Port Severn Fish Spawning Habitat Enhancement

Phase 1 Project Framework



Photo Credit: Parks Canada TSW

Framework Overview

The Severn River downstream of the Lock 45 and Bayview dams in Port Severn, Ontario is a known spawning habitat for numerous native Great Lakes fish species and has cultural significance for Indigenous communities with ties to the region. Fish habitat in this area has been subject to human alteration over time, impacting fish production potential.

There has been interest from a variety of organizations and groups in improving fish spawning habitat, and while fish habitat assessment and stewardship efforts have been undertaken in the past, ongoing environmental pressures and challenges underscore the need for additional action. The Port Severn Fish Spawning Habitat Enhancement (FiSHE) Project is a multi-year and multi-phase effort to enhance spawning habitat for walleye, lake sturgeon, and other native Georgian Bay fish species. The project is currently in Phase 1 (Planning), and this document outlines the site context and background, project objectives, partnership approach, guiding principles, and collaborative framework.

Phase 1 involves:

- Gathering information and data to inform and guide the development of habitat enhancement plans
- Developing / formalizing partner and stakeholder relationships
- Education and outreach activities
- Determining opportunities for fish spawning habitat enhancements within the study site through data and knowledge collection and habitat suitability modeling
- Assessing the feasibility of habitat enhancement options and drafting preliminary design plans

Improving ecological conditions and the function of fish spawning habitat at the site will require sustained effort, collaboration, and investment. Provided it is determined to be feasible at the end of Phase 1, it is expected that the project will progress to future phases, including implementation of spawning habitat enhancements identified in Phase 1, and monitoring of fish usage of spawning habitat and fish reproductive capacity to determine project success. If needed, separate project framework documents will be developed for future phases.

Background

The 57 km long Severn River, in central Ontario, flows generally northwest from Lakes Simcoe and Couchiching and discharges into Severn Sound in southeastern Georgian Bay, (Lake Huron) at Port Severn. This river has many names, among them: Wa-nant-git-che-ang (*where the water turns around on a big scale*) in Anishinaabemowin, Chionkiara (*where the sun rises*) in Wendat, and Rivière de Tarento (*the gateway river to the lake of the fish weirs*) to early French traders (Allen 2002). Long before the establishment of the Trent Severn Waterway (TSW), Wa-nant-git-che-ang was an integral migration and trade route through the central Ontario region that linked eastern Lake Ontario and Georgian Bay. Archaeological evidence of copper artifact caches and scared offering sites suggest the importance of the river as a main trade route connecting Lake Superior to the Ohio Valley (Wright 1987, 1999: 601) and Anishinaabe oral tradition supports the use of the river as a migration route pre-dating European contact (Allen 2002).

Wa-nant-git-che-ang and its headwaters have been a sustaining source of fish harvesting for Indigenous communities since time immemorial through to the present. This is shown by the Mnjikaning fish weirs strategically located in the Atherly Narrows, a narrow, 1-kilometer-long channel connecting Lakes Simcoe and Couchiching. The wooden stakes that make up the weir, dated to over 5,000 years old, were used to guide, trap, and harvest seasonally migrating fish species like lake sturgeon. The outlet of Wa-nant-git-che-ang into Georgian Bay, at modern day Port Severn, is another important fish harvesting area and spawning habitat for walleye, lake sturgeon, white sucker, and other native Georgian Bay fish species. During the spring spawning season, Indigenous communities engage in spear fishing in local rivers, particularly for ogaa (walleye), a practice that holds significant cultural and spiritual importance as families and neighbours come together to harvest, share food, and exchange stories.

The habitat and natural features of the Severn River have been highly altered since European settlement and development. The rise of the lumber industry in the 1850’s carved out huge tracts of land in the watershed for timber production. Over the next 40 years, most of the prime timber and forest habitat was removed from the banks of the waterway (Beahen 1980). Port Severn was the earliest location for sawmills in the region, with the first recorded mill built in 1830, and then another mill built in 1850 along with a timber dam to supply stable water levels (Beahen 1980). In 1899, the first hydroelectric power plant was built on the Severn River at Ragged Rapids and in the following 15 years, hydroelectric dams had been built at Wasdell Falls, Big Chute, and Swift Rapids (Beahen 1980), all upstream of the outlet at Port Severn. Habitat alterations such as logging and dam construction can impact fish populations by

changing natural river flows, restricting access to crucial upstream spawning grounds, and sedimentation of the small areas in river substrates where fish deposit their eggs.

Despite this exploitation of the area for natural resource production, the Severn River region retained much of its natural beauty. By the late nineteenth century, a healthy tourism industry was developing, centered around fish and game, canoeing, and wilderness escape. This strong tourist industry, which exists to the present day, was one of many factors that led to the Severn River being chosen as the last stretch of the TSW canal system that links Lake Ontario to Georgian Bay. Port Severn, at the outlet of the Severn River into Georgian Bay, is the last lock (from east to west) in the TSW. The TSW Lock 45 dam and lock construction at Port Severn was started in 1914 and was completed in 1915, with the Bayview dam being constructed around the same period. Almost 100 years after their initial construction, rehabilitation work was started on the Bayview and Lock 45 dams, with construction completed in 2021. The Lock 45 main dam (Figure 1) is now controlled by a series of automated bottom release gates based upon upstream Gloucester Pool levels and incoming flow rates; the Bayview Dam (Figure 2) discharge is controlled through a series of stoplogs, and discharge can be increased or decreased based upon Gloucester Pool levels and flow rates (R. Power, Parks Canada, pers. comm.). The lock and both dams are operated by Parks Canada TSW primarily to manage water levels and for navigation (from Victoria Day-Labour Day), to minimize flood risks with water levels maintained upstream in a relatively narrow range of approximately 10-20cm (R. Power, Parks Canada, pers. comm.). Parks Canada is committed to implementing best management practices with respect to flow to enhance fish and wildlife resources and habitat where possible within their mandate.

In addition to the hydroelectric dams constructed upriver of Port Severn, the construction of the Lock 45 and Bayview dams further altered the natural flow of the Severn River and affected fish passage upstream and flow over crucial fish spawning habitat downstream. Discharge from the Lock 45 and Bayview dams, and downstream water levels in Georgian Bay / Lake Huron can fluctuate dramatically during the spring spawning season based on several factors including winter snow accumulation and spring temperatures. The spawning success of fish species that use the habitat downstream of the dams can be impacted both by too much and too little flow through the dams during spring. High spring flows can flush eggs away from spawning areas before they attach to the substrate, while low flows can cause eggs to dry out. As the Bayview Dam and Lock 45 site is one of only two known spawning locations for walleye in Severn Sound, spawning success here has broad implications for the wider walleye population, which experiences some of the highest recreational fish harvest in Georgian Bay.



Figure 1: Trent Severn Waterway Lock 45 - lock and dam

Photo Credit: Parks Canada TSW



Figure 2: Trent Severn Waterway Bayview dam and downstream spawning shoal

Photo Credit: Parks Canada TSW

Prior to the construction of the lock and dams at Port Severn, there were natural falls (Pilkington 1963) that lake sturgeon from Georgian Bay would have migrated through to access further upstream spawning sites. Allen (2002) states, “After construction of the dam and lock at Port Severn, spawning sturgeon, once a common sight, were never again seen on the Severn River”. The Great Lakes population of lake sturgeon is currently a species at risk, designated endangered in Ontario (Species Conservation Act, 2025) and threatened federally in Canada (Species at Risk Act 2002). Lake sturgeon are still occasionally documented upstream of Lock 45 (B. Shirley, Ontario Ministry of Natural Resources, pers. comm.) and while that is now rare, the area below the dam complex has remained an important spawning ground for the species. In 2021, Shawanaga First Nation and Georgian Bay Biosphere staff detected evidence of lake sturgeon (nme) spawning in the Port Severn area from deployed egg mats. Long valued by Indigenous communities and once abundant in the Great Lakes, lake sturgeon

populations plummeted in the mid 1800's due to commercial exploitation, habitat alteration, and water sedimentation. Their populations have not recovered, partially due to their slow rate of maturity (20-25 years to reach spawning age). Protecting and enhancing confirmed lake sturgeon spawning habitat is a critical step forward in the recovery of this species at risk.

Overall, the Severn Sound fish community has changed considerably since the 1900s. At the start of the 20th century, Severn Sound supported stable cold-water fish populations, such as lake trout, herring, and whitefish. Through heavy commercial and recreational harvest, by the 1940's, this cold-water fishery had collapsed; commercial and recreational harvesting data shows that warm / cool water species such as muskellunge, walleye, and pike became the focus of harvesting efforts in the mid-1970s (Gonder, 2003). Beginning in the 1980s, the abundance of walleye began to decline (Gonder, 2003) and subsequent fish surveying catch rates in Severn Sound have remained low compared to other areas of Lake Huron, indicating a depressed population (Georgian Bay Mnidoo Gamii Biosphere 2023). In 2010, a population estimate generated during the spawning season suggested the spawning walleye population ranged from 23,000-87,000 fish, however, the spawning population as estimated in 2018 was 8,656 (range = 7,157-10,693) (C. Davis, Ontario Ministry of Natural Resources, pers. comm.). While there have been some strong walleye recruitment years such as the 2005 year-class, this spawning success has not been sustained through time (Liskauskas 2011) and thus poor recruitment remains a main concern for walleye populations in Severn Sound.

Restoring and enhancing existing spawning habitat is critical to stabilize and grow fish populations which in turn helps improve the integrity of the aquatic ecosystem. The decline in walleye, lake sturgeon, and other fish species in Severn Sound is a concern, and there has been long-standing interest from a variety of organizations and groups in improving reproductive habitat in the Port Severn area, partly because of its significance to the Severn Sound walleye population, and there have been a number of projects over the past 50 years to assess and improve habitat. Previous analysis of walleye spawning habitat in 1975 led to a habitat restoration project carried out in 1979 where 4,100 tons of new spawning substrate (cobble and boulder) were installed in the channel downstream of the Bayview dam (Townes 1979). However, the substrate used was limestone instead of the natural granite found in the area which has subsequently fractured and eroded over the years. As part of the 1975 analysis, another area downstream of the Lock 45 dam (Figure 3; Area A-9) was also suggested as a potential site for additional spawning material. In 2006 the Severn Sound Environmental Association undertook an extensive assessment of the Bayview Dam and downstream spawning channel to characterize the extent of suitable walleye spawning habitat based upon flow, depth, and substrate; the assessment did not include the Lock 45 dam and

channel and was unable to analyze high flow scenarios from the Bayview Dam (SSEA 2018). While considerable fish habitat assessment and stewardship efforts have already been undertaken, ongoing environmental pressures and challenges underscore the need for additional action. The current project aims to build on the foundation of past work and guide future fish spawning habitat improvement activities at the site.

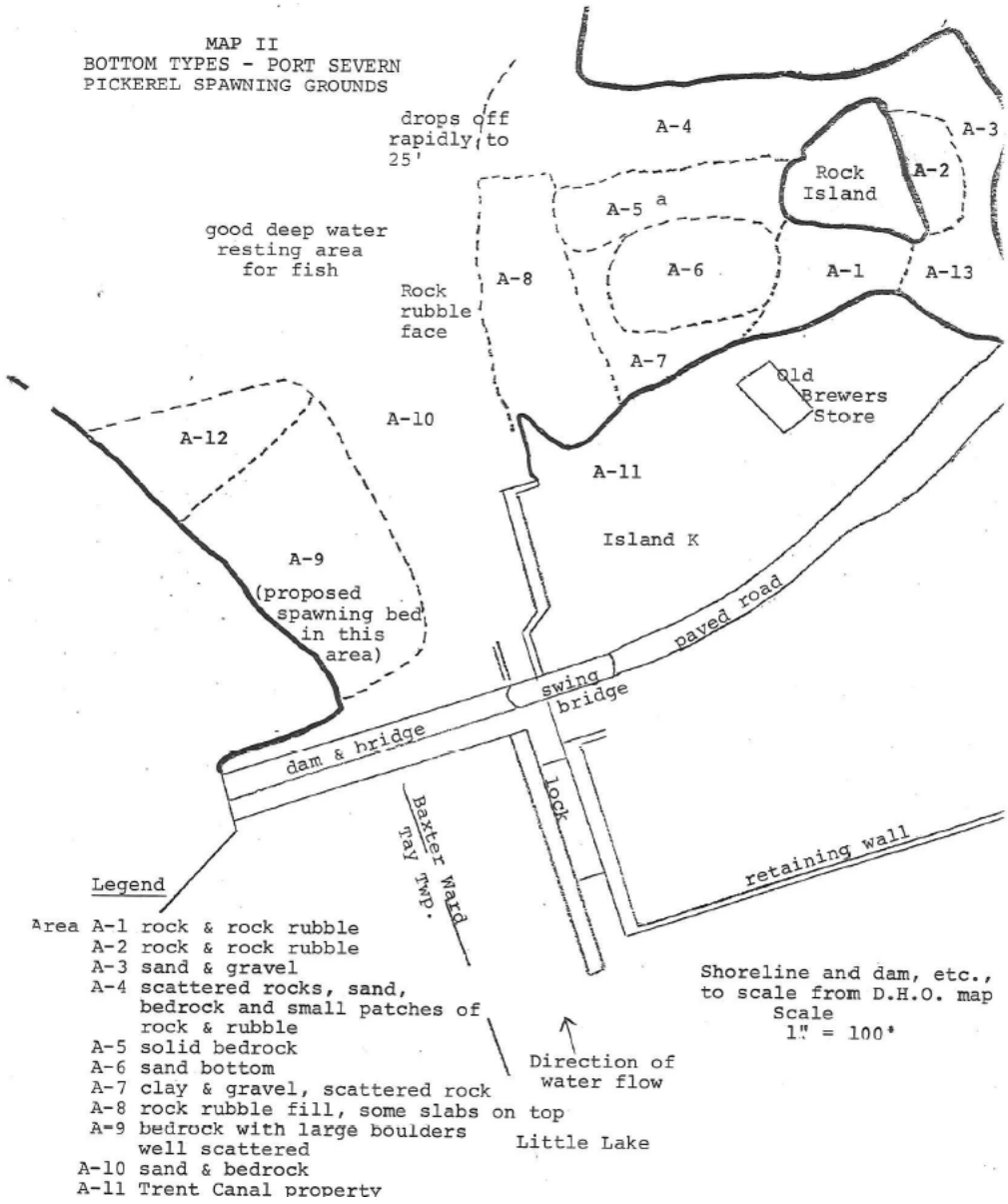


Figure 3: Map of Bayview Dam spawning shoal and substrate classification (Townes 1975). Polygon A-9 indicates additional proposed spawning site.

Current Initiative: FiSHE Project - Phase 1

The Port Severn Fish Spawning Habitat Enhancement (FiSHE) Project offers an excellent opportunity to further enhance reproductive habitat for walleye, lake sturgeon, white sucker, and other native fish species in this key area. The specific area of interest is a 9.3-hectare site downstream of the Bayview and Lock 45 dams on the Severn River in Port Severn (Figure 4).

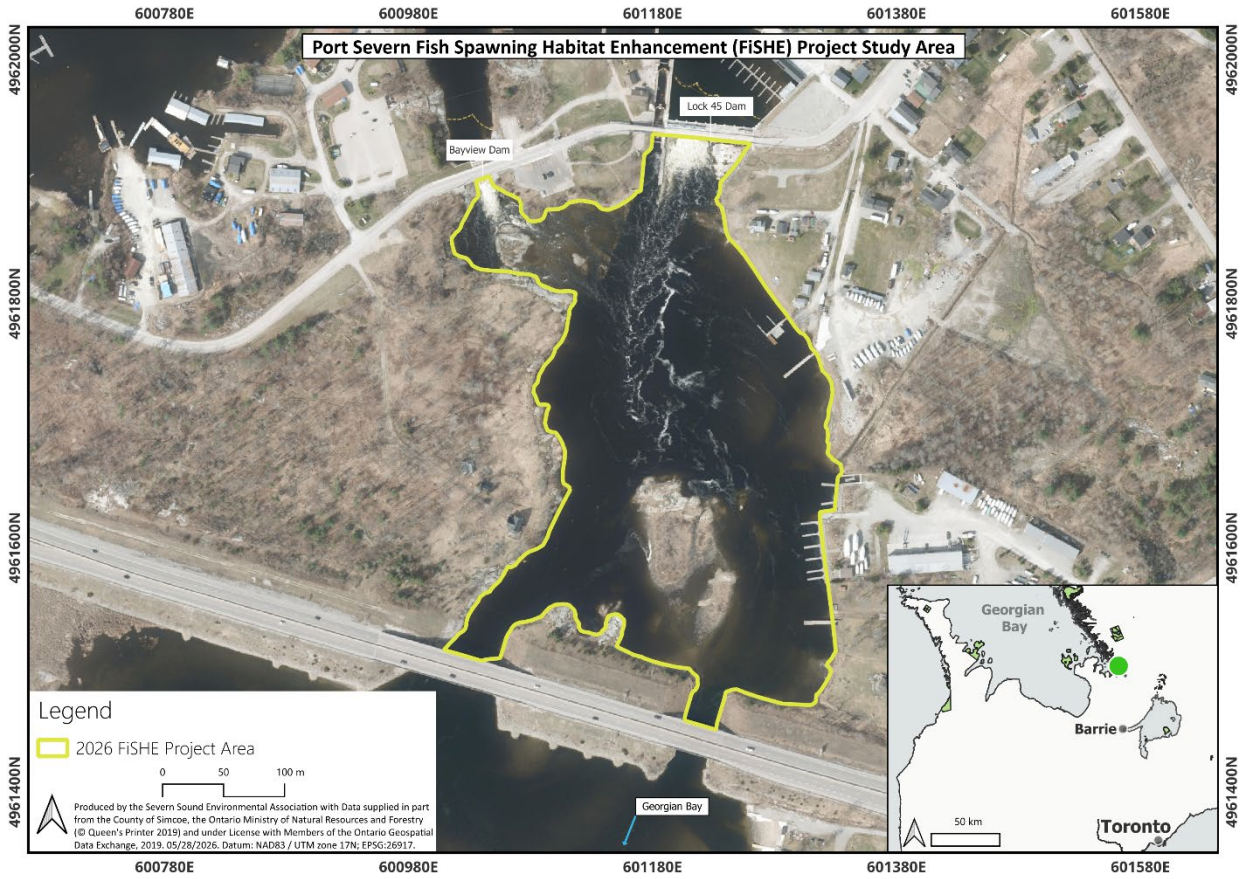


Figure 4: Port Severn Fish Spawning Habitat Enhancement Project Study Area

The FiSHE Project is a multi-year and multi-phase effort. Phase 1 involves gathering information and data to inform and guide plans to enhance spawning habitat, building upon the previous work done in a portion of the site and expanding the scope of study to include a larger area downstream of Lock 45, additional species (lake sturgeon), and varying dam discharge conditions and downstream Georgian Bay lake levels. The SSEA is coordinating Phase 1 of the FiSHE Project with generous funding support from the Great Lakes Fishery Commission and the technical expertise and support of the following agencies and organizations:

- **Great Lakes Fishery Commission** – Funding, equipment, and technical support, including contracting of habitat suitability modeling
- **Parks Canada TSW** – Hydrological and habitat data collection
- **Ontario Ministry of Natural Resources Upper Great Lakes Management Unit** – Fish community composition and spawning surveys
- **Georgian Bay Biosphere Mnidoo Gamii** – First Nations outreach and engagement support

Objectives and Timeline

Phase 1 (2026 - 2027):

- Work with a variety of partners and stakeholders to gather technical data and knowledge
- Educate stakeholders and the public about the importance of the project area as a key spawning ground for a variety of fish species and its cultural significance for many different Indigenous communities
- Develop habitat suitability models for multiple scenarios, including different dam discharge and Georgian Bay water level conditions, and various fish species
- Identify tangible opportunities to enhance reproductive habitat for fish through habitat enhancements and flow management strategies
- Assess the feasibility of habitat enhancement options and draft preliminary fish spawning habitat enhancement design plans
- Collect preliminary spawning data as baseline reference for future monitoring

Ethos / Guiding Principles

Ecological integrity and the prioritization of cultural values are foundational guiding principles of the FiSHE Project. While it is acknowledged that the spawning ground cannot be completely restored to its pre-dam and pre-colonial state, the project aims to improve and enhance the ecological function of the site while also recognizing and respecting the Indigenous cultural significance and use of the site. The use of best available scientific practices will be integrated with traditional and local ecological knowledge to conduct a holistic analysis of the spawning habitat. The FiSHE Project will be carried out using an Adaptive Management framework, with feedback, monitoring, and results used to refine and improve the methodology and approach of the work. Acknowledging that this site is important to many different communities, the guiding principles of inclusivity and collaboration are also essential to the success of the project. Communication and cooperation between project participants will be transparent, respectful, and honest; Indigenous and community perspectives will be important for decision-making.

Anticipated Future Phases

Improving ecological conditions and the function of fish spawning habitat at the site will require sustained effort, collaboration, and investment. Provided it is determined to be feasible at the end of Phase 1, it is expected the project will progress to future phases.

Phase 2: Implementation of habitat enhancements & preliminary monitoring (projected 2027 - 2030):

- Potential implementation of flow management strategies during the spring spawning season for walleye, lake sturgeon, and other native fish species
- Formal project consultation with Indigenous communities
- Potential permitting and installation of additional spawning substrate at identified site locations
- Creation and installation of interpretive signage about the area's importance as an Indigenous harvesting site, the ecological importance of the spawning ground, and the FiSHE restoration work
- Monitoring of fish usage of spawning habitat and fish reproductive capacity

Phase 3: Long-term monitoring (projected 2030 - 2035):

- Continued long-monitoring of fish reproductive capacity
- Reporting on monitoring results and effectiveness of the spawning habitat enhancements

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