Keeyask Generation Project

Aquatic Effects Monitoring Plan

Juvenile Lake Sturgeon Population Monitoring Report

AEMP-2016-02

KEEYASK

Manitoba Conservation and Water Stewardship Client File 5550.00
Manitoba Environment Act Licence No. 3107

2015 -2016

KEEYASK GENERATION PROJECT

AQUATIC EFFECTS MONITORING PLAN

REPORT #AEMP-2016-02

JUVENILE LAKE STURGEON POPULATION MONITORING, FALL 2015: YEAR 2 CONSTRUCTION

Prepared for

Manitoba Hydro

By

D.C. Burnett, L.M. Henderson, C.C. Barth, and C.L. Hrenchuk

June 2016

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

This report should be cited as follows:

Burnett, D.C, L.M. Henderson, C.C. Barth, and C.L. Hrenchuk. 2016. Juvenile Lake Sturgeon population monitoring, fall 2015: Year 2 Construction. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2016-02. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2016, 84 pp.

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.

Lake Sturgeon were identified as one of the key species for monitoring. They were chosen because they are culturally important to local people, the local populations have been previously impacted, and construction and operation of the GS will change or negatively impact important habitat. The plan to monitor the impacts of GS construction and operation on sturgeon includes several types of studies:

- Estimating the number of adults;
- Estimating the number and growth of juveniles up to ten years old (less than 800mm);
- Identifying spawning locations and numbers of spawning fish; and
- Movement studies to record seasonal habitat use and long distance movements (*i.e.,* over GS's or rapids).

The mitigation and offsetting plan for Lake Sturgeon included a commitment to a long term stocking program. This plan addressed the loss of spawning habitat at Gull Rapids during the construction and initial years of operation (*i.e.,* before the constructed spawning habitat was fully effective) by releasing young sturgeon into Stephens Lake. Stocking will also support the recovery of the existing depleted sturgeon population in Gull Lake, Stephens Lake and the Upper Split Lake Area. Stocking began in 2014, and, and its effectiveness is determined through juvenile population monitoring.

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

KEEYASK

Construction Site

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

Why is the monitoring being done?

This report presents results of juvenile Lake Sturgeon population monitoring conducted during fall 2015. Data from juvenile populations in the study area have been collected intermittently since 2008 and the juvenile population monitoring study set out in the AEMP was conducted for the first time in 2014. The plan is to conduct juvenile population monitoring annually until 2044. 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.

The juvenile Lake Sturgeon population monitoring is being done to answer several questions:

Does recruitment of wild sturgeon occur upstream and/or downstream of the GS during construction?

This question is important because if no young sturgeon are born during the six to seven year construction period, then in the future fewer adult sturgeon will be reproducing.

Is there a biologically meaningful (and statistically significant) change in condition factor and growth of juvenile sturgeon during construction?

This question is important because if sturgeon become fatter or skinnier then they used to be, then something is changing in their environment. If the condition of juveniles decreases, it can also mean that stocking is adding too many fish to the environment and they cannot find enough food. In that case, the stocking plan will be adjusted.

What is the survival rate of stocked sturgeon?

This question is important because if the survival rate is high then the number of fish stocked may be reduced. If the survival rate is low, then the stocking plan would be adjusted (*e.g.*, may change time or location of release).

What is the proportion of hatchery-reared to wild recruits within a birth year (i.e., how successful is the stocking program)?

The answer to this question will also tell us about the effectiveness of the stocking program.

What was done?

Sampling was done in the Upper Split Lake Area (including the Burntwood River, the Kelsey GS Area, and Split Lake), Gull Lake, and Stephens Lake in the fall of 2015 (NTD Map will be inserted). Gill nets were used to catch juvenile (1 to 10 years old, < 800 mm) sturgeon. The gill nets were set in deep water habitats preferred by juveniles. When a fish was caught it was measured and weighed. If the fish was not already tagged, then two different tags were applied; an external (Floy) tag and a small internal (PIT) tag to make sure the fish is identifiable if one tag is shed. If the captured fish had already been tagged, then the tag numbers were recorded before the fish was released. Tagging and recapturing fish makes it possible to determine how

much a fish grew or the distance they moved. An aging structure (a small piece of fin) was collected to determine the year that the fish was born.

What was found?

In the Upper Split Lake Area, sturgeon of many different sizes and ages were caught, particularly those born in 2011, 2012, and 2013. The presence of a number of different year classes shows that sturgeon are successfully reproducing in many years, however, sturgeon born in 2015 were not part of this year's catch. Two sturgeon were recaptured in the Burntwood River in 2015, both near where they were originally tagged (one 0.71 km away and the other 0.18 km away).

In both Gull and Stephens lakes, fish born in 2008 continued to dominate the catch. Seven Lake Sturgeon born in 2015 (called young-of-the-year [YOY]) were captured in Gull Lake, and 11 were captured in Stephens Lake. No YOY fish were captured in these areas in 2014. The high catch of YOY indicates 2015 had good recruitment for sturgeon in these areas. Seven fish recaptured in Gull and Stephens lakes were hatchery fish released in either 2014 or 2015. One of the hatchery fish was released in 2014 in the Burntwood River as a one-year-old and the remaining six were released as one-year olds in 2015 in either Gull or Stephens lakes, prior to the fall study.

What does it mean?

The capture of YOY sturgeon in Gull Lake and Stephens Lake in 2015 shows that sturgeon are successfully spawning during construction.

There is no reduction in condition factor in juveniles upstream and downstream of construction, showing that they are continuing to find food. There were some changes in growth rates, but no consistent pattern showing that conditions were worse during construction.

It is too early to assess the success of the stocking program since it will take a few years for enough stocked fish to be present to be frequently captured. The growth of the few recaptured stocked sturgeon shows that at least some are surviving and adapting to the wild. The capture of fish stocked in the Burntwood in Gull Lake was a surprising finding and future monitoring will help us determine if this is a frequent occurrence.

What will be done next?

Monitoring will continue each fall until 2044. Further monitoring will show whether construction is affecting the growth of juveniles in Gull and Stephens lakes and whether sturgeon continue to reproduce. As more data are collected, the survival and growth of stocked fish will be determined.

ACKNOWLEDGEMENTS

We would like to thank Manitoba Hydro for the opportunity and resources to conduct this study. The following members of Tataskweyak Cree Nation (TCN), Fox Lake Cree Nation (FLCN), and War Lake First Nation (WLFN) are thanked for their local expertise and assistance in conducting the field work: Kelvin Kitchekeesik, Michael Garson, and Jonathan Spence of TCN, Joe Saunders of FLCN, Nathaneal Beardy of YFFN, and Tim Flett of WLFN.

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

Christine Lacho

Mike Legge

Dave Szczepanski

Data Analysis, Report Preparation, and Report Review

Cam Barth

Duncan Burnett

Laura Henderson

Claire Hrenchuk

Christine Lacho

Craig McDougall

Patrick Nelson

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

LIST OF PHOTOS

LIST OF APPENDICES

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 licensing process for the Project, an *Aquatic Effects Monitoring Plan* (AEMP) during the construction and operational phases of the Project was developed, detailing the monitoring activities regarding various components of the aquatic environment, including the fish community, and in particular, Lake Sturgeon. The study area included in the Lake Sturgeon component of the AEMP encompasses the reach of the Nelson River from the Kelsey GS to the Kettle GS, as well as waterbodies immediately adjacent to the Nelson River (Map 1).

The Lake Sturgeon section in the AEMP lists four programs:

- Adult population monitoring – includes estimation of adult population size, condition factor and growth;
- Juvenile population monitoring – includes growth, condition factor and year-class-strength;
- Spawn monitoring – includes number and sex of spawning fish; and
- Movement monitoring – includes local movements (habitat use) and coarse scale movements between waterbodies.

Juvenile population monitoring is a key component of the overall Lake Sturgeon monitoring program. The Project is predicted to affect sturgeon recruitment by destroying existing spawning habitat at Gull Rapids (which will be replaced with constructed habitat) and altering spawning habitat at Birthday Rapids. Stocking of sturgeon (up to one year of age) raised in a hatchery from wild caught spawn is a key component of both the mitigation plan for the effects of the Project in Gull and Stephens lakes, and the offsetting plan to assist the recovery of sturgeon populations in the Upper Split Lake Area and in Gull and Stephens lakes near the Project site. Results of juvenile population monitoring will determine the impact of this loss of spawning habitat earlier than would be possible using adult population monitoring data, allowing timely adaptive management and mitigation, if required. Results of this program will also assist in assessing the effectiveness of stocking, and identify whether changes to the stocking plan are

required. Data collected during juvenile population monitoring will be used to measure cohort strength, identify changes in condition factor, determine whether natural reproduction is occurring, determine the need for young-of-the-year (YOY) habitat creation and determine whether stocked fish are surviving and growing.

The primary focus of the juvenile monitoring program is on sturgeon ranging from one to ten years of age (typically measuring less than 800 mm in fork length). Fish that correspond to these age/size classes are readily captured in gillnets (comprised of 1–6 inch mesh panels set in deep water habitats), can be reliably aged (unlike older sturgeon) to assess cohort strength, and provide a rapid indication of the success of spawning and YOY survival, the two life history stages for which the greatest uncertainty exists for the Project. Studies conducted since 2008 have increased the understanding of YOY and juvenile sturgeon abundance, habitat use, condition, growth, year-class strength and factors influencing year-class strength in the Upper Split Lake area (*i.e.*, the Burntwood River and the Nelson River between the Kelsey GS and Split Lake), in Gull Lake and in Stephens Lake (MacDonald 2009; Michaluk and MacDonald 2010; Henderson *et al*. 2011; Henderson and Pisiak 2012; Henderson *et al*. 2013; Henderson *et al*. 2015).

Aside from habitat, juvenile studies have revealed biological differences in aspects such as cohort distributions and overall growth between locations within the study area. Data collected from juvenile sturgeon in the Burntwood River in 2011 and 2012 revealed moderate quantities of fish spread amongst multiple cohorts, indicating that recruitment has occurred fairly consistently in this river over the previous 10 years (Henderson and Pisiak 2012; Henderson *et al*. 2013). Conversely, in both Gull and Stephens lakes, the cohort-frequency distribution of juvenile catches has consistently been dominated by a single cohort produced in 2008 (Henderson *et al*. 2011; Henderson and Pisiak 2012; Henderson *et al*. 2013). In addition, growth of Burntwood River Lake Sturgeon is slower than conspecifics captured in Gull and Stephens lakes (Henderson *et al*. 2013).

Stocking Lake Sturgeon in the study area occurred for the first time in 2014, at two locations: the Burntwood River and the Nelson River between Birthday Rapids and Gull Rapids. Fish stocked in the Burntwood River were progeny of adults captured in spawning condition near First Rapids during spring 2013. After being raised at the Grand Rapids Hatchery for one year, 300 yearlings were released into the Burntwood River at four locations between First Rapids and Split Lake on May 30–31, 2014. An additional 295 yearlings from the same stock were released at the same sites on October 2, 2014. Also, during spring 2014, Lake Sturgeon eggs from one female captured near Birthday Rapids were collected and fertilized. Shortly following hatch, 152,926 larval sturgeon were released downstream of Birthday Rapids on July 29, 2014. Subsequently, in late September, 4,656 three month old sturgeon (fingerlings) from the same stock were released at three different locations in Gull Lake. In 2015, yearlings from this stock were released into Gull Lake (n = 221) and Stephens Lake on June 30 (n =218), and again in Stephens Lake on September 14 (n = 200) and Gull Lake on September 16 (n = 202) (Maps 2 and 3). All stocked yearlings were tagged with PIT tags to ensure they could be recognized upon recapture during juvenile population monitoring.

Juvenile sturgeon monitoring data using the sampling protocol set out in the AEMP were collected for the first time in fall 2014. Young-of-the-year Lake Sturgeon were not captured in the Upper Split Lake Area, Gull or Stephens lakes in 2014. This is not unusual and not conclusive evidence that successful reproduction did not occur. Growth and condition factor in 2014 were similar to fish captured from 2008 to 2013 (Henderson *et al*. 2015). Two stocked fish were recaptured in 2014, one of which was released in the Burntwood River as a one-year old and recaptured 97 km downstream of its release location in Gull Lake.

This report presents results from the 2015 juvenile population monitoring conducted in the Upper Split Lake area, Gull Lake, and in Stephens Lake. Results will assist in assessing impacts of construction on recruitment and the juvenile segment of the population and provide initial indications of the success of the stocking program. Juvenile monitoring is being conducted to address the following key questions relevant during the construction period, as described in the AEMP:

- Does recruitment of wild sturgeon occur upstream and/or downstream of the GS during construction?
- Is there a biologically meaningful (and statistically significant) change in condition factor and growth of juvenile sturgeon during construction?
- What is the survival rate of stocked sturgeon?
- What is the proportion of hatchery-reared to wild recruits within a cohort (*i.e.*, how successful is the stocking program)?

Juvenile population monitoring data will be collected annually until 2044.

2.0 THE KEEYASK STUDY SETTING

Juvenile population monitoring was conducted at three locations: 1) the Upper Split Lake Area (the Burntwood River; the Kelsey GS Area; and Split Lake); 2) in the Nelson River between Birthday Rapids and Gull Rapids; and 3) in Stephens Lake.

The Burntwood River flows in a south-easterly direction from First Rapids for approximately 35 km prior to emptying into the western arm of Split Lake (Map 1). It is unknown if First Rapids represents a natural barrier to upstream fish passage, however, it is assumed to be under high flow conditions. Hard substrates predominate in the main channel, while loose fine sediments and associated macrophyte growth occur in many off-current areas. The hydrology of the Burntwood River has been affected by the Churchill River Diversion (CRD). Outflow from the Burntwood River to Split Lake prior to CRD was estimated at 90.0 m^3/s at First Rapids, and increased nearly 10-fold following diversion to 849.0 m^3/s.

The Kelsey GS is located on the upper Nelson River, approximately 90 km upstream of Gull Rapids (Map 1). Kelsey GS was completed in 1961 and was the first hydroelectric station built on the Nelson River. Downstream of the GS there is an approximately 5 km long reach of the Nelson River, characterized by predominantly fast moving water with rocky shoreline and substrate, after which the Nelson River splits into two channels around a large island. Each channel contains a set of rapids: the Anipitapiskow Rapids (~7 km north of the GS on the north channel) and Sakitowak Rapids (~10.0 km northeast of the GS on the south channel). Both channels empty into Split Lake.

Split Lake is immediately downstream of the Kelsey GS at the confluence of the Burntwood and Nelson rivers. Due to the large inflows from the Nelson and Burntwood rivers, the lake has 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.

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.

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 length. Gull Rapids is the site of the Keeyask Generation Project. A summary of 2014/2015 construction activities 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 (north arm) 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 of Stephens Lake include the North and South Moswakot rivers that enter the north arm of the lake. Looking Back Creek is a second order stream that 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. In August, the North Channel Rock Groin and North Channel Cofferdam were constructed to diverted 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 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 on 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 4.

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 5 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 m ASL 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 and surpassed 156 m 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 m ASL 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

A standardized sampling methodology has been developed for sampling juvenile sturgeon in Boreal Shield rivers using data sets collected from several populations in the Hudson Bay drainage basin (McDougall *et al*. 2014). This standardized methodology (described below) was used during monitoring to enable comparisons of cohort strength, abundance, growth and condition among years as well as with other sturgeon populations

Gillnetting was conducted in the Upper Split Lake Area, the Nelson River between Birthday Rapids and Gull Rapids (referred to as Gull Lake for the remainder of the report), and the upper 6 km of Stephens Lake. Three locations were sampled in the Upper Split Lake Area: 1) the Burntwood River between First Rapids and Split Lake; 2) the Nelson River between the Kelsey GS and Split Lake; and 3) Split Lake. This was the first year that fall juvenile population monitoring was conducted in the Nelson River between Kelsey GS and Split Lake and in Split Lake. Gill nets were composed of five panels of: 1, 2, 3, 5, and 6-inch stretched mesh (25, 51, 76, 127, and 152 mm). Each mesh panel was 25 yards (22.9 m) long and 2.7 yards (2.5 m) deep. Mesh sizes were staggered in the order of 1, 5, 2, 6, and 3-inch to better capture small and large juveniles across the length of each gang. These gillnets have been used to capture juvenile Lake Sturgeon in the Keeyask study area since 2008.

Gill nets were set in deep water habitats (average depth: 12.4 m) since YOY and juvenile Lake Sturgeon have been found to prefer these areas in the Winnipeg and Nelson Rivers (Barth *et al*. 2009; Barth 2011; Michaluk and MacDonald 2010; McDougall *et al*. 2013; Henderson *et al*. 2014). Each gill net set was given a unique identification number, and net locations were recorded using a Garmin Etrex GPS receiver (Garmin International Inc., Olathe, KS). Water depth at each end of the net was measured using a PiranhaMax Series 150 Portable Sonar (Humminbird, Eufaula, AL) and water temperature was measured daily using a hand-held thermometer (± 0.5 °C). The orientation of each gill net was dependent on water velocity. In low (0.20–0.49 m/s) or moderate (0.50–1.49 m/s) water velocities nets were set parallel to flow, and in standing (0.00–0.19 m/s) velocities set perpendicular to flow. Gill nets were checked approximately every 24 hours, weather permitting. For comparability among years, similar gillnetting locations were used in 2014 and in 2015. However, suitable gillnetting sites change between years depending on water levels and flows.

3.2 BIOLOGICAL SAMPLING

All fish captured were counted by species and location. Lake Sturgeon were measured for fork length (FL), total length (± 1 mm), and weight (± 5 g using a digital scale, or nearest 25 g for fish > 4000 g).

The first fin ray of the left pectoral fin was removed immediately adjacent to the articulation from each Lake Sturgeon captured for the first time (measuring < 800 mm FL) for age analysis. All collected fin rays were placed in individually numbered envelopes, air dried, and brought back to the North/South Consultants Inc. laboratory for ageing (Section 3.4).

Small fin clips (1–2 cm^2) from the left pelvic fin were also removed from each Lake Sturgeon and preserved in 95% Biological Grade Ethanol for genetic analysis.

3.3 TAGGING

Lake Sturgeon > 300 mm FL were marked with individually numbered external Floy-GD-94 T-bar anchor tags (FT) (Floy-tag Inc., Seattle, WA). Floy-tags were inserted into the base of the dorsal fin using a Dennison Mark II tagging gun (Avery Dennison Corporation, Pasadena, CA).

Uniquely numbered Passive Integrated Transponder (PIT) tags from Oregon RFID (Oregon RDIF Ltd., Portland, Oregon) were also used to mark Lake Sturgeon. Those measuring >250 mm FL received 12 mm HDX tags (12.0 mm x 2.12 mm, 0.1 g) and those measuring < 250 mm FL received 8 mm FDX-B tags (8.0 mm x 1.4 mm, 0.027 g). Each Lake Sturgeon was scanned for an existing PIT tag using an Agrident APR 350 Reader (Agrident Ltd. Steinkippenstrasse, Germany). For each untagged fish, a PIT tag was injected under the third dorsal scute using an Oregon RFID tag injector needle, dipped in Polysporin® to minimize the risk of infection (Photos 1–3). Tags were injected parallel to the horizontal axis of the fish, into muscle tissue (not the body cavity). Following implantation or upon recapture, the tag data was logged, and the last six digits of the PIT tag manually recorded. Injector needles were sterilized between uses in boiling water.

3.4 AGEING ANALYSIS

Lake Sturgeon fin rays were hardened in an epoxy resin (Cold Cure™) and two 0.7 mm fin sections were cut distally within 5 mm of the articulation using a Struers Minitom™ (Struers Inc. Cleveland, Ohio) low speed sectioning saw. Fin sections were mounted on glass slides using Cytoseal-60™ (Thermo Scientific, Waltham, Massachusetts) and viewed at five times magnification under a compound microscope. Annuli (growth rings) were counted by three experienced readers (independently), without prior knowledge of fish length or weight, or ages assigned by other readers. If readers assigned different ages to a fish, either the modal age or

the median age was chosen. Examples of Lake Sturgeon ageing structures are provided in Appendix 3.

3.5 DATA ANALYSIS

To better describe sampling locations, relative abundance (CPUE), and fish movements, each sampling area was divided into distinct geographical zones (see Maps 6, 7, and 8).

Mean FL (mm), weight (g), and condition factor (K) were calculated for all Lake Sturgeon by location. Condition factor was calculated based on the following equation (after Fulton 1911, in Ricker 1975):

$$K = W/(L^3/10^5)$$

Where:

W = round weight (g); and

L = fork length (mm)

To determine if growth and condition of juvenile sturgeon were affected by construction, mean length-at-age and mean condition factor-at-age were compared using Mann-Whitney U-Tests among fish captured pre-project (*i.e.*, 2008–2013) to those captured in 2014 and 2015 (statistical comparisons only conducted where sample sizes were > 8 individuals). Condition was compared by age-class and the significance level was set at 0.05 (5%).

Length-frequency distributions were plotted in 50 mm length class intervals (*e.g.*, 300–349 mm) and length-weight regression equations were derived using least squares analysis on logarithmic transformations of fork lengths and weights according to the following relationship:

$$\ln(W) = \ln(a) + \ln(L)*b$$

Where:

W = weight (g);

L = fork length (mm);

a = Y-intercept; and

b = slope of the regression line; and

were presented as:

$$W = a(L)^b$$

Cohort frequency distributions were plotted for each location.

Gillnetting hours (*i.e.*, effort) was calculated as the number of sampling hours per 100 m of net set using the following equation:

$$\text{Effort (hours)} = \text{set duration} \times (\text{net length}/100\ \text{m})$$

Catch-per-unit-effort (CPUE) was calculated and expressed as the number of fish captured in 100 m of net per 24 hour period using the following formula:

$$\text{CPUE} = \sum \#\ \text{Lake Sturgeon} / \sum \text{Effort} \times 24\ \text{h}$$

Where: Σ = sum of the number of fish or gillnetting hours at all sites.

CPUE was calculated by geographical zone for each study location and study year.

4.0 RESULTS

4.1 UPPER SPLIT LAKE AREA

4.1.1 BURNTWOOD RIVER

Eleven fish species (n = 148) were captured at 25 gillnetting sites in the Burntwood River from August 30 to October 4, 2015 (Tables 1 and 2; Map 6). Lake Sturgeon (n = 28; 18.9%) were the fourth most abundant species captured (Table 3). Gill net site data and biological and tagging information for all Lake Sturgeon captured is provided in appendices A1-1 and A2-1. Water temperature of the Burntwood River decreased from 18.0°C to 10.5°C over the course of the study (Appendix A1-1).

Twenty-eight Lake Sturgeon were captured in 858.1 gillnet hours, producing an overall CPUE of 0.78 Lake Sturgeon/100 m net/24 h (Table 4). Gill nets were set in all three zones of the Burntwood River below First Rapids (Map 6). CPUE values by zone were as follows:

- 0.76 Lake Sturgeon/100 m/24 h in Zone BWR-A (n = 8 sites);
- 1.31 Lake Sturgeon/100 m/24 h in Zone BWR-B (n = 6 sites); and
- 0.62 Lake Sturgeon/100 m/24 h in Zone BWR-C (n = 11 sites) (Table 4).

Overall CPUE values for the Burntwood River catch since 2011 are presented in Table 5.

4.1.1.1 YEAR-CLASS STRENGTH

Aged Lake Sturgeon (n = 23) ranged from 2 to 14 years, with the 2011 cohort (age 4) making up the largest proportion (n = 5; 21.7%) of the catch. The next most abundant cohorts were the 2012 (age 3) and 2013 (age 2), each accounting for 17% (n = 4) of the aged Lake Sturgeon. Cohorts 2002, 2009, and 2010 were not present in the catch. Cohort frequency distributions for all zones sampled in the Burntwood River in 2015 are presented in Figure 1.

4.1.1.2 GROWTH AND CONDITION

Captured Lake Sturgeon had a:

- Mean FL of 468 mm (n = 28; StDev = 160 mm; range: 285–860 mm);
- Mean weight of 985 g (n = 28; StDev = 1,370 g; range: 130–6,577 g); and
- Mean condition factor of 0.66 (n = 28; StDev = 0.15; range: 0.47–1.08) (Table 6).

There was no significant difference in either mean FL or condition factor between juvenile Lake sturgeon captured during baseline (*i.e.,* from 2011–2012) and construction (*i.e.,* 2015) monitoring for any of the 14 age classes compared (Figures 2 and 3).

Lake Sturgeon in the 250–299 mm, 350–399 mm, and the 400–449 mm FL intervals were the most frequently captured length classes, each representing 14.3% of the total catch (Figure 4). The length-weight regression for Lake Sturgeon captured in the Burntwood River during fall 2015 is presented in Table 7.

4.1.1.3 RECAPTURES

Two previously tagged juvenile Lake Sturgeon were recaptured in the Burntwood River (Table 8):

- One (FT# 91187) was recaptured in the same zone (BWR-A) 0.71 km from where it was initially captured on 6 June, 2011.
- The second recaptured fish was an adult (FT# 75455) that was caught in BWR-A, 0.18 km from where it was initially captured in BWR-A on 19 June, 2007.

4.1.2 KELSEY GS AREA

Ten fish species (n = 143) were captured in nine gillnet sets between August 29 and October 4, 2015 (Tables 1 and 2; Map 6). Lake Sturgeon were the fourth most abundant species captured (n = 7; 4.9%; Table 3). Gillnet site data and biological tagging information for all Lake Sturgeon captured is provided in appendices A1-1 and A2-1. Water temperature in the Nelson River mainstem declined from 17 to 11°C over the duration of the study (Appendix A1-1).

Total effort for the nine gillnetting sites was 248.5 gillnet hours, producing an overall CPUE of 0.68 Lake Sturgeon/100 m net/24 h (Table 4). Gill nets were set in three zones below the Kelsey GS (Map 6). CPUE values by zone were as follows:

- 0.30 Lake Sturgeon /100 m/24 h in Zone KGS-B (n = 3 sites);
- 0.66 Lake Sturgeon /100 m/24 h in Zone KGS-C (n = 3 sites); and
- 1.22 Lake Sturgeon /100 m/24 h in Zone KGS-D (n = 3 sites) (Table 4).

4.1.2.1 YEAR-CLASS STRENGTH

Aged Lake Sturgeon (n = 6) from the Kelsey GS Area were four, five and 12 years old. Three (50.0%) were from the 2011 cohort, two (33.3%) were from the 2010 cohort, and one (17%) was from the 2003 cohort. Cohort frequency distributions for all zones sampled in the Kelsey GS Area in 2015 are presented in Figure 5.

4.1.2.2 GROWTH AND CONDITION

Captured Lake Sturgeon had a:

- Mean FL of 579 mm (n = 7; StDev = 75; range: 495–710);
- Mean weight of 1,663 g (n = 7; StDev = 620; range: 800–2,650); and
- Mean condition factor of 0.74 (n = 7; StDev = 0.06; range: 0.64–0.84) (Table 6).

Lake Sturgeon in the 550–599 mm FL interval were the most frequently captured in the Kelsey GS Area (n = 3; 43%) (Figure 4).

There were no baseline data available on condition factor and growth from this area to make pre- and post-construction comparisons.

4.1.2.3 RECAPTURES

No previously tagged Lake Sturgeon were recaptured in the Kelsey GS Area during fall 2015.

4.1.3 SPLIT LAKE

Twelve fish species (n = 199) were captured in seven gillnetting sites set from August 29 to October 3, 2015 (Tables 1 and 2; Map 6). Lake Sturgeon were the fourth most abundant species captured (n = 9; 4.5%) (Table 3). Gillnet site data and biological tagging information for all Lake Sturgeon captured in Zone SPL-A (Map 6) is provided in appendices A1-1 and A2-1. Total effort for the seven gillnetting sites was 191.8 gillnet hours, producing an overall CPUE of 1.13 Lake Sturgeon/100 m net/24 h (Table 4).

4.1.3.1 YEAR-CLASS STRENGTH

Aged Lake Sturgeon (n = 7) ranged from 1 to 7 years-old with the majority coming from the 2013 cohort (n = 4; 57%). The remaining three sturgeon were from the 2008, 2011, and 2014 cohorts. Cohort frequency distributions for all Lake Sturgeon sampled in zone SPL-A are presented in Figure 6.

4.1.3.2 GROWTH AND CONDITION

Captured Lake Sturgeon had a:

- Mean FL of 368 mm (n = 9; StDev = 155; range: 210–710);
- Mean weight of 539 g (n = 9; StDev = 773; range: 100–2,450); and
- Mean condition factor of 0.73 (n = 9; StDev = 0.15; range: 0.61–1.08) (Table 6).

Lake Sturgeon in the 300–349 mm FL interval were the most frequently captured in Split Lake accounting for 33% of Lake Sturgeon (n = 3) (Figure 4).

Juvenile sampling was not conducted in Split Lake prior to construction of the Keeyask GS, therefore condition factor and FL comparisons between baseline and monitoring data could not be made.

4.1.3.3 RECAPTURES

No previously tagged Lake Sturgeon were recaptured in Split Lake during fall 2015.

4.2 GULL LAKE

Thirteen fish species (n = 490) were captured at 34 gillnetting sites from September 11 to 20, 2015 (Tables 1 and 2; Map 7). Lake Sturgeon (n = 139; 28.4%) were the most abundant species captured (Table 3). Gill net site data and biological and tagging information for all Lake Sturgeon captured is provided in appendices A1-2 and A2-2. Water temperature in Gull Lake decreased from 15.0°C to 12.0°C over the course of the study (Appendix A1-2).

In total, 132 juvenile and seven adult Lake Sturgeon were captured in 912.1 gillnet hours, producing an overall CPUE of 3.66 Lake Sturgeon/100 m net/24 h (Table 4). Gill nets were set in all three Gull Lake zones, as well as the first zone upstream of Gull Lake (*i.e.*, BR-D) (Map 7). CPUE values by zone, from upstream to downstream were as follows:

- 0.45 Lake Sturgeon / 100 m/24 h in Zone BR-D (n = 4 sites);
- 1.23 Lake Sturgeon /100 m/24 h in Zone GL-A (n = 10 sites);
- 7.57 Lake Sturgeon /100 m/24 h in Zone GL-B (n = 10 sites); and
- 3.19 Lake Sturgeon /100 m/24 h in Zone GL-C (n = 10 sites) (Table 4).

CPUE values for Gull Lake catches since 2007 are presented in Table 5.

4.2.1 YEAR-CLASS STRENGTH

Aged Lake Sturgeon (n = 121) ranged from 1 to 11 years old (2004–2014 cohorts), with 7 year old fish (*i.e.*, 2008 cohort) dominating the catch (n = 71; 58.7%). Cohort frequency distributions for all zones sampled in 2015 are provided in Figure 7. In addition, seven fish of YOY size (*i.e.*, < 200 mm FL) were captured.

4.2.2 GROWTH AND CONDITION

Captured Lake Sturgeon had a:

- Mean FL of 532 mm (n = 139; StDev = 178 mm; range: 101–908 mm);
- Mean weight of 1,562 g (n = 133; StDev = 1,192 mm; range: 11–7,257 g); and
- Mean condition factor of 0.75 (n = 133; StDev = 0.13 mm; range: 0.54–1.68) (Table 6).

Mean condition factor-at-age for Lake Sturgeon captured in Gull Lake was similar between baseline (*i.e.,* 2008–2012) and construction (*i.e.,* 2014 and 2015) studies (Mann-Whitney U test, $P > 0.05$, all tests; Figure 8). Mean FL-at-age was significantly higher for age-1 and age-7 Lake Sturgeon captured during baseline studies (Mann Whitney U test, $P < 0.05$) (Figure 9). There was no significant difference in FL between the other seven age classes compared (Mann Whitney U test, $P > 0.05$; Figure 9).

Lake Sturgeon in the 550–599 mm length interval were captured most frequently, representing 23.7% of the total catch (Figure 10). Fish measuring 600–649 mm FL were also frequently captured, representing 21.6% of the total catch (Figure 10). The length-weight regression for Lake Sturgeon captured in Gull Lake during fall 2015 is presented in Table 7.

4.2.3 RECAPTURES

Twenty Lake Sturgeon tagged in previous years, as well as three hatchery-reared fish, were recaptured in Gull Lake (Table 8). Of the fish that were tagged in previous years:

- One was tagged in 2008;
- One was tagged in 2010;
- Four were tagged in 2011;
- One was tagged in 2012; and
- 13 were tagged in 2014 (Table 8).

Recaptured fish moved varying distances from their original capture locations (Table 8):

- Eight fish were recaptured < 1.0 km from their last capture location;
- Twelve fish were recaptured 1.0–4.3 km from their previous capture location.

One hatchery-reared fish (PIT# 900043000119437) was released as a one-year old downstream of First Rapids in the Burntwood River on 31 May, 2014 (Table 8).

- It was recaptured in Gull Lake (zone GL-A), 91.7 rkm downstream of its original release site, on 15 September, 2015.

Two fish were stocked as one-year olds in Gull Lake in 2015 (Table 8).

- #900067000058628 was released at stocking site 1 (Map 2) on 30 June, 2015. It was recaptured 3.0 km downstream of its release location on 18 September, 2015.
- #900067000055784 was released at stocking site 2 (Map 2) on 16 September, 2015. It was recaptured 1.0 km upstream of its original release location on 19 September, 2015.

4.3 STEPHENS LAKE

Eight fish species (n = 299) were captured at 44 gillnetting sites in upper Stephens Lake from September 23 to October 2, 2015 (Tables 1 and 2; Map 8). Lake Sturgeon (n = 54; 18.1%) were the third most abundant species captured, behind Longnose Sucker (38.8%) and Burbot (18.4%) (Table 3). Gill net site data, and biological and tagging information for all Lake Sturgeon captured in Stephens Lake, are provided in appendices A1-3 and A2-3. Water temperature decreased from 11.5°C to 10.0°C during the study (Appendix A1-3).

In total, 54 juvenile Lake Sturgeon were captured in 1154.0 gillnet hours, producing an overall CPUE of 1.12 Lake Sturgeon/100 m net/24 h (Table 4). Gill nets were set in both zones located within the upper 6 km of Stephens Lake (Map 8). CPUE values by zone were as follows:

- 0.99 Lake Sturgeon / 100 m/24 h in Zone STL-A (n = 12 sites); and
- 1.17 Lake Sturgeon /100 m/24 h in Zone STL-B (n = 32 sites) (Table 4).

CPUE values for Stephens Lake catches since 2007 are presented in Table 5.

4.3.1 YEAR-CLASS STRENGTH

Aged juvenile Lake Sturgeon (n = 52) ranged from 0–9 years, with 7-year old fish (*i.e.*, 2008 cohort) representing 37.3% (n = 19) of the aged fish. The 2015 cohort (*i.e.,* YOY fish) was the next most abundant, representing 21.2% (n = 11) of aged fish. Cohort frequency distributions for the two Stephens Lakes zones are provided in Figure 11.

4.3.2 GROWTH AND CONDITION

Captured Lake Sturgeon had a:

- Mean FL of 483 mm (n = 54; StDev: 229 range: 120–795 mm);
- Mean weight of 1,407 g (n = 52; StDev: 1,141 ; range: 15–3,650 g); and
- Mean condition factor of 0.88 (n = 52; StDev: 0.24; range: 0.60–1.59) (Table 6).

Mean condition factor was similar for all age-classes compared among juvenile sturgeon captured during baseline studies (*i.e.,* 2009–2012) and construction monitoring (2014 and 2015)

(Mann Whitney U tests, P > 0.05; Figure 12). Fork-length at age comparison revealed differences among age-4 Lake Sturgeon where those captured during monitoring studies (2014 and 2015) had a significantly higher (P < 0.05) mean FL at age-4 than those captured during baseline studies (Mann Whitney U test; Figure 13).

The length-weight regression for Lake Sturgeon captured in Stephens Lake during fall 2015 is provided in Table 7. The majority of fish captured corresponded to the 650–699 mm length interval, which represented 22.2% of the total catch (Figure 10).

4.3.3 RECAPTURES

Nine Lake Sturgeon tagged in previous years, as well as four hatchery-reared fish, were recaptured in Stephens Lake (Table 8). Of the fish that were tagged in previous years:

- Two were originally tagged in 2010;
- Two were tagged in 2012;
- Three were tagged in 2014;
- Two fish could not be traced back to their initial date of tagging due to sampling error (*i.e.*, the wrong tag numbers were recorded at either initial capture or upon recapture).

All fish were recaptured near the sites of original capture (Table 8):

- Four were caught < 1.0 km from their original capture locations; and
- Three were caught between 1.1 and 2.8 km from their initial capture locations.

All four hatchery-reared fish were released as one-year olds in Stephens Lake in 2015:

- Two (PIT #900067000055295 and #900067000058544) were released at stocking site 1 (Map 3) on 30 June, 2015 and were recaptured between 1.5 and 1.9 km upstream of the stocking site on September 29, 2015 and October 1, 2015, respectively.
- Two (PIT #900067000055540 and #900067000055136) were released at stocking site 2 (Map 3) on September 14, 2015.
    - #900067000055540 was recaptured 1.4 km upstream of this site on September 30, 2015.
    - #900067000055136 was recaptured 1.1 km upstream on October 1, 2015 (Table 8).

5.0 DISCUSSION

The juvenile Lake Sturgeon population monitoring program described in the AEMP began in the fall of 2014, immediately after the start of Keeyask GS construction. Juvenile monitoring is scheduled to occur every year until 2044, using a standardized gillnetting methodology specifically developed for sampling juvenile sturgeon that are 250–800 mm in length (corresponding to 1–10 year old sturgeon) (McDougall *et al*. 2014). Data will be used to assess cohort strength, relative abundance, distribution, identify changes in condition factor, determine whether natural reproduction occurs, determine the need for YOY habitat creation, and monitor the success of the stocking program. Comparisons will be made to data gathered during studies conducted since 2008, which have measured juvenile sturgeon abundance, habitat use, condition, growth, year-class strength and factors influencing year-class strength in the Upper Split Lake area (*i.e.*, the Burntwood River and the Nelson River between the Kelsey GS and Split Lake), in Gull Lake and in Stephens Lake (MacDonald 2009; Michaluk and MacDonald 2010; Henderson *et al*. 2011; Henderson and Pisiak 2012; Henderson *et al*. 2013; Henderson *et al*. 2015). Although the standardized gillnetting methodology described in the current report was not developed until 2012, the same gill net sizes and orders were used in studies conducted since 2008. Although the ability to find and catch juvenile sturgeon has improved since these early studies, it has not changed since the start of Keeyask GS construction.

5.1 JUVENILE ABUNDANCE

Juvenile sturgeon CPUE (Lake Sturgeon/100 m net/24 h) values derived from 2014 and 2015 monitoring data suggest a low to moderate abundance of sturgeon in the study area relative to other river systems. In the Upper Split Lake Area and Stephens Lake, mean CPUE vales were < 1.5, while in Gull Lake, mean CPUEs were slightly higher (approximately 3.5). These values are lower than several sections of the Winnipeg River where mean juvenile CPUE values > 10 have been observed (Henderson *et al*. 2014; McDougall *et al*. 2014; Lacho *et al*. 2015). The catch of juvenile Lake Sturgeon from Gull and Stephens lakes continues to be dominated by a single cohort (2008), a result that has been consistent since juvenile studies began in 2008. This cohort is now seven years of age, and it can be predicted that the numbers of fish from this cohort captured during juvenile population monitoring will begin to decline as the fish grow and start to use alternate habitats. Natural recruitment has occurred in both the Gull and Stephens lakes populations in recent years (2013, 2014, and 2015). The 2015 year-class may prove to be strong as catches of YOY were relatively high in both locations. Due to their small size and propensity for limited movement (Benson *et al*. 2005; Caroffino *et al*. 2009), gillnet selectivity for YOY is believed to be lower than at older age-classes. As these fish get larger and are more effectively captured, the relative strength of this year class will be confirmed.

5.2 KEY QUESTIONS

The AEMP identified key questions for juvenile Lake Sturgeon monitoring, four of which are relevant to the construction period and are addressed in the discussion below.

Does recruitment of wild sturgeon occur upstream and/or downstream of the GS during construction?

Construction related impacts were not expected to have affected recruitment of Lake Sturgeon either upstream or downstream of Gull Rapids in 2014, as construction began in July after egg deposition and hatch were expected to have occurred (Henderson *et al*. 2015).

Recruitment in both Gull and Stephens lakes occurred in 2015, as indicated by the capture of seven YOY in Gull Lake and 11 in Stephens Lake. However, similar to other years, it remains unknown if recruitment occurred due to spawning in Gull Rapids. It is possible that the YOY captured in Stephens Lake drifted from upstream spawning areas. This was known to have occurred in 2008, as the strong 2008 cohort present in both Gull and Stephens lakes were found to share common parents (*i.e.*, both full and half siblings confirmed to occur in Gull and Stephens lakes via high resolution genetics analysis) (Gosselin *et al*. 2016).

Is there a biologically meaningful (and statistically significant) change in condition factor and growth of juvenile sturgeon during construction?

Condition factor of juvenile Lake Sturgeon captured during baseline studies and construction were not significantly different for each age class in the Burntwood River, Gull Lake, and Stephens Lake. Fork length-at-age comparisons of sturgeon captured during baseline and construction were also similar for each age class sampled in the Burntwood River. In Gull and Stephens lakes significant differences in mean fork lengths were observed for age-4 fish in Stephens Lake (growth was higher during construction) and age-1 and age-7 fish in Gull Lake (growth was lower during construction). Future monitoring will determine if these trends continue.

Two questions related to the stocking program are addressed together:

- *What is the survival rate of stocked sturgeon?; and*
- *What is the proportion of hatchery-reared to wild recruits within a cohort (i.e., how successful is the stocking program)?*

Hatchery-reared Lake Sturgeon were stocked for the first time in 2014. Approximately 600 yearlings were stocked into the Burntwood River, and more than 150,000 larval Lake Sturgeon and 4,600 fingerlings were released near Birthday Rapids. Of the 595 yearlings stocked into the Burntwood River in 2014, three have been recaptured. In 2014, one fish was recaptured in the Burntwood River 4 km upstream of its stocking site, while the other two fish were recaptured > 90 km downstream in Gull Lake; one in 2014, and the other in 2015. This is noteworthy, as genetics results indicate that few wild juveniles or adults from Gull Lake exhibit genetic

signatures characteristic of the Burntwood River population (Gosselin *et al*. 2016). In terms of success and survival of stocked sturgeon in the Burntwood River, it is still too early to make an assessment. However, based on the few recaptures to date, results indicate that at least some stocked fish are able to grow and survive in the wild.

In 2015, one-year-old sturgeon were stocked into both Gull and Stephens lakes, with approximately 400 fish stocked into each lake by mid-September. A total of six of these one-year-old fish were recaptured; two in Gull Lake and four in Stephens Lake. Of the two fish recaptured in Gull Lake, one had been stocked in June, and the other in September; both fish were stocked at sites within 3 km of each other. The fish stocked in June exhibited an increase in both length and weight (72 mm in FL; 100 g in weight) and moved a distance of 3.0 km from where it was initially stocked. The fish stocked in September was recaptured shortly after its release and had moved 1.0 km from its initial stocking location. All four hatchery-reared fish recaptured in Stephens Lake were stocked into this waterbody in either June or September, 2015. Two were recaptures from June stocking, and two were recaptures from September stocking. For the recaptured fish that were stocked in June, growth was readily evident, as length and weight had increased for both fish (FL increase: 62 and 85 mm; weight increase: 341 and 378 g). Similar to Gull Lake, all four Stephens Lake fish exhibited movement following stocking, with recapture distances ranging from 1.1 to 1.9 km from their initial stocking site. Over the next several years of study, continued monitoring of the stocking program will provide better insight into survival and stocking success.

6.0 SUMMARY AND CONCLUSIONS

- In the Upper Split Lake Area, 44 juvenile Lake Sturgeon were caught, 28 in the Burntwood River (858.09 gillnet hours, CPUE of 0.78 Lake Sturgeon/100 m net/24 h), seven near the Kelsey GS (248.45 gillnet hours, CPUE of 0.68 Lake Sturgeon/100 m net/24 h), and nine in Split Lake (191.81 gillnet hours, CPUE of 1.13 Lake Sturgeon/100 m net/24 h). Only two Lake Sturgeon were recaptured from previous years and both were caught in the Burntwood River. No YOY Lake Sturgeon were captured in 2015, but fish aged 1–14 years were captured, with the 2009, 2010, and 2014 cohorts (ages 6, 5, and 1) being absent from the catch. Statistical analysis showed no difference when comparing length-at-age and condition factor-at-age between Lake Sturgeon caught in 2015 in comparison to the baseline.
- In Gull Lake, 139 Lake Sturgeon were captured in 912.1 gillnet hours for a total CPUE of 3.66 Lake Sturgeon/100 m net/24 h. Aged Lake Sturgeon (n = 121) ranged from 1 to 11-years old (each cohort represented), with 7-year old fish (2008 cohort) dominating the catch (n = 71; 58.7%). Twenty-three Lake Sturgeon tagged in previous years or as part of the stocking program, were recaptured in 2015. Three of these recaptured fish were stocked, one of which was released in the Burntwood River at First Rapids in 2014. The remaining two hatchery-reared fish were stocked into Gull Lake in 2015; one in June and one in September. Based on length, seven YOY Lake Sturgeon were caught in Gull Lake in 2015. The mean length of two age classes of sturgeon (age-1 and age-7) was significantly lower during construction than during baseline. There was not a significant change in mean condition factor for any age class.
- In Stephens Lake, 54 Lake Sturgeon were captured in 1153.97 gillnet hours for a total CPUE of 1.12 Lake Sturgeon/100 m net/24 h. Lake Sturgeon ages ranged from 0 to 9 with the 2008 cohort (age 7) being captured most frequently (n = 19; 36.5%). Thirteen Lake Sturgeon were recaptured in 2015 having initially been tagged in a previous study year. Four of these fish were hatchery reared fish released into Stephens Lake as one-year olds in 2015. Two fish were stocked in June and two were stocked in September. Eleven YOY fish were captured, representing 21% of the total catch. The mean length of one age-class of sturgeon (age-4) was significantly higher during construction than during baseline. There was not a significant change in mean condition factor for any age class.
- The abundance of juvenile Lake Sturgeon in the study area is considered low to moderate. Despite construction at Gull Rapids, recruitment occurred in Gull and Stephens lakes in 2015, and it is possible that the 2015 cohort will be strong.

- The key questions, as described in the AEMP, for juvenile Lake Sturgeon population monitoring during construction of the Keeyask GS are as follows:
    - *Does recruitment of wild sturgeon occur upstream and/or downstream of the GS during construction?*

      Recruitment to both Gull and Stephens lakes occurred in 2015 as indicated by the capture of seven YOY in Gull Lake and 11 in Stephens Lake. However, similar to other years, it remains unknown if recruitment occurred due to spawning in Gull Rapids.
    - *Is there a biologically meaningful (and statistically significant) change in condition factor and growth of juvenile sturgeon during construction?*

      Condition factor of juvenile Lake Sturgeon captured during baseline monitoring and construction were not significantly different for each age class in the Burntwood River, Gull Lake, and Stephens Lake. Fork length-at-age comparisons of sturgeon captured during baseline and construction were also similar for each age class sampled in the Burntwood River. However, in Gull and Stephens lakes significant differences in mean fork-lengths were observed for age-4 fish in Stephens Lake (growth was higher during construction) and age-1 and age-7 fish in Gull Lake (growth was lower during construction). Future monitoring will determine if these trends continue.
    - *What is the survival rate of stocked sturgeon?; and What is the proportion of hatchery-reared to wild recruits within a cohort (i.e., how successful is the stocking program)?*

      It is still too early to make any conclusions regarding the survival rate of stocked sturgeon and the proportion of hatchery reared to wild recruits within a cohort. Additional years of data collection will be necessary. Data collected thus far indicates that some fish released as one-year olds are surviving and growing. If a large proportion of the recaptures of fish stocked in the Burntwood River continue to be in Gull Lake, then a change in the method or timing of release, such that they might be more likely to stay in the Burntwood River, will be considered.

7.0 LITERATURE CITED

Barth, C.C., S.J. Peake, P.J. Allen, and W.G. Anderson. 2009. Habitat utilization of juvenile Lake Sturgeon, Acipenser fulvescens, in a large Canadian river. Journal of Applied Ichthyology. 25: 18-26.

Barth, C.C. 2011. Ecology, behaviour, and biological characteristics of juvenile Lake Sturgeon, *Acipenser fulvescens*, within an impounded reach of the Winnipeg River, Manitoba, Canada. Ph.D. dissertation. University of Manitoba, Winnipeg, Manitoba. xv + 206 pp.

Barth, C.C., W.G. Anderson, L.M. Henderson, and S.J. Peake. 2011. Home range size and seasonal movement of juvenile Lake Sturgeon in a large river in the Hudson Bay drainage basin. Transactions of the American Fisheries Society. 140: 1629-1641.

Benson, A.C., T.M. Sutton, R.F. Elliot, T.G. Meronek. 2005. Seasonal movement patterns and habitat preferences of age-0 Lake Sturgeon in the lower Peshtigo River, Wisconsin. Transactions of the American Fisheries Society. 134: 1400-1409.

Caroffino, D.C., T.M. Sutton, and M.S. Lindberg. 2009. Abundance and movement patterns of age-0 juvenile Lake Sturgeon in the Peshtigo River, Wisconsin. Environmental Biology of Fishes. 86: 411-422.

Gosselin, T., P.A. Nelson, C.A. McDougall, and L. Bernatchez. 2016. Population genomics of Lake Sturgeon (*Acipenser fulvescens*) from northern Manitoba, final report. A report prepared for Manitoba Hydro by Université Laval and North/South Consultants Inc. 67.

Groening, L.D., J.K. Aiken, and C.A. McDougall. 2014. Upper Nelson River juvenile Lake Sturgeon inventories, 2013: The Landing River area. A report prepared for Manitoba Hydro by North/South Consultants Inc. 47 pp.

Henderson, L.M., C.C. Barth, C.L. Hrenchuk. 2015. Juvenile Lake Sturgeon population monitoring, fall 2014: Year 1 Construction. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2015-03. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2015, 61 pp.

Henderson, L.M., C.C. Barth, J.E. MacDonald, and M. Blanchard. 2011. Young-of-the-year and subadult Lake Sturgeon investigations in the Keeyask Study Area, Spring and Fall 2010. A report prepared for Manitoba Hydro by North/South Consultants Inc., Winnipeg Manitoba. ix + 49 pp.

Henderson, L.M. and D.J. Pisiak. 2012. Results of young-of-the-year and subadult Lake Sturgeon investigations in the Keeyask Study Area, spring and fall, 2011. A report prepared for Manitoba Hydro by North/South Consultants Inc. xii + 48 pp.

Henderson, L.M., C.A. McDougall, and C.C. Barth. 2013. Results of Lake Sturgeon year-class strength assessments conducted in the Keeyask Study Area, fall 2012. A report prepared for Manitoba Hydro by North/South Consultants Inc., Winnipeg Manitoba. xiii + 59 pp.

Henderson, L.M., C.A. McDougall, and D.S. MacDonell. 2014. Aquatic Effects Monitoring: Results of juvenile Lake Sturgeon Monitoring in the Slave Falls Reservoir, 2013. A report prepared for Manitoba Hydro by North/South Consultants Inc. vii + 94 pp.

Keeyask Hydropower Limited Partnership. 2012. Keeyask Generation Project Environmental Impact Statement: Physical Environment Supporting Volume, Winnipeg, Manitoba. June 2012.

Lawrence, M.J., C.R. Fazakas, L. Zrum, C.L. Bezte, and W.J. Bernhardt. 1999. The Split Lake Aquatic Ecosystem: A synthesis of Split Lake biological and environmental data, January 1997 – October 1998. A report prepared for the Tataskweyak Environmental Monitoring Agency by North/South Consultants Inc. xii + 87 pp.

MacDonald, J.E. 2009. Lake Sturgeon investigations in the Keeyask Study Area, 2007-2008. A draft report prepared for Manitoba Hydro by North/South Consultants Inc. xii + 64 pp.

McDougall, C.A., and P.A. Nelson. 2015. Upper Nelson River juvenile Lake Sturgeon inventories, 2014: Sea Falls – Sugar Falls. A report prepared for Manitoba Hydro by North/South Consultants Inc. 79 pp.

McDougall, C.A., and D. Pisiak. 2012. Results of a Lake Sturgeon inventory conducted in the Sea Falls to Sugar Falls reach of the Nelson River - Fall, 2012. A report prepared for Manitoba Hydro by North/South Consultants Inc. 46pp.

McDougall, C.A., and D. Pisiak. 2014. Upper Nelson River juvenile Lake Sturgeon inventories, 2013: Sea Falls – Sugar Falls and the Pipestone Lake area. A report prepared for Manitoba Hydro by North/South Consultants Inc. 91 pp #5923.13-01.

McDougall, C.A., P.J. Blanchfield, S.J. Peake, and W.G. Anderson. 2013. Movement patterns and size-class influence entrainment susceptibility of Lake Sturgeon in a small hydroelectric reservoir. Transactions of the American Fisheries Society. 142: 1508-1521.

McDougall, C.A., C.C. Barth, J.K. Aiken, L.M. Henderson, M.A. Blanchard, K.M. Ambrose, C.L. Hrenchuk, M.A. Gillespie, and P.A. Nelson. 2014. How to sample juvenile Lake Sturgeon, (*Acipenser fulvescens* Rafinesque, 1817), in Boreal Shield rivers using gill nets, with an emphasis on assessing recruitment patterns. Journal of Applied Ichthyology. 30:1402 – 1415.

Michaluk, Y. and J.E. MacDonald. 2010. Lake Sturgeon investigations in the Keeyask Study Area, 2009. A report prepared for Manitoba Hydro by North/South Consultants Inc. xiii + 83 pp.

Ogle, D.H. and G.R. Spangler. 1996. Check formation on the scales of hatchery-reared Lake Trout prior to and soon after release into Lake Superior. North American Journal of Fisheries Management 16(4): 896-904.

Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada Bulletin 191. Xvii + 382 pp.

TABLES

Table 1: Start and completion dates of gillnetting studies conducted in the Keeyask study area, fall 2015.

Location	Start Date	Completion Date	# Sites
Upper Split Lake Area[1]			
Burntwood River	30-Aug-15	04-Oct-15	25
Kelsey GS Area	29-Aug-15	04-Oct-15	9
Split Lake	29-Aug-15	03-Oct-15	7
Gull Lake	11-Sep-15	20-Sep-15	34
Stephens Lake	23-Sep-15	02-Oct-15	44

1. Two separate study periods took place in the Upper Split Lake Area in 2015 (29-Aug. to 9 Sep., and Oct. 2-4).

Table 2: List of fish species captured, including common and scientific names and abbreviations, during gillnetting surveys conducted in the Keeyask study area, fall 2015. An 'X' signifies species presence in the catch.

Common Name	Scientific Name	Abbreviation	Upper Split Lake Area			Gull Lake	Stephens Lake
			Burntwood River	Kelsey GS Area	Split Lake		
Burbot	*Lota lota*	BURB	X	X	X	X	X
Freshwater Drum	*Aplodinotus grunniens*	FRDR			X		
Lake Chub	*Couesius plumbeus*	LKCH		X	X		
Lake Sturgeon	*Acipenser fulvescens*	LKST	X	X	X	X	X
Lake Whitefish	*Coregonus clupeaformis*	LKWH	X		X	X	X
Longnose Sucker	*Catostomus catostomus*	LNSC	X	X	X	X	X
Mooneye	*Hiodon tergisus*	MOON	X			X	
Northern Pike	*Esox lucius*	NRPK	X	X	X	X	
Lamprey	*Petromyzontidae*	PETR (f)		X			
Rainbow Smelt	*Osmerus mordax*	RNSM				X	
Sauger	*Sander canadensis*	SAUG	X	X	X	X	X
Shorthead Redhorse	*Moxostoma macrolepidotum*	SHRD	X	X	X	X	
Spottail Shiner	*Notropis hudsonius*	SPSH				X	
Trout-perch	*Percopsis omiscomaycus*	TRPR				X	X
Walleye	*Sander vitreus*	WALL	X	X	X	X	X
White Sucker	*Catostomus commersoni*	WHSC	X	X	X	X	X
Yellow Perch	*Perca flavescens*	YLPR	X		X		

Table 3: Number (n) and frequency of occurrence (%), by species and sampling location, of fish captured in gillnets (1 to 6-inch mesh) set in the Keeyask study area, fall 2015.

Species	Upper Split Lake Area						Gull Lake		Stephens Lake		Total n	Total %
	Burntwood River		Kelsey GS Area		Split Lake							
	n	%	n	%	n	%	n	%	n	%		
Burbot	4	2.7	1	0.7	1	0.5	4	0.8	55	18.4	65	5.1
Freshwater Drum	0	0.0	0	0.0	1	0.5	0	0.0	0	0.0	1	0.1
Lake Chub	0	0.0	3	2.1	5	2.5	0	0.0	0	0.0	8	0.6
Lake Sturgeon	*28*	*18.9*	*7*	*4.9*	*9*	*4.5*	*139*	*28.4*	*54*	*18.1*	*237*	*18.5*
Lake Whitefish	1	0.7	0	0.0	5	2.5	2	0.4	2	0.7	10	0.8
Longnose Sucker	37	25.0	34	23.8	46	23.1	133	27.1	116	38.8	366	28.6
Mooneye	2	1.4	0	0.0	0	0.0	1	0.2	0	0.0	3	0.2
Northern Pike	7	4.7	2	1.4	5	2.5	22	4.5	0	0.0	36	2.8
Lamprey	0	0.0	1	0.7	0	0.0	0	0.0	0	0.0	1	0.1
Rainbow Smelt	0	0.0	0	0.0	0	0.0	6	1.2	0	0.0	6	0.5
Sauger	32	21.6	29	20.3	37	18.6	24	4.9	19	6.4	141	11.0
Shorthead Redhorse	1	0.7	10	7.0	6	3.0	8	1.6	0	0.0	25	2.0
Spottail Shiner	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0	1	0.1
Trout-perch	0	0.0	0	0.0	0	0.0	12	2.4	3	1.0	15	1.2
Walleye	32	21.6	51	35.7	76	38.2	84	17.1	6	2.0	249	19.5
White Sucker	3	2.0	5	3.5	7	3.5	54	11.0	44	14.7	113	8.8
Yellow Perch	1	0.7	0	0.0	1	0.5	0	0.0	0	0.0	2	0.2
Total	**148**	100	**143**	100	**199**	100	**490**	100	**299**	100	**1279**	100

Table 4: Lake Sturgeon catch-per-unit effort (CPUE; # fish/100 m net/24 h) by location and zone, for gillnets set in the Keeyask study area, fall 2015.

Location	Zone	# Sites	Effort (gillnet hours)	# of Lake Sturgeon	CPUE (#LKST/100m/24h)
Upper Split Lake Area:					
Burntwood River	BWR-A	8	282.44	9	0.76
	BWR-B	6	147.12	8	1.31
	BWR-C	11	428.53	11	0.62
	Total	**25**	**858.09**	**28**	**0.78**
Kelsey GS Area	KGS-B	3	81.25	1	0.30
	KGS-C	3	108.28	3	0.66
	KGS-D	3	58.92	3	1.22
	Total	**9**	**248.45**	**7**	**0.68**
Split Lake	SPL-A	7	191.81	9	1.13
	Total	**7**	**191.81**	**9**	**1.13**
Gull Lake	BR-D	4	106.09	2	0.45
	GL-A	10	272.72	14	1.32
	GL-B	10	285.24	90	7.57
	GL-C	10	248.07	33	3.19
	Total	**34**	**912.11**	**139**	**3.66**
Stephens Lake	STL-A	12	314.90	13	0.99
	STL-B	32	839.08	41	1.17
	Total	**44**	**1153.97**	**54**	**1.12**

Table 5: Lake Sturgeon catch-per-unit-effort (CPUE; #fish/100 m net/24 h) for gillnets set in the Keeyask study area between 2007 and 2015. Grey highlighted rows indicate construction monitoring.

Location	Season	Year	Start Date	Completion Date	Mesh Size	# Sites	Effort (gillnet hrs [1])	# Lake Sturgeon	CPUE
Upper Split Lake Area									
Burntwood River	Spring	2011	17-Jun	27-Jun	1.5"- 5"	10	322	55	4.10
	Fall	2012	29-Aug	08-Sep	1"- 6"	37	767	33	1.03
		2014	08-Sep	16-Sep	1"- 6"	28	734	42	1.37
		2015	29-Aug	04-Oct	1"- 6"	28	858	35	0.78
Kelsey GS Area	Spring	2011	16-Jun	22-Jun	1.5"- 5"	3	116	1	0.21
	Fall	2015	29-Aug	04-Oct	1"- 6"	7	248	7	0.68
Split Lake	Fall	2015	29-Aug	04-Oct	1"- 6"	9	192	9	1.13
Gull Lake [3]	Fall	2007	28-Sep	03-Oct	8mm - 5"	26	165	0	0.00
		2008	12-Sep	27-Sep	1.5"- 8"	15	3072	126	0.98
		2010	21-Sep	29-Sep	1"- 5"	27	851	69	1.95
		2011	18-Sep	24-Sep	1"- 5"	25	662	121	4.39
		2012	29-Aug	09-Sep	1"- 6"	30	745	101	3.25
		2014	08-Sep	16-Sep	1"- 6"	30	765	112	3.51
		2015	11-Sep	20-Sep	1"- 6"	34	912	139	3.66
Stephens Lake	Spring	2010	29-May	07-Jun	1"- 5"	15	288	5	0.42
	Fall	2007	19-Sep	23-Sep	2"- 5"	15	48	0	0.00
		2008	11-Sep	18-Sep	3.75"- 8"	12	295	8	0.65
		2009	14-Sep	20-Sep	1.5"- 5"	18	634	23	0.87
		2010	22-Sep	29-Sep	1"- 5"	18	611	32	1.26
		2011	21-Sep	01-Oct	1"- 5"	30	974	37	0.91
		2012	11-Sep	23-Sep	1"- 6"	19	1193	87	1.75
		2014	18-Sep	28-Sep	1"- 6"	94	921	47	1.23
		2015	22-Sep	02-Oct	1"- 6"	44	1154	54	1.12

1. Gillnet set durations were standardized to 100 m of net and then summed to calculate the total gillnet hours for each study.
2. Does not include Lake Sturgeon recaptured more than once in the same study.
3. Birthday Rapids to Gull Rapids.

Table 6: Mean length, weight, and condition factor (K) of Lake Sturgeon captured during gillnetting investigations conducted in the Keeyask study area, fall 2015.

Waterbody	Fork Length (mm)				Weight (g)				K			
	n [1]	Mean	Std [2]	Range	n	Mean	Std	Range	n	Mean	Std	Range
Upper Split Lake Area												
Burntwood River	28	468	160	285-860	28	985	1370	130-6577	28	0.66	0.15	0.47-1.08
Kelsey GS Area	7	579	75	495-710	6	1663	620	800-2650	6	0.74	0.06	0.64-0.84
Split Lake	9	368	155	210-710	9	539	773	100-2450	9	0.73	0.15	0.61-1.08
Gull Lake	139	532	178	101-908	133	1562	1192	11-7257	133	0.74	0.11	0.54-1.29
Stephens Lake	54	483	229	120-795	52	1407	1141	15-3650	52	0.88	0.24	0.60-1.59

1. Number of fish measured.
2. Standard deviation.

Table 7: Length-weight regression equations for Lake Sturgeon captured during gillnetting studies conducted in the Keeyask study area, fall 2015.

Location	n [1]	Regression Equation	(R^2) [2]
Upper Split Lake Area			
Burntwood River	28	$W = 8E\text{-}06(L)^{3.0}$	0.97
Gull Lake	133	$W = 5E\text{-}06(L)^{3.0}$	0.99
Stephens Lake	53	$W = 2E\text{-}05(L)^{2.8}$	0.99

1. Number of fish measured.
2. R^2 = coefficient of determination; measures the proportion of variability in fish weight explained by fork length; a value closer to 1 indicated a stronger relationship between weight and fork length.

Table 8: Original capture date and biological data for fish recaptured in gill nets set in the Keeyask study area, fall 2015. Grey highlighted cells indicate stocked hatchery fish, and red font indicates fish whose original capture data could not be found.

Location	Floy-tag #	PIT-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age [1]	Distance (km)	Days Between Capture
Gull Lake	82831	900 226000629451	BR-D	12-Sep-2015	624	725	2100	8	0.04	365
	-	-	BR-D	12-Sep-2014	590	685	1850	7		
				Growth	**34**	**40**	**250**			
Gull Lake	89988	900 226000629293	GL-A	14-Sep-2015	559	640	1260	7	0.11	363
	-	-	GL-A	16-Sep-2014	549	631	1100	6		
				Growth	**10**	**9**	**160**			
Gull Lake	105041	900 043000119437	GL-A	15-Sep-2015	330	370	225	2	91.70	472
	-	-	BWR-A	31-May-2014	189	215	35	1		
				Growth	**141**	**155**	**190**			
Gull Lake	89819	900 226000703442	GL-B	15-Sep-2015	658	754	2260	7	3.23	1453
	-	-	GL-B	23-Sep-2011	455	522	725	3		
				Growth	**203**	**232**	**1535**			
Gull Lake	82841	900 226000629380	GL-B	16-Sep-2015	594	661	1580	7	0.56	368
	-	-	GL-B	13-Sep-2014	548	608	1075	6		
				Growth	**46**	**53**	**505**			
Gull Lake	94112	900 226000703464	GL-B	16-Sep-2015	820	916	4082		0.79	1912
	-	-	GL-B	22-Jun-2010	650	735	2200			
				Growth	**170**	**181**	**1882**			
Gull Lake	105103	900 043000103825	GL-B	16-Sep-2015	640	723	1900	9	1.38	429
	-	-	GL-B	14-Jul-2014	631	690	1850	8		
				Growth	**9**	**33**	**50**			

Table 8: Original capture date and biological data for fish recaptured in gill nets set in the Keeyask study area, fall 2015. Grey highlighted cells indicate stocked hatchery fish, and red font indicates fish whose original capture data could not be found (continued).

Location	Floy-tag #	PIT-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age [1]	Distance (km)	Days Between Capture
Gull Lake	96513	900 043000103672	GL-C	17-Sep-2015	382	435	363	3	0.58	366
	-		GL-C	16-Sep-2014	343	392	300	2		
				Growth	**39**	**43**	**63**			
Gull Lake	91396	900 226000629034	GL-C	17-Sep-2015	870	980	5443		1.08	445
	-	-	GL-C	29-Jun-2014	920	1020	5443			
				Growth	**-50** [1]	**-40** [1]	**0**			
Gull Lake	105480	900 226000629277	GL-B	17-Sep-2015	885	1001	4990		2.36	456
	-	-	GL-C	18-Jun-2014	843	951	4082			
				Growth	**42**	**50**	**908**			
Gull Lake	105104	900 043000103894	GL-B	17-Sep-2015	660	731	1800	7	0.11	441
	-	-	GL-B	03-Jul-2014	580	624	1350	6		
				Growth	**80**	**107**	**450**			
Gull Lake	103463	900 226000629452	GL-B	18-Sep-2015	446	512	539	3*	0.19	372
	-	-	GL-B	11-Sep-2014	399	457	425	3		
				Growth	**47**	**55**	**114**			
Gull Lake	79297	900 067000058628	GL-B	18-Sep-2015	319	373	175	2*	3.00	80
	-	-	GL-B	30-Jun-2015	247	291	75	1		
				Growth	**72**	**82**	**100**			
Gull Lake	105691	900 043000103824	GL-B	18-Sep-2015	574	661	1100	7	0.99	443
	-	-	GL-B	02-Jul-2014	510	595	1150			
				Growth	**64**	**66**	**-50**			
Gull Lake	75321	900 226000629248	GL-C	18-Sep-2015	880	960	7257		1.73	2556
	-	-	GL-C	18-Sep-2008	710	799	-			
				Growth	**170**	**161**	**-**			

Table 8: Original capture date and biological data for fish recaptured in gill nets set in the Keeyask study area, fall 2015. Grey highlighted cells indicate stocked hatchery fish, and red font indicates fish whose original capture data could not be found (continued).

Location	Floy-tag #	PIT-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age [1]	Distance (km)	Days Between Capture
Gull Lake	100475	900 226000548726	GL-C	18-Sep-2015	585	675	1500	7	0.05	1114
	-	-	GL-C	30-Aug-2012	480	562	800	4		
				Growth	**105**	**113**	**700**			
Gull Lake	-	900 067000055784	GL-C	19-Sep-2015	280	322	-	1	1.03	3
	-	-	GL-C	16-Sep-2015	285	323	120	1		
				Growth	**-5** [1]	**-1** [1]	**-**			
Gull Lake	105689	900 043000103841	GL-B	19-Sep-2015	578	641	1300	7	1.22	444
	-	-	GL-B	02-Jul-2014	510	595	1100			
				Growth	**68**	**46**	**200**			
Gull Lake	93852	900 226000703470	GL-B	19-Sep-2015	604	690	1450	7	4.08	1459
	-	-	GL-B	21-Sep-2011	362	420	275			
				Growth	**242**	**270**	**1175**			
Gull Lake	93855	900 226000548578	GL-B	19-Sep-2015	632	698	1600	7	4.21	1460
	-	-	GL-B	20-Sep-2011	426	466	500			
				Growth	**206**	**232**	**1100**			
Gull Lake	94883	900 226000548690	GL-B	19-Sep-2015	608	682	1600	7	2.25	1456
	-	-	GL-B	24-Sep-2011	409	463	450			
				Growth	**199**	**219**	**1150**			
Gull Lake	105114	900 043000103835	GL-B	20-Sep-2015	691	797	2300	9	1.51	442
	-	-	GL-B	05-Jul-2014	636	708	2000	8		
				Growth	**55**	**89**	**300**			
Gull Lake	90304	900 043000103649	GL-B	16-Sep-2015	310	353	197	2	4.21	368
	-	-	GL-C	13-Sep-2014	240	269	75	1		
				Growth	**70**	**84**	**122**			

Table 8: Original capture date and biological data for fish recaptured in gill nets set in the Keeyask study area, fall 2015. Grey highlighted cells indicate stocked hatchery fish, and red font indicates fish whose original capture data could not be found (continued).

Location	Floy-tag #	PIT-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age [1]	Distance (km)	Days Between Capture
Stephens Lake	100142	1380348307	STL-A	24-Sep-2015	637	694	1950	7	2.79	1097
	-	-	STL-B	22-Sep-2012	464	528	775	4		
				Growth	**173**	**166**	**1175**			
Stephens Lake	88480	900 226000629394	STL-B	25-Sep-2015	586	672	1300	7	0.10	365
	-	-	STL-A	25-Sep-2014	575	663	1225	6		
				Growth	**11**	**9**	**75**			
Stephens Lake	94235	900 226000703457	STL-B	25-Sep-2015	664	725	2350	7	0.19	1823
	-	-	STL-B	28-Sep-2010	341	387	260			
				Growth	**323**	**338**	**2090**			
Stephens Lake	101491	900 067000055295	STL-A	29-Sep-2015	316	352	400	2*	1.54	99
	-	-	STL-B	30-Jun-2015	231	271	59	1		
				Growth	**85**	**81**	**341**			
Stephens Lake	101493	900 067000055540	STL-A	30-Sep-2015	297	342	200	2*	1.43	16
	-	-	STL-A	14-Sep-2015	295	348	135	1		
				Growth	**2**	**-6 [1]**	**65**			
Stephens Lake	101494	900 067000058544	STL-A	01-Oct-2015	340	392	480	1	1.94	101
	-	-	STL-B	30-Jun-2015	278	330	102	1		
				Growth	**62**	**62**	**378**			
Stephens Lake	101495	900 067000055136	STL-A	01-Oct-2015	328	369	420	2*	1.09	17
	-	-	STL-A	14-Sep-2015	330	380	208	1		
				Growth	**-2 [1]**	**-11 [1]**	**212**			

Table 8: Original capture date and biological data for fish recaptured in gill nets set in the Keeyask study area, fall 2015. Grey highlighted cells indicate stocked hatchery fish, and red font indicates fish whose original capture data could not be found (continued).

Location	Floy-tag #	PIT-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age [1]	Distance (km)	Days Between Capture
Stephens Lake	88498	900 226000629308	STL-B	28-Sep-2015	664	732	2200	7	0.52	372
	-	-	STL-A	21-Sep-2014	626	712	1875	6		
				Growth	**38**	**20**	**325**			
Stephens Lake	94226	900 226000703481	STL-B	28-Sep-2015	649	697	2200	7	0.39	1827
	-	-	STL-B	27-Sep-2010	342	387	310			
				Growth	**307**	**310**	**1890**			
Stephens Lake	88495	900 226000629336	STL-A	01-Oct-2015	409	461	725	4	1.24	374
	-	-	STL-A	22-Sep-2014	374	431	375	3		
				Growth	**35**	**30**	**350**			
Stephens Lake	94599	900 226000628373	STL-B	02-Oct-2015	762	831	3650	9	1.06	1205
	-	-	STL-B	14-Jun-2012	645	711	-			
				Growth	**117**	**120**				
Burntwood River	75455	900 226000548334	BWR-A	01-Sep-2015	860	960	4100	-	0.18	2996
	-	-	BWR-A	19-Jun-2007	899	952	6591			
				Growth	**-39 [1]**	**8**	**-2491**			
Burntwood River	91187	900 226000548827	BWR-A	01-Sep-2015	640	705	1600	14*	0.71	1536
	-	-	BWR-A	18-Jun-2011	515	571	1100			
				Growth	**125**	**134**	**500**			
Stephens Lake	91174	900 226000703433	STL-A	24-Sep-2015	674	732	2250	-	-	-
Stephens Lake	103350	900 226000703402	STL-B	27-Sep-2015	528	592	1150	5	-	-

1. Measurement discrepancies due to errors in measurement at release or recapture.

* assigned ages do not match up with known ages (*i.e.,* stocked fish) or a previous age assignment.

FIGURES

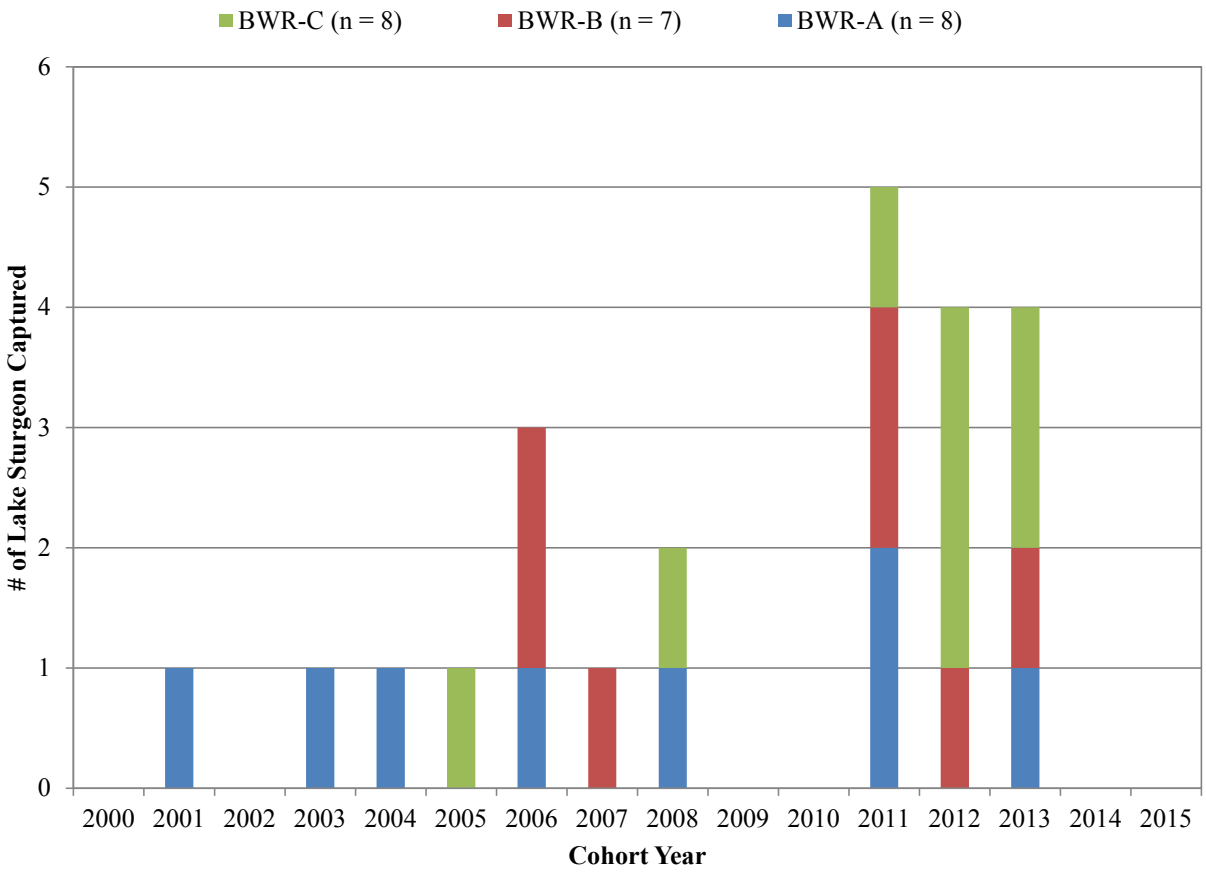


Figure 1: Cohort frequency distributions by zone, for all Lake Sturgeon captured in the Burntwood River, fall 2015.

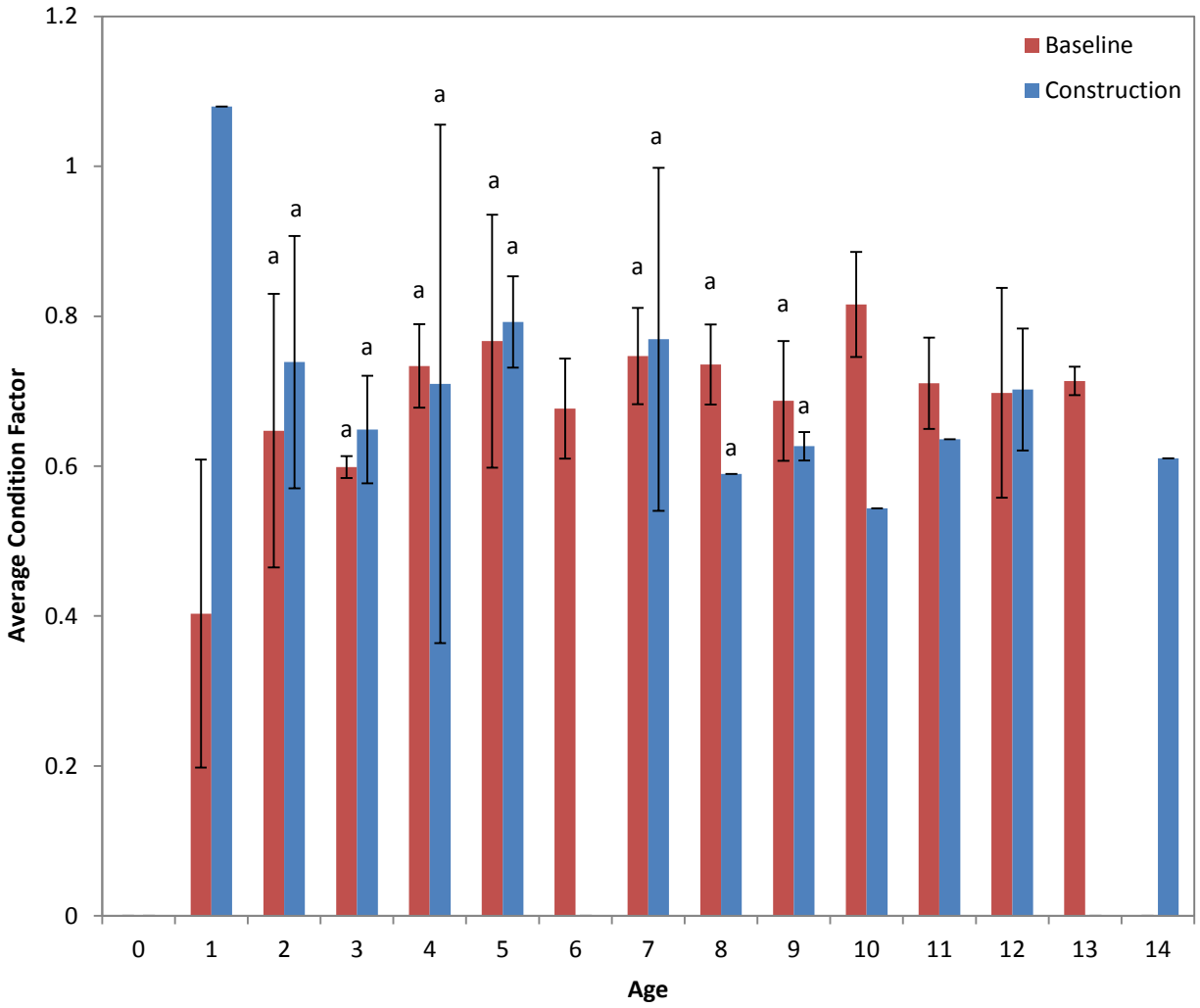


Figure 2: **Mean condition factor-at-age for Lake Sturgeon captured in the Burntwood River during baseline studies (red bars) and during the construction period (blue bars). Letters denote significant differences between groups (Mann Whitney U test, $P < 0.05$). Error bars represent standard deviations.**

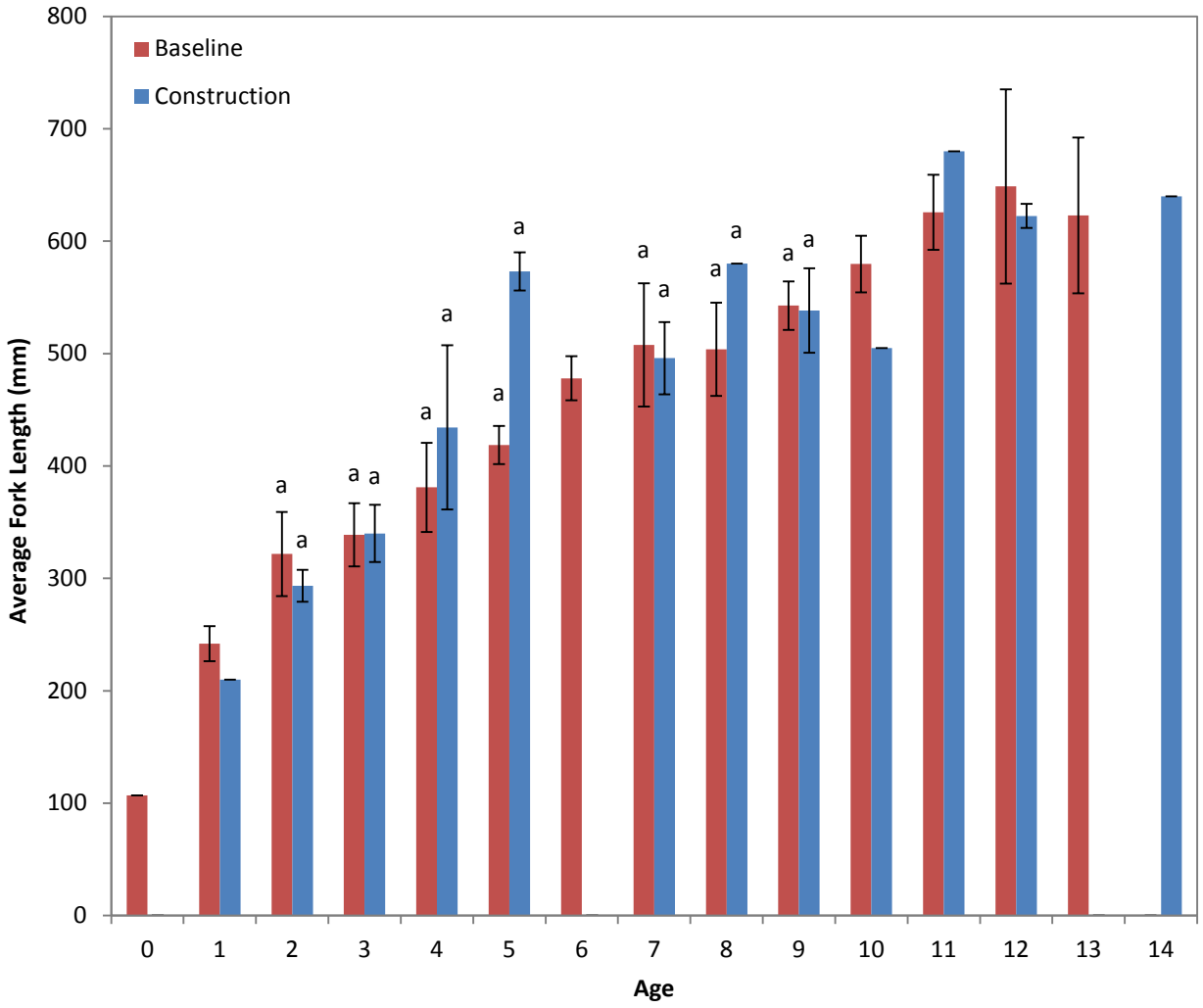


Figure 3: **Mean fork length-at-age for Lake Sturgeon captured in the Burntwood River during baseline studies (red bars) and the construction period (blue bars). Letters denote significant differences between groups (Mann Whitney U test, $P < 0.05$). Error bars represent standard deviations.**

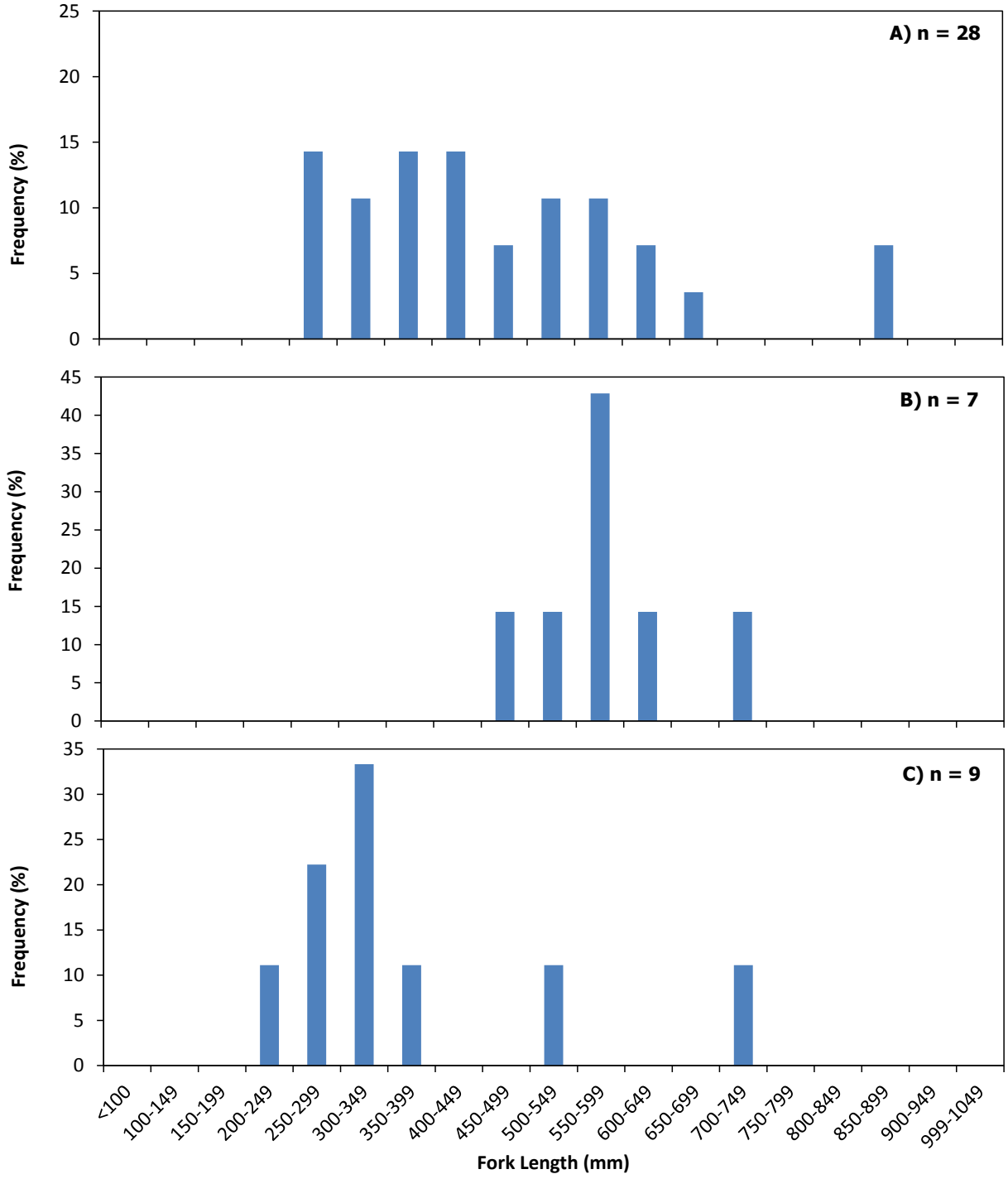


Figure 4: **Length-frequency distributions for Lake Sturgeon captured in gillnets set in the Upper Split Lake Area: A) the Burntwood River, B) the Kelsey GS Area, and C) Split Lake, fall 2015.**

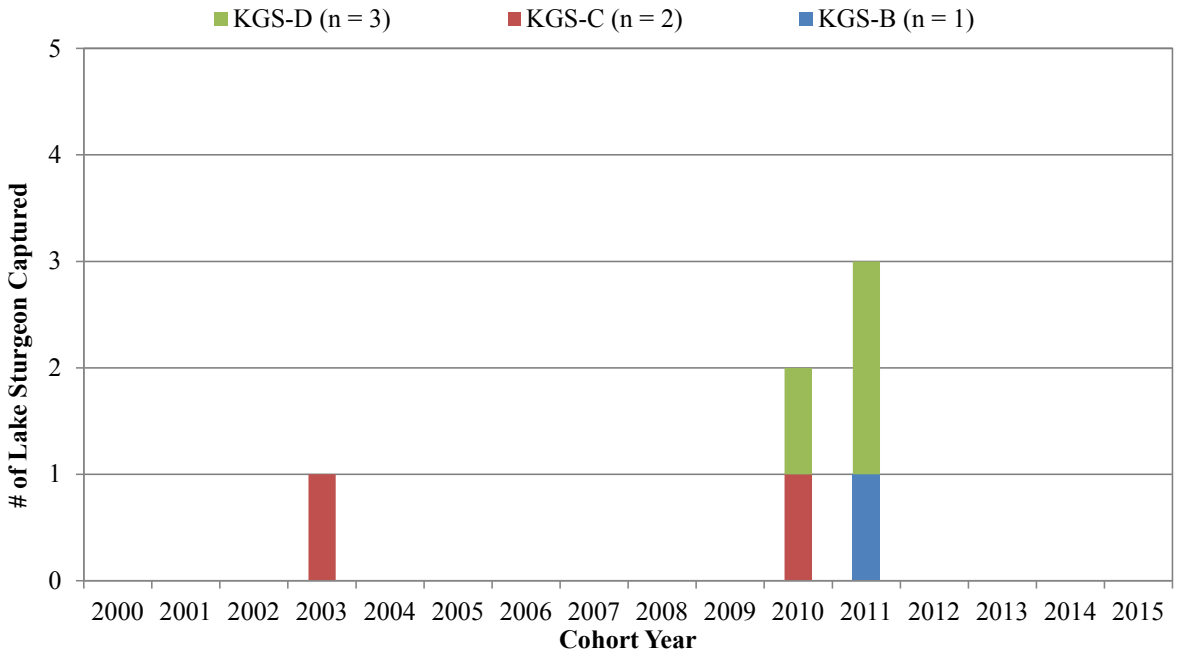


Figure 5: Cohort frequency distributions by zone, for all Lake Sturgeon captured in the Kelsey GS Area, fall 2015.

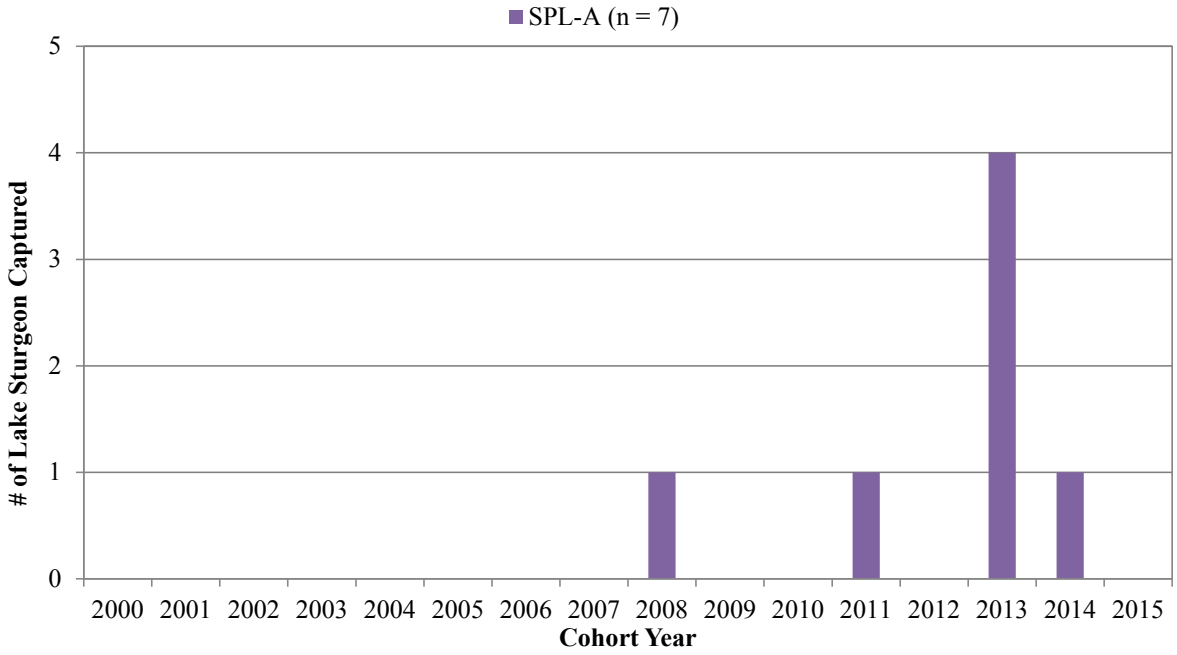


Figure 6: Cohort frequency distributions for all aged Lake Sturgeon captured in zone SPL-A of Split Lake, fall 2015.

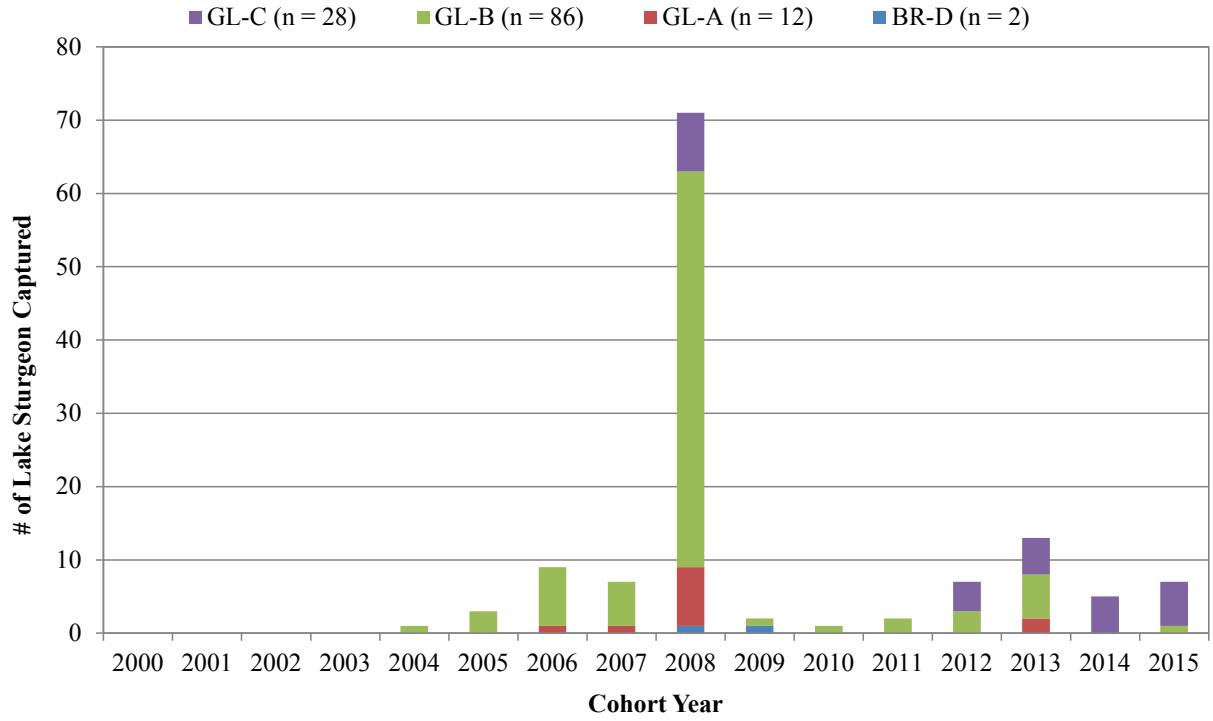


Figure 7: Cohort frequency distributions by zone, for all aged Lake Sturgeon (including 7 assumed young-of-the-year based on size) captured in Gull Lake, fall 2015.

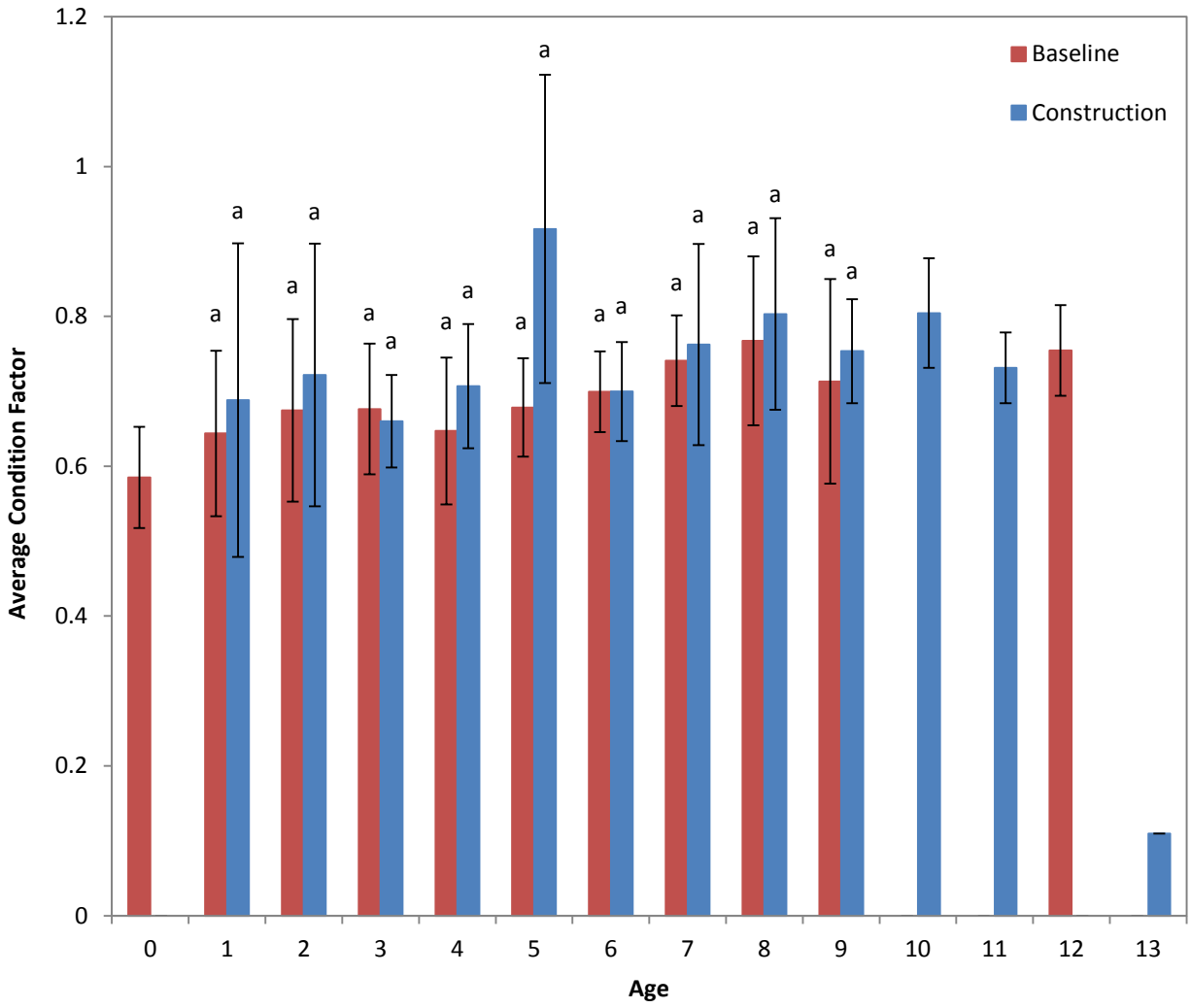


Figure 8: **Mean condition factor-at-age for Lake Sturgeon captured in Gull Lake during baseline studies (red bars) and the construction period (blue bars). Letters denote significant differences between groups (Mann Whitney U test, $P < 0.05$). Error bars represent standard deviations.**

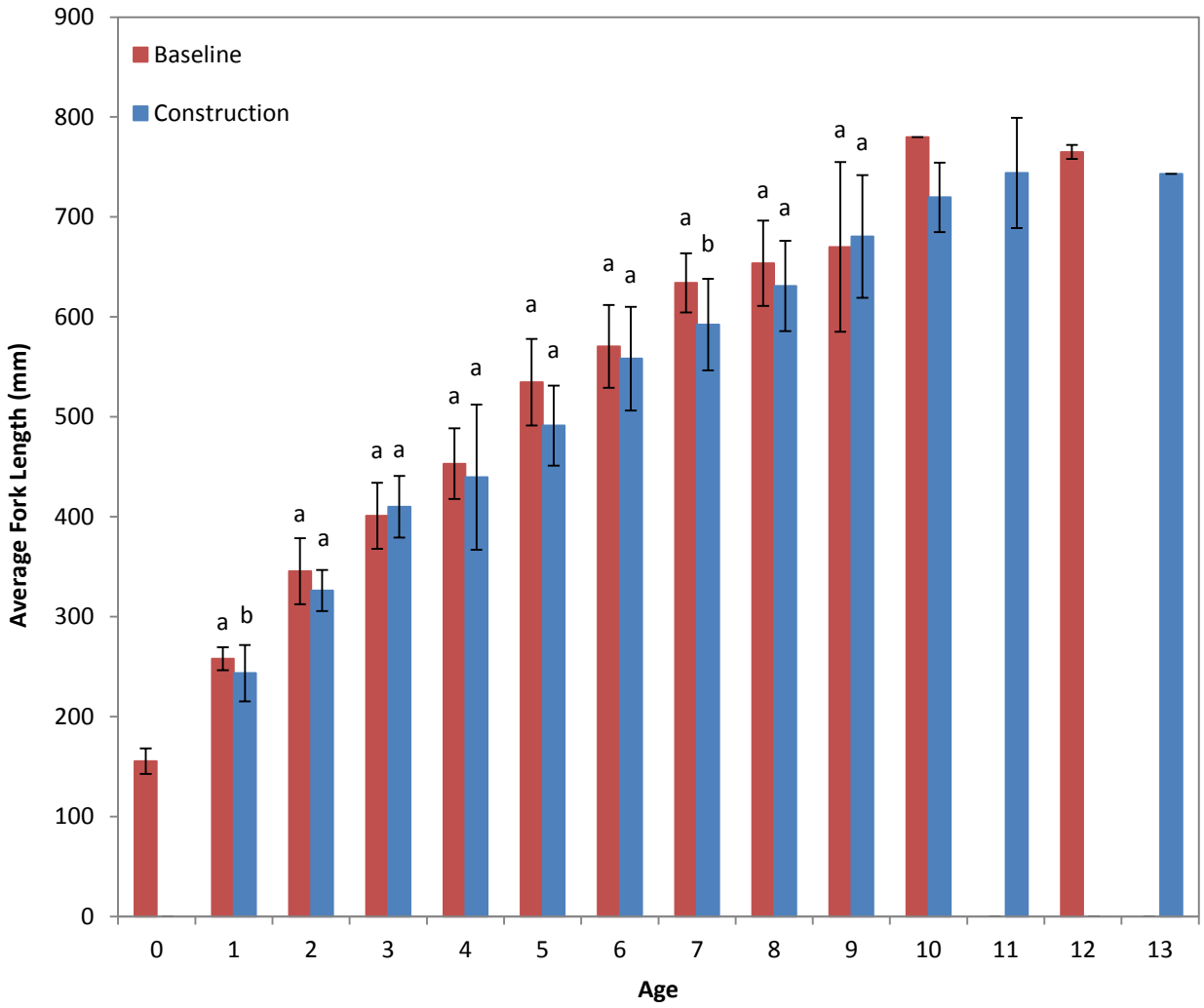


Figure 9: **Mean fork length-at-age for Lake Sturgeon captured in Gull Lake during baseline studies (red bars) and the construction period (blue bars). Letters denote significant differences between groups (Mann Whitney U test, $P < 0.05$). Error bars represent standard deviations.**

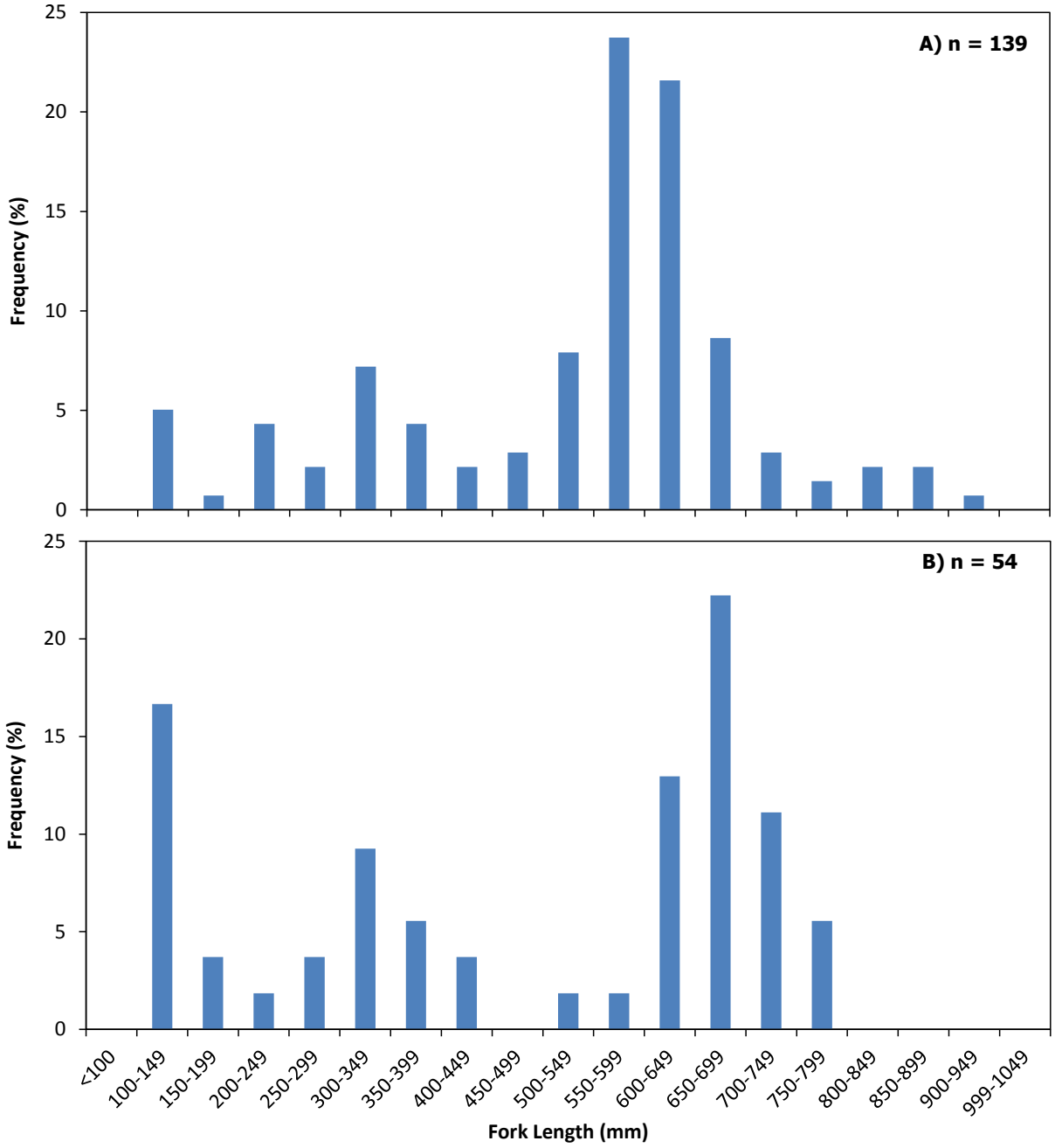


Figure 10: Length-frequency distributions for Lake Sturgeon captured in gillnets set in: A) Gull Lake and B) Stephens Lake, fall 2015.

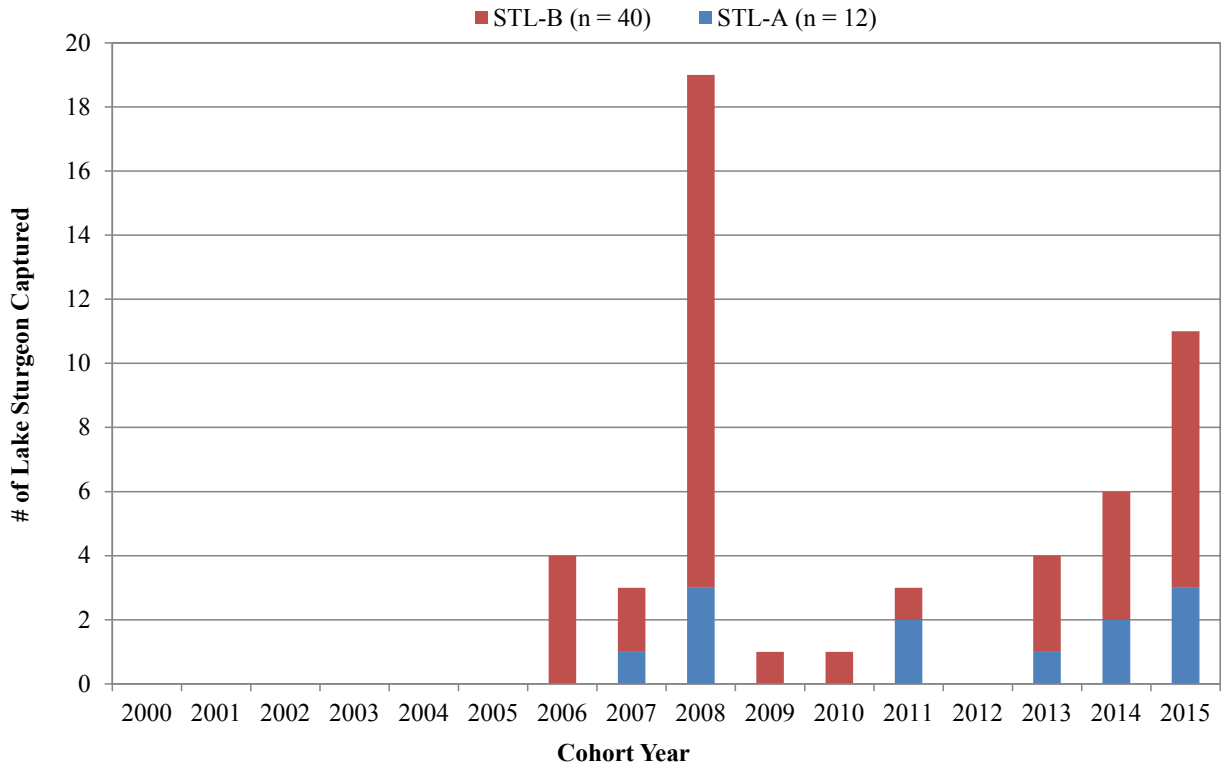


Figure 11: Cohort frequency distributions by zone, for all aged Lake Sturgeon captured in Stephens Lake, fall 2015.

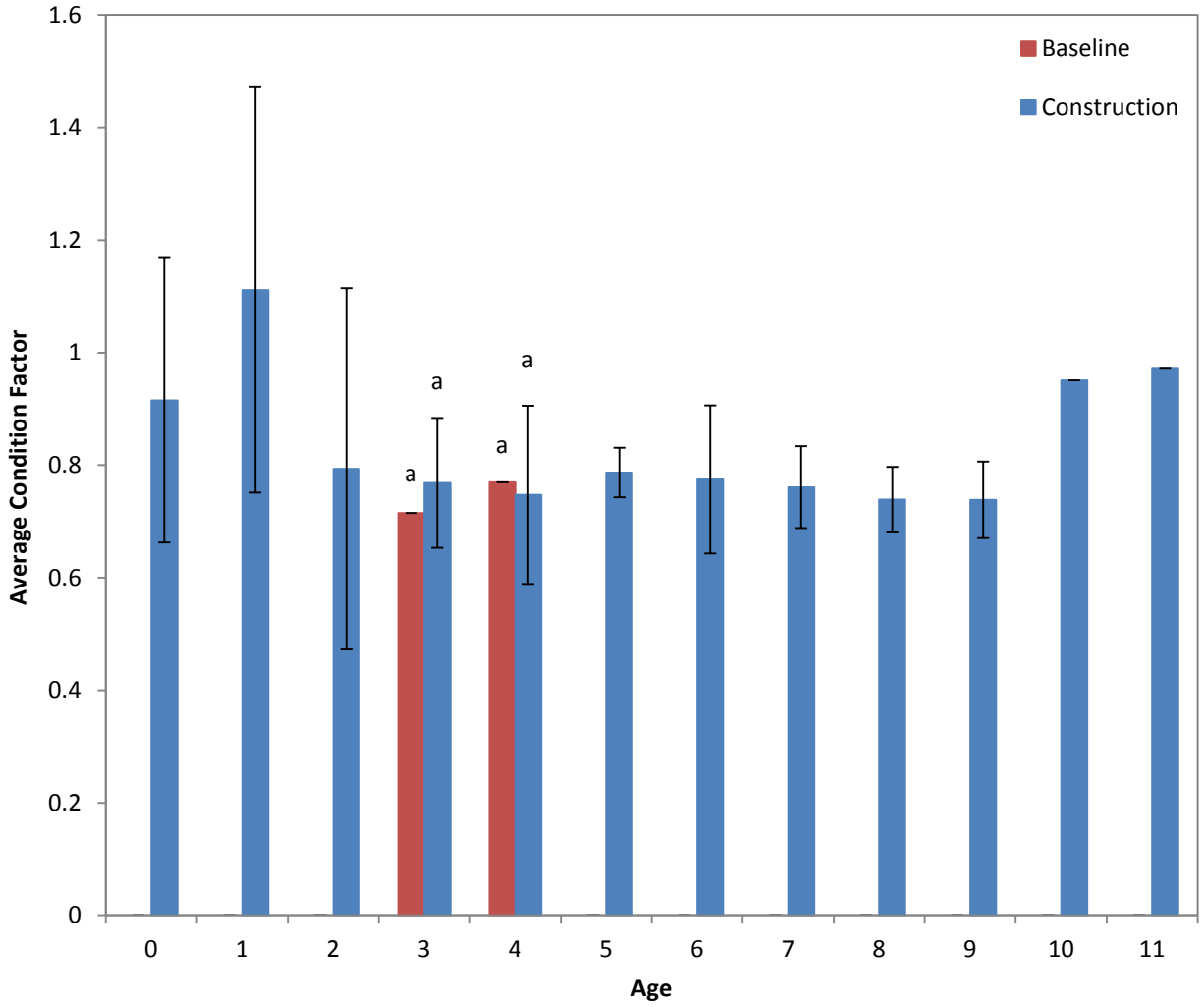


Figure 12: **Mean condition factor-at-age for Lake Sturgeon captured in Stephens Lake during baseline studies (red bars) and the construction period (blue bars). Letters denote significant differences between groups (Mann Whitney U test, $P < 0.05$). Error bars represent standard deviations.**

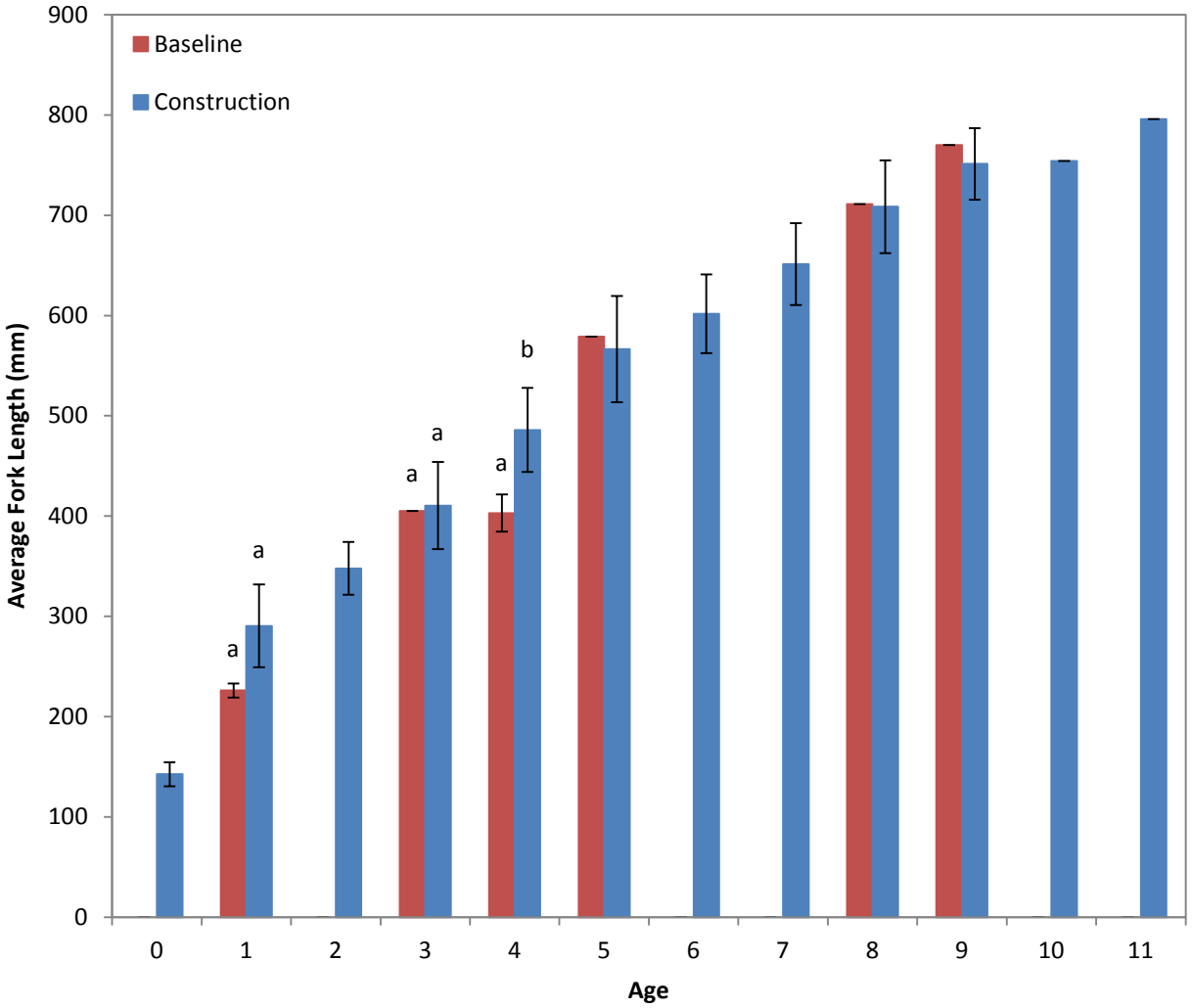


Figure 13: **Mean fork length-at-age for Lake Sturgeon captured Stephens Lake during baseline studies (red bars) and the construction period (blue bars). Letters denote significant differences between groups (Mann Whitney U test, $P < 0.05$). Error bars represent standard deviations.**

MAPS

KEEYASK

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

CREATED BY:
North/South Consultants

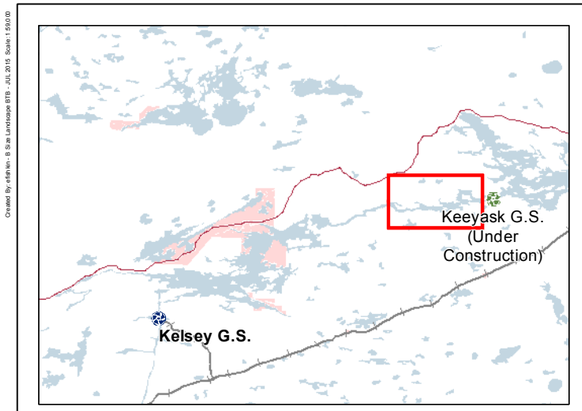
COORDINATE SYSTEM:	DATE CREATED:	REVISION DATE:
UTM NAD 1983 Z15N	09-FEB-15	02-JUN-16
0 6 12 Kilometres / 0 5 10 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

Legend

- Town
- Community
- Generating Station (Existing)
- Generating Station (Under Construction)
- Generating Station (Potential)
- Highway
- Rail
- First Nation Reserve

Keeyask Study Area

Map 1: Map of the Keeyask study area.



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	09-FEB-15	02-JUN-16
0 0.45 0.9 Kilometres 0 0.35 0.7 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

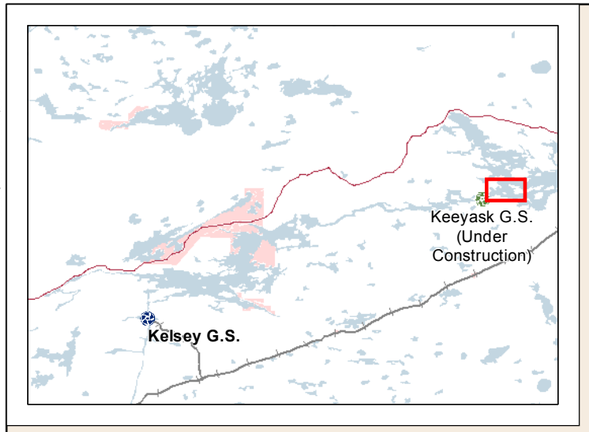
Legend

Stocking Site
- June 30, 2015
- September 16, 2015
- Generating Station (Existing)
- Generating Station (Under Construction)

- Zones
- Highway
- Rail
- First Nation Reserve

2015 Lake Sturgeon Stocking Sites
Gull Lake

Map 2: Locations where yearling sturgeon from the Grand Rapids Hatchery (Birthday Rapids progeny) were stocked in Gull Lake in 2015.



N

STEPHENS
LAKE

Site 1

Site 2

Site 3

Randy's
Island

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	09-FEB-15	02-JUN-16
0 0.45 0.9 Kilometres 0 0.35 0.7 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

Legend

Stocking Sites
- June 30, 2015
- September 14, 2015
- Generating Station (Existing)
- Generating Station (Under Construction)

Zones
Highway
Rail
First Nation Reserve

2015 Lake Sturgeon Stocking Sites
Stephens Lake

Map 3: Locations where yearling sturgeon from the Grand Rapids Hatchery (Birthday Rapids progeny) were stocked in Stephens Lake in 2015.

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

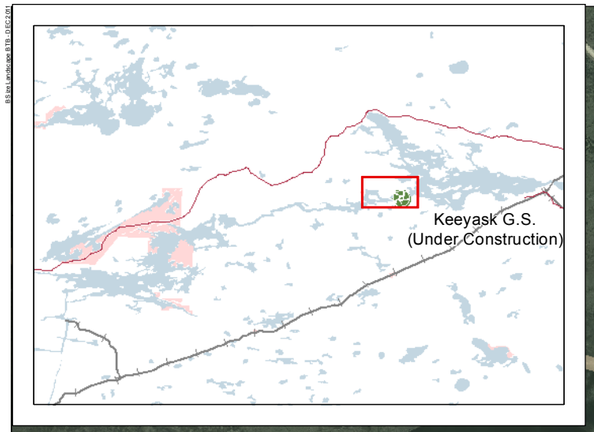
CREATED BY:
North/South Consultants

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

KEEYASK

Construction Site

Map 4: Map of instream structures at the Keeyask Generating Station site, June 2015.



KEEYASK

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

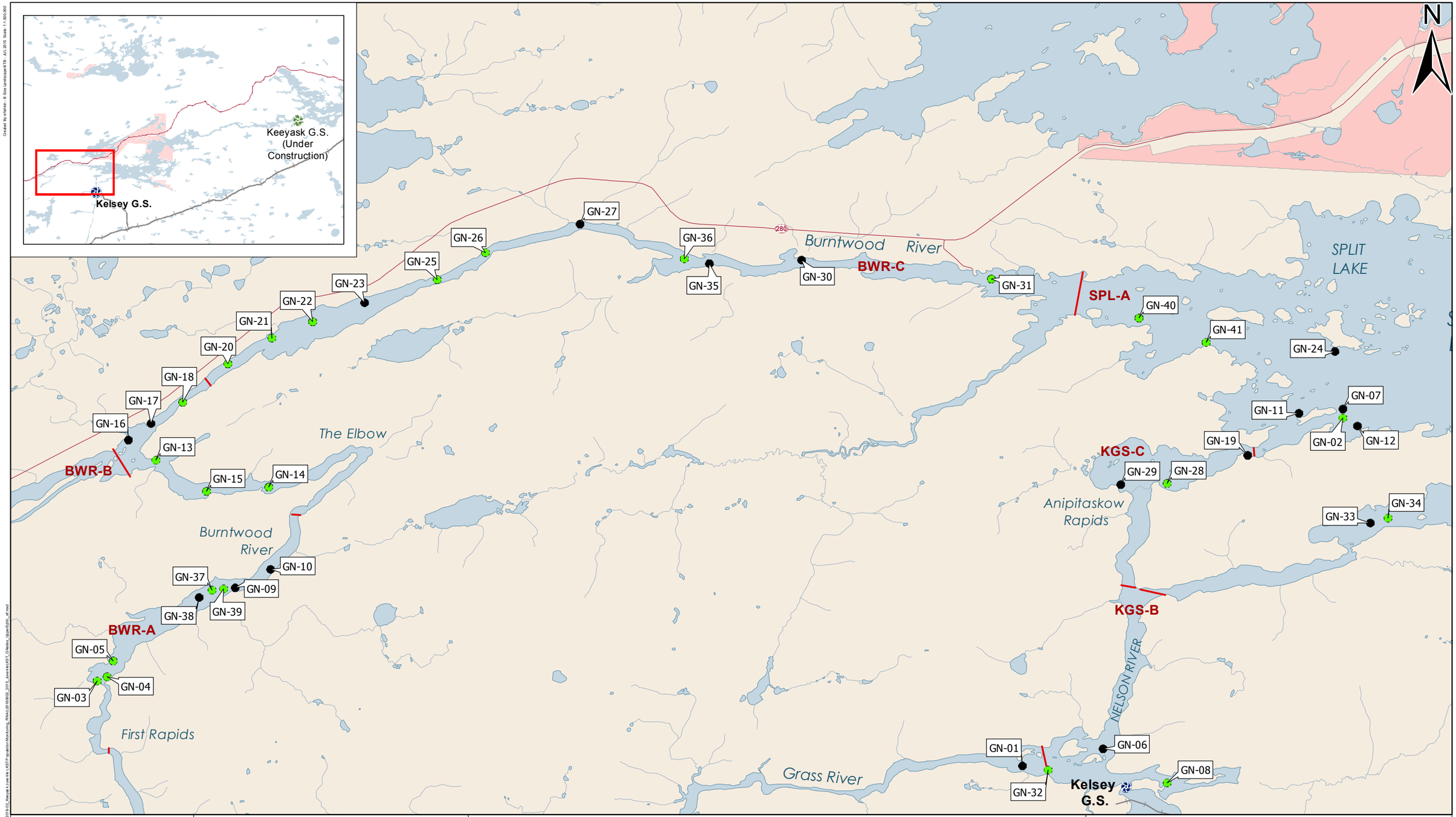
COORDINATE SYSTEM:	DATE CREATED:	REVISION DATE:
UTM NAD 1983 Z15N	22-MAY-15	06-JAN-16
0 0.4 0.8 Kilometres 0 0.3 0.6 Miles	VERSION NO: 1.0	QA/QC:

Legend

- Ice Boom
- Infrastructure

Keeyask G.S.
Ice Boom Locations

Map 5: Locations where ice booms were installed, July to August 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	09-FEB-15	09-JUN-16
0 0.4 0.8 Kilometres 0 0.35 0.7 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

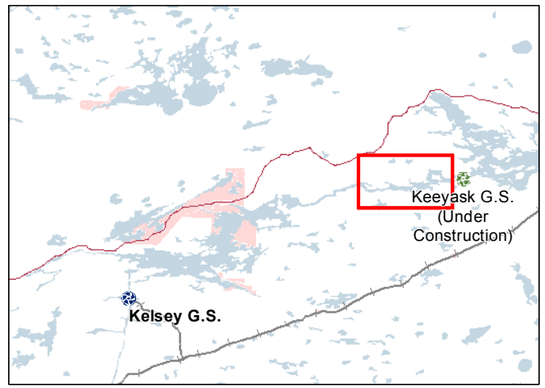
Legend

- Capture Site
- Non-capture Site
- Generating Station (Existing)
- Generating Station (Under Construction)
- Zones
- Highway
- Rail
- First Nation Reserve

2015 Juvenile Lake Sturgeon Gillnetting Sites

Upper Split Lake Area

Map 6: Sites fished with gillnets in the Upper Split Lake Area (Burntwood River, Kelsey GS Area, and Split Lake), fall 2015.



N

Effie Creek

Hidden Creek

Trickle Creek

Caribou Island

Portage Creek

Rabbit Creek

Seebeesis Creek

GL-A

GL-B

GL-C

BR-D

GN-01
GN-02
GN-03
GN-04
GN-05
GN-06
GN-07
GN-08
GN-09
GN-10
GN-11
GN-12
GN-13
GN-14
GN-15
GN-16
GN-17
GN-18
GN-19
GN-20
GN-21
GN-22
GN-23
GN-24
GN-25
GN-26
GN-27
GN-28
GN-29
GN-30
GN-31
GN-32
GN-33
GN-34

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

CREATED BY:
North/South Consultants

COORDINATE SYSTEM:
UTM NAD 1983 Z14N

DATE CREATED:
09-FEB-15

REVISION DATE:
03-JUN-16

0 0.45 0.9 Kilometres
0 0.35 0.7 Miles

VERSION NO:
1.0

QA/QC:
CMP/YYY/ZZZ

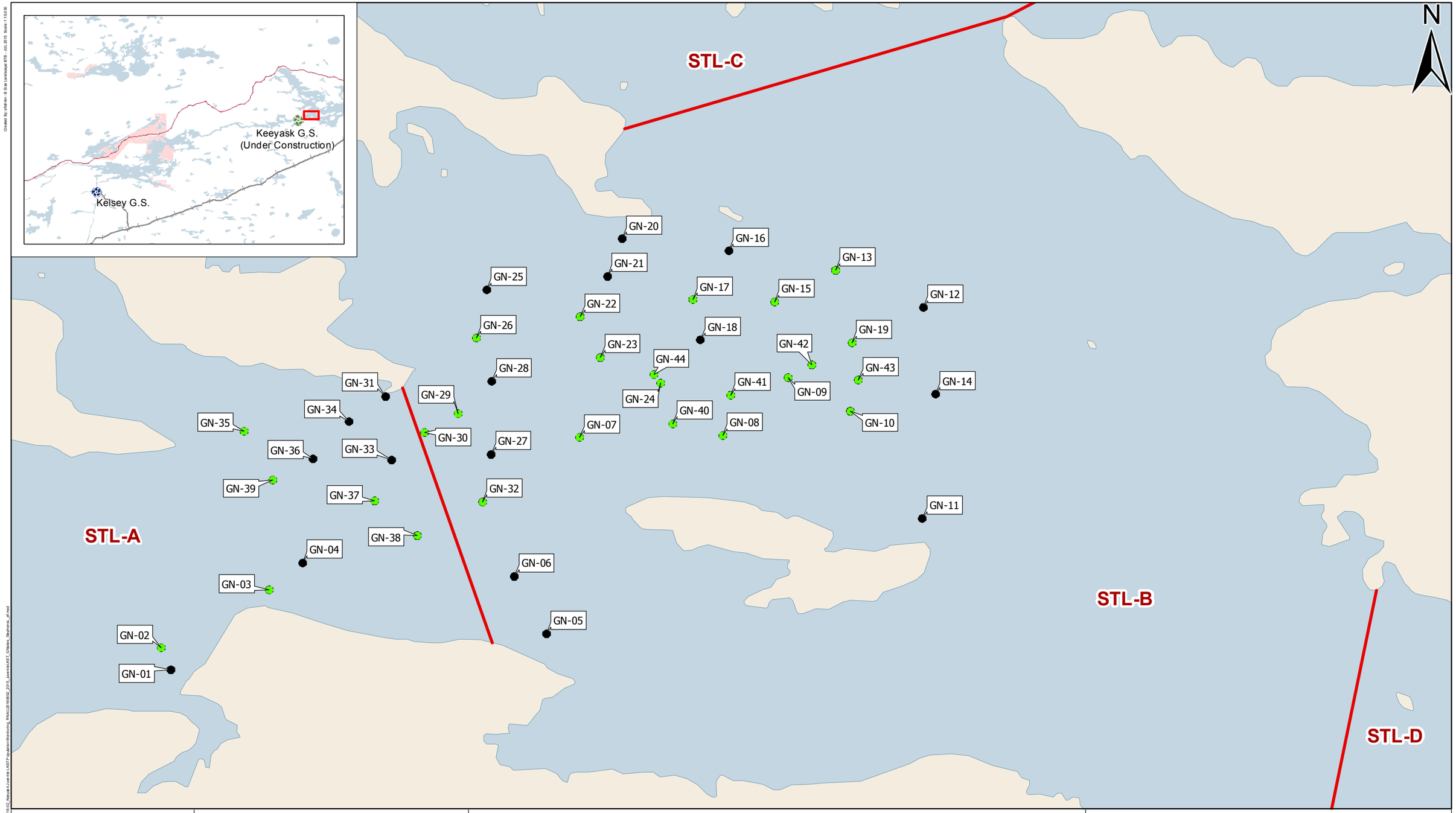
Legend

- Capture Site
- Non-capture Site
- Generating Station (Existing)
- Generating Station (Under Construction)
- Zones
- Highway
- First Nation Reserve

2015 Juvenile Lake Sturgeon Gillnetting Sites

Gull Lake

Map 7: Sites fished with gillnets in Gull Lake, fall 2015.



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	09-FEB-15	09-JUN-16
0 0.4 0.8 Kilometres 0 0.35 0.7 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

Legend

- Capture Site
- Non-capture Site
- Generating Station (Existing)
- Generating Station (Under Construction)
- Zones
- Highway
- Rail
- First Nation Reserve

2015 Juvenile Lake Sturgeon Gillnetting Sites

Stephens Lake

File Location: J:\MYFish_KEEYASK_AEMP\4_Fish\2015\MXD\NewAEMP2015\FG_Keeyask\Juvenile LKSTP-dgulation Monitoring_RNALG2015\MXD_2015_JuvenileLKSTGillnets_Stephens_all.mxd

Map 8: Sites fished with gillnets in Stephens Lake, fall 2015.

PHOTOS

Photo 1: **PIT tag is applied under the third dorsal scute using an injector needle dipped in Polysporin®.**

Photo 2: **PIT tag is injected into the muscle tissue, parallel to the horizontal axis of the fish.**

Photo 3: **Injection site following tag application.**

APPENDICES

APPENDIX 1:
LOCATION AND SITE SPECIFIC PHYSICAL MEASUREMENTS COLLECTED AT GILLNETTING SITES SET IN THE KEEYASK STUDY AREA

Table A1-1: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in the Upper Split Lake Area, fall 2015. Sites set in each region are indicated as follows Burntwood River (BWR), Kelsey GS Area (KGS), and Split Lake (SPL).

Site	UTM Location		Set Date & Time	Set Water Temp (°C)	Pull Date & Time	Pull Water Temp (°C)	Duration (dec.hrs)	Water Depth (m)	
	Easting	Northing						Start	End
GN-01 (SPL)	651045	6213574	2015/08/29 16:30	18.0	2015/08/30 13:55	17.0	21.42	20.0	11.0
GN-02 (KGS)	657504	6221943	2015/08/29 17:30	18.0	2015/08/31 08:30	-	39.00	14.0	14.0
GN-03 (BWR)	630286	6213670	2015/08/30 10:35	17.0	2015/09/01 09:10	17.0	46.58	7.8	8.9
GN-04 (BWR)	630502	6213782	2015/08/30 11:25	17.0	2015/09/01 10:30	17.0	47.08	9.2	11.4
GN-05 (BWR)	630608	6214147	2015/08/30 11:50	17.0	2015/09/01 13:25	17.0	49.58	9.2	11.0
GN-06 (SPL)	652810	6214110	2015/08/30 15:00	17.0	2015/08/31 13:30	-	22.50	14.0	20.0
GN-07 (KGS)	657491	6222147	2015/08/31 12:15	-	2015/09/02 08:30	-	20.25	12.0	11.0
GN-08 (SPL)	654309	6213470	2015/08/31 13:50	-	2015/09/01 17:00	17.0	27.17	14.0	13.0
GN-09 (BWR)	633180	6216011	2015/09/01 15:20	17.0	2015/09/02 12:48	-	21.47	14.0	16.0
GN-10 (BWR)	633926	6216484	2015/09/01 15:35	17.0	2015/09/02 13:30	-	21.92	13.0	13.0
GN-11 (KGS)	656517	6221969	2015/09/01 18:00	17.0	2015/09/02 15:30	-	21.50	7.8	10.0
GN-12 (KGS)	657845	6221796	2015/09/02 11:00	-	2015/09/03 13:00	-	26.00	13.0	14.0
GN-13 (BWR)	631170	6218706	2015/09/02 12:15	-	2015/09/03 08:40	-	20.42	10.0	18.0
GN-14 (BWR)	633729	6218322	2015/09/02 14:15	-	2015/09/03 09:40	-	19.42	10.0	8.9
GN-15 (BWR)	632350	6218098	2015/09/02 14:41	-	2015/09/03 10:51	-	20.17	8.1	8.9
GN-16 (BWR)	630522	6219099	2015/09/03 11:00	-	2015/09/04 09:20	-	22.33	7.5	6.2
GN-17 (BWR)	630985	6219506	2015/09/03 11:30	-	2015/09/04 10:05	-	22.58	3.7	2.5
GN-18 (BWR)	631655	6220049	2015/09/03 12:00	-	2015/09/04 11:48	-	23.80	7.2	9.7
GN-19 (SPL)	655463	6220922	2015/09/03 14:30	-	2015/09/04 14:30	-	24.00	5.9	7.7
GN-20 (BWR)	632583	6220981	2015/09/04 12:45	-	2015/09/05 08:30	-	19.75	7.7	7.1
GN-21 (BWR)	633512	6221646	2015/09/04 13:01	-	2015/09/05 09:10	-	20.15	7.8	6.9
GN-22 (BWR)	634390	6222082	2015/09/04 13:17	-	2015/09/05 09:50	-	20.55	10.0	11.0
GN-23 (BWR)	635512	6222608	2015/09/04 13:26	-	2015/09/05 11:00	-	21.57	9.0	9.4
GN-24 (KGS)	657203	6223412	2015/09/04 15:55	-	2015/09/05 13:45	-	21.83	2.8	3.7
GN-25 (BWR)	637073	6223264	2015/09/05 12:00	-	2015/09/08 09:45	-	69.75	11.3	11.7
GN-26 (BWR)	638100	6223964	2015/09/05 12:05	-	2015/09/08 10:50	-	70.75	13.1	15.9

Table A1-1: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in the Upper Split Lake Area, fall 2015. Sites set in each region are indicated as follows Burntwood River (BWR), Kelsey GS Area (KGS), and Split Lake (SPL) (continued).

Site	UTM Location		Set Date & Time	Set Water Temp (°C)	Pull Date & Time	Pull Water Temp (°C)	Duration (dec.hrs)	Water Depth (m)	
	Easting	Northing						Start	End
GN-27 (BWR)	640152	6224778	2015/09/05 12:16	-	2015/09/08 12:21	-	72.08	11.3	9.4
GN-28 (SPL)	653725	6220140	2015/09/05 14:23	-	2015/09/07 08:30	17.0	42.12	13.4	13.8
GN-29 (SPL)	652692	6220033	2015/09/07 09:33	17.0	2015/09/08 14:10	-	28.62	6.9	9.5
GN-30 (BWR)	645149	6224402	2015/09/08 13:30	-	2015/09/09 08:00	-	18.50	7.9	7.2
GN-31 (BWR)	649415	6224357	2015/09/08 13:45	-	2015/09/09 09:30	-	19.75	8.0	8.2
GN-32 (SPL)	651625	6213529	2015/10/02 15:46	12.0	2015/10/03 08:49	11.0	17.05	18.5	22.0
GN-33 (SPL)	658319	6219650	2015/10/02 16:25	12.0	2015/10/03 09:29	11.0	17.07	14.7	14.5
GN-34 (SPL)	658703	6219804	2015/10/02 16:32	12.0	2015/10/03 09:58	11.0	17.43	15.3	21.0
GN-35 (BWR)	643109	6224153	2015/10/02 17:29	12.0	2015/10/03 14:25	11.0	20.93	12.2	10.2
GN-36 (BWR)	642544	6224207	2015/10/02 17:39	12.0	2015/10/03 14:47	11.0	21.13	12.2	12.2
GN-37 (BWR)	632666	6215920	2015/10/03 13:29	11.0	2015/10/04 09:27	10.5	19.97	12.9	5.9
GN-38 (BWR)	632394	6215722	2015/10/03 13:37	11.0	2015/10/04 09:44	10.5	20.12	11.1	11.8
GN-39 (BWR)	632928	6215971	2015/10/03 13:44	11.0	2015/10/04 10:07	10.5	20.38	13.8	13.5
GN-40 (KGS)	652780	6223770	2015/10/03 15:54	11.0	2015/10/04 11:27	10.5	19.55	5.5	5.5
GN-41 (KGS)	654315	6223353	2015/10/03 16:07	11.0	2015/10/04 11:48	10.5	19.68	7.5	6.5

Table A1-2: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in Gull Lake, fall 2015.

Site	UTM Location		Set Date & Time	Set Water Temp (°C)	Pull Date & Time	Pull Water Temp (°C)	Duration (dec.hrs)	Water Depth (m)	
	Easting	Northing						Start	End
GN-1	347784	6243715	2015/09/11 09:40	15.0	2015/09/12 15:00	14.0	29:20	11.0	10.0
GN-2	345854	6244532	2015/09/11 09:55	15.0	2015/09/12 11:00	14.0	25:05	7.3	7.0
GN-3	345379	6243797	2015/09/11 10:10	15.0	2015/09/12 10:18	14.0	24:08	9.2	8.5
GN-4	338292	6245155	2015/09/11 11:20	15.0	2015/09/12 09:30	14.0	22:10	9.5	10.0
GN-5	338301	6245177	2015/09/12 09:50	14.0	2015/09/13 09:23	14.0	23:33	10.0	3.4
GN-6	346560	6243864	2015/09/12 10:52	14.0	2015/09/13 10:25	14.0	23:33	8.0	8.2
GN-7	346647	6244763	2015/09/12 11:50	14.0	2015/09/13 11:30	14.0	23:40	9.5	8.6
GN-8	347442	6243682	2015/09/12 15:40	14.0	2015/09/13 12:30	14.0	20:50	7.3	8.8
GN-9	338350	6245095	2015/09/13 10:05	14.0	2015/09/14 09:10	14.0	23:05	10.0	4.3
GN-10	348478	6244340	2015/09/13 11:15	14.0	2015/09/14 10:00	14.0	22:45	11.0	13.0
GN-11	349668	6243677	2015/09/13 12:00	14.0	2015/09/14 11:09	14.0	23:09	7.9	10.0
GN-12	352250	6243298	2015/09/13 13:27	14.0	2015/09/14 12:40	14.0	23:13	11.0	9.5
GN-13	338394	6245069	2015/09/14 09:35	14.0	2015/09/15 09:36	13.5	24:01	11.0	10.0
GN-14	348558	6244348	2015/09/14 11:00	14.0	2015/09/15 10:45	13.5	23:45	13.0	12.0
GN-15	353295	6244234	2015/09/14 11:55	14.0	2015/09/15 12:30	13.5	24:35	10.0	10.0
GN-16	352549	6245071	2015/09/14 13:08	14.0	2015/09/15 13:06	13.5	23:58	7.4	6.2
GN-17	348537	6244326	2015/09/15 10:39	13.5	2015/09/16 09:00	12.0	22:21	13.0	12.0
GN-18	354164	6244475	2015/09/15 12:22	13.5	2015/09/16 09:30	12.0	21:08	15.0	15.0
GN-19	353482	6244299	2015/09/15 13:00	13.5	2015/09/17 12:24	12.0	47:24	10.0	11.0
GN-20	354664	6244449	2015/09/15 13:45	13.5	2015/09/16 11:00	12.0	21:15	12.0	12.0
GN-21	355285	6246689	2015/09/16 14:40	12.0	2015/09/17 10:47	12.0	20:07	11.0	12.0
GN-22	355189	6247074	2015/09/16 15:00	12.0	2015/09/17 09:56	12.0	18:56	11.0	10.0
GN-23	355997	6247870	2015/09/16 17:30	12.0	2015/09/17 08:55	12.0	15:25	9.5	10.4
GN-24	356188	6248051	2015/09/17 09:45	12.0	2015/09/18 11:35	11.0	25:50	12.0	11.0
GN-25	355196	6247054	2015/09/17 10:45	12.0	2015/09/18 10:50	11.0	24:05	12.0	9.0
GN-26	354616	6244887	2015/09/17 11:50	12.0	2015/09/18 08:55	11.0	21:05	15.0	17.0
GN-27	354345	6244473	2015/09/17 13:13	12.0	2015/09/18 09:50	11.0	20:37	13.0	14.0

Table A1-2: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in Gull Lake, fall 2015 (continued).

Site	UTM Location		Set Date & Time	Set Water Temp (°C)	Pull Date & Time	Pull Water Temp (°C)	Duration (dec.hrs)	Water Depth (m)	
	Easting	Northing						Start	End
GN-28	354467	6244836	2015/09/18 09:43	11.0	2015/09/19 10:35	11.0	24:52	12.0	12.0
GN-29	355294	6246889	2015/09/18 10:40	11.0	2015/09/19 09:54	11.0	23:14	9.0	11.0
GN-30	356839	6248206	2015/09/18 11:30	11.0	2015/09/19 08:38	11.0	21:08	15.0	12.0
GN-31	355989	6247929	2015/09/18 12:15	11.0	2015/09/19 09:07	11.0	20:52	9.0	11.0
GN-32	356494	6248208	2015/09/19 09:45	11.0	2015/09/20 10:10	12.0	24:25	11.0	12.5
GN-33	355526	6247244	2015/09/19 10:30	11.0	2015/09/20 09:30	12.0	23:00	8.0	8.0
GN-34	354406	6244770	2015/09/19 11:17	11.0	2015/09/20 08:43	12.0	21:26	12.0	11.0

Table A1-3: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in Stephens Lake, fall 2015.

Site	UTM Location		Set Date & Time	Set Water Temp (°C)	Pull Date & Time	Pull Water Temp (°C)	Duration (dec.hrs)	Water Depth (m)	
	Easting	Northing						Start	End
GN-01	366685	6247254	2015/09/23 08:27	11.5	2015/09/24 08:28	11.0	24.02	12.6	17.6
GN-02	366644	6247346	2015/09/23 08:46	11.5	2015/09/24 09:11	11.0	24.42	18.1	15.5
GN-03	367092	6247589	2015/09/23 09:03	11.5	2015/09/24 11:27	11.0	26.40	14.2	14.7
GN-04	367232	6247701	2015/09/23 09:32	11.5	2015/09/24 12:25	11.0	26.88	15.4	18.1
GN-05	368248	6247405	2015/09/24 10:18	11.0	2015/09/25 08:40	11.0	22.37	15.6	17.8
GN-06	368115	6247644	2015/09/24 10:31	11.0	2015/09/25 09:02	11.0	22.52	15.9	14.8
GN-07	368387	6248222	2015/09/24 11:17	11.0	2015/09/25 09:59	11.0	22.70	14.5	15.1
GN-08	368982	6248231	2015/09/24 12:50	11.0	2015/09/25 10:12	11.0	21.37	13.2	14.1
GN-09	369256	6248473	2015/09/24 13:09	11.0	2015/09/25 12:25	11.0	23.27	15.8	16.1
GN-10	369513	6248332	2015/09/25 09:41	11.0	2015/09/26 08:35	12.0	22.90	15.4	16.4
GN-11	369815	6247885	2015/09/25 09:51	11.0	2015/09/26 09:00	12.0	23.15	13.6	18.0
GN-12	369818	6248765	2015/09/25 12:09	11.0	2015/09/26 09:55	12.0	21.77	16.8	15.2
GN-13	369453	6248919	2015/09/25 12:15	11.0	2015/09/26 10:23	12.0	22.13	14.8	16.9
GN-14	369870	6248403	2015/09/25 13:55	11.0	2015/09/26 11:10	12.0	21.25	18.6	19.3
GN-15	369198	6248788	2015/09/26 09:38	12.0	2015/09/27 08:19	11.5	22.68	15.6	17.2
GN-16	369008	6249000	2015/09/26 09:47	12.0	2015/09/27 08:43	11.5	22.93	18.8	14.3
GN-17	368858	6248796	2015/09/26 10:50	12.0	2015/09/27 09:20	11.5	22.50	15.8	15.9
GN-18	368890	6248629	2015/09/26 10:56	12.0	2015/09/27 09:51	11.5	22.92	17.9	17.1
GN-19	369521	6248617	2015/09/26 11:40	12.0	2015/09/27 10:48	11.5	23.13	13.9	19.5
GN-20	368563	6249051	2015/09/27 09:08	11.5	2015/09/28 08:35	11.0	23.45	12.3	11.2
GN-21	368502	6248895	2015/09/27 09:14	11.5	2015/09/28 08:55	11.0	23.68	14.2	14.0
GN-22	368389	6248725	2015/09/27 10:12	11.5	2015/09/28 09:31	11.0	23.32	15.5	17.4
GN-23	368473	6248557	2015/09/27 10:16	11.5	2015/09/28 09:57	11.0	23.68	14.3	14.3
GN-24	368724	6248450	2015/09/27 11:12	11.5	2015/09/28 10:57	11.0	23.75	13.6	16.1
GN-25	367999	6248838	2015/09/28 09:15	11.0	2015/09/29 08:34	10.5	23.32	15.9	14.3
GN-26	367957	6248636	2015/09/28 09:22	11.0	2015/09/29 09:18	10.5	23.93	15.2	16.6
GN-27	368018	6248153	2015/09/28 10:27	11.0	2015/09/29 10:36	10.5	24.15	16.1	16.5
GN-28	368021	6248457	2015/09/28 10:32	11.0	2015/09/29 12:23	10.5	25.85	16.4	13.4

Table A1-3: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in Stephens Lake, fall 2015 (continued).

Site	UTM Location		Set Date & Time	Set Water Temp (°C)	Pull Date & Time	Pull Water Temp (°C)	Duration (dec.hrs)	Water Depth (m)	
	Easting	Northing						Start	End
GN-29	367881	6248322	2015/09/28 11:51	11.0	2015/09/29 12:39	10.5	24.80	14.7	17.0
GN-30	367740	6248243	2015/09/29 09:53	10.5	2015/09/30 09:29	10.0	23.60	15.1	14.6
GN-31	367577	6248393	2015/09/29 09:59	10.5	2015/09/30 09:55	10.0	23.93	14.1	14.0
GN-32	367982	6247955	2015/09/29 12:17	10.5	2015/09/30 11:47	10.0	23.50	16.4	16.0
GN-33	367604	6248130	2015/09/29 15:26	10.5	2015/09/30 12:08	10.0	20.70	15.0	15.5
GN-34	367425	6248289	2015/09/29 15:32	10.5	2015/09/30 13:35	10.0	22.05	13.8	13.6
GN-35	366988	6248249	2015/09/30 11:29	10.0	2015/10/01 08:34	10.0	21.08	13.9	13.7
GN-36	367277	6248134	2015/09/30 11:37	10.0	2015/10/01 09:07	10.0	21.50	14.8	13.7
GN-37	367533	6247960	2015/09/30 13:22	10.0	2015/10/01 10:23	10.0	21.02	14.2	14.0
GN-38	367710	6247813	2015/09/30 13:25	10.0	2015/10/01 10:59	10.0	21.57	15.4	14.9
GN-39	367109	6248044	2015/09/30 14:00	10.0	2015/10/01 11:56	10.0	21.93	14.0	13.6
GN-40	368774	6248280	2015/10/01 10:05	10.0	2015/10/02 08:08	10.0	22.05	12.6	13.2
GN-41	369015	6248399	2015/10/01 10:10	10.0	2015/10/02 08:38	10.0	22.47	16.3	14.5
GN-42	369354	6248526	2015/10/01 11:39	10.0	2015/10/02 09:06	10.0	21.45	15.9	16.9
GN-43	369548	6248461	2015/10/01 11:43	10.0	2015/10/02 09:37	10.0	21.90	17.8	19.8
GN-44	368695	6248486	2015/10/01 12:37	10.0	2015/10/02 10:14	10.0	21.62	14.7	18.6

APPENDIX 2: BIOLOGICAL AND TAG INFORMATION FOR LAKE STURGEON CAPTURED IN THE KEEYASK STUDY AREA

Table A2-1: Biological and tag information for Lake Sturgeon captured in the Upper Split Lake Area (Burntood River, Kelsey GS Area, and Split Lake), fall 2015.

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Burntwood River	GN-03	BWR-A	01/09/2015	56598	900 226000703409	615	700	1500	12
Burntwood River	GN-04	BWR-A	01/09/2015	75455	900 226000548334	860	960	4100	-
Burntwood River	GN-04	BWR-A	01/09/2015	56597	900 226000703418	680	780	2000	11
Burntwood River	GN-05	BWR-A	01/09/2015	91187	900 226000548827	640	705	1600	14
Burntwood River	GN-05	BWR-A	01/09/2015	56596	900 226000703423	575	640	1150	9
Burntwood River	GN-13	BWR-B	03/09/2015	56594	900 226000548717	285	325	130	2
Burntwood River	GN-13	BWR-B	03/09/2015	56593	900 226000548540	408	468	351	-
Burntwood River	GN-14	BWR-B	03/09/2015	65692	900 226000703439	380	439	350	4
Burntwood River	GN-14	BWR-B	03/09/2015	65691	900 226000548812	500	565	800	9
Burntwood River	GN-14	BWR-B	03/09/2015	65690	900 226000630330	540	605	1000	9
Burntwood River	GN-15	BWR-B	03/09/2015	65689	900 226000703450	400	445	300	4
Burntwood River	GN-15	BWR-B	03/09/2015	65688	900 226000629369	580	655	1150	8
Burntwood River	GN-18	BWR-B	04/09/2015	56587	900 226000548991	350	400	274	3
Burntwood River	GN-20	BWR-C	05/09/2015	56586	900 226000703494	860	970	6577	2
Burntwood River	GN-21	BWR-C	05/09/2015	56585	900 043000103782	285	325	149	-
Burntwood River	GN-22	BWR-C	05/09/2015	56584	900 226000548673	365	410	272	3
Burntwood River	GN-22	BWR-C	05/09/2015	56583	900 226000703441	480	545	650	7
Burntwood River	GN-22	BWR-C	05/09/2015	56582	900 226000577053	505	565	700	10
Burntwood River	GN-25	BWR-C	08/09/2015	105030	900 043000103754	345	390	276	-
Burntwood River	GN-25	BWR-C	08/09/2015	105031	900 226000703490	555	620	1150	-
Burntwood River	GN-26	BWR-C	08/09/2015	-	-	405	461	394	4
Burntwood River	GN-31	BWR-C	09/09/2015	105033	900 226000703412	305	350	208	3
Burntwood River	GN-31	BWR-C	09/09/2015	105032	900 226000703414	340	395	261	3
Burntwood River	GN-36	BWR-C	03/10/2015	106954	900 043000103462	285	316	250	2
Burntwood River	GN-37	BWR-A	04/10/2015	106956	900 226000628054	475	522	1100	7
Burntwood River	GN-39	BWR-A	04/10/2015	106957	900 226000628137	424	471	450	4
Burntwood River	GN-39	BWR-A	04/10/2015	106958	900 226000577121	372	405	250	4
Burntwood River	GN-39	BWR-A	04/10/2015	106959	1380348333	291	313	200	2

Table A2-1: Biological and tag information for Lake Sturgeon captured in the Upper Split Lake Area (Burntood River, Kelsey GS Area, and Split Lake), fall 2015 (continued).

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Kelsey GS Area	GN-08	KGS-B	01/09/2015	56595	900 226000703429	500	560	800	4
Kelsey GS Area	GN-28	KGS-C	07/09/2015	105027	900 226000703474	630	705	1900	12
Kelsey GS Area	GN-28	KGS-C	07/09/2015	105028	900 226000703431	710	805	2650	-
Kelsey GS Area	GN-28	KGS-C	07/09/2015	105029	900 226000703475	585	675	1500	5
Kelsey GS Area	GN-32	KGS-D	03/10/2015	106951	900 226000703471	575	633	1350	4
Kelsey GS Area	GN-34	KGS-D	03/10/2015	106952	900 226000628256	495	545	1950	4
Kelsey GS Area	GN-34	KGS-D	03/10/2015	106953	900 226000628004	561	619	1475	5
Split Lake	GN-02	SPL-A	31/08/2015	56600	1380348271	320	355	201	2
Split Lake	GN-02	SPL-A	31/08/2015	56599	900 226000703432	710	800	2450	-
Split Lake	GN-02	SPL-A	31/08/2015	-	-	295	330	168	2
Split Lake	GN-02	SPL-A	31/08/2015	-	-	300	335	180	-
Split Lake	GN-40	SPL-A	04/10/2015	106960	1380348251	309	349	250	2
Split Lake	GN-40	SPL-A	04/10/2015	106961	900 043000103473	278	314	150	2
Split Lake	GN-40	SPL-A	04/10/2015	106962	900 226000628452	358	397	300	4
Split Lake	GN-41	SPL-A	04/10/2015	106963	1380344001	210	235	100	1
Split Lake	GN-41	SPL-A	04/10/2015	106964	900 226000703485	533	593	1050	7

Table A2-2: Biological and tag information for Lake Sturgeon captured in Gull Lake, fall 2015.

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Gull Lake	GN-4	BR-D	12/09/2015	105034	900 226000703466	639	730	1900	7
Gull Lake	GN-4	BR-D	12/09/2015	82831	900 226000629451	624	725	2100	8
Gull Lake	GN-1	GL-A	12/09/2015	105035	900 226000703408	647	734	2040	7
Gull Lake	GN-6	GL-A	13/09/2015	105036	900 226000548592	688	762	2480	9
Gull Lake	GN-6	GL-A	13/09/2015	105050	900 226000628560	819	905	3629	-
Gull Lake	GN-10	GL-A	14/09/2015	105049	900 226000548799	330	381	241	2
Gull Lake	GN-10	GL-A	14/09/2015	105048	900 226000548903	908	1043	5443	-
Gull Lake	GN-10	GL-A	14/09/2015	105047	900 226000703437	636	727	1920	7
Gull Lake	GN-10	GL-A	14/09/2015	105046	900 226000548737	565	658	1340	7
Gull Lake	GN-10	GL-A	14/09/2015	89988	900 226000629293	559	640	1260	7
Gull Lake	GN-10	GL-A	14/09/2015	105045	900 226000703486	652	746	1780	7
Gull Lake	GN-11	GL-A	14/09/2015	105044	900 226000548985	610	690	1480	7
Gull Lake	GN-14	GL-A	15/09/2015	105043	900 226000703472	658	746	2280	8
Gull Lake	GN-14	GL-A	15/09/2015	105042	900 226000703401	544	624	1160	7
Gull Lake	GN-14	GL-A	15/09/2015	105041	900 043000119437	330	370	225	2
Gull Lake	GN-15	GL-B	15/09/2015	105038	900 226000703415	597	685	1860	7
Gull Lake	GN-15	GL-B	15/09/2015	89819	900 226000703442	658	754	2260	7
Gull Lake	GN-15	GL-B	15/09/2015	105037	900 226000120174	589	666	1520	7
Gull Lake	GN-17	GL-B	16/09/2015	90321	900 226000703459	630	718	2060	7
Gull Lake	GN-18	GL-B	16/09/2015	-	900 226000703465	641	740	1820	7
Gull Lake	GN-18	GL-B	16/09/2015	82841	900 226000629380	594	661	1580	7
Gull Lake	GN-18	GL-B	16/09/2015	90320	900 226000703461	575	676	1460	7
Gull Lake	GN-18	GL-B	16/09/2015	90319	900 226000577044	481	543	940	4
Gull Lake	GN-18	GL-B	16/09/2015	90318	900 226000629346	360	412	308	3
Gull Lake	GN-18	GL-B	16/09/2015	90317	900 226000703444	320	365	213	2

Table A2-2: Biological and tag information for Lake Sturgeon captured in Gull Lake, fall 2015 (continued).

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Gull Lake	GN-18	GL-B	16/09/2015	-	-	105	109	11	-
Gull Lake	GN-20	GL-B	16/09/2015	94112	900 226000703464	820	916	4082	-
Gull Lake	GN-20	GL-B	16/09/2015	90316	900 226000703468	770	865	3629	9
Gull Lake	GN-20	GL-B	16/09/2015	90315	900 226000703484	842	968	5443	-
Gull Lake	GN-20	GL-B	16/09/2015	90310	900 226000703434	542	610	1200	7
Gull Lake	GN-20	GL-B	16/09/2015	90309	900 226000703436	500	569	1340	7
Gull Lake	GN-20	GL-B	16/09/2015	90305	900 226000703421	545	617	1480	7
Gull Lake	GN-20	GL-B	16/09/2015	90304	900 043000103649	310	353	197	2
Gull Lake	GN-20	GL-B	16/09/2015	90307	900 226000703477	745	860	3629	10
Gull Lake	GN-20	GL-B	16/09/2015	90311	900 226000703488	664	750	2260	7
Gull Lake	GN-20	GL-B	16/09/2015	90312	900 226000628161	596	665	1540	7
Gull Lake	GN-20	GL-B	16/09/2015	97347	900 226000703451	560	640	1360	7
Gull Lake	GN-20	GL-B	16/09/2015	97346	900 226000629740	652	730	2080	7
Gull Lake	GN-20	GL-B	16/09/2015	97345	900 226000577047	688	742	2220	9
Gull Lake	GN-20	GL-B	16/09/2015	97344	900 226000703420	620	705	1560	7
Gull Lake	GN-20	GL-B	16/09/2015	97343	900 226000703458	705	798	2680	11
Gull Lake	GN-20	GL-B	16/09/2015	97342	900 226000703447	638	728	1900	7
Gull Lake	GN-20	GL-B	16/09/2015	97341	900 226000703446	590	672	1400	7
Gull Lake	GN-20	GL-B	16/09/2015	97340	900 226000703480	538	605	1000	6
Gull Lake	GN-20	GL-B	16/09/2015	97339	900 226000628657	597	680	1860	9
Gull Lake	GN-20	GL-B	16/09/2015	97338	900 226000703405	591	680	1540	7
Gull Lake	GN-20	GL-B	16/09/2015	97337	900 226000703467	539	600	1360	7
Gull Lake	GN-20	GL-B	16/09/2015	97336	900 226000703492	553	628	1340	7
Gull Lake	GN-20	GL-B	16/09/2015	97335	900 226000577464	712	807	2840	9
Gull Lake	GN-20	GL-B	16/09/2015	97334	900 226000548842	734	828	3180	10

Table A2-2: Biological and tag information for Lake Sturgeon captured in Gull Lake, fall 2015 (continued).

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Gull Lake	GN-20	GL-B	16/09/2015	105103	900 043000103825	640	723	1900	8
Gull Lake	GN-20	GL-B	16/09/2015	97333	900 226000703473	648	757	2300	7
Gull Lake	GN-20	GL-B	16/09/2015	97332	900 226000548854	569	649	1568	7
Gull Lake	GN-20	GL-B	16/09/2015	97331	900 226000703462	558	656	1440	7
Gull Lake	GN-20	GL-B	16/09/2015	97330	900 226000703476	614	690	1680	7
Gull Lake	GN-20	GL-B	16/09/2015	97329	900 226000703478	524	602	1060	7
Gull Lake	GN-20	GL-B	16/09/2015	97328	900 226000548878	596	673	1580	7
Gull Lake	GN-20	GL-B	16/09/2015	97327	900 226000703411	456	528	860	5
Gull Lake	GN-20	GL-B	16/09/2015	97326	900 226000629662	625	710	2020	9
Gull Lake	GN-20	GL-B	16/09/2015	96524	900 226000703449	633	716	1840	8
Gull Lake	GN-20	GL-B	16/09/2015	96523	900 226000548992	671	760	1920	7
Gull Lake	GN-20	GL-B	16/09/2015	96522	900 226000548526	615	668	1920	7
Gull Lake	GN-20	GL-B	16/09/2015	96521	900 226000703413	570	650	1280	8
Gull Lake	GN-20	GL-B	16/09/2015	96520	900 226000703425	558	652	1280	7
Gull Lake	GN-20	GL-B	16/09/2015	96519	900 226000703403	596	675	1720	7
Gull Lake	GN-20	GL-B	16/09/2015	96518	900 226000577165	617	715	1760	7
Gull Lake	GN-20	GL-B	16/09/2015	96517	900 226000630415	565	648	1460	7
Gull Lake	GN-20	GL-B	16/09/2015	96516	900 226000703482	550	628	1220	8
Gull Lake	GN-20	GL-B	16/09/2015	96515	900 226000120160	595	679	1320	9
Gull Lake	GN-20	GL-B	16/09/2015	96514	900 226000577482	530	612	1080	7
Gull Lake	GN-23	GL-C	17/09/2015	-	1380347899	224	252	79	-
Gull Lake	GN-23	GL-C	17/09/2015	-	900 043000103490	200	231	45	1
Gull Lake	GN-23	GL-C	17/09/2015	96513	900 043000103672	382	435	363	3
Gull Lake	GN-23	GL-C	17/09/2015	91396	900 226000629034	870	980	5443	-
Gull Lake	GN-23	GL-C	17/09/2015	-	-	106	115	11	-

Table A2-2: Biological and tag information for Lake Sturgeon captured in Gull Lake, fall 2015 (continued).

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Gull Lake	GN-23	GL-C	17/09/2015	-	-	110	125	-	-
Gull Lake	GN-22	GL-C	17/09/2015	96512	900 226000629481	634	714	1920	7
Gull Lake	GN-22	GL-C	17/09/2015	96511	900 226000703469	314	362	400	2
Gull Lake	GN-22	GL-C	17/09/2015	96510	900 226000703497	575	642	1560	7
Gull Lake	GN-22	GL-C	17/09/2015	96509	900 226000703400	644	728	2280	7
Gull Lake	GN-22	GL-C	17/09/2015	-	-	101	109	-	-
Gull Lake	GN-21	GL-C	17/09/2015	96508	900 226000703479	648	747	2480	7
Gull Lake	GN-21	GL-C	17/09/2015	-	1380344836	290	344	-	2
Gull Lake	GN-19	GL-B	17/09/2015	96507	900 226000628201	600	675	1300	7
Gull Lake	GN-19	GL-B	17/09/2015	-	1380348328	260	295	150	-
Gull Lake	GN-19	GL-B	17/09/2015	96506	900 226000703495	681	780	2350	8
Gull Lake	GN-19	GL-B	17/09/2015	96505	900 226000548943	635	706	1700	7
Gull Lake	GN-19	GL-B	17/09/2015	105480	900 226000629277	885	1001	4990	-
Gull Lake	GN-19	GL-B	17/09/2015	105104	900 043000103894	660	731	1800	7
Gull Lake	GN-19	GL-B	17/09/2015	96504	900 226000703430	649	732	1900	7
Gull Lake	GN-26	GL-B	18/09/2015	79300	900 226000703452	476	548	650	4
Gull Lake	GN-26	GL-B	18/09/2015	79299	900 226000703407	367	429	278	3
Gull Lake	GN-26	GL-B	18/09/2015	79298	900 226000703487	615	706	1800	7
Gull Lake	GN-26	GL-B	18/09/2015	103463	900 226000629452	446	512	539	3
Gull Lake	GN-26	GL-B	18/09/2015	79297	900 067000058628	319	373	175	2
Gull Lake	GN-26	GL-B	18/09/2015	79296	900 226000629487	539	620	1200	7
Gull Lake	GN-26	GL-B	18/09/2015	79295	900 226000703453	775	875	3500	9
Gull Lake	GN-26	GL-B	18/09/2015	79294	900 226000548835	553	624	1300	8
Gull Lake	GN-27	GL-B	18/09/2015	105691	900 043000103824	574	661	1100	7
Gull Lake	GN-27	GL-B	18/09/2015	79293	900 226000703443	354	398	267	2

Table A2-2: Biological and tag information for Lake Sturgeon captured in Gull Lake, fall 2015 (continued).

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Gull Lake	GN-27	GL-B	18/09/2015	79292	900 226000703435	535	609	1100	7
Gull Lake	GN-27	GL-B	18/09/2015	79291	900 226000703404	562	642	1200	7
Gull Lake	GN-25	GL-C	18/09/2015	75321	900 226000629248	880	960	7257	-
Gull Lake	GN-25	GL-C	18/09/2015	-	-	130	145	12	-
Gull Lake	GN-25	GL-C	18/09/2015	100475	900 226000548726	585	675	1500	7
Gull Lake	GN-25	GL-C	18/09/2015	-	1380348267	236	268	73	1
Gull Lake	GN-24	GL-C	18/09/2015	79290	900 226000628520	578	658	1400	7
Gull Lake	GN-24	GL-C	18/09/2015	79289	900 226000630441	418	472	450	3
Gull Lake	GN-30	GL-C	19/09/2015	79288	900 226000120180	337	380	237	2
Gull Lake	GN-30	GL-C	19/09/2015	79287	900 226000628578	360	402	311	2
Gull Lake	GN-30	GL-C	19/09/2015	78286	900 226000548686	601	680	1800	7
Gull Lake	GN-31	GL-C	19/09/2015	79285	900 226000548874	385	440	424	3
Gull Lake	GN-31	GL-C	19/09/2015	101976	900 226000703499	458	523	650	3
Gull Lake	GN-31	GL-C	19/09/2015	-	900 067000055784	280	322	-	1
Gull Lake	GN-31	GL-C	19/09/2015	-	1380343890	235	268	-	-
Gull Lake	GN-31	GL-C	19/09/2015	-	1380344175	197	227	-	-
Gull Lake	GN-29	GL-C	19/09/2015	-	1380348288	220	252	66	1
Gull Lake	GN-29	GL-C	19/09/2015	101977	900 226000703438	646	728	2100	7
Gull Lake	GN-29	GL-C	19/09/2015	101978	900 226000703445	342	392	273	2
Gull Lake	GN-28	GL-B	19/09/2015	105689	900 043000103841	578	641	1300	7
Gull Lake	GN-28	GL-B	19/09/2015	93852	900 226000703470	604	690	1450	7
Gull Lake	GN-28	GL-B	19/09/2015	93855	900 226000548578	632	698	1600	7
Gull Lake	GN-28	GL-B	19/09/2015	101979	900 226000703427	569	650	1400	7
Gull Lake	GN-28	GL-B	19/09/2015	101980	900 226000548927	525	602	1100	7
Gull Lake	GN-28	GL-B	19/09/2015	101981	900 226000629280	561	651	1350	7

Table A2-2: Biological and tag information for Lake Sturgeon captured in Gull Lake, fall 2015 (continued).

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Gull Lake	GN-28	GL-B	19/09/2015	101982	900 226000703489	505	570	1000	7
Gull Lake	GN-28	GL-B	19/09/2015	94883	900 226000548690	608	682	1600	7
Gull Lake	GN-28	GL-B	19/09/2015	101983	900 226000628580	570	640	1300	7
Gull Lake	GN-34	GL-B	20/09/2015	101984	900 226000628636	320	368	197	2
Gull Lake	GN-34	GL-B	20/09/2015	105114	900 043000103835	691	797	2300	9
Gull Lake	GN-34	GL-B	20/09/2015	101985	900 226000703455	610	692	1500	7
Gull Lake	GN-34	GL-B	20/09/2015	-	-	339	390	239	2
Gull Lake	GN-34	GL-B	20/09/2015	101986	900 226000703424	680	774	2300	10
Gull Lake	GN-34	GL-B	20/09/2015	101987	900 226000703483	595	690	1650	7
Gull Lake	GN-34	GL-B	20/09/2015	101988	900 226000703417	630	712	1800	7
Gull Lake	GN-34	GL-B	20/09/2015	101989	900 226000703491	582	670	1500	7
Gull Lake	GN-33	GL-C	20/09/2015	-	-	129	146	14	-
Gull Lake	GN-33	GL-C	20/09/2015	-	-	112	130	13	-
Gull Lake	GN-32	GL-C	20/09/2015	-	1380347889	218	249	79	1

Table A2-3: Biological and tag information for Lake Sturgeon captured in Stephens Lake, fall 2015.

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Stephens Lake	GN-02	STL-A	24/09/2015	100142	1380348307	637	694	1950	7
Stephens Lake	GN-02	STL-A	24/09/2015	91174	900 226000703433	674	732	2250	-
Stephens Lake	GN-02	STL-A	24/09/2015	-	-	139	152	36	0
Stephens Lake	GN-03	STL-A	24/09/2015	101990	900 226000703448	705	770	2650	7
Stephens Lake	GN-03	STL-A	24/09/2015	101991	900 226000548980	759	817	3300	8
Stephens Lake	GN-03	STL-A	24/09/2015	101992	900 226000548942	688	786	2300	7
Stephens Lake	GN-07	STL-B	25/09/2015	-	-	140	157	21	0
Stephens Lake	GN-07	STL-B	25/09/2015	101993	1380347884	315	349	290	2
Stephens Lake	GN-07	STL-B	25/09/2015	101994	1380344626	230	246	180	1
Stephens Lake	GN-08	STL-B	25/09/2015	-	-	155	170	36	0
Stephens Lake	GN-08	STL-B	25/09/2015	88480	900 226000629394	586	672	1300	7
Stephens Lake	GN-08	STL-B	25/09/2015	101995	900 226000548857	795	865	3570	9
Stephens Lake	GN-08	STL-B	25/09/2015	101996	900 226000703426	632	684	2000	7
Stephens Lake	GN-08	STL-B	25/09/2015	101997	900 226000703456	651	710	1900	7
Stephens Lake	GN-08	STL-B	25/09/2015	101998	900 226000548920	691	760	2400	8
Stephens Lake	GN-09	STL-B	25/09/2015	94235	900 226000703457	664	725	2350	7
Stephens Lake	GN-09	STL-B	25/09/2015	-	-	135	152	20	0
Stephens Lake	GN-09	STL-B	25/09/2015	101999	900 226000703460	605	671	1600	6
Stephens Lake	GN-09	STL-B	25/09/2015	102000	900 226000548994	620	684	1750	7
Stephens Lake	GN-09	STL-B	25/09/2015	101476	900 226000703440	685	742	2750	7
Stephens Lake	GN-10	STL-B	26/09/2015	101477	900 226000703416	658	732	2000	7
Stephens Lake	GN-10	STL-B	26/09/2015	101478	900 226000548784	736	802	3000	9
Stephens Lake	GN-10	STL-B	26/09/2015	101479	900 043000103421	290	325	-	2
Stephens Lake	GN-13	STL-B	26/09/2015	101482	900 226000703493	703	772	2450	7
Stephens Lake	GN-15	STL-B	27/09/2015	-	-	120	135	15	0
Stephens Lake	GN-15	STL-B	27/09/2015	103350	900 226000703402	528	592	1150	5
Stephens Lake	GN-17	STL-B	27/09/2015	101483	900 226000703406	666	741	2400	7

Table A2-3: Biological and tag information for Lake Sturgeon captured in Stephens Lake, fall 2015 (continued).

Location	Site	Zone	Date	Floy-tag #	PIT-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Stephens Lake	GN-17	STL-B	27/09/2015	101484	900 226000703428	681	730	2600	-
Stephens Lake	GN-19	STL-B	27/09/2015	101485	900 226000548851	444	492	750	4
Stephens Lake	GN-19	STL-B	27/09/2015	101486	900 226000120154	707	780	2900	7
Stephens Lake	GN-23	STL-B	28/09/2015	88498	900 226000629308	664	732	2200	7
Stephens Lake	GN-23	STL-B	28/09/2015	101487	900 226000577021	670	737	-	7
Stephens Lake	GN-24	STL-B	28/09/2015	101488	900 226000120162	695	751	2350	7
Stephens Lake	GN-24	STL-B	28/09/2015	94266	900 226000703481	649	697	2200	7
Stephens Lake	GN-24	STL-B	28/09/2015	101489	900 226000548603	712	754	2400	9
Stephens Lake	GN-24	STL-B	28/09/2015	101490	900 226000548886	628	702	2100	7
Stephens Lake	GN-26	STL-B	29/09/2015	-	-	140	152	34	0
Stephens Lake	GN-29	STL-A	29/09/2015	-	-	140	154	21	0
Stephens Lake	GN-29	STL-A	29/09/2015	101491	900 067000055295	316	352	400	1
Stephens Lake	GN-29	STL-A	29/09/2015	101492	900 043000103456	360	387	460	2
Stephens Lake	GN-30	STL-A	30/09/2015	101493	900 067000055540	297	342	200	1
Stephens Lake	GN-32	STL-A	30/09/2015	-	-	139	157	18	0
Stephens Lake	GN-35	STL-A	01/10/2015	-	-	134	149	18	0
Stephens Lake	GN-37	STL-A	01/10/2015	101494	900 067000058544	340	392	480	1
Stephens Lake	GN-37	STL-A	01/10/2015	101495	900 067000055136	328	369	420	1
Stephens Lake	GN-38	STL-A	01/10/2015	88495	900 226000629336	409	461	725	4
Stephens Lake	GN-38	STL-A	01/10/2015	101496	900 226000548830	350	398	680	4
Stephens Lake	GN-39	STL-A	01/10/2015	101497	900 226000628198	359	392	550	2
Stephens Lake	GN-40	STL-A	02/10/2015	-	-	152	176	22	8
Stephens Lake	GN-41	STL-B	02/10/2015	101498	900 226000628221	624	656	1450	-
Stephens Lake	GN-42	STL-B	02/10/2015	101499	900 043000103732	312	358	420	1
Stephens Lake	GN-43	STL-B	02/10/2015	94599	900 226000628373	762	831	3650	9
Stephens Lake	GN-43	STL-B	02/10/2015	101500	900 226000628170	700	763	2400	7
Stephens Lake	GN-44	STL-B	02/10/2015	-	-	148	164	41	0

APPENDIX 3:
AGEING STRUCTURES OF JUVENILE LAKE STURGEON CAUGHT IN THE KEEYASK STUDY AREA IN FALL 2015

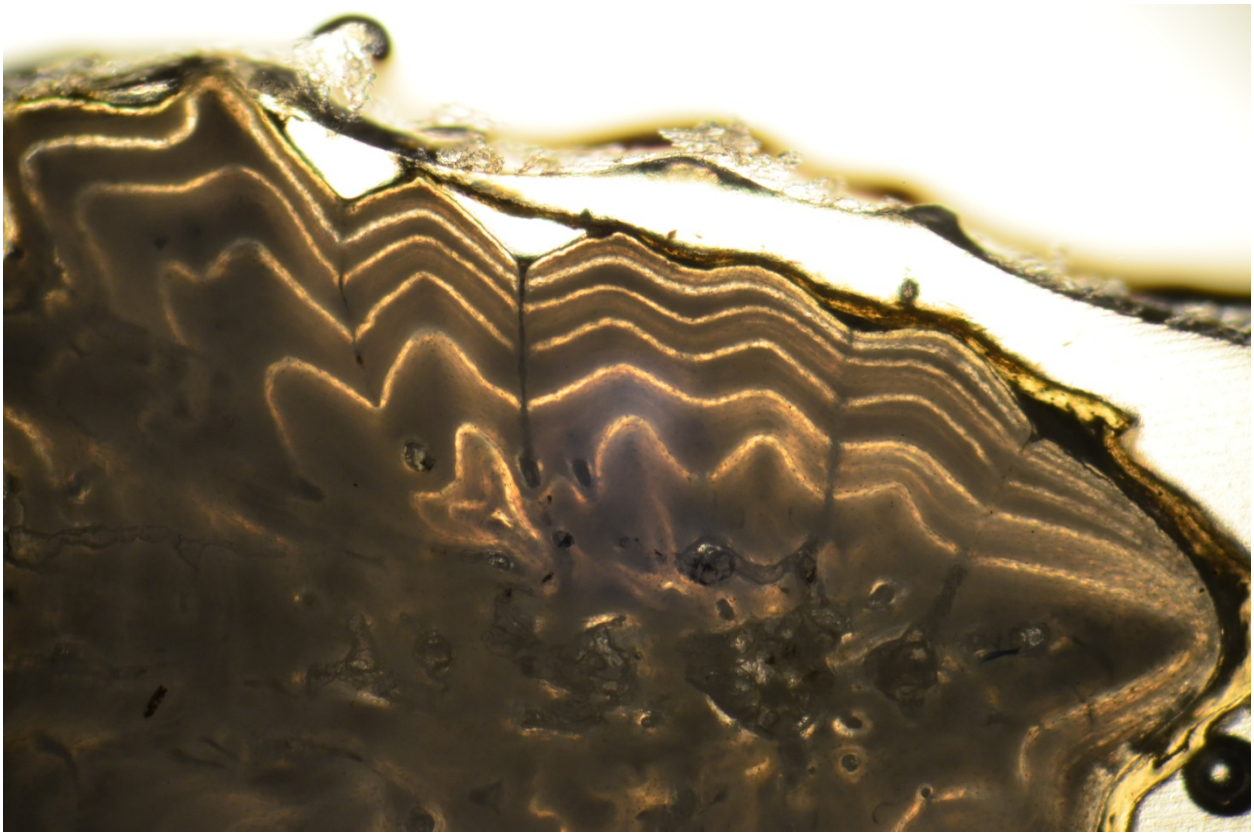


Figure A3-1: Ageing structure from a wild juvenile Lake Sturgeon caught in the Burntwood River in fall 2015 (Fish #25; FL = 585 mm; Wt = 1500 g; age 5).

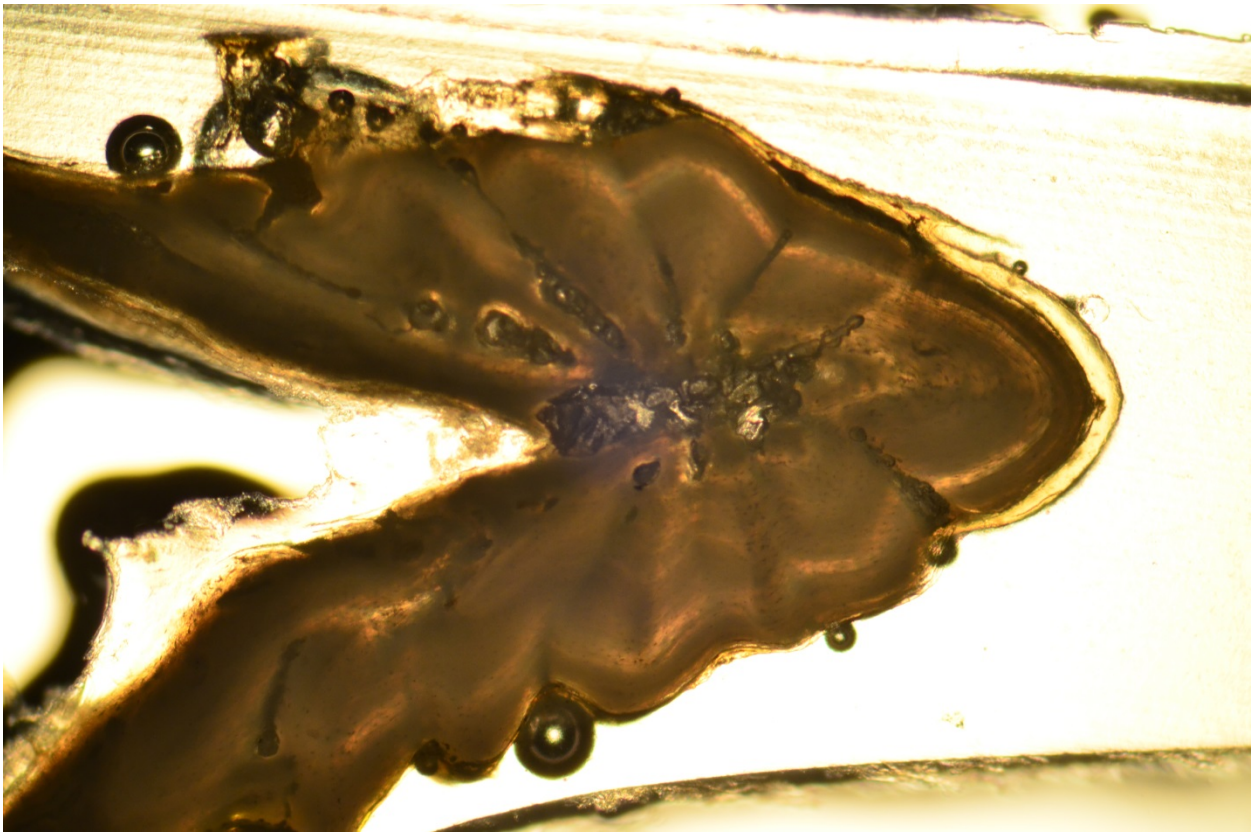


Figure A3-2: Ageing structure from a hatchery reared juvenile Lake Sturgeon caught in Gull Lake in fall 2015 (Fish #95; FL = 319 mm; Wt = 175 g; age 1). Agers noted the presence of a weak first annuli typically observed in hatchery reared Lake Sturgeon.

ᑭᔨᔪᓴ

KEEYASK

ᑭᔨᔪᓴ

KEEYASK

www.keeyask.com