WUSKWATIM GENERATION PROJECT

ENVIRONMENTAL IMPACT STATEMENT

Manitoba Hydro
and
Nisichawayasihk Cree Nation

April 2003

Volume 7

Resource Use

Nisichawayasihk Cree Nation

Manitoba Hydro

Available in accessible formats upon request.

PREFACE

Volume 7 (Resource Use) is one of a series of supporting technical volumes for Manitoba **Hydro**'s and Nisichawayasihk Cree Nation's (**NCN**) application for **environment**al licensing of the Wuskwatim Generation Project (the Project) which is entitled Wuskwatim Generation Project Environmental Impact Statement, Volume 1 (April 2003). Volume 7 has been prepared by independent discipline specialists who are members of the environmental study team retained to assist in the environmental assessment of the proposed Project and provides a Resource Use Impact Assessment prepared in accordance with Final Guidelines issued by provincial and federal regulators for the Project. The supporting volumes have contributed to the preparation of the summary Environmental Impact Statement (Volume 1) and also provide additional technical and professional supporting information to assist in the technical review of the EIS. The supporting documents have been reviewed by Manitoba Hydro and NCN and are technically consistent with the EIS. They have not been edited for consistency in format, style, or wording with either the Summary EIS (Volume 1) or other supporting volumes.

The Wuskwatim Generation Project EIS is comprised of the following:

Volume 1 – Wuskwatim Generation Project: Environmental Impact Statement

Volume 2 – Public Consultation and Involvement

Volume 3 – Project Description and Evaluation of Alternatives

Volume 4 – Physical Environment

Volume 5 – Aquatic Environment

Volume 6 – Terrestrial Environment

Volume 7 – Resource Use

Volume 8 – Socio-Economic Environment

Volume 9 – Heritage Resources

Volume 10 – Cumulative Effects Assessment (Framework Approach)

The following is a list of the components of this volume and the firms responsible for completing these components:

Traditional Resource Use	North/South Consultants Inc.
Commercial Fishing	North/South Consultants Inc.
Commercial Trapping	North/South Consultants Inc.
Commercial Forestry	Plus4 Consulting Inc.
Commercial Mining	InterGroup Consultants Ltd.
Recreational fishing and hunting	North/South Consultants Inc.
Lodges, outfitters, and other tourism	InterGroup Consultants Ltd.
Protected areas and scientific sites	North/South Consultants Ltd. Plus4 Consulting

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1.0 INTRODUCTION

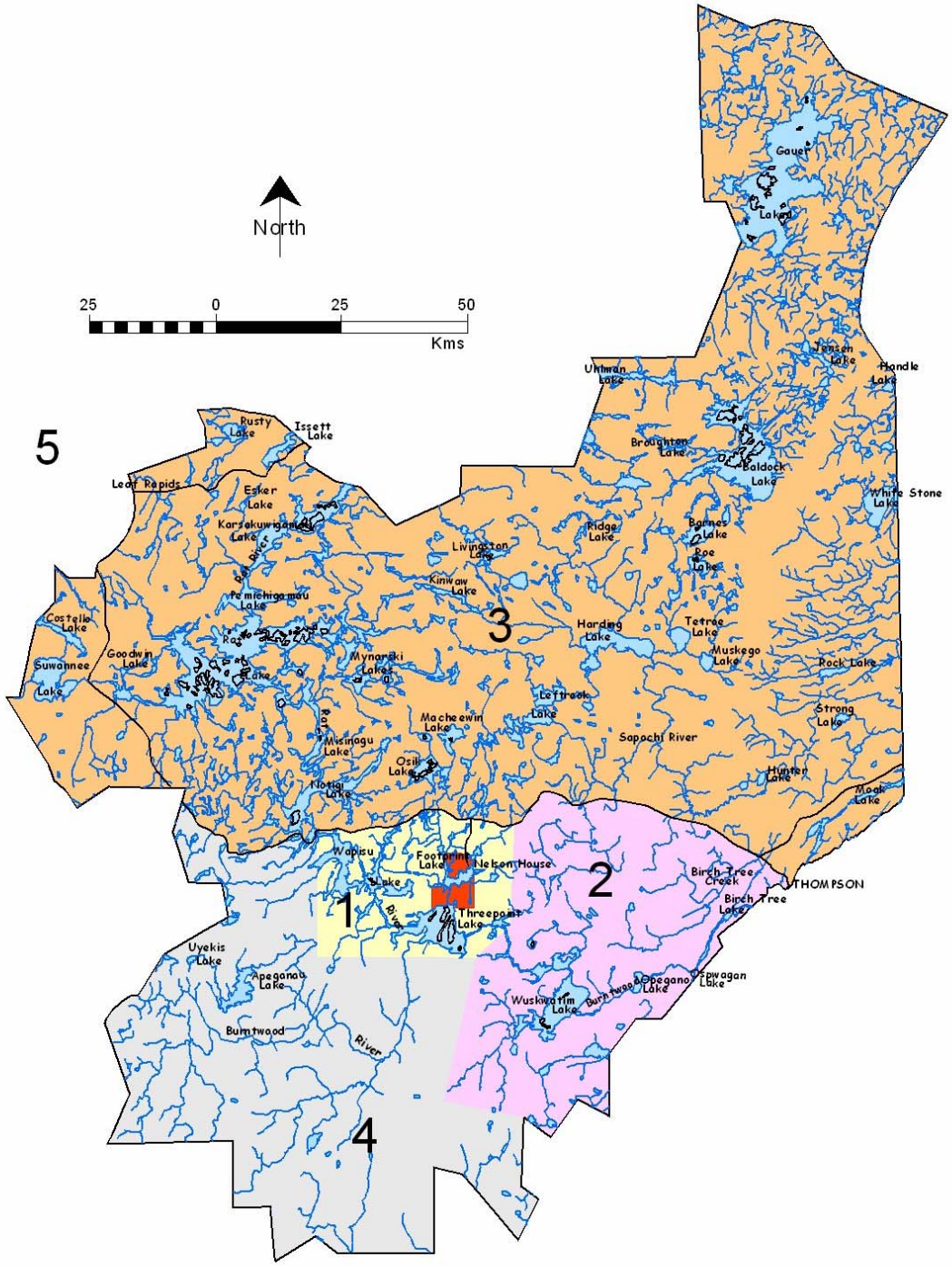
This volume of the **EIS** provides an assessment of Project impacts on resource use, reflecting Section 6.3.1 of the Wuskwatim Generation Project EIS guidelines.

Councillors D'Arcy Linklater (NCN) and David Spence (NCN) emphasized the importance of resource use by NCN in their addresses to the Clean Environment Commission on February 12, 2002. Councillor Spence stated that one of the goals of NCN was:

> "to develop a socio-economic plan to maximize training, employment and business opportunities for our people, which includes forestry, mining, tourism, transportation, resource harvesting, health, education, recreation, and hydro development."

Resource use by NCN members in the Nelson House Resource Management Area (**RMA**, Figure1-1) has a long historical record and, as noted by Councillors Linklater and Spence, will play a major role in the future of NCN. Resources harvested by NCN members provide both income and income-in-kind. NCN Elders also clearly stated that resource harvesting is not just an economic activity but is a key link to traditional lifestyles and past generations. During interviews with NCN resource harvesters it was clear that economics was often of secondary importance and that activities such as **commercial trapping** were, in some instances, conducted for cultural reasons. One NCN member stated that she continued trapping despite losing money as she could feel the presence of her ancestors when she was on the land and that it "defined what she was." It is clear that resource use must be viewed from both cultural and economic perspectives.

During scoping workshops held in early 2000, NCN members identified a number of **valued ecosystem component**s (VECs) in relation to potential Project **impact**s on resource use. These included: traditional resource use (which consists of **domestic/subsistence** hunting, trapping, and fishing, and gathering of plants for medicinal and dietary purposes); **commercial fishing**; and commercial trapping. The impact assessment focuses on these VECs but also addresses other important resource use activities in the region including: commercial forestry; mining; recreational fishing and hunting; lodges, outfitters and other tourism; and protected areas and scientific sites.



*Zones 1-5 were used to delineate the Harvest Calendar Study results.

Figure 1-1. The Nelson House Resource Management Area.

Potential **effect**s to resource use activities are identified and, where possible, classified by nature (positive, negative or neutral), magnitude (size of the effect), duration (how long the effect will last), and spatial boundary (i.e., where will the effect be noticeable – Wuskwatim Lake, RMA or northern Manitoba). However, because different resource users can perceive Project effects on resource use differently, the nature and magnitude of some effects are not classified.

Changes to resources in one area will cause resource use patterns to shift, which can ultimately affect resource use in other areas. To understand the impacts of the Project on resource use, it was necessary not only to have an understanding of how resources are used in the area to be affected, but also to have an understanding of the how important the affected area is to overall resource use in the region. Consequently, existing resource use is generally described in terms of the Nelson House RMA and in terms of the area directly affected by the Project (Zone 2 in Figure1-1).

The process of documenting existing resource use and potential impacts to resource use relied heavily on input from NCN members, particularly with regard to domestic/subsistence harvesting, commercial fishing, and commercial trapping. Traditional knowledge, which was provided by NCN Elders and resource harvesters, provides the foundation for a major part of each of these sections. A Harvest Calendar Study conducted with NCN resource harvesters in Nelson House from August 2001 to July 2002 provided information on the types, timing, magnitude and locations of domestic/subsistence harvests. Harvest calendar data were delineated by the harvesting zones indicated on Figure1-1, with harvesting in Zone 2 representing resource use in the Project area. Data from the Nelson House Country Foods Program (a program operated by the First Nation that utilizes local resource harvesters to provide **country food** to Elders and other NCN members) provided additional information on **domestic harvest** quantities and locations. Government and industry data were used to describe the locations and magnitude of commercial resource harvests. Key person interviews with government and industry officials provided additional information with regard to commercial and recreational harvests. It should be noted that in some cases, the information provided in the EIS has been generalized to safeguard resources. For example, to avoid potential over**exploitation**, moose harvest locations are not specifically identified on a map. As an alternative, the harvests have been noted in a broad sense for consideration in the impact analyses.

Some of the factors affecting resource use, such as increased access, an increase in the wage economy, and loss/change of **habitat**, will commence during construction and continue through operation. Other factors, such as the presence of a large workforce and

its effect on animal **population**s, occur only during construction, but continue to affect resource harvesting for a period of time after the Project is complete. For this reason, and to reduce repetition, discussions of Project impacts and the effects on traditional resource use, commercial fishing, commercial trapping, and recreational fishing and hunting have not been delineated by the construction and operation phases of the Project as has been done for other supporting documents.

2.0 TRADITIONAL RESOURCE USE

2.1 INTRODUCTION

Prior to the arrival of Europeans, Aboriginal (Indian) peoples inhabiting what is now Manitoba depended entirely on game, fish, and wild plants for their livelihood. "Hunting, fishing, and gathering were integral parts of their daily lives and affected every aspect of their culture, including their religion" (Young and Skarsfard 1983). Common to this type of lifestyle was the pursuit of different activities at different times of the year as dictated by nature, and the sharing of food within the social or residential group (Rupert's Land Research Centre 1992, Freeman 1986). "Our interdependence on one another was an on-going process. The earth was what gave us our life, breath, energy, and food" (Young 1990). The continued importance of traditional pursuits to NCN was noted by NCN Councillor D. Linklater (2002) who stated in his presentation to the Clean Environment Commission (**CEC**) that:

> "The well-being of NCN has always been tied to the land and its resources. In order to fully restore our self-reliance; We/NCN must achieve and maintain economic self-sufficiency. We must recognize and respect traditional pursuits and ensure they are maintained."

Research conducted across Canada over the last 30 years has shown the continued importance of harvesting and consumption of country foods to First Nations communities (Arnason et al. 1981, Wenzel 1986, Young and Skarsfard 1983, and Wein and Sabry 1988). "To this day hunting, trapping and fishing remain not only an economic necessity for many Indians but also a link with their cultural heritage and a symbol of their unique position in Canadian society" (Young and Skarsfard 1983, p. 1).

The society, culture, and economy of First Nations communities in northern Manitoba are closely linked with natural resources and harvesting activities. Traditional resource use encompasses all of these links. It has been termed "living off the land" or "bush living". It includes more than just consumption of natural resources. It is a way of life that provides sustenance, medicines, building materials, a heat supply, and spiritual fulfillment. An elder interviewed for a Traditional Knowledge Project conducted by NCN stated, "All animals are important to me because that is the way of life, food, and clothing." Access to country food continues to be important not only to the economy but also the health and well-being of families. At the Clean Environment Commission meeting in Nelson House, NCN Councillor D. Linklater stated that:

> "The degree of our influence over decisions concerning today's resource developments, and its management, are directly tied to the social, cultural, economic, and environmental well-being of our children, and our children's children."

Treaties signed in the late 1800s and early 1900s between First Nations and Canada recognized the importance of traditional resource harvesting activities by giving Status Indians the right to hunt and fish for food during anytime of the year on unoccupied crown land and on any other land to which they had legal access.

Traditional resource use includes hunting, fishing, trapping, and gathering for both domestic/subsistence and commercial purposes. Gathering includes the collection of berries, craft items, medicinal plants, firewood, and ceremonial items. This discussion of traditional resource use does not include commercial fishing or commercial trapping, which are discussed separately in sections 7.3 and 7.4. For the remainder of this section domestic/subsistence resource use will simply be referred to as domestic resource use.

Traditional resource use involves the pursuit of different activities at different times of the year as dictated by nature. For example: trapping is generally conducted during winter when furs are at their best and traveling can be conducted by snow machine; most fishing occurs during spring or fall when fish are migrating and congregating; and hunting may occur when animals are in rut. Although harvesting activities are seasonal, resources are often harvested (used) at the same time and outside of peak season. For example, a fisherman may hunt **waterfowl** between net lifts, and individuals hunting for moose may also take the opportunity to fish. Seven of ten NCN commercial trappers interviewed indicated that they harvested fish while trapping. Because of this harvesting overlap, it is difficult to quantify the amount of time traditional harvesters spend harvesting one particular **species** and to delineate the time spent harvesting from time spent on other activities associated with traditional resource use.

In the past, subsistence activities depended on the participation of the whole family unit. Men, women and children, young and old, all had specific roles. The food and items collected through traditional activities were shared within families and the community, which continues to be an important component of traditional harvests for NCN members. Even today, it is rare for country foods to be stockpiled in freezers.

Documenting traditional resource use is a key component to any environmental assessment. It is important to have an understanding of existing traditional resource use to determine how a project may affect future traditional resource use. Impacts on

traditional resource use have the potential to significantly affect not only the subsistence economy, but also the traditional lifestyle and spirituality of resource users.

2.2 GENERAL APPROACH AND METHODS

Information Sources

Traditional resource use information was gathered through six primary methods as follows:

- Harvest Calendar Study;
- Key person interviews;
- Community meetings;
- Country Foods Program;
- Opinion Survey; and
- Traditional Knowledge Study.

Nisichawayashihk Cree Nation provided significant input into both the planning and conduct of each study component.

Harvest Calendar

The objective of the Harvest Calendar Study was to quantify traditional resource harvests by residents of Nelson House and to determine the relative importance of traditional resource use in the study area compared to other resource use areas available to NCN.

The harvest calendar design and study methodology were developed with input from NCN and reviewed by independent consultants (Dr. Greg Mason, Prairie Research Associates; InterGroup Consultants Ltd.). A copy of the Harvest Calendar is provided in Appendix 1. The household, rather than the individual, was chosen as the basic unit for the study. Household harvests were recorded on a daily basis on the calendar. Total harvests for the community were then estimated based on extrapolation of data from participating households and the classification of all community households by harvest level category. It should be noted that harvest numbers in studies such as these generally represent retrieved resources, not necessarily those killed or consumed.

A household list developed by NCN for the NCN Opinion Survey was utilized as a base for the harvest study. Prior to the study, the NCN Resource and Land Use Planning Coordinator and associates with the NCN Country Foods Program classified each Nelson House household by harvest level. Harvest level was determined by the estimated

number of days that the primary (chief) harvester in each household spent in the bush the previous year. For example:

- an *Intensive Harvester* spent at least one month in the bush;
- an *Active Harvester* spent at least one week in the bush;
- an *Occasional Harvester* spent at least one day or a weekend in the bush;
- a *Non-Harvester* did not normally harvest country food; and
- a *Unique Harvester* harvested a resource that is not commonly harvested by the majority of the community and may not have been reported unless the individual participated in the study.

The study was advertised for self-identification of participants. Where insufficient representation of a specific harvest level category occurred, additional households within that category were asked to participate.

Participants were advised that the information was to be used as follows:

- to complete the Environmental Impact Assessment for the proposed Wuskwatim and Notigi **hydroelectric** generation projects;
- to act as a baseline to assist in assessing any gains or losses that may occur as a result of future development activities; and
- to allow NCN to make better decisions with regard to future resource harvesting and development activities.

Community Consultants (which are described in Volume 1, Section 3.1.1) distributed calendars to the primary (chief) harvester and all males over 16 years of age within each household. In total, 117 of 463 households (25%) within Nelson House received harvest calendars, including 49% of intensive harvesters, 42% of active harvesters, 29% of occasional harvesters, 13% of non-harvesters, and 33% of unique harvesters.

The primary (chief) harvester in each household recorded harvests by all members of the household with the exception of those harvests reported on another calendar. Harvesters were encouraged to report:

- the length of time spent harvesting;
- the locations where harvesting was conducted;
- individuals that they were harvesting with;
- the items or animals harvested; and
- the quantity of each item or animal harvested.

Reported harvests were not to include commercial or Country Foods Program harvests. Monthly participation varied, as it was dependent on who submitted their calendar.

Pages detailing the harvest were removed from the calendar on a monthly basis and collected by NCN's Community Consultants. Each page submitted was entered in a monthly prize draw. A grand prize draw including all monthly submissions was held at the end of the study.

Calendar submissions were sorted and examined on a monthly basis. Harvests by parties including more than one individual participating in the study were crosschecked to ensure that double counting was not occurring. Where data were incorrectly recorded or if data were difficult to understand, community consultants were asked to re-visit the study participant to clarify the record.

Harvests were expressed as reported values (i.e., harvests by calendar study participants) and community estimates (i.e., extrapolated harvest estimates for the whole community based on reported values and the classification of all households by harvest level). The reported values represent actual harvests by study participants and estimated values represent the harvest for the whole community. Effort was recorded as the number of days (attempts) on which particular resource harvesting activities were reported. For example, if moose hunting activity was reported on five separate days during a month, the corresponding effort was five "attempts".

Results from the Harvest Calendar were divided into six zones (0-5) (Figure1-1). Zone 1 encompassed the area immediately surrounding Nelson House; Zone 2 included the Wuskwatim Study Area and the area anticipated to be affected by the Project; Zone 3 included the area north of PR #391 within the Nelson House RMA; Zone 4 represented the area west of Wuskwatim Lake and south of Threepoint and Wapisu lakes; Zone 5 included all areas outside the Nelson House RMA; and Zone 0 included all data for which a location was not specified.

Key Person Interviews

Interviews were conducted with the NCN Resource and Land Use Planning Coordinator and the Program Coordinator of the NCN Resource Management Program. The intent was to draw on the expertise of these individuals with respect to resource use activities in the Nelson House RMA. Informal interviews were also conducted with individual trappers and fishers.

Community Meetings

One-day community meetings were conducted with Nelson House commercial fishers and commercial trappers. The meetings were advertised on the radio and individual fishers and trappers were contacted and asked to attend. An interview guide used for the meetings is provided in Appendix 6. The fishers and trappers were asked questions regarding their activities within the Nelson House RMA and within the Wuskwatim Project area in particular. The interviews were taped and transcribed.

Country Foods Program

The NCN Country Foods Program purchases country foods from domestic resource harvesters and distributes the food to elders and others within the community who are no longer able to harvest for themselves.

Information on harvests delivered to the Nelson House Country Foods Program from 1994 to 2001 was obtained from the NCN Resource and Land Use Planning Coordinator. These data indicate the type and quantity of country foods harvested and the location of the harvests.

Opinion Surveys

An Opinion Survey was undertaken by NCN in May, June and July of 2000. The objective was to survey NCN members living in Nelson House (n=377) with regard to their opinions on their community and proposed future hydro developments. A second Opinion Survey was conducted during summer 2001 to solicit opinions from NCN members living in Thompson (n=124) and Winnipeg (n=51). For the purpose of this component of the EIS, summary results from the surveys were used to provide information with regard to travel within the Nelson House RMA. Information was also gathered during community open houses and from NCN field workers during the conduct of the environmental assessment studies.

Traditional Knowledge Study

Information on traditional knowledge (**TK**) of resource use was extracted from the NCN Future Development Office TK Study (Volume 2).

Edible Food Weights and Meal Calculation

Harvest Calendar and Country Foods Program data were reported as number or weight of animals harvested. To obtain an estimate of the number of meals provided by these harvests, the data were converted to meals based on 0.2 kg of meat/meal (Canada, Department of Fisheries and Oceans 1985). Where numbers of animals were reported, individual animal weights were estimated and then converted to weight of edible meat. The estimates used to calculate animal weight and edible weight are provided in Appendix 2. Unless otherwise indicated, whole weights were taken from Banfield (1974), Wrigley (1986) and Northern Village of Pinehouse (1987), and the conversion factors from whole weight to edible weight used were those reported by Northern Village of Pinehouse (1987).

Fish

Individual fish weights were determined using an average weight for fish from experimental gillnetting data for Osik, Leftrook, Threepoint and Wuskwatim lakes (Bernhardt 1999, North/South Consultants unpubl. data). For the majority of species, average weights were determined from fish caught in 4.25" mesh nets, which are most commonly used for domestic fishing. Average weights for whitefish were determined from catches in 5" mesh, which is the most commonly used mesh when fishing for whitefish. Conversion factors to estimate edible weight for fish were taken from Northern Village of Pinehouse (1987). Where a conversion factor for a species was not available, an average based on all fish species was used.

Moose

The sex and age of moose are required to more accurately estimate the weight of the moose harvested by the community. Approximately half the moose reported in the Harvest Calendar results were classified by sex and age. Of these, approximately 50% were bulls, 25% were cows, and 25% were calves. An average weight per moose harvested (323 kg) was estimated based on these proportions, and the average weight of a bull, cow, and calf.

Waterfowl

The most common waterfowl harvested by Nelson House community members were mallards and lesser scaup (black duck). The average whole weight for mallard and lesser scaup were those reported by Environment Canada (2002), and an average of the two

species was used for ducks in general. The conversion to edible weight for waterfowl reported by Northern Village of Pinehouse (1987) was used for all species of waterfowl.

A listing of all species harvested, including their names in English, Latin (scientific) and Cree is provided below (Table 2-1).

Table 2-1. List of animal and plant species harvested by NCN.

	Species Name		
Category	**English**	**Latin**	**Cree**
Berries			
	Blueberries	*Vaccinium* sp.	Ethinimina
	Cranberries	*Oxycoccus* sp.	Wesakemina
	Raspberries	*Rubus* sp.	Athoskanuk
	Saskatoons	*Amelanchier* sp.	Misaskatoomina
	Strawberries	*Fragaria* sp.	Otihemina
Medicinal Plants/Fungi			
	Balsam fir	*Abies balsamea*	Napakasiht
	Bark		Wathakisk
	Birch tree bark	*Betula* sp.	Wuskwi-wathakisk
	Blackberry roots	*Rubus* sp.	Kahkiteminahtik-Ochipihk
	Cat tails	*Typha* sp.	Wahatoya
	Choke cherry tree	*Prunus virginiana*	Pusisaweminahtek
	Devil's claw	*Haragophytum procumbent*	
	Driftwood		Akwahonehtuk
	Ginger root	*Asarum canadense*	Wihkis
	Herbs		Muskehkewahtekwa
	Juniper	*Juniperus* sp.	Kahkakeminahtek
	Labrador tea	*Rhododendron groenlandicum*	Mwakopukwahtekwu
	Mint	*Menta arvensis*	Wehkuskwa
	Mushroom		Uthekis Otakuwastehonan
	Poplar buds	*Populus* sp.	Osemiskwuk
	Red willows	*Salix* sp.	Mehkwapemukwa
	Rosehips	*Rosa* sp.	Okenyuk
	Spruce buds	*Picea* sp.	Wunuskochunuskosuk
	Spruce gum	*Picea* sp.	Misliko-pekew
	Sweet gale	*Myrica gale*	Apischisakwewuskosa
	Tamarack	*Larix laricina*	Wakinakan
	Weed tea		Muskihkiwapwi
Fish			
	Lake cisco/Tullibee	*Coregonus artedi*	Ochonipis
	Burbot/Maria	*Lota lota*	Methachos
	Sucker/Mullet	*Catostomus* sp.	Namepith
	Longnose/Red sucker	*Catostomus catostomus*	Mehkwamepith
	White/Common sucker	*Catostomus commersoni*	Namepith
	Yellow perch	*Perca flavescens*	Asawisis
	Northern pike/Jackfish	*Esox lucius*	Osawuskwapis
	Trout-perch	*Percopsis omiscomaycus*	
	Walleye/Pickerel	*Stizostedion vitreum*	Okow
	Lake whitefish	*Coregonus clupeaformis*	Atihkamek

Table 2-1 (cont).

	Species Name		
Category	**English**	**Latin**	**Cree**
Birds			
	Bald eagle	*Haliaeetus leucocephalus*	Mikisew
	Belted kingfisher	*Ceryle alcyon*	Okiskimanaseu
	Red-winged blackbird	*Agelaius phoeniceus*	Chakatho
Grouse			
	Grouse		
	Sharp-tailed grouse	*Tympanuchus phasianellus*	Pithew
	Ruffed grouse	*Bonasa umbellus*	Pithew
	Partridge	*Perdix perdix*	Pithew
	Ptarmigan/Willow ptarmigan	*Lagopus lagopus*	Wapethew
	Spruce Hens/Spruce grouse	*Dendragapus canadensis*	Pithew
Waterfowl			**Nepinayisuk**
	Common loon	*Gavia immer*	Makwa
	Ducks		Sesep
	Mallards	*Anas platyrhynchos*	Ethinisipuk
	Black duck/Lesser scaup	*Aytha affinis*	Kahkilisipuk
	Bufflehead	*Bucephala albeola*	Wapacipisuk
	Geese/Canada geese	*Branta canadensis*	Niskuk
Mammals			
Fur Bearers			
	Arctic fox	*Alopex lagopus*	Wapahkisew
	Beaver	*Castor canadensis*	Amisk
	Fox	*Vulpes* sp.	Mahkisew
	Red Fox	*Vulpes vulpes*	Osawahkisew
	Cross Fox	*Vulpes vulpes*	Kamusinasot
	Silver Fox	*Vulpes vulpes*	Soneyawahkisew
	Fisher	*Martes pennanti*	Ochek
	Flying Squirrel	*Glaucomys sabrinus*	Taswikanikachas
	Lynx	*Lynx lynx*	Pisew
	Marten/American marten	*Martes americana*	Wapistan
	Mink/American mink	*Mustela vison*	Sakwesew
	Muskrat	*Ondatra zibethicus*	Wuchusk
	Otter/River otter	*Lutra canadensis*	Nikik
	Rabbit/Snowshoe hare	*Lepus americanus*	Wapos
	Tree Squirrel		Anikwachas
	Gray squirrel	*Scuirus carolinensis*	
	Red squirrel	*Tamiosciurus hudsonicus*	
	Weasel	*Mustela* sp.	Sehkos
	Wolverine	*Gulo gulo*	Omethaches
Ungulates			**Ka-owuskasechik**
	Caribou		
	Woodland caribou	*Rangifer tarandus caribou*	Ethinutwatehk
	Barrenground caribou	*Rangifer tarandus groenlandicus/granti*	Utehk
	Deer	*Odocoileus virginianus*	Apischachihkos
	Elk	*Cervus elaphus*	Wenaskisew
	Moose	*Alces alces*	Mooswa

2.3 EXISTING ENVIRONMENT

2.3.1 Traditional Resource Use in General

During implementation of the Harvest Calendar study, NCN resource managers estimated that approximately 55% of households within Nelson House participate in traditional harvesting activities at some time during the year. Of the households that participated in resource harvesting, approximately 19% were classified as intensive harvesters, 11% as active harvesters, 40% as occasional harvesters, 4% as unique harvesters, and 26% as non-harvesters. Harvest Calendar data are presented in Tables A3-1 to A3-8 of Appendix 3. Data are summarized in Tables 2-2 and 2-3.

Domestic harvesting activity (Table 2-2), as reported in the Harvest Calendar, was primarily conducted within Zone 1 near Nelson House (49%) and in the area north of PR #391 in Zone 3 (30%). The remainder of harvesting activity occurred as follows: 11% in Zone 2, which encompasses the Wuskwatim Study Area; 2% in Zone 4 (the area south of PR #391 and southwest of **CRD**); and, 3% in Zone 5 (all areas outside the RMA). A location was not specified for 5% of the resource harvesting activity reported (Zone 0). Opinion Survey results showed that most people travel close to the community of Nelson House (Zone 1), which corresponds with the domestic harvest locations identified in the Harvest Calendar.

Residents of NCN rely on a wide array of plants and animals for traditional purposes (Table 2-1). Resources are harvested year-round with specific resources targeted at different times of the year (Figure 2-1). Berry picking occurs from July through October; moose hunting occurs most frequently from August through October; **furbearers**, rabbits, and grouse are typically harvested from October through April; and waterfowl hunting is concentrated during spring and fall. Fish and medicinal plant harvesting occurs throughout the year. Harvests of barren ground caribou, deer and elk occur outside the RMA on an opportunistic basis. NCN Resource Program staff report that harvests of woodland caribou are rare and generally restricted to certain Elders within the community.

As discussed previously, although traditional resource harvesting is seasonal, resources are often harvested at the same time and outside of peak season. Because of this harvesting overlap, it is difficult to quantify the amount of time traditional harvesters spend harvesting one particular species and to delineate the time spent harvesting from time spent on other activities associated with traditional resource use.

Table 2-2. Summary of domestic harvest by species and harvest zone by NCN residents. Attempts and harvests are estimated values based on values from the Harvest Calendar for the period of August 2001 to July 2002. Attempts correspond to the number of days on which harvesting activity for a specific plant or animal was reported. One harvest represents one animal, one litre of berries, or one successful attempt to gather plants.

	Zone 0		Zone 1		Zone 2		Zone 3		Zone 4		Zone 5		All Zones	
	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest
Balsam Fir	-	-	2.6	2.3	-	-	4.0	4.0	-	-	-	-	6.6	6.3
Bark	-	-	7.4	7.4	-	-	-	-	-	-	-	-	7.4	7.4
Birch Bark	-	-	-	-	-	-	2.3	2.3	-	-	-	-	2.3	2.3
Blackberry Roots	-	-	2.4	2.4	-	-	-	-	-	-	-	-	2.4	2.4
Choke Cherry Tree	-	-	5.6	5.6	-	-	-	-	-	-	-	-	5.6	5.6
Devil's Claw	-	-	3.6	3.6	-	-	-	-	-	-	-	-	3.6	3.6
Driftwood	-	-	3.2	3.2	-	-	-	-	-	-	-	-	3.2	3.2
Ginger Root	11.3	11.3	97.1	60.8	30.3	9.0	35.7	35.7	-	-	-	-	174.4	116.8
Herbs	-	-	49.4	21.1	-	-	4.7	4.7	-	-	-	-	54.1	25.8
Juniper	-	-	-	-	-	-	5.9	2.0	-	-	-	-	5.9	2.0
Labrador Tea	4.0	4.0	13.7	6.0	-	-	-	-	-	-	-	-	17.7	10.0
Medicinal Plants	-	-	36.1	60.1	78.6	47.7	47.8	44.4	-	-	-	-	162.5	152.2
Mint	-	-	13.4	13.4	2.0	2.0	-	-	-	-	-	-	15.4	15.4
Mushrooms	3.2	3.2	-	-	-	-	-	-	-	-	-	-	3.2	3.2
Other Plants	-	-	-	-	-	-	4.7	2.3	-	-	-	-	4.7	2.3
Poplar Buds	-	-	21.1	13.4	12.8	2.6	-	-	-	-	-	-	33.9	16.0
Red Willows	-	-	5.9	5.9	0.0	0.0	-	-	-	-	-	-	5.9	5.9
Spruce Buds	-	-	2.6	2.6	13.9	2.8	-	-	-	-	-	-	16.5	5.4
Spruce Gum	-	-	2.6	2.6	-	-	-	-	-	-	3.4	3.4	6.0	6.0
Tamarack	-	-	2.0	2.0	-	-	-	-	-	-	-	-	2.0	2.0
Weed Tea	3.2	3.2	-	-	-	-	-	-	-	-	-	-	3.2	3.2
Plants/Fungi Total	21.7	21.7	268.7	212.4	137.6	64.1	105.1	95.4	-	-	3.4	3.4	536.5	397.0

Table 2-2. (cont.)

	Zone 0		Zone 1		Zone 2		Zone 3		Zone 4		Zone 5		All Zones	
	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest
Berries	-	-	2.4	-	-	-	-	-	-	-	-	-	2.4	0.0
Blueberries	-	-	79.0	1088.7	16.2	89.0	22.7	95.2	7.1	97.2	-	-	125.0	1370.1
Cranberries	11.1	173.7	32.6	109.7	46.1	376.9	36.0	99.9	-	-	-	-	125.8	760.2
Raspberries	-	-	69.0	428.9	9.8	38.1	-	-	-	-	-	-	78.8	467.0
Saskatoons	-	-	24.1	101.7	-	-	-	-	-	-	-	-	24.1	101.7
Strawberries	-	-	-	-	3.2	12.3	5.9	23.5	-	-	-	-	9.1	35.8
Berries Total	11.1	173.7	207.1	1729.0	75.3	516.3	64.6	218.6	7.1	97.2	-	-	365.2	2734.8
Cisco	-	-	42.1	281.3	-	-	34.7	815.8	-	-	-	-	76.8	1097.1
Fish	9.1	-	340.1	647.4	-	-	54	485.1	-	-	17.8	-	421.0	1132.5
Maria	-	-	26.7	57.7	-	-	10.4	29.2	-	-	-	-	37.1	86.9
Perch	-	-	104.8	112.6	-	-	-	-	-	-	-	-	104.8	112.6
Pike	21.6	34.2	450	1177.7	49.9	143.5	204	884.8	-	-	3.6	3.6	729.1	2243.8
Suckers	-	-	14	154.4	-	-	23.1	460.4	-	-	-	-	37.1	614.8
Walleye	25.6	59.8	490.7	2535.9	-	-	269.4	2982.7	-	-	3.6	7.1	789.3	5585.5
Whitefish	-	-	92.5	1115.5	38.5	-	111.8	1018.6	-	-	-	-	242.8	2134.1
Fish Total	56.3	94.0	1560.9	6082.5	88.4	143.5	707.4	6676.6	-	-	25.0	10.7	2438.0	13007.3
Black Ducks	-	-	7.1	-	-	-	2.6	5.1	-	-	-	-	9.7	5.1
Ducks	31.8	192.2	66.1	158.7	53.4	193.7	65.0	324.7	-	-	-	-	216.3	869.3
Geese	21.4	28.6	70.2	253.2	3.4	3.4	74.8	133.5	-	-	-	-	169.8	418.7
Mallards	-	-	10.2	47.7	-	-	15.9	91.5	-	-	9.1	18.2	35.2	157.4
Waterfowl Total	53.2	220.8	153.6	459.6	56.8	197.1	158.3	554.8	-	-	9.1	18.2	431.0	1450.5

Table 2-2. (cont.)

	Zone 0		Zone 1		Zone 2		Zone 3		Zone 4		Zone 5		All Zones	
	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest
Caribou	-	-	-	-	-	-	13.7	-	-	-	-	-	13.7	0.0
Deer	-	-	-	-	-	-	-	-	-	-	76.9	15.4	76.9	15.4
Elk	-	-	-	-	-	-	-	-	-	-	76.9	15.4	76.9	15.4
Grouse	17.7	34.0	65.6	93.3	40.1	85.7	59.6	75.8	-	-	-	-	183.0	288.8
Moose	12.0	2.6	198.9	5.8	60.0	11.1	117.9	44.1	14.2	3.9	9.1	9.1	412.1	76.6
Ptarmigan	-	-	-	-	-	-	11.8	5.9	-	-	-	-	11.8	5.9
Big Game Total	29.7	36.6	264.5	99.1	100.1	96.8	203.0	125.8	14.2	3.9	162.9	39.9	774.4	402.1
Beaver	40.6	47.1	92.7	113.2	4.7	2.3	83.9	59.3	13.0	13.0	-	-	234.9	234.9
Fisher	-	-	-	-	-	-	17.8	-	-	-	-	-	17.8	0.0
Fox	-	-	-	-	-	-	26.2	8.4	-	-	-	-	26.2	8.4
Lynx	2.4	2.4	20.2	6.4	3.0	3.0	12.1	12.1	-	-	-	-	37.7	23.9
Marten	9.0	6.8	-	-	23.0	13.1	80.2	72.7	-	-	-	-	112.2	92.6
Mink	-	-	6.1	3.0	17.2	10.3	10.0	10.0	13.0	4.3	-	-	46.3	27.6
Muskrat	-	-	-	-	20.0	20.0	-	-	-	-	-	-	20.0	20.0
Otter	-	-	2.3	2.3	38.5	15.4	30.2	10.2	-	-	-	-	71.0	27.9
Rabbit	68.6	91.8	397.1	424.7	94.2	143.7	344.2	599.7	83.7	61.9	-	-	987.8	1321.8
Squirrel	-	-	15.2	15.2	2.3	2.3	4.0	4.0	-	-	-	-	21.5	21.5
Weasel	-	-	9.1	6.0	-	-	-	-	-	-	-	-	9.1	6.0
Wolverine	-	-	-	-	-	-	4.0	4.0	-	-	-	-	4.0	4.0
Trap Total	120.6	148.1	542.7	570.8	202.9	210.1	612.6	780.4	109.7	79.2	0.0	0.0	1588.5	1788.6
All Species Total	292.6	694.9	2997.5	9153.4	661.1	1227.9	1851.0	8451.6	131.0	180.3	200.4	72.2	6133.6	19780.3

Table 2-3. Summary of domestic harvest by species and month by NCN residents. Attempts and harvests are estimated values based on values from the Harvest Calendar for the period of August 2001 to July 2002. One attempt is considered to be one trip to harvest a specific plant or animal, and one harvest represents one animal, one litre of berries, or one successful attempt to gather plants.

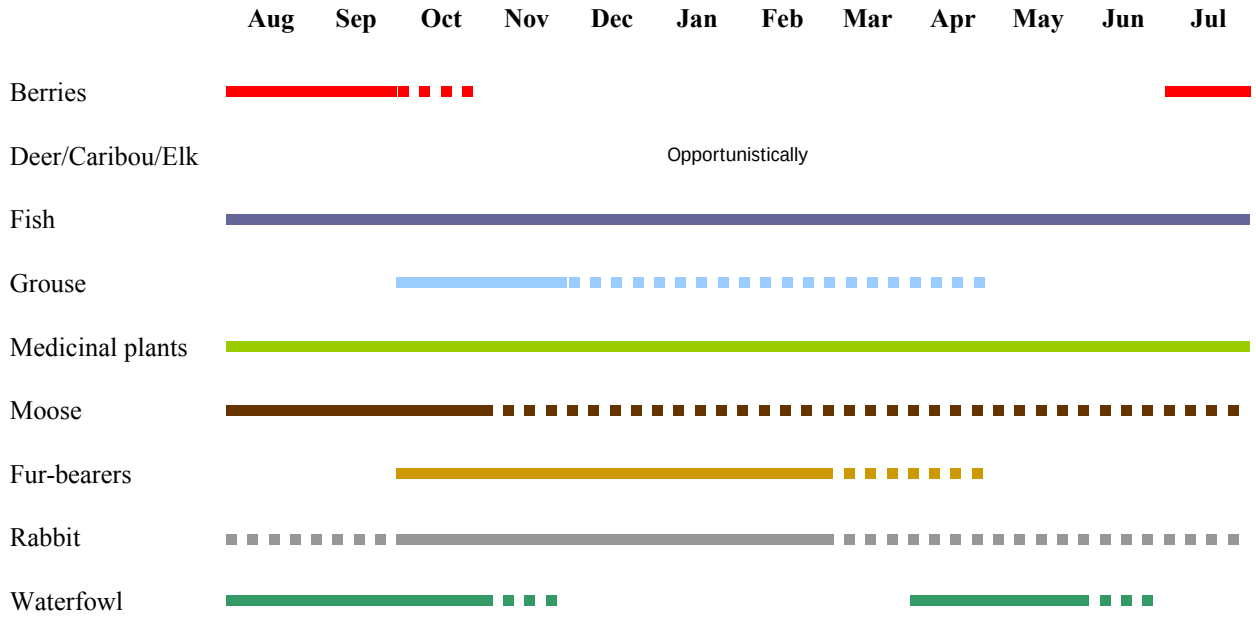
	August		September		October		November		December		January		February		March		April		May		June		July		All Months	
	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest
Balsam Fir	-	-	-	-	2.6	2.3	-	-	-	-	4	4	-	-	-	-	-	-	-	-	-	-	-	-	6.6	6.3
Bark	5.2	5.2	-	-	-	-	2.2	2.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.4	7.4
Birch Bark	-	-	-	-	2.3	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3	2.3
Blackberry Roots	-	-	-	-	-	-	-	-	2.4	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.4	2.4
Choke Cherry Tree	-	-	-	-	-	-	-	-	5.6	5.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.6	5.6
Devil's Claw	-	-	3.6	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	3.6
Driftwood	3.2	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	3.2
Ginger Root	30	13	19	7.9	79	56	20	13	-	-	-	-	-	-	-	-	4	4	-	-	5.9	5.9	17	17	174	117
Herbs	19	5.8	2.3	2.3	18	10	15	7.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54	26
Juniper	5.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	2
Labrador Tea	-	-	3.4	3.4	10	2.6	-	-	-	-	-	-	-	-	-	-	4	4	-	-	-	-	-	-	18	10
Medicinal Plants	3.6	32	-	-	52	14	-	-	-	-	-	-	-	-	-	-	4	4	13	13	52	52	38	38	163	152
Mint	4.5	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	11	15	15
Mushrooms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	3.2	-	-	3.2	3.2
Other Plants	-	-	-	-	4.7	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.7	2.3
Poplar Buds	13	2.6	-	-	13	5.1	-	-	2.4	2.4	-	-	-	-	5.9	5.9	-	-	-	-	-	-	-	-	34	16
Red Willows	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	5.9	-	-	-	-	-	-	-	-	5.9	5.9
Spruce Buds	-	-	14	2.8	2.6	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	5.4
Spruce Gum	-	-	-	-	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6
Tamarack	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Weed Tea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	3.2	-	-	3.2	3.2
Plants/Fungi Total	86	71	42	20	190	102	38	23	10	10	4.0	4.0	-	-	12	12	12	12	13	13	65	65	65	65	537	397

Table 2-3. (cont.)

	August		September		October		November		December		January		February		March		April		May		June		July		All Months	
	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest
Berries	-	-	-	-	-	-	-	-	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.4	0
Blueberries	94.8	1132	18.4	144.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.8	94.1	125	1370
Cranberries	36	147.3	49.2	340	40.6	272.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125.8	760.2
Raspberries	21.5	185.1	2.8	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54.5	279.1	78.8	467
Saskatoons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.1	101.7	24.1	101.7
Strawberries	3.2	12.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	23.5	9.1	35.8
Berries Total	155.5	1476	70.4	487.1	40.6	272.9	-	-	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	96.3	498.4	365.2	2735
Cisco	11.6	158.4	2.3	46.5	31.4	735.7	4.4	2.2	2.7	13.7	-	-	-	-	5.9	94.1	12	40	-	-	6.5	6.5	-	-	76.8	1097
Fish	10.4	-	12.3	465.1	13.7	-	13	-	-	-	81.3	20	26.1	20	21.7	-	20	56	-	-	36.8	-	185.7	571.4	421	1133
Maria	5.9	2	-	-	-	-	-	-	11.1	50	4.5	27.3	-	-	-	-	15.6	7.6	-	-	-	-	-	-	37.1	86.9
Perch	-	-	-	-	-	-	-	-	-	-	16	8	8.7	21.7	26.1	4.3	-	-	-	-	17.6	5.9	36.4	72.7	104.8	112.6
Pike	26.6	77.8	59.2	118.6	96.2	681.1	13.8	7.1	58.2	64.8	36.5	81.1	36	87.1	32	96.9	59.3	154.8	13.3	66.7	181.3	523.9	116.7	283.9	729.1	2244
Suckers	2	78.4	-	-	17.2	431	-	-	-	-	-	-	-	-	5.9	29.4	12	76	-	-	-	-	-	-	37.1	614.8
Walleye	30.4	317.7	63.9	100.2	84.6	1798	10.2	15.7	107.8	287.5	67.5	583.6	48.7	246.1	51.7	274.2	68.4	277.6	29.1	143	153.1	1250	73.9	292.1	789.3	5586
Whitefish	15.5	183.4	38.4	70.5	59.5	664.1	57.3	309.9	6.8	12.3	4.5	27.3	-	-	5.9	211.8	-	-	-	-	54.9	654.8	-	-	242.8	2134
Fish Total	102.4	817.7	176.1	800.9	302.6	4309	98.7	334.9	186.6	428.3	210.3	747.3	119.5	374.9	149.2	710.7	187.3	612.0	42.4	209.7	450.2	2441	412.7	1220	2438	13007
Black Ducks	-	-	-	-	2.6	5.1	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.7	5.1
Ducks	29.4	72.2	24.7	62.7	40.2	123.8	2.4	4.8	-	-	-	-	-	-	-	-	26.9	54.5	69.5	484.8	23.2	66.5	-	-	216.3	869.3
Geese	9.7	16.1	23.5	29	7.7	15.4	2.4	2.4	-	-	-	-	-	-	-	-	66	95.6	50	228.6	10.5	31.6	-	-	169.8	418.7
Mallards	-	-	5.6	36.1	4.7	11.6	-	-	-	-	-	-	-	-	-	-	18.2	36.4	6.7	73.3	-	-	-	-	35.2	157.4
Waterfowl Total	39.1	88.3	53.8	127.8	55.2	155.9	11.9	7.2	-	-	-	-	-	-	-	-	111.1	186.5	126.2	786.7	33.7	98.1	-	-	431.0	1451

Table 2-3. (cont.)

	August		September		October		November		December		January		February		March		April		May		June		July		All Months	
	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest	Attempt	Harvest
Caribou	-	-	-	-	-	-	-	-	13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.7	0
Deer	-	-	-	-	-	-	76.9	15.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	76.9	15.4
Elk	-	-	-	-	-	-	76.9	15.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	76.9	15.4
Grouse	2	2	-	-	40.4	92.7	85.2	98.4	7.1	16.7	10.9	14.3	8.7	8.7	4.3	4.3	24.4	51.7	-	-	-	-	-	-	183	288.8
Moose	33.4	9.5	127.2	8.3	205.1	26.1	-	-	13.7	-	-	-	4	4	-	-	9.1	9.1	14.3	14.3	5.3	5.3	-	-	412.1	76.6
Ptarmigan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.8	5.9	-	-	11.8	5.9
Big Game Total	35.4	11.5	127.2	8.3	245.5	118.8	239.0	129.2	34.5	16.7	10.9	14.3	12.7	12.7	4.3	4.3	33.5	60.8	14.3	14.3	17.1	11.2	-	-	774.4	402.1
Beaver	-	-	-	-	30.5	30.1	70.7	35.1	70.3	64.3	28.1	66.1	17	21	-	-	4	4	14.3	14.3	-	-	-	-	234.9	234.9
Fisher	-	-	-	-	-	-	-	-	17.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.8	0
Fox	-	-	-	-	-	-	22.2	4.4	-	-	-	-	-	-	-	-	4	4	-	-	-	-	-	-	26.2	8.4
Lynx	-	-	-	-	-	-	-	-	12.8	12.8	24.9	11.1	-	-	-	-	-	-	-	-	-	-	-	-	37.7	23.9
Marten	-	-	-	-	-	-	24.4	11.1	38.6	39.2	17.2	10.3	28	16	-	-	4	16	-	-	-	-	-	-	112.2	92.6
Mink	-	-	-	-	17.2	10.3	6.1	3	10	10	-	-	13	4.3	-	-	-	-	-	-	-	-	-	-	46.3	27.6
Muskrat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	20	-	-	20	20
Otter	-	-	-	-	40.8	17.7	22.2	2.2	-	-	4	4	-	-	-	-	4	4	-	-	-	-	-	-	71	27.9
Rabbit	2	7.8	-	-	85.4	86.1	234.7	303.7	173.9	300.1	299	232.7	92.4	144.1	32.4	54	23.3	52.4	-	-	44.7	140.9	-	-	987.8	1322
Squirrel	-	-	-	-	2.3	2.3	15.2	15.2	-	-	4	4	-	-	-	-	-	-	-	-	-	-	-	-	21.5	21.5
Weasel	-	-	-	-	-	-	6.1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.1	6
Wolverine	-	-	-	-	-	-	-	-	-	-	-	-	4	4	-	-	-	-	-	-	-	-	-	-	4	4
Trap Total	2.0	7.8	-	-	176.2	146.5	401.6	377.7	326.4	429.4	377.2	328.2	154.4	189.4	32.4	54.0	39.3	80.4	14.3	14.3	64.7	160.9	-	-	1589	1789
All Species Total	420.3	2472	469.7	1444	1010	5106	788.7	872.1	560.3	884.8	602.4	1094	286.6	577.0	197.7	780.8	383.2	951.7	209.7	1038	630.4	2776	574.4	1784	6134	19780



* Solid lines denote periods of relatively intense harvesting. Occasional, intermittent and/or opportunistic harvest activities are represented by dotted lines. "Berries" includes blueberries, cranberries, raspberries, saskatoons, and strawberries. "Fish" includes cisco, maria, perch, pike, suckers, walleye, and whitefish. "Medicinal plants" includes tree bark, roots, herbs, buds, teas, mint, juniper, and other traditionally-used medicinal plants. "Fur-bearers" includes beaver, fisher, fox, lynx, marten, mink, muskrat, otter, squirrel, weasel, and wolverine. "Waterfowl" includes geese, black ducks, mallards and other ducks.

Figure 2-1. Harvesting activity by NCN, August 2001 to July 2002

Country Foods Program and Harvest Calendar data suggest that moose comprise the largest component of domestic harvest, by weight, followed by lake whitefish (Table 2-4). Big game animals comprised an estimated 63% of all meat harvested by NCN residents, followed by fish at 26%. Domestic harvests provided an estimated 240,262 meals annually to NCN residents (Table 2-4) or approximately 7% of all meals consumed (based on an annual total of 3,613,550 meals calculated from a population of 3300 consuming three meals per day). Moose was by far the most important single animal in terms of the proportion of country foods meals consumed (Figure 2-2). Lake whitefish, pickerel (walleye), and northern pike (jackfish) also comprised a substantial number of meals, as did other big game animals and beaver.

Table 2-4. Estimated number of meals of meat obtained from the domestic harvest on an annual basis by NCN members.

	Harvest Calendar			Country Foods			Combined		
	Weight	# of Meals	% of Meals	Weight	# of Meals	% of Meals	Weight	# of Meals	% of Meals
Cisco	537	2,687	1	29	143	1	566	2,831	1
Fish	363	1,816	1	-	-	-	363	1,816	1
Maria	65	323	<1	-	-	-	65	323	<1
Perch	9	46	<1	-	-	-	9	46	<1
Pike	1,267	6,333	3	151	754	3	1,417	7,087	3
Suckers	414	2,068	1	34	170	1	448	2,238	1
Walleye	2,182	10,908	6	222	1,110	5	2,404	12,018	6
Whitefish	1,159	5,793	3	2,829	14,145	59	3,988	19,938	9
Trout	-	-	-	17	84	<1	17	84	<1
Roe	-	-	-	<1	2	<1	0	2	<1
Fish Total	5,995	29,973	16	3,282	16,408	68	9,276	46,381	22
Mallards	138	689	<1		-	-	138	689	<1
Black Ducks	3	15	<1		-	-	3	15	<1
Ducks	562	2,809	1	23	117	<1	585	2,926	1
Geese	813	4,065	2	68	338	1	880	4,402	2
Waterfowl Total	1,515	7,577	4	91	454	2	1,606	8,032	4
Grouse	104	520	<1		-	-	104	520	<1
Moose	23,155	115,775	62	678	3,389	14	23,833	119,164	56
Caribou	-	-	-	1,035	5,173	22	1,035	5,173	2
Elk	2,922	14,611	8	155	776	3	3,077	15,387	7
Deer	705	3,523	2	47	233	1	751	3,756	2
Big Game Total	26,782	133,909	71	1,236	6,182	26	28,018	140,091	66
Rabbit	1,134	5,668	3	14	71	<1	1,148	5,739	3
Squirrel	3	14	<1		-	-	3	14	<1
Small Game Total	1,136	5,682	3		-	-	1,136	5,682	3
Beaver	1,865	9,323	5	201	1,004	4	2,065	10,327	5
Muskrat	-	-	-	<1	2	<1	0	2	<1
Lynx	92	462	<1		-	-	92	462	<1
Trap Total	1,957	9,785	5	215	1,006	4	2,172	10,862	5
Total	37,489	187,446	89	4,839	24,051	11	42,328	211,639	100

Data from the Harvest Calendar (August 2001 to July 2002) and Country Foods Program (1994-2000). One meal of meat is defined as 0.2 kg of meat, and all weights are presented in kg.

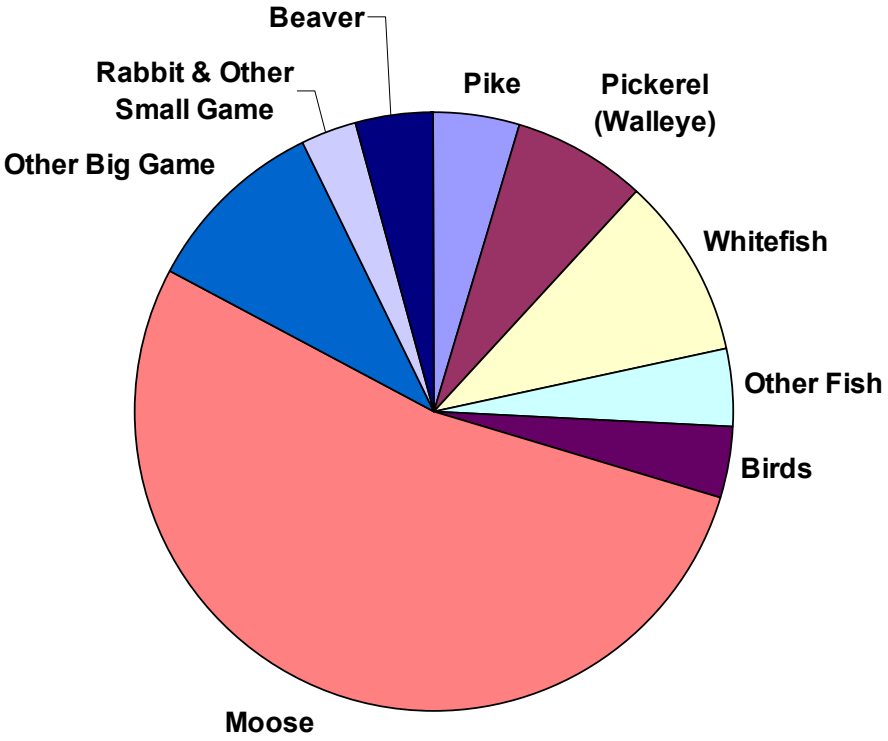


Figure 2-2. Proportions (%) of country foods meals obtained from animals harvested by the NCN (derived from Harvest Calendar and Country Foods Program data).

2.3.2 Access, Cabins, and Camping

Access is an important factor limiting where traditional resource use activities occur. Resource harvesting areas are accessed by boat, car, truck, **ATV**, snowmobile, aircraft, or on foot. The majority of harvest attempts were concentrated close to Nelson House (Table 2-2). The importance of roads is evident in Zone 2 (the Wuskwatim G.S. study area), where 84% of harvesting activity occurred along PR #391 or on waterbodies that are considered safe for navigation (e.g., Sapochi River, Birch Tree Creek, Appendix A3-4). A map illustrating study area travel routes identified by NCN resource harvesters is provided in Figure 2-3.

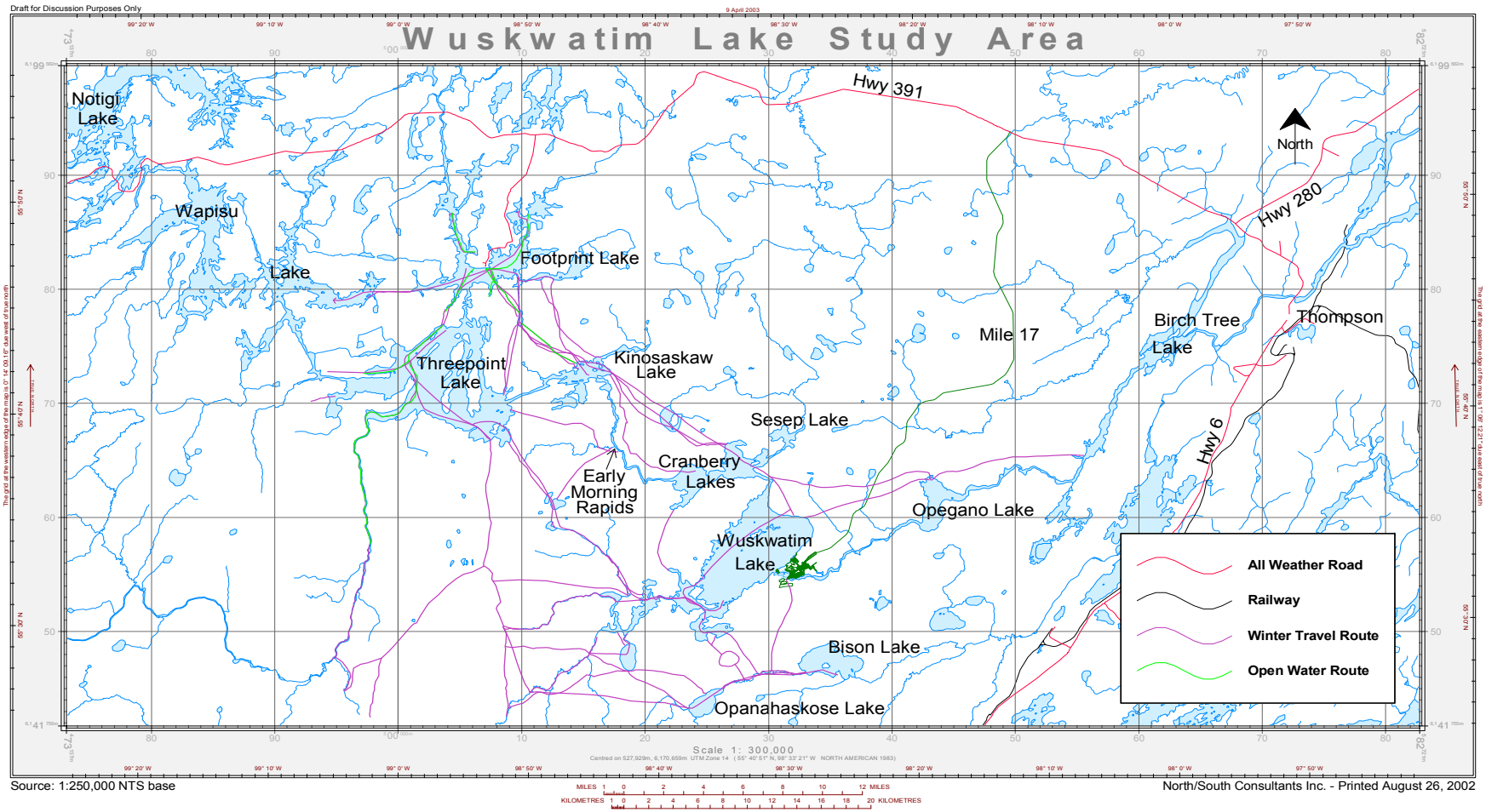


Figure 2-3. Study area travel routes identified by NCN resource harvesters.

Just over half (53%) of respondents to the Opinion Survey indicated that they had experienced navigational problems while traveling in the NCN RMA. Most (46%) indicated that debris was the main problem, but stumps and slush (14% each), and other problems (10%) attributed to the **Churchill River Diversion** (CRD) were also experienced. Navigational problems were most frequently encountered on Footprint Lake (19%), Rat River (17%), Burntwood River (16%), and Threepoint Lake (11%). With the exception of the Burntwood River, these areas were also identified as those most frequently traveled. Ten percent of respondents indicated that they encountered navigational problems everywhere they traveled, and 2.5% of respondents indicated that they had experienced navigational problems on Wuskwatim Lake. Most of the navigational problems were experienced during summer, but 10-20% of respondents also had experienced navigational problems in each of the other three seasons.

NCN members stated that traveling on the Burntwood River is a concern at all times of year because of fluctuating water levels. Trappers reported that portages along the route are generally in poor condition, especially in the section between Kinosaskaw Lake and Cranberry Lakes. Debris along the river and on Wuskwatim Lake is a concern because there are few safe locations to land a boat in unfavourable weather. Trappers reported that debris on shorelines of Wuskwatim Lake reduces the effectiveness of resource harvesting activities due to the lack of shoreline access. Commercial fishers stated that navigation is better on Wuskwatim Lake when water levels are stable and low. Although the occasional group still travels down the Burntwood River to Wuskwatim Lake, most travel to and from the lake currently occurs by floatplane or helicopter

Under agreements, license arrangements and federal legislation, Manitoba Hydro is responsible for mitigating adverse effects from its operations on travel and access along affected waterways. The 1996 NFA Implementation Agreement (which implements the Northern Flood Agreement for NCN) contains a number of safety provisions to be undertaken by Manitoba Hydro to ensure safe travel along affected waterways in the Nelson House RMA, as well as a claims mechanism established through the NCN Trust. These safety provisions are associated with safe ice trails, navigational aids, and debris management.

Cabins within the Nelson House RMA are used throughout the year and are important for carrying out a traditional lifestyle and as a base for commercial harvesting. An important factor that limits the placement and use of cabins is access. There are a number of cabins located along PR 391 that can be accessed by car or truck and are generally used throughout the year. A cabin near Birch Tree Lake is accessed on occasion by walking during summer and more often on snow machine in winter. Cabins without road access

are used primarily by commercial fishers and trappers and are generally used less often than those with road access. NCN resource users and harvesters identified approximately 45 cabins in the vicinity of Nelson House, PR 391 and the Burntwood River, two of which are located on Wuskwatim Lake (Figure 2-4). NCN residents also identified some regularly used camping locations within the RMA. Camping locations are often selected because of features that are desirable to the camper (e.g., a hunting location, boat landing location). At the request of cabin owners, specific cabin and campsite locations are not provided.

2.3.3 Domestic Hunting/Trapping

Domestic hunting is an integral component of the traditional lifestyle in Nelson House. The animals that are most actively pursued include moose, barren ground caribou, waterfowl, grouse, and furbearers. Woodland caribou are not targeted, but are taken on occasion. Based on Harvest Calendar and Country Foods Program data, hunting and trapping harvests provided an estimated 178,257 meals to NCN resident in 2001/2002 (or approximately 5% of all meals consumed).

Hunting is generally focused on areas where particular resources are abundant and where access is not limited. In addition, ease of access to an area affects the number of people that hunt in that area. For this reason, most of the hunting activity in the Nelson House RMA is concentrated along navigable waterways and roads. Commercial fishers stated that they do not generally harvest animals along PR 391, which provides access to the northern portion of Zone 2, because the area encompasses occupied registered traplines. Between August 2001 and July 2002, 40% of hunting activity for ducks, geese, grouse, ptarmigan and moose occurred in Zone 1, which encompasses the community of Nelson House, and Footprint, Threepoint and Wapisu lakes. A further 34% of hunting activity for these species occurred in Zone 3, north of PR 391, while 15% occurred in Zone 2, which includes Wuskwatim Lake (Table 2-2).

Due to poor access, there is currently little use of the Wuskwatim Lake area for hunting. The proportion of NCN hunting activity (i.e., days spent hunting) that occurred in Zone 2 (as reported in the Harvest Calendar) ranged from approximately 13-14% of waterfowl and moose hunting, respectively, to 40% of grouse hunting. However, very little of this hunting activity occurred in the vicinity of Wuskwatim Lake, which accounted for just 3.9% of the total domestic hunting harvests from Zone 2. Reported domestic harvests from Wuskwatim Lake in 2001/2002 included three moose and three ducks. Over 50% of the domestic hunting harvests from Zone 2 were taken directly adjacent to PR 391.

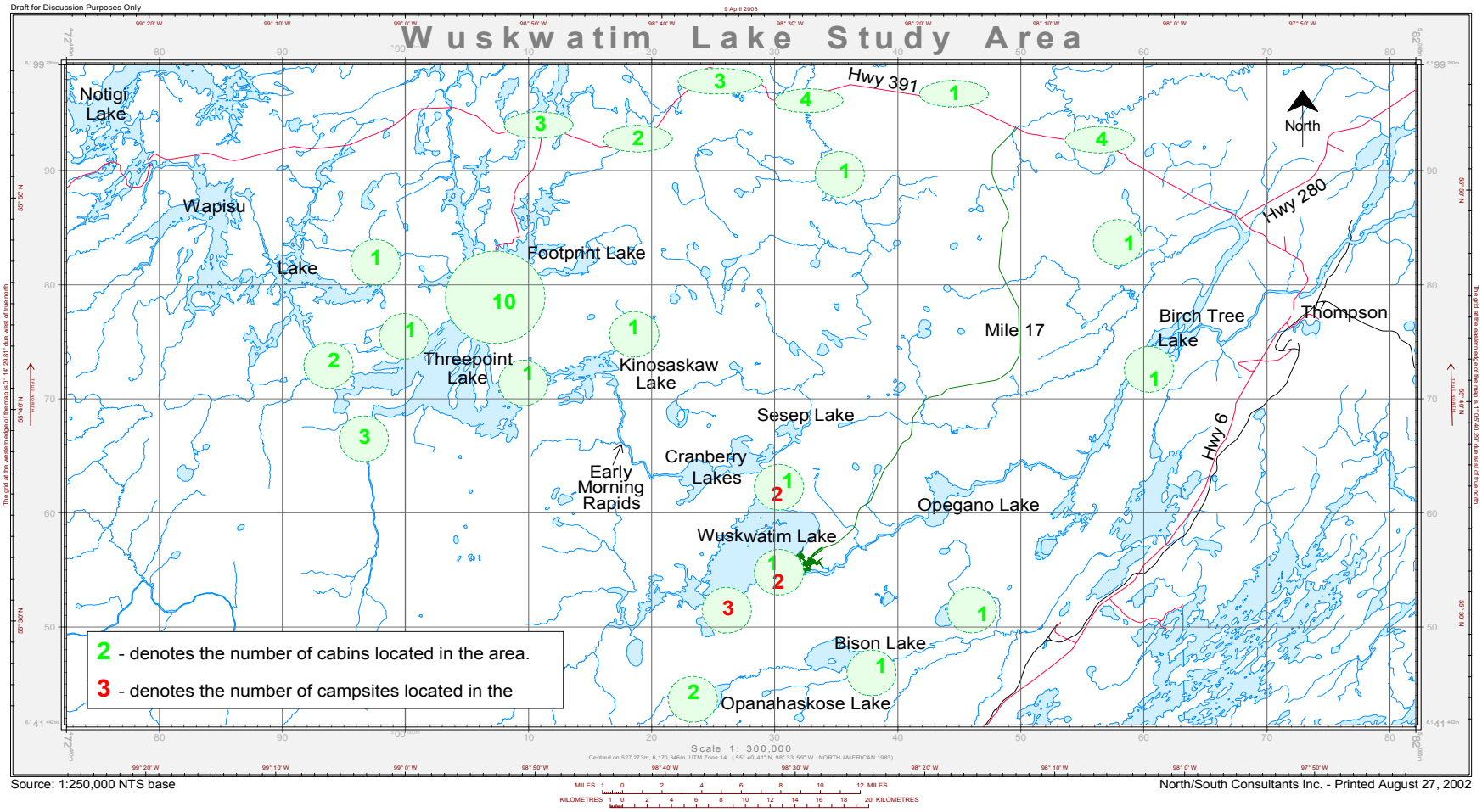


Figure 2-4. Locations of cabins and campsites within the study area.

In addition to problems with access, trappers indicated that the number of permits required for guns, etc. has become a deterrent to traditional hunting.

Total harvests of birds (ducks, geese, grouse, ptarmigan) and ungulates (moose, deer, elk) by Nelson House residents, estimated from the reported numbers in the Harvest Calendar from August 2001 to July 2002, included: 6 ptarmigan, 289 grouse, 1032 ducks (including black ducks and mallards), 419 geese, 15 deer, 15 elk, and 77 moose (all the deer and elk were harvested outside of the RMA, Table 2-3).

Big Game

Although most of the big game harvesting activity reported in the Nelson House Harvest Calendar occurred within the Nelson House RMA, some occurred outside the RMA. Nelson House residents traveled to: the Duck Mountains to harvest elk and moose; to Brochet, Southern Indian Lake, and York Landing to hunt barren ground caribou; and to southern Manitoba to hunt white-tailed deer. Hunting for moose and other big game animals is primarily conducted in fall and early winter.

Moose is the primary big game animal targeted by domestic hunters from NCN. The majority of moose hunting effort (48%) was expended near the community in Zone 1, followed by the area north of PR 391 in Zone 3 (29%), and Zone 2 (14%). Approximately 3% of moose harvesting activity occurred outside of the RMA (Table 2-2). Eighty-nine percent of moose hunting activity occurred in August, September, and October (Table2-3).

A total of 20 moose were reported harvested by Harvest Calendar Study participants between August 2001 and July 2002, yielding a total estimated harvest for the community during this time of 77 moose (Table A3-8 and Table 2-3). Fifty-eight percent of moose harvests came from Zone 3 north of PR 391, 15% from Zone 2, and 12% from outside of the RMA (Table 2-2). It should be recognized that Zone 3 is the largest zone in the RMA and the large proportion of moose harvested from it may be related to the size of the area. It should also be noted that Zone 1 accounted for only 8% of the moose harvest despite having 48% of the attempts. Fifty-seven percent of moose harvests occurred during August, September, and October, and 37% during April, May and June (Table 2-3).

NCN Resource Managers reported that a group of 6-8 individuals who use cabins along PR 391 hunt on the Sapochi River for moose each fall. A group of hunters from Nelson House (approximately 4 individuals) has hunted in the Birch Tree Creek area each fall. A group of hunters from Nelson House also fly into small lakes in the Wuskwatim Lake area to hunt moose each year.

Although moose were the most numerous big game animal reported harvested by Harvest Calendar participants, moose meat ranked second, in terms of weight, in quantity of big game meat distributed by the Country Foods program from 1994-2000 (Appendix 4). An average of 1035 kg of caribou meat was distributed annually during this period compared to an average of 678 kg of moose meat. This discrepancy is attributable to the way in which the two animals are hunted. Caribou hunting is primarily conducted as a community hunt and, consequently, much of the meat is turned over to the County Foods Program for distribution in the community. Country Foods harvests of caribou have been reported from locations such as Brochet, Southern Indian Lake and York Landing. In contrast, moose are primarily hunted and shared independent of the Country Foods Program.

There were no caribou (woodland or barren ground) harvested in the Nelson House RMA based on Harvest Calendar data, although there were 14 attempts to harvest caribou in Zone 3 in December (tables 2-2 and 2-3). Barren ground caribou hunting occurs during winter when the animals move south and are concentrated south of the tree line.

NCN residents harvested an estimated 15 elk and 15 deer from August 2001 to July 2002 (Table 2-3). All of these harvests occurred in November and came from outside the RMA (Table 2-3). As noted above, NCN members will travel as far as the Duck Mountains to harvest elk and as far as southern Manitoba to harvest deer. On average, 155 kg of elk and 47 kg of deer were distributed annually by the Country Foods Program between 1994 and 2000 (Appendix 4).

Small Game

For the purpose of this discussion, small game refers to ptarmigan and grouse, which are hunted, and all other smaller mammals including rabbit, beaver, and martin, which are primarily obtained by trapping or snaring (although some hunting occurs for beaver and rabbit). Hunting or trapping of small game animals was not reported to occur outside of the RMA (Zone 5), although locations were not specified (Zone 0) for 12% of the grouse and 8% of other animals obtained by trapping (Table 2-2).

Food distributed through the Country Foods program between 1994 and 2000 included beaver (201 kg/year), rabbit (14 kg/year), and muskrat (<1 kg/year, Appendix 4). Of these, only beaver and rabbit were consumed to any notable degree, representing approximately 5% and 3% of the total number of meat meals, respectively (Table 2-4). It should be noted that the Country Foods program accounts for a very small percentage of the rabbit (1%) and beaver (10%) consumed (Table 2-4). Grouse, squirrel, muskrat, and

lynx are also harvested, however, their combined total represents less than 1% of meat meals consumed by members of NCN (Table 2-4).

Grouse hunting activity occurred primarily in zones 1 (36%), 2 (22%), and 3 (33%) (Table 2-2). Grouse were harvested in all months, (with the exceptions of September 2001 and May-July 2002), although most hunting attempts occurred in October (22%), November (46%), and April (13%, Table 2-3).

A total of 88 grouse were reported harvested between August 2001 and July 2002, yielding a total estimated harvest of 289 grouse for the entire community (Table A3-8 and Table 2-3). Harvests in October, November, and April accounted for 32%, 34%, and 18% respectively, of the total numbers of grouse harvested (Table 2-3).

With the exception of grouse, most other small game harvesting activity occurred in the winter, with 69% occurring in the months of November (25%), December (20%), and January (24%) (Table 2-3).

Estimated small game harvests for August 2001 to July 2002 included 1322 rabbits, 235 beaver, and 93 marten, accounting for 74%, 13%, and 5% of the total small game harvest, respectively (Table 2-3). The majority of animals were taken in Zone 3 (44%) and Zone 1 (32%), with 12% coming from Zone 2, the Wuskwatim study area (Table 2-2). Forty-eight percent of the beaver were harvested in Zone 1 near the community, 25% in Zone 3 north of PR 391, and 20% from unspecified locations. Rabbits were most frequently taken in Zone 3 (45%), followed by Zone 1 (32%), and Zone 2 (11%). Marten were most frequently harvested in Zone 3 (78%), followed by Zone 2 (14%) and unspecified locations (Zone 0, 8%). No marten were taken from Zone 1 (Table 2-2).

Waterfowl

The majority of waterfowl hunting activity from August 2001 to July 2002 occurred in Zone 3 (37%), followed by Zone 1 (36%), Zone 2 (13%), and unspecified locations (12%) (Table 2-2). There was no waterfowl hunting in Zone 4, west of Wuskwatim Lake and south of Threepoint and Wapisu lakes, and only 2% occurred outside of the RMA (Zone 5). NCN resource managers reported that a group of hunters often flies into Apeganau Lake during spring to hunt waterfowl. No specific fly-in areas for waterfowl hunting were identified in the Wuskwatim study area (Zone 2). Some NCN members travel as far as the Churchill area to hunt geese.

Waterfowl hunting is primarily concentrated during spring (67% of the waterfowl harvests were taken in April/May) when birds returning north concentrate in areas of

open water (Table 2-3). Waterfowl hunting also occurs in fall (25% of the waterfowl harvests were taken in September/October) during the southern **migration**.

It is estimated that geese (68 kg/year) and ducks (23 kg/year, Appendix 5) distributed by the Country Foods program between 1994 and 2000 would have accounted for approximately 6% of waterfowl consumed on an annual basis by NCN members (based on Harvest Calendar data, Table 2-4). Waterfowl accounted for an estimated 4% of the total number of country foods meat meals consumed by members of NCN (Table 2-4). It is estimated that slightly more geese were consumed compared to ducks (Table 2-4).

Duck hunting activity in 2001/2002 was concentrated in Zone 1, near the community and Zone 3, north of PR 391 (32% each), with 20% occurring in the Wuskwatim study area (Zone 2), and 12% at unspecified locations (Table 2-2). Only 4% of duck hunting activity occurred outside of the RMA (Zone 5).

A total of 191 ducks were harvested between August 2001 and July 2002, for an estimated community total of 1032 (Table A3-8 and Table 2-3). Most ducks were obtained from Zone 3 (41%), with 20% harvested from Zone 1, 19% from unspecified locations, and 19% from Zone 2 (Table 2-2).

Similar to duck hunting, goose hunting activity was concentrated north of and near the community in zones 3 (44%) and 1 (41%), with 13 % occurring in unspecified locations (Table 2-2). Only 2% of goose hunting activity occurred in the Wuskwatim study area (Zone 2), while no goose hunting occurred outside of the RMA (Zone 5).

A total of 56 geese were reported harvested between August 2001 and July 2002, yielding an estimated community harvest of 419 (Table A3-8 and Table 2-3). Most geese were harvested from Zone 1 (60%), followed by Zone 3 (32%), unspecified locations (7%), and Zone 2 (<1%) (Table 2-2).

2.3.4 Domestic Fishing

Domestic fishing occurs throughout the year and includes methods such as angling, snaring and netting. Catches are often shared within families and the community and, based on Harvest Calendar and Country Foods Program data, provided an estimated 62,005 meals to NCN residents in 2001/2002 (or approximately 2% of all meals consumed) (Table 2-4). As with most traditional activities, fishing is often conducted while participating in other resource harvesting activities. Commercial fishers also reported that they generally keep a portion of non-saleable fish from their catch, such as longnose (red) sucker, for domestic use.

The most common fish species (based on weight) distributed annually by the NCN Country Foods Program between 1994 and 2000 were lake whitefish (2829 kg), pickerel (222 kg), northern pike (151 kg), sucker (34 kg), tullibee (lake cisco; 29 kg), and lake trout (17 kg, Appendix 4). Longnose sucker, lake whitefish, and northern pike are commonly smoked prior to distribution. Table 2-5 provides a summary of the types and forms of fish distributed by the NCN Country Foods Program and the harvest locations. Leftrook and Footprint lakes are reserved for domestic fishing only.

Access is a key factor limiting the **domestic fishery** in the RMA. Harvest Calendar data show that 64% of domestic fishing effort was concentrated around Nelson House (Zone 1), including Footprint and Threepoint lakes, from August 2001 to July 2002 (Table 2-2). A considerable amount of fishing (29%) also occurred north of PR 391 in Zone 3. Very little (4%) domestic fishing was conducted in Zone 2 (the Project study area). Domestic harvesting most often targeted pickerel (walleye, 32%), northern pike (jackfish, 30%), and lake whitefish (10%). Fishing activity for pickerel and northern pike was concentrated around Nelson House in Zone 1, whereas fishing for lake whitefish was concentrated north of PR 391 in Zone 3 (Table 2-2). Spring efforts often focus on runs of spawning fish in creeks located along PR 391.

Some NCN resource harvesters consider lake whitefish from Wuskwatim Lake to be of higher quality than lake whitefish from Footprint or Threepoint lakes. In fish quality testing conducted by the University of Manitoba Faculty of Food Sciences, lake whitefish from Wuskwatim Lake were classified highest in terms of "acceptability" by NCN residents (Ryland and Watts 2002). However, it should be noted that lake whitefish and pickerel from all locations sampled from within the RMA were liked "moderately", and no significant differences were found among any of the lakes for any fish species. Despite the high regard for fish in Wuskwatim Lake, poor access and unsafe conditions restrict the amount of domestic fishing that occurs on the lake to a negligible level.

Table 2-5. Species, form, and harvest locations of fish distributed by the Nelson House Country Foods Program from 1994 to 2000.

Fish Species	**Form**	**Harvest Lakes**
Lake Whitefish	Whole Fillets Smoked	Footprint Lake, Suwannee Lake, Osik Lake, Footprint River, Mile 55, Wapisu Lake, Threepoint Lake, Rat Lake, Burntwood River, Notigi Lake, Pemichigamau Lake, Harding Lake, Little Puk, Baldock Lake, Moak Lake, Burntwood Lake, Leftrook Lake, Moski Lake, Wuskwatim Lake, Blackwater Lake, Livingston Lake, Barnes Lake
Red Sucker (Longnose sucker)	Heads Smoked	Suwannee Lake, Footprint River, Osik Lake, Leftrook Lake, Wapisu Lake, Notigi Lake, Threepoint Lake, Rat Lake, Pemichigamau Lake, Mynarski Lake, Squirrel Lake, Little Puk
Pickerel (Walleye)	Fillets Whole	Leftrook Lake, Suwannee Lake, Footprint River, Mile 55, Hatch Lake, Okaw Lake, Baldock Lake
Northern Pike (Jackfish)	Whole Fillets Smoked	Suwannee Lake, Footprint Lake, Leftrook Lake, Footprint River, Harding Lake, Notigi Lake, Wapisu Lake, Osik Lake, Baldock Lake, Moski Lake, Burtwood Lake, Threepoint Lake Whitestone Lake
Lake Trout	Whole	small lake near SIL
Tullibee (Cisco)	Whole	Suwannee Lake, Footprint Lake, Footprint River

Fishing activity occurred most frequently in June and July (18% and 17% respectively) and October (12%) and at lower levels for the other months (Table 2-3). Northern pike and pickerel were targeted most frequently in June (25% and 19% respectively), while suckers, tullibee, and lake whitefish were targeted most frequently in October (46%, 41%, and 25% respectively).

Nelson House residents harvested an estimated 13,007 fish from August 2001 to July 2002 (excluding Country Foods Program harvests) (Table 2-3). The harvest was comprised primarily of pickerel (43%), followed by northern pike (17%), lake whitefish (16%), tullibee (8%), suckers (5%), unidentified fish (9%), maria (1%) and perch (1%). The majority of the harvest (51%) came from Zone 3 and 47% of the harvest came from Zone 1 (Table 2-2). Zone 2 yielded an estimated catch of only 23 northern pike, which represented 1% of the total harvest from the RMA. Fifty-three percent of the pickerel, 48% of the lake whitefish, 39% of the northern pike, 75% of the suckers, and 74% of the tullibee were harvested from Zone 3 (Table 2-2). The majority of fish were harvested in October (33%) and June (19%). However, most maria were harvested in the winter and most yellow perch in July.

Due to high **mercury** levels, northern pike in Rat Lake and pickerel in Notigi and Wuskwatim lakes are currently not being accepted for commercial sale by Freshwater Fish Marketing Corporation (FFMC). While these closures do not apply to the domestic harvest, such closures can discourage people from harvesting fish for domestic use. (It should be noted that recent **monitoring** conducted as part of the Joint Study Program has shown that mercury levels in pickerel from Wuskwatim Lake are below the commercial sales limit for Canada).

2.3.5 Resource Gathering

In addition to fish, birds, and mammals, northern forests provide First Nations peoples with plants for food, medicines, fuel, building materials, and craft items. Arnason et al. (1981) reported at least 175 food plants and 52 beverage plants gathered by Native peoples in eastern Canada. Although not as important to the local economy of First Nations communities as it was historically, resource gathering continues to provide a significant contribution to domestic needs within the community and an opportunity for First Nations to remain in close contact with the land.

Berries

Berries ranked third, in terms of weight, in quantity of food items distributed by the Country Foods Program from 1994 to 2000 (Appendix 4). An average of 302 kg of

berries were distributed annually of which 54% were blueberries, 28% were cranberries, and 19% were raspberries/strawberries (Table 2-4).

Berry gathering occurs in a relatively restricted time during summer and fall when the berries are ripe. Based on Harvest Calendar data an estimated 365 individual days were spent harvesting berries between August 2001 and July 2002 (Table 2-3). The majority of trips were made in August (43%), followed by July (26%) and September (19%, Table 2-3). Berry harvesting activity was concentrated in Zone 1 (57%) with lower activity in Zone 2 (21%) and Zone 3 (18%, Table 2-2). Most harvesting trips were for blueberries and cranberries (34% each).

Excluding country foods harvests, residents of Nelson House harvested an estimated 2735 litres of berries from August 2001 to July 2002 (Table 2-3). Blueberries comprised the majority (50%) of the harvest, followed by cranberries (28%), and raspberries (17%). The majority of berries were harvested from Zone 1 (63%), followed by Zone 2 (19%), and Zone 3 (8%, Table 2-2). Berry picking is generally a family activity and ease of access is an important factor in determining berry-picking locations. Consequently, berry picking is focused on areas near Nelson House in Zone 1 and along PR 391 in Zone 2 (Table A3-4).

Plants and Other Items

Medicinal plants have been, and continue to be, particularly important to NCN members; NCN medicine men such as the late Mr. Nazar Linklater were known across Canada for their vast knowledge in this area. NCN Elders noted that the harvesting of medicinal plants, both in regards to harvesting techniques and locations of harvests, have strong cultural and spiritual links. Elders also noted that medicinal plants from areas affected by CRD appear to have decreased strength or potency.

Plants identified in the Harvest Calendar as being collected included: bark, devil's claw, driftwood, **herb**s, juniper, Labrador tea, mint, poplar buds, spruce buds, wakinakan, wihkis, mushrooms (actually a **fungus**), and "medicinal plants" (tables 2-2 and 2-3). According to NCN members, factors that limit the collection of traditional plants include: knowledge of plants, access, and need. Safe access to locations where traditional plants grow was a concern noted by commercial trappers.

Between August 2001 and July 2002, plant harvests were reported from all areas within the Nelson House RMA with the exception of Zone 4 (Table 2-3). Of the total harvesting time reported, 50% was spent in Zone 1, near Nelson House, Footprint Lake, Threepoint Lake and Wapisu Lake (Table 2-2). Twenty-six percent of plant harvesting activity

occurred in Zone 2, and 20% in Zone 3, north of PR 391 (Table 2-2). Wihkis (ginger root) was the most frequently sought after plant, accounting for 33% of the harvesting activity, followed by medicinal plants (30%), herbs (10%), and poplar buds (6%). Most harvesting activity occurred in October (35%), with relatively large percentages also occurring in August, June, and July (16%, 12%, and 12%, respectively, Table 2-3). A smaller level of harvesting activity (1 to 8%) occurred in all other months, with the exception of Febr0uary, when no harvest occurred.

Plants classified, as "medicinal" comprised 38% of all plant harvests reported. The next most frequently harvested plants included wihkis (29% of the harvest), herbs (7%), and poplar buds (4%, tables 2-2 and 2-3). Wihkis was primarily harvested in October (48%), and in Zone 1 (52%). Eight percent of the wihkis harvest came from Zone 2, the Wuskwatim study area and 31% from Zone 3. The majority of medicinal plant (39%), herb (82%), and poplar bud (84%) harvests also occurred in Zone 1, near the community (Table 2-2). NCN resource users and harvesters listed wihkis, mint, and spruce gum as the most frequently harvested medicinal plants.

Harvests at Wuskwatim Lake accounted for 60% of the activity in Zone 2, and included wihkis, poplar buds, and spruce buds (Table A3-4). All of this harvest occurred during August of 2001. Almost all commercial trappers and fishers operating in the Wuskwatim Lake study area reported collecting plants. Some plants identified from the Wuskwatim area are considered rare in other parts of the RMA (e.g., saskatoons). Resource harvesters indicated that **flood**ing from CRD has made harvesting of medicinal plants at Wuskwatim Lake more difficult than it was prior to 1976. One trapper indicated that plant harvests are excellent at Bison Lake because there is no flooding there.

In addition to plants and berries, commercial trappers and fishers indicated that gull eggs were also periodically collected for consumption. A small lake south of the Wuskwatim study area was identified as a location where gull eggs could be harvested.

2.4 IMPACTS AND MITIGATION

Positive and negative effects to traditional resource use during construction and operation of the Project have the potential to occur as a result of the following:

- increased access;
- presence of a large workforce;
- **terrestrial** habitat loss;
- disturbances from Project construction;
- disturbances from Project operation;

- change in water level regime and **flow**s; and
- increased wage economy.

2.4.1 Increased Access

Traditional resource use is presently limited in the Wuskwatim area due to poor access. The Wuskwatim road will provide access to an area that is currently only accessible by foot, boat (e.g., on the Sapochi or Burntwood rivers), snow machine, or all-terrain vehicle on relatively rough trails. NCN residents have stated that once road access is provided, they will have an interest in travelling to the Wuskwatim Lake area to undertake traditional resource harvesting activities. It is also expected that commercial and recreational resource users will have an interest in accessing the area. The increased interest in the Wuskwatim area will result in a shift in resource use activity in the RMA. The extent to which resource use increases in the Wuskwatim area will depend on measures implemented by NCN, Manitoba Hydro, and **Manitoba Conservation**.

During construction, access will be controlled at PR 391 by a staffed gate and will be limited to construction crews. Access by others will be by special arrangement only. NCN and Manitoba Hydro, in consultation with the Nelson House Resource Management Board, will develop an Access Management Plan for the construction period prior to the start of construction (Appendix 3, Volume 3). An Access Management Plan for the operation period will be developed at the end of the construction period. Measures included in the Plan will directly influence the amount of harvesting that will occur in the Wuskwatim area during and after construction.

Harvest calendar data indicate that increased access generally results in increased levels of domestic hunting, fishing and gathering. In 2001/2002, 11% of resource harvesting activity by residents of Nelson House occurred in the study area (Zone 2), and only 16% of that harvesting activity was reported from the Wuskwatim Lake area. The proportion of the community harvest that came from Zone 2 ranged from 2% of geese to 15% of moose. It is anticipated that if access if provided to the Wuskwatim Lake area, both harvesting activity and harvests within the area will increase (pers. comm. NCN Resource Programs staff 2002). This will redistribute some of the domestic harvesting activity from other areas within the RMA (specifically zone 1).

Domestic Hunting

The Access Management Plan will state who will be provided access to the Wuskwatim area during construction and operation. During construction, hunting would not be allowed near the access road or work areas due to safety concerns.

If NCN members are provided access it will likely result in an increase in domestic hunting activity in the Wuskwatim area, particularly for moose and waterfowl. It is expected that the majority of effort would be redistributed from elsewhere in the RMA. Domestic hunters from NCN will view increased access as a positive effect. However, the increased hunting pressure could have a negative effect on local animal populations.

Because of the history of limited access into the area, it is anticipated that there will be a perception that moose densities are higher in the Wuskwatim area than other more accessible areas within the Nelson House RMA. Consequently, if access is provided it is expected that moose harvesting activity in Zone 2 by Nelson House residents (60 days in 2001/2002) will increase by 2-3 times and approach the level of activity reported for zones 3 (113 days in 2001/2002) and 1 (199 days in 2001/2002). It is expected that over the first few years after construction moose harvests from the Wuskwatim area (Zone 2) will exceed the current level. After completion of the Project, the Wuskwatim area (Zone 2) will continue to draw some domestic moose hunting pressure away from Zones 1 and 3, such that all three zones will probably have similar moose hunting effort. However, it is expected that after an initial increase in harvest, the number of moose harvested in Zone 2 will be similar to Zone 1 (because of similar access).

Domestic harvests of small game would also be expected to increase in Wuskwatim area if the use of the four traplines directly affected by the Project increases (Section 4). Waterfowl hunting activity and harvests in Zone 2 would also increase with access, drawing some of the hunting pressure from Zones 1 and 3, and approaching the hunting activity and harvests in those zones. The redistribution of resource harvesting effort would result in a corresponding decrease in harvests from the areas in which resource harvesting previously occurred.

NCN has identified increased access and harvesting by non-NCN members, and subsequent effects on resource populations, as a key concern related to the Project. Increased road access into the Pinehouse region of northern Saskatchewan resulted in increased demand by southern economic interests for resources on the community's land base (Northern Village of Pinehouse 1987). An increased level of recreational hunting in the Wuskwatim area would contribute to a reduction of animals in the area available to domestic hunters. This is not expected to be an issue during construction, however, as gated access and restrictions on weapons will likely preclude recreational hunting in the Project area. The Access Management Plan will determine the level of access provided to recreational resource users during Project operation. Management of harvests by recreational hunters is ultimately the responsibility of Manitoba Conservation. Use of the Nelson House RMA by First Nation members from outside of the area is not expected to

increase noticeably because of increased access. According to NCN Resource Program staff, aboriginal harvesters generally respect RMA boundaries and harvest within their own areas.

Woodland caribou are known to use the Project area for migration, feeding, and calving. Increased access to the area will increase the probability of human/caribou encounters and caribou harvests. According to NCN Resources Program staff, NCN residents do not generally target caribou when hunting but will occasionally harvest the animals when encountered. Harvests are generally restricted to Elders who share the animals within the community. As a result, NCN Resource Program staff does not anticipate that additional harvests of caribou by NCN members as a result of the road will be significant. A Woodland Caribou Conservation Awareness Program stressing the vulnerability and scarcity of the species will be implemented during road construction to **mitigate** the potential for increased harvests.

Domestic Fishing

The Access Management Plan will state who will be provided access to the Wuskwatim area during construction and operation. If NCN members are provided access it will likely result in an increase in domestic fishing activity on Wuskwatim Lake. Much of the increased effort would probably be redirected from elsewhere in the RMA. An increase in domestic fishing effort will be moderated to some degree by the distance of Wuskwatim Lake from Nelson House (~ 50 **km** by road). However, local resource users have indicated that lake whitefish from Wuskwatim Lake are considered to be of high quality and will be of interest to domestic fishers. It is expected that the annual domestic harvest after access is provided to Wuskwatim Lake will be similar to, or less than, the harvest from Threepoint Lake as estimated from Harvest Calendar data in 2001/2002 (n= 1,605 fish). **Species composition** of the domestic catch would be similar to recent experimental and commercial catches from Wuskwatim Lake as follows: 10% pickerel, 36% lake whitefish, 7% northern pike, 26% tullibee, and 21% other species. According to NCN Resource Program staff, increased access to Wuskwatim Lake would be viewed as a positive effect by NCN domestic fishers.

Commercial and recreational fishers will also have an interest in accessing Wuskwatim Lake and will compete for resources with domestic fishers. Measures outlined in the Access Management Plan will ultimately determine the level of harvest that occurs by these groups in the Wuskwatim Lake area. Increased harvests by commercial and recreational fishers would have a negative effect on the resources available to domestic fishers.

Gathering

Harvest Calendar data indicated that berry-picking by NCN residents was heavily dependent on access and was primarily focused on road-accessible areas. It is expected that with increased access there would be some interest in berry picking activity in the Wuskwatim area. Any increase in berry-picking effort in the Wuskwatim area would likely be small and redirected from other locations within the RMA. Measures in the Access Management Plan will determine when and if berry-picking effort will increase in the Wuskwatim area.

Gathering of medicinal plants and other forest resources is expected to increase as access increases. NCN Elders indicated that some plants found in the Wuskwatim area are rare in other areas of the Nelson House RMA (i.e., saskatoons). It is expected that increased access will facilitate the harvesting of these and other plants that are more common in the Wuskwatim area. Measures in the Access Management Plan will determine the degree to which the gathering of medicinal plants will increase in the Wuskwatim area.

Other Considerations

The Project will provide a safe all-season means of crossing the Burntwood River and accessing resource harvesting areas to the south. Whether access will be provided and to whom, will be determined by the Access Management Plan. The additional access would be especially beneficial to the trapline holders in the area who are expected to increase commercial production (Section 4). Domestic harvesting activity and harvests are expected to increase concurrent with the commercial activity. Limited access into the area south of the Burntwood River will moderate the potential for increased harvests by other domestic resource harvesters. Access downstream of the Wuskwatim G.S. will remain difficult after completion of the Project because of dangerous water conditions and a lack of trails. Potential resource harvesting impacts from increased access across the Burntwood River via the Generating Station will be mitigated through measures recommended by the Access Management Committee.

Increased access is also expected to increase the demand by NCN residents to construct cabins on Wuskwatim Lake and along the access road. The number of cabins built on Wuskwatim Lake is not expected to exceed the number currently on Threepoint Lake (8). Cabin construction will be regulated under existing permitting by Manitoba Conservation and reviewed jointly by the Nelson House Resource Management Board. Overall, the presence of increased numbers of people in the Wuskwatim area will increase the probability of cabin vandalism and environmental disturbances such as fuel spills, garbage, and forest fires. Manitoba Hydro and NCN will implement educational

programs and provide signage to encourage people to respect local property and to protect against forest fires and other environmental damage.

2.4.2 Presence of a Large Workforce

During peak construction, there will be approximately 600 people employed by the Project of which approximately half will be people from the south and approximately 150 will be Aboriginal peoples from other locations in northern Manitoba. The remainder of the workers will be NCN members. Non-NCN workers will compete for space and resources with domestic harvesters from Nelson House. The presence of the workforce will increase the probability of cabin vandalism and environmental disturbances such as fuel spills, garbage, and forest fires. The ability of the workforce to harvest resources in the Wuskwatim area will be addressed through the Access Management Plan and will be discussed with the Nelson House Resource Management Board.

In addition to measures in the Access Management Plan, restrictions on gun possession and long work days (six 9-hour days per week) will likely preclude hunting and reduce fishing and gathering in the Wuskwatim area by the workforce. However, it is expected that there will be some harvest of resources from other locations in the RMA by the workforce. To put the magnitude of the non-aboriginal workers from the south (~300) into context, it amounts to approximately 3% of the non-aboriginal adult population of Thompson (~8,700). If it is assumed the non-aboriginal workers will harvest resources in the Nelson House RMA at the same frequency as Thompson's non-aboriginal adult population, then it would be expected that non-aboriginal harvests and harvesting activity within the RMA during construction would increase by approximately 3%.

Although there are no records of resource harvests from the Nelson House RMA by non-aboriginals, provincial harvest records for big game animals from Game Hunting areas 9 and 9A (of which the Nelson House RMA comprises about 20%) provides an estimate of the potential magnitude of the additional harvesting activity. A 3% increase in one-fifth of the average resident moose harvest from these game-hunting areas from 1993/94 through 2000/2001 equates to < 1 moose per year. Such a harvest is not expected to have a noticeable effect on the availability of animals for NCN domestic hunters. Similarly, a 3% increase in fishing and waterfowl hunting by non-aboriginals within the Nelson House RMA would have little noticeable effect on the availability of fish or birds for NCN resource harvesters.

To put the magnitude of potential harvests by aboriginal workers from communities other than Nelson House into perspective, it can be assumed that approximately 50% of the 150 outside aboriginal workers during peak construction will be resource harvesters (based on

Harvest Calendar results from Nelson House 2001/2002). If half of these individuals (n=35) chose to hunt for moose within the Nelson House RMA (it is probable that the proportion would be less) and had similar success as Nelson House domestic hunters and Manitoba recreational hunters (approximately 20% - from Harvest Calendar results and Manitoba Conservation 2002a), there is potential for an additional harvest of seven moose annually from the Nelson House RMA during the peak construction period. This could have a short-term negative effect on local moose abundance, and therefore on NCN resource harvesters. However, because aboriginal workers will not be familiar with the area and will have limited time to harvest due to long work days, it is likely harvests will be much lower and have little noticeable affect on NCN resource harvesters. There will also be an increased potential for caribou harvests by aboriginal workers, which will be mitigated by implementation of a Woodland Caribou Conservation Awareness Program during construction stressing the vulnerability and scarcity of woodland caribou.

2.4.3 Terrestrial Habitat Loss

Only 11% of harvesting activity reported by Nelson House residents occurred within the Wuskwatim area (Zone 2) in 2001/2002, most of which occurred adjacent to PR 391. Very little resource harvesting activity occurred near the access road or generating station locations. The majority of disturbances and habitat loss associated with construction will occur in areas where little resource harvesting has taken place in the recent past.

Habitat losses, resulting from **borrow pit** excavation and camp construction, are not expected to have a significant effect on regional animal populations (Volume 6). A stand of balsam fir, which is used for medicinal purposes, will be lost in the **footprint** of the **generating station**, and other medicinal plants are expected to be lost where vegetation clearing occurs. However, plants of interest to resource harvesters that will be affected by terrestrial habitat loss are commonly found elsewhere within the RMA (Volume 6).

2.4.4 Disturbances from Project Construction

Disturbances related to construction of the access road and generating station, and to the presence of increased people and traffic, will have a negative effect on the environmental setting of the Wuskwatim Lake area. Commercial trappers from NCN stated that construction noises would frighten animals and cause them to avoid the areas during the construction phase. The disturbances are not expected to affect the long-term abundance of animals in the area available to resource harvesters, however, resource harvesters may notice a small short-term decrease in the abundance of animals in the immediate area of disturbance (Volume 6). Increased traffic on PR 391 may have a small short-term

negative effect on cabin use and berry picking areas. There are 17 cabins adjacent to PR 391, many within 100 **m** and in direct view of the road. A substantial amount of berry picking activity is also known to occur adjacent to the road. With the exception of noise, disturbances to existing cabin users on Wuskwatim Lake from Project construction are expected to be minimal as the cabins are located approximately 6 km from the Project site. If traditional resource harvesters are permitted into the area, Manitoba Hydro will implement educational programs in relation to construction activities and safety concerns.

In summary, disturbances to resource users as a result of construction activity are expected to be negative, moderate, short-term and localized to the Wuskwatim Lake area and PR 391.

2.4.5 Disturbances from Project Operation

Operation of the Project will affect traditional resource users by changing the environmental setting on Wuskwatim Lake, causing safety concerns near the Generating Station, and causing a small increase in traffic on PR 391 and on the access road. Manitoba Hydro will implement an educational program and signage in relation to safety concerns for resource harvesters in the area. Because little resource use currently occurs in the area, it could be surmised that setting changes will have little effect on traditional resource use. However, the overall effect of operational disturbances will depend on perception, and be specific to each individual resource user.

2.4.6 Change in Water Level Regime and Flows

Changes to shoreline habitat as a result of changes to the water regime upstream of the generating station are not expected to have a significant effect on animal abundance in the Wuskwatim area (Volume 6) and, therefore, should have no affect on the availability of animals for harvest. Changes in abundance of wihkis (sweet flag), wisayimina (mountain cranberry), ithinimina (velvet blueberry), and bog cranberry are expected to be negligible or positive as a result of higher and stable water levels. Wild mint (wehkuskwa) is the only domestic resource for which a reduction in abundance is expected as a result of the change in water level regime (Volume 6). However, wild mint is widespread in the region, and losses are expected to have no effect on resource use. Increased and stabilized water levels are expected to have a small long-term positive impact on fish populations (Volume 5), which should have a small, long-term, positive effect on traditional resource harvesters.

The change in water level regime upstream of the proposed generating station will increase shoreline **erosion** and woody debris (Volume 4) and could make it incrementally

more difficult for resource harvesters to access shorelines and to secure boats. However, more stable water levels will facilitate shoreline access to some degree by decreasing the distance that boats will need to be pulled up on shore. Most of the additional debris entering the lake is expected to remain trapped behind the existing floating debris mat on the shorelines and should not have a noticeable effect on navigation (Volume 4). However, NCN fishers expect that the increased levels of debris will be mobilized by ice and high water and will have a negative effect on domestic fishing efforts by causing increased levels of debris in nets. Floating debris hazards will be monitored and mitigated as required. Ice conditions are not expected to change on the lake (Volume 4) and, therefore, winter traveling conditions are not expected to change. Safety concerns with regard to navigation will be communicated through signage and educational programs.

Water levels downstream of generating station will fluctuate by a greater magnitude and more rapidly than the existing regime (Volume 4) and will make travel in this reach even more difficult than it is now. However, there is currently little travel in this reach because of poor access, fast water and impassable falls.

Increased water levels upstream are expected to cause mercury **concentration**s in some fish species to rise marginally after construction of the Project (Volume 5), which could decrease the demand to harvest fish for domestic consumption. However, this is not expected to be a major deterrent to domestic fishers, as post-Project mercury levels will remain lower than current mercury levels in fish from Footprint and Threepoint lakes. The abundance of northern pike, which act as the primary host for *Triaenophorus crassus* (a tapeworm which **encysts** in the flesh of whitefish), is expected to increase marginally as a result of the Project, but the degree to which this will affect cyst levels in lake whitefish is uncertain (Volume 5). Lake whitefish catches will be monitored to determine if infection levels change as a result of the Project.

Some NCN residents have stated that flooding decreases the potency of some medicinal plants. This may decrease interest in harvesting some medicinal plants along shorelines in the Wuskwatim area. Increased erosion is expected to increase levels of total suspended solids in nearshore areas (Volume 4), which could decrease drinking water quality for those resource harvesters who take their water near shore or require harvesters to take their water further offshore

Changes in the water level regime and flows are expected to have a small long-term negative effect on the quality of resources available to traditional resource users in the Wuskwatim area.

Water levels and flows downstream of the Project will remain highly variable and should have no effect on resource harvesting activity in the area.

2.4.7 Increased Wage Economy

Increased employment and increased income as a result of the Project (Volume 8) will have counteracting effects on domestic resource use activity. Local residents that gain employment as a result of construction will have less time to use cabins and pursue traditional domestic resource gathering, hunting and fishing activities. Wolfe and Walker (1987), who studied subsistence economies in Alaska, showed an inverse relationship between a community's average personal income level and subsistence productivity. However, increased incomes will also increase the ability of local residents to purchase resource-harvesting equipment such as trucks, boats, snowmobiles, ATVs, nets and guns, and to construct cabins, which would facilitate increased harvesting activity. Wein and Sabry (1988) examined native food use near Wood Buffalo National Park and concluded that the availability of country foods within a household was largely dependent on a means of transportation for hunting.

The majority of construction employment will occur during the summer months, with a large proportion of the local construction workers laid-off during winter (Volume 8). Consequently, resource harvesting activity is expected to decrease in the summer months during peak employment periods, but increase during winter months when construction activity is low.

The long-term effect of the increased wage economy remains uncertain. It is expected that some of the shift away from traditional resource use caused by the increase in wage economy will be mitigated by promotion of traditional lifestyles by NCN.

3.0 COMMERCIAL FISHING

3.1 INTRODUCTION

Manitoba's commercial fisheries account for 25% of all freshwater fish harvested in Canada and contribute significantly to the province's economy. The commercial fishing industry is extremely important in northern Manitoba, and especially within First Nations communities, where other economic opportunities are often limited. Commercial fishing is one of the few sectors of the cash economy in which aboriginals can participate while maintaining their traditional subsistence lifestyle.

3.2 APPROACH AND METHODS

A community meeting was held with Nelson House commercial fishers in Nelson House on January 28, 2002. The meeting was advertised on the radio and individual fishers were contacted and asked to attend. The meeting consisted of an informal question and answer period that focused on the existing commercial fishing environment within the proposed study area and how that environment may change as a result of the Project. The interview guide used at the meeting is provided in Appendix 6. Key person interviews were also conducted with the Manager of the Nelson House Fishermen's Co-op in 2001 the Manitoba Conservation Regional Fisheries Biologist in Thompson, the NCN Resource and Land Use Planning Coordinator, and the Program Coordinator of the NCN Resource Management Program.

Data on the commercial fishery within the Nelson House RMA were obtained from Manitoba Fisheries Branch. Information on fish quality and mercury closures was obtained from the Freshwater Fish Marketing Corporation (FFMC) in Winnipeg.

3.3 EXISTING ENVIRONMENT

Manitoba

Approximately 300 lakes in Manitoba are listed in the commercial harvest schedule. From 1990 to 2000, Manitoba's commercial fisheries produced an average of 11.6 million kg of fish annually (Manitoba Conservation 2001a). Northern lakes contributed approximately 24% of the total provincial production and almost 20% of the landed value.

Pickerel (walleye) are the most valuable species in Manitoba's commercial fishery, comprising approximately 50% of the landed value (Manitoba Conservation 2001a). Sauger (19%), lake whitefish (11%), northern pike (6%) and yellow perch (6%) comprise most of the remaining value. Suckers account for 20% of the marketed weight, but only 3% of the total landed value of the fishery.

In northern Manitoba, lake whitefish are the most valuable species (accounting for 29% of the open-water catch value), followed by northern pike (24%), suckers (22%) and pickerel (19%) (Manitoba Conservation 2001a). An average of 733 fishers were employed annually in northern Manitoba fisheries from 1990-2000, earning an average income of $6,449 (2002 dollars) per fisher before expenses (Manitoba Conservation 2001a). Expenses incurred by fishers include the costs of boats, motors, gasoline, nets, helpers, etc.

Nelson House RMA

The Nelson House RMA contains 47 lakes for which names can be found on NTS maps or in Manitoba Conservation databases, 29 of which have been fished commercially since 1976. Approximately half of the lakes that have been fished are accessible by road or boat, while the others are more remote and primarily accessed by aircraft. Twenty-six of the lakes have been assigned quotas by Manitoba Fisheries Branch (Table 3-1). Lakes without quotas have had very little production, are remote, and/or have been fished on no more than three occasions. Leftrook and Footprint lakes are reserved for domestic fishing. Manitoba Conservation has allocated the responsibility of assigning commercial fishers to lakes within the RMA to the Nelson House Fishermen's Association. Lakes assigned to NCN are divided up among the fishers primarily based on past fishing experience. Residents of Granville Lake and South Indian Lake fish some of the lakes within the Nelson House RMA.

Harvesting of commercial fish within the RMA is conducted with **gill net**s. Gillnet mesh size is restricted to not less than 108 **mm** on all lakes, with the exception of Rat, Wapisu, and Threepoint, where gillnet mesh size is restricted to not less than 127 mm. The larger mesh size is intended to target lake whitefish rather than pickerel.

Table 3-1. Lakes assigned commercial fishing quotas and/or commercially fished in the Nelson House RMA, 1976-2002.

Lake	Quota (kg)	Lake	Quota (kg)
Gauer	32700	Osik	4600
Rat	20500	Ospwagon	4600
Baldock	18200	Pemichigamau	4600
Wuskwatim	18200	Macheewin	2300
Mynarski	14600	Mooswu	2300
Uhlman	13800	Roe	2300
Wapisu	13700	Esker	1500
Harding	9100	Opegano	1000
Notigi	8200	Hunter	1000
Suwannee	7600	Barnes	-
Issett	6900	Pemichigamali	-
Apeganau	6900	Ridge	-
Kinwaw	6800	Numapin	-
Rusty	5500	Goodwin	-
Threepoint	4600	Karsakuwigamak	-
Livingston	4600	Kinosaskaw	-
Costello	4600	Leftrook	Domestic

The majority of lakes with commercial quotas in the Nelson House RMA are open to commercial fishing year-round, with the exception of May 1 to May 31, and from October 21 to "when ice first makes after November 1". Opegano Lake, which is only open for commercial fishing from June 1 to October 20, and Esker and Hunter lakes, which are only open from "when ice first makes after November 1" to April 30, are the exceptions.

From 1976 to 2002, the average annual value of commercial fish production from the Nelson House RMA was $215,714 (2002 dollars) (Table A5-1, Table A5-2). The most valuable catches came from Gauer, Mynarski, Suwannee, Wuskwatim, Uhlman, Baldock and Rat lakes (Table 3-2). Pickerel accounted for approximately 49% of the value of the fishery during this period, with lake whitefish (32%) and northern pike (16%) generating most of the remaining revenue. Over 90% of the value of the fishery was produced during the open-water season.

Eight lakes were fished during the open-water season of 2002, producing a total of 80,758 kg of whitefish, pickerel, northern pike, and "other species", such as lake trout, sauger, suckers, and tullibee worth $186,060. Suwannee (27,222 kg), Gauer (15,048 kg), Rat (14,792 kg), Uhlman (9,057 kg), and Issett (6,807 kg) lakes had the highest production. No commercial fishing was conducted during winter 2001/2002. Commercial production from all lakes in the RMA since 1976 is provided in Appendix 5.

Commercial fish taken from lakes in the Nelson House RMA are delivered to one of three fish processing plants: Nelson House, Wabowden, or Leaf Rapids. Fishers generally deliver their fish to the nearest of the three plants to minimize costs. The Nelson House Plant is owned by the Freshwater Fish Marketing Corporation and operated by the Nelson House Fishermen's Association. The Fishermen's Association hires an individual to coordinate the commercial fishing program and a manager to operate the Processing Plant. These two individuals are responsible for arranging for fish to be transported from the lakes to the plant, for fish to be cleaned and packaged, and transportation of fish to FFMC in Winnipeg. Fishers receive an initial payment from the Freshwater Fish Marketing Corporation based on the composition and weight of the catch delivered to the plant, and then receive a final payment based on the final selling price after the fish have been marketed.

Factors limiting the commercial fishery in the Nelson House RMA include: production of fish; transportation costs; sale price; mercury concentrations; and fish quality (parasitism in lake whitefish and tullibee). During summer 2002, fishers received (including the final payment) approximately $7.12/kg for headless medium pickerel (data from FFMC), $2.70/kg for "Jumbo" export dressed lake whitefish, $1.21/kg for headless dressed pike, and $0.90/kg for large dressed tullibee. Due to the higher value of pickerel, fishers generally target lakes that produce higher pickerel catches.

Table 3-2. Summary of total and average production and production value for lakes commercially fished in the Nelson House RMA, 1976-2002. Numbers may not add up to totals due to rounding.

		Whitefish		Walleye		Northern Pike		Other		All Species - Total			All Species - Average		
Lake	Number of Years Fished	Total Weight (kg)	Average Weight (kg)	Total Weight (kg)	Average Weight (kg)	Total Weight (kg)	Average Weight (kg)	Total Weight (kg)	Average Weight (kg)	Weight (kg)	Nominal Value	Present Value (2002$)	Weight (kg)	Nominal Value	Present Value (2002$)
Apeganau	9	377	42	16,404	1,823	1,581	176	73	8	18,435	$ 39,211	$ 79,094	2,048	$ 4,357	$ 8,788
Baldock	18	49,133	2,730	54,358	3,020	47,341	2,630	3,712	206	154,544	$ 279,530	$ 387,253	8,586	$ 15,529	$ 21,514
Barnes	6	16,753	2,792	1,004	167	3,333	556	7	1	21,097	$ 28,788	$ 34,344	3,516	$ 4,798	$ 5,724
Costello	16	33,032	2,064	7,069	442	6,572	411	8,227	514	54,900	$ 87,135	$ 107,097	3,431	$ 5,446	$ 6,694
Gauer	28	45,258	1,616	215,181	7,685	304,642	10,880	152	5	565,233	$ 970,209	$ 1,398,334	20,187	$ 34,650	$ 49,940
Goodwin	4	2,018	505	1,294	324	2,268	567	98	25	5,678	$ 12,685	$ 14,893	1,420	$ 3,171	$ 3,723
Harding	7	8,122	1,160	2,034	291	18,435	2,634	513	73	29,103	$ 26,092	$ 33,979	4,158	$ 3,727	$ 4,854
Issett	18	92,200	5,122	17,297	961	23,851	1,325	15,772	876	149,121	$ 227,083	$ 259,306	8,285	$ 12,616	$ 14,406
Karsakuwigamak	4	13,113	3,278	2,760	690	1,621	405	293	73	17,787	$ 29,811	$ 32,023	4,447	$ 7,453	$ 8,006
Kinosaskaw	1	83	83	-	-	-	-	29	29	205	$ 156	$ 183	205	$ 156	$ 183
Kinwaw	3	2,687	896	2,489	830	5,466	1,822	-	-	10,643	$ 17,214	$ 25,839	3,548	$ 5,738	$ 8,613
Leftrook	12	88,943	7,412	4,815	401	4,496	375	6	1	98,261	$ 83,615	$ 165,527	8,188	$ 6,968	$ 13,794
Livingston	5	8,928	1,786	241	48	3,185	637	59	12	12,412	$ 16,677	$ 23,794	2,482	$ 3,335	$ 4,759
Macheewin	15	13,682	912	5,300	353	5,555	370	2,564	171	27,100	$ 38,083	$ 46,568	1,807	$ 2,539	$ 3,105
Mooswu	2	1,043	521	376	188	429	214	110	55	2,464	$ 2,813	$ 3,360	1,232	$ 1,407	$ 1,680
Mynarski	47	169,985	3,617	115,546	2,458	81,395	1,732	103,075	2,193	470,001	$ 686,540	$ 954,182	10,000	$ 14,607	$ 20,302
Notigi	16	55,912	3,495	14,645	915	10,937	684	9,234	577	91,846	$ 114,492	$ 153,024	5,740	$ 7,156	$ 9,564
Numapin	2	-	-	126	63	90	45	2,549	1,275	2,765	$ 2,158	$ 2,675	1,382	$ 1,079	$ 1,337
Pemichigamau	5	5,531	1,106	1,218	244	2,852	570	369	74	9,970	$ 12,840	$ 15,086	1,994	$ 2,568	$ 3,017
Rat - West	18	176,380	9,799	35,003	1,945	5,183	288	261	14	216,827	$ 306,020	$ 367,281	12,046	$ 17,001	$ 20,405
Ridge	1	2	2	15	15	31	31	-	-	48	$ 84	$ 106	48	$ 84	$ 106
Roe	2	3,109	1,555	75	37	198	99	32	16	3,415	$ 2,206	$ 2,889	1,707	$ 1,103	$ 1,445
Rusty	14	49,109	3,508	943	67	3,250	232	413	29	53,714	$ 49,539	$ 106,689	3,837	$ 3,539	$ 7,621
Suwannee	21	239,526	11,406	45,483	2,166	20,715	986	74,593	3,552	380,316	$ 457,789	$ 548,120	18,110	$ 21,799	$ 26,101
Threepoint	12	15,052	1,254	1,394	116	1,358	113	3,073	256	20,892	$ 30,397	$ 34,620	1,741	$ 2,533	$ 2,885
Uhlman	31	197,092	6,358	29,771	960	61,120	1,972	383	12	288,365	$ 367,376	$ 507,411	9,302	$ 11,851	$ 16,368
Wapisu	10	12,348	1,235	4,337	434	3,544	354	1,691	169	21,919	$ 14,393	$ 32,251	2,192	$ 1,439	$ 3,225
Wuskwatim	27	134,824	4,993	45,567	1,688	21,091	781	85,926	3,182	290,007	$ 313,912	$ 518,726	10,741	$ 11,626	$ 19,212

Mercury concentrations in fish are an important factor limiting the commercial fishery in northern Manitoba, especially in areas affected by flooding from hydroelectric development (Volume 5). The FFMC and Canadian Food Inspection Agency test mercury concentrations in fish delivered to FFMC on a periodic basis. The FFMC will not purchase fish if it is determined that mercury levels are above guidelines. Currently, FFMC will not purchase northern pike from Rat Lake, and walleye from Notigi and Wuskwatim lakes (pers. comm. FFMC staff 2002). However, it should be noted that sampling conducted as part of the Joint Study Program for the Wuskwatim Generation Project EIS has indicated that mercury levels in walleye are now below the limit for commercial sale in Canada (Volume 5).

Gross returns to fishers for lake whitefish are determined by the catch and grade. The grade of the fish is determined by three factors: size, colour, and rate of infestation by muscle cysts of the cestode **parasite** *Triaenophorus crassus* (Bodaly et al. 1984). Small, dark fish with higher muscle cyst counts are worth less than large, light-coloured fish with low muscle cyst counts. Cyst counts are determined by the Canadian Food Inspection Agency and by FFMC (Table 3-3). Whitefish from lakes such as Gauer, Harding and Kinwaw, which are graded as "cutter", are worth substantially less than whitefish from lakes such as Costello, Goodwin, and Issett that are graded as "export" ($1.10/kg vs. up to $2.70 /kg).

The 1996 NFA Implementation Agreement allocated monies to subsidize the Nelson House commercial fishery from 1996 through 2001. Subsidy allocation to individual fishers was decided by NCN and evolved during implementation of the agreement. Subsidies received by fishers were generally based on harvest and provided in addition to revenues generated from the sale of the fish. As of 2002, the **Community Approval Process** has the responsibility to decide how much trust money, if any, commercial fishing will receive in a year. Fishers operating on some of the more remote lakes in the Nelson House RMA received up to $0.90/kg from the subsidy program in 2002 (pers. comm. NCN Resource Programs staff 2002). All commercial fishers operating out of Nelson House receive some amount of subsidy regardless of the location fished.

Commercial fish are transported to the processing plants by boat, truck, or airplane. Costs of transportation are significantly higher for lakes that are only accessible by air. These additional costs can be a key factor in determining whether a fishery in a remote lake is economically viable.

Table 3-3. Lake whitefish grade classifications for lakes in the Nelson House RMA.

Lake	Grade[1]		Lake	Grade	
	FFMC[2]	CFIA[3]		FFMC	CFIA
Apeganau	Continental		Mynarksi	Continental	Export
Baldock	Continental		Notigi	Continental	
Barnes	Continental		Numapin	Continental	
Costello	Export	Export	Pemichigamali		
Gauer	Cutter		Pemichigamau	Cutter	
Goodwin	Export	Export	Rat		
Harding	Cutter		Ridge		
Issett	Export	Export	Roe	Continental	Export
Karsakuwigamak	Continental		Rusty	Continental	
Kinosaskaw	Continental	Export	Suwannee	Export	
Kinwaw	Cutter		Threepoint	Export	
Leftrook	Continental		Uhlman	Continental	
Livingston	Continental		Wapisu	Cutter	
Macheewin	Cutter		Wuskwatim	Export	
Mooswu	Continental				

[1]Export – Less than 50 cysts per 100 pounds
Continental – 50-80 cysts per 100 pounds
Cutter - >80 cysts per 100 pounds
[*]Freshwater Fish Marketing Corporation
[**]Canadian Food Inspection Agency

Wuskwatim Lake

Wuskwatim Lake has a quota of 18,200 kg for lake whitefish and pickerel combined. The lake was commercially fished in all but six years from 1976 to 2002, primarily during open-water in June and September (Table 3-4). Winter fishing was conducted in seven years during this period, but has not occurred since 1993. Nelson House commercial fishers interviewed during January 2002 stated that winter fishing was difficult on Wuskwatim Lake because of unsafe ice conditions, slush on the ice, and poor access.

Table 3-4. Quota on the Wuskwatim Lake commercial fishery from 1976 to 2002.

Year	Quota on Wuskwatim Lake (for whitefish and walleye)	Production from Wuskwatim Lake (round kg)			Portion of Quota Not Used
		Whitefish	Walleye	Total	
1976	18,200	9,376	8,984	18,360	- 160
1977	18,200	9,845	3,189	13,034	5,167
1978	18,200	-	-	-	18,200
1979	18,200	-	-	-	18,200
1980	18,200	14,165	2,602	16,767	1,433
1981	18,200	18,521	846	19,367	- 1,167
1982	18,200	6,947	1,049	7,995	10,205
1983	18,200	10,667	4,551	15,218	2,982
1984	18,200	3,479	2,414	5,893	12,307
1985	18,200	8,628	4,280	12,908	5,292
1986	18,200	6,618	1,345	7,963	10,237
1987	18,200	2,042	1,287	3,329	14,871
1988	18,200	12,118	3,092	15,210	2,990
1989	18,200	4,896	2,351	7,247	10,953
1990	18,200	259	193	451	17,749
1991	18,200	296	516	812	17,388
1992	18,200	5,191	3,861	9,052	9,148
1993	18,200	9,099	819	9,919	8,282
1994	18,200	2,068	475	2,543	15,657
1995	18,200	-	-	-	18,200
1996	18,200	-	-	-	18,200
1997	18,200	128	595	723	17,477
1998	18,200	4,517	1,946	6,463	11,737
1999	18,200	5,512	1,071	6,583	11,617
2000	18,200	454	100	554	17,646
2001	18,200	-	-	-	18,200
2002	18,200	-	-	-	18,200

Commercial fishing on Wuskwatim Lake generally employs 4-10 individuals during the open-water season. Fishers stated that they bring their boats to the lake via the Burntwood River, portaging around at least two sets of rapids. Boats are often left at the lake from year to year to avoid traveling on the river. Access to and from the lake during the commercial fishing season is by aircraft. In recent years, the fishers have resided in a cabin at the south end of the lake while conducting the fishery.

Total annual commercial harvest by weight from Wuskwatim Lake from 1976-2002 is illustrated in Figure 3-1. Average harvests of fish during the open-water and winter

fisheries from 1976-2000 were 12,811 kg and 4,828 kg, respectively. Since 1976, the quota has only been reached on two occasions (1976 and 1981), and less than two thirds of the quota has been taken each year since 1988 (Figure 3-1). The Wuskwatim Lake harvest has comprised approximately 8.9% of the total value of the commercial harvest from the Nelson House RMA since 1976. In more recent years (1989-2002), harvests from Wuskwatim Lake have comprised an average of 4.2% of the commercial harvest value from the RMA (It should be noted that the value of the catch from Wuskwatim Lake is proportionally much higher to Nelson House fishers than to all RMA fishers, as some of the RMA fishers come from other communities). Commercial fishing was not conducted on Wuskwatim Lake in 2001 and 2002 and less than 1500 kg of fish were harvested from the lake in 2000. The low level of commercial fishing on the lake in recent years is attributable to the availability of alternative employment opportunities (pers. comm. NCN Resource Programs staff 2002). The fishers that are usually employed to conduct commercial fishing on Wuskwatim Lake were hired to conduct Wuskwatim Generation Project **EIA** studies on the lake in 2000/2001 and 2001/2002.

"Other fish", including yellow perch, tullibee, suckers, and sauger, comprised less than 500 kg of the total annual catch from the Wuskwatim Lake fishery from 1976 to 1984, but have comprised the majority of the harvest in over half the years (n=9) since 1985. Commercial fishers stated that tullibee have replaced pickerel as the most abundant fish in Wuskwatim Lake over the past 10-15 years.

The cost of transportation to and from Wuskwatim Lake is a key factor currently limiting the fishery. From 1988 to 1999, the average annual delivered value of fish harvested from Wuskwatim Lake was $1.40 (2001 dollars) per kg. The cost of flying fish out of Wuskwatim Lake to the Nelson House fish plant in 2001 was approximately $1.30/kg (pers. comm. Nelson House Fishermen's Association Manager 2001). Nelson House fishers stated that although there is an abundance of fish in Wuskwatim Lake, it is not economically viable to fly them out. The unreliability of air transportation (e.g., due to weather) can lead to fish spoilage, adding costs to a fishery that is already marginal. The cost of transportation becomes even more significant when the value of the harvest decreases. As of 2001, Freshwater Fish Marketing Corporation decided not to accept pickerel from Wuskwatim Lake because of mercury concentrations (however, as noted previously, sampling conducted for the EIS has indicated that mercury levels in pickerel are now below the limit for commercial sale in Canada, Volume 5).

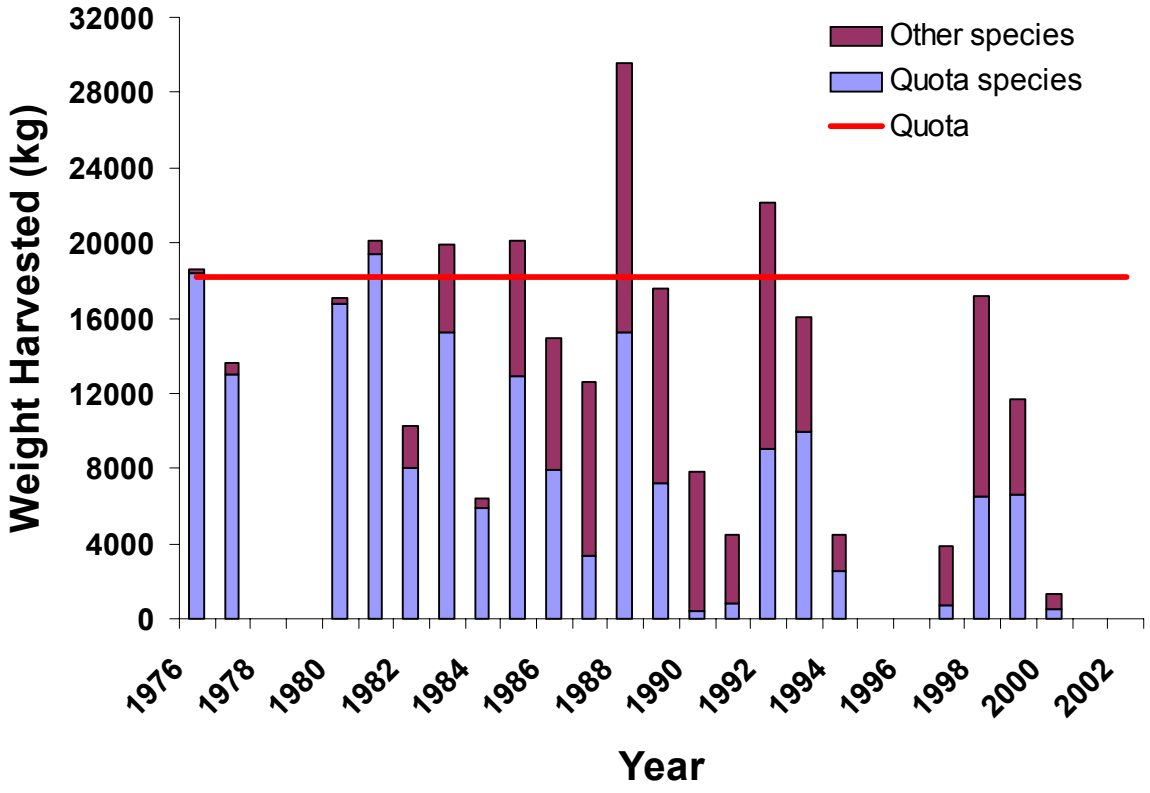


Figure 3-1. Commercial harvest of quota fish species (pickerel and lake whitefish) and other fish species from Wuskwatim Lake from 1976-2002.

Lower revenues generated by other fish species reduce the feasibility of operating a viable fishery on the lake where air transportation is presently the only option for delivering fish to the plant.

As a result of CRD, erosion and debris levels at Wuskwatim Lake have increased since 1976. Local fishers stated that eroding shorelines require that campsites and docks be relocated on a regular basis. Fishers reported that the debris affects navigation and is a safety concern to those traveling on the lake. The debris also affects fishing efforts by becoming entangled in nets, thereby decreasing fishing efficiency and increasing net maintenance. Fishers stated that it is often difficult to find set locations where debris can be avoided. Fishers generally avoid areas with currents and target protected areas such as behind islands. To reduce net maintenance, fishers often set just one or two net panels

(100 yards long). Fishers also stated that floating islands were a hazard to gillnet sets in Wuskwatim Lake.

Other Lakes

Opegano Lake is the only other lake within the study area that has been assigned a commercial quota by Manitoba Fisheries Branch (1500 kg of pickerel and lake whitefish). However, because it is only accessible by air and has a small quota, it has never been fished commercially. Birch Tree Lake has not been assigned a quota because there has never been interest to fish it commercially (pers. comm. Manitoba Fisheries Branch Regional Biologist, Thompson, 2002).

3.4 IMPACTS AND MITIGATION

Positive and negative effects to commercial fishing during construction and operation of the Project have the potential to occur as a result of the following:

- increased access;
- presence of a large workforce;
- disturbances from Project construction;
- disturbances from Project operation;
- change in water level regime and flows; and
- increased wage economy.

3.4.1 Increased Access

The Wuskwatim road will facilitate access to Wuskwatim Lake. Once the road is completed, NCN commercial fishers will have an interest in using it to access the lake and to transport their catch to the Nelson House fish plant. The extent to which commercial fishers are allowed to use the access road will depend on measures implemented by NCN and Manitoba Hydro. During construction, access will be controlled at PR 391 by a staffed gate and will be limited to construction crews. Access by commercial fishers will occur by special arrangement only. NCN and Manitoba Hydro, in consultation with the Nelson House Resource Management Board, are developing an Access Management Plan (Appendix 3, Volume 3). Measures included in the Plan will influence the accessibility to Wuskwatim Lake by commercial fishers and other resource users during and after construction.

The access road to the Wuskwatim **GS** site will provide a cost effective mode of transportation for de1ivering commercial fish catches from Wuskwatim Lake to the

Nelson House fish plant. Transportation by truck will result in a cost saving of approximately $1.20/kg of fish compared to air transportation (based on road transportation costs of $0.10/kg and air transportation costs of $1.30/kg in 2001 dollars). Based on the average harvest from 1988-1999 (6534 kg) this would result in a net annual saving of $7,841 (2001 dollars) annually. The value of increased access will change in relation to harvests. The cost savings will significantly increase interest in the commercial fishery on the lake.

The average gross revenue from the Wuskwatim Lake commercial fishery, excluding subsidies, over the last ten years of significant harvests (1988-1999) was $9,148 (2001 dollars) annually (or $1.40/kg). However, the value of the fishery on an annual basis is highly dependent on the species of fish being harvested and sold. As discussed previously, the Freshwater Fish Marketing Corporation is not currently accepting walleye from Wuskwatim Lake because of mercury levels (Section 7.3.2). Without harvesting walleye, the value of each kg of fish harvested from Wuskwatim Lake decreases significantly. As discussed previously, recent sampling conducted for the EIS has indicated that mercury levels in walleye are now below the limit for commercial sale (Volume 5). It is assumed that FFMC will review the EIS data and the status of Wuskwatim Lake walleye.

Regardless of whether walleye are harvested, road access will make it more cost effective to harvest fish of lesser value (e.g., tullibee). Consequently, it is likely that if the commercial fishery resumes with road access, annual total harvests of species other than walleye will increase compared to recent historical values.

Overall, the cost savings associated with road access will have a positive, large, long-term effect on the Wuskwatim Lake and Nelson House commercial fisheries.

As discussed in Section 7.2.3, depending on measures in the Access Management Plan, domestic fishing effort may also increase on Wuskwatim Lake with increased access. While domestic harvests could approach those from Threepoint Lake (estimated from Harvest Calendar data at 1,605 fish weighing approximately 1,621 kg in 2000/2001), it is probable that in the short term the actual domestic harvest will be much lower (moderated by the distance from Nelson House and the perception of high mercury levels). A domestic harvest equivalent to the harvest from Threepoint Lake would amount to approximately 13% of the average commercial catch from Wuskwatim Lake from 1988 to 2000 (1,621 kg compared to 12,389 kg). Such a harvest would have a large negative effect on the commercial fishery. The actual magnitude of the effect over the long term is uncertain, as it is difficult to predict future traditional resource use activity.

Access to Wuskwatim Lake by **recreational fishers** will be determined by measures in the Access Management Plan. It is expected that recreational fishers from outside the workforce will not be allowed to use the access road during construction. If access is provided during operation, there will be an interest by recreational fishers to travel to Wuskwatim Lake. Wuskwatim Lake has a relatively high gillnet **catch-per-unit-effort** compared to other road-accessible lakes in the area such as Wapisu and Notigi, and it is expected that some recreational fishing effort would be re-directed to the lake after completion of the Project. Over the short-term, the effects from increased recreational fishing on the Wuskwatim Lake commercial fishery are expected to be small. However, levels of recreational fishing could increase in the future and have a more noticeable effect on the commercial fishery.

Although the ultimate harvest levels and magnitude of effects are uncertain, the combined effect of increased domestic and recreational fishing pressure on Wuskwatim Lake has the potential to have a negative, large, long-term effect on the fish population and, ultimately, on the commercial fishery. This will offset to some degree, the positive, large, long-term effects to the commercial fishery resulting from savings associated with transportation costs.

3.4.2 Presence of a Large Workforce

During peak construction there will be approximately 600 workers at Wuskwatim work site that could potentially fish, 50% of which will be aboriginal and have treaty-fishing rights. Recreational fishing, if permitted for camp residents, is expected to be shore-based and will not result in significant harvests. Use of the access road and/or Project facilities by recreational boats will be addressed in the Access Management Plan. If allowed, harvests by aboriginal workers could be substantial, but would be short-term and would have no effect on the commercial fishery in the long-term. The actual level of domestic and recreational harvests by the workforce will be dictated by measures incorporated into the Access Management Plan.

3.4.3 Disturbances From Project Construction

Disturbances from Project construction activities (such as noise and dust) will change the environmental setting for commercial fishers working on the lake. The perceived change will be moderated to some extent by the location of the current fish camp, which is situated at least 6 km from the construction site at the south end of the lake. Construction activities will also be a safety concern for commercial fishers. Manitoba Hydro will implement an educational program with regard to construction activities and safety for all resource harvesters allowed on the access road during construction. It is also expected

that boat traffic will not be permitted near the construction site. Disturbances from Project construction are expected to have a negative, small, local, and short-term effect on the commercial fishery.

3.4.4 Disturbances From Project Operation

Project operation will change the environmental setting on Wuskwatim Lake for commercial fishers and may cause some safety concerns near the station. Manitoba Hydro will implement an educational program and signage in relation to safety concerns for commercial fishers in the area. It is expected that the change in environmental setting will only have a small effect on local commercial fishers. However, the actual effects will depend on perception, and be specific to each individual commercial fisher. Destruction of **fish habitat** in the footprint of the dam is not expected to have a measurable effect on fish populations in Wuskwatim Lake (Volume 5) and, therefore, should have no effect on the commercial fishery

3.4.5 Change to Water Level Regime and Flows

NCN commercial fishers stated that fishing is generally better when water levels are more stable. Stabilized water levels are expected to have a positive, small, long-term effect on fish populations in Wuskwatim Lake (Volume 5) and to the commercial fishery.

Increased water levels on Wuskwatim Lake will increase erosion of shorelines and the level of debris entering the lake. The additional debris entering the lake will primarily be contained nearshore by existing debris mats (Volume 4). However, NCN commercial fishers expect that some debris will be mobilized by high water levels and ice and will have a negative short-term effect on fishing conditions and navigation. Floating debris will be monitored and mitigated as required.

Increased water levels in Wuskwatim Lake area are expected to result in a small increase in mercury concentrations in walleye, northern pike and whitefish, but with the possible exception of northern pike, mean mercury concentrations are expected to remain below levels of concern for the commercial fishery (Volume 5). The abundance of northern pike, which act as the primary host for *Triaenophorus crassus* (a tapeworm that encysts in the flesh of whitefish), is expected to increase marginally as a result of the Project, but the degree to which this will affect lake whitefish infections is uncertain (Volume 5). Lake whitefish catches will be monitored to determine if cyst counts increase as a result of the Project.

3.4.6 Increased Wage Economy

An increase in the wage economy during construction may cause a short-term decrease in the number of individuals interested in commercial fishing. Fishers may be required to choose between commercial fishing and Project employment as the majority of jobs provided to Nelson House residents will occur during existing commercial fishing seasons (spring and fall). The extent to which a decrease in interest occurs will be dependent on the potential return from the fishery (e.g., whether FFMC accepts pickerel from Wuskwatim Lake). If the potential returns are high, it is expected that the benefits from increased access will outweigh any wage effects, resulting in a net increase in interest in the fishery. Layoffs during winter could also increase interest in a winter commercial fishery. The increased wage economy is expected to have no effect on the commercial fishery.

4.0 COMMERCIAL TRAPPING

4.1 INTRODUCTION

Commercial trapping is an integral component of the social setting and economy in the north. Similar to commercial fishing, it is one of the few sectors of the cash economy in which First Nation people can participate, while maintaining their traditional subsistence lifestyle.

4.2 APPROACH AND METHODS

A community meeting was held with Nelson House commercial trappers in Nelson House on January 28, 2002. The meeting was advertised on the radio and individual trappers were contacted and asked to attend. The meeting consisted of an informal question and answer period that focused on the existing commercial trapping environment within the proposed study area and how that environment may change as a result of the Project. The interview guide used at the meeting is provided in Appendix 6. Key person interviews were also conducted with the NCN Resource and Land Use Planning Coordinator and the Program Coordinator of the NCN Resource Management Program. Commercial trapping data from traplines within the NCN RMA were obtained from Manitoba Conservation and from the Program Coordinator of the NCN Resource Management Program.

4.3 EXISTING ENVIRONMENT

Background

In the 1940s the Government of Manitoba developed the registered trapline system to address conflicts between trappers and to improve management of fur resources. The system divided most of the province into relatively large Registered Trapline Districts that were subdivided into individual registered traplines (**RTL**s). Manitoba Conservation allocates registered traplines to specific trappers who maintain an individual right to trap within the designated boundary of the trapline. Where RTL Districts are operated as community trapping blocks (such as at Nelson House), a local fur council recommends to Manitoba Conservation the allocation of specific trapping areas to members of the local trapping community. Historical use of areas by individuals or families is often the basis for allocation. The RTL system makes each RTL trapper responsible for managing the harvest of all fur-bearers in his/her trapline area to ensure sustained production over the years. Registered traplines can be reallocated if fur production over a three-year period is

insufficient. Re-allocation is done in agreement with Local Fur Councils, elected representatives of trappers within a given trapping district, and/or the Fur Manager.

Trapping is generally initiated when it is safe to travel after ice first forms on creeks and rivers and when furs are generally in prime condition (between December and March). The majority of trappers have cabins located within or adjacent to their respective RTL areas. Travel to and from cabins and on the trapline trails is generally conducted by snowmobile on trails cleared by the trappers. Traps are set within walking distance of main trapline trails and are generally checked daily (weather permitting).

Costs associated with trapping include snowmobiles, traps, cabin maintenance, gas, etc. The benefits of trapping include the monetary value of the furs and meat, as well as the non-monetary value associated with living a traditional life-style. NCN elders have stated that the value of meat produced by trapping may, in many cases, exceed the value of the income received from the sale of the furs. For example, beaver meat is an important food source for trappers, and is often consumed in place of store bought food.

The cash income generated from commercial trapping is important not only for subsistence, but also to support other subsistence activities such as hunting. Cash can often be a scarce resource in a traditional way of life. Money from the sale of furs can be used to buy snowmobiles, boats, guns, traps, ammunition, gas and oil. When costs associated with trapping approach revenues from the sale of furs harvested (such as in the late 1980s), harvests generally decrease.

Nelson House Registered Trapline District

The study area for this assessment lies entirely within the Nelson House RTL District, which is located within the Nelson House RMA. The Nelson House RTL District is the seventh largest in the province with an area of 22,975 km^2 and a total of 54 registered traplines (Figure 4-1). The Nelson House Local Fur Council assigns traplines within the RTL. Trapline 49 is retained as a community trapline, for educational purposes, hobby trapping and to allow elders access, and Trapline 53 is reserved for youth trapping.

The primary species targeted by commercial trappers within the Nelson House Trapping District include: beaver, muskrat, ermine, fisher, red fox, lynx, marten, mink, otter, and squirrel. Wolf, wolverine, **arctic** fox, and bear are also harvested, but in lesser numbers, and coyote and raccoon are harvested infrequently. Trappers reported that wolf numbers have decreased in recent years, while lynx, beaver, and marten populations have been increasing. Trappers sell their furs to the Northern Store, or to private fur buyers, who then sell the fur at auctions in the south.

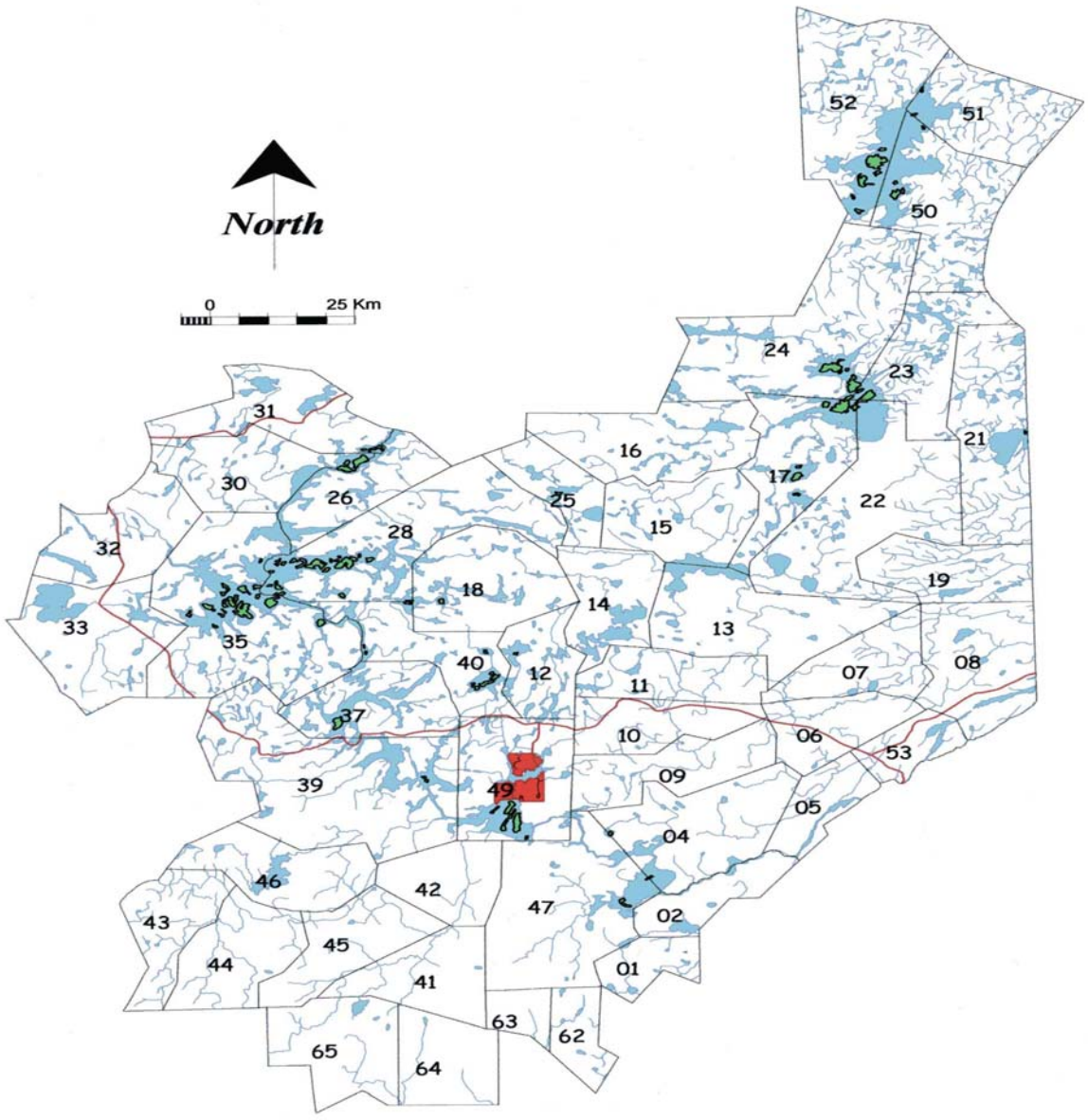


Figure 4-1. Registered traplines within the Nelson House Registered Trapline District.

Between 1976 and 1990, the number of individuals reporting harvests from registered traplines in the Nelson House RTL District averaged approximately 129 annually. After 1990, the number of trappers reporting harvests from the District dropped to an average of approximately 53 annually. The number of traplines from which harvests were reported peaked in 1979/1980 at 46. Harvests were reported from 23 traplines in 2001/2002 (Appendix 7).

The value of annual harvests from the Nelson House RTL District since 1976 peaked in 1978/1979 at $1,135,140 (2002 dollars). Annual harvest value decreased to $197,196 by 1981/1982 and remained relatively stable during the remainder of the 1980s averaging $179,378, before dropping again in 1989/1990 to $50,302 (Figure 4-2). The annual harvest value from 1989/1990 to 2001/2002 has been $53,130, or 14% of the average reported from the previous 14 years ($370,166 annually)(Appendix 7). The value of the harvest in 2001/2002 was $30,348. Declining fur prices in the 1980s is the key factor contributing to the reduction in harvests. Local trappers attribute some of the decrease in value to a decrease in the number of animals and quality of fur in the RMA since construction of the CRD in the mid-1970s.

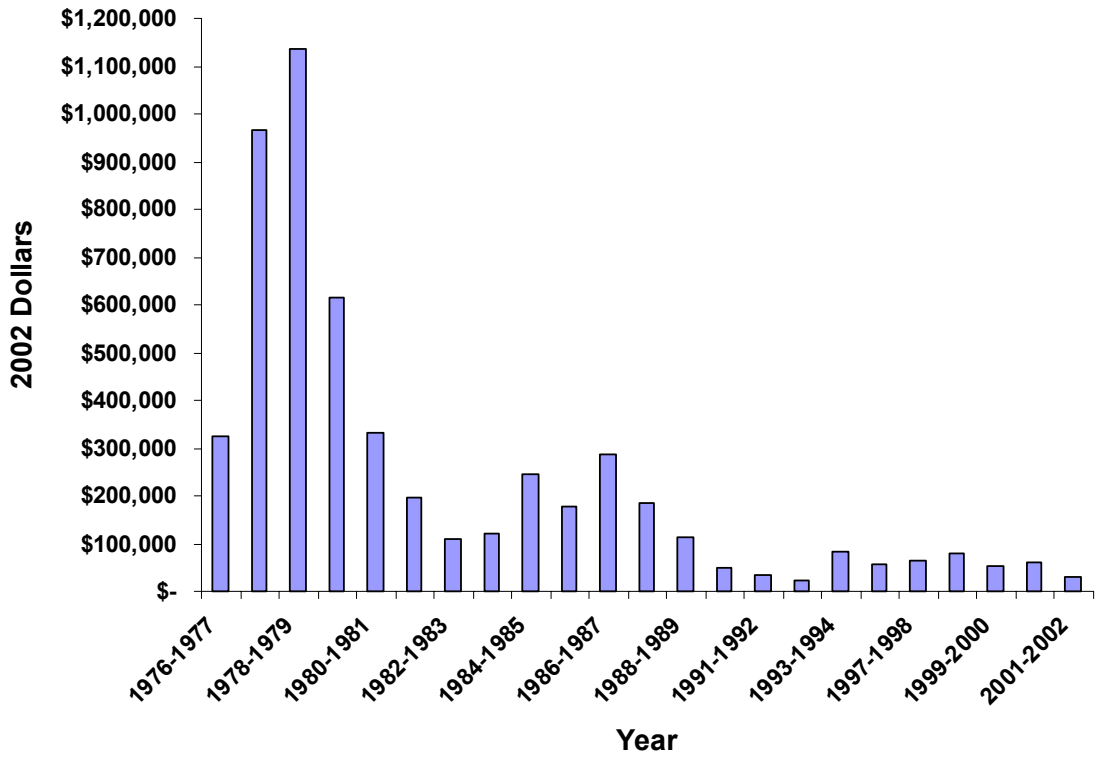


Figure 4-2. Annual value of commercial trapping harvests in the Nelson House RTL District from 1976-2002.

In terms of animal numbers, muskrat and beaver have comprised the greatest proportion of the trapping harvest since 1976, representing approximately 38% and 30% of the annual harvest, respectively (Table 4-1). However, in six of the last nine years

Table 4-1. Commercial trapping harvests from the Nelson House RTL district, 1976-2002.

Year	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982	1982-1983	1983-1984	1984-1985	1985-1986	1986-1987	1987-1988	1988-1989	1989-1990	1991-1992	1992-1993	1993-1994	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	Total
Bear	3	0	6	4	5	5	0	2	2	2	6	1	3	1	0	0	1	1	0	0	0	0	1	**43**
%	<0.1	0.0	0.1	0.1	0.1	0.1	0.0	<0.1	<0.1	0.1	0.1	<0.1	0.1	0.1	0.0	0.0	<0.1	0.1	0.0	0.0	0.0	0.0	0.1	**<1**
Beaver	943	1601	2589	2877	2129	1561	972	1219	1648	1341	2116	1663	941	545	281	374	695	391	632	684	312	314	191	**26019**
%	15.6	15.3	36.5	44.0	31.9	32.5	28.9	21.2	24.2	42.0	50.5	33.9	31.7	39.9	35.3	42.3	34.1	23.8	34.2	29.4	20.8	20.7	26.9	**30**
Coyote	0	0	2	6	3	2	0	2	1	0	2	0	1	1	1	0	2	0	3	4	0	1	0	**31**
%	0.0	0.0	<0.1	0.1	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	0.0	<0.1	0.1	0.1	0.0	0.1	0.0	0.2	0.2	0.0	0.1	0.0	**<1**
Ermine	133	168	132	100	90	197	107	121	209	240	206	116	114	44	27	30	39	38	38	45	10	13	11	**2228**
%	2.2	1.6	1.9	1.5	1.3	4.1	3.2	2.1	3.1	7.5	4.9	2.4	3.8	3.2	3.4	3.4	1.9	2.3	2.1	1.9	0.7	0.9	1.5	**3**
Fisher	14	16	30	65	77	95	99	102	93	119	132	180	124	92	124	76	93	25	31	21	10	30	11	**1659**
%	0.2	0.2	0.4	1.0	1.2	2.0	2.9	1.8	1.4	3.7	3.1	3.7	4.2	6.7	15.6	8.6	4.6	1.5	1.7	0.9	0.7	2.0	1.5	**2**
Blue Fox	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**
%	0.0	<0.1	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**<1**
Cross Fox	6	38	90	131	46	51	29	8	23	19	32	18	14	10	18	7	15	5	10	9	4	11	5	**599**
%	0.1	0.4	1.3	2.0	0.7	1.1	0.9	0.1	0.3	0.6	0.8	0.4	0.5	0.7	2.3	0.8	0.7	0.3	0.5	0.4	0.3	0.7	0.7	**1**
Red Fox	12	107	204	275	135	143	99	27	31	51	64	54	35	23	48	12	29	20	25	16	16	38	11	**1475**
%	0.2	1.0	2.9	4.2	2.0	3.0	2.9	0.5	0.5	1.6	1.5	1.1	1.2	1.7	6.0	1.4	1.4	1.2	1.4	0.7	1.1	2.5	1.5	**2**
Silver Fox	0	10	16	12	8	19	14	4	2	2	5	2	2	3	3	1	5	1	2	4	2	11	0	**128**
%	0.0	0.1	0.2	0.2	0.1	0.4	0.4	0.1	<0.1	0.1	0.1	<0.1	0.1	0.2	0.4	0.1	0.2	0.1	0.1	0.2	0.1	0.7	0.0	**<1**
White Fox	7	6	0	10	4	0	3	0	1	12	0	2	0	7	0	1	6	0	22	37	0	1	0	**119**
%	0.1	0.1	0.0	0.2	0.1	0.0	0.1	0.0	<0.1	0.4	0.0	<0.1	0.0	0.5	0.0	0.1	0.3	0.0	1.2	1.6	0.0	0.1	0.0	**<1**
Lynx	245	814	805	293	114	67	26	17	47	0	50	38	53	46	16	14	20	8	12	23	19	61	32	**2820**
%	4.1	7.8	11.4	4.5	1.7	1.4	0.8	0.3	0.7	0.0	1.2	0.8	1.8	3.4	2.0	1.6	1.0	0.5	0.6	1.0	1.3	4.0	4.5	**3**
Marten	4	3	18	2	1	1	24	4	204	33	101	221	187	100	108	70	335	418	467	864	727	870	344	**5106**
%	0.1	<0.1	0.3	<0.1	<0.1	<0.1	0.7	0.1	3.0	1.0	2.4	4.5	6.3	7.3	13.6	7.9	16.4	25.4	25.3	37.1	48.4	57.3	48.5	**6**
Mink	209	363	826	619	315	256	82	202	411	634	270	252	302	177	97	132	159	88	174	322	216	54	44	**6204**
%	3.5	3.5	11.7	9.5	4.7	5.3	2.4	3.5	6.0	19.9	6.4	5.1	10.2	13.0	12.2	14.9	7.8	5.4	9.4	13.8	14.4	3.6	6.2	**7**
Muskrat	3955	6783	1803	1262	2953	1854	1362	3552	3636	382	956	2002	993	244	19	52	528	501	289	82	126	62	15	**33411**
%	65.4	65.0	25.4	19.3	44.2	38.6	40.5	61.7	53.4	12.0	22.8	40.8	33.5	17.9	2.4	5.9	25.9	30.5	15.6	3.5	8.4	4.1	2.1	**38**
Otter	56	88	164	133	76	122	56	58	77	90	75	54	34	34	13	36	49	60	45	59	43	38	18	**1478**
%	0.9	0.8	2.3	2.0	1.1	2.5	1.7	1.0	1.1	2.8	1.8	1.1	1.1	2.5	1.6	4.1	2.4	3.6	2.4	2.5	2.9	2.5	2.5	**2**
Raccoon	0	0	0	0	0	2	0	0	0	4	0	1	1	0	0	0	0	0	2	0	0	0	2	**12**
%	0.0	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.1	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.3	**<1**
Squirrel	453	431	392	725	715	415	465	418	413	249	167	292	144	27	28	72	53	83	88	130	16	3	18	**5797**
%	7.5	4.1	5.5	11.1	10.7	8.6	13.8	7.3	6.1	7.8	4.0	6.0	4.9	2.0	3.5	8.1	2.6	5.0	4.8	5.6	1.1	0.2	2.5	**7**
Wolf	3	3	3	4	3	4	12	11	0	4	5	4	13	7	11	5	6	1	3	23	2	7	7	**141**
%	<0.1	<0.1	<0.1	0.1	<0.1	0.1	0.4	0.2	0.0	0.1	0.1	0.1	0.4	0.5	1.4	0.6	0.3	0.1	0.2	1.0	0.1	0.5	1.0	**<1**
Wolverine	1	4	7	15	4	15	13	6	7	10	6	3	3	5	3	2	5	4	5	7	0	4	0	**129**
%	<0.1	<0.1	0.1	0.2	0.1	0.3	0.4	0.1	0.1	0.3	0.1	0.1	0.1	0.4	0.4	0.2	0.2	0.2	0.3	0.3	0.0	0.3	0.0	**<1**
Total	**6044**	**10436**	**7087**	**6535**	**6678**	**4809**	**3363**	**5753**	**6805**	**3192**	**4193**	**4903**	**2964**	**1366**	**797**	**884**	**2040**	**1644**	**1848**	**2330**	**1503**	**1518**	**710**	**87402**

(1991/1992 to 2001/2002) muskrat have comprised less than 10% of the animals harvested. In contrast, the proportion of marten harvested increased from less than 5% annually from 1976/1977 to 1987/1988 to more than 48% of the annual harvest in the last three years (1999/2000 to 2001/2002). Some NCN resource harvesters noted that marten numbers have been increasing in the RMA in recent years and attribute the decrease in muskrat harvests to the effects of the CRD. It is probable that fur prices also have had a significant influence on the types and quantities of species harvested.

Access is an important limiting factor in the level of harvest in the Nelson House RTL District, particularly in the trapline areas south of the Burntwood River (pers. comm. NCN Resource Programs staff 2002). The primary concerns are safety and travel conditions on waterbodies affected by CRD. Local trappers stated that slush and unstable ice prevent travel on the main waterbodies, and fluctuating water levels create unstable ice along the shorelines and in tributaries including small creeks. For example, trappers reported that the old Wabowden Bombardier Trail, which runs south from the Burntwood River near Wuskwatim Lake, is difficult to traverse due to uncertain ice conditions on smaller creeks caused by the effects of CRD. Debris is also reported to hinder travel along shorelines, especially the southeast shore of Wuskwatim Lake. Trappers stated that trails to some areas (including those to and around the Wuskwatim Lake area) have deteriorated because of a lack of maintenance and decreased use over the past generation. Manitoba Hydro is responsible for mitigating adverse effects from its operations on travel and access along affected waterways and undertakes a number of safety provisions in this regard, including safe ice trails, navigational aids, and debris management.

Trapline harvest values for road accessible/inaccessible and Project affected/unaffected traplines are summarized in Table 4-2. Of 54 traplines in the Nelson House Trap Line District, 16 are directly accessible by road. The average annual harvest since 1976 from traplines with road access ($7,474) is more than double the harvest from traplines without road access (including unused traplines) ($2,936) (Figure 4-3).

Traplines 2, 4, 9, and 47 (Figure 4-1) have the most potential to be directly affected by the Project. Since 1976, these traplines have produced from 2% to 11% (average of 8%) of the total annual value of the Nelson House RTL District harvest and rank from 9th (Trapline 4, on the north side of the Burntwood River) to 38th (Trapline 2, on the south side of the Burntwood River) in average total annual production value (Appendix 7). During this period, the average annual production value from each of these traplines ($4,443) was similar to the average production value from all other traplines in the RTL District ($4,278).

Table 4-2. Total harvest and average harvest per trapline from 1976/1977 to 2001/2002 for all traplines in the Nelson House RTL District (n=54), traplines anticipated to be affected by the Project (n=4, 2, 4, 9, and 47), traplines that will not be directly affected (n=50), traplines that are directly accessible by road (n=16), and traplines that are not accessible by road (n=38). Harvest presented as number of animals harvested and as value in 2002 dollars.

Species	All Traplines		Affected Traplines		Non-Affected Traplines		Road Accessible Traplines		Traplines without Road Access		Unknown Traplines
	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	Total
Bear	43	1	1	<1	36	1	27	2	10	<1	6
Beaver	26019	482	1880	470	24059	481	14567	910	11316	298	136
Coyote	31	1	2	1	27	1	22	1	7	<1	2
Ermine	2228	41	85	21	2120	42	1501	94	702	18	25
Fisher	1659	31	51	13	1594	32	1053	66	590	16	16
Blue Fox	3	<1	0	0	3	<1	2	<1	1	<1	0
Cross Fox	599	11	26	7	572	11	342	21	255	7	2
Red Fox	1475	27	67	17	1392	28	835	52	623	16	17
Silver Fox	128	2	6	2	122	2	73	5	55	1	0
White Fox	119	2	7	2	99	2	50	3	56	1	13
Lynx	2820	52	283	71	2536	51	1305	82	1509	40	6
Marten	5106	95	164	41	4930	99	3351	209	1743	46	12
Mink	6204	115	232	58	5950	119	3453	216	2715	71	36
Muskrat	33411	619	1784	446	31496	630	18281	1143	14760	388	370
Otter	1478	27	80	20	1392	28	749	47	721	19	8
Raccoon	12	<1	0	0	12	<1	9	1	3	<1	0
Squirrel	5797	107	288	72	5496	110	3872	242	1887	50	38
Wolf	141	3	1	<1	131	3	97	6	35	1	9
Wolverine	129	2	8	2	118	2	71	4	55	1	3
Total Harvest	**87402**	**1619**	**4965**	**1241**	**82085**	**1642**	**49660**	**3104**	**37043**	**975**	**699**
Value (2002$)	**$ 5,343,461**	**$ 98,953**	**$ 408,761**	**$ 102,190**	**$ 4,919,823**	**$ 98,396**	**$ 2,750,461**	**$ 171,904**	**$ 2,566,421**	**$ 67,537**	**$ 26,580**

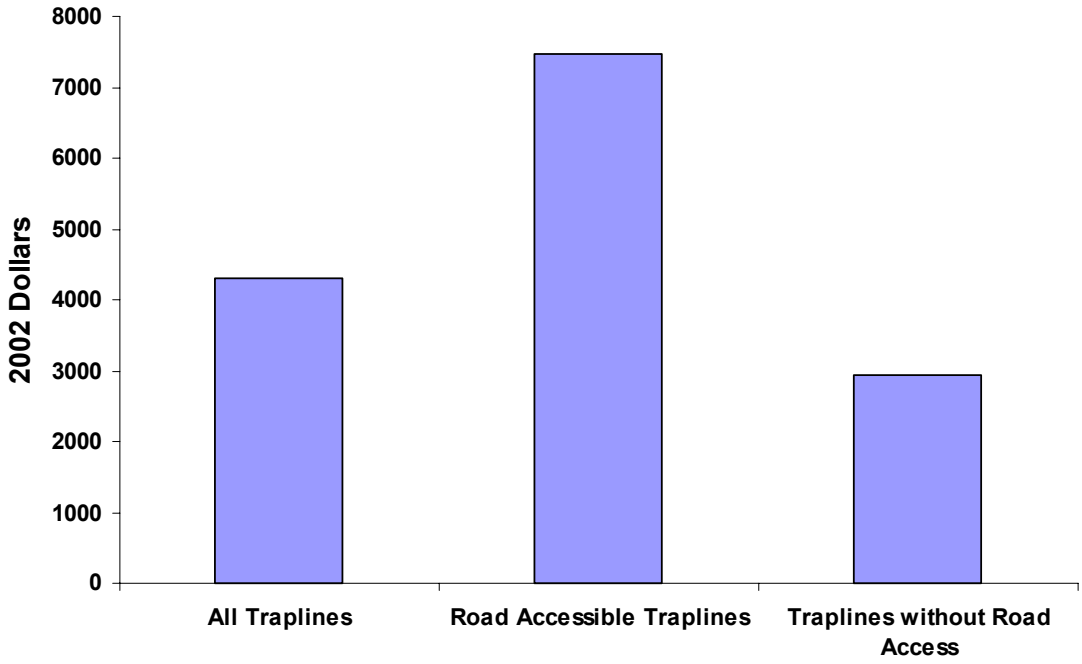


Figure 4-3. Average annual harvest value from Nelson House RTL District traplines with and without road access, 1976-2002.

4.4 IMPACTS AND MITIGATION

Positive and negative effects to commercial trapping during construction and operation of the Project have the potential to occur as a result of the following:

- increased access;
- disturbances from Project construction;
- disturbances from Project operation;
- change in water level regime and flows; and
- increased wage economy.

4.4.1 Increased Access

The road to the Wuskwatim G.S. will provide direct access into, or to the edge of, four RTLs that have not previously had road access (traplines 2, 4, 9, 47, Figure 4-1). Commercial trappers holding the affected traplines will have an interest in using the road to access their traplines. The extent to which the trappers will be allowed to use the

access road will depend on measures implemented by NCN and Manitoba Hydro. During construction, access will be controlled at PR 391 by a staffed gate and will be limited to construction crews. Access by commercial trappers will occur by special arrangement only. NCN and Manitoba Hydro, in consultation with the Nelson House Resource Management Board, are developing an Access Management Plan. Measures included in the Plan will influence how accessible the Wuskwatim Lake area will be to commercial trappers and other resource users during and after construction.

If commercial trappers were provided with road access they would be able to drive directly into RTLs 4 and 9 and to Wuskwatim Lake but would need to travel across the lake to access traplines south of the Burntwood River (e.g., traplines 2 and 47). Completion of the generating station will provide a means of safe passage across the Burntwood River during all seasons and would provide an additional level of safety for accessing traplines 2 and 47 and other traplines further to the south. Provision of access across the generating station during the operational phase of the Project will be addressed in the Access Management Plan.

During interviews, commercial trappers indicated that increased safety and reduced transportation costs associated with road access would facilitate increased harvests from affected traplines. From 1976-2002, average annual production from road accessible RTLs in the Nelson House RTL District was $7,474 (2002 dollars) compared to an average annual production value of $4,434 (2002 dollars) from traplines 2, 4, 9, and 47. It can be expected that increased access will facilitate increased productivity from these traplines. According to NCN Resource Programs staff, production may also increase from other traplines south of the Burntwood River that have been difficult to access since completion of CRD (e.g., traplines 1, 62, 63).

If domestic and recreational resource harvesters also gain access to the area they are not expected to have any noticeable effect on the number of animals available for commercial trappers. Harvests of furbearers by domestic and recreational resource users are expected to be negligible. According to NCN Resources Program staff, domestic resource users generally do not harvest furbearers on RTLs held by other individuals.

Overall, increased access is expected to have a positive, large, and long-term effect on commercial trapping in the Wuskwatim area by facilitating travel and decreasing costs.

4.4.2 Disturbances from Project Construction

During interviews with commercial trappers it was suggested that construction noises would frighten animals and cause them to avoid the Wuskwatim area during the

construction period. Construction activity and the associated increase in number of people and traffic are expected to cause a redistribution of animals in the area, but not to have a significant effect on the overall regional abundance of animals (Volume 6). Increased traffic may cause a reduction in the number animals found near roads. The overall impact of animal redistribution on trapping is expected to be negative, small and short-term. Loss of habitat associated with station construction, borrow pits, and the access road is expected to have a negative, small long-term effect on animal populations in the area. However, the reduction in animal populations is expected to be too small to measure (Volume 6) and should have no detectable effect on commercial trapping production.

Safety concerns for trappers during the construction period will be addressed in the Access Management Plan.

4.4.3 Disturbances from Project Operation

Traffic and noise associated with access road use, operating noises, and the presence of the generating station will result in a change in the environmental setting of traplines 2, 4 and 9. Although these changes are expected to have only a small negative effect on local commercial trappers, the actual effects will depend on perception and be specific to each individual trapper. According to NCN Resource Program managers, there will likely be a desire by some trappers to construct cabins along the access road despite the potential disturbances.

4.4.4 Change in Water Level Regime and Flows

Alterations to water levels and flows will have direct effects on traplines 2, 4, 5, 9, and 47 (Figure 4.1). Changes to shorelines as a result of changes to the water level regime upstream and downstream of the generating station are expected to have no effect on furbearer abundance (Volume 6) and/or commercial harvests. A small increase in near-shore debris (Volume 4) will make it incrementally more difficult for trappers to access shorelines from Wuskwatim Lake. Existing dangerous travel conditions on the Burntwood River downstream of the Taskinigup Falls will remain after construction of the Project. Commercial trappers have concerns that trails currently used for travel will become flooded and pose a danger for winter travel. This may occur on portions of some trails situated immediately adjacent to the Burntwood River and Wuskwatim Lake; however, no changes to winter ice conditions are expected on Wuskwatim Lake (Volume 4).

Effects related to changes in water levels and flows are expected to be neutral in relation to commercial trapping activity.

4.4.5 Increased Wage Economy

During Project construction, a large part of the local labour force will be laid off during winter months (Volume 8) when most commercial trapping is conducted and will have income available to purchase resource harvesting equipment (e.g., snowmobiles). Consequently, the increase in wage economy during construction could result in a small short-term increase in commercial trapping activity in the Nelson House RTL District. The long-term effect of an increased wage economy on commercial trapping is uncertain.

5.0 COMMERCIAL FORESTRY

5.1 EXISTING ENVIRONMENT

Manitoba ranks fifth among the provinces and territories in terms of productive forest area (14,269,613 **hectare**s) and standing **merchantable** volume of **timber** (675.7 million m^3) (Manitoba Conservation 2001b). Manitoba's commercial forest industry contributes approximately $480 million in export sales to the provincial economy (Natural Resources Canada 1999). Although Manitoba's total **Annual Allowable Cut** (AAC) amounts to 9.4 million m^3 only about 2.2 million m^3 are harvested annually (Manitoba Conservation 2001b). Commercial forestry activities are an important component of northern Manitoba's (north of the 53rd parallel) economic structure with an approximate annual harvest of 770,000 m^3 (Hunt and Mount 1997, Hunt et al.1998, Ksiezopolski and Chapman 1999, Sullivan et al. 2000, 2001).

Within the study region approximately 87% is classified as land while approximately 13% is water. Of the land area approximately 40% is classified as **productive forest land** capable of supporting commercially viable forests. More than 99% of the area is Crown owned (Manitoba Natural Resources 1996).

5.1.1 APPROACH AND METHODS

Forestry information relevant to the study area was obtained through literature research, personal interviews and field studies.

5.1.1.1 Literature Research

Relevant document and data sources include various branches within Manitoba Conservation (Forestry, Habitat Management & Ecosystem Monitoring, Lands), the Canadian Forest Service (CFS), the Manitoba Forestry Association (MFA) and the forest industry, particularly Tolko Industries Ltd. who is the current **Forest Management License** (FML) holder for the areas overlapping the study area.

5.1.1.2 Key Person Interviews

Key person interviews were also held with individuals from the above-mentioned organizations and NCN relevant to commercial timber use and forest management, planning and administration. Research-based activities regarding the Boreal Ecosystem-Atmosphere Study (BOREAS) were also discussed via phone and email with numerous research coordinators from across Canada and the United States.

5.1.1.3 Field Studies

Field study activities included general surface and aerial reconnaissance, **forest resource inventory** (FRI) data verification and update, and stand-based sampling to support establishing baseline information, impact identification and quantification. More specifically, fieldwork involved sample plot placement in representative stands of all species **working group**s along the shorelines in the Project area. Given that the forest resource inventory (FRI) is somewhat dated (1985-91) and a high percentage of forest stands fall into cutting classes (CC) 0, 1, 2, and 3 it is important to obtain actual field data to verify and update the existing FRI.

Using basal area factor 2 prism variable size plots, selected representative forest stands were sampled for age, species composition, height, stem diameters, site class, crown **density**, and vegetation type classification according to the Manitoba Forest Ecosystem Classification (Zoladeski et al. 1995). Similar sampling was also carried out at the generating station footprint to gain a more accurate understanding of timber resources in the area. Among other things, the data was used to update species composition and cutting classes in the FRI.

5.1.1.4 Forest Stand Stem Densities

Access was obtained to **Forestry Branch** temporary sample plot (TSP) data dating back to the 1970s for the Nelson River and Highrock **Forest Section**s. The data was cleaned and analyzed to determine stem densities by size class for each **type aggregate** (stand type). As data was not collected in CC 0, 1 and 2 stands, stem densities for these stand types are not available; however, very few such stand types are found along the shorelines of the Project area. Typically, stem sizes below 8.9 cm **diameter at breast height** (dbh = 1.3 m above the root collar) are also not recorded when sampling CC 3, 4, and 5 stands. These small diameter stems are therefore excluded from the data set, however their numbers are less frequent in older stands.

5.1.1.5 Impact Rating Method

Impact significance determination is based on residual impacts after the implementation of mitigative measures. The method of determining significance is discussed in Volume 1, Section 2.

5.1.2 The Manitoba Forest Resource Inventory

The provincial FRI forms the basis for describing and quantifying forest resources and Project related impacts on them within the study area. The FRI is a spatial and tabular

forestry database of aerial photograph interpretation at a scale of 1:15,840, maintained and managed within a **Geographic Information System** (GIS) environment. It is generally updated on a 15–year cycle for areas with significant forestry activity. Areas that sustain large-scale fire damage are re-photographed, re-interpreted and the timber volumes re-calculated. For areas in which there is very little activity or disturbance, the re-inventory interval period may be as long as 25-30 years. The most recent inventory years for those **Forest Management Unit**s (FMUs) within the regional study area are given in Appendix 8.

The FRI spatially stratifies the landscape into commercially productive and **non-productive forestlands**. Stand detail on productive forest lands includes tree species composition, growing site, cutting class (a representation of age) and stand density. Within the FRI database the information is maintained in a system of numerical codes. The species composition is referred to as the **sub-type** and the combination of sub-type, site, cutting class and stand density is referred to as the type aggregate. The type aggregates are consolidated into species working groups at larger scales.

The interpreted data along with representative field data enables the forest manager to calculate productive and non-productive forest area, standing volumes of timber, stem densities, incremental growth, etc. This information is then used to calculate the annual allowable cut, representing a sustainable level of timber harvest for any given area. AACs are normally calculated by FMU and summed by Forest Section (FS), **Forest Management License Area** (FMLA) and provincially.

The FRI database includes information on non-productive forest areas such as **fen**s, **bog**s, **swamp**s, rock out crops, etc. This information is useful from ecological and engineering perspectives when planning forest operations.

5.1.3 Forest Management Responsibilities

The Province of Manitoba retains the responsibility to administer all resources, including forests on crown lands. This falls within the jurisdiction of Manitoba Conservation and, for the timber resources, specifically with the Forestry Branch. Under the mandate of sustainable management, Manitoba Conservation must balance the multitude of user needs and demands on public lands and resources between consumptive resource use and the maintenance of ecosystem integrity.

The Forestry Branch is responsible for maintaining the provincial FRI and calculating the AAC keeping in mind the demands of the public for **conservation** and economic development. The AAC is calculated on an FMU basis and summed at the Forest Section

(FS) level. The available volumes are then allocated through a number of mechanisms to industry and private individuals. The Forest Act and Regulations provide the statutory authority to allocate and administer activities relative to the cutting of the forest resource while legal instruments such as the Forest Management License (FML), the **Timber Sale**, **Timber Permit** and the **Timber Quota System** are used to award and administer timber cutting and related processes.

The FML Agreement is negotiated between the Province and a forestry company. The agreement wood supply is identified within a geographic area and is allocated to the company who then takes on all responsibilities for forest management, planning and operations. The FML is normally issued for a 20-year period. Formally planned operations under the license are usually approved for 10-year periods after environmental review. The approval of the second 10-year plan may result in the FML being extended for a 10-year period beyond the original 20-year date. Other allocation holders (e.g. **timber quota holder**s) within the FML area retain their harvesting rights and fall under the administration of the FML holder. The province takes on a monitoring role ensuring license holder compliance to the agreement. Most of the Project study area falls within **Forest Management License Area #2** (FMLA #2) currently held by Tolko Industries Ltd.

The Timber Quota System is a mechanism to assign timber rights in perpetuity but the authority to cut the timber is the Timber Sale. Timber Sales are often of multiple year duration and cover a wide range of volume. The Timber Sale is also used to cover auction sales and special allocations that might be offered to salvage timber from burns, for **silviculture** treatment areas or in some cases for specific industry needs.

The Timber Permit is normally made available for a year or less for small volume applications that include own-use fuel wood applications and Christmas tree cutting.

5.1.3.1 Land Ownership and Forest Cover Distribution

For purposes of describing the existing environment as it pertains to commercial forest use, information particular to the **Nelson River Forest Section** (NRFS) is provided as this unit most closely overlaps the study region and all of the Wuskwatim sub-region (Volume 6, Figure 3-1).

The vast majority of the lands within the study area are under Crown ownership with only 0.3% being privately owned (Table 5-1). The distribution of forest **cover** within the study area is classified as approximately 39% productive forest land and 61% as non-productive. According to the Manitoba FRI productive forest lands are those capable of

producing merchantable wood. Also, 98% of the total area is categorized as "Open" indicating availability to commercial timber utilization and/or industrial development.

Table 5-1. NRFS land cover distribution.

Status & Ownership	Total Land (ha)	Water (ha)	Total Area (ha)	% Land of Total Area	% Productive Forest land of Total Land Area	% Non-Productive Land[1] of Total Land Area
All Status & Ownerships[2]	3 897 455	601 855	4 499 310	87	39	61
Crown Land Open	3 835 919	588 722	4 424 641	87	39	61
Private	13 274	1210	14 484	92	44	56

Source: Manitoba Conservation 2001b.
[1] Includes forested and non-forested lands.
[2] Note that "All Status & Ownership" includes "Crown Land Open" and "Closed"

General forest cover distribution similar to the NRFS is evidenced at the region level in land cover and forest **maturity** class distribution (Figures 5-1 and 5-2). **Dominant** features at the region level are **conifer** species on productive forest land (37%) and treed (32%) and non-treed **wetland**s (6%) (Figure 5-1). Figure 5-2 reflects the influence of fire in the **Boreal forest** environment maintaining a young and **immature** dominant forest structure. Mature forest cover constitutes only 15% of all productive forest land with 56% being young and 29% immature.

Consistent with conifer species dominance, merchantable timber volume consists predominantly of **softwood**s (74%). **Hardwood**s contribute 26% of the merchantable volume in the NRFS (Manitoba Natural Resources 1996) (Table 5-2).

Table 5-2. NRFS net merchantable timber volume summary (000 m^3).

Status & Ownership	Total Softwood	Sftw % of Total	Total Hardwood[1]	Hdw % of Total	Total
All Status & Ownerships[2]	68 160	77	19 951	23	88 111
Crown Land Open	66 366	77	19 376	23	85 742
Private	305	74	107	26	412

Source: Manitoba Conservation 2001b.
[1] Inclusive of "Other hardwoods"; i.e. Cotton wood, Basswood, Maple, Ash, Elm, Willow, Oak, etc.
[2] Includes restricted or "closed" zones

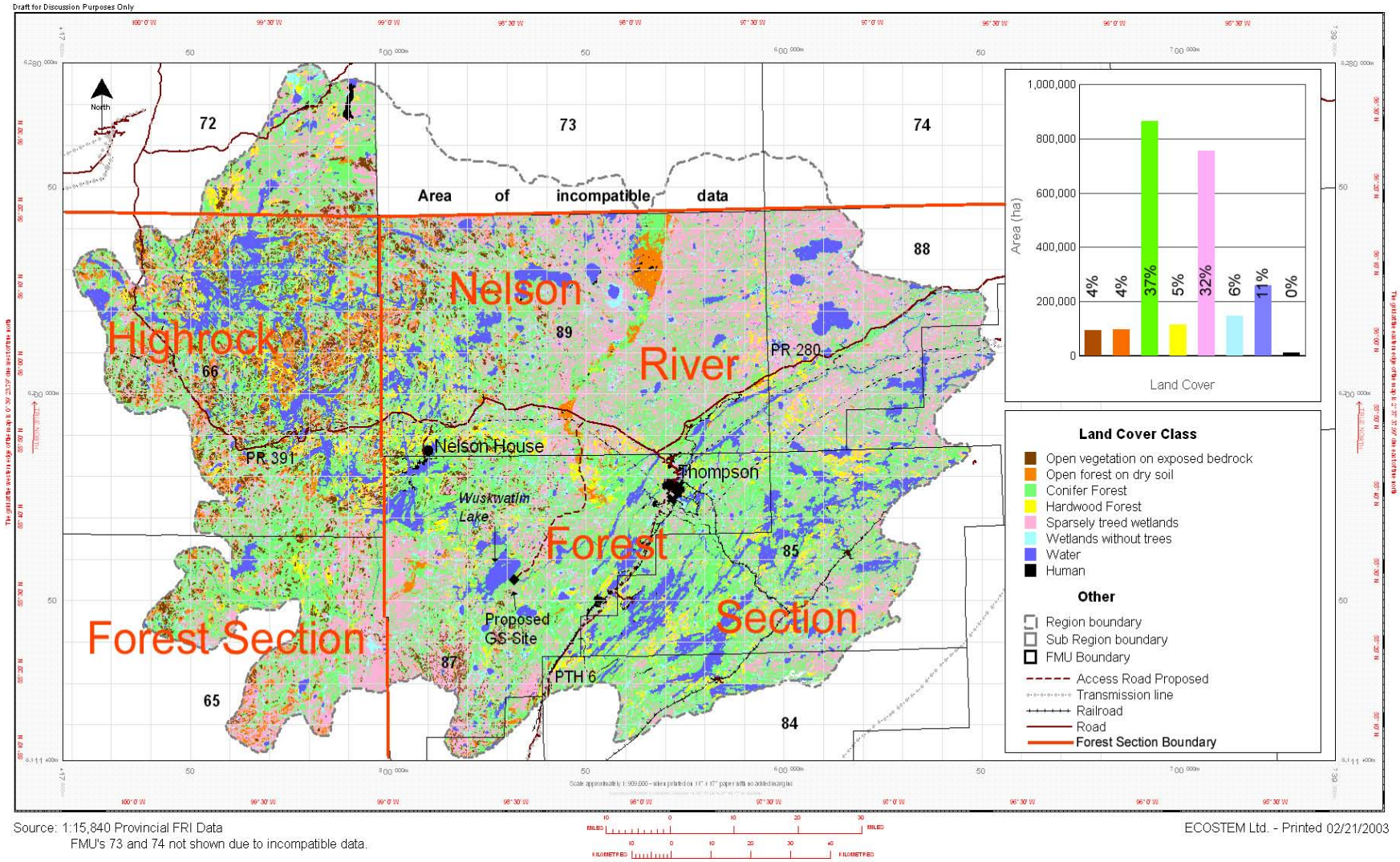


Figure 5-1. Land cover distribution in the Wuskwatim region.

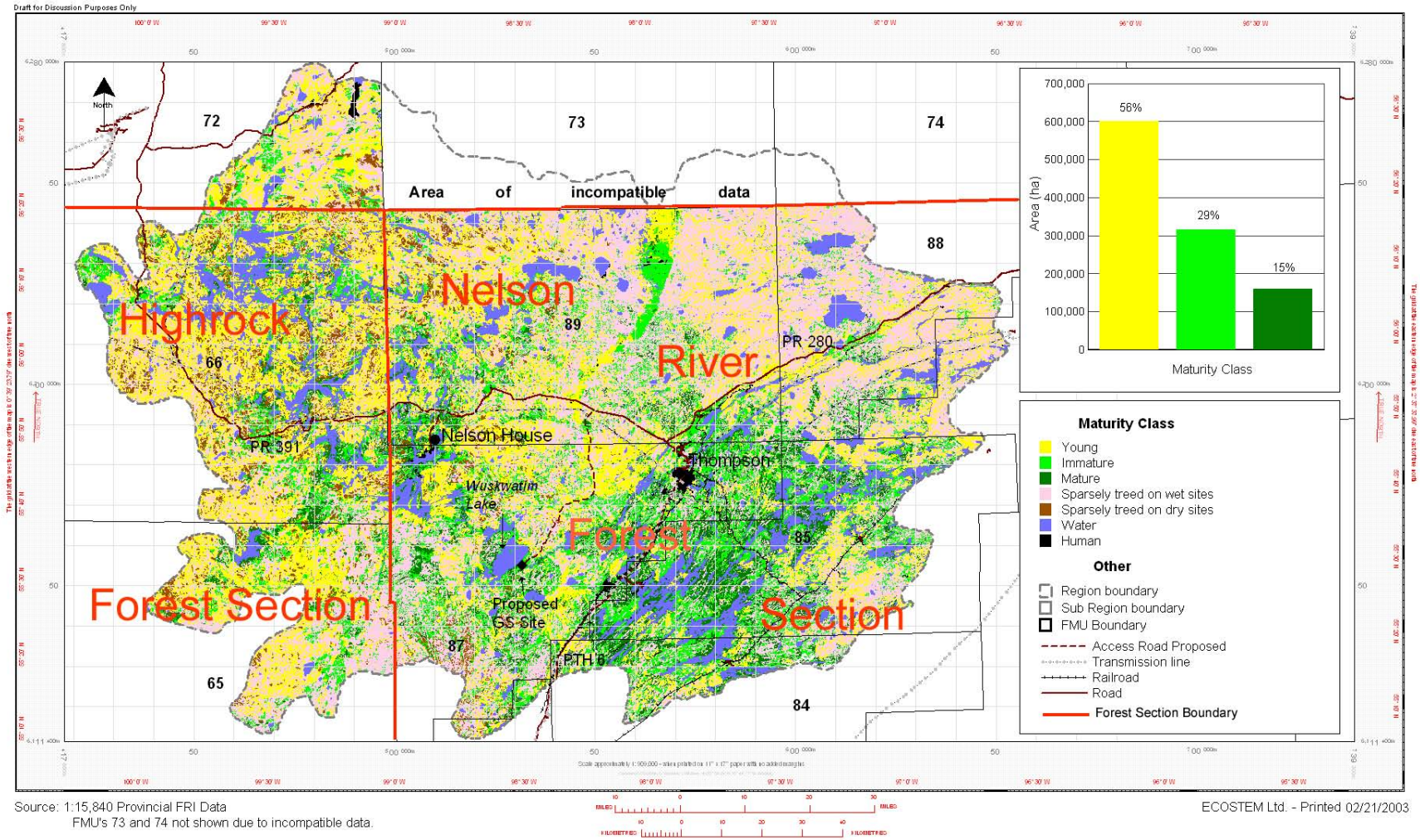


Figure 5-2. Forest maturity distribution in the Wuskwatim region.

Currently, there is room for expansion of the commercial forest industry in the NRFS as demonstrated by the large surplus in AAC (Table 5-3). In the most recent period 1996 to 2001 only 30% and 1% of the softwood and hardwood AACs respectively were harvested (Manitoba Conservation 2001b).

Table 5-3. NRFS historical wood surplus - Provincial Crown Land "Open" (Net Merchantable m^3/yr).

	AAC[1]		Harvest[2]		Indicated Surplus		Surplus % of AAC[3]	
Years	**Softwood**	**Hardwood**	**Softwood**	**Hardwood**	**Softwood**	**Hardwood**	**Softwood**	**Hardwood**
1981-1986	952 440	247 610	9 912	2 470	942 527	245 140	99	99
1986-1991	952 440	247 610	202 216	2 742	750 224	244 868	79	99
1991-1996	1 022 190	328 790	179 591	3 026	842 599	325 764	82	99
1996-2001	1 022 190	328 790	306 711	2 444	715 479	326 346	70	99

Source: Manitoba Natural Resources 1986b, 1991b, 1996, Manitoba Conservation 2001b.
[1] Based on cutting classes 4 & 5.
[2] Values are 5-year averages
[3] Excludes fire losses.

Forest fires are a dominant influence on the boreal forest landscape, far exceeding areas harvested, and are a major cause of forest volume loss affecting AAC levels (Volume 6, and Table 5-4 below) (Manitoba Natural Resources 1986a, 1991a). Losses to wildfires are never consistent from year to year as numbers and sizes of fires fluctuate. The severity of any fire season is directly linked to local and regional climatic conditions where hot, dry summers can cause highly volatile conditions. This is clearly visible in Table 5-4, which shows that 67% of fire losses for the 25-year period 1976 to 2001 occurred in the 5-year period 1986 to 1990.

Table 5-4. NRFS historical wildfire area losses – Provincial Crown - All Status Ownership (ha average annual).

	Fire Losses			Harvested	
Years	**Productive Forest land**	**Non-Productive Land[1]**	**Total Land**	**Years**	**Total Land**
1976-1985	6 847	5 793	12 640	**1981-86**	103
1986-1990	41 847	32 929	74 776	**1986-91**	1708
1991-1996	6 865	15 493	22 358	**1991-96**	1522
1997-2000	1 293	1 314	2 607	**1996-2001**	2576
25-yr Avg.	**14 213**	**13 882**	28 095	**20-yr Avg.**	**1477**

Source: Manitoba Natural Resources 1986b, 1991b, 1996, Manitoba Conservation 2001b
[1] Includes forested and non-forested lands.
[2] Conversion factor of 120 m^3/ha.

Timber volume losses to wildfire are incorporated when forest managers calculate available timber for industrial harvest. Industrial uses and losses to fire, windstorms, insects and disease are balanced against incremental forest growth to ensure sustainability

is maintained (Manitoba Natural Resources 1986a, 1991a). Table 5-3 shows the average annual forest surplus calculated by Manitoba Conservation for the 20-year period 1981 to 2001 for the NRFS. The large positive balances remain in part due to lack of accessibility and distance to present manufacturing locations and markets. The high positive balance in hardwoods is reflective of limited markets in regard to these species in northern Manitoba. The indicated surplus in Table 5-3 implies that substantially more timber could be harvested than what is currently occurring.

5.1.3.2 Tolko Industries Ltd.

Tolko Industries Ltd. (Tolko), located at The Pas, Manitoba, owns and operates a Kraft pulp and paper mill and a modern small-dimension sawmill. For the 2001 calendar year a total of 831,000 m^3 of softwood were harvested from FMLA #2 (Sullivan et al. 2002) of which 292,000 m^3 (35 % amounting to 2,430 **ha**) were harvested from the NRFS much of which overlaps the Wuskwatim study region (Volume 6, Figure 3-1). The remaining supply was harvested from other FMUs within FMLA #2 or acquired through other mechanisms (including purchase) from outside of the FMLA.

Tolko acquired the manufacturing facilities' timber rights from Repap Manitoba Inc. in 1998. Tolko also assumed all forest management and planning responsibilities for FMLA #2 (Volume 6, Figure 3-1) that include administrative duties, reforestation, as well as third party administration and supervision. Manitoba Conservation monitors company activities and requires periodic planning, reporting, licensing and permitting procedures.

Planning responsibilities include the preparation of a 10-year (some flexibility is allowed) **forest management plan** (FMP) and **annual harvest and renewal plan**s (AHRP). These plans respectively outline the general and specific locations of company operations including harvesting, forest renewal and road construction. They also include all timber harvest activities of **third party operator**s within the FML area. The 10-year FMP requires environmental review and licensing while annual plans do not require the same degree of environmental review and approval by Manitoba Conservation. Tolko is currently operating under license of the 1997 – 2009 FMP submitted for review and licensing in 1996 by the former FMLA #2 holder Repap Manitoba Inc.

Recent Forest Industry Activities

Harvesting

The FMP (1997 – 2009) very generally indicates areas of potential forest harvest and renewal activities within FMUs 66, 83, 84, 85, 87, and 89 that form part of the

Wuskwatim study region (Volume 6, Figure 3-1 and Figure 5-3). Although large operating areas have been identified in the FMP, these generally indicate areas of mature timber and opportunity for potential harvest. Specific harvest areas are identified in Tolko's AHRP. To date, most targeted harvest areas have been located close to, or east of PTH #6 (FMUs 83, 84, 87) and south of PR #391 (FMU 66) (Figure 5-4), all quite far removed from the site of the proposed Project. In some instances deviations have occurred from indicated plans in the FMP due to unforeseen circumstances that may include stakeholder objections, treaty land entitlement negotiations and the nominations of lands under Manitoba's Protected Areas Initiative (PAI). A case in point is the Partridge Crop Hill area (Figure 5-4) west of Wuskwatim Lake, which is under review for protected area status (Creed 2001). Reductions in timber volumes extractable from specific operating areas influence decisions to construct seasonal versus all-weather roads, which ultimately affect the degree of environmental disturbance.

Tolko continues to operate well within the **net merchantable** and current interim AAC limits of the individual FMUs and the NRFS (Table 5-5). Based on the average harvest for years 1997 to 2001 in the NRFS, **net merchantable AAC** volume surpluses exist for both softwood (64.5%) and hardwood (100%). Within FMUs 87 & 89 AAC softwood volume surpluses are 96.1% and 100% respectively (excluding the INCO Strip – Section 7.5.2.4 and Volume 6, Figure 3-1). However, it should be noted that the current AAC level used by Tolko (**Net Operable Level 1**) is based on a lower level of utilization than that used as a standard (net merchantable) in calculations by Manitoba Conservation (Sullivan et al. 2002). Achievable economic utilization standards vary from the net merchantable and allowances are made by Manitoba to provide industry with realistic parameters. Net merchantable utilization standards are considered achievable under optimal economic conditions and the most efficient timber use.

Table 5-5. NRFS annual allowable cut (m^3)[1].

FMU	AAC (Net Merchantable)[2]		5-yr Avg. Harvest[3]		Surplus[4] of AAC		Surplus % of AAC	
	Sftw.	Hdw.	Sftw.	Hdw.	Sftw.	Hdw.	Sftw.	Hwd.
83	239730	91460	79576	0	160154	0	66.8	N/A
84	209880	68650	127792	0	82088	0	39.1	N/A
85	146250	41880	82888	0	63362	0	43.3	N/A
87[5]	144550	39440	5614	0	138936	0	96.1	N/A
89[5]	54580	20730	0	0	54580	0	100.0	N/A
Inco Strip	51460	18030	4298	0	47162	0	91.6	N/A
Total	**846450**	**280190**	**300168**	**0**	**546282**	**280190**	**64.5**	**100.0**

[1] Excludes FMUs 82, 86 and 88 which are not in Tolko's FML area
[2] Manitoba Conservation 2001b
[3] Hunt et al. 1998; Ksiezopolski and Chapman 1999; Sullivan et al. 2000; 2001; 2002
[4] Based on 5-yr average harvest (1997 – 2001) at the Net Operable Level 1 AAC & 10.16 cm top dia. utilization in 2001.
[5] FMUs directly affected by Project impacts.

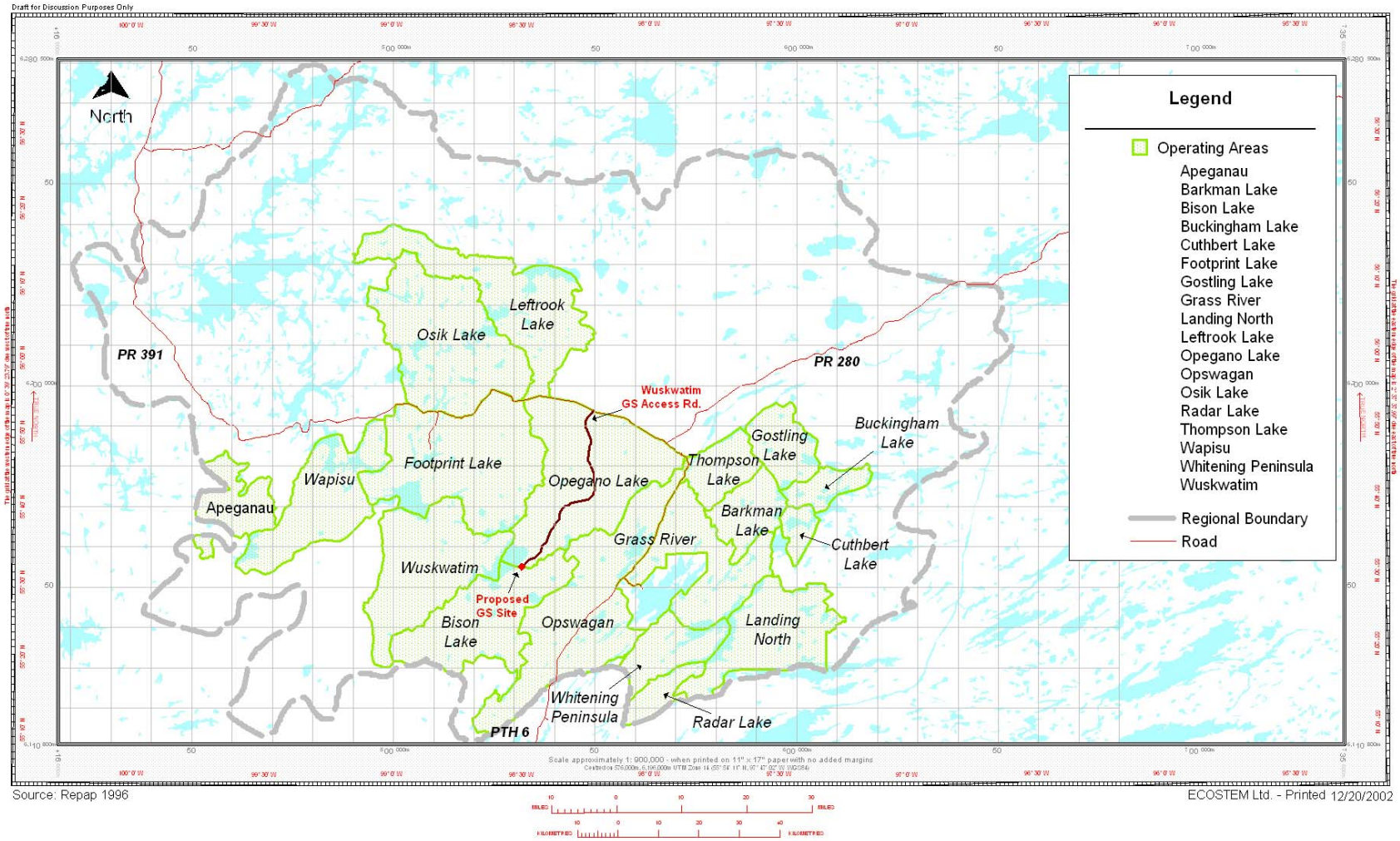


Figure 5-3. Tolko 1997-2009 operating areas within the Wuskwatim Region.

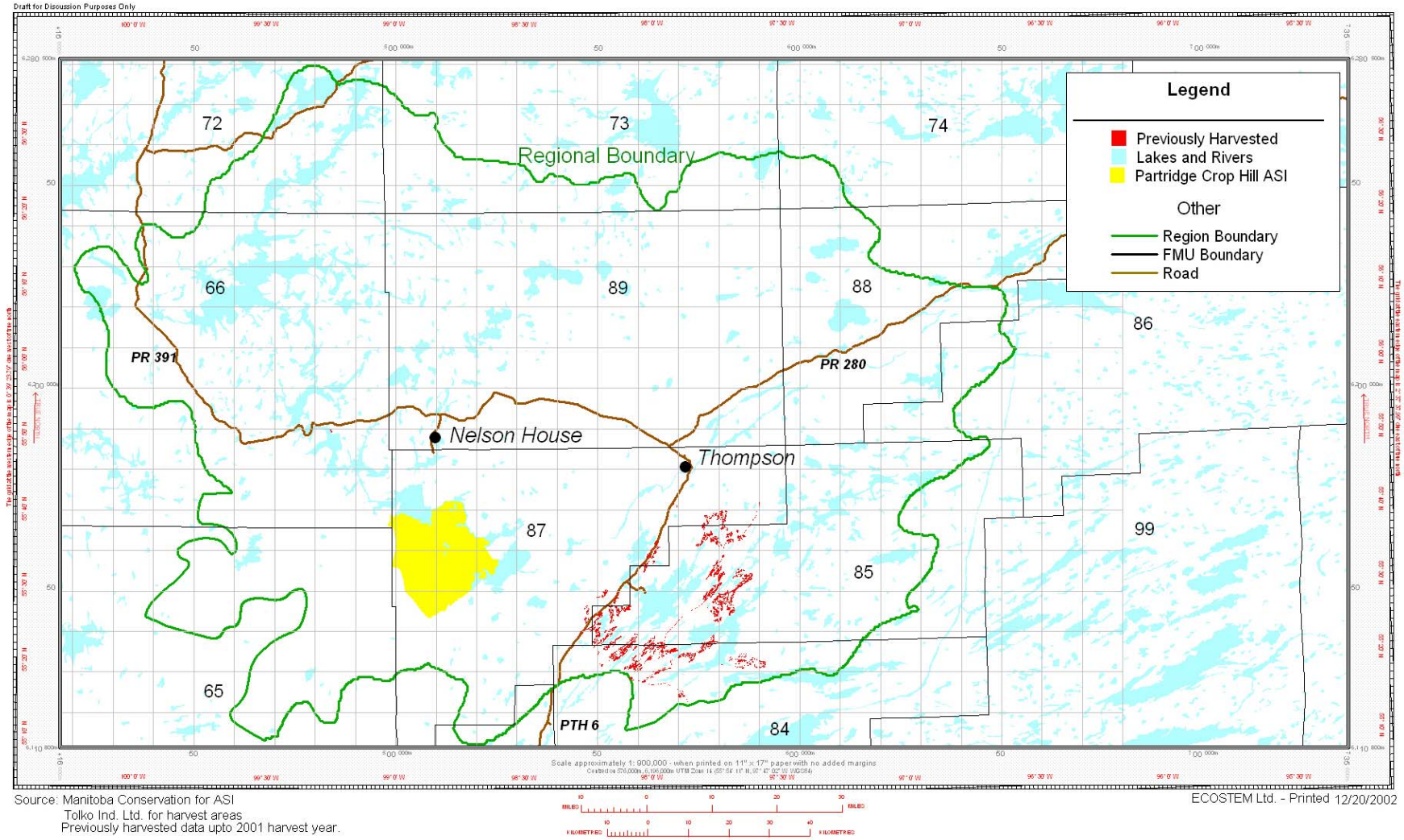


Figure 5-4. Historic FMLA #2 holder harvest activities within the Wuskwatim region

Tolko's facilities rely entirely on softwood species (jack pine, black and white spruce) leaving the available hardwood component entirely untouched. A small amount of hardwood is harvested and processed by third party operators. Until recently, Tolko held the timber rights to most of the available hardwood volumes within the license area as well. These were relinquished in 2001 when it formally dropped all plans to develop any processing facilities to utilize these species (pers. comm. D. Hunt 2002).

Access Development

Although the bulk of timber harvesting is conducted in the winter months, a certain amount of semi-permanent **infrastructure** is required to access areas and facilitate resource extraction. Table 5-6 summarizes the scope of infrastructure development Tolko has initiated in the Wuskwatim study region between 1997 and 2001. Most of these activities took place east of PTH #6 (Figure 5-4). It should be noted that significantly more development was indicated by the company in its AHRPs and FMP. The difference can be attributed to access restrictions to certain areas through the approvals process, budget restrictions, soft markets and changes in mill complex design that alter previous capacity and species demand projections. Periodic restrictions in infrastructure development for various reasons may require accelerated development during other periods. Roads that are constructed are built with specific life spans in mind that serve to extract mature timber from specific operating areas. These roads are **decommission**ed once planned objectives have been met.

Table 5-6. Access development within the Wuskwatim region 1997 – 2001.

Year	Name	Road (km)			Water Crossing	
		R-O-W	Roadway	Upgrade	Bridge	Culvert
1997	McLaren Ck. Rd.		5.7			
	Lucky Bay Rd.		6.3			
	Wintering Pen. Rd.		2.9			
1998	Wintering Pen. Rd.		20.1	2.9		Km 8.0 – Ck.
	McLaren Ck. Rd.		8.0			Km 10.2 – Lost Ck.
1999	Buckingham Rd.		12.0			Km. 3.0
2000	Buckingham Rd.	2.0				
	Radar Lake Rd.	5.0				
2001	Buckingham	8.0	3.0			
	Radar Lake Rd.	4.0	9.0			
Total		**19.0**	**67.0**	**2.9**	**0**	**3**

Source: Repap Manitoba Inc. 1996
Hunt and Mount 1997; Hunt et al. 1998; Ksiezopolski and Chapman 1999; Sullivan et al. 2000; 2001

Forest Renewal

Impacts of forest harvesting are partly mitigated through forest renewal activities carried out by Tolko on all Crown lands harvested within FMLA #2. Thus, forestry impacts are in large part transitory on the landscape. Table 5-7 indicates the level of renewal

activities within the applicable study area FMUs. Site prepared areas are subsequently planted. Consistent with harvesting and infrastructure development up to the year 2001 most forest renewal activities have been conducted in FMUs 83, 84 and 85 of the NRFS (Figure 5-4).

Table 5-7. NRFS avg. annual forest renewal activities (ha) 1997 – 2001.

FMU	Treatment (ha)		
	Site Preparation	Plant	Total
83	492	570	1062
84	834	801	1635
85[1]	728	680	1408
87[1]	38	73	111
89	0	0	0
Total	**2092**	**2124**	**4216**

Source: Hunt et al. 1998; Ksiezopolski and Chapman 1999; Sullivan et al. 2000; 2001; 2002
Note: Activities on INCO area are included in FMU values.

Proposed Forest Industry Activities

Harvesting

According to the Tolko 2003 AHRP annual timber harvesting levels within the Wuskwatim region will vary from approximately 207,000 m^3 in 2003 to 314,000 m^3 in 2005. This is in contrast to a declining volume projected to be harvested in the larger area encompassing all of the FMUs that totally or partially overlap with the study region (414,000 m^3 in 2003 to 359,000 m^3 in 2005) (Tolko 2002). The bulk of this volume will continue to be harvested east of PTH #6 in FMUs 84 and 85. Volumes are also expected out of FMUs 65, 66 and 87 (Figure 5-5 and Table 5-8). Harvest blocks are indicated at Apeganau Lake and in the Suwannee Lake area (FMU 66), specifically targeting Nelson House Forest Industries as the harvesting contractor (pers. comm. D. Aikman 2002).

Access Development

To facilitate forest harvesting road access must be constructed. Within the study region 35 km of road ROW clearing and 39 km of all-weather road construction are planned for the period 2003 to 2005 (Table 5-9, Figure 5-5) (Tolko 2002). This road construction program requires three separate bridge installations. Most road developments have associated terminal life expectancy time frames based on timber volume and maturity within the targeted operating areas.

Table 5-8. Projected timber harvesting within the Wuskwatim region (2003 – 2005).

Year	FMU	Softwood Vol. (m^3)	Approx. Area (ha)
2003			
	66	23000	152
	84	4000	26
	85	78700	521
	87	75000	497
	INCO	26700	176
Subt.		**207400**	**1374**
2004			
	65	25000	166
	84	95500	632
	85	78700	521
	87	75000	497
	INCO	23700	157
Subt.		**297900**	**1973**
2005			
	65	35000	232
	84	101500	672
	85	78700	521
	87	75000	497
	INCO	24200	160
Subt.		**314400**	**2082**
TOTAL		**819700**	**5429**

Source: Tolko Industries Ltd., 2002
Mean vol/ha = 151m^3/ha
A very small amount of hardwood is harvested by third party operators. Where this occurs outside of softwood operations, Manitoba Conservation Forestry Branch administers these operations.

Table 5-9. Tolko proposed all-weather access development (2003–2005) in the Wuskwatim region.

Year	Name	Road Development (km)		Water Crossing	
		R-O-W	Construction	Type	Location (km)
2003	Buckingham L.	0.0	6.0	-	-
	Didmus-Moose	5.0	5.0	Bridge	0.5
	Radar L.	8.0	9.0	Bridge	15.0
	Three Point L.	0.0	4.0	-	-
2004	Buckingham L.	10.0	10.0	-	-
	Three Point L.	0.0	5.0	-	-
2005	Buckingham L.	12.0	0.0	Bridge	32.0
Total		**35.0**	**39.0**		

Source: Tolko Industries Ltd., 2002

Forest Renewal

All sites harvested are site-prepared, planted and tended to meet provincial **stocking** standards ("**free-to-grow**" status) 14 years after harvest, thus effectively mitigating forest harvest impacts. Immediate emphasis on forest renewal following harvest proves to be economic and environmentally effective. Follow-up activities monitor stocking levels, survival rates, vegetative **competition** as well as insect and disease problems that might arise. Provincial stocking requirements reflect the pre-harvest species composition.

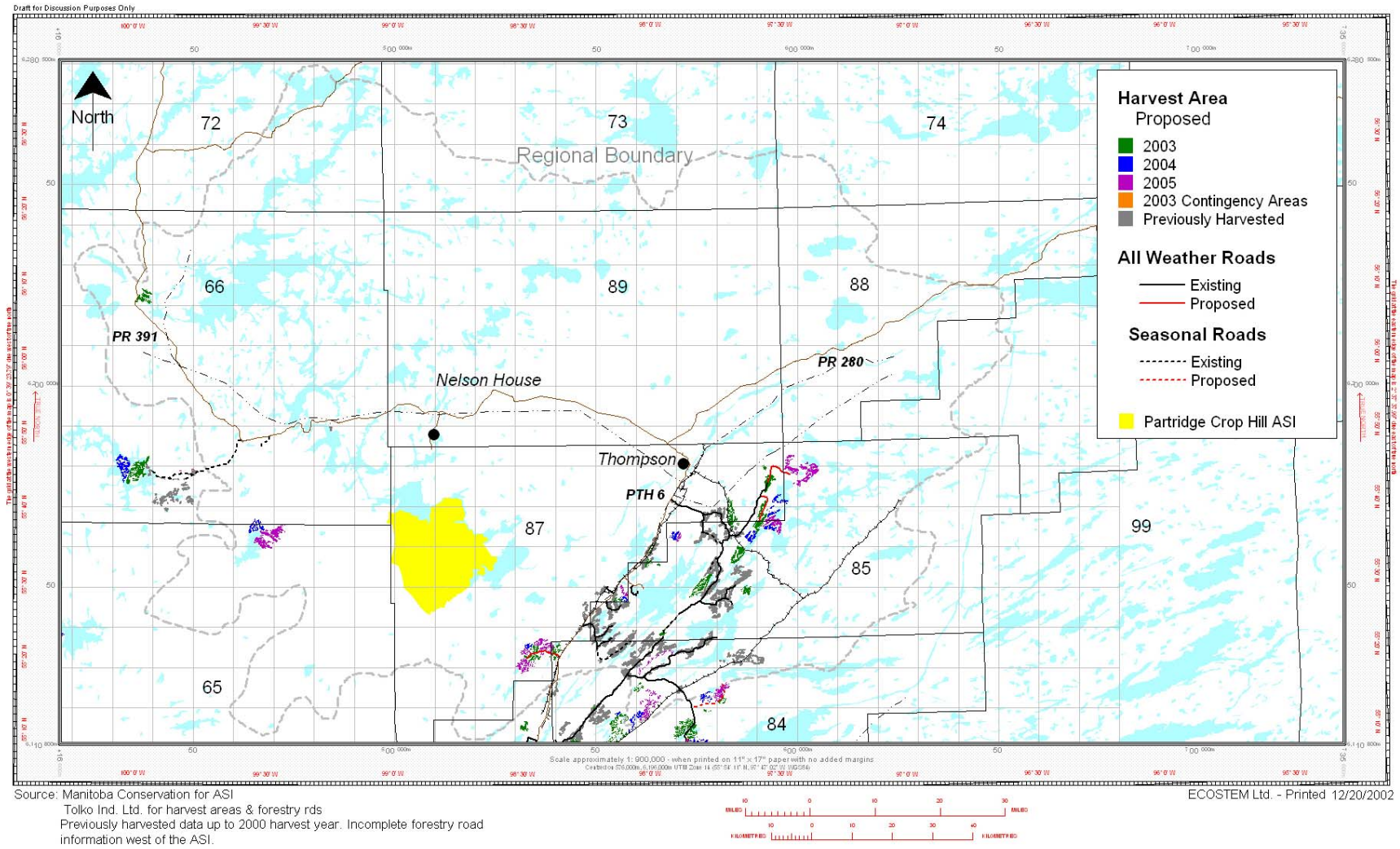


Figure 5-5. Recent and proposed (2003 – 2005) road development and timber harvest areas within the Wuskwatim region.

Forest Protection

The Province of Manitoba is responsible for primary forest protection on all Crown lands including FMLA #2. However, the company does contribute to forest protection against fire, insects and disease in a number of ways (Repap 1996; Tolko 2002). Details are provided in Appendix 9.

5.1.3.3 Third Party Operators (Timber Quota Holders)

All third party operations are included in Tolko's AHRP. Minor exceptions may arise where Manitoba Conservation issues special allocations. Exceptions may also include salvage operations due to fire, insects or disease that are not foreseeable under normal planning conditions.

Currently, there are two timber quota holders (Hilbert Mosiondz and Wabman Trucking Service Ltd.) with a combined volume of 13,230 m^3 of softwood operating within FMLA #2 and the NRFS. Planning, management, reporting and administration of these quota holder operations are conducted by Tolko as is required in their license agreement with Manitoba. Most of the timber harvested from such operations is delivered to the Tolko mills at The Pas although these allocation holders are free to market their timber as they please.

Manitoba Conservation Forestry Branch from time to time exercises its' option to offer timber sales by means of auction (pers. comm. B. Holmes 2001). Auctioned timber sales are normally used for reasons of timber salvage or to satisfy local product-specific demands. Where timber surpluses exist, the provision of auction sales can be accommodated under the FML agreement.

5.1.3.4 Nelson House Forest Industries

Nelson House Forest Industries (NHFI), owned by NCN, was started in 1976 with a loan from Manitoba Hydro as part of Manitoba Hydro's Churchill River Diversion Project (pers. comm. G. Bunn 2003). At the time, NHFI held a contract with Manitoba Hydro to provide shoreline clearing services along reaches of the CRD.

Despite its' name, NHFI's core business today is heavy construction with timber harvesting forming a sideline (pers. comm. G. Bunn 2003). Currently the company sub-contracts actual harvesting to others while it slashes and hauls the timber. Timber harvesting contracts with FMLA #2 holders (currently Tolko) vary in size from year to year. Opportunities exist for NHFI to expand its' timber production and deliveries to Tolko (pers. comm. Aikman 2002; G. Bunn 2003). In recent years NHFI has harvested

timber in the Wapisu Lake, Rat Lake and Eden Lake areas within the Wuskwatim region; the latter being a fire salvage operation. Current operations are focused in the Rat Lake block south of Leaf Rapids.

NHFI owns a sawmill that it has recently moved to the Leaf Rapids area outside of FMLA #2 (pers. comm. G. Bunn 2003). The equipment has been activated and NHFI is hoping to operate it there pending timber supply agreements with Manitoba Conservation.

Periodically under contract with Manitoba Hydro, NHFI provides transmission line **right-of-way** clearing services. Where economical, merchantable timber is salvaged and delivered to Tolko.

5.1.3.5 International Nickel Company of Canada (INCO)

The International Nickel Company of Canada (INCO) maintains its' softwood timber allocation within the geographic boundaries of FMLA #2 and portions of the Wuskwatim study region (Volume 6, Figure 3-1). The INCO allocation overlaps with portions of FMUs 83, 84, 85, 87, 88 and 89.

INCO maintains first right to timber 20.3 cm (8 inches) and greater in diameter within this area but has never exercised this right. Instead INCO allows Tolko and third party operators to harvest timber within the allocation boundaries (pers. comm. D. Hunt 2002d. 2002; B. Holmes 2001). Tolko and Manitoba Conservation continue to track harvest volumes and calculate an AAC for the INCO allocation (also known as the INCO Strip).

5.1.3.6 Forest Research/Monitoring

Government agencies and organizations such as Manitoba Conservation, the Canadian Forest Service (CFS) and Tolko Industries Ltd. carry out long-term forestry related research activities in and around the study area. These are shown on Figure 5-6 and include:

- forest resource inventory **permanent sample plot**s;
- forest health monitoring sites;
- tree improvement program sites;
- eco-monitoring sites;
- forest **succession**;
- growth and yield; and
- forest regeneration assessment on harvest sites.

The Boreal Ecosystem-Atmosphere Study (BOREAS) is a collaborative study initiated in the early 1990s and supported by a number of Canadian and American agencies. The Canadian agencies include:

- Natural Resources Canada (NRCan) – the Science Directorate of the Canadian Forest Service (CFS);
- Canada Centre for Remote Sensing (CCRS); Energy, Mines & Resources Canada;
- Natural Sciences and Engineering Research Council of Canada;
- Research Branch of Agriculture Canada;
- Institute for Aerospace Research – National Research Council;
- Atmospheric Environment Service Canadian Climate Centre – Environment Canada; and
- Canadian Global Change Program – The Royal Society for Canada.

Sponsors from the United States include:

- Ecosystems Dynamics & Biogeochemical Cycles Branch – National Aeronautics and Space Administration (NASA);
- National Oceanic and Atmospheric Administration (NOAA) – Office of Global Programs;
- National Science Foundation (NSF) – Atmospheric Sciences and Environmental Biology Divisions; and
- Office of Research and Development – U.S. Department of Energy, Environmental Protection Agency (EPA).

The study objective is to improve understanding of the boreal forests' role in influencing climate and how global climate change may affect the forest. Scientists have chosen sites to study contrasting boreal forest conditions; i.e., the cold short growing season of the north near Thompson, Manitoba, and the warmer, drier conditions of Prince Albert National Park in central Saskatchewan (Mercer et al. 1992). The Manitoba site overlaps with the Wuskwatim study region and partially with the sub-region.

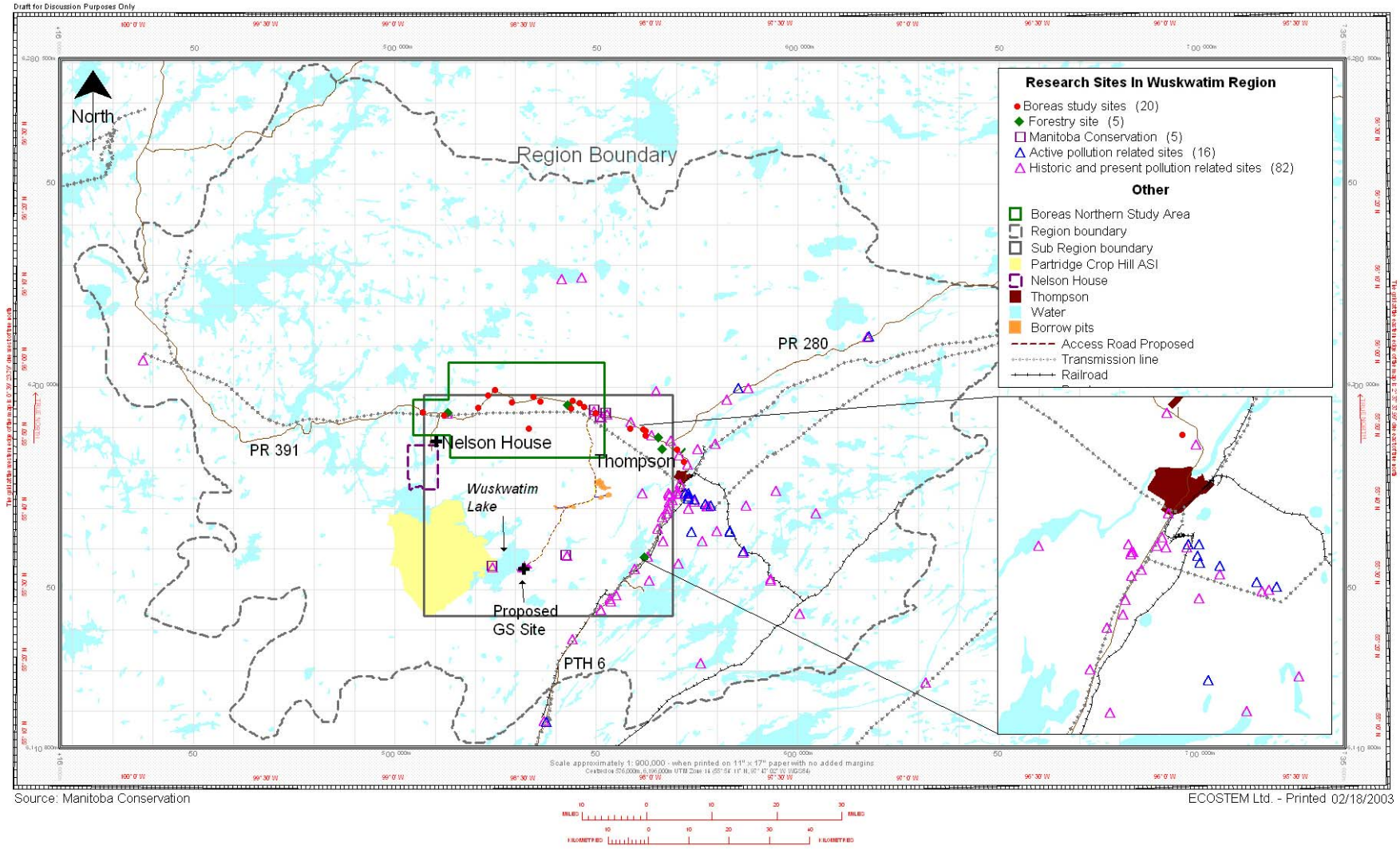


Figure 5-6. Research and monitoring sites in the Wuskwatim region.

More information on all of the above mentioned research and monitoring activities is available in Appendix 10.

5.1.3.7 Forestry Conservation/Enhancement Programs

Maintenance of forest cover in the study area is important for commercial and ecological sustainability. In addition, awareness of non-traditional forest values is increasing, opening new opportunities and markets. A number of available woodland support programs have been identified and are briefly discussed in Appendix 11. Although some of these programs more appropriately target southern Manitoba where woodlands and forests are less dominant they do not exclude northern Manitoba. Support program objectives are conservation, environmental protection and habitat maintenance or **enhancement**.

5.2 IMPACTS AND MITIGATION

5.2.1 Forestry Impact Definition

There are three major categories that contribute to forestry resource impacts from the Project. These are clearing, flooding, and erosion all of which are limited to the confines of the Sub-Region (Volume 6, Figure 4-2). The impacts are summarized in Table 5-10.

Table 5-10. Project impact summary.

Impact	Area (ha)
Clearing^	1566
Flooding	38
Erosion*	45
Total	**1649**

^ Inclludes the GS footprint in its entirety.
* Incremental erosion up to 2034 (Volume 4, Section 6).
Only the first 5 years of erosion impacts (27 ha) are included in the impact on the AAC calculations.

Although impacts to forest resources may occur upstream and downstream of the generating station site, these impacts will not be separated for impact determination purposes on commercial forestry. All forestry impacts are contained within MUs 87 and 89, the local provincial administrative units for forest resource management and administration (Volume 6, Figure 3.1) and are best related at this level.

The Project area is largely forested. Therefore, impacts of clearing, flooding and erosion will result in the removal of forest resources (temporary and permanent). From a

commercial forestry perspective, forest cover removal results in a number of impacts that include:

- forested area loss;
- standing timber volume loss;
- reduction in the AAC; and
- area withdrawal from FMLA #2.

The above impacts are discussed in greater detail in this section along with the effects of these impacts on the forest industry and related activities within the MUs and the Nelson River FS.

The infrastructure for the proposed Project has a life span of 100 years or more. Flood and erosion impacts are permanent as are some attributable to clearing. However, portions of the footprint area for the generating station and borrow pit areas will be required only during the construction phase of the Project (Volume 1, Section 4). Impacts on such areas are, therefore, considered to be temporary, as these sites will be **rehabilitate**d following construction.

Although erosion is permanent, the impacts are gradual and continual over the 100-year projection period (2009 – 2109). In regards to forestry, only the first five years of impacts from erosion are incorporated into the forest resource loss impact calculations. The longer-term erosion impacts are dealt with only in general terms as these are minimal over such a long time. Their inclusion would require forest **model**ing to incorporate changing conditions relative to forest stand ages and structure and would only be applicable to the current inventory (the NRFS is due for a new FRI in the near-term).

5.2.1.1 Loss of Forest Resources

Area

Located in the Boreal Shield ecozone, the Project area is dominantly forested (Volume 6). As such, Project development affects the forest resources in the immediate vicinity. Losses will be incurred due to clearing, flooding and erosion. The extent of these is shown in Table 5-11. All impacts to forest resources are contained within the NRFS and more specifically within MUs 87 and 89.

The impact areas include a broad variety of site types of both productive and non-productive forestlands. Productive and non-productive forestlands are defined in the

Table 5-11. Project impacts on productive forestland and non-productive land.

FMU	Impact	Area (ha) Productive	Non-productive	Total
87*	Clearing	1294	177	**1471**
	Flooding	34	4	**38**
	Erosion	24	3	**27**
Subt.		**1352**	**184**	**1536**
89	Clearing	65	30	**95**
Subt.		**65**	**30**	**95**
Total		**1417**	**214**	**1631**

Source: Manitoba Conservation FRI
* Includes Project specific erosion impacts up to 2014.

Manitoba FRI as those lands capable and not capable respectively of producing stands of commercially viable forests (Manitoba Conservation 1998). The break down of these two major classes is defined in Appendix 5.5. The split of impact by area on productive versus non-productive lands in FMUs 87 and 89 is 87 % and 13 % respectively where the latter represents fens, bogs, **marsh**es, bare rock, meadows, etc. Impacts to non-productive lands are primarily ecological rather than forestry related and are, therefore, discussed in Volume 6.

The required clearing activities constitute the majority of the impacts on the productive forest lands which is expected as upland sites are generally preferred for construction purposes from logistical and economical perspectives.

From a forest industry and AAC perspective, Project impacts are limited to productive forestlands free of status and ownership restrictions. All lands affected by the Generation Project are classified within the FRI as Crown owned "Open" to commercial forest harvesting and other development. Impacts specific to crown land open areas are further influenced by forest type, site class and cutting class (CC). As impacts to these forestlands are the same whether from clearing, flooding or erosion, these impact categories are further lumped to simplify matters.

Table 5-12 summarizes the affected productive forestlands by working group and cutting class groups. Of the affected productive forest lands 58% are under young CCs (0, 1, 2) that currently have no commercial timber value. Another 31% of the area is categorized as immature timber stands (CC 3) which may or may not be merchantable. The remaining 11% consist of mature forest stands (CCs 4, 5), which are considered commercially merchantable.

Table 5-12. Impacted productive forest land by working group and cutting class group.

FMU	Working Group	Area by Cutting Class Group (ha) 0, 1, 2	3	4, 5	Total
87	Jack pine	606	69	-	675
	Black spruce	148	312	99	559
	White spruce	-	2	34	36
	Balsam fir	-	1	-	1
	Trembling aspen	44	33	4	81
Subt.		**798**	**417**	**137**	**1352**
89	Jack pine	18	6	14	38
	Black spruce	10	17	-	27
Subt.		**28**	**23**	**14**	**65**
Total		**826**	**440**	**151**	**1417**

Source: Manitoba Conservation FRI
Manitoba Natural Resources 1994a, 1994b

Timber Volume

With the productive forestland loss indicated in Table 5-12, an associated standing volume of timber is also lost. Volume calculations for young stands (CCs 1, 2) are done according to Manitoba's system of damage appraisal. The Forestry Branch has regionally calculated midpoints for each cutting class by working group and site class. Additionally, volume growth increment has been determined and is represented as mean annual increment (MAI) by working group and site class (Manitoba Conservation 2002b) (Appendix 13). Type aggregates are associated with the appropriate working group and volume for these young stands is calculated as shown below. Volumes are calculated by type aggregate and summed at the working group and softwood/hardwood levels.

Vol. (m^3) = type aggregate area (ha) x cutting class mid-pt. (yrs) x MAI/species (m^3/ha/yr)

The Forestry Branch has also developed regional stand **stock** volume tables (SSVT) for the entire administered forest zone of Manitoba. Net merchantable volumes are most frequently used when relating issues to the AAC and forest management planning. These incorporate species-specific cull factors (Appendix 12). The SSVTs are applic```ble to CCs 3, 4 and 5 (Appendix 14). They list volume by species per hectare for each type aggregate. To calculate net merchantable volume, the areas of similar type aggregates are subtotalled. Volume is then determined as indicated below. As with the young

stands, volumes are summed by species working group, and then by softwood and hardwood.

Vol. (m^3) = total type aggregate area (ha) x vol. (m^3/ha) for each species

As with area, volumes are subtotalled by species working group and CC groups in Table 5-13. Note that CC 0 is excluded for volume calculation purposes. This class represents recently disturbed sites (e.g., fire, harvest, wind storms, etc.) and has no associated volume (Manitoba Conservation 2002b). A total of 61,660 m^3 of softwood and 10,060 m3 of hardwood may be affected by the Project. These numbers reflect the softwood dominant nature of the northern Boreal forest. Although CCs 0, 1 and 2 represent 58% of the total productive area affected, they account for only 30% (21,560 m^3) of the volume affected. The immature (CC 3) and mature (CCs 4, 5) groups account for 47% (33,610 m^3) and 23% (16,540 m3) of the total volume respectively.

Table 5-13. Timber volume loss by working group and cutting class.

		Volume by Cutting Class Grp. (m^3)								
	Working	1, 2		3		4, 5		Total		Grand
FMU	Group	Sftwd	Hrdwd	Sftwd	Hrdwd	Sftwd	Hrdwd	Sftwd	Hrdwd	Total
87	Jack pine	13270	1810	3890	400	20	-	17180	2210	19390
	Black spruce	4080	470	21620	2690	9080	700	34780	3860	38640
	White spruce	-	-	170	50	4470	500	4640	550	5190
	Balsam fir	-	-	90	10	-	-	90	10	100
	Trembling aspen	370	970	1030	2000	190	210	1590	3180	4770
Subt.		**17720**	**3250**	**26800**	**5150**	**13760**	**1410**	**58280**	**9810**	**68090**
89	Jack pine	230	20	210	10	1310	50	1750	80	1830
	Black spruce	300	40	1320	130	10	-	1630	170	1800
Subt.		**530**	**60**	**1530**	**140**	**1320**	**50**	**3380**	**250**	**3630**
Total		**18250**	**3310**	**28330**	**5290**	**15080**	**1460**	**61660**	**10060**	**71720**

5.2.1.2 Area and Volume Impact Summary

An area and volume impact summary is provided in Table 5-14. Impact distribution on FMUs 87 and 89 on a percentage basis are similar for area (94% and 6%) and volume (95% and 5%) respectively.

Table 5-14. Area and volume impact summary.

	Impact Area (ha)				Volume Impact	
FMU	**Productive Land**	**Non-productive Land**	**Total**	**% of Total Area**	**m^3**	**% of Total**
87	1352	184	1536	94	68090	95
89	65	30	95	6	3630	5
Total	**1417**	**214**	**1631**	**100**	**71720**	**100**

5.2.2 Impact Effects

5.2.2.1 Annual Allowable Cut

Manitoba Conservation Forestry Branch calculates the AAC for timber resources at the FMU level. The AAC is based on "productive" forestlands and calculated for Crown-owned open & restricted lands. As all affected lands are classified Crown-owned open, calculations of effects on the AAC are somewhat simplified.

The most common AAC value used by Manitoba is the "net merchantable". This AAC reflects the latest in product technology and highest level of utilization (Manitoba Conservation 2001b). It represents the volume of all species with stem diameters equal to or greater than 9.1 cm at breast height (1.3 metres from the root collar) less the respective cull factors (Manitoba Conservation 1998) (Appendix 12). In addition, a 15% reduction is applied to safeguard against normal losses to fire, windstorms, insect and disease, etc.

The calculation of the AAC for any one FMU is complex. Given the relatively small area affected by the Project (1,417 ha productive forest land) relative to the extent of the individual MUs and the NRFS, Manitoba Conservation Forestry Branch advised that it would not be worthwhile to recalculate the entire AAC for the applicable FMUs (pers. comm. G. Carlson 2001; B. Holmes 2001). As a simplified alternative it was suggested that the impact on the AAC be calculated for each working group within each FMU as a percent of "productive" area affected. This approach has been adopted in this analysis. Two perspectives are presented;

a) Project impacts on CCs 4 and 5 only; and

b) Project impacts on all productive forestlands (all cutting classes).

Where the first scenario focuses on effects on current operational AACs and harvest levels, the second provides perspective of Project impacts on the long-term timber

resource sustainability. Neither approach gives an accurate account of AAC reduction as a result of the Project impacts, but rather estimates effects on the AAC.

Appendix 15 provides area of forest distribution for the FMUs in which the Project is located. The information is presented by working groups and CCs. Also shown are non-productive forest areas and non-forested areas within the FMUs.

Operational AAC

The impact, represented as area, cannot be directly applied against the AAC as the latter is a function of Volume within CCs 4 and 5 and overall CC distribution. However, comparing the impacted area of these mature forest stands against the total similar area within the affected FMUs provides a useful perspective. Table 5-15 summarizes the mature working groups, namely CCs 4 and 5, within FMUs 87 and 89 from Appendix 15.

Table 5-15. Productive forest land (ha) contributing to the AAC - Crown Land "OPEN" (CC 4 & 5) in FMUs 87 & 89.

						Working Group Total					Grand
FMU	JP	BS	WS	BF	TL	Softwood	TA	BA	WB	Total Hardwood	Total
87	8027	20415	478	0	0	28920	5188	32	9	5228	**34148**
89	1870	14015	163	0	0	16048	3030	66	7	3103	**19151**
Total	**9897**	**34430**	**641**	**0**	**0**	**44968**	**8218**	**98**	**16**	**8331**	**53299**

Source: Manitoba Conservation FRI

Area based Project related impacts on productive forest lands were calculated and are indicated in Appendix 16. This allows for direct comparison of impacts on overall working groups and age class distribution as presented in Appendix 15. Area based summaries of impacts (on CCs 4 & 5) by working group and specific to softwood and hardwood are presented in tables 5-16 and 5-17. Impacts specific to each FMU are given. Cumulatively the area impacts affecting the study area operational AACs amount to 147 ha of softwood representing 0.33 % of the mature softwood working groups combined area (Table 5-16). Only 4 ha of mature hardwood working group areas are impacted affecting 0.05% of that total area (Table 5-17).

With respect to the impact on the AAC volume, Table 5-18 shows the existing net merchantable AACs (as calculated by Manitoba Conservation) for the FMUs affected by the Project. Project related impacts on the AAC are applied at the FMU and working group levels. For this study purpose the percent value of area impacted (CCs 4 & 5) for each working group is also applied to each working group AAC within the applicable FMU. The impact results are detailed in Appendix 17 and summarized in Table 5-19.

Project impacts on the current operational AACs for FMUs 87 and 89 are minimal (Table 5-19). From a volume perspective, the highest losses of AAC for both softwoods and hardwoods are to FMU 87. In total, operational AAC reductions amount to approximately 1,221 m3 (0.6%) of softwood and 25 m3 (0.0%) of hardwood. Percentage wise these impacts on the operational AACs are long-term, small, local, and, therefore, insignificant.

Timber Resource Sustainability

Area based Project related impacts on all productive forest lands are discussed in Section 7.5.5.2. These are further summarized in Table 5-20 and compared to total productive forestlands in FMUs 87 and 89. Impacts are very small within each FMU as well as cumulatively registering 0.4% and 0.2% of productive forest lands affected under softwood and hardwood cover types respectively. Softwood cover types are dominant in the study area as is reflected in Table 5-20 and the areas impacted (1336 ha softwood and 81 ha hardwood). The majority of the impacts are contained in FMU 87 with 1352 ha affected of a total of 186,210 ha productive forest land. These impacts are long-term, small, local, and, therefore, insignificant.

5.2.2.2 Effects on the Forest Industry

Given the post-Project surplus timber volumes that remain, relative to current harvest levels, no impacts are anticipated on current harvest levels to either the FMLA #2 holder or third party operators. Post-Project AAC values (incorporating impact reductions) and current mean harvest levels are provided in Table 5-21 with resulting anticipated balances. Positive balances clearly remain in both affected FMUs.

Tolko Industries Ltd.

Area

All of the area affected by the Project is under FML Agreement #2, the holder of which is Tolko Industries Ltd., located in The Pas, Manitoba. The company has been assigned the rights to the timber resources within the license area by Manitoba (Volume 6, Figure 3.1) excepting those that are committed to other allocation holders.

Manitoba reserves the right to withdraw certain areas within the FML Area for hydroelectric development, recreation, roads, uses pursuant to the Northern Flood Agreement, treaty land entitlement, and/or other uses, which Manitoba deems to be in the

Table 5-16. Area based impact on the softwood AAC (ha) by working group (CC 4 & 5) – Crown Land "Open".

	AAC Area (ha) by Working Group						Area (ha) Impact by Working Group						Impact % by Working Group					
FMU	**JP**	**BS**	**WS**	**BF**	**TL**	**Total**	**JP**	**BS**	**WS**	**BF**	**TL**	**Total**	**JP**	**BS**	**WS**	**BF**	**TL**	**Total**
87	8027	20415	478	0	0	28920	0	99	34	0	0	**133**	0.00	0.49	7.10	0.00	0.00	**0.46**
89	1870	14015	163	0	0	16048	14	0	0	0	0	**14**	0.73	0.00	0.00	0.00	0.00	**0.09**
Subt.	**9897**	**34430**	**641**	**0**	**0**	**44968**	**14**	**100**	**34**	**0**	**0**	**147**	**0.14**	**0.29**	**5.29**	**0.00**	**0.00**	**0.33**

Where: JP = jack pine, BS = black spruce, WS = white spruce, BF = balsam fir, TL = tamarack, TA = trembling aspen, WB = white birch, BP = balsam poplar

Table 5-17. Area based impact on the hardwood AAC (ha) by working group (CC 4 & 5) – Crown Land "Open".

	AAC Area (ha) by Working group				Area (ha) Impact by Working Group				Impact % by Working Group			
FMU	**TA**	**WB**	**BA**	**Total**	**TA**	**WB**	**BA**	**Total**	**TA**	**WB**	**BA**	**Total**
87	5188	32	9	5228	4	0	0	4	0.08	0.00	0.00	**0.08**
89	3030	7	66	3103	0	0	0	0	0.00	0.00	0.00	**0.00**
Subt.	**8218**	**39**	**75**	**8331**	**4**	**0**	**0**	**4**	**0.05**	**0.00**	**0.00**	**0.05**

Where: JP = jack pine, BS = black spruce, WS = white spruce, BF = balsam fir, TL = tamarack, TA = trembling aspen, WB = white birch, BP = balsam poplar

Table 5-18. Annual allowable cut (Net Merchantable Vol. m^3) by working group – Crown Land "Open".

	Working Group									
FMU	**JP**	**BS**	**WS**	**BF**	**TL**	**Total Softwd.**	**TA**	**BA**	**WB**	**Total Hardwd.**
87	41390	91880	10200	820	260	144550	31190	4150	4100	39440
89	6400	40820	6570	590	200	54580	17290	1960	1480	20730
Subt.	**47790**	**132700**	**16770**	**1410**	**460**	**199130**	**48480**	**6110**	**5580**	**60170**

Source: Manitoba Conservation 2002b

Excludes all INCO areas and associated volumes.

The AAC volumes for tamarack are derived from volumes found within other working groups.

Where: JP = jack pine, BS = black spruce, WS = white spruce, BF = balsam fir, TL = tamarack, TA = trembling aspen, WB = white birch, BA = balsam poplar

Table 5-19. Estimated AAC impact summary and balance (net merchantable).

	Softwood				Hardwood			
	Volume (m^3)				Volume (m^3)			
FMU	AAC	Impact	AAC Balance	% Impact on AAC	AAC	Impact	AAC Balance	% Impact on AAC
87	144550	1174	143376	**0.8**	39440	25	39415	**0.1**
89	54580	47	54533	**0.1**	20730	0	20730	**0.0**
Total	**199130**	**1221**	**197909**	**0.6**	**46740**	**25**	**46715**	**0.0**

Table 5-20. Impact on productive forest land by working group – all cutting classes - Crown Land "Open".

FMU	Working Group	Productive Area (ha)	Impact Area (ha)	% Impact
87	Softwood	168119	1271	0.8
	Hardwood	18091	81	0.4
89	Softwood	210572	65	0.0
	Hardwood	21630	0	0.0
Cumulative	**Softwood**	**378691**	**1336**	**0.4**
	Hardwood	**39721**	**81**	**0.2**

Excludes FMU 87 INCO areas.
Source: Manitoba Conservation 2001b

Table 5-21. Post-project net merchantable AAC balances relative to current mean harvest levels.

FMU	Mean Harvested		AAC Post-Project		Surplus Vol. (m^3)		Surplus %	
	Softwd.[3, 4]	Hdw. [2, 5]	Softw.	Hdw.	Sftwd.	Hdw.	Sftwd.	Hdw.
87	5614	N/a	143376	39415	137762	n/a	96	n/a
89	0	N/a	54533	20730	54533	n/a	100	n/a
Subtotal	**5614**	**n/a [1]**	**197909**	**46715 [1]**	**192295**	**n/a [1]**	**97**	**n/a [1]**

1 Values are not available on an FMU basis but negligible (pers. comm. B. Holmes 2001)
2 Manitoba Conservation 2001b
3 Hunt et al. 1998; Ksiezopolski and Chapman1999; Sullivan et al. 2000; 2001; 2002
4 Based on 5-Yr average harvest (1997-2001) at Net Operable Level 1 AAC & 10.16 cm top dia. utilization in 2001
5 Hardwood harvest levels not available for individual FMUs.

public interest (Repap 1996). In order to ensure the rights of the license holder and maintain necessary volumes of timber provided in the FML Agreement limitations on area withdrawals from the FML area have been established in the Agreement (1989) as follows (Table 5-22):

- cumulatively 5% of the productive forest land base within the FML Area over 1 rotation period (100 years); or
- cumulatively 0.5% of the productive forest land base within the FML Area over a 10-year period.

Table 5-22. FMLA #2 productive forest land withdrawal and balances (ha).

		Withdrawal Limits			
Forest Section	Total Prod. Forest Land	100-Yr Period (5%)	10-Yr Period (0.5%)	Proposed Project Withdrawal	% of 10-Yr Limit
Nelson River	1073000	53600	5360	1417	26.4

Source: Manitoba, Repap 1989
Manitoba Conservation 2002b

Withdrawal limitations are specific to each FS within the FML area. All withdrawals are recorded and tracked. When the above stated limits are exceeded Manitoba must live up to the following FML Agreement stipulations:

- add new productive forest land to the FML Area such that full allowable levels are restored. Replacement land is to be comparable to that withdrawn, from the perspective of company operating costs; and/or
- provide an additional timber supply acceptable to the company, such timber to be comparable to the timber on the withdrawn land from the perspective of company operating costs, tree species, growth rate and distance from the mill site.

The 10-year periods referenced commence with the FML #2 Agreement signed between Manitoba and the then license holder Repap Manitoba Inc., that date being May 4, 1989.

Where the company has any fixed, sunk or capital costs in the areas withdrawn, Manitoba must compensate the company for 100% of the current replacement cost. In addition, where allowable area withdrawal limits are exceeded in any 10-year period, and

Manitoba cannot provide additional land or timber of equivalent quality, cost and value, Manitoba must compensate the company for resulting losses and/or increased costs (Repap 1996).

The Project will require productive forestland withdrawals from the Nelson River Forest Section totalling 1,417 ha. This represents 26.4% of the present 10-year withdrawal limit for the NRFS as set out in the FML Agreement #2 (1989) (Table 5-22). The current 10-year period start date was May 4, 1999.

Volume

Tolko Industries Ltd. continues to operate well within the AACs of FMUs 87 and 89 (Table 5-21), harvesting an average of only 3% of the softwood permissible net merchantable volume. The impacts of the Project are all limited to FMUs 87 and 89, the latter FMU having impacts solely from the access road construction. Because the impact on the NRFS AAC is minor (1,221 m^3 softwood), it does not infringe on the current annual harvesting level of Tolko Industries Ltd.

Quota Holders

Two Quota Holders currently operate within the NRFS (Volume 7) accounting for an annual harvest of 13,230 m^3 of softwoods (Repap, 1996). The Project related AAC reduction will not affect Quota Holders. Given the surplus volume (Table 5-21) that remains available within FMU's 87 and 89 as well as the under-utilized AAC volumes within the remainder of the NRFS (547,000 m^3 of softwood & 277,000 m^3 of hardwood), no reduction will be applied to the two quota holders annual harvest levels. Although listed as quota holders within the NRFS these allocation holders have thus far not been harvesting within FMUs 87 and 89 but rather in the area designated as the INCO strip and FMU 85.

Nelson House Forest Industries

Nelson House Forest Industries timber harvesting activities will not be negatively impacted by the Project. The company currently harvests timber under contract for Tolko whose current harvest levels in this region will not be negatively affected (7.5.5.2).

From a logistical perspective, NHFI may benefit from the Project by having increased and improved all-weather access to previously inaccessible areas. The construction of the access road to the generating station site will require clearing and possible salvage of timber resources. This timber salvage could be a short-term economic opportunity for NHFI. In addition, post-Project access across the Burntwood River via the generating

station dam will provide access to a considerable volume of mature timber and could provide long-term economic opportunities for NCN and NHFI.

International Nickel Company of Canada

The Project will have no effect on the AAC of timber resources within the INCO strip. Project related impacts are all well outside of the INCO strip (Volume 6).

5.2.2.3 Woody Debris Contribution as a Result of Erosion

Woody debris contribution to the **aquatic environment** as a result of erosion is discussed in detail in Volume 4, Section 6.

5.2.2.4 Forest Research/Monitoring Activities

A number of forest research/monitoring activities are identified in Section 7.5.4.6. In most cases no impacts on these sites are anticipated; however, two studies overlap with the study area and are susceptible to some level of impact from the Project. These are Manitoba Conservation's Eco-monitoring – Forest Health study and the BOREAS project. These are discussed in greater detail below.

Manitoba Conservation – Eco-monitoring

Several inactive forest health research sites that were established by the Canadian Forest Service (CFS), Manitoba Natural Resources (MNR) and INCO may be affected by the Project (Section 7.5.4.6). Specifically, these sites are located on the west shore of Wuskwatim Lake, on the south shore of Opegano Lake and near the intersection of PR 391 and the proposed Mile 17 access road (Figure 5-7 and Appendix 10). Manitoba Conservation has requested that these sites be protected from disturbance where possible to facilitate future reactivation of the sites and to build on existing data.

Discussions with Mr. Floyd Philips (2002), who was involved with the initial establishment of some of the forest health plots, revealed that the Slaney Site #12 on Wuskwatim Lake was located approximately 50 metres in from the shoreline. The shoreline itself is described as a high-**gradient** shoreline thereby ensuring the integrity of the site from direct Project impacts. Similarly, Slaney Site # 47 on the south shore of Opegano Lake will be immune from direct Project impacts. It was placed approximately 300 metres inland and estimated to be 15 metres above the waterline (pers. comm. F. Philips 2002).

Slaney Site #34 JP and CFS Site NOR-1-114, although in proximity to the proposed junction of PR 391 and the Mile 17 access road, are located on the north side of PR 391 and should not be adversely affected. Slaney Site #34 BS is located south of PR 391 and east of the proposed junction with the Mile 17 road also will not be affected by the Project. These two sites should be marked in the field at the time of road construction so they are not accidentally damaged.

Boreal Ecosystem – Atmosphere Study

The access road will traverse the south-eastern portion of the BOREAS Modeling Sub-area (Appendix 10). It will be in close proximity to the eastern-most Auxiliary Site at the junction of PR 391. Three other Auxiliary Sites and the Young Jack Pine Flux Tower Site are within a 10-km radius to the northwest. Access road routing has taken into account researchers concerns thereby negating impacts to the research program.

5.2.3 Mitigation

5.2.3.1 Clearing

Clearing of forest cover is required for the construction of the Mile 17 access road, borrow pits, generating station footprint and the area to be flooded in the immediate **forebay**. Where economically and logistically feasible all merchantable timber will be salvaged. The forest stands affected are listed in Appendix 17. Some logistical challenges may be experienced as clearing for various components are scheduled at different phases of construction (Volume 1, Section 4). Clearing will be planned in advance and limited to areas actually required for construction and infrastructure purposes and monitored during actual clearing operations to prevent unnecessary and/or excessive clearing.

Temporary use sites such as borrow pits and portions of the station footprint will be rehabilitated as soon as possible following Project construction. This will include the reshaping of the terrain where it has been disturbed and the spreading of **stockpile**d over-burden materials. Re-growth of native vegetation will be encouraged. By re-establishing forest cover on productive forest lands, Project impacts will be partially mitigated.

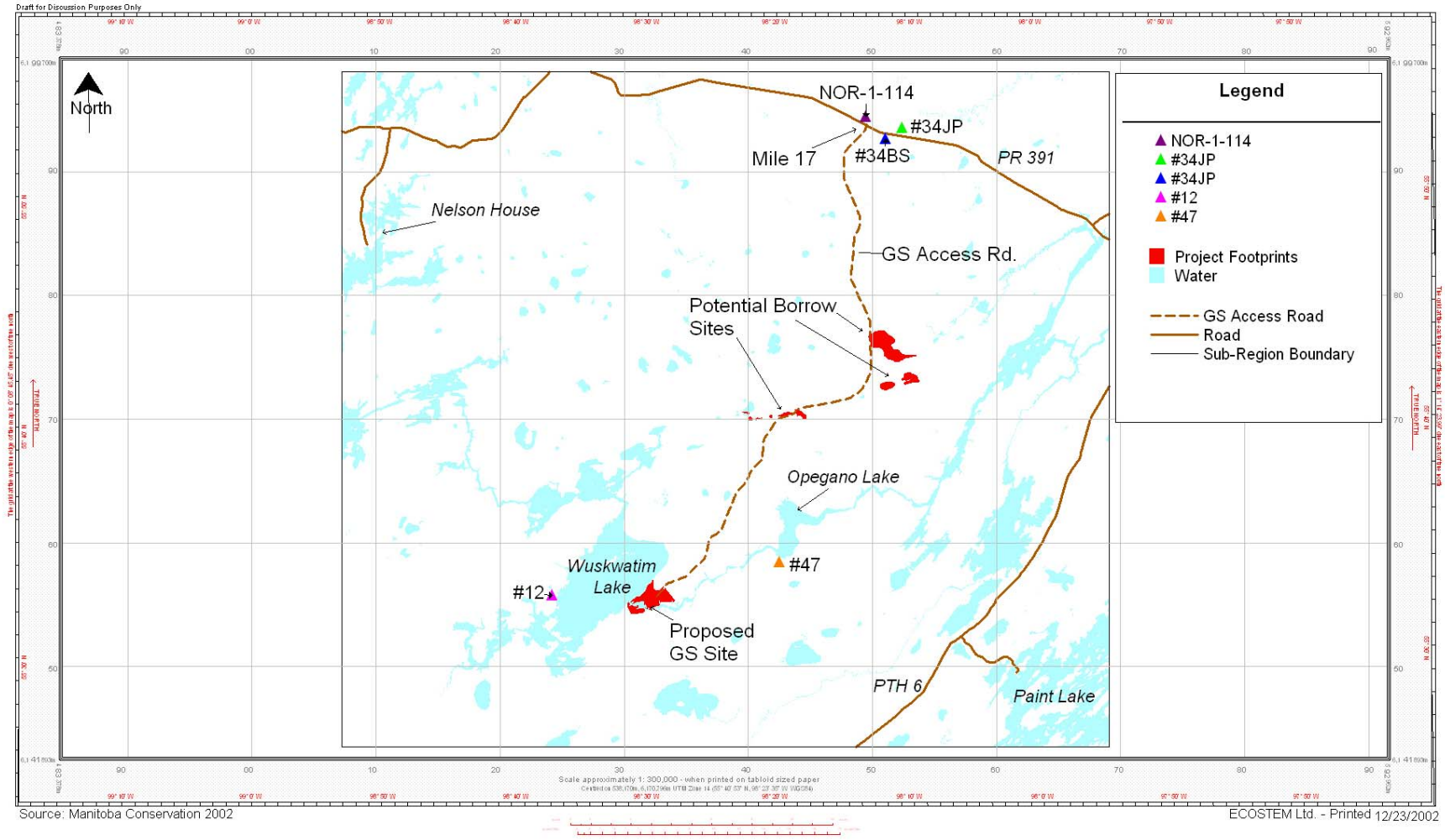


Figure 5-7. Manitoba conservation research sites within the Wuskwatim sub-region.

Potentially merchantable and non-merchantable volumes by working group are illustrated in Table 5-13 and by type aggregate in Appendix 18. These calculations are inclusive of flooding impacts and erosion for the time period 2009 to 2014. Provincial forest damage fees and timber dues are generally applied to all productive forestlands on which land uses include clearing the timber resources. If applicable, these will be calculated by Manitoba Conservation at the time of impact.

Clearing in the Vicinity of Research/Monitoring Sites

Where research/monitoring sites are located in the proximity of development such as the proposed access road at the junction of PR # 391, these sites will be clearly identified in the **EnvPP** and marked in the field prior to construction to ensure that they are not jeopardized. Equipment operators must be made aware of their existence, locations and protection.

5.2.3.2 Flooding

Most of the area (38 ha) that will be flooded by the Project is currently forested with merchantable and non-merchantable timber. The area on the north side of the river, being easily accessible will be cleared and merchantable material will be salvaged where feasible. Where timber salvage is not viable on the south side of the river due to small volume and/or dangerous ice conditions that restrict access, woody debris from clearing will be piled and burnt, ramped or buried above the water line.

5.2.3.3 Erosion

High risk erosion prone shorelines are also forested in the **reservoir** area. Impacts at any one site are minimal and gradual over time. Salvage of timber from such erosion prone stands is logistically difficult and uneconomical. These stands are currently inaccessible to harvesting equipment and their salvage using conventional harvesting techniques might destabilize shorelines and cause accelerated erosion. It is therefore not recommended. Other mitigation efforts are limited to a forest damage appraisal and valuation.

6.0 MINING IN THE NELSON HOUSE RMA

6.1 SOURCES OF IMPACT

Creation of the access road will be the primary source of impact from the Project on mining activities in the Nelson House Resource Management Area. For purposes of this assessment, mining activity includes mining claims and exploration license activity. The road may make it easier to access the Wuskwatim Lake area, as well as areas north and south of the Burntwood River.

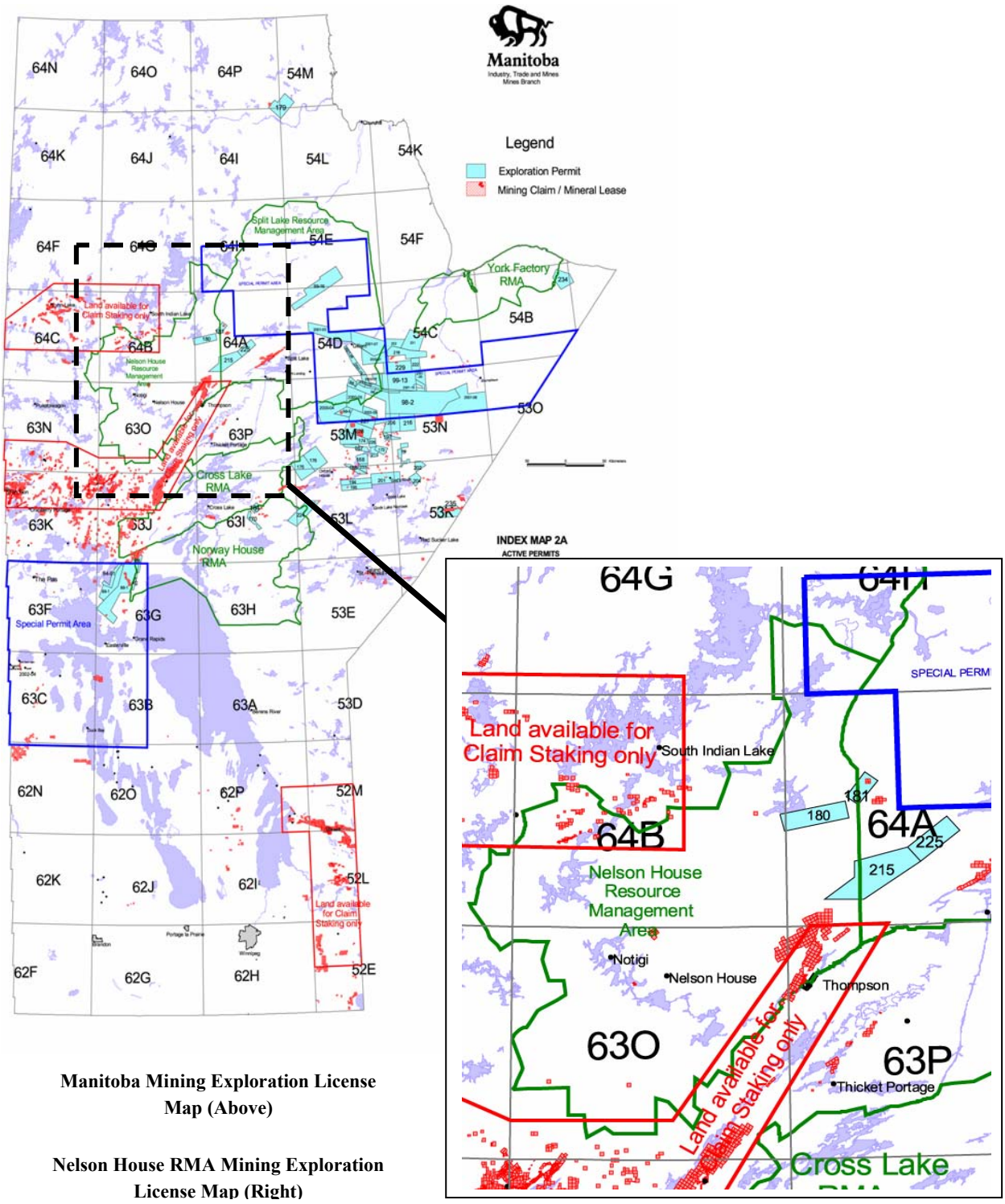
6.2 EXISTING ENVIRONMENT

The Thompson Nickel Belt runs through the eastern edge of the Nelson House Resource Management Area (RMA), reaching the outlet of Opegano Lake along its westernmost edge. Despite this, there is relatively little mining activity in the RMA. There are a number of mining claim sites, and several exploration licenses throughout the RMA; however there are no operating mines in the Nelson House RMA, other than infrequent aggregate quarries (pers. comm. Mining Association of Manitoba and Manitoba Industry, Trades and Mines, Assessment/Exploration Section 2002).

There is substantial mineral exploration and mining activity in areas surrounding the RMA. In particular, INCO Limited has a very large nickel mine complex a few kilometres northeast of Thompson, just east of the Nelson House RMA. As well, until recently, Hudson Bay Mining and Smelting operated the Ruttan Mine (zinc, copper and by-product precious metals) in Leaf Rapids near the northwest corner of the RMA. As a result, mining has played a very important role in the development of this area and exploration continues to be prevalent throughout the region.

In terms of future development, INCO Limited has ongoing exploration activities intended to help extend the life span of their existing operations. Other companies are also conducting exploration in these areas, although there has been no indication of any major discoveries (however, it is possible that, for business purposes, such information may not be publicly disclosed).

Figure 6-1 identifies mining claims and exploration licenses within Manitoba and, in particular, the Nelson House RMA.



Manitoba Mining Exploration License Map (Above)

Nelson House RMA Mining Exploration License Map (Right)

Figure 6-1. Mineral exploration in the Nelson House RMA, October, 2002. Source: Manitoba Industry, Trades and Mines, Mining Engineering Section 2002.

6.2.1 Mining Claims

The RMA includes several mining claims. A mining claim is a parcel of Crown mineral land used to explore for and develop minerals. Under *The Mines and Minerals Act (Manitoba)*, mining claims vary in size from a minimum of 16 hectares to a maximum of 256 hectares. To stake a claim a staker must have a prospecting license, which allows the licensee to stake any number of claims. Mining claims have to be physically staked out and recorded. Claims are valid for two years, and lapse if no further exploration work has been conducted on the area. If work is being conducted, a claim will remain in good standing. A mineral license must be acquired before an area can be developed as a mine (Manitoba Industry, Trade and Mines 2002).

There are two areas partially within the RMA designated as 'Available for Claim Staking Only' and the majority of mining claim sites located within the RMA are within or adjacent to these areas. There are only three such areas in the Province, and in terms of mining activity, they have been reserved exclusively for claim staking (i.e. exploration licenses are not issued in these areas – see below). The two areas in the Nelson House RMA extend along:

- the southeast border of the Nelson House RMA; and
- the far northwest corner of the RMA, including South Indian Lake and Lynn Lake beyond the RMA (Manitoba Industry, Trades and Mines, Mining Engineering Section 2002).

There are also several individual mining claim sites throughout the RMA, outside of the areas designated for claim staking only. These claims are principally along the RMA boundaries and include:

- a large number along the eastern side of the RMA, north of Thompson;
- two in the far southern portion of the RMA;
- two north and slightly east of Notigi;
- one west of Nelson House and south of Notigi; and
- one in the vicinity of the exploration license number 180 (see Figure 2-1) in the northeast corner of the RMA (Manitoba Industry, Trades and Mines, Mining Engineering Section 2002).

The primary parties with mineral claims in the Nelson House RMA (there are others) include the following:

- Hudson Bay Exploration and Development Company Limited;
- Hudson Bay Mining and Smelting Company Limited;
- Falconbridge Limited;
- INCO Limited;
- Canmine Resources Corporation; and
- Cominco Mining Worldwide Holdings Limited (Manitoba Industry, Trade and Mines 2002).

Creeman Consulting Incorporated, an NCN-based company, has also performed prospecting and exploration work throughout the Nelson House RMA on behalf of NCN. They focus primarily on NCN's Treaty Land Entitlement (**TLE**) selections and the NCN reserve and tend to concentrate on areas that can be accessed along PR 391 or from frozen waterways during the winter months. Most of their work occurs in the Notigi Lake area, the northwest arm of Notigi Creek and the Wapisu Lake area. In 2002, all of the geophysical and drilling work performed in the RMA was conducted by Creeman Consulting (pers. comm. Creeman Consulting 2002).

6.2.2 Exploration Licenses

In addition to mining claims in the RMA, there are also several exploration licenses. Under *The Mines and Minerals Act (Manitoba)*, exploration licenses are used to reserve a large area of Crown land for mineral exploration. Areas covered under exploration licenses do not need to be staked, but the co-ordinates have to be provided to the Manitoba government for mapping. Exploration licenses partially or fully within the Nelson House RMA, part of Manitoba's "Zone B", range in size from 5,000 hectares to 100,000 hectares. In Zone B, exploration licenses are valid for five years and can be extended in the same manner as mining claims, once work is being conducted on the area. A substantial capital investment, generally about $200,000, has to be secured as a deposit before an exploration license is issued (pers. comm. Manitoba Industry, Trades and Mines, Mining Engineering Section 2002).

There are currently three active exploration licenses within the Nelson House RMA – one fully within the RMA and two partially within the RMA (see Table 6-1 and Figure 6-1 above). These exploration licenses occur along the northeast boundary of the RMA, and two extend into the Split Lake RMA.

Table 6.1. Major active exploration licenses in the Nelson House RMA.

License Number	Exploration License Holder
180	Cominco Limited
181	Cominco Limited (mostly in Split Lake RMA)
215	Hudson Bay Exploration (mostly in Split Lake RMA)

Source: Manitoba Industry, Trades and Mines, Mining Engineering Section 2002.

6.3 IMPACTS AND MITIGATION

6.3.1 During Construction

Mining activities in the Nelson House RMA are not expected to change during Project construction. During this time, use of the access road will be controlled at PR 391 with a staffed gate and access will generally be limited to those people working on the Project. According to the Access Management Plan (Appendix 3, Volume 3), access by those not associated with Project construction, would be limited (the Limited Partnership would consider requests for access and make judgements as to whether to permit access). As such, new access for prospecting and mineral exploration is expected to be limited.

The lack of current or known future mining activity at the Project site or along the Mile 17 access road route (there are no active exploration licenses, mining claims or mineral leases in these areas) means that construction of the Project infrastructure will not affect any current mining activity.

No specific **mitigation** measures for mining are considered to be necessary during Project construction because impacts will be minimal to non-existent.

6.3.2 During Operations

Once the Project is in operation, effects on mining activities in the Nelson House RMA are expected to be minimal. The access road will improve access to the area, and could result in increased mineral exploration activity in the Wuskwatim area; however, this access may be limited, depending on the final terms of the operations portion of the Access Management Plan. These terms will be jointly developed by NCN and Manitoba Hydro during the Project construction time period.

Even with the increased access created by the access road, substantial increases in mining activity are not anticipated, based on current activity and interest in the area. At present, there are no active exploration permits, mining claims or mineral leases along the stretch of the Burntwood River between Early Morning Rapids and Birchtree Lake, nor are there any along the access road route.

As well, gaining access to an area for mineral exploration is only the first of many steps in commercial mineral development. There are many additional considerations that affect mineral development, including the obvious presence of minerals of sufficient value and grade to warrant development, mineral market prices and trends and production costs. Access is a small consideration in the development of mineral resources, and suggests that new access to the Wuskwatim area is not likely to impact mineral development.

No specific mitigation measures for mining are considered to be necessary during Project operation because impacts will be minimal.

7.0 RECREATIONAL FISHING AND HUNTING

7.1 INTRODUCTION

Recreational fishing and hunting as discussed in this section is restricted to non-aboriginals. Fishing and hunting by aboriginals is discussed under traditional resource use (Section 8.2).

Recreational fishing and hunting are important leisure and economic activities in Manitoba, and particularly in the northern part of the province. The importance of these activities to the economy is not only reflected by more than more than 100 licensed lodge and outfitter operations in the province but also in the significant amount of money spent elsewhere on food, travel and equipment. Project impacts with the most potential to affect recreational fishing and hunting include the access road and presence of a large workforce.

7.2 APPROACH AND METHODS

Characterization of recreational fishing and hunting in the study area and impact assessment were based on by interviews with provincial government biologists and a review of government publications.

7.3 EXISTING ENVIRONMENT

Recreational fishing pressure in the Nelson House RMA is relatively low compared to areas southwest of Thompson (e.g., Paint Lake) and near Snow Lake (e.g., Wekusko Lake, pers. comm. Manitoba Fisheries Branch Regional Biologist, Thompson, 2002). The primary locations targeted by recreational fishers during the open-water season are road accessible and include Footprint, Wapisu, and Notigi lakes. The base of the Notigi Control Structure is a popular location for shore-based fishers, and RC Channel at Nelson House and Leftrook Lake are popular destinations for ice-fishers from Thompson. Tourists are known to fish in the RMA but generally focus their effort in areas to the south and north of the RMA. Some tourists are known to utilize Wapisu and Notigi lakes, and the Suwannee River to access Rat Lake. Recreational fishing at Wuskwatim Lake is limited by access and is currently negligible.

Recreational hunting within the RMA is relatively low compared to other areas northeast and southwest of Thompson. The Nelson House RMA lies within Game Hunting Areas 9 and 9a, which have a general resident rifle season for moose during September and October and in December; an archery moose season during August and September; and a

non-resident rifle moose season during September and October. Harvests are generally restricted to one bull or calf moose per hunter. The Rat River system and Birch Tree Creek, as well as areas adjacent to PR 391, receive some local moose hunting effort. Resident and non-resident moose harvests from Game Hunting Areas 9 and 9a, of which the Nelson House RMA comprises approximately 20% of the area, averaged 114 animals annually from 1993/94 to 2000/01 (data from Manitoba Conservation). Based on these data it can be assumed that the recreational moose harvest from the RMA has averaged less than 23 animals annually. A small amount of bear hunting, some through outfitters based out of Thompson (Section 8.8.1.2), also occurs in the area during spring and fall. The harvest is limited to one adult bear per hunter. The average bear harvest from GHA 9 and 9a from 1993/94 to 2000/01 was 91 animals per year. Thus, the recreational harvest of bear from the RMA likely averages less than 18 animals annually. Because of difficult access, recreational hunting effort at Wuskwatim Lake is negligible. Very little other hunting activity occurs in the RMA.

7.4 IMPACTS AND MITIGATION

Recreational hunting and fishing is currently limited in the Project area. The extent to which recreational resource harvesters will gain access to the Wuskwatim area will be determined by measures in the Access Management Plan. If access is granted to recreational harvesters it will facilitate increased levels of recreational hunting and fishing activity in the Wuskwatim area and it is expected that some effort will be redistributed from other areas in the vicinity. Recreational fishers and hunters accessing the Wuskwatim area will compete for resources with commercial and domestic resource harvesters from NCN.

8.0 LODGES, OUTFITTERS AND OTHER TOURISM IN THE NELSON HOUSE RESOURCE MANAGEMENT AREA

8.1 SOURCES OF IMPACT

Creation of the access road will be the primary source of impact from the Project on tourism activities in the Nelson House Resource Management Area (RMA). The road may make it easier to access the Wuskwatim Lake area, as well as areas north and south of the Burntwood River. An additional source of impact will be the Project's physical infrastructure on the landscape, including the access road, construction camp and other structures associated with the generating station.

8.2 EXISTING ENVIRONMENT

One lodge and seven outfitters operate in the Nelson House RMA. There are also four businesses that offer adventure travel and eco-tourism activities in and around the Nelson House RMA.

8.2.1 Lodges

The Notigi Portage Lodge, the only lodge in the Nelson House RMA, is located near Notigi Lake about 100 kilometres (60 miles) west of Thompson on PR 391 (Notigi Portage Outfitters 2001).

Notigi Portage Lodge has a restaurant, gas station and three rental cabins. Fishing and hunting outfitting services based out of the lodge have been provided since 2001. The lodge also operates four boat caches (at Muskwa, Muhekun, Mooswu and Northern Lakes) and five fly-in outcamps (at Baldock, Broughton, Roe, Barnes and Apeganau Lakes) as part of its outfitting operations. It is open from spring until fall each year (Notigi Portage Outfitters 2001).

8.2.2 Sport Hunting and Fishing Outfitters

There are currently seven outfitters whose allocations are fully or partially located within the Nelson House RMA. Outfitters operating in the Nelson House RMA provide both **sport fishing** and hunting services, and most have non-resident hunting allocations (a parcel of land assigned to an outfitter to carry out their guiding services) and licenses (primarily for black bear and moose) (see Table 8-1).

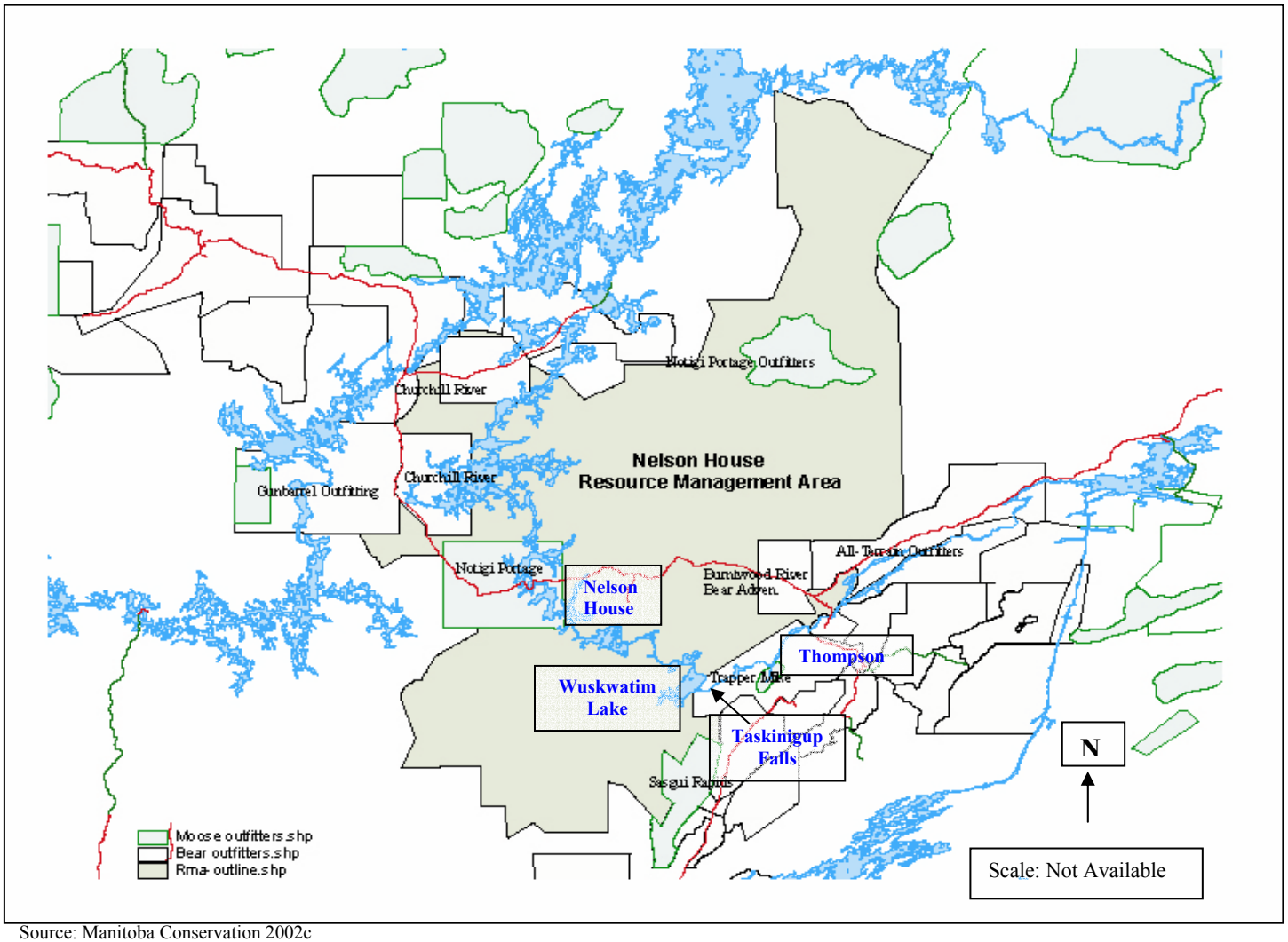
Table 8-1. Outfitters operating in the Nelson House RMA: 2002

Outfitter	Services Offered	Location of Outfitting Allocation
Notigi Portage Outfitters	Non-resident black bear and moose hunting Fishing Photography, wildlife viewing, canoe trips, cross country skiing, snowmobiling, visiting a native trapline and attending native sweat ceremonies Full-service with tent camps	Includes the Notigi Lake, Muskwa Lake, Muhekun Lake, Mooswu Lake, Northern Lake, Baldock Lake, Broughton Lake, Roe Lake, Barnes Lake and Apagenau Lake (fishing only) areas Extends into the west side of the Nelson House RMA
All Terrain Bear Hunts	Non-resident black bear and moose hunting Guide service for fishing Limited service	North of Thompson Extends into the east side of the Nelson House RMA
Burntwood River Bear Adventures	Resident and non-resident black bear hunting Limited service	Northeast of Thompson (65 kilometres) on the Burntwood River Along the southeast side of the Nelson House RMA
Trapper Mike's Outfitting Service	Non-resident black bear and moose hunting Fishing, photography and winter packages Full-service	Southwest of Thompson along the Burntwood River Along the southeast side of the Nelson House RMA
Sasgui Rapids Outfitting	Non-resident black bear hunting Fishing Full-service	South of the Burntwood River Along the southeast side of the Nelson House RMA
Churchill Bear Adventures	Non-resident black bear hunting	Along the western side of the Nelson House RMA
Gunbarrel Outfitting	Non-resident black bear hunting	Along the southeast side of the Nelson House RMA

Source: Manitoba Culture, Heritage and Tourism 2002 (a)

With the exception of Notigi Portage Outfitters, all of the outfitters operate along the exterior boundaries of the Nelson House RMA with only a portion of their allocations extending into the RMA (Figure 8-1). Notigi Portage Outfitters and Trapper Mike's Outfitting Service are the only outfitters in the RMA known to operate along the Burntwood River system.

Notigi Portage Outfitters started in 2001 and operates out of the Notigi Portage Lodge from spring until fall (previously discussed in the "Lodges" section above). They operate in an outfitting allocation located in the Notigi-Wapisu area of the Nelson House RMA.



Source: Manitoba Conservation 2002c

Figure 8-1. Outfitting allocations in the Nelson House RMA.

Their allocation is divided into two parts (Figure 8-1), one around Notigi Lake and the other around Baldock Lake (pers. comm. Manitoba Conservation, Thompson Office, 2002). They offer fly-in fishing, drive-in camp fishing, ice fishing, moose hunting and black bear hunting packages (Notigi Portage Outfitters 2001). In 2001, they had four hunters – two from Kansas and two from Michigan (pers. comm. Notigi Portage Outfitters 2002). For 2002, they were issued six non-resident moose licences (all issued for the Baldock Lake allocation area only) and 20 non-resident bear licenses (can be used throughout both Notigi and Baldock Lake allocation areas) (pers. comm. Manitoba Conservation, Thompson Office 2002).

Trapper Mike's Outfitting, based out of Thompson has an outfitting allocation that extends throughout the entire area between Wuskwatim and Opegano Lakes (allocation #24 on Figure 8-1). In 2002, Trapper Mike's Outfitting was issued 24 non-resident bear hunting licenses and two non-resident moose licenses (pers. comm. Manitoba Conservation, Thompson Office, 2002). During this year, Trapper Mike's took out 14 American hunting parties (pers. comm. Trapper Mike's Outfitting).

Allocations to outfitters are initially made for a five-year period, which allows the outfitter to develop and build his or her business. Once established with a business operating license, outfitters can apply for non-resident hunting licenses. The number of licenses issued depends upon the size and location of the particular allocation, the number of licenses needed by the outfitter to operate the business and the amount of local resident hunting pressure (pers. comm. Manitoba Conservation, Thompson Office, 2002).

Outfitters are required to meet a provincial performance standard and must sell, on average, at least 65 per cent of their allotted licenses over a three-year period to keep their **wildlife** allocation for the next year. If they do not meet this standard, they will initially be issued fewer non-resident licenses. If they persist in not meeting the performance standard, their allocation is reassigned to another outfitter (pers. comm. Manitoba Conservation, Thompson Office, 2002).

When deciding whether to issue licenses to outfitters, Manitoba Conservation considers resident use first. The bulk of outfitting in the Nelson House RMA is for black bear hunting. There is a low resident demand for black bear and a higher population of black bear (relative to moose), allowing for more non-resident black bear hunting opportunities. Allocations for black bear are done on the basis of one black bear per 50 square kilometres. Non-resident bear licenses are usually sold by outfitters for about $2,500 US (pers. comm. Manitoba Conservation, Thompson Office, 2002).

Typically, there is a high resident demand for moose throughout Manitoba, including the Nelson House RMA. As a result, only limited non-resident moose hunting is permitted, with only about 125 non-resident moose hunting licenses issued provincially each year, primarily in remote areas. Allocations for moose are done on the basis of one moose per 70 to 75 square kilometres. Typically, non-resident moose licenses are sold by outfitters for approximately $5,000 US, but can be worth as much as $10,000 US (pers. comm. Manitoba Conservation, Thompson Office, 2002).

All foreign hunters must use an outfitter to purchase non-resident hunting licenses and to hunt in Canada. More than 90 per cent of the non-resident hunters are from the United States. The provincial success rate for black bear is about 80 per cent and the provincial success rate for moose is about 50 per cent. If success rates are higher than these averages over a number of years, then the number of licenses issued is reviewed by Manitoba Conservation and may be decreased (pers. comm. Manitoba Conservation, Thompson Office, 2002).

Throughout the year, there are distinct non-resident hunting seasons for black bear and moose. In 2002, hunting seasons for black bear were from April 22nd to June 22nd and from August 26th to October 5th. There is typically only one annual moose hunting season, and in 2002 it was from September 16th to October 12th (Manitoba Conservation 2002a).

Four of the outfitters also provide sport fishing services (see Table 8-1). The Nelson House RMA falls along Manitoba Conservation's boundary for the "North Central Fishing Division" and the "Northwest Fishing Division". The fishing season for both divisions is generally closed from May 1st until May 17th, opening on May 18th. A number of fish species can be caught in lakes throughout the Nelson House RMA, including: walleye, northern pike, and lake trout (Notigi Portage Outfitters 2001).

Nearly 80 per cent of fishing permits sold in Manitoba to non-residents are conservation licenses. Conservation licenses differ from regular licenses in that they have lower catch limits for certain fish species. Manitoba also promotes "catch-and-release" practices with the mandatory use of barbless hooks throughout the Province. Recreational fishing in Manitoba is governed by regulations made under *The Fisheries Act (Manitoba)* (Manitoba Conservation 2002d).

8.2.3 Adventure Travel and Eco-tourism

Adventure travel and eco-tourism (ATE) activities are characterized as non-consumptive, nature-based travel experiences that respect the integrity of the ecology, culture and

economy of the local area and community. Eco-tourism differs somewhat from adventure travel in that it also explicitly incorporates educational components.

There are approximately 80 ATE companies operating in Manitoba, and this industry has been growing rapidly over the past 10 years (Manitoba Culture, Heritage and Tourism 2002b). Four businesses offer ATE activities in or near the Nelson House RMA (Table 8-2). Three of the four ATE operators also offer hunting and fishing outfitting services. It is likely that the areas they use for ATE activities are consistent with their outfitting allocations (Figure 8-1).

Table 8-2. ATE operators, activities offered and areas of activity undertaken in the Nelson House RMA.

Operator	ATE Activities Offered	Area of Activity
Nooshishim Whitetail Outfitters	Wildlife viewing of moose and bear at Spagnum Bog, horse buggy tours, snowmobiling, photography, bird-watching and hiking tours Full-service	Extends into the far northwest corner of the Nelson House RMA
Trapper Mike's Outfitting Service	Nature photography tours, snowshoeing, snowmobiling, dog sledding, cross-country skiing and viewing of northern lights Full-service	Southwest of Thompson along the Burntwood River Along the southeast side of the Nelson House RMA
Notigi Portage Outfitters	Photography, wildlife viewing, custom-planned canoe trips, cross country skiing, snowmobiling and visiting a native sweat ceremony	Includes the Notigi Lake, Muskwa Lake, Muhekun Lake, Mooswu Lake, Northern Lake, Baldock Lake, Broughton Lake, Roe Lake, Barnes Lake and Apagenau Lake areas Extends into the west side of the Nelson House RMA
North River Outfitters	Canoe and equipment rentals Drop-offs and pick-ups	Operates out of Thompson

Source: Manitoba Culture, Heritage and Tourism 2002 (b)

In addition to the ATE operators currently operating in the Nelson House RMA, there may be others who provide services in the area on a "request basis." Many ATE operators custom design tours based on client requests and, since ATE activities are not regulated by Manitoba Conservation, it is difficult to determine exactly which areas ATE operators are using (pers. comm. Manitoba Adventure Travel Directory 2000).

There are also proposed eco-tourism operations under consideration by NCN in the Nelson House RMA (the specifics are yet to be released) (pers. comm. Notigi Portage Outfitters 2002).

8.3 IMPACTS AND MITIGATION

8.3.1 During Construction

Current tourism activities in the Nelson House RMA are not expected to be affected during Project construction. Wuskwatim Lake and the area in the vicinity of the Project construction site, work areas, camp, access road and borrow areas are not now used for tourism activities. There is one outfitter with an allocation in this area; however, as a result of access difficulties this outfitter currently focuses on areas within the allocation that are south of the Burntwood River (pers. comm. M. Snihor 2002).

During this time, use of the access road will be restricted via a staffed gate and limited to those people working on the Project with few exceptions (Appendix 3, Volume 3). As such, improved access for tourism activities via this road is unlikely.

No specific mitigation measures for tourism are considered to be necessary during Project construction, since no impacts on tourism are expected.

8.3.2 During Operations

Once in operation, the Project access road may improve access to the Wuskwatim Lake area for the outfitter whose allocation is adjacent to Wuskwatim Lake (in the area north of the Burntwood River, which is currently used very little due to access difficulties) and, potentially, for other tourism operators. As well, it is possible that, with easier access into Wuskwatim Lake, local outfitters would begin to guide clients into the area for sport fishing; the reduced aesthetic quality of Wuskwatim Lake may mitigate against such use. The presence of a major new hydroelectric facility could encourage a certain type of tourism and discourage tourism that depends on a more natural environment. Access to the area is dependent on the final terms of the operations portion of the Access Management Plan regarding the ability of tourism operators to use the Wuskwatim access road.

The access road may also provide new access to the Wuskwatim Lake area to individuals other than outfitters. The presence of additional people in the area may result in reduced success rates for outfitters. More people visiting the area could also detract from the

perceived remoteness of the area, which could make it less appealing to the few that currently utilize the area.

No specific mitigation measures for tourism are considered to be necessary during the Project operation phase.

9.0 PROTECTED AREAS AND SCIENTIFIC SITES

This section provides a brief overview of the potential effects of the proposed Project on Manitoba's Protected Areas Initiative and an overview of scientific sites in the area.

9.1 PROTECTED AREAS

The Province of Manitoba is in the process of assembling a network of lands to protect and conserve representative examples of each of the province's 18 natural regions. Representation of each natural region requires that adequate examples of all of the characteristic landforms or enduring features within a region be set aside in protected land where, at a minimum, industrial uses such as mining (including aggregate extraction), logging, oil, petroleum, natural gas and hydro-electric development are prohibited. These protected areas still allow for activities such as hunting, trapping or fishing and also respect First Nation's rights and agreements such as the Manitoba Treaty Land Entitlement Framework Agreement. Activities such as intensive agriculture, urban or major recreational developments are avoided when establishing protected areas.

Areas of Special Interest (ASI) is the term used to describe "candidate sites" identified as having high potential to efficiently protect groupings of enduring features and associated natural and cultural values. Once ASIs have been identified, they form the starting point for protection discussions. The final boundary will depend upon consultations with various **stakeholders** and the levels of public support received. Candidate sites are chosen, wherever possible, to avoid resource allocation conflicts and to protect undeveloped areas of significant size. Further discussion of the Protected Areas Initiative and the consultation process is provided in the Wuskwatim Transmission Project EIS.

Sites in the Project Area

During the route selection for the access road, analysis of landform, soil, and vegetation features identified a glacial outwash plain as an uncommon feature in the area. Discussions with personnel in Manitoba Conservation, Parks and Natural Areas (pers. comm. R. Schroeder and H. Hernandez 2002) indicated that three enduring features were traversed by the proposed route alignment. The southern third of the access route traverses an enduring feature of deep basin deposits with grey brown luvisolic soils (DB/F) that is abundant in the region and ample opportunity exists elsewhere in the region to represent this feature.

The northern two-thirds of the access route traverses a complex of two enduring features: a deep basin deposit with eutric brunisolic soils (DB/M) and a beach and near shore

deposit with eutric brunisolic soils on morainal features (BN/M/M). These features extend north of PR 391 some 80 kms into the former Amisk Park Reserve and into the two associated ASIs of the Amisk North and Amisk South Addition. The BN/M/M feature would be adequately represented through the redesignation of the currently lapsed Amisk Park Reserve, an action that is likely to be taken. An abundance of the DB/M feature stretches north and east out toward the Stephens Lake ASI where opportunity exists to protect that feature.

The association of enduring features is a consideration in the design of a protected area network. These two enduring features (DB/M and BN/M/M) occur in combination along portions of the access route and as well in isolated locations in the South Amisk Addition and North Amisk Addition ASIs. Consequently, the selection of this route for the access road highlights the importance of the redesignation of the Amisk Park Reserve and protecting the designated ASIs (Amisk South and North additions) that encompass the association of these features.

Partridge Crop Hill ASI

Partridge Crop Hill was identified as an area of cultural importance to NCN. In addition, an ASI has been identified around and including Partridge Crop Hill and extending northwards to the Burntwood River and east to Wuskwatim Lake (Figure 9-1). Development of the Project would not directly impact this ASI (i.e., construction of permanent facilities and flooding associated with the Project are well away from this area). The Project would affect the existing water regime and rates of erosion on segments of Wuskwatim Lake and the Burntwood River, which form boundaries for the ASI; however, these waters are presently regulated for hydroelectric generation (i.e., CRD).

9.2 SCIENTIFIC SITES

A variety of active and dormant research sites are present in the area (Figure 9-1). The sites can be classified into three broad categories:

- forestry research (e.g., measurement of tree growth) maintained by Manitoba Conservation and/or the Canadian Forestry service;
- **pollution** studies related to emissions from the INCO smelter in Thompson conducted by the Canadian Forest Service, INCO, and, most recently, Manitoba Conservation; and
- Boreal Ecosystem-Atmosphere Study (BOREAS) sites an international study.

These sites are not directly affected by the Project. The access road passes in close proximity to several of the BOREAS sites but does not directly impact them.

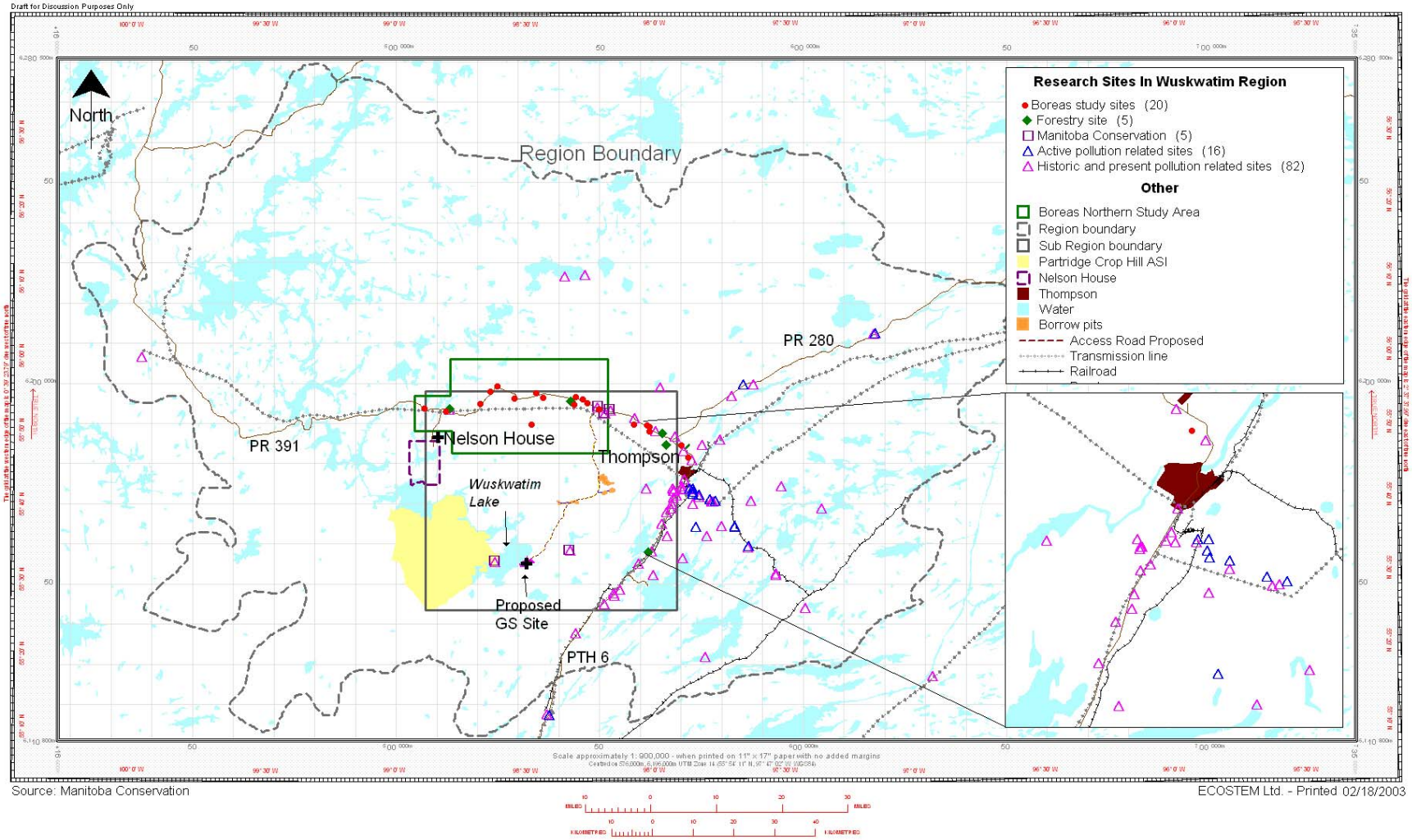


Figure 9-1. Active and dormant sites in the Wuskwatim study area.

10.0 RESIDUAL EFFECTS

Residual impacts are those that remain after the implementation of mitigative measures. Residual effects to resource use VECs (i.e., traditional resource use, commercial fishing, and commercial trapping) will primarily result from the increased access provided by the Project. Levels of domestic, commercial, and recreational resource harvesting activity in the Wuskwatim area are expected to increase. However, the residual level of increase will depend on the level of access provided to harvesters through the Access Management Plan.

Although increased access is generally viewed as a positive long-term benefit to all three resource-user groups, each will compete against the other for available resources. It is expected that some resource harvesting activity will be redirected from other locations, thereby, reducing harvesting pressures elsewhere within the Nelson House RMA. However, increases in commercial fishing, commercial trapping, and recreational harvesting as a result of the Project are expected to result in a net increase in resource harvesting activity in the Nelson House RMA.

Although improved access and the presence of the Project will affect the environmental setting of the area in the vicinity of Wuskwatim Lake, the change was not mentioned during resource user interviews as a significant negative effect of the Project. However, the nature and magnitude of this effect will be specific to each resource user.

Decreases in animal abundance due to loss of terrestrial habitat are expected to be small and should have no noticeable effect on resource use. Similarly, positive effects on fish populations due to changes to the water level regime on Wuskwatim Lake are expected to be small and will likely have no noticeable effect on the domestic, recreational, or commercial fisheries. Increased access will probably result in increased utilization of the two existing cabins on the lake and construction of several more cabins on or in the vicinity of the lake and access road. Increased numbers of people utilizing the Wuskwatim area for resource use activities will increase the chances of cabin vandalism, environmental disturbances, and/or forest fires in the area

Improved access will significantly decrease operating costs for the Wuskwatim Lake commercial fishery. Decreased costs will increase the potential for higher net revenues, increasing interest in the fishery, and ultimately leading to increased commercial harvests. Similarly, increased access is expected to result in increased harvests from traplines in the vicinity of the Project (particularly RTLs 2, 4, 9, and 47). Based on

average harvests from road accessible RTLs and affected RTLs, harvests could increase by as much as 68%.

Overall, NCN resource harvesters have indicated that, primarily because of the benefits of increased access, the Project will result in a **positive, moderate, long-term, regional, and, therefore significant effect on traditional resource use, and a positive, large, long-term, local, and, therefore significant effect on commercial fishing and commercial trapping.**

Improved access may also result in a marginal increase in mineral exploration activity and tourism and recreational activities in the Wuskwatim Lake area and on either side of the Burntwood River. Such access, however, is contingent on the final terms of the operations portion of the Access Management Plan to be developed during Project construction.

Forestry related effects resulting from borrow pits and construction of the generating station will be mitigated in part by the **rehabilitation** of the cleared areas. Although 1,649 ha have been identified as being potentially affected by the Project, only about 700 ha will actually be cleared and/or affected by the Project. The 700 ha is approximately 0.08% of the total land area within FMUs 87 and 89 and less than 0.02% of the area within the NRFS. Under a worst case scenario, about 1,417 ha will be affected which represents 0.3% of the productive forest land in the two FMUs directly affected by the Project and less than 0.1% of the productive forest land within the NRFS. Estimated effects on the operational AAC equate to a reduction of approximately 0.6% (1221 m^3) of softwoods and 0.05% (25 m^3) of hardwoods. These reductions are inconsequential with regard to current harvest levels. The withdrawal of 1,417 ha of productive forest land within the NRFS from FMLA #2 equates to 26.4% of the 10-year (1999 – 2009) allowable withdrawal limit as set out in the FML Agreement.

A summary of mitigation and **residual effects** of the Project on traditional resource use, commercial fishing and trapping and recreational resource use is provided in Table 10-1. A summary of mitigation and residual effects on commercial forestry is provided in Table 10-2.

Table10-1. Mitigation summary for Project effects on resource use (excluding forestry).

Source of Effect	Description of Effect	Proposed Mitigation	Residual Effect
Increased Access	Road access will increase opportunities to harvest resources in Wuskwatim area by NCN residents	**Construction** -Access Management plan. -Gated access at PR 391. -Access granted by special permission only. **Operation** -Access Management plan.	**Significant** increase in resource harvesting activity in Wuskwatim area by NCN members. **Significant** cost savings associated with transportation for commercial fishing and trapping industries.
	Increased opportunity to harvest resources in Wuskwatim area by non-NCN First Nations people.	**Construction** -Access Management Plan. -Gated access at PR 391. **Operation** -Access Management plan.	Depends on Access Management Plan – Possible significant increase in resource harvesting activity in Wuskwatim area by non-NCN First Nations people.
	Increased opportunity for recreational resource harvesters to harvest resources in the Wuskwatim area.	**Construction** -Access Management Plan -Gated access at PR 391. -No access to recreational hunters will be permitted. **Operation** -Access Management plan.	Depends on Access Management Plan – Possible significant increase in resource harvesting activity by recreational resource harvesters. Small increase in opportunities for local outfitters.
	Increased poaching.	**Construction** -Access Management Plan -Gated access at PR 391. **Operation** -Access Management Plan -Work with Manitoba Conservation to ensure regulatory patrols are adequate.	Depends on Access Management Plan - An increase in poaching is likely to occur in the Wuskwatim area if access is open.

Table10-1. (cont.)

Source of Effect	Description of Effect	Proposed Mitigation	Residual Effect
	Increased resource use in Wuskwatim area may reduce animal and plant populations available for resource users.	-Addressed by mitigation for impacts to the terrestrial and aquatic environments. -Measures to be outlined in Access Management Plan. -Work with Manitoba Conservation to ensure proper regulatory measures and patrols are in place.	Will depend on results of mitigation and follow-up and the Access Management Plan. Potential for small to large reduction in animals available for harvest.
	Change in environmental setting for traditional resource users. Increased chances of vandalism on cabins and environmental disturbances (e.g., fuel spills, forest fires).	**Construction** -Access Management Plan. -No cabin construction will be permitted during construction. -Educational program to encourage resource users to respect local property and to protect against forest fires, etc. **Operation** -Access Management Plan. -Manitoba Conservation in consultation with NCN will determine number of cabins on lake by permitting process. -Educational program to encourage people to respect local property and to protect against forest fires, etc.	The environmental setting of Wuskwatim Lake will change. The level of effect will depend on perception and will be specific to individual resource users. There will be an increased possibility of environmental disturbances associated with increased access. Level of effects will depend on Access Management Plan.
Presence of a Large Workforce.	Compete for resources with NCN resource users in Wuskwatim area and elsewhere in RMA.	**Construction** -Access Management Plan. -Hunting in Wuskwatim area will be limited by on-site restriction on guns. -Work with Manitoba Conservation to ensure proper regulatory measures and patrols are in place.	No residual effects anticipated.
	Increased chances of vandalism on cabins and environmental disturbances (e.g., fuel spills, forest fires).	**Construction** -Access Management Plan. -Educational program to encourage workers to respect local property and to protect against forest fires, etc.	No residual effects are anticipated.

Table10-1. (cont.)

Source of Effect	Description of Effect	Proposed Mitigation	Residual Effect
Disturbances from Construction and Operation of Project	Safety concerns for resource harvesters in relation to construction and operation activities.	**Construction** -Access Management Plan. -Gated access at PR 391. -Access granted by special permission only. -Educational program for workers and NCN members granted access. -No fishing and hunting area near station and access road. -Signage **Operation** -Signage.	No residual effects are anticipated.
	Change in environmental setting for traditional resource users.		Level of effect will depend on perception and be specific to individual resource users.
Change in Water Regime	Increased debris causing navigational and fishing problems (debris in nets).	**Operation** If and as required: -Boat Patrols. -Debris management. -Navigational aids. -Signage -Extend safe ice trails.	No residual effects are anticipated.
	Quality of resources may change (e.g., mercury, whitefish cysts, potency of medicinal plants).	**Operation** -Communication program to educate resource users about changes in mercury levels and whitefish quality.	Long-term negative effect on opportunity to harvest medicinal plants along shoreline and near generating station. No other residual effects anticipated.
Shift to Wage Economy	Possible reduction in resource harvesting activity.	-Promotion of traditional harvesting lifestyle by NCN.	Unknown.

Table 10-2. Wuskwatim GS Project construction and operation forestry impact summary.

Source of Effect	Description of Effect	Proposed Mitigation	Residual Effect
Productive forest area loss during construction & operation	• Result of clearing, flooding & erosion; • Permanent & temporary losses; • Reduction in productive forest base; • Woody debris contribution to the reservoir.	• Minimize clearing; • Rehabilitate sites after construction; • Support reforestation & tree planting initiatives in other areas; • Pay forest damage fees if applicable;	Duration – short-/long-term; Magnitude – small; Geographic extent – local; **Overall – insignificant.**
Timber volume loss during construction	• Reduced standing volume; • Reduced volume contributing to the AAC.	• Minimize clearing; • Salvage timber where feasible; • Rehabilitate sites after construction; • Support reforestation & tree planting initiatives in other areas; • Pay forest damage fees & timber dues, if applicable.	Duration – short-/long-term; Magnitude – small; Geographic extent – local; **Overall – insignificant.**
Reduced AAC during construction & operation	• Reduced industrial expansion potential.	• Minimize clearing; • Rehabilitate sites after construction; • Support reforestation & tree planting initiatives in other areas.	Duration – long-term; Magnitude – small; Geographic extent – local; **Overall – insignificant.**
Area withdrawal from FMLA #2 during construction & operation	• Reduced management area.	• Minimize area of impact; • Rehabilitate sites after construction.	Duration – long-term; Magnitude – small; Geographic extent – local; **Overall – insignificant.**

11.0 CUMULATIVE EFFECTS

A scoping exercise identified four potential future development activities in the Wuskwatim region that may have a **cumulative effect** with the proposed Project on resource use VECs: the Wuskwatim Transmission Project, Tolko forest harvesting activity, designation of Partridge Crop Hill Area of Special Interest as a protected area, and Treaty Land Entitlements.

The Wuskwatim Transmission Project will facilitate access into the Nelson House RMA south of the Burntwood River concurrent with Project construction. Tolko has plans to initiate forest harvesting activity in the Nelson House RMA in the 2009 to 2014 time period (i.e., following the construction phase of the Project), which may include construction of access into areas to the south and east of the Threepoint Lake (note that there is currently a legal challenge to Tolko's license. As of writing, the license is valid). The additional access provided by these developments will further increase harvesting activity and pressure on resources in the Wuskwatim region, particularly south of the Burntwood River. Future development and inhabitation of Treaty Land Entitlements near Wuskwatim Lake would cause an additional incremental increase in harvesting activity in the area. Designation of the Partridge Crop Hill Area as a protected area would counteract some of the increased access and possible increase in resource harvesting activity.

Resource users generally view increased access as a positive effect. Increased access resulting from the additional activities (i.e., transmission lines, forest harvesting, treaty land entitlements) is expected to contribute to the significant positive long-term regional effect that the Project will have on resource use activity. However, as access increases further, some resource users, particularly commercial trappers and some traditional resource harvesters, may view the cumulative changes to the current environmental setting as a negative effect. Increased harvesting activity also has the potential to cause an overexploitation of resources in the area. However, **cumulative effects assessment**s of aquatic and terrestrial resources (Volumes 5 and 6) have concluded that there will be no significant long-term negative effects on resource abundance in the area as a result of the potential additional projects (although there is some uncertainty with regard to woodland caribou, this species comprises a negligible proportion of current resource use). Consequently, it is expected that the cumulative effects of the projects considered would not change the significant positive, long-term regional effect on resource use VECs that will result from the Project.

The Wuskwatim Transmission Project**,** Treaty Land Entitlements, and conservation initiatives have the potential to cumulatively affect the forest industry through reductions in productive forest land available under forest management. Although such withdrawals of productive forest lands may not immediately affect current harvest levels as these are below AAC levels, the AAC is negatively affected each time productive forest land is withdrawn. The potential is there to exceed the 10-year withdrawal limit of productive forest land from FMLA #2 within the Nelson River Forest Section. Such cumulative effects may limit potential forest industry expansion opportunities in the area.

Although most future withdrawals are uncertain, the Wuskwatim Transmission Project will require a further withdrawal from the NRFS of approximately 420 ha of productive forest land. Combined with the Generation Project this amounts to a total of 1,837 ha which represents 34.3 % of the allowable limit for the 10-yr period (1999-2009). While this represents a relatively large percent of the withdrawal limit, it constitutes 0.1% of the total productive forest land within the NRFS. This relatively small withdrawal represents an insignificant effect on the long-term sustainability of the timber resources.

12.0 ENVIRONMENTAL FOLLOW-UP AND MONITORING

The most significant effect to resource use resulting from the Project is increased access to the Wuskwatim Lake area, which is expected to result in increased harvesting activity. Monitoring of harvests during and after construction will be necessary to gain an understanding of how resource use changes and additional measures that may need to be taken to prevent overexploitation.

Changes in traditional resource harvesting activity will be documented by repeating the Harvest Calendar study during and after construction. It is expected that there will also be measures specified in the Access Management Plan to monitor non-NCN harvesting activity via the access road after construction.

Manitoba Conservation is responsible for implementing **regulatory** measures to control harvests of resources. Manitoba Conservation, cooperatively with the Nelson House Resource Management Board, will be responsible for using the domestic and recreational harvest monitoring data in conjunction with annual commercial fishing and trapping data to assess resource harvesting pressures and implement suitable regulatory measures to ensure sustainable harvests and protect resources. Individual trapline holders are responsible for managing harvests on their own traplines.

Post-Project monitoring of fish populations in Wuskwatim Lake (as discussed in Volume 5) will address fish quality issues for resource harvesters including mercury concentrations and infestations of *Triaenophorus crassus* (a tapeworm which encysts in the flesh of whitefish).

Beyond monitoring completed as part of the Access Management Plan, no specific monitoring and follow-up measures are considered necessary for forestry, mining, and tourism activities in the Nelson House RMA.

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14.0 GLOSSARY OF TERMS AND ACRONYMS

ATV - all-terrain vehicle

Annual Allowable Cut (AAC) - the volume of wood that may be harvested from a given area each year on a sustained yield basis

Annual Harvest and Renewal Plan (AHRP) - Tolko Industries version of the required Annual Operating Plan (AOP). It is a detailed plan of all harvesting, forest renewal and related activities that are to be carried out in a designated area. In Manitoba the AOP also includes a 3-year activity projection

aquatic - living or found in water

aquatic environment - areas that are permanently under water, or that are under water for a sufficient period to support organisms that remain for their entire lives, or a significant portion of their lives, totally immersed in water

arctic - pertaining to the regions at or near the poles of the earth

bog - wetland ecosystem characterized by an accumulation of peat, acid conditions, and a plant community dominated by sphagnum moss

boreal forest - needle-leafed evergreen or coniferous forest bordering sub-polar regions

borrow pit - The hole left by the removal of material (usually sand or gravel) for construction purposes

CEC - Clean Environment Commission

CPUE – see catch-per-unit-effort

CRD - Churchill River Diversion

catch-per-unit-effort (CPUE) - the number or weight of fish caught in a given time period with a specific size of net (e.g., #fish/100m/24hrs)

Churchill River Diversion - the diversion of the Churchill River under the CRD Licence including the Augmented Flow Program and shall include the construction and operation of the Notigi and Missi control structures and the consequent impact on flows and water levels in the lower Churchill River

commercial fishing - a fishery where the catch is sold

commercial trapping – the capture of furbearers for the sale furs

Community Approval Process - the process for approving future community driven remedial works, programs and activities and for accessing funds from the Community Mitigation Trust Fund

Community Consultants - NCN members working in the Future Development Office. The specific duties of the community consultants include organizing meetings with NCN members on and off reserve to discuss future development issues, disseminating information to members, and acting as a liaison between Chief and Council, the NCN Team, advisors, and Manitoba Hydro.

competition - common use of a limited resource by a number of organisms of the same or different species

concentration - the amount of a material suspended or dissolved in a fluid

conifer - any of numerous cone-bearing trees of the order Pinales, including the pine, fir and spruce; having simple, needlelike leaves

conservation - any various efforts to preserve or restore the earth's natural resources, including such measures as: the protection of wildlife, the maintenance of forest or wilderness areas, the control of air and water pollution and the prudent use of farmland, mineral deposits, and energy supplies

country food – food hunted/gathered from the natural environment

cover - 1) vegetation such as trees or undergrowth that provide shelter for wildlife; 2) also the surface area of a stratum of vegetation as based on the vertical projection on the ground of all aboveground parts of the plant, and, which in the present study corresponds to the following category: closed = >60% cover; open = >25-60% cover; and sparse = 10-25% cover; 3) also the material in or overhanging the wetted area of a lake or stream which provides fish with protection from predators or adverse flow conditions, e.g., boulders, deep pools, logs, vegetation

cumulative effects assessment - an assessment of the effects of the proposed developments in the context of the effects of past, current, and future developments in the study area

cumulative effect - the impact on the environment which results from effects of a project when combined with those of other past, existing, and imminent projects and activities

DBH - diameter at breast height

decommission - to remove infrastructure or equipment from active service

density - the number of individuals in relation to the space in which they occur

domestic fishery - a fishery where the catch is for personal consumption, dog food, or bait for trapping; the catch is not sold

domestic harvest - the harvest of natural resources for personal use or consumption (i.e., not sold)

dominant - in plant communities, the condition which one or more species, by means of their number, coverage, or size, have considerable influence upon or control of the conditions of existence of associated species

EIA - Environmental Impact Assessment

EIS - Environmental Impact Statement

EnvPP - Environmental Protection Plan

effect - something that inevitably follows an antecedent (as a cause or agent)

encysts – an action whereby a larval parasite becomes encapsulated within a sac within a host's tissue awaiting transfer to the next host

enhancement - to improve by increasing in number or in attractiveness

environment - 1) the total of all the surrounding natural conditions that affect the existence of living organisms on earth, including air, water, soil, minerals, climate and the organisms themselves; and, 2) the local complex of such conditions that affects a particular organism and ultimately determines its physiology and survival

Environmental Impact Statement (EIS) - an assessment designed to identify, predict, interpret and communicate information about the impact of a proposed action on the natural and human environment

Environmental Protection Plan (EnvPP) - a document that provides site-specific and detailed information on construction practices that will be followed during project construction so as to avoid or minimize potential environmental effects

erosion – 1) the wearing away of the earth's surface by the action of water, wind, current, etc.; and, 2) in reference to fish – the wearing away of tissues, typically used in reference to fins

exploitation - harvesting or using a natural resource

fen - a peatland with the water table usually at or just above the surface; often stagnant and alkaline

fish habitat - spawning, nursery, rearing, food supply and migration areas on which fish depend

fishery - the harvest of fish from a specific location at a specific time using a particular type of gear

flood - the rising of a body of water so that it overflows its natural or artificial boundaries and covers adjoining land that is not usually underwater

flow - the continuous motion of a fluid

footprint - the surface area occupied by a structure or activity

forebay - the portion of a reservoir immediately upstream of a hydroelectric facility

Forest Management License (FML) - a license issued under the Manitoba Forest Act to a forest industry company providing that company the authority to carry out sustainable timber harvesting, renewal and management activities on a designated forest area of Manitoba

Forest Management License Area (FMLA) - specified and designated forest area in Manitoba allocated to a forest industry company in which that company may carry out forestry operations under the authority of a FML.

Forest Management License Area #2 - the FMLA allocated to Tolko Industries Ltd. under FML #2 and described in the FML agreement between the Province of Manitoba and Tolko Industries Ltd.

Forest Management Plan (FMP) - a long-term plan of forest management activities covering the FMLA for a period of 10 or 20 years. It is prepared by FML holders as part of their obligations under the FML agreement and is subject to governmental approval

Forest Section (FS) - a term applied to designated areas of the Province of Manitoba by Manitoba Conservation for the administration of the forest resources. The FS is subdivided into Forest Management Units (FMU)

Forest Management Unit (FMU) - a forest resource based administrative unit within a FS

forest resource inventory (FRI) - a classification system and inventory derived from aerial photo interpretation of the provinces forest resources. It is the base information that is used to calculate growth and yield and the annual allowable cut

Forestry Branch (FB) - a branch of the department of Manitoba Conservation that is responsible for the administration and management of all forests on provincial Crown lands

"free-to-grow" - the condition of a stand determined through a regeneration survey in which the target species (usually softwoods) are well enough established to be unimpeded from surrounding competition

fungus - a simple, nonphotosynthetic organism which lives instead off living or decomposing organisms

furbearer - referring to those mammal species that are trapped (e.g., marten, fox, etc.) for the useful or economic value of their fur

GS – Generating Station

generating station – structure producing hydroelectricity

Geographic Information System (GIS) - a computerized information system which uses geo-referenced spatial and tabular databases to capture, store, update, manipulate, analyze and display information.

gill net - netting of various mesh sizes suspended in the water column by floats and anchored to the bottom by weights, designed to catch fish by entangling them around the gill covers

gradient - the slope of a stream or land surface

ha - hectares

habitat - the place where a plant or animal lives; often related to a function such as breeding, feeding, etc.

hardwood(s) - deciduous, broad leaved tree species belonging to the botanical group Angiospermae that shed their leaves annually, such as trembling aspen, white birch, balsam poplar, ash, oak, elm, Manitoba maple, basswood, etc. Also refers to stands of such trees and the wood produced by them.

hectare - a metric unit of square measure equal to 10,000 square metres or 2.471 acres

herb - a plant with stems that are not secondarily thickened and non-woody and which dies down annually (herbaceous)

Hydro - the Manitoba Hydro-electric Board

hydroelectric - of or relating to the production of electricity by water power

immature – see juvenile

impact - a positive or negative effect of a disturbance on the environment or a component of the environment

infrastructure - the fundamental facilities and systems servicing a country, city or area, e.g., transportation and communication systems

juvenile - the stage in an organism's life before it is able to reproduce

km - kilometre

m - metre

mm – millimetre

Manitoba Conservation (MC) - a department in the government of the Province of Manitoba

marsh - a low-lying wetland with grassy vegetation; differs from a swamp by having more vegetation and few or no trees; and differs from a bog by having soil as a base

maturity - the life stage at which an organism is able to reproduce

merchantable - a tree or a stand of trees that has reached maturity (rotation age and/or size) and is suitable and/or ready for harvest

mercury (Hg) - a natural metallic element that occurs in soils and minerals of the earth's crust

migration - the movement of an individual or group of individuals from one area to another

mitigate - to cause to become less harsh or hostile, to reduce the effects of development

mitigation - actions taken during the planning, design, construction and operation of works to alleviate or avoid potential adverse effects

model - a tool used to help visualize something that cannot be directly observed

monitoring - any ongoing process or program for measuring the actual effects of constructing or operating a development

NFA - Northern Flood Agreement

NCN - Nisichawayasihk Cree Nation

Nelson River Forest Section (NRFS) - a specific FS located in northern Manitoba encompassing a large portion of the Nelson River.

net merchantable - see merchantable and net merchantable AAC

net merchantable AAC - reflects the latest product technology's ability to make the most complete use of harvestable timber. In addition to cull factor reductions, net merchantable AAC has been reduced by 15 percent to account for buffer zones and reserves that protect other resource values, and to account for natural events such as wildfire, insect and disease losses

net operable level 1 - a reduced level of the net merchantable AAC. It consists of the volume of all operable stands which contain a minimum of 55 m^3/ha or greater in Cutting Classes 4 and 5 only for the four major softwood species (jack pine, black spruce, white spruce and balsam fir) excluding trees in the 10 cm diameter (dbh) class

non-productive forestland - a classification within the Manitoba FRI. It includes all forest land not capable of producing timber of merchantable size.

parasite - an animal or plant living in or on an organism of another species (its host), obtaining from it part or all of its organic nutriment, and commonly exhibiting some degree of adaptive structural modification. The host is typically, but not always, harmed by the presence of the parasite, and never benefits from this presence

permanent sample plots (PSP) - monitoring plots permanently established in forest stands of all ages and types to gather information relative to tree survival, ingress, health and growth

pollution - any alteration of the natural environment producing a condition that is harmful to living organisms

population - a group of interbeeding organisms of the same species that occupy a particular area or space

productive forestland - a classification within the Manitoba FRI. It includes all forest land capable of producing timber of merchantable size.

RMA - Resource Management Area

RTL – Registered Trapline

recreational fishery - a fishery where the primary intent is enjoyment; angling

regulatory – rules that govern or direct

rehabilitate - to carry on or cause a process of rehabilitation

rehabilitation - restoring to a more normal state

reservoir - an artificial lake where water is collected and kept in quantity for use

residual effect - effect on a population after mitigative measures have been implemented

right-of-way - a strip of land obtained and cleared for the purpose of building a road or transmission line

silviculture - the theory and practice of controlling the establishment, composition, care, and development of stands of trees to achieve the objectives of management.

softwood(s) - cone-bearing trees with needle or scale-like leaves belonging to the botanical group Gymnospermae. It includes such tree species as jack pine, black spruce white spruce, balsam fir, etc. Also refers to stands of such trees and/or the wood produced by them

species - a group of inter-breeding organisms that can produce fertile offspring

species composition - the number of different species that occur in an area

sport fishing - recreational fishing or angling

stakeholders - people with an interest or concern in something; in this EIS, refers particularly to community residents from Churchill and surrounding areas

stock - 1) a group of individuals of common descent or ancestry; and, 2) to introduce a particular life history stage of fish (e.g., eggs, young-of-the year, yearlings) to a water body

stocking - to supplement a natural population with individuals from an outside source

stockpile - material that is collected for future use, e.g., sand, gravel

sub-type - the designation used within the FRI to describe a stand of trees based on the composition, (number and frequency of individual tree species), expressed as a percentage of the total number and frequency of all species making up the stand.

succession - the replacement of one plant community by another in progressive development towards a mature or climax community

swamp - an area that is seasonally flooded with more trees than a marsh and better drainage than a bog

TK - Traditional Knowledge

TLE - Treaty Lands Entitlement

terrestrial - living on or in the ground; relating to the ground/earth as opposed to water

third party operator - a timber operator(s) that harvests timber within the FML area under the authority of a timber permit, timber sale agreement or special timber sale allocation.

timber - the wood of trees, whether growing or cut

timber permit - cutting authority issued under the Forest Act and generally the Timber Quota System for small volumes of timber (usually 300 cubic meters or less)

timber quota holders - a person or a company in Manitoba having the right to cut a specified volume of softwood and/or hardwood timber on Crown land in perpetuity under a permit and/or timber sale agreement

timber quota system - the timber allocation system instituted in 1965 that provided timber permit and/or timber sale agreement holders the right to cut a volume of softwood and/or hardwood timber on Crown land in perpetuity. It was based on the average annual harvest of timber in the years 1962 to 1964 inclusive

timber sale - cutting authority issued under the Forest Act and generally the Timber Quota System for large volumes of timber (usually in excess of 300 cubic meters)

type aggregate - the term used to describe a 5-digit aggregate of codes within the Manitoba FRI that describe stand species composition, site class, cutting class and crown closure (stand density).

valued ecosystem component (VEC) - those components of an ecosystem (often populations of animals or plants that are harvested) that have cultural or economic value to humans

waterfowl - ducks, geese and other related game birds that frequent water

wetland - marshes, swamps, and bogs

wildlife - wild animals collectively

working group(s) - refers to the grouping within the FRI of all subtypes having the same dominant species e.g. the “Jack Pine Working group”

APPENDIX 1

HARVEST CALENDAR SAMPLE PAGES

Hunting, Fishing, and Gathering Calendar

Nisichawayasihk Cree Nation

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2001
2002

Nisichawayasihk Cree Nation

NISICHAWAYASIHK CREE NATION (NCN) DOMESTIC HARVEST STUDY

NEED FOR STUDY:

1) Obtaining a better understanding of the resource harvest in the NCN Resource Management Area will allow NCN to make better decisions with regard to future resource harvesting and developmental activities.

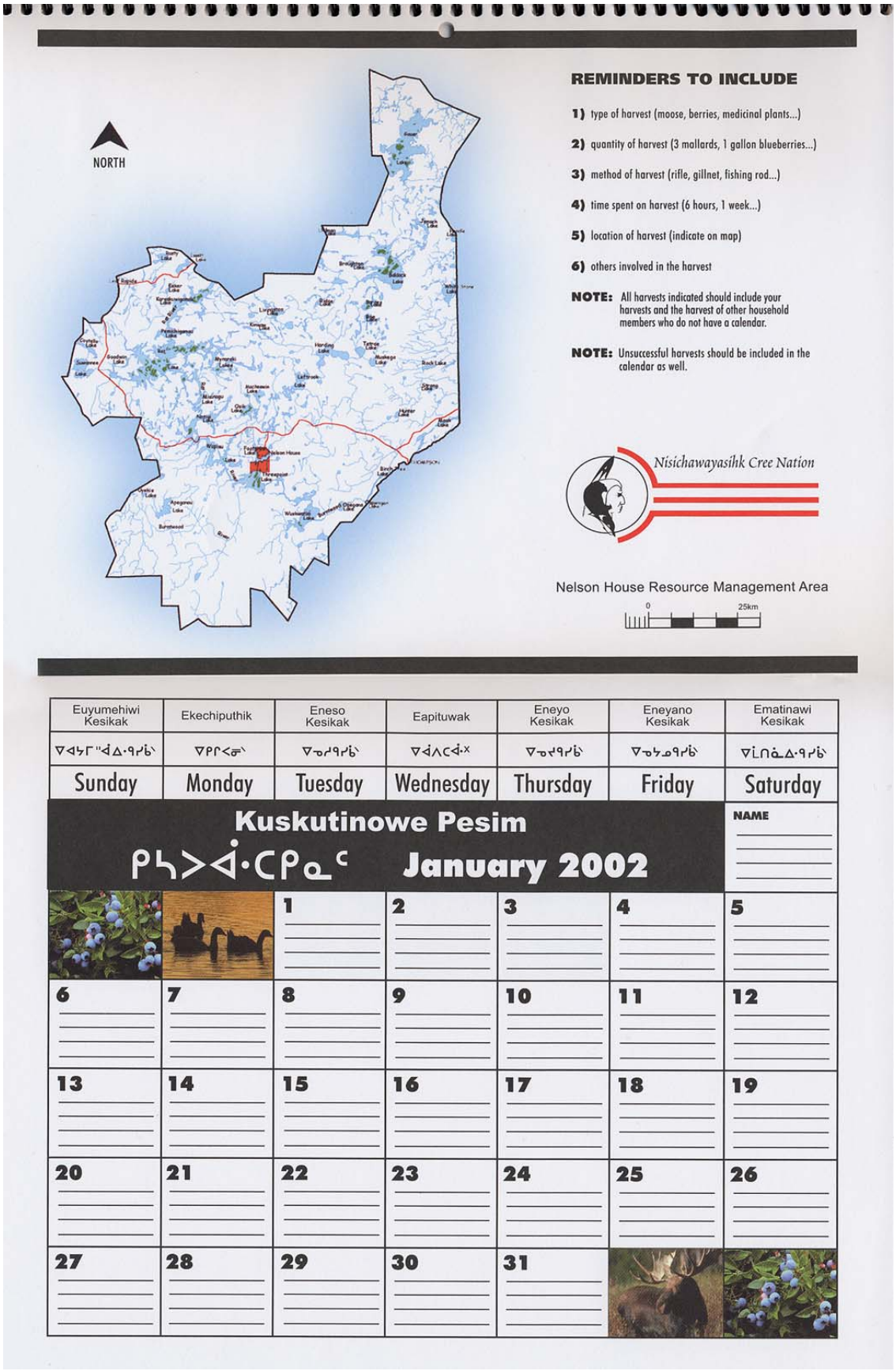
2) To complete the Environmental Impact Assessment for the proposed Wuskwatim and Notigi generation projects it is important to understand the degree to which NCN harvests resources for domestic consumption and what proportion of those harvests come from the areas that will be impacted by the projects.

3) The current level of resource harvesting in the NCN Resource Management Area, as determined by this study, will act as a baseline to assist in assessing any gains or losses that may occur as a result of future developmental activities.

Basic Instructions

(detailed instructions are included at the back of the calendar)

- keep the calendar in a convenient location
- only the person directly responsible for a harvest should report the harvest. For example:
  - those pulling the trigger for the kill;
  - if a group is gillnetting and catches fish, the boat owner is the only one that should report the harvest of fish regardless of who takes the fish home;
  - anglers should report those fish that they themselves removed from the water;
  - the person actually picking the berries should report the harvest;
  - the person actually picking the medicinal plants should report the harvest;
  - trapped animals should be reported by the person running the trapline;
  - if an animal is harvested from a boat by any other means than a gun, then the boat owner should report the kill.
- record the number and type of each fish on the day you caught them
- record the number of ducks, geese, animals harvested on the day you caught them
- record the amount of berries (quarts/liters) or number of plants collected on the day you gathered them
- if gillnetting, record the number of nets used and amount of time set
- record the method used to harvest (eg. gillnetting, angling, hunting, trapping, gathering)
- record the amount of time spent harvesting (eg. hours, days)
- record who you were harvesting with
- on the map, record where you were harvesting even if it is outside the RMA (eg. circle the general area)
- even if nothing was harvested, record the amount of time spent and method used
- calendars will be collected monthly by community consultants.
- each completed calendar will be entered into monthly and grand prize contests.


NORTH
REMINDERS TO INCLUDE
1) type of harvest (moose, berries, medicinal plants...)
2) quantity of harvest (3 mallards, 1 gallon blueberries...)
3) method of harvest (rifle, gillnet, fishing rod...)
4) time spent on harvest (6 hours, 1 week...)
5) location of harvest (indicate on map)
6) others involved in the harvest
NOTE: All harvests indicated should include your harvests and the harvest of other household members who do not have a calendar.
NOTE: Unsuccessful harvests should be included in the calendar as well.
Nisichawayasihk Cree Nation
Nelson House Resource Management Area
0
25km
Euyumehiwi Kesikak
Ekechiputhik
Eneso Kesikak
Eapituwak
Eneyo Kesikak
Eneyano Kesikak
Ematinawi Kesikak
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Kuskutinowe Pesim
January 2002
NAME

NCN Hunting, Fishing and Gathering Calendar - Participant Information

KEEPING A RECORD OF RESOURCES HARVESTED PROVIDES VALUABLE INFORMATION

Keeping a record of how many fish, ducks, and geese that are harvested each year and where these resources are harvested can be useful for a number of reasons.

1) Obtaining a better understanding of the resource harvest in the NCN Resource Management Area will allow NCN to make better decisions with regard to future resource harvesting and developmental activities.

2) To complete the Environmental Impact Assessment for the proposed Wuskwatim and Notigi generation projects it is important to understand the degree to which NCN harvests resources for domestic consumption and what proportion of those harvests come from the areas that will be impacted by the projects.

3) The current level of resource harvesting in the NCN Resource Management Area, as determined by this study, will act as a baseline to assist in assessing any gains or losses that may occur as a result of future developmental activities.

For example:

- Knowing how many fish are caught helps us to understand the effect fishing may be having on fish populations in the area. For example, when a large number of one species (kind) of fish is removed from an area, other species may become more plentiful.
- Knowing how many geese and ducks are harvested helps us to understand the effect hunting may be having on the bird populations in the area.
- Keeping a record of how much effort (time spent, nets fished) is required to harvest the same number of fish, ducks, and geese from year to year, will indicate whether the abundance of these animals is changing in the area where the harvesting occurs. Change in the abundance of a species, may be the result of harvesting, or it may be due to changes in the environment such as change in water levels, stream flows, the presence of a road or transmission line, or the amount of food available.
- Knowing where fish, ducks, and geese are harvested, and whether the good fishing and hunting spots change over time, may indicate the effects of harvesting on where these animals are plentiful. It may also indicate environmental change.
- Knowing where berries and other forest products are harvested and how much time is spent harvesting will help to identify areas of importance to the community.

WHAT WILL BE LEARNED FROM THE CALENDARS

The information that you provide on the calendars will be compiled and analyzed. The results will be reported back to the community showing:

- ☐ How many moose were taken in the Nelson House Resource Management Area (RMA).
- ☐ The general vicinity of where moose were harvested.
- ☐ How many fish of each species were caught in the Nelson House RMA.
- ☐ How fish were caught (angling, gillnetting, or some other method).
- ☐ How much effort it took to catch fish (number of hours, number of nets).
- ☐ Where fish were caught.
- ☐ How many ducks and geese were harvested.
- ☐ How much effort it took to harvest ducks and geese.
- ☐ Where ducks and geese were shot.
- ☐ How much time was spent harvesting berries and medicinal plants and where important harvesting areas are located.

NCN Hunting, Fishing and Gathering Calendar- Participant Information

INSTRUCTIONS FOR COMPLETING THE HARVEST CALENDAR AND MAP

These instructions should be followed when putting fishing, hunting, and gathering information on your calendar and map. An example calendar page has been provided to assist you in filling out your own calendar and map.

1. Keep the "Harvest Calendar" in a convenient, visible spot where it will act as a reminder to fill it out regularly.
2. At the start of each month, write your name in the space provided on that page of the calendar. Fill out the calendar whenever you return from a harvesting activity, using the instructions and map provided.
3. When you return from hunting, fishing, or gathering:

   - ☐ Mark down the number of each type of fish, and the number of ducks and geese, you harvested in the space provided for that day of the month.
   - ☐ If you were angling, mark down how many hours that you spent angling.
   - ☐ If you were gillnetting, mark down how many nets you had out and for how long.
   - ☐ If you were fishing by some means other than gillnetting or angling, write down the method, and how many hours you spent fishing by that method.
   - ☐ If you were hunting, mark down how many hours that you spent hunting.
   - ☐ If you were gathering berries or other forest products mark down how much time you spent gathering.
   - ☐ Indicate who you were with when you were harvesting (this allows us to cross-reference the harvests to ensure double counting does not occur).

4. Where were you fishing, hunting, or gathering?

   There is a map of the Nelson House RMA on each page of the calendar. Indicate on the calendar (using a circle) the general vicinity of where you were fishing, hunting, or gathering each day of the month. See the July 2001 calendar for examples. If you fished, hunted, or gathered in several different locations on the same day, please draw circles around all of the separate areas where you fished, hunted, or gathered.

5. If you were fishing, hunting, or gathering outside the Nelson House RMA, then indicate that the location was "outside the RMA".
6. Please remember that if you go fishing, hunting, or gathering but do not harvest anything, record that also, along with the information about how you were fishing or hunting, where you were, and for how long you fished, hunted, or gathered.
7. A community consultant will visit you at the beginning of each month to collect the completed calendar from the previous month. The consultant will review the information recorded on the calendar to ensure that it is reported correctly. All monthly calendars will be entered into a monthly draw for five prizes. All monthly calendars will be entered into a grand prize contest to be held at the end of the program. If you have completed all 12 monthly calendars you will have 12 chances of winning the grand prize!
8. Calendars submitted after the monthly draw will be automatically entered into the following monthly draw.

APPENDIX 2

ESTIMATED ANIMAL AND EDIBLE WEIGHTS USED IN THE HARVEST CALENDAR

Table A2.1. Estimated weight (kg) of individual animals reported in Harvest Calendar data and the conversion factor for converting animal weight to edible weight.

Species	Weight/ Individual (kg)	Conversion (%)
Cisco	0.77	0.64
Fish	1.01	0.64
Maria	1.16	0.64
Perch	0.42	0.64
Pike	1.47	0.60
Suckers	1.14	0.59
Walleye	0.76	0.71
Whitefish	1.36	0.67
Mallards	1.25	0.70
Black Ducks	0.83	0.70
Ducks	1.0	0.70
Geese	3.0	0.70
Grouse	0.6	0.60
Moose	323	0.69
Deer	75	0.61
Elk	275	0.69
Rabbit	1.5	0.64
Squirrel	0.2	0.64
Beaver	12.6	0.63
Lynx	7.7	0.50

APPENDIX 3

HARVEST CALENDAR RESULTS TABLES

Table A3-1. Household participation levels, August 2001 – May 2002.

August		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	14	39
	Intensive	51	26	51
	Non-harvesters	208	23	11
	Occasional	150	46	31
	Unique	18	5	28

September		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	13	36
	Intensive	51	22	43
	Non-harvesters	208	21	10
	Occasional	150	44	29
	Unique	18	5	28

October		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	13	36
	Intensive	51	22	43
	Non-harvesters	208	28	13
	Occasional	150	43	29

November		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	15	42
	Intensive	51	23	45
	Non-harvesters	208	27	13
	Occasional	150	45	30
	Unique	18	6	33
	Unique	18	5	28

December		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	15	42
	Intensive	51	22	43
	Non-harvesters	208	38	18
	Occasional	150	49	33
	Unique	18	3	17

Table A3-1. (cont.)

January		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	8	22
	Intensive	51	15	29
	Non-harvesters	208	26	13
	Occasional	150	38	25
	Unique	18	3	17

February		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	7	19
	Intensive	51	13	25
	Non-harvesters	208	23	11
	Occasional	150	34	23
	Unique	18	3	17

March		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	7	19
	Intensive	51	13	25
	Non-harvesters	208	27	13
	Occasional	150	34	23
	Unique	18	2	11

April		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	4	11
	Intensive	51	13	25
	Non-harvesters	208	17	8
	Occasional	150	24	16
	Unique	18	5	28

May		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	3	8
	Intensive	51	7	14
	Non-harvesters	208	15	7
	Occasional	150	23	15
	Unique	18	2	11

Table A3-1. (cont.)

June		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	7	19
	Intensive	51	16	31
	Non-harvesters	208	10	5
	Occasional	150	26	17
	Unique	18	3	17

July		Households		
	Activity Level	Identified	Calendars Submitted	% Participation
	Active	36	6	17
	Intensive	51	10	20
	Non-harvesters	208	14	7
	Occasional	150	16	11
	Unique	18	2	11

Table A3-2. Total harvest by activity level and zone for each month, August 2001 – July 2002.

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
August, 2001						
Active	Zone 1	Cisco	3	22	8	56
		Cranberries	2	8	5	21
		Herbs	1	1	3	3
		Mint	1	1	3	3
		Raspberries	1	4	3	10
		Whitefish	3	57	8	146
	Zone 2	Cranberries	3	19	8	49
		Poplar buds	5	1	13	3
		Wigis	5	1	13	3
	Zone 3	Blueberries	2	2	5	6
		Ducks	2	7	5	18
	Zone 4	Blueberries	2	38	5	97
Intensive	Zone 0	Moose	0	0	0	0
	Zone 1	Bark	1	1	2	2
		Blueberries	4	133	8	260
		Cisco	1	40	2	78
		Cranberries	1	3	2	6
		Ducks	3	8	6	16
		Fish	2	0	4	0
		Grouse	1	1	2	2
		Moose	1	0	2	0
		Pike	1	4	2	8
		Rabbit	1	4	2	8
		Suckers	1	40	2	78
		Wakinahkan	1	1	2	2
		Walleye	1	5	2	10
		Wigis	2	2	4	4

Table A3-2. (cont'd).

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
August, 2001 (Cont'd)						
Intensive	Zone 2	Blueberries	3	24	6	47
		Cranberries	1	0	2	0
		Mint	1	1	2	2
		Moose	3	1	6	2
		Raspberries	5	19	10	38
	Zone 3	Cisco	1	12	2	24
		Cranberries	3	1	6	2
		Ducks	1	6	2	12
		Juniper	3	1	6	2
		Maria	3	1	6	2
		Pike	3	5	6	10
		Whitefish	4	19	8	37
	Zone 4	Blueberries	1	0	2	0
		Moose	3	2	6	4
Non-harvesters	Zone 1	Blueberries	1	1	9	8
		Pike	1	2	9	18
		Raspberries	1	15	9	137
		Walleye	1	14	9	127
Occasional	Zone 1	Bark	1	1	3	3
		Blueberries	9	144	29	466
		Driftwood	1	1	3	3
		Ducks	3	2	10	7
		Geese	3	5	10	16
		Herbs	5	1	16	3
		Moose	5	0	16	0
		Pike	2	7	7	23
		Walleye	1	2	3	7
		Wigis	3	1	10	3

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
August, 2001 (Cont'd)						
Occasional	Zone 2	Ducks	1	3	3	10
		Strawberries	1	4	3	12
	Zone 3	Blueberries	4	16	13	52
		Cranberries	3	4	10	13
		Fish	2	0	7	0
		Pike	1	6	3	19
		Walleye	5	54	16	174
Unique	Zone 1	Blueberries	5	55	18	196
		Medicinal plants	1	9	4	32
	Zone 2	Cranberries	1	16	4	58
		Ducks	1	3	4	11
		Moose	1	1	4	4
		Wigis	1	1	4	4
September, 2001						
Active	Zone 1	Geese	1	3	3	8
		Mallards	2	13	6	36
		Moose	4	0	11	0
		Raspberries	1	1	3	3
		Wigis	1	1	3	3
	Zone 2	Cranberries	5	53	14	147
		Moose	1	2	3	6
		Spruce buds	5	1	14	3
		Wigis	5	1	14	3
	Zone 3	Cranberries	1	4	3	11
		Ducks	1	6	3	17
		Moose	1	1	3	3

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
September, 2001 (Cont'd)						
Active	Zone 3	Pike	13	2	36	6
		Walleye	13	4	36	11
		Whitefish	13	17	36	47
	Zone 4	Moose	3	0	8	0
Intensive	Zone 1	Cranberries	1	1	2	1
		Moose	12	0	28	0
	Zone 3	Not specified	2	0	5	0
		Blueberries	2	16	5	37
		Cisco	1	20	2	47
		Cranberries	4	24	9	55
		Ducks	2	2	5	5
		Fish	1	200	2	465
		Herbs	1	1	2	2
		Pike	1	1	2	2
		Walleye	3	16	7	37
		Whitefish	1	10	2	23
		Wigis	1	1	2	2
	Zone 4	Not specified	2	0	5	0
Non-harvesters	Zone 1	Fish	1	0	10	0
		Moose	5	0	50	0
Occasional	Zone 0	Moose	1	0	3	0
	Zone 1	Blueberries	1	19	3	65
		Cranberries	2	8	7	27
		Ducks	5	12	17	41
		Geese	5	5	17	17

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
September, 2001 (Cont'd)						
Occasional	Zone 1	Labrador Tea	1	1	3	3
		Moose	5	0	17	0
		Pike	4	25	14	86
		Walleye	1	2	3	7
	Zone 2	Blueberries	3	12	10	42
		Cranberries	2	9	7	31
		Geese	1	1	3	3
		Pike	1	4	3	14
	Zone 3	Walleye	4	12	14	41
Unique	Zone 1	Devil's Claw	1	1	4	4
	Zone 2	Cranberries	2	19	7	68
	Zone 3	Cranberries	1	4	4	14
		Moose	1	0	4	0
		Pike	1	3	4	11
		Walleye	1	1	4	4
October, 2001						
Active	Zone 0	Moose	2	1	5	3
	Zone 1	Balsam Fir	1	1	3	2
		Cisco	1	20	3	51
		Ducks	2	16	5	41
		Fish	1	0	3	0
		Labrador Tea	4	1	10	3
		Moose	10	0	26	0
		Pike	1	5	3	13
		Poplar buds	5	2	13	5

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
October, 2001 (Cont'd)						
Active	Zone 1	Spruce buds	1	1	3	3
		Spruce Gum	1	1	3	3
		Whitefish	1	20	3	51
		Wigis	4	1	10	3
	Zone 2	Cranberries	1	8	3	21
	Zone 3	Black ducks	1	2	3	5
		Moose	2	2	5	5
Intensive	Zone 1	Cisco	3	20	7	47
		Ducks	3	8	7	19
		Grouse	3	11	7	26
		Mallards	2	5	5	12
		Medicinal plants	3	1	7	2
		Moose	18	1	42	2
		Otter	1	1	2	2
		Pike	12	120	28	279
		Rabbit	7	8	16	19
		Walleye	12	100	28	233
		Whitefish	12	120	28	279
		Wigis	1	1	2	2
	Zone 2	Beaver	2	1	5	2
		Cranberries	1	2	2	5
		Grouse	4	17	9	40
		Moose	4	0	9	0
		Rabbit	5	11	12	26
		Squirrel	1	1	2	2
	Zone 3	Beaver	3	2	7	5
		Birch tree bark	1	1	2	2
		Cisco	2	0	5	0
		Cranberries	1	0	2	0

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
October, 2001 (Cont'd)						
Intensive	Zone 3	Ducks	1	1	2	2
		Herbs	1	1	2	2
		Moose	5	1	12	2
		Other plants	2	1	5	2
		Pike	6	18	14	42
		Rabbit	5	4	12	9
		Walleye	11	486	26	1130
		Whitefish	11	102	26	237
Non-harvesters	Zone 1	Not specified	2	0	15	0
		Beaver	2	3	15	23
		Ducks	2	4	15	31
		Geese	1	2	8	15
		Herbs	2	1	15	8
		Pike	1	3	8	23
		Rabbit	1	2	8	15
		Wigis	5	3	39	23
	Zone 2	Medicinal plants	5	1	39	8
		Moose	5	0	39	0
		Otter	5	2	39	15
	Zone 3	Moose	3	0	23	0
		Wigis	1	1	8	8
	Zone 5	Fish	1	0	8	0
Occasional	Zone 0	Cranberries	1	19	3	65
		Moose	1	0	3	0
		Pike	1	2	3	7
		Walleye	1	3	3	10

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
November, 2001						
Active	Zone 1	Beaver	1	1	2	2
		Black ducks	3	0	7	0
		Ducks	1	2	2	5
		Geese	1	1	2	2
		Pike	3	3	7	7
		Rabbit	5	5	12	12
		Walleye	1	1	2	2
Intensive	Zone 0	Beaver	5	0	11	0
		Marten	1	0	2	0
	Zone 1	Bark	1	1	2	2
		Beaver	2	2	4	4
		Cisco	2	1	4	2
		Grouse	9	10	20	22
		Pike	3	0	7	0
		Rabbit	18	28	40	62
		Walleye	2	0	4	0
		Whitefish	5	1	11	2
	Zone 3	Beaver	15	10	33	22
		Fox	10	2	22	4
		Grouse	11	6	24	13
		Marten	10	5	22	11
		Otter	10	1	22	2
		Rabbit	19	17	42	38
		Wigis	1	1	2	2
	Zone 5	Fish	3	0	7	0

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
November, 2001 (Cont'd)						
Non-harvesters	Zone 1	Not specified	13	0	100	0
		Herbs	2	1	15	8
		Whitefish	1	40	8	308
		Wigis	1	1	8	8
	Zone 2	Grouse	4	6	31	46
		Rabbit	5	10	39	77
		Whitefish	5	0	39	0
	Zone 5	Deer	10	2	77	15
		Elk	10	2	77	15
Occasional	Zone 0	Grouse	2	3	7	10
		Rabbit	12	6	40	20
	Zone 1	Beaver	4	0	13	0
		Fish	1	0	3	0
		Grouse	1	2	3	7
		Rabbit	6	11	20	37
		Walleye	1	4	3	13
		Wigis	3	1	10	3
	Zone 3	Not specified	10	0	33	0
		Rabbit	9	12	30	40
Unique	Zone 1	Beaver	2	2	6	6
		Fish	1	0	3	0
		Mink	2	1	6	3
		Rabbit	4	6	12	18
		Squirrel	5	5	15	15
		Weasel	2	1	6	3

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
December, 2001						
Active	Zone 0	Beaver	2	3	5	7
		Lynx	1	1	2	2
		Marten	1	1	2	2
		Rabbit	3	6	7	14
	Zone 1	Berries	1	0	2	0
		Blackberry Roots	1	1	2	2
		Poplar buds	1	1	2	2
Intensive	Zone 0	Beaver	1	1	1	1
		Grouse	3	10	4	14
		Marten	1	1	1	1
		Rabbit	5	14	7	19
	Zone 1	Pike	2	10	3	14
		Rabbit	2	10	3	14
		Walleye	2	20	3	27
	Zone 3	Beaver	14	12	19	16
		Caribou	10	0	14	0
		Cisco	2	10	3	14
		Fisher	13	0	18	0
		Lynx	1	1	1	1
		Marten	21	17	29	23
		Mink	3	3	4	4
		Moose	10	0	14	0
		Pike	4	17	6	23
		Rabbit	16	26	22	36
		Whitefish	5	9	7	12
Non-harvesters	Zone 0	Rabbit	1	2	6	11

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
December, 2001 (Cont'd)						
Non-harvesters	Zone 1	Choke Cherry Tree	1	1	6	6
		Maria	2	9	11	50
		Pike	9	5	50	28
		Rabbit	4	4	22	22
		Walleye	14	43	78	239
	Zone 3	Beaver	1	0	6	0
		Rabbit	1	0	6	0
Occasional	Zone 0	Not specified	1	0	3	0
		Beaver	3	8	9	24
		Marten	1	1	3	3
		Rabbit	3	9	9	27
	Zone 1	Beaver	10	5	30	15
		Grouse	1	1	3	3
		Lynx	1	1	3	3
		Rabbit	19	9	58	27
		Walleye	9	21	27	64
		Weasel	1	1	3	3
	Zone 2	Lynx	1	1	3	3
		Marten	1	3	3	9
	Zone 3	Lynx	1	1	3	3
Unique	Zone 3	Mink	1	1	6	6
		Rabbit	6	22	35	129
January, 2002						
Active	Zone 1	Not specified	1	0	5	0

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
January, 2002 (Cont'd)						
Active	Zone 3	Maria	1	6	5	27
		Pike	1	2	5	9
		Whitefish	1	6	5	27
	Zone 4	Rabbit	3	5	14	23
Intensive	Zone 0	Grouse	2	3	7	10
	Zone 1	Beaver	5	18	17	62
		Fish	10	0	35	0
		Lynx	5	1	17	3
		Rabbit	28	4	97	14
Intensive	Zone 3	Beaver	2	0	7	0
		Marten	5	3	17	10
		Rabbit	3	1	10	3
	Zone 4	Rabbit	15	2	52	7
Non-harvesters	Zone 1	Fish	4	0	31	0
		Rabbit	4	7	31	54
		Walleye	1	2	8	15
	Zone 3	Lynx	1	1	8	8
Occasional	Zone 1	Fish	4	5	16	20
		Perch	4	2	16	8
		Pike	6	14	24	56
		Walleye	8	74	32	296

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
January, 2002 (Cont'd)						
Occasional	Zone 3	Balsam Fir	1	1	4	4
		Beaver	1	1	4	4
		Grouse	1	1	4	4
		Otter	1	1	4	4
		Pike	2	4	8	16
		Rabbit	24	33	96	132
		Squirrel	1	1	4	4
		Walleye	4	21	16	84
Unique	Zone 3	Walleye	2	32	12	188
February, 2002						
Active	Zone 4	Rabbit	1	2	5	11
Intensive	Zone 0	Walleye	1	1	4	4
	Zone 1	Rabbit	4	5	16	20
	Zone 2	Marten	5	1	20	4
		Rabbit	5	6	20	24
	Zone 3	Not specified	1	0	4	0
		Beaver	1	2	4	8
		Fish	1	5	4	20
		Marten	2	3	8	12
		Moose	1	1	4	4
		Pike	1	4	4	16
		Rabbit	3	5	12	20
		Walleye	1	1	4	4
		Wolverine	1	1	4	4

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
February, 2002 (Cont'd)						
Non-harvesters	Zone 0	Fish	1	0	9	0
Occasional	Zone 1	Fish	2	0	9	0
		Perch	2	5	9	22
		Pike	6	15	26	65
		Rabbit	2	0	9	0
		Walleye	7	27	30	117
	Zone 3	Fish	1	0	4	0
		Grouse	2	2	9	9
		Rabbit	4	11	17	48
		Walleye	1	21	4	91
	Zone 4	Beaver	3	3	13	13
		Mink	3	1	13	4
		Rabbit	3	5	13	22
Unique	Zone 1	Pike	1	1	6	6
		Walleye	1	5	6	29
March, 2002						
Active	Zone 1	Poplar buds	1	1	6	6
		Red Willows	1	1	6	6
	Zone 3	Cisco	1	16	6	94
		Pike	1	15	6	88
		Suckers	1	5	6	29
		Walleye	1	22	6	129
		Whitefish	1	36	6	212

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
March, 2002 (Cont'd)						
Intensive	Zone 3	Rabbit	2	3	8	13
Non-harvesters	Zone 1	Walleye	2	3	15	23
	Zone 3	Rabbit	2	2	15	15
Occasional	Zone 1	Fish	5	0	22	0
		Perch	6	1	26	4
		Pike	6	2	26	9
		Walleye	6	6	26	26
	Zone 3	Grouse	1	1	4	4
		Rabbit	2	6	9	26
		Walleye	1	22	4	96
April, 2002						
Active	Zone 3	Ducks	1	6	9	55
		Geese	3	7	27	64
		Grouse	2	5	18	46
		Mallards	1	2	9	18
		Rabbit	1	2	9	18
		Walleye	1	2	9	18
	Zone 5	Mallards	1	2	9	18
		Moose	1	1	9	9
Intensive	Zone 0	Mokopawatikwa	1	1	4	4
	Zone 1	Cisco	3	10	12	40
		Fish	5	14	20	56

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
April, 2002 (Cont'd)						
Intensive	Zone 1	Geese	4	2	16	8
		Maria	3	1	12	4
		Medicinal plants	1	1	4	4
		Mullet	3	19	12	76
		Pike	3	5	12	20
		Walleye	3	24	12	96
	Zone 3	Beaver	1	1	4	4
		Fox	1	1	4	4
		Geese	1	6	4	24
		Marten	1	4	4	16
		Otter	1	1	4	4
		Rabbit	2	7	8	28
		Wigis	1	1	4	4
Non-harvesters	Zone 3	Pike	3	10	38	125
		Walleye	3	12	38	150
Occasional	Zone 1	Grouse	1	1	6	6
		Pike	1	1	6	6
		Rabbit	1	1	6	6
		Walleye	1	1	6	6
	Zone 3	Geese	3	0	19	0
Unique	Zone 1	Maria	1	1	4	4
		Pike	1	1	4	4
		Walleye	1	2	4	7
	Zone 3	Ducks	5	0	18	0

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
May, 2002						
Active	Zone 1	Medicinal plants	1	1	13	13
Intensive	Zone 0	Beaver	2	2	14	14
		Ducks	4	26	29	186
		Geese	3	4	21	29
Non-harvesters	Zone 1	Geese	1	13	14	186
	Zone 3	Ducks	1	13	14	186
		Geese	1	1	14	14
		Moose	1	1	14	14
Occasional	Zone 2	Ducks	4	17	27	113
	Zone 3	Mallards	1	11	7	73
		Pike	2	10	13	67
		Walleye	3	16	20	107
Unique	Zone 1	Walleye	1	4	9	36

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
June, 2002 (Cont'd)						
Intensive	Zone 0	Ducks	1	2	3	7
		Mushrooms	1	1	3	3
		Weed tea	1	1	3	3
	Zone 1	Cisco	2	2	7	7
		Pike	9	27	29	87
		Rabbit	10	30	32	97
		Walleye	11	21	36	68
		Whitefish	11	102	36	329
	Zone 2	Pike	2	3	7	10
	Zone 3	Medicinal plants	2	2	7	7
		Pike	6	31	19	100
		Rabbit	2	10	7	32
		Walleye	6	11	19	36
		Whitefish	6	101	19	326
Non-harvesters	Zone 1	Pike	2	8	40	160
		Walleye	2	20	40	400
	Zone 2	Ducks	1	3	20	60
		Medicinal plants	2	2	40	40
		Muskrat	1	1	20	20
		Pike	2	6	40	120
Occasional	Zone 1	Perch	3	1	18	6
		Pike	4	6	24	35
		Walleye	4	92	24	541
	Zone 3	Medicinal plants	1	1	6	6
		Pike	3	2	18	12
		Ptarmigan	2	1	12	6

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
June, 2002 (Cont'd)						
Occasional	Zone 3	Rabbit	1	2	6	12
		Walleye	3	23	18	135
		Wigis	1	1	6	6
Unique	Zone 1	Walleye	2	12	12	71
July, 2002						
Active	Zone 1	Blueberries	2	16	12	94
		Mint	1	1	6	6
		Raspberries	2	23	12	135
		Saskatoons	1	4	6	24
	Zone 3	Strawberries	1	4	6	24
		Wigis	2	2	12	12
Intensive	Zone 1	Mint	1	1	5	5
		Pike	1	9	5	45
		Raspberries	1	4	5	19
		Walleye	1	8	5	40
		Wigis	1	1	5	5
Non-harvesters	Zone 1	Fish	13	40	186	571
		Pike	4	4	57	57
		Raspberries	2	8	29	109
		Walleye	1	3	14	43
	Zone 3	Medicinal plants	2	2	29	29
Occasional	Zone 1	Medicinal plants	1	1	9	9

Table A3-2. (cont.)

Harvester Activity Level	Zone	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
July, 2002 (Cont'd)						
Occasional	Zone 1	Perch	4	8	36	73
		Pike	4	7	36	64
		Raspberries	1	2	9	17
		Saskatoons	2	9	18	78
		Walleye	4	3	36	27
	Zone 3	Pike	10		91	
		Walleye	15		136	
Unique	Zone 0	Pike	2	3	18	27
		Walleye	2	5	18	46

Table A3-3. Total harvests by zone for each month, August 2001 – July 2002.

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
August, 2001					
Zone 0	Moose	*	0	*	0
Zone 1	Bark	2	2	5	5
	Blueberries	19	333	64	930
	Cisco	4	62	10	135
	Cranberries	3	11	7	27
	Driftwood	1	1	3	3
	Ducks	6	10	16	22
	Fish	2	0	4	0
	Geese	3	5	10	16
	Grouse	1	1	2	2
	Herbs	6	2	19	6
	Medicinal plants	1	9	4	32
	Mint	1	1	3	3
	Moose	6	0	18	0
	Pike	4	13	18	49
	Rabbit	1	4	2	8
	Raspberries	2	19	12	147
	Suckers	1	40	2	78
	Wakinahkan	1	1	2	2
	Walleye	3	21	14	144
	Whitefish	3	57	8	146
	Wigis	5	3	14	7
Zone 2	Blueberries	3	24	6	47
	Cranberries	5	35	13	106
	Ducks	2	6	7	20
	Mint	1	1	2	2
	Moose	4	2	10	6
	Poplar buds	5	1	13	3
	Raspberries	5	19	10	38
	Strawberries	1	4	3	12
	Wigis	6	2	16	6

* Number of attempts not specified.

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
August, 2001 (Continued)					
Zone 3	Blueberries	6	18	18	58
	Cisco	1	12	2	24
	Cranberries	6	5	16	15
	Ducks	3	13	7	30
	Fish	2	0	7	0
	Juniper	3	1	6	2
	Maria	3	1	6	2
	Pike	4	11	9	29
	Walleye	5	54	16	174
	Whitefish	4	19	8	37
Zone 4	Blueberries	3	38	7	97
	Moose	3	2	6	4
September, 2001					
Zone 0	Moose	1	0	3	0
Zone 1	Blueberries	1	19	3	65
	Cranberries	3	8	9	28
	Devil's Claw	1	1	4	4
	Ducks	5	12	17	41
	Fish	1	0	10	0
	Geese	6	8	20	26
	Labrador Tea	1	1	3	3
	Mallards	2	13	6	36
	Moose	26	0	106	0
	Pike	4	25	14	86
	Raspberries	1	1	3	3
	Walleye	1	2	3	7
	Wigis	1	1	3	3
Zone 2	Blueberries	3	12	10	42
	Cranberries	9	81	28	246

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
September, 2001 (Continued)					
Zone 2	Geese	1	1	3	3
	Moose	1	2	3	6
	Pike	1	4	3	14
	Spruce buds	5	1	14	3
	Wigis	5	1	14	3
Zone 3	Not specified	2	0	5	0
	Blueberries	2	16	5	37
	Cisco	1	20	2	47
	Cranberries	6	32	16	80
	Ducks	3	8	7	21
	Fish	1	200	2	465
	Herbs	1	1	2	2
	Moose	2	1	6	3
	Pike	15	6	42	19
	Walleye	21	33	61	93
	Whitefish	14	27	38	71
	Wigis	1	1	2	2
Zone 4	Not specified	2	0	5	0
	Moose	3	0	8	0
October, 2001					
Zone 0	Cranberries	1	19	3	65
	Moose	3	1	9	3
	Pike	1	2	3	7
	Walleye	1	3	3	10
	Wigis	1	1	4	4
Zone 1	Not specified	2	0	15	0
	Balsam Fir	1	1	3	2
	Beaver	3	3	19	23
	Cisco	4	40	10	98

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
October, 2001 (Continued)					
Zone 1	Ducks	8	28	31	90
	Fish	1	0	3	0
	Geese	1	2	8	15
	Grouse	10	19	31	53
	Herbs	2	1	15	8
	Labrador Tea	4	1	10	3
	Mallards	2	5	5	12
	Medicinal plants	3	1	7	2
	Moose	30	2	74	6
	Otter	1	1	2	2
	Pike	18	147	52	381
	Poplar buds	5	2	13	5
	Rabbit	12	10	38	34
	Spruce buds	1	1	3	3
	Spruce Gum	1	1	3	3
	Walleye	14	102	35	240
	Whitefish	13	140	31	330
	Wigis	12	7	58	35
Zone 2	Beaver	2	1	5	2
	Cranberries	2	10	5	25
	Grouse	4	17	9	40
	Medicinal plants	5	1	39	8
	Mink	5	3	17	10
	Moose	9	0	48	0
	Otter	5	2	39	15
	Rabbit	12	16	36	43
	Squirrel	1	1	2	2
Zone 3	Not specified	3	0	10	0
	Beaver	3	2	7	5
	Birch tree bark	1	1	2	2
	Black ducks	1	2	3	5
	Cisco	7	185	22	638
	Cranberries	2	2	6	7

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
October, 2001 (Continued)					
Zone 3	Ducks	3	10	9	33
	Herbs	1	1	2	2
	Medicinal plants	2	1	7	3
	Moose	20	6	74	18
	Other plants	2	1	5	2
	Pike	12	90	35	290
	Rabbit	5	4	12	9
	Suckers	5	125	17	431
	Walleye	16	605	43	1541
	Whitefish	12	130	29	334
	Wigis	3	3	15	15
Zone 5	Fish	2	0	11	0
	Pike	1	1	4	4
	Spruce Gum	1	1	3	3
	Walleye	1	2	4	7
November, 2001					
Zone 0	Beaver	5	0	11	0
	Grouse	2	3	7	10
	Marten	1	0	2	0
	Rabbit	12	6	40	20
Zone 1	Not specified	13	0	100	0
	Bark	1	1	2	2
	Beaver	9	5	26	13
	Black ducks	3	0	7	0
	Cisco	2	1	4	2
	Ducks	1	2	2	5
	Fish	2	0	6	0
	Geese	1	1	2	2
	Grouse	10	12	23	29
	Herbs	2	1	15	8

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
November, 2001 (Continued)					
Zone 1	Mink	2	1	6	3
	Pike	6	3	14	7
	Rabbit	33	50	84	129
	Squirrel	5	5	15	15
	Walleye	4	5	10	16
	Weasel	2	1	6	3
	Whitefish	6	41	19	310
	Wigis	4	2	18	11
Zone 2	Grouse	4	6	31	46
	Rabbit	5	10	39	77
	Whitefish	5	0	39	0
Zone 3	Not specified	10	0	33	0
	Beaver	15	10	33	22
	Fox	10	2	22	4
	Grouse	11	6	24	13
	Marten	10	5	22	11
	Otter	10	1	22	2
	Rabbit	28	29	72	78
	Wigis	1	1	2	2
Zone 5	Deer	10	2	77	15
	Elk	10	2	77	15
	Fish	3	0	7	0
December, 2001					
Zone 0	Not specified	1	0	3	0
	Beaver	6	12	15	33
	Grouse	3	10	4	14
	Lynx	1	1	2	2
	Marten	3	3	7	7
	Rabbit	12	31	29	72

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
December, 2001 (Continued)					
Zone 1	Beaver	10	5	30	15
	Berries	1	0	2	0
	Blackberry Roots	1	1	2	2
	Choke Cherry Tree	1	1	6	6
	Grouse	1	1	3	3
	Lynx	1	1	3	3
	Maria	2	9	11	50
	Pike	11	15	53	42
	Poplar buds	1	1	2	2
	Rabbit	25	23	83	63
	Walleye	25	84	108	288
	Weasel	1	1	3	3
Zone 2	Lynx	1	1	3	3
	Marten	1	3	3	9
Zone 3	Beaver	15	12	25	16
	Caribou	10	0	14	0
	Cisco	2	10	3	14
	Fisher	13	0	18	0
	Lynx	2	2	4	4
	Marten	21	17	29	23
	Mink	4	4	10	10
	Moose	10	0	14	0
	Pike	4	17	6	23
	Rabbit	23	48	63	165
	Whitefish	5	9	7	12
January, 2002					
Zone 0	Grouse	2	3	7	10
Zone 1	Not specified	1	0	5	0
	Beaver	5	18	17	62

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
January, 2002 (Continued)					
Zone 1	Fish	18	5	81	20
	Grouse	0	0	0	0
	Lynx	5	1	17	3
	Partridge	0	0	0	0
	Perch	4	2	16	8
	Pike	6	14	24	56
	Rabbit	32	11	127	68
	Walleye	9	76	40	311
Zone 3	Balsam Fir	1	1	4	4
	Beaver	3	1	11	4
	Grouse	1	1	4	4
	Lynx	1	1	8	8
	Maria	1	6	5	27
	Marten	5	3	17	10
	Otter	1	1	4	4
	Pike	3	6	13	25
	Rabbit	27	34	106	135
	Squirrel	1	1	4	4
	Walleye	6	53	28	272
	Whitefish	1	6	5	27
Zone 4	Rabbit	18	7	65	30
February, 2002					
Zone 0	Fish	1	0	9	0
	Walleye	1	1	4	4
Zone 1	Fish	2	0	9	0
	Perch	2	5	9	22
	Pike	7	16	32	71
	Rabbit	6	5	25	20
	Walleye	8	32	36	147

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
February, 2002 (Continued)					
Zone 2	Marten	5.0	1.0	20.0	4.0
	Rabbit	5.0	6.0	20.0	24.0
Zone 3	Not specified	1.0	0.0	4.0	0.0
	Beaver	1.0	2.0	4.0	8.0
	Fish	2.0	5.0	8.3	20.0
	Grouse	2.0	2.0	8.7	8.7
	Marten	2.0	3.0	8.0	12.0
	Moose	1.0	1.0	4.0	4.0
	Pike	1.0	4.0	4.0	16.0
	Rabbit	7.0	16.0	29.4	67.8
	Walleye	2.0	22.0	8.3	95.3
	Wolverine	1.0	1.0	4.0	4.0
Zone 4	Beaver	3.0	3.0	13.0	13.0
	Mink	3.0	1.0	13.0	4.3
	Rabbit	4.0	7.0	18.3	32.3
March, 2002					
Zone 1	Fish	5.0	0.0	21.7	0.0
	Perch	6.0	1.0	26.1	4.3
	Pike	6.0	2.0	26.1	8.7
	Poplar buds	1.0	1.0	5.9	5.9
	Red Willows	1.0	1.0	5.9	5.9
	Walleye	8.0	9.0	41.5	49.2
Zone 3	Cisco	1.0	16.0	5.9	94.1
	Grouse	1.0	1.0	4.3	4.3
	Pike	1.0	15.0	5.9	88.2
	Rabbit	6.0	11.0	32.4	54.0
	Suckers	1.0	5.0	5.9	29.4
	Walleye	2.0	44.0	10.2	225.1
	Whitefish	1.0	36.0	5.9	211.8

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
April, 2002					
Zone 0	Mokopawatikwa	1.0	1.0	4.0	4.0
Zone 1	Cisco	3.0	10.0	12.0	40.0
	Fish	5.0	14.0	20.0	56.0
	Geese	4.0	2.0	16.0	8.0
	Grouse	1.0	1.0	6.3	6.3
	Maria	4.0	2.0	15.6	7.6
	Medicinal plants	1.0	1.0	4.0	4.0
	Mullet	3.0	19.0	12.0	76.0
	Pike	5.0	7.0	21.8	29.8
	Rabbit	1.0	1.0	6.3	6.3
	Walleye	5.0	27.0	21.8	109.4
Zone 3	Beaver	1.0	1.0	4.0	4.0
	Ducks	6.0	6.0	26.9	54.5
	Fox	1.0	1.0	4.0	4.0
	Geese	7.0	13.0	50.0	87.6
	Grouse	2.0	5.0	18.2	45.5
	Mallards	1.0	2.0	9.1	18.2
	Marten	1.0	4.0	4.0	16.0
	Otter	1.0	1.0	4.0	4.0
	Pike	3.0	10.0	37.5	125.0
	Rabbit	3.0	9.0	17.1	46.2
	Walleye	4.0	14.0	46.6	168.2
	Wigis	1.0	1.0	4.0	4.0
Zone 5	Mallards	1.0	2.0	9.1	18.2
	Moose	1.0	1.0	9.1	9.1
May, 2002					
Zone 0	Beaver	2.0	2.0	14.3	14.3
	Ducks	4.0	26.0	28.6	185.7
	Geese	3.0	4.0	21.4	28.6

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
May, 2002 (Continued)					
Zone 1	Geese	1.0	13.0	14.3	185.7
	Medicinal plants	1.0	1.0	12.5	12.5
	Walleye	1.0	4.0	9.1	36.4
Zone 2	Ducks	4.0	17.0	26.7	113.3
Zone 3	Ducks	1.0	13.0	14.3	185.7
	Geese	1.0	1.0	14.3	14.3
	Mallards	1.0	11.0	6.7	73.3
	Moose	1.0	1.0	14.3	14.3
	Pike	2.0	10.0	13.3	66.7
	Walleye	3.0	16.0	20.0	106.7
June, 2002					
Zone 0	Ducks	1.0	2.0	3.2	6.5
	Mushrooms	1.0	1.0	3.2	3.2
	Weed tea	1.0	1.0	3.2	3.2
Zone 1	Cisco	2.0	2.0	6.5	6.5
	Perch	3.0	1.0	17.6	5.9
	Pike	16.0	41.0	97.8	282.4
	Rabbit	10.0	30.0	32.3	96.8
	Walleye	20.0	145.0	116.0	1079.5
	Whitefish	11.0	102.0	35.5	329.0
Zone 2	Ducks	1.0	3.0	20.0	60.0
	Medicinal plants	2.0	2.0	40.0	40.0
	Muskrat	1.0	1.0	20.0	20.0
	Pike	4.0	9.0	46.5	129.7
Zone 3	Fish	7.0		36.8	
	Geese	2.0	6.0	10.5	31.6
	Medicinal plants	3.0	3.0	12.3	12.3

Table A3-3. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
June, 2002 (Continued)					
Zone 3	Moose	1.0	1.0	5.3	5.3
	Pike	9.0	33.0	37.0	111.8
	Ptarmigan	2.0	1.0	11.8	5.9
	Rabbit	3.0	12.0	12.3	44.0
	Walleye	9.0	34.0	37.0	170.8
	Whitefish	6.0	101.0	19.4	325.8
	Wigis	1.0	1.0	5.9	5.9
July, 2002					
Zone 0	Pike	2.0	3.0	18.2	27.3
	Walleye	2.0	5.0	18.2	45.5
Zone 1	Blueberries	2.0	16.0	11.8	94.1
	Fish	13.0	40.0	185.7	571.4
	Medicinal plants	1.0	1.0	9.1	9.1
	Mint	2.0	2.0	10.9	10.9
	Perch	4.0	8.0	36.4	72.7
	Pike	9.0	20.0	98.5	165.8
	Raspberries	6.0	36.1	54.4	279.1
	Saskatoons	3.0	12.6	24.1	101.7
	Walleye	6.0	14.0	55.6	110.1
	Wigis	1.0	1.0	5.0	5.0
Zone 3	Medicinal plants	2.0	2.0	28.6	28.6
	Pike	10.0			
	Strawberries	1.0	4.0	5.9	23.5
	Walleye	15.0			
	Wigis	2.0	2.0	11.8	11.8

Table A3-4. Monthly harvests by location and activity level in Zone 2, August 2001-July, 2002.

Location	Harvester Activity Level	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
August, 2001						
Mile 12	Intensive	Raspberries	2	8	4	15
Mile 20	Active	Cranberries	3	19	8	49
	Intensive	Moose	3	1	6	2
	Unique	Cranberries	1	16	4	58
Mile 32	Intensive	Blueberries	3	24	6	47
		Mint	1	1	2	2
Mile 33	Intensive	Cranberries	1	2		
		Raspberries	3	12	6	23
Sapochi River	Occasional	Ducks	1	3	3	10
		Strawberries	1	4	3	12
Wuskwatim Lake	Active	Poplar buds	5	1	13	3
		Wigis	5	1	13	3
	Unique	Ducks	1	3	4	11
		Moose	1	1	4	4
		Wigis	1	1	4	4
September, 2001						
Mile 20	Active	Cranberries	5	53	14	147
	Occasional	Blueberries	3	12	10	42
		Cranberries	1	4	3	14
		Geese	1	1	3	3
	Unique	Cranberries	2	19	7	68
Opegano Lake	Occasional	Cranberries	1	5	3	17
Wuskwatim Lake	Active	Moose	1	2	3	6
		Spruce buds	5	1	14	3
		Wigis	5	1	14	3
Wuskwatim Lake	Occasional	Pike	1	4	3	14

Table A3-4. (cont.)

Location	Harvester Activity Level	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
October, 2001						
Birch Tree Brook	Non-harvesters	Medicinal plants	5	1	39	8
		Moose	5	0	39	0
		Otter	5	2	39	15
Birch Tree Creek	Intensive	Moose	4	0	9	0
Mile 20	Active	Cranberries	1	8	3	21
	Intensive	Beaver	2	1	5	2
		Grouse	4	17	9	40
		Rabbit	5	11	12	26
		Squirrel	1	1	2	2
	Occasional	Mink	5	3	17	10
		Rabbit	5	1	17	3
Mile 20 and Hwy 391, South	Intensive	Cranberries	1	2	2	5
Mile 8	Occasional	Rabbit	2	4	7	14
November, 2001						
Mile 20	Non-harvesters	Grouse	4	6	31	46
		Rabbit	5	10	39	77
		Whitefish	5	39		
December, 2001						
Sapochi River	Occasional	Lynx	1	1	3	3
		Marten	1	3	3	9
February, 2002						
Mile 32	Intensive	Marten	5	1	20	4
		Rabbit	5	6	20	24

Table A3-4. (cont.)

Location	Harvester Activity Level	Species	Attempts	Harvests	Extrapolated	
					Attempts	Harvests
May, 2002						
Between Mile 11 and Birch Tree Lake	Occasional	Ducks	4	17	27	113
June, 2002						
Birch Tree Lake	Intensive	Pike	2	3	7	10
	Non-harvesters	Ducks	1	3	20	60
		Medicinal plants	2	2	40	40
		Muskrat	1	1	20	20
		Pike	2	6	40	120

Table A3-5. Comparison of Zone 2 with all harvests for each month, August 2001 – July 2002.

Species	All Harvests				Zone 2			
	Attempts	Harvests	Extrapolated		Extrapolated			
			Attempts	Harvests	Attempts	Harvests	Attempts (%)	Harvests (%)
August, 2001								
Bark	2	2	5	5	0	0	0	0
Blueberries	31	413	95	1132	6	47	6	4
Cisco	5	74	12	158	0	0	0	0
Cranberries	14	51	36	147	13	106	37	72
Driftwood	1	1	3	3	0	0	0	0
Ducks	11	29	29	72	7	20	23	28
Fish	4	0	10	0	0	0	0	0
Geese	3	5	10	16	0	0	0	0
Grouse	1	1	2	2	0	0	0	0
Herbs	6	2	19	6	0	0	0	0
Juniper	3	1	6	2	0	0	0	0
Maria	3	1	6	2	0	0	0	0
Medicinal plants	1	9	4	32	0	0	0	0
Mint	2	2	5	5	2	2	43	43
Moose	13	4	33	10	10	6	28	59
Pike	8	24	27	78	0	0	0	0
Poplar buds	5	1	13	3	13	3	100	100
Rabbit	1	4	2	8	0	0	0	0
Raspberries	7	38	22	185	10	38	46	21
Strawberries	1	4	3	12	3	12	100	100
Suckers	1	40	2	78	0	0	0	0
Wakinahkan	1	1	2	2	0	0	0	0
Walleye	8	75	30	318	0	0	0	0
Whitefish	7	76	16	183	0	0	0	0
Wigis	11	5	30	13	16	6	55	46
September, 2001								
Not specified	4	0	9	0	0	0	0	0
Blueberries	6	47	18	144	10	42	56	29
Cisco	1	20	2	47	0	0	0	0
Cranberries	18	121	53	354	28	246	53	70
Devil's Claw	1	1	4	4	0	0	0	0
Ducks	8	20	25	63	0	0	0	0
Fish	2	200	12	465	0	0	0	0
Geese	7	9	24	29	3	3	15	12
Herbs	1	1	2	2	0	0	0	0
Labrador Tea	1	1	3	3	0	0	0	0

Table A3-5. (cont.)

Species	All Harvests				Zone 2			
	Attempts	Harvests	Extrapolated		Extrapolated			
			Attempts	Harvests	Attempts	Harvests	Attempts (%)	Harvests (%)
September, 2001 (cont'd)								
Mallards	2	13	6	36	0	0	0	0
Moose	33	3	127	8	3	6	2	67
Pike	20	35	59	119	3	14	6	12
Raspberries	1	1	3	3	0	0	0	0
Spruce buds	5	1	14	3	14	3	100	100
Walleye	22	35	64	100	0	0	0	0
Whitefish	14	27	38	71	0	0	0	0
Wigis	7	3	19	8	14	3	73	35
October 2001								
Not specified	5	0	26	0	0	0	0	0
Balsam Fir	1	1	3	2	0	0	0	0
Beaver	8	6	31	30	5	2	15	8
Birch tree bark	1	1	2	2	0	0	0	0
Black ducks	1	2	3	5	0	0	0	0
Cisco	11	225	31	736	0	0	0	0
Cranberries	5	31	14	97	5	25	35	26
Ducks	11	38	40	124	0	0	0	0
Fish	3	0	14	0	0	0	0	0
Geese	1	2	8	15	0	0	0	0
Grouse	14	36	40	93	9	40	23	43
Herbs	3	2	18	10	0	0	0	0
Labrador Tea	4	1	10	3	0	0	0	0
Mallards	2	5	5	12	0	0	0	0
Medicinal plants	10	3	52	14	39	8	74	57
Mink	5	3	17	10	17	10	100	100
Moose	62	9	205	26	48	0	23	0
Other plants	2	1	5	2	0	0	0	0
Otter	6	3	41	18	39	15	94	87
Pike	32	240	94	681	0	0	0	0
Poplar buds	5	2	13	5	0	0	0	0
Rabbit	29	30	85	86	36	43	42	50
Spruce buds	1	1	3	3	0	0	0	0
Spruce Gum	2	2	6	6	0	0	0	0
Squirrel	1	1	2	2	2	2	100	100
Suckers	5	125	17	431	0	0	0	0
Walleye	32	712	85	1798	0	0	0	0

Table A3-5. (cont.)

Species	All Harvests				Zone 2			
	Attempts	Harvests	Extrapolated		Extrapolated			
			Attempts	Harvests	Attempts	Harvests	Attempts (%)	Harvests (%)
October, 2001 (cont'd)								
Whitefish	25	270	60	664	0	0	0	0
Wigis	16	11	76	53	0	0	0	0
November 2001								
Not specified	23	0	133	0	0	0	0	0
Bark	1	1	2	2	0	0	0	0
Beaver	29	15	71	35	0	0	0	0
Black ducks	3	0	7	0	0	0	0	0
Cisco	2	1	4	2	0	0	0	0
Deer	10	2	77	15	0	0	0	0
Ducks	1	2	2	5	0	0	0	0
Elk	10	2	77	15	0	0	0	0
Fish	5	0	13	0	0	0	0	0
Fox	10	2	22	4	0	0	0	0
Geese	1	1	2	2	0	0	0	0
Grouse	27	27	85	98	31	46	36	47
Herbs	2	1	15	8	0	0	0	0
Marten	11	5	24	11	0	0	0	0
Mink	2	1	6	3	0	0	0	0
Otter	10	1	22	2	0	0	0	0
Pike	6	3	14	7	0	0	0	0
Rabbit	78	95	235	304	39	77	16	25
Squirrel	5	5	15	15	0	0	0	0
Walleye	4	5	10	16	0	0	0	0
Weasel	2	1	6	3	0	0	0	0
Whitefish	11	41	57	310	39	67	0	0
Wigis	5	3	20	13	0	0	0	0
December 2001								
Not specified	1	0	3	0	0	0	0	0
Beaver	31	29	70	64	0	0	0	0
Berries	1	0	2	0	0	0	0	0
Blackberry Roots	1	1	2	2	0	0	0	0
Caribou	10	0	14	0	0	0	0	0
Choke Cherry Tree	1	1	6	6	0	0	0	0

Table A3-5. (cont.)

Species	All Harvests				Zone 2			
	Attempts	Harvests	Extrapolated		Extrapolated			
			Attempts	Harvests	Attempts	Harvests	Attempts (%)	Harvests (%)
December, 2001 (cont'd)								
Cisco	2	10	3	14	0	0	0	0
Fisher	13	0	18	0	0	0	0	0
Grouse	4	11	7	17	0	0	0	0
Lynx	5	5	13	13	3	3	24	24
Maria	2	9	11	50	0	0	0	0
Marten	25	23	39	39	3	9	8	23
Mink	4	4	10	10	0	0	0	0
Moose	10	0	14	0	0	0	0	0
Pike	15	32	58	65	0	0	0	0
Poplar buds	1	1	2	2	0	0	0	0
Rabbit	60	102	174	300	0	0	0	0
Walleye	25	84	108	288	0	0	0	0
Weasel	1	1	3	3	0	0	0	0
Whitefish	5	9	7	12	0	0	0	0
January, 2002								
Not specified	1	0	5	0	0	0	0	0
Balsam Fir	1	1	4	4	0	0	0	0
Beaver	8	19	28	66	0	0	0	0
Fish	18	5	81	20	0	0	0	0
Grouse	3	4	11	14	0	0	0	0
Lynx	6	2	25	11	0	0	0	0
Maria	1	6	5	27	0	0	0	0
Marten	5	3	17	10	0	0	0	0
Otter	1	1	4	4	0	0	0	0
Partridge	0	0	0	0	0	0	0	0
Perch	4	2	16	8	0	0	0	0
Pike	9	20	37	81	0	0	0	0
Rabbit	77	52	299	233	0	0	0	0
Squirrel	1	1	4	4	0	0	0	0
Walleye	15	129	68	584	0	0	0	0
Whitefish	1	6	5	27	0	0	0	0
February, 2002								
Beaver	4	5	17	21	0	0	0	0
Fish	5	5	26	20	0	0	0	0
Grouse	2	2	9	9	0	0	0	0

Table A3-5. (cont.)

Species	All Harvests				Zone 2			
	Attempts	Harvests	Extrapolated		Extrapolated			
			Attempts	Harvests	Attempts	Harvests	Attempts (%)	Harvests (%)
February, 2002 (cont'd)								
Marten	7	4	28	16	20	4	71	25
Mink	3	1	13	4	0	0	0	0
Moose	1	1	4	4	0	0	0	0
Not specified	1	0	4	0	0	0	0	0
Perch	2	5	9	22	0	0	0	0
Pike	8	20	36	87	0	0	0	0
Rabbit	22	34	92	144	20	24	22	17
Walleye	11	55	49	246	0	0	0	0
Wolverine	1	1	4	4	0	0	0	0
March 2002								
Cisco	1	16	6	94	0	0	0	0
Fish	5	0	22	0	0	0	0	0
Grouse	1	1	4	4	0	0	0	0
Perch	6	1	26	4	0	0	0	0
Pike	7	17	32	97	0	0	0	0
Poplar buds	1	1	6	6	0	0	0	0
Rabbit	6	11	32	54	0	0	0	0
Red Willows	1	1	6	6	0	0	0	0
Suckers	1	5	6	29	0	0	0	0
Walleye	10	53	52	274	0	0	0	0
Whitefish	1	36	6	212	0	0	0	0
April, 2002								
Beaver	1	1	4	4	0	0	0	0
Cisco	3	10	12	40	0	0	0	0
Ducks	6	6	27	55	0	0	0	0
Fish	5	14	20	56	0	0	0	0
Fox	1	1	4	4	0	0	0	0
Geese	11	15	66	96	0	0	0	0
Grouse	3	6	24	52	0	0	0	0
Mallards	2	4	18	36	0	0	0	0
Maria	4	2	16	8	0	0	0	0
Marten	1	4	4	16	0	0	0	0
Medicinal plants	1	1	4	4	0	0	0	0
Mokopawatikwa	1	1	4	4	0	0	0	0
Moose	1	1	9	9	0	0	0	0

Table A3-5. (cont.)

Species	All Harvests				Zone 2			
	Attempts	Harvests	Extrapolated		Extrapolated			
			Attempts	Harvests	Attempts	Harvests	Attempts (%)	Harvests (%)
April, 2002 (cont'd)								
Marten	1	4	4	16	0	0	0	0
Medicinal plants	1	1	4	4	0	0	0	0
Mokopawatikwa	1	1	4	4	0	0	0	0
Moose	1	1	9	9	0	0	0	0
Mullet	3	19	12	76	0	0	0	0
Otter	1	1	4	4	0	0	0	0
Pike	8	17	59	155	0	0	0	0
Rabbit	4	10	23	52	0	0	0	0
Walleye	9	41	68	278	0	0	0	0
Wigis	1	1	4	4	0	0	0	0
May 2002								
Beaver	2	2	14	14	0	0	0	0
Ducks	9	56	70	485	27	113	38	23
Geese	5	18	50	229	0	0	0	0
Mallards	1	11	7	73	0	0	0	0
Medicinal plants	1	1	13	13	0	0	0	0
Moose	1	1	14	14	0	0	0	0
Pike	2	10	13	67	0	0	0	0
Walleye	4	20	29	143	0	0	0	0
June 2002								
Cisco	2	2	7	7				
Ducks	2	5	23	67	20	60	86	90
Fish	7		37					
Geese	2	6	11	32				
Medicinal plants	5	5	52	52	40	40	76	76
Moose	1	1	5	5				
Mushrooms	1	1	3	3				
Muskrat	1	1	20	20	20	20	100	100
Perch	3	1	18	6				
Pike	29	83	181	524	47	130	26	25
Ptarmigan	2	1	12	6				
Rabbit	13	42	45	141				
Walleye	29	179	153	1250				

Table A3-5. (cont.)

Species	All Harvests				Zone 2			
	Attempts	Harvests	Extrapolated		Extrapolated			
			Attempts	Harvests	Attempts	Harvests	Attempts (%)	Harvests (%)
June 2002 (Cont'd)								
Weed tea	1	1	3	3				
Whitefish	17	203	55	655				
Wigis	1	1	6	6				
July 2002								
Blueberries	2	16	12	94				
Fish	13	40	186	571				
Medicinal plants	3	3	38	38				
Mint	2	2	11	11				
Perch	4	8	36	73				
Pike	11	33	117	284				
Raspberries	6	36	54	279				
Saskatoons	3	13	24	102				
Strawberries	1	4	6	24				
Walleye	8	34	74	292				
Wigis	3	3	17	17				

Table A3-6. Species harvested per month, August 2001 – July 2002.

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
August, 2001				
Bark	2	2	5	5
Blueberries	31	413	95	1132
Cisco	5	74	12	158
Cranberries	14	51	36	147
Driftwood	1	1	3	3
Ducks	11	29	29	72
Fish	4	0	10	0
Geese	3	5	10	16
Grouse	1	1	2	2
Herbs	6	2	19	6
Juniper	3	1	6	2
Maria	3	1	6	2
Medicinal plants	1	9	4	32
Mint	2	2	5	5
Moose	13	4	33	10
Pike	8	24	27	78
Poplar buds	5	1	13	3
Rabbit	1	4	2	8
Raspberries	7	38	22	185
Strawberries	1	4	3	12
Suckers	1	40	2	78
Wakinahkan	1	1	2	2
Walleye	8	75	30	318
Whitefish	7	76	16	183
Wigis	11	5	30	13
September, 2001				
Not specified	4	0	9	0
Blueberries	6	47	18	144
Cisco	1	20	2	47
Cranberries	18	121	53	354
Devil's Claw	1	1	4	4
Ducks	8	20	25	63

Table A3-6. (cont.)

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
September, 2001 (cont'd)				
Fish	2	200	12	465
Geese	7	9	24	29
Herbs	1	1	2	2
Labrador Tea	1	1	3	3
Mallards	2	13	6	36
Moose	33	3	127	8
Pike	20	35	59	119
Raspberries	1	1	3	3
Spruce buds	5	1	14	3
Walleye	22	35	64	100
Whitefish	14	27	38	71
Wigis	7	3	19	8
October, 2001				
Not specified	5	0	26	0
Balsam Fir	1	1	3	2
Beaver	8	6	31	30
Birch tree bark	1	1	2	2
Black ducks	1	2	3	5
Cisco	11	225	31	736
Cranberries	5	31	14	97
Ducks	11	38	40	124
Fish	3	0	14	0
Geese	1	2	8	15
Grouse	14	36	40	93
Herbs	3	2	18	10
Labrador Tea	4	1	10	3
Mallards	2	5	5	12
Medicinal plants	10	3	52	14
Mink	5	3	17	10
Moose	62	9	205	26
Other plants	2	1	5	2
Otter	6	3	41	18

Table A3-6. (cont.)

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
October, 2001 (cont'd)				
Pike	32	240	94	681
Poplar buds	5	2	13	5
Rabbit	29	30	85	86
Spruce buds	1	1	3	3
Spruce Gum	2	2	6	6
Squirrel	1	1	2	2
Suckers	5	125	17	431
Walleye	32	712	85	1798
Whitefish	25	270	60	664
Wigis	16	11	76	53
November, 2001				
Not specified	23	0	133	0
Bark	1	1	2	2
Beaver	29	15	71	35
Black ducks	3	0	7	0
Cisco	2	1	4	2
Deer	10	2	77	15
Ducks	1	2	2	5
Elk	10	2	77	15
Fish	5	0	13	0
Fox	10	2	22	4
Geese	1	1	2	2
Grouse	27	27	85	98
Herbs	2	1	15	8
Marten	11	5	24	11
Mink	2	1	6	3
Otter	10	1	22	2
Pike	6	3	14	7
Rabbit	78	95	235	304
Squirrel	5	5	15	15
Walleye	4	5	10	16
Weasel	2	1	6	3

Table A3-6. (cont.)

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
November, 2001 (cont'd)				
Whitefish	11	41	57	310
Wigis	5	3	20	13
December, 2001				
Not specified	1	0	3	0
Beaver	31	29	70	64
Berries	1	0	2	0
Blackberry Roots	1	1	2	2
Caribou	10	0	14	0
Choke Cherry Tree	1	1	6	6
Cisco	2	10	3	14
Fisher	13	0	18	0
Grouse	4	11	7	17
Lynx	5	5	13	13
Maria	2	9	11	50
Marten	25	23	39	39
Mink	4	4	10	10
Moose	10	0	14	0
Pike	15	32	58	65
Poplar buds	1	1	2	2
Rabbit	60	102	174	300
Walleye	25	84	108	288
Weasel	1	1	3	3
Whitefish	5	9	7	12
January, 2002				
Not specified	1	0	5	0
Balsam Fir	1	1	4	4
Beaver	8	19	28	66
Fish	18	5	81	20
Grouse	3	4	11	14

Table A3-6. (cont.)

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
January, 2002 (cont'd)				
Lynx	6	2	25	11
Maria	1	6	5	27
Marten	5	3	17	10
Otter	1	1	4	4
Partridge	0	0	0	0
Perch	4	2	16	8
Pike	9	20	37	81
Rabbit	77	52	299	233
Squirrel	1	1	4	4
Walleye	15	129	68	584
Whitefish	1	6	5	27
February, 2002				
Not specified	1	0	4	0
Beaver	4	5	17	21
Fish	5	5	26	20
Grouse	2	2	9	9
Marten	7	4	28	16
Mink	3	1	13	4
Moose	1	1	4	4
Perch	2	5	9	22
Pike	8	20	36	87
Rabbit	22	34	92	144
Walleye	11	55	49	246
Wolverine	1	1	4	4
March, 2002				
Cisco	1	16	6	94
Fish	5	0	22	0
Grouse	1	1	4	4
Perch	6	1	26	4

Table A3-6. (cont.)

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
March, 2002 (cont'd)				
Pike	7	17	32	97
Poplar buds	1	1	6	6
Rabbit	6	11	32	54
Red Willows	1	1	6	6
Suckers	1	5	6	29
Walleye	10	53	52	274
Whitefish	1	36	6	212
April, 2002				
Beaver	1	1	4	4
Cisco	3	10	12	40
Ducks	6	6	27	55
Fish	5	14	20	56
Fox	1	1	4	4
Geese	11	15	66	96
Grouse	3	6	24	52
Mallards	2	4	18	36
Maria	4	2	16	8
Marten	1	4	4	16
Medicinal plants	1	1	4	4
Mokopawatikwa	1	1	4	4
Moose	1	1	9	9
Mullet	3	19	12	76
Otter	1	1	4	4
Pike	8	17	59	155
Rabbit	4	10	23	52
Walleye	9	41	68	278
Wigis	1	1	4	4
May, 2002				
Beaver	2	2	14	14

Table A3-6. (cont.)

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
May, 2002 (cont'd)				
Ducks	9	56	70	485
Geese	5	18	50	229
Mallards	1	11	7	73
Medicinal plants	1	1	13	13
Moose	1	1	14	14
Pike	2	10	13	67
Walleye	4	20	29	143
June, 2002				
Cisco	2	2	7	7
Ducks	2	5	23	67
Fish	7		37	
Geese	2	6	11	32
Medicinal plants	5	5	52	52
Moose	1	1	5	5
Mushrooms	1	1	3	3
Muskrat	1	1	20	20
Perch	3	1	18	6
Pike	29	83	181	524
Ptarmigan	2	1	12	6
Rabbit	13	42	45	141
Walleye	29	179	153	1250
Weed tea	1	1	3	3
Whitefish	17	203	55	655
Wigis	1	1	6	6
July, 2002				
Blueberries	2	16	12	94
Fish	13	40	186	571
Medicinal plants	3	3	38	38
Mint	2	2	11	11

Table A3-6. (cont.)

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
July, 2002 (cont'd)				
Perch	4	8	36	73
Pike	11	33	117	284
Raspberries	6	36	54	279
Saskatoons	3	13	24	102
Strawberries	1	4	6	24
Walleye	8	34	74	292
Wigis	3	3	17	17

Table A3-7. Total harvests by zone for all months, August 2001 – July 2002.

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
Zone 0	Not specified	1	0	3	0
	Beaver	13	14	41	47
	Cranberries	1	19	3	65
	Ducks	5	28	32	192
	Fish	1	0	9	0
	Geese	3	4	21	29
	Grouse	7	16	18	34
	Lynx	1	1	2	2
	Marten	4	3	9	7
	Mokopawatikwa	1	1	4	4
	Moose	4	1	12	3
	Mushrooms	1	1	3	3
	Pike	3	5	22	34
	Rabbit	24	37	69	92
	Walleye	4	9	26	60
	Weed tea	1	1	3	3
	Wigis	1	1	4	4
Zone 1	Not specified	16	0	120	0
	Balsam Fir	1	1	3	2
	Bark	3	3	7	7
	Beaver	27	31	93	113
	Berries	1		2	
	Black ducks	3		7	
	Blackberry Roots	1	1	2	2
	Blueberries	22	368	79	1089
	Choke Cherry Tree	1	1	6	6
	Cisco	15	115	42	281
	Cranberries	6	20	16	55
	Devil's Claw	1	1	4	4
	Driftwood	1	1	3	3
	Ducks	20	52	66	159
	Fish	49	59	340	647
	Geese	16	31	70	253
	Grouse	23	34	66	93
	Herbs	10	4	50	21

Table A3-7. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
Zone 1	Labrador Tea	5	2	14	6
	Lynx	6	2	20	7
	Mallards	4	18	10	48
	Maria	6	11	27	58
	Medicinal plants	7	13	36	60
	Mink	2	1	6	3
	Mint	3	3	13	13
	Moose	62	2	199	6
	Mullet	3	19	12	76
	Otter	1	1	2	2
	Partridge				
	Perch	19	17	105	113
	Pike	92	303	450	1178
	Poplar buds	7	4	21	13
	Rabbit	120	134	397	425
	Raspberries	9	56	69	429
	Red Willows	1	1	6	6
	Saskatoons	3	13	24	102
	Spruce buds	1	1	3	3
	Spruce Gum	1	1	3	3
	Squirrel	5	5	15	15
	Suckers	1	40	2	78
	Wakinahkan	1	1	2	2
	Walleye	104	521	491	2536
	Weasel	3	2	9	6
	Whitefish	33	340	93	1116
	Wigis	23	14	97	61
Zone 2	Beaver	2	1	5	2
	Blueberries	6	36	16	89
	Cranberries	16	126	46	377
	Ducks	7	26	54	194
	Geese	1	1	3	3
	Grouse	8	23	40	86
	Lynx	1	1	3	3
	Marten	6	4	23	13

Table A3-7. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
Zone 2	Medicinal plants	7	3	79	48
	Mink	5	3	17	10
	Mint	1	1	2	2
	Moose	14	4	60	11
	Muskrat	1	1	20	20
	Otter	5	2	39	15
	Pike	5	13	50	144
	Poplar buds	5	1	13	3
	Rabbit	22	32	94	144
	Raspberries	5	19	10	38
	Spruce buds	5	1	14	3
	Squirrel	1	1	2	2
	Strawberries	1	4	3	12
	Whitefish	5		39	
	Wigis	11	3	30	9
Zone 3	Not specified	16	0	52	0
	Balsam Fir	1	1	4	4
	Beaver	38	28	84	59
	Birch tree bark	1	1	2	2
	Black ducks	1	2	3	5
	Blueberries	8	35	23	95
	Caribou	10	0	14	0
	Cisco	12	243	35	816
	Cranberries	14	38	37	101
	Ducks	16	50	65	325
	Fish	12	205	54	485
	Fisher	13	0	18	0
	Fox	11	3	26	8
	Geese	10	20	75	134
	Grouse	17	15	60	76
	Herbs	2	2	5	5
	Juniper	3	1	6	2
	Lynx	3	3	12	12
	Mallards	2	13	16	92
	Maria	4	7	10	29

Table A3-7. (cont.)

Zone	Species	Attempts	Harvests	Extrapolated	
				Attempts	Harvests
Zone 3	Marten	39	32	80	73
	Medicinal plants	7	6	48	44
	Mink	4	4	10	10
	Moose	35	10	118	44
	Other plants	2	1	5	2
	Otter	12	3	30	10
	Pike	54	212	202	885
	Ptarmigan	2	1	12	6
	Rabbit	102	163	344	600
	Squirrel	1	1	4	4
	Strawberries	1	4	6	24
	Suckers	6	130	23	460
	Walleye	68	890	269	2983
	Whitefish	43	328	112	1019
	Wigis	9	9	41	41
	Wolverine	1	1	4	4
Zone 4	Not specified	2	0	5	0
	Beaver	3	3	13	13
	Blueberries	3	38	7	97
	Mink	3	1	13	4
	Moose	6	2	14	4
	Rabbit	22	14	84	62
Zone 5	Deer	10	2	77	15
	Elk	10	2	77	15
	Fish	5	0	18	0
	Mallards	1	2	9	18
	Moose	1	1	9	9
	Pike	1	1	4	4
	Spruce Gum	1	1	3	3
	Walleye	1	2	4	7

Table A3-8. Total harvests for all zones and months, August 2001 – July 2002.

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
Not specified	35	0	180	0
Balsam Fir	2	2	7	6
Bark	3	3	7	7
Beaver	83	77	235	235
Berries	1	2		
Birch tree bark	1	1	2	2
Black ducks	4	2	10	5
Blackberry Roots	1	1	2	2
Blueberries	39	476	125	1370
Caribou	10	0	14	0
Choke Cherry Tree	1	1	6	6
Cisco	27	358	77	1097
Cranberries	37	203	103	598
Deer	10	2	77	15
Devil's Claw	1	1	4	4
Driftwood	1	1	3	3
Ducks	48	156	216	869
Elk	10	2	77	15
Fish	67	264	421	1133
Fisher	13	0	18	0
Fox	11	3	26	8
Geese	30	56	170	419
Grouse	55	88	183	289
Herbs	12	6	54	26
Juniper	3	1	6	2
Labrador Tea	5	2	14	6
Lynx	11	7	38	24
Mallards	7	33	35	157
Maria	10	18	37	87
Marten	49	39	112	93
Medicinal plants	21	22	162	152
Mink	14	9	46	28
Mint	4	4	15	15
Mokopawatikwa	1	1	4	4
Moose	122	20	412	77
Mullet	3	19	12	76
Mushrooms	1	1	3	3
Muskrat	1	1	20	20

Table A3-8. (cont.)

Species	Attempts	Harvests	Extrapolated	
			Attempts	Harvests
Other plants	2	1	5	2
Otter	18	6	71	28
Partridge				
Perch	19	17	105	113
Pike	155	534	727	2244
Poplar buds	12	5	34	16
Ptarmigan	2	1	12	6
Rabbit	290	380	988	1322
Raspberries	14	75	79	467
Red Willows	1	1	6	6
Saskatoons	3	13	24	102
Spruce buds	6	2	17	5
Spruce Gum	2	2	6	6
Squirrel	7	7	22	22
Strawberries	2	8	9	36
Suckers	7	170	25	539
Wakinahkan	1	1	2	2
Walleye	177	1422	789	5585
Weasel	3	2	9	6
Weed tea	1	1	3	3
Whitefish	81	668	243	2134
Wigis	44	27	172	114
Wolverine	1	1	4	4

APPENDIX 4

SUMMARY OF COUNTRY FOODS PROGRAM DISTRUBTION FROM 1994 TO 2000

Table A4-1. Summary of Country Foods Program distribution from 1994 to 2000 (kg).

Species	1994	1995	1996	1997	1998	1999	2000	Total	Average
Whitefish (whole and fillets)	2821	2053	2747	2138	2846	2370	2619	17594	2513
Whitefish (smoked)	402	84	207	688	334	222	273	2210	316
Pickerel (smoked)	312	215	292	48	75	109	1	1051	150
Pickerel (fillets)	3	98	157	59	40	86	59	501	72
Pike (whole, fillets or smoked)	26	90	143	99	136	443	118	1056	151
Sucker (smoked or parts)	0	4	3	95	19	97	22	238	34
Trout	0	23	20	40	0	35	0	118	17
Tullibee	0	0	0	201	0	0	0	201	29
Roe	0	0	0	0	0	3	0	3	0
Caribou	910	1593	757	1821	1275	45	840	7242	1035
Moose	1283	1017	736	692	417	552	48	4744	678
Elk	0	0	693	95	0	298	0	1086	155
Deer	0	0	259	0	0	44	23	326	47
Muskrat	1	0	0	2	0	0	0	3	<1
Beaver	1	111	227	48	448	456	114	1406	201
Rabbit	5	22	40	2	10	17	5	100	14
Goose	142	61	5	118	82	35	31	473	68
Duck	48	35	39	18	8	9	7	164	23
Blueberries	532	79	225	40	85	109	66	1135	162
Cranberries	306	185	7	20	41	25	0	584	83
Raspberries/Strawberries	29	256	39	61	0	8	5	397	57
All Species	6819	5925	6595	6285	5817	4962	4229	40632	302

APPENDIX 5

SUMMARY OF COMMERCIAL FISHERY INFORMATION FROM THE NCN RMA 1976-2002

Table A5-1. Nominal and present value (2002$) of commercial fish production from Wuskwatim Lake and all lakes in the Nelson House RMA, 1976-2002.

	All Lakes in NCN RMA		Wuskwatim Lake			All Other Lakes in NCN RMA (not including Wuskwatim)		
Year	Nominal Value	Present Value (2002$)	Nominal Value	Present Value (2002$)	% Make-up of the Fishery (2002$)	Nominal Value	Present Value (2002$)	% Make-up of the Fishery (2002$)
1976	$ 38,804	$ 125,729	$ 17,403	$ 56,388	44.8%	$ 21,401	$ 69,342	55.2%
1977	$ 51,628	$ 154,608	$ 10,018	$ 30,000	19.4%	$ 41,610	$ 124,607	80.6%
1978	$ 69,984	$ 193,118	$ -	$ -	0.0%	$ 69,984	$ 193,118	100.0%
1979	$ 53,037	$ 134,177	$ -	$ -	0.0%	$ 53,037	$ 134,177	100.0%
1980	$ 103,323	$ 237,804	$ 18,963	$ 43,645	18.4%	$ 84,360	$ 194,160	81.6%
1981	$ 80,013	$ 165,595	$ 16,421	$ 33,985	20.5%	$ 63,592	$ 131,610	79.5%
1982	$ 71,744	$ 136,510	$ 7,225	$ 13,747	10.1%	$ 64,519	$ 122,763	89.9%
1983	$ 67,399	$ 120,146	$ 20,078	$ 35,791	29.8%	$ 47,321	$ 84,355	70.2%
1984	$ 122,400	$ 210,594	$ 12,624	$ 21,720	10.3%	$ 109,776	$ 188,874	89.7%
1985	$ 104,555	$ 172,748	$ 25,117	$ 41,499	24.0%	$ 79,438	$ 131,249	76.0%
1986	$ 119,806	$ 189,434	$ 14,349	$ 22,688	12.0%	$ 105,457	$ 166,746	88.0%
1987	$ 175,365	$ 266,107	$ 15,487	$ 23,501	8.8%	$ 159,878	$ 242,606	91.2%
1988	$ 189,425	$ 276,049	$ 30,162	$ 43,955	15.9%	$ 159,263	$ 232,094	84.1%
1989	$ 158,599	$ 220,556	$ 14,166	$ 19,700	8.9%	$ 144,433	$ 200,856	91.1%
1990	$ 131,989	$ 175,523	$ 4,312	$ 5,734	3.3%	$ 127,677	$ 169,789	96.7%
1991	$ 236,185	$ 298,760	$ 4,827	$ 6,106	2.0%	$ 231,358	$ 292,654	98.0%
1992	$ 263,111	$ 327,836	$ 31,311	$ 39,014	11.9%	$ 231,800	$ 288,823	88.1%
1993	$ 150,801	$ 182,995	$ 15,391	$ 18,677	10.2%	$ 135,410	$ 164,318	89.8%
1994	$ 177,905	$ 218,609	$ 2,216	$ 2,723	1.2%	$ 175,689	$ 215,886	98.8%
1995	$ 222,645	$ 266,490	$ -	$ -	0.0%	$ 222,645	$ 266,490	100.0%
1996	$ 261,651	$ 306,695	$ -	$ -	0.0%	$ 261,651	$ 306,695	100.0%
1997	$ 224,758	$ 257,634	$ 4,308	$ 4,938	1.9%	$ 220,450	$ 252,696	98.1%
1998	$ 282,683	$ 320,203	$ 27,467	$ 31,113	9.7%	$ 255,216	$ 289,090	90.3%
1999	$ 247,881	$ 268,107	$ 19,907	$ 21,531	8.0%	$ 227,974	$ 246,576	92.0%
2000	$ 195,002	$ 205,040	$ 2,160	$ 2,271	1.1%	$ 192,842	$ 202,769	98.9%
2001	$ 199,842	$ 207,157	$ -	$ -	0.0%	$ 199,842	$ 207,157	100.0%
2002	$ 216,429	$ 216,429	$ -	$ -	0.0%	$ 216,429	$ 216,429	100.0%
Total	**$ 4,216,964**	**$ 5,854,656**	**$ 313,912**	**$ 518,726**	**8.9%**	**$ 3,903,052**	**$ 5,335,930**	**91.1%**

Table A5-2. Production and value of lakes commercially fished in the NCN RMA from 1976 to 2002. Numbers may not add up to totals due to rounding (S=summer; W=winter; R=round).

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Apeganau	1976	S	R	349	$ 193	6,351	$ 9,209	397	$ 121	24	$ 9	7,121	$ 9,532	$ 30,885
Apeganau	1977	S	R	17	$ 10	1,984	$ 3,177	97	$ 40	21	$ 22	2,118	$ 3,249	$ 9,730
Apeganau	1979	S	R	11	$ 8	798	$ 1,712	4	$ 2	6	$ 11	820	$ 1,733	$ 4,384
Apeganau	1982	S	R	-	$ -	1,512	$ 2,324	20	$ 13	8	$ 11	1,540	$ 2,348	$ 4,468
Apeganau	1986	S	R	-	$ -	1,525	$ 5,875	319	$ 367	3	$ 11	1,847	$ 6,253	$ 9,887
Apeganau	1992	S	R	-	$ -	1,307	$ 4,717	313	$ 359	-	$ -	1,620	$ 5,076	$ 6,325
Apeganau	1993	S	R	-	$ -	1,372	$ 4,217	230	$ 147	7	$ 11	1,609	$ 4,375	$ 5,309
Apeganau	1994	S	R	-	$ -	1,294	$ 5,527	103	$ 75	4	$ 12	1,401	$ 5,614	$ 6,898
Apeganau	1996	W	R	-	n/a	262	n/a	98	n/a	-	n/a	360	$ 1,031	$ 1,208
Apeganau Total												**18,435**	**$ 39,211**	**$ 79,094**
Baldock	1979	S	R	246	$ 79	2,713	$ 5,666	282	$ 161	130	$ 132	3,371	$ 6,038	$ 15,275
Baldock	1980	S	R	1,145	$ 1,005	8,754	$ 23,594	2,261	$ 977	1,535	$ 1,268	13,695	$ 26,844	$ 61,783
Baldock	1982	S	R	28	$ 12	310	$ 467	358	$ 103	11	$ 6	707	$ 588	$ 1,119
Baldock	1987	S	R	3,409	$ 1,748	3,581	$ 16,275	3,365	$ 3,515	487	$ 606	10,841	$ 22,144	$ 33,602
Baldock	1988	W	R	2,342	$ 1,863	5,328	$ 21,160	3,983	$ 3,758	12	$ 21	11,666	$ 26,802	$ 39,059
Baldock	1989	S	R	4,292	$ 1,924	4,938	$ 9,919	4,427	$ 2,574	61	$ 60	13,718	$ 14,477	$ 20,133
Baldock	1989	W	R	65	$ 27	3,282	$ 7,944	5,247	$ 3,270	-	$ -	8,593	$ 11,241	$ 15,632
Baldock	1990	S	R	4,625	$ 1,369	2,137	$ 4,029	3,737	$ 3,748	605	$ 263	11,104	$ 9,409	$ 12,512
Baldock	1990	W	R	8,056	$ 1,503	117	$ 334	4,839	$ 4,912	5	$ 5	13,016	$ 6,754	$ 8,982
Baldock	1991	S	R	6,558	$ 3,345	2,733	$ 9,090	2,606	$ 2,707	284	$ 209	12,181	$ 15,351	$ 19,418
Baldock	1992	S	R	13,286	$ 6,855	1,168	$ 4,197	6,148	$ 5,853	291	$ 107	20,894	$ 17,012	$ 21,197
Baldock	1993	W	R	623	$ 199	4	$ 16	551	$ 354	29	$ 7	1,207	$ 576	$ 699
Baldock	1996	W	R	1,315	n/a	4,687	n/a	952	n/a	2	n/a	6,956	$ 17,635	$ 20,671
Baldock	1997	S	R	38	n/a	3,483	n/a	1,535	n/a	-	n/a	5,056	$ 20,720	$ 23,751
Baldock	1998	S	R	34	n/a	6,747	n/a	4,744	n/a	13	n/a	11,538	$ 51,848	$ 58,730
Baldock	1999	S	R	1,435	n/a	1,484	n/a	930	n/a	15	n/a	3,864	$ 12,191	$ 13,186
Baldock	1999	W	R	1,636	n/a	2,780	n/a	1,376	n/a	122	n/a	5,914	$ 19,264	$ 20,836
Baldock	2000	S	R	-	n/a	112	n/a	-	n/a	112	n/a	224	$ 636	$ 669
Baldock Total												**154,544**	**$ 279,530**	**$ 387,253**
Barnes	1987	W	R	97	$ 63	-	$ -	23	$ 36	-	$ -	120	$ 99	$ 150
Barnes	1991	S	R	3,159	$ 2,683	612	$ 1,899	1,146	$ 851	-	$ -	4,916	$ 5,433	$ 6,872
Barnes	1993	W	R	5,413	$ 8,148	75	$ 307	858	$ 565	-	$ -	6,346	$ 9,020	$ 10,946
Barnes	1994	W	R	1,634	$ 2,894	78	$ 384	559	$ 415	1	$ 1	2,271	$ 3,694	$ 4,539
Barnes	1996	W	R	2,492	n/a	36	n/a	373	n/a	6	n/a	2,907	$ 4,797	$ 5,623
Barnes	1999	S	R	3,959	n/a	203	n/a	374	n/a	-	n/a	4,536	$ 5,745	$ 6,214
Barnes Total												**21,097**	**$ 28,788**	**$ 34,344**

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Costello	1976	W	R	393	$ 339	10	$ 17	63	$ 13	-	$ -	466	$ 369	$ 1,196
Costello	1979	S	R	2,441	$ 1,945	99	$ 217	180	$ 100	370	$ 87	3,089	$ 2,349	$ 5,943
Costello	1986	W	R	48	$ 28	10	$ 54	5	$ 7	-	$ -	64	$ 89	$ 141
Costello	1989	W	R	2,774	$ 3,635	1,214	$ 3,632	603	$ 359	78	$ 91	4,669	$ 7,717	$ 10,732
Costello	1990	S	R	4,916	$ 4,380	873	$ 1,663	34	$ 32	1	$ 2	5,825	$ 6,077	$ 8,081
Costello	1990	W	R	2,170	$ 3,325	36	$ 107	288	$ 253	49	$ 158	2,544	$ 3,843	$ 5,111
Costello	1991	S	R	67	$ 65	543	$ 1,829	225	$ 235	-	$ -	836	$ 2,129	$ 2,693
Costello	1991	W	R	2,736	$ 4,256	98	$ 427	3,121	$ 3,292	95	$ 234	6,050	$ 8,209	$ 10,384
Costello	1992	S	R	267	$ 255	29	$ 102	19	$ 20	-	$ -	315	$ 377	$ 470
Costello	1994	S	R	2,948	$ 3,154	315	$ 1,221	30	$ 22	-	$ -	3,292	$ 4,397	$ 5,403
Costello	1994	W	R	1,934	$ 3,558	242	$ 1,259	486	$ 232	245	$ 1,096	2,907	$ 6,145	$ 7,551
Costello	1995	S	R	45	n/a	111	n/a	220	n/a	-	n/a	376	$ 1,012	$ 1,211
Costello	1996	S	R	3,730	n/a	775	n/a	575	n/a	131	n/a	5,211	$ 9,333	$ 10,940
Costello	1997	S	R	2,528	n/a	410	n/a	116	n/a	132	n/a	3,186	$ 5,214	$ 5,977
Costello	2000	S	R	3,824	n/a	1,703	n/a	484	n/a	3,328	n/a	9,339	$ 20,028	$ 21,059
Costello	2001	S	R	2,211	n/a	600	n/a	123	n/a	3,799	n/a	6,733	$ 9,847	$ 10,207
Costello Total												**54,900**	**$ 87,135**	**$ 107,097**
Gauer	1978	S	R	3,158	$ 1,966	20,420	$ 32,472	5,725	$ 2,646	-	$ -	29,303	$ 37,084	$ 102,332
Gauer	1979	S	R	8,389	$ 4,828	9,743	$ 20,303	1,692	$ 698	-	$ -	19,824	$ 25,829	$ 65,344
Gauer	1980	S	R	1,496	$ 548	3,121	$ 8,446	3,882	$ 1,904	33	$ 27	8,532	$ 10,925	$ 25,145
Gauer	1981	S	R	130	$ 43	4,092	$ 9,751	10,631	$ 6,173	-	$ -	14,853	$ 15,967	$ 33,045
Gauer	1981	W	R	2,826	$ 1,477	499	$ 1,261	5,772	$ 3,103	-	$ -	9,097	$ 5,841	$ 12,089
Gauer	1982	S	R	228	$ 99	7,258	$ 10,949	14,947	$ 6,621	-	$ -	22,433	$ 17,669	$ 33,619
Gauer	1982	W	R	-	$ -	436	$ 828	1,250	$ 825	-	$ -	1,686	$ 1,653	$ 3,145
Gauer	1983	S	R	841	$ 303	6,247	$ 14,831	5,870	$ 3,660	59	$ 15	13,018	$ 18,809	$ 33,529
Gauer	1984	S	R	3,887	$ 2,403	20,749	$ 51,032	11,357	$ 7,642	-	$ -	35,993	$ 61,077	$ 105,085
Gauer	1985	S	R	2,257	$ 1,065	12,498	$ 30,663	22,527	$ 14,295	2	$ 4	37,284	$ 46,027	$ 76,047
Gauer	1986	S	R	-	$ -	5,063	$ 19,635	14,866	$ 14,625	12	$ 11	19,941	$ 34,271	$ 54,188
Gauer	1987	S	R	-	$ -	6,722	$ 30,555	23,574	$ 25,753	6	$ 8	30,302	$ 56,316	$ 85,456
Gauer	1987	W	R	1,198	$ 565	162	$ 970	1,745	$ 2,219	-	$ -	3,105	$ 3,754	$ 5,696
Gauer	1988	S	R	1,757	$ 1,199	6,785	$ 18,369	16,755	$ 14,596	38	$ 42	25,334	$ 34,206	$ 49,849
Gauer	1989	S	R	-	$ -	9,348	$ 18,545	20,532	$ 12,339	-	$ -	29,880	$ 30,884	$ 42,949
Gauer	1990	S	R	4,316	$ 1,462	12,976	$ 24,132	17,379	$ 14,344	1	$ 1	34,672	$ 39,939	$ 53,112
Gauer	1991	S	R	6,953	$ 3,546	16,187	$ 53,825	17,626	$ 17,768	-	$ -	40,765	$ 75,139	$ 95,046
Gauer	1992	S	R	522	$ 269	14,681	$ 53,096	12,167	$ 12,308	-	$ -	27,370	$ 65,673	$ 81,829
Gauer	1993	S	R	-	$ -	13,757	$ 40,933	19,536	$ 12,195	1	$ 1	33,295	$ 53,129	$ 64,471
Gauer	1994	S	R	84	$ 22	807	$ 3,119	1,139	$ 679	-	$ -	2,031	$ 3,820	$ 4,694

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Gauer	1995	S	R	29	n/a	5,023	n/a	10,082	n/a	1	n/a	15,135	$ 41,485	$ 49,654
Gauer	1996	S	R	966	n/a	7,625	n/a	11,717	n/a	-	n/a	20,308	$ 46,930	$ 55,009
Gauer	1997	S	R	-	n/a	9,851	n/a	14,075	n/a	-	n/a	23,926	$ 66,230	$ 75,918
Gauer	1998	S	R	-	n/a	8,552	n/a	10,774	n/a	-	n/a	19,326	$ 67,318	$ 76,253
Gauer	1999	S	R	1,182	n/a	3,711	n/a	9,584	n/a	-	n/a	14,477	$ 34,910	$ 37,759
Gauer	2000	S	R	-	n/a	1,102	n/a	3,944	n/a	-	n/a	5,046	$ 11,323	$ 11,906
Gauer	2001	S	R	1,342	n/a	3,915	n/a	7,994	n/a	-	n/a	13,251	$ 31,756	$ 32,918
Gauer	2002	S	R	3,698	n/a	3,851	n/a	7,499	n/a	-	n/a	15,048	$ 32,245	$ 32,245
Gauer Total												**565,233**	**$ 970,209**	**$ 1,398,334**
Goodwin	1988	W	R	244	$ 236	206	$ 871	485	$ 401	-	$ -	935	$ 1,508	$ 2,198
Goodwin	1995	W	R	530	n/a	305	n/a	335	n/a	5	n/a	1,175	$ 2,025	$ 2,424
Goodwin	1996	S	R	327	n/a	610	n/a	673	n/a	-	n/a	1,610	$ 4,117	$ 4,826
Goodwin	1999	W	R	917	n/a	173	n/a	775	n/a	93	n/a	1,958	$ 5,035	$ 5,446
Goodwin Total												**5,678**	**$ 12,685**	**$ 14,893**
Harding	1982	S	R	-	$ -	353	$ 533	1,912	$ 559	-	$ -	2,265	$ 1,092	$ 2,078
Harding	1983	S	R	-	$ -	47	$ 111	92	$ 74	-	$ -	140	$ 185	$ 330
Harding	1987	S	R	1,629	$ 1,028	452	$ 2,105	2,303	$ 2,976	-	$ -	4,384	$ 6,109	$ 9,270
Harding	1988	S	R	701	$ 498	158	$ 432	1,303	$ 1,060	-	$ -	2,162	$ 1,990	$ 2,900
Harding	1993	S	R	3,528	$ 1,123	760	$ 2,279	10,221	$ 6,798	-	$ -	14,509	$ 10,200	$ 12,378
Harding	1994	S	R	911	$ 268	120	$ 468	387	$ 237	-	$ -	1,418	$ 973	$ 1,196
Harding	2000	W	R	1,353	n/a	143	n/a	2,216	n/a	513	n/a	4,225	$ 5,543	$ 5,828
Harding Total												**29,103**	**$ 26,092**	**$ 33,979**
Issett	1984	S	R	1,136	$ 883	400	$ 946	1,737	$ 1,119	260	$ 166	3,534	$ 3,114	$ 5,358
Issett	1985	S	R	2,882	$ 1,770	-	$ -	-	$ -	-	$ -	2,882	$ 1,770	$ 2,924
Issett	1987	S	R	2,518	$ 1,614	36	$ 163	24	$ 28	-	$ -	2,578	$ 1,805	$ 2,739
Issett	1988	S	R	4,117	$ 3,441	-	$ -	-	$ -	-	$ -	4,117	$ 3,441	$ 5,015
Issett	1989	S	R	3,445	$ 1,809	-	$ -	-	$ -	3	$ 7	3,449	$ 1,816	$ 2,525
Issett	1990	S	R	4,847	$ 1,467	-	$ -	-	$ -	-	$ -	4,847	$ 1,467	$ 1,951
Issett	1991	S	R	3,187	$ 1,730	1,021	$ 3,421	597	$ 602	41	$ 9	4,845	$ 5,762	$ 7,289
Issett	1992	S	R	6,586	$ 3,616	1,912	$ 6,907	1,890	$ 1,982	140	$ 48	10,527	$ 12,553	$ 15,641
Issett	1993	S	R	3,318	$ 1,062	584	$ 1,740	707	$ 461	-	$ -	4,609	$ 3,263	$ 3,960
Issett	1994	S	R	9,777	$ 5,928	1,230	$ 4,832	1,587	$ 1,026	-	$ -	12,594	$ 11,786	$ 14,483
Issett	1995	S	R	6,441	n/a	857	n/a	907	n/a	-	n/a	8,205	$ 11,452	$ 13,707
Issett	1996	S	R	4,511	n/a	1,854	n/a	2,314	n/a	1,939	n/a	10,618	$ 16,144	$ 18,923
Issett	1997	S	R	8,677	n/a	1,833	n/a	3,709	n/a	347	n/a	14,566	$ 24,988	$ 28,643

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	**Year**	**Season**	**Unit**	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Issett	1998	S	R	7,000	n/a	1,752	n/a	1,934	n/a	624	n/a	11,310	$ 25,336	$ 28,699
Issett	1999	S	R	8,118	n/a	1,420	n/a	2,813	n/a	3,159	n/a	15,510	$ 29,816	$ 32,249
Issett	2000	S	R	9,351	n/a	1,520	n/a	3,504	n/a	5,127	n/a	19,502	$ 37,359	$ 39,282
Issett	2001	S	R	3,815	n/a	1,421	n/a	1,103	n/a	2,282	n/a	8,621	$ 19,326	$ 20,033
Issett	2002	S	R	2,474	n/a	1,457	n/a	1,025	n/a	1,851	n/a	6,807	$ 15,885	$ 15,885
Issett Total												**149,121**	**$ 227,083**	**$ 259,306**
Karsakuwigamak	1992	S	R	3,374	$ 1,854	358	$ 1,287	1,489	$ 1,556	-	$ -	5,221	$ 4,697	$ 5,852
Karsakuwigamak	1996	S	R	5,857	n/a	-	n/a	-	n/a	-	n/a	5,857	$ 5,254	$ 6,158
Karsakuwigamak	1999	S	R	1,757	n/a	-	n/a	-	n/a	33	n/a	1,790	$ 1,869	$ 2,022
Karsakuwigamak	2002	S	R	2,125	n/a	2,402	n/a	132	n/a	260	n/a	4,919	$ 17,991	$ 17,991
Karsakuwigamak Total												**17,787**	**$ 29,811**	**$ 32,023**
Kinosaskaw	1996	S	R	83	n/a	-	n/a	-	n/a	29	n/a	205	$ 156	$ 183
Kinosaskaw Total												**205**	**$ 156**	**$ 183**
Kinwaw	1987	S	R	2,330	$ 1,493	1,837	$ 8,478	4,161	$ 5,040	-	$ -	8,328	$ 15,011	$ 22,778
Kinwaw	1989	S	R	358	$ 160	652	$ 1,285	1,265	$ 718	-	$ -	2,275	$ 2,163	$ 3,008
Kinwaw	1990	W	R	-	$ -	-	$ -	41	$ 40	-	$ -	41	$ 40	$ 53
Kinwaw Total												**10,643**	**$ 17,214**	**$ 25,839**
Leftrook	1976	S	R	12,422	$ 9,589	296	$ 423	-	$ -	-	$ -	12,718	$ 10,012	$ 32,440
Leftrook	1977	S	R	8,833	$ 6,653	295	$ 464	1,605	$ 622	5	$ 1	10,738	$ 7,740	$ 23,179
Leftrook	1980	W	R	1,022	$ 1,424	204	$ 784	155	$ 89	-	$ -	1,381	$ 2,297	$ 5,287
Leftrook	1981	S	R	7,234	$ 5,152	382	$ 914	146	$ 102	1	$ 1	7,763	$ 6,169	$ 12,767
Leftrook	1982	S	R	13,465	$ 8,074	1,480	$ 2,099	22	$ 9	-	$ -	14,967	$ 10,182	$ 19,374
Leftrook	1983	S	R	7,429	$ 5,174	855	$ 1,955	104	$ 81	-	$ -	8,388	$ 7,210	$ 12,853
Leftrook	1986	S	R	14,665	$ 10,116	142	$ 520	-	$ -	-	$ -	14,807	$ 10,636	$ 16,817
Leftrook	1986	W	R	880	$ 1,017	31	$ 120	53	$ 68	-	$ -	964	$ 1,205	$ 1,905
Leftrook	1987	S	R	13,461	$ 14,476	259	$ 1,085	412	$ 494	-	$ -	14,131	$ 16,055	$ 24,363
Leftrook	1988	S	R	640	$ 736	75	$ 179	38	$ 26	-	$ -	753	$ 941	$ 1,371
Leftrook	1989	S	R	3,614	$ 4,000	442	$ 831	716	$ 429	-	$ -	4,771	$ 5,260	$ 7,315
Leftrook	1990	S	R	5,279	$ 4,214	355	$ 615	1,246	$ 1,079	-	$ -	6,880	$ 5,908	$ 7,857
Leftrook Total												**98,261**	**$ 83,615**	**$ 165,527**

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Livingston	1983	S	R	278	$ 194	59	$ 140	92	$ 81	-	$ -	430	$ 415	$ 740
Livingston	1987	W	R	3,287	$ 5,517	86	$ 489	1,241	$ 1,511	-	$ -	4,613	$ 7,517	$ 11,407
Livingston	1988	W	R	942	$ 1,127	58	$ 183	626	$ 520	-	$ -	1,625	$ 1,830	$ 2,667
Livingston	1989	W	R	1,620	$ 2,757	35	$ 92	776	$ 465	59	$ 14	2,491	$ 3,328	$ 4,628
Livingston	1993	W	R	2,801	$ 3,239	3	$ 12	449	$ 336	-	$ -	3,253	$ 3,587	$ 4,353
Livingston Total												**12,412**	**$ 16,677**	**$ 23,794**
Macheewin	1981	S	R	1,342	$ 711	434	$ 1,029	38	$ 27	1	$ 1	1,814	$ 1,768	$ 3,659
Macheewin	1982	S	R	602	$ 262	320	$ 475	298	$ 183	-	$ -	1,221	$ 920	$ 1,751
Macheewin	1983	S	R	39	$ 20	10	$ 23	10	$ 8	-	$ -	58	$ 51	$ 91
Macheewin	1987	W	R	398	$ 185	90	$ 474	241	$ 359	-	$ -	729	$ 1,018	$ 1,545
Macheewin	1988	S	R	1,184	$ 842	215	$ 593	185	$ 134	-	$ -	1,584	$ 1,569	$ 2,287
Macheewin	1990	S	R	1,064	$ 260	508	$ 964	303	$ 256	-	$ -	1,876	$ 1,480	$ 1,968
Macheewin	1991	S	R	1,912	$ 975	672	$ 2,261	593	$ 693	-	$ -	3,177	$ 3,929	$ 4,970
Macheewin	1992	S	R	835	$ 369	476	$ 1,666	645	$ 665	-	$ -	1,956	$ 2,700	$ 3,364
Macheewin	1994	S	R	1,519	$ 452	234	$ 847	484	$ 166	224	$ 62	2,460	$ 1,527	$ 1,876
Macheewin	1996	S	R	506	n/a	631	n/a	627	n/a	162	n/a	1,926	$ 4,523	$ 5,302
Macheewin	1997	S	R	279	n/a	150	n/a	210	n/a	-	n/a	639	$ 1,276	$ 1,463
Macheewin	1998	S	R	962	n/a	290	n/a	689	n/a	409	n/a	2,350	$ 3,785	$ 4,287
Macheewin	1999	W	R	751	n/a	263	n/a	407	n/a	469	n/a	1,890	$ 3,079	$ 3,330
Macheewin	2000	S	R	1,466	n/a	281	n/a	379	n/a	425	n/a	2,551	$ 4,223	$ 4,440
Macheewin	2002	S	R	822	n/a	726	n/a	446	n/a	874	n/a	2,868	$ 6,235	$ 6,235
Macheewin Total												**27,100**	**$ 38,083**	**$ 46,568**
Mooswu	1989	W	R	127	$ 59	39	$ 117	161	$ 110	-	$ -	326	$ 286	$ 398
Mooswu	1996	W	R	916	n/a	337	n/a	268	n/a	110	n/a	2,138	$ 2,527	$ 2,962
Mooswu Total												**2,464**	**$ 2,813**	**$ 3,360**
Mynarski - East/West	1977	S	R	5,332	$ 4,366	8,684	$ 12,864	1,437	$ 418	1	$ -	15,453	$ 17,648	$ 52,850
Mynarski - East/West	1980	S	R	749	$ 679	-	$ -	-	$ -	192	$ 61	942	$ 740	$ 1,703
Mynarski - East/West	1980	W	R	7,518	$ 10,707	958	$ 3,697	2,429	$ 1,582	-	$ -	10,904	$ 15,986	$ 36,793
Mynarski - East	1981	S	R	8,058	$ 6,820	5,549	$ 13,163	-	$ -	3	$ 3	13,610	$ 19,986	$ 41,363
Mynarski - East/West	1982	S	R	16,300	$ 10,899	3,170	$ 4,753	1,176	$ 719	33	$ 12	20,679	$ 16,383	$ 31,173
Mynarski - East	1983	S	R	10,142	$ 5,228	314	$ 747	540	$ 471	-	$ -	10,995	$ 6,446	$ 11,491
Mynarski - West	1983	S	R	2,239	$ 1,154	364	$ 856	-	$ -	-	$ -	2,603	$ 2,010	$ 3,583
Mynarski - East	1984	S	R	10,396	$ 8,100	803	$ 1,984	2,424	$ 2,381	8	$ 5	13,631	$ 12,470	$ 21,455
Mynarski - West	1984	S	R	6,200	$ 4,816	3,619	$ 8,836	-	$ -	19	$ 12	9,837	$ 13,664	$ 23,509
Mynarski - East	1985	S	R	1,356	$ 827	430	$ 1,013	1,677	$ 983	-	$ -	3,463	$ 2,823	$ 4,664
Mynarski - West	1985	S	R	5,046	$ 3,076	3,426	$ 8,067	-	$ -	-	$ -	8,472	$ 11,143	$ 18,411

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Mynarski - East	1986	S	R	3,983	$ 1,520	106	$ 402	1,733	$ 1,585	-	$ -	5,822	$ 3,507	$ 5,545
Mynarski - West	1986	S	R	9,356	$ 3,675	2,692	$ 10,240	4,187	$ 3,828	-	$ -	16,234	$ 17,743	$ 28,055
Mynarski - East	1986	W	R	1,594	$ 1,044	522	$ 2,815	1,341	$ 1,896	-	$ -	3,457	$ 5,755	$ 9,100
Mynarski - West	1987	S	R	9,500	$ 6,075	107	$ 469	890	$ 1,028	-	$ -	10,496	$ 7,572	$ 11,490
Mynarski - East	1988	S	R	6,406	$ 5,222	1,201	$ 3,258	2,294	$ 1,738	-	$ -	9,901	$ 10,218	$ 14,891
Mynarski - West	1988	S	R	8,626	$ 7,037	5,388	$ 14,346	6,376	$ 5,308	-	$ -	20,389	$ 26,691	$ 38,897
Mynarski - East	1989	S	R	3,144	$ 1,651	546	$ 1,071	3,170	$ 2,218	-	$ -	6,859	$ 4,940	$ 6,870
Mynarski - West	1989	S	R	1,462	$ 767	5,599	$ 11,201	4,107	$ 2,501	1	$ 1	11,169	$ 14,470	$ 20,123
Mynarski - East	1990	S	R	2,769	$ 810	1,566	$ 2,955	3,641	$ 3,385	-	$ -	7,976	$ 7,150	$ 9,508
Mynarski - West	1990	S	R	1,301	$ 393	4,063	$ 7,600	2,158	$ 1,842	-	$ -	7,523	$ 9,835	$ 13,079
Mynarski - East	1990	W	R	1,538	$ 1,494	1,343	$ 3,932	1,080	$ 1,091	-	$ -	3,961	$ 6,517	$ 8,667
Mynarski - West	1990	W	R	1,662	$ 1,964	1,300	$ 3,124	3,021	$ 3,081	-	$ -	5,983	$ 8,169	$ 10,863
Mynarski - East	1991	S	R	3,056	$ 2,838	1,927	$ 6,373	2,943	$ 2,739	1,152	$ 689	9,078	$ 12,639	$ 15,988
Mynarski - West	1991	S	R	6,052	$ 5,891	3,914	$ 12,190	2,579	$ 1,911	4,775	$ 2,857	17,320	$ 22,849	$ 28,903
Mynarski - East	1991	W	R	96	$ 154	483	$ 2,114	380	$ 450	170	$ 55	1,129	$ 2,773	$ 3,508
Mynarski - West	1991	W	R	913	$ 1,452	4,193	$ 17,480	1,821	$ 2,111	4,299	$ 2,340	11,226	$ 23,383	$ 29,578
Mynarski - East	1992	S	R	2,409	$ 2,348	2,080	$ 7,340	3,485	$ 3,522	3,117	$ 2,814	11,092	$ 16,024	$ 19,966
Mynarski - West	1992	S	R	6,438	$ 6,217	8,034	$ 28,922	5,564	$ 5,880	10,124	$ 9,140	30,160	$ 50,159	$ 62,498
Mynarski - East	1993	S	R	616	$ 424	570	$ 1,754	839	$ 559	1,573	$ 784	3,598	$ 3,521	$ 4,273
Mynarski - West	1993	S	R	5,454	$ 4,040	4,575	$ 14,008	3,690	$ 2,520	11,873	$ 5,906	25,592	$ 26,474	$ 32,126
Mynarski - West	1994	S	R	4,263	$ 4,623	7,205	$ 26,082	2,526	$ 863	19,351	$ 11,565	33,344	$ 43,133	$ 53,002
Mynarski - East	1994	W	R	9	$ 12	283	$ 1,396	504	$ 363	78	$ 45	874	$ 1,816	$ 2,231
Mynarski - West	1994	W	R	59	$ 90	3,850	$ 18,944	326	$ 217	866	$ 573	5,101	$ 19,824	$ 24,360
Mynarski - West	1995	S	R	2,402	n/a	7,984	n/a	750	n/a	8,340	n/a	19,476	$ 57,025	$ 68,255
Mynarski - West	1996	S	R	1,768	n/a	3,917	n/a	1,748	n/a	5,196	n/a	12,629	$ 28,374	$ 33,259
Mynarski - East	1996	W	R	1,997	n/a	1,568	n/a	1,759	n/a	996	n/a	6,320	$ 11,530	$ 13,515
Mynarski - West	1996	W	R	42	n/a	266	n/a	354	n/a	595	n/a	1,257	$ 1,709	$ 2,003
Mynarski - East	1997	S	R	393	n/a	643	n/a	550	n/a	326	n/a	1,912	$ 3,573	$ 4,096
Mynarski - West	1997	S	R	1,176	n/a	3,692	n/a	1,180	n/a	4,939	n/a	10,987	$ 26,513	$ 30,391
Mynarski - East	1998	S	R	4,317	n/a	348	n/a	1,226	n/a	2,604	n/a	8,495	$ 11,633	$ 13,177
Mynarski - West	1998	S	R	1,192	n/a	2,985	n/a	1,406	n/a	9,579	n/a	15,162	$ 28,519	$ 32,304
Mynarski - West	1999	S	R	1,307	n/a	2,248	n/a	1,171	n/a	4,667	n/a	9,393	$ 21,283	$ 23,020
Mynarski - East	1999	W	R	878	n/a	87	n/a	648	n/a	522	n/a	2,135	$ 3,960	$ 4,283
Mynarski - West	1999	W	R	3	n/a	56	n/a	28	n/a	67	n/a	154	$ 302	$ 327
Mynarski - West	2000	S	R	374	n/a	2,652	n/a	2,023	n/a	6,581	n/a	11,630	$ 24,855	$ 26,134
Mynarski - West	2001	S	R	97	n/a	239	n/a	215	n/a	1,027	n/a	1,578	$ 2,803	$ 2,906
Mynarski Total												**470,001**	**$ 686,540**	**$ 954,182**

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Notigi	1977	S	R	480	$ 271	409	$ 643	1,453	$ 500	142	$ 34	2,485	$ 1,448	$ 4,336
Notigi	1978	S	R	6,231	$ 4,260	1,055	$ 1,701	-	$ -	2,877	$ 1,523	10,162	$ 7,484	$ 20,652
Notigi	1980	S	R	2,289	$ 1,363	-	$ -	-	$ -	1,055	$ 109	3,344	$ 1,472	$ 3,388
Notigi	1982	S	R	76	$ 33	27	$ 39	543	$ 314	-	$ -	645	$ 386	$ 734
Notigi	1988	S	R	4,984	$ 4,027	-	$ -	-	$ -	-	$ -	4,984	$ 4,027	$ 5,869
Notigi	1990	S	R	2,069	$ 619	475	$ 851	622	$ 575	-	$ -	3,167	$ 2,045	$ 2,720
Notigi	1991	S	R	4,731	$ 2,417	1,219	$ 3,998	1,017	$ 1,117	-	$ -	6,967	$ 7,532	$ 9,528
Notigi	1992	S	R	6,483	$ 3,623	1,788	$ 6,443	1,210	$ 1,216	-	$ -	9,481	$ 11,282	$ 14,057
Notigi	1993	S	R	7,868	$ 2,751	998	$ 3,070	211	$ 159	-	$ -	9,077	$ 5,980	$ 7,257
Notigi	1994	S	R	8,962	$ 5,838	873	$ 3,160	687	$ 240	323	$ 90	10,845	$ 9,328	$ 11,462
Notigi	1995	S	R	5,394	n/a	2,175	n/a	398	n/a	-	n/a	7,967	$ 16,144	$ 19,323
Notigi	1996	S	R	1,137	n/a	1,841	n/a	899	n/a	-	n/a	5,086	$ 12,643	$ 14,820
Notigi	1996	W	R	56	n/a	2	n/a	197	n/a	1,220	n/a	410	$ 336	$ 394
Notigi	1997	S	R	1,002	n/a	1,087	n/a	1,094	n/a	161	n/a	3,598	$ 7,396	$ 8,478
Notigi	1998	S	R	1,432	n/a	1,891	n/a	1,454	n/a	984	n/a	6,837	$ 17,188	$ 19,469
Notigi	1999	S	R	2,563	n/a	699	n/a	681	n/a	1,590	n/a	5,178	$ 7,711	$ 8,340
Notigi	2000	S	R	156	n/a	107	n/a	470	n/a	883	n/a	1,616	$ 2,090	$ 2,198
Notigi Total												**91,846**	**$ 114,492**	**$ 153,024**
Numapin	1994	S	R	-	$ -	68	$ 247	32	$ 17	2,303	$ 1,388	2,403	$ 1,652	$ 2,030
Numapin	2001	S	R	-	n/a	58	n/a	58	n/a	246	n/a	362	$ 622	$ 645
Numapin Total												**2,765**	**$ 2,274**	**$ 2,675**
Pemichigamau	1988	S	R	438	$ 312	-	$ -	-	$ -	-	$ -	438	$ 312	$ 455
Pemichigamau	1992	S	R	1,490	$ 768	777	$ 2,800	2,852	$ 3,022	-	$ -	5,119	$ 6,590	$ 8,211
Pemichigamau	1996	S	R	1,122	n/a	-	n/a	-	n/a	-	n/a	1,122	$ 886	$ 1,039
Pemichigamau	1997	S	R	1,992	n/a	-	n/a	-	n/a	-	n/a	1,992	$ 1,324	$ 1,518
Pemichigamau	2001	S	R	489	n/a	441	n/a	-	n/a	369	n/a	1,299	$ 3,728	$ 3,864
Pemichigamau Total												**9,970**	**$ 12,840**	**$ 15,086**
Rat - West	1978	S	R	3,053	$ 3,340	5,543	$ 8,767	5,133	$ 2,370	156	$ 81	13,884	$ 14,558	$ 40,172
Rat - West	1988	S	R	22,734	$ 15,963	-	$ -	-	$ -	-	$ -	22,734	$ 15,963	$ 23,263
Rat - West	1989	S	R	21,798	$ 9,773	-	$ -	-	$ -	-	$ -	21,798	$ 9,773	$ 13,591
Rat - West	1990	S	R	11,496	$ 2,807	-	$ -	-	$ -	-	$ -	11,496	$ 2,807	$ 3,733
Rat - West	1991	S	R	20,923	$ 10,670	-	$ -	-	$ -	-	$ -	20,923	$ 10,670	$ 13,497
Rat - West	1992	S	R	21,910	$ 11,301	-	$ -	-	$ -	-	$ -	21,910	$ 11,301	$ 14,081
Rat - West	1993	S	R	21,809	$ 6,997	-	$ -	-	$ -	-	$ -	21,809	$ 6,997	$ 8,491
Rat - West	1994	S	R	15,466	$ 9,118	-	$ -	-	$ -	26	$ 78	15,492	$ 9,196	$ 11,300

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Rat - East	1995	S	R	-	n/a	3,361	n/a	-	n/a	-	n/a	3,361	$ 21,826	$ 26,124
Rat - West	1995	S	R	14,055	n/a	-	n/a	-	n/a	-	n/a	14,055	$ 11,305	$ 13,531
Rat - East	1996	S	R	-	n/a	3,419	n/a	-	n/a	-	n/a	3,419	$ 16,834	$ 19,732
Rat - West	1996	S	R	6,869	n/a	-	n/a	-	n/a	79	n/a	6,948	$ 6,152	$ 7,211
Rat - West	1997	S	R	5,345	n/a	-	n/a	-	n/a	-	n/a	5,345	$ 4,035	$ 4,625
Rat - West	1998	S	R	1,234	n/a	-	n/a	-	n/a	-	n/a	1,234	$ 1,310	$ 1,484
Rat - West	1999	S	R	5,248	n/a	318	n/a	50	n/a	-	n/a	5,616	$ 7,655	$ 8,280
Rat - West	2000	S	R	248	n/a	-	n/a	-	n/a	-	n/a	248	$ 298	$ 313
Rat - West	2001	S	R	2,109	n/a	9,654	n/a	-	n/a	-	n/a	11,763	$ 68,646	$ 71,159
Rat - West	2002	S	R	2,084	n/a	12,708	n/a		n/a		n/a	14,792	$ 86,694	$ 86,694
Rat Total												**216,827**	**$ 306,020**	**$ 367,281**
Ridge	1991	S	R	2	$ 1	15	$ 52	31	$ 31	-	$ -	48	$ 84	$ 106
Ridge Total												**48**	**$ 84**	**$ 106**
Roe	1987	W	R	400	$ 244	3	$ 11	119	$ 137	-	$ -	523	$ 392	$ 595
Roe	1991	S	R	2,709	$ 1,461	72	$ 239	79	$ 88	32	$ 26	2,892	$ 1,814	$ 2,295
Roe Total												**3,415**	**$ 2,206**	**$ 2,889**
Rusty	1977	S	R	5,331	$ 3,228	90	$ 130	-	$ -	-	$ -	5,421	$ 3,358	$ 10,056
Rusty	1978	S	R	5,966	$ 6,847	47	$ 69	-	$ -	-	$ -	6,013	$ 6,916	$ 19,084
Rusty	1979	S	R	5,545	$ 6,388	13	$ 27	-	$ -	413	$ 1,138	5,971	$ 7,553	$ 19,108
Rusty	1980	S	R	5,461	$ 5,151	39	$ 105	-	$ -	-	$ -	5,499	$ 5,256	$ 12,097
Rusty	1981	S	R	4,884	$ 4,303	88	$ 208	-	$ -	-	$ -	4,972	$ 4,511	$ 9,336
Rusty	1982	S	R	5,217	$ 3,854	52	$ 76	-	$ -	-	$ -	5,269	$ 3,930	$ 7,478
Rusty	1983	S	R	5,190	$ 3,732	233	$ 553	-	$ -	-	$ -	5,423	$ 4,285	$ 7,638
Rusty	1984	S	R	4,740	$ 4,358	139	$ 344	-	$ -	-	$ -	4,879	$ 4,702	$ 8,090
Rusty	1985	S	R	5,490	$ 4,607	79	$ 194	-	$ -	-	$ -	5,569	$ 4,801	$ 7,932
Rusty	1986	S	R	1,155	$ 823	55	$ 210	520	$ 551	-	$ -	1,730	$ 1,584	$ 2,505
Rusty	1987	S	R	4	$ 5	2	$ 7	6	$ 9	-	$ -	13	$ 21	$ 32
Rusty	1989	S	R	66	$ 80	17	$ 33	1,585	$ 904	-	$ -	1,668	$ 1,017	$ 1,414
Rusty	1991	S	R	46	$ 48	39	$ 130	473	$ 485	-	$ -	558	$ 663	$ 839
Rusty	1997	S	R	13	n/a	52	n/a	665	n/a	-	n/a	730	$ 942	$ 1,080
Rusty Total												**53,714**	**$ 49,539**	**$ 106,689**

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Suwannee	1976	W	R	573	$ 132	3	$ 5	81	$ 19	-	$ -	657	$ 156	$ 505
Suwannee	1978	S	R	-	$ -	2,132	$ 3,429	981	$ 513	-	$ -	3,113	$ 3,942	$ 10,878
Suwannee	1979	S	R	13,897	$ 7,860	301	$ 655	877	$ 369	985	$ 232	16,060	$ 9,116	$ 23,062
Suwannee	1980	S	R	15,678	$ 5,487	801	$ 2,161	1,325	$ 609	-	$ -	17,804	$ 8,257	$ 19,004
Suwannee	1986	W	R	1,920	$ 863	6	$ 32	178	$ 213	494	$ 253	2,598	$ 1,361	$ 2,152
Suwannee	1988	W	R	2,860	$ 2,273	11	$ 38	464	$ 421	-	$ -	3,335	$ 2,732	$ 3,981
Suwannee	1989	S	R	5,412	$ 2,427	4,701	$ 9,425	578	$ 354	76	$ 22	10,767	$ 12,228	$ 17,005
Suwannee	1989	W	R	5,890	$ 3,038	417	$ 1,055	2,560	$ 1,380	8	$ 16	8,874	$ 5,489	$ 7,633
Suwannee	1990	S	R	3,264	$ 797	2,181	$ 4,149	263	$ 203	-	$ -	5,708	$ 5,149	$ 6,847
Suwannee	1991	S	R	21,037	$ 10,734	1,888	$ 6,346	1,746	$ 1,800	-	$ -	24,671	$ 18,880	$ 23,882
Suwannee	1992	S	R	28,219	$ 14,557	380	$ 1,367	1,534	$ 1,611	712	$ 241	30,844	$ 17,776	$ 22,149
Suwannee	1994	S	R	44,435	$ 13,219	3,263	$ 12,729	1,332	$ 657	-	$ -	49,030	$ 26,605	$ 32,692
Suwannee	1995	S	R	13,331	n/a	2,331	n/a	2,888	n/a	4,104	n/a	22,654	$ 26,177	$ 31,332
Suwannee	1995	W	R	14	n/a	299	n/a	231	n/a	15	n/a	559	$ 1,500	$ 1,795
Suwannee	1996	S	R	24,887	n/a	3,859	n/a	1,495	n/a	7,940	n/a	38,181	$ 50,387	$ 59,061
Suwannee	1997	S	R	6,934	n/a	5,377	n/a	252	n/a	3,140	n/a	15,703	$ 39,370	$ 45,129
Suwannee	1998	S	R	2,254	n/a	2,411	n/a	1,552	n/a	1,470	n/a	7,687	$ 22,307	$ 25,268
Suwannee	1999	S	R	15,747	n/a	4,088	n/a	1,129	n/a	10,636	n/a	31,600	$ 58,394	$ 63,159
Suwannee	2000	S	R	14,375	n/a	4,154	n/a	607	n/a	16,023	n/a	35,159	$ 61,419	$ 64,581
Suwannee	2001	S	R	8,227	n/a	2,933	n/a	509	n/a	16,423	n/a	28,092	$ 39,883	$ 41,343
Suwannee	2002	S	R	10,573	n/a	3,948	n/a	133	n/a	12,568	n/a	27,222	$ 46,661	$ 46,661
Suwannee Total												**380,316**	**$ 457,789**	**$ 548,120**
Threepoint	1987	S	R	1,501	$ 940	19	$ 81	243	$ 227	-	$ -	1,763	$ 1,248	$ 1,894
Threepoint	1988	S	R	2,349	$ 1,861	2	$ 5	-	$ -	-	$ -	2,351	$ 1,866	$ 2,719
Threepoint	1994	S	R	3,380	$ 2,851	-	$ -	-	$ -	468	$ 130	3,848	$ 2,981	$ 3,663
Threepoint	1995	S	R	1,068	n/a	-	n/a	-	n/a	372	n/a	1,440	$ 2,049	$ 2,453
Threepoint	1996	S	R	2,018	n/a	-	n/a	-	n/a	47	n/a	2,065	$ 2,706	$ 3,172
Threepoint	1997	S	R	743	n/a	-	n/a	-	n/a	-	n/a	743	$ 891	$ 1,021
Threepoint	1998	S	R	1,141	n/a	25	n/a	-	n/a	416	n/a	1,708	$ 2,133	$ 2,416
Threepoint	1999	S	R	59	n/a	-	n/a	-	n/a	126	n/a	74	$ 99	$ 107
Threepoint	2000	S	R	1,790	n/a	827	n/a	562	n/a	907	n/a	4,086	$ 10,212	$ 10,738
Threepoint	2000	W	R	4	n/a	4	n/a	8	n/a	-	n/a	16	$ 39	$ 41
Threepoint	2001	S	R	978	n/a	517	n/a	521	n/a	737	n/a	2,753	$ 6,102	$ 6,325
Threepoint	2002	S	R	21	n/a		n/a	24	n/a		n/a	45	$ 71	$ 71
Threepoint Total												**20,892**	**$ 30,397**	**$ 34,620**

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Uhlman	1976	W	R	1,310	$ 704	112	$ 178	1,918	$ 450	-	$ -	3,340	$ 1,332	$ 4,316
Uhlman	1979	S	R	167	$ 100	52	$ 109	460	$ 210	-	$ -	680	$ 419	$ 1,060
Uhlman	1980	W	R	6,742	$ 9,249	266	$ 973	3,820	$ 2,361	-	$ -	10,828	$ 12,583	$ 28,961
Uhlman	1981	S	R	5,883	$ 4,811	1,073	$ 2,601	2,784	$ 1,351	214	$ 587	9,953	$ 9,350	$ 19,351
Uhlman	1982	S	R	9,629	$ 6,336	1,342	$ 2,025	3,340	$ 1,007	-	$ -	14,311	$ 9,368	$ 17,825
Uhlman	1983	S	R	4,288	$ 2,967	1,320	$ 3,147	2,826	$ 1,796	-	$ -	8,434	$ 7,910	$ 14,100
Uhlman	1984	S	R	6,607	$ 6,306	2,571	$ 6,364	3,326	$ 2,066	20	$ 13	12,523	$ 14,749	$ 25,376
Uhlman	1985	S	R	11,079	$ 9,005	1,055	$ 2,415	2,438	$ 1,454	-	$ -	14,573	$ 12,874	$ 21,271
Uhlman	1986	S	R	7,916	$ 5,475	1,860	$ 7,156	4,121	$ 4,033	2	$ 1	13,899	$ 16,665	$ 26,350
Uhlman	1986	W	R	3,300	$ 5,159	17	$ 88	987	$ 1,141	-	$ -	4,304	$ 6,388	$ 10,101
Uhlman	1987	S	R	11,400	$ 12,169	532	$ 2,440	5,506	$ 6,208	-	$ -	17,439	$ 20,817	$ 31,589
Uhlman	1988	S	R	3,891	$ 4,400	1,975	$ 5,438	2,092	$ 1,855	-	$ -	7,957	$ 11,693	$ 17,040
Uhlman	1988	W	R	5,551	$ 10,683	73	$ 272	1,335	$ 1,218	-	$ -	6,958	$ 12,173	$ 17,740
Uhlman	1989	S	R	6,839	$ 7,503	2,164	$ 4,321	3,291	$ 2,172	-	$ -	12,294	$ 13,996	$ 19,464
Uhlman	1989	W	R	2,805	$ 4,934	21	$ 47	666	$ 367	-	$ -	3,492	$ 5,348	$ 7,437
Uhlman	1990	S	R	6,257	$ 5,503	864	$ 1,641	974	$ 829	-	$ -	8,094	$ 7,973	$ 10,603
Uhlman	1990	W	R	1,610	$ 1,835	78	$ 229	1,063	$ 1,051	-	$ -	2,751	$ 3,115	$ 4,142
Uhlman	1991	S	R	2,558	$ 2,506	1,157	$ 3,531	2,705	$ 1,972	134	$ 29	6,553	$ 8,038	$ 10,168
Uhlman	1991	W	R	2,116	$ 3,381	58	$ 252	1,214	$ 1,465	-	$ -	3,389	$ 5,098	$ 6,449
Uhlman	1992	S	R	3,098	$ 3,026	1,242	$ 4,506	2,439	$ 2,514	-	$ -	6,779	$ 10,046	$ 12,517
Uhlman	1993	S	R	8,295	$ 5,578	239	$ 679	3,058	$ 2,003	-	$ -	11,592	$ 8,260	$ 10,023
Uhlman	1994	S	R	11,108	$ 10,929	2,661	$ 10,553	507	$ 337	-	$ -	14,276	$ 21,819	$ 26,811
Uhlman	1995	S	R	13,857	n/a	1,722	n/a	768	n/a	-	n/a	16,347	$ 27,333	$ 32,716
Uhlman	1995	W	R	1,717	n/a	56	n/a	336	n/a	3	n/a	2,112	$ 3,294	$ 3,943
Uhlman	1996	S	R	6,701	n/a	1,844	n/a	893	n/a	-	n/a	9,438	$ 17,647	$ 20,685
Uhlman	1997	S	R	9,740	n/a	1,138	n/a	1,643	n/a	-	n/a	12,521	$ 17,978	$ 20,608
Uhlman	1998	S	R	7,144	n/a	1,388	n/a	2,896	n/a	-	n/a	11,428	$ 22,000	$ 24,920
Uhlman	1999	S	R	8,739	n/a	937	n/a	1,380	n/a	9	n/a	11,065	$ 16,517	$ 17,865
Uhlman	2000	S	R	6,874	n/a	872	n/a	1,100	n/a	1	n/a	8,847	$ 14,817	$ 15,580
Uhlman	2001	S	R	11,713	n/a	756	n/a	664	n/a	-	n/a	13,133	$ 17,129	$ 17,756
Uhlman	2002	S	R	8,160	n/a	327	n/a	570	n/a		n/a	9,057	$ 10,647	$ 10,647
Uhlman Total												**288,365**	**$ 367,376**	**$ 507,411**
Wapisu	1977	S	R	2,125	$ 185	4,326	$ 6,817	3,520	$ 1,165	-	$ -	9,970	$ 8,167	$ 24,457
Wapisu	1988	S	R	1,835	$ 1,301	-	$ -	-	$ -	-	$ -	1,835	$ 1,301	$ 1,896
Wapisu	1991	S	R	1,615	$ 824	-	$ -	-	$ -	-	$ -	1,615	$ 824	$ 1,042
Wapisu	1991	W	R	317	$ 159	-	$ -	-	$ -	-	$ -	317	$ 159	$ 201
Wapisu	1992	S	R	1,034	$ 534	-	$ -	-	$ -	-	$ -	1,034	$ 534	$ 665

Table A5-2. (cont.)

				Whitefish		Walleye		Northern Pike		Other		All Species		
Lake	Year	Season	Unit	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Weight (kg)	Nominal Value	Present Value (2002$)
Wapisu	1993	S	R	88	$ 28	-	$ -	-	$ -	-	$ -	88	$ 28	$ 34
Wapisu	1994	S	R	3,715	$ 1,105	-	$ -	-	$ -	986	$ 274	4,701	$ 1,379	$ 1,695
Wapisu	1995	S	R	50	n/a	-	n/a	-	n/a	-	n/a	50	$ 18	$ 22
Wapisu	1998	S	R	1,403	n/a	11	n/a	24	n/a	320	n/a	2,143	$ 1,839	$ 2,083
Wapisu	1999	S	R	166	n/a	-	n/a	-	n/a	385	n/a	166	$ 144	$ 156
Wapisu Total												**21,919**	**$ 14,393**	**$ 32,251**
Wuskwatim	1976	S	R	9,376	$ 4,520	8,984	$ 12,831	-	$ -	241	$ 52	18,601	$ 17,403	$ 56,388
Wuskwatim	1977	S	R	9,845	$ 4,762	3,189	$ 5,064	376	$ 125	205	$ 67	13,615	$ 10,018	$ 30,000
Wuskwatim	1980	S	R	14,165	$ 11,882	2,602	$ 6,911	293	$ 143	43	$ 27	17,103	$ 18,963	$ 43,645
Wuskwatim	1981	S	R	18,521	$ 13,914	846	$ 2,073	754	$ 419	32	$ -	20,154	$ 16,421	$ 33,985
Wuskwatim	1982	S	R	6,947	$ 4,566	1,049	$ 1,570	2,275	$ 1,078	41	$ 12	10,310	$ 7,225	$ 13,747
Wuskwatim	1983	S	R	10,667	$ 7,753	4,551	$ 10,968	4,631	$ 1,246	31	$ 111	19,881	$ 20,078	$ 35,791
Wuskwatim	1984	W	R	3,479	$ 5,074	2,414	$ 7,094	-	$ -	491	$ 455	6,385	$ 12,624	$ 21,720
Wuskwatim	1985	S	R	8,538	$ 7,256	3,580	$ 8,889	1,636	$ 1,373	461	$ 790	14,215	$ 18,307	$ 30,247
Wuskwatim	1985	W	R	90	$ 145	700	$ 2,536	109	$ 119	5,007	$ 4,010	5,905	$ 6,810	$ 11,252
Wuskwatim	1986	S	R	6,618	$ 4,960	1,345	$ 5,251	1,006	$ 1,203	6,001	$ 2,933	14,973	$ 14,349	$ 22,688
Wuskwatim	1987	S	R	2,016	$ 2,239	1,002	$ 4,685	1,765	$ 2,513	3,877	$ 2,029	8,657	$ 11,464	$ 17,396
Wuskwatim	1987	W	R	25	$ 50	285	$ 1,528	128	$ 142	3,487	$ 2,303	3,926	$ 4,023	$ 6,105
Wuskwatim	1988	S	R	12,115	$ 14,344	2,992	$ 8,286	1,361	$ 1,345	11,486	$ 5,193	27,954	$ 29,168	$ 42,507
Wuskwatim	1988	W	R	2	$ 2	100	$ 325	45	$ 44	1,461	$ 623	1,608	$ 994	$ 1,449
Wuskwatim	1989	S	R	4,896	$ 5,619	2,351	$ 4,765	1,246	$ 981	9,039	$ 2,800	17,531	$ 14,166	$ 19,700
Wuskwatim	1990	S	R	259	$ 239	39	$ 72	-	$ -	453	$ 124	750	$ 435	$ 578
Wuskwatim	1990	W	R	-	$ -	154	$ 416	108	$ 111	6,834	$ 3,350	7,096	$ 3,877	$ 5,156
Wuskwatim	1991	S	R	199	$ 159	4	$ 12	2	$ 1	-	$ -	205	$ 172	$ 218
Wuskwatim	1991	W	R	97	$ 162	512	$ 2,239	69	$ 81	3,624	$ 2,173	4,302	$ 4,655	$ 5,888
Wuskwatim	1992	S	R	5,191	$ 5,129	3,861	$ 13,968	1,536	$ 1,640	11,531	$ 10,574	22,120	$ 31,311	$ 39,014
Wuskwatim	1993	S	R	6,663	$ 4,617	663	$ 2,042	733	$ 474	3,431	$ 1,752	11,489	$ 8,885	$ 10,782
Wuskwatim	1993	W	R	2,437	$ 4,125	156	$ 644	350	$ 223	1,629	$ 1,514	4,571	$ 6,506	$ 7,895
Wuskwatim	1994	S	R	2,068	$ 1,307	475	$ 355	189	$ 8	1,775	$ 546	4,507	$ 2,216	$ 2,723
Wuskwatim	1997	S	R	128	n/a	595	n/a	89	n/a	3	n/a	3,893	$ 4,308	$ 4,938
Wuskwatim	1998	S	R	4,517	n/a	1,946	n/a	1,359	n/a	9,883	n/a	17,202	$ 27,467	$ 31,113
Wuskwatim	1999	S	R	5,512	n/a	1,071	n/a	929	n/a	4,196	n/a	11,733	$ 19,907	$ 21,531
Wuskwatim	2000	S	R	454	n/a	100	n/a	104	n/a	665	n/a	1,323	$ 2,160	$ 2,271
Wuskwatim Total												**290,007**	**$ 313,912**	**$ 518,726**

APPENDIX 6

NCN COMMERCIAL FISHERS/TRAPPERS INTERVIEW GUIDE

INTRODUCTION

- community consultants are presently conducting the TK interviews for the EIS;
- the present interviews are being conducted to collect information from commercial harvesters who depend on the resources in the area of interest for their livelihood;
- collecting this type of information is important because it can provide information that is not available through scientific studies such as long-term trends in the abundance of moose or other animals;
- an additional type of information that we want to collect in these interviews is the identification of issues that are important to resource harvesters and their livelihood (e.g., debris under present conditions and post-project);
- discuss how the information provided by the harvesters will be used in the EIS (e.g., in the EIS we may state that a specific animal is uncommon in the area but also say that the population has been increasing over the past 15 years); and,
- following the interviews, interview notes will be written up and sent to Ron and Bill. They will review these notes with you to ensure that we have recorded the information correctly.

THE INTERVIEW

The interview will contain three parts: 1) questions related to specific resource harvesting activities in the area of interest; 2) questions related to the harvester's opinion on potential impacts of the project on resource harvesting activities in the area of interest; and, 3) questions related to navigation and safety.

MAPS

- define the area of interest (Kinosaskaw Lake downstream through Wuskwatim Lake to Birch Tree Lake north to PR 391 and a corridor south of the Rat/Burntwood system)
- briefly illustrate the location of the GS and access road and note that the project will be described in the second part of the interview

Part I:

The following question will be asked to initiate the discussions with the commercial fishers and trappers:

- could you tell us about your commercial and domestic resource harvesting activities in the area of interest, and how important is this area to you for these activities (e.g., fishing, trapping, hunting, and gathering berries and medicinal plants) as compared to other areas?

The following questions will be used as prompts during the discussion:

General

1.1 are there any resources that you harvest in the area of interest that you can not get elsewhere?
1.2 what things (e.g., access, debris, price, mercury) currently restrict, or make harvesting in the area of interest difficult?
1.3 have you noticed any significant changes in the area of interest over the past 10 to 15 years? For example, are there any animals or plants that are becoming more abundant or less abundant; are harvesting conditions becoming better or worse; is debris increasing or decreasing?
1.4 how often do you normally go to the area of interest? where in the area of interest do you normally go? what time of year do you normally go? how long do you normally stay?

Commercial and Domestic Fishing

1.5 do any of you fish commercially in the area of interest?
1.6 if so, where in the area of interest do you fish commercially?
1.7 do you fish in these areas to target a particular species of fish?
1.8 while fishing commercially, do you also harvest fish for your own use (domestic fishing) from Wuskwatim Lake as well as the rest of the area of interest?
1.9 do you also make special trips to the area of interest only for domestic fishing purposes?
1.10 is there anyone else who is not here who fishes commercially in the area of interest and, if so, where and what do they fish for?

Commercial and Domestic Trapping

1.11 do any of you trap commercially in the area of interest?
1.12 if so, where in the area of interest do you trap commercially?
1.13 what animals do you trap most commonly?
1.14 are some animals more or less abundant in certain parts of the area of interest (e.g., are beavers more common on one trapline than in another)?
1.15 while trapping commercially, do you also trap other animals for your own use (domestic trapping) in the area of interest?
1.16 do you also make special trips to the area of interest only for domestic trapping purposes?
1.17 is there anyone else who is not here who traps commercially in the area of interest and, if so, where and what do they trap?

Domestic Hunting and Gathering

1.18 do any of you hunt or harvest plants (i.e., berries, medicinal plants or materials for crafts) in the area of interest?
1.19 if so, where in the area of interest do you conduct these activities?
1.20 do you make special trips to the area of interest to conduct these activities or do you conduct these activities while in the area for commercial fishing or trapping?
1.21 what animals do you hunt most commonly?
1.22 what plants do you harvest most commonly?
1.23 are some animals and plants more or less abundant in certain parts of the area of interest?
1.24 is there anyone else who is not here who hunts or gathers plants in the area of interest and, if so, where and what do they harvest?

Cabins

1.25 using the map, note the cabins previously indicated by Ron and Bill?
1.26 are there any more cabins in the area?

Part II

This section of the interview will provide information on potential impacts of the project on harvesting activities in the area of interest. Firstly, provide a review of the project including:

- where the various structures and infrastructure (e.g., roads) will be located (a map will be shown);
- what the current water regime is like;
- what the water regime will be like; and,
- a brief overview of physical impacts.

The following questions will be asked:

2.1 what commercial and domestic harvesting activities do you think will be affected by the project and in what way?

2.2 do you think increased access to Wuskwatim Lake will result in an increased commercial fishing harvest?

2.3 do you think increased access to Wuskwatim Lake will result in an increased trapping harvest?

2.4 do you think increased access to Wuskwatim Lake will increase the number of NCN members or other people (e.g., from Thompson) harvesting in the area?

2.5 how do you think increased access will affect domestic fishing, trapping, and hunting and gathering in the area?

2.6 how will the project affect the existing cabins? Would more cabins be built as a result of better access?

Part III

This section of the interview will provide information on navigation and safety in the area of interest.

Present Conditions

3.1 where in the area of interest do you go and how often?
3.2 do you travel on the waterways during open-water and/or ice conditions?
3.3 what are the navigation hazards (e.g., rapids, debris, etc.)?
3.4 excluding the recent incidents, have there been any accidents, injuries or deaths in the area of interest? If so, where?

Post-Project Conditions

3.5 do you anticipate any new navigation concerns, under both open-water and ice conditions, related to operation of the project?

APPENDIX 7

SUMMARY OF COMMERCIAL TRAPPING INFORMATION FROM NCN RMA 1976-2002

Table A7-1. Total annual harvest for each trapline in the NCN RMA from 1976-1977 to 2001-2002, expressed as 2002 values in Canadian dollars (data not available for 1990-1991, 1994-1995, or 1995-1996). * indicates trap line anticipated to be affected by the project, ** indicates trap line with road access, and *** indicates trap line anticipated to be affected, and with road access. Trapline that were combined in some years (eg. 50/52) were still counted as two traplines when determining number used each year. For total number utilized from 1976-2002 each trapline is only counted once even if it had been combined with another in some years.

Trap Line	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982	1982-1983	1983-1984	1984-1985	1985-1986	1986-1987	1987-1988	1988-1989
1	1,572	3,477	21,605	19,833	3,967	715	644	51	1,884	1,601	5,889	203	225
2*		3,012	9,757	8,119	4,509	2,820	2,304	1,294	1,232	2,440	880	1,685	190
4*	14,320	39,636	60,194	13,756	12,331	7,469	3,055	1,472	1,785	2,699	3,049	3,937	3,933
5**		7,401	35,520	11,733	9,313	3,362	1,064	1,495	3,150	1,789	3,900	1,852	1,362
6**	4,472	17,335	12,713	2,836	6,157	3,055	380	2,863	5,122	3,221	4,253	2,928	133
7	6,851	4,642	21,241	1,658	2,419	39		812	6,098		3,154		419
8**	4,678	6,697		7,554	2,694	2,148	98		6,383	1,244	4,572	895	634
9***	2,976	31,095	29,258	8,551	7,800	1,744	1,033	411	1,713	397	2,727	1,208	
10**	8,929	18,512	39,240	17,589	12,989	5,653	3,261	1,777	7,872	4,414	9,917	8,746	4,634
11**	7,521	28,513	30,420	11,690	18,736	8,115	2,688	5,172	5,997	5,466	10,476	5,242	3,547
12	17,210	30,335	35,910	29,098	18,052	15,752	6,203	8,197	15,141	7,066	13,960	13,846	5,275
13	218	6,549	19,718	9,174	7,206	4,468	1,288	2,542		2,882	2,564	1,528	1,292
14	6,311	45,281	32,324	21,180	13,712	5,030	3,673	6,204	2,419	32	7,412	1,613	2,378
15	2,865	11,966	6,664	16,128	3,912	5,031	1,461	1,358	4,275				
16	2,032	12,518	1,349	5,622	6,582		319	860	4,102	2,428	1,304	343	27
17	6,134	29,085	18,740	24,450	8,697	8,270	1,826	5,728	6,822		1,484	1,546	3,209
18		38,543	49,565	7,844	8,634	1,819	1,158	839	288	681		776	977
19	1,092	14,325	28,734	11,447	3,712	352	30	73	1,291	343	1,045	79	193
21		28,586	37,738	18,187	8,546	1,424			1,537	3,567		197	1,538
22	4,370	17,433	37,368	22,885	13,023	7,138	1,278	4,096	4,688	11,417	7,956	9,148	4,664
23		6,043		2,310			339	3,169					
24	6,600	9,516	31,724	9,265	4,427	8,677	8,598	539	8,127	11,541	3,997	1,916	8,646
25	553		9,126	2,522	2,732	275	1,341	1,372					
26			1,049	883	729	768	30	638	760	1,520	408	2,704	57
28	10,982	19,317	41,858	22,553	24,789	4,982	1,912	4,548	6,355	1,109	2,871	4,046	864
30**	16,364	22,244	31,665	7,409	311	5,706	3,164	3,663	14,028	2,808	7,664	7,261	6,021
31**	15,717	17,833	19,115	4,381	1,098	736	765	448	3,450	2,454	8,393	4,633	3,870
32**	18,090	42,610	36,306	14,952		718	5,523		1,596	5,810	37,174	34,461	10,595
33**		29,257	29,812	21,349		1,678	3,762	4,188	9,372	9,883	12,352	8,351	4,452
35**	29,816	71,083	43,601	22,845	15,239	8,263	2,769	7,195	8,763	13,423	11,008	6,973	4,550
37**	3,200	4,427	7,483	7,997	3,008	3,342	2,607	3,970	8,445	13,806	11,120	3,171	1,143
39**	17,502	82,067	82,076	32,248	23,633	18,579	7,438	9,150	29,549	21,298	21,919	10,548	6,934
40**	9,498	48,859	36,961	20,450	15,245	7,353	3,156	5,571	9,010	3,287	7,302	1,446	2,457
41	5,323	35,700	33,781	11,036	125			1,010	96		329	6,404	
42		16,141	16,146	9,687	2,606	1,705	1,558	1,451	398	262	3,124	865	3,199
43	23,278			6,403	831	134	3,087			5,373	7,329	1,126	5,082
44	15,481	19,579	7,689	6,477	3,003	5,189	1,830	2,597	1,207	419	1,982	671	708
45	5,144	41,063	13,413	12,663	5,617	454	80	525	109		548	206	
46	15,230	33,301	29,329	16,212	5,171	6,995	5,672	5,623	12,164	3,890	8,302	320	3,148
47*	1,209	26,654	27,011	21,079	10,480	1,627	1,552	2,488	3,447	546	1,366	316	970
49**	27,204	35,003	44,545	48,799	25,546	17,832	7,990	9,970	11,494	10,681	23,849	13,084	4,819
50													
50/52	4,006												
51		2,932	4,150	755		584					1,607	4,189	
52		878	2,081					1,091			3,632	3,060	1,095
53**	268	4,239	12,107	32,119	11,983	13,326	14,762	7,025	22,175	14,205	19,552	7,858	7,585
62									1,096				
62/63	2,526	3,557	6,343	3,196	2,157	1,350							
64									96		55	270	1,306
64/65	6,482	171	39,715	8,326	1,588	2,517	1,151	397					
65									569				
unknown									11,702	3,131	4,769	3,452	1,735
Total	**$ 326,023**	**$ 967,414**	**$ 1,135,140**	**$ 615,248**	**$ 333,309**	**$ 197,196**	**$ 110,849**	**$ 121,872**	**$ 245,810**	**$ 177,132**	**$ 285,192**	**$ 183,102**	**$ 113,869**
# traplines	**40**	**44**	**44**	**46**	**42**	**42**	**40**	**40**	**41**	**35**	**40**	**41**	**38**
$/trapline	**$ 8,151**	**$ 21,987**	**$ 25,799**	**$ 13,375**	**$ 7,936**	**$ 4,695**	**$ 2,771**	**$ 3,047**	**$ 5,995**	**$ 5,061**	**$ 7,130**	**$ 4,466**	**$ 2,997**

Table A7-1. (Cont.)

Trap Line	1989-1990	1991-1992	1992-1993	1993-1994	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	Total 1976-2002	% Total 1976-2002
1	105			406			286	313	28	469	**$ 63,271**	**1.18**
2*	754								572		**$ 39,569**	**0.74**
4*	172		145	505		595		47	81		**$ 169,181**	**3.17**
5**	2,007	833	1,147	177	1,155	165			73	98	**$ 87,595**	**1.64**
6**	736	1,391	317	864	645	703	1,305	919	1,827	3,336	**$ 77,512**	**1.45**
7							104				**$ 47,437**	**0.89**
8**			1,122	656		149	3,331	5,262	1,442	828	**$ 50,386**	**0.94**
9***		317			1,054	1,963	2,738	1,501	3,564	451	**$ 100,499**	**1.88**
10**	2,364	264	954	1,884	4,281	4,267	4,815	2,316	3,131	1,941	**$ 169,751**	**3.18**
11**	2,699	741	33	353	162	355	1,034	2,706	2,054	3,957	**$ 157,677**	**2.95**
12	2,567	625	2,014	7,721	7,386	3,061	4,290	1,719	1,394	531	**$ 247,354**	**4.63**
13	1,119	1,051	609	738	2,596	587	2,869	396	1,625	696	**$ 71,714**	**1.34**
14				492	62			288	1,101		**$ 149,512**	**2.80**
15		502		2,414		295		210	597	891	**$ 58,569**	**1.10**
16	118				219	186	1,071				**$ 39,080**	**0.73**
17		258		5,463	2,429	3,103	45	3,096	2,779	1,394	**$ 134,555**	**2.52**
18						152			473		**$ 111,748**	**2.09**
19	116					37		428			**$ 63,298**	**1.18**
21					124						**$ 101,445**	**1.90**
22	617	1,120	866	2,026	2,152	2,695		2,471	1,285	373	**$ 159,069**	**2.98**
23	489	569		1,446	2,228	1,413		1,178	2,093	1,316	**$ 22,594**	**0.42**
24		4,126	2,452	9,282	5,635	1,720	6,614	4,625	4,207	674	**$ 152,906**	**2.86**
25											**$ 17,920**	**0.34**
26	141	468	748								**$ 10,903**	**0.20**
28	471								2,624		**$ 149,280**	**2.79**
30**	2,734	208	1,850	1,752	2,515	2,149	520		761	382	**$ 141,180**	**2.64**
31**	1,739	2,353	463	1,830	567	1,254	2,310	2,850	3,717	1,555	**$ 101,533**	**1.90**
32**	7,815	2,888	3,537	7,532	3,125	1,817	18,423	9,938	7,019	53	**$ 269,981**	**5.05**
33**	5,228	1,618	576	3,016	2,941	408					**$ 148,242**	**2.77**
35**	1,761	1,196		5,495	1,038	1,045	1,748	784			**$ 258,594**	**4.84**
37**	2,603	1,212	901	309	2,038	2,090	1,613	1,499	3,707	881	**$ 90,569**	**1.69**
39**	4,013	1,975	1,727	2,071	2,147	7,805	7,964	1,937	4,447	3,735	**$ 400,763**	**7.50**
40**	123	969	600	2,552	1,307	689	164	479	536	668	**$ 178,682**	**3.34**
41	219				271	37					**$ 94,330**	**1.77**
42	1,175					325	2,984		431		**$ 62,056**	**1.16**
43	479				290	576	490				**$ 54,476**	**1.02**
44		227									**$ 67,059**	**1.25**
45											**$ 79,823**	**1.49**
46		95		2,912	1,677	5,039			3,631	1,746	**$ 160,458**	**3.00**
47*			107		179		381	101			**$ 99,512**	**1.86**
49**	3,970	2,807	2,790	7,920	1,721	3,985	3,532	1,450	2,264	1,783	**$ 313,040**	**5.86**
50				1,113		2,208	2,497	212			**$ 6,030**	**0.11**
50/52											**$ 4,006**	**0.07**
51				1,982		3,428	4,421	3,887			**$ 27,936**	**0.52**
52				5,022	265			176			**$ 17,301**	**0.32**
53**	2,215	5,048	1,554	4,549	5,273	7,796	2,657	1,938	3,634	2,591	**$ 204,458**	**3.83**
62											**$ 1,096**	**0.02**
62/63						239			659		**$ 20,028**	**0.37**
64											**$ 1,727**	**0.03**
64/65						215					**$ 60,561**	**1.13**
65	46										**$ 615**	**0.01**
unknown	1,706								84		**$ 26,580**	**0.50**
Total	**$ 50,302**	**$ 32,862**	**$ 24,510**	**$ 82,481**	**$ 55,480**	**$ 62,553**	**$ 78,205**	**$ 52,726**	**$ 61,839**	**$ 30,348**	**$ 5,343,461**	**100**
# traplines	**29**	**25**	**21**	**29**	**29**	**36**	**26**	**28**	**31**	**23**	**46**	**46**
$/trapline	**$ 1,735**	**$ 1,314**	**$ 1,167**	**$ 2,844**	**$ 1,913**	**$ 1,738**	**$ 3,008**	**$ 1,883**	**$ 1,995**	**$ 1,319**	**$ 116,162**	**-**

APPENDIX 8

MANITOBA FOREST RESOURCE INVENTORY UPDATE YEARS FOR THE WUSKWATIM REGION

Table A8-1. Year of forest resource inventory update for areas overlapping the Wuskwatim Generating Station region.

Forest Section	FMU	Year of Inventory
Highrock	65	1988
	66	1988
Churchill River	72	1969
	73	1975
	74	1975
	83	1986
	84	1986
	85	1986
Nelson River	86	1992
	87	1985
	88	1992
	89	1989/91

Source: Manitoba Conservation, Forestry Branch 2000.

APPENDIX 9

FOREST PROTECTION ON FOREST MANAGEMENT LICENSE AREA #2 (FMLA #2)

FIRE

The Province of Manitoba is responsible for primary fire protection for FMLA #2 including the Wuskwatim G.S. regional study area. Supplemental to the provincial initiative, Tolko appropriates funds annually for its own Fire Management program (Repap 1996).

The company maintains a core response team consisting of a Fire Specialist and two, three-person seasonal fire crews trained to Provincial Crew Boss standards (Tolko 2001). The Fire Specialist is responsible for coordinating the company's initial attack program and for submitting to Manitoba Conservation an annual Fire Protection/Suppression Plan. Additional company-trained staff and equipment are available during the fire season for prevention, detection and suppression of fires when required.

In addition, Tolko enforces its Industrial Forest Operations Equipment Standards and applies its Forest Operation Modification Guidelines which spell out forest operation restrictions according to fire hazard ratings.

INSECTS AND DISEASE

As with fire, the Province of Manitoba is responsible for forest protection from insect and disease infestations. However, through normal forestry activities that include a variety of monitoring and operational surveys, Tolko documents and reports to Manitoba Conservation on the incidence of insect and disease damage (Repap 1996).

Where infestations are problematic Tolko attempts to minimize the effects through a number of harvesting and forest management activities that include:

- priority harvesting of affected stands;
- harvest block sanitation (complete removal of all infected trees) before reforesting; and
- establishment of disease resistant seedlings/species that are immune to a specific insect or disease.

Areas that have been treated are cooperatively monitored and managed by Manitoba Conservation and Tolko. In the case of multiple-year infestations, Tolko assists Manitoba Conservation in prioritizing areas for protection initiatives.

REFERENCES

REPAP MANITOBA INC., 1996. Repap Manitoba 1997 – 2009 Forest Management Plan. Repap Manitoba Inc. The Pas, Manitoba. October 1996. 598 pp.

TOLKO INDUSTRIES LTD. 2001. 2002 Annual Harvest and Renewal Plan. Woodlands Department Manitoba Solid Wood & Woodlands Division, Tolko Industries Ltd.

APPENDIX 10

FOREST RESEARCH/MONITORING ACTIVITIES WITHIN THE WUSKWATIM GENERATION REGION

There are a number of organizations and government agencies that carry out forestry related research activities in and around the study area.

1.0 MANITOBA CONSERVATION

1.1 FOREST RESOURCE INVENTORY PERMANENT SAMPLE PLOTS

Manitoba Conservation Forestry Branch has an on-going Growth and Yield study program that aims to more accurately quantify forest growth and incremental volume relative to time. This is accomplished through the establishment and periodic re-measurement (usually at 5-year intervals) of *permanent sample plots* (PSP) in a wide variety of forest stands throughout the province (pers. comm. Becker 2000). Some of these plots are now nearing 15 years of age and are a valuable source of data. Within the Wuskwatim Study Area three PSPs have been established in FMU 89 (see Table 1). All are located along PR 391 but are well clear of proposed project related activities (Figure 1).

Table A10-1 Manitoba Conservation PSPs within the Wuskwatim Region

• FMU	TWP	RGE (W)	SECTION	# of PLOTS
89	79	4	1, 15	2
	80	6	3	1
• TOTAL				**3**

Source: Manitoba Conservation, Forestry Branch 2001

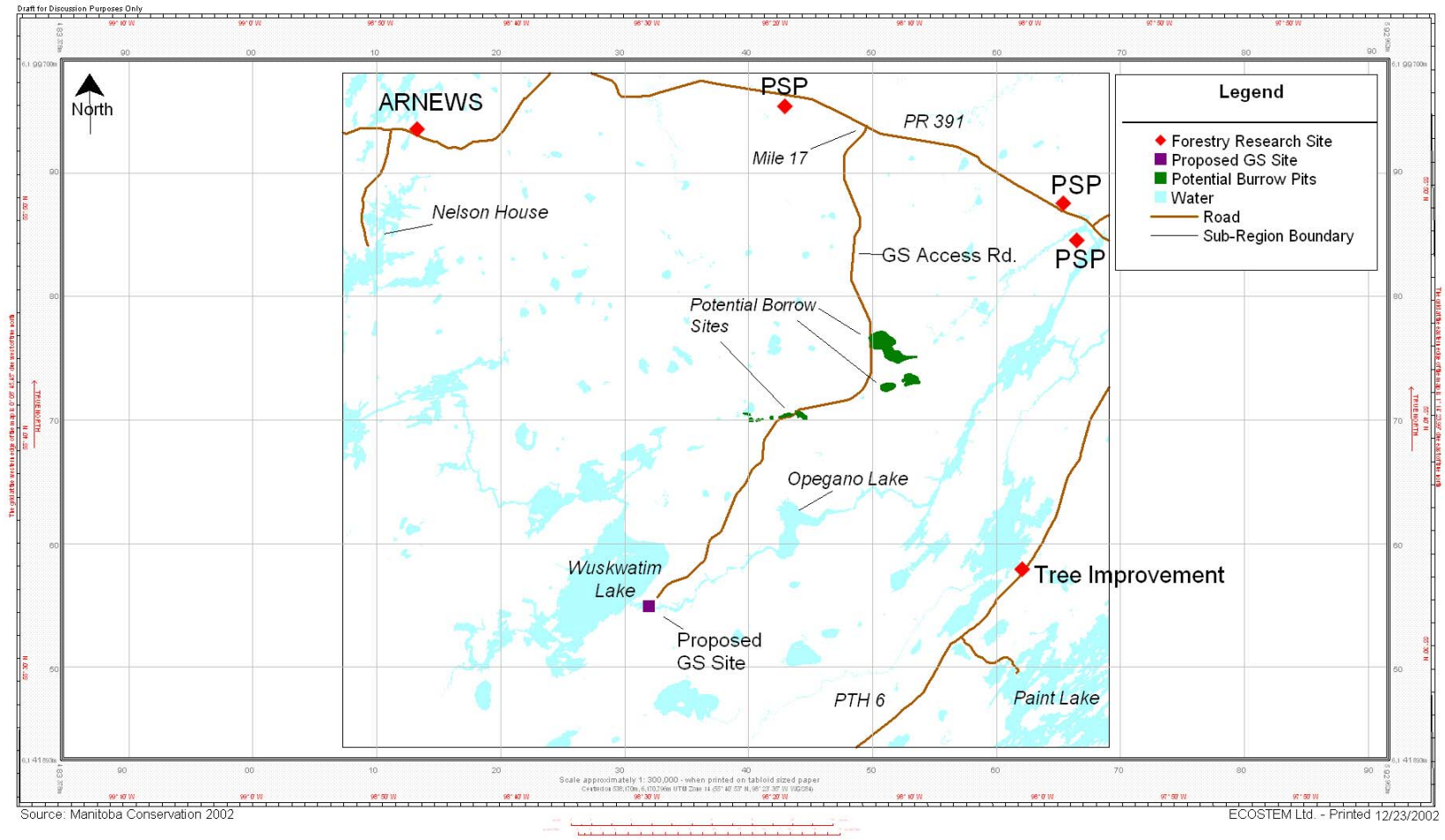


Figure A10-1 Forestry Research Sites Within the Wuskwatim Sub-Region.

1.2 FOREST HEALTH MONITORING

The Forestry Branch of Manitoba Conservation is also responsible for monitoring and, where feasible, control of forest pests and disease infestations. Of primary concern are jack pine budworm, spruce budworm, forest tent caterpillar and dwarf mistletoe infestations. Spruce budworm and forest tent caterpillar egg mass counts are conducted annually at temporary sample points to predict next-year infestation levels. Jack pine budworm pheromone traps are permanently located and monitored annually as an early warning detection system (pers. comm. Dojack 2002). Such plots however are not located in the immediate Wuskwatim Study Area. Jack pine budworm has not been a concern within the study area since the mid-1980's (Grandmaison 1988). Conditions are predicted to remain similar for 2003 (Manitoba Conservation 2003).

Moderate to severe defoliation by spruce budworm have been recorded for the past few years in the Reed and Burntwood Lakes areas and west. This outbreak started in 1995 in the Namew Lake area near the Saskatchewan border and moved northeast. Generally, the Wuskwatim study area does not have a high number of budworm vulnerable sites; i.e. stands that have the appropriate species composition (balsam fir and/or white spruce) and density to support severe and widespread spruce budworm infestations. However, white spruce and balsam fir dominant and co-dominant stand types are found along rivers and lake shores including those of the Burntwood River and Wuskwatim Lake. Moderate to severe infestations are predicted for 2002 as far east as Sherridon, the File River and Burntwood Lake (Manitoba Conservation 2003). Spruce budworm infestations can spread widely and rapidly if wind conditions are favorable during the moth stage of insect development.

Forest tent caterpillar infestations in proximity to the Wuskwatim study area occurred in the late 1980's, spiking in 1989. It affected hardwood stands in the Wabowden, Jenpeg and PTH #6 south of Ponton areas (Grandmaison 1992). The summer of 2001 also saw localized infestations of forest tent caterpillars in hardwood dominant stands in the Nelson River Forest Section. No outbreaks in the Wuskwatim area are expected in 2003 (Manitoba Conservation 2003).

1.3 TREE IMPROVEMENT PROGRAM

The tree improvement program is a cooperative program between Manitoba Conservation Forestry Branch and Tolko. It started with the collection of seed from superior class trees and the subsequent establishment of family test plots. Located within the Wuskwatim region are the Nelson River Black Spruce Tree Improvement Sites at Bah Lake and Ospwagan Lake, the latter being in the Wuskwatim study area (Figure 1). Both were

established in 1993 (see Table 2). Detailed location information is available in Addendum 1.

Table A10-2. Tree improvement family test site locations

• Name	FMU	TWP	RGE (W)	SEC	LEGAL SUBD.	UTM ZONE	NORTHING	EASTING
Bah Lake	83	71	8	12	9, 10	14	0529257	6110080
Ospawagon	87	76	4	10	13	14	0562803	5159232

Source: Manitoba Conservation 2001

1.4 THOMPSON ECO-MONITORING – FOREST HEALTH

There have been a number of pollution related studies that have been undertaken in the Thompson area related to emissions from the International Nickel Company of Canada (INCO) smelter. Some were commissioned by the Canadian Forest Service (CFS) while others were undertaken by INCO. These attempted to capture information on rates of deposition and effects on forest vegetation. More recently, Manitoba Conservation has become involved in the Thompson Eco-monitoring program that focuses on forest health, seedling regeneration and survival, and heavy metals accumulation and dispersal in clay soils. The provincial studies incorporate some of the plots first established by the CFS (pers. comm. Jones 2002).

Plots established for the various studies over the years and those active today are provided in Figure 3. Although none of the currently active monitoring sites are located within the project footprint several dormant sites exist at Wuskwatim Lake, Opegano Lake and in the vicinity of the PR 391 and Mile 17 generating station access road junction. Considerable data has been collected at all of these sites. The opportunity now exists to re-activate dormant sites to build on information already collected and incorporate it into current research programs (e.g., Acid Rain National Early Warning System; Section 2.1). Manitoba Conservation indicated that all research sites should be avoided where possible when planning infrastructure development to facilitate re-activation of sampling sites in the future (pers. comm. Jones 2002).

2.0 THE CANADIAN FOREST SERVICE

The Canadian Forest Service (CFS) has established numerous forest research plots within Manitoba. These plots are mostly of a permanent nature and are generally re-measured at regular intervals. Some projects have been ongoing for many years while others have

been discontinued. Still others have been incorporated into other studies as mentioned above.

2.1 ACID RAIN NATIONAL EARLY WARNING SYSTEM

The Acid Rain National Early Warning System (ARNEWS) is a nation-wide study, initiated in 1984, with the objective of detecting early signs of air pollution damage to Canada's forests. In spite of the name the study is not limited to acid rain.

Basic forest health data were collected annually and mensurational data every five years. Data on soil and ground vegetation were also collected. The last year of data collection was 1998 and although the project is now somewhat dormant, the objective is to retain and protect permanent plot sites for future assessments (pers. comm. Michaelian 2002). Six monitoring sites were established across Manitoba with one near the junction of PR 391 and the Nelson House access road (Lat. 55.9292; Long. 98.6218) (Figure 1). Plot dimensions are 10 m by 40 m with a 50 m surrounding buffer.

3.0 TOLKO INDUSTRIES LTD.

Tolko Industries Ltd. is involved in various research initiatives within its' FMLA and conducts joint silviculture-based research with Manitoba Conservation Forestry Branch. Tolko has established and monitors PSPs related to growth and yield and forest succession studies. One PSP is located within the general proximity of the Wuskwatim study area (Twp. 79, Rge. 3 WPM) but is well clear of the generating station project activities.

Tolko also has and continues to establish *regeneration assessment plots* (RAP) within FMLA #2. These are placed primarily in forest renewal sites. Considering the lack of timber harvest and forest renewal activities in the immediate Generation Project area, there are also no RAPs located in the area of concern (pers. comm. Donald 2001).

4.0 BOREAL ECOSYSTEM-ATMOSPHERE STUDY

The Boreal Ecosystem-Atmosphere Study (BOREAS) is a collaborative study initiated in the early 1990s and supported by a number of American and Canadian agencies. The Canadian agencies include:

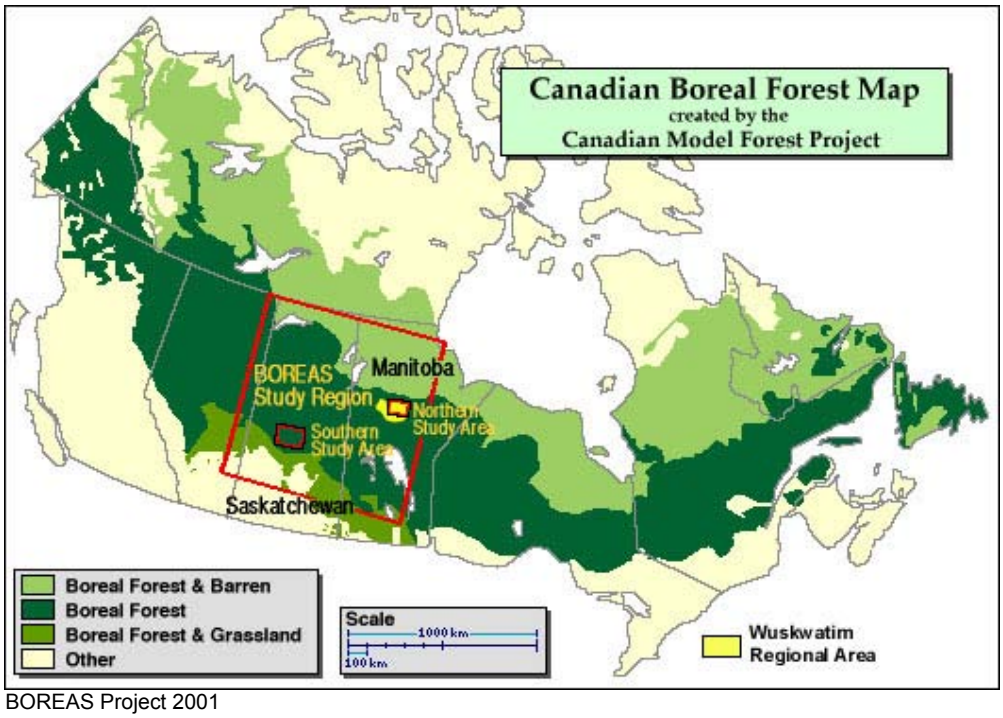
- Natural Resources Canada (NRCan) – the Science Directorate of the Canadian Forest Service (CFS);
- Canada Center for Remote Sensing (CCRS); Energy, Mines & Resources Canada;
- Natural Sciences and Engineering Research Council of Canada;
- Research Branch of Agriculture Canada;
- Institute for Aerospace Research – National Research Council;
- Atmospheric Environment Service Canadian Climate Centre – Environment Canada; and
- Canadian Global Change Program – The Royal Society for Canada.

Sponsors from the United States include:

- Ecosystems Dynamics & Biogeochemical Cycles Branch – National Aeronautics and Space Administration (NASA);
- National Oceanic and Atmospheric Administration (NOAA) – Office of Global Programs;
- National Science Foundation (NSF) – Atmospheric Sciences and Environmental Biology Divisions; and
- Office of Research and Development – U.S. Department of Energy, Environmental Protection Agency (EPA).

NASA and NRCan (through CCRS) lead the study but have participating scientists from Britain, France and Russia (Canadian Environmental Protection 1994, Mercer et al. 1992).

The study objective is to improve understanding of the boreal forests' role in influencing climate and how global climate change may affect the forest. Scientists have chosen sites to study contrasting boreal forest conditions; i.e., the cold short growing season of the north near Thompson, Manitoba, and the warmer, drier conditions of Prince Albert National Park in central Saskatchewan (Mercer et al. 1992) (Figure 2).



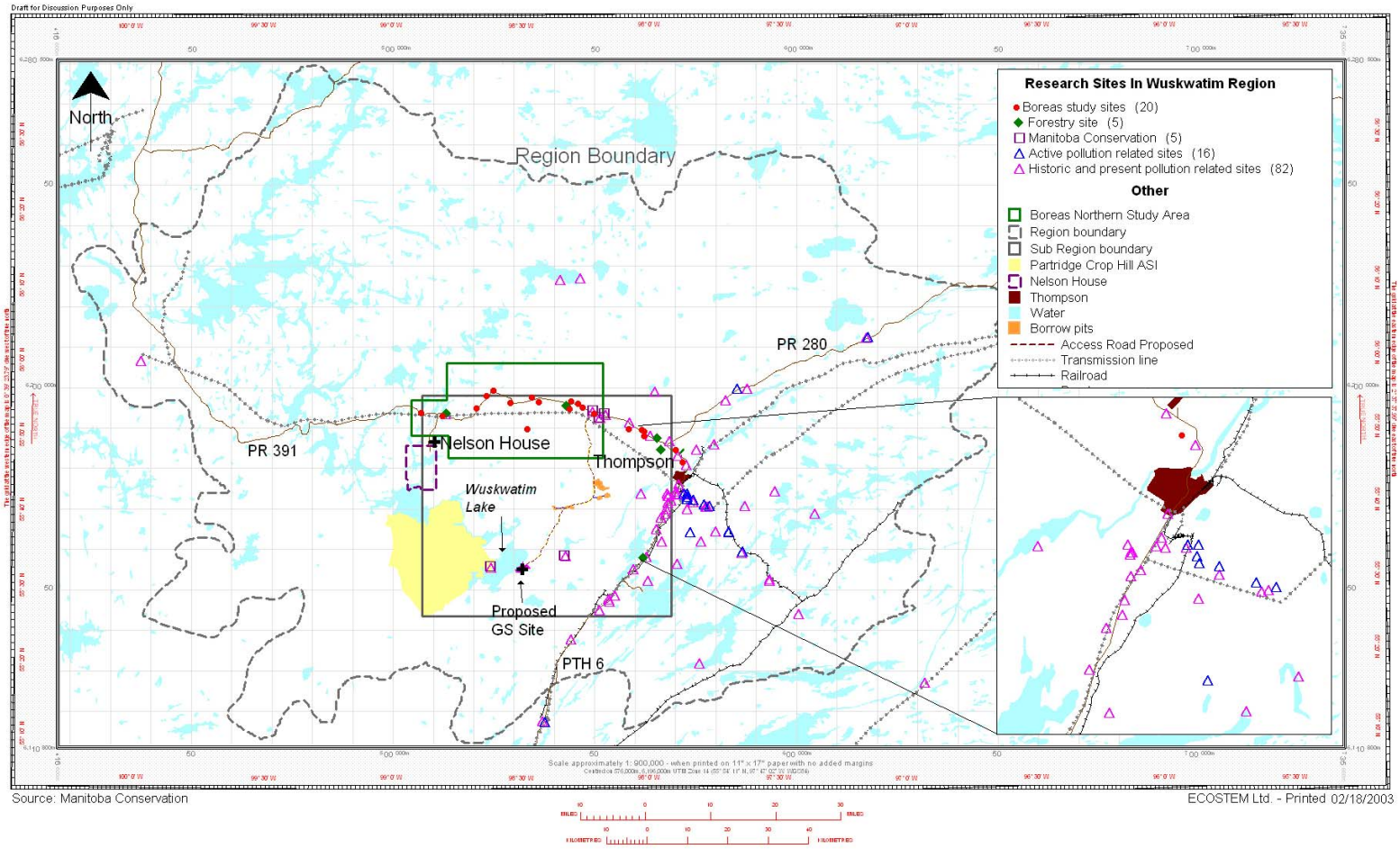
Source: BOREAS Project 2001

Figure A10-2. BOREAS study region and Wuskwatim region.

The BOREAS Northern Study Area encompasses approximately 875 square kilometers of the boreal forest located northwest of Thompson, and north and northeast of Nelson House (Figure 3). The area is zoned for study intensity purposes and includes a development restrictions request to exclude forest harvesting (Canadian Environmental Protection 1994). Although the actual generating station site is outside of the BOREAS study area, the proposed Mile 17 generating station access road will traverse the local Modeling Sub-area and will be in close proximity to one flux tower site and several auxiliary sites (Figure 3).

Data collection focuses around six flux station-monitoring sites distributed within the core of the research areas (one is located east of the broader study area) and numerous auxiliary sites. Continuing data collection includes the hourly measurement of atmospheric concentrations of gases such as carbon dioxide and water vapor and heat. This site is the source of the longest running record of such measurements in Canada and has recently been incorporated in a new initiative to begin similar measurements around the country. The research is slated to continue long-term with an indefinite termination date (pers. comm. Wofsy 2000). Intensive consultation by Manitoba Hydro with the research community resulted in early mitigation measures that re-routed the proposed

access road to alleviate concerns by the researchers regarding any development that includes forest clearing around specific study sites (Volume 1, Section 3).



Source: BOREAS Project 2001

Figure A10-3. Research study sites in the Wuskwatim GS region.

ADDENDUM 1

Tree Improvement Program Family Test Sites

NELSON RIVER BLACK SPRUCE TREE IMPROVEMENT SITES

•Manitoba Forestry Branch/Tolko Manitoba Inc. (Repap Manitoba) Tree Improvement Co-operative

Bah Lake Family Test (See Figure 11.7b)

Location: **L.S. 9 & 10 Section 12, Township 71, Range 8W**

Planted: **June 1993**

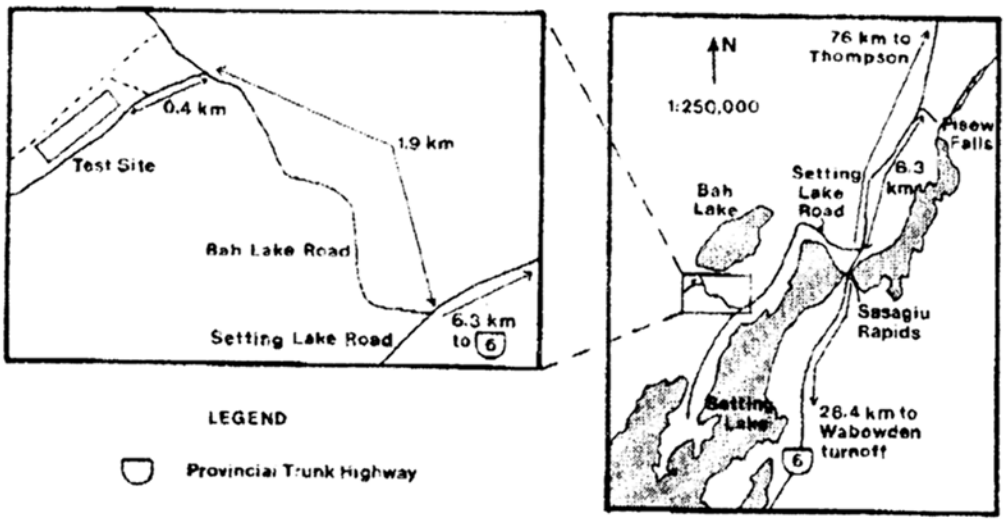
Test Design: **20 replications of 433 families and 2 general collection sources (435 trees/rep) with 2 rows of border trees in the periphery. Five of 433 families originated from Breeding Zone 11.2 and five families originated from Breeding Zone 11.5. Planted at 2m x 2m spacing in 2 separate blocks covering 4.0 hectares.**

Ospwagan Family Test (See Figure 11.7c)

Location: **L.S. 13 of Section 10 and L.S. 4 of Section 15, Township 76, Range 4W**

Planted: **June 1993**

Test Design: **20 replications of 433 families and 2 general collection sources (435 trees/rep) with 2 rows of border trees in the periphery. Five of 433 families originated from Breeding Zone 11.2 and five families originated from Breeding Zone 11.5. Planted at 2m x 2m spacing covering 3.7 hectares.**



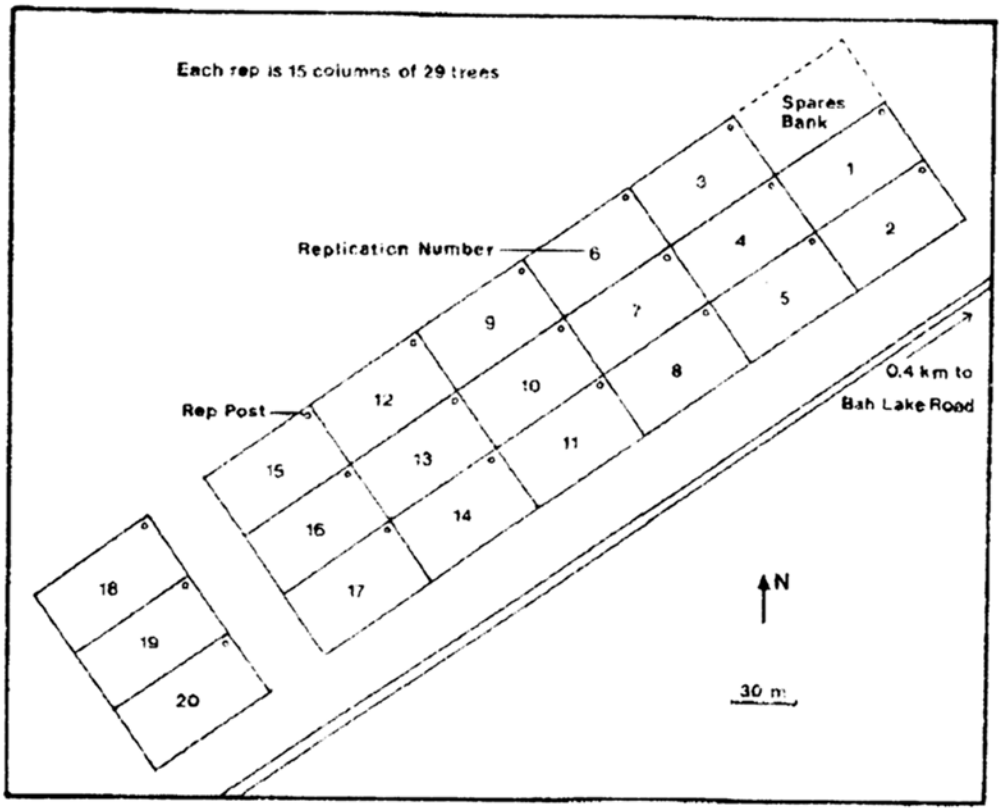
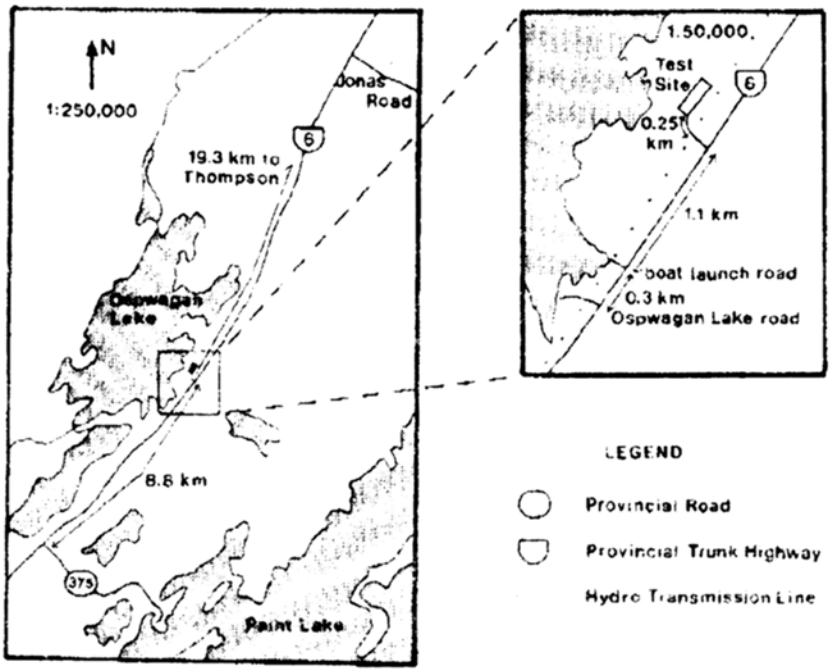


Figure 11.7b Location and layout maps - Bah Lake black spruce family test



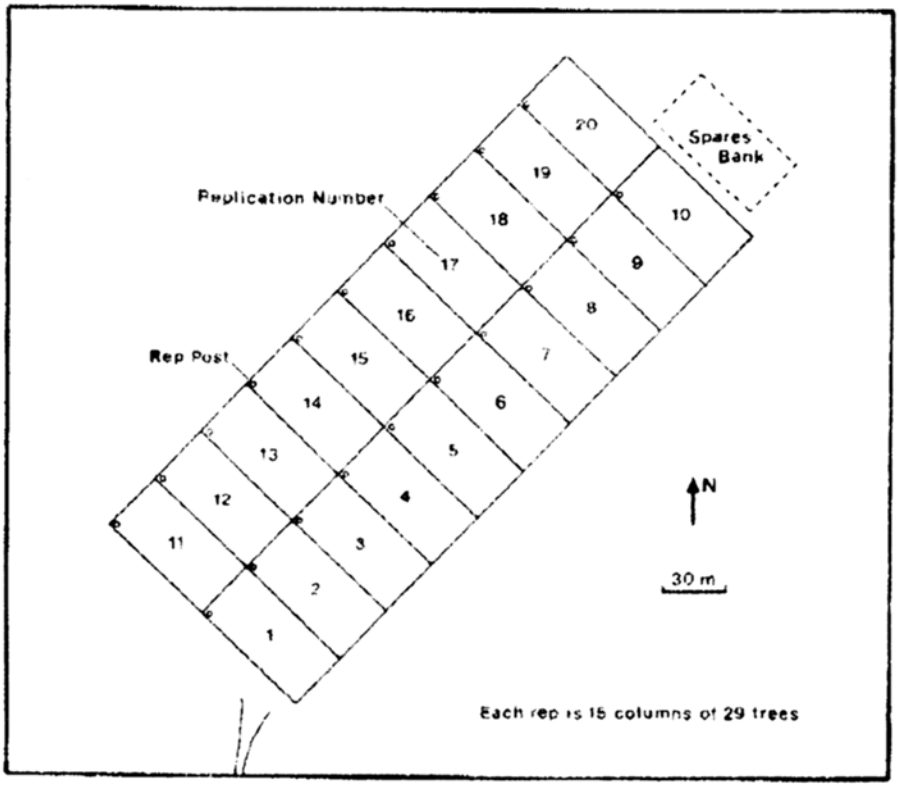


Figure 11.7c Location and layout maps - Ospwagan black spruce family test

ADDENDUM II

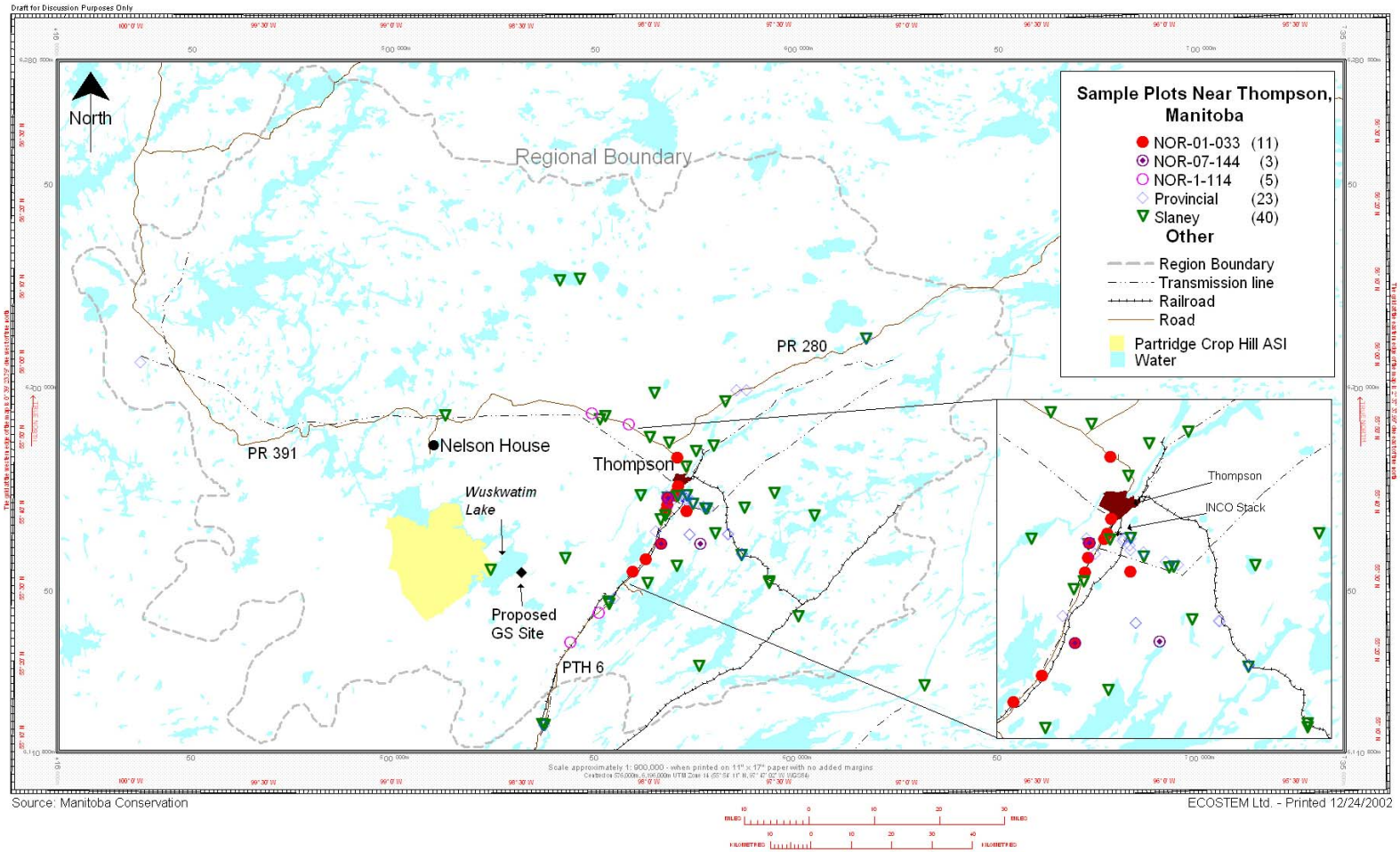


Figure 1. Historic and present pollution related research sites in the Thompson area

THOMPSON ECO-MONITORING – FOREST HEALTH RESEARCH SITES

Proponent_			Location~					
Project	Manager	Title	Sect-Twp-Rge	Easting	Northing	Site ID	Comments	Description
[1]CFS_NOR-1-114	Blauel R.	Smelter Pollution Flin Flon	11-67-10	508154.2	6070839.6		Non-active*	
CFS_NOR-1-114	Blauel R.	Smelter Pollution Thompson	32-74-5	551220.5	6145089.6		Non-active	
CFS_NOR-1-114	Blauel R.	Smelter Pollution Thompson	3-74-6	544188.2	6137726.0		Non-active	
CFS_NOR-1-114	Blauel R.	Smelter Pollution Thompson	19-79-4	558635.1	6191424.5		Non-active	
CFS_NOR-1-114	Blauel R.	Smelter Pollution Thompson	31-79-5	549541.5	6194014.7		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	31-75-4	559580.4	6155194.5		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	10-76-4	562885.1	6158192.9		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	24-76-4	566686.7	6161908.2		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	15-77-3	573045.2	6170001.7		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	18-77-3	567799.5	6169919.7		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	19-77-3	568212.7	6171589.9		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	29-77-3	570050.3	6173708.9		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	30-77-3	568237.6	6173270.8		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	32-77-3	570392.3	6174335.4		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	4-78-3	570829.5	6176014.7		Non-active	
CFS_NOR-01-033	Malhotra S.	Smelter Pollution Flin Flon and Thompson	28-78-3	570733.8	6183099.5		Non-active	
CFS_NOR-07-144	Malhotra S.	Smelter Pollution Flin Flon and Thompson	24-76-3	576410.4	6162021.2		Non-active	
CFS_NOR-07-144	Malhotra S.	Smelter Pollution Flin Flon and Thompson	24-76-4	566686.7	6161908.2		Non-active	
CFS_NOR-07-144	Malhotra S.	Smelter Pollution Flin Flon and Thompson	30-77-3	568333.8	6173270.8		Non-active	
[2] Ind_Slaney		Thompson Smelter Emission Study		541467.0	6226530.6	45	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		546517.1	6227023.3	45	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		513142.8	6193492.6	46	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		552762.1	6193191.9	34	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		551408.9	6192440.1	34	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		565016.3	6198905.5	48	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		563813.4	6188154.9	32	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		568549.7	6186801.7	49	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		582608.1	6196875.7	43	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		617369.8	6212317.8	20	Non-active	Orr Lake Focal Site
Ind_Slaney		Thompson Smelter Emission Study		575190.1	6184626.4	40	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		579636.0	6185949.2	14	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		572788.2	6180884.6	50	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		561632.0	6173713.8	27	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		567621.1	6168863.8	26	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		566482.1	6167945.2	26	Non-active	

Proponent_ Location~

Project	Manager	Title	Sect-Twp-Rge	Easting	Northing	Site ID	Comments	Description
Ind_Slaney		Thompson Smelter Emission Study		542782.9	6158392.1	47	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		570681.0	6173631.7	51	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		568139.5	6173136.5	28	Non-active	BT Mine
Ind_Slaney		Thompson Smelter Emission Study		573004.1	6173806.5	5	Non-active	Focal Site
Ind_Slaney		Thompson Smelter Emission Study		577485.2	6170497.2	29	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		577974.2	6170586.1	29	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		574493.4	6171705.2	1	Non-active	Dam B Focal Site
Ind_Slaney		Thompson Smelter Emission Study		580129.9	6164496.7	2	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		586530.4	6159096.3	3	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		587330.5	6170763.9	19	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		594708.9	6174386.4	52	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		604665.2	6168763.7	10	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		593397.6	6152673.5	4	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		593419.9	6152229.0	4	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		600553.8	6144028.4	53	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		576117.8	6131869.8	18	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		631808.0	6127008.3	54	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		570475.0	6156524.5	24	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		563182.7	6152183.9	44	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		553720.1	6147105.4	41	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		553546.5	6147713.1	41	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		537138.9	6117589.1	7	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		537790.0	6117285.3	7	Non-active	
Ind_Slaney		Thompson Smelter Emission Study		524464.3	6155526.2	12	Non-active	
Provincial	[3] Man. Conservation	Thompson Ecomonitoring - Forest Health		572999.8	6173820.9	TQ0101	Active	New site established at forrmer site #10
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		578540.8	6170798.3	TQ0102	Active	Jack Pine stand at former site #5
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		573665.1	6164213.8	TQ0103	Active	Black Spruce stand at former site #4
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		573665.5	6164192.1	TQ0104	Active	Jack Pine stand at former site #4
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		583241.0	6164402.4	TQ0105	Active	Black Spruce stand at former site #6
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		583259.9	6164322.5	TQ0106	Active	Jack Pine stand at former site #6
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		586686.9	6159424.5	TQ0107	Active	Black Spruce stand at former site #7
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		586687.3	6159406.0	TQ0108	Active	Jack Pine stand at former site #7
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		572128.2	6173585.9	11	Non-active	
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		567998.0	6173813.6	12	Non-active	
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		568951.6	6172031.8	1	Non-active	
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		565271.3	6164975.4	2	Non-active	

Proponent_				Location~				
Project	Manager	Title	Sect-Twp-Rge	Easting	Northing	Site ID	Comments	Description
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		555017.5	6148646.2	3	Non-active	
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		437625.6	6206514.9	8	Non-active	
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		587943.0	6199741.8	13	Non-active	
Provincial	Man. Conservation	Thompson Ecomonitoring - Seedling Regeneration		572258.0	6173837.5	TQ0109	Active	Thompson seedling study plot TH 1B
Provincial	Man. Conservation	Thompson Ecomonitoring - Seedling Regeneration		574509.2	6172270.6	TQ0110	Active	Thompson seedling study plot TH 2
Provincial	Man. Conservation	Thompson Ecomonitoring - Seedling Regeneration		577113.9	6171159.4	TQ0111	Active	Thompson seedling study plot TH 3
Provincial	Man. Conservation	Thompson Ecomonitoring - Seedling Regeneration		585338.9	6199811.8	TQ0112	Active	Tompson seedling study plot TH4(Moak Lake)
Provincial	Man. Conservation	Thompson Ecomonitoring - Forest Health		537653.7	6117326.7	TQ0113	Active	New site established at forrmer site #9
Provincial	Man. Conservation	Thompson Ecomonitoring - Metal Moverment in Soil		573070.9	6172510.9	TQ0131	Active	Thompson dust plots,black spruce stand 2.7 km SE of stack on DAM B Rd.
Provincial	Man. Conservation	Thompson Ecomonitoring - Metal Moverment in Soil		572916.5	6173007.3	TQ0130	Active	Thompson burn plots,black spruce stand 2.2 km SE of stack on DAM B Rd.
Provincial	Man. Conservation	Thompson Ecomonitoring - Metal Moverment in Soil		617833.0	6212419.2	TQ0132	Active	Thompson dust plots,black spruce 60 km NE of stack near Orr Lake

[1] Canadian Forest Service; [2] Industry; [3] Manitoba Conservation;

* Non-active as far as can be determined

~ Also see attached figures

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APPENDIX 11

FOREST CONSERVATION AND ENHANCEMENT PROGRAMS IN MANITOBA

1.0 FORESTRY CONSERVATION/ENHANCEMENT PROGRAMS

Maintenance of forest cover in the study area is important for commercial and ecological sustainability. In addition, awareness of non-traditional forest values is increasing, opening new opportunities and markets. A number of available woodland support programs have been identified and are briefly discussed below. Some of these programs more appropriately target southern Manitoba where woodlands and forests are less dominant. Support program objectives are conservation, environmental protection and habitat maintenance or enhancement.

1.1 MANITOBA FORESTRY ASSOCIATION INC.

The provincial and federal governments have long recognized the importance of forests and woodlands. Over the years they have made technical and financial assistance available to various non-profit groups, such as the Manitoba Forestry Association Inc. (MFA), through a number of federal/provincial agreements. Manitoba Conservation has also provided financial, technical and in-kind support to the MFA. The MFA also receives financial, technical and in-kind support from a variety of other agencies and delivers educational extension services addressing issues pertaining to environmental and economic forestry values. An example is the Northern Schools Tour Program, funded by Manitoba Hydro and the Fire Management Branch of Manitoba Conservation, focuses on forest fire prevention and the value of forests to local communities. Another initiative, the Learning Tree Program, provides natural resource-specific technical support and resources that can be incorporated into a variety of school curricula *(pers. comm. Beaven 2001).*

1.2 MANITOBA CONSERVATION

Environmental Youth Corps

Manitoba Conservation, through the Environmental Youth Corps (EYC), offers Manitoba's young people an opportunity to prepare for environmental challenges of tomorrow by helping them gain valuable education and experience. EYC is designed to encourage youth throughout the province to voluntarily participate in innovative projects that will help to improve and protect Manitoba's environment. The program stresses the importance of local action for sustaining the environment (Manitoba Conservation 2001a).

Sustainable Development Innovations Fund (SDIF)

Program focus is on environmental, economic, human health and social sustainability while supporting sustainable economic growth. The Sustainable Development Innovations Fund (SDIF) provides funding for the development, implementation and promotion of environmental innovative and sustainable development projects. Specific program target areas include environmental and eco-tourism issues and opportunities for rural, northern and remote communities. The SDIF is funded and administered by Manitoba Conservation. (Manitoba Conservation 2002b).

1.3 MANITOBA HYDRO

Manitoba Hydro promotes forest replacement, re-establishment and enhancement in recognition of forest losses due to its development projects. Manitoba Hydro offers support through the Forest Enhancement Program and targets non-profit, non-government organizations and educational institutions that have identified projects that benefit the community, region or province. Co-operative community projects are encouraged. The program focuses on tree plantings, public forest education and innovative forest projects (Manitoba Hydro 1999).

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APPENDIX 12

MANITOBA CONSERVATION

FORESTRY BRANCH

FOREST INVENTORY

FIELD INSTRUCTION MANUAL

1998

(Applicable sections)

FOREST MANAGEMENT SECTION

NOTE: PAGE NUMBERS ARE DIFFERENT THAN THOSE THAT APPEAR IN THE ORIGINAL PROVINCIAL DOCUMENT TO ALLOW THE PAGE NUMBERS WITHIN THIS APPENDIX TO REMAIN IN SEQUENCE.

TABLE OF CONTENTS

PROVINCIAL FOREST INVENTORY

FIELD INSTRUCTIONS, 1998

INTRODUCTION

The forest inventory instructions have been prepared to provide Field Personnel with a basic set of instructions with which to follow through the procedures and codes used in the Forest Inventory program in Manitoba.

The field instructions are divided so as not only to present the terminology and codes used in the program, but also thereafter, to indicate how the terminology and coding system are applied in the field in order to describe land and the forests occurring on it, and the productivity thereof.

I FOREST SECTIONS AND MANAGEMENT UNITS

There are ten (10) Forest Sections in the Forest Zone. The Forest Sections are divided into Management Units as follows:

0. Aspen - Parkland Section	Management Units 01 - 07
1. Mountain Section	Management Units 10 - 15
2. Pineland Section	Management Units 20 - 23
3. Lake Winnipeg East Section	Management Units 30 - 39
4. Interlake Section	Management Units 40 - 47
5. Saskatchewan River Section	Management Units 51 - 57
6. Highrock Section	Management Units 60 - 66
7. Churchill River Section	Management Units 71 - 75
8. Nelson River Section	Management Units 82 - 89
9. Hayes River Section	Management Units 90 - 99

II AREA CLASSIFICATION

This classification applies to the Wooded and Aspen-Parkland Area of the Province only. The transition zone and tundra are not presently classified by area.

The total area is divided according to status of land, ownership and productivity.

1. Status of Land*	Code
Agriculture	0
Provincial Forest	1
Permanent Forest	2
National Park	3
Wildlife Management Area	4
Forest Management License	5
Specified Area	6
Provincial Park	7
INCO Land	8
Other Land	9

*Note Status of land may have a double digit code. The first digit will be the primary status with the second digit secondary in nature, but occupying the same land ie: Code 17 will be Provincial Forest (1) with Provincial Park (7) the secondary status.

2. Ownership	Code
Provincial Crown Land - Closed	0
Provincial Crown Land - Open	1
Provincial Crown Land - Restricted	2
Federal Crown Land	3
Municipal Land	4
Patented Land	5
Local Government District	6
Indian Reserve	7
Other (include Community Pasture)	9

3. Explanation of terms used:

a) Productive Forested Land

Includes all forest land capable of producing merchantable wood regardless of its existing stage of productivity.

1) Softwood: 'S'	(Cover Type 0-3) - includes all stands where 76 Percent and over of the total basal area consists of coniferous species.
2) Mixedwood: 'M'	(Cover Type 4-7) - includes all stands where the basal area of all the coniferous species is between 51 percent and 75 percent of the total basal area.
3) Mixedwood: 'N'	(Cover Type 8) - includes all stands where the basal area of all coniferous species is between 26 percent and 50 percent of the total basal area.
4) Hardwood: 'H'	(Cover Type 9) - includes all stands where the basal area of all coniferous species is less than 25 percent of the total basal area.

b) Non-Productive Forested Land

Includes all forest land not capable of producing merchantable timber due to very low productivity.

i) Treed Muskeg (700)- Similar to open muskeg, except that the area is supporting semi-stagnated or stagnated trees. Some of the trees may produce "Christmas" trees or fence posts, but will not produce pulpwood size trees within a rotation age of 140 years (9.0+cm d.b.h., height over 10.0m and 20m^3 of net merchantable volume per hectare). At least 10 percent of the area will be tree covered.

701 - Black Spruce Treed Muskeg 51 Percent of Species Composition
702 - Tamarack Larch Treed Muskeg 51 Percent of Species Composition
703 - Eastern Cedar Treed Muskeg 51 Percent of Species Composition
704 - Taiga (Northern Transition Forest)

ii) Treed Rock (710) - Rock with a very shallow soil, supporting semi-stagnated or stagnated trees. At least 26 percent of the area will be tree covered. These sites do not produce merchantable stands.

711 - Jack Pine Treed Rock	51 Percent of Species Composition
712 - Black Spruce Treed Rock	51 Percent of Species Composition
713 - Hardwood Treed Rock	51 Percent of Species Composition

iii) Willow/Alder (720) - Low lying areas with a saturated water table presently supporting willow or alder growth. Without improvements these sites are not capable of producing merchantable timber stands. At least 51 percent of the area must be shrub covered.

721 - Willow	51 Percent of ground cover
722 - Alder	51 Percent of ground cover
723 - Dwarf Birch	51 Percent of ground cover
724 - Shrub	76 Percent of ground cover
725 - Shrub/PrairieShrub	51 Percent of ground cover

iv) Protection Forest (730) - Presently developed or reserved recreational areas and small islands (less than 2 hectares)

731 - Recreational sites
732 - Small Islands (less than 2 ha.)
733 - Precipitous slopes/Fragile sites
734 - Shelter Belts

c) Non-Forested Land

Includes areas withdrawn from timber production for a long period of time, such as cultivated fields, hay meadows, pastures, settlements, rights-of-way, gravel pits, beaches, wide ditches, summer resorts, bare rock, barren, mines, marsh and muskeg.

i) Barren-Bare Rock (800) - Tundra and rock with less than 25 percent tree cover.

801 - Barrens - Tundra
802 - Bare Rock - Igneous
803 - Bare Rock - Sedimentary
804 - Open Sand Dunes

ii) Fields (Agriculture) (810) - Areas of private and leased land cleared of tree cover and presently under an agricultural use. Less than 10 percent of the area will be tree covered.

811 - Hayland - cultivated
812 - Cropland - cultivated
813 - Pastureland - domestic animals
815 - Land clearing in progress
816 - Abandoned cultivated land

iii) Meadow (820) - Moist to wet grassland suitable for hay production (natural hay land), at least 51 percent of the area is covered by grass.

821 - Dry Upland Ridge Prairie
822 - Moist Prairie

823 - Wet Meadow
824 - Sand Prairie

iv) Marsh - Muskeg (830)

831 - Muskeg - Wetland which has a vegetative cover consisting mainly of sphagnum moss and heath plants with very scattered brush. Black Spruce, Tamarack or Cedar cover does no exceed 10 percent
832 - String Bogs
835 - Marsh - Wetland completely or partially covered with tall grass, rushes, or sedges, unsuitable for hay but can be used as a habitat for furbearing animals.
838 - Mud/Salt Flats
839 - Sand Beaches

v) Unclassified (840-859) - right-of-way, roads, gravel pits, beaches, summer resorts, mines, oil fields, etc.

841 - Townsites/Residential Sites
842 - Airstrips
843 - Roads/Railroads
844 - Transmission lines/Pipelines
845 - Gravel Pits/Mine sites
846 - Fence lines (Community Pastures), fire guards
847 - Drainage Ditches
848 - Beaver Flood
849 - Dugouts/Water holes
851 - Oil Fields - oil wells, all structures pertaining to.

d) Water (900)

Includes lakes and rivers, measured at the high water mark, able to be delineated with a double line on the aerial photographs. Narrow river and creeks marked by a single blue line are not to be considered as separate types, nor as type boundaries.

901 - Rivers, arrows showing direction of flow
991 - Lake Winnipeg
992 - Lake Manitoba
993 - Lake Winnipegosis
994 - Red River
995 - Assiniboine River

III SUBDIVISION OF FORESTED PRODUCTIVE LAND

1. Type Aggregate

This term is used in reference to all productive stands or potentially productive areas in a Forest Management Unit or Forest Section which have common characteristics as to cover type, subtype, site, cutting class and crown closure.

Cover Type

Four broad cover types are recognized - Softwood 'S', Softwood-Hardwood 'M', Hardwood-Softwood 'N', Hardwood 'H'. The first number of the sub-type code indicated the type aggregate.

CODE	
0-3	Softwood 'S' includes all stands where at least 76 percent of the total basal area consists of coniferous species.
4-7	Softwood-Hardwood Mixedwood 'M' includes all stands where the basal area of all the coniferous species is between 51 percent and 75 percent of the total basal area.
8	Hardwood-Softwood Mixedwood 'N' includes all stands where the basal area of all coniferous species is between 26 and 50 percent of the total basal area.
9	Hardwood 'H' includes all stands where the basal area of all coniferous species is less than 25 percent of total basal area.

The above cover types are therefore to be determined by the percent of the basal area of softwood tally in proportion to the total basal area found on all plots taken within a stand.

2. Subtype

This term indicates the species composition in broad groups within the cover type. Subtype is determined by the proportion of basal area of two or three main species in the stand as found on sample plots to the total basal area of all species. To determine the subtype, the basal area of individual species must be computed and rounded off to the nearest ten percent.

The percentage range marked after the species symbol indicates the proportion of the basal area of this particular species in comparison to the total basal area of all species in the type. The second number of the code of type aggregate identifies the subtype.

On the following page is a list of the recognized subtypes:

SUBTYPE CODE

Cover type 'S' > 76% S	Code Code
Red Pine 71-100%	01
Red Pine 40-70%-jp	02
Jack Pine 71-100%	04
Jack Pine 40-70%-rp,sp	05
Jack Pine 40-70%-spr	06
Scots Pine 71-100%	08
Scots Pine 40-70%-jp	09
White Spruce 71-100%	10
White Spruce 40-70%-bf,jp,bs	11
Black Spruce 71-100%	13
Black Spruce 40-70%-jp	14
Black Spruce 40-70%- bf,ws	15
Black Spruce 40-70%-tl	16
Black Spruce 40-70%-ec	17
Balsam Fir 71-100%	20
Balsam Fir 40-70%-spr	21
Balsam Fir 40-70%-ec	22
Tamarack 71-100%	30
Tamarack 40-70%-spr	31
Tamarack 40-70%-ec	32
Cedar 71-100%	36
Cedar 40-70%	37
Cover Type 'N' 26-50% S	
Trembling Aspen-rp	80
Trembling Aspen-jp	81
Trembling Aspen-spr,bf,tl	82
Birch-rp	85
Birch-jp	86
Birch-spr & bf	87
Balsam Poplar-spr,bf,tl	88
Northern Region ***	
Hardwood - Pine	83
Hardwood - Spruce	84

Cover type 'M' 51-75% S	
Red Pine 51%+	41
Red Pine 50% or less-jp	42
White Pine 51%+	43
Jack Pine 51%+	44
Jack Pine 50% or less-rp	45
Jack Pine 50% or less-spr	46
Scots Pine 51%+	48
Scots Pine 50% or less	49
White Spruce 51%+	50
White Spruce 50% or less-bf,jp,bs	51
Black Spruce 51%+	53
Black Spruce 50% or less-jp	54
Black Spruce 50% or less-bf	55
Black Spruce 50% or less-tl	56
Black Spruce 50% or less-ec	57
Black Spruce 50% or less-ws	58
Balsam Fir 51%+	60
Balsam Fir 50% or less-spr	61
Balsam Fir 50% or less-ec	62
Tamarack 51%+	70
Tamarack 50% or less-spr	71
Tamarack 50% or less-ec	72
Cedar 51%+	76
Cedar 50% or less	77
Cover Type 'H'< 25% S	
Trembling Aspen	90*
Trembling Aspen < 50%, wb(20%+)	91
Birch	92
Basswood	93
Ash	94
Elm	95
Oak	96
Manitoba Maple	97
Balsam Poplar	98**
Largetooth Aspen	9A
Eastern Cottonwood	9B
Hackberry	9C
Hop Hornbeam	9D
Willow	9E
Northern Region ***	
All Hardwoods	99

* Code 90 - Where Aspen and Balsam Poplar together equal 51% and Aspen predominates.
** If ba is 50% or less with 20% + wb then classify as 91
*** Special Note - Code 83, 84, and 99 will remain in effect until such time as an area is re-inventoried, at that time the full range of Cover Type 'N' and 'H'codes will be implemented.

Working Group Classification

Working Group	Subtype Code	Cover Type	Species Content
Red Pine	01	Softwood (S)	Red Pine 71-100%
	02	Softwood (S)	Red Pine 40-70%: 2nd major species Jack Pine
	41	Softwood-Hardwood (M)	Red Pine 51%+: 2nd major species Hardwood
	42	Softwood-Hardwood (M)	Red Pine 50% or less: 2nd major species Jack Pine; 3rd major species Hardwood
White Pine	43	Softwood-Hardwood (M)	White Pine 51%+: 2nd major species Hardwood
Jack Pine	04	Softwood (S)	Jack Pine 71-100%
	05	Softwood (S)	Jack Pine 40-70%; 2nd major species Red Pine
	06	Softwood (S)	Jack Pine 40-70%: 2nd major species Spruce
	44	Softwood-Hardwood(M)	Jack Pine 51%; 2nd major species Hardwood
	45	Softwood-Hardwood(M)	Jack Pine 50% or less: 2nd major species Red Pine: 3rd major species Hardwood
	46	Softwood-Hardwood (M)	Jack Pine 50% or less: 2nd major species Spruce; 3rd major species Hardwood
Scots Pine	08	Softwood (S)	Scots Pine 71-100%
	09	Softwood (S)	Scots Pine 40-70% 2nd major species Jack Pine
	48	Softwood-Hardwood (M)	Scots Pine 51%+: 2nd major species Hardwood
	49	Softwood-Hardwood (M)	Scots Pine 50% or less: 2nd major species Jack Pine; 3rd major species Hardwood
White Spruce	10	Softwood (S)	White Spruce 71-100%
	11	Softwood (S)	White Spruce 40-70%: 2nd major species Jack Pine, Balsam Fir or Black Spruce
	50	Softwood-Hardwood (M)	White Spruce 51%+: 2nd major species Hardwood
	51	Softwood-Hardwood (M)	White Spruce 50% or less: 2nd major species Balsam Fir, Jack Pine or Black Spruce
Black Spruce	13	Softwood (S)	Black Spruce 71-100%
	14	Softwood (S)	Black Spruce 40-70%: 2nd major species Jack Pine
	15	Softwood (S)	Black Spruce 40-70%: 2nd major species Balsam Fir, White Spruce
	16	Softwood (S)	Black Spruce 40-70%: 2nd major species Tamarack Larch
	17	Softwood (S)	Black Spruce 40-70%: 2nd major species Eastern Cedar
Black Spruce	53	Softwood-Hardwood (M) Hardwood	Black Spruce 51%+: 2nd major species

	54	Softwood-Hardwood (M)	Black Spruce 50% or less: 2nd major species Jack Pine, 3rd major species Hardwood
	55	Softwood-Hardwood (M)	Black Spruce 50% or less: 2nd major species Balsam Fir; 3rd major species Hardwood
	56	Softwood-Hardwood (M)	Black Spruce 50% or less: 2nd major species Tamarack Larch; 3rd species Hardwood
	57	Softwood-Hardwood (M)	Black Spruce 50% or less: 2nd major species Eastern Cedar; 3rd major species Hardwood
	58	Softwood-Hardwood (M)	Black Spruce 50% or less: 2nd major species White Spruce; 3rd major species Hardwood
Balsam Fir	20	Softwood (S)	Balsam Fir 71-100%
	21	Softwood (S)	Balsam Fir 40-70%: 2nd major species Spruce
	22	Softwood (S)	Balsam Fir 40-70%: 2nd major species Easter Cedar
	60	Softwood-Hardwood (M)	Balsam Fir 51%+: 2nd major species Hardwood
	61	Softwood-Hardwood (M)	Balsam Fir 50% or less: 2nd major species Spruce; 3rd major species Hardwood
	62	Softwood-Hardwood (M)	Balsam Fir 50% or less: 2nd major species Eastern Cedar; 3rd major species Hardwood
Tamarack Larch	30	Softwood (S)	Tamarack Larch 71-100%
	31	Softwood (S)	Tamarack Larch 40-70%: 2nd major species Spruce
	32	Softwood (S)	Tamarack Larch 40-70%: 2nd major species Eastern Cedar
	70	Softwood-Hardwood (M)	Tamarack Larch 51%+: 2nd major species Hardwood
	71	Softwood-Hardwood (M)	Tamarack Larch 50% or less: 2nd major species Spruce; 3rd major species Hardwood
	72	Softwood-Hardwood (M)	Tamarack Larch 50% or less: 2nd major species Eastern Cedar; 3rd major species Hardwood
Eastern Cedar	36	Softwood (S)	Eastern Cedar 71-100%
	37	Softwood (S)	Eastern Cedar 40-70%
	76	Softwood-Hardwood (M)	Eastern Cedar 51%+: 2nd major species Hardwood
	77	Softwood-Hardwood (M)	Eastern Cedar 50% or less: 2nd major species Hardwood
Trembling Aspen	90	Hardwood (H)	Trembling Aspen
	91	Hardwood (H)	Trembling Aspen less than 50%: 2nd major species White Birch (20%)
	80	Hardwood-Softwood (N)	Trembling Aspen: 2nd major species Red Pine

	81	Hardwood-Softwood (N)	Trembling Aspen: 2nd major species Jack Pine
	82	Hardwood-Softwood (N)	Trembling Aspen: 2nd major species Spruce or Balsam Fir
Balsam Poplar	98	Hardwood (H)	Balsam Poplar
	88	Hardwood-Softwood (N)	Balsam Poplar: 2nd major species Softwood
White Birch	92	Hardwood (H)	White Birch
	85	Hardwood-Softwood (N)	White Birch: 2nd major species Red Pine
	86	Hardwood-Softwood (N)	White Birch: 2nd major species Jack Pine
	87	Hardwood-Softwood (N)	White Birch: 2nd major species Spruce or Balsam Fir
Basswood	93	Hardwood (H)	Basswood
Ash	94	Hardwood (H)	Ash
Elm	95	Hardwood (H)	Elm
Oak	96	Hardwood (H)	Bur Oak
Manitoba Maple	97	Hardwood (H)	Manitoba Maple
Hardwoods	83	Hardwood-Softwood (N)	Hardwoods: 2nd major species Pine
	84	Hardwood-Softwood (N)	Hardwoods: 2nd major species Spruce
	99	Hardwood (H)	All Hardwoods
Lrgtooth Aspen	9A	Hardwood (H)	Largetooth Aspen
Estn Cottonwood	9B	Hardwood (H)	Eastern Cottonwood
Hackberry	9C	Hardwood (H)	Hackberry
Hop Hornbeam	9D	Hardwood (H)	Hop Hornbeam
Willow	9E	Hardwood (H)	Willow

3. F.E.C. Vegetation Types

Mainly Hardwood

V1 Balsam Poplar Hardwood and Mixedwood
V2 Black Ash (White Elm) Hardwood
V3 Miscellaneous Hardwoods
V4 White Birch Hardwood and Mixedwood
V5 Aspen Hardwood
V6 Trembling Aspen-Balsam Fir/Mountain Maple/Herb-Rich
V7 Trembling Aspen-Balsam Fir/Shrub- and Herb-Poor
V8 Trembling Aspen Mixedwood/Tall Shrub
V9 Trembling Aspen Mixedwood/Low Shrub
V10 Trembling Aspen Mixedwood/Feather Moss

Conifer Mixedwood

V11 White Pine Mixedwood
V12 Red Pine Mixedwood
V13 White Spruce Mixedwood
V14 White Spruce Mixedwood/Feather Moss
V15 Jack Pine Mixedwood/Shrub-Rich
V16 Jack Pine Mixedwood/Feather Moss
V17 Black Spruce Mixedwood/Shrub- and Herb-Rich
V18 Black Spruce Mixedwood/Feather Moss

Conifer

V19 Cedar Conifer and Mixedwood
V20 Tamarack/Labrador Tea
V21 White Spruce/Balsam Fir Shrub
V22 White Pine Conifer
V23 Red Pine Conifer
V24 Jack Pine Conifer
V25 Jack Pine/Feather Moss
V26 Jack Pine-Black Spruce/Lichen
V27 Black Spruce/Shrub- and Herb-Poor
V28 Jack Pine-Black Spruce/Feather Moss
V29 Black Spruce/Feather Moss
V30 Black Spruce/Labrador Tea/Feather Moss (Sphagnum)
V31 Black Spruce/Herb-Rich/Sphagnum (Feather Moss)
V32 Black Spruce/Herb-Poor/Sphagnum (Feather Moss)
V33 Black Spruce/Sphagnum

Note: See the Forest Ecosystem Classification for Manitoba (field guide) for descriptions of the vegetation types.

4. Site Classification

The following site classification has been described for the INTERLAKE SECTION of Manitoba ONLY. The land types and associated indicator plants are described for each moisture regime in the following table. The moisture regime in return denotes the site class for each tree species. Since height growth and stand density are reflections of site, these factors should be considered when evaluating the growth of timber types. A site class will be assigned to each subtype on the basis of its major species.

Although these plants generally reflect the moisture regime of the area, they become important site indicators only when they occur in abundance throughout the entire type. Localized elevations and depressions in the timber stand can reflect entirely different plant indicators than those throughout most of the type. Mineral and nutrients strongly influence tree growth but may not affect the presence of minor vegetation. Most of the soil in the Interlake area of Manitoba consists of strongly calcareous till. Although this high calcareous content does not affect the growth of indicators of Class 1 Jack Pine site, it seriously inhibits the growth of Jack Pine. On the other hand, Sphagnum ssp. do not tolerate high lime conditions. For this reason, feather moss rather than sphagnum is found on much of the deep organic terrain in the Interlake Section.

Since most indicator plants grow over a range of moisture regimes, they generally become important only when they occur in abundance and when a variety of plants are present. In isolated cases, however, the mere presence of a certain indicator plant throughout the type can denote site class. A good example of this is when bunchberry or twinflower occurs in association with jack pine. These plants do not occur on dry moisture regimes and therefore denote site class 1.

All factors of landform, indicator plants and tree growth should be considered when assigning site class. The following indicator plants should be used as a guide when evaluating site.

INDICATOR PLANTS

1. Cladonia mites (most common species of reindeer lichens)
   Typical for d type; indicates that soil is very surface dry

2. Cladonia rangiferna (Reindeer moss - a lichen)
   Often together with C.mites, not quite as common, but indication same conditions.

3. Juniperus horizontalis (Creeping savin)
   On vd type on limestone rock outcrops and on d type, on beach ridges.

4. Arctostaphylos uva-ursi (Bearberry)
   On surface dry soils, most abundant on d and f types; on d together with Clandonia, on f with Linnaea.

5. Oryzopsis pungens (Mountain [slender] rice)
   Specifically on d type on beach ridges.

6. Juniperus communis (Common Juniper)
   On beach deposits and outwash soils with good surface drainage from d to m(g) types usually in association with jp.

7. Shepherdia canadensis (Buffalo Berry)
   On beach and outwash; on habitats with good surface drainage ranging from d to m(g) types.

8. Linnaea borealis (Twin Flower)
   Typical of f types together with Arctostaphylos, grows from here onto moister conditions, not on d type.

9. Oryzopsis asperifolia (Rough grained or rough mountain rice)
   Dominantly on f type, but ranges from d to m(g) type, note difference to O.pungens (slender mountain rice).

10. Cornus canadensis (Bunchberry)
    Scattered on f type, shows some soil moisture present (for separation from d type); more abundant on m(g) type, present on all moist types.

11. Cornus stolonifera (Red-osier dogwood)
    On all moist habitats m(g), m, vm, and w; even in half bogs.

12. Ribes hirtellum (Low wild gooseberry)
    Typical for m type.

13. Ribes glandulosum (Skunk current)
    Typical for m type.

14. Mitella nuda (Naked miterwort)
    Very characteristic for m and vm habitat types.

15. Gaultheria hispidula (Creeping snowberry)
    Found on m(g) type of low margin of beach (mostly on rotten wood).

16. Alnus rugosa (Speckled alder)
    Characteristic of moist soil conditions, m, vm, wet, mineral soil types and half bogs.

17. Tomenthypnum nitens (and Oxycoccus quadrialus) (Bog cranberry)
    On mineral soil only on vm and w types (not on m), abundant on low moors.

18. Calth palustris (Marsh marigold)
    Characteristic on w mineral soil type and useful for distinguishing this from m type. Also on deep organic deposits.

19. Sphagnum spp.
    Restricted to deep organic deposits and saturated moisture regimes.

20. Ericaceae spp.(Heath)
    a: any of a family of shrubby dicotyledonous and often evergreen plants that thrive on open barren usu. acid and ill-drained soil; esp:an evergreen subshrub of either of two genera (Erica and Calluna) with whorls of needlelike leaves and clusters of small flowers. b: any of various plants that resemble true heaths.

INDICATOR PLANTS

MOISTURE REGIME	LANDFORM	INDICATOR PLANTS		SUBTYPE AND SITE CLASS					
		ABUNDANT	SCATTERED	JP	WS	BP	BS	TL	TA
ARID	rock outcrop, higher gravel beach ridges	reindeer moss, creeping savin	bearberry	2	3	-	-	-	3
DRY	higher beach, outwash and moraine ridges	bearberry, creeping savin, reindeer moss, slender mountain rice	common juniper, soapberry	2	3	3	3	-	2
MOIST (ground water and vadose water types)	low positions and flaring-out margins on beach and outwash OR till plains, lacustrine flats and higher flood plains	red-osier dogwood, bunchberry, Ribes sp. naked miterwort, creeping snowberry	buffalo berry, common juniper, rough grained mountain rice, alder	1	1	1	1	-	1
VERY MOIST	depressional positions on beach and outwash and lacustrine deposits	red-osier dogwood, naked miterwort, bunchberry, Ribes sp., alder	bog cranberry	1	1	1	1	1	1
WET	depressional positions on till and lacustrine material	alder, marsh marigold, bog cranberry		-	-	-	1	1	1
SATURATED	deep organic terrain	sphagnum sp., labrador tea, marsh marigold		-	-	-	2	2	-

NOTE: - Arid sites are generally devoid of tree cover.

5. Cutting Class

Cutting class is based on size, vigour, state of development and maturity of a stand for harvesting purposes.

a) Class 0 - Forest land not restocked following fire, cutting, windfall or other major disturbances (hence, potentially productive land). Some reproduction or scattered residual trees (with net merchantable volume less than 20 m^3 per hectare) may be present.

b) Class 1 - Stands which have been restocked either naturally or artificially. There may be scattered residual trees present as in Cutting Class 0. To be in Cutting Class 1 the average height of the stand must be less than 3 meters.

c) Class 2 - Advanced young growth of post size, with some merchantable volume. The average height of the stand must be over 3 meters in order to be in this cutting class.

d) Class 3 - Immature stands with merchantable volume growing at or near their maximum rate, which definitely should not be cut. The average height of the stand should be over 10 meters and the average diameter should be over 9.0 centimeters (9.0 cm) at Dbh (1.3 m).

e) Class 4 - Mature stands which may be cut as they have reached rotation age (+\-) 10 years on Site 1 or (+\-) 20 years on Site 2.

f) Class 5 - Overmature stands, which should be given priority in cutting.

FOREST INVENTORY
ROTATION AGES

SPECIES	SITES	Forest Management Unit									CC 4
		01-07	10-15	20,23	30-39	40-47	51-57	60-66	71-75	82-99	+ -
Jack Pine/Scots Pine	**All Sites**	60	60	60	80	60	75	80	80	80	10
Red Pine/White Pine	**All Sites**	-	-	80	-	80	-	-	-	-	10
Black Spruce	**Site 1**	80	80	80	80	80	80	80	100	80	10
	Site 2	140	140	140	140	140	140	140	140	140	20
	Site 3	-	140	140	140	140	140	140	140	140	20
White Spruce	**All Sites**	80	100	80	100	80	100	100	100	100	10
Balsam Fir	**All Sites**	-	60	60	70	60	80	80	-	80	10
Tamarack Larch	**Site 1**	90	90	90	90	90	90	-	-	-	20
	Site 2	140	140	140	140	140	140	-	-	-	20
Eastern Cedar	**Site 1**	-	-	80	-	80	80	-	-	-	10
	Site 2	-	-	140	-	140	140	-	-	-	20
Hardwoods	**All Sites**	60	60	60	60	60	60	80	80	80	10

6. Crown Closure Class

Crown closure will be estimated from the photographs by the photo-interpreter. Four classes will be recognized and entered onto the stand description sheet for each township as part of the photo-interpreter type aggregate. Changes of this estimate can be made only under exceptional circumstances.

Code

0 - 0 % - 20% crown closure

2 - 21% - 50% crown closure

3 - 51% - 70% crown closure

4 - 71% and over

Example of type a aggregate written in full

04-1-3-4

Where:

0 - Cover Type: Softwood

4 - Subtype: Jack Pine 71% - 100%

1 - Site 1

3 - Cutting Class 3

4 - Crown closure 71% and over

7. Species Composition

The species composition of the stand is based on the comparison of the tree count (basal area) for each species to the total tree count (basal area) of the stand expressed as a percentage. Species composition will be calculated to the nearest 1/10 percent for species group determination purposes and then rounded to the nearest 10 percent before entering the species composition as an introductory portion of the type aggregate.

EXAMPLE:

Species	Tree Count	Percentage
bs	68	$\frac{68}{118} \times 100 = 57.6\% = 6$
jp	50	$\frac{50}{118} \times 100 = 42.4\% = 4$
total	118 trees	

Hence: a) This is softwood - Black Spruce, therefore Cover Type - 1

b) The main species Black Spruce 40% - 70%, subtype Code - 4

c) Species composition - bs6jp4 - this symbol will be entered on the stand index card in front of the type aggregate code.

FOREST INVENTORY
CULL FACTORS IN PERCENT

Species	M.U. 13		M.U. 14		M.U. 20, 23		Section 3		M.U. 40-47		All other areas	
	10-24 cm	25 cm+	10-24 cm	25 cm+	10-24 cm	25 cm+	10-24 cm	25 cm+	10-24 cm	25 cm+	10-24 cm	25 cm+
BS, WS	5	10	5	10	5	10	5	5	5	5	5	10
JP	5	10	5	15	10	15	10	25	10	15	10	15
BF	15	40	15	40	15	25	25	40	25	40	15	25
TL	5	10	5	15	10	10	10	10	10	10	10	10
EC	10	20	10	20	30	70	10	20	10	20	10	20
H	15	25	15	25	20	40	20	40	20	40	20	40
TA	20	40	20	40								
BA	20	40	30	40								
WB	5	15	5	10								

APPENDIX 13

MANITOBA CONSERVATION
FORESTRY BRANCH

Forest Damage Appraisal and Valuation

2002

Forest Damage Appraisal and Valuation

On all Crown land regardless of Crown Land Classification Committee (C.L.C.C.) or other land use zoning or designation, the Crown controls timber rights. All operations on these lands causing the disturbance or destruction of any timber whether young growth, mature timber, or plantations must receive Regional Operations and\or Integrated Resource Management Teams (IRMT) approval and be covered by all necessary work permits and authorizations required by legislation. The requirements of authorization and valid permits apply to all users, whether they are members of the public, private agencies or other Departments and Crown Corporations. The only exception is the clearing of leased Agricultural Crown Lands which is covered by different procedures - although timber charges levied can be calculated using the attached procedures (See Circular FBTM - 28-2).

The intent of this procedure is to encourage the planning and orderly removal of timber products during any forest operation. If regional staff are given enough time and the removal follows proper procedures, including all applicable mitigating conditions, only the basic charges of timber dues, and the Forest Renewal and Fire Protection charges will be levied. If, however, timber whether merchantable or unmerchantable is destroyed and \ or not salvaged, or areas which have had significant forestry investment, are disturbed, additional charges as identified in this document will be applied.

The MNR Forestry Branch and Regional Operations requests that a minimum of 12 months notice be given by the 'user' (permitee \ proponent) to allow for the orderly harvest of the merchantable timber off the lands to be cleared. Regional Operations and Forestry Branch staff will determine the method of timber disposal. The wood may be removed as part of existing industrial FML or quota commitments by a third party. Or it may be that the 'user' will have the option of cutting and marketing the timber themselves under the authority of a Timber Permit once all dues and charges have been paid. If the 'user' does not wish the timber, they may be directed to cut and pile the timber in tree length or other form as directed by Regional Operations staff at approved locations. In this case, Regional Operations staff will auction or dispose of the timber following normal procedures. If, due to urgency or other reason, insufficient notice is provided, the 'user' will be directed to make every attempt to harvest the merchantable timber while clearing the land. If after all attempts, the merchantable timber can not be salvaged or if immature stands or established plantations are disturbed resulting in non-merchantable material being produced, the 'user' will be assessed a forest damage appraisal charge using the procedures outlined in the following pages.

As timber dues, gross merchantable volumes, mean annual increments and age classes vary from Forest Management Unit to Forest Management Unit and by Forest Section, each region should use the attached formula to calculate their own yearly growth and timber values. With the anticipated changes underway in the Forest Resource Management Section including the new techniques and calculations of forest growth, the attached process will be modified when yield tables and year of origin data is available. Attached for present use are the Forest Section and mean annual increment and age distribution data.

Due to the wide range of site types, conditions and methods, values such as silvicultural treatment costs have been derived on a regional basis and incorporated into a provincial Forest Renewal Charge (FRC) and a provincial Establishment Cost and are included. The FRC is used to calculate the cost to replace disturbed mature forest. Due to the lack of volume growth over the short-term and the high cost of plantation establishment, Plantations if damaged are much more costly to replace and the Establishment Cost has been set based on actual regional average costs. Other Forestry operations such as permanent and research sample plots, intensively managed sites, tree improvement sites fall into the category of 'High Value Forestry Sites'. The cost assessed for these will be calculated from project records and will be in addition to the FRC. It is intended that these values will be updated regularly to incorporate current costs.

In addition, as the time and effort to perform this type of valuation resulting from poorly planned or unauthorized timber destruction is outside the normal day to day activities of Regional Operations staff, the 'user' will be charged for the investigating staffs' time and expenses.

There may be cases where due to inaccessibility or remoteness, the marketing of the merchantable timber might be difficult. In this event, salvage or other dues rates might be applied instead of full stumpage rates. Again, this is at the Regional Operations and Forestry Branches' discretion. However, the operations and access to these remote areas is likely winter-season only, consequently, the removal of the timber products would still be possible and the onus still on the 'user' to utilize it.

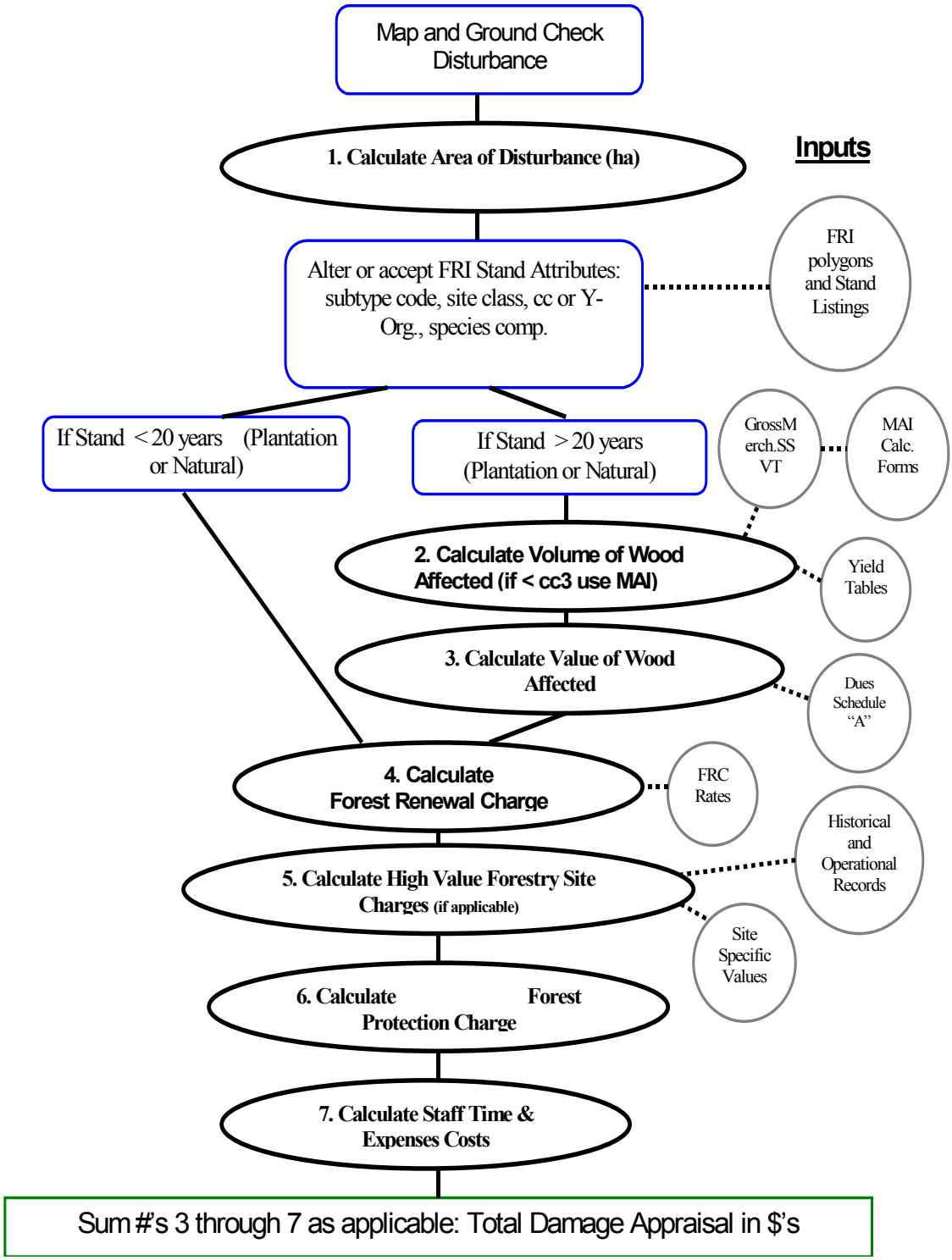


Figure A12-1. Forest Damage Appraisal and Valuation Flowchart

APPENDIX II

A) PROVINCIAL FOREST PROTECTION COST (1989)

Protection Cost	cost per cubic meter - calculated by Forest Management Section -applied to Primary Protection Zone only	= $**0.17** /$m^3$
Average Volume	average merchantable volume per hectare for all cover types	= 150 m^3/ha
		=$25.50/ha

B) FOREST RENEWAL CHARGE (1996):

Softwood	**$4.58** /$m^3$
Hardwood	**$0.50** /$m^3$

C) YEARLY GROWTH VALUE (Use attached Spreadsheet)

Mean Annual Increment (M^3\ha\yr) x Age Class Midpoint (yrs) = _____ m^3

Mean Annual Increment	per species, by Forest Section, by working group by site -see tables attached
Age Class Midpoint	by Forest Section -see tables attached
Dues	by Forest Section -see Schedule "A" (Revision _____) of Forest Act Regulations.

D) ESTABLISHMENT COST (based on 1999 FRC Review)

Provincial Average: **$882.35** per ha

APPENDIX III

STAFF TIME AND EXPENSE COST

Investigating Staff:

Position_____, Wage Rate /hr._____ X _____hrs = $_____
Position_____, Wage Rate /hr._____ X _____hrs = $_____
Position_____, Wage Rate /hr._____ X _____hrs = $_____
Position_____, Wage Rate /hr._____ X _____hrs = $_____
Position_____, Wage Rate /hr._____ X _____hrs = $_____
Position_____, Wage Rate /hr._____ X _____hrs = $_____
Position_____, Wage Rate /hr._____ X _____hrs = $_____

Total Wage Expense $_____

Vehicle Mileage:

Vehicle_____, Mileage Rate_____/km X_____kms = $_____
Vehicle_____, Mileage Rate_____/km X_____kms = $_____
Vehicle_____, Mileage Rate_____/km X_____kms = $_____
Vehicle_____, Mileage Rate_____/km X_____kms = $_____

Total Mileage Expense $_____

Itemized Miscellaneous Expenses:

_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____

Total Misc. Expenses $_____
Total Staff Time and Expense Costs **$_____**

Assessment Summary:

1) Area of Disturbance:

Stand Number	**Area** Affected (ha)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Total

2) Establishment Cost (from Calcs. Sheet). =$_____

3) Timber Volume (from Calcs. Sheet),

Softwood = _____, Hardwood =_____ = _____m^3

4) Total Timber Value (from Calcs. Sheet) =$ _____

5) FRC Calculation: Soft. Volume (m^3) x $4.58 =$ _____
Hard. Volume (m^3) x $0.50 =$ _____

6) Fire Protection: Volume (m^3) x $0.17 =$ _____

7) High Value Forestry Site: (actual costs) =$ _____

8) Staff Time & Expense Cost: (actual costs) =$ _____

Total Damage Appraisal =$ _____

Signature:_____
Investigating Officer

Approved:_____
Regional Forester

APPENDIX IV:

Age Distribution in years by Cutting Class and Working Group

FOREST SECTIONS: 6 & 8 – Highrock & Nelson River

WORKING GROUP / SITE	CUTTING CLASS 1	2	3	4	5
Jack Pine / All	1 – 10 (5)	11 – 25 (18)	26 - 70	71 - 90	91+
Black Spruce / 1	1 – 15 (8)	16 – 30 (23)	31 - 70	71 - 90	91+
Black Spruce / 2 & 3	1 – 30 (15)	31 – 75 (53)	76 - 120	121 - 160	161+
White Spruce / All	1 – 20 (11)	21 – 30 (26)	31 - 90	91 - 110	111+
Balsam Fir / All	1 – 10 (5)	11 – 25 (18)	26 - 70	71 - 90	91+
Tamarack / 1	1 – 15 (8)	16 – 30 (23)	31 - 70	71 - 110	111+
Tamarack / 2	1 – 25 (13)	26 – 70 (48)	71 - 120	121 - 160	161+
Hardwoods / All	1 – 15 (8)	16 – 30 (23)	31 - 70	71 - 90	91+

* Age Class Midpoints ( )

APPENDIX V: Mean Annual Increment by Working Group and Species (updated 4/1981)

FOREST SECTION: 8 – Nelson River

WORKING GROUP / SITE	SPECIES											TOTAL
	OTHER PINE	JACK PINE	BLACK SPRUCE	WHITE SPRUCE	BALSAM FIR	TAMARACK	CEDAR	ASPEN	BALSAM POPLAR	WHITE BIRCH	OTHER HRDWD	
JACK PINE / 1		1.06	0.30	0.03				0.27	0.03	0.04		1.73
JACK PINE / 2		0.96	0.13	0.05					0.01	0.04		1.19
WHITE SPRUCE / 1		0.04	0.37	1.02	0.16			0.28	0.04	0.11		2.02
BLACK SPRUCE / 1		0.14	1.07	0.10	0.02			0.11	0.02	0.03		1.49
BLACK SPRUCE / 2		0.02	0.43	0.01				0.01	0.01			0.48
BLACK SPRUCE / 3		0.03	0.42	0.13				0.06	0.02	0.01		0.67
BALSAM FIR / 1			0.13	0.45	0.85			0.35	0.02	0.15		1.95
HARDWOODS / 1		0.13	0.14	0.20	0.02			1.13	0.10	0.07		1.79
HARDWOODS / 2		0.13	0.04					1.07	0.06	0.01		1.31
HARDWOODS / 3		0.03	0.38					0.92	0.33			1.66

APPENDIX 14

NELSON RIVER FOREST SECTION NET MERCHANTABLE STAND STOCK VOLUME TABLE (M^3)

Table A14-1. Nelson River forest section net merchantable stand stock volume.

COVERTYPE	OTHER_P	J_PINE	B_SPR	W_SPR	B_FIR	LARCH	CEDAR	T_ASPEN	B_POP	BIRCH	OTHER_H	TOTAL
04132	0.0000	15.1014	1.1859	0.0591	0.0000	0.0000	0.0000	0.3959	0.1036	0.0990	0.0000	16.9449
04133	0.0000	36.0556	4.2479	0.1023	0.0000	0.0855	0.0000	1.5111	0.1535	0.3127	0.0000	42.4686
04134	0.0321	66.5609	3.1881	0.0970	0.0000	0.0124	0.0000	3.7235	0.3136	1.1303	0.0000	75.0579
04142	0.0000	20.0160	4.7686	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	24.7846
04143	0.0000	58.5660	10.0289	0.9541	0.0000	0.0000	0.0000	0.2344	1.8163	1.2603	0.0000	72.8600
04144	0.0000	104.8437	6.3862	0.3504	0.0000	0.0000	0.0000	5.4157	0.8659	1.2470	0.0000	119.1089
04153	0.0000	67.8749	13.2794	1.0670	0.0000	2.6506	0.0000	0.0000	2.9364	2.0879	0.0000	89.8962
04154	0.0000	97.4765	7.5520	3.2675	0.0000	0.0000	0.0000	6.1802	0.0000	0.8221	0.0000	115.2983
04232	0.0000	13.4151	0.7316	0.0000	0.0000	0.0000	0.0000	0.4512	0.0557	0.1905	0.0000	14.8441
04233	0.0000	29.3116	2.3077	0.1672	0.0000	0.0000	0.0000	0.6310	0.1722	0.5911	0.0000	33.1808
04234	0.0000	48.4762	4.0777	0.0000	0.0000	0.0000	0.0000	0.1220	0.0000	0.6020	0.0000	53.2779
04242	0.0000	28.5822	7.7000	1.2689	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	37.5511
04243	0.0000	48.7424	11.5018	0.0000	0.0000	0.0000	0.0000	0.0000	1.0565	0.3262	0.0000	61.6269
04252	0.0000	30.3643	0.0000	1.3995	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	31.7638
06132	0.0000	8.4438	2.9382	0.0000	0.0000	0.1739	0.0000	1.1744	0.0461	0.0964	0.0000	12.8728
06133	0.0000	28.0119	14.3310	2.0438	0.0000	0.0000	0.0000	3.1534	0.4445	0.1648	0.0000	48.1494
06134	0.0000	49.2351	23.6370	1.7944	0.0000	0.2980	0.0000	6.6253	0.4135	1.3235	0.0000	83.3268
06142	0.0000	15.2675	5.3647	0.0000	0.0000	0.0000	0.0000	0.5971	0.9255	0.0000	0.0000	22.1548
06143	0.0000	57.9099	26.5770	2.3345	0.0000	0.1326	0.0000	6.8017	1.1813	2.1248	0.0000	97.0618
06144	0.0000	69.0143	36.4711	4.9628	0.0000	0.0000	0.0000	12.1160	1.1150	2.6198	0.0000	126.2990
06153	0.0000	59.5704	27.8857	1.3963	0.0000	0.0000	0.0000	1.6443	1.2611	1.8941	0.0000	93.6519
06154	0.0000	91.8951	58.7783	2.6419	0.0000	0.0000	0.0000	16.9768	9.5045	0.0000	0.0000	179.7966
06232	0.0000	11.7881	5.9851	0.3689	0.3314	0.0424	0.0000	0.6564	0.1130	0.0440	0.0000	19.3293
06233	0.0000	21.8946	13.6700	0.0000	0.0000	0.9034	0.0000	0.8317	0.0000	0.4226	0.0000	37.7223
06234	0.0000	26.2049	21.3849	1.0574	0.0000	0.9132	0.0000	1.0109	0.0000	0.0000	0.0000	50.5713
06242	0.0000	15.9521	9.8037	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3787	0.0000	26.1345
06244	0.0000	64.0532	32.7747	4.9295	0.0000	0.0000	0.0000	0.6517	1.7097	1.4072	0.0000	105.5260
10133	0.0000	0.0000	0.0000	85.6011	0.0000	0.0000	0.0000	1.2085	0.0000	0.0000	0.0000	86.8096
10134	0.0000	0.0000	3.9008	118.2011	10.8927	0.0000	0.0000	3.8010	1.1383	7.8037	0.0000	145.7376
10144	0.0000	0.6064	4.6832	179.8209	6.2360	0.0000	0.0000	9.3163	1.1127	7.7104	0.0000	209.4859
10152	0.0000	0.0000	0.9835	28.4638	0.0000	0.0000	0.0000	0.8900	0.0000	0.0000	0.0000	30.3373
10154	0.0000	0.0000	13.2486	215.7170	9.5953	0.0000	0.0000	0.5493	0.5276	7.3655	0.0000	247.0033
11132	0.0000	0.0000	6.3670	15.0832	2.1012	0.0000	0.0000	0.0000	1.5947	1.1980	0.0000	26.3441
11133	0.0000	2.5209	21.6236	57.0125	3.2533	0.4026	0.0000	3.9710	1.2264	1.5048	0.0000	91.5151
11134	0.0000	2.0347	27.6791	82.9557	10.3886	0.0000	0.0000	6.7100	1.3873	5.6791	0.0000	136.8345

COVERTYPE	OTHER_P	J_PINE	B_SPR	W_SPR	B_FIR	LARCH	CEDAR	T_ASPEN	B_POP	BIRCH	OTHER_H	TOTAL
11142	0.0000	0.0000	7.1529	23.1758	8.8254	0.0000	0.0000	3.8870	0.0000	1.0336	0.0000	44.0747
11143	0.0000	1.1115	21.0233	68.7857	12.4837	0.0000	0.0000	5.6188	0.9335	2.6511	0.0000	112.6076
11144	0.0000	3.2820	33.5981	103.4141	8.9373	0.0000	0.0000	7.6188	1.6932	5.2768	0.0000	163.8203
11153	0.0000	0.0000	13.4487	60.6808	11.5438	0.0000	0.0000	0.3195	0.0000	4.3546	0.0000	90.3474
11154	0.0000	1.7259	34.4557	111.9535	24.0062	0.0000	0.0000	4.4452	1.5491	4.3399	0.0000	182.4755
13132	0.0000	1.1409	17.0839	0.1618	0.0000	0.4296	0.0000	0.3457	0.1973	0.3576	0.0000	19.7168
13133	0.0000	2.2926	48.6651	1.5280	0.1057	0.2497	0.0000	2.0192	0.4260	0.8496	0.0000	56.1359
13134	0.0000	1.5472	69.1522	3.0754	0.4635	0.2472	0.0000	1.6922	0.4034	1.3152	0.0000	77.8963
13142	0.0000	1.3674	30.7956	0.6438	0.0487	0.0532	0.0000	0.2877	0.7879	0.4052	0.0000	34.3895
13143	0.0000	2.8499	66.4769	4.1111	0.4499	0.1724	0.0000	0.5198	1.2099	0.5777	0.0000	76.3676
13144	0.0000	4.0999	101.9824	4.7337	0.3595	0.0557	0.0000	2.6361	0.8313	0.9251	0.0000	115.6237
13152	0.0000	0.3443	39.1895	0.9932	0.1064	0.2879	0.0000	1.0079	0.7825	0.0000	0.0000	42.7117
13153	0.0000	1.3557	76.4736	4.7988	0.7924	0.1105	0.0000	0.7255	0.7093	0.7167	0.0000	85.6825
13154	0.0000	0.8555	107.6668	6.2189	1.1645	0.1644	0.0000	0.5181	0.6999	0.6692	0.0000	117.9573
13232	0.0000	0.2162	24.2746	0.4348	0.0327	0.4507	0.0000	0.3619	0.3233	0.3603	0.0000	26.4545
13233	0.0000	0.5437	42.3079	1.2265	0.1350	0.3266	0.0000	0.4505	0.2350	0.3389	0.0000	45.5641
13234	0.0000	1.4441	66.9092	2.1776	0.2667	1.4591	0.0000	1.6262	0.5249	1.0826	0.0000	75.4904
13242	0.0000	0.0000	28.2187	0.0000	0.0000	0.3857	0.0000	0.2070	0.5114	0.0000	0.0000	29.3228
13243	0.0000	1.6957	54.3817	0.3726	0.0000	0.3548	0.0000	0.0000	0.2840	0.1329	0.0000	57.2217
13244	0.0000	0.8726	82.4047	0.5113	0.3147	0.7478	0.0000	0.2380	0.2889	0.0000	0.0000	85.3780
13252	0.0000	0.0000	7.0711	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	7.0711
13253	0.0000	0.0000	64.6572	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	64.6572
13332	0.0000	2.3059	21.1731	0.1489	0.0000	0.0000	0.0000	0.0552	0.1798	0.0948	0.0000	23.9577
13333	0.0000	4.1700	36.2809	0.0000	0.0000	0.0000	0.0000	1.2740	0.0588	0.4785	0.0000	42.2622
13334	0.0000	5.0099	64.3788	1.4816	0.1779	0.0000	0.0000	0.2151	0.5265	0.7075	0.0000	72.4973
13343	0.0000	0.0000	66.8305	0.0000	0.0000	0.0000	0.0000	0.0000	4.5593	0.6548	0.0000	72.0446
13344	0.0000	7.4734	69.6740	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	77.1474
14132	0.0000	6.8041	11.6237	0.0000	0.0723	0.8097	0.0000	0.2993	0.0542	0.7457	0.0000	20.4090
14133	0.0000	17.8602	33.8210	1.3569	0.0743	0.2091	0.0000	3.4582	0.4926	0.2117	0.0000	57.4840
14134	0.0000	27.2852	56.2976	1.9206	0.0000	0.1061	0.0000	7.3620	1.1042	0.7843	0.0000	94.8600
14142	0.0000	7.1554	17.0581	4.0789	0.0000	0.0000	0.0000	5.1214	0.0000	0.0000	0.0000	33.4138
14143	0.0000	23.5191	47.2804	0.4024	0.0000	0.4606	0.0000	2.2565	0.4392	0.2452	0.0000	74.6034
14144	0.0000	34.0391	69.9544	2.0070	0.1805	0.1452	0.0000	6.3606	1.5552	1.8621	0.0000	116.1041
14152	0.0000	8.8299	28.3260	0.0000	0.0000	0.0000	0.0000	3.5738	0.3811	0.0000	0.0000	41.1108
14153	0.0000	10.1755	36.6138	0.0000	0.0000	0.0000	0.0000	6.5902	0.0000	1.1705	0.0000	54.5500
14154	0.0000	33.3918	72.8839	13.7443	0.7239	0.0000	0.0000	12.0698	2.1525	3.5579	0.0000	138.5241
14232	0.0000	16.4154	26.9038	0.0000	0.0000	1.2844	0.0000	0.0000	0.0000	0.0000	0.0000	44.6036

COVERTYPE	OTHER_P	J_PINE	B_SPR	W_SPR	B_FIR	LARCH	CEDAR	T_ASPEN	B_POP	BIRCH	OTHER_H	TOTAL
14332	0.0000	9.6519	14.7805	0.0000	0.0000	0.0000	0.0000	0.7451	0.2392	0.6649	0.0000	26.0816
14333	0.0000	14.7835	27.1246	0.0000	0.0000	0.1338	0.0000	0.9439	0.0000	1.2282	0.0000	44.2140
14334	0.0000	32.1955	57.0313	0.0000	0.0000	1.3215	0.0000	2.2957	1.2348	0.2077	0.0000	94.2865
15132	0.0000	0.4065	15.0103	4.7396	1.9758	0.6937	0.0000	1.2698	1.1252	0.4827	0.0000	25.7036
15133	0.0000	0.7788	39.1450	12.1385	2.5318	0.7450	0.0000	3.5072	2.1829	1.2447	0.0000	62.2739
15134	0.0000	0.8878	51.2958	33.8024	4.8755	0.0505	0.0000	5.2571	1.0663	2.6136	0.0000	99.8490
15142	0.0000	3.0681	32.9986	19.1264	5.5333	0.0000	0.0000	0.0000	0.0000	2.4354	0.0000	63.1618
15143	0.0000	1.6352	49.2008	30.5863	6.8259	0.1474	0.0000	5.4324	1.4312	2.5563	0.0000	97.8155
15144	0.0000	2.5883	72.0869	38.2330	7.5876	0.0000	0.0000	6.2061	0.8342	3.3308	0.0000	130.8669
15152	0.0000	0.0000	36.0633	12.9934	0.0000	0.0000	0.0000	0.0000	4.4712	0.0000	0.0000	53.5279
15153	0.0000	0.0000	46.1858	29.8402	5.4830	0.4703	0.0000	2.4685	1.6158	3.3430	0.0000	89.4066
15154	0.0000	0.7843	83.9340	44.7634	10.9930	0.0000	0.0000	5.3391	0.6305	3.5579	0.0000	150.0022
15233	0.0000	0.0000	37.8658	9.3014	7.9995	1.5180	0.0000	0.6283	2.8627	2.1145	0.0000	62.2902
15332	0.0000	2.7392	12.5398	7.7775	0.0000	4.2026	0.0000	0.0000	0.0000	0.0000	0.0000	27.2591
15343	0.0000	0.8233	45.1916	17.8889	0.0000	0.0000	0.0000	4.3137	0.4183	0.8966	0.0000	69.5324
15354	0.0000	0.0000	67.2090	32.5325	0.0000	0.0000	0.0000	0.0000	0.0000	4.7136	0.0000	104.4551
16132	0.0000	0.5955	11.2470	0.0000	0.0000	5.0128	0.0000	0.0000	0.0000	0.9688	0.0000	17.8241
16133	0.0000	0.0000	25.6922	0.0000	0.0000	9.0329	0.0000	0.0000	0.0000	0.0000	0.0000	34.7251
16232	0.0000	0.1632	18.7164	0.0000	0.0000	12.1966	0.0000	0.0000	0.0000	1.3092	0.0000	32.3854
16233	0.0000	0.5577	30.4126	3.5233	0.0000	12.1724	0.0000	2.0617	0.5453	0.1688	0.0000	49.4418
20144	0.0000	0.0000	0.0000	40.6188	88.6801	0.0000	0.0000	0.0000	0.0000	4.1497	0.0000	133.4486
21132	0.0000	0.0000	6.8169	24.6965	19.2106	0.0000	0.0000	0.0000	0.0000	2.0315	0.0000	52.7555
21133	0.0000	0.0000	4.5454	26.1174	35.0896	0.0000	0.0000	2.3504	0.6670	1.2251	0.0000	69.9949
21134	0.0000	0.0000	11.9229	34.5003	50.1128	0.0000	0.0000	6.1014	0.0000	7.1238	0.0000	109.7612
21143	0.0000	0.0000	3.8563	40.9798	33.4539	0.0000	0.0000	0.0000	0.0000	9.5413	0.0000	87.8313
21144	0.0000	0.0000	20.6398	56.0479	40.6316	0.0000	0.0000	2.8424	0.0000	6.3703	0.0000	126.5320
21152	0.0000	0.0000	8.9746	29.0581	33.0073	0.0000	0.0000	0.0000	0.0000	3.2827	0.0000	74.3227
31132	0.0000	1.6650	8.0550	0.0000	0.0000	10.4080	0.0000	1.3187	0.1666	0.7764	0.0000	22.3897
31233	0.0000	0.0000	17.4421	6.6010	0.0000	15.0009	0.0000	1.1843	0.0000	0.3937	0.0000	40.6220
44132	0.0000	8.8429	1.1856	0.0000	0.0000	0.0000	0.0000	2.9566	0.1205	0.1120	0.0000	13.2176
44133	0.0000	23.2223	1.4359	0.4920	0.0000	0.0000	0.0000	6.5769	1.1427	1.8681	0.0000	34.7379
44134	0.0000	55.2641	3.9361	0.7656	0.0000	0.0000	0.0000	17.8088	1.5983	2.4508	0.0000	81.8237
44142	0.0000	33.1266	0.0000	0.0000	0.0000	0.0000	0.0000	10.8921	0.0000	0.0000	0.0000	44.0187
44143	0.0000	34.3287	11.6373	0.0000	0.0000	0.0000	0.0000	6.2967	0.0000	9.5975	0.0000	61.8602
44144	0.0000	79.3162	5.2901	2.6423	0.0000	0.0000	0.0000	23.4555	1.6704	2.4440	0.0000	114.8185
44154	0.0000	67.1767	6.3026	4.1483	0.0000	0.0000	0.0000	22.1190	0.5785	0.0000	0.0000	100.3251
44232	0.0000	4.5463	1.9590	0.0000	0.0000	0.0000	0.0000	0.9621	0.6500	0.0000	0.0000	8.1174

COVERTYPE	OTHER_P	J_PINE	B_SPR	W_SPR	B_FIR	LARCH	CEDAR	T_ASPEN	B_POP	BIRCH	OTHER_H	TOTAL
44234	0.0000	38.1817	2.6028	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	7.7753	0.0000	48.5598
44243	0.0000	25.2718	0.0000	0.0000	0.0000	0.0000	0.0000	11.5297	1.1365	0.0000	0.0000	37.9380
46132	0.0000	7.5199	1.7067	1.2942	0.6076	0.0000	0.0000	4.0710	0.0000	0.0000	0.0000	15.1994
46133	0.0000	23.3021	11.3870	4.5466	0.1601	0.4487	0.0000	11.0274	1.2904	0.6546	0.0000	52.8169
46134	0.0000	43.1062	21.1070	2.8716	0.0846	0.0483	0.0000	21.1356	1.8796	2.0586	0.0000	92.2915
46143	0.0000	29.9479	17.3235	1.1095	0.0000	0.0000	0.0000	14.6229	0.3740	2.0161	0.0000	65.3939
46144	0.0000	61.2908	24.7267	5.6515	0.0000	0.0000	0.0000	33.1329	3.0700	1.5343	0.0000	129.4062
46153	0.0000	31.1980	11.7595	7.5316	0.0000	0.0000	0.0000	18.0995	0.8374	0.0000	0.0000	69.4260
46154	0.0000	65.2068	23.4049	6.6162	0.0000	0.0000	0.0000	29.5773	2.0418	6.9495	0.0000	133.7965
46232	0.0000	0.7932	0.8512	0.0000	0.0000	0.0000	0.0000	1.0091	0.0000	0.0000	0.0000	2.6535
46233	0.0000	12.0529	6.1892	0.0000	0.0000	0.1835	0.0000	8.3614	0.6689	0.9249	0.0000	28.3808
46234	0.0000	25.4977	17.4761	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	11.1822	0.0000	54.1560
50132	0.0000	0.0000	0.0000	32.3934	0.0000	0.0000	0.0000	0.0000	0.0000	18.2350	0.0000	50.6284
50133	0.0000	0.0000	3.2918	58.9355	0.5013	0.0000	0.0000	7.6552	2.3883	8.7789	0.0000	81.5510
50134	0.0000	1.9764	8.4476	84.9708	4.0884	0.0000	0.0000	15.3691	2.0536	10.7012	0.0000	127.6071
50142	0.0000	0.0000	1.7338	25.3744	2.2704	0.0000	0.0000	0.0000	5.1566	0.6928	0.0000	35.2280
50143	0.0000	0.0000	5.3648	96.5448	13.4290	0.0000	0.0000	11.8026	2.2153	2.4716	0.0000	131.8281
50144	0.0000	0.0000	5.5194	116.0639	6.9487	0.0000	0.0000	42.3077	5.0571	4.5360	0.0000	180.4328
50154	0.0000	0.0000	9.9792	147.6179	0.0000	0.0000	0.0000	23.2520	2.9550	7.2260	0.0000	191.0301
51132	0.0000	0.0000	7.7907	14.5799	0.0000	0.0000	0.0000	5.9351	2.3478	3.6056	0.0000	34.2591
51133	0.0000	0.4457	12.3934	31.7325	8.3744	0.0551	0.0000	11.3928	3.5247	5.3263	0.0000	73.2449
51134	0.0000	2.8591	18.7447	62.3911	5.4080	0.0552	0.0000	28.0265	1.7386	4.8658	0.0000	124.0890
51142	0.0000	0.0000	11.5626	23.4694	0.2669	0.0000	0.0000	8.0138	0.0000	1.9545	0.0000	45.2672
51143	0.0000	2.0805	19.6527	59.4993	5.6825	0.0000	0.0000	22.4080	2.1052	3.4927	0.0000	114.9209
51144	0.0000	4.8529	19.6121	74.5205	12.7375	0.0000	0.0000	28.2239	1.8652	11.3200	0.0000	153.1321
51153	0.0000	0.0000	31.0439	64.3605	8.3829	0.0000	0.0000	23.1667	0.3283	4.5299	0.0000	131.8122
51154	0.0000	0.3824	25.2269	84.7505	8.0859	0.0000	0.0000	21.8042	10.7343	0.8030	0.0000	151.7872
53132	0.0000	0.0467	12.9123	1.2748	0.0000	0.1413	0.0000	4.8005	0.0370	1.1679	0.0000	20.3805
53133	0.0000	1.5119	33.8720	2.7455	0.2751	0.4028	0.0000	9.4632	1.0111	3.6052	0.0000	52.8868
53134	0.0000	2.7721	59.3275	3.1470	0.1584	0.0423	0.0000	21.2190	1.6440	1.8976	0.0000	90.2079
53142	0.0000	0.0000	11.0486	0.0000	0.0000	0.0000	0.0000	4.1243	0.5567	0.0000	0.0000	15.7296
53143	0.0000	1.8830	44.6295	4.7546	0.1413	0.0000	0.0000	10.4311	1.4497	4.1394	0.0000	67.4286
53144	0.0000	2.1853	72.6522	5.9774	0.1044	0.0000	0.0000	15.3694	2.8414	3.4796	0.0000	102.6097
53153	0.0000	4.2335	62.6990	10.5932	0.1283	0.0000	0.0000	17.5218	1.3794	3.9203	0.0000	100.4755
53154	0.0000	2.4120	89.7086	22.2516	0.0000	0.0000	0.0000	28.7424	2.7617	6.1349	0.0000	152.0112
53232	0.0000	0.0000	19.2063	0.0000	0.0000	0.0000	0.0000	2.0274	0.0000	4.1293	0.0000	25.3630
53233	0.0000	3.0659	26.9838	0.4250	0.0000	0.0000	0.0000	6.7556	3.6446	0.3949	0.0000	41.2698

COVERTYPE	OTHER_P	J_PINE	B_SPR	W_SPR	B_FIR	LARCH	CEDAR	T_ASPEN	B_POP	BIRCH	OTHER_H	TOTAL
53234	0.0000	0.0000	35.7678	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	16.8168	0.0000	52.5846
53332	0.0000	0.2589	27.0177	0.2704	0.0000	0.0000	0.0000	3.2871	0.0000	2.6797	0.0000	33.5138
53333	0.0000	3.9282	29.6353	0.0000	0.0000	0.0000	0.0000	7.2074	0.0000	2.2010	0.0000	42.9719
54132	0.0000	4.5998	11.6025	0.2443	0.0000	0.0000	0.0000	8.5089	0.1777	1.4111	0.0000	26.5443
54133	0.0000	9.6027	19.7858	1.4979	0.0438	0.7146	0.0000	9.5146	1.4532	2.6443	0.0000	45.2569
54134	0.0000	18.5650	40.1126	6.1712	0.4863	0.6271	0.0000	25.9674	0.6893	0.7462	0.0000	93.3651
54143	0.0000	24.7575	33.9255	3.3651	0.0000	0.0000	0.0000	25.8250	2.3383	1.8441	0.0000	92.0555
54144	0.0000	25.4672	50.7040	3.7469	0.0673	0.0000	0.0000	23.2638	3.9478	2.1114	0.0000	109.3084
54153	0.0000	14.4129	48.4999	4.7749	0.0000	0.0000	0.0000	20.8695	1.0537	1.8332	0.0000	91.4441
54154	0.0000	33.8384	57.9658	9.9304	0.0000	0.5131	0.0000	28.4089	0.8852	4.8988	0.0000	136.4406
54332	0.0000	1.9247	9.0696	1.4790	0.0000	0.0000	0.0000	6.7546	0.4111	1.1220	0.0000	20.7610
54333	0.0000	7.6078	16.6006	1.0978	0.0000	0.0000	0.0000	10.1850	1.0760	1.9627	0.0000	38.5299
54334	0.0000	12.5442	30.5438	0.8877	0.0000	0.6432	0.0000	15.8138	1.4278	1.1881	0.0000	63.0486
55133	0.0000	0.9018	26.1759	8.1522	12.9430	0.0000	0.0000	10.4311	3.2299	0.0000	0.0000	61.8339
56132	0.0000	0.0000	11.8883	0.7753	0.0000	3.7548	0.0000	3.8899	1.2520	0.5873	0.0000	22.1476
56133	0.0000	0.0000	20.5319	0.7614	0.0000	5.8285	0.0000	7.6804	9.3535	0.0000	0.0000	44.1557
56134	0.0000	0.0000	44.3160	8.1717	0.0000	3.5564	0.0000	27.6580	0.0000	0.0000	0.0000	83.7021
58132	0.0000	0.0000	16.8272	4.2025	0.0000	0.0000	0.0000	2.1062	3.4519	1.9424	0.0000	28.5302
58133	0.0000	0.5946	21.5895	17.0391	0.5358	0.3879	0.0000	15.2947	1.6437	0.9846	0.0000	58.0699
58134	0.0000	3.5605	44.4477	18.5532	2.7135	0.1667	0.0000	17.7802	3.0533	7.1011	0.0000	97.3762
58142	0.0000	0.0000	8.4755	3.5617	0.7308	0.0000	0.0000	2.4041	0.0000	0.4425	0.0000	15.6146
58143	0.0000	1.8144	31.4760	18.2362	2.1294	0.0000	0.0000	19.5742	1.6089	0.2335	0.0000	75.0726
58144	0.0000	2.8618	47.5507	34.8406	2.2810	0.0000	0.0000	25.4848	4.0467	3.8616	0.0000	120.9272
58152	0.0000	0.0000	10.3488	6.4271	0.0000	0.0000	0.0000	0.0000	0.0000	3.6261	0.0000	20.4020
58153	0.0000	3.5640	41.4918	36.7228	1.6430	0.0000	0.0000	12.2233	0.8805	2.6362	0.0000	99.1616
58154	0.0000	5.1215	59.2217	35.4633	2.9550	0.1906	0.0000	31.2623	4.6018	4.6592	0.0000	143.4754
58232	0.0000	0.0000	7.4176	3.4529	0.0000	0.0000	0.0000	0.0000	0.5542	1.6330	0.0000	13.0577
58333	0.0000	1.5920	12.9694	10.2474	3.9510	0.0000	0.0000	0.0000	2.9022	5.8543	0.0000	37.5163
60143	0.0000	0.0000	0.0000	4.6359	52.1567	0.0000	0.0000	13.6892	2.1472	6.3408	0.0000	78.9698
61132	0.0000	0.0000	0.5261	2.1614	10.4599	0.0000	0.0000	3.7070	3.6710	0.2551	0.0000	20.7805
61133	0.0000	0.0000	8.1981	20.1206	24.7573	0.0000	0.0000	19.2409	2.2994	4.5755	0.0000	79.1918
61134	0.0000	1.2575	11.7807	20.7942	35.2680	3.4889	0.0000	7.5241	9.3064	15.3941	0.0000	104.8139
61144	0.0000	0.3841	6.7200	52.8518	47.2833	0.0000	0.0000	23.2406	1.2863	12.2497	0.0000	144.0158
81132	0.0000	7.4127	1.4068	0.5961	0.0000	0.0000	0.0000	7.2421	1.3145	0.3037	0.0000	18.2759
81133	0.0000	18.6574	4.0381	2.9545	0.0000	0.0000	0.0000	23.7848	1.3136	2.2921	0.0000	53.0405
81134	0.0000	30.0976	12.1701	6.7576	0.0000	0.0000	0.0000	44.7764	8.8620	2.0526	0.0000	104.7163
81142	0.0000	19.7102	4.4568	2.5298	0.0000	0.0000	0.0000	16.5553	0.0000	2.9189	0.0000	46.1710

COVERTYPE	OTHER_P	J_PINE	B_SPR	W_SPR	B_FIR	LARCH	CEDAR	T_ASPEN	B_POP	BIRCH	OTHER_H	TOTAL
81143	0.0000	22.6424	3.4343	3.9920	0.0000	0.0000	0.0000	30.3215	1.0195	0.1792	0.0000	61.5889
81144	0.0000	40.1567	7.7777	8.5116	0.0000	0.0000	0.0000	49.4400	3.5797	2.1264	0.0000	111.5921
81154	0.0000	38.9494	15.4446	3.5071	0.0000	0.0000	0.0000	61.5111	5.7538	4.0868	0.0000	129.2528
81232	0.0000	2.2902	0.3209	0.0000	0.0000	0.0000	0.0000	7.2110	0.0000	0.0000	0.0000	9.8221
81233	0.0000	12.4859	3.8699	3.3767	0.0000	0.0000	0.0000	18.8710	0.6088	1.8578	0.0000	41.0701
82132	0.0000	1.6651	6.1804	3.2917	0.8308	0.4773	0.0000	10.2907	1.4520	0.9672	0.0000	25.1552
82133	0.0000	2.7161	18.3131	7.0847	1.3386	0.0921	0.0000	26.5900	1.7479	2.0846	0.0000	59.9671
82134	0.0000	3.8634	20.6397	18.8272	1.0075	0.0235	0.0000	48.4242	4.2659	2.6548	0.0000	99.7062
82142	0.0000	1.3472	3.3523	3.4143	0.0000	0.0000	0.0000	17.6984	0.0000	0.0000	0.0000	25.8122
82143	0.0000	6.5449	13.4356	18.6246	0.3047	0.0000	0.0000	35.4891	2.4169	1.6186	0.0000	78.4344
82144	0.0000	3.1141	21.2246	35.4381	2.7332	0.0460	0.0000	57.9049	5.2451	3.4424	0.0000	129.1484
82152	0.0000	2.2125	4.7082	8.2893	1.2687	0.0000	0.0000	23.9053	0.0000	6.3960	0.0000	46.7800
82153	0.0000	11.7007	20.3194	7.6964	0.0000	0.0000	0.0000	39.2573	1.5336	0.0000	0.0000	80.5074
82154	0.0000	9.7615	31.5265	14.4666	0.1647	0.0000	0.0000	56.9686	2.1810	3.8406	0.0000	118.9095
82332	0.0000	4.2409	4.4241	0.0000	0.0000	0.0000	0.0000	12.2423	0.0000	0.0000	0.0000	20.9073
86132	0.0000	2.3045	1.3315	0.0000	0.0000	0.0000	0.0000	0.8262	0.0000	4.8017	0.0000	9.2639
86133	0.0000	11.9802	7.8525	0.0000	0.0000	0.0000	0.0000	4.0068	5.1647	10.4659	0.0000	39.4701
87132	0.0000	0.0946	3.9541	2.9187	1.2578	0.4010	0.0000	0.3573	0.4309	7.1990	0.0000	16.6134
87133	0.0000	0.0000	19.3578	6.2331	0.2939	0.2673	0.0000	1.5506	0.0000	21.9892	0.0000	49.6919
87134	0.0000	3.8399	18.3550	18.1428	8.1827	0.3798	0.0000	13.2862	2.0218	25.2215	0.0000	89.4297
87144	0.0000	0.0000	4.5452	56.3057	4.9748	0.0000	0.0000	14.5460	0.3940	49.3103	0.0000	130.0760
87152	0.0000	0.0000	0.0000	7.4576	5.6901	0.0000	0.0000	0.8967	0.0000	9.7678	0.0000	23.8122
87153	0.0000	0.0000	3.8320	10.2197	11.0092	0.0000	0.0000	8.1893	2.9058	12.2722	0.0000	48.4282
87332	0.0000	1.9298	4.3231	0.9085	0.0000	0.0000	0.0000	6.2276	0.0000	4.0710	0.0000	17.4600
88132	0.0000	0.0000	6.3106	10.9662	1.7940	0.0000	0.0000	4.7487	7.0359	0.0000	0.0000	30.8554
88133	0.0000	3.6568	20.9925	8.5641	0.2431	0.5414	0.0000	7.3305	16.3131	6.3406	0.0000	63.9821
88142	0.0000	0.4935	6.3757	6.2215	0.0000	0.0000	0.0000	2.8601	7.8185	0.0000	0.0000	23.7693
88143	0.0000	0.0000	0.0000	51.0484	0.0000	0.0000	0.0000	19.7051	28.2091	0.7680	0.0000	99.7306
88144	0.0000	0.9440	19.2740	20.4577	18.5856	0.0000	0.0000	25.5461	46.7697	0.0000	0.0000	131.5771
90132	0.0000	0.4139	1.7741	0.2882	0.0316	0.0000	0.0000	15.2570	0.6795	0.4402	0.0000	18.8845
90133	0.0000	1.1694	2.3343	2.4115	0.7122	0.1999	0.0000	36.7747	2.9157	1.1745	0.0000	47.6922
90134	0.0000	5.9515	5.3983	3.8716	1.0953	0.0000	0.0000	69.5081	4.9395	2.6349	0.0000	93.3992
90142	0.0000	1.7764	1.1417	2.3443	0.0000	0.0000	0.0000	23.2396	0.9869	0.6203	0.0000	30.1092
90143	0.0000	1.5238	7.4065	3.0522	0.1121	0.0000	0.0000	44.8135	1.7993	1.5156	0.0000	60.2230
90144	0.0000	3.9813	5.5290	8.3247	0.6330	0.2006	0.0000	77.7260	5.6147	3.0938	0.0000	105.1031
90152	0.0000	2.6386	0.0000	1.8858	0.0000	0.0000	0.0000	21.9878	0.0000	0.0000	0.0000	26.5122
90153	0.0000	2.8904	2.8268	6.7986	0.4183	0.0000	0.0000	67.6982	0.9085	5.6455	0.0000	87.1863

COVERTYPE	OTHER_P	J_PINE	B_SPR	W_SPR	B_FIR	LARCH	CEDAR	T_ASPEN	B_POP	BIRCH	OTHER_H	TOTAL
90154	0.0000	0.8200	4.6994	12.4898	0.2662	0.0000	0.0000	66.1680	5.8338	12.0774	0.0000	102.3546
90232	0.0000	0.5577	1.7944	0.0000	0.0000	0.0000	0.0000	9.4958	0.2193	0.0000	0.0000	12.0672
90233	0.0000	1.8463	0.7455	0.6738	0.0000	0.0000	0.0000	31.1150	3.4838	0.0000	0.0000	37.8644
90234	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	61.5993	0.0000	0.0000	0.0000	61.5993
90332	0.0000	1.1764	0.0000	0.0000	0.0000	0.0000	0.0000	20.4552	1.3334	0.0000	0.0000	22.9650
90333	0.0000	0.0000	1.2342	7.2872	0.0000	0.0000	0.0000	37.1955	5.1767	0.0000	0.0000	50.8936
92132	0.0000	0.1391	1.3146	0.3773	0.0000	0.0000	0.0000	1.0139	0.3093	11.7984	0.0000	14.9526
92133	0.0000	0.0000	3.4253	0.0000	0.0000	0.0000	0.0000	0.4709	2.6040	26.1709	0.0000	32.6711
92142	0.0000	0.3230	1.3673	0.0000	0.0000	0.0000	0.0000	2.3664	1.3872	7.6303	0.0000	13.0742
92243	0.0000	1.3168	10.7995	0.0000	0.0000	0.0000	0.0000	9.9407	0.9320	24.4474	0.0000	47.4364
92332	0.0000	0.0000	0.0000	6.4353	0.7951	0.0000	0.0000	0.0000	0.0000	17.1192	0.0000	24.3496
98132	0.0000	0.0000	0.4166	1.0646	1.0278	0.0000	0.0000	4.2662	12.0326	0.6209	0.0000	19.4287
98143	0.0000	0.0000	13.7939	3.4532	0.0000	0.0000	0.0000	13.3843	23.9773	3.6293	0.0000	58.2380
98154	0.0000	0.0000	3.2373	1.6345	0.0000	0.0000	0.0000	48.5265	56.3470	0.0000	0.0000	109.7453

APPENDIX 15

DISTRIBUTION OF LAND COVER AREA BY WORKING GROUP AND CUTTING CLASS - CROWN LAND "OPEN"

FMU 89 - Distribution of Land Cover Area by Working Group and Cutting Class - Crown Land "Open"

	Productive Area (ha) by Cutting Class						
Working Group	**0**	**1**	**2**	**3**	**4**	**5**	**Total**
Jack pine	9078.4	14943.4	10793.9	13014.2	1776.0	94.0	49699.9
Black spruce	34050.6	10043.6	57315.5	45157.8	13538.1	476.4	160582.0
White spruce	0.0	0.0	0.0	99.4	145.5	17.8	262.7
Tamarack	0.0	8.9	4.4	13.7	0.0	0.0	27.0
Total Softwood	**43129.0**	**24995.9**	**68113.8**	**58285.1**	**15459.6**	**588.2**	**210571.6**
Trembling aspen	1145.3	7282.4	2643.7	7165.9	2857.0	172.7	21267.0
White birch	0.0	0.0	8.0	54.0	7.3	0.0	69.3
Balsam poplar	0.0	25.8	16.1	186.1	60.0	5.7	293.7
Total Hardwood	**1145.3**	**7308.2**	**2667.8**	**7406.0**	**2924.3**	**178.4**	**21630.0**
Total Productive Area	**44274.3**	**32304.1**	**70781.6**	**65691.1**	**18383.9**	**766.6**	**232201.6**
Non-Productive Area	-	-	-	-	-	-	**239514.8**
Non-Forested Area	-	-	-	-	-	-	**32872.9**
Total Area (excludes water)	-	-	-	-	-	-	**504589.3**

Non-productive classes exclude patented lands
Source: Manitoba 1994

FMU 89 - Distribution of Land Cover Area by Working Group and Cutting Class - Crown Land "Open"

	Productive Area (ha) by Cutting Class						
Working Group	**0**	**1**	**2**	**3**	**4**	**5**	**Total**
Jack pine	9078.4	14943.4	10793.9	13014.2	1776.0	94.0	49699.9
Black spruce	34050.6	10043.6	57315.5	45157.8	13538.1	476.4	160582.0
White spruce	0.0	0.0	0.0	99.4	145.5	17.8	262.7
Tamarack	0.0	8.9	4.4	13.7	0.0	0.0	27.0
Total Softwood	**43129.0**	**24995.9**	**68113.8**	**58285.1**	**15459.6**	**588.2**	**210571.6**
Trembling aspen	1145.3	7282.4	2643.7	7165.9	2857.0	172.7	21267.0
White birch	0.0	0.0	8.0	54.0	7.3	0.0	69.3
Balsam poplar	0.0	25.8	16.1	186.1	60.0	5.7	293.7
Total Hardwood	**1145.3**	**7308.2**	**2667.8**	**7406.0**	**2924.3**	**178.4**	**21630.0**
Total Productive Area	**44274.3**	**32304.1**	**70781.6**	**65691.1**	**18383.9**	**766.6**	**232201.6**
Non-Productive Area	-	-	-	-	-	-	**239514.8**
Non-Forested Area	-	-	-	-	-	-	**32872.9**
Total Area (excludes water)	-	-	-	-	-	-	**504589.3**

Non-productive classes exclude patented lands
Source: Manitoba 1994

APPENDIX 16

PROJECT IMPACT ON PRODUCTIVE FOREST LAND BY WORKING GROUP & CUTTING CLASS - "CROWN LAND OPEN"

FMU 87 - Project Impact on Productive Forest Land by Working Group & Cutting Class - "Crown Land Open"

	Productive Area (ha) by Cutting Class						
Working Group	**0**	**1**	**2**	**3**	**4**	**5**	**Total**
Jack pine	0.0	19.2	587.4	68.8	0.0	0.1	675.5
Black spruce	0.0	18.5	129.3	311.6	32.7	66.7	558.8
White spruce	0.0	0.0	0.0	1.7	33.2	0.7	35.6
Tamarack	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Balsam fir	0.0	0.0	0.0	0.9	0.0	0.0	0.9
Total Softwood	**0.0**	**37.7**	**716.7**	**383.0**	**65.9**	**67.5**	**1270.8**
Trembling aspen	0.0	17.6	26.2	33.0	3.6	0.4	80.8
White birch	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Balsam poplar	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Hardwood	**0.0**	**17.6**	**26.2**	**33.0**	**3.6**	**0.4**	**80.8**
Total Productive Area	**0.0**	**55.3**	**742.9**	**416.0**	**69.5**	**67.9**	**1351.6**

FMU 89 - Project Impact on Productive Forest Land by Working Group & Cutting Class - "Crown Land Open"

	Productive Area (ha) by Cutting Class						
Working Group	**0**	**1**	**2**	**3**	**4**	**5**	**Total**
Jack pine	0.0	11.4	7.5	6.3	13.6	0.0	38.8
Black spruce	0.0	0.0	9.8	16.8	0.1	0.0	26.7
White spruce	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tamarack	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Softwood	**0.0**	**11.4**	**17.3**	**23.1**	**13.7**	**0.0**	**65.5**
Trembling aspen	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White birch	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Balsam poplar	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Hardwood	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Productive Area	**0.0**	**11.4**	**17.3**	**23.1**	**13.7**	**0.0**	**65.5**

APPENDIX 17

AAC IMPACTS ON PRODUCTIVE FOREST LAND AND VOLUME (NET MERCHANTABLE)

		Softwood					Hardwood			
		Area Based Impact on AAC		Volume (m^3)			Area Based Impact on AAC		Volume (m^3)	
FMU	WG	(%)	AAC	AAC Balance	AAC Reduction	WG	(%)	AAC	AAC Balance	AAC Reduction
87	JP	0.00	41390	41390	0	TA	0.08	31190	31165	25
	BS	0.49	91880	91430	450	BA	0.00	4150	4150	0
	WS	7.10	10200	9476	724	WB	0.00	4100	4100	0
	BF	0.00	820	820	0					
	TL	0.00	260	260	0					
Subt.			***144550***	***143376***	***1174***			***39440***	***39415***	***25***
89	JP	0.73	6400	6353	47	TA	0.00	17290	17290	0
	BS	0.00	40820	40820	0	BA	0.00	1960	1960	0
	WS	0.00	6570	6570	0	WB	0.00	1480	1480	0
	BF	0.00	590	590	0					
	TL	0.00	200	200	0					
Subt.			***54580***	***54533***	***47***			***20730***	***20730***	***0***
Total			**199130**	**197909**	**1221**			**60170**	**60145**	**25**

Excludes all INCO lands and associated AAC values.

APPENDIX 18

AFFECTED FRI STAND LISTING

(EXCLUDING EROSION)

Where: IDR_ID GIS polygon identification number
COVERTYPE FRI type aggregate code providing stand descriptive information as to subtype, site,cutting class and crown closure
SPECIES Stand species composition as a percent (e.g. 8 = 80%)
FMU Forest Management Unit
AREA In hectares
CAPTION Describes impact site

IDR_ID	COVERTYPE	SPECIES	FMU	AREA	CAPTION
16967	4114	JP10	89	0.8	Access Road
17004	4114	JP10	89	1.7	Access Road
8542	4124	JP8TA2	87	4.8	Access Road
12060	4124	JP10	87	6.5	Access Road
12060	4124	JP10	87	0.5	Access Road
16964	4124	JP8TA2	89	2.1	Access Road
11776	4214	JP10	87	19.2	Access Road
16980	4214	JP10	89	1.0	Access Road
17020	4214	JP10	89	7.9	Access Road
12047	4222	JP10	87	2.3	Access Road
12094	4223	JP10	87	0.8	Access Road
12094	4223	JP10	87	4.1	Access Road
12036	4224	JP9TA1	87	1.6	Access Road
12036	4224	JP9TA1	87	5.4	Access Road
17006	4224	JP10	89	1.8	Access Road
7406	4233	JP10	87	0.8	Access Road
17002	4233	JP8BS2	89	1.8	Access Road
17016	4233	JP9BS1	89	1.9	Access Road
7336	4234	JP8BS2	87	1.2	Access Road
8657	4234	JP8BS2	87	3.2	Access Road
16712	4243	JP10	89	1.8	Access Road
5515	6124	JP6BS4	87	0.4	Access Road
6155	6124	JP6BS2TA2	87	0.6	Access Road
6209	6124	JP5BS3TA2	87	1.6	Access Road
6284	6124	JP7BS2TA1	87	0.3	Access Road
7481	6124	JP6BS2TA2	87	1.3	Access Road
11796	6124	JP6BS4	87	0.3	Access Road
7397	6134	JP6BS4	87	0.3	Access Road
7397	6134	JP6BS4	87	0.0	Access Road
7403	6134	JP6BS2TA2	87	0.4	Access Road
7403	6134	JP6BS2TA2	87	0.7	Access Road
8635	6134	JP5BS5	87	3.7	Access Road
16948	6233	JP6BS3TA1	89	2.5	Access Road
16794	6244	JP7BS2TA1	89	11.8	Access Road
7548	13114	BS10	87	5.5	Access Road
7389	13123	BS8JP2	87	0.6	Access Road
7451	13123	BS10	87	5.5	Access Road
6289	13124	BS9TA1	87	1.5	Access Road
6319	13124	BS8TA2	87	0.2	Access Road
7431	13124	BS10	87	1.1	Access Road
7431	13124	BS10	87	3.7	Access Road
7487	13124	BS10	87	3.0	Access Road
16631	13124	BS10	89	0.5	Access Road
16652	13124	BS8JP2	89	3.5	Access Road

IDR_ID	COVERTYPE	SPECIES	FMU	AREA	CAPTION
16917	13124	BS8JP2	89	5.4	Access Road
16941	13124	BS9JP1	89	0.4	Access Road
5603	13133	BS10	87	3.0	Access Road
5632	13133	BS10	87	0.0	Access Road
6343	13133	BS8TA2	87	2.3	Access Road
7337	13133	BS9JP1	87	0.7	Access Road
7458	13133	BS10	87	2.4	Access Road
16645	13133	BS9JP1	89	3.8	Access Road
6341	13133	BS9TA1	87	1.1	Access Road
6336	13134	BS9JP1	87	5.1	Access Road
7342	13134	BS8JP2	87	0.3	Access Road
7355	13134	BS8JP2	87	0.1	Access Road
7359	13134	BS10	87	0.5	Access Road
7496	13134	BS10	87	0.1	Access Road
8669	13134	BS8JP2	87	0.0	Access Road
16766	13134	BS10	89	0.2	Access Road
1746	13134	BS9WS1	87	0.0	Access Road
6348	13134	BS8JP1TA1	87	2.8	Access Road
6348	13134	BS8JP1TA1	87	0.6	Access Road
11985	13144	BS10	87	0.3	Access Road
12028	13223	BS8BA2	87	2.1	Access Road
7333	13224	BS10	87	3.0	Access Road
11902	13232	BS8TA2	87	3.4	Access Road
11917	13232	BS8TA2	87	0.4	Access Road
5595	13233	BS10	87	2.6	Access Road
5630	13233	BS10	87	3.1	Access Road
7445	13233	BS9TL1	87	1.7	Access Road
7340	13234	BS10	87	0.2	Access Road
8602	13234	BS10	87	0.9	Access Road
16647	13234	BS10	89	0.0	Access Road
1727	13234	BS10	87	2.1	Access Road
6387	13234	BS10	87	3.7	Access Road
5558	14124	BS7JP2TA1	87	1.3	Access Road
5561	14124	BS7JP3	87	0.1	Access Road
6193	14124	BS7JP2TA1	87	0.1	Access Road
6302	14124	BS6JP3TA1	87	2.8	Access Road
7238	14124	BS7JP3	87	17.2	Access Road
7317	14124	BS6JP4	87	3.6	Access Road
7318	14124	BS7JP3	87	2.5	Access Road
7318	14124	BS7JP3	87	0.9	Access Road
7318	14124	BS7JP3	87	11.5	Access Road
7468	14124	BS7JP3	87	0.2	Access Road
7556	14124	BS6JP3TA1	87	5.4	Access Road
8616	14124	BS7JP3	87	8.1	Access Road
6220	14133	BS7JP3	87	1.2	Access Road
5508	14134	BS6JP4	87	0.8	Access Road
6318	14134	BS6JP2TA2	87	0.5	Access Road
8636	14134	BS7JP2TA1	87	1.0	Access Road
16821	14134	BS7JP2TA1	89	12.8	Access Road
8615	14144	BS5JP4TA1	87	5.8	Access Road
16835	14144	BS7JP3	89	0.1	Access Road
7324	16233	BS6TL4	87	1.3	Access Road
6248	44124	JP7TA3	87	0.6	Access Road
11822	44124	JP7TA3	87	5.9	Access Road
16960	44224	JP7TA3	89	3.6	Access Road

IDR_ID	COVERTYPE	SPECIES	FMU	AREA	CAPTION
8547	46124	JP5BS1TA4	87	10.6	Access Road
11960	53113	BS7TA2BA1	87	5.0	Access Road
11944	53123	BS6TA4	87	4.4	Access Road
6254	53133	BS6TA4	87	0.0	Access Road
6156	53134	BS7TA3	87	0.1	Access Road
6325	53134	BS6TA4	87	2.8	Access Road
1731	53134	BS7TA3	87	1.0	Access Road
6344	53134	BS7TA3	87	0.5	Access Road
11800	81114	TA6JP3BS1	87	12.4	Access Road
11919	82113	TA5BS3JP2	87	4.5	Access Road
11936	82123	TA5BA2BS3	87	2.2	Access Road
12004	82124	TA6BA1BS2JP1	87	2.7	Access Road
6174	82133	TA6BS4	87	0.3	Access Road
6357	82143	TA7BS3	87	0.5	Access Road
11903	90124	TA8BS2	87	3.4	Access Road
5463	99701		87	21.0	Access Road
5643	99701		87	1.3	Access Road
5941	99701		87	13.6	Access Road
6187	99701		87	0.0	Access Road
6215	99701		87	18.9	Access Road
7356	99701		87	1.5	Access Road
7437	99701		87	4.8	Access Road
7459	99701		87	4.1	Access Road
7504	99701		87	3.8	Access Road
7516	99701		87	2.4	Access Road
7588	99701		87	8.1	Access Road
8538	99701		87	3.1	Access Road
8574	99701		87	1.9	Access Road
8605	99701		87	2.3	Access Road
8649	99701		87	0.2	Access Road
11773	99701		87	0.4	Access Road
11967	99701		87	9.5	Access Road
12032	99701		87	0.0	Access Road
12079	99701		87	0.2	Access Road
12079	99701		87	0.3	Access Road
16639	99701		89	9.4	Access Road
16684	99701		89	15.9	Access Road
16883	99701		89	2.8	Access Road
6187	99701		87	20.6	Access Road
6187	99701		87	1.8	Access Road
7338	99702		87	0.0	Access Road
5473	99711		87	1.6	Access Road
5496	99711		87	2.1	Access Road
7640	99711		87	3.3	Access Road
7649	99711		87	1.1	Access Road
7666	99711		87	0.1	Access Road
11925	99721		87	0.8	Access Road
16913	99721		89	0.7	Access Road
7345	99831		87	0.5	Access Road
16583	99843		89	0.1	Access Road
16673	99844		89	0.4	Access Road
5477	99848		87	0.6	Access Road
5533	99848		87	3.5	Access Road
6114	99848		87	0.7	Access Road
6153	99848		87	1.3	Access Road

IDR_ID	COVERTYPE	SPECIES	FMU	AREA	CAPTION
6314	99848		87	0.0	Access Road
7322	99848		87	0.9	Access Road
7354	99848		87	0.8	Access Road
7509	99848		87	1.3	Access Road
8582	99848		87	1.6	Access Road
11962	99848		87	1.4	Access Road
16721	99848		89	0.5	Access Road
7348	99900		87	0.1	Access Road
8535	4124	JP10	87	1.0	Borrow Pit G
12060	4124	JP10	87	36.1	Borrow Pit G
12094	4223	JP10	87	3.3	Borrow Pit G
8528	4224	JP9TA1	87	115.0	Borrow Pit G
12036	4224	JP9TA1	87	210.3	Borrow Pit G
8554	81124	TA5JP4BS1	87	0.3	Borrow Pit G
12073	81124	TA5WB2JP3	87	8.1	Borrow Pit G
12012	82123	TA5BA2BS2JP1	87	3.6	Borrow Pit G
8534	82124	TA6BS3JP1	87	0.6	Borrow Pit G
12107	82124	TA6BS3JP1	87	0.1	Borrow Pit G
8553	90124	TA8JP2	87	3.7	Borrow Pit G
8538	99701		87	8.5	Borrow Pit G
12037	99701		87	1.4	Borrow Pit G
12079	99701		87	0.1	Borrow Pit G
8530	99848		87	0.0	Borrow Pit G
8581	4124	JP9TA1	87	13.8	Borrow Pit H Access
8591	13213	BS9TA1	87	7.2	Borrow Pit H Access
8615	14144	BS5JP4TA1	87	16.2	Borrow Pit H Access
8595	46123	JP5BS1TA4	87	6.2	Borrow Pit H Access
8571	81124	TA6JP3BS1	87	1.3	Borrow Pit H Access
8605	99701		87	0.1	Borrow Pit H Access
8581	4124	JP9TA1	87	89.7	Borrow Pit H-E
8571	81124	TA6JP3BS1	87	0.2	Borrow Pit H-E
8581	4124	JP9TA1	87	56.1	Borrow Pit H-W
8595	46123	JP5BS1TA4	87	8.1	Borrow Pit H-W
8621	99701		87	0.1	Borrow Pit H-W
7416	4124	JP8BS2	87	0.1	Borrow Pit J Access
7413	6134	JP5BS4TA1	87	0.0	Borrow Pit J Access
7413	6134	JP5BS4TA1	87	2.5	Borrow Pit J Access
7435	6233	JP7BS1TA2	87	1.9	Borrow Pit J Access
7435	6233	JP7BS1TA2	87	0.5	Borrow Pit J Access
7417	13124	BS8JP2	87	4.8	Borrow Pit J Access
7419	13124	BS10	87	0.1	Borrow Pit J Access
7430	13124	BS10	87	1.3	Borrow Pit J Access
7447	13124	BS8JP2	87	1.7	Borrow Pit J Access
7434	13232	BS10	87	1.5	Borrow Pit J Access
7318	14124	BS7JP3	87	2.8	Borrow Pit J Access
7370	14124	BS6JP4	87	4.3	Borrow Pit J Access
7452	14124	BS7JP2TA1	87	0.4	Borrow Pit J Access
7383	14134	BS7JP3	87	0.0	Borrow Pit J Access
7439	44234	JP7TA3	87	2.9	Borrow Pit J Access
7440	44234	JP7TA3	87	2.9	Borrow Pit J Access
7441	53124	BS7TA3	87	0.2	Borrow Pit J Access
7375	81133	TA5JP3BS2	87	1.3	Borrow Pit J Access
7405	99701		87	2.1	Borrow Pit J Access
7284	99702		87	0.2	Borrow Pit J Access
7446	99711		87	0.0	Borrow Pit J Access

IDR_ID	COVERTYPE	SPECIES	FMU	AREA	CAPTION
7322	99848		87	2.7	Borrow Pit J Access
7428	99900		87	0.8	Borrow Pit J Access
7383	14134	BS7JP3	87	4.8	Borrow Pit J-1
7375	81133	TA5JP3BS2	87	1.9	Borrow Pit J-1
7395	90134	TA8JP1BS1	87	0.2	Borrow Pit J-1
7352	99900		87	0.5	Borrow Pit J-1
7435	6233	JP7BS1TA2	87	9.8	Borrow Pit J-2
7434	13232	BS10	87	0.4	Borrow Pit J-2
7447	13124	BS8JP2	87	0.1	Borrow Pit J-3
7452	14124	BS7JP2TA1	87	0.1	Borrow Pit J-3
7439	44234	JP7TA3	87	1.1	Borrow Pit J-3
7440	44234	JP7TA3	87	3.7	Borrow Pit J-3
7446	99711		87	1.7	Borrow Pit J-3
7413	6134	JP5BS4TA1	87	4.7	Borrow Pit J-4
7370	14124	BS6JP4	87	0.8	Borrow Pit J-4
7431	13124	BS10	87	2.8	Borrow Pit J-5
7318	14124	BS7JP3	87	17.5	Borrow Pit J-5
7437	99701		87	0.2	Borrow Pit J-5
7284	99702		87	0.9	Borrow Pit J-5
7386	99702		87	0.3	Borrow Pit J-5
7406	4233	JP10	87	7.0	Borrow Pit J-6
7397	6134	JP6BS4	87	0.5	Borrow Pit J-6
7403	6134	JP6BS2TA2	87	21.0	Borrow Pit J-6
7389	13123	BS8JP2	87	0.1	Borrow Pit J-6
7318	14124	BS7JP3	87	9.7	Borrow Pit J-6
1763	11143	WS7BS3	87	0.9	Flooded Area Clearing
1744	11144	WS7BS2TA1	87	2.1	Flooded Area Clearing
1744	11144	WS7BS2TA1	87	4.7	Flooded Area Clearing
1776	13134	BS10	87	2.6	Flooded Area Clearing
1793	13134	BS10	87	2.3	Flooded Area Clearing
1746	13134	BS9WS1	87	8.0	Flooded Area Clearing
1781	13143	BS10	87	0.1	Flooded Area Clearing
1748	13154	BS10	87	0.5	Flooded Area Clearing
1778	15133	BS7WS3	87	3.7	Flooded Area Clearing
1764	15134	BS7WS3	87	0.8	Flooded Area Clearing
1738	15153	BS6WS3TA1	87	0.7	Flooded Area Clearing
1792	50143	WS7TA3	87	0.5	Flooded Area Clearing
1731	53134	BS7TA3	87	6.1	Flooded Area Clearing
1755	82134	TA6BS3JP1	87	0.4	Flooded Area Clearing
1796	99701		87	4.4	Flooded Area Clearing
1761	99732		87	0.4	Flooded Area Clearing
1787	99732		87	0.1	Flooded Area Clearing
1789	99732		87	0.2	Flooded Area Clearing
1761	99732		87	0.0	Flooded Area Clearing
1711	99901		87	0.0	Flooded Area Clearing
1711	99901		87	0.0	Flooded Area Clearing
1744	11144	WS7BS2TA1	87	10.5	GS North Structures & Construction
1722	13134	BS8JP1TA1	87	1.9	GS North Structures & Construction
1753	13134	BS8TA2	87	1.3	GS North Structures & Construction
1757	13134	BS8TA1BW1	87	9.1	GS North Structures & Construction
1759	13134	BS10	87	0.4	GS North Structures & Construction
1726	13134	BS8JP1TA1	87	36.7	GS North Structures & Construction
1746	13134	BS9WS1	87	22.4	GS North Structures & Construction
1729	13134	BS8JP1TA1	87	1.2	GS North Structures & Construction
6348	13134	BS8JP1TA1	87	10.1	GS North Structures & Construction

IDR_ID	COVERTYPE	SPECIES	FMU	AREA	CAPTION
1748	13154	BS10	87	3.4	GS North Structures & Construction
1737	13154	BS10	87	3.4	GS North Structures & Construction
6403	13154	BS10	87	0.0	GS North Structures & Construction
6403	13154	BS10	87	0.0	GS North Structures & Construction
6403	13154	BS10	87	1.1	GS North Structures & Construction
1767	13224	BS10	87	2.5	GS North Structures & Construction
1727	13234	BS10	87	27.0	GS North Structures & Construction
1728	13234	BS8JP1TL1	87	8.7	GS North Structures & Construction
6389	13234	BS8JP1TL1	87	2.4	GS North Structures & Construction
1730	13234	BS10	87	1.7	GS North Structures & Construction
6378	13234	BS10	87	2.7	GS North Structures & Construction
6387	13234	BS10	87	4.4	GS North Structures & Construction
6358	14134	BS7JP3	87	0.8	GS North Structures & Construction
1735	15153	BS5WS4TA1	87	0.3	GS North Structures & Construction
1736	15153	BS5WS4TA1	87	8.7	GS North Structures & Construction
1738	15153	BS6WS3TA1	87	0.0	GS North Structures & Construction
1738	15153	BS6WS3TA1	87	0.0	GS North Structures & Construction
1738	15153	BS6WS3TA1	87	18.8	GS North Structures & Construction
6364	15153	BS5WS4TA1	87	0.0	GS North Structures & Construction
6364	15153	BS5WS4TA1	87	0.0	GS North Structures & Construction
6364	15153	BS5WS4TA1	87	0.0	GS North Structures & Construction
6364	15153	BS5WS4TA1	87	25.2	GS North Structures & Construction
6410	15153	BS6WS3TA1	87	0.0	GS North Structures & Construction
6410	15153	BS6WS3TA1	87	0.0	GS North Structures & Construction
6410	15153	BS6WS3TA1	87	0.0	GS North Structures & Construction
6410	15153	BS6WS3TA1	87	0.3	GS North Structures & Construction
6377	16233	BS6TL2BW2	87	1.2	GS North Structures & Construction
1766	53134	BS7TA3	87	3.2	GS North Structures & Construction
6409	53134	BS7TA3	87	0.3	GS North Structures & Construction
6411	53134	BS7TA3	87	0.4	GS North Structures & Construction
1731	53134	BS7TA3	87	27.7	GS North Structures & Construction
6344	53134	BS7TA3	87	22.2	GS North Structures & Construction
6317	58134	BS5WS2TA3	87	0.0	GS North Structures & Construction
6317	58134	BS5WS2TA3	87	7.6	GS North Structures & Construction
1755	82134	TA6BS3JP1	87	15.1	GS North Structures & Construction
6357	82143	TA7BS3	87	1.6	GS North Structures & Construction
1733	90134	TA8BS2	87	2.2	GS North Structures & Construction
1734	90134	TA8BS2	87	1.2	GS North Structures & Construction
6393	90134	TA8BS2	87	6.0	GS North Structures & Construction
1732	90134	TA9BS1	87	0.2	GS North Structures & Construction
6396	90134	TA9BS1	87	2.8	GS North Structures & Construction
1724	99701		87	8.4	GS North Structures & Construction
6187	99701		87	2.2	GS North Structures & Construction
6379	99711		87	2.1	GS North Structures & Construction
0	99900		87	0.0	GS North Structures & Construction
1711	99901		87	0.0	GS North Structures & Construction
1763	11143	WS7BS3	87	5.5	GS South Structures
1776	13134	BS10	87	14.0	GS South Structures
1793	13134	BS10	87	17.1	GS South Structures
1794	13134	BS8JP1TA1	87	2.9	GS South Structures
1781	13143	BS10	87	7.8	GS South Structures
1780	13154	BS9WS1	87	0.0	GS South Structures
1778	15133	BS7WS3	87	1.3	GS South Structures
1797	15133	BS5WS3TA2	87	1.2	GS South Structures
1792	50143	WS7TA3	87	6.1	GS South Structures

IDR_ID	COVERTYPE	SPECIES	FMU	AREA	CAPTION
1796	99701		87	1.7	GS South Structures
1711	99901		87	0.0	GS South Structures
1787	99732		87	1.4	Island
1789	99732		87	0.3	Island
1711	99901		87	0.0	Island
1711	99901		87	0.0	Island

APPENDIX 19

WUSKWATIM GENERATION PROJECT IMPACT VOLUME CALCULATIONS.

FMU 87 CUTTING CLASSES 1 & 2 VOLUME CALCULATIONS.

			MAI (m3/h/yr)								Total m3		JP		BS		TA		
COVER TYPE	Area	cut cl mid-pt	JP	BS	WS	BF	TL	TA	BA	WB	Sftwd	Hrdwd	Sftwd	Hrdwd	Sftwd	Hrdwd	Sftwd	Hrdwd	Total
4124	208.7	18	1.06	0.3	0.03			0.27	0.03	0.04	5222.0	1277.3	13264.5	1810.3	4080.1	473.0	364.5	967.1	**20959.5**
4214	19.2	5	0.96	0.13	0.05				0.01	0.04	109.5	4.8							
4222	2.3	18	0.96	0.13	0.05				0.01	0.04	48.1	2.1							
4223	8.2	18	0.96	0.13	0.05				0.01	0.04	168.3	7.4							
4224	332.3	18	0.96	0.13	0.05				0.01	0.04	6817.8	299.0							
6124	4.6	18	1.06	0.3	0.03			0.27	0.03	0.04	115.4	28.2							
6224	0.0	18	0.96	0.13	0.05				0.01	0.04	1.0	0.0							
13114	5.6	8	0.14	1.07	0.1	0.02		0.11	0.02	0.03	59.8	7.2							
13123	6.2	23	0.14	1.07	0.1	0.02		0.11	0.02	0.03	189.6	22.8							
13124	20.5	23	0.14	1.07	0.1	0.02		0.11	0.02	0.03	627.6	75.5							
13213	7.2	15	0.02	0.43	0.01			0.01	0.01		49.6	2.2							
13223	2.1	53	0.02	0.43	0.01			0.01	0.01		50.8	2.2							
13224	5.4	53	0.02	0.43	0.01			0.01	0.01		132.0	5.7							
14123	0.0	23	0.14	1.07	0.1	0.02		0.11	0.02	0.03	1.5	0.2							
14124	89.7	23	0.14	1.07	0.1	0.02		0.11	0.02	0.03	2745.4	330.3							
44124	6.5	18	1.06	0.3	0.03			0.27	0.03	0.04	161.6	39.5							
46123	14.2	18	1.06	0.3	0.03			0.27	0.03	0.04	356.5	87.2							
46124	10.6	18	1.06	0.3	0.03			0.27	0.03	0.04	264.2	64.6							
53113	5.0	8	0.14	1.07	0.1	0.02		0.11	0.02	0.03	53.4	6.4							
53114	0.7	8	0.14	1.07	0.1	0.02		0.11	0.02	0.03	7.6	0.9							
53123	4.4	23	0.14	1.07	0.1	0.02		0.11	0.02	0.03	133.8	16.1							
53124	1.0	23	0.14	1.07	0.1	0.02		0.11	0.02	0.03	29.1	3.5							
81114	12.4	8	0.13	0.14	0.2	0.02		1.13	0.1	0.07	48.7	129.2							
81124	9.9	23	0.13	0.14	0.2	0.02		1.13	0.1	0.07	111.1	294.8							
82113	4.9	8	0.13	0.14	0.2	0.02		1.13	0.1	0.07	19.4	51.4							
82114	0.2	8	0.13	0.14	0.2	0.02		1.13	0.1	0.07	0.8	2.2							
82123	5.8	23	0.13	0.14	0.2	0.02		1.13	0.1	0.07	65.4	173.5							
82124	3.5	23	0.13	0.14	0.2	0.02		1.13	0.1	0.07	39.2	104.0							
90124	7.1	23	0.13	0.14	0.2	0.02		1.13	0.1	0.07	79.9	212.1							
Total	**798.3**										**17709.1**	**3250.4**							

JP = jack pine; BS = black spruce; WS = white spruce; BF = balsam fir; LT = larch; TA = trembling aspen; BA = balsam poplar; BW = white birch

FMU 87 CUTTING CLASS 3 VOLUME CALCULATIONS

												WG SUMMARY										
				Vol m3/ha						Total Vol m3		JP		BS		WS		BF		TA		
COVER TYPE	AREA	JP	BS	WS	BF	TL	TA	BA	BW	sftwd	hrdwd	sftwd	hrdwd	sftwd	hrdwd	sftwd	hrdwd	sftwd	hrdwd	sftwd	hardwd	Total
4233	7.79	29.31	2.31	0.17	0.00	0.00	0.63	0.17	0.59	247.47	10.85	3888.1	394.7	21618.0	2686.2	167.4	53.1	84.9	11.6	1033.9	2003.9	**31941.7**
4234	4.34	48.48	4.08	0.00	0.00	0.00	0.12	0.00	0.60	228.34	3.15											
6134	33.76	49.24	23.64	1.79	0.00	0.30	6.63	0.41	1.32	2531.16	282.35											
6233	12.24	21.89	13.67	0.00	0.00	0.90	0.83	0.00	0.42	446.29	15.35											
10133	0.04	0.00	0.00	85.60	0.00	0.00	1.21	0.00	0.00	3.25	0.05											
10134	0.27	0.00	3.90	118.20	10.89	0.00	3.80	1.14	7.80	35.91	3.44											
13133	10.02	2.29	48.67	1.53	0.11	0.25	2.02	0.43	0.85	529.62	33.02											
13134	142.27	1.55	69.15	3.08	0.46	0.25	1.69	0.40	1.32	10597.12	485.26											
13232	5.78	0.22	24.27	0.43	0.03	0.45	0.36	0.32	0.36	146.98	6.05											
13233	7.38	0.54	42.31	1.23	0.14	0.33	0.45	0.24	0.34	328.86	7.56											
13234	53.89	1.44	66.91	2.18	0.27	1.46	1.63	0.52	1.08	3893.77	174.26											
14132	0.03	6.80	11.62	0.00	0.07	0.81	0.30	0.05	0.75	0.56	0.03											
14133	1.16	17.86	33.82	1.36	0.07	0.21	3.46	0.49	0.21	61.74	4.82											
14134	7.97	27.29	56.30	1.92	0.00	0.11	7.36	1.10	0.78	682.55	73.75											
15133	6.40	0.78	39.15	12.14	2.53	0.75	3.51	2.18	1.24	354.12	44.38											
15134	0.80	0.89	51.30	33.80	4.88	0.05	5.26	1.07	2.61	72.63	7.14											
16233	2.48	0.56	30.41	3.52	0.00	12.17	2.06	0.55	0.17	115.55	6.87											
21134	0.88	0.00	11.92	34.50	50.11	0.00	6.10	0.00	7.12	84.86	11.62											
44234	10.64	38.18	2.60	0.00	0.00	0.00	0.00	0.00	7.78	434.12	82.76											
46134	0.01	43.11	21.11	2.87	0.08	0.05	21.14	1.88	2.06	0.74	0.28											
51134	1.43	2.86	18.74	62.39	5.41	0.06	28.03	1.74	4.87	128.19	49.63											
53133	0.11	1.51	33.87	2.75	0.28	0.40	9.46	1.01	3.61	4.13	1.50											
53134	64.82	2.77	59.33	3.15	0.16	0.04	21.22	1.64	1.90	4242.24	1604.96											
58134	8.47	3.56	44.45	18.55	2.71	0.17	17.78	3.05	7.10	588.10	236.58											
81133	3.21	18.66	4.04	2.95	0.00	0.00	23.78	1.31	2.29	82.26	87.84											
81134	0.05	30.10	12.17	6.76	0.00	0.00	44.78	8.86	2.05	2.50	2.84											
82133	0.62	2.72	18.31	7.08	1.34	0.09	26.59	1.75	2.08	18.45	18.99											
82134	16.23	3.86	20.64	18.83	1.01	0.02	48.42	4.27	2.65	719.81	898.03											
90134	12.92	5.95	5.40	3.87	1.10	0.00	69.51	4.94	2.63	210.86	996.15											
Total	**416.02**									**26792.17**	**5149.51**											

JP = jack pine; BS = black spruce; WS = white spruce; BF = balsam fir; LT = larch; TA = trembling aspen; BA = balsam poplar; BW = white birch

FMU 87 CUTTING CLASSES 4 & 5 VOLUME CALCULATIONS

												WG SUMMARY								
				Vol m3/ha						Total vol m3		JP		BS		WS		TA		
COVERTYPE	AREA	JP	BS	WS	BF	TL	TA	BA	BW	softwd	hardwd	softwd	hardwd	softwd	hardwd	softwd	hardwd	softwd	hardwd	Total
6144	0.03	69.01	36.47	4.96	0.00	0.00	12.12	1.12	2.62	2.76	0.40	15.2	2.5	9083.2	701.6	4470.8	503.4	190.4	211.3	15178.5
6154	0.08	91.90	58.78	2.64	0.00	0.00	16.98	9.50	0.00	12.42	2.14									
10144	0.06	0.61	4.68	179.82	6.24	0.00	9.32	1.11	7.71	11.10	1.05									
11143	6.91	1.11	21.02	68.79	12.48	0.00	5.62	0.93	2.65	714.70	63.61									
11144	18.21	3.28	33.60	103.41	8.94	0.00	7.62	1.69	5.28	2716.96	265.61									
11154	0.66	1.73	34.46	111.95	24.01	0.00	4.45	1.55	4.34	114.30	6.86									
13143	8.37	2.85	66.48	4.11	0.45	0.17	0.52	1.21	0.58	620.03	19.32									
13144	1.96	4.10	101.98	4.73	0.36	0.06	2.64	0.83	0.93	217.74	8.60									
13154	11.32	0.86	107.67	6.22	1.16	0.16	0.52	0.70	0.67	1313.68	21.36									
14143	0.06	23.52	47.28	0.40	0.00	0.46	2.26	0.44	0.25	4.30	0.18									
14144	22.07	34.04	69.95	2.01	0.18	0.15	6.36	1.56	1.86	2346.14	215.75									
15144	0.25	2.59	72.09	38.23	7.59	0.00	6.21	0.83	3.33	30.49	2.62									
15153	54.65	0.00	46.19	29.84	5.48	0.47	2.47	1.62	3.34	4480.10	405.90									
50143	6.56	0.00	5.36	96.54	13.43	0.00	11.80	2.22	2.47	756.06	108.09									
51143	0.06	2.08	19.65	59.50	5.68	0.00	22.41	2.11	3.49	5.21	1.68									
51144	1.37	4.85	19.61	74.52	12.74	0.00	28.22	1.87	11.32	152.50	56.52									
58154	0.69	5.12	59.22	35.46	2.96	0.19	31.26	4.60	4.66	70.73	27.84									
82143	2.08	6.54	13.44	18.62	0.30	0.00	35.49	2.42	1.62	80.84	82.11									
82144	1.35	3.11	21.22	35.44	2.73	0.05	57.90	5.25	3.44	84.64	90.10									
82154	0.39	9.76	31.53	14.47	0.16	0.00	56.97	2.18	3.84	21.75	24.50									
90144	0.17	3.98	5.53	8.32	0.63	0.20	77.73	5.61	3.09	3.15	14.61									
Total	137.28									13759.60	1418.86									

JP = jack pine; BS = black spruce; WS = white spruce; BF = balsam fir; LT = larch; TA = trembling aspen; BA = balsam poplar; BW = white birch

FMU 89 CUTTING CLASSES 1, 2 VOLUME CALCULATIONS

			MAI (m3/ha/yr)										WG SUMMARY				
COVERTYPE	AREA	cut cl mid-pt	JP	BS	WS	BF	TL	TA	BA	WB	Total (m3)		JP		BS		
											Softwd	Hardwd	Softwd	Hardwd	Softwd	Hardwd	Total
4114	2.51	5	1.06	0.3	0.03			0.27	0.03	0.04	17.43	4.26	230.6	24.3	299.1	36.0	**590.0**
4124	2.13	18	1.06	0.3	0.03			0.27	0.03	0.04	53.18	13.01					
4214	8.88	5	0.96	0.13	0.05				0.01	0.04	50.63	2.22					
4224	1.77	18	0.96	0.13	0.05				0.01	0.04	36.42	1.60					
13124	9.78	23	0.14	1.07	0.1	0.02		0.11	0.02	0.03	299.13	35.99					
44224	3.56	18	0.96	0.13	0.05				0.01	0.04	72.97	3.20					
Total	**28.63**										**529.76**	**60.28**					

JP = jack pine; BS = black spruce; WS = white spruce; BF = balsam fir; LT = larch; TA = trembling aspen; BA = balsam poplar; BW = white birch

FMU 89 CUTTING CLASS 3 VOLUME CALCULATIONS

		Vol m3/ha								Total m3		WG SUMMARY JP		BS		
COVERTYPE	AREA	JP	BS	WS	BF	LT	TA	BA	BW	softwd	hardwd	softwd	hardwd	softwd	hardwd	**Total**
4233	3.78	29.31	2.31	0.17	0.00	0.00	0.63	0.17	0.59	120.27	5.28	212.8	8.5	1314.9	131.8	**1668.0**
6233	2.54	21.89	13.67	0.00	0.00	0.90	0.83	0.00	0.42	92.55	3.18					
13133	3.75	2.29	48.67	1.53	0.11	0.25	2.02	0.43	0.85	198.30	12.36					
13134	0.22	1.55	69.15	3.08	0.46	0.25	1.69	0.40	1.32	16.15	0.74					
13234	0.04	1.44	66.91	2.18	0.27	1.46	1.63	0.52	1.08	3.21	0.14					
14134	12.82	27.29	56.30	1.92	0.00	0.11	7.36	1.10	0.78	1097.27	118.57					
Total	**23.15**									**1527.75**	**140.27**					

JP = jack pine; BS = black spruce; WS = white spruce; BF = balsam fir; LT = larch; TA = trembling aspen; BA = balsam poplar; BW = white birch

FMU 89 CUTTING CLASSES 4 & 5 VOLUME CALCULATIONS

		Vol m3/ha								Total Vol m3		WG SUMMARY JP		BS		
COVERTYPE	**AREA**	**JP**	**BS**	**WS**	**BF**	**LT**	**TA**	**BA**	**BW**	**Softwd**	**Hardwd**	**Softwd**	**Hardwd**	**Softwd**	**Hardwd**	**Total**
4243	1.79	48.74	11.50	0.00	0.00	0.00	0.00	1.06	0.33	107.70	2.47	1310.3	47.0	9.5	0.9	**1367.7**
6244	11.82	64.05	32.77	4.93	0.00	0.00	0.65	1.71	1.41	1202.56	44.54					
14144	0.09	34.04	69.95	2.01	0.18	0.15	6.36	1.56	1.86	9.54	0.88					
Total	**13.70**									**1319.80**	**47.89**					

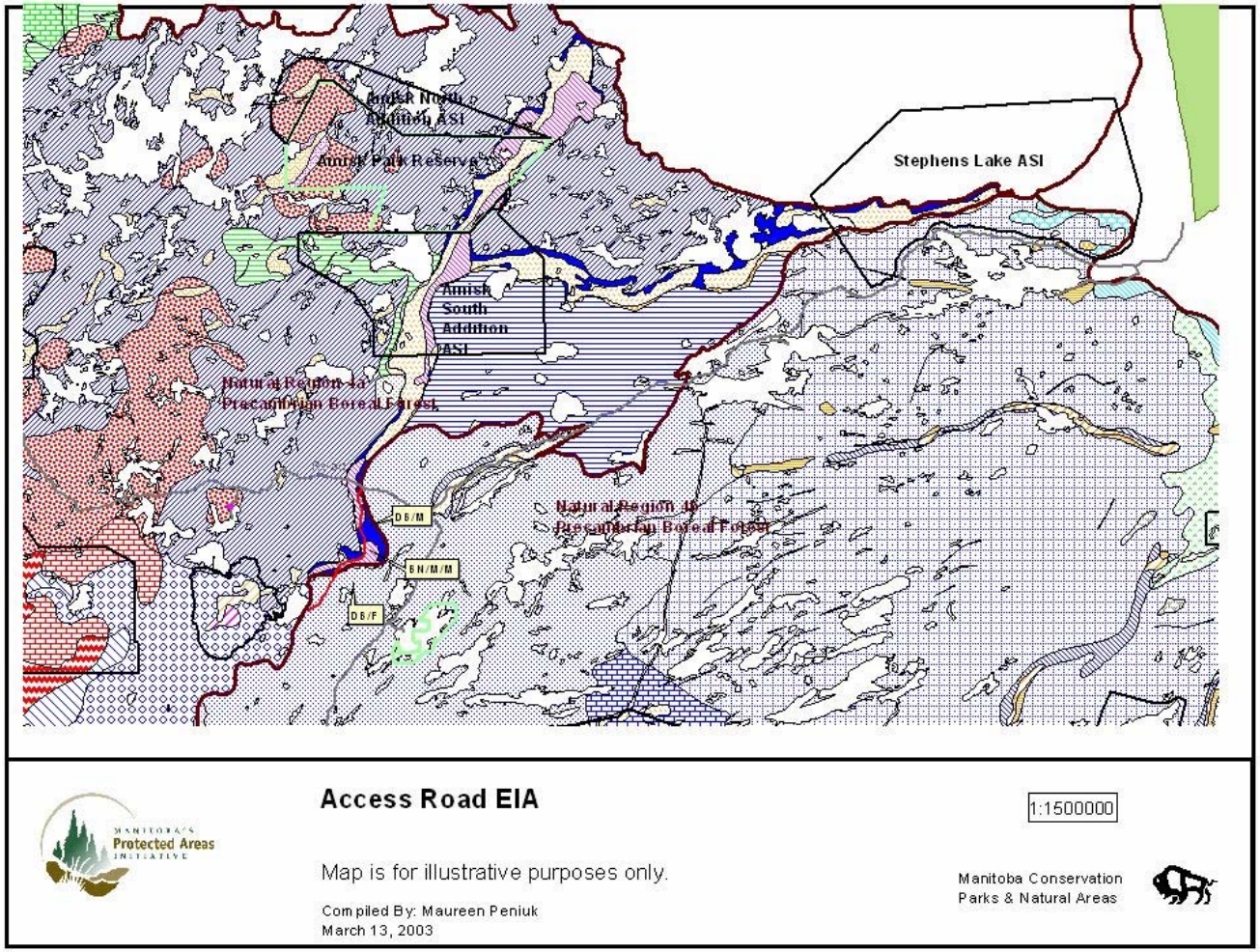
JP = jack pine; BS = black spruce; WS = white spruce; BF = balsam fir; LT = larch; TA = trembling aspen; BA = balsam poplar; BW = white birch

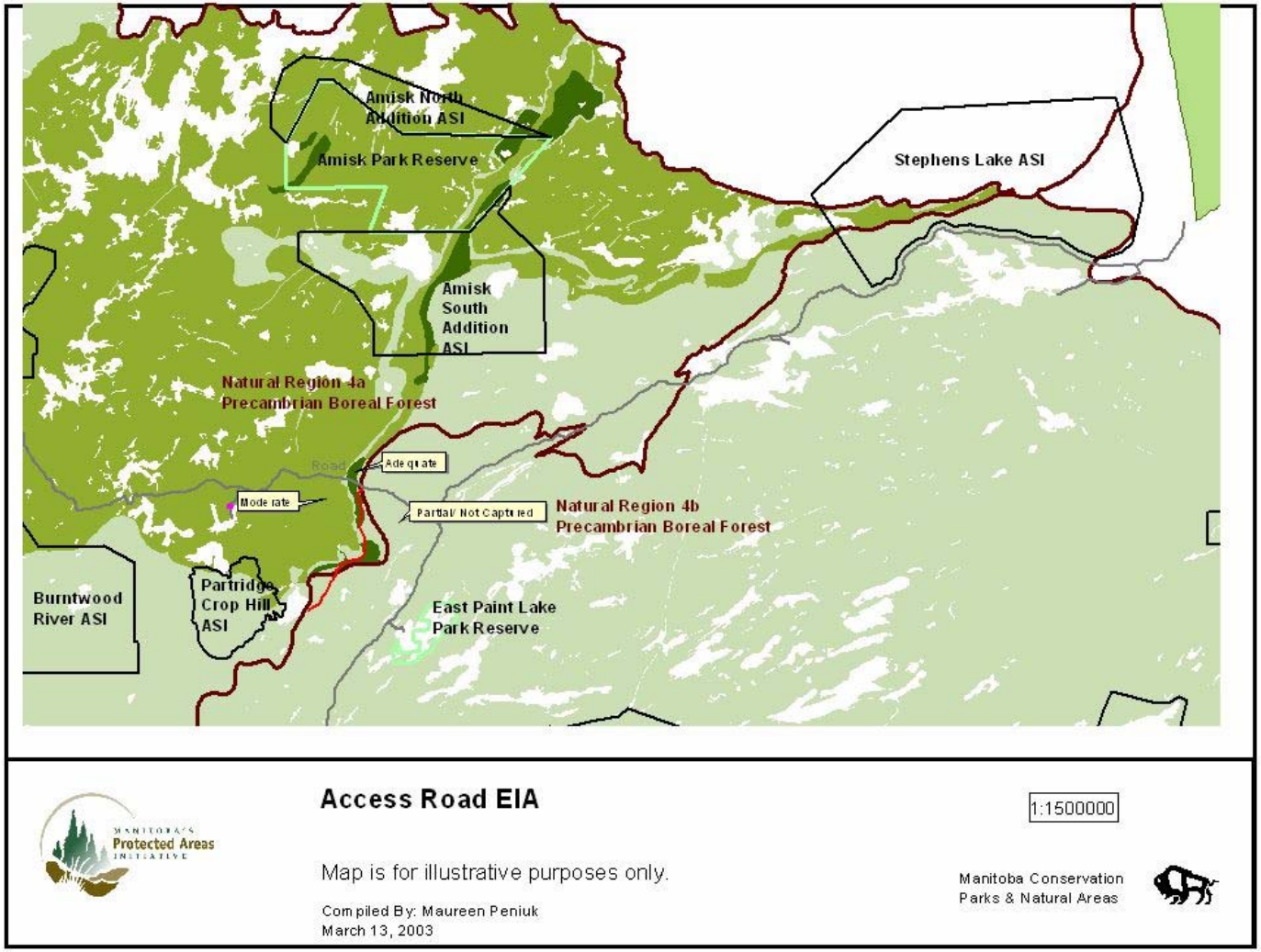
APPENDIX 20

ACCESS ROAD MAPS

During the route selection for the access road, analysis of landforms, soil, and vegetation features identified that three enduring features were impacted across two Natural Regions as defined by Manitoba Conservation staff, Helios Hernandez and Roger Schroeder. The southern third of the access road is in Natural Region 4b: Precambrian Boreal Forest: Hayes River Upland. It traverses an enduring feature of deep basin deposits with grey brown luvisolic soils (DB/F). This enduring feature is abundant within this Natural Region and ample opportunity exists elsewhere in this region to represent this feature within a future protected area.

The northern two thirds of the road crosses into Natural Region 4a, Precambrian Boreal Forest: Churchill River Upland. It traverses a complex of two enduring features: a deep basin deposit with eutric brunisolic soils (DB/M) and a beach and near shore deposit with eutric brunisolic soils on morainal features (BN/M/M). These features extend north of PR 391some 80 kms into the former Amisk Park Reserve and into the two associated ASIs of Amisk North and Amisk South Addition. At the writing of this report this park reserve designation had lapsed although there was a strong likelihood of it's redesignation. The BN/M/M would be adequately represented through the continued designation of Amisk Park Reserve while the remaining feature of DB/M is only partially represented. However, the combination of these two enduring features occurs along the access route only and in isolated locations in South Amisk Addition and North Amisk Addition ASIs. This is significant, as the association of enduring features is an important consideration in the design of protected areas. An abundance of DB/M stretches north and east out towards the Stephens Lake ASI. On balance, while the access route will negatively impact the ecological integrity of those enduring features, opportunity exists elsewhere to represent these features in a network of protected area. The consequence of the road development is that it decreases options for the representation of these features and increases the need to protect other ASIs in the Natural Region to complete Manitoba's Network of Protected Areas.


Stephens Lake ASI
Annisk South Addition ASI
Natural Region 4a
Precambrian Boreal Forest
Natural Region 4b
Precambrian Boreal Forest
D8/M
BN/M/M
D8/F
Access Road EIA
1:1500000
Map is for illustrative purposes only.
Compiled By: Maureen Peniuk
March 13, 2003
Manitoba's Protected Areas Initiative
Manitoba Conservation
Parks & Natural Areas


Amisk North Addition ASI
Amisk Park Reserve
Stephens Lake ASI
Amisk South Addition ASI
Natural Region 4a Precambrian Boreal Forest
Road
Adequate
Moderate
Partial/ Not Captured
Natural Region 4b Precambrian Boreal Forest
Burntwood River ASI
Partridge Crop Hill ASI
East Paint Lake Park Reserve
Access Road EIA
1:1500000
Map is for illustrative purposes only.
Compiled By: Maureen Peniuk
March 13, 2003
Manitoba's Protected Areas Initiative
Manitoba Conservation
Parks & Natural Areas