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## **Black Bay & Black Sturgeon River Native Fisheries Rehabilitation —**

**Decommissioning of the Camp 43 dam and  
construction of a multi-purpose sea  
lamprey barrier at Eskwanonwatin Lake.**

### **Project Description.**

*Completed per A Class Environmental Assessment for Provincial Parks and Conservation Reserves.*

**Northwest Region Planning Unit  
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## OVERVIEW

Black Bay was once home to the largest population of walleye in Lake Superior, supporting sizable commercial and recreational fisheries. The walleye population collapsed in 1968, due to a combination of factors, including overfishing, habitat loss, and predation of juvenile walleye by rainbow smelt. Several initiatives to rehabilitate the walleye population have been largely unsuccessful. These initiatives have included stocking of various life stages, and both recreational and commercial fishing closures.

Recent studies (e.g. Furlong et al. 2006; Biberhofer & Prokopec 2007) suggest that spawning habitat is limiting in Black Bay, and that the remnant walleye stock spawns in the Black Sturgeon River. The Camp 43 dam (also known as the Twin Rapids dam or the Black Sturgeon dam) was constructed on the Black Sturgeon River, 17 km from the mouth, in 1959/60, cutting off access to spawning habitat formerly available to migratory walleye and other native fish species, including lake sturgeon. The creation of artificial spawning shoals is untenable due to the amount of new habitat required, the extreme cost involved, and the lack of road access for the transportation of materials. Providing fish access to naturally occurring habitat is considered essential for the large scale rehabilitation of the native fish community in Black Bay and the Black Sturgeon River.

The Camp 43 dam is a component of the binational sea lamprey control program mandated by the Great Lakes Fishery Commission and carried out by the Canadian Department of Fisheries and Oceans on the Black Sturgeon River. Currently, sea lamprey chemical treatments are carried out once every five years. Removing the Camp 43 dam would necessitate increasing the frequency and magnitude of treatments, and would result in reduced treatment efficacy, resulting in higher numbers of sea lamprey in Lake Superior.

In order to address the goals of rehabilitation of the native fish community, while at the same time ensuring effective and cost-efficient sea lamprey control, the Fisheries Management Zone 9 (FMZ 9) Advisory Council was charged with reviewing options and providing the Ministry of Natural Resources with recommendations for the future of the Camp 43 dam. Their preferred option is to decommission the Camp 43 dam, and to replace it with a new sea lamprey barrier 50 km upstream at the outlet of Eskwanonwatin Lake, the site of the former Camp 1 dam (also known as Dolan's Dam) (Bobrowicz et al. 2010). This option would restore access to the full area of spawning habitat available in the Black Sturgeon River prior to the construction of the Camp 43 dam, but would minimize new production of sea lamprey in the river, resulting in an incremental increase in parasitic sea lamprey in Lake Superior.

The FMZ 9 Advisory Council recommendations were endorsed by the adjacent Fisheries Management Zone 6 (FMZ 6) Advisory Council in September 2010, and subsequently approved by the Minister of Natural Resources in January 2011. MNR completed an aboriginal engagement process between January 2011 and March 2012, which included ten affected or potentially affected First Nations and three Métis organizations. Responses from the aboriginal engagement process ranged from positive to neutral.

In April 2012, the Minister of Natural Resources directed MNR to initiate an EA process to further examine the recommendations of the FMZ 9 Advisory Council. As both sites are located within the boundaries of Black Sturgeon River Provincial Park, this EA will be carried out under the auspices of the Class Environmental Assessment for Provincial Parks and Conservation Reserves (MNR 2005).

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## **1. Name of project.**

Decommissioning of the Camp 43 dam and construction of a multi-purpose sea lamprey barrier at Eskwanonwatin Lake.

## **2. Provincial Park or Conservation Reserve name and location.**

Black Sturgeon River Provincial Park (waterway class). The park is located northwest of the Town of Nipigon. The Black Sturgeon River originates near Lake Nipigon and flows into Black Bay on Lake Superior. The park stretches approximately 72 kilometres northerly along the Black Sturgeon River from Lyon Township (northern limit of pipeline right-of-way in the vicinity of Lot1 Con 7) to the Philips and Benner baseline at the north end of Black Sturgeon Lake.

The Camp 43 site is located at the south end of the park, at 48°55'19"N 88°23'23"W. The Camp 1 site is located at the outlet of Eskwanonwatin Lake, at 49°09'04"N 88°36'43"W.

Figure 1 illustrates the park boundary and the location of the two sites.

## **3. Purpose and rationale.**

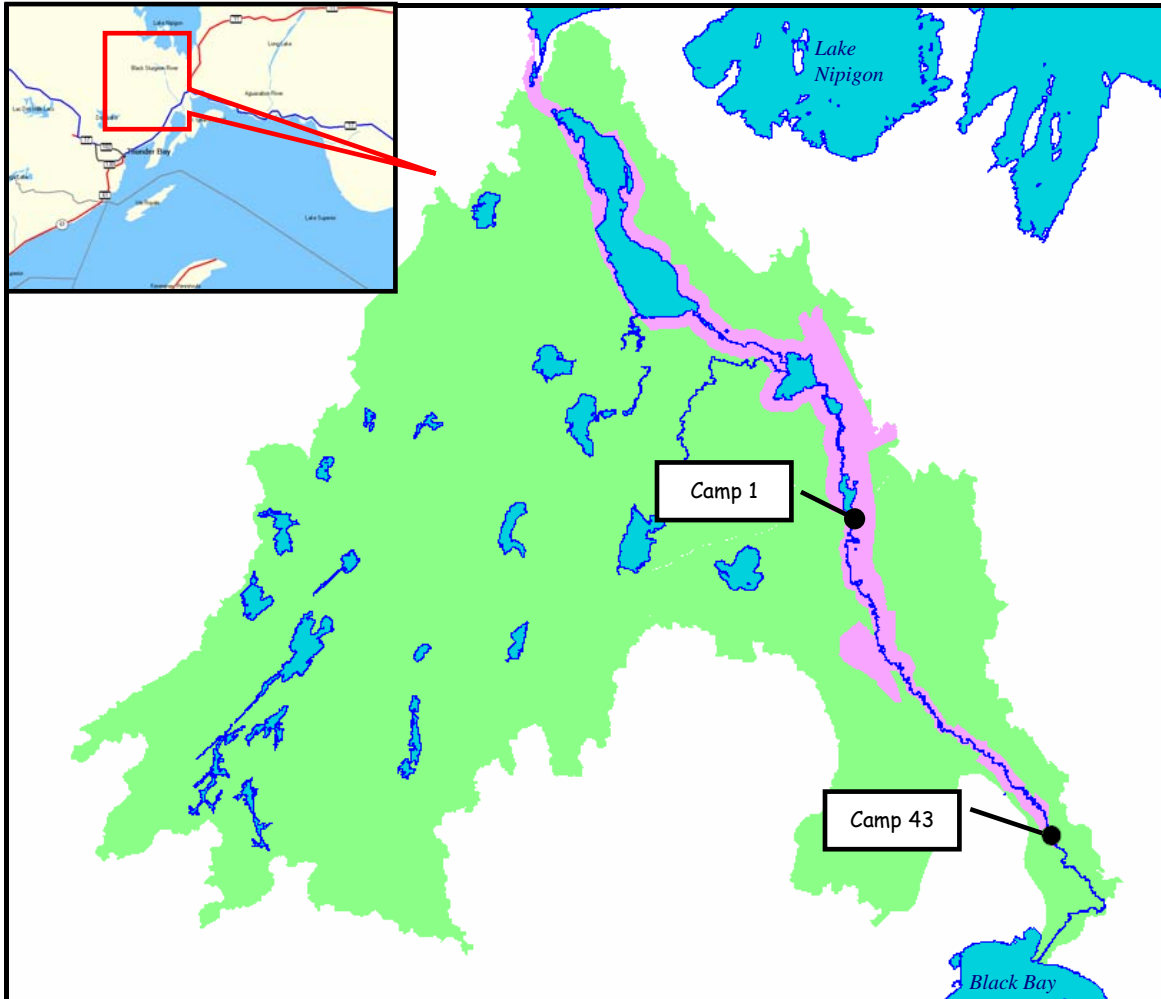
### *3.1 Strategic context*

The Ontario Ministry of Natural Resources is charged with the management, conservation, and sustainable use of Ontario's fish and wildlife resources through the *Fish and Wildlife Conservation Act* (S.O. 1997). This legislative responsibility is elaborated through the MNR's *Strategic Plan for Ontario Fisheries* (SPOF II; MNR 1992), which aims for "healthy aquatic ecosystems that provide sustainable benefits, contributing to society's present and future requirements for a high-quality environment, wholesome food, employment and income, recreational activity, and cultural heritage." This goal is then operationalized through the objective of rehabilitation of degraded aquatic ecosystems.

Guidance specific to particular geographic areas and fisheries is developed through fisheries management planning exercises, which involve multi-stakeholder advisory councils. The advisory councils for Fisheries Management Zones 9 (Lake Superior, including Black Bay) and 6 (inland waters, including the Black Sturgeon River) have endorsed the proposed undertaking, and in particular, recognize its value in meeting the *Fish Community Objectives for Lake Superior* (Horns et al. 2003) in the context of the *Strategic Plan for Ontario Fisheries* (MNR 1992).

### *3.2 Local context*

Black Bay was once home to the largest population of walleye in Lake Superior, supporting sizable commercial and recreational fisheries. The walleye population collapsed in 1968, due to a combination of factors, including overfishing, habitat loss, and predation of juvenile walleye by rainbow smelt. Several initiatives to rehabilitate the walleye population have been largely unsuccessful (Garner et al. *in press.*) These initiatives have included stocking of various life stages, and both recreational and commercial fishing closures.



**Figure 1:** Black Sturgeon watershed illustrating the boundaries of Black Sturgeon River Provincial Park (pink area).

Recent studies (e.g. Furlong et al. 2006; Biberhofer & Prokopec 2007; Sakamoto 2007) suggest that spawning habitat is limiting in Black Bay, and that the remnant walleye stock spawns in the Black Sturgeon River. The Camp 43 dam (also known as the Twin Rapids dam or the Black Sturgeon dam), constructed on the Black Sturgeon River 17 km from the mouth, in 1959/60, currently blocks migration to approximately 80% of the spawning habitat formerly available to walleye, lake sturgeon and other native fish species. The creation of artificial spawning shoals is untenable due to the amount of new habitat required, the extreme cost involved, and the lack of road access for the transportation of materials. Providing fish access to naturally occurring habitat is considered essential for the large scale rehabilitation of the native fish community in Black Bay and the Black Sturgeon River.

### *3.2 Federal and International Linkages*

The governments of Ontario and Canada are party to several agreements and legislation which speak to the management of the Great Lakes and control of invasive species (see Section 7). The rehabilitation of walleye and other native fish species, and the restoration of degraded habitats, including tributaries that have been fragmented by dams, is supported by the Lake Superior Committee's *Fish Community Objectives for Lake Superior* (Horns et al. 2003). The GLFC has endorsed the Lake Superior Technical Committee *Rehabilitation Plan for Walleye Populations and Habitats in Lake Superior* (Hoff 2001), which highlights Black Bay as a priority area in Lake Superior for walleye rehabilitation in recognition of its historic importance for fish production.

The Camp 43 dam is a component of the binational sea lamprey control program mandated by the Great Lakes Fishery Commission (GLFC) and carried out by the Canadian Department of Fisheries and Oceans (DFO) on the Black Sturgeon River. Removing the dam would allow access by walleye and other native fish species to the spawning habitat in the upper reaches of the Black Sturgeon watershed, but would also increase sea lamprey production in the river.

### *3.3 Proposed Course of Action: Identifying the Undertaking*

The goals of the undertaking are to rehabilitate the self-sustaining native fish community of Black Bay and the Black Sturgeon River, while at the same time ensuring an effective and cost-efficient sea lamprey control program is maintained. Based on the finding that the Camp 43 dam is a barrier to rehabilitation of walleye in Black Bay (Furlong et al. 2006), in 2008 a multi-disciplinary group of stakeholders, the Fisheries Management Zone 9 Advisory Council, was charged with reviewing options and providing the Ministry of Natural Resources with recommendations for the future of the Camp 43 dam.

The FMZ 9 preferred option was to decommission the Camp 43 dam, and to replace it with a new sea lamprey barrier 50 km upstream at the outlet of Eskwanonwatin Lake, the site of the former Camp 1 dam (also known as Dolan's Dam) (Bobrowicz et al. 2010). This option would restore access to the full area of spawning habitat available in the Black Sturgeon River prior to the construction of the Camp 43 dam, but would minimize new production of sea lamprey in the river, resulting in an incremental increase in parasitic sea lamprey in Lake Superior.

The FMZ 9 Advisory Council considered several options involving the dam over the course of their deliberations. Of these, four were considered impractical:

- a) Status quo/do nothing: Status quo is considered impractical because it does not address the spawning habitat limitations that have been identified for walleye, sturgeon and other native fish species. Moreover, a 2009 structural evaluation of the dam suggested that the



functional lifespan of the structure is 10-20 years; sometime during this period the dam will either need to be decommissioned or subject to major repairs. Maintaining status quo in the short term is not a permanent solution.

- b) Shillabeer Creek option: This option involves decommissioning the Camp 43 dam and replacing it with a new sea lamprey barrier at some point below the confluence of the Black Sturgeon River and Shillabeer Creek; a potential site was identified approximately 18 km upstream of Camp 43. However, this reach of the Black Sturgeon River contains very little potential spawning habitat, and restricting access at Shillabeer Creek would only result in an incremental improvement to the walleye and sturgeon populations. The Shillabeer Creek option was considered impractical because it does not meet the objective of native species rehabilitation.
- c) Complete removal option: This option involves decommissioning the Camp 43 dam and rehabilitation of the site, without replacement. The main stem of the Black Sturgeon River would be free-flowing from its headwaters at Black Sturgeon Lake, to the mouth of the river at Black Bay. Most of the Black Sturgeon watershed would become available to migrating fish species, both desirable (e.g. walleye, sturgeon) and undesirable (e.g. sea lamprey, ruffe). The sea lamprey control program would necessarily expand from one treatment site on a five year rotation, to as many as forty-five sites on a three year rotation, increasing the amortized annual treatment cost by 2100%. The complete removal option was considered impractical because it does not meet the objective of effective and cost-efficient sea lamprey treatment.
- d) Hydro generation options: Interest in conversion of the Camp 43 dam by a third party for hydro generation necessitated the inclusion of two sub-options for consideration by the FMZ9 Advisory Council. In both cases, converting the dam to a hydro generating facility precluded the effective passage of fish. The hydro generation options were considered impractical because they did not meet the objective of native species rehabilitation, and further, because the dam is located within a regulated provincial park. Hydro development in parks is generally prohibited by the *Provincial Parks and Conservation Reserves Act* (S.O. 2006).

In addition, three other rehabilitation options that did not involve the Camp 43 dam were considered impractical:

- e) Stocking: MNR has made several attempts at stocking walleye of various life stages into Black Bay, none of which have significantly contributed to natural reproduction in the population (Garner et al. *in press*). The *Guidelines for Stocking Fish in Inland Waters of Ontario* (MNR 2002) recommends against stocking walleye in waters already containing naturally reproducing populations of walleye. While limited supplemental stocking may be required during the early stages of rehabilitation of the population, reliance on stocking in perpetuity under a put-grow-take management strategy is impractical because of the high cost, low success rate, and does not meet the objective of rehabilitating self-sustaining population of native fish species.
- f) Artificial spawning habitat: MNR and its partners often undertake small scale projects to create or restore walleye spawning habitat, and these are likewise often components of fish habitat compensation agreements under the federal *Fisheries Act* (R.S.C. 1985). However, in the case of the Black Sturgeon River, the scale of such a project makes it impractical. Based on the estimates derived from Sakamoto (2007), an additional 320,000 m<sup>2</sup> of spawning

habitat would need to be created in the Black Sturgeon River in order to fully rehabilitate the walleye population. High cost, limited road access and hydrological considerations have eliminated this approach from further consideration.

- g) Regulatory and harvest controls: MNR has applied several regulatory and harvest controls to the commercial and recreational walleye fisheries in Black Bay and the Black Sturgeon River, beginning with the commercial closure for walleye in 1971. While it is recognized that overharvest contributed to the demise of walleye in Black Bay, regulatory and harvest controls cannot address the limitation of spawning habitat which is necessary to rehabilitate a self-sustaining population of walleye; even with zero harvest from all user groups, the rehabilitation potential is expected to be capped at 20% of the pre-collapse population if the habitat limitation is not resolved.

FMZ 9 identified one alternative approach to their preferred option. A selective fish-passage structure, known as a trap-and-sort fishway, is described in Section 5.2.

The FMZ 9 Advisory Council recommendations were endorsed by the adjacent Fisheries Management Zone 6 (FMZ 6) Advisory Council in September 2010, and subsequently approved by the Minister of Natural Resources in January 2011. MNR completed an aboriginal engagement process between January 2011 and March 2012, which included ten affected or potentially affected First Nations and three Métis organizations. Responses from the aboriginal engagement process ranged from positive to neutral.

In April 2012, the Minister of Natural Resources directed MNR to initiate an EA process to further examine the recommendations of the FMZ 9 Advisory Council. As both sites are located within the boundaries of Black Sturgeon River Provincial Park, this EA will be carried out under the auspices of the Class Environmental Assessment for Provincial Parks and Conservation Reserves (MNR 2005).

#### **4. Project description, scale and duration.**

The Project is comprised of four phases:

- a) Access upgrades and associated infrastructure
- b) Construction of a multi-purpose sea lamprey barrier at the Camp 1 site
- c) Decommissioning of the Camp 43 dam
- d) Monitoring, and construction of supplementary sea lamprey barriers on Shillabeer and Moseau Creeks if necessary.

In addition, the Black Sturgeon River Park Management Plan (MNR 2004) contains several sections which pertain to the Project and which need to be amended. Amendments to existing park management direction are required to address changes in policy originating from internal proposals or to respond to valid external requests for a policy change to keep the management direction current and relevant. This requires Aboriginal, stakeholder and public involvement activities (MNR 2009). The park management plan amendment process, as outlined in the Protected Areas Planning Manual (MNR 2009) will be carried out concurrently to this environmental assessment.

##### *4.1 Access upgrades and associated infrastructure*

The Camp 1 site is accessed from Hwy. 11/17 via the Black Sturgeon Road (Figure 2), a loose-surface primary forest access road that passes through patent, Provincial Park and general use

Crown lands. This road was designed for heavy truck traffic; the Township of Dorion has taken responsibility for the portion of the road closest to the Trans-Canada Highway, but with the decline of the forest industry, most of the road has received minimal maintenance in recent years. It is anticipated that basic road maintenance (i.e. grading) will be required along 44 kilometres of the Black Sturgeon Road. The former Camp 1 dam site is found at the end of a 1 kilometre spur road within the Black Sturgeon River Provincial Park boundary. This spur road is well used by campers and other recreational users but is unmaintained. Widening and resurfacing will be required for access by construction equipment.

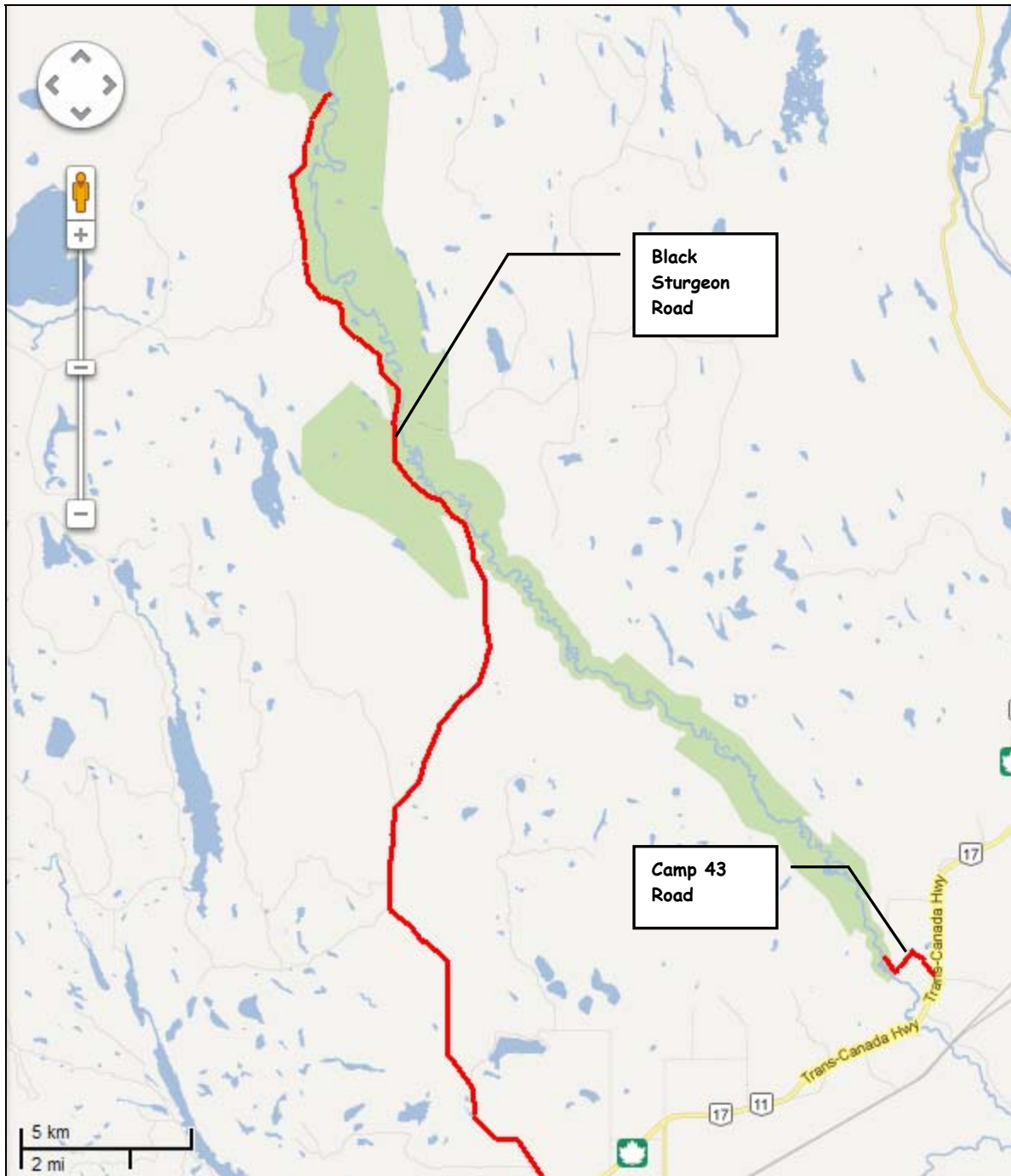
The Camp 43 site is accessed from Hwy. 11/17 via an unnamed road (herein *the Camp 43 Road*, Figure 2) that passes through Crown, patent and Provincial Park lands. The first 750 metres of this road is well-maintained, as it serves to access the Red Rock Landfill Site; the remaining 3.75 kilometres to the east side of the dam is in extremely poor condition; widening and resurfacing will be required for access by construction equipment.

Infrastructure associated with the access upgrades is principally limited to aggregate pits and laydown areas. Aggregate sources for the access upgrades have not yet been identified, although pits licensed to the forest industry exist along the Black Sturgeon Road. The laydown area at Camp 1 (Figure 3) is expected to be located in previously perturbed areas within the former timber camp area, while the laydown area at Camp 43 is expected to be confined to the bald rock area at the toe of the dam (Figure 4).

#### *4.2 Construction of a multi-purpose sea lamprey barrier at the Camp 1 site*

Camp 1 is located at the outlet of Eskwanonwatin Lake on the main stem of the Black Sturgeon River (Figure 3). This was the site of the first lumber camp in the area, as well as the first dam constructed on the Black Sturgeon River, in 1937. The Camp 1 Dam (aka Dolan's Dam) was a timber crib structure that burnt in a forest fire in 1999; the remains of the dam were removed by MNR in 2007. The Camp 1 site is currently used by recreationists for camping, fishing and white water paddling.

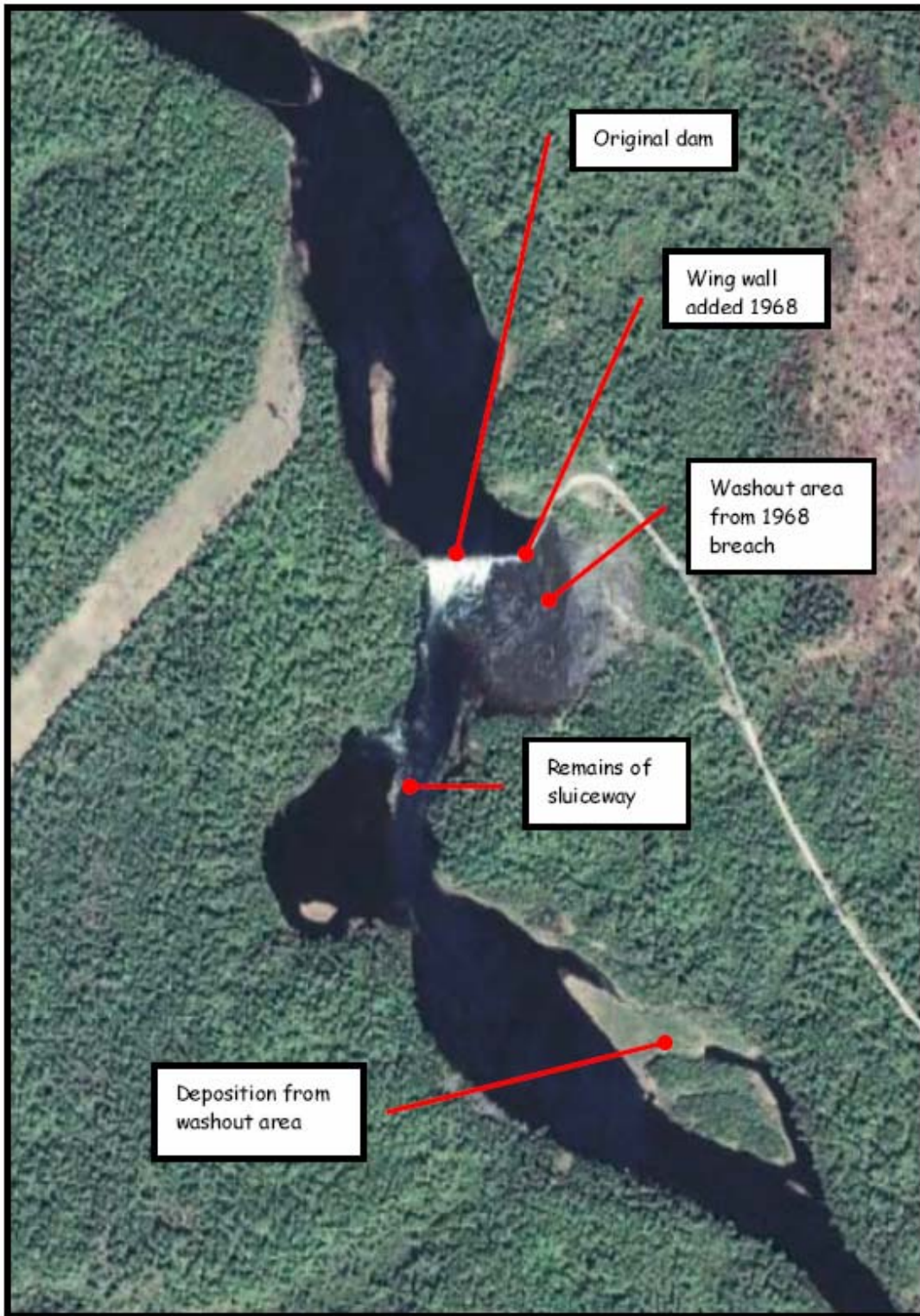
Most purpose-built sea lamprey barriers are designed with the minimal crest height necessary to prevent sea lamprey passage, but do not inhibit passage of migratory fishes capable of jumping (e.g. Pacific salmon). However, in the case of the Black Sturgeon River, MNR wishes to exclude non-native salmonids from the upper watershed. To this end, the new sea lamprey barrier will be built to a height sufficient to achieve the additional purpose of preventing passage by all jumping fish species.



**Figure 2:** Portions of the Black Sturgeon Road and Camp 43 Road requiring access upgrades. Source: Google Maps.



**Figure 3:** Outlet of Eskwanonwatin Lake showing the location of the former Camp 1 dam. Source: Google Earth.



**Figure 4:** 2009 satellite imagery of the Camp 43 site. Source: Google Earth.

The new sea lamprey barrier will be installed at or near the site of the original dam. Design of the barrier has yet to be determined; the simplest sea lamprey barriers are static in nature. However, an opportunity exists here to install a variable-crest barrier which would prevent fish passage during the migratory periods for lamprey and Pacific salmonids, but could allow full or partial passage at other times of the year. In order to minimize disturbance to the spawning activities of sturgeon, walleye and brook trout, in-water construction of the sea lamprey barrier should be confined to the period between approximately July 15 and September 15.

#### *4.3 Decommissioning of the Camp 43 dam*

The Camp 43 dam was constructed in the winter of 1959/60; in 1968 the dam was breached on the east bank, necessitating the addition of an overflow weir (wing wall) (Figure 4). The site also included a 250m boulder/rubble sluiceway below the dam. The sluiceway has deteriorated over time; the remains of the sluiceway now provide additional spawning habitat at the site.

The preferred approach to decommissioning the Camp 43 dam involves the complete removal of the entire structure and naturalization of the site; restoration to a pre-development state is not possible due to the effects of the 1968 breach.

The Camp 43 headpond will be drained in a stepwise fashion, and sediments will be removed from the upstream dam face as they are exposed. A disposal plan for the sediment will be developed, based on the results of pre-construction toxicity testing. The area exposed by the draining of the headpond will be allowed to re-vegetate naturally. The remains of the sluiceway will remain in place.

In order to minimize disturbance to the spawning activities of sturgeon, walleye and brook trout, in-water work during the decommissioning phase should be confined to the period between July 15 and September 15.

#### *4.4 Monitoring, and construction of supplementary sea lamprey barriers on Shillabeer and Moseau Creeks if necessary*

This environmental assessment uses walleye, sturgeon and sea lamprey as key indicator species in achieving its objectives, and therefore assessment focuses primarily on these species.

Monitoring activities will track the following:

- Sea lamprey production in the Black Sturgeon River, Shillabeer Creek and Moseau Creek.
- Walleye migration and production in the Black Sturgeon River.
- Sturgeon migration and production in the Black Sturgeon River.
- Fish community status (including coaster brook trout) in the Black Sturgeon River, Shillabeer Creek and Moseau Creek.
- Fish community status in Black Bay.

Monitoring of sea lamprey, walleye and sturgeon should occur at regular intervals until such a time as fisheries managers have determined that the fish community in Black Bay has been rehabilitated and that sea lamprey production from the Black Sturgeon watershed is being maintained at acceptable levels. At that point, monitoring of Black Bay should be re-integrated into MNR's

regular rotation of fish community assessment in the Canadian waters of Lake Superior. Fish community index netting in Black Bay was conducted by MNR in 2002, 2008, 2010 and 2012 to establish baseline values.

Shillabeer and Moseau Creeks are the only substantive tributaries to the Black Sturgeon River downstream from the Camp 1 site. Prior to the construction of the Camp 43 dam in 1959/60, these tributaries were evaluated by the Canadian Department of Fisheries; the conclusion of those studies was that chemical lamprey treatment of Shillabeer and Moseau Creeks was not warranted at that time (P. Sullivan, DFO, pers. comm.). However, should post-decommissioning monitoring of these tributaries indicate that they are being used by spawning-phase sea lampreys, construction of sea lamprey barriers on these sites may be considered in consultation with the Great Lakes Fishery Commission and the Canadian Department of Fisheries and Oceans. Specific site locations for these potential barriers have not yet been identified.

## **5. Alternatives to the Project and alternative methods to carrying out the Project**

Alternatives to the project, and alternative methods of carrying out the project should be considered under the Provincial Parks and Conservation Reserves Class Environmental Assessment. Where no alternatives are being considered, an explanation should be provided. The Class EA also allows for projects to be scoped within the context of previous planning efforts that identified this specific project need. In the instance of Black Bay, a significant amount of public and inter-agency analysis of options and alternatives has been carried out and documented to date (Bobrowicz 2010; Bobrowicz et al. 2010). As such, the MNR is limiting the alternatives to those that were endorsed by both Fisheries Management Advisory Councils 6 and 9, and the Minister of Natural Resources.

### *5.1 Alternatives to the Project*

Of the five options considered by the FMZ 9 Advisory Council, only one was recommended as a potential alternative to the preferred option.

#### 5.1.1 Trap-and-sort fishway

The original Camp 43 dam (i.e. prior to the 1968 breach and subsequent re-construction) was constructed with a “fish ladder” incorporated into the design. Design drawings of this structure are unavailable and historic photographs are unclear, but it is assumed that the fish ladder incorporated either the pool-and-weir or Denil concepts. While no surveys were ever conducted at Camp 43, it is known that these types of fish ladders are generally unsuccessful in passing non-jumping fish species, including walleye and lake sturgeon (Schwalme et al. 1985). Conversely, sea lampreys are proficient at negotiating fish ladders, and were found in the Black Sturgeon watershed above Camp 43 until 1966, when the fish ladder was filled in, in order to block lamprey migration.

In January 2009, the GLFC hosted a fish passage workshop at the United States Geological Survey’s Conte Anadromous Fish Laboratory in Turner’s Falls, MA, to discuss the feasibility of modifying the Camp 43 dam to include a fish passage structure that would pass walleye and sturgeon while excluding sea lamprey. The conclusion of the workshop attendees was that the most feasible design was a “trap-and-sort fishway”. The workshop proceedings (McLaughlin et al. 2009) included conceptual illustrations which show one possible configuration of a trap-and-sort fishway integrated into the Camp 43 dam (Figure 5).



A trap-and-sort fishway uses a combination of engineered features, particularly attractant flow, to entice fish to approach and enter the downstream end of the trap. The trap is made up of a series of containers with decreasing opening widths, through which fish will sort themselves by size. The trap is then periodically manually sorted. Desirable species are released above the dam, while undesirable species are either released downstream or destroyed. Trap-and-sort fishways are useful for upstream migrations of fish only; both adult and juvenile fish migrating downstream will fall over the dam or remain above the barrier. Depending on the final design of the facility, the structure could be opened to allow uninhibited passage of fish outside of the period of concern for lamprey migration. However, trap-and-sort fishways are fairly new technology, and there is uncertainty associated with whether it could be successfully deployed on a river the size of the Black Sturgeon, as well as whether it would be effective in capturing walleye and sturgeon. This uncertainty notwithstanding, the number of walleye that would need to be passed through this structure on an annual basis (~84,000) is at the higher end of what the literature suggests is physically practical (Smyth et al. *in press*).

Perhaps the most critical consideration in the evaluation of the trap-and-sort alternative is that it relies on manual sorting in order to operate the facility. A trap-and-sort facility will need to be staffed in perpetuity in order to be successful. If, at any time in the future, funding to staff this facility cannot be assured, it will cease to function. For this reason, the trap-and-sort option cannot fully address the objective of *rehabilitation of self-sustaining native fish populations*.

Further, the high costs associated with designing, constructing, operating and maintaining the fishway in perpetuity (Bobrowicz 2010; Smyth et al. *in press*) combined with the challenge associated with achieving the appropriate magnitude of fish passage to facilitate rehabilitation (Smyth et al. *in press*) make this option untenable.

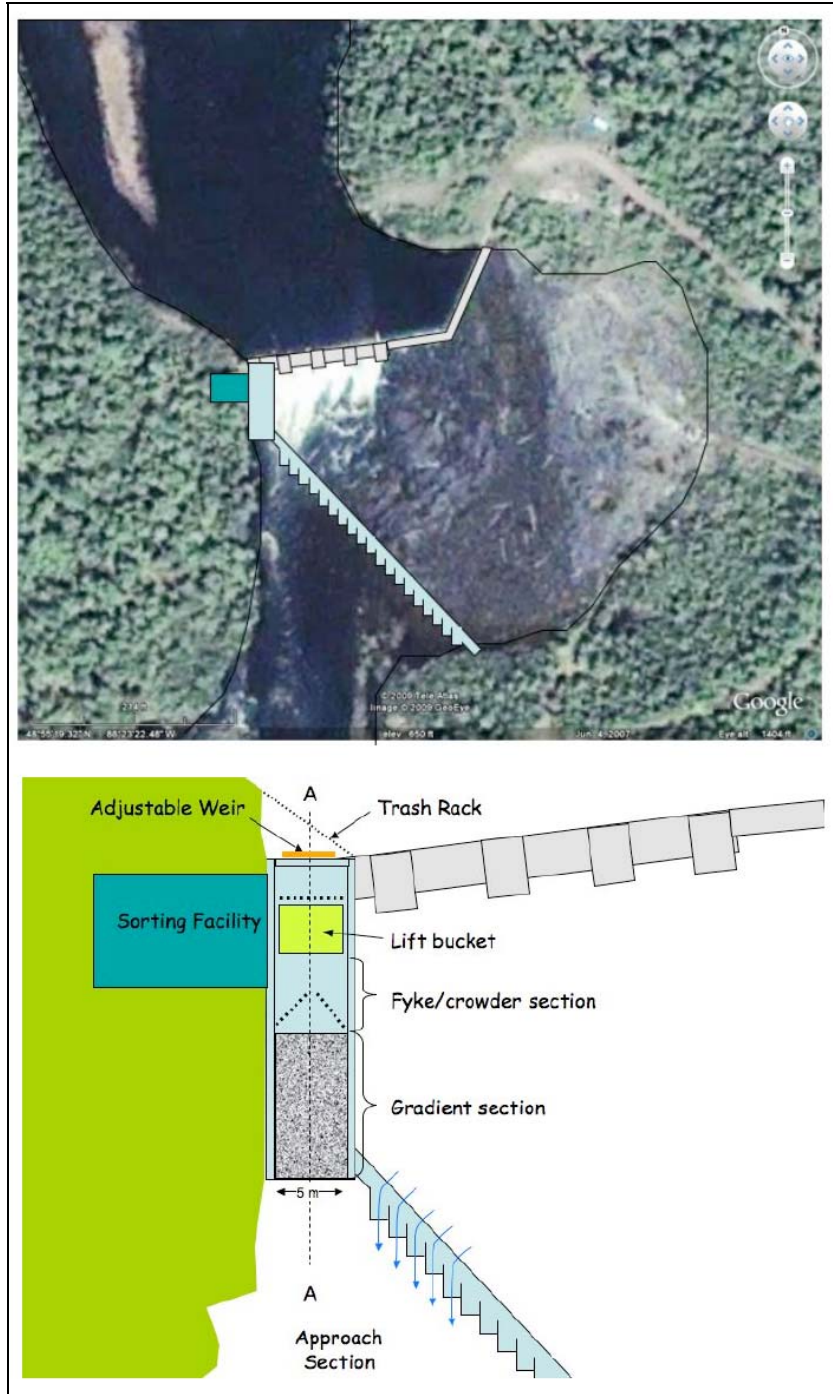
## 5.2 *Alternative methods to carrying out the project*

### 5.2.1 Access

There are no alternatives to accessing the Camp 1 site. During the original construction of the Camp 43 dam (1959/60), the west bank of the river was accessed via the hydro transmission corridor. This approach could be considered for the decommissioning phase, but preliminary advice from MNR engineers suggests that all work could be completed via that east bank access, making the reconstruction of roads on the west side of the river unnecessary.

### 5.2.2 Construction of a new barrier at the Camp 1 site

Use of a variable-crest barrier at Camp 1 would allow freer movement of native species between the Black Sturgeon River and Eskwanonwatin Lake outside of the migration periods for sea lamprey and Pacific salmonids. However, due to the presence of both spring and fall



**Figure 5:** Conceptual schematic of an idealistic passage facility for the Camp 43 dam. Top image: Satellite image showing the dam, fish sorting facility and fishway (left bank), and guidance structure extending diagonally and downward from the fishway (bottom middle of the top image). Bottom image: Drawing of the components of the passage facility (drawings provided by A. Haro, United States Geological Survey, Conte Laboratory).

migrating Pacific salmonids in the lower Black Sturgeon River, the utility of a variable-crest barrier is questionable, because of length of time the barrier would be required; essentially, the entire open-water period. A fixed-crest barrier was chosen as the preferred scenario due to lower installation cost and ease of maintenance over the life of the structure.

### 5.2.3 Decommissioning of the Camp 43 dam

No alternate approaches to decommissioning the Camp 43 dam are being considered; the construction details of how the decommissioning will be carried out will be dependent on engineering considerations and the results of ongoing hydrological modelling, and will be determined during the design phase of the project.

### 5.2.4 Monitoring and construction of supplementary sea lamprey barriers on Shillabeer and Moseau Creeks

The alternate approach is to construct sea lamprey barriers on Shillabeer and Moseau Creeks prior to the decommissioning of the Camp 43 dam. Assessment of these sites by the Canadian Department of Fisheries prior to the construction of Camp 43 did not warrant treatment for sea lampreys. It would be imprudent to construct barriers on these tributaries without a contemporary assessment of the threat of sea lamprey invasion and status of native fish species in these tributaries, post-decommissioning.

### *5.3 Alternatives to be evaluated*

Alternatives considered above, including those in Section 3, will not be evaluated further in the EA.

## **6. Preliminary evaluation**

### *6.1 Cost*

Preliminary cost estimate for the project, including the Environmental Assessment, construction of the new barrier and decommissioning of Camp 43, but not including post-decommissioning monitoring or the possibility of sea lamprey barriers on Shillabeer and Moseau Creeks, is \$4.5 million +/- 40%.

This estimate was provided by the MNR Regional Engineer and reviewed by C. Frese (Kleinschmidt Associates).

N.B.: +/- 40% is an industry standard margin of error for cost estimates for projects of this type (K. Brown, MNR, pers. comm.).

### *6.2 Feasibility*

Dam decommissioning and sea lamprey barrier construction are common engineering undertakings in North America. Hydrological assessment of the Camp 1 site is being undertaken as part of this environmental assessment in order to help determine the suitability of the sites. Shillabeer and Moseau Creeks have not been evaluated for potential sites for sea lamprey barriers.

### *6.3 Effectiveness*

The effectiveness of the project and of the alternatives to the project are summarized in the Options Evaluation Document (Bobrowicz 2010). In short, the project is expected to have the following effects in the long term (decades):

An additional 50 kilometres of riverine habitat will become available to walleye, sturgeon, coaster brook trout and other native migratory species. Within this 50 kilometres, walleye will have access to approximately 336,000m<sup>2</sup> of additional spawning habitat, which was sufficient to support a spawning population of between 340,000 to 680,000 fish, prior to the collapse of the population in 1968 (Bobrowicz 2010). It is recognized that to achieve long term rehabilitation, other related management actions may be necessary; these management actions are outside of the scope of this EA. It is further recognized that post-collapse changes in the Black Bay fish community and climate change may influence the magnitude of rehabilitation that is ultimately realized, and that the historical population estimate should be viewed as a point of reference rather than a target.

Rehabilitation of the lake sturgeon population in Black Bay is numerically unquantifiable with available data. Based on their habitat requirements, it is expected that access improvements for walleye will have a reciprocal benefit to sturgeon, albeit on a longer time scale due to the protracted life history of this species. It should be noted that MNR researchers have identified the Black Bay/Black Sturgeon River population of lake sturgeon as “disproportionately important” to the rehabilitation of the species in the Lake Superior basin (C. Wilson, MNR, pers. comm.). Removal of barriers is consistent with the objectives of the Recovery Strategy for Lake Sturgeon In Ontario (Golder 2011).

Coaster brook trout populations collapsed decades prior to the construction of the Camp 43 dam, probably due to a combination of overfishing and habitat destruction due to logging practices. While these perturbations have now been managed in the Canadian waters of Lake Superior, the Camp 43 dam now prevents access to the upper watershed by migratory brook trout. Decommissioning of the dam would provide access by brook trout to an additional 40 small tributaries between Camp 43 and Camp 1; the available spawning and nursery habitat in these tributaries has not been quantified.

The lake cisco population in Black Bay collapsed in the mid 1980s due to a combination of poor year class strength and overfishing. Rehabilitation of this population has been hindered by the expansion of non-native rainbow smelt in Black Bay. The restoration of walleye as the top predator in Black Bay has the potential to markedly reduce the rainbow smelt population, allowing cisco to exploit this niche and re-establish this species as the primary prey species in the bay.

Additionally, the Camp 43 dam is nearing the end of its expected lifespan; a 2009 structural assessment estimated the longevity of the dam at 10-20 years. Decommissioning of Camp 43 eliminates the possibility of catastrophic failure of the structure at some point in the future.

#### *6.4 Potential effects*

The potential effects of the construction activities associated with access upgrades, construction at Camp 1 and decommissioning at Camp 43 are negligible, as these are previously perturbed areas. Possible effects in these phases include:

- Siltation of spawning areas downstream from construction sites; mitigated through appropriate timing windows and a stepwise approach to the decommissioning of the Camp 43 dam.

- Disturbance of the eagle nesting adjacent to the Camp 43 dam; mitigated through appropriate timing windows and identification of the nest tree to construction crews.
- Accidental spills of fuel and other chemicals associated with the operation of heavy machinery; mitigated by minimizing work in water, establishing a fuelling site away from the river, and establishment of a spill management plan.

Long term effects are primarily associated with the restoration of fish passage at the Camp 43 site (Bobrowicz 2010):

- Sea lamprey will have access to similar amount of spawning habitat as walleye and sturgeon in the Black Sturgeon River. This will necessitate an expansion of the sea lamprey control program in the Black Sturgeon watershed; cost of sea lamprey treatment is expected to increase from \$118,000 per five year cycle (2007 dollars; amortized to \$23,600 per year) to \$249,000 per four year cycle (amortized to \$62,250 per year; difference of \$38,650 per year).
- The efficacy of the expanded sea lamprey control program is expected to decrease from 98% to 93%. Escapage of parasitic-phase sea lamprey is expected to increase from 11 individuals per year to 576 per year, resulting in an additional 10,000 kg of annual fish damage in Lake Superior waters, of which 3600 kg is expected to be lake trout (*Salvelinus namaycush*).
- Expanded use of chemical lampricide (TFM) upstream of Camp 43 is expected to have negative effects on native populations of northern brook lamprey (special concern).
- Removal of the dam potentially allows other aquatic invasive species access to the river upstream to Camp 1. Foster et al. (2009) list nine aquatic invasive species (other than sea lamprey) "likely" to invade the upper river, although the report is unclear as to whether those species are currently found in the lower river.
- Migratory rainbow trout and Pacific salmon spawn in the lower river; decommissioning of the dam will allow their expansion upstream to Camp 1. This presents both positive and negative effects. Additional angling opportunities will be created; however, the migratory fish may compete with river-resident rainbow trout and brook trout for forage and spawning habitat.
- Improvements to access will increase use of the Camp 1 and Camp 43 sites by anglers, Crown land campers, and other recreationists.
- There will be long term changes in function of habitat from Black Bay to the upstream limit of the area of inundation at Eskwanonwatin Lake. The nature of these changes will be illustrated through ongoing hydrological modeling, and presented in the draft environmental studies report.

## 7. Legislative and Policy Details

Management of the fisheries in Black Bay and the lower Black Sturgeon River, the river above Camp 43, the dam and its surrounding lands, is a complex issue crossing many provincial and federal jurisdictions. The governments of Ontario and Canada have numerous legal and policy commitments which will affect the application of the preferred option.

Fisheries Act (R.S.C. 1985): protects fish habitat and fish migration.

Great Lakes Fisheries Convention Act (R.S.C. 1985): establishes the GLFC and sets its mandate for sea lamprey control.

Species at Risk Act (S.C. 2002): provides protection for federally-listed species at risk and their habitats.

Navigable Waters Protection Act (R.S.C. 1985): protects navigable waters from in-filling or the construction of barriers.

Canadian Environmental Assessment Act (S.C. 1992): establishes the requirements and processes for federal environmental assessments.

Fish and Wildlife Conservation Act (S.O. 1997): prescribes the management, conservation and sustainable use of fish and wildlife resources in Ontario.

Lakes and Rivers Improvement Act (R.S.O. 1990): prescribes the management, protection, preservation and use of lakes and rivers in Ontario, including the appropriate location and operation of dams.

Public Lands Act (R.S.O. 1990): deals with the management, sale and disposition of Crown lands and forests in Ontario. This act does not apply to Provincial Parks lands, but does apply to roads on Crown lands outside of the park.

Provincial Parks and Conservation Reserves Act (S.O. 2006): permanently protects a network of representative ecosystems, natural and cultural heritage resources, biodiversity and provides opportunities for sustainable recreation. Specifies prohibited land uses within provincial parks.

Endangered Species Act (S.O. 2007): provides protection for provincially-listed species at risk and their habitats.

Ontario Environmental Assessment Act (R.S.O. 1990): establishes the requirements and processes for provincial environmental assessments.

Joint Strategic Plan for Management of Great Lakes Fisheries: a formal set of procedures adopted by GLFC and its partners, intended to ensure that the actions of one fishery-management agency do not jeopardize the interests of a sister agency.

Fish-Community Objectives for Lake Superior: Lake Superior Committee (GLFC) guiding objective statements for individual species, species cadre, habitat and diversity (Appendix A).

Great Lakes Water Quality Agreement: The GLWQA is a formal international agreement between Canada and the United States, first signed in 1972, that reflects the two countries' commitment to resolve a wide range of water quality issues facing the Great Lakes and the international section of the St. Lawrence River.

Lake Superior Lakewide Management Plan (LaMP): The Lake Superior LaMP is a strategic, action-focused management plan for restoring and protecting the Lake Superior ecosystem. The LaMP is coordinated by Canadian and U.S. federal, state, provincial and tribal/First Nations governments.

Our Sustainable Future: MNR's current strategic direction document.

Ontario's Biodiversity Strategy: MNR's guiding document for the preservation and rehabilitation of biodiversity resources.

An Alien Species Strategy for Canada: Outlines national goals and key actions for the management of invasive species.

Strategic Plan for Ontario Fisheries (SPOF II): Ontario's strategic management framework for fisheries.

A New Ecological Framework for Recreational Fisheries Management in Ontario: A major policy shift in the way MNR manages recreational fisheries, including the adoption of an adaptive management approach to fisheries management, and the establishment of the FMZ Advisory Councils.

Guidelines for Stocking Fish in Inland Waters of Ontario: Provides guidance on where, when, why and how fish are to be stocked.

Federal/Provincial Agreement on Sea Lamprey Barrier Dams: Contractual agreement between the governments of Canada and Ontario which specifies the responsibilities for construction and maintenance of sea lamprey barrier dams.

FMZ 6 Fisheries Management Plan: Affects fisheries in the Black Sturgeon River.

Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem: Agreement between the governments of Canada and Ontario which contributes to meeting Canada's obligations under the Great Lakes Water Quality Agreement. Restoration of the Black Bay fishery has been identified as a priority action.

### *7.1 Black Sturgeon River Provincial Park Management Plan*

The Camp 43 dam is located within Black Sturgeon River Provincial Park, a non-operating, waterway class park which was regulated in 2002. The southern terminus of the park is the pipeline located approximately 600 m downstream of the Camp 43 dam. The park generally encompasses all Crown lands within 200-1000 m of the high water mark on both sides of the Black Sturgeon River, including its headwaters at Black Sturgeon Lake, the height of land and a portion of Black Sturgeon Bay (Lake Nipigon) (Figure 1).

Black Sturgeon River Provincial Park was recommended as part of *Ontario's Living Legacy Land Use Strategy* (MNR 1999a), and falls within the Lake Nipigon Basin Signature Site. Management of the

park is guided by the *Lake Nipigon Basin Signature Site Ecological Land Use and Resource Management Strategy* (MNR 2004a) and the *Black Sturgeon River Park Management Plan* (MNR 2004).

Decommissioning of the Camp 43 dam and construction of a new barrier at Camp 1 will necessitate an amendment to the Park Management Plan. The amendment process, including public consultation and subsequent Minister approval, is being carried out concurrent to this environmental assessment.

## **8. Appropriate mitigation features**

- *Siltation of spawning areas downstream from construction sites*: mitigated through appropriate timing windows and a stepwise approach to the decommissioning of the Camp 43 dam.
- *Disturbance of the eagle nesting adjacent to the Camp 43 dam*: mitigated through appropriate timing windows and identification of the nest tree to construction crews.
- *Accidental spills of fuel and other chemicals associated with the operation of heavy machinery*: mitigated by minimizing work in water, establishing a fuelling site away from the river, and establishment of a spill management plan.
- *Production of sea lamprey in Shillabeer and Moseau Creeks*: mitigated through post-decommissioning monitoring and, if necessary and appropriate, subsequent construction of sea lamprey barriers on these tributaries.
- *Production of sea lamprey in the Black Sturgeon River*: mitigated through post-decommissioning monitoring in the river (larval surveys) and Lake Superior (fish wounding rates), and enhancement of the sea lamprey control program in the Black Sturgeon River.
- *Expansion of aquatic invasive species and Pacific salmonids*: mitigated through appropriate design of the new Camp 1 barrier.
- *TFM impacts to northern brook lamprey*: Included in monitoring strategy. Likely no mitigation possible.
- *Increased use of Camp 1 and Camp 43 sites*: Mitigated through Park Management Plan (e.g. zoning) and recreational angling regulatory controls.



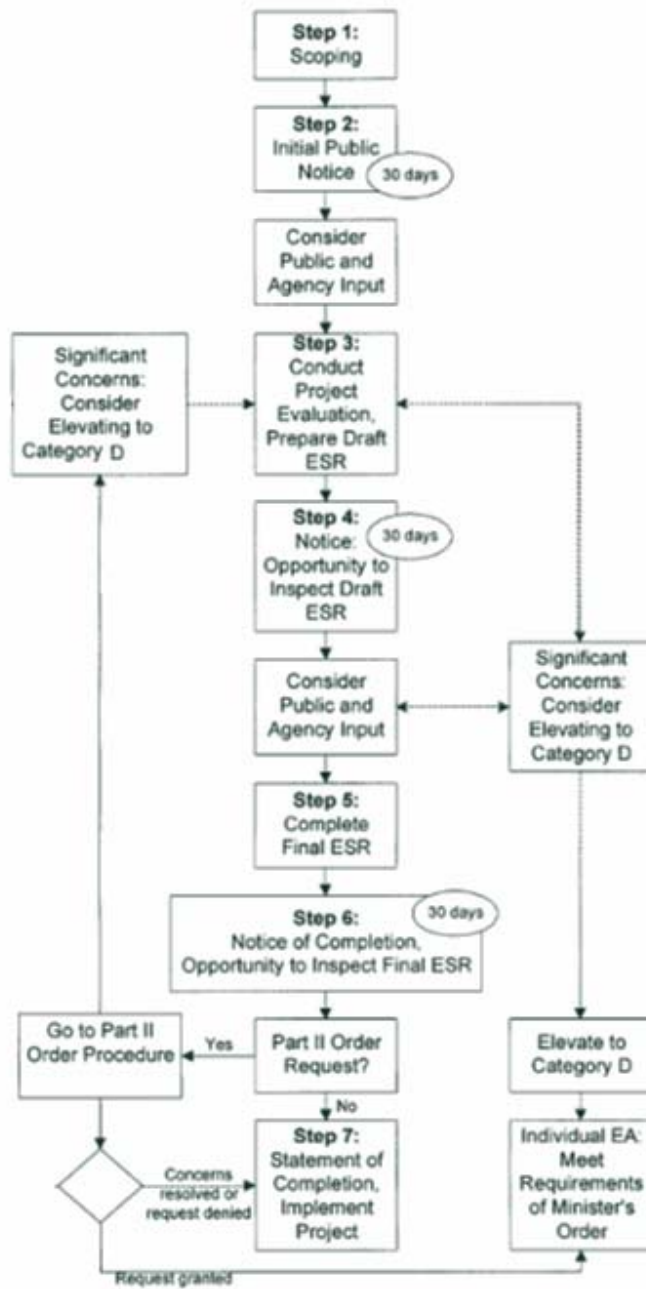
## **9. Project Screening and Environmental Assessment Process**

The *Class Environmental Assessment for Provincial Parks and Conservation Reserves* (MNR 2005) identifies proposals to build, replace or retire a dam among those which require screening to identify the appropriate category within the Class EA under which the proposal shall be reviewed; this categorization in turn specifies the steps in the project evaluation and consultation process.

The preferred option (i.e., total removal of the dam and construction of a new multi-purpose sea lamprey barrier at the outlet of Eskwanonwatin Lake) was assessed against the screening criteria required by the Class EA in order to identify potential net negative and positive effects that could occur as a result of the project.

The screening process has resulted in the assignment of the project to Category C. This category is intended for projects that may have the potential for medium to high net negative environmental effects and/or public or agency concern. The principal rationale for the assignment to Category C is the ongoing concern expressed by the Great Lakes Fishery Commission, the Canadian Department of Fisheries and Oceans' Sea Lamprey Control Centre and interested American state and federal agencies that removal of the Camp 43 dam will negatively affect their ability to control sea lamprey in Lake Superior.

The Class EA specifies a project evaluation and consultation process for Category C projects which includes three opportunities for stakeholders, agencies and other interested parties to review information, and provide input to the evaluation of the project. This input will be reviewed by the Ministry of Natural Resources and if necessary, used to modify the scope of the project. The steps in the Category C process are illustrated in Figure 6; a more fulsome description of the process can be found in the Class EA document (MNR 2005).



**Figure 6:** Project evaluation and consultation process for Category C projects.

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## **Appendix A: Fish Community Objectives For Lake Superior** (Horns et al. 2003)

The development of lake-wide fish community objectives for each of the Great Lakes is the first strategic procedure listed in the Joint Strategic Plan. The *Fish Community Objectives for Lake Superior* contains high-level, guiding objective statements for individual species, species cadre, habitat and diversity, including the following:

**Habitat:** Achieve no net loss of the productive capacity of habitat supporting Lake Superior fishes. Where feasible, restore habitats that have been degraded and have lost their capacity for fish production. Reduce contaminants so that all fish are safe to eat. Develop comprehensive and detailed inventories of fish habitats.

**Prey Species:** A self-sustaining assemblage of prey dominated by indigenous species at population levels capable of supporting desired populations of predators and a managed commercial fishery.

**Lake Trout:** Achieve and maintain genetically diverse self-sustaining populations of lake trout that are similar to those found in the lake prior to 1940, with lean lake trout being the dominant form in nearshore waters, siscowet lake trout the dominant form in offshore waters, and humper lake trout a common form in eastern waters and around Isle Royale.

**Lake Whitefish:** Maintain self-sustaining populations of lake whitefish within the range of abundance observed during 1990-99.

**Walleye:** Maintain, enhance, and rehabilitate self-sustaining populations of walleye and their habitat over their historical range.

**Lake Sturgeon:** Rehabilitate and maintain spawning populations of lake sturgeon that are self-sustaining throughout their native range.

**Brook Trout:** Maintain widely distributed, self-sustaining populations in as many of the historical habitats as is practical.

**Pacific Salmon, Rainbow Trout, and Brown Trout:** Manage populations of Pacific salmon, rainbow trout, and brown trout that are predominantly self-sustaining but that may be supplemented by stocking that is compatible with restoration and management goals established for indigenous fish species.

**Sea Lamprey:** Suppress sea lampreys to population levels that cause only insignificant mortality on adult lake trout.

**Nuisance Species:** 1) Prevent the introduction of any non-indigenous aquatic species that is not currently established in Lake Superior; 2) Prevent or delay the spread of non-indigenous nuisance species, where feasible, and; 3) Eliminate or reduce populations of non-indigenous nuisance species, where feasible.

**Species Diversity:** Protect and sustain the diverse community of indigenous fish species not specifically mentioned earlier (burbot, minnows, yellow perch, northern pike, and suckers). These species add to the richness of the fish community and should be recognized for their ecological importance and cultural, social, and economic values.

## SUPPLEMENTARY DOCUMENTATION CD

- 1) Bobrowicz, S.M. 2012. Black Bay & Black Sturgeon River Native Fisheries Rehabilitation — Decommissioning of the Camp 43 dam and construction of a multi-purpose sea lamprey barrier at Eskwanonwatin Lake. Project Description. Northwest Regional Planning Unit, Ontario Ministry of Natural Resources, Thunder Bay, ON. 26pp. plus appendices. **[electronic version of this document].**
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- 11) Ontario Ministry of Natural Resources. 2005. A class environmental assessment for provincial parks and conservation reserves. Peterborough: Queen’s Printer for Ontario. 47 pp. plus appendices.
- 12) Land tenure map of the Black Sturgeon River and surrounding area.