PART 2
RESOURCE USE

KEEYASK
Hydropower Limited Partnership

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1.0 RESOURCE USE

1.1 INTRODUCTION

1.1.1 Purpose and Content of Resource Use Impact Assessment

This section of the Socio-economic Environment, Resource Use and Heritage Resources volume of the **Keeyask Generation Project Environmental Impact Statement** (**EIS)** provides:

- The historical and current resource use environment and future trends without the Project;
- An assessment of impacts on resource use including the **nature** of predicted **effect**s within the context of measures that have already been put in place to enhance positive effects and reduce adverse effects of the Project on the Keeyask Cree Nations (KCNs). Measures include those identified in the JKDA and individual AEAs;
- **Mitigation** measures designed to reduce effects;
- **Residual effect**s that remain after mitigation measures have been applied; and
- **Monitoring** plans which are intended to track effects as they occur and to identify unanticipated impacts that would trigger follow-up action as required.

Resource Use is the second section of this volume, addressing components of Section 8.3.4 of the Keeyask Project EIS guidelines. The Keeyask Generation Project will be referred to as the **Project**.

Resource use is comprised of subsistence, commercial and recreational use of resources derived from the natural environment. Resource use for subsistence is conducted by Aboriginal people and includes hunting, fishing, **trapping** and **gathering** for food production. Gathering includes collection of natural products such as firewood, driftwood, feathers or other products used for cultural purposes in addition to plants for dietary and medicinal purposes. Commercial resource use includes **commercial fishing**, **commercial trapping**, mining, forestry, **lodges** and **outfitters** and **eco-tourism** in which both Aboriginal and non-Aboriginal people participate. Recreational resource use includes **recreational fishing**, **recreational hunting** and cabin use by non-Aboriginal people. Protected areas and scientific sites also are included in resource use.

The process of documenting and predicting impacts on domestic resource use relied heavily on KCNs input. Available information was used to describe locations and magnitude of domestic resource use and make effects predictions. Published and unpublished literature also was consulted to incorporate the views of the KCNs. The **Aboriginal traditional knowledge** (ATK) provided by the KCNs is displayed prominently instead of being synthesized into the document (See Socio-economy Section 1.2.3 for ATK principles).

Key person interviews with government officials, **stakeholders** and government database review provided information with regard to commercial and recreational resource use.

It should be noted that in some cases, the information provided in the EIS has been generalized to safeguard resources. For example, to protect the resource and the interests of the individual holders of information, moose harvest locations, cabins, trails, and other features are not displayed on maps. This approach also respects the privacy of ATK and local knowledge held by KCNs communities. As an alternative, harvests have been noted in a broad sense for consideration in the impact analysis.

1.1.2 Overview of Assessment Approach

1.1.2.1 Resource Use and Inter-relationships with the Environment

Where possible, an **interdisciplinary approach** was employed to assess the potential impacts of the Project on resource use. Information presented incorporates findings from aquatic, terrestrial and physical environment components (for example, aquatic and terrestrial **habitat**s are considered because they support life, which in turn, supports human resource use activity). This approach is consistent with KCNs beliefs, and widely held ecological views, that all components of the environment are important to maintaining the whole, and that organisms and their environment are interdependent and, therefore, of importance and value.

1.1.2.2 Scope of the Assessment

The description of current conditions for this assessment focused on 1997 to 2008 inclusive and included identification of current and predicted future trends without the Project. Historic conditions included conditions pre-1997. The 1997 temporal division ensured that a minimum of a 10-year period would be examined to characterize trends in resource use with some built-in flexibility for any data reporting lags (*i.e.*, census data for per capita reporting). This period also reflected the availability of continuous trapping data. Further emphasis was placed on important KCNs temporal frames of reference such as former **hydroelectric** developments in the region and in the case of YFFN, the 1957 relocation to York Landing.

The assessment focused on Project-related activities and effects that are expected to occur after the license is received. The temporal scope of the effects assessment includes the following phases of the Project:

- Construction Phase: Construction of the Project will occur over eight and a half years, beginning in 2014 (PD SV). Construction phase effects on the resource use environment are expected to be different than operation phase effects; and
- Operation Phase: The operation phase of the Project will begin in 2019 when initial generation of power begins (PD SV). The first three years of operation will overlap with the last three years of construction. Effects described within this assessment treat reservoir **flooding** and GS operation as an operation phase effect. The Project is expected to operate for a century or more. If the Project is

decommissioned at some point in the future, it will be undertaken according to the legislative standards of that time.

The spatial scope of the resource use **Local** and **Regional study areas** is described in Section 1.1.3.

1.1.2.3 Selection of Valued Environmental Components

The following **valued environmental component**s (VECs) were identified based on professional judgement and KCNs input:

- Fishing (domestic);
- Hunting and gathering (domestic); and
- Commercial trapping.

Although all resource use components have been considered, focus has been placed on VECs.

1.1.2.4 KCNs Involvement

Early engagement of the First Nations in the immediate vicinity of the Project began in the early 1990s, which provided input into Project design and led to partnership in the Project through the JKDA signed in 2009. As part of the JKDA process, individual AEAs were developed with each KCNs community and ratified through a referendum process. The AEAs identified mitigation and compensation measures to address foreseen and reasonably foreseeable effects of the Project. Where effects could not be avoided or reduced sufficiently, the AEAs provide appropriate replacements, substitutions or opportunities to offset foreseeable adverse effects of the Project.

The process of documenting existing resource use and potential impacts to resource use relied heavily on input from the KCNs communities (see Section 1.2.2 for details). The KCNs were particularly knowledgeable with regard to domestic/subsistence harvesting, commercial fishing, and commercial trapping. Resource harvesters, community resource managers and Elders provided Aboriginal traditional knowledge and knowledge of the local environment. This information provided the foundation for the following sections. This document has undergone KCNs community review to ensure that resource use information has been appropriately characterized and interpreted.

Each of the KCNs also has undertaken their own Project evaluation process which is described in Chapter 5 of the Response to EIS Guidelines and located in KCNs Environmental Evaluation Reports .

1.1.2.5 Assessment Methodology

For impact assessment, both construction and operation phase pathways of effect were examined for their potential impacts on resource use including:

- Construction disturbances causing changes in navigation and access;
- Construction disturbances causing increases in noise and dust potentially affecting resource users and **wildlife** resources;

- Construction disturbances affecting resource user safety;
- Reservoir clearing (construction);
- Disturbances causing potential changes to the fish resources (construction and operation);
- The presence of a large workforce during construction increasing **competition** for resources;
- Increases and decreases in access (construction and operation);
- Increases in the wage economy potentially reducing resource use activity (construction);
- Reservoir flooding (operation);
- Shifting patterns of resource use associated with AEA offsetting programs (construction and operation); and
- Increases in **populations** in Gillam (operation) increasing competition for resources.

Some of the factors affecting resource use, such as the presence of a large workforce and participation in construction related employment among resource harvesters, occur only during construction. Other factors affecting resource use, such as changes in access, shifting patterns of resource use and changes to resources, will commence during construction and continue through operation. For this reason, and to reduce repetition, discussions of Project impacts that begin in the construction phase and continue through operation are discussed as construction phase effects. The **duration** of these effects is clearly stated to continue through operation. Effects that will occur exclusively in the operation phase are documented in the operation phase effects sections.

The residual Project effects (effects left over after mitigation is applied) on resource use components were evaluated using predetermined criteria such as direction (positive, adverse or neutral); **magnitude** (small, moderate or large); geographic extent (small, medium or large); and duration (short-term, medium-term or long-term). The frequency of the effect (*i.e.,* how often will it occur) and reversibility (*i.e.,* the potential for recovery from the effect) was described. The ecological or social context describes whether the component is particularly sensitive to disturbance and has the capacity to adapt to change. Certainty (*i.e.,* level of confidence) was also provided. See Chapter 5 of the Response to EIS Guidelines for full descriptions of criteria.

Monitoring and follow-up requirements were identified where appropriate. The sensitivity of Project residual effects to climate change is located in Section 1-10.

1.1.3 Study Area

The Regional Study Area used in this section includes the Split Lake Resource Management Area (**SLRMA**), the Fox Lake Resource Management Area (**FLRMA**), and the York Factory Resource Management Area (**YFRMA**) including YFFN Trapline 13 (Map 1-1). The War Lake **Traditional Area** is contained by the SLRMA. Together, these areas comprise over 50,000 km² or approximately 9.5% of Manitoba.

Changes to resource use in one area can shift the pattern of resource use and ultimately affect efforts in other areas. To understand the impacts of the Project on resource use, it was necessary not only to have an understanding of how important the affected Project area is to resource use, but also to understand its relative importance to overall resource use in the broader region. The Regional Study Area is the **spatial boundary** within which **indirect environmental effect**s were assessed. This area included the SLRMA, the FLRMA and the YFRMA with focus on the SLRMA.

The **Local Study Area** is the region within Traplines 07, 09, 15, and 25 bounded in the northwest by Provincial Road (PR) 280 and the rail line to the southeast. West to east, the Local Study Area encompasses Clark Lake to the town of Gillam. This region is where direct changes to the terrestrial, aquatic and social environment are expected to occur (*i.e.,* **direct environmental effect**s) (Map 1-2) Unless otherwise specified in specific sections of this document, the Regional Study Area and the Local Study Area are defined as above.

1.1.4 Sources of Information

Resource use information was gathered using seven primary methods and/or sources:

- KCNs Environmental Evaluation Reports;
- KCNs community workshops;
- Socio-economic fieldwork research programs;
- KCNs community studies as follows:
  - YFFN Traditional Values, Occupancy & Community History Project;
  - FLCN Community History Project (Draft);
  - FLCN Preliminary Sturgeon TK Study (Draft); and
  - FLCN Keeyask Traditional Knowledge Report (Draft);
- Key person interviews of government / industry officials and other stakeholders;
- Government databases; and
- Literature reviews.

Specific methods for gathering information are described within each resource use subcomponent section.

1.2 DOMESTIC RESOURCE USE

1.2.1 Introduction

Prior to the arrival of Europeans, Aboriginal peoples inhabiting what is now northern Manitoba subsisted entirely on game, fish, and wild plants. Land use and occupation followed codes of access based on kin-group dependence on unrestricted access to large areas of land and water enabling sufficient harvests in exchange for efficient use of labour (Usher and Weinstein 1991; Hill 1993). The economic base "was mainly characterized by hunting, fishing, trapping and gathering….land was vital to [their] well being" (Young 1990). To this day, "hunting, fishing and gathering remain not only an economic necessity for many Indians [sic], but also a link with their cultural heritage and a symbol of their unique position in Canadian society" (Young and Skarsgard 1983 p. 3).

In addition to supplying subsistence needs, "harvesting is important … culturally and socially. It puts food on the table, reaffirms the continuing vitality of Aboriginal culture and strengthens the kinship links through which harvesting is organised and wild food distributed" (Loney 1995; Brody 1981, 1987; Feit 1982). Therefore, although commercial (financial) returns are cited in this document, the social and cultural contributions of resource use activities are very important.

Traditional resource use includes hunting, fishing, trapping, and gathering for domestic/subsistence 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 in Sections 1.3 and 1.4. However, commercial and domestic harvesting are often conducted simultaneously.

Domestic resource use involves the pursuit of different activities at different times of the year. For example, trapping is generally conducted during winter when furs are the best quality and travelling can be conducted by snowmobile; most fishing occurs during the spring and fall when fish are migrating and congregating; and hunting may occur when animals are in rut. These activities are not mutually exclusive. For example, trappers will fish near their winter camps or consume beaver meat and sell the fur, thereby combining subsistence and commercial activity (Usher and Weinstein 1991). Hill (1993) explained that "according to Cree culture and history, the practice of combining land uses evolved in response to a need to maximize the resource harvest, and minimize the amount of effort expended".

Domestic resource use has been and continues to be a vital and substantive way of life for the KCNs communities. It has been termed "living off the land". Not simply consumption of natural resources, domestic resource use was and still is a way of life that provides sustenance, medicines, building materials, heat, and spiritual fulfillment. Respect and honour are displayed to animals that have been killed and only enough to eat is taken and shared. For example, CNP **Member**s take pride in living their relationships with *Askiy* (see also Chapter 2 of the Response to EIS Guidelines for the KCNs worldview), which is considered part of caring for the land (CNP Keeyask Environmental Evaluation Report).

Canada acknowledged the importance of traditional resource use through solemn agreements known as the Numbered Treaties in relation to lands in Manitoba. The Treaty 5 adhesion was signed in 1910 at

Split Lake and York Factory and represented the peoples who later became the Tataskweyak Cree Nation, the War Lake First Nation, the York Factory First Nation and the Fox Lake Cree Nation. The rights conveyed by the Treaty adhesion included traditional resource harvesting by Status Indians and 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. Section 35(1) of the *Constitution Act* 1982 recognized and affirmed existing Aboriginal and Treaty rights thereby protecting the activities, practice or traditions that are integral to the distinctive culture of Aboriginal peoples.

Traditional resource use is both traditional and contemporary. On the past, TCN stated: "The Cree relationship and connection with this land is an experience that no other Canadian has had….Since long before the white man came, the Tataskweyak Cree made their living from their relationship with the land, from hunting, fishing, gathering and trapping" (TCN 2002). On the future, one TCN vision is "to ensure that the opportunities be available for our people to experience traditional ways of living based on hunting, trapping, fishing and gathering within the Split Lake Resource Management Area" (TCN 1999).

Documenting domestic resource use is a key component to an environmental assessment. It is important to have an understanding of existing domestic resource use to determine how a project may affect future domestic resource use. Impacts on domestic resource use have the potential to affect not only the subsistence economy, but also the traditional lifestyle and spirituality of resource users. Resource harvesting should be viewed more broadly as a social system, versus strictly as an economic system. Social impact indicators include skills and knowledge of resource harvesting, accessibility and quality of harvests, inter-generational transmission of values, and sharing and reciprocity; all of which are inherently embedded in the social system.

1.2.2 Approach and Methodology

1.2.2.1 Overview to Approach

This section presents available domestic resource use information provided by the four Keeyask Cree Nations (KCNs). Each of the KCNs has had the opportunity to present information from their unique perspectives and from the Cree worldview and provide evaluation reports. In this section, information provided by the KCNs has been supplemented and cross-referenced with information gathered from literature and key person interviews.

This assessment involves identifying potential effects to domestic resource use activities as described in Section 1.1.2.5. However, because different resource users can perceive Project effects differently, the nature and magnitude of some effects are not classified. Methodological differences with regard to community evaluation reports have also presented challenges for comparative purposes, as discussed below.

Project effects on domestic resource use are predicted for KCNs communities only. Use of the Local Study Area by other Aboriginal groups has not been identified through the Public Involvement Program or through direct consultations with Aboriginal groups and communities (see PIP SV). Therefore no effects to other Aboriginal groups have been identified. Ongoing discussions are occurring with the

Manitoba Metis Federation and Cross Lake First Nation (also known as the Pimicikamak Cree Nation) (PIP SV).

1.2.2.2 Data and Information Sources

Though methods varied for each of the four KCNs, domestic resource use information was gathered using six primary methods and sources listed and described below:

- Community Evaluation Reports as follows:
  - Keeyask Environmental Evaluation: A report on the environmental effects of the proposed Keeyask Project on Tataskweyak Cree Nation and War Lake First Nation (CNP Keeyask Environmental Evaluation Report);
  - Kipekiskwaywinan: Our voices by York Factory First Nation (YFFN Evaluation Report (*Kipekiskwaywinan*)); and
  - Mino Pimatisiwin: the Fox Lake volume of the Keeyask EIS (FLCN Environment Evaluation Report [Draft]).
- Community workshops;
- Socio-economic fieldwork research programs;
- Community studies as follows:
  - YFFN Traditional Values, Occupancy & Community History Project (YFFN 2010);
  - YFFN initial community-based environmental overview: Proposed Keeyask Hydro Project (YFFN 2002); and
  - YFFN community-identified socio-economic conditions and future priorities (YFFN 2004)
  - FLCN Community History Project (Draft) (FLCN 2009 Draft);
  - FLCN Sturgeon Traditional Knowledge Study (Draft) (FLCN 2008 Draft);
  - FLCN Aboriginal Traditional Knowledge Study (Draft) (FLCN 2010 Draft);
  - Key person interviews of government officials; and
- Literature review.

1.2.2.2.1 KCNs' Environmental Evaluation Reports

The Cree Nation Partners comprised of the Tataskweyak Cree Nation and War Lake First Nation took responsibility for evaluating the potential Project impacts on themselves, which included Project impacts on domestic resource use. The evaluation is published in Keeyask Environmental Evaluation: A report on the environmental effects of the proposed Keeyask Project on Tataskweyak Cree Nation and War Lake First Nation (CNP Keeyask Environmental Evaluation Report). The CNP approach focused on the relationships that reflect CNP customs and relationships with the land and water. The CNP opted to provide limited information on domestic resource use in terms of harvest, participation and location. The

Project was evaluated by CNP based on their holistic understanding of the **ecosystem** inherent to the Cree worldview and culture.

The YFFN community Evaluation Report *Kipekiskwaywinan: Our Voices* describes the present conditions of resource use and access and provides perspectives on the Project. Cultural values that are integral to YFFN's relationship with the land also are described.

The FLCN Environment Evaluation Report (Draft) provided information on resource use and FLCN perspectives on the Project.

1.2.2.2.2 Community Workshops

In August 2009, two workshop sessions (afternoon and evening) focusing on resource use were undertaken with a total of 20 YFFN Members at York Landing. In addition, five active resource harvesters participated in mapping resource harvest areas, animals harvested and local and traditional knowledge. The mapping sessions also served to validate, update and build upon resource use and harvesting mapping data collected previously by the community. Follow up interviews and mapping sessions with three additional resource harvesters were undertaken in November and December 2009. Results of the workshops and mapping sessions were presented back to the community for verification in January 2009.

In April 2012, two workshop sessions were held with FLCN resource users and the Kitayatisuk core (Elder) group. Participants shared their knowledge of and perspectives on Keeyask area resource use.

1.2.2.2.3 Community Led Research Initiatives

The CNP also led several community socio-economic baseline research initiatives. Results from these initiatives are published in six technical memoranda, five of which contained descriptive information with regard to resource use:

- Keeyask EIS – Socio-Economic Baseline Conditions DRAFT Technical Memorandum: Governance, Health, Travel Access and Community Life War Lake First Nation – Ilford, Manitoba (CNP 2010a);
- Keeyask EIS – Socio-Economic Baseline Conditions DRAFT Technical Memorandum Economy War Lake First Nation – Ilford, Manitoba (CNP 2010b);
- Keeyask EIS – Socio-Economic Baseline Conditions DRAFT Technical Memorandum Governance, Health, Travel Access and Community Life Tataskweyak Cree Nation – Split Lake, Manitoba (CNP 2010c);
- Keeyask EIS – Socio-Economic Baseline Conditions DRAFT Technical Memorandum Economy Tataskweyak Cree Nation – Split Lake, Manitoba (CNP 2010d); and
- Keeyask EIS – Socio-Economic Baseline Conditions DRAFT Technical Memorandum Population, Infrastructure and Services Tataskweyak Cree Nation – Split Lake Manitoba (CNP 2010e).

The YFFN community researchers also conducted additional resource use interviews with two Elders and a Resource Management Board member as part of a Key Person Interview Program (see Socio-

economy Section 1.2.3). The intent was to draw on the expertise of these individuals with respect to past and present resource use activities in the YFFN **RMA** and the Local Study Area.

These documents provide local community expertise, participation levels, perspectives and outlooks on resource use.

1.2.2.2.4 Community Studies

The FLCN undertook three intensive studies collecting FLCN Members' local and traditional knowledge related to community history (FLCN 2009 Draft), *namao* or lake sturgeon (FLCN 2008 Draft), and ATK related to the Keeyask study area (FLCN 2010 Draft). All three studies provided extensive descriptions of past and present resource use. FLCN Members opted to frame the FLCN (2010 Draft) ATK document time periods to reflect the pre- and post-Kettle (1974) periods.

York Factory First Nation also undertook three community studies that informed this assessment: YFFN Traditional Values, Occupancy & Community History Project (YFFN 2010), the Initial community-based environmental overview: proposed Keeyask hydro project (YFFN 2002); and, the Community-identified socio-economic conditions and future priorities (YFFN 2004).

1.2.2.2.5 Key Person Interviews

A workshop with officials from Manitoba Conservation and Water Stewardship North East Conservation District was held in February 2009 and was attended by the Regional Fisheries Manager, the Regional Wildlife Manager, the Assistant District Manager, the Gillam District Natural Resource Officer and the Regional Lands Officer. The purpose of this meeting was to record provincial government officials' knowledge of commercial, recreational, and domestic resource use in the region.

Three former and one current commercial fisher and two non-Aboriginal resource users were interviewed for their perspectives and observations over time of the Local and Regional study areas.

1.2.2.2.6 Literature Review

Key literature reviewed included, but was not limited to, the following:

- Split Lake Cree Post Project Environmental Review (PPER) (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a);
- Fox Lake First [Cree] Nation land use and occupancy: living memory of the Fox Lake Cree (Hill 1993);
- Towards assessing the effects of Lake Winnipeg Regulation and Churchill River Diversion on resource harvesting in native communities in northern Manitoba (Usher and Weinstein 1991); and
- Voices from Hudson Bay: Cree Stories from York Factory (Beardy and Coutts 1996).

Information was also drawn from other literature as cited in the text of this document.

1.2.3 Existing Environment

1.2.3.1 Past Conditions

1.2.3.1.1 Traditional Resource Use in General

PRE-EUROPEAN CONTACT AND EARLY EUROPEAN CONTACT

Prior to European contact, the *Maskego-Eniniwuk* or swampy Cree inhabited the Hudson Bay lowlands surviving on caribou (*attik*), moose (*mooswa*), lake sturgeon (*numa'o*), jackfish (*unjobayo*), rabbit (*wa'pos*), beaver (*amisk*), Canada goose (*nis'ku*) and other waterfowl (*seesee-puk-ako-kotuk-pinasesuk*) (YFFN 2010). 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 and this continues to be an important component of traditional harvests for KCNs Members.

Settlement of Split Lake may have occurred in the late 1800s by inland family groups who summered in the Split Lake region (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a). At approximately the same time, a year-round settlement and trade center also was present at Recluse Lake where a Hudson's Bay Company trading post had been established. Up to 30 families were enumerated as indigenous to the Split Lake region before the turn of the century while other family groups (perhaps up to 45 additional families) travelled to York Factory or Churchill for portions of the year (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a).

For these *Maskego-Eniniwuk* family groups, or as they called themselves the *Inininuk* (the people), the seasonal pattern of settlement and land use involved travelling to the coastal Hudson Bay lowlands for summer hunting, fishing and gathering and returning inland to customary family wintering areas (FLCN 1997). The coast offered returning caribou herds, which provided a dependable and accessible food source in spring and summer, as well as whale and seal hunting opportunities (YFFN 2010). The spring goose hunt drew people to coastal waters for the abundant lesser snow geese (*wawao*) and the Canada goose which congregated there. Willow ptarmigan (*wapinayo*) were hunted all year round (YFFN 2010). Although fishing occurred year round, the most productive fishing occurred during spring (suckers, lake sturgeon and jackfish) and fall (lake whitefish) spawning periods. A fall caribou hunt was undertaken at river crossings as the caribou began their journey southwards. In winter, inland camps were situated near trees, which provided heat and protection from the cold. Family groups travelled inland to winter encampments on the Hayes River, north to Churchill, and as far inland as Gillam, Split Lake, Fox (Atkinson) Lake and Ilford. To the east, families travelled as far as Fort Severn and Big Trout Lake, Ontario (YFFN 2010).

Following the establishment of both French and English forts near the mouth of the Nelson River, the *Maskego-Eniniwuk* became middlemen, trading fur for European goods. Seasonal patterns of resource use were adapted somewhat to supply fresh meat to the forts such as Fort Nelson and later, exclusively to the York Factory fort. In June, some families would move towards York Factory supplying wood and food to the fort and freight goods in summer months inland to destinations such as Cross Lake, Shamattawa

on the God's River (Fast and Saunders 1996) and Norway House (Split Lake Cree Nation - Manitoba Hydro Joint Study Group 1996a). These people became known as the 'homeguard' Cree.

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For many *Inininuk* the tradition of working for and exchanging goods with the Hudson Bay Company base at York Factory continued until its closure in 1957, though some families relocated inland prior to 1957 to work at various mile stops on the Canadian National Railway or at the transportation hub at Ilford. In 1957, the remaining homeguard Cree at York Factory were relocated to York Landing, though many families opted to settle in other communities such as Split Lake, Gillam, Bird and Shamattawa.

Country foods such as moose, caribou, beaver, muskrat, fish, waterfowl, rabbits, spruce grouse continued to be important in KCNs community diets. Wild berry crops like niskeminah (strawberries), ostikonihminah (cloudberries), oskisihkhominah (logan berries) and osapominah (gooseberries) and gull and duck eggs also contributed to diets (Split Lake Cree Nation - Manitoba Hydro Joint Study Group 1996a; FLCN 2009 Draft).

Some York Factory First Nation Members described the area near the community of York Landing as "a Garden of Eden" in 1957 where abundant wildlife such as fish, muskrat and beaver was available. At this time, subsistence harvest was conducted by canoes, which were occasionally outfitted with an outboard motor. People would go out on the waterways or land to hunt, returning to the community only when successful. People stated they relied on hunting and trapping for the vast majority of their needs and harvesting **country food**s was the only way the family survived. Other foodstuffs such as flour were purchased from Ilford and travel was by dogsled or by boat.

All KCNs report that the series of developments on the Nelson River, including Kelsey (1961), Kettle (1974), Long Spruce (1979) and Limestone (1992), profoundly and negatively affected the patterns of domestic resource use in the area. The **Churchill River Diversion** (**CRD)** and the **Lake Winnipeg Regulation (LWR)** also were events that changed the flows on the Nelson and the Churchill rivers. Changes to historical fishing, hunting, trapping and gathering patterns and distribution subsequent to these developments are discussed below.

Fishing

Fish are considered a staple in KCNs community diets. Fish can account for the majority of country foods consumed, and fish abundance is likely an explanation for the relatively dense populations of First Nations on the Nelson River system (Usher and Weinstein 1991). The bulk of fishing takes place nearby communities on the main waterways (*i.e.*, Nelson River, Split Lake, and the Assean, Aiken, Cyril , Butnau and Kettle rivers among others) (Usher and Weinstein 1991) and the harvest is generally shared with other members of the community.

Traditionally, Split Lake was the most important local domestic resource harvesting area in the Split Lake RMA for Tataskweyak Cree Nation Members, though Waskaiowaka also was important (Split Lake Cree Nation - Manitoba Hydro Joint Study Group 1996a). In 1966, it was estimated that the Split Lake domestic fishery produced over 27,000 kg (or over 60,000 **lbs**) of fish annually (Schlick 1968). Depending on the species, and conversion factor applied, this could translate into 38 kg (86 lbs) per capita edible

weight (at 50% of round weight) annually for the 350 Split Lake residents there at the time. In 1984, Wagner (1986) estimated that the Split Lake domestic fishery produced 10.4 kg per capita per year in edible weight (at 50% of round weight), suggesting substantive post-CRD/LWR decline. Although only two estimates were available, each with methodological challenges (see Usher and Weinstein 1991), the loss of confidence in water quality and the fear of mercury contamination resulting from CRD/LWR may have contributed to the reduced consumption of domestic foods, particularly fish (Split Lake Cree Nation - Manitoba Hydro Joint Study Group 1996a). The timing of Wagner's (1986) study also corresponded to the decade with the lowest estimated country food consumption rates since the 1960s (at 50% of dietary contribution) (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a).

The Post Project Environmental Review (Split Lake Cree Nation - Manitoba Hydro Joint Study Group 1996a) stated that CRD/LWR made domestic fishing and trapping more difficult to carry out and produced substantial hidden costs in terms of extra expense, time, and effort, particularly in relation to access and transportation. Usher and Weinstein (1991) also suggested that "subsistence fishing, like commercial fishing, [became] more difficult, more expensive, and less enjoyable". At this time, YFFN conducted much of their subsistence fishing on the Aiken River (in the post-1957 period) and on Split Lake, and consequently, their experiences were likely similar to those of TCN. War Lake First Nation Members (formerly TCN Members residing at Ilford) were likely less affected as their domestic fisheries are focussed on off-system lakes such as War, Cyril, South Kinosew and Fox (Atkinson) lakes.

The Fox Lake Cree Nation noted that riverbanks and the mouths of rivers and streams were targeted for a rich variety of fish. Tributaries of the Nelson River, including the Limestone, Weir, Kettle, Fox and Wabuttnakh (Butnau) rivers, were the main travel routes and an abundant source of food and water. Fish were noted as a main dietary source for community members (FLCN 2009 Draft). The mouths of the Roblin, Limestone, and Weir rivers were renowned to FLCN Members for good hunting and fishing (FLCN 2008 Draft; FLCN 2010 Draft). Moose Nose Lake and the confluences of the Butnau and the Kettle rivers at the Nelson River also were noted as important fishing areas prior to the impoundment of Stephens Lake (FLCN 2010 Draft).

The TCN reported that fishing, which was conducted year-round, was perhaps their primary source of food (Split Lake Cree Nation - Manitoba Hydro Joint Study Group 1996a). Fish were primarily harvested from settlement locations at Split and Recluse lakes and at outcamps at Assean, Waskaiowaka, Billard and Atkinson lakes.

Fishing – Sturgeon

Historically, some Aboriginal communities were estimated to obtain up to 50% of their protein from sturgeon (Nolan 2006), though Usher and Weinstein (1991) suggested that the abundance of many fish species on the Nelson River system made up the bulk of country food consumption. Sturgeon bones have been found at archaeological sites in association with tools dating back as early as perhaps 5,000 years ago (YFFN 2010). Lake sturgeon were typically captured during spring spawning runs providing a variety of products including isinglass (used for glue), oil for medicinal purposes, bones for needles and spear and arrow heads (Manitoba Conservation 2010). Socially, lake sturgeon harvest also served to

strengthen social and cultural traditions as the spring spawning grounds became meeting grounds for widely dispersed people (Manitoba Conservation 2010).

For TCN Members, historical sturgeon harvest occurred in the spring and fall with Fox Lake Cree families at Moose Nose Lake and at Atkinson (Fox) Lake. Lake sturgeon harvest also occurred in the Little Churchill River downstream of Recluse Lake (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a), on the Burntwood and Grass rivers (Tataskweyak Cree Nation 2007) and at the confluence of the Assean River and Clark Lake. Historical lake sturgeon harvest by YFFN Members occurred at spawning locations in rapids and waterfalls (Fast and Saunders 1996) and at creek mouths such as an unnamed Nelson River tributary in the Jackfish Island area (Hannibal-Paci 2000). Prior to the early 1970s, FLCN Members reported that lake sturgeon was plentiful in the lower Nelson River, particularly at the mouths of the larger tributaries such as the Butnau, Limestone, Kettle, Angling and Weir rivers and at rapids on the mainstem of the Nelson River including Gull Rapids (FLCN 2008 Draft, FLCN Environment Evaluation Report [Draft]).

Current domestic lake sturgeon harvests, to the extent recorded, are discussed in Section 1.2.3.2. Commercial lake sturgeon fishing is described in Section 1.3.3.1.

Hunting, Trapping and Gathering

Manitoba has a long history of Indigenous occupancy dating back to the time of the great ice, the *Misse Muskomi*, or when glaciers receded from the land (YFFN 2010). Evidence of animal bones found at various archaeological sites provides a record of the animals used to sustain life. For the KCNs, hunting beaver, muskrat, geese, ducks, bear, rabbit, and particularly caribou provided the people with all their needs prior to European contact (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a).

With regard to trapping, only in the last 300 years have **pelt**s been valuable commercially through the establishment of the Hudson Bay Company in 1670 (Manitoba Conservation 2010). The fur trade era was characterized as a mutually beneficial relationship whereby the Cree people acted as middlemen between Aboriginal fur gatherers and Hudson's Bay Company representatives. By the 1940s, trapping was out of control in Manitoba with many outsiders taking advantage of the new railway access to points as far north as Churchill (the CNR line was completed in 1929 to its terminus in Churchill). Outsiders from the south were '**high-grading'** resources, particularly beaver, causing severe depletion and threatening important local community food and income sources (Carmichael 1973).

At the request of local communities, the registered trapline (RTL) system was established securing (predominantly) local First Nation access to the fur resources and formally defining the traditional lands used by family groups (Manitoba Conservation 2010) though some First Nation Members regard the trapline system as restrictive. Even despite fur price reductions in the post-WWII period lasting until the 1970s, trapping persisted as an economic activity due to its linkage to domestic food production (Usher and Weinstein 1991) (see Section 1.4.3.2 for more information on commercial trapping). In particular, beaver and muskrat remained important species because they provided substantive quantities of food as well as cash income (Usher and Weinstein 1991).

Fur prices increased from the 1970s to the early 1990s resulting in increased demands for traplines and increases in commercial participation. What was instructive, however, was the ongoing high demand for

traplines following price declines in the early 1990s, which perhaps underscores the social value of trapping. Traplines are often components of the traditional territories of First Nations and loss of lines to non-community members signifies a loss of traditional lands to the community (Manitoba Conservation n.d.). The maintenance of these social relations is thought to be as much a priority as the production of material goods (Usher and Weinstein 1991; CNP Keeyask Environmental Evaluation Report).

Prior to European contact, hunting clans selected Split Lake as a central gathering spot (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a). At the time of the Treaty in 1910 the Tataskweyak Cree numbered approximately 250 at the Split Lake wintering location and hunting grounds were described from the junction of the Little Churchill and Churchill rivers southward to Split Lake and east to Fox (Atkinson) Lake (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a).

Hunting of migratory species such as ducks and geese typically occurred during periods of high concentration and opportunistically at other times. Ducks were hunted in fall and geese in spring (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a). Small game animals such as rabbits, ptarmigan or grouse were typically hunted opportunistically and frequently using snares. When abundant, these animals would have contributed substantively to food supplies, though during periods of cyclical population declines these food sources would have been ignored (Usher and Weinstein 1991). Hunting small game was often conducted in tandem with large game hunting or trapping. The inception of the rail line might have changed the patterns of the spring goose hunt in part, shifting it north westwards to Churchill as some resource harvesters have stated that they now go to Churchill for the spring hunt.

For the KCNs, hunting was generally practiced concurrent with other activities such as berry picking, plant gathering and trapping involving the entire family. The FLCN indicated that people consumed a variety of food resources from the land including rabbits, chickens (ptarmigan or spruce grouse) and seagulls (FLCN 2009 Draft). Trapping of fox and beaver were regular occurrences and caribou were noted to be plentiful in the 1940s and 1950s. Usher and Weinstein (1991) also made note of the importance of caribou to the subsistence economy, especially up to the end of the 1950s. Based on estimates by TCN Elders, food derived from subsistence hunting comprised about 90% of all meals eaten by TCN in the 1960s declining to 50% in the 1980s after which a recovery was noted to about a 60% composition by the mid-1990s (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a).

Tataskweyak Cree Nation Members also derived medicinal benefits from natural products (Split Lake Cree Nation - Manitoba Hydro Joint Study Group 1996a). Seneca root (*Polygala senega*) was used as a remedy for headaches and various other tree products were used for wound healing and treating pain (FLCN 2011). Fox Lake Cree Nation Members reported that medicines harvested in the Moose Nose Lake area (Moosokot) were lost due to flooding caused by construction of Kettle GS in the early 1970s. Sea-coast medicinal herbs were harvested by YFFN Members (YFFN 2010).

Access

Traditionally, Tataskweyak Cree Nation Members used waterways as their main transportation routes to access areas in the SLRMA and beyond and this system of transport continued from time immemorial through to the 1900s (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a). The Hudson Bay rail line, which was extended to Churchill in 1929, modified access in the region by encouraging settlement

along the rail line at Ilford and secondarily at Gillam (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a). As mentioned above, improved access brought about the by the railway extension had important implications for both trapping and fishing as evidenced by destructive competition for fur resources in the 1940s and the depletion of Nelson River lake sturgeon populations by commercial fisheries (See sections 1.4.3.2 and 1.3.3.1.1 respectively).

The railway also enabled KCNs community Members economical access to an expanded region to carry out trapping, hunting and fishing for subsistence and commercial purposes. Rail travel supplemented existing modes of travel and access such as dog team travel, walking or canoeing. The closure of the York Factory Fort in 1957 precipitated the relocation of the remaining homeguard Cree to the newly established community of York Landing and secondarily to other communities. Later in the century technologies such as outboard motors, skidoos and all-terrain vehicles (**ATV**s) enabled resource users to reach remote locations in short time periods greatly expanding the geographic reach but also the expense of resource use.

Roads in the region were built primarily to support the Kelsey (1961), Kettle (1974), Long Spruce (1979), and Limestone (1992) developments in the Split Lake RMA. These roads served a dual purpose - providing economical access to resource use areas for the KCNs but also providing access to outsiders, which exert greater pressures on the resource base (Hill 1993).

1.2.3.2 Current Conditions

1.2.3.2.1 Traditional Resource Use in General

Usher and Weinstein (1991) described a dual geographic harvesting pattern that focuses on: 1) a relatively intense harvesting zone along roadways and waterways close to the community; and 2) use areas that are kin-based and scattered throughout a community's traditional use area. These patterns of access typically result in the presence of trails, cabins and campsites close to the frequently accessed home community. Locations further from the home community are accessed less frequently, for longer periods and distributed more widely in the traditional use area and are characteristic of family or kin-based harvest areas.

Expenses related to buying and maintaining equipment such as boats, motors and ATV's limits resource use. People who work also are limited by time, though resource use is often conducted after work, on weekends and during holidays. Access is also an important factor affecting the number and frequency of traditional resource use trips.

The TCN seasonal pattern of land use, which was recorded by Manitoba Keewatinowi Okimakanak and updated in 2011 with input from the other KCNs communities, reflects the Cree seasonal pattern of resource use (Figure 1-1). Summer resource use is focussed (though not exclusively) on gathering (plants, medicines and berries) followed by moose hunting in the late summer – fall period. Caribou hunting and trapping occurs in winter. Goose and duck hunting occurs mainly in the spring and fall. Fishing occurs year-round. It should be noted that resource use activities generally are not mutually exclusive. For example, a trapper might set nets for a supply of fresh fish or plant gathering may occur in conjunction with the fall moose hunt.

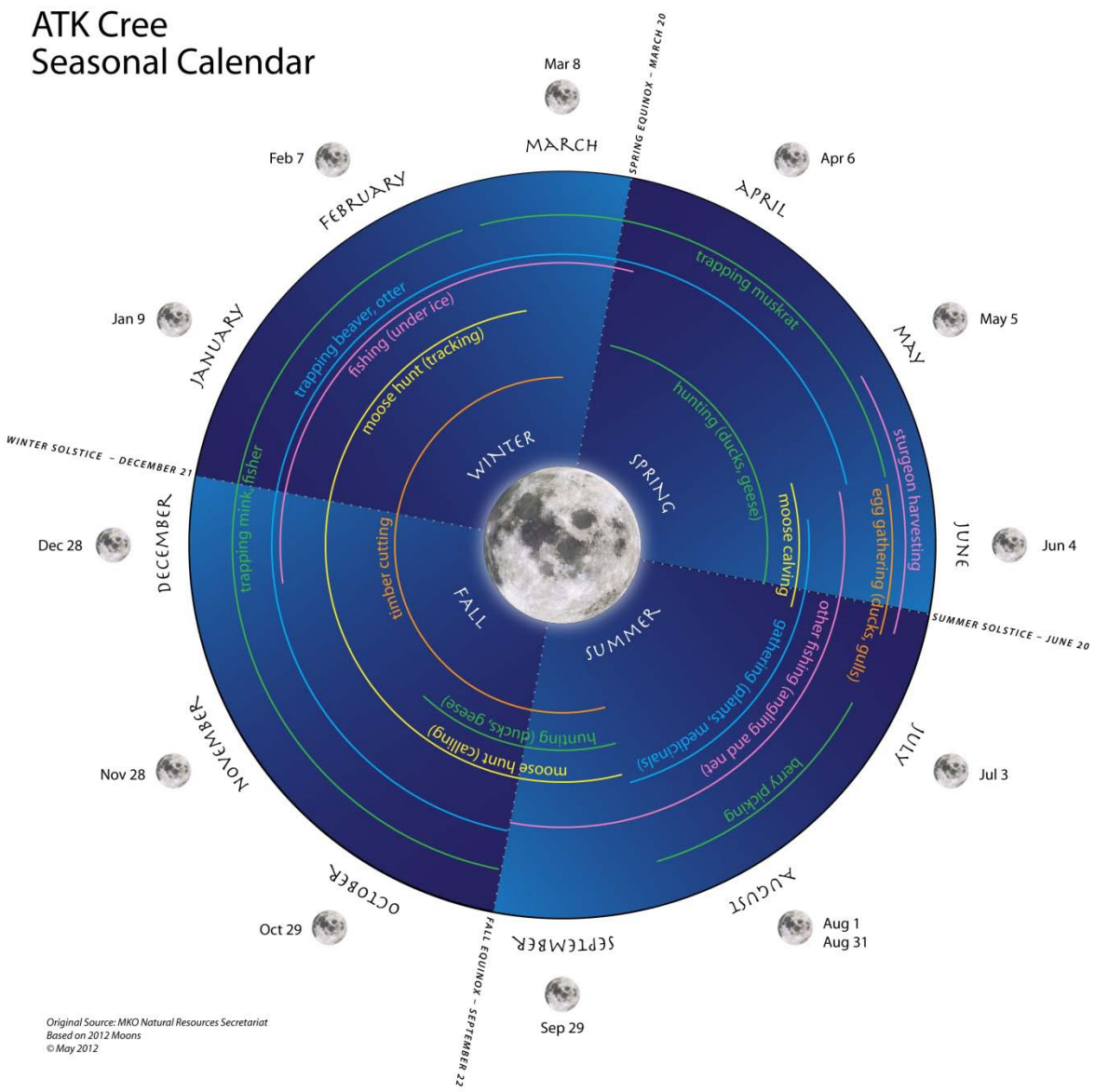

Figure 1-1: The Cree Seasonal Calendar

With respect to the level of participation, TCN has reported decreasing numbers of older Members and increasing numbers of youth participating in resource use activities (CNP 2010d). The TCN reported that of the 1,820 on reserve Members (CNP 2010e), on average 200 Members trap in the SLRMA, 150 Members hunt, and 100 Members gather plants periodically with some likely participating in all of the above resource use activities (CNP 2010c). The WLFN reported that fewer than 15 Members are currently participating in trapping.

Approximately 75% of YFFN community Members participate in resource harvesting and it was estimated that there is a hunter residing in almost every household (about 45-50). An even greater

number of people also fish. It was stated that younger people do not participate in resource use as much as older generations due to a lack of interest.

Fox Lake Cree Nation Members also are active in the Regional and Local study areas (FLCN 2010 Draft). The FLCN considers all their Members resource users due to all Members benefiting from resource use (*i.e.,* consumption of country foods) (FLCN Environment Evaluation Report [Draft]).

1.2.3.2.2 Access, Cabins and Camping

ACCESS

Safe and economical access to harvesting areas has always and continues to be critical to resource use. Hydroelectric development on the Nelson River (see the Response to EIS Guidelines, Section 6.2) has substantially altered the patterns of resource use, which KCNs state have added hidden costs in terms of safety (changes to water and ice conditions) and increased time and effort (*e.g.*, debris in water damaging equipment) required to harvest resources (CNP Keeyask Environmental Evaluation Report; YFFN Evaluation Report (*Kipekiskwaywinan*); FLCN 2010 Draft). Water level changes on hydro affected lakes and rivers can cause hanging or suspended ice after drawdowns and flooded ice conditions after water level increases. Less predictable water flows in the open-water season and ice in winter have caused some resource users to reduce or discontinue use of affected waterbodies due to safety concerns (YFFN Evaluation Report (*Kipekiskwaywinan*)). Despite change, the Nelson River is still reported to be the most important travel route in the SLRMA (CNP Keeyask Environmental Evaluation Report).

In general, resource harvesting areas are accessed by boat, truck, all-terrain vehicle, snowmobile, aircraft or on foot. Roads, either all weather or winter, provide a direct link for people to resources. Transmission and rail line corridors also form important winter transportation corridors for snowmobile access. The most common modes of land-based transportation reported by the KCNs are ATV and snowmobile (CNP 2010a; 2010d) though snowmobile is stated to be the most prevalent mode of travel for YFFN Members.

The all-weather PR 280 serves as a main transportation corridor between Thompson, Split Lake, and Gillam. From the Long Spruce GS, PR 290 carries on connecting from the terminus of PR 280 to Sundance with a linking road to Bird. The Conawapa access road extends from Sundance to the potential site of the Conawapa GS. Two winter roads exist in the region: a 64 kilometre road linking Split Lake to York Landing and Ilford; and a 200 km road linking Gillam to Shamattawa. The Hudson Bay Railroad's Churchill line extends from the Pas to Churchill servicing the WLFN community at Ilford and Gillam approximately three times per week from Thompson (Dillon Consulting 2001). This infrastructure reduces costs for fuel and travel time for resource users. Roads such as PR 280 improve access to resource harvesting areas such as Assean Lake, the North Arm of Stephens Lake, and the North and South Moswakot rivers.

Also important are additional access trails built and maintained by community members to access areas such as traplines, hunting grounds, and fishing areas. Socially, these trails function as access routes to resource areas and allow people to remain connected to their traditional way of life (Center for Indigenous Environmental Resources 2006). Examples of such trails include WLFN's trail from Ilford to

Fox (Atkinson) Lake along the Cyril River (CNP 2010a) and TCN's trail from Split Lake to Gull Lake (CNP 2010c) both of which can be travelled by ATV or snowmobile.

The general pattern of access for YFFN Members includes travel from the York Landing community to the south east on the Aiken River and northeast by snowmobile and boat. Boat travel upstream on the Nelson River was also reported. Some boat travel was reported on the southeast shores of Split Lake. Most lakes and rivers within Trapline 13 were travelled frequently and this area is reported to be crowded. Overall, however, the YFFN report that a lack of trails currently limits their access to resource use areas.

Additional trails such as the abandoned rail bed to Port Nelson and transmission line corridors also are used by KCNs community Members. The TCN reported that resource users regularly use areas such as Pelletier, Waskaiowaka, Recluse, Limestone, and Troy lakes as well as the Assean River, which are accessed by a system of overland trails, portages and waterways (CNP 2010c). Although no difficulties in accessing these sites were formally reported, the trail to Waskaiowaka currently may be affected by blowdown conditions following a forest fire in the region (TE SV Section 2.3.2).

ACCESS - LOCAL STUDY AREA

Boat travel downstream over Birthday Rapids is possible but can be dangerous due to the narrowing of the Nelson River channel creating high velocity flows (more than 1.5 m/s) (PE SV Section 4.3.1.1). Travel in the upstream direction requires an experienced boat driver with local knowledge of hazards. As a result, Birthday Rapids is not commonly navigated. Travel over Gull Rapids also is not frequently attempted (if at all) due to the 11 m drop across its length, very high water velocities and numerous rock outcrops (PE SV Section 4.3.1.1). Portage routes are not in good condition and would be required for upstream travel. Consequently, boat-based resource use in the area between Birthday and Gull Rapids is limited.

In winter, travel downstream of Birthday Rapids to Gull Rapids on the Nelson River is limited by large ice pans and sheets which jam or form hanging ice though these do not form every year (PE SV Section 4.3.2.4). In many years safer shore ice, which can be traversed by a snowmobile, may be limited to areas with low flow such as Clark Lake. The relative scarcity of shore ice has the tendency to reduce winter travel potential downstream of Clark Lake to the base of Gull Rapids. Instead, winter travel between the outlet of Clark Lake and Gull Rapids must be overland.

Regular travel was not reported east of Clark Lake into the Local Study Area by YFFN Members, though former hunting trips near the north access road were documented and a boat trip extending from Split Lake to Gull Lake also was recorded. East-west oriented snowmobile trails on the both the north and south sides of the Nelson River extending from the community of Split Lake to Gull Lake are reported by TCN to be in "acceptable" condition though portions surrounding Gull Rapids are reported to be in an "overgrown" condition (CNP 2010c). Linking to this trail network, an additional trail to Stephens Lake was documented by TCN, though its condition is unrecorded (CNP 2010c). In the post-Kettle period, FLCN Members have accessed the Local Study Area via boat between Gull Rapids and the inlet of Stephens Lake (FLCN 2010 Draft). Boat travel also is undertaken to the mouth of Looking Back Creek (FLCN 2010 Draft).

CABINS AND CAMPING

Cabins in the Regional and Local study areas are used throughout the year and are important for carrying out a traditional lifestyle and also are used as bases for commercial harvesting such as trapping and fishing.

In the Regional Study Area, seven cabins used by YFFN Members are located in the vicinity of York Landing to stage resource use activities. Two YFFN tent frames are located on the southern shores of Split Lake. Cabins near the mouth of Ten Shilling Creek (near the mouth of the Hayes River) also are used by YFFN community members to support resource use at the coast. Tent camping by YFFN resource users was reported to be infrequent. Fox Lake Cree Nation Members use three cabins located downstream of Gillam on the Nelson River and other cabins located elsewhere in FLCN RMA.

Known cabins in the Local Study Area include three cabins located on the north side of the Nelson River between Birthday and Gull Lake, two of which are located on the same site. Four cabins on two sites are located close to PR 280 near the junction of the north access road. Additional cabins are located on an island near the inlet of Stephens Lake approximately 4 km downstream of the Project. These cabins are used for commercial fishing. One camp is located at the mouth of Looking Back Creek (FLCN 2010 Draft).

1.2.3.2.3 Domestic Fishing, Hunting and Trapping

FISHING

Harvests of pickerel, lake whitefish, jackfish and other species often occur close to the communities. For example, TCN Members fish Split Lake (Usher and Weinstein 1991); WLFN Members fish Moose Nose, War and Atkinson lakes (Usher and Weinstein 1991); FLCN Members fish Stephens Lake and the Kettle River (FLCN 2010 Draft); and YFFN Members fish the Mistuka (YFFN Evaluation Report (*Kipekiskwaywinan*)), Ripple and Aiken rivers (YFFN 2004).

In the Regional Study Area, YFFN Members fish year round, but most frequently during spring just after breakup. Fish are caught either by line, net or snare and pickerel are the most targeted species and generally more popular than whitefish. The YFFN stated that jackfish are preferred by older generations. The majority of fishing locations are situated up and downstream from York Landing on the Aiken River and its tributaries in close proximity to the York Landing community. Limited fishing was reported on Split Lake where debris was stated to limit fishing success. Winter fishing locations are generally close to the community or close to cabins used by community members. Sakitowak and Anipitapiskow rapids on the Nelson River downstream of the Kelsey GS were also noted as important fishing destinations for pickerel and jackfish as well as the Nelson River mainstem upstream of these rapids. These sites likely are used most frequently during moose hunting.

Fox Lake Cree Nation Members reported fishing in Stephens Lake, which is accessed from the Butnau marina (FLCN 2010 Draft). The western shorelines are more intensively fished including the North Moswakot River area (FLCN Workshop 2012; FLCN 2010 Draft). FLCN Members also target areas along the Limestone River for brook trout during the open-water season (Hill 1993), the mouths of

Nelson River tributaries, and Fox and Angling Lakes (FLCN Environment Evaluation Report [Draft]). Winter fishing activity occurs at Angling Lake (Hill 1993).

In the Local Study Area, TCN resource users conduct fishing on local waterbodies. Gull Lake and Gull Rapids have been reported as important fishing locations for TCN (CNP, YFFN and FLCN 2011). The FLCN documented an intensively used area downstream of Gull Rapids on the Nelson River now (FLCN 2010 Draft) and in the past (FLCN Environment Evaluation Report [Draft]). Pickerel is the preferred species for consumption (FLCN 2010 Draft). Fish also are harvested from Looking Back Creek and Pond 13 (FLCN 2010 Draft; FLCN Workshop 2012). Other FLCN Members report that they do not fish upriver anymore because of the dams (FLCN 2008 Draft) and reduced palatability and fear of mercury contamination has caused many KCNs Members to discard or avoid eating fish from the Nelson River, Split or Stephens lake (Split Lake Cree – Manitoba Hydro Joint Study Group1996b, FLCN 2008 Draft, 2009 Draft, 2010 Draft; YFFN Evaluation Report (*Kipekiskwaywinan*)).

LAKE STURGEON

TCN Members reported that the confluence of the Churchill and Little Churchill rivers is an important harvesting location for lake sturgeon (Tataskweyak Cree Nation 2010). The YFFN resource users indicated that lake sturgeon are not an important food source for YFFN Members at York Landing due to increasing difficulty in catching sturgeon in Split Lake (YFFN Evaluation Report (*Kipekiskwaywinan*)). Sturgeon are harvested in the vicinity of Jackfish Island on the lower reach of the Nelson River below the Limestone GS (YFFN Evaluation Report (*Kipekiskwaywinan*)). Sturgeon are valued as an important fish species by YFFN community Members (YFFN 2002; YFFN Evaluation Report (*Kipekiskwaywinan*)).

Today, FLCN Members report that lake sturgeon are rarely harvested from the Nelson River due to concerns with regard to **pollution** and water quality leading to changes in taste, texture, colour and the overall quality of the sturgeon for consumption (FLCN 2008 Draft). Instead, tributary waters are preferred. MacDonell (1998) reported sturgeon harvest (12 adults) close to the mouths of the Weir, Angling and Limestone rivers by KCNs fishers.

In the Local Study Area, lake sturgeon harvest has been observed by aquatic field staff working in the Clark and Gull lakes area. Due to interest in conserving lake sturgeon and concerns with respect to its quality as food, KCNs Members have reported reduced sturgeon harvest from the Nelson River in recent years (CNP, YFFN and FLCN 2011; FLCN 2008 Draft). FLCN has reported that pickerel have replaced lake sturgeon as the most valued fish (FLCN 2010 Draft, FLCN Environment Evaluation Report [Draft]).

HUNTING AND TRAPPING

The spring goose hunt is an important event for KCNs communities. The TCN hold an annual goose hunt in the spring (Tataskweyak Cree Nation 2006). York Factory First Nation Members hunt geese up and downstream from the community on the Aiken (Landing) River and duck hunting occurs in the same locations during fall. Some resource users take the train to Churchill for the spring goose hunt. Fox Lake Cree Nation Members reported goose hunting on the Butnau and Kettle rivers, at Cache Lake and by Dyke 5 and Pond 13 and other locations close to Gillam and Bird (FLCN 2010 Draft). The mouth of the

Limestone River also was noted to be an important spring goose hunt location for FLCN Members (FLCN 2011).

Small game such as spruce grouse, sharp-tailed grouse, ptarmigan and rabbits are opportunistically harvested by YFFN community Members using snares or 22 calibre rifles. Most small game is typically taken in close proximity to the community. FLCN members snare small rabbits close to Bird and hunt ptarmigans and grouse from the Conawapa road (FLCN 2011). Small game harvests in the Local Study Area have not been recorded.

Moose hunters prefer hunting from boats because moose are attracted to shorelines and transporting the harvest is easier than by overland routes. York Factory First Nation Members conduct moose hunting generally south and east of the York Landing community, up and downstream of the Kelsey GS. Areas targeted include the shorelines of rivers, lakes, and creeks where moose browse such as willow is available. The north arm of Stephens Lake near PR 280 and the vicinity of the North Moswakot River are key areas (FLCN Workshop 2012). The FLCN also hunt moose along all shorelines of Stephens Lake with the most activity concentrated on the western shores and bays including Looking Back Creek (FLCN Workshop 2012). Moose are reported to be abundant in the Stephens Lake area (Gillam KPI Program 2009-2010; FLCN Environment Evaluation Report [Draft]). Cache Lake, the Butnau, Moswakot and Kettle rivers and the Butnau road also are reported to be intensively used (FLCN 2010 Draft; FLCN Workshop 2012).

Hunting for moose is known to occur in the Local Study Area, most commonly in the lower reaches of Gull Lake and in the region around Gull Rapids by TCN members. Difficult boat access and swampy terrain acts to limit moose hunting activity in the area, though TCN resource users are known to use this area. Moose hunting has been reported by FLCN Members downstream of Gull Rapids on the Nelson River, and in the area north of the proposed south access road (FLCN 2010 Draft).

The KCNs conduct caribou hunting predominantly in winter in areas that vary from year to year depending on the location of the herd (YFFN Member 2009). According to YFFN resource users, harvests typically occur south of Gillam and south and east of the community of York Landing in areas such as the Angling Lakes and the Aiken River. War Lake First Nation Members typically conduct caribou hunting at War, Cyril and Atkinson lakes. Fox Lake Cree Nation Members stated that caribou hunting has occurred on the majority of islands in central and northern regions of Stephens Lake (FLCN 2010 Draft).

Caribou are not reported to be plentiful in the Local Study Area though recent trends indicate that increasing numbers of caribou are being sighted east of the Split Lake area (Hedman *pers. comm.* 2009). Caribou abundance is noted to be highly variable among years (TE SV Section 3.3.3.2). A Manitoba Conservation and Water Stewardship official reported that little caribou hunting occurs upstream of Gull Rapids excepting infrequent harvest of the odd caribou separated from the main herd (Hedman, *pers. comm.* 2009).

Domestic trapping activity in the Local Study Area has not been documented but may occur in conjunction with other harvesting activities. Commercial trapping is discussed in Section 1.4.

GATHERING

TCN Members harvest plants irregularly. Up to 100 TCN Members were reported to be involved in plant harvests including Labrador tea on islands close to the community and berry picking close to PR 280 (CNP 2010c). Elders are the main consumers of gathered plants.

The YFFN reported collecting and harvesting a wide variety of items from the natural environment. Gathering occurs close to the community for berries such as blueberries (*Vaccinium spp.*), bilberries (*Vaccinium uliginosum*), strawberries (*Fragaria virginiana*), raspberries (*Rubus idaeus*), bog cranberries (*Vaccinium oxycoccos*), cloudberries (*Rubus chamaemorus*) and gooseberries (*Ribes spp.)* in late summer to early fall. Other items collected, also close to the community, are sweet grass (*Hierocloe odorata*) (used for smudging), tea and medicinal herbs, wood for carving and heat, willow, birch bark, driftwood, gravel and feathers.

The FLCN reported gathering similar berries to YFFN Members with the addition of logonberries (dew berries) (*Rubus pubescens*) from road accessible locations (FLCN 2010 Draft). Labrador tea (*Ledum groenlandicum*) and black spruce (*Picea mariana)* pitch are also collected from various locations for tea and for producing a skin ointment, respectively. Wekas[1] root (*Acorus americanus*) is reported by FLCN and YFFN Members to be used as a headache or cough remedy (FLCN 2009 Draft).

Within the Local Study Area, the TCN reported that Lillian Island (upstream of Gull Rapids) is a gathering site that will be flooded (CNP Keeyask Environmental Evaluation Report 2012). Strawberries, raspberries, blueberries also are harvested from individual camp locations such as a camp near Looking Back Creek (FLCN 2010 Draft) and at cabins on an island east of Gull Rapids (FLCN Workshop 2012).

1.2.3.3 Trends

The TCN reported that fishing is increasingly difficult on Split Lake due to debris particularly since 2005 (CNP 2010c) when record flood conditions were experienced (PE SV Section 4.3.1.1). The YFFN also have expressed concerns in regards to:

- High water levels causing river banks to slump or erode preventing snowmobile access to or from shore;
- Debris impeding open water travel;
- Shoreline willows and sandy patches which support ptarmigan and areas with medicinal plants being reported as flooded; and
- Goose blind locations used by resource users have been noted to be underwater during high water years.

[1] Cree spelling varies.

The FLCN reported that the formation of floating peat islands in Stephens Lake has been increasing in the five years since 2005 (FLCN 2010 Draft).

KCNs resource users and community Members also have reported poor ice conditions (*i.e.*, slush pockets) and a shorter season in which the ice road is serviceable in the past number of years (Centre for Indigenous Environmental Resources 2006). Accessing the main YFFN community resource area (Trapline 13) across the Aiken River from York Landing has been difficult in the three years prior to 2008 due to slush ice and hanging ice. The FLCN reported post-Kettle reductions in travel safety attributable to hydroelectric development (FLCN 2010 Draft). Due to changes in the environment for example, FLCN Members have experienced reduced utility from traditional and local knowledge of travel hazards (and how to avoid them) particularly for travel on ice.

Changes in access have affected all KCNs Members at different locations but changes to the way people travel on water are discussed most frequently. For YFFN Members, fluctuating water levels are reported to flood existing ice cover when rising, or leave ice hanging or suspended over the water level when receding. Both conditions are reported to affect resource user's ability to travel. Increasing risks to personal safety have made it more difficult to engage in traditional activities and in turn, this reduces the amount of country food available to the communities and the participation of younger generations in traditional pursuits (TCN excepted as younger generations are reported to have expressed increased interest in resource use activities).

Reductions in wildlife abundance noted in recent years have caused YFFN Members to travel further from the community especially for moose.

According to FLCN Members, the development and expansion of Gillam and the use of herbicides on the rail right-of-way have reduced berry picking opportunities (FLCN 2010 Draft). The YFFN also reported reductions in berry abundance close to the community, particularly raspberries growing on shorelines (YFFN Member 2009). Berry picking was noted to be in decline among YFFN community Members in recent years.

1.2.4 Project Effects, Mitigation and Monitoring

The following sections consider predicted effects, mitigation and **monitoring** for domestic fishing and domestic hunting and gathering separately. Both are VECs.

1.2.4.1 Domestic Fishing

1.2.4.1.1 Construction Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect domestic fishing during construction:

- Disturbances causing changes in navigation and access;
- Disturbances causing potential changes to fish resources;
- The presence of a large workforce potentially increasing competition for fish;

- Increases in the wage economy potentially reducing domestic fishing activity; and
- Shifting patterns of resource use due to offsetting programs.

The effects described below are predicted for KCNs communities. Use of the Local Study Area by other Aboriginal groups has not been identified through the Public Involvement Program or through direct consultations with Aboriginal groups and communities (PIP SV). Therefore, no effects to other Aboriginal groups have been identified. Ongoing discussions are occurring with the Manitoba Metis Federation and Cross Lake First Nation (also known as the Pimicikamak Cree Nation) (PIP SV).

Flow velocities and open-water levels will be altered between 3 km downstream of the outlet of Clark Lake and the inlet of Stephens Lake (PE SV Section 4.2.3). Depending on location and the stage of construction, changes will range from being difficult to detect (*i.e.*, upstream of Birthday Rapids and at the inlet of Stephens Lake) to being noticeable at areas close to the construction site (*i.e.*, close to coffer dam construction areas where flows will be redirected during Stage I and II Diversions). Areas close to the Project site have existing high flow velocities that presently limit navigation and therefore change in these local areas is not expected to cause an important decline in domestic fishing activity. Boat travel in these local areas will be restricted for safety reasons.

Construction of two temporary causeways to deposits N-5 and G-3 will affect navigation in the channels south and east of Pond 13 for approximately six years (PD SV Section 2.4.7). These channels provide southern access to Pond 13 and to the mouth of Looking Back Creek, both of which have been identified as fishing locations for FLCN members (FLCN 2010 Draft). Booms will be installed on either side of the two causeways to protect public safety (PD SV Section 2.4.7) but these will prevent access to Pond 13 and Looking Back Creek from the south. Access to both locations will still be possible by the northern route through O'Neill Bay on Stephens Lake though using the northern route will require a lengthier travel distance for FLCN members from Gillam. The southern route has only been in use by FLCN in recent years since ice scouring opened up these channels to navigation (PD SV 2.4.7).

Increasing open-water levels and decreasing flow velocities on Gull Lake are predicted over the construction phases. The final construction phase (Stage IIB Rollway Construction) will result in reservoir impoundment (PD SV 3.4.3). These locations will undergo substantial change as portions of the Nelson River and Gull Lake are converted from a river environment into a reservoir during the final stage of construction. The nature of any domestic fishing on these waterbodies also will change requiring a period of adjustment to new navigation and access conditions for domestic fishers.

To mitigate changes in the open-water environment to domestic fishers, AEA Access/Offsetting Programs are in place to conduct domestic fishing activity in alternate and unaffected locations (see **Adverse Effects Agreements**: TCN and Manitoba Hydro 2009; FLCN and Manitoba Hydro 2009; YFFN and Manitoba Hydro 2009; and WLFN and Manitoba Hydro 2009). As part of Schedule 11-1 of the JKDA, the Reservoir Clearing Plan is expected to minimize the impacts of standing trees and shrubs on fishing in selected areas within the **reservoir**. This plan also is expected to minimize hazards to boating safety and fishing resulting from large floating debris by reducing debris sources. Annually prior to reservoir impoundment, the Waterways Management Program (see JKDA Schedule 11-2) will operate a multi-purpose boat patrol that will:

- Monitor waterway activities between Split and Stephens lakes;
- Liaise with individuals and groups using the Nelson River; and
- Construct and maintain one or more safety cabins.

In winter and under low to moderate flows, the ice boom (see PE SV 4.4) is expected to facilitate stable ice cover upstream of Gull Rapids three to four weeks sooner than under existing conditions thereby expanding the upstream extents of ice coverage (due to an extended period for ice formation) (PE SV 4.4.1). Under high flow conditions, formation of ice cover may occur six to eight weeks earlier (PE SV Section 4.4.1). The ice cover will continue, as it does today, to form by a shoving and mechanical thickening process (PE SV 4.4.1) and will remain difficult to travel on. These conditions are similar to the existing environment, which already limits opportunities to access potential domestic fishing areas in winter.

The ice boom is predicted to reduce frazil ice formation that causes a hanging ice dam downstream of Gull Rapids (PE SV Section 4.4.2.4). The reduction of hanging ice downstream (and associated ice accumulation) is anticipated to enable domestic fishers to access the Nelson River upstream of the inlet of Stephens Lake earlier in the spring and possibly improve snowmobile access in winter (due to more stable ice). Improved spring access will be offset in part by the requirement for restricting boat traffic in areas close to construction activities, particularly during the Stage II Diversion when high flow velocities are expected to extend approximately 800 m downstream. This area and the Nelson River south channel downstream of the ice boom will be designated as Dangerous Waterway Zones within which use of the waterway will be strongly dissuaded or prevented (PD SV). Buoys will be installed at the upstream and downstream boundary of the Dangerous Waterway Zones (PD SV).

During winter and to facilitate safe travel, the Waterways Management Program will install and regularly monitor the condition of safe ice trails and the nature and extent of their use. As mentioned above, one or more safety cabins will be constructed.

The construction of cofferdams and alteration of Nelson River flows will result in a loss of aquatic habitat in Gull Rapids, which is used as spawning habitat for fish in Stephens Lake (AE SV Section 5.4.1.2). The loss of habitat and alteration of downstream flows are predicted to result in a reduction in the year class strength of fish species in Stephens Lake that rely on spawning habitat in Gull Rapids (*e.g.*, lake whitefish, lake sturgeon, and, to a lesser extent, pickerel) for the years the cofferdams are in place (AE SV 5.4.1.2). However, local reductions in fish availability will not be noticeable to resource users during the construction period because of the time required for fish to become recruited into the fishery. This effect is discussed under operation effects.

The presence of a large workforce residing in camp may cause increased competition for resources at local and/or road accessible fishing areas. At Wuskwatim, fishing which is mainly catch and release has been conducted by a very small proportion of the construction workforce (*i.e.*, approximately 1%) (Yetman *pers. comm.* 2011). Boats will not be permitted on site (see AMP) so boat-based fish harvest by the construction workforce is not expected. This level of fishing, if it remains similar or even increases moderately at Keeyask, is not expected to reduce domestic fishing resources. Due to KCNs concerns expressed with respect to workforce construction harvest (see CNP Keeyask Environmental Evaluation

Report; FLCN 2009 Draft; FLCN Environment Evaluation Report [Draft]), monitoring of construction workforce fish harvest (which will be permitted in areas away from construction activity that are safe to access) will be conducted (see Section 1.2.4.2.6 below).

Net in-migration to Gillam during construction is expected to be low (see Socio-economy Section 4.4.1.1.2), therefore, harvest undertaken by any construction workforce residing in Gillam is expected to be nominal or very low. No effects are expected.

Increases in the wage economy, though typically regarded as a positive effect for northern communities with limited employment options, may reduce the quantity of domestic fishing activity as resource harvesters may choose to engage in construction employment. Alternatively, wage employment may increase the capacity of resource users to purchase equipment such as boats or fishing gear (Hobart 1981; Bone 1985). Pursuing Project employment is an individual choice and may affect individuals and groups both positively and negatively. Effects cannot be readily assessed.

AEA Offsetting Programs are expected to reduce fishing (and hunting and gathering) pressures in existing areas of resource use concentration and redistribute it over larger land bases such as community RMAs. KCNs Members will have the opportunity to increase country food supply, more KCNs Members will be able to participate in cultural practices and traditions on the land and improved inter-generational transmission of knowledge is anticipated.

Given the Cree responsibility for showing respect for every part of creation and being keepers of the land, the AEA Offsetting Programs have been central to establishing the Keeyask Partnership. For example, the TCN anticipate that participation in these programs will allow for expanded opportunities to show respect in other parts of their homeland ecosystem and the programs will restore traditional ecological knowledge to a condition which is better than presently exists (CNP Keeyask Environmental Evaluation Report).

This Cree stewardship role, which incorporates self-regulation of fish (and wildlife) harvest when resources are scarce (CNP, YFFN and FLCN 2011), is expected to safeguard resources needed to conduct the TCN Access Program, the WLFN Improved Access Program, the YFFN Resource Access and Use Program and the FLCN Alternative Resource Use program (which is shorter-term due to selection of other offsetting priorities). Other offsetting programs allow for KCNs to show respect for the land and waters and pass on knowledge and skills to younger generations including but not limited to:

- The TCN Land Stewardship Program will provide opportunities for TCN to show respect for the land within the SLRMA (TCN and Manitoba Hydro 2009);
- The WLFN Traditional Learning/Lifestyle Program (WLFN and Manitoba Hydro 2009) is designed to provide young adults the opportunity to experience a traditional lifestyle program;
- The FLCN Youth Wilderness Traditions Program is designed to provide young members the opportunity to experience a traditional lifestyle; and
- The YFFN Cultural Sustainability Program provides for cultural programs and seasonal gatherings and celebrations.

Additional measures to support the long-term sustainability of fishing programs such as the TCN Healthy Food Fish Program and the WLFN Community Fish Program will be addressed through a fish

harvest sustainability plan developed by CNP and WLFN (CNP Keeyask Environmental Evaluation Report). As part of their AEA Agreements, TCN and WLFN will take the sole responsibility for the management, implementation and operation of offsetting programs. The AEAs provide for coordination with and annual reports to be submitted to the Resource Management Boards with respect to the management and administration of the AEA Offsetting Programs.

Apart from the programs implemented for the Project, there also are additional initiatives that would affect the abundance of sturgeon in the Local and Regional study areas. Manitoba Hydro, TCN, WLFN, YFFN, FLCN, and Shamattawa First Nation, potentially other parties including the KHLP, are developing a Lower Nelson River Sturgeon Stewardship Agreement, which has the goal to conserve and enhance the present population of lake sturgeon in the lower Nelson River (see Response to EIS Guidelines, Section 7.4.1.2 for more details). A similar agreement also is being developed for the Churchill River.

1.2.4.1.2 Operation Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect domestic fishing during operation:

- Changes to the fish resources from local waterbodies due to mercury;
- Changes in navigation and access;
- Increasing populations in Gillam; and
- Shifting patterns of resource use due to offsetting programs.

Change to the fish resource (*e.g.*, increased mercury in fish) is predicted for the reservoir and downstream of the GS to Stephens Lake (AE SV Section 7.2.4). Though many KCNs Members report that they do not consume fish from the Nelson River, the presence of increased mercury in fish may further reduce local fish consumption. No effects are predicted for Split Lake or the Aiken River.

Mitigation measures include continuous monitoring of mercury levels in fish and education and communication strategies to advise KCNs Members (and also Gillam residents) on local consumption recommendations with respect to mercury (see Socio-economy Section 5.4.2.3).

As discussed above and in the AE SV, year class strength may be reduced during construction for pickerel, lake whitefish and lake sturgeon (sturgeon populations will be replaced through stocking) in Stephens Lake. This effect is expected to be undetectable to domestic fishers. Because of the eight-year delay for these fish to reach sufficient size to be recruited into the fishery, the reduction in lake whitefish and pickerel spawn during the construction period has the potential to be observed for the first eight to nine years of operation. However, this effect is expected to be undetectable to domestic fishers due to:

- Harvest reduction of pickerel (and likely whitefish by-catch) associated with discontinuing the (single license) Stephens Lake commercial fishery (see Section 1.3.4);
- The ongoing availability of alternate pickerel and whitefish spawning locations in Stephens Lake; and
- Low to negligible levels of existing domestic fish harvest below Gull Rapids.

Domestic fishers who choose to use local waterbodies will undergo a period of adjustment resulting from changes in navigation and access. During the operation phase, the Waterways Management Program (JKDA Schedule 11-2) will continue to contribute to the safe use and enjoyment of the waterways between Split Lake and Stephens Lake. Two boat crews and one ice trail crew will operate for various durations upstream of the GS conducting the following selected activities as applicable:

- Collecting floating debris that are a risk to navigation;
- Monitoring waterway activity and liaising with individuals and groups;
- Preparing reservoir depth charts and travel routes;
- Marking safe travel routes by installing and maintaining navigation and hazard markers;
- Constructing and maintaining safe landing sites and required docks and shelters;
- Installing and regularly monitoring the condition of safe ice trails and the nature and extent of their use; and
- Maintaining trails and a portage.

One additional boat patrol crew also will operate downstream of the GS primarily to implement safety measures, deliver information to downstream resource users and help people become accustomed to the powerhouse operating mode. This activity is planned for a three-year duration and will be re-evaluated thereafter. Areas in close proximity to the GS will be restricted for safety reasons by designating them as Dangerous Waterway Zones and installing buoys (PD SV).

Increasing populations in Gillam (ranging from 120 to 150 people associated with 46 Keeyask operation jobs) (see Socio-economy Section 4.4.2.1.2) may increase recreational (non-Aboriginal) harvesting which may in turn, compete for domestic fish resources. The offsetting programs that will redistribute domestic harvest to other locations will mitigate this effect. Increases in recreational fishing may occur in the Project reservoir (where a new boat launch and access roads will make the area accessible), though any increase in recreational fish harvest is expected to remain within sustainable levels due to:

- Predicted population increases in Gillam are conservative (high) and only a small proportion of the new population in Gillam would be expected to fish recreationally;
- Provincial harvest regulations such as recreational fishing licences limit fish harvest (and prohibit recreational lake sturgeon harvest);
- Low levels of use are expected due to distance from Gillam (greater than 30 km); and
- The availability of similar fishing areas (*i.e.,* type of species available for fishing and a reservoir fishing environment) are located closer to Gillam (*e.g.*, Stephens Lake).

Resource users may notice, however, increases in the numbers of people fishing at popular locations such as Stephens Lake, the North and South Moswakot rivers, the Limestone River and other areas. This may reduce aesthetics for some domestic fishers due to feeling 'crowded' at various fishing sites.

As discussed in the construction phase effects, shifting patterns of resource use will also occur during the operation phase. Offsetting programs will provide TCN, WLFN, and YFFN with healthy food fish from off-system lakes. Domestic fishers also will experience improved access to areas such as the boat launches on either side of the GS. Also discussed above, measures to facilitate the long-term sustainability of the fish resource will continue through the operation phase.

1.2.4.1.3 Residual Effects

CONSTRUCTION

In summary, the following mitigation measures found in the JKDA and AEAs will be implemented to address construction effects on domestic fishing:

- Offsetting fishing programs;
- Reservoir Clearing Plan;
- Waterways Management Program; and
- Fish harvest sustainability plan.

The residual effects on domestic fishing expected during construction are:

- Domestic fishing pressures will be re-distributed to a larger (regional) land base which will increase KCNs opportunity to acquire country food and increase the KCNs cultural practices and traditions associated with domestic fishing. The fish harvest sustainability plan will serve to secure these benefits by sustainably managing fish resources;
- Redistribution of KCNs domestic fishing to a broader area through the AEA Offsetting Programs may overlap existing areas used by other domestic fishers which may increase competition and contact among resource users, though existing KCNs domestic fishers also will be able to participate in offsetting programs; and
- Resource users who choose to continue to use the areas affected by Project construction are expected to experience changes to water flow patterns and ice conditions on local waterbodies. Local areas such as immediately up and downstream of construction activities will need to be restricted for safety reasons. For example, flows will be concentrated and redirected by coffer dams. These effects will be mitigated to some degree by provisions in the Reservoir Clearing Plan (*i.e.,* removal of potential debris) and Waterways Management Program (*i.e.,* boat patrols). Current use of these areas is considered low due to difficult access.

Though no residual effects are predicted in relation to workforce fish harvest in turn reducing domestic resources, workforce fish harvest within the construction site will be monitored to address KCNs concerns (see Section 1.2.4.1.5 below).

OPERATION

In summary, the following mitigation measures will be implemented to address operation effects on domestic fishing:

- Communication of local consumption recommendations with respect to mercury in fish;
- Offsetting fishing programs;
- Waterways Management Program; and
- Fish harvest sustainability plan.

The residual effects on domestic fishing expected during operation are:

- Domestic fishing pressures will be re-distributed to a larger (regional) land base which will increase KCNs opportunity to acquire country food and increase cultural practices and traditions associated with domestic fishing. The fish harvest sustainability plan will serve to secure these benefits by sustainably managing fish resources;
- Individual preferences (quantity or species) for domestic fish consumption are expected to change (CNP Keeyask Environmental Evaluation Report, FLCN Environment Evaluation Report (Draft); 2008 Draft, 2010 Draft; YFFN Evaluation Report (*Kipekiskwaywinan*)) which will be offset by communication strategies with respect to mercury in fish (see Socio-Economy Section 5.4.2);
- A short to medium-term period of adjustment to new conditions and reduced predictability of the environment for resource users choosing to use waterbodies affected by the Project including the reservoir and the area immediately (approximately 800 m) downstream of the Project. This effect will be mitigated in part by the Waterways Management Program; and
- Increased contact among resource users (*e.g.*, potential for crowding) at fishing sites due to an increase in population in Gillam. This effect is expected to affect aesthetics but not domestic fishing success.

1.2.4.1.4 Conclusions about Residual Effects

For communities as a whole, the offsetting programs are expected to positively benefit domestic fishing by providing KCNs with fish for food and by increasing opportunities to practice cultural traditions. However, it is recognized that some resource users may be negatively affected by a change in the spiritual and cultural nature of their domestic fishing activities neutralizing the positive effects of the offsetting programs (*e.g.,* local knowledge would need to be relearned at new fishing locations and fish consumption would require more caution with respect to mercury levels in fish in the operation phase).

The overall conclusion about residual effects on domestic fishing in both the construction and operation phases is neutral. Certainty is high that the long-term positive benefits of offsetting programs in combination with measures within the Waterways Management Program and measures to ensure long-term sustainability of the fish resources will offset negative effects or provide additional benefits to most individuals. The AEA offsetting programs have been negotiated by the KCNs communities to meet the

specific needs of their Members and each community-specific AEA has been ratified by their respective community.

1.2.4.1.5 Environmental Follow-up and Monitoring

As described in Chapter 8 of the Response to EIS Guidelines, Environmental Monitoring Plans are being developed as part of the Environmental Protection Program for the Project. The intent of the monitoring plans is to determine whether effects of the Project are as predicted and mitigation measures are functioning as intended. The monitoring plans will also provide for follow-up actions if effects are greater than predicted: the actions that would be taken depend on the nature and magnitude of the effect. The design of the monitoring plans will also consider uncertainties identified during the analysis and/or raised by the KCNs or during the regulatory review process. For example, the technical analysis predicts that workforce fish harvest will not in turn reduce domestic food fish available to KCNs. However, based on local knowledge, the KCNs have identified that adverse effects to domestic fishing may occur in relation to increased competition for these resources by the workforce. Workforce fish harvest monitoring within the construction site area is therefore being included.

If greater than expected harvests occur within the construction site area by workforce members (existing domestic resource users will be admitted to areas safe to continue fishing) measures may be implemented to adjust the AMP or Camp Regulations. ATK monitoring is planned to ensure ongoing communication among the partners (see Chapter 8 of the Response to EIS Guidelines).

In areas outside of the security gates, the Partnership does not have authority to manage fish (or wildlife) resources. Manitoba Conservation and Water Stewardship has the mandate to sustainably manage use of the fisheries resources which can be accomplished through provincial harvest restrictions applicable to recreational resource users. Aboriginal harvests are self-regulated and a priority for provincial resource allocation.

If greater than expected harvests occur outside the construction gates during Project construction and throughout the region during Project operation, communication between resource users and Manitoba Conservation and Water Stewardship will be critical to ensure appropriate responses are developed and implemented in a timely manner. Local Resource Management Boards (Split Lake, York Factory and Fox Lake), which are comprised of representatives from First Nations and the provincial government are expected to provide the venue for communication on any resource harvesting conflicts and allow for appropriate responses to potential increases in recreational and/or Aboriginal resource use during construction. This approach will also apply to the operation phase.

It should be noted that after conservation, domestic resource use by Aboriginal people is given priority by provincial management agencies when allocating resources for harvest.

Other monitoring plans are being developed to monitor fish abundance, fish quality (*i.e.,* mercury in fish) and communication of mercury monitoring results to KCNs communities and Gillam residents (see Chapter 8 of the Response to EIS Guidelines).

1.2.4.2 Domestic Hunting and Gathering

1.2.4.2.1 Construction Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect domestic hunting and gathering during construction:

- Disturbances causing increases in noise and dust affecting resource users;
- Disturbances affecting resource user safety;
- Changes in access and navigation in areas proximal to Project construction;
- Disturbances causing potential reductions to wildlife resources that resource users target;
- The presence of a large workforce potentially increasing competition for resources;
- Increases in the wage economy potentially reducing domestic hunting and gathering activity; and
- Shifting patterns of resource use due to offsetting programs.

The effects described below are predicted for KCNs communities. Use of the Local Study Area by other Aboriginal groups has not been identified through the Public Involvement Program or through direct consultations with Aboriginal groups and communities (PIP SV). Therefore, no effects to other Aboriginal groups have been identified. Ongoing discussions are occurring with the Manitoba Metis Federation and Cross Lake First Nation (also known as the Pimicikamak Cree Nation) (PIP SV).

Disturbances from Project construction may include reduced aesthetics to resource users due to construction noise (and potentially dust) close to the construction site, on the north access road and near the south access road during construction. Owners of cabins located adjacent to PR 280 may be affected by increases in dust and traffic-associated noise (CNP Keeyask Environmental Evaluation Report). Resource users that are in close proximity to the construction site or access roads will notice construction and traffic-associated noise. Resource users will be affected differently depending on their perceptions and proximity to the construction activity.

Mitigation (and regular maintenance) planned to address traffic-related dust on PR 280 affecting cabin owners includes upgrading of the highway by MIT which is ongoing (see Socio-economy Section 4.3.5) and dust control under MIT's Maintenance and Preservation Program which is a regular maintenance program (Manitoba Infrastructure and Transportation 2011). For resource users using areas adjacent to the north access road and later in the construction phase, the south access road, mitigation measures include use of dust control and speed reductions where required (PE SV 3.3.4). Though there are no specific measures that can be implemented to reduce the effects of noise on resource users, noise effects are predicted to be localized (PE SV 3.3.4). For those resource users who are affected by noise, the AEA Offsetting Programs can provide alternate locations to conduct domestic hunting and gathering.

Domestic hunter safety also may be affected by crossing the north access road. The use of rifles in proximity to the access roads has the potential to increase risk to those using the roads (both resource users and construction workers travelling on roads).

Measures identified in the Access Management Plan are in place to address resource user safety related to Project construction disturbances. Measures include providing signage at road crossings and limiting hunting near the construction site and access road right-of-ways. The offsetting programs provide access to alternate resource use areas. For safety reasons and to prevent hunting by the workforce, guns and recreational vehicles will not be allowed on site.

Project-associated loss or damage to cabins will be addressed by the TCN AEA Article 10, Members' Claims which provides a process for reimbursement for personal property not otherwise addressed under the AEAs. KCNs Members who have been regular resource users (*e.g.,* cabin owners), will still be able to conduct resource use in the Local Study Area in areas safe to do so (see Access Management Plan for details).

As discussed in Section 1.2.3, much domestic hunting, particularly moose hunting, is conducted along shorelines by boat. This activity is predicted to be affected by changes in access and navigation in areas proximal to Project construction activity. Mitigation for boat-based travel in areas close to Project construction activity is discussed above under domestic fishing. As discussed in the domestic fishing section, causeway construction will require resource users to travel longer distances to areas such as Looking Back Creek and Pond 13 though access to these areas will remain available.

Disturbances from Project construction have the potential to reduce wildlife populations that resource users target due to habitat loss, sensory disturbances and traffic-related mortality. These potential effects have been identified as important concerns among KCNs Members (CNP Keeyask Environmental Evaluation Report; YFFN Evaluation Report (*Kipekiskwaywinan*); FLCN Environment Evaluation Report [Draft]).

The Project assessment indicates that no noticeable (*i.e.,* small magnitude) reduction in moose, caribou or waterfowl including Canada goose and mallard duck abundance will occur during construction and operation of the Project (see TE SV Section 7.4 for moose and caribou and Section 6.4 for Canada goose and mallard). In addition to mitigation measures described in TE SV Section 7.4 and to address KCNs concerns, the terrestrial monitoring program will monitor these animals in the Keeyask region (see Chapter 8 of the Response to EIS Guidelines for monitoring).

The presence of a large workforce residing in the construction camp has the potential to increase competition for resources in the Project vicinity. KCNs Members have identified this as a concern and expect that increasing competition for resources by the workforce has the potential to reduce domestic hunting success.

To mitigate workforce effects on resource use due to potential increases in competition, Access Management Plan provisions such as gated access at PR 280 and on the south access road, will prevent access to the construction site by the public. Harvest of wildlife by the workforce residing at the construction camp will be prohibited by Camp Regulations though it is expected to be negligible due to gun and recreational vehicle restrictions, long work hours and limited recreational time. Established KCNs resource users will still be able to conduct resource use in areas within the gated area considered safe to access (see Access Management Plan).

Net in-migration to Gillam during construction is expected to be low (see Socio-economy Section 4.4.1.1.2), therefore, harvest undertaken by any construction workforce residing in Gillam is expected to be nominal or very low. No mitigation is required.

Increases in the wage economy, though typically regarded as a positive effect for northern communities with limited employment options, may reduce the quantity of resource use activity as resource users obtain jobs. Alternatively, wage employment may increase the capacity of resource users to purchase equipment such as snowmobiles, guns and ATVs (Hobart 1981; Bone 1985). Pursuing Project employment is an individual choice and may affect individuals and groups both positively and negatively. Effects cannot be readily assessed.

AEA Offsetting Programs are expected to reduce hunting and gathering pressures in existing resource use areas and redistribute KCNs' domestic hunting and gathering activity over larger (regional) land bases. KCNs Members will have the opportunity to increase country food supplies, more KCNs Members will be able to participate in cultural practices and traditions on the land and improved inter-generational transmission of knowledge is anticipated. This effect is expected to begin in the construction phase and continue through the operation phase.

The following two measures are anticipated to safeguard wildlife resources on a long-term basis, which, in turn will support offsetting programs:

- The traditional Cree stewardship role which protects wildlife populations; and
- The moose harvest sustainability plan.

As part of the TCN AEA Access Program, the CNP expect that their inherent stewardship role will be fulfilled in part by having a greater relationship with wildlife in other parts of the SLRMA (CNP Keeyask Environmental Evaluation Report). Shared by all KCNs, this Cree stewardship role incorporates self-regulation of wildlife harvest when resources are scarce (see Section 1.2.3.2.3), which is expected to safeguard resources for the long-term success of the TCN Access Program, the WLFN Improved Access Program, the YFFN Resource Access and Use Program and the FLCN Alternative Resource Use program. The FLCN program is shorter-term due to selection of other offsetting priorities.

The moose harvest sustainability plan has been prepared to sustainably manage the TCN Access Program components of the AEA.

Increases in caribou hunting are not expected in relation to the offsetting programs due to their timing (spring and fall) which does not coincide with the late fall to winter timing of the traditional caribou hunt.

1.2.4.2.2 Operation Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect domestic hunting and gathering during operation:

- Shifting patterns of resource use due to offsetting programs;
- Increasing populations in Gillam;
- Increases and decreases in access;

- Loss of plant harvesting opportunities; and
- Changes to navigation in the reservoir area and reduced access downstream of the GS.

As discussed above in the construction phase effects and mitigation section, shifting patterns of resource use caused by the offsetting programs will begin in the construction phase and continue through operation. Effects and mitigation are the same for both the construction and operation phases.

Increasing populations in Gillam (ranging from 120 to 150 people associated with 46 Keeyask operation jobs) (see Socio-economy Section 4.4.2.1.2) may increase recreational (non-Aboriginal) harvesting which may in turn, compete for domestic hunting resources. The offsetting programs that will redistribute domestic harvests to other locations will mitigate this effect. Harvest by recreational harvesters also is expected to be constrained by existing provincial harvest regulations. The addition of a nominal number of hunters is not expected to affect domestic harvest success. A residual effect may occur as increasing competition (*e.g.*, potential for crowding) in the fall to winter period when both domestic and recreational groups are conducting moose and caribou hunting. Areas of increasing and overlapping use may occur on waterbodies commonly used for moose hunting by both recreational and Aboriginal hunters such as Stephens Lake.

Once the Project is commissioned, PR 280 will be re-routed to include the north access road, the generating station facility over the Nelson River and the south access road to Gillam increasing access to the Local Study Area. While increased access can be expected to increase local hunting activity by both recreational (non-Aboriginal) and domestic resource users, domestic hunting and gathering will also be dispersed to a larger geographic region by offsetting program participation.

Increases in access are also expected to occur due to the provision of boat launches above and below the GS. This increased access will benefit domestic hunters who may choose to hunt by boat along reservoir shorelines and downstream of the GS. Increased access provided by the boat launches may also benefit recreational hunters which in turn has the potential to reduce available domestic resources.

Increases in recreational harvester access by access roads and by the boat launches is not expected to affect the domestic resources available to KCNs community Members for two reasons:

- Recreational harvest is expected to be constrained by existing provincial harvest restrictions; and
- Offsetting programs are available to provide alternate domestic hunting locations which are expected to disperse existing harvest pressures in the Local Study Area overall.

Wildlife resources are managed by the provincial government through harvest restrictions and licensing. If necessary, Resource Management Boards can be used as a forum to develop appropriate responses to any increases in recreational harvest including the development of resource management plans (see 1.2.4.2.5).

The reservoir and footprints of the GS and dykes are expected to reduce plant harvesting opportunities. Plant harvest and other gathering activity will no longer be possible along a large portion of the shorelines of the reservoir and where permanent infrastructure (*i.e.,* dykes) will be built. Lillian Island was identified as a gathering site that will no longer be available in the operation phase (CNP Keeyask

Environmental Evaluation Report). Offsetting programs that will enable plant harvest in alternate locations will mitigate this effect.

Changed access is expected in the reservoir area. The existing shorelines along Gull Lake and at several locations on the Nelson River downstream of Clark Lake will shift to the new reservoir shorelines and increased water levels at Birthday Rapids (PE SV 4.4.3) will make the rapids more navigable. Hunting along these modified shorelines could still occur, but in a modified state. Resource users will require a period of adjustment to navigate in the changed environment because of differences in terms of navigation routes, water depth and velocities. Shoreline access also will be affected. Changes to the winter ice regime will improve access in some locations (*i.e.*, more stable ice cover on the reservoir) and will remain the same in others (PE SV 4.4.2).

Project-associated loss or damage to cabins will be addressed by the TCN AEA Article 10, Members' Claims which provides a process for reimbursement for personal property not otherwise addressed under the AEAs.

Changed access is expected to occur to approximately 800 m downstream of the GS in winter due to a lack of ice cover (PE SV 4.4.2). However, this will not act to reduce access as there is generally a large ice dam that currently forms at this location in most years. The remainder of this reach to Stephens Lake is expected to have a thermal (navigable) ice cover similar to Stephens Lake which will improve access (*i.e.*, by snowmobile). Resource harvesters using the Nelson River downstream of the GS will require time to become accustomed to the new conditions (in winter and summer) in this area.

To mitigate changes to navigation or reductions in access, AEA Offsetting Programs are available to provide substitute opportunities for domestic hunting and gathering in other locations. As discussed in the domestic fishing effects and mitigation section, mitigation described in the Waterways Management Program also will address changes in navigation and access in winter and summer within the reservoir and the Nelson River downstream of the GS.

1.2.4.2.3 Residual Effects

CONSTRUCTION

In summary, the following mitigation measures will be implemented to address construction effects on domestic hunting and gathering:

- Speed reductions and dust control on north and south access roads;
- AEA Offsetting Programs;
- Access Management Plan;
- Waterways Management Program; and
- The moose harvest sustainability plan.

The residual effects on domestic hunting and gathering expected during operation are:

- Hunting and gathering pressures will be re-distributed to a larger (regional) land base which will increase KCNs opportunity to harvest country food and cultural practices and traditions associated with domestic hunting and gathering. The moose harvest sustainability plan will serve to secure these benefits by sustainably managing moose resources. The nature of caribou hunting is not expected to change due to offsetting programs (due to timing of the programs in spring and fall as opposed to winter months when caribou are traditionally hunted);
- Redistribution of resource use to a broader area through offsetting programs may overlap existing areas of domestic hunting and gathering which may increase competition and contact among resource users. Existing use is thought to be small. Existing domestic resource users also will be able to participate in offsetting programs. To a certain extent, this effect will be offset because existing domestic hunters and gatherers also will be able to participate in offsetting programs;
- Opportunities to gather plants and other items in the reservoir area and at construction sites will be lost due to reservoir clearing activities. This will be mitigated to a certain extent by offsetting programs;
- Resource users who choose to continue to use areas proximal to construction are expected to experience residual effects related to construction noise. The magnitude of this residual effect will depend on the perceptions of individual resource users and their proximity to construction activities; and
- KCNs ATK indicates that hunting success in areas local to construction activity will be reduced resulting in a residual effect. Wildlife populations in areas local to construction activity will be monitored (see TE SV Section 7.4.10).

OPERATION

In summary, the following mitigation measures will be implemented to address operation effects on domestic hunting and gathering:

- AEA Offsetting Programs;
- Waterways Management Program; and
- Moose harvest sustainability plan.

The residual effects on domestic hunting and gathering expected during operation are:

- Hunting and gathering pressures will be re-distributed to a larger (regional) land base which will increase country food availability for KCNs and increase the KCNs cultural practices and traditions associated with domestic hunting and gathering;
- Potential increases for crowding at popular hunting sites due to increases in Gillam populations; and,
- A short to medium-term period of adjustment to new conditions and reduced predictability of the environment for local area resource users using the reservoir and areas directly downstream of the GS.

1.2.4.2.4 Conclusions about Residual Effects

For communities as a whole, the offsetting programs are expected to provide positive benefits by providing KCNs with increased opportunities to practice cultural traditions associated with hunting and gathering. However, it is recognized that some resource users may be negatively affected by a change in the spiritual and cultural nature of their domestic hunting and gathering activities neutralizing the positive effects of the offsetting programs (*e.g.,* local knowledge would need to be relearned at new locations; hunting or gathering may not be as spontaneous for some Members as it would become, in part, a planned activity through offsetting programs).

The overall conclusion about residual effects on domestic hunting and gathering in both the construction and operation phases is neutral. Certainty is high that the long-term positive benefits of offsetting programs in combination with measures within the Waterways Management Program and measures to ensure long-term sustainability of the moose resource will offset negative effects or provide additional benefits to most individuals. The AEA Offsetting Programs have been negotiated by the KCNs communities to meet the specific needs of their Members and each community-specific AEA has been ratified by their respective community.

1.2.4.2.5 Environmental Follow-up and Monitoring

Monitoring of domestic hunting and gathering activity is not proposed. However, as part of Chapter 8 of the Response to EIS Guidelines, monitoring plans are being developed to monitor the wildlife that resource users rely on including waterfowl (mallard and Canada goose), caribou and moose. As discussed in Section 1.2.4.1.5 above, Resource Management Boards and ATK monitoring will ensure timely communication of any resource user issues or concerns to the Partnership and Provincial resource managers.

1.3 COMMERCIAL FISHING

1.3.1 Introduction

The commercial fishing industry is important in northern Manitoba, especially within First Nation 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.

1.3.2 Approach and Methodology

1.3.2.1 Overview to Approach

Commercial fishing was examined at three levels of detail - both past and present:

- From a provincial perspective to understand the contribution of the commercial fishing industry to the regional economy and to Aboriginal peoples in the north;
- From an RMA perspective to provide an understanding of participation levels, an overview of opportunities and constraints in the region, and to understand recent trends in the industry; and
- From an individual perspective to examine more detailed harvest information and identify potential Project effects. An overview of the historic commercial lake sturgeon fishery also is presented.

It is important to note that "pickerel" instead of "walleye" is used to describe the species *Sander vitreus*. "Tullibee" and "cisco" also are the same species, *Coregonus artedi*. Jackfish is the term used to describe northern pike (*Esox lucius*).

1.3.2.2 Data and Information Sources

Data from lakes commercially fished within the Split Lake and Fox Lake RMAs from 1960-1989 were obtained from Manitoba Conservation and Water Stewardship and post-1989 data from the Freshwater Fish Marketing Corporation (**FFMC**). The FFMC also provided information on fish quality and mercury closures. For the purpose of delineating current and historic periods, 1997 was selected as the cut-off in order to identify a minimum of a 10-year period from which current trends could be adequately described.

Three fishermen were interviewed with respect to their former participation in the Split Lake, Gull Lake and regional commercial fisheries and the changes and trends they observed over time.

Manitoba Conservation and Water Stewardship's North East Division fisheries manager, regional wildlife manager and natural resource officers also were interviewed.

1.3.2.3 Study Area

The Regional Study Area is northern Manitoba with a detailed focus on the Split Lake and Fox Lake RMAs (Map 1-3). No commercial fishing is conducted in the York Factory RMA. The Local Study Area includes waterbodies between the outlet of Clark Lake to Stephens Lake.

1.3.2.4 Assumptions

Weights for fishery production were received in two formats: delivered (or marketed weight) and round weights from FFMC and from Manitoba's Water Stewardship Department, respectively. Round weights are weights of whole fish as removed from the lakes. Harvest quotas are based on round weights. Delivered or marketed weights reflect the quantities of fish sold and can be markedly reduced from the round weight due to whether fish were sold as dressed, headless or fillets. For example, pickerel conversions from marketed to round weights, are increased by 110%, 140%, and 240%, respectively (Cann *pers. comm*. 2008).

In this section, information presented related to payments to fishers are based on marketed weights. Production discussions are based on round weights.

1.3.3 Existing Environment

1.3.3.1 Past Conditions

The Manitoban fishing industry began in Lake Winnipeg in the 1880s to respond to demands for whitefish in the American (U.S.) market (Tough 1984). The industry was initially supported by Aboriginal labour but was later supplanted in part by Icelandic labour, particularly on Lake Winnipeg. Intensive capitalization of the industry began around the turn of the century. While pickerel had been a relatively unimportant species until about 1900, by 1930 the pickerel catch in Manitoba exceeded that of whitefish (Kennedy 1966).

In northern Manitoba, commercial fishing began upon completion of the Hudson Bay railway in the 1920s which provided the only economical means of fish transport to southern markets. Most fishing occurred in winter to ensure a quality product. At this time, a network of private winter roads supported fish transport from outlying communities to the railhead in Ilford (Kuryk 2003). Prime winter fishing lakes such as Northern Indian, Fidler and Billard lakes and a growing international market enabled Ilford to be a major rail-shipping centre providing employment income to its residents (WLFN 2002). Many WLFN Members actively participated in the industry as fishers as well as freight packers. In the mid-1960s improvements in transport and processing facilities began a shift towards summer only fisheries which continued until 1971 when the transition to summer fishing was virtually complete (Usher and Weinstein 1991).

By 1963, between 90 and 95 percent of the output of Manitoba's fishery was sold to New York, Chicago, and Detroit by less than 10 distributors in the province resulting in inequitable returns to fishers (Manitoba Department of Mines and Natural Resources 1963). During the mid to late 1960s local fishermen-managed co-operatives began to replace the distribution system controlled by the south. In 1969 the Freshwater Fish Marketing Corporation was established as a central marketing board with the mandate to establish new markets and increase returns to fishers. In 1979, a packing plant was opened at the Odie River Landing, which supported a high level of regional production.

The 1980s and 1990s brought increasing air transportation costs related to conveying fish from inland lakes which led to a decline in the commercial fishery serviced by the Ilford hub. Prior to 1997, 31 lakes were fished intermittently at an average frequency of once every four years; an approach known as a "pulse or rotational strategy" to return the highest production for the least effort (Usher and Weinstein 1991). Lakes in the Regional Study Area are typically shallow and do not contain abundant fish populations. If lakes are fished intensively, the fish stocks can be depleted in a short period of time (Macdonald *pers. comm.* 2009).

No lakes had consistent yearly production except Split Lake, which was fished in 88% of the years between 1960 and 1997. Commercial fishery production on Split Lake began in 1954, predominantly as a summer fishery, which produced the largest catch in the Regional Study Area in this period. The target species at this time was primarily whitefish and secondarily pickerel. Between the early 1960s and 1988, the Split Lake fishery employed an average of 16 men from the community of Split Lake (Usher and Weinstein 1991).

Atkinson (Fox) and War lakes show relatively consistent harvests from 1963 to 1989 and 1960 to 1993 respectively. Assean Lake was fished for 14 years during this period with no production reported in the 1970s. Dafoe and Fidler lakes were fished in 50% of these years. Moose Nose also was harvested intermittently 10 times between 1968 and 1986. Appendix 1A displays full production/payment records and value of catch from 1960-2008.

In 1992, The Split Lake Northern Flood Implementation Agreement provided for the packing plant at Split Lake that is present there today which, in turn, provides fish processing facilities in support of road accessible lakes such as Assean and Split. This facility continues to support summer only fisheries on Assean and Split Lakes. Production from fly-out lakes has not occurred since 1997 and is discussed in Section 1.3.3.

1.3.3.1.1 The Commercial Lake Sturgeon Fishery

Intensive sturgeon harvest began in the late 1890s on Lake Winnipeg. Early harvest statistics are confounded by different jurisdictions as provincial boundaries were changing until 1912. As a result, some harvests are reported under the 'northwest territories' or 'northern districts' and are difficult to reconcile to specific waterbodies or jurisdictions (*i.e.*, portions of the Churchill River located in Saskatchewan versus those located in Manitoba). Furthermore, prior to the establishment of the Freshwater Fish Marketing Corporation (a central marketing agency) in 1989, harvest was marketed through many smaller fishing companies causing harvesting records to be incomplete (Stewart 2009). The sequence of the lake sturgeon commercial fishery expansion is clearer.

Production of lake sturgeon gradually crept north along the shores of Lake Winnipeg and its tributaries as various forms of transporting the fish to market became available (Tough 1996). By 1900 Members of the Norway House and Cross Lake bands fished commercially (Tough 1996) and by 1902[1], 61,327 kg or 135,200 pounds of lake sturgeon were harvested from the upper[2] Nelson River almost exclusively by Aboriginal fishers as per a Department of Fisheries policy to favour local residents for sturgeon fishing licenses (Tough 1996).

The high price of lake sturgeon at this time made it the only fish that could be profitably transported from the Nelson River region to market. For example, the firm Ewing and Fryer employed a series of boats to transport sturgeon from Sipiwesk Lake to the Spider Island station on Lake Winnipeg (Tough 1996). The total catch from the Nelson River between 1902 and 1910 was estimated to be 313,075 kg (690,212 lbs) (Stewart 2009) and was harvested mainly from the upper Nelson River reaches (Sunde 1959). A province-wide closure was instituted in 1911 to allow stocks to rebuild mainly over concerns of sturgeon stocks in Lake Winnipeg rather than the Nelson River stocks specifically (MacDonell 1997, Cleater *et al.* 2010).

The fishery re-opened in 1917. The Hudson Bay railway reached Gillam in 1917 and Amery in 1927 greatly facilitating movement of upper Nelson River sturgeon to markets in the south (MacDonell 1997). However, by 1927, harvests had again declined sharply leading to another closure in 1931 (MacDonell 1997). Total catch between 1917 and 1931 from both the lower and upper Nelson River reaches was estimated to be 299,072 kg or 659,341 lbs (Stewart 2009).

The 600,000 kg or 1.3 million pounds of lake sturgeon harvested prior to 1931 caused a decline in sturgeon stocks from which recovery has never occurred. The Nelson River commercial fishery was opened for two periods (1937-1946 and 1953-1960) each lasting less than ten years before closure was again required due to declining harvests (MacDonell 1997).

Reopening in 1970 with a much reduced quota, the Nelson River fishery operated until 1992 when it was closed permanently due to concerns over declining catches and increased domestic harvests (MacDonald *pers. comm.* 2009).

On the Churchill River[3], commercial lake sturgeon fishing was conducted intermittently during the first half of the 1900s, after which catches declined despite continued fishing effort (DFO 2010). Over-**exploitation** of sturgeon stocks by commercial fishing also occurred on the Churchill River and populations have yet to recover (DFO 2010).

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[1] Lake sturgeon harvest may have been conducted on the Nelson River in 1900 and 1901 but the recorded harvest location, 'Northern Districts', casts some doubt on the location of harvest (see Stewart 2009).

[2] At least 80% of the sturgeon production from the Nelson River was taken from a 160 km stretch of the river in the vicinity of Sipiwesk Lake (Sunde 1959). This area is referred to as the "upper Nelson River". The lower Nelson River refers the Nelson River reaches downstream of the Kelsey GS to Hudson Bay.

[3] From Kettle Falls in Saskatchewan to Hudson Bay.

Prior to its permanent closure in 1992, commercial sturgeon fishing on the Churchill River near the mouth of the Little Churchill River was licensed in 1980 and had an initial production of 1,202 kg. Subsequent production records were 1,123 kg in 1982; 888 kg in 1983; and 745 kg in 1987 (MacDonald *pers. comm.* 2009). Commercial lake sturgeon fishing at all locations off the Nelson River system was shut down permanently in 1992 with the last one on the Fox River closing in 1997 with little reported production in the interim years (1992-1997).

1.3.3.2 Current Conditions

1.3.3.2.1 Manitoba

There are approximately 300 lakes on the 2008 Manitoba Commercial Harvest Schedule, which lists seasons and quotas by species for each lake. Between 1997/1998 and 2006/2007, the total quota for Manitoba lakes has averaged 13.0 million kilograms. Additional non-quota species also are caught increasing the total catch. Pickerel comprise the greatest proportion of production by weight (34%) followed by mullet (suckers) (25%), lake whitefish (17%), and jackfish (11%) (Manitoba Conservation 2008a).

Pickerel also are the most valuable species comprising over 67% of the averaged landed value of the annual Manitoba catch (approximately $30 million); whitefish are second averaging over 10% and jackfish over 4%.

Lake Winnipeg contributes over 40% of the total Manitoba production while Northern lakes contribute about 21% (Manitoba Conservation, 2008a). The open-water catch from northern lakes is comprised of pickerel (37%), jackfish (25%), whitefish (25%) and mullet (suckers) (9%) by weight. By value, northern lakes accounted for 17.4% of the Manitoba commercial catch or 5.2 million dollars on average for each year between 1997/98 and 2006/07 (Manitoba Conservation 2008a).

In northern Manitoba, commercial fisheries are important contributors to local economies. Between 1997/1998 and 2006/2007, northern Manitoba commercial fisheries employed an average of 760 fishermen and helpers at an average of $6,860 per person per year (Manitoba Conservation 2008a). In the Regional Study Area, however this average is somewhat lower due to the relatively low productive capacity of the lakes in the region (discussed next).

1.3.3.2.2 The Regional Study Area

Twenty-two (22) lakes listed in the 2008 Manitoba Harvest Schedule are located in the Split Lake RMA and one in the Fox Lake RMA. An additional 13 lakes in the Split Lake RMA have been fished historically (Table 1-1) (Map 1-4). There are no commercial fishing lakes in the York Factory RMA.

Table 1-1: Lakes Assigned Commercial Fishing Quotas (2008) and/or Former Commercially Fished Lakes in the Split Lake and Fox Lake Resource Management Areas (1960-2008)

RMA / Lake	Active (2008) Quota / Historic Catch	Quota (kg)	Quota Species
SPLIT LAKE RMA			
Assean Lake	Active Quota	4,600	Pickerel and Jackfish
Billard Lake	Active Quota	7,000	Pickerel and Whitefish
Bradshaw Lake	Active Quota	9,100	Pickerel, Trout and Whitefish
Buckland Lake	Active Quota	10,900	Pickerel, Trout and Whitefish
Butnaw Lake	Historic Catch	0	-
Caldwell Lake	Active Quota	5,500	Pickerel and Whitefish
Campbell Lake	Historic Catch	0	-
Christie Lake	Active Quota	6,900	Pickerel and Whitefish
Cygnet Lake	Historic Catch	0	-
Dafoe Lake	Historic Catch	0	-
Fidler Lake	Active Quota	4,600	Pickerel and Whitefish
Fox (Atkinson) Lake	Active Quota	18,200	Pickerel and Whitefish
Freeman Lake	Active Quota	4600	Pickerel, Trout and Whitefish
Gull Lake	Active Quota	4,600	Pickerel, Whitefish and Jackfish
Handle Lake	Historic Catch	0	-
Holmes Lake	Historic Catch	0	-
Holmes-Thomas /Thomas	Historic Catch	0	-
Kiask Lake	Historic Catch	0	-
Limestone Lake	Historic Catch	0	-
Little Cygnet Lake	Historic Catch	0	-
Mistake Lake	Active Quota	2,300	Pickerel, Trout and Whitefish
Moose Nose Lake	Active Quota	3200	Pickerel and Whitefish

Table 1-1: Lakes Assigned Commercial Fishing Quotas (2008) and/or Former Commercially Fished Lakes in the Split Lake and Fox Lake Resource Management Areas (1960-2008)

RMA / Lake	Active (2008) Quota / Historic Catch	Quota (kg)	Quota Species
Mooswu Lake	Active Quota	2,300	Pickerel and Whitefish
Pearson Lake	Active Quota	9,100	Pickerel, Whitefish and Jackfish
Pelletier Lake	Active Quota	9,100	Pickerel and Whitefish
Settee Lake	Active Quota	9,100	Pickerel and Whitefish
Solmundsson Lake	Active Quota	6,900	Pickerel, Trout and Whitefish
Split Lake	Active Quota	59,000	Pickerel, Goldeye, Sauger, Whitefish and Jackfish
Stephens Lake	Historic Catch	0	-
Thomas Lake	Historic Catch	0	-
War Lake	Active Quota	3,200	Pickerel and Whitefish
Waskaiowaka Lake	Historic Catch	0	-
Wernham Lake	Active Quota	4,600	Pickerel and Whitefish
Whitecap Lake	Active Quota	4,600	Pickerel, Trout and Whitefish
FOX LAKE RMA			
Spence Lake	Active Quota	1,500	Whitefish

All commercial quota lakes in the region are open to commercial fishing year round excepting critical spawning periods denoted as "May 1 to May 31 [and] Oct. 31 to when ice makes on or after Nov. 1" (Manitoba Conservation 2008b).

Although Mistake, Pearson, Whitecap, Solmundsson and Freeman Lakes have been assigned quotas, no records from Manitoba Conservation and Water Stewardship, Fisheries Branch indicate a commercial catch has ever occurred. With the exception of Assean and Split Lakes, all other lakes listed in Table 1-1 above are currently inactive.

Split and Assean lakes have been the only active commercial fisheries in the Regional Study since 1997. Quota species for Split Lake include pickerel, goldeye, sauger, lake whitefish, and jackfish up to a maximum of 59,000 kg round weight. The Assean Lake quota is 4,600 kg of pickerel and jackfish.

Together, these two lakes occupy 18-20 fishers, mainly in June for approximately two weeks (Macdonald *pers. comm.* 2009). The TCN reported that 13 fishers are active on Split Lake (CNP 2010a) in both spring

and fall (Whitaker *pers. comm.* 2012), all of whom are residents of Split Lake. Fish caught in the Split Lake RMA are taken to the fish packing shed in Split Lake.

From 1997-2008, an average of 42,268 kg marketed weight was produced from Assean and Split lakes (averaged over years the lakes were fished) for an average annual value of $102,000 ($2008) (Table 1-2). If non-production years are factored in, revenues amount to $91,500 annually. Assuming a conservative number of fishers (18), the average gross revenue received per fisher averaged over all 12 years is just over $5,000 per year, more than 25% less than the provincial average.

The Split Lake harvest is primarily comprised of jackfish (34%). Whitefish and pickerel each make up 22% of the catch. The remainder of the catch includes goldeye, mullet, tullibee, sauger, and whitefish roe. Mullet accounts for the vast majority of the non-quota species caught.

The Split Lake fishery accounts for over 96% of the fishery production and value in the Regional Study Area. Figure 1-2 displays Split Lake production over the 12 years between 1997 and 2008 relative to its 59,000 kg round weight quota for pickerel, goldeye, sauger, whitefish, and jackfish. Production has been variable on an annual basis, with little or no production reported in 1997, 2005, and 2008. Low production in these years was associated with high water conditions. In other years such as the fall of 2010, the pickerel catch was reported to be very good (Whitaker *pers. comm.* 2012). Low water years also may prevent delivery of the catch to the fish plant docks. In years when fishing effort is reduced (or eliminated in the case of 2005) due to water level fluctuations, compensation is available to fishers pursuant to the 1992 Split Lake Northern Flood Agreement Implementation Agreement. In addition, employment programming is provided to fishers by Manitoba Hydro.

Table 1-2: Active Commercial Fishery Production and Payments (1997-2008)

Waterbody	Year	Whitefish Round (kg)	Whitefish Marketed (kg)	Pickerel Round (kg)	Pickerel Marketed (kg)	Jackfish Round (kg)	Jackfish Marketed (kg)	Other Round (kg)	Other Marketed (kg)	Total Round Weight (kg)	Total Marketed Production (kg)	Total Payment ($2008)
Assean Lake	2002	184	154	333	239	521	348	52	35	1,091	776	$2,438
Assean Lake	2004	575	479	1,588	1,159	3,767	2,512	1	1	5,930	4,151	$8,879
Assean Lake	2006	404	337	1,573	1,124	1,088	726	75	68	3,140	2,255	$6,492
Assean Lake	2007	178	148	358	270	741	494	346	232	1,622	1,144	$2,031
Assean Lake	2008	467	389	115	83	283	189	217	145	1,081	806	$1,098
Average (n=5)		**361**	**301**	**793**	**575**	**1,280**	**854**	**138**	**96**	**2,573**	**1,826**	**$4,188**
Gull Lake	1998	-	80	-	13	-	53	-	60	-	206	No Data
Average (n=1)		**0**	**80**	**0**	**13**	**0**	**53**	**0**	**60**	**0**	**206**	**n/a**
Split Lake	1997	2,347	2,134	1,663	1,193	7,263	5,251	9,001	6,015	20,274	14,593	$20,820
Split Lake	1998	12,692	11,534	9,249	6,654	22,820	15,550	24,338	16,389	69,099	50,127	$107,412
Split Lake	1999	13,947	12,679	6,589	4,852	15,402	10,291	21,969	14,742	57,906	42,564	$83,859
Split Lake	2000	13,621	12,383	8,045	5,786	15,328	10,387	15,174	10,445	52,169	39,001	$92,900
Split Lake	2001	11,260	10,236	24,496	17,609	22,381	14,932	12,714	8,866	70,851	51,643	$178,838
Split Lake	2002	13,828	12,571	22,996	16,596	20,248	13,514	16,989	11,711	74,060	54,392	$177,721
Split Lake	2003	6,642	6,038	15,101	10,843	24,264	16,209	18,079	12,240	64,086	45,330	$101,780
Split Lake	2004	7,860	7,145	17,182	12,327	31,146	21,301	7,671	5,303	63,858	46,076	$105,474
Split Lake	2006	11,179	10,163	18,139	12,999	26,021	17,347	8,019	5,601	63,357	46,110	$104,723
Split Lake	2007	8,258	7,498	10,911	7,870	29,165	19,444	8,198	5,501	56,532	40,313	$76,409
Split Lake	2008	6,436	5,851	2,402	1,738	8,822	5,881	1,819	1,248	19,479	14,718	$27,710
Average (n=11)		**9,824**	**8,930**	**12,434**	**8,952**	**20,260**	**13,646**	**13,088**	**8,915**	**55,606**	**40,442**	**$97,968**
Totals		**109,898**	**99,819**	**140,740**	**102,548**	**236,523**	**154,376**	**153,663**	**98,542**	**644,809**	**453,999**	**$1,098,584**
Annual		**9,157**	**8,318**	**11,728**	**8,546**	**19,710**	**12,865**	**12,805**	**8,212**	**53,734**	**37,833**	**$91,548**

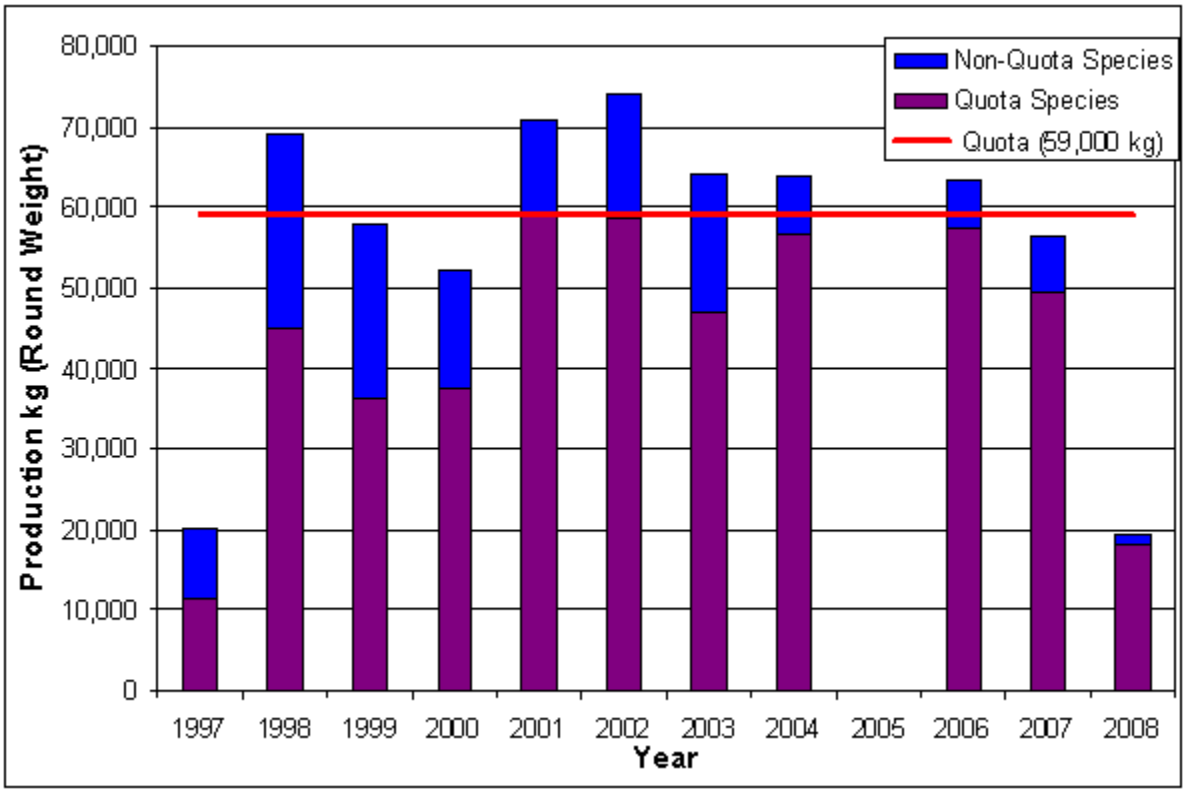


Figure 1-2: Split Lake Fishery Production of Quota and Non-Quota Species (1997-2008)

In most years such as 1998, 1999, 2001-2004, 2006 and 2007, the Split Lake fishery operated at or near the quota. Assean Lake production (Figure 1-3) is tied to Split Lake production as the packing plant opens only when Split Lake is in production. However, in years in which Split Lake is in production, production from Assean Lake has remained sporadic. In only one year in this eleven year period did production from Assean Lake reach (actually exceed) the 4,600 kg quota of pickerel and jackfish. Seven of eleven years had no production. This may be explained, in part, by low fishing effort but also by fish grading, which is explained next.

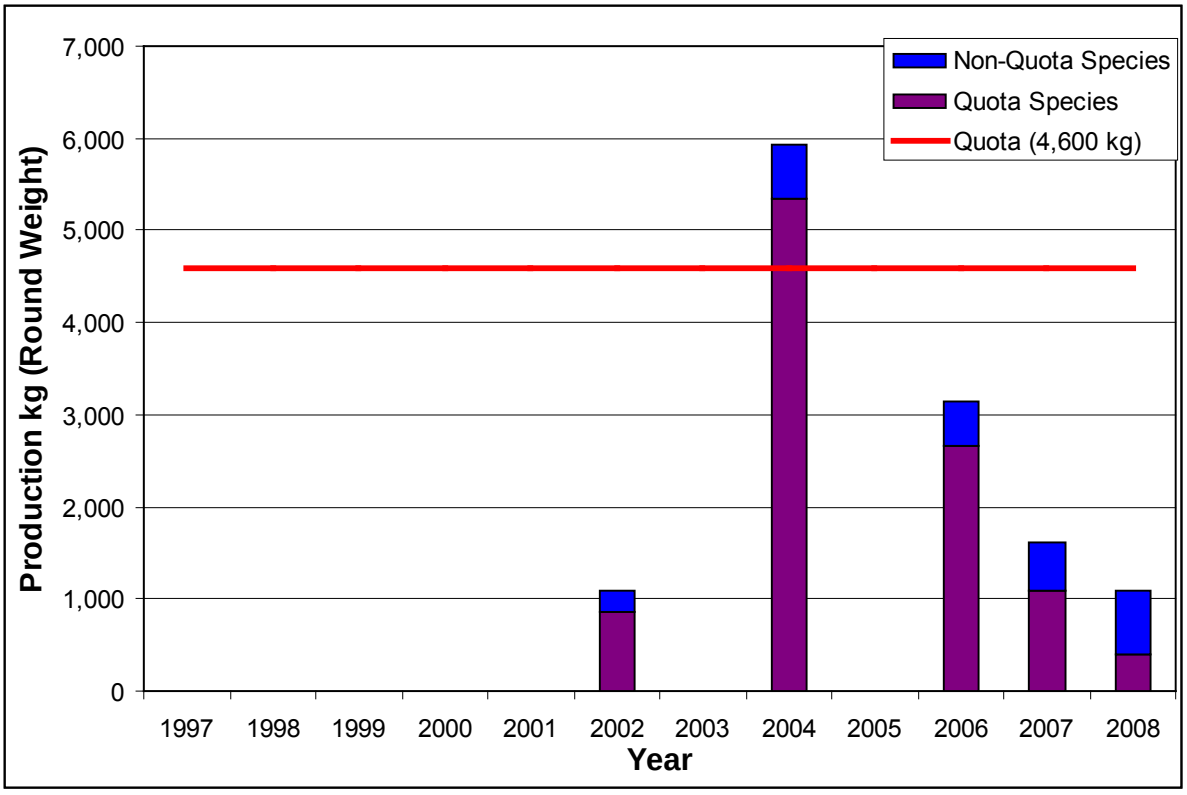


Figure 1-3: Assean Lake Fishery Production of Quota and Non-Quota Species (1997-2008)

Gross returns to fishers for lake whitefish are determined by grade. The grade of the fish is determined by the rate of infestation by muscle cysts of the cestode **parasite** *Triaenophorus crassus* (Bodaly *et al.* 1984). Fish with higher muscle cyst counts are worth less than fish with low muscle cyst counts. Two grades are determined: export grade (less than 50 cysts / 100 **lbs** of fish headless) and "other" grade (>50cysts / 100 lbs of fish headless) (Smith *pers. comm.* 2008). The Canadian Food Inspection Agency (**CFIA**) produces a list of export quality approved lakeswhich is supplemented by FFMC quality control tests from all lakes (Table 1-3).

Lake whitefish from lakes such as Assean, which are graded as "other", are worth substantially less than whitefish from lakes such as Split that are graded as "export" ($1.20/kg vs. up to $2.69/kg) (Smith *pers. comm.* 2008). *Triaenophorus crassus* parasitism affects tullibee in the same way.

Table 1-3: Lake Whitefish and Tullibee Grades for the Split Lake Resource Management Area

Lake Name*	FFMC** Whitefish Class	FFMC Tullibee Class	Whitefish CFIA*** Approved List (June 2008)
Assean	O	O	No Data
Atkinson	O	O	No Data
Billard	O	O	No Data
Buckland	O	O	No Data
Butnau	O	O	No Data
Caldwell	O	O	No Data
Fidler	O	O	No Data
Gull	O	O	No Data
Limestone	O	O	No Data
Moose Nose	O	N	No Data
Nelson River	O	O	No Data
Solmundsson	N	N	No Data
Split	X	O	X
Stephens	O	O	No Data

Notes:
X = Export; O=Other; N = Not Classified
* Manitoba Active Lake Listing December, 2008
** Freshwater Fish Marketing Corporation
*** Canadian Food Inspection Agency

During summer of 2008, fishers received approximately $4.71/kg for export quality headless medium pickerel, $2.69/kg for 'Jumbo" export dressed lake whitefish, $1.32/kg for dressed jackfish and $0.72/kg for large dressed tullibee (Smith *pers. comm.* 2008). Due to the higher comparative value of pickerel, fishers generally target lakes that produce higher pickerel catches and export grade whitefish such as Split Lake.

Mercury **concentration**s in fish are an important factor limiting the commercial fishery in northern Manitoba especially in areas affected by flooding from hydroelectric development (AE SV). The Canadian Food Inspection Agency (CFIA) guideline for mercury concentrations is not to exceed 0.5 **ppm** for fish to be commercially marketed in Canada (Health Canada 2002). The FFMC and the CFIA test mercury concentrations in fish delivered to the FFMC on a periodic basis. The FFMC will not purchase fish if it is determined that mercury levels are above guidelines. As of January 2009, no commercial fishing lakes in the Regional Study Area were listed by FFMC as having high (> 0.5 ppm) levels of mercury in fish (Kjarsgaard *pers. comm.* 2009).

In addition to the 0.5 ppm standard, the Medical Service Branch of Health Canada recommended in 1976 that the maximum acceptable concentration of mercury in fish should be 0.2 ppm for those persons that eat large quantities of fish (Wheatley 1979). Although this guideline value has no official status, it is still

frequently used in the risk assessment of fish consumption by health professionals (see AE SV for further discussion).

1.3.3.2.3 The Local Study Area

From Clark Lake to Gull Lake, the Nelson River has a high velocity current and is shallow, which together make it a difficult river to fish commercially (Macdonald *pers. comm*. 2009). A license for Gull Lake was issued prior to 2007 but no production has been reported in the last 10 years excepting a catch of 206 kg in 1998. No commercial fishing occurs on the Long Spruce or Limestone reservoirs (Macdonald *pers. comm*. 2009).

A Gillam resident holds a license authorizing catch in Stephens Lake and a dealer's license (for authorizing local sale of fish). The primary target of this fishery is pickerel which is sold directly to restaurants and individuals in Gillam and Churchill. Due to the unique nature of these licenses, production from this fishery is not published in FFMC records and a quota for Stephens Lake is not published in the Manitoba commercial fishing harvest schedule.

According to the operator, this fishery produces 100-300 pounds of pickerel fillets per day for 10 weeks with a limit of 500 pounds per day (round weight). The inlet of Stephens Lake is the targeted location of this fishing operation. This fishery is staged from three cabins located on an island approximately 4 km downstream from the proposed Keeyask GS. The island on which these cabins are situated has experienced substantial erosion that the owner has attributed to hydroelectric development.

Triaenophorus crassus parasitism does not affect pickerel (the primary target species of this fishery) and therefore, *T. crassus* infestation levels are not relevant to the Stephens Lake commercial fishery. In Stephens Lake the mean standardized mercury level in pickerel was 0.33 ppm as of 2003. It should be noted that the mean mercury concentrations in Stephens Lake are currently at, or even below concentrations observed in natural reference lakes in the general area (see AE SV).

1.3.3.3 Trends

Table 1-4 displays a pattern of marked decline by decade in commercial fishing production and value in the Regional Study Area from 1960 to present day. A substantive decline in the number of lakes fished also has occurred (23 in the 1960s to 2 this decade not including the Stephens Lake fishery). Appendix 1B compares the frequency of fishing by lake in the past and present periods.

Table 1-4: Summary of Production and Value[1] of the Commercial Fishery by Decade

Decade	Harvest (marketed)	Gross Income ($2008)	Number of Lakes Fished
1960-1969	759,287 kg	1,152,127	23
1970-1979	425,009 kg	938,446	15
1980-1989	600,167 kg	1,367,859	14
1990-1999	303,186 kg	650,773	9
2000-2008	346,715 kg	886,495	2

[1] Excludes Stephens Lake fishery production and value which is not reported by the FFMC.

The cost of transporting fish was and still is limiting the fishery. Air transportation is not only costly but can be unreliable (due to weather) which can lead to fish spoilage. Lower revenues generated by fish other than pickerel or whitefish reduces the feasibility of operating a viable fishery on lakes where air transportation is presently the only option for delivering fish to the plant. As a result, only road accessible lakes are currently being fished.

The 2008 sale prices discussed above reflect increasing payments for jackfish, sauger, and whitefish which had been stagnant for 5-6 years previous to 2008 (Smith *pers. comm*. 2008). Although relative price increases have occurred, fishing provides only part-time or occasional employment for people who participate in the industry (Gilason *et al.* 1982) and "people can make more money doing other things" (Macdonald *pers. comm*. 2008).

For the future, given former declines in participation, erosion of income and high replacement costs of equipment and fuel, it would be reasonable to predict that the commercial fishing industry in the Regional Study Area will remain static or slowly decline. It would be expected that the levels of the commercial catch will continue to vary from year to year on the basis of water levels and the effort of fishers.

Split Lake fishers attribute declines in the fishery to hydroelectric development. For example, "the cost of fishing has increased because of the additional effort and expense required as a result of debris damaging boats, motors and nets…" (Split Lake Cree Nation - Manitoba Hydro Joint Study Group 1996a, p.87). Split Lake fishers have reported changes in the colour, taste and availability of fish due to water fluctuations which has been more noticeable since the high water levels of 2005 (CNP 2010b).

Observed deformities, erosion, lesions and tumours in fish are referred to collectively as **DELT**s. The 2001-2004 aquatic studies conducted on Split Lake observed DELTs on 0% of whitefish, 0.1% of jackfish, and 0.3% of pickerel (see AE SV). Fishermen also have reported catching fish with DELTs from Split Lake, including some with eyes missing, abdominal wounds and open cuts. The mean frequency of DELTs in Stephens Lake pickerel was 1% based on studies conducted in 2002 and 2003 (see AE SV).

1.3.4 Project Effects, Mitigation and Monitoring

1.3.4.1 Construction Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect commercial fishing during construction:

- Disturbances from Project construction limiting access; and
- Disturbances from Project construction causing potential reductions to fish resources.

All effects pertain to the small (single licence) Stephens Lake fishery. No effects are predicted for the Split and Assean lake fisheries.

Changes in flows downstream of the Project on the Nelson River and upstream of Stephens Lake have the potential to affect the Stephens Lake commercial fishery by changing fish congregations and by affecting navigation. Due to the construction of causeways to access deposits N-5 and G-3 (see PD SV Section 2.4.7), navigation through the unnamed channels to Pond 13 and to the mouth of Looking Back Creek will be restricted from the south. These two waterbodies have been identified as possible Stephens Lake fishery locations (FLCN 2010 Draft). Access to these waterbodies will still be possible though distance and travel time will increase by taking the route from the east via O'Neil Bay in Stephens Lake. Due to both construction and operation effects (discussed below), it is expected that this fishery will be discontinued through a compensation agreement. Discussions are underway.

1.3.4.2 Operation Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect commercial fishing during operation:

- Changes due to mercury levels in fish; and
- Increases in debris in the water downstream of the GS.

In Stephens Lake, the mean standardized mercury level in pickerel (which is targeted by this fishery) is predicted to increase from 0.33 ppm to 0.5 ppm (AE SV Section 7.2). The latter value is the threshold at which the Canadian Food Inspection Agency refuses fish for national sale. Based on these predictions, the fishery is expected to be discontinued by agreement.

Increases in debris have the potential to affect fishing nets set in areas below Gull Rapids (see PE SV Section 10.4). The quantity of mobile peat transported from the reservoir downstream into Stephens Lake is predicted to be small and periodic. Debris is transported only when the spillway is in operation (PE SV Section 10.4). Peat transport will reduce overtime ceasing by year 15 post-impoundment. The Project also will eliminate the hanging ice dam from forming immediately downstream of the GS which causes shoreline erosion. Reduced shoreline erosion will reduce the introduction of woody debris in the water. The Reservoir Clearing Plan and the Waterways Management Program will serve to limit the sources of debris and collect floating debris for the safe use of the waterway respectively.

1.3.4.3 Residual Effects

Given the expected agreement with the Stephens Lake fisher during both the construction and operation phases no residual effects on commercial fishing are expected.

1.3.4.4 Environmental Follow-up and Monitoring

No monitoring activities are planned for the Split or Assean lake fisheries.

1.4 COMMERCIAL TRAPPING

1.4.1 Introduction

Commercial trapping is an integral component of the social setting and economy in the north. It is one of the few sectors of the cash economy in which Aboriginal people can participate while maintaining their traditional subsistence lifestyle. Socio-culturally, trapping is important: "In a society in which animals are sacred and labour is highly valued and a source of respect, social exchanges of bush foods and access to hunting lands are highly valued" (Feit 2004). Consequently, the possession of a trapline license is a source of pride, elevated social standing and community respect. Commercial trapping is a VEC.

1.4.2 Approach and Methodology

1.4.2.1 Overview to Approach

The approach to data analysis and data summary is based upon aggregation of twelve years (1996/2007 to 2007/2008) of trapline production data and revenues from groupings of lines based on whether the lines are road accessible or not. Road accessible traplines include those with winter roads.

The approach of grouping traplines was selected for three reasons:

- Data aggregations protect the privacy and confidentiality of individual line holders and their helpers;
- Trapline accessibility explains production and revenues better than the RMA in which the trapline is situated; and
- Trapline production is known to be transferred from one line to another and therefore grouping traplines is not considered to decrease the overall quality of interpretation.

To conduct the impact analysis, four directly "affected" lines were compared with lines that will not be directly affected to generate a comparison of production and revenues. Road and non-road accessible traplines were also compared for their relative production and revenues produced. This approach illustrates the positive correlation between accessibility and production.

1.4.2.2 Data and Information Sources

Manitoba wide trapping data were obtained from the Manitoba Conservation and Water Stewardship, Wildlife and Ecosystem Protection Branch to describe average fur value and production trends province wide.

Key person interviews were conducted with the provincial Furbearer Manager and the Regional Wildlife Manager in Thompson. Interviews also were held with a Member of the York Factory Resource Management Board and non-Aboriginal trappers.

Trapping data by trapline were obtained for all lines in the Split Lake RMA and the Fox Lake RMA. Data also were received for YFFN Community Trapline 13 and Trapline 22 in the Shamattawa section. The

data include harvests from the 1996/1997 to 2007/2008 trapping seasons, inclusive. Production data dating back to 1960 were received for the Split Lake trapping section only. These data were used primarily to illustrate longer term and historical trends to compare with current trapping activity.

1.4.2.3 Study Area

The Regional Study Area includes all traplines in the Split Lake RMA, the Fox Lake RMA and York Factory's Trapline 13 in the York Factory RMA. Trapline 22 in the Shamattawa section also is included in the Regional Study Area because YFFN Members are line holders in this area. The Local Study Area includes traplines 520-07, 520-09, 520-15 and 520-25 in the Split Lake trapping section (Map 1-5 displays the Local and Regional study areas). These traplines are referred to below as "affected" because the terrestrial and riparian habitats within the lines will be changed post-Project. Traplines that are not directly affected by the project are referred to as "unaffected".

1.4.2.4 Assumptions

It is generally known that while overall production numbers are accurate, there is some transfer of production (number of **pelt**s) from trapline to trapline at times due to one trapper selling another's fur at auction. Therefore, aggregations of line data are presented here to improve interpretation of production and for the reasons listed above.

It is acknowledged that trapping records do not contain social, economic and biological factors that influence trapping effort and production such as alternative wage employment, fur price fluctuations (due to market forces such as supply and demand), influence from government programs or compensation programs, weather conditions, forest fires and cyclical fur population changes. These factors have been considered here, where possible.

1.4.3 Existing Environment

1.4.3.1 Introduction

The registered trapline (**RTL**) system was designed in the 1940s to reduce conflicts between trappers, improve management and reduce depletion of fur resources. This system divided the province into relatively large RTL sections that were further sub-divided into individual registered traplines. Manitoba Conservation and Water Stewardship allocates an RTL permit for $10.00 on an annual basis to individuals, who in exchange, are granted the exclusive individual right for harvesting. Two 'helpers' are permitted to assist the line holder on the line. Holding an RTL permit also makes the line holder the steward of the fur resource (Manitoba Conservation 2008c).

RTL lines cannot be sold, inherited or handed down (Manitoba Conservation 2008c). An undesignated RTL is allocated based on family relationship to the previous line holder, proximity of the candidates' residence, and an active and recent fur harvest history. Lines can be reallocated if harvest has been inactive for two years without good reason, if the line holder fails to renew his/her permit, or if the line holder dies or voluntarily gives up the permit.

Trapping can be prohibited on Treaty Land Entitlement (**TLE**) parcels designated as "Exclusive Use" via an "Exclusive Use Permit". Treaty Land Entitlement parcels are lands that have become eligible for designation as reserve lands under the Treaty Land Entitlement Framework Agreement (1999). Where an Exclusive Use Permit has been requested by the First Nation and issued by the Crown Lands Branch of Manitoba Conservation and Water Stewardship, the First Nation has the authority to exclude all current and future use of the permitted lands including trapping activity. Trapping also can be prohibited in **provincial park**s that are closed to all hunting and trapping, **wildlife** refuge areas, most **ecological reserves** (**ER**) and areas closed due to specific conservation purposes. Prohibitions apply to both non-Aboriginal and Aboriginal people.

Trapping is generally performed in winter when it is safe to travel on iced-over waterbodies and when fur is in prime condition, generally from mid-November to mid-March, though this varies somewhat by species. For example, American marten, referred to as marten, are generally at their prime prior to the New Year, while beaver are best later in the winter. Trappers can secure a permit to build cabins on their trapline from which to stage their activities.

1.4.3.2 Past Conditions

The trapping industry was regarded by Telleit (1979) to be Manitoba's oldest commercial activity resulting from the establishment of the Hudson's Bay Company (**HBC**) in 1670 and the commercial fur trade (Tough 1996). The mid-17th to mid-19th century seasonal cycle of trapping was generalized by Tough (1996). Starting in early fall trappers were outfitted or 'debted' by the HBC post with equipment and necessities and travelled to their trapping areas to return in late December to trade furs at the post. In the New Year, trappers returned to their lines for late winter trapping followed by the spring muskrat hunt. Debts were settled at the post or carried over until the following year. Since trappers are dependent on fur populations, which are subject to population cycles, credit was extended in years of fur scarcity to

assist the trappers in surviving. This also secured for the HBC ongoing fur production by indebted trappers.

The historical pattern of land use was characterized by harvesting territories maintained by individual family groups (which later became the basis for trapline boundary establishment) (Usher and Weinstein 1991). Permission for use and access by those not in the kin group could be granted by a chief hunter thereby providing flexibility for community members to harvest in areas of abundance and, therefore, where harvest effort could be minimized. In this way, animal harvests were intensive, then allowed to recover while other areas were used (Usher and Weinstein 1991). Up to 1929, trapping in winter and casual summer employment were the two primary sources of cash for northern Manitobans and Aboriginals alike who generally profited from high demand and prices for fur.

Fur price collapse in the 1929-1931 Depression era encouraged destructive competition for fur resources by increasing numbers of southern newcomer trappers who attempted to compensate for low prices by increasing production. Resident trappers, whose lines were now shared with newcomers, were obliged to salvage what fur there was from their lines for themselves, leaving the fur resources depleted (Carmichael 1973). Fur price recovery occurred after 1931 but sustained levels of high exploitation had led to general fur depletion and the 1940 closure of beaver trapping in the north. At this time, the Split Lake Cree (TCN) could only trap beaver in the far northern regions of their territory along the Churchill River and beyond (Split Lake Cree - Manitoba Hydro Joint Study Group 1996a).

Registered traplines were introduced on a trial basis in 1940 to eliminate destructive competition and allocate exclusive rights to individuals who would become stewards of the fur resources on each respective line (Carmichael 1973). The first lines established in Manitoba were located between Ilford (mile 185 of the rail line) and The Pas, referred to as the Central Trapping District. By 1945, communities established trapping sections, such as the Split Lake Trapping Section (which later became the Split Lake RMA boundary). Trapping sections were later further divided into family and then individual lines. The trapline registration process succeeded in excluding southern interlopers but established non-Aboriginal trappers were provided lines. During this period, beaver populations recovered.

Following WWII, a second precipitous decline in the value of furs occurred causing widespread hardship among the people of northern communities until the 1970s (Usher and Weinstein 1991). Usher and Weinstein (1991) suggested that the only reason fur trapping continued during this period was because of its contribution as a food source. Muskrats and beaver not only provided fur, albeit for low returns, but were important as staple foods.

Price recovery in the mid to late 1970s led to increased trapping effort for beaver, muskrat and particularly lynx (Usher and Weinstein 1991). Trapper effort hit a 10 year high in the 1975/1976 season (Telleit 1979) in the mid-Northern region of Manitoba due to high fur prices and the joint Federal-Provincially funded Manitoba Wild Fur Program. This program provided marketing assistance, biological improvement assistance and facilitated the creation of local fur councils, one of which was established in Split Lake.

In the Split Lake trapping section, trapper participation grew throughout the 1970s from approximately 75 in the early 1970s to approximately 150 in 1980 (Usher and Weinstein 1991). Increased participation in

trapping was stated to be the result of high fur prices, benefits accrued from the Wild Fur Program and incentives offered by Manitoba Hydro's fur compensation program (Usher and Weinstein 1991).

Together, beaver and muskrat accounted for just under 65% of total fur production in equal proportions in the Split Lake RMA from 1960 to the mid-1990s. Marten accounted for 14% of production, most of which occurred in the early 1990s, corresponding to a steep increase in the value of this fur. Prior to the late 1980s and early 1990s, marten harvest was inconsequential. Figure 1-4 displays the species composition of harvest from1960 to 1996 (Split Lake RMA traplines only).

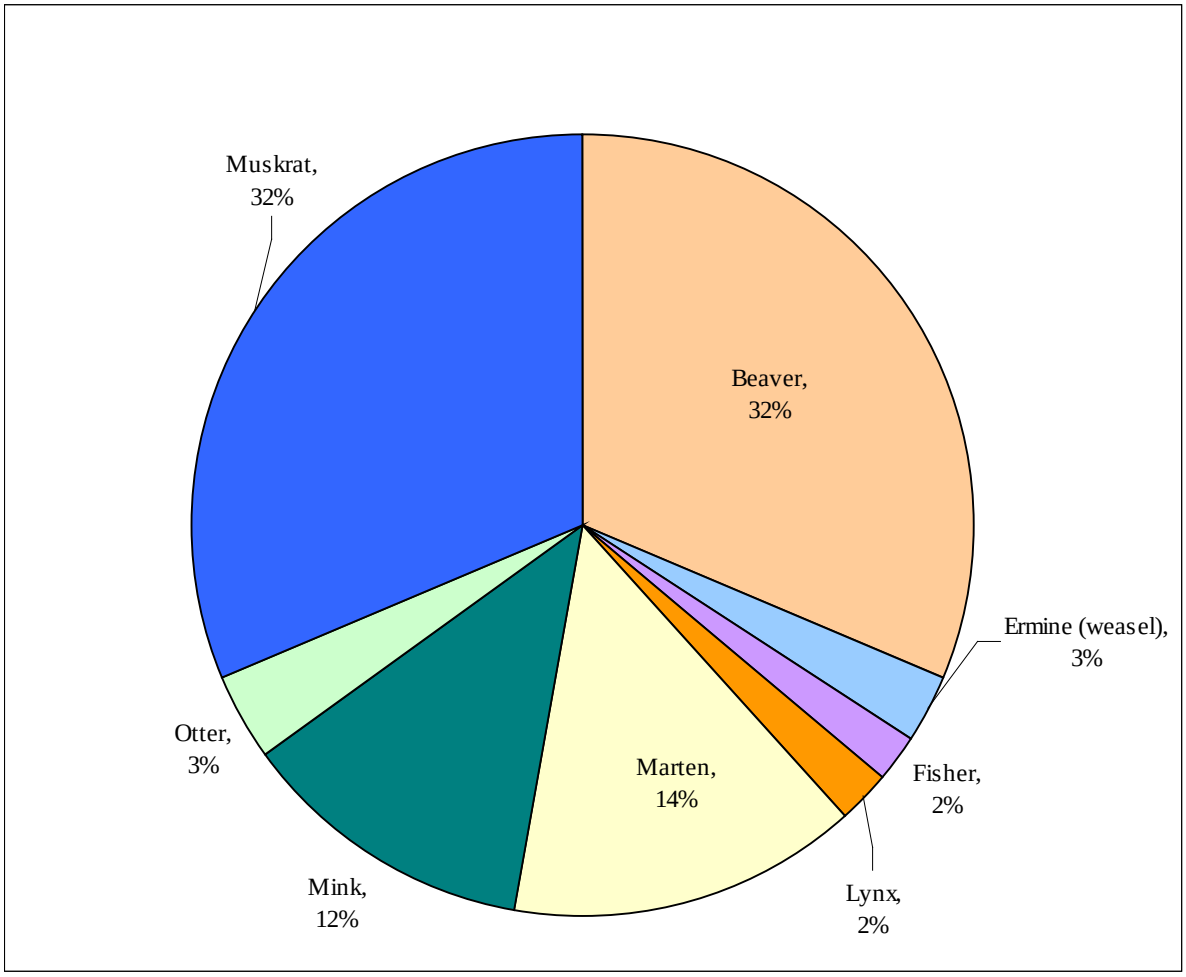


Figure 1-4: Species Composition of Harvest From 1960 to 1996 in the Split Lake RMA

The value of fur declined steeply in the late 1980s from an average return of over $162 / fur in 1980 (for all species excluding bobcat) to just under $70 in 1996 ($2008), over a 200% reduction. A notable peak in marten fur prices occurred in 1986, which stimulated trapping efforts for this species. Since 1990, fur values have fluctuated moderately, changing in average value by +/- $15 in any given year (Figure 1-5)

1.4.3.3 Current Conditions

Over the past twelve years, trapping in the Regional Study Area generated a total of over 2 million dollars or over $170,000 and 3,100 pelts per year ($2008) (Figure 1-6). It should be noted that there are many non-Treaty individuals that trap in this region (Usher and Weinstein 1991) and therefore, not all of the revenues are distributed among KCNs community Members. Though the ratio of Aboriginal to non-Aboriginal trappers is not available for the whole period of record, approximately 15% of Trapline lineholders were non-Treaty as of 2008.

Over the past twelve years, marten comprised 68 % of the harvest, followed by beaver (13%), fox (all) 5%, mink (5%), muskrat (3%) and otter (2%) with all other species each making up less than 4% of the harvest (Figure 1-7).

Equipment costs limit trapping. Snowmobiles, traps, and trapping cabins and their associated purchase and maintenance costs require a source of extra income that can exclude those who do not have full-time jobs. For those trappers who are employed, limited time to conduct trapping precludes an extended trapping effort, such that trapping becomes a part-time income source or a lifestyle choice versus a viable source of income (Hedman *pers. comm.* 2009).

Access is both a limiting and enabling factor in the level of harvest in the Regional Study Area. Traplines that were inaccessible by road produced less than 70% of traplines that were accessible by road (though there are a few highly productive road inaccessible lines) (Figure 1-8).

Of the 83 traplines in the Regional Study Area, 21 have road access (either all weather or winter roads) and 62 have no road access (Map 1-6 displays road accessible/inaccessible traplines). Three traplines difficult to access in the Split Lake Section (49, 52, and 76) which are located at the extreme northwestern extents of the RMA have had no production in 12 years from 1996 to 2008 inclusive. Easily accessed community lines such as YFFN Trapline 13, War Lake Trapline 04, Gillam's Trapline 04 and to a lesser extent, Split Lake's Trapline 14, when production is normalized for area, display the most intensive production by area in the Regional Study Area. Other traplines, licensed to individuals such as 01, 05 and 06 also displayed similarly high production by area; the former two have access via transmission lines and all three are located close to the community of Ilford.

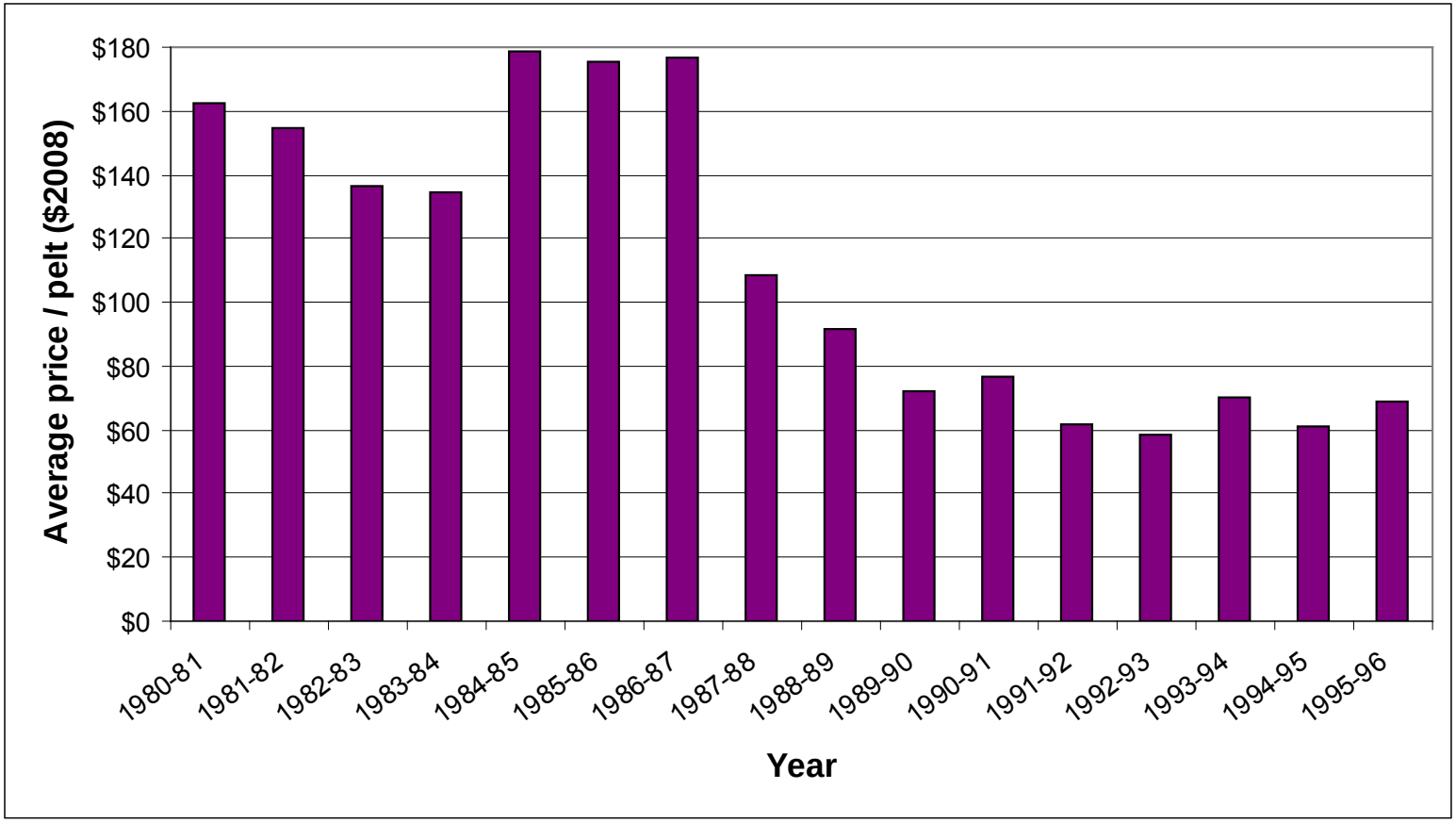


Figure 1-5: Average Fur Prices per Pelt Prior to 1996

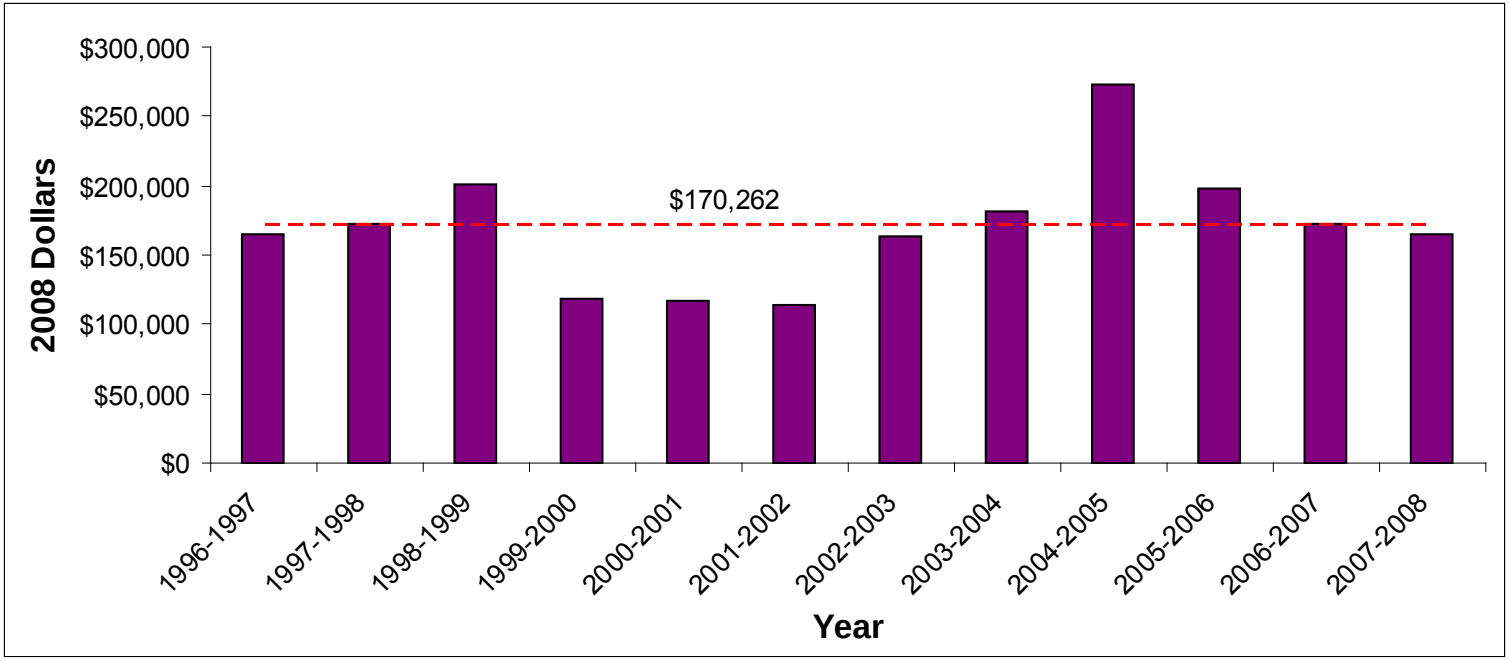


Figure 1-6: Annual Trapping Revenues as Compared to the 12 year Average of $170,262 in the Regional Study Area

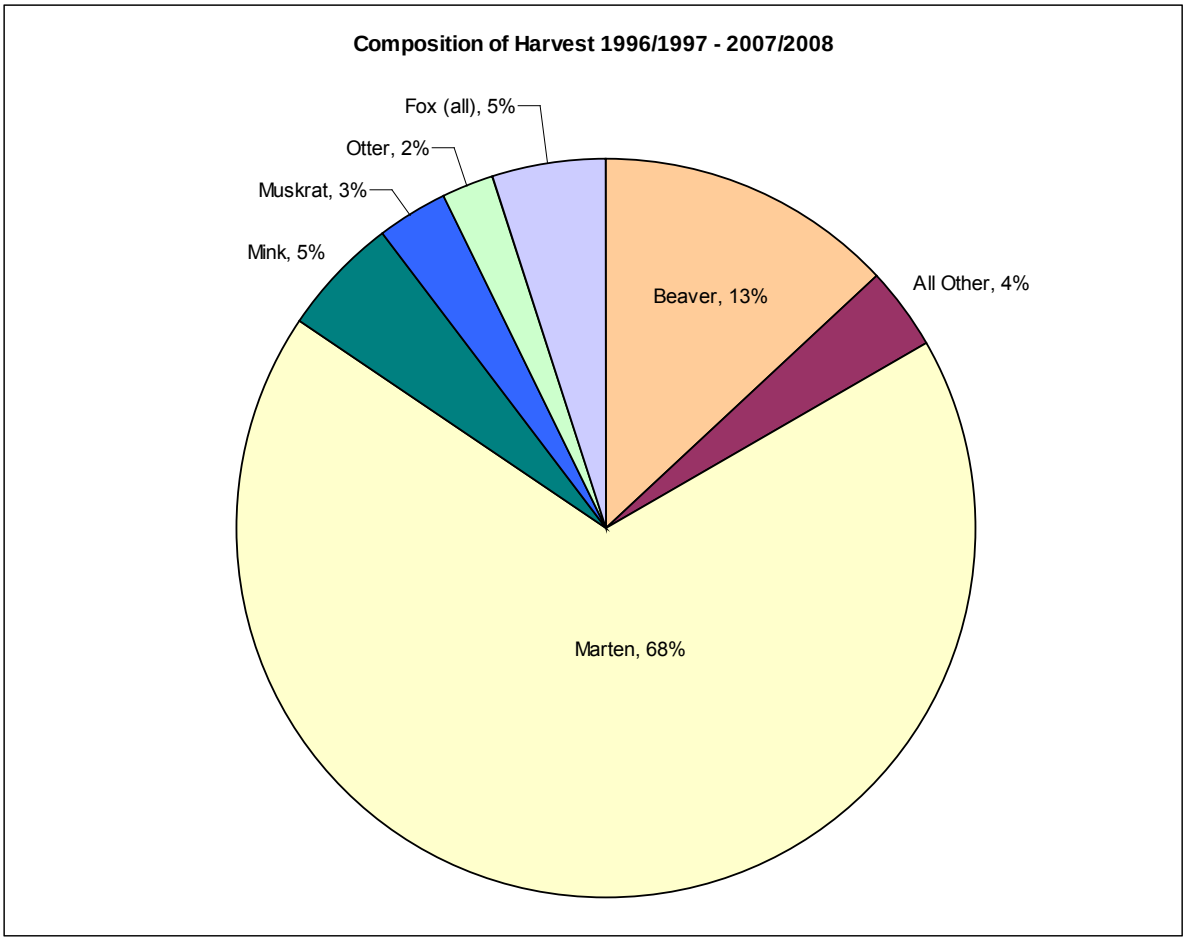


Figure 1-7: Species Composition of Harvest from the 1996/1997 to 2007/2008 Seasons in the Regional Study Area

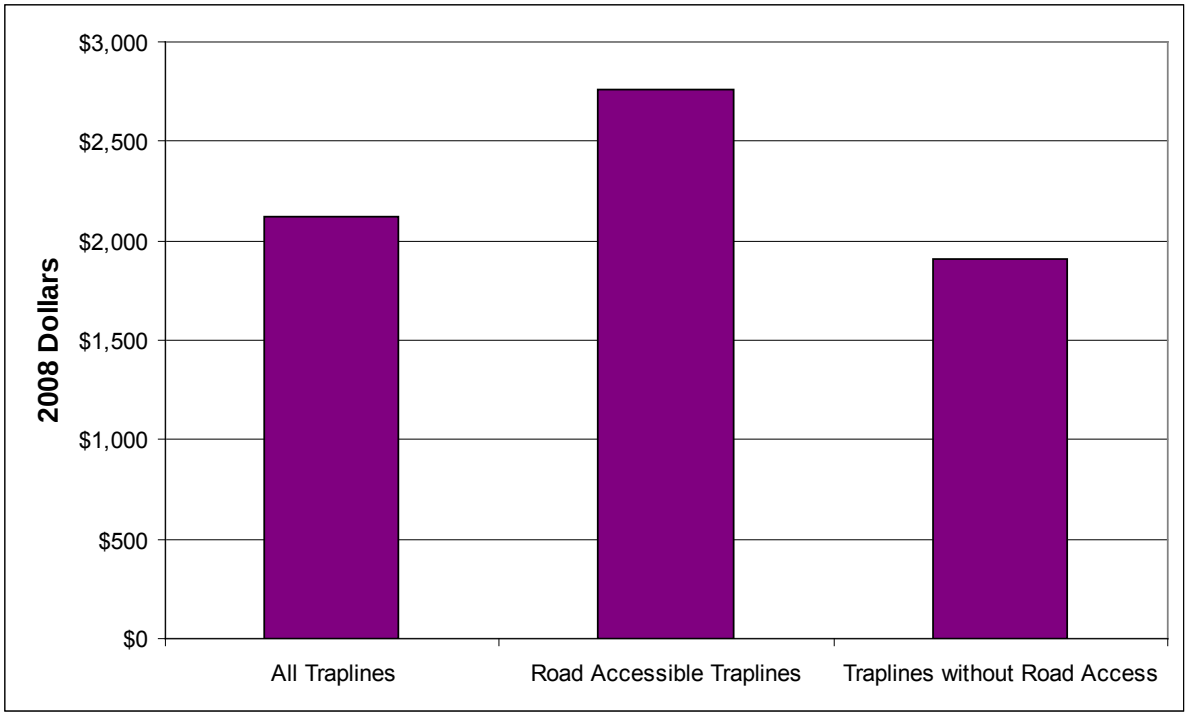


Figure 1-8: Comparison of all Traplines, Road Accessible Traplines and Road Inaccessible Traplines' Production Value in the Regional Study Area

Despite limiting factors, the benefits of trapping include **country food** production, social benefits and financial benefits. In a workshop with YFFN resource users, one individual stated "If we don't have country food, we will be missing a part of who we are" (YFFN Member *pers. comm.* 2009). People also recognize that it is important for Elders to have country food and people often say "wild meat is part of our way of life…[people] don't get as hungry as when they eat purchased food" (YFFN Member *pers. comm.* 2009). Although it is not now a primary source of income, one local trapper stated "there are still hundreds of people that get their income from trapping in order to provide their kids with a good Christmas".

Traplines 07, 09, 15 and 25 in the Split Lake Section (shown on Map 1-7) are expected to be directly affected by the Project. Since 1996, affected traplines averaged similar annual revenue ($1,908) when compared with unaffected traplines ($2,142) and the average of all traplines ($2,125). Production may have been influenced by Trapline 15 being unallocated since 2001 (a license was issued for this line in 2012) and intermittent harvest on Trapline 25. Examination of the intensity of harvest by area shows affected traplines have produced 4.5% of the total value produced in the Regional Study Area but represent only 3.3% of the area. Average trapline harvest values for road Project affected/unaffected traplines are summarized in Table 1-5.

Table 1-5: Average Trapping Revenues ($2008 adjusted) and Average Production by Line (1996-2008)

Species	All Traplines		Affected Traplines		Unaffected Traplines		Road Accessible Traplines		Traplines Without Road Access	
	Average Annual Total per line (n=84)	Average Annual Production per line	Average Annual Total per line (n=4)	Average Annual Production	Average Annual Total per line (n=80)	Average Annual Production	Average Annual Total per line (n=21)	Average Annual Production	Average Annual Total per line (n=64)	Average Annual Production
Badger	$0.03	<1	$0.00	<1	$0.03	<1	$0.00	<1	$0.04	<1
Beaver	$151.04	5	$193.45	7	$150.80	5	$187.90	6	$140.49	5
Black Bear	$0.70	<1	$0.00	<1	$0.75	<1	$0.43	<1	$0.81	<1
Coyote	$0.70	<1	$0.00	<1	$0.74	<1	$1.36	<1	$0.48	<1
Ermine	$0.73	<1	$0.52	<1	$0.75	<1	$1.24	<1	$0.56	<1
Fisher	$7.03	<1	$9.30	<1	$7.00	<1	$10.65	<1	$5.86	<1
Blue Fox	$0.10	<1	$0.00	<1	$0.11	<1	$0.00	<1	$0.14	<1
Cross Fox	$7.23	<1	$9.16	<1	$7.13	<1	$8.75	<1	$6.70	<1
Red Fox	$21.41	<1	$15.29	<1	$21.83	<1	$30.93	1	$18.15	<1
Silver Fox	$1.93	<1	$1.84	<1	$1.96	<1	$2.35	<1	$1.81	<1
Unknown Fox	$0.05	<1	$0.00	<1	$0.05	<1	$0.11	<1	$0.03	<1
White Fox	$28.98	1	$4.14	<1	$30.67	1	$16.84	<1	$33.79	1
Lynx	$36.07	<1	$33.07	<1	$36.70	<1	$44.71	<1	$33.61	<1
Marten	$1,682.75	27	$1,427.80	26	$1,697.06	27	$2,211.40	35	$1,495.73	24
Mink	$43.56	2	$55.41	2	$43.34	2	$61.59	3	$37.67	2
Muskrat	$3.87	1	$4.37	2	$3.90	1	$3.99	1	$3.90	1
Otter	$103.05	<1	$126.12	<1	$103.19	<1	$141.87	1	$90.98	<1
Squirrel	$0.37	<1	$0.47	<1	$0.37	<1	$0.35	<1	$0.38	<1
Wolf	$16.73	<1	$22.12	<1	$16.67	<1	$19.21	<1	$16.13	<1
Wolverine	$18.33	<1	$4.89	<1	$19.28	<1	$19.80	<1	$18.12	<1

Table 1-5: Average Trapping Revenues ($2008 adjusted) and Average Production by Line (1996-2008)

Species	All Traplines		Affected Traplines		Unaffected Traplines		Road Accessible Traplines		Traplines Without Road Access	
	Average Annual Total per line (n=84)	Average Annual Production per line	Average Annual Total per line (n=4)	Average Annual Production	Average Annual Total per line (n=80)	Average Annual Production	Average Annual Total per line (n=21)	Average Annual Production	Average Annual Total per line (n=64)	Average Annual Production
Average Value / Total Pelt Harvest per line	$2,125	36	$1,908	36	$2,142	36	$2,763	48	$1,905	33
Total Annual Study Area Revenue and Production	$170,449	3,172	$7,632	158	$162,817	2,985	$58,032	1,057	$112,416	2,086

1.4.3.4 Trends

Recent species harvest composition trends vary considerably from historic harvests. Prior to 1996, muskrat comprised 32% of the harvest which was reduced to 3% in the current period; beaver has changed from 32% to 13%; mink from 12% to 5%; and marten from 14% to 68%. Otter harvest has not changed substantively.

Following steep declines in the late 1980s and early 1990s, beaver harvest continued to show a moderate decline to 2008 (Figure 1-9 displays marten and beaver harvest and trends). Beaver fur prices declined from over $35 in 1997 to less than $20 in 2009. Muskrat fur prices followed a similar pattern, reducing in value from $8 in the early 1980s to less than $4 in 2009.

While there are several explanations for reduced beaver and muskrat harvests, the Split Lake Cree Nation - Manitoba Hydro Joint Study Group (1996a) noted that increases in slush ice attributable to the Churchill River Diversion - Lake Winnipeg Regulation (CRD-LWR), have curtailed commercial trapping activity on lines bordering the Nelson River. Rising water levels, affecting the abundance of aquatic mammals (beaver, otter, mink and muskrat) on traplines adjacent to Gull Lake and Split Lake also have been noted by trappers as a factor in declining fur production. The FLCN and YFFN attributed declines in beaver and other furbearers in the vicinity of the Nelson River to hydroelectric development (YFFN 2002; FLCN 2008 Draft). Though there are other factors affecting trapping production discussed below, compensation and trapping programs have been made available to affected trappers by Manitoba Hydro to address concerns related to the CRD-LWR.

In the past 12 years, marten harvests have fluctuated with peaks in 1998-1999 and 2004-2005 seasons with a trend line that demonstrates a shallow decline in harvests. The current high volume of marten harvest is in stark contrast to pre-1990 harvests due to this species re-inhabiting its historic range coupled with high fur prices, events that are credited for "saving trapping in Manitoba" (Berezanski *pers. comm.* 2008). Tataskweyak Cree Nation trappers have also observed increasing abundance of marten (CNP 2010a). The relatively high value of marten fur has certainly positively influenced trapping effort targeting this species though prices have demonstrated cyclical peaks and troughs ranging from a low of $41 in 1998/1999 to a high of over $80 in 2005/2006.

It is probable that fur prices have had a very strong influence on the types and quantities of species harvested (Figure 1-10 displays fur prices for the top two harvested species).

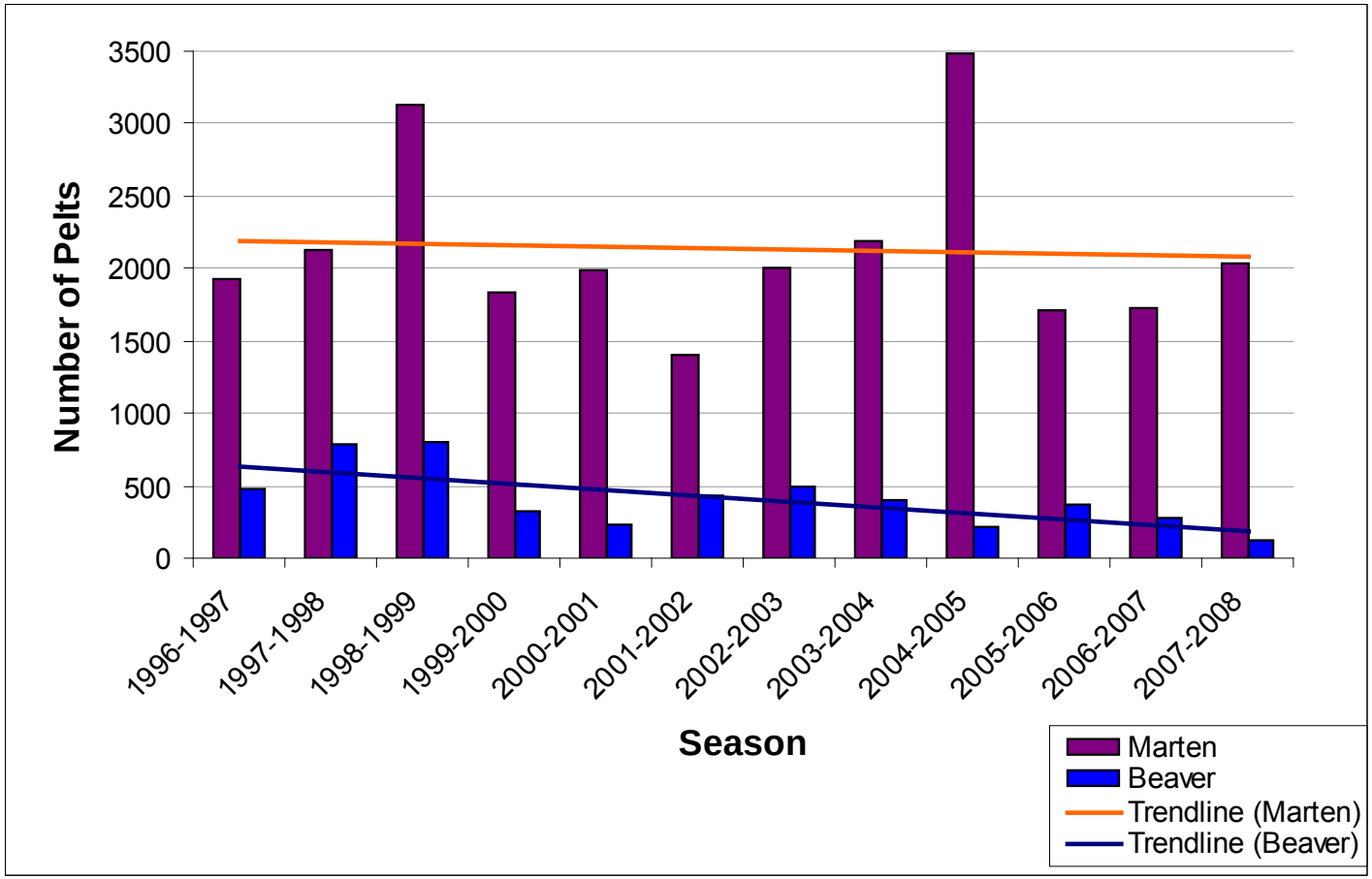


Figure 1-9: Magnitude of and Changes in Marten and Beaver Harvests Between the 1996/1997 and 2007/2008 Seasons

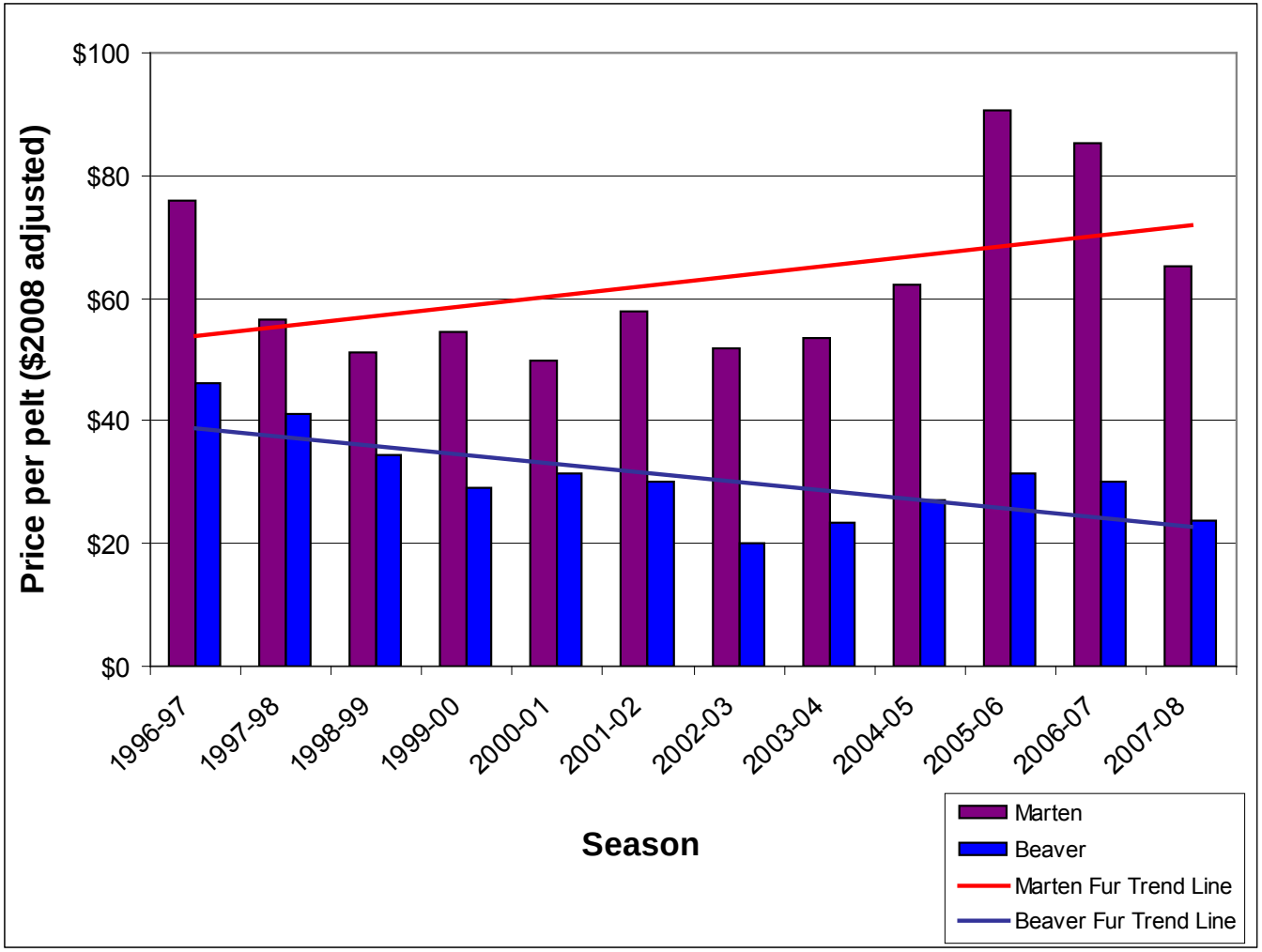


Figure 1-10: Fur Prices per Pelt Since 1996 for Top Two Species Harvested ($2008 adjusted)

Accessibility to traplines strongly influences harvesting levels. From 2005 to 2008, the late onset of winter prevented trappers from getting out to their lines in late fall. Warm winter weather and deep snow overlaying thin ice also can prolong poor ice conditions and affect trapping effort. This is particularly relevant for Trapline 13 where YFFN Members must cross the Aiken River to reach the line and for Trapline 14 where TCN Members must cross the Nelson River to reach the line (YFFN Member *pers. comm*. 2009). Regulated reductions in water levels on the Nelson River following freeze-up can cause hanging ice and an additional danger for accessing lines.

Rising fuel costs also have had an important effect on harvests. In June 2008, fuel costs reached $1.32 per litre, compared to a weighted average of $0.63 for the seven years from 2002 to 2008 (Manitoba Science, Technology, Energy and Mines 2009). High fuel costs present an even greater challenge for remote communities, particularly with regard to freight. For example, when fuel in Winnipeg was $1.30 per litre, it was $1.90 in parts of the North (Service Canada 2008). Although fuel prices have dropped since the summer of 2008 ($1.08 per litre as of February 21, 2012), fuel costs remain one of the most important constraints to the economic viability of trapping.

In 2007-2008, new regulations were implemented to ensure the use of humane traps in compliance with the Canada-Russia-European Union (EU) Agreement on the International Humane Trapping Standards (AIHTS) (EU Regulation #3254/91). The use of certified humane traps for beaver, fisher, marten, muskrat, and racoon keeps the fur markets to the EU open for business (Manitoba Conservation 2008c). Certified restraining traps also are required for lynx. Aboriginal people who are trapping for subsistence (versus commercial trapping) are not subject to trap requirements under EU Regulation #3254/91. Commercially, however, with individual trappers setting up to 200 traps, at a cost of approximately $12 per trap, a high expenditure has been required to continue trapping in compliance with trapping standards.

Factors such as low fur prices (excepting marten), difficult or unsafe access to trapping areas, costs of fuel, and new trap regulations have contributed to an overall decline in trapping activity over the years. The number of traplines used in the Split Lake RMA displayed a steady pattern of decline from 55 in 1980 (or 83%) to 47 (71%) in 1996 to 36 (55%) in 2007. It should be noted, that as of 2008, more than 55% of the SLRMA traplines were allocated (licence granted), but not all had production in every year.

As of 2008, 23 (27%) of 84 traplines in the Regional Study Area remain unallocated. Annual production reports from all lines indicated that in the 12 years previous, individual lines were reporting production for an average of only 7 of 12 years, signifying that lines on average were used in less than 60% of years. As one long time trapper explained, it is generally expected that trapping will continue to decline as long-time trappers retire and younger people show little interest. However, TCN offered a different perspective stating that trapping is becoming increasingly important for cultural reasons though not for economic reasons (CNP 2010a).

1.4.4 Project Effects, Mitigation and Monitoring

1.4.4.1 Construction Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect commercial trapping during construction:

- Disturbances causing increases in noise and dust affecting resource users;
- Disturbances affecting resource user safety;
- Disturbances causing potential reductions to furbearer resources that resource users target;
- The presence of a large workforce potentially increasing competition for resources;
- Increases in the wage economy potentially reducing commercial trapping activity; and
- Shifting patterns of resource use due to offsetting programs.

Project construction disturbances (noise, dust and changes to safety) may affect commercial trappers in the same way as domestic hunters. Mitigation measures are the same though there are some additional provisions in trapline agreements discussed at the end of this section. Project construction disturbances to the furbearer resource can be caused by increases in sensory disturbances (*i.e.*, noise), reservoir clearing, increases in predation, and wildlife-vehicle disturbances. The KCNs expect these disturbances to affect trapping success. Project construction disturbances expected on Traplines 09 and 15 are expected to be addressed through Trapline agreements (an agreement is currently in place with the Trapline 09 holder). An agreement with the Trapline 07 holder is expected to address the area of Trapline 07 that will be cleared as part of the Reservoir Clearing Plan.

The presence of a large workforce potentially increasing competition for fur resources is not expected due to furbearer harvest being prohibited by anyone other than a licensed trapper under *The Wildlife Act* (Manitoba).

Increases in the wage economy may cause short-term decreases in the number of individuals interested in commercial trapping. The extent to which a decrease occurs is dependent on personal preferences of individual trappers and the availability of winter employment which will compete with winter trapping activities.

Traplines may be visited by people other than the licensee or helpers more frequently due to the offsetting programs. This is not expected to cause a substantive effect on trapping due to the timing of offsetting programs (spring and fall) which do not coincide with peak trapping activity (winter months). Within communities, licensed trappers are recognized and respected as the stewards of the furbearer resources. Harvest of furbearers is not expected to occur as part of the offsetting programs without permission of the trapline holder (TCN OWL Staff 2009).

To mitigate effects on commercial trapping, commitments under 'Members Claims' in the TCN AEA and 'Citizens' Claims' in the FLCN AEA provide for any loss of net revenue from commercial trapping and for any direct loss or damage to any buildings, structures or other infrastructure located on a

Registered Trapline. Compensation agreements are expected to address construction phase effects on Traplines 07, 15, and 09.

1.4.4.2 Operation Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect commercial trapping during operation:

- Changes to furbearer populations; and
- Improved access on Traplines 15 and 09.

Changes to furbearer populations are expected to be caused by flooding in the reservoir area and by operation of access roads. Flooding will occur on small proportions of Traplines 07, 15, and 25 (a TCN community line) with the majority of flooding occurring in Trapline 15. The flooded area will increase marginally due to reservoir expansion over 30 years. New roads, which will form a new segment of PR 280, will pass through Traplines 09 and 15 and potentially affect furbearer populations while at the same time improving access.

To mitigate potential adverse effects, Manitoba Hydro expects to have trapline agreements in place for all affected traplines including 07, 09, 15, and 25.

1.4.4.3 Residual Effects

Compensation agreements and improvements in access during operation are expected to prevent adverse residual effects on commercial trapping resulting in a neutral effect.

1.4.4.4 Environmental Follow-up and Monitoring

No monitoring activities are planned.

1.5 COMMERCIAL FORESTRY

1.5.1 Introduction

The Project will directly affect forestry resources during both construction and operation phases of the development. Initial effects are expected as a result of clearing for infrastructure and reservoir purposes. Effects during the operation phase are expected as a result of shoreline erosion of forested sites on mineral soil. Project effects are quantified according to the Manitoba Conservation and Water Stewardship, Forestry Branch administrative zones straddling the Project Footprint and the Forestry Regional Study Area.

1.5.2 Approach and Methodology

The Project Footprint and Regional Study Area straddle both of the Manitoba Forestry Branch designated "Non-commercial Forest" and "Commercial Forest Zones" (Map 1-8). Given that the two forest zones have different administrative requirements, two different approaches to the effects assessment were required.

1.5.2.1 Non-commercial Forest Zone

The assessment within the Non-commercial Forest Zone (NCFZ) is limited to the identification and quantification of potentially useable timber resources during the construction phase of the development. Useable timber resources are defined as forest stands of sufficient age to have produced trees of sufficient size (stem diameter and length).

As there is no forest inventory data for the NCFZ, the description and assessment of the forest resources in the Project area started with a preliminary review of the immediately adjacent existing Manitoba forest resource inventory (FRI) data available for the **Commercial Forest Zone** (CFZ), specifically FMU 86 (Map 1-8). This assisted in getting an early appreciation of forest types and distribution. This was followed by forest sampling in 2001 and 2003. Field activities and data collected were documented in Environmental Studies Program Technical Reports 01-16 and 03-07 (Plus4 *et al.* 2004; Plus4 2005). All field data were eventually incorporated into the ecosystems and habitat classification database facilitating spatial description and analysis. A detailed description of the habitat land cover data can be found in TE SV Section 2.2.4.

To facilitate the potential effects assessment on timber within the NCFZ, the vegetation structure classifications "forest" and "woodland" on mineral soil were correlated to the FRI and **type aggregate**s assigned. The "year of origin" field was correlated to **cutting class** as per the FRI Manual (Manitoba, Government of 2007) to approximate forest stand age. Applicable type aggregate codes were assigned including **subtype**, **site index**, cutting class and **crown closure.** This facilitated application of provincial **stand stock volume table**s (SSVT) applicable to the Nelson River Forest Section. The SSVTs are a product of Manitoba Conservation and Water Stewardship, Forestry Branch and the result of stand level sampling (Manitoba, Government of 1991). They are developed on a Forest Section (FS) basis and provide average volume by species for all stand type aggregates found within the forest section (date of

inventory specific). Volume estimates of potentially salvageable timber are hence based on these tables. Potential salvage of timber is limited to the construction phase of the Project as clearing during the operation phase of the development will be very limited in extent, dispersed along the reservoir shoreline and limited to hand clearing methods, thereby making salvage impractical.

The extent of Project effects was determined by overlaying the Project Footprint shapefile with the habitat land cover classification (TE SV Section 2.2.4) and soils data in a **Geographic Information System** (GIS) environment. The resultant data were summarized and the SSVTs applied to stands of cutting class 3 and higher to determine potential volume. The base year for determination of effects is 2010.

1.5.2.2 Commercial Forest Zone

The Project Footprint partially overlaps FMU 86 within the Nelson River FS which forms part of the Commercial Forest Zone (Map 1-8). Manitoba Conservation and Water Stewardship, Forestry Branch manages the CFZ on a sustained yield basis, expressed as Annual Allowable Cut (AAC) and administered at the FMU level. Sustainability is in part, calculated based on the amount of **productive forestland** available and the rate of growth, expressed as **mean annual increment** (MAI) on those lands. When productive forestlands are converted to other land uses (*e.g.,* reservoir, dykes, roads), these lands are removed from the land base under forest management thereby reducing the theoretical sustainable volume of timber within the FMU. A measureable parameter therefore to determine Project effects within the CFZ are productive forestlands measured in hectares.

Given the limited Project Footprint within FMU 86, the age of the applicable FRI (origin 1991), the dated associated AAC values and the fact that Manitoba has no timber commitments within the FMU, an estimation of effect on AAC would have limited value. Manitoba Conservation and Water Stewardship, Forestry Branch advised to limit the assessment to the appraisal and valuation as specified in the Forest Damage Appraisal and Valuation (FDA&V) policy (Manitoba, Government of, 2002; Epp and Holmes *pers. comm*. 2012). The important measureable parameter required to conduct the FDA&V is standing volume of timber, measured in cubic metres, on productive forestlands.

1.5.2.2.1 Productive Forestland

Manitoba Conservation and Water Stewardship, Forestry Branch, maintains a forest inventory for the CFZ in Manitoba and specifically, FMU 86 that overlaps a portion of the Project Footprint (Map 1-8). The Forest Resource Inventory (FRI) covering this area was re-interpreted from 1991 photography and has most recently been updated in 2011 to reflect depletions and fires (Boyd. *pers. comm*. 2011). Wild fires are a common occurrence in this northern region. The original SSVTs, developed from volume sampling data throughout the province in the 1980's, remain valid and form the basis for volume estimation for the FMU.

The affected lands are all classed as Crown lands within the FRI. Non-productive lands, as related to forestry, include FRI classification codes 700-900 series. These codes include all non-forest types, wetlands and water. The productive forestland codes 1–699 series have been grouped into two broad

classifications; softwood leading **cover type**s (codes 1-77), and hardwood leading cover types (codes 80-98) (Manitoba, Government of 2007).

Project effects were determined by overlaying the Project Footprint shapefile with the FRI data in a GIS environment. The resultant data were filtered for non-productive and productive forestlands and summarized. Finally, the area of productive forestlands affected was compared to the total within FMU 86. The base year for determination of effects is 2011.

1.5.2.2.2 Forest Damage Appraisal and Valuation

Manitoba Conservation and Water Stewardship applies the Forest Damage Appraisal and Valuation (FDA&V) Policy (Manitoba, Government of 2002) whenever productive forestland is removed from the land base within the CFZ. It is a compensatory form of mitigation that the province levies on the Project proponent. It accounts for the volume of timber in cutting class 3, 4 and 5 stands within the Project Footprint as well as the loss in growth potential of timber within immature cutting classes (1 and 2) at the time of clearing. It also accounts for the investments in forest management such as forest renewal, forest protection, and research and monitoring sites, where applicable. The FDA&V relies on the FRI to determine the area of productive forestland affected, the type and age of forest stands on those lands and the associated volume of timber. To perform a realistic damage appraisal and valuation on the forest resources that will be affected by the Project, the FRI required updating.

1.5.2.2.3 Forest Resource Inventory Update

Although the FRI was updated by Forestry Branch for depletions (fire, harvest, development) to 2011, these changes were limited to the year of these changes but no adjustments had been made for natural stand development over time. For untreated depletion areas a **subtype**, reflective of the activity and/or expected forest transition, was assigned and the cutting class and crown closure component of the type aggregate was updated to 2011. For all other productive forested polygons, unaffected by depletion or renewal, the cutting class and crown closure components of the type aggregate were updated from year of photography (interpretation) to 2011.

The methodology employed to update cutting class required the determination of cutting class midpoint age from the cutting class age range tables, provided in the FDA&V guideline document (Manitoba, Government of 2002). The year 2011 was then used to calculate the number of years each forest stand has aged since initial interpretation or depletion. This value was added to the original cutting class midpoint age, thereby arriving at a 2011 age. The cutting class age range tables were again used to update the cutting class attribute of the type aggregate to reflect its age at 2011. Crown closure was then updated to reflect the change in age or cutting class. The update to crown closure estimates the probable change in **stand density** over time. For the purpose of this exercise, the subtype and site index of a type aggregate remain unchanged from the year of photography/interpretation. The results of this update process are reflected in the attribute data of the FRI for FMU 86 and used in all further assessment of effects within the CFZ.

APPRAISAL

In undertaking the forest damage appraisal, the area of productive forestlands falling within the Project Footprint were identified and summarized by type aggregate (subtype, site, cutting class and crown closure).

Within a type aggregate there are 6 cutting classes (0-5). Type aggregates within cutting class 3, 4 and 5 were assigned the softwood and hardwood gross **merchantable** volumes (m^3/ha), presented in the SSVT, appropriate to the FS/FMU. The total softwood and hardwood volumes/ha within these type aggregates were then multiplied by their respective areas to derive the total hardwood and softwood volumes, which are subject to the forest damage appraisal fee calculation.

Type aggregates, within immature cutting classes (1 and 2), are not reflected in the SSVT. Therefore, for type aggregates within these cutting classes, MAI was used to determine the volume of standing timber on these sites. In accordance with the procedures outlined in the FDA&V guidelines (Manitoba, Government of 2002), the MAI value appropriate to the subtype, site and FS within which the type aggregate is located, was assigned. The total gross merchantable softwood and hardwood volumes for a type aggregate are then calculated by multiplying the MAI value with its mid-age of the cutting class and area. The derived volumes are subject to the forest damage appraisal fee calculation.

Type aggregates within cutting class 0 are considered recently disturbed sites (harvest, fire, *etc.*) and are considered to have no associated standing timber volume and are therefore not subject to forest damage appraisal.

The FDA&V has been conducted on the proposed Project Footprint using a worst-case scenario. It assumes that all footprint features identified will be cleared to their maximum extent. Changes in actual footprint development may be realized (*e.g.,* **borrow area** requirements) that may ultimately affect the total amount of productive forestland affected and therefore the results of the FDA&V. A new FDA&V assessment may be required following construction to determine the exact effect on the productive forestland base.

The results of this FDA&V are summarized in Section 1.5.4.2.2.

VALUATION

Effective January 1, 2008, the application of Crown **timber dues** moved from a strictly volume based timber pricing system to a more comprehensive system (Manitoba, Government of 2011). The valuation system accounts for the intended end product, current market value of that product and distance to the mill or processing facility. Timber dues are set monthly, based on the previous months average commodity reference price. The new system determines dues for hardwood and softwood timber and an associated forest product class. There are four main product classes (Kraft, Lumber, Oriented Strand Board and Newsprint) and personal use classes, such as fuel wood, posts and rails. Charges, in addition to the Crown timber dues, include a forest renewal charge (FRC) and fire protection charge (FP). The FRC is collected to offset the cost of forest renewal throughout the province and the FP charge is collected to offset the firefighting/prevention costs the province undertakes to protect forests. Both of these additional charges are volume based. The FRC charge for softwood is \$5.75/m^3 and \$0.50/m^3 for

hardwood. The FP charge is $0.17/m^3$ for softwood and hardwood. Forest plantations or high value forestry sites such as **seed orchard**s and research plots are subject to an additional charge by the Province. The Province establishes a charge that reflects the value of investment into these sites. Presently the provincial average establishment cost for plantations is $882.35/ha. However, no high value forestry sites were encountered within the Project Footprint.

In order to undertake the calculations needed to arrive at a valuation of the standing timber affected by the Project Footprint, a determination of market destination for the timber was required as well as an estimate of a fluctuating market value (commodity price index) of an as yet to be determined timber product. The uncertainty that would be associated with such determinations prompted the need for a composite dues table more suited for this valuation. The timber dues table needed to be re-structured in such a way as to provide a reasonable presumption of product end use and market index price. This involved considerable consultation with Manitoba Forestry Branch staff (Epp *pers. comm.* 2011) and Branch regional staff (Thorpe and Swanson *pers. comm.* 2011) along with an extensive examination of historical and present market pricing indices, mill demand and area specific historical trends for forest products and future market opportunities.

A composite timber dues table was prepared and structured to provide an estimate of timber dues likely to be incurred on softwood and hardwood volumes cleared within the Project Footprint at the time of construction. The composite timber dues table is provided in Appendix 1C.

The FDA&V has been completed for productive forestlands that will be cleared from the Project Footprint. The work sheets for the FDA&V determination are contained in Appendix 1D while the results are summarized in Section 1.5.4.2.2.

1.5.2.2.4 Potentially Salvageable Timber

Based on the standing timber volume calculations discussed in section 1.5.2.2.3 above, cutting class 4 stands were screened from the data along with their associated hardwood and softwood volumes. The stands are further identified in map form (Map 1-9) as potential timber salvage areas in section 1.5.4.2.1.

1.5.3 Existing Environment

The proposed Keeyask GS Project Footprint encompasses a range of ecosites with soil types ranging from mineral to organic. A detailed description is provided in TE SV, Section 2.3. Forest stands on mineral soils and veneer **bog**s on slopes and woodland stands on mineral soils, comprised primarily of black spruce and jack pine in pure and mixed wood stands, populate the area. Also present are trembling aspen and white birch however, these are found primarily as minor admixtures to the conifer dominant stands. White spruce are present but uncommon within this northern region.

Wildfires govern the stage of development of vegetation communities in the Forestry Regional Study Area (Zone 4). Much of the Project Footprint area was affected by the 1999, 2003 and 2005 wildfires. More detail and a fire history map can be found in TE SV, Section 2.5. These burnt areas now host young regenerating forest stands and shrub communities. Any timber killed at the time of these fires is now past the point of salvage. Although few, most remaining older forest and woodland stands that are potentially salvageable within the Project Footprint (Zone 1), originated during the 1930s and 1940s.

The Project Footprint straddles both of the Manitoba Forestry Branch designated Non-commercial Forest and Commercial Forest Zones (Map 1-8). The NCFZ in Northern Manitoba is so designated due to its limited timber production potential (due to climatic conditions), distance to mills and markets, and lack of infrastructure (*i.e.,* roads, railroads). Although so classified, specific ecosite types within the Regional Study Area have the potential to grow timber to useable size. Growth rates however, are generally less than those in more southern latitudes and this is typified in the Project area. Although nearing their theoretical rotation age (maturity), tree stems are small in diameter and short in length resulting in low volumes per hectare.

The southwestern portion of the Project Footprint is located on open Crown land within the CFZ albeit on the furthest northeast extremity of Forest Management Unit (FMU) 86 within the Nelson River Forest Section (FS) (Map 1-9). Of note is that much of the Project Footprint within the CFZ has been burnt by recent wildfires (TE SV Section 2.5), most notably in 2005, and is therefore in the early stages of regeneration or immature in forest stand development.

At present, there is no commercial scale demand and therefore no commercial harvest of timber within, the Regional Study Area (Holmes *pers. comm.* 2012). In part, this condition is created by a supply of wood fibre that exceeds the demand in closer proximity to mills and markets. Small-scale timber harvest for personal use, primarily firewood, does exist in proximity to the Regional Study Area, most notably in the vicinity of the Tataskweyak Cree Nation community on the north shore of Split Lake and in the vicinity of Gillam. Communities such as Split Lake also are the beneficiaries of the Waterways Management Program (as part of the Northern Flood Agreement Comprehensive Implementation Agreement) which collects and disposes of wooden debris floating in the Nelson River system and washed up on shorelines. Some is piled near the communities for local use (Walkoski *pers. comm.* 2012).

Although commercial timber harvesting may not be economically viable within or in proximity to the Regional Study Area, it does not necessarily preclude timber salvage where an end use/market is available. The difference between typical timber harvesting and salvage operations is that the former is entirely reliant for economic viability based on the market price of the timber while salvage operations are

partly funded by the clearing contract price. Where the clearing contractor can envision economic gain by salvaging timber then he may be motivated to do so providing all other clearing contract conditions are met. Timber salvage does incur additional equipment, time, logistics and costs. Timber demand and prices are subject to market conditions and will have to be assessed at the time of clearing (see Reservoir Clearing Plan, JKDA Schedule 11-1).

Minor quantities of timber of useable size are present on portions of the Project Footprint, specifically those sites classified as "forest" and "woodland" on mineral soils (productive forestland). Primary species are black spruce and jack pine with minor quantities of trembling aspen and white birch also present.

1.5.4 Project Effects, Mitigation and Monitoring

1.5.4.1 Non-commercial Forest Zone

Through the following pathway, the Project has the potential to affect the NCFZ during both the construction and operation phases:

- Clearing of standing timber.

1.5.4.1.1 Construction Phase Effects

The effects assessment assumes the worst-case scenario that all areas shown as impact areas (Project Footprint) in Map 1-8 will be cleared (*e.g.,* all roads to full right-of-way widths, the full extent of all borrow areas, all dykes, buffers, *etc.*). This implies that a total of 473 hectares of potentially salvageable forest and woodland will be cleared, of which 81% and 19% are softwood and hardwood dominant respectively (Table 1-6).

Table 1-6: Potential Salvageable Forest/Timber in the NCFZ to be Affected by the Project

Working Group	Construction Phase (ha)	Volume (m^3)
Softwood	381.5	28,493
Hardwood	91.6	7,350
Total	***473.2***	***35,843***

Note: Volume estimates based on Manitoba Conservation and Water Stewardship, Forestry Branch Stand Stock Volume Tables.

Given the climatic constraints in the Regional Study Area, commercially useable tree species develop at reduced growth rates than in more southern areas of Manitoba. Although at or near rotation age (maturity), potentially salvageable timber stands exhibit small diameter stem sizes and trees are short. Stem densities also are lower in some stands due to mortality within the stands from ground fires and disease. Because of these factors many of the stands identified as being potentially salvageable have a low volume content on a per hectare basis (Appendix 1E). Volume estimates rely on the provincial stand stock volume table for the immediately adjacent Nelson River FS. Net merchantable volume for

identified stands is calculated for all trees with a diameter at breast height of 9.1 centimetres and greater. Typically in softwood timber harvest operations, stands should have a minimum of 55 m^3/ha of merchantable timber to make the operation economically feasible. Local conditions and markets may affect this.

An estimated maximum 35,843 m^3 of timber may be salvageable in the Project Footprint area (Table 1-6). Of this, approximately 79% consists of softwood and 21% of hardwoods. It should be noted that some of this volume may be located in very small patches scattered over the Project Footprint area which may make it logistically challenging to salvage. The ultimate utilization options available for the timber and field logistics at the time of clearing/salvage will therefore influence the amount that can be practically and feasibly salvaged.

1.5.4.1.2 Construction Phase Mitigation

Opportunities for timber utilization should be examined locally and provincially in advance of clearing. Where timber demand exists and salvage is feasible from logistical and economical perspectives, all efforts will be made to salvage the timber.

Loss of standing timber may be reduced where on-site clearing requirements are less than identified in Map 1-9 (*e.g.,* entire borrow site areas are not needed).

The assessment of the NCFZ (Appendix 1E) identified areas of standing timber with potential salvage volume of 35,800 m^3. This volume is reflected in numerous scattered and small patches and stands that may challenge logistics of salvage. In addition, average volume per ha within these marginal stands are typically low owing to small stem diameter, short length and low density. Local logistics may be exacerbated with the long distances to manufacturing facilities. Salvage opportunities for fuel wood within the NCFZ may exist if demand from local communities is identified.

1.5.4.1.3 Operation Phase Effects and Mitigation

Very limited amounts of forest loss are expected during the operation phase of the development. Such effects are anticipated to be the result of shoreline erosion within the reservoir area, specific to "forest" and "woodland" sites on mineral soil. The Reservoir Clearing Plan specifies that the forest resources are to be cleared manually in advance of erosion to prevent the trees from entering the water body and becoming hazardous debris (JKDA, Schedule 11-1; Plus4 *et al.* 2006). Some positive effects may be realized where portions of the Project Footprint are rehabilitated and reforested (*e.g.,* decommissioning of borrow areas, work camp areas, *etc.*).

1.5.4.2 Commercial Forest Zone

Through the following pathways, the Project has the potential to affect the CFZ during both the construction and operation phases:

- Loss of productive forestland; and
- Clearing of standing timber.

1.5.4.2.1 Construction Phase Effects

PRODUCTIVE FORESTLAND

Productive forestlands form the basis for all forest management planning for Manitoba Conservation and Water Stewardship, Forestry Branch. It is the basis from which Manitoba Conservation and Water Stewardship determines sustainable harvest levels for all Crown lands. A summary of the amount of productive forestland within FMU 86 and affected by the Project Footprint is provided in Table 1-7. Project effects on productive forestland are measured in area (hectares).

The bulk of Project effects on productive forestland will occur during the construction phase and are primarily the result of clearing activities. The construction phase accounts for 738 ha (0.69%) while the operation phase is projected to be limited to a mere 45 ha (0.04%) for a Project total of 787 ha representing 0.73% of the total productive forestland within FMU 86.

Table 1-7: Project Effects on Productive Forestland in FMU 86 (CFZ)

Pre-Project Productive Forestland (ha)	Project Effects (ha)		Total Effect (ha)	Project Effects (%)		Total Effect (%)
	Construction Phase	Operation Phase		Construction Phase	Operation Phase	
106,542	738.0	45.0	787.0	0.69	0.04	0.73

Source: Manitoba, Government of 2011.

STANDING TIMBER

The Project Footprint will be cleared of all trees. Standing timber considers all forest stands, regardless of age (cutting class), on Crown-owned productive forestlands within FMU 87. The total volume of timber found on Crown-owned productive, forestland and intersected by the Project Footprint is taken into account in the FDA&V (Section 1.5.4.2.2).

Effects on standing timber in FMU 86 as a result of the Project Footprint are shown in Table 1-8. An estimated total of 40,859 m^3 (0.63%) of softwood and 5,293 m^3 (0.54%) of hardwood will be affected by the Project for a combined total of 46,152 m^3 (0.62%). This is less than 1% of the total standing timber within the FMU. Some of this wood volume may be of sufficient size and concentration to make it practical to salvage.

Table 1-8: Project Effect on Standing Timber within FMU 86 (CFZ)

Pre-Project Standing Timber Gross Merchantable[1] in FMU 86 (m^3)			Project Effect on Standing Timber Gross Merchantable (m^3)			Project Effect (%)		
Soft wood	Hard wood	Total	Soft wood	Hard wood	Total	Soft wood	Hard wood	Total
6,450,518	975,391	7,425,909	40,859	5,293	46,152	0.63	0.54	0.62

[1] Gross Merchantable Volume does not consider operational constraints or cull factors. Gross Merchantable volume was used in the FDA&V.

Potentially Salvageable Timber within the Project Footprint

Forest stands within FMU 86, classified as mature by the FRI (cutting classes 4 & 5), are potentially salvageable during the construction phase of the Project. This potential volume is indicated in Table 1-9 and the stands are shown on Map 1-9. Note that logistics and economics may be factors influencing the ability to salvage these stands. Volume summaries by cutting class and cover type are shown in Appendix 1E.

Table 1-9: Potentially Salvageable Timber in the CFZ of the Project Footprint

Working Group	Volume (m^3)
Softwood	7,075
Hardwood	815
Total	***7,890***

Notes: Volume estimates based on Manitoba Conservation and Water Stewardship, Forestry Branch Stand Stock Volume Tables and updated FRI. All are Gross Merchantable volumes. Considers construction phase only.

1.5.4.2.2 Construction Phase Mitigation

Opportunities for timber utilization should be examined locally and provincially in advance of clearing. Where the opportunities exist and are feasible from logistical and economical perspectives, efforts will be made to salvage the timber.

Best management practices for reservoir clearing contained within the Reservoir Clearing Plan (JKDA Schedule 11-1) include:

- Forest clearing boundaries will be surveyed and flagged to minimize the extents of the cleared area;
- In areas where timber is to be salvaged, harvest activities will precede clearing activities;
- Areas deemed as sensitive sites and those areas not accessible by heavy equipment (*i.e.,* islands, steep slopes) will be hand cleared (see JKDA Schedule 11-1, Figure 1);
- Mechanical clearing activities will be conducted during the winter on frozen ground;

- Mechanically cleared material may be piled to dry then burned the following winter; and
- All aspects of the Reservoir Clearing Plan will be strictly supervised on site.

The above mitigation measures do not lessen the environmental effects of clearing required for the Project. However, these effects may be reduced where on-site clearing requirements are less than identified in the Project description (*e.g.,* entire borrow site areas may not be needed).

FOREST DAMAGE APPRAISAL AND VALUATION

The Manitoba Conservation and Water Stewardship, Forest Damage Appraisal and Valuation (FDA&V) policy stipulates financial compensation for timber values and investments on Crown productive forestlands within the CFZ (Manitoba, Government of 2002). The Keeyask Hydropower Limited Partnership will compensate Manitoba Conservation and Water Stewardship for the effects of the Project as specified in the policy. The FDA&V was applied to the Project Footprint area in order to quantify the effect on Crown forest resources. Table 1-10 summarizes the damage appraisal conducted and estimates the value of compensation payable to Manitoba Conservation and Water Stewardship. The assessment of softwood and hardwood dues is based on the volume of standing timber affected (Table 1-10). No plantations or other high value forest sites are affected. The resultant FDA&V indicates the estimated compensation payable to be $298,011.75. The calculation includes effects of construction and operation phases of the development.

Table 1-10: Project Forest Damage Appraisal and Valuation Summary ($)

Plantation Cost	Softwood Dues	Hardwood Dues	Forest Renewal Charge	Fire Protection Charge	Total Valuation
0.00	46,987.71	6,086.85	237,585.09	7,351.97	298,011.75

Plantation establishment cost $882.35/ha; FRC = forest renewal charge (softwood = $5.75/$m^3$, hardwood = $0.50/$m^3$); FPC = forest protection charge ($0.17/$m^3$); Considers Gross Merchantable Volume which does not consider operational constraints or cull factors (Manitoba, Government of 2002).

The composite timber dues applied in the FDA&V and the supporting documentation required to calculate the compensation are provided in Appendix 1C. As with the effects assessment within the NCFZ, this assessment considers a worst-case scenario where the entire Footprint that has been identified would be cleared.

It should be noted that this evaluation is an estimate only and that recalculations may occur at the time of clearing to ensure that the FDA&V is reflective of the actual Project Footprint extents.

1.5.4.2.3 Operation Phase Effects and Mitigation

Very limited amounts of forest loss are expected within the CFZ during the operation of the development as indicated in Table 1-11. Minor effects are anticipated to be the result of shoreline erosion within the reservoir area, specific to productive forestlands. The Reservoir Clearing Plan (Plus4 *et al.* 2006; JKDA, Schedule 11-1) specifies that the forest resources are to be cleared manually in advance of erosion to prevent the trees from entering the water body and becoming hazardous debris. Some positive effects may be realized where portions of the Project Footprint are rehabilitated and reforested (*e.g.,* decommissioning of borrow areas, work camp area).

1.5.4.3 Residual Effects

The aerial extent of effects on forestry values within the Non-commercial and Commercial Forest Zones is shown in Table 1-11. A total of 473 ha of forest and woodland will be cleared in the Non-Commercial Forest Zone while 787 ha of productive forestlands are projected to be affected within the Commercial Forest Zone. The latter represents 0.7% of that within FMU 86.

Table 1-11: Forestry Residual Effects Area Summary (ha)

Non-commercial Forest Zone (forest & woodland on mineral soil)	Commercial Forest Zone (Productive Forestland)		Sub-total Effect	Total Effect
Construction Phase	Construction Phase	Operation Phase		
473	738	45	787	1,260

The effect of clearing a volume of potentially useable timber within the NCFZ is limited in extent and is not important to the local timber supply as the Project Footprint area is quite far removed from any communities. Timber supplies, required primarily for heating purposes in surrounding communities, are readily available in closer proximity to all communities.

The effect of clearing standing timber from productive forestlands within the CFZ and removing those lands from the land base under forest management has no effect on the forest industry in Manitoba as there are no timber commitments within the FMU. It marginally reduces the amount of productive forestland within the FMU. Of note is that there has been no commercial scale timber demand in the region historically nor is there any currently.

Project-specific residual effects on forestry resources are negligible. Where timber is salvaged and utilized, positive environmental and economic effects are anticipated.

1.5.4.4 Environmental Follow-up and Monitoring

The following reporting may be conducted at the end of the construction phase:

- Calculate the actual Project Footprint within the Non-commercial and Commercial Forest Zones to finalize the FDA&V (if required for finalizing compensation to Manitoba Conservation and Water Stewardship); and

- Document the volume of timber salvaged (if salvage occurs).

As very limited effects are predicted to forestry resources during the operation phase of the project, no monitoring is proposed. The extent of ecological effects will be captured by terrestrial monitoring activities as proposed in the Terrestrial Environment Monitoring Plan (see Chapter 8 of the Response to EIS Guidelines).

1.6 MINING

1.6.1 Existing Environment

1.6.1.1 Introduction

Mining has played an important role in the development of some parts of the north and this is especially true around the City of Thompson. Vale has a very large nickel mine complex a few kilometres northeast of the City and exploration continues to be prevalent throughout the region.

1.6.1.2 Mining Claims and Quarry Leases

There are no operating mines within the Local Study Area; however, there are several mining claims to the north of Split Lake (Map 1-10). In anticipation of the Project, Manitoba Hydro has applied for a number of quarry leases on the north and south sides of the Nelson River.

1.6.1.3 Exploration Licenses

Under *The Mines and Minerals Act (Manitoba)*, an exploration license is a license issued under section 51 for the purpose of exploring for minerals, other than quarry minerals, on, in or under Crown mineral land specified in the license (Government of Manitoba 2004). 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 (Wuskwatim Generation Project Environmental Impact Statement 2003).

Gaining access to an area for mineral exploration is only the first of many steps in commercial mineral development; other considerations include the presence of minerals of sufficient value and grade to warrant development, mineral market prices and trends and production costs. In February 2008, a Mineral Exploration License for a 12,341 hectare area on the north side of Stephens Lake, approximately 10 km northeast of the Project site, was granted to Exploratus Ltd. Exploratus primarily explores for gold, nickel, platinum, and base metals (Business Week 2010; Credit Risk Monitor 2010). There has been no indication of any major discoveries (however, it is possible that, for business purposes such information may not be publicly disclosed). The anniversary date for the exploration license is February 5, 2013.

1.6.2 Project Effects and Mitigation

1.6.2.1 Construction Phase Effects and Mitigation

Mining activities near the Project site are not expected to be affected by Project construction. During this time, use of the north access road will be controlled at PR 280 with a staffed gate and access will be limited to those people working on or associated with the Project. During Project construction, the north and south access roads will be private roads, closed to the general public.

There are no active exploration licenses, mining claims, or mineral leases within the Project site that will intersect with construction activities; therefore, there are no pathways of effect on mining activity. As there are no effects on mining, no mitigation or monitoring is required.

1.6.2.2 Operation Phase Effects and Mitigation

Once the Project is in operation, effects on mining activities in the Local Study Area are expected to be positive (due to improved access). The access roads will improve access to the area, and could potentially result in increased mineral exploration activity in the Local Study Area.

As effects on mining activities are expected to be positive, mitigation and monitoring is not required.

1.7 RECREATIONAL FISHING, HUNTING AND CABIN SITES

1.7.1 Introduction

This section addresses non-Aboriginal recreational fishing, hunting and cabin sites. Aboriginal fishing, hunting and cabin sites are discussed under domestic resource use and are considered in the context of Cree cultural pursuits as opposed to recreational activities (Section 1.2).

Recreational fishing, hunting and cabin use are important leisure and economic activities in Manitoba. For example, the Town of Gillam describes its economic base as follows: "Gillam is located in a wilderness paradise … and the opportunities for trophy fishing are almost endless" (Town of Gillam 2009). Project impacts with the most potential to affect recreational fishing, hunting and cabin use include: changing access; increasing populations in Gillam; and the presence of a large workforce.

1.7.2 Approach and Methodology

1.7.2.1 Overview to Approach

Characterization of recreational fishing, hunting, and cabin use in the Regional and Local study areas and impact assessment were based on interviews with provincial government officials from the North East Conservation District and the Wildlife Allocation manager in Winnipeg. Government publications also were reviewed.

Key person interviews were conducted in Gillam with people who owned cabins on Stephens Lake to understand cabin occupation and related resource use.

1.7.2.2 Study Area

In the Regional Study Area, the main administrative boundaries delineating fishing activities are the provincial fishing divisions. The North Central fishing division extends from the southeast boundary of the Regional Study Area, on either side of the lower Nelson River to Sundance Creek. The remainder of the Study Area is within the North East fishing division. The main difference between the divisions is that the North East division is generally open to **angling** all year and in the North Central division angling is generally restricted during the first half of May (Manitoba Water Stewardship 2010). In the North East division (east of Sundance) however, the Nelson River and its tributaries are closed to brook trout fishing from September 1 through 30 inclusive. Fishing divisions are published in the Manitoba Anglers' Guide.

The main administrative boundaries for recreational hunting are Game Hunting Areas (**GHAs**), six of which intersect within the Regional Study Area (Map 1-11). These GHA's form the administrative management units for licence allocation and hunting seasons for non-Aboriginals. Recreational cabins on Stephens Lake were also considered for potential effects.

1.7.2.3 Data and Information Sources

Sources of information included discussions with Manitoba Conservation and Water Stewardship Wildlife Managers and Natural Resource Officers and literature review such as current Manitoba Conservation and Water Stewardship hunting and anglers guides. Interviews were also conducted with Stephens Lake cabin owners. Place names referenced in this section are shown on Map 1-12.

1.7.2.4 Assumptions

Big game harvests in Manitoba are monitored by GHA using a voluntary survey format. Consequently, big game harvests by Manitoba **resident** hunters in the Regional Study Area are inconclusive due to the voluntary nature of harvest location reporting and because moose and bear licensing within the Area spans portions of multiple GHAs. In contrast, caribou licensing is limited to portions of just two GHAs and is more conclusive.

1.7.3 Existing Environment

1.7.3.1 Fishing

Manitoba's vast system of lakes covers approximately 17% or 101,600 km^2 of its surface area (Manitoba Water Stewardship 2008). Over 157,000 Manitobans and visitors go **sports fishing** each year, contributing in excess of $100 million to the provincial economy. Sport fishers keep an estimated 1.5 million kilograms of fish annually (Manitoba Water Stewardship 2005).

In the Regional Study Area, recreational fishing pressures are relatively low and higher use areas are usually accessible by road or trail. According to Manitoba Conservation and Water Stewardship North East Division officials, the Assean River is a popular destination for pickerel fishing and is frequented by residents of Gillam and, in the past, by residents of the U.S. Use of this area by Thompson residents has declined in recent years. The North Moswakot River also is fished for pickerel by people from Gillam (off-shore fishery).

In winter, Atkinson and Butnau lakes have become increasingly popular ice fishing destinations, used mainly by people living in Gillam. There also are a few ice fishing shacks off Dike 4 on Stephens Lake.

Remote lakes, accessible only by float plane, such as Cygnet with abundant pickerel, are used less frequently than in previous decades. Similarly, Pelletier and Campbell lakes, and Rainbow Falls on the Fox River were popular fly-in destinations for sport fishermen from Thompson and Gillam, respectively. Recent decreases in the use of these areas are attributable to increased costs of flying.

Few U.S. residents come to fish in the area (MacDonald *pers. comm.* 2009) and occasionally some are seen at accessible places like the mouth of Wilson Creek (east of the Local Study Area). One group of U.S. residents fish recreationally on Moose Nose Lake (near Ilford) annually each fall. United States residents who purchase lodge or outfitting packages for hunting also participate in recreational fishing on various lakes throughout the Split Lake RMA if they have filled their moose or bear tag.

In the Local Study Area, only very limited fishing occurs on Gull Lake by Gillam residents for pickerel and sauger (MacDonald *pers. comm.* 2009).

1.7.3.2 Hunting

The Regional Study Area lies within portions of GHA's 1, 2, 3a, 3, 9 and 9a, each of which have a general **resident** (person living in Manitoba) rifle season for moose from mid-September to mid-October and the first half of December. The season for archery (non-draw) resident licences in GHA 9 and 9a for moose spans from late August – mid-September. Both licenses are limited to one bull or calf moose in GHA's 1, 2, 3a, 3, 9 and one bull moose in 9a. For **non-resident**s (including non-resident Canadian citizens and foreign citizens) of Manitoba, general rifle seasons are late August to mid-October for GHA's 1, 2, 3a and 3 and mid-September- mid-October in GHA 9 and 9b (Manitoba Conservation 2008d). Hunting seasons and harvest restrictions do not apply to Aboriginal people.

All of northern Manitoba is classified as Zone A relating to bear and gray wolf hunting zones with a season from April 21-June 29 and August 25 – October 5 (dates may vary slightly annually). One adult black bear and one wolf are permitted for resident rifle hunters. Non-resident and **foreign resident**s may only hunt wolves if they have an unfilled and valid deer, moose, black bear or caribou game tag. Foreign residents must also be accompanied by a licensed Manitoba **guide** (see Section 1.8).

To hunt caribou in GHA 1, all resident, non-resident (Canadians living outside Manitoba), and foreign residents (those who reside outside Canada) are required to book though a registered lodge or outfitter (hunting related to lodge and outfitting activity is discussed in section 1.8). In GHA 2 and 3, only residents of Manitoba can hunt caribou with a valid license (Hagglund, *pers. comm.* 2008). Seventy five (75) licenses are issued for GHA 3 annually, of which approximately 65 are sold to residents of Gillam and 10 licenses are sold to people outside Gillam. All of the licenses are generally sold within one day. Resident caribou hunting occurs mainly off the Shamattawa winter road, on Atkinson Lake and on the DC line (see Map 1-12 for location of transmission lines TL KN 36/TL R2K6) to the south and west of Gillam, averaging an estimated 50% success rate. A limited number of licenses are sold to Gillam residents for GHA 2, but to a much lesser degree than GHA 3. Most Gillam residents prefer to hunt GHA 3 as it is directly accessible from the community.

No license is required for small mammals such as rabbits. Other small game animals such as fox or red squirrel are classified as fur-bearing animals and require a valid trapping license (Manitoba Conservation 2008d).

Moose hunting in the Regional Study Area is staged from cabins on the Fox River by residents of Gillam. Other targeted areas include the Bigstone River, the south side of Limestone Lake and the Little Churchill River, which are accessed by all-terrain vehicles (ATVs). A camp on Stephens Lake also is used

for moose hunting. Very few resident hunters come from Thompson. Resident hunters usually come from Gillam or have ties with people from Gillam.

Fly-out moose hunting is down somewhat compared to the 1990's. Most of the moose hunters that fly-out are Gillam residents hunting on the Fox and Bigstone rivers. A remote cabin is typically used for moose hunting purposes. Approximately 10-15 licensed resident hunters participate annually.

In the Local Study Area, very little moose hunting activity occurs directly upstream of Gull Rapids. Caribou hunting is prohibited in the Local Study Area (GHA 9) and bear hunting is nominal throughout both the Regional and Local study areas by resident hunters.

Resident moose harvest levels in both the Local and Regional study areas are inconclusive due to the voluntary nature of resident harvest reporting and the intersection of six Game Hunting Areas in the Regional Study Area (Hedman *pers. comm.* 2009). For non-resident moose harvest estimates, see Section 1.8.

1.7.3.3 Recreational Cabins

Forty-seven (47) cabins on Stephens Lake are permitted with remote recreational cottage permits (Barton *pers. comm.* 2008), which are boat and snowmobile accessible in the summer and winter, respectively, from the Gillam marina. Most of the cabins on Stephens Lake are located within a five kilometre radius of the marina on the wind-protected south shores of islands such as Stratford Island and two unnamed islands to the north and west of it. There are a few scattered cabins located on small islands near Callan Island in the north central region of the lake. Recreational fishing for jackfish and lake whitefish is conducted from these cabins and, to a lesser extent, moose hunting. There are cabins on the north arm of the lake owned or used by TCN Members and accessed from highway PR 280 (discussed in Section 1.2 on Aboriginal cabin use). As of 2009, new cottage /cabin development was no longer being permitted on Stephens Lake (Barton *pers. comm.* 2009).

Access to cabins is generally good except when high winds create high wave conditions. Increased difficulty in travelling to and from cabins also occurs occasionally in winter when lake water levels fluctuate causing water to pool over ice on shorelines, though water levels are controlled in this area by the Kettle GS between specific elevations (139.1 to 141.1 m). Those interviewed did not foresee any negative effects to water levels related to the Project.

Two recreational cabins are known to be located on Kiask Lake, which is on the west central boundary of the Split Lake RMA, and two on Dafoe Lake. These cabins are used by non-Aboriginal residents of Thompson.

1.7.4 Project Effects, Mitigation and Monitoring

1.7.4.1 Construction Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect recreational fishing, hunting and cabin use during construction:

- Changes in access; and
- The presence of a large workforce.

No effects to recreational cabins are expected.

Areas such as Gull Lake and Gull Rapids will not be accessible during the construction phase due to gated access at the north and south access roads and restricted access to the Project construction site. As only nominal recreational hunting and fishing has been reported in these areas, no effect due to reduced access is expected.

Recreational hunting and fishing are not expected to increase during Project construction. Based on the Wuskwatim experience, recreational hunting is not expected to be conducted by the Project workforce residing in the construction camp and levels of recreational fishing are expected to be low (Yetman *pers. comm.* 2011). To address KCNs concerns, Project workforce fish harvest will be monitored (see Section 1.2.4) and hunting will not be permitted as per Camp Regulations within the Project site. Due to nominal net in-migration of Keeyask GS workforce populations to Gillam during construction (see Socio-economy Section 4.4.1), only very small increases in recreational fishing and hunting are expected. Harvests are managed through Manitoba Water Stewardship and Conservation.

No mitigation is required.

1.7.4.2 Operation Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect recreational fishing, hunting, and cabin use during operation:

- Improved access; and
- Increasing populations in Gillam.

The Project reservoir area and the Nelson River downstream of the GS will be made more accessible by boat launches up and downstream from the GS. In combination with new access along the north and south access roads (due to the MIT conversion of these roads to PR 280), improved access may attract recreational fishers and hunters to these areas.

Potential effects of increases in recreational fishing and hunting on the availability of resources are managed by the provincial government through harvest restrictions and licensing.

Increasing populations in Gillam (ranging from 120 to 150 people associated with 46 Keeyask operation jobs) (see Socio-economy Section 4.4.2) may increase recreational harvesting to a certain extent. However, only a small proportion of these new populations would be expected to fish or hunt

recreationally. For existing recreational resource users, increasing contact with other users may occur (*e.g.*, increasing the potential for crowding). If this effect occurs, it would be most noticeable at spring fishing locations and in the fall-winter periods when both (KCNs and recreational) groups are conducting moose and caribou hunting. Increased recreational resource use is not expected to affect resource abundance (Hedman and MacDonald *pers. comm.* 2009). Potential increases in recreational fishing and hunting in the operation phase and the associated potential effects on resources will be managed by the provincial government.

In summary, only nominal increases in recreational fishing and hunting are expected. The potential effects of these increases are mitigated by existing provincial harvest regulations.

1.7.4.3 Residual Effects

Recreational fishers and hunters may make use of the new boat launch facilities up and downstream of the GS in the operation phase and experience improved access to these areas. Changes to aesthetics (*i.e.*, crowding) may occur but are not expected to have an important effect on recreational fishers and hunters due to low levels of existing use. No mitigation is planned.

Overall, effects to recreational resource users are expected to be neutral.

1.7.4.4 Environmental Follow-up and Monitoring

To address any uncertainty with respect to workforce harvest during construction affecting the availability of resources for other resource users, monitoring of construction workforce fish harvest is planned (see Section 1.2.4). The provincial government is responsible for the licensing of recreational harvest undertaken by non-Aboriginal Gillam (and other) residents. Resource Management Boards are expected to provide a forum for ongoing communication among resource user groups and provincial resource managers (see Section 1.2.4 for a more detailed discussion).

1.8 LODGES, OUTFITTERS AND OTHER TOURISM

1.8.1 Introduction

Lodge and outfitting operations in the Regional Study Area bring in over $1 million dollars gross income annually. This activity also provides substantive supplemental contributions to the regional economies of Gillam and Thompson in the form of service provision. Demand for fuel, clothing, equipment, food, air service, and accommodation stemming from the industry provides secure annual business for goods and services providers. However, the demand has eroded somewhat since 2008 due to the slump in the U.S. economy and the strong Canadian dollar.

A modest estimate of 100 people are employed annually in the Regional Study Area in the lodge and outfitting industry as guides, cooks, bookkeepers, and servers. A high proportion of those employed are people of Aboriginal descent who are able to work locally. Those working in the industry can earn $100-$150 per day plus tips over a season of up to six months in duration.

1.8.2 Approach and Methodology

1.8.2.1 Overview to Approach

Key person interviews were used to collect primary information with respect to lodge and outfitting operations, the magnitude and geographic distribution of activity, and the regional contribution of the industry to the regional economy (see also Socio-economy Section 3.2.5). Lodge owners and outfitters also were asked about their current and future business intentions in regards to expansion or contraction of their businesses and the current and future challenges anticipated with and without the Project.

1.8.2.2 Data and Information Sources

Eleven telephone interviews were conducted in total with five lodge owners, four outfitters, and two tourism operators over four months in 2009, representing all active and three inactive operations in the Regional Study Area. The executive director of the Manitoba Lodge and Outfitters Association (MLOA) also was interviewed to gain the MLOA perspective of regional activity and overall trends in the industry.

1.8.3 Existing Environment

1.8.3.1 Introduction

Lodges are defined under *The Resource Tourism Operators Act* (Manitoba) as a "facility of a permanent or semi-permanent nature that accommodates nine or more persons" (S. 3(b)). Lodge operators often provide additional services such as provision of equipment (boats and gas) as well as guiding services for the purposes of hunting and/or fishing. Outfitters provide similar services in connection with hunting and/or fishing but accommodations are usually at **outcamp**s which accommodate less than nine persons. Lodges also may run outcamp facilities under their operations.

Nine lodges and outfitters (three currently inactive) in the Regional Study Area offer three primary services: **sports fishing**; moose hunting; and bear hunting (sometimes in combination) to foreign residents (primarily U.S. residents). In Manitoba, non-resident hunting licenses can only be purchased through a licensed outfitter or lodge operator and the quantity of licenses is limited. Hunting must be undertaken on Provincial Crown lands or by permission on other lands (such as private lands or First Nation Reserve Lands).

Manitoba Conservation and Water Stewardship's policy for **allocation** of bear and moose hunting tags (one tag allows for the taking of one animal) to outfitters and lodge owners is based on conservation of the resource and preserving resource harvesting opportunities. The hierarchy for resource allocation places Aboriginal subsistence harvesting first, followed by resident resource harvesting and lastly non-resident resource harvesting. Where non-resident hunting allocations are provided, they are comprised of parcels of land and associated big game tags that give the lodges and outfitters exclusive use for servicing non-resident harvesters in that area.

Outfitters and lodges that offer big game hunting are required to meet a provincial performance standard and must sell, on average, at least 65 per cent of their allocated licenses/tags over a three-year period to keep their wildlife allocation for the next year. If they do not meet this standard, they may initially be issued fewer non-resident licences/tags. If they persist in not meeting the performance standard, their allocation may be reassigned to another outfitter (Hagglund *pers. comm.* 2008).

1.8.3.2 Lodges

Lodges in the region offer moose hunting trips for about $6,000 **USD** per week and bear hunting trips for about $3,000 USD per week to U.S. resident clientele. Fishing lodges offer trophy jackfish and pickerel fishing trips for about $2,500-3,000 USD depending on whether the trip is guided or not and if guided, the guide to fisher ratio. Fishing trips can be combined with moose or bear hunts if desired and if licenses are available. The moose hunting season runs for approximately four weeks from mid-September to mid-October and bear hunting is conducted in the spring and/or the fall. Occasionally, a combination moose-bear hunt is offered for interested clients. Fishing occurs during the open-water season.

There are five lodges located in the Regional Study Area, three of which were active in the 2009 season (Table 1-12).

Table 1-12: Lodge Operations in the Regional Study Area

Lodge	Services Offered	Location of Lodge and/or Outcamp(s)
Dunlop's Fly-In Fishing Lodge and Outposts	Sports fishing lodge; 12 non-resident bear hunts available.	East side of Waskaiowaka (main lodge) & outposts on Pelletier and Campbell Lakes
Holmes Lake Lodge	None at present; historically a fishing lodge.	Holmes Lake
Mystery Country's Lodge and Outposts	Resident and non-resident black bear, wolf, and moose hunting at fly-in outposts as well as sports fishing (8 moose tags and 12 bear tags allocated to all outposts).	Bear Head cabin on Clear Water River, Teal Lake, Dafoe Lake and Goose Hunting Lake.
Recluse Lake Lodge	None at present; historically a fishing lodge.	Recluse Lake
Silver Goose Lodge	None at present; historically Goose hunting.	York Factory

Dunlop's Fly-in Fishing Lodge and Outposts focuses on catch and release trophy jackfish and pickerel fishing, but also offers twelve non-resident bear hunts. The main lodge is located on the east end of Waskaiowaka Lake at the junction of the Little Churchill River and outposts are located on Pelletier and Campbell Lakes. The operation has experienced growth every year except the 2009 season which was delayed two weeks by late ice break-up.

Holmes Lake Lodge is exclusively a fishing lodge that has not been in operation since 2003, though it is in the process of refurbishment. This lodge has a 12-bed capacity designed for fly-in fishing trips marketed to U.S. resident clientele for up to a 10-week season. Two outcamp locations are in the process of being developed for future use.

Mystery Country Paint Lake Resort operates a drive-up main lodge on Paint Lake near Thompson which is outside of the Regional Study Area. Outcamps, along with five boat caches are operated on Clear Water River (near the outlet of Cauchon Lake), Teal Lake, Goose Hunting Lake and Dafoe Lake; the last two of which are within 10 km of the Regional Study Area. At the outposts, eight tags are available for a fall moose hunt and 12 tags are available for spring and fall black bear hunts.

Recluse Lake lodge is a twelve-bed facility in the Split Lake RMA that has not been in operation since 2003 pending the sale of the operation to the TCN. The Recluse Lake area has considerable historical meaning to TCN Members (Tataskweyak Cree Nation 2008b).

Silver Goose Lodge has been owned and operated by the YFFN since 1995. The lodge has not been in commercial operation for the last number of years but the previous focus was on providing goose hunting trips mainly to U.S. resident clients. In more recent years, the lodge has informally hosted up to 30 visitors each year for purposes unrelated to resource harvesting (*e.g.,* Manitoba Hydro personnel

undertaking environmental work). The York Factory airstrip, located on a nearby island, to and from which air charter service can be booked, is maintained from this facility. As of 2009, four cabins were located at this site with another two under construction. The YFFN regard eco-tourism as a promising activity to market and pursue in the future. This area is rich in both marine and terrestrial wildlife such as whales, seals, polar bears and caribou.

1.8.3.3 Sport Hunting and Fishing Outfitters

There are currently four outfitters with allocations in the Regional Study Area (Table 1-13).

Table 1-13: Outfitting Operations in the Regional Study Area

Outfitter	Services Offered	Location of Lodge /Outfitting / Tourism
ACE Wilderness Guiding	Non-resident black bear hunting	Gillam
All Terrain Bear Hunts	Non-resident black bear and moose hunts, and fishing	Wernham Lake
Fox River Outfitters	Spring and fall black bear hunting; fly-in for moose or moose and bear combination	Fox River
Lea Meadows Outfitters	Non-resident moose, black bear, wolf and fishing combo hunt	Churchill River at Billard Lake

ACE Wilderness Guiding is a small and stable operation offering spring bear hunts to U.S. resident clients along the PR 280 corridor from Stephens Lake to Gillam and on surrounding roads south of the Nelson River. Eighteen bear tags are available annually, with an average of 12 -14 used each year.

All Terrain Bear Hunts operates a tent camp at Wernham Lake on the western boundary of the RMA. Since 2002, All Terrain Bear Hunts has offered spring bear hunts and fall moose/bear combination hunts. Timber wolf hunting and fishing trips are offered in fall. Twenty bear tags and eight moose tags are available annually to U.S. resident clientele.

Fox River Outfitters has been in business for 16 years, offering up to 20 moose hunts and eight bear hunts on the Fox River each year, sometimes in combination. Clients have all been U.S residents. After a period of expanding business, the owner was noting a decline in business in 2008 due to a poor U.S. economy and a strong Canadian dollar.

Lea Meadows Outfitters operates on Billard Lake where the main camp is located. This camp is used as a staging area from which moose hunting, and secondarily, bear hunting is conducted on the Churchill River in the fall. Twelve moose tags and eight bear tags are available.

1.8.3.4 Eco-Tourism

Adventure travel and eco-tourism (**ATE**) activities can be described as non-consumptive, nature-based travel experiences that respect the integrity of the ecology, culture and economy of the local area and communities.

There is little ATE activity in the Regional Study Area. Activity presently is focussed primarily on guided canoe trips which operate peripherally to the Regional Study Area.

Rivers Run Wild has been in business since 2000, primarily for canoe instruction but the business also is licensed to guide canoe trips in northeastern Manitoba on the Nelson, Fox, Churchill, and Hayes rivers and Hayes River tributaries. The business owner is still growing his business and attempting to attract clientele from the United States and Europe for trips in these areas. The owner is currently exploring the potential of partnerships with other canoe outfitters to offer additional wilderness experiences for hunters and fishers.

For the future, the owner of Rivers Run Wild intends to focus on rivers surrounding the Winnipeg region for canoe instruction and expand trip offerings to the Bigstone, Fox, and Little Fox rivers, and also Atkinson Lake because of his familiarity with this region. The remoteness of these northern rivers and lakes is attractive to clientele from Europe.

Northern Soul Wilderness Adventures offers a canoeing adventure originating from Oxford House on the Hayes River to York Factory. Canoeists stay at York Factory with the curator upon arrival. Another trip is offered on the Deer River to Churchill which is accessed at mile 158 of the Hudson Bay railway.

1.8.3.5 Trends

Lodge and outfitting businesses in Manitoba have a long history of operation with some Manitoba Lodge and Outfitting Association (MLOA) members being in business for over 40 years. As of 2009, trends in the industry involved an increase in hunting over previous years and a small decrease in sport fishing. Eco-tourism also is regarded as an expanding opportunity in Manitoba, with many people from all over the world partaking in whale and polar bear viewing, canoeing and dog sledding - though few of these activities are currently offered in the Regional Study Area. Clientele for these activities are traditionally not the same target market as the lodge and outfitting clientele (Suffron, *pers. comm*. 2009).

Demographics may play a role in regards to the decrease in fishing clients, as youth today do not seem as interested in fishing activities as previous generations (Suffron, *pers. comm*. 2009). The cost of a fishing trip, which is generally more family-oriented, may be prohibitive in the current economic situation and in comparison to many other family vacation options.

Hunting remains a popular activity among various demographics. However, the lodge and outfitting industry, which targets hunters have felt the recent repercussions from a weakened U.S. economy. Since 2008, Tourism Manitoba has estimated that visitation from the U.S. (for all Manitoba tourist attractions) declined 13% in 2008, declined a further 6.9% in 2009 and a further 4.3% in 2010 (Travel Manitoba 2011). The declining trend was predicted to level off in 2011 (Travel Manitoba 2011).

As of 2008, moose tags allocated within (and proximal to [<10 km]) the Split Lake RMA are estimated to be approximately 52. Not all tags are sold or filled (harvested moose) each year. To put this in context, assuming a range of 70% - 80% are sold and of those sold, there was a 60% - 80% success (harvest) rate, approximately 22 to 33 moose are assumed to be harvested by non-resident hunters each year, all of which would be bull moose. Black bear hunting tags available within (or proximal to [<10 km]) the Split Lake RMA are estimated to be approximately 66. Assuming a lower demand for bear tags (50% of tags annually available are sold) and assuming a success rate of 60-80%, black bear harvest could range from 20 to 26.

Although adventure travel and eco-tourism activity in the Regional Study Area is currently limited, expansion of existing ATE and growth of new initiatives is regarded as a substantive opportunity for economic development for northern communities (Manitoba Culture, Heritage and Tourism 2008).

1.8.4 Project Effects, Mitigation and Monitoring

1.8.4.1 Construction Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect lodge and outfitting operations during construction:

- Increases in the wage economy;
- Shifting patterns of resource use due to KCNs' AEA Offsetting Programs; and
- Increased competition for fish resources.

Eco-tourism is not expected to be affected.

Due to increases in the wage economy associated with Project construction, lodge owners and outfitters may have decreased ability to attract guides and other staff from KCNs communities. The extent to which a decrease in qualified staff will occur depends on personal preferences and choices of selected individuals. No mitigation is feasible.

Some lodge operators and outfitters that supply a variety of equipment and facilities at remote locations, expect that TCN's AEA Access Program activities may pose some risk to their equipment/facilities due to increases in the number of people using the same areas. There also is an expectation that resource user conflicts (*e.g.*, hunting for the same resource at the same time and place) may occur under shifting patterns of resource use.

To mitigate any potential effects, TCN which is solely responsible for the management, implementation and operation of the TCN's AEA Offsetting Programs, established guidelines and principles for participants as part of the Access Program (which began in 2009 after five years of a pilot Access Program) (TCN OWL Staff 2009). These include the following:

- Respect for the land and environment (*i.e.,* leaving areas clean);
- Firearm safety measures to reduce risks to TCN Members and others;

- Conducting selective harvest; and
- Respect for others (including refraining from acts of aggression and disrespect to property).

The TCN Access Program is implemented consistent with all applicable laws and standards in force in the Province of Manitoba and also in compliance with applicable federal legislation. Ongoing compliance with the Guidelines and Principles (TCN OWL Staff 2009) in the future years of the Access Program will minimize effects.

A residual effect may occur if lodge and outfitting clientele, who may expect a private 'wilderness' experience, come into contact with resource users and become disappointed with the services offered by lodges and outfitters. Such conditions can potentially affect the ability of lodge owners and outfitters to retain clientele and reduce their resilience to withstand other business challenges. If effects occur, effects are expected to begin in the construction phase and continue through the operation phase. Effects may not be continuous or even noticeable to some operators. No mitigation is planned.

Reduced opportunity for moose harvest may occur where localized hunting pressures have the possibility of increasing due to AEA Offsetting Programs. This effect may not affect some lodge and outfitters at all and its magnitude is dependent on the distribution, intensity, and harvest levels associated with shifting patterns of resource use. As discussed, Manitoba Conservation and Water Stewardship prioritize resources for Aboriginal and Treaty rights holders over all other users of the moose resource. No mitigation is planned.

Increased competition for fish resources may occur in relation to the TCN Healthy Food Fish Program planned for lakes such as Waskaiowaka and Pelletier (among others) where a lodge business and its outcamp are in operation. These lakes, in addition to three others, may be subject to a combined harvest of up to 62,000 kg of fish (round weight) annually beginning March 31, 2013 . The fish harvest sustainability plan is expected to manage this fishery sustainably to support the ongoing operation of the TCN Healthy Food Fish Program. However, net fisheries and commercial sports fisheries are typically incompatible. Reductions in the abundance of large trophy fish (*i.e.,* large fish targeted by sports fishers) will likely be noticeable to the Waskaiowaka and Pelletier lodge clientele if the designated harvest level is achieved from these lakes. No mitigation is planned.

1.8.4.2 Operation Phase Effects and Mitigation

Through the following pathways, the Project has the potential to affect lodges and outfitters during operation:

- Increases in the wage economy;
- Shifting patterns of resource use due to offsetting program; and
- Improvements in access.

Eco-tourism is not expected to be affected.

Operation phase effects and mitigation on lodges and outfitters are the same as the construction phase with the exception of improvements in access which will result from a re-route of PR 280 to include the

north access road, the GS facility over the Nelson River and the south access road to Gillam. Improvements in ground transportation for lodges and outfitters based out of Gillam or those that use Gillam as a transportation hub will occur. Clientele will have improved access to their operations due to a shorter direct road link from Thompson to Gillam. No mitigation is planned.

1.8.4.3 Residual Effects

Residual effects on tourism expected during the construction and operation phases include:

- Potential for increased contact among lodge and outfitting clientele and TCN Access Program participants may affect lodge and outfitting clientele with respect to having a 'secluded' or 'wilderness' experience. If local hunting for moose occurs, localized reductions in the availability of moose also may occur though this would only affect lodges/outfitters with moose allocations. The frequency and duration of any residual effects is largely dependent on the destinations, timing, harvest and number of people selecting areas that overlap with lodge and outfitting allocation areas. For this reason, certainty also is reduced; and
- Reductions in the abundance of large trophy fish in Waskaiowaka and/or Pelletier lakes is expected to be noticeable to lodge clientele if the designated harvest level (62,000 kg) of the Healthy Food Fish Program is achieved. Magnitude and duration of any effects to large trophy fish which will depend on actual harvest levels, which are currently uncertain. The frequency of fishing at Waskaiowaka and/or Pelletier also cannot be determined due to the availability of three other lakes designated as destinations under the Healthy Food Fish Program.

Residual effects of Project construction on lodges and outfitters is expected to be adverse, small, of a small geographical extent (to tourist operations), and long-term. No mitigation is planned.

No residual effects on eco-tourism are expected.

1.8.4.4 Environmental Follow-up and Monitoring

The fish harvest sustainability plan is intended to manage and monitor the fish resource for the ongoing sustainable operation of the TCN Healthy Food Fish Program and the WLFN Community Fish Program (see Section 1.2.4). No other monitoring or follow-up is planned.

1.9 PROTECTED AREAS AND SCIENTIFIC SITES

1.9.1 Introduction

This section provides an overview, description and location of protected areas, proposed protected areas and scientific sites in the Resource Use Local and Regional Study Areas.

1.9.2 Approach and Methodology

Information on protected area policy, natural regions, and protected areas was collected using literature from Manitoba Conservation and Water Stewardship, Parks and Natural Areas Branch and from personal communication with provincial officials specializing in parks, protected areas and ecological reserves.

Identification of scientific sites relied on scanning many national, sub-national and provincial scientific studies and research organizations including, but not limited to:

- The Canadian Forest Service;
- The International Biological Program;
- The Boreal Ecosystem-Atmosphere Study (BOREAS);
- The Boreal Forest Transect Case Study;
- The Forest Insect and Disease Study;
- The Acid Rain National Early Warning System; and
- Personal communications with officials from Parks Canada and Natural Resources Canada.

Provincial officials from the Manitoba Conservation and Water Stewardship, Wildlife and Ecosystem Protection Branch and Manitoba Conservation and Water Stewardship, Forestry Branch also were consulted.

1.9.3 Existing Environment

1.9.3.1 Protected Areas

The Province of Manitoba is in the process of assembling a network of land 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 the characteristic landforms or **enduring features** within a region be set aside in protected land. Industrial uses such as mining, logging, oil, petroleum, natural gas and hydroelectric development are prohibited in protected areas (excepting some explicit land use categories in some provincial parks). These protected areas generally still allow for activities such as hunting, trapping or fishing that respect Aboriginal and Treaty rights. Treaty Land Entitlement parcel selection also is permitted.

Areas can be permanently protected under four Manitoba Acts with the following designations: **Provincial Park**s, Ecological Reserves (ER), **Wildlife Management Areas** (**WMA**s), and **Provincial Forest**s. Within provincial parks several different **Land Use Categories** (**LUC**) exist which governs land use, two of which are wilderness parks and natural parks. **Provincial wilderness parks** serve primarily to preserve natural landscapes in a pristine condition and **provincial natural parks** serve to protect natural landscapes as well as to provide recreational and resource use opportunities. Ecological reserves are created to preserve examples from 1,000 plus habitat types with unique and rare characteristics of plant or animal populations or geologic landforms (Manitoba Conservation 2002). Ecological reserve status enables prohibition of sport hunting and the removal of plants or other materials from the reserve. Domestic hunting on ecological reserves is considered on a case-by-case basis. Wildlife management areas (WMAs) are Crown lands set aside for the better management, conservation and enhancement of the wildlife resources of the province. Within WMAs, hunting and trapping are generally permitted but each WMA has its own set of restrictions in place to protect the integrity of the area. Federally protected areas are National Parks of Canada.

Under *The Provincial Parks Act* (Manitoba), an area may be provided with interim protection via designation as a **park reserve**. Park Reserves prohibit the same industrial uses listed above until boundaries and management issues are identified for the area following which permanent park status can be issued. Park reserve status must be renewed, initially for a six month term usually followed by a five year term to allow consultation with First Nations, Metis, local communities and environmental organizations.

Areas of Special Interest (**ASI**s) is the term to describe "candidate sites" which have not been protected in any formal manner but have a high potential to protect groupings of enduring features and associated natural and cultural values. ASIs are areas identified to complete the representation of features not adequately captured in existing protected areas. ASI boundaries are flexible and can respond to new information. Candidate sites are chosen, whenever possible, to avoid resource allocation conflicts and to protect undeveloped areas of substantive size.

Although development and other resource uses are generally restricted in protected areas, there is no infringement on Aboriginal and Treaty rights to hunt, fish or trap for subsistence.

1.9.3.1.1 Protected Areas in the Regional Study Area

The Regional Study Area spans portions of four of Manitoba's natural regions; the Precambrian Boreal Forest, subdivided into the Churchill River Upland (4a) and the Hayes River Upland (4b), the Northern Transition Forest (Selwyn Lake Upland subdivision 1a), the Hudson Bay Lowlands (3), and Arctic Tundra (Coastal Hudson Bay subdivision 2b). Protected areas and areas proposed for protection are shown on Map 1-13.

A portion of Amisk Park Reserve is located in the western extreme of the Regional Study Area south of Wernham Lake and partially encompassing Kiask Lake. The park reserve contains representation of 10 different enduring features, either adequately, moderately or partially and it is the only protected area that rests entirely within Natural Region 4a – The Churchill River Upland (Manitoba Conservation 2008e). In June 2008, Amisk Park Reserve was renewed until May 2013 (Manitoba Conservation 2008f). Two ASIs

augment the Amisk Park Reserve's capture of enduring features: the Amisk South Addition ASI, and the Amisk North Addition ASI.

The Stephens Lake ASI is not currently identified as a high priority candidate site (Manitoba Conservation n.d.). It is centrally and completely located in the Regional Study Area comprising approximately 3,750 km^2. The Stephens Lake ASI is important because it captures the confluence or transition zones of the four natural regions listed above thereby containing a greater diversity of species. Bounded by PR 280 to the south, it transects Limestone Lake on the west and Myre Lake in the north (Map 1-13).

Over 1,000 km^2 of the Bradshaw Lake ASI is located partially within the Regional Study Area. Approximately two-thirds (over 2,000 km^2) of Numaykoos Lake Provincial Wilderness Park is located in the extreme northern portion of the Split Lake RMA which protects winter range for barren-ground caribou in an undisturbed state.

The Churchill Wildlife Management Area encompasses the northern half of the Fox Lake RMA and a portion of the northwestern corner of the York Factory RMA at the coast. The Cape Tatnam WMA is a coastal strip of land approximately 16 kilometres wide extending from the Hayes River to the Manitoba – Ontario Border. Both provide critical habitat for caribou and polar bears. The Cape Tatnam Addition ASI at the eastern extent of the Regional Study Area, is noted for its transition from spruce forest to tundra at the edge of Hudson Bay. The Marsh Point North Proposed Ecological Reserve is 21.6 km^2 located at the Hudson Bay estuary between the mouths of the Nelson and the Hayes rivers. Ecological reserves such as this one have the highest level of protection among Manitoba's protected areas which are authorized for research, education and nature study only (Manitoba Conservation 2007). The Churchill and Cape Tatnam WMAs, the Marsh Point North Proposed Ecological Reserve, the Marsh Point ASI and the Cape Tatnam Addition ASI have all been identified as priority areas by Manitoba Conservation and Water Stewardship's Protected Areas Initiative (Manitoba Conservation n.d.).

1.9.3.1.2 Protected Areas in the Local Study Area

There are no protected areas such as national parks, provincial parks, ecological reserves, or WMAs in the Local Study Area. There are no candidate ASIs in the Local Study Area.

1.9.3.2 Scientific Sites

1.9.3.2.1 Scientific Sites in the Regional Study Area

The Boreal Forest Transect Case Study (BFTCS) is a multi-disciplinary ecological study organised around a 1,000 km transect comprised of 97 sites located between Batoche Saskatchewan and Gillam, Manitoba. Data collected provide a background database for the diverse measurements of terrestrial ecology, land surface climatology, tropospheric chemistry, and remote sensing which provide important baseline information for ongoing studies of the boreal forest in a region sensitive to global change. Two sites are located in the Regional Study Area near Gillam, which forms the northeastern boundary of the BFTCS transect.

The Boreal Ecosystem - Atmosphere Study (BOREAS) was an intensive remote-sensing and field study in the boreal forests of central Canada during the years 1993 to 1996. One BOREAS weather station is located in the Town of Gillam.

The Acid Rain National Early Warning System (ARNEWS) plot network was initiated in 1984 when the then Canadian Forestry Service established a national program to detect early signs of air pollution damage to Canada's forests. These sites monitor changes in forest vegetation and soils caused by air pollution and environmental change. One ARNEWS site is active and located on PR 280 approximately 3 km south of Gillam. This site is monitored every five years.

A total of 18 sites were established to monitor the effects of atmospheric emissions from the Vale-Inco (now Vale) smelter on forest plant species composition, tree and shrub growth and soil chemistry. These sites were established in the early to mid-1980s, one of which is located in the Regional Study Area south of Orr Lake near PR 280 and west of the community of Split Lake. This site is active and monitored at five-year intervals.

National Forest Inventory plots are based on contributions from a host of agencies and managed by Natural Resources Canada for the purpose of assessing and monitoring the extent, state and sustainable development of Canada's forests (Natural Resources Canada 1999). Twenty thousand plots have been established throughout the country spaced at 20 km intervals (Natural Resources Canada 2010). One hundred and sixty 2 km by 2 km photo plots are located in the Regional Study Area, which allow for collection of information on forest area, wood volume and total biomass (Natural Resources Canada 2010). A subset of five are ground plots.

Scientific sites in the Regional Study Area are displayed on Map 1-14.

1.9.3.2.2 Scientific Sites in the Local Study Area

The Canadian Forest Service National Forest Inventory plot #1101466 is a photo based plot (as opposed to a ground plot) and is located on the north shore of Gull Lake approximately 13 km upstream of the proposed GS.

1.9.4 Project Effects, Mitigation and Monitoring

1.9.4.1 Construction Phases Effects and Mitigation

Through the following pathway, the Project has the potential to affect scientific sites during construction:

- Reservoir clearing.

No effects to protected or proposed protected areas are predicted.

Scientific site National Forest Inventory plot #1101466 is expected to be partially subject to reservoir clearing in the construction phase. This photo plot will be no longer usable for monitoring forest growth. This plot is one of 159 other plots present in the Regional Study Area. Based on correspondence with the National Forest Inventory National Manager, loss of this plot will be unimportant to the program (Gillis *pers. comm.* 2010). No mitigation is planned.

1.9.4.2 Operation Phases Effects and Mitigation

Through the following pathway, the Project has the potential to affect scientific sites during construction:

- Flooding of the reservoir.

Operation effects are not predicted for protected or proposed protected areas.

National Forest Inventory plot #1101466 is expected to be partially flooded in the construction phase. This photo plot will be no longer usable. Based on correspondence with the National Forest Inventory National Manager, loss of this plot will be unimportant to the program (Gillis *pers. comm.* 2010). No mitigation is planned.

1.9.4.3 Residual Effects

No residual effects are expected.

1.9.4.4 Environmental Follow-up and Monitoring

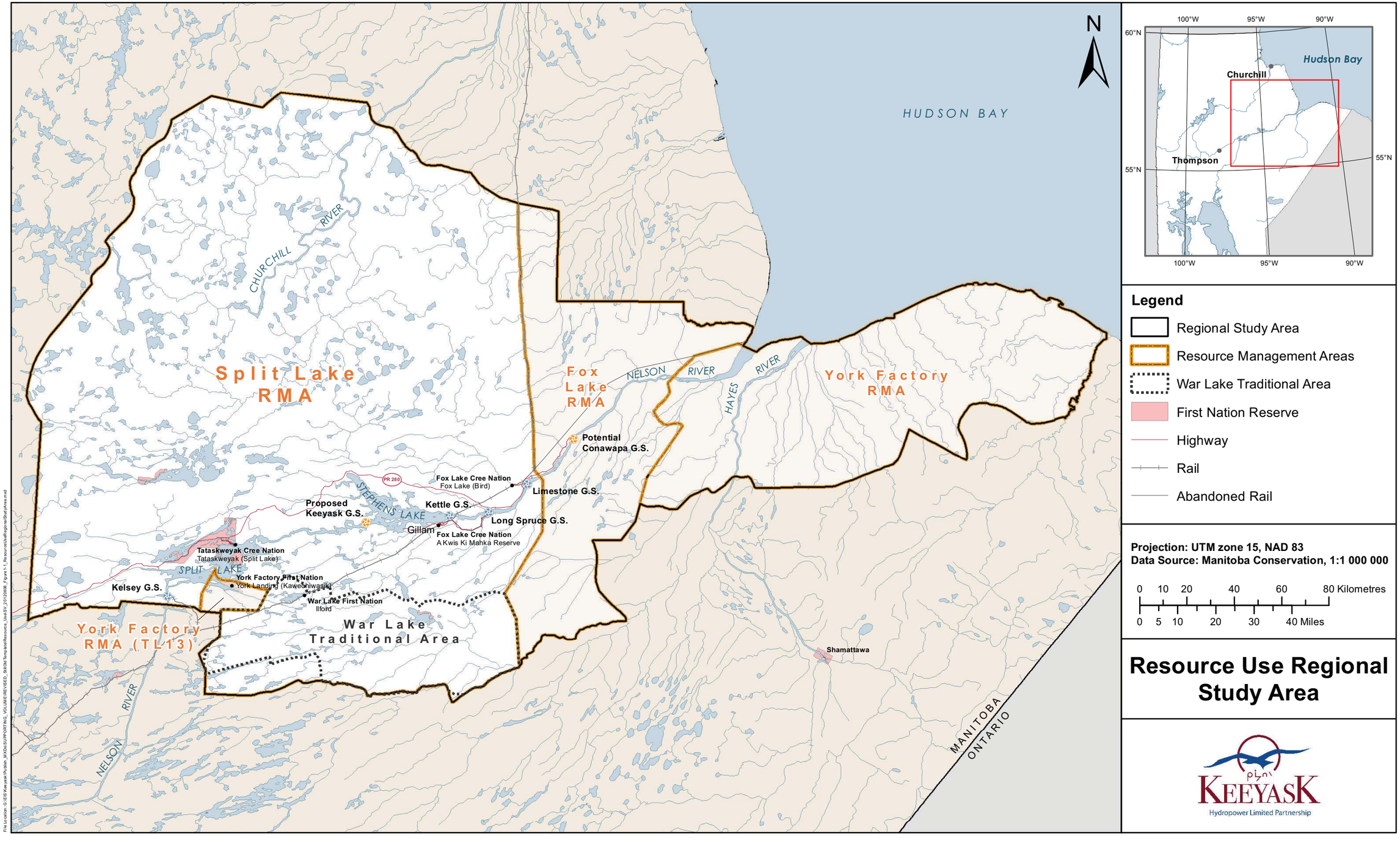
No environmental follow-up and monitoring measures are planned.

1.10 SENSITIVITY OF EFFECTS TO CLIMATE CHANGE

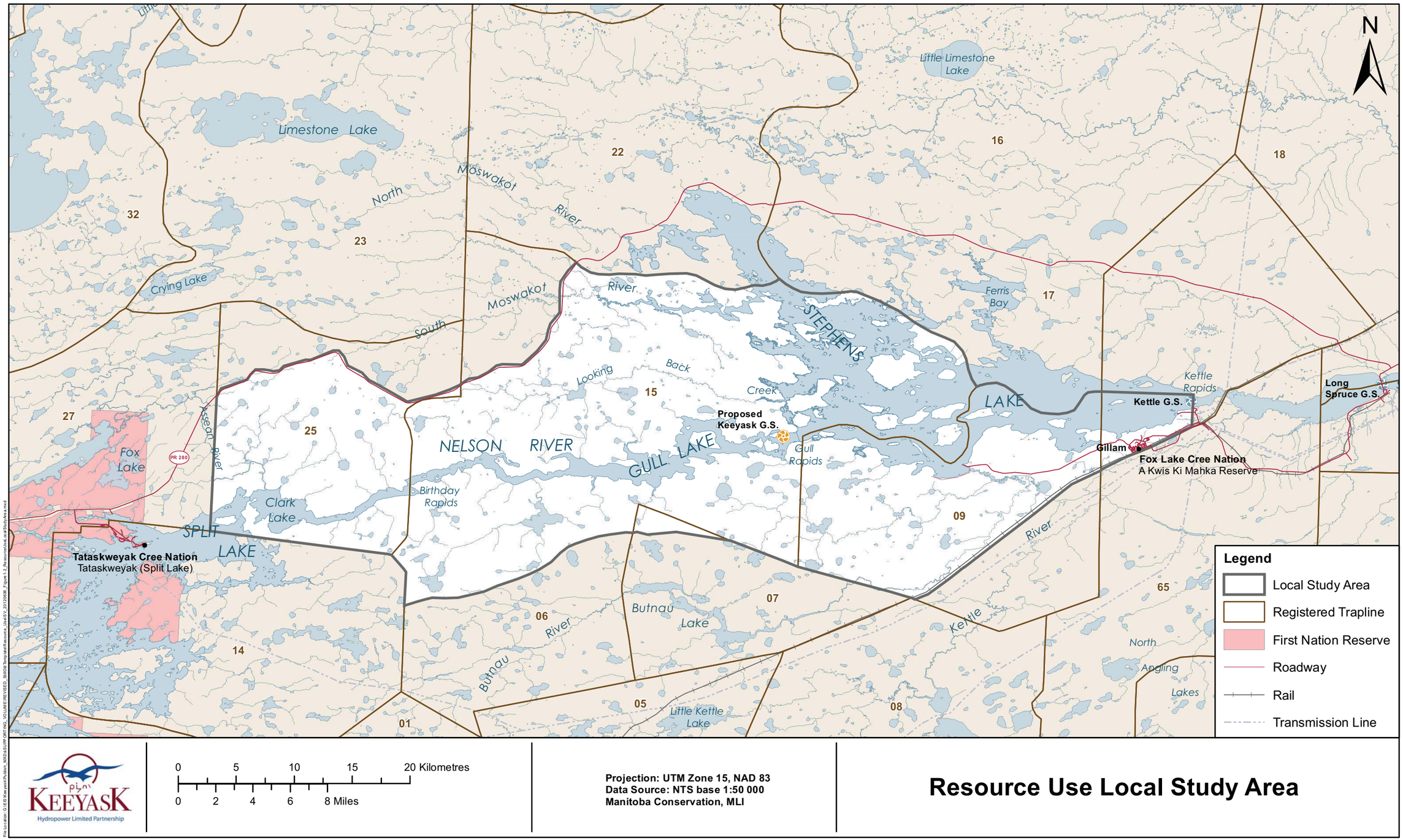
As described in PE SV Section 11.1, the probable scenario of climate change for the 2020s, 2050s and 2080s involves increasing temperatures and precipitation (especially in the winter period) in the Resource Use Local Study Area.

As a residual effect of the Project, resource users are predicted to undergo a period of adjustment to new environmental conditions in the Local Study Area such as changes to water levels and flows and changing winter ice conditions. This period of adjustment is expected to last a few years into the operation phase as resource users become familiar with new conditions on the reservoir and the GS operation mode downstream of the Project. This period of adjustment will be facilitated and expedited by the Waterways Management Program in both winter and summer by the development of ice trails and navigation routes as well as communication with resource users.

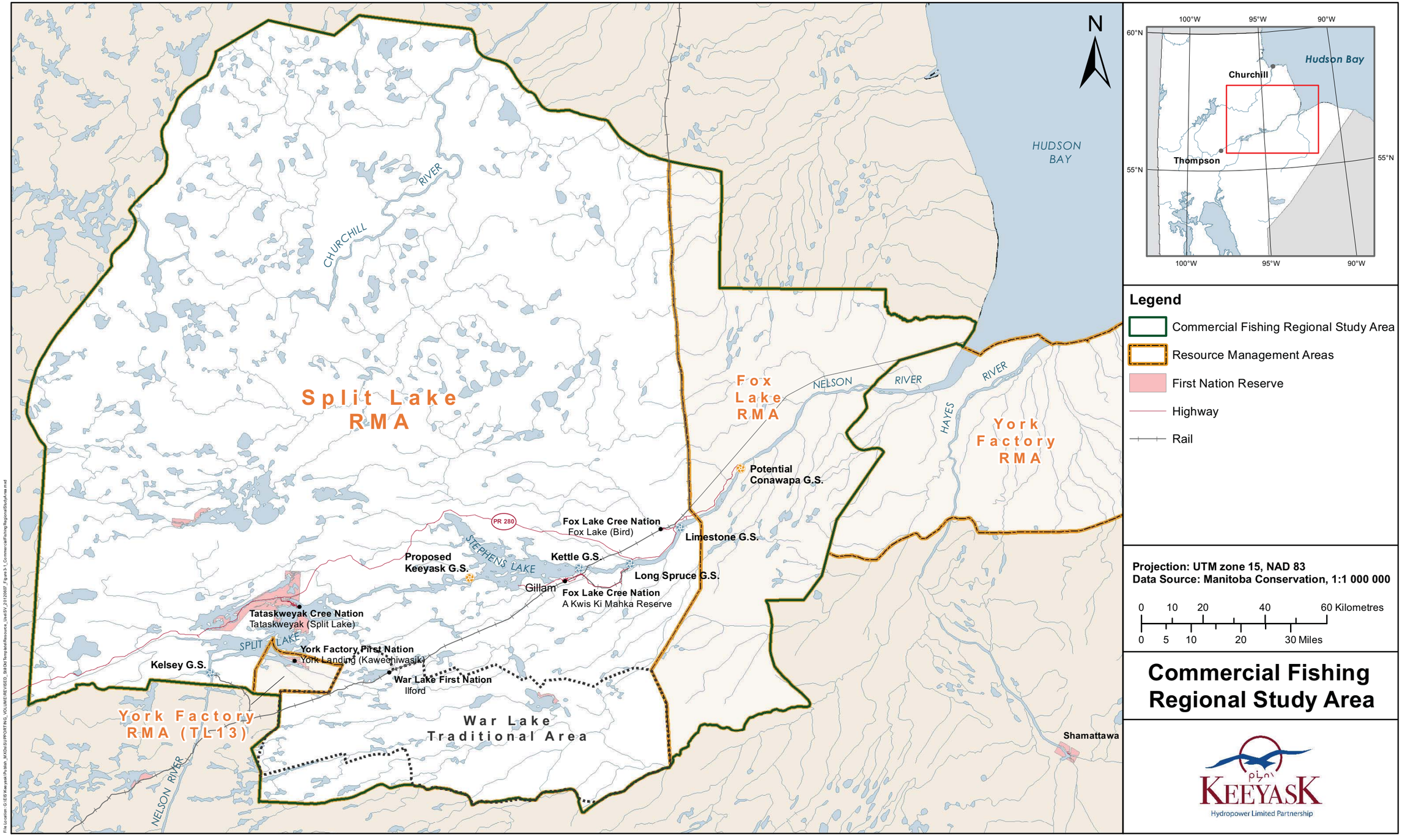
Climate change is considered a longer-term phenomenon and therefore residual Project effects to resource use are not expected to interact with climate change variables.


HUDSON BAY
N
CHURCHILL RIVER
Split Lake RMA
Fox Lake RMA
NELSON RIVER
HAYES RIVER
York Factory RMA
Potential Conawapa G.S.
PR 280
Fox Lake Cree Nation
Fox Lake (Bird)
Limestone G.S.
STEPHENS LAKE
Proposed Keeyask G.S.
Kettle G.S.
Gillam
Long Spruce G.S.
Fox Lake Cree Nation
A Kwis Ki Mahka Reserve
Tataskweyak Cree Nation
Tataskweyak (Split Lake)
SPLIT LAKE
York Factory First Nation
York Landing (Kawechiwasik)
Kelsey G.S.
War Lake First Nation
Ilford
War Lake Traditional Area
York Factory RMA (TL13)
Shamattawa
NELSON RIVER
MANITOBA
ONTARIO
100°W
95°W
90°W
60°N
55°N
Hudson Bay
Churchill
Thompson
Legend
Regional Study Area
Resource Management Areas
War Lake Traditional Area
First Nation Reserve
Highway
Rail
Abandoned Rail
Projection: UTM zone 15, NAD 83
Data Source: Manitoba Conservation, 1:1 000 000
0 10 20 40 60 80 Kilometres
0 5 10 20 30 40 Miles
Resource Use Regional Study Area
KEEYASK
Hydropower Limited Partnership

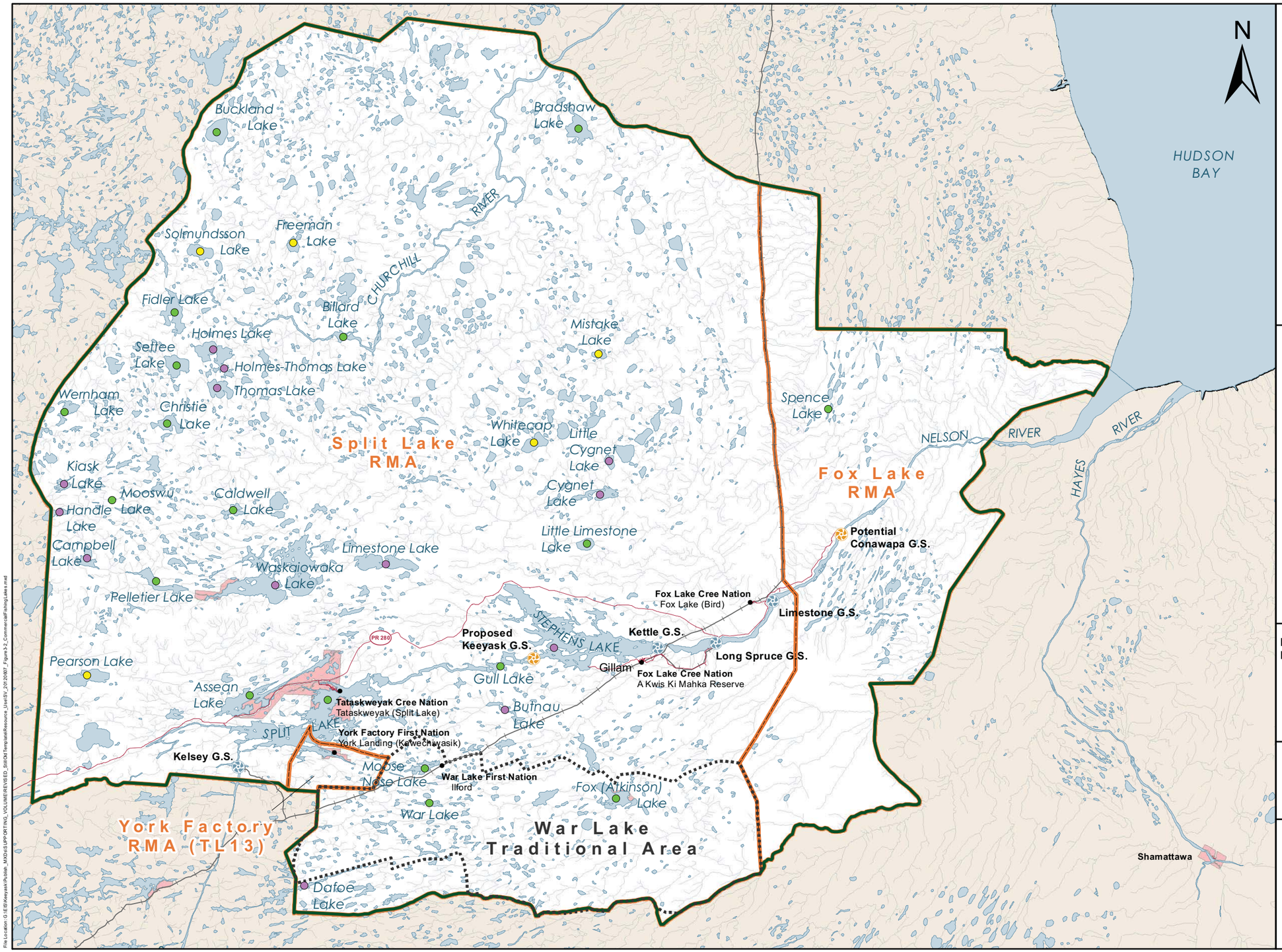
Map 1-1


N
Limestone Lake
Little Limestone Lake
North Moswakot River
Moswakot River
South Moswakot River
Looking Back Creek
Crying Lake
Fox Lake
Assean River
PR 280
NELSON RIVER
GULL LAKE
STEPHENS LAKE
Ferris Bay
Kettle Rapids
Kettle G.S.
Long Spruce G.S.
Proposed Keeyask G.S.
Gull Rapids
Gillam
Fox Lake Cree Nation
A Kwis Ki Mahka Reserve
Birthday Rapids
Clark Lake
SPLIT LAKE
Tataskweyak Cree Nation
Tataskweyak (Split Lake)
Butnau River
Butnau Lake
Little Kettle Lake
Kettle River
North Angling Lakes
22
16
18
32
23
17
27
25
15
09
14
06
07
65
05
08
01
Legend
Local Study Area
Registered Trapline
First Nation Reserve
Roadway
Rail
Transmission Line
0 5 10 15 20 Kilometres
0 2 4 6 8 Miles
Projection: UTM Zone 15, NAD 83
Data Source: NTS base 1:50 000
Manitoba Conservation, MLI
Resource Use Local Study Area

Map 1-2


N
HUDSON BAY
CHURCHILL RIVER
Split Lake RMA
Fox Lake RMA
NELSON RIVER
HAYES RIVER
York Factory RMA
Potential Conawapa G.S.
PR 280
Fox Lake Cree Nation
Fox Lake (Bird)
Limestone G.S.
Proposed Keeyask G.S.
STEPHENS LAKE
Kettle G.S.
Long Spruce G.S.
Gillam
Fox Lake Cree Nation
A Kwis Ki Mahka Reserve
Tataskweyak Cree Nation
Tataskweyak (Split Lake)
SPLIT LAKE
York Factory First Nation
York Landing (Kaweechiwasik)
Kelsey G.S.
War Lake First Nation
Ilford
York Factory RMA (TL13)
War Lake Traditional Area
NELSON RIVER
Shamattawa
100°W
95°W
90°W
60°N
55°N
Hudson Bay
Churchill
Thompson
Legend
Commercial Fishing Regional Study Area
Resource Management Areas
First Nation Reserve
Highway
Rail
Projection: UTM zone 15, NAD 83
Data Source: Manitoba Conservation, 1:1 000 000
0 10 20 40 60 Kilometres
0 5 10 20 30 Miles
Commercial Fishing Regional Study Area
KEEYASK
Hydropower Limited Partnership

Map 1-3



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Sand Lakes Provincial Park
Numaykoos Lake Provincial Park
Wapusk National Park of Canada
HUDSON BAY
CHURCHILL RIVER
NELSON RIVER
HAYES RIVER
STEPHENS LAKE
SPLIT LAKE
Amisk Park Reserve
Split Lake RMA
Fox Lake RMA
York Factory RMA
York Factory RMA (TL13)
PR 280
Tataskweyak Cree Nation
Tataskweyak (Split Lake)
York Factory First Nation
York Landing (Kawechiwasik)
War Lake First Nation
Ilford
Fox Lake Cree Nation
Fox Lake (Bird)
Fox Lake Cree Nation
A Kwis Ki Mahka Reserve
Gillam
Proposed Keeyask G.S.
Kettle G.S.
Limestone G.S.
Long Spruce G.S.
Potential Conawapa G.S.
Kelsey G.S.
Shamattawa

N

100°W 95°W 90°W
60°N
55°N
Hudson Bay
Churchill
Thompson

Legend

- Regional Study Area
- Local Study Area
- Resource Management Areas
- Registered Traplines
- War Lake Traditional Area
- First Nation Reserve
- All Weather Roads
- Winter Roads
- Rail

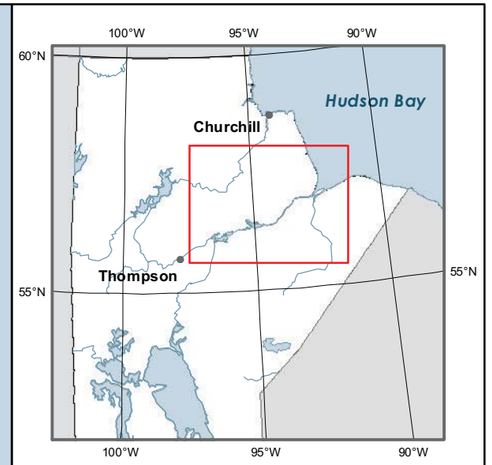
Projection: UTM zone 15, NAD 83
Data Source: Manitoba Conservation, 1:1 000 000

0 10 20 40 60 Kilometres
0 5 10 20 30 Miles

Commercial Trapping Regional and Local Study Areas

KEEYASK
Hydropower Limited Partnership

Sand Lakes Provincial Park
Numaykoos Lake Provincial Park
Wapusk National Park of Canada
HUDSON BAY
Amisk Park Reserve
Split Lake RMA
Fox Lake RMA
York Factory RMA
York Factory RMA (TL13)
CHURCHILL RIVER
NELSON RIVER
HAYES RIVER
STEPHENS LAKE
SPLIT LAKE
PR 280
Potential Conawapa G.S.
Fox Lake Cree Nation
Fox Lake (Bird)
Limestone G.S.
Kettle G.S.
Long Spruce G.S.
Proposed Keeyask G.S.
Gillam
Fox Lake Cree Nation
A Kwis Ki Mahka Reserve
Tataskweyak Cree Nation
Tataskweyak (Split Lake)
York Factory First Nation
York Landing (Kawechiwasik)
War Lake First Nation
Ilford
Kelsey G.S.
Shamattawa



Legend

- All Weather Road Access
- Winter Road Access
- No Road Access
- Resource Management Areas
- Registered Traplines
- War Lake Traditional Area
- First Nation Reserve
- All Weather Roads
- Winter Roads

Projection: UTM zone 15, NAD 83
Data Source: Manitoba Conservation, 1:1 000 000

0 10 20 40 60 Kilometres
0 5 10 20 30 Miles

Trapline Accessibility

KEEYASK
Hydropower Limited Partnership

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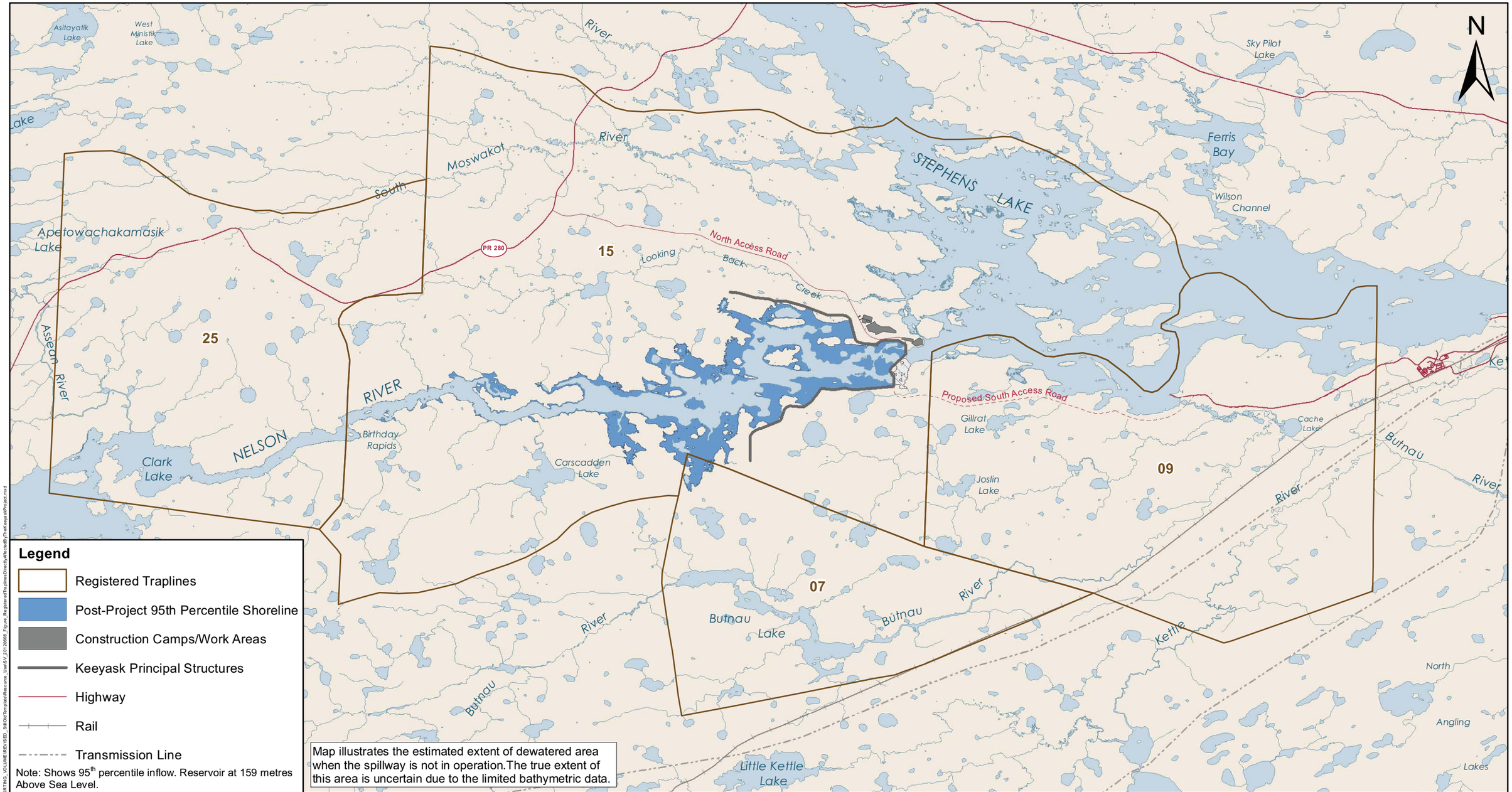

Registered Traplines Directly Affected by the Keeyask Project

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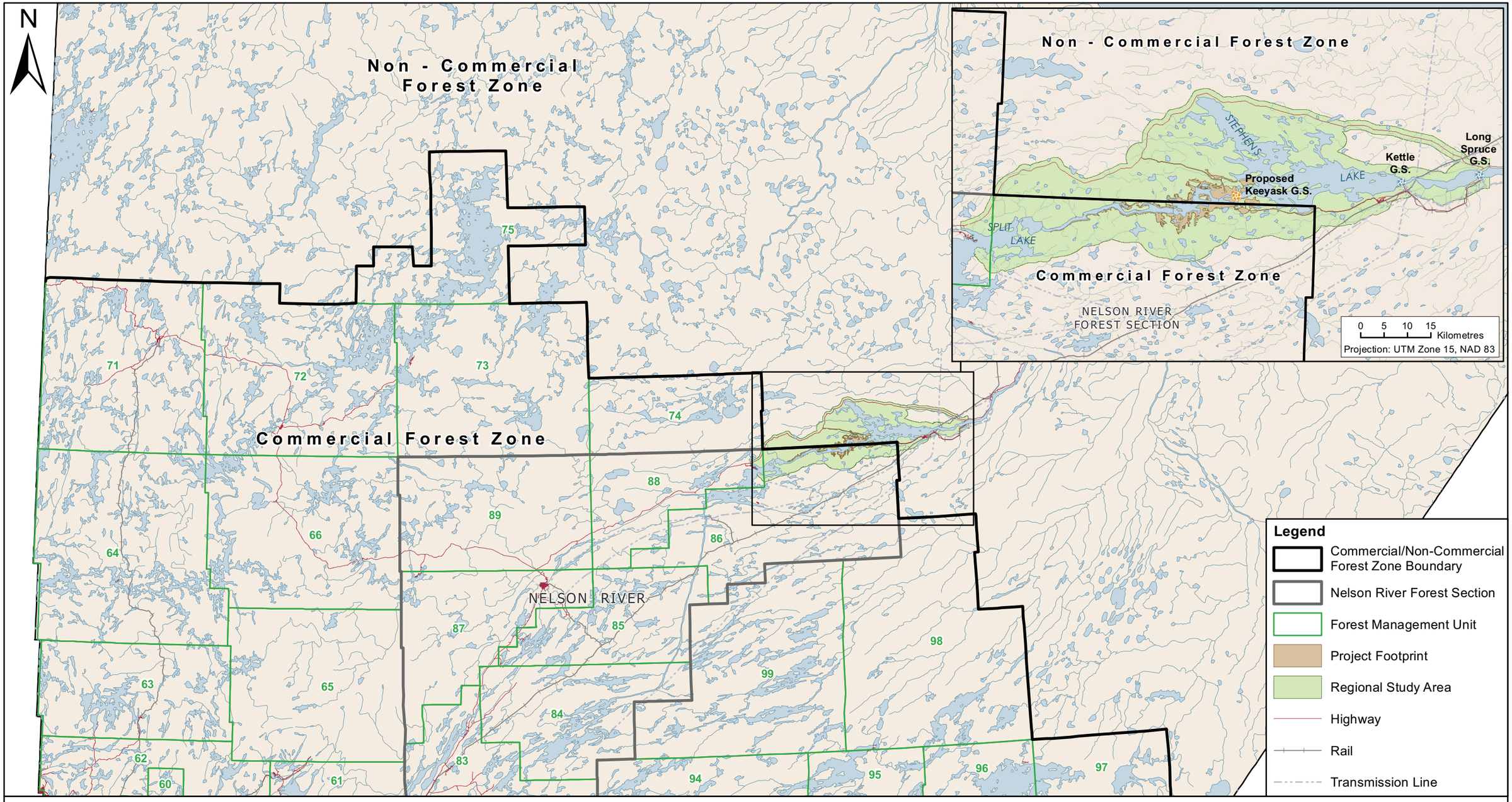
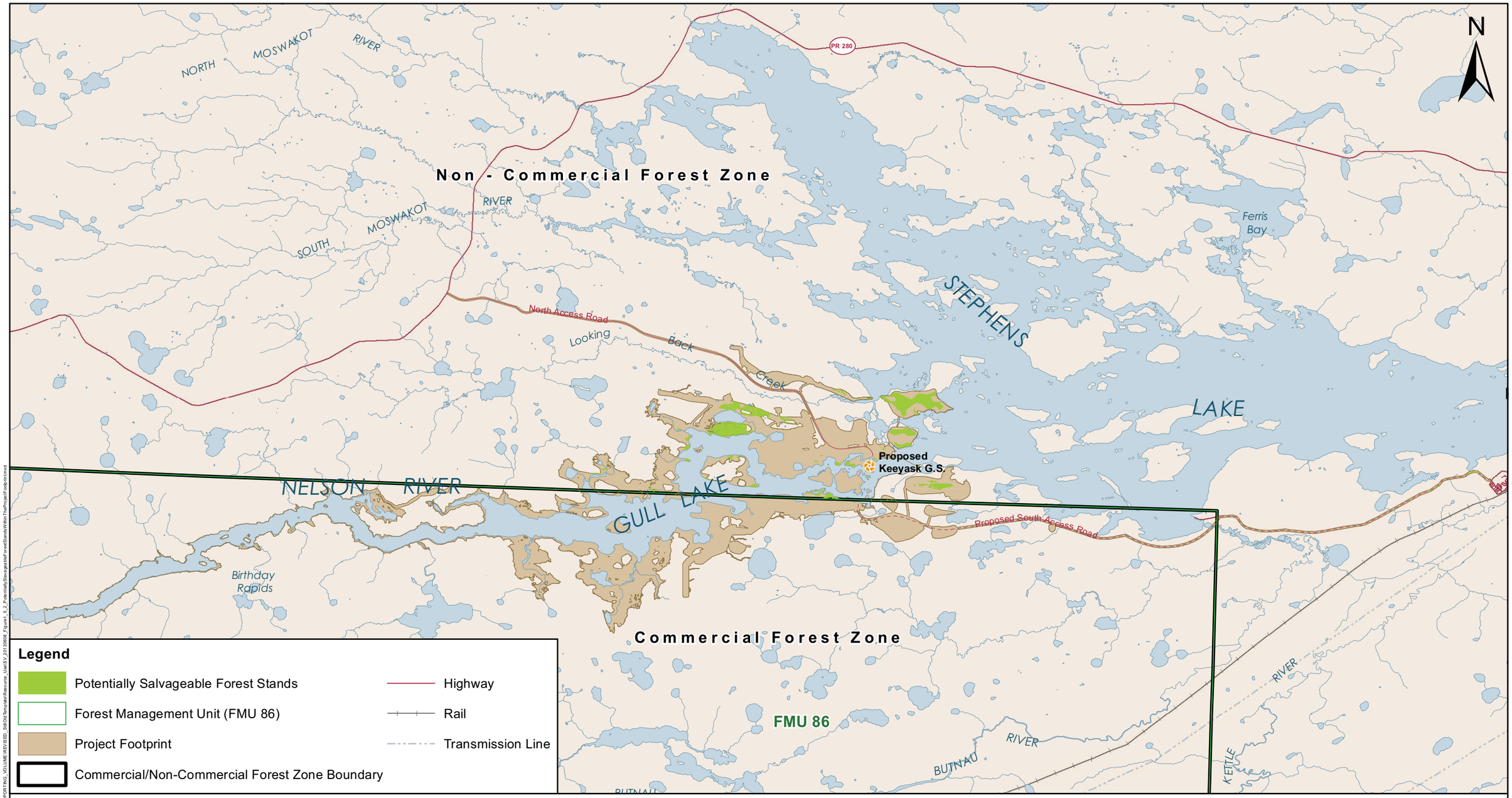


KEEYASK Hydropower Limited Partnership

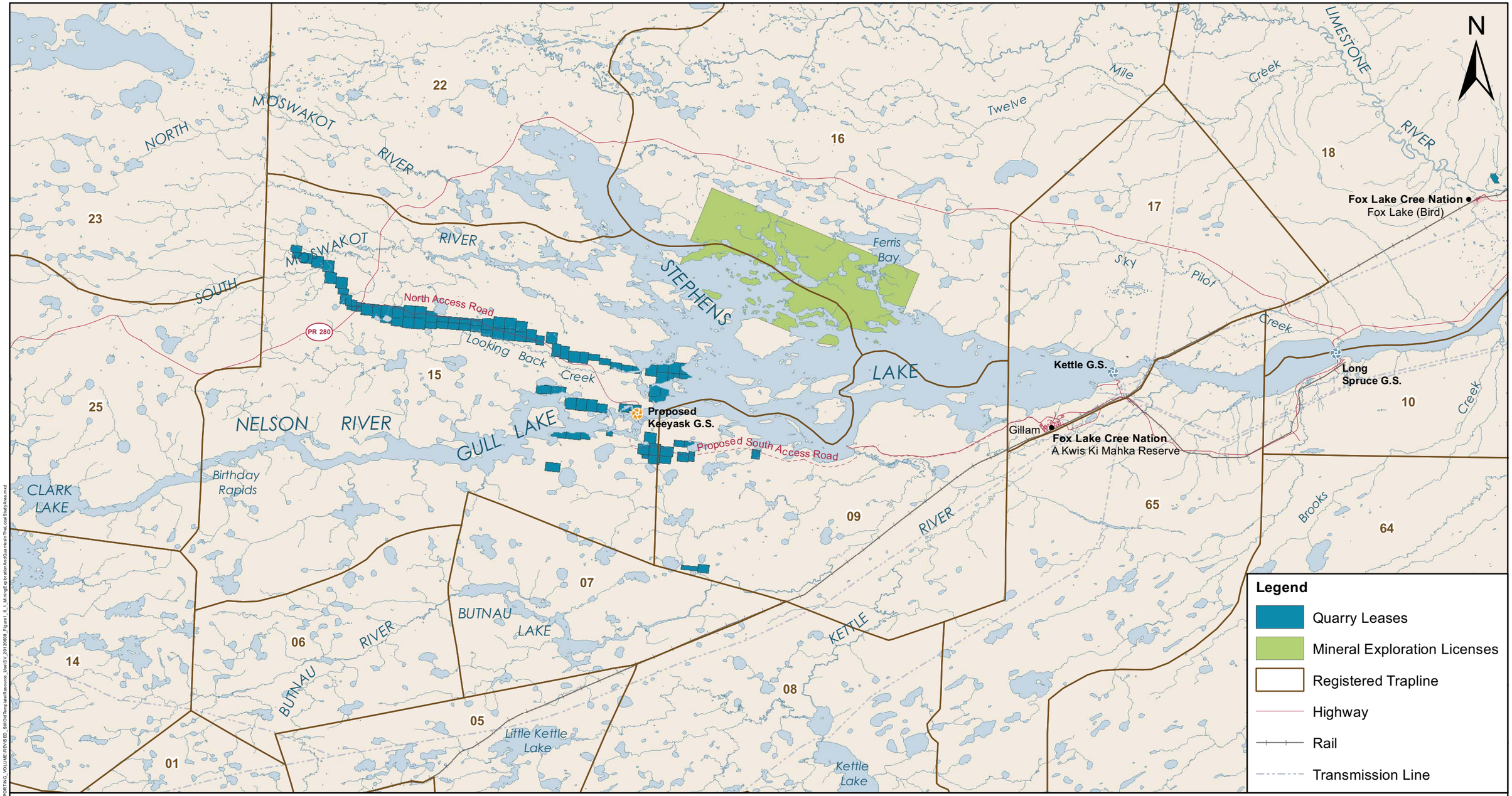
0 50 100 150 Kilometres
0 50 Miles

Projection: UTM Zone 14, NAD 83
Data Source: Manitoba Conservation, 1:1 000 000

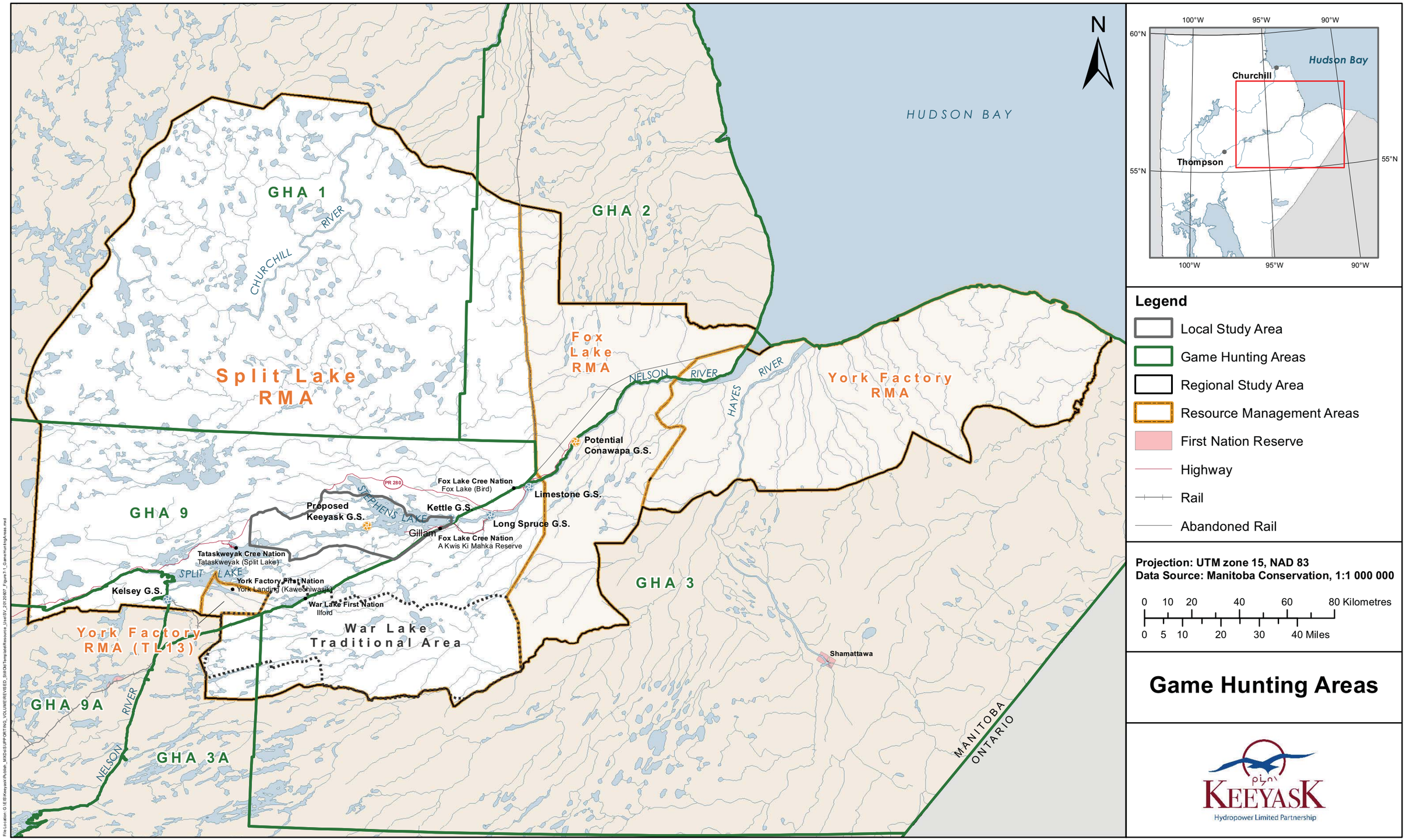
Manitoba Forest Zones and Forestry Study Area



Potentially Salvageable Forest Stands Within the Project Footprint



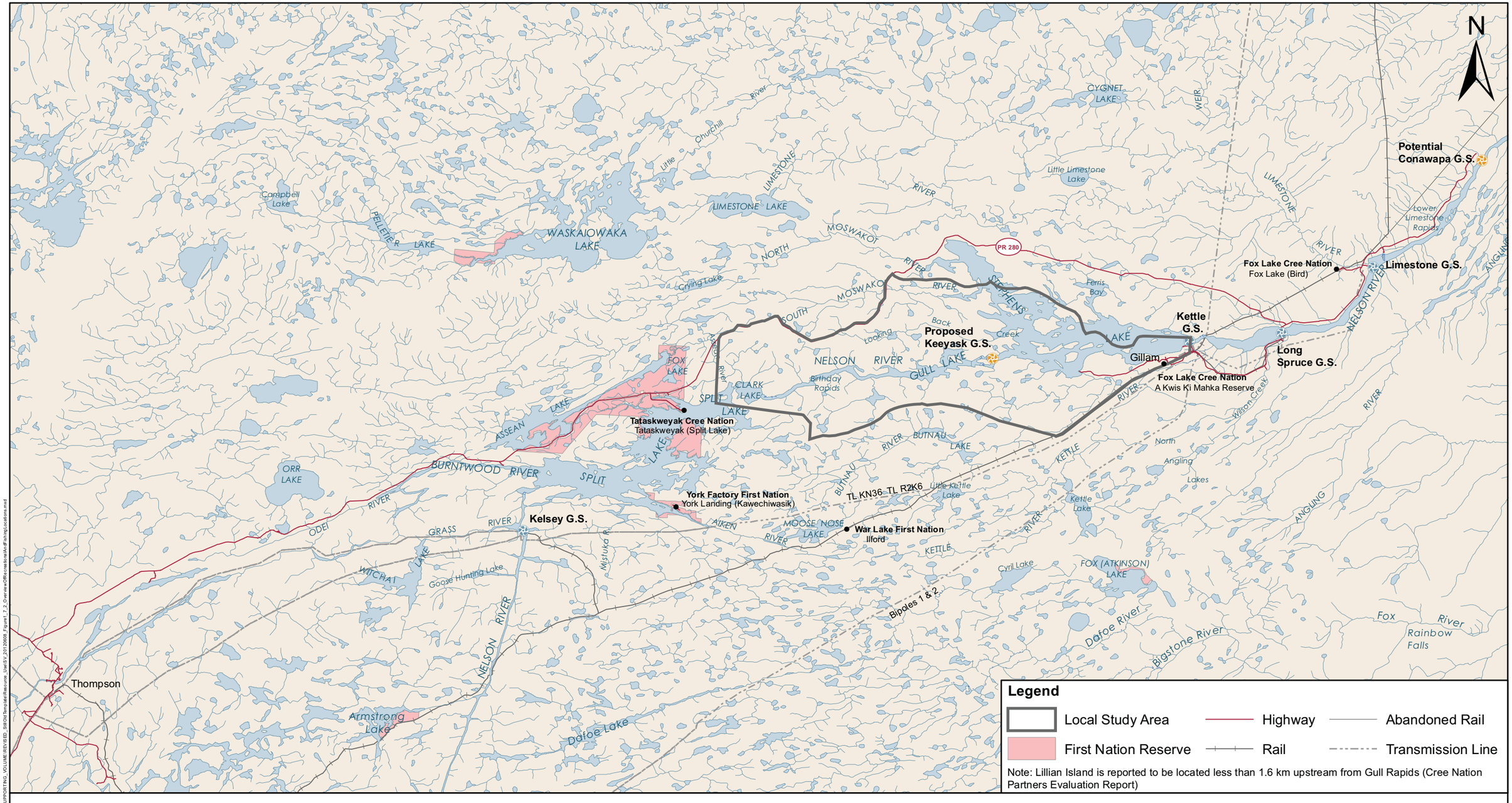
Mining Exploration and Quarries in the Local Study Area



File Location: G:\EIS\Keeyask\Public_MXD\SUPPORTING_VOLUME\REVISED_SIMDA\Template\Resource_Use\SV_20120907_Figure 1-1_GameHuntingAreas.mxd

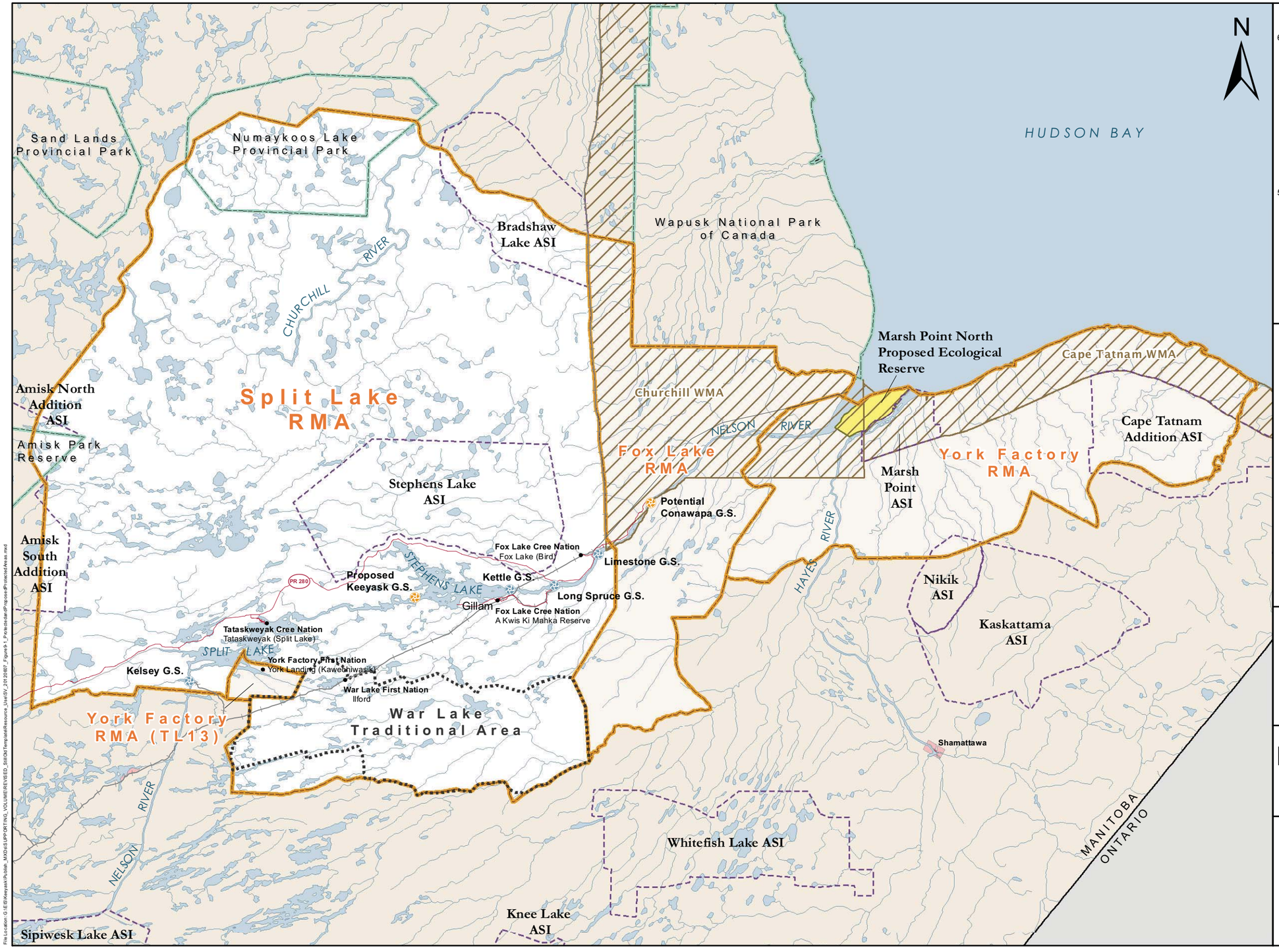
Game Hunting Areas

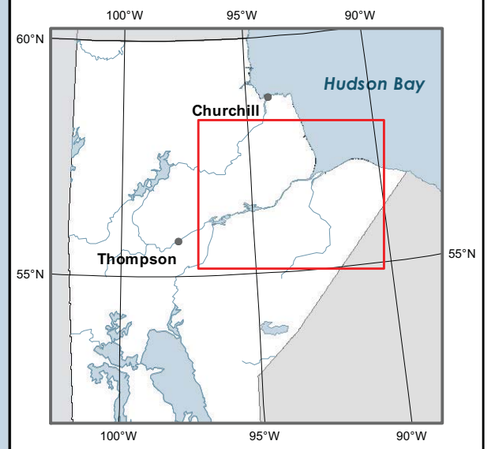
KEEYASK Hydropower Limited Partnership



Overview of Recreational Hunting and Fishing Locations

File Location: G:\ES\Keeyask\Publish_MXD\dS\UPPORTING_VOLUME\REVISED_SitPlnTemplate\Resource_Use\SV 20120608_Figure1_7_2_OverviewOfRecreationalAndFishingLocations.mxd





Legend

Protected Areas

- Area of Special Interest (ASI)
- Proposed Ecological Reserve
- Wildlife Management Areas (WMA)
- Federal and Provincial Parks
- Resource Management Areas (RMA)
- First Nation Reserve
- Highway
- Rail

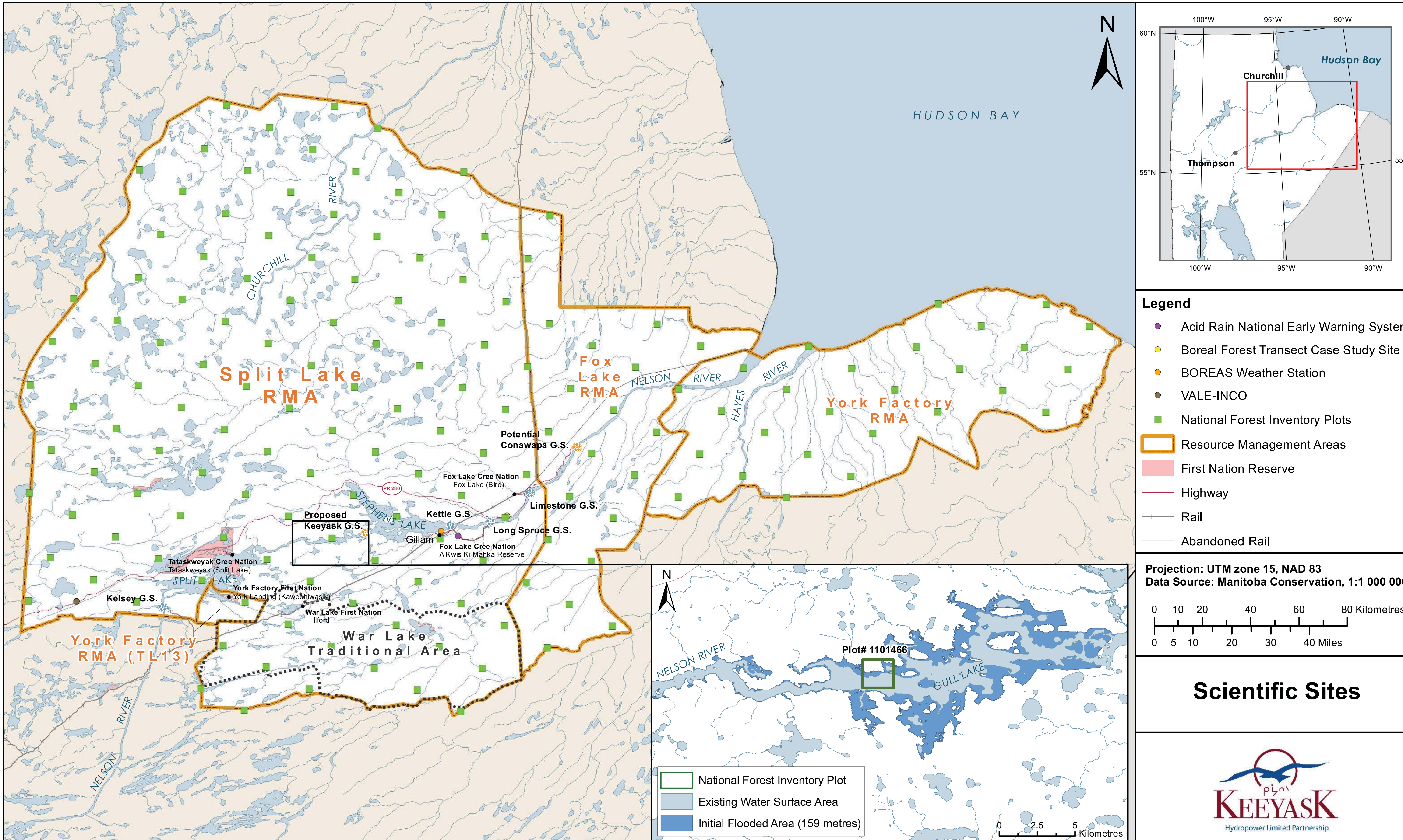
Projection: UTM zone 15, NAD 83
Data Source: Manitoba Conservation, 1:1 000 000

0 20 40 60 80 Kilometres
0 10 20 30 40 Miles

Protected and Proposed Protected Areas

KEEYASK
Hydropower Limited Partnership

File Location: G:\EIS\Keeyask Publish_MXD\SUPPORTING_VOLUME\REVISED_SR\Sr\Template\Resource_Use\SV_20120907_Figure 9-1_ProtectedandProposedProtectedAreas.mxd


HUDSON BAY
Split Lake RMA
Fox Lake RMA
York Factory RMA
York Factory RMA (TL13)
War Lake Traditional Area
CHURCHILL RIVER
NELSON RIVER
HAYES RIVER
STEPHENS LAKE
SPLIT LAKE
PR 280
Potential Conawapa G.S.
Fox Lake Cree Nation
Fox Lake (Bird)
Limestone G.S.
Kettle G.S.
Long Spruce G.S.
Proposed Keeyask G.S.
Gillam
Fox Lake Cree Nation
A Kwis Ki Mahka Reserve
Tataskweyak Cree Nation
Tataskweyak (Split Lake)
York Factory First Nation
York Landing (Kawechiwasik)
War Lake First Nation
Ilford
Kelsey G.S.
N
100°W
95°W
90°W
60°N
55°N
Hudson Bay
Churchill
Thompson
Legend
Acid Rain National Early Warning System
Boreal Forest Transect Case Study Site
BOREAS Weather Station
VALE-INCO
National Forest Inventory Plots
Resource Management Areas
First Nation Reserve
Highway
Rail
Abandoned Rail
NELSON RIVER
Plot# 1101466
GULL LAKE
National Forest Inventory Plot
Existing Water Surface Area
Initial Flooded Area (159 metres)
0 2.5 5 Kilometres
Projection: UTM zone 15, NAD 83
Data Source: Manitoba Conservation, 1:1 000 000
0 10 20 40 60 80 Kilometres
0 5 10 20 30 40 Miles
Scientific Sites
KEEYASK
Hydropower Limited Partnership

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1.12 GLOSSARY

Aboriginal Traditional Knowledge (ATK): Aboriginal traditional knowledge is knowledge that is held by, and unique to, Aboriginal peoples. It is a living bit of knowledge that is cumulative and dynamic and adapted over time to reflect changes in the social, economic, environmental, spiritual and political spheres of the Aboriginal knowledge holders. It often includes knowledge about the land and its resources, spiritual beliefs, language, mythology, culture, laws, customs and medicines (Canadian Environmental Assessment Act).

Adverse Effects Agreements: Negotiated agreements with KCN communities that deal with the negative consequences of the planning, construction and operation of the proposed Project, either direct or indirect, which effect or change the physical, chemical or biological quality of the environment and includes, without limitation, risks or injuries to the health, safety, well-being, comfort or enjoyment of the First Nations and their Members and impacts on interests in lands, pursuits, activities, opportunities, lifestyles and assets of the First Nations and their Members.

Allocation[1]: A parcel of land assigned to an outfitter or lodge operator to carry out their guiding services.

Angling[2]: Means fishing by means of a line and hook, or a rod, line and hook.

Areas of Special Interest[3]: "Candidate sites" which have not been protected in any formal manner but have a high potential to protect groupings of enduring features and associated natural and cultural values.

Bog[4]: A wetland ecosystem made up of in-situ accumulations of peat, either moderately or slightly decomposed, derived primarily from sphagnum moss. Bog water is acidic, usually at or very near the surface and unaffected by the nutrient-rich groundwater found in the adjacent mineral soil.

Borrow area[5]: A small quarry or excavation beyond the limits of road or dam construction, which provide material for use in the construction project.

Churchill River Diversion: The diversion of the Churchill River under the CRD Licence including the Augmented Flow Program which shall also 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.

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[1] *The Resource Tourism Operators Act (Manitoba).* S.M. 2002, c. 46.

[2] *Manitoba Fishery Regulations, 1987.* SOR/87-509.

[3] Manitoba Conservation, 2010. Protecting Manitoba's Outstanding Landscapes, Manitoba's Protected Areas Initiative. Available from: http://www.gov.mb.ca/conservation/pai/pdf/protected_areas_booklet_web.pdf [accessed April 14, 2011].

[4] Dunster, J., K. Dunster. 1996. Dictionary of Natural Resource Management. ISBN 0-7748-0503-X. UBC Press. University of British Columbia. Vancouver, B.C.

[5] Dunster, J., K. Dunster. 1996. Dictionary of Natural Resource Management. ISBN 0-7748-0503-X. UBC Press. University of British Columbia. Vancouver, B.C.

Commercial Fishing[1]: Means fishing for the purpose of sale or barter or for any other commercial purpose.

Commercial Forest Zone: The geographic area, defined by Manitoba Conservation, Forestry Branch, that is capable of producing trees large enough for commercial harvesting. The Commercial Forest Zone includes most of the Prairie, Boreal Plains and Boreal Shield ecozones. It is also referred to as the Productive Forest Zone.

Commercial Trapping: Means trapping animals for the purpose of selling fur.

Competition[2]: Utilization by two or more individuals, or by two or more populations, of the same limited resource; an interaction where both parties are harmed.

Concentration[3]: The density or amount of a material suspended or dissolved in a fluid (aqueous) or amount of material in a solid (e.g., sediments).

Country Food[4]: Country foods include those harvested by hunting, trapping, fishing or small-scale farming, and produce grown in vegetable gardens and orchards or collected from naturally occurring sources (e.g. wild berries).

Covertype[5]: Four broad cover types are recognized: Softwood 'S', Softwood–Hardwood 'M', Hardwood–Softwood 'N', Hardwood 'H'. The first number of the subtype code indicates the type aggregate (0 to 3 : Softwood; 4 to 7 – Softwood/Hardwood Mixed ; 8 – Hardwood/Softwood Mixed; 9 – Hardwood)

Crown closure[6]: 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 (0 : 0 % : 20 % crown closure; 2 -21 % : 50 % crown closure; 3- 51 % : 70 % crown closure; 4 - 71 % and over)

Cutting class[7]: Cutting class is base on size, vigour, state of development and maturity of a stand for harvesting purposes.

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[1] *Manitoba Fishery Regulations, 1987*. SOR/87-509.

[2] Keeton, W. T. Biological Science, 3rd ed. W.W. Norton & Company, New York, New York.

[3] Manitoba Hydro and Nisichawayasihk Cree Nation. 2003 Wuskwatim Generation Project Environmental Impact Statement.

[4] Health Canada. How Health Canada Contributes to Environmental Assessment. 2010. Government of Canada, Ottawa Ontario.

[5] Manitoba, Government of. 2007. Forestry Inventory Manual 1.3, 1996 - 1997. Manitoba Conservation, Forestry Branch. Forest Inventory Section. Winnipeg, Manitoba.

[6] Manitoba Conservation. 2007. Forestry Inventory Manual 1.2, 1992 - 1996. Manitoba Conservation, Forestry Branch. Forest Inventory Section. Winnipeg, Manitoba.

[7] Manitoba Conservation. 2007. Forestry Inventory Manual 1.2, 1992 - 1996. Manitoba Conservation, Forestry Branch. Forest Inventory Section. Winnipeg, Manitoba.

DELT[1]: Acronym for the presence of Deformities (physical blemishes or distortions), Erosion (wearing away of a structure to reduce the size and effectiveness of that structure), Lesions (abnormal changes in the structure of an organism due to injury or disease, not including injuries due to predation or fishing) and Tumours (an abnormal benign or malignant mass of tissue that does not arise from inflammation) in fish.

Direct Environmental Effect[2]: A direct effect is a consequence of a cause-effect relationship between a project and a specific environmental component.

Duration: describes the temporal boundary or length of time within which the predicted residual environmental effect would last.

Ecological Reserves[3]: Established under the Ecological Reserve Act, ecological reserves are created to preserve unique and rare examples of plants, animals, and geological features.

Ecosystem[4]: Means an ecological system consisting of living things, including humans and plants, together with their respective environments.

Eco–tourism[5]: Means 1) viewing or studying fish, wildlife or a natural area, and 2) recreational or adventure activities such as canoeing, hiking and horseback riding that take place in a natural area.

Effect[6]: Any change that the Project may cause in the environment, including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by Aboriginal persons.

Enduring Features[7]: Combinations of soils and surficial geology that are used to represent the biodiversity within Manitoba's 18 natural regions.

Environmental Impact Statement (EIS)[8]: A document that presents the findings of an environmental assessment.

Exploitation: Harvesting or using a natural resource.

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[1] North/South Consultants Inc. 2003-2010. Keeyask Generating Station Environmental Studies Program reports. Prepared for Manitoba Hydro.

[2] Canadian Environmental Assessment Agency 2010. Policy and Guidance Glossary. Available from http://www.ceaa.gc.ca/default.asp?lang=En&n=B7CA7139-1&offset=1&toc=show. [accessed April 13, 2011].

[3] *The Ecological Reserves Act (Manitoba).* C.C.S.M. c. E5.

[4] *The Ecological Reserves Act (Manitoba).* C.C.S.M. c. E5.

[5] *The Resource Tourism Operators Act (Manitoba).* S.M. 2002, c. 46.

[6] *The Canadian Environmental Assessment Act.* S.C. 1992, c.37.

[7] Manitoba Conservation, 2010. Protecting Manitoba's Outstanding Landscapes, Manitoba's Protected Areas Initiative. Available from: http://www.gov.mb.ca/conservation/pai/pdf/protected_areas_booklet_web.pdf [accessed April 14, 2011].

[8] Canadian Environmental Assessment Agency 2010. Policy and Guidance Glossary. Available from http://www.ceaa.gc.ca/default.asp?lang=En&n=B7CA7139-1&offset=1&toc=show. [accessed April 13, 2011].

Flooding: 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.

Foreign Resident[1]: A person who is neither a Canadian citizen nor a resident of Manitoba.

Gathering: Collection plants for medicinal and dietary purposes and other natural products such as firewood, driftwood, or feathers for cultural purposes.

Geographic Information System[2]: The use of a computer system to overlay large volumes of spatial data of different kinds. The data are referred to a set of geographical coordinates and encoded in computer (digital) format so they can be sorted, selectively retrieved, statically and spatially analyzed).

Guide[3]: A person who accompanies another person and provides direction and expertise to assist that person in locating, hunting, taking or killing fish or wildlife.

Habitat[4]: The place where a plant or animal lives; often related to a function such as breeding, feeding etc.

High-grading[5]: the practice of selecting only the most healthy or valuable individuals in harvesting a natural resource (as timber or fish).

Hydroelectric: Of or relating to the production of electricity by water power.

Indirect Environmental Effect[6]: A secondary environmental effect that occurs as a result of a change that a project may cause in the environment. An indirect effect is at least one step removed from a project activity in terms of cause-effect linkages.

Interdisciplinary approach: refers to research or study that integrates concepts from different disciplines resulting in a synthesised or co-ordinated coherent whole[7].

Keeyask Generation Project: The Keeyask Generation Project (the Project) is a proposed 695–MW hydroelectric generating station located near Gull Rapids on Nelson River in the Province of Manitoba

Lake Winnipeg Regulation: Lake Winnipeg Regulation, completed in 1976, allowed Lake Winnipeg to be regulated within certain limits thereby allowing for greater flows into the Nelson River when needed.

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[1] *The Wildlife Act (Manitoba)*. C.C.S.M. c. W130.

[2] Dunster, J., K. Dunster. 1996. Dictionary of Natural Resource Management. ISBN 0-7748-0503-X. UBC Press. University of British Columbia. Vancouver, B.C.

[3] *The Resource Tourism Operators Act (Manitoba)*. S.M. 2002, c. 46.

[4] North/South Consultants Inc. 2003-2010. Keeyask Generating Station Environmental Studies Program reports. Prepared for Manitoba Hydro.

[5] "High-grading". 2012. Merriam-Webster.com. Available from: from http://www.merriam-webster.com/dictionary/high-grading. [accessed February 14, 2012].

[6] Canadian Environmental Assessment Agency 2010. Policy and Guidance Glossary. Available from http://www.ceaa.gc.ca/default.asp?lang=En&n=B7CA7139-1&offset=1&toc=show. [accessed April 13, 2011].

[7] Harvey, L., 2004–9, Analytic Quality Glossary, Quality Research International.

Land Use Categories[1]: Zoning categories governing certain prohibited or permitted activities within provincial parks.

Local Study Area: The spatial area within which local effects are assessed (*i.e.,* within close proximity to the action where direct effects are anticipated).

Lodge[2]: An accommodation facility of a permanent or semi-permanent nature that accommodates nine or more persons.

Magnitude: A measure of how adverse or beneficial an effect may be.

Mean annual increment[3]: or mean annual growth refers to the average growth per year a tree or stand of trees has exhibited/experienced to a specified age.

Member[4]: Means a person who is a "Member of a band" as defined in subsection 2(1) of the *Indian Act* (Canada).

Merchantable: A tree or stand of trees is considered to be merchantable once it has reached a size, quality, volume or a combination of these that permits harvesting and processing. Merchantability is independent of economic factors, such as road accessibility or logging feasibility.

Mitigation[5]: A means of reducing the significance of adverse effects. Under CEAA, mitigation is "the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means".

Monitoring[6]: A continuing assessment of conditions at and surrounding the action. This determines if effects occur as predicted or if operations remain within acceptable limits, and if mitigation measures are as effective as predicted.

Nature (of effect): Classification of effects such as positive, neutral and adverse.

Non-Commercial Forest Zone: The geographic area, defined by Manitoba Conservation, Forestry Branch, that is predominately not capable of producing trees large enough for commercial harvesting. The Non-Commercial Forest Zone lies north of the provincially designated by forest management administrative boundary areas (Forest Sections and Forest Management Units).

Non–resident[7]: A person who is a Canadian citizen but is not a Manitoba resident.

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[1] *The Provincial Parks Act (Manitoba).* C.C.S.M. c. P20.

[2] *The Resource Tourism Operators Act (Manitoba).* S.M. 2002, c. 46.

[3] Dunster, J., K. Dunster. 1996. Dictionary of Natural Resource Management. ISBN 0-7748-0503-X. UBC Press. University of British Columbia. Vancouver, B.C.

[4] *The Indian Act.* R.S.C., c.I-5

[5] *The Canadian Environmental Assessment Act.* S.C. 1992, c.37.

[6] Canadian Environmental Assessment Agency 2010. Policy and Guidance Glossary. Available from http://www.ceaa.gc.ca/default.asp?lang=En&n=B7CA7139-1&offset=1&toc=show. [accessed April 13, 2011].

[7] The Wildlife Act (Manitoba). C.C.S.M. c. W130.

Outcamp[1]: An accommodation facility of a permanent or semi-permanent nature that accommodates fewer that nine persons.

Outfitter[2]: Means a person who, for gain, remuneration or reward or the hope or expectation of gain, remuneration or reward, provides two or more outfitting services to others in connection with hunting, fishing or ecotourism activities.

Parasite[3]: An organism that lives in association with, and at the expense of, another organism, the host, from which it obtains organic nutrition.

Pollution: any alteration of the natural environment producing a condition that is harmful to living organisms.

Population[4]: A group of individuals belonging to the same species.

Park Reserve[5]: A temporary designation under the *Manitoba Provincial Parks Act* to ensure that the lands under consideration for provincial park status are not otherwise allocated or used while planning and consultation is taking place.

Pelt[6]: Means the skin or hide of a fur bearing animal that has not been tanned or otherwise processed by chemical or mechanical means.

Productive forestland[7]: Includes all forest land capable of producing merchantable wood regardless of its existing stage of productivity.

Project: The Keeyask Generation Project.

Provincial Forest[8]: Crown Lands reserved for a perpetual growth of timber withdrawn from disposition, sale, settlement or occupancy.

Provincial Natural Park[9]: Crown lands designated to protect natural landscapes as well as to provide recreational and resource use opportunities.

Provincial Park[10]: Crown lands designated under the *Manitoba Provincial Parks Act.*

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[1] *The Resource Tourism Operators Act (Manitoba).* S.M. 2002, c. 46.

[2] *The Resource Tourism Operators Act (Manitoba).* S.M. 2002, c. 46.

[3] Manitoba Hydro and Nisichawayasihk Cree Nation. 2003 Wuskwatim Generation Project Environmental Impact Statement.

[4] Keeton, W. T. Biological Science, 3rd ed. W.W. Norton & Company, New York, New York.

[5] *The Provincial Parks Act (Manitoba).* C.C.S.M. c. P20.

[6] *The Wildlife Act (Manitoba).* C.C.S.M. c. W130.

[7] Manitoba, Government of. 2007. Forestry Inventory Manual 1.3, 1996 - 1997. Manitoba Conservation, Forestry Branch. Forest Inventory Section. Winnipeg, Manitoba.

[8] *The Provincial Parks Act (Manitoba).* C.C.S.M. c. P20.

[9] *The Provincial Parks Act (Manitoba).* C.C.S.M. c. P20.

[10] *The Provincial Parks Act (Manitoba).* C.C.S.M. c. P20.

Provincial Wilderness Park[1]: This designation preserves representative areas of a natural region, meaning no resource extraction such as logging, mining, or development of hydro–electric power is allowed. The purpose of wilderness parks is to protect natural landscapes in an undisturbed state and provide recreational opportunities that depend on a pristine environment.

Recreational Fishing[2]: Means fishing by dip netting, seine netting, minnow trapping, angling, bow fishing or spearfishing, but does not include:

a) fishing by an Indian for food for their personal use or for the use of their immediate family, or
b) commercial fishing.

Regional Study Area: The spatial area in which effects are assessed (*i.e.,* extending a distance from the project footprint in which both direct and indirect effects are anticipated to occur).

Residual Effect[3]: An environmental effect that remains, or is predicted to remain, even after mitigation measures have been applied.

Resident[4]: A person living in Manitoba for the last consecutive six months.

Seed orchard[5]: A plantation of trees either proven by analysis to be genetically superior, or a plantation of plus trees that are being tested for superior genetic traits. The seed orchard is isolated to reduce cross-pollination from potentially inferior, outside sources, and is intensively managed to improve the genotype and produce frequent, abundant, and easily harvestable seed crops.

Site index: a classification that describes the potential for forest trees to grow at a particular location or "site". It relates to the productivity of the site.

Spatial Boundary: The spatial extent of potential environmental effects, traditional and local knowledge, current and proposed land use by Aboriginal groups and ecological, technical and social and cultural considerations[6].

Sports Fishing: See recreational fishing or angling.

Stakeholders[7]: Are members of the public and special interest groups, federal authorities, provincial or municipal governments, landowners or other parties who have an interest in the proposed project.

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[1] *The Provincial Parks Act (Manitoba).* C.C.S.M. c. P20.

[2] *Manitoba Fishery Regulations, 1987*. SOR/87-509.

[3] Canadian Environmental Assessment Agency 2010. Policy and Guidance Glossary. Available from http://www.ceaa.gc.ca/default.asp?lang=En&n=B7CA7139-1&offset=1&toc=show. [accessed April 13, 2011].

[4] *The Wildlife Act (Manitoba).* C.C.S.M. c. W130.

[5] Dunster, J., K. Dunster. 1996. Dictionary of Natural Resource Management. ISBN 0-7748-0503-X. UBC Press. University of British Columbia. Vancouver, B.C.

[6] Canadian Environmental Assessment Agency. March 2012. Draft Environmental Impact Statement Guidelines proposed by the Keeyask Hydropower Limited Partnership.

[7] Major Projects Management Office. 2008. Guide to Preparing a Project description for a Major Resource Project. Government of Canada, Ottawa, Ontario.

Stand density[1]: A quantitative measure of the number and size of trees on a forest site. Can be expressed as number of trees per hectare, basal area (m2/hectare), stand density index, or weight. Unless specified, stand density would include all trees regardless of age.

Stand Stock Volume Tables: Compiled from provincial volume sampling data, the table is comprised of forest stand volume estimates by type aggregate, diameter at breast height (DBH) class and species for specific areas throughout the province. Volumes are provided at various utilization levels for cutting classes 3, 4 and 5 stands.

Study Area: The geographic limits within which an impact to a VEC is assessed.

Subtype[2]: 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 type aggregate code identifies the subtype. Subtype will include non-productive forested land and non-forested land codes. Subtype will also include the Non-Productive Forested Land and Non Forested Land codes.

Timber Dues[3]: Crown Timber harvested in Manitoba is measured in cubic metres (m^3). For each cubic metre of timber harvested, specific dues and charges must be paid. Commercial users must pay three specific charges as per The Forest Act, which include Crown Timber Dues, Forest Renewal Charge and Forest Protection Charge.

Type aggregate[4]: 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.

Traditional Area[5]: An area that has been historically used or occupied for the purposes of subsistence hunting, fishing and gathering.

Trapping[1]: Means taking, capturing or killing or attempting to take, capture or kill wildlife by any means or contrivance designed to enclose, capture, hold, ensnare or otherwise restrain an animal, whether that means or contrivance kills the animal or not.

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[1] Dunster, J., K. Dunster. 1996. Dictionary of Natural Resource Management. ISBN 0-7748-0503-X. UBC Press. University of British Columbia. Vancouver, B.C.

[2] Manitoba, Government of. 2007. Forestry Inventory Manual 1.3, 1996 - 1997. Manitoba Conservation, Forestry Branch. Forest Inventory Section. Winnipeg, Manitoba.

[3] Manitoba, Government of. Manitoba Conservation. 2011. "Timber Pricing" Available from http://www.gov.mb.ca/conservation/forestry/timber-admin/index.html [accessed February 20, 2011].

[4] Manitoba, Government of. 2007. Forestry Inventory Manual 1.3, 1996 - 1997. Manitoba Conservation, Forestry Branch. Forest Inventory Section. Winnipeg, Manitoba.

[5] Notzke, C. 1994. Aboriginal Peoples and Natural Resources in Canada. Captus Press, Concord Ontario.

Valued Environmental Component[2]: Any part of the environment that is considered important by the proponent, public, scientists or government involved in the assessment process. Importance may be determined on the basis of cultural values or scientific concern.

Veneer[3]: unconsolidated materials too thin to mask the minor irregularities of the underlying unit surface; ranges from 10 cm to 1 m in thickness and will possess no form typical of the materials genesis.

Wildlife[4]: Means a live or dead vertebrate animal of any species or type that is not a fish.

Wildlife Management Area[5]: Crown lands set aside for the better management, conservation and enhancement of the wildlife resources of the province.

Working group[6]: This term indicates the grouping of subtypes, where the dominant or leading species in the species composition forms the working group (*i.e.,* the jack pine working group contains all the subtypes where jack pine is the leading species in the subtype species composition).

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[1] *The Wildlife Act (Manitoba)*. C.C.S.M. c. W130.

[2] Hegmann, G.C. *et al.,* 1999. Cumulative Effects Assessment Practitioners Guide, Canadian Environmental Assessment Agency, Ottawa, Ontario.

[3] Canada Soil Survey Committee, Subcommittee on Soil Classification. 1978. The Canadian system of soil classification. Can. Dep. Agric. Publ. 1646. Supply and Services Canada, Ottawa, Ont. 164 pp.

[4] *The Wildlife Act (Manitoba)*. C.C.S.M. c. W130.

[5] *The Wildlife Act (Manitoba)*. C.C.S.M. c. W130.

[6] Manitoba, Government of. 2007. Forestry Inventory Manual 1.3, 1996 - 1997. Manitoba Conservation, Forestry Branch. Forest Inventory Section. Winnipeg, Manitoba.

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APPENDIX 1A
Production (marketed weights) and Value of the Commercial Fisheries Located in the Split Lake and Fox Lake Resource Management Areas (1960 to 2008)

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		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
Assean	1965	23,958	14,337	3,219	7,705	1,148	343	-	-	28,325	22,385
Assean	1966	15,262	8,579	896	2,060	432	125	-	-	16,590	10,765
Assean	1968	3,032	3,243	867	1,159	65	35	-	-	3,964	4,437
Assean	1969	1,172	3,489	203	1,007	0	0	-	-	1,375	4,496
Assean	1982	5,159	4,154	1,041	4,682	2,765	2,641	-	-	8,965	11,477
Assean	1983	18,583	17,410	957	5,497	1,638	2,680	-	-	21,178	25,587
Assean	1984	8,806	5,729	1,363	2,152	3,214	3,370	-	-	13,383	11,250
Assean	1985	2,706	3,023	754	3,815	2,705	4,599	-	-	6,165	11,437
Assean	1987	123	135	1,422	12,513	1,192	3,285	-	-	2,737	15,933
Assean	1988	2,735	2,886	1,569	17,238	1,983	5,243	-	-	6,287	25,367
Assean	1989	1,328	1,192	911	3,215	2,348	3,048	1	2	4,588	7,456
Assean	1990	433	212	553	1,719	1,089	2,003	-	-	2,075	3,933
Assean	1991	288	267	1,267	6,662	2,296	4,971	-	-	3,851	11,899
Assean	1996	441	-	356	-	924	-	32	-	1,753	3,984
Assean	2002	154	-	239	-	348	-	35	-	776	2,438
Assean	2004	479	-	1,159	-	2,512	-	1	-	4,151	8,879
Assean	2006	337	-	1,124	-	726	-	68	-	2,255	6,492
Assean	2007	148	-	270	-	494	-	232	-	1,144	2,031
Assean	2008	389	-	83	-	189	-	145	-	806	1,098
									Assean Total	**130,368**	**191,346**
									Assean Average	**6,861**	**10,071**
Atkinson	1963	8,987	14,030	2,094	5,556	7,508	4,688	-	-	18,589	24,274
Atkinson	1964	10,305	47,375	5,078	31,909	4,395	2,021	-	-	19,778	81,305
Atkinson	1965	8,529	16,588	2,800	16,758	5,584	3,341	-	-	16,913	36,687
Atkinson	1966	4,067	15,770	1,593	7,552	5,318	5,735	-	-	10,978	29,057
Atkinson	1967	12,495	34,699	4,855	20,897	8,596	14,323	-	-	25,946	69,919
Atkinson	1968	19,433	51,957	2,121	11,342	5,145	6,878	-	-	26,699	70,177
Atkinson	1969	14,016	57,469	322	1,915	463	1,001	-	-	14,801	60,385
Atkinson	1969	5,498	-	50	0	109	-	-	-	5,657	-
Atkinson	1970	9,092	20,700	1,184	6,531	270	702	-	-	10,546	27,933
Atkinson	1970	358	-	29	-	470	-	-	-	857	-

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		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
Atkinson	1971	5,687	11,428	1,263	8,184	225	424	-	-	7,175	20,035
Atkinson	1971	245	-	185	0	109	-	-	-	539	-
Atkinson	1972	3,709	4,507	3,162	11,442	673	389	-	-	7,544	16,338
Atkinson	1973	1,770	2,368	42	187	-	-	-	-	1,812	2,555
Atkinson	1976	819	1,286	386	1,834	563	402	-	-	1,768	3,522
Atkinson	1977	4,593	6,489	57	233	1,599	2,041	-	-	6,249	8,762
Atkinson	1979	9,762	31,664	4,587	33,348	2,732	5,395	1	3	17,082	70,409
Atkinson	1980	11,417	27,729	160	1,413	1,533	2,895	-	-	13,110	32,037
Atkinson	1981	17,115	24,378	2,267	17,562	5,531	9,509	2	12	24,915	51,461
Atkinson	1982	1,880	-	420	-	1,379	no data	-	-	3,679	-
Atkinson	1983	858	1,035	1,413	7,715	1,012	1,689	-	-	3,283	10,439
Atkinson	1984	337	583	869	4,655	611	1,394	-	-	1,817	6,632
Atkinson	1985	8,303	10,821	2,369	11,860	1,238	2,073	-	-	11,910	24,754
Atkinson	1986	12,274	11,009	83	635	1,791	4,769	-	-	14,148	16,413
Atkinson	1989	3,102	2,661	2,051	6,931	3,196	3,878	1	-	8,350	13,470
									Atkinson Total	**274,145**	**676,564**
									Atkinson Average	**10,966**	**32,217**
Billard	1966	4,166	5,983	458	1,315	1,644	472	-	-	6,268	7,769
Billard	1969	8,092	27,522	272	1,308	-	-	-	-	8,364	28,830
Billard	1970	8,263	21,727	89	511	-	-	-	-	8,352	22,238
Billard	1971	6,547	16,439	14	77	-	-	7	22	6,568	16,538
Billard	1972	3,897	7,896	6	26	17	11	-	-	3,920	7,933
Billard	1973	6,834	9,960	96	413	-	-	218	49	7,148	10,422
Billard	1975	6,579	15,770	43	182	3,218	3,559	-	-	9,840	19,511
									Billard Total	**50,460**	**113,241**
									Billard Average	**7,209**	**16,177**
Bradshaw	1960	862	1,677	-	-	-	-	-	-	862	1,677
Bradshaw	1961	1,179	1,888	-	-	-	-	-	-	1,179	1,888
Bradshaw	1962	2,449	5,808	-	-	-	-	-	-	2,449	5,808

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
									Bradshaw Total	**4,490**	**9,372**
									Bradshaw Average	**1,497**	**3,124**
Buckland	1967	13,677	9,492	-	-	-	-	1,842	2,557	15,519	12,049
Buckland	1968	8,342	17,840	-	-	-	-	980	2,227	9,322	20,066
Buckland	1969	9,852	34,356	-	-	-	-	-	-	9,852	34,356
Buckland	1970	9,132	24,395	-	-	-	-	198	567	9,330	24,962
Buckland	1971	9,523	24,210	-	-	-	-	88	253	9,611	24,463
Buckland	1982	5,410	7,851	-	-	1,906	1,741	384	702	7,700	10,294
Buckland	1985	526	875	-	-	484	794	10	26	1,020	1,695
Buckland	1987	1,907	-	11	-	758	-	162	-	2,838	-
Buckland	1987	1,611	9,705	-	89	1,741	6,862	83	801	3,435	17,458
Buckland	1988	4,852	10,065	-	-	1,047	2,045	206	452	6,105	12,561
Buckland	1990	676	918	-	-	244	-	21	15	941	933
									Buckland Total	**75,673**	**158,838**
									Buckland Average	**6,879**	**15,884**
Butnaw	1968	181	485	68	364	68	91	-	-	317	940
Butnaw	1982	1,080	5,809	-	-	-	-	-	-	1,080	5,809
Butnaw	1993	2,068	3,739	2	7	181	237	-	-	2,251	3,982
Butnaw	1994	2,360	3,755	369	2,254	205	215	15	13	2,949	6,237
									Butnaw Total	**6,597**	**16,969**
									Butnaw Average	**1,649**	**4,242**
Caldwell	1971	1,616	4,191	30	143	114	121	-	-	1,760	5,490
Caldwell	1972	1,307	2,648	48	215	-	-	-	-	1,355	3,550
Caldwell	1982	3,549	4,229	241	1,037	699	869	-	-	4,489	16,050
									Caldwell Total	**7,604**	**25,090**
									Caldwell Average	**2,535**	**8,363**

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
Campbell	1965	8,261	4,943	1,945	5,818	3,685	1,103	-	-	13,891	11,864
Campbell	1966	6,527	9,373	468	1,343	1,010	299	-	-	8,005	11,016
Campbell	1970	3,559	2,965	186	629	0	0	-	-	3,745	3,594
									Campbell Total	**25,641**	**26,474**
									Campbell Average	**8,547**	**8,825**
Christie	1965	1,806	1,081	2,432	7,276	74	22	-	-	4,312	8,378
Christie	1966	876	629	15	56	40	11	-	-	931	697
Christie	1970	802	595	144	635	-	-	-	-	946	1,230
Christie	1971	2,141	2,968	1,228	5,805	-	-	-	-	3,369	8,773
									Christie Total	**9,558**	**19,078**
									Christie Average	**2,390**	**4,770**
Cygnet	1961	1,041		-		-		751	-	1,792	no data
									Cygnet Total	**1,792**	no data
Dafoe	1961	513	658	99	317	-	-	-	-	612	974
Dafoe	1963	11,038	17,231	1,692	5,284	8,091	5,052	6,277	3,919	27,098	31,486
Dafoe	1964	3,144	3,854	765	2,111	1,420	653	-	-	5,329	6,618
Dafoe	1966	4,868	10,488	436	2,381	1,583	2,727	-	-	6,887	15,596
Dafoe	1969	2,486	7,558	81	405	860	1,065	475	122	3,902	9,149
Dafoe	1970	5,481	13,090	1,823	8,227	3,673	3,852	5	-	10,982	25,170
Dafoe	1971	1,840	4,582	94	562	953	1,294	-	-	2,887	6,438
Dafoe	1973	651	3,086	110	904	557	1,140	416	791	1,734	5,921
Dafoe	1976	1,469	2,835	2,166	12,843	1,787	2,196	900	760	6,322	18,635
Dafoe	1977	3,002	5,717	2,166	11,154	510	590	1	-	5,679	17,461
Dafoe	1978	3,439	7,600	1,879	10,466	1,941	3,763	2,596	4,915	9,855	26,743
Dafoe	1979	2,842	6,193	644	4,811	1,696	4,235	2,978	3,366	8,160	18,605
Dafoe	1980	3,473	6,123	1,632	12,257	737	1,392	1,026	1,166	6,868	20,938
Dafoe	1982	108	129	33	148	145	137	118	719	404	1,134
Dafoe	1983	6,183	7,439	1,302	6,959	1,623	2,883	3,744	2,226	12,852	19,507

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
Dafoe	1984	3,204	5,317	880	868	732	1,373	1	-	4,817	7,559
Dafoe	1985	4,629	6,076	1,343	6,568	1,523	2,789	1	151	7,496	15,584
Dafoe	1987	2,345	2,913	877	7,797	702	1,946	-	-	3,924	12,656
									Dafoe Total	**125,808**	**260,174**
									Dafoe Average	**6,989**	**14,454**
Fidler	1960	15,059	19,529	-	-	594	96	-	-	15,653	19,625
Fidler	1961	12,213	41,058	-	-	-	-	-	-	12,213	41,058
Fidler	1962	9,850	26,468	-	-	-	-	-	-	9,850	26,468
Fidler	1963	4,281	6,683	8	15	-	-	-	-	4,289	6,698
Fidler	1964	11,573	31,925	9	40	-	-	30	149	11,612	32,114
Fidler	1965	10,465	20,353	7	45	-	-	9	24	10,481	20,422
Fidler	1966	4,626	15,281	-	-	742	853	-	-	5,368	16,134
Fidler	1967	3,191	8,862	4	10	-	-	-	-	3,195	8,872
Fidler	1968	1,379	5,530	-	-	980	1,043	-	-	2,359	6,573
Fidler	1969	4,300	14,554	-	-	-	-	-	-	4,300	14,554
Fidler	1970	8,246	21,930	-	-	-	-	-	-	8,246	21,930
Fidler	1971	7,753	18,818	45	253	-	-	83	231	7,881	19,303
Fidler	1973	8,432	11,985	-	-	-	-	22	34	8,454	12,019
Fidler	1975	7,975	18,046	16	71	2,436	2,680	-	-	10,427	20,797
Fidler	1985	512	855	-	-	1,019	1,872	2	2	1,533	2,729
Fidler	1986	2,084	3,015	17	212	2,145	2,350	-	-	4,246	5,577
Fidler	1990	2,137	3,101	59	179	1,079	1,976	-	-	3,275	5,255
									Fidler Total	**123,382**	**280,125**
									Fidler Average	**7,258**	**16,478**
Gull Lake	1998	80	-	13	-	53	-	60	-	206	256
									Gull Total	**206**	**256**
Handle	1963	1,005	785	74	116	140	22	428	1,069	1,647	1,992
Handle	1966	1,808	1,298	1,134	3,256	204	59	582	1,003	3,728	5,615

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
									Handle Total	**5,375**	**7,607**
									Handle Average	**2,688**	**3,804**
Holmes	1961	3,318	3,187	-	-	-	-	-	-	3,318	3,187
Holmes	1962	1,864	1,768	-	-	-	-	-	-	1,864	1,768
Holmes	1965	14,554	8,709	1,451	4,342	415	124	-	-	16,420	13,175
Holmes	1966	13,445	9,654	666	1,914	707	203	4	4	14,822	11,776
Holmes	1967	26,951	18,711	559	777	1,248	347	5	9	28,763	19,844
									Holmes Total	**65,187**	**49,749**
									Holmes Average	**13,037**	**9,950**
Holmes-Thomas	1968	19,963	21,350	-	-	-	-	-	-	19,963	21,350
Holmes-Thomas	1969	22,211	74,673	136	718	11	23	-	-	22,358	75,414
Holmes-Thomas	1970	21,650	55,394	40	230	57	39	-	-	21,747	55,663
Holmes-Thomas	1971	18,193	35,417	178	628	0	0	-	-	18,371	36,045
Holmes-Thomas	1972	20,531	26,176	32	149	508	308	-	-	21,071	26,633
									Holmes-Thomas Total	**103,510**	**215,105**
									Holmes-Thomas Average	**20,702**	**43,021**
Kiask	1963	922	-	-	-	-	-	999	-	1,921	-
Kiask	1965	4,784	-	-	-	506	-	2,033	-	7,323	-
Kiask	1970	962	-	-	-	-	-	680	-	1,642	-
Kiask	1971	1,290	-	-	-	-	-	357	-	1,647	-
									Kiask Total	**12,533**	**-**
									Kiask Average	**3,133**	**-**
Limestone	1969	10,705	31,758	-	-	3,075	4,207	-	-	13,780	35,965
Limestone	1970	2,269	1,758	-	-	475	607	-	-	2,744	2,364

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
									Limestone Total	**16,524**	**38,329**
									Limestone Average	**8,262**	**19,165**
Little Cygnet	1961	1,040	1,666	-	-	-	-	751	3,126	1,791	4,792
Little Cygnet	1962	1,475	1,399	-	-	-	-	510	1,452	1,985	2,850
									Little Cygnet Total	**3,776**	**7,642**
									Little Cygnet Average	**1,888**	**3,821**
Moose & Stephens	1978	1,070	5,360	8	134	559	2,227	123	109	1,760	7,831
Moose & Stephens	1979	2,026	9,548	3	34	5	14	365	345	2,399	9,941
Moose & Stephens	1980	626	2,257	193	758	-	75	418	252	1,237	3,342
Moose & Stephens	1980	255	-	18	-	36	-	79	-	388	-
Moose & Stephens	1981	1,768	2,541	2,548	19,809	2	5	3	5	4,321	22,359
Moose & Stephens	1983	545	3,313	19	129	102	82	45	44	711	3,569
Moose & Stephens	1984	370	2,158	16	120	238	600	15	103	639	2,981
Moose & Stephens	1986	146	787	39	255	113	262	-	-	298	1,304
Moose & Stephens	1989	499	577	193	601	234	227	272	130	1,198	1,535
									Moose and Stephens Total	**12,951**	**52,862**
									Moose and Stephens Average	**1,439**	**6,608**
Moose Nose	1968	4,516	4,830	-	-	481	321	-	-	4,997	5,152
Moose Nose	1971	1,643	1,795	-	-	759	369	-	-	2,402	2,164
Moose Nose	1972	2,342	2,033	-	-	877	510	-	-	3,219	2,543
Moose Nose	1973	85	79	-	-	14	10	-	-	99	88

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
Moose Nose	1974	1,288	3,497	-	-	157	209	-	-	1,445	3,706
Moose Nose	1981	1,328	2,525	-	-	128	-	-	-	1,456	2,525
Moose Nose	1983	1,976	3,046	-	-	254	424	-	-	2,230	3,470
Moose Nose	1984	2,011	4,228	-	-	293	616	-	-	2,304	4,844
Moose Nose	1985	16,125	26,479	-	-	946	1,596	-	-	17,071	28,075
Moose Nose	1986	11,215	9,345	-	-	1,348	3,780	-	-	12,563	13,125
									Moose Nose Total	**47,786**	**65,692**
									Moose Nose Average	**4,779**	**6,569**
Moosewu	1989	115	93	39	183	118	157	-	-	272	433
Moosewu	1996	916	-	337	-	268	-	110	-	1,631	3,251
									Moosewu Total	**1,903**	**3,684**
									Moosewu Average	**952**	**1,842**
Pelletier	1965	5,898	3,529	1,672	5,004	2,033	608	-	-	9,603	9,142
Pelletier	1966	6,643		580		778		-	-	8,001	-
Pelletier	1969	4,187	17,632	-	-	914	932	678	3,831	5,779	22,395
									Pelletier Total	**23,383**	**31,537**
									Pelletier Average	**7,794**	**15,769**
Settee	1960	648	525	-	-	77	25	345	1,118	1,070	1,668
Settee	1963	346	324	-	-	118	74	366	800	830	1,197
Settee	1965	4,570	5,469	65	195	828	248	5,650	10,143	11,113	16,055
Settee	1966	-	-	-	-	487	140	4,054	6,986	4,541	7,126
Settee	1967	4,198	2,915	-	-	51	7	420	583	4,669	3,505
Settee	1969	4,188	17,632	-	-	914	932	679	3,831	5,781	22,395
									Settee Total	**28,004**	**51,946**
									Settee Average	**4,667**	**8,658**
Split	1960	4,200	6,129	2,109	3,762	-	-	-	-	6,309	9,891
Split	1963	7,613	9,508	1,125	2,107	-	-	196	609	8,934	12,224

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
Split	1964	9,022	5,531	11,837	27,211	2,222	681	1,240	4,749	24,321	38,172
Split	1965	9,964	11,924	6,613	15,828	6,360	1,903	1,029	4,001	23,966	33,656
Split	1966	2,215	3,936	1,401	4,206	298	85	12	45	3,926	8,272
Split	1966	1,313	-	159	-	-	-	4	-	1,476	-
Split	1967	10,493	21,252	4,172	8,508	3,291	1,371	374	519	18,330	31,650
Split	1967	1,203	-	280	-	-	-	-	-	1,483	-
Split	1968	9,510	20,341	2,383	6,372	2,774	1,483	117	282	14,784	28,478
Split	1969	11,091	32,001	2,418	12,366	-	-	-	-	13,509	44,367
Split	1970	1,192	3,353	1,263	6,891	562	449	-	-	3,017	10,692
Split	1972	14,789	29,876	-	-	-	-	-	-	14,789	29,876
Split	1973	19,989	44,711	5,140	-	3,427	-	-	-	28,556	44,711
Split	1974	10,832	29,400	3,745	17,652	-	-	-	-	14,577	47,052
Split	1977	18,581	54,160	8,806	47,415	-	-	-	-	27,387	101,575
Split	1978	16,579	55,284	1,746	11,204	-	-	89	125	18,414	66,612
Split	1979	22,266	-	3,373	-	3,971	-	21	-	29,631	-
Split	1980	17,431	42,912	2,380	23,449	1	3	179	216	19,991	66,580
Split	1981	26,148	52,585	5,372	41,686	2,048	2,979	68	72	33,636	97,322
Split	1982	12,733	20,477	4,923	22,104	8,025	7,935	34	30	25,715	50,546
Split	1983	5,264	8,239	3,006	17,568	3,310	5,461	-	-	11,580	31,269
Split	1984	5,155	3,354	3,617	5,669	5,612	5,884	-	-	14,384	14,907
Split	1985	4,464	6,963	2,521	12,778	3,486	5,929	17	22	10,488	25,693
Split	1986	22,157	30,363	4,976	37,831	10,310	26,486	27	36	37,470	94,714
Split	1987	22,807	46,692	5,851	50,638	14,904	39,600	297	1,255	43,859	138,185
Split	1988	26,498	55,867	6,428	32,079	14,258	27,399	372	1,151	47,556	116,497
Split	1989	17,131	33,465	5,401	18,784	19,246	26,736	182	405	41,960	79,389
Split	1990	10,158	15,732	5,698	17,969	10,242	17,744	204	483	26,302	51,927
Split	1991	11,410	18,567	6,859	34,724	14,987	27,988	10,147	5,643	43,403	86,921
Split	1992	3,663	5,735	3,448	19,477	7,333	14,916	15	89	14,459	40,216
Split	1995	14,337	-	5,945	-	11,127	-	2,408	-	33,817	82,639
Split	1996	21,306	-	9,064	-	17,266	-	10,350	-	57,986	121,227
Split	1997	2,134	-	1,193	-	5,251	-	6,015	-	14,593	20,820
Split	1998	9,378	-	6,396	-	11,427	-	14,466	-	41,667	-

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
Split	1998	2,156	-	258	-	4,123	-	1,923	-	8,460	107,412
Split	1999	12,679	-	4,852	-	10,291	-	14,742	-	42,564	83,859
Split	2000	12,383	-	5,786	-	10,387	-	10,445	-	39,001	92,900
Split	2001	10,236	-	17,609	-	14,932	-	8,866	-	51,643	178,838
Split	2002	12,571	-	16,596	-	13,514	-	11,711	-	54,392	177,721
Split	2003	6,038	-	10,843	-	16,209	-	12,240	-	45,330	101,780
Split	2004	7,145	-	12,327	-	21,301	-	5,303	-	46,076	105,474
Split	2005								0	0	0
Split	2006	10,163	-	12,999	-	17,347	-	5,601	-	46,110	104,723
Split	2007	7,498	-	7,870	-	19,444	-	5,501	-	40,313	76,409
Split	2008	5,851	-	1,738	-	5,881	-	1,248	-	14,718	27,710
									Split Total	**1,160,882**	**2,682,906**
									Split Average	**26,384**	**67,073**
Spence	1978	7	22	6	28	4,343	8,077	268	118	4,625	8,245
Spence	1979	-	-	-	-	235	450	-	-	235	450
Spence	1981	1	2	-	-	43	61	181	56	225	119
Spence	1982	0	-	-	-	2,319	3,199	689	215	3,008	3,414
									Spence Total	**8,092**	**12,228**
									Spence Average	**2,023**	**3,057**
Stephens	1980	1,191	2,280	1,740	16,682	357	732	852	2,654	4,140	22,348
Stephens	1993	256	396	102	512	48	42	-	-	406	950
Stephens	1994	20	20	77	410	-	-	-	-	97	430
									Stephens Total	**4,643**	**23,728**
									Stephens Average	**1,548**	**7,909**
Thomas	1965	6,661	-	1,008	-	427	-	-	-	8,096	54,937
Thomas	1965	2,806	9,444	1,660	13,945	358	235	342	1,535	5,166	25,158
Thomas	1966	6,021	4,324	87	185	152	44	-	-	6,260	4,552
Thomas	1967	8,537	5,927	-	-	-	-	-	-	8,537	5,927

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
									Thomas Total	**28,059**	**90,575**
									Thomas Average	**7,015**	**22,644**
War	1960	4,513	8,782	29	70	-	-	-	-	4,542	8,851
War	1961	3,450	5,522	-	-	-	-	-	-	3,450	5,522
War	1962	2,236	8,612	707	2,793	347	165	-	-	3,290	11,569
War	1964	86	357	152	815	104	192	-	-	342	1,363
War	1965	2,629	7,078	64	385	-	-	-	-	2,693	7,464
War	1966	136	782	-	-	-	-	-	-	136	782
War	1967	3,192	13,763	64	358	137	38	-	-	3,393	14,159
War	1968	1,909	5,105	196	629	173	162	-	-	2,278	5,895
War	1969	1,851	6,580	-	-	240	185	82	-	2,173	6,788
War	1970	2,853	10,238	46	258	39	28	-	-	2,938	10,524
War	1971	2,325	6,063	92	325	-	-	-	-	2,417	6,388
War	1972	1,634	3,310	72	326	83	47	-	-	1,789	3,683
War	1973	2,805	7,164	-	-	-	-	-	-	2,805	7,164
War	1975	218	633	7	36	21	32	-	-	246	701
War	1979	4,425	14,732	5	34	75	148	-	-	4,505	14,914
War	1980	3,222	8,476	20	197	114	195	-	-	3,356	8,868
War	1981	3,874	7,968	95	744	290	501	-	-	4,259	9,213
War	1982	97	159	19	86	24	21	-	-	140	266
War	1983	2,235	3,593	2	14	136	235	-	-	2,373	3,842
War	1984	2,514	5,345	83	439	50	93	-	-	2,647	5,877
War	1985	2,239	4,340	8	47	-	-	-	-	2,247	4,387
War	1985	216	-	-	-	-	-	-	-	216	-
War	1986	1,781	2,724	-	-	36	52	-	-	1,817	2,776
War	1988	1,448	3,129	4	18	370	677	-	-	1,822	3,824
War	1993	250	387	250	1,256	-	-	-	-	500	1,644
									War Total	**56,374**	**146,464**
									War Average	**2,255**	**6,103**

		Whitefish		Pickerel (Walleye)		Jackfish (Northern Pike)		Other		All Species	
Waterbody	Year	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Total Paymt. ($2008)	Marketed Weight (kg)	Value ($ 2008)
Waskaiowaka	1960	151	98	2,954	4,789	-	-	73	119	3,178	5,007
Waskaiowaka	1961	475	609	5,606	10,770	-	-	254	733	6,335	12,112
Waskaiowaka	1965	26,712	15,984	4,844	11,594	370	111	380	682	32,306	28,371
Waskaiowaka	1966	21,182	-	1,392	-	1,227	-	21	-	23,822	-
Waskaiowaka	1966	3,086	18,756	427	5,438	1,126	1,647	-	-	4,639	25,840
Waskaiowaka	1967	15,720	-	2,026	-	-	-	6	-	17,752	-
Waskaiowaka	1967	1,084	21,075	34	2,965	14	4	-	8	1,132	24,052
Waskaiowaka	1968	23,676	12,660	3,099	7,458	-	-	-	-	26,775	20,118
Waskaiowaka	1969	20,868	59,529	1,934	9,768	-	-	-	-	22,802	69,297
Waskaiowaka	1970	19,897	-	1,407	-	1,378	-	7	-	22,689	-
Waskaiowaka	1970	7,462	50,003	629	10,400	2,443	2,398	8	39	10,542	62,840
Waskaiowaka	1971	9,331	-	894	-	2,997	-	5	-	13,227	-
Waskaiowaka	1971	82	-	-	-	-	-	-	-	82	-
Waskaiowaka	1972	3,150	3,830	130	588	516	299	-	-	3,796	4,718
								Waskaiowaka Total		**189,077**	**252,354**
								Waskaiowaka Average		**13,506**	**28,039**
Wernham	1965	1,177	704	-	-	462	138	-	-	1,639	842
								Wernham Total		**1,639**	**842**
Totals		**1,578,525**		**356,555**		**497,533**		**172,809**		**2,605,422**	**5,510,779**
Average (annual)		**6,048**		**1,366**		**1,906**		**662**		**9,982**	**22,772**

* Total Payment is total of initial and final payments. Payments for post-1993 are not species specific. Average marketed weight (n=261). Average value calculated by total payments / number payments which are not null (n=242). Values are indexed to 2008 equivalent dollars.

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APPENDIX 1B
Comparison of Fishing Frequency by Lake in Pre- and Post-1997 Periods

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Lake	Frequency of fishing pre-1997 (1960-1996) n=36 years	%	Frequency of fishing in 1997 and later (1997-2008) n=12 years	%
Assean Lake	14	39%	5	42%
Atkinson (Fox)	25	69%	0	0%
Billard	7	19%	0	0%
Bradshaw	3	8%	0	0%
Buckland	11	31%	0	0%
Butnau	4	11%	0	0%
Caldwell	3	8%	0	0%
Campbell	3	8%	0	0%
Christie	4	11%	0	0%
Cygnet	1	3%	0	0%
Dafoe	18	50%	0	0%
Fidler	17	47%	0	0%
Gull Lake	1	3%	0	0%
Handle	2	6%	0	0%
Holmes-Thomas	10	28%	0	0%
Kiask	4	11%	0	0%
Limestone	2	6%	0	0%
Little Cygnet	2	6%	0	0%
Moose and Stephens	9	25%	0	0%
Moose Nose	10	28%	0	0%
Moose Nose	2	6%	0	0%
Pelletier	3	8%	0	0%
Settee	6	17%	0	0%
Split Lake	32	89%	11	92%
Spence	4	11%	0	0%
Stephens	3	8%	0	0%
Thomas	4	11%	0	0%
War	25	69%	0	0%
Waskaiowaka	14	39%	0	0%
Wernham	1	3%	0	0%
Average	**8.1**	**23%**	**0.5**	**4%**

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APPENDIX 1C
Composite Timber Dues Tables

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Table 1C-1: Manitoba Crown Timber Dues for FMU 86 FOR February 2012

Commodity	Short Distance Dues Rate ($/m³)	Medium Distance Dues Rate ($/m³)	Long Distance Dues Rate ($/m³)
Softwood Lumber	$1.75	$1.40	$1.15
Kraft	$2.92	$2.12	$1.34
Newsprint	$1.75	$1.40	$1.15
OSB	$1.75	$1.40	$1.15

Table 1C-2: Other Commodities and Species (April 1, 2010-March 31, 2011)

Other Commodities and Species	Short Distance Dues Rate ($/m³)	Medium Distance Dues Rate ($/m³)	Long Distance Dues Rate ($/m³)
Post and Rails (any species)	$1.40	N/A	N/A
Hardwood lumber	$1.75	$1.40	$1.15
Tamarack used for any commodity or product	$1.75	$1.40	$1.15
Fuelwood	$1.75	N/A	N/A
Bio-product	$1.75	N/A	N/A

The Crown timber dues listed in the above tables have been extracted from the Manitoba Conservation and Water Stewardship website (Manitoba, Government of 2011) and reflect the February 2011 timber dues rates applied to forest products. The rates reflect the influence of the markets' product price index.

Dues rates may change monthly as they are based on commodity prices. Since the commodity value cannot be predicted for the time of clearing nor the product or facility that may process the wood (*i.e.,* kraft mill or private lumber mill) the base rate of $1.15/m³ is used in this valuation process. This was done in consultation with Manitoba Conservation, Forestry Branch (Epp. *pers. comm.* 2011).

The composite dues rates presented in Table 1C-3 have been developed for the application of the Forest Damage Appraisal and Valuation Policy for Crown standing timber estimated within the Project Footprint (Government of Manitoba 2002).

Table 1C-3: FDA&V Composite Dues Rates for FMU 86

FMU	Softwood Lumber Base Rate	Kraft Base Rate	OSB Base Rate	Hardwood Lumber Base Rate	Larch Cedar Base Rate	Softwood Composite Rate	Hardwood Composite Rate
86	$1.15	$1.15	$1.15	$1.15	$1.75	$1.15	$1.15

Source: Manitoba, Government of, "2010-2011 Timber Dues Tables-Base Rate" 2011

The rationale for developing the composite dues rates for all softwood and hardwood products, presented in Table 1C-3 lies in the current timber pricing methodology, the uncertainty of predicting the end use of the timber harvested and the influence of a product's timber price index on the dues rate at any point in time in the future. The timber price index is reviewed monthly and timber dues rates are adjusted to reflect market conditions. The distance of the Project from commercial timber processing facilities renders the possibility of salvaging timber, on an economic basis from the Project site, a remote possibility. In addition, the depressed economic conditions within the forest industry since 2007 are projected to remain soft well into the future. However, the demand for softwood timber by the Kraft Mill in The Pas has remained stable.

The composite dues rates, presented in Table 1C-3 for softwood and hardwood, was not developed to reflect the influence of mill demand, distance from mills and market price index on viable market alternatives of the timber harvested. The rates have been developed, in consultation with Manitoba Conservation and Water Stewardship (Epp, Thorpe and Swanson, *pers. comm.* 2011), and along with the estimates of volume, are only approximations. Final dues valuation may occur after the entire Project Footprint has been cleared when volume, product and current market price index can be accurately assessed.

APPENDIX 1D
Forest Damage Appraisal & Valuation Determination

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Table 1D-1: Project Footprint Productive Forestland within the CFZ by Covertype

Covertype (Ha)				Total (Ha)
S	H	M	N	
754.3	0.0	5.4	23.3	783.0

Notes:
S- Softwood, H- Hardwood, M- Softwood mixed wood, N- Hardwood mixed wood

Table 1D-2: Project Footprint Gross Merchantable Volume (m³) within the CFZ Subject to Valuation

Softwood	Hardwood	Total
40,858.9	5,293.0	46,151.9

Notes:
Project Footprint falls entirely within open Crown land (ownership code =1)

Table 1D-3: Project Footprint Gross Merchantable Volume Valuation ($)

Softwood	Hardwood	Total
46,987.71	6,086.98	53,074.69

Notes:
Based on timber dues as per Table 1C-1, Appendix 1C

Table 1D-4: Project Footprint within CFZ Forest Renewal Charge Valuation ($)

Softwood	Hardwood	Total
234,938.57	2,646.52	237,585.09

Notes:
Based on 2009 Softwood forest renewal charge of $5.75/m³.

Table 1D-5: Project Footprint within the CFZ Fire Protection Cost Valuation ($)

Softwood	Hardwood	Total
6,894.36	457.61	7,351.97

Notes:
Based on Forest Protection Charge of $0.17/m³.

Table 1D-6: Crown Land Forest Damage Appraisal and Valuation Summary

Total Area (ha)	Total Softwood (m^3)	Total Hardwood (m^3)	Soft-wood Dues ($)	Hard-wood Dues ($)	FRC Charge ($)	FP Charge ($)	Total Valuation ($)
783	40,858.9	5,293.0	46,987.71	6,086.98	237,585.09	7,351.97	298,011.75

Notes:
FRC- Forest Renewal Charge; FP- Forest Protection Charge

APPENDIX 1E
Potential Salvageable Stands within the Project Footprint

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Table 1E-1: Potentially Salvageable Timber within the Project Footprint in the Non-Commercial Forest Zone (Construction Phase)

Vegetation_ Composition	FRI_Type Aggregate	Volume /ha (m^3)			Total Volume (m^3)	
		Softwood	Hardwood	Area (ha)	Softwood	Hardwood
BS10	13134	70.9466	3.4108	163.7	11616	558
BS6TA4	51134	21.659	34.6309	1.6	35	56
BS6TA4	51134	21.659	34.6309	0.6	13	20
BS6TL4	16234	43.1427	2.7758	0.3	11	1
BS7JP3	14134	83.6889	9.2505	3.6	304	34
BS7TL3	16134	52.2341	8.937	4.8	253	43
BS7WB2TA1	53134	62.1419	24.7606	3.6	222	89
BS8JP2	13134	70.9466	3.4108	144.4	10242	492
BS8TA1WB1	13134	70.9466	3.4108	3.2	224	11
BS8TA2	13134	70.9466	3.4108	1.4	103	5
BS8WB1TA1	13134	70.9466	3.4108	8.8	623	30
BS9JP1	13134	70.9466	3.4108	4.3	305	15
BS9TA1	13134	70.9466	3.4108	23.6	1673	80
BS9WB1	13134	70.9466	3.4108	0.6	39	2
JP4BS3TA3	6134	73.1701	8.3623	0.4	30	3
JP4TA3BS2WB1	6134	73.1701	8.3623	6.7	488	56
JP6TA2BS2	6134	73.1701	8.3623	1.4	105	12
JP7BS3	6134	73.1701	8.3623	1.3	98	11
JP8BS2	4134	69.7614	5.1674	7.1	495	37
JP9BS1	4134	69.7614	5.1674	0.2	14	1
TA3JP3WB2BS2	81134	42.2677	55.691	2.0	84	111
TA3WB3JP2BS2	81134	42.2677	55.691	3.5	148	195
TA5BS5	82134	24.5266	55.3449	5.8	142	321
TA5WB3BS2	90134	11.3498	77.0825	9.1	104	704
TA6WB2JP1BS1	90134	11.3498	77.0825	8.9	101	683
TA6WB3BA1	90134	11.3498	77.0825	1.5	17	114
TA6WB3BS1	90134	11.3498	77.0825	15.2	173	1173
TA8WB2/ TS	90134	11.3498	77.0825	0.2	2	14
TA9BS1	90134	11.3498	77.0825	1.1	13	87
WB5JP4BS1	86134	22.5747	40.5295	28.0	633	1136
WB6TA3BS1	92134	11.3498	77.0825	6.9	78	530
WB8BS2	92134	11.3498	77.0825	2.4	27	182
WB8TA2	92134	11.3498	77.0825	7.1	80	546
Total				473.2	28493	7350

Notes:
ha=hectares

Table 1E-2: Standing Timber Volume Affected during the Construction Phase of the Project

		Cover Type			
Cutting Class	**Working Group**	**M**	**N**	**S**	**Total (m^3)**
0	Softwood	0.0	0.0	0.0	0.0
0	Hardwood	0.0	0.0	0.0	0.0
1	Softwood	1.1	258.8	10338.9	10598.7
1	Hardwood	0.1	686.6	999.7	1686.4
2	Softwood	0.0	0.0	8484.7	8484.7
2	Hardwood	0.0	0.0	615.4	615.4
3	Softwood	84.1	289.3	11819.5	12193.0
3	Hardwood	45.0	767.7	965.9	1778.6
4	Softwood	162.6	267.7	6645.3	7075.5
4	Hardwood	70.9	421.8	322.0	814.6
5	Softwood	0.0	0.0	0.0	0.0
5	Hardwood	0.0	0.0	0.0	0.0
Softwood Total		247.7	815.8	37288.4	38351.9
Hardwood Total		116.0	1876.0	2902.9	4895.0
Grand Total		363.8	2691.8	40191.3	43246.9

Notes:
M= softwood mixedwood; N= hardwood mixedwood; S= softwood

Table 1E-3: Standing Timber Volume Affected during the Operations Phase of the Project

		Cover Type			
Cutting Class	**Working Group**	**M**	**N**	**S**	**Total (m^3)**
0	Softwood	0.0	0.0	0.0	0.0
0	Hardwood	0.0	0.0	0.0	0.0
1	Softwood	0.0	0.0	1158.4	1158.4
1	Hardwood	0.0	0.0	122.8	122.8
2	Softwood	0.0	0.0	88.7	88.7
2	Hardwood	0.0	0.0	4.4	4.4
3	Softwood	0.0	35.0	699.8	734.8
3	Hardwood	0.0	92.9	51.7	144.5
4	Softwood	51.6	53.5	419.9	525.0
4	Hardwood	22.1	84.3	19.9	126.4
5	Softwood	0.0	0.0	0.0	0.0
5	Hardwood	0.0	0.0	0.0	0.0
Softwood Total		51.6	88.5	2366.8	2506.9
Hardwood Total		22.1	177.2	198.8	398.1
Grand Total		73.8	265.7	2565.5	2905.0

Notes:
M= softwood mixedwood; N= hardwood mixedwood; S= softwood

Table 1E-4: Standing Timber Volume Affected during the Construction and Operations Phase of the Project

		Cover Type			
Cutting Class	**Working Group**	**M**	**N**	**S**	**Total (m^3)**
0	Softwood	0.0	0.0	0.0	0.0
0	Hardwood	0.0	0.0	0.0	0.0
1	Softwood	1.1	258.8	11497.3	11757.1
1	Hardwood	0.1	686.6	1122.5	1809.2
2	Softwood	0.0	0.0	8573.4	8573.4
2	Hardwood	0.0	0.0	619.8	619.8
3	Softwood	84.1	324.3	12519.3	12927.8
3	Hardwood	45.0	860.5	1017.5	1923.1
4	Softwood	214.2	321.2	7065.2	7600.6
4	Hardwood	93.0	506.1	341.9	941.0
5	Softwood	0.0	0.0	0.0	0.0
5	Hardwood	0.0	0.0	0.0	0.0
Softwood Total		299.4	904.3	39655.2	40858.9
Hardwood Total		138.2	2053.2	3101.7	5293.0
Grand Total		437.6	2957.5	42756.9	46151.9

Notes:
M= softwood mixedwood; N= hardwood mixedwood; S= softwood