



## Keeyask Generation Project Aquatic Effects Monitoring Plan

# Juvenile Lake Sturgeon Population Monitoring Report

AEMP-2022-06



# **KEEYASK GENERATION PROJECT**

## **AQUATIC EFFECTS MONITORING PLAN**

REPORT #AEMP-2022-06

### **JUVENILE LAKE STURGEON POPULATION MONITORING, FALL 2021: YEAR 8 CONSTRUCTION**

Prepared for

Manitoba Hydro

By

D.C. Burnett, C.L. Hrenchuk, and P. Nelson

June 2022



**North/South Consultants Inc.**  
Aquatic Environment Specialists

83 Scurfield Blvd.  
Winnipeg, Manitoba, R3Y 1G4  
Website: [www.nscons.ca](http://www.nscons.ca)

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

This report should be cited as:

Burnett, D.C., Hrenchuk, C.L., and P. Nelson. 2022. Juvenile Lake Sturgeon population monitoring, fall 2021: Year 8 Construction. Keeyask Generation Project Aquatic Effects Monitoring Plan Report #AEMP-2022-06. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2022. xvii + 119 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 and instream work was completed in 2020. The reservoir was impounded with water levels being raised to full supply level between August 31 and September 5, 2020. Commissioning of the powerhouse turbines was initiated after impoundment and five of seven units were in-service by fall 2021. During commissioning and as units came into service, substantial flows continued through the spillway until the summer of 2021 when more flow was going through the powerhouse than spillway. By mid-September the spillway was closed and barely used in the fall.

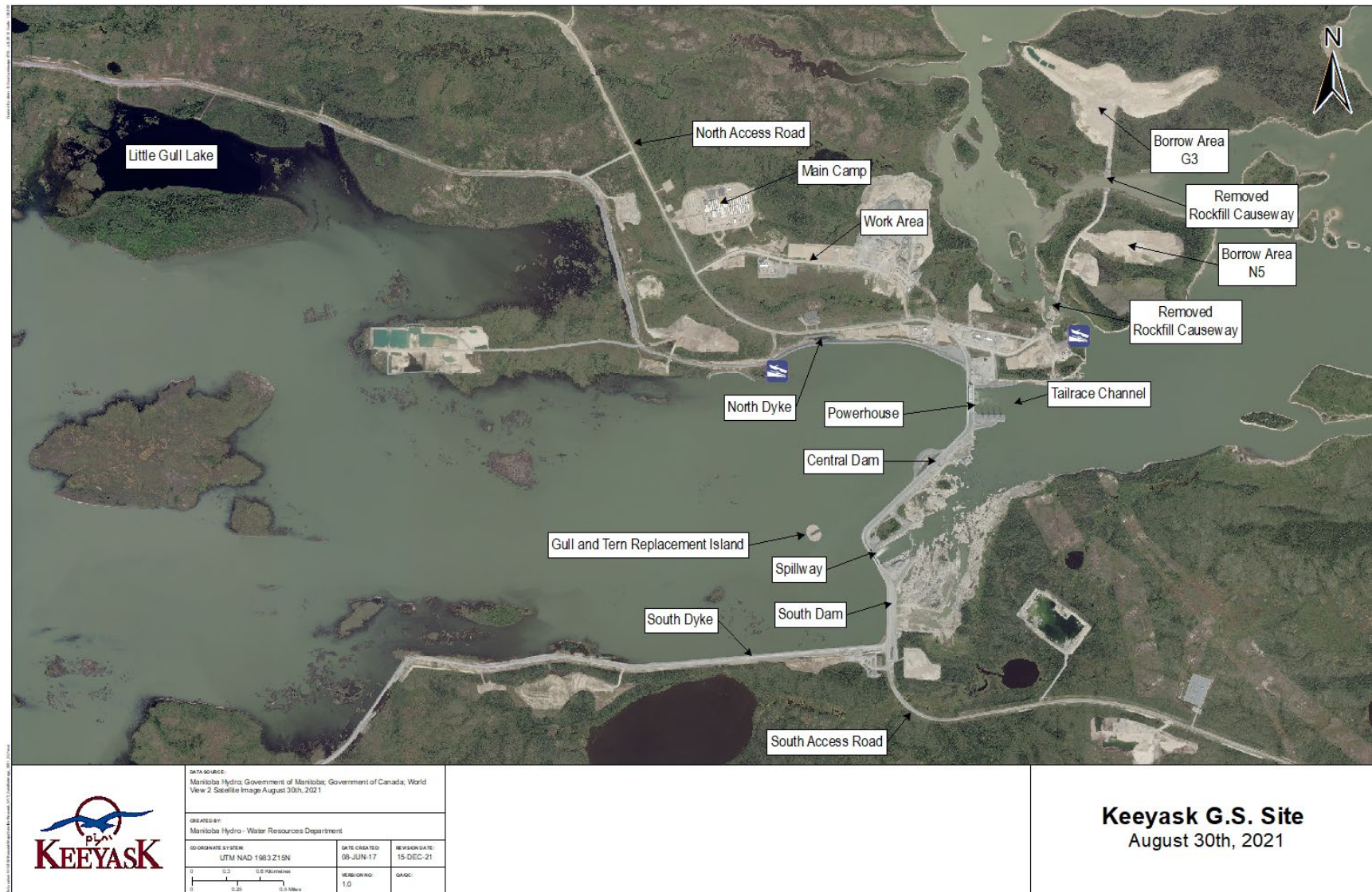
Lake Sturgeon were identified as one of the key species for monitoring. They were chosen because they are culturally important to Partner First Nations, local sturgeon populations have been previously impacted, and construction and operation of the GS will change or negatively impact important habitat. 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 (less than 800 millimetres [mm] in length);
- Identifying spawning locations and numbers of spawning fish; and
- Movement studies to record seasonal habitat use, long distance movements, and movements past barriers (*i.e.*, over GSs or Gull Rapids).

The mitigation and offsetting plan for Lake Sturgeon included a commitment to a long-term stocking program. This plan addressed the predicted loss of spawning habitat at Gull Rapids during the construction and initial years of operation (*i.e.*, before the constructed spawning habitat is fully effective) by releasing young sturgeon into Stephens Lake. Stocking will also support the recovery of the sturgeon populations in Gull Lake (the Keeyask reservoir), Stephens Lake, and the Upper Split Lake Area. Stocking began in 2014, with locations alternated between years (Keeyask reservoir and Stephens Lake were stocked with fish born in 2014, 2016, and 2018, and Burntwood River was stocked with fish born in 2013, 2015, 2017 and 2019) and its effectiveness is assessed through juvenile population monitoring. No fish spawned in 2021 were released before sampling.

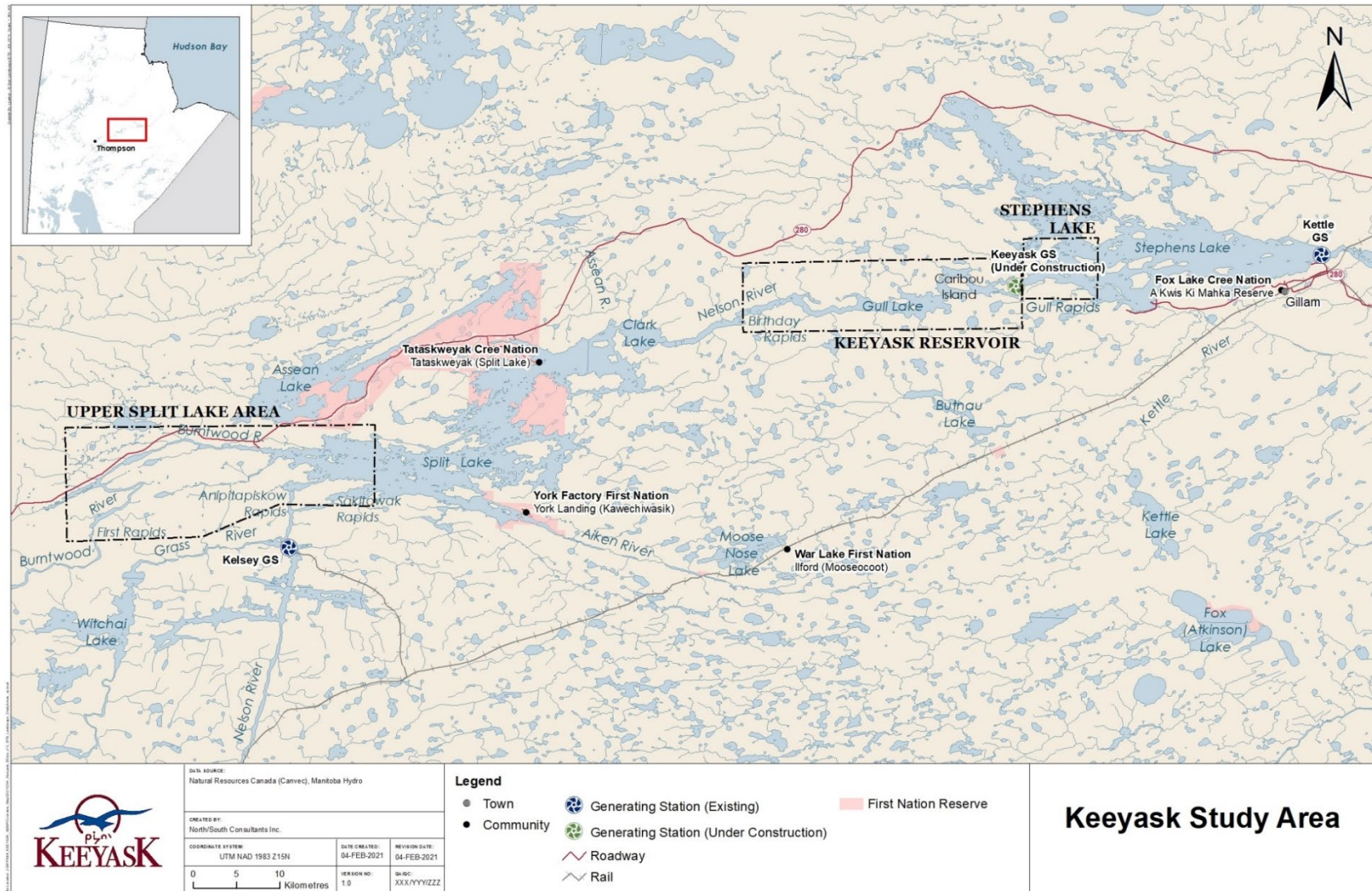


This report presents results of juvenile Lake Sturgeon population monitoring conducted during fall 2021. Data from juvenile populations in the study area have been collected intermittently since 2007 and the juvenile population monitoring study was conducted for the first time in 2014. Juvenile population monitoring will be conducted 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.



**Map illustrating instream structures at the Keeyask Generating Station site after reservoir flooding, August 2021.**





**Map of the study area for the juvenile Lake Sturgeon population monitoring program. Sampling is done in the Upper Split Lake Area (every second year), the Keeyask reservoir (yearly), and Stephens Lake (yearly). Sampling was done in the Keeyask reservoir and Stephens Lake in fall 2021.**



**Why is the study being done?**

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 and/or operation?*

This question is important because if no young sturgeon are born during construction and operation of the GS, then in the future fewer adult sturgeon will be reproducing.

*Does spawning habitat need to be created/modified (if recruitment of wild fish is not observed)?*

This question is important because if there is no recruitment of wild fish then measures can be taken to improve habitat in the area and make spawning more successful.

*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.

*Do stocking rates need to be adjusted?*

This question is important because if the number of stocked fish in the catch is too high or too low then the stocking plan would be adjusted (e.g., increasing or decreasing the number of hatchery fish released).

*Is there a change in condition factor and growth of juvenile sturgeon during construction and/or operation?*

This question is important because if sturgeon become fatter or skinnier than 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.

*Will the locations that YOY and juvenile Lake Sturgeon are found change in the Keeyask reservoir and Stephens Lake after impoundment?*

Flooding of Gull Lake will cause changes to available habitat in the area. This may cause juvenile Lake Sturgeon to move away or to use different areas of the river.

*Does additional YOY habitat need to be created in the Keeyask reservoir or in Stephens Lake?*

This question is important because if there is no habitat for YOY sturgeon to grow, they will not survive. If this happens, habitat will have to be made.



**Juvenile (left) and young-of-the-year (right) Lake Sturgeon.**

### **What was done?**

Sampling was conducted in the Keeyask reservoir (the Nelson River between Clark Lake and the Keeyask GS) and Stephens Lake in the fall of 2021. Gill nets were used to catch juvenile sturgeon, defined as those that are less than 800 mm in length. 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 PIT tag to make sure the fish is identifiable if one tag is lost. 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. It also makes it possible to estimate how many sturgeon are in a population. An ageing structure (a small piece of fin) was also collected to determine the year that the fish was born.



**Captured juvenile Lake Sturgeon in a fish tub (left); measuring (middle); and weighing (right) a Lake Sturgeon after capture.**

### **What was found?**

A total of 266 Lake Sturgeon (263 juveniles and 3 adults) were captured in the Keeyask reservoir. No YOY sturgeon were captured in this area in 2021. Of the 266 sturgeon caught, 30 had been tagged in a previous year (between 2014 and 2020), and 57 were tagged hatchery-reared sturgeon released as one-year-olds in either the Burntwood River (three fish stocked in 2014 and one in 2018) or the Keeyask reservoir (53 fish released in either 2015, 2017, or 2019). Including

the four fish caught in 2021, a total of 11 hatchery-reared fish released in the Burntwood River have been caught in the Keeyask reservoir since stocking began in 2014. Young hatchery fish (age 1–4) are generally longer than wild fish of the same age, but by age-5 the lengths of hatchery and wild fish are similar.

In Stephens Lake, a total of 158 Lake Sturgeon (151 juvenile and seven adult) were captured. Two of these were YOY fish (born in 2021). A total of 38 sturgeon tagged in a previous year were recaptured, as well as 69 hatchery-reared sturgeon (released as one-year-olds). Hatchery-reared sturgeon accounted for 44% of the total catch in Stephens Lake. Ten of the hatchery-reared sturgeon were stocked in the Keeyask reservoir and 59 were stocked in Stephens Lake. Additionally, 11 wild fish captured in Stephens Lake were originally tagged in the Keeyask reservoir and one fish was originally tagged in Split Lake. As in the Keeyask reservoir, age 1–4 fish are generally longer than wild fish of the same age, but by age-5 the lengths of hatchery and wild fish are similar.

A computer model was used to generate estimates of population size and survival for wild juvenile Lake Sturgeon in the Keeyask reservoir and Stephens Lake. In 2021, the Keeyask reservoir population was estimated at 2,776 wild fish and the Stephens Lake population was estimated at 526 wild fish. It was estimated that 75% of all wild juvenile Lake Sturgeon survive each year in the Keeyask reservoir and 78% survive in Stephens Lake.

A different model was used to generate survival estimates for hatchery-reared fish. The percentage of stocked fish that survive each year was estimated at 92% in the Keeyask reservoir, and 78% in Stephens Lake. In the Keeyask reservoir, 927 hatchery-raised fish were estimated to be present, or 25% of all juvenile sturgeon. In Stephens Lake 585 hatchery-raised fish were estimated to be present, or 53% of all juvenile sturgeon.

### **What does it mean?**

Sampling happened one year after flooding for the Keeyask reservoir, and Lake Sturgeon were still captured in the same general areas and numbers upstream and downstream of the station. Wild YOY sturgeon have been caught in each year since construction started (2015–2020) in the Keeyask reservoir except 2021. YOY fish were caught in Stephens Lake in 2021, showing that spawning happened this year (YOY fish were stocked into Stephens Lake after sampling in 2021). No wild Lake Sturgeon from the 2018 cohort (currently age-3 fish) have ever been caught in Stephens Lake.

The capture of many hatchery-reared sturgeon released as one-year-olds in the Keeyask reservoir and Stephens Lake over the last five study years suggests the stocking program is having a positive effect on Lake Sturgeon abundance in these areas. It shows that stocked sturgeon are surviving in the wild and that they are growing after release.

### **What will be done next?**

Monitoring will continue each fall until 2044. Monitoring in 2021 represents the first full year that juvenile sturgeon were living in the impounded reservoir (flooding of the Keeyask reservoir was



completed on September 5, 2020 shortly before the 2020 sampling program). Further monitoring will show whether Lake Sturgeon can successfully reproduce in the Keeyask reservoir (i.e., do newly spawned fish survive?) and whether juveniles can successfully survive and grow in the Keeyask reservoir. After the generating station is fully commissioned, it will also show whether Lake Sturgeon continue to successfully spawn and grow in Stephens Lake. Survival, growth, and population size of stocked and wild juveniles will continue to be assessed.

Juvenile Lake Sturgeon monitoring is planned for every second year in the Upper Split Lake Area, and will happen in 2022.

# ACKNOWLEDGEMENTS

We would like to thank Manitoba Hydro for the opportunity and resources to conduct this study.

Kelvin Kitchokeesik, Tyler Kitchokeesik, Mark Garson, and Terry Kitchokeesik of Tataskweyak Cree Nation and Grant Massan, Ray Mayham, and Randy Naismith Jr. of Fox Lake Cree Nation are thanked for their local expertise and assistance in conducting the field work.

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 #08-21.

# STUDY TEAM

## **Data Collection**

Claire Hrenchuk

Dylan MacKenzie

Grant Massan

Jon Peake

Kelvin Kitchokeesik

Mark Garson

Tyler Kitchokeesik

## **Data Analysis, Report Preparation, and Report Review**

Ashley Moore

Candace Parker

Cam Barth

Claire Hrenchuk

Duncan Burnett

Friederike Schneider-Vieira

Jenelle Ehn

Jon Peake

Ken Ambrose

Patrick Nelson



# TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2.0</b>	<b>STUDY SETTING.....</b>	<b>4</b>
2.1	<b>FLOWS, WATER LEVELS, AND KEEYASK OPERATIONS .....</b>	<b>5</b>
<b>3.0</b>	<b>METHODS .....</b>	<b>7</b>
3.1	<b>GILLNETTING .....</b>	<b>7</b>
3.2	<b>BIOLOGICAL SAMPLING .....</b>	<b>7</b>
3.3	<b>TAGGING.....</b>	<b>8</b>
3.4	<b>AGEING ANALYSIS .....</b>	<b>8</b>
3.5	<b>DATA ANALYSIS.....</b>	<b>9</b>
3.6	<b>POPULATION ESTIMATE .....</b>	<b>11</b>
<b>4.0</b>	<b>RESULTS .....</b>	<b>12</b>
4.1	<b>KEEYASK RESERVOIR.....</b>	<b>12</b>
4.1.1	Year-Class Strength .....	13
4.1.2	Population Estimate.....	13
4.1.3	Growth and Condition .....	13
4.1.4	Recaptures.....	14
4.1.5	Hatchery Captures.....	14
4.2	<b>STEPHENS LAKE .....</b>	<b>15</b>
4.2.1	Year-Class Strength .....	16
4.2.2	Population Estimate.....	16
4.2.3	Growth and Condition .....	16
4.2.4	Recaptures.....	17
4.2.5	Hatchery Captures.....	18
<b>5.0</b>	<b>DISCUSSION .....</b>	<b>19</b>
5.1	<b>ABUNDANCE .....</b>	<b>19</b>
5.2	<b>RECRUITMENT .....</b>	<b>19</b>
5.3	<b>MOVEMENTS.....</b>	<b>20</b>
5.4	<b>HATCHERY FISH.....</b>	<b>20</b>
5.5	<b>KEY QUESTIONS .....</b>	<b>21</b>
5.6	<b>NEXT STEPS.....</b>	<b>23</b>
<b>6.0</b>	<b>SUMMARY AND CONCLUSIONS .....</b>	<b>24</b>

<b>7.0</b>	<b>LITERATURE CITED .....</b>	<b>27</b>
------------	-------------------------------	-----------

# LIST OF TABLES

Table 1:	Summary of Lake Sturgeon stocking since 2014. ....	31
Table 2:	Summary of start and completion dates for juvenile Lake Sturgeon monitoring during fall 2021, by location. ....	31
Table 3:	Number (n) and frequency of occurrence (%), by species and sampling location, of fish captured during juvenile Lake Sturgeon monitoring, fall 2021. ....	32
Table 4:	Lake Sturgeon catch-per-unit effort (CPUE; # LKST/100 m net/24 h) by location and zone, for gill nets set during juvenile Lake Sturgeon monitoring, fall 2021. ....	33
Table 5:	Lake Sturgeon catch-per-unit-effort (CPUE; # LKST/100 m net/24 h) for gill nets set to target juvenile Lake Sturgeon between 2007 and 2021. ....	34
Table 6:	Catch-per-unit-effort (CPUE; # LKST/100 m net/24 h) for hatchery and wild caught Lake Sturgeon in the Keeyask reservoir and Stephens Lake, fall 2021. ....	35
Table 7:	Number of wild Lake Sturgeon captured from 2008 to 2021, from which ages and cohorts were determined. ....	36
Table 8:	Mean length, weight, and condition factor of wild Lake Sturgeon captured during juvenile Lake Sturgeon monitoring, since 2008. ....	37
Table 9:	Mean length, weight, and condition factor of Lake Sturgeon captured during juvenile Lake Sturgeon monitoring, fall 2021. ....	38
Table 10:	Mean length, weight, and condition factor of hatchery-reared Lake Sturgeon captured during juvenile Lake Sturgeon monitoring, since 2014. ....	39
Table 11:	Recapture summary for wild Lake Sturgeon between 2008 and 2021. ....	40
Table 12:	Number (n) and percentage (%) of catch of hatchery-reared Lake Sturgeon caught between 2014 and 2021. ....	41
Table 13:	Number and ages of hatchery-reared Lake Sturgeon released as age-1 fish and captured during juvenile Lake Sturgeon studies since 2014. ....	42

# LIST OF FIGURES

Figure 1:	Cohort frequency distributions for all aged juvenile Lake Sturgeon captured by zone in the Keeyask reservoir (A) and by hatchery and wild Lake Sturgeon (B), fall 2021.....	44
Figure 2:	Juvenile Lake Sturgeon abundance ( <i>i.e.</i> , fish <800 mm fork length) estimates based on POPAN best model for the Keeyask reservoir (2010, 2012–2021). .....	45
Figure 3:	Comparison of weight (g) at-fork length (mm) (log transformed) for Lake Sturgeon captured in: A) the Keeyask reservoir and B) Stephens Lake, fall 2021.....	46
Figure 4:	Fork length frequency distributions for Lake Sturgeon captured in gill nets set in: A) the Keeyask reservoir and B) Stephens Lake, fall 2021.....	47
Figure 5:	Fork length-at-age (A) and von Bertalanffy growth curve analysis (B) for all wild aged Lake Sturgeon caught during baseline (red; 2008–2012), construction (blue; 2014–2020), and post-impoundment (orange; 2021) monitoring years in Gull Lake/the Keeyask reservoir. ....	48
Figure 6:	Fork length-at-age (A) and von Bertalanffy growth curve analysis (B) for all wild (green) and hatchery-reared (purple) Lake Sturgeon released and/or recaptured in the Keeyask reservoir since stocking began in 2014.....	49
Figure 7:	Cohort frequency distributions for all aged juvenile Lake Sturgeon captured in Stephens Lake by zone (A) and by hatchery-reared and wild Lake Sturgeon (B), fall 2021. ....	50
Figure 8:	Juvenile Lake Sturgeon abundance estimates based on POPAN best model for Stephens Lake (2010, 2012–2021). Results of the POPAN abundance estimate are presented in black. ....	51
Figure 9:	Fork length-at-age (A) and von Bertalanffy growth curve analysis (B) for all wild (green) and hatchery-reared (purple) Lake Sturgeon released and/or recaptured in the Stephens Lake since stocking began in 2014. ....	52



# LIST OF MAPS

Map 1:	Map of Nelson River showing the site of Keeyask Generating Station and the juvenile Lake Sturgeon population monitoring study setting. ....	54
Map 2:	Map illustrating instream structures at the Keeyask Generating Station site after reservoir flooding, August 2021. ....	55
Map 3:	Map of Lake Sturgeon yearling stocking sites in the Burntwood River since 2014.....	56
Map 4:	Map of sites fished with gill nets in the Keeyask reservoir, fall 2021 (pre-impoundment shoreline shown). ....	57
Map 5:	Map of Lake Sturgeon yearling stocking sites in the Keeyask reservoir since 2014.....	58
Map 6:	Map of sites fished with gill nets in Stephens Lake, fall 2021.....	59
Map 7:	Map of Lake Sturgeon yearling stocking sites in Stephens Lake since 2014. ....	60

# LIST OF APPENDICES

Appendix 1:	Locations and site-specific physical measurements collected at gillnetting sites, fall 2021. ....	62
Appendix 2:	Biological and tag information for Lake Sturgeon captured in fall 2021. ....	69
Appendix 3:	Ageing Structures of Juvenile Lake Sturgeon caught in the Keeyask Study Area. ....	86
Appendix 4:	Wild and Hatchery Lake Sturgeon Recapture data, Fall 2021. ....	89
Appendix 5:	Population Estimate Information. ....	113

# 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 and the reservoir was impounded in early fall 2020. In spring 2021, approximately one third of the units were commissioned so flow was passing through both the spillway and powerhouse. In fall of 2021, four of the seven units were in-service.

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* (AESV). As part of the licensing process for the Project, an *Aquatic Effects Monitoring Plan* (AEMP) was developed detailing the monitoring activities of various components of the aquatic environment, including the focus of this report, juvenile Lake Sturgeon populations, for the construction and operation phases of the Project.

For the purposes of this monitoring program, Lake Sturgeon that are 800 mm in fork length or longer are classified as adults and smaller sturgeon are considered juveniles. Although fish greater than 800 mm length may not yet be sexually mature and may not reach sexual maturity for some years, this length was used as the threshold to distinguish between juveniles and adults because the smallest mature fish captured to date has been 809 mm (captured in 2016 in Stephens Lake; Legge *et al.* 2017).

Juvenile population monitoring is a key component of the overall Lake Sturgeon monitoring program. The Project is predicted to affect sturgeon recruitment by altering spawning habitat at Gull Rapids (now the Keeyask GS) and Birthday Rapids. Stocking aims to assist the recovery of sturgeon populations in the Upper Split Lake Area (*i.e.*, the Burntwood River and the Nelson River between the Kelsey GS and Split Lake) and in the Keeyask reservoir and Stephens Lake. Stocking locations alternate between years. The Burntwood River was stocked in 2014, 2016, 2018, and 2020. The Keeyask reservoir and Stephens Lake were stocked in 2015, 2017, and 2019. Additional fingerlings were Stocked in Stephens Lake in 2021 following the juvenile Lake Sturgeon sampling period. Results of juvenile population monitoring will determine the impact of the loss of spawning habitat earlier than would be possible using adult population monitoring data, allowing timely adaptive management and mitigation, if required. Results of juvenile population monitoring 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 population size and cohort strength, identify changes in condition factor, determine

whether natural reproduction is occurring, assess the need for young-of-the-year (YOY) habitat creation, and determine whether stocked fish are surviving and growing.

Juvenile Lake Sturgeon studies have been conducted in Gull Lake (the Keeyask reservoir) and Stephens Lake since 2007. Surveys were initiated in the Burntwood River in 2012 and in the Nelson River downstream of the Kelsey GS and in Split Lake in 2015. These studies have increased the understanding of YOY and juvenile abundance, distribution, habitat use, condition, size, and year-class strength (MacDonald 2009; Michaluk and MacDonald 2010; Henderson and Pisiak 2012; Henderson *et al.* 2011, 2013, 2015; Burnett *et al.* 2016, 2017, 2018, 2021; Burnett and Hrenchuk 2019, 2020). In both the Keeyask reservoir and Stephens Lake, recruitment has also occurred consistently over the past ten years, but until recently, the cohort-frequency distribution has been dominated by a single cohort produced in 2008 (Henderson *et al.* 2011, 2013, 2015; Henderson and Pisiak 2012; Burnett *et al.* 2017, 2018; Burnett and Hrenchuk 2019, 2020). As new, younger cohorts emerge, fish from the 2008 cohort are becoming too large for the juvenile sample gear and are therefore making up a smaller proportion of the catch in each waterbody.

Lake Sturgeon stocking is being conducted using wild caught broodstock from the Burntwood River and from the Keeyask reservoir. To maintain the genetic structure of each population, progeny from each broodstock location are released back into their respective rivers (*i.e.*, Burntwood River progeny released back into the Burntwood River and Keeyask reservoir progeny released back to the reservoir and Stephens Lake). Stocking occurred for the first time in 2014 and has occurred annually since with a variety of life stages (larvae, fingerlings, yearlings) being released (Table 1; Klassen *et al.* 2017, 2018, 2019, 2020, 2021, 2022).

This report presents results from juvenile population monitoring conducted in the Keeyask reservoir (previously referred to as Gull Lake), and Stephens Lake in 2021. Sampling in the reservoir in 2021 represents the first year of post-impoundment data and three additional key questions outlined in the AEMP are relevant. Data collected during the field program are relevant to the juvenile population monitoring and movement monitoring programs. The key questions set out in the AEMP for juvenile population monitoring were:

- Does recruitment of wild sturgeon occur upstream and/or downstream of the GS during construction and operation?
- Is there a biologically meaningful (and statistically significant) change in condition factor and growth of juvenile sturgeon during construction and operation?
- 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)?
- Do stocking rates need to be adjusted?
- Where in the reservoir and in Stephens Lake will YOY rearing habitat be located, and will the distribution of YOY and juvenile Lake Sturgeon change following reservoir creation?



- Does spawning habitat need to be created/modified (if recruitment of wild fish is not observed)?
- Does additional YOY habitat need to be created in the Keeyask reservoir or in Stephens Lake?

Juvenile population monitoring data will be collected annually from the Keeyask reservoir and Stephens Lake until 2044.

## 2.0 STUDY SETTING

The study area encompasses an approximately 110 km long reach of the Nelson River from Clark Lake to the upstream end of the Limestone Reservoir (Map 1). This section of river offers a diversity of physical habitat conditions, including a variety of substrate types, and variable water depths (range: 0–30 m) and velocities. Clark Lake is located immediately downstream of Split Lake, and approximately 42 km upstream of the Keeyask GS (formerly Gull Rapids) (Map 1). Current is restricted to the main section of the lake, with off-current bays outside the main channel. The Assean River is the only major tributary to Clark Lake and flows into the north side. Downstream from the outlet of Clark Lake, the Nelson River narrows and water velocity increases for a 3 km stretch, known as Long Rapids. For the next 7 km, the river widens, and water velocity decreases. The area between Clark Lake and the Keeyask GS is considered the Keeyask reservoir.

Birthday Rapids is located approximately 10 km downstream of Clark Lake and 30 km upstream of Gull Rapids/the Keeyask GS (Maps 1 and 2) and marks the upstream end of major water level changes as a result of impoundment by the Keeyask GS. The drop in elevation from the upstream to downstream side of Birthday Rapids was approximately 2 m prior to impoundment but is now a nearly level, albeit fast-flowing section of river. The 14 km reach of the Nelson River between Birthday Rapids and Gull Lake was characterized as a large and somewhat uniform channel with medium to high water velocities and a few large bays. This area is now within the Keeyask reservoir, though flooding was limited to mainly shoreline areas.

Prior to impoundment, Gull Lake was a widening of the Nelson River, with moderate to low water velocity beginning approximately 20 km upstream of Gull Rapids/the Keeyask GS. Water levels on Gull Lake increased by several metres following impoundment and flooding along the shoreline and small tributaries entering this reach was extensive. Although this area is now a portion of the Keeyask reservoir, it is referred to herein as Gull Lake.

Just below the Keeyask GS, the Nelson River enters Stephens Lake (Map 3). 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 has altered the flow distribution immediately downstream of Gull Rapids as all flow now passes via the south channel of Gull Rapids. In August 2018, flow was further constricted when the spillway was commissioned.

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 (Map 1). 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 FLOWS, WATER LEVELS, AND KEEYASK OPERATIONS

From October 2020 to mid-June 2021 the calculated Split Lake outflow varied about the median flow of about 3,300 m<sup>3</sup>/s, ranging between about 3,000 m<sup>3</sup>/s and 3,900 m<sup>3</sup>/s. From mid-June to mid-August, the flows steadily decreased from about 3,700 m<sup>3</sup>/s to about 2,000 m<sup>3</sup>/s, which is approximately the 5th percentile low flow. Low flow conditions persisted from summer into winter, with flows dropping to a low of about 1,800 m<sup>3</sup>/s at the end of November 2021. These are the lowest flows that have occurred during Keeyask construction. It is not since 2005 that flows this low have occurred on the Nelson River.

Water levels on Gull Lake have been held steady between about 158.8-159 m since reservoir impoundment in September 2020. Upstream of Gull Lake at gauges below and above Birthday Rapids the levels were about 0.5 m and 2 m higher than on Gull Lake, a smaller difference than would have occurred prior to the project. Upstream levels increased about 3-4 m at these sites in winter due to ice effects as in previous years. Due to low flows in summer 2021 the water surface was relatively flat from Gull Lake to the gauge just upstream of Birthday Rapids, with a difference of only about 0.8-0.9 m between the two.

Keeyask is transitioning from a construction project to an operating station (Map 2). In 2021, the work at site has been focused on bringing units into service. By the end of April 2021, prior to the start of aquatic monitoring, Unit 1 and Unit 2 were in service. Throughout the open water period more units were being tested and brought into service one at a time. As units came into service, the distribution of flow between the spillway and powerhouse has gradually shifted, as summarized below. By the end of October 2021 five units were fully in service.

Discharges from the spillway and powerhouse are not measured but have been estimated based on performance design curves. For reference it is noted that the design discharge capacity of the powerhouse is 4,000 m<sup>3</sup>/s, giving each turbine unit a discharge capacity of approximately 570 m<sup>3</sup>/s.

Table with a summary of Keeyask GS operations, including spillway and powerhouse flows, during 2021.

Dates	Powerhouse Units	Spillway Gate Operation	Powerhouse	Spillway	Keeyask Total
			Discharge (m <sup>3</sup> /s)		
End Apr. - end June 2021	Unit 2 online; Unit 3 testing	Gates 1, 2, 3, 5, 7 in use until mid-June. Gates 1, 3, 5, 7 primarily mid- to end-June	Steady at about 1,100 varying down to 600 on a few intermittent days and up to 1,650 during two weeks of Unit 3 testing.	Generally, 2,200-2,800 except during Unit 3 testing it varied from about 1,400-2,400.	Generally, 3,400-3,900 except during Unit 3 testing it varied from 2,600-3,600.
End June – mid-Sept. 2021	Unit 3 online; Unit 5 testing	Generally, Gates 1, 3, 5, 7 until mid-July. Gates 3, 5, 7 until end of July. Various gates used in Aug. Gates 1 and 7 used in Sept. until closure of all gates on Sept. 11.	About 1,650, but reduced to 1,100 for two weeks with a unit shut down and varying up to 2,100 during two weeks of Unit 5 testing.	From end of June to mid Aug. Nelson R inflow declined from about 3,600 to about 1,800-2,200 and has remained steady around 2,000-2,200 since then – corresponding spillway discharge gradually declined from about 2,400 to 0 by mid-Sept. when Unit 5 came into service, although daily variations of +/- 200-400 or more in a few instances occurred during this time.	Total Keeyask discharge declined from about 3,600 to an average of about 2,000-2,200 corresponding to the decrease in Nelson R inflow, and daily variation of about +/- 200-400 depending on spillway and powerhouse operations.
Mid-Sept. – end Oct. 2021	Unit 5 online; Unit 4 testing; Unit 4 online Oct. 25	Various gates used very sporadically. First reopening on Sept. 28.	Average discharge about 2,000-2,200 with typical daily variation from 1,600-2,200 and a maximum variation between 1,000-2,800 depending on unit operations and Unit 4 testing.	No spillway flow except for a few intermittent days of up to 1,000.	Same as powerhouse.



## 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.* 2014a). This standardized methodology (described below) is being used to enable comparisons of cohort strength, abundance, growth, and condition among years. The gillnetting methods described below have been used to capture juvenile Lake Sturgeon during environmental studies related to the Keeyask Generation Project since 2008.

Gillnetting was conducted in the Keeyask reservoir and the upper 10 km of Stephens Lake. Gill nets were composed of five panels of 1, 2, 3, 5, and 6" twisted nylon stretched mesh (25, 51, 76, 127, and 152 mm). Each panel was 25 yards (yd) (22.9 m) long and 2.7 yd (2.5 m) deep. Mesh sizes were staggered in the order of 1, 5, 2, 6, and 3" to capture small and large juveniles across the length of each gang.

Gill nets were set in deep-water habitats (average depth = 14.2 m) since YOY and juvenile Lake Sturgeon have been found to prefer these areas in the Winnipeg, Burntwood, and Nelson rivers (Barth *et al.* 2009; 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). Water temperature was measured daily in each area using a hand-held thermometer ( $\pm 0.5^{\circ}\text{C}$ ). HOBO Water Temperature Pro data loggers ( $\pm 0.2^{\circ}\text{C}$ ), set approximately 1 m off the substrate, were also used to log water temperature at 6-hour intervals in the Keeyask reservoir and Stephens Lake. Gill nets were checked approximately every 24-hours, weather permitting.

For comparability among years, similar gillnetting locations were used during juvenile monitoring programs conducted from 2014 to 2021. However, some sites have changed between years depending on water levels and flows, especially in the Keeyask reservoir. Locations and site-specific physical measurements collected at gillnetting sites in 2021 are found in Appendix 1.

### 3.2 BIOLOGICAL SAMPLING

All fish captured were counted by species and location. Lake Sturgeon were measured for fork length (FL;  $\pm 1$  mm), total length (TL;  $\pm 1$  mm), and weight ( $\pm 5$  g using a digital scale, or nearest 25 g for fish greater than 4,000 g).

For age analysis, the first ray of the left pectoral fin was removed immediately adjacent to its articulation from each juvenile Lake Sturgeon captured for the first time. If fish appeared to have

been aged previously, or had deformed pectoral fins, ageing structures were not collected. All collected fin rays were placed in individually numbered envelopes, air dried, and brought back to the NSC laboratory for ageing (Section 3.4).

Small samples (1–2 cm<sup>2</sup>) were removed from the left pelvic fin of each Lake Sturgeon and preserved in 95% Biological Grade Ethanol for potential future genetic analysis.

Ageing structures and genetic samples were not taken from YOY fish due to concerns of harming the small fish. Ages were inferred based on size (*i.e.*, fish smaller than 150 mm FL were considered YOY).

### 3.3 TAGGING

Lake Sturgeon greater than 250 mm FL were marked with individually numbered external Floy-FD-94 T-bar anchor tags (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 RFID Ltd., Portland, OR) were also used to mark Lake Sturgeon. Those measuring greater than 250 mm FL received 12 mm HDX tags (12.0 mm x 2.12 mm; 0.1 g) and those measuring less than 250 mm FL (smallest fish tagged was 99 mm) 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., Barsinghausen, 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. Tags were injected parallel to the horizontal axis of the fish, into muscle tissue (not the body cavity). Following implantation or upon recapture, the tags were logged, and the last six digits manually recorded. Injector needles were sterilized in boiling water prior to the start of sampling and again upon sampling completion.

### 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, OH) low-speed sectioning saw. Fin sections were mounted on glass slides using Cytoseal-60 (Thermo Scientific, Waltham, MA) 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. The rate of three-reader agreement was calculated in percent (percentage). Examples of Lake Sturgeon ageing structures are provided in Appendix 3.

Lake Sturgeon ageing structures exhibit well-defined banding patterns characteristic of repeated summer (fast-growth) and winter (slow/non-growth) periods (McDougall and Pisiak 2014a;

Appendix A3-1). Ageing structures from hatchery-reared Lake Sturgeon have different banding patterns that complicate the ageing process (described in Burnett and Hrenchuk 2019). In fish stocked at age-1, the weak annulus is often followed by the presence of a false annulus, not corresponding to slowed winter growth, but instead to stocking and the subsequent establishment period. The false annuli decrease ageing accuracy because they are difficult to distinguish from true annuli. Ageing structures collected from known hatchery fish were not aged, instead their known ages were used. All fish caught without a hatchery assigned PIT tag were deemed wild fish for the purpose of this report.

### 3.5 DATA ANALYSIS

As was done in previous years, data were analysed for all sizes of Lake Sturgeon captured (as opposed to only those measuring less than 800 mm FL). Mesh sizes used select for small Lake Sturgeon but larger fish are also captured; therefore, including all fish in the summary statistics ensures comparability among years.

To better describe sampling locations, relative abundance, and fish movements, each sampling area was divided into distinct geographical zones.

Mean FL (mm), weight (g), and condition factor (K) were calculated for all Lake Sturgeon by location. In the Keeyask reservoir and Stephens Lake, known hatchery and wild fish were presented separately. Lake Sturgeon not confirmed as being either hatchery or wild (based on ageing structure analysis; described in Section 3.4) were only included in totals. 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).

Ageing structures were only collected for fish measuring <800 mm FL. Because fish approach this length by age nine, all age analyses were restricted to fish aged 0–9 years as the full range of sizes for older fish would not be included in the sample.

A von Bertalanffy growth curve was generated from all age and length data collected during the study, to compare the growth of wild vs. hatchery-reared fish, as well as wild fish captured during baseline vs. construction for fish aged as nine years or less. Fish older than age-9 were not included in the analysis as they are not fully represented in the catch (ageing structures are not collected from fish >800 mm fork length, which corresponds to fish older than age-9). The curve was calculated using the following equation:

$$L = L_{\infty} (1 - e^{-k(t-t_0)})$$

Where:

$t$  = age (years)

$t_0$  = is the theoretical age at which FL is 0;

$L$  = is the fork length (mm) of the fish at age  $t$ ;

$L_{\infty}$  = is the theoretical maximum TL that an individual in the population can attain; and

$k$  = growth rate.

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.

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-h period using the following formula:

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

Where:  $\Sigma$  = 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.

Hatchery-reared Lake Sturgeon are released as fingerlings and yearlings (and were also released as larvae in earlier years). However, without additional analysis (genetics or isotopic signature in fin rays) fish can only be conclusively identified as hatchery-reared based on the presence of a PIT tag, which are exclusive to fish stocked at age-one. All fish not definitively identified as hatchery-reared (based on the presence of a PIT tag) were classified as “wild” in order to facilitate data analysis. As the additional analysis (genetics or isotopic signature in fin rays) has not been undertaken, the definitive origin (hatchery or wild) of fish belonging to cohorts corresponding to years in which larvae or fingerlings were stocked cannot be determined.



## 3.6 POPULATION ESTIMATE

Mark-recapture population estimates have been calculated for the Keeyask reservoir (years: 2010 and 2012–2021) and Stephens Lake (years: 2010 and 2012–2021). The Jolly-Seber model (POPAN formulation; Arnason and Schwarz 2002), as implemented within MARK, was used to estimate the annual abundance of wild juvenile Lake Sturgeon. Detailed methods can be found in Appendix 5. Estimates are reported as a mean with 95% confidence intervals (CI).

A Cormack-Jolly-Seber model was used to calculate a survival estimate for hatchery-reared juvenile Lake Sturgeon cohorts with a minimum number of recaptures ( $n = 25$ ) stocked in the Keeyask reservoir and Stephens Lake, using the probability of recapture in each year. The population of hatchery-reared Lake Sturgeon was estimated based on the total number of fish released multiplied by the survival estimate (e.g., 1,000 fish released and an 80% survival estimate would generate a population estimate of 800 individuals). The estimate is recalculated every year between stocking and the study year, to get the final estimate (e.g., 1,000 fish released in 2017 at 80% survival would generate a population estimate of 800 individuals in 2018, and 640 in 2019). The model assumes that the survival rate remains constant between years.

## 4.0 RESULTS

Gill net site data is presented in Appendix 1 and biological and tagging information for Lake Sturgeon captured in 2021 are provided in Appendix 2.

### 4.1 KEEYASK RESERVOIR

Sampling locations remained similar to previous years with the exception of several new locations within the Keeyask reservoir. Several locations not previously sampled because of shallow depths and high current were identified as suitable juvenile habitat in 2021 (Zones BR-D and GL-A; Map 4).

A total of 482 fish from seven fish species were captured at 31 sites between September 14 and 23, 2021 (Tables 2 and 3; Map 4). Water temperature during sampling ranged from 12.6°C to 14.1°C (Appendix A1-1). Lake Sturgeon ( $n = 266$ ; 55.2%) were the most abundant species captured (Table 3). Gill net site data as well as biological and tagging information for all Lake Sturgeon captured are provided in Appendices A1-1 and A2-1.

In total, 263 juvenile (<800 mm FL) and three adult Lake Sturgeon were captured in 1,570.2 gill net hours, producing an overall CPUE of 4.07 LKST/100 m net/24 h (Table 4). Three juvenile mortalities (1.1%) were recorded during sampling: one on September 14 and two on September 17. Gill nets were set throughout the Keeyask reservoir (*i.e.*, in zones GL-A, GL-B, and GL-C), as well as the first zone upstream of the former Gull Lake (*i.e.*, BR-D) (Map 4). Total CPUE by zone, from upstream to downstream, was as follows:

- 3.55 LKST/100 m/24 h in Zone BR-D ( $n = 3$  sites);
- 5.74 LKST/100 m/24 h in Zone GL-A ( $n = 4$  sites);
- 3.57 LKST/100 m/24 h in Zone GL-B ( $n = 8$  sites); and
- 3.98 LKST/100 m/24 h in Zone GL-C ( $n = 16$  sites; Table 4).

Total annual CPUE data recorded in the Keeyask reservoir since 2007 are presented in Table 5. Total CPUE in 2021 was higher than in any year during construction monitoring and was only slightly lower than the highest recorded CPUE recorded in 2011 (4.39 LKST/100 m/24 h).

Of the 266 Lake Sturgeon captured, 57 were known hatchery-reared fish (*i.e.*, stocked as age-1 and marked with PIT tags; discussed in further detail in Section 4.1.5). Total CPUE for wild and hatchery-reared Lake Sturgeon was as follows:

- 3.19 LKST/100 m/24 h ( $n = 209$ ) for wild Lake Sturgeon; and
- 0.87 LKST/100 m/24 h ( $n = 57$ ) for hatchery-reared Lake Sturgeon (Table 6).

### 4.1.1 YEAR-CLASS STRENGTH

Ages were assigned to 246 of the 263 juvenile fish captured. Of the 17 fish not aged, six fish were approaching adult size (799 mm FL), four did not have ageing structures taken due to the fish being in poor condition at the time of capture, two had structures that were unreadable, and five were accidentally released prior to a structure being taken.

Lake Sturgeon (both wild and hatchery) ranged in age from 1 to 16 years (2005–2020 cohorts; Figure 1), with the 2016 cohort captured most frequently ( $n = 60$ ; 24.4%). The 2013 and 2014 cohorts were also relatively abundant in the catch, accounting for 13% ( $n = 33$ ) and 17% ( $n = 43$ ), respectively. No YOY fish were captured in the Keeyask reservoir in 2021. Known hatchery-reared fish accounted for 9%, 49%, 13%, 7%, and 92% of the 2013, 2014, 2016, 2017, and 2018 cohorts, respectively (Figure 1).

Wild fish from all cohorts since 2000, except for the 2002 and 2021 cohorts, have been represented in the catch since studies began (Table 7).

### 4.1.2 POPULATION ESTIMATE

The 2021 estimate for the Keeyask reservoir population was 2,776 wild juvenile Lake Sturgeon (95% CI: 1,757–4,385; Figure 2; Appendix A5-1). The estimated annual survival rate was 75%.

Survival of hatchery-reared Lake Sturgeon stocked into the Keeyask reservoir was estimated at 92% (Appendix A5-2). Based on this survival estimate, 257, 332, and 337 hatchery-reared individuals from the 2014, 2016, and 2018 cohorts are predicted to still be present in the Keeyask reservoir, contributing to a population estimate of 927 hatchery fish. Based on these numbers, it is estimated that hatchery fish currently make up 25% of the total juvenile Lake Sturgeon population in the Keeyask reservoir.

### 4.1.3 GROWTH AND CONDITION

Length-weight relationships for hatchery-reared and wild Lake Sturgeon captured in the Keeyask reservoir are presented in Figure 3. Mean length, weight, and condition factor of wild Lake Sturgeon captured during juvenile Lake Sturgeon monitoring since 2008 is presented in Table 8.

Wild Lake Sturgeon had a:

- Mean FL of 518 mm ( $n = 209$ ; StDev = 142 mm; range 160–819 mm);
- Mean weight of 1,109 g ( $n = 208$ ; StDev = 859 g; range 50–4,750 g); and
- Mean condition factor of 0.66 ( $n = 208$ ; StDev = 0.12; range 0.43–1.22) (Table 9).

Wild Lake Sturgeon in the 450–499 mm FL interval were captured most frequently, representing 18% ( $n = 38$ ) of the wild catch (Figure 4). Fish measuring 400–449 mm and 500–549 mm were

also frequently captured representing 16% ( $n = 33$ ) and 15% ( $n = 32$ ) of the wild catch, respectively (Figure 4).

Hatchery-reared Lake Sturgeon had a:

- Mean FL of 475 mm ( $n = 57$ ; StDev = 69 mm; range 373–636 mm);
- Mean weight of 679 g ( $n = 57$ ; StDev = 334 g; range 300–1,650 g); and
- Mean condition factor of 0.59 ( $n = 57$ ; StDev = 0.07; range 0.48–0.76) (Table 9).

Hatchery-reared Lake Sturgeon in the 400–449 mm FL interval were captured most frequently, representing 28% of the hatchery catch ( $n = 16$ ) (Figure 4). Fish measuring 450–499 mm and 500–549 mm were also frequently captured representing 23% ( $n = 14$ ) and 21% of the catch, respectively (Figure 4). A comparison of hatchery growth and condition since 2014 is provided in Table 10.

A comparison of von Bertalanffy growth curves between baseline (2008–2012), construction (2014–2020), and operation (2021) monitoring years shows no difference between the groups (Figure 5). Growth curve analysis of hatchery and wild fish shows young hatchery fish (0–4 years-old) are longer than wild fish of the same cohort. However, the lengths of wild and hatchery fish become similar around age-5 (Figure 6).

#### 4.1.4 RECAPTURES

A total of 30 Lake Sturgeon tagged in a previous year were recaptured in 2021, all of which were originally tagged in the Keeyask reservoir (Table 11; Appendix A4-1). The initial tagging information for one fish identified as a previous year recapture could not be found.

Recaptured fish moved varying distances from their original capture locations:

- Eleven moved less than 1.0 km.
- Fifteen moved between 1.0 and 7.5 km.
- Two were recaptured more than 10.0 km from their initial capture locations (15.4 km and 10.1 km).
- One was an acoustically tagged fish (Tag #31782) and moved 2.1 km from its original tagging location. Details on its movements since tagging in 2018 can be found in Funk and Hrenchuk (2022).

#### 4.1.5 HATCHERY CAPTURES

Fifty-seven known hatchery-reared fish (*i.e.*, those PIT tagged and stocked as age-1) were caught in 2021, representing 21.4% of the total Lake Sturgeon catch (Table 12). Six of the hatchery-

reared fish were caught in a previous study year and one was caught in multiple years. An age breakdown of all hatchery-reared fish captured between 2014 and 2021 is presented in Table 13.

Fifty-three were stocked in the Keeyask reservoir (Map 5):

- Eight were stocked on June 22, 2015 at sites 1 and 2 (Zone GL-B). These fish were captured between 0.2 and 13.9 km of their original stocking location.
- Thirteen were stocked on September 16, 2015 at sites 6 (Zone GL-B) and 7 (Zone GL-C) and were caught between 0.2 and 8.1 km of their stocking location.
- Eight were stocked on June 8, 2017 at site 1 (Zone GL-A) and were caught between 4.5 and 12.7 km of their stocking location.
- Twenty-four were stocked in the Keeyask reservoir on June 6, 2019 at sites 1 (Zone GL-C) and 2 (Zone GL-B; ) and were caught between 0.2 and 7.6 km of their stocking location.

Four were stocked in the Burntwood River (Map 3):

- One was stocked on May 31, 2014 in Zone BWR-C and was recaptured on September 17, 2021 in Zone GL-C, approximately 101 km downstream. In the seven years since release, it increased in size by 277 mm and 433 g.
- One was stocked on October 2, 2014 in Zone BWR-C and was recaptured on September 15, 2021 in Zone GL-C, approximately 102 km downstream. In the seven years since release, it increased in size by 260 mm and 633 g.
- One was stocked on May 30, 2014 in Zone BWR-B and was recaptured on September 19, 2021 in Zone GL-C, approximately 114 km downstream. In the seven years since release, it increased in size by 380 mm and 1,434 g.
- One was stocked on May 31, 2018 at an unknown location within the Burntwood River and was recaptured on September 18, 2021 in the Keeyask reservoir (Zone GL-B). In the three years since release, it increased in size by 158 mm and 229 g.

## 4.2 STEPHENS LAKE

Between September 14 and 23, 2021 a total of 34 gill net sites were fished in upper Stephens Lake (Table 2; Map 6). Water temperature during sampling ranged from 11.9°C to 14.4°C (Appendix A1-2). A total of 633 fish from ten fish species were captured, and Lake Sturgeon were the second most abundant ( $n = 158$ ; 25.0%) (Table 3). Gill net site data is presented in Appendix A1-2 and biological and tagging information are presented in Appendix A2-2.

In total, 151 juvenile and 7 adult Lake Sturgeon were captured in 1,523.3 gill net hours for a total CPUE of 2.49 LKST/100 m net/24 h (Table 4). No juvenile mortalities were recorded during sampling. Total CPUE in 2021 was higher than any previous monitoring year except for 2019 (Table 5). Gill nets were set in both zones located within the upper 10 km of Stephens Lake with effort split evenly between zones STL-A and STL-B (Map 6). Total CPUE by zone was as follows:



- 2.28 LKST/100 m/24 h in Zone STL-A (n = 19 sites); and
- 2.67 LKST/100 m/24 h in Zone STL-B (n = 15 sites; Table 4).

Of the 158 Lake Sturgeon captured, 69 were known hatchery-reared fish (*i.e.*, stocked at age-1 and marked with PIT tags; discussed in further detail in Section 4.2.5). Total CPUE for wild Lake Sturgeon and hatchery-reared Lake Sturgeon were as follows:

- 1.40 LKST/100 m/24 h (n = 89) for wild Lake Sturgeon; and
- 1.09 LKST/100 m/24 h (n = 69) for hatchery-reared Lake Sturgeon (Table 6).

### 4.2.1 YEAR-CLASS STRENGTH

Ages were assigned to 148 of the 151 juvenile fish captured as well as one adult sturgeon aged in a previous study year. Ageing structures from the three remaining juvenile fish were not taken due to the fish being in poor condition at the time of capture.

Aged juvenile Lake Sturgeon (including both wild and hatchery) ranged from 0–14 years old (*i.e.*, 2007–2021 cohorts). The 2018 cohort (age-3) was the most frequent in the catch accounting for 35% (n = 51) of aged fish (Figure 7). The 2015 and 2016 cohorts (ages 6 and 5) were the next most abundant age-classes, representing 14% (n = 20) and 16% (n = 23) of the catch, respectively (Figure 7). Hatchery-reared Lake Sturgeon were abundant in the catch accounting for the majority of the 2014 cohort (n = 9; 82%), 38% of the 2016 cohort (n = 9), and the entire 2018 cohort (n = 51; Figure 7). Wild fish from all cohorts between 2000 and 2021, except for the 2018 cohort, have been present in the catch since studies began (Table 7).

### 4.2.2 POPULATION ESTIMATE

The 2021 population estimate for Stephens Lake was 526 wild juvenile Lake Sturgeon (95% CI: 369–749; Figure 8; Appendix A5-3). The estimated annual survival rate was 78%.

Survival of hatchery-reared Lake Sturgeon stocked into Stephens Lake was estimated at 78% (Appendix A5-4). Based on this survival estimate, 91, 260, and 234 hatchery-reared individuals from the 2014, 2016, and 2018 cohorts are present in Stephens Lake, contributing to a population estimate of 585 hatchery fish. Based on these numbers, it is estimated that hatchery fish currently make up 53% of the total juvenile Lake Sturgeon population in Stephens Lake.

### 4.2.3 GROWTH AND CONDITION

Length-weight relationships for hatchery-reared and wild Lake Sturgeon are presented in Figure 3. Mean length, weight, and condition factor of wild Lake Sturgeon captured during juvenile Lake Sturgeon monitoring since 2008 is presented in Table 8.

Wild Lake Sturgeon had a:

- Mean FL of 516 mm ( $n = 89$ ; StDev = 178 mm; range 101–940 mm);
- Mean weight of 1,344 g ( $n = 87$ ; StDev = 1,266 g; range 25–6,010 g); and
- Mean condition factor of 0.71 ( $n = 87$ ; StDev = 0.14; range 0.32–1.46) (Table 9).

Wild Lake Sturgeon in the 550–599 mm FL interval were captured most frequently accounting for 13% ( $n = 18$ ) of the wild catch. The 450–499 mm and 500–549 mm FL intervals were also caught frequently and accounted for 10% ( $n = 14$ ) and 11% ( $n = 15$ ) of the catch, respectively (Figure 4).

Hatchery-reared Lake Sturgeon had a:

- Mean FL of 459 mm ( $n = 69$ ; StDev = 69 mm; range 376–652 mm);
- Mean weight of 671 g ( $n = 69$ ; StDev = 379 g; range 375–1,900 g); and
- Mean condition factor of 0.64 ( $n = 69$ ; StDev = 0.06; range 0.49–0.79) (Table 9).

Hatchery-reared Lake Sturgeon in the 400–449 mm FL interval ( $n = 41$ ; 59%) were captured most frequently (Figure 4). The mean FL, weight and condition factor of hatchery-reared Lake Sturgeon caught in Stephens Lake since 2014 is presented in Table 10.

Growth curve analysis of hatchery and wild fish showed that young hatchery fish (0–4 years-old) are longer than wild fish of the same cohort. However, the lengths of wild and hatchery fish appear similar around age-5 (Figure 9).

## 4.2.4 RECAPTURES

A total of 38 Lake Sturgeon tagged in a previous year were recaptured in Stephens Lake in 2021 (Table 11; Appendix A4-3). Recaptured fish moved varying distances from their original capture locations:

- Twenty-six fish were originally captured in Stephens Lake. Four were recaptured within 1.0 km of their initial capture location and twenty-two between 1.1 and 2.9 km of their initial capture location.
- Eleven were originally tagged in the Keeyask reservoir and were captured between 11.3 and 14.5 km downstream of their original tagging location. Although it is not possible to determine the exact date that these fish moved downstream, based on the date of last capture, nine moved downstream between 2012 and 2019. The remaining two fish moved downstream after reservoir impoundment:
  - Floy tag #118890 was last captured in the Keeyask reservoir in September 2020 following impoundment.
  - One was an acoustically tagged fish (Floy tag #31685) that moved downstream through the Keeyask GS in July 2021. Details on its movements since tagging in 2018 can be found in Funk and Hrenchuk (2022).

- One (Floy tag #116587) fish was originally tagged in Split Lake (Zone SPL-A; Map 3) on September 12, 2019. It was recaptured in Stephens Lake during sampling in both 2020 and 2021 (>100 km downstream). It increased in size by 109 mm and 555 g since its initial capture.

## 4.2.5 HATCHERY CAPTURES

A total of 69 hatchery-reared Lake Sturgeon released as one-year-olds were captured in Stephens Lake in 2021, representing 43.7% of the total catch (Table 12). An age breakdown of all the hatchery-reared fish captured between 2014 and 2021 is presented in Table 13.

Fifty-nine were stocked in Stephens Lake (Map 7):

- Eight were stocked in 2015, six on June 22 at Site 3 (Zone STL-B) and two on September 14 at Sites 4 (Zone STL-B) and 5 (Zone STL-A). These fish were captured within 1.1 and 2.2 km of their stocking locations.
- Seven were stocked in 2017, four on June 15 at Site 1 (Zone STL-A) and three on October 5 at Site 4 (Zone STL-B). These fish were captured within 1.3 and 4.0 km of their stocking locations.
- Forty-four were stocked on June 13, 2019 at Sites 1 (Zone STL-A) and 2 (Zone STL-B). These fish were captured between 0.1 and 2.6 km of their stocking locations.

Ten were stocked in Gull Lake (now the Keeyask reservoir) (Map 5):

- Three were stocked prior to spillway commissioning and may have moved downstream through Gull Rapids or the Keeyask GS spillway.
  - One was stocked on June 22, 2015 at Site 1 (Zone GL-B) and was recaptured 16.8 km downstream of its stocking location.
  - Two were stocked on June 8, 2017 at Site 1 (Zone GL-A) and were captured 22.9 and 23.5 km downstream.
- Seven were stocked after spillway commissioning and moved downstream through the Keeyask GS spillway.
  - Four were stocked on June 6, 2019 at Site 1 (Zone GL-C) and were captured between 11.4 and 12.4 km downstream.
  - Three were stocked on June 6, 2019 in at Site 2 (Zone GL-B) and were captured between 12.4 and 15.7 km downstream.

## 5.0 DISCUSSION

Juvenile Lake Sturgeon population monitoring described in the Keeyask AEMP began in the fall of 2014, immediately after the start of the Keeyask GS construction. The monitoring program enables comparisons to data gathered during studies conducted since 2008 that measured juvenile sturgeon abundance, habitat use, condition, growth, year-class strength and factors influencing year-class strength in the Upper Split Lake Area, the Keeyask reservoir, and in Stephens Lake. Sampling in the Keeyask reservoir in 2021 occurred one full year after reservoir impoundment, which was completed on September 5, 2020.

### 5.1 ABUNDANCE

The overall catch and abundance estimates for wild juvenile Lake Sturgeon in the Keeyask reservoir suggest that the number of juveniles has remained relatively stable since 2018. The CPUE in 2021 (4.07 LKST/100 m/24 h) was the highest recorded since construction started in 2014 and was only slightly lower than the highest CPUE ever recorded (in 2011; 4.39 LKST/100 m/24 h). The 2021 population estimate for the Keeyask reservoir was 2,776 (95% CI: 1,757-4,385) juvenile Lake Sturgeon. Survival of wild juvenile Lake Sturgeon within the Keeyask reservoir was measured at 75% (Jolly-Seber model within MARK). Overall, the population estimate for the wild juvenile population in the Keeyask reservoir has remained relatively stable since 2014, particularly the more recent estimates derived from 2018 to 2021.

Similar to the Keeyask reservoir, capture rates and abundance estimates suggest that the number of juvenile Lake Sturgeon has remained relatively stable in Stephens Lake. The CPUE in 2021 (2.49 LKST/100 m/24 h) was only lower than the CPUE recorded in 2019 (3.52 LKST/100 m/24 h), which was influenced by a stocking event immediately prior to sampling (Burnett and Hrenchuk 2020). The population estimate for wild juvenile Lake Sturgeon was calculated at 526 individuals (95% CI: 369-749). Juvenile survival was estimated to be 78% (Jolly-Seber model within MARK).

### 5.2 RECRUITMENT

Juvenile Lake Sturgeon recruitment has occurred in the majority of study years in both the Keeyask reservoir and Stephens Lake since 2014. Of the aged wild Lake Sturgeon caught in 2021, 34 were aged between 0 and 3 (22 in the Keeyask reservoir and 12 in Stephens Lake). The presence of fish between age-0 and age-3 provides a short-term indication of spawning and recruitment success of early life stages during the construction and post-impoundment periods. The majority of young fish (between age-0 and -3) were age-1 ( $n = 25$ ) suggesting the 2020 cohort may be strong in future study years. YOY fish were only captured in Stephens Lake in 2021 ( $n =$

2); however, the YOY age class have historically represented a small proportion of the catch as they are not fully recruited to the sampling gear.

The absence of juveniles  $\leq 3$  years of age in a sampling year represents an early warning trigger action level. This provides an alert that further analysis may be required to determine if unanticipated negative effects are occurring. There were initial concerns regarding the absence of wild YOY and age-1 fish from Stephens Lake in the 2019 study year (2017, 2018, and 2019 cohorts), however, several wild sturgeon from the 2017 ( $n = 12$ ), 2019 ( $n = 3$ ), and 2020 ( $n = 9$ ) cohorts have been captured since this time. Additionally, YOY were captured in Stephens Lake in both the 2020 and 2021 study years.

Wild fish from the 2018 cohort were absent from the catch in Stephens Lake for the fourth consecutive year. In the Keeyask reservoir, wild fish from the 2018 cohort are present at low abundances, and only five have been captured since 2018. In general, Lake Sturgeon recruitment is known to be highly variable across their range, and variable recruitment is considered to be a trait of this species (McDougall *et al.* 2014b). The capture of wild Lake Sturgeon from the 2019–2021 cohorts indicates recruitment has continued to occur during the later stages of construction and the early stages of operation of Keeyask.

## 5.3 MOVEMENTS

Prior to reservoir impoundment in 2020, relatively few wild Lake Sturgeon originally tagged upstream of the Keeyask GS were recaptured in Stephens Lake ( $n = 7$  since 2009). However, in 2021, 11 wild Lake Sturgeon tagged upstream of the Keeyask GS, including one tagged in Split Lake, were recaptured in Stephens Lake. Although the timing of the majority of these movements is not known, it is possible that downstream movements have increased post-impoundment. Acoustic tracking of both juvenile and adult Lake Sturgeon documented increased movements through the Keeyask GS in 2021 compared to all previous sampling years (16% of tracked juveniles and 32% of tracked adults) (discussed in Funk and Hrenchuk 2022 and Small and Hrenchuk 2022). Juvenile population monitoring in future years will help determine if this pattern continues.

## 5.4 HATCHERY FISH

Stocking in the Burntwood River began in 2014 and since that time 2,123 age-1<sup>1</sup> Lake Sturgeon have been released (“Burntwood stocked fish”). Based on the recapture locations of Lake Sturgeon stocked in the Burntwood River, some of the stocked fish disperse a long distance

---

<sup>1</sup> Due to the cancellation of spring field activities in 2020 as a result of COVID-19, no broodstock were collected and a total of 192 Burntwood River yearling were kept at the Grand Rapids Hatchery. They were released in spring 2021 at age-2 (discussed in Klassen *et al.* 2022).

downstream after release. Four Burntwood stocked fish were recaptured downstream in the Keeyask reservoir in 2021, the highest number recaptured since stocking began. The four captures bring the total number of Burntwood stocked fish caught in the Keeyask reservoir to 11. While Burntwood stocked fish have been recaptured in Stephens Lake in previous study years, none were recaptured in 2021.

Stocking in the Keeyask reservoir began in 2015 with 1,284 age-1 fish released to date (“Keeyask stocked fish”). Stocking of yearlings was scheduled to occur in 2021 but due to complications related to COVID-19 no broodstock was collected from Gull Lake (now the Keeyask reservoir) in the spring of 2020. The proportion of Keeyask stocked fish in the 2021 catch was the second highest since stocking began ( $n = 53$ ; 20%). In Stephens Lake, 1,528 age-1 hatchery-reared Lake Sturgeon have been released since 2015 (“Stephens stocked fish”). Similar to the Keeyask reservoir, the proportion of hatchery fish in the catch was the second highest since stocking began ( $n = 69$ ; 44%).

The proportion of Keeyask and Stephens stocked fish in the catch has been increasing, even with a missed stocking year in 2021. Of the 1,284 yearlings stocked in the Keeyask reservoir, 230 (18%) have been recaptured, 188 in the Keeyask reservoir and 42 in Stephens Lake. A similar proportion of Stephens stocked fish have been recaptured in Stephens Lake ( $n = 269$ ; 18%). The number of Keeyask stocked fish recaptured in Stephens Lake continues to be high with ten fish caught in 2021.

## 5.5 KEY QUESTIONS

Impoundment of the Keeyask reservoir was completed on September 5, 2020 and sampling in the Keeyask reservoir in 2021 represented the first year that the water was at full supply level. Monitoring in Stephens Lake, however, represented a transition between construction and operation. During the juvenile monitoring the spillway was closed and four powerhouse units were fully in-service which, due to the very low flows, could pass the entire flow of the river. Due to Keeyask reservoir impoundment, several key questions identified in the AEMP that have not been previously discussed are addressed below.

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

In 2021, two YOY Lake Sturgeon were caught in Stephens Lake in the vicinity of the Keeyask GS and none were caught upstream in the Keeyask reservoir. The absence of YOY in the Keeyask reservoir does not necessarily mean recruitment was unsuccessful, as YOY are often underrepresented in the catch due to their size. Spawning has occurred consistently since construction began. Successful spawning has been demonstrated in every year since construction began (*i.e.*, 2015–2021) with the exception of 2018 in Stephens Lake and 2021 in the Keeyask reservoir.

*Does spawning habitat need to be created/modified (if recruitment of wild fish is not observed)?*



At this time, it is too early to determine if recruitment has been impacted by creation of the Keeyask reservoir, as only a single cohort has been produced post-impoundment. Recruitment has occurred consistently since construction began and two YOY Lake Sturgeon were caught in Stephens Lake in 2021 indicating successful recruitment in the vicinity of the Keeyask GS. Spring spawning studies captured spawning adult Lake Sturgeon both upstream and downstream of the GS (Loeppky and Hrenchuk 2022).

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

Condition factor of juvenile Lake Sturgeon sampled in the Keeyask reservoir and Stephens Lake in 2021 were within the ranges observed in previous years. Comparison of growth curves of wild fish captured in the Keeyask reservoir during baseline, construction, and operation indicated growth was similar across time periods. Too few juveniles were collected in Stephens Lake prior to construction to support a pre-/post-construction analysis but growth rates are comparable to or slightly greater than observed in the Keeyask reservoir.

*Where in the reservoir and in Stephens Lake will YOY rearing habitat be located, and will the distribution of YOY and juvenile Lake Sturgeon change following reservoir creation?*

Creation of the Keeyask reservoir was completed on September 5, 2020, with sampling in 2021 occurring just over a year after impoundment. Similar to previous sampling years, juvenile Lake Sturgeon in 2021 were largely captured in the lower portion of the middle basin of the reservoir (Zone GL-B) and in the area northwest of Caribou Island (Zone GL-C). However, gill nets set farther upstream in Zones GL-A and BR-D displayed a higher CPUE than in previous study years and may be the result of increased habitat suitability related to impoundment. In Stephens Lake, the majority of fish were concentrated within the deep areas of water north of the islands located approximately 6 km downstream of the GS, in the same general areas as in previous sampling years. Continued monitoring of juvenile Lake Sturgeon in the Keeyask study area will indicate both the short- and long-term impacts of impoundment on habitat utilization and abundance.

*Does additional YOY habitat need to be created in the Keeyask reservoir or in Stephens Lake?*

Recruitment of wild juvenile Lake Sturgeon has occurred consistently both upstream and downstream of the Keeyask GS since construction began. As a result, there is no current need for the creation of additional YOY habitat in the Keeyask reservoir or Stephens Lake. Continued monitoring will help determine if YOY habitat is needed in the future.

Three questions related to the stocking program are addressed below:

- *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)?; and*
- *Do stocking rates need to be adjusted?*

In 2021, modelling results estimated the annual survival rate of stocked sturgeon at 92% in the Keeyask reservoir and 78% in Stephens Lake. The population of hatchery-reared Lake Sturgeon

in the Keeyask reservoir was estimated at 927 individuals (25% of the total juvenile population). The population of hatchery-reared Lake Sturgeon in Stephens Lake was estimated at 585 individuals (53% of the total juvenile population). It is important to note that only sturgeon stocked as yearlings and marked with PIT tags can be distinguished from wild fish, thus, the model only considers these fish.

In 2021, hatchery-reared fish continued to account for a high proportion of the catch in both the Keeyask reservoir and Stephens Lake. Within the Keeyask reservoir, hatchery-reared fish accounted for 9% of the 2013, 49% of the 2014, 13% of the 2016, 7% of the 2017, and 92% of the 2018 cohorts. Within Stephens Lake, hatchery-reared fish accounted for 75% of the 2014, 38% of the 2016, and 100% of the 2018 cohorts.

Based on survival and capture rates, stocking is proving to be very successful both in the Keeyask reservoir and in Stephens Lake. Stocking rates will be examined closely in the next couple of years to determine if adjustment is required.

## 5.6 NEXT STEPS

Sampling conducted in 2021 represents the second year of monitoring following impoundment of the Keeyask GS reservoir. The juvenile Lake Sturgeon population monitoring program will be repeated in 2022 and will include the Upper Split Lake Area. As described in the AEMP, juvenile population monitoring is scheduled to occur annually in the future Keeyask reservoir and Stephens Lake, and biennially in the Upper Split Lake Area.

## 6.0 SUMMARY AND CONCLUSIONS

- Sampling locations in the Keeyask reservoir and Stephens Lake remained similar to previous years with the exception of several new locations within the Keeyask reservoir. Sampling in the Upper Split Lake Area did not occur in 2021 but will continue biennially in 2022.
- In the Keeyask reservoir, 266 (263 juvenile and three adult) Lake Sturgeon were captured in 1,570.2 gill net hours for a total CPUE of 4.07 Lake Sturgeon/100 m net/24 h. Aged juvenile Lake Sturgeon ( $n = 246$ ) ranged from 1 to 16 years old with 5-year-old fish (2016 cohort) being the most prevalent in the catch ( $n = 60$ ; 24.4%). No YOY were captured in the Keeyask reservoir. A total of 30 Lake Sturgeon tagged in previous years and 57 stocked yearlings were captured. Of the 57 hatchery-reared fish: 21 were released into the Keeyask reservoir in 2015 (2014 cohort), eight were released in 2017 (2016 cohort), and 24 were released in 2019 (2018 cohort). Four additional hatchery fish were originally released in the Burntwood River: three in 2014 (2013 cohort) and one in 2018 (2017 cohort).
- In Stephens Lake, 158 (151 juvenile and seven adult) Lake Sturgeon were captured in 1,523.3 gill net hours for a total CPUE of 2.49 Lake Sturgeon/100 m net/24 h. Aged Lake Sturgeon ( $n = 148$ ) ranged from 0 to 14 years old with the 2018 cohort (age-3) captured most frequently ( $n = 51$ ; 34.5%). Two wild YOY fish were captured. A total of 38 Lake Sturgeon tagged in a previous year and 69 stocked yearlings were captured. Eleven of the 38 recaptured wild Lake Sturgeon were initially tagged upstream of the Keeyask GS: ten in the Keeyask reservoir and one in Split Lake. Of the 69 hatchery-reared fish caught in 2021: eight were released in Stephens Lake in 2015 (2014 cohort), seven were released in 2017 (2016 cohort) and 44 were released in 2019 (2018 cohort). An additional ten were hatchery recaptures stocked in the Keeyask reservoir: one in 2015, two in 2017 and seven in 2019.
- Abundance estimates were calculated for wild juvenile Lake Sturgeon in the Keeyask reservoir and Stephens Lake. Survival was estimated to be 75% in the Keeyask reservoir and 78% in Stephens Lake. The 2021 population estimates for the Keeyask reservoir and Stephens Lake were 2,776 (95% CI: 1,757–4,385) and 526 (95% CI: 369–749), respectively.
- The key questions, as described in the AEMP, for juvenile Lake Sturgeon population monitoring during construction and operation of the Keeyask GS are as follows:
  - *Does recruitment of wild sturgeon occur upstream and/or downstream of the GS during construction and operation?*

In 2021, two wild YOY Lake Sturgeon were caught in Stephens Lake in the vicinity of the Keeyask GS. Successful spawning has been demonstrated in every year since construction began (i.e., 2015–2021), with the exception of 2018 Stephens Lake and 2021 Keeyask reservoir.

- *Does spawning habitat need to be created/modified (if recruitment of wild fish is not observed)?*

At this time, it is too early to determine if recruitment has been impacted by creation of the Keeyask reservoir, as only a single cohort has been spawned post-impoundment. Future monitoring will determine if spawning habitat needs to be created/modified to offset any potential impacts related to Keeyask GS operation

- *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 sampled in the Keeyask reservoir and Stephens Lake in 2021 were within the ranges observed in previous years. Comparison of growth curves of wild fish captured in the Keeyask reservoir during baseline and construction indicated growth during both time periods was similar. Too few juveniles were collected in Stephens Lake prior to construction to support a pre/post construction analysis but growth rates are comparable to or slightly greater than observed in the Keeyask reservoir.

- *Where in the Keeyask reservoir and in Stephens Lake will YOY rearing habitat be located, and will the distribution of YOY and juvenile Lake Sturgeon change following reservoir creation?*

Sampling in 2021 occurred more than one year after reservoir impoundment. Juvenile Lake Sturgeon were captured in the same general locations within the Keeyask reservoir and Stephens Lake as in previous years. However, during 2021 sampling, sturgeon were caught at several areas farther upstream within the Keeyask reservoir that had not been suitable for netting prior to impoundment.

- *Does additional YOY habitat need to be created in the Keeyask reservoir or in Stephens Lake?*

Recruitment of wild juvenile Lake Sturgeon has occurred consistently both upstream and downstream of the Keeyask GS since construction began. No YOY were captured in the Keeyask reservoir in 2021 which is not unusual as this age class is too small to be recruited to the sampling gear. Future sampling will indicate whether YOY survive in the reservoir.

- *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)? Do stocking rates need to be adjusted?*

The survival rates of stocked sturgeon were 92% in the Keeyask reservoir and 78% in Stephens Lake. Based on these survival rates, the population of stocked fish was estimated at 927 fish (or 25% of the juvenile population) in the Keeyask reservoir and 585 fish (53%) in Stephens Lake.

Within the Keeyask reservoir, hatchery-reared fish accounted for 9% of the 2013, 49% of the 2014, 13% of the 2016, 7% of the 2017, and 92% of the 2018 cohorts. Within Stephens Lake, hatchery-reared fish accounted for 75% of the 2014, 38% of the 2016, and 100% of the 2018 cohorts.

Stocked fish currently make up a large portion of the juvenile Lake Sturgeon in both areas, and especially in Stephens Lake. Stocking rates will be examined closely in the next couple of years to determine if adjustment is required.

## 7.0 LITERATURE CITED

- Arnason, A.N. and Schwarz, C.J. 2002. POPAN-6: Exploring convergence and estimate properties with SIMULATE. *Journal of Applied Statistics* 29: 649–668.
- Barth, C.C., Peake, S.J., Allen, P.J. and Anderson, W.G. 2009. Habitat utilization of juvenile Lake Sturgeon, *Acipenser fulvescens*, in a large Canadian river. *Journal of Applied Ichthyology* 25: 18–26.
- Burnett, D.C. and McDougall, C.A. 2015. Upper Nelson River juvenile Lake Sturgeon inventories, 2014: Little Playgreen Lake. A Lake Sturgeon Stewardship and Enhancement Program report prepared for Manitoba Hydro by North/South Consultants Inc. 65 pp.
- Burnett, D.C., Henderson, L.M., Barth, C.C. and Hrenchuk, C.L. 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. xiii + 84 pp.
- Burnett, D.C., Lacho, C.D. and Hrenchuk, C.L. 2017. Juvenile Lake Sturgeon population monitoring, fall 2016: Year 3 Construction. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2017-06. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2017. xv + 86 pp.
- Burnett, D.C., Hrenchuk, C.L. and Barth, C.C. 2018. Juvenile Lake Sturgeon population monitoring, fall 2017: Year 4 Construction. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2018-02. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2018. xv + 120 pp.
- Burnett, D.C. and Hrenchuk, C.L. 2019. Juvenile Lake Sturgeon population monitoring, fall 2018: Year 5 Construction. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2019-06. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2019. xv + 151 pp.
- Burnett, D.C. and Hrenchuk, C.L. 2020. Juvenile Lake Sturgeon population monitoring, fall 2019: Year 6 Construction. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2020-06. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2020. xv + 120 pp.
- Burnett, D.C., Hrenchuk, C.L. and Nelson, P.A. 2021. Juvenile Lake Sturgeon population monitoring, fall 2020: Year 7 Construction. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2021-05. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2020. xv + 142 pp.
- Funk, B. and C.L. Hrenchuk. 2022. Juvenile Lake Sturgeon movement monitoring in the Nelson River between Clark Lake and the Limestone Generating Station, October 2020 to 2021: Year 8 Construction. Keeyask Generation Project Aquatic Effects Monitoring Plan Report #AEMP-2022-01. A report prepared for Manitoba Hydro by North/South Consultants Inc.



- Henderson, L.M. and Pisiak, D.J. 2012. Results of young-of-the-year and sub-adult 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., Barth, C.C., MacDonald, J.E. and Blanchard, M. 2011. Young-of-the-year and sub-adult Lake Sturgeon investigations in the Keeyask Study Area, spring and fall 2010. A report prepared for Manitoba Hydro by North/South Consultants Inc. ix + 49 pp.
- Henderson, L.M., McDougall, C.A. and Barth, C.C. 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. xiii + 59 pp.
- Henderson, L.M., McDougall, C.A. and MacDonell, D.S. 2014. 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.
- Henderson, L.M., Barth, C.C. and Hrenchuk, C.L. 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. xi + 61 pp.
- Klassen, C., Michaluk, Y., Alexander, M. and Groening, L. 2017. Lake Sturgeon production and stocking summary for Birthday Rapids and Burntwood River populations, October 2015 to September 2016: Year 3 Construction. A report prepared by Manitoba Hydro.
- Klassen, C., Michaluk, Y., Kirchmann, S. and Clark, N. 2018. Lake Sturgeon production and stocking summary for Birthday Rapids and Burntwood River populations, October 2016 to October 2017: Year 4 Construction. Keeyask Generation Project Fisheries Off-Setting and Mitigation Report #FOMP-2018-01. A report prepared by Manitoba Hydro, June 2018.
- Klassen, C., Michaluk, Y., Kirchmann, S. and Groening, L. 2019. Lake Sturgeon production and stocking summary for Birthday Rapids and Burntwood River populations, November 2017 to October 2018: Year 5 Construction. A report prepared by Manitoba Hydro. June 2019.
- Klassen, C., Michaluk, Y., Kirchmann, S. and Groening, L. 2020. Lake Sturgeon production and stocking summary for Birthday Rapids and Burntwood River populations, November 2018 to October 2019: Year 6 Construction. A report prepared by Manitoba Hydro. June 2020.
- Klassen, C., U. Michaluk, S. Kirchmann, L. Froening, and L. Boudreau. 2021. Lake Sturgeon production and stocking summary for Birthday Rapids and Burntwood River populations, November 2019 to October 2020: Year 7 Construction. Keeyask Generation Project Fisheries Off-Setting and Mitigation Report #FOMP-2021-01. A report prepared by Manitoba Hydro, June 2021.
- Lawrence, M.J., Fazakas, C.R., Zrum, L., Bezte, C.L. and Bernhardt, W.J. 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.

- Legge, M., Hrenchuk, C.L., Barth, C.C. and Burnett, D.C. 2017. Adult Lake Sturgeon population monitoring in the Keeyask Area (Clark Lake to Gull Rapids) and Stephens Lake, 2016. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2017-05. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2017. xii +67 pp.
- Loeppky, A. and C.L. Hrenchuk. 2022. Adult Lake Sturgeon population monitoring in the Keeyask reservoir and Stephens Lake, 2021. Keeyask Generation Project Aquatic Effects Monitoring Plan Report #AEMP-2022-05. A draft report prepared for Manitoba Hydro by North/South Consultants Inc.
- MacDonald, J.E. 2009. Lake Sturgeon investigations in the Keeyask Study Area, 2007–2008. A report prepared for Manitoba Hydro by North/South Consultants Inc. xii + 64 pp.
- McDougall, C.A. and Pisiak, D.J. 2014. Upper Nelson River juvenile Lake Sturgeon inventories, 2013: Sea Falls – Sugar Falls and the Pipestone Lake area. A Lake Sturgeon Stewardship and Enhancement Program report prepared for Manitoba Hydro by North/South Consultants Inc. 91 pp.
- McDougall, C.A., Blanchfield, P.J., Peake, S.J. and Anderson, W.G. 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., Barth, C.C., Aiken, J.K., Henderson, L.M., Blanchard, M.A., Ambrose, K.M., Hrenchuk, C.L., Gillespie, M.A. and Nelson, P.A. 2014a. How to sample juvenile Lake Sturgeon, (*Acipenser fulvescens* Rafinesque, 1817), in Boreal Shield rivers using gillnets, with an emphasis on assessing recruitment patterns. Journal of Applied Ichthyology 30: 1402–1415.
- McDougall, C.A., Pisiak, D.J., Barth, C.C., Blanchard, M.A., MacDonell, D.S., and Macdonald, D. 2014b. Relative recruitment success of stocked age-1 vs age-0 Lake Sturgeon (*Acipenser fulvescens* Rafinesque, 1817) in the Nelson River, northern Journal of Applied Ichthyology 30: 1451–1460.
- Michaluk, Y. and MacDonald, J.E. 2010. Lake Sturgeon investigations in the Keeyask Study Area, 2009. A report prepared for Manitoba Hydro by North/South Consultants Inc. xiii + 83 pp.
- Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada Bulletin 191. xvii + 382 pp.
- Small, K. and C.L. Hrenchuk. 2022. Adult Lake Sturgeon movement monitoring in the Nelson River between Clark Lake and the Limestone Generating Station, October 2020 to 2021: Year 8 Construction. Keeyask Generation Project Aquatic Effects Monitoring Plan Report #AEMP-2022-01. A report prepared for Manitoba Hydro by North/South Consultants Inc.

## **TABLES**

**Table 1: Summary of Lake Sturgeon stocking since 2014. Numbers of stocked fish are from Klassen *et al.* 2022.**

Year <sup>a</sup>	Burntwood River			Keeyask reservoir <sup>b</sup>			Stephens Lake		
	Larvae	Fingerlings	Age-1	Larvae	Fingerlings	Age-1	Larvae	Fingerlings	Age-1
2014	-	-	595	152,926	4,656	-	-	-	-
2015	-	-	-	-	-	423	-	-	418
2016	-	-	23	192,167	780	-	184,134	799	-
2017	71,740	3,765	-	-	-	463	-	-	720
2018	-	-	739	-	933	-	-	1,010	-
2019	-	(3,681) <sup>c</sup>	-	-	-	398	-	-	390
2020	-	-	574	-	-	-	-	-	-
2021	-	-	188 <sup>d</sup>	-	-	-	-	(1,050)	-
<b>Total</b>	<b>71,740</b>	<b>7,446</b>	<b>2,119</b>	<b>345,093</b>	<b>6,369</b>	<b>1,284</b>	<b>184,134</b>	<b>2,859</b>	<b>1,528</b>

a – Stocking year

b – From Birthday Rapids to Gull Rapids/the Keeyask GS

c – Numbers in parentheses were stocked after the juvenile survey

d – Due to the cancellation of spring field activities as a result of COVID-19 in 2020, a total of 192 Burntwood River yearlings remained at the hatchery for the 2020/2021 winter. They were released in spring 2021 as age-2 fish.

**Table 2: Summary of start and completion dates for juvenile Lake Sturgeon monitoring during fall 2021, by location.**

Location	Start Date	Completion Date	# Sites
Keeyask reservoir	14-Sep-21	23-Sep-21	31
Stephens Lake	14-Sep-21	23-Sep-21	34

**Table 3: Number (n) and frequency of occurrence (%), by species and sampling location, of fish captured during juvenile Lake Sturgeon monitoring, fall 2021.**

Species	Scientific Name	Keeyask reservoir		Stephens Lake		Total n	Total %
		n	%	n	%		
Burbot	<i>Lota lota</i>	0	0.0	31	4.9	31	2.8
Lake Chub	<i>Couesius plumbeus</i>	0	0.0	0	0.0	0	0.0
<b>Lake Sturgeon</b>	<b><i>Acipenser fulvescens</i></b>	<b>266</b>	<b>55.2</b>	<b>158</b>	<b>25.0</b>	<b>424</b>	<b>38.0</b>
Lake Whitefish	<i>Coregonus clupeaformis</i>	1	0.2	20	3.2	21	1.9
Longnose Sucker	<i>Catostomus catostomus</i>	180	37.3	273	43.1	453	40.6
Northern Pike	<i>Esox lucius</i>	1	0.2	1	0.2	2	0.2
Rainbow Smelt	<i>Osmerus mordax</i>	0	0.0	0	0.0	0	0.0
Sauger	<i>Sander canadensis</i>	23	4.8	75	11.8	98	8.8
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	0	0.0	6	0.9	6	0.5
Troutperch	<i>Percopsis omiscomaycus</i>	0	0.0	2	0.3	2	0.2
Walleye	<i>Sander vitreus</i>	10	2.1	46	7.3	56	5.0
White Sucker	<i>Catostomus commersoni</i>	0	0.0	21	3.3	21	1.9
Yellow Perch	<i>Perca flavescens</i>	1	0.2	0	0.0	1	0.1
<b>Total</b>		<b>482</b>	<b>100</b>	<b>633</b>	<b>100</b>	<b>1115</b>	<b>100</b>

**Table 4: Lake Sturgeon catch-per-unit effort (CPUE; # LKST/100 m net/24 h) by location and zone, for gill nets set during juvenile Lake Sturgeon monitoring, fall 2021.**

Location	Zone	# of Sites	Effort (gill net hours)	# of Lake Sturgeon	CPUE (#LKST/100m/24h)
Keeyask reservoir	BR-D	3	162.1	24	3.55
	GL-A	4	221.5	53	5.74
	GL-B	8	456.8	68	3.57
	GL-C	16	729.7	121	3.98
<b>Total</b>		<b>31</b>	<b>1570.2</b>	<b>266</b>	<b>4.07</b>
Stephens Lake	STL-A	19	715.5	68	2.28
	STL-B	15	807.8	90	2.67
<b>Total</b>		<b>34</b>	<b>1523.3</b>	<b>158</b>	<b>2.49</b>



**Table 5: Lake Sturgeon catch-per-unit-effort (CPUE; # LKST/100 m net/24 h) for gill nets set to target juvenile Lake Sturgeon between 2007 and 2021. Grey highlighted rows indicate construction monitoring and the blue highlighted row indicates post-impoundment monitoring.**

Location	Year	Start Date	Completion Date	Mesh Size	# Sites	Effort (gill net hrs <sup>a</sup> )	# Lake Sturgeon <sup>b</sup>	CPUE
Keeyask reservoir <sup>c</sup>	2007	28-Sep	03-Oct	8mm - 5"	26	165	0	0
	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
	2016	12-Sep	23-Sep	1" - 6"	37	997	96	2.31
	2017	09-Sep	19-Sep	1" - 6"	51	1551	177	2.74
	2018	09-Sep	19-Sep	1" - 6"	50	1377	150	2.61
	2019	10-Sep	20-Sep	1" - 6"	39	1561	244	3.75
	2020	15-Sep	23-Sep	1" - 6"	38	1599	205	3.08
	2021	14-Sep	26-Sep	1" - 6"	31	1570	266	4.07
Stephens Lake	2007	19-Sep	23-Sep	2" - 5"	15	48	0	0
	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
	2016	12-Sep	23-Sep	1" - 6"	37	1384	66	1.14
	2017	09-Sep	19-Sep	1" - 6"	40	1796	148	1.98
	2018	09-Sep	21-Sep	1" - 6"	49	1599	74	1.11
	2019	11-Sep	21-Sep	1" - 6"	40	1561	229	3.52
	2020	15-Sep	25-Sep	1" - 6"	54	1605	142	2.12
	2021	14-Sep	23-Sep	1" - 6"	34	1523	158	2.49

a - Gill net set durations were standardized to 100 m of net and then summed to calculate the total gill net hours for each study

b - Does not include Lake Sturgeon recaptured more than once in the same study

c - Birthday Rapids to Gull Rapids/the Keeyask GS

**Table 6: Catch-per-unit-effort (CPUE; # LKST/100 m net/24 h) for hatchery and wild caught Lake Sturgeon in the Keeyask reservoir and Stephens Lake, fall 2021.**

<b>Location</b>	<b>Effort (gill net hours)</b>	<b># of Lake Sturgeon</b>	<b>CPUE (#LKST/100m/24h)</b>
Keeyask reservoir			
<i>Wild</i>	1,570.2	209	3.19
<i>Hatchery</i>	1,570.2	57	0.87
<b>Total</b>		<b>266</b>	<b>4.07</b>
Stephens Lake			
<i>Wild</i>	1,523.3	89	1.40
<i>Hatchery</i>	1,523.3	69	1.09
<b>Total</b>		<b>158</b>	<b>2.49</b>

**Table 7: Number of wild Lake Sturgeon captured from 2008 to 2021, from which ages and cohorts were determined. Grey highlighted columns indicate cohorts spawned during Keeyask GS construction, blue highlighted cell indicates cohort spawned after impoundment of the Keeyask reservoir, and red values indicate cohorts not present in the corresponding study year.**

Location	Cohort Year																					
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Keeyask reservoir																						
2008 Study Year	0	0	0	0	0	0	12	2	14	-	-	-	-	-	-	-	-	-	-	-	-	-
2010 Study Year	1	0	0	6	3	1	3	5	18	0	0	-	-	-	-	-	-	-	-	-	-	-
2011 Study Year	0	0	0	5	2	2	7	5	94	1	2	0	-	-	-	-	-	-	-	-	-	-
2012 Study Year	0	0	0	2	2	2	12	6	60	3	1	4	0	-	-	-	-	-	-	-	-	-
2014 Study Year	0	1	0	1	0	1	6	2	58	3	4	7	3	9	0	-	-	-	-	-	-	-
2015 Study Year	0	0	0	0	1	3	10	7	71	1	1	3	6	11	3	4	-	-	-	-	-	-
2016 Study Year	0	0	0	0	0	1	15	0	29	2	1	5	6	13	6	4	4	-	-	-	-	-
2017 Study Year	0	0	0	1	1	0	6	3	56	2	2	11	7	20	10	10	10	1	-	-	-	-
2018 Study Year	0	0	0	0	0	0	3	4	33	5	3	6	4	9	5	9	34	5	1	-	-	-
2019 Study Year	0	0	0	0	0	0	2	1	30	2	3	6	6	20	20	17	44	15	1	4	-	-
2020 Study Year	0	0	0	0	1	1	1	0	18	3	1	6	5	24	16	13	57	12	1	5	1	-
2021 Study Year	0	0	0	0	0	1	0	1	6	6	4	5	9	30	22	17	52	14	2	3	17	-
Total	1	1	0	15	10	12	77	36	487	28	22	53	46	136	82	74	201	47	5	12	18	0
Present in the Catch	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Stephens Lake																						
2009 Study Year	1	1	0	0	1	3	1	0	2	0	-	-	-	-	-	-	-	-	-	-	-	-
2010 Study Year	0	0	1	3	0	1	5	7	14	0	0	-	-	-	-	-	-	-	-	-	-	-
2011 Study Year	0	0	0	1	0	0	0	2	28	2	0	1	-	-	-	-	-	-	-	-	-	-
2012 Study Year	0	0	0	0	0	0	7	4	49	1	2	2	0	-	-	-	-	-	-	-	-	-
2014 Study Year	0	0	0	1	1	0	5	4	25	1	4	5	0	0	0	-	-	-	-	-	-	-
2015 Study Year	0	0	0	0	0	0	4	3	19	1	1	3	0	4	2	11	-	-	-	-	-	-
2016 Study Year	0	0	0	0	1	0	4	4	31	0	0	2	1	3	4	8	0	-	-	-	-	-
2017 Study Year	0	0	0	0	0	0	0	0	19	2	0	3	0	11	4	20	9	5	-	-	-	-
2018 Study Year	0	0	0	0	0	0	0	0	4	0	0	4	1	9	3	20	4	3	0	-	-	-
2019 Study Year	0	0	0	0	0	0	0	0	11	0	2	6	3	11	8	33	15	9	0	0	-	-
2020 Study Year	1	0	0	0	0	0	0	0	9	1	0	3	1	10	4	33	13	5	0	1	2	-
2021 Study Year	0	0	0	0	0	1	0	1	0	1	1	5	0	6	3	21	15	13	0	2	8	2
Total	2	1	1	5	3	5	26	25	211	9	10	34	6	54	28	146	56	35	0	3	10	2
Present in the Catch	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

**Table 8: Mean length, weight, and condition factor of wild Lake Sturgeon captured during juvenile Lake Sturgeon monitoring, since 2008. Grey highlighted rows indicate construction monitoring and blue highlighted row indicates after reservoir impoundment.**

Waterbody	Fork Length (mm)				Weight (g)				Condition Factor			
	n <sup>a</sup>	Mean	Std <sup>b</sup>	Range	n	Mean	Std	Range	n	Mean	Std	Range
Keeyask reservoir												
2008 Study Year	112	607	169	132-1,200	53	1,663	1,138	110-6,804	53	0.74	0.08	0.62-1.03
2010 Study Year	69	389	119	292-780	68	514	620	150-3,250	68	0.69	0.10	0.48-1.03
2011 Study Year	121	433	90	263-835	121	657	648	100-4,950	121	0.68	0.09	0.42-0.99
2012 Study Year	101	488	99	250-842	99	825	541	75-3,150	99	0.66	0.09	0.45-1.16
2014 Study Year	112	533	140	225-946	111	1,279	995	50-5,750	111	0.72	0.13	0.11-1.20
2015 Study Year	136	537	177	101-908	131	1,583	1,189	11-7,257	131	0.75	0.13	0.55-1.68
2016 Study Year	89	534	181	98-836	86	1,601	1,177	8-4,560	86	0.75	0.11	0.42-1.10
2017 Study Year	152	560	171	129-919	147	1,706	1,255	100-6,100	147	0.72	0.09	0.47-0.96
2018 Study Year	133	518	205	87-1,031	132	1,519	1,620	50-8,500	132	0.72	0.13	0.32-1.30
2019 Study Year	187	502	178	95-1,060	183	1,294	1,430	100-8,550	183	0.68	0.11	0.25-1.24
2020 Study Year	169	508	140	104-860	169	1,151	1,043	6-5,300	169	0.68	0.11	0.46-1.35
2021 Study Year	209	518	142	160-819	208	1,109	859	50-4,750	208	0.66	0.12	0.43-1.22
Stephens Lake												
2009 Study Year	23	344	166	110-770	7	346	167	150-525	7	0.95	0.31	0.59-1.32
2010 Study Year	32	423	136	304-772	32	862	978	210-3,570	31	0.74	0.10	0.58-1.10
2011 Study Year	37	450	109	168-756	36	921	894	375-4,125	36	0.81	0.11	0.58-1.03
2012 Study Year	87	539	124	250-970	83	1,373	1,175	75-5,525	83	0.74	0.13	0.40-0.99
2014 Study Year	51	612	121	373-971	51	2,049	1,525	350-8,700	51	0.78	0.12	0.62-1.36
2015 Study Year	50	496	233	120-795	49	1,473	1,143	15-3,650	49	0.88	0.28	0.60-2.05
2016 Study Year	61	607	182	233-1,000	61	2,234	1,520	80-8,400	61	0.77	0.12	0.49-1.12
2017 Study Year	97	487	208	135-851	92	1,497	1,560	75-5,425	92	0.72	0.12	0.44-1.03
2018 Study Year	57	481	154	222-837	57	1,113	1,215	50-4,925	57	0.72	0.10	0.46-0.90
2019 Study Year	111	542	175	287-1,060	110	1,594	1,818	100-11,500	110	0.72	0.11	0.32-1.01
2020 Study Year	93	552	165	97-1,050	93	1,586	1,613	4-9,000	93	0.71	0.10	0.39-0.95
2021 Study Year	89	516	178	101-940	87	1,344	1,266	25-6,010	87	0.71	0.14	0.32-1.46

a – Number of fish

b – Standard deviation

**Table 9: Mean length, weight, and condition factor of Lake Sturgeon captured during juvenile Lake Sturgeon monitoring, fall 2021.**

Waterbody	Fork Length (mm)				Weight (g)				Condition Factor			
	n <sup>a</sup>	Mean	Std <sup>b</sup>	Range	n	Mean	Std	Range	n	Mean	Std	Range
Keeyask reservoir												
<i>Wild</i>	209	518	142	160-819	208	1,109	859	50-4,750	208	0.66	0.12	0.43-1.22
<i>Hatchery</i>	57	475	69	373-636	57	679	334	300-1,650	57	0.59	0.07	0.48-0.76
	<b>266</b>	<b>509</b>	<b>131</b>	<b>160-819</b>	<b>265</b>	<b>1,017</b>	<b>796</b>	<b>50-4,750</b>	<b>265</b>	<b>0.64</b>	<b>0.11</b>	<b>0.43-1.22</b>
Stephens Lake												
<i>Wild</i>	89	516	178	101-940	87	1,344	1,266	25-6,010	87	0.71	0.14	0.32-1.46
<i>Hatchery</i>	69	459	69	376-652	69	671	379	375-1,900	69	0.64	0.06	0.49-0.79
	<b>158</b>	<b>492</b>	<b>144</b>	<b>101-940</b>	<b>156</b>	<b>1,046</b>	<b>1,032</b>	<b>25-6,100</b>	<b>156</b>	<b>0.68</b>	<b>0.11</b>	<b>0.32-1.46</b>

a – Number of fish measured

b – Standard deviation

**Table 10: Mean length, weight, and condition factor of hatchery-reared Lake Sturgeon captured during juvenile Lake Sturgeon monitoring, since 2014.**

Waterbody	Fork Length (mm)				Weight (g)				Condition Factor			
	n <sup>a</sup>	Mean	Std <sup>b</sup>	Range	n	Mean	Std	Range	n	Mean	Std	Range
Keeyask reservoir												
2014 Study Year	1	272	-	-	1	150	-	-	1	0.75		
2015 Study Year	3	310	26	280-330	2	200	35	175-225	2	0.58	0.06	0.54-0.63
2016 Study Year	7	366	25	320-396	7	335	44	280-400	7	0.69	0.10	0.52-0.85
2017 Study Year	21	380	69	285-465	21	355	176	100-600	21	0.59	0.07	0.43-0.74
2018 Study Year	17	396	57	255-479	17	394	148	100-700	17	0.60	0.05	0.53-0.72
2019 Study Year	57	364	72	265-530	56	307	214	75-950	56	0.54	0.12	0.28-0.95
2020 Study Year	36	422	62	337-573	36	476	244	200-1,175	36	0.58	0.07	0.44-0.71
2021 Study Year	57	475	69	373-636	57	679	334	300-1,650	57	0.59	0.07	0.48-0.76
Stephens Lake												
2014 Study Year	0	-	-	-	0	-	-	-	0	-	-	-
2015 Study Year	4	320	18	297-340	4	375	122	200-480	4	1.11	0.23	0.76-1.27
2016 Study Year	5	394	24	363-418	5	348	87	260-440	5	0.56	0.06	0.47-0.61
2017 Study Year	51	362	66	262-487	51	322	191	75-750	51	0.61	0.08	0.42-0.78
2018 Study Year	17	432	64	346-503	17	596	239	275-900	17	0.70	0.06	0.55-0.85
2019 Study Year	118	354	92	261-586	118	318	330	75-1,300	118	0.54	0.12	0.29-1.03
2020 Study Year	49	453	101	330-630	49	677	491	200-1,950	49	0.61	0.08	0.44-0.86
2021 Study Year	69	459	69	376-652	69	671	379	375-1,900	69	0.64	0.06	0.49-0.79

a – Number of fish measured

b – Standard deviation



**Table 11: Recapture summary for wild Lake Sturgeon between 2008 and 2021.**

Recapture Location	Sampling Year	Tagging Location		
		Upper Split Lake Area	Keeyask reservoir	Stephens Lake
		n	n	n
Upper Split Lake Area	2011	0	0	0
	2012	2	0	0
	2014	2	0	0
	2015	2	0	0
	2016	2	0	0
	2017	3	0	0
	2018	4	0	0
	2019	9	2	0
	2020	6	0	0
	2021	-	-	-
Keeyask reservoir	2008	0	9	0
	2010	0	2	0
	2011	0	4	0
	2012	0	8	0
	2014	0	17	0
	2015	0	20	0
	2016	0	11	0
	2017	0	17	0
	2018	0	18	0
	2019	0	21	0
	2020	0	26	0
	2021	0	30	0
Stephens Lake	2009	0	0	0
	2010	0	0	0
	2011	0	0	0
	2012	0	0	11
	2014	0	0	8
	2015	0	0	7
	2016	0	0	14
	2017	0	3	17
	2018	0	1	10
	2019	0	2	22
	2020	1	1	38
	2021	1	11	26

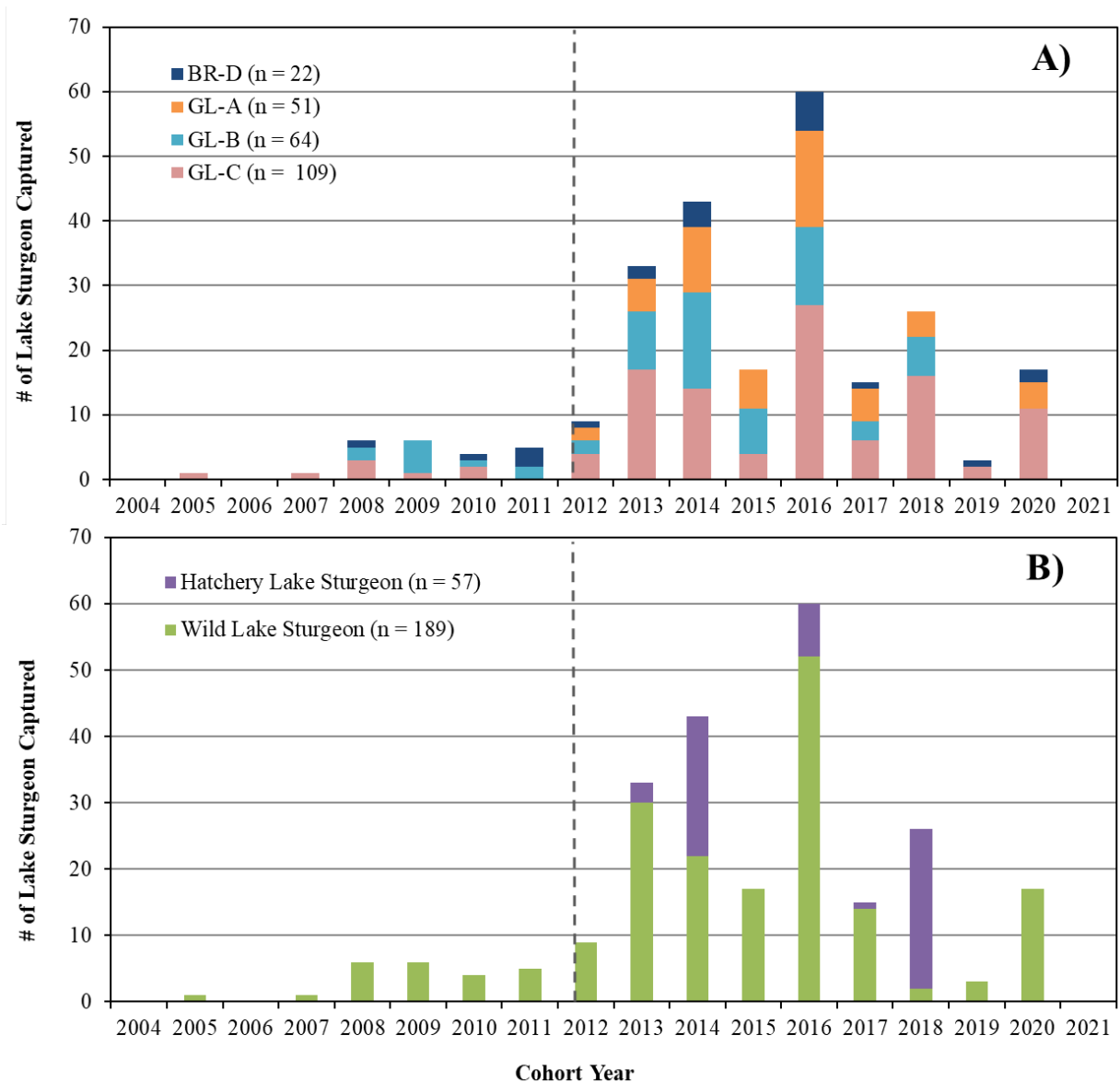
**Table 12: Number (n) and percentage (%) of catch of hatchery-reared Lake Sturgeon caught between 2014 and 2021.**

Capture Location	Sample Year	Release Location						Total	% of Total Catch
		Burntwood River		Keeyask reservoir		Stephens Lake			
		n	% of Catch	n	% of Catch	n	% of Catch		
Keeyask reservoir	2014	1	0.9	-	-	-	-	1	0.9
	2015	1	0.7	2	1.4	-	-	3	2.2
	2016	0	0.0	7	7.3	-	-	7	7.3
	2017	1	0.6	20	11.6	-	-	21	11.9
	2018	1	0.7	16	10.7	-	-	17	11.3
	2019	2	0.8	55	22.5	-	-	57	23.4
	2020	1	0.5	35	17.1	-	-	36	17.6
	2021	4	1.5	53	19.9	-	-	57	21.4
Stephens Lake	2014	-	-	-	-	-	-	-	-
	2015	0	0.0	0	0.0	4	7.4	4	8.5
	2016	0	0.0	1	1.5	4	6.1	5	7.6
	2017	0	0.0	11	7.4	40	27.0	51	34.5
	2018	0	0.0	3	4.1	14	18.9	17	23.0
	2019	1	0.4	11	4.8	106	46.3	118	51.5
	2020	1	0.7	6	4.2	42	29.6	49	34.5
	2021	0	0.0	10	6.3	59	37.3	69	43.7

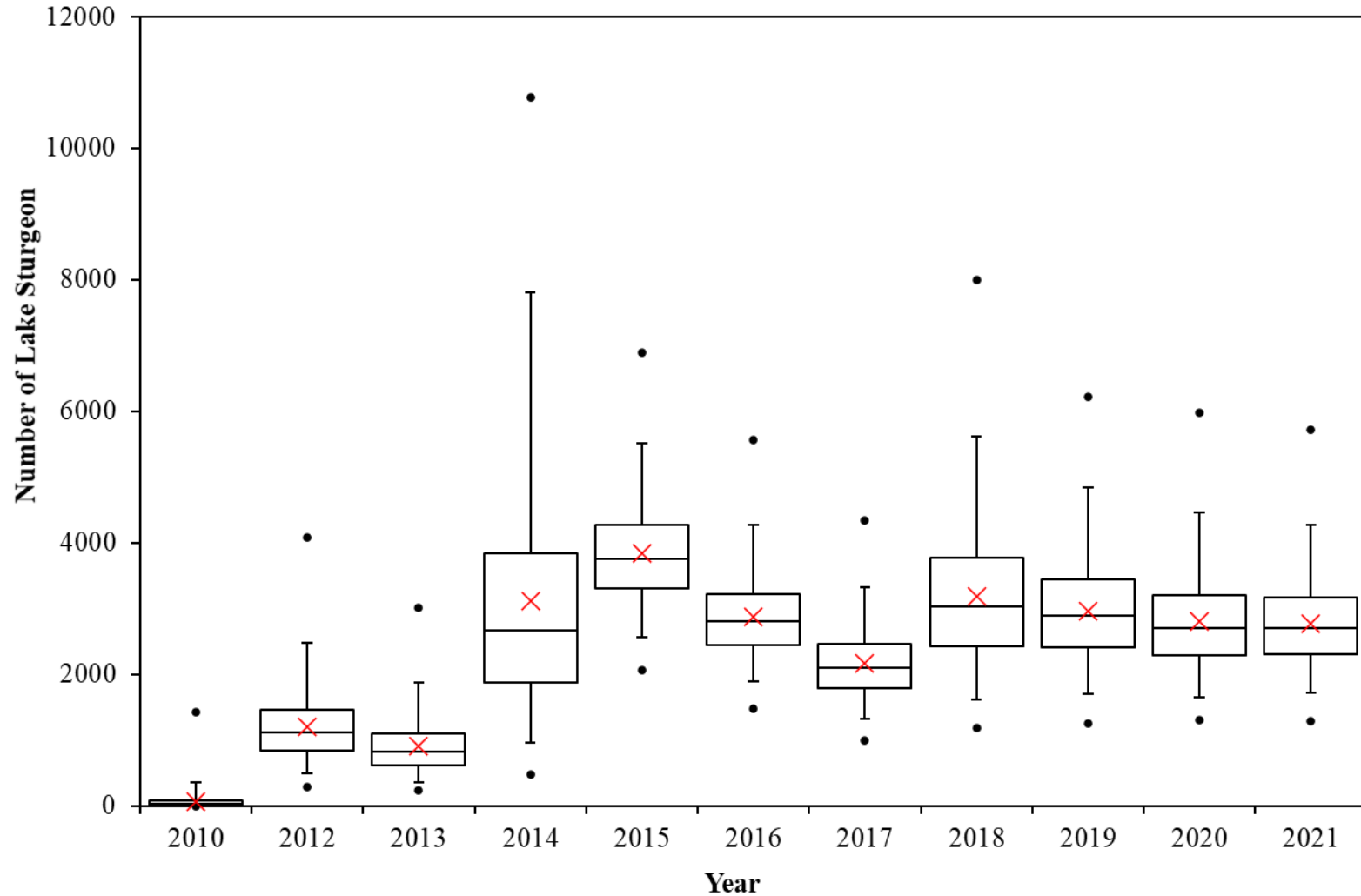
**Table 13: Number and ages of hatchery-reared Lake Sturgeon released as age-1 fish and captured during juvenile Lake Sturgeon studies since 2014.**

Monitoring Year	Upper Split Lake Area	Keeyask reservoir	Stephens Lake
<b>2014</b>	<b>1</b>	<b>1</b>	-
	(1 year old)	(1 year old)	
<b>2015</b>	-	<b>3</b>	<b>4</b>
		(2 were 1 year old)	(All were 1 year old)
		(1 was 2 years old)	
<b>2016</b>	<b>1</b>	<b>7</b>	<b>5</b>
	(all were 3 years old)	(All were 2 years old)	(All were 2 years old)
<b>2017</b>	<b>3</b>	<b>21</b>	<b>51</b>
	(all were 4 years old)	(9 were 1 year old)	(33 were 1 year old)
		(11 were 3 years old)	(18 were 3 years old)
		(1 was 4 years old)	
<b>2018</b>	<b>1</b>	<b>18</b>	<b>17</b>
	(5 years old)	(1 was 1 years old)	(7 were 2 years old)
		(8 were 2 years old)	(10 were 4 years old)
		(8 were 4 years old)	
		(1 was 5 years old)	
<b>2019</b>	<b>10</b>	<b>57</b>	<b>118</b>
	(8 were 2 years old)	(27 were 1 years old)	(84 were 1 years old)
	(2 were 6 years old)	(1 was 2 years old)	(13 were 3 years old)
		(16 were 3 years old)	(20 were 5 years old)
		(12 were 5 years old)	(1 was 6 years old)
		(1 was 6 years old)	
<b>2020</b>	<b>21</b>	<b>36</b>	<b>49</b>
	(1 was 1 years old)	(17 were 2 years old)	(25 were 2 years old)
	(12 were 3 years old)	(12 were 4 years old)	(1 was 3 years old)
	(2 were 5 years old)	(6 were 6 years old)	(5 were 4 years old)
	(6 were 7 years old)	(1 was 7 years old)	(18 were 6 years old)
<b>2021</b>	-	<b>57</b>	<b>69</b>
		(24 were 3 years old)	(51 were 3 years old)
		(1 was 4 years old)	(9 were 5 years old)
		(9 were 5 years old)	(9 were 7 years old)
		(21 were 7 years old)	
		(3 were 8 years old)	

## FIGURES

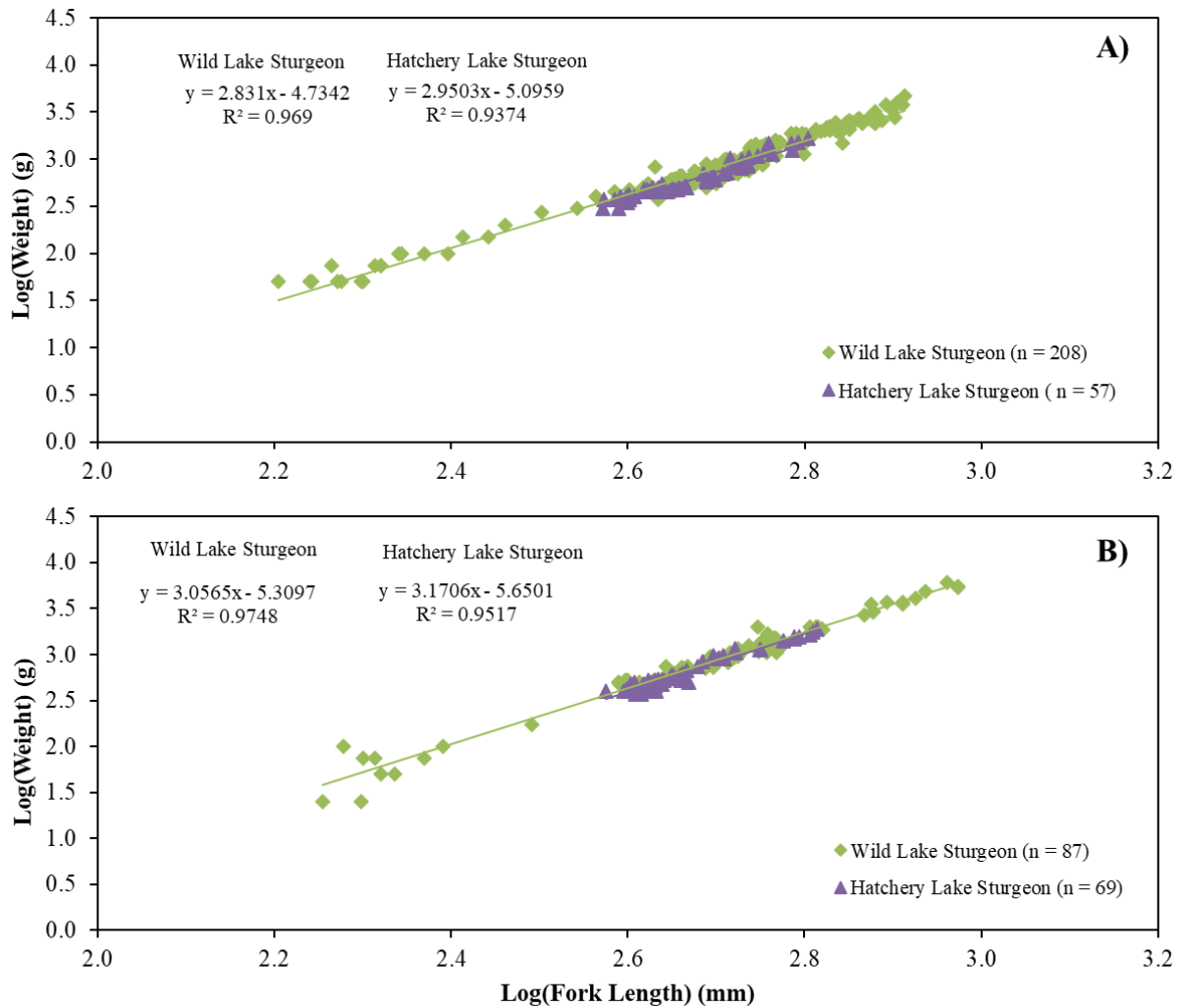


**Figure 1:** Cohort frequency distributions for all aged juvenile Lake Sturgeon captured by zone in the Keeyask reservoir (A) and by hatchery and wild Lake Sturgeon (B), fall 2021. Cohorts prior to 2012 (*i.e.*, age-9 fish) are not fully represented as ageing structures are not collected from fish  $\geq 800$  mm fork length (indicated by vertical dashed line).

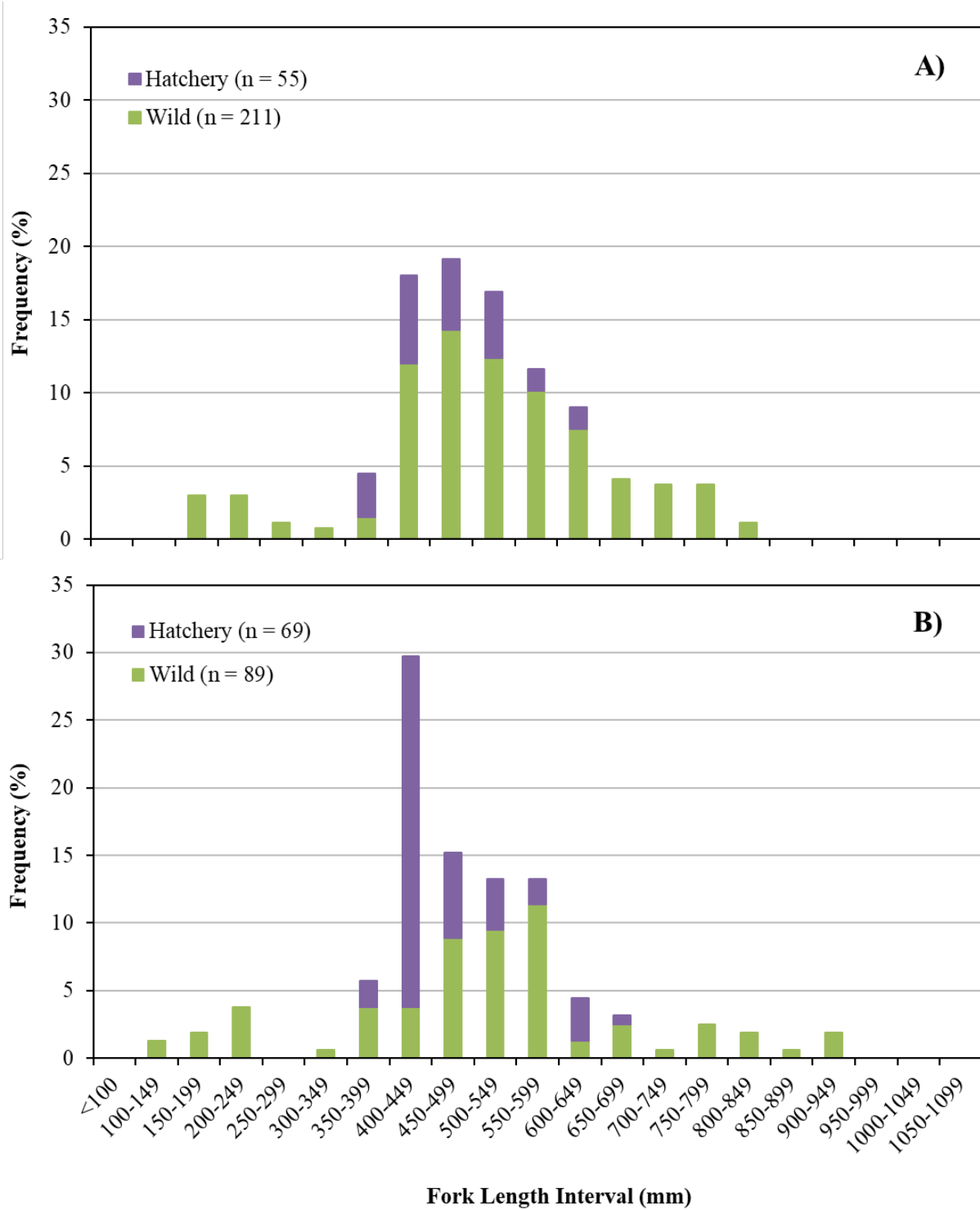


**Figure 2:** Juvenile Lake Sturgeon abundance (*i.e.*, fish <800 mm fork length) estimates based on POPAN best model for the Keeyask reservoir (2010, 2012–2021). Each red x marks the estimated abundance for each year (*i.e.*, the number of juvenile Lake Sturgeon), the black dots represent the min and max estimates, and the vertical bar lines represent the upper and lower 95% confidence intervals.

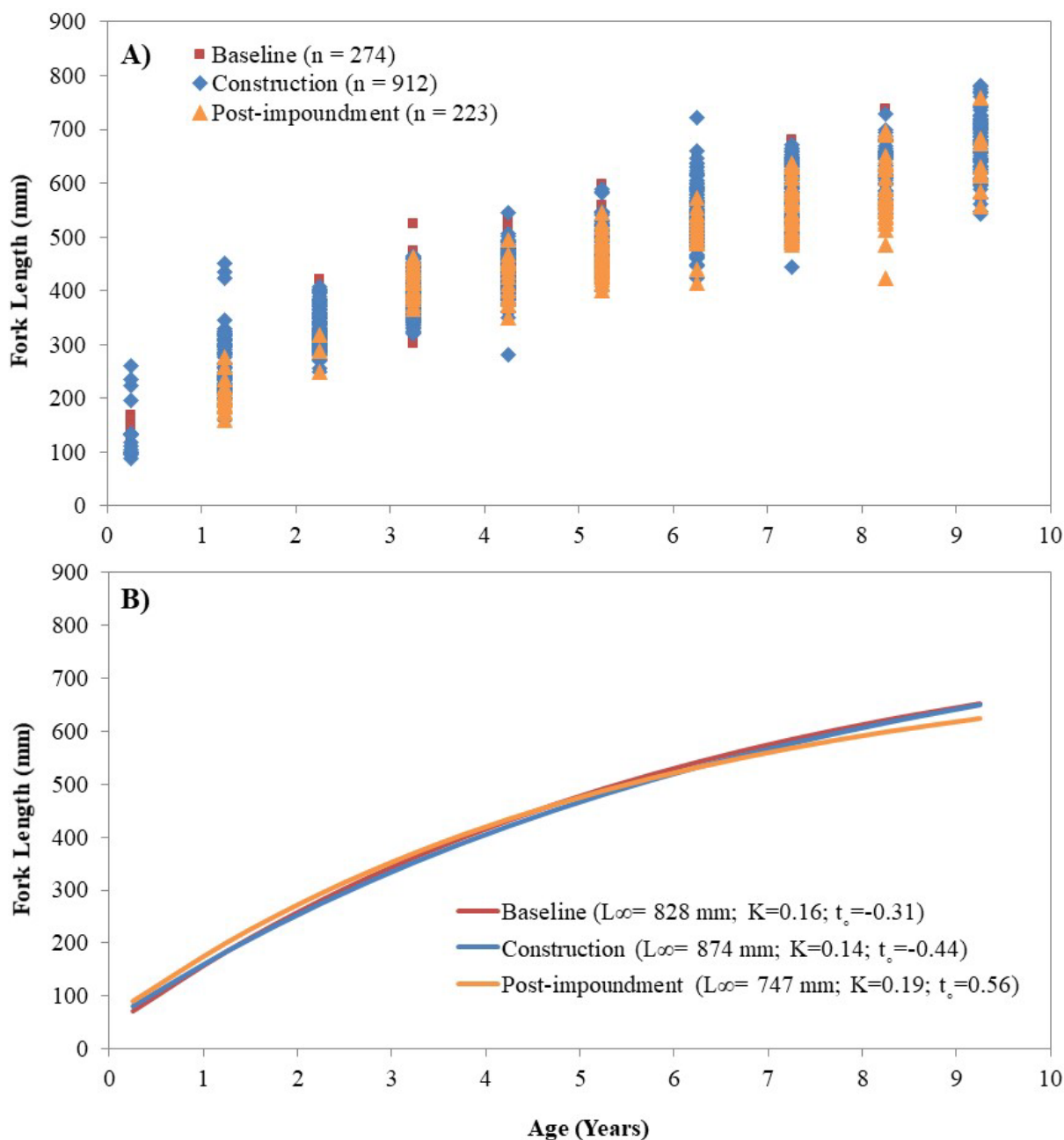




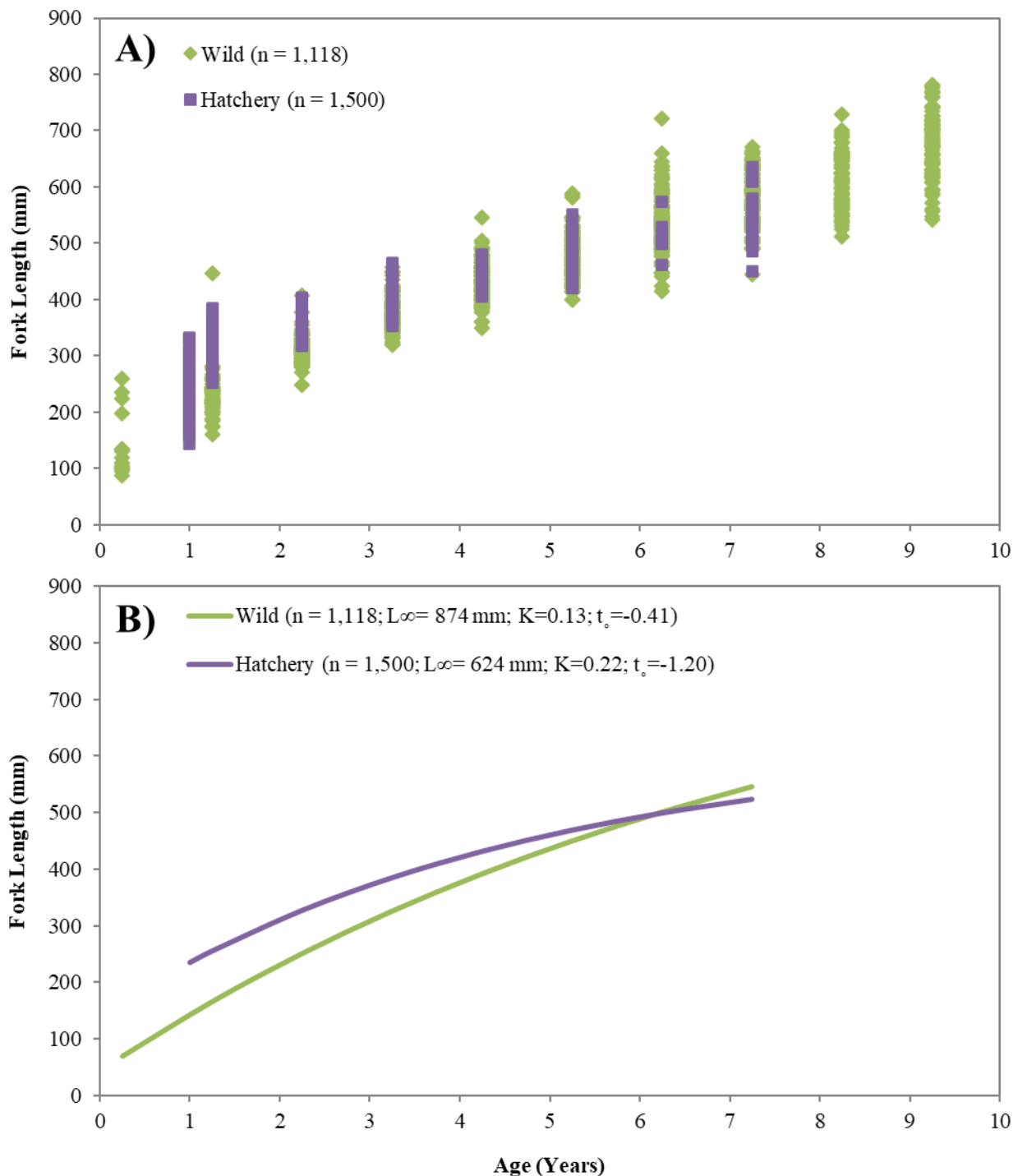
**Figure 3: Comparison of weight (g) at-fork length (mm) (log transformed) for Lake Sturgeon captured in: A) the Keeyask reservoir and B) Stephens Lake, fall 2021.**



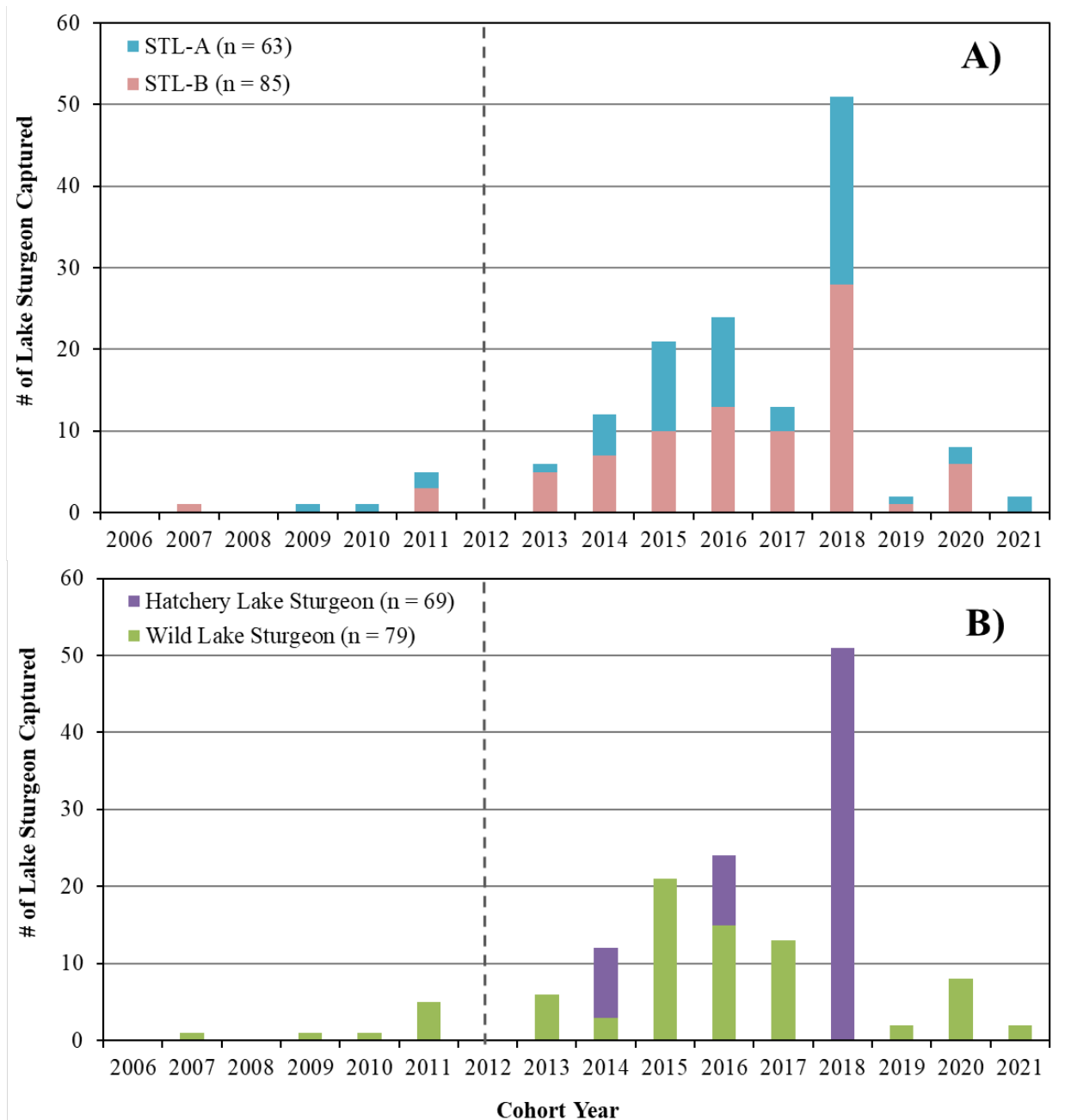
**Figure 4:** Fork length frequency distributions for Lake Sturgeon captured in gill nets set in: A) the Keeyask reservoir and B) Stephens Lake, fall 2021.



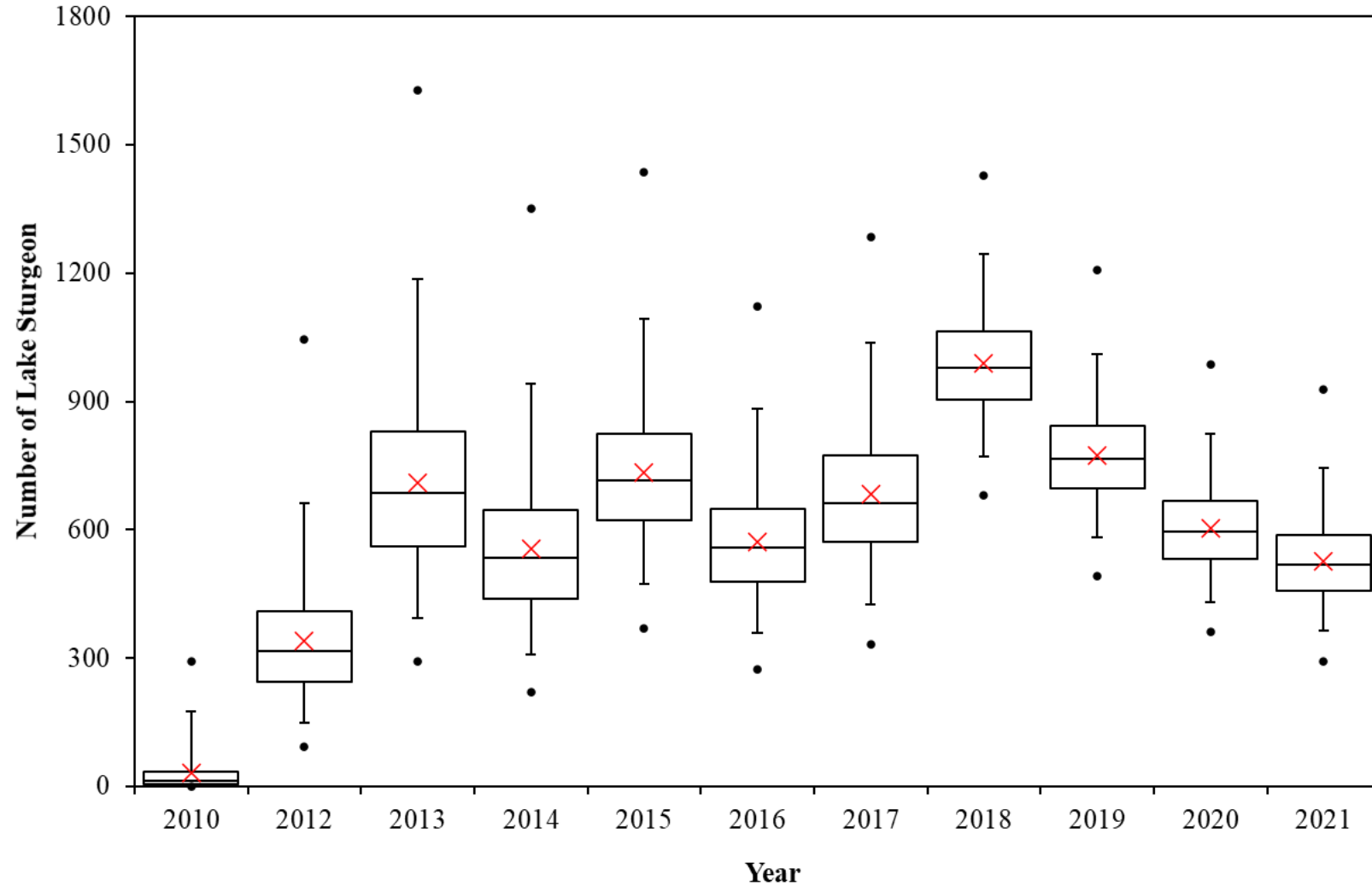
**Figure 5:** Fork length-at-age (A) and von Bertalanffy growth curve analysis (B) for all wild aged Lake Sturgeon caught during baseline (red; 2008–2012), construction (blue; 2014–2020), and post-impoundment (orange; 2021) monitoring years in Gull Lake/the Keeyask reservoir. Fish older than age-9 were not included in the analysis as they are not fully represented in the catch (ageing structures are not collected from fish  $\geq 800$  mm fork length, which corresponds to fish older than age-9).



**Figure 6:** Fork length-at-age (A) and von Bertalanffy growth curve analysis (B) for all wild (green) and hatchery-reared (purple) Lake Sturgeon released and/or recaptured in the Keeyask reservoir since stocking began in 2014. Fish older than age-9 were not included in the analysis as they are not fully represented in the catch (ageing structures are not collected from fish  $\geq 800$  mm fork length, which corresponds to fish older than age-9).

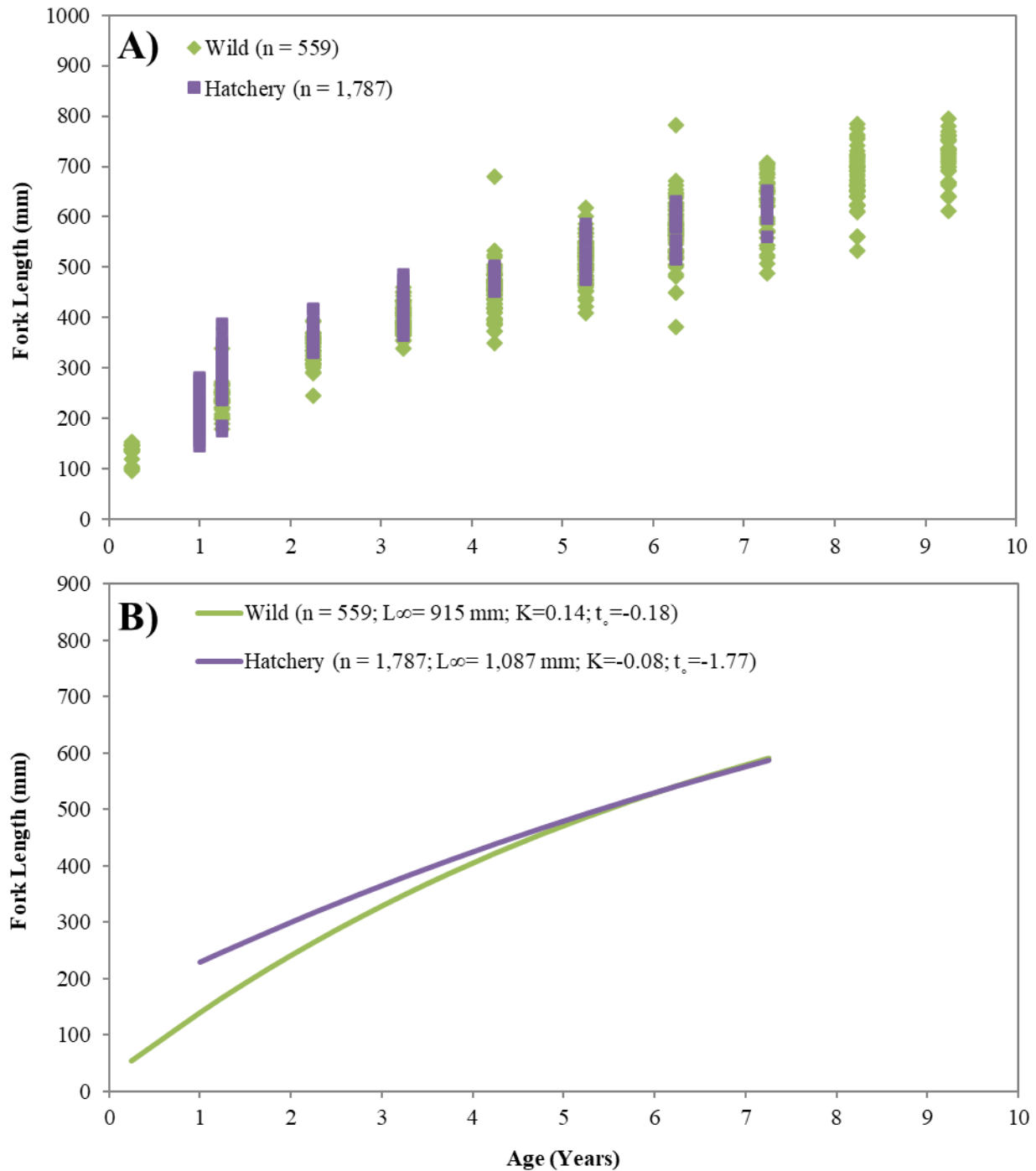


**Figure 7:** Cohort frequency distributions for all aged juvenile Lake Sturgeon captured in Stephens Lake by zone (A) and by hatchery-reared and wild Lake Sturgeon (B), fall 2021. Cohorts prior to 2012 (*i.e.*, age-9 fish) are not fully represented as ageing structures are not collected from fish  $\geq 800$  mm fork length (indicated by vertical dashed line).



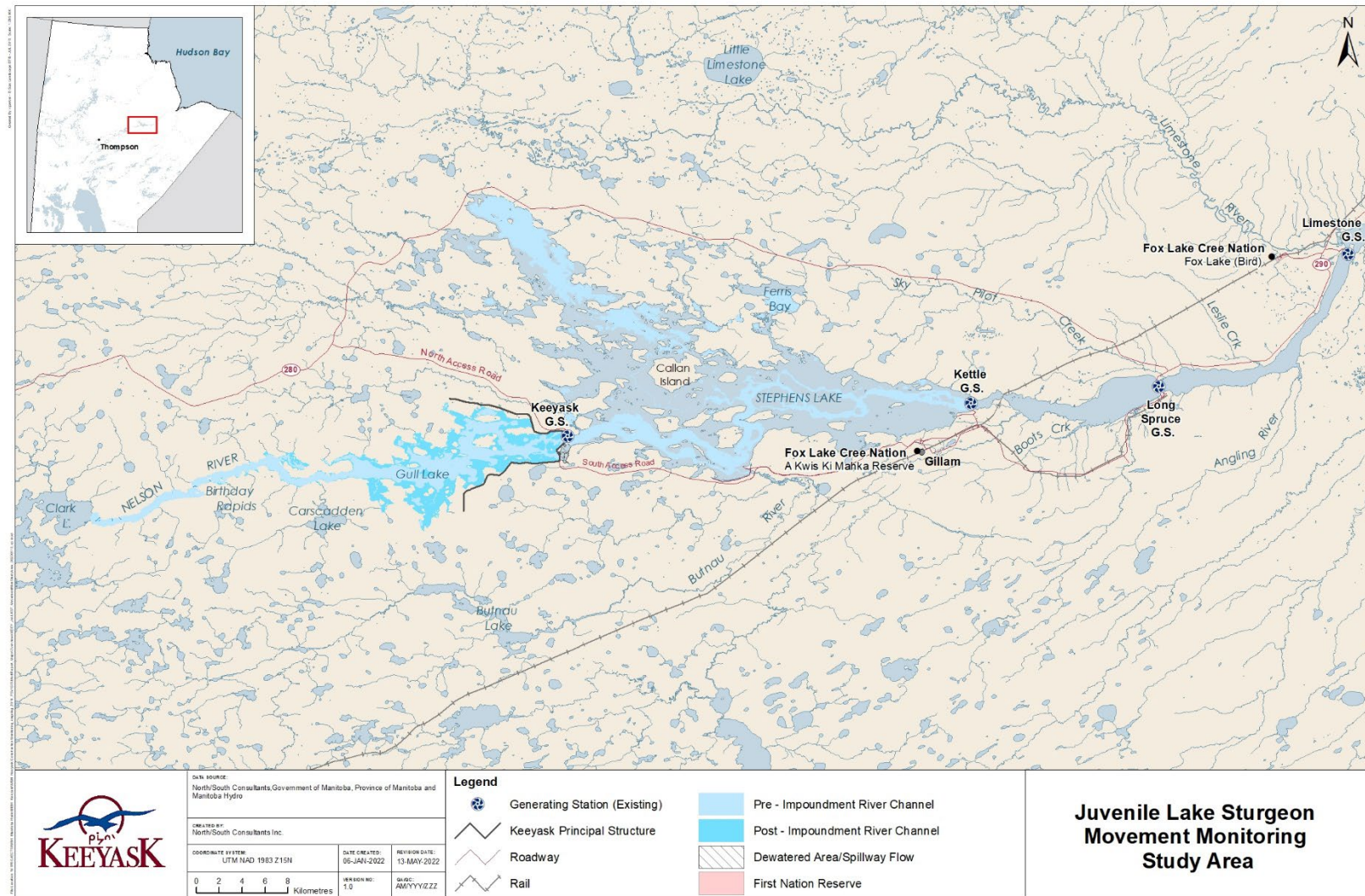
**Figure 8: Juvenile Lake Sturgeon abundance estimates based on POPAN best model for Stephens Lake (2010, 2012–2021). Results of the POPAN abundance estimate are presented in black. Each red x marks the estimated abundance for each year (*i.e.*, the number of juvenile Lake Sturgeon), the black dots represent the min and max estimates, and the vertical bar lines represent the upper and lower 95% confidence range.**





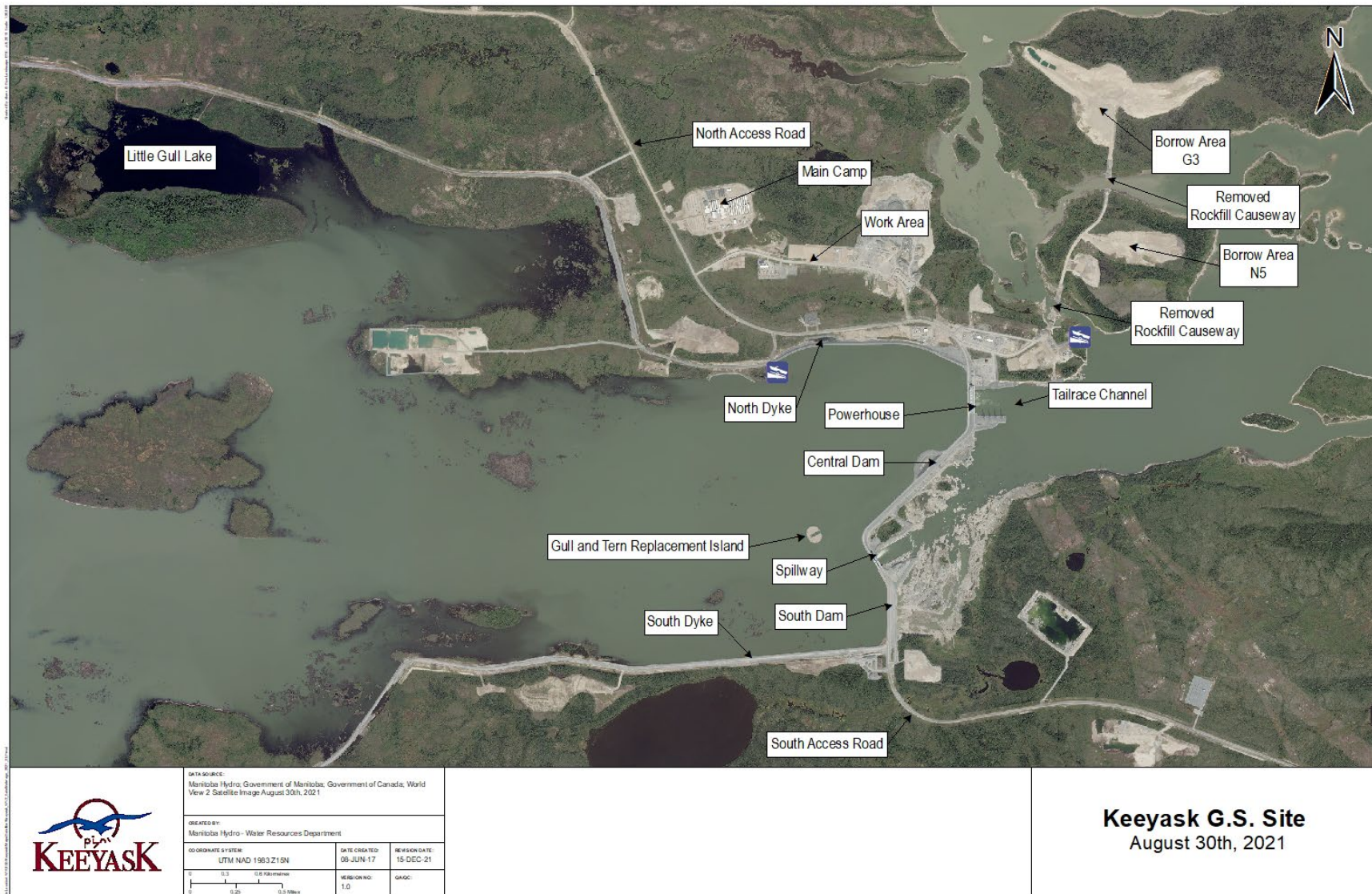
**Figure 9:** Fork length-at-age (A) and von Bertalanffy growth curve analysis (B) for all wild (green) and hatchery-reared (purple) Lake Sturgeon released and/or recaptured in the Stephens Lake since stocking began in 2014. Fish older than age-9 were not included in the analysis as they are not fully represented in the catch (ageing structures are not collected from fish > 800 mm fork length, which corresponds to fish older than age-9).

# MAPS

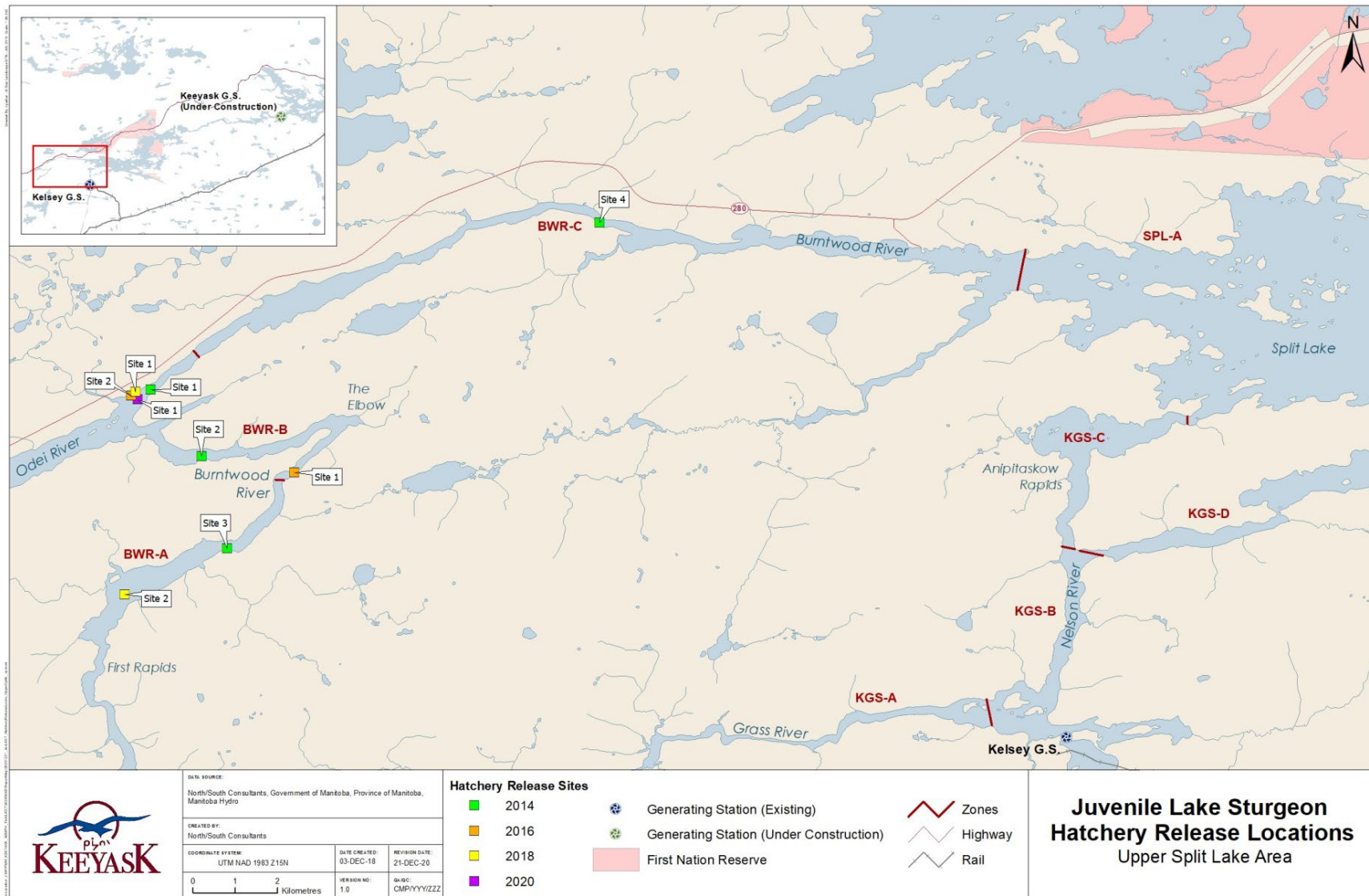


**Map 1: Map of Nelson River showing the site of Keeyask Generating Station and the juvenile Lake Sturgeon population monitoring study setting. The Keeyask reservoir and Stephens Lake were sampled in 2021.**



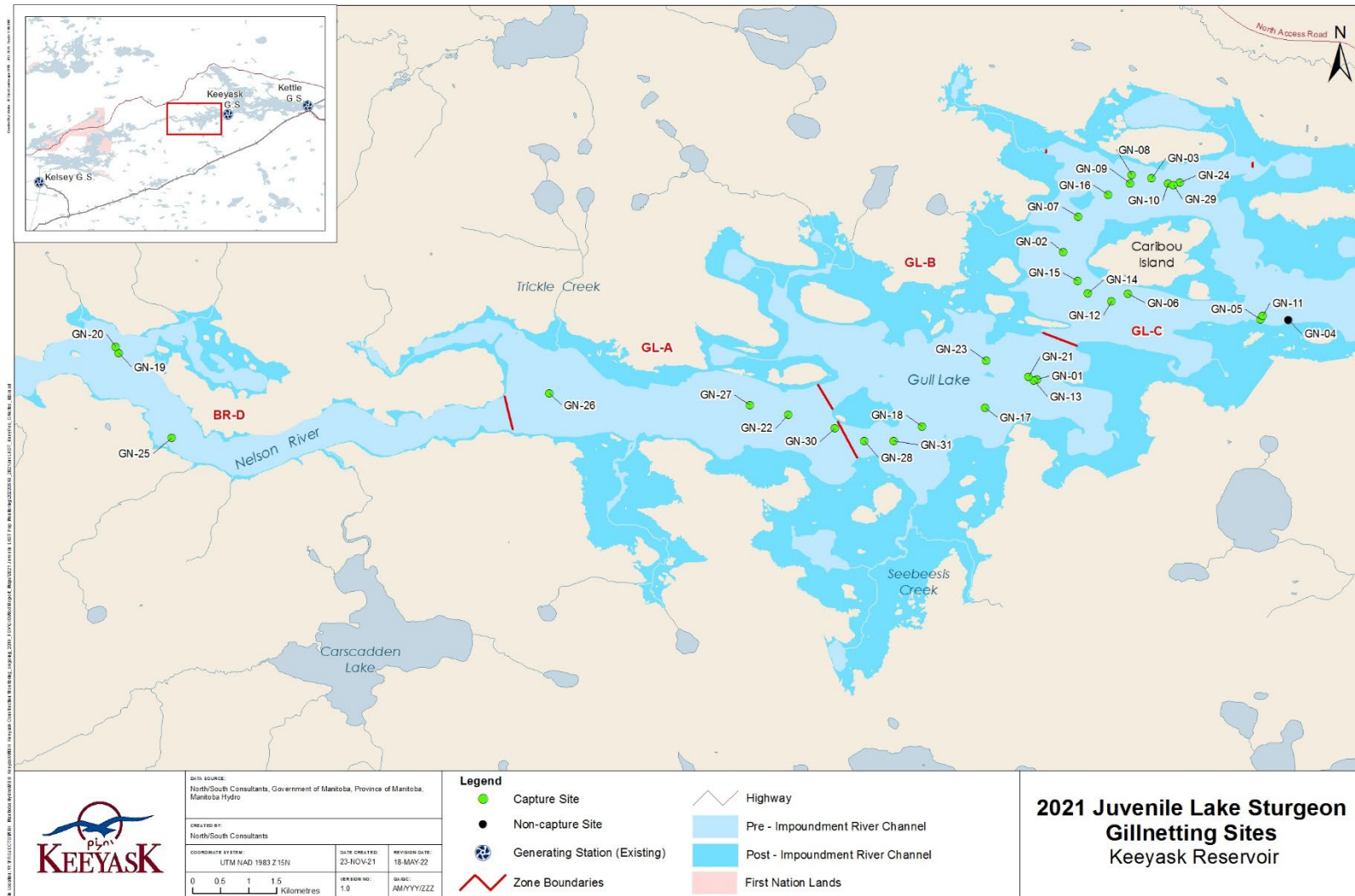


**Map 2: Map illustrating instream structures at the Keeyask Generating Station site after reservoir flooding, August 2021.**



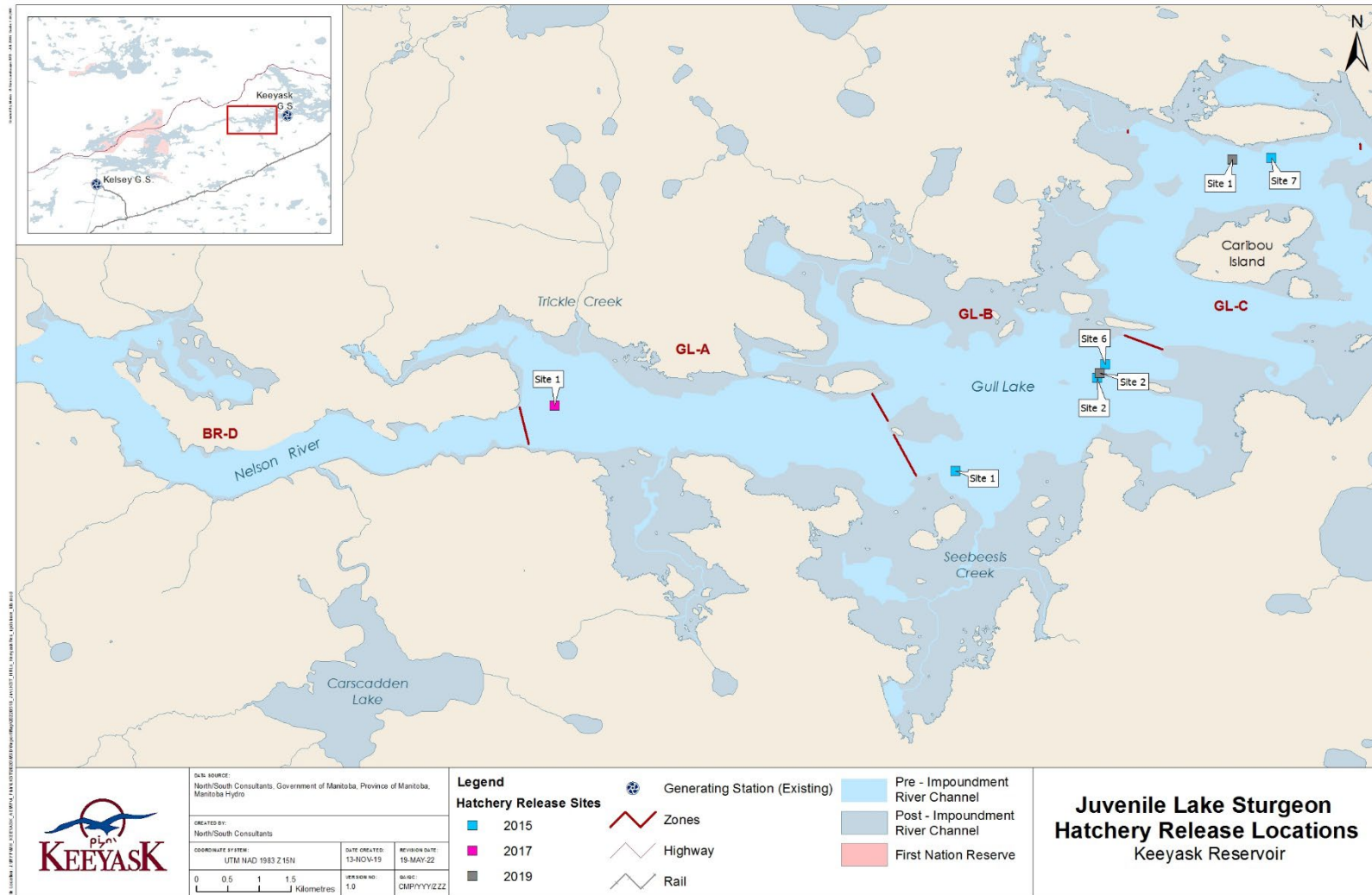
**Map 3: Map of Lake Sturgeon yearling stocking sites in the Burntwood River since 2014.**



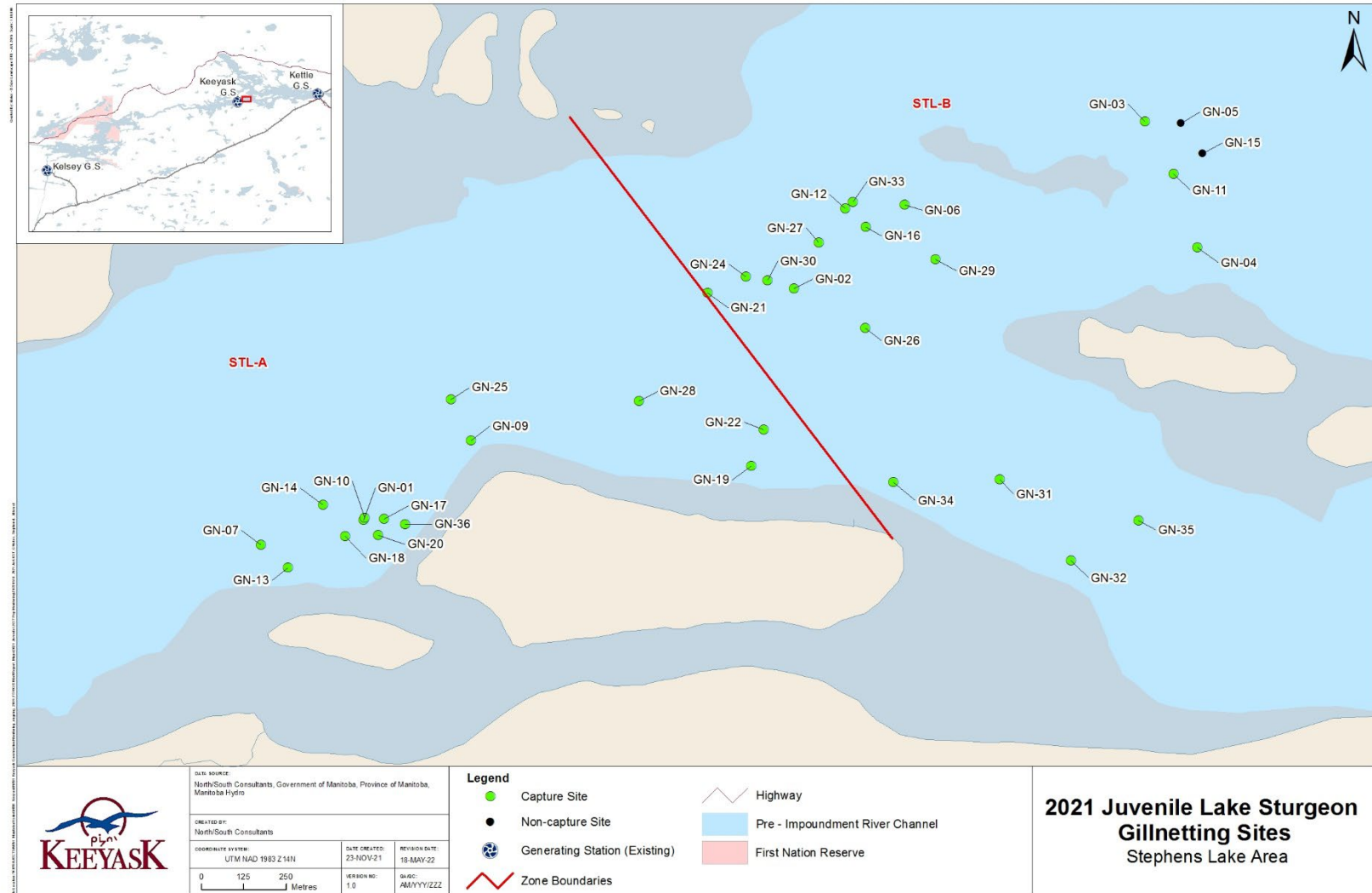


**Map 4: Map of sites fished with gill nets in the Keeyask reservoir, fall 2021 (pre-impoundment shoreline shown).**

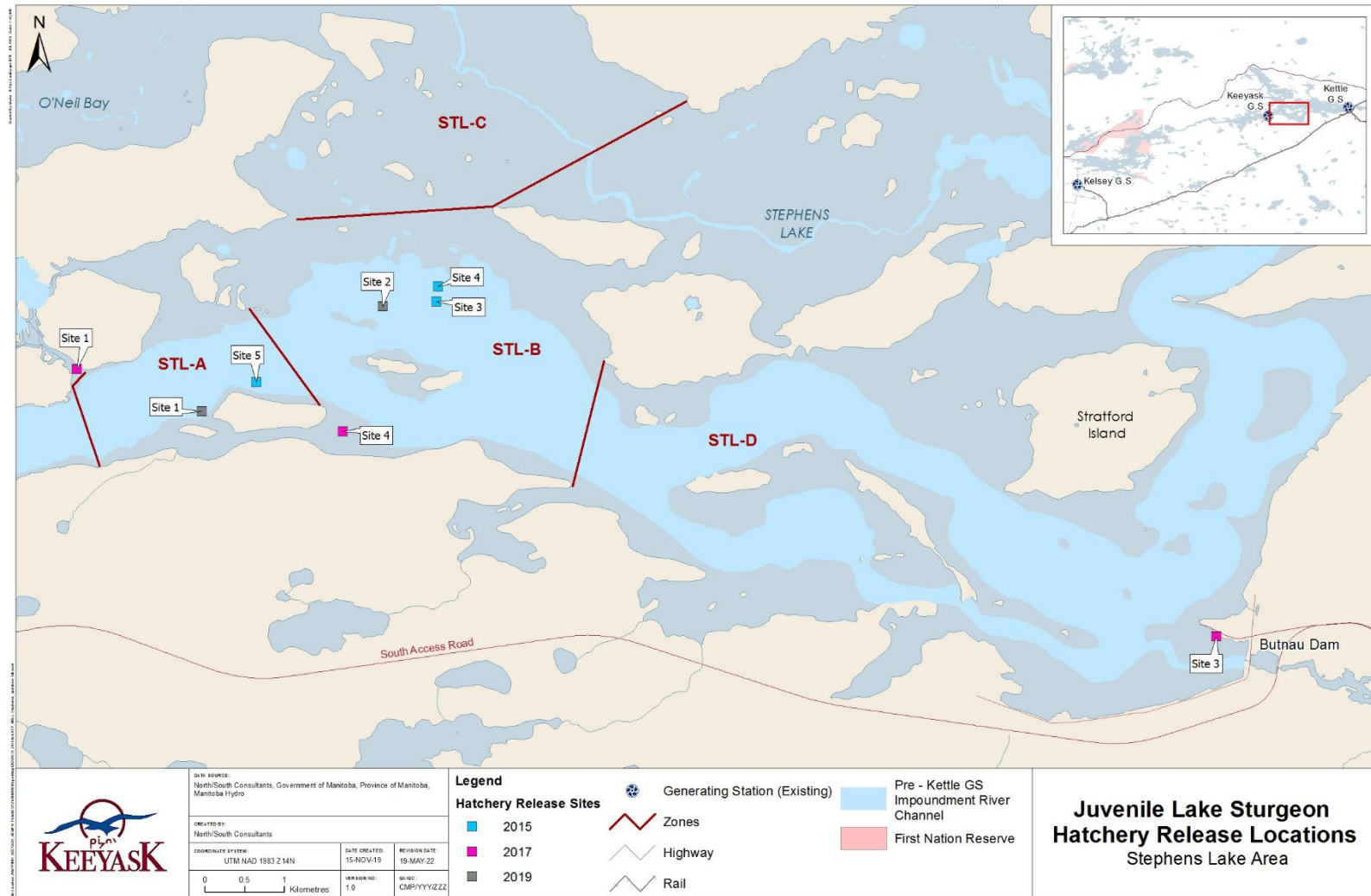




**Map 5: Map of Lake Sturgeon yearling stocking sites in the Keeyask reservoir since 2014.**



**Map 6: Map of sites fished with gill nets in Stephens Lake, fall 2021.**



**Map 7: Map of Lake Sturgeon yearling stocking sites in Stephens Lake since 2014.**

# APPENDICES

## APPENDIX 1: LOCATIONS AND SITE-SPECIFIC PHYSICAL MEASUREMENTS COLLECTED AT GILLNETTING SITES, FALL 2021.

---

Table A1-1:	Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in the Keeyask reservoir, fall 2021. ....	63
Table A1-2:	Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in Stephens Lake, fall 2021. ....	66

**No table of figures entries found.**

**Table A1-1: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in the Keeyask reservoir, fall 2021.**

Site	Zone	UTM Location		Set Date	Set Water Temp (°C)	Pull Date	Pull Water Temp (°C)	Duration (dec. hrs)	Water Depth (m)	
		Easting	Northing						Start	End
GN-01	GL-B	354703	6244579	13-Sep-21	14.5	14-Sep-21	13.9	19.78	16.8	15.9
GN-02	GL-C	355169	6246845	13-Sep-21	14.5	14-Sep-21	13.9	20.63	12.6	11.3
GN-03	GL-C	356747	6248159	13-Sep-21	14.5	14-Sep-21	13.9	21.32	15.8	17.2
GN-03	GL-C	356747	6248159	14-Sep-21	13.9	15-Sep-21	13.3	22.95	15.8	17.2
GN-04	GL-C	359184	6245637	14-Sep-21	13.9	15-Sep-21	13.3	27.97	9.3	7.1
GN-05	GL-C	358684	6245645	14-Sep-21	13.9	15-Sep-21	13.3	27.03	11.3	10.8
GN-06	GL-C	356320	6246103	14-Sep-21	13.9	15-Sep-21	13.3	21.53	13.8	16.1
GN-06	GL-C	356320	6246103	15-Sep-21	13.3	16-Sep-21	13.1	24.88	13.8	16.1
GN-07	GL-C	355434	6247479	14-Sep-21	13.9	15-Sep-21	13.3	21.58	11.5	12.2
GN-07	GL-C	355434	6247479	15-Sep-21	13.3	16-Sep-21	13.1	24.85	11.5	12.2
GN-08	GL-C	356387	6248215	14-Sep-21	13.9	15-Sep-21	13.3	22.18	10.8	16.6
GN-09	GL-C	356358	6248069	15-Sep-21	13.3	16-Sep-21	13.1	24.13	12.6	12.1
GN-09	GL-C	356358	6248069	16-Sep-21	13.1	17-Sep-21	13.1	24.00	12.6	12.1
GN-09	GL-C	356358	6248069	17-Sep-21	13.1	18-Sep-21	12.9	27.00	12.6	12.1
GN-09	GL-C	356358	6248069	18-Sep-21	12.9	19-Sep-21	13.0	23.65	12.6	12.1
GN-10	GL-C	357040	6248064	15-Sep-21	13.3	16-Sep-21	13.1	24.75	12.9	14.1
GN-10	GL-C	357040	6248064	16-Sep-21	13.1	17-Sep-21	13.1	23.63	12.9	14.1
GN-11	GL-C	358723	6245716	15-Sep-21	13.3	16-Sep-21	13.1	19.52	10.8	10.6
GN-12	GL-C	356025	6245971	15-Sep-21	13.3	16-Sep-21	13.1	19.77	10.7	11.1
GN-13	GL-B	354650	6244564	16-Sep-21	13.1	17-Sep-21	13.1	28.85	13.6	12.8
GN-13	GL-B	354650	6244564	17-Sep-21	13.1	18-Sep-21	12.9	22.07	13.6	12.8
GN-13	GL-B	354650	6244564	18-Sep-21	12.9	19-Sep-21	13.0	24.83	13.6	12.8

**Table A1-1: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in the Keeyask reservoir, fall 2021 (continued).**

Site	Zone	UTM Location		Set Date	Set Water Temp (°C)	Pull Date	Pull Water Temp (°C)	Duration (dec. hrs)	Water Depth (m)	
		Easting	Northing						Start	End
GN-13	GL-B	354650	6244564	22-Sep-21	12.6	23-Sep-21	12.6	25.42	13.6	12.8
GN-14	GL-C	355609	6246113	16-Sep-21	13.1	17-Sep-21	13.1	23.47	10.6	11.7
GN-14	GL-C	355609	6246113	17-Sep-21	13.1	18-Sep-21	12.9	28.35	10.6	11.7
GN-15	GL-C	355431	6246337	16-Sep-21	13.1	17-Sep-21	13.1	23.67	13.6	10.5
GN-16	GL-C	355974	6247863	16-Sep-21	13.1	17-Sep-21	13.1	23.28	12.9	13.3
GN-16	GL-C	355974	6247863	17-Sep-21	13.1	18-Sep-21	12.9	27.52	12.9	13.3
GN-17	GL-B	353780	6244075	17-Sep-21	13.1	18-Sep-21	12.9	21.90	11.7	12.9
GN-18	GL-B	352661	6243741	17-Sep-21	13.1	18-Sep-21	12.9	21.28	17.7	15.1
GN-18	GL-B	352661	6243741	18-Sep-21	12.9	19-Sep-21	13.0	21.88	17.7	15.1
GN-19	BR-D	338349	6245051	18-Sep-21	12.9	19-Sep-21	13.0	23.55	10.9	11.3
GN-19	BR-D	338349	6245051	19-Sep-21	13.0	20-Sep-21	13.0	25.88	10.9	11.3
GN-19	BR-D	338349	6245051	20-Sep-21	13.0	21-Sep-21	12.8	21.92	10.9	11.3
GN-20	BR-D	338295	6245158	18-Sep-21	12.9	19-Sep-21	13.0	24.50	10.9	9.7
GN-20	BR-D	338295	6245158	19-Sep-21	13.0	20-Sep-21	13.0	25.05	10.9	9.7
GN-21	GL-B	354551	6244632	18-Sep-21	12.9	19-Sep-21	13.0	24.22	14.1	13.8
GN-21	GL-B	354551	6244632	19-Sep-21	13.0	20-Sep-21	13.0	19.52	14.1	13.8
GN-21	GL-B	354551	6244632	20-Sep-21	13.0	21-Sep-21	12.8	27.82	14.1	13.8
GN-21	GL-B	354551	6244632	21-Sep-21	12.8	22-Sep-21	12.6	23.35	14.1	13.8
GN-21	GL-B	354551	6244632	22-Sep-21	12.6	23-Sep-21	12.6	25.42	14.1	13.8
GN-22	GL-A	350275	6243949	19-Sep-21	13.0	20-Sep-21	13.0	24.63	11.9	12.2
GN-22	GL-A	350275	6243949	20-Sep-21	13.0	21-Sep-21	12.8	25.10	11.9	12.2
GN-22	GL-A	350275	6243949	21-Sep-21	12.8	22-Sep-21	12.6	22.92	11.9	12.2



**Table A1-1: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in the Keeyask reservoir, fall 2021 (continued).**

Site	Zone	UTM Location		Set Date	Set Water Temp (°C)	Pull Date	Pull Water Temp (°C)	Duration (dec. hrs)	Water Depth (m)	
		Easting	Northing						Start	End
GN-22	GL-A	350275	6243949	22-Sep-21	12.6	23-Sep-21	12.6	25.40	11.9	12.2
GN-23	GL-B	353802	6244914	19-Sep-21	13.0	20-Sep-21	13.0	19.83	10.9	10.7
GN-23	GL-B	353802	6244914	20-Sep-21	13.0	21-Sep-21	12.8	26.62	10.9	10.7
GN-24	GL-C	357246	6248086	19-Sep-21	13.0	20-Sep-21	13.0	22.90	12.6	15.9
GN-24	GL-C	357246	6248086	20-Sep-21	13.0	21-Sep-21	12.8	24.52	12.6	15.9
GN-25	BR-D	339289	6243539	20-Sep-21	13.0	21-Sep-21	12.8	20.95	11.7	12.2
GN-26	GL-A	346018	6244334	21-Sep-21	12.8	22-Sep-21	12.6	22.23	10.9	10.1
GN-27	GL-A	349586	6244124	21-Sep-21	12.8	22-Sep-21	12.6	22.72	14.1	13.6
GN-27	GL-A	349586	6244124	22-Sep-21	12.6	23-Sep-21	12.6	25.68	14.1	13.6
GN-28	GL-B	351624	6243484	21-Sep-21	12.8	22-Sep-21	12.6	21.70	13.9	18.2
GN-29	GL-C	357133	6248035	21-Sep-21	12.8	22-Sep-21	12.6	21.90	11.1	10.9
GN-29	GL-C	357133	6248035	22-Sep-21	12.6	23-Sep-21	12.6	21.45	11.1	10.9
GN-30	GL-A	351105	6243710	22-Sep-21	12.6	23-Sep-21	12.6	25.15	13.2	16.6
GN-31	GL-B	352155	6243485	22-Sep-21	12.6	23-Sep-21	12.6	25.17	15.6	11.1

**Table A1-2: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in Stephens Lake, fall 2021.**

Site	Zone	UTM Location		Set Date	Set Water Temp (°C)	Pull Date	Pull Water Temp (°C)	Duration (dec. hrs)	Water Depth (m)	
		Easting	Northing						Start	End
GN-01	STL-A	366567	6247362	13-Sep-21	14.5	14-Sep-21	14.2	18.92	17.0	16.7
GN-02	STL-A	367832	6248042	13-Sep-21	14.5	14-Sep-21	14.2	19.30	15.0	15.8
GN-03	STL-B	368864	6248533	13-Sep-21	14.5	14-Sep-21	14.2	20.20	17.7	18.5
GN-03	STL-B	368864	6248533	14-Sep-21	14.2	15-Sep-21	13.8	22.47	17.7	18.5
GN-04	STL-B	369018	6248162	14-Sep-21	14.2	15-Sep-21	13.8	25.67	13.0	13.1
GN-05	STL-B	368970	6248527	14-Sep-21	14.2	15-Sep-21	13.8	26.00	17.1	16.3
GN-06	STL-B	368157	6248288	14-Sep-21	14.2	15-Sep-21	13.8	23.98	14.9	12.7
GN-06	STL-B	368157	6248288	15-Sep-21	13.8	16-Sep-21	13.6	23.58	14.9	12.7
GN-07	STL-A	366265	6247289	14-Sep-21	14.2	15-Sep-21	13.8	26.43	13.9	14.7
GN-09	STL-A	366883	6247596	14-Sep-21	14.2	15-Sep-21	13.8	26.20	14.6	14.2
GN-10	STL-A	366569	6247369	15-Sep-21	13.8	16-Sep-21	13.6	26.20	17.0	17.6
GN-10	STL-A	366569	6247369	16-Sep-21	13.6	17-Sep-21	13.1	26.08	17.0	17.6
GN-11	STL-B	368948	6248378	15-Sep-21	13.8	16-Sep-21	13.6	21.83	13.3	13.9
GN-12	STL-B	367982	6248276	15-Sep-21	13.8	16-Sep-21	13.6	22.30	15.5	14.7
GN-12	STL-B	367982	6248276	16-Sep-21	13.6	17-Sep-21	13.1	25.67	15.5	14.7
GN-12	STL-B	367982	6248276	17-Sep-21	13.1	18-Sep-21	12.8	21.33	15.5	14.7
GN-12	STL-B	367982	6248276	18-Sep-21	12.8	19-Sep-21	12.7	25.00	15.5	14.7
GN-13	STL-A	366344	6247223	15-Sep-21	13.8	16-Sep-21	13.6	23.08	15.1	14.5
GN-14	STL-A	366447	6247407	15-Sep-21	13.8	16-Sep-21	13.6	22.07	15.1	14.4
GN-15	STL-B	369033	6248439	16-Sep-21	13.6	17-Sep-21	13.1	24.08	15.4	16.2
GN-16	STL-B	368042	6248223	16-Sep-21	13.6	17-Sep-21	13.1	24.18	16.0	14.3
GN-16	STL-B	368042	6248223	17-Sep-21	13.1	18-Sep-21	12.8	23.50	16.0	14.3

**Table A1-2: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in Stephens Lake, fall 2021 (continued).**

Site	Zone	UTM Location		Set Date	Set Water Temp (°C)	Pull Date	Pull Water Temp (°C)	Duration (dec. hrs)	Water Depth (m)	
		Easting	Northing						Start	End
GN-16	STL-B	368042	6248223	18-Sep-21	12.8	19-Sep-21	12.7	23.67	16.0	14.3
GN-17	STL-A	366627	6247366	16-Sep-21	13.6	17-Sep-21	13.1	23.75	18.5	15.5
GN-17	STL-A	366627	6247366	17-Sep-21	13.1	18-Sep-21	12.8	24.00	18.5	15.5
GN-18	STL-A	366513	6247315	16-Sep-21	13.6	17-Sep-21	13.1	24.67	15.1	17.7
GN-19	STL-A	367706	6247521	17-Sep-21	13.1	18-Sep-21	12.8	14.20	14.6	15.8
GN-20	STL-A	366609	6247318	17-Sep-21	13.1	18-Sep-21	12.8	21.58	17.9	18.3
GN-20	STL-A	366609	6247318	18-Sep-21	12.8	19-Sep-21	12.7	24.00	17.9	18.3
GN-21	STL-A	367577	6248029	17-Sep-21	13.1	18-Sep-21	12.8	20.50	14.8	15.2
GN-22	STL-A	367742	6247627	18-Sep-21	12.8	19-Sep-21	12.7	23.83	15.8	15.7
GN-22	STL-A	367742	6247627	19-Sep-21	12.7	20-Sep-21	12.6	23.50	15.8	15.7
GN-22	STL-A	367742	6247627	20-Sep-21	12.6	21-Sep-21	12.2	26.00	15.8	15.7
GN-22	STL-A	367742	6247627	21-Sep-21	12.2	22-Sep-21	12.3	23.00	15.8	15.7
GN-24	STL-A	367690	6248077	18-Sep-21	12.8	19-Sep-21	12.7	22.15	15.9	15.5
GN-24	STL-A	367690	6248077	19-Sep-21	12.7	20-Sep-21	12.6	25.42	15.9	15.5
GN-25	STL-A	366823	6247716	18-Sep-21	12.8	19-Sep-21	12.7	23.42	14.6	16.0
GN-26	STL-B	368041	6247926	19-Sep-21	12.7	20-Sep-21	12.6	23.30	14.8	16.0
GN-26	STL-B	368041	6247926	20-Sep-21	12.6	21-Sep-21	12.2	27.27	14.8	16.0
GN-26	STL-B	368041	6247926	21-Sep-21	12.2	22-Sep-21	12.3	21.98	14.8	16.0
GN-27	STL-B	367904	6248177	19-Sep-21	12.7	20-Sep-21	12.6	22.67	15.0	15.5
GN-27	STL-B	367904	6248177	20-Sep-21	12.6	21-Sep-21	12.2	24.00	15.0	15.5
GN-27	STL-B	367904	6248177	21-Sep-21	12.2	22-Sep-21	12.3	23.50	15.0	15.5
GN-28	STL-A	367376	6247712	19-Sep-21	12.7	20-Sep-21	12.6	23.37	17.0	16.5

**Table A1-2: Location and site-specific physical measurements collected at gillnetting sites during juvenile Lake Sturgeon investigations conducted in Stephens Lake, fall 2021 (continued).**

Site	Zone	UTM Location		Set Date	Set Water Temp (°C)	Pull Date	Pull Water Temp (°C)	Duration (dec. hrs)	Water Depth (m)	
		Easting	Northing						Start	End
GN-28	STL-A	367376	6247712	20-Sep-21	12.6	21-Sep-21	12.2	25.25	17.0	16.5
GN-29	STL-B	368248	6248128	19-Sep-21	12.7	20-Sep-21	12.6	21.13	14.1	13.8
GN-29	STL-B	368248	6248128	20-Sep-21	12.6	21-Sep-21	12.2	24.92	14.1	13.8
GN-29	STL-B	368248	6248128	21-Sep-21	12.2	22-Sep-21	12.3	22.75	14.1	13.8
GN-29	STL-B	368248	6248128	22-Sep-21	12.3	23-Sep-21	12.3	24.25	14.1	13.8
GN-30	STL-A	367753	6248066	20-Sep-21	12.6	21-Sep-21	12.2	21.58	15.9	15.3
GN-31	STL-B	368437	6247482	21-Sep-21	12.2	22-Sep-21	12.3	23.83	17.7	16.2
GN-31	STL-B	368437	6247482	22-Sep-21	12.3	23-Sep-21	12.3	24.08	17.7	16.2
GN-32	STL-B	368646	6247243	21-Sep-21	12.2	22-Sep-21	12.3	21.75	16.8	16.9
GN-33	STL-B	368004	6248296	22-Sep-21	12.3	23-Sep-21	12.3	24.17	16.8	13.4
GN-34	STL-A	368123	6247474	22-Sep-21	12.3	23-Sep-21	12.344	23.83	16.1	16
GN-35	STL-B	368844	6247360	22-Sep-21	12.3	23-Sep-21	12.344	23.67	15.7	15.4
GN-36	STL-A	366689	6247349	22-Sep-21	12.3	23-Sep-21	12.344	23.67	19.3	16.1

## **APPENDIX 2: BIOLOGICAL AND TAG INFORMATION FOR LAKE STURGEON CAPTURED IN FALL 2021.**

---

Table A2-1:	Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. ....	70
Table A2-2:	Biological and tag information for Lake Sturgeon captured in Stephens Lake, fall 2021. ....	80

**No table of figures entries found.**

**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality.**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-1	GL-B	14-Sep-21	1	121151	900 226001224727	550	638	1175	8
Keeyask Reservoir	GN-1	GL-B	14-Sep-21	2	121152	900 067000058492	620	705	1500	7
Keeyask Reservoir	GN-1	GL-B	14-Sep-21	3	121153	900 226001224743	590	677	1475	8
Keeyask Reservoir	GN-2	GL-C	14-Sep-21	4	121154	900 226000327598	450	510	625	5
Keeyask Reservoir	GN-2	GL-C	14-Sep-21	5	-	-	546	591	750	5
Keeyask Reservoir	GN-3	GL-C	14-Sep-21	6	121155	900 226001224771	461	529	600	5
Keeyask Reservoir	GN-3	GL-C	14-Sep-21	7	-	900 067000121416	277	311	150	1
Keeyask Reservoir	GN-3	GL-C	14-Sep-21	8	-	900 067000121271	219	243	100	1
Keeyask Reservoir	GN-6	GL-C	15-Sep-21	9	121156	900 226001224819	798	871	2750	-
Keeyask Reservoir	GN-6	GL-C	15-Sep-21	10	121157	900 226001224830	629	716	1550	7
Keeyask Reservoir	GN-6	GL-C	15-Sep-21	11	121158	900 226001224818	631	711	1625	11
Keeyask Reservoir	GN-6	GL-C	15-Sep-21	12	121139	900 067000113433	415	476	475	3
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	13	121160	900 226001224884	815	909	3750	-
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	14	118633	900 226001658940	450	516	550	4
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	15	121161	900 067000055432	545	619	1050	7
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	16	121162	900 226001224835	584	656	1275	7
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	17	121163	900 067000113184	424	487	500	3
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	18	121164	900 067000113674	374	425	375	3
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	19	121165	900 067000059477	489	554	625	5
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	20	121166	900 226001227158	490	555	750	5
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	21	121167	900 226001224821	385	435	450	4
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	22	121168	900 226001224864	456	501	675	4
Keeyask Reservoir	GN-7	GL-C	15-Sep-21	23	-	900 067000121495	259	295	150	1
Keeyask Reservoir	GN-8	GL-C	15-Sep-21	24	121169	900 226001224857	759	861	3175	-
Keeyask Reservoir	GN-8	GL-C	15-Sep-21	25	121170	900 226001224844	639	730	1675	8
Keeyask Reservoir	GN-8	GL-C	15-Sep-21	26	121172	900 226000327573	427	487	825	5
Keeyask Reservoir	GN-8	GL-C	15-Sep-21	27	109729	1380347899	555	613	1000	6

**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-3	GL-C	15-Sep-21	28	121173	900 043000103659	689	781	1950	8
Keeyask Reservoir	GN-3	GL-C	15-Sep-21	29	121175	900 043000103107	485	541	700	8
Keeyask Reservoir	GN-3	GL-C	15-Sep-21	30	118097	900 226001658865	450	505	450	4
Keeyask Reservoir	GN-3	GL-C	15-Sep-21	31	121174	900 226001224849	489	556	500	6
Keeyask Reservoir	GN-3	GL-C	15-Sep-21	32	121201	900 226001224807	571	621	1075	7
Keeyask Reservoir	GN-5	GL-C	15-Sep-21	33	121202	900 226001224834	757	865	2850	11
Keeyask Reservoir	GN-11	GL-C	16-Sep-21	34	121203	900 226001224885	697	765	1475	8
Keeyask Reservoir	GN-12	GL-C	16-Sep-21	35	111938	900 226001224866	795	878	3625	-
Keeyask Reservoir	GN-12	GL-C	16-Sep-21	36	109563	900 226000893903	565	635	1275	7
Keeyask Reservoir	GN-6	GL-C	16-Sep-21	37	121204	900 067000112451	455	502	500	5
Keeyask Reservoir	GN-6	GL-C	16-Sep-21	38	121205	900 226001224833	426	485	450	-
Keeyask Reservoir	GN-7	GL-C	16-Sep-21	39	117092	900 226001031204	394	446	375	3
Keeyask Reservoir	GN-9	GL-C	16-Sep-21	40	121206	900 226001224803	637	736	1675	8
Keeyask Reservoir	GN-9	GL-C	16-Sep-21	41	121207	900 067000112916	405	455	400	3
Keeyask Reservoir	GN-9	GL-C	16-Sep-21	42	121208	900 067000058712	611	695	1250	7
Keeyask Reservoir	GN-9	GL-C	16-Sep-21	43	121209	900 067000107900	400	463	400	3
Keeyask Reservoir	GN-9	GL-C	16-Sep-21	44	117007	900 226001224875	397	459	400	3
Keeyask Reservoir	GN-9	GL-C	16-Sep-21	45	121210	900 226001224870	489	556	800	6
Keeyask Reservoir	GN-9	GL-C	16-Sep-21	46	113804	900 226000327519	431	464	375	5
Keeyask Reservoir	GN-9	GL-C	16-Sep-21	48	116791	900 226001031198	445	514	525	5
Keeyask Reservoir	GN-9	GL-C	16-Sep-21	49	-	900 067000121244	249	286	100	2
Keeyask Reservoir	GN-10	GL-C	16-Sep-21	50	121211	900 067000108622	441	504	450	3
Keeyask Reservoir	GN-10	GL-C	16-Sep-21	51	121212	900 067000112914	431	492	500	3
Keeyask Reservoir	GN-10	GL-C	16-Sep-21	52	106468	900 067000112432	489	551	575	5
Keeyask Reservoir	GN-10	GL-C	16-Sep-21	53	118631	900 226001658900	461	522	550	5
Keeyask Reservoir	GN-10	GL-C	16-Sep-21	54	121213	900 226001224873	434	495	400	4
Keeyask Reservoir	GN-10	GL-C	16-Sep-21	55	121215	900 067000055620	580	660	1125	7



**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-10	GL-C	16-Sep-21	56	121216	900 067000109334	453	512	475	3
Keeyask Reservoir	GN-10	GL-C	16-Sep-21	57	121217	900 067000112888	398	450	350	3
Keeyask Reservoir	GN-14	GL-C	17-Sep-21	58	121218	900 226001224886	567	645	1250	8
Keeyask Reservoir	GN-14	GL-C	17-Sep-21	59	121219	900 226001224850	709	812	2600	12
Keeyask Reservoir	GN-14	GL-C	17-Sep-21	60	121220	900 226001224823	759	841	3000	16
Keeyask Reservoir	GN-14	GL-C	17-Sep-21	61	121221	900 226001224815	525	572	975	8
Keeyask Reservoir	GN-14	GL-C	17-Sep-21	62	121223	900 226001224808	614	698	1650	9
Keeyask Reservoir	GN-14	GL-C	17-Sep-21	63	121224	900 226001224876	505	581	675	7
Keeyask Reservoir	GN-14	GL-C	17-Sep-21	64	121225	900 226001224890	587	665	1075	-
Keeyask Reservoir	GN-15	GL-C	17-Sep-21	65	121222	900 226001224837	779	882	3750	13
Keeyask Reservoir	GN-16	GL-C	17-Sep-21	66	121251	900 043000119551	424	471	450	8
Keeyask Reservoir	GN-16	GL-C	17-Sep-21	67	121252	900 067000108656	415	471	450	3
Keeyask Reservoir	GN-16	GL-C	17-Sep-21	68	121253	900 067000113249	463	515	525	3
Keeyask Reservoir	GN-16	GL-C	17-Sep-21	69	121254	900 226001224838	435	501	500	5
Keeyask Reservoir	GN-16	GL-C	17-Sep-21	70	121255	900 226001224836	759	851	2375	9
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	71	121256	900 226001224867	715	813	2450	14
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	72	121257	900 226001224899	625	705	1575	8
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	73	121258	900 226001224831	506	573	775	5
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	74	121259	900 226001224853	616	702	1550	9
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	75	121260	-	546	624	1000	7
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	76	121261	-	501	573	550	-
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	77	121262	-	553	629	825	8
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	78	-	-	289	329	200	2
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	79	-	-	221	254	100	1
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	80	-	-	184	204	75	1
Keeyask Reservoir	GN-9	GL-C	17-Sep-21	81	-	-	444	509	500	5
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	82	121263	-	565	660	875	8

**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	83	121265	-	433	490	450	-
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	84	113018	900 226000327584	496	549	600	5
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	85	121266	-	469	535	600	5
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	86	121267	-	509	583	725	-
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	87	117056	900 067000112400	446	515	500	5
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	88	121268	-	482	549	650	5
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	89	121269	-	404	465	400	-
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	90	121270	-	517	595	725	5
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	91	118634	900 226001658796	509	565	625	5
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	92	121271	-	530	605	700	8
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	93	118302	900 226001658958	506	568	675	5
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	94	-	-	209	235	75	1
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	95	-	-	189	211	50	1
Keeyask Reservoir	GN-10	GL-C	17-Sep-21	96	-	-	526	587	725	5
Keeyask Reservoir	GN-13	GL-B	17-Sep-21	97	121272	-	490	570	650	7
Keeyask Reservoir	GN-13	GL-B	17-Sep-21	98	121273	-	497	571	725	5
Keeyask Reservoir	GN-13	GL-B	17-Sep-21	99	121274	-	614	695	1325	-
Keeyask Reservoir	GN-13	GL-B	17-Sep-21	100	121275	-	507	590	750	6
Keeyask Reservoir	GN-13	GL-B	17-Sep-21	101	121226	-	448	513	575	5
Keeyask Reservoir	GN-13	GL-B	17-Sep-21	102	121227	-	510	585	700	7
Keeyask Reservoir	GN-13	GL-B	17-Sep-21	103	121228	-	791	891	3350	-
Keeyask Reservoir	GN-18	GL-B	18-Sep-21	104	121229	900 067000109911	373	416	300	4
Keeyask Reservoir	GN-18	GL-B	18-Sep-21	105	121230	900 226001224883	574	655	1075	8
Keeyask Reservoir	GN-17	GL-B	18-Sep-21	106	121231	900 067000055227	497	578	675	7
Keeyask Reservoir	GN-17	GL-B	18-Sep-21	107	121232	900 226001224824	471	539	650	5
Keeyask Reservoir	GN-13	GL-B	18-Sep-21	108	121233	900 067000058462	536	617	975	7
Keeyask Reservoir	GN-13	GL-B	18-Sep-21	109	121234	900 226001224889	733	821	2375	10

**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-13	GL-B	18-Sep-21	110	121235	900 226001224848	695	787	1975	12
Keeyask Reservoir	GN-13	GL-B	18-Sep-21	111	121236	900 067000055504	524	604	825	7
Keeyask Reservoir	GN-13	GL-B	18-Sep-21	112	121237	900 226001224822	556	634	1375	9
Keeyask Reservoir	GN-13	GL-B	18-Sep-21	113	121238	900 226001224872	436	485	475	5
Keeyask Reservoir	GN-13	GL-B	18-Sep-21	114	111041	900 226000893866	619	710	1775	13
Keeyask Reservoir	GN-13	GL-B	18-Sep-21	115	121239	900 226001224847	467	525	550	5
Keeyask Reservoir	GN-14	GL-C	18-Sep-21	116	121240	900 226001224816	791	891	3400	-
Keeyask Reservoir	GN-14	GL-C	18-Sep-21	117	121241	900 226001224855	704	800	2450	13
Keeyask Reservoir	GN-16	GL-C	18-Sep-21	118	121242	900 226001224842	802	899	3950	-
Keeyask Reservoir	GN-16	GL-C	18-Sep-21	119	121243	900 067000113692	391	440	400	3
Keeyask Reservoir	GN-16	GL-C	18-Sep-21	120	121244	900 226001224845	574	645	1250	8
Keeyask Reservoir	GN-16	GL-C	18-Sep-21	121	121245	900 067000113002	437	500	450	3
Keeyask Reservoir	GN-9	GL-C	18-Sep-21	122	121246	900 226001224852	674	771	2250	13
Keeyask Reservoir	GN-9	GL-C	18-Sep-21	123	121247	900 067000112929	446	511	500	3
Keeyask Reservoir	GN-9	GL-C	18-Sep-21	124	109628	900 067000055300	636	725	1650	7
Keeyask Reservoir	GN-9	GL-C	18-Sep-21	125	-	-	160	187	50	1
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	126	121248	900 226001224854	512	594	975	8
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	127	245	989 001038119815	474	537	575	5
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	128	121249	900 226001224811	635	721	1550	7
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	129	121176	900 226001224820	771	866	2600	13
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	130	121177	900 226001055589	668	765	2150	-
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	131	121178	900 226001224865	446	506	500	5
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	132	121179	900 226001224896	470	529	600	5
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	133	121180	900 226001224861	674	768	2000	9
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	134	121181	900 067000055035	609	695	1475	7
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	135	121182	900 226000154026	658	716	1975	-
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	136	121183	900 226001224809	450	509	500	5

**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	137	118033	900 226001658843	425	486	500	4
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	138	121184	900 226001224871	570	639	1000	7
Keeyask Reservoir	GN-19	BR-D	19-Sep-21	139	406	989 001038119623	634	732	1850	8
Keeyask Reservoir	GN-20	BR-D	19-Sep-21	140	121185	900 226001224859	728	825	2675	10
Keeyask Reservoir	GN-20	BR-D	19-Sep-21	141	121186	900 226001224826	543	615	1075	7
Keeyask Reservoir	GN-20	BR-D	19-Sep-21	142	121187	900 226001224887	665	749	2000	10
Keeyask Reservoir	GN-20	BR-D	19-Sep-21	143	111048	900 226000152997	633	700	1625	11
Keeyask Reservoir	GN-20	BR-D	19-Sep-21	144	121188	900 226001224898	489	545	675	5
Keeyask Reservoir	GN-20	BR-D	19-Sep-21	145	121189	900 226001224891	445	499	600	5
Keeyask Reservoir	GN-21	GL-B	19-Sep-21	146	121190	900 226001224806	819	936	4750	-
Keeyask Reservoir	GN-21	GL-B	19-Sep-21	147	121191	900 226001224863	492	551	775	6
Keeyask Reservoir	GN-21	GL-B	19-Sep-21	148	121192	900 226001224869	414	466	500	5
Keeyask Reservoir	GN-21	GL-B	19-Sep-21	149	121193	900 226001224817	413	471	450	4
Keeyask Reservoir	GN-13	GL-B	19-Sep-21	150	121195	900 226001224703	709	790	2050	13
Keeyask Reservoir	GN-9	GL-C	19-Sep-21	151	121196	900 043000119961	575	645	1475	8
Keeyask Reservoir	GN-9	GL-C	19-Sep-21	152	121198	900 226001224723	486	555	725	5
Keeyask Reservoir	GN-9	GL-C	19-Sep-21	153	117053	900 226001031169	570	650	1450	8
Keeyask Reservoir	GN-21	GL-B	20-Sep-21	154	121199	900 067000108608	416	474	475	3
Keeyask Reservoir	GN-21	GL-B	20-Sep-21	155	121200	900 226001224781	459	524	600	5
Keeyask Reservoir	GN-23	GL-B	20-Sep-21	156	121276	900 226001224757	630	715	1125	9
Keeyask Reservoir	GN-23	GL-B	20-Sep-21	157	121277	900 226001224765	543	591	875	6
Keeyask Reservoir	GN-23	GL-B	20-Sep-21	158	121278	900 067000109339	385	436	375	3
Keeyask Reservoir	GN-23	GL-B	20-Sep-21	159	121279	900 067000108624	460	520	500	3
Keeyask Reservoir	GN-22	GL-A	20-Sep-21	160	121280	900 226001224764	619	691	1450	9
Keeyask Reservoir	GN-22	GL-A	20-Sep-21	161	121281	900 226001224745	534	603	1000	7
Keeyask Reservoir	GN-22	GL-A	20-Sep-21	162	121282	900 226001224758	545	617	950	7
Keeyask Reservoir	GN-22	GL-A	20-Sep-21	163	121283	900 226001224724	529	605	750	7

**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-22	GL-A	20-Sep-21	164	121284	900 067000055198	510	592	700	7
Keeyask Reservoir	GN-22	GL-A	20-Sep-21	165	121285	900 067000112903	419	481	475	3
Keeyask Reservoir	GN-22	GL-A	20-Sep-21	166	121286	900 226001224759	449	510	575	5
Keeyask Reservoir	GN-22	GL-A	20-Sep-21	167	121287	900 226001224705	440	510	550	6
Keeyask Reservoir	GN-19	BR-D	20-Sep-21	168	-	972 273000041188	234	264	100	1
Keeyask Reservoir	GN-19	BR-D	20-Sep-21	169	-	972 273000041192	209	239	75	1
Keeyask Reservoir	GN-20	BR-D	20-Sep-21	170	121288	900 226001224753	649	731	2050	10
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	171	121289	900 226001224760	650	744	1975	8
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	172	121290	900 226001224755	514	575	1000	6
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	173	121291	900 067000055529	558	645	1075	7
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	174	121292	900 226001224874	489	555	900	5
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	175	121293	900 067000058447	570	651	1250	7
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	176	113848	900 067000056730	519	590	1025	5
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	177	121294	900 226001224777	474	540	750	5
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	179	121296	900 226001224788	449	505	600	5
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	180	113044	900 067000055461	485	549	700	7
Keeyask Reservoir	GN-24	GL-C	20-Sep-21	181	121298	900 226001224718	466	521	600	4
Keeyask Reservoir	GN-25	BR-D	21-Sep-21	182	121299	1380347930	318	361	275	2
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	183	121300	900 226001224786	573	645	1400	6
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	184	121301	900 226001224706	534	604	1000	6
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	185	121302	900 226001224739	500	584	675	7
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	186	121303	900 067000055548	544	623	900	7
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	187	111040	900 067000058596	516	604	725	7
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	188	121304	900 226001224722	460	515	600	5
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	189	121305	900 067000058530	530	603	850	7
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	190	121306	900 226001224767	414	484	500	6
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	191	118018	900 226001658847	476	540	725	5

**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	192	121307	900 067000112936	399	453	425	3
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	193	121308	900 226001224700	570	650	1350	8
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	194	121309	900 226001224782	446	506	600	5
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	195	-	972 273000041191	206	232	75	1
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	196	-	900 043000182550	174	196	50	1
Keeyask Reservoir	GN-22	GL-A	21-Sep-21	197	-	900 067000121413	175	197	50	1
Keeyask Reservoir	GN-23	GL-B	21-Sep-21	198	121310	900 226001224772	746	852	2750	12
Keeyask Reservoir	GN-23	GL-B	21-Sep-21	199	113155	900 226000327540	491	551	675	7
Keeyask Reservoir	GN-23	GL-B	21-Sep-21	200	121311	900 067000109331	436	500	525	3
Keeyask Reservoir	GN-21	GL-B	21-Sep-21	201	121313	900 226001224719	625	710	1650	8
Keeyask Reservoir	GN-21	GL-B	21-Sep-21	202	121312	900 226001224798	710	805	2400	12
Keeyask Reservoir	GN-21	GL-B	21-Sep-21	203	121314	900 226001224710	366	417	400	3
Keeyask Reservoir	GN-21	GL-B	21-Sep-21	204	121315	900 226001224738	684	752	2025	12
Keeyask Reservoir	GN-21	GL-B	21-Sep-21	205	118041	900 226001658817	485	553	650	5
Keeyask Reservoir	GN-21	GL-B	21-Sep-21	206	121316	900 226001224717	492	564	675	7
Keeyask Reservoir	GN-21	GL-B	21-Sep-21	207	121317	900 226001224762	540	624	1075	8
Keeyask Reservoir	GN-21	GL-B	21-Sep-21	208	121318	900 226001224708	500	575	875	6
Keeyask Reservoir	GN-21	GL-B	21-Sep-21	209	-	900 067000112159	435	465	550	5
Keeyask Reservoir	GN-24	GL-C	21-Sep-21	210	121325	900 226001224735	593	665	1500	7
Keeyask Reservoir	GN-24	GL-C	21-Sep-21	211	121324	900 226001224766	580	661	1425	8
Keeyask Reservoir	GN-26	GL-A	22-Sep-21	212	121323	900 226001224734	547	631	1325	8
Keeyask Reservoir	GN-27	GL-A	22-Sep-21	213	121322	900 226001224752	413	465	475	5
Keeyask Reservoir	GN-27	GL-A	22-Sep-21	214	121321	900 226001224791	520	585	725	6
Keeyask Reservoir	GN-27	GL-A	22-Sep-21	215	121320	900 226001224726	442	501	500	5
Keeyask Reservoir	GN-27	GL-A	22-Sep-21	216	121319	900 226001224736	400	457	475	4
Keeyask Reservoir	GN-27	GL-A	22-Sep-21	217	117926	900 226001224746	443	507	550	4
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	218	117927	900 226001224785	589	675	1500	7

**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	219	117928	900 226000122776	748	844	2650	-
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	220	117929	900 226001224713	585	669	1575	9
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	221	117930	900 226001224754	588	670	1475	8
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	222	111013	900 226000893552	555	640	1450	-
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	223	117931	900 226001224794	453	512	600	5
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	224	117932	900 067000112908	416	472	450	3
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	225	117933	900 226001224733	440	492	550	5
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	226	117934	900 226001224797	487	540	700	5
Keeyask Reservoir	GN-22	GL-A	22-Sep-21	227	117935	900 226001224730	420	484	550	5
Keeyask Reservoir	GN-28	GL-B	22-Sep-21	228	117936	900 226001224741	627	710	1875	10
Keeyask Reservoir	GN-28	GL-B	22-Sep-21	229	117938	900 067000058455	495	572	675	7
Keeyask Reservoir	GN-21	GL-B	22-Sep-21	230	117939	900 226001224778	548	637	1375	8
Keeyask Reservoir	GN-21	GL-B	22-Sep-21	231	117940	900 226001224707	458	510	675	4
Keeyask Reservoir	GN-21	GL-B	22-Sep-21	232	117941	900 226001224787	490	565	675	6
Keeyask Reservoir	GN-21	GL-B	22-Sep-21	233	117942	900 226001224747	444	503	550	5
Keeyask Reservoir	GN-21	GL-B	22-Sep-21	234	117943	900 226001224740	560	627	1250	8
Keeyask Reservoir	GN-21	GL-B	22-Sep-21	235	117944	900 226001224750	488	555	725	6
Keeyask Reservoir	GN-21	GL-B	22-Sep-21	236	117120	900 226001031189	561	645	1000	7
Keeyask Reservoir	GN-29	GL-C	22-Sep-21	237	-	972 273000041184	199	224	50	1
Keeyask Reservoir	GN-29	GL-C	22-Sep-21	238	-	900 067000121372	200	226	50	1
Keeyask Reservoir	GN-29	GL-C	23-Sep-21	239	117945	900 226001224780	684	765	2450	9
Keeyask Reservoir	GN-29	GL-C	23-Sep-21	240	-	900 067000121296	195	230	-	1
Keeyask Reservoir	GN-27	GL-A	23-Sep-21	241	117946	900 226001224856	610	684	1875	8
Keeyask Reservoir	GN-27	GL-A	23-Sep-21	242	117947	900 226001224701	540	609	775	6
Keeyask Reservoir	GN-27	GL-A	44462	243	117948	900 226001224796	493	561	675	5
Keeyask Reservoir	GN-22	GL-A	44462	244	117949	900 226001224775	494	571	600	4
Keeyask Reservoir	GN-22	GL-A	44462	245	117950	900 226001224789	426	475	450	5
Keeyask Reservoir	GN-22	GL-A	44462	246	117901	900 067000113073	400	470	375	3



**Table A2-1: Biological and tag information for Lake Sturgeon captured in the Keeyask reservoir, fall 2021. Red text indicates fish mortality (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Keeyask Reservoir	GN-22	GL-A	44462	247	117903	900 226001224761	564	661	1375	8
Keeyask Reservoir	GN-22	GL-A	44462	248	113022	900 067000059369	450	501	475	5
Keeyask Reservoir	GN-30	GL-A	44462	249	117904	900 226001224792	542	612	975	7
Keeyask Reservoir	GN-30	GL-A	44462	250	117905	900 067000112289	464	535	500	5
Keeyask Reservoir	GN-30	GL-A	44462	251	117906	900 226001224731	349	400	300	4
Keeyask Reservoir	GN-30	GL-A	44462	252	117907	900 226001224711	390	444	375	4
Keeyask Reservoir	GN-30	GL-A	44462	253	116799	900 226001031162	435	490	450	5
Keeyask Reservoir	GN-30	GL-A	44462	254	-	900 067000121376	187	215	50	1
Keeyask Reservoir	GN-31	GL-B	44462	255	113162	900 226000327544	400	441	400	5
Keeyask Reservoir	GN-31	GL-B	44462	256	117908	900 067000055114	500	586	600	7
Keeyask Reservoir	GN-31	GL-B	44462	257	117909	900 226001224732	526	604	775	6
Keeyask Reservoir	GN-31	GL-B	44462	258	117910	900 067000058540	524	603	825	7
Keeyask Reservoir	GN-31	GL-B	44462	259	117911	900 226001224776	538	606	825	8
Keeyask Reservoir	GN-31	GL-B	44462	260	117912	900 067000055127	536	610	800	7
Keeyask Reservoir	GN-31	GL-B	44462	261	117914	900 226001224720	537	611	850	8
Keeyask Reservoir	GN-31	GL-B	44462	262	117915	900 226001224744	629	715	1625	11
Keeyask Reservoir	GN-31	GL-B	44462	263	117916	900 067000113017	389	441	300	3
Keeyask Reservoir	GN-21	GL-B	44462	264	117917	900 226001224742	723	810	2650	12
Keeyask Reservoir	GN-21	GL-B	44462	265	117918	900 226001224737	592	670	1475	7
Keeyask Reservoir	GN-21	GL-B	44462	266	117919	900 226001224751	617	710	1875	-
Keeyask Reservoir	GN-21	GL-B	44462	267	117920	900 067000055591	544	625	850	7
Keeyask Reservoir	GN-21	GL-B	44462	268	117921	900 226001224709	474	535	550	5

**Table A2-2: Biological and tag information for Lake Sturgeon captured in Stephens Lake, fall 2021.**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Stephens Lake	GN-01	STL-A	14-Sep-21	1	121350	900 226001227105	660	739	1900	12
Stephens Lake	GN-01	STL-A	14-Sep-21	2	121349	900 067000109352	405	475	500	3
Stephens Lake	GN-01	STL-A	14-Sep-21	3	121348	900 226001227104	516	584	950	5
Stephens Lake	GN-01	STL-A	14-Sep-21	4	121347	900 226001227163	545	631	1250	6
Stephens Lake	GN-02	STL-A	14-Sep-21	5	121346	900 067000113256	433	494	475	3
Stephens Lake	GN-03	STL-B	14-Sep-21	6	121345	900 067000113564	512	576	900	5
Stephens Lake	GN-03	STL-B	14-Sep-21	7	121344	900 226001227143	396	447	475	4
Stephens Lake	GN-03	STL-B	14-Sep-21	8	-	900 043000192329	199	224	25	1
Stephens Lake	GN-04	STL-B	15-Sep-21	13	121340	900 226001227110	395	452	500	4
Stephens Lake	GN-04	STL-B	15-Sep-21	14	121339	900 067000111886	509	569	900	5
Stephens Lake	GN-04	STL-B	15-Sep-21	15	94120	900 226001227189	559	745	2000	-
Stephens Lake	GN-06	STL-B	15-Sep-21	9	117569	900 067000113384	428	477	450	3
Stephens Lake	GN-06	STL-B	15-Sep-21	10	121343	900 226001227190	560	644	1075	8
Stephens Lake	GN-06	STL-B	15-Sep-21	11	121342	900 226001227103	505	580	925	5
Stephens Lake	GN-06	STL-B	15-Sep-21	12	121341	900 226001227188	815	916	3540	-
Stephens Lake	GN-06	STL-B	16-Sep-21	21	121336	900 226001227156	755	850	2900	14
Stephens Lake	GN-06	STL-B	16-Sep-21	22	117682	900 067000109624	431	596	540	3
Stephens Lake	GN-07	STL-A	15-Sep-21	16	121338	900 067000059076	497	560	970	5
Stephens Lake	GN-07	STL-A	15-Sep-21	17	118738	900 226001055033	572	663	1040	7
Stephens Lake	GN-09	STL-A	15-Sep-21	18	-	-	101	115	-	0
Stephens Lake	GN-09	STL-A	15-Sep-21	19	121337	900 226001227121	653	733	2010	10
Stephens Lake	GN-10	STL-A	16-Sep-21	26	121332	900 226001227114	310	360	175	2
Stephens Lake	GN-10	STL-A	16-Sep-21	27	121331	900 226001227172	496	561	875	5
Stephens Lake	GN-10	STL-A	17-Sep-21	48	118899	900 226001055099	466	535	675	5
Stephens Lake	GN-10	STL-A	17-Sep-21	49	121389	900 226001227122	497	556	725	5
Stephens Lake	GN-10	STL-A	17-Sep-21	50	112940	900 067000055264	614	711	1475	7
Stephens Lake	GN-11	STL-B	16-Sep-21	20	113277	900 226000327966	563	632	1125	6

**Table A2-2: Biological and tag information for Lake Sturgeon captured in Stephens Lake, fall 2021 (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Stephens Lake	GN-12	STL-B	16-Sep-21	23	117678	900 067000059220	504	577	900	5
Stephens Lake	GN-12	STL-B	16-Sep-21	24	121334	900 226001227119	458	520	720	4
Stephens Lake	GN-12	STL-B	16-Sep-21	25	121333	900 067000113410	457	513	525	3
Stephens Lake	GN-12	STL-B	17-Sep-21	40	121395	900 067000113683	405	465	400	3
Stephens Lake	GN-12	STL-B	18-Sep-21	51	121388	900 067000113021	446	510	600	3
Stephens Lake	GN-12	STL-B	18-Sep-21	52	121387	900 067000113442	459	531	625	3
Stephens Lake	GN-12	STL-B	18-Sep-21	53	121386	900 067000109329	403	461	425	3
Stephens Lake	GN-12	STL-B	18-Sep-21	54	118868	900 067000108602	425	495	500	3
Stephens Lake	GN-12	STL-B	18-Sep-21	55	116755	900 226001031214	410	475	500	5
Stephens Lake	GN-12	STL-B	18-Sep-21	56	113016	900 226000327568	450	495	625	6
Stephens Lake	GN-12	STL-B	18-Sep-21	57	115149	900 226000154278	584	662	1525	6
Stephens Lake	GN-12	STL-B	19-Sep-21	77	121428	900 067000112005	528	608	1050	5
Stephens Lake	GN-12	STL-B	19-Sep-21	78	-	900 043000192363	200	224	75	1
Stephens Lake	GN-13	STL-A	16-Sep-21	29	121330	900 226001227144	530	617	950	5
Stephens Lake	GN-13	STL-A	16-Sep-21	30	121329	900 067000113213	394	456	400	3
Stephens Lake	GN-14	STL-A	16-Sep-21	28	-	-	101	113	-	0
Stephens Lake	GN-16	STL-B	17-Sep-21	31	121328	900 067000113391	438	504	525	3
Stephens Lake	GN-16	STL-B	17-Sep-21	32	121327	900 226001227146	390	446	475	4
Stephens Lake	GN-16	STL-B	17-Sep-21	33	121326	900 226001031033	595	674	1250	6
Stephens Lake	GN-16	STL-B	17-Sep-21	34	118812	900 067000121184	517	592	1000	5
Stephens Lake	GN-16	STL-B	17-Sep-21	35	121396	900 067000112931	427	485	525	3
Stephens Lake	GN-16	STL-B	17-Sep-21	36	121399	900 226001227186	456	509	625	4
Stephens Lake	GN-16	STL-B	17-Sep-21	37	121398	900 067000121334	465	529	750	5
Stephens Lake	GN-16	STL-B	17-Sep-21	38	116052	900 067000113708	376	421	400	3
Stephens Lake	GN-16	STL-B	17-Sep-21	39	121397	900 067000112975	420	486	525	3
Stephens Lake	GN-16	STL-B	18-Sep-21	58	121385	900 067000113398	397	469	425	3
Stephens Lake	GN-16	STL-B	18-Sep-21	59	121384	900 226001227120	574	657	1450	10

**Table A2-2: Biological and tag information for Lake Sturgeon captured in Stephens Lake, fall 2021 (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Stephens Lake	GN-16	STL-B	18-Sep-21	60	118890	900 226001055012	662	750	1850	10
Stephens Lake	GN-16	STL-B	18-Sep-21	61	116069	900 067000113446	414	477	475	3
Stephens Lake	GN-17	STL-A	17-Sep-21	41	121394	900 067000109322	414	484	450	3
Stephens Lake	GN-17	STL-A	17-Sep-21	42	120054	900 067000113707	416	475	475	3
Stephens Lake	GN-17	STL-A	17-Sep-21	43	121392	900 226001227162	525	610	1000	7
Stephens Lake	GN-17	STL-A	17-Sep-21	44	121391	900 226001227126	440	505	750	5
Stephens Lake	GN-17	STL-A	17-Sep-21	45	-	900 226001227028	209	236	50	1
Stephens Lake	GN-18	STL-A	17-Sep-21	46	116048	900 067000113397	426	485	400	3
Stephens Lake	GN-18	STL-A	17-Sep-21	47	117697	900 226000767237	487	562	700	6
Stephens Lake	GN-19	STL-A	18-Sep-21	62	119425	900 226001225221	915	1020	6010	-
Stephens Lake	GN-19	STL-A	18-Sep-21	63	121383	900 226001227115	494	560	950	5
Stephens Lake	GN-20	STL-A	18-Sep-21	68	121376	900 067000109589	429	497	475	3
Stephens Lake	GN-20	STL-A	18-Sep-21	69	110597	900 043000103528	533	604	1025	8
Stephens Lake	GN-20	STL-A	18-Sep-21	70	121400	900 067000113262	435	492	475	3
Stephens Lake	GN-20	STL-A	18-Sep-21	71	-	900 043000192395	190	216	100	1
Stephens Lake	GN-20	STL-A	19-Sep-21	88	116029	900 067000109610	405	461	400	3
Stephens Lake	GN-21	STL-A	18-Sep-21	64	121381	900 067000113236	418	483	450	3
Stephens Lake	GN-21	STL-A	18-Sep-21	65	121380	900 067000113468	422	485	500	3
Stephens Lake	GN-21	STL-A	18-Sep-21	66	121379	900 067000113463	458	524	575	3
Stephens Lake	GN-21	STL-A	18-Sep-21	67	121377	900 067000059030	478	549	750	5
Stephens Lake	GN-22	STL-A	19-Sep-21	80	121430	900 067000055547	614	701	1575	7
Stephens Lake	GN-22	STL-A	19-Sep-21	81	121431	900 226001055340	460	520	700	5
Stephens Lake	GN-22	STL-A	19-Sep-21	82	118863	900 067000113411	418	477	450	3
Stephens Lake	GN-22	STL-A	19-Sep-21	83	110794	900 226000893916	573	642	1700	6
Stephens Lake	GN-22	STL-A	19-Sep-21	84	121433	900 226001227128	585	670	1425	6
Stephens Lake	GN-22	STL-A	19-Sep-21	85	121434	900 226001227195	575	660	1325	6
Stephens Lake	GN-22	STL-A	19-Sep-21	86	113281	900 226000327919	506	560	875	6

**Table A2-2: Biological and tag information for Lake Sturgeon captured in Stephens Lake, fall 2021 (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Stephens Lake	GN-22	STL-A	19-Sep-21	87	121435	900 226001030350	738	820	2675	10
Stephens Lake	GN-22	STL-A	20-Sep-21	105	117580	900 226001227197	565	636	1400	6
Stephens Lake	GN-22	STL-A	20-Sep-21	106	113167	900 226000327532	515	580	925	6
Stephens Lake	GN-22	STL-A	20-Sep-21	107	116038	900 226001030392	750	862	3500	11
Stephens Lake	GN-22	STL-A	20-Sep-21	108	101445	900 226000629018	755	868	3000	-
Stephens Lake	GN-22	STL-A	20-Sep-21	109	121390	900 226001227098	865	941	4850	-
Stephens Lake	GN-24	STL-A	19-Sep-21	72	121378	900 067000113407	435	506	525	3
Stephens Lake	GN-24	STL-A	19-Sep-21	73	121426	900 067000109638	401	467	400	3
Stephens Lake	GN-24	STL-A	19-Sep-21	74	121427	900 067000113754	405	464	450	3
Stephens Lake	GN-24	STL-A	19-Sep-21	75	110570	900 226001225407	565	645	1250	-
Stephens Lake	GN-24	STL-A	19-Sep-21	76	116055	900 067000113406	404	464	400	3
Stephens Lake	GN-24	STL-A	20-Sep-21	110	121335	900 067000055239	597	674	1400	7
Stephens Lake	GN-24	STL-A	20-Sep-21	111	121425	900 067000121295	389	450	500	4
Stephens Lake	GN-24	STL-A	20-Sep-21	112	121423	900 226000893737	524	570	900	6
Stephens Lake	GN-24	STL-A	20-Sep-21	113	121422	900 067000108674	431	490	475	3
Stephens Lake	GN-24	STL-A	20-Sep-21	114	117669	900 067000113443	445	504	575	3
Stephens Lake	GN-24	STL-A	20-Sep-21	115	121421	900 043000192373	487	554	800	4
Stephens Lake	GN-25	STL-A	19-Sep-21	89A	121438	900 226001055342	428	490	475	4
Stephens Lake	GN-26	STL-B	20-Sep-21	89B	121439	900 067000121390	396	446	525	4
Stephens Lake	GN-26	STL-B	20-Sep-21	90	121440	900 067000113738	406	465	375	3
Stephens Lake	GN-26	STL-B	20-Sep-21	91	121441	900 067000058505	652	745	1900	7
Stephens Lake	GN-26	STL-B	20-Sep-21	92	121442	900 067000058580	622	709	1550	7
Stephens Lake	GN-26	STL-B	20-Sep-21	93	121443	900 226001227117	843	933	4100	-
Stephens Lake	GN-26	STL-B	21-Sep-21	129	89481	900 226000893352	940	1060	5400	-
Stephens Lake	GN-26	STL-B	21-Sep-21	130	121413	900 226001055023	521	585	1000	6
Stephens Lake	GN-26	STL-B	21-Sep-21	131	121411	900 067000112096	527	614	1150	5
Stephens Lake	GN-26	STL-B	21-Sep-21	132	-	900 226001227150	234	266	75	1

**Table A2-2: Biological and tag information for Lake Sturgeon captured in Stephens Lake, fall 2021 (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Stephens Lake	GN-26	STL-B	21-Sep-21	133	-	900 043000192370	206	234	75	1
Stephens Lake	GN-27	STL-B	20-Sep-21	94	121444	900 067000108595	464	520	675	3
Stephens Lake	GN-27	STL-B	20-Sep-21	95	117681	900 067000113465	402	455	400	3
Stephens Lake	GN-27	STL-B	20-Sep-21	96	121445	900 043000192390	445	504	600	4
Stephens Lake	GN-27	STL-B	20-Sep-21	97	121446	900 067000059007	510	583	975	5
Stephens Lake	GN-27	STL-B	21-Sep-21	119	121418	900 067000113439	444	504	550	3
Stephens Lake	GN-27	STL-B	21-Sep-21	120	112527	900 226000548594	488	547	800	7
Stephens Lake	GN-27	STL-B	21-Sep-21	121	103350	900 226000703402	782	889	3700	6
Stephens Lake	GN-27	STL-B	21-Sep-21	122	100671	900 226000768698	569	643	1200	6
Stephens Lake	GN-27	STL-B	22-Sep-21	135	121410	900 067000108631	429	492	400	3
Stephens Lake	GN-27	STL-B	22-Sep-21	136	121409	900 226001227141	495	557	775	5
Stephens Lake	GN-27	STL-B	22-Sep-21	137	121408	900 067000112989	415	476	450	3
Stephens Lake	GN-28	STL-A	20-Sep-21	116	121420	900 067000113181	451	514	550	3
Stephens Lake	GN-28	STL-A	20-Sep-21	117	119406	900 226001225253	565	632	1300	-
Stephens Lake	GN-28	STL-A	21-Sep-21	134	106460	900 226000893864	517	583	825	6
Stephens Lake	GN-29	STL-B	20-Sep-21	98	121447	900 226001227174	398	493	525	4
Stephens Lake	GN-29	STL-B	20-Sep-21	99	121449	900 067000113035	401	460	475	3
Stephens Lake	GN-29	STL-B	20-Sep-21	100	121450	900 067000113478	448	516	600	3
Stephens Lake	GN-29	STL-B	20-Sep-21	101	121448	900 226001227125	530	610	1150	6
Stephens Lake	GN-29	STL-B	20-Sep-21	102	90304	900 043000103649	560	629	1275	8
Stephens Lake	GN-29	STL-B	20-Sep-21	103	121432	900 067000109674	456	519	600	3
Stephens Lake	GN-29	STL-B	20-Sep-21	104	-	900 226001227145	246	276	100	2
Stephens Lake	GN-29	STL-B	21-Sep-21	123	89851	900 226001055324	940	1320	5525	16
Stephens Lake	GN-29	STL-B	21-Sep-21	124	121416	900 226001658090	815	916	3750	-
Stephens Lake	GN-29	STL-B	21-Sep-21	125	121415	900 226001658159	650	732	2000	8
Stephens Lake	GN-29	STL-B	21-Sep-21	126	112941	900 067000055582	561	642	1125	7
Stephens Lake	GN-29	STL-B	21-Sep-21	127	121414	900 226001658079	426	483	525	4

**Table A2-2: Biological and tag information for Lake Sturgeon captured in Stephens Lake, fall 2021 (continued).**

Waterbody	Site	Zone	Date	Fish #	Floy-tag #	Pit-tag #	Fork Length (mm)	Total Length (mm)	Weight (g)	Age
Stephens Lake	GN-29	STL-B	21-Sep-21	128	-	900 067000121248	180	200	25	1
Stephens Lake	GN-29	STL-B	22-Sep-21	138	121407	900 067000113255	412	462	400	3
Stephens Lake	GN-29	STL-B	22-Sep-21	139	121406	900 067000113747	419	486	425	3
Stephens Lake	GN-29	STL-B	22-Sep-21	140	121405	900 226001658023	520	592	1050	6
Stephens Lake	GN-29	STL-B	22-Sep-21	141	121404	900 067000058740	563	631	1125	7
Stephens Lake	GN-29	STL-B	23-Sep-21	150	121500	900 067000113241	432	494	475	3
Stephens Lake	GN-29	STL-B	23-Sep-21	151	121499	900 067000112562	483	562	850	5
Stephens Lake	GN-30	STL-A	21-Sep-21	118	116050	900 067000113045	414	476	450	3
Stephens Lake	GN-31	STL-B	22-Sep-21	142	113292	900 226000327973	640	726	2000	8
Stephens Lake	GN-31	STL-B	22-Sep-21	143	101497	900 226000628198	642	719	1750	8
Stephens Lake	GN-31	STL-B	22-Sep-21	144	115779	900 067000055312	640	730	1625	7
Stephens Lake	GN-31	STL-B	22-Sep-21	145	121402	900 067000055398	645	734	1775	7
Stephens Lake	GN-32	STL-B	22-Sep-21	146A	111053	900 226000154228	532	603	1025	4
Stephens Lake	GN-33	STL-B	23-Sep-21	146B	116041	900 067000113436	412	466	375	3
Stephens Lake	GN-33	STL-B	23-Sep-21	147	121393	900 226001227123	436	497	550	5
Stephens Lake	GN-33	STL-B	23-Sep-21	148	112936	900 226000893917	587	677	1040	6
Stephens Lake	GN-33	STL-B	23-Sep-21	149	-	900 043000192338	217	247	50	1
Stephens Lake	GN-34	STL-A	23-Sep-21	152	113284	900 226000327852	577	664	1325	6
Stephens Lake	GN-35	STL-B	23-Sep-21	154	121498	900 043000192357	586	663	1475	10
Stephens Lake	GN-35	STL-B	23-Sep-21	155	121497	900 067000113280	423	475	400	3
Stephens Lake	GN-36	STL-A	23-Sep-21	156	121496	900 226001055353	455	503	575	5
Stephens Lake	GN-36	STL-A	23-Sep-21	157	121495	900 067000113001	467	532	500	3
Stephens Lake	GN-36	STL-A	23-Sep-21	158	121493	900 067000109603	423	485	400	3



## **APPENDIX 3:**

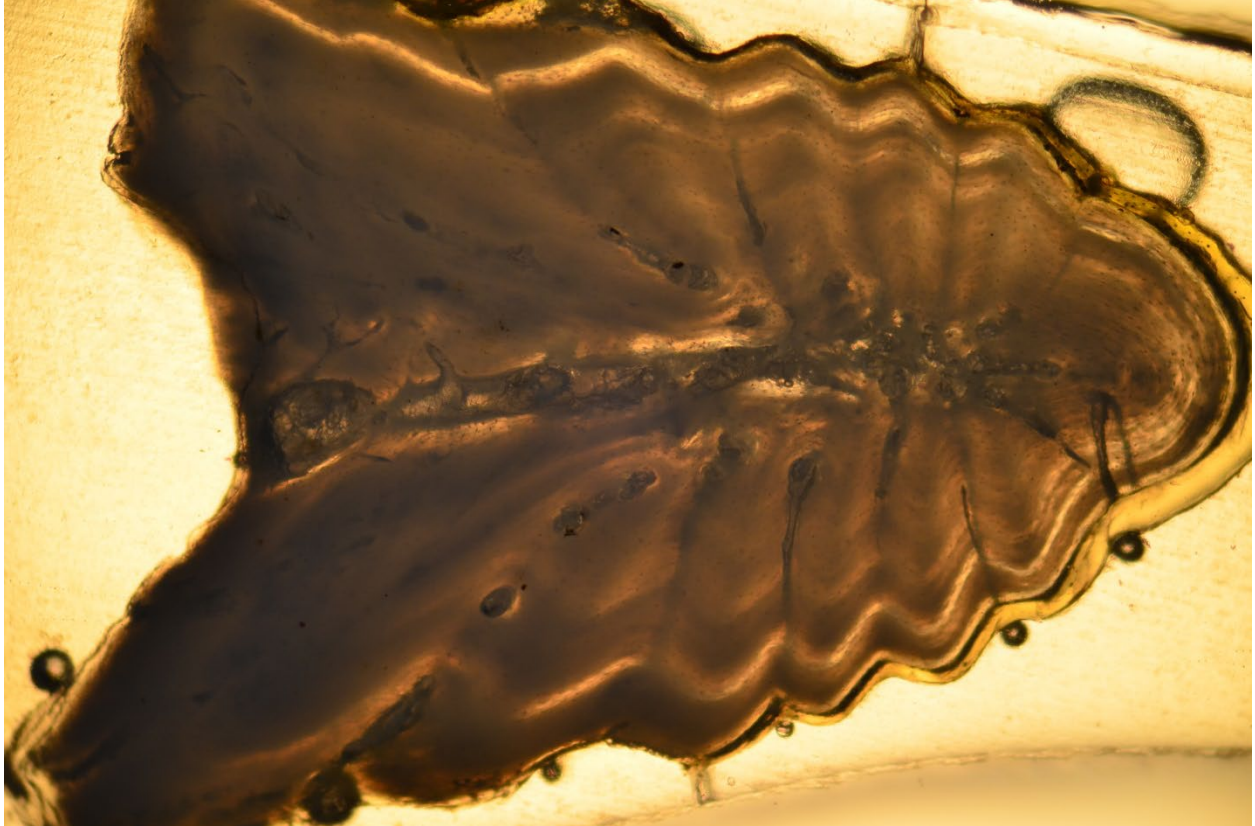
### **AGEING STRUCTURES OF JUVENILE LAKE STURGEON CAUGHT IN THE KEEYASK STUDY AREA.**

---

Figure A3-1: Ageing structure from a wild juvenile Lake Sturgeon (8-year-old) caught in the Keeyask reservoir. ....	87
Figure A3-2: Ageing structure from a hatchery-reared juvenile Lake Sturgeon caught in Stephens Lake (2-year-old). Agers noted the presence of a weak first annulus and false annuli typically observed in hatchery-reared Lake Sturgeon. ....	88



**Figure A3-1: Ageing structure from a wild juvenile Lake Sturgeon (8-year-old) caught in the Keeyask reservoir.**



**Figure A3-2: Ageing structure from a hatchery-reared juvenile Lake Sturgeon caught in Stephens Lake (2-year-old). Agers noted the presence of a weak first annulus and false annuli typically observed in hatchery-reared Lake Sturgeon.**

## **APPENDIX 4:**

### **WILD AND HATCHERY LAKE STURGEON RECAPTURE DATA, FALL 2021.**

---

Table A4-1:	Original capture date and biological data for wild Lake Sturgeon recaptured in gill nets, fall 2021. ....	90
Table A4-2:	Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in the Keeyask reservoir, fall 2021. ....	97
Table A4-3:	Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021.....	104

**Table A4-1: Original capture date and biological data for wild Lake Sturgeon recaptured in gill nets, fall 2021.**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121152	900 067000058492	GL-B	14-Sep-21	620	705	1500	7	4.05	2276
Keeyask Reservoir	-	-	GL-B	22-Jun-15	238	276	75	1		
			<b>Growth</b>		<b>382</b>	<b>429</b>	<b>1425</b>			
Keeyask Reservoir	121139	900 067000113433	GL-C	15-Sep-21	415	476	475	3	2.10	832
Keeyask Reservoir	-	-	GL-C	06-Jun-19	235	279	65	1		
			<b>Growth</b>		<b>180</b>	<b>197</b>	<b>410</b>			
Keeyask Reservoir	121161	900 067000055432	GL-C	15-Sep-21	545	619	1050	7	2.70	2191
Keeyask Reservoir	-	-	GL-B	16-Sep-15	304	349	150	1		
			<b>Growth</b>		<b>241</b>	<b>270</b>	<b>900</b>			
Keeyask Reservoir	121163	900 067000113184	GL-C	15-Sep-21	424	487	500	3	2.85	832
Keeyask Reservoir	-	-	GL-B	6-Jun-19	238	275	66	1		
			<b>Growth</b>		<b>186</b>	<b>212</b>	<b>434</b>			
Keeyask Reservoir	121164	900 067000113674	GL-C	15-Sep-21	374	425	375	3	1.29	832
Keeyask Reservoir	-	-	GL-C	6-Jun-19	240	285	77	1		
			<b>Growth</b>		<b>134</b>	<b>140</b>	<b>298</b>			
Keeyask Reservoir	121165	900 067000059477	GL-C	15-Sep-21	489	554	625	5	10.2	1560
Keeyask Reservoir	-	-	GL-A	8-Jun-17	228	267	64	1		
			<b>Growth</b>		<b>261</b>	<b>287</b>	<b>561</b>			
Keeyask Reservoir	121175	900 043000103107	GL-C	15-Sep-21	485	541	700	8	101.6	2540
Burntwood River	-	-	BWR-C	2-Oct-14	225	255	67	1		
			<b>Growth</b>		<b>260</b>	<b>286</b>	<b>633</b>			
Keeyask Reservoir	121204	900 067000112451	GL-C	16-Sep-21	455	502	500	5	10.70	1561
Keeyask Reservoir	-	-	GL-A	8-Jun-17	232	270	67	1		
			<b>Growth</b>		<b>223</b>	<b>232</b>	<b>433</b>			
Keeyask Reservoir	121207	900 067000112916	GL-C	16-Sep-21	405	455	400	3	0.20	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	232	275	69	1		
			<b>Growth</b>		<b>173</b>	<b>180</b>	<b>331</b>			
Keeyask Reservoir	121208	900 067000058712	GL-C	16-Sep-21	611	695	1250	7	0.79	2192
Keeyask Reservoir	-	-	GL-C	16-Sep-15	311	361	148	1		
			<b>Growth</b>		<b>300</b>	<b>334</b>	<b>1102</b>			

**Table A4-1: Original capture date and biological data for wild Lake Sturgeon recaptured in gill nets, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121209	900 067000107900	GL-C	16-Sep-21	400	463	400	3	0.20	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	260	310	105	1		
			<b>Growth</b>		<b>140</b>	<b>153</b>	<b>295</b>			
Keeyask Reservoir	117007	900 226001224875	GL-C	16-Sep-21	397	459	400	3	0.20	833
Keeyask Reservoir	-	900 067000113724	GL-C	6-Jun-19	235	277	73	1		
			<b>Growth</b>		<b>162</b>	<b>182</b>	<b>327</b>			
Keeyask Reservoir	121211	900 067000108622	GL-C	16-Sep-21	441	504	450	3	0.55	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	236	272	74	1		
			<b>Growth</b>		<b>205</b>	<b>232</b>	<b>376</b>			
Keeyask Reservoir	121212	900 067000112914	GL-C	16-Sep-21	431	492	500	3	0.55	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	245	291	94	1		
			<b>Growth</b>		<b>186</b>	<b>201</b>	<b>406</b>			
Keeyask Reservoir	106468	900 067000112432	GL-C	16-Sep-21	489	551	575	5	11.9	1465
Keeyask Reservoir	-	-	GL-C	12-Sep-17	306	352	200	1		
Keeyask Reservoir	-	-	GL-A	8-Jun-17	244	283	80	1		
			<b>Growth</b>		<b>245</b>	<b>268</b>	<b>495</b>			
Keeyask Reservoir	121215	900 067000055620	GL-C	16-Sep-21	580	660	1125	7	4.02	2192
Keeyask Reservoir	-	-	GL-B	16-Sep-15	292	333	131	1		
			<b>Growth</b>		<b>288</b>	<b>327</b>	<b>994</b>			
Keeyask Reservoir	121216	900 067000109334	GL-C	16-Sep-21	453	512	475	3	0.55	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	164	306	100	1		
			<b>Growth</b>		<b>289</b>	<b>206</b>	<b>375</b>			
Keeyask Reservoir	121217	900 067000112888	GL-C	16-Sep-21	398	450	350	3	4.18	833
Keeyask Reservoir	-	-	GL-B	6-Jun-19	239	277	73	1		
			<b>Growth</b>		<b>159</b>	<b>173</b>	<b>277</b>			
Keeyask Reservoir	121251	900 043000119551	GL-C	17-Sep-21	424	471	450	8	100.9	2666
Burntwood River	-	-	BWR-C	31-May-14	147	168	17	1		
			<b>Growth</b>		<b>277</b>	<b>303</b>	<b>433</b>			



**Table A4-1: Original capture date and biological data for wild Lake Sturgeon recaptured in gill nets, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121252	900 067000108656	GL-C	17-Sep-21	415	471	450	3	0.63	834
Keeyask Reservoir	-	-	GL-C	6-Jun-19	228	269	66	1		
			<b>Growth</b>		<b>187</b>	<b>202</b>	<b>384</b>			
Keeyask Reservoir	121253	900 067000113249	GL-C	17-Sep-21	463	515	525	3	3.42	834
Keeyask Reservoir	-	-	GL-B	6-Jun-19	225	265	66	1		
			<b>Growth</b>		<b>238</b>	<b>250</b>	<b>459</b>			
Keeyask Reservoir	117056	900 067000112400	GL-C	17-Sep-21	446	515	500	5	11.9	1562
Keeyask Reservoir	-	-	GL-A	8-Jun-17	220	257	58	1		
			<b>Growth</b>		<b>226</b>	<b>258</b>	<b>442</b>			
Keeyask Reservoir	121229	900 067000109911	GL-B	18-Sep-21	373	416	300	4	-	1199
Burntwood River	-	-	-	7-Jun-18	215	249	71	1		
			<b>Growth</b>		<b>158</b>	<b>167</b>	<b>229</b>			
Keeyask Reservoir	121231	900 067000055227	GL-B	18-Sep-21	497	578	675	7	5.33	2194
Keeyask Reservoir	-	-	GL-C	16-Sep-15	313	361	156	1		
			<b>Growth</b>		<b>184</b>	<b>217</b>	<b>519</b>			
Keeyask Reservoir	121233	900 067000058462	GL-B	18-Sep-21	536	617	975	7	2.85	2280
Keeyask Reservoir	-	-	GL-B	22-Jun-15	225	265	74	1		
			<b>Growth</b>		<b>311</b>	<b>352</b>	<b>901</b>			
Keeyask Reservoir	121236	900 067000055504	GL-B	18-Sep-21	524	604	825	7	0.41	2194
Keeyask Reservoir	-	-	GL-B	16-Sep-15	315	364	155	1		
			<b>Growth</b>		<b>209</b>	<b>240</b>	<b>670</b>			
Keeyask Reservoir	121243	900 067000113692	GL-C	18-Sep-21	391	440	400	3	0.63	358
Keeyask Reservoir	118638		GL-C	25-Sep-20	357	404	250	2		
Keeyask Reservoir	-	-	GL-C	6-Jun-19	235	270	63	1		
			<b>Growth</b>		<b>156</b>	<b>170</b>	<b>337</b>			
Keeyask Reservoir	121245	900 067000113002	GL-C	18-Sep-21	437	500	450	3	3.42	364
Keeyask Reservoir	118071	-	GL-C	19-Sep-20	397	460	375	2		
Keeyask Reservoir	-	-	GL-B	6-Jun-19	230	269	58	1		
			<b>Growth</b>		<b>167</b>	<b>191</b>	<b>317</b>			



**Table A4-1: Original capture date and biological data for wild Lake Sturgeon recaptured in gill nets, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121247	900 067000112929	GL-C	18-Sep-21	446	511	500	3	0.20	835
Keeyask Reservoir	-	-	GL-C	6-Jun-19	235	271	62	1		
			<b>Growth</b>		<b>211</b>	<b>240</b>	<b>438</b>			
Keeyask Reservoir	109628	900 067000055300	GL-C	18-Sep-21	636	725	1650	7	0.79	731
Keeyask Reservoir	-	-	GL-C	18-Sep-19	528	610	950	5		
Keeyask Reservoir	-	-	GL-C	13-Sep-17	461	529	600	3		
Keeyask Reservoir	-	-	GL-C	16-Sep-15	320	366	184	1		
			<b>Growth</b>		<b>316</b>	<b>359</b>	<b>1466</b>			
Keeyask Reservoir	121181	900 067000055035	BR-D	19-Sep-21	609	695	1475	7	13.9	2281
Keeyask Reservoir	-	-	GL-B	22-Jun-15	186	217	39	1		
			<b>Growth</b>		<b>423</b>	<b>478</b>	<b>1436</b>			
Keeyask Reservoir	121196	900 043000119961	GL-C	19-Sep-21	575	645	1475	8	113.6	2669
Burntwood River	-	-	BWR-B	30-May-14	195	224	41	1		
			<b>Growth</b>		<b>380</b>	<b>421</b>	<b>1434</b>			
Keeyask Reservoir	121199	900 067000108608	GL-B	20-Sep-21	416	474	475	3	4.07	837
Keeyask Reservoir	-	-	GL-C	6-Jun-19	209	244	51	1		
			<b>Growth</b>		<b>207</b>	<b>230</b>	<b>424</b>			
Keeyask Reservoir	121278	900 067000109339	GL-B	20-Sep-21	385	436	375	3	0.62	837
Keeyask Reservoir	-	-	GL-B	6-Jun-19	209	246	51	1		
			<b>Growth</b>		<b>176</b>	<b>190</b>	<b>324</b>			
Keeyask Reservoir	121279	900 067000108624	GL-B	20-Sep-21	460	520	500	3	4.26	837
Keeyask Reservoir	-	-	GL-C	6-Jun-19	245	284	80	1		
			<b>Growth</b>		<b>215</b>	<b>236</b>	<b>420</b>			
Keeyask Reservoir	121284	900 067000055198	GL-A	20-Sep-21	510	592	700	7	4.52	2282
Keeyask Reservoir	-	-	GL-B	22-Jun-15	198	236	46	1		
			<b>Growth</b>		<b>312</b>	<b>356</b>	<b>654</b>			
Keeyask Reservoir	121285	900 067000112903	GL-A	20-Sep-21	419	481	475	3	4.23	837
Keeyask Reservoir	-	-	GL-B	6-Jun-19	239	281	76	1		
			<b>Growth</b>		<b>180</b>	<b>200</b>	<b>399</b>			

**Table A4-1: Original capture date and biological data for wild Lake Sturgeon recaptured in gill nets, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121291	900 067000055529	GL-C	20-Sep-21	558	645	1075	7	4.17	2196
Keeyask Reservoir	-	-	GL-B	16-Sep-15	320	371	185	1		
			<b>Growth</b>		<b>238</b>	<b>274</b>	<b>890</b>			
Keeyask Reservoir	121293	900 067000058447	GL-C	20-Sep-21	570	651	1250	7	0.18	2196
Keeyask Reservoir	-	-	GL-C	16-Sep-15	342	391	220	1		
			<b>Growth</b>		<b>228</b>	<b>260</b>	<b>1030</b>			
Keeyask Reservoir	113848	900 067000056730	GL-C	20-Sep-21	519	590	1025	5	12.1	1098
Keeyask Reservoir	-	-	GL-C	18-Sep-18	381	438	400	2		
Keeyask Reservoir	-	-	GL-A	8-Jun-17	249	290	90	1		
			<b>Growth</b>		<b>270</b>	<b>300</b>	<b>935</b>			
Keeyask Reservoir	113044	900 067000055461	GL-C	20-Sep-21	485	549	700	7	4.17	1102
Keeyask Reservoir	-	-	GL-C	14-Sep-18	424	488	450	4		
Keeyask Reservoir	-	-	GL-B	16-Sep-15	295	343	136	1		
			<b>Growth</b>		<b>190</b>	<b>206</b>	<b>564</b>			
Keeyask Reservoir	121303	900 067000055548	GL-A	21-Sep-21	544	623	900	7	4.34	2197
Keeyask Reservoir	-	-	GL-B	16-Sep-15	322	377	165	1		
			<b>Growth</b>		<b>222</b>	<b>246</b>	<b>735</b>			
Keeyask Reservoir	111040	900 067000058596	GL-A	21-Sep-21	516	604	725	7	4.34	1466
Keeyask Reservoir	-	-	GL-B	16-Sep-17	443	518	400	3		
Keeyask Reservoir	-	-	GL-B	16-Sep-15	355	415	218	1		
			<b>Growth</b>		<b>161</b>	<b>189</b>	<b>507</b>			
Keeyask Reservoir	121305	900 067000058530	GL-A	21-Sep-21	530	603	850	7	8.08	2197
Keeyask Reservoir	-	-	GL-C	16-Sep-15	340	392	200	1		
			<b>Growth</b>		<b>190</b>	<b>211</b>	<b>650</b>			
Keeyask Reservoir	121307	900 067000112936	GL-A	21-Sep-21	399	453	425	3	7.55	838
Keeyask Reservoir	-	-	GL-C	6-Jun-19	225	266	65	1		
			<b>Growth</b>		<b>174</b>	<b>187</b>	<b>360</b>			
Keeyask Reservoir	121311	900 067000109331	GL-B	21-Sep-21	436	500	525	3	0.62	838
Keeyask Reservoir	-	-	GL-B	6-Jun-19	245	291	83	1		
			<b>Growth</b>		<b>191</b>	<b>209</b>	<b>442</b>			

**Table A4-1: Original capture date and biological data for wild Lake Sturgeon recaptured in gill nets, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	-	900 067000112159	GL-B	21-Sep-21	435	465	550	5	8.79	1566
Keeyask Reservoir	-	-	GL-A	8-Jun-17	309	113	-	1		
			<b>Growth</b>		<b>126</b>	<b>352</b>	<b>-</b>			
Keeyask Reservoir	117932	900 067000112908	GL-A	22-Sep-21	416	472	450	3	7.55	839
Keeyask Reservoir	-	-	GL-C	6-Jun-19	245	291	80	1		
			<b>Growth</b>		<b>171</b>	<b>181</b>	<b>370</b>			
Keeyask Reservoir	117938	900 067000058455	GL-B	22-Sep-21	495	572	675	7	5.91	2284
Keeyask Reservoir	-	-	GL-B	22-Jun-15	240	281	84	1		
			<b>Growth</b>		<b>255</b>	<b>291</b>	<b>591</b>			
Keeyask Reservoir	117901	900 067000113073	GL-A	23-Sep-21	400	470	375	3	4.23	840
Keeyask Reservoir	-	-	GL-B	6-Jun-19	248	299	91	1		
			<b>Growth</b>		<b>152</b>	<b>171</b>	<b>284</b>			
Keeyask Reservoir	113022	900 067000059369	GL-A	23-Sep-21	450	501	475	7	4.52	1106
Keeyask Reservoir	-	-	GL-A	13-Sep-18	349	390	250	2		
Keeyask Reservoir	-	-	GL-A	8-Jun-17	220	250	63	1		
			<b>Growth</b>		<b>230</b>	<b>251</b>	<b>412</b>			
Keeyask Reservoir	117905	900 067000112289	GL-A	23-Sep-21	464	535	500	5	5.37	1568
Keeyask Reservoir	-	-	GL-A	8-Jun-17	235	278	73	1		
			<b>Growth</b>		<b>229</b>	<b>257</b>	<b>427</b>			
Keeyask Reservoir	117908	900 067000055114	GL-B	23-Sep-21	500	586	600	7	2.54	2285
Keeyask Reservoir	-	-	GL-B	22-Jun-15	190	227	36	1		
			<b>Growth</b>		<b>310</b>	<b>359</b>	<b>564</b>			
Keeyask Reservoir	117910	900 067000058540	GL-B	23-Sep-21	524	603	825	7	2.54	2285
Keeyask Reservoir	-	-	GL-B	22-Jun-15	226	267	67	1		
			<b>Growth</b>		<b>298</b>	<b>336</b>	<b>758</b>			
Keeyask Reservoir	117912	900 067000055127	GL-B	23-Sep-21	536	610	800	7	6.87	2199
Keeyask Reservoir	-	-	GL-C	16-Sep-15	320	366	161	1		
			<b>Growth</b>		<b>216</b>	<b>244</b>	<b>639</b>			

**Table A4-1: Original capture date and biological data for wild Lake Sturgeon recaptured in gill nets, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	117916	900 067000113017	GL-B	23-Sep-21	389	441	300	3	2.62	840
Keeyask Reservoir	-	-	GL-B	6-Jun-19	210	254	51	1		
<b>Growth</b>					<b>179</b>	<b>187</b>	<b>249</b>			
Keeyask Reservoir	117920	900 067000055591	GL-B	23-Sep-21	544	625	850	7	0.21	2285
Keeyask Reservoir	-	-	GL-B	22-Jun-15	233	272	74	1		
<b>Growth</b>					<b>311</b>	<b>353</b>	<b>776</b>			

**Table A4-2: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in the Keeyask reservoir, fall 2021.**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121152	900 067000058492	GL-B	14-Sep-21	620	705	1500	7	4.05	2276
Keeyask Reservoir	-	-	GL-B	22-Jun-15	238	276	75	1		
<b>Growth</b>					<b>382</b>	<b>429</b>	<b>1425</b>			
Keeyask Reservoir	121139	900 067000113433	GL-C	15-Sep-21	415	476	475	3	2.10	832
Keeyask Reservoir	-	-	GL-C	06-Jun-19	235	279	65	1		
<b>Growth</b>					<b>180</b>	<b>197</b>	<b>410</b>			
Keeyask Reservoir	121161	900 067000055432	GL-C	15-Sep-21	545	619	1050	7	2.70	2191
Keeyask Reservoir	-	-	GL-B	16-Sep-15	304	349	150	1		
<b>Growth</b>					<b>241</b>	<b>270</b>	<b>900</b>			
Keeyask Reservoir	121163	900 067000113184	GL-C	15-Sep-21	424	487	500	3	2.85	832
Keeyask Reservoir	-	-	GL-B	6-Jun-19	238	275	66	1		
<b>Growth</b>					<b>186</b>	<b>212</b>	<b>434</b>			
Keeyask Reservoir	121164	900 067000113674	GL-C	15-Sep-21	374	425	375	3	1.29	832
Keeyask Reservoir	-	-	GL-C	6-Jun-19	240	285	77	1		
<b>Growth</b>					<b>134</b>	<b>140</b>	<b>298</b>			
Keeyask Reservoir	121165	900 067000059477	GL-C	15-Sep-21	489	554	625	5	10.2	1560
Keeyask Reservoir	-	-	GL-A	8-Jun-17	228	267	64	1		
<b>Growth</b>					<b>261</b>	<b>287</b>	<b>561</b>			
Keeyask Reservoir	121175	900 043000103107	GL-C	15-Sep-21	485	541	700	8	101.6	2540
Burntwood River	-	-	BWR-C	2-Oct-14	225	255	67	1		
<b>Growth</b>					<b>260</b>	<b>286</b>	<b>633</b>			
Keeyask Reservoir	121204	900 067000112451	GL-C	16-Sep-21	455	502	500	5	10.70	1561
Keeyask Reservoir	-	-	GL-A	8-Jun-17	232	270	67	1		
<b>Growth</b>					<b>223</b>	<b>232</b>	<b>433</b>			
Keeyask Reservoir	121207	900 067000112916	GL-C	16-Sep-21	405	455	400	3	0.20	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	232	275	69	1		
<b>Growth</b>					<b>173</b>	<b>180</b>	<b>331</b>			

**Table A4-2: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in the Keeyask reservoir, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121208	900 067000058712	GL-C	16-Sep-21	611	695	1250	7	0.79	2192
Keeyask Reservoir	-	-	GL-C	16-Sep-15	311	361	148	1		
<b>Growth</b>					<b>300</b>	<b>334</b>	<b>1102</b>			
Keeyask Reservoir	121209	900 067000107900	GL-C	16-Sep-21	400	463	400	3	0.20	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	260	310	105	1		
<b>Growth</b>					<b>140</b>	<b>153</b>	<b>295</b>			
Keeyask Reservoir	117007	900 226001224875	GL-C	16-Sep-21	397	459	400	3	0.20	833
Keeyask Reservoir	-	900 067000113724	GL-C	6-Jun-19	235	277	73	1		
<b>Growth</b>					<b>162</b>	<b>182</b>	<b>327</b>			
Keeyask Reservoir	121211	900 067000108622	GL-C	16-Sep-21	441	504	450	3	0.55	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	236	272	74	1		
<b>Growth</b>					<b>205</b>	<b>232</b>	<b>376</b>			
Keeyask Reservoir	121212	900 067000112914	GL-C	16-Sep-21	431	492	500	3	0.55	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	245	291	94	1		
<b>Growth</b>					<b>186</b>	<b>201</b>	<b>406</b>			
Keeyask Reservoir	106468	900 067000112432	GL-C	16-Sep-21	489	551	575	5	11.9	1465
Keeyask Reservoir	-	-	GL-C	12-Sep-17	306	352	200	1		
Keeyask Reservoir	-	-	GL-A	8-Jun-17	244	283	80	1		
<b>Growth</b>					<b>245</b>	<b>268</b>	<b>495</b>			
Keeyask Reservoir	121215	900 067000055620	GL-C	16-Sep-21	580	660	1125	7	4.02	2192
Keeyask Reservoir	-	-	GL-B	16-Sep-15	292	333	131	1		
<b>Growth</b>					<b>288</b>	<b>327</b>	<b>994</b>			
Keeyask Reservoir	121216	900 067000109334	GL-C	16-Sep-21	453	512	475	3	0.55	833
Keeyask Reservoir	-	-	GL-C	6-Jun-19	164	306	100	1		
<b>Growth</b>					<b>289</b>	<b>206</b>	<b>375</b>			
Keeyask Reservoir	121217	900 067000112888	GL-C	16-Sep-21	398	450	350	3	4.18	833
Keeyask Reservoir	-	-	GL-B	6-Jun-19	239	277	73	1		
<b>Growth</b>					<b>159</b>	<b>173</b>	<b>277</b>			

**Table A4-2: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in the Keeyask reservoir, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121251	900 043000119551	GL-C	17-Sep-21	424	471	450	8	100.9	2666
Burntwood River	-	-	BWR-C	31-May-14	147	168	17	1		
<b>Growth</b>					<b>277</b>	<b>303</b>	<b>433</b>			
Keeyask Reservoir	121252	900 067000108656	GL-C	17-Sep-21	415	471	450	3	0.63	834
Keeyask Reservoir	-	-	GL-C	6-Jun-19	228	269	66	1		
<b>Growth</b>					<b>187</b>	<b>202</b>	<b>384</b>			
Keeyask Reservoir	121253	900 067000113249	GL-C	17-Sep-21	463	515	525	3	3.42	834
Keeyask Reservoir	-	-	GL-B	6-Jun-19	225	265	66	1		
<b>Growth</b>					<b>238</b>	<b>250</b>	<b>459</b>			
Keeyask Reservoir	117056	900 067000112400	GL-C	17-Sep-21	446	515	500	5	11.9	1562
Keeyask Reservoir	-	-	GL-A	8-Jun-17	220	257	58	1		
<b>Growth</b>					<b>226</b>	<b>258</b>	<b>442</b>			
Keeyask Reservoir	121229	900 067000109911	GL-B	18-Sep-21	373	416	300	4	-	1199
Burntwood River	-	-	-	7-Jun-18	215	249	71	1		
<b>Growth</b>					<b>158</b>	<b>167</b>	<b>229</b>			
Keeyask Reservoir	121231	900 067000055227	GL-B	18-Sep-21	497	578	675	7	5.33	2194
Keeyask Reservoir	-	-	GL-C	16-Sep-15	313	361	156	1		
<b>Growth</b>					<b>184</b>	<b>217</b>	<b>519</b>			
Keeyask Reservoir	121233	900 067000058462	GL-B	18-Sep-21	536	617	975	7	2.85	2280
Keeyask Reservoir	-	-	GL-B	22-Jun-15	225	265	74	1		
<b>Growth</b>					<b>311</b>	<b>352</b>	<b>901</b>			
Keeyask Reservoir	121236	900 067000055504	GL-B	18-Sep-21	524	604	825	7	0.41	2194
Keeyask Reservoir	-	-	GL-B	16-Sep-15	315	364	155	1		
<b>Growth</b>					<b>209</b>	<b>240</b>	<b>670</b>			
Keeyask Reservoir	121243	900 067000113692	GL-C	18-Sep-21	391	440	400	3	0.63	358
Keeyask Reservoir	118638		GL-C	25-Sep-20	357	404	250	2		
Keeyask Reservoir	-	-	GL-C	6-Jun-19	235	270	63	1		
<b>Growth</b>					<b>156</b>	<b>170</b>	<b>337</b>			



**Table A4-2: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in the Keeyask reservoir, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121245	900 067000113002	GL-C	18-Sep-21	437	500	450	3	3.42	364
Keeyask Reservoir	118071	-	GL-C	19-Sep-20	397	460	375	2		
Keeyask Reservoir	-	-	GL-B	6-Jun-19	230	269	58	1		
<b>Growth</b>					<b>167</b>	<b>191</b>	<b>317</b>			
Keeyask Reservoir	121247	900 067000112929	GL-C	18-Sep-21	446	511	500	3	0.20	835
Keeyask Reservoir	-	-	GL-C	6-Jun-19	235	271	62	1		
<b>Growth</b>					<b>211</b>	<b>240</b>	<b>438</b>			
Keeyask Reservoir	109628	900 067000055300	GL-C	18-Sep-21	636	725	1650	7	0.79	731
Keeyask Reservoir	-	-	GL-C	18-Sep-19	528	610	950	5		
Keeyask Reservoir	-	-	GL-C	13-Sep-17	461	529	600	3		
Keeyask Reservoir	-	-	GL-C	16-Sep-15	320	366	184	1		
<b>Growth</b>					<b>316</b>	<b>359</b>	<b>1466</b>			
Keeyask Reservoir	121181	900 067000055035	BR-D	19-Sep-21	609	695	1475	7	13.9	2281
Keeyask Reservoir	-	-	GL-B	22-Jun-15	186	217	39	1		
<b>Growth</b>					<b>423</b>	<b>478</b>	<b>1436</b>			
Keeyask Reservoir	121196	900 043000119961	GL-C	19-Sep-21	575	645	1475	8	113.6	2669
Burntwood River	-	-	BWR-B	30-May-14	195	224	41	1		
<b>Growth</b>					<b>380</b>	<b>421</b>	<b>1434</b>			
Keeyask Reservoir	121199	900 067000108608	GL-B	20-Sep-21	416	474	475	3	4.07	837
Keeyask Reservoir	-	-	GL-C	6-Jun-19	209	244	51	1		
<b>Growth</b>					<b>207</b>	<b>230</b>	<b>424</b>			
Keeyask Reservoir	121278	900 067000109339	GL-B	20-Sep-21	385	436	375	3	0.62	837
Keeyask Reservoir	-	-	GL-B	6-Jun-19	209	246	51	1		
<b>Growth</b>					<b>176</b>	<b>190</b>	<b>324</b>			
Keeyask Reservoir	121279	900 067000108624	GL-B	20-Sep-21	460	520	500	3	4.26	837
Keeyask Reservoir	-	-	GL-C	6-Jun-19	245	284	80	1		
<b>Growth</b>					<b>215</b>	<b>236</b>	<b>420</b>			

**Table A4-2: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in the Keeyask reservoir, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121284	900 067000055198	GL-A	20-Sep-21	510	592	700	7	4.52	2282
Keeyask Reservoir	-	-	GL-B	22-Jun-15	198	236	46	1		
<b>Growth</b>					<b>312</b>	<b>356</b>	<b>654</b>			
Keeyask Reservoir	121285	900 067000112903	GL-A	20-Sep-21	419	481	475	3	4.23	837
Keeyask Reservoir	-	-	GL-B	6-Jun-19	239	281	76	1		
<b>Growth</b>					<b>180</b>	<b>200</b>	<b>399</b>			
Keeyask Reservoir	121291	900 067000055529	GL-C	20-Sep-21	558	645	1075	7	4.17	2196
Keeyask Reservoir	-	-	GL-B	16-Sep-15	320	371	185	1		
<b>Growth</b>					<b>238</b>	<b>274</b>	<b>890</b>			
Keeyask Reservoir	121293	900 067000058447	GL-C	20-Sep-21	570	651	1250	7	0.18	2196
Keeyask Reservoir	-	-	GL-C	16-Sep-15	342	391	220	1		
<b>Growth</b>					<b>228</b>	<b>260</b>	<b>1030</b>			
Keeyask Reservoir	113848	900 067000056730	GL-C	20-Sep-21	519	590	1025	5	12.1	1098
Keeyask Reservoir	-	-	GL-C	18-Sep-18	381	438	400	2		
Keeyask Reservoir	-	-	GL-A	8-Jun-17	249	290	90	1		
<b>Growth</b>					<b>270</b>	<b>300</b>	<b>935</b>			
Keeyask Reservoir	113044	900 067000055461	GL-C	20-Sep-21	485	549	700	7	4.17	1102
Keeyask Reservoir	-	-	GL-C	14-Sep-18	424	488	450	4		
Keeyask Reservoir	-	-	GL-B	16-Sep-15	295	343	136	1		
<b>Growth</b>					<b>190</b>	<b>206</b>	<b>564</b>			
Keeyask Reservoir	121303	900 067000055548	GL-A	21-Sep-21	544	623	900	7	4.34	2197
Keeyask Reservoir	-	-	GL-B	16-Sep-15	322	377	165	1		
<b>Growth</b>					<b>222</b>	<b>246</b>	<b>735</b>			
Keeyask Reservoir	111040	900 067000058596	GL-A	21-Sep-21	516	604	725	7	4.34	1466
Keeyask Reservoir	-	-	GL-B	16-Sep-17	443	518	400	3		
Keeyask Reservoir	-	-	GL-B	16-Sep-15	355	415	218	1		
<b>Growth</b>					<b>161</b>	<b>189</b>	<b>507</b>			

**Table A4-2: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in the Keeyask reservoir, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	121305	900 067000058530	GL-A	21-Sep-21	530	603	850	7	8.08	2197
Keeyask Reservoir	-	-	GL-C	16-Sep-15	340	392	200	1		
			<b>Growth</b>		<b>190</b>	<b>211</b>	<b>650</b>			
Keeyask Reservoir	121307	900 067000112936	GL-A	21-Sep-21	399	453	425	3	7.55	838
Keeyask Reservoir	-	-	GL-C	6-Jun-19	225	266	65	1		
			<b>Growth</b>		<b>174</b>	<b>187</b>	<b>360</b>			
Keeyask Reservoir	121311	900 067000109331	GL-B	21-Sep-21	436	500	525	3	0.62	838
Keeyask Reservoir	-	-	GL-B	6-Jun-19	245	291	83	1		
			<b>Growth</b>		<b>191</b>	<b>209</b>	<b>442</b>			
Keeyask Reservoir	-	900 067000112159	GL-B	21-Sep-21	435	465	550	5	8.79	1566
Keeyask Reservoir	-	-	GL-A	8-Jun-17	309	113	-	1		
			<b>Growth</b>		<b>126</b>	<b>352</b>	<b>-</b>			
Keeyask Reservoir	117932	900 067000112908	GL-A	22-Sep-21	416	472	450	3	7.55	839
Keeyask Reservoir	-	-	GL-C	6-Jun-19	245	291	80	1		
			<b>Growth</b>		<b>171</b>	<b>181</b>	<b>370</b>			
Keeyask Reservoir	117938	900 067000058455	GL-B	22-Sep-21	495	572	675	7	5.91	2284
Keeyask Reservoir	-	-	GL-B	22-Jun-15	240	281	84	1		
			<b>Growth</b>		<b>255</b>	<b>291</b>	<b>591</b>			
Keeyask Reservoir	117901	900 067000113073	GL-A	23-Sep-21	400	470	375	3	4.23	840
Keeyask Reservoir	-	-	GL-B	6-Jun-19	248	299	91	1		
			<b>Growth</b>		<b>152</b>	<b>171</b>	<b>284</b>			
Keeyask Reservoir	113022	900 067000059369	GL-A	23-Sep-21	450	501	475	7	4.52	1106
Keeyask Reservoir	-	-	GL-A	13-Sep-18	349	390	250	2		
Keeyask Reservoir	-	-	GL-A	8-Jun-17	220	250	63	1		
			<b>Growth</b>		<b>230</b>	<b>251</b>	<b>412</b>			
Keeyask Reservoir	117905	900 067000112289	GL-A	23-Sep-21	464	535	500	5	5.37	1568
Keeyask Reservoir	-	-	GL-A	8-Jun-17	235	278	73	1		
			<b>Growth</b>		<b>229</b>	<b>257</b>	<b>427</b>			

**Table A4-2: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in the Keeyask reservoir, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Keeyask Reservoir	117908	900 067000055114	GL-B	23-Sep-21	500	586	600	7	2.54	2285
Keeyask Reservoir	-	-	GL-B	22-Jun-15	190	227	36	1		
<b>Growth</b>					<b>310</b>	<b>359</b>	<b>564</b>			
Keeyask Reservoir	117910	900 067000058540	GL-B	23-Sep-21	524	603	825	7	2.54	2285
Keeyask Reservoir	-	-	GL-B	22-Jun-15	226	267	67	1		
<b>Growth</b>					<b>298</b>	<b>336</b>	<b>758</b>			
Keeyask Reservoir	117912	900 067000055127	GL-B	23-Sep-21	536	610	800	7	6.87	2199
Keeyask Reservoir	-	-	GL-C	16-Sep-15	320	366	161	1		
<b>Growth</b>					<b>216</b>	<b>244</b>	<b>639</b>			
Keeyask Reservoir	117916	900 067000113017	GL-B	23-Sep-21	389	441	300	3	2.62	840
Keeyask Reservoir	-	-	GL-B	6-Jun-19	210	254	51	1		
<b>Growth</b>					<b>179</b>	<b>187</b>	<b>249</b>			
Keeyask Reservoir	117920	900 067000055591	GL-B	23-Sep-21	544	625	850	7	0.21	2285
Keeyask Reservoir	-	-	GL-B	22-Jun-15	233	272	74	1		
<b>Growth</b>					<b>311</b>	<b>353</b>	<b>776</b>			

**Table A4-3: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021.**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Stephens Lake	121349	900 067000109352	STL-A	14-Sep-21	405	475	500	3	0.11	824
Stephens Lake	-	-	STL-A	13-Jun-19	225	260	58	1		
<b>Growth</b>					<b>180</b>	<b>215</b>	<b>442</b>			
Stephens Lake	121346	900 067000113256	STL-A	14-Sep-21	433	494	475	3	1.17	824
Stephens Lake	-	-	STL-B	13-Jun-19	229	271	65	1		
<b>Growth</b>					<b>204</b>	<b>223</b>	<b>410</b>			
Stephens Lake	121345	900 067000113564	STL-B	14-Sep-21	512	576	900	5	3.93	1552
Stephens Lake	-	-	STL-A	15-Jun-17	238	278	76	1		
<b>Growth</b>					<b>274</b>	<b>298</b>	<b>825</b>			
Stephens Lake	121339	900 067000111886	STL-B	15-Sep-21	509	569	900	5	4.03	1553
Stephens Lake	-	-	STL-A	15-Jun-17	241	277	80	1		
<b>Growth</b>					<b>268</b>	<b>292</b>	<b>820</b>			
Stephens Lake	117569	900 067000113384	STL-B	15-Sep-21	428	477	450	3	1.88	728
Stephens Lake	-	-	STL-B	18-Sep-19	325	365	100	1		
Stephens Lake	-	-	STL-A	13-Jun-19	242	278	73	1		
<b>Growth</b>					<b>186</b>	<b>199</b>	<b>377</b>			
Stephens Lake	117682	900 067000109624	STL-B	16-Sep-21	431	596	540	3	1.88	727
Stephens Lake	-	-	STL-B	20-Sep-19	294	336	100	1		
Stephens Lake	-	-	STL-A	13-Jun-19	197	227	39	1		
<b>Growth</b>					<b>234</b>	<b>369</b>	<b>501</b>			
Stephens Lake	121338	900 067000059076	STL-A	15-Sep-21	497	560	970	5	2.12	1442
Stephens Lake	-	-	STL-B	5-Oct-17	300	345	170	1		
<b>Growth</b>					<b>197</b>	<b>215</b>	<b>800</b>			
Stephens Lake	112940	900 067000055264	STL-A	17-Sep-21	614	711	1475	7	3.24	1460
Stephens Lake	-	-	STL-A	19-Sep-17	440	511	525	3		
Stephens Lake	-	-	STL-B	22-Jun-15	208	242	47	1		
<b>Growth</b>					<b>406</b>	<b>469</b>	<b>1428</b>			

**Table A4-3: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Stephens Lake	117678	900 067000059220	STL-B	16-Sep-21	504	577	900	5	23.5	728
Stephens Lake	-	-	STL-B	19-Sep-19	415	475	400	3		
Keeyask Reservoir	-	-	GL-A	8-Jun-17	231	274	72	1		
<b>Growth</b>					<b>273</b>	<b>303</b>	<b>828</b>			
Stephens Lake	121333	900 067000113410	STL-B	16-Sep-21	457	513	525	3	2.62	826
Stephens Lake	-	-	STL-A	13-Jun-19	257	295	91	1		
<b>Growth</b>					<b>200</b>	<b>218</b>	<b>434</b>			
Stephens Lake	121395	900 067000113683	STL-B	17-Sep-21	405	465	400	3	12.4	834
Keeyask Reservoir	-	-	GL-C	6-Jun-19	230	265	61	1		
<b>Growth</b>					<b>175</b>	<b>200</b>	<b>339</b>			
Stephens Lake	121388	900 067000113021	STL-B	18-Sep-21	446	510	600	3	2.62	828
Stephens Lake	-	-	STL-A	13-Jun-19	262	305	89	1		
<b>Growth</b>					<b>184</b>	<b>205</b>	<b>511</b>			
Stephens Lake	121387	900 067000113442	STL-B	18-Sep-21	459	531	625	3	0.22	828
Stephens Lake	-	-	STL-B	13-Jun-19	236	268	70	1		
<b>Growth</b>					<b>223</b>	<b>263</b>	<b>555</b>			
Stephens Lake	121386	900 067000109329	STL-B	18-Sep-21	403	461	425	3	15.7	731
Keeyask Reservoir	116847		GL-B	18-Sep-19	295	340	100	1		
Keeyask Reservoir	-	-	GL-B	6-Jun-19	208	246	49	1		
<b>Growth</b>					<b>195</b>	<b>215</b>	<b>376</b>			
Stephens Lake	118868	900 067000108602	STL-B	18-Sep-21	425	495	500	3	2.62	363
Stephens Lake	-	-	STL-B	20-Sep-20	378	440	350	2		
Stephens Lake	-	-	STL-A	13-Jun-19	240	284	75	1		
<b>Growth</b>					<b>185</b>	<b>211</b>	<b>425</b>			
Stephens Lake	121428	900 067000112005	STL-B	19-Sep-21	528	608	1050	5	3.99	1557
Stephens Lake	-	-	STL-A	15-Jun-17	233	272	78	1		
<b>Growth</b>					<b>295</b>	<b>336</b>	<b>972</b>			

**Table A4-3: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Stephens Lake	121329	900 067000113213	STL-A	16-Sep-21	394	456	400	3	0.24	827
Stephens Lake	-	-	STL-A	13-Jun-19	190	218	38	1		
<b>Growth</b>					<b>204</b>	<b>238</b>	<b>362</b>			
Stephens Lake	121328	900 067000113391	STL-B	17-Sep-21	438	504	525	3	0.91	827
Stephens Lake	-	-	STL-B	13-Jun-19	210	247	48	1		
<b>Growth</b>					<b>228</b>	<b>257</b>	<b>477</b>			
Stephens Lake	121396	900 067000112931	STL-B	17-Sep-21	427	485	525	3	11.5	834
Keeyask Reservoir	-	-	GL-C	6-Jun-19	225	270	65	1		
<b>Growth</b>					<b>202</b>	<b>215</b>	<b>460</b>			
Stephens Lake	116052	900 067000113708	STL-B	17-Sep-21	376	421	400	3	1.75	733
Stephens Lake	-	-	STL-B	15-Sep-19	301	348	200	1		
Stephens Lake	-	-	STL-A	13-Jun-19	235	280	73	1		
<b>Growth</b>					<b>141</b>	<b>141</b>	<b>327</b>			
Stephens Lake	121397	900 067000112975	STL-B	17-Sep-21	420	486	525	3	11.5	834
Keeyask Reservoir	-	-	GL-C	6-Jun-19	235	275	74	1		
<b>Growth</b>					<b>185</b>	<b>211</b>	<b>451</b>			
Stephens Lake	121385	900 067000113398	STL-B	18-Sep-21	397	469	425	3	1.75	828
Stephens Lake	-	-	STL-A	13-Jun-19	230	270	70	1		
<b>Growth</b>					<b>167</b>	<b>199</b>	<b>355</b>			
Stephens Lake	116069	900 067000113446	STL-B	18-Sep-21	414	477	475	3	0.91	736
Stephens Lake	-	-	STL-B	13-Sep-19	322	377	150	1		
Stephens Lake	-	-	STL-B	13-Jun-19	255	305	93	1		
<b>Growth</b>					<b>159</b>	<b>172</b>	<b>382</b>			
Stephens Lake	121394	900 067000109322	STL-A	17-Sep-21	414	484	450	3	2.55	828
Stephens Lake	-	-	STL-B	13-Jun-19	214	254	56	1		
<b>Growth</b>					<b>200</b>	<b>230</b>	<b>394</b>			
Stephens Lake	120054	900 067000113707	STL-A	17-Sep-21	416	475	475	3	0.12	828
Stephens Lake	-	-	STL-A	13-Jun-19	231	266	66	1		
<b>Growth</b>					<b>185</b>	<b>209</b>	<b>409</b>			



**Table A4-3: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Stephens Lake	116048	900 067000113397	STL-A	17-Sep-21	426	485	400	3	0.09	735
Stephens Lake	-	-	STL-B	14-Sep-19	310	357	150	1		
Stephens Lake	-	-	STL-A	13-Jun-19	222	261	61	1		
<b>Growth</b>					<b>204</b>	<b>224</b>	<b>339</b>			
Stephens Lake	121376	900 067000109589	STL-A	18-Sep-21	429	497	475	3	12.4	835
Keeyask Reservoir	-	-	GL-B	6-Jun-19	240	281	72	1		
<b>Growth</b>					<b>189</b>	<b>216</b>	<b>403</b>			
Stephens Lake	121400	900 067000113262	STL-A	18-Sep-21	435	492	475	3	2.59	828
Stephens Lake	-	-	STL-B	13-Jun-19	235	274	64	1		
<b>Growth</b>					<b>200</b>	<b>218</b>	<b>411</b>			
Stephens Lake	116029	900 067000109610	STL-A	19-Sep-21	405	461	400	3	0.07	738
Stephens Lake	-	-	STL-B	12-Sep-19	310	353	100	1		
Stephens Lake	-	-	STL-A	13-Jun-19	234	276	65	1		
<b>Growth</b>					<b>171</b>	<b>185</b>	<b>335</b>			
Stephens Lake	121381	900 067000113236	STL-A	18-Sep-21	418	483	450	3	1.26	828
Stephens Lake	-	-	STL-A	13-Jun-19	233	275	68	1		
<b>Growth</b>					<b>185</b>	<b>208</b>	<b>382</b>			
Stephens Lake	121380	900 067000113468	STL-A	18-Sep-21	422	485	500	3	1.41	828
Stephens Lake	-	-	STL-B	13-Jun-19	250	300	75	1		
<b>Growth</b>					<b>172</b>	<b>185</b>	<b>425</b>			
Stephens Lake	121379	900 067000113463	STL-A	18-Sep-21	458	524	575	3	1.26	828
Stephens Lake	-	-	STL-A	13-Jun-19	235	274	62	1		
<b>Growth</b>					<b>223</b>	<b>250</b>	<b>513</b>			
Stephens Lake	121377	900 067000059030	STL-A	18-Sep-21	478	549	750	5	1.29	1444
Stephens Lake	-	-	STL-B	5-Oct-17	305	356	150	1		
<b>Growth</b>					<b>173</b>	<b>193</b>	<b>600</b>			
Stephens Lake	121430	900 067000055547	STL-A	19-Sep-21	614	701	1575	7	2.19	2197
Stephens Lake	-	-	STL-B	14-Sep-15	310	359	183	1		
<b>Growth</b>					<b>304</b>	<b>342</b>	<b>1392</b>			

**Table A4-3: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Stephens Lake	118863	900 067000113411	STL-A	19-Sep-21	418	477	450	3	1.22	364
Stephens Lake	-	-	STL-B	20-Sep-20	380	435	400	2		
Stephens Lake	-	-	STL-A	13-Jun-19	250	293	85	1		
<b>Growth</b>					<b>168</b>	<b>184</b>	<b>365</b>			
Stephens Lake	121378	900 067000113407	STL-A	19-Sep-21	435	506	525	3	1.38	829
Stephens Lake	-	-	STL-A	13-Jun-19	240	280	79	1		
<b>Growth</b>					<b>195</b>	<b>226</b>	<b>446</b>			
Stephens Lake	121426	900 067000109638	STL-A	19-Sep-21	401	467	400	3	1.29	829
Stephens Lake	-	-	STL-B	13-Jun-19	239	280	76	1		
<b>Growth</b>					<b>162</b>	<b>187</b>	<b>324</b>			
Stephens Lake	121427	900 067000113754	STL-A	19-Sep-21	405	464	450	3	1.38	829
Stephens Lake	-	-	STL-A	13-Jun-19	215	251	55	1		
<b>Growth</b>					<b>190</b>	<b>213</b>	<b>395</b>			
Stephens Lake	116055	900 067000113406	STL-A	19-Sep-21	404	464	400	3	1.29	735
Stephens Lake	-	-	STL-B	15-Sep-19	285	328	150	1		
Stephens Lake	-	-	STL-B	13-Jun-19	220	260	54	1		
<b>Growth</b>					<b>184</b>	<b>204</b>	<b>346</b>			
Stephens Lake	121335	900 067000055239	STL-A	20-Sep-21	597	674	1400	7	1.94	2282
Stephens Lake	-	-	STL-B	22-Jun-15	191	220	38	1		
<b>Growth</b>					<b>406</b>	<b>454</b>	<b>1362</b>			
Stephens Lake	121422	900 067000108674	STL-A	20-Sep-21	431	490	475	3	1.38	830
Stephens Lake	-	-	STL-A	13-Jun-19	229	265	57	1		
<b>Growth</b>					<b>202</b>	<b>225</b>	<b>418</b>			
Stephens Lake	117669	900 067000113443	STL-A	20-Sep-21	445	504	575	3	1.38	732
Stephens Lake	-	-	STL-B	19-Sep-19	320	371	200	1		
Stephens Lake	-	-	STL-A	13-Jun-19	265	310	115	1		
<b>Growth</b>					<b>180</b>	<b>194</b>	<b>460</b>			

**Table A4-3: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Stephens Lake	121440	900 067000113738	STL-B	20-Sep-21	406	465	375	3	1.61	830
Stephens Lake	-	-	STL-A	13-Jun-19	240	280	79	1		
<b>Growth</b>					<b>166</b>	<b>185</b>	<b>296</b>			
Stephens Lake	121441	900 067000058505	STL-B	20-Sep-21	652	745	1900	7	1.67	2282
Stephens Lake	-	-	STL-B	22-Jun-15	245	281	76	1		
<b>Growth</b>					<b>407</b>	<b>464</b>	<b>1824</b>			
Stephens Lake	121442	900 067000058580	STL-B	20-Sep-21	622	709	1550	7	1.67	2282
Stephens Lake	-	-	STL-B	22-Jun-15	213	251	53	1		
<b>Growth</b>					<b>409</b>	<b>458</b>	<b>1498</b>			
Stephens Lake	121411	900 067000112096	STL-B	21-Sep-21	527	614	1150	5	3.04	1559
Stephens Lake	-	-	STL-A	15-Jun-17	231	275	72	1		
<b>Growth</b>					<b>296</b>	<b>339</b>	<b>1078</b>			
Stephens Lake	121444	900 067000108595	STL-B	20-Sep-21	464	520	675	3	11.4	837
Keeyask Reservoir	-	-	GL-C	6-Jun-19	260	301	106	1		
<b>Growth</b>					<b>204</b>	<b>219</b>	<b>569</b>			
Stephens Lake	117681	900 067000113465	STL-B	20-Sep-21	402	455	400	3	1.61	731
Stephens Lake	-	-	STL-B	20-Sep-19	307	349	100	1		
Stephens Lake	-	-	STL-A	13-Jun-19	240	278	80	1		
<b>Growth</b>					<b>162</b>	<b>177</b>	<b>320</b>			
Stephens Lake	121446	900 067000059007	STL-B	20-Sep-21	510	583	975	5	1.26	1446
Stephens Lake	-	-	STL-B	5-Oct-17	325	377	200	1		
<b>Growth</b>					<b>185</b>	<b>206</b>	<b>775</b>			
Stephens Lake	121418	900 067000113439	STL-B	21-Sep-21	444	504	550	3	1.61	831
Stephens Lake	-	-	STL-A	13-Jun-19	240	283	82	1		
<b>Growth</b>					<b>204</b>	<b>221</b>	<b>468</b>			
Stephens Lake	121410	900 067000108631	STL-B	22-Sep-21	429	492	400	3	1.05	832
Stephens Lake	-	-	STL-B	13-Jun-19	223	267	60	1		
<b>Growth</b>					<b>206</b>	<b>225</b>	<b>340</b>			

**Table A4-3: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Stephens Lake	121408	900 067000112989	STL-B	22-Sep-21	415	476	450	3	1.05	832
Stephens Lake	-	-	STL-B	13-Jun-19	228	268	65	1		
<b>Growth</b>					<b>187</b>	<b>208</b>	<b>385</b>			
Stephens Lake	121420	900 067000113181	STL-A	20-Sep-21	451	514	550	3	1.73	360
Stephens Lake	118828	-	STL-B	25-Sep-20	389	449	400	2		
Stephens Lake	-	-	STL-B	13-Jun-19	230	269	62	1		
<b>Growth</b>					<b>221</b>	<b>245</b>	<b>488</b>			
Stephens Lake	121449	900 067000113035	STL-B	20-Sep-21	401	460	475	3	0.77	830
Stephens Lake	-	-	STL-B	13-Jun-19	225	267	64	1		
<b>Growth</b>					<b>176</b>	<b>193</b>	<b>411</b>			
Stephens Lake	121450	900 067000113478	STL-B	20-Sep-21	448	516	600	3	1.88	830
Stephens Lake	-	-	STL-A	13-Jun-19	235	275	73	1		
<b>Growth</b>					<b>213</b>	<b>241</b>	<b>527</b>			
Stephens Lake	121432	900 067000109674	STL-B	20-Sep-21	456	519	600	3	0.77	830
Stephens Lake	-	-	STL-B	13-Jun-19	281	321	132	1		
<b>Growth</b>					<b>175</b>	<b>198</b>	<b>468</b>			
Stephens Lake	112941	900 067000055582	STL-B	21-Sep-21	561	642	1125	7	1.10	1463
Stephens Lake	-	-	STL-A	19-Sep-17	427	475	450	3		
Stephens Lake	-	-	STL-A	14-Sep-15	265	310	114	1		
<b>Growth</b>					<b>296</b>	<b>332</b>	<b>1011</b>			
Stephens Lake	121407	900 067000113255	STL-B	22-Sep-21	412	462	400	3	0.77	832
Stephens Lake	-	-	STL-B	13-Jun-19	240	277	72	1		
<b>Growth</b>					<b>172</b>	<b>185</b>	<b>328</b>			
Stephens Lake	121406	900 067000113747	STL-B	22-Sep-21	419	486	425	3	1.88	832
Stephens Lake	-	-	STL-A	13-Jun-19	244	295	80	1		
<b>Growth</b>					<b>175</b>	<b>191</b>	<b>345</b>			
Stephens Lake	121404	900 067000058740	STL-B	22-Sep-21	563	631	1125	7	16.8	2284
Keeyask Reservoir	-	-	GL-B	22-Jun-15	236	273	72	1		
<b>Growth</b>					<b>327</b>	<b>358</b>	<b>1053</b>			

**Table A4-3: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Stephens Lake	121500	900 0670000113241	STL-B	23-Sep-21	432	494	475	3	1.88	833
Stephens Lake	-	-	STL-A	13-Jun-19	220	258	58	1		
<b>Growth</b>					<b>212</b>	<b>236</b>	<b>417</b>			
Stephens Lake	121499	900 0670000112562	STL-B	23-Sep-21	483	562	850	5	22.8	1568
Keeyask Reservoir	-	-	GL-A	8-Jun-17	208	248	55	1		
<b>Growth</b>					<b>275</b>	<b>314</b>	<b>795</b>			
Stephens Lake	116050	900 0670000113045	STL-A	21-Sep-21	414	476	450	3	1.23	738
Stephens Lake	-	-	STL-B	14-Sep-19	295	341	150	1		
Stephens Lake	-	-	STL-B	13-Jun-19	205	244	47	1		
<b>Growth</b>					<b>209</b>	<b>232</b>	<b>403</b>			
Stephens Lake	115779	900 0670000055312	STL-B	22-Sep-21	640	730	1625	7	1.88	1206
Stephens Lake	-	-	STL-A	4-Jun-18	476	550	5775	4		
Stephens Lake	-	-	STL-B	22-Jun-15	196	230	38	1		
<b>Growth</b>					<b>444</b>	<b>500</b>	<b>1587</b>			
Stephens Lake	121402	900 0670000055398	STL-B	22-Sep-21	645	734	1775	7	1.61	2284
Stephens Lake	-	-	STL-B	22-Jun-15	223	262	65	1		
<b>Growth</b>					<b>422</b>	<b>472</b>	<b>1710</b>			
Stephens Lake	116041	900 0670000113436	STL-B	23-Sep-21	412	466	375	3	1.76	740
Stephens Lake	-	-	STL-A	14-Sep-19	318	363	150	1		
Stephens Lake	-	-	STL-A	13-Jun-19	235	272	71	1		
<b>Growth</b>					<b>177</b>	<b>194</b>	<b>305</b>			
Stephens Lake	121497	900 0670000113280	STL-B	23-Sep-21	423	475	400	3	14.7	840
Keeyask Reservoir	-	-	GL-C	6-Jun-19	205	241	50	1		
<b>Growth</b>					<b>218</b>	<b>234</b>	<b>350</b>			

**Table A4-3: Original release date and biological data for hatchery-reared Lake Sturgeon captured in gill nets set in Stephens Lake, fall 2021 (continued).**

Location	Floy-tag #	Pit-tag #	Zone	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Distance (km)	Days Between Capture
Stephens Lake	121495	900 067000113001	STL-A	23-Sep-21	467	532	500	3	0.14	833
Stephens Lake	-	-	STL-A	13-Jun-19	232	270	60	1		
<b>Growth</b>					<b>235</b>	<b>262</b>	<b>440</b>			
Stephens Lake	121493	900 067000109603	STL-A	23-Sep-21	423	485	400	3	2.51	833
Stephens Lake	-	-	STL-B	13-Jun-19	225	264	60	1		
<b>Growth</b>					<b>198</b>	<b>221</b>	<b>340</b>			

## APPENDIX 5:

### POPULATION ESTIMATE INFORMATION.

---

Table A5-1:	Results of POPAN analysis of juvenile Lake Sturgeon from the Keeyask reservoir. ....	116
Table A5-2:	Results of POPAN analysis of hatchery-reared juvenile Lake Sturgeon from the Keeyask reservoir. ....	117
Table A5-3:	Results of POPAN analysis of juvenile Lake Sturgeon from Stephens Lake. ...	118
Table A5-4:	Results of POPAN analysis of hatchery-reared juvenile Lake Sturgeon from Stephens Lake.....	119



Mark-recapture population estimates were calculated for wild fish in the Keeyask reservoir and Stephens Lake during the fall of eleven different years (2010 and 2012-2021). Only wild Lake Sturgeon classified as juveniles (*i.e.*, fork length less than 800 mm) were included in the population estimate. All data for the period 2008–2012 were collected annually as part of environmental studies related to the pre-Project environment, while data from 2014 until 2044 will be collected annually as part of monitoring studies related to the Keeyask GS Project.

Data were analysed using the program MARK (White and Burnham 1999; Kendall 2001; Arnason and Schwartz 2002), which is an industry standard for the analysis of data from marked populations. Program MARK uses binary numbers to represent the encounter history of individuals, and then uses the cumulative pattern of 0's (not-encountered) and 1's (re-encountered live capture) to generate a probability distribution of tag recaptures which form the basis of population estimation. Re-encounters can also be from dead recoveries (*e.g.*, the animal is harvested) in which case the model uses a value of -1. For example, the history "10-1" indicates that an animal was captured for the first time at sampling occasion 1, not encountered at sampling occasion 2, and recovered dead at sampling occasion 3.

Several different population model variants exist, most of which can be classified as either closed or open models. Closed models assume there are no births, deaths, immigration, or emigration between sample periods, while open models assume these processes occur. The Jolly-Seber model (POPAN formulation; Arnason and Schwarz 2002), as implemented within MARK, was used to estimate the annual abundance of juvenile Lake Sturgeon. This is an open model that requires few assumptions and modeled variables, and thus likely provides a reliable estimate of abundance.

Using first-time capture and recapture information, POPAN estimates the survival (*i.e.*, the probability that a fish will survive from one capture to the next), the probability of recapture (*p*; *i.e.*, the probability that a fish will be recaptured given that the animal is alive and in the study area), and abundance (*N*; *i.e.*, the number of juvenile Lake Sturgeon in the area during each capture period) (Tables A5-1, A5-2 and A5-4).

- Model fit for survival was calculated as 75% for the Keeyask reservoir and 78% for Stephens Lake.
- The probability of recapture varied among years:
  - Recapture rates were split into nine groups based on the model for the Keeyask reservoir: i) 2010 (0.99); ii) 2012 (0.07); iii) 2013 (0.03); iv) 2014 (0.04); v) 2015 and 2016 (0.03); vi) 2017 (0.06); vii) 2018 (0.04); viii) 2019 and 2020 (0.06); and ix) 2021 (0.07).
  - For Stephens Lake, recapture rates were split into ten groups: i) 2010 (1.00); ii) 2012 (0.25); iii) 2013 (0.04); iv) 2014 (0.08); v) 2015 (0.06); vi) 2016 (0.12); vii) 2017 (0.14); viii) 2018 (0.06); ix) 2019 (0.13); and x) 2020 and 2021 (0.15).
- Abundance estimates for the Keeyask reservoir and Stephens Lake are provided for the 2010 and 2012-2021 study years.

- As sampling continues (*i.e.*, year to year) and data is added to the model, the parameters are recalculated. Thus, although survival rates and abundance estimates are calculated for the same time periods, they may differ among reporting periods. This allows the estimates to become more refined and precise over time.

The Cormack-Jolly-Seber model was used to calculate an estimate of survival of hatchery-reared lake Sturgeon in both the Keeyask reservoir and Stephens Lake between 2015 (when stocking began) and 2021. This model calculates an estimate using the probability of recapture. For example, if 426 juveniles were stocked in a system and the estimated survival rate was 0.93 over three years then the remaining number of hatchery fish in the system would be calculated by multiplying the number of stocked fish by the survival rate over three years. The resulting number would be calculated as follows:  $(426 \text{ hatchery fish}) \times (0.93) \times (0.93) \times (0.93) = 342$  and would represent the number of hatchery fish estimated to still be present in the system after three years.

## References

- Arnason, A.N. and Schwarz, C.J. 2002. POPAN-6: Exploring convergence and estimate properties with SIMULATE. *Journal of Applied Statistics* 29: 649–668.
- Kendall, W.L. 2001. The robust design for capture-recapture studies: Analysis using Program MARK. In *Wildlife, Land, and People: Priorities for the 21<sup>st</sup> Century*. Proceedings of the Second International Wildlife Management Congress. Edited by R. Field, R.J. Warren, H. Okarma, and P.R. Sievert. The Wildlife Society, Bethesda, Maryland, USA. p. 350–356.
- White, G.C. and Burnham, K.P. 1999. Program MARK: Survival estimation from populations of marked animals. *Bird Study* 46 Supplement: 120–138.

**Table A5-1: Results of POPAN analysis of juvenile Lake Sturgeon from the Keeyask reservoir. Best model was constant survival and variable recapture. Confidence intervals are rounded.**

Parameter	Mean	SE	95% Confidence Interval	
			Low	High
Survival (All Years)	0.75	0.04	0.67	0.82
2010 Recapture	0.99	1.64	0.00	1.00
2012 Recapture	0.07	0.03	0.03	0.15
2013 Recapture	0.03	0.01	0.01	0.07
2014 Recapture	0.04	0.02	0.01	0.11
2015 and 2016 Recapture	0.03	0.01	0.02	0.05
2017 Recapture	0.06	0.02	0.04	0.11
2018 Recapture	0.04	0.01	0.02	0.08
2019 and 2020 Recapture	0.06	0.02	0.03	0.10
2021 Recapture	0.07	0.02	0.04	0.11
2010 Abundance	69	115	7	661
2012 Abundance	1198	518	532	2698
2013 Abundance	900	398	393	2062
2014 Abundance	3115	1785	1096	8852
2015 Abundance	3834	748	2625	5601
2016 Abundance	2879	610	1909	4342
2017 Abundance	2162	516	1363	3430
2018 Abundance	3180	1037	1706	5930
2019 Abundance	2968	809	1757	5015
2020 Abundance	2800	713	1713	4577
2021 Abundance	2776	656	1757	4385

**Table A5-2: Results of POPAN analysis of hatchery-reared juvenile Lake Sturgeon from the Keeyask reservoir. Best model was constant survival and variable recapture. Confidence intervals are rounded.**

Parameter	Mean	SE	95% Confidence Interval	
			Lower	Upper
Survival	0.92	0.10	0.45	0.99
2014 Cohort at Large	257		4	408
2016 Cohort at Large	332		20	452
2018 Cohort at Large	337		82	393
Stocked	927		106	1252
Wild	2776	656	1757	4385
Percent Hatchery	25.04%		5.67%	22.21%

**Table A5-3: Results of POPAN analysis of juvenile Lake Sturgeon from Stephens Lake. Best model was constant survival and variable recapture. Confidence intervals are rounded.**

Parameter	Mean	SE	95% Confidence Interval	
			Low	High
Survival (All Years)	0.78	0.03	0.72	0.83
2010 Recapture	1.00	2.12	0.00	1.00
2012 Recapture	0.25	0.10	0.10	0.49
2013 Recapture	0.04	0.01	0.02	0.08
2014 Recapture	0.08	0.03	0.04	0.16
2015 Recapture	0.06	0.02	0.04	0.10
2016 Recapture	0.12	0.03	0.07	0.19
2017 Recapture	0.14	0.03	0.08	0.22
2018 Recapture	0.06	0.01	0.04	0.08
2019 Recapture	0.13	0.02	0.09	0.18
2020 and 2021 Recapture	0.15	0.03	0.10	0.22
2010 Abundance	32	69	2	419
2012 Abundance	340	136	160	725
2013 Abundance	710	206	406	1239
2014 Abundance	555	165	314	980
2015 Abundance	733	160	480	1118
2016 Abundance	573	132	367	895
2017 Abundance	682	156	439	1061
2018 Abundance	988	120	779	1253
2019 Abundance	773	109	586	1018
2020 Abundance	604	101	436	836
2021 Abundance	526	96	369	749

**Table A5-4: Results of POPAN analysis of hatchery-reared juvenile Lake Sturgeon from Stephens Lake. Best model was constant survival and variable recapture. Confidence intervals are rounded.**

Parameter	Mean	SE	95% Confidence Interval	
			Lower	Upper
Survival	0.78	0.07	0.62	0.88
2014 Cohort at Large	91		24	192
2016 Cohort at Large	260		108	429
2018 Cohort at Large	234		151	301
Stocked	585		283	922
Wild	526	96	369	749
Percent Hatchery	52.66%		43.37%	55.17%