FIVE YEAR SUSTAINABLE FOREST MANAGEMENT PLAN

for

FOREST MANAGEMENT DISTRICT 1

(The Avalon Peninsula)

for the period January 1, 2012 to December 31, 2016

Nov 2, 2011

ACKNOWLEDGEMENTS

Concern for forest resources and the future bring individuals, groups and government departments together to chart the best possible course that can be agreed on in an open, multi-stakeholder approach. Concessions and movements have been made in consideration of all views brought to the table. Appreciation is due to all those who attended and worked toward shared understandings and levels of agreement that could be obtained, whether new members or returning members representing various interests. Appreciation is also due to staff of the Department of Natural Resources for the research, mapping, word processing and many other tasks to support the Planning Team and the preparation of this plan. May our efforts result in improved forest conditions.

Contact information:

Jason Glode
Department of Natural Resources
P. O. Box 13036
St. John's, NL
A1B 3V8
Phone: (709) 729-4180
e-mail: jasonglode@gov.nl.ca

Dave Poole
Department of Natural Resources
30 Airport Blvd, Gander
Phone: (709) 256-1416
Facs: (709) 729-4292
e-mail: davepoole@gov.nl.ca

TABLE OF CONTENTS

1.0 INTRODUCTION

Subsequent to the formation of Forest Management Districts in 1974, forest management planning began in the province in 1975 under the *Forest Management Act* (1974). Initially, a forest management plan was prepared for each district using input from government departments only. The process evolved over the following two decades through use of public meetings, questionnaires and other mechanisms up to 1995 when forest ecosystem management planning was attempted through an open, multi-stakeholder, consensus-based process. In order for this process to work, each stakeholder has to accept other stakeholders' points of view as valid and commit to work toward common solutions.

This process produced in 1997 a Forest Ecosystem Strategy Document and a Five Year Operating Plan for District 1 (The Avalon Peninsula) for 1997 to 2002. A second Planning Team similarly produced two similar companion documents for the period 2002 to 2007. These plans guided forest management activities for each period and attempted to influence actions and planning where responsibilities crossed a number of jurisdictions. Inputs from responsible agencies, outside processes, and the results of other related studies and reviews are accepted as inputs into the process.

As society has come to understand more about the holistic, integrated character of forest ecosystems, it is demanding ecosystem management as a replacement for traditional timber or other single-value management. Forests can only be managed as ecosystems if all values are managed under a single, integrated, multivalue and ecologically based plan by a single, agency/organization/collective over time scales that are consistent with the ecosystem processes responsible for resilience and sustainability (Kimmins, 2003). Kimmins further states that the forgoing is one of the pre-requisites for forest ecosystem management.

Hence, while the current Newfoundland situation is not conducive to pure ecosystem management (where the focus of management is on ecosystem health under a single agency), sustainable management (which balances economic, social and environmental considerations) is realistic. Ecologically based knowledge guides environmental concerns in one of the three pillars of the sustainable management approach. This means that a Planning Team attempts to use the best knowledge available from a variety of disciplines and a variety of levels to form an operating plan for sustainable forest management in a particular area.

Cleary and Moores, 2003, in a discussion paper on alternate approaches to forest management planning note that this province [NL] is a leader in Canada with respect to public participation and environmental assessment of forest management activities. The forest management planning process implemented today has been heavily influenced by the requirement for environmental assessment registration of a five year operating plan (Nazir and Moores, 2001).

Cleary and Moores also point that an effective land use planning process could facilitate planning and decision-making and result in less conflicts and challenges that arise during the forest management planning phase and environmental assessment review. The reality, however, is that a comprehensive

land use planning process is not in place, and resource management activities are distributed over a number of departments with limited co-ordination.

On December 13, 2005 changes in the *Forestry Act* (Govt of NL, 2005) required the preparation of a Five Year Operating Plan for each management District (based on calendar years rather than fiscal years) in the context of an overall Provincial Sustainable Forest Management Strategy which had been published in 2003. Hence the task of the current planning team is to produce a Five Year Operating Plan for the Avalon Peninsula for the period January 1, 2012 to December 31, 2016.

The Department of Natural Resource's vision, as outlined in the 2003 Provincial Sustainable Forest Management Strategy (PSFMS), is to ensure the long term contribution of our forests to the well being of the citizens of this Province. The 2003 Provincial Sustainable Forest Management Strategy set the direction for moving towards this vision. That Strategy defined forest values and discussed their viability and sustainability within the context of sustainable forest management (SFM). The Newfoundland Forest Service also adopted six guiding principles to support its vision and mission statements and these principles were designed to serve as the foundation for SFM in the province, these guiding principles were;

- Forest ecosystems are to be managed to maintain their ecological integrity, productive capacity, resiliency, and biodiversity.
- Management practices are to respect all forest land use and forest values.
- Partnerships will be fostered to provide meaningful participation in SFM.
- Economic benefits from the forest resource will be maximized.
- Adaptive management principles are to be applied in the management of forest ecosystems.
- Conservation and compliance that ensures the protection of wildlife and forest ecosystems.

Through the Zone 5 submission to Environmental Assessment during the winter 2011, the Department received input from several Environmental Groups and members of the scientific community. Generally these groups and individuals supported the Department's Vision as outlined in the 2003 Forest Research Strategy but, as did the Auditor General, they pointed out that the Department failed to live up to its commitments contained within Strategy and also that the 5-year operating plan was lacking in terms of its scientific support for many of its activities.

The Department accepts these comments and is committed to addressing the concerns of these and other stakeholders on a go forward basis. The Department notes that many of the concerns expressed through the EA process for the zone 5 plan are provincial in scope and recognizing this, we have decided that these issues will be dealt with in two ways;

1. The Environmental Protection Plan and the Sustainable Forest Management guidelines will be updated. In consultation with various stakeholders these will be reviewed and updated by March 31, 2012. The implementation of these new guidelines will begin immediately.

2. The Department will also now begin the process of revising the 2003 SFM Strategy, in preparation for the 2013 strategy (as required by legislation). The Department will soon engage in meaningful consultations with ENGO's, the academic community, the forest industry and the citizens of this Province, on this plan. We will also seek independent scientific advice on substantive policy issues respecting old growth forests, forest and wildlife habitat management, climate change, social values, and protection of soil and water.

The Department believes that many of the elements of this 5 year plan are in line with the values and objectives contained within the 2003 strategy and where values conflict we have included all the necessary protections and mitigations to allow the plan to proceed. The Department also believes that this plan will not detract in any way from meaningful implementation of new guidelines, policy changes or enhancements that will emerge as a result of its new initiatives planned for the next two years.

A Five Year Operating Plan is prepared for each of the eighteen districts in insular Newfoundland and five districts in Labrador. It sets out information respecting forestry activities in a district and provides for sustained yield forest management consistent with the sustainable forest management strategy for the province. Forestry activities include forest access road construction and decommissioning, timber harvest, silviculture, forest protection, forest management research and monitoring and conservation activities.

Sustainable use is defined as the use of an organism, ecosystem or other renewable resource at a rate which does not exceed its capacity for renewal. Sustainable forest management is defined as the management of forest resources in a manner that meets the needs of the present without compromising the ability of future generations to meet their own needs. As the Avalon continues to experience unprecedented growth and it is of the utmost that all government agencies adhere to sustainable development from forestry, agriculture, industrial development, and cabin/cottage development.

The current task is probably best seen as the preparation of a sustainable forest management plan in an environmentally sustainable way that takes into account other needs and values. The task is guided by the following vision statement reproduced from the provincial strategy (Govt of NL, 2003):

> 'The forests of Newfoundland and Labrador will maintain a sustainable balance of environmental, economic and cultural values desired by society. They will provide for viable populations of native species, sustainable yields of forest products and the creation of wealth and employment to support local, regional and provincial economies'.

Inputs into the planning process include such things as the Annual Allowable Cut (AAC) and the

Environmental Protection Guidelines (EPG). The determination of the AAC is through a separate process which examines forest description, landbase availability, no-cut buffers, wildlife corridors, protected areas and other factors as outlined in its public review process (Government of NL, 2006). Environmental Protection Guidelines were established based on extensive study, discussion and agreement of agencies responsible for various resources. These inputs and the planning process produce a document with a blend of scientific and local knowledge which are registered in an Environmental Assessment review process where agencies, groups and general public can express concerns to be considered by the Department of Environment and Conservation and the proponent.

1.1 Description of Avalon District and Forest Ecosystem

District 1 is essentially the Avalon Peninsula, east of Come by Chance as described in Appendix 2: Gazetting of District Boundary. Information on geology, soils and climate is given in Appendix 3. The surface area of the Avalon Peninsula is approximately 969,000 hectares (ha). The 628,800 hectares of Crown land included in intensive forest inventory of the Avalon is broken down, based on 2005 updates of satellite imagery and other updates to aerial photography as follows;

Land Type	**Area (ha)**
Water	55,200
Forested	162,400
Scrub	190,700
Bog	96,200
Rock Barren	27,500
Soil Barren	81,600
Agriculture	2,900
Cleared	1,600
Residential	1,600
Right of Ways	2,200
Other	6,900
Total Crown	**628,800**

Forested land accounts for some 57% of the inventoried crown landbase. The forested portion can be further divided into 26% productive forest and 31% scrub, based on its ability to produce ten cubic meters per hectare of timber (if one were to consider a timber volume measure). Appendix 4 contains further information on drainages, peatland and ecological land classification on the Avalon. It is important to note that the productive forested area is less than 20% of the area of the Avalon and that forest operations would occur on less than 2% of the productive forest landbase annually.

An ecosystem can be defined as a group of organisms interacting with themselves and their environment. The forests of the Avalon, indeed as of the province, are part of the larger boreal forest ecosystem. Boreal forest species have evolved over millennia from catastrophic events such as fire, insect outbreaks and wind throw which occur in the Avalon boreal forest in periods of usually less than a century, as evidenced by forest age class distribution.

The growing season in the Central Avalon is the longest in the province at 190 days (Robertson et al, 1993) and soils are better in terms of topsoil depth and finer textures on some parts of the Avalon (Page, 1971; Roberts 1983), than in many parts of the province. This is particularly true in sheltered valleys of the Avalon. While stoniness and rolling topography are two of the limiting factors for agriculture, they are not limiting for coniferous tree growth. Soils are acidic and drainage often poor on fine textured bottom slopes resulting in dense, slow-growing black spruce and balsam fir forests at these sites. At mid-slope conditions with fine textured soils, balsam fir trees on the Avalon have among the largest diameters in NL; however, height is frequently lower, particularly in exposed areas.

The Avalon naturally contains all tree species that occur in insular Newfoundland with the exception of red pine and black ash. The forests however are dominated by balsam fir, black spruce and white birch. Wilton, (1956) reported that white pine on the Avalon was of considerable importance but cutting and disease had reduced this species to a rarity. Eastern larch (juniper) declined throughout eastern North America in the late 1800's (Roberts and Van Nostrand 1995) but is becoming common once again particularly on exposed mineral soils or poorer sites.

Rarely does productive forest extend above the 500 foot (150 m) elevation on the Avalon. Approximately 55 % of the more productive forests, in the terms of growth, occur on mineral soil representing about 10 % of the surface area of the Peninsula (Wilton 1956) notably in the Avalon Forest Ecoregion.

The plant community and its structure largely influence wildlife habitation of an area. While some animals are generalists and can occupy a wide range of habitat, certain seasonal requirements of these species can be habitat specific (e.g., moose / caribou wintering areas where suitable combinations of browse and cover are required). A variety of forest age classes can provide increased habitat and sustainability for some wildlife species while others require a specific age class or condition for maintenance.

Forest types are recurrent patterns of forest vegetation and soils that react similarly to disturbance and silvicultural treatment. Using tree cover, ground vegetation and soil characteristics, accurate projection can be made on forest succession, productivity, wildlife habitat, operational concerns and silvicultural prescriptions including regeneration capability for each forest type.

In 1989, Meades and Moores published a field guide to the Damman Forest types of Newfoundland. The balsam fir forest types of the Avalon are stable (ie. they naturally come back to the same forest type) following cutting, insect infestation and windthrow but, after disturbance by fire, often go to spruce or hardwood forest types. Spruce types generally go to another spruce type following fire, but after cutting to a more open spruce type or heath in the absence of silvicultural treatment. Soil characteristics may be the cause for some barren/heath development following a disturbance and from a silvicultural stand point may require scarification to make them productive. More information on forest types and successional pathways is provided in Appendix 5.

1.1.1 Factors That Have Influenced Forest Conditions

The boreal forest, of which the forests of the Avalon are part, have evolved in concert with fire, insects and wind throw which are the main agents that recycle our forests. These agents leave stands regenerating with the same age of trees although these trees can have quite different diameters or sizes as the stand develops. There is generally a mix of forest stands of different sizes and stands of different ages over the landscape. Human interventions in the forest have often ignored natural dynamics, and have left a forest that often does not equate to the natural model. This is quite evident on the Avalon which has sustained the highest human population and therefore the greatest pressure on the forest resources since European contact.

Historically, fire and insect infestation have been the agents that cause widespread mortality in the forest. Since the 1600's over 163 000 hectares have burned involving in excess of twelve hundred fires (Wilton and Evans, 1974). Most of the Avalon has burned at one time or another with the most recent large scale wildfires occurring on the Bay de Verde Peninsula and the Southern Shore in the 1960's. The Spread Eagle fire was the largest fire on the Eastern half of the island in 1999. After a fire, forest regeneration is usually successful; however, repeated burning of certain areas of the Avalon caused a loss of available seed source as well as soil degradation which, combined, resulted in failure of tree regeneration and invasion by ericaceous shrubs and low ground vegetation. Over 80 000 hectares of the Avalon Peninsula that were once forested are currently in heath condition.

Recording of insect outbreaks began in the early 1900's and severe hemlock looper outbreaks occurred in 1920 - 1926, 1968, 1972, 1983 and 1986 (Otvos et al, 1979). The first spruce budworm outbreak was recorded in Bell Island in 1942 and spread to other parts of the Avalon by 1947. A major spruce budworm outbreak occurred from 1978 - 1982 with a high of 69 000 ha of severe defoliation in 1979 (Otvos and Moody, 1978). Parts of the Trinity Shore, the Northeast Avalon, Southern Shore and Central Avalon were most affected. Periodic outbreaks of the hemlock looper have caused balsam fir mortality throughout the Avalon. Severe insect outbreaks generally cause mortality of Balsam fir stands and areas of tree mortality may range in size from 0.25 ha up to hundreds of hectares. Forest regeneration after

insect infestation is usually successful and the new stand is generally composed of species that comprised the previous one.

Wind damage occurs periodically dependent on climate factors, amount of mature forest (60 yrs +) and recent forest history. Boreal forest tree species are typically shallow rooted making them prone to wind damage. Windthrow generally tends to be relatively small scale unlike fire or insect damage, however severe wind events can be significant and when combined with insect damage forests the effect can be drastic. The most recent severe wind damage occurred in 1994 - 95 with approximately 4650 ha of mature and senescent forest windthrown on the Avalon Peninsula.

The introduction of moose to the province in 1904 has provided us with a remarkable example of population growth in the absence of major predators. From a founding population of only four animals, moose numbers in insular Newfoundland now exceed 150,000. This growth however has not been without growing pains. In the late 1950's it was reported that moose densities in Central Newfoundland had grown to a level whereby they were depleting their food resources to a seriously low level. On the south coast a major decline in the moose population was directly attributable to over browsing of their range. The moose has provided many benefits to Newfoundlanders and is now part of our ecosystem. Moose was first reported on the Avalon in 1941 (Pimlott, 1953). Moose should not be managed as a premier species but as part of the ecosystem. In areas of the Avalon where moose browsing is severely impeding the growth of hardwood, softwood and other native flora, a feedback mechanism should be emplaced to provide those setting quotas with data necessary to ensure a healthy moose population is maintained and that the integrity of the habitat is not compromised. Currently there is a significant lack of hardwoods growing to maturity as their growth is being curtailed at an early age through browsing. In fact most birch barely even establish before they are browsed by moose/rabbits. If seedlings are protected from browsing (exclosures) there are no other factors limiting growth.

Ecoregion V (Central Avalon) has been spared the ravages of fire that decimated the surrounding landscape because of an excessively moist climate (Meades and Moores 1989). The development of the extensive heath landscape in Ecoregion VI (Maritime Barrens) was precipitated by indiscriminate burning by European settlers.

Human use of the forest has also influenced development through cutting and burning. Fuelwood cutting has been a common practice since European settlers arrived on the Avalon. This common practice involved small clearcut patches, usually less than one acre in extent (Wilton 1956). There was clearcutting of young stands for pitprops from the 1930's to 50's, pulpwood shipped to the AND Company in the early 1950's, clearcutting for pressboard production from the mid - 1950's to 1980 and approximately four million board feet (fbm) per year of lumber produced at that time (the latter largely by selective logging). Much of the early cutting was concentrated along waterways and the reaches of watersheds where water driving was possible. Contractors for Newfoundland Fiberply cut areas in

Salmonier, Windsor Lake, Island Pond Ridge, Spread Eagle and other areas of the Avalon. Current lumber production approximates 1.7 million fbm from crown land and 500,000 from private per year from timber harvested on the Avalon. Commercial operations ensure timber is fully utilized in local markets. Large diameter wood is used for lumber and pallet production, small diameter wood is sold as fuelwood, slabs from sawlogs are also utilized as fuelwood, and many operators sell sawdust and shavings to the farming industry for bedding.

All these natural and human induced events have influenced the forest condition and productivity of the Avalon forest ecosystem. Avalon forests are resilient and regenerate to the original forest after disturbance (Meades and Moores 1989). Of course moose and rabbit populations now heavily influence regeneration patterns. Using an age-class distribution graph, Figure 1, the forest ecosystem is divided into specific age-classes. The data is based on 1995 photography, annual inventory updates, and adjusted for current time frame. As the forest grows it moves to the right into older age classes, until it returns to the first age class following disturbance. The age class distribution is one tool used to capture current forest development patterns.

Figure 1. Age class distribution of productive forest for the Avalon Peninsula.

1.2 Past Activities

Activities of the elapsed portion of the last Five Year Operating plan for April 1, 2002 to March 31, 2007 were conducted in accordance with principle and strategies provided in that plan. Activities are

summarized in the following text and tables with more detail provided in annual reports.

The annual allowable cut was established in 2007 as 52,000 m3 (class I) per year (Table 1). Commercial cutting remained relatively consistent with the exception for years where developments such as the Torbay by pass, CBS bypass and the Vale INCO project occurred. Domestic harvest fluctuated with the rise and fall of fuel prices. The percentage of total cutting changed from 40% and 60% (2002-2006) for commercial and domestic respectively to 20% and 80% respectively (2007-2011). One of the largest factors influencing the decline in commercial harvest is the increase in commercial harvest from development projects and the result of market changes from the closure of the Abitibi Bowater mill.

Table 1. Crown timber harvest for the plan period 2002 to 2007 [m3 gmv and (m3 nmv)]

Year of Cut	Commercial (n)	Domestic (n)	Total volume cut (n)
2007	12,129	33,568	45,697
2008	5,726	41,528	47,254
2009	11,143*	36,120	47,263
2010	5,935	32,736	38,671
2011**	7,000	33,000	40,000

* 4956 m3 part of Long Harbour development
** projected

As shown in Table 2 silviculture treatments continued to concentrate on planting and thinning of natural forest regrowth, while scarification began in the plan period to increase the density of hardwood regeneration in attempt to mitigate browsing effects. Thinning is divided into pre-commercial thinning and commercial thinning depending on the size of stems thinned.

Table 2. Silviculture Treatments (ha) 2002 -2007

Treatment Year	Planting	Pre-commercial thin	Commercial Thin	Yearly Total
2007	91	0	0	91
2008	284	0	0	284
2009	0	40	0	40
2010	289	50	0	339
2011*	65	40	20	140

*Based on projected funding and Annual Operating Plan

Table 3 summarizes road construction by the Department of Natural Resources over the past five year period.

Table 3. Access Road Construction and Decommissioning (km.)

Year	New Construction Dept. Natural Res.	Re-Construction	Decommissioning
2007	3.8	0	0
2008	2.0	0	5.2
2009	2.0	0	2.0
2010	3.5	0	1.0
2011*	3.0	2.0	4.5
Five year total	14.2	2.0	12.7

* based on projected funding and Annual Operating Plan

Surveys continuing in the plan period included utilization, lichen, road decommissioning, hare, ptarmigan, and creel and rare plant surveys.

Table 4 shows the number of wildfires and area burned in the period. Most fires were contained to less than one hectare in size. The largest fires in the period annually burned in the range of ten to twenty-five hectares each.

Table 4. Wildfire Summary

Year	Number of Fires	Area Burned (ha.)
2007	31	46
2008	28	61
2009	95	290
2010	12	6

1.3 Previous Mitigations

Under the previous five year operating plan, DNR committed to ensuring it was meeting all the conditions associated with the release from Environmental Assessment. On an annual basis activities in the annual operating plan ensured concerns raised during the five year planning process were being addressed. Appendix 11 identifies the linkages between the five year sustainable forest management plan development/approval and the annual operating plans. It outlines specific concerns that were raised during the planning process and through each annual operating planning period these issues were being addressed. In addition there are further details describing mitigations that were in place to address concerns expressed through the planning process.

Over the life of the last plan additional work was completed to improve and adapt management options. This included work focused on road decommissioning, browsing effects, and managed stand assessments.

A road decommissioning study has resulted in our efforts to improve the ability of roads to limit access and regenerate more successfully. A trial of a product that has shown to be successful in preventing browsing was tested on a number of differing sites and the results were negative. DNR will continue to test alternative methods for improving successful regeneration in areas experiencing heavy browse. Also in the last couple operating seasons DNR has focused on new technology for assessing the rate of decay and decline of managed stands in FMD1. This work is ongoing and is improving the ways we manage these stand types from initial thinning to final harvest. Greater detail will be discussed in other sections.

1.4 The Planning Team

The Planning Team is not selected as participation in the process is open and voluntary for groups, organizations, or individuals. DNR encourages anyone who is interested to participate in the planning process. In order to ensure a wide variety of interests and participation in this current five year plan development, the Department informed the public of their intent to develop a plan through a public planning team process by advertizing with main media outlets (newspaper and radio) including the Telegram, NTV, VOCM and CBC as well as the Government new release website. In addition to this DNR ensured advertisement in all local community newspapers throughout the Avalon Peninsula. Finally informational emails to former planning team members and notification was issued to individuals or groups that have shown an interest in providing input into the plan.

The task of the planning team was to modify, add or subtract from the framework plan as provided by the Department of Natural Resources through a consensus approach. Using guidelines, relevant information, and ground rules established by DNR and agreed to by the entire planning team, a plan was developed that is intended to satisfy the needs, hopes and goals of everyone involved. While sometimes it is not possible to accommodate everyone, the goal is to provide a Five Year Operating Plan that, although not perfect, will satisfy most of the groups/individuals most of the time.

The final task of the planning process was to provide a level of endorsement for the plan from full endorsement to full opposition along with each individual's reasoning. Although that is the final task in the planning process, their work is still not finished. A smaller workgroup is established as a monitoring committee to meet annually for updates and a field trip. The annual meeting is used to determine the effectiveness of the plan and to ensure that the objectives of the original planning team are met and that the Department of Natural Resources are following the guidelines as set out in the Five Year Plan.

1.5 Overview

District 1, the Avalon Peninsula, is the third largest in surface area on the island of Newfoundland. It contains approximately half the human population of the province and therefore records the most wildfires, human-animal conflicts, complaints on illegal activity and referrals for allocation of crown land.

Loss of productive forest land to competing land uses (such as cottages, agriculture, residential, roadways, quarrying and other commercial use) on both crown and private land is probably the greatest threat to forestry and conservation. Although differences in the periodically inventoried area preclude direct analyses of losses, in terms of crown land in general from 2007 to present, approximately 838 ha of new Crown land titles per year were issued, totaling 3,773 ha, of which 42% (1,600 ha) was for the Vale INCO Long Harbour facility. Many titles were issued in areas that would not have realistically affected the productive forest base. No issuances of new titles on areas identified as productive forest, silviculture, commercial or domestic cutting areas would have occurred without referral to Forestry Branch.

The rate of forest land alienation may continue to increase in the current plan period with the continued demographic shift in the island's population towards the Northeast Avalon and with attempts to satisfy expanding cabin development areas and agriculture development. The land base erosion represents a threat not only to sustainable timber and habitat production, but also to the myriad of values people hold of the forest and to the ecological functions that forested land provides.

Conversely, opportunities exist for value added timber products and non-timber forest products which can be integrated with sustained timber production. Institution of some form of land use planning or the designation of reserves for forestry and ecological purposes can bring more certainty for the long term. Utilization of woody material currently below merchantability standards can be applied to domestic heating and other energy needs, and simultaneously provide economic opportunity and employment.

The forests are a valuable and renewable natural resource. Sawmillers and other forest operators have contributed to the rural lifestyle and economy of the Avalon for generations, and they require assurance that sustainable forest operations are secured for future generations in balance with environmental and social considerations. These three realities are recognized in the sustainable forest management approach. Sustainable forest management is both a challenge and an opportunity for the present and for the future as reflected in Planning Team discussions.

Large scale topographic maps provide an overview of areas and activities referenced in the text in accordance with the discussions of the Planning Team.

2.0 RESERVES

Forest Ecosystem Strategy Documents of 1997 and of 2002 for the Avalon detail a wide range of resource values and uses which are included as Appendix 6. Wilderness and natural areas are highly valued and must contain a variety of wetlands, representative areas and unique areas. The 2002 Strategic Plan further recognizes that protected areas provide a benchmark to measure and guide management decisions (Planning Team, 2002).

The Avalon Peninsula contains three of the nine ecoregions in Insular Newfoundland, as outlined in Appendix 4. The Provincial Sustainable Forest Management Strategy of 2003 commits the Department of Natural Resources to work with the Department of Environment and Conservation to recommend protected areas that will provide adequate representation of each ecoregion (Govt of NL, 2003). The Natural Areas System Plan under the responsibility of the Department of Environment and Conservation recommends a plan of proposed protected areas for the province. The Natural Areas Systems Plan is a "coarse filter" which represents the broadest level of protection and is intended to allow for major ecosystem types, habitats and species which utilize large areas.

Areas proposed for forest management activities in this operating plan avoid all existing reserves and reserves currently proposed under the Natural Areas Systems Plan for ecological reserve status, as advocated by the Parks and Natural Areas Division of the Department of Environment and Conservation and the Wilderness and Ecological Reserves Advisory Council. Nevertheless, there is a need to address preservation of natural ecological functioning at the various levels in order to ensure that forest operations are sustainable. Natural retention will ensure networks and corridors of contiguous forested habitat are maintained in the Avalon Boreal Forest.

Levels of protection such as landbase planning, pre-operational surveys, appended principles guiding this plan, and the application of the Environmental Protection Plan are discussed in Section 4 Protection.

An ad hoc sub-committee of the first Planning Team (for the period 1997 to 2002) recommended establishment of a Forest Reserve in the Central Avalon which would allow forest operations and other activities to continue, but restrict construction of permanent roads and cabin development in the proposed area. The proposal received widespread support and was submitted to the Interdepartmental Land Use Committee, ILUC, (Wells, 2000) where opposition from a number of agencies did not allow the proposal to proceed. It is not the mandate of the District 1 planning team and planning process to establish reserves. However through the process planning team members felt that given the significant pressure on the land base this type of proposal still holds value going forward. The planning team decided to take their concerns and advocate for this type of planning on their own behalf.

In view of removals of forested lands for other land uses as outlined in the previous section, some security of a long term forest landbase is required, not only for timber production, but for wildlife and the myriad of other values and services a managed forest provides. As a minimum, areas where forest management and silviculture systems have been applied should be reserved as part of a long term forest landbase.

3.0 OBJECTIVES AND OPERATIONS

The concept of sustainable development (including its subset, sustainable resource management) has achieved near universal recognition as a functional and operational principle that provides guidance in formulating decisions within a wide range of management and policy issues (Emmett, 2006). An overall objective of this plan is to manage the Avalon District forest resources for the benefit of all users such that it will provide these benefits perpetually (Planning Team 2002). Operational activity is presented in the following four sections within the overall context of the Provincial Sustainable Forest Management Strategy and in accordance with the Environmental Protection Plan.

3.1 Allocation of Wood Supply and Harvesting

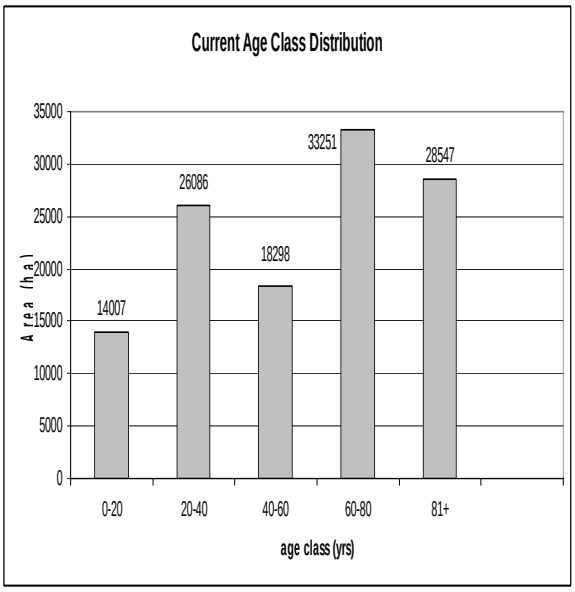
It is a policy of the Government of Newfoundland and Labrador to ensure that timber harvesting in this province is conducted in a sustainable manner (ie. harvesting will not exceed established AACs) (Government of NL, 2006). The term annual allowable cut (AAC) is commonly used to express the quantity of wood that can be cut in a sustainable manner that preserves the young growing forest and allows for harvest of those stands deemed eligible for cutting.

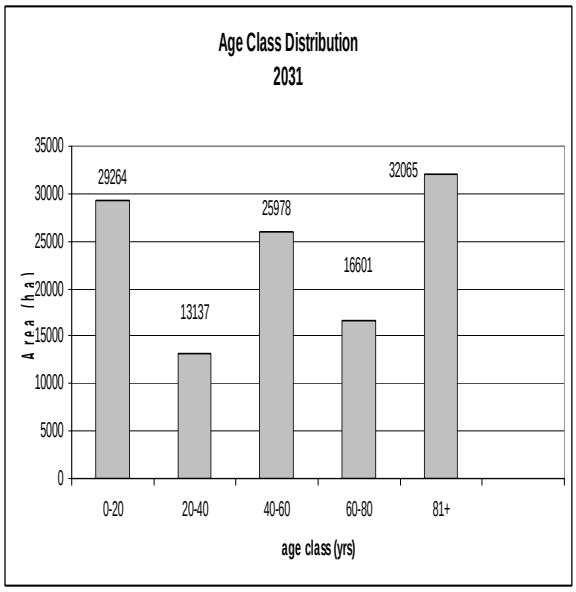
Forest inventory assigns to all forested land a typing that describes its tree species composition, age, height, tree crown density, site quality and the area of individual stands. Each stand follows a growth curve, natural or managed, for that particular classification which projects the volume and associated characteristics over time and allows for harvest or other silvicultural treatment of eligible stands at specified times or conditions.

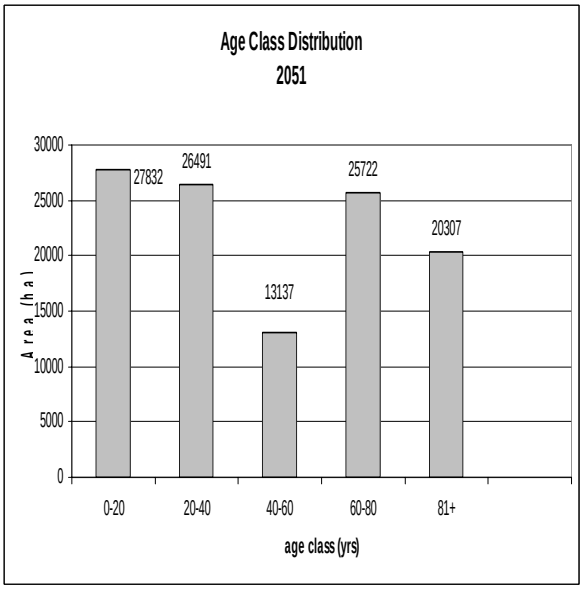
This sustainable wood supply is determined through use of computer models WOODSTOCK and STANLEY applied on a forest management district basis to project forest development and characteristics over a 160 year period. Other inputs or constraints in the modelling include;

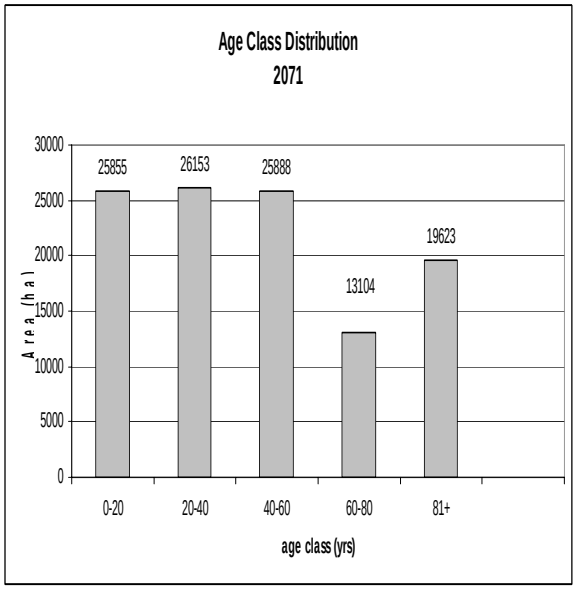
- a minimum of 20% of the forest must be older than 81years +
- operable growing stock no less than twice the level of a five year harvest
- cutting of poor sites not exceeding the proportion of poor sites in inventory
- Losses to the productive forest land base approximately 240 hectares per year
- Silviculture treatment levels at 60 ha annually of planting and 40 ha annually of pre-commercial thinning.

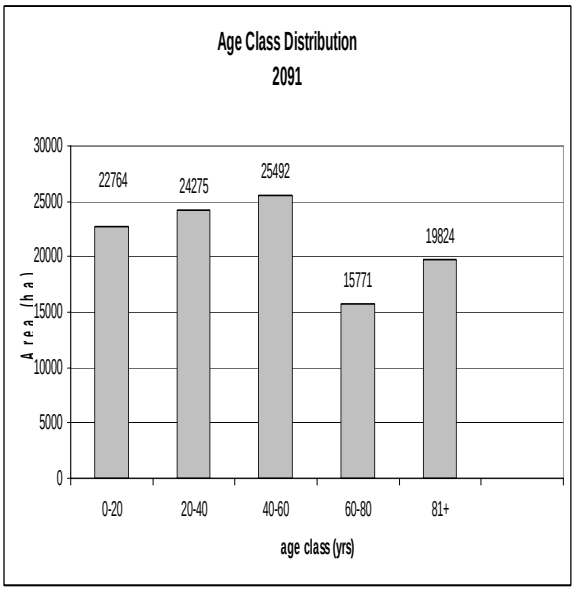
Figures 2(a) to 2(f) show how the forest age class structure develops over time. Harvest of a mature or senescent stand brings it back through natural regeneration or planting to an immature condition (0 to 20 years old or “age class 1”) where it starts to grow back until the next harvest. Similarly each age class moves up and eventually returns to age class 1. Stands that are not cut are cycled though their life by other agents. Although a perfectly regulated age class structure is not obtained, age class imbalances are reduced over the extended period.

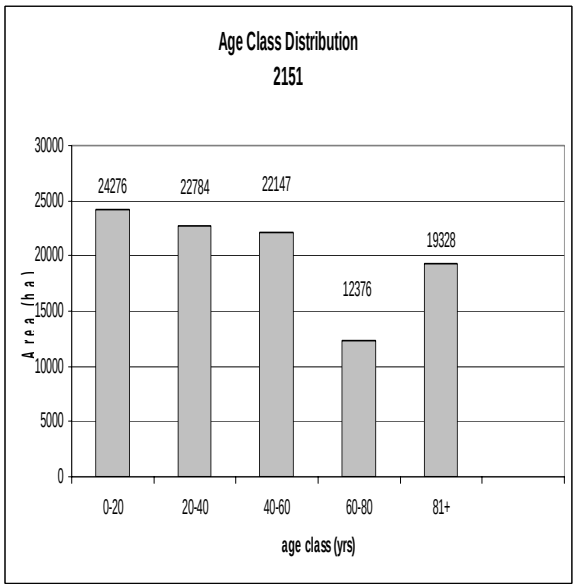












Figures 2 show current age class distribution and projected age class distributions at 20, 40, 60, 80 and 140 years into the future.

Wood Supply Analysis, Public Review (Govt of NL, 2006**)** provides further detail on the process, and categorizes AAC's as Land class I (available for harvest), Land class III (partially available for harvest) and a hardwood AAC. AAC's were subsequently determined (Sutton, 2011) for District 1, the Avalon Peninsula to be 77,010 m^3nmv/yr (Landclass I), 9,789 m^3nmv/yr (Land class III) and 256 (Hardwoods) m^3nmv/yr. The Land class III AAC categorized as partially available due to operational limitations is located in very remote, steep, coastal and inaccessible areas. A negligible amount of this volume is available for harvest. Cutting of hardwood species is not permitted within the district over the life of this plan except under right of way clearing or exceptions may be made for trial purposes. The AAC for the next five year planning period is 77,010 m^3 nmv/yr. This represents an increase over the past AAC in the previous five year operating plan. This increase is attributed to under harvest of commercial volumes over the past five years, benefits from silviculture activities, the lack of spatial reductions on domestic harvest areas, and a decrease in inventory deductions for timber utilization. The decrease in inventory adjustments is the result of recent work by the Department to more accurately quantify volume losses. The department will take a precautionary approach going forward, maintaining current allocations and domestic harvest levels, continuing to build information for inventory adjustments.

Timber demand remains heavily weighted towards domestic consumption. The AAC is projected to be utilized on an 80%: 20% ratio, domestic to commercial. This of course is subject to change based on a number of variables. Appendix 7 describes graphically, and in text, information on timber demand since Forest Management Districts were established.

Principles on allocation of wood (included as Appendix 14) relate to the subdivision of the Avalon and to ensuring that cutting does not exceed the maximum sustainable levels in each zone. Table 5 shows the

situation with respect to net Landclass I AAC's specifically in each of thirteen zones which were established based on ecoregion, sub-region, and watershed areas used by Environment Canada and geographic divides. Although current harvest is in line with the sustainable level of cutting District-wide, some areas continue to be overcut and require alteration in approach. Landclass III, which is generally in lower volume and extremely remote areas, can provide a minor degree of relief to domestic and commercial operators under specific and regulated conditions within the prescribed limitations. However, total harvest from all sources must not exceed total the AAC.

Principles on cutting (Appendix 15) generally apply to domestic and commercial harvesting. However, alterations in cutting patterns, retention of hardwood and other restrictions have been more effectively implemented with commercial operations where pre-harvest plans and monitoring of individual permit holders are in place. Similarly, redirection of cutting to remote areas of blowdown has been more effective with commercial operations.

Table 5. Average demand (2007 to 2010) and sustainable supply of crown timber by ecoregion and submanagement unit (zone) in Forest Management District 1.

Ecoregion/ submanagement unit (Zone)	Demand (m^3) Domestic (net m^3)	Commercial (net m^3)	Total harvest (net m^3)[1]	Total harvest (gross m^3)[2]	AAC (m^3)	Surplus deficit (m^3)
Avalon Forest						
A. Central Avalon North	1,815	540	2,355	3,015	4,307	1,292
B. Central Avalon South	1,195	2,686	3,882	4,969	16,778	11,810
Maritime Barrens						
C. Eastern Shore St. Mary's Bay	2,281	0	2,281	2,919	3,247	328
D. Southern Shore	2,849	80	2,929	3,749	4,716	967
E. Northeastern Avalon	2,256	764	3,021	3,866	4,175	309
F. Eastern Shore Conception Bay	1,554	930	2,483	3,178	6,186	3,007
G. Eastern Cape Shore	913	0	913	1,169	2,320	1,151
H. Western Cape Shore	1,643	25	1,668	2,135	9,278	7,144
I. Bay de Verde Peninsula West	9,129	456	9,585	12,268	11,753	(516)
J. Bay de Verde Peninsula East	5,675	100	5,775	7,392	1,933	(5,459)
K. Isthmus	4,246	2,726	6,972	8,924	9,974	1,051
Eastern Hyper – Oceanic Barrens						
L. Trepassey	1,646	0	1,646	2,107	2,320	212
M. Cape St. Mary's	0	0	0	0	232	232
Totals	**35,202**	**8.306**	**43,508**	**64,561**	**77,219**	**21,529**

1. Net cubic volume of wood before adjustment for poor utilization and under-reporting.
2. Gross cubic volume of wood adjusted for poor utilization and under-reporting.

Estimates of blowdown in the 1990's were in the range of 4,650 hectares, mostly in the Ecoregion V (otherwise known as the Avalon Forest or Central Avalon). Significant amounts of blowdown also occurred on the Southern Avalon, including the Avalon Wilderness Reserve. Estimates of areas of blowdown still considered operationally usable are in the range of 1,000 hectares, mainly in the Avalon Forest. Consideration should still be given to volume increases to salvage of remote areas of blowdown; however, regular permit volumes in areas of standing timber should not be exceeded.

Silvicultural systems, including cutting, should be geared to even age stand development, as occurs naturally, and cut sizes in productive forest areas should reflect the naturally occurring stand size distribution as shown in Figure 3 (ie. 50% of stands less than 10 hectares in area). Currently 90% of cutover sizes are less than five hectares in size (Figure 4) which is actually resulting in a more fragmented forest than would naturally be found. Monitoring of cut sizes should also include levels of browsing at different distances from edges with a view to mitigation of browsing on native species.

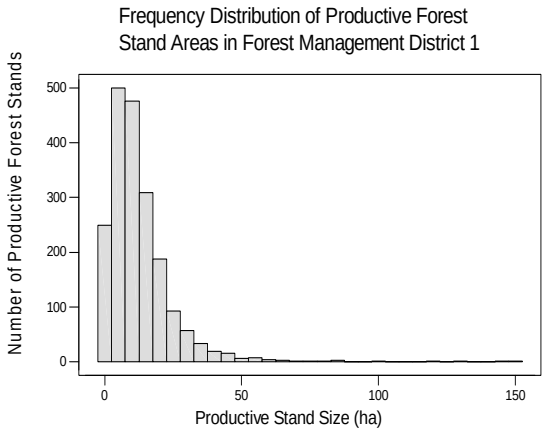


Figure 3. Stand sizes

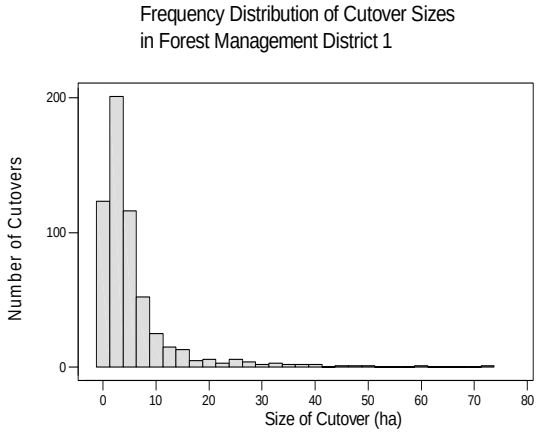


Figure 4. Cut sizes

Table 6. Stand size distribution and cumulative area of productive forest.

Stand size (ha)	Number of Stands	Total Area (ha)
0-5	48,378	93,916
5.1-10	5,550	37,903
10.1-15	1,343	16,117
15.1-20	461	7,887
20.1-25	221	4,904
25.1-30	142	3,857
30.1-35	67	2,165

35.1-40	42	1,562
40.1-45	30	1,283
45.1-50	22	1,054
50.1-55	9	472
55.1-60	11	636
65.1-70	4	246
70+	23	2,197

Table 6 shows cumulative areas of stand sizes by groupings taken from updated 1995 photography.

Cutting at the level of the AAC corresponds to approximately 1,000 hectares per year and, due to natural topography and to traditional cutting patterns would be spread over an excess of one thousand stands within scheduled cutting areas.

Overview maps 1 and 2 show proposed domestic and commercial cutting areas at 1:250,000 scale, and are available in binders of mapping at the 1:50,000 topographic scale and 1:30,000 covertype scale registered with the Environmental Assessment Division and maintained at the Paddy's Pond office.

In terms of commercial operating areas there has been very little change from the previous five year plan. There have been modifications to operating areas that have seen activity in the past five years and there has been the addition of a new area for the purpose of salvaging blowdown and restoring productive forest. For the most part domestic cutting areas have remained unchanged for approximately 20 years or more. For this plan there are modifications to domestic areas with the most significant changes occurring on the Bay De Verde peninsula. These modifications or opening of new areas also mean closing of older areas and the department will focus on ensuring the successful regeneration of these stands.

In addition to regular domestic and commercial areas an older red/jack pine plantation on the Bay De Verde peninsula has been added as a domestic pine reserve. The plantation has begun to break up and contains a significant amount of dead down and standing wood. The intent is to allow domestic harvest of the blowdown and standing dead timber. Environmental protection guidelines will be followed and snags for cavity nesting species will be maintained.

3.2 Silviculture

Silviculture systems which emulate even aged conditions are the seed tree, the shelterwood and the clearcut systems. Seed tree and shelterwood are used in areas where there are regeneration problems in getting enough trees back on a site following disturbance and where wind is not a problem for trees which are left. The clearcut method is used where there are adequate amounts of natural regeneration

and where wind may or may not be a problem. The forests of the Avalon almost invariably regenerate to an overstocked condition except where moose and rabbit populations are significantly high. This is the largest impact on natural regeneration of forests on the Avalon at the moment.

Selection cutting is a system applied to uneven aged stands. It requires trees of all ages (not all sizes) or at least three distinct age groups well distributed throughout a stand. Biologically, it is suited to trees that require partial shade to establish, grow or compete and to species that have deep rooting systems able to withstand increased wind on established trees. Selective cutting is a different term (as opposed to selection cutting) used when individual trees are removed from older even aged stands which are basically finished growing and do not have all ages present or species conducive to uneven aged management.

Selection thinning (commercial thinning) is a term used where selected stems are removed from young even aged stands to encourage the growth of the remaining stems. The condition of the growing stems which are left is the primary concern. It must be stressed, though, that after a number of thinnings the stand would be cut if natural mortality of the stand were to be avoided.

Cutting of mature and senescent stands uses trees which would otherwise experience mortality through fire or other agents of disturbance. It is important in cutting those branches and tops of stems which are utilized are left on site, as this is where the trees' nutrients are concentrated. Nutrients which are locked up in the cold soils of Newfoundland become available and cycled more quickly with higher temperatures when tree cover is removed, but nutrients in the soil must be replaced with those from branches and tops which are left to decay.

The biology of boreal overstory species (ie. relatively short lived, prolific seeders, grow best in full sunlight, naturally occur as even aged stands) indicates a silviculture or harvesting system in concert with these attributes is best suited to cutting and renewal of these species. Such a system is clearcutting. Clearcutting is defined as removal of a stand in one cutting with reproduction by small seedlings already on site, by planting or by seeding from adjacent stands. Unfortunately, the appearance of a fresh clearcut is not aesthetically pleasing and, if not applied correctly, other values may not be safeguarded. Systems recommended on the Avalon are a modified clearcut for mature and senescent stands, and a selection thinning for younger, growing stands.

Modifications to a basic clearcutting system include restriction on cut sizes, use of leave trees for nesting, perching and other wildlife purposes, and other green tree retention mainly for seeding purposes where birch and spruce are present. Balsam fir seedlings are established prolifically on the ground before a canopy is removed and species with lighter seeds, such as birch, are dispersed mainly by wind and establish on exposed mineral soil. The forests of the Avalon almost invariably regenerate to overstocked conditions; however, due to heavy browsing pressure on natural regeneration, scarification

trials under seed trees have been attempted to increase hardwood regeneration to densities that will hopefully allow adequate numbers of hardwoods to achieve free to grow condition. The management of prolific balsam fir regeneration and of fir dominated stands is a challenge because fir is the preferred host of a number of native and exotic insects, is heavily browsed and it is highly susceptible to butt and stem rots. Increasing the proportion of other tree species in regenerating stands assists in an integrated pest management approach while increasing forest values.

The regeneration of dense softwoods that are self-thinning is part of the natural cycle that allows trees to compete for light and gain height in a relatively windy landscape. Over-stocked is a silvicultural term used to describe the natural cycle of these forests in terms of implications for growth rates and rotation age. A vast majority of domestic and commercial harvests in FMD1 follow a natural cycle of this nature post harvest. Silviculture is practiced primarily to ensure all forest sites have adequate regenerating trees following disturbance and that the trees are in a condition to provide optimum growth for fibre and habitat production. Forest stands on the Avalon which regenerate profusely (and have been able to attain free to grow status) are thinned at various stages of development. Pre-commercial thinning (PCT) is done before trees become merchantable, although waiting until height growth attains 3.0 meters appears to extensively mitigate moose browsing. Subsequent thinnings may be done up to an approximate age of forty years after which growth benefits of thinning are greatly reduced.

Sites typically planted have been fir forest covertypes that have burned. There has been a significant increase in area planted following disturbance on the Avalon. These sites are predominately salvage areas of blowdown. Due to moose browse, black and white spruces are planted to enable fir to gain establishment and plantation maintenance provides the opportunity to adjust species mixtures going forward. Planted sites can produce higher timber volume yields depending on tree species planted and densities. Judicious planting of species such as White Spruce, Norway spruce and Japanese larch can significantly increase timber production. Depending on site conditions, various mixtures of these and native species such as black spruce, eastern larch and white pine are proposed. As white pine blister rust continues to decimate regeneration and often saplings of this species throughout Newfoundland, species such as red pine (which has not been recorded historically on the Avalon) will be included in reforestation programs.

The level of planting on the Avalon now exceeds the level of thinning of natural regeneration, which is almost a complete reversal of the situation just ten years ago. As mentioned in the section on factors that have affected forest conditions, there are an estimated 80,000 hectares of once forested area on the Avalon now occupied by heath. Stratification of this area by land ownership, soil capability, exposure and Canada Land Inventory classification shows areas suitable for trial plantings to be expanded into operational plantings. The point should be strongly reinforced that such plantings and other silviculture work are desirable investments by governments and others to provide immediate employment opportunities in rural areas, future economic benefit (when stands reach maturity) and a myriad of

values on the landscape while such stands of trees are growing.

Table 7 shows silvicultural treatments proposed over the five year period. Selection thinning is proposed on a trial basis in select domestic cutting areas with the hope of eventually scheduling a portion of the domestic harvest through this means of silviculture treatment. It is also planned in some older thinned areas as a means of enhancing remaining crop trees for commercial purposes but providing volume to domestic users as well. If successful it allows both commercial and domestic users to benefit from the same piece of land base. Planting and plantation maintenance includes operational planting on heathland as a means of increasing forested area, particularly in areas of heavy domestic use. Other innovative projects which may not have areas explicitly shown on maps are also proposed for possible funding under silviculture. Scarification may be used where site characteristics require especially on healthland projects and silviculutre improvement areas through District 1 are in the plan to ensure we have the operational capacity to work in these areas if they require thinning, planting, pruning etc. These areas are shown on the overview maps in appendix 9.

Proposed silviculture areas are shown on the 1:250 000 scale overview map and are available at 1:50 000 and 1:30 000 scale from the Paddy's Pond Office and at the Environmental Assessment Division of the Department of Environment and Conservation.

Table 7. Silviculture Treatments proposed for 2012-2016 (in hectares).

		Operations for the period January 1,2012 to December 31,2016		
Year	No.	Location	Treatment	Area(ha)
2012	1.	Spread Eagle	Planting	60
	2.	Country Pond	PCT	40
	3.	Trepassey	Heathland Planting	25
	4.	Seal Cove Pond	DSL	5
	5.	Quirke's Ridge	RR	2
	**	Henders	HW seeding	5
2013	6.	Spread Eagle	Planting	60
	7.	Joyces Trail/	PCT	40
	8.	Trepassey	Heathland Planting	25
	9.	Tower Road	DSL	5
	10.	Spead Eagle	RR	1
2014	11.	Sutton's Pond	Planting	15
	12.	Bad Pond	Planting	45

	13.	Glover Road	PCT	40
	14.	Hearts Content Burn	Heathland Planting	25
	15.	Tower Road	DSL	5
2015	16.	Suttons Pond	Planting	15
	17.	Bad Pond	Planting	45
	18.	Glover Road	PCT	40
	19.	Western Bay	Heathland Planting	25
	20.	Henders	DSL	5
	21.	Quirke's Ridge	RR	2
2016	22.	Penney's Pit	Planting	10
	23.	Big Round Pond	Planting	25
	24.	Sutton's Pond	Planting	25
	25.	Ryan's Pond	PCT	40
	26.	New Melbourne	Heathland Planting	25
	27.	Hall's Gullies	RR	1
	28.	Island Pond Ridge	DST	5
			TOTAL	656

DSL=Domestic Selection Thinning, RR=Planting, PCT Pre-commercial thinning ** Other includes-Hardwood Management

3.3 Road Construction and Decommissioning

The Department tenders construction of resource roads in areas of productive forest land which enable access by forest operators and the public for a wide variety of consumptive and non-consumptive forest uses. Appendix 10 contains standards for roads built for the Department or by private contractors including a standard for roads built with the intent or option of future decommissioning. Since the proclamation of the Forestry Act of 1990, bulldozed skid trails and landings constructed by private operators must be approved by the Department to a standard designated by resource agencies. The Environmental Protection Plan of 1994 also provides explicit guidelines for forest road construction.

Forest cutting by commercial and domestic operators and subsequent silviculture work has concentrated on areas accessed by forest resource roads and in many areas all that can be currently undertaken from existing roads has been completed. In theory a network of operational roads could be constructed from existing access roads. It may be desirable to decommission some roads. Various levels of road decommissioning are considered on a case by case basis. Roads for agriculture, cottage development, private roads, public highways and other development should avoid areas of productive forest on the Avalon where possible.

Despite the values and opportunities provided by forest access roads, there has been widespread opposition to their construction, particularly on the Avalon. The opposition is not so much to road design, construction techniques or damage by roads, but often to subsequent uses, increased access to a variety of users, the increased spread of garbage and illegal occupation, and the general loss of the naturalness of the area.

However, it is often recognized that the cycling of the forest is necessary and will occur through one means or another. The objection is mainly not to cutting, but to increased access. It is also realized that no matter what the means of harvest, after a certain extraction distance, road access is necessary. Driving on rivers and ponds is no longer an option. Operators and those opposed to road construction generally agree that forest access roads need not be built to a 20 year standard that they could be built to a lower standard, and many agree that they should be closed, decommissioned or restored to a condition capable of growing another forest after use.

Trials conducted on road decommissioning in 1997 compared various types of construction equipment in terms of the quality and cost of road decommissioning. Findings were that a mid-sized excavator gave preferred results in terms of ground disturbance and ability to restock the site. Cost was approximately $1,000 per kilometer of operator constructed road decommissioned (Butler and Sharron, 1998).

In the summer of 2010 field staff completed a survey of all past road decommissioning projects. The project was initiated through discussion and concerns at the fall annual monitoring meeting and was intended to provide better information on the success of road decommissioning and help make better decisions going forward. The assessments observed the current condition of previously reclamated roads and determined if the decommissioning successfully limited access, interfered with forest management monitoring and activities, and/or are fully regenerating or do they require additional planting.

The results indicate that 25 % of roads decommissioned were unsuccessful due to heavy atv and other recreational vehicle use. The decommissioning did not always prevent access because after a number of years the ground settles out allowing easier passage for the vehicles. Recreational/atv vehicles prevented regeneration of natural and planted seedlings. Regeneration was also affected by browsing and competing ground vegetation. Two areas not successfully regenerating are slated for replanting in 2011-12.

In general, decommissioning is an effective forest management tool for closing out areas once harvest operations have occurred. They limit access, defer *ad hoc* cabin development, and put area that would normally be out of production back into the wood supply. The only question that still exists is the timing of the practice. The sound approach would be decommissioning once all expected silviculture interventions have taken place and monitoring has ensured that the area is at a free to grow stage (approx. 5yrs). To date DNR has been successful with balancing construction and decommissioning

levels given the amount of old forest access roads that were no longer operational. Going forward striking a balance will be more difficult as a constructed road will likely be operational for a number of years before it can be decommissioned and the majority of older access roads will have already been decommissioned.

Appendix 16 contains principles on forest access road construction and decommissioning. Road decommissioning and the restriction of access while operations are ongoing in an area are proposed on an individual road basis.

Table 8 shows proposals for construction, re-construction and decommissioning over the five year plan period. It is anticipated that only a fraction of road proposals will actually be funded. It is recognized that road construction and decommissioning in the central Avalon is of particular interest to several stakeholders and that monitoring of activity in this area is critical. In this plan 14 ha of previous roads will be restored through decommissioning. This could potentially result in a reforested ground producing greater then 1400m^3 of wood depending on the success of planted trees.

Table 8. Proposed Road Activity 2012-2016

Proposed Road Activity 2012-2016

Year Proposed	Code	Length (km)	Location	Activity	Stream crossings
2012	RC	2.5	Bad Pond	Construction	1
	RC	1.5	White Hill Pond Road	Construction	0
	RD	2.0	Quirks Ridge	Decommissioning	1
	RD	1.0	Seymours Gullies	Decommissioning	0
2013	RC	2.6	Spread Eagle	Construction	1
	RC	2.0	White Hill Pond Road	Construction	0
	RC	3.3	Spread Eagle Brook	Construction	2
	RD	1.0	Spread Eagle	Decommissioning	0
	RD	1.0	Seymours Gullies	Decommissioning	0
2014	RC	1.2	Southern Henders	Construction	0
	RC	1.0	Country Pond	Construction	1
	RC	1.0	White Hill Pond	Construction	0
	RD	1.0	Seymours Gullies	Decommissioning	0

2015	RC	1.3	Southern Henders	Construction	0
	RC	1.0	Big Round Pond	Construction	0
	RD	2.0	Quirks Ridge	Decommissioning	0
	RD	1.0	Seymours Gullies	Decommissioning	0
	RD	1.5	Spread Eagle	Decommissioning	0
2016	RD	2.0	Halls Gullies	Decommissioning	0
	RD	1.5	Spread Eagle	Decommissioning	1
	RD	1.8	Seymours Gullies	Decommissioning	0
Totals	RC = Road construction = 17.4 km. RD = Road decommissioning = 15.8 km.				

In most cases the construction technique will continue to allow the option of future road decommissioning. Unless otherwise specified, decommissioning is by replacement of soil and overburden, planting and denial of vehicular access to the former roadbed. Stream crossings greater than five meters would be by Bailey or other sectional or portable bridge. The construction or removal of a culvert or bridge requires approval under Section 11 of the Environment Act.

Locations of road activity are shown on 1:250,000 maps of Overview Map 4 and 1:50,000 and 1:30,000 scale maps are available with the Environment and Conservation and the Paddy's Pond office. Skid trails will continue to be reclaimed as necessary to enable natural revegetation or planting.

3.4 Surveys

Surveys are usually done to determine the presence or quantity of particular values such as timber, habitat or sensitive values in an area or to determine the regeneration status or utilization on an area that has been harvested or otherwise disturbed. The data obtained are used as input to develop plans and to make necessary adjustments to the existing plan during its execution. As always surveys will be conducted in all major areas scheduled for harvest. These surveys will be used in the development of pre-harvest plans. Values assessed include such features as moose sheltering areas, salmonid habitat and rare lichen. Post harvest surveys will be conducted to assess operating areas that have been harvested. These surveys are to ensure pre- harvest plans are adhered to, that management is successful and help determine management decisions for the area going forward. Post harvest assessments would include regeneration surveys to determine silviculture requirements such as planting or thinning, utilization surveys to determine the extent of utilization and impact on supply/demand projections, ground disturbance surveys to ensure sites are not excessively disturbed, and observational assessments to

ensure operators did not harvest outside of block boundaries or within unapproved areas such as riparian habitat.

4.0 POTENTIAL IMPACTS OF FOREST OPERATIONS AND ASSOCIATED MITIGATIONS

4.1 Water Supply Areas

Guidelines for forest operations within Protected Water Supplies are as described in the Environmental Protection Plan for Ecologically Based Forest Resource Management (Govt of NL, 1998) which specifies standards for road construction, buffers, stream crossings, fuel handling and storage and other activity. There are thirty-nine domestic cutting areas, five commercial cutting areas and no road construction partially or completely overlapping water supply areas or portion of a water supply in the five year period.

A number of communities that have the greatest portion of domestic harvesting within water supplies were consulted during this planning. All community leaders recognized the importance of forest management to their residents, to the health of the forests within their water supplies, and appreciated the involvement and guidance of DNR in managing forests in their water supplies.

Any activity in a protected water supply area requires approval under Section 10 of the Environment Act. To this end, a detailed four page application is required by Water Resources Division requiring information on activity, location, size, access, stream crossings and other particulars. Approvals would be necessary before any pre-harvest plan could be recommended or activity begins, and conditions of the environmental approval would be binding on all activity in a protected or unprotected water supply area.

The following buffer guidelines will apply to forest operations near waterways and officers will monitor all intake ponds to ensure people are not hauling wood by ski-doo across water supplies.

Water Body	Width of Buffer Zone
1. Intake pond/lake/reservoir	A minimum of 150 m
2. River intake	A minimum of 150 m for 1 km upstream and 100 m downstream
3. Main river channel	A minimum of 75 m
4. Major tributaries/lakes/ponds	A minimum of 50 m

5. Other water bodies	A minimum of 30 m

4.2 Habitat

Habitat conservation, preservation and provision affect the viability and success of our flora and fauna. Areas are designated sensitive for a number of reasons as outlined in the Environmental Protection Plan.

For some species such as moose, hares and caribou, the maintenance of certain habitat types within a geographic range will provide adequate yearly habitat. For other species such as great-horned owls, bald eagles and salmon with more specific affinities for particular sites, detrimental intrusion should not be allowed and any activity in the vicinity would be conducted as per the Environmental Protection Guidelines (Appendix 17). With flora, the successful reproduction of native plants following disturbance determines management actions during this planning period. It is impossible to manage on a species by species basis. However, by maintaining a variety of habitat types and ages, the species that need successional habitats (e.g. grouse) and high floral diversity will have adequate cover. Concentration of cutting on senescent stands and blowdown puts stands in successional pathways and age classes that would occur with natural disturbance.

District 1 contains two recognized caribou populations. The Avalon herd with estimated population of several hundred and the Cape Shore Herd estimated at 356 animals. No proposed activities in this plan will impact these populations.

Known locations of raptor nesting sites have been provided by the Wildlife Division and will continue to be updated. Any management activities shall be directed away from sites where specific raptor activity is occurring, and operations shall maintain a minimum buffer on the nest site of 800 m during nesting season and 200 m during non-nesting periods. As well activities in the vicinity shall be conducted at non-nesting times.

Aquatic and marshland habitat requires adequate buffering to ensure maintenance of integrity. Aquatic habitat buffers are specified in the Environmental Protection Plan for Ecologically Based Forest Management which has been approved by the Department of Fisheries and Oceans. In addition, stream crossings will avoid spawning areas (see Jones and Winter, 1995). Wetlands and associated riparian habitats are enriched sites that support high biodiversities of valued ecosystem components, such as waterfowl, passerine birds, and moose (seasonally) and other species. The protection of sensitive habitats is as agreed to with fisheries or wildlife biologists in the agencies responsible and who designate these sites.

Field staff laying out harvest blocks will ensure that a minimum five meter buffer is maintained around bogs and a minimum twenty meter buffer on regular waterbodies. Due to the natural topography, stand sizes, and the occurrence of "non-productive" forested areas on the Avalon, connectivity is maintained through the mosaic of uncut areas of forest cover naturally occurring across the landscape.

Riparian buffers contribute to local biodiversity by supporting species dependent on riparian habitat but upland sites may contribute equally or greater to local biodiversity (Doucet, 2006). In sensitive areas where additional riparian habitat is required, the standard twenty meter buffer is expanded in consultation with biologists of the agencies that have designated the sensitive wildlife area. Landbase mapping additionally removes buffers, steep slopes and other areas of particular concern from the portion of the landbase eligible for forest operations.

Throughout the District, field staff ensures that coarse woody debris is being left on harvested sites. Snags and a number of hardwood and softwood trees preferably in clumps are left to ensure structural heterogeneity and also additional seed source after cutting. Cut sizes follow the historical distribution of disturbance sizes.

Principles on cutting and on road construction and decommissioning (Appendices 16 and 17) and the Environmental Protection Plan for forest operations further address habitat protection. "Pre-harvest planning" done for all commercial cutting on the Avalon will be expanded to "pre-operational planning" to include all silviculture and forest access road activity as well as a sampling of domestic cutting areas.

The successful reproduction of a new forest stand following cutting or other disturbance is pivotal to the maintenance of habitat throughout the District. In most cases balsam fir regenerate naturally, often prolifically following harvest. These sites are still silviculturally managed to maintain and enhance forest diversity as well as protect regenerating fir and hardwood species from animal browse. Today's young forest is the futures shelter for wildlife and lichen habitat. As well, reproduction following disturbances generally increases biodiversity. In many parts of the Avalon, however, successful reproduction of a diverse forest is impinged by various environmental factors, often to the detriment of biodiversity. For example areas that suffered significant blowdown and continual browsing from moose and rabbit and have not been managed by DNR remain senescent. These areas have since changed from what was once productive forest landbase into barren grassland. This is evident in areas under interest by the Parks and Natural Areas Division, the Bad Pond operating area, and the eastern side of the Salmonier river valley. Going forward these blowdown areas, with the exception of those under interim protection, will continue to be the focus of forest management and reforestation defer harvest in intact forest for the time being and ensure healthy, diverse, productive forests are maintained on the landscape.

This is of vital importance to the Avalon Forest Ecoregion where balsam fir, spruce, yellow birch and

white birch are climax tree species, but successful growth of all three are severely limited or precluded by browsing. Monitoring of exclosures constructed in 1997 to examine herbivory indicates that moose, squirrels, hares, and avifauna may be delaying successful regeneration of balsam fir. A number of trials starting in 2011 will be focused on broadcast hardwood seeding on areas post harvest. A main focus will be the Henders operating area which was intensively managed in the late 60's and 70's to favour a balsam fir dominated stand structure. Forest management in this area going forward will focus on establishing a mixture of balsam fir, white spruce, and black spruce as well as assess the effectiveness of hardwood seeding in an attempt to diversify the current forest types in the area. Size of disturbed areas and other factors will continue to be assessed in relation to browsing and effects on natural succession, and recommendations made to various agencies.

4.3 Biodiversity

Biodiversity is the wellspring of life. The Provincial Sustainable Forest Management Strategy of 2003 accepts the Canadian Biodiversity Strategy's definition of biodiversity as 'the variety of species and ecosystems and the natural process of which they are part'. The provincial strategy goes on to establish key biodiversity issues pertaining to managing forest ecosystems in the province and sets goals, indicators and actions that will be monitored and reported on through an established process.

As mentioned in the preceding section, browsing by introduced species is affecting natural succession and native biodiversity. Forest practices should not impinge biodiversity, but do have the potential to, where not applied properly on the ground.

Two management actions that have the potential to impact diversity are planting and pre-commercial thinning. No herbicide treatments are planned for the next five years. Planting in the District will be where there are insufficient young trees to form a new stand. As an example, Mitchell's Brook in St. Mary's Bay was burned in 1985 and had not successfully regenerated. Productive areas in this burnover were planted with varieties of native species (larch and spruces) grown from local seed sources. As well planting will also be considered even when balsam fir and birch regeneration are adequate to form a new stand. This will enhance forest diversity and ensure the protection of regenerating fir and birch to a free to grow stage.

The provincial strategy does allow for judicious planting of non-native trees and notes that over 95% of seedlings planted are of native species. Introduced species used in nursery production and reforestation programs have been present on the island for a significant number of years and have been proven non-invasive. The district will continue to maintain non native planting to less then five percent. Typical species that are planted include Norway spruce and European Larch.

Pre-commercial thinning of young forest stands will strive to maintain tree and shrub diversity.

Conservation Officers and silviculture staff they supervise are instructed to ensure that the relative species composition of the treated stand is the same as the pre-treatment stand. In many sites on the Avalon, hardwoods are favoured over softwood in crop tree selection. As well, field staff will ensure that untreated blocks are left in areas scheduled for thinning so that comparisons can be made.

Within Management District 1 white pine is an extremely rare species. Preliminary observations of the few stands and isolated white pine that remain indicate that healthy young pine regeneration is poor to absent. However, the preservation of white pine is clearly identified in the Provincial Sustainable Forest Management Strategy. White pine blister rust continues to jeopardize natural regeneration and the success of the white pine gene preservation garden at Paddy's Pond. Cultural operations, such as pruning and fungicide application, continue against blister rust in the gene preservation garden. Planting of healthy white pine seedlings continues in mixtures planted operationally, while cutting of natural white pine on Crown Land is not permitted.

Within the forest, stand biodiversity is maintained by having a mosaic of age classes and stand types. As forest stands age, the compliment of flora and fauna within that stand changes. For example, arboreal lichens, terrestrial mosses and bryophytes increase in abundance as stands age but are virtually absent in a young stand. The Provincial Sustainable Forest Management Strategy incorporates the objective that 15 – 20 % of the total productive forest within a district be older than 80 years, as projected through a 160 year planning horizon. Analysis of the projection on the Avalon shows that the proportion greater than 80 years will not fall below 20% on Crown land over this extended planning horizon. By ensuring we have a mosaic of forest stands types and ages on the landscape, we will maintain diversity of flora and fauna. In addition large tracts of forest land are maintained in parks and protected areas.

4.4 Consideration for Species at Risk in FMD1

Biological diversity and species abundance are one of the indications of a healthy forest and a healthy ecosystem. While most of the native species found in District 1 are healthy and relatively abundant there are others that are considered species at risk.

Species at risk in Newfoundland and Labrador are assessed and monitored mainly by two organizations, The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and by the Wildlife Division of the Department of Environment and Conservation, Government of Newfoundland and Labrador. The two groups work together to maintain a listing, along with management and recovery programs, for any species listed under the *Endangered Species Act* (Government of Newfoundland and Labrador). At present time there are 32 species listed under the Act of which 10 are endangered, 9 threatened and 13 listed as vulnerable.

In District 1 only 6 species (5 birds and 1 lichen) on the list are of consideration in this five year operating plan. However there is one additional lichen which is under consideration by the Wildlife Division for listing and there is a possibility of two others (1 fish and 1 mammal) if populations continue to decline.

Listed species

Common Name	Scientific Name	Designation
Red Crossbill	*Loxia curviristra percna*	Endangered
Rusty Blackbird	*Euphagus carolinus*	Vulnerable- NL ESA Special consern - SARA
Olive Sided Flycatcher	*Contopus cooperi*	Threatened - NL ESA Threatened - SARA
Short Eared Owl	*Asio flammeus*	Vulnerable
Gray Cheeked Thrush	*Catharus minimus*	Vulnerable
Boreal Felt Lichen	*Erioderma pedicellatum*	Vulnerable
Possible listed species		**Proposed Designation**
Graceful Felt Lichen	*Erioderma mollissimum*	TBD
Woodland Caribou	*Rangifer terrandus*	TBD
Atlantic Salmon	*Salmo salar* (South Coast Population)	TBD

The provincial designations differ somewhat than those of COSEWIC. The designation of Vulnerable corresponds to the COSEWIC designation as species of Special Concern.

Under the *Endangered Species Act* the designations of Endangered, Threatened or Vulnerable are treated the same for protection, management and recovery however penalties for destroying, moving or disturbing an individual are only in place for the Endangered or Threatened categories. The protection for species identified as Vulnerable would be through pre-harvest planning and as a condition on a Commercial Cutting Permit under the Forestry Act. Conservation Officers, as is policy, prepare the pre-harvest plans and lay out harvest blocks using the criteria set forth by the Department of Environment and Conservation for any species listed under the Endangered Species Act. The Department of Justice has the authority to enforce the Endangered Species Act.

4.4.1 Species at Risk and the Five Year Plan

While all species are considered when developing the District's Five Year Plan, Species at Risk, in all their designations are given a higher priority in planning when and where to operate. Through legislation, Environmental Assessments and consultation with the Wildlife Division mitigations are developed to minimize the impact of any forestry activity on the health and well being of any of the species listed, and even some that aren't.

An example of this would be the Boreal Felt Lichen. Before the Boreal Felt Lichen was designated by COSEWIC or even before there was legislation enacted to protect Endangered Species in Newfoundland, buffering the areas around lichen populations, lichen searches and even avoidance of areas in which the lichen occur are common practice. Once legislation was enacted DNR produced a protocol for dealing with forestry activities in all areas on the Avalon Peninsula. While the possibility of finding BFL in some areas scheduled for harvest is remote, a search is still conducted using the protocol as designed by the Wildlife Division. In cases where the lichen is found, harvesting strategies are modified to minimize the impact on the species based on conditions as prescribed by the Wildlife Division. In areas with highly concentrated populations harvesting is often postponed and or cancelled.

In this planning period, District 1 used habitat parameters for the listed species to assist in the modeling for District 1. The model is used to provide an Annual Allowable Cut while also maintaining the mosaic of various age classes of forest which provide for the habitat requirements of the species at risk. DNR continues to assist the Wildlife Division in population counts, searches, research and development of mitigations to allow for the sustainable harvest of our forests while maintaining suitable habitat for species at risk.

4.5 Wildfire

Wildfire protection continues to be primarily through ground crews with aerial support. As mentioned in the section on past activities, most fires have been contained to less than a one hectare burn size on the Avalon. Trained forest fire ground crews are stationed at five locations on the Avalon (Cape Broyle, Heart's Desire, Paddy's Pond, Salmonier and Whitbourne). Regular staff at all locations in the District has experience and training in wildfire suppression and investigation. Preventative patrols and effective public information remain major tools in fire prevention, as most fires on the Avalon are still human caused with 16% through illegal burning.

Despite the use of prescribed burning in other parts of the Province, this technique has not widely been used for forest site preparation or reforestation on the Avalon. Although it may be considered in the plan period, there is none proposed at this time. It is anticipated that prescribed burning will continue to be practised for Agriculture and may be re-investigated for berry production for wildlife purposes. Staff will continue involvement in training techniques, review of burn plans and other assistance in these areas.

4.6 Browsing

Throughout the public consultation process and planning meetings it was evident that everyone involved recognized the significant impacts of moose and rabbit browsing on forest ecosystems. Planning team

members expressed great concern over this continuing trend and was not satisfied with the level of involvement or perceived lack of concern from other government agencies responsible for managing wildlife populations. Current population levels of moose are restricting natural regeneration on large areas of forested landscapes on the Avalon, including both harvested areas (domestic and commercial) and areas that experienced significant windthrow some 15-20 years ago. The result has been a shift in the normal successional pathways from a birch and fir dominated forest to a grassland condition. The effect of high browsing creating unnatural transitions has been documented, including grassland transitions (e.g., Olofsson, 2006; Abraham et al., 2005;) This alteration of forest ecosystem dynamics by introductions of wild ungulates is an indirect effect of human intervention on the landscape (Gill,2006; Van der Wal, 2006). The concern raised by those in the planning process are warranted and are not outside the norm where other instances of this nature have or are occurring as changes in forest transitions, composition, and regeneration resulting from significant browsing by introduced species are a concern for biodiversity management (Vavra et al., 2007). The Wildlife Division confirms that moose populations are declining and they have increased licenses for the 2011 season.

The impacts of browsing are province wide and not contained to FMD1. The regeneration of fir has been impacted in several areas of central and eastern Newfoundland, primarily as a result of moose browsing (Bergerud et al., 1968; McLaren et al., 2004). Recently Parks Canada acknowledged the significant impact moose are having on Newfoundland forests. Parks are now in the development stages of a multi-year program to remove moose by lethal reduction for both the Gros Morne and Terra Nova National Parks (www.pc.gc.ca/foresthealth). The intent of the program is to reverse regeneration failure resulting in once forested landscapes transitioning to shrub barrens or meadows, a condition that has been mentioned numerous times in this current planning process.

Some recent work in Newfoundland showed that eliminating moose browsing resulted in a competitive advantage for broadleaf trees and shrubs, regardless of initial densities of individual taxa in the forest understorey, including density of advanced regeneration of balsam fir (McLaren et al. 2009). In fact normal stand transitioning was able to occur as is generally understood, with tolerant conifer species initially suppressed by fast growing intolerant hardwood species (McLaren et al. 2009). This recent work only further supports that moose are affecting boreal forest succession and as previously mentioned it is an ongoing struggle to manage forests in FMD1 to ensure successful regeneration of hardwood species. McLaren et al. 2009, suggests restorative actions intended to mimic usual patterns of forest regeneration might best combine moose removal with site preparation and/or planting to historic densities.

Given the seriousness of the situation, the anticipated timeframe before any significant changes to management of the moose populations take place, DNR will continue to try and manage forests to a fully regenerating state. Options currently being utilized include clean up of damaged areas, reforestation, planting of buffer species to promote and protect establishment of birch and balsam fir,

timing of thinning prescriptions and prescriptions that favour birch and fir once trees reach free to grow, and seeding trials or possibly prescribed burning to promote hardwood regeneration. Other actions that DNR are planning to undertake in this plan have been argued to be actually supporting the healthy population of moose in FMD1. Road decommissioning has been argued to be limiting access to hunters. Maclaren, 2000 suggests contributing to hunter success in a moose management area was a long, well-maintained road network and attempts to increase moose harvests in less accessible areas have met with poorer hunter success (unpubl. reports). This coupled with anticipated lower public involvement in moose and rabbit hunting going forward will severely limit the ability to control these populations through regular hunting efforts. DNR will also be working with Dr. Luise Hermanutz to gather more information on the severity, cause, and management options for areas failing to regenerate.

4.7 Climate Change

While climate change was not discussed in great detail in the current planning process it is important to acknowledge the reality of climate change and the implications for forest management. It is anticipated this will be a more prominent topic in future planning processes as DNR works to develop forest climate change policy.

Climate change is already affecting Canada's forests and will continue to do so for the foreseeable future. Impacts observed to date include changes in forest fire regimes, large-scale insect outbreaks, droughts in central Canada, severe windstorms in Atlantic Canada and shorter periods of frozen soil. It is projected that mean annual temperature increases of 3.1 to 10.6°C will be realized by the end of the 21st century and these increases are significantly higher for Canada than the global average (PCIC, 2007). Such increases in temperature, over a relatively short period of time, could have significant consequences for Canada's forested ecosystems. Given the higher then normal increases for Canada it's not surprising that the forested portions of Canada are expected to experience greater impacts of climate change than many areas of the world (Field et al. 2007). Of particular concern to Canadian forest managers are impacts related to increased frequency and intensity of fires (Flannigan et al. 2005), increased outbreaks of forest pests, both insects and disease (Johnston et al. 2006), increased frequency of drought leading to forest dieback, particularly on the southern fringe of the boreal forest (Hogg and Bernier 2005), and changes to growth, species composition, and amount of harvestable wood volume (Johnston and Williamson 2005, Girardin et al. 2008).

During the last several decades, forest managers have relied on paradigms of ecological sustainability, historical variability, and ecological integrity to set goals and inform management decisions (Lackey 1995, Landres et al. 1999). Maintain or restoring past conditions sometimes require increasingly greater inputs of management and could result in forests that are ill adapted to current conditions and more susceptible to undesirable changes. Throughout the current planning process for district 1 often the views from planning team members favor maintaining/ protecting preindustrial forest conditions and/or

maintaining or increasing the current levels of certain species, forest types, forest age classes etc. We all must realize and continue to openly discuss that the result of maintaining historical patterns may have significant impacts given anticipated affects of climate change. Accepting that the future will be different from both the past and the present forces us to manage forests in new ways (Millar et al 2007). Managing in the face of uncertainty will require a portfolio of approaches, including short-term and long-term strategies, that focus on improving ecosystem resistance and resilience as well as assisting forested ecosystems to adapt to the inevitable changes as climates and environments continue to shift. Resilient forests are those that not only accommodate gradual changes related to climate but tend to return toward a prior condition after disturbance either naturally or with management assistance (Millar et al 2007).

Significant disturbances such as recurring droughts in the west and windstorms in the east have synchronized forest composition and age and stand structure across broad landscapes, which then become vulnerable to climate shifts. This appears to have happened in some western forests as widespread drought has induced diebacks (Breshears et al. 2005). Opportunities exist to manage early succession stages to manage forests to succeed through climate effects by promoting diverse age classes, species mixes, within-stand and across-landscape structural diversities, and genetic diversity. Early successional stages provide the most practical opportunities for resetting ecological trajectories in ways that are adaptive to present and future rather than past conditions.(Betancourt et al. 2004).

Current or future disturbances may require realignment and/or restoration. Management of these areas may need to be in line with anticipated future conditions rather than restoration to historical pre-disturbance conditions. This type of management may be a preferred choice (Harris et al. 2006, Millar and Brubaker 2006). In this case, management seeks to bring processes of the disturbed landscape into the range of current or expected future environments (Halpin 1997).

While currently no policy on forest climate change exists within DNR. The management activities outlined through this planning process will be followed through as presented however many current operational aspects of management scenarios will need to be reviewed and assessed on a go forward basis. For example planning team members currently express strong views in relation to planting of exotic species and the decline of balsam fir. While concerns over both topics could be debated, going forward climate change may require reviewing the current provincial policy for exotic planting levels or reviewing district level planting and thinning prescriptions. Other management regimes may also have to be reviewed in the context of climate change such as modifying harvest schedules, altering thinning prescriptions and other silvicultural treatments, replanting with different species, shifting desired species to new forest locations, and taking precautions to mitigate likely increases in stress on plantation and forest trees. Other operational issues that may need to be reviewed could include road construction and decommissioning to ensure its best suited to handle extreme weather events, ensuring species diversity to better manage a major insect outbreak, or alteration of domestic cutting areas to ensure people have

all season access. Already in this current plan domestic area changes on the Bay de Verde Peninsula were in part due to limited access resulting from a lack of freeze up on ponds and lake, something unheard of just 10 years ago.

It is likely that adapting to climate change will become more prominent in forest management and planning provincially and nationally. There is a large need for further assessment of the ability of Canada's forest management enterprise to adapt to climate change impacts (Johnston and Williamson 2007). Climate change policy is still very much lacking in many industries and government agencies across Canada. In the coming years DNR will be committed to working towards a climate change policy in relation to forestry management. This policy will need to assume a changing physical environment and will need to be adaptive. In developing any new forest policy it is important the policies are able to evolve in ways that help the sector deal more effectively with uncertainty, including the effects of climate change. Forest managers will increasingly need the ability to make innovative and locally relevant decisions related to climate change adaptation.

4.8 Resource Values and Uses

The forests of the Avalon are a source of many values and uses. Some are consumptive (such as timber, wild meat, or berries) whereby goods are removed from the forest. Some are transformative (such as hydroelectric production, mining and aggregate production, cabin development and urbanization) whereby forest land is valued for other uses. Others are non-consumptive (such as hiking, photography or canoeing) and unless occurring in extremely high concentration cause little impact on the forest. Consumptive and transformative uses have higher impact on the environment and require regulation to proceed within sustainable limits or within the ability of the ecosystem to maintain itself.

There are intangible spiritual or intrinsic values which the forest provides such as tranquility, fulfillment, or the comfort or just knowing that the forest is there. These intangible values are more difficult to define, but are often deeply held and must be acknowledged. Wood cutting also has intangible values associated with it, including exercise and fitness, the contribution of spending time in the woods to mental well-being, the continuance of a long-established Newfoundland cultural tradition, the contribution to self sustainability (by making a person less dependent on others or on money for heat) and, in general, contributing to maintaining the rural, outport way of life.

Commercial wood cutting, in addition to some of the intangible values listed above, has extrinsic values, in that it contributes to gainful employment. As such, it also contributes to the economic sustainability of small and large communities.

Not all values of the forest fall neatly within the above categories of transformative, consumptive or non-consumptive, or of intrinsic and extrinsic. For example, appreciation of historic resources is partly intrinsic, but may involve the transformation of former forest land. Gathering from the forest, which is often intrinsically satisfying, may be either consumptive or non-consumptive, depending on the circumstances. A complete list of values associated with forests on the Avalon and further description of each can be found in appendix 12.

Through the planning process and consultations this plan has attempted to capture and mitigate any conflicts with resource values and forest management activities. Often as operations unfold conflicts can arise and DNR will consult with the user(s) for which activities are affecting their values. These consultations occur on a regular basis and for most part are resolved positively.

4.9 Viewscapes

Managing viewscapes has become increasingly important in recent years. Viewscapes can be valued differently depending on the significance of a particular piece of landscape. In recent years tourism has placed significant value on viewscapes. Tourism is an important industry in Newfoundland and Labrador. Forest management activities that are visible are believed to be received negatively by tourist and impact their possible return or their personal marketing of the province to others. Hunting outfitters have also highlighted the importance of viewscapes around their operations.

Forest management education for the general public is one of the key aspects deciding value placed on the visual impact from harvesting. Having the ability to see beyond the initial harvest but instead the reforested condition within a very short time frame is key to gaining public acceptance of this practice. Given the growth on the Avalon and the increase in competing values it will become a more important issue in the future.

In FMD1 there are no hunting outfitting businesses in operation and there are no other tourism businesses where a conflict exists between planned management activities and viewscape. During the development of this plan no viewscape analysis was completed however DNR is currently completing 3D viewscape analysis for FMD1 and this will be incorporated into management activities when it is completed in the coming months. High impact areas resulting from this analysis may result in modified harvest practices such as variable retention harvest to soften our footprint in landscapes that are of value to tourism, public, and forestry.

4.10 Fish and Fish Habitat

In Canada, fish and fish habitat are protected by the fish habitat protection provisions of the federal *Fisheries Act.* Fish require suitable habitat to live, feed and reproduce. They also require corridors to migrate between these places. Areas that meet life cycle requirements for fish including, food, shelter,

reproduction and movement are called fish habitat. All forms of waterways can provide important habitat for fish. It is therefore important that we protect the habitat that provides fish with clean water, spawning and rearing grounds, an adequate food supply and clear migration routes.

Operational impacts that could affect fish and fish habitat are discussed in greater detail below but the more significant aspects resulting over this five year plan could include siltation, turbidity, temperature increases, and pollution from fuel spills. Mitigations to ensure these impacts do not occur or are minimized are listed in the environmental protection guidelines for forest operations. Some of these mitigations include no-cut, treed buffer of 20 meters for fish and wildlife habitat, no permitting of heavy equipment and machinery in any waterbody, wetland or a bog (unless frozen) without a Certificate of Approval from the Department of Environment and Conservation and without contacting the DFO, and no permitting of heavy equipment or machinery being refuelled, serviced, or washed within 30 metres of a waterbody. While mitigations of potential impacts through road construction activities are discussed in more detail below it should be noted that the installation of any culverts and bridges will be done so in accordance with the manufacturers specifications and the specifications attached to the Certificates of Approval received from the Department of Environment and Conservation and from DFO. Proposed road construction in this plan outlines the number of stream crossings required and DFO will be consulted with regard to this work. DNR maintains a very good working relationship with DFO staff for the Avalon and we continually work to ensure that all fish habitat is protected from potential impacts from forest management activities.

4.11 Impacts of Forest Harvesting Operations

Commercial forest operations are completed by a number of different harvesting systems. The most common operation in FMD1 is the shortwood system. In this system a single grip harvester and forwarder are used in the extraction of timber. Variations of this system are also in place by some operators depending on the scale of operations including manual harvesting with chainsaw and forwarder for hauling or manual harvesting and the use of an atv/ski-doo for hauling. There are aspects of these operations that could result in potential impacts, the severity of the impact being closely related to scale of the operation. Aspects related to harvesting operations could include fuel spills, soil rutting or compaction, visual impacts, and impacts on water quality. The environmental protection guidelines are in place to minimize any of these impacts from occurring and strict monitoring of operations that are ongoing would minimize any impact and ensure steps are taken so it does not occur in the future.

Some specific mitigation includes no permitting of site disturbance of more than 10% of the total forest within an operating area, wherever possible slash will be placed on forwarded trails while forwarders are operating in an area. Woody material of any kind (trees, slash, sawdust, slabs, etc.) is not permitted to enter a waterbody. Garbage is to be disposed of at an approved garbage disposal site. All equipment is to be removed from the operating area where operations are completed. Where safety is not an issue, a

minimum average of 10 trees or snags per hectare (average on a cut block) or a clump of trees is to be left on all sites (harvesting and silviculture) and complete utilization of harvested trees is required.

Pre-harvest plans are required on all forest operations and will include:

- boundaries of protected water supplies (if applicable);
- existing and proposed access roads;
- skid trails and landing locations;
- areas sensitive to erosion;
- buffer zones around water bodies;
- approved stream crossings;
- fuel storage locations;
- wildlife corridors.
- lichen survey

In addition layout and monitoring will ensure harvesting or other heavy equipment will not be used on wetlands or bogs. Steep areas with a high potential for erosion should not be harvested. Wherever possible, skid trails will run along contours and never cross wetlands and waterbodies. Landings will be less than 0.25 ha and located at least 100 metres from a waterbody. In sensitive areas prone to erosion, equipment will have wide tires, or harvesting will occur during the winter when the ground is frozen.

4.12 Impacts of Transportation and Loading

The transportation and loading of wood products from forest operations have some aspects that could result in potential impacts to the environment. In FMD1 most commercial operators transport wood by either transport trucks or flatbed trucks. The more significant aspects of these operations would include fuel spills, exhaust emissions, and fibre loss from loading. Mitigating potential impacts would include guidelines associated with fuel handling and storage in the environmental protection guidelines as well as timber utilization standards, spill kits on site, and ensuring through monitoring that equipment is in good working order.

4.13 Impacts of Silviculture

Aspects of silviculture operations that could have potential impacts to the environment would include similar aspects associated with harvesting but at a smaller scale, this would include fuel spills by atv, soil compaction or rutting by atv, and damage to leave trees. The results if either should occur would be water and soil contamination and habitat damage since leave trees would not survive damage from

treatment.

Mitigations from a silvicultural stand point would include quality control surveys are conducted during pre-commercial thinning operations. This ensures that all guidelines are being followed by contractors and that the treatment is as specified in the contract. It also ensures that damage to residual trees is minimized and hardwood species are protected. Where possible, pre-commercial thinning will not occur in important wildlife areas during the periods of birth and/or hatching. These areas and times will be identified by the Wildlife Division. Trees cut during treatment will not be felled into waterbodies. Scarification operations will be best suited for preparing the area for planting and for minimizing ground disturbance. Where slash is piled into windrows, the windrows are placed where slash cannot be washed into streams at peak flooding conditions. To minimize erosion scarification equipment will not be directed straight down slope. All planting operations are also strictly monitored for quality assurance ensuring that treatment specifics are followed and seedling survival is assured. .

4.14 Impacts of Road Construction and Maintenance

The aspects of road construction and maintenance include fuel spills, water quality, garbage, visual quality etc. These aspects of operations could result in numerous impacts on the environment. Like all aspects of forest operations these are closely monitored. Potential impacts from road construction activities include siltation, turbidity, and pollution of water, and erosion. There are also the impacts on streams if there are mistakes in sizing and selection of materials required for stream crossings. As well other issues that have been previously discussed such as increased access, illegal cabins, and lack of hunting pressure through road decommissioning. The end result of decommissioning is site rehabilitation and access prevention.

Some mitigation to minimize any issues arising through forest access road operations include a "no-grub" zone of 30 metres of undisturbed ground vegetation maintained around any waterbody crossing to minimize the damage to the lower vegetation and organic cover, thus reducing the erosion potential. Take-off ditching will be used on both sides of the road, or in conjunction with culverts, to divert the ditch flow into the woods or into stable vegetated areas above the no-grub zones. In all areas where road construction approaches a waterbody, a buffer zone of undisturbed vegetation must be maintained on both sides of the right-of-way and stream fording is prohibited in protected water supply areas. Finally to minimize erosion and sedimentation, waterbody crossings shall:

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

vi) have all mineral soil exposed during bridge construction and culvert installation seeded with grass.

5.0 EXISTING AND POTENTIAL LANDBASE CONFLICTS

Conflicts or competing interest exists and are expected to increase throughout this planning period. The main competing interests will include agriculture, cottage development, industrial development, residential/community expansion, and quarry development.

5.1 Agriculture

The landbase required for both growing crops and trees means both these industries will continue to have some level of competing interest. The Government of Newfoundland and Labrador continues to promote and develop the agriculture industry. In an effort to reach provincial sustainability with agricultural products there will be ongoing consultations with agriculture to define a landbase that are beneficial to both industries. While initial land clearing will provide a wood supply to commercial operators it will ultimately result in a loss of forest landbase. DNR will ensure that all merchantable timber associated with land clearing for agricultural purposes will go to benefit local commercial forest operators.

5.2 Industrial Development / Quarries

Industrial development is the most unpredictable of the landbase conflicts. During the previous five year plan the VALE INCO Long Harbour development resulted in a significant portion of the forest landbase being removed. This 1300 ha development resulted in, trials to transplant rare lichens which forest operations must protect and completely removed domestic cutting areas in the region. Currently there are no major industrial developments expected that would impact the forest landbase. Quarry development projects will be assessed on a case by case basis. If projects arise that would have serious implications to the forest resource and resource users then forestry would work closely with the proponent to ensure impacts are minimized.

5.3 Cottage Development

Currently DNR works closely with two cottage development areas in close proximity of ongoing and planned forest management activities. Both Deer Park and Peak Pond cottage areas support operations in their regions. While no new areas are known at present, new cottage development areas are expected as we go forward given the demand from a growing population on the Avalon. DNR will work closely with Crown Lands to ensure that new areas limit the impacts on the forest landbase. Where removal of the

forest landbase cannot be avoided DNR will ensure developments are not within silviculturally treated areas and any merchantable timber will be allocated to local commercial operators.

5.4 Residential Development / Community Expansion

Over the last planning period the most common landbase conflict with forest operations has been residential development in and around communities. As the Avalon continues to experience a boom in business and population, development continues to increase as well. The results are significant infringement and sometimes complete removal of domestic harvesting areas and sometimes commercial areas. DNR is often the last defense in the land referral process to ensure that forested areas are maintained in and around communities. DNR will continue to assess developments on a case by case basis, educate leaders of local communities of the benefits that forests provide to their citizens, and will analyze the security of areas for long term silvicultural investments.

6.0 MONITORING AND RESEARCH

6.1 Monitoring Using Criteria

The purpose of monitoring is to evaluate the actions of the management agency, resource users and the forest itself, and to compare the results of evaluations against objectives and operations stipulated in plans.

At the provincial level, criteria developed by the Canadian Council of Forest Ministers and associated provincial values will be monitored. Criteria are listed in the Provincial Sustainable Forest Management Strategy as; conservation of biological diversity, maintaining healthy forests, conservation of soil and water resources, forest ecosystem contributions to global ecological cycles, multiple benefits to society and accepting society's responsibility for sustainable development. There are eighty-three indicators associated with the six criteria specified in the CCFM document. The Provincial Sustainable Forest Management Strategy provides detail on criteria and provincial values that will be monitored.

For several years now the planning team has been dedicated to attending annual meetings and field trips intended to monitor management actions and that those actions adhere to the objectives in the five year plan. These meetings keep planning team members informed on activities and the knowledge gained is helpful when members need to assess any amendments to this plan. As well planning team members also initiate research trials where information gaps may be lacking. The relationship between the department and the planning team is important for a host of reasons but specifically significant for ensuring management on the ground reflects activities agreed to in the development of this plan. For

these reasons going forward an annual meeting and field trip will be held in the fall of each year of the plan to review district operations for the year and to propose any modification deemed necessary.

At these meetings, DNR will continue to provide updates on numbers of domestic permits, volumes cut annually by domestic and commercial operations by zone; access road construction, decommissioning and reconstruction; number of fires and areas burned; land referrals; insect and disease; and surveys undertaken. Some other criteria that DNR will try to provide updates on through monitoring meetings will include:

- Area and severity of insect attack
- Area and severity of disease infestation
- Area and severity of fire damage
- Percentage and extent of area by forest type and age class
- Percentage of area successfully naturally regenerated and artificially regenerated
- Area of forest converted to non-forest land use, for example, urbanization
- Proportion of land base occupied by forest access roads
- Area of forest depletion

6.2 Research

Science provides information for the decision making process. Information is used to define boundaries, options within boundaries, consequences of those options, and to evaluate the effect of the chosen options and to manage risks at biologically and socially acceptable levels. The scientific understanding of forests should influence management policies. It is important to understand that fundamental to management is the recognition that the management of natural processes is based on incomplete knowledge. The most difficult thing is to balance biological science with social science and with the philosophical views of how society values renewable and non-renewable resources. To obtain balance, the desired outcomes and goals are determined through the established democratic and institutional process. It is extremely difficult to obtain consensus on all aspects of the plan between diversified interest groups (Bajzak and Roberts, 1998). It is important to fill knowledge gaps to assist in management decisions and monitoring of the plan.

6.3 Proposed Research

Since the last five year plan the Department has created a new division dedicated to research. The Center for Forest Science and Innovation is invested in meeting Forestry related research needs for the province. The majority of work will be focused on projects that benefit across districts and are **provincial in scope**. In addition, the district will undertake new research and build on continuing work that guides adaptive management at the finer district scale.

The following is broader research scheduled to occur in this planning period:

1) *Erioderma sp*. is lichens found throughout the forests of southern Newfoundland and the Avalon Peninsula. One of the prominent research topics going forward will be focused on surveys to more accurately estimate the distribution and abundance of *Erioderma sp*. at the landscape scale on insular Newfoundland.
2) Adaptive Management Research on the impacts of forest harvest on Woodland Caribou.
3) Quantification and mapping of the forest succession impacts of moose browsing – This project will have two components; 1) maintenance and data collection at 22 moose exclosure sites that were established in 1997-98 to study the impacts of moose browsing on forest regeneration, and 2) georeference, validate status, and quantify the area of forest that has been significantly impacted by moose browsing. The first component will be executed in collaboration with Parks Canada (10 of the exclosures are within Terra Nova National Park). The second component will be executed in conjunction with Memorial University. GIS tools and satellite imagery will be used to quantify impacts in a large region of central Newfoundland (an area encompassing the Bay du Nord Wilderness Area).
4) Impacts of forest harvest on brook trout productivity and terrestrial-aquatic flows of mercury. This project by Dr. Robert Scott at Sir Wilfred Grenfell College, Memorial University will look at human impacts on boreal lake ecosystems. This research will examine how human activities alter boreal lake ecosystems, thereby affecting fish populations. It will focus on the impacts of timber harvesting on nutrient input to boreal lakes, and the impacts this has on brook trout.
5) Modeling carbon storage in forest soils and the flow of dissolved organic matter in boreal aquatic systems in response to climate change. This research project represents collaboration between the Forest Service Branch of the Department of Natural Resources, the Canadian Forest Service, and Memorial University and is aimed at developing watershed scale indicators for understanding the impact of climate change on boreal forest soil carbon reservoirs in Newfoundland and Labrador. The project will exploit the established Newfoundland and Labrador Boreal Ecosystem Latitudinal Transect (NL-BELT) in order to capture variation in soil organic carbon processing with climate.

District specific work will focus on answering some specific questions allowing us to adaptively manage resources based on the results of the work. Some of the work is continuing from current projects. One of the ongoing research projects focuses on pre-commercially thinned forests. Data are being collected to assess pre-commercially thinned stands for the abundance of rot, the quality of wood, the volumes associated with these stands and to determine the ideal time of harvest. This work is in conjunction with work being done by the Canadian Forest Service. Ongoing work to better understand volume reductions and adjustments will focus on utilization surveys to more accurately determine volume projections. Planting will be a large focus over the next number of years and as previously mentioned the Department will be conducting trial plants for broadcasting hardwood seed. As well we will attempt to plant heathland area on an annual basis. This work will be focused on the southern shore. Finally we will be conducting a full assessment of current plantations to monitor their stocking, disease or insect outbreaks and general health. Other work will be focused on selection thinning in pre-commercially thinned stands by domestic harvesters. The intent is to gauge the response of remaining stems in the post harvest to assess the viability of this silvicultural intervention to provide a wood supply for both domestic and commercial users.

One planning team member has also suggested research regarding the correlation between moose browse and boxy wood in winter yarding areas. Boxy wood has a number of growth rings that make sawing of the trees very difficult. The same member has also suggested a comparison of tree growth on decommissioned roads versus the harvest block. The district supports and sees value in this work and will actively pursue this and report on the results over the next couple of field seasons.

6.4 Forest Certification

Forest certification is becoming the business reality for the forest industry in Canada (Abusow 2008). Currently six forest management certification standards are present in the Canadian forest industry. Most common of these are Canadian standards association (CSA), Sustainable forestry initiative (SFI) standard, and Forest stewardship council (FSC). Each of these standards has unique attributes and is viewed differently from industry, environment, and the public. The success of each standard is often linked to the marketing of those standards as a brand that the public recognizes however certification is a major undertaking and can result in major changes to current operations. Masters et al 2010 showed FSC standard required the most changes to current operations than the others, and CSA required unique standards such as carbon requirements.

DNR recognizes the importance and value in forest certification from an environmental, social, and economic perspective. Currently DNR is assessing the option of ISO14001 certification for crown forests. The ISO 14000 family addresses various aspects of environmental management. It provides assurance to management that it is in control of the organizational processes and activities having an impact on the environment and provides assurance on environmental issues to external stakeholders, such as customers, the community and regulatory agencies (http://www.iso.org/iso/iso _14000_

essentials, 2011). DNR will continue to work on this process over this operating plan and believes we are taken the correct approach to move forward towards adopting one of the major certification standards mentioned above.

6.5 Amendments and Revisions

Any amendments proposed to the plan which requires Environmental Assessment will be simultaneously circulated to consensus Planning Team members and to the Department of Environment. Other amendments which are submitted to Forest Ecosystem Management Division for consideration will be posted on the website. Any amendments that are in close proximity (500 m) to Parks and natural areas or proposed reserves will be discussed with Parks and Natural Areas Division. Appendix 20 contains a list of Planning Team members and Appendix 21 a list of meetings.

7.0 CONSULTATIONS

Over the planning period, consultations were had with towns, private groups, professionals etc. to ensure the activities in this five year operating plan were not in conflict with there interests and values.

7.1 Town Councils

The Town Council representing Mount Carmel, St. Catherine's, and Mitchells Brook were concerned with plans for harvest blocks mosquito brook and bad pond. This issue resulted outside the planning team and concern was raised by the council because they were provided information by a planning team member. It was addressed outside of the planning team process. Consultation was had with the entire town council. DNR presented the plans for the areas of concern and showed pictures of the current condition of the operating areas and our intent for reforestation. We also committed to taking council members on an annual field trip to the area to show our progress and we committed to decommissioning the road in bad pond once all areas are fully reforested.

Prior to the start of the planning process the Town of Whiteway had raised concerns over domestic harvesting in the towns water supply. DNR consulted with the Town of Whiteway as well as the communities of Hearts Delight-Islington, and Heart's Content. These communities have the highest dependency for fuel wood on the Avalon and Heart's Content in particular has an extremely large water supply with numerous domestic and commercial areas. DNR showed community leaders the planned harvest areas for the next five years including closures, changes, and new areas. Some modifications were made to areas after the consultations and the communities were appreciative of the consultation

and agreed to work closely with DNR on a go forward basis.

DNR works on a continuous basis with communities on the Avalon. Given the current development boom in the region the majority of meetings and consultations are related to residential and industrial development within town boundaries and the conflict associated with domestic or commercial harvest areas. Towns generally accept that their citizens rely heavily on domestic fuelwood for home heating but they also realize that developments provide significant support to the community. Going forward it is expected that consultations of this nature will increase. Communities and the people they represent really need to discuss the level of development and the extent of the forest environment they want as a community as it becomes more and more difficult for DNR to protect a forest landbase within community boundaries from development.

7.2 Private Groups

Consultations were also had with two private groups representing domestic harvest interests on the Bay de Verde Peninsula. Concerns were raised over lack of change to domestic areas in the past 20 years, weather conditions no longer permitting access to some areas, and lack of wood to harvest in some areas. DNR assessed the domestic harvest program for this region and consequently closed areas that were heavily harvested to ensure regeneration for future harvest, adjusted boundaries to current areas, and opened some new areas. Both groups gave full support to the plan and all were informed that closed areas will be strictly monitored to ensure successful regeneration and areas struggling to restock naturally would be planted by DNR.

7.3 Local Service Districts/ Cottage Development Areas

DNR has a long history of forest management in the Central Avalon in particular the Henders, Quirks Ridge, and Deer Park. Over the last number of years the development of the Local Deer Park District has been significant. DNR has maintained a very good working relationship with the leaders for the Deer Park area. They are continually updated on any operations starting or ongoing within this area. We have committed to them that they will be notified of all operations, we will continue to ensure the public's safety with proper warning signage, we will maintain the portions of road that are used during forestry operations and we are available to discuss any concerns as we move forward. DNR fully appreciates the support and the working relationship with the Local Service District and acknowledge the importantance of this relationship for forest management and it should serve as a model going forward when forestry activities are bound to conflict with other cottage development areas in the future.

One such other area where this model of co-operation has been developing in recent years is the Peak Pond cottage area where DNR have and will continue to have forest management activities in this vicinity with the Spread Eagle operating area. DNR has been in consultation with leaders for this cottage area and we have been working to ensure the same aspects of involvement and co-operation are adhered to as with the Deer Park area. DNR will continue to foster this relationship as we proceed with forest management in the area.

7.4 Academic

The concerns over the impacts of browsing on forest succession have been highlighted numerous times in this plan. Some of the more recent work on this issue has been completed by Dr. Luise Hermanutz from Memorial University. DNR has consulted with Dr. Hermanutz as we see great value in her work. We have offered that district staff may be able to assist with field work on the Avalon as scientific information related to the ecological impact of browsing could improve upon current forest management activities, specifically reforestation efforts.

7.5 ENGO's

DNR's new Centre for Forest Science and Innovation has been actively engaging various ENGO's concerning five year operating plans and the conflicts they have with the process and the activities that are planned. For the most part the issues being raised are not a mandate of five year plans but are more provincial in scope and policy driven and this Division is committed to continued consultations over the next number of years as DNR develops new polices in conjunction with other agencies, academic community, ENGOs' and the public. The work resulting from this will be worked into the ongoing five year plan.

7.6 Organizations

The Wooden Boat Museum of Newfoundland and Labrador Inc. is a non-profit organization dedicated to safeguarding the wooden boat building legacy and preserving the boat building history in Newfoundland and Labrador. The museum strives to preserve the act of traditional boat building and helps active boat builders to continue building boats while instilling the skills and knowledge in younger generations. Consultations were had with the leaders of the organization to discuss the availability of a suitable wood supply for boat builders in the organization and concerns over permitting to allow the harvest of timbers that are required. These types of timbers are often unique in shape and often not

suited for traditional sawmilling. DNR has committed to working with the organization over the next several months to implement a system which ensures active builders have access to resources they require for keeping this tradition alive.

8.0 MITIGATIONS

The following are issues that arose during the development of this five year operating plan and the mitigations that were taken in response. Some of the issues were previously discussed in the consultations section above. For the most part, issues presented were rectified through a consensus based approach but unfortunately some concerns could not be resolved even with significant discussions.

In January a group of local people representing a number of communities from the Bay De Verde Peninsula presented a petition with approximately sixty signatures requesting significant changes to domestic cutting areas in the next five year operating plan. Domestic areas in this region have been relatively unchanged for a number of years and weather in the past number of years has prevented access to remote areas. As a result DNR worked diligently to examine forest management options for domestic cutting in the region. The result was closures of some areas as well as boundary modifications to current areas. It was a requirement from a sustainable forest management perspective to close areas ensuring successful regeneration for future forest harvest. These changes were presented to representatives of the group and they were more then pleased with the proposals we put forth in this five year plan. DNR has agreed to work closely with the individuals on a go forward basis to ensure that domestic harvest requirements are met.

Harvesting activity is planned for the Henders operating area in this five year operating plan and access is through the Local Deer Park Service District. DNR has maintained a good working relationship with the local service district and concerns were raised over safety and access road damage as a result of operations. DNR has committed, as in the past, to ensuring that proper safety signage is in place and road maintenance is conducted while operations are ongoing. The local service district was satisfied with these mitigations and we will continue to work with them closely on a go forward basis.

At a planning team meeting on May 5th, 2011 one planning team member expressed their concerns over changes to domestic cutting areas on the Cape Shore. These changes were made to facilitate the ease of domestic management in this area. The member was concerned that this would have a detrimental effect on the caribou herd in this area as the forested valleys are key habitat. Given the members concerns DNR committed to removing these changes and have since went back to the old domestic areas from the previous five year plan.

There is still a lack of knowledge on rare lichen that exists on the Avalon and in the province. As a result DNR is still committed to increasing our knowledge through research as previously mentioned and as well will continue to work with the wildlife division to ensure interim protection of forest activity in key areas. DNR is also committed to pre-harvest lichen surveys and ensure that lichen found is buffered accordingly.

At a planning team meeting on April 18th, 2011 one planning team member put forth a request for inclusion of the use of Global Forest Watch (GFW) data in delineating "probable old growth forest" as well as deferrals on harvest areas based on this data. Significant correspondence was had on this issue. The provincial forest resource inventory (FRI) is the only real tool available to begin the process of identifying old growth forest. The GFW Report is far too coarse as recognized by the planning team member, and uses a methodology that is completely unrelated to the condition of the actual forest. The GFW report simply eliminated areas with signs of human activity for potential intact forest sites. Developing an old growth definition and policy is an extensive process, involving numerous research projects, literature reviews, consultation, detailed mapping etc. as reflected by processes in other provinces. It is not something that is handled at the district level in a five year operating plan. This is provincial in scope and as such DNR, through The Centre for Forest Science and Innovation (CFSI) will be working on this at the provincial scale on a go forward basis.

In addition to committing to addressing this concern through extensive research, other mitigation for the planning team members concerns was expressed. In relation to POG data proposed, the harvest areas in this plan highlight that District 1 planning is not aggressively targeting old growth given that only 7% of the POG proposed by the planning team member is within current cutblocks, meaning 93% (96,000 ha) of POG proposed has no planned activity. This clearly is a substantial area without planned activity that should serve as a significant pre-cautionary approach on a go forward basis. In addition, DNR recognizes the significant role and value of old growth forest highlighted by the fact that DNR has provided interim protection areas of interest by Parks and Natural Areas which includes substantial POG proposed by the planning team member. DNR has also ensured 20% of 80+ year age classes over a 160 year planning horizon. Finally, of all the harvest area proposed in the next five year plan only 2% is 80+ years old. This clearly shows that District 1 planning is not aggressively targeting or degrading old growth forest and there is substantial protection of old growth over the life of this five year operating plan.

Operators on the planning team have also highlighted the history of logging in some of the areas proposed for deferral based on GFW data. They have expressed that ENGO's and academics have been very successful in the protection of large tracts of productive forest and they are against any further deferrals which they feel will impact their livelihood. The planning process is a consensus based approach which attempts to meet all stakeholder values. In terms of GFW data and deferrals DNR

mitigations are those previously mentioned above and as a result this should serve to mitigate commercial operator concerns since DNR did not defer on proposed cutblocks based this data. This ensures flexibility and security of a wood supply for commercial operators.

At the May 30th planning team meeting a member of the team expressed concern over the proposed road reconstruction that was planned for the year 2016 in an area of interest by Parks and Natural Areas. This was identified as a project to be included in case there was an agreement reached at some point to try harvesting trials with respect to affects on lichen species. The member expressed concern with this and as mitigation DNR decided to remove the planned project from the five year operating plan. It should be noted that in the latest information from parks and natural areas is that this area was no longer identified for interim protection. DNR will still work closely with wildlife on opportunities to further knowledge on lichen species and are open to trials examining the affects of harvesting on such species.

9.0 EDUCATION

Education of the public concerning sustainable forest management activities is a very important part of the planning process and the execution of the plan. The awareness and appreciation of modern forestry practices should be promoted. There are various programs in existence and development by the Provincial Department of Natural Resources the Western Newfoundland Model Forest and other groups. Officers in the district continue to focus on school presentations, fairs, and other opportunities to promote conservation and forest and wildlife management. These activities will continue to be promoted going forward through the next planning period.

10.0 LITERATURE CITED

Abraham, K.F., Jeffries, R.L., Rockwell, R.F., 2005. Goose-induced changes in vegetation and landcover between 1976 and 1997 in an artic coastal marsh. Artic Ant. Alp. Res. 37, 269-275.

Acres International. 1987. Regional Water Resources of the Eastern Avalon Peninsula. Prepared by Water Resources Division, Dept. of Environment, Government of Newfoundland and Labrador.

Acres International and Colin Karasek Ltd. 1988. Regional Water Resources Study of the Western Avalon Peninsula. Prepared by Water Resources Division, Dept. of Environment, Government of Newfoundland and Labrador.

Bajzak, D. and B. A. Roberts. 1996. Development of Ecological Land Classification and Mapping in Support of Forest Management in Northern Newfoundland, Canada. Environmental Monitoring and Assessment 39:199-213.

Bajzak, D and B. A. Roberts. 1998. Public Planning Process in Forest Management for the Avalon District, Newfoundland, a Case Study. Proceedings of the ASPRS –RTI Annual Conference March 30 to April, Tampa, Florida.

Barney, W. 2006. Department of Environment and Conservation. E-mail of February 21, 2006 providing Update on Wildlife Values.

Bergerud, A. T., F. Manuel, and H. Whalen. 1968. The harvest reduction of a moose population in Newfoundland. Journal of Wildlife Management 32: 722-728.

Betancourt, J., D. Breshears, and P. Mulholland. 2004. Ecological impacts of climate change. Report from NEON Science workshop. Agust 24-25, 2004. Tucson, AZ. American Institute of Biological Sciences, Washington, D.C., USA.

Breshears, D., et al. 2005. Regional vegetation die-off in response to global-change-type drought. Proceedings of the National Academy of Sciences. 102: 15144-15148.

Butler, K. and J. Sharron. 1998. Resource Road Deactivation in District 1. Department of Forest Resources and Agrifoods.

Cleary, B. and L. Moores. 2003. Forest Management Planning : A Discussion Paper on Alternate Approaches, Government of Newfoundland and Labrador.

Coleman-Sadd, S and S. A. Scott. 1994. Newfoundland and Labrador Traveler's Guide to the Geology. Canada – Newfoundland Co-operation Agreement on Mineral Development.

Cohlmeyer, C. 2006. Department of Natural Resources. E-mail of March 8, 2006 in relation it Wood Supply Presentation.

Doucet, C. 2006 Personal communication and e-mail of June 6, 2006 in relation to riparian buffers.

Drake, M. 1996. Resources Archaeologist, Historic Resources Division. Correspondence of June 12, 1996 in relation to Historic Resources.

Emmett, B. 2006. Perspectives on Sustainable Development and Sustainability in the Canadian Forest Sector. The Forestry Chronicle. Volume 82, No. 1 January/February 2006.

Field, C.B., Mortsch, L.D., Brklacich, M., Forbes, D.L., Kovacs, P., Patz, J.A., Running, S.W. and Scott, M.J. 2007. North America. Pp. 617-652 in: Climate change 2007: impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Flannigan, M.D., K.A. Logan, B.D. Amiro, W.R. Skinner and B.J. Stocks. 2005. Future area burned in Canada. Climatic Change 72: 1-16.

Fowells, H.A. 1965. Silvics of Forest Trees of the United States, Agriculture Handbook. No. 271, United States Forest Service.

Gill, R.M.A., 2006. The influence of large herbivores on tree recruitment and forest dynamics. Large Herbivore Ecology, EcosystemDynamics and conservation. Cambridge university press. 170-204.

Government of Newfoundland and Labrador. 1998. Environmental Protection Guidelines for Ecologically Based Forest Resource Management. Dept. of Forestry Resources and Agrifoods.

Government of Newfoundland and Labrador. 2003. Provincial Sustainable Forest Management Strategy, Department of Forest Resources and Agrifoods.

Government of Newfoundland and Labrador. 2005. Bill 32, An Act to Amend the Forestry Act. House of Assembly.

Government of Newfoundland and Labrador, 2006. Island Wood Supply Analysis, Public Review. Department of Natural Resources.

Halpin, P.N. 1997. Global climate change and natural area protection: management responses and research directions. Ecological Applications 7: 828-843.

Hogg, E.H. and Bernier, P.Y. 2005. Climate change impacts on drought-prone forests in western Canada. The Forestry Chronicle 81: 675-682.

Harris, J.A., R.J., Hobbs, E. higgs, and J. Aronson. 2006. Ecological restoration and global climate change. Restoration Ecology 14: 170-176.

Jacobs, J. D. 2004. Correspondence of November 17, 2004 on behalf of District 1 Planning Team to Minister Byrne and to Minister Osborne regarding release of Natural Areas Systems Plan.

Johnston, M. and Williamson, T. 2005. Climate change implications for stand yields and soil expectation values: a northern Saskatchewan case study. The forestry Chronicle 81: 683-690.

Johnston, M., Willamson, T. Price, D. Spittlehouse, D., Wellstead, A., Gray, P., Scott, D., Askew, S. and Webber, S. 2006. Adapting forest management to the impacts of climate change in Canada. A BIOCAP Research Integration Program synthesis paper. BIOCAP Canada, Kingston, On.

Johnston, M. and Williamson, T. 2007. A framework for assessing climate change vulnerability of the Canadian forest sector. The Forestry Chronicle 83: 358-361.

Jones , C and G. Winter. 1995. Watershed Profiles for Eleven River Basins on the Avalon Peninsula, Newfoundland (A proposal of the Central Avalon Coalition, the Northeast Avalon Community Futures and SAEN under DFO Habitat Action Plan).

Kimmins, J. P. 2003. Forest Ecosystem Management : An environmental necessity, but is it a practical reality or simply an ecotopian ideal? XII World Forestry Congress, Quebec City, Canada.

Lackey, R. 1995. Seven pillars of ecosystem management. Landscape and Urban Planning 40: 21-30.

Landres, P. B., P. Morgan, and F.J. Swanson. 1999. Overview of the use of natural variability concepts in managing ecological systems. Ecological Applications 9: 1179-1188.

Kirby, F. 2006. Department of Natural Resources. E-mail of February 28, 2006 providing information on Minerals and Aggregate Resources.

McLaren, B. E., B. A. Roberts, N. Djan-Chékar, and K. P. Lewis. 2004. Effects of overabundant moose on the Newfoundland landscape. Alces 40: 45-59.

McLaren, B., Hermanutz, L.,Gosse, J., Collet, b., Kasimos, C. 2009. Broadleaf competition interferes with balsam fir regeneration following experimental removal of moose. Forest Ecology and Management 257: 1395-1404.

Meades, S. J. 1990. Natural Regions of Newfoundland and Labrador. A contract report submitted to the Protection Areas Association.

Meades, W. J. 1986. Successional status of Ericaceous dwarf-shrub heath in Eastern Newfoundland. Ph.D. Thesis, University of Connecticut.

Meades, W. J. and L. Moores. 1989. Forest Site Classification Manual : A Field Guide to the Damman Forest Types of Newfoundland. FRDA Report 003.

Meades, W. J. And B. A. Roberts. 1992. A Review of Site Classification Activities in Newfoundland and Labrador. The Forestry Chronicle, Vol. 68, No. 1.

Millar, C.I., and L. b. Brubaker. 2006. Climate change and paleoecology: new contexts for restoration ecology. Pages 315-340. restoration science. Island Press, Washington, D.C., USA.

Nazir, M and L. Moores. 2001. Forest Policy in Newfoundland and Labrador. The Forestry Chronicle, Vol. 77.

Northlands. 1994. Environmental Protection Plan for Ecologically Based Forest Resource Management. Prepared for the Newfoundland Forest Service, Dept. of Forestry and Agriculture.

Olofsson, J. 2006. Short and long term effects of changes in reindeer grazing pressure on tundra heath vegetation. J. Ecol. 94, 431-440.

Otvos, I. S. and B. H. Moody. 1978. The Spruce Budworm in Newfoundland : History, Status and Control. Newfoundland Forest Research Center, St. John=s, Nfld. Information Report N-X-150.

Otvos, I. S., L. J. Clarke and D. S. Durling. 1979. A History of Recorded Eastern Hemlock Looper Outbreaks in Newfoundland. Newfoundland Forest Research Center, St. John=s, Nfld. Information Report N-X-179.

Page, G. 1971 Properties of some Common Newfoundland Forest Soils and their Relation to Forest Growth. Canadian Journal of Forest Research 1:174-192.

Pimlott, D. H. 1953. Newfoundland Moose. Transactions of the 18th North American Wildlife Conference.

Planning Team for Forest Ecosystem Management on the Avalon. 2002. Forest Ecosystem Strategy Document for Forest Management District 1 (The Avalon Peninsula).

Pollett, F. C. 1968. Peatlands of the Avalon Peninsula. Based on Peat Resources of Newfoundland. Mineral Resources Report No. 2, Government of Newfoundland and Labrador.

Roberts, B. A. 1983. Soils of Newfoundland an Introduction. Monographiae Biologicae 48:107-161.

Roberts, B. A. and R. S. Van Nostrand. 1995. Distribution and site ecology of Eastern Larch in Newfoundland, Canada. Paper presented at the Symposium on Ecology and Management of Larix Forest. Whitefish, Mt. USA.. P. 349-359

Robertson, A. W., F. C. Pollett and O. A. Olsen. 1973. Peatland Flora of Newfoundland

Robertson, A. W., S. Porter and G. Brodie. 1993. Climate and Weather of Newfoundland and Labrador. Canadian Meteorlogical and Oceanographic Society.

Toews, D.A.A. and Brownlee. 1987. A Handbook for Fish Habitat Protection on Forest Lands in British Columbia. Habitat Protection Division, DFO.

Trelawney, P. 1995. The Demand and Supply of Domestic Fuelwood in Newfoundland. Newfoundland Section, Canadian Institute of Forestry 39th Annual Meeting.

Twenhofel, W. H. And P. MacClintock. 1940. Surface of Newfoundland. Geological Association of America Bulletin. Vol. 51. Pages 1665 - 1728.

Van der Wal, R. 2006. Do herbivores cause habitat degradation or vegetation state transition? Evidence from the tundra. Oikos 114, 177-186.

Vavra, M., Parks, CG., Wisdom, M.J., 2007. Biodiversity, exotic plant species, and herbivory: the good, the bad, and the ungulate. For. Ecol. Manage. 246, 66-72.

Walsh, F. 1996. Habitat Protection Division, Dept. of Fisheries and Oceans, Government of Canada. Pers. Comm. and facsimile of November 11, 1996 in relation to fish habitat.

Water Resources Division. 1992. Water Resources Atlas of Newfoundland, Dept. of Environment, Government of Newfoundland and Labrador.

Wells, W. A. 2000. Proposed Reserve in Central Avalon. A submission from the Department of Forest Resources & Agrifoods to the Interdepartmental Land Use Committee April 10, 2000.

Wilton, W. C. 1956. Forest Resources of the Avalon Peninsula, Newfoundland, Dept of Northern Affairs and Natural Resources. Forestry Branch, Forest Research Division. Technical Note No. 50.

Wilton, W. C. and C. H. Evans. 1974. Newfoundland Forest Fire History. Newfoundland Forest Research Center. Information Report N-X-116