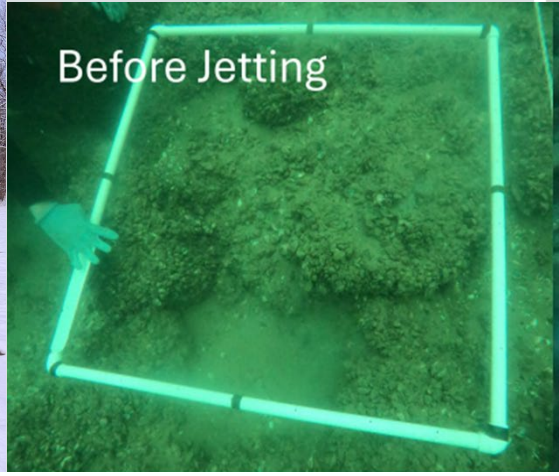

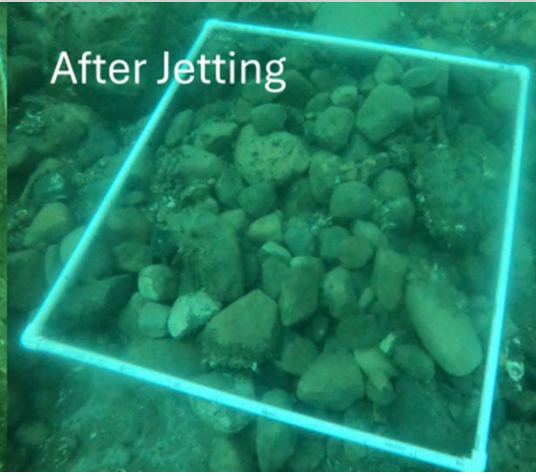

NEW YORK STATE | Department of Environmental Conservation

Great Lakes Fish Habitat Enhancement Plan

Kathy Hochul, Governor | Amanda Lefton, Commissioner

Great Lakes Fish Habitat Enhancement Plan

Prepared by:
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Goal

Restore or enhance self-sustaining populations of native fish species in New York waters of Lake Erie and Lake Ontario.

Philosophy

New York's Great Lakes fisheries are managed to encourage natural reproduction of native species, to the greatest possible extent. Given suitable habitat, wild, self-sustaining, populations can produce more fish than stocking programs and are more stable and sustainable over the long-term.

Need

High quality spawning and juvenile rearing habitats are critical to early life survival and development of naturally produced fish stocks. Large scale habitat enhancement is needed to conserve the remaining native fish populations, and to restore extirpated and at-risk fish populations in both Lake Ontario and Lake Erie.

Degraded spawning habitat has been identified as an impediment to successful natural reproduction of several native fishes, including:

- Lake trout
- Lake whitefish
- Cisco
- Walleye
- Atlantic salmon
- Northern pike
- Muskellunge
- Lake sturgeon

Poor reproductive success has inhibited the success of lake trout restoration programs, caused major declines in lake whitefish and cisco populations in Lake Ontario and Lake Erie, and has contributed to declining walleye populations in eastern Lake Ontario. Lake whitefish populations have declined to a point where this species may be lost if spawning and rearing habitats are not restored in the very near future and the cisco population in Lake Erie is functionally extirpated.

Implementing habitat enhancement programs is the **most impactful action that DEC can take to conserve and restore native fish species in New York's Great Lakes**. Although habitat enhancement projects require significant upfront capital, they are likely to provide a greater return on investment compared to stocking programs because they address the root cause of native species decline rather than just the symptoms (*i.e.*, stocking). Targeted enhancement efforts also have the potential for added value by providing long-duration benefits to a broad range of species.

The restoration and enhancement of Great Lakes native fish habitats is a shared strategic priority among multiple binational, federal and lakewide restoration programs and plans. Strategies and proposed projects identified in this plan align with habitat enhancement priorities within NY's Great Lakes Action Agenda, the federal Great Lakes Restoration Initiative (GLRI) Action Plan IV (2025-2029), the Great Lakes Fishery Commission's Lake Erie and Lake Ontario Committees, and the Lake Erie and Lake Ontario Lake Action and Management Plans, among others.

Background

High quality spawning and juvenile rearing habitat is essential for naturally reproducing fish populations. New York's Great Lakes fish habitat has been degraded since European colonization due to a number of mechanisms including invasive species introductions and land use practices. Restoration stocking programs have been largely unsuccessful in re-establishing self-sustaining populations of native species in Lake Ontario and Lake Erie, and degraded spawning and rearing habitats have been identified as a primary limiting factor to native species restoration (Lake Ontario Lake Trout Working Group, 2022; Lake Erie Committee 2021).

Lake trout stocking has been ongoing for over 50 years yet natural reproduction continues to be extremely low in both lakes (O'Malley et al. 2025; Coldwater Task Group 2025). Similarly, Atlantic salmon were extirpated from Lake Ontario and although restoration stocking programs have increased adult fish numbers, the restoration of a self-sustaining population is not currently feasible due to limited juvenile rearing habitats within Lake Ontario tributaries (DiRado et al. 2017).

Interstitial spaces (i.e., spaces between rocks) are critical for lithophilic spawning fish (e.g., lake trout, coregonines, and walleye) because eggs settle into these spaces and are protected from disturbance and predation during incubation (Weidel et al. 2023). Interstitial spaces associated with spawning habitats in both Lakes have been filled in by fine sediment, invasive mussel shells, and live invasive mussels. A Lakewide lake trout spawning habitat assessment conducted in Lake Ontario as part of the 2023 Coordinated Science and Monitoring Initiative found that less than 0.2% of surveyed locations had high quality interstitial spaces (Le Tarte et al. 2025). Similarly, severe degradation of historic lake trout spawning areas in Lake Erie has been well documented (Markham et al. 2022).

There are indications that habitat rehabilitation, specifically restoring or creating interstitial spaces associated with spawning habitats, may positively impact spawning populations in New Yorks's Great Lakes (Gatch et al. 2021). An experimental spawning habitat restoration project for lake whitefish and cisco in Chaumont Bay (implemented in 2021) found 20 times higher egg to larval survival compared to control locations (B. Weidel, USGS. Personal Communication). In Lake Erie, wild lake trout fry have been sampled associated with clean spawning habitats in nearshore areas (Markham et al. 2022). Increased early life survival on restored or existing habitats indicates that high quality spawning habitat is limited.

Lake Ontario tributaries can produce large numbers of wild Chinook salmon (Connerton 2022) but high summer water temperatures and limited juvenile habitat reduce the production of Atlantic salmon that spend one, or more, years in tributaries prior to migrating out to the lake. Projects focused on improving thermal and physical habitat have the potential to increase survival of early life stages.

Scope

This plan outlines fish habitat restoration priorities and an implementation approach for the New York waters of Lake Ontario and Lake Erie, including their embayments and tributaries, and the upper Niagara River.

Priority Habitats and Species

Fish habitat enhancement projects focus on the species and habitats listed below; however, these projects will also benefit a host of other species that utilize similar habitats.[1]

Open waters
Open water habitat enhancement efforts focus on improving or increasing nearshore and offshore spawning and juvenile rearing habitats for lake trout, lake whitefish, cisco, and walleye.

Embayments
Habitat enhancements in embayments focus on increasing spawning and juvenile rearing habitats for lake whitefish, cisco, walleye, northern pike, and muskellunge.

Tributaries
Habitat enhancements in tributaries focus on projects that improve the amount of cold-water habitat available during the summer months to support juvenile survival of Atlantic salmon and improving spawning substrate and juvenile rearing habitats for Atlantic salmon and walleye.

Approach to Habitat Enhancements

This section outlines an approach for each habitat type. Specific habitat enhancement projects are listed in Appendix A.

The overall approach to Great Lakes fish habitat enhancements will be adaptive and will change based on success and knowledge gained as projects are implemented. The specific methods used for fish habitat enhancements will vary and may include cleaning/remediating existing habitats, adding new habitat, stream channel modifications, strategic wood additions, providing fish passage, or other methods/tools. Regardless of the method used, each project is likely to require monitoring and maintenance to ensure that it continues to function over the long-term. Some projects, such as reef cleaning, may require on-going/annual work to maintain their functionality.

[1] Species such as lake sturgeon, although not specifically mentioned, will benefit from an array of planned habitat projects.

DEC's Bureau of Fisheries will serve as the lead for enhancing fish habitat, but will rely on partnerships with several other entities, including DEC's Great Lakes Program, U.S. Federal Agencies (e.g., USFWS and USGS), and non-profit organizations (e.g., Trout Unlimited and Nature Conservancy) to ensure projects are carried out in an effective and successful manner.

Open water habitat

Open water habitat enhancements in Lake Ontario focus on increasing the amount of high-quality spawning habitat available for lake trout and may include cleaning existing habitat or adding new spawning substrate. Similarly, open water enhancements in Lake Erie will focus on continuing the cleaning and remediation of highly impacted existing lake trout spawning habitat that began in 2025. Adding new spawning substrate will also be considered in Lake Erie based on the success of the cleaning projects.

Strategies:

- Implement at least one lake trout spawning habitat enhancement project in each of the five lake management areas in Lake Ontario.
- Implement the recently developed reef cleaning approach on an additional 2.5 acres of historic lake trout spawning habitat in Lake Erie.

Embayment habitat

Lake Ontario embayment habitat enhancements will focus on increasing the amount of high-quality spawning habitat for lake whitefish, cisco, and walleye. Lake Erie embayment habitat enhancements will focus on improving spawning and juvenile rearing habitats for muskellunge in Buffalo Harbor.

Strategies:

- Implement at least one spawning habitat enhancement project in Mud Bay, Chaumont Bay and Little Sodus Bay in Lake Ontario to increase spawning habitat for lake whitefish, cisco, and walleye.
- Implement at least one coastal wetland enhancement project to enhance early life stage habitat for muskellunge in Buffalo Harbor or the Upper Niagara River.

Tributary habitats

Tributary habitat enhancements in Lake Ontario will focus on improving Atlantic salmon habitat in several tributary systems by providing fish passage, increasing the amount of coolwater habitat available to juvenile salmon during the summer months, and improving spawning habitat. There will also be a focus on enhancing and increasing the amount of walleye spawning habitat in Lake Ontario eastern basin tributaries.

Strategies:

- Provide fish passage for Atlantic salmon to access additional spawning and juvenile rearing habitat at South Sandy Creek and Little Salmon River.
- Conduct Atlantic salmon habitat assessments in Oak Orchard Creek, Sandy Creek, Irondequoit Creek, Salmon River, and South Sandy Creek.
- Implement Atlantic salmon habitat improvements based on habitat assessments.
- Implement at least one spawning habitat enhancement project in the Chaumont River, Kents Creek, Guffin Creek, and Stony Creek to support the Lake Ontario Eastern Basin Walleye Fisheries Management Plan objective to increase walleye spawning stock biomass in eastern basin tributaries.

Habitat Research and Monitoring

There are several ongoing or planned research and/or monitoring projects that support fish habitat enhancements in Lake Ontario and Lake Erie. These projects will direct where and how future habitat enhancement projects are implemented. Pre- and post-project monitoring will be essential to adaptively managing the projects over time and sustaining ecosystem benefits.

Lake Ontario

- Baseline fish habitat assessments are being conducted by DEC and USFWS in Oak Orchard Creek, Sandy Creek, Irondequoit Creek, Salmon River, and South Sandy Creek. These baseline habitat surveys will inform the development of specific habitat enhancement plans for each stream.

- A multi-agency lake trout acoustic telemetry project is underway that seeks to identify where lake trout are currently spawning in Lake Ontario, with a planned follow up project to assess the habitat characteristics at these locations.

- For Atlantic salmon, the USGS is conducting research to identify groundwater sources to Lake Ontario tributaries and map the influence of groundwater on stream temperature.

- Cornell University is also planning a project to use remote sensing to map stream temperature and habitat types in Lake Ontario tributaries. This study also includes on the ground fish sampling and acoustic telemetry to determine specific habitat use by Atlantic salmon.

Lake Erie

- DEC recently secured funding from the US EPA to conduct an acoustic telemetry study designed to identify additional areas of spawning congregation for lake trout, lake whitefish, and walleye in NY waters. This work will inform decisions around the protection and potential remediation of these areas to support successful spawning and early life stage survival for these species.
- The recently completed reef cleaning project focused on reclaiming historic spawning habitat is being monitored in cooperation with TNC and USFWS to evaluate the success and potential longevity of the project. The results of this monitoring will inform the utility of this approach and potential maintenance needs.

Information Needs

Detailed bathometric and habitat assessment information associated with nearshore and offshore areas, and embayments in Lake Ontario, Lake Erie, and the Niagara River will help inform potential focus, locations, and design for future habitat work. This information could be in the form of LiDAR surveys, detailed sidescan or multibeam sonar surveys, substrate mapping, and/or habitat assessment and classification.

Evaluation

All habitat enhancement projects will include an evaluation component. In the short-term each project will be assessed to determine if the intended outcomes of the project are being met. For example, a spawning habitat enhancement project will be assessed to determine if fish are using the project area for spawning and to determine if larvae are being produced from the project. Each project will also be monitored over a longer-term to determine if the project is still functioning as intended, or if the project has become degraded and in need of maintenance work to bring it back to full functionality.

Outreach

Outreach to the angling public will be a critical part of habitat enhancement in New York's Great Lakes. Outreach activities include informing the public about planned habitat projects so that the intended outcomes of each project are clearly understood and to solicit feedback on planned/potential habitat enhancements. Press releases, the Fishing Line Newsletter and the DEC social media platforms will be used to keep the public informed as projects progress.

Funding and Partnerships

The success of this plan depends on securing and coordinating funding from multiple sources, with a strong emphasis on leveraging both state and federal investments. For example, the Great Lakes Restoration Initiative Focus Area 4 Habitats and Species programs have funded

much of the collaborative research that has quantified the extent and impact of spawning habitat degradation. DEC Bureau of Fisheries and the Great Lakes Program will collaborate to strategically utilize state funding to match and unlock larger opportunities for federal support, including project design and implementation. DEC will strive to align and leverage these state investments with priorities of federal funding programs such as the Great Lakes Restoration Initiative. This coordinated approach is critical as many federal programs require non-federal cost share or demonstrate a preference for projects with committed state and local investments.

When appropriate, DEC will also provide support and pursue partnerships with external organizations to secure funding, amplify outreach, and leverage resources and technical capabilities to implement projects within this plan. Through strategic partnerships and a regionally coordinated effort, DEC will be well-positioned to maximize New York's investments to enhance and sustain aquatic habitats essential to maintaining a robust and resilient Great Lakes fishery.

Appendix A – Project List

Table A1. List of planned habitat improvement projects in Lake Ontario and Lake Erie.

Lake Ontario

Lake management area	Location	Project type	Primary species	Other species
West	Olcott Reef	Spawning habitat	Lake trout	Lake whitefish, Cisco, and other lithophilic spawners
West central	Whatoma Shoals area	Spawning habitat	Lake trout	Lake whitefish, Cisco, and other lithophilic spawners
East Central	TBD	Spawning habitat	Lake trout	Lake whitefish, Cisco, and other lithophilic spawners
East	TBD	Spawning habitat	Lake trout	Lake whitefish, Cisco, and other lithophilic spawners
Eastern basin	Eastern basin islands/shoals	Spawning habitat	Lake trout	Lake whitefish, Cisco, and other lithophilic spawners
East Central	Little Sodus Bay	Spawning habitat	Lake whitefish and Cisco	walleye, Lake trout, and other lithophilic spawners
Eastern basin	Chaumont Bay	Spawning habitat	Lake whitefish and Cisco	walleye, Lake trout, and other lithophilic spawners
Eastern basin	Chaumont River	Spawning habitat	Walleye	Cisco, suckers, and other lithophilic spawners
Eastern basin	Eastern basin shoals	Spawning habitat	Walleye	Cisco, suckers, and other lithophilic spawners
Eastern basin	Eastern basin tributaries	Spawning habitat	Walleye	Cisco, suckers, and other lithophilic spawners
West central	Sandy Creek	Expanded groundwater influence/spawning habitat/juvenile habitat	Atlantic salmon	All species of salmon and trout
West central	Irondequoit Creek	Expanded groundwater influence/spawning habitat/juvenile habitat	Atlantic salmon	All species of salmon and trout
East	South Sandy Creek	Expanded groundwater influence/spawning habitat/juvenile habitat	Atlantic salmon	All species of salmon and trout
East	South Sandy Creek	Selective fish passage	Atlantic salmon	None

East	Salmon River system	Expanded groundwater influence/spawning habitat/juvenile habitat	Atlantic salmon	All species of salmon and trout
East	Little Salmon River	Fish passage	Atlantic salmon	All species of salmon and trout, and walleye.

Lake Erie

East	Historic Brocton Shoal	Spawning Habitat Cleaning	Lake Trout	Lake trout, and other lithophilic spawners
East	Buffalo Harbor and Upper Niagara River	Costal wetland and fish habitat enhancement	Muskellunge	Norther Pile and other wetland associated species
East	Cattaraugus Creek	Spawning Habitat Enhancement	Walleye and Lake Sturgeon	Other lithophilic spawners
East	Lake Erie Tributaries	Maintain existing fish passage projects	Smallmouth Bass	Tributary spawning species
East	Lake Erie Tributaries	Pursue additional fish passage projects	Smallmouth Bass	Tributary spawning species

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