



Keeyask Generation Project Fisheries Off-setting Management Plan

Lake Sturgeon Stocking Report

FOMP-2015-01



KEEYASK GENERATION PROJECT

FISHERIES OFF-SETTING MANAGEMENT PLAN

Report # FOMP-2015-01

Production and Stocking Summary for Burntwood River and Birthday
Rapids lake sturgeon populations, June 2013 to September 2014: Year 1
Construction

Prepared for

Manitoba Hydro

By

C.N. Klassen

January 2015

This report should be cited as follows:

Klassen, C.N. 2015. Production and stocking summary for burntwood river and birthday rapids lake sturgeon populations, June 2013 to September 2014: Year 1 Construction. A report prepared for Manitoba Hydro. January 2015. 56 pp.

SUMMARY

BACKGROUND

Construction of the Keeyask Generation Project at Gull Rapids began in July 2014. Before the government allowed construction to begin, the owner, Keeyask Hydropower Limited Partnership (KHLP), had to prepare a plan outlining activities that could reduce the potential effects of the Keeyask Generation Project on fish and water quality in the Nelson River. The plan also explained how the proposed activities would be completed and monitored.

Activities directed at Lake Sturgeon were included in the plan because 1) they are important to local people, 2) their current population numbers are low, and 3) the generating station will change or destroy important habitat that they need to survive and reproduce. To increase Lake Sturgeon populations, the KHLP has made a commitment to produce and release hatchery-reared sturgeon into the Burntwood River and the lower Nelson River until there is a self-sustaining population.

This summary describes the hatchery production and stocking activities from June 2013 to October 2014.

LAKE STURGEON STOCKING PROGRAM

Lake Sturgeon are produced at the Grand Rapids Fish Hatchery (GRFH) located in Grand Rapids, MB from the eggs and sperm (milt) of wild adults. Offspring are reared in fiberglass troughs using well water, although surface water from the Saskatchewan River is added during the summer months to increase water temperatures and improve water quality. Fish are started on a diet of newly hatched brine shrimp and later transitioned to frozen bloodworm.

Lake Sturgeon are released as larvae (less than 1 month old) and fingerlings (3 to 4 months old) when space limitations impede fish growth. At these stages, fish are not large enough to be marked. Instead, tissue samples from individuals representing each family group are preserved for future genetic reference. Each year some of the fingerlings are kept over winter at GRFH and released as yearlings (12 to 15 months old). Prior to release, yearlings are marked with uniquely numbered Passive Integrated Transponder (PIT) tags inserted into the muscle. PIT tag scanners held over the fish can detect a tag and display the number on a screen. This marking technique helps to identify hatchery-reared fish caught in the river and can be used to assess the movement and growth of individual fish following stocking. Stocking locations are chosen to ensure that the hatchery-reared sturgeon have a genetically similar background to the existing wild population.

GRFH operates under provincially issued Live Fish Handling Permits. Stocking approvals are granted by Manitoba Conservation and Water Stewardship (Fisheries Branch).

BURNTWOOD RIVER POPULATION (2013 YEAR-CLASS)

Spawn Camp

Wild Lake Sturgeon were captured using gill nets below First Rapids in early June, 2013. Adults identified as spawning fish were maintained in tanks along the shore of the Burntwood River for

several days during which time females and males received a small dose of Gonadotropin-Releasing Hormone (GnRH). This hormone provides a natural trigger for the release of eggs and milt which helps to coordinate activities at the spawn camp (e.g., egg fertilization and transportation to the hatchery).

On June 6, the milt of three males was mixed with the eggs of two females. The total number of eggs collected was estimated to be 182,450. Fertilized eggs were then driven from the spawn camp to GRFH.



Field crew checking a wild adult sturgeon held at the Burntwood River spawn camp, June 2013.

Hatchery Production

Prior to entering GRFH, the sturgeon eggs were submerged in a disinfectant to kill any potential pathogens (e.g., viruses) that may have attached to the surface of the egg during fertilization and/or transportation. Approximately 1,000 larvae hatched from June 15 to 21. It is unclear why so few Lake Sturgeon hatched ($< 1\%$).

At the end of September, overall survival was approximately 68%. A total of 603 individuals were maintained at GRFH over the winter for release as yearlings. Survival was nearly 100% from the beginning of October 2013 until the end of May 2014, with one accidental death in April.

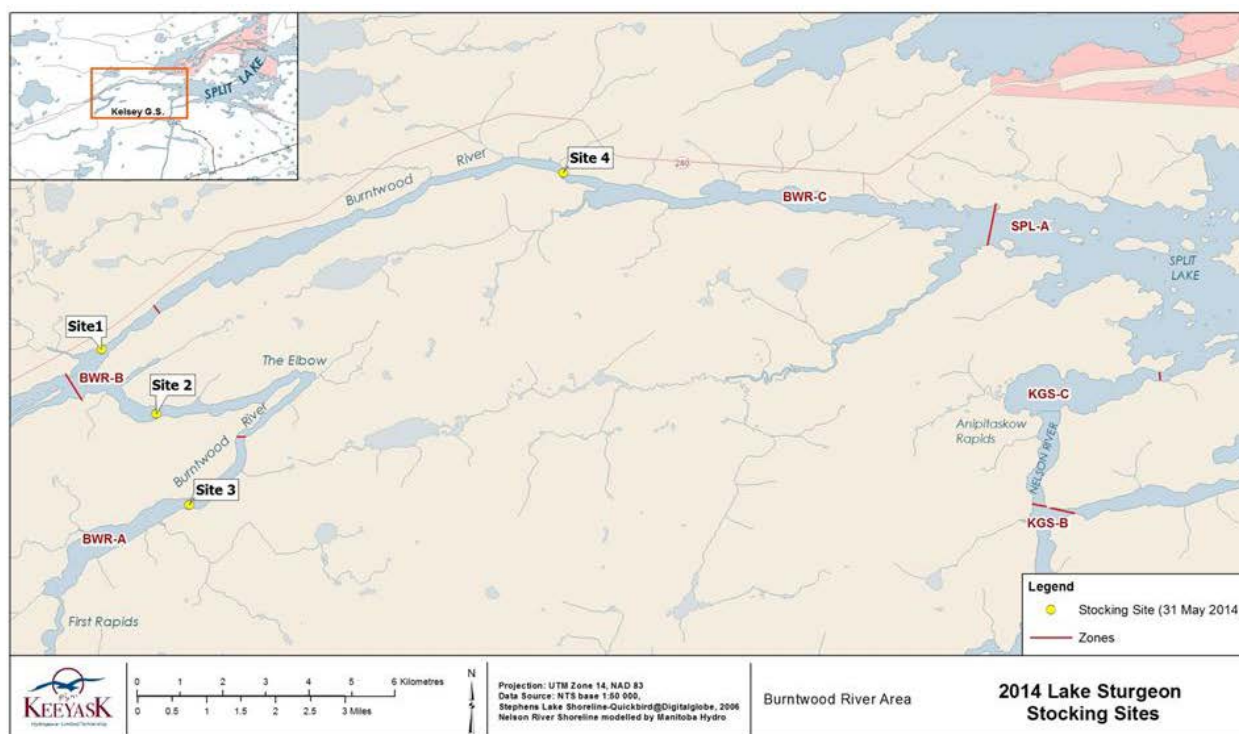
Following the spring stocking event, a total of 302 yearlings remained at GRFH for release in fall. To facilitate further growth, fish were transferred from the standard rearing troughs to a larger tank. Survival was approximately 98% from the beginning of June 2014 until the end of September 2014.

Stocking

On the final two days of May 2014, a total of 300 Lake Sturgeon yearlings were transported by truck to be stocked into the Burntwood River. Four stocking locations were chosen downstream

of First Rapids including the Orr Creek boat launch to better facilitate a shore-side public stocking event coordinated by community members from Split Lake, MB. At the time of spring stocking, yearlings had an average total length of 232 mm and an average weight of 51.3 g.

On October 2 the remaining 295 yearlings were released across the same four locations as the spring stocking. Community members from York Landing, MB met hatchery staff at the Orr Creek boat launch for a shore-side public stocking event. At the time of fall stocking, yearlings had an average total length of 283 mm and an average weight of 94.6 g.



Birthday Rapids Population (2014 Year-Class)

Spawn Camp

Lake Sturgeon were captured in the lower Nelson River in early June, 2014 using gill nets set below Birthday Rapids. Adults identified as spawning fish were kept in tanks along the shore of the Nelson River for several days during which time one female and two males received a small dose of Gonadotropin-Releasing Hormone (GnRH).

On June 12, the milt of both males was mixed with the eggs of the female. The total number of eggs collected was estimated to be 250,450. Fertilized eggs were transported within the same day to GRFH by air.

Hatchery Production

Prior to entering GRFH, the sturgeon eggs were disinfected to kill any potential pathogens (e.g., viruses) that may have attached to the surface of the egg during fertilization and/or transportation. An estimated 184,523 larvae hatched from June 21 to 24 for an overall hatch success of approximately 74%.

From the point of hatch to the end of July, survival was approximately 87%. Due to space constraints it became necessary to stock out a large number of sturgeon at the end of July.



Fiberglass troughs used to produce Lake Sturgeon at Grand Rapids Fish Hatchery

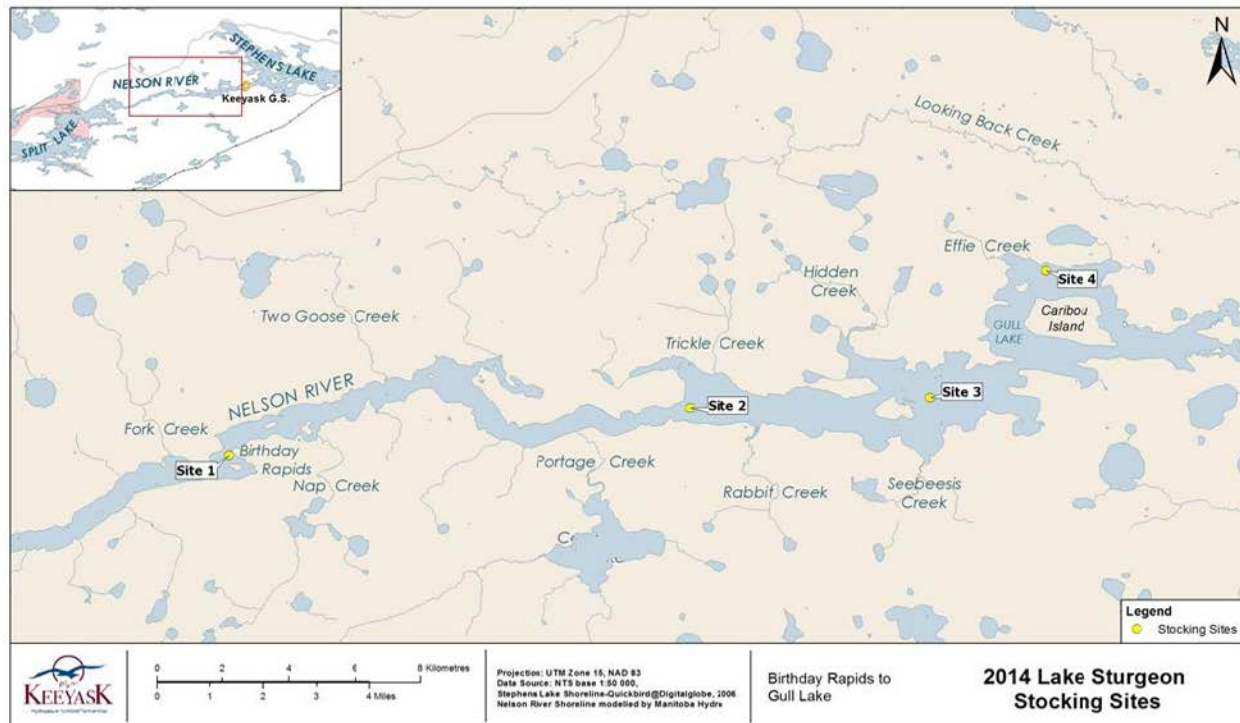
Approximately 8,000 sturgeon were kept at GRFH for further growth. Of the 8,000 approximately 74% survived until the end of September.

Following the fall stocking event, a total of 896 fingerlings were kept at GRFH to be released as yearlings in 2015.

Stocking

An estimated 153,000 sturgeon were transported from GRFH by air on July 29, 2014 to be stocked into an area immediately downstream of Birthday Rapids. At the time of release fish had an average total length of 31 mm and an average weight of 0.10 g.

On September 25 & 27, 2014 a total of 4,656 fingerlings were transported by truck to the Keeyask camp and released into Gull Lake by boat. Three sites were selected based on previous studies that caught wild juveniles in these areas. Fingerlings had an average total length of 89 mm and an average weight of 2.87 g at the time of stocking.



FUTURE ACTIVITIES

Hatchery-reared sturgeon from the Birthday Rapids population will be released as yearlings into the lower Nelson River in 2015. Egg and milt collection from wild adults will take place at the Burntwood River in spring 2015.

ACKNOWLEDGEMENTS

Keeyask Hydropower Limited Partnership is thanked for the resources to produce and stock Lake Sturgeon from the Burntwood River and Birthday Rapids populations.

North South Consultants are thanked for their field assistance in setting up spawn camps, collecting gametes and stocking, as well as, providing maps for this report. Joe Hunter (Sustainable Sturgeon Culture) was instrumental during Lake Sturgeon gamete collection. Field crews from Manitoba Hydro (Waterways Management Program) are thanked for their assistance during stocking activities.

Sharon Clouthier and Elissa Van Walleggem (Department of Fisheries and Oceans) conducted virus testing of Lake Sturgeon brood stock and offspring.

Members from the Kischi Sipi Namao Committee organized public release events at Burntwood River.

The collection of Lake Sturgeon brood stock and release of their offspring described in this report was authorized by Manitoba Conservation and Water Stewardship (Fisheries Branch) under the terms of Live Fish Handling Permits.

LAKE STURGEON PRODUCTION AND STOCKING TEAM

Grand Rapids Fish Hatchery

Randy Huff, Supervisor

Yhana Michaluk, Senior

Meagan Alexander, Senior

Reg Waterman, Senior

Jerry Cook

Morgan Blacksmith

Bryce Taylor

Tom Gamble

Reginald Ballantyne, Seasonal

Lucas Ballantyne, Seasonal

Tobias Dolinski, Seasonal

Environmental Licensing & Protection Department

Shelley Matkowski, Senior Environmental Specialist

Cheryl Klassen, Environmental Specialist

Katie Sheppard, Environmental Specialist

TABLE OF CONTENTS

1.0	INTRODUCTION	13
2.0	GRAND RAPIDS FISH HATCHERY	16
3.0	BURNTWOOD RIVER POPULATION (2013 YEAR-CLASS)	17
3.1	GAMETE COLLECTION (2013).....	17
3.2	HATCH (2013).....	18
3.3	SUMMER GROW-OUT (2013)	19
3.4	WINTER GROW-OUT (2013/14).....	22
3.5	SPRING YEARLING STOCKING (2014).....	24
3.6	SUMMER GROW-OUT (2014)	24
3.7	FALL YEARLING STOCKING (2014).....	25
4.0	BIRTHDAY RAPIDS POPULATION (2014 YEAR-CLASS)	26
4.1	GAMETE COLLECTION (2014).....	26
4.2	HATCH (2014).....	27
4.3	SUMMER LARVAL STOCKING (2014)	28
4.4	SUMMER GROW-OUT (2014)	29
4.5	FALL FINGERLING STOCKING (2014).....	32
5.0	PRODUCTION AND STOCKING ACTIVITIES IN 2014/15.....	34
6.0	REFERENCES	35

LIST OF TABLES

Table 1:	Tag numbers, body mass and GnRH dose used during gamete collection for Lake Sturgeon brood stock collected in the Nelson River at Birthday Rapids, June 2013.	27
----------	--	----

LIST OF FIGURES

Figure 1:	Burntwood River stocking locations for Lake Sturgeon yearlings released in May and October, 2014	23
Figure 2:	Floor tank (A) at Grand Rapids Fish Hatchery used for over winter grow-out	25
Figure 3:	Transport tanks used to move sturgeon by truck (A) and boat (B).....	26
Figure 4:	Lake sturgeon larvae being loaded into aircraft at the Grand Rapids, MB airstrip.	28
Figure 5:	Stocking Locations for Birthday Rapids Lake Sturgeon (2014 year-class) released in 2014.	30
Figure 6:	Overall survival (%) from July 30 to September 27 for two Lake Sturgeon families produced from wild brood stock collected in the Nelson River near Birthday Rapids, 2014.....	31
Figure 7:	Mean number of Birthday Rapids sturgeon kept per m ² rearing area at mean total length (mm). Suggested low and high densities at total length taken from HDR, Inc. (2014).....	31
Figure 8:	Mean water temperature (°C) of rearing tanks holding Birthday Rapids sturgeon from incubation (June 2014) to the fall fingerling stocking event (October 2014).	32
Figure 9:	Mean total length (mm) and body mass (g) for Birthday Rapids sturgeon at month end measurements. Values represent 15 individuals randomly selected from each active rearing trough. F1xM1 (shaded), F1xM2 (open).	32

LIST OF APPENDICES

APPENDIX 1: Water Quality	37
APPENDIX 2: Lake sturgeon stocking	44

1.0 INTRODUCTION

In June 2012, the Keeyask Hydropower Limited Partnership (KHLP) filed an Environmental Impact Statement (EIS) in support of the Keeyask Generation Project (the Project), a 695 MegaWatt hydroelectric generating station (GS) to be built at Gull Rapids on the Nelson River (Figure 1). Construction of the Project began in July 2014 following regulatory approval.

As discussed in the EIS, construction and operation of the Project will result in the alteration and destruction of Lake Sturgeon habitat, thereby potentially affecting regional populations.

To mitigate impacts of the Project, the KHLP has developed a strategy that involves several components, including:

- management measures during construction to avoid mortality of sturgeon;
- stocking of sturgeon into Stephens Lake during construction to offset potential effects of reduced spawning in Gull Rapids;
- spawning habitat creation in the tailrace of the GS;
- alterations to habitat upstream of Birthday Rapids, if post-Project monitoring demonstrates that this area is no longer suitable for spawning sturgeon;
- creation of young-of-the-year rearing habitat at the upper end of Gull Lake following impoundment, if post-Project monitoring demonstrates that suitable habitat is not available;
- on-going studies to determine requirements (if any) for upstream fish passage;
- the use of monitoring of downstream movements and mortality to determine the need for any additional fish protection measures related to downstream passage at the GS;
- a conservation stocking program, with the objective of re-establishing a self-sustaining Lake Sturgeon population; and
- a conservation awareness program, highlighting the vulnerability of Lake Sturgeon.

Stocking was identified as being critically important to the overall plan amid concerns that the current population may be too low to recover unaided, even in absence of GS construction. Therefore, a conservation stocking plan for the lower Nelson River was designed to address:

- existing low population numbers due to historic effects, in particular a commercial fishery that closed in 1992;
- potential effects of creation of the Keeyask reservoir, including possible emigration of adult Lake Sturgeon in response to water level changes at impoundment, and reduced year class strength in the initial years of impoundment due to changes in spawning and young-of-the-year habitat. These effects are predicted to be restricted to the first years of impoundment, if they occur at all; and
- potential decrease in year class strength of sturgeon in Stephens Lake, due to the alteration and ultimate loss of spawning habitat in Gull Rapids during construction of the GS. This effect is offset during the operation phase by the constructed spawning habitat.

An initial ten year stocking plan has been developed and described in the Fisheries Offsetting and Mitigation Plan (FOMP). The Keeyask Fisheries Regulatory Review Committee (which will undertake the role of the Lake Sturgeon Advisory Committee described in the *Environment Act* licence) may decide to modify the stocking plan based on annual monitoring activities.

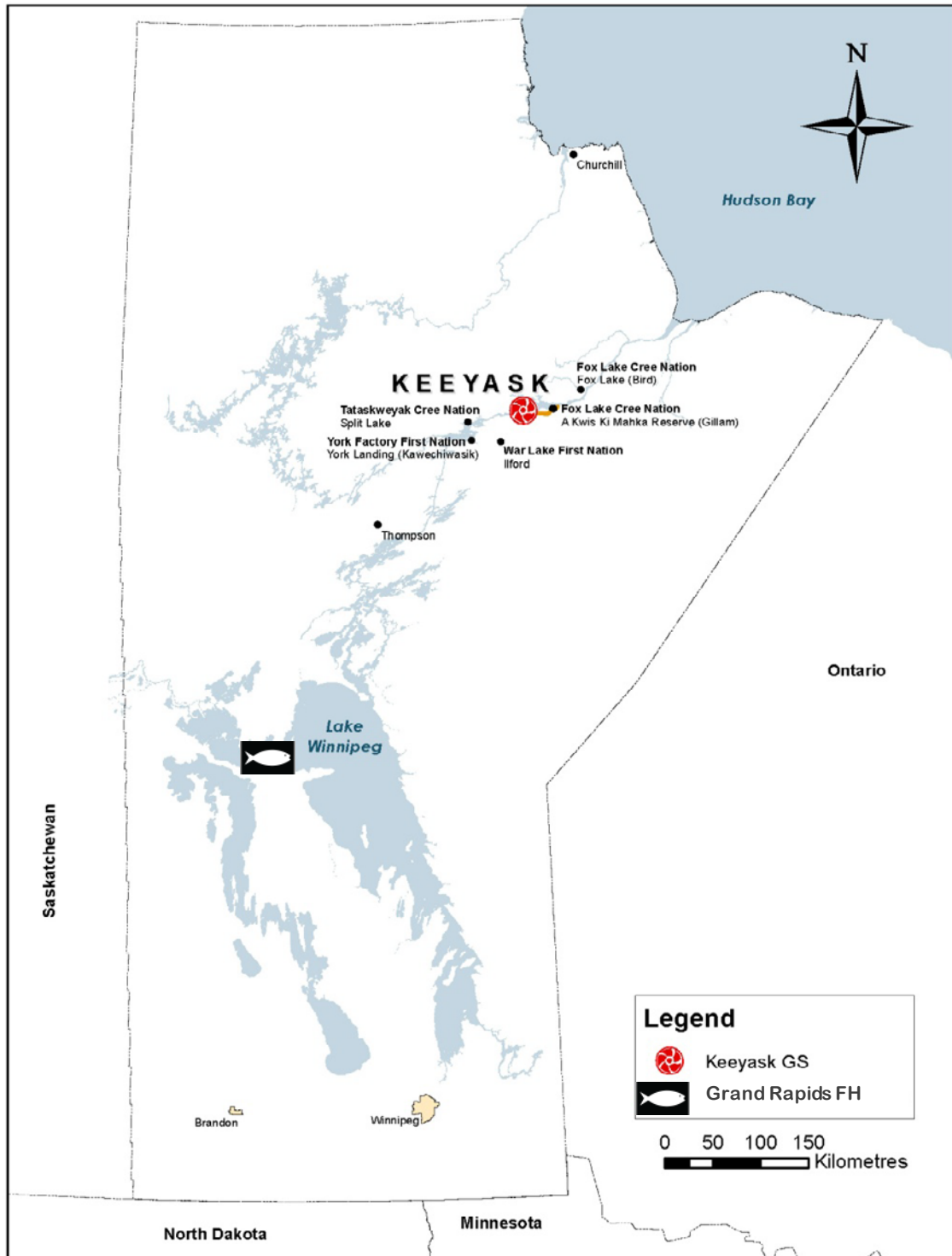


Figure 1: Location of Keeyask Generation Project and Grand Rapids Fish Hatchery

Lake Sturgeon stocking in the lower Nelson River began in 2014 and will continue until self-sustaining populations are established. At present, it is anticipated that stocking will occur for at least one full generation (25 years) to restore the historically depleted population.

The purpose of this document is to provide a summary of trial Lake Sturgeon production at Grand Rapids Fish Hatchery and stocking activities for the KHLP in 2013 and 2014.

2.0 GRAND RAPIDS FISH HATCHERY

The Grand Rapids Fish Hatchery (GRFH) is located in the community of Grand Rapids, MB (Figure 1). Constructed in the early 1970's by the province of Manitoba, the building was originally configured for production of Walleye, Whitefish and a variety of trout species. In 1994, GRFH began producing Lake Sturgeon for the Nelson River Sturgeon Board in efforts to conserve upper Nelson River populations.

Manitoba Hydro purchased GRFH in 2007 and the facility was operated in partnership with Manitoba Conservation and Water Stewardship (Fisheries Branch) through a Joint Management Committee. At the end of 2012, Manitoba Hydro assumed full operation of the hatchery employing six permanent and two seasonal staff. Staffing and building maintenance are currently under the direction of the Grand Rapids Generating Station. Fish production and regulatory matters are overseen by Manitoba Hydro's Environmental Licensing and Protection Department.

Since 2012, GRFH has focused its production efforts exclusively on Lake Sturgeon and Walleye. In addition to producing Lake Sturgeon for the Nelson River Sturgeon Board, GRFH began producing Lake Sturgeon for the KHLP in 2013. All production and stocking activities are conducted under the terms of Live Fish Handling Permits issued by Manitoba Conservation and Water Stewardship (Fisheries Branch).

The existing infrastructure at GRFH includes three 140-jar batteries for egg incubation, 16 gray fiberglass rearing troughs (4.6 m x 0.55 m x 0.25 m), and 8 blue rearing troughs (4.2 m x 0.41 m x 0.26 m). Total usable rearing area is approximately 50 m². The grey troughs have been configured to permit the use of both well water and surface water (Saskatchewan River). Concrete floor tanks, originally used for fish production, now serve as water reservoirs in a simple sump pump operated water recirculation system. Water temperature is managed using ambient room heating and submerged water heaters or by blending well and surface water.

In March 2014, a facility assessment was completed by HDR (2014) which concluded that the existing infrastructure cannot meet projected Lake Sturgeon production commitments. Upgrades are also necessary to reach national and provincial biosecurity standards. Planning for expansion of GRFH began at the end of 2014.

3.0 BURNTWOOD RIVER POPULATION (2013 YEAR-CLASS)

3.1 GAMETE COLLECTION (2013)

Lake Sturgeon brood stock were collected in the Burntwood River at the base of First Rapids in collaboration with North South Consultants. Two females and two males were injected with a Gonadotropin Releasing Hormone (GnRH; Bachem Americas, Inc., Torrance, CA, USA) on June 4 & 5 (Table 1). Administration of GnRH is useful for conservation aquaculture programs because it stimulates the production of sex steroids (estradiol and testosterone) necessary for maturation and production of eggs and milt. Recent research on the use of GnRH during Lake Sturgeon gamete collection suggests no lasting negative effects on brood stock health or human consumption complications (Genz et al. 2014).

Water temperatures ranged from 15°C to 17°C in tanks which were set up on shore to hold sturgeon brood stock. On June 6 a combined total of 4.48 L of eggs were collected at approximately 09:00. Four family groups (i.e., F1xM1, F1xM2, F2xM1 and F2xM2/M3) were created using gametes (eggs and milt) collected from brood stock that received GnRH injections and milt collected opportunistically from a third male captured during gillnetting efforts.

Table 1: Tag numbers, body mass and GnRH dose used during gamete collection for Lake Sturgeon brood stock collected in Burntwood River, June 2013.

Floy Tag ID	Hatchery ID	Body Mass (Kg)	Injection Date	Injection Time	GnRH (µg/Kg)	Solution		
						GnRH (µl) ¹	Ringer's (µl) ²	Total (µl)
Females								
88684	F1	18.6	4-Jun	21:00	2.0	3.7	368	372
			5-Jun	9:00	12.0	22.3	350	372
88689	F2	16.8	4-Jun	21:00	1.0	1.7	334	336
			5-Jun	9:00	6.0	10.0	326	336
Males								
88681	M1	6.8	4-Jun	21:00	2.0	1.4	135	136
			5-Jun	9:00	6.0	4.0	132	136
88699	M2	7.7	4-Jun			Not injected		
			5-Jun	10:30	6.0	4.8	155	160
86926	M3	n/a	n/a			Not injected		

¹ GnRH solution = 10µg GnRH per µl

² Saline solution used to transport GnRH into fish muscle during injections

Following fertilization, eggs were transported to GRFH in insulated containers by truck and surface disinfected using Ovadine® (Syndel Laboratories Ltd., Nanaimo, BC) prior to entering the hatchery at 100 ppm for 10 min.

Brood stock were held at the spawn camp for an additional 24 hours before being released. Prior to release, tissue samples (pectoral fin) were collected and preserved for virus testing. Testing by Dr. Sharon Clouthier (Research Scientist, Department of Fisheries and Oceans) using qPCR confirmed that one female was positive for Numao virus. It is not yet known if the virus can be passed from parent to offspring and research to address this question is on-going. A second fin clip was taken from each brood stock for future genetic reference of Lake Sturgeon families produced at GRFH.

3.2 HATCH (2013)

There was estimated to be 72,450 eggs from F1 (42 eggs/ml) and 110,000 eggs from F2 (40 eggs/ml) for a total of 182,450 eggs. Eggs were placed into McDonald hatching jars for incubation (Figure 2). Mean incubation temperature was 13.3°C (range: 11.3 to 15.6°C) and hatch occurred from June 15 – 21. Well water was used exclusively during this period and following hatch. Well water is typically 5°C which is not conducive for growth. Therefore, higher temperatures were attained by recirculating the tank water and adding minimal make-up water to the recirculation system.



Figure 2: McDonald hatching jars used to incubate lake sturgeon eggs

Five days after egg collection, fertilization rate was assessed and there were few viable eggs (< 1%). Intensive sorting to separate viable from unviable eggs led to the hatch of approximately 1,000 larvae. Few offspring hatched from F1 eggs (< 100) and no F1 offspring survived past August 14 (Figure 3).

It is unclear why hatch success was poor for the Burntwood River population. A couple of factors that may have contributed to poor hatch were 1) the unusually hot and sunny conditions during fertilization, and 2) the rough driving conditions along PR 280 while transporting the eggs to GRFH.

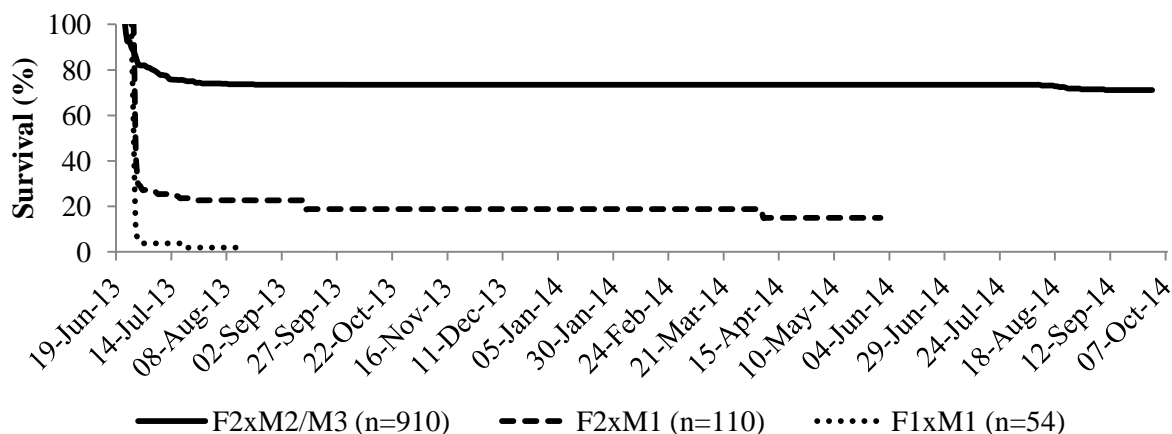


Figure 3: Overall survival (%) following hatch for three Lake Sturgeon families produced from wild brood stock collected in the Burntwood River, 2013.

3.3 SUMMER GROW-OUT (2013)

Of the roughly 1,000 larvae that hatched from the F2 eggs, survival was approximately 68% at the end of September. The family group F2xM2/M3 had the highest survival (74%) and F2xM1 had the lowest survival (19%) (Figure 3). The majority of mortalities occurred at the end of June and it was noted that many dead larvae had deformities.

Brine Shrimp was first offered to the sturgeon on June 29 and chopped bloodworm was introduced July 16. Most sturgeon were feeding on whole bloodworm by August 8 when fish had a mean total length of 48 mm (range: 32 to 55 mm) and mean body mass of 0.57 g (range: 0.26 to 0.77 g). Fish were fed to satiation three times daily at 08:00, 13:00 and 17:00.



Figure 4: Feeding whole bloodworm to Lake Sturgeon kept in grey fiberglass troughs.

The majority of sturgeon were maintained in grey fiberglass troughs with a rearing area of 2.24 m² (Figure 4). Smaller tanks with a rearing area of 0.18 m² were used for the few remaining F1xM1 and M2xM1 family members early in development. Densities for the F2xM1 family were well below those experienced by fish from the F2xM2/M3 family (Figure 5) and likely the reason why the former group maintained higher growth rates throughout production (Figure 6).

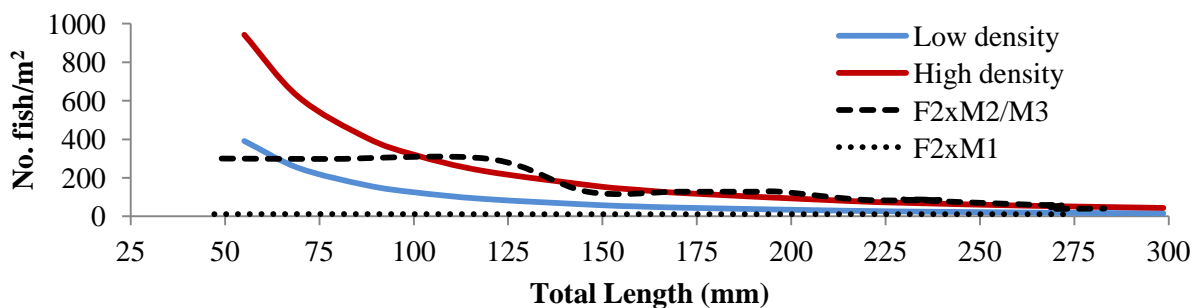


Figure 5: Mean number of sturgeon kept per m² rearing area at mean total length (mm). Suggested low and high densities at total length taken from HDR, Inc. (2014).

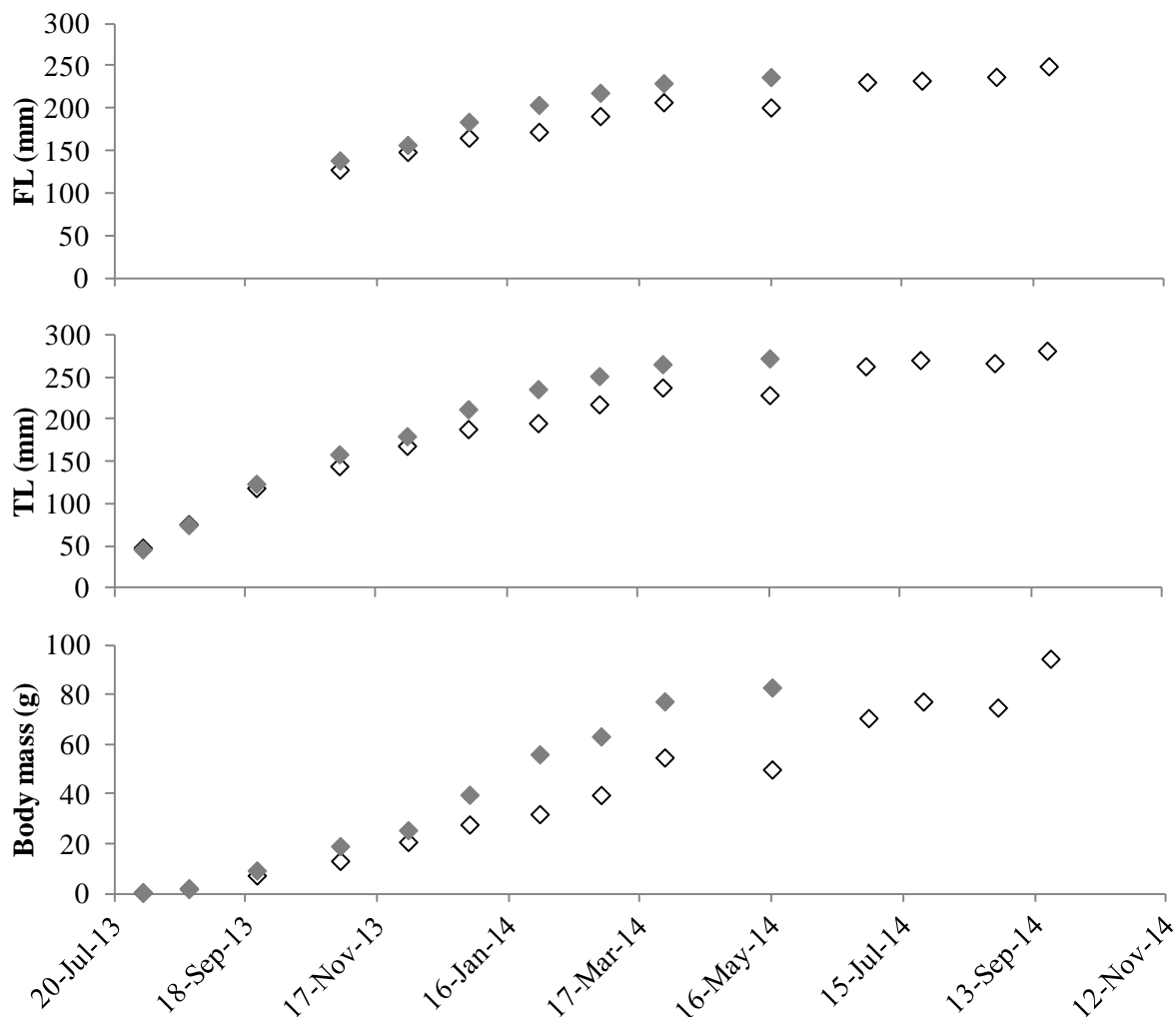


Figure 6: Mean fork length (FL), total length (TL) and body mass for Burntwood River sturgeon at month end measurements. Values represent 15 individuals randomly selected from each active rearing trough except for April 2013 and September 2014 when all fish were measured prior to release. F2xM1 (shaded), F2xM2/M3 (open).

To encourage growth, fish were reared in surface water from the Saskatchewan River beginning on July 19. Mean temperature was 16.6°C (range: 14.0 to 18.1°C) from July 1 to October 1 (Figure 7). By the end of September fingerlings had an overall mean total length of 123 mm (range: 90 to 151 mm) and mean body mass of 8.5 g (range: 3.1 to 15.2 g) (Figure 6).

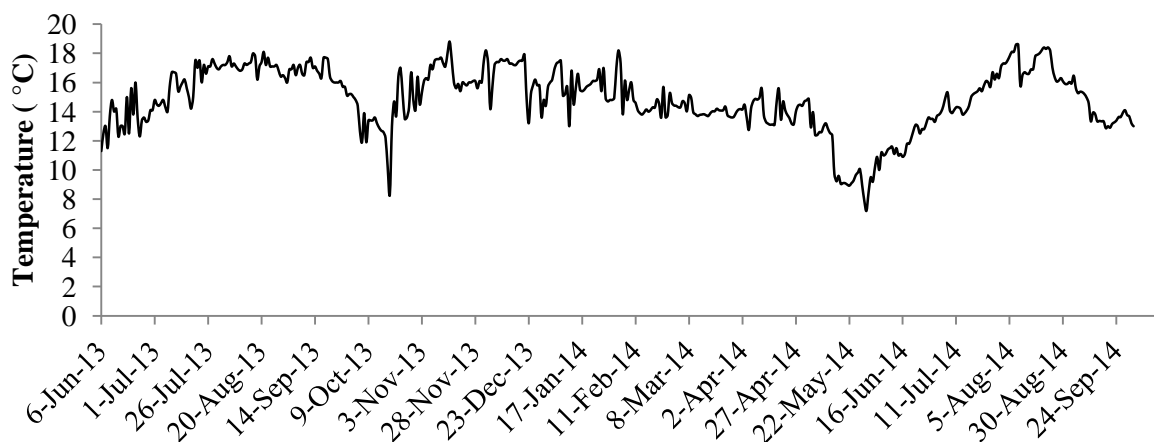


Figure 7: Mean water temperature (°C) of rearing tanks holding Burntwood River sturgeon from incubation (June 2013) to the fall yearling stocking event (October 2014).

Water quality was assessed weekly from June 29 to September 30. Dissolved oxygen (DO; Table A1-1), dissolved carbon dioxide (dCO₂; Table A1-2), pH (Table A1-3), ammonia-nitrogen (NH₃-N; Table A1-4) and nitrite nitrogen (NO₂-N) values were recorded from water samples collected in the water reservoir shared between the Burntwood River Lake Sturgeon families (i.e., floor tank 5). Suggested threshold values for sturgeon production are listed in Table A1-5. All mean values were within acceptable limits (including NO₂-N, < 0.05 mg/L), with the exception of NH₃-N (0.05 mg/L) which was above the suggested threshold of 0.01. It is believed values were high due to insufficient biofiltration under the current water recirculation system and is discussed further in section 5.0.

No Burntwood River fingerlings were released in fall 2013.

3.4 WINTER GROW-OUT (2013/14)

A total of 603 Burntwood River Lake Sturgeon were maintained at GRFH over winter. Survival was 100% from October 1 to the spring stocking event at the end of May, with the exception of one accidental death in April (Figure 3) when a Passive Integrated Transponder (PIT) tag was inserted too deeply into the dorsal muscle. Fish were transitioned from surface water to recirculated well water on October 19 and mean rearing temperature was 14.5°C (range: 7.2 to 18.8°C) from October 1 to June 1 (Figure 7). Lake Sturgeon were fed bloodworm to satiation twice daily at 08:00 and 13:00.

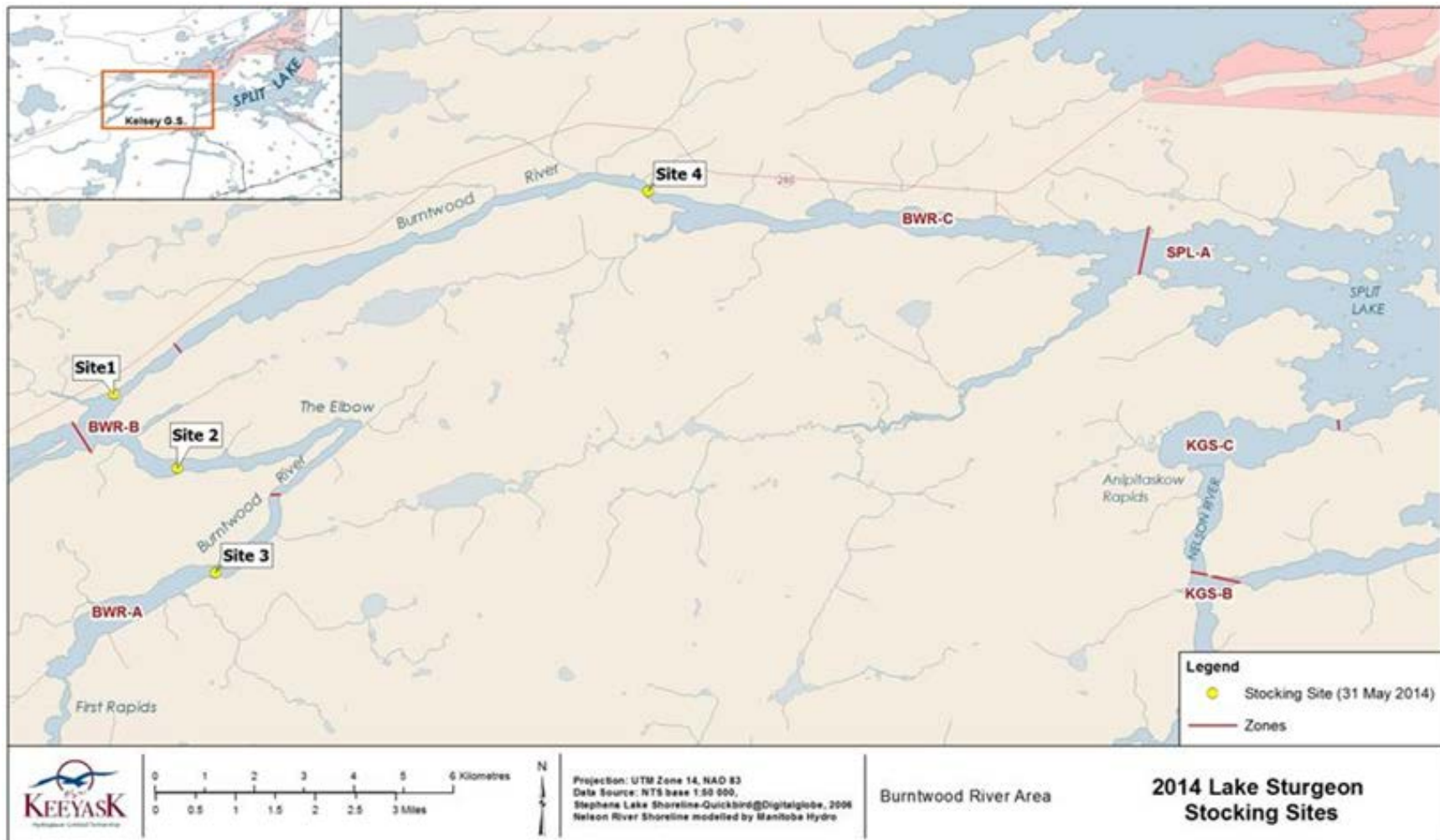


Figure 1: Burntwood River stocking locations for Lake Sturgeon yearlings released in May and October, 2014

Water quality samples were taken from each rearing tank throughout the winter. Overall pH (Table A1-3) and Ammonia-nitrogen (Table A1-4) levels remained higher than optimal (Table A1-6) for both family groups.

Tissue samples (pectoral fin) were collected from 60 Burntwood River sturgeon on April 2 and sent to Dr. Sharon Clouthier for virus testing. All samples tested negative by Numao virus qPCR and fish were cleared by the local fish health officer for stocking.

Prior to the spring stocking event, yearlings had a mean total length of 232 mm (range: 89 to 315 mm) and mean body mass of 51.3 g (range: 2.99 to 132.1 g) (Figure 6). All Lake Sturgeon were PIT tagged in April 2014, with the exception of eight individuals that did not have sufficient body size.

3.5 SPRING YEARLING STOCKING (2014)

On behalf of GRFH, North South Consultants transported a total of 300 Lake Sturgeon yearlings (i.e., two groups of 150) to the Burntwood River for release on May 30 & 31 (Table A2-1, A2-2). A total of 51 yearlings were released directly from shore on May 30 at stocking site (1) (Figure 8) in conjunction with a public release event that included students and community members from Split Lake, MB. River temperature was 11°C.

The remaining 249 yearlings were distributed by boat among three additional sites: (2) 1.7 km upstream of the Odie River confluence ($n = 99$), (3) 4 km below First Rapids ($n = 76$), and (4) 9.5 km upstream of Split Lake ($n = 74$) (Figure 8). Water depth was 10 m, 13 m and 21 m at sites (2), (3) and (4), respectively. River temperature was 7°C at all three sites.

Lake Sturgeon yearlings were acclimated to river conditions by mixing some river water in with the transport water. Care was taken to avoid releasing fish transport water into the river.

3.6 SUMMER GROW-OUT (2014)

A total of 302 Burntwood River yearlings, all from the F2xM2/M3 family, were retained at GRFH for further grow out. Sturgeon were transferred on May 27 from grey rearing troughs to a larger floor tank which provided a rearing area of 5.1 m² (Figure 9). From June 1 to October 1 sturgeon were exposed to a flow-through surface/well water mix and mean temperature was 14.5°C (range: 9.2 to 18.6°C). Fish were fed bloodworm to satiation twice daily at 8:00 and 13:00.

Survival was 100% until August 12 when a few unexpected mortalities occurred over a two week period. At this time, mean total length of yearlings was > 260 mm and density was near the suggested maximum (Figure 5). In response, 80 fish were removed from the floor tank and distributed equally into two grey rearing troughs until the fall stocking event.

Water quality was taken weekly throughout the summer and mean ammonia-nitrogen values (Table A1-4) remained above the suggested optimal (Table A1-6)



Figure 2: Floor tank (A) at Grand Rapids Fish Hatchery used for over winter grow-out

Tissue samples (pectoral fin) were collected from 15 Burntwood River sturgeon on August 29 and sent to Dr. Sharon Clouthier for virus testing. All samples tested negative by Numao virus qPCR and fish were cleared by the local fish health officer for stocking.

Prior to the fall stocking event, yearlings had a mean total length of 283 mm (range: 150 to 391 mm) and mean body mass of 94.6 g (range: 11.8 to 210.0 g) (Figure 6). Sturgeon had been implanted with a PIT tag in April.

3.7 FALL YEARLING STOCKING (2014)

A total of 295 yearlings were transported by hatchery staff using truck and trailer (Figure 10) to the Burntwood River on October 2 (Table A2-1, A2-3). A total of 48 yearlings were released directly from shore at stocking site (1) in conjunction with a public release event that included students and community members from York Landing, MB (Figure 8). River temperature was 9°C.

The remaining 245 yearlings were distributed by boat in collaboration with field crews from Manitoba Hydro's Waterways Management Program among the same three sites targeted in spring: (2) 1.7 km upstream of the Odie River confluence (n = 87), (3) 4 km below First Rapids (n = 79), and (4) 9.5 km upstream of Split Lake (n = 79) (Figure 8). River temperature was 10°C.

Two individuals were not accounted for in the field records (Table A2-3). It is assumed that these fish were stocked into the Burntwood River because there was no hatchery record indicating mortality prior to the stocking date.



Figure 3: Transport tanks used to move sturgeon by truck (A) and boat (B).

4.0 BIRTHDAY RAPIDS POPULATION (2014 YEAR-CLASS)

4.1 GAMETE COLLECTION (2014)

Lake Sturgeon brood stock were collected in the Nelson River near Birthday Rapids in collaboration with North South Consultants. One female and two males were injected with GnRHa on June 10 & 11 (Table 2). Water temperatures within the brood stock holding tanks ranged from 9°C to 10°C. On June 12 a total of 6.6 L of eggs were collected at 14:30 and two family groups were created, F1xM1 and F1xM2. Eggs were fertilized under a canopy to avoid any potential damage that direct sun may have had during the 2013 production activities.

Eggs were not transported by truck but rather in insulated containers by float plane to Gillam, MB and then by land-based aircraft to Grand Rapids, MB. Eggs arrived at GRFH by 19:00 and prior to entering the hatchery, eggs were disinfected with Ovadine® for 10 min at 100 ppm.

Brood stock were held at the spawn camp for 24 hours before being released. Prior to release, gamete and tissue samples (pectoral fin) were collected from brood stock for virus testing. Testing by Dr. Sharon Clouthier using qPCR confirmed that F1 and M1 were positive for Numao virus. A second fin clip was taken from brood stock for future genetic reference of Lake Sturgeon families produced at GRFH.

Table 1: Tag numbers, body mass and GnRH dose used during gamete collection for Lake Sturgeon brood stock collected in the Nelson River at Birthday Rapids, June 2013.

Floy Tag ID	Hatchery ID	Body Mass (Kg)	Injection Date	Injection Time	GnRH (µg/Kg)	Solution		
						GnRH (µl) ¹	Ringer's (µl) ²	Total (µl)
Female								
105423	F1	23.86	10-Jun	19:00	3.0	7.2	477.3	484.5
			11-Jun	7:00	14.0	33.4	477.3	510.7
Males								
105422	M1	8.41	10-Jun	19:00	1.5	1.3	168.2	169.5
			11-Jun	7:00	7.0	5.9	168.2	174.1
80255/	M2	15.45	10-Jun	19:00	1.5	2.3	309.1	311.4
80256			11-Jun	7:00	7.0	10.8	309.1	319.9

¹ GnRH solution = 10µg GnRH per µl² Saline solution used to transport GnRH into fish muscle during injections

4.2 HATCH (2014)

There was estimated to be 121,875 eggs from the M1 cross (39 eggs/ml) and 128,575 eggs from the M2 cross (37 eggs/ml) for a total of 250,450 eggs. Eggs were placed in McDonald hatching jars for incubation (Figure 2). Mean incubation temperature was 13.0°C (range: 11.9 to 13.7°C) and hatch occurred from June 21 – 24. Well water was used exclusively during this period and following hatch. Appropriate water temperatures were attained in tanks by recirculating well water and adding minimal make-up water to each water recirculation system.

Five days after egg collection, fertilization rate was assessed. The mean proportion of viable eggs was calculated from egg samples collected within incubation jars from both the M1 and M2 families. The mean proportion of viable eggs from each family was then multiplied by the total egg volume of that family to estimate hatch success. Mean fertilization success was 72.5% and 74.7% for the M1 and M2 families, respectively. This translated to an estimated 88,715 and 95,808 larvae at hatch for the M1 and M2 family groups, respectively.

The number of dead larvae removed from tanks was recorded daily. From the point of hatch to late July, survival was estimated to be 88% and 87% for the M1 and M2 families, respectively. It was noted that a large number of mortalities resulted from suffocation as a result of larvae burying under each other.

Grand Rapids Fish Hatchery does not have the capacity to support the numbers of larvae hatched in 2014 and the total volume of eggs brought to GRFH should be reduced in future years. In addition, more effective substrate is required within rearing tanks to spread out newly

emerged larvae. Mounds of chain and small pieces of PVC piping have been used with limited success. Plans are in place to assess bio-balls in 2015.

Thirty whole body samples from each of the two families were collected on June 23 and sent to Dr. Clouthier for testing. One individual from the M1 family tested positive for Numao virus using qPCR. Permission to stock larvae from the M1 family was granted by the local fish health officer for four reasons: 1) the virus was shown to be present in the source population, 2) the prevalence in the hatchery was extremely low (1 out of 30), 3) larvae would be stocked at the site of the source population, and 4) the Lake Sturgeon population at Birthday Rapids is being considered for legal listing under the Species at Risk Act (SARA).

4.3 SUMMER LARVAL STOCKING (2014)

It was necessary to stock out a large number of larvae due to the limited capacity at Grand Rapids Fish Hatchery. On July 29 an estimated 152,926 larvae were distributed among 20 fish transport bags at densities of approximately 6,900 to 8,400 larvae per bag. Each bag held approximately 15L of water and was filled with oxygen. Bags were placed inside a cooler to ensure that water temperature did not fluctuate during travel.

Sturgeon larvae were first transported by land-based aircraft to Gillam, MB (Figure 11) followed by a second trip in a float plane to the stocking site at Birthday Rapids. A field crew from North South Consultants met the float plane and distributed the larvae below Birthday Rapids (Site 1; Figure 12) following acclimation to river water.

At the time of stocking, larvae had an overall mean total length of 31 mm (range: 24 to 37 mm) and mean body mass of 0.10 g (range: 0.04 to 0.17 g).



Figure 4: Lake sturgeon larvae being loaded into aircraft at the Grand Rapids, MB airstrip.

4.4 SUMMER GROW-OUT (2014)

Approximately 8,000 larvae from the Birthday Rapids population were kept at GRFH for further growth and represented both the M1 (n = 4,151) and M2 (n = 4,139) groups. Families were maintained on separate water recirculation systems due to the positive Numao virus result among the M1 family. Sturgeon were first offered brine shrimp on July 2 and chopped bloodworm on July 17. Most sturgeon were feeding on whole bloodworm by August 31 when fish had a mean total length of 66 mm (range: 45 to 78 mm) and mean body mass of 1.14 g (range: 0.45 to 1.81 g).

From July 30 to September 27 survival was 93% for the M1 family and 54% for the M2 family. The majority of mortalities for the M2 group occurred from August 10 to 12 (Figure 13). Routine water quality testing on August 11 indicated an ammonia-nitrogen spike within the water recirculation system holding the M2 family. It remains unclear if increased ammonia-nitrogen levels led to, or were the result of, increased mortality (Table A2-5).

Surface water was added to the water recirculation system on August 11 and this allowed hatchery staff to increase the volume of make-up water without dropping the water temperature. On August 12 the M2 family also received a salt bath (1% solution) for 20 min. Although mortalities continued until August 23, the rate was greatly reduced following these two mitigation measures. Ammonia-nitrogen levels had dropped by August 18.

Sturgeon were held in shallow troughs (2.24 m²) within suggested densities throughout the summer (Figure 14) and reared in well water until August 11 and 16 when forebay water was mixed into the water recirculation systems holding the M2 and M1 families, respectively.

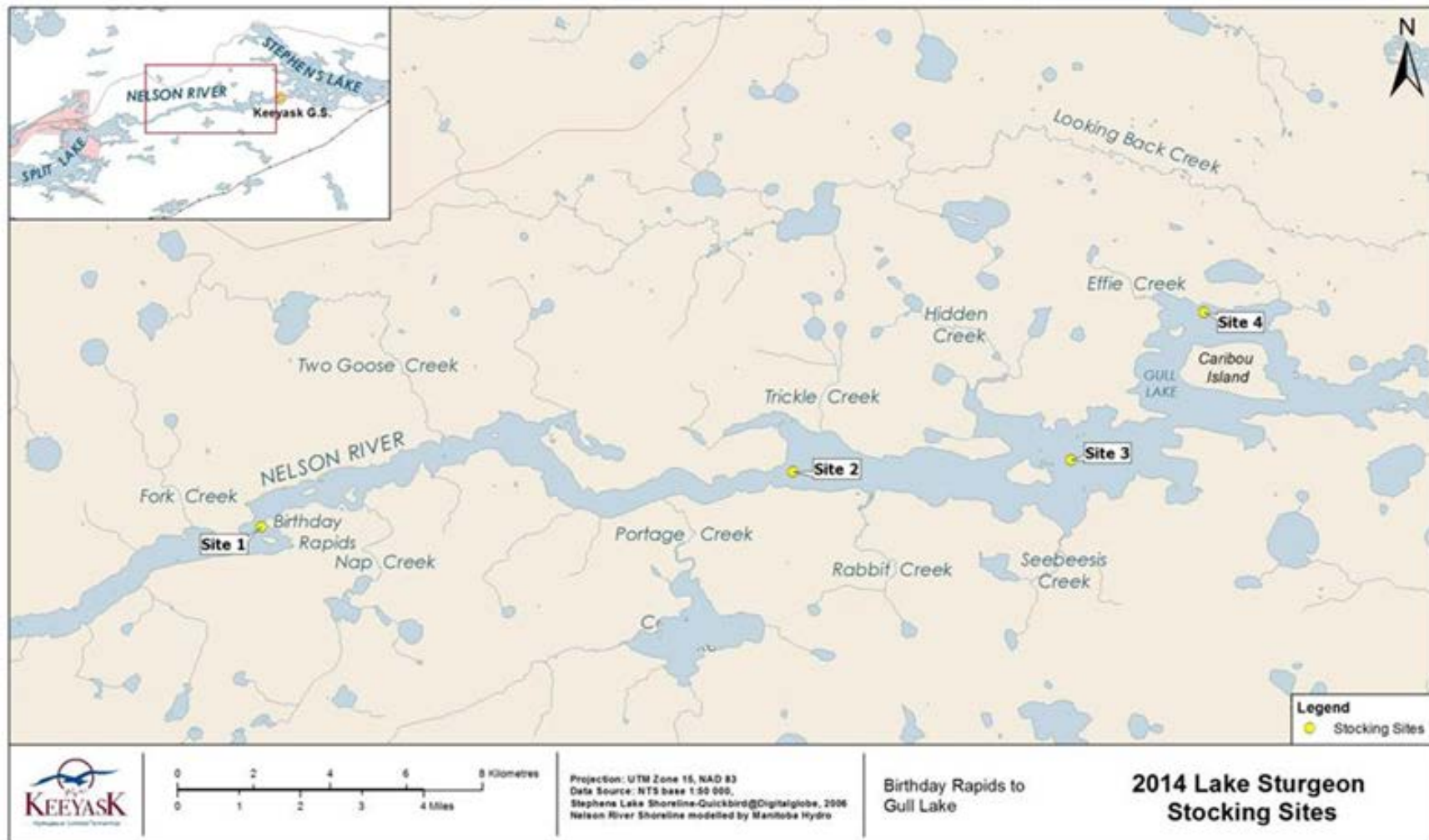


Figure 5: Stocking Locations for Birthday Rapids Lake Sturgeon (2014 year-class) released in 2014.

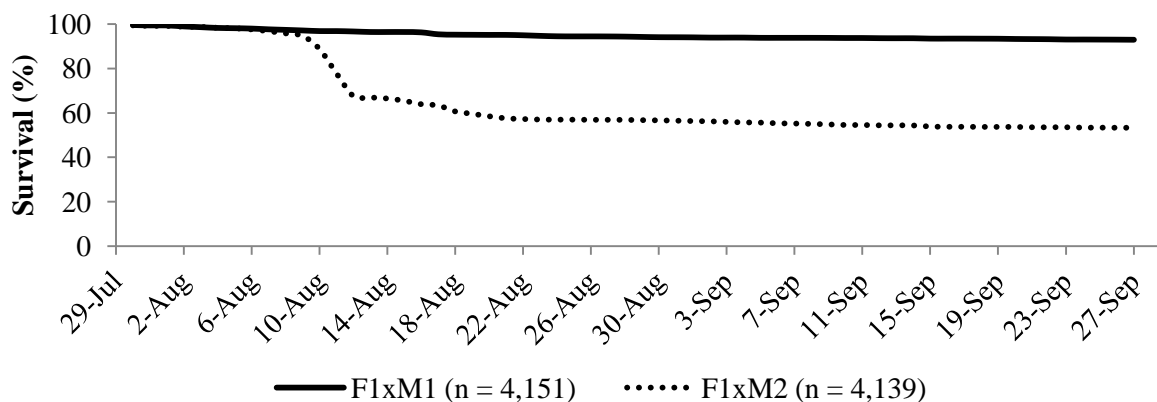


Figure 6: Overall survival (%) from July 30 to September 27 for two Lake Sturgeon families produced from wild brood stock collected in the Nelson River near Birthday Rapids, 2014.

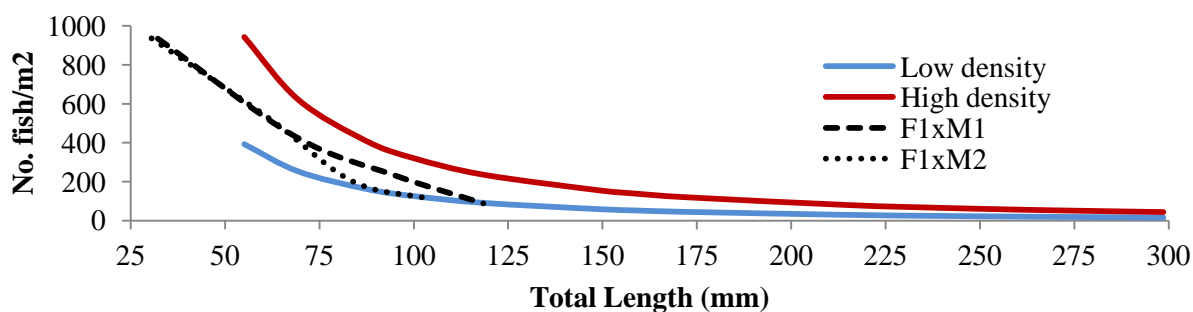


Figure 7: Mean number of Birthday Rapids sturgeon kept per m² rearing area at mean total length (mm). Suggested low and high densities at total length taken from HDR, Inc. (2014).

From July 1 to October 1 mean temperature for the M1 family group was 15.5°C (range: 12.5 to 17.7°C) and only slightly higher than the M2 family during the same period which had a mean temperature of 15.3°C (range: 13.6 to 18.2°C) (Figure 15).

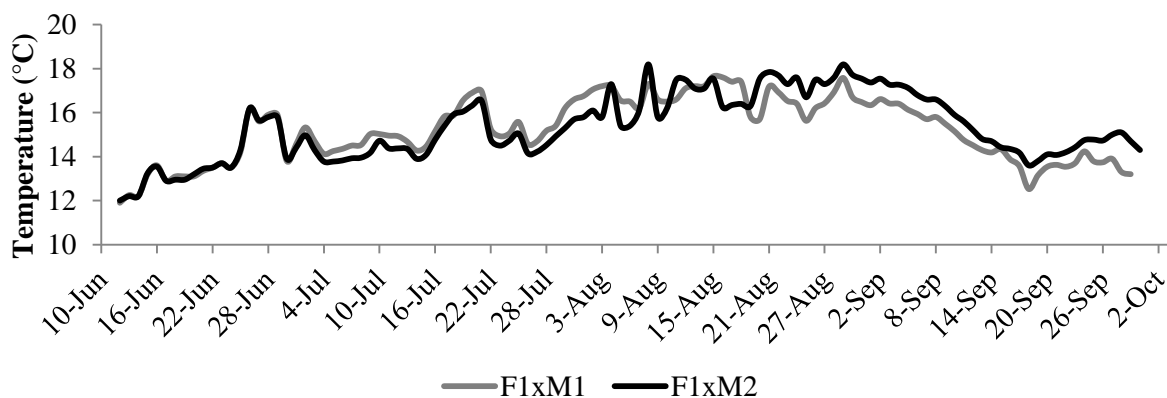


Figure 8: Mean water temperature (°C) of rearing tanks holding Birthday Rapids sturgeon from incubation (June 2014) to the fall fingerling stocking event (October 2014).

By the end of September fingerlings had an overall mean total length of 89 mm (range: 59 to 112 mm) and mean body mass of 2.87 g (range: 0.83 to 5.0 g). Mean size of the M2 family was smaller than the M1 family group throughout production (Figure 16).

Overall size of the Birthday Rapids sturgeon were smaller than the Burntwood River sturgeon at the same age a year earlier. Temperature may have been a contributing factor as the mean temperature between July 1 and October 1 was approximately one degree lower in the 2014 production season than the 2013 production season.

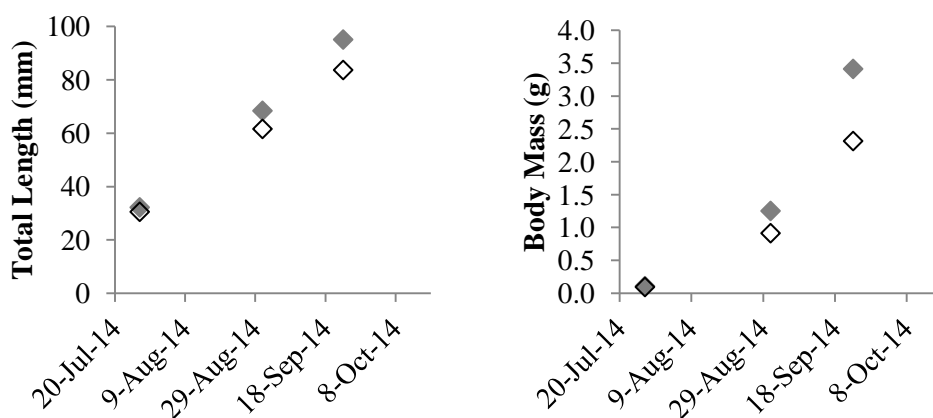


Figure 9: Mean total length (mm) and body mass (g) for Birthday Rapids sturgeon at month end measurements. Values represent 15 individuals randomly selected from each active rearing trough. F1xM1 (shaded), F1xM2 (open).

Water quality in every active tank was assessed weekly from June 23 to September 30 (Table A1-5). All mean values were within acceptable limits (including NO₂-N, < 0.05 mg/L), with the exception of NH₃-N (M1: 0.16 mg/L, M2: 0.17 mg/L) which was above the suggested threshold of 0.01 (Table A1-6) and discussed further in section 5.0.

Tissue samples (pectoral fin) were collected from a total of 35 Birthday Rapids sturgeon, including the M1 (n = 20) and M2 (n = 15) families, on Aug 29 and sent to Dr. Sharon Clouthier's lab to test for Numao virus. All samples tested negative by Numao virus qPCR and fish were cleared by the local fish health officer for stocking.

4.5 FALL FINGERLING STOCKING (2014)

A total of 4,656 Birthday Rapids fingerlings were transported by GRFH staff to Gull Lake at the end of September (Table A2-1) using the transport tank trailer (Figure 10). Three sites were selected based on capture of wild juveniles during past studies conducted by North South

Consultants. Half of the fish were released on September 25 and divided between Site (3) and Site (4) and half were released at Site (3) on September 27 (Figure 12).

It should be noted that there was some confusion in the field and Lake Sturgeon were released much closer to shore than was planned. To avoid similar misunderstandings in the future, a GPS unit with specific release site coordinates and a water depth reader will be provided to field teams involved in stocking events.

5.0 PRODUCTION AND STOCKING ACTIVITIES IN 2014/15

A total of 896 Birthday Rapids Lake Sturgeon fingerlings were retained for the 2014/15 winter. Fish will be released as yearlings in the spring of 2015, pending virus test results. Stocking sites have yet to be determined.

Lake Sturgeon will be reared in recirculated well water throughout the winter. To address the high ammonia-nitrogen levels observed at GRFH, larger volumes of biofilter media will be placed in water recirculation systems and seeded with bacteria (Bacta-Pur® N3000, Fish Farm Supply, Elmira, ON).

Feeding strategy will also be assessed over the winter to determine if the current regime (i.e., two daily feedings) is maximizing growth. Studies will compare two versus four daily feedings at suggested daily rates (i.e., % body mass).

In collaboration with North South Consultants, Lake Sturgeon brood stock capture and gamete collection will take place at Burntwood River during spring 2015.

6.0 REFERENCES

Genz, J., McDougall, C.A., Burnett, D., Arcinas, L., Khetoo, S. and Anderson, W.G. 2014. Induced spawning of wild-caught adult Lake Sturgeon: assessment of hormonal and stress responses, gamete quality, and survival. *Journal of Applied Ichthyology* 30, 1565-1577.

HDR. 2014. Grand Rapids Fish Hatchery: Phase 1 – Hatchery Upgrade Study. A report prepared by HDR Corporation for Manitoba Hydro, Vancouver, BC. # 218211

APPENDICES

APPENDIX 1: WATER QUALITY

Table A1-1:	Mean (\pm SD), minimum and maximum Dissolved Oxygen ¹ (mg/L) levels for Burntwood River Lake Sturgeon (2013 year-class) reared at Grand Rapids Fish Hatchery.	38
Table A1-2:	Mean (\pm SD), minimum and maximum Dissolved Carbon Dioxide ¹ (mg/L) levels for Burntwood River Lake Sturgeon (2013 year-class) reared at Grand Rapids Fish Hatchery.....	39
Table A1-3:	Mean (\pm SD), minimum and maximum pH ¹ values for Burntwood River Lake Sturgeon (2013 year-class) reared at Grand Rapids Fish Hatchery.	40
Table A1-4:	Mean (\pm SD), minimum and maximum Ammonia-Nitrogen 1 (mg/L) levels for Burntwood River Lake Sturgeon (2013 year-class) reared at Grand Rapids Fish Hatchery.	41
Table A1-5:	Mean (\pm SD), minimum and maximum Dissolved Oxygen (mg/L), Dissolved Carbon Dioxide (mg/L), pH and Ammonia-Nitrogen (mg/L) values for Birthday Rapids Lake Sturgeon (2014 year-class) reared at Grand Rapids Fish Hatchery.	42
Table A1-6:	Reported Lake Sturgeon threshold values for Dissolved Oxygen, Dissolved Carbon Dioxide, pH, Ammonia-Nitrogen and Nitrite Nitrogen.	43

Table A1-1: Mean (\pm SD), minimum and maximum Dissolved Oxygen¹ (mg/L) levels for Burntwood River Lake Sturgeon (2013 year-class) reared at Grand Rapids Fish Hatchery.

Production Period	Month	F2xM1					F2xM2/M3				
		N2	Mean	SD3	Min	Max	N	Mean	SD	Min	Max
First Summer	Jun-13	1	8.6				1	8.6			
	Jul-13	2	8.48	0.74	7.96	9	2	8.48	0.74	7.96	9
	Aug-13	3	7.82	1.11	6.55	8.6	3	7.82	1.11	6.55	8.6
	Sep-13	5	7.01	0.86	5.82	8.14	5	7.01	0.86	5.82	8.14
	Total	11	7.64	1.02	5.82	9	11	7.64	1.02	5.82	9
Over Winter	Oct-13	4	8.48	1.7	6.62	10.11	4	7.97	1.37	6.46	9.54
	Nov-13	4	7.29	1.7	5.22	8.75	4	7.16	1.4	5.85	9.15
	Dec-13	5	8.77	0.9	7.44	9.6	6	8.59	0.69	7.5	9.6
	Jan-14	4	7.88	0.12	7.71	7.97	7	7.01	0.38	6.54	7.67
	Feb-14	4	7.5	0.42	7.21	8.12	11	7.11	0.35	6.62	7.8
	Mar-14	5	7.23	1.02	6.26	8.97	15	7.08	0.72	6.4	8.63
	Apr-14	4	8.11	0.81	7.25	8.86	12	7.62	0.49	6.84	8.2
	May-14	4	8.75	0.7	7.73	9.33	12	8.44	0.62	7.29	9.56
	Total	34	8	1.11	5.22	10.11	71	7.58	0.89	5.85	9.6
Second Summer	Jun-14						5	9.26	1.22	7.78	10.98
	Jul-14						4	8.71	0.25	8.35	8.93
	Aug-14			stocked			9	9.52	1.13	8.38	11.51
	Sep-14						12	8.34	0.96	7.64	10.75
	Total						30	8.9	1.09	7.64	11.51
Overall	Total		7.91	1.09	5.22	10.11	112	7.94	1.11	5.82	11.51
1. Exstik II DO600, Extech Instruments, Nashua, New Hampshire 2. Number of water samples analyzed 3. Standard Deviation											

Table A1-2: Mean (\pm SD), minimum and maximum Dissolved Carbon Dioxide¹ (mg/L) levels for Burntwood River Lake Sturgeon (2013 year-class) reared at Grand Rapids Fish Hatchery.

Production		F2xM1					F2xM2/M3				
Period	Month	N2	Mean	SD3	Min	Max	N	Mean	SD	Min	Max
First Summer	Jun-13	1	4				1	4			
	Jul-13	2	2.5	0.71	2	3	2	2.5	0.71	2	3
	Aug-13	3	2.67	0.58	2	3	3	2.67	0.58	2	3
	Sep-13	5	2.4	1.14	1	4	5	2.4	1.14	1	4
	Total	11	2.64	0.92	1	4	11	2.64	0.92	1	4
Over Winter	Oct-13	4	2.75	0.5	2	3	4	2.25	0.96	1	3
	Nov-13	3	3.67	2.08	2	6	3	4.33	1.53	3	6
	Dec-13	5	3.2	0.45	3	4	5	3	0	3	3
	Jan-14	4	2.75	0.5	2	3	7	3.14	0.38	3	4
	Feb-14	4	3.25	0.5	3	4	11	3.59	0.49	3	4
	Mar-14	5	3	0	3	3	15	3.87	0.35	3	4
	Apr-14	4	3	0	3	3	12	3.67	0.49	3	4
	May-14	4	3.75	0.96	3	5	12	4.5	0.67	4	6
	Total	33	3.15	0.76	2	6	69	3.69	0.79	1	6
Second Summer	Jun-14						5	1.8	0.45	1	2
	Jul-14						4	2.13	0.25	2	2.5
	Aug-14			stocked			9	1.45	0.88	0.02	3
	Sep-14						12	1.5	0.52	1	2
	Total						30	1.62	0.64	0.02	3
Overall		Total	3.02	0.82	1	6	112	3.02	1.19	0.02	6

1. 1 GO2P CO2 Portable, Oxygaurd International, Farum, Denmark
2. Number of water samples analyzed
3. Standard Deviation

Table A1-3: Mean (\pm SD), minimum and maximum pH¹ values for Burntwood River Lake Sturgeon (2013 year-class) reared at Grand Rapids Fish Hatchery.

Production Period	Month	F2xM1					F2xM2/M3				
		N2	Mean	SD3	Min	Max	N	Mean	SD	Min	Max
First Summer	Jun-13	1	8.64				1	8.64			
	Jul-13	2	8.39	0.16	8.27	8.5	2	8.39	0.16	8.27	8.5
	Aug-13	3	8.45	0.06	8.38	8.5	3	8.45	0.06	8.38	8.5
	Sep-13	5	8.64	0.12	8.5	8.77	5	8.64	0.12	8.5	8.77
	Total	11	8.54	0.15	8.27	8.77	11	8.54	0.15	8.27	8.77
Over Winter	Oct-13	4	8.84	0.06	8.78	8.91	4	8.81	0.09	8.7	8.91
	Nov-13	3	8.82	0.02	8.81	8.84	3	8.72	0.08	8.64	8.79
	Dec-13	5	8.47	0.42	8	8.8	5	8.47	0.43	8	8.82
	Jan-14	4	8.79	0.04	8.73	8.82	7	8.73	0.03	8.7	8.79
	Feb-14	4	8.8	0.07	8.7	8.86	11	8.74	0.07	8.59	8.81
	Mar-14	5	8.86	0.06	8.8	8.94	15	8.78	0.06	8.71	8.87
	Apr-14	4	8.85	0.08	8.75	8.92	12	8.76	0.08	8.63	8.87
	May-14	4	9.1	0.31	8.93	9.56	12	9.05	0.33	8.83	9.79
	Total	33	8.81	0.25	8	9.56	69	8.79	0.23	8	9.79
Second Summer	Jun-14						5	8.54	0.42	8.18	9.13
	Jul-14						4	8.25	0.07	8.16	8.3
	Aug-14			stocked			9	8.48	0.3	7.76	8.79
	Sep-14						12	8.39	0.2	8.05	8.65
	Total						30	0.22	.06	.08	.34
Overall	Total		8.74	0.25	8	9.56	112	8.66	0.28	7.76	9.79
1. HI98128, Hana Instruments, Woonsocket, Rhode Island 2. Number of water samples analyzed 3. Standard Deviation											

Table A1-4: Mean (\pm SD), minimum and maximum Ammonia-Nitrogen 1 (mg/L) levels for Burntwood River Lake Sturgeon (2013 year-class) reared at Grand Rapids Fish Hatchery.

Production Period	Month	F2xM1					F2xM2/M3				
		N ²	Mean	SD ³	Min	Max	N	Mean	SD	Min	Max
First Summer	Jun-13	1	0.03				1	0.03			
	Jul-13	2	0.03	0.04	0	0.06	2	0.03	0.04	0	0.06
	Aug-13	3	0.03	0.05	0	0.08	3	0.03	0.05	0	0.08
	Sep-13	5	0.09	0.1	0	0.21	5	0.09	0.1	0	0.21
	Total	11	0.05	0.07	0	0.21	11	0.05	0.07	0	0.21
Over Winter	Oct-13	5	0.15	0.07	0.08	0.24	5	0.17	0.07	0.08	0.27
	Nov-13	3	0.16	0.13	0.08	0.31	3	0.2	0.08	0.15	0.29
	Dec-13	5	0.16	0.04	0.1	0.19	5	0.2	0.04	0.14	0.24
	Jan-14	4	0.19	0.08	0.12	0.31	7	0.2	0.07	0.13	0.32
	Feb-14	4	0.16	0.06	0.07	0.22	11	0.21	0.11	0	0.38
	Mar-14	5	0.24	0.05	0.19	0.31	15	0.32	0.04	0.22	0.41
	Apr-14	4	0.19	0.06	0.11	0.25	12	0.33	0.07	0.23	0.51
	May-14	4	0.21	0.14	0	0.31	12	0.19	0.08	0.09	0.31
	Total	34	0.18	0.08	0	0.31	70	0.25	0.09	0	0.51
Second Summer	Jun-14	stocked					5	0.19	0.08	0.08	0.3
	Jul-14						4	0.25	0.03	0.22	0.29
	Aug-14						9	0.23	0.07	0.15	0.34
	Sep-14						12	0.21	0.04	0.14	0.27
	Total						30	0.22	0.06	0.08	0.34
Overall	Total	Total	0.15	0.09	0	0.31	112	0.22	0.1	0	0.51

1. HI96700C Low Range Portable Photometer, Hanna Instruments, Woonsocket, Rhode Island
2. Number of water samples analyzed
3. Standard Deviation

Table A1-5: Mean (\pm SD), minimum and maximum Dissolved Oxygen (mg/L), Dissolved Carbon Dioxide (mg/L), pH and Ammonia-Nitrogen (mg/L) values for Birthday Rapids Lake Sturgeon (2014 year-class) reared at Grand Rapids Fish Hatchery.

Parameter	Month	F1xM1			F1xM2						
		N ¹	Mean	SD ²	Min	Max	N	Mean	SD	Min	Max
Dissolved O₂ (mg/L)	Jun-14	4	9.05	0.27	8.77	9.35	4	8.91	0.18	8.78	9.18
	Jul-14	16	8.92	0.42	8.13	9.74	14	9.08	0.32	8.56	9.61
	Aug-14	14	10.12	0.93	8.85	11.58	7	9.16	0.83	8.1	10.12
	Sep-14	26	8.62	1.05	7.33	10.44	17	8.81	1.09	7.73	11.17
	Total	60	9.08	1.03	7.33	11.58	42	8.97	0.79	7.73	11.17
Dissolved CO₂ (mg/L)	Jun-14	4	2	0	2	2	4	2.25	0.5	2	3
	Jul-14	16	2.31	0.48	2	3	14	2.57	0.51	2	3
	Aug-14	14	2.29	0.47	2	3	7	1.71	0.49	1	2
	Sep-14	26	1.77	0.65	1	3	17	1.29	0.47	1	2
	Total	60	2.05	0.59	1	3	42	1.88	0.74	1	3
pH	Jun-14	4	8.5	0.08	8.42	8.59	4	8.47	0.09	8.36	8.56
	Jul-14	16	8.56	0.06	8.46	8.64	14	8.52	0.08	8.4	8.63
	Aug-14	14	8.51	0.06	8.41	8.6	7	8.61	0.13	8.39	8.73
	Sep-14	26	8.46	0.19	8.18	8.77	17	8.52	0.16	8.25	8.73
	Total	60	8.5	0.14	8.18	8.77	42	8.53	0.13	8.25	8.73
Ammonia NH₃-N (mg/L)	Jun-14	4	0.16	0.08	0.08	0.24	4	0.13	0.03	0.09	0.16
	Jul-14	16	0.09	0.07	0	0.22	14	0.13	0.1	0.03	0.4
	Aug-14	14	0.17	0.08	0.05	0.27	7	0.27	0.14	0.08	0.46
	Sep-14	26	0.2	0.04	0.14	0.28	17	0.18	0.04	0.1	0.23
	Total	60	0.16	0.08	0	0.28	42	0.17	0.1	0.03	0.46
1. Number of water samples analyzed 2. Standard Deviation											

Table A1-6: Reported Lake Sturgeon threshold values for Dissolved Oxygen, Dissolved Carbon Dioxide, pH, Ammonia-Nitrogen and Nitrite Nitrogen.

Parameter	Threshold Values	References
Dissolved O₂ (mg/L)	> 6.0	Hochleithner and Gessner 2012
	> 4.0	Chebanov and Galich 2011
	> 5.0	Mims et al 2002
	> 6.0	Dettlaff et al 1993
Dissolved CO₂ (mg/L)	< 10.0	Hochleithner and Gessner 2012
	< 10.0	Chebanov and Galich 2011
pH	6.5 to 8.0	Hochleithner and Gessner 2012
	6.5 to 7.5	Chebanov and Galich 2011
	6.5 to 8.5	Mims et al 2002
	6.5 to 8.0	Dettlaff et al 1993
Ammonia NH₃-N (mg/L)	< 0.01	Hochleithner and Gessner 2012
	< 0.003	Chebanov and Galich 2011
	< 0.01	Mims et al 2002
Nitrite Nitrogen (mg/L)	0.1 to 0.2	Chebanov and Galich 2011
	< 0.1	Mims et al 2002

Hochleithner, M. and Gessner, J. 2012. *The sturgeons and paddleshishes of the world: biology and aquaculture 3rd edition*. Aqua Tech Publications, Kitzbuehel, Austria, 248 pp.

Chebanov, M.S.C. and Galich, E.V. *Sturgeon hatchery manual*. 2011. FAO Fisheries and Aquaculture Technical Paper. No. 558. Ankara, FAO, 303 p.

Mims, S.D. Lazur, A., Shelton, W.L., Gomelsky, B. and Chapman, F. 2002. *Species profile: production of sturgeon*. Southern Regional Aquaculture Centre Publication No. 7200. 8 pp.

Dettlaff, T.A., Ginsburg, A.S. and Schmalhausen, O.I. 1993. *Sturgeon fishes: developmental biology and aquaculture*. Springer-Verlag, New York, 300 pp.

APPENDIX 2: LAKE STURGEON STOCKING

Table A2-1:	Lake Sturgeon stocking summary for the Keeyask Hydropower Limited Partnership in 2014.....	45
Table A2-2:	Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.	46
Table A2-3:	Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.	55

Table A2-1: Lake Sturgeon stocking summary for the Keeyask Hydropower Limited Partnership in 2014.

Lot ID	Source River	Family	Date	Number	Age	Location
2013 Year-class						
LKST-13-BWR	Burntwood River	F2 x M1	30-May-14	12	11 months	Burntwood River
LKST-13-BWR	Burntwood River	F2 x M2/M3	30-May-14	138	11 months	Burntwood River
LKST-13-BWR	Burntwood River	F2 x M1	31-May-14	12	11 months	Burntwood River
LKST-13-BWR	Burntwood River	F2 x M2/M3	31-May-14	138	11 months	Burntwood River
Burntwood River (Yearlings) = 300						
LKST-13-BWR	Burntwood River	F2xM2/M3	2-Oct-14	295	13 months	Burntwood River
Burntwood River (Yearlings) = 295						
2014 Year-class						
LKST-14-BDR	Birthday Rapids	F1XM2	29-Jul-14	78,850	1 month	Birthday Rapids
LKST-14-BDR	Birthday Rapids	F1XM1	29-Jul-14	74,076	1 month	Birthday Rapids
Birthday Rapids (Larvae) = 152,926						
LKST-14-BDR	Birthday Rapids	F1XM1	25-Sep-14	1,649	3 months	Gull Lake
LKST-14-BDR	Birthday Rapids	F1XM2	25-Sep-14	508	3 months	Gull Lake
LKST-14-BDR	Birthday Rapids	F1XM1	27-Sep-14	1,598	3 months	Gull Lake
LKST-14-BDR	Birthday Rapids	F1XM2	27-Sep-14	901	3 months	Gull Lake
Gull Lake (Fingerlings) = 4,656						

Table A2-2: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119800	F2xM2/M3	16-May-14	166	182	29.09	30-May-14	1
900043000119804	F2xM2/M3	16-May-14	202	231	53.1	30-May-14	1
900043000119805	F2xM2/M3	16-May-14	246	281	86.2	30-May-14	1
900043000119806	F2xM2/M3	16-May-14	225	257	68.82	30-May-14	1
900043000119811	F2xM2/M3	16-May-14	215	246	61.7	30-May-14	1
900043000119813	F2xM2/M3	16-May-14	210	237	63.55	30-May-14	1
900043000119814	F2xM2/M3	16-May	205	29-Jul	29-Feb	30-May-14	1
900043000119817	F2xM2/M3	16-May-14	241	277	90.69	30-May-14	1
900043000119822	F2xM2/M3	16-May-14	195	225	45.82	30-May-14	1
900043000119825	F2xM2/M3	16-May-14	143	277	83.08	30-May-14	1
900043000119829	F2xM2/M3	16-May-14	241	277	81.05	30-May-14	1
900043000119839	F2xM2/M3	16-May-14	205	235	47.63	30-May-14	1
900043000119846	F2xM2/M3	16-May	191	8-Aug	6-Feb	30-May-14	1
900043000119850	F2xM2/M3	16-May-14	235	266	81.86	30-May-14	1
900043000119852	F2xM2/M3	16-May-14	224	258	61.02	30-May-14	1
900043000119856	F2xM2/M3	16-May-14	249	285	92.53	30-May-14	1
900043000119870	F2xM2/M3	16-May-14	213	245	62.85	30-May-14	1
900043000119874	F2xM2/M3	16-May-14	197	226	43	30-May-14	1
900043000119875	F2xM2/M3	16-May-14	228	264	75.64	30-May-14	1
900043000119879	F2xM2/M3	16-May-14	200	232	50.82	30-May-14	1
900043000119883	F2xM2/M3	16-May-14	237	270	79.06	30-May-14	1
900043000119886	F2xM2/M3	16-May-14	170	196	29.9	30-May-14	1
900043000119888	F2xM2/M3	16-May-14	185	211	37.74	30-May-14	1
900043000119892	F2xM2/M3	16-May-14	214	240	54.64	30-May-14	1
900043000119896	F2xM2/M3	16-May-14	244	280	81.27	30-May-14	1
900043000119908	F2xM2/M3	16-May-14	208	235	51.63	30-May-14	1
900043000119912	F2xM2/M3	16-May-14	176	206	33.34	30-May-14	1
900043000119915	F2xM2/M3	16-May-14	215	246	63.38	30-May-14	1
900043000119916	F2xM2/M3	16-May-14	221	255	64.56	30-May-14	1
900043000119927	F2xM2/M3	16-May-14	198	230	45.5	30-May-14	1
900043000119929	F2xM2/M3	16-May-14	185	209	36	30-May-14	1
900043000119934	F2xM2/M3	16-May-14	192	218	47.22	30-May-14	1
900043000119935	F2xM2/M3	16-May-14	241	275	86.14	30-May-14	1
900043000119947	F2xM2/M3	16-May-14	208	238	51.48	30-May-14	1

Table A2-2: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119948	F2xM2/M3	16-May-14	210	241	56.66	30-May-14	1
900043000119952	F2xM2/M3	16-May-14	198	229	46.03	30-May-14	1
900043000119956	F2xM2/M3	16-May-14	215	246	53.16	30-May-14	1
900043000119957	F2xM2/M3	16-May-14	206	231	48.38	30-May-14	1
900043000119961	F2xM2/M3	16-May-14	195	224	40.56	30-May-14	1
900043000119970	F2xM2/M3	16-May-14	220	248	60.88	30-May-14	1
900043000119977	F2xM2/M3	16-May-14	235	266	80.06	30-May-14	1
900043000119984	F2xM2/M3	16-May-14	220	252	61.48	30-May-14	1
900043000119987	F2xM2/M3	16-May-14	228	261	70.5	30-May-14	1
900043000119993	F2xM2/M3	16-May-14	225	256	64.67	30-May-14	1
900043000119995	F2xM2/M3	16-May-14	208	240	55.59	30-May-14	1
982000362084789	F2xM1	16-May-14	250	297	93.36	30-May-14	1
982000362084866	F2xM1	16-May-14	233	278	88.92	30-May-14	1
982000362432269	F2xM1	16-May-14	208	240	62.24	30-May-14	1
900043000119799	F2xM2/M3	16-May-14	220	246	62.66	30-May-14	2
900043000119802	F2xM2/M3	16-May-14	212	236	54.34	30-May-14	2
900043000119803	F2xM2/M3	16-May-14	246	285	92.85	30-May-14	2
900043000119807	F2xM2/M3	16-May-14	211	245	50.5	30-May-14	2
900043000119810	F2xM2/M3	16-May-14	237	265	78.92	30-May-14	2
900043000119815	F2xM2/M3	16-May-14	235	272	83.86	30-May-14	2
900043000119819	F2xM2/M3	16-May-14	242	272	78.24	30-May-14	2
900043000119820	F2xM2/M3	16-May-14	190	216	40.34	30-May-14	2
900043000119830	F2xM2/M3	16-May-14	214	245	55.65	30-May-14	2
900043000119831	F2xM2/M3	16-May-14	175	201	31.24	30-May-14	2
900043000119832	F2xM2/M3	16-May-14	238	274	86.72	30-May-14	2
900043000119834	F2xM2/M3	16-May-14	215	252	60.81	30-May-14	2
900043000119835	F2xM2/M3	16-May-14	210	241	58.28	30-May-14	2
900043000119836	F2xM2/M3	16-May-14	211	242	53.72	30-May-14	2
900043000119838	F2xM2/M3	16-May-14	218	248	60.12	30-May-14	2
900043000119841	F2xM2/M3	16-May-14	215	246	60.73	30-May-14	2
900043000119843	F2xM2/M3	16-May-14	200	230	43.76	30-May-14	2
900043000119845	F2xM2/M3	16-May-14	196	225	39.12	30-May-14	2
900043000119848	F2xM2/M3	16-May-14	198	233	43.02	30-May-14	2
900043000119849	F2xM2/M3	16-May-14	170	192	23.39	30-May-14	2

Table A2-2: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119851	F2xM2/M3	16-May-14	227	262	72.2	30-May-14	2
900043000119853	F2xM2/M3	16-May-14	209	241	50.79	30-May-14	2
900043000119854	F2xM2/M3	16-May-14	190	220	42.22	30-May-14	2
900043000119858	F2xM2/M3	16-May-14	175	204	33.98	30-May-14	2
900043000119859	F2xM2/M3	16-May-14	232	263	75.55	30-May-14	2
900043000119860	F2xM2/M3	16-May-14	243	274	85.38	30-May-14	2
900043000119863	F2xM2/M3	16-May-14	226	257	71.22	30-May-14	2
900043000119864	F2xM2/M3	16-May-14	211	238	58.9	30-May-14	2
900043000119865	F2xM2/M3	16-May-14	181	210	42.6	30-May-14	2
900043000119866	F2xM2/M3	16-May-14	236	263	73.63	30-May-14	2
900043000119872	F2xM2/M3	16-May-14	205	231	45.23	30-May-14	2
900043000119876	F2xM2/M3	16-May-14	224	254	60	30-May-14	2
900043000119877	F2xM2/M3	16-May-14	201	234	45.31	30-May-14	2
900043000119878	F2xM2/M3	16-May-14	208	236	51.31	30-May-14	2
900043000119880	F2xM2/M3	16-May-14	228	257	74.06	30-May-14	2
900043000119889	F2xM2/M3	16-May-14	220	250	57	30-May-14	2
900043000119893	F2xM2/M3	16-May-14	215	245	58.4	30-May-14	2
900043000119895	F2xM2/M3	16-May-14	217	253	59.69	30-May-14	2
900043000119897	F2xM2/M3	16-May-14	168	196	28.9	30-May-14	2
900043000119902	F2xM2/M3	16-May-14	195	222	39.18	30-May-14	2
900043000119903	F2xM2/M3	16-May-14	230	264	75.84	30-May-14	2
900043000119905	F2xM2/M3	16-May-14	172	203	30.5	30-May-14	2
900043000119906	F2xM2/M3	16-May-14	200	225	42.12	30-May-14	2
900043000119907	F2xM2/M3	16-May-14	241	282	80.82	30-May-14	2
900043000119909	F2xM2/M3	16-May-14	235	264	74.81	30-May-14	2
900043000119910	F2xM2/M3	16-May-14	195	222	32.46	30-May-14	2
900043000119913	F2xM2/M3	16-May-14	161	178	24.24	30-May-14	2
900043000119914	F2xM2/M3	16-May-14	174	201	29.14	30-May-14	2
900043000119920	F2xM2/M3	16-May-14	206	239	59.87	30-May-14	2
900043000119921	F2xM2/M3	16-May-14	235	271	79.1	30-May-14	2
900043000119923	F2xM2/M3	16-May-14	200	229	55.68	30-May-14	2
900043000119925	F2xM2/M3	16-May-14	227	262	64.42	30-May-14	2
900043000119931	F2xM2/M3	16-May-14	215	247	51.3	30-May-14	2
900043000119932	F2xM2/M3	16-May-14	234	267	78.4	30-May-14	2

Table A2-2: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119937	F2xM2/M3	16-May-14	187	215	39.28	30-May-14	2
900043000119939	F2xM2/M3	16-May-14	219	248	67.06	30-May-14	2
900043000119940	F2xM2/M3	16-May-14	208	237	62.36	30-May-14	2
900043000119941	F2xM2/M3	16-May-14	239	271	82.58	30-May-14	2
900043000119942	F2xM2/M3	16-May-14	225	262	62.09	30-May-14	2
900043000119943	F2xM2/M3	16-May-14	235	268	82	30-May-14	2
900043000119944	F2xM2/M3	16-May-14	172	195	27.2	30-May-14	2
900043000119945	F2xM2/M3	16-May-14	201	233	45.55	30-May-14	2
900043000119946	F2xM2/M3	16-May-14	217	250	66.26	30-May-14	2
900043000119950	F2xM2/M3	16-May-14	231	269	83.3	30-May-14	2
900043000119951	F2xM2/M3	16-May-14	219	247	60.61	30-May-14	2
900043000119955	F2xM2/M3	16-May-14	209	237	52.49	30-May-14	2
900043000119958	F2xM2/M3	16-May-14	208	234	52.42	30-May-14	2
900043000119959	F2xM2/M3	16-May-14	226	257	66.69	30-May-14	2
900043000119960	F2xM2/M3	16-May-14	208	236	54.78	30-May-14	2
900043000119962	F2xM2/M3	16-May-14	229	258	70.32	30-May-14	2
900043000119963	F2xM2/M3	16-May-14	222	255	70.72	30-May-14	2
900043000119965	F2xM2/M3	16-May-14	222	248	66.72	30-May-14	2
900043000119968	F2xM2/M3	16-May-14	202	230	42.55	30-May-14	2
900043000119971	F2xM2/M3	16-May-14	215	242	59.48	30-May-14	2
900043000119972	F2xM2/M3	16-May-14	215	246	62.09	30-May-14	2
900043000119973	F2xM2/M3	16-May-14	225	260	67.76	30-May-14	2
900043000119976	F2xM2/M3	16-May-14	210	242	52.62	30-May-14	2
900043000119979	F2xM2/M3	16-May-14	195	222	46.37	30-May-14	2
900043000119980	F2xM2/M3	16-May-14	196	224	49.14	30-May-14	2
900043000119982	F2xM2/M3	16-May-14	234	261	75.56	30-May-14	2
900043000119985	F2xM2/M3	16-May-14	205	242	59.96	30-May-14	2
900043000119986	F2xM2/M3	16-May-14	195	219	42.94	30-May-14	2
900043000119991	F2xM2/M3	16-May-14	234	267	82.22	30-May-14	2
900043000119992	F2xM2/M3	16-May-14	202	228	53.09	30-May-14	2
900043000119996	F2xM2/M3	16-May-14	208	237	53.34	30-May-14	2
900043000119997	F2xM2/M3	16-May-14	181	199	37.9	30-May-14	2
982000362084842	F2xM1	16-May-14	224	266	68.68	30-May-14	2
982000362084865	F2xM1	16-May-14	260	303	104.8	30-May-14	2

Table A2-2: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
982000362432207	F2xM1	16-May-14	238	276	79.18	30-May-14	2
982000362432213	F2xM1	16-May-14	275	312	117.23	30-May-14	2
982000362432227	F2xM1	16-May-14	168	190	26.03	30-May-14	2
982000362432230	F2xM1	16-May-14	248	285	86.79	30-May-14	2
982000362432255	F2xM1	16-May-14	212	244	56.8	30-May-14	2
982000362432262	F2xM1	16-May-14	217	253	54.44	30-May-14	2
982000362432273	F2xM1	16-May-14	248	285	92.08	30-May-14	2
*	F2xM2/M3	16-May-14	79	89	2.99	30-May-14	-
*	F2xM2/M3	16-May-14	116	131	8.43	30-May-14	-
*	F2xM2/M3	16-May-14	124	141	10.39	30-May-14	-
*	F2xM2/M3	16-May-14	105	120	6.3	30-May-14	-
*	F2xM2/M3	16-May-14	100	116	6.6	30-May-14	-
*	F2xM2/M3	16-May-14	119	135	9.89	30-May-14	-
*	F2xM2/M3	16-May-14	135	160	16.42	30-May-14	-
900043000119399	F2xM2/M3	16-May-14	228	250	70.3	31-May-14	3
900043000119400	F2xM2/M3	16-May-14	243	274	80.28	31-May-14	3
900043000119403	F2xM2/M3	16-May-14	216	251	55.15	31-May-14	3
900043000119405	F2xM2/M3	16-May-14	191	212	38.57	31-May-14	3
900043000119410	F2xM2/M3	16-May-14	226	256	69.69	31-May-14	3
900043000119411	F2xM2/M3	16-May-14	233	264	69.27	31-May-14	3
900043000119412	F2xM2/M3	16-May-14	151	171	19.66	31-May-14	3
900043000119415	F2xM2/M3	16-May-14	192	216	46.83	31-May-14	3
900043000119421	F2xM2/M3	16-May-14	216	247	61.83	31-May-14	3
900043000119426	F2xM2/M3	16-May-14	194	222	45.29	31-May-14	3
900043000119428	F2xM2/M3	16-May-14	210	240	48.88	31-May-14	3
900043000119429	F2xM2/M3	16-May-14	212	240	47.68	31-May-14	3
900043000119433	F2xM2/M3	16-May-14	217	240	58.24	31-May-14	3
900043000119437	F2xM2/M3	16-May-14	189	215	35.23	31-May-14	3
900043000119439	F2xM2/M3	16-May-14	175	193	25.72	31-May-14	3
900043000119442	F2xM2/M3	16-May-14	225	255	64.64	31-May-14	3
900043000119444	F2xM2/M3	16-May-14	207	235	52.58	31-May-14	3
900043000119448	F2xM2/M3	16-May-14	220	253	60.74	31-May-14	3
900043000119449	F2xM2/M3	16-May-14	233	260	73.2	31-May-14	3
900043000119452	F2xM2/M3	16-May-14	201	229	44.12	31-May-14	3

Table A2-2: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119453	F2xM2/M3	16-May-14	214	247	65.42	31-May-14	3
900043000119454	F2xM2/M3	16-May-14	192	222	40.72	31-May-14	3
900043000119455	F2xM2/M3	16-May-14	221	247	57.34	31-May-14	3
900043000119457	F2xM2/M3	16-May-14	230	262	69.66	31-May-14	3
900043000119464	F2xM2/M3	16-May-14	217	249	56.02	31-May-14	3
900043000119467	F2xM2/M3	16-May-14	191	219	40.01	31-May-14	3
900043000119471	F2xM2/M3	16-May-14	201	230	44.08	31-May-14	3
900043000119473	F2xM2/M3	16-May-14	201	231	45.14	31-May-14	3
900043000119477	F2xM2/M3	16-May-14	188	215	37.34	31-May-14	3
900043000119484	F2xM2/M3	16-May-14	173	197	27.16	31-May-14	3
900043000119485	F2xM2/M3	16-May-14	163	190	23.69	31-May-14	3
900043000119487	F2xM2/M3	16-May-14	225	255	67.32	31-May-14	3
900043000119491	F2xM2/M3	16-May-14	207	235	46.48	31-May-14	3
900043000119493	F2xM2/M3	16-May-14	193	220	44.52	31-May-14	3
900043000119495	F2xM2/M3	16-May-14	184	210	33.98	31-May-14	3
900043000119500	F2xM2/M3	16-May-14	226	252	73.98	31-May-14	3
900043000119503	F2xM2/M3	16-May-14	222	250	63.36	31-May-14	3
900043000119505	F2xM2/M3	16-May-14	205	237	47.64	31-May-14	3
900043000119510	F2xM2/M3	16-May-14	223	255	58.94	31-May-14	3
900043000119513	F2xM2/M3	16-May-14	200	230	47.1	31-May-14	3
900043000119514	F2xM2/M3	16-May-14	215	244	55.37	31-May-14	3
900043000119517	F2xM2/M3	16-May-14	151	171	21.28	31-May-14	3
900043000119519	F2xM2/M3	16-May-14	218	245	56.53	31-May-14	3
900043000119525	F2xM2/M3	16-May-14	191	222	45.58	31-May-14	3
900043000119526	F2xM2/M3	16-May-14	201	230	46.34	31-May-14	3
900043000119527	F2xM2/M3	16-May-14	200	222	43.48	31-May-14	3
900043000119533	F2xM2/M3	16-May-14	183	209	34.08	31-May-14	3
900043000119539	F2xM2/M3	16-May-14	182	207	37.26	31-May-14	3
900043000119547	F2xM2/M3	16-May-14	226	252	69.69	31-May-14	3
900043000119555	F2xM2/M3	16-May-14	-	-	-	31-May-14	3
900043000119558	F2xM2/M3	16-May-14	195	224	38.32	31-May-14	3
900043000119559	F2xM2/M3	16-May-14	199	225	42.03	31-May-14	3
900043000119562	F2xM2/M3	16-May-14	202	229	44.83	31-May-14	3
900043000119563	F2xM2/M3	16-May-14	170	197	28.99	31-May-14	3

Table A2-2: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119572	F2xM2/M3	16-May-14	202	235	45.32	31-May-14	3
900043000119573	F2xM2/M3	16-May-14	204	235	48.13	31-May-14	3
900043000119574	F2xM2/M3	16-May-14	212	243	59.51	31-May-14	3
900043000119576	F2xM2/M3	16-May-14	224	252	60.98	31-May-14	3
900043000119578	F2xM2/M3	16-May-14	145	179	79.51	31-May-14	3
900043000119580	F2xM2/M3	16-May-14	220	254	61.72	31-May-14	3
900043000119581	F2xM2/M3	16-May-14	222	255	54.42	31-May-14	3
900043000119584	F2xM2/M3	16-May-14	276	310	109.28	31-May-14	3
900043000119586	F2xM2/M3	16-May-14	241	276	81.98	31-May-14	3
900043000119587	F2xM2/M3	16-May-14	201	236	43.61	31-May-14	3
900043000119595	F2xM2/M3	16-May-14	194	226	42.68	31-May-14	3
900043000119596	F2xM2/M3	16-May-14	200	233	40.32	31-May-14	3
900043000119597	F2xM2/M3	16-May-14	207	232	52.83	31-May-14	3
982000362084779	F2xM1	16-May-14	255	294	103.94	31-May-14	3
982000362432225	F2xM1	16-May-14	253	291	87.65	31-May-14	3
982000362432237	F2xM1	16-May-14	210	249	64.11	31-May-14	3
982000362432249	F2xM1	16-May-14	215	248	54	31-May-14	3
982000362432250	F2xM1	16-May-14	255	292	95.95	31-May-14	3
982000362432257	F2xM1	16-May-14	266	312	116.67	31-May-14	3
982000362432264	F2xM1	16-May-14	260	296	110.32	31-May-14	3
982000362432289	F2xM1	16-May-14	230	257	68.67	31-May-14	3
982000362432311	F2xM1	16-May-14	268	307	116.26	31-May-14	3
900043000119402	F2xM2/M3	16-May-14	194	220	37.02	31-May-14	4
900043000119404	F2xM2/M3	16-May-14	230	263	73.58	31-May-14	4
900043000119413	F2xM2/M3	16-May-14	217	246	59.82	31-May-14	4
900043000119416	F2xM2/M3	16-May-14	220	252	63.38	31-May-14	4
900043000119417	F2xM2/M3	16-May-14	240	274	64.68	31-May-14	4
900043000119418	F2xM2/M3	16-May-14	223	250	58.41	31-May-14	4
900043000119423	F2xM2/M3	16-May-14	171	195	27.82	31-May-14	4
900043000119424	F2xM2/M3	16-May-14	248	278	85.48	31-May-14	4
900043000119427	F2xM2/M3	16-May-14	217	248	55.32	31-May-14	4
900043000119434	F2xM2/M3	16-May-14	238	274	90.96	31-May-14	4
900043000119436	F2xM2/M3	16-May-14	240	267	76.06	31-May-14	4
900043000119438	F2xM2/M3	16-May-14	150	170	20	31-May-14	4

Table A2-2: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119445	F2xM2/M3	16-May-14	229	256	77.09	31-May-14	4
900043000119456	F2xM2/M3	16-May-14	202	227	52.13	31-May-14	4
900043000119459	F2xM2/M3	16-May-14	237	269	72.83	31-May-14	4
900043000119460	F2xM2/M3	16-May-14	225	252	59.18	31-May-14	4
900043000119462	F2xM2/M3	16-May-14	224	258	16.04	31-May-14	4
900043000119468	F2xM2/M3	16-May-14	224	256	58.42	31-May-14	4
900043000119472	F2xM2/M3	16-May-14	198	224	44.63	31-May-14	4
900043000119476	F2xM2/M3	16-May-14	205	234	43.21	31-May-14	4
900043000119478	F2xM2/M3	16-May-14	242	277	78.62	31-May-14	4
900043000119479	F2xM2/M3	16-May-14	225	257	63.64	31-May-14	4
900043000119480	F2xM2/M3	16-May-14	155	175	19.73	31-May-14	4
900043000119481	F2xM2/M3	16-May-14	206	236	51.28	31-May-14	4
900043000119482	F2xM2/M3	16-May-14	199	222	45.5	31-May-14	4
900043000119488	F2xM2/M3	16-May-14	219	249	51.58	31-May-14	4
900043000119494	F2xM2/M3	16-May-14	211	236	51.13	31-May-14	4
900043000119496	F2xM2/M3	16-May-14	157	177	21.05	31-May-14	4
900043000119499	F2xM2/M3	16-May-14	171	197	26.43	31-May-14	4
900043000119501	F2xM2/M3	16-May-14	204	231	46.45	31-May-14	4
900043000119502	F2xM2/M3	16-May-14	205	235	46.91	31-May-14	4
900043000119504	F2xM2/M3	16-May-14	185	207	34.53	31-May-14	4
900043000119506	F2xM2/M3	16-May-14	141	160	16.36	31-May-14	4
900043000119507	F2xM2/M3	16-May-14	150	170	18.6	31-May-14	4
900043000119508	F2xM2/M3	16-May-14	171	197	27.74	31-May-14	4
900043000119509	F2xM2/M3	16-May-14	208	240	52.26	31-May-14	4
900043000119518	F2xM2/M3	16-May-14	232	261	65.91	31-May-14	4
900043000119521	F2xM2/M3	16-May-14	210	241	46.53	31-May-14	4
900043000119523	F2xM2/M3	16-May-14	194	225	40.81	31-May-14	4
900043000119524	F2xM2/M3	16-May-14	192	217	38.98	31-May-14	4
900043000119528	F2xM2/M3	16-May-14	204	238	48.96	31-May-14	4
900043000119529	F2xM2/M3	16-May-14	181	215	49.31	31-May-14	4
900043000119530	F2xM2/M3	16-May-14	241	276	79.58	31-May-14	4
900043000119532	F2xM2/M3	16-May-14	224	261	68.86	31-May-14	4
900043000119535	F2xM2/M3	16-May-14	233	268	68.3	31-May-14	4
900043000119536	F2xM2/M3	16-May-14	202	236	51.67	31-May-14	4

Table A2-2: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, May 2014. Description of release sites are provided in section 3.5 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119540	F2xM2/M3	16-May-14	208	236	50.67	31-May-14	4
900043000119541	F2xM2/M3	16-May-14	220	247	54.45	31-May-14	4
900043000119542	F2xM2/M3	16-May-14	202	229	43.95	31-May-14	4
900043000119543	F2xM2/M3	16-May-14	219	250	58.89	31-May-14	4
900043000119544	F2xM2/M3	16-May-14	197	225	42.53	31-May-14	4
900043000119545	F2xM2/M3	16-May-14	225	253	62.69	31-May-14	4
900043000119546	F2xM2/M3	16-May-14	152	170	18.23	31-May-14	4
900043000119548	F2xM2/M3	16-May-14	229	263	68.43	31-May-14	4
900043000119550	F2xM2/M3	16-May-14	196	225	43.96	31-May-14	4
900043000119551	F2xM2/M3	16-May-14	147	168	17.49	31-May-14	4
900043000119552	F2xM2/M3	16-May-14	162	185	24.37	31-May-14	4
900043000119553	F2xM2/M3	16-May-14	154	174	20.74	31-May-14	4
900043000119560	F2xM2/M3	16-May-14	204	231	48.06	31-May-14	4
900043000119564	F2xM2/M3	16-May-14	159	183	21.76	31-May-14	4
900043000119565	F2xM2/M3	16-May-14	219	247	57.4	31-May-14	4
900043000119566	F2xM2/M3	16-May-14	215	249	62.25	31-May-14	4
900043000119569	F2xM2/M3	16-May-14	229	259	67.91	31-May-14	4
900043000119577	F2xM2/M3	16-May-14	213	243	59.59	31-May-14	4
900043000119582	F2xM2/M3	16-May-14	142	162	15.42	31-May-14	4
900043000119588	F2xM2/M3	16-May-14	206	238	52.78	31-May-14	4
900043000119589	F2xM2/M3	16-May-14	216	247	56.82	31-May-14	4
900043000119590	F2xM2/M3	16-May-14	202	227	50.6	31-May-14	4
900043000119591	F2xM2/M3	16-May-14	135	156	14.34	31-May-14	4
900043000119594	F2xM2/M3	16-May-14	214	244	54.76	31-May-14	4
982000362084874	F2xM1	16-May-14	270	305	132.14	31-May-14	4
982000362432272	F2xM1	16-May-14	204	234	46.35	31-May-14	4
982000362432300	F2xM1	16-May-14	225	260	65.59	31-May-14	4
**	F2xM2/M3	16-May-14	126	144	10.99	31-May-14	4

* Hatchery-reared Lake Sturgeon not tagged due to insufficient body size (three fish to Site 1, four fish to Site 2).

** Hatchery-reared sturgeon not tagged due to insufficient body size.

Table A2-3: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000102903	F2xM2/M3	19-Sep-14	274	310	130	2-Oct-14	1
900043000102913	F2xM2/M3	20-Sep-14	281	315	129	2-Oct-14	1
900043000102917	F2xM2/M3	20-Sep-14	245	278	87	2-Oct-14	1
900043000102921	F2xM2/M3	21-Sep-14	310	355	195	2-Oct-14	1
900043000102922	F2xM2/M3	19-Sep-14	280	313	140	2-Oct-14	1
900043000102928	F2xM2/M3	21-Sep-14	295	330	181	2-Oct-14	1
900043000102933	F2xM2/M3	21-Sep-14	300	337	175	2-Oct-14	1
900043000102935	F2xM2/M3	21-Sep-14	295	334	163	2-Oct-14	1
900043000102939	F2xM2/M3	20-Sep-14	270	307	101.74	2-Oct-14	1
900043000102943	F2xM2/M3	19-Sep-14	255	287	101.63	2-Oct-14	1
900043000102944	F2xM2/M3	20-Sep	277	321	117	2-Oct	1
900043000102946	F2xM2/M3	21-Sep-14	301	346	193	2-Oct-14	1
900043000102971	F2xM2/M3	20-Sep-14	245	277	112	2-Oct-14	1
900043000102975	F2xM2/M3	19-Sep-14	270	306	112	2-Oct-14	1
900043000102980	F2xM2/M3	21-Sep-14	260	296	95.29	2-Oct-14	1
900043000102982	F2xM2/M3	21-Sep-14	308	348	174	2-Oct-14	1
900043000102985	F2xM2/M3	20-Sep	245	276	78	2-Oct	1
900043000102986	F2xM2/M3	19-Sep-14	255	292	88.3	2-Oct-14	1
900043000102990	F2xM2/M3	20-Sep-14	260	300	97.84	2-Oct-14	1
900043000102991	F2xM2/M3	20-Sep-14	255	292	97	2-Oct-14	1
900043000103109	F2xM2/M3	21-Sep-14	280	318	128	2-Oct-14	1
900043000103123	F2xM2/M3	20-Sep-14	219	244	65.98	2-Oct-14	1
900043000103125	F2xM2/M3	19-Sep-14	271	301	110.62	2-Oct-14	1
900043000103134	F2xM2/M3	21-Sep-14	258	290	112	2-Oct-14	1
900043000103138	F2xM2/M3	21-Sep-14	256	292	87.04	2-Oct-14	1
900043000103141	F2xM2/M3	20-Sep-14	305	349	145	2-Oct-14	1
900043000103150	F2xM2/M3	20-Sep-14	290	330	140	2-Oct-14	1
900043000103158	F2xM2/M3	21-Sep-14	215	240	58.95	2-Oct-14	1
900043000103162	F2xM2/M3	21-Sep-14	280	321	130	2-Oct-14	1
900043000103170	F2xM2/M3	20-Sep-14	272	305	103	2-Oct-14	1
900043000119398	F2xM2/M3	21-Sep-14	282	316	143	2-Oct-14	1
900043000119414	F2xM2/M3	20-Sep-14	260	289	90.5	2-Oct-14	1
900043000119431	F2xM2/M3	21-Sep-14	315	355	125	2-Oct-14	1
900043000119447	F2xM2/M3	19-Sep-14	282	322	150	2-Oct-14	1

Table A2-3: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119465	F2xM2/M3	21-Sep-14	285	320	140	2-Oct-14	1
900043000119466	F2xM2/M3	20-Sep-14	250	286	105	2-Oct-14	1
900043000119474	F2xM2/M3	20-Sep-14	170	195	25.06	2-Oct-14	1
900043000119497	F2xM2/M3	19-Sep-14	230	255	68.08	2-Oct-14	1
900043000119511	F2xM2/M3	20-Sep-14	298	346	145	2-Oct-14	1
900043000119516	F2xM2/M3	19-Sep-14	250	285	82.99	2-Oct-14	1
900043000119537	F2xM2/M3	19-Sep-14	262	295	100.58	2-Oct-14	1
900043000119554	F2xM2/M3	19-Sep-14	265	308	110	2-Oct-14	1
900043000119557	F2xM2/M3	20-Sep-14	260	295	83.08	2-Oct-14	1
900043000119585	F2xM2/M3	20-Sep-14	275	307	107	2-Oct-14	1
900043000119818	F2xM2/M3	19-Sep-14	200	226	51.46	2-Oct-14	1
900043000119842	F2xM2/M3	20-Sep-14	260	293	86.62	2-Oct-14	1
900043000119855	F2xM2/M3	20-Sep-14	195	221	38.58	2-Oct-14	1
900043000119983	F2xM2/M3	20-Sep-14	288	326	133	2-Oct-14	1
900043000102904	F2xM2/M3	20-Sep-14	271	306	120	2-Oct-14	2
900043000102908	F2xM2/M3	20-Sep-14	242	275	72.07	2-Oct-14	2
900043000102910	F2xM2/M3	19-Sep-14	150	166	17.88	2-Oct-14	2
900043000102911	F2xM2/M3	20-Sep-14	200	226	41.7	2-Oct-14	2
900043000102914	F2xM2/M3	20-Sep-14	250	285	81.36	2-Oct-14	2
900043000102925	F2xM2/M3	20-Sep-14	275	311	96.15	2-Oct-14	2
900043000102926	F2xM2/M3	20-Sep-14	270	305	120	2-Oct-14	2
900043000102927	F2xM2/M3	20-Sep-14	285	323	127	2-Oct-14	2
900043000102932	F2xM2/M3	20-Sep-14	216	241	55.32	2-Oct-14	2
900043000102936	F2xM2/M3	19-Sep-14	252	287	85.43	2-Oct-14	2
900043000102945	F2xM2/M3	19-Sep-14	275	311	145	2-Oct-14	2
900043000102949	F2xM2/M3	20-Sep-14	285	325	132	2-Oct-14	2
900043000102950	F2xM2/M3	20-Sep-14	270	315	109.06	2-Oct-14	2
900043000102951	F2xM2/M3	20-Sep-14	226	254	63	2-Oct-14	2
900043000102956	F2xM2/M3	19-Sep-14	260	292	100.03	2-Oct-14	2
900043000102957	F2xM2/M3	19-Sep-14	265	297	105	2-Oct-14	2
900043000102960	F2xM2/M3	20-Sep-14	135	150	11.77	2-Oct-14	2
900043000102964	F2xM2/M3	19-Sep-14	235	265	67.69	2-Oct-14	2
900043000102965	F2xM2/M3	19-Sep-14	225	255	67.51	2-Oct-14	2
900043000102966	F2xM2/M3	20-Sep-14	289	321	112	2-Oct-14	2

Table A2-3: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000102968	F2xM2/M3	20-Sep-14	262	302	118	2-Oct-14	2
900043000102969	F2xM2/M3	20-Sep-14	260	292	94.93	2-Oct-14	2
900043000102976	F2xM2/M3	19-Sep-14	255	287	87.79	2-Oct-14	2
900043000102983	F2xM2/M3	19-Sep-14	285	333	140	2-Oct-14	2
900043000102988	F2xM2/M3	20-Sep-14	305	345	162	2-Oct-14	2
900043000102989	F2xM2/M3	19-Sep-14	281	316	135	2-Oct-14	2
900043000102993	F2xM2/M3	19-Sep-14	260	293	94.62	2-Oct-14	2
900043000103102	F2xM2/M3	20-Sep-14	245	272	76.8	2-Oct-14	2
900043000103113	F2xM2/M3	20-Sep-14	286	323	130	2-Oct-14	2
900043000103116	F2xM2/M3	20-Sep-14	275	307	123	2-Oct-14	2
900043000103119	F2xM2/M3	19-Sep-14	280	315	135	2-Oct-14	2
900043000103124	F2xM2/M3	19-Sep-14	272	310	135	2-Oct-14	2
900043000103128	F2xM2/M3	20-Sep-14	205	230	48.2	2-Oct-14	2
900043000103136	F2xM2/M3	20-Sep-14	217	242	52.68	2-Oct-14	2
900043000103139	F2xM2/M3	19-Sep-14	160	178	23.46	2-Oct-14	2
900043000103142	F2xM2/M3	20-Sep-14	200	231	46.03	2-Oct-14	2
900043000103144	F2xM2/M3	20-Sep-14	252	294	83.16	2-Oct-14	2
900043000103147	F2xM2/M3	20-Sep-14	275	306	125	2-Oct-14	2
900043000103148	F2xM2/M3	19-Sep-14	245	275	82.2	2-Oct-14	2
900043000103149	F2xM2/M3	20-Sep-14	250	281	90	2-Oct-14	2
900043000103163	F2xM2/M3	20-Sep-14	275	315	113.38	2-Oct-14	2
900043000103166	F2xM2/M3	19-Sep-14	220	245	52.73	2-Oct-14	2
900043000103167	F2xM2/M3	20-Sep-14	271	303	101	2-Oct-14	2
900043000103172	F2xM2/M3	19-Sep-14	248	282	76.34	2-Oct-14	2
900043000103173	F2xM2/M3	19-Sep-14	168	188	25.65	2-Oct-14	2
900043000103175	F2xM2/M3	20-Sep-14	265	295	90.24	2-Oct-14	2
900043000103181	F2xM2/M3	19-Sep-14	250	280	77.11	2-Oct-14	2
900043000103182	F2xM2/M3	20-Sep-14	295	340	155	2-Oct-14	2
900043000103183	F2xM2/M3	20-Sep-14	270	306	103.86	2-Oct-14	2
900043000103186	F2xM2/M3	19-Sep-14	237	272	70.07	2-Oct-14	2
900043000103187	F2xM2/M3	20-Sep-14	258	290	103	2-Oct-14	2
900043000103189	F2xM2/M3	19-Sep-14	241	270	68.45	2-Oct-14	2
900043000103190	F2xM2/M3	20-Sep-14	264	295	84.31	2-Oct-14	2
900043000103195	F2xM2/M3	19-Sep-14	252	280	80.15	2-Oct-14	2

Table A2-3: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000103198	F2xM2/M3	20-Sep-14	196	225	35.76	2-Oct-14	2
900043000119407	F2xM2/M3	20-Sep-14	293	326	118	2-Oct-14	2
900043000119420	F2xM2/M3	20-Sep-14	295	335	147	2-Oct-14	2
900043000119422	F2xM2/M3	19-Sep-14	250	283	92.54	2-Oct-14	2
900043000119446	F2xM2/M3	20-Sep-14	195	221	35.12	2-Oct-14	2
900043000119450	F2xM2/M3	20-Sep-14	265	306	121	2-Oct-14	2
900043000119463	F2xM2/M3	19-Sep-14	206	233	45.83	2-Oct-14	2
900043000119475	F2xM2/M3	20-Sep-14	282	322	130	2-Oct-14	2
900043000119498	F2xM2/M3	20-Sep-14	271	309	109	2-Oct-14	2
900043000119512	F2xM2/M3	20-Sep-14	245	285	88.9	2-Oct-14	2
900043000119515	F2xM2/M3	20-Sep-14	250	280	82.4	2-Oct-14	2
900043000119522	F2xM2/M3	19-Sep-14	257	285	90.61	2-Oct-14	2
900043000119549	F2xM2/M3	19-Sep-14	295	333	125	2-Oct-14	2
900043000119571	F2xM2/M3	19-Sep-14	233	265	68.26	2-Oct-14	2
900043000119583	F2xM2/M3	19-Sep-14	280	322	121	2-Oct-14	2
900043000119809	F2xM2/M3	20-Sep-14	245	273	80.42	2-Oct-14	2
900043000119823	F2xM2/M3	19-Sep-14	232	262	64.73	2-Oct-14	2
900043000119871	F2xM2/M3	20-Sep-14	321	372	186	2-Oct-14	2
900043000119885	F2xM2/M3	20-Sep-14	195	224	36.86	2-Oct-14	2
900043000119890	F2xM2/M3	19-Sep-14	232	266	63.3	2-Oct-14	2
900043000119894	F2xM2/M3	19-Sep-14	160	180	22.68	2-Oct-14	2
900043000119898	F2xM2/M3	20-Sep-14	185	206	31.17	2-Oct-14	2
900043000119899	F2xM2/M3	20-Sep-14	205	237	41.05	2-Oct-14	2
900043000119911	F2xM2/M3	20-Sep-14	189	213	34.64	2-Oct-14	2
900043000119918	F2xM2/M3	19-Sep-14	246	275	84.38	2-Oct-14	2
900043000119919	F2xM2/M3	20-Sep-14	246	277	77.85	2-Oct-14	2
900043000119922	F2xM2/M3	19-Sep-14	232	265	66.55	2-Oct-14	2
900043000119928	F2xM2/M3	19-Sep-14	210	238	44.05	2-Oct-14	2
900043000119953	F2xM2/M3	20-Sep-14	184	208	28.41	2-Oct-14	2
900043000119954	F2xM2/M3	20-Sep-14	230	260	63.53	2-Oct-14	2
900043000119969	F2xM2/M3	20-Sep-14	215	247	55.95	2-Oct-14	2
900043000119981	F2xM2/M3	19-Sep-14	215	245	51.48	2-Oct-14	2
900067000057473	F2xM2/M3	20-Sep-14	140	157	17.94	2-Oct-14	2
900043000102900	F2xM2/M3	21-Sep-14	303	345	161	2-Oct-14	3

Table A2-3: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000102902	F2xM2/M3	21-Sep-14	260	296	102	2-Oct-14	3
900043000102905	F2xM2/M3	19-Sep-14	265	302	94.01	2-Oct-14	3
900043000102906	F2xM2/M3	20-Sep-14	295	328	147	2-Oct-14	3
900043000102912	F2xM2/M3	21-Sep-14	265	292	118	2-Oct-14	3
900043000102915	F2xM2/M3	21-Sep-14	280	312	164	2-Oct-14	3
900043000102923	F2xM2/M3	21-Sep-14	308	350	181	2-Oct-14	3
900043000102931	F2xM2/M3	21-Sep-14	290	320	145	2-Oct-14	3
900043000102937	F2xM2/M3	21-Sep-14	255	286	106	2-Oct-14	3
900043000102947	F2xM2/M3	19-Sep-14	210	241	54.22	2-Oct-14	3
900043000102952	F2xM2/M3	20-Sep-14	260	291	92.58	2-Oct-14	3
900043000102955	F2xM2/M3	21-Sep-14	295	330	136	2-Oct-14	3
900043000102958	F2xM2/M3	21-Sep-14	310	355	170	2-Oct-14	3
900043000102962	F2xM2/M3	21-Sep-14	209	236	55.01	2-Oct-14	3
900043000102967	F2xM2/M3	20-Sep-14	225	248	60.28	2-Oct-14	3
900043000102974	F2xM2/M3	20-Sep-14	220	250	57.12	2-Oct-14	3
900043000102979	F2xM2/M3	20-Sep-14	218	251	58.02	2-Oct-14	3
900043000102992	F2xM2/M3	21-Sep-14	300	337	156	2-Oct-14	3
900043000102994	F2xM2/M3	19-Sep-14	285	315	135	2-Oct-14	3
900043000102999	F2xM2/M3	20-Sep-14	265	302	107	2-Oct-14	3
900043000103105	F2xM2/M3	21-Sep-14	300	342	165	2-Oct-14	3
900043000103108	F2xM2/M3	20-Sep-14	259	294	83.24	2-Oct-14	3
900043000103111	F2xM2/M3	21-Sep-14	179	203	29.75	2-Oct-14	3
900043000103112	F2xM2/M3	19-Sep-14	245	272	78.82	2-Oct-14	3
900043000103117	F2xM2/M3	20-Sep-14	300	340	145	2-Oct-14	3
900043000103118	F2xM2/M3	20-Sep-14	170	196	26.74	2-Oct-14	3
900043000103120	F2xM2/M3	20-Sep-14	225	255	54.5	2-Oct-14	3
900043000103121	F2xM2/M3	20-Sep-14	285	322	130	2-Oct-14	3
900043000103122	F2xM2/M3	21-Sep-14	241	275	74.55	2-Oct-14	3
900043000103130	F2xM2/M3	20-Sep-14	205	235	59.18	2-Oct-14	3
900043000103131	F2xM2/M3	21-Sep-14	300	335	167	2-Oct-14	3
900043000103135	F2xM2/M3	20-Sep-14	215	249	53.07	2-Oct-14	3
900043000103140	F2xM2/M3	20-Sep-14	250	286	82.52	2-Oct-14	3
900043000103143	F2xM2/M3	21-Sep-14	270	307	121	2-Oct-14	3
900043000103152	F2xM2/M3	20-Sep-14	258	294	93	2-Oct-14	3

Table A2-3: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.

Lake Sturgeon		Final Measurement				Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000103153	F2xM2/M3	19-Sep-14	233	266	76.42	2-Oct-14	3
900043000103159	F2xM2/M3	21-Sep-14	233	265	72.11	2-Oct-14	3
900043000103160	F2xM2/M3	19-Sep-14	258	290	88.01	2-Oct-14	3
900043000103164	F2xM2/M3	21-Sep-14	298	340	150	2-Oct-14	3
900043000103169	F2xM2/M3	19-Sep-14	216	245	56.83	2-Oct-14	3
900043000103176	F2xM2/M3	21-Sep-14	265	300	111	2-Oct-14	3
900043000103178	F2xM2/M3	20-Sep-14	285	316	118	2-Oct-14	3
900043000103179	F2xM2/M3	20-Sep-14	275	315	105	2-Oct-14	3
900043000103180	F2xM2/M3	21-Sep-14	277	315	126	2-Oct-14	3
900043000103191	F2xM2/M3	21-Sep-14	275	308	116	2-Oct-14	3
900043000119406	F2xM2/M3	21-Sep-14	195	220	38.49	2-Oct-14	3
900043000119408	F2xM2/M3	21-Sep-14	285	322	125	2-Oct-14	3
900043000119409	F2xM2/M3	21-Sep-14	275	310	127	2-Oct-14	3
900043000119425	F2xM2/M3	20-Sep-14	266	304	108	2-Oct-14	3
900043000119430	F2xM2/M3	19-Sep-14	155	175	18.71	2-Oct-14	3
900043000119435	F2xM2/M3	20-Sep-14	218	245	59.48	2-Oct-14	3
900043000119440	F2xM2/M3	20-Sep-14	241	271	74.54	2-Oct-14	3
900043000119451	F2xM2/M3	20-Sep-14	162	185	23.74	2-Oct-14	3
900043000119486	F2xM2/M3	19-Sep-14	252	273	87.58	2-Oct-14	3
900043000119520	F2xM2/M3	21-Sep-14	255	292	95.41	2-Oct-14	3
900043000119561	F2xM2/M3	19-Sep-14	280	312	112	2-Oct-14	3
900043000119568	F2xM2/M3	20-Sep-14	270	306	115	2-Oct-14	3
900043000119579	F2xM2/M3	19-Sep-14	300	342	145	2-Oct-14	3
900043000119592	F2xM2/M3	21-Sep-14	281	319	156	2-Oct-14	3
900043000119812	F2xM2/M3	19-Sep-14	266	299	118	2-Oct-14	3
900043000119816	F2xM2/M3	19-Sep-14	175	196	28.46	2-Oct-14	3
900043000119827	F2xM2/M3	21-Sep-14	235	260	65.56	2-Oct-14	3
900043000119833	F2xM2/M3	21-Sep-14	310	350	181	2-Oct-14	3
900043000119837	F2xM2/M3	20-Sep-14	196	221	37.47	2-Oct-14	3
900043000119840	F2xM2/M3	20-Sep-14	200	224	43.54	2-Oct-14	3
900043000119857	F2xM2/M3	21-Sep-14	250	285	97	2-Oct-14	3
900043000119861	F2xM2/M3	20-Sep-14	205	235	46.46	2-Oct-14	3
900043000119868	F2xM2/M3	19-Sep-14	160	185	21.52	2-Oct-14	3
900043000119873	F2xM2/M3	20-Sep-14	245	275	77.86	2-Oct-14	3

Table A2-3: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119887	F2xM2/M3	20-Sep-14	182	210	29.13	2-Oct-14	3
900043000119900	F2xM2/M3	20-Sep-14	185	211	38.05	2-Oct-14	3
900043000119930	F2xM2/M3	20-Sep-14	190	218	44.55	2-Oct-14	3
900043000119936	F2xM2/M3	20-Sep-14	180	206	29.48	2-Oct-14	3
900043000119938	F2xM2/M3	21-Sep-14	215	245	55	2-Oct-14	3
900043000119949	F2xM2/M3	21-Sep-14	255	292	95.49	2-Oct-14	3
900043000119966	F2xM2/M3	21-Sep-14	260	295	103	2-Oct-14	3
900043000119975	F2xM2/M3	19-Sep-14	201	225	42.84	2-Oct-14	3
900067000057429	F2xM2/M3	20-Sep-14	170	185	25.23	2-Oct-14	3
900067000057433	F2xM2/M3	20-Sep-14	172	197	26.34	2-Oct-14	3
900043000102901	F2xM2/M3	20-Sep-14	241	275	74.88	2-Oct-14	4
900043000102907	F2xM2/M3	21-Sep-14	305	345	180	2-Oct-14	4
900043000102909	F2xM2/M3	21-Sep-14	277	310	131	2-Oct-14	4
900043000102918	F2xM2/M3	20-Sep-14	272	306	124	2-Oct-14	4
900043000102919	F2xM2/M3	19-Sep-14	241	271	80.06	2-Oct-14	4
900043000102920	F2xM2/M3	19-Sep-14	305	345	170	2-Oct-14	4
900043000102924	F2xM2/M3	21-Sep-14	265	298	123	2-Oct-14	4
900043000102929	F2xM2/M3	20-Sep-14	280	309	100	2-Oct-14	4
900043000102930	F2xM2/M3	20-Sep-14	261	298	91.22	2-Oct-14	4
900043000102938	F2xM2/M3	20-Sep-14	251	286	76.67	2-Oct-14	4
900043000102940	F2xM2/M3	19-Sep-14	292	335	130	2-Oct-14	4
900043000102941	F2xM2/M3	19-Sep-14	300	334	155	2-Oct-14	4
900043000102942	F2xM2/M3	20-Sep-14	281	320	115	2-Oct-14	4
900043000102948	F2xM2/M3	19-Sep-14	292	330	140	2-Oct-14	4
900043000102953	F2xM2/M3	19-Sep-14	260	294	93	2-Oct-14	4
900043000102954	F2xM2/M3	19-Sep-14	240	270	85.1	2-Oct-14	4
900043000102959	F2xM2/M3	19-Sep-14	181	206	29.92	2-Oct-14	4
900043000102961	F2xM2/M3	20-Sep-14	275	312	140	2-Oct-14	4
900043000102963	F2xM2/M3	21-Sep-14	224	261	74.96	2-Oct-14	4
900043000102972	F2xM2/M3	21-Sep-14	288	325	122	2-Oct-14	4
900043000102977	F2xM2/M3	20-Sep-14	285	331	142	2-Oct-14	4
900043000102981	F2xM2/M3	19-Sep-14	270	302	103.14	2-Oct-14	4
900043000102984	F2xM2/M3	19-Sep-14	250	282	77	2-Oct-14	4
900043000102987	F2xM2/M3	20-Sep-14	250	285	79.54	2-Oct-14	4

Table A2-3: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000102995	F2xM2/M3	21-Sep-14	279	316	140	2-Oct-14	4
900043000102996	F2xM2/M3	21-Sep-14	255	285	90.82	2-Oct-14	4
900043000102997	F2xM2/M3	21-Sep-14	260	285	109	2-Oct-14	4
900043000102998	F2xM2/M3	20-Sep-14	275	310	115	2-Oct-14	4
900043000103101	F2xM2/M3	21-Sep-14	247	275	104	2-Oct-14	4
900043000103103	F2xM2/M3	19-Sep-14	270	297	100.88	2-Oct-14	4
900043000103104	F2xM2/M3	21-Sep-14	285	328	135	2-Oct-14	4
900043000103106	F2xM2/M3	21-Sep-14	285	381	150	2-Oct-14	4
900043000103107	F2xM2/M3	20-Sep-14	225	255	66.89	2-Oct-14	4
900043000103110	F2xM2/M3	21-Sep-14	290	327	140	2-Oct-14	4
900043000103115	F2xM2/M3	19-Sep-14	250	282	83.37	2-Oct-14	4
900043000103133	F2xM2/M3	20-Sep-14	265	298	94.83	2-Oct-14	4
900043000103137	F2xM2/M3	20-Sep-14	260	295	96.68	2-Oct-14	4
900043000103145	F2xM2/M3	21-Sep-14	278	310	120	2-Oct-14	4
900043000103146	F2xM2/M3	21-Sep-14	260	294	107	2-Oct-14	4
900043000103155	F2xM2/M3	21-Sep-14	272	305	104	2-Oct-14	4
900043000103156	F2xM2/M3	19-Sep-14	272	310	135	2-Oct-14	4
900043000103157	F2xM2/M3	20-Sep-14	250	285	94.88	2-Oct-14	4
900043000103165	F2xM2/M3	19-Sep-14	235	265	71.58	2-Oct-14	4
900043000103171	F2xM2/M3	20-Sep-14	260	293	87.54	2-Oct-14	4
900043000103177	F2xM2/M3	20-Sep-14	225	262	58.32	2-Oct-14	4
900043000103184	F2xM2/M3	20-Sep-14	215	248	57.59	2-Oct-14	4
900043000103185	F2xM2/M3	21-Sep-14	250	280	89.21	2-Oct-14	4
900043000103192	F2xM2/M3	21-Sep-14	245	278	82.66	2-Oct-14	4
900043000103193	F2xM2/M3	20-Sep-14	265	298	103	2-Oct-14	4
900043000103194	F2xM2/M3	21-Sep-14	275	310	124	2-Oct-14	4
900043000103196	F2xM2/M3	21-Sep-14	195	220	39.2	2-Oct-14	4
900043000103197	F2xM2/M3	21-Sep-14	270	305	111	2-Oct-14	4
900043000103199	F2xM2/M3	20-Sep-14	173	195	27.29	2-Oct-14	4
900043000119419	F2xM2/M3	21-Sep-14	185	200	37.44	2-Oct-14	4
900043000119441	F2xM2/M3	21-Sep-14	252	280	109	2-Oct-14	4
900043000119443	F2xM2/M3	21-Sep-14	260	300	106.4	2-Oct-14	4
900043000119461	F2xM2/M3	19-Sep-14	335	385	210	2-Oct-14	4
900043000119469	F2xM2/M3	20-Sep-14	230	265	72.81	2-Oct-14	4

Table A2-3: Biological and PIT tag information for hatchery-reared Lake Sturgeon yearlings released into the Burntwood River, October 2014. Description of release sites are provided in section 3.7 of report.

Lake Sturgeon			Final Measurement			Stocking Activity	
PIT Tag ID	Family	Date	Fork Length (mm)	Total Length (mm)	Body Mass (g)	Date	Site ID
900043000119470	F2xM2/M3	21-Sep-14	280	313	142	2-Oct-14	4
900043000119483	F2xM2/M3	21-Sep-14	291	391	145	2-Oct-14	4
900043000119492	F2xM2/M3	19-Sep-14	210	242	56.78	2-Oct-14	4
900043000119531	F2xM2/M3	20-Sep-14	225	255	61.71	2-Oct-14	4
900043000119534	F2xM2/M3	21-Sep-14	235	266	84.69	2-Oct-14	4
900043000119556	F2xM2/M3	20-Sep-14	277	311	127	2-Oct-14	4
900043000119567	F2xM2/M3	21-Sep-14	250	280	88.12	2-Oct-14	4
900043000119570	F2xM2/M3	20-Sep-14	250	285	96	2-Oct-14	4
900043000119575	F2xM2/M3	20-Sep-14	306	343	150	2-Oct-14	4
900043000119593	F2xM2/M3	20-Sep-14	215	245	50.7	2-Oct-14	4
900043000119798	F2xM2/M3	21-Sep-14	215	230	49.55	2-Oct-14	4
900043000119847	F2xM2/M3	19-Sep-14	281	322	125	2-Oct-14	4
900043000119862	F2xM2/M3	21-Sep-14	282	322	140	2-Oct-14	4
900043000119881	F2xM2/M3	20-Sep-14	182	210	32.16	2-Oct-14	4
900043000119882	F2xM2/M3	20-Sep-14	158	179	24.52	2-Oct-14	4
900043000119884	F2xM2/M3	20-Sep-14	164	186	21.22	2-Oct-14	4
900043000119988	F2xM2/M3	21-Sep-14	255	288	99.32	2-Oct-14	4
900043000119989	F2xM2/M3	21-Sep-14	231	256	63.33	2-Oct-14	4
900043000119990	F2xM2/M3	19-Sep-14	245	278	78.63	2-Oct-14	4
900043000119994	F2xM2/M3	19-Sep-14	205	222	53.06	2-Oct-14	4
982000362432235	F2xM2/M3	20-Sep-14	182	207	27.62	2-Oct-14	4
900043000102970*	F2xM2/M3	41903	265	304	110.00	2-Oct-14	-
900043000102978*	F2xM2/M3	41901	240	275	72.46	2-Oct-14	-

* Stocking site not recorded