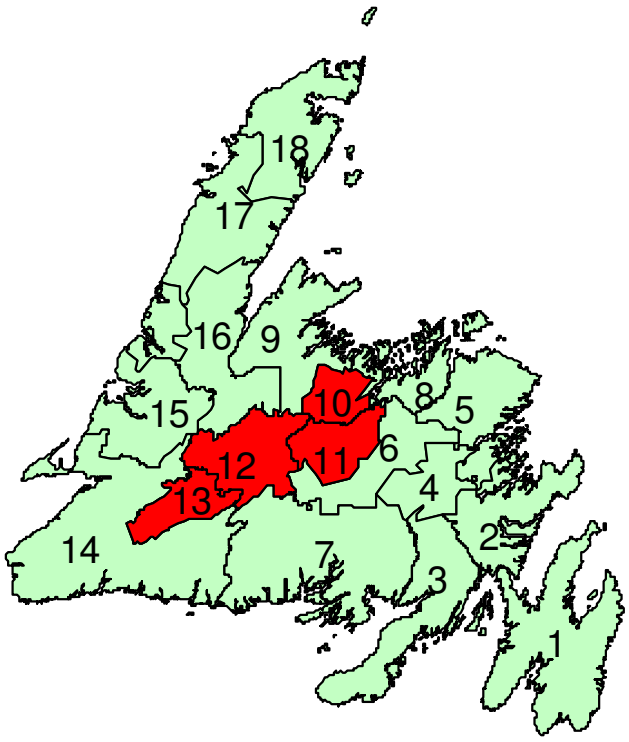
Crown Five Year Operating Plan

Forest Management Districts 10, 11, 12 and 13

ZONE 5

January 1, 2011- December 31, 2015



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INTRODUCTION

On December 16, 2008, the passing of Bill 75 resulted in the expropriation and return to crown, timber lands associated with Forest Management Districts 10, 11, 12 and 13 previously vested to Abitibi-Bowater. With the return of these timber lands to the crown, it was the Department of Natural Resources position that the management of these lands would be consistent with the strategies and philosophies in effect in all other crown managed districts in the province.
This plan which covers the period January 1, 2011 to December 31, 2015 reflects these changes and will replace the 2008-2012 plan previously prepared by Abitibi-Bowater for this area.

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

Another major change to the planning process is the creation of eight planning zones on the island which are based primarily on ecoregion composition. Districts 10, 11, 12 and 13 are adjacent and share common ecoregion characteristics and collectively form Planning Zone Five. The requirement for submission to the Forestry Services Branch 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. This zone is comprised entirely of crown land so there will be only one submission by the crown. Throughout this five year plan,

references will be made to Districts 10, 11, 12 and 13 individually but when combined they will collectively be referred to as Planning Zone Five or the zone. The planning team for this zone is located in Grand Falls-Winsor. 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. However, tables and figures will be constructed such that information for individual districts will be available if a breakout is required. Discussion and information will be presented separately for each district where warranted based on unique and distinct differences in scope and content. The more descriptive sections of this plan will be generic in nature and give information for the entire zone as well as some broad comparative statistics.

Finally, this document will attempt to build on previous documents and on efforts of previous 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

1.1General

1.1.1 Location

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

1.1.2 History

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

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

names until the closure of Abitibi-Bowater Inc. in 2009. Some of the reasons for closure were high energy and operating costs. The land area has since been expropriated and managed by the Crown.

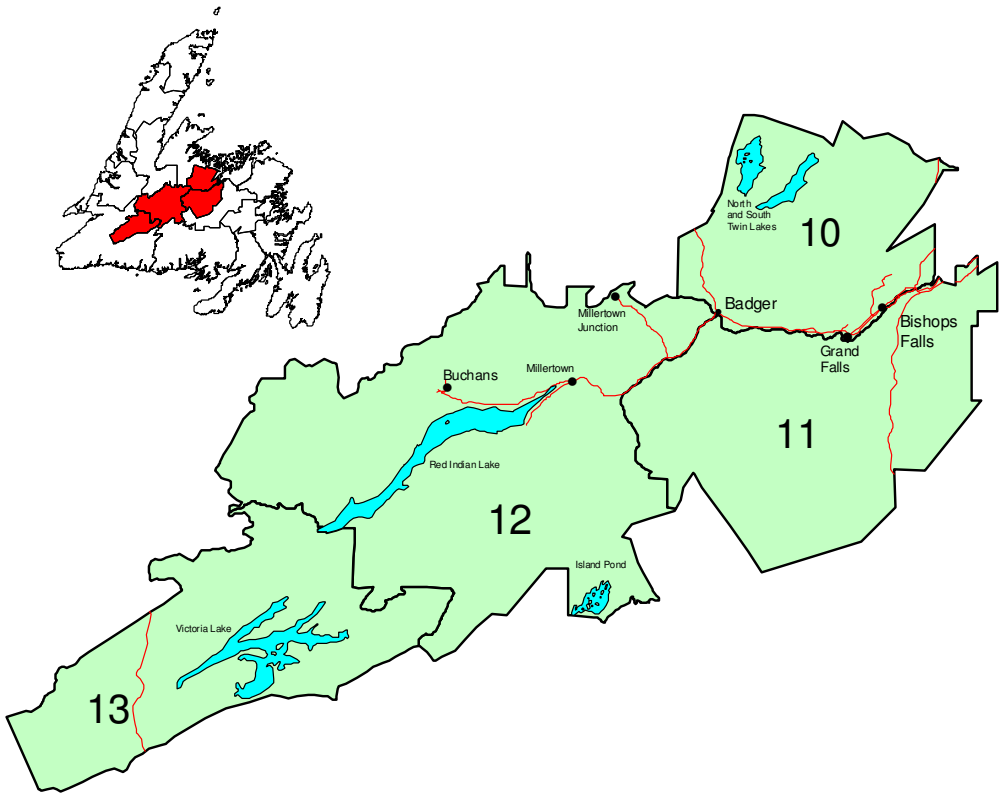

Figure 1 Location of Planning Zone 5

1.1.3 Ownership

The entire land area located in Planning Zone Five is currently managed by the crown.

1.2 Physical

1.2.1Topography and Hydrology

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

Generally the most productive forest occurs on the more undulating terrain. The areas with the highest productivity occur in the river valleys. Forest productivity decreases beyond 400 metres culminating in rock and soil barrens at the highest elevations.

The more prominent highland areas in the zone include Hodges Hills in the northeast, Buchans Plateau and Gaff Topsails in north central and the eastern extent of the Annieopsquotch range in the south west.

The zone is dominated by three major river basins; the Exploits, Victoria and Lloyds River systems. These rivers originate in the interior areas and drain large watersheds. Red Indian Lake is of extreme importance as a reservoir to allow flow control on the Exploits River for the generation of hydroelectricity.

1.2.2 Geology

In the majority of the zone, the underlying bedrock is composed of sedimentary and metamorphic shale, schist and sandstone dating from the Paleozoic era, with intrusions of harder

granite and diorite. The area has been heavily glaciated and stony till with a sandy loam-to-loam texture covers the bedrock in most locations. In the northern section near Mark's Lake, Frozen Ocean Lake and Lewis Lake treeless granite outcrops occur on the steep terrain. There are a number of steep isolated rock hills or monadnocks located at Hodges Hills, Hungry Hill and Harpoon Hill which rise sharply above the surrounding terrain.

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

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

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

1.2.3 Soils

For most of the zone soil profiles developed in the till are chiefly orthic and humo-feric podzols on the well-drained upland sites, and gleysols and peats on the low-lying sites. The bogs are dominated by organic soils. The better-drained, more permeable soils, which offer better machine mobility and make better road construction material, are usually associated with poorer tree growth. The heavier, finer textured soils, which have greater water retention capabilities and poor vehicle mobility and make poor road building material, are usually associated with the best tree growth. These heavier soils form an almost continuous east- west strip along the river basins. There are some minor areas of more permeable soils within this area; however, they do not make up a significant portion.

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

1.2.4 Climate

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

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

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

1.3 Ecosystems

1.3.1 Forest Ecosystems

An ecosystem is a community of interacting and interdependent plants, animals and microorganisms, together with the physical environment within which they exist (adapted from Perry, 1994). It is important to remember that within an ecosystem the interactions between the biotic and abiotic components are at least as important as the component themselves. Another critical characteristic of ecosystems is their overlapping boundaries. While each is definable in time and space, and distinguishable from adjacent ecosystems, each is intimately integrated with other local ecosystems. Additionally, each local ecosystem is nested within increasingly larger ecosystems. The scale at which an ecosystem is viewed is contingent on the species or abiotic characteristic under consideration. While planet earth represents the ultimate global ecosystem, complex ecosystems also exist under fallen logs and rocks.

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

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

1.3.2. Ecoregions and Subregions

Damman 1979, defined ecoregions as areas where comparable vegetation and soil can be found on sites occupying similar topographic positions on the same parent material, provided that these sites have experienced a similar history of disturbance. Thus, an ecoregion cannot be defined in isolation from the physical landscape, but vegetation toposequence, vegetation structure, floristic composition, and floristic distributions can provide the primary criteria. According to Damman, nine ecoregions are represented in Newfoundland. Each of these is further divided into subregions (also known as ecodistricts) All of the Newfoundland ecoregions and subregions contain many of the same ecosystem variables. It is the dominance and variance of these variables (e.g., vegetation and climate) that determine their classification.

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

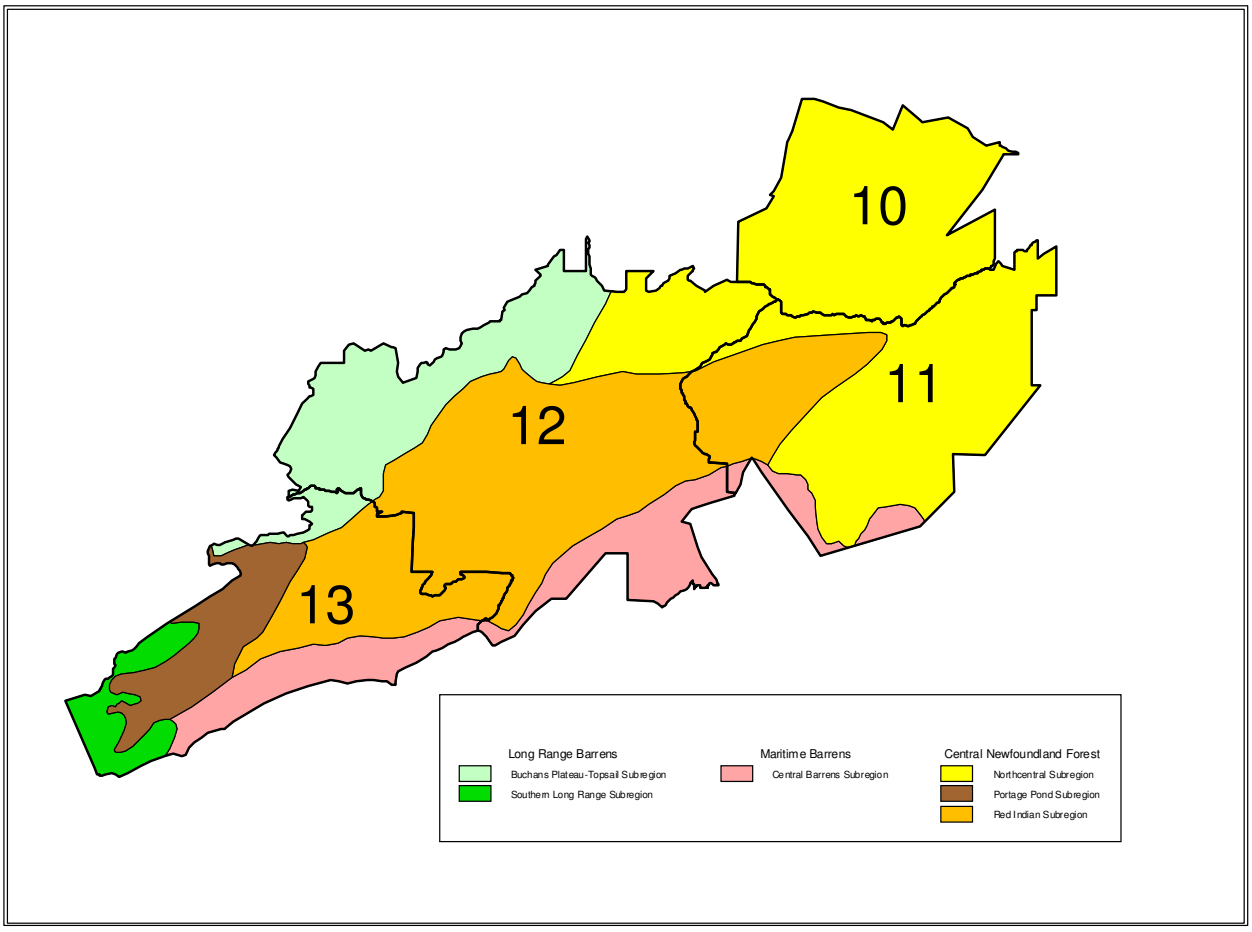

Figure 2 Ecoregions and subregions of Planning Zone 5

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

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

Name of Ecoregion and Subregion	Total Area in Province (ha)	Percentage of Total Area in Districts					Relative Percentage of Ecoregion and Subregion in Districts				
		10	11	12	13	Total	10	11	12	13	Combined
Long Range Barrens											
Buchans Plateau - Topsail Subregion	369811	0	0	36	4	40	0	0	14	5	12
Southern Long Range Subregion	599815	0	0	0	6	6	0	0	0	13	3
Central Newfoundland Forest											
Portage Pond Subregion	149319	0	0	0	43	43	0	0	0	26	5
Northcentral Subregion	2310742	9	9	3	0	21	100	69	14	0	38
Red Indian Subregion	393911	0	18	59	23	100	0	24	47	35	31
Maritime Barrens											
Central Barrens Subregion	1514392	0	1	4	3	8	0	7	12	22	11

1.3.2.1 Central Newfoundland Forest Ecoregion

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

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

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

1.3.2.1.1 North Central Subregion

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

1.3.2.1.2 Red Indian Lake Subregion

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

1.3.2.1.3 Portage Pond Subregion

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

1.3.2.2 Long Range Barrens Ecoregion

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

Cool summers and cold winters are typical of this ecoregion. The mean daily temperatures are relative low therefore the vegetative season is short. Snowfall can exceed 5 m and drifting is extreme throughout the winter. Snow cover is permanent throughout the winter and persists through to late spring. Western and southwestern facing slopes are severely exposed due to the prevailing winds from this direction.

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

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

1.3.2.2.1 Buchans Plateau - Topsail Subregion

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

1.3.2.2.2 Southern Long Range Subregion

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

1.3.2.3 Maritime Barrens Ecoregion

This ecoregion extends from the east coast of Newfoundland to the west coast through to the south central portion of the island. It is characterized by relatively mild winters with intermittent snow cover and the coldest summers with frequent fog and strong winds. The dominant landscape pattern consists of usually stunted, almost pure stands of balsam fir, broken by extensive open heathland. Good forest growth is localized on long slopes of a few protected valleys. The heaths are dominated by *Kalmia angustifolia* on protected slopes where snow accumulates and by cushions of *Empetrum nigrum*, or *Empetrum eamesii* on windswept ridges.

1.3.2.3.1 Central Barrens Subregion

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

and bogs are slightly raised or domed. This subregion occurs on the southern extremes of Districts 11, 12, and 13.

1.4 Ecosystem Dynamics

1.4.1 Ecosystem Condition and Productivity

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

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

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

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

Succession involves changes in both community composition and in the ecosystem structure and process. Succession is the orderly change whereby the dominant species is replaced by another species, then another etc. until a new dominant species establishes a relatively stable community. The following sections will discuss each of these concepts in more detail as they relate to the ecosystems of Planning Zone Five. For the most part this section will be descriptive and explanatory in nature. 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 and a good site would have a higher potential than a poor site.

Overall, the landscape in Planning Zone Five has approximately 44 percent productive forest. As well, the relative proportion of site types is 17 percent good, 65 percent medium and 18 percent poor with a mean annual increment (MAI) of 2.6, 1.7, and, 0.8 m3/ha/yr respectively. The

distribution of productive sites across the landscape and range of productivity within these sites is largely dependent on landscape patterns, climate, and soils.

The more productive areas occur in the lowlands and gently rolling uplands of the zone with the most productive being in the river valleys. These areas have deeper soils and less exposed bedrock. The landscape patterns are more consistent and the growing season is longer. In the Buchans Plateau section of District 12 and the south central and south west portion of District 12 and 13 the soils are shallower with bedrock at or near the surface. The terrain is much rougher and the growing season is shorter.

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

1.4.1.2 Resilience

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

The potential for populations to recover from low levels following disturbance by having adequate regeneration capacity and a balanced distribution of forest types and age classes provides a reliable measure of resilience at the landscape level. Indicators include the percent and extent of area by forest type and age class and the percentage of disturbed areas that are successfully regenerated. Resilience is determined by measuring and monitoring these parameters. Forest activities must be carefully planned to not upset the natural balance and lower an ecosystem's resilience.

The ability of forest stands to regenerate themselves demonstrates their resiliency in the face of harvesting or some other natural disturbance. 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 1.5.5, harvesting accounts for the majority of disturbance in the zone and occurs on a regular and consistent basis. Fire and insect damage are the other two major disturbances and occur on a more irregular or cyclic basis. With the exception of a major windstorm, wind throw usually occurs after a stand is weakened by some other agent like insects. For this reason successional patterns after insect damage and wind throw will be discussed together. The following is a brief synopsis of successional patterns after each major disturbance type by forest type and site type.

1.4.1.4.1 Harvesting

Regeneration patterns in the black spruce type after harvesting is mainly back to black spruce, the component of which increases as the sites get better. There is substantial regeneration failure in this forest type; NSR rates increase from a low of near 10 percent on good sites to a high of approximately 50 percent on poor sites. These sites would be candidates for planting with white, black or Norway spruce.

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

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

Regeneration after harvest on the hardwood types is variable. Sites regenerate back to hardwood or to balsam fir in varying proportions. Mixed wood regeneration is also common. Usually the better the site the more likely the site will regenerate to hardwood. Since the timber supply for hardwood is so sensitive to regeneration of hardwood types, this component merits further survey.

1.4.1.4.2 Fire

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

1.4.1.4.3 Insect

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

Mature balsam fir types usually regenerate to balsam fir with a component of black spruce and mixed wood on the poorer sites. Disturbance by insects in young balsam fir stands can cause succession to white spruce. In black spruce stands regeneration is usually consistently back to black spruce across site types with a lesser component of balsam fir that increases as the sites improve. Regeneration patterns in mixed wood types usually depend on the type of mixture. If black spruce is a component then it will persist and form part of the new stand. Otherwise balsam fir and balsam fir/hardwood mixtures regenerate after insect attack. Black spruce is also a component in stands with higher hardwood content. Regeneration patterns in the hardwood types are variable and can regenerate with equal components of black spruce, balsam fir, white birch and trembling aspen. Regeneration failure occurs approximately 10 percent of the time but can be significantly higher if pure stands of immature balsam fir are killed.

1.4.2 Biodiversity

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

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 extirpated.

Biodiversity provides such essential services for humans as climate control, oxygen production, purification of freshwater supplies, carbon dioxide removal from the atmosphere, soil generation, and nutrient cycling. 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. Species extinction is the most dramatic and recognizable form of reduced biodiversity; habitat loss the most drastic in terms of far reaching effect. The prevention of species extinction is a key factor in the conservation of biodiversity. Changes in species population levels indicate the potential for serious changes in ecosystem integrity.

1.4.2.2 Genetic Diversity

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

1.4.2.3 Ecosystem Diversity

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

A forest interspersed with barrens, marshes, lakes and ponds provides for diversity across the landscape. Each ecoregion in the province should have representative areas protected which displays the diversity where such exists. These areas can serve as a benchmark from which to measure and guide management decisions. These representative areas protect the integrity of the ecoregion and are vital for guiding management actions. As benchmark areas, they will illustrate the multi-species mosaic that planning actions must maintain. Representative and protected areas will be discussed in more detail in Section 4. s 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 2 displays the land classification broken down by district for Planning Zone 5. The total mapped land area in the zone is approximately 1.14 million hectares. There are approximately 37 000 and 2 000 ha not mapped in Districts 12 and 13 respectively. The following discussion will focus on the mapped area.

There are four basic categories that currently represent how the land is classified; productive, non productive, non-forest and fresh water. Individual break outs by district are shown in Table 2. Figures 3, 4, 5, and 6 display the relative percentages of each major land class category found within in each district.

Productive forest land comprises approximately 44 percent of the zone. Relative productivity is highest in districts 10 and 11. This is mainly due to the high proportion of area in the bog, barren, and scrub category on the peripheries of Districts 12 and 13. 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. The Forestry Services Branch is now classifying forest scrub by site, height and density class as new inventories are completed. This Table 2 and classification by district and area for Planning Zone 5.

Total All Classes	201244	296812	410121	230269	1138446
Land Class	District				Total
	10	11	12	13	
disturbed	7921	9088	16323	3733	37065
age class 1	28858	53436	22901	18183	123378
age class 2	29873	37624	25463	8540	101500
age class 3	5971	20719	18927	14732	60349
age class 4	6342	11120	25951	1929	45342
age class 5	25709	17830	40086	9915	93540
age class 6	3785	0	8320	6236	18341
age class 7	1918	0	10420	8112	20450
Total Productive	110377	149817	168391	71380	499965
softwood scrub	28700	61588	90502	55278	236068
hardwood scrub	2359	5458	5189	502	13508
Total Non-Productive	31059	67046	95691	55780	249576
rock barren	192	1926	3608	8513	14239
soil barren	642	4727	14783	13435	33587
bog	33132	46962	76977	36036	193107
cleared land	578	190	355	165	1288
agriculture land	627	8	55	0	690
residential	1285	28	195	0	1508
right of ways	842	867	485	226	2420
miscellaneous	567	1929	1504	723	4723
Total Non Forested	37865	56637	97962	59098	251562
Fresh Water	21943	23312	48077	44011	137343

information will be invaluable in determining which scrub areas are marginally productive or can meet some other non-timber objective.

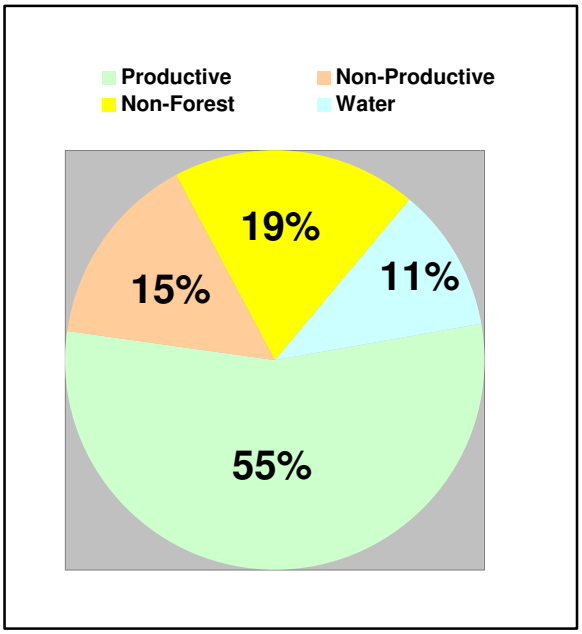

Figure 3 Land class breakdown for District 10

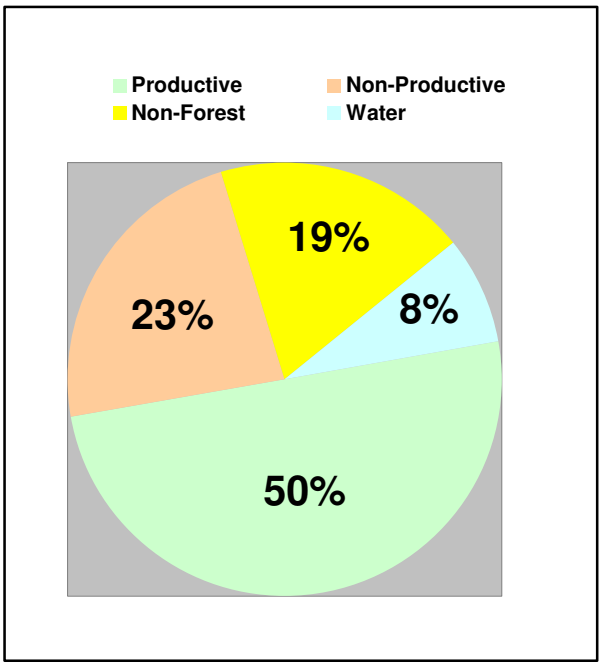

Figure 4 Land class breakdown for District 11

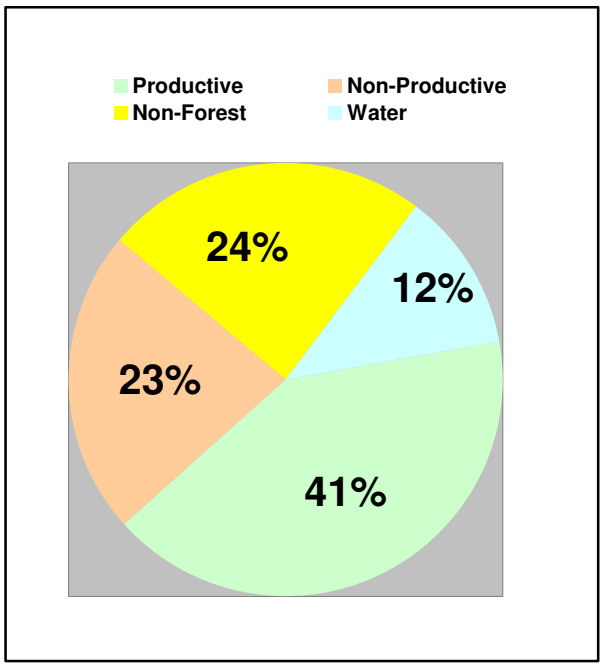

Figure 5 Land class breakdown for District 12

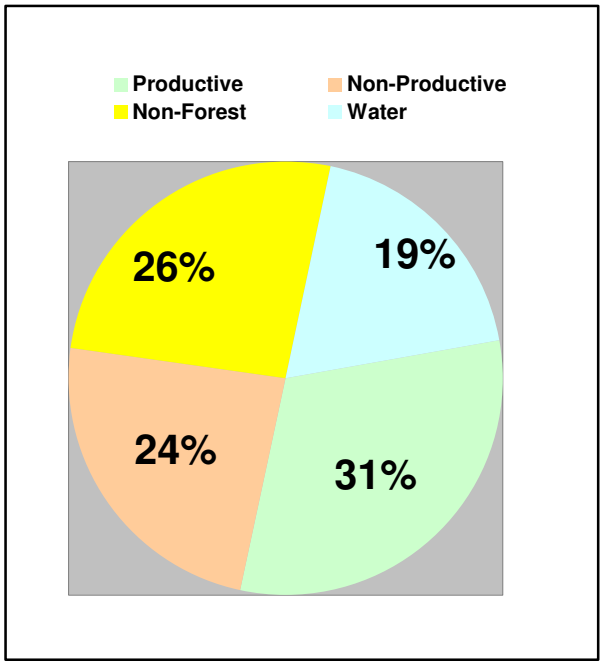

Figure 6 Land class breakdown for District 13

1.5.2 Age Class

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

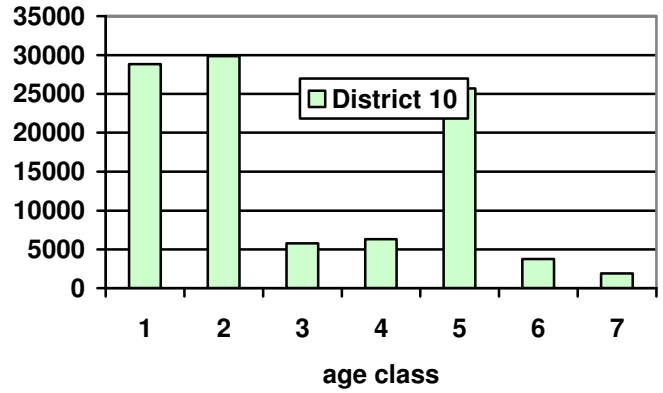

Figure 7 Age class distribution for District 10

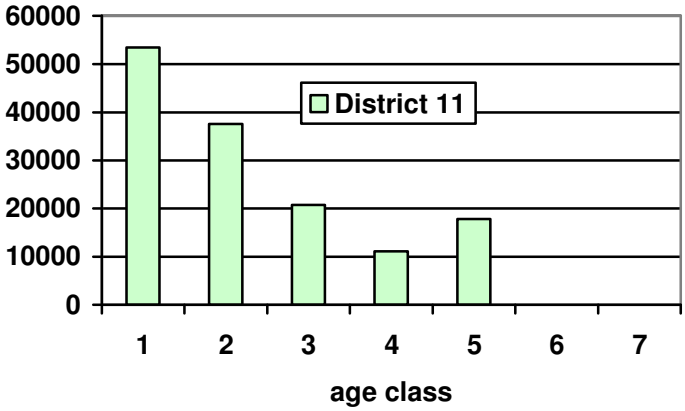

Figure 8 Age class distribution for District 11

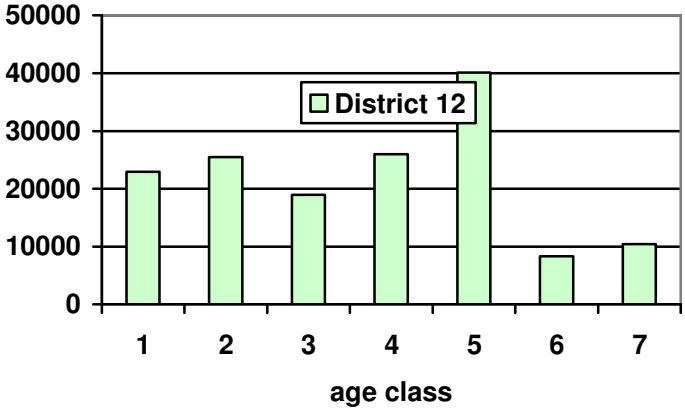

Figure 9 Age class distribution for District 12

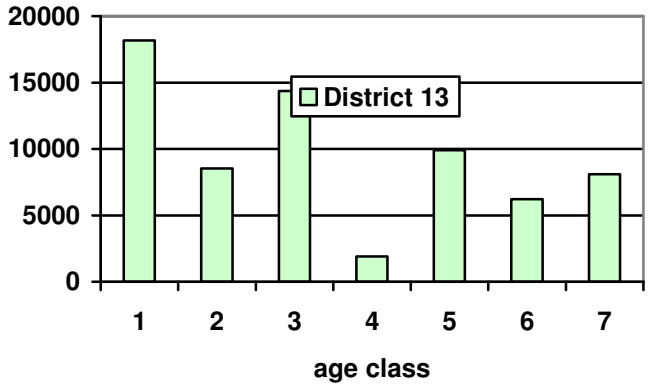

Figure 10 Age class distribution for District 13

1.5.3 Site Class

The productive forest in the zone is further sub-divided along a gradient of productivity ranging from poor to good site class. The site class is determined through air photo interpretation supplemented with field checks and is based primarily on the sites ability to produce timber. Site capability is determined on a number of factors including soil fertility, moisture regime and geographic (slope) position. In the zone, medium site types are most abundant accounting for approximately two-thirds of the productive area. The distribution of area by site class for each district is shown in Figures 11, 12, 13 and 14. On average, good sites are capable of producing 2.6 m3/ha/yr, medium sites 1.7 m3/ha/yr, and poor sites 0.8 m3/ha/yr.

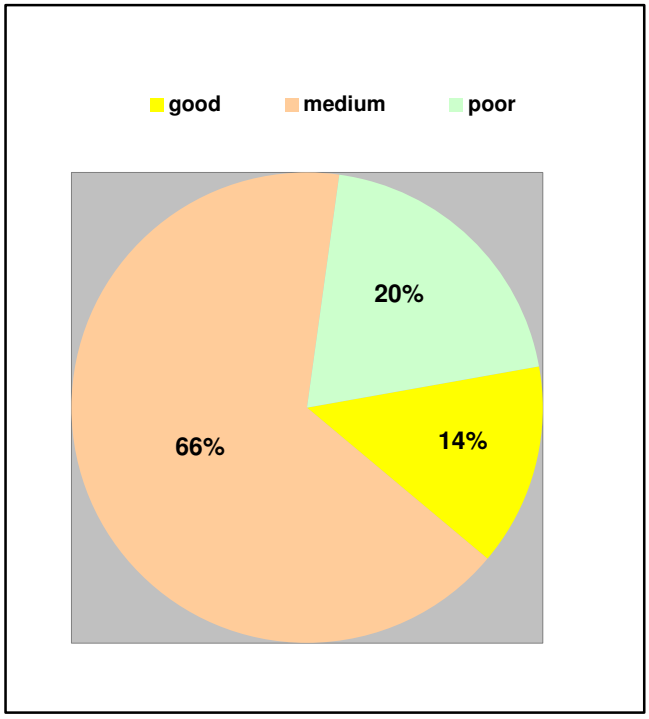

Figure 11 Site class breakdown for District 10

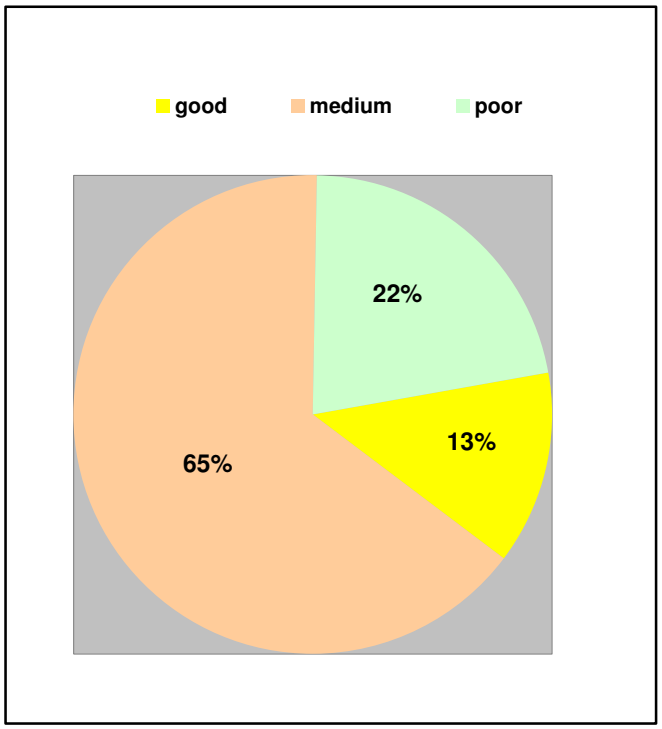

Figure 12 Site class breakdown for District 11

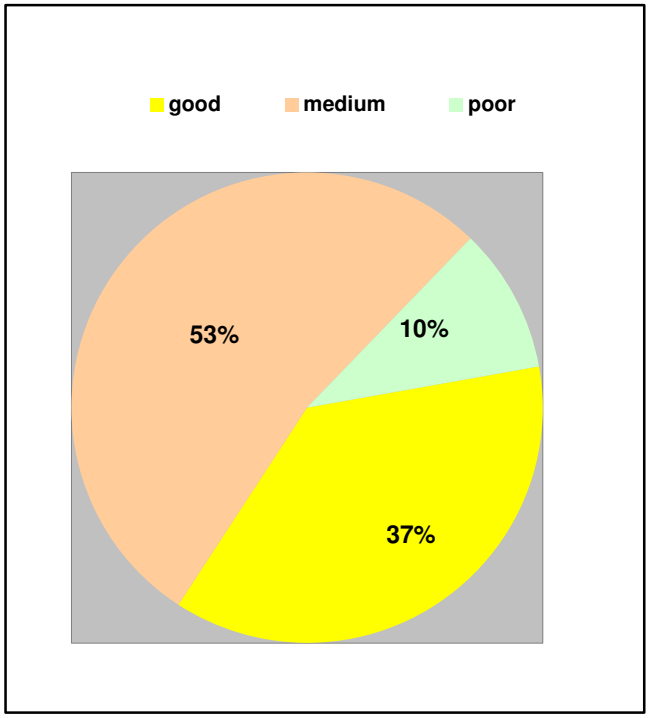

Figure 13 Site class breakdown for District 12

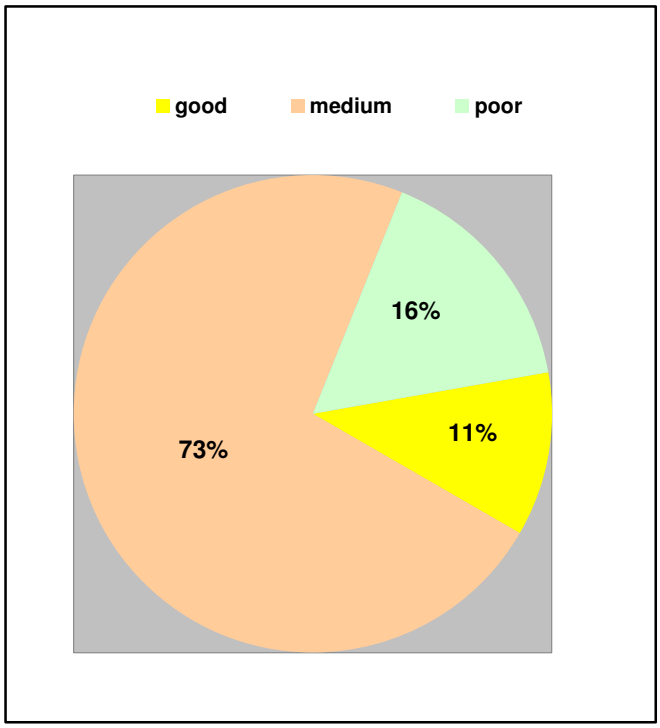

Figure 14 Site class breakdown for District 13

1.5.4 Species and Working Group

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

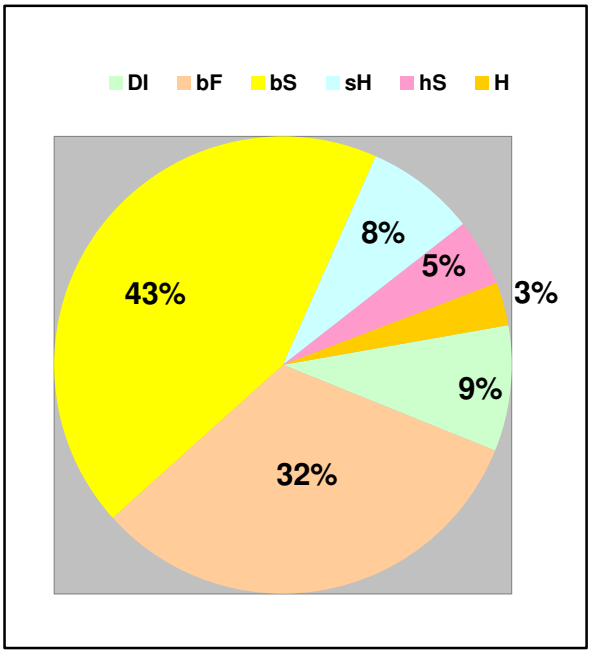

Figure 15 Working group breakdown for District 10

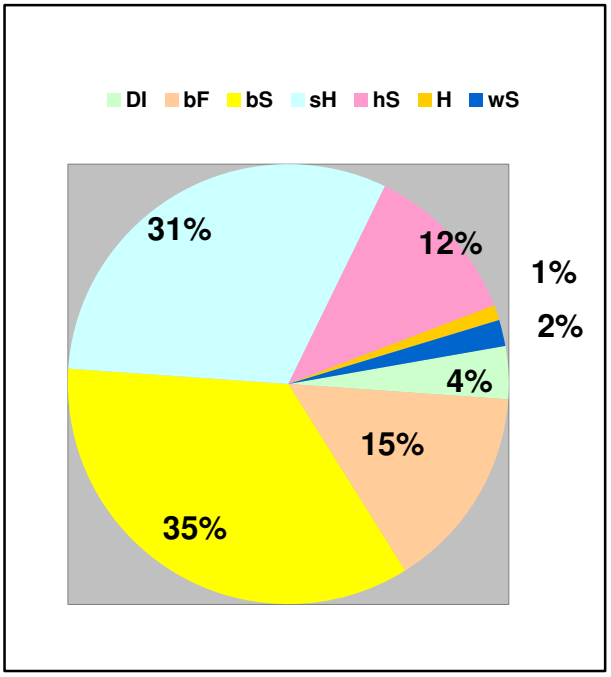

Figure 16 Working group breakdown for District 11

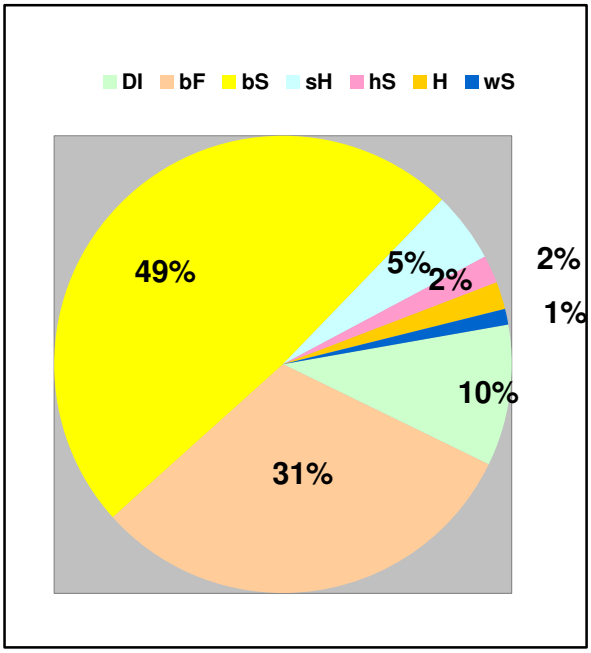

Figure 17 Working group breakdown for District 12

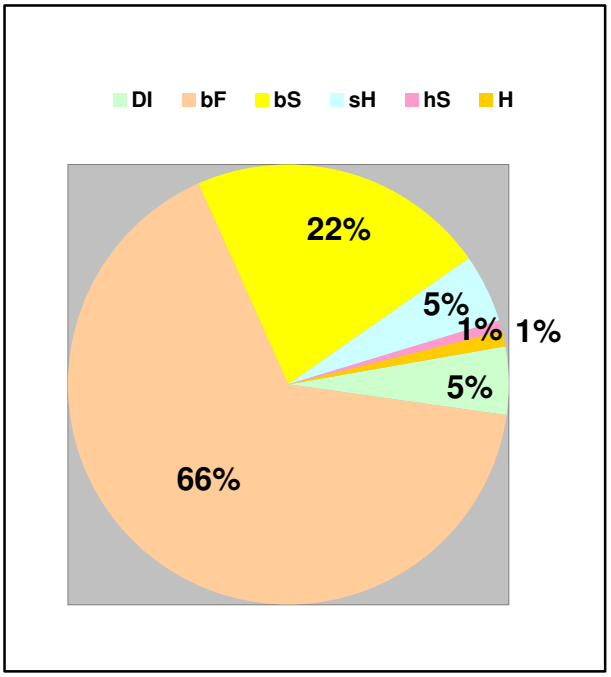

Figure 18 Working group breakdown for District 13

The softwood hardwood working group occurs as varying mixtures of fir, spruce, and birch. The hardwood softwood, white birch, and white spruce working groups occupy a small portion of the productive forest in each district. Approximately six percent of the productive forest is classed as disturbed. Disturbances include harvesting, which accounts for most of the total, insect damage, fire and wind throw.

1.5.5 Forest Disturbances

In the past 20-25 years approximately 110 000 ha have been disturbed by some means on crown land in the zone. Harvesting has accounted for a large portion of this disturbance at approximately 63 000 ha. Fire is the second most important disturbance type and has accounted for nearly 28 000 ha. Insect damage has occurred on over 15 000 ha with 4 percent in light (0-25 percent mortality), 4 percent in moderate (26-50 percent mortality), 4 percent in severe (51 -75 percent mortality) and 88 percent in extreme (76+percent mortality). Most of the insect damage occurred in District 13 which has a high proportion of balsam fir. There has been over 4 300 ha of mortality due to blow down which has occurred as scattered pockets throughout the zone. This usually occurs after another disturbance (like insect damage) has weakened a stand. It should be noted that these areas are not mutually exclusive and there is overlap between disturbances. (ie. insects may have killed a stand, followed by salvage harvesting and then perhaps fire).

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

The main forest insects which have affected forests in western portion of the zone, mainly in District 13, are the hemlock looper and the spruce budworm. There was a major infestation in the mid-late 1980's that resulted in significant mortality and subsequent blowdown. At that time the window for harvesting insect damaged timber was wider and a large portion of timber was salvaged. Balsam woolly adelgid also impacts growth of balsam fir forests in Districts 10 and 11.

A chemical spray program was initiated in 1969, to aid in the control of the hemlock looper. 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 biologically insecticide bacillus thurengiensis (bT), a naturally occurring, biological control agent. Despite the use of insecticides, the hemlock looper and the spruce budworm continue to pose a significant threat to the balsam fir forests in the western portion of the zone and new infestations are likely to develop over the next 20 years.

Section 2 Past Activities

In the five year plan prepared by Abitibi-Bowater for 2008 to 2012 there is a section detailing past forestry activities for 2002 to 2006 (pages 27-30). http://www.env.gov.nl.ca/env/Env/EA%202001/pdf%20files%202007/1346%20-%20Abitibi%20Districts%2010-13%20Five%20Yr%20Plan/Text.pdf Normal operations occurred in 2007 and 2008 however there has been little activity since; in 2009 Abitibi-Bowater operations were winding down and there has been a transition period whereby the crown has conducted limited operations. Normally this section would be more detailed comparing actual activities with those proposed over a five year period and detailing progress toward achieving management objectives and strategies. This cannot be completed however due to unique circumstances that have transpired within this zone. The following tables will detail the activities for 2007, 2008, 2009 and those proposed for 2010.

Table 3 Summary of harvesting activity for Districts 10, 11, 12, and 13 for 2007 to 2010

District	Commercial Harvest (m3)	Domestic Harvest (m3)	Total Harvest (m3)
10	54 177	44 000	98 177
11	291 454	44 000	335 444
12			
13	0	0	0

Table 4 Summary of silviculture activities for Districts 10, 11, 12, and 13 for 2007 to 2010

District	Thinning (ha)	Planting (ha)	Site Preparation (ha)	Total (ha)
10	277	132	0	409
11	280	744	1023	2 047
12				
13	0	0	0	0

Table 5 Summary of road construction for Districts 10, 11, 12, and 13 for 2007 to 2010

District	Roads Constructed (km)	Bridges Built
10	0	0
11	8.7	0
12		
13	0	0

Section 3 Timber Supply Analysis

The current annual allowable cuts for each district are in effect from January 1, 2006 to December 31, 2010. The new timber supply analysis is currently underway and the new harvest levels will take effect on January 1, 2011. This is the same date that this plan comes into effect. The plan will be prepared and submitted for environmental assessment before the new timber supply analysis is completed therefore the new allowable cut levels will not be known

The methodology for completing the new timber supply analysis has remained largely the same as detailed in the following sections. The current allowable cut results (2006-2010) are presented however it is recognized that the new figures for (2011-2015) will be used when the plan comes into effect on January 1, 2011. At this point there is no reason to believe that there will be any significant changes to the allowable cut for Districts 10, 11, 12 and 13. The timber supply analysis results will be closely monitored in the coming months as the plan unfolds. If there are any significant changes to the allowable cut and if time permits before the plan is submitted then they will be discussed with the planning team. The plan will contain enough flexibility to adapt to any changes in the AAC as a result of the new analysis.

3.1 Introduction

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

3.2 Guiding Principles and Policy Direction

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

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

3.3 Factors Affecting Timber Supply

The forests of insular Newfoundland are very variable in terms of age distribution. Typically, there are significant amounts of mature/over-mature forest and regenerating forest, and limited intermediate aged forests. This imbalance is not unusual in a boreal forest where cyclic catastrophic disturbances are common. Figure 8 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 a matrix of measures is employed which is designed to fill the gap in the age

structure. These range from an aggressive forest protection program to keep the mature and over-mature stands alive as long as possible so that they can be harvested before they collapse naturally, harvesting programs that attempt to exclusively target the oldest stands first in order to minimize the harvesting pressure on the naturally weak intermediate age classes, and thinning of the regenerating forest so that it becomes operable at an earlier age.

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

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

3.4 Timber Supply Analysis

In 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. An estimate of forest stock is kept current through an update program which is conducted each year to account for all natural and man-made disturbances such as fire, insects, and harvesting, and any enhancement programs such as tree planting and pre-commercial thinning. Also, each stand in the forest inventory is updated to reflect any yield changes that may have occurred since the previous inventory update.

3.4.2 Land Availability

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

3.4.2.1 Non-Timber Related

Consideration of these non-timber values had a direct impact on provincial AAC's. It is obvious that as the amount of productive forest land available for timber management drops, so too will the AAC. With the current restrictions, the AAC land base (area where harvesting operations can

occur) is only 17% of the total landmass on the island or 66% of the total productive forest land base. In any one year, less than1% of the productive forest land base is influenced by harvesting operations.

3.4.2.1.1 No-Cut Buffer Zones

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

3.4.2.1.2 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 under the Natural Areas Systems Plan 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 of loss from these surveys are used to reduce the AAC.

3.4.2.2.3 Operational Constraints

Areas that are inaccessible (surrounded by bogs or hills), timber on steep slopes, and low volume stands are removed from the class 1 AAC calculation up front. Also, significant adjustments are applied to the provincial forest inventory for stands deemed operable in the timber analysis but left unharvested within operating areas. The reasons for this are linked to the character of Newfoundland's forests; low volume, steep slopes, rough terrain, and excessively wet ground conditions etc.

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

3.4.3 Growth Forecasting

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

Yield curves are a key element in a wood supply analysis. In fact, the validity, or "usefulness", of the wood supply analysis is determined by the truth, or "correctness", of the yield forecasts. While there is no way of predicting with certainty how stands will actually grow in the future, care must be taken to ensure that the yield projections used are realistic and reasonable.

Respecting the sensitivity and importance of these forecasts, the Newfoundland Forest Service has directed a large portion of its resources and time into developing realistic yield curves. Two growth models were used, one for projecting stand development under natural conditions and the other for projecting growth under managed (i.e., silviculturally enhanced) conditions. Tree and stand development data generated from the Forest Service's forest inventory program were used to make stand growth predictions. These projections were then checked against empirical data from thousands of temporary plots established throughout the island. If the projections varied from the real life evidence, the curves were adjusted to make them more accurate.

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

3.4.4 Management Strategies

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

3.4.4.1 Harvest Flow Constraints

An even-flow harvest constraint was used in the analysis to maximize the sustainable harvest level. This strategy produced the maximum even flow harvest but resulted in less than optimum economic use of the forest resource. If no even flow constraint is used and harvest levels are permitted to fluctuate in response to market value, the overall economic potential of the forest will increase. However, the lower economic potential is offset by stability in mills and employment. 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 where no harvest scheduling was done, the software used cannot realistically know all the operational restrictions within a forest management district. In the manual process, the on the ground conditions that restrict harvesting are accounted for when a spatial harvest schedule is defined. The proposed harvest schedule is then played back through the modeling software to see if it is sustainable and see if non-timber objectives are met. In most case, this harvest schedule has to go through several cycles before an acceptable harvest schedule could be found. The spatial arrangement of areas for timber harvesting is especially challenging in this province because of the natural fragmentation of our forests. This model provided forest planners with the ability to mimic realistic timber harvest schedules based on current practices and to identify other forest stands that are not as accessible for harvesting.

Manual harvest scheduling has several major benefits. First, it fosters the long term sustainability of our AAC's by mimicking current harvest practices and accounting for actual on the ground conditions that delay or restrict the harvesting of stands. These restrictions, which were previously unaccounted for, have made our past AAC's higher than was realistically sustainable. Secondly, the mapped 25 year harvest schedules build credibility into the forest management process. A common misconception is that the province is running out of wood and soon will not be able to support existing forest industries. Every stand that will be harvested over the next 25 years must already be in the second (20-40 years old) or third (41-60) age class and can be easily identified and highlighted on the harvest schedule maps. Being able to see the

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

3.4.4.3 Planning Horizons

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

3.4.4.4 Operable Growing Stock Buffer

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

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

3.4.4.5 Old Forest Targets

Consistent with 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 coarse filter approach to maintaining representative forest structure. It ensures the presence of certain amounts of old forest across the landscape into the future. With advances in modeling, this target can now be tracked across a district rather than a single ownership. This has resulted in this strategy being less restrictive than the last analysis. As well, the site class distribution of the older forest reserve is being examined in an attempt to make it representative of each ecoregion and subregion. This is in line with Value 1.1, Representative Landscapes, of the Ecosystem Diversity Element of Criterion 1, Biodiversity, in the *Provincial Sustainable Forest Management Strategy.*

3.4.4.6 Operability Limits

Operability limits are the time windows in which forest management actions such as harvesting can be undertaken within forest stands. Stand growth development as measured in stand merchantable timber volume and individual piece size of trees determine a stands readiness for harvest. In some young stands, one can have acceptable harvest volumes, but still have trees that are too small to harvest. In the 2006 wood supply analysis both stand volume and tree size were used to determine the earliest age when a stand could be initially harvested. In addition to determining the absolute earliest age a stand can be harvested, it was recognized that not all stands on the same site develop exactly the at the same rate. A small portion of a stand will

develop faster; a small portion will lag behind; with the bulk of the stand type representing the average condition. Therefore, the first operability limit was staggered by 5 year intervals with the 10 percent, 30 percent, and 60 percent assigned to each availability class listed above respectively. The ending operability limits or the last age in which a stand can be harvested before it becomes too old to harvest is solely determined on a minimum stand volume of between 60 to 80 m3/ha, after which that stand does not have enough volume to make it economical to harvest. It should be noted that while the operability limits define the extreme end points of when stands can be harvested, very few stands are ever harvested at these extreme points. In order to meet other non-timber objectives and in order to maximize the total volume of wood harvested the model schedules stands to harvest somewhere inside the operability limit window.

3.4.4.7 Silviculture

Silviculture is one of the main forest management tools available to forest managers when they are analyzing the many different future forests that are generated using the wood supply modelling software. The silvicultural actions use in the 2006 analysis include; 1) 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. The thinning levels (ha) for districts 10, 11, 12, and 13 used in the analysis were 288, 300, 497 and 144 ha respectively. The planting levels (ha) for districts 10, 11, 12, and 13 used in the analysis were 83, 500, 308 and 0 ha respectively.

3.5 Inventory Adjustments

One of the limitations of the current wood supply model is its inability to account for volume depletions outside of what is reported for harvesting operations. The model produces a gross merchantable volume (GMV) figure which needs to be adjusted to account for volume losses as

a result of; fire, insects and disease, timber utilization practices and the presence of stand remnants. In previous analyses the lack of province wide digital stand information, the absence of computer tools and the small number of people involved with the wood supply analysis, resulted in a high degree of uncertainty around values derived for each depletion. It was recognized that a need existed to study each component more intensely and to expand the time frame and staff responsible for such an analysis. Such was the task of the Forest Engineering and Industry Services Division whose staff, over a seven year period, completed an analysis of the individual components.

3.5.1 Fire

An estimate of productive area loss as a result of fire was based on an analysis of the historical fire statistics maintained by DNR. The fire deduction for operations in Districts 10, 11, 12 and 13 were 1.9, 1.0, 3.4 and 0.1 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 Districts 10, 11, 12 and 13 were 1.0, 1.0, 1.0, and 6.0 percent respectively.

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 10, 11, 12 and 13 were 5.5, 4.8, 3.4 and 11.4 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 10, 11, 12 and 13 were 7.0, 8.0, 7.0 and 8.0 percent respectively.

The total inventory adjustment for Districts 10, 11, 12 and 13 were 15, 15, 15, and 25 percent respectively.

3.6 Results

Table 6 Annual Allowable Cut results for Districts 10, 11, 12, and 13 for 2006-2010.

	Class 1 Softwood (m3)	Class 3 Softwood (m3)	Hardwood (m3)
District 10	82 000	1500	4 370
District 11	167 000	6500	8 040
District 12	189 000	16 000	13 230
District 13	30 000	10 000	2 650

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. It ensures the needs of the present are met without compromising the ability of future generations to meet their needs 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 is a high priority for many of the residents Newfoundland and Labrador. 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 and Labrador's culture to the planning process. A forest management strategy cannot be successful without allowances within the strategy for traditional access and use of the land. For generations, many of Newfoundland and Labrador's public has had free range in our pristine wilderness, a fact that can not be ignored

when planning for the zone. All are key interlocking components and each must be maintained if sustainable development is to be achieved.

4.2 Value Description

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

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

Characterization

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

Critical Elements

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

Guiding Principles

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

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

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

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

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

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

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

4.2.1 Biotic Values

4.2.1.1 Big Game

4.2.1.1.1 Moose

Characterization:

Moose are not native to the island. A pair was introduced to Gander Bay in 1878 and two pairs were introduced to Howley in 1904 (Northcott, 1980). Today, moose are distributed throughout the island and the population is estimated to be about 125,000 - 140,000.

Currently, moose are managed on an area/quota system in the province. The island is divided into 50 management areas and license quotas are set annually for each area. Quotas are set based upon the management objective for each area (i.e., whether it is desired that the population increase, decrease or stabilize). Generally, if an area has too high of a moose population, managers will increase quotas to bring down the population in order to prevent damage to the habitat. However, if the habitat is in good condition, and the area could support more animals, future quotas may be increased. All or portions of moose management areas 11-13 and 15-22 are located within the zone.

Critical Elements:

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

4.2.1.1.2 Caribou

Characterization:

Caribou is the only native ungulate species on the island (Northcott, 1980). Prior to the railway being built in 1898 there was a healthy population on the island but by 1930 the population had declined to about 2,000 animals (Murphy and Minty 1993). Between 1980 and 2000 the number

of caribou has increased considerably on the island with a population estimated at 70,000+ animals. In the past few years however populations have declined significantly with Planning Zone Five being no exception. All or portions of caribou management areas 61, 62, 63, 66, 67 and 68 are located in the zone. Core caribou areas 16-19, 22 and 32-34 are located in the zone representing the Buchans, LaPoile and Grey River, Gaff Topsails, Mount Peyton and Pot Hill caribou herds.

Critical Elements:

Any potential impact of forestry activities on caribou in the zone depends on the distribution, movements, and habits of these animals. It has been thought that forestry activities in the immediate vicinity of calving areas during the calving period may have an impact on caribou populations. Resent information collected from radio telemetry data suggest that caribou usage of the habitat and dispersal across the landscape may be significantly different than first thought. Forest road construction provides improved access into remote areas, which may account for and contribute to an increase in 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 (Northcott, 1980). Currently, the number of black bears occurring on the island is not known but is crudely estimated to be about 6 - 10,000 animals (Christine Doucette, Pers. Comm.). All or portions of black bear management areas 11-13 and 15-22 are located within the zone.

Critical Elements:

- den sites for winter hibernation;
- forest cover

Guiding Principles:

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

Management of big game species in the province is accomplished by a planning process in which a Big Game Management Plan is prepared annually by the Wildlife Division (WD) of the Department of Environment and Conservation. This process takes into consideration information provided by the public and wildlife and forestry staff. Each year the WD 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.

Moose

Mature stands of timber serve as moose shelter or moose yards and will be identified in consultation with the Wildlife Division.

Caribou

- In areas where caribou utilize lichens, a minimum amount of forest which supports these lichens should be maintained for caribou.

Because the caribou population has experienced a decline in the past, the WD in conjunction with forestry division and industry has identified important caribou habitat areas which were incorporated into a document produced by WD entitled *Forest Management Guidelines for Woodland Caribou for the Island of Newfoundland 2007.* Since that time new information has been collected from radio collared animals which suggest that usage of the habitat and dispersion across the landscape is different from the original thinking. This data will be used to develop a new set of caribou guidelines. The forest service in conjunction with wildlife division will be conducting an adaptive management experiment using operating areas in this plan. This approach is detailed in the mitigations section (section 8) of this plan and results will be incorporated into a new set of caribou guidelines for forest management.

Bear

A 50-metre, no-cut, treed buffer must be maintained around known bear den sites (winter) or those encountered during harvesting. This distance will be reviewed when the EPG's are updated. Den sites must be reported to the WD.

4.2.1.2 Furbearers

Characterization:

A number of furbearers occur in the zone the more prominent of which include 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:

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

Guiding Principles:

Fur Bearer Management Strategy:

Recommendations concerning the management of furbearer species are developed annually, upon consultation with provincial trappers, Newfoundland and Labrador Trappers Association, general public, and departmental staff. Like the big 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 Species of Interest

4.2.1.3.1 American Marten

Characterization:

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

Since the initiation of the live-trapping program, it has been revealed that Main River, Little Grand Lake and Red-Indian Lake are high-density marten areas on the island. Based on this information, it is important that marten habitat be protected in these areas. Furthermore, it is important that some remnant stands of old growth (80+) forests 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 Canadian Forest Service, WD, Corner Brook Pulp and Paper and the Forestry and Agrifoods Agency sit on the Newfoundland Marten Recovery Team. The primary functions of the Recovery Team are to prepare and periodically revise the recovery plan for American marten in Newfoundland and to provide advice to Government on species recovery. The recovery plan may include short and long-term population goals and outlines actions required to reach recovery goals. The team has identified critical marten habitat and is in the process of determining what forestry activities should be permitted within the boundaries of critical habitat. The team is also investigating the best way to approach long-term landscape level planning for marten recovery. In addition, Brian Hearn of the Canadian Forest Service is close to completing an analysis of the impact of the scheduled 25 year harvest plan on the availability, distribution and connectivity of marten habitat.

Critical Elements:

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

Guiding Principles:

Critical marten habitat 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 potential impacts of harvesting on this habitat and resultant changes to population levels. Continued development and refinement of this model will provide a more reliable means of evaluating impacts of harvesting on marten habitat in the future.

Early indications from Brian Hearn's work with the harvest schedule indicate that there is abundant suitable habitat in districts tested and that the amount will increase over the next 10 years, even if the full harvest schedule is implemented. Work is now underway to extend this analysis to 20 years. Anecdotal evidence also seems to suggest that snaring and trapping may be the main impediments to marten recovery. Maintenance of appropriate forest habitat is also

integral to the long-term recovery of this species. More testing of the model needs to be undertaken especially on the distribution of suitable habitat and on the occupancy of this habitat.

The current timber supply model is constructed in such a way that analysis of marten critical habitat can be evaluated at the landscape level to determine any impacts on timber supply. Recommendations resulting from any of these ongoing initiatives will be incorporated into harvesting prescriptions as required.

4.2.1.3.2 Rare Plants

Characterization:

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

Most of the rare plant species throughout Newfoundland are inhabitants of fairly open habitats, such as river gravels, salt marshes, wetlands, aquatic habitats and barrens; all areas where no forestry operations are practiced. In Forest Management Districts 10, 11, 12 and 13 the greatest concentration of rare plants can be found in the flood plain of the Exploits River between Badger and Bishops Falls. The rare species occupy a variety of mostly open habitats, including gravelly and rocky shorelines and aquatic habitats in backwaters and ponds adjacent to the river. There are only two other areas where two or more rare plant species occur in close proximity, at Lloyds River, approximately 7 km upstream of its mouth (District 13), and at Quarry on the former rail bed (border of Districts 12 and 16).

The known rare plant distribution is very much a reflection of survey effort, which is mostly limited to a strip about a kilometre wide adjacent to major roads. Only a few botanists have

ventured onto the forest resource roads, therefore most rare plant locations in Districts 10-13 likely remain undiscovered. Many areas of central Newfoundland appear to be devoid of rare plants, but it is likely that they have never been visited by botanists. Many riparian areas have potential for rare plants, and could be impacted as stream crossings are constructed for new forestry roads.

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

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

Of these species, teaberry is of the greatest concern as there are only 4 known locations in Newfoundland. One of these locations is at Badger, and the other is located between Badger and Millertown (Districts 10 and 12).

Critical Elements:

- quarrying and road construction
- logging and extraction using heavy equipment
- mechanical site preparation
- all terrain vehicle traffic also poses a potential threat in some areas

Guiding Principles:

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

4.2.1.3.3 Waterfowl

Characterization:

In District 10 there are two wetland sites located at Little Rushy Pond and Corduroy Brook which are within the Town of Grand-Falls Windsor Municipal Planning Area and have been identified by the Town as being significant wetland sites. In 1998, the Town signed a Stewardship Agreement with the provincial government to protect and conserve these areas. A third wetland in the Red Cliff area is also considered important for waterfowl but is not officially designated.

The provincial Wildlife Division has also designated a number of sensitive areas within Districts 12 and 13 at Victoria Steadies on the Victoria River.

Critical Elements:

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

Guiding Principles:

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

4.2.1.3.4 Other Species

Other species, particularly the red crossbill, are currently listed as endangered. The Forestry and Agrifoods Agency 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 Forestry Services Branch.

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, Newfoundland's Triahlomethane (THM) controversy, and numerous incidents of giradiasis in community water supplies have heightened public awareness on water issues. While much of the current focus is directed towards drinking water, it is also recognized that an equal importance must be attached to waters which have other beneficial uses. Human impacts both locally and globally have the potential to impair water for future uses.

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

Human activity on the land has the potential to alter water quality and water quantity. Commercial forest harvesting is the predominant activity and occurs throughout the zone. Hydroelectric development has resulted in several river diversions. There is a vast array of roads associated with the harvesting and traditional access routes as well as newly constructed roads which dissect the unit. Mining operations within the zone are limited to mostly small quarrying operations associated with road construction. Some exploration activity for hydrocarbons, dimension stone and base metals has occurred sporadically throughout the region.

Critical Elements:

Forest management activities such as road construction, use and maintenance, timber harvesting, and silviculture may substantially alter the quality of water draining from watersheds as well as other defining characteristics such as stream hydrology, sediment loadings, stream characteristics, and aquatic discharges from municipalities. Careless storage and handling of fuels by industrial and recreational users, stream diversions and agricultural operations are other examples.

Guiding Principles:

There are numerous protective measures listed in the EPG's 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. The market value of forest products harvested and employment levels in Zone Five is unknown at this time because since the re-development of the forest industry following the closure of Abitibi-Bowater's Grand Falls Windsor newsprint mill is in its infancy. There is potential however, to provide a significant contribution to the local and provincial economy. Historically timber has been harvested since the first inhabitants settled in the zone. Initial uses were mainly domestic in nature to supply timber to build houses, fishing sheds and equipment and for heating and cooking. With the increase in population, more commercial uses have arisen to supply lumber and pulp and paper products. The zone supports an annual allowable cut (AAC) of both softwood and hardwood of 87 870, 181 540, 218 230 m3 and 42,650 m3 in Districts 10, 11, 12, and 13 respectively.

Commercial logging contractors are allocated the majority of the annual allowable cut in the zone. Commercial harvesting and sawmilling activity provides many jobs in harvesting, sawmilling, trucking, pulp and paper manufacturing and related spin off industries for local residents. There has been a call for expressions of interest to develop a commercial industry in the zone; this process is ongoing.

Domestic harvesting still provides fuelwood to heat many homes and sawlog material for residential house construction in the zone. In fact, the easy access to domestic sawlogs and lumber is one of the reasons why this province has the highest rate of home ownership in the country.

The change in management philosophy will see a more structured approach to domestic harvesting in each district. Harvesting will be conducted in specific domestic cutting areas via a crown domestic cutting permit that is required and issued by each district. Unless otherwise specified; domestic cutting will be limited to these designated cutting areas. The permit will also specify the volume and species that can be harvested, utilization standards, and other relevant conditions. While some domestic cutting

areas are designated for hardwood only, the majority of areas will allow the harvest of all hardwood and softwood species.

Silviculture treatments are important to the forest resource of the zone 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 will be a significant investment on silviculture in the zone each year creating seasonal employment.

Timely access to timber is critical to planning any forestry operations. Primary, secondary and tertiary roads form an integral part of operating areas and are used after timber extraction is completed for silviculture and recreational purposes. A significant amount of money will be 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. Fire has been a major disturbance, so protection is 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

Guiding Principles:

- enforcement of forestry act, regulations, guidelines and policies
- minimize loss of productive land base through spatial and temporal compromises and continuous dialogue with other resource users
- education (staff, public, operators)
- aggressively conduct silviculture, access road, and protection activities
- implement best management practices. The *EPG's* outline courses of action and mitigative measures for forest activities. These EPG's are outlined in their entirety in Appendix 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:

Agricultural activity is limited in the zone. The vast majority of commercial agricultural activity is located in the Agriculture Development Area at Wooddale in District 10. Additionally, hundreds of subsistence farming plots are scattered throughout the zone. The vegetables grown on these plots are used to supplement food requirements during the winter months. There are also several pastures and areas designated for hay production.

The wild berry industry (bakeapple, partridgeberry, strawberry, blueberry, and raspberry) plays a significant role in the economic picture for the zone. While there is no actual record of domestic production, thousands of kilograms of berries are harvested annually. These berries are sold locally and to travelling tourists.

Critical Elements:

Surveys indicate that approximately five percent of the soils in the province are suitable for agriculture. It is not possible to identify and plan all sites for future agriculture use and often there is a conflict with

other land uses particularly forestry because these sites are of high growing capability. Although a suitable 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 Forestry and Agrifoods Agency to determine if opportunities exist for an exchange between agriculturally viable forest areas with unsuitable agriculture land within the Agriculture Development Areas.

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

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

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

4.2.2.3 Mining

Characterization:

There is a significant mining presence throughout the zone. Major base metal mines and deposits are located at Buchans Mine, Duck Pond, Buchans Lundberg, Point Leamington Boomerang, Bobby's Pond, Denny's Pond and Tulks Hill. Gold is also found at Valentine Lake. The original and current resource value is in excess of $18 billion. The GDP contribution of the mining industry in 2006 was 11.7% of the provincial total and employment in 2008 was 1.7% of the provincial total or 3 800 person years (from presentation by Ken Andrews to the planning team) There are also a number of active aggregate and quarry leases located throughout the zone. These are usually for very small areas which can be rehabilitated; thereby, minimizing their impact upon the forest ecosystem. Exploration activities continue to form a large portion of the activities in the zone. There is exploration for gold at Little Rattling Brook and the Huxter-Brady Property as well as zinc lead and copper at other locations in the zone (from presentation by Golden Dory Resources to the planning team)

Critical Elements:

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

Guiding Principles:

- Ensure that quarries and open-pit mines are rehabilitated. The organic overburden should be stockpiled and stored in a manner so that it can be used to rehabilitate the site.
- Maintain updated maps of mineral potential, mineral claims and aggregate and quarry areas at the district office.
- Avoid planning silviculture activity in areas adjacent to mines or quarries.
- Make every attempt to extract timber harvested as part of exploration and development. If timber can not be feasibly extracted using conventional means then timber shall be piled so that it may be extracted during winter months by snowmobiles.
- Mineral exploration that proposes to explore or develop within a silviculturally treated area must be undertaken with minimal disturbance and provide compensation as required

- Mineral exploration and/or development on mineral licenses within the zone will not be impeded. Specific proposed harvesting activities are identified in the annual operating plan.
- Quarry permits are required for aggregate material taken outside of the road ROW for purposes of road construction
- Non-compliance with exploration permits will be passed to the District Manager and submitted to Mines Division, Dept. of Natural Resources.

4.2.2.4 Historic Resources

Characterization:

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

Archaeological sites are non-renewable resources and play a vital role in understanding our heritage. It is important to professionally record as much information 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 does not have an adverse impact on forestry activities.

Archaeological surveys have been carried out in several areas within the zone over the years, however many areas still remain to be surveyed. To date there are many archaeological sites within the zone which are protected under the Historic Resources Act. Most notably is the evidence of the Beothic along the Exploits River. There is potential for other historic resources to be found in the zone.

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

archaeological projects. These businesses include bed and breakfasts, boat tours, restaurants and gift shops.

Critical elements:

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

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

Guiding Principles:

Any project involving land-use has the potential to adversely impact historic resources; therefore it is important 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 to protect known archaeological sites and potential unknown sites are protected from forestry activity 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 along the coastline where there is potential for archaeological resources to be found.

Occasionally there are accidental discoveries made of historic resources. In the event that this does happen, activities should cease in this area and contact be made immediately with the provincial archaeologists at 729-2462.

4.2.2.5 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 50 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 in conjunction with the T'Railway Council 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 cross country skiing, hiking, biking, snowmobile 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 allowed with a special permit.

Critical Element

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

Guiding Principles:

- 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
- 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.
- where feasible, harvesting using the T'Rrailway shall be from May to December to avoid conflict with other user groups.

4.2.2.6 Parks and Protected Areas

Characterization:

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

There are several different types of conservation areas in the province that contribute to the provincial system of protected areas, as recognized by the International Union for the Conservation of Nature. Wilderness reserves and ecological reserves are established via the *Wilderness and Ecological Reserves Act*. Wilderness reserves are generally large (>1000 km2) and are designed to protect complete ecological systems. Ecological reserves may be established to protect representative samples of each of the province's natural regions (ecoregions) with a mid-sized reserve (50-1000 km2), or to protect exceptional natural features, occurring in an area <10 km2, such as rare species or areas of unusual biological richness .Provincial Parks, established under the *Provincial Parks Act*, do play a conservation role but are primarily established as sites for outdoor recreation and nature-based education. Wildlife reserves may be established under the *Wildlife Act* for the protection of specific species or habitats, and public or crown reserves may be established for conservation reasons under the *Lands Act*. Finally, National Parks such as Terra Nova, Gros Morne and Torngat Mountains are established under the federal *National Parks Act*.

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

There are three existing protected areas within the Zone 5 planning area: King George IV Ecological Reserve and, two areas which lie adjacent to each other, Little Grand Lake Ecological Reserve and Little Grand Lake Wildlife Reserve. There are also some areas being considered through the Natural Areas System Planning process as study areas for future protected areas. At the time of the forest management planning process for Zone 5, these areas have not yet been finalized or released for public review.

Critical Elements:

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

Guiding Principles:

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

4.2.2.7 Outfitting

Characterization:

The outfitting industry has been an integral component of the tourism industry in Central Newfoundland since the early 1900's. This region has always been a popular hunting and fishing destination because of the pristine environment and abundance of fish and wildlife species. There are many outfitters operating within the boundaries of the zone that operate and maintain main and/or line camps. These operations provide seasonal employment for many local individuals.

An economic impact study conducted in 1995 by the Department of Industry, Trade and Technology suggests that each big game license has a net economic impact of $6864. By approximating this value at $7500 for 2010, it can be seen that big game alone has a significant impact on the local economy. The many trout and salmon destinations in the zone also make fishing an important economic contributor.

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

Critical Elements:

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

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

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.

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:

Through consultations with any outfitter located within the zone, it maybe deemed necessary to establish a managed forest area around the established outfitting lodge.

- consideration should be given to decommissioning roads and bridges (where possible) after harvesting is completed. This will eliminate damage to the hunting area by reducing the possibilities of increased hunting pressure. When roads are in use actively for harvesting purposes, access to hunters should be restricted or limited.
- harvest in the winter whenever possible. Winter roads are less passable in summer and fall and will help to reduce traffic. These roads will also be cheaper and easier to decommission.

- construct new roads as far away from existing outfitting camps as possible Harvesting should be restricted around hunting and fishing camps during their season of operation. At these times, harvesting should occur as far away as possible from outfitters.
- forest operations should be carried out in compliance with existing regulations
-efforts should be made to ensure that the integrity of the view from outfitter cabins is maintained when conducting forest operations.
- forest operations should ensure that whatever is brought into an area is removed from the area once harvesting is complete.

4.2.2.8 Recreation

Characterization:

Central Newfoundland 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 many rivers, walking the many hiking trails (especially the Appalachian Trail), traversing the numerous ski and hundreds of kilometers of managed, groomed snowmobile trails, and excellent opportunities for hunting, fishing and adventure tourism 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 and 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 some forest access roads near remote areas is 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.

4.2.2.9 Tourism

Characterization:

The tourism industry in Newfoundland and Labrador is based on our natural and cultural resources. Protection of these resources is critical for the industry to survive and grow**.** Newfoundland and Labrador 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 contributes approximately $800 million annually to the provincial economy and provides 15,000 person years of employment (presentation by Derek Stewart to the planning team). Government tax revenue from tourism in 1998 was estimated to be $105 million and continues to increase. The worldwide growth of tourism at rate of 41 percent, the national growth of 25 percent and the provincial 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 Catamaran, Beothuck and Mary March Parks, the wildlife museum at Millertown, and the salmon viewing ladder in Grand Falls are just a few examples of the more formal and prominent tourist attractions. Many tourists also come for the outdoor recreational opportunities or to partake of the excellent scenery.

Critical Elements:

- viewscape
- accessibility
- wilderness ambiance
- remoteness

Guiding Principles:

Work with provincial parks, tourism division and tourism operators to implement strategies to minimize the visual impact of harvesting operations on the aesthetic values associated with viewscapes. By bringing together the FSB, 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 FSB, local Town Councils, tourism operators, Tourism Division and other relevant groups will get together to examine the relevant issues, where applicable, in the zone.

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

In previous planning processes planning teams were established 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. For this plan there was one planning team and planning process and one five year operating plan submitted for Planning Zone 5 with all meetings held at Grand Falls-Windsor.

5.3 Planning Team Participation

An initial advertisement was placed in local and regional newspapers, informal invitations were sent to community leaders in the zone, and an extensive email to interest groups and individuals was done to

inform potential participants of initial meetings in Grand Falls- Windsor. A press release was done by FAA a few weeks before the initial meeting and a media advisory alert was done on the day of the initial meeting.

The initial two public meeting on January 20 and February 10, 2010 were designed to explain the planning framework, review and approve the ground rules for participation, and to form the new planning team for the zone. The turnout at these meetings was excellent with over 80 stakeholders attending. Approximately 50 of these attendees indicated that they wanted to sit on the planning team. A list of these members and their affiliations is shown in Appendix 2. Planning team membership was not restricted to those listed and was open to anyone who wanted to join the process at any time.

There were 14 planning team meetings held approximately every two weeks from February to December, 2010 (most concentration of meetings during winter / spring). There were presentations at each meeting by different stakeholders who identified their specific value and discussed the importance and potential impacts of forestry activity on these values. Maps of potential harvest areas as identified in the harvesting scheduling exercise, discussed in Section 3, were posted at each of these meetings so any areas of concern could be spatially identified. A website was created and a copy of the minutes, presentations and maps were posted after each meeting. This website, which houses the planning team information for the entire process, is located at http://www.nr.gov.nl.ca/forestry/management/district10_13/default.stm username – forest1013, password – D1$TricT. At the sixth and tenth meetings on April 22, and June 2, 2010, draft sections of the plan were circulated to the planning team for review. In early June maps and descriptions of operating areas were sent to various government departments with an interest in natural resource management for review and comment.

A draft plan was prepared and a final planning team meeting was held on December to finalize input from members. The results from this meeting and from comments received on the operating area maps and descriptions that were sent out were used to make revisions to the plan before it was submitted for environmental assessment. A letter of concern to the planning team and the response is also presented in Appendix 2.

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

The forest in the zone is part of the boreal forest which is characterized by stand-replacing natural disturbances result in the formation of relatively even aged stands. The clearcut silvicultural system most closely emulates this natural disturbance pattern. 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 where the cuts are relatively small and dispersed resulting in the creation of a range of age and development classes.

6.1.1 Commercial

Section 3 outlines the general approach for the timber supply analysis and outlines the specific results for all districts in the zone. The model used to calculate the annual allowable cut is a spatial optimiztion model which outlines a specific course and timing of actions to maximize timber production. The harvest schedule outlines 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 to maintain the validity of the AAC.

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. In managed stands, this priority may change to allow for a faster rotation on good sites that have been silviculturally treated.

Specific commercial strategies are:

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

6.1.2 Domestic

The harvest of domestic fuelwood and sawlogs occurs from designated domestic cutting blocks and cutover, landing and roadside clean up. 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 there are concentrations of timber eligible for harvest. 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 which is why the AAC adjustment (spatial net down) is higher than in commercial areas. Utilization of cutover residue, dead timber and scrub areas that are not part of the timber supply analysis help make up for this difference.

Specific domestic strategies are:

- target low volume stands that have poor commercial harvest chance
- encourage use of poor quality hardwood (birch, larch and aspen). In areas where there are future softwood commercial operations, domestic harvesting is limited to non-commercial hardwoods
- target dead, burnt and insect damaged stands that are beyond commercial salvage
- target alienation class 3 lands that have low commercial potential
- in areas of high domestic demand, limit volume allocation in designated cutting areas and encourage alternate sources (cutovers, landings, scrub etc)
- monitor stands harvested in domestic cutting areas for compliance to the harvest schedule 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 and site types. Areas that do not regenerate naturally are renewed by some combination of site preparation and planting or gap planting. Areas that adequately regenerate 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. There is concern about the type (species) of regeneration because of the presence of balsam woolly adelgid in parts of the zone. This insect causes growth loss and impacts the form and quality of balsam fir trees. In adelgid infested areas, regeneration to balsam fir may not necessarily be acceptable depending on the severity of attack. In other areas, the presence of kalmia causes problems because of its allelopathic effect on natural and artificial black spruce regeneration. Prescriptions to treat 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 disturbances caused 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. There is usually some form of mechanical site preparation before a site is planted to reduce the thickness of the duff layer and in some cases remove or disturb kalmia that is present. Prescribed burning is also used to sanitize some sites where adelgid is present. This treatment reduces the slash loading and duff thickness to prepare the site for planting and kills any balsam fir which could potentially perpetuate the adelgid problem. Full or gap planting is done to ensure stocking of desired species is at acceptable levels.

Treatment to prepare sites that have been overgrown with hardwoods and other herbaceous species has been done with herbicides to reduce this competition and make the site more accessible and suitable for planting. Release herbicide treatment is also done which 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. In other instances, herbicides are used to control Kalmia either before or after planting. Herbicides, while used sparingly, are sometimes a necessary tool to help establishment of a new forest, particularly on the better sites.

When there is complete regeneration failure requiring full planting, the site is prepared if necessary, and planted with black or white spruce and to a lesser extent, Norway spruce. In cases where adelgid has been a problem, balsam fir regeneration is sometimes ignored and the site is planted with spruce seedlings. In instances where there is partial regeneration failure and the site does not have enough stocking of desired species, the area can be gap planted to increase the seedling density to acceptable stocking standards. On adelgid sites partially regenerated to balsam fir, planting is done through the existing regeneration to obtain a sufficient stocking level of an adelgid resistance species. Gap planting is done with spruce seedlings, 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 sources. Seed orchards have been established at Pynns Brook and Wooddale to produce seed from plus trees collected throughout the province. Plus trees are normally selected because they have superior growth and physiological characteristics. It is hoped that once the orchard is in full production, the majority of the planting stock will be grown from this source. The ultimate goal is to plant seedlings that have superior growth characteristics and thus increase yield and maintain genetic diversity.

Exotic species have been planted in trials at some locations in the zone, however, it is not anticipated 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

and diameter limit thinning). In areas that have high moose browsing potential, the precommercial thinning age is increased to 20 – 25 years so that the crop trees are tall enough to be out of reach of moose.

Precommercial thinning reduces density levels in overstocked stands 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. This prescription results in a mixed softwood stand (depending on the original density of spruce) which is more diverse and less susceptible to insect infestation. As well, any hardwood species that are not in direct competition with spruce or fir are left to increase the biodiversity of the stand.

Commercial and diameter limit thinning is occasionally done in older balsam fir stands (either natural or previously thinned) and is designed to capture any mortality that would normally occur in the stand through self thinning. The trees from commercial thinning operations are extracted and utilized. The remaining trees are left to grow, free from competition and are harvested when mature. By salvaging this eminent mortality a higher yield can be obtained in these stands. As with precommercial thinning, spruce and hardwoods are left where possible to increase the stand diversity. Both types of thinning will produce large diameter stems in a shorter time period which should increase the percentage of merchantable volume that is suitable for sawlog material and decrease the harvest cost. Commercial thinning has yet to be done in the zone and diameter limit thinning has been done sparingly, however, recent indications of root rot and blowdown in thinned stands may increase their importance.

Specific silviculture stratagies are:

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

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 and commercial values such as hunting, fishing, skiing, berry picking, hiking and mineral exploration. Roads can also have a negative impact both from an environmental perspective (loss of productive land base, sedimentation, habitat fragmentation etc.) and other value perspective (eg. access near remote outfitting lodges).

As a general principle from both an environmental and a cost perspective, the minimal amount of road will be built to effectively harvest available timber. Roads will be constructed to specifications that minimize right-of-way and running surface width but still access the timber in a safe and effective manner. Forwarding distances will be maximized to minimize the amount of road constructed. These principles ensure that the minimum amount of road will be built which effectively reduces the loss of productive forest land base while also minimizing the amount of environmental disturbance.

In sensitive and wet areas, winter harvesting and road construction are encouraged and are often the only option. This minimizes environmental disturbance while providing access to valuable timber.

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. It is recognized that roads built for forestry activities are used by other stakeholders. Any road or bridge decommissioning should be discussed by the planning team to determine impacts and formulate alternatives (cost sharing to replace an old bridge etc.).

The nature of the current wood supply, particularly on class 3 areas, is that harvestable areas or stands are becoming smaller and more remote and scattered. Achievement of the allocated harvest is contingent on accessing these areas and stands; therefore more roads are needed to access this timber.

The crown has inherited a large road infrastructure in the zone. It is not reasonable to expect this infrastructure to be maintained in perpetuity. Much of the infrastructure has already deteriorated and will become a public safety issue/liability if not addressed. Road and bridge maintenance and/or decommissioning is an issue and needs to be addressed on a case by case basis.

Specific roads strategies are:

- 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
- determine impacts and explore alternatives (cost sharing) in areas where road and bridge decommissioning impacts other stakeholders
- explore all avenues to secure funding for road construction and encourage operators to build their own roads in exchange for royalty reductions

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. Balsam fir is susceptible to most of the major insects including spruce budworm, hemlock looper, and balsam woolly adelgid. In the past, severe mortality has occurred in District 13 resulting in massive salvage efforts. In recent years, 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.

In recent years, the hemlock looper and spruce budworm have not been a problem in the zone. However; populations of these insects are closely monitored and treatment is employed where warranted. The adelgid problem is worsening in District 10 and 11. Alternative silviculture prescriptions (centered on

minimizing fir regeneration in susceptible areas) are being employed to minimize the impact of this insect.

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

Specific insect and disease strategies are:

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

6.4.2 Fire

As outlined in previous sections, there has been a cyclic fire history in the zone resulting in significant losses from major fires. A fire in an unusually dry year can have devastating effects on the forest and can exacerbate an already tight wood supply situation. The zone can minimize the risk of a serious fire by maintaining a highly trained, efficient and effective fire control program and by minimizing the risk in forest stands through maintenance of forest health and vigour.

Specific fire strategies are:

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

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 forest health and vigour mainly through silvicultural treatments and protection from insects.

Specific windthrow strategies are:

- 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 may be pursued are:

Specific information and education strategies are:

- field trips
- school visits
- commercial operator environmental training programs

- information meetings
- training courses
- seminars
- general day to day contact

Section 7 Proposed Activities

7.1 District 10

7.1.1 Overview

This section will outline all forest activities that will occur on crown land in District 10 from 2011-2015. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail.

To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in Appendix 3. This map shows all proposed operating areas so that operations can be viewed from a landscape perspective in District 10. 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.

7.1.2 Allocation of Timber Supply

There is 436 850m3 of timber scheduled to be harvested in District 10 for the next 5 years. To put the total harvest in perspective, there is approximately 3600 ha scheduled for harvest in this five year period out of a total of 110 370 ha of productive forest. This represents 3.2 percent of the productive land base being harvested in the next five years and only 0.65 percent in any given year. There will be 415 000 m3 of softwood timber harvested in District 10 in the next 5 years with 410 000 m3 scheduled for class 1 land and 5 000m3 for class 3 land. The proposed hardwood harvest is 21 850 m3. Table 11 details this proposed volume by harvest type and compares it to the 5 year AAC.

Table 7 Proposed softwood harvest in District 10 from 2011-2015

Class1 Softwood (5 year totals)		Class 3 Softwood (5 year totals)		Hardwood 5 Year Totals	
Total AAC	410 000	Total AAC	7 500	Total AAC	21 850
Commercial	795 000	Commercial	0	Commercial	23 550
Domestic	25 000	Domestic	5 000	Domestic	10 000
Total	820 000*	Total	5 000	Total	33 550*
Total Deviation (+/-)	+ 410 000	Total Deviation (+/-)	- 2 500	Total Deviation (+/-)	+ 11 700

*note that this represents more than the established AAC. Only half this volume will be harvested. The AAC will not be exceeded.

The majority of the harvest (95%) is scheduled for commercial purposes. This is due to nature of the landbase which was originally designated for industrial purposes. In most other traditional crown districts the landbase is located near the coast where there are many communities and the domestic demand is high. In District 10 there are few communities and the domestic demand is lower. There is sufficient domestic timber allocated to meet the demand. There is room in the class 3 softwood AAC (2 500m3) however, to accommodate an increase in domestic demand should oil prices continue to increase. The class 1 softwood and hardwood 5 year AAC's are fully allocated.

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 approximates the harvest schedule that was used to determine the AAC in Section 3. Since it has been nearly five years since the last AAC was calculated, a significant portion of the timber that was scheduled in the first five year period has been harvested therefore other periods are also allocated. The allocated operating area and associated harvest volumes represent as much as two times the actual proposed harvest (Table 7). The purpose of including more volume than is actually proposed is to allow for operational flexibility and inventory deviations within operating areas without having to constantly amend the plan.

There are 409 275 m3 of timber scheduled to be harvested commercially in the next five years (Table 8). Commercial harvesting of all species accounts for over 95 percent of the total proposed harvest in the district. Approximately 6 percent of the commercial harvest will be hardwoods in both pure and residual stands. Commercial activity in hardwoods is limited due to the availability of suitable stands.

There are 6 commercial operations in the district with permit sizes ranging from 250 m3 to 10 000 m3. These operations occur manually or mechanically using conventional harvesting equipment such as chainsaws, shortwood harvesters, skidders and forwarders and are conducted year round. The more sensitive sites are usually harvested in winter and most operations are integrated utilizing sawlogs, pulpwood and fuelwood.

7.1.2.2 Domestic

There are 40 000 m3 scheduled to be harvested domestically from 2011 to 2015 which represents 5 percent of the proposed harvest (Table 9). The allocation will be 25 000 m3 from the class 1 softwood AAC, 5 000 m3 from the class 3 softwood AAC and 10 000 m3 from the hardwood AAC. Harvesting will occur in designated domestic cutting areas and is generally conducted on a small patch cut system. There are two operating areas dedicated to domestic cutting; cD1001 is scheduled for both softwood and hardwood cutting and cD1002 is scheduled for hardwood and non-commercial species cutting only. All domestic cutting is done under permit which has conditions attached that outline the species, volume, location and utilization standards to be employed. Most cutting occurs in fall and winter with extraction by snowmobile or ATV. Domestic permit allocation is 23 m3.

7.1.2.3 Hardwoods

There is 21 775 m3 of hardwoods scheduled to be harvested for domestic (10 000) and commercial (11 775) purposes in the next five years (Tables 8 and 9). This domestic harvest of birch occurs as a mixture in softwood stands and is utilized as fuelwood. The commercial hardwood harvest is for sawlogs and fuelwood and occurs in some pure stands but mostly as residual in hardwood/softwood and softwood/hardwood stands.

Table 8 Summary of commercial harvest by operating area in District 10 for 2011-2015

Operating Area Name	Operating Area Number	Volume (net m3) by AAC Type		
		Class 1 Softwood	Class 3 Softwood	Hardwood
Askel Lake West	c1001	10 000		200
Trout Lake West	c1002	13 000		200
Long Pond West 1	c1003	32 000		4 000
Long Pond West 2	c1004	47 000		500
Seal Bay River East	c1005	30 000		500
Rocky Pond South	c1006	63 000		500
Otter Pond	c1007	43 000		2 500
Middleton West	c1008	20 000		200
Moose Pond	c1009	13 000		300
Rocky Pond North	c1010	41 000		500
Badger Southeast	c1011	11 000		1 000
Middleton East	c1012	13 000		200
Peace Pond	c1013	37 000		100
Hodges East	c1014	37 000		100
Crooked Bog	c1015	3 000		50
Northern Arm Brook	c1016	6 000		100
Aspen Brook West	c1017	13 000		200
Seabright Pond	c1018	39 000		4 000
Seal Bay River West	c1019	43 000		500
Lewis Lake	c1020	49 000		500
North Twin West 1	c1021	40 000		200
North Twin West 2	c1022	40 000		200
North Twin North	c1023	112 000		500
New Bay Burn Area	c1024F	30 000		4 000
Four Mile Lake	c1025F	10 000		2 500
Total		795 000		23 550

Table 9 Summary of domestic harvest by operating area in District 10 for 2011-2015

Operating Area Name	Operating Area Number	Volume (net m3) by AAC Type		
		Class 1 Softwood	Class 3 Softwood	Hardwood
District 10 (H and S)	cD1001	25 000	5 000	2 500
District 10 (H)	cD1002			7 500
Total		25 000	5 000	10 000

7.1.3 Silviculture

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

There are two silviculture prescriptions scheduled; planting/gap planting including site preparation (mechanical, prescribed burning and/or herbicide), where required, and thinning (pre-commercial/diameter limit and commercial). Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. Full planting is required where there is complete natural regeneration failure and gap planting when a site has some desired regeneration but not enough to meet minimum stocking standards. Pre-commercial thinning is conducted on regenerating stands (0 - 25 years) to reduce the high density and concentrate the growth on the remaining crop trees thus reducing the time to harvest. Diameter limit /commercial thinning is carried out on immature stands (25-40 years) and is designed to produce a sawlog crop while salvaging any trees thinned as pulpwood or fuelwood.

Each district in the zone has unique silviculture challenges. In Districts 10, 11 and 12 these challenges include sites transitioning to alders or kalmia post harvest; and limited pre commercial thinning opportunity because stands have passed the treatment window. In District 13 challenges include more fir regeneration than spruce making the forest more susceptible to insect outbreaks, and logistical concerns due to remoteness when applying silviculture treatments.

These districts all share the common challenge of having to contend with the growing problem associated with balsam woolly adelgid. The range and severity of this insect is increasing within the province and it continues to target balsam fir trees by severely reducing both growth rates and productivity of certain sites to the point where commercial viability is questionable. The silviculture program over the next five year period will help mitigate the impacts of this insect on sites dominated by

balsam fir. As the problem with this insect is still relatively new in these districts and the extent of affected areas and rate of spread is still unknown, it is extremely difficult to identify specific areas for management at this time.

Potential silvicultural treatment areas need to undergo reconnaissance and / or intensive surveys to determine the regeneration level and severity adelgid attack. Such surveys will be conducted during this five year period but until they are completed, specific locations and treatment amounts cannot be identified. Silviculture prescriptions have been developed however, for implementation on specific site conditions. These prescriptions are described below.

Areas that are scheduled for commercial harvest or have been harvested are identified on the operating area maps and are candidates for planting or gap planting to black, white or Norway spruce. These areas will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting and the presence of adelgid. Adelgid damage evaluation will be based on damage class as described below.

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

If balsam woolly adelgid damage is less than Code 3 in adjacent stands then balsam fir will be considered an acceptable regeneration species. If balsam woolly adelgid damage is greater than Code 2 in adjacent stands then balsam fir will not be considered an acceptable regeneration species. Sites not meeting required stocking levels will be either full planted or gap planted with spruce, as required, to bring them up to minimum stocking levels.

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

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

Immature and regenerating stands have been identified within operating areas. If the regenerating species is balsam fir then the presence of a balsam woolly adelgid will be evaluated using reconnaissance surveys. If presence of balsam woolly adelgid is non existent or light (Codes 1and 2) then the balsam fir stands will be considered for thinning (pre-commercial, diameter limit or commercial thinning) but, if presence of balsam woolly adelgid is Code 3 or higher in the areas the stands will be left to develop naturally. An increasing balsam woolly adelgid presence may cause the pre-commercial thinning program to diminish over time in favour of planting. Root rot in the older pre-commercially thinned stands may make commercial and diameter limit thinning more important in the future.

Note that while a prescription approach has been employed, stands that can be potentially silviculturally treated are explicitly identified on operating area maps. Stands that are identified as scheduled for harvest and cutovers are eligible for planting and immature stands are eligible for thinning.

7.1.4 Primary Access Roads and Bridges

There are 52 km of primary forest access roads scheduled to be constructed in District 10 in the next five years (Table 10) to access timber for commercial purposes. All roads will be built to the specifications of the Class C-2 standard and all pertinent EPG's will be followed. In addition, secondary, operational and winter access roads and upgrading of existing road will be required and will be submitted in the annual operating plan prior to the year that they are planned to be built. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before any construction is initiated.

Table 10 Summary of primary access road construction in District 10 for 2011-2015

Operating Area Name	Operating Area Number	Length (km)
Askel Lake West	C1001	1
Trout Lake West	C1002	3
Long Pond West 1	C1003	2
Long Pond West 2	C1004	3
Seal Bay River East	C1005	4
Rocky Pond South	C1006	3
Seabright Pond	C1018	7
Seal Bay River West	C1019	7
Lewis Lake	C1020	4
North Twin West 1	C1021	7
North Twin West 2	C1022	11
TOTAL		52

7.1.5 Activities in Protected Water Supply Areas

There are operations scheduled to occur in protected water supply areas (PWSA) in the following operating areas: commercial at New Bay Lake Area (c1024f) and Four Mile Lake (c1025f) and domestic at Northern Arm Lake (CD1001- Map 10-2) and Nanny Bag Lake/Four Mile Lake (CD1002 – Map 10-9). 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, approval under the Water Resources Act must be obtained annually by the Forestry and Agrifoods Agency 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 little merchantable volume lost. There have been major fires in the past however, so the district must remain vigilant in its fire suppression program to ensure any future losses are minimized.

There are fire crews and equipment stationed at Gander, Bishop's Falls 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 in Gander that are available for initial attack.

7.1.6.2 Insect and Disease

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

7.1.6.3 General Environment

The environmental protection guidelines form the basis for protecting the environment from the effects of forest activities. Commercial forest activities can have a significant environmental impact if not conducted properly. 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 ensure 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 its 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, annual participation with the Teacher Institute, meetings and National Forest Week activities.

7.2 District 11

7.2.1 Overview

This section will outline all forest activities that will occur on crown land in District 11 from 2011-2015. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail.

To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in Appendix 3. This map shows all proposed operating areas by the crown so that operations can be viewed from a landscape perspective in District 11. Maps of individual crown operating areas and summary sheets are also presented in Appendix 5. 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

A total of 860 400 m3 of timber is scheduled for harvest by the crown in this planning period. To put the total inventoried harvest for crown land in perspective, there is approximately 7 000 ha scheduled for harvest in this five year period out of a total of 150 000 ha of productive forest. This represents 4.7 percent of the productive landbase being harvested in the next five years and only 0.9 percent in any given year.

There will be 820 200 m3 of softwood timber harvested in District 11 in the next 5 years with 815 200 m3 scheduled for class 1 land and 5 000m3 for class 3 land. The proposed hardwood harvest is 40 200 m3. Table 11 details this proposed volume by harvest type and compares it to the 5 year AAC.

The majority of the harvest (98%) is scheduled for commercial purposes. This is due to nature of the landbase which was originally designated for industrial purposes. In most other traditional crown districts the landbase is located near the coast where there are many communities and the domestic

demand is high. In District 11 there are few communities and the domestic demand is lower. There is room in the class 3 softwood AAC (2 500m3) however, to accommodate an increase in domestic demand should oil prices continue to increase The proposed harvest is very close to the 5 year AAC in the other categories.

Table 11 Proposed softwood harvest in District 11 from 2011-2015

Class1 Softwood (5 year totals)		Class 3 Softwood (5 year totals)		Hardwood 5 Year Totals	
Total AAC	835 000	Total AAC	7 500	Total AAC	40 200
Commercial	790 200	Commercial	0	Commercial	51 770
Domestic	25 000*	Domestic	5 000*	Domestic	10 000
Total	815 200	Total	5 000	Total*	61 770
Total Deviation (+/-)	-19 800	Total Deviation (+/-)	-2 500	Total Deviation (+/-)	+ 21 570

*note that this represents more than the established AAC. Only half this volume will be harvested. The AAC will not be exceeded

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 approximates the harvest schedule that was used to determine the AAC in Section 3. Since it has been nearly five years since the last AAC was calculated, a significant portion of the timber that was scheduled in the first five year period has been harvested therefore other periods are also allocated. The allocated operating area and associated harvest volumes (for hardwood) represent as much as two times the actual proposed harvest (Table 11). The purpose of including more volume than is actually proposed is to allow for operational flexibility and inventory deviations within operating areas without having to constantly amend the plan.

There are 815 200 m3 of timber scheduled to be harvested commercially in the next five years (Table 12). Commercial harvesting of all species accounts for over 97 percent of the total proposed harvest in

Table 12 Summary of commercial harvest by operating area in District 11 for 2011-2015

Operating Area Name	Operating Area Number	Volume (net m3) by AAC Type		
		Class 1 Softwood	Class 3 Softwood	Hardwood
North Great Rattling	C1101	67 000		1 300
South Great Rattling	C1102	27 000		500
Beaver Pond	C1103	21 000		400
Great Rattling	C1104	38 000		700
Miguel Lake	C1105	100 000		2 000
Sepepet Block 1	C1106	20 000		400
Sepepet Block 1	C1107	18 000		300
Golden Gullies	C1108	6 000		50
Budgells Pond	C1109	10 000		500
Nugents Pond 1	C1110	8 000		100
Luffs Pond 1	C1111	56 000		500
Luffs Pond 2	C1112	24 000		500
Luffs Pond 3	C1113	67 000		4 000
Great Rattling West	C1114	10 000		200
Great Rattling West 2	C1115	800		50
Rushy Pond	C1116	11 000		200
Cannings Lake	C1117	34 000		5 000
Hynes Lake	C1118	42 000		5 000
20 Mile	C1119	400		20
Tote Lake	C1120	2 000		50
Arthurs Lake	C11021	3 000		100
Sunday Pond Road	C1122	43 000		1 000
Patchy Pond	C1123	13 000		300
Sandy Lake	C1124	19 000		400
Pistol Lake 1	C1125	4 000		200
Pistol Lake 2	C1126	6 000		100
Trappers	C1127	17 000		300
Mill Pond	C1128	8 000		200
Noel Paul	C1129	4 000		2 000
Seacat Pond	C1130	2 000		100
Jumpers Brook	C1132	35 000		2 500
Rattling Brook	C1133	22 000		5 000
Kennedy's Point	C1134	16 000		300
West Lake	C1134f	5 000		10 000
Noel Paul	C1135f	1 000		2 500
Miguel Lake Burn	C1136f	15 000		2 500
Paradise Lake Burn	C1137f	15 000		2 500
Total		790 200		51 770

the district. Approximately 4 percent of the commercial harvest will be hardwoods in both pure and residual stands. Commercial activity in hardwoods is limited due to the availability of suitable stands.

There are 6 commercial operations in the district with permit sizes ranging from 250 m3 to 10 000 m3. These operations occur manually or mechanically using conventional harvesting equipment such as chainsaws, shortwood harvesters, skidders and forwarders and are conducted year round. The more sensitive sites are usually harvested in winter and most operations are integrated utilizing sawlogs, pulpwood and fuelwood.

7.2.2.2 Domestic

There are 40 000 m3 scheduled to be harvested domestically from 2011 to 2015 which represents 5 percent of the proposed harvest (Table 13). The allocation will be 25 000 m3 from the class 1 softwood AAC, 5 000 m3 from the class 3 softwood AAC and 10 000 m3 from the hardwood AAC. Harvesting will occur in designated domestic cutting areas and is generally conducted on a small patch cut system. There are two operating areas dedicated to domestic cutting; cD1103 is scheduled for both softwood and hardwood cutting and cD1104 is scheduled for hardwood and non-commercial species cutting only. All domestic cutting is done under permit which has conditions attached that outline the species, volume, location and utilization standards to be employed. Most cutting occurs in fall and winter with extraction by snowmobile or ATV. Domestic permit allocation is 23 m3.

Table 13 Summary of domestic harvest by operating area in District 11 for 2011-2015

Operating Area Name	Operating Area Number	Volume (net m3) by AAC Type		
		Class 1 Softwood	Class 3 Softwood	Hardwood
District 11 (S and H)	cD1103	25 000	5 000	2 500
District11 (H)	cD1104			7 500
Total		25 000	5 000	10 000

7.2.2.3 Hardwoods

There is 40 200 m3 of hardwoods scheduled to be harvested for domestic (10 000) and commercial (30 200) purposes in the next five years (Tables 12 and 13). This domestic harvest of birch occurs as a mixture in softwood stands and is utilized as fuelwood. The commercial hardwood harvest is for sawlogs and fuelwood and occurs in some pure stands but mostly as residual in hardwood/softwood and softwood/hardwood stands

7.2.3 Silviculture

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

There are two silviculture prescriptions scheduled; planting/gap planting including site preparation (mechanical, prescribed burning and/or herbicide), where required, and thinning (pre-commercial/diameter limit and commercial). Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. Full planting is required where there is complete natural regeneration failure and gap planting when a site has some desired regeneration but not enough to meet minimum stocking standards. Pre-commercial thinning is conducted on regenerating stands (0 - 25 years) to reduce the high density and concentrate the growth on the remaining crop trees thus reducing the time to harvest. Diameter limit /commercial thinning is carried out on immature stands (25-40 years) and is designed to produce a sawlog crop while salvaging any trees thinned as pulpwood or fuelwood.

Each district in the zone has unique silviculture challenges. In Districts 10, 11 and 12 these challenges include sites transitioning to alders or kalmia post harvest; and limited pre commercial thinning opportunity because stands have passed the treatment window. In District 13 challenges include more fir

regeneration than spruce making the forest more susceptible to insect outbreaks, and logistical concerns due to remoteness when applying silviculture treatments.

These districts all share the common challenge of having to contend with the growing problem associated with balsam woolly adelgid. The range and severity of this insect is increasing within the province and it continues to target balsam fir trees by severely reducing both growth rates and productivity of certain sites to the point where commercial viability is questionable. The silviculture program over the next five year period will help mitigate the impacts of this insect on sites dominated by balsam fir. As the problem with this insect is still relatively new in these districts and the extent of affected areas and rate of spread is still unknown, it is extremely difficult to identify specific areas for management at this time.

Potential silvicultural treatment areas need to undergo reconnaissance and / or intensive surveys to determine the regeneration level and severity adelgid attack. Such surveys will be conducted during this five year period but until they are completed, specific locations and treatment amounts cannot be identified. Silviculture prescriptions have been developed however, for implementation on specific site conditions. These prescriptions are described below.

Areas that are scheduled for commercial harvest or have been harvested are identified on the operating area maps and are candidates for planting or gap planting to black, white or Norway spruce. These areas will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting and the presence of adelgid. Adelgid damage evaluation will be based on damage class as described below. If balsam woolly adelgid damage is less than Code 3 in adjacent stands then balsam fir will be considered an acceptable regeneration species. If balsam woolly adelgid damage is greater than Code 2 in adjacent stands then balsam fir will not be considered an acceptable regeneration species. Sites not meeting required stocking levels will be either full planted or gap planted with spruce, as required, to bring them up to minimum stocking levels.

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

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

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

Immature and regenerating stands have been identified within operating areas. If the regenerating species is balsam fir then the presence of a balsam woolly adelgid will be evaluated using reconnaissance surveys. If presence of balsam woolly adelgid is non existent or light (Codes 1and 2)

then the balsam fir stands will be considered for thinning (pre-commercial, diameter limit or commercial thinning) but, if presence of balsam woolly adelgid is Code 3 or higher in the areas the stands will be left to develop naturally. An increasing balsam woolly adelgid presence may cause the pre-commercial thinning program to diminish over time in favour of planting. Root rot in the older pre-commercially thinned stands may make commercial and diameter limit thinning more important in the future.

Note that while a prescription approach has been employed, stands that can be potentially silviculturally treated are explicitly identified on operating area maps. Stands that are identified as scheduled for harvest and cutovers are eligible for planting and immature stands are eligible for thinning.

7.2.4 Primary Access Roads and Bridges

There are 60 km of primary forest access roads scheduled to be constructed in District 11 in the next five years (Table 14) to access timber for commercial purposes. All roads will be built to the specifications of the Class C-2 standard and all pertinent EPG's will be followed. In addition, secondary, operational and winter access roads and upgrading of existing road will be required and will be submitted in the annual operating plan prior to the year that they are planned to be built. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before any construction is initiated. Operational and winter access roads will be required and will be submitted in the annual operating plan prior to the year that they are planned to be built. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before any construction is initiated.

7.2.5 Activities in Protected Water Supply Areas

There are no proposed activities inside protected water supply areas in District 11.

Table 14 Summary of primary access road construction in District 11 for 2011-2015

Operating Area Name	Operating Area Number	Length (km)
Beaver Pond	C1103	2
Great Rattling	C1104	2
Miguel Lake	C1105	7
Luffs Pond 1	C1111	2
Luffs Pond 2	C1112	5
Luffs Pond 3	C1113	5.5
Great Rattling West 1	C1114	3.5
Great Rattling West 2	C1115	3
Cannings Lake	C1117	4
Hynes Lake	C1118	11.5
Patchy Pond	C1123	8.1
Pistol Lake 2	C1126	6.4
Total		60

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 little merchantable volume lost. There have been major fires in the past however, so the district must remain vigilant in its fire suppression program to ensure any future losses are minimized.

There are fire crews and equipment stationed at Gander, Bishop's Falls 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 in Gander that are available for initial attack.

7.2.6.2 Insect and Disease

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

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 sites 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 ensure 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 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 its 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, annual participation with the Teacher Institute, meetings and National Forest Week activities.

7.3 District 12

7.3.1 Overview

This section will outline all forest activities that will occur on crown land in District 12 from 2011-2015. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail.

To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in Appendix 3. This map shows all proposed operating areas by the crown so that operations can be viewed from a landscape perspective in District 12. Maps of individual crown operating areas and summary sheets are also presented in Appendix 6. 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.

7.3.2 Allocation of Timber Supply

There is 1 028 440 m3 of timber scheduled to be harvested by the crown in District 12 for the next 5 years. To put the total harvest for mapped crown land in perspective, there is approximately 8500 ha scheduled for harvest in this five year period out of a total of 168 391 ha of productive forest. This

represents 5.0 percent of the productive land base being harvested in the next five years and 1.0 percent in any given year. There will be 962 480 m3 of softwood timber harvested from crown land in District 12 in the next 5 years with 945 000 m3 scheduled for class 1 land and 17 480 for class 3 land. Table 15 details this proposed volume by harvest type and compares it to the 5 year AAC.

Table 15 Proposed softwood harvest in District 12 from 2011-2015

Class1 Softwood (5 year totals)		Class 3 Softwood (5 year totals)		Hardwood 5 Year Totals	
Total AAC	945 000	Total AAC	80 000	Total AAC	66 150
Commercial	932 800	Commercial	10 000	Commercial	51 200
Domestic	12 200	Domestic	7 480	Domestic	14 760
Total	945 000	Total	17 480	Total	65 960
Total Deviation (+/-)	0	Total Deviation (+/-)	-62250	Total Deviation (+/-)	-190

There no deviation from the five year AAC in both the class1 softwood and hardwood land bases. The class 3 land base is under allocated because of the difficult logging chance. The ratio of domestic to commercial harvest is 97:3 percent. There is 65 960 m3 of hardwoods scheduled for harvest on crown land in District 12 in the next five years. The commercial allotment is 51 200 m3 which represents 78% of the harvest and the domestic allocation will be 14 760 m3 which represents 22% of the hardwood harvest. The majority of harvest is in the form of residual birch from cutovers or from birch intermixed in softwood stands.

7.3.2.1 Commercial

The timber scheduled for commercial harvest in the district is overmature with some small pockets of mature dispersed throughout. This proposed harvest approximates the harvest schedule that was used to determine the AAC in Section 3. Since it has been nearly five years since the last AAC was calculated, a significant portion of the timber that was scheduled in the first five year period has been harvested

therefore other periods are also allocated. The allocated area represents as much as two times the actual proposed harvest. The purpose of including more area than is actually proposed is to allow for operational flexibility and inventory deviations within operating areas without having to constantly amend the plan.

There are 993 800 m3 of timber scheduled to be harvested commercially in the next five years (Table 16). Drain against the class1 softwood, class3 softwood and hardwood AAC's represents 94, 1 and 5 percent of the commercial harvest respectively. Commercial harvesting of all species accounts for 97 percent of the total proposed harvest in the district.

There are 8 commercial operations in the district with permit sizes ranging from 1 500 m3 to 60 000 m3. These operations occur manually or mechanically using conventional harvesting equipment such as chainsaws, shortwood harvesters, skidders and forwarders and are conducted year round. The more sensitive sites are usually harvested in winter and most operations are integrated utilizing sawlogs, pulpwood and fuelwood.

7.3.2.2 Domestic

There are 32 240m3 scheduled to be harvested domestically from 2011 to 2015 which represents 3 percent of the proposed harvest (Table 17). This proportion is low because there are few communities in the district. The allocation will be 12 200m3 from the class1 softwood, 7 480 m3 from the class 3 softwood and 14 760 from the hardwood AAC sources. 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 that outline the species, volume, location and utilization standards to be employed. Most cutting occurs in winter with extraction by snowmobile or ATV. Domestic permit allocation is 22 m3.

Table 16 Summary of commercial harvest by operating area in District 12 for 2011-2015

Operating Area Name	Operating Area Number	Volume (net m3) by AAC Type		
		Class 1 Softwood	Class 3 Softwood	Hardwood
Grindstone	C-12-01	0	0	0
Mary March	C-12-02	5700	0	200
Patricks Pond	C-12-03	0	0	1000
Joe Glodes	C-12-04	0	0	2000
Millertown Jct. Road	C-12-05	50 000	0	4000
Little Red Indian	C-12-06	8000	0	500
Badger Burn	C-12-07	0	10 000	0
Exploits	C-12-08	5300	0	500
Moosehead East	C-12-09	5000	0	1000
Moosehead West	C-12-10	0	0	1000
Valley Brook	C-12-11	1500	0	1000
Millertown	C-12-12	10 000	0	3000
Red Indian Lake	C-12-13	9500	0	1000
Warfords	C-12-14	0	0	500
Buchans Tower	C-12-15	6000	0	500
Wileys East	C-12-16	5000	0	1000
Wileys West	C-12-17	80 000	0	1000
303 Pond	C-12-18	0	0	2000
Harpoon West	C-12-19	0	0	2000
211 Road	C-12-20	0	0	4000
Harpoon East	C-12-21	0	0	500
Tally Pond	C-12-22	15 000	0	500
Noel Paul North	C-12-23	10 000	0	1000
Island Pond	C-12-24	40 000	0	4000
Denny's Pond North	C-12-25	50 000	0	4000
Denny's Pond South	C-12-26	75 000	0	4000
Kelly's Pond	C-12-27	117 000	0	1000
Lake Ambrose	C-12-28	70 000	0	1000
Lake Douglas	C-12-29	170 000	0	1000
Noel Paul South	C-12-30	50 000	0	500
Carter Lake	C-12-31	50 000	0	500
Victoria	C-12-32	24 800	0	3000
Bobby's Pond	C-12-33	50 000	0	2000
Jones Pond	C-12-34	0	0	2000
Selby's Pond	C-12-35	25 000	0	2000
Total		932 800	10 000	51 200

Table 17 Summary of domestic harvest by operating area in District 12 for 2011-2015

Operating Area Name	Operating Area Number	Volume (net m3) by AAC Type		
		Class 1 Softwood	Class 3 Softwood	Hardwood
Badger Track	D-12-01	0	0	2220
Badger Burn	D-12-02	0	7480	0
Joe Glodes	D-12-03	0	0	2640
Little Red Indian	D-12-05	0	0	2000
Buchans Junction	D-12-06	1000	0	200
Millertown	D-12-07	3000	0	400
Warfords Ridge	D-12-08	0	0	200
Buchans	D-12-09	8200	0	500
Wileys Brook	D-12-10	0	0	500
Star Lake	D-12-11	0	0	500
Noel Paul	D-12-12	0	0	800
Harpoon	D-12-13	0	0	500
Hungry Hill	D-12-14	0	0	800
Tally Pond	D-12-15	0	0	500
Lake Ambrose	D-12-16	0	0	500
Snowshoe	D-12-17	0	0	500
Rodeross Lake	D-12-18	0	0	500
Costigan	D-12-19	0	0	500
Sutherlands	D-12-20	0	0	500
Harbour Round	D-12-21	0	0	500
Total		12 200	7 480	14 760

7.3.2.3 Hardwoods

There is 65 960 m3 of hardwoods (birch) scheduled to be harvested for domestic (14 760) and commercial (51 200) purposes in the next five years (Tables 16 and 17). This domestic harvest of birch occurs as a mixture in softwood stands and is utilized as fuelwood. The commercial hardwood harvest is for sawlogs and fuelwood and occurs in some pure stands but mostly as residual in hardwood/softwood

and softwood/hardwood stands. There are also portions of some operating areas set aside for non-consumptive birch sap production.

7.3.3 Silviculture

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

There are two silviculture prescriptions scheduled; planting/gap planting including site preparation (mechanical, prescribed burning and/or herbicide), where required, and thinning (pre-commercial/diameter limit and commercial). Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. Full planting is required where there is complete natural regeneration failure and gap planting when a site has some desired regeneration but not enough to meet minimum stocking standards. Pre-commercial thinning is conducted on regenerating stands (0 - 25 years) to reduce the high density and concentrate the growth on the remaining crop trees thus reducing the time to harvest. Diameter limit /commercial thinning is carried out on immature stands (25-40 years) and is designed to produce a sawlog crop while salvaging any trees thinned as pulpwood or fuelwood.

Each district in the zone has unique silviculture challenges. In Districts 10, 11 and 12 these challenges include sites transitioning to alders or kalmia post harvest; and limited pre commercial thinning opportunity because stands have passed the treatment window. In District 13 challenges include more fir regeneration than spruce making the forest more susceptible to insect outbreaks, and logistical concerns due to remoteness when applying silviculture treatments.

These districts all share the common challenge of having to contend with the growing problem associated with balsam woolly adelgid. The range and severity of this insect is increasing within the province and it continues to target balsam fir trees by severely reducing both growth rates and

productivity of certain sites to the point where commercial viability is questionable. The silviculture program over the next five year period will help mitigate the impacts of this insect on sites dominated by balsam fir. As the problem with this insect is still relatively new in these districts and the extent of affected areas and rate of spread is still unknown, it is extremely difficult to identify specific areas for management at this time.

Potential silvicultural treatment areas need to undergo reconnaissance and / or intensive surveys to determine the regeneration level and severity adelgid attack. Such surveys will be conducted during this five year period but until they are completed, specific locations and treatment amounts cannot be identified. Silviculture prescriptions have been developed however, for implementation on specific site conditions. These prescriptions are described below.

Areas that are scheduled for commercial harvest or have been harvested are identified on the operating area maps and are candidates for planting or gap planting to black, white or Norway spruce. These areas will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting and the presence of adelgid. Adelgid damage evaluation will be based on damage class as described below.

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

If balsam woolly adelgid damage is less than Code 3 in adjacent stands then balsam fir will be considered an acceptable regeneration species. If balsam woolly adelgid damage is greater than Code 2 in adjacent stands then balsam fir will not be considered an acceptable regeneration species. Sites not meeting required stocking levels will be either full planted or gap planted with spruce, as required, to bring them up to minimum stocking levels.

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

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

Immature and regenerating stands have been identified within operating areas. If the regenerating species is balsam fir then the presence of a balsam woolly adelgid will be evaluated using reconnaissance surveys. If presence of balsam woolly adelgid is non existent or light (Codes 1and 2) then the balsam fir stands will be considered for thinning (pre-commercial, diameter limit or commercial thinning) but, if presence of balsam woolly adelgid is Code 3 or higher in the areas the stands will be left to develop naturally. An increasing balsam woolly adelgid presence may cause the pre-commercial thinning program to diminish over time in favour of planting. Root rot in the older pre-commercially thinned stands may make commercial and diameter limit thinning more important in the future.

Note that while a prescription approach has been employed, stands that can be potentially silviculturally treated are explicitly identified on operating area maps. Stands that are identified as scheduled for harvest and cutovers are eligible for planting and immature stands are eligible for thinning.

7.3.4 Primary Access Roads and Bridges

There are 70.7 km of primary forest access roads scheduled to be constructed in District 12 in the next five years (Table 18) to access timber for commercial purposes. All roads will be built to the specifications of the Class C-2 standard and all pertinent EPG's will be followed. In addition, secondary, operational and winter access roads will be required and will be submitted in the annual operating plan prior to the year that they are planned to be built. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before any construction is initiated.

Table 18 Summary of primary access road construction in District 12 for 2011-2015

Operating Area Name	Operating Area Number	Length (km)
Millertown Junction Road	C1205	10
Red Indian Lake	C1213	3.6
Wileys West	C1217	9.6
Tally Pond	C1222	2.8
Noel Paul North	C1223	3.9
Island Pond	C1224	3
Dennys Pond North	C1225	7.1
Dennys Pond South	C1226	6.5
Kellys Pond	C1227	3
Lake Ambrose	C1228	2.7
Noel Paul South	C1230	2.3
Carter Lake	C1231	4.6
Bobbys Pond	C1233	8.1
Selbys Pond	C1235	3.5
TOTAL		70.7

7.3.5 Activities in Protected Water Supply Areas

There are domestic operations scheduled to occur in one protected water supply areas (PWSA) in the Buchans (d1209) operating area. 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, approval under the Water Resources Act must be obtained by the Forestry and Agrifoods Agency before any commercial or domestic harvesting commences inside the PWSA.

7.3.6 Environmental Protection

7.3.6.1 Fire

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

There are fire crews and equipment stationed at Gander, Bishop's Falls, 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 Gander that are available for initial attack.

7.3.6.2 Insect and Disease

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

7.3.6.3 General Environment

The environmental protection guidelines form the basis for protecting the environment from the effects of forest activities. Commercial forest activities can have a significant environmental impact if not conducted properly. 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.

7.3.7 Surveys

Utilization surveys will be conducted on both commercial and domestic cutovers to ensure 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.

7.3.8 Information and Education

The district will continue its 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, annual participation with the Teacher Institute, meetings and National Forest Week activities.

7.4 District 13

7.4.1 Overview

This section will outline all forest activities that will occur on crown land in District 13 from 2011-2015. More specifically, all proposed harvesting, silviculture, and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail. To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in Appendix 3. This map shows all proposed operating areas so that operations can be viewed from a landscape perspective in District 13. Maps of individual crown operating areas and summary sheets are also presented in Appendix 7. 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.

7.4.2 Allocation of Timber Supply

A total of 127 811 m3 of timber is scheduled for harvest by the crown in this planning period. To put the total harvest for crown land in perspective, there is approximately 1 100 ha scheduled for harvest in this five year period out of a total of 71 400 ha of productive forest. This represents 1.5 percent of the productive landbase being harvested in the next five years and only 0.3 percent in any given year.

There will be 114 561 m3 of softwood timber harvested from crown land in District 13 in the next 5 years with 107 225 m3 scheduled from class 1 land , 7 416 m3 from class 3 land. The proposed hardwood harvest is 13 250. Table 19 details this proposed volume by harvest type and compares it to the 5 year AAC.

Table 19 Proposed softwood harvest in District 13 from 2011-2015

Class1 Softwood (5 year totals)		Class 3 Softwood (5 year totals)		Hardwood 5 Year Totals	
Total AAC	150 000	Total AAC	50 000	Total AAC	13 250
Commercial	105 475	Commercial	6 586	Commercial	8 750
Domestic	1750	Domestic	750	Domestic	4500
Total	107 225	Total	7 336	Total	13 250
Total Deviation (+/-)	-42 775	Total Deviation (+/-)	-42 664	Total Deviation (+/-)	0

Approximately 95 % of the harvest will be commercial with the remainder being domestic. There will be a deviation from the five year AAC in both the class1 and class 3 softwood land bases. In both instances the AAC will be under allocated. Presently there is no commercial activity in District 13 and none is anticipated in the foreseeable future (the next five year period). This situation could change however, if a commercial processing facility starts up; therefore enough timber is allocated to accommodate such an eventuality. The proposed hardwood harvest is equal to the hardwood AAC.

7.4.2.1 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 described 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 120 811 m3 of timber scheduled to be harvested commercially in the next five years (Table 20) with approximately 93 percent being softwood The majority of the softwood harvest is proposed for the class 1 landbase.

Normally commercial operations use conventional harvesting equipment such as shortwood harvesters and forwarders with operations occurring year round. Any operations will be integrated utilizing sawlogs, pulpwood, fuelwood or any other appropriate products.

Table 20 Summary of commercial harvest by operating area in District 13 for 2011-2015

Operating Area Name	Operating Area Number	Volume (net m3) by AAC Type		
		Class 1 Softwood	Class 3 Softwood	Hardwood
Hospital Pond	C1304	105 475	6 586	8 750
Total		105 475	6 586	8 750

7.4.2.2 Domestic

There are 7 000 m3 scheduled to be harvested domestically from 2011 to 2015 which represents six percent of the proposed harvest (Table 21). Approximately two-thirds of this harvest is hardwood. Harvesting will occur in designated domestic cutting areas and is generally conducted on a small patch cut system. Hardwoods are generally harvested from older cutovers. All domestic cutting is done under permit that have conditions attached which outline the species, volume, location and utilization standards. Cutting occurs mainly in fall and winter with extraction by ATV and snowmobile. There are no communities located in District 13. The majority of harvesting is scheduled to provide a fuelwood supply to cabin owners.

7.4.2.3 Hardwoods

There are 13 250 m3 of hardwoods (birch) scheduled to be harvested for commercial (8 750 m3) and domestic (4 500 m3) purposes in the next five years (Table 19). This domestic harvest of birch occurs as a mixture in softwood stands snd cutovers and is utilized as fuelwood. The commercial hardwood harvest is for sawlogs and fuelwood and occurs in some pure stands but mostly as residual in hardwood/softwood and softwood/hardwood stands.

Table 21 Summary of domestic harvest by operating area in District 13 for 2011-2015

Operating Area Name	Operating Area Number	Volume (net m3) by AAC Type		
		Class 1 Softwood	Class 3 Softwood	Hardwood
Red Indian	C1303	250	250	1 500
Portage Lake	C1302	250	250	1 500
Peter Strides	C1301	1 250	250	1 500
Total		1 750	750	4 500

7.4.3 Silviculture

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

There are two silviculture prescriptions scheduled; planting/gap planting including site preparation (mechanical, prescribed burning and/or herbicide), where required, and thinning (pre-commercial/diameter limit and commercial). Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. Full planting is required where there is complete natural regeneration failure and gap planting when a site has some desired regeneration but not enough to meet

minimum stocking standards. Pre-commercial thinning is conducted on regenerating stands (0 - 25 years) to reduce the high density and concentrate the growth on the remaining crop trees thus reducing the time to harvest. Diameter limit /commercial thinning is carried out on immature stands (25-40 years) and is designed to produce a sawlog crop while salvaging any trees thinned as pulpwood or fuelwood.

Each district in the zone has unique silviculture challenges. In Districts 10, 11 and 12 these challenges include sites transitioning to alders or kalmia post harvest; and limited pre commercial thinning opportunity because stands have passed the treatment window. In District 13 challenges include more fir regeneration than spruce making the forest more susceptible to insect outbreaks, and logistical concerns due to remoteness when applying silviculture treatments.

These districts all share the common challenge of having to contend with the growing problem associated with balsam woolly adelgid. The range and severity of this insect is increasing within the province and it continues to target balsam fir trees by severely reducing both growth rates and productivity of certain sites to the point where commercial viability is questionable. The silviculture program over the next five year period will help mitigate the impacts of this insect on sites dominated by balsam fir. As the problem with this insect is still relatively new in these districts and the extent of affected areas and rate of spread is still unknown, it is extremely difficult to identify specific areas for management at this time.

Potential silvicultural treatment areas need to undergo reconnaissance and / or intensive surveys to determine the regeneration level and severity adelgid attack. Such surveys will be conducted during this five year period but until they are completed, specific locations and treatment amounts cannot be identified. Silviculture prescriptions have been developed however, for implementation on specific site conditions. These prescriptions are described below.

Areas that are scheduled for commercial harvest or have been harvested are identified on the operating area maps and are candidates for planting or gap planting to black, white or Norway spruce. These areas

will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting and the presence of adelgid. Adelgid damage evaluation will be based on damage class as described below.

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

If balsam woolly adelgid damage is less than Code 3 in adjacent stands then balsam fir will be considered an acceptable regeneration species. If balsam woolly adelgid damage is greater than Code 2 in adjacent stands then balsam fir will not be considered an acceptable regeneration species. Sites not meeting required stocking levels will be either full planted or gap planted with spruce, as required, to bring them up to minimum stocking levels.

Site preparation using either mechanical methods or prescribed burning will be employed on suitable sites that have impediments to planting. On black spruce cutovers where kalmia is present, mechanical site preparation (row scarification) or prescribed burning will be used to disturb the kalmia and create

suitable microsites to plant black spruce. In fir areas, burning is a preferred treatment to sanitize the site of any existing adelgid infested trees.

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

Immature and regenerating stands have been identified within operating areas. If the regenerating species is balsam fir then the presence of a balsam woolly adelgid will be evaluated using reconnaissance surveys. If presence of balsam woolly adelgid is non existent or light (Codes 1and 2) then the balsam fir stands will be considered for thinning (pre-commercial, diameter limit or commercial thinning) but, if presence of balsam woolly adelgid is Code 3 or higher in the areas the stands will be left to develop naturally. An increasing balsam woolly adelgid presence may cause the pre-commercial thinning program to diminish over time in favour of planting. Root rot in the older pre-commercially thinned stands may make commercial and diameter limit thinning more important in the future.

Note that while a prescription approach has been employed, stands that can be potentially silviculturally treated are explicitly identified on operating area maps. Stands that are identified as scheduled for harvest and cutovers are eligible for planting and immature stands are eligible for thinning.

7.4.4 Primary Access Roads and Bridges

There are 10.3 km of primary forest access roads scheduled to be constructed in District 13 in the next five years (Table 22) to access timber for commercial purposes. All roads will be built to the specifications of the Class C-2 standard and all pertinent EPG's will be followed. In addition, secondary, operational and winter access roads and upgrading of existing road will be required and will

be submitted in the annual operating plan prior to the year that they are planned to be built. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before any construction is initiated.

Table 22 Summary of primary access road construction in District 13 for 2011-2015

Operating Area Name	Operating Area Number	Length (km)
Hospital Pond	C1304	10.3
TOTAL		10.3

7.4.5 Activities in Protected Water Supply Areas

There are no proposed activities inside protected water supply areas in District 13.

7.4.6 Environmental Protection

7.4.6.1 Fire

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

There are fire crews and equipment stationed at Gander, Bishop's Falls, St. Georges 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.

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7.4.6.2 Insect and Disease

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

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

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

7.4.7 Surveys

Utilization surveys will be conducted on both commercial and domestic cutovers to ensure 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 for balsam woolly adelgid will be done to determine suitable areas to conduct silvicultural treatments.

7.4.8 Information and Education

The district will continue its 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, annual participation with the Teacher Institute, meetings and National Forest Week activities.

Section 8 Mitigations

General

Domestic cutting has been raised as an issue throughout the zone. Prior to development of this plan, domestic cutting was limited to hardwoods and burnt timber by the former land tenure holder. For the next five years in each district in the zone domestic harvesting will be conducted in designated cutting areas strategically located near towns, communities and cabin areas. While some areas will be for hardwood only, the majority of domestic cutting blocks will be for all softwood and hardwood species. All cutting will be regulated by a domestic cutting permit which will specify the area, species, and volume to be harvested, utilization standards, and any special conditions.

Decommissioning of roads and particularly bridges has also been an issue. There has been a number of water crossing structures identified throughout the zone where safety has become or is becoming an issue due to age and condition. Concern has been expressed that randomly removing these structures will limit access to some stakeholders. While no decommissioning has explicitly been identified in this five year operating plan, it is still the intent of the Forestry and Agrifoods Agency to decommission/replace water crossing structures starting in 2011. With the exception of any major catastrophic even, any structures that are scheduled for decommissioning will be identified in the annual operating plan. Prior to implementation, the planning team will meet to review the annual operating plan

to discuss and mitigate concerns, if any, with water crossing structures that are scheduled for decommissioning.

There will be no forestry activity inside existing and proposed protected areas. A 500 m no roads buffer will be maintained around all existing and proposed protected areas.

The Department of Natural Resources (DNR) and the Department of Environment and Conservation (DEC) have committed to applying the principles of adaptive management where forest management and caribou values overlap. Both parties have tentatively agreed to assign some conflict areas for inclusion in an adaptive management study. (potential conflict areas are listed below) DNR and DEC will collaborate with academic partners to develop a detailed study design for these areas. This proposed research design will be prepared by May 1, 2011. Through consultation with academic partners and the Planning Team, DNR and DEC will assign each area to a control or treatment category (based on scientific and operational requirements). Study sites will be assigned a category no later than June 1, 2011. Forest harvesting in treatment sites will occur based on discussions between DNR and DEC, and experimental design requirements. The results of this adaptive management study will be used to inform the development of forest management-caribou guidelines that will be the basis for resolving value conflicts in future forest management planning processes.

District 11

C1124 – Sandy Lake, C1101 – North Great Rattling, C1108 – Golden Gullies
C1109 – Budgells Pond, C1110 – Nugents Pond 1, C1111 – Luffs Pond 1
C1112 – Luffs Pond 2, C1113 – Luffs Pond 3, C1114 – Great Rattling West,
C1115 – Great Rattling West 2

District 12

C-12-01 Grindstone, C-12-02 Mary March, C-12-03 Patricks Pond,
C-12-04 Joe Glodes, C-12-05 Millertown Junction Road, C-12-07 Badger Burn,
C-12-15 Buchans Tower, C-12-16 Wileys East, C-12-25 Denny's Pond North,
C-12-26 Denny's Pond South, C-12-27 Kelly's Pond, C-12-30 Noel Paul South

District 13
C1304, Hospital Pond

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 Appendices 3, 4, 5 and 6 for Districts 10, 11, 12 and 13 respectively. 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 meetings and local concerns for each district are listed below. More specific details by individual operating area can be found on the map cover sheets.

8.1 District 10

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

Concerns were raised by a local tourist establishment on the Exploit's River regarding proposed operations within Aspen Brook West (c1017) and Badger Southeast (c1011) operating areas. The Forestry Services Branch will work with the operator to mitigate these concerns. A more detailed mitigation strategy is outlined within the specific operating area sheets.

8.2 District 11

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

Beaver Pond (c1103) An outfitter is established within this operating area. A no harvest buffer will be maintained around the outfitting camp and the route to access the area has been adjusted to accommodate the outfitter's concerns – see operating area sheet and map.

8.3 District 12

- a 100 m buffer will be maintained on the T'Railway in the Badger Track, d1201, Joe Glodes, d1203, Patricks Pond, c1203 and the Mary March, d1202 operating areas

- a 100 m buffer will be left on the Victoria River in Dennys Pond North, c1225 and Dennys Pond South, c1226 operating areas. Representative stands of white birch will be maintained in these operating areas. Winter roads will be utilized where possible to avoid permanent intrusion towards Victoria River.

- a 100 m buffer will be maintained on the Buchans Highway in the Exploits, c1208 and Moosehead East, c1209 operating areas.

- a 30 m no cut buffer and an additional 70 managed buffer will be maintained on Red Indian Lake in the Red Indian Lake , c1213 operating area

- Wileys East, c1216, Wileys West, c1217, Bobbys Pond, c1232 and Jones Pond, c1234 operating areas are in the pine marten snaring and trapping area. IFWD will be consulted on harvesting activities

- Outfitting lodges are located at Lake Douglas and Snowshoe Lake in the Lake Douglas, c1229 operating area. Harvest areas will be designed to mitigate impacts on lodges in operating area.

- in Harpoon West, c1219 and 211 Road, c1220 operating areas, areas will be identified for sapwood and hardwood sawlog production

8.4 District 13

- a 100 m buffer will be maintained the Burgeo Highway in operating area c1301 – Peter Strides

- a 20 m buffer will be maintained on approved cabins in operating areas c1301 – Peter Strides, c1302 – Portage Lake, C1303 – Red Indian and c1304 – Hospital Pond

- a 20 m buffer will be maintained on NLSF trails in operating areas c1302 – Portage Lake, C1303 – Red Indian

- operating area boundary has been modified in c1304 - Hospital Pond to eliminate core caribou areas

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 penalties if work does not meet 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. 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 Forestry and Agrifoods Agency and one that must be submitted to

the Environmental Assessment Division for public review. Changes to this plan can be approved by the Forestry and Agrifoods Agency if they are:

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

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

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

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

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

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

Section 10 Literature Cited

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Newfoundland Labrador
Department of Natural Resources

Five Year Plan (2011-2015)
Zone 5
Overview Map

- Proposed Commercial Operating Areas
- Proposed Domestic Areas
- Forest Management District
- Waterbodies
- Streams
- Powerlines

Roads

- Trans Canada Highway
- Paved Public
- Unpaved Public
- Resource Road
- Historic Resource Road
- Extraction and Winter Resource
- Abandoned Railbed
- Proposed Roads

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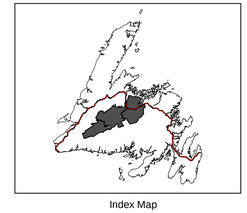
Modified Transverse Mercator
Zone 2
NAD83
December 2010



Index Map

0 2.5 5 10 15 20 25 Km

1:250,000