

# SALMON RIVER RAILWAY BRIDGE EXPANSION

CN

2017 Railroad Environmental Conference

October 24, 2017



# Overview

1. Introduction
2. Planning and Design Challenges
3. Construction and Restoration
4. Post-Construction Monitoring
5. Lessons Learned

# Overview/Background

- Railway Bridge crosses Salmon River approximately 115 miles east of Toronto
- Salmon River is approximately 70 m wide and over 3 m deep at bridge location
- Supports diverse fish community
- Agency consultation and pre-construction assessments identified two species at risk:
  - Channel Darter (*Percina copelandi*) - Threatened
  - Rainbow mussel (*Villosa iris*) - Endangered



# Proposed Work

Expand bridge to accommodate third track to facilitate additional passenger train service

Extend two abutments and three piers

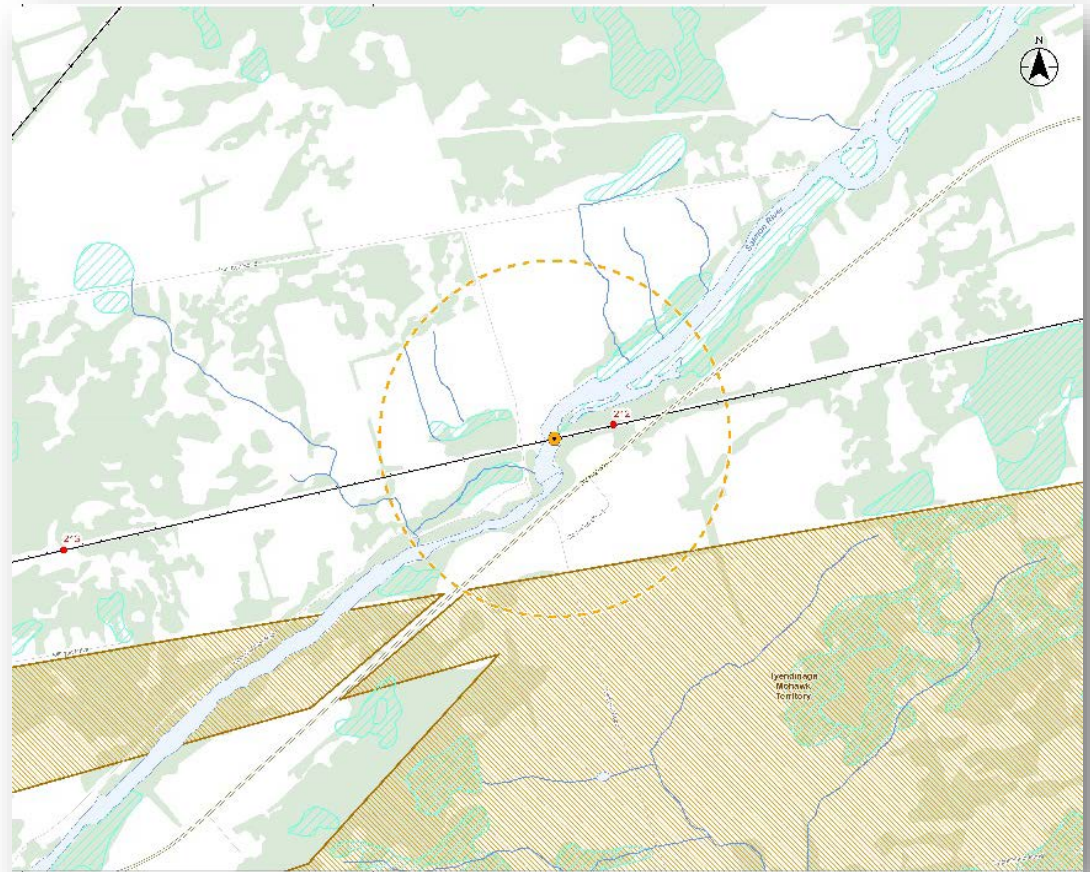
Install and remove temporary access for construction

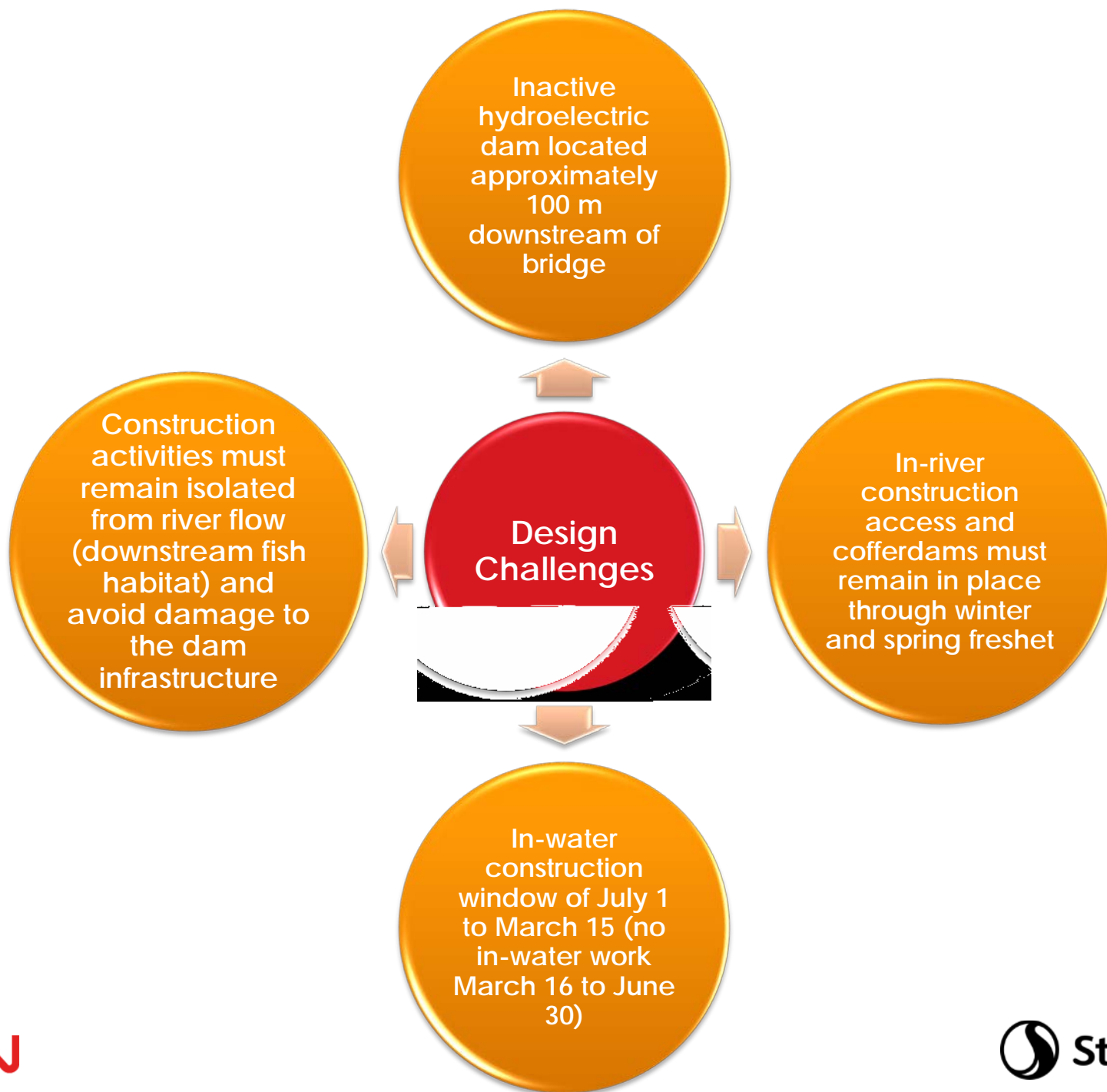
Install and remove work area isolation measures

Complete mitigation to offset in-water permanent impacts

# Planning Challenges

- Located close to Mohawks of the Bay of Quinte First Nation
- Construction requires one year (including in-water winter work) to complete the new bridge
- Habitat for two Species At Risk: Channel Darter and Rainbow Mussel
- Habitat for both species not present near bridge site and difficult to create for compensation
- DFO requires compensation (offsetting) for permit issuance

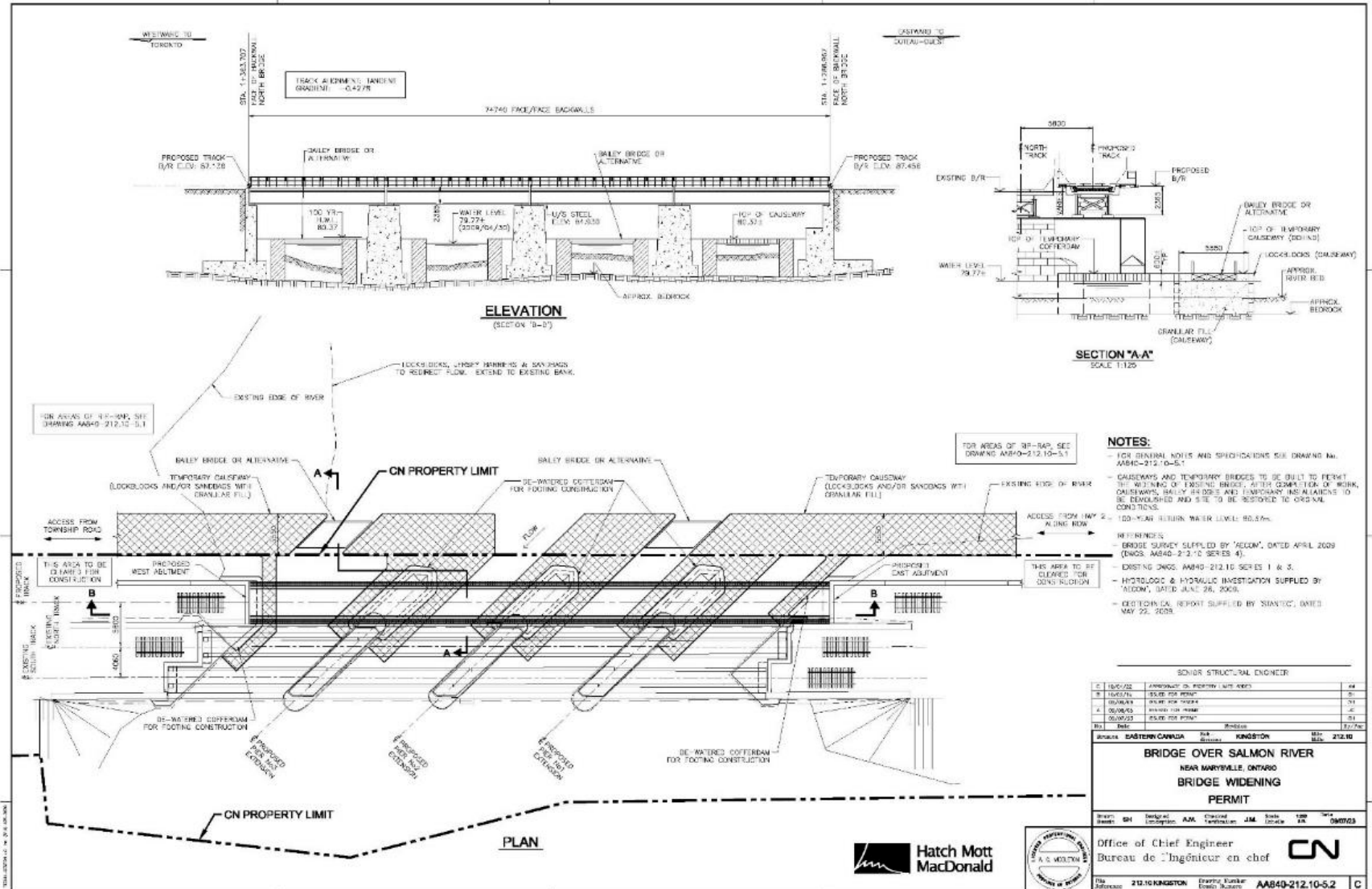




# Bridge Location

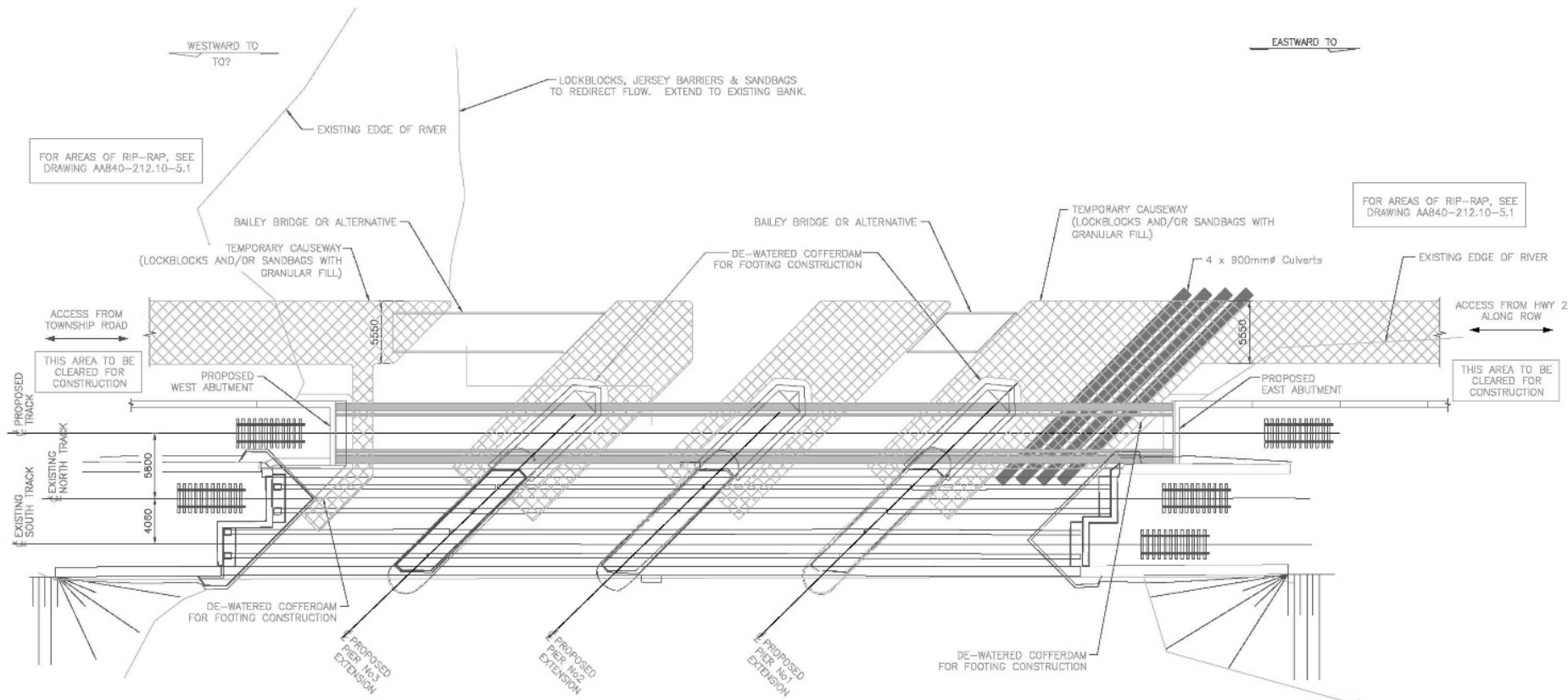


# Salmon River Bridge and Access





# Access Solutions



**PLAN - STAGE 2**

Stage 1 & 2 plans effective July 15, 2010  
supersede previous construction phasing plans.

# Typical Habitat Mitigation

**“No net loss of productivity of fish habitat” - Fisheries and Oceans Canada guiding principle**

**Identify potential restoration opportunities in immediate vicinity of project – riparian plantings, bank erosion repair**

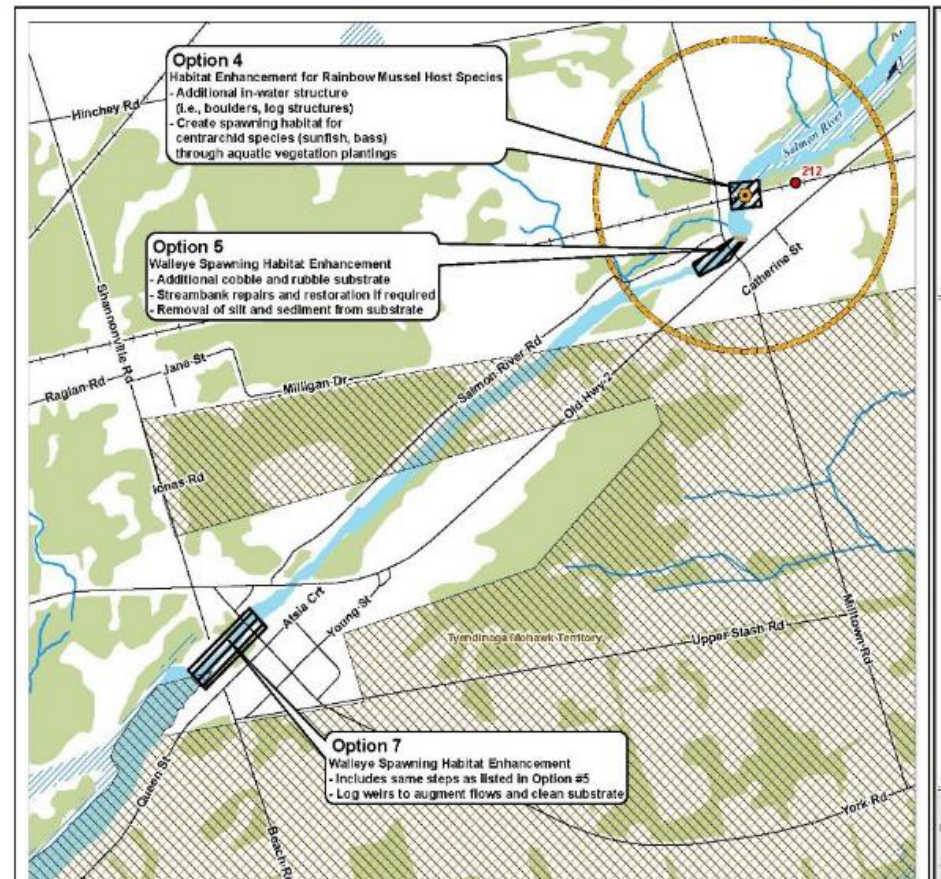
**Work with local authority (i.e., DFO, conservation authority) to determine appropriate site within same watershed that requires restoration**

# Mitigation Solution for Salmon River

- Seven options for compensation(now offsetting) were reviewed and assessed based on:
  - constructability
  - feasibility to compensate for impacts to fish habitat
- Reviewed opportunities on and off site
- Habitat for Species at Risk not located near the bridge, difficult to create
- Preferred solution was to enhance habitat for fish species that host Rainbow mussel during larval stage

# Fish Habitat Mitigation Options

1. Create habitat for Rainbow mussel and Channel Darter within the CN ROW.
2. Increase area of mussel bed downstream of bridge.
3. Mitigate Lamprey barrier at mouth of Salmon River to improve fish passage.
4. Habitat enhancement for Rainbow mussel host fish species.
5. Walleye habitat enhancement downstream of Milltown dam.
6. Passage for jumping fish at downstream (Milltown) dam.
7. Walleye spawning habitat enhancement downstream of DFO Lamprey Barrier near mouth of Salmon River.

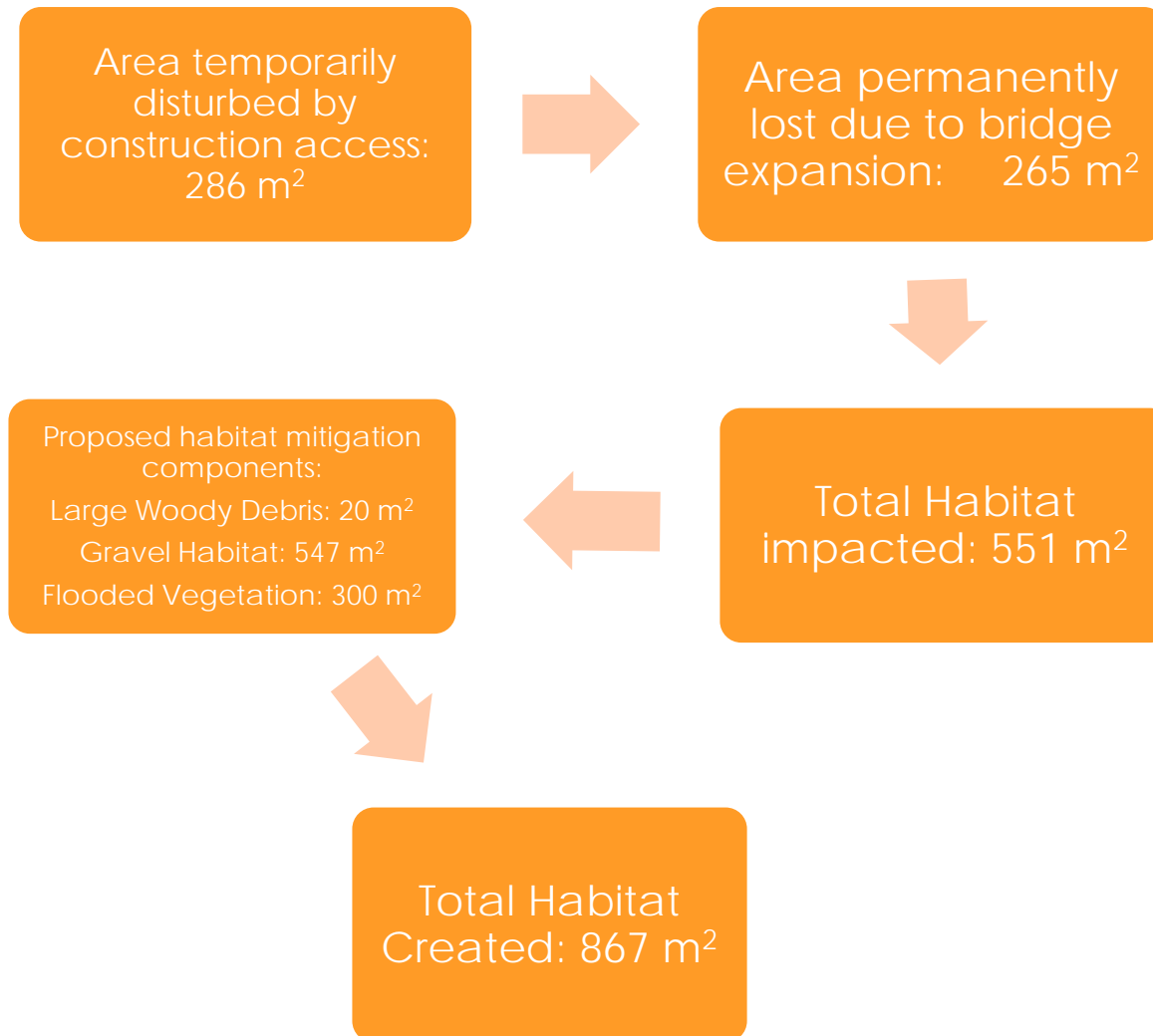


# Preferred Mitigation Option – #4: Create Habitat for Rainbow Mussel Host Species



- Rainbow mussel require fish species to host larval stage:
  - Smallmouth Bass
  - Rock Bass
  - Yellow Perch
- Create areas of clean gravel with boulders for bass spawning
- Increase in-water cover with large woody debris
- Enhance flooded vegetation areas to provide higher quality spawning and nursery habitat.
- Maintain offsetting measures within CN ROW and on participating landowner property

# Habitat Mitigation Plan



# Construction Access



# Construction Access





# Construction Access



# Habitat Mitigation Installation



# Habitat Mitigation Installation



# Post Construction Monitoring

DFO authorization required a 5-year post-construction monitoring program from 2012 to 2017.

Compensation measures have remained in place and are functioning as designed

*Centrarchid* nests have been found in gravel habitats when submerged during spring

Juvenile and young-of-the-year *Centrarchid* captured during fish community surveys

Fish species diversity has remained stable through monitoring program

# Monitoring Results – Year 1



# Monitoring Results Spawning Habitat



# Monitoring Results Fish



Smallmouth Bass



American Eel

# Monitoring Results Final

- Mitigation measures on east side of bridge have resulted in:
  - Addition of spawning habitat upstream and under bridge where suitable habitat did not exist prior to construction
  - Improved nursery habitat quality provided with diversified submergent aquatic vegetation upstream of bridge and spawning habitat





# Monitoring Results Final

- Mitigation measures on west side of bridge have resulted in:
  - Improved in-water cover provided by addition of large woody debris in form of root wads
  - Improved bank stability through vegetation plantings and root wad installation



# Lessons Learned

✓ Designing access and work area isolation measures to 10-year storm event ensured that high water events did not cause delays to construction (difficult to design but no delays)

Site specific Environmental protection measures allowed DFO to approve continuing to work throughout sensitive time periods for species at risk

Habitat compensation /offsetting developed and functional to improve habitat for mussel host species

# Questions?

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