Keeyask Generation Project

Fisheries Offsetting and Mitigation Plan

Spillway Fish Salvage Report

FOMP-2024-02

KEEYASK

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KEEYASK GENERATION PROJECT

FISHERIES OFFSETTING AND MITIGATION PLAN

REPORT #FOMP-2024-02

KEEYASK GS SPILLWAY FISH SALVAGE, 2023

Prepared for

Manitoba Hydro

By

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SUMMARY

Background

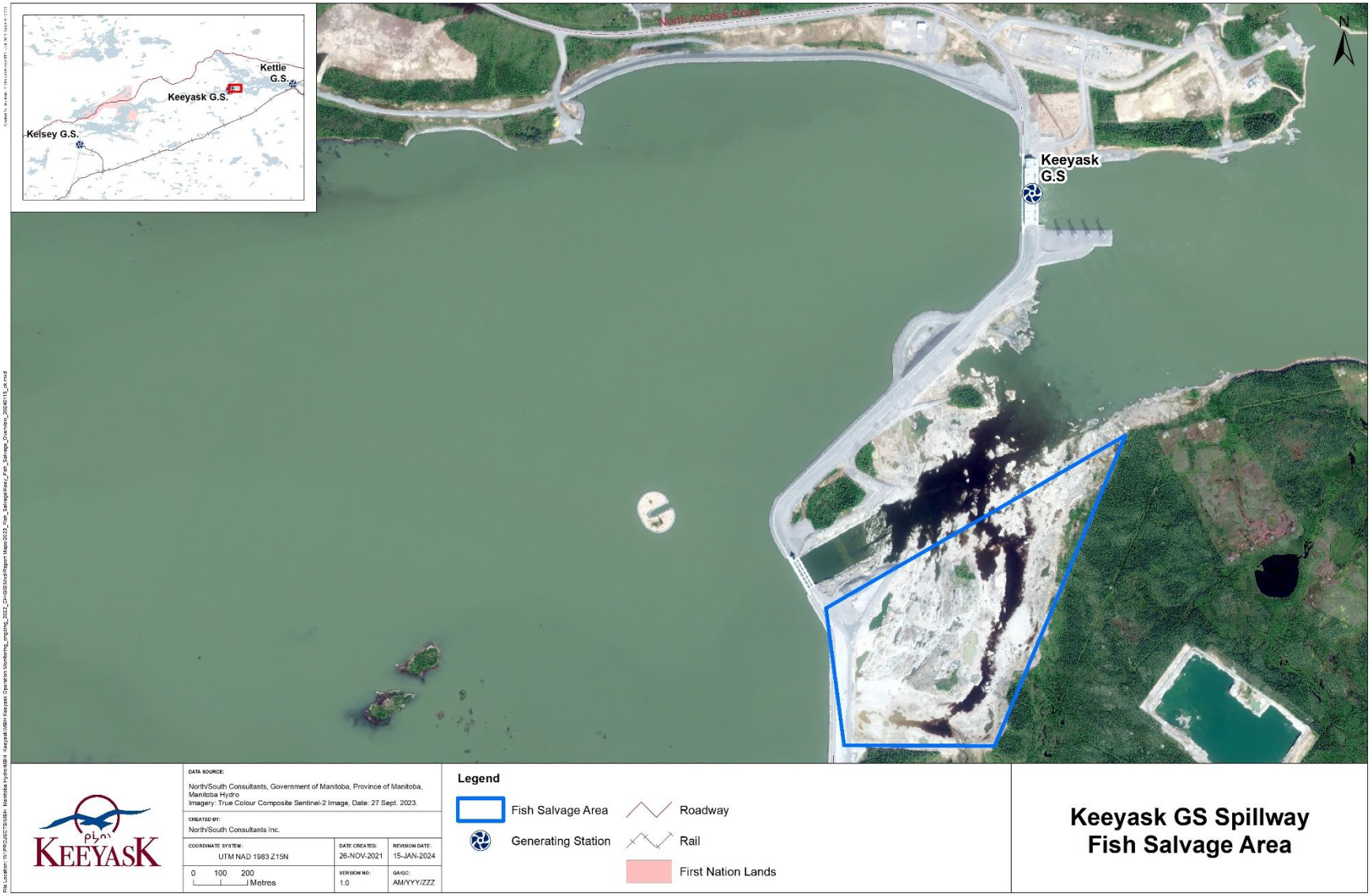
Construction of the Keeyask Generation Project (the Project) at Gull Rapids began in July 2014 and was completed in March 2022. The Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan outlining activities that could reduce the potential effects of the Project on fish in the Nelson River (the Fisheries Offsetting and Mitigation Plan; FOMP). The plan also explained how the proposed activities would be completed and monitored. Fish salvages (involving capturing and transferring live fish from isolated areas where they may be trapped to the main part of the river) were identified in the FOMP as a way to avoid serious harm to fish both during the construction and operation phases of the Project.

During construction, fish salvages were conducted in areas isolated by cofferdams. During operation, the area downstream of the Keeyask GS spillway was identified as a place where fish may become trapped (see map below). When the spillway gates are open, the area becomes flooded and fish are able to enter from the main part of Stephens Lake. However, when the spillway gates are close, the area drains and becomes disconnected from the main river channel. This means that fish may become trapped in isolated pools. Fish are not able to live in these pools because they become too hot and anoxic (have no oxygen) in the summer and/or freeze to the bottom in winter. In the future, a berm will be built to block fish from entering this area from the main part of the river, even when the spillway gates are open. Until that happens, fish salvages will be conducted when the spillway gates are closed following a spill event to remove fish from isolated pools and return them to Stephens Lake.

This report presents the results of a fish salvage conducted downstream of the Keeyask GS spillway in fall 2023.

What was done?

A fish salvage was conducted on September 28, 2023, in isolated areas downstream of the Keeyask GS spillway. All isolated pools were identified and fish were captured using a backpack electrofisher, small-mesh seine and dip nets, and gill nets. All captured fish were identified to species, counted, and released. All large-bodied species were measured for fork length (mm). Captured fish were kept in a tub filled with fresh water and equipped with an air stone to provide oxygen. All fish were then released into a channel within the salvage area that is always connected to Stephens Lake. This location was chosen because it is easy to access, it is close to where the fish salvage was being done (to reduce transporting time and stress to fish), and it is an area of calm water out of the main river flow. Fishing activities continued within the isolated pools until no more fish were caught.



Map of the Keeyask GS showing the area downstream of the spillway where fish salvages are conducted. The satellite image was taken on September 29, 2023, when all spillway gates were closed.

What was found?

Nine isolated pools were identified and fished. Eight pools were shallow (measuring <1.0 m in depth) and were fished using a combination of backpack electrofishing, dip nets, and seine nets. One pool was deep (>2.0 m) and seine nets were used to fish along its edges where the water was shallow and a gill net was set along its length.

A total of 355 fish were captured representing 12 species. Most were minnows including shiners and Troutperch. Eight large-bodied fish were captured including suckers, jackfish (Northern Pike), pickerel (Walleye), and mariah (Burbot). All fish captured were released alive and in good condition.

Jackfish (left), pickerel (middle), and sucker (right) captured during the fish salvage downstream of the Keeyask GS spillway in September 2023.

What will be done next?

Additional fish salvages will be conducted in 2024 if the spillway is closed following spill events.

ACKNOWLEDGEMENTS

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

Leslie Flett of Tataskweyak Cree Nation is thanked for his local expertise and assistance in conducting the field work.

The collection of biological samples described in this report was authorized by Manitoba Natural Resources and Northern Development, Fish and Wildlife Branch, under terms of the Live Fish Handling Permit #57151165 (LFH-GP 06-2023).

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1.0 INTRODUCTION

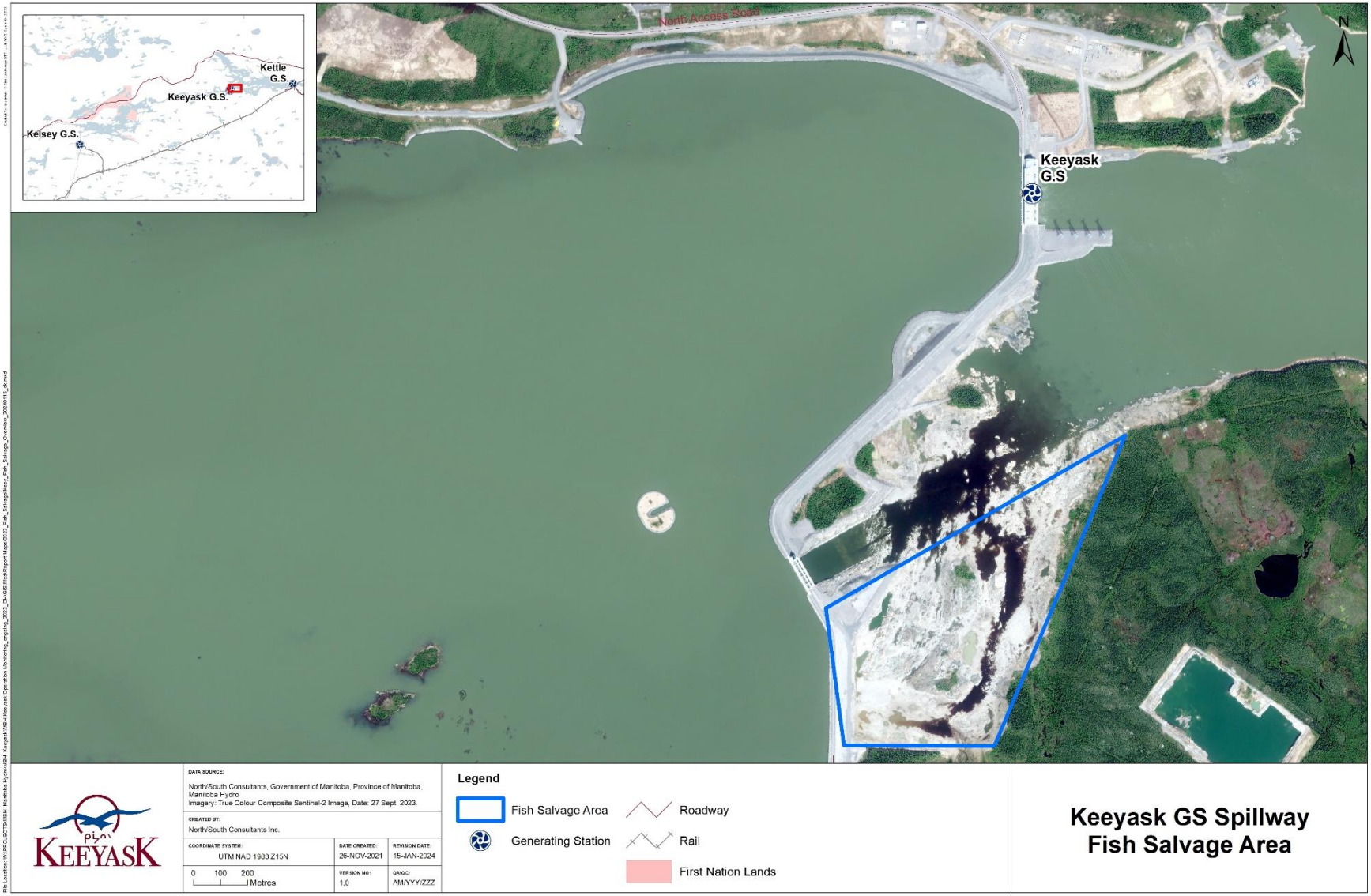
The Keeyask Generation Project (the Project) is a 695-megawatt (MW) hydroelectric generating station at Gull Rapids on the lower Nelson River in northern Manitoba. The Project is approximately 725 kilometres (km) northeast of Winnipeg, 35 km upstream of the existing Kettle Generating Station, where Gull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

The *Keeyask Generation Project: Response to EIS Guidelines*, completed in June 2012, provides a summary of predicted effects and planned mitigation for the Project. Technical supporting information for the aquatic environment, including a description of the environmental setting, effects and mitigation, and a summary of proposed monitoring and follow-up programs, is provided in the *Keeyask Generation Project Environmental Impact Statement: Aquatic Environment Supporting Volume* (AE SV). As part of the licensing process for the Project, a *Fisheries Offsetting and Monitoring Plan* (FOMP) was developed detailing mitigation and offsetting measures for the construction and operation phases of the Project.

Fish salvages were identified as a mitigation measure to avoid serious harm to fish. During construction, fish salvages were conducted to mitigate effects associated with fish stranding in areas isolated by cofferdams. During operation, fish salvages were identified as a mitigation measure to catch and release fish trapped in isolated pools in the south channel downstream of the Keeyask GS spillway after spilling ceases.

Low water levels along the length of the Nelson River in 2023 forced the closure of all spillway gates of the Keeyask GS. Areas downstream of the spillway then became disconnected from the main river channel (Map 1). Based on the capture of fish within isolated pools downstream of the spillway during previous spillway closures, it was determined that these isolated pools required a salvage fishery in compliance with Section 35 of the *Fisheries Act*.

A salvage fishery was conducted downstream of the Keeyask GS spillway in late September 2023. The primary objective of the salvage fishery was to capture and release, live and in good health, all fish occupying waters that would no longer be suitable as fish habitat.



Map 1: **Map of the Keeyask GS showing the area downstream of the spillway where fish salvages are conducted. Satellite image was taken on September 29, 2023.**

2.0 METHODS

On September 28, 2023, a fish salvage was conducted in isolated areas downstream of the Keeyask GS spillway (Map 2). All isolated pools were identified and using a variety of capture gear, depending on water depth or obstructions caused by the presence of boulders within the pools. Capture gear included: backpack electrofishers (Smith-Roots model LR-24), small-mesh seine and dip nets, and gill net gangs consisting of three 25 yd panels of 2", 3", and 3¾" twisted nylon stretched mesh (51, 76, and 95 mm). Each panel was 25 yards (yd) (22.9 m) long and 2.7 yd (2.5 m) deep. Substrates encountered included boulder and large cobble and silt. Depths ranged from wadable (i.e., 0.1–0.8 m) in the majority of pools to >1.5 m in pool 2.

Fish were identified to species, enumerated, and released. All large-bodied species captured were measured for fork length (FL; mm). Captured fish were retained in a tub filled with fresh water and equipped with an air stone. Fish were then released into a channel that maintains connectivity with Stephens Lake within the salvage area. This location was chosen based on its ease of access, proximity to salvage locations (to reduce transporting time and stress to fish), and water characteristics (an area of calm water out of the main river flow). Fishing activities continued within the isolated pools until the catch was reduced to zero fish.

Map 2. **Location of the nine pools fished downstream of the Keeyask GS spillway, September 28, 2023. Satellite image was taken on September 29, 2023, and may differ slightly from conditions during salvage. All pools within the salvage area were inspected.**

3.0 RESULTS

Fishing was conducted within all nine isolated pools within the salvage area. Eight pools (numbers 1 and 3–9) were fished using a seine net, a backpack electrofisher, and dip nets (Photo 1). In total, 1,031 seconds of electrofishing effort and ten seine tows were conducted. Fish were captured in seven of the nine pools, with no fish captured in pools 8 or 9.

Photo 1. Small, isolated pool (pool 5) downstream of the Keeyask GS spillway where seine netting and backpack electrofishing was conducted to capture stranded fish, September 28, 2023.

Access to a single larger pool (Pool 2) was limited based on its depth (>2 m), therefore a seine net was used to sample areas <1 m and a gill net was set along its length (Photo 2). The gill net was set twice for a total of six hours.

Photo 2. Gill net set in a large pool (Pool 2) downstream of the Keeyask GS spillway, September 28, 2023.

A total of 355 fish were captured during the salvage operation. Twelve fish species (Table 1) were encountered of which Emerald Shiner (85%) Spottail Shiner (6%), and Troutperch (5%) were predominant (Table 2).

Table 1. Common and scientific names and abbreviations of fish species captured during fish salvage operations downstream of the Keeyask GS spillway, September 2023.

Species	Scientific Name	Abbreviation
Burbot	Lota lota	BURB
Emerald Shiner	Notropis atherinoides	EMSH
Johnny Darter	Etheostoma nigrum	JHDR
Longnose Dace	Rhinichthys cataractae	LNDC
Northern Pike	Esox lucius	NRPK
Rainbow Smelt	Osmerus mordax	RNSM
Shorthead Redhorse	Moxostoma macrolepidotum	SHRD
Slimy Sculpin	Cottus cognatus	SLSC
Spottail Shiner	Notropis hudsonius	SPSH
Troutperch	Percopsis omiscomaycus	TRPR
Walleye	Sander vitreus	WALL
White Sucker	Catostomos commersonii	WHSC

Table 2. Species and number of fish captured during fish salvage operations downstream of the Keeyask GS spillway, September 2023.

Location	Species												Total
	BURB	EMSH	JHDR	LNDC	NRPK	RNSM	SHRD	SLSC	SPSH	TRPR	WALL	WHSC	
Pool 1	-	-	1	-	-	-	-	2	1	-	-	-	**4**
Pool 2	1	300	-	-	3	-	2	-	-	-	-	1	**307**
Pool 3	-	-	1	-	-	-	-	-	-	1	-	-	**2**
Pool 4	-	-	-	-	-	-	-	-	-	9	1	-	**10**
Pool 5	-	1	-	-	-	-	-	-	-	1	-	-	**2**
Pool 6	-	2	-	1	-	1	-	-	20	5	-	-	**29**
Pool 7	-	-	-	-	-	-	-	-	1	-	-	-	**1**
Pool 8	-	-	-	-	-	-	-	-	-	-	-	-	**0**
Pool 9	-	-	-	-	-	-	-	-	-	-	-	-	**0**
Total	**1**	**303**	**2**	**1**	**3**	**1**	**2**	**2**	**22**	**16**	**1**	**1**	**355**

Large-bodied species captured included Burbot, Northern Pike (Photo 3), Shorthead Redhorse, Walleye (Photo 4), and White Sucker (Photo 5). All large-bodied species captured were adult size ranging from 350 to 475 mm FL (Table 3).

Table 3. Fork lengths of large-bodied fish species captured in each pool during fish salvage operations downstream of the Keeyask GS spillway, September 2023.

Location	Species	Fork Length (mm)
Pool 1	-	-
Pool 2	Burbot	-
	White Sucker	432
	Shorthead Redhorse	375
		350
	Northern Pike	470
		435
		475
Pool 3	-	-
Pool 4	Walleye	437
Pool 5	-	-
Pool 6	-	-
Pool 7	-	-
Pool 8	-	-
Pool 9	-	-

Photo 3. Northern Pike captured during the salvage fishery conducted downstream of the Keeyask GS spillway, September 28, 2023.

Photo 4. **Walleye captured during the salvage fishery conducted downstream of the Keeyask GS spillway, September 28, 2023.**

Photo 5. **White Sucker captured during the salvage fishery conducted downstream of the Keeyask GS spillway, September 28, 2023.**

The single Rainbow Smelt captured was a fry, measuring less than 50 mm FL. The remaining small-bodied species ranged between 50 and 100 mm in length.

Overall, fish survival was estimated to be near 100%.

4.0 CONCLUSIONS

The fish salvage conducted within isolated pools downstream of the Keeyask GS spillway in 2023 resulted in the capture of 355 fish, including both small- and large-bodied species. All fish captured were released alive and in good condition. Additional salvages will be conducted in 2024 if and as needed following closure of the spillway gates during low water events.