ONTARIO POWER GENERATION

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December 2019

Aguasabon River Water Management Plan

Implementation Report Submission

April 1, 2013 to December 31, 2019

Prepared by: ______________________ Nov 7, 2024
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Approved by: Mike Woodcock ______________________ November 29, 2024
Mike Woodcock — Director Plant Operations, Northwest Operations — Date

Acronyms

CMP	Compliance Monitoring Plan
DICP	Data and Information Collection Program
EMP	Effectiveness Monitoring Program
IR	Implementation Report
LLCD	Long Lake Control Dam
MNRF	Ministry of Natural Resources and Forestry
OMNRF	Ontario Ministry of Natural Resources and Forestry
OPG	Ontario Power Generation
SAC	Standing Advisory Committee
VHF	Very High Frequency
WMP	Water Management Plan
WSC	Water Survey of Canada
NWO	Northwest Operations
ARSWMP	Aguasabon River System Water Management Plan

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1. Background

The original Aguasabon River System Water Management Plan (ARSWMP) was prepared according to the Ontario Ministry of Natural Resources' 2002 *Water Management Planning Guidelines for Hydropower*, and approved for an initial period of May 10, 2005 to March 31, 2012.

The process of renewing the ARSWMP began in 2010 resulting in the completion of a renewed ARSWMP for a ten-year period of April 1, 2013 to March 31, 2023. The ARSWMP was one of only a few plans that was renewed **before** the Ontario Ministry of Natural Resources and Forestry's (MNRF) 2016 *Maintaining Water Management Plans* Technical Bulletin was issued.

In August 2017, the ARSWMP was amended to align with the Ontario Ministry of Natural Resources and Forestry's (MNRF) 2016 *Maintaining Water Management Plans* Technical Bulletin. This administrative amendment resulted in several administrative changes, the largest of which was to include a requirement to prepare an Implementation Report (IR) submission to MNRF every five years.

IRs are required to provide status updates, transparency of dam operations, and inform adaptive management considerations, including the following minimum content:

- a summary of all amendment requests received, including the rationale for completed amendments and how proposed amendments that did not proceed were addressed.
- the status of the applicable Standing Advisory Committee (SAC),
- the results of the applicable Effectiveness Monitoring Program (EMP), including a summary of the monitoring conducted and findings, a determination of whether operations are having a negative or unintended impact, and an assessment of whether revisions to the facility operations, or to the EMP are required; and
- the status and results of any data or information collection outlined in the WMP's Data and Information Collection Program (DICP), and a determination of whether revisions to the program are required.

This document represents the first IR for the ARSWMP covering the period from April 1, 2013 to December 31, 2019.

The implementation of the ARSWMP between the dates of April 1, 2005 to March 31, 2012 can be found documented in the Aguasabon River System Water Management Plan **Renewal**, dated April 2013.

2. Summary of Amendment Requests

2.1. Description

This section of the report provides a summary of all amendment requests pertinent to OPG facilities on the Aguasabon River, or the ARSWMP document, including the rationale for completed amendments and how proposed amendments that did not proceed were addressed, if applicable.

2.2. Amendment Requests Received by OPG

None.

2.3. Amendment Requests Proposed by OPG

None.

2.4. Amendments Ordered by MNRF

'Maintaining Water Management Plans' Technical Bulletin (MNRF, 2016).

2.5. Amendments Completed by MNRF

MNRF completed an administrative amendment to the ARSWMP August 15, 2017 to align the plan with the approved 2016 *Maintaining Water Management Plans* Technical Bulletin.

The full text of the Technical Bulletin and additional information on the new requirements for the long-term maintenance of Water Management Plans (WMPs) are available on the MNRF website at:

https://www.ontario.ca/page/maintaining-water-management-plans?nocache=1.

This administrative amendment resulted in changes to the following sections of the ARSWMP:

Expiry Date has been removed
Monitoring and Reporting Section 13.1 was revised, data to be provided as requested rather than periodically.
Compliance Section 13.2 was revised to add the description of, and the requirement for, an Implementation Report.
Provision for Plan Amendments Section 14 was revised and reworded.

3. Standing Advisory Committee

3.1. Description

The ARSWMP SAC, was originally created from interested members of the Public Advisory Committee. It has been active since the implementation of the Water Management Plan.

3.2. SAC Status Update

The Aguasabon SAC remains active. There are annual meetings where a variety of information is provided from OPG and the MNR to the SAC. The last meeting was held

November 3rd, 2022. OPG is the administrator of the SAC and keeps records of the meeting minutes. Contact OPG's Thunder Bay Water Management group for information on the SAC.

SAC Committee Members:

Dick Mannisto – Longlac (Chair)

Jody Davis – Terrace Bay

George Horobec, SAC member from Geraldton has passed away. He will be sadly missed by the SAC Committee.

Louis Garon, SAC Member from Longlac representing the Greenstone District Trapper's Council has also passed away. The last meeting he had attended, he put forward the name of Brian Desrochers as a replacement for himself as he was planning on stepping down for health reasons. Louis will also be sadly missed.

Brian Desrochers is a new SAC member representing the Greenstone District Trapper's Council.

Resources to the SAC from the MNRF include:
Raymond Tyhuis, Management Biologist, Nipigon District
Philip Wilson, Management Biologist, Geraldton Field Office
Natalie Cormier, IRM Technical Specialist, Geraldton Field Office
Patti Westerman, Resources Management Supervisor, Nipigon District.

Resources to the SAC from OPG include:
David Pacholczak, Water Manager, OPG
Chad Tanner, Stakeholder Relations, OPG.

The SAC has an approved terms of reference by which the committee operates.

4. Compliance Monitoring and Reporting Program

4.1. Description

This section of the report provides a high-level summary on OPG's compliance with the operating, monitoring and reporting requirements prescribed in Chapter 13 of the ARSWMP. As such, it is intended to address the transparency on operations requirements of the IR, and to set the general operating context for the following EMP and DICP related content of this report.

4.2. Compliance Monitoring and Reporting Results

OPG has fulfilled all its compliance reporting requirements in a timely and complete manner, including incident notifications within 24 hours from occurrence, and summaries within the Annual Compliance Reports for each calendar year.

Between 2013 to 2019, there were 4 incidents of operation outside of the mandatory operating limits prescribed by the ARSWMP.

2013 – OPG and MNR agrees to deem conditions 'out of normal' due to delayed snow melt and freshet.

2014 – Long Lake Water Level exceeded due to excessive rain event.

2016 – OPG/MNR/SAC agree to an approved temporary deviation to operate Hays Lake below the lower compliance limit of 273.4 in the fall of 2016 during a planned station outage at the Aguasabon GS.

2019 – Long Lake Water Level (upper compliance) exceeded due to blockage in river system.

Specific details on prevailing hydrologic and operating conditions are available in the corresponding compliance reports submitted to MNRF.

5. Effectiveness Monitoring Program

5.1. Description

This section of the report provides a summary of the Effectiveness Monitoring Plan (EMP) components applicable to OPG facilities as outlined in the Chapter 12/Appendix 7 of the ARSWMP, including details on:

- Definition and goals of effectiveness monitoring,
- Monitoring the effectiveness of operational changes,
- Monitoring the effectiveness of operations in achieving the objectives (eg. ecological, flooding, power generation, recreation and tourism)
- determination of whether revisions to the facility operations, or to the EMP, are required, e.g., proposed changes/amendments going forward.

5.2. Effectiveness Monitoring Program Components

The purpose of an EMP is to confirm that operational changes resulting from the implementation of a WMP generate the expected ecological and social benefits.

The EMP is outlined in Chapter 12, and detailed in Appendix 7 of the Aguasabon River System WMP Renewal, dated April 2013

5.3. Effectiveness Monitoring Program Results

Table 1: MNRF Effectiveness Monitoring Program commitments for Long Lake

Code	Objective	Proposed studies	Scheduled Frequency	Commitment	Result	Status
LL-1	*Protect, Restore and Enhance Aquatic Ecosystems*	Identify timing and duration of Lake Trout spawning in Long Lake	Initial efforts over 2 years	MNRF field efforts	MNRF tagged 14 lake trout with VHF radio transmitters and recorded spawning shoals	Project is ongoing
LL-2	*Protect, Restore and Enhance Aquatic Ecosystems*	Confirm impacts of water and ice level fluctuations on recruitment	Annual review of Long Lake water levels during fall spawning (late September − October)	OPG Long Lake water level gauges used for monitoring lake levels in the north basin, Eldee Landing, and at the LLCD.	Drawdown “intent” identified in the WMP does not occur in years when conditions don’t allow.	Recommend discussions with OPG on results of the EM program and any future monitoring work.
LL-3	*Protect, Restore and Enhance Aquatic Ecosystems*	Monitor lake trout population and assess year class cohorts	10-year cycles	MNRF to complete assessment	Poor recruitment, low density population. Waiting for genetic analyses.	Reassess population recruitment in 10-year cycles
LL-5	Protect, Maintain or Enhance Wildlife Habitat	Investigate whether the installation of Loon nesting platforms results in breeding success.	Yearly	Two surveys per year including monitoring of loon platforms.	Surveys completed annually, summary report in 2019.	ongoing
LL-6	*Protect, Maintain, or Enhance Wildlife Habitat*	Survey of amphibians to use as	Yearly	MNRF completed breeding	Isis wetland where breeding	Discontinued surveys in 2019.

		indicator of health of riparian wildlife population		amphibian surveys	amphibian surveys conducted, has not changed and neither has the amphibian species presence.	MNRF recommends removing this commitment from the ARSWMP.
LL-7	*Protect, Restore and Enhance Aquatic Ecosystems*	Identify timing and duration of Brook Trout spawning in Long Lake	Yearly – spring	MNRF captured and tagged adult brook	Incomplete, continued monitoring and tagging	Ongoing
LL-8	*Protect, Maintain, or Enhance Wildlife Habitat*	Determine beaver population based on number of lodges for population comparisons pending changing operating regime	One-time survey	Greenstone District Trappers Council survey	Beavers not trapped in Long Lake. Concern is not considered an issue.	Survey of trappers was Complete MNRF recommends removing this commitment from the ARSWMP.

5.3.1. LONG LAKE EMP Summary

5.3.1.1 Lake Trout Spawning Objective: LL-1

A lake trout telemetry study was initiated to locate spawning shoals within Long Lake, to better understand the depths at which lake trout deposit their eggs (Armstrong 2008). During the summer of 2007 – 2008, 14 lake trout were angled and individually tagged with external VHF radio transmitters attached to the base of the dorsal fin. Helicopter flights occurred during the spawning period (October), to locate tagged fish in areas thought to be lake trout spawning areas. GPS coordinates were recorded for all tagged fish located by helicopter, and suspected spawning shoals were identified for follow-up work on egg viability (see 5.3.1.2).

5.3.1.2 Impacts of water and ice fluctuations on recruitment Objective: LL-2

The OPG-operated Kenogami Diversion Dam north of Longlac and the Long Lake Control Dam south of Long Lake controls the water level in Long Lake. The Kenogamisis Lake Dam at the outflow of Kenogamisis Lake (operated by MNRF), also influences water levels in Long Lake. The waters of Long Lake are used to operate the Aguasabon Generating Station south of Long Lake. Water levels in Long Lake on average decline by 1.6 meters from November to April (upper and lower compliance levels are 313.6 m and 311.2 m respectively). Winter drawdowns create storage for spring freshet and provide water for power generation through the winter months.

The 2013 Water Management Plan describes the Long Lake autumn lake-level intent to achieve as low an elevation as possible (approximately 312.40 m) by 1 October within the lower compliance line (312.30 m) through the period of 1 – 15 October. The intent serves to force lake trout to spawn at lower water elevations over spawning shoals, then to increase water levels thereafter to protect eggs from being crushed or frozen by the winter ice cover.

Lake trout spawn over shallow lake shoals during autumn where eggs are deposited in the interstitial spaces between gravel / cobble substrates. Young lake trout (alevin) hatch the following March to April and remain in the substrates until they are strong enough to free swim. There is concern that winter drawdown levels and associated ice fluctuations may crush incubating eggs and thereby reduce recruitment. In response to understand what impacts winter drawdowns had on incubating lake trout eggs, adult lake trout were captured and outfitted with external VHF transmitters to identify spawning shoals in Long Lake. The objective was to locate spawning shoals, then assess egg viability through a series of diving expeditions.

During October 2010, divers surveyed the suspected spawning shoals identified in 2007-2008 (see section 5.3.1.1). Eggs deposited in two shoals were counted and egg viability was determined. Divers also surveyed lake trout eggs along islands on the east side of Long Lake, approximately 3 km northeast of Halfway Landing.

A large proportion of lake trout eggs (> 50%) were confirmed dead, which is common in northwestern Ontario lake trout lakes. Most eggs were documented within 3 – 4 feet below the surface but ranged from 1 – 10 feet below surface.

The shoal at Red Pine Bay and surrounding islands off the point was surveyed by a second dive team. Egg viability was much higher at the Red Pine location than the area to the south, represented by 60 – 70% viable eggs. Most eggs were found at 5 feet below surface but ranged between 3 – 8 feet below surface.

Figure 1shows the actual draw down Long Lake to 312.40 m between 1 – 15 October has been achieved on very few occasions, notably in 2017 and 2019, within the last 10 years as conditions have to be optimal. Wet conditions don’t allow the Long Lake water level to be lowered to 312.40m without spilling water at either the Kenogami Dam or the Hays Lake Dam and although dry conditions allow for the 312.40m target to be met, low inflows don't allow for both the Long Lake refill after Oct 15 and the Long Lake Control Dam minimum flow intent of 10cms.

Lake trout spawn in water temps between 8 °C – 13 °C, which generally occurs within the first 2 weeks of October. Based on the temperature data presented in Figure 1, MNRF recommends an earlier fall drawdown one week earlier. The purpose of this shift in drawdown is to align the fall drawdown with the optimal spawning temperatures and force lake trout to spawn in deeper shoals between 25 September – 15 October. The historical fall elevations suggest that eggs laid above the 311.8 m contour will not survive due to the winter drawdown, where eggs would become crushed by ice in March with water drawdown.

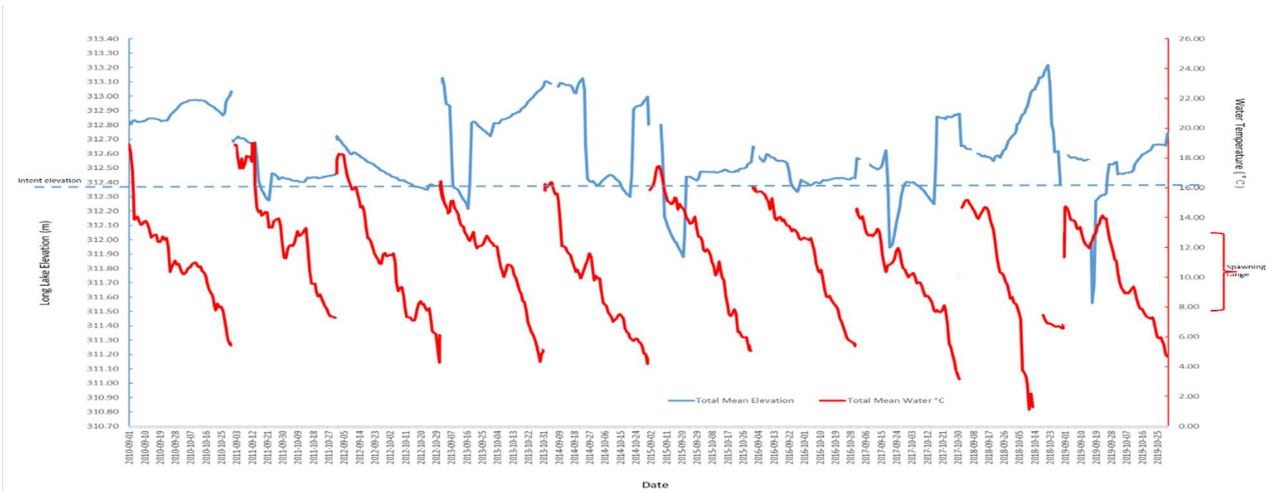

Figure 1 Water elevation (blue) and temperatures (red) for Long Lake for September through October (2010 to 2019). Dashed blue line represents the autumn drawdown intent (312.40m) identified in the WMP.

Annual compliance operation levels shown in Figure 2 for Long Lake provides insight into how recruitment of juvenile lake trout can be improved. MNRF suggests that if water from the Kenogamisis Lake Dam is released in late-February to early March to increase water levels in Long Lake, this would potentially mitigate water levels bottoming out at 311.50 m or lower by the end of March, which is where egg crushing by lake ice would be observed. Moving to an earlier release of water from Kenogamisis Lake would be beneficial because the gates from the Kenogamisis Lake Dam are often completely opened to maintain Kenogamisis Lake levels within compliance during the spring freshet. An earlier release of water from Kenogamisis Lake with some refinements in water manipulation to support the lake trout fishery in Long Lake would be beneficial for the Aguasabon River System WMP.

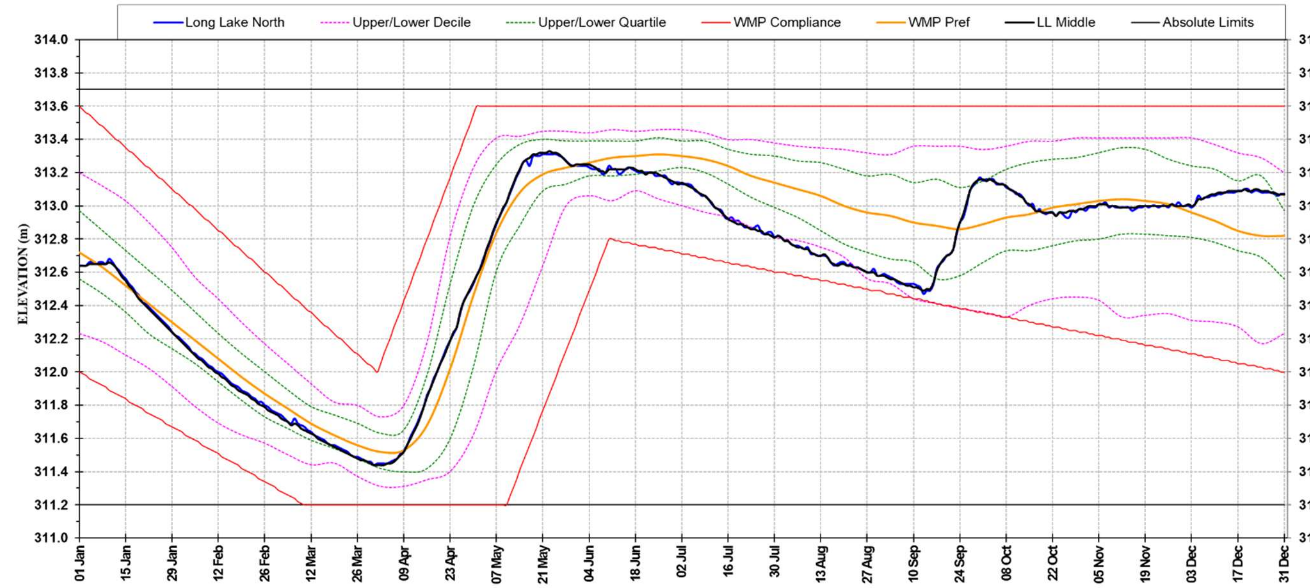

Figure 2 Annual compliance operation levels for Long Lake. Red bands indicate the upper and lower compliance limits.

5.3.1.3 Lake Trout Population Objective: LL-3

Interest in the lake trout population and effects from water drawdowns were voiced by concerned local First Nation communities and licenced anglers during the development of the Aguasabon WMP in the 2000s. The population of lake trout in Long Lake were studied over several decades using different techniques to understand population fluctuations. Over the years, as netting protocols were refined, broad-based unbiased netting techniques were developed to categorize lake wide fish communities; however, these methods are not useful when attempting to address trout specific population questions. Thus, the Summer Profundal Index Netting (SPIN) protocol was developed as an assessment tool to target lake trout and thereby provide density estimates and a biological evaluation of population integrity to monitor for effects of exploitation on life history, such as angling pressure, and recruitment potentially linked to annual water drawdowns during the spawning period.

A SPIN survey was completed in 2006; however, Long Lake was not sampled systematically as per the SPIN protocol. Thus results were too coarse to provide a reliable estimate of lake trout density. Recommendations from the 2006 SPIN were to assess the lake trout population in 10-year cycles, and to include sampling in the Effectiveness Monitoring Program.

MNRF completed a SPIN survey in 2021. The objectives were:

- to estimate the 2021 lake trout population,
- compare the 2021 estimate to an estimate from 2006,
- detect changes in population recruitment,
- evaluate the biological integrity of the population using genetic sampling, and
- to monitor long term effects of water drawdowns.

The 2021 SPIN survey was conducted on Long Lake from 16 August to 3 September. Forty-six sites were sampled over 15 days, using 82 nets composed of either single or double gang sets.

Species captured included, lake trout (*Salvelinus namaycush),* brook trout (*Salvelinus fontinalis*), lake herring (*Coregonus artedi*), burbot (*Lota lota*), lake whitefish (*Coregonus clupeaformis*), longnose sucker (*Catostomus catostomus*), white sucker (*Catostomus commersonii*), walleye (*Sander vitreus*), rainbow smelt (*Osmerus mordax*), northern pike (*Esox Lucius*), and likely blackfin cisco (*Coregonus nigripinnis*). Blackfin cisco, a threatened species listed under the ESA and SARA, were first documented during an initial survey of Long Lake (Harkness and Hart, 1927) but were not identified again later during subsequent fisheries assessments. Caudal fin clip samples were collected for analyses of genetic material to confirm if the species persists in Long Lake.

Thirty-four lake trout were captured, and therefore the minimum sampling requirements of 30 fish were acquired to estimate density and survival. Ageing structures (otoliths and fin rays) are currently being aged and will be used to inform survival / mortality estimates, size at age maturity, and growth metrics. Genetic samples were taken from all lake trout, and in combination with the 16 lake trout captured during an incomplete 2017 SPIN, a sample of 50 individual fish were sent for DNA sequencing to Trent University.

The 2006 SPIN data was generated from the capture of 24 lake trout, which as defined in the SPIN protocol, does not meet the minimum threshold to estimate a population density for the lake. However, the population estimate derived in the 2006 SPIN report indicated a raw population level of 5,800 individual lake trout. Unfortunately, the relative standard error (RSE - a measure of precision of estimates) for the 2006 sample was considered poor at 27%. An RSE in fisheries management considered adequate for population estimation is 20%. Although an attempted 2017 SPIN was incomplete, and only 16 lake trout were captured, Figure 3 illustrates 2006, 2017, and 2021 lake trout captures, predominantly large-bodied, mature adult fish. The 2021 SPIN was able to achieve an RSE of 20%, and thus considered reliable for estimating the lake trout population, which was approximately 8,300 individuals at a density of 1 lake trout / ha (i.e., very low density).

Currently this project is ongoing and population assessments on lake trout should continue on Long Lake. New data paired with those previously collected from lake trout in Long Lake, will help to provide further insight on water manipulations and temperatures that are likely influencing the lake trout population.

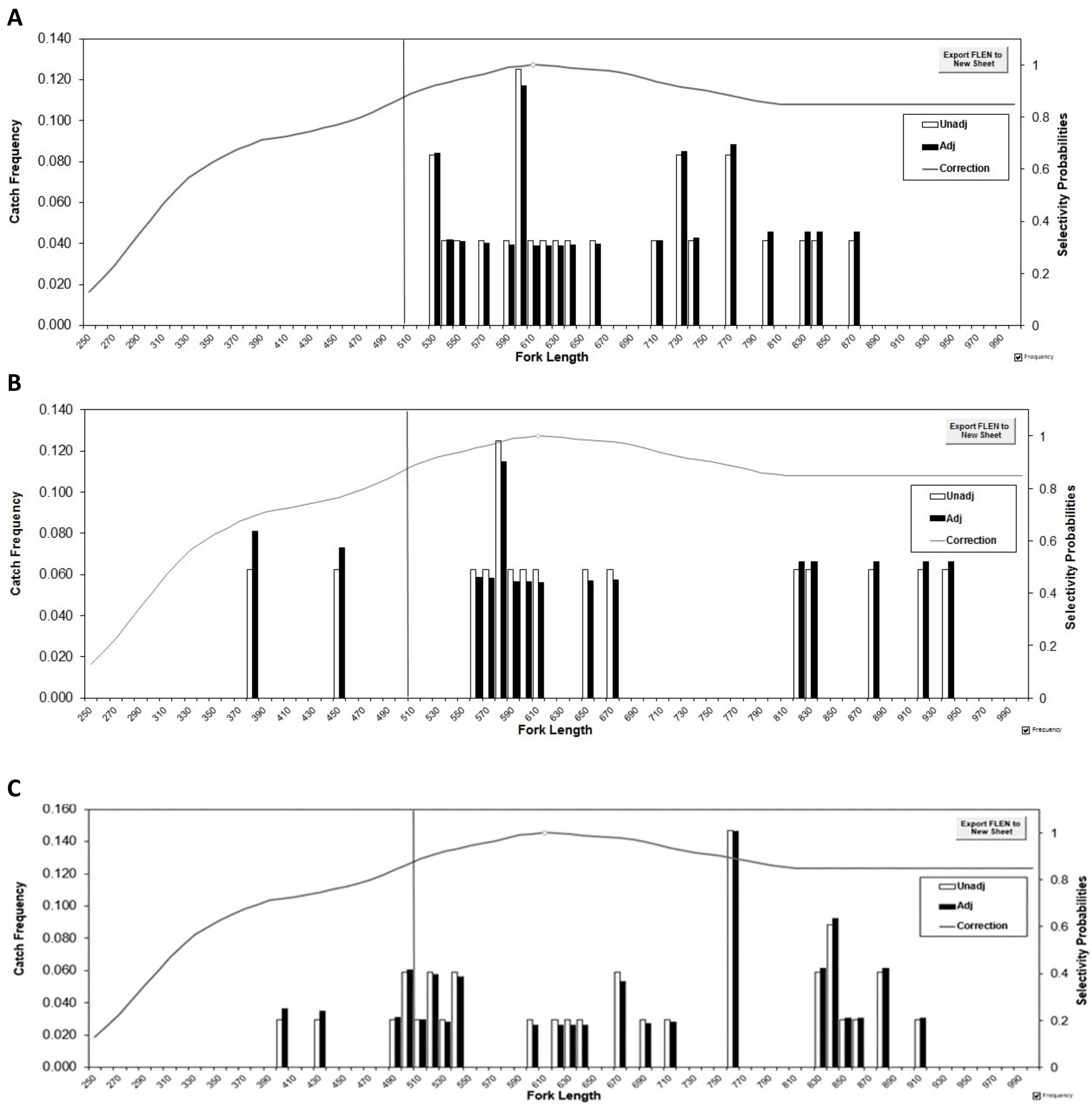

Figure 3 Fork lengths catch data for lake trout from Long Lake SPIN assessments; A – 2006, B – 2017, C - 2021.

5.3.1.4 Waterfowl (common loon) Survey Objective: LL-5

This effectiveness monitoring commitment was in response to an observation of a flooded loon nest on the shore of Long Lake in 2009. The purpose of the commitment is two-fold: first to determine the success of nesting pairs in incubating / hatching young and second, to investigate whether nesting platforms deployed along the Aguasabon system are successfully used by loons. The nesting platforms are intended to float with rising water levels, hoping to prevent eggs from being inundated during the incubation period. Three platforms were deployed in the survey area, while the other two were located downstream but were still monitored.

Use of nesting platforms:

In 2012 five loon nest platforms were distributed over the system: three at the southern end of Long Lake, one each in Aguasabon and Hays Lakes. Annual surveys identified that only the platform on Hays Lake was used (2013-2015 and again in 2017).

Shoreline nesting success survey:

The Long Lake shoreline was surveyed by boat in May to identify nests, and again in July to determine if nesting pairs successfully incubated and hatched young. Surveys took place annually from 2012 to 2019. Results showed considerable variation in adult loon numbers between years and survey periods (Table 1). Young loons were observed in several of the years monitoring. Only one of the platforms was utilized successfully by loons but it was not one of the ones in the survey area.

Table 1: Summary of Loon Surveys on Long Lake from 2012 to 2019. Table identifies how many sites were surveyed, the number of loons observed and the number of nesting pairs and corresponding chicks.

	First Survey*		Second Survey**		
Year	Locations	Adult Loons observed	Locations	Adult Loons observed	Nesting pairs to Chicks
2012			9	18	1 nesting pair with 1 chick
2013	15	36	12	28	1 nesting pair with 1 chick
2014	8	12	13	21	2 nesting pairs, each with 1 chick
2015	16	19			
2016	3	5	12	17	1 nesting pair with 2 chicks
2017	11	23	3	3	No nesting/chick observations
2018	2	3	18	24	1 nesting pair with 2 chicks
2019	2	2	5	7	0

* Generally first survey in June and second in July. No chicks were observed during the first survey in any year.

** Note that the number of adult loons observed is much higher than the nesting pairs. Long Lake is likely being used as a feeding site for loons who are not breeding.

Nesting success was compared to water levels throughout the nesting period (Figure 4. Long Lake water levels, 2009, 2012-2019 (April - June), red lines (years 2009, 2015, 2017 and 2019) are years with no nesting pairs or loon chicks observed in surveys.Figure 4). The poor nesting success in 2009, 2015, 2017 and 2019 may be attributed to a comparatively sharp rise in water levels from the end of April to early May. Although a causal relationship is inconclusive at this time, MNRF recommends the annual survey of nesting platforms and nesting successes on Long Lake be continued.

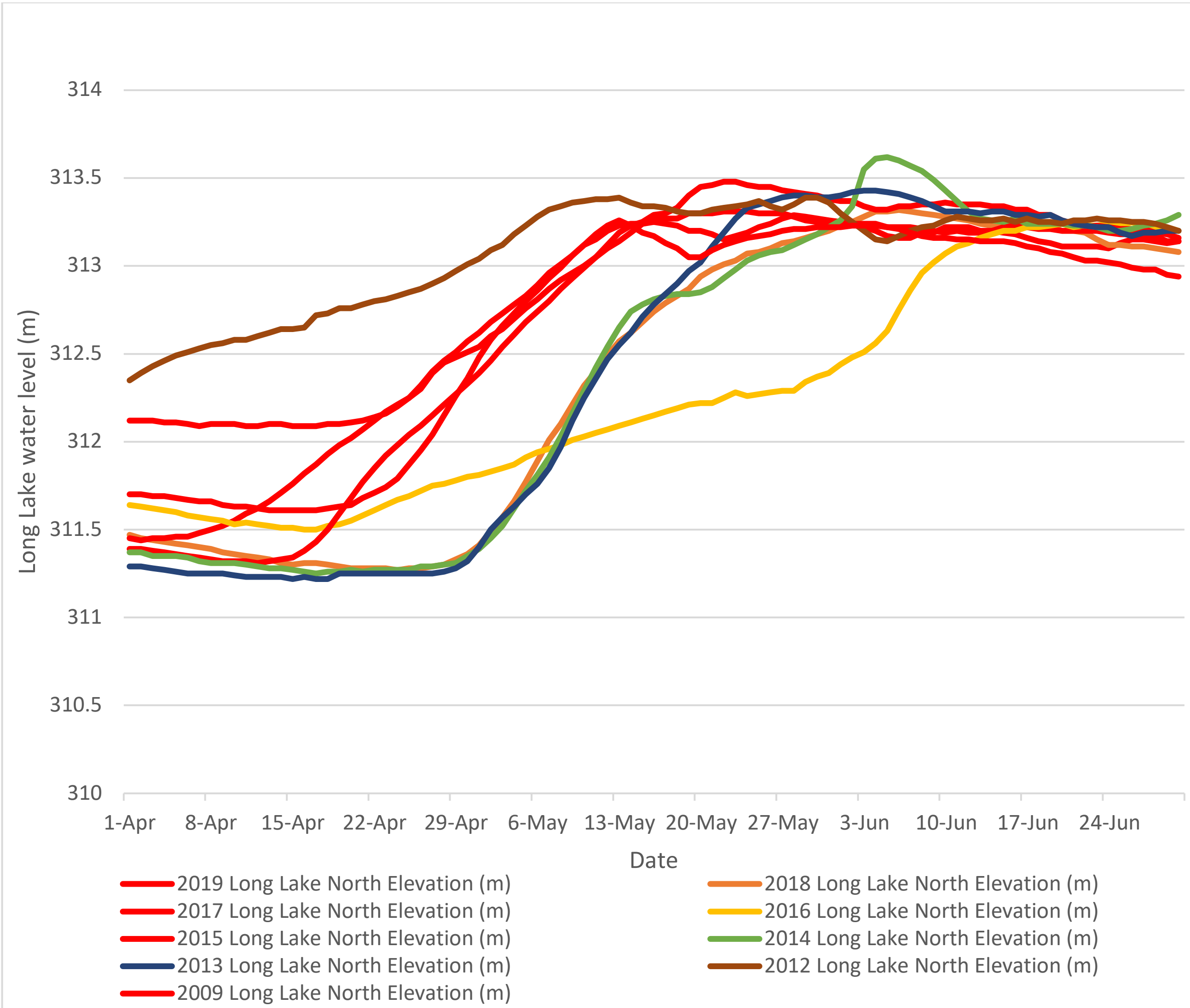

Figure 4. Long Lake water levels, 2009, 2012-2019 (April - June), red lines (years 2009, 2015, 2017 and 2019) are years with no nesting pairs or loon chicks observed in surveys.

5.3.1.5 Amphibian Survey / Riparian Health Objective: LL-6

During the preparation of the WMP, concerns were voiced that past management practices may have been detrimental to the health of wetlands associated with Long Lake. The Provincially Significant Isis wetland found at the northern most part of Long Lake, was of particular interest. The Isis wetland is 467 hectares in size, including 75 hectares of fen and 196 hectares combined swamp and marsh.

To address riparian health, amphibians are often used as a surrogate to document changes to wetland complexities. Amphibian call surveys are used to record the emergence, peak, and lull of breeding frogs and toads between May – July. Over time, data can be used to show changes or stability in the distribution of amphibian species. Although these surveys were carried out annual between 2013 – 2019, they did not conform to Bird Studies Canada's Marsh Monitoring Program, and thus data are not quantitative to deal with analyses of change over time. The number of species (4) never changed over time, but variation in survey date (a non-standardized variable) may have influenced the species and intensities documented, and likely missed the late calling sequence of American Toad. Species documented on the survey route included, Spring Peeper, Wood Frog, Chorus Frog, and Northern Leopard Frog. The wetland hasn't changed over time, as well as the composition of amphibian species noted during surveys. Thus, in 2019 it was concluded that amphibian surveys were no longer required because the wetland is considered stable and unchanged.

5.3.1.6 Brook Trout Spawning — Objective: LL- 7

Monitoring objective for Lake Trout were expanded in 2017 to investigate spawning activities of Brook Trout (*Salvenius frontenalis*) in Long Lake above the Long Lake Control Dam. At present, little is known about brook trout populations in Long Lake, mainly because the species has been understudied and few current day angling records support known distributions. Brook trout occupy both cold water tributaries of Long Lake and the lake environments itself; however, it's unknown whether Brook Trout migrate from the lake environment to spawn over riverine gravel beds, or over lake shoals along shoreline habitats, or a combination of both strategies.

Previous lake assessments revealed limited brook trout data, which may be a result of stratified sampling in unfavorable brook trout habitats, with non-trout specific objectives. Brook trout distributions in Long Lake were used to populate fisheries maps of the Geraldton Administrative District Boundary in the 1990s. All tributaries entering Long Lake were documented as bearing brook trout, identified through electrofishing, angler diaries, and former creel surveys.

In efforts to identify brook trout spawning areas, and associated spawning timing windows in Long Lake, MNRF implanted three adult brook trout (> 900 g) with acoustic transmitters in the spring of 2018. Marked fish were captured in the Catlonite Bay area close to a shoal identified as part of a previous telemetry study. These fish were tracked over the spawning period (September-November) in 2018 using a series of stationary receivers situated throughout the lake however, results are considered preliminary as additional receivers are needed to improve accuracy of fish movements. Monitoring and captures will remain ongoing into future years until all the transmitters are deployed.

5.3.1.7 Beaver Population — Objective LL-8

A survey was distributed to the Greenstone District Trapping council (2015) requesting for registered trapline holders that overlapped Long Lake, to respond about their understanding of beaver populations throughout the lake. Trappers unanimously responded that trapping beaver was largely unsuccessful and avoided due to 3 primary reasons; 1) lake levels were unpredictable during the open season for beaver, making it difficult to set beaver traps in water levels where they would be effective or where trappers could easily retrieve them, 2) beavers have adapted to variable lake levels and created tunneled entrances deep below the water surface accessing the lodge, which are not accessible to trappers, and 3) the poor returns on beaver pelt sales over the past decade is simply not financially feasible to support trapping costs and efforts. Beaver populations are considered stable on Long Lake because they are not trapped but no conclusions can be determined on whether operations are having an effect on the beaver population on Long Lake. Trappers use Long Lake as a source population and target those beavers that disperse to adjacent smaller lakes and ponds.

This effectiveness monitoring commitment is considered complete. No changes to the WMP are proposed.

5.3.2. KENOGAMISIS EMP Results

Table 1. MNRF Effectiveness Monitoring Program commitments for Kenogamisis Lake

Code	Objective	Proposed Frequency	Commitment	Result	Status
KL-1	Study walleye population to try to determine if specific water level regimes are problematic. Could use poor year/age of fish and try to relate to specific water management	5-year intervals	BsM sampling to monitor as a FMZ 7 walleye trend lake	Smaller adult body sizes compared to other lakes in FMZ 7	Stable walleye population

5.3.2.1 Walleye Population Objective: KL-1

The provincial Broad-scale Monitoring (BsM) program was created in 2008, to evaluate Ontario’s fisheries in a consistent and standardized method. These surveys are used to assess relative abundance of fish within identified trend lakes, monitored in 5-year cycles. Kenogamisis Lake was identified as a trend lake and received sampling in 2008 during cycle 1, 2013 during cycle 2, and 2018 during cycle 3.

A metric used to describe a walleye fishery is to compare kilograms of adult sized walleye (≥ 350 mm total length) catch per unit effort (CPUE) per standard North American (NA1) net in a specific lake to the average adult walleye size across the Fisheries Management Zone (FMZ). Walleye CPUE for Kenogamisis Lake was 2.14, 2.51, and 2.59 kg/net, during cycle 1 cycle 2, and cycle 3, respectively. Walleye CPUE for FMZ 7 was 3.14, and 3.48 kg/net in cycles 1 and 2, respectively; surveys are not complete for cycle 3 to compare Kenogamisis Lake to the whole FMZ 7. Data from the first 2 cycles suggests that walleye within Kenogamisis Lake are abundant but, adult body size is relatively small.

Reporting on walleye abundance and age class distribution for Kenogamisis Lake is of limited value to the water management plan because the tributaries of Kenogamisis Lake are not managed, and walleye spawning in these tributaries are minimally impacted by drawdowns at the outlet (Kenogamisis Lake Dam). As a result, MNRF recommends removing the commitment to study walleye populations within Kenogamisis Lake from the water management plan. Note that Kenogamisis Lake will continue to be surveyed as part of the BsM program every 5 years and survey information can be used in the future if concerns arise. It would be of more value to the WMP to investigate walleye spawning in the Kenogamisis River, below the Kenogamisis Lake Dam, as this area is affected by flows and levels.

5.3.3. CHIPMAN LAKE EMP Results

5.3.4. AGUASABON RIVER EMP Results

The Effectiveness Monitoring commitments associated with Aguasabon River arose because of concern that flow out of the LLCD was not sufficient to protect aquatic life. The area immediately below of the LLCD was regularly dewatered by nearly 90%. Concerns about survival of benthic invertebrates and access below the LLCD for fish spawning were identified. As a result, the 2013 ASRWMP implemented a minimum flow intent of 12 cms during the spring and 10cms during other times of the year. A number of the effectiveness monitoring commitments identified below aim to evaluate the impact of this change on various facets of the aquatic ecosystem.

Table 3. MNRF Effectiveness Monitoring Program commitments for Aguasabon River. These commitments are related to the ecological objective ‘Protect, Restore and Enhance Aquatic Ecosystems’.

Code	Objective	Proposed Frequency	Commitment	Result	Status
AR-1	Electrofishing survey	Annually, in August. Only conducted when water levels are low.	Monitor small fish communities to determine if operations have an effect on near shore areas	Surveys completed in 2015, 2016, 2017, 2018 and 2019.	Ongoing
AR-2	Evaluate the impacts of spring flow intent	Annually in October pending favorable water levels. Note, high water levels can limit access to the sites.	Benthic Survey below LLCD. Two riverine sites, one Lake site and one reference site.	Surveys completed in 2013, 2015 and 2016. Riverine sites are considered healthy	Ongoing

AR-3	Water quality Monitoring	Annual temperature and Dissolved Oxygen monitoring.	To determine thermal mixing depths versus flow from LLCD. Monitor seasonal changes in flow regimes through time in regards to thermal mixing in lake environments.	Annual monitoring completed	Ongoing
AR-4	Walleye/ brook trout studies	Annual driftnetting for brook trout	Driftnetting used to monitor spawning of brook trout, in the Aguasabon River	Annual surveys completed for brook trout	Ongoing
AR-5	Walleye/ whitefish studies	Annual visual walleye surveys in spring	To monitor spawning of walleye and lake whitefish in the Aguasabon River	Annual surveys completed for walleye.	Ongoing
AR-6	Walleye/ brook trout studies	Proposed survey in 2013 for brook trout	Mark and Recapture program for brook trout	Completed surveys for brook trout in 2015	ongoing
AR-7	Walleye/ brook trout studies	Proposed multi year study 2013-2014	Monitor brook trout/walleye movements	Completed, methods used were not ideal.	No further monitoring at this time.
AR-8	Walleye/ brook trout studies	Proposed survey in 2014	Mark and Recapture walleye – L. Aguasabon River	Completed survey in 2016	ongoing
AR-9	Creel Survey	Proposed survey in 2014	To determine angler fishing statistics for the Aguasabon River	Completed in 2014 – Angler Access Creel	ongoing
AR-10	Groundwater level monitoring	Multi year study	OPG Piezometer/ groundwater study at BT spawning area	Completed 2015-2017	No further monitoring at this time.

AR-11	Water quality Monitoring	Annual temperature and Dissolved Oxygen monitoring.	To determine thermal mixing depths versus flow from LLCD. Monitor seasonal changes in flow regimes through time in regards to thermal mixing in lake environments.	Annual monitoring completed	Ongoing

5.3.4.1 Monitoring Small Fish Objective: AR-1

The purpose of the small fish monitoring program is to assess composition and abundance of the nearshore fish communities affected by water fluctuations from the LLCD. Up to four sites within 1.5 to 12km downstream of the LLCD are surveyed by electrofishing in August or September, when the low flow is as near as possible to the 10cms minimum flow identified in the water management plan. One site is considered outside of the influence of the LLCD and is used as a reference site. Each site is approximately 75 m in length and covers the area abutting the shore up to 1m in depth. Fish collected are identified, counted, weighed and measured. Not all sites have conditions favorable for electrofishing each year, making it difficult to compare between sites. However, one site located downstream of LLCD as well as the reference site along the Little Aguasabon River provide some insight into small fish community composition through time.

The site below LLCD showed a marked increase in the sculpin catch from 2015 through 2018, with a similar decline in dace (blacknose and longnose combined) species (Figure 5. Aguasabon River electrofishing catches from 2015 to 2018 at the Long Lake Control Dam (LLCD) site.Figure 5).

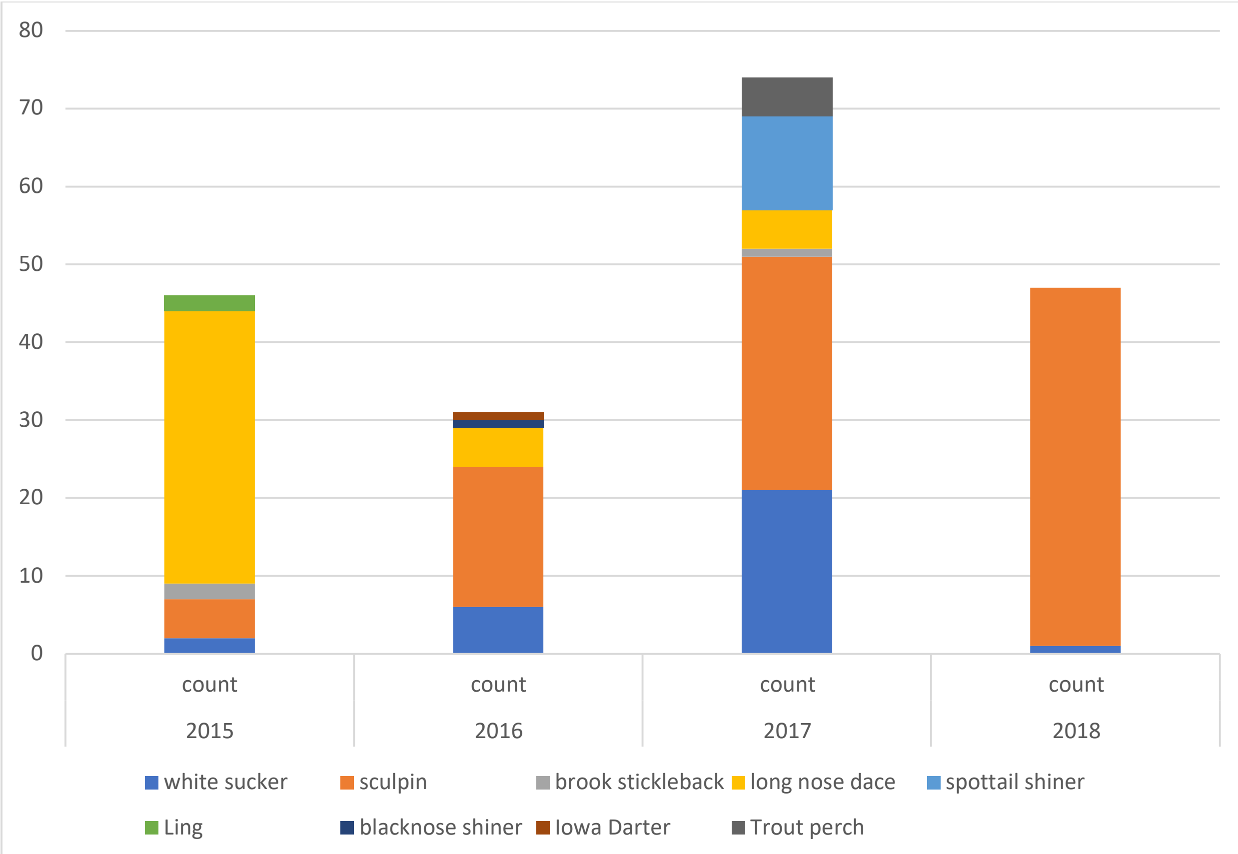

Figure 5. Aguasabon River electrofishing catches from 2015 to 2018 at the Long Lake Control Dam (LLCD) site.

Samples collected at the reference site located in the Little Aguasabon River show a fluctuation in total catch from 2015 to 2019, however, the composition remained reasonably stable with the majority of the catch being dace (blacknose and longnose combined) (**Error! Reference source not found.**Figure 6).

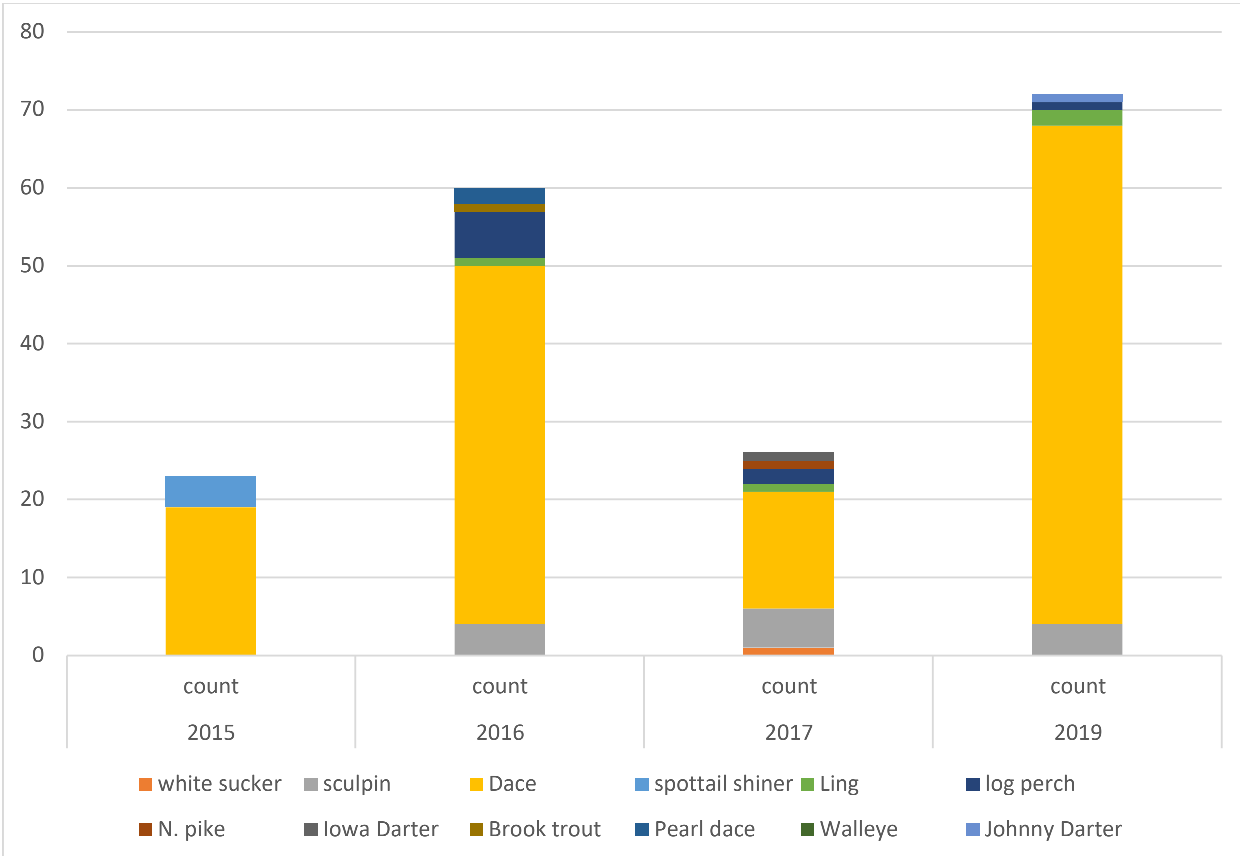

Figure 6. Number of small fish captured at the reference site at the Little Aguasabon River from 2015 to 2019.

In summary, although the timing of the sampling coincides with a good small fish distribution and sufficient size of young fish to capture using electrofishing, annually there does not seem to be enough time to consistently sample all sites before water levels increase. The recommendation is to consider beginning electrofishing earlier in August if water levels approach the minimum flow to hopefully get all sites sampled annually. Currently, this project is ongoing and monitoring of small bodied fishes should continue at the four sites to determine the effect of water level fluctuations by the LLCD on small bodied fishes abundance and species composition.

5.3.4.2 Benthic Survey Objective A-2

As part of the Aguasabon 2013 water management plan, a new 'intent' was made to provide a more ecologically appropriate minimum flow (12 cms) during the spring at the LLCD.

As a result, benthic invertebrate monitoring was completed to provide baseline information on the health of benthic communities below the LLCD when associated with the intent flow.

Three sites are located below LLCD, two in the riverine environment and one in Aguasabon Lake. A fourth site, located within the Little Aguasabon River, is not influenced by regulated flows and was sampled as a reference site. Note, these sites are the same as sites surveyed using electrofishing (see A-1). Surveys are scheduled annually in October.

Benthic invertebrate samples were collected in 2013, 2015 and 2016 using the Ontario Benthos Biomonitoring Network Protocol (OBBN), although no replicates were sampled in 2016. Benthic invertebrates were identified and species richness, biological indices (e.g., diversity and Ephemeroptera, Plecopteran, Tricoptera; EPT) relative abundance of invertebrate taxa were calculated and compared between years and sites (Table 4).

Generally, the results indicate that systems are healthy and considered high quality fish habitat. Although there is some between-year variation noted for the Harvey and Sandbar sites, mostly in regard to chironomids and EPT. Overall, the Sandbar site had a lower EPT composition in 2013 and 2015 as compared to the other sites, however this site might expect to have a lower EPT as it is located in a lake as opposed to riverine environment.

MNRF will consider pausing surveys or reducing the sampling frequency for years when the minimum flow intent is met since appropriate baseline information has been captured. Future surveys should focus on years when the minimum flow intent is not met, and for a few years thereafter to assess the impact of low water levels on the benthic community and to assess the resilience or how long it takes the community to rebound after a low water event.

Table 4. Summary of diversity indices and for benthic samples collected in the Aguasabon River system, 2013, 2015 & 2016

Site Name	Date	Species Richness	Shannon's Diversity Index (H)	Hilsenhoff's Biotic Index	% EPT*	% Chironomid	% worms	% dominants
Little Aguasabon	15-Oct-13	8.3	1.34	4.95	78.4	11.0	0.6	58.3
	8-Oct-15	8.0	1.30	4.92	79.3	11.4	0.0	56.8
	7-Oct-16	8.7	1.50	5.20	70.1	10.8	6.2	45.8
Harvey	17-Oct-13	7.3	1.28	4.79	85.6	4.7	1.3	48.8
	7-Oct-15	8.0	1.24	4.85	75.2	20.8	0.3	53.5
	7-Oct-16	7.0	1.26	5.50	57.5	38.7	0.0	38.7
Sandbar	22-Oct-13	9.3	1.23	6.90	3.8	65.2	13.1	65.2
	8-Oct-15	10.5	1.58	6.30	15.0	53.4	9.3	53.4
	12-Oct-16	9.0	1.59	5.40	44.4	18.3	0.0	43.7
LLCD	22-Oct-13	6.3	1.32	5.03	75.5	15.1	2.9	40.1
	7-Oct-15	6.5	1.16	4.42	85.6	10.4	0.4	60.1
	12-Oct-16	8.0	1.51	4.60	76.9	5.6	1.9	45.4

*EPT Index is based on richness of species within the insect orders Ephemeroptera, Plecoptera and Trichoptera (mayflies, stoneflies and caddisflies).

5.3.4.3 Water Quality Monitoring Objective: AR-3

MNRF has not fulfilled this commitment. Some commitments made in the WMP are being met through other initiatives that were implemented after the approval of the WMP, are now the responsibility of another Ministry, or may be met based on future work planning. Over time and since the approval of the WMP, ministry priorities, structure and approaches have shifted including those for Water Management Plans. Work undertaken by MNRF must always be considered relative to current established priorities, resourcing and workloads.

5.3.4.4 Brook Trout Spawning – Driftnetting Objective: AR-4

The success of the spring intent of the LLCD (to provide minimum flows of 12 cms for spawning purposes; see section 10.4.1 in the ARSWMP) was evaluated by monitoring brook trout spawning success. Brook Trout fry were monitored annually from 2010-2019 within the Aguasabon River.

Drift nets were deployed downstream of brook trout spawning areas (redds) in April through May to capture brook trout fry drifting downstream. Fry were captured, counted and released alive. Instrumentation positioned on the drift nets recorded water flow and nearby data loggers recorded temperature of the redd.

Hauser (2017) reviewed the data from 2010-2016 for relationships between the number of brook trout fry captured, river flow and temperature of the redd. Hauser concluded that there is an optimal temperature for which brook trout fry are more abundant and that higher flows encourage drifting.

Figure 7. Total catch of brook trout fry (# of fry) and effort (days /year) according to year along the Aguasabon River.Figure 7 shows the annual catch of fry according to netting effort. Note that data is not shown for 2010 and 2017 due to extreme water levels. In 2010, water levels were so low that the normal spawning redds were exposed, making it difficult to compare results to the other years and high water levels in 2017 prevented sampling. Results show substantial variability in catch between years despite a reasonably consistent effort.

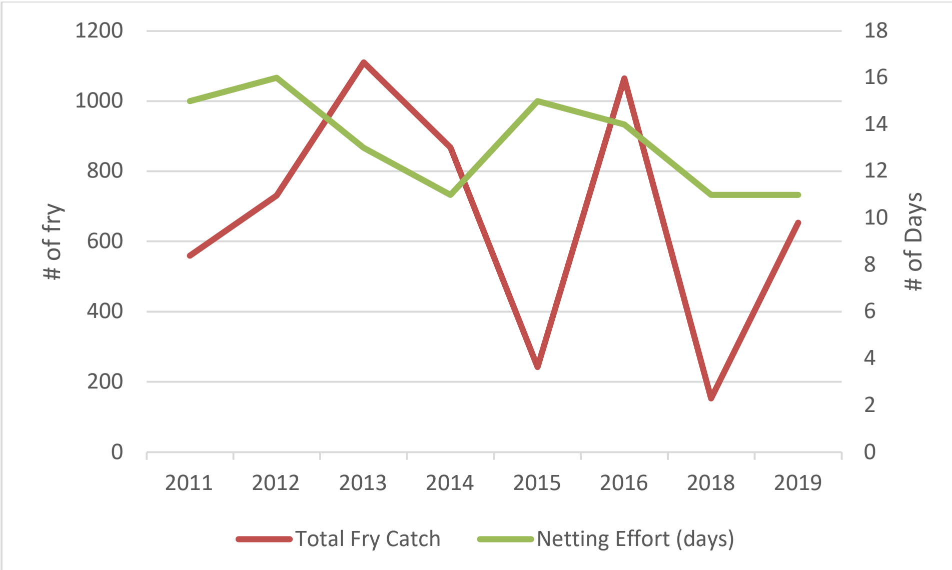

Figure 7. Total catch of brook trout fry (# of fry) and effort (days /year) according to year along the Aguasabon River.

The bulk of the fry were caught between mid-April to mid-May. As a result, the start of the driftnetting survey period has been shifted to a later start date (mid-April). However, it should be noted that the full survey may be shortened in some years because higher flows later in May tend to foul the nets. As a result, fry catch numbers may be misrepresented in these circumstances. Currently, the project is ongoing. Focusing future survey effort on the peak period of larval drift from the end of April to the beginning of May will help to mitigate high water effects and provide a consistent window for comparing annual changes.

5.3.4.4 Walleye & Lake Whitefish Spawning — Objective: AR-5

The purpose of this monitoring program is to confirm the use of spawning areas by walleye and lake whitefish and to assess whether the minimum flow intent of 12cms (spring intent) or 10 cms (fall intent) is sufficient to enable spawning activities for these species. Annual monitoring also provides an opportunity to evaluate whether lower flows create a barrier to fish spawning if the minimum flow intent is not met. Since the 2013 plan, the minimum flow intent of 12cms has been met during the spring.

Walleye:
Visual spawning surveys for walleye were conducted in the spring from 2014 to 2019 at a maximum of eight known spawning areas downstream of the LLCD. Since the new spring minimum flow was implemented, annual spring spawning surveys have confirmed walleye can access spawning areas throughout the system at this flow, and no concerns have been raised. Although walleye are able to access the area directly below LLCD, the majority of walleye spawning observations occurred in the Little Aguasabon River.

MNRF recommends continuing this survey since it is helpful to identify annual variation in spawning abundance and timing as it relates to changing flows during the spring period.

Whitefish:

Although monitoring whitefish spawning is identified as a commitment in the ARSWMP, there are no known spawning locations along the managed portion of the Aguasabon River. The only known whitefish spawning occurs along the Little Aguasabon River, which is not influenced by the LLCD. Identifying new whitefish spawning sites is challenging as whitefish are less visible when conducting night visual surveys. In addition, catch and release methods (e.g., dip netting) to determine whether whitefish are present at a potential spawning location tends to be lethal. As a result, MNRF does not intend to continue this program on whitefish. It is recommended that this commitment be removed from the ASRWMP.

5.3.4.6 Mark/Recapture of Brook Trout Objective: AR-6

Mark and recapture surveys occurred at the only known spawning area below LLCD, in 2006, 2008 and 2015. Brook trout were captured using short set gill nets during the fall spawning period, usually mid to late October. Fish were marked by "T" tag and fin rays were collected and sent to Dryden lab for aging. The 2006 and 2008 surveys used a daily mark and recapture over a 2-week period, whereas the 2015 survey used the Peterson method where the first week is focused on marking fish and the second week focusses on fish recapture.

Population estimates of 72 and 64 brook trout were obtained in 2006 and 2008, respectively. The population estimate in 2015 was more than double (164) the estimates for both 2006 and 2008. Part of this increase is likely attributed to a change in mark and capture methods.

Currently, it is not known whether LLCD operations are having an effect on brook trout populations and MNRF recommends that the population estimate surveys continue. However, consideration should be made to ensure frequency of the surveys does not exceed the median age of the fish population (approximately 3 to 4 years old) in order to follow age class strength through time.

5.3.4.7 Monitor Brook Trout & Walleye movement Objective: AR-7

The minimum water levels under the old ASRWMP impeded access to spawning grounds for fish and was detrimental to the incubation of eggs. Studying walleye and brook trout movements below LLCD in relation to water levels is intended to assess whether the new minimum flow intents have alleviated these challenges.

Eleven Brook trout and six walleye were affixed with acoustic monitoring tags from 2012 to 2014. Acoustic transmitters (as opposed to radio-telemetry transmitters) were thought to be a better choice for fish residing in the fast water environment because they do not have an associated antenna, which is thought to reduce resistance from the high flows.

Unfortunately, ambient noise of the river, particularly in rocky areas with lots of flow, interfered with the ability of receivers to track fish movements using the acoustic technology. However, enough information was obtained to note changes in walleye spawning behavior. Walleye appeared to move from the area directly below the dam to areas further downstream to spawn. This is corroborated by the higher observations of walleye spawning in Lake Aguasabon as compared to immediately south of the LLCD (See 5.3.4.4 Walleye & Lake Whitefish Spawning Objective: AR-5). The results also identified that both walleye and brook trout movements range from LLCD, south to Hays Lake.

Further study on the walleye spawning behavior below the LLCD may be warranted to understand the relationship between flow, spawning locations and spawning success. Despite the amount of drag that radio-telemetry transmitters might impose on walleye living in a fast water environment, it is likely the best choice to locate fish residing in fast flowing environments that cause too much noise interference for acoustic transmitters. This may take several seasons to get a range of spring flows.

5.3.4.8 Mark/Recapture Walleye in the Lower Aguasabon River Objective: AR-8

The mark and recapture program was completed in 2008 at the mouth of the Little Aguasabon River, before changes to the water management plan were implemented. Population estimate is provided in Figure 8. Aguasabon River spawning walleye population estimate for 2008, using three methods on cumulative catches (Schumacher, Schnabel and Peterson)Figure 8. Surveys were completed after the new minimum flow intent was initiated to determine whether changes resulted in increased spawning success for walleye.

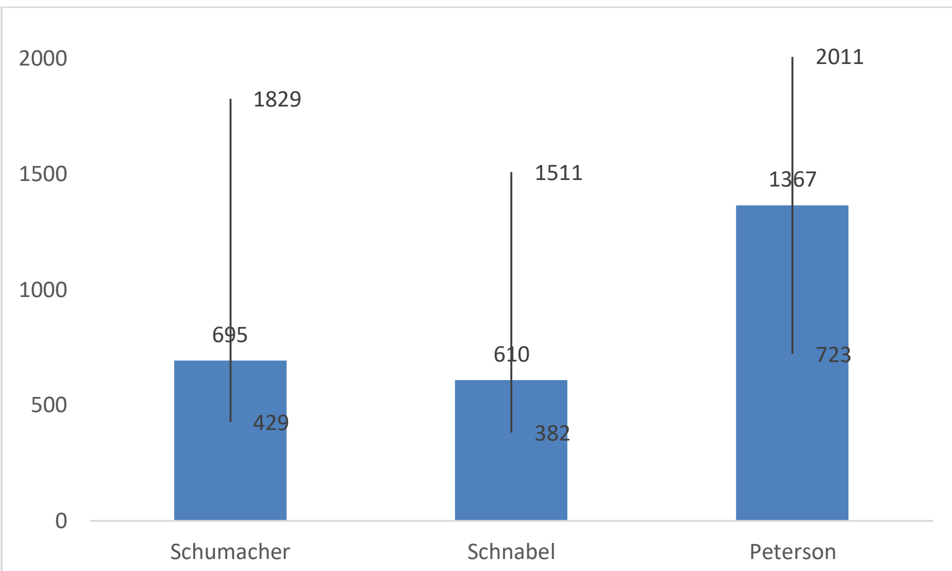

Figure 8. Aguasabon River spawning walleye population estimate for 2008, using three methods on cumulative catches (Schumacher, Schnabel and Peterson)

Mark and recapture surveys for walleye were conducted in May 2014, 2015 and 2016 at the mouth of the Little Aguasabon River using trap nets. Fish were marked via fin clip and “T” tags, and samples were collected for aging. Catches were too low in 2014 and 2015 to report on, and only 28 walleye were marked in 2016. Unfortunately, no population estimate was calculated in 2016 because of the low number of walleye marked and recaptured. Another walleye survey is planned for 2020.

Pike and white sucker were also caught in the trap nests as by-catch in both 2008 and 2015. A shift to younger age classes for pike is notable in the 2015 survey (Figure 9).

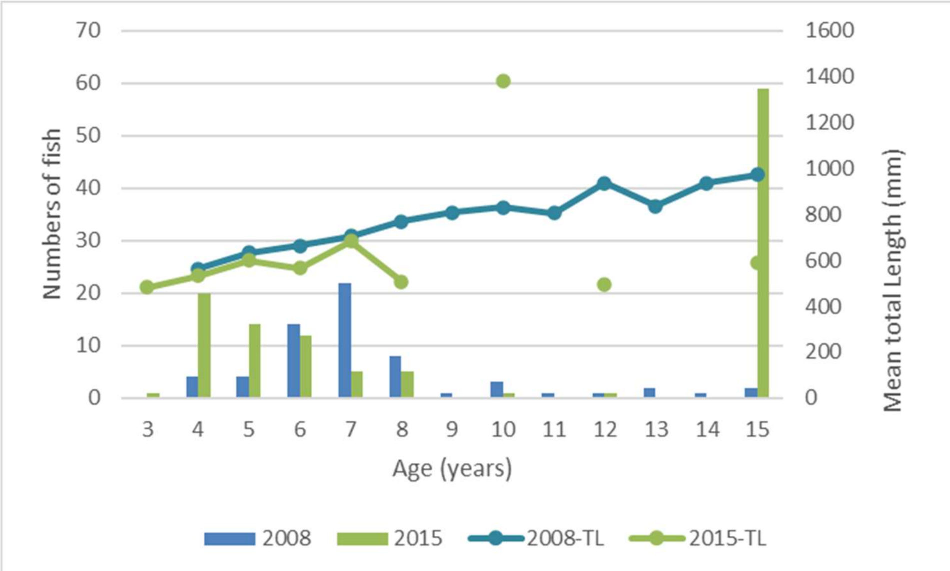

Figure 9. Aguasabon River trap netting catch of Northern pike, 2008 (n= 63) and 2015 (n=59). Numbers and Size (mean total length (mm) at age)

Four hundred and thirteen white suckers were caught as by-catch in 2008, although ages were not obtained. The survey in 2015 caught 211 white suckers and showed a healthy age and size distribution (Figure 10).

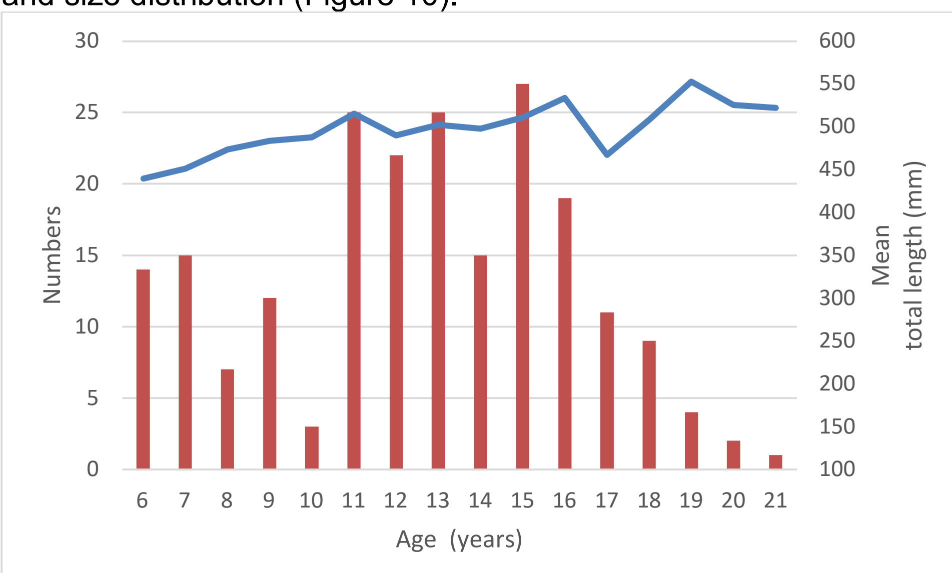

Figure 10. White sucker catch (red bars; *n*=211) and average length (blue line) according to age.

The number of white suckers appears to be sufficient in all the survey years to produce population estimates. Consideration should be made towards including white suckers as a monitoring tool because populations are not influenced by harvesting, and changes to the population parameters can be better attributed to environmental conditions.

The project is ongoing and no changes to monitoring program or operations are being considered at this time.

5.3.4.9 Creel Survey Objective: AR-9

Creel surveys are used to assess fishing pressure and collect biological samples from harvested fish for an area. Angling pressure and results from the biological samples (e.g., age, size) can provide an indicate of the health of the fish population.

A creel survey was conducted in 2014 to estimate fishing pressure at Hays Lake and the Aguasabon River below the LLCD. The survey was designed to intercept anglers at access points, but the hours worked by surveyors did not overlap well with anglers returning from their day of fishing. As a result, direct interviews with anglers were rare. Vehicle counts at the access sites were the closest indicator of fishing effort. Based on vehicles alone, angling effort is estimated to be low.

To address the shortfalls of the 2014 survey, MNRF recommends employing a roving creel survey in 2020. This method intercepts anglers while out on the water and interviews them directly; collecting information on how they accessed the water, how many hours spent fishing, the number of fish caught or released and collects biological samples for those fish kept.

The additional roving creel study was not completed at the time of writing this report.

5.3.4.10 Piezometer/Groundwater Study – Brook Trout Spawning Objective: AR-10

Areas of groundwater upwelling are used by brook trout for spawning. The groundwater is thought to prevent eggs from freezing or being dewatered during the winter incubation period. Groundwater flow and temperature are thought to be sensitive to waterpower operations. As such a study was undertaken (Slongo Study) and no connections were made to operations of the Long Lake Control Dam and impacts on Brook Trout larval incubation.

Impacts of the LLCD operations on temperature and groundwater levels were investigated by Slongo (2018). Temperature loggers and measuring probes were installed within the only known brook trout spawning area along the Aguasabon River approximately 12 km downstream of LLCD. Temperature and the amount of groundwater flow present at the site was measured during the egg incubation period (fall 2016 to spring 2017). Increases in flow from the LLCD were found to temporarily impact the groundwater upwellings and as a result decrease the temperature of the spawning locations to near freezing conditions. In response to this observation, the potential impacts of the lower temperatures on egg incubation was studied in a controlled environment at the Dorion Fish Culture Station.

Results of the controlled temperature study demonstrated that cold temperature shock on incubating brook trout eggs has relatively no effect on incubation success. Although it is noted that increased flows from LLCD may also influence dissolved oxygen, pH and conductivity, other factors that may influence brook trout spawning success. This study is considered complete.

5.3.4.11 Water Quality Monitoring – Thermal mixing Objective: AR-11

Diversion and Aguasabon lakes have a high load of woody debris on their lake bottoms from the decades of historical log drives along the river. High amounts of woody debris consume available oxygen during the decomposition process, which has the potential to create an anoxic environment in the hypolimnion (layer of water below the thermocline) when the lake is stratified. The intent of this program was to determine levels of dissolved oxygen within these lakes and secondly whether water flow impacts levels of dissolved oxygen.

Methods:
Water chemistry and temperature profiles were monitored below LLCD within Aguasabon and Diversion Lakes, over various flow conditions. Dissolved oxygen profile was measured manually at two locations (one within Diversion Lake and the other within Aguasabon Lake) monthly from June to October 2015-2019. At these sites, temperature was recorded from the water surface to 1m off the lake bottom.

In addition, temperature of riverine environments was also measured for reference purposes. Temperature loggers were set at 6 sites from a kilometer below the LLCD to Terrace Bay in riverine habitats. Temperature loggers were set at varying depths (from 5 to 29m) and monitored temperature on an hourly basis from May to October for the years 2015, 2016, 2018 and 2019.

Dissolved Oxygen results:

Results suggest that dissolved oxygen is a concern in the lakes during summer stratification. The dissolved oxygen levels in the hypolimnion went below the threshold required to support fish. Increasing the minimum flows to 10 cms in the non-spawning period as part of the 2013 ARSWMP appeared to delay the onset of thermal stratification and reduced its duration. Further modeling of temperature and dissolved oxygen may lead to better understanding of their relationship with changes in flows. MNRF recommends continuing to monitor Dissolved Oxygen and temperature.

5.3.5. HAYS LAKE EMP Results

5.3.5.1 Water level changes below lower compliance

5.3.5.2 Shoreline impacts of low levels

<u>Hays Lake Drawdown Study</u>

In 2013 OPG Environment staff, in support of Northwest operations were engaged to support a shoreline water drawdown study on Hays Lake as part of the Aguasabon River Water Management plan (WMP) effectiveness monitoring study. The regulators interest in increasing minimum flows within the main branch of the Aguasabon River (water controlled at the Long Lake Control Dam (LLCD)) was a primary motivation for undertaking the study.

Historically flow at the LLCD was reduced to a minimum (either leakage or 2 cms) during times when maintenance is performed at the Aguasabon Generating Station (GS). This is mainly done to reduce the quantity of flow bypassed around the station during maintenance work. With a higher minimum flow from the LLCD (10 cms), there would be an increased quantity of spill during maintenance. As an adaptive management undertaking, it was agreed that OPG would be allowed to temporarily reduce the level on Hays Lake below the existing lower compliance line (273.40 m) in advance of maintenance work to increase the amount of storage room. This would essentially maintain a similar quantity of spill in the system on a whole, but would allow for higher flow at LLCD, which is beneficial to the resident brook trout and walleye populations. Since 2013, OPG has been reducing the water level below the existing compliance level to as low as the current winter low of 272.20 m and performing a visual assessment of various areas around Hays Lake to assess the impact of lowered water levels.

The following is the concluding statement of the study:

Over all the shoreline drawdown study on Hays Lake was consider a success in terms of supporting adaptive management activities under the Aguasabon River Water Management Plan. Shallow, nearshore, littoral habitat was observed and assessed at a number of different elevations as potential changes to the operating flows on the Aguasabon River were considered.

In terms of habitat function and quality, outside of the spring spawning window for warm water fish (i.e. white sucker, walleye and northern pike), the drawdown level to 272.85 m does not appear to alter the overall quality of nearshore habitat in Hays Lake (from a biological significance perspective).

By drawing the reservoir down to 272.85 m, the quantity of habitat, in terms of square meters, may be reduced. However Hays Lake has been routinely drawn down in the winter to 272.20 m since the generating station began operation in 1948. As a result, aquatic vegetation and large benthic invertebrates (i.e. mussels etc.) do not extensively colonize the near shore littoral habitat. For these reasons the nearshore habitat within Hays Lake which routinely becomes exposed is characterized as poor/limited from a fish habitat and productivity perspective. As a result, provided drawdowns occur outside of the spring spawning periods (i.e. May/June) a drawdown to 272.85m does not appear to add new operational impacts to the system. As such, it is concluded that risks to fish habitat would be minimal provided drawdown to 272.85 m occurs between July-Feb timeframe.

Drawdown to the winter low of 272.20 m exposed considerably more shoreline. Once again, since this reduction takes place on an annual basis in the winter period, the overall increase in operational impacts on Hays Lake from a fish habitat perspective is minimal/nil. Despite this, from a biological perspective, routine draw down to this low during the summer and early fall period is not recommended. Reducing the overall size of the water body on a routine basis during the summer/fall period may lead to concerns over mid-summer oxygen levels and/or water temperatures (especially in the summer months). In addition, the recreational use of the Lake becomes limited at this lower elevation due to difficulty with accessing the boat launches and exposure of reefs that are normally submerged. A short-term temporary deviation down to 272.20 m in advance of maintenance work at the generating station may be of low impact but extended periods of time at this elevation may result in greater risks to fish and fish habitat as well as seasonal recreation opportunities.

5.3.5.3 Creel Survey – see results under 5.3.4.9

5.3.6. SOCIAL OBJECTIVES EMP Results

5.3.6.1 Stakeholder comment tracking

Kenogamisis Lake

In 2016, MNRF staff received phone calls and a face-to-face visit from the owner of Kenogamisis Lake Resort. He had concerns about low water levels on Kenogamisis Lake in the late open water season, which can impact his water supply wells, as well as his ability to launch boats. Kenogamisis Lake was out of compliance (lower end) at the time of the visit from the Resort owner. MNRF staff assured the Resort owner that all possible steps had been taken at the Dam to maintain water levels in the lake.

In 2019, MNRF proposed a rehabilitation project for the existing Kenogamisis Lake Dam as a result of a Dam Safety Assessment that took place in 2015. As part of the Category B Project Evaluation – Class Environmental Assessment for MNRF Resource Stewardship and Development Projects, stakeholder and First Nation consultation occurred. Letters were sent to residents of Geraldton and Longlac, as well as to area stakeholders and local First Nations. A 30-day comment period was given, with MNRF receiving 2 comments from the public. One inquiry was from a resident of Camp 25, asking to be kept informed of when the rehab work was going to take place. The other was from the bait fish harvester in the area, inquiring about access to the lake that he traps minnows from during the rehab project.

OPG has no record of stakeholder comments outside of the SAC.

5.3.6.2 Erosion

OPG has not performed any specific studies for erosion.

5.3.6.3 First Nations, Historical and Culture

OPG has no record of stakeholder comments concerning First Nations, Historical or Cultural issues with the Aguasabon River System Water Management Plan.

5.3.6.4 Power Generation

There was one impact to power generation arising from an intent of the Water Management Plan. The intent to lower the Long Lake water level to 312.40m Oct 1-15 and then refill back into the normal range to support fall spawning Lake Trout has an impact during dry falls. During a dry fall there isn't enough inflow to refill the Long Lake water level resulting in entering the high demand winter period approximately 60cm lower than normal. This 60cm of water could have been used through the higher demand winter period for power generation. From 2012 - 2019, there has been 2 out of 8 years with dry conditions in the fall when the Long Lake water level was lowered to 312.40m then could not be refilled.

6. Data and Information Collection Program

6.1. Description

This section of the report provides a summary of the applicable DICP components outlined in Appendix 6 of the ARSWMP, including details on:

- background and intent of program component,
- timing and duration of data or information collection conducted,
- findings and conclusions, e.g., assessment of information,
- determination of whether revisions to the facility operations or to the DICP are required, e.g., proposed changes/amendments going forward.

6.2. Data and Information Collection Program Components

Appendix 6 of the ARSWMP lists a number of information gaps identified by the initial Steering Committee during the stakeholders' consultation process as points of interest or questions for future consideration. Filling these gaps was recommended to follow a cooperative approach between MNRF and plan proponents, as well as First Nations and other interest groups as applicable.

This section is a copy of Appendix 6 of the ARSWMP which is a table which identifies and describes the DICPs that involve OPG and MNRF facilities on the Aguasabon River System. The DICPs are listed as per the WMP, with planning team ranked items first, followed by unranked items, in order as per the WMP table.

1. *Maintain or Improve Public Safety*

   To manage water levels and flows to ensure the current level of public safety is maintained. Areas of concern included flooding, ice safety, and flow/level changes.

2. *Maintain or Improve Recreation, Tourism, and Commercial Experiences and Opportunities*

   To manage water levels and flows to maintain or improve the use of recreational areas such as marinas, parks, boat launches, boardwalks, and trailer parks.

3. *Maintain or Improve the Value of Water Power Generation*

   To manage water levels to provide the water storage and flexibility required to efficiently produce water power throughout the system.

4. *Protect, Restore, and Enhance Aquatic Ecosystems*

To manage water levels and flows to maintain or improve aquatic ecosystems on the Aguasabon River System. This includes fish, aquatic plants, invertebrates, mollusks and crustaceans.

5. *Protect, Maintain, or Enhance Waterfowl Habitat*

   To manage water levels and flows to protect or improve identified waterfowl nesting and staging areas on the system.

6. *Minimize Shoreline Erosion*

   To manage water levels and flows to minimize the instances of damage caused by shoreline erosion.

7. *Minimize Damage to Infrastructure*

   To manage water levels and flows to minimize damage to docks, bridges, dams, boat launches, and other facilities in the system. This includes ice damage in winter and water damage in summer.

8. *Protect Native Values*

   To manage water levels and flows to protect identified Native Values sites. It has been recognized that some of the other objectives work toward protecting Native Values such as those concerning aquatic ecosystems, wildlife, erosion, and infrastructure protection.

9. *Protect Historical and Cultural Sites*

   To manage water levels and flows to protect identified historical sites on the system. This objective also may effectively be achieved through other objectives such as minimizing erosion and damage to infrastructure.

10. *Protect, Maintain, or Enhance Wildlife Habitat*

    To manage water levels and flows to minimize the negative effects on riparian wildlife. This includes animals such as moose, beaver, shorebirds, amphibians, and reptiles.

6.3. Data and Information Collection Program Results

The list of data gaps associated with Appendix 6 of the Aguasabon River System Water Management Plan was intended to serve as a comprehensive compilation of all the unknowns or gaps in knowledge related to the system. It was never intended for all these gaps to be investigated, but for the list to provide flexibility and strategic options that could be investigated on an as needed basis as conditions changed or new issues arose. Upon plan renewal in 2013, the list of 41 data gaps were prioritized (top 25). Any of these prioritized data gaps, or their respective sub-components, that were deemed relevant were included as part of the Effectiveness Monitoring program and are reported on in in section 5.3.

Clarification of the intent of the data gaps table within the Aguasabon River System Water Management Plan to make it consistent with the intent of the 2016 Maintaining Water Management Plans Technical Bulletin may be considered as part of a future amendment.

7. Conclusions and Recommendations

This Implementation Report represents the first IR for the ARSWMP covering the period from April 1, 2013 to December 31, 2019. IR's are required to provide a summary of amendments, status of the Standing Advisory Committee, compliance reporting requirements, results of Effectiveness Monitoring and status and results of any data or information gaps.

Amendments

- There have been no amendments received or requested by OPG
- There was 1 amendment by the MNRF to align the plan with the 2016 Maintaining Water Management Plans technical bulletin

Standing Advisory Committee

- The SAC is active and operates under a Terms of Reference

Compliance Reporting

OPG has fulfilled all its compliance reporting requirements in a timely and complete manner, including incident notifications within 24 hours from occurrence, and summaries within the Annual Compliance Reports for each calendar year. Over the 5 years of this IR there were 4 incidents of operation outside of the mandatory operating limits prescribed in the ARWMP. Details can be found above or in the specific Out of Compliance letters provided by OPG to the MNRF.

Effectiveness Monitoring

In the ARWMP there are 7 Effectiveness Monitoring objectives on Long Lake, 1 on Kenogamissis, 1 on Chipman Lake, 11 on the Aguasabon River and 1 on Hays Lake for a total of 21. Of these 21 objectives, 14 are ongoing, 6 are complete and 1 is complete and recommended to move the study to a different location. Specific details on these studies can be found in the report.

Long Lake

- Long Lake Lake Trout spawning (ongoing)
- Study the effects of winter drawdown on Lake Trout recruitment (discuss results)
- Monitor Lake Trout population and assess class cohorts (re-assess population on 10 Y cycle)
- Loon nesting platforms (Ongoing)
- Amphibian surveys as a surrogate to determine the health of the Isis wetland (complete and remove this commitment)
- Long Lake Brook Trout spawning timing and duration (ongoing)
- Beaver populations (complete and remove this commitment)

Kenogamissis

- Kenogamissis Lake Walleye study to determine if specific water level regimes are problematic to population (Kenogamissis Lake tributaries are minimally impacted by drawdown on Kenogamissis so removed this commitment and study walleye spawning downstream of the Kenogamissis Dam)

Chipman Lake

- Chipman Lake Sturgeon spawning (complete)

Aguasabon River

- Electrofishing to determine if operations have an effect on near shore areas) (ongoing)
- Benthic survey below LLCD (ongoing)
- Water quality monitoring using temperature and dissolved oxygen to determine thermal mixing depths vs flow from LLCD in river environment (ongoing)
- Walleye and brook Trout studies – annual driftnetting for brook trout (ongoing)
- Walleye/Whitefish studies – annual visual spring surveys for walleye (ongoing)
- Walleye/brook trout studies – mark and recapture for brook trout (ongoing)
- Walleye/brook trout studies – monitor movements (no further monitoring)
- Walleye/brook trout – mark and recapture for walleye (ongoing)
- Creel survey – determine angler fishing statistics (ongoing)
- Groundwater level monitoring – (no further monitoring)
- Water quality monitoring using temperature and dissolved oxygen monitoring to determine thermal mixing depths vs flows from LLCD in lake environments (ongoing)

Hays Lake

- Hays Lake drawdown study to determine the effect of lowering the water level to the spring minimum during other times of the year to limit spill during outages. (complete)

Data and Information Gaps

Appendix 6 in the ARWMP provides a list of 41 data gaps that were prioritized into the top 25. These data gaps never intended to be investigated but for the list to provide flexibility and strategic options as conditions changed and new issues arose.

8. References

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