



**Five Year Operating Plan (Draft)**  
**Forest Management District 20**



**(Sandwich Bay, Labrador)**

**Operating Period**

**January 01, 2010 - December 31, 2014**

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## EXECUTIVE SUMMARY

Forest management planning sessions were initiated by the Department in 2009. These sessions provided local residents and stakeholders a voice on the preparation and implementation of the Forest Management Plan in District 20. Over time many stakeholders including local residents have contributed both scientific and local knowledge, which was used to develop this plan. Every attempt was made to include all stakeholders including representatives from the Labrador Métis Nation (LMN) and the Labrador Inuit Association. In addition to the public consultation sessions, a meeting was held with commercial and domestic cutters and saw millers.

Results of the public consultation process yielded a five year operating plan (2010-2014). This plan outlines the various management activities that will take place in the district during the specified planning period. A detailed description of timber harvesting, road construction, silviculture, resource protection, monitoring, and public consultation is provided. Further refinements of operational activities are made in the annual work schedule.

District 20 is 2.2 million hectares of boreal forest, situated on the south coast of Labrador. It is comprised of approximately 95% mature to over mature age classes of mainly dominant black spruce forest. Generally it is bound to the north by Lake Melville, to the west by Etagaulet and Paradise Rivers, to the south by the Main and Hawke Rivers and to the east by the Labrador Coast.

Historically commercial activity in district 20 has been inconsistent and currently commercial operations are minimal. Domestic activities remain relatively consistent as residents of Cartwright, Paradise River and Black Tickle/Domino harvest fuelwood and sawlogs for domestic use.

The current inventory covers the majority of the non-isolated commercial forest in the district. The current annual allowable cut (AAC) for the district has been calculated to be 30,085 m<sup>3</sup> for a total harvest of 150,425 m<sup>3</sup> over the five year planning period. This AAC is unchanged from the previous five year plan and is based on the commercial forest of the Southside operating area, south of Paradise River (Figure 4).

Extensive areas have been identified to preserve ecological, cultural\* and local values. Approximately 91% of the total district landbase was excluded from the determination of available wood supply. Consequently, this has resulted in vast areas in the District that are not considered for commercial or domestic harvest. These areas, which are identified at three scales; landscape, watershed and stand, provide habitat for various native flora and fauna and act as scientific benchmarks.

Sixteen commercial operating blocks are proposed for harvest over the next five years. These blocks contain sufficient volumes to support commercial allocations of approximately 25,000 m<sup>3</sup>/year. Additionally an area between Cartwright and Paradise River remains a selective commercial harvest area. Domestic harvests, estimated to be approximately 4,285 m<sup>3</sup>/year, will take place in several blocks located near the communities. In all cases, permit conditions and the Environmental Protection Guidelines will govern all operations.

The majority of commercial timber available for harvest is accessible by current road networks. If current levels of commercial activity significantly increase an additional 14.2 kilometers of forest access roads will need construction. Due to the lack of disturbed area, silviculture efforts will focus on monitoring and research activities. Protection will focus on maintaining forest health during a recent Hemlock Looper outbreak and protecting people, property, and resources from forest fires.

Information and research including, surveys will be used to monitor past actions and provide hard data for future management decisions. Numerous surveys including pre-harvest surveys, regeneration surveys, utilization surveys, and site disturbance surveys will be conducted during this time period. District Conservation Officers will routinely monitor all activities to ensure compliance with various conditions, legislation and guidelines.

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\* Further reference should be made to disclaimer on Page ii.

## **1.0 INTRODUCTION**

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

The Forest Ecosystem Management planning process is based on the input and consensus of various stakeholders who participate in public meetings and continue to provide input on activities throughout the life of the plan. The result is a process that provides flexibility over the planning period to adapt to changes in forest ecosystem processes, disturbance regimes, environmental and industrial changes, as well as public values.

Participants are acknowledged for the time and effort put into the process in the District, which was initiated in Cartwright in 2009 (Appendix I). A summary of the topics discussed during the meetings can be seen in Appendix II.

The five year operating plan provides details of various management activities that are scheduled to occur between January 01, 2010 and December 31, 2014. These activities, including harvesting, silviculture, road construction, ecosystem protection, and surveys and monitoring, are intended to maintain ecosystem health, ensure the sustainable management of resources, and minimize the environmental impact. Further refinements of the individual planning activities are set out in an Annual Work Schedule on a yearly basis and are subject to public review.

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

In accordance with the Forestry Act, this document will be submitted by the Department to the Minister of the Department of Environment and Conservation to be registered for assessment under the Environment Protection Act and is subject to further public review.

## 1.1 Description of Land Base

Forest Management District 20 (FMD20) is situated on the south coast of Labrador (Figure 1). It is generally bound to the North by Lake Melville, to the West by the Ettagaulet and Paradise Rivers, to the South by the Main and Hawke rivers and to the East by the Labrador Coast.

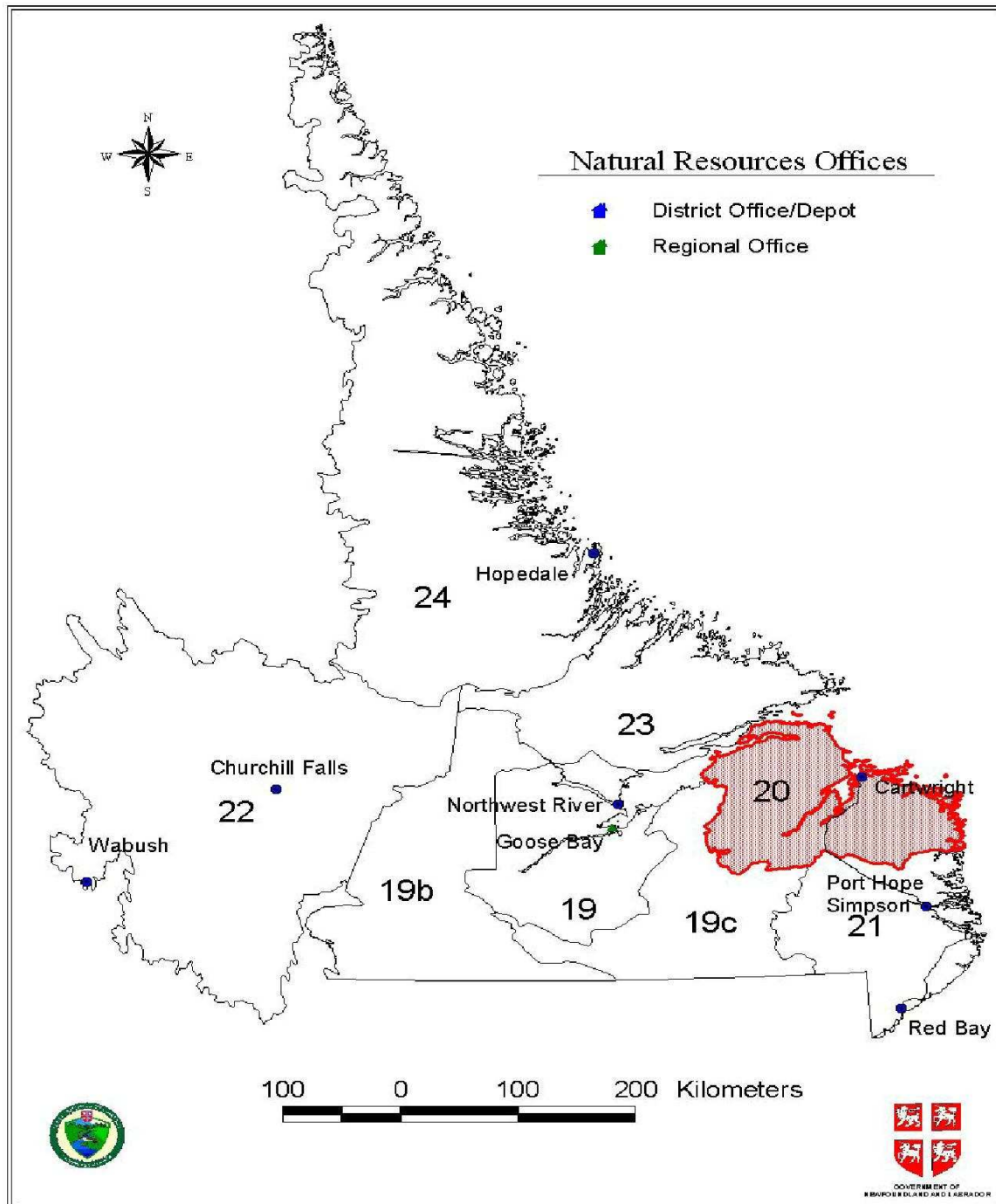


Figure 1. Forest Management District boundaries and office locations in Labrador.

## **1.2 Physical Features**

The planning zone is a large area (approx 2.2 million ha) of boreal forest situated on the South Coast of Labrador. Physical features vary a great deal over such a large landscape. The following descriptions apply generally to District 20.

### **1.2.1 Topography and Physiography**

District 20 contains a diversity of terrain types. The area has generally rolling topography with the exception of the more rugged Mealy Mountain Range. Rolling hills are commonly between 100 and 200 metres, and rarely extend above 300 metres. The Mealy Mountain range reaches heights of more than 1,000 m (3,281 ft), with the highest peak being more than 1,180 m (3,871 ft). The District has an extensive coastline dominated by bedrock with scattered pocket beaches and inland is dominated by numerous lakes, rivers, and wetland areas.

### **1.2.3 Climate**

The climate of Labrador is more Arctic than Atlantic. Because it is on the eastern side of the continent, it experiences strong seasonal contrasts in the characteristics and movement of air masses. The Labrador Sea is infested with floating pack ice and icebergs for eight months of the year. The masses of ice keep sea temperatures below 4C. An east wind off the Labrador Current is a cool wind in summer, often with light rain or drizzle. In winter, when the Atlantic air is relatively mild, the accompanying weather includes cloud and frequent snow flurries. Whenever easterly winds bring very moist air from the Atlantic, widespread fog occurs. Winters are very cold, with typical daytime temperatures for January between -10 and -15C, colder than Newfoundland and more like the frigidity of the southern Prairies. An occasional incursion of Atlantic air will warm up the winter. The summer season is brief and cool along the coast because of the cold Labrador Current. July average temperatures are from 8 to 10C along the coast but are 3 to 5C warmer in the interior. The pleasantness of the summer day along the coast is often determined by the wind direction--westerly winds bring clear, mild continental air, whereas easterlies, blowing off the Labrador Current, bring cold, cloudy, and moist weather. Southern Labrador is not unlike the moist northern shores of Newfoundland, with 1000 mm, as a typical yearly fall of precipitation. About 45% of this occurs as snow. In the south, Cartwright averages 440 cm of snow fall annually.

## **1.3 Ecosystems**

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



### **1.3.1 The Forest Ecosystem**

A forest ecosystem, as the term implies, is an ecosystem dominated by tree cover. At the coarsest level, the forest of District 20, form part of the boreal forest ecosystem. The boreal forest is a green belt which spans much of the northern hemisphere. It stretches from the Atlantic shores of Scandinavia through Russia, across Alaska, through the mid latitudes of Canada until it reaches the Atlantic Ocean again in Newfoundland and Labrador.

One of the distinguishing characteristics of the boreal forest is the phenomena of periodic, catastrophic stand replacement. Natural disturbances such as fire and insect outbreaks typically give rise to uniform, even aged forests, dominated by a few tree species. The tree species which characterize the Canadian boreal forest include black spruce, white spruce, balsam fir, eastern larch, trembling aspen, white birch and jack pine. By far the dominant species in district 20 are black spruce and balsam fir.

The primary natural disturbance factors attributed to boreal forests are fire and insects. Forest fires are frequent and extensive in Labrador and result in specific successional trends depending on the site type. More often than not, the spruce component is increased following fire, whereas other disturbance types such as insects and cutting often result in an increase in the fir component.

Aquatic ecosystems of the boreal forest are heavily dependant on forest cover for temperature regulation, nutrient cycling and stream flow regulation. Consequently, forest harvesting activities adjacent to riparian areas are critical to sustainability of fish habitat and maintenance of fish migration routes. Suitability of various streams and ponds as waterfowl breeding, feeding and resting areas are also dependant on adjacent forest cover. Biological production in streams is based on a combination of internal and external nutrient and energy pathways. Stream side vegetation has a strong influence on both since they are so closely linked to surrounding terrestrial events. Small streams in forested areas receive much of their materials from the surrounding terrestrial ecosystem. For these reasons, maintenance of suitable riparian zones for protection of aquatic ecosystems, as well as providing wildlife travel corridors is a primary consideration of any forest management strategy.

### **1.3.2 The National Ecological Land Classification System**

A hierarchical framework of ecological land classifications has been recognized for some time in most jurisdictions as a means of stratifying the earth into progressively smaller areas of increasingly uniform ecological units. In Canada, the Canadian Ecological Land Classification System (Wiken, 1986) provides for seven levels of examination or organization based on ecological principles. This system of classification is better suited than a classical forest inventory for use in an ecological approach to forest management. The seven categories are listed and described in table 1.

Table 1. Canadian Ecological Land Classification System.

Level	Description	Common Map Scale
ECOZONE	Areas of large land masses representing very generalized ecological units, based on the consideration that the earth's surface is interactive and continuously adjusting to the mix of biotic and abiotic factors that may be present at any given time (e.g. Boreal Shield).	1: 50 000 000
ECOPROVINCE	Areas of the earth's surface characterized by major structural or surface forms, faunal realms, vegetation, hydrology, soil, and climatic zones (e.g. Labrador)	1: 10 000 000 1: 5 000 000
ECOREGION	A part of the ecoprovince characterized by distinctive ecological responses to climate as expressed by vegetation, soil, water, and fauna (e.g. Mid Boreal Forest – Paradise River)	1: 3 000 000 1: 1 000 000
ECODISTRICT	A part of ecoregion characterized by a distinctive pattern of relief, geology, geomorphology, vegetation, water, and fauna.	1: 500 000 1: 125 000
ECOSECTION	A part of the ecodistrict throughout which there is a recurring pattern of terrain, soil, vegetation, waterbodies, and fauna.	1: 250 000 1: 50 000
ECOSITE	A part of the ecosection having a relatively uniform parent material, soil, hydrology, and chronosequence of vegetation.	1: 250 000 1: 50 000
ECOELEMENT	A part of ecosite displaying uniform soil, topographical, vegetative, and hydrological characteristics.	1: 10 000 1: 2 500

### 1.3.3 Ecoregions and Subregions

With the evolution of an ecosystem approach to forest resource management, it would be advantageous to have a standard framework to classify combinations like general climate and regional physiography, as well as the other components of an ecosystem, into distinguishable regions. Damman defined ecoregions as areas where a comparable vegetation and soil can be found on sites occupying similar topographic positions on the same parent material, provided that these sites have experienced a similar history of disturbance. Thus, an ecoregion cannot be defined in isolation from the physical landscape, but vegetation toposequence, vegetation structure, floristic composition and floristic distributions can provide the primary criteria (Damman, 1979).

According to Damman, Labrador has ten ecoregions. These ecoregions and subregions contain many of the same ecosystem variables. It is the dominance and variance of these variables (e.g., vegetation and climate) that determine their classification. District 20 contains three distinct ecoregions. They are: the mid boreal forest – Paradise River Ecoregion, Coastal Barrens - Okak/Battle Harbour Ecoregion, and string bog – Eagle River plateau Ecoregion (Figure 2). Of these, the mid boreal forest contains the largest portion in the district. The following descriptions are taken from the Department of Natural Resources website ([http://www.nr.gov.nl.ca/forestry/maps/eco\\_lab.stm](http://www.nr.gov.nl.ca/forestry/maps/eco_lab.stm), accessed on, June 30, 2009)

#### **1.3.3.1 Mid Boreal Forest - Paradise River**

This undulating, bedrock controlled landscape of southeastern Labrador has many rock outcrops and supports fairly productive, closed-crown forests. The climate is considered boreal and is moister and cooler than the Lake Melville area. Summers are cool to warm and winters are short and cold. The growing season is 120 to 140 days. Black spruce and balsam fir are the most common tree species, but hardwoods are commonly encountered. Raised bogs are characteristic of valleys in the area.

#### **1.3.3.2 Coastal Barrens - Okak/Battle Harbour**

This ecoregion extends from Napaktok Bay south to the Strait of Belle Isle. Much of the coast is characterized by long, sheltered inlets. The summers are cool to warm and the growing season is 100 to 120 days. The winters are cold. Empetrum barren is the dominate vegetation type, with forest occurring in sheltered valleys. Most mid and lower slopes support a continuous spruce forest with a moss understory. Repeated fires have changed many forested areas to dwarf shrub barrens. Plateau bogs with frozen peat (palsas) and salt marshes on marine terraces are characteristic of the valleys in this ecoregion.

#### **1.3.3.3 String Bog - Eagle River Plateau**

The Eagle River Plateau comprises most of this ecoregion. This upland plateau is composed of extensive string bogs with numerous open pools surrounded by fen vegetation. Bog hummocks are dominated by scrub spruce, Labrador tea, and feathermoss. The peatland expanses are occasionally interrupted by only a few conspicuous eskers, which support open, lichen woodland. Alder thickets are common along river banks.

- 1 Low Arctic Tundra - Cape Chidley
- 2 Arctic - Alpine Tundra - Torngat
- 3 High Subarctic Tundra - Kingurutil/fraser
- 4 Coastal Barrens - Okak/Battle Harbour
- 5 Mid Subarctic Forest Michikamau
- 6 High Boreal Forest - Lake Melville
- 7 Mid Boreal Forest - Paradise River
- 8 Low Subarctic Forest - Mecatian River
- 9 String Bog - Eagle River Plateau
- 10 Forteau Barrens



Figure 2. Ecoregions of Labrador

## 1.4 Biodiversity

Biodiversity is a term used to describe the variety of life on earth. A basic definition of biodiversity includes the variety of animals, plants and microorganisms that exist on our planet, the genetic variety within these species and the variety of ecosystems they inhabit. Some scientists estimate the total number of species on earth between two and 100 million, however, the best estimate is considered to be within the range of 10-30 million. This is remarkable considering only 1.4 million species have actually been given names. The largest concentration of biodiversity on the planet is found in the tropical areas of developing countries. Small areas of rainforest often contain species that are found nowhere else on earth. Mishandling even small tracts of land could lead to extinction of several species, one of which may hold the key for the prevention or cure of some disease. While the boreal forest does not have the extent of biodiversity that some of the equatorial regions possess, Canada does have just over 70,000 species of plants, animals, and micro organisms in its boreal and other forest regions. An equivalent number remain un-described or unreported by science. While the boreal forest has less diversity of large plants than many other forest regions, it has greater biological diversity in some micro organisms. For example, the boreal forest has fewer tree species than the tropical rainforest but 500 times as many mycorrhizal fungi. Despite the large number of organisms

contained within the boreal forest, only five percent are actually plants and vertebrates. The other 95 percent remain largely unrecorded and unstudied. As a result, we need to conduct more surveys and studies and manage with caution so that species are not inadvertently wiped out. Biodiversity provides such essential services as climate control, oxygen production, and purification of freshwater supplies, carbon dioxide removal from the atmosphere, soil generation, and nutrient cycling for humans. Without the species that provide these processes, humanity would be unable to survive. There have been several international initiatives during the 1900's directed at developing strategies to protect Earth's biodiversity. Canada signed the United Nations Convention on Biological Diversity in 1992 at the Rio de Janeiro earth summit. All governments at both the federal and provincial level have agreed to meet these objectives through implementation of the 1995 Canadian Biodiversity Strategy: Canada's Response to the Convention on Biodiversity. The three components of biodiversity are species diversity, genetic diversity, and ecosystem diversity.

#### **1.4.1 Species Diversity**

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

#### **1.4.2 Genetic Diversity**

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

#### **1.4.3 Landscape Diversity**

Ecosystem diversity describes the range of natural systems found throughout a region, a country, a continent or the planet. Wetlands and grasslands are examples of ecosystems in Canada. A complex and intricate mix of plants, animals, micro organisms and the soil, water, and air they occupy create virtually limitless ecosystems around the world. A forest interspersed with barrens, marshes, lakes and ponds provides for diversity across the landscape. To ensure biodiversity is maintained at all scales this plan ensures extensive areas have protection of ecological values.

## 2.0 PAST ACTIVITIES

The previous five year forest management plan (2005-2009) was an overall success. Activities remained consistent over each year of the planning period. The underlying management objective was to support the sustainable development of the forest ecosystem ensuring the general well being of all resources for present and future generations. The fundamental objective of this was to provide maximum social and economic benefits from the forest ecosystem, while maintaining its integrity at all spatial scales.

Early accounts of commercial harvesting and sawmill operations in the Sandwich Bay area are vague. Several attempts were made to establish operations in the district. Traditionally timber was harvested for use in the local commercial salmon industry and for general building needs around Sandwich Bay. Several operations were attempted in the area but were unsuccessful. Early attempts of establishing harvesting operations were susceptible to numerous problems; some of them forest managers' struggle with today. They were believed to include: lack of infrastructure; transportation issues; lack of experienced labor; high logging costs and financial problems.

The annual allowable cut ( $100,000 \text{ m}^3$ ) from the mid 1990's to early 2000 was recognized as an opportunity for commercial development. As a result the Sandwich Bay Timber Ltd. began operations in 1994 and by the fall of 1996 had shipped two barge loads of pulpwood, totaling  $9795 \text{ m}^3$  (solid) to the Abitibi-Price mill located in Stephenville. Shortly after this operation ceased the Cottles Island Lumber Company began its commercial operation in Cartwright. The operation lasted for four months and approximately  $7000 \text{ m}^3$  of timber was harvested. The majority of this timber was shipped the next summer and fall, via barge, to their mill located in Summerford, NL, for processing with plans to commission a sawmill in Cartwright the following year. These plans later fell through.

The forest industry in district 20 has remained relatively stable in the past five years. Commercial operations have remained minimal. Over the past five year planning period approximately  $1,031 \text{ m}^3$  have been harvested from an available allocation of  $125,000 \text{ m}^3$  (Table 2). The lack of commercial operations has decreased other forestry related activities including road construction and silviculture. Commercial harvest levels will remain consistent in the immediate future until viable markets for lower quality fiber (pulpwood, fuel wood, bio-energy materials etc.) or value added products are identified. The current global market conditions have created a difficult environment for growth but overall there is a positive outlook for the future. This is mainly due to the interest and dedication of many stakeholders and the Department.

Domestic harvesting has remained consistent in the past five year period. The number of domestic permits issued averaged around 166 per year (@  $23 \text{ m}^3$  per permit). Fuel prices were relatively high over the past five years and as a result residents of communities in the district depended on fuelwood for home heating. Over the past five year period domestic harvesting has accounted for approximately  $15,721 \text{ m}^3$  (Table 2).

The majority of domestic harvesting occurred near the communities of Cartwright, Paradise River, and Reeds Brook (by residents of Black Tickle). The locations of both the commercial and domestic harvesting areas are illustrated in Figures 3 & 3a.

Table 2. Summary of commercial and domestic harvest levels for the period January 1, 2005 - December 31, 2009.

Year	Permit Type	# of Permits	Volume Issued (m3)	Volume Harvested (m3)
2005	Com. Permit	6	1168	468
2006	Com. Permit	7	722	65
2007	Com. Permit	9	620	252
2008	Com. Permit	6	570	246
2009	Com. Permit	5 to date	958	
<b>5 year total</b>			<b>4,038</b>	<b>1,031</b>
2005	Dom. Permit	182	4127	3095
2006	Dom. Permit	184	4232	3174
2007	Dom. Permit	180	4140	3105
2008	Dom. Permit	190	4370	3277
2009	Dom. Permit	178 to date	4094	3070
<b>5 year total</b>			<b>20,963</b>	<b>15,721</b>

The majority of road that exists in the district was constructed in 1987 by the Department of National Defense (DND) to provide access to the radar site located on White Hills, 24 kilometers southeast of Cartwright. In addition to this road system, the Department of Natural Resources (DNR) has constructed approximately 8.5 km of class C-2 primary forest access road to accommodate commercial operations. This includes 2.0 km of class C-2 which was the only new road construction in the past five years. Table 3 provides a summary of the road construction activity in FMD 20 over the past five years.

Table 3. Summary of road construction activity for the period of January 1, 2005 - December 31, 2009.

Year	New Construction	Reconstruction	Total (km)
2005	2.0	---	2.0
<b>Total</b>	<b>2.0</b>	<b>---</b>	<b>2.0</b>

Silviculture has been limited because of a lack of large scale disturbance (harvesting or natural disturbance). As a result, planting efforts have focused on the regeneration of poorly stocked burned areas. Over the previous five year operating plan approximately 75,000 black spruce (*Picea mariana*) and white spruce (*Picea glauca*) seedlings were planted over a 30 hectare area that had previously burned. As well 25 hectares were planted in 2002 with approximately 62,500 seedlings and 110 ha were planted in 2008 with 275,000 seedlings.



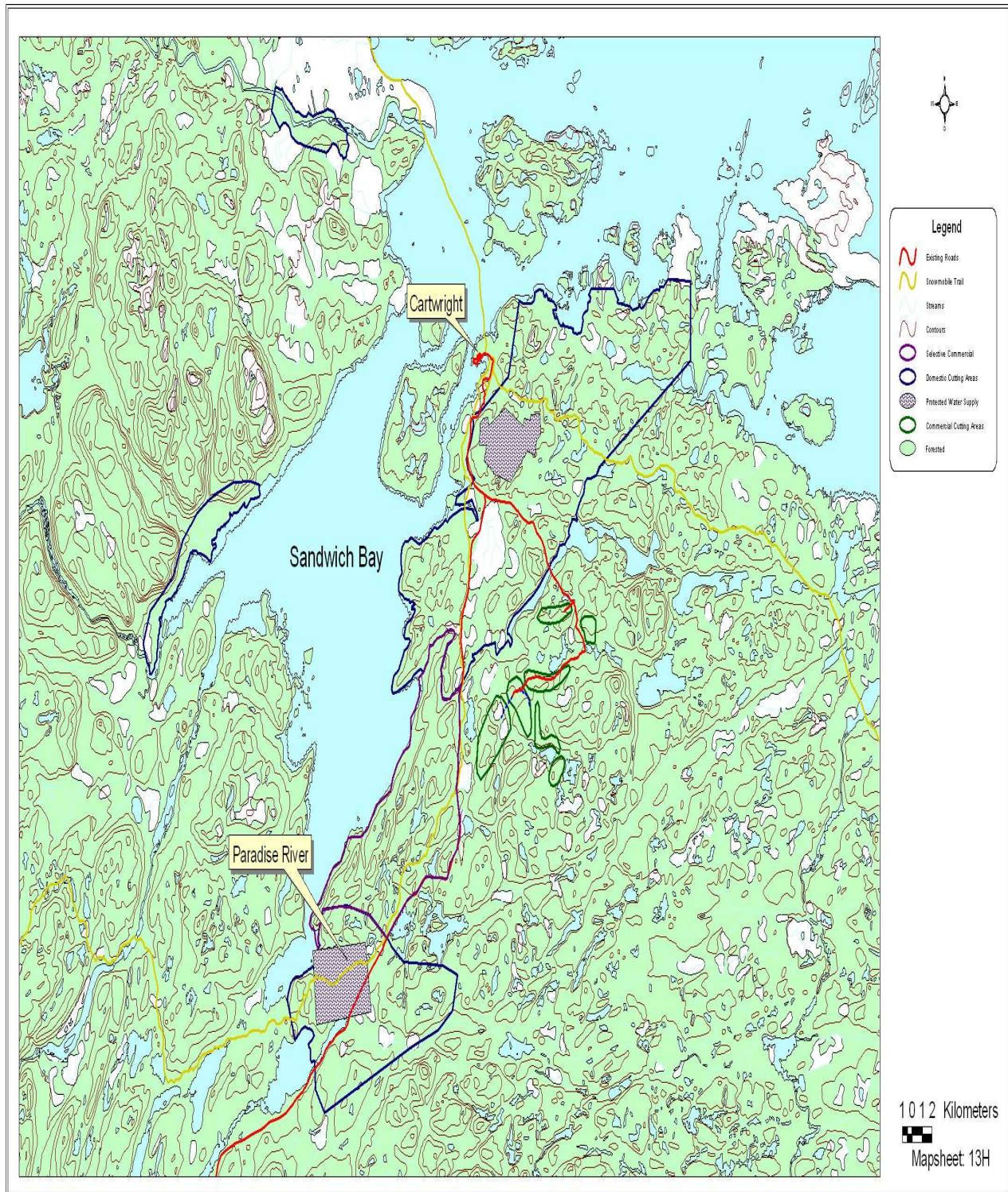


Figure 3. Commercial and domestic harvesting and forest access road activities in FMD 20 from 2004 - 2009 (Cartwright area)



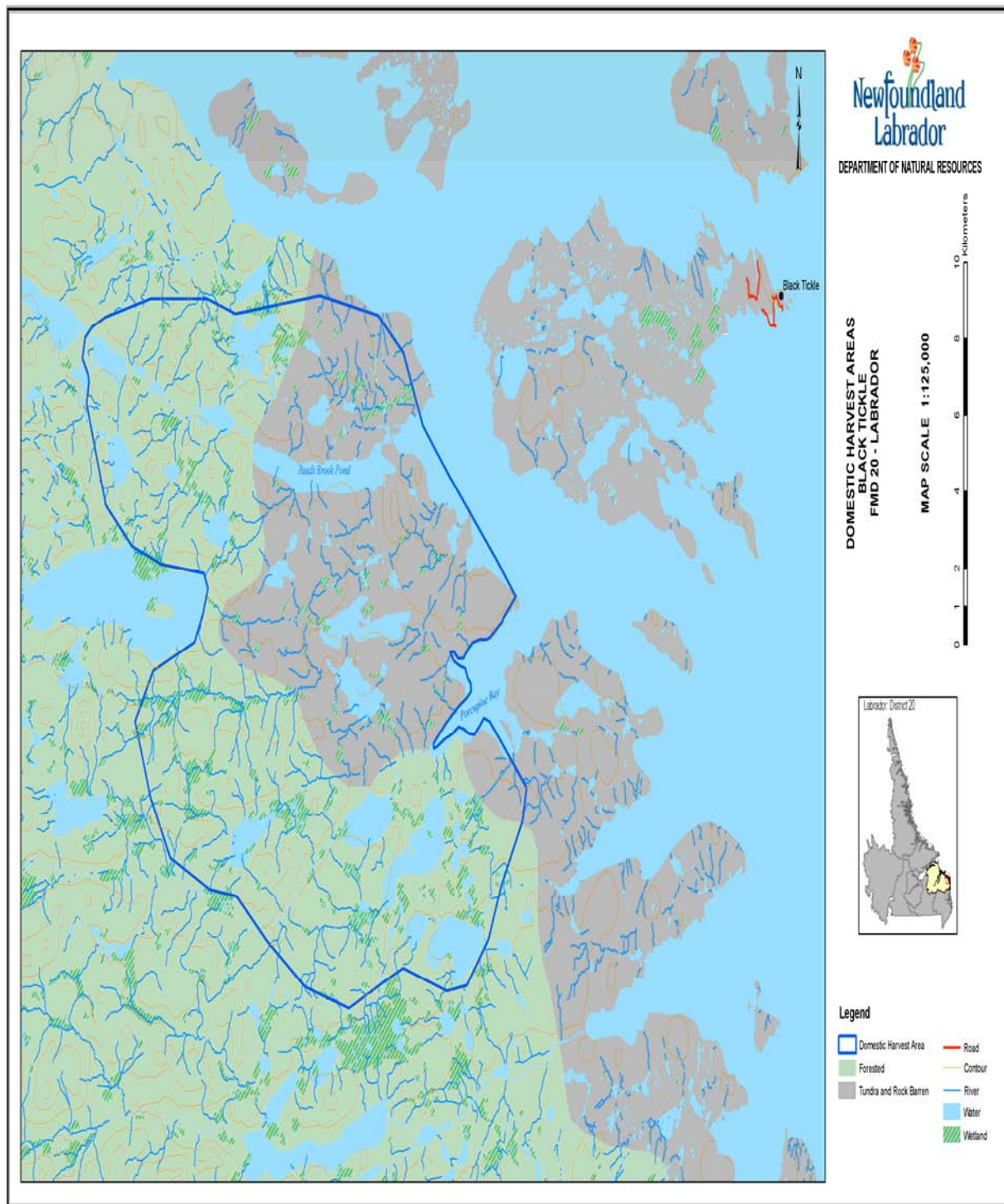


Figure 3a. Commercial and domestic harvesting area in FMD 20 from 2004 - 2009 (Black Tickle area)

Several forest fires were reported during the past five years. Two of these were fairly major fires that required full suppression efforts. In 2008 a fire located on the Eagle River threatened both human life and property. This fire was approximately 164 ha when suppressed. Another major fire burned approximately 6000 ha near Canoe Pond. Suppression efforts were made where the fire traveled along the Trans Labrador Highway. Like the majority of fires in the district both of these was the result of lightning strikes. Both fires were contained by District staff from Cartwright, as well as staff from Port Hope Simpson, Red Bay, and North West River, and required water bomber and/or helicopter support from Goose Bay.

### **3.0 OVERVIEW OF PROPOSED ACTIVITIES**

An overview of proposed forest management activities scheduled for this five-year period (2010- 2014) is presented in the appended maps (Appendix VII). Activities include: i) harvesting, ii) silviculture, iii) road construction.

Over this planning period a total of 150,425 m<sup>3</sup> is proposed for commercial and domestic harvest. Commercially, 129,000 m<sup>3</sup> will be available for allocation, scheduled for harvest from sixteen blocks in the commercial operating area, identified south of Muddy Bay Pond (Dykes River) as well as from the selective commercial area.

Domestic harvesting is expected to continue at current levels (less than 4285 m<sup>3</sup>/year) consequently; approximately 21,425 m<sup>3</sup> is estimated to be sufficient to meet district domestic requirements for the next five years. The majority of domestic cutting will occur near the one of the three communities in the district, Cartwright, Paradise River, and Black Tickle.

Silviculture activities will focus on monitoring and research with the view of developing an effective silviculture strategy for this District. Possible areas for planting and thinning are identified and efforts will focus on the assessment of previous plantations.

Approximately 14.2 kilometers of Crown and operator built primary access road has been proposed for this planning period. The current forest access road system originates from the DND access road, which connects the community of Cartwright to the North Warning Radar Site located on the White Hills. Proposed road construction will be an extension of our forest access road system. This access will be required to maintain the proposed harvest schedule if large scale commercial operations are identified.

In addition to fire suppression, resource protection will focus on maintaining ecosystem health from forest insect damage. Recently a Hemlock Looper (*Lambdina fuscicollis*) outbreak has caused extensive damage to balsam fir – black spruce forest throughout neighbouring district 21. Large areas of damage have been identified in district 20. The outbreak will be closely monitored and treatment may be required. Public consultation sessions will be held prior to any control actions.

### **3.1 Management**

Further refinement of the sixteen proposed commercial harvest blocks outlined in this plan will be administered through the development of an annual work schedule by April 1st of each year

and will be made available to the planning team. In addition, a report on past operations will be completed after March 31 of each year.

#### 4.0 WOOD SUPPLY / OPERATIONS

The operational activity for this planning period is described in the following sections. A more detailed description of operations will be outlined in annual work schedules.

##### 4.1 Age Class

Individual tree ages in a stand can all be the same after disturbance such as fire or harvesting; however in most cases the ages vary. Forest managers describe stand ages in terms of age classes which generally encompass 20 years. The forests in District 20 have not been subjected to any large scale disturbance in recent years. Fires have been relatively small and isolated and harvesting activity has been limited. This has resulted in a relatively old forest. As illustrated in Figure 4, approximately 95% of the forest is greater than 100 years of age. Forests in the 0-20 year age class account for less than 1% of the total.

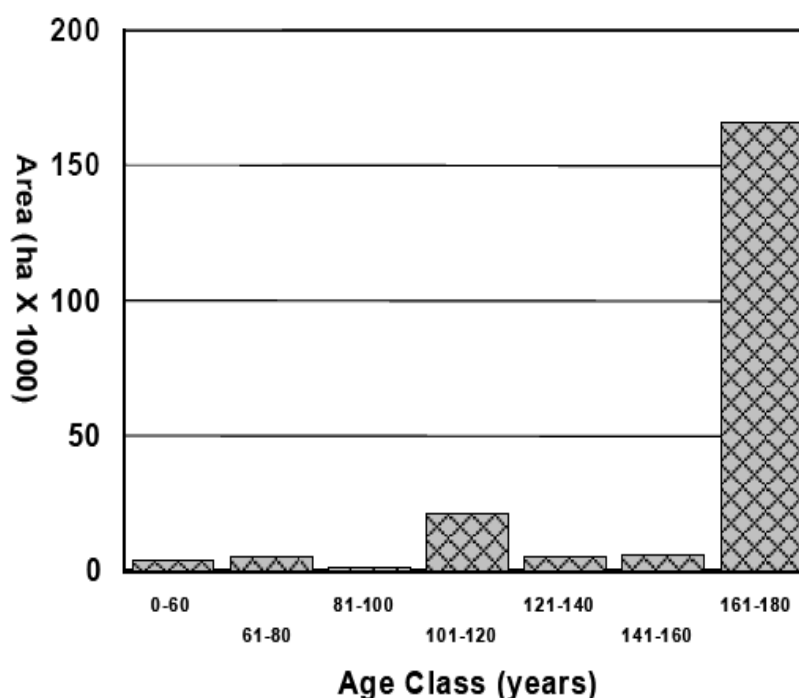


Figure 4. Summary of productive forest area (ha) by age class in FMD 20.

##### 4.2 Allocation of Wood Supply

The annual allowable cut (AAC) is the maximum volume that can be harvested on an annual basis while maintaining a sustainable supply of timber and providing a landscape, which supports non-timber values for future generations. Since the necessary growth and yield data required to run linear wood supply models (such as Woodstock) are absent for the district, the AAC is calculated using a basic area/volume formula. The total AAC for the south side management area in District 20 is 30,085m<sup>3</sup>/yr. This volume includes reductions (20%) to

account for retention, waste and natural disturbances (Appendix III). Recently the overseas wood/fuel pellet market has been identified as a growing opportunity for our forest industry and Labrador has the potential for a pellet plant operation to access these markets. Pellet plants are able to utilize timber which is typically non-merchantable for a pulp and paper operation. The result is the ability to recoup losses as a result of poor utilization and cull. In the event of such an industry its possible the waste and cull reductions applied to the AAC (13%) could be considered for removal which would increase the AAC to 35,128 m<sup>3</sup>/yr.

The 1992 forest inventory used in the determination of the AAC did not survey the entire District; however it did survey the majority of the non-isolated commercial forest in District 20 5). Efforts will be made to inventory these areas prior to the next wood supply analysis. The 1992 inventory was incorporated into a Geographical Information System which was used in the development of this plan.

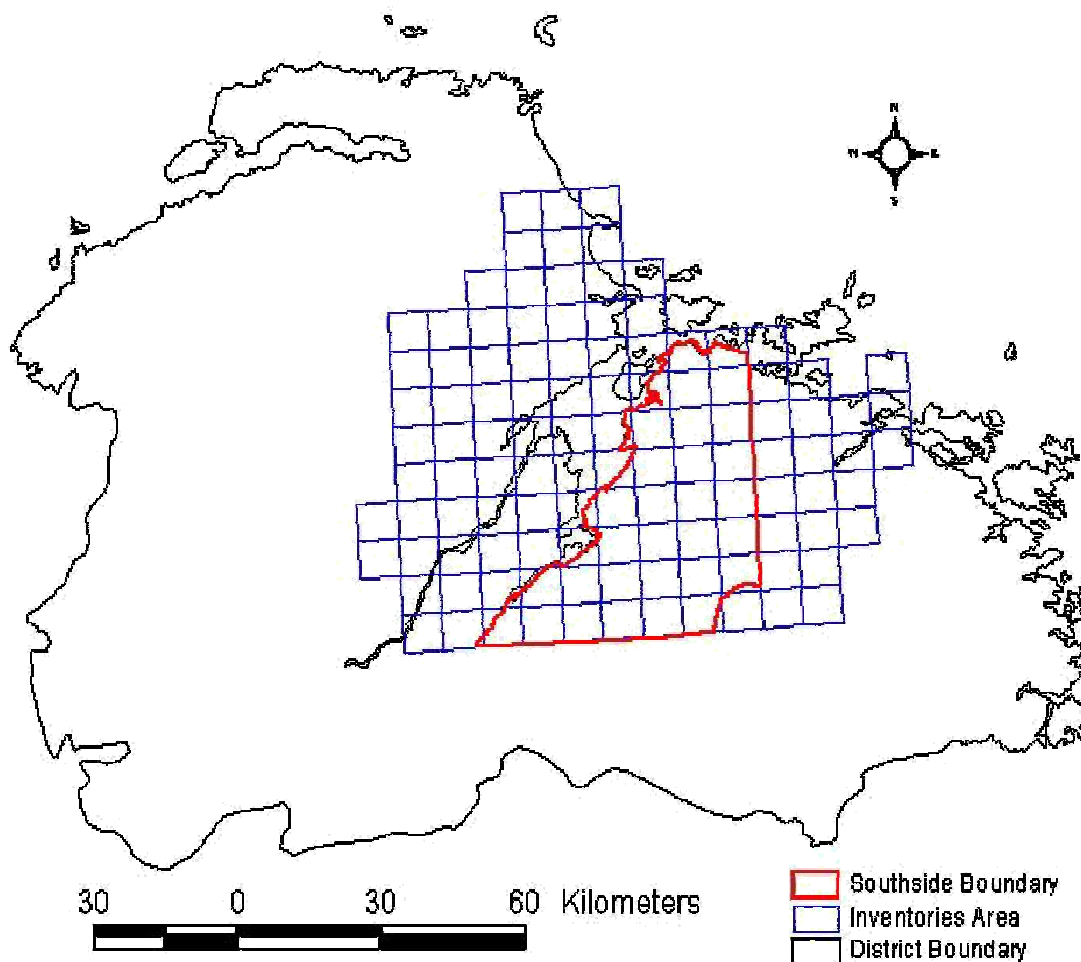


Figure 5. Map illustrating current forest inventory for FMD 20.



During this five year period, only a portion of the South side of Sandwich Bay is considered for harvesting (Figure 6). Consequently, the AAC calculation is based solely on this area. The South side operating area, in which all commercial harvesting is scheduled to take place, does not intersect Labrador Inuit Association (LIA) land claims areas nor the proposed Mealy Mountains park study area (Appendix VII). In future operating periods, alternate sources of commercial timber may be explored. Current inventory data indicates that the North side of Sandwich Bay has the potential for commercial harvesting. The current operable landbase excludes the Mealy Mountain National Park study area as well as the area between the Paradise and Eagle Rivers. Both areas are excluded provisionally, until the final boundaries of the National Park are established by Parks Canada, and further work can be completed with stakeholders to determine the significance of any other land uses in the area.

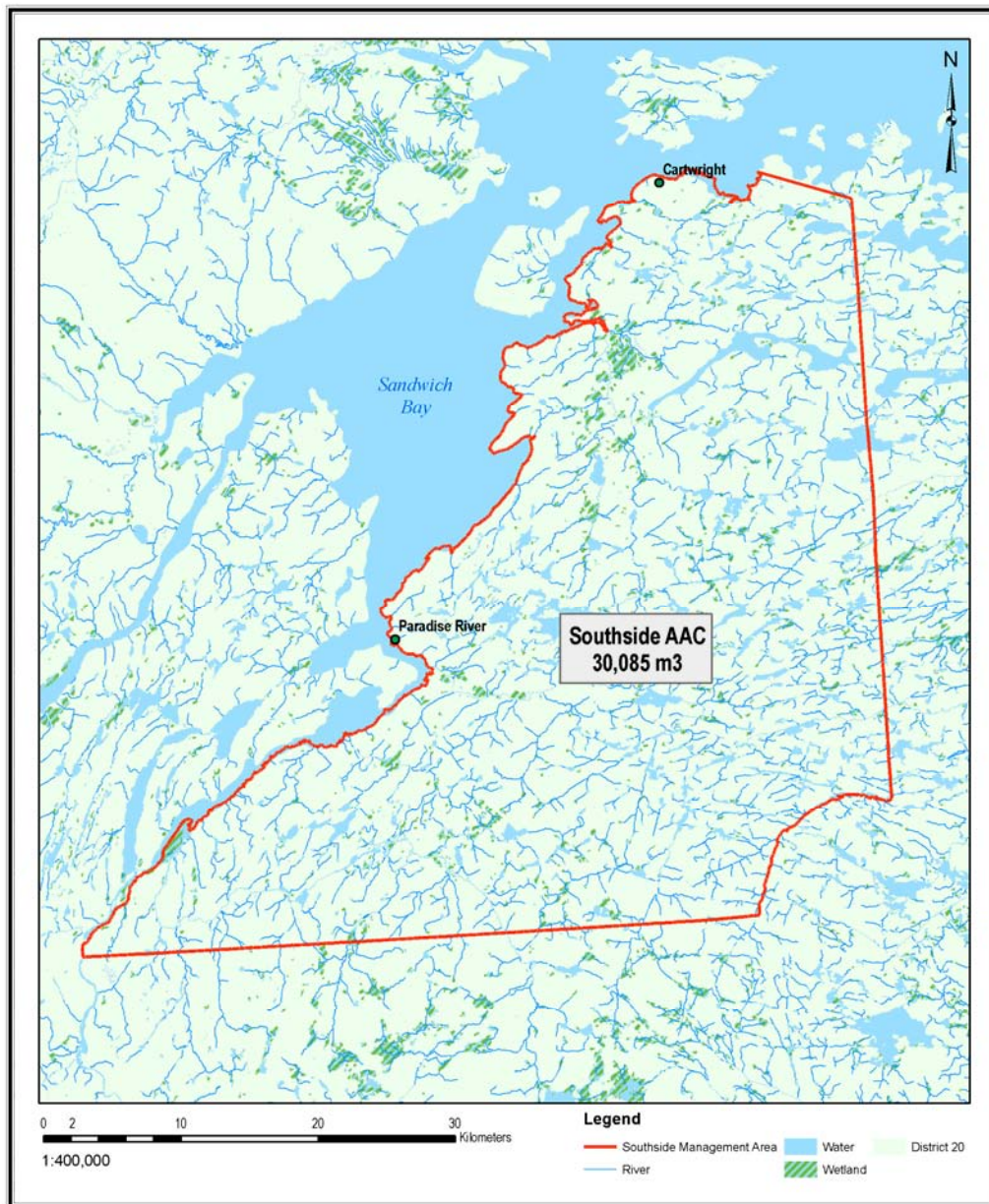


Figure 6. Location of Southside allocation area for 2010 – 2014 corresponding AAC.

A summary of the wood supply analysis is provided in Appendix III. As indicated in Table 4, 150,425 m<sup>3</sup> has been scheduled for harvest over the next five years. A total of 129,000 m<sup>3</sup> has been allocated for commercial and selective commercial operations and 21,425 m<sup>3</sup> has been estimated for domestic use.

Fourteen commercial operating areas have been proposed for harvesting over the next five years. Appended in the maps are the locations of these areas (Appendix VII). A summary of the commercial harvesting blocks is provided in table 4.

Table 4. Summary of proposed harvesting activity for the next five years in FMD 20.

Year	Commercial (m <sup>3</sup> )	Selective Com. (m <sup>3</sup> )	Domestic (m <sup>3</sup> )	Total (m <sup>3</sup> )
2010	25,000	800	4,285	30,085
2011	25,000	800	4,285	30,085
2012	25,000	800	4,285	30,085
2013	25,000	800	4,285	30,085
2014	25,000	800	4,285	30,085
<b>Total</b>	<b>125,000</b>	<b>4,000</b>	<b>21,425</b>	<b>150,425</b>

As described, 125,000 m<sup>3</sup> has been scheduled for commercial harvest. The proposed commercial areas contain an estimated 193,640 m<sup>3</sup> Net Commercial Volume (NCV) of timber. This additional volume, 68,640 m<sup>3</sup> greater than what has been scheduled, will provide operational flexibility. This is to ensure that the interim harvesting guidelines (Appendix IV) are met and that any additional land removed from the harvesting areas as a result of the pre-harvest surveys for the annual operating plans can be accommodated. All harvesting operations are also governed by the *Environmental Protection Guidelines* (EPG) which have been developed by the Department in consultation with various government departments and industry (Appendix V).

### 4.3 Commercial Operations

Commercial operations will be confined to the fourteen identified blocks in the plan and the selective-commercial reserve area. In general mechanical harvesters and conventional harvesting methods will be used. It is anticipated that, with the exception of the selective-commercial reserve area, all commercial harvesting will be through the clearcut silvicultural system with the retention of non-merchantable and wildlife trees.



Table 5. Summary of commercial harvest blocks for January, 2010 - December, 2014.

Harvest Block	Commercial Volume (m <sup>3</sup> )	Net Commercial (m <sup>3</sup> )	Commercial Area (ha)
C20-1	27080	23018	192
C20-2	10998	9348	79
C20-3	17413	14801	110
C20-4	18090	15376	114
C20-5	9416	8003	76
C20-6	12921	10982	90
C20-7	8632	7337	70
C20-8	8483	7210	63
C20-9	13105	11139	106
C20-10	4117	3499	30
C20-11	21053	17895	132
C20-12	10166	8641	68
C20-13	17927	15237	121
C20-14	9369	7963	63
C20-15	16985	14437	132
C20-16	22057	18748	171
<b>Total</b>	<b>227812</b>	<b>193640</b>	<b>1617</b>

#### 4.3.1 Selective Commercial

Selective operations will be done manually using chainsaw and will mainly operate during the winter months. Access road construction in the selective commercial area is not required. For this five year period the commercial selective area will be located between the two domestic areas identified near Cartwright and Paradise River on the north side of the Trans-Labrador highway as shown in Map 1.

#### 4.4 Domestic Operations

The harvest of fuelwood, sawlogs and building materials for domestic use will be carried out under a permit in identified harvesting areas throughout the District. These areas are generally located in close proximity to communities such as Cartwright and Paradise River (Figure 3). Residents of Black Tickle fulfill their domestic requirements in the Porcupine Bay area (Figure 3a). Small volumes are also harvested at various locations throughout the District by cabin owners. The Department will ensure that the number of permits issued for each domestic block do not exceed sustainable harvest levels. Requests for domestic harvesting blocks outside the approved domestic area, as indicated in the appended maps (Appendix VII), will require prior approval from District staff. They will be closely monitored and subject to review on an annual basis. Modifications to this practice may be recommended and enforced as required.

Domestic harvesting will not be permitted in the commercial area, which is located south of Muddy Bay Pond (Dykes River) while commercial operations are present. However once commercial operations cease in an area, domestics may be allowed to harvest or clean up commercial areas. Over time this will reduce the pressure on the green tree resource and increase the utilization. Harvesting is also restricted in various buffers that have been established for roads (100m) and snowmobile trails (30m). A minimum of 125m no harvest buffer will be applied to all major waterbodies with an additional 50m of modified harvest, when required, to be determined in the field by District staff (Map 18). Consensus was reached and major waterbodies were defined by local stakeholders during public consultation sessions. All other waterbodies identified on a 1:50,000 map or have a width greater than 1 meter will have a minimum no harvest buffer zone of 30m. In any instance, when field conditions require, additional buffer distance may be applied. Consensus was reached among local planning team members that the following exceptions should apply to domestic harvesting in buffers:

- some dead trees may be harvested
- some blow-downs can be salvaged
- special building materials (i.e. boat timbers) may be harvested provided good utilization is practiced

These activities will require prior approval from District staff, and will be closely monitored and subjected to review by the local planning team on an annual basis. Modifications to these practices may be recommended as required.

Black spruce, the common fuelwood species in FMD20, will account for 90% of the domestic fuelwood harvest. The remaining volume, balsam fir (*Abies balsamea*), will be sawn in local sawmills. Local residents also use white birch (*Betula papyrifera*) for fuelwood and value added products such as snowshoes. For this, and other domestic uses, white birch within the defined domestic harvesting areas is available for harvest, providing all other conditions (ex. buffers) are adhered to. It is requested that straight stemmed trees with clear boles not be harvested for firewood and left standing for future value added opportunities.

## **4.5 Silviculture**

Silviculture refers to the theory and practice of controlling the establishment, composition, growth and quality of forest stands to achieve the objectives of management (Smith, Larson, Kelty and Ashton 1997). Two of the most common techniques that are associated with this practice are planting and thinning.

The silviculture program in District 20 will focus on monitoring and research. However, suitable areas that may be identified for planting during the operating period are identified in (Appendix VII). These areas are forecasted harvest blocks which may not regenerate as expected. These areas may also become suitable areas for pre-commercial thinning, hardwood management, or require site preparation in the operating period covered by this plan. Further refinements to each project will be described in the Annual Work Schedules developed each year.

Based upon past observations, it is anticipated that most areas when harvested will regenerate naturally within a five year establishment period, however recent hemlock looper infestations may warrant planting less prone spruce species in areas where balsam fir regeneration is adequate. Harvested areas will be monitored for regeneration and detailed surveys will be conducted in areas where regeneration appears to be inadequate.

Harvested stands (or portions of harvested stands) that are not regenerating will be scheduled for planting. The planted species will be determined on a site specific basis but will be highly dependent on the pre-disturbance stand structure. Subject to funding, cone collections will also be initiated within the District to provide a local planting stock of native tree species. All planting projects are supported by the Regional Tree Nursery in Goose Bay.

Research will focus on silviculture techniques that will enhance natural regeneration. Potential projects include:

- (1) Retention of groups of seed trees.
- (2) Modification of harvesting patterns.
- (3) Investigation of various site preparation techniques.
- (4) Species trials
- (5) Past plantation assessment

#### 4.6 Access Road Construction

The construction of an effective road network is essential to ensure the success of commercial operations in the area. To ensure this success, 14.2 kilometers of primary access road have been proposed for construction during this planning period. Based on current costs this will require a funding commitment well in excess of one million dollars. A summary of this program is provided in Table 6.

Table 6. Proposed primary access road construction for the period January 1, 2010 - December 31, 2014.

Year	Class	Approx. Length (km)
2010	C-2 (Primary)	3.0
2011	C-2 (Primary)	3.5
2012	C-2 (Primary)	2.5
2013	C-2 (Primary)	3.0
2014	C-2 (Primary)	2.2
<b>Total</b>		<b>14.2</b>

The 14.2 km of road construction will be an extension to the existing forest access road. The road system originates from the DND road, which links the North Warning Radar Site to the community of Cartwright. The location of the proposed primary road construction activity is illustrated on the 1:50,000 cover type and 1:50,000 topographic maps provided in the appended

maps (Appendix VII). This road network will potentially provide access to approximately 168,000 m<sup>3</sup> (NCV) during the first four years of this plan. All roads constructed by the Department will be of class C-2 standard (Appendix VI).

Operational roads (secondary and tertiary) are not identified in the five year plan. However, they may be necessary in order to ensure that the timber scheduled for harvest can be fully accessed. Royalty reductions, as per regulations, will be offered as incentive for commercial operators to construct their own access roads. These roads must adhere to established construction and environmental standards and will be subject to approval by District staff and identified in annual plans. Considering the limited access that currently exists within the District, decommissioning (barring or rehabilitating of access roads) has not been scheduled for this planning period. It will be considered when it is in the interest of protecting sensitive wildlife or fish habitat. Road construction activity will be carried out as per the Environmental Protection Guidelines, which are provided in Appendix V. Certificates of approval must be obtained from the Department of Environment and Conservation for any stream crossing.

#### **4.7 Monitoring and Research**

A public monitoring and research committee will be established in the district during the implementation phase of the five year plan. The adaptive management approach will afford the opportunity for participants to continually improve the plan and set the stage for the next planning period.

Surveys are important management tools that are necessary in order to evaluate past action and provide data on which to base future management decisions. A number of surveys are scheduled for this upcoming planning period subject to adequate staffing and funding.

##### **4.7.1 Pre-harvest Surveys**

Proposed harvesting areas will be surveyed for sensitive habitats such as the presence of raptor nesting sites, critical spawning areas and presence of aquatic furbearers. Detailed harvest sensitivity surveys (slope, groundwater condition, soil texture) may also be conducted to identify areas with high compaction and soil erosion hazard potential. A trial comparing the amount of coarse woody debris before and after logging may also be initiated.

##### **4.7.2 Regeneration Surveys**

Surveys will be conducted on areas that have been harvested in order to determine the quantity and quality of natural regeneration as per the Regeneration Assessment Procedures for Newfoundland and Labrador. Areas will normally be surveyed three to five years after harvesting to allow sufficient time for seedlings to establish.

##### **4.7.3 Utilization Surveys**

Problems with improper utilization will be addressed through regular monitoring and enforcement by District Conservation Officers. Formal surveys, defined by Newfoundland & Labrador Forest Service, will also be carried out in order to obtain baseline data or to resolve

disputes.

While these surveys are necessary to measure the immediate impact of activities on the ecosystem, mechanisms to monitor change over the long term are also necessary. During the summer of 2001 approximately 30 PSP (permanent sample plots) were established in District 20 by the inventory branch of DFRA. These permanent sample plots will be an important component of long term monitoring. A five to ten year measurement cycle is expected in District 20. In addition to obtaining growth and yield information, data pertaining to site, coarse woody debris and the presence of small mammals and songbirds will be recorded and monitored over time. After two cycles of measurement, growth trends can be observed and preliminary data analyzed. More measurements are required to ensure that more representative results are obtained. These results will prove helpful in future planning period.

#### **4.7.4 Site Disturbance Surveys**

These surveys, as defined in the Ground Disturbance Survey Guidelines developed by the Newfoundland and Labrador Forest Service, will be conducted following harvesting activities to ensure compliance with the site disturbance and erosions sections of the Environmental Protection Guidelines.

#### **4.7.5 Information and Research**

All stakeholders including DNR acknowledge the information gap, which exists in Labrador. Currently, little to no research has been conducted in the immediate area making management decisions cumbersome. In consultation with stakeholders, subject to funding, DNR plans to initiate several smaller research projects over the next five year period. These projects will provide relevant site specific information, which can be used, for management decisions and processes during the next planning period. These projects will be developed with input from the regional ecologist.

Another important monitoring mechanism that is required under the current management planning process is the preparation of annual work schedules. These plans will be subject to review by the planning team and the general public. This will provide an opportunity for stakeholders to evaluate the plan progress and recommend necessary changes.

Finally, District Conservation Officers will routinely monitor harvesting, road construction and silviculture operations. This will ensure that activities are being carried out in a manner consistent with various legislation, guidelines and the objectives of the five year plan. Labrador Métis Nation Forest Guardians may also be assisting with some of the aforementioned monitoring.

### **5.0 PROTECTION**

This section is intended to address issues that concern the protection of aquatic and terrestrial habitats, biodiversity and ecosystem health. This strategy will be based on the Environmental Protection Guidelines, which are appended to this document.

## 5.1 Management Units

Extensive areas have been identified for District 20 for the protection of ecological values and to ensure the sustainability of domestic activities. During the previous planning period the LMN identified several management units as having cultural significance. Landscape, watershed and stand level scales are used as successive scales to filter and identify protected ecosystem functions within each level.

Protected areas at the landscape scale are designed to protect large representative areas of major ecosystem and habitat types as well as ensuring the connectivity of the landscape remains and habitat fragmentation is limited. Broad scale management units (mapped at the 1:500,000 or 1:250,000 scales) were identified across the district. At this level large areas, such as the Mealy Mountain National Park Study area (including IBP sites), entire protected watersheds, ecological reserves (such as the Gannet Islands) and a Federal reserve radar site are considered. The landscape management units are briefly described in 7 below and illustrated in Appendix VII.

At the next level, watershed features such as recreational cabin areas, transportation routes such as Provincial highways, recreational areas including groomed snowmobile trails, steep slopes, and wildlife corridors are protected. At this scale (1:50,000), several portions and entire watersheds including the Eagle River, Black Bear River, North River, White Bear River and a portion of the Paradise River are also protected.

Table 7. Management unit description including operability and proposed forest management activities.

Management Unit	Included in Operable Landbase (Y/N)	Forest Management Activities
1	Y	Commercial and domestic harvesting
2	Y	Potential commercial and domestic harvesting
3	Y	Potential commercial harvesting; silviculture treatment areas
4	Y	Domestic harvesting
5	N	Inventory
6	N	Domestic harvesting
7	N	Possible silviculture treatment area; operable area buffer; inventory
Domestic Harvest Blocks	Y	Domestic harvesting
Selective	Y	Selective commercial harvesting
Commercial Block	Y	Commercial harvesting
MMNP Study Area	N	None

Further reference should be made to disclaimer on Page ii.

The final filter is at the stand level. Features at this level are identified as a result of the pre-operational surveys and in the annual work schedule at the 1:12,500 scales. Identifiable stand level protected features include riparian buffers, water fowl staging areas, wildlife dwellings, raptor nest buffers, isolated stands and slopes, snag and green tree retention on harvest blocks, additional Provincial highway and snowmobile trail buffers, protected water supplies and town buffers. An additional 15% reduction to the net commercial forest area is applied during the annual allowable cut calculations for such areas.

Results of a survey conducted by the Labrador Métis Nation have revealed that at the landscape level the following features are important:

- Traditional hunting\*, gathering\* and berry picking\*
- Important visual landscapes
- Travel routes and high use areas
- Cultural\* heritage values
- Domestic forest harvesting
- Recreational activities

## **5.2 Habitat Protection**

Mature forests provide important habitat for a variety of plant and animal species. Examples range from various lichens to economically important fur bearers such as American Marten (*Martes americana*). Large contiguous forested areas have been excluded from the current wood supply analysis. Approximately 53% of the commercial forest was not included in the AAC calculation. At the landscape level, entire watersheds (i.e. Eagle and Black Bear Rivers) or significant portions of watersheds have not been considered for harvesting. There is also a federal reserve at the White Hills radar site, which is excluded from harvesting. These areas can provide important bench marks for scientific study and long term monitoring of ecosystem health. At the stand level, interim harvesting guidelines (Appendix IV) will provide for unharvested areas and connectivity. These wildlife corridors will ensure that wildlife species have the ability to move across the landscape. Where possible these corridors will incorporate riparian areas and follow the natural topography. Corridors will be identified in the annual work plans.

Watercourse buffers are important in the protection of aquatic ecosystems and the maintenance of water quality and quantity in general. They provide shade, act as filters against excessive sedimentation and stabilize soils when properly planned. Buffers also serve as important travel corridors and habitat for wildlife. Current guidelines require a minimum 30 metre treed buffer be maintained on all water bodies that are one metre in width or greater. Guidelines also permit for an increased buffer when required (i.e. steep slopes, sensitive spawning areas, etc.).

In the case of major rivers, a minimum of 125 meters will be maintained with an additional area of modified harvest when required. Waterfowl staging areas will require a 30 meter buffer. The harvesting of hardwoods within 30 meters of a water body occupied by a beaver will not be permitted.



Coarse woody debris, which includes both standing snags and downed woody material, are also important to a variety of plant and animal species. In recognition of its value, whole tree logging will not be permitted under this plan. Logging systems that leave limbs and tops on the harvesting site will be favored. Guidelines also require that a minimum of 10 snags per hectare remain after an area has been logged. When appropriate, efforts will be made to retain green trees to prevent snags from blowing down. Larger trees (>50cm dbh) will be preferred. In order to provide a future source of coarse woody debris, efforts will be made to maintain green trees (green tree retention) in harvested areas. Clusters of trees will be preferred over single trees. Where ever possible snags should be maintained in association with green tree retention. Efforts will be made to follow patterns of natural disturbances, such as irregular and feathered edges.

There are no known black bear dens within the proposed operating areas. A 50 meter buffer will be maintained on any black bear denning sites that are found within the proposed operating areas. In the event that an active raptor nest is identified in the annual plans, guidelines require an 800 meter buffer be maintained during the nesting season (March 15 to July 31). These dates may vary in Labrador due to weather conditions. Once the young have left the nest, a 200 meter buffer is required. Annual pre-harvest surveys will be conducted to identify these areas.

### **5.3 Wildfire Protection**

Large fires have not been common in District 20 in recent years. Wildfire, however, is documented as a natural occurrence in the Labrador Region. Large fires have occurred in Southern Labrador (Port Hope Simpson); therefore an effective fire suppression program is necessary to ensure that losses to fire are minimized. Fires, which pose no threat to life, property or commercial resources, will be allowed to burn. The priority fire suppression zones within Labrador are outlined in the appended maps (Appendix VII).

The District Office in Cartwright currently has staff and equipment to provide initial suppression attacks. Two seasonal fire protection staff is stationed in Cartwright from mid May to September, complemented by three permanent District staff, all trained in forest fire suppression. The office is manned from 1200 to 1900 hours daily. After regular hours, the District Fire Duty Officer is responsible for receiving fire reports and dispatching staff and equipment. The Forest Management Centre located in North West River, assists in coordinating air support (tanker, helicopter) and can provide additional staff and equipment as required.

### **5.4 Insect and Disease**

Protection of the regions forest from insects is now a priority in Labrador. In recent years an outbreak of hemlock looper has been identified. This is the first known outbreak of hemlock looper in Labrador. It has resulted in significant damage to balsam fir-black spruce forest in neighbouring district 21 and minor damage in district 20. Similar to district 21 treatment is expected to occur in district 20 and continue until the population decreases to normal levels.

Over mature stands increase the risk of insect and /or disease outbreaks. The five year harvest schedule targets oldest stands first in an attempt to reduce the potential risk for such outbreaks and also reduce the risk of major forest fires. Harvesting alone is not enough to control the

population. Silviculture will focus on planting harvested sites with less susceptible species such as spruce. At the planning meetings stakeholders were made aware of the seriousness of this outbreak and our control options. No stakeholders raised concerns over treatment. Crews from the Insect and Disease branch at Headquarters in Corner Brook, with input from District staff, will monitor insect populations through aerial and ground reconnaissance. Information collected will assist managers in the development of adequate forest protection measures that can be presented to the local public for input and approval.

The Department and other organizations will be undertaking a number of studies to examine the affects and impact of a hemlock looper outbreak in the region. Researching the outbreak in Labrador is particularly of interest as it relates to the affects of climate change on forested ecosystems in northern areas. The current circumstances provide the opportunity to investigate and improve existing knowledge and fill information gaps to better monitor, forecast and manage hemlock looper outbreaks.

## **5.5 Hunting and Trapping**

During the planning process stakeholders expressed concerns that increased road access would have negative impacts on the furbearer population in the interior when phase III of the TLH is complete. Already residents have seen increased trapping pressure from individuals from other regions. The Department of Environment and conservation will monitor furbearer populations and resource pressure.

During this operational period domestic hunting and trapping opportunities will continue to exist. Domestic harvesting of wild meat (small game including ptarmigan, rabbit and grouse), fish, berries and mushrooms for subsistence and furs for sale are common. Current areas will allow these activities to continue within normal levels. Seasons and bag limits along with research requirements and regulations are prepared by the Department of Environment and Conservation with public input on a yearly basis. District conservation officers will continue to enforce these regulations.

## **5.6 Cabin Development**

During the planning process stakeholders expressed concerns that increased road access may facilitate increased cabin development. They requested that the construction of cabins near sensitive wildlife areas be discouraged. Currently Crown Lands have a no cabin development within 1 km of phase III of the TLH. Current environmental guidelines require a minimum of 50m treed buffer between operations and approved cabin development areas. As sensitive wildlife areas are identified, this concern can be addressed through the Crown Lands Referral process.

## **5.7 Historical Resources**

Officials of the Historical Resources Division indicated that Muddy Bay Pond (Dykes River) is considered to have archeological potential. Activity in this area will be limited to domestic harvesting during winter months; therefore, it is anticipated that standard no cut buffers on these larger water bodies will provide adequate protection of potential archeological sites.

Schwartz (1997) classified the areas proposed for commercial harvesting as having “unknown archeological potential”. The proposed harvesting areas are located on upland sites, which are considered to have lower risk of encountering historical artifacts. In the event that an archeological site or artifact is found, all operations will cease and the Historical Resources Division will be notified.

## **5.8 Trans-Labrador Highway**

Construction commenced on the south coast portion of the Trans-Labrador Highway (TLH) in June, 1999. Currently the TLH connects the communities of Cartwright and Paradise River to several other communities on the south coast. Phase III of the TLH, connecting the south coast to Happy Valley Goose Bay is expected to be completed by the time this plan begins. A minimum of 100m no cutting buffer will be implemented for all domestic and commercial harvesting along the highway.

Harvesting activity may be visible from the route but in an effort to minimize the visual impact of these operations, the proposed harvesting areas have been modified. Skyline reserves will be maintained and roads will be located on the lower slope and buffered so as not to be seen from the highway.

In an effort to ensure the conservation and long term sustainability of all resources in this relatively new accessible landbase, enforcement and compliance will be a large part of our mandate over the next planning period along phase III of the TLH.

## **6.0 AMENDMENTS**

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

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

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

Changes that are not covered by the above must be submitted for Environmental Assessment (EA) in the form of an amendment to the five year operating plan. Once approved through EA the amendment still has to be approved by the Ecosystem Management Division of the Forest Service however. Amendments requiring submission through EA will be reviewed by the planning team. Other amendments may also be reviewed by the monitoring committee if the District Manager deems that they represent a significant change to the plan.

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## APPENDIX I

### Planning Team Members and Correspondents

The following is a list of participants who have attended sessions since the planning process began in 2009. Minutes for the final 8 sessions can be found online at [www.gov.nl.ca/forest/district20.ca](http://www.gov.nl.ca/forest/district20.ca)

Name	Community	Representation
Bird, Cecil	Cartwright	Public Member
Cabot, George	Cartwright	Commercial Operator
Davis, Doris	Cartwright	Public Member
Davis, Lewis	Cartwright	Public Member
Dyson, Charlotte	Cartwright	Southern Aurora Development Association
Earle, Dorothy	Port Hope Simpson	Southern Aurora Development Association
Elson, Kirby	Cartwright	Fisherman
Elson, Tony	Cartwright	Public Member, Junior Rangers
Fequet, Mike	Cartwright	DNR
Glode, Jason	Cartwright	DNR
Jennings, Darren	HV-GB	DNR
Lethbridge, Norman	Cartwright	Public Member, outfitter
Martin, John	Cartwright	Public Member
Meshner, Howard	Cartwright	Commercial Operator
Michelin, Steve	HV-GB	DNR
Notley, Roxanne	Port Hope Simpson	Southern Aurora Development Association
Pardy, Judy	Cartwright	Public Member
Phillips, Frank	HV-GB	DNR
Roberts, Wade	Cartwright	Public Member
Sinclair, Josh	Cartwright	DNR
Tremblet, Shirley	Cartwright	Public Member
Worthman, Harry	Cartwright	DNR

## **APPENDIX II**

### **Summary of Meeting Minutes from February 2009 to April 2009**

In February of 2009 the planning process for District 20 was re-initiated in the Cartwright area. From this time until April 2009, three sessions were held with participants to discuss outstanding forestry issues relating to the district 20 five year operating plan and strategy document. An initial meeting was held to discuss the draft document. The meetings were facilitated by Jason Glode (District Ecosystem Manager). Every effort was made to ensure representation by all stakeholders. Stakeholders who declined representation included the Labrador Métis Nation, Labrador Inuit Association, Crown Lands, and Wildlife officials with the Department of Environment. Topics discussed included:

- Domestic hunting and trapping
- Cabin development
- Waterway access/ public access
- Local resource access
- Harvesting methods – clear cutting
- Ecosystem health – general
- Buffer widths
- Protected areas
- Endangered species
- Rotation age
- AAC calculation – poor sites
- Research
- Local opportunities – sawmilling and harvesting
- Mealy Mountain National Park Study Area
- Forest industry
- Community consultation
- TLH development – Phase III
- Hemlock Looper Control

Complete minutes are available online at [www.gov.nl.ca/forest/district20/](http://www.gov.nl.ca/forest/district20/)

## APPENDIX III

### Wood Supply Analysis

The annual allowable cut (AAC) is the maximum volume that can be harvested on an annual basis while maintaining a sustainable supply of timber and providing a landscape, which supports non-timber values for future generations. Since the necessary growth and yield data required to run linear wood supply models (such as Woodstock) are absent for the district, the AAC was calculated using a basic area/volume formula.

$$\text{AAC (m}^3\text{/year)} = \frac{\text{Net Commercial Forest Area (ha)} \times \text{Net Merchantable Volume (m}^3\text{)}}{\text{Rotation Age (yrs)} \times \text{Hectare}}$$

Where:

- **Net Commercial Forest Area** is the net landbase of commercial forest.
- **Rotation Age** is the time period (in years) required to establish and grow trees to a condition of maturity following a disturbance.
- **Net Merchantable Volume** is the expected merchantable volume on a specified landbase taking into account losses for fire, waste and retention.

#### Net Commercial Forest Area Determination

Landbase	Area (ha)	Swd. Volume (m <sup>3</sup> )
Total Area (1992 inventory)	612,337	23,928,973
Total Area (southside management area)	174,640	9,005,661
Productive Forest	50,933	6,899,254
Commercial Forest	50,125	6,882,947
Un-alienated Commercial Forest	38,612	5,330,052
Net Commercial Forest	32,820	4,530,544

Definitions and assumptions:

**Productive Forest** Stands that are capable of producing 35 m<sup>3</sup>/yr at rotation.

**Commercial Forest** Stands (bF, bS, wS, sH) that contain a minimum softwood volume of 88 m<sup>3</sup>/ha. Height class 3 and all 3P stands are not considered commercial.



**Un-alienated** Isolated stands and sensitive areas were not included in the AAC calculations.

**Net Comm. Forest** Total commercial forest with a 15% reduction applied to account for buffers, stands located on slopes >30% and other sensitive areas requiring protection.

### Rotation Age

Rotation age is the age at which the mean annual increment of merchantable volume reaches its peak and yields the most volume per unit area per year. Normal yield tables show that rotation age increases as site quality decreases. They also show that the corresponding merchantable volume and mean annual increment decrease greatly from good to poor sites (USDA 1990). Averages for black spruce stands of three site classes in the boreal forest of Canada are as follows:

	<b>Good</b>	<b>Medium</b>	<b>Poor</b>
<b>Rotation Age</b> (years)	95	113	132
<b>Merchantable Volume</b> (m <sup>3</sup> /year)	218	160	101
<b>Mean Annual Increment</b> (m <sup>3</sup> /ha)	2.3	1.4	0.8

Approximately 78% or more of the area in District 20 are black spruce stands. The proportion of site classes of forest stands is approximately 46% poor, 45% medium and 9% good. The average gross merchantable volume is approximately 140 m<sup>3</sup>/ha. Considering these figures a best estimation of the rotation age for District 20 is **120 years**.

### Net Merchantable Volume Determination

The forest cover inventory used to derive the described landbase measures softwood and hardwood volumes per hectare of forestland. Analysis of 1:12,500 scale aerial photos identified height, species, age and productivity of the landbase. Ground truthing plots were used to verify this information and furthermore the resulting inventory has specific volume/hectare values for all forest cover types.

During the landbase net-down exercise the Commercial Volume and the commercial land base area are determined. The Gross volume/hectare is found by using the following formula:

$$\text{Gross Volume/ Hectare} = \frac{\text{Net Commercial Volume}}{\text{Net Commercial Area}}$$

This number (Gross Volume/hectare) is further refined to account for retention, waste and natural disturbances. This number, referred to as the **Net Commercial Volume**, is then used in the AAC calculation. The expected net downs for district 20 were applied to account for the following losses:

Cull*	10%
Residual Stands	6%
Harvesting Losses	3%
Fire	1%
<b>Total</b>	<b>20%</b>

\* Due to lack of previous large scale harvesting operations, the exact percentage of cull in District 20 is unknown. Harvesting operations in the area will determine this percentage over time. Consideration will be given to recalculate the AAC if cull percentage difference is found to be greater than 5 % in the first year.

Estimations of the operable landbase and volume estimations for the Southside operating area are shown below.

	Gross Volume (m <sup>3</sup> )	Gross Area (ha)	Commercial Volume (m <sup>3</sup> )	Commercial Landbase Area (ha)
Southside Area	9,005,661	174,640	4,530,544	32820

$$\text{Gross Volume/ Hectare} = \frac{\text{Commercial Volume}}{\text{Commercial Area}}$$

$$= \frac{4530544 \text{ m}^3}{32820 \text{ ha}}$$

$$= 138.04 \text{ m}^3/\text{ha}$$

$$\text{Net Volume/Hectare} = 138.04 \text{ m}^3/\text{ha} - 20\%$$

$$= 110 \text{ m}^3/\text{ha}$$

### AAC Calculation

$$\begin{aligned}\text{AAC (m}^3\text{/year)} &= \frac{\text{Net Commercial Forest Area (ha)}}{\text{Rotation Age (yrs)}} \times \frac{\text{Net Commercial Volume (m}^3\text{)}}{\text{Hectare}} \\ &= \frac{32820 \text{ ha}}{120 \text{ years}} \times \frac{110 \text{ m}^3}{\text{hectare}} \\ &= 30,085 \text{ m}^3\text{/year}\end{aligned}$$

## **APPENDIX IV**

### **Interim Harvesting Guidelines**

#### **Size of Area**

- 1) Size of clearcuts will be limited (50-80 ha), with expected average between 50-60 ha, depending upon environmental circumstances. Maximum contiguous clearcuts will not exceed 100 ha in any management period (20 years).
- 2) Harvest areas that follow natural topographic features and curved edges, are feathered where possible.
- 3) Harvest areas with varied dimensions and maximum cover-to-cover distances of <300 m are expected.
- 4) Harvest areas with maximum edge ratios are preferred.

#### **Location of Proposed Harvest Area**

- 1) Buffer areas or uncut blocks are required between cut areas or natural non-forested sites.
- 2) Appreciable areas of uncut timber will be left as residual forest by block and watershed. Actual leave-areas may vary from 25-50%. Leave areas will be maintained during the current management period.
- 3) Blocks with low potential for alternate use or resource conflict may be harvested within the management period (or operating period) at an accelerated pace if other circumstances permit (i.e. Forest conditions).
- 4) Various factors (environmental, topographic, forest conditions, etc.) may restrict or require harvest modifications.
- 5) Generally, harvest areas will be staggered with green belts and wildlife corridors will be maintained, particularly on major access routes.

#### **Other Factors**

- 1) Generally, oldest stands (or those in deteriorating condition) will be harvested first. Stands less than 90 years will not be considered.
- 2) Accessible stands of quality sawlogs will be reserved for that product. General harvest allocation will reflect a proportionate degree of good and poor areas from a harvest perspective to maintain an adequate balance of harvest opportunities.

- 3) Harvest modifications or restrictions will be employed in areas of high potential alternate use, watershed areas, sensitive sites, and critical habitat locations.
- 4) Silvicultural requirements on a site specific basis may modify harvest practices. These will be dealt with on an individual (or generic) basis as they arise.
- 5) Buffer zones, particularly on designated lakes, river, and ponds may be required. These will vary in width from 30 m to 300 m, depending upon circumstances.

## **APPENDIX V**

### **Environmental Protection Guidelines for Ecologically Based Forest Resource Management (Stand Level Operations)**

#### **ENVIRONMENTAL PROTECTION GUIDELINES**

"Forests are interconnected webs which focus on sustaining the whole, not the production of any one part or commodity. Trees, the most obvious part of a forest, are critical structural members of a forest framework. However, trees are only a small portion of the structure needed for a fully functioning forest." (Hammond, 1991)

This ecologically based approach to forest resource management requires that resource managers shift their focus from managing components of the ecosystem to managing the three-dimensional landscape ecosystems that produce them. Primary concern becomes the maintenance of landscapes and waterways as complete ecosystems because the only way to assure the sustained benefit of forest values, now and in the future, is to keep them and all their parts in a healthy state. This is the foundation for an ecologically based approach to forest management. It means that everyone attends to the conservation and sustainability of ecosystems instead of sharply focusing on the productivity of individual or competing resources which has been our traditional mode of operation.

The Newfoundland Forest Service is committed to the concept of forest ecosystem management, which is captured in the Twenty-year Forestry Development Plan (1996-2016) vision statement:

"To conserve and manage the ecosystems of the Province which sustain forests and wildlife populations and to provide for the utilization of these resources by the people of the Province under the principles of sustainable development, an ecologically-based management philosophy, and sound environmental practices."

There are five strategic goals in the Twenty-year Forestry Development Plan (1996-2016) which provide the foundation upon which ecologically based resource management will be developed.

1. Manage forest ecosystems so that their integrity, productive capacity, resiliency, and biodiversity are maintained.
2. Refine and develop management practices in an environmentally sound manner to reflect all resource values.
3. Develop public partnerships or networks to facilitate meaningful public involvement in resource management.

4. Promote adaptive ecosystem management and conduct research that focuses on ecosystem processes, functions, and ecosystem management principles.
5. Establish and enforce conservation and public safety laws with respect to managing ecosystems.

The environmental protection guidelines provide specific "on the ground" tasks for loggers and gives management direction to planners. Individually, the guidelines appear as specific rules; however, when implemented collectively they will facilitate ecologically based forest resource management.

## **1.0 GENERAL GUIDELINES**

These guidelines are generated from impacts described in the literature and from discussions with resource managers. As new information and management techniques become available the guidelines will be changed to reflect this improved information base. Consequently, the guidelines will be reviewed on an annual basis to incorporate any necessary changes. The "General Guidelines" applies to all forestry activities (i.e., silviculture, harvesting, and road construction). These guidelines form Schedule IV of the Certificate of Managed Land. They are conditions of Crown commercial permits and they form the basis for the voluntary compliance program.

### **1.1 Planning**

1. The location and type of all waterbody crossings must be submitted to the Department of Environment and Labour and the Department of Fisheries and Oceans. Certificates of Approval are required from both departments for waterbody crossings. A waterbody is defined as any water identified on the latest 1:50,000 topographic map. Appropriate protection is still required for streams greater than 1.0 m in width (at its narrowest point from the high water mark) not found on the 1:50,000 topographic map.
2. All waste disposal sites require a Certificate of Approval from the Minister of Government Services.
3. Excessive bulldozing is not permitted and no more than 10% of the total forest within an operating area can be disturbed. In situations where specific operating areas require more than 10% disturbance to capture available timber, the operator is required to rehabilitate the area to reduce the total net disturbance to the 10% maximum. Where disturbance has been excessive, a rehabilitation plan will be developed with the Forest Service District Manager. Disturbance is defined as per the Ground Disturbance Survey Guidelines developed by the Newfoundland Forest Service.



4. When an archaeological site or artifact is found, the *Historical Resources Act* requires that all development temporarily cease in the area and the discovery be reported to the Historical Resources Division (709-729-2462).

The Historic Resources Division will respond immediately and will have mitigation measures in place within seven days as agreed to by the Historical Resources Division and the operator. Forestry activity can then continue.

The Historic Resources Division will be contacted during the preparation of five-year operating plans to determine the location of historic resources and appropriate mitigation measures will be designed. These measures will include such things as buffer zones and modified operations or surveys.

5. Should an oil or gas spill in excess of 70 litres occur, the operator must make every effort to first contain and second clean up the spill after reporting the spill to the appropriate authorities:

Government Services Centre Spill  
Report Line (709)772-2083 or 1-  
800-563-2444

6. The Parks and Natural Areas Division will be contacted during the preparation of five- year operating plans. Where operations are within one kilometre of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary.
7. In areas where caribou utilize arboreal lichens during the summer and/or winter, and terrestrial lichens during the summer, a minimum amount of lichen forest must be maintained for the caribou. Forestry activity will be designed in consultation with the Wildlife Division where this situation has been identified.
8. Areas identified as containing rare and/or unique flora (through literature review) are to be protected from forestry activity by avoiding these areas.
9. Where mature stands of timber for moose shelter and moose yards are required, they will be identified in consultation with Wildlife Division.
10. The impacts of forest operations on pine marten have been an ongoing issue. Until appropriate guidelines are developed for pine marten habitat, forestry activities within high-density pine marten areas and dispersion areas required for pine marten recovery will require consultation with the Wildlife Division.

11. During the preparation of five-year operating plans, areas identified as “Sensitive Wildlife Areas” in the Land Use Atlas require consultation with the Wildlife Division prior to any forestry activity.

## **1.2 Operations**

1. A 20-metre, treed buffer zone shall be established around all water bodies that are identified on the latest 1:50,000 topographic maps and around water bodies greater than 1.0 metre in width that do not appear on the maps. Where the slope is greater than 30% there shall be a no-harvest buffer of  $30\text{ m} + (1.5 \times \% \text{ slope})$ . All equipment or machinery is prohibited from entering waterbodies; thus, structures must be created to cross over such waterbodies. Every reasonable effort will be made to identify intermittent streams and they will be subject to this buffer requirement. The District Manager of Forest Ecosystems is permitted to adjust the specified buffer requirements in the following circumstances:
  - the no-cut, treed buffer can exceed the 30 m for fish and wildlife habitat requirements.
  - a 50-metre, no-cut, treed buffer will be maintained around known black bear denning sites (winter) or those encountered during harvesting. These den sites must be reported to the Wildlife Division.
  - no forestry activity is to occur within 800 metres of a bald eagle or osprey nest during the nesting season (March 15 to July 31) and 200 metres during the remainder of the year. The location of any raptor nest site must be reported to the Wildlife Division.
  - all hardwoods within 30 metres of a waterbody occupied by beaver are to be left standing.
  - a minimum 30 metre, no-cut, treed buffer will be maintained from the high water mark in waterfowl breeding, moulting and staging areas. The Canadian Wildlife Service and/or the Wildlife Division will identify these sites.
2. Heavy equipment and machinery are not permitted in any waterbody, on a wetland or a bog (unless frozen) without a Certificate of Approval from the Department of Environment and Labour and without contacting the DFO Area Habitat Co-coordinator.
3. No heavy equipment or machinery is to be refueled, serviced, or washed within 30 metres of a waterbody. Gasoline or lubricant depots must be placed 100 metres from the nearest waterbody. All fuel-storage tanks (including JEEP tanks) must be registered with the Department of Government Services and Lands and installed in accordance with the *Storage and Handling of Gasoline and Associated Products Regulations*. Fuel storage

within protected water supplies are more stringent. Please refer to “Guidelines for Forest Operations within Protected Water Supplies” for more information.

4. Used or waste oil shall be collected either in a tank or a closed container.
5. Above ground storage tanks shall be surrounded by a dyke. The dyked area will contain not less than 110% of the capacity of the tank. The base and walls of the dyke shall have an impermeable lining of clay, concrete, solid masonry or other material, designed, constructed and maintained to be liquid tight to a permeability of  $25\text{L}/\text{M}^2/\text{d}$ . There shall be a method to eliminate water accumulations inside the dyke.
6. Wherever possible, place slash on forwarded trails while forwarders are operating in an area. Skidding timber through any waterbody (as defined in Section 1.2.1) is prohibited.
7. Any forestry operation that directly or indirectly results in silt entering a waterbody must be dealt with immediately (a government official must be notified within 24 hours). Failure to comply will result in the operation being stopped.
8. Woody material of any kind (trees, slash, sawdust, slabs, etc.) is not permitted to enter a waterbody. Woody material on ice within the high water floodplain of any waterbody is prohibited.
9. 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.
10. Garbage is to be disposed of at an approved garbage disposal site. Prior to disposal it must be contained in a manner not to attract wildlife. All equipment is to be removed from the operating area where operations are completed.
11. 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). Preference will be given to trees over 50 cm dbh.

## **2.0 TIMBER HARVESTING GUIDELINES**

### **2.1 Planning**

1. There will be corridors to connect areas of forest that will not be harvested (isolated stands within cutovers are not considered forested areas). These corridors connect wildlife habitat, watersheds and minimize fragmentation. Acceptable corridor vegetation includes productive forest areas (all age classes) and softwood/hardwood scrub. These corridors do not have to be continuous (i.e., breaks in vegetation are permitted) and will be determined in the five-year operating plan and identified in the annual work schedule.
2. Complete utilization of harvested trees is required. (Complete utilization is harvesting trees to a top diameter of 8 cm and stumps to a height of 30 cm). The District Manager can modify the stump height requirement to accommodate snow conditions. Where markets exist, non-commercial tree species that are harvested should be brought to roadside. This will be determined in consultation with the District Manager.
3. Preplanning is required on all forest operations (Industry/Crown) at the request of the District Manager (for Industry) and the Section Head i/c Management Planning (for Crown). Preplanning 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.
4. Harvesting is not permitted within caribou calving areas from May 15 - June 15 (calving period). Harvesting is not permitted within post-calving areas from June 15 to July 31. These areas will be identified by the Wildlife Division.
5. Harvest scheduling should be modified during the migration of wildlife (e.g., caribou) and during temporary wildlife concentrations (e.g., waterfowl staging). Wildlife Biologists will identify the areas of concern, and in conjunction with district or company foresters, aid in the modification of forestry operations.

### **2.2 Operations**

1. When skid trails and winter roads are to be constructed, soil disturbance and impacts on waterbodies are to be minimized. The operator will use culverts and/or log bridges depending on the conditions. The objective is to minimize erosion and sedimentation to

avoid restricting streamflow, and to ensure fish passage in fish-bearing streams. Erosion control measures (e.g., laying down brush mats and the construction of diversion ditches for water run-off) are to be maintained while the skid trail is in use. All temporary crossings are to be removed at the end of the operating season unless the District Manager agrees to extend the life of the crossing for more than one season.

2. A minimum 50 metre, no-cut buffer is to be left between operations within approved cabin development areas.

### **3.0 FOREST ACCESS ROADS GUIDELINES**

#### **3.1 Planning**

Forest access roads, barrow pits and quarries shall avoid:

- ) wetlands, deltas, and floodplain or fluvial wetlands;
  - i) terrain with high erodibility potential;
  - ii) known sensitive wildlife areas such as:
    - calving grounds, post calving areas, caribou migration routes, caribou rutting areas, and winter areas,
    - waterfowl breeding areas and colonial nesting sites,
    - established moose yards by one kilometre,
    - eagle and osprey nest sites,
    - where site conditions and engineering permits, main haul roads should be one kilometre from permanent water bodies and all other roads by not more than 100 metres,
    - endangered or endemic species or subspecies of flora or fauna and other areas to be determined by qualified authorities;
  - iii) known sensitive fish areas such as:
    - spawning and rearing grounds;
  - iv) historically significant areas such as:
    - archaeological sites;
  - v) existing reserves such as:
    - parks (municipal, provincial, national);
    - wilderness areas and ecological reserves;
    - rare and endangered plant sites and habitats.
2. With respect to borrow pits and quarries, the operator shall:
    - i) minimize the number of new borrow areas opened for construction and/or maintenance;
    - ii) use existing barrow areas whenever practical.

- iii) be in possession of a valid quarry permit from the Department of Mines and Energy prior to aggregate extraction activities;
  - iv) not locate pits and quarries in sensitive areas as identified by planning processes.
- 3. Forest access roads will not obstruct wildlife migration routes. The following guidelines will be followed to ensure the road is as unobstructing as possible:
  - i) roads should be of low profile (less than 1 m above the surrounding terrain);
  - ii) slash and other debris shall be removed;
  - iii) the slope of ditches and road banks should not exceed 1½ horizontal to vertical.
- 4. Culverts and bridges are to be installed in accordance with the manufacturer's specifications and the specifications attached to the Certificates of Approval received from the Department of Environment and Labour and from the Department of Fisheries and Oceans. Culvert ends will be properly riprapped.
- 5. Where road construction is to occur around identified waterfowl breeding, moulting and staging areas the Canadian Wildlife Service is to be consulted.
- 6. Road construction is not permitted within any buffer zone except with the permission of the District Manager.
- 7. When a skid trail is on steep ground and is no longer in use, cut-off ditches and push lanes must be created. The frequency will be determined by the District Manager.
- 8. When disturbance is over 10%, the conditions in 1. 1.3 will apply.
- 9. There shall be no bulldozing of standing merchantable timber or poor utilization of merchantable softwoods and hardwoods during cutting of the right-of-way.
- 10. Excavations required for the construction of piers, abutments or multi-plate culverts shall be completed in the dry. (Where exceptions occur, consultation with District Manager is required).
- 11. On a site specific basis, roads can be decommissioned and/or rehabilitated as directed by the District Manager. Decommissioning is defined as barring access; rehabilitation means to re-vegetate the road.

### **3.2 Operations**

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

sites should be used to remove or control vegetation. Right-of-way widths at waterbody crossings should be kept to a minimum.

2. Fill materials for road building must not be obtained from any waterbody or from within the floodplain of any waterbody.
3. Trees are to be felled away from all waterbodies, and slash and debris should be piled above the high water mark so that it cannot enter waterbodies during periods of peak flow.
4. Equipment activity in water crossing areas is to be kept to a minimum. Whenever possible, any work is to be carried out from dry stable areas.
5. Unnecessary side casting or backbiting in the vicinity of waterbodies is not permitted. Where topographical constraints dictate that the roadbed must be constructed adjacent to a waterbody, road slope stabilization is to be undertaken at the toe of the fill where it enters the water (an area where active erosion is likely). The placement of large riprap or armour stone is recommended in such areas.
6. Side casting must be carried out in such a manner that sediment does not enter any waterbody.
7. Where borrow pit or quarry activity is likely to cause sediment-laden runoff to contaminate a waterbody, sediment control measures such as filter fabric berms or sedimentation ponds are to be installed. Contact is to be made with the District Manager prior to construction where such conditions exist.
8. Stabilize cut banks and fill slopes in the vicinity of waterbodies.
9. When using ditches, especially on long slopes, baffles and culverts are to be used at frequent intervals.
10. When constructing ditches near streams, the ditch itself is not to lead directly into the stream.
11. Keep ditches at the same gradient as the road.
12. In side hill and similar areas, install ditches on the uphill sides of roads to intercept seepage and run-off.
13. Borrow pits are to be located 50 metres from the nearest waterbody.



#### **4.0 SILVICULTURAL PRACTICES AND FOREST REGENERATION GUIDELINES**

##### **4.1 Scarification**

1. Select scarification methods best suited for preparing the area for planting and for minimizing ground disturbance.
2. Where slash is piled into windrows, ensure the windrows are placed where slash cannot be washed into streams at peak flooding conditions.
3. To minimize erosion, do not direct scarification equipment straight down slope.
4. Where safety is not an issue, a minimum average of 10 cavity trees or snags per hectare, or a clump of trees, will be left on all sites.
5. Whenever possible, white pine regeneration will not be disturbed.

##### **4.2 Planting**

1. Landings will be stabilized through seeding (grass) or planting at time of plantation establishment.

##### **4.3 Pre-commercial Thinning**

1. Where possible, do not carry out pre-commercial thinning in important wildlife areas during the period of birth and/or hatching. These areas and times will be identified by the Wildlife Division.
2. Where white pine regeneration is present, the District Manager will determine how the pine will be thinned.
3. Trees cut will not be felled into waterbodies.

#### **5.0 FOREST PROTECTION GUIDELINES**

1. A pesticide application licence must be obtained from the Department of Environment. This licence will determine planning and operational requirements.

#### **6.0 GUIDELINES FOR FORESTRY OPERATIONS WITHIN PROTECTED WATER SUPPLY AREAS**

The primary function of a protected water supply area is to provide the public with an adequate quantity of safe and good quality water on a permanent basis, to meet its present and future

demands. Any other activity within water supply areas is considered secondary, and if permitted, must be strictly regulated and monitored to ensure that the water supply integrity is not threatened and the quality of the water is not impaired.

In Newfoundland, forestry operations are permitted in protected water supply areas on a limited and controlled basis provided the proposed operations have no, or minimal, water quality impairment potential.

The following permits and approvals are required prior to the beginning of forestry operations within a protected water supply area:

- 1) Approval of the forest operating plan by the Newfoundland Forest Service.
- 2) Approval of the forest operating plan by the provincial Department of Environment and Labour and issuance of a Certificate of Approval under *Section 10 of the Department of Environment Act*.
- 3) Quarry permits from the provincial Department of Mines and Energy for all borrow areas and ballast pits on unalienated Crown lands and alienated Crown land (i.e., leased and licensed land).
- 4) Stream crossing permits under *Section 11 of the Department of Environment Act* and from the federal Department of Fisheries and Oceans.
- 5) Other permits or approvals as required by natural resource management and regulatory agencies.

## **6.1 Planning**

1. Prior to beginning any work, a forest operating plan must be prepared and approved by the Newfoundland Forest Service and the Department of Environment and Labour, and a Certificate of Approval must be obtained under Section 10 of the Department of Environment Act for site specific activities such as road construction, commercial harvesting, silvicultural operations, and other activities associated with forestry operations.
2. In addition to the information normally contained in a forest operating plan, the plan must include maps to show:
  - the boundary of the protected water supply area;
  - existing and proposed access roads;
  - proposed harvesting areas;
  - areas sensitive to erosion;
  - buffer zones around water bodies; approved stream crossings,

- proposed landing and skid trail locations;
- proposed fuel storage locations;
- peatland and other wetlands;
- nearby communities;
- other relevant information.

The plan must also contain a written section describing the harvesting techniques to be used, the equipment required for the operation, and the schedule of the operation.

3. Locate roads to avoid all waterbodies and areas of sensitive terrain.
4. The forest operating plan must identify an Operations Manager who shall have the responsibility for ensuring that the special protection measures are followed. The Operations Manager is responsible for co-ordinating clean-up efforts in the event of a fuel or oil spill.

## **6.2 Forest Access Road Construction**

1. A "no-grub" zone of 30 metres of undisturbed ground vegetation must be maintained around any waterbody crossing to minimize the damage to the lower vegetation and organic cover, thus reducing the erosion potential. Manual clearing at waterbody crossing sites should be used to remove or control vegetation. Right-of-way widths at waterbody crossings should be kept to a minimum.
2. Clear-cutting up to the perimeter of any waterbody is not permitted. 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 using the buffer zone criteria outlined in Section 6.6.
3. Fill materials for road building must not be obtained from any waterbody or from within the floodplain of any waterbody.
4. Provide adequately designed and constructed drainage ditches along forest roads to allow for good road drainage.
5. Take-off ditching can 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. Where take-off ditches are unstable or cannot be constructed, the use of check dams and settling basins in the ditches is required until the ditches become stabilized.
6. Trees are to be felled away from all waterbodies, and slash and debris should be piled above the high water mark so that it cannot enter waterbodies during periods of peak flow.

7. Equipment activity in water crossing areas shall be kept to a minimum. Any work will be carried out in dry, stable areas.
8. When working near sensitive areas such as streams or lakes, road building operations causing erosion or siltation are to be followed as per Section 1.2.7.
9. Unnecessary side casting or backfilling in the vicinity of water bodies is not permitted. Where topographical constraints dictate that the roadbed must be constructed adjacent to a water body, road slope stabilization is to be undertaken at the toe of the fill where it enters water, an area where active erosion is likely. The placement of large riprap or armour stone is recommended in such areas. Contact is to be made with the District Manager prior to construction when such conditions occur.
10. Side casting must be carried out in such a manner that sediment does not enter any waterbody.
11. Maintenance support sites must be located outside the protected water supply area.

### **6.3 Forest Access Road Stream Crossings**

1. Stream fording is prohibited in protected water supply areas.
2. All stream crossings, whether culverts or bridges, require written approval under *Section 11 of the Department of Environment Act*.
3. The operator must comply with all terms and conditions of a Certificate of Approval for stream crossings.

### **6.4 Harvesting**

1. Harvesting or other heavy equipment will not be used on wetlands or bogs.
2. Steep areas with high potential for erosion should not be harvested.
3. Wherever possible, skid trails should run along contours and never cross wetlands and waterbodies.
4. Landings will be few in number with a maximum size of less than 0.25 ha. All landings should be located at least 100 metres from a waterbody.
5. In sensitive areas prone to erosion, equipment must have wide tires, or harvesting must occur during the winter when the ground is frozen.

6. Harvesting equipment shall not enter a buffer zone or any waterbody without permission of the District Manager.
7. The operator must implement erosion control and rehabilitation measures in areas where soils have been unduly disturbed by harvesting activity. In addition to general erosion control measures presented in other sections of these guidelines, the following should also be considered in protected water supply areas:
  - undertake contour furrowing;
  - construct diversion ditches to lessen the possibility of forming new drainage channels;
  - seed or plant areas that are difficult to stabilize by other means;
  - plough or rip prior to seeding any surfaces which have been compacted

## 6.5 Buffer Zones

The Newfoundland Forest Service on unalienated Crown land and the appropriate company on leased, licensed, private or charter land will provide the operator with a map indicating the harvesting area and no-cutting buffer zones, and will ensure that the operator is familiar with the boundaries.

No forestry activities are permitted within the following buffer zones.

Water Body	Width of Buffer Zone
1. Intake pond/lake/reservoir	A minimum of 150 m
2. River intake	A minimum of 150m 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

## 6.6 Fuel/Oil Handling and Storage

Fuel storage and the operation of fuel storage equipment is regulated by the *Storage and Handling of Gasoline and Associated Products Regulations* (1982) under the Department of Environment and Lands Act. According to the regulations, the owner or operator of a fuel storage system must submit a Schedule "A" Storage Tank System Application to the Department of Environment. The applicant must be in receipt of a Certificate of Approval for the system before the system is used for fuel storage. Section 9 of the above Act states: "*No owner or operator shall directly or indirectly cause pollution of the soil or water by causing, suffering or permitting leakage or spillage of gasoline or associated products from a storage tank system or vehicle.*"

In addition to the above regulatory requirements, the following guidelines are to be followed:

1. Bulk fuel is to be stored outside the protected water supply area. If fuel must be stored in the protected area, it must be in the least sensitive area and be approved by the Water Resources Management Division of the Department of Environment and Labour.
2. Fuel must be stored in self-dyked, above-ground Jeep Tanks, which have been approved by the Department of Environment and Labour.
3. A maximum of seven days fuel supply can be stored within a water supply area.
4. Refuelling must not take place within 100 metres of a waterbody.
5. Daily dipping of tanks and weekly reconciliation are mandatory. Visual inspection of the dykes and the surrounding area must be carried out daily and inspection records must be maintained.
6. Each unit must be fitted with a locking valve system for the elimination of water inside the outer tank. The valve must be closed and locked except to drain precipitation.
7. Each person involved with fuel handling must be cautioned that any spillage is to be cleaned up immediately.
8. Each person involved with fuel storage must exercise extreme caution when refuelling equipment.
9. All waste materials and waste oil on the site must be collected in enclosed containers and removed to an approved site, at least weekly.
10. Contaminated soil or snow must be disposed of at an approved waste disposal site.
11. Any spill in excess of 70 litres must be reported immediately through the 24 hour Spill Report Number (709-772-2083) or the Government Services Centre (1-800-563-2444).
12. All self-dyked Jeep Tanks must be located at a minimum distance of 500 metres from any major waterbody.
13. A fuel or oil spill cleanup kit must be kept on site within the protected area to facilitate any cleanup in the event of a spill. This kit must include absorbent pads, loose absorbent materials such as dried peat, speedy-dry or sawdust, and a container such as an empty drum for recovering the fuel or oil. If there is a bulk fuel storage facility within the protected area, the cleanup kit must include the following list of fuel or oil spill cleanup equipment:
  - Fire pump and 100 metres of hose

- Two hand operated fuel pumps -Six recovery containers such as empty drums - Four long handled shovels
- Two pick axes
- Ten metres of containment boom
- Twenty-five absorbent pads
- One hundred litres of loose absorbent material.

When any fuel spill occurs, stop the fuel flow immediately. This may entail repairing a leak, pumping out a tank, or shutting off a valve. If fuel or oil is spilled onto soil, dyking may be necessary. If fuel or oil enters water, absorbent booms or barriers such as fencing or netting with loose absorbent or straw must be used to contain the spill. If necessary, culverts may be blocked off by earth or wooden barriers to contain the fuel or oil provided the threat of flooding is addressed.

All recovered fuel or oil must be stored in containers. Contaminated soil must be removed and placed in containers for transport and disposal. Extensive soil removal may cause problems such as erosion and the subsequent siltation of waterbodies- therefore, the affected area must be backfilled and sloped and revegetated as required by the Department of Environment and Labour.

Recovered fuel or oil should be reused or collected by a waste oil company for recycling. Oily debris and contaminated soils must be disposed of at an approved waste disposal site with the approval of the disposal site owner or operator. Contact must be made with the appropriate regional office of the Department of Environment and Labour before disposal.

## **6.7 Support Service and Structures**

1. Storage of any type of pesticide, chemical or other hazardous material is prohibited within a protected water supply area.
2. Dormitory camps, garages or any other structures are prohibited within a protected water supply area.
3. The establishment of new sawmills is not permitted in protected water supply areas.
4. Wherever possible toilet facilities must be provided in all work areas.
5. Garbage cans must be located in all work areas and garbage is to be collected regularly and disposed of at an approved waste disposal site outside the protected area.

## **6.8 Silviculture**

1. Chemicals are to be used within a protected water supply area only under the approval of the Division of Water Resources.



2. Scarification must be minimized and restricted to the trench or spot types.
3. If scarification leads to erosion or sedimentation of small streams or water bodies, scarification operations must be suspended and remedial measures must be taken.

## **6.9 Abandonment**

When forestry operations in a protected water supply area have been completed, an abandonment plan for the area should be developed. This will involve input from the Newfoundland Forest Service, the Community involved, and the Water Resources Management Division of the Department of Environment and Labour. In general, the purpose of the plan is:

- (i) to ensure that the post-harvest conditions do not lead to water quality impairment, and
- (ii) to discourage activities or use of the area that could lead to water quality impairment.

An important question will be whether access roads will remain open. This will be decided on a case-by-case basis in consultation with the municipality, Water Resources Management Division and the operator. Issues such as the rehabilitation of cutover areas, landing sites, skid trails, and the abandonment of roads are to be discussed during the consultation process to control post-harvesting environmental impacts and activities.

The following are recommended precautionary measures if roads are to be closed to control post-harvesting access to the area:

Use water bars (trenches 8-10" deep dug across the road) to intercept and deflect surface roadside ditches rather than have it flow into a waterbody. Water bars can be placed 500 metres apart in gentle to moderate terrain (up to 10% slope), but should be no more than 150 metres apart in terrain greater than 10%. In most cases, it is sufficient to limit water bars to one kilometre on each side of a stream crossing.

Roadside ditches should flow into the woods or into stable, vegetation covered areas.

Stable bridge abutments and erosion protection works at crossings need not be removed.

Bridge decking, culverts and other easily removable structures should be transported out of the watershed area.

All disturbed areas of river banks will be stabilized and seeded.

## **6.10 Monitoring and Inspection**

1. Forestry operations approved under Section 10 of the Department of Environment Act will be inspected from time to time by the staff of the Water Resources Management

Division to ensure the operator's compliance with the environmental protection guidelines and the terms and conditions of the approvals.

2. In case of an oil spill, the sedimentation of a water body, or any other water quality impairment related issue, the operator might be required by the Department of Environment and Labour to undertake water quality monitoring to assess the extent of the damage and to select appropriate mitigative measures to correct the harmful conditions.
3. Any water quality impairment problem should be reported to the Water Resources Management Division.

## **7.0 PROCESSING FACILITIES AND SUPPORT SERVICES GUIDELINES.**

1. If possible, use previously disturbed sites (e.g., barrow pit).
2. Minimize the size of the area cleared for the establishment of any camp, processing or support structures. Wherever possible, these facilities should not be established within 100 metres of a waterbody.
3. All sumps containing effluent from a kitchen or washroom facility must be properly treated on a daily basis in compliance with Department of Health regulations.
4. Sewage disposal must be carried out in compliance with the Public Health Act.
5. A permit to occupy is required for Crown Land developments.
6. Facilities will not be located within known sensitive wildlife areas. These areas will be identified by the Wildlife Division.
7. A permit is required for a firearm.

## **8.0 PLANNING AND MUNICIPAL AREA GUIDELINES**

1. Timber harvesting, resource road construction, silviculture, processing facilities, and support services are developments under the Urban and Rural Planning Act. Where these activities occur within a planning area boundary or within 400 metres of a protected road, a development permit is required before any activity takes place.
2. Consultation with the planning agency (usually municipality, but also the Development Control Unit of the Department of Municipal and Provincial Affairs) is to be made at the planning stage so that regulatory requirements can be made known and taken into account. This should occur three months before the desired commencement of the development and the permit obtained about one month before the development is to start.

**APPENDIX VI**  
**Resource access road – classification standards and specifications**

Road Class						
	A	B	C-2	C	C-1	D
Design Load and Speed	(Loaded tractor trailer) @55 kph. @ 50 kph.		(Loaded tandem [pallet]) 30 kph.			Single axle 3 metric tonnes or less @ 25 kph.
Road width, drop off to drop off	9.0 m	7.5 m	6.0 m	5.0 m	4.0 m	3.5 m – 4.5 m
Max. grade	6%	8%	10%			15%
R.O.W. width	30 m	20 m – 30 m	20 m			15 m – 20 m
Min. sight dist.	150 m	120 m	90 m			45 m
Max. change of grade (blind hill limitations)	0.6 m in 20 m	0.8 m in 20 m	1.0 m in 20 m			-----
Min. depth of ditch	1.0 m	-----	0.6 m			0.3 m
Surface material (type and depth)	Min. 15 cm of AASHO class A-1-b or better	Granular, no stones larger than 10 cm in the top 30 cm	Granular, no stones larger than 15 cm in the top 30 cm			Granular, no stones larger than 15 cm in surface
Design load	(Loaded tractor trailer) @ 55 kph. @ 50 kph.		(Loaded tandem [pallet]) 30 kph.			Single axle 3 metric tonnes or less @ 25 kph.
Fill slope	2:1	1 ½:1	1 ½: 1			-----
Cut slope (backslope)_	2:1	1 ½:1	1 ½:1			-----

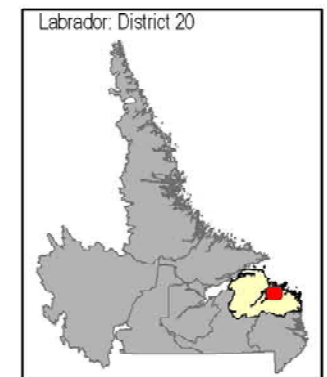
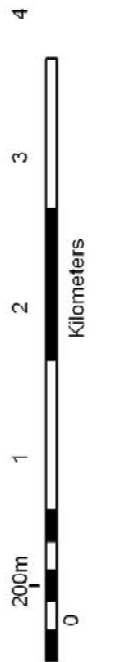
**APPENDIX VII**  
**(Five Year Planning Maps)**





**PROPOSED OPERATIONS  
5 YEAR MANAGEMENT PLAN  
FMD 20 - LABRADOR**

MAP SCALE 1:50,000

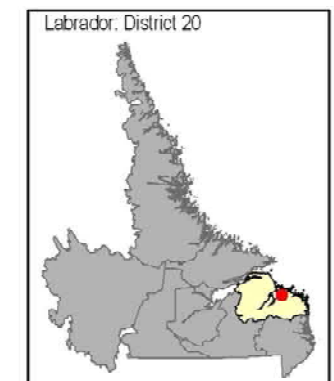
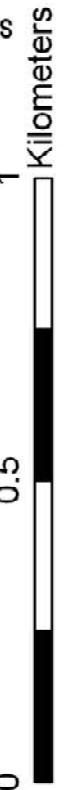






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FMD 20 - LABRADOR**

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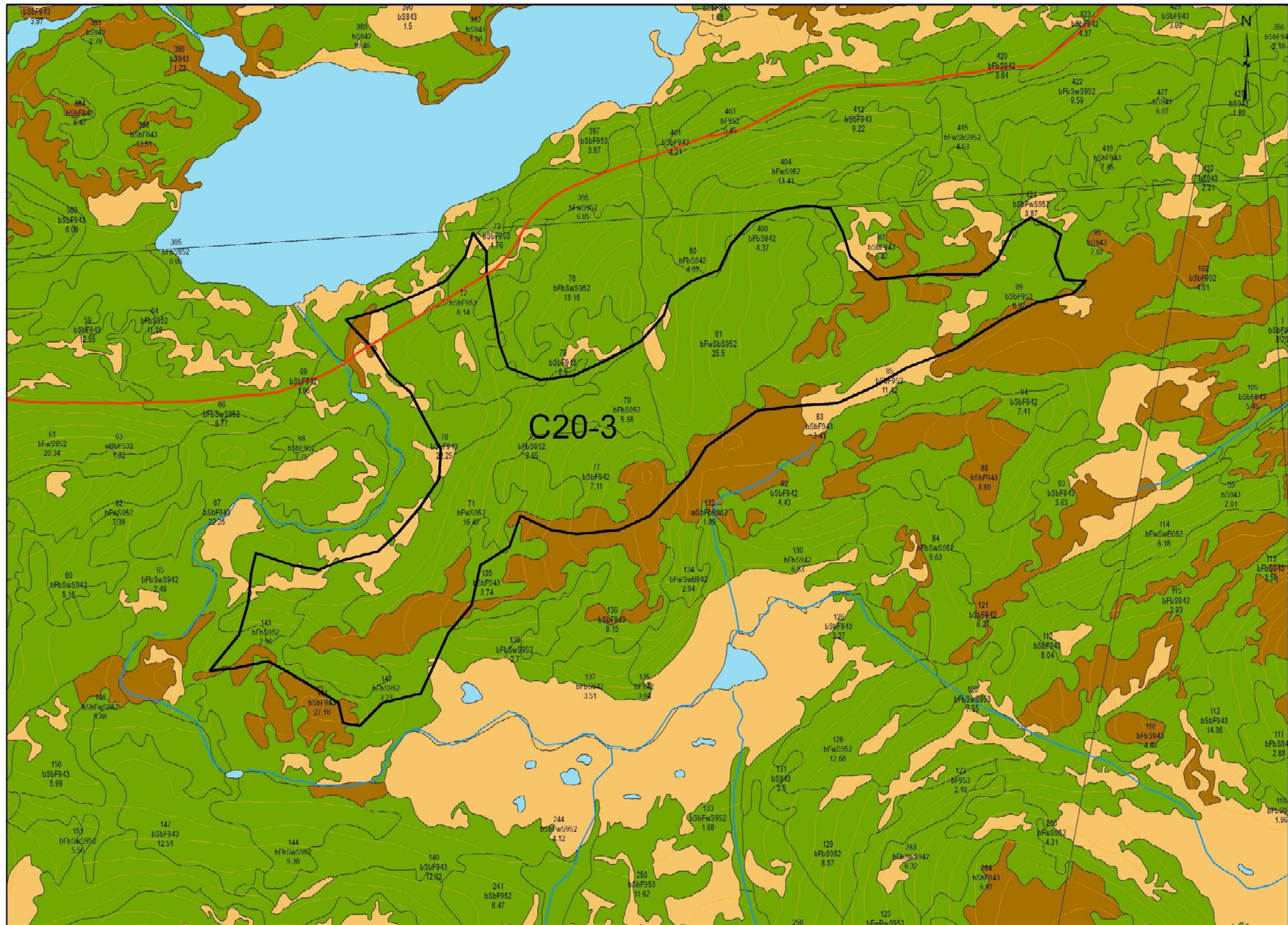


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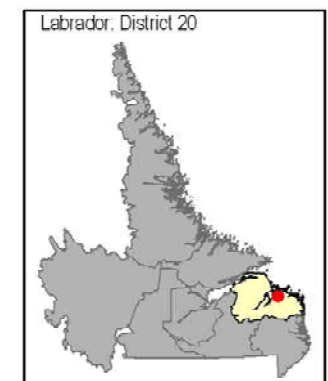




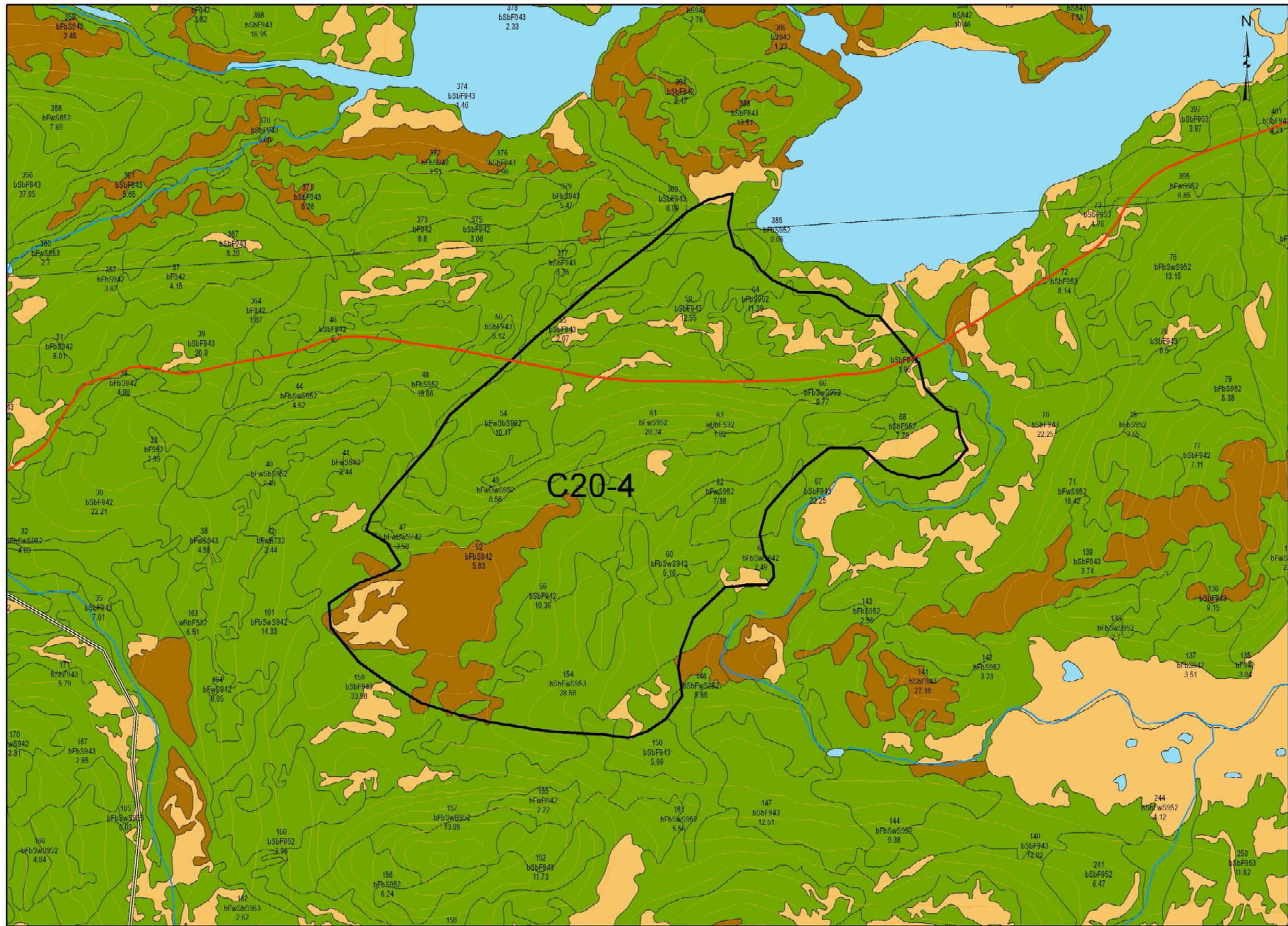


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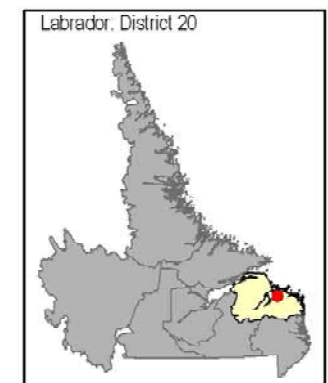




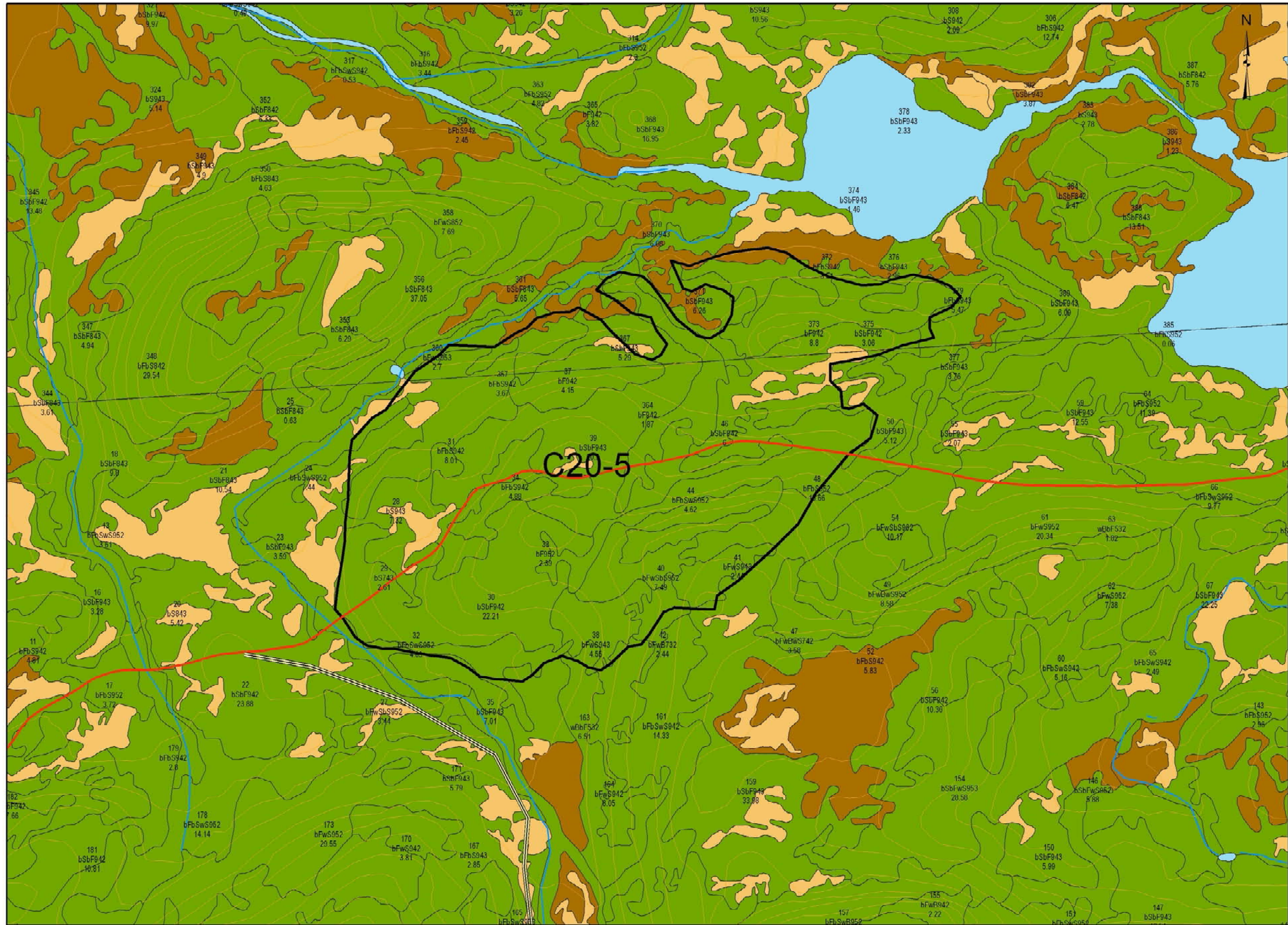


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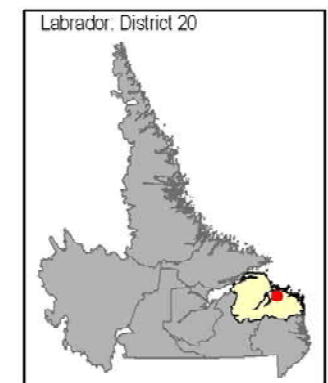




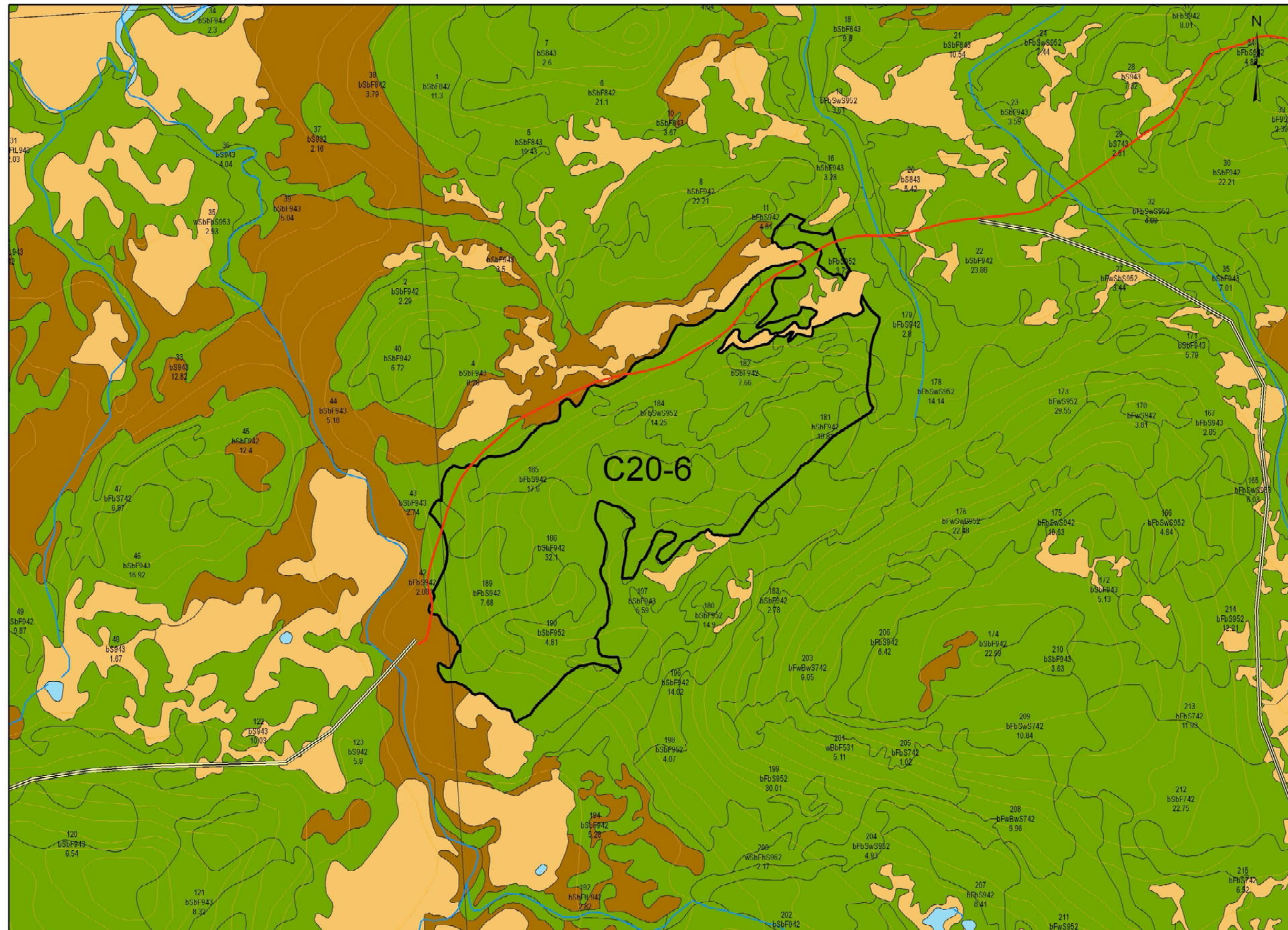


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5 YEAR MANAGEMENT PLAN  
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**PROPOSED OPERATIONS  
5 YEAR MANAGEMENT PLAN  
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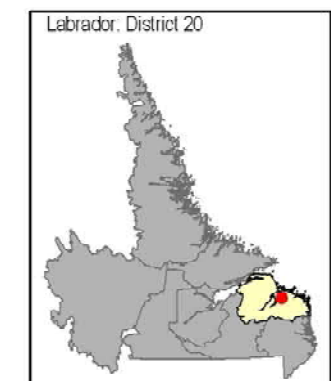






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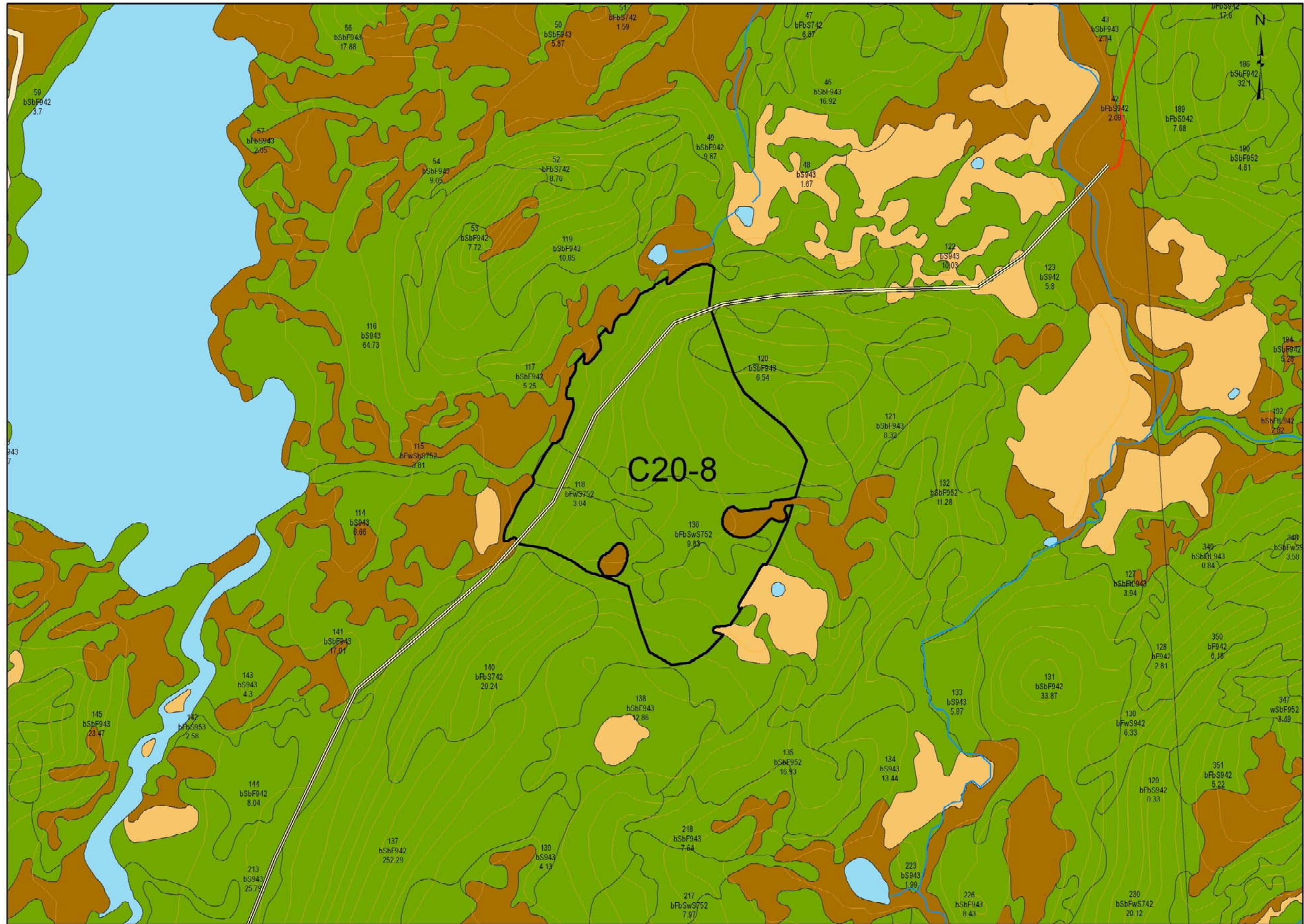
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**Legend**

- Existing Road
- Proposed Class 'C'
- Contour
- Streams
- 5 Year Plan Blocks
- Mature
- Immature
- Bog/Sand
- SCS
- Lakes



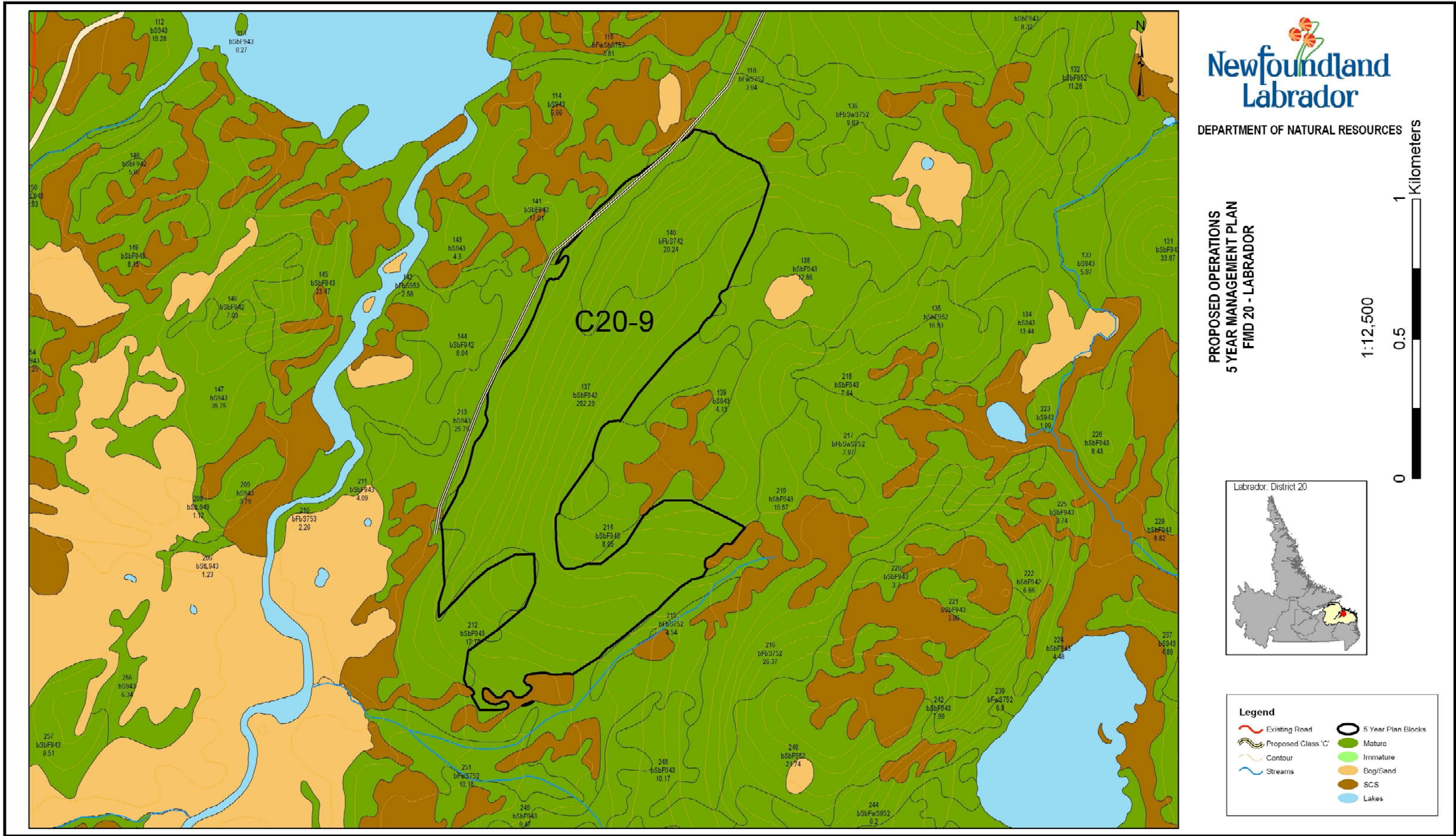


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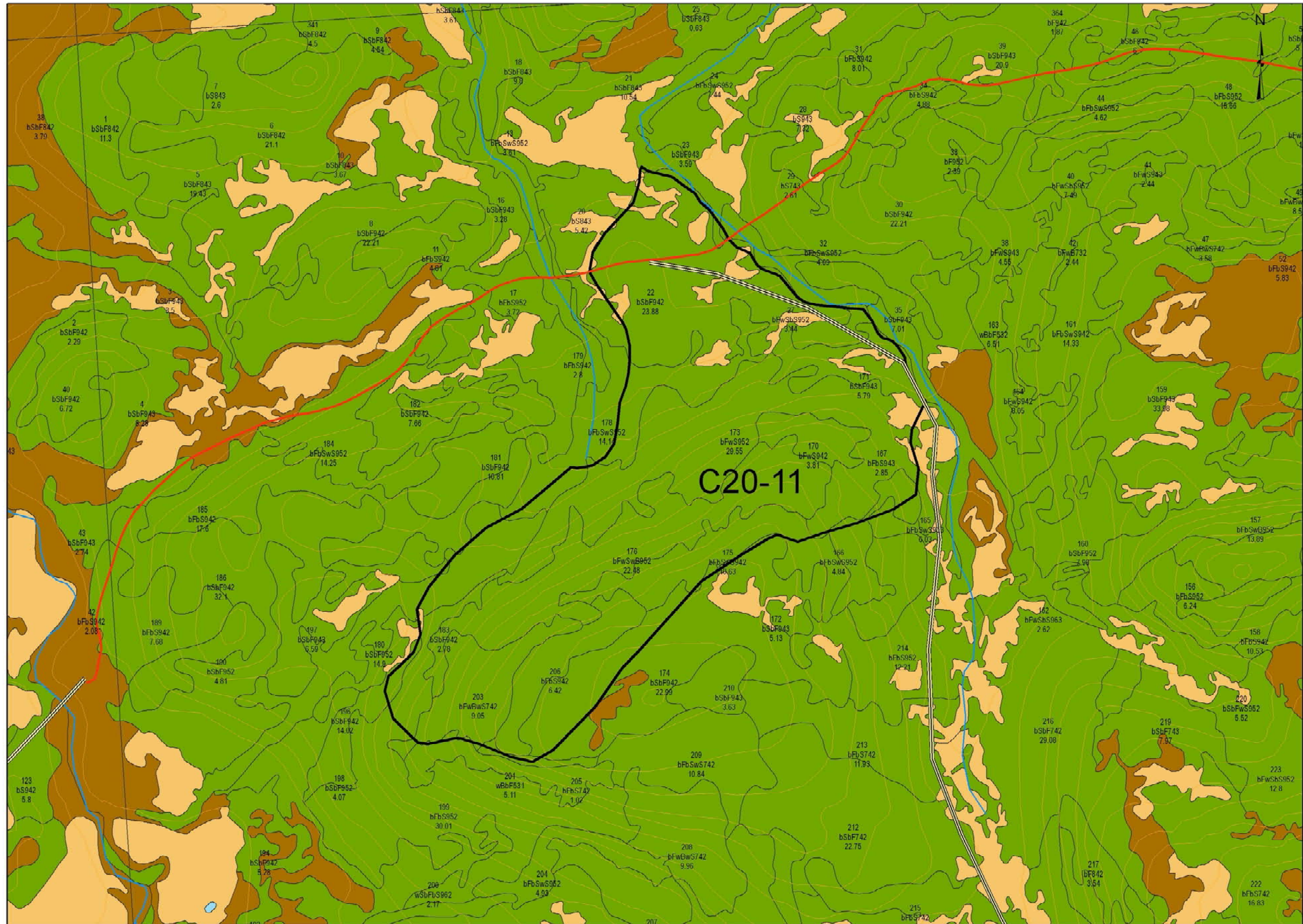






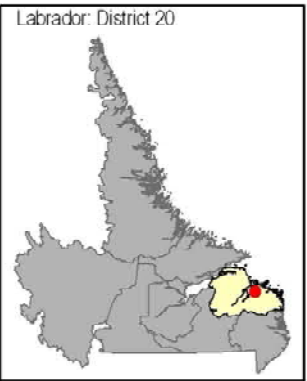






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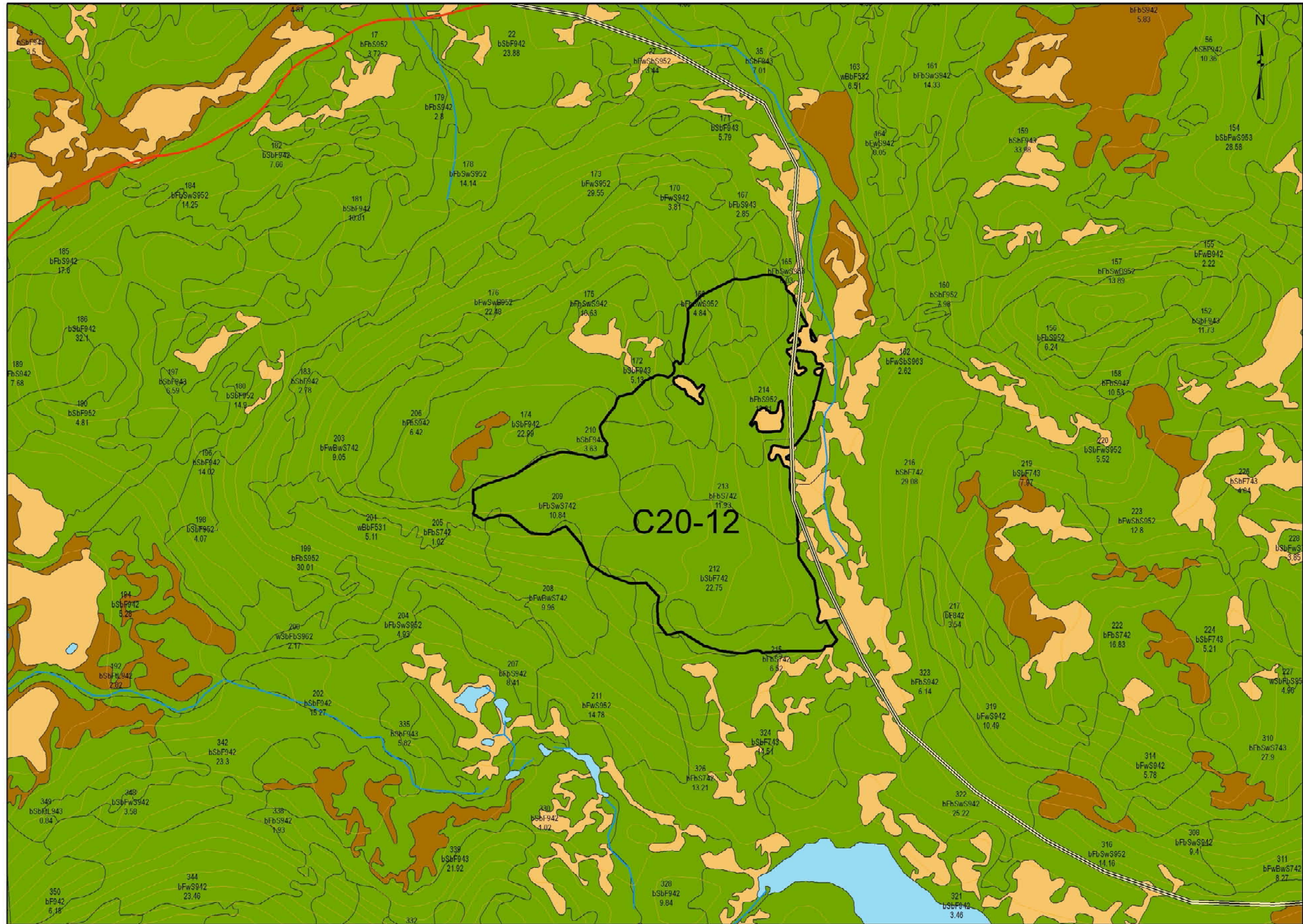
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Legend

- Existing Road
- Proposed Class 'C'
- Contour
- Streams
- Lakes
- 5 Year Plan Blocks
- Mature
- Immature
- Bog/Sand
- SCS





**PROPOSED OPERATIONS  
5 YEAR MANAGEMENT PLAN  
FMD 20 - LABRADOR**

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- Legend**
- Existing Road
  - Proposed Class 'C'
  - Contour
  - Streams
  - Lakes
  - 5 Year Plan Blocks
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**PROPOSED OPERATIONS  
5 YEAR MANAGEMENT PLAN  
FMD 20 - LABRADOR**

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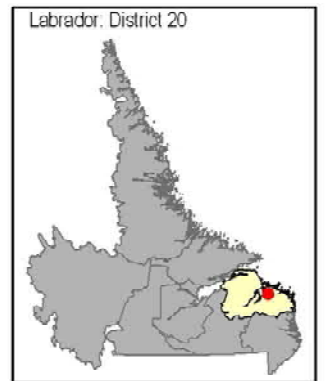
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- Streams
- 5 Year Plan Blocks
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- Bog/Sand
- SCS
- Lakes





**PROPOSED OPERATIONS  
5 YEAR MANAGEMENT PLAN  
FMD 20 - LABRADOR**

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- Legend**
- Existing Road
  - Proposed Class 'C'
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  - Streams
  - 5 Year Plan Blocks
  - Mature
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  - Bog/Sand
  - SCS
  - Lakes





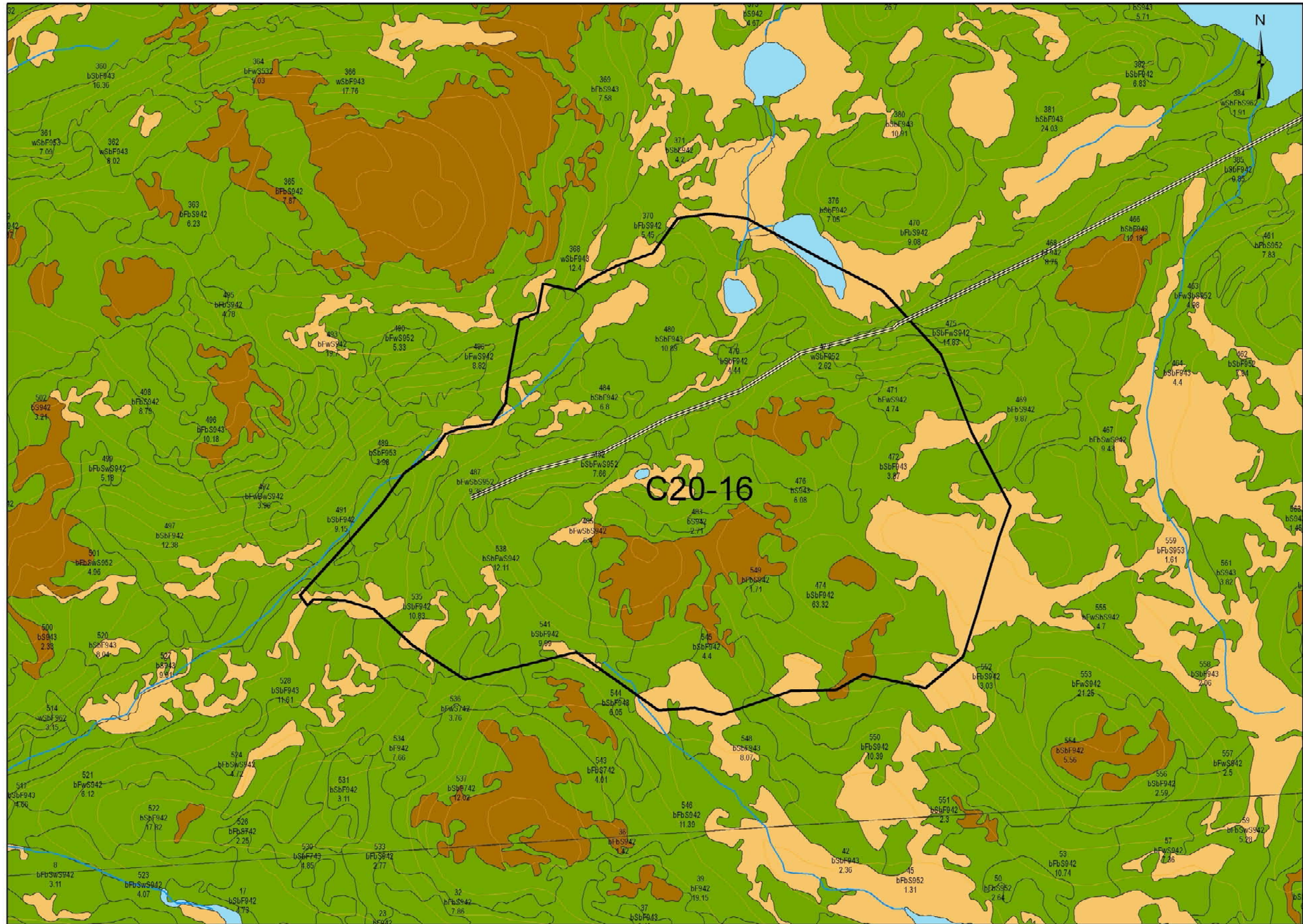
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5 YEAR MANAGEMENT PLAN  
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- Legend**
- Existing Road
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  - 5 Year Plan Blocks
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  - Lakes





**PROPOSED OPERATIONS  
5 YEAR MANAGEMENT PLAN  
FMD 20 - LABRADOR**

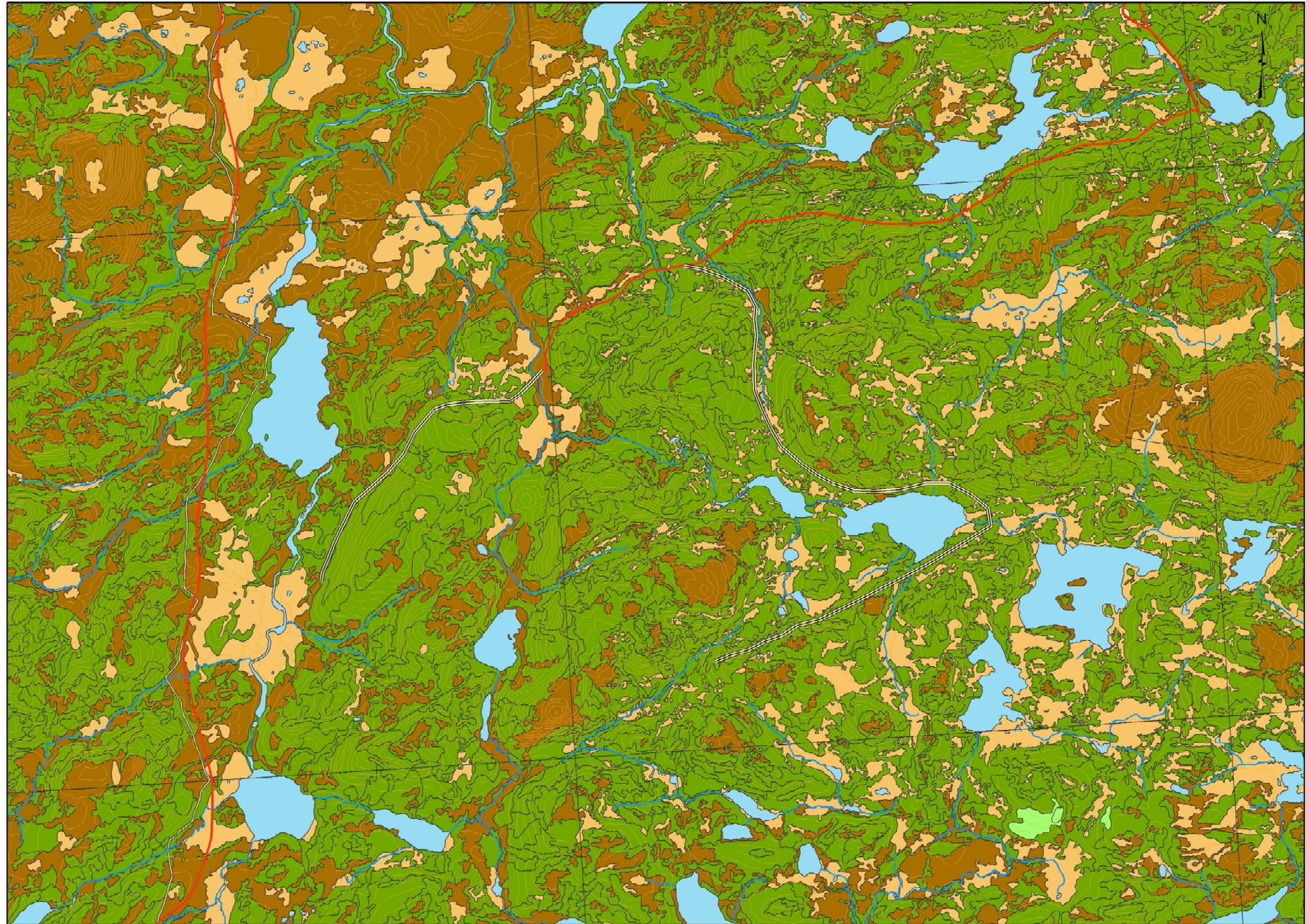
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**Legend**

-  Existing Road
-  Proposed Class 'C'
-  Contour
-  Streams
-  5 Year Plan Blocks
-  Mature
-  Immature
-  Bog/Sand
-  SCS
-  Lakes





**PROPOSED ROADS  
5 YEAR MANAGEMENT PLAN  
FMD 20 - LABRADOR**

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**Legend**

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|--------------------|----------|
| Existing Road      | Mature   |
| Proposed Class 'C' | Immature |
| Contour            | Bog/Sand |
| Streams            | SCS      |
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**PROPOSED ROADS  
5 YEAR MANAGEMENT PLAN  
FMD 20 - LABRADOR**

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**Legend**

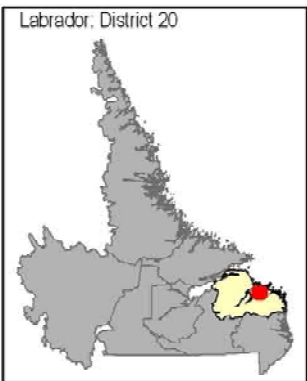
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- Contour
- Streams
- district20





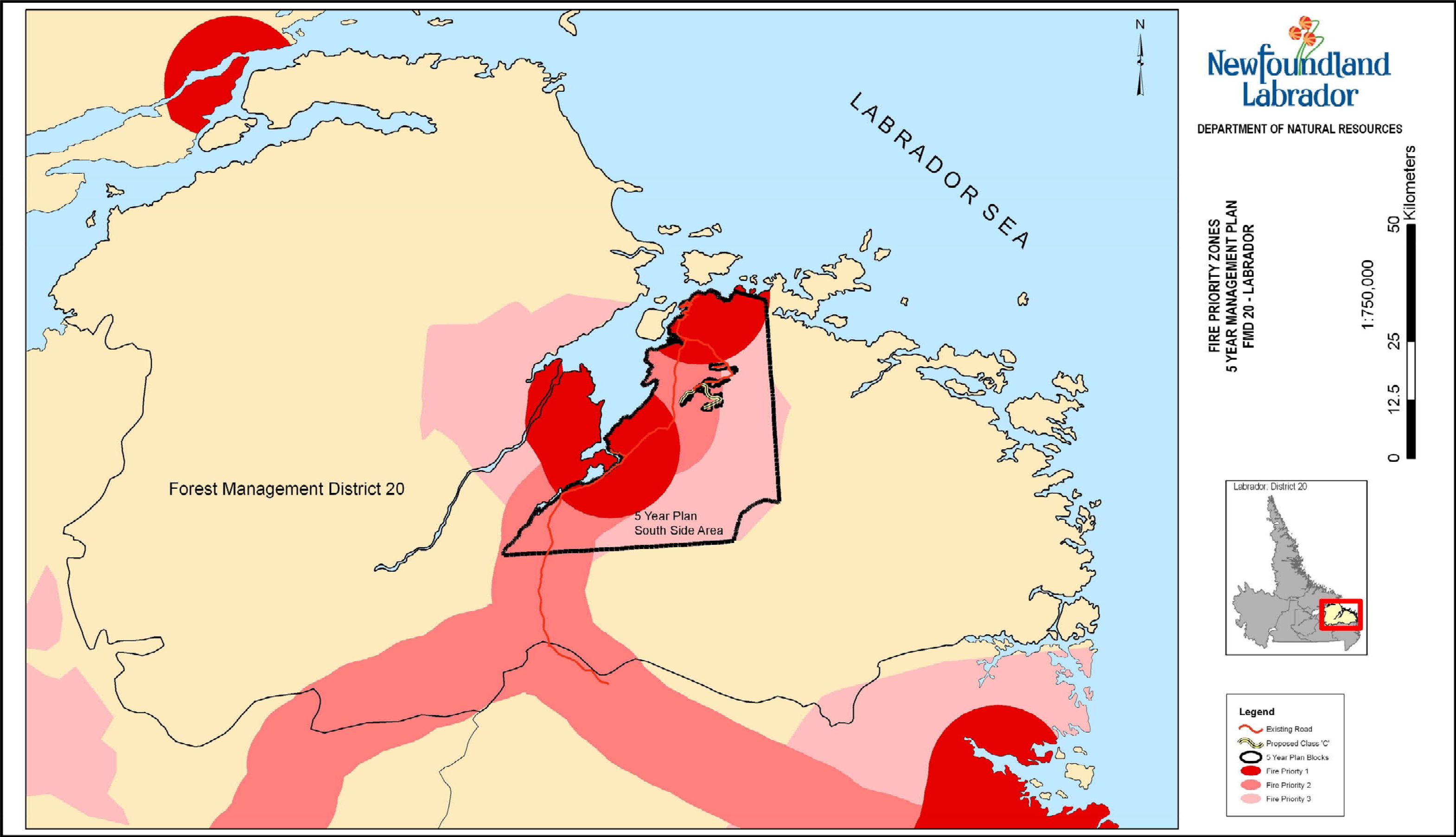
**PROPOSED PLANTING  
5 YEAR MANAGEMENT PLAN  
FMD 20 - LABRADOR**

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- Legend**
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|                    | Lakes                |







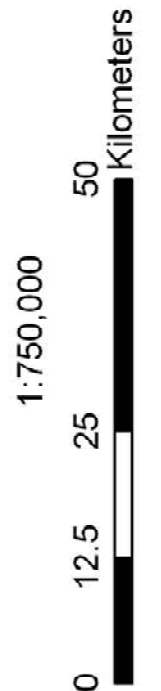
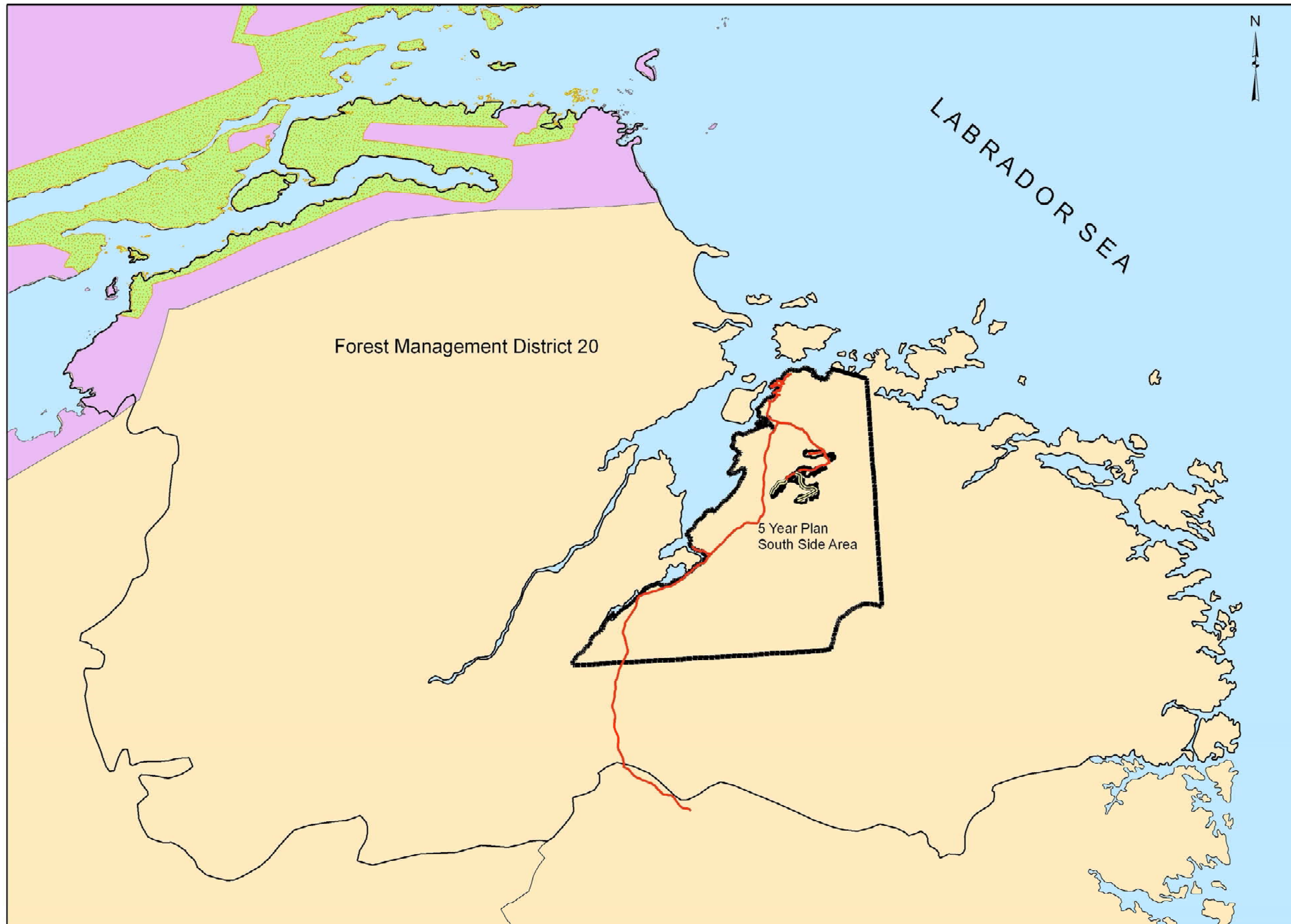
**MAJOR WATERWAYS  
5 YEAR MANAGEMENT PLAN  
FMD 20 - LABRADOR**

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- Legend**
- Existing Road
  - Proposed Class 'C'
  - 5 Year Plan Blocks
  - Lakes
  - waterarc20
  - district20





**Legend**

- Existing Road
- Proposed Class 'C'
- 5 Year Plan Blocks
- LIL
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