



REMEDICATION AND RESTORATION OF AN ESTUARINE RIVER

A CASE STUDY FOR IMPACTED SEDIMENT REPLACEMENT

*Presented by Jeff Earle P. Eng.
On behalf of the Atlantic PIRI Committee*

What is PIRI ? Who is RBCA ?



Atlantic RBCA FAQs

Established in 1997, Atlantic PIRI is a collaborative group of provincial environment regulators, industry representatives, and regional environmental consultants from Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador. This group identifies and discusses issues, develops standards and processes, and provides recommendations for continued technical and regulatory harmonization across the region.

PIRI = Partnership In (RBCA) Implementation – This is the Committee

RBCA = Risk Based Corrective Action – This is the approach

The Value of PIRI and RBCA



- The key strength of PIRI and the RBCA process is cooperation of dissimilar groups with different jobs but aligned goals.
- Continuous development of a process that is based on the science of measured risk rather than arbitrary thresholds or perception of risk.
- Commitment of harmonization to decrease cross jurisdictional variation (both interprovincial and with the Federal government)

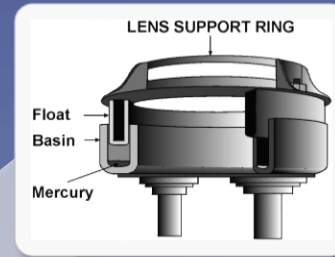
So Why this project ?

Needed a project that was interesting and showcased the value of cooperation, early regulatory engagement, innovation and risk assessment in action.



IMAGINE A LIGHTHOUSE

Dillon Consulting Limited



IMAGINE A Lighthouse

Expected Result

- Impacted soil replaced with clean soil
- Birds would no longer be exposed
- Ecological health would be restored



Actual Result

- During soil replacement, storms completely washed the soil away
- Attempts to re-establish the soil were fruitless
- The birds did not return

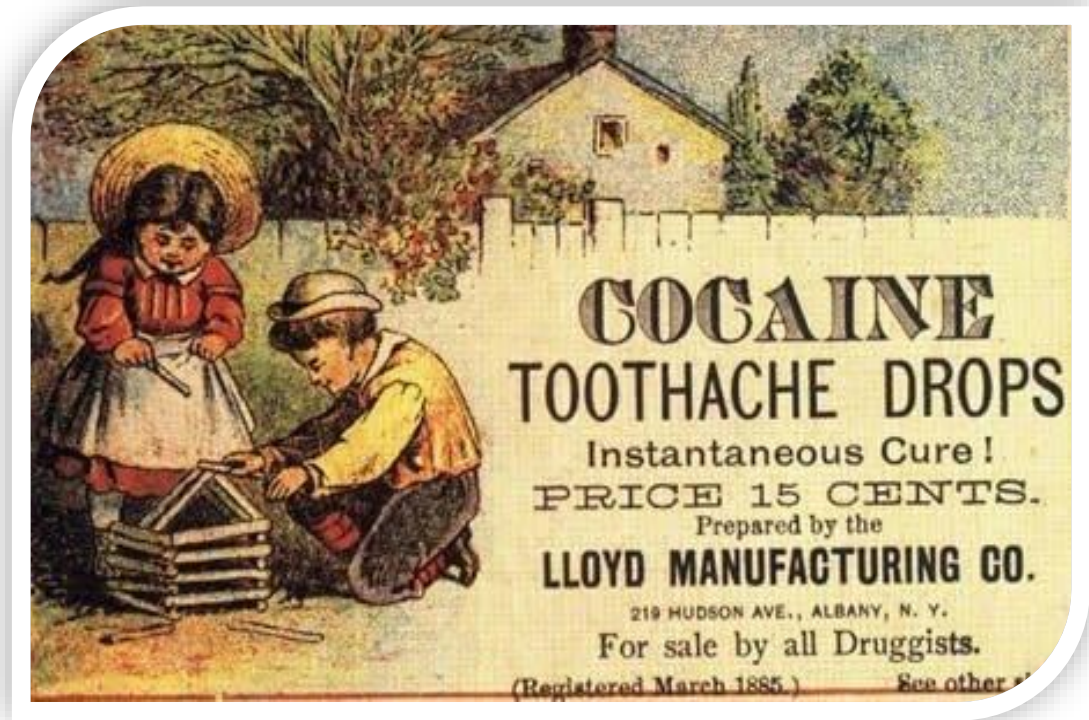


IMAGINE A LIGHTHOUSE

Aegrescit medendo. – Virgil
“We must ensure that the cure
is not worse than the disease”



This concept has guided
Ecological Risk Assessment
since its inception.



But what happens when the reverse is true?

THE HEALTH OF A RIVER

Geomorphology: coastal drainage

- the upper portion flows through a generally undeveloped area
- the lower portion flows through an urban area (industrial extraction and discharge occurs)



Background

- The river has received treated wastewater from a large industrial facilities since the late 1950's
- 2004-2014: the Canadian Rivers Institute (CRI) studied the health of the river



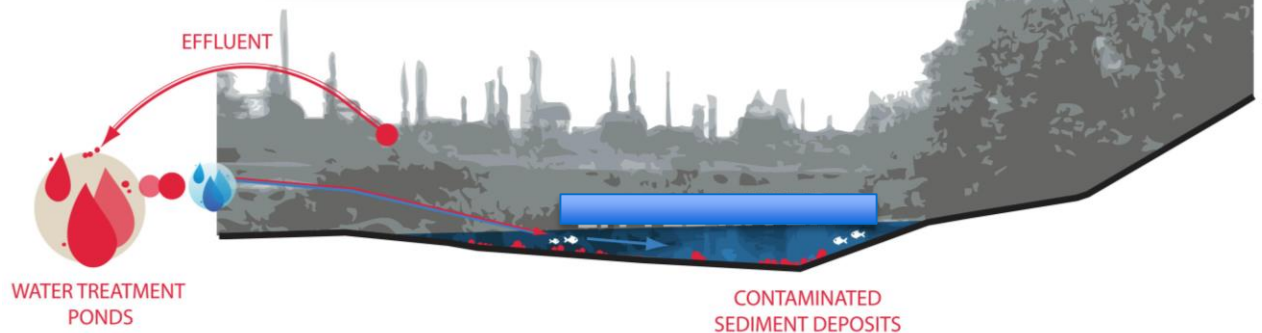
Results

- Reduced abundance and variety of fish
- Effluent met criteria
- Sediment impacted with PHCs and PAHs

OUR 3 HEADED PROBLEM

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1. Improving the WWT system will not improve the situation in the river.
2. Sediment has not improved on its own.
3. The Approval requires biological/aquatic species recovery.... not just meeting criteria.



PROBLEM FORMULATION

In the Spring of 2015 our Client engaged Dillon Consulting Limited to provide a solution

Primary Goal

- Remove, reduce, and/or sequester impacted sediment

Secondary Goal

- Improve and/or enhance habitat
- Minimize disturbance to the environment and operations
- Ensure resiliency to future events



THE SOLUTION



Inputs

Client – Operations/Project Intent

Consultant – Technical Specialists

DFO – Fishery Protection/Regulations

Province – CoA and WAWA

Contractors – Methods

Outcomes

Remove up to 0.3 m of the river bed

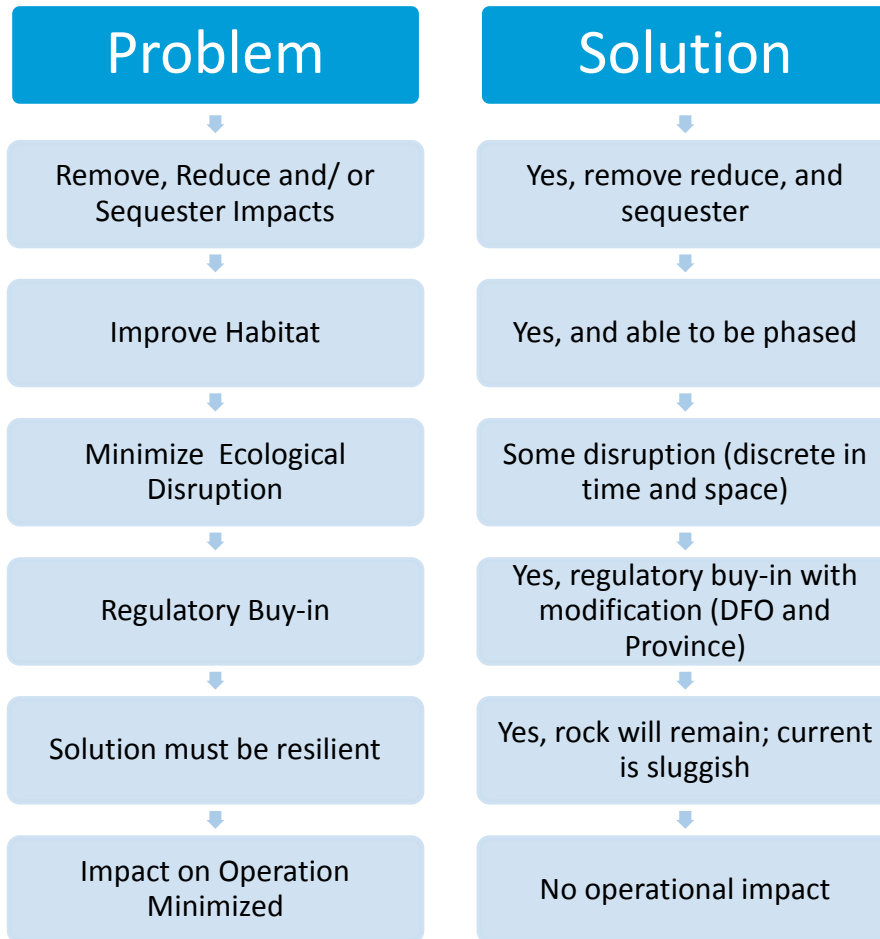
Replace with same amount of coarse river stone

Monitor results in 2016 and 2017

Enhance habitat as necessary

VALUE ENGINEERING

EVALUATION



METHODS

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Dredging



Rock Replacement



Permitting and Preparation

De-Watering

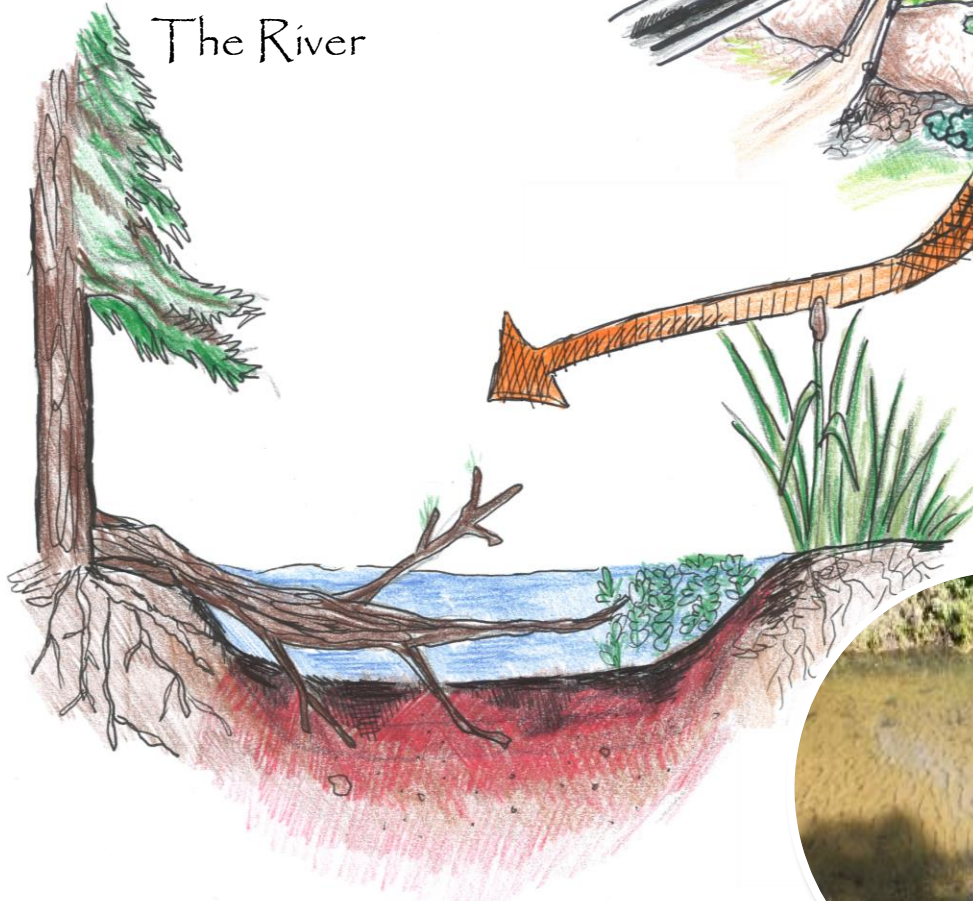


Environmental Protection

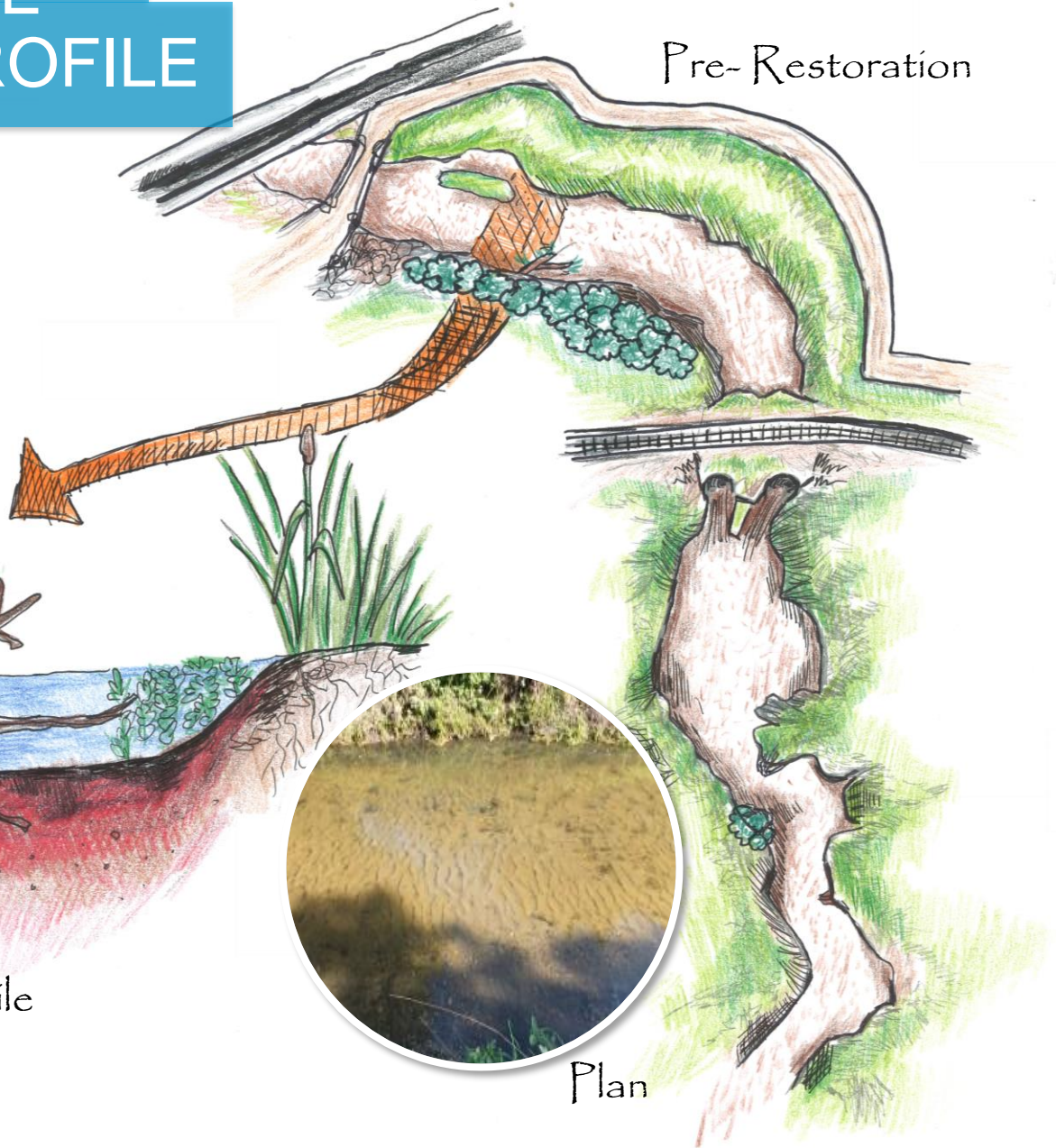
THE BASELINE – PLAN AND PROFILE

Pre-Restoration

The River



Profile

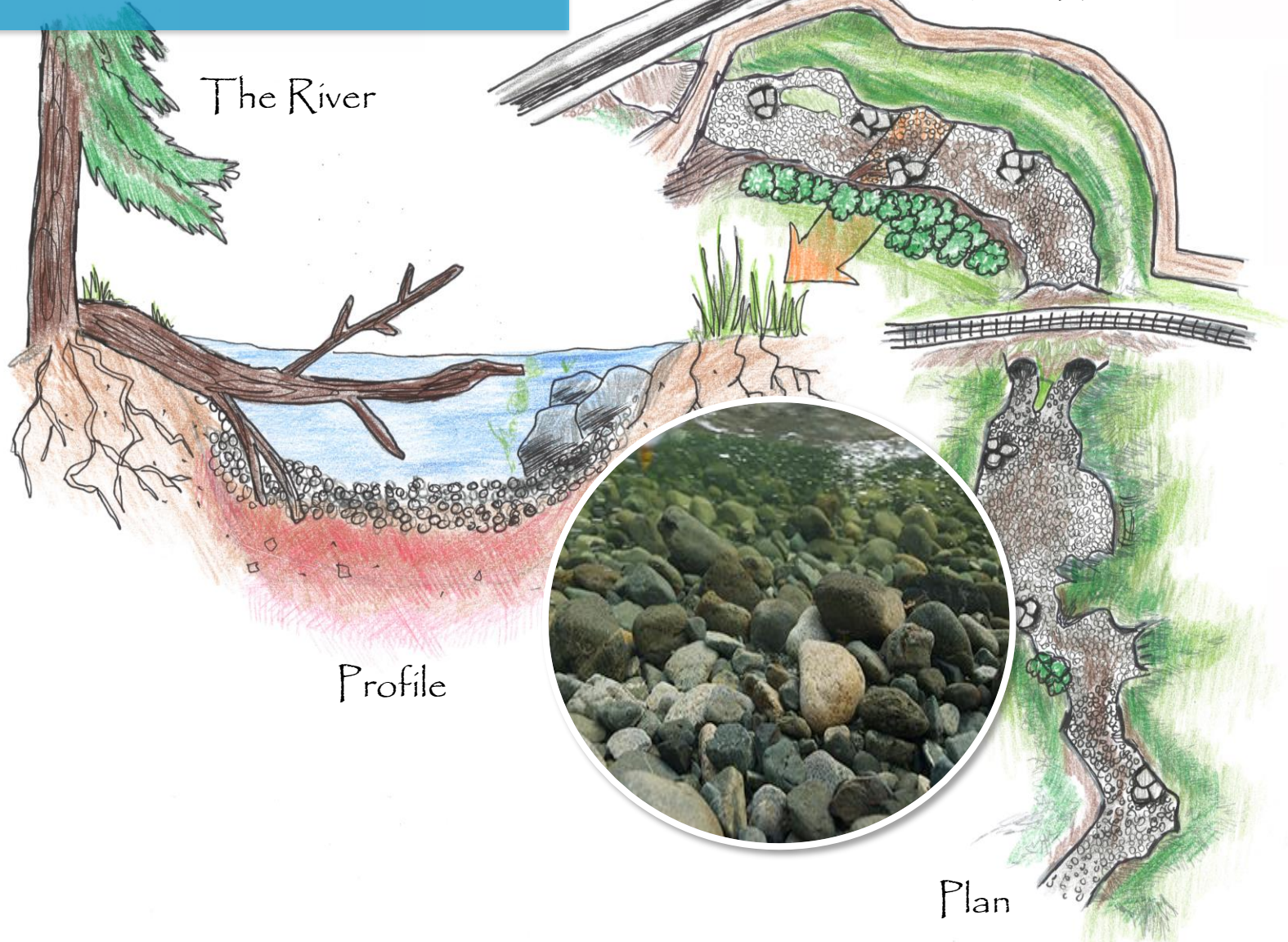


Plan



POST RESTORATION – PLAN AND PROFILE

Post Restoration























Post Project Ecological Assessment

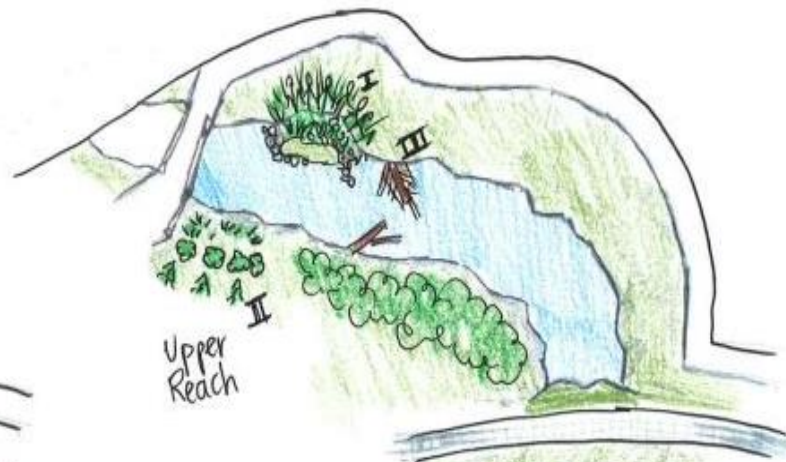
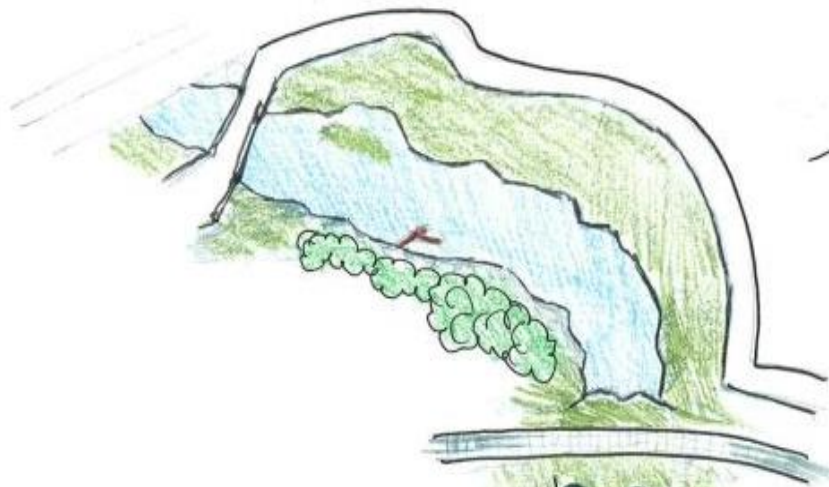
- **Primary Goal** – fish community assessment for populations and diversity
- **Primary Goal** – benthic community assessment
- **Secondary Goal** – determine broader ecological health of the assessment area (wetland, water quality, plants, shoreline health).

Initial Results (2016 - 2018)

- Added 5 habitat structures
- Good aquatic recovery,
- Increased populations,
- Increased diversity
- New CoA issued in 2017

Ongoing Monitoring

- Continue monitoring post restoration
- New evidence of sentinel species spawning
- Trends toward improved health overall
- Including clean substrates being deposited
- Fish use of structures



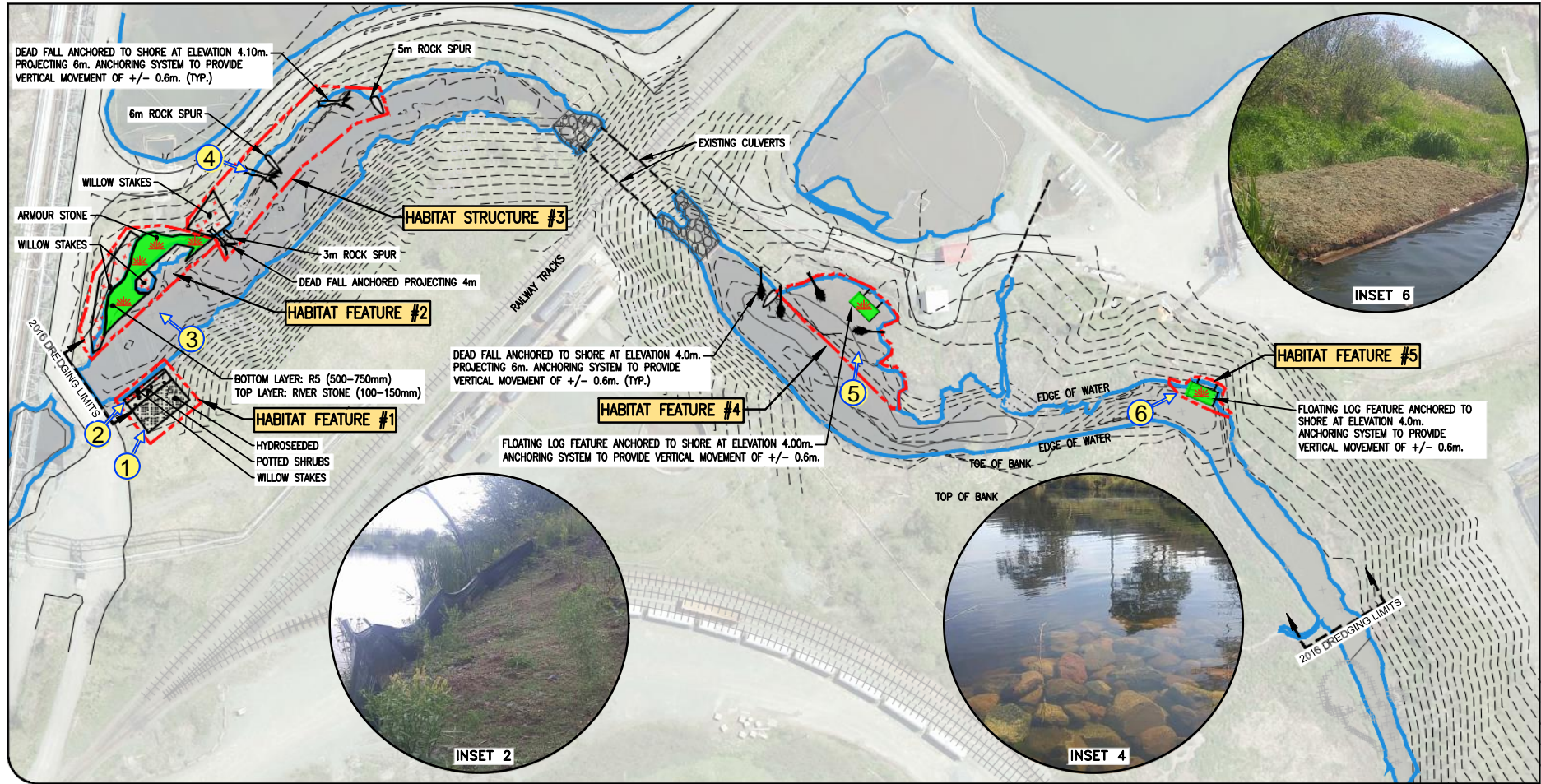
Upper Reach



Current Conditions
Lower Reach



Planned Restoration
Lower Reach



RIVER RESTORATION
PHASES 1 TO 3

POST CONSTRUCTION
HABITAT FEATURES

FIGURE 1.2

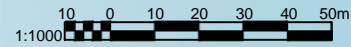
LEGEND

PHASE 3 - SEEDING

HABITAT FEATURES

INSET NUMBER AND VIEW DIRECTION

MAP/DRAWING INFORMATION
Property boundaries are based
on service New Brunswick
records and may not be exact.
This is not a legal survey.



NOTE:
INFRASTRUCTURE LOCATIONS
ARE APPROXIMATE ONLY.



PROJECT: 17-5887-9400
STATUS: FINAL
DATE: 2019/04/17



WHEN? WHY? WHO?
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