

# Effectiveness of Early Actions in Accelerating a Harbour-Wide MNR Remedy in Esquimalt Harbour



---

Presented by: Rob Thomas, M.A.Sc GIT, Public Services and Procurement Canada

Collaborators: Amy Corp, P. Chem, EP, and Derek Ormerod, P.E., Anchor QEA

Michael Bodman, Department of National Defence, Kristen Ritchot, Public Services and Procurement Canada





# History of Esquimalt Harbour

- ◆ For over 4000 years the Songhees and Esquimalt Nations have lived on the shores of the harbour
- ◆ Industrial development began in the 1850s, and in 1855, the Royal Navy established Esquimalt Harbour as a military installation
- ◆ Today, the Department of National Defence (DND) owns and manages the majority of aquatic lands.



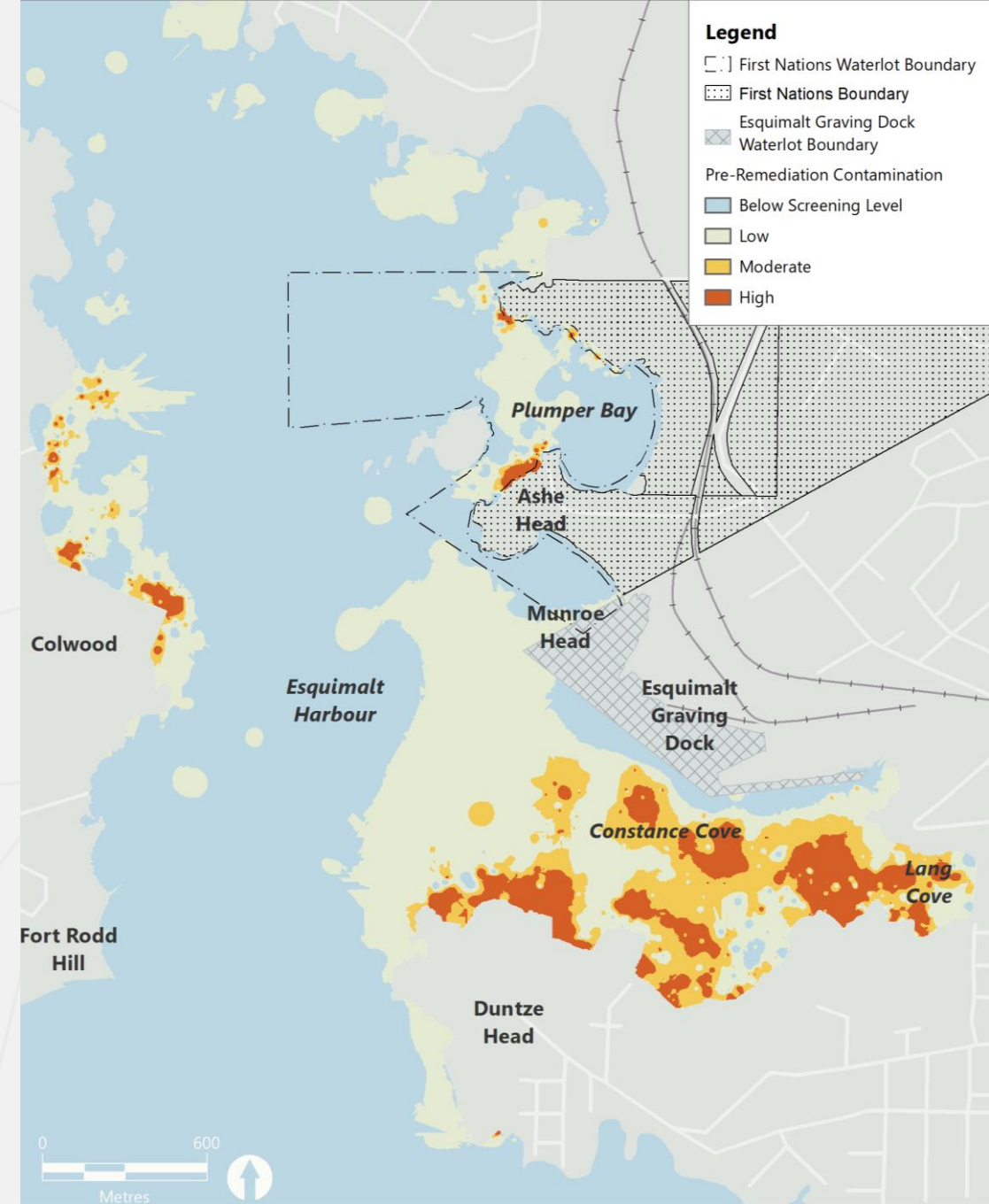
## Primary activities in the harbour have included:

- Shipyards and dry docks
- Storage and shipping of coal, oil, and other fuels
- Masonry, foundries, blacksmith and machine shops
- Log booms, sawmills, and plywood mills
- Canneries
- Naval base

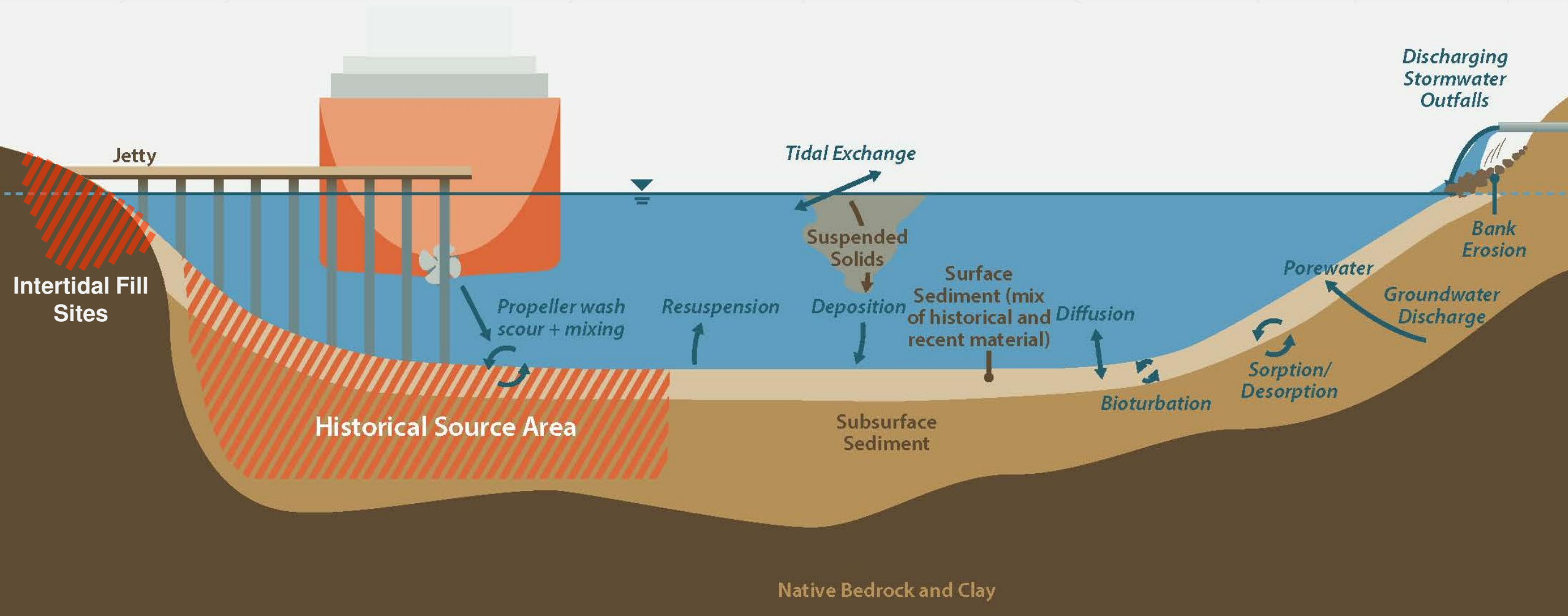
# Conditions Prior to Remediation (2016)

170 years of Industrial activities have contributed to significant areas of contamination.

- ◆ Contaminants include metals, PCBs, PAH, and dioxin/furans
- ◆ Localized around historic jetties or areas of fill
- ◆ Propwash has spread contamination over large areas



# Harbour Conceptual Site Model



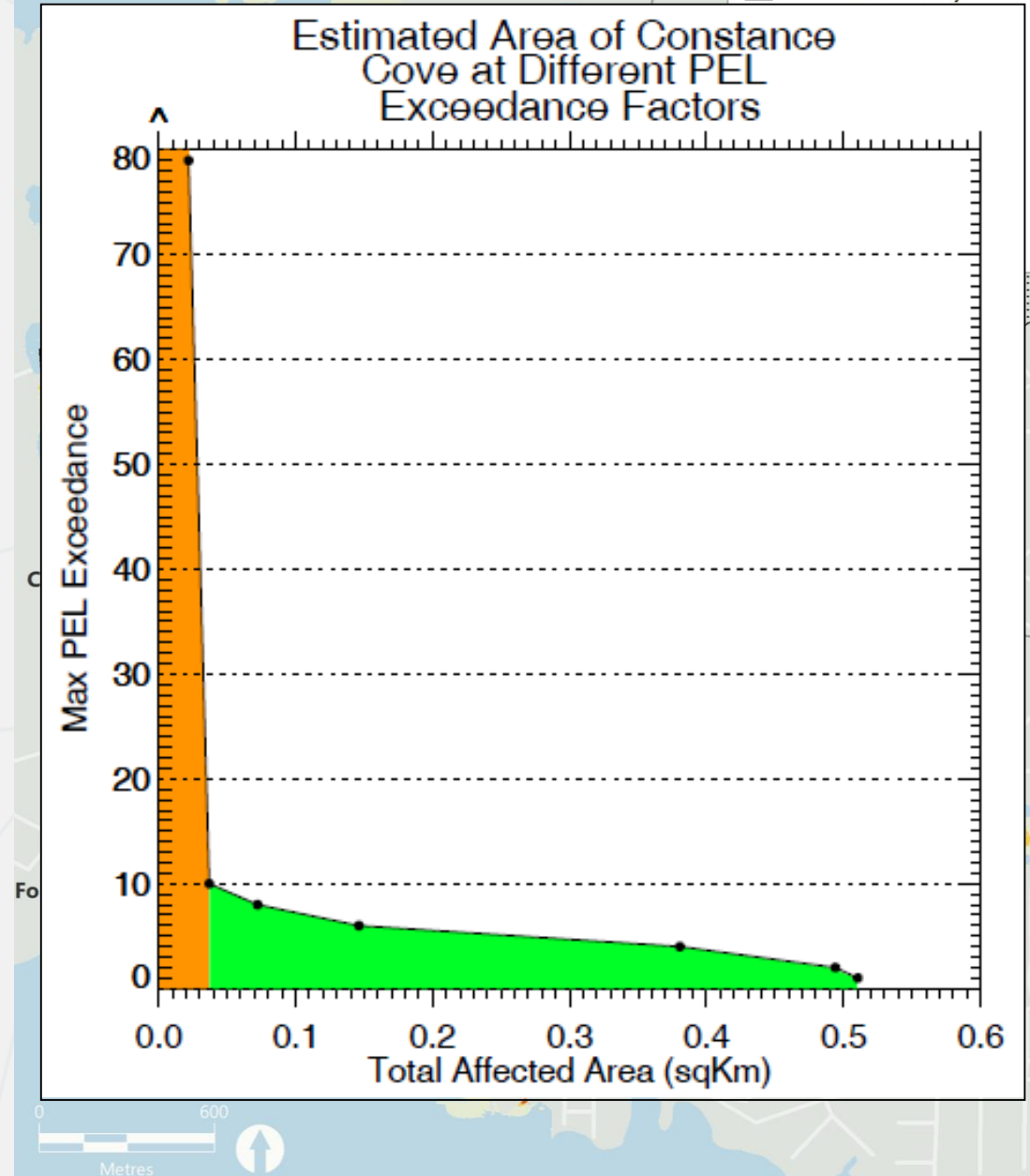
# Remedial Strategy

To large an area to actively remediate,  
“hot spots” cover a small area

Dredging and residuals  
management cover in worst areas

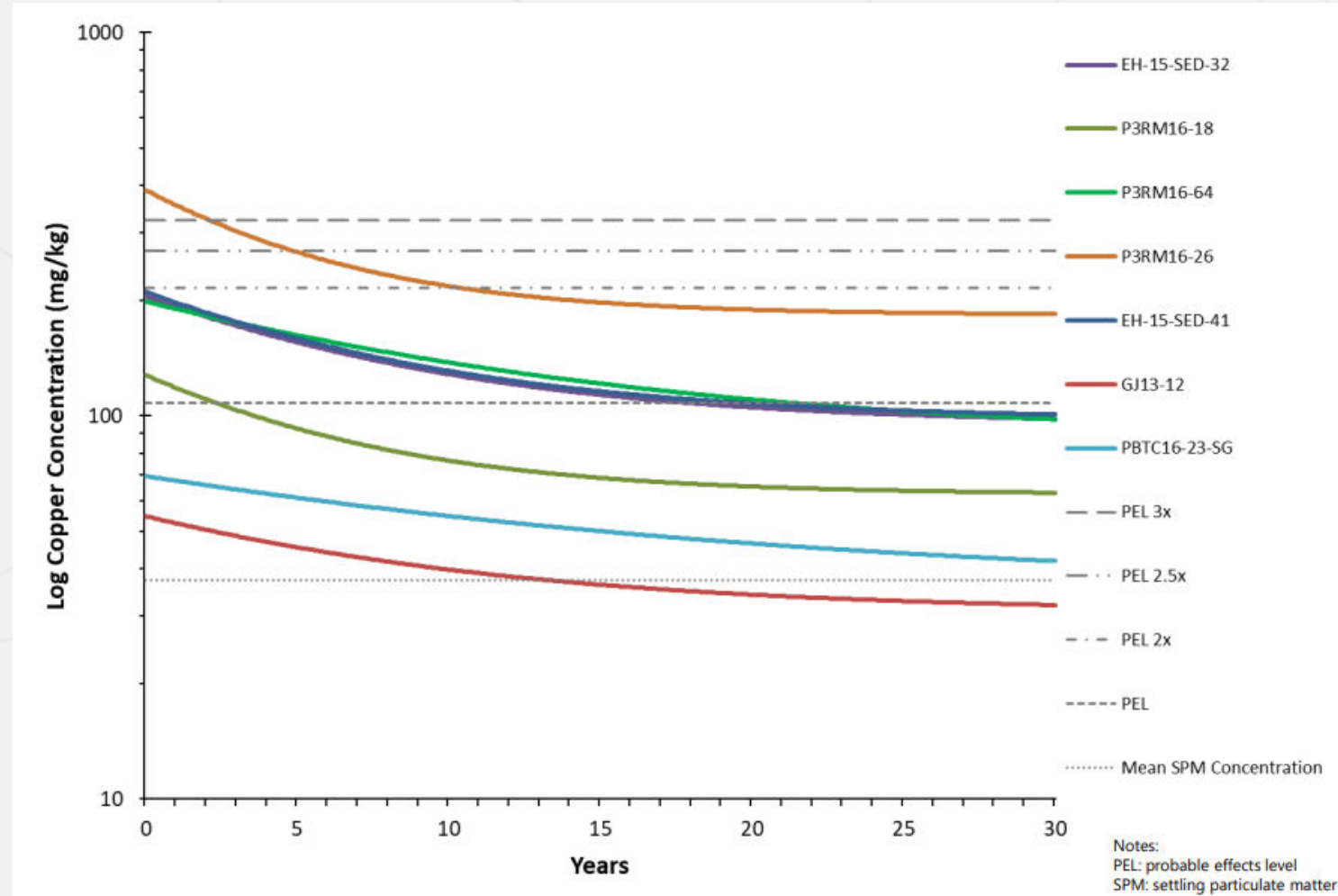
Remove continued redistribution  
of contamination through propwash

Monitored natural recovery (MNR)  
of remaining areas



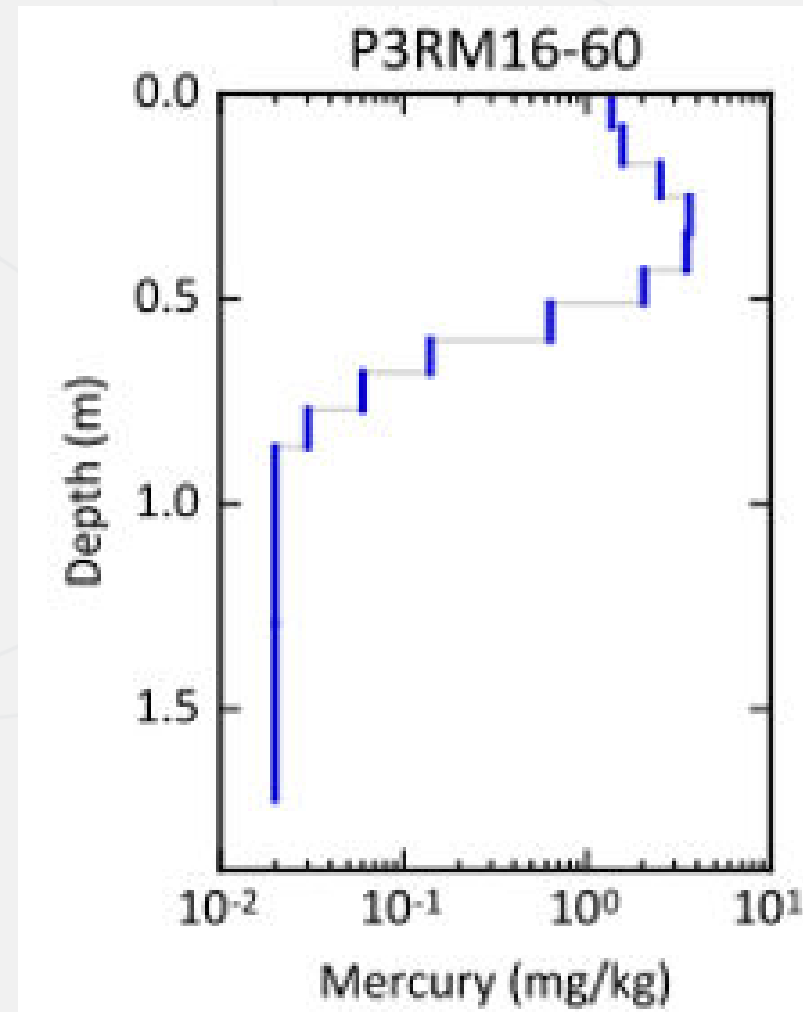
# Support for MNR

- ◆ Natural recovery modeling using net sedimentation rate and settling particulate matter concentrations indicated most areas drop to background levels for COCs within 30 years



# Support for MNR

- Core profiles indicated decreasing sediment concentrations toward the surface





# Remediation Timeline

2016

D Jetty  
Dredging  

---

F/G Jetty  
Dredging

2017

Constance  
Cove  
Dredging

2018

Plumper  
Bay and  
Ashe  
Head  
Dredging  

---

C Jetty  
Dredging

2019

Y Jetty  
and Lang  
Cove  
Dredging

2020

Central  
Constance  
Cove  
Dredging  

---

B Jetty  
Dredging

2021

G Jetty and  
Jetty 11  
Dredging

2022

2023

Plumper  
Bay  
Intertidal  
Dredging  

---

Western  
Constance  
Cove  
Dredging

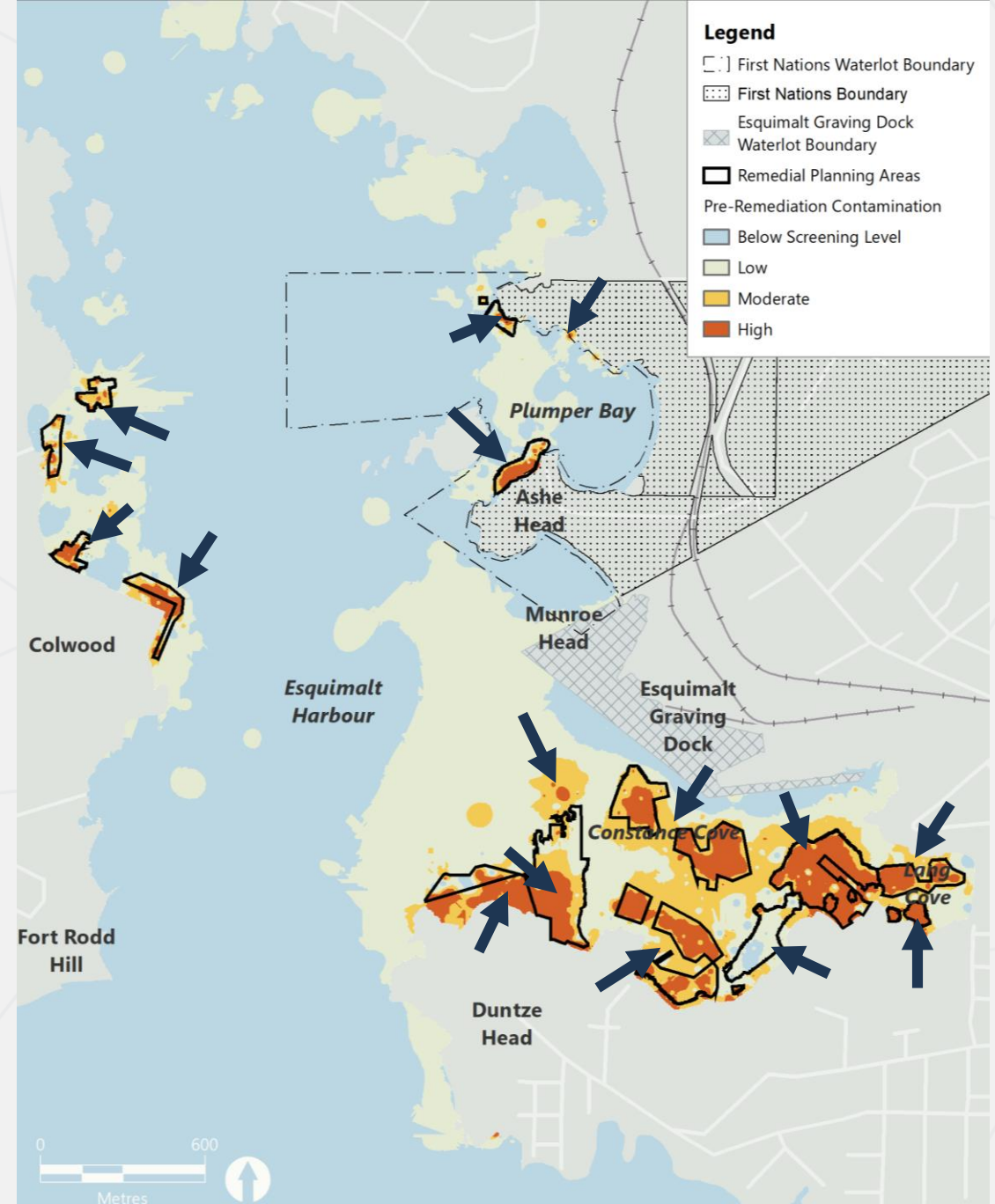
2024

2025

A Jetty  
Dredging  

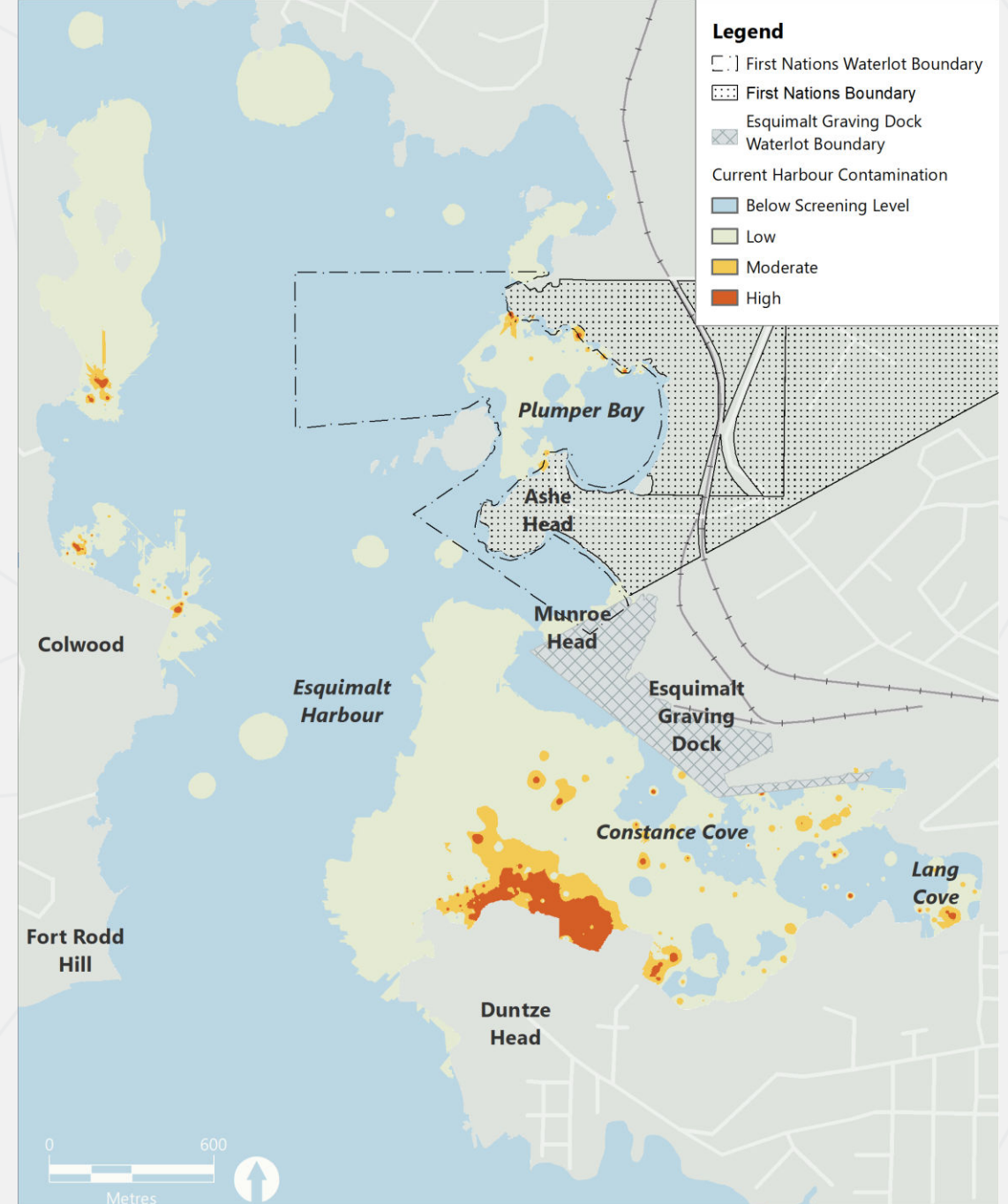
---

Lang  
Cove  
Dredging



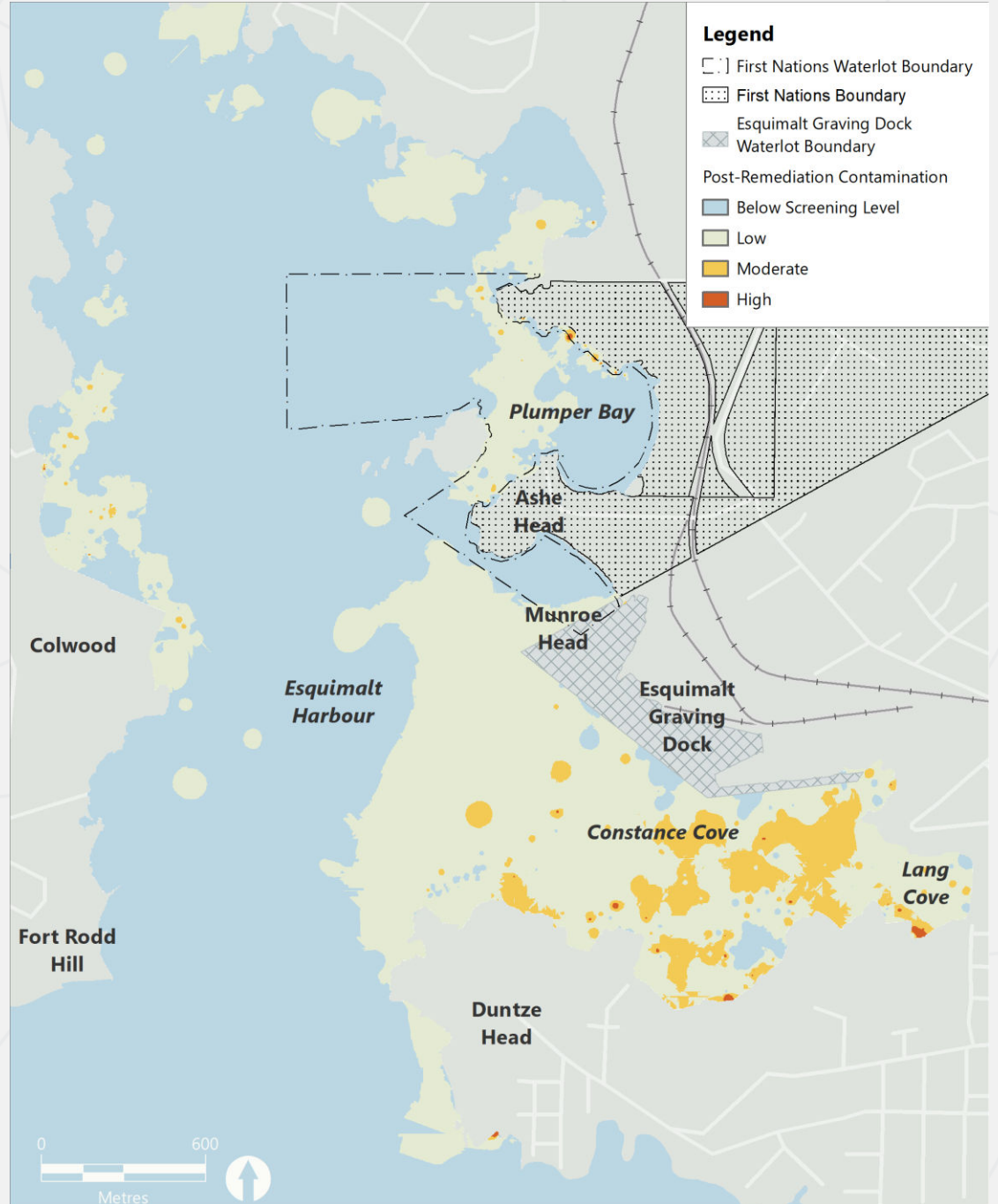
# Current Conditions

- Majority of hot spots have now been remediated with remainder to be addressed by 2025
- Residual contamination in remediated areas due to bedrock



# Anticipated Post-Remediation Conditions

- Following all active remediation, large areas of low- to moderate-level contamination remain to allow MNR to bring to background



# Is The Remedial Strategy Working?



# Lines of Evidence

## ◆ Sediment

- ◆ Prior to, during, and for 3 years following hot spot remediation
- ◆ Harbour-wide surface sediment temporal trends
- ◆ Sediment traps and surface water particulates

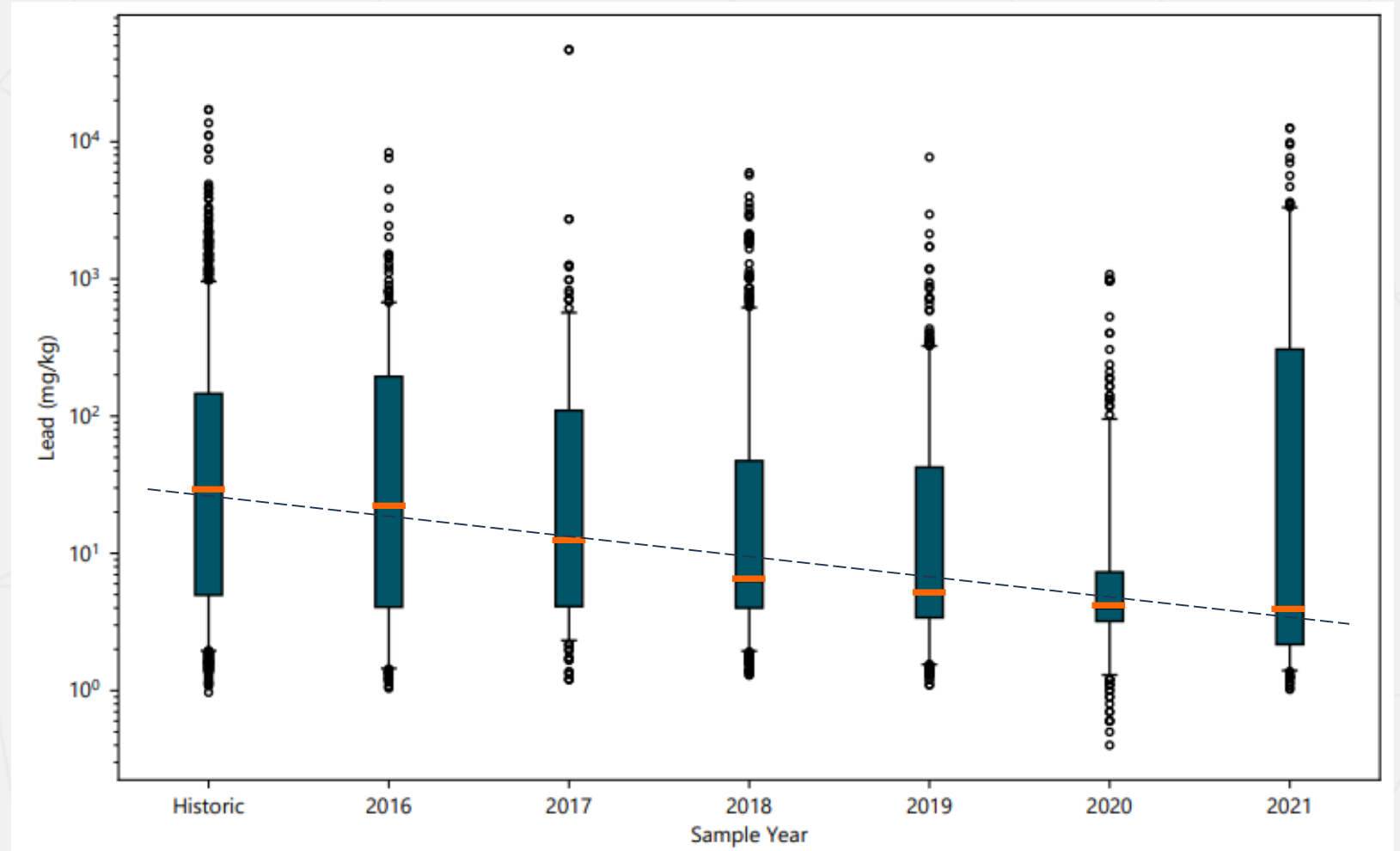
## ◆ Tissue

- ◆ Crab, fish, clams, chiton, and urchin over last 17 years



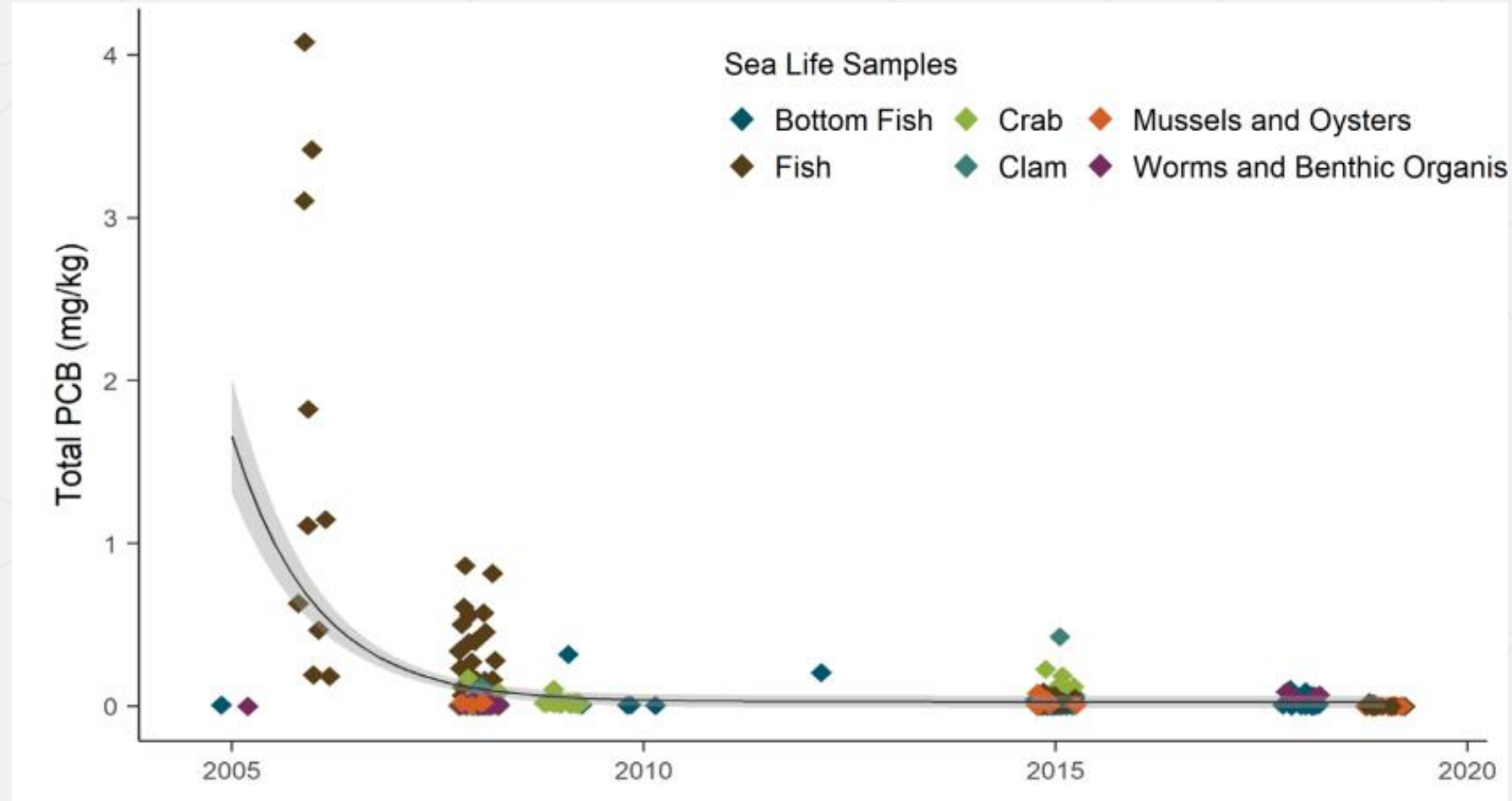
# Harbour-Wide Surface Sediment Trends

- ◆ Surface sediment concentrations in the harbour, as a whole, are decreasing



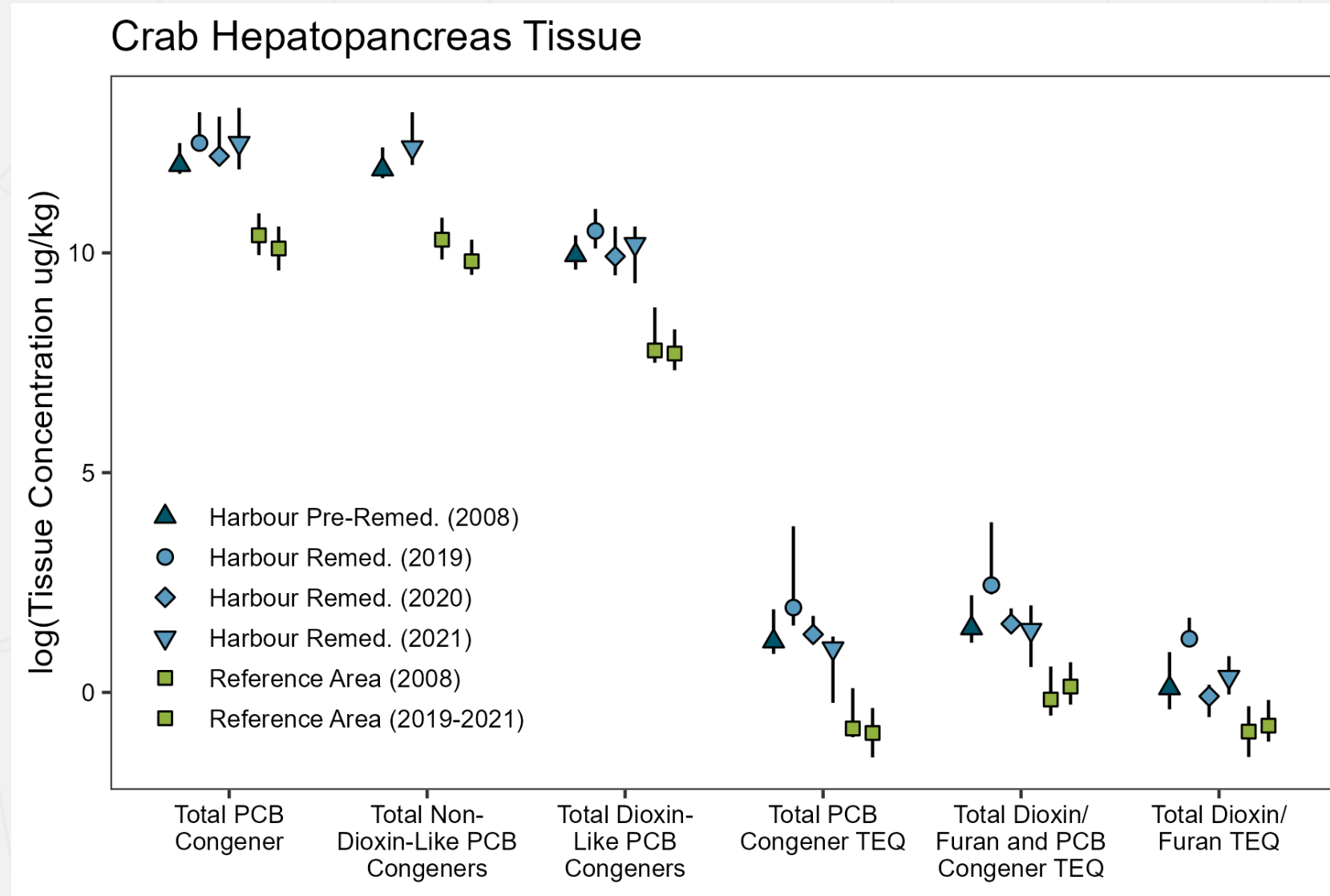
# Tissue Trends

- Tissue concentrations, overall, have been decreasing over time



# Tissue Trends

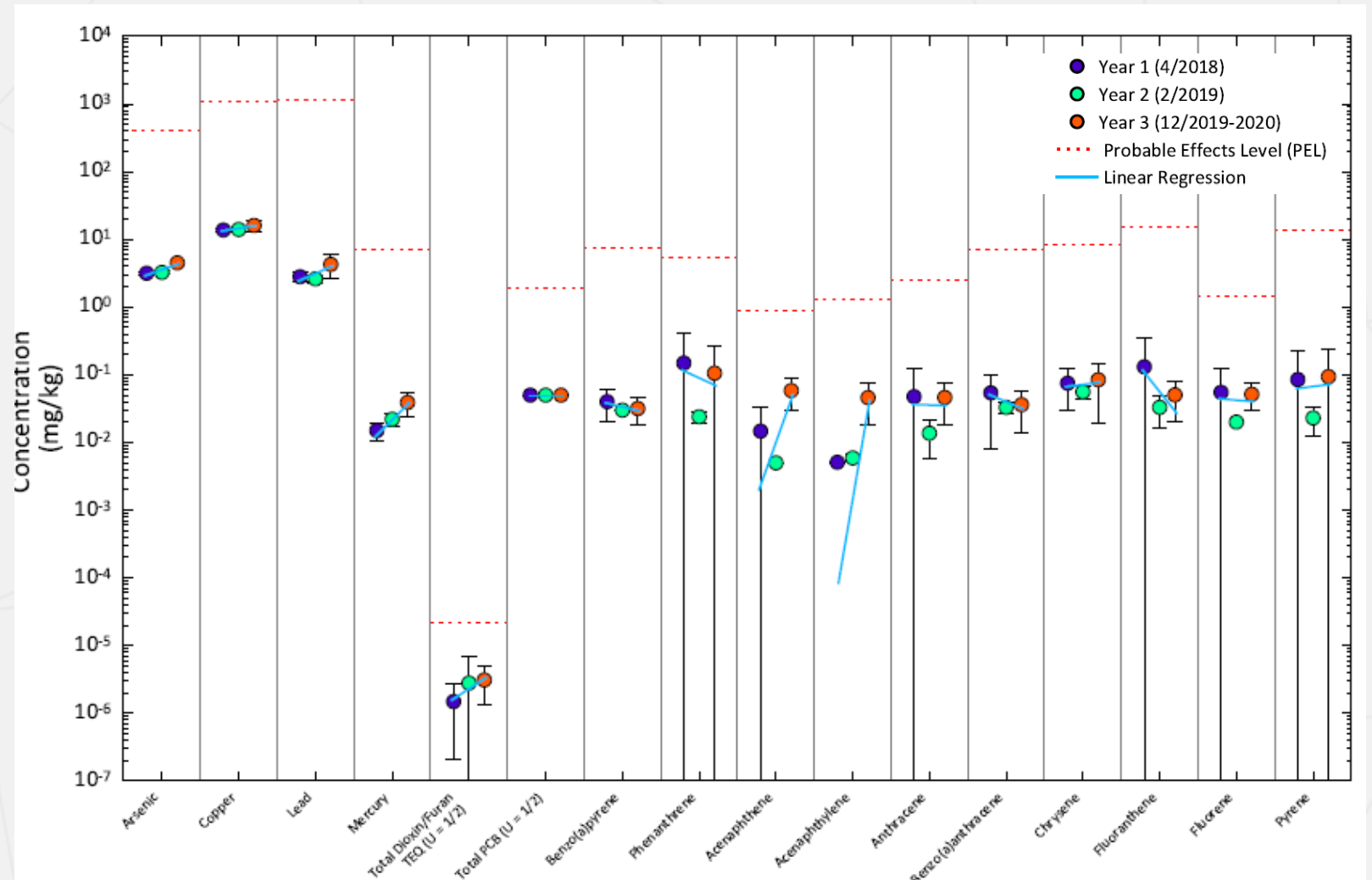
- Some increases in tissue trends have been observed during and immediately following remediation





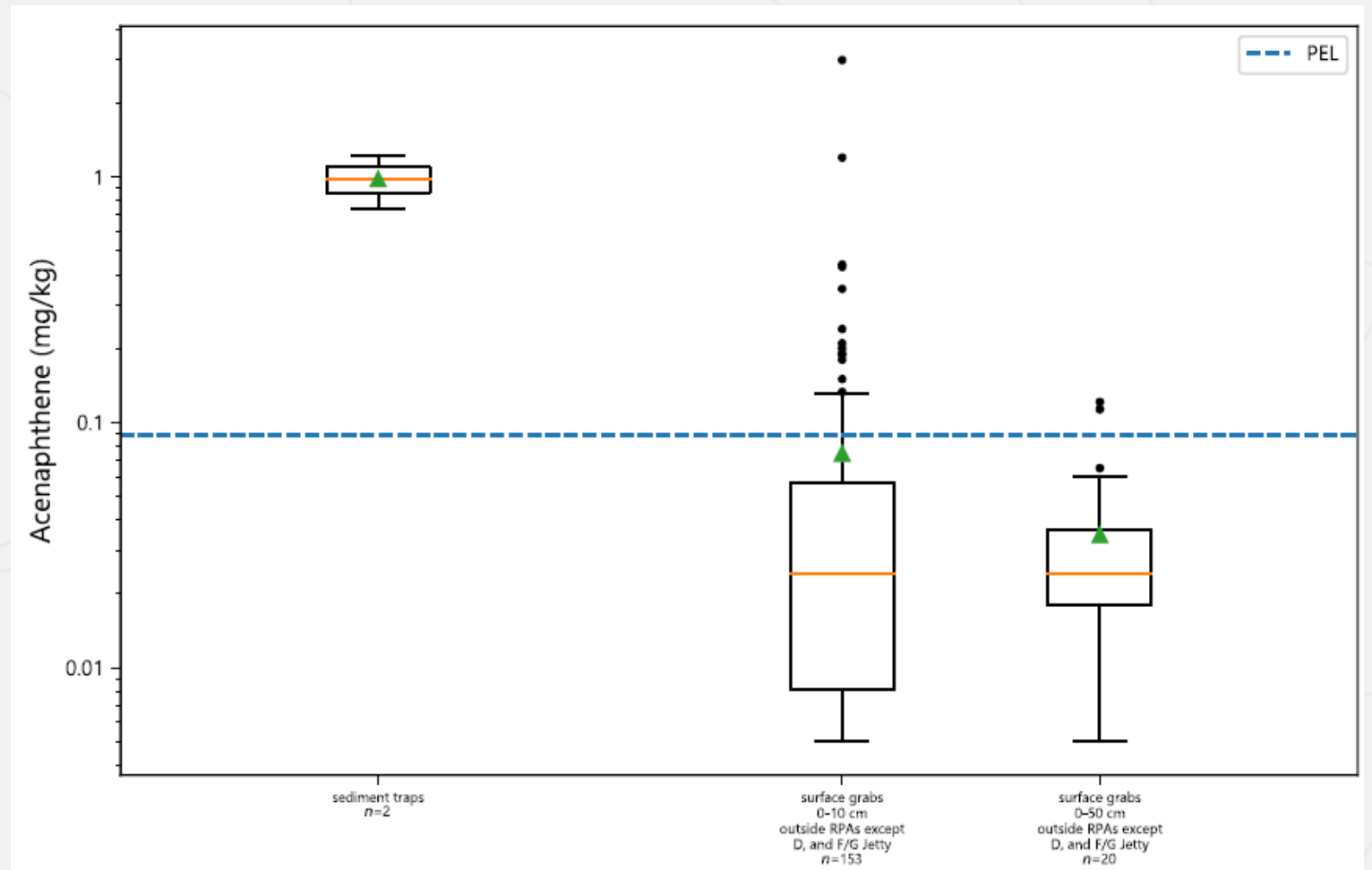
# Surface Sediment in Remediated Areas

- Surface sediment in remediated areas are equilibrating to harbor background levels, consistent with recontamination modeling results



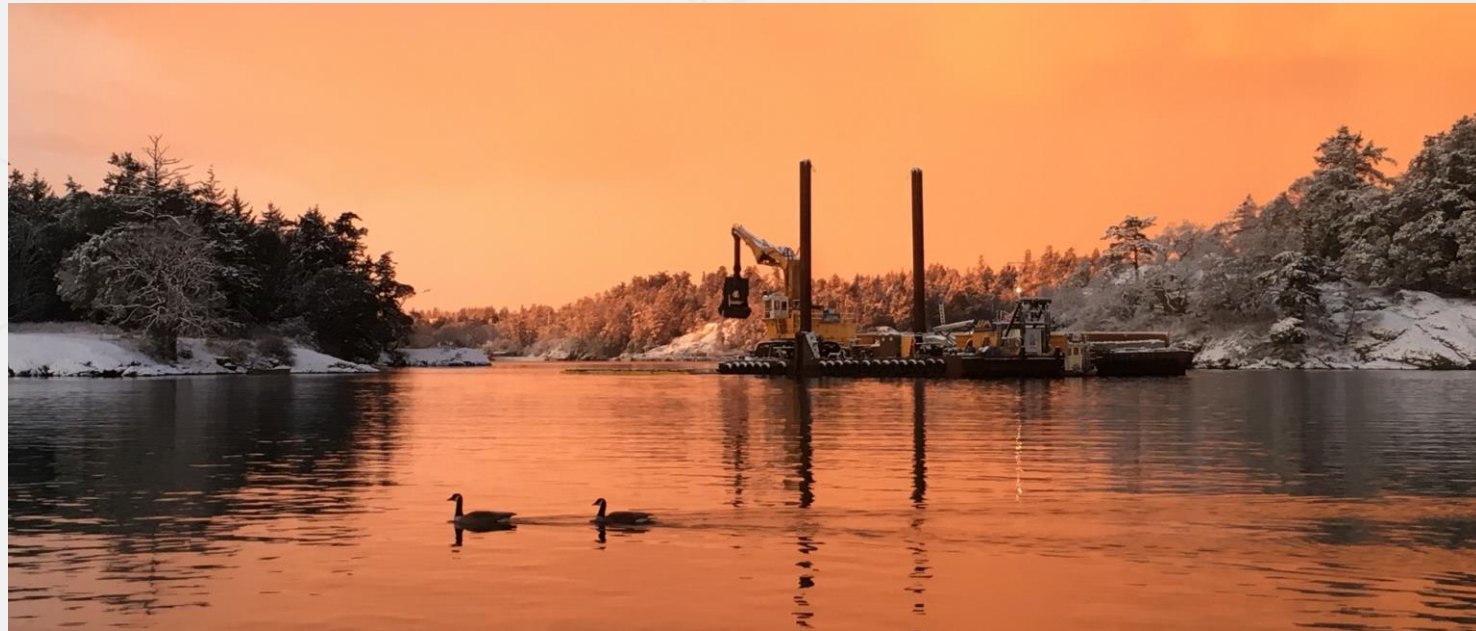
# Identification of Potential Recontamination Concerns

- ◆ Sediment trap concentrations in targeted areas are exceeding local surface sediment concentrations, which indicates potential for ongoing sources



# Summary

- ◆ MNR, following early action, appears to be viable strategy for remediation of the majority of Esquimalt Harbor
- ◆ Potential need for additional source control and/or supplemental remediation in limited areas may exist
- ◆ Beneficial to collect data during and after active remediation to inform decisions



# Thanks for attending, Questions?

---

## Rob Thomas, M.A.Sc, GIT

Environmental Specialist

Public Services and Procurement Canada

[Robert.thomas2@pwsgc.gc.ca](mailto:Robert.thomas2@pwsgc.gc.ca)



