



Prince Edward Island

Department of Environment, Energy and Forestry—Forests, Fish and Wildlife Division

WOODLOT MANAGEMENT PLAN FOR PROVINCIAL FOREST PROPERTIES

#326405

#326694

#326413

#492736

Area: 170 ha (421 ac)

46.0346, -62.8107

Gairloch, PEI



Rosalyn Ridlington Abbott
October 11th, 2010 (*revised January 2011*)

Silent Season: April 15th-August 15th



Table of Contents

INTRODUCTION.....	1
GENERAL DESCRIPTION.....	3
LAND HISTORY.....	8
STRENGTHS AND WEAKNESSES	12
STAND DESCRIPTIONS AND FOREST PLANNING STRATEGY.....	17
Scots Pine Plantations.....	21
Plantations	23
Mature Softwood.....	24
Riparian Zones.....	25
European Larch Plantation.....	29
Mature Mixed Wood.....	31
Annual Allowable Cut.....	38
Silent Season	40

Table of Figures

Figure 1	5
Map of Gairloch properties including property lines, woods roads, and streams. Inset map depicts location of properties on Prince Edward Island.	
Figure 2	6
Map of Flat River North Watershed, including location of Gairloch properties within it. Southwest perimeter of watershed is the coastline of Prince Edward Island.	
Figure 3	9
Forest cover on Gairloch properties and Prince Edward Island in (A) 1900, and (B) 1935.	
Figure 4	13
Trail system on Gairloch properties.	
Figure 5	14
Woods road on property.	
Figure 6	19
Map of forest stands and identification numbers on properties in Gairloch, PEI.	
Figure 7	20
Mature spruce stand for patch harvest.	
Figure 8	24
Cover types in Gairloch stands.	
Figure 9	27
Riparian buffer areas to be enhanced through enrichment plantings.	
Figure 10	28
Stream on western side of property, taken from footbridge on trail.	
Figure 11	29
Photo of the European larch plantation (Stand 135532) at southern end of Gairloch property, taken April, 2010.	
Figure 12	31
Photo of eastern hemlock on property, taken from below.	
Figure 13	31
Photo of mature mixed wood/hardwood stand.	
Figure 14	32
Boulders in dry stream bed in mature mixed wood/hardwood stand.	
Figure 15	32
Dry stream bed.	
Figure 16	33
Valuable snag, full of cavities in mature mixed wood/hardwood stand (135923).	

INTRODUCTION

The Gairloch properties are provincially owned forest properties that lie in eastern Prince Edward Island. They are included in several properties currently under management by the Macphail Woods Ecological Forestry Project in Orwell, PEI. This management partnership was developed in 2005 through an agreement with the provincial government for a ten-year renewable lease of 800 hectares of public land in eastern PEI to be used to demonstrate forest management that exhibits environmental, social, and economic responsibility; it will also demonstrate the restoration of PEI's native Acadian woodlands. The Gairloch properties, specifically, will further this demonstration of responsible forest management by moving toward a goal of forest certification by the Forest Stewardship Council. These properties will be certified under FSC's Small and Low Intensity Managed Forests (SLIMF) program, through which certification is granted to a group of small woodlot owners participating in a membership pool that shares the annual audit costs and therefore makes FSC certification a viable and affordable option for small landowners. The provincial government will become a member of the Acadian Forest Keepers pool, which includes mainly private landowners from throughout the Maritime provinces, further bringing into effect the objectives outlined in the 2006 Prince Edward Island Forest Policy, "Moving to Restore A Balance in Island Forests."

The Forest Stewardship Council is a not-for-profit, non-governmental organization that was established in 1993 in response to concern over the degradation and loss of forests around the world. It seeks to promote the responsible management of these forests, and acts as a forum in which different stakeholders from industry, government and the not-for-profit sector can come together to discuss issues related to the conscientious management of forest resources. One way in which FSC promotes socially and environmentally responsible forest management is through their certification process. By adhering to the FSC Principles and Criteria for responsible forest management, producers in the forest industry can become certified through the FSC certification process, thereby displaying the FSC logo and indicating to consumers that their products are a more socially and environmentally conscious choice. This provides value to the consumers and benefits people and the environment in the areas in which production activities take place.

The Acadian Forest ecoregion, which is the type of forest found on Prince Edward Island and through much of the other Maritime provinces, is generally described as a complex forest, found at a zone of transition between the boreal forest to the north and the deciduous forests to the south. It incorporates a blend of both conifer (softwood) species and deciduous (hardwood) species. Typically, forest stands regenerate by means of small, frequent natural disturbances leading to a dominantly late successional forest condition. In disturbed areas, plant and tree species quickly establish and replace the trees that once occupied that area. Disturbances that create large openings (e.g. fire, spruce budworm, blow down), and lead to entire stands being replaced, are uncommon.

The forests on Prince Edward Island have changed dramatically since the first European settlers arrived. Historically, Prince Edward Island was blanketed in thick forest cover that included long-lived, shade-tolerant species such as red spruce, sugar maple, yellow birch, American beech, white pine, and eastern hemlock. Years of harvesting trees for the ship building industry and land clearing for agriculture have resulted in a very different landscape than the original Acadian forest that greeted the first settlers a few hundred years ago. Much of the forest cover now found on Prince Edward Island has been cut many times; it is a young forest that has not had the time to mature to a late successional stage. As a result, the present forests contain many shorter-lived species that would have been present in lower proportions in the original forest cover. In order to restore the current forest to a landscape that more closely resembles the historical forest cover of the province, various methods of intervention will be applied to these properties that will initiate the process of developing a more diverse Acadian forest community.

The intent of this management plan is to outline management activities that will be carried out in the next five years (2011-2015). These activities will serve to begin restoration and diversification of particular stands in order to encourage a progression to a healthier forest of uneven-aged, mixed species stands that more truly reflect the Acadian forest of Prince Edward Island.

The main objectives of this management plan are:

- 1) to restore and diversify the forest, providing valuable wildlife habitat;**
- 2) to increase the future value of the woodland;**
- 3) to provide enjoyable recreational activities for the general public of Prince Edward Island, allowing for active living and a chance to experience natural settings on public land;**
- 4) to safeguard water resources and enhance riparian areas;**

- 5) to provide conscientious harvesting opportunities for fuel wood and hardwood lumber; and
- 6) to serve as a demonstration of small woodlot certification to other woodlot owners on Prince Edward Island.

Diversification, as it pertains to the management activities on this property, signifies the process by which the forest will become more diverse in regard to number of species (trees, ground plants, wildlife, etc.), ages of the trees within stands, genetics of the individual trees, structure of the stands, and the overall forest ecosystem.

GENERAL DESCRIPTION

The Gairloch properties are made up of a combination of four individual adjacent properties, PID numbers 326405, 326413, 326694, and 492736. In their entirety, they encompass 170.33 hectares (420.9 acres) and 70 different forest stands. The GPS coordinates of a point falling into the central region of the properties are 46.0346, -62.8107 (NAD 83).

Streams and Waterways

Although Figure 1 shows a network of streams throughout the property, several of them are ephemeral, running only seasonally. However, like the permanent stream present on the western side of the property (running north and northeast), they will be managed as special management zones as they do have defined channels.

Watershed Information

The properties lie within the Flat River North watershed of eastern PEI and the management activities of Southeast Environmental Association, a local environmental and watershed non-profit group. The watershed encompasses 2,249 hectares of land, 1,760 (78%) of which are forested (Figure 2). The forested area consists of 771 hectares of hardwood forest, 159 hectares of softwood forest, and 433 hectares of mixed wood land.

Road Access and Boundary Lines

The Gairloch properties are accessed from an entrance on the south side of the Gairloch road, approximately 500 metres east of the Confederation Trail (Rails to Trails) intersection with the road.

This entrance leads to a network of forest roads that run through much of the property and in some instances intersect with a recreational trail present on the land created by Island Trails in 2009. The Confederation cycling and hiking trail runs through the northwest corner of the property. The boundary lines on the property should be established prior to any work being done. When establishing property boundary lines between provincial and private land for forest management activities, landowner agreements are created between the two owners in which each party agrees on the boundary line, up to which forestry activities on either side can take place.

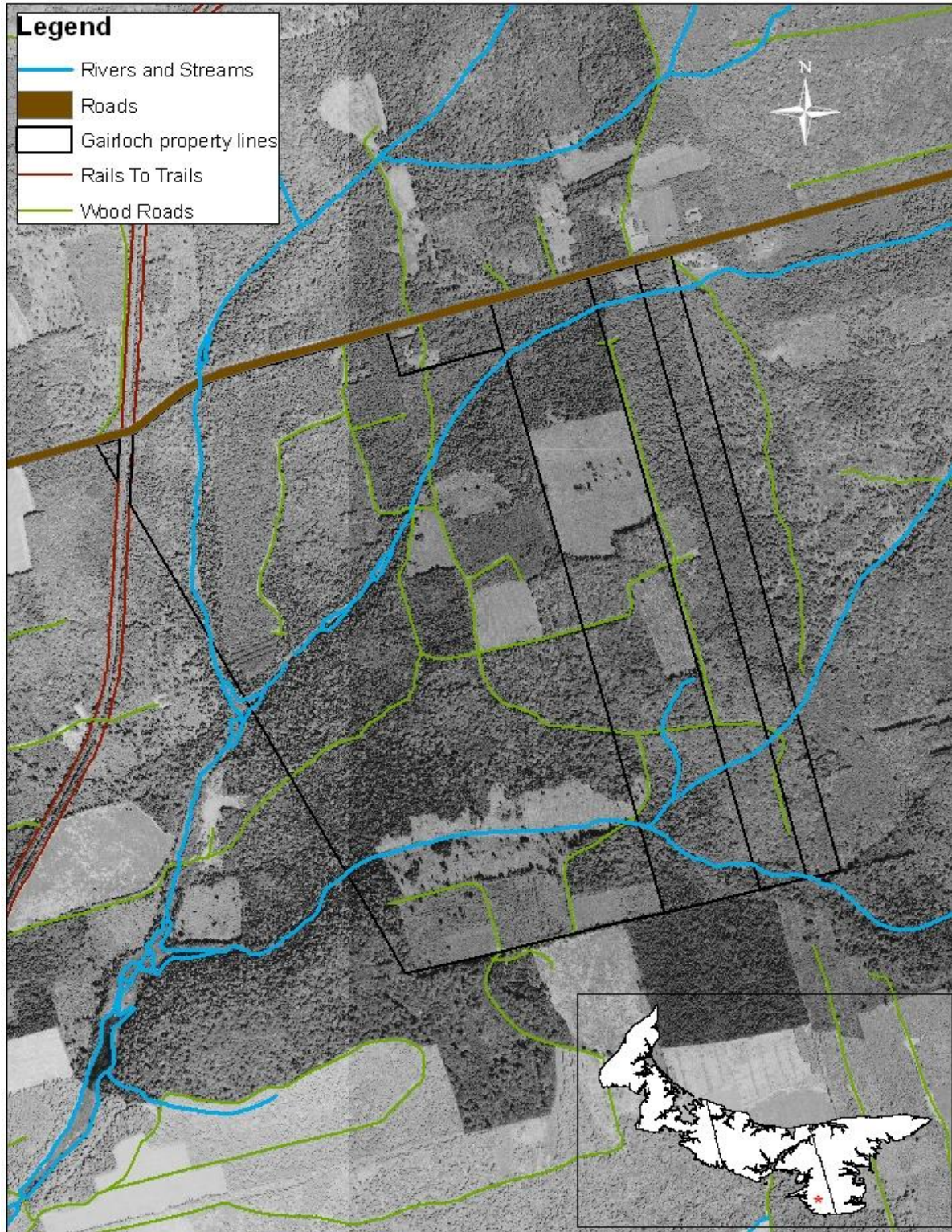


Figure 1. Map of Gairloch properties including property lines, woods roads, and streams. Inset map depicts location of properties on Prince Edward Island.

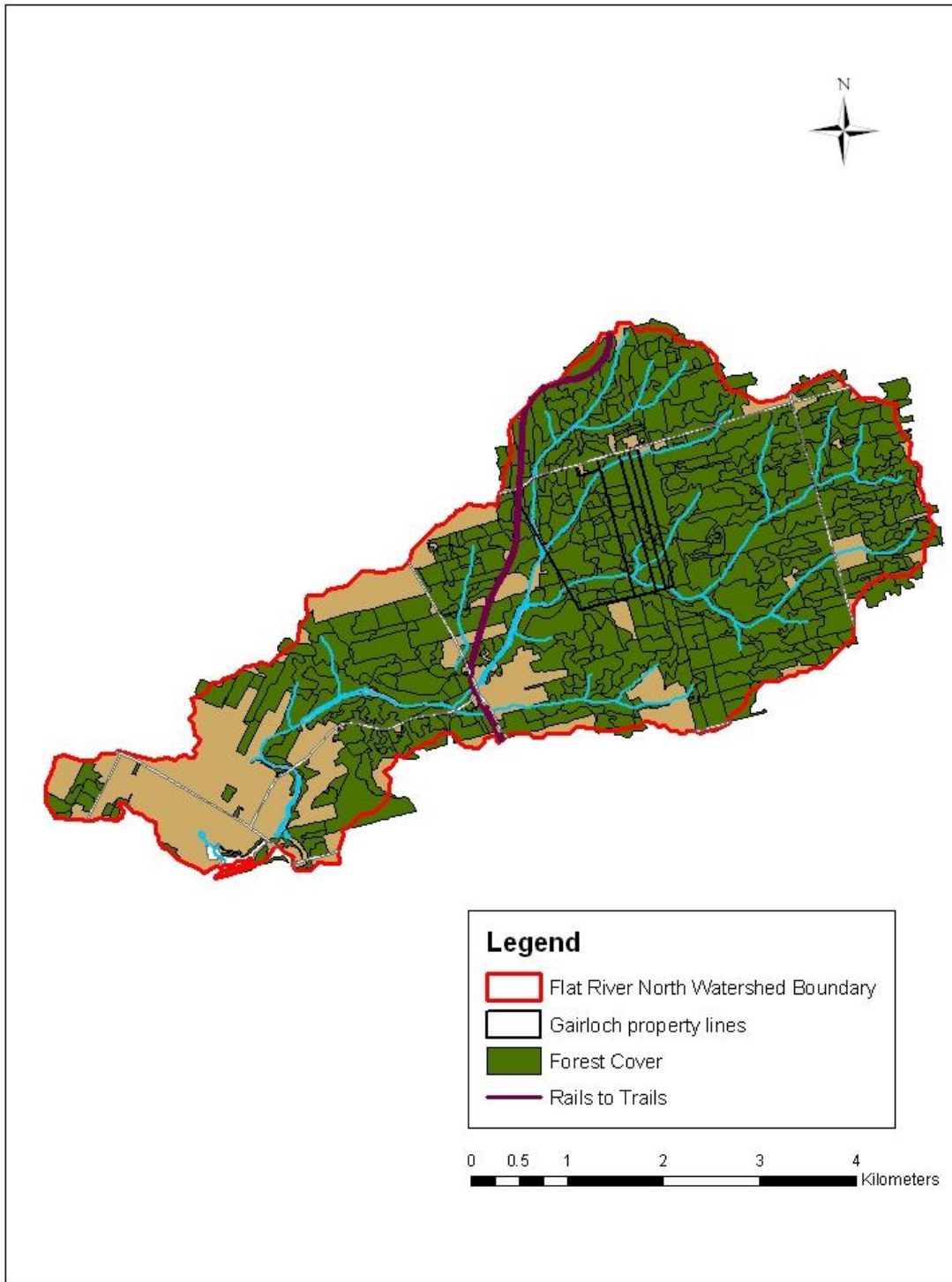


Figure 2. Map of Flat River North Watershed, including location of Gairloch properties within it. Southwest perimeter of watershed is the coastline of Prince Edward Island.

Forest Fire Suppression

Forest fire suppression efforts are carried out by the province, and governed by the Fire Prevention Act. Under this act, anyone who observes a forest fire must report it by calling 911 and identifying the location by road name and closest civic address. Upon identification as forest fire, specifically trained forestry officials will respond to the scene with equipment owned by the provincial government to combat the fire and prevent its spread. The Gairloch properties fall into the Georgetown Forest Fire Zone of the Eastern District. Additionally, when a forest fire has been identified, local fire departments are also notified. These properties fall under the jurisdiction of the Belfast Fire Department.

Wildlife Habitats

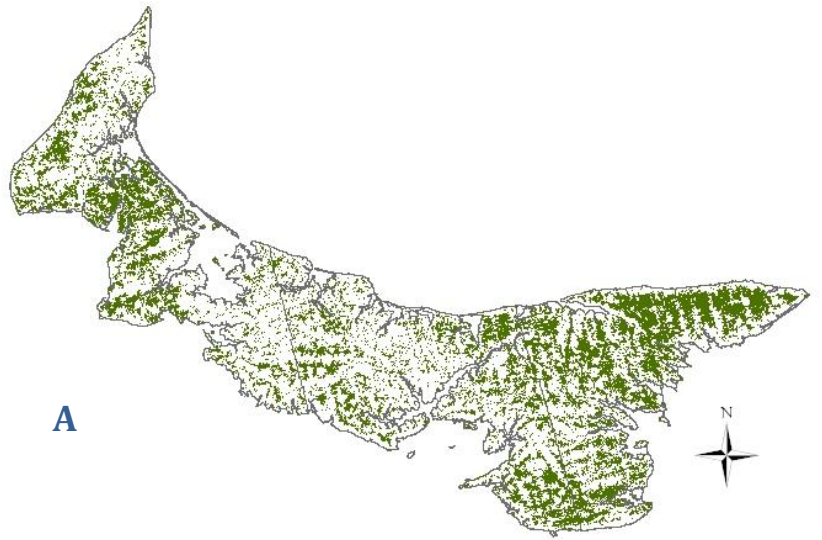
There are a variety of different habitats present on these properties, with the mature mixed-wood stand in the southern section the most valuable to wildlife—the diversity of tree species and ages, and the less disturbed nature of the forest, allow it to provide habitat for a number of different species that tend to be less willing to make use of other areas of the properties, due to sensitivity to disturbance. The more advanced age of some of these trees also allows the possibility of larger-sized cavities for larger cavity-nesting birds such as barred owls. The regenerating and immature sections of the parcel provide habitat for species that specialize in successional habitats and that can make use of the fruit-bearing tree and shrub species that dominate regenerating areas. The plantations, while allowing ample red squirrel feeding opportunities, provide very little else in terms of habitat for other species of wildlife. Stand 135532, the European larch plantation, is very grassy and currently provides a more open, meadow-like habitat to wildlife. Wildlife sightings in that area include ruffed grouse, snowshoe hare, meadow voles, song sparrows and signs of coyote activity. Appendix 1 gives examples of a variety of native wildlife species that use different types of forest habitat in a series of tables and figures, and can provide insight as to what types of wildlife might be found in different parts of the Gairloch properties.

LAND HISTORY

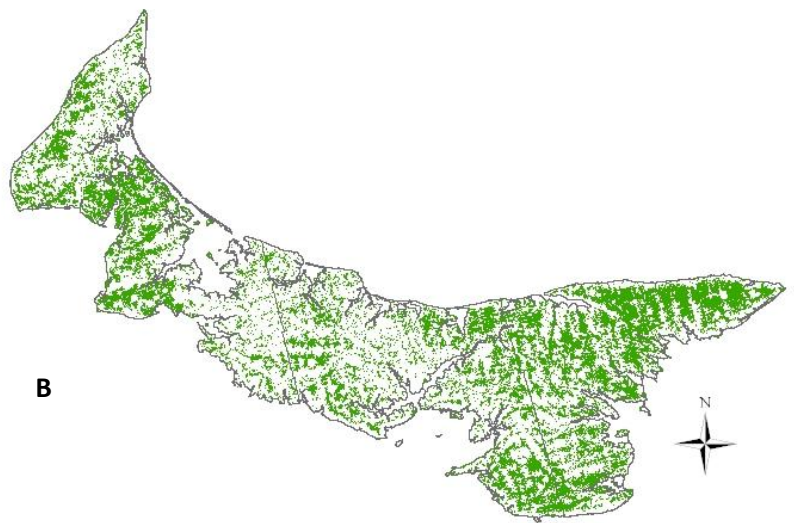
The Gairloch properties are situated in an area of eastern Queens county that was historically known as Lot 60, or one of the lots in the original survey completed by Samuel Holland in 1766. This region comprises such communities as Culloden, Caledonia, Melville, Valley, Lewes, and Flat River, and is still referred to as Lot 60 for census purposes. This area has historically been a region inhabited by persons of Scottish descent, as is apparent in the names of some communities in the area, and agriculture was a driving force in land change in the area, as it was across the island.

Andrew Hill Clark in his book “Three Centuries and the Island: a Historical Geography of Settlement and Agriculture in Prince Edward Island, Canada”, outlines the settlement history of the Lot 60 area, which encompassed 19, 240 acres and was one of the later areas to be settled. At the end of the 1700s, it was still empty, despite nearby coastal Acadian settlements that had established some clearing of the land in the region but did not lead to further settlement inland. Scottish immigration began in earnest in nearby lots in the early 1800s, and according to archive information from the census records of 1841, farms had already been established in the Lot 60 area by persons of Scottish descent. However, according to Clark’s book, Lot 60 remained one of the less densely populated districts on PEI and remains so at this time, with a population of 320 according to the 2001 census. While clearing had occurred for agriculture in this region, maps delineating forest cover for PEI circa 1900 show that less clearing had taken place in the Lot 60 area compared to other regions, particularly central PEI.

It is possible to note as one walks through the Gairloch properties that past agricultural activity in the early to mid 20th century has affected the forest cover of this landscape as well (Figure 3). This is evidenced by the presence of mature stands of old-field white spruce that are still growing in a successional state of forest renewal.



A



B

Figure 3. Forest cover on Gairloch properties and Prince Edward Island in (A) 1900, and (B) 1935.

According to the Island register, the ownership of Lot 60 in 1767 (shortly after the Island was divided into lots and properties were granted to various parties) was deeded to Major John Wrightson and Captain Daniel Shaw. It changed hands several times over subsequent years, and in 1864 was listed as public land. Through further changes in ownership throughout the next century, the four adjacent parcels making up the Gairloch properties were purchased by the PEI provincial government at different times to once again become public forest land in the mid to late 20th century. These purchases were dated as follows:

- PID 326405—January 12th, 1967
- PID 326413—July 12th, 1967
- PID 326694—February 21st, 1994
- PID 492736—December 21st, 1994

The forest on the Gairloch properties have a long history of human intervention, between the agricultural activity before the property came to belong to the provincial government and the forestry activities that have been carried out on the land since it become public forest. Various parts of the forest were cleared; some areas were left to naturally regenerate, while plantations were established on other sections. These different activities have given rise to properties which present interesting challenges to the development of current management decisions and priorities, and can bring insight into how these decisions can bring about a more diverse Acadian landscape on other lands that have seen a heavy human hand in the past.

***Note:** in the Provincial Policy on Consultation with the Mi'kmaq, the policy states:

“It is the policy of Prince Edward Island to consult with and, if required, accommodate the interests of the Mi'kmaq when the Crown has knowledge, real or constructive, of the potential existence of an Aboriginal or treaty right and contemplates conduct that might adversely affect it.”

The Mi'kmaq Confederacy of Prince Edward Island was contacted for information during the writing of this document. However, no response was received. Therefore, information on historical use of the area by First Nations peoples has not been included at this time but may be added in the future should the Confederacy wish.

In keeping with the Forests, Fish and Wildlife Division's consultation procedures, Chiefs of PEI's two First Nation Reserves, staff of the Mi'kmaq Confederacy and the Provincial Archeologist/Director of Aboriginal Affairs are being consulted on this management plan.

STRENGTHS AND WEAKNESSES

The Gairloch properties have a complicated history of management and that leads to them having various strengths and weaknesses. Combined, they form an unusually large contiguous property for Prince Edward Island, and that in itself can be considered a strength, since due to the high proportion of privately owned, small properties, it can be difficult on PEI to implement cohesive management strategies for areas of this size.

A mountain biking and hiking trail was established on this property in 2009 with construction of bridges finished in early spring, 2010 (Figure 4). This work was completed through federal economic stimulus funding provided to Island Trails and provides a very enjoyable recreational experience to hikers, bikers and nature enthusiasts. Combined with the established road system on the property, it makes it easy for visitors to get around the majority of the property and view the different forest stands, streams, wildlife, and other points of interest. Because the certification of these provincial properties will serve as a demonstration to other woodlot owners and the public on Prince Edward Island, the fact that it is an enjoyable location to visit and can serve as a recreational outing can only increase its benefit as a demonstration site by perhaps bringing awareness to more islanders about the responsible management of provincial forest and the types of properties that can be certified through FSC.

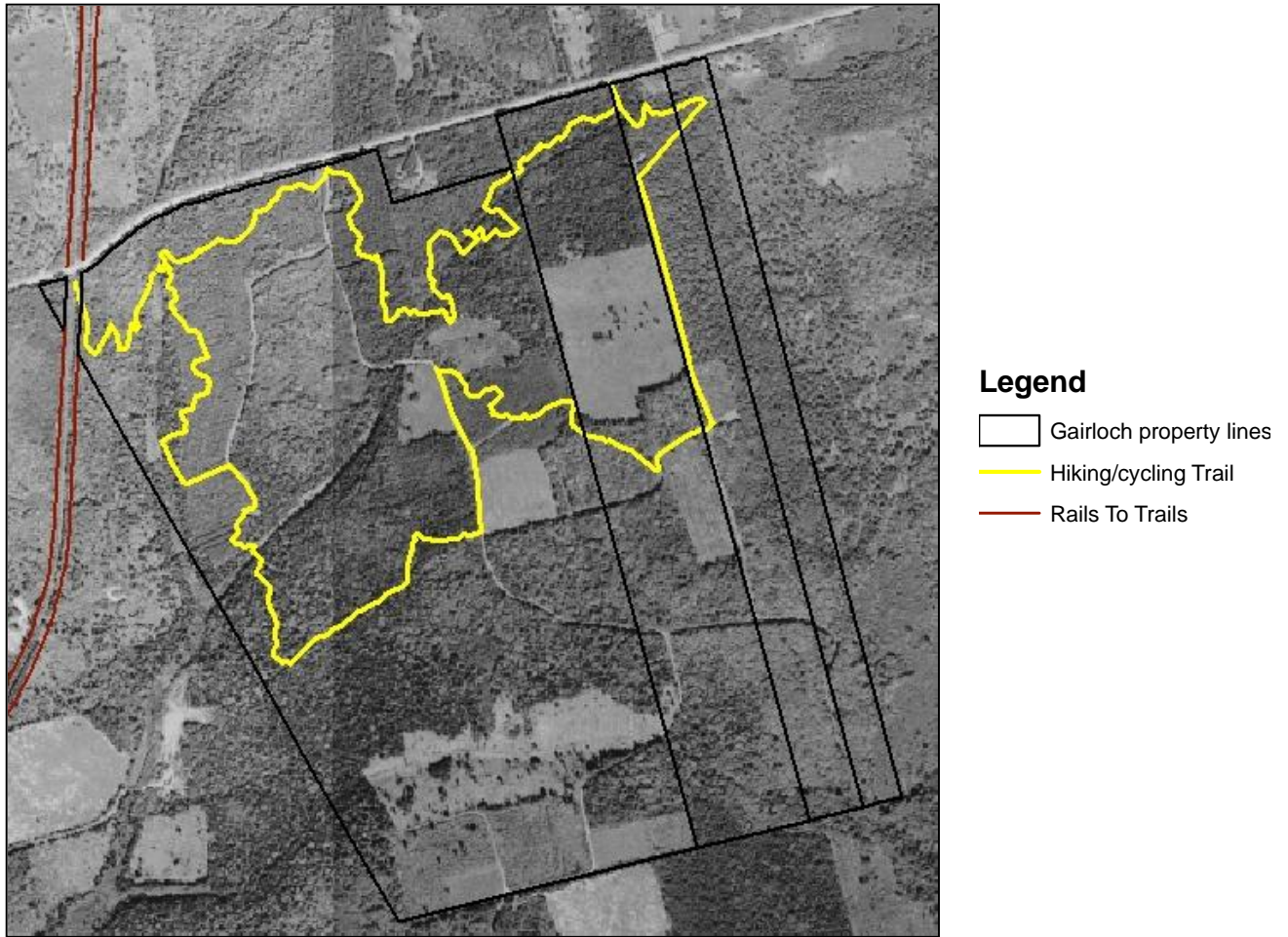


Figure 4. Trail system on Gairloch properties.

In the south-eastern section of the property lies a mixed-wood, uneven-aged stand that contains many shade-tolerant hardwood tree species and longer-lived conifers such as hemlock. This section is invaluable as wildlife habitat and representative of PEI’s original Acadian forest. In particular, the hemlock trees are a real asset to the property and should be highlighted as something to conserve and emphasize. Additionally, in stand 135923 specifically, there is an abundance of sugar maple trees growing in and around a dry stream bed (which may seasonally see some water). It is possible that this could be developed as a sugar bush and used as a demonstration to the public.

The road system present on the property is another strength (Figure 5). Although sections of the road could benefit from some immediate maintenance, the system allows access to much of the parcel and is in good shape for travel. Guidelines for the development and construction of woods roads are outlined

in the Ecosystem-Based Forest Management Standards Manual, available on-line at <http://www.gov.pe.ca/photos/original/2011ecomannual.pdf> or through the Forests, Fish and Wildlife Division.



Figure 5. Woods road on property.

Other interesting points within this property include the presence of a high number of lady's slipper plants (*Cypripedium acaule*), as well as a number of apple trees (*Malus sp.*) scattered throughout the property. The lady's slipper is Prince Edward Island's provincial flower and provides aesthetic appeal to visitors. The apple trees can also provide aesthetic value, as well as historic appeal due to the fact that their presence indicates past homestead development in the area. Apple trees also offer food to a number of frugivorous, insectivorous and nectarivorous wildlife. The fruit is appealing to such animals as cedar waxwings, ruffed grouse, robins, evening grosbeaks, foxes, squirrels and raccoons, as well as many others. Apple trees are a preferred tree for yellow-bellied sapsuckers, who drill their sapwells in the bark in order to feed on the tree's sap. Many pollinating insects, which are in decline throughout the world, including PEI, can make use of the flowering nature of the trees, as can ruby-throated hummingbirds, which also use of the sapwells created by the woodpeckers. Apple trees additionally attract many types of insects to feed on their leaves, flowers and fruit; these insects become food for a

large variety of other wildlife. Coyotes also make use of the apple crop as a large proportion of their diet during the fall and early winter months. It is beneficial for them to have valuable habitat as not only do they prey on small mammals that can girdle desirable, regenerating saplings and planted trees, but by providing an abundance and variety of food for these predators, government forest properties such as the ones in Gairloch will be able to meet their food and habitat requirements.

A weakness on this property in terms of biological diversity and the restoration of Acadian forest is the proportional area of plantations. Approximately thirty percent of the property is in plantation, and a number of these plantations are composed of non-native species (Table 1). While the plantations all differ in size, shape, species and age, there are some general similarities in their structure. In general, they lack vertical structure, snags, legacy trees, and coarse woody material. As a result, they require some intervention in order to become more diverse systems and provide habitat to a greater variety of species. There will be a financial cost associated with such intervention, and the economic return from this will be low, adding to this weakness.

Table 1. Plantations present on the Gairloch forest properties.

Species	Year Established	Size (hectares)	Stand Number
Scots Pine	1965	1.49	135461
Scots Pine	1966	1.63	135462
Douglas Fir, Norway Spruce, White Spruce	1970	2.7	135942
Black Spruce	1981	0.4	135464
Red Pine	1983	1.76	135465
White Spruce	1983	3.48	135515
Jack Pine	1983	2.21	135946
White Spruce	1986	1.8	135535
Red Pine	1986	1.31	135938
White Spruce	1986	0.76	1351007
Norway Spruce	1993	1.14	135485
White Spruce	1993	0.95	135525
Red Spruce	1994	2.01	135744
Norway Spruce	1994	1.3	135541
White Spruce	1997	0.54	135937
Red Pine	1997	2.58	135538
White Pine	1997	2.06	135939
Red Spruce	1999	2.02	135494
European Larch	2000	7.56	135532
Jack Pine	2000	0.86	135500
Japanese Larch	2000	0.36	135501

Larch	2002	1.55	n/a
White Pine	2002	2.31	n/a
Norway Spruce	2002	1.6	n/a
Red Pine	2002	2.36	n/a
Norway Spruce	2002	1.6	n/a
Norway Spruce	2004	2	n/a
Total Hectares in Plantation		50.34	

At the southern boundary of the property, there are additional tree improvement trial plantations. These plantations are small stands of trees that have been planted for experimental purposes and will not be included in this current management plan.

Additionally, some of the forest cover has grown up from abandoned agricultural land, and combined with the prevalence of plantations, the result is overall lower species diversity and an even-aged forest structure across most of the property. These are areas where intervention is desirable to initiate future change in the forest, creating a more dynamic, diverse ecosystem. Because these softwood stands are advanced in age, small interventions at this time, can ensure a greater vertical structure and species diversity in future; the time needed to create a more mature stand in these areas will be reduced. However, while low in diversity, these mature softwood stands do at the current time provide valuable nesting opportunities for some species of migratory songbirds, such as Blackburnian warblers and northern parulas, both of which prefer mature conifers.

Throughout the property, the two species most seen in regeneration are balsam fir and red maple. While the presence of these young trees is not necessarily a weakness, the fact that there are not more young trees of other species could be a potential weakness that could be offset by the planting of a diversity of other native species.

Finally, a weakness that must be addressed is the presence of invasive Scots pine on the property.

STAND DESCRIPTIONS AND FOREST PLANNING STRATEGY

Stand descriptions in this management plan are derived from cruise tally sheets that convey information gathered by Prince Edward Island provincial forest technicians in the fall of 2010, combined with information from the 2000 forest inventory. They are each referred to by stand number, which are outlined in Figure 6 for clarification, and Figure 7 illustrates the cover types on the parcel.

This management plan has been developed in consultation among the provincial government, the Nagaya/Acadian Forest Keepers Resource Manager, and the current property manager, the Macphail Woods Ecological Forestry Project. In order to move toward an Acadian forest type that provides wildlife habitat, maintains water quality and quantity, and provides recreational and income opportunities, a number of priority measures have been identified for the first five-year period of the certification of this property. These include:

- 1) the removal of Scots pine;
- 2) the safeguarding and enhancement of riparian zones through planting;
- 3) the selection harvest of hardwood from the mixed-wood stand , with a focus on hardwood lumber and fuel wood, which will promote, enhance and develop the quality of the hardwood stand while allowing the opportunity to derive income from the property;
- 4) the diversification of the plantations on the property;
- 5) the harvest of mature softwood from some of the old-field white spruce stands on the property;
and
- 6) the diversification and initiation of restoration measures in the European larch plantation and surrounding area with heavy grass cover that has had low tree productivity since it was replanted in 2000.

The following section expands on each of these priorities, describes each priority management area to be addressed in the coming five-year period, and indicates when each action will be taken; operational planning is outlined in Table 2. Table 3 briefly summarizes the stands' species, height, age, volume, and prescription information, for more detailed information, please see stand tally sheets in Appendix 2. It is acknowledged that these tally sheets include minimal information on understory and ground vegetation.

This gap will be addressed in 2011, and updated sheets will be appended to this plan not later than October 30, 2011.

Note: The Prince Edward Island Ecosystem-Based Forest Management Standards Manual requires leaving a minimum of 15 wildlife trees (including snags) per hectare. In the Forest Management Guidelines to Protect Native Biodiversity in the Greater Fundy Ecosystem, these guidelines are more specifically 8 snags and 8 living cavity trees over 30 cm in diameter per hectare. While most of the stands have few or no snags over 30 cm in diameter due to the younger nature of the forest, the numbers indicated above regarding snags over 20 cm in size more than meet the requirements of the PEI Manual.

The Manual also states that in areas that are to be clear cut, 200 pieces of coarse woody material (CWD) over 7.5 cm in diameter and over 2 m in length must be left per hectare. These size requirements were the minimum for what was measured during the cruise of the Gairloch property, and the numbers obtained would indicate that a healthy quantity is available in the majority of stands that will be the focus of intervention for the purpose of this plan. Extra CWD may be necessary in some of the plantations.

Stands in which there will be no interventions in the coming five years have not been described in this management plan, but some brief information is available in Table 3 and more details are available in the stand tally sheets. More information will be added during the 2011 field season.

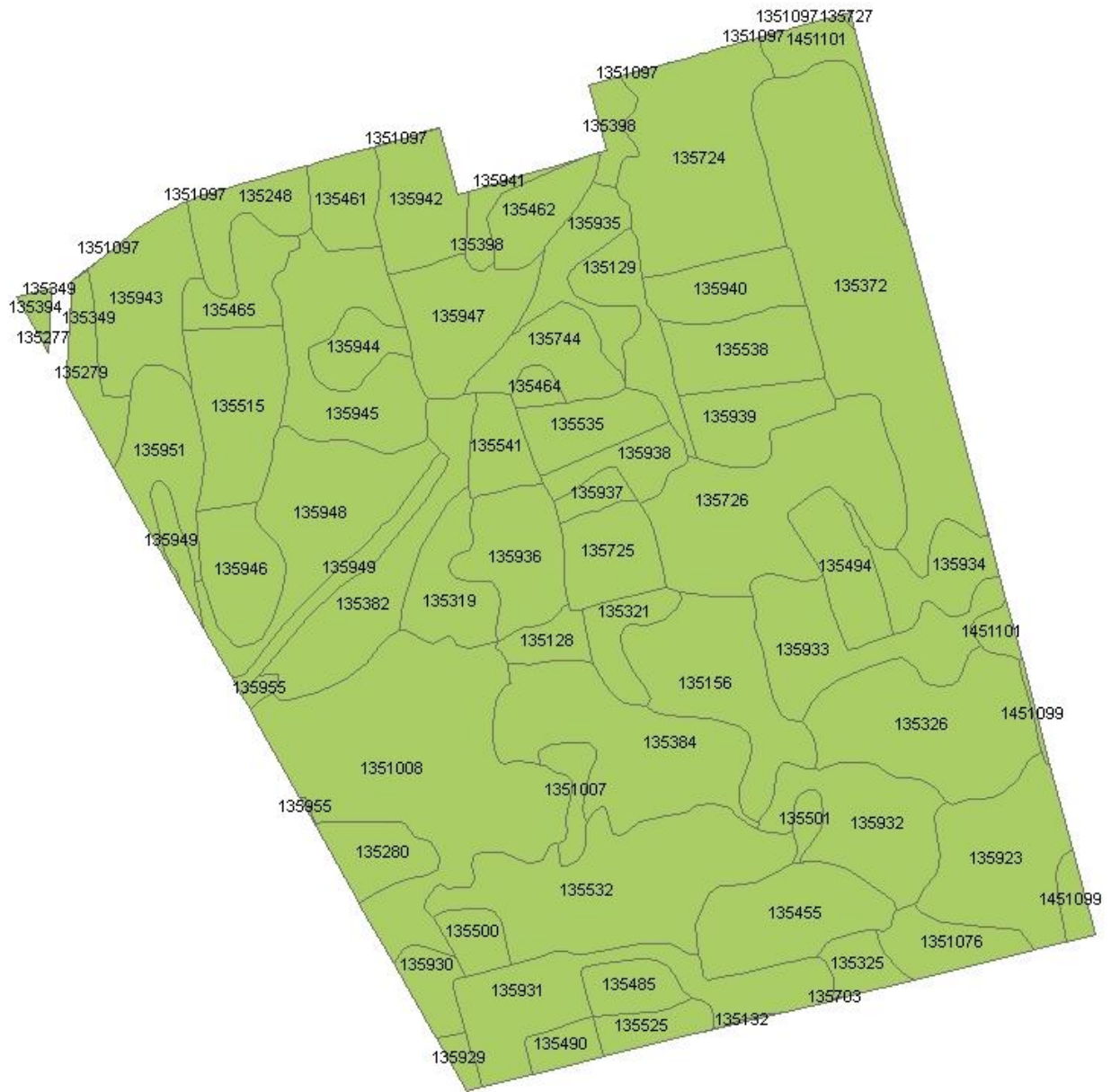


Figure 6. Map of forest stands and identification numbers on properties in Gairloch, PEI.

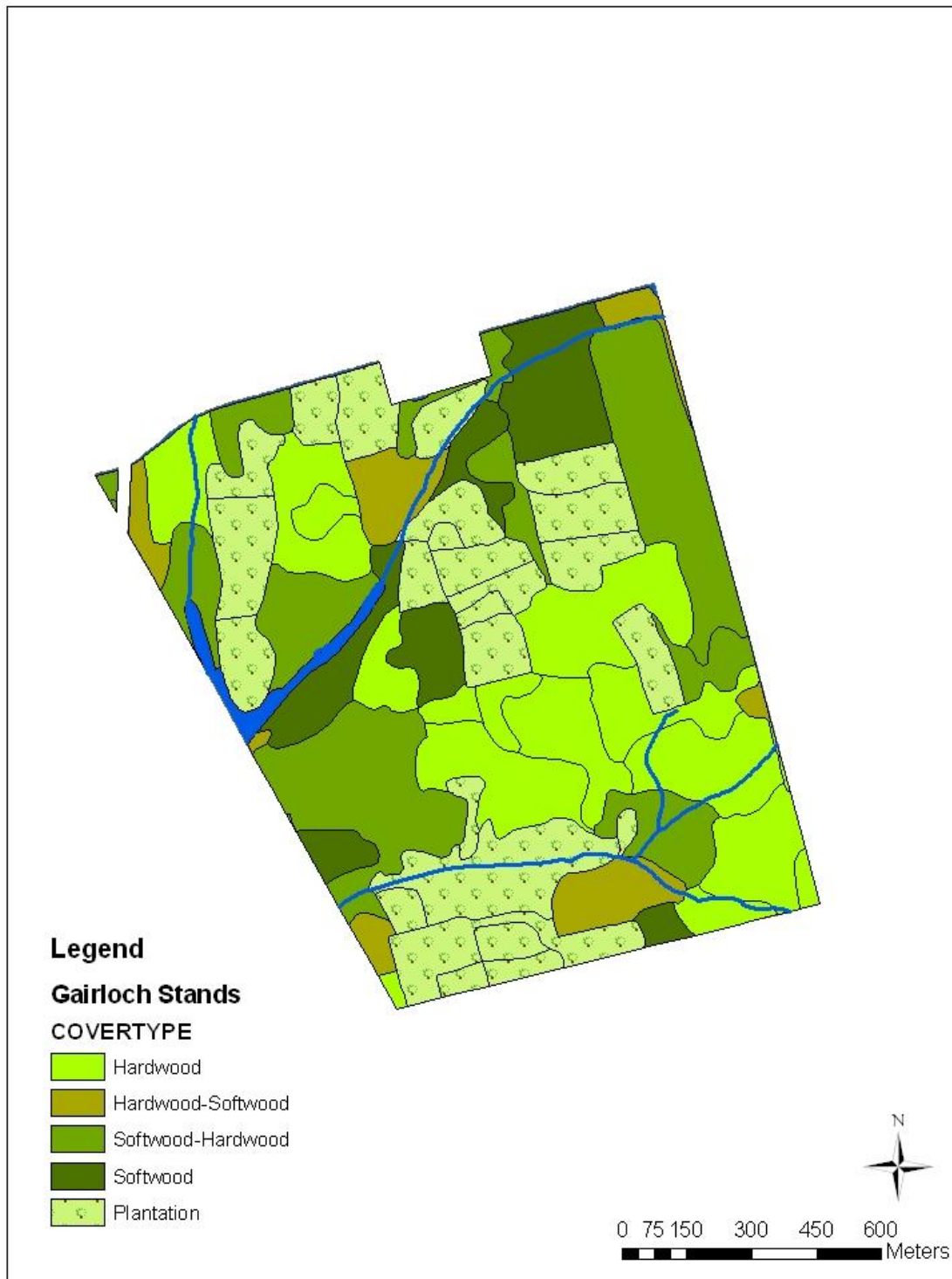


Figure 7. Cover types in Gairloch stands.

Scots Pine Plantations

Stand #135461 Description

This stand is 1.49 hectares in area and was established in 1965. Although it was established as a Scots pine plantation, it contains a larger percentage of white spruce, with 70% of the trees present being white spruce and 30% Scots pine. The stand is even-aged and mature, resulting from an old field that had naturally regenerating white spruce competing with and eventually surpassing the Scots pine. The density of the trees in the stands averages 1500 stems per hectare and the basal area of softwood species is 20 m²/ha; the volume available in this stand is 244.5 m³/ha. The slope of the stand is about 5% with a south to south-west aspect, and there is good drainage of water on the site. The average height of the trees in the stand is 16.4 metres, with an average D.B.H. of 24.5 centimetres. It was noted that the growth of the trees in this stand has slowed considerably in the last 15-20 years. There is little regeneration underneath with only some young balsam fir coming up in the understory, and ground plants include blue-bead lily, speedwell, false lily-of-the-valley, starflower, and Schrebers, haircap and wavy dicranum mosses; *Usnea* lichen is also present. There are a very large number of small diameter snags in this stand, due to the senescent state of the Scots pine but there are none greater than 16 cm in diameter; coarse woody material is present at an average number of 650 pieces per hectare. Red squirrels were observed in the stand. This stand occupies formerly ploughed land.

Stand #135462 Description

This stand is a larger (1.63 hectares) Scots pine plantation which was established in 1966. Scots pine makes up the majority of the stand as 92.5% of the tree cover, with white birch, poplar and white spruce each making up 2.5% of the canopy. The stand is even-aged and mature, resulting from an old-field site that was clear-cut and then planted. The density of trees in the stand averages 875 stems per hectare. The basal area of the softwood species in the stand is 30 m²/ha; the volume available in this stand is 210.5 m³/ha. The slope of the stand is about 9% with a south-east aspect, and there is good drainage of water on the site. The average height of the trees in the stand is 17.8 metres, with an average D.B.H. of 25.2 centimetres. The regeneration varies within the site, with only a small amount of young balsam fir and red maple in some areas, becoming heavier in others, where balsam fir, red maple and poplar are noted to be coming up in the understory. Ground plants in the stand include golden rod, wood fern, blackberry, starflower, grasses, and haircap moss. There are approximately 118 snag trees (per hectare) greater than 20 cm and less than 30 cm in diameter available in this stand, many of which are the dead and dying Scots pine that were originally planted. Moderate to heavy coarse woody material is present

(1500 pieces per hectare). Red squirrels and signs of their feeding were observed in the stand. This stand also occupies formerly ploughed land.

Prescription for Scots Pine Plantations: Removal of the Species

Scots pine has been recognized to be an invasive species in the years since it was planted in two stands on the property. As a result, the possibility of its seeding in and spreading throughout the forest on the Gairloch property is of concern. Work will be carried out to remove the majority of this tree species from the property, with all the trees in one plantation coming down and a third of the trees in the other being cut. Some of the wood will be sawn at the Macphail Woods site to be used for nursery maintenance projects, some will be spread as coarse woody material in stands that currently have less present on the forest floor, and some may be used for biomass. By harvesting this species early in the management plan, not only is the problem of an invasive species addressed immediately but any income derived from the wood sent for biomass can be used to further implement the management plan strategies outlined in this document.

A strip cut is planned for the larger plantation (stand 135462) to initiate the elimination of the mature trees that could potentially spread seed into neighbouring stands. A third of the area (0.5 ha), or roughly 95 m³, will be removed in the centre of this stand, allowing some shade to remain for new trees to be planted in the cut. Time will allow regeneration to begin in the cut area, and it will also be supplemented by the planting of a variety of tree species that exhibit intermediate tolerance to shade, including red oak, yellow birch, and white pine. Additionally, on a private property adjacent to this stand, there is an abundance of poplar which will also likely regenerate in the cut. These regenerating poplar seedlings and suckers will add yet another hardwood species to the stand as well as potential wildlife food and future habitat for cavity nesters. As a result, they will be managed to ensure that some of the regenerating poplar grows to be healthy and a benefit for wildlife species on the property. The remaining two thirds will be cut at one time in future, after this five-year plan has been implemented.

In the second stand where Scots pine is present (135461), more of the stand is made up of white spruce. Therefore, neither a clearcut nor a strip cut are the preferred treatments in this stand. The prescription being recommended is to have the Scots pine selectively cut out of the stand. The remaining white spruce is patchy, with thicker areas closer to the road and more open areas toward the back of the stand, therefore for planting purposes trees will be chosen based on each microsite and the conditions

present. However, in general, a suggested planting plan would include establishing sugar maple and red spruce in the shadier spots and planting red oak and white pine in the more open areas of this stand.

In both stands, it will be important to monitor for regenerating Scots pine seedlings in the subsequent years following the harvest in order to ensure the species does not come back or spread to adjacent stands.

Scots pine has also been noted in the large European larch plantation in the south of the property (addressed in point five). It should be removed.

Plantations

On-going diversification of the plantations on the parcel is a priority and while a list has been provided above of the plantations present on the property, detailed information can be obtained about them by looking at the stand tally sheets in Appendix 2.

Prescription: Diversification

Due to the high proportion of plantations making up the property's area, diversification of these plantations is a priority if the management objective is to restore the Acadian forest. By implementing an earlier intervention, it reduces the time required to improve the diversity, ecological health, and future value of these stands. Over the next five years, small patch cuts will be prescribed for the older plantations, with cut diameters more or less equalling the height of the trees in the stand. These will be planted with site-appropriate species to augment species and age diversity to the plantations.

In other, younger plantations, routine maintenance and thinning will be carried out in such a way as to not discriminate between planted species and natural regeneration that is currently growing within the stand. Trees will be assessed for value and health and then released, with the intention of leaving higher quality of trees of a variety of species to grow; some released trees will be the planted species in the plantation, while others will be desirable specimens of other species that have come up naturally. In the event that the trees in the plantation are non-native species, preference will be given to native regenerating species, with more individuals of the non-native species being removed.

This process is dependent on staff and available funding at the Macphail Woods Ecological Forestry Project. Conditional upon these resources, it is hoped that 20% of the plantations (or approximately 10 hectares) will be addressed in this manner per year.

Mature Softwood

Description

In the north end of stand #135372, there is a region of mature white spruce (Figure 8). The stand is about 3 hectares in size, approximately 65 years old, and made up of sixty percent white spruce; white birch and poplar are also present, with the former making up 30% of the stand and the latter 10%. The basal area of softwood species is 16 m²/ha, and hardwood species is 8 m²/ha; the volume available in this stand is 133 m³/ha. Regenerating trees are individuals of balsam fir and red maple. This area has a slope of 14% and a northerly aspect, and appears to be the result of abandoned pasture on previously ploughed land, which is supported by the fact that this section of the property was clear in 1900 and in 1935 (Figure 3). The poplar present are afflicted with target canker and there has been very little growth in the white spruce in the last 20 years; the stand is beginning to die. There is heavy moss cover on the ground, the drainage is good, and there are 750 pieces of coarse woody material per hectare. Approximately 53 snags per hectare greater than 20 cm in diameter are available in this stand.



Figure 8. Mature spruce stand for patch harvest.

Prescription: Softwood Harvest

A number of stands on the property have mature softwood that has resulted from successional growth after the abandonment of old fields. Stand 135372 is one such stand, and will be harvested with patch cuts to remove lumber for further sale as well as change the age class structure of the stands and allow for the regeneration of young trees of a variety of species. Due to the steeply sloped nature of the stand, very little volume will actually be removed from these stands. Two small patch cuts per hectare that create an opening with a diameter of three quarters of a tree height (0.75) are recommended; as the average tree height in the stand is 18 m, this will leave an opening of 143 m² each. This will allow for the removal of some product, but leave enough trees to remain windfirm and provide soil stability and shade for new plantings. Plantings should include yellow birch, sugar maple, red spruce, white pine and hemlock plus a variety of shade tolerant shrubs that are absent in the area. Plantings may also be carried out in areas where light allows without the removal of any of the mature trees present.

There is a lot of fir regeneration present, and some of this will be removed using a spacing saw to cut the stems low to the ground.

Riparian Zones

Enhancement of the riparian zones is another management priority outlined in this plan. By planting a diversity of tree and shrub species in the riparian zone (Figure 9), the wildlife value, level of biodiversity, and aesthetic beauty of the site will be improved. The specific streams targeted in this plan are the north and northeast branches of the permanent stream on the western side of property 326405 (Figure 10). Because of their locations, there are a number of stands that will be affected by this enhancement. However, due to the minimal area of intervention (i.e. just in the riparian zone), the stands will be combined for a general description of the riparian areas.

Description

The stands included in the riparian zone enhancement area are **135382, 135943, 135946, 135948, and 135951**, and together the stands make up an area of 17 hectares. The majority of these stands are made up of mature growth of poplar, red maple, white spruce, balsam fir, white birch, and black spruce with some younger, regenerating areas composed of large-tooth aspen, white spruce and pin cherry, with the exception of stand 135946, a jack pine plantation made up of jack pine, black spruce and grey birch. The topography of the area is sloped, with an average slope of approximately 9%, and has good drainage. Detailed data on snags and coarse woody material are unavailable for the riparian zone, but

within the stands as a whole the number of large snags and quantity of coarse woody material could be improved (light to moderate). Ground vegetation includes bunchberry, false lily-of-the-valley, bracken fern, blueberry, raspberry, twinflower, starflower, sarsaparilla, mayflower, and mosses, such as plume moss, wavy dicranum and Schreber's moss. There are also some scattered white pine trees in the area and although no beavers are currently present, in two of the three stands evidence of past beaver activity (browse) was noted. As part of this management plan, the riparian zone will surpass the legislated 15 metre strip in which no cutting is permitted; a 40-metre strip will be considered the width of the riparian buffer to further safeguard the water quality and aquatic habitat, enhance wildlife and prevent erosion from surrounding slopes. At this width on either side of the stream, the riparian zone was calculated to have a total area of approximately 9.5 hectares.

Prescription: Enhancement Plantings

The riparian zones on the property have been identified as priority stands for conservation and enhancement. Due to the high humidity and moisture levels near the banks of streams, a diversity of plant species may be found in riparian zones and their value for wildlife is very high. Buffer zone legislation on Prince Edward Island restricts cutting trees in riparian zones to within 15 m on either side of the stream. The riparian areas on this property will be considered to be larger, to within 40 m on either side of the stream, and they will not be cut; they will therefore provide an opportunity to develop a rich, thriving riparian ecosystem that will be an invaluable to local wildlife, provide aesthetic beauty and recreational enjoyment, and strengthen the health of our water resources and the forest as a whole.

These riparian zones will be enhanced through a series of plantings of native trees and shrubs that will diversify and further augment the value of these areas in terms of species diversity and ecosystem functions. Suggested tree species for planting include white ash, hemlock, white pine, sugar maple, American elm, ironwood and cedar; shrub plantings will include hobblebush, witch hazel, and alternate-leaved dogwood. Depending on space and light conditions, approximately 250 trees and shrubs will be planted per hectare of riparian zone. The area to be diversified includes the entire riparian zone, including the Jack Pine plantatation.

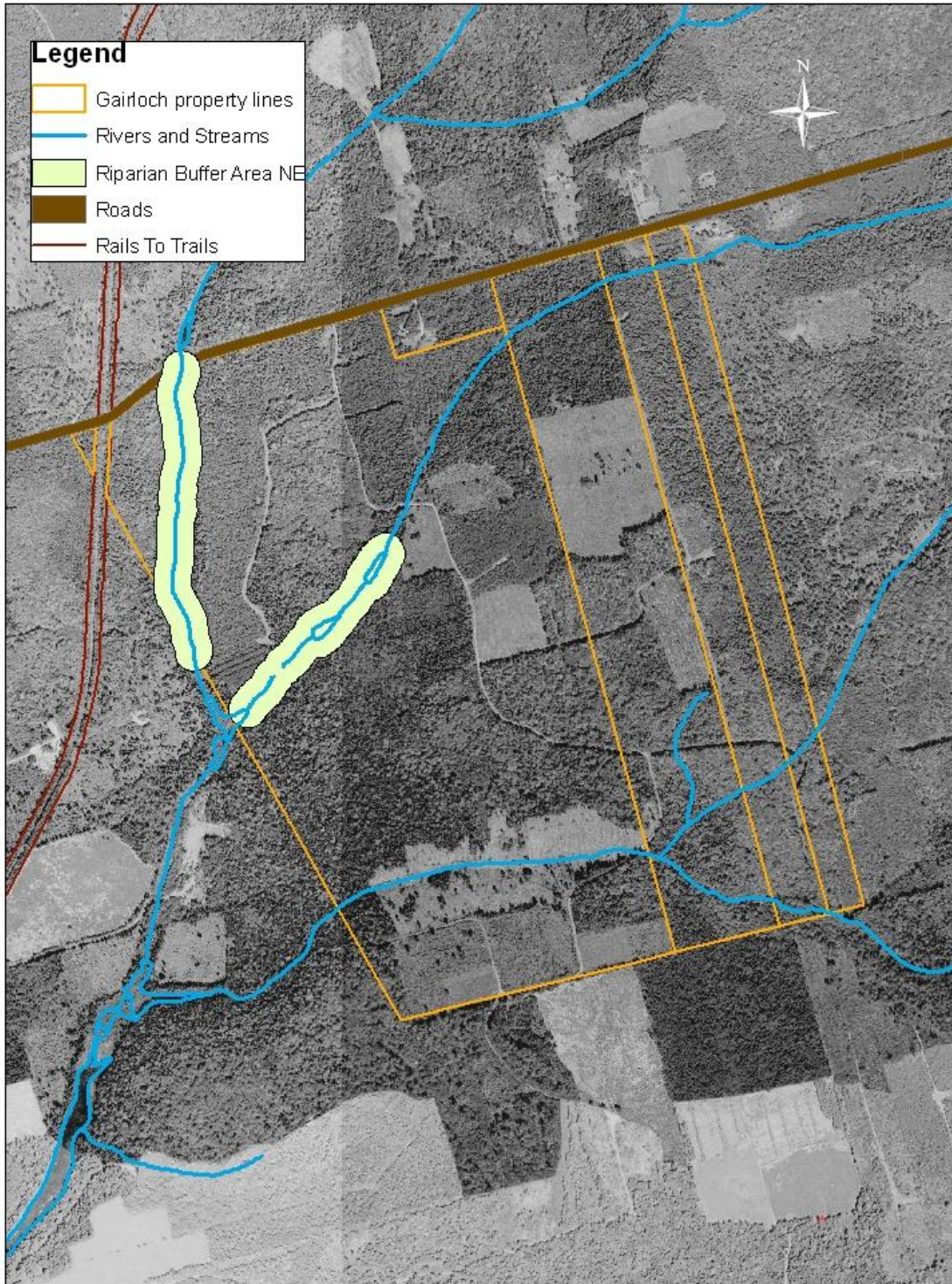


Figure 9. Riparian buffer areas to be enhanced through enrichment plantings.



Figure 10. Stream on western side of property, taken from footbridge on trail.

European Larch Plantation

Stand #135532 Description

At 7.58 hectares, this stand is the largest plantation on the property, and is planted with European larch. The plantation is 10 years old and composed of 32% European larch, 20% grey birch, 29% pin cherry, 8% poplar, 6% red maple, and 4% white spruce. Stand stocking is patchy, with grassy expanses between clumps of trees, creating a grassy woodland of young trees (Figure 11). The density of softwood species in the stand is 1400 trees/ha, the hardwood density is 3350trees/ha, and basal area of softwood species is 6 m² per hectare. The average slope is 7.6%, with a southerly aspect and good drainage, the majority of this stand lies in what was once a shale pit. An ephemeral stream cuts through the majority of the stand, but at the time of cruising (fall 2010), no water was observed. Ground vegetation includes heavy grass cover, blueberry, strawberry, bunchberry, bracken fern, raspberry, asters, golden rod, false lily-of-the-valley, and mosses. There are no snags present in this stand and little to no coarse woody material. Wildlife observations include signs of snowshoe hare and sightings of ruffed grouse.



Figure 11. Photo of the European larch plantation (Stand 135532) at southern end of Gairloch property, taken April, 2010.

Prescription: Remediation

The European larch plantation (Stand 135532) in the southern end of the property has not been productive since it was established in 2000 in a previous clearcut. Thick grass growth has come up, competing with tree growth and leading to a grassy woodland planted with exotic species. Coupled with this is the lack of topsoil, a result of this site’s history as a shale pit. The treatment focus for this stand will be remediation as opportunity allows. This may include direct seeding of acorns to help increase future diversity, as well as planting eastern larch, white spruce, red maple, white ash, sugar maple, white pine, highbush cranberry, serviceberry, red osier dogwood, hawthorn and willow.

The hardwood species that are already growing in this area will be maintained and allowed to grow in order to provide some diversity as the area shifts to a more forested state. Even the grey birch present

will provide wildlife value as it is a food source to some avian species and to the larval form of the eastern swallowtail butterfly.

Given the poor soil and highly disturbed nature of this site, it is not a high priority for labour-intensive restoration work. However, it can be a test site for shale pit rehabilitation using a combination of direct seeding and planting as described above, thus contributing to the objectives of this management plan.

Mature Mixed Wood

Description

Due to similar management practice, the stands of mature mixed wood (primarily hardwood) in the southern section of the property are combined in this description, much like the riparian zone. This part of the property holds the most value in terms of wildlife habitat, quality hardwoods, recreational opportunities and aesthetics (Figures 12 through 16). The stands in this area include **135726,135321, 135156, 135933, 135326, 135932, 135923, 1451099, 1351067** and **135455**, and make up approximately 37 hectares. The composition of the forest cover includes red maple, yellow birch, eastern hemlock, white birch, balsam fir, sugar maple, and beech. Striped maple is also present in the understory. The ground vegetation includes wood fern, false lily-of-the-valley, blue-bead lily, ground hemlock, bunchberry, sarsaparilla, starflower, and starry false Solomon's seal.

The area has a slope of approximately 7.6% with a south to southwest aspect, and is well drained. Of the targeted stands in this management plan, these are the only stands that were previously unploughed and exhibit pit and mound topography. The average basal area of softwood species throughout these stands is 3 m²/ha, and of hardwood species is 27 m²/ha; the average volume available throughout these stands is 185 m³/ha. This area is rich in snags, with an average of 152 snags greater than 20 cm in diameter per hectare; of these, an average of 28.1 are very large with a diameter falling between 30 and 42 cm. There is an average of 416 pieces of coarse woody material per hectare, and in stand 135923 an ephemeral stream was observed with no running water at the time of data collection.



Figure 12. Photo of eastern hemlock on property, taken from below.



Figure 13. Photo of mature mixed wood/hardwood stand.

Figure 14. Boulders in dry stream bed in mature mixed wood/hardwood stand.



Figure 15. Dry stream bed.





Figure 16. Valuable snag, full of cavities in mature mixed wood/hardwood stand (135923).

Prescription: Fuelwood Harvest, Conservation of Habitat

In the older mixed-wood stands, there will be a selection cut of individual hardwood trees for lumber and firewood as a means to derive some income from the property to facilitate the implementation of the management plan as a whole. This will be an on-going step in the management plan, and will not leave a significant sign of human intervention in this area of the property which is the most valuable in terms of wildlife habitat, diversity, aesthetics, and overall forest health. Over the course of the five year period identified in this plan, it is estimated that 8% or approximately 532 m³ of the poorer quality trees will be removed throughout this section of the property for fuel wood purposes.

Table 2. Operational Plan for Gairloch Property, 2011-2015.

Stand	Area (ha)	Species	Age (yr)	Treatment	Objective	Year	Projected Volume
135462	1.63	Scots pine, some white birch	44	Strip cut, leave white birch, plant (pp. 26-27)	Diversify, remove invasive species	2011	95 m ³
135461	1.49	White spruce, Scots pine	45	Remove all Scots pine, leave WS (pp. 26-27)	Remove invasive species	2012	109 m ³
Plantations	50.34 (~10 ha/yr)	Various	Various	Patch cuts and planting, thinning to promote diversity (pg. 28)	Diversify	2011-2015	n/a (minimal)
135372	3	White spruce	63	Patch cuts and planting (pg. 28)	Diversify, obtain lumber	2014	8.5 m ³
135382 135943 135948 135951	9.5	White spruce, aspen, red maple, black spruce, fir (riparian zone)	Mature	Enhancement plantings, see above for species, 250 per hectare (pg. 29)	Diversify, enhance	2013, 2014	---
135532	7.56	Grey birch, pin cherry, European larch	10	Plant white spruce, hawthorn and willow, remove any SP (pg. 29)	Diversify, restore forest cover	On-going	---
135932 135326 135923	14.5	Red and sugar maple, white and yellow birch, hemlock	~65	Selection harvest of hardwoods, 8% (pg. 30)	Remove fuel wood, conserve habitat	On-going	207 m ³ total, or 41 m ³ /yr on average

Harvesting equipment will include a harvester for the strip cut in the Scots pine stand, and a chainsaw with a winch for a tractor in the majority of the other stands. A “forcat” mini skidder may also be used in some areas.

Table 3. Stand Summary Table for Gairloch Properties.

Stand	Species 1	Species 2	Species 3	Age (yrs)	Height (m)	Volume m ³ /ha		Area (ha)	Prescription
						SW	HW		
1351007	BF	GB	RM	24	7	52		0.76	No prescription
1351008	RM	PO	WS	35	13	196	80	11.99	No prescription
1351076	RM	SM	EH	70	17	230		1.56	No prescription
135128	WB	RM	BF	25	5	20		0.85	No prescription
135129	WS	WB	-		16	170		0.95	No prescription
135156	RM	BF	YB	45	18	106	140	4.66	No prescription
135248	BF	RS	BS	40	13.4	194	-	1.85	No prescription
135279	WS	WB	RM	40	15	118	56	1.31	No prescription
135280	BS	BF	WB	35	12	98		1.49	No prescription
135319	PO	RM	WB	55	16	8	200	2.13	No prescription
135321	RM	BF	WB	50	15	30	100	1.26	No prescription
135325	WS	BF	RM	14	16	72		0.89	No prescription
135326	RM	YB	WB	66	17	8	183	5.85	Harvest hardwood, conserve habitat
135372	WS	WB	PO	63	18	82	118	11.92	Patch cuts (WS), enhancement planting
135382	PO	RM	WS	40	15	53	47	3.92	Enhancement planting (riparian zone)
135384	RM	YB	EH	60	16	85	98	6.02	No prescription
135398	WS	PO	WB	45	13	100		1.41	No prescription
135455	RM	WS	EH	35	17	135		3.66	No prescription
135461	WS	SP	-	44	16	244.5	-	1.49	Selection cut, remove SP
135462	SP	WS	-	45	18	191	20	1.63	Strip cut, remove SP
135464	BS	WS	WP	29	6	160		0.4	No prescription
135465	RP	GB	-	27	7	213		1.76	No prescription
135485	NS	BF	GB	17	-	20		1.14	No prescription
135490	JL	-	-	13	-	25	-	0.68	No prescription

135494	RS	WB	RM	11	-	-	-	2.02	No prescription
135500	JP	RM	PC	10	-	-	-	0.85	No prescription
135501	PC	RM	JL	10	-	-	-	0.35	No prescription
135515	WS	GB	WB	27	7	25	17	3.54	No prescription
135525	WS	GB	-	17	-	-	30	0.94	No prescription
135532	EL	PC	GB	10	-	-	-	7.58	Enhancement planting, leave to regen
135535	BS	GB	WB	24	3	-	40	1.8	No prescription
135538	GB	RP	-	13	-	-	10	2.58	No prescription
135541	NS	GB	-	16	-	-	15	1.29	No prescription
135724	WS	PO	WB		15	160	2	6.97	No prescription
135725	WS	BS	-		-	-	-	2.06	No prescription
135726	RM	WB	SM		17	-	-	7.13	No prescription
135744	RS	GB	-	16	-	-	-	2.01	No prescription
135923	RM	SM	BE/WB	65	19	-	240	4.51	Harvest hardwood, conserve habitat
135929	RM	WB	BF	15	18	-	9	0.31	No prescription
135930	BF	RM	WB	50	17	48	53	0.97	No prescription
135931a	WB	RM	EL		-	-	-		No prescription
135931b	WP	-	-		-	-	-	4.75	No prescription
135932	RM	BF	WB	55	14	-	134	3.85	Harvest hardwood, conserve habitat
135933	YB	WB	RM	60	16	-	116	3.97	No prescription
135934	WS	RM	PO		15	-	134	1.95	No prescription
135935	WS	WB	PO	40	15	-	156	1.97	No prescription
135936	WS	BF	SP	20	12	89	31	2.82	No prescription
135937	WS	BF	GB	13	-	5	-	0.54	No prescription
135938	RP	-	-	24	12	170	-	1.3	No prescription
135939	WP	-	-	13	8	-	-	2.06	No prescription
135940	NS	HW comp	-		-	-	-	2.04	No prescription
135942	DF	NS	WS	40	18	170	-	2.49	No prescription
135943	BF	RM	WS	56	17	43.5	69	3.43	Enhancement planting (riparian zone)

135944	RM	BF	WB	20	13	25	123	1.19	No prescription
135945	BF	RM	WB	15	10	11	61	4.74	No prescription
135946	JP	BS	GB	27	8	118	-	2.22	No prescription
135947	WS	WB	PO	20	12	104	-	3.26	No prescription
135948	LTA	WS	PC	6	15	-	-	4.84	Enhancement planting (riparian zone)
135951	BS	BF	RM	20	15	27		2.64	Enhancement planting (riparian zone)
1451099	RM	YB	PC	20	4	47		0.6	No prescription
1451101	WS	RM	PO	15	15	6	32	1.63	No prescription

Annual Allowable Cut

Forest inventory information was collected that allowed stand ages and volumes to be documented. The method for measuring volumes was based on methodology and data from the province's permanent sample plots and from growth and yield information collected historically throughout the province. The annual allowable cut was calculated based on the premise that the harvest would be less than or equal to current growth.

The mean annual increment was calculated for each stand, by dividing the merchantable volume of each stand by its age, and a sum of the resulting volume/year totals was obtained to provide a value of mean annual increment or total annual growth, given below as 336 m³.

The exception was for the young plantations that do not yet contribute to the overall volume of wood available on the parcel.

Using the the guidelines of precautionary reductions outlined by Nagaya/Forest Keepers, one estimate of annual allowable cut has been calculated as follows:

Precautionary Reductions

Insects and Disease	-10%	33.6 m ³
Wind Damage	-5%	16.8 m ³
Increased Stocking	-5%	16.8 m ³
Natural Cycling Allowance	-10%	33.6 m ³

ANNUAL ALLOWABLE CUT **235.2 m³**

A second method for estimating annual growth was to use the experiential knowledge the Manager of the Macphail Woods Ecological Forestry Project has gained through decades of forest management in similar types of woodlots on Prince Edward Island. This estimate is 0.5 cords per acre per year, or total annual growth of 453 m³. As this is presented as a very conservative estimate, no further precautionary reductions have been applied.

Using the average of these two estimates the annual allowable cut has been calculated as follows:

Total Annual Growth **(235.2 m³ + 453 m³) ÷ 2 = 344.1 m³**

It is acknowledged that this is a very conservative estimate of AAC, and that more work needs to be done. This will be addressed, and the estimated AAC confirmed or revised by October 31, 2011.

Much of the forest on the Gairloch properties is currently in a younger state in which the trees have not yet truly begun to put on a high level of growth. This is expected to change in the future and therefore the growth rates should be reassessed every 5-10 years to determine changes in the growth rates and therefore, the quantity of wood that is available and appropriate to harvest.

As is clear from the operational plan outlined above, the total volume to be removed from the property over the course of the five year period beginning in 2011 and ending in 2015 is less than the amount authorized by the annual allowable cut. The AAC would allow, over that period, a volume of 1,720.5 m³ to be removed from the Gairloch properties. However, the total quantity of wood to be removed is 745 m³. This gives a difference of 975.5 m³.

Silent Season

The Nagaya/Forest Keepers group membership pool for FSC certification requires that all management plans include a specified “Silent Season”, or time when no disruptive activities such as harvesting will be carried out on the property. For this management plan, a silent season with a duration of four months has been chosen, starting April 15th and ending August 15th.

The justification for this period of time lies in the sensitivity of the forest in the spring and early summer. Breeding owls return to the woods on PEI to set up their breeding territories around the end of March or early in April, and due to the value of the mixed-wood/hardwood stand on the property as habitat for owls, it is preferred to leave the area alone during that time. Other breeding birds begin to arrive a bit later and their breeding season extends through the spring and early summer, with the possibility of late and re-nesting birds fledging their broods into mid-summer. Vernal pools, upon which many forest amphibians are dependent for breeding habitat, are extremely sensitive to heavy machinery, as are the amphibians themselves as they travel to these pools. The pools are ephemeral in nature and last only for the spring and early summer, and should be safeguarded. By the end of the summer, the majority of ground plants have begun to go to seed and decline, therefore it is a less sensitive time for trampling of plants. Finally, the level of moisture in the ground is quite high early in the spring and summer; it is preferable to reduce the amount of rutting, compaction and other damage to the soil and leaf litter that can occur when trucks and other heavy machinery are driven on the damp forest floor.

