ECS Lunch and Learn

Supporting internal knowledge transfer within TRCA

January 14, 2021

Toronto and Region Conservation Authority

Evaluating the effectiveness of fish habitat restoration across the Toronto waterfront

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ECS Lunch and Learn
January 14, 2021

[1] Toronto and Region Conservation Authority
[2] Fisheries and Oceans Canada
[3] PREreview.org

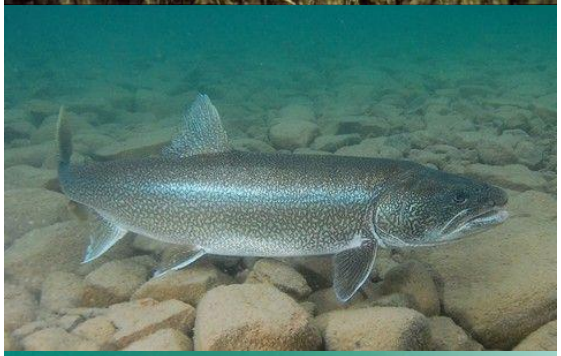
Toronto and Region Conservation Authority

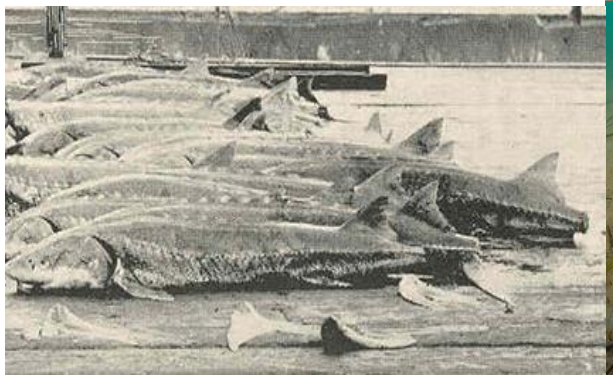
Toronto Port Lands 1899. Looking north west to Toronto skyline in left background.

Toronto Public Library

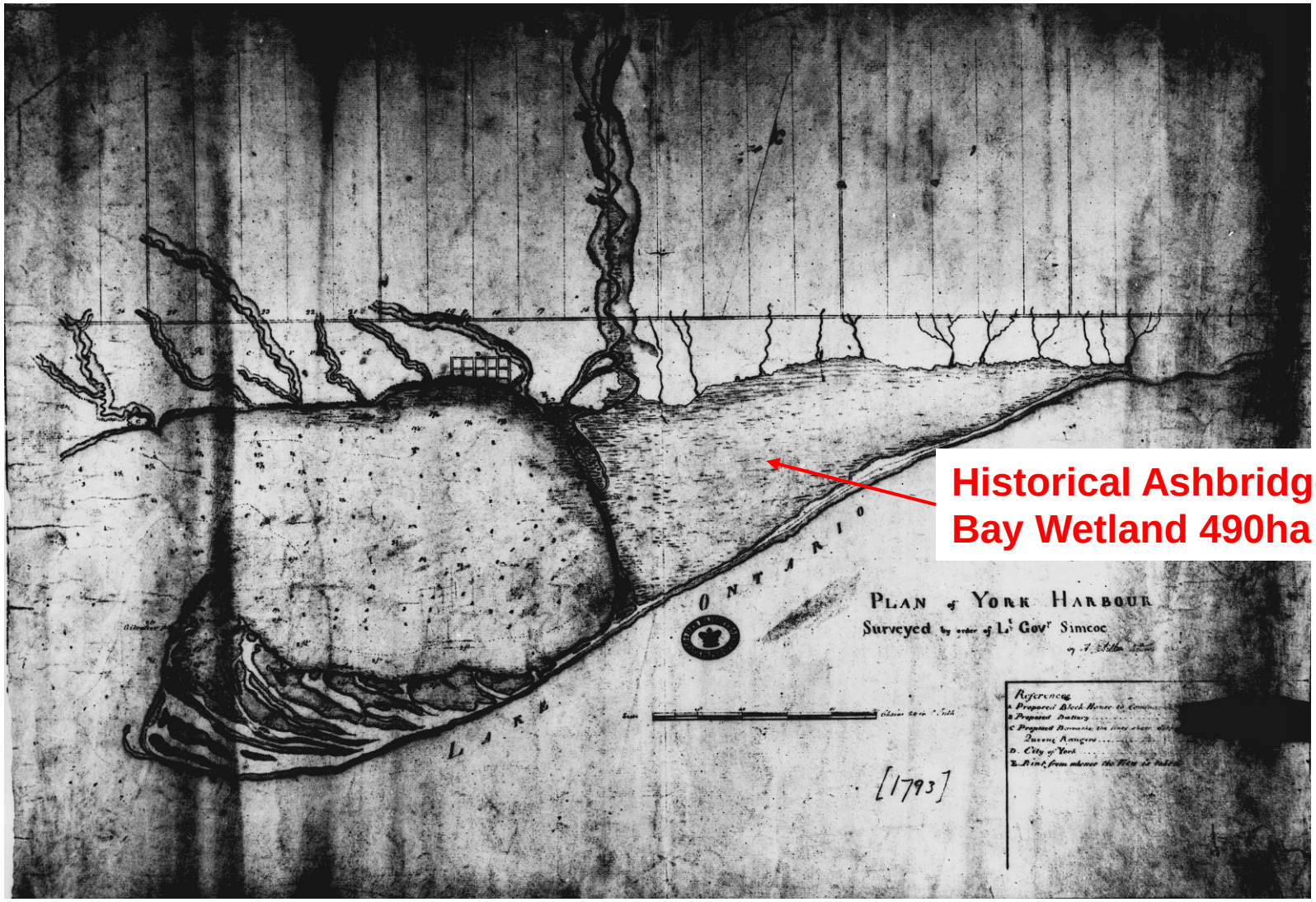
Historical Fish Abundance

- 200 years ago Lake Ontario was pristine and teeming with Lake Trout and Atlantic Salmon
- The Toronto Islands were a large sandy spit protecting a huge wetland where Muskellunge, Northern Pike, and Walleye thrived
- The now rare Lake Sturgeon and American Eel were common



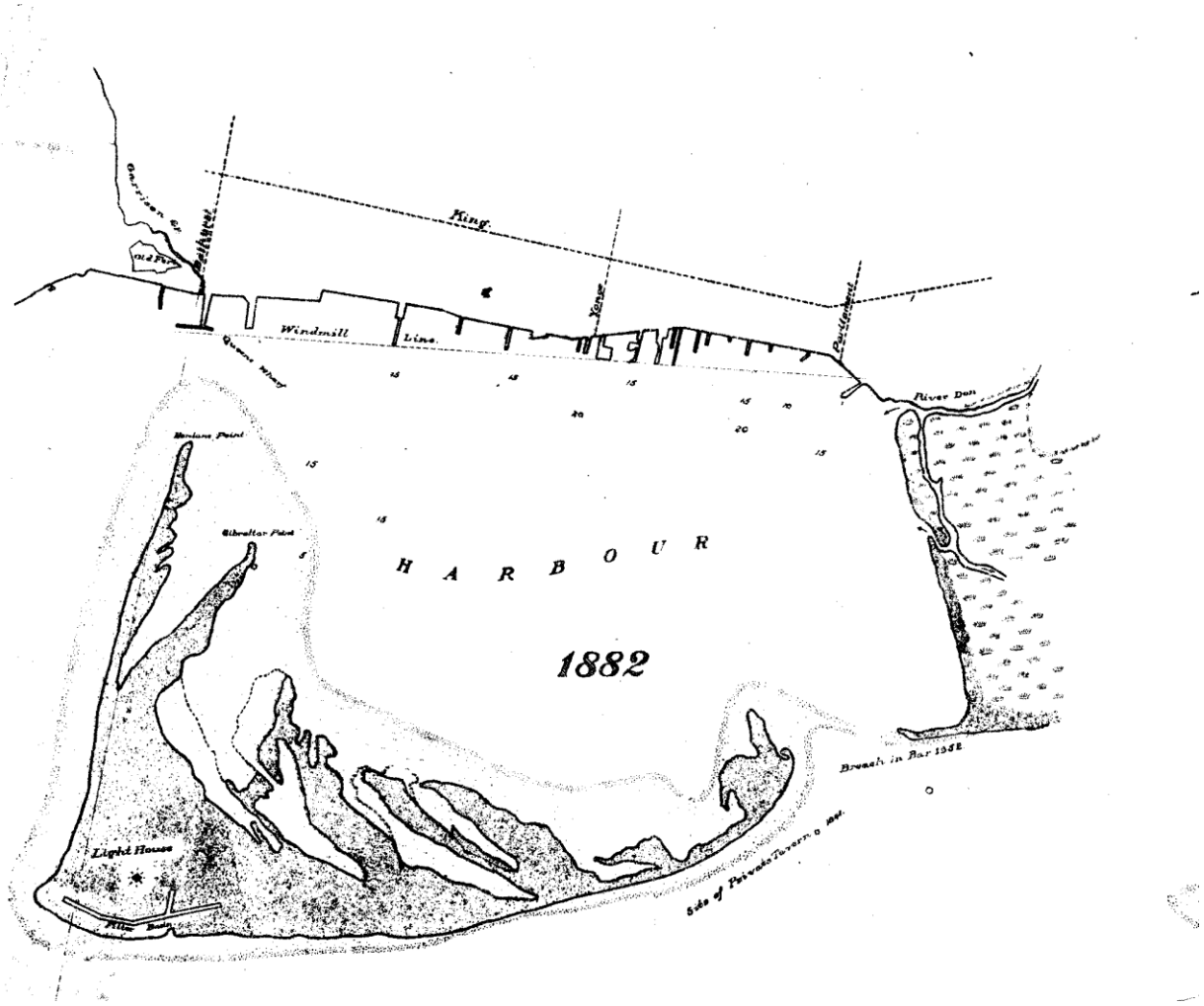


Toronto Harbour 1793



University of Toronto Libraries - Map & Data Library

Toronto Harbour 1882



University of Toronto Libraries - Map & Data Library

In 1858, Toronto islands were formed when a storm completely separated the peninsula from the mainland creating a gap too large to repair

Toronto Harbour 1913

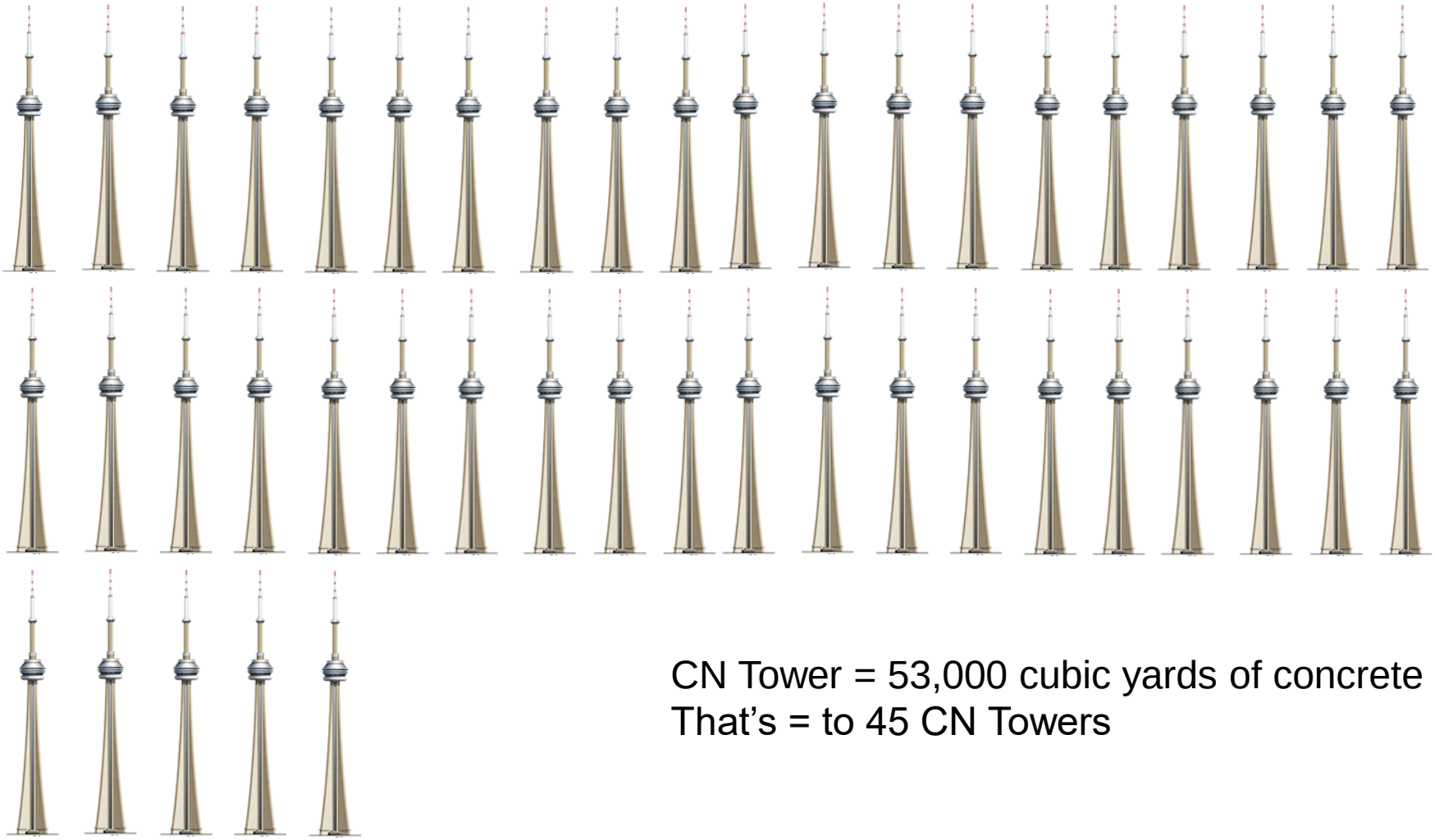
University of Toronto Libraries - Map & Data Library

This map of Toronto Bay shows the creation of the Western and Eastern Gap, the Keating Cut, and the outline of Ashbridges Bay Marsh.

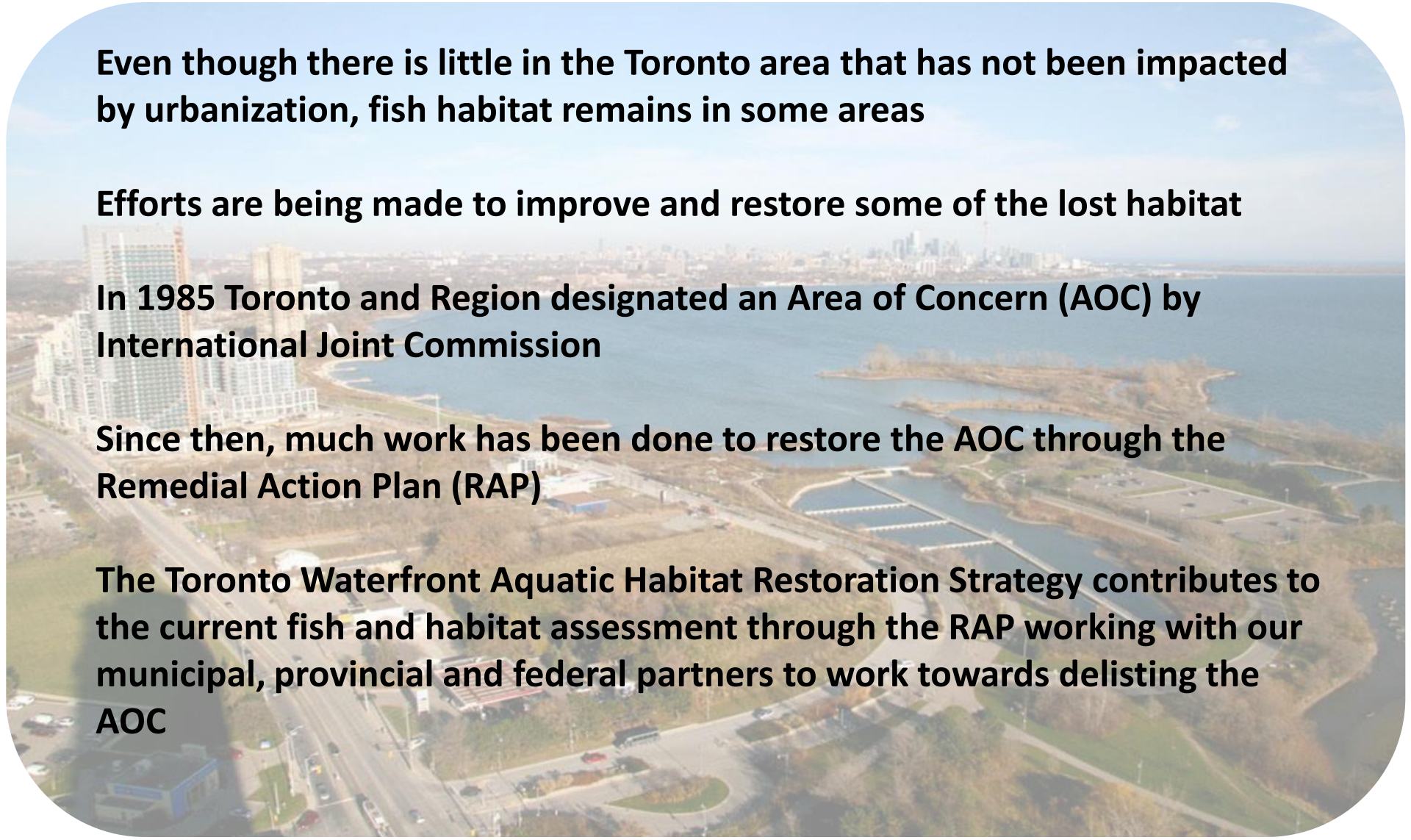
Toronto Harbour Today

Stonehooking in the Toronto Region 1815 -1920

Legacy of Impact due to Stonehooking
Let's Put this in Perspective: 2.4 million cubic yards =



CN Tower = 53,000 cubic yards of concrete
That's = to 45 CN Towers



Even though there is little in the Toronto area that has not been impacted by urbanization, fish habitat remains in some areas

Efforts are being made to improve and restore some of the lost habitat

In 1985 Toronto and Region designated an Area of Concern (AOC) by International Joint Commission

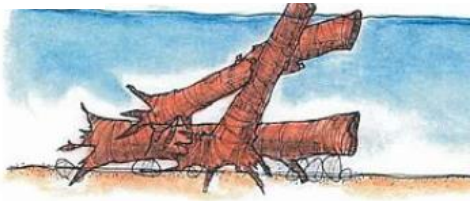
Since then, much work has been done to restore the AOC through the Remedial Action Plan (RAP)

The Toronto Waterfront Aquatic Habitat Restoration Strategy contributes to the current fish and habitat assessment through the RAP working with our municipal, provincial and federal partners to work towards delisting the AOC

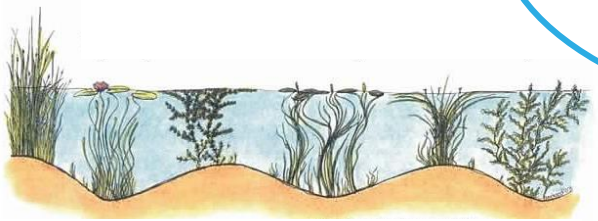
Aquatic Habitat Toronto

Developed by TRCA in 2003

Provides practical information for decision-makers, designers and regulatory agencies to ensure all waterfront projects incorporate opportunities to improve aquatic habitat



Toronto Waterfront Aquatic Habitat Restoration Strategy (TWAHRS)



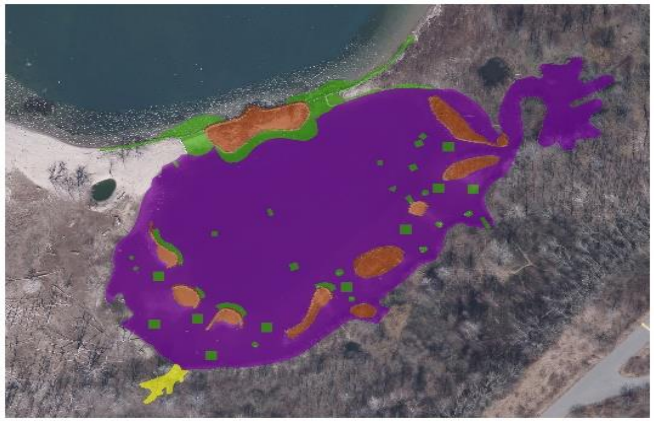
Ecosystem approach, ecological integrity, self-sustaining communities, native species, connectivity, conservation design, human use, consultative approach

Compendium of restoration techniques

Targets

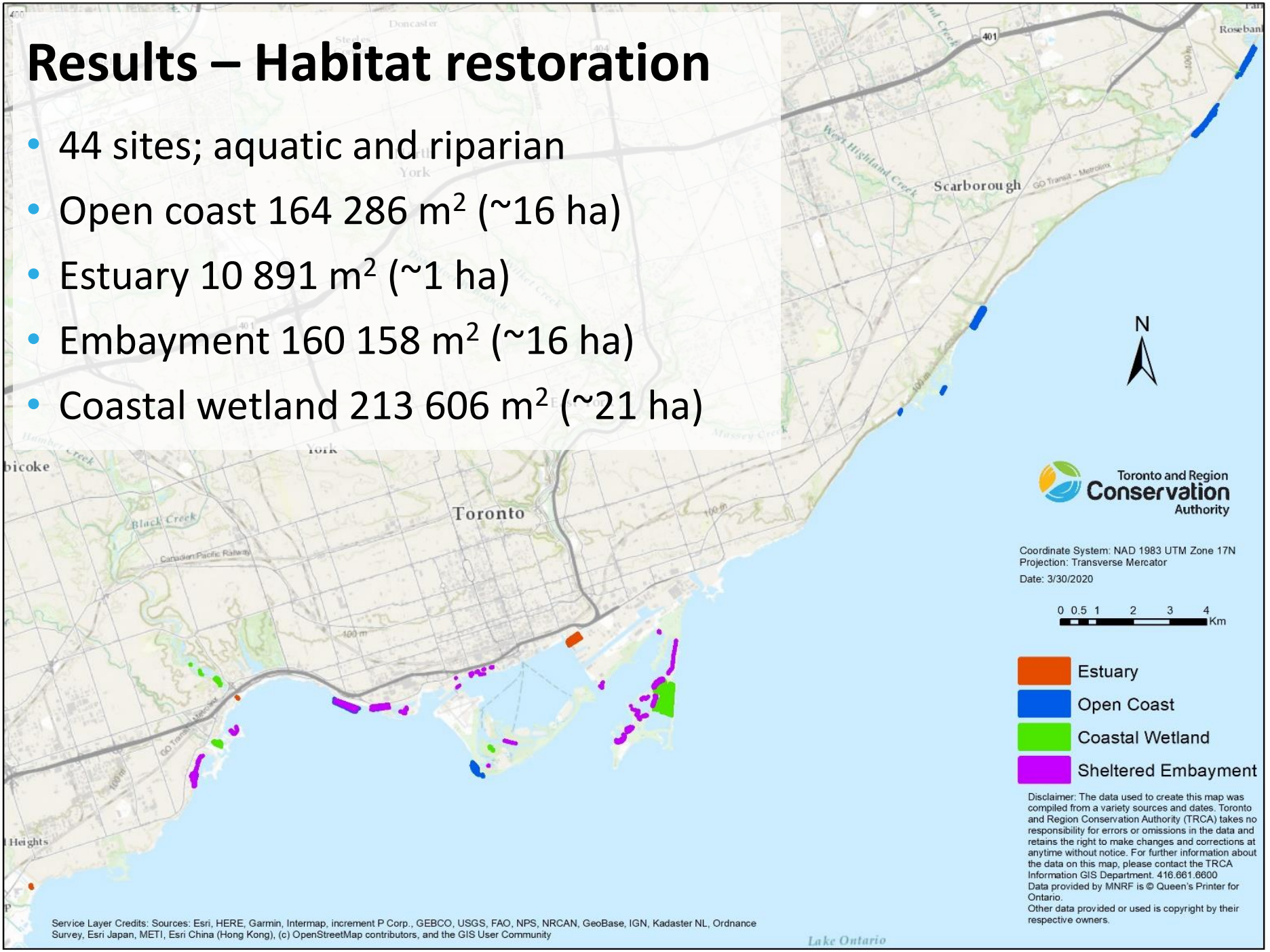
Objective

- To evaluate the *effectiveness* of fish habitat restoration using the Strategy
  - Quantify the *amount* of restored habitat
    - Net gain
    - Mapped restoration projects
  - Assess the *response* of fish communities to aquatic habitat restoration
    - Piscivores, forage, Common Carp, thermal guilds (IBI)
    - Waterfront electrofishing

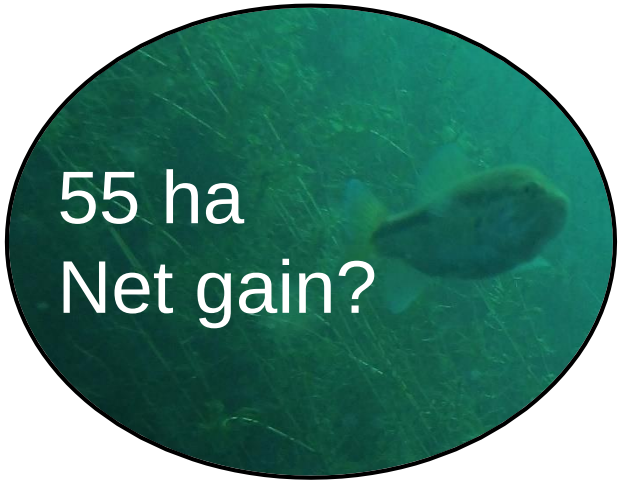


Results – Habitat restoration

- 44 sites; aquatic and riparian
- Open coast 164 286 m^2 (~16 ha)
- Estuary 10 891 m^2 (~1 ha)
- Embayment 160 158 m^2 (~16 ha)
- Coastal wetland 213 606 m^2 (~21 ha)



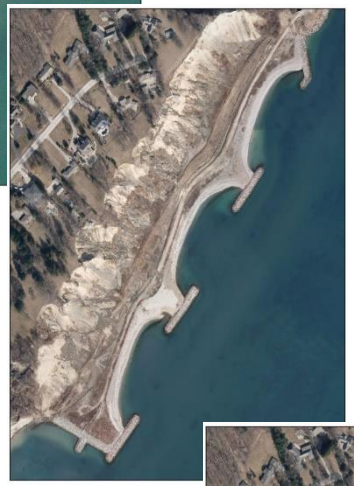
Did we meet the targets set in the Strategy?



Results – Open coast fish communities

- 4 restored, 1 reference
- Few species
- Cool and coldwater species
- Restored sites often had more species than the reference site
  - ↑ Smallmouth Bass, Rock Bass
  - ↓ Spottail Shiner, Emerald Shiner
- Round goby?

2002



2018

2018

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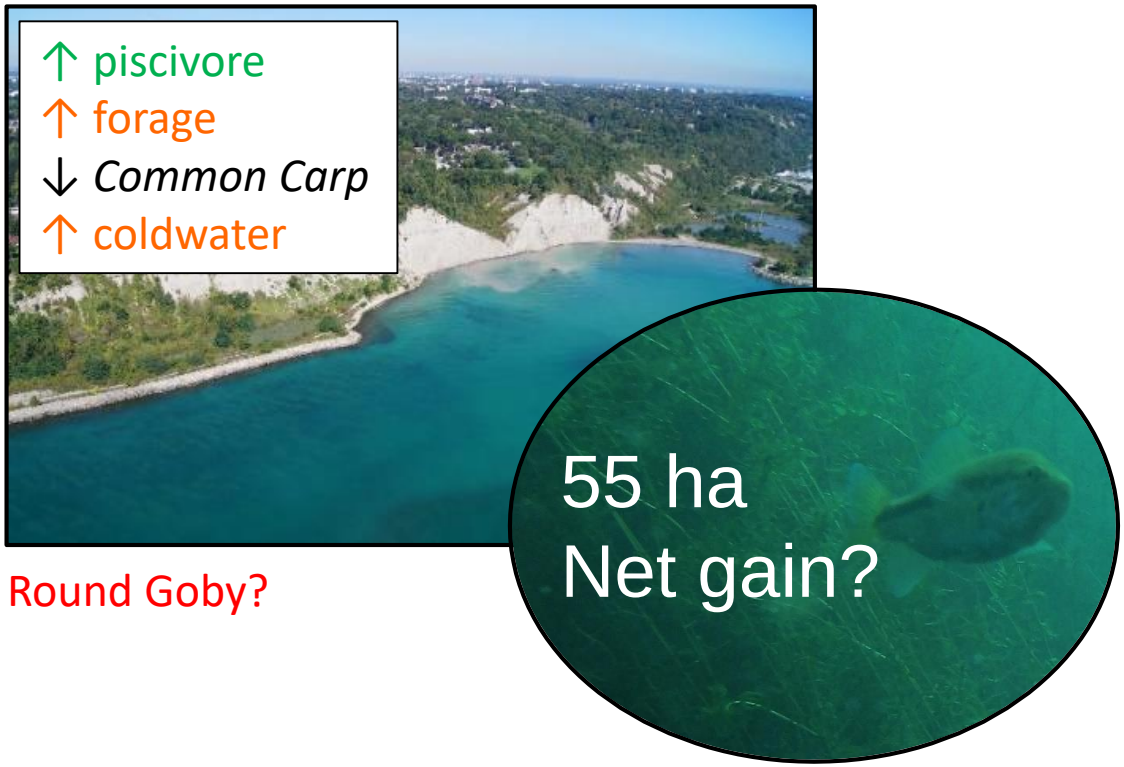
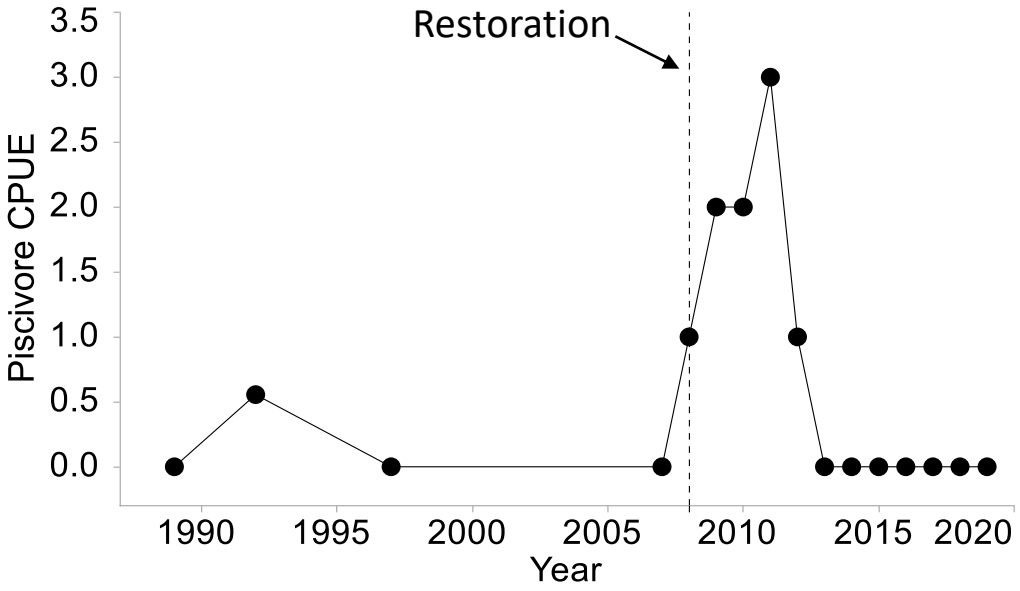
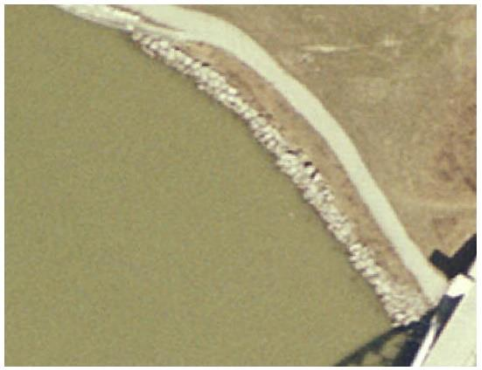


Round Goby?

Results – Estuary fish communities

- 2 restored, 1 reference
- Primarily coolwater species
- ↑ Rock Bass, shiners, minnows
- ↓ Spottail Shiner, Common Carp





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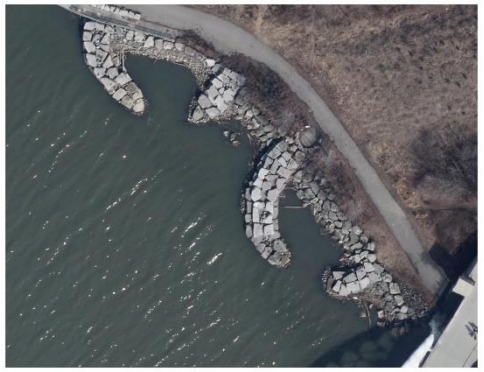

2018

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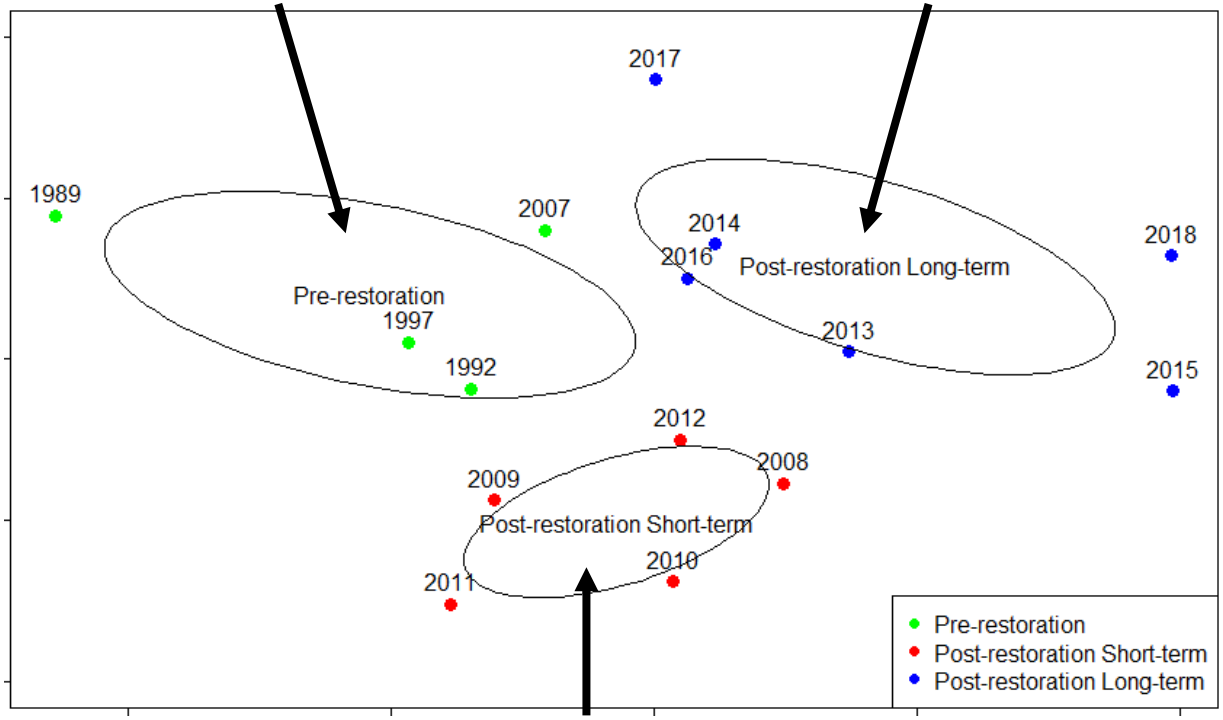
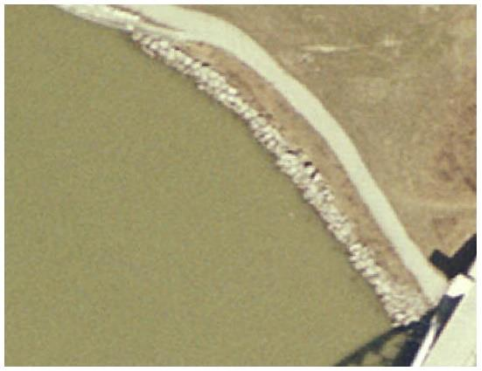
Results – Estuary fish communities

Emerald Shiner, Spottail Shiner Common Carp, Brown Trout, Trout-perch

Common Shiner, White Perch, Brown Bullhead, Rock Bass, Gizzard Shad



Yellow Perch, Spottail Shiner, Spotfin Shiner, Smallmouth Bass, Northern Pike, Bluntnose Minnow, Common Carp, Common Shiner, Emerald Shiner, Rock Bass



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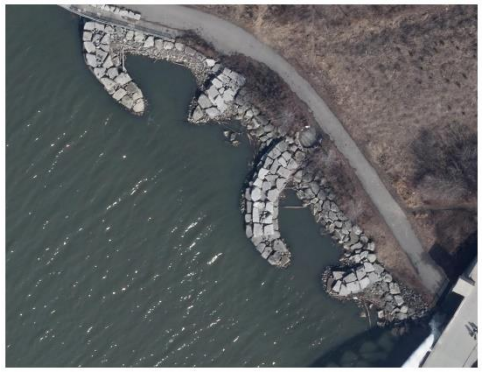
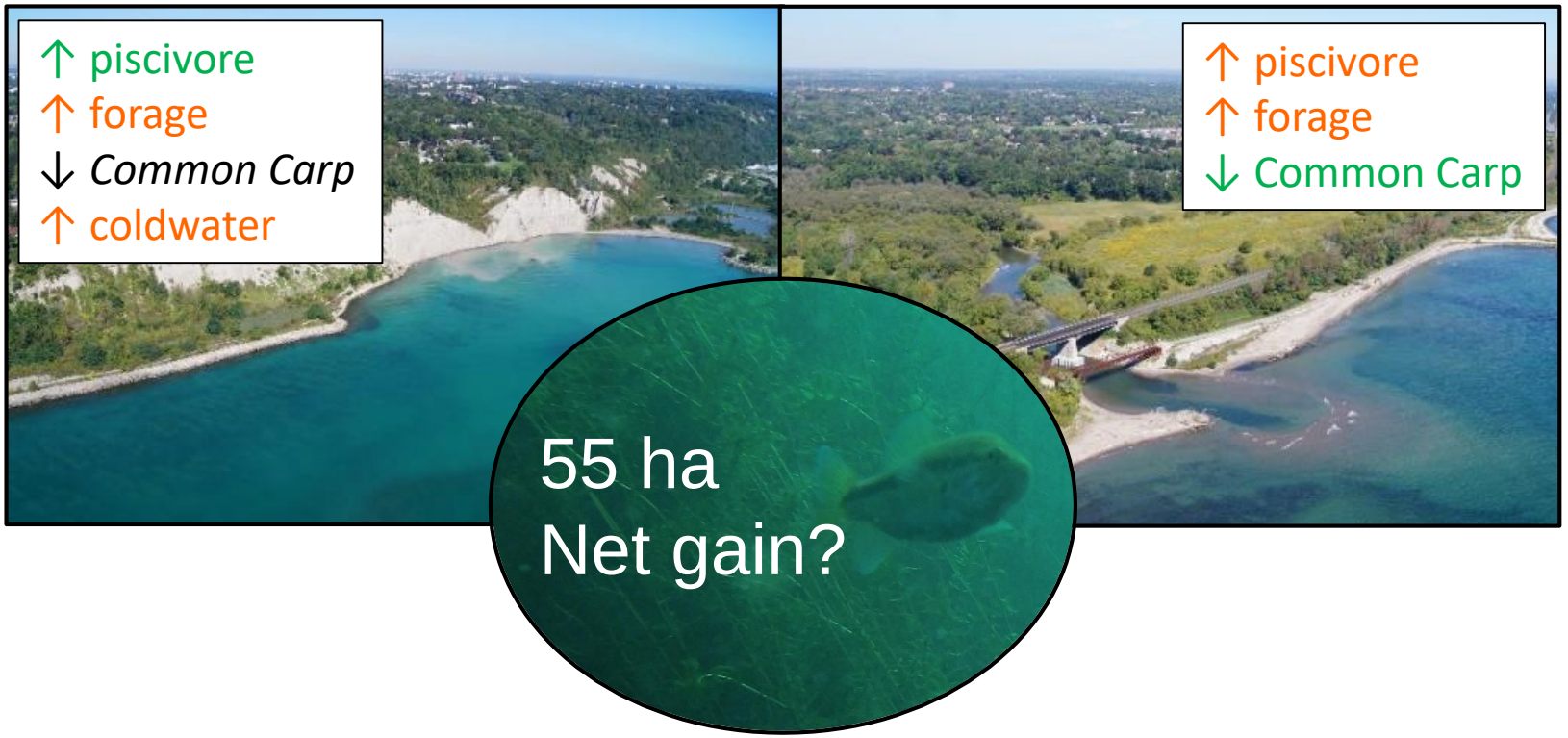


2018

2018

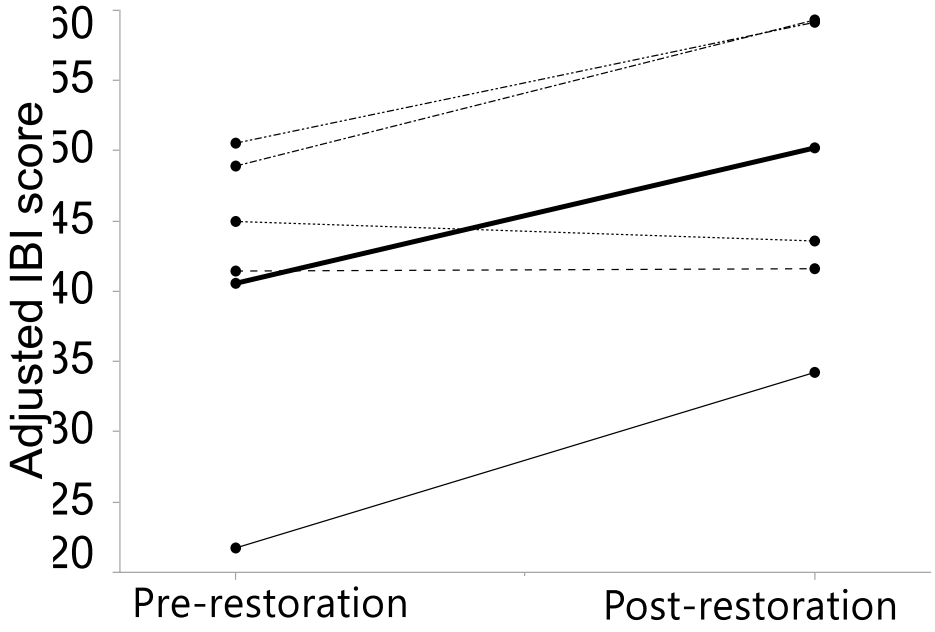
Did we meet the targets set in the Strategy?



Round Goby?

Results – Embayment fish communities

- 10 restored, 1 reference
- Cool and warmwater species
- Juvenile Largemouth Bass and Northern Pike
- IBI metrics
  - ↑ Pumpkinseed, Largemouth Bass, Rock Bass, Yellow Perch, Northern Pike
  - ↓ Spottail Shiner, Emerald Shiner
  - Still degraded but improved



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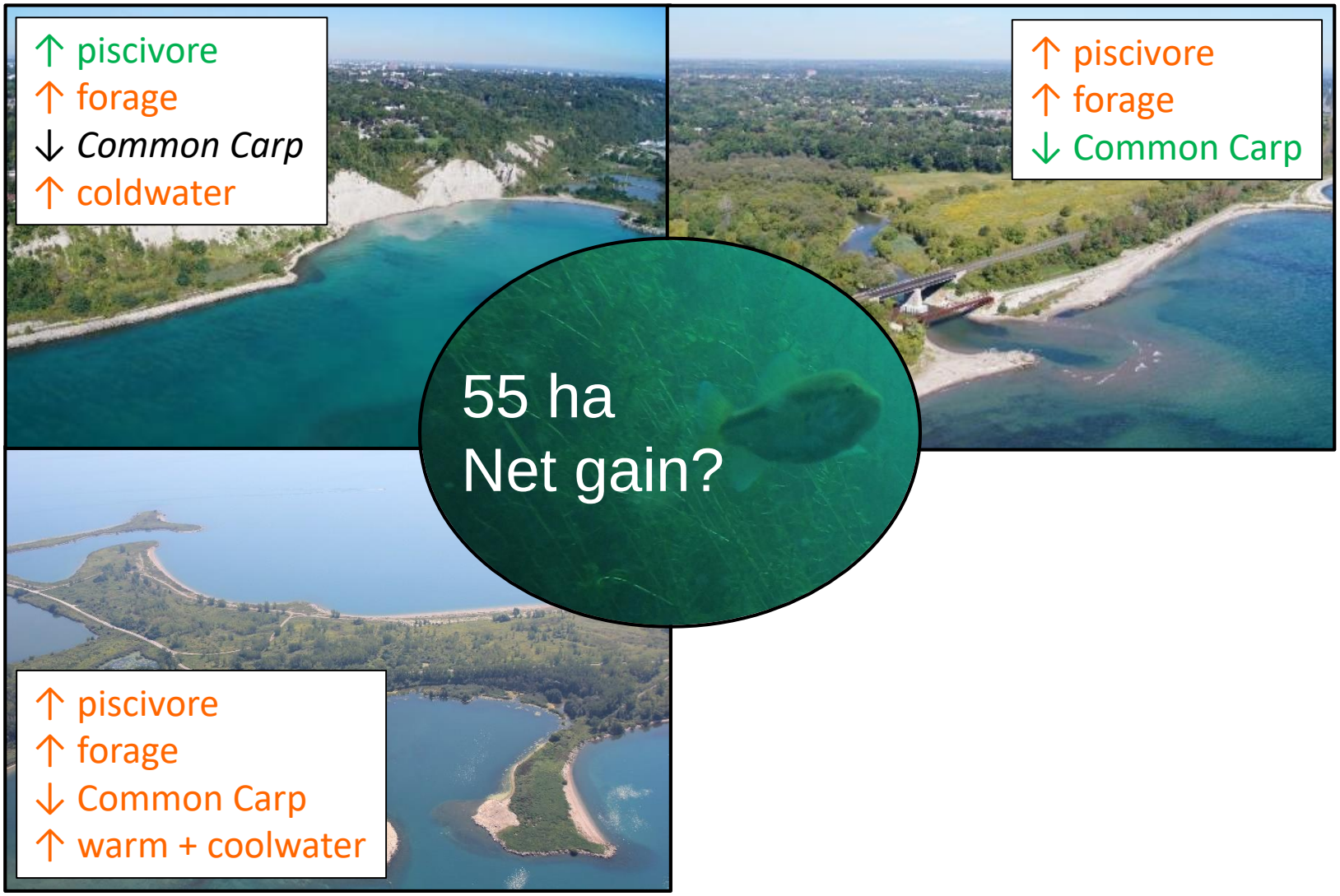
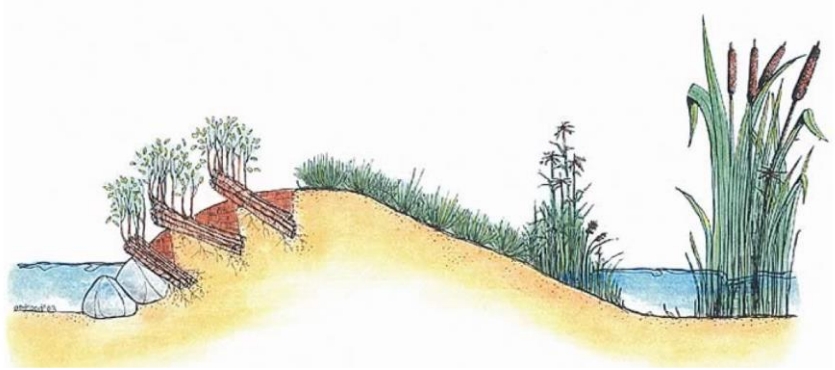


Round Goby?

Results – Coastal wetland fish communities

- 3 restored
- Many species, shift from cool to warmwater species, nursery, foraging habitat, carp
- ↑ Largemouth Bass, Yellow Perch, Pumpkinseed
- ↓ Spottail Shiner, Bluntnose Minnow



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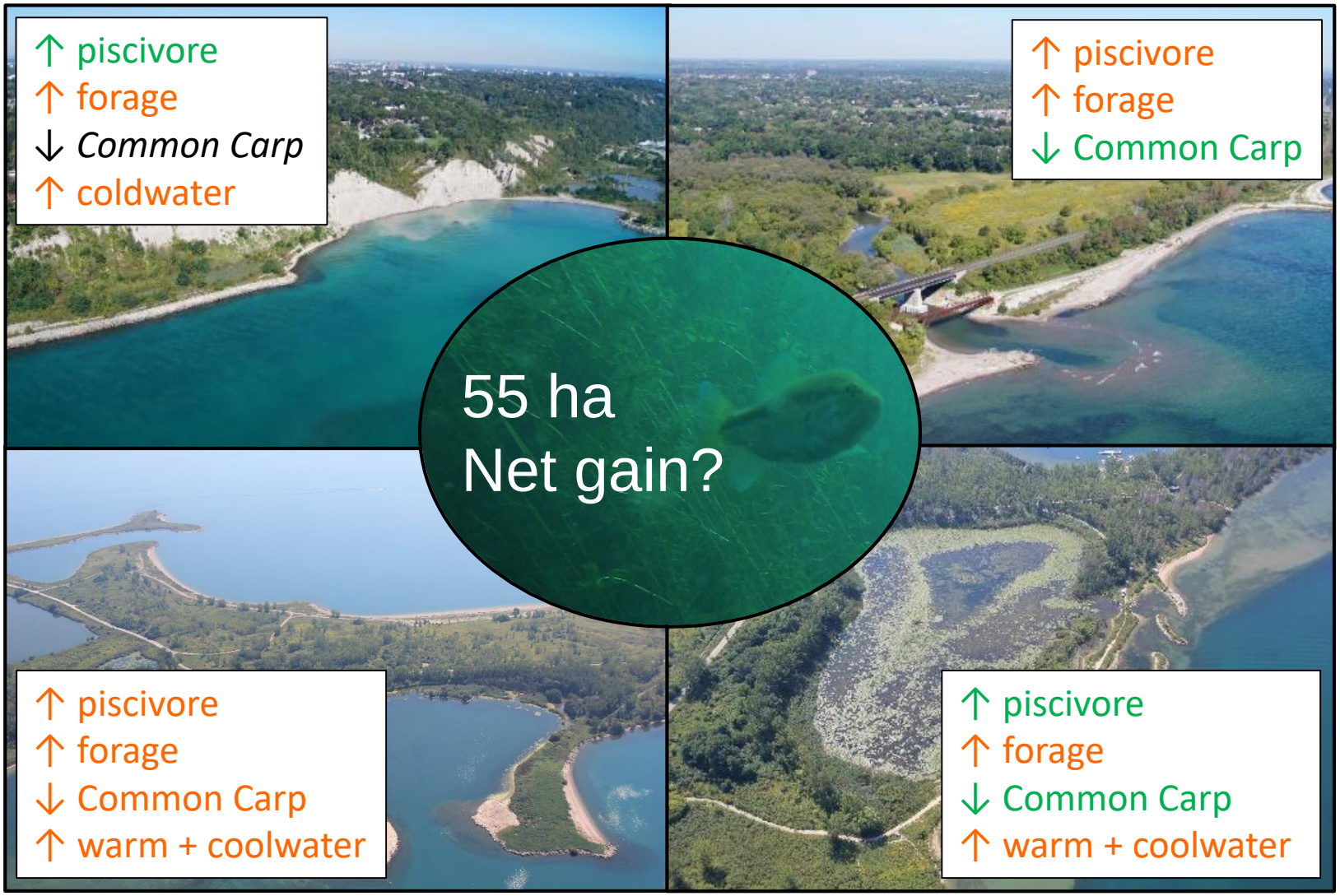

Round Goby?

Conclusions

- The Toronto Waterfront Aquatic Habitat Restoration Strategy:
  - Provides a holistic approach to waterfront development
  - Coordinated planning and management

- Restoration effectiveness was variable
    - Coastal wetland restoration

Next steps

- Aquatic Habitat Toronto consultation and implementation of the Strategy must continue to ensure targets are met and mitigate future threats
  - Invasive species, water quality, climate change

- Environmental monitoring needs to continue across the waterfront to support adaptive management decisions related to restoration activities

- Continue to work with our research and development partners using the innovative approach to aquatic habitat improvement outlined in the Strategy to achieve our common goal of a sustainable environment

Acknowledgements

Questions or comments?
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TORONTO & REGION REMEDIAL ACTION PLAN

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Upcoming ECS Lunch and Learns!

Wednesday, January 27
11:30am-12:30pm

Erosion Risk Management

By Matt Johnston, Ashour Rehana, and David Gingerich

Wednesday, February 10
11:00am-12:00pm

Research in the Meadoway

By Katie Turnbull, Paul Morris, Lyndsay Cartwright, and Chris Cormack

Wednesday, March 24
11:00am-12:00pm

Natural Heritage System (NHS) Update

By Namrata Shrestha

Past Recordings

Watersheds and Ecosystems Reporting
Draft Web Application

Laura Del Giudice, Senior Manager, Watershed Planning & Reporting
Kristina Dokoska, Project Coordinator, Ontario Climate Consortium

September 21, 2020

Introduction to the LID Treatment Train Tool

Presented by – Steve Auger, Sahlla Abbasi and Yuestas David

STEP Water is a partnership between:

November 5, 2020

TRCA's Recent Floodplain Mapping Updates

Wilfred Ho*, Christina Bright*, Mike Todd**

* Flood Risk Management, Development & Engineering Services
** Information Technology & Records Management

November 10, 2020

Working with Indigenous Communities

Lunch and Learn

November 17, 2020

Green Infrastructure in Asset Management Planning

Presented by:
Michelle Sawka, Senior Research Scientist
Tracy Timmins, Research Analyst

Ecosystem and Climate Science

December 8, 2020

Explore TRCA's Biodiversity

How to get the most from our enormous natural heritage data set.

Presented by: Gavin Miller, Flora Biologist, Paul Prior, Fauna Biologist, and Parth Sheth, GIS Technician.

December 17, 2020

Thank you

For questions about the ECS Lunch and Learn Series, please contact:

Sharon Lam
sharon.lam@trca.ca

Toronto and Region Conservation Authority