Diving Into FishPass

The Connectivity Conundrum and the Science of Selective Fish Passage

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Overview

- **The Great Lakes Fishery Commission**
  - History
  - Roles and Mandates
- **FishPass**
  - History
  - Mission/Vision
  - Progress

The Great Lakes Fishery

- Binational treasure worth more than $7 billion annually
- Attracts millions of anglers
- Supports valuable commercial and charter fishing
- A mainstay for native peoples
- The fabric of a healthy environment

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Many Jurisdictions

- Two Nations
- Eight States
- One Province
- Several Tribes

The fishery resources do not observe political boundaries

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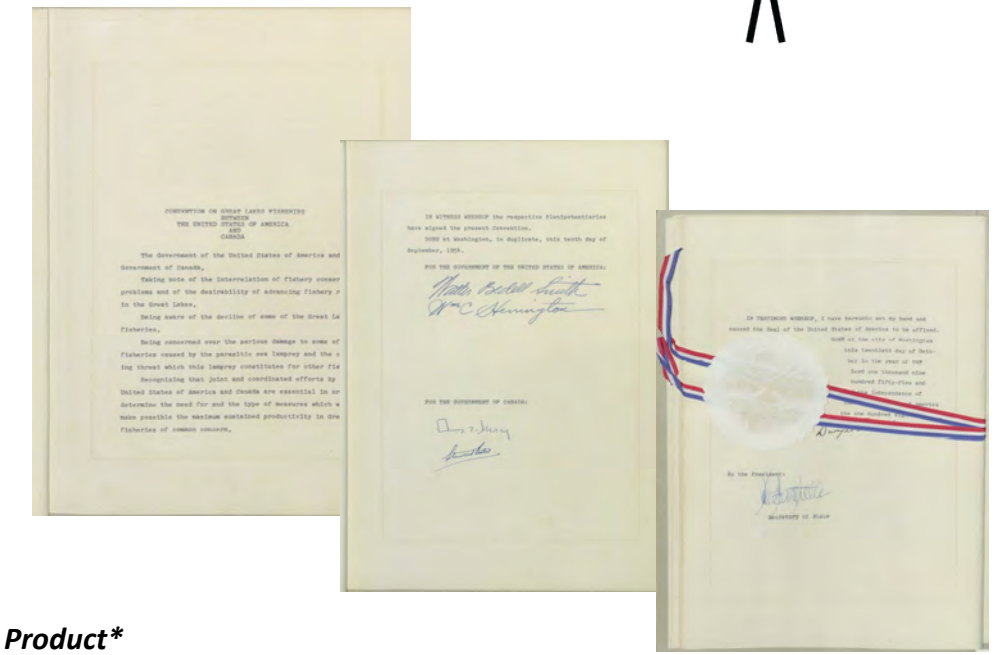
Complex Relationships

- 1800s – 1950s, the states and Ontario tried no fewer than 40 times to create a lasting mechanism for cooperation
- Sea lamprey invasion was the catalyst for development a collaborative relationship
- **1954 Convention on Great Lakes Fisheries**

The Great Lakes Fishery Commission

- Formed with the **1954 Convention on Great Lakes Fisheries**
  - A treaty between Canada and the United States
    - Binational Governance (Commissioners)
  - Mandates the Commission to:
    - Control Sea Lamprey
    - Advance Science
    - Help Agencies Work Together



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CANADIAN COMMISSIONERS

Four commissioners

Appointed by Privy Council

Hecky Provost McKane Baker Estenoz Diver Taylor Wecker

Not pictured: Cmr. Cronin

JAMES MCKANE
Vice-Chair
Commissioner

Conservationist

(Federal nomination by tradition)

ROBERT HECKY
Commissioner

University of Guelph

(Provincial nomination by tradition)

EARL PROVOST
Canadian Section Chair
Commissioner

Agent General, Prov. of Ont.

(Provincial nomination by tradition)

NIALL CRONIN
Commissioner

Global Affairs Canada

(Federal nomination by tradition)

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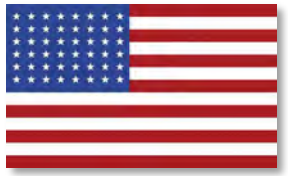
U.S. COMMISSIONERS



Four commissioners plus one alternate
Appointed by the President
*No two from same state
No Senate confirmation

Hecky Provost McKane Baker Estenoz Diver Taylor Wecker

Not pictured: Cmr. Cronin

ETHAN BAKER
Chair
***Commissioner**

Mayor
City of Troy, Michigan

KAREN DIVER
Chair, US Section
***Commissioner**

University of Minnesota
Senior Advisor to the President

SHANNON ESTENOZ
Commissioner

Assistant Secretary for Fish, Wildlife, and Parks

WILLIAM TAYLOR
Alternate Commissioner

Professor, Michigan State University

KENDRA WECKER
***Commissioner**

Chief, Division of Wildlife
Ohio DNR

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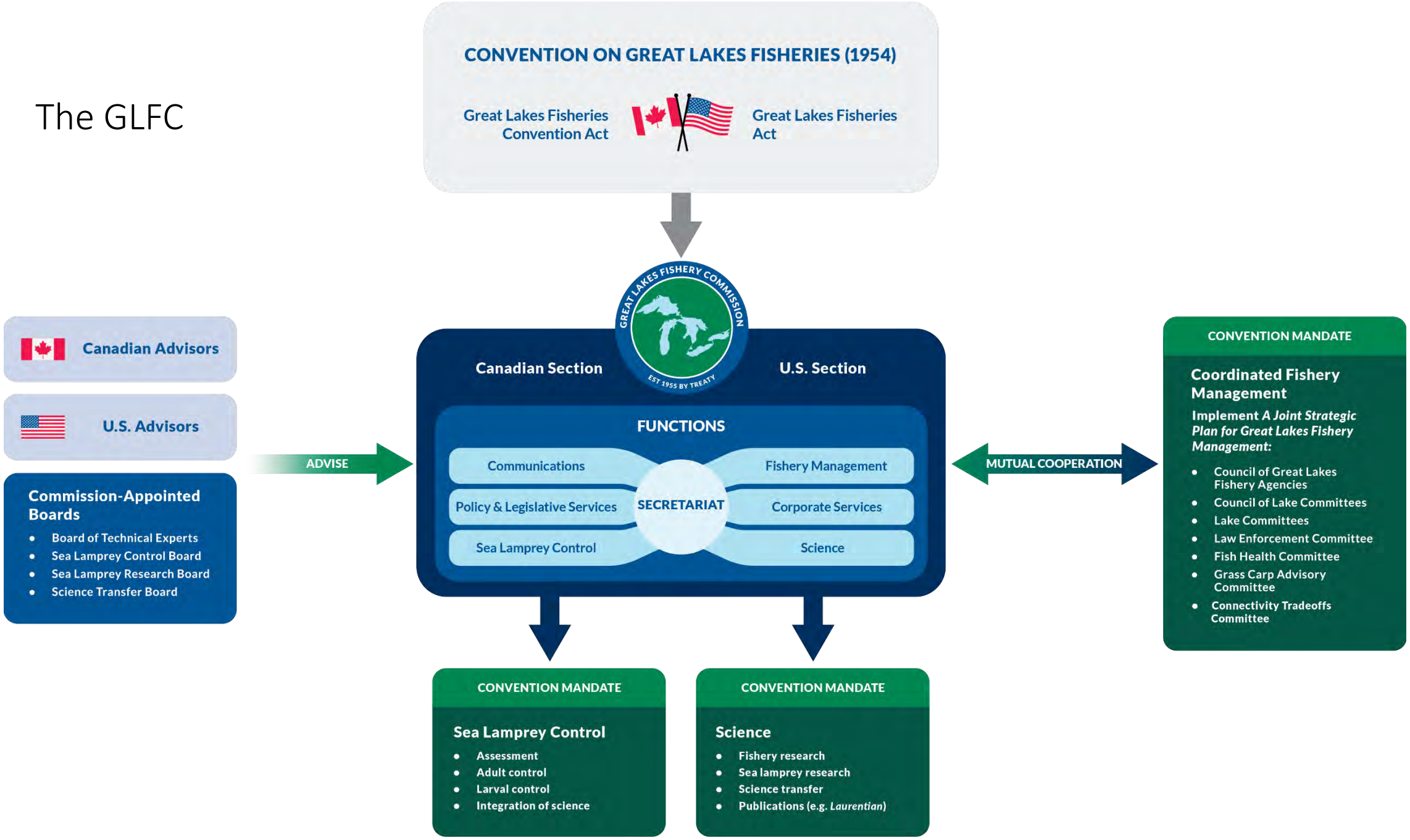
The GLFC



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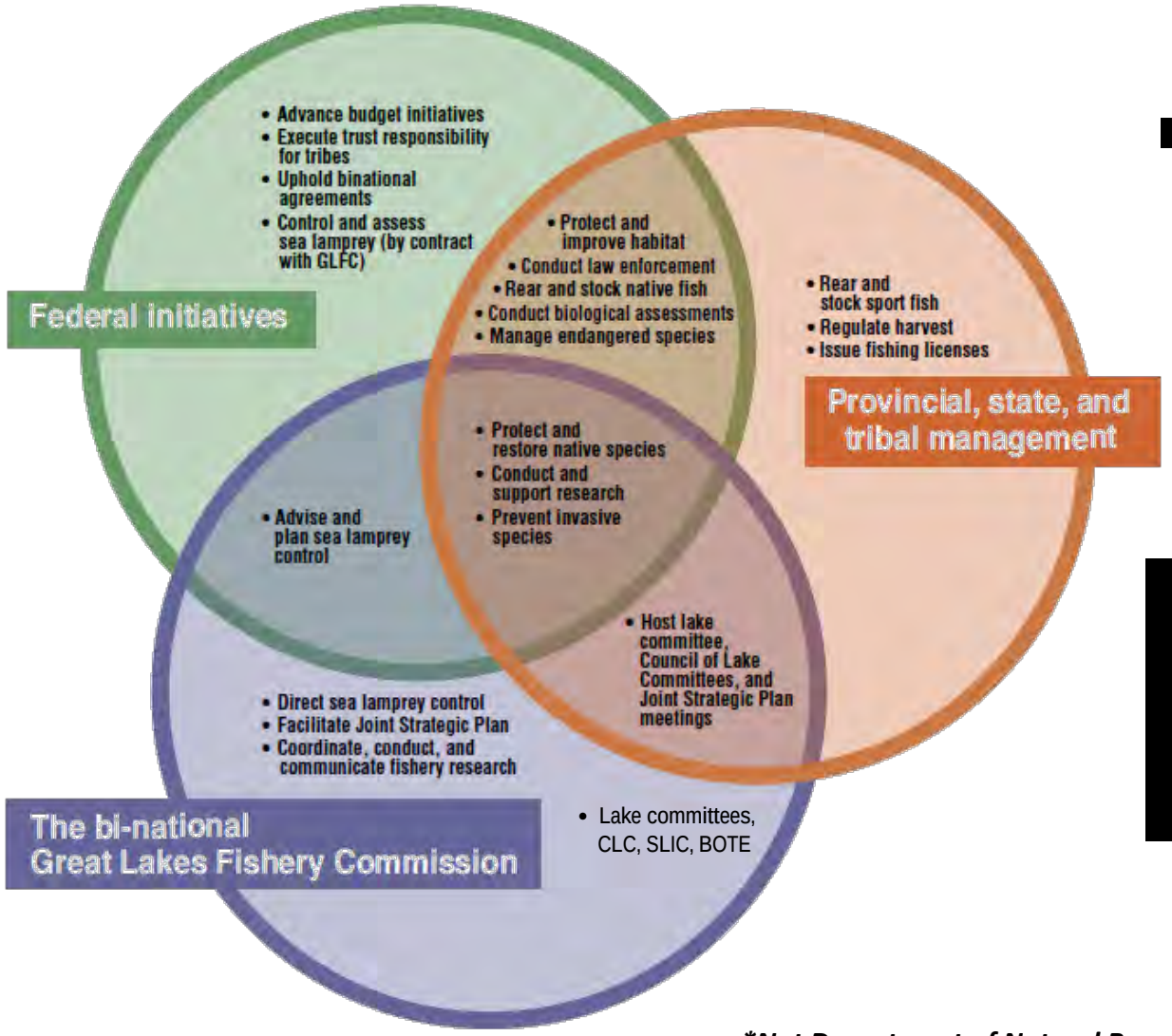
GREAT LAKES FISHERY RESPONSIBILITIES



Federal Agencies Signatory to the Plan

CANADA NOAA USGS science for a changing world

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Diagram: M. Gaden

CONVENTION MANDATE:
CARRY OUT SEA LAMPREY CONTROL

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CONVENTION MANDATE:
COORDINATE FISHERY SCIENCE

- Fisheries Research
- Sea Lamprey Research
  - In partnership with USGS, MSU, U of Guelph
- Science Transfer
  - Fish and Wildlife Service, Restoration Act

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CONVENTION MANDATE: MAINTAIN "WORKING ARRANGEMENTS"

. . . while protecting sub-national authority

- Many jurisdictions on the lakes
  - Provincial, state, tribal, federal, binational
- Complex issues
  - Translate science into management
  - Balance competing interests
- Agencies need to work together

- A Joint Strategic Plan For Management Of Great Lakes Fisheries
  - Signed in 1981; revised in 1997
- Great Lakes Fishery Commission facilitates

- Highly successful agreement!

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FISH PASS

GIIGOOK MAH-JOWAG

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Great Lakes RESTORATION

USGS science for a changing world

US Army Corps of Engineers.

CITY of TRAVERSE CITY

DEPARTMENT OF NATURAL RESOURCES DNR MICHIGAN

GRAND TRAVERSE BAND OF OTTAWA/CHIPPEWA NATURAL RESOURCES

Great Lakes Fishery Trust

U.S. FISH & WILDLIFE SERVICE

Sea Grant Michigan

GREAT LAKES FISHERY COMMISSION PROTECTING OUR FISHERY

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What is FishPass? Why the Boardman?

- **FishPass will enhance fish passage and connectivity** between the Boardman River and Lake Michigan **while removing invasive or non-desirable fishes** through controlled sorting
- The **Boardman Implementation Team and Dams Committee** spent many years trying to identify a solution to the Union Street Dam
  - The dam is in disrepair and requires significant repair/replacement
  - A solution was needed to the sea lamprey control and fish passage dilemma
  - FishPass represents a capstone to the 20 year Boardman Restoration Project
- The Boardman was selected via decision analysis among 12 sites

Connectivity conundrum?

Sea lamprey

Lake sturgeon

Longnose suckers

A Global problem:

- Tension between improving passage for desirable species while decreasing or eliminating passage by invasive or undesirable species.

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Boardman (Ottaway) River

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- Dams
- Road crossings

Moody et al. 2017. Fisheries. 42(1):57-65.

FishPass Mission

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Existing Conditions

Proposed Conditions

To provide up- and down-stream passage of desirable fishes while simultaneously blocking and/or removing undesirable fishes.

1) *develop and implement selective bi-directional fish guidance, sorting, and passage techniques and technologies;*
2) *determine protocols for implementing selective passage solutions within the Boardman River and throughout the Great Lakes Basin; and*
3) *set solutions in a global context so the approach can be exported.*

Solutions to the connectivity conundrum

Selective passage = How to sort an assortment of things?

- Evolution of single-stream-recycling can **inform approaches** and **expectations** for selective fish passage
- Emphasize **automation** and **attribute-driven sorting**

Aug 2013 Popular Science

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Attribute based sorting

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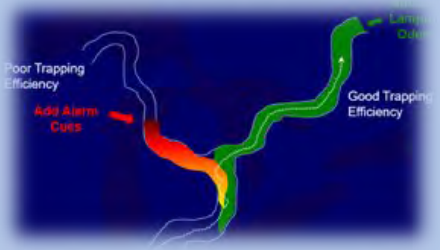
PHENOLOGY	MORPHOLOGY	BEHAVIOUR	PHYSIOLOGY
Run Timing; Species	Size, Shape	Guidance, Deterrence, Attraction	Hydraulic Challenges; Leaping ability
			
			
			

FishPass

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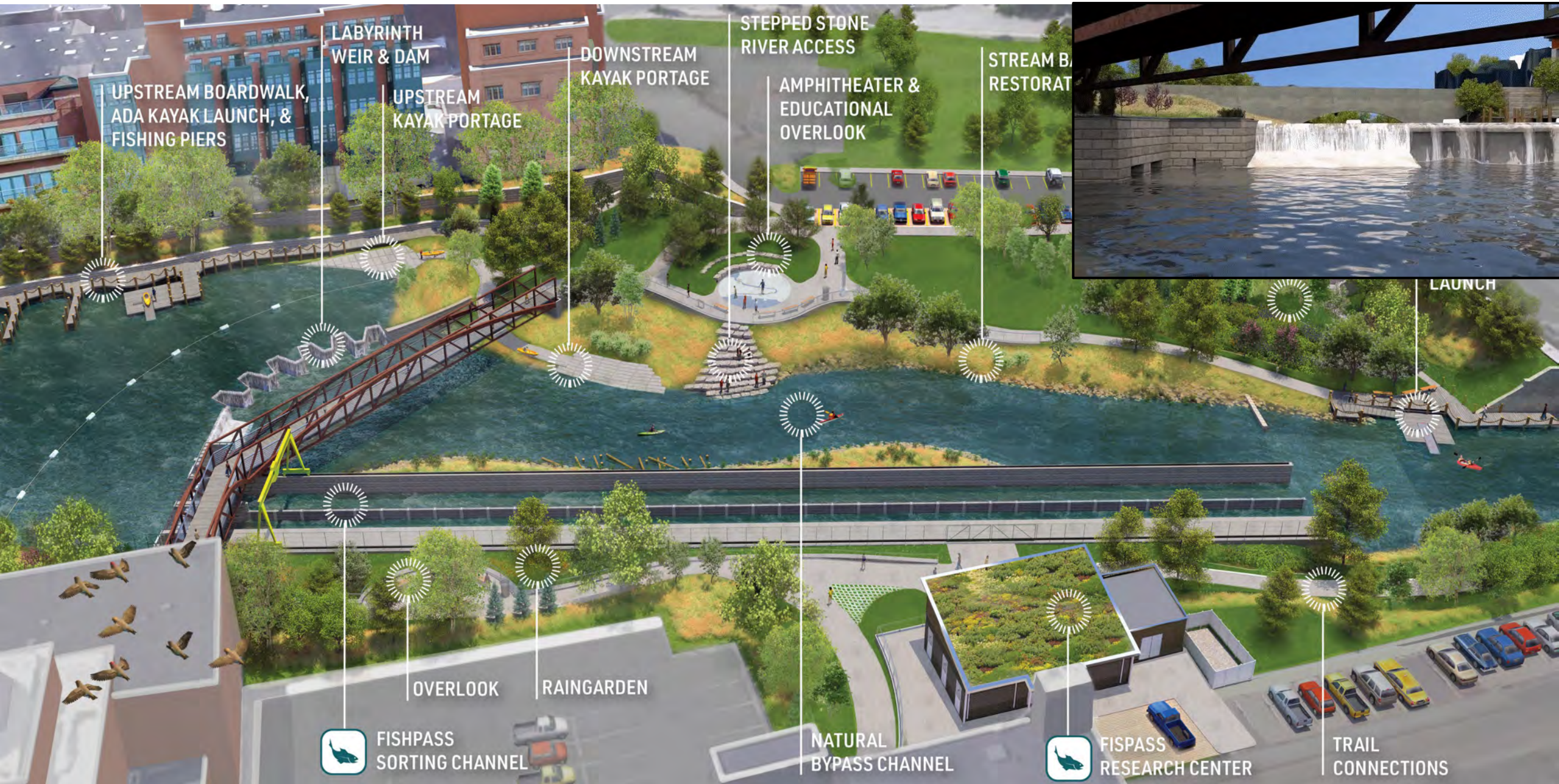
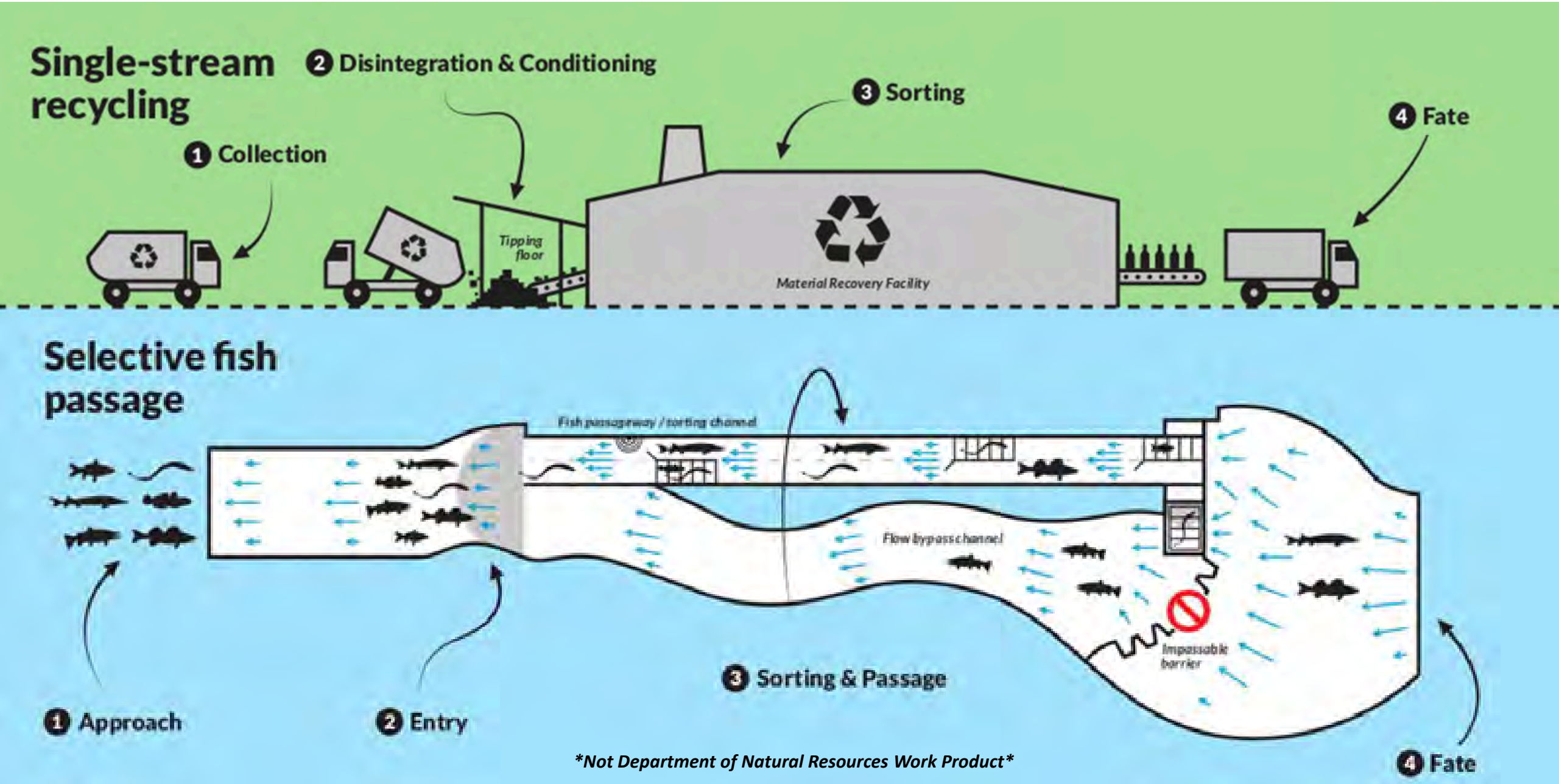


Parallel mechanics of fish passage and recycling



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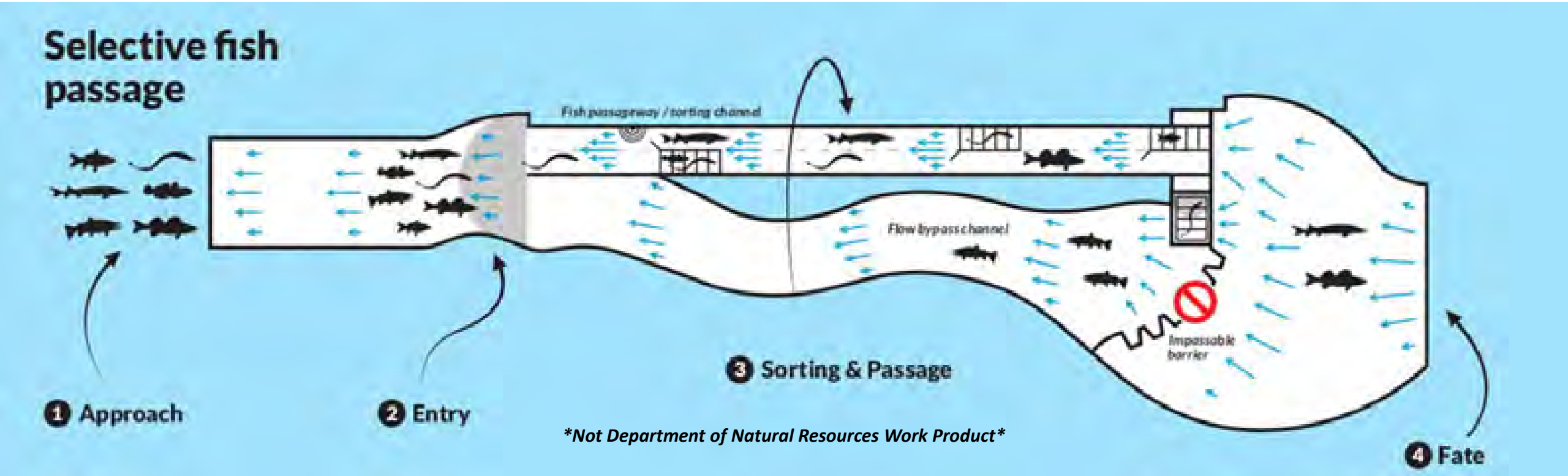

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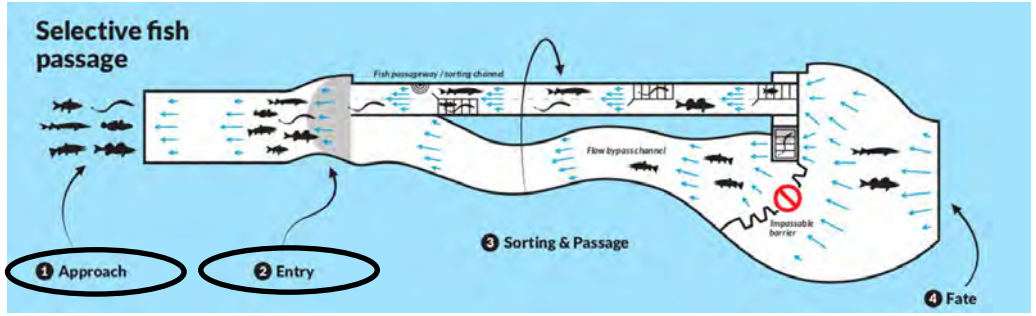
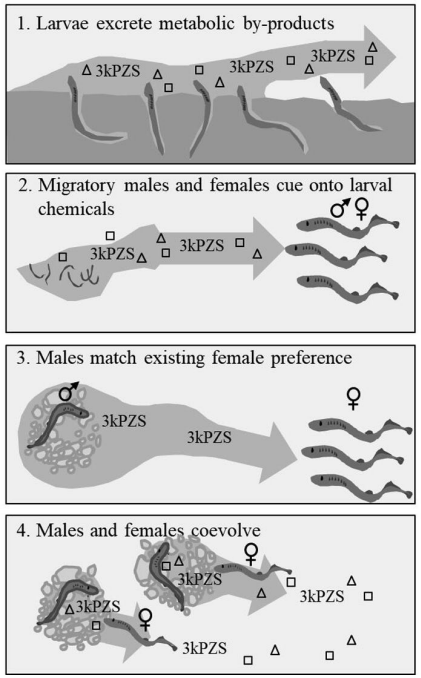
Attribute based selective passage at FishPass

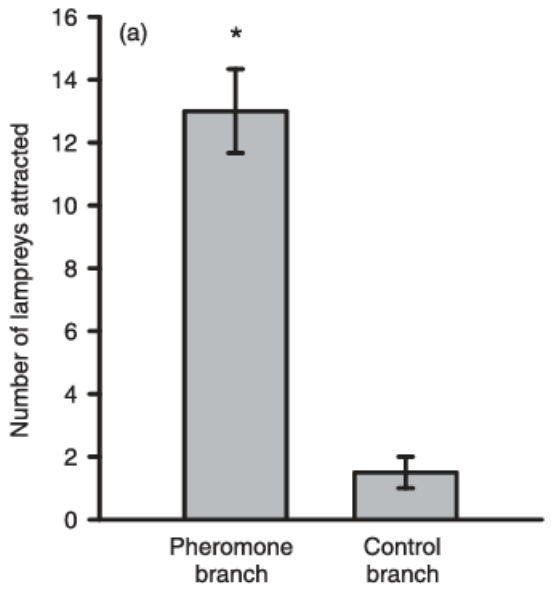


Sorting:

Pheromones:

Chemical cues used to attract sea lamprey





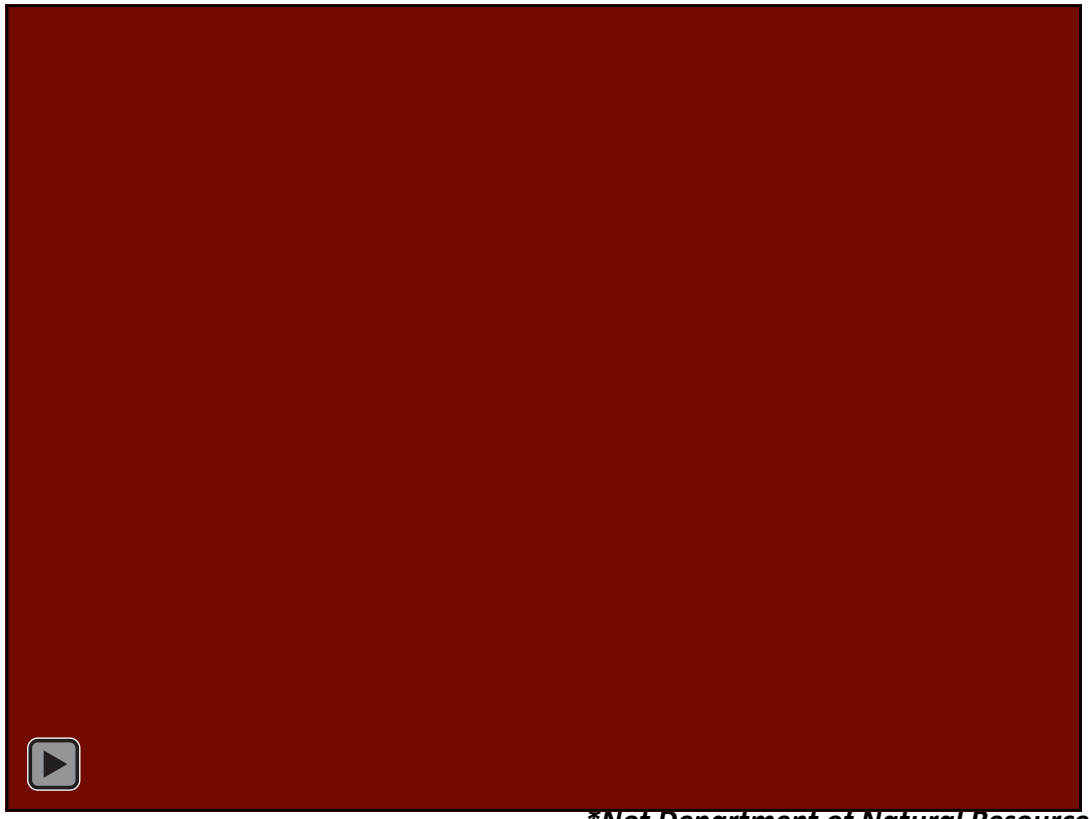
Fisette et al. 2021. J Great Lakes Res 47:S660-S672.
Wagner et al. 2006. J. Fish. Aquat. Sci. 63(3):475-479.

Sorting:

Alarm cue:

Chemical cues used to deter sea lamprey

Wagner Lab: Bottling Fear



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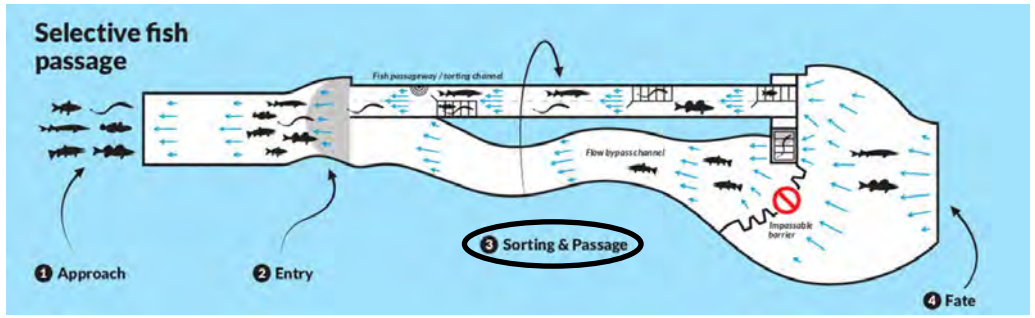
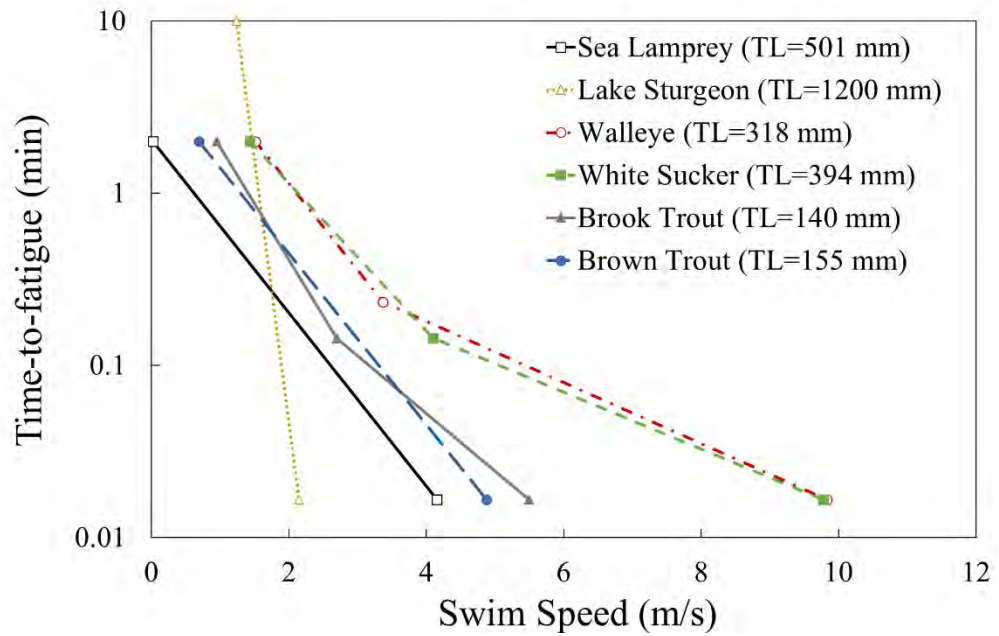
Attribute based selective passage at FishPass



Sorting:

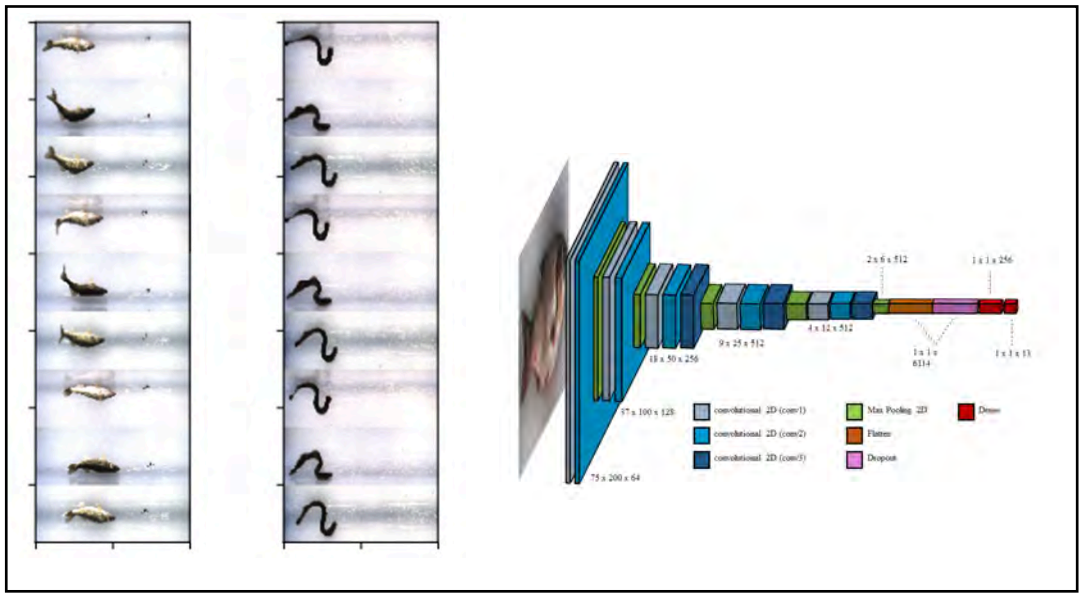
Velocity barrier:

Exploit sea lamprey attachment and swimming performance relative to desirable species



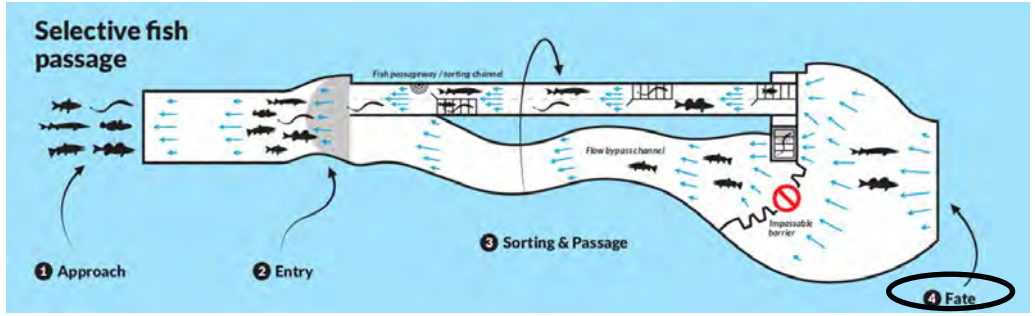
Morphology:

Sea lamprey have unique morphology that can be exploited by screens or image recognition



Eickholt et al. 2020. ICES J. Marine Sci. 77(7-8):2804-2813; Bravata et al. 2020. Eco. Evol., 10:9313-9325; Zielinski et al. 2022. Water, 14, 2298.

Attribute based selective passage at FishPass



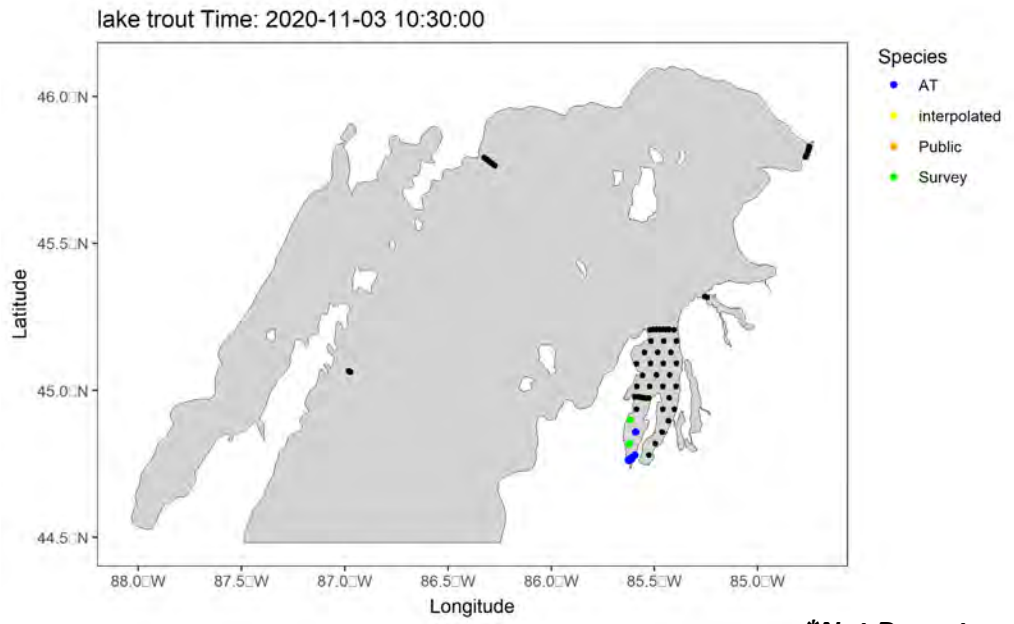
Stage: Fate

Attribute: N/A

Assessment:

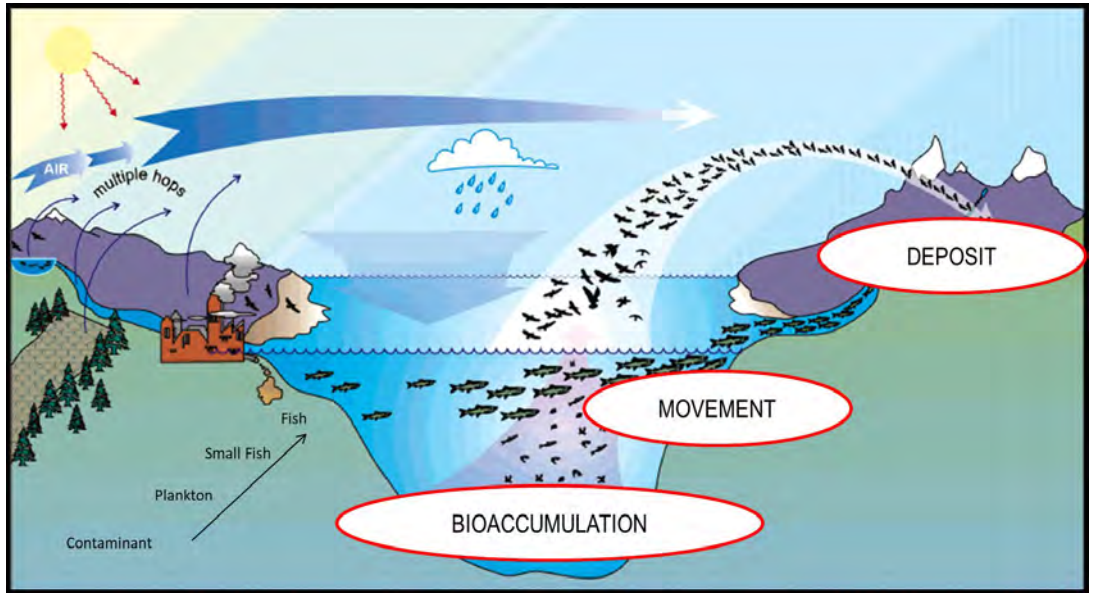
Telemetry:

I.D. where fish are coming from and where do they go in the watershed



Effects of selective connectivity:

Monitor energy, nutrients, contaminants, and gene flow before and after connectivity is restored



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Project Timeline

Workshop #1
Partnerships & needs
Windsor, ON

Workshop #2
Alternatives analysis
Traverse City, MI

Workshop #3
30% Design review
Traverse City, MI

Assessment
Begin baseline monitoring and assessment

Final Design
Engineering design complete

65% Design
Engineering design review

Prioritization
GLFC and CLC identify selective bi-directionality a high priority

Legal delay

Construction

Research
Optimize passage selectivity ≥10 yr

2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028

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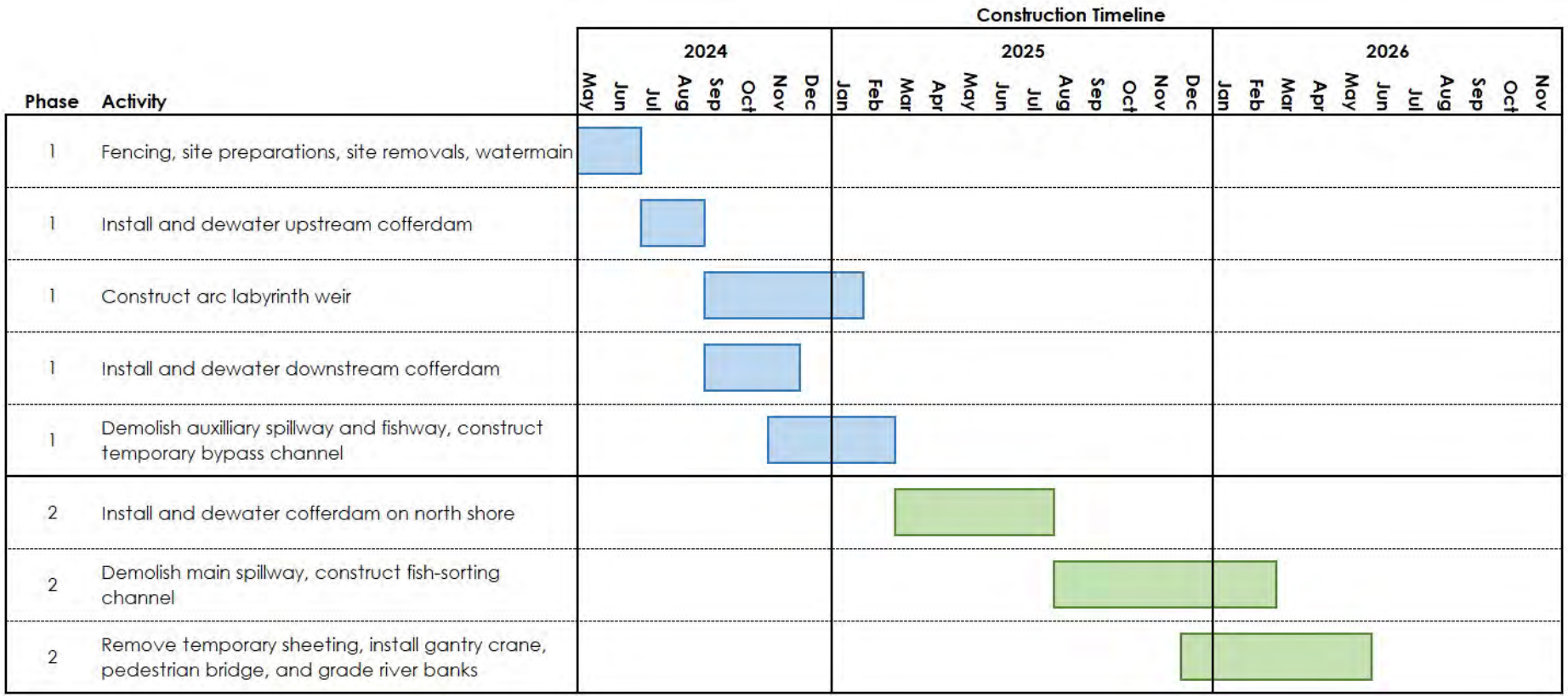
Project update

- Contract suspension lifted on Phase 1&2 (in-stream infrastructure)
- Construction started in May 2024
- Additional $4.6M funding awards this year (GLRI, EGLE, State of MI, NOAA)



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Construction

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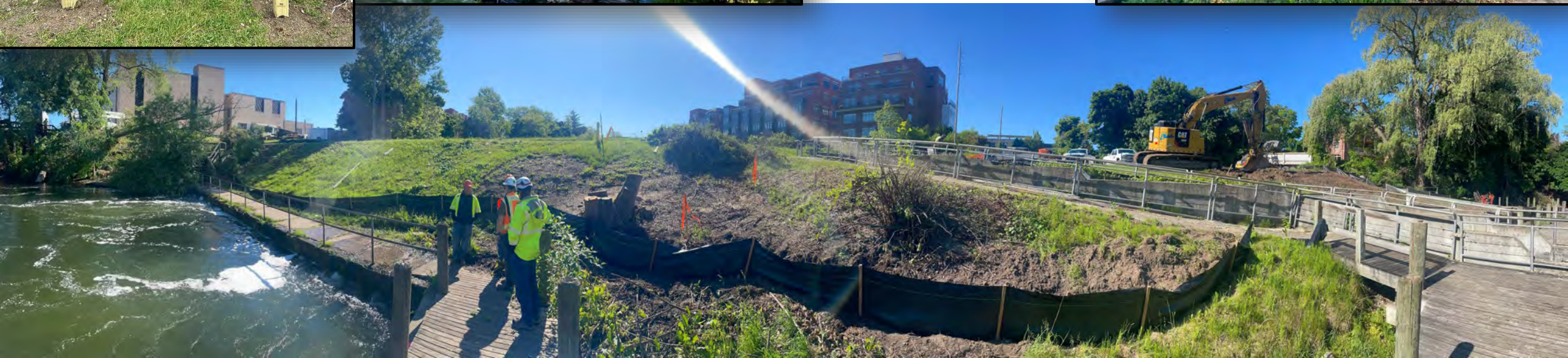

Construction

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