11.0 EFFECTIVENESS MONITORING PROGRAM

To ensure that operational changes are effective in meeting the ecological objectives of the Matabitchuan River WMP, a monitoring program as prescribed in the WMP Guidelines, has been developed. The following section outlines the goals of effectiveness monitoring and presents the Matabitchuan River Effectiveness Monitoring Program.

11.1 Goals of Effectiveness Monitoring

There are two types of monitoring programs that are identified in the WMP Guidelines in Ontario, namely compliance monitoring and effectiveness monitoring

Compliance monitoring can be used to determine whether an operator conforms to an approved plan. For example, one could check to determine if the waterpower operator is maintaining flow and level regimes as prescribed in the applicable Water Management Plan (WMP). This monitoring activity involves the collection of data through observation and measurement as operations progress.

Effectiveness monitoring is used to determine if management activities are producing the expected results. Within a WMP, effectiveness monitoring enables a waterpower operator to determine if changes prescribed by the WMP have been successful in achieving the desired effects. At a broader scale, effectiveness monitoring may be used by the MNR to determine whether treatments prescribed within the Aquatic Ecosystem Guidelines are meeting expectations and, if they are not, to investigate why they were not as successful as expected and make appropriate modifications in the future. The results of the effectiveness monitoring program will be considered in a timely manner.

11.2 Effectiveness Monitoring Needs Within the Montreal River WMP

The preferred option developed within a WMP may contain operational changes for water control structures and describe the desired effect of these changes. These operational changes and objectives may be used to define effectiveness monitoring needs within the WMP. For the Matabitchuan River system, the operational changes and objectives are summarized in the table that follows.

11.3 Matabitchuan River Effectiveness Monitoring Needs

Geographic Region	Operational Change	Objective	Effectiveness Monitoring Needs
Net Creek	• Begin winter drawdown on September 15 by 30 cm and on Thanksgiving day weekend continue winter drawdown	Aquatic Ecosystem • Lake trout • Flood mitigation • Beaver habitat	MNR • Assess the health of the stock
North Milne Lake	No Change		None
Rabbit Lake	• Remove January 15 constraint • Drawdown target of 287.00 m by March 20 and then close off dam with onset of freshet • Revise the operating minimum to 287.00 m	Aquatic Ecosystem • Lake trout Power generation Reduces ice damage to docks	MNR • Assess baseline data for lake trout and walleye
	• Establish a new walleye constraint to achieve the summer level of 291.40 m by May 1 on a reasonable effort basis	Aquatic Ecosystem • Lake trout • Pike • Loon nesting Recreation and navigation	MNR • Assess the baseline data for walleye
	• Target the minimum of the summer band 291.40 m by Thanksgiving day weekend during dry summers	Aquatic Ecosystem Downstream recreation and navigation	None
Matabitchuan G.S.	No Change		None

11.4 Priority Effectiveness Monitoring Needs

11.4.1 Walleye Spawning Habitat on Rabbit Lake

Step One: State issue & objective

Issue: Inadequate water levels for walleye spawning in spring.

Objective: Improve conditions for walleye spawning by providing water levels that allow walleye to access known spawning sites prior to the commencement of spawning activity on Rabbit Lake.

Current or previous studies:

Previously (2000) a spring walleye spawning study was undertaken in conjunction with a local cottaging group (Cassels and Adjoining Lakes Association). Many of the known and some potential spawning sites were adequately inundated with water for spring spawning activities based on the water levels observed during the spawning period. It was apparent however that water levels any lower than this anomalous 2000 high spring water year would be detrimental to the sites walleye were using. Lower water levels would also be detrimental to potential sites (mouths of creeks where lake levels affect egg deposition). The water level during this investigation on May 1st was 291.46 masl (OPG records).

Step Two: Define the strategy for meeting the objective

- **Target level or flow** A minimum level of 291.4 masl must be established prior to the onset of spawning activity
- **Current level or flow** Current level or historic level in mid April has been as low as 287.4 (1992) and as high as 290.5 (1991) 290.0 (1988) with other years 287.9 (1989), 289.0 (1990). It has been exceptionally variable while the rule curve prescribed 288.0m for April 15th.
- **Timing**: Local knowledge documents that by the 20th of April walleye are actively seeking spawning sites and recent observations by cottagers and MNR have documented walleye spawning activity as underway on May 1st (2000 and 2005) on Rabbit Lake.

- **Rationale** Water levels suitable to allow walleye to access known sites (Rabbit Creek, SW Bay creek and an observed shoal outside NE Bay) are necessary to provide critical habitat. The weaker than average walleye population in Rabbit Lake has been recovering in part due to the new angling regulations although the quality of the fishery and in particular the reliability of recruitment could be improved upon through improved water level management in spring that would allow spawning fish access to high quality substrate annually. Based on the field investigations to date 291.4m is the preferred water level for May 1st.

Step Three: Define the question

Monitoring question/ hypothesis: The provision of adequate water (0.5m)over known and potential spawning sites during the spawning period will improve recruitment of walleye during the early life stages.

Confounding factors:
e.g.
- Natural variation in walleye recruitment due to weather events.
- Recruitment may improve simply by implementation of the changes in walleye regulation allowing more adult fish to survive.

Step Four: Methods

Indicators of success in increasing walleye spawning activity would be achieved through visual inspection of spawning shoals (known and potential) previously out of water in spring. The presence of spawning fish on these spawning sites previously high and dry in spring is indication of success.

Evaluation of hatching walleye fry on sites previously not under water during the period of spawning activity is a sufficient measure of success.

4a) Selection of indicators (what we are *measuring*; e.g. #s of dead and live eggs, depth of eggs) Measurements involve the documentation of elevation of known and potential shoals hence the amount of water required to inundate a spawning sites. The presence of walleye fry from sites previously not accessible to walleye is the measure of success.

4b) Data required and frequency of collection. Clearly define what data will be collected (e.g. presence of fry) and the frequency of their collection (e.g. daily, monthly, seasonally, annually). Walleye fry hatch at known spawning locations(Rabbit Creek, Teacher's Bay and in particular the NE Bay shoal) will document the success of improvements in water level management. These sites had limited spawning success as the vast majority of the sites were rarely under water.

Photographs documenting the early spring levels 290.0m and comparison photos of the level at 291.4m will be collected.

4c) Data collection methods and protocols.

- Observations of walleye spawning numbers and location over a 4 night spawning period at each shoal and creek mouth identified as having walleye spawning potential
- Attempt to capture walleye fry from each site that spawning walleye were observed on in each year to confirm natural recruitment success

4d) Determine limits of detection

Water levels and elevation of the shoal are a relative measure hence the use of OPG water levels for the dates of observation should prove accurate. As a second level of measure the depth of water over the shoal will be measured at 10 sites on the shoal using a measure tape during each site visit.

The presence of walleye fry at each location indicates there is sufficient substrate inundated to allow for natural reproduction

4e) Cost and resources required:

- Staff (2 staff for 4 nights per year -3 years) $6,000
- Staff (2 staff for 3 days per year -3 years-fry assessment) $6,000
- Equipment (1 boat)
- Travel cost ($1,000 per year)
- Others (field expenses, cost of analysis, etc.)
- Break down according to work schedule e.g. seasonal or multi-year schedule (approx. April 15th -290.0m level –document shoal coverage during daylight and 3 nights of walleye spawning observations in late April and early May contingent on water temperatures for spawning –creek temps 6 degrees C and lake temps of 6C)

4f) Responsibilities for data collection.

MNR will coordinate and collect data on walleye spawning activity and fry emergence information at each of the test spawning sites annually along with elevation and observed water level information, photographs etc

Step Five: Study evaluation, reporting and recommendations

Reporting:

- **Timing and frequency of periodic reports** - annually within 2 months of completion
- **Timing of final report** - within 6 months of final field work

- **Interpretation of results –** MNR will provide reports and data to OPG and to the SAC for review

Recommendations:

- **Recommendations for maintenance of (or changes to) operating regime based on whether intent of objective is being met** (recommendations for water level management (timing and level determination) to meet the objective will be based on the timing of walleye spawning activity in creeks where low lake levels impede access to the creeks and on shoals where low levels impede access to prime spawning substrate. SAC will review the information and relate it to the achievement of the specific objectives for Rabbit Lake in the WMP and make recommendations to the Steering Committee.

Step Six: Define how results are to be incorporated into WMP

If, upon determination that the new regime is having the desired effect as outlined in step 5 in the interpretive report, the new flow regime will become a permanent regime outlined in the water management plan and implemented through the standing advisory committee**.**

NOTE: While this monitoring plan was requested as a component of the WMP the practical aspects of this plan have been implemented and the documentation of improvements in spawning walleye access to sites is a fact at 291.4m on May 1st.

Further documentation may refine the timing.

11.4.2 Trout Spawning Habitat on Rabbit Lake

Step One: State issue & objective

Issue: Lake Trout egg, early sac fry and juvenile life stage survival in Rabbit Lake may be negatively impacted by late fall and winter water level management.

Objective: Maintain or improve early life stages of Lake Trout (egg, sac fry and juvenile) survival in Rabbit Lake through improvements in winter drawdown management.

Background: Water levels are presently reduced by upward of 4.4m (typically 291.7 to 287.3) during the period October 1-March 18th. Lake trout naturally reproduce in Rabbit Lake although of the 12 potential sites visited in 1982 only one site had active spawning activity (lake trout observed) and it was in less than 2.0m of water.

Step Two: (Describe levels and flows and how they impact objective)

Drawdown post egg deposition (October 15th) and before May 1st is detrimental to any lake trout eggs deposited above the minimum draw down level. Wilton (1980) observed that freshly hatched lake trout were incapable of keeping pace with winter drawdowns and were left to freeze as the waters receded. Rabbit Lake has had an October 15th level of approx 291.7 and a March 15th level of 287.3

Step Three: (define monitoring question)

What late fall and spring water management regime will either improve or maintain egg and sac fry survival until May 1st annually and result in natural levels of survival of juvenile lake trout to 300mm-400mm?

Reducing the extent of winter drawdown post egg deposition should allow more Lake Trout eggs to survive by reducing mortality associated with winter drawdown.

Confounding factors:

- Natural variation in Lake Trout egg deposition.
- Finding sufficient numbers of eggs in the spring to draw conclusions.
- Presently natural reproduction does occur in the lake.

Step Four: (Data Collection requirements)

Indicators of Lake Trout recruitment success would be achieved through the mechanical lifting of lake trout eggs from known spawning sites to determine 1) presence of eggs and 2) survival to emergence in April by documenting which shoals are active and which of those are being impacted by drawdown. These sites may be above or below the minimum water levels observed annually. Evaluation of egg mortality will provide an account of mortality by depth. This information can use these counts to estimate mortality associated with different minimum drawdown levels to provide maximum egg survival.

The second component of the assessment is to conduct Summer Profundal Index Netting to document abundance of juvenile lake trout (300mm to 400mm) before (2007) and 5yrs after initiation (2012) of the WMP water level regime. As juveniles vulnerable to SPIN gear are approximately 5 yrs of age and 300mm in length the time span between assessments is 5 yrs.

4a) Data required, frequency of collection, methods of assessment.

Dates of initiation of lake trout egg deposition are required in the event that early fall drawdown is considered. All 12 potential lake trout spawning sites must be visited on at least 2 occasions during the spawning activity (2 year study) to determine activity. In addition a further late winter assessment of water levels on these 12 sites will be recorded.

The records of activity and conditions will conform to the Shoal investigation field sheet (Appendix 1)-GPS centroid, substrate material, condition, depth (shallowest to deepest, number and size of spawning fish, temperature etc. Use of lights is suggested for observation of spawning activity.

Each shoal will have an estimated area(in sq meters)of suitable material established using a fieldranger measuring tool(hipchain) and marker buoys to delineate the corners of the shoal. The shallowest and deepest extents of the shoal will be marked with yellow painted rocks at the GPS sites.

As a function of the site visits 30 minute gill net sets of 50m of 2” mesh monofilament gillnet will be set and the fish captured sampled for lengths, weights, sexual development and live released. Accurate depths of the net sets and observed shoal material are critical.

Confirmation of egg deposition

Egg deposition sampling will be conducted at each site to confirm egg deposition. A minimum of 10 -5 litre samples or 1 lift / 20 sq m for shoals greater than 200 m square will be collected at each site using an egg lift. These lifts maybe random from with half being from within 1m of the deepest part of the shoal and half from 1m deeper than the shallowest portion of the shoal (depth stratified) or directed if eggs are observed. Visual observation of eggs, including video taping will be conducted using an AquaView underwater camera and high power surface lights. This sampling will be done immediately upon lifting and sampling the gill nets each night.

Fry emergence traps (4 per shoal) will be placed at every spawning site that is inundated with water on March 15th based on depth of spawning activity observed and water level manipulation.

Presence of emergent lake trout (>5 per trap) would suggest a high use site and successful incubation.

Documentation of the condition of all potential spawning locations would be conducted on March 15th through the ice using a power ice auger. Observation includes depth of water over shallowest and deepest portion of shoal. These measures will be taken each year of the study.

Essential to the documentation of the impacts is the ability to document water levels on a day by day basis which involves the use of a DCP installed at the dam on Rabbit Lake as offered by OPG. Records of daily water levels are essential.

All standard SPIN data requirements will be met including aging, stomach and sexing, measurements to provincial standard SPIN protocol

4c) Identify cost and resources required for completion and potential sources for acquiring them.

Costs for equipment are not completely known. DCP establishment is essential for the OPG proposed spring water temperature (5C) based water level establishment for walleye hence it is required in any case.

Aquaview camera ($1,000.00), fieldranger hipchain ($300.00), egg lift device ($250.00), gillnets ($800.00), operational materials (fuel, fry traps and maintenance) of $2,500) per season plus field crew of 2 (3 weeks per season) at ($9,000) plus accommodations ($1,500)for a total cost of approximately $16,000.00 per season for two seasons (fall 2007 and 2008).

A total of 15 SPIN nets would be required for an annual project at a cost of $3000 in equipment, a further $1000 in laboratory aging and sampling costs, operational materials cost of ($1000), plus a 3 person field crew for a week ($2500). Total cost of SPIN $7,500 annually for two seasons (2007 and 2012).

4d) Responsibilities for data collection.

This work will be conducted by MNR.

4e) Determine limits of detection.

Spawning shoal dimensions will be measured using a hipchain which literature suggests is accurate within 0.2%. Area measurement of each spawning area will be within approximately 10%.

Depth of the shoal extremities will be determined by sonar at the designated 4 corners of each shoal. Measures to within 0.1 feet are displayed by modern sonar's.

Water level measures from the DCP are of unknown accuracy at present.

Egg deposition measures of less than 5 eggs per 5 litre lift suggest low density use of the shoal. Absence of eggs after 10 lifts per shoal or 1/20sq mitres on shoals larger than 200m square suggests that egg deposition did not occur.

Typical SPIN confidence intervals are +/- 20%. Total SPIN catch data will be applied to the CI values as a +/- 20% applied to only juvenile fish may require significant additional sampling depending upon juvenile density and vulnerability to nets.

Step Five: Measures that indicate progress and when management intervention required

Progress in the process would be measured by an improvement in early life stage survival by maintaining proven spawning sites with a covering of 0.3m or more of water during the entire egg and sac fry development period (Oct 10-May 1st).

Egg and sac fry mortality due to water level management activities (as measured by known spawning areas being dewatered due to winter drawdown) would be a trigger for management intervention.

SPIN results not only measure the before (2007) and after (2012) survival of juvenile lake trout to age 5 (300mm) but also can compare the relative health of the fishery in the 5 yr period based on catches from fish beyond 400mm.

Comparison with other non-reservoir lake trout lakes SPIN results based on similar fish community and angler effort levels may help to determine whether the new WMP regime is benefiting the naturally reproducing lake trout population.

Interim reports on field projects will be tabled to the SAC within 6 months of completion of the field components of the annual project.

Step Six: Define how results are incorporated into WMP

If impact is shown from the present historic regime on lake trout recruitment a strategy to achieve the desired objective will be determined.

The Matabitchuan River WMP Standing Advisory Committee will review the results of these two projects (egg and sac fry project and SPIN project) and include these results in their annual report to the Matabitchuan River WMP Steering Committee along with any recommendations they may deem appropriate.

11.5 Priority Key Gaps in Baseline Data and Information

1. Matabitchuan G.S. – Erosion assessment – **OPGI 2004/2005**
2. Rabbit Lake – Assessment of Walleye below the dam – **OPGI/MNR 2004/2005**

11.6 Effectiveness Monitoring Plan for the Matabitchuan River system Plan

This effectiveness monitoring program has been approved by the Planning Team and the Steering Committee.

Figure 11.1: MNR Index Netting Survey – Net Lake
(Courtesy of MNR)

Figure 11.2: MNR Fish Survey – Net Lake
(Courtesy of MNR)