

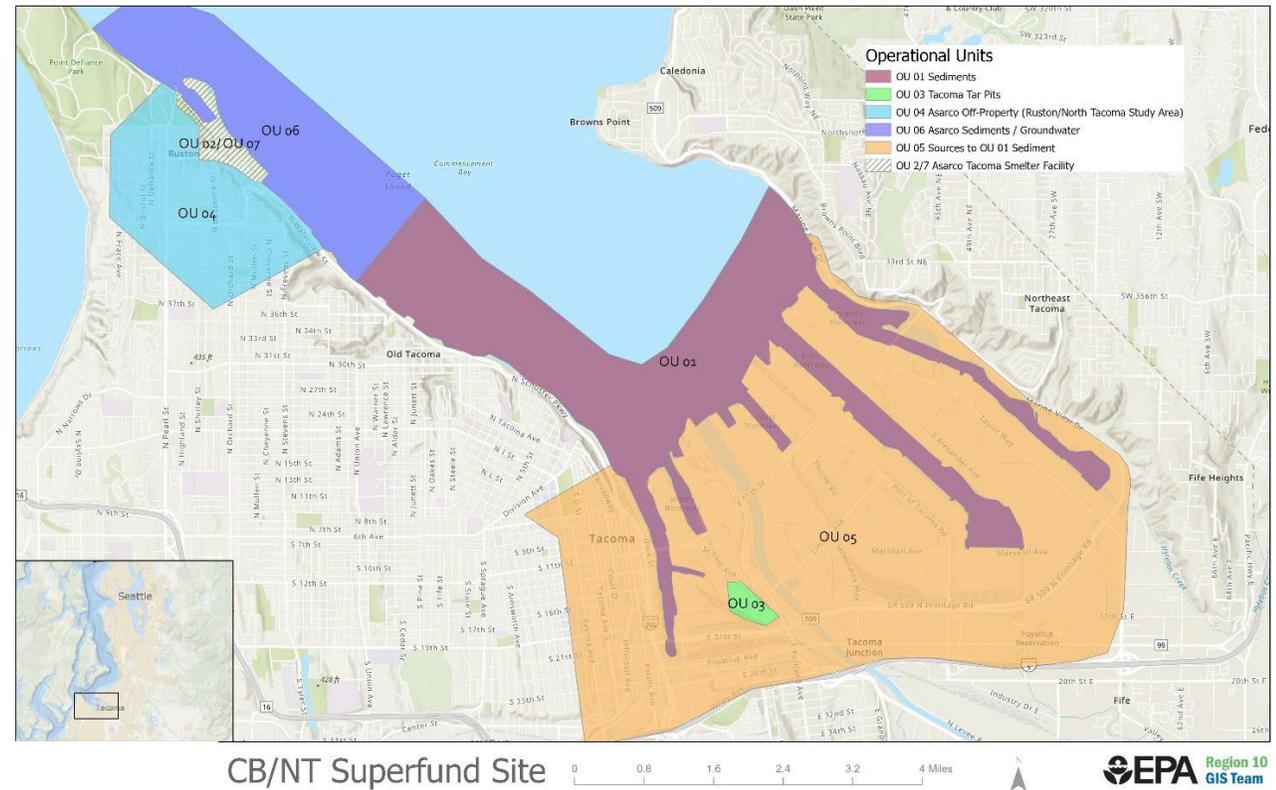
COMMENCEMENT BAY NEARSHORE/TIDEFLATS, WA

KRISTINE KOCH

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 10

Site Overview

- 7 Operable Units
- OU1 Sediments/OU5 Sources
 - 8 Problem areas – Tideflats area
 - First Superfund sediment “megasite” (1983)
 - 800 acres
 - Over 100 responsible parties



Objectives of Remediation

- Control sources early
- Achieve specified sediment concentrations
- Reduce fish tissue => reference area
- Maintain functional habitat and enhance fisheries



Cleanup Remedy Components

Bottom-feeding fish due to pollution

Debido a la contaminación, NO CONSUMA cangrejos, mariscos o pescados que se alimentan en el fondo.
由於水質的污染，切勿食用在水底覓食的魚、螃蟹或貝類。
경고: 민물고기 바닥 밑에서 서식하는 아미달(생선, 개, 조개, 새우) 등을 함부로 먹지 마십시오.
Không nên ăn cua, ngêu, sò hoặc loài cá sinh sống hay ăn những thứ ở đáy nước vì bị nhiễm bẩn.



Fish advisory



Source control



Dredge and cap
above remedial action levels



Monitored natural recovery
10 years post-construction

Refinements to Remedy

- 5 Explanations of Significant Differences (ESDs)
- Specified:
 - Dredging areas and volumes
 - Disposal locations
 - Capping areas
 - Natural recovery areas
- Added enhanced natural recovery
- Changed PCB cleanup goal

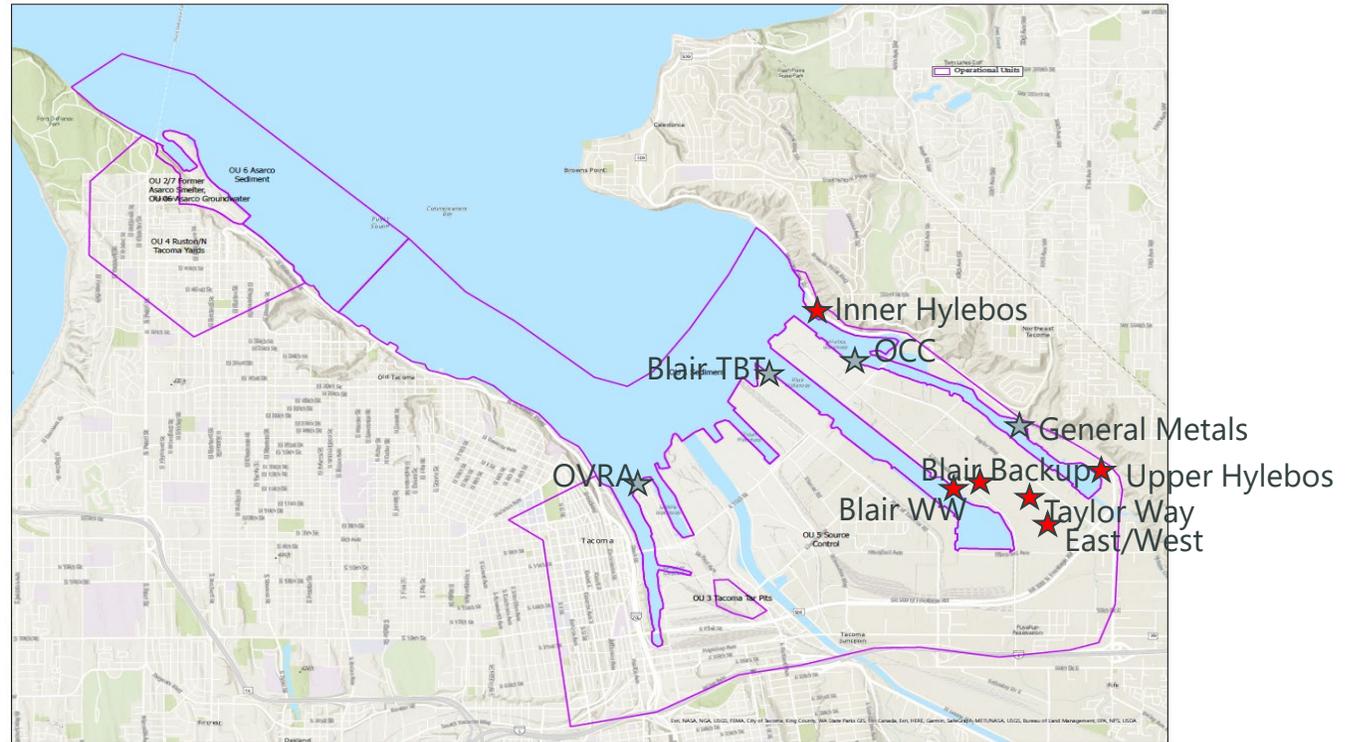


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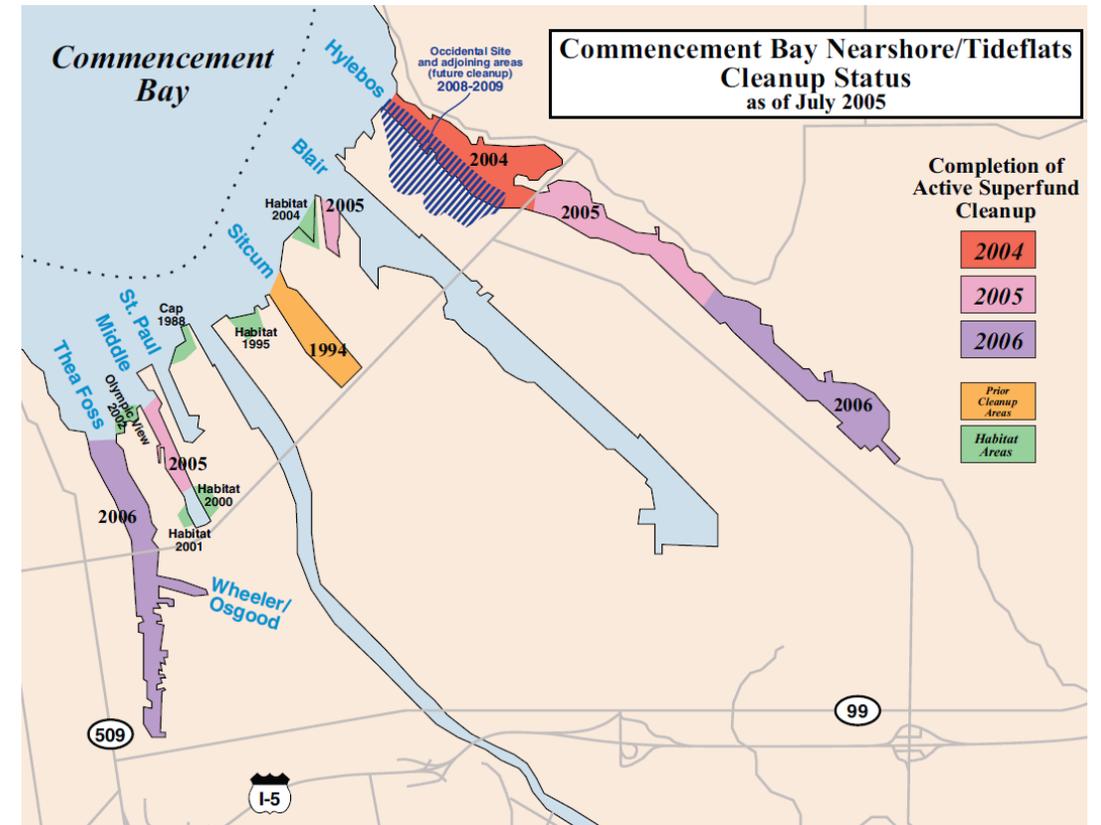
Additional Removal Actions

- Puyallup Land Claim
- General Metals
- Olympic View Resource Area (OVRA)
- Blair TBT
- Occidental (OCC)



Timeline of Remedial Actions

- 1985: Fish and shellfish advisory
- 1988: St. Paul cap and habitat
- 1989: ROD
- 1990 – 2001: Source controls
- 1994 – 2006: Dredging and capping
- 1996: Partial Superfund deletions
- 1997 – 2004: 5 ESDs
- Ongoing: Long-term monitoring and maintenance



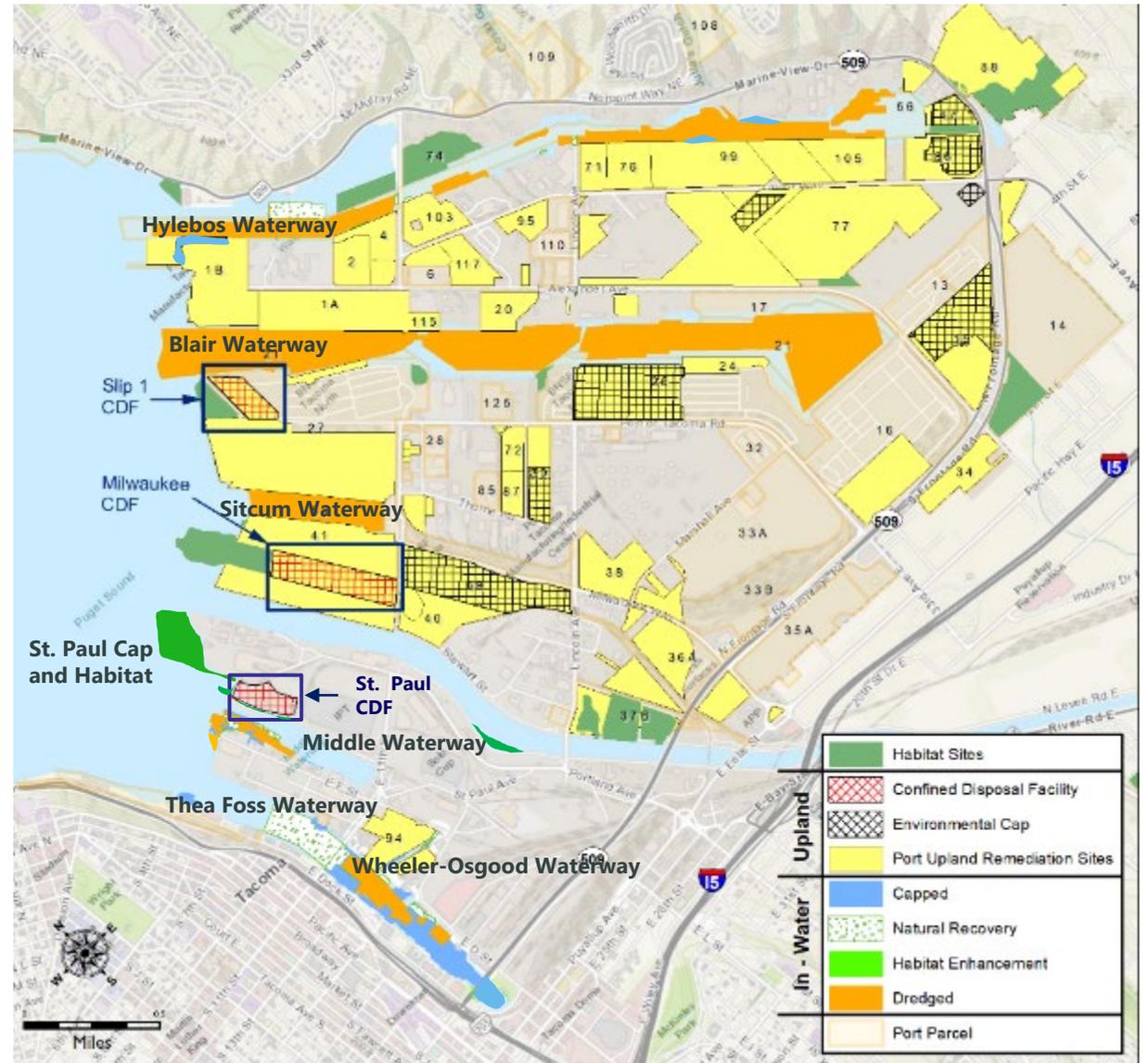
Upland and Nearshore Source Controls

- More work than anticipated
- Started pre-ROD
- Milestone reports – completed in 2001
- 2 major sources still not controlled
- Post-construction recontamination
 - Additional source/response actions
 - Anticipated localized recontamination - phthalates
 - Superfund cannot deal with widespread contamination (no identified source)



Summary of Remedy

- Greater than \$600 million
- 500 acres dredged
 - 2,400,000 cubic yards (cy) to three confined disposal facilities (CDFs)
 - 400,000 cy to off-site landfills
 - 200,000 cy to open-water disposal
- 40 acres capped
- 60 acres monitored or enhanced natural recovery
- Coordinated with restoration, navigation, and urban renewal



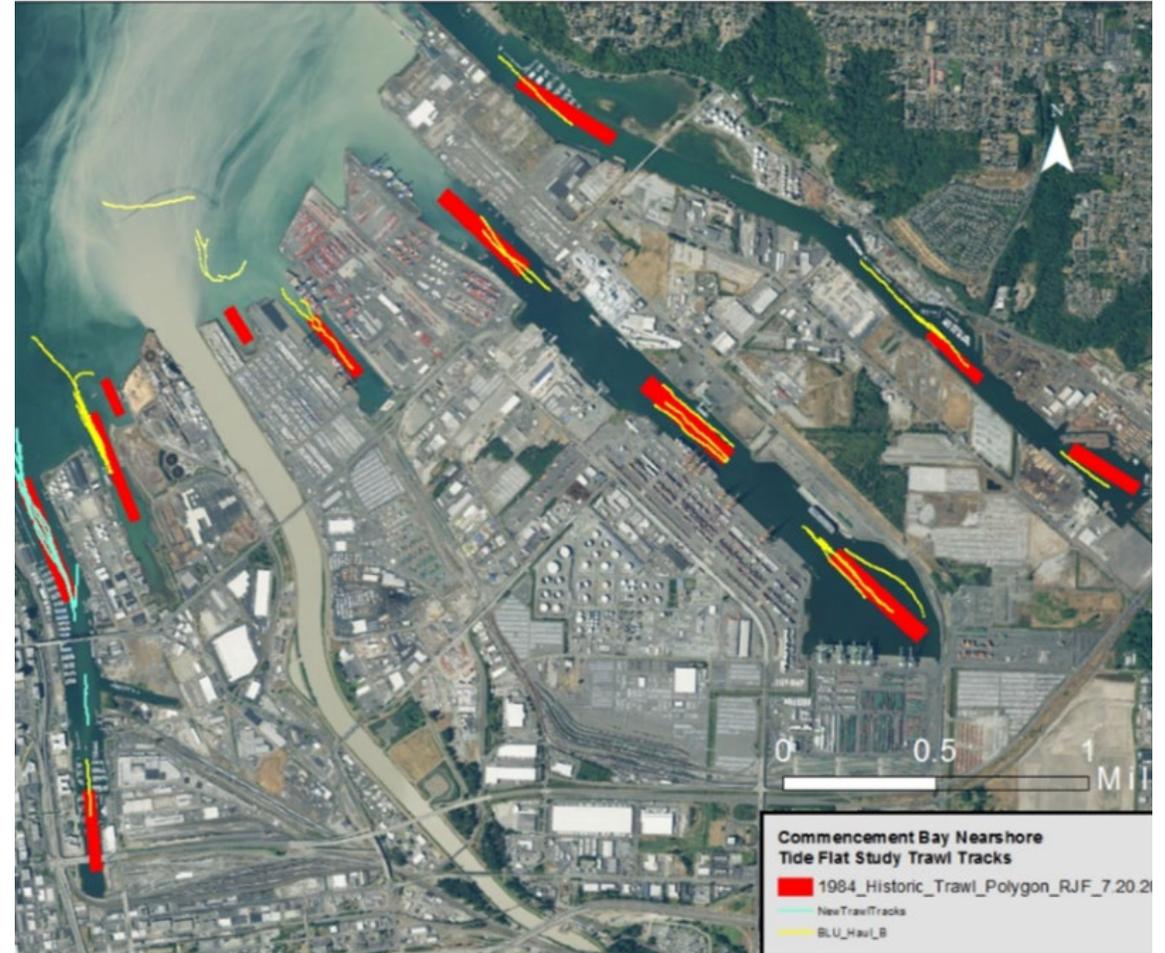
Significant Remedy Schedule and Scope Deviations

- Source control took longer – delayed construction
- PCB cancer slope changed
- Problem areas increased to entire waterways
- Dredge prism expansion (area & depth)
- Habitat mitigation requirements changed
- Cost (3x greater than pre-design estimates)
- Additional removal actions



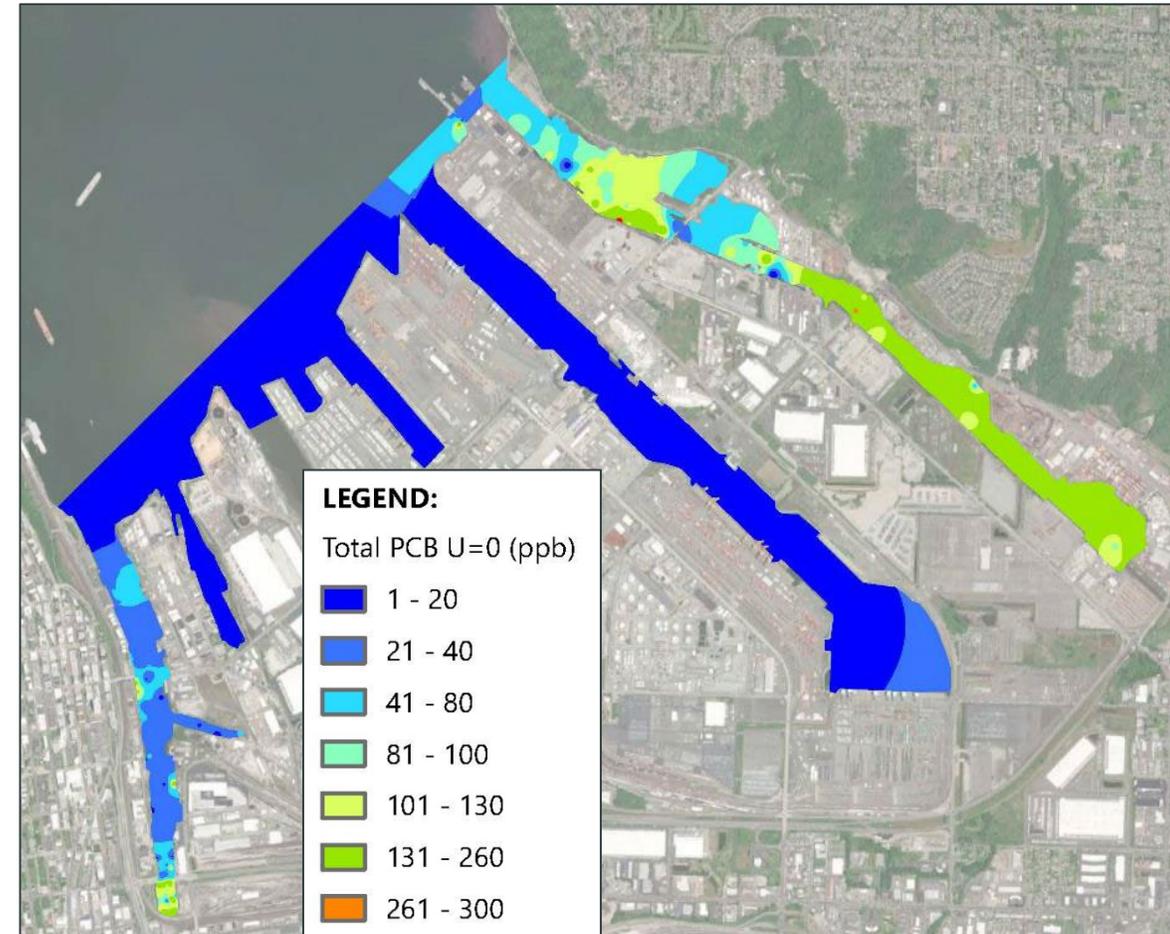
Remedy Effectiveness Monitoring

- Surface sediment
 - Chemical concentrations
 - Confirmatory toxicity bioassays
- Fish tissue
 - Reproduced RI sampling
 - 17 trawl lines (had to move some)
 - 5 fish/trawl (where we could)
 - English sole muscle tissue PCB levels
 - Compare to reference area (Carr Inlet)



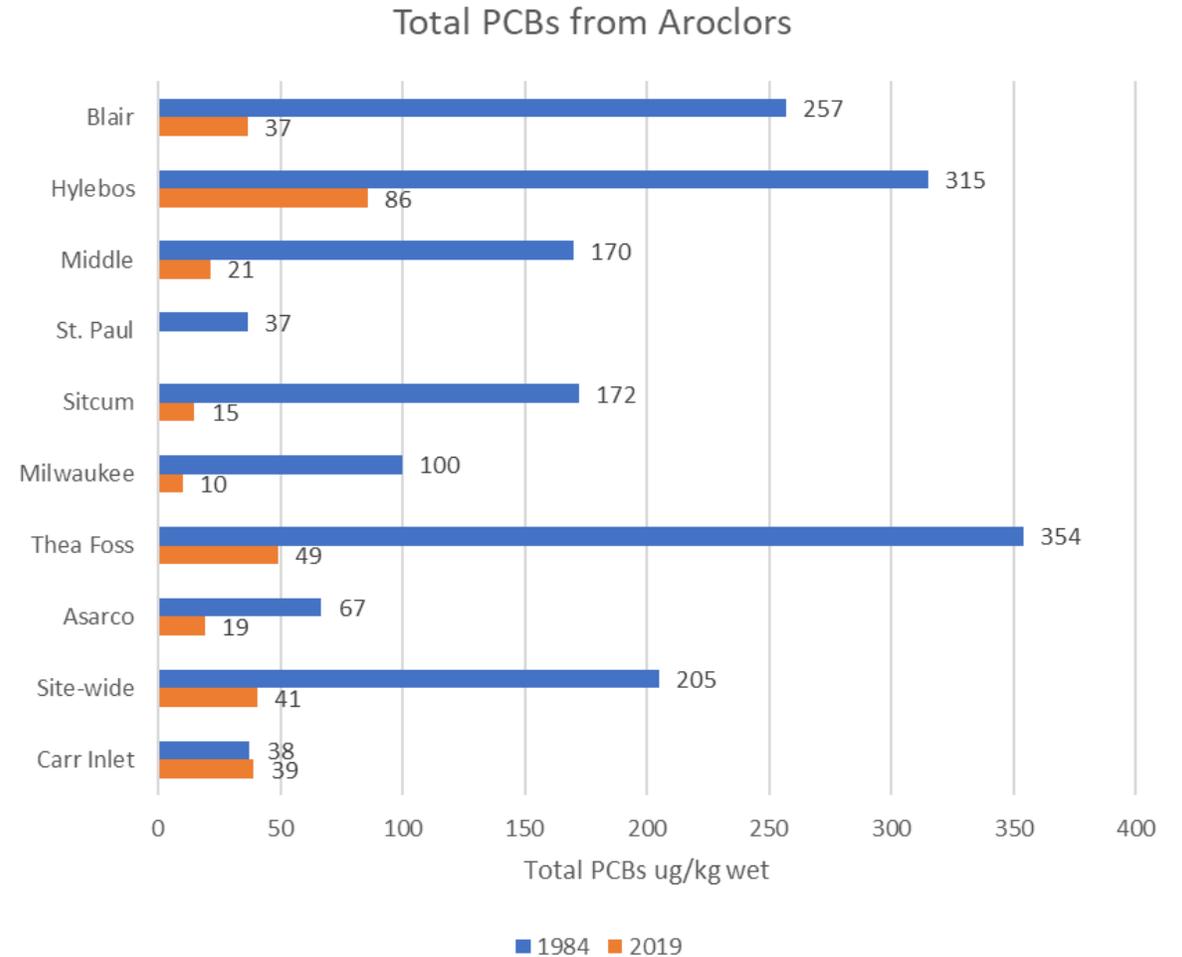
Surface Sediment Cleanup Levels Achieved

- Concentrations successfully reduced below cleanup levels
 - Benthic toxicity eliminated
 - Bioassay confirmation
 - PCBs < 300 ppb cleanup level
 - Localized exceedances of some CoCs:
 - Non-CERCLA diffuse stormwater sources
 - Slow under-pier natural recovery



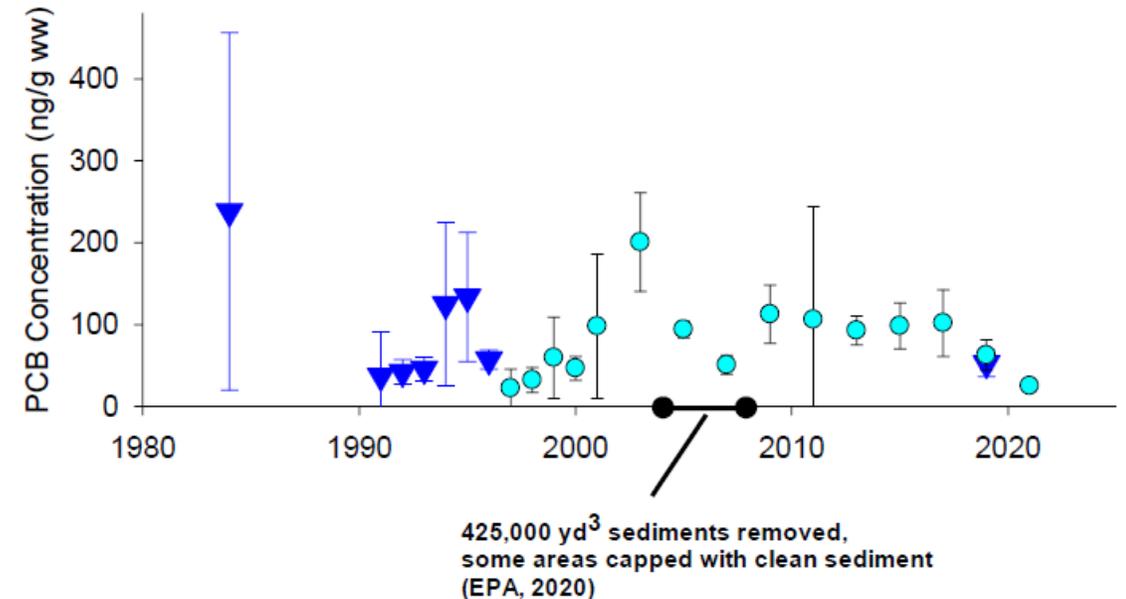
PCB Bioaccumulation Objectives Achieved

- RI sampling - 1984
- Post-remedy sampling - 2019
- Site-wide tissue conc. no different from reference (Carr Inlet)
 - 2-sample test; $p=0.05$
 - 80% lower than 1984 levels



35-Yr Tissue PCB Trends: Mouth of Thea Foss Wtwy.

- Changes in analytical methods
- No long-term trend over 30 years
 - Uncertain sediment contribution to PCB bioaccumulation
 - No surface water data
 - Ongoing plankton research



Source: Washington State Department of Fish and Wildlife (2022)

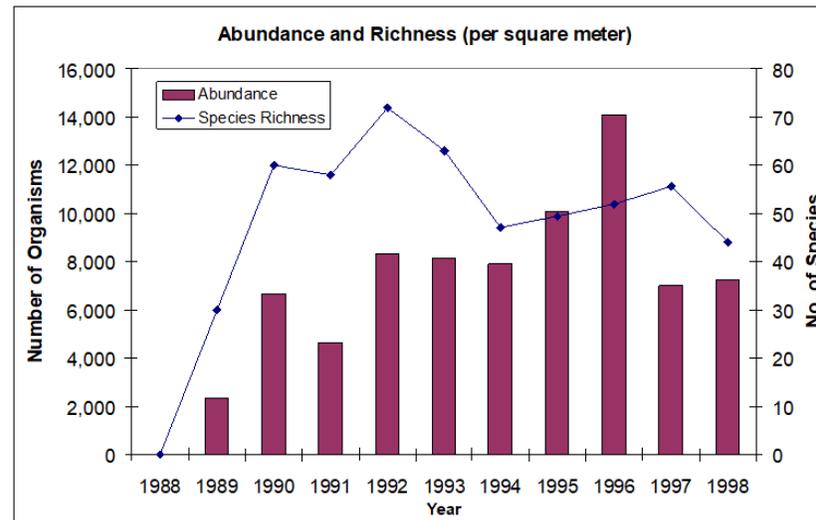
Post-Remedy Habitat Enhancements/Mitigation

- 18 locations
 - 16 on-site; 2 off-site
- Over 70 acres improved
 - Still need 1.6 acres for intertidal habitat mitigation
- Performance measures achieved
- Institutional controls in place
- Long-term monitoring and maintenance



St. Paul Waterway Integrated Cleanup and NRD

- Remedial capping integrated with 20-acre intertidal beach restoration
 - 15-year post-construction monitoring: physical, chemical, and biological criteria
 - All cleanup and NRD restoration performance criteria achieved



Source: Parametrix 1999



Short- and Long-Term Remediation Objectives

- Sources controlled prior to construction
 - Source control was key
- Overall, sediment cleanup goals achieved
 - Localized areas affected by non-CERCLA sources
- Site-wide fish tissue PCB levels achieved
 - Variability across site
- Habitat enhancements implemented
 - One remaining mitigation site



Key Take-Home Messages

- Coordinating cleanup with restoration, navigation, and urban renewal is complex and critical – well worth the effort
 - Things change – be adaptive
- Forge good working relationships & trust
- Keep track of the important pieces; don't forget to measure the fish
 - Wrap up loose ends
- Plan for the long-term



Questions?

