Renfrew Power Generation Inc., Multistream Power Corporation, Eganville Generation Corporation, Vornweg Waterpower

Implementation Report

Bonnechere River Water Management Plan

CIMA+

CIMA+ file number: HS00275
November 22, 2022 – Review 000

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Bonnechere River Water Management Plan

Prepared by: _____ for: _____

Tami Sugarman, P. Geo.

Senior Project Manager / Environmental Approvals

Energy – Hydropower and Dams

Verified by: _____

Kai Markvorsen, B.Sc., CET

Environment Specialist

Urban Planning and Environment

CIMA+

600–1400 Blair Towers Place, Ottawa, ON

Canada K1J 9B8

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1 Introduction

On February 16th, 2018, the Ministry of Natural Resources and Forestry (MNRF) under the authority of Section 23.1(6) of the *Lakes and Rivers Improvement Act* (LRIA), amended the Bonnechere River Water Management Plan (BRWMP) to align the BRWMP with the 2016 Maintaining Water Management Plans Technical Bulletin (the Technical Bulletin).

The 2018 amended BRWMP included the requirement for the plan proponent(s) to prepare and submit an Implementation Report (IR) to the MNRF, after every five years of operation.

The BRWMP is a complex plan involving four proponents:

- Renfrew Power Generation Inc. (RPG);
- Multistream Power Corporation (Multistream);
- Eganville Generation Corporation (EGC); and
- Vornweg Waterpower.

All of the plan proponents operated dams that generated power during the reporting period, however; Vornweg Waterpower sold the Killaloe waterpower facility in 2018 and the dam has not been operational since. This IR has been produced to represent all plan proponents.

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

- Summarizes all amendment activity during the term;
- Reports on the status of the Standing Advisory Committee (SAC);
- Outlines the results and conclusions of the effectiveness monitoring program (EMP), if applicable; and,
- Reports on the status and results of the data collection program (DCP), if applicable, and determine if revisions to the program are required.

This IR, which summarizes the findings, has been developed based on the contributions from all proponents, including MNRF.

For information or questions related to facility operations, including incidents and annual reporting, please contact the appropriate facility operator.

2 Amendment Requests

The following section outlines all amendment requests received, including a rationale for any completed amendments and how proposed amendments that did not proceed were addressed.

2.1 Summary of Amendment Requests and Outcome of Requests

2.1.1 Renfrew Power Generation Inc.

2007 Amendment Requests

MNRF considered eight proposed amendment requests by RPG for modifications to the BRWMP. The following four requests were later either withdrawn by RPG or were denied by the MNRF:

1. An amendment was proposed to amend the lower limit on Round Lake by removing the Lake trout box on a trial basis and lower the limit from week 38-52. RPG withdrew this amendment to avoid potential impacts of the proposal on Lake trout and to work with the ministry further on this prior to issuing an amendment request.
2. An amendment was initially proposed to change the upper limits of the operating regime at Renfrew, Douglas and Eganville. RPG withdrew this amendment for Douglas and Eganville, and the changes proposed for Renfrew were incorporated into request #6 below.
3. RPG proposed raising the upper limit on Round Lake at week 12 from 171.06 to 171.23 to reflect historic water levels. The amendment was denied as it appeared the water level did not often exceed 171.06 and that exceeding the upper limit during this period would be considered an incident and not declared a non-compliance issue.
4. The fourth amendment proposed that investigations of non-compliance and the decisions to apply consequences are conducted by MNRF, waterpower producers, the SAC and a third-party arbitrator. This amendment was denied on the basis that it was contrary to existing legislation, policy and guidance.

The MNRF Regional Director, Southern Region considered the four remaining amendment requests:

5. An application to establish daily limits (maximum/minimum value) that would be used for reporting and enforcement at the current reservoir lakes (excluding Lake Clear) and generating facilities. Reporting and compliance would be based on a daily reading which will be an average of all the readings taken in a 24-hour period from 12 midnight to 12 midnight.
6. An application to change the upper limit of the Renfrew reach to reflect the historical operation of the Renfrew generating stations. The upper limit at the Renfrew site would be 111.03 metres above sea level (masl) for weeks 1 to 10, 111.19 masl from weeks 11 to 21 and 110.86 masl from weeks 22 to 52.
7. An application to change Section 2.5.2 of the BRWMP to better reference the co-relationship between the water levels on Round and Golden lakes during periods of high water and to more clearly describe the restricted ability to control water levels on one lake without adversely affecting the other.
8. An application to revise the fall limit on Golden Lake so that it is the same value as the spring at 168.71, after the summer period of week 31 with a gradual drawdown to week 44.

Amendment requests #5, #6 and #7 were reviewed as administrative amendments under Section 4.3 of this plan, approved in January of 2009, and included in the March 2009 amended version of the BRWMP.

Request #8 was reviewed as a minor amendment under Section 4.3 of this plan, approved in March of 2009, and included in the March 2009 amended version of the BRWMP.

2009 Amendment Request

MNRF received an application request from RPG for an amendment that would change lower limits of the operating regime for Round Lake and remove the specific lower limits during the spring period, known as the Lake Trout box. The motivation for this amendment request lay with the operational difficulty of the March drawdown requirements. The lower limit of the drawdown was not permitted until the last possible period prior to the freshet due to spawning requirements for the population of Lake Trout. As a result, RPG requested the removal of the Lake Trout box.

This request was reviewed as an administrative amendment under Section 4.3 of this plan, approved in January of 2010, and included in the January 2010 amended version of the BRWMP. Details of studies and outcomes related to this amendment approval can be found in Section 5.7 and 5.8.

2.1.2 Multistream Power Corporation

In the spring of 2005, MNRF reviewed an amendment request from Multistream for a minor adjustment to the Douglas Dam operating regime. The amendment request proposed to change the head pond water level range to -30cm to +40cm to allow the passing of water over the spillway wall during the time that the plant flows are greater than operating capacity (winter and spring). The historic operating range was -40cm to more than 50cm.

A meeting was held between MNRF and Multistream at the MNRF in Pembroke District office on March 10, 2004, to discuss Multistream's proposal to improve the operating regime that was outlined in the BRWMP. Multistream contested that the BRWMP operational regime was unnecessarily restrictive. The MNRF raised three primary issues during the meeting that Multistream would need to address in their amendment request, including:

1. Water flow and level management
2. Side spillway wall stability
3. Maintenance and improvement of existing fish habitats

In preparation of the amendment request Multistream reviewed the SAC issues raised during the planning process and the issues raised by MNRF and developed a plan for future work which would address the issues. Multistream submitted an amendment to the Douglas Dam Operating Plan to adjust the head pond water level range to -30 cm to +40 cm which would allow the passing of water over the spillway wall during 40% of the time that plant flows are greater than operating capacity (winter and spring). Assuming the dam is anchored for increased stability then higher operating levels are reasonable and should be allowed.

In the absence of a SAC, the amendment to the Douglas Dam operating regime was classified as a minor amendment under section 4.3 of this plan.

Multistream's proposal for an amended operating regime included the following additional commitments:

- To provide a tighter and more consistent operating range thereby providing constant flow downstream and reducing drainage episodes upstream.
- To improving its operation of the dam and having a response capability.
- To raising the deck to improve freeboard thereby allowing for easier stop log removal when necessary.
- To automating the 280 kW turbine and to add a water level control mechanism as an automatic method for unit shutdown.

- To providing a stability check of the spillway wall as soon as possible and installation of anchorage, and,
- To increased and consistent communication with the other waterpower operators upstream and downstream.

No significant concerns were raised during consultation on the amendment request. The amendment was approved by MNRF Regional Director, Southern Region on March 31, 2005, and included in the 2005 amended version of the BRWMP.

2.1.3 Eganville Generation Corporation

In the spring of 2005, MNRF reviewed an amendment request from EGC for a minor adjustment to the Eganville Dam operating regime. The BRWMP indicated an operating range of 161.87 to 162.07 masl. The amendment request proposed to change the operating range to 161.71 masl to 162.10 masl which would more accurately reflect their historic operating regime. The proposed amendment to the operating regime did not change the current and/or historic operations at the Eganville Dam but rather correct a miscalculation that was made during the preparation of the WMP. A narrow operating band of 14 cm was presented in the draft plan, when historically, the operating band for the Eganville Dam and generating station had been 35 cm. EGC contended that, based on two years of production data, it could not operate within the restrictive band of 14 cm (20 cm during spring freshet).

During the formal review and approval stage of the BRWMP in 2004, the EGC (Board and General Manager) was still in negotiations with the MNRF concerning the facility's operating regime proposed in the BRWMP. At a March 10, 2004, meeting between the parties, the EGC General Manager presented a graph that indicated the maximum and minimum head pond levels for the entire 2003 operating year. The EGC General Manager also provided a table with copy of the log sheets from 1997 to 2000 of water levels that indicated the former operating regime maintained a band of 34 cm. The range of operation was a minimum level of 70 cm and an upper limit of 104 cm (local datum).

Through discussion, the parties agreed that EGC would issue a formal letter of proposal to present preferred operational limits. The proposal would include photographic documentation of identified areas of concern to demonstrate that the proposed water levels did not create any detriment to riverine landowners. This letter of proposal would be presented to the BRWMP SAC (yet to be appointed) as part of the dispute procedure outlined in the WMP. This approach was agreed upon so that the signing of the BRWMP would not be delayed and to prevent the necessity of another public meeting. During the March 10, 2004 meeting it was agreed that there would be a transitory latitude granted to

EGC to maintain the historical operations until the decision over the new proposal was made by the SAC and MNRF. Furthermore, the Eganville Dam head pond water level was to be recorded and a water level graph submitted to the MNRF on a weekly basis.

The formal proposal request for an amendment to the September 2004 BRWMP was issued by EGC in the spring of 2005. It was adopted by the BRWMP Working Group with the recommendation that the amendment proposal move forward.

The amendment to the Eganville Dam operating regime was classified as a minor amendment under section 4.3 of this plan.

No significant concerns were raised during consultation on the amendment request. The amendment was approved by MNRF Regional Director, Southern Region on March 31, 2005, and included in the 2005 amended version of the BRWMP.

2.1.4 Vornweg Waterpower

No amendment requests were submitted by Vornweg Waterpower during this term of the BRWMP.

2.1.5 Ministry of Northern Development, Mines, Natural Resources and Forestry

The MNRF initiated three amendment requests over the course of the reporting period:

- In 2014, the MNRF considered an amendment to the BRWMP which extended the term of the plan by 18 months (from September 2014 to March 31, 2016). The request was approved and categorized as administrative under Section 4.3 of the BRWMP. The amendment resulted in changes to the following sections of the Plan:
    1. Approval Page
    2. Section 4.3 Plan Term, Review and Amendment

- In late 2015/early 2016, the MNRF considered an amendment to the BRWMP which extended the term of the plan by 5 years (from March 2016 to March 31, 2021). The request was categorized as administrative under Section 4.3 of the BRWMP. The amendment resulted in changes to the following sections of the Plan:
    - Approval Page
    - Section 4.3 Plan Term, Review and Amendment

- In 2017, the MNRF considered an amendment to the BRWMP to align the plan with the approved 2016 Maintaining Water Management Plans Technical Bulletin.

  An administrative amendment was approved by MNRF on February 16th, 2018. The amendment was required to align the BRWMP with new policy requirements under the Technical Bulletin.

  Several changes to the BRWMP were required to align the plan with the Technical Bulletin (refer to Appendix 9 of the BRWMP document (amended February 2018) for a complete summary of amendment text changes):

  - The expiry date was removed.
  - The 'administrative' category of amendments was removed.
  - Requirements for both 'minor' and 'major' amendments were outlined, along with changes in responsibility for processing amendments to plan proponents.
  - New text was added to clarify requirements for self-reporting (incidental and annual).
  - The 10-year plan review was removed
  - The requirement for an IR every five years was added.

2.1.6 Township of Killaloe, Hagarty and Richards

On October 11, 2017, RPG received a request from the Township of Killaloe, Hagarty and Richards (KHR) for an amendment to the BRWMP. The amendment was proposed to decrease the lower operating limit by 50 cm on Round Lake, from a lower limit of 170.10 m to 169.60 m, from January 1st to May 12th. The purpose of the proposed amendment was to provide increased capacity for spring freshet however, to achieve the lower winter/spring operating limit, an increased drawdown in the fall was needed to ensure impacts to fall spawning fish were mitigated.

The amendment was categorized as major and included consultation with public and Indigenous communities, in accordance with the Technical Bulletin. This amendment resulted in changes to the following sections of the plan:

Section 4.5.3 "Reach 8: Round Lake (Jack Chute to Tramore Dam)":

- Text description has been revised
- Table 10 has been revised
- Figure 8 has been replaced
- Table 11 has been revised with a major amendment resulting in changes to the following sections of the plan to reflect the approved request

The Ministry of the Environment, Conservation and Parks (MECP), Fisheries and Oceans Canada (DFO), and MNRF were concerned about potential impacts to aquatic species and turtle terrestrial species in the lake and its tributaries as a result of the amendment request. KHR along with financial assistance from the Round Lake Property Owners Association (RLPOA), the Golden Lake Property Owners Association (GLPOA), the Township of North Algona Wilberforce and the Township of Bonnechere Valley, hired Bowfin Environmental Consulting to undertake studies for Lake Trout, Blanding's Turtle and other turtle species in Round Lake and associated tributaries. RPG assisted with manpower costs for ice and depth surveys and provided a boat and driver for the field work.

Bowfin undertook the following studies:

1. Lake Trout and Whitefish spawning surveys (Algonquins of Ontario (Algonquins of Pikwàkanagàn)) volunteers assisted by surveying the identified shoals for eggs).
2. Habitat mapping at lower elevations of the lake spawning shoals and tributaries.
3. Ice thickness and water depth – RPG was already gathering water depth and ice thickness on Round Lake. They extended their program to include areas in Bonnechere Provincial Park.
4. Aquatic vegetation mapping.
5. Basking turtle surveys in early spring.

A surveyor was hired to survey the mouths of the tributaries (169.6 – 170.1 masl contour information). The surveyor's work in the tributaries trimmed down the area that could possibly be impacted by the increased lowering over the winter on the aquatic environment.

Key conclusions of the study are summarized below.

<u>Conclusions for the Fall Spawner Species</u>

- Lake Trout population had gone back to pre-glacial time (genetically isolated) and would have been present prior to the construction of the Tramore Dam. Lowering the water level in the lake during the fall period would not affect the Lake Trout as there is readily available habitat at deeper depths. MNRF had mapped it in 2006 (see Section 5.7) and confirmed lower habitat at a certain range and acknowledged that there were more habitats down deeper for them. However, the timing of the lowering was an important consideration to help encourage fish to spawn at lower depths.
- The regulators agreed with an adjustment to the rate and timing of the lake. They agreed to an early drawdown to achieve the newly proposed level before the peak

spawning time in fall. This would force the fall spawning species to spawn at a protected lower level.

- DFO, when presented with the new mapping data, was satisfied that the Lake Trout and Whitefish had adjusted to the 2010 amendment to remove the Lake Trout box and could readjust to this lower level. DFO agreed the amendment would not create a Harmful Alteration, Disruption and Destruction (HADD) under the *Fisheries Act*.
- The mandatory lower limit declines beginning in late August (week 32) and continues to drop at a gradual rate until week 52. The Typical Operating Line mirrors this trend with a slow decline throughout September and into the fall and winter. Target drawdown rate is 7 cm per week between early September and late October. Water levels need to be at 170.2 masl by week 42 to ensure that eggs are deposited in areas that would not be exposed due to the drawdown. Drawdown target rate continues at a rate of 4 cm per week until it reaches the new lower limit of 169.6 masl (from the existing lower limit of 170.1 masl). This also adheres to the ice timelines for the lake (see Section 5.11).
- Based on discussions with DFO, Bowfin went out with AOO in 2019 to collect information on eggs that may become stranded in shallow water under the previous regime. Bowfin returned to the site in 2020 when the water levels were near 50cm lower and mapped the available fish habitat again to prove there was habitat at the new lower levels. This information confirmed there was still lots of habitat for fish on the known shoals.

<u>Conclusions for the Turtles Species</u>

- Bowfin's professional opinion, based on the monitoring of the 2019/2020 overwintering period, was that there was no impact to turtle overwintering habitat in the river at the new lower winter level. This was due to there being so much flow that ice never formed more than a few centimeters in most of the upper reaches and there was sufficient water depth in all of the areas influenced by the lowered limit to allow for successful overwintering.
- Because the lower limits were not reached in the 2019/2020 overwintering period, there were still concerns about some of the oxbow habitats. As such, the program was repeated in the following year and was supplemented with early spring basking surveys. Bowfin conducted this work in 2020-21 and confirmed they were not critically impacted.
- By March 31, 2021, Bowfin was still waiting for MECP to review the submitted report for Species at Risk.

- RPG installed temporary water loggers in specific locations in Bonnechere Provincial Park to further understand water levels in relation to Round Lake levels.

DFO approved the amendment as a Letter of Advice (LOA) and requested to be involved in WMP discussions moving forward. Bowfin remained in contact with DFO on an annual basis.

On October 3, 2019, MNRF approved a major amendment to the BRWMP.

The investigative studies and outcomes associated with this amendment request also satisfied some of the information needs identified in the BRWMP, such as:

- concerns for amphibian and reptiles within Reach 8 which are noted in Section 5.1 and,
- concerns for the availability of spawning habitat for Lake Trout at lower levels which are noted in Section 5.9.

2.2 Summary of Amendments Pending Approval

There are no pending amendments currently being considered for the BRWMP.

3 Standing Advisory Committee Status

As a component of the implementation of the BRWMP, a public SAC was to be formed to advise, review and assist in the implementation of the BRWMP. The SAC enabled collaboration of the various stakeholders of the WMP through such tasks as assessing operations, reviewing plan amendment requests, and representing and communicating with the public on water management issues.

The draft Terms of Reference for the SAC calls for a SAC made up of 6-9 individuals. During the week of October 4th, 2004, a letter was sent to the Bonnechere River stakeholder mailing list and an advertisement appeared in local newspapers throughout the Bonnechere River system inviting participants to apply to the SAC by October 29th, 2004. From October 28th to November 3rd, 2004, a series of radio spots were played on Star 96 FM extending the deadline for applications to the SAC until November 29th.

Public interest in the SAC was very limited with only five applicants. As a result, MNRF and the proponents postponed the formation of the SAC until 2005.

The inaugural meeting of the BRWMP SAC took place on September 29, 2005. Meetings were held approximately five to six times each year until 2009 when the meetings became more focused on the spring and fall wet seasons or when an amendment request had to be addressed. This amounted to about three times a year until June 2012. The meeting

minutes of June 7, 2012 indicated that the SAC was planning to continue and recruit new members during the period of Plan review at the MNRF. The next meeting was planned for October 2012; however, meeting minutes were not on record. There was a SAC meeting in March 2013, however, the minutes were never finalized. In December 2013 the SAC took part in a teleconference meeting with MNRF Pembroke District Manager to advise them of the Environmental Registry posting outlining the new Technical Bulletin under the LRIA and the comment period which was to end in January 2014. A similar meeting was held between the MNRF and the Waterpower operators on the Bonnechere and Mississippi Rivers. It is not clear what the status of the SAC was during the period between December 2013 and February 2018, as there are no SAC records available for review. As a result of changes to the SAC requirements outlined in the 2016 Technical Bulletin, the Ministry issued a standard letter to SAC members in 2017 informing them of changes to the WMP. These changes communicated that SACs are no longer a mandatory requirement of WMPs, though they remain a recommended best practice.

In late 2017, the BRWMP proponents decided to continue with a new SAC. Since February 2018, the BRWMP SAC has been composed of representatives from each municipality as well as the Algonquins of Pikwàkanagàn community that are chosen by each of their councils. Each proponent on the river also attends the SAC meetings. The SAC has a Terms of Reference and proponents do not have voting rights concerning proposed amendments. Officially, anyone can bring a complaint or amendment request to the SAC, however, more often complaints are brought directly to RPG and they bring any issues to the SAC for discussion and consideration. For amendments, requestors must submit, in the format outlined in the Technical Bulletin, to the affected proponent. The forum to inform the public of water management matters on the Bonnechere is hosted on the RPG website which provides an avenue for members of the public to submit concerns.

SAC meeting minutes can be obtained from RPG's website (https://www.renfrewpg.ca/standing-advisory-committee-minutes/).

4 Effectiveness Monitoring Plan (EMP)

The following section outlines the status and results of the effectiveness monitoring projects mandated to be undertaken in the WMP (Table 9.1) as part of EMP since September 2004. The monitoring plan included monitoring requirements related to both environmental and socioeconomic components, which may be affected by the operations of the waterpower facilities or the requirements of the WMP. EMP commitments are the responsibility of all plan proponents, including MNRF.

Some commitments made in the WMP are being met through initiatives that were implemented after the approval of the WMP such as Broad-scale Monitoring (BsM) through MNRF Provincial Services Division.

BsM was created by MNRF to evaluate Ontario's fisheries on a broad level and is led by MNRF Provincial Services Division, Biodiversity and Monitoring Section. Once every 5 years, information is collected from a representative number of lakes in each Fisheries Management Zone (FMZ). BsM is now the standardized landscape level monitoring program for the province that collects detailed information about fish species and fish communities such as Lake Trout, physical and chemical water characteristics, aquatic invasive species, and fishing effort for each lake surveyed.

Some commitments in the WMP may now be achieved through the BsM program. For each commitment where this is the case, a statement has been included to note that the program is now being achieved through BsM.

4.1 Environmental Monitoring

Environmental effectiveness monitoring on the river was to be undertaken by MNRF (Pembroke District) with support from the proponents to ensure that the assumptions used to develop and select the approved operating plan were appropriate. The collected environmental monitoring data can be used by MNRF to identify if, and if so, where impacts to fisheries and the overall ecosystem health may be occurring.

4.1.1 Environmental Objective – Ensure the health and sustainability of Lake Trout populations in Round Lake, in Reach 8, through the protection of spawning shoals (RPG and MNRF)

The MNRF was to monitor the effectiveness of RPG's efforts to monitor annually the ice thickness and water depth over Lake Trout spawning beds on Round Lake during the spring and adjust the lake water levels during this critical period (week 8-13) to meet this objective. MNRF and RPG were to report annually to the SAC.

RPG is conducting an ongoing program of monitoring ice thickness and water depth in the Bonnechere river and a few lakes in the Bonnechere River Provincial Park, including Round Lake. In 2019 they extended their program to specific areas of Bonnechere Provincial Park to assist Bowfin with work related to the KHR amendment approval process.

4.1.1.1 Findings of Effectiveness Monitoring

The 2010 Round Lake Trout Report produced by MNRF, Pembroke District and a representative from RPG discussed the findings from a series of studies that were undertaken between 2005 and 2008 to investigate the population and spawning habitat of Lake Trout on Round Lake. One study in the report focused on the average ice thickness over the Victoria Island shoal between 2005 and 2009. The average ice thickness for these years was 0.5 m. Since most eggs were deposited below 169.5 masl, it was determined that drawdown could extend to 170.1 masl without directly impacting most of the incubating eggs during the critical period (week 8-13).

The 2019 amendment to the BRWMP reduced the lower operating limit to 169.6 masl to build capacity for spring freshet. The fall drawdown, established to safely meet the lowered winter/spring water levels while considering impacts to fall spawning species, must reach 170.2 masl by week 42 (mid-October). Lowering the water levels prior to the peak spawning period (mid-October) will force the Lake Trout to spawn at lower water levels.

Subsequent monitoring has shifted to BsM which occurred on Round Lake in 2008, 2014, 2018.

4.1.1.2 Requirement for Proposed Changes to Operations or EMP

No proposed changes to the EMP or operations for any of the facilities are required beyond what has been described in this section.

4.1.1.3 Adaptive Management

This EMP is now in part achieved through BsM.

4.1.2 Environmental Objective – Ensure water coverage over the Walleye spawning area below Tramore Dam in Reach 7 (RPG and MNRF)

MNRF (Pembroke District) and RPG were assigned the task to maintain a Walleye Watch program below the Tramore Dam and use new stream gauges that provide water temperature values and adjust flows through the Tramore Dam.

4.1.2.1 Findings of Effectiveness Monitoring

Walleye Watch occurred at the Tramore Dam in Reach 7 in 1997,1999, 2000, 2001, 2003, and 2005. Walleye Watch is completed by volunteers as resources are available. As a result of several factors on the river system including changes in water quality related to the needs of the species (e.g., increased clarity, decrease in nutrients, etc.), over

harvesting, introduction of black crappie and an increasing smelt population, Walleye have been experiencing a population decline. These changes in Walleye population and habitat on the river system are supported by the results of the BsM cycles 1, 2 and 3, hydro acoustic work that was completed to study the smelt population and secchi disk readings from various points in time that demonstrate changes in water clarity.

4.1.2.2 Requirement for Proposed Changes to Operations or EMP

As water quantity (levels and flows) at spawning sites, during the spring freshet, has not been identified as a factor in Walleye population decline in the river in this reach, there is no requirement to propose changes to operations. In addition, the EMP related to Walleye spawning below the Tramore dam in Reach 7 is therefore, no longer required. MNRF may consider amending the WMP to reflect this change.

4.1.2.3 Adaptive Management

No adaptive management has been recommended at this time.

4.1.3 Environmental Objective – Ensure water coverage over the Walleye spawning area above (Reach 7) and below (Reach 6) Golden Lake Dam (RPG an MNRF)

MNRF was to maintain a Walleye Watch program above and below the Golden Lake Dam and use new stream gauges that provide water temperature values, adjust flows and levels to meet this objective. The assessment of flow, water levels, precipitation, and dam operations across these spawning areas during critical spawning periods would inform an annual summary of this spawning activity to determine if spring flow regime is beneficial to the sustainability of Walleye in each Reach (7 and 6). MNRF was to monitor the effectiveness of this effort and, in co-operation with RPG, will report annually to the SAC.

4.1.3.1 Findings of Effectiveness Monitoring

Walleye Watch occurred at the Golden Lake Dam in Reach 7 in 1999, 2003, 2005, and 2006. Walleye Watch is completed by volunteers as resources are available. Golden Lake property owners participated in a Walleye Watch on Golden Lake. Based on the results of Walleye Watch, the Walleye population appears to have declined significantly. As a result of several factors on the river system including changes in water quality (e.g., clarity, decrease in nutrients, etc.), over harvesting, introduction of black crappie and an increasing smelt population, Walleye have been experiencing a population decline. These changes in Walleye population and habitat on the river system are supported by the results of the BsM cycles 1, 2 and 3, hydro acoustic work that was completed to study the smelt population and secchi disk readings from various points in time that demonstrate

changes in water clarity. The decline in population is not believed to be related to water levels.

The sustainability of Walleye below the Golden Lake Dam in Reach 6 has not been undertaken to date (see Section 5.19).

4.1.3.2 Requirement for Proposed Changes to Operations or EMP

As water quantity (levels and flows) at spawning sites, during the spring freshet, has not been identified as a factor in Walleye population decline in the river in this reach, there is no requirement to propose changes to operations. In addition, the EMP related to Walleye spawning area above the Golden Lake Dam (Reach 7) is therefore, no longer required. MNRF may consider amending the WMP to reflect this change.

4.1.3.3 Adaptive Management

No adaptive management has been recommended at this time.

4.1.4 Environmental Objective – Increase our understanding of the natural constriction in the river near the Golden Lake Dam (Reach 7) and assess the impact of this constriction on the ability to manage flows and levels effectively on the Bonnechere system (RPG)

RPG were to undertake a detailed engineering survey and water flow calculations to characterize the restriction and flow control point near the Golden Lake Dam. MNRF would review the outcome of the RPG engineering survey and in cooperation with RPG, report the results to the SAC.

In 2017 RPG contracted a hydraulic engineering firm, HydroSys Inc. (now CIMA+), to use bathymetric survey data, previously collected by BluMetric Environmental Inc. in 2011, and monitored water flow calculations levels, as recorded by RPG at several locations around the dam and in Golden Lake outlet, to undertake a hydraulic analysis of the Golden Lake outlet area. The second purpose of this study was to quantify the flow restriction at the outlet.

The hydraulic analysis was to provide an estimation of the water surface elevation at Bonnechere River and Golden Lake, under various flood flows, to characterize the restriction and flow control point near the Golden Lake Dam. The Golden Lake county-owned bridge's deck was not included in the model, as water levels do not exceed the underside of the deck; however, surveyed bridge abutments were included in the hydraulic model.

The resulting report, "*Hydraulic Assessment of Golden Lake Outlet – Final Report*" (CIMA+, November 16, 2017), was submitted by RPG to interested parties, including the MNRF, by email on November 20, 2017.

4.1.4.1 Findings of Effectiveness Monitoring

The results of the hydraulic model confirmed that, "*the water levels in Golden Lake are not directly set by the operation of the dam, but by a combination of the dam operations and head losses due to natural features of the lakebed*". Once all logs are removed from the dam, the Golden Lake Dam is not the control point for Golden Lake. The study also indicated that two constrictions within the Golden Lake outlet upstream from the dam may be the pinch points for the lake discharge during high flows, especially when all logs are removed from the dam.

As the water levels in Golden Lake were determined to be a factor of dam operations and head losses due to natural features of the lakebed, CIMA+ was asked to propose avenues for reducing flood levels in Golden Lake, based on the model results. Three main solutions were briefly studied:

- Modifying the existing dam;
- Modifying the river reach downstream of the dam;
- Dredging or excavating a channel at flow restriction #1.

As mentioned above, the dam is not believed to be a hydraulic control in high flow situations when all logs are removed. As such, any modification to the dam may not help to significantly reduce the water level in Golden Lake.

The flow condition downstream of the dam is most likely dictated by the geometry of the river (i.e., slope and roughness). If this is the case, lowering the water levels downstream of the dam is not economically feasible.

Economic viability of the third solution was also found to be doubtful. To determine the practicality of this solution, a more comprehensive study would have needed to be undertaken from Round Lake to Eganville on the Bonnechere River. It was suspected that a modification to the main pinch point in the outlet (restriction #1 in the report) and possibly also widening of the river channel from the bridge to the dam would need to be completed to resolve the situation. Support for altering the natural riverbed and shorelines was limited. Further studies are needed to determine what is necessary to improve the system. This is a long-term solution that will continue to be pursued by interested parties including the Algonquins of Pikwàkanagàn.

4.1.4.2 Requirement for Proposed Changes to Operations or EMP

Without further assessment, there is no need to propose changes to operations at the Golden Lake Dam.

4.1.4.3 Adaptive Management

Not applicable.

4.1.5 Environmental Objective – Establish minimum flow requirements (for ecological values) for each of the control structures on the main channel (Reach 8 to 1) of the Bonnechere River (Proponents and MNRF)

Proponents were to install stream gauges as resources become available and establish minimum flow requirements for ecological values, in consultation with DFO (within the first two years of the term of this WMP). Once established, minimum flow requirements were to be added to the WMP as an amendment. The approach is summarized below:

- Install stream gauges at each of the control structures to collect accurate flow data.
- Where possible, determine historic, very-low flow information for each control structure by measuring leakage flows.
- Use data collected above, in combination with the best available information on river ecology, natural flow regime models, etc. to establish minimum flow requirements for each control structure.

4.1.5.1 Findings of Effectiveness Monitoring

This approach has not been formally completed for all dams on the system. May be considered for future work planning.

RPG has installed level gauges at Golden Lake, Round Lake and Clear Lake; EGC and Multistream have level gauges installed at their generation facilities. The Thomas Low GS calculates levels from flow data recorded through the dams. See section 5.4 for information on minimum flows established at waterpower facilities along the Bonnechere River.

4.1.5.2 Requirement for Proposed Changes to Operations or EMP

No proposed changes to the EMP or operations for any of the facilities are required.

4.1.5.3 Adaptive Management

No adaptive management has been recommended at this time.

4.2 Socio-Economic Monitoring

Socio-Economic effectiveness monitoring on the river was to be undertaken by MNRF and proponents to ensure that the assumptions used to develop and select the approved operating plan were appropriate. The collected data can be used to identify if and where social, cultural, and economic impacts to users in the system may be occurring.

4.2.1 Socio-Economic Objective – Improve public understanding of water flow and level management on the Bonnechere River (Reach 8 to 1 - Proponents and MNRF)

Develop an Internet Website and respond to all phone requests, providing current flow and level information to the public. Together, the proponents and MNRF were to promote public use of the Website and phone response system.

4.2.1.1 Findings of Effectiveness Monitoring

RPG developed a system-wide information portal on their company's website for public access to information pertaining to the Bonnechere river system and associated WMP. The website contains water level and flow information for each facility on the system that is updated weekly throughout the year and daily during the freshet. Contact information is posted for all plan proponents and stakeholders, including MNRF, the townships, Property Owners Associations including Round Lake, Golden Lake and Lake Clear, and the Algonquins of Pikwàkanagàn. The BRWMP and other associated documents, such as information related to amendments to the plan can be found on the website.

4.2.1.2 Requirement for Proposed Changes to Operations or EMP

No proposed changes to the EMP or operations for any of the facilities are required.

4.2.1.3 Adaptive Management

No adaptive management has been recommended at this time.

4.2.2 Socio-Economic Objective – Investigate the possible impact of water level and management on recreation and tourism on Wilber Lake (Reach 6 - RPG and MNRF)

Baseline information (based on proposed new stream gauges at the Golden Lake bridge and at the rapids downstream of Wilber Lake) was to be collected to document seasonal levels and flows on this reach.

Once baseline flow and level data was established, MNRF and RPG were to work with local tourism operations and residents to identify any possible impacts on recreation and tourism.

RPG and MNRF were to report the results of the above efforts to the SAC.

4.2.2.1 Findings of Effectiveness Monitoring

No issues have been raised by tourism operations or residents. If issues arise, an investigation of the possible impacts of water levels and management on recreation and tourism may be considered for future work planning.

4.2.2.2 Requirement for Proposed Changes to Operations or EMP

No proposed changes to the EMP or operations for any of the facilities are required.

4.2.2.3 Adaptive Management

No adaptive management has been recommended at this time.

5 Information needs and Data Collection Programs

Section 6.2 of the BRWMP outlines several information needs and related Data Collection Programs (DCP) to be undertaken. The priorities for these programs were to be set and DCP items assigned to specific parties within the first year of plan implementation in collaboration with the SAC.

The following DCPs were developed within the original WMP (2004) and remained within all the amended versions:

1. Status of Amphibian and Reptile Populations (Reaches 8 to 1 inclusive; low priority).
2. Status of Fur-Bearer Populations (Reaches 8 to 3 inclusive).
3. Water Level Impacts on Near Shore Nesting Birds (Reaches 8 to 3 inclusive).
4. Minimum Flows at each control structure.
5. Bathymetry Data (Round Lake, Golden Lake and Wilber Lake).
6. Monitor the Whole Fish Community (Reaches 5, 4 and 2).
7. Status of Lake Trout Population on Round Lake.
8. Lake Trout and Walleye Spawning Areas on Round Lake.
9. Lake Trout Spawning at Lower Levels on Round Lake.
10. Northern Pike Spawning Areas on Round Lake.
11. Ice Effect on Shoreline on Round Lake.
12. Bedrock Restriction at Golden Lake Bridge hydraulic study.
13. Golden Lake Spawning Areas and Activity Study.

14. Monitoring Walleye Success (Reach 7).
15. Lake Whitefish Population Status (Golden Lake).
16. Brennan's Creek Spawning Fish Community Assessment.
17. Monitoring Water Levels and Flows on Golden Lake.
18. Water Level and Flow Impacts on Wild Rice (Reach 7 and 6).
19. Walleye Spawning Below Golden Lake Dam (Reach 6).
20. Brook Trout in Hurds Creek (Reach 6).
21. Brown Trout Survival (Reach 4 and 5).
22. Impacts to Spawning Sites (Reach 4).
23. Spawning and Spawning Habitat Assessment (Reach 1, 2 and 3).

As a formalized priority rating exercise was never undertaken for the DCPs during the water management planning process, for the purposes of this report, the following priority 'levels' were determined using the four overall goals of the BRWMP as identified in the Executive Summary on page 17 of the 2019 BRWMP.

High Priority:

- Ecological integrity - sustaining and enhancing the Bonnechere River's aquatic ecosystems.
- Water levels and flows (including, flood and drought control) to support recreational, tourism, industrial and riparian land uses.

Low Priority:

- Fostering public awareness and understanding of the issues involved with levels and flows management on the whole river system.
- Generating electricity safely, efficiently, reliably, and economically.

During the review of SAC meeting minutes and other available information it was discovered that during the SAC meetings of September 27, 2006 (#7) and November 29, 2006 (#8) a prioritization exercise was undertaken by SAC members to determine the priority level of the DCPs outlined in the BRWMP. The SAC members identified only high priority DCPs at that time and these were adopted for this report. Any DCPs, not identified as high priority by the SAC in 2006 and which was not considered one of the two high priority goals of the BRWMP were given a low priority rating.

5.1 Status of Amphibian and Reptile Populations (Reaches 8 to 1 inclusive)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"Only anecdotal information exists on the location and abundance of amphibian and reptile species (turtles are of special concern)."*

Priority: **High**

Data Collection Program:

1. Research the location and abundance of amphibian and reptile species in Reaches 8 to 1.
2. This is a system-wide information need that could be addressed in conjunction with fur-bearer research.

Responsibilities: MNRF

Interim or Final Results:

The DCP has not been completed.

Work that was completed in 2019 to support the KHR amendment (see Section 2.2.5), informs this DCP. The Township of KHR hired Bowfin to undertake a study on turtles in regard to the proposal to decrease the lower operating limit by 50cm on Round Lake, from a lower limit of 170.1 m to 169.6 m, from January 1st to May 12th. Bowfin's study centered around SAR (Blanding's Turtle) and other turtles in tributaries around Round Lake. RPG assisted with manpower costs for ice and water depth surveys in the tributaries as they were already engaged in similar studies in the Bonnechere River Provincial Park. RPG also provided a boat and driver for the Bowfin field crew. Refer to Section 2.2.5 for more details of this study.

Describe any proposed changes to the sampling program and rationale:

No changes are proposed for this DCP at this time. This objective may be considered for future work planning or as part of other Ministry program areas (e.g., Science and Research Branch). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.2 Status of Fur-Bearer Populations (Reaches 8 to 3 inclusive)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"Only anecdotal information exists on the location and abundance of fur-bearer species. Research could be expanded in this area."*

Priority: **Low** (could be completed alongside 5.1)

Data Collection Program:

1. Research on the location and abundance of fur-bearer species needs to be expanded.
2. This is a system-wide information need that could be addressed in conjunction with amphibian and reptile research.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed.

Describe any proposed changes to the sampling program and rationale:

No changes are proposed at this time. This objective may be considered for future work planning or as part of other Ministry program areas (e.g., Science and Research Branch). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.3 Water Level Impacts on Near Shore Nesting Birds

The following excerpt from the Water Management Plan describes the information need:

Information Need: "*There is a need to assess the operating regime impacts on the reproductive success of aquatic birds and vegetation in areas where this type of habitat occurs.*"

Priority: **Low**

Data Collection Program:

Effects of high and low water levels on nesting locations (e.g., Killaloe Swamp, oxbows) should be investigated at different times of the year to see if the wetlands are dry enough in the summer and wet enough in the spring.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed.

Describe any proposed changes to the sampling program and rationale:

No changes are proposed at this time. This objective may be considered for future work planning or as part of other Ministry program areas (e.g., Science and Research Branch). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.4 Minimum Flows (Reaches 2 to 8)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"Specific minimum flows through each of the control structures on the Bonnechere River are required to maintain fish habitat and the overall health of the aquatic ecosystem."*

Priority: **High**

Data Collection Program:

The water control structures have approved operating regimes in the BRWMP. Inherent in these regimes are unofficial historical minimum flows based on leakage flows experienced at each structure, although in most cases this value has not been formally added to an official Operation and Maintenance Plan for each dam site within the BRWMP. The exception might be a generating station that has undertaken a redevelopment or rehabilitation project and the associated LRIA Section 16, approval. In these cases, the Proponent was required to establish a minimum flow value for their facility.

For instance, a residual flow value was established for the Thomas Low Hydroelectric redevelopment project during the 2009-2015 Class Environmental Assessment (EA) for Waterpower Projects planning process. The redeveloped Thomas Low facility at Renfrew in Reach 2 of the Bonnechere River has a residual flow value of approximately 2 cubic meters per second (cms) between mid-April and the end of May to maintain spawning habitat at the site. Subsequent LRIA Section 16 approvals for this undertaking may also note the residual flow requirements at the site.

The Multistream waterpower facility located in Reach 3 of the Bonnechere River also mentions a historical minimum flow over the dam during its Guide to Environmental Assessment Requirement for Electricity Project (GEAR) EA screening under Ontario Regulation 116/01 under the *Environmental Assessment Act* (EAA). This value was set at 0.5 cm during the EA process and may also have been formalized through the LRIA Section 16 approval of the redevelopment of the site in 2008.

The Eganville facility has established a 0.68 cm minimum flow based on historical flows for their operations.

Specific minimum flows need to be established and added to the operating regimes for each control structure on the Bonnechere River within the WMP.

Responsibilities: Proponents with MNRF

Interim or Final Results:

Minimum flows have been established at each waterpower facility. The BRWMP may be amended to formalize these values within the current version of the document. This action may be considered for future work planning.

Describe any proposed changes to the sampling program and rationale:

No changes are proposed at this time.

5.5 Bathymetry Data (Reaches 6, 7 and 8)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"Bathymetry data, particularly for Round Lake, Golden Lake and Wilber Lake, need updating. This will assist with other information needs on the Bonnechere watershed, and fish and wildlife research on the river system."*

Priority: **High**

Data Collection Program:

1. Bathymetric mapping of Round Lake, Golden Lake and Wilber Lake

Responsibilities: MNRF

Interim or Final Results:

Bathymetric mapping of Round Lake was completed in 2007 by MNRF. Bathymetry data for Golden Lake and Wilber Lake has not been completed by MNRF and may be considered for future work planning.

BsM has occurred on Round Lake in 2008, 2014, 2018.

RPG hired BluMetric Environmental Inc. to conduct a bathymetric survey of the Golden Lake outlet area with a mono beam echo sounder in 2011. This data was used to inform the hydraulic modeling study of the same area in 2017. Details of the CIMA+ hydraulic modeling work can be found in Section 4.1.4 of this report.

Describe any Proposed Changes to the Sampling Program and Rationale:

No changes are proposed at this time. This objective may be considered for future work planning or as part of other Ministry program areas (e.g., Science and Research Branch). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.6 Monitor the Whole Fish Community (Reaches 2, 4 and 5)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"The whole fish community should be assessed (i.e., Near Shore Community Index Netting (NSCIN)) on Reaches 5, 4 and 2."*

Priority: **High**

Data Collection Program:

Population Assessments (NSCIN; BsM) were conducted by MNRF.

RPG conducted fish community sampling during their Class EA for Waterpower Projects work associated with the proposed Thomas Low development project (2009 - 2012) in Reach 2 and the First Chute development project (2007).

Fish Communities Sampling was completed using backpack electrofishing, gill netting, minnow traps and seine nets on the Bonnechere River in Reach 2 and 1 and within eight tributaries located in Reach 2.

RPG was also required to conduct an American eel survey as part of an on-going monitoring program in Reach 2 of the Bonnechere River. RPG and MNRF monitored an eel trap from 2012 until 2015 when RPG hired Bowfin Environmental Consulting to provide advice on American Eel. RPG set two (2) eel traps in Reach 2 below the lower dam to continue this monitoring program.

Responsibilities: MNRF and RPG

Interim or Final Results:

MNRF has done some assessment of the fish community on the Bonnechere and will continue to monitor fish populations under the district fish and wildlife program:

1. BsM was completed on Round Lake in 2008, 2014, 2018
2. BsM was completed on Golden Lake in 2009, 2015, 2021
3. NSCIN was completed by MNRF at First Chute in 2007

RPG's fish community sampling programs were conducted between 2007 and 2009 in Reach 1 and 2. In total 919 fish representing 23 species were captured: Northern Pike, White Sucker, Shorthead Redhorse, Emerald Shiner, Blackchin Shiner, Common Shiner, Sand/Mimic Shiner, Fathead Minnow, Bluntnose Minnow, Longnose Dace, Creek Chub, Brown Bullhead, Banded Killifish, Brook Stickleback, Rock Bass, Pumpkinseed, Smallmouth Bass, Walleye, Johnny Darter, Logperch and Mottled Sculpin. All fish species were common warm to cool water species. No Brook Trout were captured.

In the RPG monitoring program for American Eel, when an eel is caught in the eel trap it is transferred upstream to Reach 3. Only one individual has been caught and transferred upstream to Reach 3 since the program began in 2012.

Describe any Proposed Changes to the Sampling Program and Rationale:

This DCP is now achieved through BsM.

RPG's monitoring of eel traps at Renfrew in Reach 2 continues at the present time.

5.7 Status of Lake Trout Population on Round Lake (Reach 8)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"Little baseline information exists on the impacts of current waterpower operations on the long-term sustainability of the naturally reproducing Lake Trout population in Round Lake. The status of the population will be assessed (i.e., SLIN (Spring Littoral Index Netting) or SPIN (Summer Profundal Index Netting)) on an on-going basis to measure the population response to the new operating regime."*

Priority: **High**

Data Collection Program:

A study was undertaken to investigate water level management in relation to Lake Trout spawning and egg incubation as well as understanding the community structure of the Lake Trout population in Round Lake, as such:

1. Mapping suitable habitat/good spawning habitat for Lake Trout on Round Lake.
2. Assess Lake Trout population (SLIN or SPIN) on Round Lake to measure the population response to the operating regime.

Financial contributions toward the various studies undertaken by MNRF and a private biology consulting firm, Natural Resource Solutions Inc, (NRSI) in 2007 were provided by RPG, Multistream, EGC, RLPOA, GLPOA and the Township of North Algona Wilberforce.

Responsibilities: MNRF and RPG

Interim or Final Results:

MNRF conducted mapping in 2006 and an initial SPIN survey targeting Lake Trout was completed in 2007. Subsequent monitoring has shifted to BsM, which has occurred on Round Lake in 2008, 2014, 2018.

Rehabilitative stocking (collected native Round Lake strain) occurred in 2012, 2013, 2014, which resulted in 38,950 Lake Trout of various sizes being stocked back into Round Lake. The goal was to stock to 7-10 years using native strain to restore numbers of breeding adults.

Describe any proposed changes to the sampling program and rationale:

A sampling program to specifically target Lake Trout (i.e., SPIN or SLIN) would provide better Lake Trout specific results, including the positive results from the rehabilitative stocking between 2012 and 2014.

This DCP is now, in part, achieved through BsM.

5.8 Lake Trout and Walleye Spawning Areas (Reach 8)

The following excerpt from the Water Management Plan describes the information need:

Information Need: "*Identifying and assessing known and potential spawning areas for Lake Trout and Walleye."*

Priority: **High**

Data Collection Program:

1. Investigate lake bathymetry.
2. Water temperature and depth surveys.
3. A more in-depth shoal survey needs to be conducted at known Lake Trout spawning shoals to characterize their shape relative to water levels. This should be done in combination with a fall Lake Trout spawning assessment.
4. Spawning fish and eggs should be located and compared to the characteristics of the shoal to confirm the depth of the critical spawning habitat.

A summary of these studies was included in a report *Summary of Lake Trout (Salvelinus namaycush) & Spawning Habitat in Relation to Water Management on Round Lake* (Rosien, D. (MNR) and Steele, R. (NRSI), May 2010).

As mentioned above, financial contributions toward the various studies undertaken by MNRF and a private biology consulting firm, Natural Resource Solutions Inc, (NRSI) in 2007 were provided by RPG, Multistream, EGC, RLPOA, GLPOA and the Township of North Algona Wilberforce.

Responsibilities: MNRF and RPG

Interim or Final Results:

A bathymetric survey was completed in 2005 on Round Lake. Complete mapping of Lake Trout spawning habitat including their respective elevations was completed in 2006 and 2007 on Round Lake. Diving occurred in 2007 that documented the elevation of deposited eggs. The results indicated that spawning habitat for Lake Trout ranged between 166.1masl and 170.4 masl on the shoals of the lake. A summary of the findings from these studies is detailed in the 2010 Round Lake Trout report.

Describe any proposed changes to the sampling program and rationale:

Habitat quality for Walleye in the Bonnechere River has declined. As a result of several factors on the river system including changes in water quality (e.g., clarity, decrease in nutrients, etc.), over harvesting, introduction of Black Crappie and an increasing smelt population, Walleye have been experiencing a population decline. These changes in Walleye population and habitat on the river system are supported by the results of the BsM cycles 1, 2 and 3, hydro acoustic work that was completed to study the smelt population and secchi disk readings from various points in time that demonstrate changes in water clarity. RPG will continue to maintain water levels over the Walleye spawning beds immediately below the Tramore Dam.

5.9 Lake Trout Spawning at Lower Levels (Reach 8)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"The feasibility of forcing or conditioning Lake Trout to spawn at lower water levels should be investigated. The outcome or result of this information may have an impact on the future operations."*

Priority: **High**

Data Collection Program:

Investigating the feasibility of conditioning Lake Trout to spawn at lower levels has been completed during two separate investigations. The first investigation was completed between 2005 and 2008 by MNRF and RPG's consultant, NRSI. The results and conclusions of this study were presented in the 2010 Round Lake Trout report. A detailed discussion of this investigation can be found in Sections 4.1.1, 5.7 and 5.8 of this report. The second investigation occurred more recently in 2019-2020 by Bowfin Environmental Consulting (Bowfin). A description of this investigation and its conclusions can be found in Section 2.2.5 of this report.

The 2005-2008 studies were funded by MNRF, RPG, Multistream, EGC, RLPOA, GLPOA and the Township of North Algona Wilberforce.

The 2019-2020 investigation was funded by the KHR along with some financial assistance from the RLPOA, the GLPOA, the Township of Bonnechere Valley and the Township of North Algona Wilberforce. RPG assisted with manpower costs for ice and depth surveys and provided a boat and driver for the field crews.

Responsibilities: MNRF and RPG

Interim or Final Results:

The 2010 Round Lake Trout Report produced by MNRF, Pembroke District and a representative from RPG discussed the findings from a series of studies that were

undertaken between 2005 and 2008 to investigate the population and spawning habitat of Lake Trout on Round Lake. One study in the report focused on the average ice thickness over the Victoria Island shoal between 2005 and 2009. The average ice thickness for these years was 0.5m. Since most eggs were deposited below 169.5 masl, it was determined that drawdown could extend to 170.1 masl without directly impacting most of the incubating eggs.

The 2019 amendment to the BRWMP reduced the lower operating limit to 169.6 masl to build capacity for spring freshet. The fall drawdown, established to safely meet the lowered winter/spring water levels while considering impacts to fall spawning species, must reach 170.20 masl by week 42 (mid-October). Lowering the water levels prior to the peak spawning period (mid-October) will force the Lake Trout to spawn at lower water levels.

In 2019, Bowfin went out with AOO to collect information on eggs that may become stranded in shallow water under the previous regime. Bowfin returned to the site in 2020 when the water levels were near 50cm lower and mapped the available fish habitat again to prove there was habitat at the new lower levels. This information confirmed there was still a lot of habitat for fish on the known shoals.

Describe any proposed changes to the sampling program and rationale:

With the implementation of the 2019 amendment to the WMP, specific monitoring to determine the impacts of the drawdown on fall spawning species, such as Lake Trout, should be continued until further notice.

5.10 Northern Pike Spawning Areas (Reach 8)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"It is recommended that this information be refined by identifying and assessing known and potential spawning areas for northern pike."*

Priority: **High**

Data Collection Program:

1. Identify and assess known and potential spawning areas for Northern Pike.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed..

Describe any proposed changes to the sampling program and rationale:

This objective may be considered for future work planning or as part of other Ministry program areas (e.g., BsM). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.11 Ice Effect on Shoreline (Reach 8)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"Need to assess how movement of Round Lake ice impacts the shoreline environment."*

Priority: **High**

Data Collection Program:

1. RPG commissioned an engineering company in Kanata (BMT Fleet Technologies Inc.) to investigate the ice related damages to Round and Golden Lake in 2005.
2. MNRF and RPG collected ice measurements every year between 2005 and 2009.
3. RPG has undertaken on-going winter monitoring of ice depths in Golden Lake, Lake Clear and Round Lake since 2007.

Responsibilities: MNRF and RPG

Interim or Final Results:

The SAC (SAC meeting # 3, January 2006, comment from Don Pouliot, SAC) has questioned if the ice damage could be reduced by lowering Round Lake to levels that were experienced in the 1950s.

Research that occurred following the implementation of the BRWMP was an ice study conducted in 2005 by BMT Fleet Technology Limited, Kanata, Ontario, *Investigation of Ice-related Damages to Private Properties on Round and Golden Lake – Final Report*. The shorelines of Round Lake regularly experienced flooding and erosion damages. The high-water levels in the spring can cause ice push which damages shorelines. The report prepared on the ice push for Round Lake (BMT, 2005) recommended the following:

- Winter water levels should be less than 170.8 masl.
- A continuous steady drawdown is preferred after freezing. They recommended a rate of 4 cm/week.
- No increases to water levels once ice forms. (Note that heavy rain events may result in this occurring, but the operation plan should not include increases to water levels after freeze-up until spring).
- It also recommended that residents leave the berms created by ice push in place.

Other research between 2005-2007 (MNRF and NRSI) was conducted on the Lake Trout population and spawning habitat to determine if the initial operational plan established in the BRWMP could include more flexibility in the water levels between late fall and spring. That work found that water levels could be reduced from the previous practice of maintaining 170.41 masl between late February to end of March to an elevation of 170.1 masl. This would allow a 60 cm buffer between the elevation where most eggs were deposited (169.5 masl) and the bottom of the ice (ice thickness measured at 50 cm) (MNR and NRSI, 2010).

KHR's amendment request of 2017 recommended adopting a fall drawdown to ensure ice damage is minimized in Reach 8 (see Section 2.5.5). The mandatory lower limit declines beginning in August (week 32) and continues to drop at a gradual rate until week 52. The Typical Operating Line mirrors this with a slow decline throughout September and into the fall and winter. Drawdown is to occur at a rate of roughly 7 cm per week between early September until mid-October (prior to the peak Lake Trout spawning period). Then continue at a rate of roughly 4 cm per week until it reaches the new lower limit of 169.60 masl (from the existing lower limit of 170.1 masl). This also adheres to the ice timelines for the lake recommended by BMT noted above.

On October 3, 2019, the MNRF approved the KHR major amendment for the BRWMP.

Describe any proposed changes to the sampling program and rationale:

Annual measurements of ice thickness and snow depth over ice sheet were recommended in the MNRF/NRSI 2010 report. RPG has been collecting this data since 2007 and it is on-going.

5.12 Bedrock Restriction at Golden Lake Bridge (Reach 7)

The following excerpt from the Water Management Plan describes the information need:

Information Need: ***"To conduct a hydrologic study of the bedrock restriction. This information will enhance the existing hydrologic model and our understanding of Golden Lake's ability to pass spring water volumes."***

Priority: **High**

Data Collection Program:

1. Arrange to have the bedrock restriction downstream of the Golden Lake bridge studied.

Responsibilities: RPG

Interim or Final Results:

Please refer to Section 4.1.4 for an explanation of the hydraulic analysis that has been completed for the Golden Lake outlet undertaken by RPG.

Describe any proposed changes to the sampling program and rationale:

No further investigative programs were deemed necessary due to cultural and economic restrictions.

No change to the Golden Lake Dam operations were required as a result of the hydraulic study undertaken in 2017. The financial and cultural barriers to improving the ability of Golden Lake to pass spring water volumes have deterred any further investigation into the removal of the bedrock restriction.

5.13 Golden Lake Whitefish Spawning Areas (Reach 7)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"Known and potential Whitefish spawning areas on Golden Lake need to be identified."*

Priority: **High**

Data Collection Program:

1. Information on spawning shoal size, location and elevation, and condition must be obtained.
2. Time of spawning and fry emergence should also be investigated.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed.

Describe any proposed changes to the sampling program and rationale:

This objective may be considered for future work planning or as part of other Ministry program areas (e.g., fisheries management planning). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.14 Monitoring Walleye Success (Reach 7)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"The operating regime may have an impact on the degree of success in rehabilitating Walleye."*

Priority: **High**

Data Collection Program:

1. Spawning Observation Surveys.
2. Monitor success of the five-year Walleye season moratorium between 2002 and 2006.

Responsibilities: MNRF

Interim or Final Results:

As a result of several factors on the river system including changes in water quality (e.g., clarity, decrease in nutrients, etc.), over harvesting, introduction of Black Crappie and an increasing smelt population, Walleye have been experiencing a population decline. These changes in Walleye population and habitat on the river system are supported by the results of the BsM cycles 1, 2 and 3, hydro acoustic work that was completed to study the smelt population and secchi disk readings from various points in time that demonstrate changes in water clarity.

Sections 4.1.2 and 4.1.3 in this report outline EMPs associated with Walleye spawning beds downstream of the Tramore Dam and upstream of the Golden Lake Dam (Reach 7). These studies concluded that water quantity (levels and flows) at spawning sites in this reach, during the spring freshet, has not been identified as a factor in Walleye population decline and therefore, there is no requirement to propose changes to operating regimes at the Tramore Dam or Golden Lake Dam. In addition, the EMPs related to Walleye spawning areas in Reach 7 were determined to be no longer required.

Describe any proposed changes to the sampling program and rationale:

MNRF may consider amending the WMP to reflect this change and update the approach for assessing Walleye populations throughout the Bonnechere river system.

5.15 Golden Lake Whitefish Population Status (Reach 7)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"The long-term sustainability of the Golden Lake Whitefish population. It is recommended that the present status of the population be assessed (i.e., SPIN) and continue to be re-assessed under the new operating regime."*

Priority: **High**

Data Collection Program:

1. Assess population of Whitefish population in Golden Lake

Responsibilities: MNRF

Interim or Final Results:

Has not been completed.

Describe any proposed changes to the sampling program and rationale:

This objective may be considered for future work planning or as part of other Ministry program areas (e.g., fisheries management planning). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.16 Brennan's Creek Spawning Fish Community (Reach 7)

The following excerpt from the Water Management Plan describes the information need:

Information Need: "*Water flows on Brennans Creek are affected by the operation of the Old Killaloe Mill and Killaloe Station Dams. This may have implications for fish and wildlife along the creek. Impacts will be investigated.*"

Priority: **High**

Data Collection Program:

1. Undertake a fish community survey and potential spawning areas survey (spring and fall spawners) in Brennan's Creek.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed.

Describe any proposed changes to the sampling program and rationale:

This objective may be considered for future work planning or as part of other Ministry program areas (e.g., BsM, fisheries management planning). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.17 Monitoring Water Levels and Flows on Golden Lake (Reach 7)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"Upgrade the water level monitoring gauge (temperature and flow information) near the Golden Lake bridge."*

Priority: **High**

Data Collection Program:

1. The upgraded station will collect real-time water level, temperature and flow information to assist the MNRF in WMP implementation and enforcement.

Responsibilities: RPG

Interim or Final Results:

RPG installed a full weather, water temperature and water level station at the Golden Lake bridge location on March 23, 2015. RPG has all the records filed and sends a weekly report on water levels to the MNRF.

A modern station with water level and rain gauge was installed at Round Lake on June 24, 2020.

Describe any proposed changes to the sampling program and rationale:

There are no proposed changes at this time. The practice of collecting and recording data has not changed.

5.18 Water Level and Flow Impacts on Wild Rice (Reach 6 and 7)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"Members of the Algonquins of Pikwàkanagàn community traditionally harvest wild rice on parts of Reach 7 and Reach 6. It is recommended that studies be conducted to identify the extent and location of these areas traditionally harvested, and to determine if water level and flow manipulations regulated through the WMP impact those areas and/or harvesting activity."*

Priority: **Low**

Data Collection Program:

1. Identify the extent and location of wild rice areas traditionally harvested.
2. Determine if water level and flow manipulations regulated through the WMP impact those areas and/or harvesting.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed. MNRF is not aware of any concerns related to wild rice on the Bonnechere River system and has not completed any work related to the impacts of water level and flows on wild rice.

Describe any proposed changes to the sampling program and rationale:

This objective may be considered for future work planning or as part of other Ministry program areas (e.g., BsM, fisheries management planning). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.19 Walleye Spawning Below Golden Lake Dam (Reach 6)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"The area downstream of the Golden Lake Dam is known to attract spawning Walleye in the spring. It is recommended that the spawning activity be assessed. This information should be used to refine the operating regime at the Golden Lake Dam during the spring to maximize the amount of available spawning and rearing habitat."*

Priority: **High**

Data Collection Program:

1. Undertake a spring spawning survey below the Golden Lake Dam.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed.

Describe any proposed changes to the sampling program and rationale:

As a result of several factors on the river system including changes in water quality (e.g., clarity, decrease in nutrients, etc.), over harvesting, introduction of black crappie and an increasing smelt population, Walleye have been experiencing a population decline. These changes in Walleye population and habitat on the river system are supported by the results of the BsM cycles 1, 2 and 3, hydro acoustic work that was completed to study the smelt population and secchi disk readings from various points in time that demonstrate changes in water clarity.

5.20 Brook Trout in Hurds Creek (Reach 6)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"It is recommended that the status of the Brook Trout population in Hurds Creek be assessed. This information should be used to refine the operating regime at the Lake Clear Dam upstream."*

Priority: **High**

Data Collection Program:

1. Conduct a survey for Brook Trout in Hurd's Creek.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed.

Describe any proposed changes to the sampling program and rationale

This objective may be considered for future work planning. Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.21 Brown Trout Survival (Reach 4 and 5)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"It is recommended that year-round survival success of Brown Trout present in these reaches be assessed."*

Priority: **Low**

Data Collection Program:

1. Conduct year-round survey for Brook Trout in reaches 4 and 5.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed.

Stocking of Brown Trout was discontinued as water temperatures became too warm to support this species.

Describe any proposed changes to the sampling program and rationale:

During the SAC Meeting #7 held on September 27, 2006, this information need was removed from the program list. Amendments to the plan may be considered to reflect this.

5.22 Impacts to Spawning Sites (Reach 4)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"The operating regime established for the Eganville and Douglas dams should be monitored for any negative impacts on potential spawning areas in this reach. Studies should be conducted to establish fish species and spawning success in this reach. Spawning activity should be monitored to identify any impacts caused by the operating regime and seasonal conditions."*

Priority: **High**

Data Collection Program:

1. Conduct a study to identify fish species
2. Undertake an assessment of the success of potential spawning areas in this reach
3. Study the impacts to spawning activities caused by the operating regime and seasonal conditions.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed.

Describe any proposed changes to the sampling program and rationale:

This objective may be considered for future work planning or as part of other Ministry program areas (e.g., BsM, fisheries management planning). Amendments to the plan may be considered to align this objective with current MNRF approaches.

5.23 Spawning and Spawning Habitat Assessment (Reach 1, 2 and 3)

The following excerpt from the Water Management Plan describes the information need:

Information Need: *"…The spawning patterns and specific locations of the spawning sites in this reach should be assessed. The operating regime for Douglas Dam should be monitored in terms of impacts to spawning sites and fish survival downstream of the dam."*

Priority: **High**

Data Collection Program:

1. A study of spawning sites in Reach 1, 2 and 3 should be assessed.
2. The operating regime for the Douglas Dam should be monitored in terms of impacts to spawning sites and fish survival downstream of the dam in Reach 3.
3. This information will be useful for updating operating regimes for the dams in Renfrew and upstream to maximize fish survival and optimize flows for power generation in Reach 3 and Reach 2.
4. Spawning sites in Reach 1 should also be assessed for possible impacts from siltation.

Responsibilities: MNRF

Interim or Final Results:

Has not been completed. May be considered for future work planning.

RPG and Multistream have completed habitat assessments associated with development projects for their facilities that may inform this DCP.

Reach 3

In 2012, Multistream hired Bowfin Environmental Consultants (Bowfin) to conduct an aquatic habitat and communities' assessment, mitigation measures and impact analysis for proposed work to deepen the river downstream of the Douglas dam. Background review and field work data used by Bowfin in the 2012 report were taken from 2007 and 2008 work also undertaken by Bowfin as part of the 2009 Environmental Assessment planning process conducted at the site for a project to upgrade the generating station. In the 2009 and 2012 Bowfin reports the habitat surrounding the Multistream Douglas GS was described, and fish communities identified. The following studies were undertaken in 2007 and 2008:

- general channel morphology (depth, substrate size, morphological units and in-stream cover, specific habitat features (i.e. bedrock, pockets of gravel/pebbles, large woody debris and pools)).
- Water velocity.
- Community Sampling (benthic macroinvertebrate and fish community were sampled). Fish sampling methods included:
    - underwater video camera;
    - spring visual surveys;
    - spring egg and larvae collections;
    - backpack electrofishing;
    - upwelling surveys; and
    - fall visual surveys conducted during water manipulation exercises.

As a result of these investigations, it was Bowfin's professional opinion that the area was used most often by Rock Bass and Smallmouth Bass, indicating that the general area is used for spawning and nursery habitat by species which prefer rocky substrate. The 2007 and 2008 studies assumed that some spawning by early spring species could occur throughout the general project area. In addition, based on the data collected at the time the area was not thought to be conducive to Brook Trout spawning:

"*The potential for fall spawning Brook Trout would be limited due to the lack of upwellings. A survey of the area for evidence of spawning and for adult trout was conducted during two water manipulation exercises in 2008. No trout, redds or eggs were observed. It is unlikely that the project area is utilized by trout for spawning."* (Bowfin Report, May 2012).

Reach 2 and 1

RPG conducted spawning habitat mapping and assessments during their EA associated with the proposed Thomas Low development project (2009 - 2012) and some preliminary mapping associated with their proposal for a greenfield development at First Chute project (2006, 2007, 2012 and 2013). Eight tributaries along Reach 2 of the Bonnechere River were investigated and information on water quality, habitats and fish communities was collected. The larvae sampling occurred below the First Chute in Reach 1.

Results

The habitat downstream of the First Chute (Reach 1) consisted of the chute, a fast-flowing run, back bay and fast flowing, deep glide. The substrate consisted primarily of bedrock with depositional area of fines. The in-water cover consisted of rocks, and the occasional large woody debris and aquatic vegetation.

The habitat upstream of First Chute (Reach 2) consisted largely of shallow and deep glides interspersed with fast flowing, deep runs, and shallow riffles. In general, the river contained tall steep banks, mostly fines (clay) and is well vegetated. The banks near the Upper Plant and First Chute were bedrock. The substrate varied from rocky (bedrock, boulders, cobble, pebble, gravels) to fines. Spawning habitat for Walleye was noted at the top of Reach 2 below RPG's lower dam.

The tributaries along Reach 2 consisted of a variety of glides, riffle, runs and pools. The substrates varied between, fines, gravel pebbles, cobbles, and few with boulders. Spawning surveys were not conducted in these tributaries as part of RPG's program.

The area downstream of the First Chute in Reach 1 provides potential Lake Sturgeon spawning habitat. Monitoring of the area below First Chute for spawning in 2007 found no Sturgeon (Walleye/sauger and sucker family larvae were captured).

Describe any proposed changes to the sampling program and rationale

The DCP associated with the Thomas Low redevelopment project and the First Chute development project did not continue as these sampling programs were developed and undertaken in relation to proposals for redevelopment and upgrade projects, the sampling programs were designed and undertaken within specific frameworks associated with each project's proposals. These sampling programs are not on-going. The one exception is the monitoring of the American Eel traps below the Renfrew dams complex in Reach 2 which continues to this date.

There is no evidence that the sampling programs noted above by RPG and Multistream were undertaken in relation to specific data programs dictated in the BRWMP. The work was done as part of their respective EA planning processes associated with proposals for

facility redevelopment or upgrades. As such, these studies focused on the potential impacts associated with the proposed change to the aquatic environment because of these respective proposals. These programs were not associated with effectiveness monitoring of the established operating regime's (since 2004) impact on spawning sites that existed prior to 2004.

6 Conclusion

The BRWMP came into effect on September 2004. Over the course of the last seventeen years there have been fifteen amendment requests submitted to MNRF and of those, eleven amendment requests have been approved.

Since February 2018, the BRWMP SAC has been composed of representatives from each municipality as well as the Algonquins of Pikwàkanagàn community that are chosen by each of their councils. Each proponent on the river also attends the SAC meetings. The SAC has a Terms of Reference and proponents do not have voting rights concerning proposed amendments.

Seven EMPs and twenty-three DCPs were assigned in the BRWMP, mainly to RPG and MNRF. In 2006 the SAC assigned a high priority to DCPs within the BRWMP. It is assumed the remaining DCPs were given low priority status by the SAC.

Lake Trout studies on Round Lake have led to approved amendments to reduce the lower operating limit on the lake to build capacity for spring freshet without any long-term effects to the natural species.

Walleye Watch occurred at the Tramore Dam in Reach 8/7, and below the Golden Lake Dam in Reach 7. Walleye population in the river has declined significantly. The decline in population is not believed to be related to water levels but to increased water clarity, introduction of Black Crappie and an increased smelt population. MNRF may consider amending the WMP to reflect this change and update the approach for assessing Walleye populations throughout the Bonnechere River system.

RPG undertook a hydraulic analysis to characterize the restriction and flow control point near the Golden Lake Dam. The dam is not believed to be a hydraulic control in high flow situations when all logs are removed. As such, any modification to the dam may not help to significantly reduce the water level in Golden Lake. The flow condition downstream of the dam is most likely dictated by the geometry of the river (i.e., slope and roughness).

RPG has installed level gauges at Golden Lake, Round Lake and Clear Lake; EGC and Multistream have level gauges installed at their generation facilities. The Thomas Low GS calculates levels from flow data recorded through the dams. The redeveloped Thomas

Low facility at Renfrew in Reach 2 of the Bonnechere River has a residual flow value of approximately 2 cubic meters per second (cms) between mid-April and the end of May to maintain spawning habitat at the site. The Multistream waterpower facility located in Reach 3 of the Bonnechere River also mentions an historical minimum flow over the dam. This value was set at 0.5 cm during the EA process. The Eganville facility has established a 0.68 cm minimum flow based on historical flows for their operations. This approach has formally not been completed for all dams on the system and may be considered for future work planning.

RPG developed a system-wide information portal on their company's website for public access to information pertaining to the Bonnechere River system and associated WMP. The website contains water level and flow information for each facility on the system that is updated weekly throughout the year and daily during the freshet.

Of the twenty-three DCPs assigned nineteen were given a rating of high priority and four were given a rating of low priority. Of the high priority assigned projects seven have been completed, some with on-going monitoring; another five are incomplete with interim results; and, seven have yet to be initiated. Of the low priority projects none have been initiated.

RPG and other proponents have fulfilled their original commitments and at times have provided additional information and data on the Bonnechere River system through facility specific redevelopment projects as part of their EAA requirements. There are a number of outstanding MNRF commitments identified in the approved BRWMP. No changes proposed at this time for DCPs that remain incomplete or have not yet been initiated. These objectives may be considered for future work planning or as part of other Ministry program areas (e.g.,BsM).

MNRF and proponents may consider amending the WMP to reflect where commitments no longer align with MNRF's responsibilities and/or are no longer relevant to the WMP.