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Item for the Information of the Regional Watershed Alliance

TO: Chair and Members of the Regional Watershed Alliance
Meeting #4/20, Wednesday, November 18, 2020

FROM: Sameer Dhalla, Director, Development and Engineering Services

RE: **TORONTO WATERFRONT AQUATIC HABITAT RESTORATION STRATEGY (TWAHRS) UPDATE AND EVALUATION**

KEY ISSUE

To inform the Regional Watershed Alliance regarding the results of a recently completed two-year research study to update and evaluate the Toronto Waterfront Aquatic Habitat Restoration Strategy (TWAHRS).

RECOMMENDATION

WHEREAS the Toronto and Region Conservation Authority (TRCA), in partnership and collaboration with TRCA's science partners from the Toronto Remedial Action Plan and Fisheries and Oceans Canada, completed a two-year study and evaluation in 2020;

IT IS RECOMMENDED THAT the staff report and presentation on the Toronto Waterfront Aquatic Habitat Restoration Strategy (TWAHRS) evaluation be received.

BACKGROUND

Fish populations of the Laurentian Great Lakes are impacted by a variety of stressors. Commercial and recreational fishing directly affect the fishery through harvest while other stressors, such as land use changes and degraded water quality, indirectly affect survival and reproduction through a loss or degradation of habitat. Great Lakes fisheries are also affected by competition and predation by invasive species along with changes in climate such as increasing lake temperatures. An estimated 80% of the approximately 200 fish species found in the Great Lakes use the nearshore areas for some portion of their life and as such, coastal development pressures such as shoreline modifications and watershed urbanization continue to impact the fishery.

The Toronto Waterfront Aquatic Habitat Restoration Strategy (TWAHRS) was developed by the Toronto and Region Conservation Authority with guidance from a committee of subject matter experts to provide practical information for decision-makers, designers and regulatory agencies to ensure that implementation of all waterfront projects incorporate opportunities to improve aquatic habitat. The TWAHRS includes an illustrated compendium of habitat restoration techniques intended to improve waterfront aquatic habitats for a diversity of species - fish, mammals, reptiles, amphibians, molluscs, invertebrates and plants; however, it focuses on fish because they are excellent indicators of the overall health of the ecosystem. In addition to an illustrated compendium of techniques, the TWAHRS proposes a strong framework for inter-agency cooperation prior to the start of waterfront development projects.

The overall goal of TWAHRS was to develop and achieve consensus on an aquatic habitat restoration strategy that will maximize the potential ecological integrity of the Toronto waterfront.

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Adoption and implementation

After TWAHRS was finalized and published in 2003, it was immediately adopted by several of the agencies from its stakeholder committee that had contributed to its inception including Fisheries and Oceans Canada, the Ontario Ministry of Natural Resources, City of Toronto, Environment Canada, Ontario Ministry of the Environment, and the Toronto Port Authority. The agency stakeholder committee was tasked with the protection, enhancement and long-term management of waterfront aquatic habitats. These were the first steps toward developing and achieving consensus on an aquatic habitat restoration strategy.

In the spring of 2006, Fisheries and Oceans Canada and its partners developed the governance framework and strategic priorities for the implementation of TWAHRS. The document describes a governance framework to facilitate delivery and to establish evidence-based strategic priorities for implementation. Shortly after, TWAHRS executives met with the Toronto Waterfront Revitalization Corporation and they adopted TWAHRS in their business planning.

Recognizing that the success of TWAHRS would lie in its use, a mechanism to implement TWAHRS would need to be developed among restoration practitioners in the Toronto Region. The establishment of an inter-agency coordinating mechanism would be multi-purposed. It would ensure that: (i) habitat opportunities are incorporated into project planning, (ii) scientific rigour, peer-review and best management practices in experimental habitat management would be used, (iii) cumulative effects of projects are identified through monitoring, and (iv) there is regular reporting on implementation of the Strategy.

The actions described above led to the establishment of Aquatic Habitat Toronto (AHT), a multi-agency partnership charged with implementing TWAHRS. The committee consists of Fisheries and Oceans Canada, Ontario Ministry of Natural Resources and Forestry, Toronto and Region Conservation Authority, Waterfront Toronto, Environment and Climate Change Canada, Ports Toronto and the City of Toronto. AHT works with proponents to facilitate project approvals utilizing an integrated planning approach. This process is guided by TWAHRS with the goal of conserving, restoring and creating aquatic habitat that was historically degraded. AHT also works collaboratively to design aquatic habitat offsetting strategies that contribute to the improvement of local aquatic habitat supply and support decision-making by advancing scientific research and environmental monitoring. AHT provides crucial information to help decision-makers, designers, and regulatory authorities ensure that waterfront projects incorporate improvements to aquatic habitat along the Toronto Waterfront.

RATIONALE

Evaluation and update of the Toronto Waterfront Aquatic Habitat Restoration Strategy

It has been over 15 years since TWAHRS was first implemented and as stated in the strategy document the success would lie in its use and ultimately be measured using scientific rigour to identify cumulative effect of all projects and report on its success. This evaluation is also timely in that it will contribute to the Toronto Remedial Action Plan habitat beneficial use impairment evaluation currently underway with the goal of de-listing Toronto as an area of concern.

The overall objective of this TWAHRS evaluation project was to evaluate the effectiveness of fish habitat restoration along the Toronto waterfront between 2002 and 2019 by:

- a) quantifying the extent of TWAHRS-recommended restoration techniques incorporated into waterfront development and conservation projects, and by
- b) examining the response of local fish communities to restoration projects incorporating TWAHRS-recommended restoration techniques.

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Methods

We examined changes in fish communities pre- and post-restoration at 28 large-scale waterfront restoration projects in open coast, estuary, embayment and coastal wetland habitat types. We used TRCA's long-term waterfront fisheries data set and detailed restoration project information to compare pre- and post-restoration fish communities to offer lines of evidence toward the effectiveness and success of the habitat works.

General findings

Between 2002 and 2019, the Strategy served as a resource to direct aquatic habitat restoration by multiple agencies at 44 waterfront projects, totaling approximately 55 ha in area. Fish communities have changed at many of the restored sites across the Toronto waterfront. Even though these changes were often unique for each restored site, some general patterns emerged. Implementation of TWAHRS techniques at open coast sites generally created habitat for piscivores (fish that eat other fish) and other species that use cobble substrate for spawning (e.g. Smallmouth Bass, Rock Bass). This change in habitat could have also contributed to declines in Spottail Shiner and Emerald Shiner, species that use sandy shorelines, although we also found declines for these species at other restored and unrestored sites.

Restored estuary sites were limited; however, the creation of high estuary hooks and associated back water areas resulted in an increase in piscivores and species richness although these patterns were short-term and the fish community changed again likely responding to changes in substrate. Declines in Common Carp (a TWAHRS fish community objective) occurred across estuary sites.

Embayment restoration was extensive across the waterfront with the most effective projects using a combination of TWAHRS techniques that were suited to the site-specific conditions. Overall, restored embayment sites consisted of primarily cool and warm water species and several sites had increasing Yellow Perch catch and many juvenile piscivores.

Complex coastal wetland restoration was completed at three sites at Tommy Thompson Park. Restoration included the creation of berms, carp exclusion barriers and extensive aquatic plantings. Fish community response to restoration was dramatic at these sites resulting in a shift from cool water species to warm water species. These sites are also providing essential spawning and nursery habitat for several species of piscivore while demonstrating evidence of effective carp exclusion.

After more than 17 years of habitat restoration following the recommendations of TWAHRS, we found that generally a combination of restoration techniques provided the most fisheries benefit. We also found that fish communities on the Toronto waterfront have changed over the past 30 years both at restored sites and unrestored sites and these changes varied among habitat type. While restoration projects implemented through TWAHRS create or maintain fish habitat across the Toronto waterfront helping to restore fish communities, restoration efforts need to continue to ensure population persistence in the face of known and emerging threats in the Lake Ontario ecosystem including invasive species and climate change.

Relationship to Building the Living City, the TRCA 2013-2022 Strategic Plan

This report supports the following strategies set forth in the TRCA 2013-2022 Strategic Plan:

Strategy 4 – Create complete communities that integrate nature and the built environment

Strategy 7 – Build partnerships and new business models

Strategy 8 – Gather and share the best sustainability knowledge

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Strategy 9 – Measure performance
Strategy 10 – Accelerate innovation

FINANCIAL DETAILS

TRCA received funding support through Environment Canada's Great Lakes Protection Initiative and collaboration with TRCA's science partners from the Toronto Remedial Action Plan and Fisheries and Oceans Canada to conduct this study.

DETAILS OF WORK TO BE DONE

TRCA will continue to support our municipal and research partners by advancing science and continuing to implement the Toronto Waterfront Aquatic Habitat Restoration Strategy through our many waterfront projects and through our advisory role as a partner on the Aquatic Habitat Toronto committee. We will work with our partners in Fall 2020 to post a completed final report online to disseminate results and advance the latest science to improve the natural environment through restoration projects on the Lake Ontario waterfront.

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