Keeyask Generation Project

Aquatic Effects Monitoring Plan

Fish Community Monitoring Report

AEMP-2016-09

KEEYASK

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KEEYASK GENERATION PROJECT

AQUATIC EFFECTS MONITORING REPORT

Report #AEMP–2016–09

FISH COMMUNITY MONITORING IN THE NELSON RIVER FROM SPLIT LAKE TO STEPHENS LAKE, SUMMER 2015

Prepared for

Manitoba Hydro

By

S.C. Lavergne, R.A. Remnant, and C.L. Hrenchuk

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North/South Consultants Inc.
Aquatic Environment Specialists

83 Scurfield Blvd.
Winnipeg, Manitoba, R3Y 1G4
Website: www.nscons.ca

Tel.: (204) 284-3366
Fax: (204) 477-4173
E-mail: nscons@nscons.ca

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SUMMARY

Background

The Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan to monitor the effects of construction and operation of the Keeyask Generating Station (GS) on the environment. Besides measuring the accuracy of the predictions made and actual effects of the GS on the environment, monitoring results will provide information on how construction and operation of the GS will affect the environment and if more needs to be done to reduce harmful effects.

Construction of the Keeyask GS began in mid-July 2014. During August and September, the flow in the north and central channels of Gull Rapids was blocked off and all the flow was diverted to the south channel. Cofferdams were constructed in the north and central channels and these channels were dewatered by fall (see construction site map below). The combination of high natural flows in the Nelson River and diversion of flow resulted in water levels on Gull Lake increasing about 1.3 m at the water level monitoring site at Caribou Island. The rise in water levels resulted in flooding along the shoreline and in low-lying areas. During the winter, a cofferdam was constructed extending into the south channel. During the spring of 2015, flows in the Nelson River decreased and water level on Gull Lake went down to pre-construction high water levels.

The monitoring of fish communities (in terms of species composition and abundance) is an important component of the overall plan to monitor the impacts of construction and operation of the Keeyask GS on fish. Fish communities upstream of Gull Rapids, which include several species that are important sources of food to local people, may be affected by operation of the Keeyask GS through reservoir impoundment. Changes in water levels and flow will result in the alteration or loss of existing habitats and the creation of new habitats. Furthermore, these habitat changes will also result in changes to the production of aquatic plants, invertebrates, and forage fish. Results from fish community monitoring during Keeyask GS construction and operation will be used to describe existing fish populations and to provide the basis for assessing potential changes to fish populations that may be associated with the construction and operation of the generating station.

This report presents the results of fish community monitoring conducted in the reach of the Nelson River from Split Lake downstream to the Kettle GS (*i.e.*, Stephens Lake) during summer 2015. Fish community data were previously collected in the Keeyask study area in 2001, 2002, 2003, and 2009. Since 2009, monitoring was conducted every year in Split Lake, and every third year in Stephens Lake, under the Coordinated Aquatic Monitoring Program (CAMP), a program conducted jointly by Manitoba Conservation & Water Stewardship and Manitoba Hydro.

Map of instream structures at the Keeyask Generating Station site, June 2015.

Why is the monitoring being done?

The monitoring of fish communities is being done to answer several questions:

Will the abundance (i.e., catch-per-unit-effort) and species composition of the fish communities in the Keeyask reservoir and Stephens Lake change as a result of construction and operation of the Project?

This question is important because habitat changes associated with the construction and operation of the Keeyask GS (for example, changes in water levels and flows) may result in changes in the abundance and species composition of resident fish communities. It is possible that certain fish species could move away from the newly created reservoir and be lost from the local populations, while other species could move into the reservoir and become more abundant.

For the three Valued Environmental Component (VEC) fish species (i.e., Lake Whitefish, Northern Pike, and Walleye), will a biologically meaningful change in condition factor or growth be observed in the Keeyask reservoir and/or Stephens Lake in comparison to pre-Project conditions?

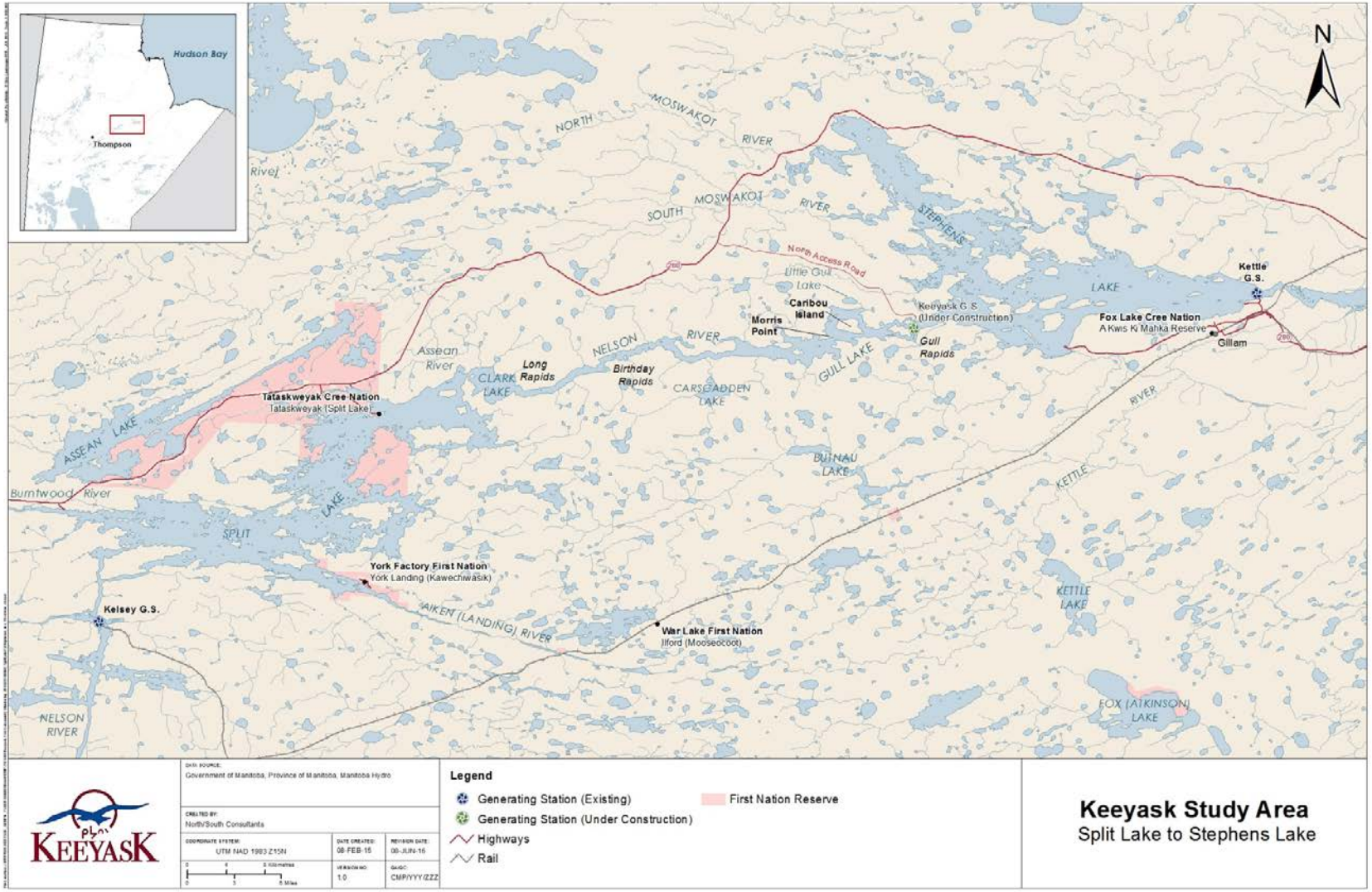
This question is important because a change in body condition (if any of these species become fatter or skinnier than they used to be) might mean that something in their environment is changing.

Will the abundance of small-bodied fish captured in small-mesh index gill nets set in the Keeyask reservoir and Stephens Lake change following construction and during operation of the Project?

This question is important because the small-bodied fish community is the major food source for species such as Walleye and Northern Pike.

What was done?

Sampling was conducted in Split Lake, the Nelson River between Clark Lake and Gull Rapids (including an off-river lake called Little Gull Lake), and Stephens Lake (split into north and south parts) in the summer of 2015 (see study area map below). Two types of gill nets were used: standard gang index which catch large-bodied fish, and small-mesh index which catch small bodied fish (also called forage fish). All fish captured in each waterbody were identified by species and counted. When a large-bodied fish was caught, it was measured and weighed. Ageing structures were taken from Lake Whitefish, Northern Pike, and Walleye so that ages could be determined. All Lake Sturgeon, Lake Whitefish, Northern Pike, Walleye, and White Sucker caught were checked for signs of any abnormalities (including deformities, erosion, lesions, and tumours).



Map of the study area.

Gill net set in the Nelson River (left) and a Walleye being measured (right).

What was found?

A total of 20 species and 3,584 fish were captured in standard gang and small-mesh index gill nets set in 2015. This included 13 large-bodied species and seven forage species. Most species caught during previous studies were also caught in 2015. The species not caught in 2015 are not common, and were captured infrequently over multiple years. The biggest change was in the number of Rainbow Smelt (a small non-native forage fish that is food for larger fish) caught. Fewer Rainbow Smelt were captured in 2015 than during previous studies in all locations.

Catch-per-unit-effort (CPUE) is a measure of how many fish were caught over a certain time in a certain length of net and is used to tell how abundant fish are in an area. The CPUE for fish caught in standard gang index gill nets were similar during baseline studies and in 2015. In small mesh index gill nets, the CPUE in 2015 was higher between Clark Lake and Gull Rapids and in Stephens Lake (both the north and south part) than in any other year, which tells us that there may be more small fish in these areas.

The condition factor (a measure of how fat a fish is at a given size) of Lake Whitefish and Northern Pike was within the range seen in other years in Split Lake and Stephens Lake (north and south parts). Lake Whitefish and Northern Pike caught between Clark Lake and Gull Rapids were thinner than in previous years. Walleye caught in 2015 were thinner than in previous years in all locations.

What does this mean?

The number and type of fish caught was generally similar between previous studies and in 2015. Fish condition was not similar for all fish species between years, but can be quite variable naturally.

What will be done next?

Monitoring will continue at different sampling locations in different years. Split Lake will continue to be sampled every year. Stephens Lake will be sampled in 2018. The Nelson River between Clark Lake and Gull Rapids will be sampled next in 2018, prior to impoundment based on the current construction schedule. Following impoundment in late 2018, two or three consecutive years of monitoring will be conducted in both the Keeyask reservoir and Stephens Lake to record the response of the fish community to the newly formed reservoir and the loss of Gull Rapids. Each year, sampling will be conducted using the same capture methods, so that results can be compared between different years and trends can be seen.

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The collection of biological samples described in this report was authorized by Manitoba Conservation and Water Stewardship, Fisheries Branch, under terms of the Scientific Collection Permit #17-15.

STUDY TEAM

Data Collection

Christian Lavergne

Data Analysis, Report Preparation, and Report Review

Christian Lavergne

Richard Remnant

Claire Hrenchuk

Elena Fishkin

Friederike Schneider-Vieira

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1.0 INTRODUCTION

The Keeyask Generation Project (the Project) is a 695-megawatt (MW) hydroelectric generating station at Gull Rapids on the lower Nelson River in northern Manitoba. The Project is approximately 725 kilometres (km) northeast of Winnipeg, 35 km upstream of the existing Kettle Generating Station, where Gull Lake flows into Stephens Lake, 60 km east of the community of Split Lake, 180 km east-northeast of Thompson and 30 km west of Gillam (Map 1). Construction of the Project began in July 2014.

The *Keeyask Generation Project: Response to EIS Guidelines*, completed in June 2012, provides a summary of predicted effects and planned mitigation for the Project. Technical supporting information for the aquatic environment, including a description of the environmental setting, effects and mitigation, and a summary of proposed monitoring and follow-up programs, is provided in the *Keeyask Generation Project Environmental Impact Statement: Aquatic Environment Supporting Volume* (AE SV). As part of the licencing process for the Project, an Aquatic Effects Monitoring Plan (AEMP) was developed detailing the monitoring activities of various components of the aquatic environment. This Monitoring Plan includes the collection of fish community data upstream and downstream of Gull Rapids, for the construction and operation phases of the Project (Keeyask Hydropower Limited Partnership 2014). This includes targeting species that had been identified as being of particular concern during the environmental assessment (referred to as Valued Ecosystem Components, or VECs). These species include Lake Whitefish, Northern Pike, and Walleye.

1.1 PROGRAM DESCRIPTION

Fish community studies in the Keeyask study area were initially conducted between 2001 and 2004. Surveyed waterbodies included Split Lake (Dunmall *et al*. 2004; Holm and Remnant 2004), Clark Lake (Dunmall *et al*. 2004; Holm and Remnant 2004; Holm 2005), Assean Lake (off-system waterbody that flows into Clark Lake) (Dunmall *et al*. 2003; Holm *et al*. 2003), the reach of the Nelson River between Clark Lake and Gull Rapids (Remnant *et al*. 2004b; Johnson and Parks 2005; Bretecher *et al*. 2007; Johnson 2005, 2007) and Stephens Lake (Pisiak *et al*. 2004; Pisiak 2005a, b; MacDonald 2007). In these studies, fish species composition and abundance were described, fish movements and biological variables were assessed, and fish spawning areas were identified. Concurrent fish studies were also conducted in several tributaries of the Nelson River between Clark Lake and Gull Rapids from 2001 to 2003 to determine fish usage and to assess the importance of each tributary to fish spawning populations (Barth *et al*. 2003; Remnant *et al*. 2004a; Richardson and Holm 2005; Kroeker and Jansen 2006). A similar fish spawning study was conducted in several tributaries of Stephens Lake in 2005 and 2006 (Cassin and Remnant 2008). Also, in Stephens Lake, Walleye (*Sander*

vitreus) condition was evaluated in 2003 (Cooley and Johnson 2008) and the habitat preferences of fish in flooded areas were described in 2006 (Cooley and Dolce 2008).

In 2009, fish community data in the reach of the Nelson River between Clark Lake and Gull Rapids were updated and fish communities in open-water habitat were described (Holm 2010). From 2009–2015 fish community monitoring took place in Split and Assean lakes (annually), and in Stephens Lake (every third year), as part of the Coordinated Aquatic Monitoring Program (CAMP), a program conducted jointly by Manitoba Conservation & Water Stewardship and Manitoba Hydro (CAMP 2014, CAMP in prep.; CAMP unpublished data). The Burntwood River, from First Rapids downstream to the inlet of Split Lake, was added to the program in 2011 (sampled every third year).

Construction and operation of the Keeyask GS may affect Nelson River fish populations upstream of Gull Rapids through changes made to existing habitat due to reservoir impoundment. Changes in water levels and flow will result in the alteration or loss of present habitats (*e.g.*, tributaries, rapids, littoral) and the creation of new habitats. Furthermore, these habitat changes will similarly result in changes to the production of aquatic plants, invertebrates, and forage fish. Downstream of Gull Rapids, construction and operation of the generating station may also affect fish populations in Stephens Lake by changing fish habitat, primarily within the 3-km reach of the Nelson River between the location of the powerhouse and Stephens Lake (KHLP 2012). In addition to changes in water levels, velocity, and sedimentation in this reach of river, spawning habitat in Gull Rapids will be lost due to the footprint of the Keeyask GS and dewatering.

The objective of the 2015 program was to collect information on the species composition and abundance, as well as selected biological metrics, of the fish community in the reach of the Nelson River between Clark Lake and Gull Rapids, and in Split and Stephens lakes. These data will be compared to baseline data to determine if the fish community has changed since completion of the studies for the EIS. If changes are detected, then these data will be considered when analyzing the results of monitoring following impoundment of the Keeyask reservoir.

The following report presents the results of fish community sampling conducted in the reach of the Nelson River between Clark Lake and Gull Rapids and Split and Stephens lakes during summer, 2015.

2.0 THE KEEYASK STUDY SETTING

The study area for the 2015 fish community monitoring program includes Split Lake, the reach of the Nelson River between Clark Lake and Gull Rapids, and Stephens Lake.

Split Lake is immediately downstream of the Kelsey GS at the confluence of the Burntwood and Nelson rivers (Map 1). Due to large inflows from the Nelson and Burntwood rivers, the lake has a detectable current in several locations. Split Lake has maximum and mean depths of 28.0 m and 3.9 m respectively, at a water surface elevation of 167.0 m above sea level (ASL) (Lawrence *et al*. 1999). The surface area of Split Lake was determined to be 26,100 ha (excluding islands), with a total shoreline length, including islands, of 940.0 km (Lawrence *et al*. 1999). The numerous islands in Split Lake represent 411.6 km of the total shoreline.

Clark Lake is located immediately downstream of Split Lake, and approximately 42 km upstream of Gull Rapids (Map 1). Current is restricted to the main section of the lake, with off-current bays outside the main channel. The Assean River is the only major tributary to Clark Lake, and flows into the north side. Downstream from the outlet of Clark Lake, the Nelson River narrows and water velocity increases for a 3 km stretch, known as Long Rapids. For the next 7 km, the river widens, and water velocity decreases. Birthday Rapids is located approximately 10 km downstream of Clark Lake and 30 km upstream of Gull Rapids (Map 1). The drop in elevation from the upstream to downstream side of Birthday Rapids is approximately 2 m. The 14 km reach of the Nelson River between Birthday Rapids and Gull Lake is characterized as a large somewhat uniform channel with medium to high water velocities. There are a few large bays with reduced water velocity and a number of small tributaries that drain into the Nelson River.

Gull Lake is a section of the Nelson River where the river widens, with moderate to low water velocity. Gull Lake is herein defined as the reach of the Nelson River beginning approximately 17 km upstream of Gull Rapids and 14 km downstream of Birthday Rapids, where the river widens to the north into a bay around a large point of land (Map 1), and extending to the downstream end of Caribou Island, approximately 3 km upstream of Gull Rapids. Gull Lake has three distinct basins, the first extending from the upstream end of the lake downstream approximately 6 km to a large island; the second extending from the large island to Morris Point (a constriction in the river immediately upstream of Caribou Island); and the third extending from Morris Point to the downstream end of Caribou Island (Map 1).

Gull Rapids is located approximately 3 km downstream of Caribou Island on the Nelson River (Map 1). Two large islands and several small islands occur within the rapids, prior to the river narrowing. The rapids are approximately 2 km in length, and the river elevation drops approximately 11 m along its 2 km length. A summary of 2014/2015 construction activities at Gull Rapids is provided in Section 2.1.

Just below Gull Rapids, the Nelson River enters Stephens Lake. Stephens Lake was formed in 1971 by construction of the Kettle GS. Between Gull Rapids and Stephens Lake there is an approximately 6 km long reach of the Nelson River that, although affected by water regulation at the Kettle GS, remains riverine habitat with moderate velocity. Construction of the Kettle GS flooded Moose Nose Lake (which formed the north arm of Stephens Lake) and several other small lakes that previously drained into the Nelson River, as well as the old channels of the Nelson River that now lie within the southern portion of the lake. Major tributaries to Stephens Lake include the North and South Moswakot rivers, which enter the north arm of the lake. Looking Back Creek is a second order stream that also drains into the north arm of Stephens Lake (Map 1). Kettle GS is located approximately 40 km downstream of Gull Rapids.

2.1 2014/2015 CONSTRUCTION SUMMARY

Construction of the Keeyask GS began in mid-July 2014 with the construction of the Quarry Cofferdam in the north channel of Gull Rapids (Map 2). In August, the North Channel Rock Groin and North Channel Cofferdam were constructed to divert flow from the north and central channels of Gull Rapids to the south channel. The north and central channels were gradually dewatered by late fall 2014. The Stage 1 Powerhouse Cofferdam was constructed in the fall to permit excavation of the powerhouse. Construction of the Central Dam Cofferdam rock groins began the fall of 2014 and was completed in the summer of 2015. During the winter of 2014/15, high flows in the Nelson River and partial failure of the ice boom resulted in high water levels in Gull Rapids, which required some cofferdams to be raised. The North Channel Rock Groin was extended into the south channel of Gull Rapids during the winter 2014/15 to raise the water level in Gull Lake to promote the formation of a stable ice cover. The groin extension was partially removed in 2015. Construction of the spillway cofferdam, which extends into the south channel of Gull Rapids, began in early winter 2015 and was completed by late summer. Dewatering of the spillway cofferdam occurred in summer/fall 2015. The configuration of cofferdams as of mid-summer 2015 is shown on Map 2.

During July and August 2015, additional ice booms were installed in Gull Lake so that a stable ice cover would develop upstream of the construction site (as noted above, the previous ice boom had partially failed during the winter of 2014/2015). Map 3 illustrates the location of the new ice booms, which are held in place by anchors drilled into the bedrock below the river bottom.

Due to high flows in the Nelson River (almost a 1:20 year flow event) and the construction of the North Channel Rock Groin, water levels in Gull Lake rose to between 155 and 156 m ASL during late summer 2014. This resulted in water levels above the existing environment 95th percentile water level for open-water (154.2 m ASL) until the following spring (Manitoba Hydro 2015). Open-water levels on Gull Lake in the existing environment were as high as 155 m ASL and surpassed 156 m ASL during winter on occasion. The amount of land inundated during the 2014–2015 period is not known, but based on estimates of flooded areas expected in the later

stages of construction (as presented in the Environmental Impact Statement), this area likely included the nearshore areas of much of Gull Lake and some localized areas in and around Gull Rapids, as well as low-lying areas that extended further inland. Water levels during the open-water season of 2015 declined due to lower discharge in the Nelson River. Water levels on Gull Lake ranged from 154 to 155 m ASL in 2015, and inundated areas were likely confined to localized sections of low-lying areas around Gull Lake.

3.0 METHODS

3.1 GILLNETTING

3.1.1 SPLIT LAKE

Gillnetting was conducted in Split Lake (Map 1) as part of CAMP from August 14 to 18, 2015. Standard gang index (SGI) gill nets were used to sample the large-bodied fish community at 12 established sites in Split Lake (Map 4). Standard gang index gill nets were composed of six 22.9-m (25-yd) long by 2.4-m (2.7-yd) deep gillnet panels made of twisted nylon mesh. Individual panels were joined together in a stretched mesh-size sequence of 38, 51, 76, 95, 108, and 127 mm (or 1½, 2, 3, 3¾, 4¼, and 5 inches). All SGI gill nets were set on the bottom for approximately 24 hours. A hand-held global positioning system unit was used to record the location of each gillnetting site. Water depth was measured (in metres) at each end of the net using a portable depth sounder, and water temperature was measured (± 0.5°C) at least once daily using a hand-held thermometer.

Small-mesh index gill nets also were set to collect information on forage (*i.e.*, small-bodied) and juvenile fish communities. These nets were attached to the 1½-inch end of four of the SGI gill nets. Small-mesh index gill nets consisted of three 10-m (10.9-yd) long by 1.8-m (2.0-yd) deep gillnet panels made of twisted nylon mesh. Panels were tied together in a stretched mesh-size order of 16, 20, and 25 mm (or 0.63, 0.78, and 0.98 inches), with the 25-mm mesh size end attached to the 38-mm (1½ inch) end of the SGI gill net.

3.1.2 NELSON RIVER BETWEEN CLARK LAKE AND GULL RAPIDS (AND IN LITTLE GULL LAKE)

Gillnetting was conducted in the reach of the Nelson River between Clark Lake and Gull Rapids, and in Little Gull Lake, from August 11 to 18, 2015. Little Gull Lake is a shallow, 68-ha off-set lake located approximately 900 m north of Gull Lake (Map 1). The specifications of SGI and small-mesh index gill nets used and the sampling methods employed were the same as those described above for Split Lake (Section 2.1.1).

Standard gang index gillnet sites in the reach of the Nelson River between Clark Lake and Gull Rapids were predetermined as presented in the AEMP (Keeyask Hydropower Limited Partnership 2014). A total of 17 sites were selected, with several of the sites being sampled during index gillnetting studies conducted in 2001, 2002, and 2009 (Remnant *et al*. 2004b; Johnson and Parks 2005; Holm 2010). Five sites were either not yet wetted or were situated in

present-day Gull Rapids, and could not be sampled in 2015. A site in present-day Little Gull Lake was sampled in 2015 as one of the 17 pre-determined sites, and will become part of the Keeyask reservoir once full supply level is reached (Map 5).

Three small mesh index sites were fished between Clark Lake and Birthday Rapids, one between Birthday Rapids and Gull Lake (*i.e.*, in Pahwaybanic Bay), and one in Gull Lake (*i.e.*, Sam Bay) (see Map 5). Another small-mesh gill net was set in Little Gull Lake. Two proposed small mesh index gillnet sites could not be sampled in 2015 as they were either not yet wetted or were situated in present-day Gull Rapids.

3.1.3 STEPHENS LAKE

Gillnetting was conducted in Stephens Lake (Map 1) as part of CAMP from September 2 to 9, 2015 (as described in Section 2.1.1). Standard gang index gill nets were set at 18 established sites in Stephens Lake. Nine sites were located in Stephens Lake 'North' and the other nine in Stephens Lake 'South' (Map 6). Three small mesh index gill nets were set in each of the Stephens Lake North and South designated areas (Map 6).

3.2 DEBRIS MONITORING IN GILL NETS

The type and quantity of debris in SGI and small-mesh index gill nets were evaluated after each set by direct observation. Debris categories were based on the Manitoba Hydro Net Observation Program conducted in Playgreen Lake in 1984 (Horne 1994). Estimates of debris level and composition were based on the entire gillnet gang. Each gang was assigned one of the following debris levels based on the area covered by debris:

- None (no debris in gang; nets were clean);
- Low (< 5% of gang area covered by debris);
- Moderate (5–15% of gang area covered by debris);
- High (16–25% of gang area covered by debris); and
- Very high (> 25% of gang area covered by debris).

Each type of debris observed in the gang was expressed as a percentage of the total debris present. Debris was categorized into the following types:

- terrestrial vegetation;
- terrestrial moss;
- sticks;
- algae;
- aquatic vegetation;
- aquatic moss; and
- silt/mud.

3.3 BIOLOGICAL SAMPLING

All fish captured in each waterbody surveyed were identified to species and enumerated. The date, location, gillnet type (SGI vs. small-mesh), and mesh size from which individual fish were captured (for SGI gill nets only) were recorded. All fish captured in SGI gill nets and all large-bodied species captured in small-mesh gill nets were measured for fork length (± 1 mm) and round weight (± 25 g; mechanical pan scale). Burbot (*Lota lota*) were measured for total length and Lake Sturgeon (*Acipenser fulvescens*) were measured for both fork and total lengths. Forage fish species captured in small-mesh gill nets were bulk weighed, and the juveniles of large-bodied species (< 100 g) were individually weighed, using a digital scale (± 1 g).

Cleithra were removed from Northern Pike and otoliths from both Lake Whitefish and Walleye for ageing purposes. All structures collected were placed in individually labelled coin envelopes and air-dried prior to shipment to the North/South Consultants Inc. laboratory in Winnipeg for ageing.

For age determination, individual cleithra were first boiled to remove any tissue or oil residue that was left on the structure after removal from the fish. Cleithra were then typically read 'free-hand' (*i.e.*, without a microscope) against a dark background; however, a dissecting microscope (or a magnified ring light) was utilized when required. Dried otoliths were coated in epoxy and sectioned with a Struers Minitom™ low-speed sectioning saw. Sections were then fixed on glass slides with Cytoseal-60™ and examined under a microscope with transmitting light. Light intensity and magnification were adjusted throughout the viewing process.

All structures were viewed once by an experienced ageing technician and assigned an age and confidence index rating based on qualitative and quantitative characteristics of the structure. Quality assurance and quality control (QA/QC) was conducted on a randomly selected 10% of the structures by an alternate experienced ageing technician not involved in the initial age determination.

3.4 DEFORMITIES, EROSION, LESIONS, AND TUMOURS

All captured Lake Whitefish, Northern Pike, Walleye, White Sucker (*Catostomus commersonii*), and Lake Sturgeon were examined for external deformities, erosion, lesions, and tumours (collectively referred to as DELTs). Deformities consisted of a deformed fin or fin ray, head, spinal column or other body part, as well as scale disorientation, such as scale whorling or reversal. Erosion included erosion of fins, operculum, and tail, as well as fin rot. Lesions included open sores, exposed tissue, ulcerations, cysts, and eye abnormalities (*e.g.*, cataracts, exophthalmia). As per the USEPA "fingernail test", solid growths were classified as tumours, whereas fluid-filled growths or nodules were considered lesions. Tumours may also include growths that are not true neoplaisia (*e.g.*, epidermal hyperplaisia, granulomatous growths), as

histological confirmations were not performed. Where present, the frequency of DELTs was expressed as a percentage of the number of fish examined per species.

3.5 DATA ANALYSIS

The gillnetting catches were tabulated by species, sampling location, set type, and waterbody. For fish captured in SGI gill nets, catch-per-unit-effort (CPUE) was expressed as the number of fish captured in a 100-m net set for 24 hours. For fish captured in small-mesh index gill nets, CPUE was expressed as the number of fish captured in a 30-m net set for 24 hours. Catch-per-unit-effort was calculated for the total catch and for each species by gear type and gillnetting site, and was expressed as mean CPUE $\pm$ 1 standard deviation (Std). Frequency of occurrence of a species was calculated as the percentage in relation to the total catch.

Mean length, weight, and condition factor (K) were calculated for all large-bodied fish species captured in SGI gill nets. Condition factor was calculated (after Fulton 1911, in Ricker 1975) for individual fish using the following equation:

$$K = W \times 10^5 / L^3$$

where: W = round weight (g); and
L = fork length (mm).

Length-frequency distributions were plotted for Lake Whitefish, Northern Pike, and Walleye captured in SGI gill nets with catches of at least 25 fish. Length intervals of 25 mm (*e.g.*, 225–249 mm) were chosen for these species except Northern Pike, for which length intervals of 50 mm (*e.g.*, 350–399 mm) were used.

Age-frequency distributions were also plotted for whitefish, pike, and Walleye captured in SGI gill nets where at least 25 fish were sampled.

4.0 RESULTS AND DISCUSSION

Gillnet survey information for the 2015 monitoring of fish communities in the Keeyask study area is presented in Appendix 1. Water temperature during monitoring in Split Lake and in the reach of the Nelson River between Clark Lake and Gull Rapids (August 11 to 18) ranged from 16.0 to 20.0°C, whereas in Little Gull Lake (August 17), it was slightly cooler at 14.0°C. In Stephens Lake North and South (September 2 to 8), water temperature ranged from 14.0 to 18.0°C.

A total of 20 fish species were captured during fish community monitoring in the Keeyask study area. This included 13 large-bodied species and seven forage species (Table 1). Just over half these species (n = 11) were captured in all the Nelson River waterbodies surveyed. Four other species were captured in only one waterbody, including Freshwater Drum (*Aplodinotus grunniens*) in Split Lake, Brook Stickleback (*Culaea inconstans*) in Little Gull Lake, Golden Shiner (*Notemigonus crysoleucas*) in the Nelson River between Clark Lake and Gull Rapids, and Burbot in Stephens Lake North.

The occurrence of debris in standard gang and small-mesh index gill nets set throughout the Keeyask study area are tabulated in Appendix 2, and the incidence of external DELTs on fish captured in the study area are presented in Appendix 3.

4.1 DEBRIS MONITORING IN GILL NETS

'Moderate' to 'very high' levels of debris were present in 50% of both the standard gang and small-mesh index gill nets set in Split Lake. Debris consisted predominately of algae and sticks, plus a smaller amount of aquatic vegetation (Appendix A2-1).

Debris was present in 50% of the SGI gill nets, and in 25% of the small-mesh index gill nets, set in the reach of the Nelson River between Clark Lake and Gull Rapids. When present, debris consisted of 'low' to 'high' levels of algae, aquatic vegetation, and/or silt. No debris had accumulated on SGI gill nets set in Little Gull Lake.

Approximately 78% of the SGI gill nets set in Stephens Lake North, and 89% of the SGI gill nets set in Stephens Lake South, contained 'low' to 'high' levels of debris. The most common occurring debris types included sticks (Stephens Lake North) and terrestrial vegetation (Stephens Lake South). Debris was present in 33% of the small mesh index gill nets set in Stephens Lake North (*i.e.*, a high level of sticks), but none was recorded from those set in Stephens Lake South.

4.2 GILLNETTING

4.2.1 STANDARD GANG INDEX GILL NETS

4.2.1.1 SPLIT LAKE

Fourteen species (n = 580 fish) were captured in SGI gill nets set in Split Lake during summer 2015 (Table 2). White Sucker was the most frequently captured species (31%), followed by Walleye (24%), Sauger (*Sander canadensis*; 19%), and Northern Pike (10%) (Table 3). Sauger and White Sucker were the only two species captured at all gillnet sites in Split Lake. Walleye were captured at all but two sites, and both Lake Whitefish and Northern Pike at all but three sites. Conversely, Freshwater Drum was captured at only one site and each of Cisco (*Coregonus artedi*), Lake Sturgeon, and Mooneye (*Hiodon tergisus*) at only two sites. A total of eight Lake Sturgeon were captured in Split Lake, including seven downstream of Anipitapiskow Rapids at Site GN-28, and one near Opanekow Narrows at Site GN-26 (Map 4). Five species previously captured in standard gang index gill nets set in Split Lake were not captured in 2015, including Burbot, Carp, Flathead Chub, Goldeye, and Trout-perch (Table 4).

Mean total CPUE in Split Lake was 36.1 fish/100 m/24 h, with site-specific CPUE values ranging from 13.0 at Site GN-26 to 54.4 at Site GN-13 (Table 5, Map 4). The mean total CPUE was within the range observed in 2001–2002 and 2009–2014, when values ranged from a low of 33.7 fish/100 m/24 h in 2002 to a high of 48.9 fish in 2011 (Table 6). Among individual species, White Sucker had the highest CPUE (10.9 fish/100 m/24 h), followed by Walleye (8.6 fish) and Sauger (7.0 fish) (Table 5). These species, along with Northern Pike, also had the highest CPUE values in Split Lake during previous studies.

External DELTs were observed on 0.3% of fish examined (n = 406) in Split Lake.

4.2.1.2 REACH OF NELSON RIVER BETWEEN CLARK LAKE AND GULL RAPIDS

Eleven species (n = 244 fish) were captured in SGI gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids during summer 2015; no fish were captured in the SGI gill net set in Little Gull Lake (Table 7). Northern Pike was the most frequently captured species (42%), followed by Walleye (26%), White Sucker (10%), and Yellow Perch (*Perca flavescens*; 10%) (Table 8). Seven other species combined to represent the remaining 12% of the total fish catch. Northern Pike was captured at all gillnet sites, Walleye at all but one site, and White Sucker at all but two sites. In contrast, a single Lake Sturgeon, Longnose Sucker (*Catostomus catostomus*), and Mooneye were each captured at only one site. The sturgeon was gillnetted downstream of Birthday Rapids at Site GN-05 (Map 5). Five species previously captured in standard gang index gill nets set in the reach of the Nelson River between Clark Lake and Gull

Rapids were not captured in 2015, including Burbot, Flathead Chub, Lake Chub, Rainbow Smelt, and Trout-perch (Table 9).

Mean total CPUE in the reach of the Nelson River between Clark Lake and Gull Rapids was 15.4 fish/100 m/24 h (Table 10). Excluding Little Gull Lake, where no fish were captured, site-specific CPUE ranged from 9.3 at Site GN-04 to 23.6 at Site GN-07 (Map 5). The mean total CPUE was slightly below the range observed during previous studies, when values extended from a low of 16.8 fish/100 m/24 h in 2009 to a high of 23.9 fish in 2001 (Table 6). Among individual species, Northern Pike had the highest CPUE (6.5 fish/100 m/24 h), followed by Walleye (4.1 fish) and White Sucker (1.6 fish). During previous studies, the highest CPUE values also belonged to these three species in the same order of abundance.

External DELTs were observed on 9.2% of fish examined (n = 207) in the reach of the Nelson River between Clark Lake and Gull Rapids.

4.2.1.3 STEPHENS LAKE NORTH

Ten species (n = 338 fish) were captured in SGI gill nets set in Stephens Lake North during late summer 2015 (Table 11). Walleye was the most frequently captured species (50%), followed by Northern Pike (22%), Mooneye (12%), and Lake Whitefish (6%) (Table 12). Northern Pike and Walleye were the only two species captured at all the gillnet sites, whereas Lake Whitefish was captured at all but one site. Burbot, Longnose Sucker, and Mooneye were each captured at only one gillnet site. All Mooneye gillnetted in Stephens Lake North (n = 42) were captured at one site (*i.e.*, GN-35) that was located in shallow, off-current habitat (Map 6).

Three species previously captured in standard gang index gill nets set in Stephens Lake North were not captured in 2015, including Carp, Sauger, and Shorthead Redhorse (Table 13). Three additional species were captured in 2015 that had not been captured previously, including Burbot, Longnose Sucker, and Mooneye (Table 13).

Mean total CPUE in Stephens Lake North was 30.0 fish/100 m/24 h (Table 14). Site-specific CPUE ranged from 7.0 fish at Site GN-34 to 57.0 at Site GN-35 (Map 6). The mean total CPUE was higher than those reported in 2009 and 2012 (22.3 and 15.6 fish/100 m/24 h, respectively) (Table 6). In 2015, Walleye had the highest CPUE (14.0 fish/100 m/24 h), followed by Northern Pike (6.6 fish) and Mooneye (4.8 fish – included in the pooled CPUE for 'Other' fish species; see Table 14). During previous studies, Walleye and Northern Pike also were the two dominant species captured in Stephens Lake North. Mooneye, on the other hand, were not captured in this waterbody in 2009 and only one was captured in 2012.

External DELTs were observed on 0.7% of fish examined (n = 278) in Stephens Lake North. Lesions were detected on one Northern Pike and one Walleye. Of the 211 fish examined during previous studies, 1.9% displayed DELTs. These included incidence rates of 1.9% for Walleye (n = 2) and 2.3% for Northern Pike (n = 2).

4.2.1.4 STEPHENS LAKE SOUTH

Nine species (n = 226 fish) were captured in SGI gill nets set in Stephens Lake South during late summer 2015 (Table 15). Walleye was the most frequently captured species (45%), followed by White Sucker (25%) and Northern Pike (20%) (Table 16). Walleye and White Sucker were each captured at all but one gillnet site, and Northern Pike at all but two sites. Cisco, Lake Sturgeon, and Longnose Sucker were each captured at only one site. The single Lake Sturgeon was gillnetted downstream of Gull Rapids at Site GN-30 (Map 6). Three species (Mooneye, Rainbow Smelt, and Trout-perch) previously captured in standard gang index gill nets set in Stephens Lake South were not captured in 2015 (Table 17).

Mean total CPUE in Stephens Lake South was 20.1 fish/100 m/24 h (Table 18). Site-specific CPUE ranged from 9.6 at Site GN-32 to 40.1 at Site GN-14 (Map 6). The mean total CPUE was within the range observed in 2009 and 2012, when values ranged from 17.8 to 35.5 fish/100 m/24 h (Table 6). In 2015, Walleye had the highest CPUE (8.9 fish/100 m/24 h), followed by White Sucker (5.2 fish) and Northern Pike (4.0 fish). During previous studies, Walleye also supported the highest CPUE in Stephens Lake South. Conversely, Northern Pike previously supported the second highest CPUE among species captured in 2009 and 2012, while White Sucker CPUE values were noticeably lower.

External DELTs were observed on 1.4% of fish examined (n = 210) in Stephens Lake South. Deformities were recorded for two Walleye and a tumour for one Walleye. Of the 472 fish examined during previous studies, 2.5% displayed DELTs. The highest incidence rate was observed for Northern Pike (4.0%; n = 6), followed by White Sucker (3.8%; n = 2) and Walleye (1.5%; n = 4).

4.2.2 SMALL-MESH INDEX GILL NETS

4.2.2.1 SPLIT LAKE

Eleven species (n = 355 fish) were captured in small-mesh index gill nets set in Split Lake during summer 2015 (Table 19). This included six large-bodied and five forage fish species. Spottail Shiner (*Notropis hudsonius*) accounted for nearly half of the total catch (49%), with Trout-perch (*Percopsis omiscomaycus*; 18), Emerald Shiner (*Notropis atherinoides*; 13) and Lake Chub (*Couesius plumbeus*; 10) combining to represent almost all of the other half (Table 20). Trout-perch was the only species captured at all four gillnet sites. Six species previously captured in small mesh index gill nets set in Split Lake were not captured in 2015, including Burbot, Lake Sturgeon, Lake Whitefish, Longnose Sucker, Mooneye, and Slimy Sculpin (Table 4).

Mean total CPUE in Split Lake was 90.0 fish/30 m/24 h (Table 21). Site-specific CPUE ranged from 7.9 at Site SN-26 to 226.7 at Site SN-03 (Map 4). The mean total CPUE value was within the range observed during previous studies, when values ranged from a low of

24.0 fish/30 m/24 h in 2001 to a high of 202.2 fish in 2014 (Table 22). Among individual species in 2015, Spottail Shiner had the highest mean CPUE (43.7 fish/30 m/24 h), followed by Trout-perch (16.3 fish), Emerald Shiner (11.4 fish), and Lake Chub (8.9 fish). Spottail Shiner, Trout-perch, and Emerald Shiner had CPUE values within the range of previous studies (Table 22). Rainbow Smelt CPUE (2.3 fish/30 m/24 h) was on the low end of what was observed in previous years (2.0–79.1 fish).

4.2.2.2 REACH OF NELSON RIVER BETWEEN CLARK LAKE AND GULL RAPIDS

Ten species (n = 943 fish) were captured in small-mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids during summer 2015 (Table 23). This included five large-bodied and five forage fish species. Spottail Shiner and Emerald Shiner were the most frequently captured species and combined to account for more than 90% of the total fish catch (48 and 46%, respectively) (Table 24). Brook Stickleback (n = 22) was captured in a small-mesh gill net set in Little Gull Lake. The fish community in this lake was previously surveyed in 2002, when seine hauls collected nearly 500 Brook Stickleback plus two Fathead Minnow (*Pimephales promelas*) (Richardson and Holm 2005). These species are commonly associated with headwater bog habitats in streams (Stewart and Watkinson 2004), which aptly describes the aquatic environment in and around Little Gull Lake.

Eight species previously captured in small mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids were not captured in 2015, including Lake Chub, Lake Sturgeon, Lake Whitefish, Logperch, Longnose Sucker, Shorthead Redhorse, Slimy Sculpin, and Walleye (Table 9). Three additional species were captured in 2015 that had not been captured previously, including Brook Stickleback, Golden Shiner, and Mooneye (Table 9).

The capture of one Golden Shiner in Gull Lake (*i.e.*, Site SN-15 in Sam Bay; Map 5) represents a second range extension for this species in the province during the past seven years. Two Golden Shiner were previously captured in the Nelson River at the Kelsey GS in 2008 (Jansen 2009), more than 300 km north of its northernmost known occurrence in Manitoba (Stewart and Watkinson 2004). The Golden Shiner captured during this study extended the range of this species in the Nelson River nearly another 100 river kilometres farther downstream of the Kelsey Generating Station.

Mean total CPUE in the reach of the Nelson River between Clark Lake and Gull Rapids was 279.5 fish/30 m/24 h (Table 25). In Little Gull Lake (*i.e.*, Site SN-14), mean total CPUE was 23.1 fish/30 m/24 h. Site-specific CPUE ranged from 15.8 at Site SN-01 to 580.4 at Site SN-06 (Map 5). The mean total CPUE was considerably higher than the range observed in 2001, 2002, and 2009, when values ranged from 52.7 to 83.7 fish/30 m/24 h (Table 22). In 2015, Spottail Shiner had the highest mean CPUE (133.6 fish/30 m/24 h), followed by Emerald Shiner (127.8 fish) and Cisco (5.1 fish). The CPUE of both Spottail and Emerald shiners was higher in 2015 than was observed in previous years (15.3–40.2 and 0.7–2.1 fish/30 m/24 h, respectively) while Trout-perch was lower (11.3–21.2 fish/30 m/24 h) (Table 22). The largest difference in CPUE in

2015 compared to previous years was for Rainbow Smelt (0.6 fish/30 m/24 h in 2015 and 13.6–24.8 fish/30 m/24 h in previous years) (Table 22).

4.2.2.3 STEPHENS LAKE NORTH

Seven species (n = 500 fish) were captured in small-mesh index gill nets set in Stephens Lake North during late summer 2015 (Table 26). This included three large-bodied and four forage fish species. Spottail Shiner and Emerald Shiner were the most frequently captured species and combined to account for more than 90% of the total fish catch (57 and 36%, respectively) (Table 27). Spottail Shiner was captured at all three gillnet sites, whereas a notably high number of Emerald Shiner was captured at Site SN-04 in the north arm of Stephens Lake (Map 6). Only two species previously captured in small mesh index gill nets set in Stephens Lake North were not captured in 2015, including Lake Whitefish and Mooneye; however, these species were previously captured in small numbers (Table 13).

Mean total CPUE in Stephens Lake North was 186.1 fish/30 m/24 h (Table 28). Site-specific CPUE ranged from 130.1 at Site SN-09 to 219.3 at Site SN-34 (Map 6). Similar to what was observed in the reach of the Nelson River between Clark Lake and Gull Rapids, the mean total CPUE value in Stephens Lake North was considerably higher than the range observed in 2009 and 2012, when values ranged from 27.5 to 66.7 fish/30 m/24 h (Table 22). In 2015, Spottail Shiner had the highest mean CPUE (111.4 fish/30 m/24 h), followed by Emerald Shiner (60.7 fish) (Table 22). These values were higher than in previous years (14.3–27.6 and 0.0–11.6 fish/30 m/24 h, respectively). The CPUE of Rainbow Smelt was lower in 2015 (0.6 fish/30 m/24 h) than in previous years (13.6–24.8 fish/30 m/24 h) (Table 22).

4.2.2.4 STEPHENS LAKE SOUTH

Twelve species (n = 398 fish) were captured in small-mesh index gill nets set in Stephens Lake South during late summer 2015 (Table 29). This included seven large-bodied and five forage fish species. Spottail Shiner was the most frequently captured species, accounting for 70% of the total fish catch (Table 30). Emerald Shiner and Trout-perch combined to represent another 21% of the total catch (13 and 8%, respectively). All Emerald Shiner and nearly all Spottail Shiner were captured at the downstream half of Stephens Lake South at sites SN-14 and -22 (Map 6).

Four species previously captured in small mesh index gill nets set in Stephens Lake South were not captured in 2015, including Freshwater Drum, Logperch, and Shorthead Redhorse; however, these species were previously captured in small numbers (Table 17). Four additional species were captured in 2015 that had not been captured previously, including Emerald Shiner, Lake Chub, Lake Whitefish, and Longnose Sucker (Table 17).

Mean total CPUE in Stephens Lake South was 155.7 fish/30 m/24 h (Table 31). Site-specific CPUE ranged from 19.8 at Site SN-32 to 248.9 at Site SN-22 (Map 6). Similar to what was observed in Stephens Lake North and in the reach of the Nelson River between Clark Lake and

Gull Rapids, the mean total CPUE in Stephens Lake South was considerably higher than the range observed in 2009 and 2012, when values ranged from 43.6 to 60.6 fish/30 m/24 h (Table 22). In 2015, Spottail Shiner had the highest mean CPUE (109.6 fish/30 m/24 h), followed by Emerald Shiner (21.2 fish), and Trout-perch (10.3 fish). CPUE of both Spottail and Emerald shiners were higher than in previous years (10.3–27.7 and 0.0–0.0 fish/30 m/24 h, respectively) (Table 22). CPUE of both Trout-perch and Rainbow Smelt (3.8 fish/30 m/24 h) were within the range of previous years (13.6–24.8 and 1.5–15.4 fish/30 m/24 h, respectively) (Table 22).

4.3 SPECIES ACCOUNTS

The following sections present fish capture data for three VEC species (Lake Whitefish, Northern Pike, and Walleye) gillnetted in each Nelson River waterbody surveyed during summer 2015. Mean size and condition factor of all individual fish species captured in standard gang and small-mesh index gill nets are presented in Tables 32–35 and 36–39, respectively. Length-frequency distributions for Northern Pike and Walleye captured in SGI gill nets in each Nelson River waterbody are shown in Figures 1–8, and age-frequency distributions for the same two species are shown in Figures 9–16. A summary of annual mean measures of abundance and size for all four above mentioned species are provided in Tables 40–43.

4.3.1 LAKE WHITEFISH

4.3.1.1 SPLIT LAKE

4.3.1.1.1 STANDARD GANG INDEX GILL NETS

Lake Whitefish (n = 22) composed 3.8% of the SGI gillnet catch in Split Lake (Tables 2 and 3). Lake Whitefish were captured at all but three gillnet sites, with the largest number (n = 9) being captured at Site GN-18 in shallow-water habitat upstream of Opakenow Narrows (Map 4). Mean CPUE was 1.4 fish/100 m/24 h (Table 5), which was within the range (0.7–2.6) observed in previous years (Table 40).

Lake Whitefish had a mean length of 404 mm (range: 225–486 mm) and a mean condition factor of 1.65 (range: 1.23–1.92) (Table 32). Mean length of the whitefish catch was within the range observed in previous years (382–498 mm), as was mean fish condition (1.57–1.93) (Table 40). None of the Lake Whitefish captured in SGI gill nets were observed to have DELTs (Table A3-1). Lake Whitefish were not captured in the small-mesh gill nets set in Split Lake (Table 19).

4.3.1.2 REACH OF NELSON RIVER BETWEEN CLARK LAKE AND GULL RAPIDS

4.3.1.2.1 STANDARD GANG INDEX GILL NETS

Lake Whitefish (n = 16) were captured at four SGI gillnet sites and accounted for 6.6% of the total fish catch (Tables 7 and 8). More than half (n = 13) were captured between Birthday Rapids and the inlet of Gull Lake, particularly at Site GN-06 in Pahwaybanic Bay (Map 5). No Lake Whitefish were captured in Little Gull Lake (GN-14). Mean CPUE was 1.0 fish/100 m/24 h (Table 10), which was within the range observed in previous years (1.0–1.8 fish; Table 41). Captured whitefish had a mean length of 388 mm (range: 157–524 mm) and a mean condition factor of 1.58 (range: 1.13–1.75) (Table 33). Both mean length and condition factor were slightly below their ranges measured in previous years (394–436 and 1.70–1.77 mm, respectively; Table 41). DELTs were not observed on any of the Lake Whitefish examined (Table A3-2). No whitefish were captured in the small-mesh index gill nets set in this section of the Nelson River or in Little Gull Lake (Table 23).

4.3.1.3 STEPHENS LAKE NORTH

4.3.1.3.1 STANDARD GANG INDEX GILL NETS

A total of 21 Lake Whitefish were captured in Stephens Lake North, which represented 6.2% of the total SGI gillnet catch (Tables 11 and 12). Between one and five whitefish were captured at eight of nine gillnet sites. Mean CPUE was 1.8 fish/100 m/24 h (Table 14), which was higher than the values observed in previous years (0.6 and 1.0 fish; Table 42).

Captured whitefish had a mean length of 361 mm (range: 171–550 mm) and a mean condition factor of 1.45 (range: 1.00–1.92) (Table 34). Mean fork length of the whitefish catch was within the range observed in previous years (317–407 mm), as was mean fish condition (1.40–1.91) (Table 42). DELTs were not observed on any of the whitefish examined (Table A3-3). No whitefish were captured in the small-mesh index gill nets set in Stephens Lake North (Table 26).

4.3.1.4 STEPHENS LAKE SOUTH

4.3.1.4.1 STANDARD GANG INDEX GILL NETS

Lake Whitefish (n = 6) composed 2.7% of the SGI gillnet catch in Stephens Lake South (Tables 15 and 16). Single specimens were captured at four gillnet sites and two at another site. Mean CPUE was 0.5 fish/100 m/24 h (Table 18), which was within the range observed in previous years (0.3–0.6 fish; Table 43).

Captured whitefish had a mean length of 481 mm (range: 410–549 mm) and a mean condition factor of 1.81 (range: 1.38–2.19) (Table 35). Mean fork length of the whitefish catch was slightly below the range observed in previous years (486–526 mm), but mean fish condition was within

the range observed in previous years (1.81–2.04) (Table 43). DELTs were not observed on any of the whitefish examined (Table A3-4).

4.3.1.4.2 SMALL-MESH INDEX GILL NETS

A total of six Lake Whitefish were captured in small-mesh index gill nets set in Stephens Lake South, which represented 1.5% of the total fish catch (Tables 29 and 30). Five whitefish were captured at Site SN-22, located along the south shoreline of Stephens Lake in shallow-water habitat (Map 6). Mean CPUE was 2.3 fish/30 m/24 h (Table 31). Lake Whitefish had a mean length of 87 mm (range: 80–95 mm; Table 39) and were likely all young-of-the-year.

4.3.2 NORTHERN PIKE

4.3.2.1 SPLIT LAKE

4.3.2.1.1 STANDARD GANG INDEX GILL NETS

Northern Pike (n = 60) was the fourth most frequently captured species in SGI gill nets, accounting for 10.3% of the total fish catch (Tables 2 and 3). More than half the total pike catch (n = 32) was captured in near-shore shallow-water habitat at sites GN-03 and -06 (Table 2; Map 4). Mean CPUE was 3.7 fish/100 m/24 h (Table 5), which was within the range observed in previous years (3.5–6.3 fish; Table 40).

Northern Pike had a mean length of 504 mm (range: 208–1001 mm) and a mean condition factor of 0.68 (range: 0.57–0.81) (Table 32). The modal length interval of the pike catch was 450–499 mm, with approximately 18% of the fish in this class (Figure 1). Mean length of the pike catch was within the range observed in previous years (420–530 mm), as was mean fish condition (0.68–0.78) (Table 40). Captured pike ranged in age from 1 to 16 years, with an estimated mean of 4.8 years (Figure 9). None of the Northern Pike captured in SGI gill nets were observed to have DELTs (Table A3-1).

4.3.2.1.2 SMALL-MESH INDEX GILL NETS

A total of six Northern Pike were captured in small-mesh index gill nets set in Split Lake, which represented 1.7% of the total fish catch (Tables 19 and 20). Most pike were captured at Site SN-06, located along the north shore of the lake (Map 4). Mean CPUE was 1.5 fish/30 m/24 h (Table 21). Northern Pike had a mean length of 399 mm (range: 227–470 mm) and a mean condition factor of 0.72 (range: 0.66–0.77) (Table 36).

4.3.2.2 REACH OF NELSON RIVER BETWEEN CLARK LAKE AND GULL RAPIDS

4.3.2.2.1 STANDARD GANG INDEX GILL NETS

Northern Pike (n = 103) was the most frequently captured species in SGI gill nets, accounting for 42% of the total fish catch (Tables 7 and 8). The majority of pike were captured in shallow-water habitats characterized by having moderate to high levels of aquatic vegetation (*i.e.*, sites GN-06, -07, -13, and -15; Map 5); however, Northern Pike were captured at all SGI gillnet sites in this reach of the Nelson River. No Northern Pike were captured in Little Gull Lake (GN-14). Mean CPUE was 6.5 fish/100 m/24 h (Table 10), which was slightly lower than the range observed in previous years (6.7–10.3 fish; Table 41).

Northern Pike had a mean length of 570 mm (range: 205–946 mm) and a mean condition factor of 0.70 (range: 0.43–1.28) (Table 33). The modal length interval for pike was 550–599 mm, with 17% of fish in this class (Figure 3). The mean fork length was narrowly above the range observed in previous years (490–569 mm), whereas the condition was slightly lower (0.75–0.78) (Table 41).Pike ages ranged from 1 to 13 years, with an estimated mean of 5.6 years (Figure 11). Eight Northern Pike captured in SGI gill nets had external DELTs (Table A3-2). Seven fish had lesions on the body and one had a deformed dorsal fin.

4.3.2.2.2 SMALL-MESH INDEX GILL NETS

Ten Northern Pike were captured in small-mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids (Table 23). This represented 1.1% of the total fish catch (Table 24). All ten pike were captured in shallow-water vegetated habitats at sites SN-06 and -15 (Map 5). Mean CPUE was 2.9 fish/30 m/24 h (Table 25). Northern Pike had a mean length of 374 mm (range: 191–774 mm) and a mean condition factor of 0.81 (range: 0.46–1.22) (Table 37).

4.3.2.3 STEPHENS LAKE NORTH

4.3.2.3.1 STANDARD GANG INDEX GILL NETS

A total of 74 Northern Pike were captured in Stephens Lake North, which represented 21.9% of the total SGI gillnet catch (Tables 11 and 12). Pike were captured at all gillnet sites, with the highest numbers being sampled at the upper end of the north arm of Stephens lake (*i.e.*, at sites GN-01, -04, and -05; Map 6). Mean CPUE was 6.6 fish/100 m/24 h (Table 14), which was within the range observed in previous years (4.7–7.3; Table 42).

Captured Northern Pike had a mean length of 585 mm (range: 278–969 mm) and a mean condition factor of 0.66 (range: 0.41–0.89) (Table 34). The modal length interval for pike was 450–499 and 500–549 mm, each representing 16% of the catch (Figure 5). Mean fork length of the pike catch was within the range observed in previous years (548–608 mm), but fish condition was slightly lower in 2015 than in previous years (0.70–0.74) (Table 42). Northern

Pike ages ranged from 2 to 15 years, with an estimated mean of 6.0 years (Figure 13). A DELT was observed on one Northern Pike, which was reported to have a severe lesion (Table A3-3).

4.3.2.3.2 SMALL-MESH INDEX GILL NETS

Thirteen Northern Pike were captured in small-mesh index gill nets set in Stephens Lake North, accounting for 2.6% of the total fish catch (Tables 26 and 27). Most pike (n = 10) were captured in shallow near-shore habitat at Site SN-04 in the north arm of Stephens Lake (Map 6). Mean CPUE was 4.3 fish/30 m/24 h (Table 28). Northern Pike had a mean length of 494 mm (range: 225–596 mm) and a mean condition factor of 0.70 (range: 0.61–0.99) (Table 38).

4.3.2.4 STEPHENS LAKE SOUTH

4.3.2.4.1 STANDARD GANG INDEX GILL NETS

Northern Pike (n = 45) was the third most frequently captured species in SGI gill nets, accounting for 19.9% of the total fish catch (Tables 15 and 16). Pike were captured at all but the two downstream most sites in Stephens Lake (*i.e.*, GN-13 and -15; Map 6). Mean CPUE was 4.0 fish/100 m/24 h (Table 18), which was slightly below the values observed in previous years (4.5 and 8.4 fish; Table 43).

Northern Pike had a mean length of 538 mm (range: 304–878 mm) and a mean condition factor of 0.70 (range: 0.38–0.97) (Table 35). The modal length interval of the catch was 550–599 mm, with approximately 20% of the fish in this class (Figure 7). Mean length of the pike catch in 2015 was slightly higher than those in previous years (529 and 530 mm), and mean condition in 2015 was similar to those of previous years (0.70 and 0.74) (Table 43).

Captured pike ranged in age from 3 to 12 years, with an estimated mean of 5.5 years (Figure 15). None of the Northern Pike captured in SGI gill nets were observed to have DELTs (Table A3-4).

4.3.2.4.2 SMALL-MESH INDEX GILL NETS

A total of five Northern Pike were captured in small-mesh index gill nets set in Stephens Lake South, accounting for 1.3% of the total fish catch (Tables 29 and 30). Three pike were captured in shallow near-shore habitat at Site SN-22 and two pike were captured in deep-water habitat at Site SN-30 (Map 6). Mean CPUE was 1.7 fish/30 m/24 h (Table 31). Northern Pike had a mean length of 355 mm (range: 126–556 mm) and a mean condition factor of 0.62 (range: 0.57–0.68) (Table 39).

4.3.3 WALLEYE

4.3.3.1 SPLIT LAKE

4.3.3.1.1 STANDARD GANG INDEX GILL NETS

Walleye (n = 138) was the second most frequently captured species in SGI gill nets, accounting for 23.8% of the total fish catch (Tables 2 and 3). Walleye were captured at all but two sites (*i.e.*, GN-26 and -28), with most fish captured at sites GN-03, -06, -13, -15, -21, and -29 (Map 4). Mean CPUE was 8.6 fish/100 m/24 h (Table 5), which was within the range observed in previous years (7.4–15.2; Table 40).

Captured Walleye had a mean length of 344 mm (range: 145–557 mm) and a mean condition factor of 1.09 (range: 0.84–1.34) (Table 32). The modal length interval of the catch was 325–349 mm, with approximately 14% of the fish in this class (Figure 2). Mean length of the Walleye catch was noticeably higher, and mean fish condition was visibly lower, than the ranges observed in previous years (236–325 mm and 1.13–1.29, respectively; Table 40). Walleye ranged in age from 1 to 16 years, with an estimated mean of 4.6 years (Figure 10). None of the Walleye captured in SGI gill nets were observed to have DELTs (Table A3-1).

4.3.3.1.2 SMALL-MESH INDEX GILL NETS

A total of seven Walleye were captured in small-mesh index gill nets set in Split Lake, accounting for 2.0% of the total fish catch (Tables 19 and 20). All Walleye were captured in shallow near-shore habitats at sites SN-03 and -06 (Map 4). Mean CPUE was 1.8 fish/30 m/24 h (Table 21). Walleye had a mean length of 308 mm (range: 72–492 mm) and a mean condition factor of 1.03 (range: 0.54–1.25) (Table 36).

4.3.3.2 REACH OF NELSON RIVER BETWEEN CLARK LAKE AND GULL RAPIDS

4.3.3.2.1 STANDARD GANG INDEX GILL NETS

Walleye (n = 64) accounted for 26% of the total fish catch in SGI gill nets and were captured at all but one site in this reach of the Nelson River (Tables 7 and 8). Walleye were captured in relatively similar abundance at sites GN-02, -03, -07, -08, and -12 (Map 5). No Walleye were captured in Little Gull Lake (GN-14). Mean CPUE was 4.1 fish/100 m/24 h (Table 10), which was within the range observed in previous years (3.0–6.3; Table 41).

Walleye captured in SGI gill nets had a mean length of 401 mm (range: 148–625 mm) and a mean condition factor of 1.13 (range: 0.78–1.63) (Table 33). The modal length interval for Walleye was 450–474 mm, with 13% of fish in this class (Figure 4). Mean length fell within the range of values observed in previous years (401–446 mm), but mean condition factor was noticeably lower than in previous years (1.29–1.33) (Table 41). Walleye ages ranged from 1 to 23 years, with an estimated mean of 7.8 years (Figure 12). Nine Walleye had external DELTs

(Table A3-2). Five fish had lesions on the body, three had deformities, and one had a small tumour on the caudal fin. An additional two Walleye had leeches, also on the caudal fin. No Walleye were captured in small-mesh index gill nets set in this reach of the Nelson River (Table 23).

4.3.3.3 STEPHENS LAKE NORTH

4.3.3.3.1 STANDARD GANG INDEX GILL NETS

A total of 168 Walleye were captured in Stephens Lake North, which represented 49.7% of the total SGI gillnet catch (Tables 11 and 12). Walleye were captured at all gillnet sites, with the highest numbers being captured at the northern end of the north arm of Stephens Lake (*i.e.*, sites GN-01, -02, -04, and -05; Map 6). Mean CPUE was 14.0 fish/100 m/24 h (Table 14), which was noticeably higher than the range observed in previous years (9.1 and 9.6; Table 42).

Captured Walleye had a mean length of 384 mm (range: 170–585 mm) and a mean condition factor of 1.15 (range: 0.84–1.37) (Table 34). The modal length interval for Walleye was 325–349 mm, with 15% of fish in this class (Figure 6). Mean fork length of the Walleye catch was lower than the range observed in previous years (415 and 435 mm), as was fish condition (1.25 and 1.40) (Table 42). Walleye ages ranged from 2 to 22 years, with an estimated mean of 7.9 years (Figure 14). DELTs were observed on one Walleye, which was reported to have a mild lesion (Table A3-3).

4.3.3.3.2 SMALL-MESH INDEX GILL NETS

Eight Walleye were captured in small-mesh index gill nets set in Stephens Lake North, accounting for 1.6% of the total fish catch (Tables 26 and 27). Relatively equal numbers of Walleye were captured at each gillnet site (Table 26, Map 6). Mean CPUE was 3.0 fish/30 m/24 h (Table 28). Walleye had a mean length of 339 mm (range: 84–468 mm) and a mean condition factor of 1.22 (range: 1.06–1.69) (Table 38).

4.3.3.4 STEPHENS LAKE SOUTH

4.3.3.4.1 STANDARD GANG INDEX GILL NETS

Walleye (n = 101) was the most frequently captured species in SGI gill nets, accounting for 44.7% of the total fish catch (Tables 15 and 16). Walleye were captured at all but one site (*i.e.*, GN-15), with the highest numbers being sampled in near-shore shallow-water habitat along the south shoreline of Stephens Lake (*i.e.*, sites GN-14 and -22; Map 6). Mean CPUE was 8.9 fish/100 m/24 h (Table 18), which was within the range observed in previous years (6.4 and 17.5, Table 43).

Captured Walleye had a mean length of 417 mm (range: 170–602 mm) and a mean condition factor of 1.15 (range: 0.82–1.84) (Table 35). The modal length interval of the catch was 475–499 mm, with approximately 15% of the fish in this class (Figure 8). Both mean length and fish

condition of the Walleye catch in 2015 were noticeably lower than their ranges observed in previous years (442–480 mm and 1.28–1.40, respectively; Table 43). Aged fish ranged from 1 to 30 years, with a mean of 10.3 years (Figure 16). Three Walleye had external DELTs: two individuals had mild deformities and one had a small tumour on the right pelvic fin (Table A3-4).

4.3.3.4.2 SMALL-MESH INDEX GILL NETS

A total of three Walleye were captured in small-mesh index gill nets set in Stephens Lake South, accounting for 0.8% of the total fish catch (Tables 29 and 30). Mean CPUE was 1.2 fish/30 m/24 h (Table 31). Walleye had a mean length of 282 mm (range: 161–501 mm) and a mean condition factor of 1.01 (range: 0.80–1.28) (Table 39).

5.0 SUMMARY AND CONCLUSIONS

- Fish community sampling was conducted using standard gang and small mesh index gill nets in the Nelson River between Clark Lake and Gull Rapids, as well as Split Lake, Stephens Lake North, and Stephens Lake South, in summer 2015. Split and Stephens Lake sampling was conducted as part of the Coordinated Aquatic Monitoring program. Data collected in the reach of the Nelson River between Clark Lake and Gull Rapids was collected as per the Keeyask Generation Project Aquatic Effects Monitoring Plan (AEMP).
- A total of 13 large-bodied and seven small-bodied species were captured in the four waterbodies. The large bodied species captured most frequently were Walleye, Northern Pike, and White Sucker, with Sauger and Mooneye being captured frequently in Split Lake and Stephens Lake North, respectively. Spottail Shiner, Emerald Shiner, and Trout-perch were the three most frequently captured species in all four waterbodies. Rainbow Smelt were not abundant in any of the four waterbodies.
- Mean total catch-per-unit-effort (CPUE) for standard gang index gill nets ranged from a high of 36.1 fish/100 m of net/24 hours in Split Lake to 30.0 fish in Stephens Lake North to 20.1 fish in Stephens Lake South and 15.4 fish in the reach of the Nelson River between Clark Lake and Gull Rapids. The CPUE for Stephens Lake North was above the existing range from previous studies, CPUEs for Split Lake and Stephens Lake South fell within the existing range from previous studies, and the CPUE for the reach of the Nelson River between Clark Lake and Gull Rapids fell slightly below the existing range from previous studies.
- Mean total CPUE for small mesh index gill nets ranged from a high of 279.5 fish/30 m of net/24 hours in the reach of the Nelson River between Clark Lake and Gull Rapids to 186.1 fish in Stephens Lake North to 155.7 fish in Stephens Lake South and 90.0 fish in Split Lake. The CPUEs for the reach of the Nelson River between Clark Lake and Gull Rapids, Stephens Lake North, and Stephens Lake South were all above the existing range from previous studies, while the CPUE for Split Lake was within the existing range from previous studies.
- Key questions in the AEMP related to fish community monitoring in the Keeyask area are listed below:
    - *Will the abundance (CPUE) and species composition of the fish communities in the Keeyask reservoir and Stephens Lake change as a result of construction and operation of the Project?*

      In standard gang index gill nets, the CPUE in 2015 was relatively similar to those of previous studies in all four sampling locations. Species composition in the reach of the Nelson River between Clark Lake and Gull Rapids and in Stephens Lake was

comparable to that of previous years, with only a few uncommon species not captured in 2015.

- *For the three VEC fish species, will a biologically relevant (and statistically significant) change in condition factor or growth be observed in the Keeyask reservoir and Stephens Lake in comparison to pre-Project conditions?*

  The condition factor of Lake Whitefish and Northern Pike was within the range seen in other years in Split Lake and Stephens Lake (North and South). Lake Whitefish and Northern Pike caught in the reach of the Nelson River between Clark Lake and Gull Rapids were thinner than in previous years. Walleye caught in 2015 were thinner than in previous years at all locations.

- *Will the abundance of small-bodied fish captured in small mesh gill nets set in the Keeyask reservoir and Stephens Lake change following construction of the Project?*

  In small mesh index gill nets, the CPUE in 2015 was higher in the reach of the Nelson River between Clark Lake and Gull Rapids and in Stephens Lake (North and South) than in any other year, suggesting that there may be more small fish in these areas.

- The species composition and abundance of fish caught was generally similar between previous studies and in 2015. Fish condition was not similar for all fish species between years, but it can be quite variable naturally.
- Results of the 2015 gillnetting do not indicate a need to modify the current sampling schedule which calls for monitoring of Stephens Lake, and the reach of the Nelson River between Clark Lake and Gull Rapids, if the construction schedule continues as planned, in 2018. Split Lake will continue to be sampled annually as part of CAMP.

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TABLES

Table 1: Fish species captured during standard gang and small-mesh index gillnetting surveys conducted in the Keeyask study area during summer 2015.

Common name	Scientific name	Abbreviation	Split Lake	Nelson River between Clark Lake and Gull Rapids	Stephens Lake		Little Gull Lake [1]
					North	South	
Brook Stickleback	*Culaea inconstans*	BRST					X
Burbot	*Lota lota*	BURB			X		
Cisco	*Coregonus artedi*	CISC	X	X	X	X	
Emerald Shiner	*Notropis atherinoides*	EMSH	X	X	X	X	
Freshwater Drum	*Aplodinotus grunniens*	FRDR	X				
Golden Shiner	*Notemigonus crysoleucas*	GLSH		X			
Lake Chub	*Couesius plumbeus*	LKCH	X			X	
Lake Sturgeon	*Acipenser fluvescencs*	LKST	X	X		X	
Lake Whitefish	*Coregonus clupeaformis*	LKWH	X	X	X	X	
Longnose Sucker	*Catostomus catostomus*	LNSC	X	X	X	X	
Mooneye	*Hiodon tergisus*	MOON	X	X	X		
Northern Pike	*Esox lucius*	NRPK	X	X	X	X	
Rainbow Smelt	*Osmerus mordax*	RNSM	X	X	X	X	
Sauger	*Sander canadensis*	SAUG	X	X		X	
Shorthead Redhorse	*Moxostoma macrolepidotum*	SHRD	X	X			
Spottail Shiner	*Notropis hudsonius*	SPSH	X	X	X	X	
Trout-perch	*Percopsis omiscomaycus*	TRPR	X	X	X	X	
Walleye	*Sander vitreus*	WALL	X	X	X	X	
White Sucker	*Catostomus commersonii*	WHSC	X	X	X	X	
Yellow Perch	*Perca flavescens*	YLPR	X	X	X	X	

1. Small offset lake north of Gull Lake.

Table 2: Total number of fish, by site and species, captured in standard gang index gill nets set in Split Lake, summer 2015.

Species	Gillnet site												Totals
	GN-03	GN-05	GN-06	GN-13	GN-15	GN-18	GN-20	GN-21	GN-22	GN-26	GN-28	GN-29	
Cisco	3	1	-	-	-	-	-	-	-	-	-	-	**4**
Freshwater Drum	-	-	-	-	3	-	-	-	-	-	-	-	**3**
Lake Chub	-	-	-	2	-	2	1	-	-	-	-	-	**5**
Lake Sturgeon	-	-	-	-	-	-	-	-	-	1	7	-	**8**
Lake Whitefish	4	1	2	1	-	9	-	2	1	1	-	1	**22**
Longnose Sucker	-	-	-	-	-	-	-	-	1	4	3	1	**9**
Mooneye	-	5	-	-	8	-	-	-	-	-	-	-	**13**
Northern Pike	14	9	18	-	7	4	1	4	1	-	-	2	**60**
Rainbow Smelt	-	-	-	-	-	1	-	-	-	-	-	-	**1**
Sauger	1	7	9	2	5	14	9	14	20	10	14	7	**112**
Shorthead Redhorse	-	-	-	13	4	1	-	-	-	-	-	-	**18**
Walleye	16	10	20	17	22	8	2	25	2	-	-	16	**138**
White Sucker	6	2	5	40	13	7	15	26	29	2	9	24	**178**
Yellow Perch	-	-	1	1	5	-	-	2	-	-	-	-	**9**
Totals	**44**	**35**	**55**	**76**	**67**	**46**	**28**	**73**	**54**	**18**	**33**	**51**	**580**

Table 3: Percent frequency of occurrence of fish, by site and species, captured in standard gang index gill nets set in Split Lake, summer 2015.

Species	Gillnet site												Totals [1]
	GN-03	GN-05	GN-06	GN-13	GN-15	GN-18	GN-20	GN-21	GN-22	GN-26	GN-28	GN-29	
Cisco	6.8	2.9	-	-	-	-	-	-	-	-	-	-	**0.7**
Freshwater Drum	-	-	-	-	4.5	-	-	-	-	-	-	-	**0.5**
Lake Chub	-	-	-	2.6	-	4.3	3.6	-	-	-	-	-	**0.9**
Lake Sturgeon	-	-	-	-	-	-	-	-	-	5.6	21.2	-	**1.4**
Lake Whitefish	9.1	2.9	3.6	1.3	-	19.6	-	2.7	1.9	5.6	-	2.0	**3.8**
Longnose Sucker	-	-	-	-	-	-	-	-	1.9	22.2	9.1	2.0	**1.6**
Mooneye	-	14.3	-	-	11.9	-	-	-	-	-	-	-	**2.2**
Northern Pike	31.8	25.7	32.7	-	10.4	8.7	3.6	5.5	1.9	-	-	3.9	**10.3**
Rainbow Smelt	-	-	-	-	-	2.2	-	-	-	-	-	-	**0.2**
Sauger	2.3	20.0	16.4	2.6	7.5	30.4	32.1	19.2	37.0	55.6	42.4	13.7	**19.3**
Shorthead Redhorse	-	-	-	17.1	6.0	2.2	-	-	-	-	-	-	**3.1**
Walleye	36.4	28.6	36.4	22.4	32.8	17.4	7.1	34.2	3.7	-	-	31.4	**23.8**
White Sucker	13.6	5.7	9.1	52.6	19.4	15.2	53.6	35.6	53.7	11.1	27.3	47.1	**30.7**
Yellow Perch	-	-	1.8	1.3	7.5	-	-	2.7	-	-	-	-	**1.6**
Totals	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

1. Totals may not equal 100% due to rounding.

Table 4: Total number (n) and relative abundance (%) of fish, by species, captured in standard gang and small mesh index gill nets set in Split Lake during previous studies (2001, 2002, 2009, 2010, 2011, 2012, 2013, and 2014) and in 2015.

Common name	Index				Small Mesh			
	Previous Studies		2015		Previous Studies		2015	
	n	%	n	%	n	%	n	%
Burbot	89	1.4	-	-	8	0.2	-	-
Carp	1	0.0	-	-	-	-	-	-
Cisco	41	0.6	4	0.7	3	0.1	1	0.3
Emerald Shiner	-	-	-	-	554	10.5	45	12.7
Flathead Chub	2	0.0	-	-	-	-	-	-
Freshwater Drum	10	0.2	3	0.5	-	-	-	-
Goldeye	1	0.0	-	-	-	-	-	-
Lake Chub	44	0.7	5	0.9	84	1.6	35	9.9
Lake Sturgeon	15	0.2	8	1.4	1	0.0	-	-
Lake Whitefish	275	4.3	22	3.8	2	0.0	-	-
Longnose Sucker	118	1.8	9	1.6	1	0.0	-	-
Mooneye	132	2.1	13	2.2	18	0.3	-	-
Northern Pike	944	14.7	60	10.3	37	0.7	6	1.7
Rainbow Smelt	159	2.5	1	0.2	986	18.7	9	2.5
Sauger	997	15.6	112	19.3	44	0.8	5	1.4
Shorthead Redhorse	27	0.4	18	3.1	-	-	-	-
Slimy Sculpin	-	-	-	-	8	0.2	-	-
Spottail Shiner	-	-	-	-	2047	38.8	172	48.5
Trout-perch	10	0.2	-	-	1245	23.6	65	18.3
Walleye	2015	31.4	138	23.8	57	1.1	7	2.0
White Sucker	1415	22.1	178	30.7	17	0.3	3	0.8
Yellow Perch	114	1.8	9	1.6	169	3.2	7	2.0
Total	**6409**	**-**	**580**	**-**	**5281**	**-**	**355**	**-**

Table 5: Mean catch-per-unit-effort of fish, by site and species, captured in standard gang index gill nets set in Split Lake, summer 2015.

Site	Species [1]												Total	
	LKWH		NRPK		SAUG		WALL		WHSC		Other [2]			
	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
GN-03	3.0	-	10.4	-	0.7	-	11.9	-	4.5	-	2.2	-	**32.7**	**-**
GN-05	0.7	-	6.5	-	5.1	-	7.2	-	1.4	-	4.3	-	**25.3**	**-**
GN-06	1.5	-	13.2	-	6.6	-	14.7	-	3.7	-	0.7	-	**40.4**	**-**
GN-13	0.7	-	0.0	-	1.4	-	12.2	-	28.6	-	11.5	-	**54.4**	**-**
GN-15	0.0	-	5.5	-	4.0	-	17.4	-	10.3	-	15.8	-	**53.0**	**-**
GN-18	7.6	-	3.4	-	11.8	-	6.8	-	5.9	-	3.4	-	**38.9**	**-**
GN-20	0.0	-	0.7	-	6.3	-	1.4	-	10.6	-	0.7	-	**19.7**	**-**
GN-21	1.5	-	2.9	-	10.3	-	18.3	-	19.1	-	1.5	-	**53.6**	**-**
GN-22	0.7	-	0.7	-	14.1	-	1.4	-	20.4	-	0.7	-	**38.0**	**-**
GN-26	0.7	-	0.0	-	7.2	-	0.0	-	1.4	-	3.6	-	**13.0**	**-**
GN-28	0.0	-	0.0	-	11.3	-	0.0	-	7.3	-	8.1	-	**26.7**	**-**
GN-29	0.7	-	1.5	-	5.1	-	11.7	-	17.6	-	0.7	-	**37.3**	**-**
Totals	**1.4**	**2.1**	**3.7**	**4.4**	**7.0**	**4.2**	**8.6**	**6.7**	**10.9**	**8.7**	**4.4**	**4.9**	**36.1**	**13.4**

CPUE = catch-per-unit-effort (# fish/100 m/24 h).

Std = standard deviation.

1. See Table 1 for fish species abbreviations.
2. Pooled CPUE from all remaining fish species.

Table 6: Mean total catch-per-unit-effort of select fish species, and of the entire fish catch, in standard gang index gill nets set in different Keeyask study area waterbodies during previous studies and in 2015.

Waterbody	Year	Species [1]						Total mean CPUE
		WALL	WHSC	NRPK	SAUG	LKWH	All other species	
Split Lake	2001*	16.0	5.1	5.4	4.6	1.5	3.5	36.1
	2002*	6.2	6.0	7.4	6.6	2.1	5.4	33.7
	2009	15.2	6.8	4.9	4.9	0.7	4.4	36.9
	2010	12.2	10.1	4.1	4.3	1.9	5.1	37.7
	2011	14.6	10.2	4.3	9.9	2.6	7.3	48.9
	2012	7.4	15.2	6.3	7.2	2.1	5.6	43.8
	2013	15.1	13.6	5.3	2.8	1.5	4.1	42.4
	2014	11.7	10.3	3.5	7.9	0.7	2.6	36.7
	2015	**8.6**	**10.9**	**3.7**	**7.0**	**1.4**	**4.5**	**36.1**
Nelson River reach [2]	2001	6.3	1.9	7.7	-	1.8	6.2	23.9
	2002	4.2	3.0	10.3	-	1.0	3.9	22.4
	2009	3.0	1.6	6.7	-	1.1	4.4	16.8
	2015	**4.1**	**1.6**	**6.5**	**-**	**1.0**	**2.2**	**15.4**
Stephens Lake North	2009	10.6	0.6	8.1	-	1.3	1.7	22.3
	2012	9.1	0.8	4.7	-	0.6	0.4	15.6
	2015	**14.0**	**1.5**	**6.6**	**-**	**1.8**	**6.2**	**30.0**
Stephens Lake South	2009	17.5	1.5	8.4	-	0.6	7.5	35.5
	2012	6.6	2.7	4.5	-	0.3	3.7	17.8
	2015	**8.9**	**5.2**	**4.0**	**-**	**0.5**	**1.5**	**20.1**

CPUE = catch-per-unit-effort (# fish/100 m/24 h).

* Excludes CPUE data from gillnet sites located in Clark Lake.

1. See Table 1 for fish species abbreviations.
2. Between Clark Lake and Gull Rapids.

Table 7: Total number of fish, by site and species, captured in standard gang index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, and in Little Gull Lake, summer 2015.

Species	Gillnet site												Totals
	GN-01	GN-02	GN-03	GN-04	GN-05	GN-06	GN-07	GN-08	GN-12	GN-13	GN-14 [1]	GN-15	
Cisco	-	-	-	-	-	-	-	-	-	1	-	1	**2**
Lake Sturgeon	-	-	-	-	1	-	-	-	-	-	-	-	**1**
Lake Whitefish	1	-	-	-	-	10	3	-	-	-	-	2	**16**
Longnose Sucker	1	-	-	-	-	-	-	-	-	-	-	-	**1**
Mooneye	-	-	1	-	-	-	-	-	-	-	-	-	**1**
Northern Pike	8	4	8	6	1	17	15	4	5	16	-	19	**103**
Sauger	-	1	-	-	1	-	-	-	-	-	-	-	**2**
Shorthead Redhorse	-	-	2	3	-	-	-	-	-	-	-	-	**5**
Walleye	3	8	8	3	5	2	14	8	10	-	-	3	**64**
White Sucker	1	8	4	1	4	1	1	2	-	-	-	3	**25**
Yellow Perch	-	-	7	1	1	5	1	5	-	1	-	3	**24**
Totals	**14**	**21**	**30**	**14**	**13**	**35**	**34**	**19**	**15**	**18**	**0**	**31**	**244**

1. Little Gull Lake.

Table 8: Percent frequency of occurrence of fish, by site and species, captured in standard gang index gill nets set in the reach of Nelson River between Clark Lake and Gull Rapids, summer 2015.

Species	Gillnet site											Totals [1]
	GN-01	GN-02	GN-03	GN-04	GN-05	GN-06	GN-07	GN-08	GN-12	GN-13	GN-15	
Cisco	-	-	-	-	-	-	-	-	-	5.6	3.2	**0.8**
Lake Sturgeon	-	-	-	-	7.7	-	-	-	-	-	-	**0.4**
Lake Whitefish	7.1	-	-	-	-	28.6	8.8	-	-	-	6.5	**6.6**
Longnose Sucker	7.1	-	-	-	-	-	-	-	-	-	-	**0.4**
Mooneye	-	-	3.3	-	-	-	-	-	-	-	-	**0.4**
Northern Pike	57.1	19.0	26.7	42.9	7.7	48.6	44.1	21.1	33.3	88.9	61.3	**42.2**
Sauger	-	4.8	-	-	7.7	-	-	-	-	-	-	**0.8**
Shorthead Redhorse	-	-	6.7	21.4	-	-	-	-	-	-	-	**2.0**
Walleye	21.4	38.1	26.7	21.4	38.5	5.7	41.2	42.1	66.7	-	9.7	**26.2**
White Sucker	7.1	38.1	13.3	7.1	30.8	2.9	2.9	10.5	-	-	9.7	**10.2**
Yellow Perch	-	-	23.3	7.1	7.7	14.3	2.9	26.3	-	5.6	9.7	**9.8**
Totals	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

1. Totals may not equal 100% due to rounding

Table 9: Total number (n) and relative abundance (%) of fish, by species, captured in standard gang and small mesh index gill nets set in the Nelson River between Clark Lake and Gull Rapids during previous studies (2001, 2002, and 2009) and in 2015.

Common name	Index				Small Mesh			
	Previous Studies		2015		Previous Studies		2015	
	n	%	n	%	n	%	n	%
Brook Stickleback	-	-	-	-	-	-	22	2.3
Burbot	8	0.2	-	-	-	-	-	-
Cisco	11	0.3	2	0.8	1	0.0	17	1.8
Emerald Shiner	-	-	-	-	82	1.6	429	44.5
Flathead Chub	1	0.0	-	-	-	-	-	-
Golden Shiner	-	-	-	-	-	-	1	0.1
Lake Chub	8	0.2	-	-	26	0.5	-	-
Lake Sturgeon	16	0.5	1	0.4	2	0.0	-	-
Lake Whitefish	203	6.2	16	6.6	6	0.1	-	-
Logperch	-	-	-	-	1	0.0	-	-
Longnose Sucker	23	0.7	1	0.4	11	0.2	-	-
Mooneye	138	4.2	1	0.4	-	-	1	0.1
Northern Pike	1297	39.5	103	42.2	41	0.8	10	1.0
Rainbow Smelt	92	2.8	-	-	1467	28.3	2	0.2
Sauger	54	1.6	2	0.8	-	-	-	-
Shorthead Redhorse	57	1.7	5	2.0	1	0.0	-	-
Slimy Sculpin	-	-	-	-	1	0.0	-	-
Spottail Shiner	-	-	-	-	1993	38.5	453	46.9
Trout-perch	1	0.0	-	-	1137	21.9	14	1.5
Walleye	712	21.7	64	26.2	78	1.5	-	-
White Sucker	384	11.7	25	10.2	37	0.7	4	0.4
Yellow Perch	282	8.6	24	9.8	298	5.8	12	1.2
Total	3287	-	244	-	5182	-	965	-

Table 10: Mean catch-per-unit-effort of fish captured, by site and species, in standard gang index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.

Nelson River section	Site	Species [1]										Total	
		LKWH		NRPK		WALL		WHSC		Other [2]			
		CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
Clark Lake to Birthday Rapids													
	GN-01	0.7	-	5.7	-	2.2	-	0.7	-	0.7	-	**10.1**	**-**
	GN-02	0.0	-	2.8	-	5.5	-	5.5	-	0.7	-	**14.5**	**-**
	GN-03	0.0	-	5.6	-	5.6	-	2.8	-	7.0	-	**21.0**	**-**
Birthday Rapids to Gull Lake													
	GN-04	0.0	-	4.0	-	2.0	-	0.7	-	2.7	-	**9.3**	**-**
	GN-05	0.0	-	0.8	-	3.8	-	3.0	-	2.3	-	**9.8**	**-**
	GN-06	6.5	-	11.0	-	1.3	-	0.6	-	3.2	-	**22.7**	**-**
Gull Lake													
	GN-07	2.1	-	10.4	-	9.7	-	0.7	-	0.7	-	**23.6**	**-**
	GN-08	0.0	-	2.6	-	5.2	-	1.3	-	3.2	-	**12.3**	**-**
	GN-12	0.0	-	4.0	-	8.0	-	0.0	-	0.0	-	**12.0**	**-**
	GN-13	0.0	-	12.8	-	0.0	-	0.0	-	1.6	-	**14.4**	**-**
	GN-15	1.3	-	12.1	-	1.9	-	1.9	-	2.6	-	**19.8**	**-**
	Totals	**1.0**	**2.6**	**6.5**	**4.3**	**4.1**	**3.0**	**1.6**	**1.7**	**2.2**	**1.9**	**15.4**	**5.4**

CPUE = catch-per-unit-effort (# fish/100 m/24 h).

Std = standard deviation.

1. See Table 1 for fish species abbreviation.
2. Pooled CPUE from all remaining fish species.

Table 11: Total number of fish, by site and species, captured in standard gang index gill nets set in Stephens Lake North, summer 2015.

Species	Gillnet site									Totals
	GN-01	GN-02	GN-04	GN-05	GN-09	GN-26	GN-31	GN-34	GN-35	
Burbot	-	-	-	-	-	1	-	-	-	**1**
Cisco	2	5	-	-	-	-	-	-	-	**7**
Lake Whitefish	5	5	1	3	1	3	2	-	1	**21**
Longnose Sucker	1	-	-	-	-	-	-	-	1	**2**
Mooneye	-	-	-	-	-	-	-	-	42	**42**
Northern Pike	12	9	11	13	7	8	3	3	8	**74**
Raindow Smelt	1	4	-	-	1	-	-	-	-	**6**
Walleye	60	27	17	26	17	13	1	3	4	**168**
White Sucker	1	-	-	-	4	5	4	1	-	**15**
Yellow Perch	-	1	1	-	-	-	-	-	-	**2**
Totals	**82**	**51**	**30**	**42**	**30**	**30**	**10**	**7**	**56**	**338**

Table 12: Percent frequency of occurrence of fish, by site and species, captured in standard gang index gill nets set in Stephens Lake North, summer 2015.

Species	Gillnet site									Totals [1]
	GN-01	GN-02	GN-04	GN-05	GN-09	GN-26	GN-31	GN-34	GN-35	
Burbot	-	-	-	-	-	3.3	-	-	-	**0.3**
Cisco	2.4	9.8	-	-	-	-	-	-	-	**2.1**
Lake Whitefish	6.1	9.8	3.3	7.1	3.3	10.0	20.0	-	1.8	**6.2**
Longnose Sucker	1.2	-	-	-	-	-	-	-	1.8	**0.6**
Mooneye	-	-	-	-	-	-	-	-	75.0	**12.4**
Northern Pike	14.6	17.6	36.7	31.0	23.3	26.7	30.0	42.9	14.3	**21.9**
Raindow Smelt	1.2	7.8	-	-	3.3	-	-	-	-	**1.8**
Walleye	73.2	52.9	56.7	61.9	56.7	43.3	10.0	42.9	7.1	**49.7**
White Sucker	1.2	-	-	-	13.3	16.7	40.0	14.3	-	**4.4**
Yellow Perch	-	2.0	3.3	-	-	-	-	-	-	**0.6**
Totals	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

1. Totals may not equal 100% due to rounding

Table 13: Total number (n) and relative abundance (%) of fish, by species, captured in standard gang and small mesh index gill nets set in Stephens Lake North during previous studies (2009 and 2012) and in 2015.

Common name	Index				Small Mesh			
	Previous Studies		2015		Previous Studies		2015	
	n	%	n	%	n	%	n	%
Burbot	-	-	1	0.3	-	-	-	-
Carp	1	0.2	-	-	-	-	-	-
Cisco	9	2.2	7	2.1	-	-	-	-
Emerald Shiner	-	-	-	-	34	10.4	180	36.0
Lake Whitefish	20	4.8	21	6.2	1	0.3	-	-
Longnose Sucker	-	-	2	0.6	-	-	-	-
Mooneye	-	-	42	12.4	1	0.3	-	-
Northern Pike	138	33.3	74	21.9	6	1.8	13	2.6
Rainbow Smelt	16	3.9	6	1.8	95	29.0	5	1.0
Sauger	1	0.2	-	-	-	-	-	-
Shorthead Redhorse	1	0.2	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	148	45.1	283	56.6
Trout-perch	-	-	-	-	17	5.2	10	2.0
Walleye	212	51.1	168	49.7	16	4.9	8	1.6
White Sucker	15	3.6	15	4.4	-	-	-	-
Yellow Perch	2	0.5	2	0.6	10	3.0	1	0.2
Total	415	-	338	-	328	-	500	-

Table 14: Mean catch-per-unit-effort of fish, by site and species, captured in standard gang index gill nets set in Stephens Lake North, summer 2015.

Site	Species [1]										Total	
	LKWH		NRPK		WALL		WHSC		Other [2]			
	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
GN-01	3.4	-	8.2	-	40.8	-	0.7	-	2.7	-	**55.7**	**-**
GN-02	3.4	-	6.1	-	18.2	-	0.0	-	6.7	-	**34.4**	**-**
GN-04	0.7	-	7.2	-	11.1	-	0.0	-	0.7	-	**19.6**	**-**
GN-05	2.5	-	11.0	-	22.0	-	0.0	-	0.0	-	**35.5**	**-**
GN-09	0.9	-	6.1	-	14.9	-	3.5	-	0.9	-	**26.3**	**-**
GN-26	2.4	-	6.5	-	10.5	-	4.1	-	0.8	-	**24.3**	**-**
GN-31	2.0	-	3.0	-	1.0	-	4.0	-	0.0	-	**9.9**	**-**
GN-34	0.0	-	3.0	-	3.0	-	1.0	-	0.0	-	**7.0**	**-**
GN-35	1.0	-	8.1	-	4.1	-	0.0	-	43.8	-	**57.0**	**-**
Totals	**1.8**	**1.2**	**6.6**	**2.5**	**14.0**	**12.3**	**1.5**	**1.8**	**6.2**	**14.3**	**30.0**	**17.8**

CPUE = catch-per-unit-effort (# fish/100 m/24 h)

Std = standard deviation

1. See Table 1 for fish species abbreviations
2. Pooled CPUE from all remaining fish species

Table 15: Total number of fish, by site and species, captured in standard gang index gill nets set in Stephens Lake South, summer 2015.

species	Gillnet site									Totals
	GN-13	GN-14	GN-15	GN-16	GN-17	GN-22	GN-30	GN-32	GN-33	
Cisco	-	-	-	2	-	-	-	-	-	**2**
Lake Sturgeon	-	-	-	-	-	-	1	-	-	**1**
Lake Whitefish	-	-	1	1	1	1	-	-	2	**6**
Longnose Sucker	-	-	-	-	-	-	4	-	-	**4**
Northern Pike	-	8	-	7	4	6	2	1	17	**45**
Sauger	1	2	1	-	1	-	-	-	-	**5**
Walleye	13	21	-	6	3	19	16	10	13	**101**
White Sucker	9	11	11	2	4	6	9	5	-	**57**
Yellow Perch	-	1	-	-	-	1	-	-	3	**5**
Totals	**23**	**43**	**13**	**18**	**13**	**33**	**32**	**16**	**35**	**226**

Table 16: Percent frequency of occurrence of fish, by site and species, captured in standard gang index gill nets set in Stephens Lake South, summer 2015.

Species	Gillnet site									Totals [1]
	GN-13	GN-14	GN-15	GN-16	GN-17	GN-22	GN-30	GN-32	GN-33	
Cisco	-	-	-	11.1	-	-	-	-	-	**0.9**
Lake Sturgeon	-	-	-	-	-	-	3.1	-	-	**0.4**
Lake Whitefish	-	-	7.7	5.6	7.7	3.0	-	-	5.7	**2.7**
Longnose Sucker	-	-	-	-	-	-	12.5	-	-	**1.8**
Northern Pike	-	18.6	-	38.9	30.8	18.2	6.3	6.3	48.6	**19.9**
Sauger	4.3	4.7	7.7	-	7.7	-	-	-	-	**2.2**
Walleye	56.5	48.8	-	33.3	23.1	57.6	50.0	62.5	37.1	**44.7**
White Sucker	39.1	25.6	84.6	11.1	30.8	18.2	28.1	31.3	-	**25.2**
Yellow Perch	-	2.3	-	-	-	3.0	-	-	8.6	**2.2**
Totals	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

1. Totals may not equal 100% due to rounding.

Table 17: Total number (n) and relative abundance (%) of fish, by species, captured in standard gang and small mesh index gill nets set in Stephens Lake South during previous studies (2009 and 2012) and in 2015.

Common name	Index				Small Mesh			
	Previous Studies		2015		Previous Studies		2015	
	n	%	n	%	n	%	n	%
Cisco	1	0.2	2	0.9	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	53	13.3
Freshwater Drum	-	-	-	-	4	1.2	-	-
Lake Chub	-	-	-	-	-	-	1	0.3
Lake Sturgeon	1	0.2	1	0.4	-	-	-	-
Lake Whitefish	11	1.9	6	2.7	-	-	6	1.5
Logperch	-	-	-	-	1	0.3	-	-
Longnose Sucker	6	1.0	4	1.8	-	-	5	1.3
Mooneye	14	2.4	-	-	-	-	-	-
Northern Pike	150	25.4	45	19.9	4	1.2	5	1.3
Rainbow Smelt	29	4.9	-	-	50	14.7	9	2.3
Sauger	64	10.8	5	2.2	9	2.7	2	0.5
Shorthead Redhorse	-	-	-	-	1	0.3	-	-
Spottail Shiner	-	-	-	-	121	35.7	277	69.6
Trout-perch	1	0.2	-	-	131	38.6	31	7.8
Walleye	261	44.2	101	44.7	4	1.2	3	0.8
White Sucker	49	8.3	57	25.2	4	1.2	1	0.3
Yellow Perch	4	0.7	5	2.2	10	2.9	5	1.3
Total	**591**	**-**	**226**	**-**	**339**	**-**	**398**	**-**

Table 18: Mean catch-per-unit-effort of fish, by site and species, captured in standard gang index gill nets set in Stephens Lake South, summer 2015.

Site	Species [1]										Total	
	LKWH		NRPK		WALL		WHSC		Other [2]			
	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
GN-13	0.0	-	0.0	-	11.9	-	8.2	-	0.9	-	**21.1**	**-**
GN-14	0.0	-	7.5	-	19.6	-	10.2	-	2.8	-	**40.1**	**-**
GN-15	0.9	-	0.0	-	0.0	-	10.0	-	0.9	-	**11.8**	**-**
GN-16	0.9	-	6.5	-	5.5	-	1.8	-	1.8	-	**16.6**	**-**
GN-17	0.8	-	3.3	-	2.4	-	3.3	-	0.8	-	**10.6**	**-**
GN-22	0.8	-	5.0	-	15.7	-	5.0	-	0.8	-	**27.3**	**-**
GN-30	0.0	-	1.2	-	9.2	-	5.2	-	2.9	-	**18.4**	**-**
GN-32	0.0	-	0.6	-	6.0	-	3.0	-	0.0	-	**9.6**	**-**
GN-33	1.5	-	12.5	-	9.6	-	0.0	-	2.2	-	**25.7**	**-**
Totals	**0.5**	**0.6**	**4.0**	**4.2**	**8.9**	**6.2**	**5.2**	**3.6**	**1.5**	**1.0**	**20.1**	**9.8**

CPUE = catch-per-unit-effort (# fish/100 m/24 h).

Std = standard deviation.

1. See Table 1 for fish species abbreviations.
2. Pooled CPUE from all remaining fish species.

Table 19: Total number of fish, by site and species, captured in small-mesh index gill nets set in Split Lake, summer 2015.

Species	Gillnet site				Totals
	SN-03	SN-06	SN-20	SN-26	
Cisco	1	-	-	-	**1**
Emerald Shiner	30	14	1	-	**45**
Lake Chub	30	5	-	-	**35**
Northern Pike	1	5	-	-	**6**
Rainbow Smelt	2	6	1	-	**9**
Sauger	-	2	2	1	**5**
Spottail Shiner	118	53	1	-	**172**
Trout-perch	37	5	17	6	**65**
Walleye	3	4	-	-	**7**
White Sucker	-	1	2	-	**3**
Yellow Perch	-	6	-	1	**7**
Totals	**222**	**101**	**24**	**8**	**355**

Table 20: Percent frequency of occurrence of fish, by site and species, captured in small-mesh index gill nets set in Split Lake, summer 2015.

Species	Gillnet site				Totals [1]
	SN-03	SN-06	SN-20	SN-26	
Cisco	0.5	-	-	-	**0.3**
Emerald Shiner	13.5	13.9	4.2	-	**12.7**
Lake Chub	13.5	5.0	-	-	**9.9**
Northern Pike	0.5	5.0	-	-	**1.7**
Rainbow Smelt	0.9	5.9	4.2	-	**2.5**
Sauger	-	2.0	8.3	12.5	**1.4**
Spottail Shiner	53.2	52.5	4.2	-	**48.5**
Trout-perch	16.7	5.0	70.8	75.0	**18.3**
Walleye	1.4	4.0	-	-	**2.0**
White Sucker	-	1.0	8.3	-	**0.8**
Yellow Perch	-	5.9	-	12.5	**2.0**
Totals	**100**	**100**	**100**	**100**	**100**

1. Totals may not equal 100% due to rounding.

Table 21: Mean catch-per-unit-effort of fish, by site and species, captured in small-mesh index gill nets set in Split Lake, summer 2015.

Site	CISC [1]		EMSH		LKCH		NRPK		RNSM		SAUG	
	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
SN-03	1.0	-	30.6	-	30.6	-	1.0	-	2.0	-	0.0	-
SN-06	0.0	-	14.1	-	5.0	-	5.0	-	6.1	-	2.0	-
SN-20	0.0	-	1.0	-	0.0	-	0.0	-	1.0	-	1.9	-
SN-26	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	1.0	-
Totals	**0.3**	**0.5**	**11.4**	**14.3**	**8.9**	**14.7**	**1.5**	**2.4**	**2.3**	**2.7**	**1.2**	**0.9**

Table 21: Mean catch-per-unit-effort of fish, by site and species, captured in small-mesh index gill nets set in Split Lake, summer 2015 (continued).

Site	SPSH		TRPR		WALL		WHSC		YLPR		Total	
	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
SN-03	120.5	-	37.8	-	3.1	-	0.0	-	0.0	-	**226.7**	**-**
SN-06	53.5	-	5.0	-	4.0	-	1.0	-	6.1	-	**102.0**	**-**
SN-20	1.0	-	16.4	-	0.0	-	1.9	-	0.0	-	**23.2**	**-**
SN-26	0.0	-	5.9	-	0.0	-	0.0	-	1.0	-	**7.9**	**-**
Totals	**43.7**	**57.0**	**16.3**	**15.2**	**1.8**	**2.1**	**0.7**	**0.9**	**1.8**	**2.9**	**90.0**	**100.1**

CPUE = catch-per-unit-effort (# fish/30 m/24 h).

Std = standard deviation.

1. See Table 1 for fish species abbreviations.

Table 22: Mean total catch-per-unit-effort of select fish species, and of the entire fish catch, in small-mesh index gill nets set in different Keeyask study area waterbodies during previous studies and in 2015.

Waterbody	Year	Species [1]					Total mean CPUE
		SPSH	TRPR	EMSH	RNSM	All other species	
Split Lake	2001*	6.2	6.2	0.6	8.3	2.7	24.0
	2002*	25.0	18.9	3.4	7.7	6.7	61.7
	2009	19.7	9.7	6.8	24.1	8.1	68.4
	2010	12.7	9.1	0.0	10.0	1.4	33.2
	2011	39.8	55.6	1.7	79.1	3.3	179.5
	2012	20.2	19.1	9.2	2.8	4.6	55.9
	2013	103.2	20.0	35.6	9.8	4.5	173.1
	2014	104.0	21.6	63.3	2.0	11.3	202.2
	2015	**43.7**	**16.3**	**11.4**	**2.3**	**16.3**	**90.0**
Nelson River	2001	40.2	11.3	1.0	24.8	6.4	83.7
(Clark Lake to Gull Rapids)	2002	15.3	21.2	0.7	13.6	1.9	52.7
	2009	26.2	13.1	2.1	21.8	16.0	79.2
	2015	**133.6**	**4.2**	**127.8**	**0.6**	**13.3**	**279.5**
Stephens Lake North	2009	27.6	0.3	11.6	21.3	5.9	66.7
	2012	14.3	4.5	0.0	5.6	3.1	27.5
	2015	**111.4**	**4.4**	**60.7**	**2.0**	**7.6**	**186.1**
Stephens Lake South	2009	10.3	13.6	0.0	15.4	4.3	43.6
	2012	27.7	24.8	0.0	1.5	6.6	60.6
	2015	**109.6**	**10.3**	**21.2**	**3.8**	**10.8**	**155.7**

CPUE = catch-per-unit-effort (# fish/100 m/24 h).

* Excludes CPUE data from gillnet sites located in Clark Lake.

1. See Table 1 for fish species abbreviations.

Table 23: Total number of fish, by site and species, captured in small-mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, and in Little Gull Lake, summer 2015.

Species	Gillnet site				Totals
	SN-01	SN-06	SN-14 [1]	SN-15	
Brook Stickleback	-	-	22	-	**22**
Cisco	-	17	-	-	**17**
Emerald Shiner	12	401	-	16	**429**
Golden Shiner	-	-	-	1	**1**
Mooneye	-	-	-	1	**1**
Northern Pike	-	5	-	5	**10**
Rainbow Smelt	-	2	-	-	**2**
Spottail Shiner	1	213	-	239	**453**
Trout-perch	3	6	-	5	**14**
White Sucker	-	4	-	-	**4**
Yellow Perch	-	3	-	9	**12**
Totals	**16**	**651**	**22**	**276**	**965**

1. Little Gull Lake.

Table 24: Percent frequency of occurrence of fish, by site and species, captured in small-mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.

Species	Gillnet site			Totals [1]
	SN-01	SN-06	SN-15	
Cisco	-	2.6	-	**1.8**
Emerald Shiner	75.0	61.6	5.8	**45.5**
Golden Shiner	-	-	0.4	**0.1**
Mooneye	-	-	0.4	**0.1**
Northern Pike	-	0.8	1.8	**1.1**
Rainbow Smelt	-	0.3	-	**0.2**
Spottail Shiner	6.3	32.7	86.6	**48.0**
Trout-perch	18.8	0.9	1.8	**1.5**
White Sucker	-	0.6	-	**0.4**
Yellow Perch	-	0.5	3.3	**1.3**
Totals	**100**	**100**	**100**	**100**

1. Totals may not equal 100% due to rounding

Table 25: Mean catch-per-unit-effort of fish, by site and species, captured in small-mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.

Nelson River section [1]	Site	CISC [2]		EMSH		GLSH		MOON		NRPK	
		CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
Clark Lake to Birthday Rapids	SN-01	0.0	-	11.8	-	0.0	-	0.0	-	0.0	-
Birthday Rapids to Gull Lake	SN-06	15.2	-	357.5	-	0.0	-	0.0	-	4.5	-
Gull Lake	SN-15	0.0	-	14.1	-	0.3	-	0.3	-	4.4	-
	Totals	**5.1**	**-**	**127.8**	**198.9**	**0.3**	**-**	**0.3**	**-**	**2.9**	**2.6**

Table 25: Mean catch-per-unit-effort of fish, by site and species, captured in small-mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015 (continued).

Nelson River section	Site	RNSM[1]		SPSH		TRPR		WHSC		YLPR		Total	
		CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
Clark Lake to Birthday Rapids	SN-01	0.0	-	1.0	-	3.0	-	0.0	-	0.0	-	**15.8**	**-**
Birthday Rapids to Gull Lake	SN-06	1.8	-	189.9	-	5.3	-	3.6	-	2.7	-	**580.4**	**-**
Gull Lake	SN-15	0.0	-	209.9	-	4.4	-	0.0	-	7.9	-	**242.4**	**-**
	Totals	**0.6**	**-**	**133.6**	**115.3**	**4.2**	**1.2**	**1.2**	**-**	**3.5**	**4.0**	**279.5**	**284.1**

CPUE = catch-per-unit-effort (# fish/30 m/24 h).

Std = standard deviation.

1. See Table 1 for fish species abbreviations.

Table 26: Total number of fish, by site and species, captured in small-mesh index gill nets set in Stephens Lake North, summer 2015.

Species	Gillnet site			Totals
	SN-04	SN-09	SN-34	
Emerald Shiner	133	11	36	**180**
Northern Pike	10	2	1	**13**
Rainbow Smelt	-	5	-	**5**
Spottail Shiner	86	84	113	**283**
Trout-perch	-	3	7	**10**
Walleye	3	3	2	**8**
Yellow Perch	1	-	-	**1**
Totals	**233**	**108**	**159**	**500**

Table 27: Percent frequency of occurrence of fish, by site and species, captured in small-mesh index gill nets set in Stephens Lake North, summer 2015.

Species	Gillnet site			Totals [1]
	SN-04	SN-09	SN-34	
Emerald Shiner	57.1	10.2	22.6	**36.0**
Northern Pike	4.3	1.9	0.6	**2.6**
Rainbow Smelt	-	4.6	-	**1.0**
Spottail Shiner	36.9	77.8	71.1	**56.6**
Trout-perch	-	2.8	4.4	**2.0**
Walleye	1.3	2.8	1.3	**1.6**
Yellow Perch	0.4	-	-	**0.2**
Totals	**100**	**100**	**100**	**100**

1. Totals may not equal 100% due to rounding.

Table 28: Mean catch-per-unit-effort of fish, by site and species, captured in small-mesh index gill nets set in Stephens Lake North, summer 2015.

Site	EMSH [1]		NRPK		RNSM		SPSH		TRPR		WALL		YLPR		Total	
	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
SN-04	119.3	-	9.0	-	0.0	-	77.1	-	0.0	-	2.7	-	0.9	-	**208.9**	**-**
SN-09	13.3	-	2.4	-	6.0	-	101.2	-	3.6	-	3.6	-	0.0	-	**130.1**	**-**
SN-34	49.7	-	1.4	-	0.0	-	155.9	-	9.7	-	2.8	-	0.0	-	**219.3**	**-**
Totals	**60.7**	**53.9**	**4.3**	**4.1**	**2.0**	**3.5**	**111.4**	**40.3**	**4.4**	**4.9**	**3.0**	**0.5**	**0.3**	**0.5**	**186.1**	**48.8**

CPUE = catch-per-unit-effort (# fish/30 m/24 h)

Std = standard deviation

1. See Table 1 for fish species abbreviations.

Table 29: Total number of fish, by site and species, captured in small-mesh index gill nets set in Stephens Lake South, summer 2015.

Species	Gillnet site			Totals
	SN-14	SN-22	SN-30	
Emerald Shiner	23	30	-	**53**
Lake Chub	-	1	-	**1**
Lake Whitefish	1	5	-	**6**
Longnose Sucker	5	-	-	**5**
Northern Pike	-	3	2	**5**
Rainbow Smelt	8	1	-	**9**
Sauger	-	-	2	**2**
Spottail Shiner	104	170	3	**277**
Trout-perch	6	8	17	**31**
Walleye	2	1	-	**3**
White Sucker	1	-	-	**1**
Yellow Perch	5	-	-	**5**
Totals	**155**	**219**	**24**	**398**

Table 30: Percent frequency of occurrence of fish, by site and species, captured in small-mesh index gill nets set in Stephens Lake South, summer 2015.

Species	Gillnet site			Totals [1]
	SN-14	SN-22	SN-30	
Emerald Shiner	14.8	13.7	-	**13.3**
Lake Chub	-	0.5	-	**0.3**
Lake Whitefish	0.6	2.3	-	**1.5**
Longnose Sucker	3.2	-	-	**1.3**
Northern Pike	-	1.4	8.3	**1.3**
Rainbow Smelt	5.2	0.5	-	**2.3**
Sauger	-	-	8.3	**0.5**
Spottail Shiner	67.1	77.6	12.5	**69.6**
Trout-perch	3.9	3.7	70.8	**7.8**
Walleye	1.3	0.5	-	**0.8**
White Sucker	0.6	-	-	**0.3**
Yellow Perch	3.2	-	-	**1.3**
Totals	**100**	**100**	**100**	**100**

1. Totals may not equal 100% due to rounding.

Table 31: Mean catch-per-unit-effort of fish captured, by site and species, in small-mesh index gill nets set in Stephens Lake South, summer 2015.

Site	CISC [1]		EMSH		LKWH		LNSC		NRPK		RNSM		SAUG	
	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
SN-14	0	-	29.4	-	1.3	-	6.4	-	0.0	-	10.2	-	0.0	-
SN-22	1.1	-	34.1	-	5.7	-	0.0	-	3.4	-	1.1	-	0.0	-
SN-32	0.0	-	0.0	-	0.0	-	0.0	-	1.6	-	0.0	-	1.6	-
Totals	**0.4**	**0.7**	**21.2**	**18.5**	**2.3**	**3.0**	**2.1**	**3.7**	**1.7**	**1.7**	**3.8**	**5.6**	**0.5**	**1.0**

Table 31: Mean catch-per-unit-effort of fish captured, by site and species, in small-mesh index gill nets set in Stephens Lake South, summer 2015 (continued).

Site	SPSH		TRPR		WALL		WHSC		YLPR		Total	
	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std	CPUE	Std
SN-14	133.1	-	7.7	-	2.6	-	1.3	-	6.4	-	**198.4**	**-**
SN-22	193.2	-	9.1	-	1.1	-	0.0	-	0.0	-	**248.9**	**-**
SN-32	2.5	-	14.0	-	0.0	-	0.0	-	0.0	-	**19.8**	**-**
Totals	**109.6**	**97.5**	**10.3**	**3.3**	**1.2**	**1.3**	**0.4**	**0.7**	**2.1**	**3.7**	**155.7**	**120.4**

CPUE = catch-per-unit-effort (# fish/30 m/24 h).

Std = standard deviation.

1. See Table 1 for fish species abbreviations.

Table 32: Mean fork length, weight, and condition factor (K) of fish, by species, captured in standard gang index gill nets set in Split Lake, summer 2015.

Species	Length (mm)				Weight (g)				K			
	n	Mean	Std	Range	n	Mean	Std	Range	n	Mean	Std	Range
Cisco	-	-	-	-	4	421	257	92–640	-	-	-	-
Freshwater Drum	-	-	-	-	1	1480	-	-	-	-	-	-
Lake Chub	-	-	-	-	3	57	23	30–70	-	-	-	-
Lake Sturgeon	8	453	111	300–570	7	647	423	170–1220	7	0.66	0.04	0.63–0.72
Lake Whitefish	22	404	55	225–486	22	1159	437	140–2050	22	1.65	0.17	1.23–1.92
Longnose Sucker	-	-	-	-	9	852	359	109–1400	-	-	-	-
Mooneye	-	-	-	-	1	240	-	-	-	-	-	-
Northern Pike	60	504	143	208–1001	60	1085	1052	60–7330	60	0.68	0.05	0.57–0.81
Rainbow Smelt	-	-	-	-	1	6	-	-	-	-	-	-
Sauger	-	-	-	-	112	457	225	53–960	-	-	-	-
Shorthead Redhorse	-	-	-	-	5	695	580	77–1405	-	-	-	-
Walleye	138	344	82	145–557	138	530	364	31–2040	138	1.09	0.09	0.84–1.34
White Sucker	178	374	95	143–500	177	1006	545	45–2360	177	1.60	0.16	1.14–2.22
Yellow Perch	-	-	-	-	4	109	68	65–210	-	-	-	-

n = number of fish measured.

Std = standard deviation.

Table 33: Mean fork length, weight, and condition factor (K) of fish captured, by species, in standard gang index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.

Species	Length (mm)				Weight (g)				K			
	n	Mean	Std	Range	n	Mean	Std	Range	n	Mean	Std	Range
Cisco	2	331	27	312–350	2	563	124	475–650	2	1.54	0.03	1.52–1.56
Lake Sturgeon	1	532	-	-	1	925	-	-	1	0.61	-	-
Lake Whitefish	15	388	126	157–524	14	1269	720	125–2050	14	1.58	0.17	1.13–1.75
Longnose Sucker	1	375	-	-	1	650	-	-	1	1.23	-	-
Mooneye	1	322	-	-	1	450	-	-	1	1.35	-	-
Northern Pike	103	570	160	205–946	103	1586	1258	110–6775	103	0.70	0.13	0.43–1.28
Sauger	2	281	113	201–361	2	275	247	100–450	2	1.09	0.19	0.96–1.23
Shorthead Redhorse	5	339	60	258–410	5	680	352	258	5	1.59	0.14	1.45–1.79
Walleye	64	401	125	148–625	64	932	711	44–2650	64	1.13	0.16	0.78–1.63
White Sucker	24	307	112	135–444	24	599	508	35–1600	24	1.49	0.18	1.06–1.83
Yellow Perch	24	155	20	130–201	-	-	-	-	-	-	-	-

n = number of fish measured.

Std = standard deviation.

Table 34: Mean fork length, weight, and condition factor (K) of fish, by species, captured in standard gang index gill nets set in Stephens Lake North, summer 2015.

Species	Length (mm)				Weight (g)				K			
	n	Mean	Std	Range	n	Mean	Std	Range	n	Mean	Std	Range
Burbot	-	-	-	-	1	60	-	-	-	-	-	-
Cisco	-	-	-	-	3	367	514	70–960	-	-	-	-
Lake Whitefish	21	361	136	171–550	21	1044	930	50–2510	21	1.45	0.24	1.00–1.92
Longnose Sucker	-	-	-	-	2	495	587	80–910	-	-	-	-
Mooneye	-	-	-	-	1	460	-	-	-	-	-	-
Northern Pike	74	585	153	278–969	74	1640	1512	140–7410	74	0.66	0.08	0.41–0.89
Raindow Smelt	-	-	-	-	2	55	64	10–100	-	-	-	-
Walleye	168	384	92	170–585	168	778	544	60–2200	168	1.15	0.08	0.84–1.37
White Sucker	15	372	101	200–495	15	992	604	110–1890	15	1.59	0.15	1.35–1.80
Yellow Perch	-	-	-	-	2	60	14	50–70	-	-	-	-

n = number of fish measured.

Std = standard deviation.

Table 35: Mean fork length, weight, and condition factor (K) of fish, by species, captured in standard gang index gill nets set in Stephens Lake South, summer 2015.

Species	Length (mm)				Weight (g)				K			
	n	Mean	Std	Range	n	Mean	Std	Range	n	Mean	Std	Range
Cisco	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	1	850	-	-	1	5400	-	-	1	0.88	-	-
Lake Whitefish	6	481	67	410–549	6	2080	900	1210–3620	6	1.81	0.34	1.38–2.19
Longnose Sucker	-	-	-	-	2	1205	219	1050–1360	-	-	-	-
Northern Pike	45	538	132	304–878	45	1356	1204	170–5700	45	0.70	0.10	0.38–0.97
Sauger	-	-	-	-	5	884	111	760–1000	-	-	-	-
Walleye	101	417	109	170–602	101	996	593	50–2490	101	1.15	0.13	0.82–1.84
White Sucker	57	410	92	140–514	57	1363	643	50–2350	57	1.72	0.15	1.35–2.03
Yellow Perch	-	-	-	-	2	175	134	80–270	-	-	-	-

n = number of fish measured.

Std = standard deviation.

Table 36: Mean fork length, weight, and condition factor (K) of select fish species captured in small-mesh index gill nets set in Split Lake, summer 2015.

Species	Length (mm)				Weight (g)				K			
	n	Mean	Std	Range	n	Mean	Std	Range	n	Mean	Std	Range
Cisco	-	-	-	-	1	4	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	1	6	-	-	-	-	-	-
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	6	399	87	227–470	6	500	216	90–710	6	0.72	0.04	0.66–0.77
Rainbow Smelt	-	-	-	-	1	5	-	-	-	-	-	-
Sauger	-	-	-	-	5	421	298	5–730	-	-	-	-
Spottail Shiner	-	-	-	-	1	5	-	-	-	-	-	-
Trout-perch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	7	308	147	72–492	7	522	498	2–1370	7	1.03	0.24	0.54–1.25
White Sucker	2	88	1	87–88	3	10	8	5–20	2	0.82	0.13	0.73–0.91
Yellow Perch	-	-	-	-	1	20	-	-	-	-	-	-

n = number of fish measured.

Std = standard deviation.

Table 37: Mean fork length, weight, and condition factor (K) of select fish species captured in small-mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.

Species	Length (mm)				Weight (g)				K			
	n	Mean	Std	Range	n	Mean	Std	Range	n	Mean	Std	Range
Cisco	17	100	16	75–132	-	-	-	-	-	-	-	-
Mooneye	1	146	-	-	-	-	-	-	-	-	-	-
Northern Pike	10	374	185	191–774	10	619	924	82–3100	10	0.81	0.28	0.46–1.22
Rainbow Smelt	2	109	4	106–111	2	8	1	7-9	2	0.62	0.05	0.59–0.66
White Sucker	4	85	4	81–90	-	-	-	-	-	-	-	-
Yellow Perch	6	117	16	97–142	-	-	-	-	-	-	-	-

n = number of fish measured.

Std = standard deviation.

Table 38: Mean fork length, weight, and condition factor (K) of select fish species captured in small-mesh index gill nets set in Stephens Lake North, summer 2015.

Species	Length (mm)				Weight (g)				K			
	n	Mean	Std	Range	n	Mean	Std	Range	n	Mean	Std	Range
Northern Pike	13	494	98	225–596	13	928	409	70–1470	13	0.70	0.10	0.61–0.99
Walleye	8	339	144	84–468	8	630	436	10–1190	8	1.22	0.20	1.06–1.69
Yellow Perch	-	-	-	-	1	5	-	-	-	-	-	-

n = number of fish measured.

Std = standard deviation.

Table 39: Mean fork length, weight, and condition factor (K) of select fish species captured in small-mesh index gill nets set in Stephens Lake South, summer 2015.

Species	Length (mm)				Weight (g)				K			
	n	Mean	Std	Range	n	Mean	Std	Range	n	Mean	Std	Range
Lake Whitefish	6	87	6	80–95	6	7	1	5–8	6	1.03	0.14	0.89–1.21
Northern Pike	5	355	196	126–556	5	478	449	12–1050	5	0.62	0.04	0.57–0.68
Walleye	3	282	190	161–501	3	567	904	40–1610	3	1.01	0.24	0.80–1.28
White Sucker	1	132	-	-	1	30	-	-	1	1.30	-	-
Yellow Perch	5	89	15	77–113	5	10	5	7–19	5	1.39	0.14	1.27–1.56

n = number of fish measured.

Std = standard deviation.

Table 40: Summary of annual mean measures of abundance and size of selected fish species captured in standard gang index gill nets set in Split Lake during summer, 2009–2015.

Species	Year*	n	Frequency of occurrence (%)	CPUE	Fork length (mm)	K
Lake Whitefish	2009	10	2.2	0.7	498	1.93
	2010	28	5.0	1.9	382	1.62
	2011	34	6.6	2.6	390	1.64
	2012	29	5.3	2.1	401	1.61
	2013	20	4.2	1.5	413	1.57
	2014	11	1.8	0.7	416	1.67
	2015	**22**	**3.8**	**1.4**	**404**	**1.65**
Northern Pike	2009	58	12.5	4.4	432	0.77
	2010	74	13.2	4.1	452	0.76
	2011	54	10.5	4.3	460	0.78
	2012	77	14.2	6.3	420	0.72
	2013	64	13.4	5.3	453	0.68
	2014	56	9.3	3.5	530	0.73
	2015	**60**	**10.3**	**3.7**	**504**	**0.68**
Walleye	2009	189	40.7	15.2	236	1.29
	2010	194	34.6	12.2	297	1.26
	2011	150	29.1	14.6	279	1.28
	2012	75	13.8	7.4	264	1.14
	2013	171	35.8	15.1	276	1.13
	2014	189	31.3	11.7	325	1.13
	2015	**138**	**23.8**	**8.6**	**344**	**1.09**

n = number of fish measured.

CPUE = catch-per-unit-effort (total # fish/100 m/24 hours).

K = condition factor.

* All sample years were conducted under CAMP (in prep.).

Table 41: Summary of annual mean measures of abundance and size of selected fish species captured in standard gang index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids during summer, 2001–2015.

Species	Year	n	Frequency of occurrence (%)	CPUE	Fork length (mm)	K
Lake Whitefish	2001 [1]	103	7.5	1.8	436	1.70
	2002 [2]	61	4.7	1.0	394	1.72
	2009 [3]	39	6.4	1.1	431	1.77
	2015	**16**	**6.6**	**1.0**	**388**	**1.58**
Northern Pike	2001	447	32.7	7.7	490	0.78
	2002	607	46.4	10.3	543	0.77
	2009	243	39.9	6.7	569	0.75
	2015	**103**	**42.2**	**6.5**	**570**	**0.70**
Walleye	2001	360	26.3	6.3	407	1.29
	2002	242	18.5	4.2	446	1.33
	2009	110	18.1	3.0	401	1.31
	2015	**64**	**26.2**	**4.1**	**401**	**1.13**

n = number of fish measured

CPUE = catch-per-unit-effort (total # fish/100 m/24 hours)

K = condition factor

1. Remnant *et al.* 2004.
2. Johnson and Parks 2005.
3. Holm 2010.

Table 42: Summary of annual mean measures of abundance and size of selected fish species captured in standard gang index gill nets set in Stephens Lake North during summer, 2009–2015.

Species	Year*	n	Frequency of occurrence (%)	CPUE	Fork length (mm)	K
Lake Whitefish	2009	13	5.5	1.0	407	1.91
	2012	7	3.9	0.6	317	1.40
	2015	**21**	**6.2**	**1.8**	**361**	**1.45**
Northern Pike	2009	85	36.2	7.3	548	0.74
	2012	53	29.4	4.7	608	0.70
	2015	**74**	**21.9**	**6.6**	**585**	**0.66**
Walleye	2009	107	45.5	9.6	435	1.40
	2012	105	58.3	9.1	415	1.25
	2015	**168**	**49.7**	**14.0**	**384**	**1.15**

n = number of fish measured.

CPUE = catch-per-unit-effort (total # fish/100 m/24 hours).

K = condition factor.

* All sample years were conducted under CAMP (in prep.).

Table 43: Summary of annual mean measures of abundance and size of selected fish species captured in standard gang index gill nets set in Stephens Lake South during summer, 2009–2015.

Species	Year*	n	Frequency of occurrence (%)	CPUE	Fork length (mm)	K
Lake Whitefish	2009	6	1.6	0.6	486	2.04
	2012	5	2.2	0.3	526	1.81
	2015	**6**	**2.7**	**0.5**	**481**	**1.81**
Northern Pike	2009	88	23.9	8.4	529	0.74
	2012	62	27.8	4.5	530	0.70
	2015	**45**	**19.9**	**4.0**	**538**	**0.70**
Walleye	2009	183	49.7	17.5	442	1.40
	2012	78	35.0	6.4	480	1.28
	2015	**101**	**44.7**	**8.9**	**417**	**1.15**

n = number of fish measured.

CPUE = catch-per-unit-effort (total # fish/100 m/24 hours).

K = condition factor.

* All sample years were conducted under CAMP (in prep.).

FIGURES

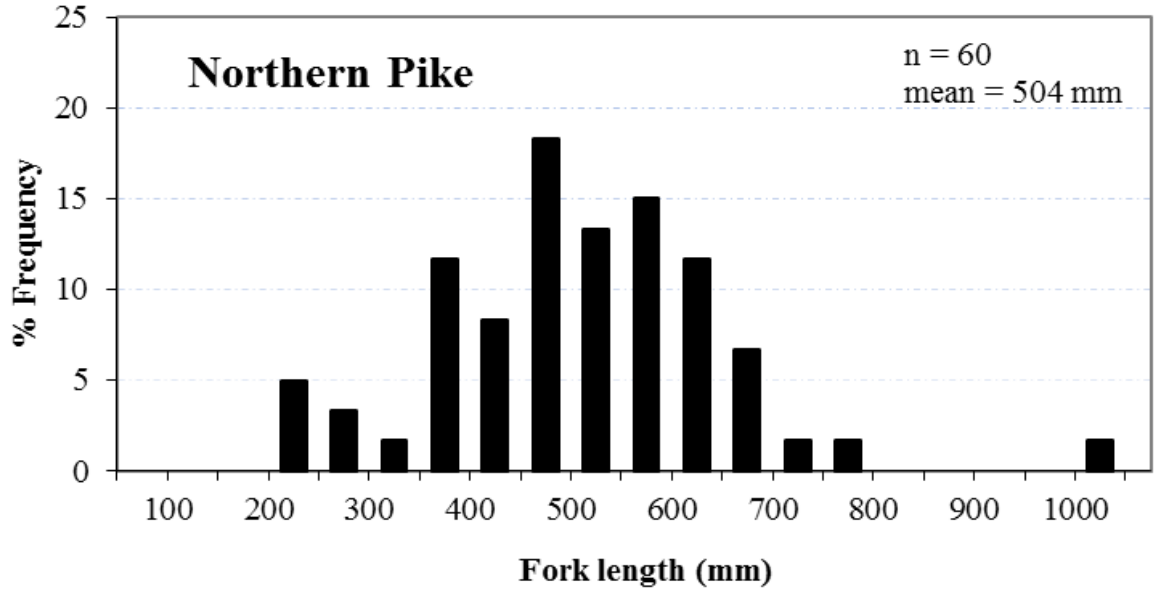


Figure 1: **Length-frequency distribution of Northern Pike captured in standard gang index gill nets in Split Lake, summer 2015.**

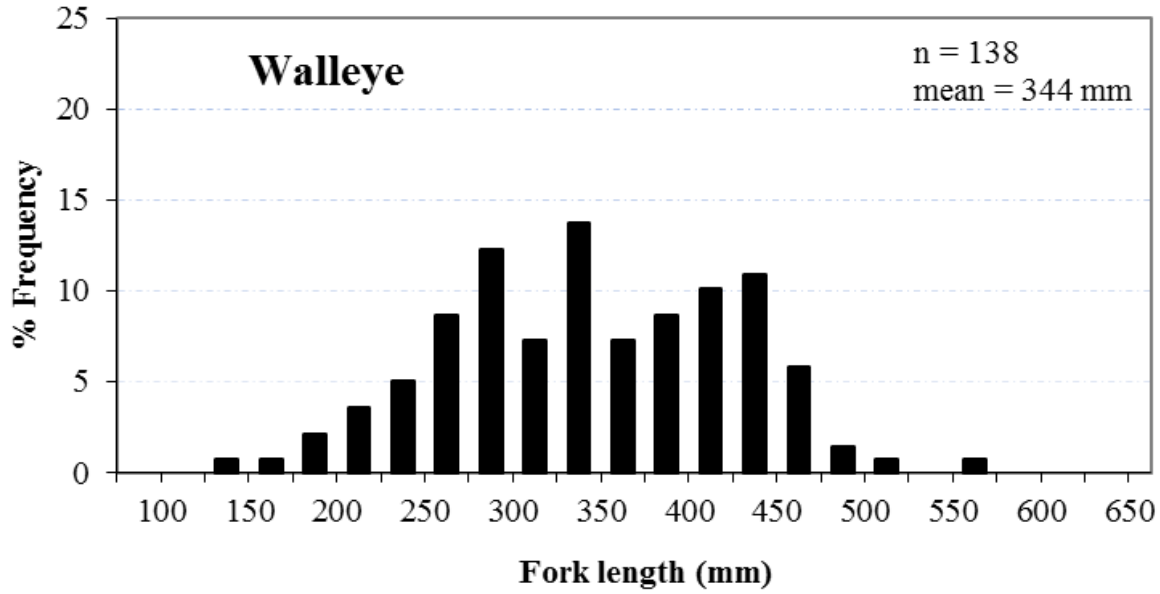


Figure 2: **Length-frequency distribution of Walleye captured in standard gang index gill nets in Split Lake, summer 2015.**

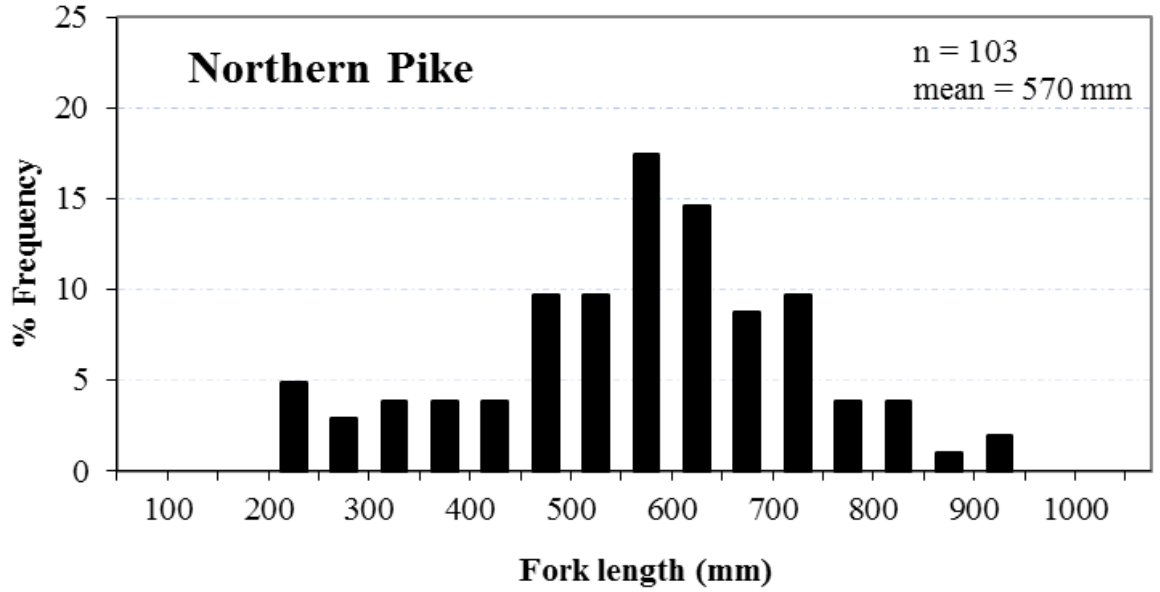


Figure 3: **Length-frequency distribution of Northern Pike captured in standard gang index gill nets in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.**

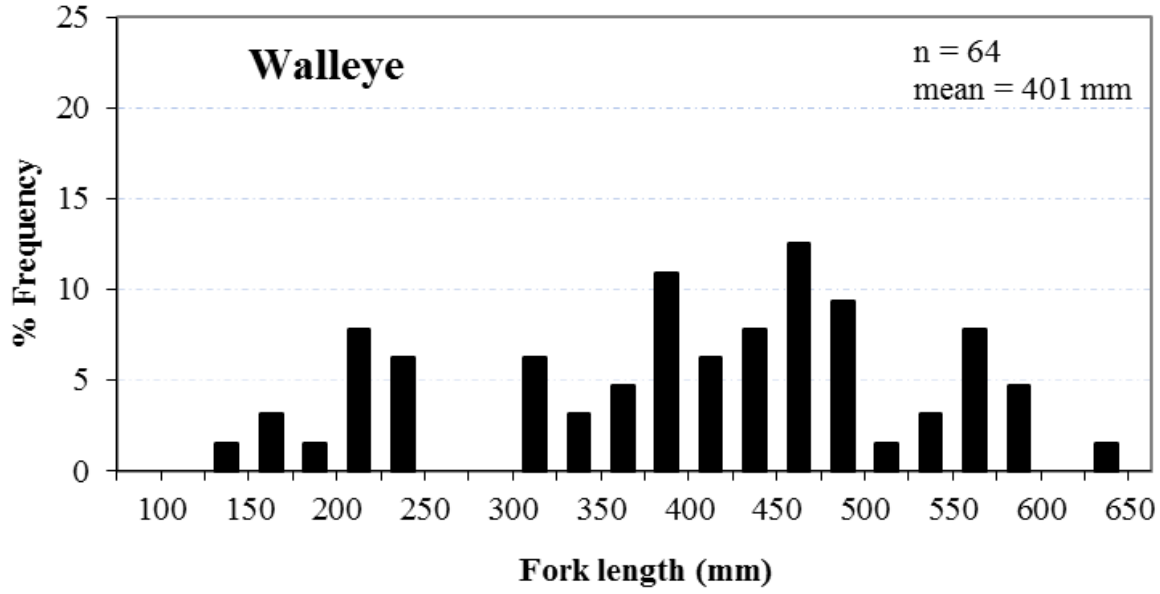


Figure 4: **Length-frequency distribution of Walleye captured in standard gang index gill nets in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.**

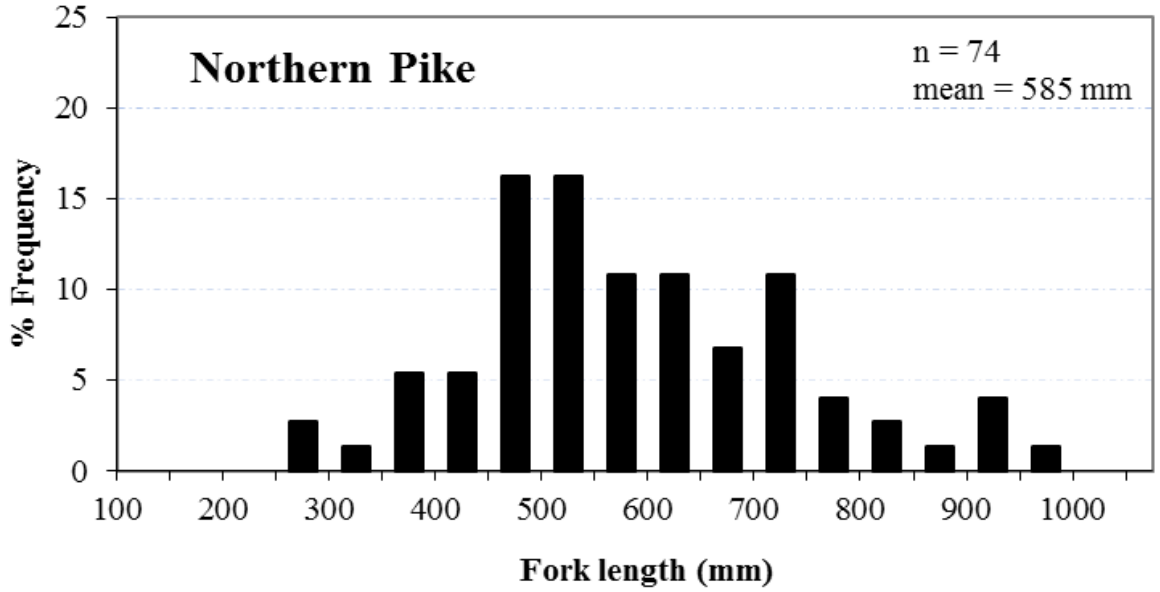


Figure 5: **Length-frequency distribution of Northern Pike captured in standard gang index gill nets in Stephens Lake North, summer 2015.**

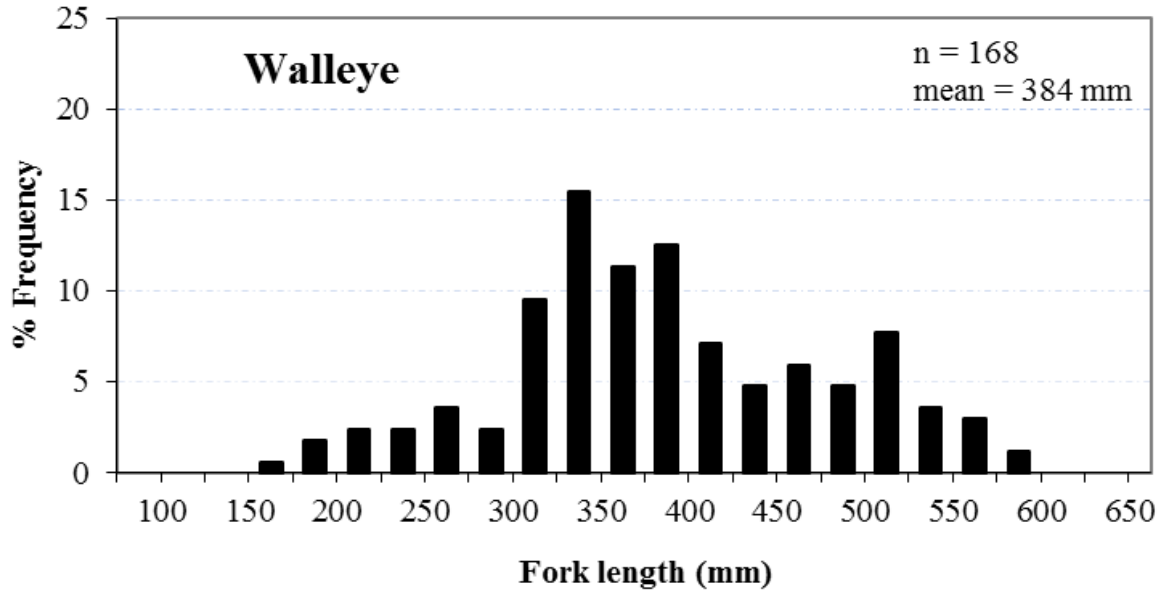


Figure 6: **Length-frequency distribution of Walleye captured in standard gang index gill nets in Stephens Lake North, summer 2015.**

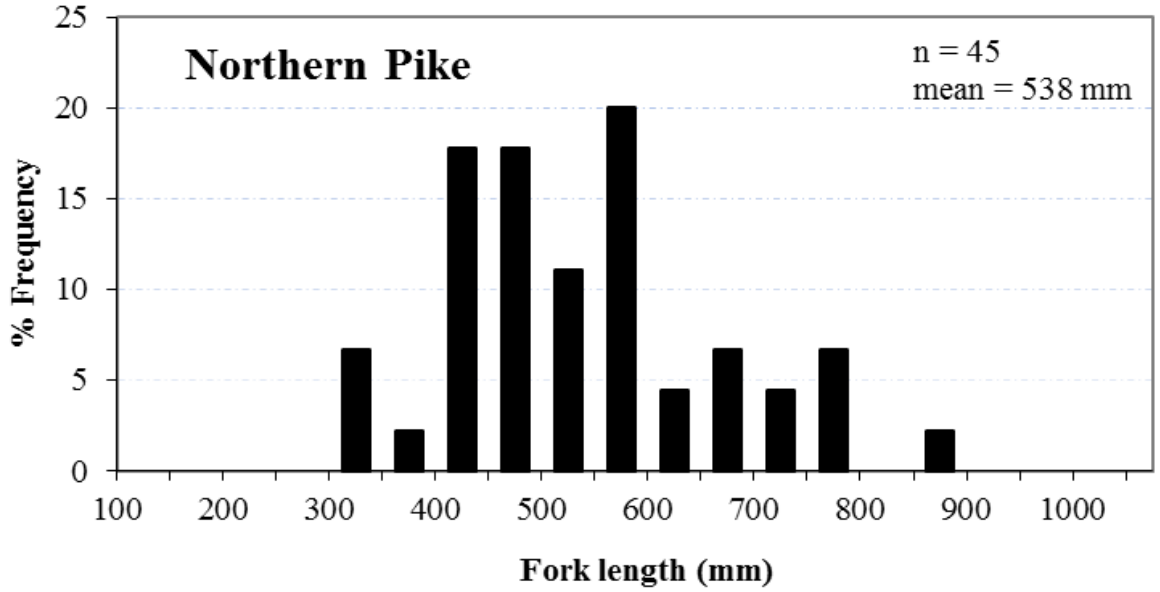


Figure 7: **Length-frequency distribution of Northern Pike captured in standard gang index gill nets in Stephens Lake South, summer 2015.**

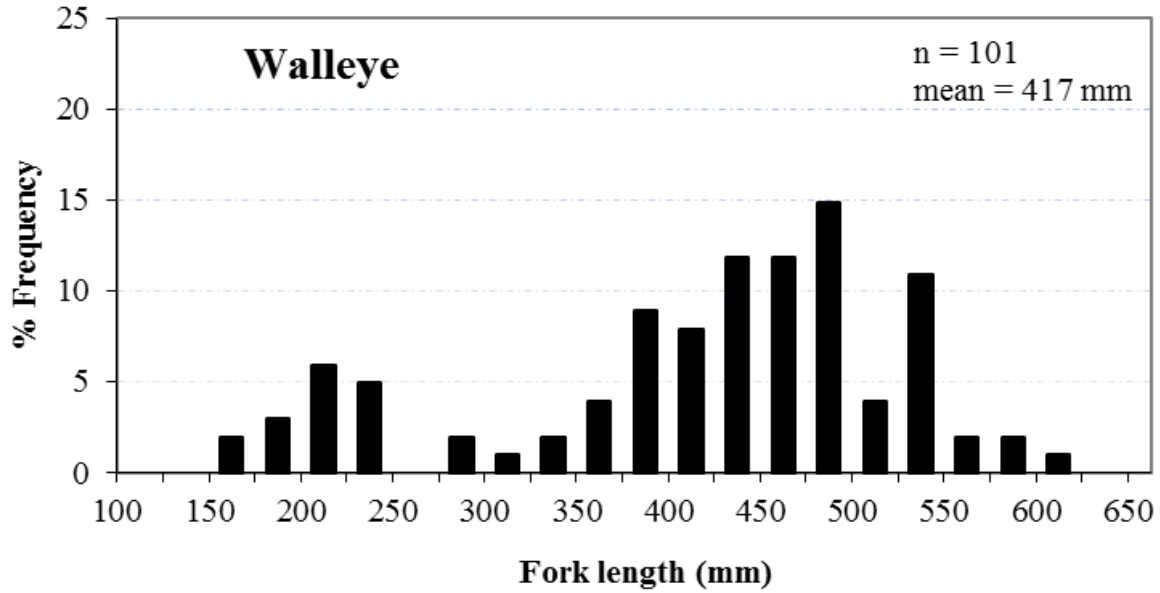


Figure 8: **Length-frequency distribution of Walleye captured in standard gang index gill nets in Stephens Lake South, summer 2015.**

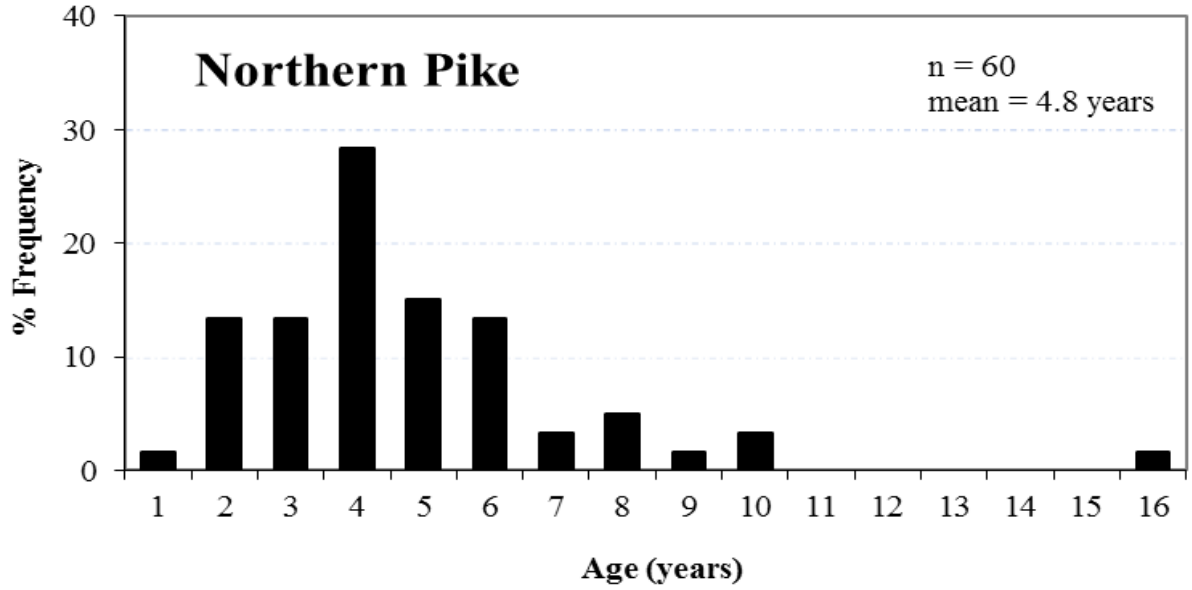


Figure 9: Age-frequency distribution of Northern Pike captured in standard gang index gill nets in Split Lake, summer 2015.

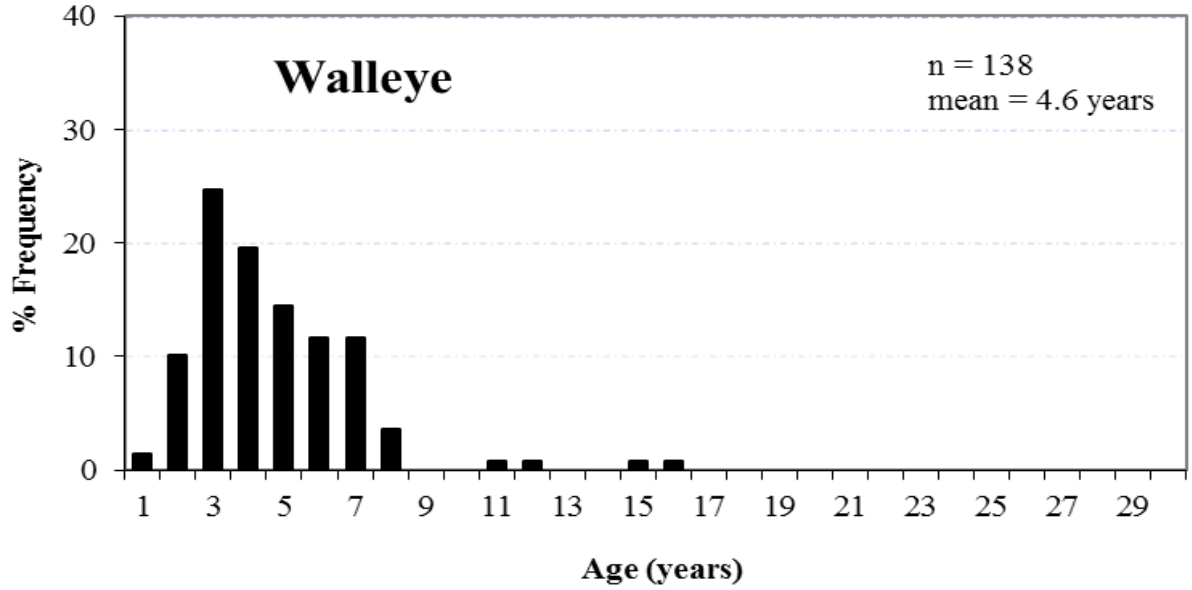


Figure 10: Age-frequency distribution of Walleye captured in standard gang index gill nets in Split Lake, summer 2015.

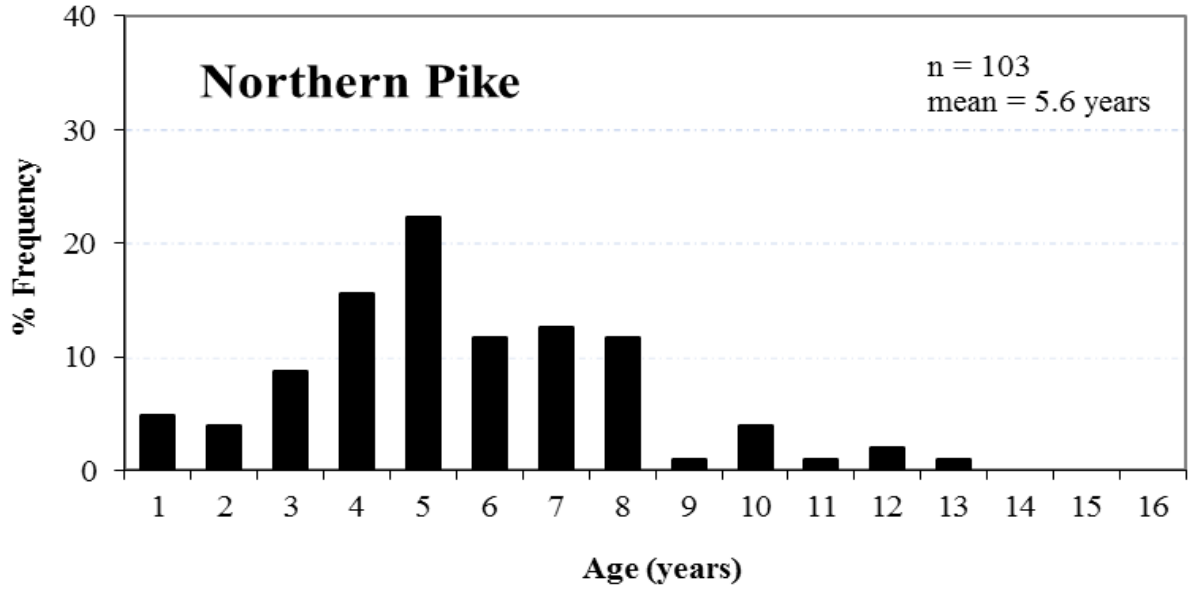


Figure 11: Age-frequency distribution of Northern Pike captured in standard gang index gill nets in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.

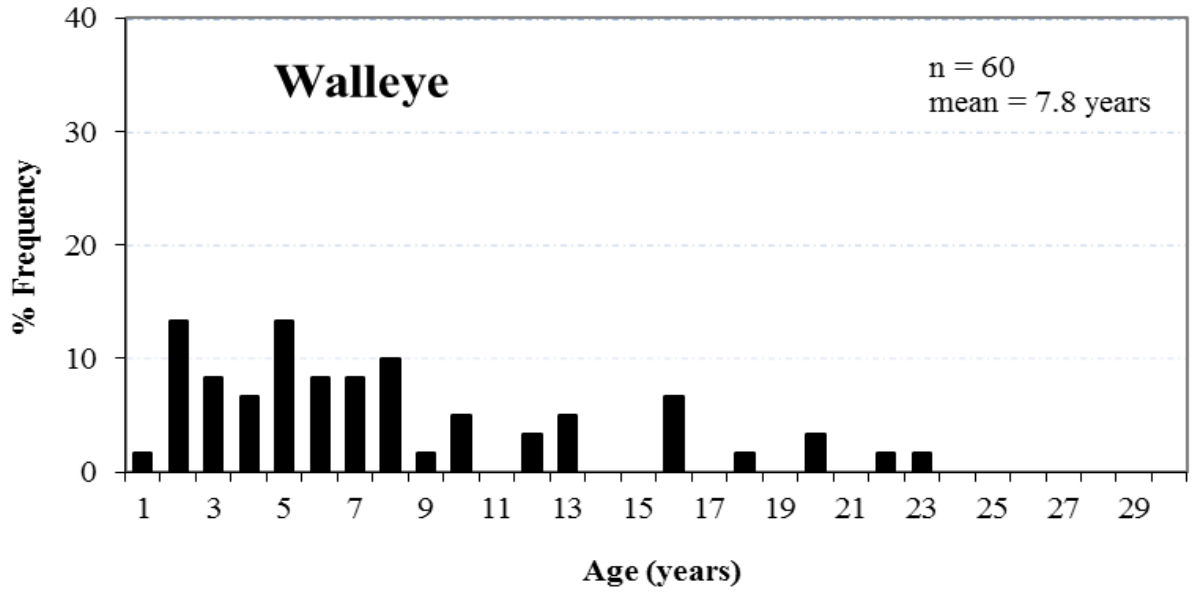


Figure 12: Age-frequency distribution of Walleye captured in standard gang index gill nets in the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.

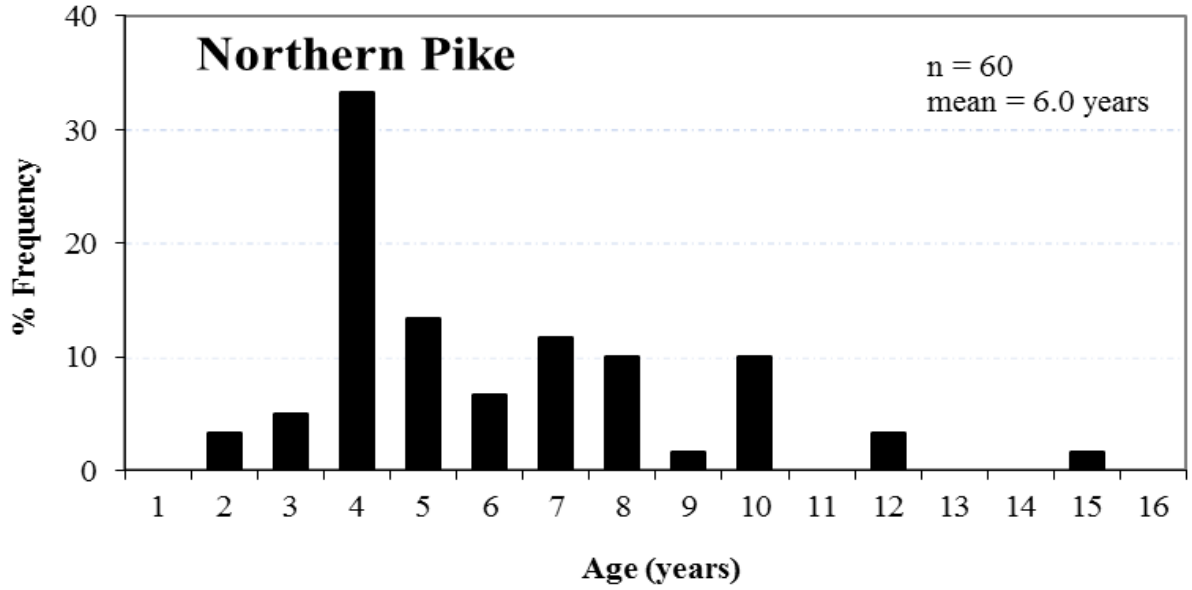


Figure 13: Age-frequency distribution of Northern Pike captured in standard gang index gill nets in Stephens Lake North, summer 2015.

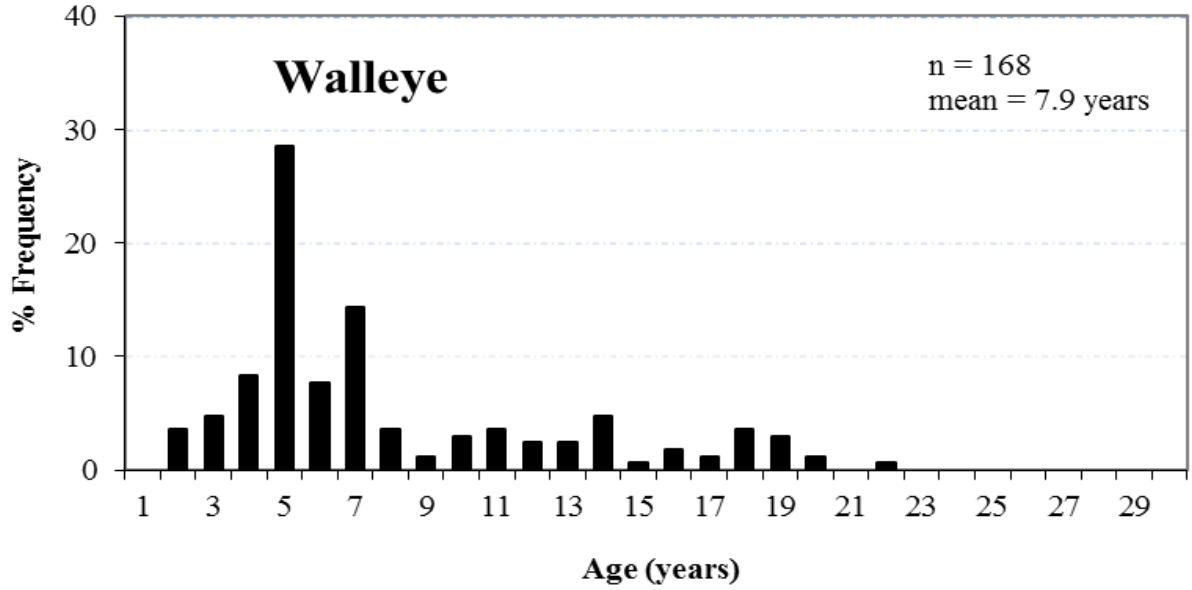


Figure 14: Age-frequency distribution of Walleye captured in standard gang index gill nets in Stephens Lake North, summer 2015.

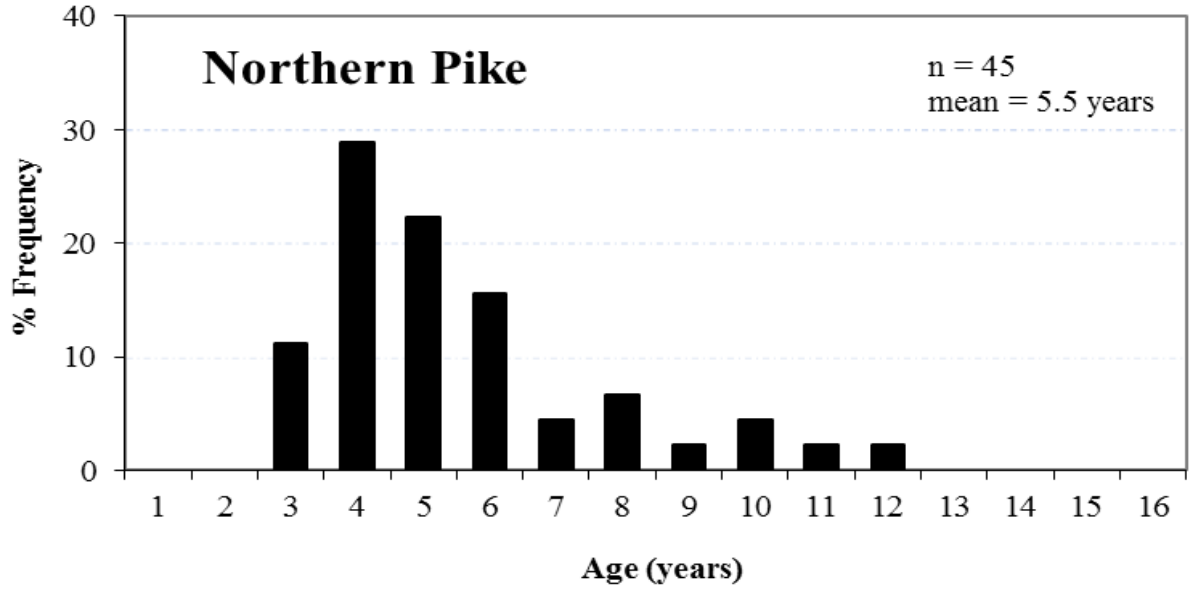


Figure 15: Age-frequency distribution of Northern Pike captured in standard gang index gill nets in Stephens Lake South, summer 2015.

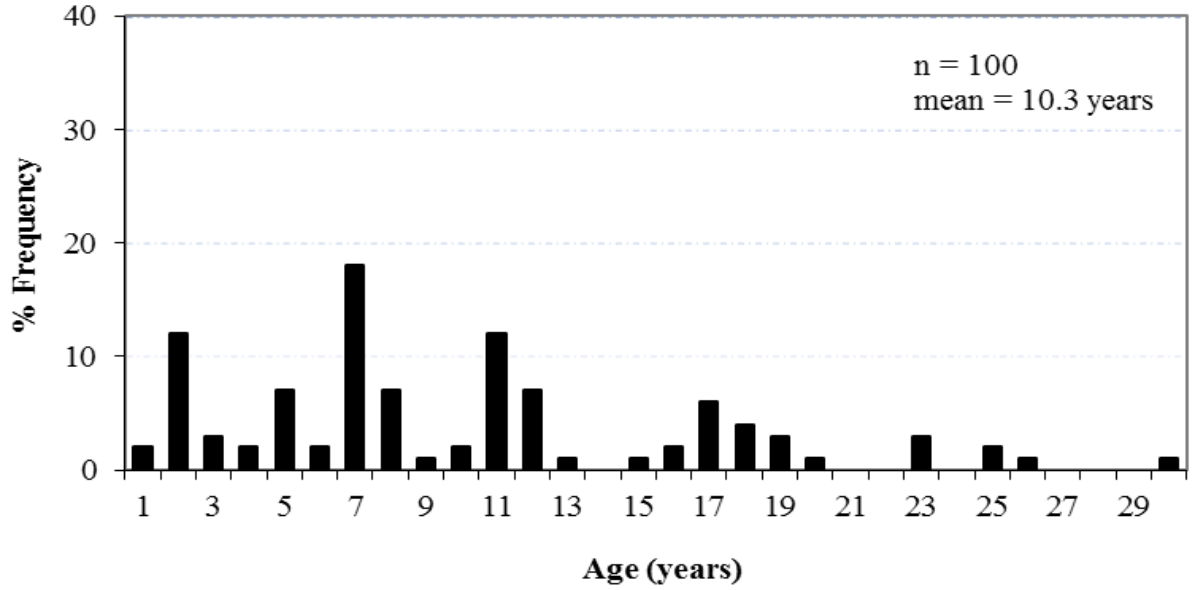


Figure 16: Age-frequency distribution of Walleye captured in standard gang index gill nets in Stephens Lake South, summer 2015.

MAPS

DATA SOURCE:
Government of Manitoba, Province of Manitoba, Manitoba Hydro

CREATED BY:
North/South Consultants

COORDINATE SYSTEM:	DATE CREATED:	REVISION DATE:
UTM NAD 1983 Z15N	08-FEB-15	08-JUN-16
0 4 8 Kilometres / 0 3 6 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

Legend

- Generating Station (Existing)
- Generating Station (Under Construction)
- Highways
- Rail
- First Nation Reserve

Keeyask Study Area
Split Lake to Stephens Lake

Map 1: Map showing hydroelectric development on the Nelson River and the Keeyask Study Area, which encompasses an approximate 140-km long reach of the river from Kelsey GS downstream to the Kettle GS.

DATA SOURCE:
Orthophoto: Manitoba Hydro - June 21, 2015

CREATED BY:
North/South Consultants

COORDINATE SYSTEM:	DATE CREATED:	REVISION DATE:
UTM NAD 1983 Z15N	26-FEB-10	30-MAY-16
0 0.15 0.3 Kilometres / 0 0.15 0.3 Miles	VERSION NO: 2.0	QA/QC: PMC/FSV/MWZ

Construction Site

Map 2: Instream structures at the Keeyask Generating Station site, June 2015.

DATA SOURCE:
Manitoba Hydro; Government of Manitoba; Government of Canada:
Imagery - 2010 Keeyask 10cm and 1999 Gull 1m (Black an White)

CREATED BY:
Manitoba Hydro - GIS Studies

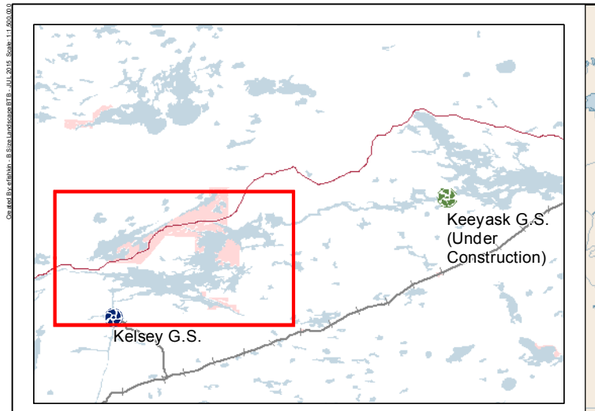
COORDINATE SYSTEM:	DATE CREATED:	REVISION DATE:
UTM NAD 1983 Z15N	22-MAY-15	06-JAN-16
0 0.4 0.8 Kilometres 0 0.3 0.6 Miles	VERSION NO: 1.0	QA/QC:

Legend

- Ice Boom
- Infrastructure

Keeyask G.S.
Ice Boom Locations

Map 3: Locations where ice booms were installed at the Keeyask Generating Station site, July to August 2015.



N

Little Assean Lake
Fox Lake
Assean River
Pukituwaw Lake
Iskwayach Bay
Clark Lake
Keskapiskow Bay
Tataskweyak Cree Nation
Split Lake
5
3
20
6
21
22
Assean Lake
Mukataysip Lake
Apichetapeskak Bay
Burntwood River
Opanekow Narrows
SPLIT LAKE
Amistuhe Bay
18
26
15
28
SPLIT LAKE
13
29
Anipitapiskow Rapids
Sakitowak Rapids
York Factory First Nation
York Landing (Kawechiwasik)
Grass River
Ripple River
Aiken River
Kelsey G.S.

KEEYASK

DATA SOURCE:
Government of Manitoba, Province of Manitoba, Manitoba Hydro

CREATED BY:
North/South Consultants

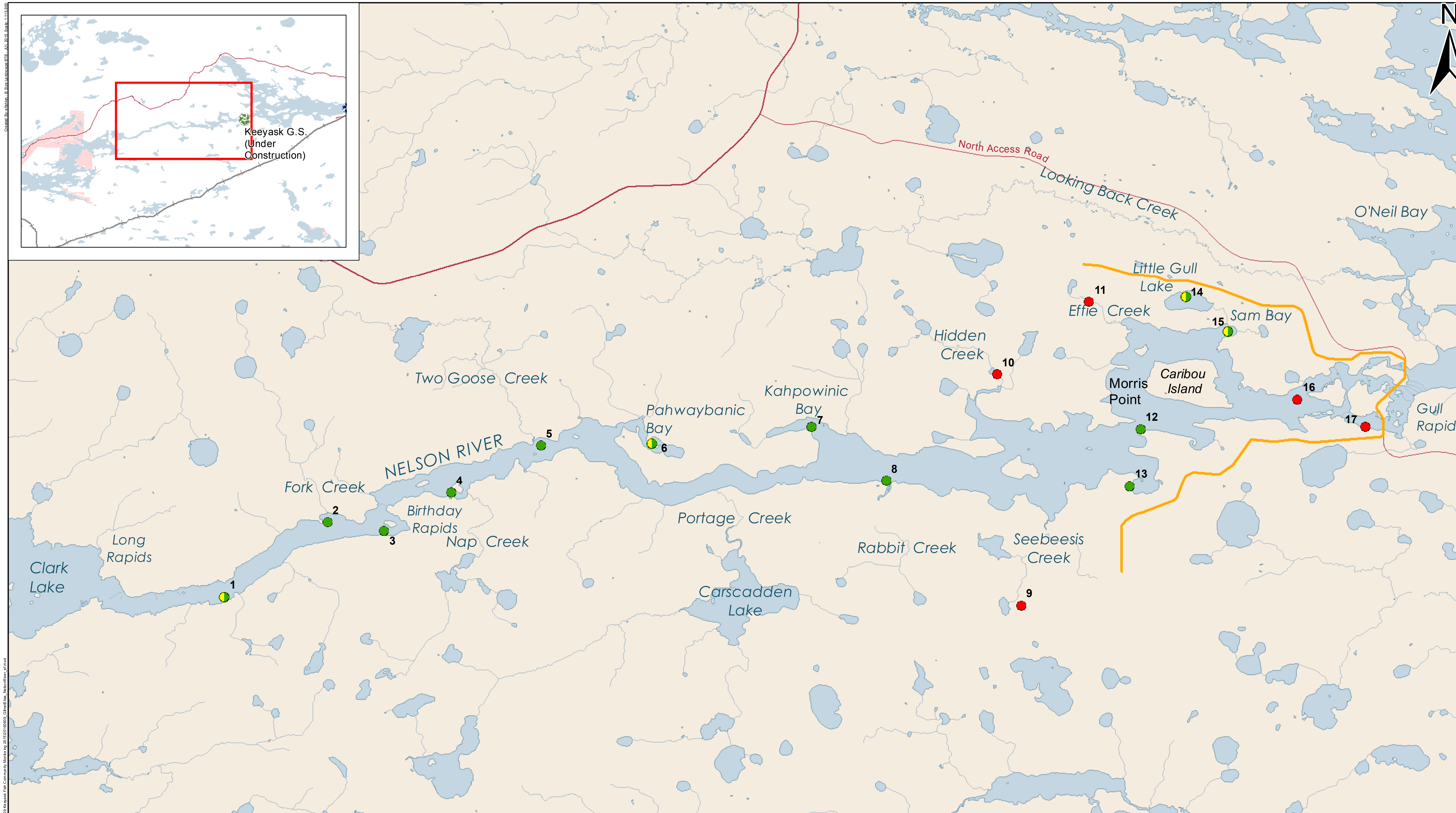
COORDINATE SYSTEM:	DATE CREATED:	REVISION DATE:
UTM NAD 1983 Z14N	02-JUN-16	09-JUN-16
0 4.5 9 Kilometres 0 3.5 7 Miles	VERSION NO: 1.0	QA/QC: XXX/YYY/ZZZ

Legend

- Standard gang index gillnet site
- Standard gang/small-mesh index gillnet site
- Generating Station (Existing)
- Generating Station (Under Construction)
- Highways
- Rail
- First Nation Reserve

Gillnet Sites
Split Lake Area

Map 4: Standard gang and small-mesh index gillnetting sites in Split Lake, summer 2015.



DATA SOURCE:
Government of Manitoba, Province of Manitoba, Manitoba Hydro

CREATED BY:
North/South Consultants

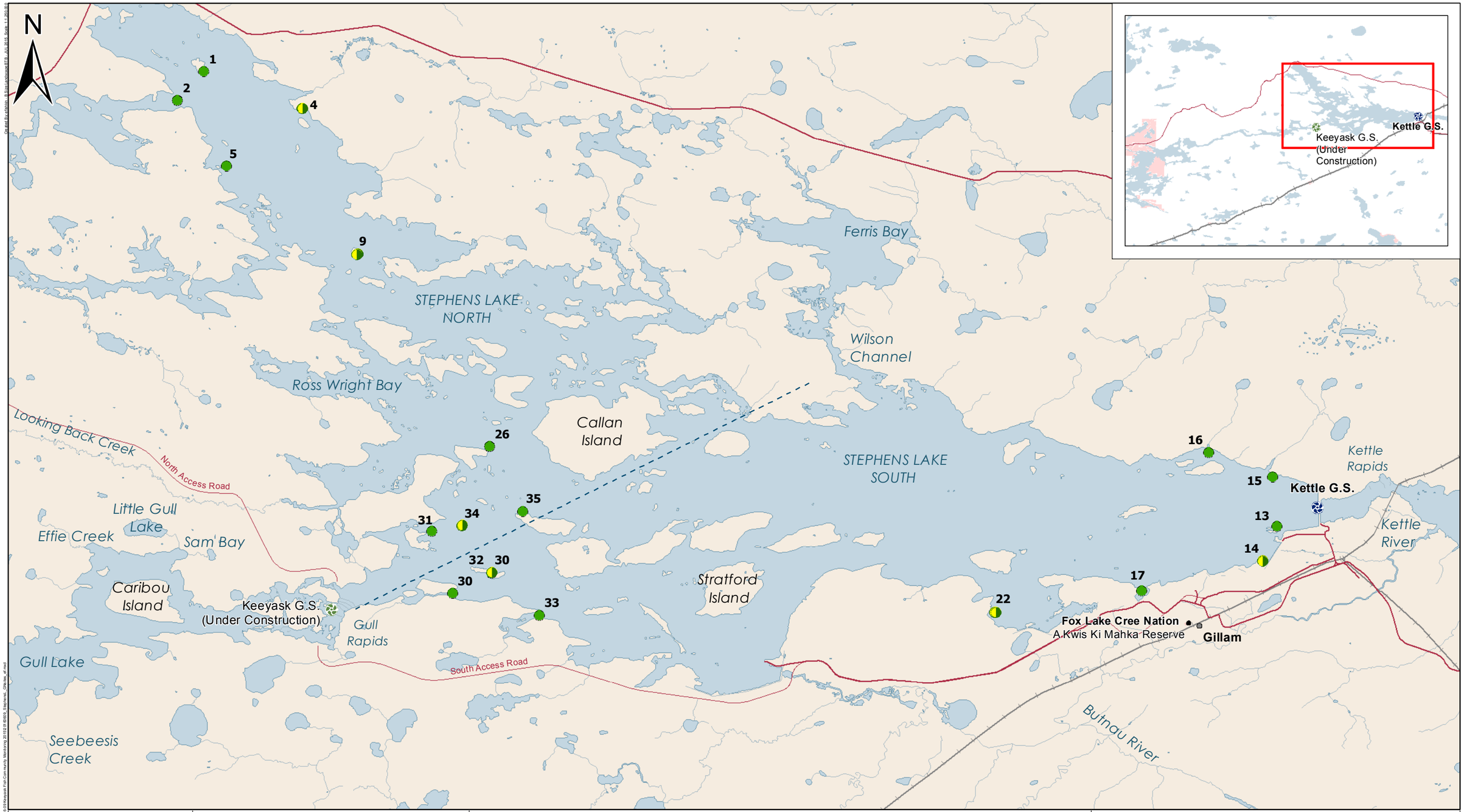
COORDINATE SYSTEM:	DATE CREATED:	REVISION DATE:
UTM NAD 1983 Z14N	02-JUN-16	09-JUN-16
0 4.5 9 Kilometres / 0 3.5 7 Miles	VERSION NO: 1.0	QA/QC: XXX/YYY/ZZZ

Legend

- Standard gang index gillnet site
- Standard gang / small-mesh index gillnet site
- Standard gang index gillnet site not sampled in 2015
- Generating Station (Existing)
- Generating Station (Under Construction)
- Highways
- Rail
- First Nation Reserve

Gillnet Sites
Nelson River Area
Clark Lake to Gull Rapids

Map 5: Pre-determined standard gang and small-mesh index gillnetting sites in the reach of the Nelson River from Clark Lake to Gull Rapids, summer 2015.



DATA SOURCE:
Government of Manitoba, Province of Manitoba, Manitoba Hydro

CREATED BY:
North/South Consultants

COORDINATE SYSTEM:	DATE CREATED:	REVISION DATE:
UTM NAD 1983 Z15N	08-FEB-15	09-JUN-16
0 4 8 Kilometres 0 3 6 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

Legend

- Standard gang index gillnet site
- Standard gang / small-mesh index gillnet site
- Generating Station (Existing)
- Generating Station (Under Construction)
- Highways
- Rail
- First Nation Reserve

Gillnet Sites
Stephens Lake Area

Map 6: Standard gang and small-mesh index gillnetting sites in Stephens Lake North and South, summer 2015.

APPENDICES

APPENDIX 1:
GILLNET SURVEY INFORMATION FOR SPLIT LAKE, STEPHENS LAKE, AND IN THE REACH OF THE NELSON RIVER BETWEEN CLARK LAKE AND GULL RAPIDS, 2015

Table A1-1: Standard gang index gillnet survey information, Split Lake, summer 2015. 90
Table A1-2: Standard gang index gillnet survey information, reach of the Nelson River between Clark Lake and Gull Rapids (including Little Gull Lake), summer 2015 91
Table A1-3: Standard gang index gillnet survey information, Stephens Lake (north and south basins), summer 2015. 92
Table A1-4: Small-mesh index gillnet survey information for Split Lake, Stephens Lake, and the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015. 93

Table A1-1: Standard gang index gillnet survey information, Split Lake, summer 2015.

Site	Date set	UTM coordinates			Duration (dec. hours)	Depths (m)		Velocity	Substrate	Vegetation	Water temp. (°C)
		Zone	Easting	Northing		1½"	5"				
GN-03	14-Aug	15 V	316466	6237833	23.50	3.7	4.1	none	soft	low	20.0
GN-05	14-Aug	14 V	673687	6236230	24.13	2.7	2.4	none	soft	low	19.0
GN-06	16-Aug	14 V	673500	6233821	23.77	2.6	3.7	none	soft	low	18.0
GN-13	16-Aug	14 V	669785	6221742	24.40	4.6	5.5	low	soft	low	18.0
GN-15	17-Aug	14 V	657457	6221742	22.10	4.4	1.8	low	soft	low	19.0
GN-18	16-Aug	14 V	669566	6225263	20.67	3.0	3.4	low	soft	low	18.0
GN-20	15-Aug	14 V	683051	6236584	24.83	9.0	9.6	low	soft	low	20.0
GN-21	14-Aug	14 V	675143	6233872	23.80	4.3	5.7	low	soft	low	19.0
GN-22	15-Aug	14 V	677986	6233149	24.80	10.3	12.3	low	soft	low	19.0
GN-26	17-Aug	14 V	670918	6225489	24.27	11.2	12.1	low	soft	low	17.0
GN-28	17-Aug	14 V	657733	6221830	21.62	15.0	10.2	low	soft	low	19.0
GN-29	15-Aug	14 V	670856	6222040	23.87	7.7	6.1	low	soft	low	19.0

UTM = Universal Transverse Mercator.

Table A1-2: Standard gang index gillnet survey information, reach of the Nelson River between Clark Lake and Gull Rapids (including Little Gull Lake), summer 2015.

Nelson River section	Site	Date set	UTM coordinates			Duration (dec. hours)	Depths (m)		Velocity	Substrate	Vegetation	Water temp. (°C)
			Zone	Easting	Northing		1½"	5"				
Clark Lake to Birthday Rapids [1]	GN-01	14-Aug	15 V	326067	6239781	24.33	2.3	3.2	low	hard	low	18.0
	GN-02	14-Aug	15 V	329692	6242324	25.33	5.6	4.1	low	moderate	low	18.5
	GN-03	14-Aug	15 V	331512	6242011	25.00	3.0	3.0	low	soft	low	20.0
Birthday Rapids to Gull Lake [2]	GN-04	12-Aug	15 V	333768	6243119	26.25	1.6	3.0	moderate	moderate	low	18.0
	GN-05	11-Aug	15 V	336270	6244804	23.25	7.6	2.4	low	soft	low	17.5
	GN-06	12-Aug	15 V	339695	6245018	26.92	1.9	1.9	none	soft	moderate	19.0
Gull Lake [3]	GN-07	11-Aug	15 V	345195	6245209	25.17	2.7	1.9	none	soft	high	18.0
	GN-08	13-Aug	15 V	347314	6243618	26.92	3.8	5.7	low	moderate	low	18.0
	GN-12	16-Aug	15 V	355608	6245291	21.92	7.3	2.4	low	hard	low	17.0
	GN-13	16-Aug	15 V	355378	6243422	21.83	1.6	1.6	none	soft	high	16.0
	GN-15	13-Aug	15 V	358282	6248291	27.33	2.2	2.0	none	soft	high	19.0
Little Gull Lake [4]	GN-14	17-Aug	15 V	356908	6249458	22.92	1.3	1.4	none	soft	high	14.0

UTM = Universal Transverse Mercator.

1. The 10-km section of river between Clark Lake and Birthday Rapids.
2. The 14-km section of river between Birthday Rapids and the inlet of Gull Lake.
3. Defined as the lowest 17-km reach of river upstream of Gull Rapids.
4. Small offset lake.

Table A1-3: Standard gang index gillnet survey information, Stephens Lake (north and south basins), summer 2015.

Stephens Lake	Site	Date set	UTM coordinates			Duration (dec. hours)	Depths (m)		Velocity	Substrate	Vegetation	Water temp. (°C)
			Zone	Easting	Northing		1½"	5"				
North basin	GN-01	03-Sep	15 V	359096	6265681	25.70	7.5	8.0	none	soft	none	15.5
	GN-02	03-Sep	15 V	358155	6264656	25.88	7.3	7.0	none	soft	none	15.5
	GN-04	03-Sep	15 V	362616	6264360	26.77	2.2	5.3	none	soft	none	15.5
	GN-05	04-Sep	15 V	359924	6262295	20.67	2.2	2.3	none	soft	none	16.0
	GN-09	04-Sep	15 V	364624	6259158	19.92	5.1	7.0	none	soft	none	16.5
	GN-26	04-Sep	15 V	369344	6252258	21.53	8.2	4.3	none	soft	none	16.5
	GN-31	02-Sep	15 V	367276	6249208	17.65	3.9	4.5	none	soft	none	18.0
	GN-34	02-Sep	15 V	368348	6249418	17.40	2.7	1.3	none	soft	none	18.0
	GN-35	02-Sep	15 V	370527	6249925	17.15	2.3	2.7	none	soft	none	18.0
South basin	GN-13	08-Sep	15 V	397555	6249384	19.08	7.3	15.3	-	hard	-	16.0
	GN-14	08-Sep	15 V	397051	6248155	18.75	2.3	4.5	-	hard	-	15.0
	GN-15	08-Sep	15 V	397399	6251152	19.17	13.6	8.7	-	soft	-	16.0
	GN-16	08-Sep	15 V	395096	6252041	18.92	5.0	3.0	-	soft	-	16.0
	GN-17	07-Sep	15 V	392715	6247087	21.45	4.5	6.0	-	hard	-	15.5
	GN-22	07-Sep	15 V	387443	6246302	21.12	2.4	1.6	-	hard	-	14.0
	GN-30	06-Sep	15 V	368014	6246987	30.33	7.8	8.7	-	hard	-	17.0
	GN-32	06-Sep	15 V	369396	6247724	29.15	9.8	6.5	-	hard	-	17.0
	GN-33	06-Sep	15 V	371115	6246205	23.75	2.5	2.1	-	soft	-	16.0

UTM = Universal Transverse Mercator.

Table A1-4: Small-mesh index gillnet survey information for Split Lake, Stephens Lake, and the reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.

Waterbody	Site	Date set	UTM coordinates			Duration (dec. hours)	Depths (m)		Velocity	Substrate	Vegetation	Water temp. (°C)
			Zone	Easting	Northing		16-mm	25-mm				
Split Lake	SN-03	14-Aug	15 V	316497	6237819	23.50	3.6	3.7	none	soft	low	20.0
	SN-06	16-Aug	14 V	673478	6233854	23.77	2.3	2.6	low	soft	low	18.0
	SN-20	15-Aug	14 V	683082	6236586	24.83	8.7	9.0	low	soft	low	20.0
	SN-26	17-Aug	14 V	670896	6225514	24.27	11.1	11.2	low	soft	low	17.0
Nelson River between	SN-01	14-Aug	15 V	325987	6239796	24.33	1.4	2.3	low	hard	low	18.0
Clark Lake and Gull	SN-06	12-Aug	15 V	339749	6244957	26.92	1.6	1.9	none	soft	moderate	19.0
Rapids	SN-15	13-Aug	15 V	358212	6248330	27.33	2.3	2.2	none	soft	high	19.0
Little Gull Lake	SN-14	17-Aug	15 V	356987	6249428	22.92	1.4	1.3	none	soft	high	14.0
Stephens LakeNorth	SN-04	03-Sep	15 V	362649	6264379	26.77	2.2	2.2	none	soft	none	15.5
	SN-09	04-Sep	15 V	364592	6259135	19.92	3.6	5.1	none	soft	none	16.5
	SN-34	02-Sep	15 V	368373	6249433	17.40	1.6	2.7	none	soft	none	18.0
Stephens LakeSouth	SN-14	08-Sep	15 V	397036	6248146	18.75	2.1	2.3	-	hard	-	15.0
	SN-22	07-Sep	15 V	387476	6246309	21.12	2.8	2.4	-	hard	-	14.0
	SN-32	06-Sep	15 V	369432	6247739	29.15	10.0	9.8	-	hard	-	17.0

UTM = Universal Transverse Mercator.

APPENDIX 2:
OCCURRENCE OF DEBRIS IN STANDARD GANG AND SMALL-MESH INDEX GILL NETS SET THROUGHOUT THE KEEYASK STUDY AREA, SUMMER 2015

Table A2-1: Occurrence of debris in standard gang and small-mesh index gill nets set in Split Lake, summer 2015. 95
Table A2-2: Occurrence of debris in standard gang and small-mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, and in Little Gull Lake, summer 2015....96
Table A2-3: Occurrence of debris in standard gang and small-mesh index gill nets set in Stephens Lake (North and South), summer 2015. 97

Table A2-1: Occurrence of debris in standard gang and small-mesh index gill nets set in Split Lake, summer 2015.

Gillnet type	Site	Quantity of debris	Type of debris (%)						
			Terrestrial vegetation	Terrestrial moss	Sticks	Algae	Aquatic vegetation	Aquatic moss	Silt / mud
Standard gang	GN-03	None	-	-	-	-	-	-	-
	GN-05	None	-	-	-	-	-	-	-
	GN-06	None	-	-	-	-	-	-	-
	GN-13	Moderate (5–15%)	-	-	80	20	-	-	-
	GN-15	Moderate (5–15%)	-	-	20	60	20	-	-
	GN-18	None	-	-	-	-	-	-	-
	GN-20	Very High (> 26%)	-	-	-	100	-	-	-
	GN-21	None	-	-	-	-	-	-	-
	GN-22	None	-	-	-	-	-	-	-
	GN-26	Moderate (5–15%)	-	-	80	20	-	-	-
	GN-28	High (16–25%)	-	-	30	70	-	-	-
	GN-29	High (16–25%)	-	-	10	90	-	-	-
Small-mesh	SN-03	None	-	-	-	-	-	-	-
	SN-06	None	-	-	-	-	-	-	-
	SN-20	Very High (> 26%)	-	-	-	100	-	-	-
	SN-26	Moderate (5–15%)	-	-	80	20	-	-	-

Table A2-2: Occurrence of debris in standard gang and small-mesh index gill nets set in the reach of the Nelson River between Clark Lake and Gull Rapids, and in Little Gull Lake, summer 2015.

Gillnet type	Site	Quantity of debris	Type of debris (%)						
			Terrestrial vegetation	Terrestrial moss	Sticks	Algae	Aquatic vegetation	Aquatic moss	Silt / mud
Standard gang	GN-01	High (16–25%)	-	-	-	-	50	-	50
	GN-02	None	-	-	-	-	-	-	-
	GN-03	Moderate (5–15%)	-	-	-	60	30	-	10
	GN-04	High (16–25%)	-	-	-	90	10	-	-
	GN-05	Low (< 5%)	-	-	-	70	30	-	-
	GN-06	None	-	-	-	-	-	-	-
	GN-07	None	-	-	-	-	-	-	-
	GN-08	Low (< 5%)	-	-	-	50	50	-	-
	GN-12	Low (< 5%)	-	-	-	-	100	-	-
	GN-13	None	-	-	-	-	-	-	-
	GN-14*	None	-	-	-	-	-	-	-
	GN-15	None	-	-	-	-	-	-	-
Small-mesh	SN-01	High (16–25%)	-	-	-	-	-	-	100
	SN-06	None	-	-	-	-	-	-	-
	SN-14*	None	-	-	-	-	-	-	-
	SN-15	None	-	-	-	-	-	-	-

* Little Gull Lake.

Table A2-3: Occurrence of debris in standard gang and small-mesh index gill nets set in Stephens Lake (North and South), summer 2015.

Stephens Lake	Gillnet type	Site	Quantity of debris	Type of debris (%)						
				Terrestrial vegetation	Terrestrial moss	Sticks	Algae	Aquatic vegetation	Aquatic moss	Silt / mud
North	Standard gang	GN-01	Low (< 5%)	-	-	100	-	-	-	-
		GN-02	Low (< 5%)	-	-	100	-	-	-	-
		GN-04	High (16–25%)	-	-	100	-	-	-	-
		GN-05	High (16–25%)	-	-	100	-	-	-	-
		GN-09	None	-	-	-	-	-	-	-
		GN-26	Low (< 5%)	-	-	100	-	-	-	-
		GN-31	Low (< 5%)	-	-	100	-	-	-	-
		GN-34	None	-	-	-	-	-	-	-
		GN-35	Low (< 5%)	-	-	100	-	-	-	-
	Small-mesh	SN-04	High (16–25%)	-	-	100	-	-	-	-
		SN-09	None	-	-	-	-	-	-	-
		SN-34	None	-	-	-	-	-	-	-
South	Standard gang	GN-13	Low (< 5%)	-	-	-	-	100	-	-
		GN-14	Medium (5–15%)	-	-	-	-	100	-	-
		GN-15	Medium (5–15%)	-	-	-	-	100	-	-
		GN-16	Medium (5–15%)	-	-	-	-	100	-	-
		GN-17	None	-	-	-	-	-	-	-
		GN-22	High (16–25%)	100	-	-	-	-	-	-
		GN-30	Medium (5–15%)	-	-	75	-	25	-	-
		GN-32	Low (< 5%)	-	-	-	-	100	-	-
		GN-33	High (16–25%)	-	-	60	-	40	-	-
	Small-mesh	SN-14	Medium (5–15%)	-	-	-	-	100	-	-
		SN-22	High (16–25%)	-	-	-	-	100	-	-
		SN-32	Low (< 5%)	-	-	-	-	100	-	-

APPENDIX 3:
INCIDENCE OF EXTERNAL DEFORMITIES, EROSION, LESIONS, AND TUMOURS (DELTS) AND ECTOPARASITES ON FISH CAPTURED IN THE KEEYASK STUDY AREA, 2015

Table A3-1: Incidence of external deformities, erosion, lesions, and tumours (DELTs) on fish captured in standard gang index gill nets, Split Lake, summer 2015.....99
Table A3-2: Incidence of external deformities, erosion, lesions, and tumours (DELTs) and ectoparasites on fish captured in standard gang index gill nets, reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.....100
Table A3-3: Incidence of external deformities, erosion, lesions, and tumours (DELTs) on fish captured in standard gang index gill nets, Stephens Lake North, summer 2015.....101
Table A3-4: Incidence of external deformities, erosion, lesions, and tumours (DELTs) on fish captured in standard gang index gill nets, Stephens Lake South, summer 2015.....101

Table A3-1: Incidence of external deformities, erosion, lesions, and tumours (DELTs) on fish captured in standard gang index gill nets, Split Lake, summer 2015.

Anomaly	Species [1]				
	LKST	LKWH	NRPK	WALL	WHSC
Deformity	-	-	-	-	1
% of catch	-	-	-	-	0.6
Erosion	-	-	-	-	-
% of catch	-	-	-	-	-
Lesions	-	-	-	-	-
% of catch	-	-	-	-	-
Tumours	-	-	-	-	-
% of catch	-	-	-	-	-
Number of fish inspected	8	22	60	138	178
Number of fish with DELTs	0	0	0	0	1
% of catch with DELTs	0.0	0.0	0.0	0.0	0.6

1. See Table 1 for fish species abbreviations

Table A3-2: Incidence of external deformities, erosion, lesions, and tumours (DELTs) and ectoparasites on fish captured in standard gang index gill nets, reach of the Nelson River between Clark Lake and Gull Rapids, summer 2015.

Anomaly	Species [1]				
	LKST	LKWH	NRPK	WALL	WHSC
DELTs					
Deformity	-	-	1	3	2
% of catch	-	-	1.0	4.7	8.3
Erosion	-	-	-	-	-
% of catch	-	-	-	-	-
Lesions	-	-	7	5	-
% of catch	-	-	6.8	7.8	-
Tumours	-	-	-	1	-
% of catch	-	-	-	1.6	-
Number of fish inspected	1	15	103	64	24
Number of fish with DELTs	0	0	8	9	2
% of catch with DELTs	0.0	0.0	7.8	14.1	8.3
ECTOPARASITES					
Number of fish inspected	1	15	103	64	24
Number of fish with ectoparasites	0	0	0	2	0
% of catch with ectoparasites	0.0	0.0	0.0	3.1	0.0

1. See Table 1 for fish species abbreviations.

Table A3-3: Incidence of external deformities, erosion, lesions, and tumours (DELTs) on fish captured in standard gang index gill nets, Stephens Lake North, summer 2015.

Anomaly	Species [1]			
	LKWH	NRPK	WALL	WHSC
Deformity	-	-	-	-
% of catch	-	-	-	-
Erosion	-	-	-	-
% of catch	-	-	-	-
Lesions	-	1	1	-
% of catch	-	1.4	0.6	-
Tumours	-	-	-	-
% of catch	-	-	-	-
Number of fish inspected	21	74	168	15
Number of fish with DELTs	0	1	1	0
% of catch with DELTs	0.0	1.4	0.6	0.0

1. See Table 1 for fish species abbreviations.

Table A3-4: Incidence of external deformities, erosion, lesions, and tumours (DELTs) on fish captured in standard gang index gill nets, Stephens Lake South, summer 2015.

Anomaly	Species [1]				
	LKST	LKWH	NRPK	WALL	WHSC
Deformity	-	-	-	2	-
% of catch	-	-	-	2.0	-
Erosion	-	-	-	-	-
% of catch	-	-	-	-	-
Lesions	-	-	-	-	-
% of catch	-	-	-	-	-
Tumours	-	-	-	1	-
% of catch	-	-	-	1.0	-
Number of fish inspected	1	6	45	101	57
Number of fish with DELTs	0	0	0	3	0
% of catch with DELTs	0.0	0.0	0.0	3.0	0.0

1. See Table 1 for fish species abbreviations.

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