

Saint Mary's University, Department of Environmental Science, Halifax, N.S.
Dynamic Environment and Ecosystem Health Research Group (DEEHR)

Wetland Remediation Group

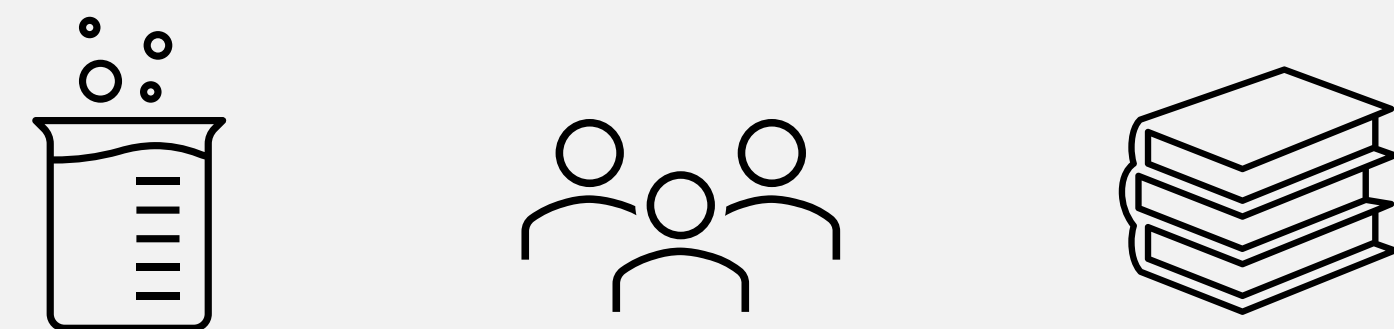
Dr. Linda Campbell **Dr. Emily Chapman**

Heidi Gavel Technician **David Lewis** PhD student **Enobong Charles** MSc student **Lauren MacDonald** MSc student

Bradley Knockwood Intern **Samuel Sequeira** Intern/BSc (Hon) student **Logan Phillips** Intern

WE ARE RECRUITING!

<http://www.ap.smu.ca/~lcampbel/Gold.html>



Details

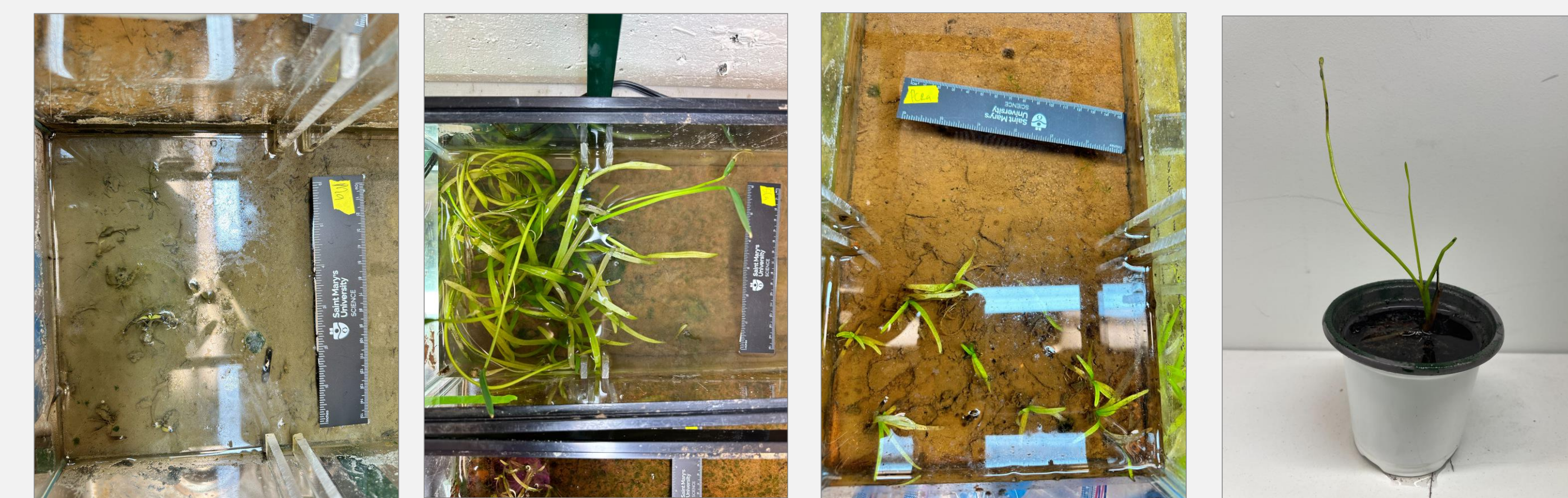
OBJECTIVE:
Develop a cost effective in-situ risk management strategy for enhancing natural recovery of highly contaminated gold-mine-tailing impacted wetlands.

WHAT?
Reactive Amendment Protective Capping (RAPC)
Protective Capping (PC)
Reactive Amendment (RA)
Contaminated sediment

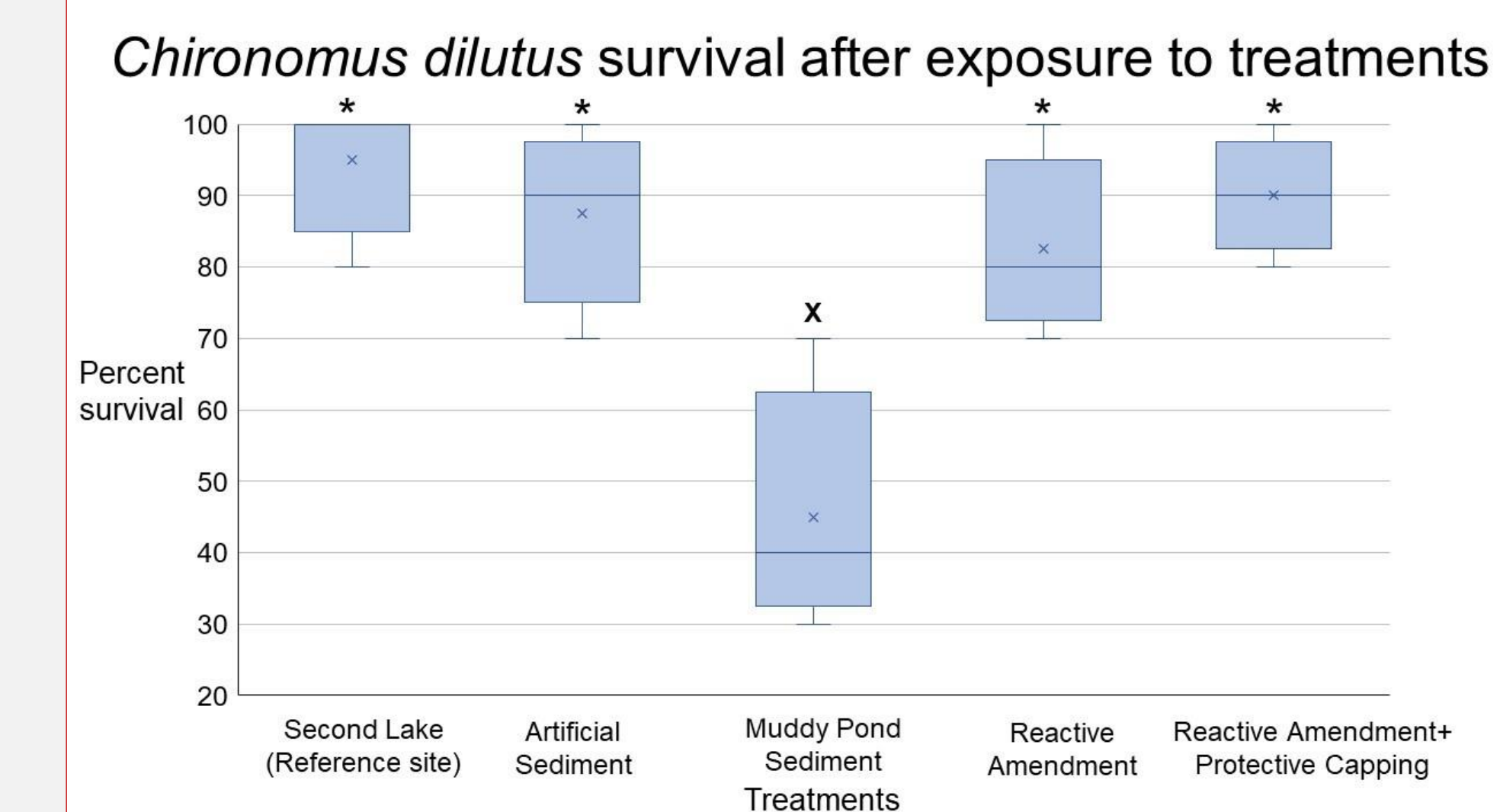
HOW?
Engineering/chemistry – Development of RAPC
Ecotoxicology - As/Hg toxicity and bioaccumulation with and without RAPC
Geochemistry/hydrogeology - speciation of Hg and As with and without RAPC, erosion, water budget
Biology/ecology - Biodiversity assessments at impacted and non-impacted sites

Work In Progress!

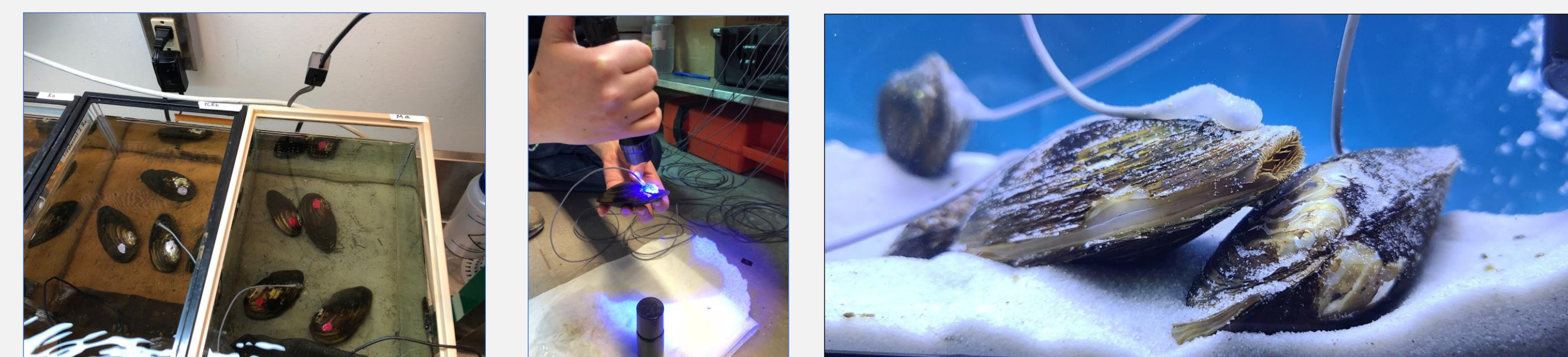
Pickerelweed (*Pontederia cordata*) pilot project



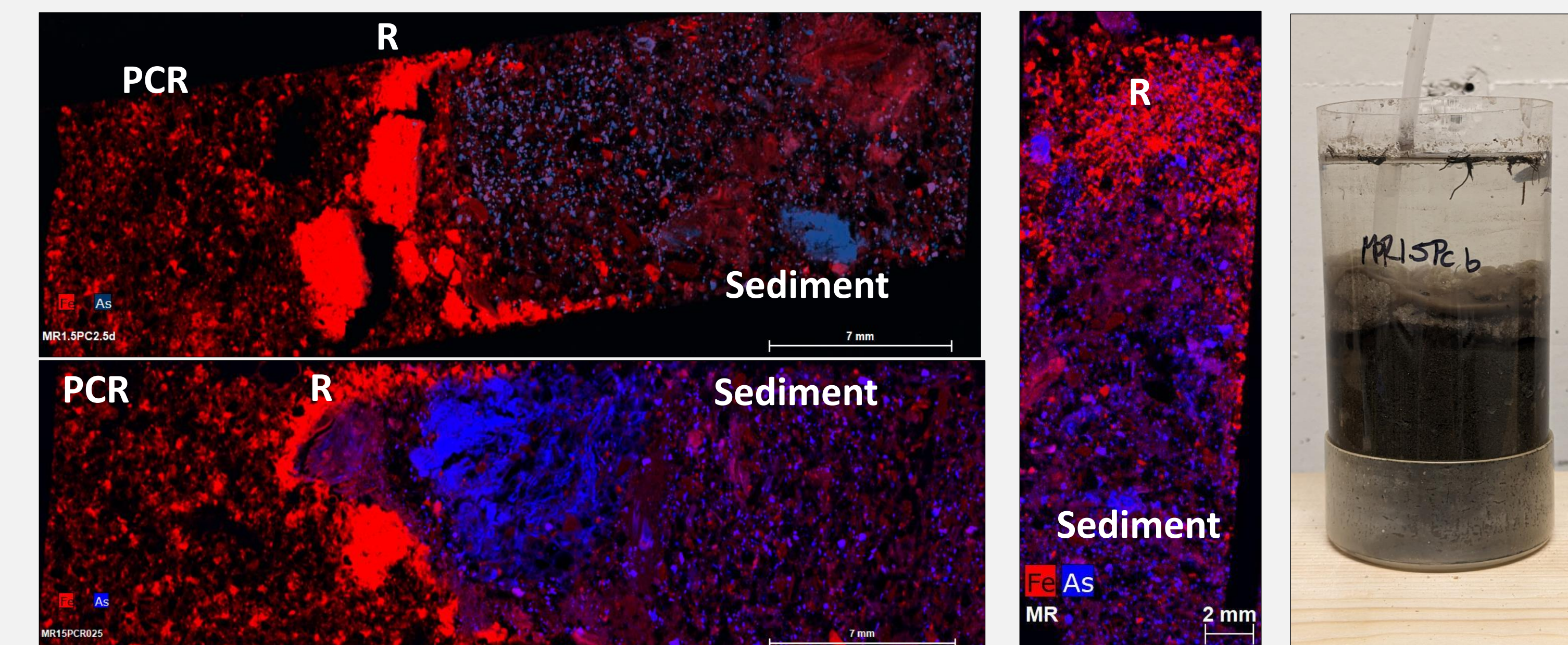
Chironomus dilutus pilot project



Freshwater mussel (*Pyganodon cataracta*) pilot project



Mini Column & Mini Core mXRF images with treatments



Winter porewater and surface water sampling

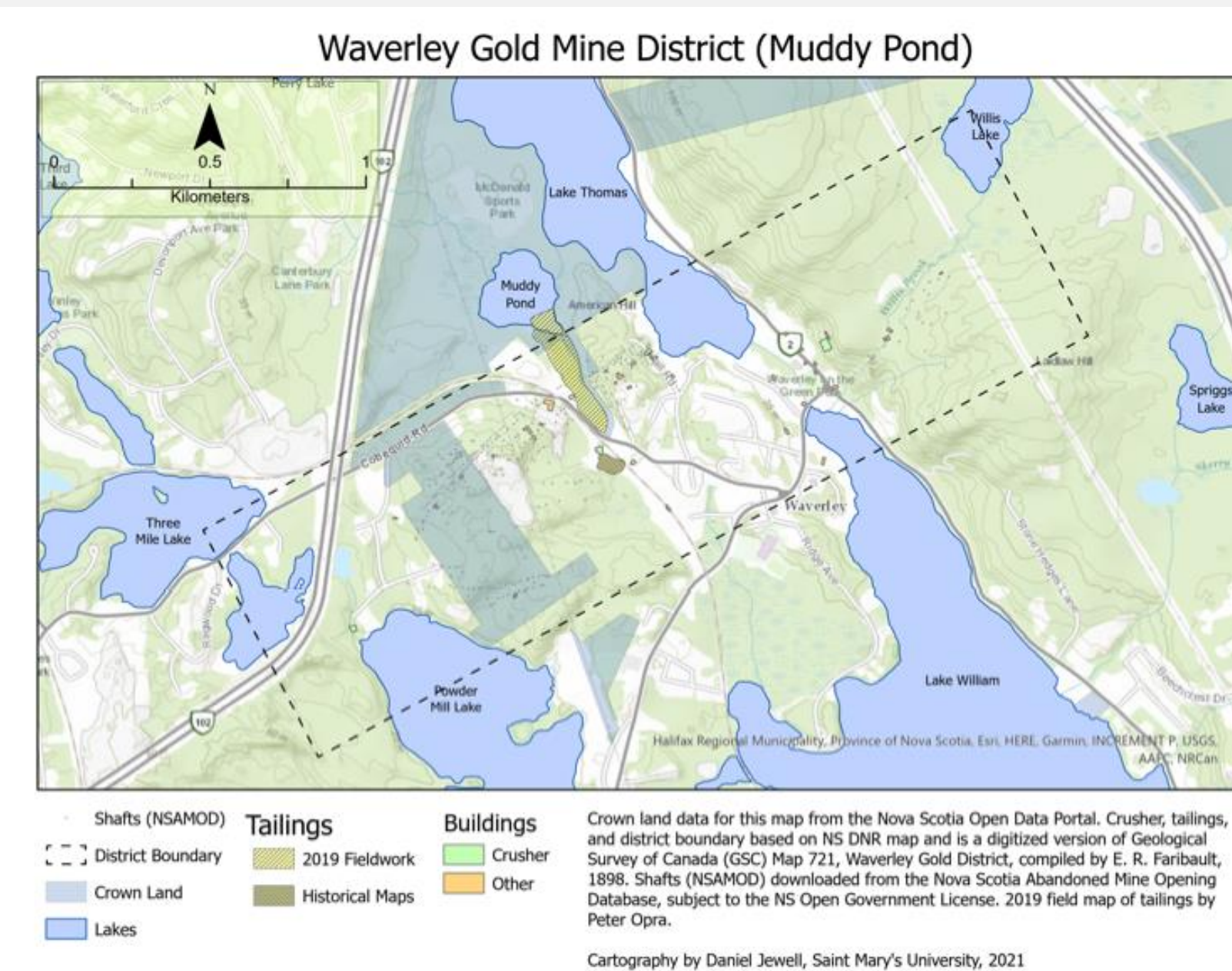


Project Background

- In the late 1800's, **mercury (Hg)** and **arsenic (As)** contaminated gold mine tailings were deposited in low-lying areas close to the mines, including **wetlands**
- Elevated concentrations of contaminants still exist, potentially **impacting hundreds of wetlands in NS, Canada**
- Traditional risk management approaches, such as dredging and thick isolation caps could result in a net loss of wetland areas.
- Isolation caps can be improved using reactive capping materials which have higher sorptive capabilities.



Muddy Pond



- Muddy Pond (MP), is a low-lying freshwater wetland in the Waverley (Historical) Gold Mining District
- Active gold mining operations took place between 1862-1940 in the Waverley Gold Mining District
- MP is the current selected site for testing remediation success in the field
- Contaminated sediment is collected from MP for laboratory experiments



Research Phases For the 5-year Project

- 1. RAPC development/selection**
- 2. RAPC Hg and As Adsorption testing**
- 3. RAPC effectiveness/toxicity (beaker experiment)**
- 4. RAPC toxicity/effectiveness (bucket experiment)**
- 5. RAPC long term effectiveness/geochemistry (column experiment)**
- 6. RAPC long term effectiveness/toxicity (field mesocosm experiment)**