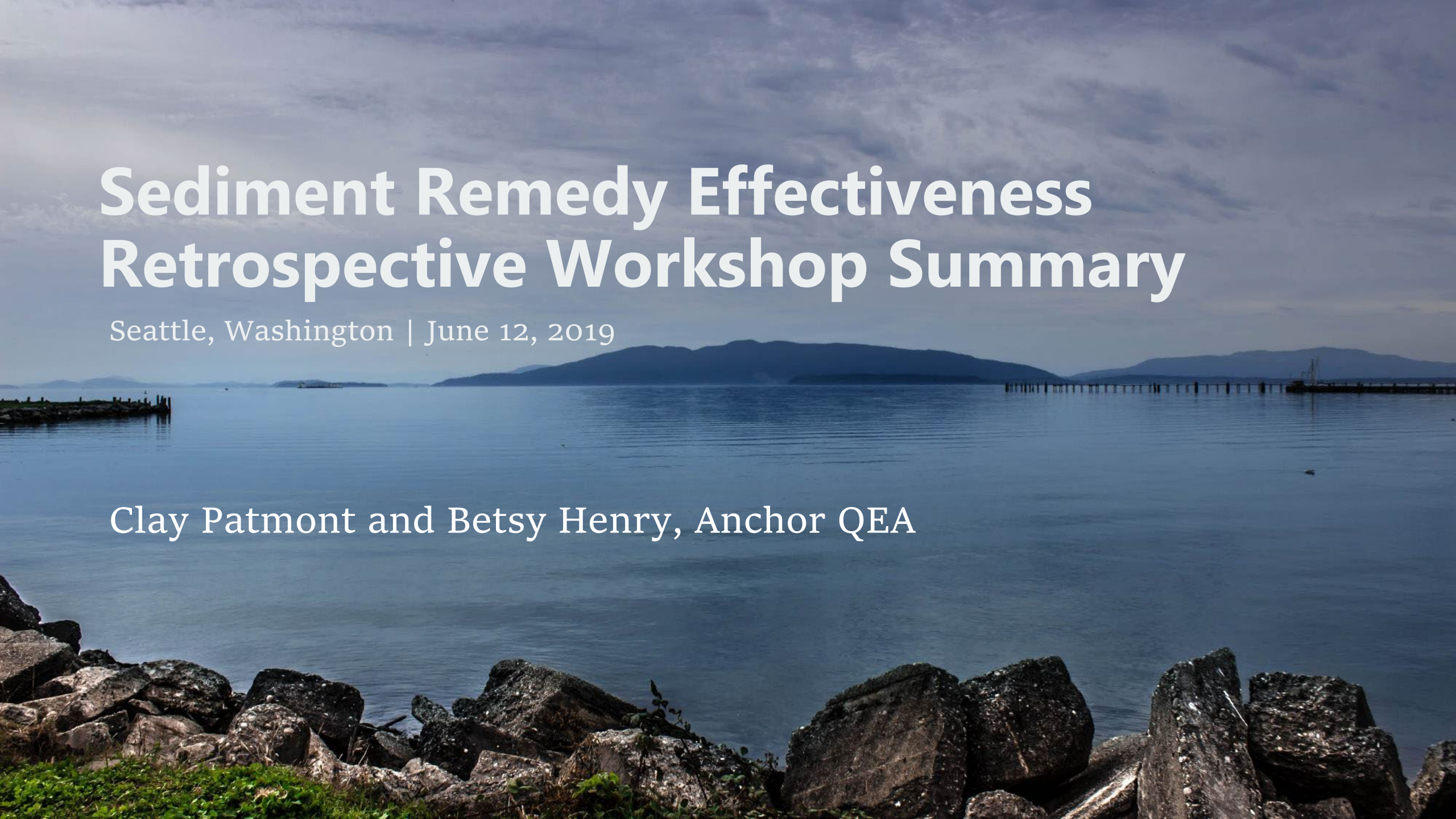


Sediment Remedy Effectiveness Retrospective Workshop Summary

Seattle, Washington | June 12, 2019

Clay Patmont and Betsy Henry, Anchor QEA

Objective of Workshop

- Collaboratively review robust sediment cleanup remedy effectiveness case studies to more broadly develop knowledge to inform future sediment cleanup remedies
- Interactive training, learning, and discussion format
- 66 participants
  - 28 federal agency representatives
  - 21 industry representatives
  - 17 state/local agency representatives
- All workshop presentations posted on SMWG website

Eight Common Topics For Each Case Study

1. Objectives of remediation
2. Summary of completed early actions and/or final remedy
3. Significant remedy scope or schedule deviations
4. When were external sources characterized and addressed?
5. Primary pre- and post-remedy effectiveness monitoring elements
6. Did the remedy achieve remediation objectives for surface sediment?
7. Is the remedy on track to achieve water/biota remediation objectives?
8. Key take-home messages on overall lessons learned

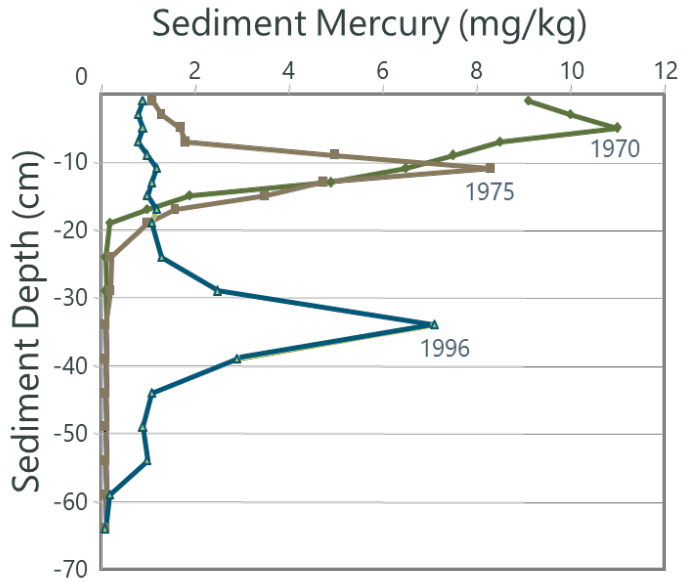
Twelve Case Studies (each with robust monitoring data)

1. **Bellingham Bay, WA** | Pete Adolphson, WA State Department of Ecology
2. **St. Paul Waterway, WA** | Dave McEntee, Simpson Lumber Co.
3. **Eagle Harbor, WA** | Helen Bottcher, USEPA R10
4. **Sinclair Inlet, WA** | Bob Johnston, Applied Ecological Solutions (US Navy SPAWAR, Ret.)
5. **McCormick & Baxter, OR** | Kevin Parrett, OR Department of Environmental Quality
6. **Lavaca Bay, TX** | Gary Baumgarten, USEPA R6
7. **Ottawa River, OH** | Scott Cieniawski, USEPA GLNPO and Marc Mills, USEPA ORD
8. **Fox River, WI** | Paul Montney, Georgia-Pacific Consumer Products
9. **Hudson River, NY** | Marc Greenberg, USEPA OLEM/OSRTI/TIFSD/ERT
10. **Onondaga Lake, NY** | Betsy Henry, Anchor QEA
11. **Duwamish Waterway, WA** | Elly Hale, USEPA R10 and Kathy Gottfredson, Windward Env.
12. **Puget Sound Biota/Sediment Relationships** | Clay Patmont, Anchor QEA and Jeff Stern, King Co.

Bellingham Bay, WA

Pete Adolphson, WA State Department of Ecology

- Source control (1970-1972), natural recovery, cap (2001 & 2016) & dredge (2015-2016) remedy
- Faster natural recovery than simple model projections (complex fate & transport)
- Corresponding sediment toxicity and crab tissue mercury recovery (to background)
- Cooperative project benefits
  - Integrated habitat restoration and cleanup
  - Adjusted to changing community land use needs

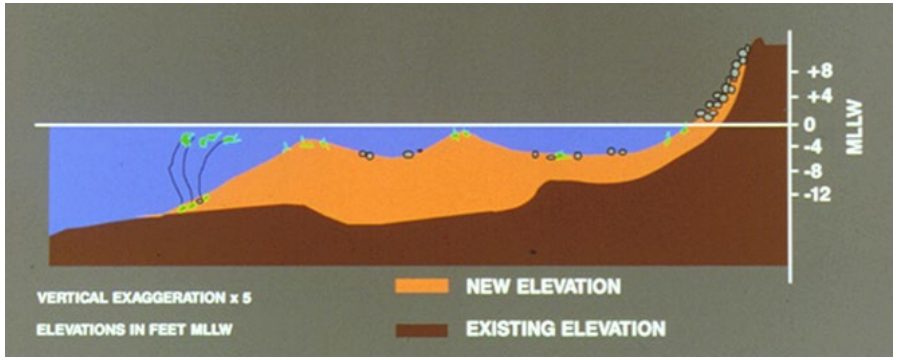


Source: Patmont et al. 2004

St. Paul Waterway, WA

Dave McEntee, Simpson Lumber Co.

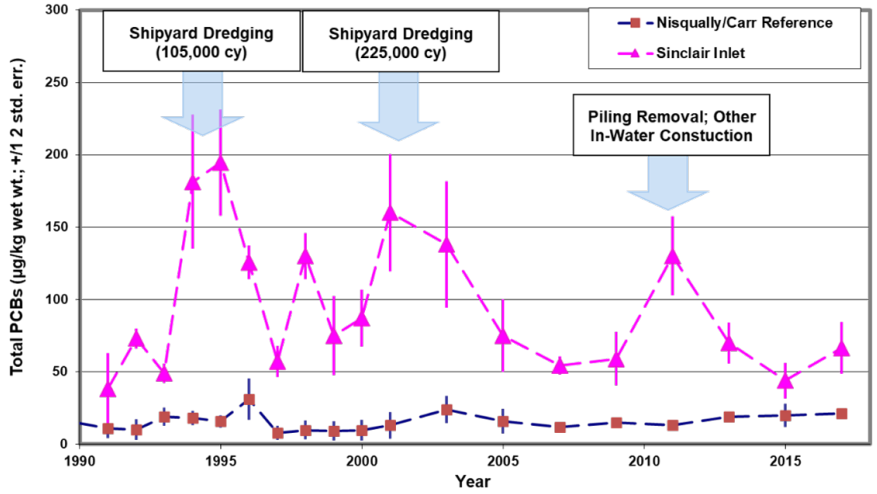
- Source control and cap remedy (1988)
- Integrated habitat restoration and cleanup
  - Cap restored regional priority intertidal habitats
  - Robust monitoring confirmed cap protectiveness
- Cooperative project benefits
  - Process and implementation efficiencies
  - Productive stakeholder/community involvement
  - All involved worked toward a common vision



Sinclair Inlet, WA

Bob Johnston, Applied Ecological Solutions (US Navy SPAWAR, Retired)

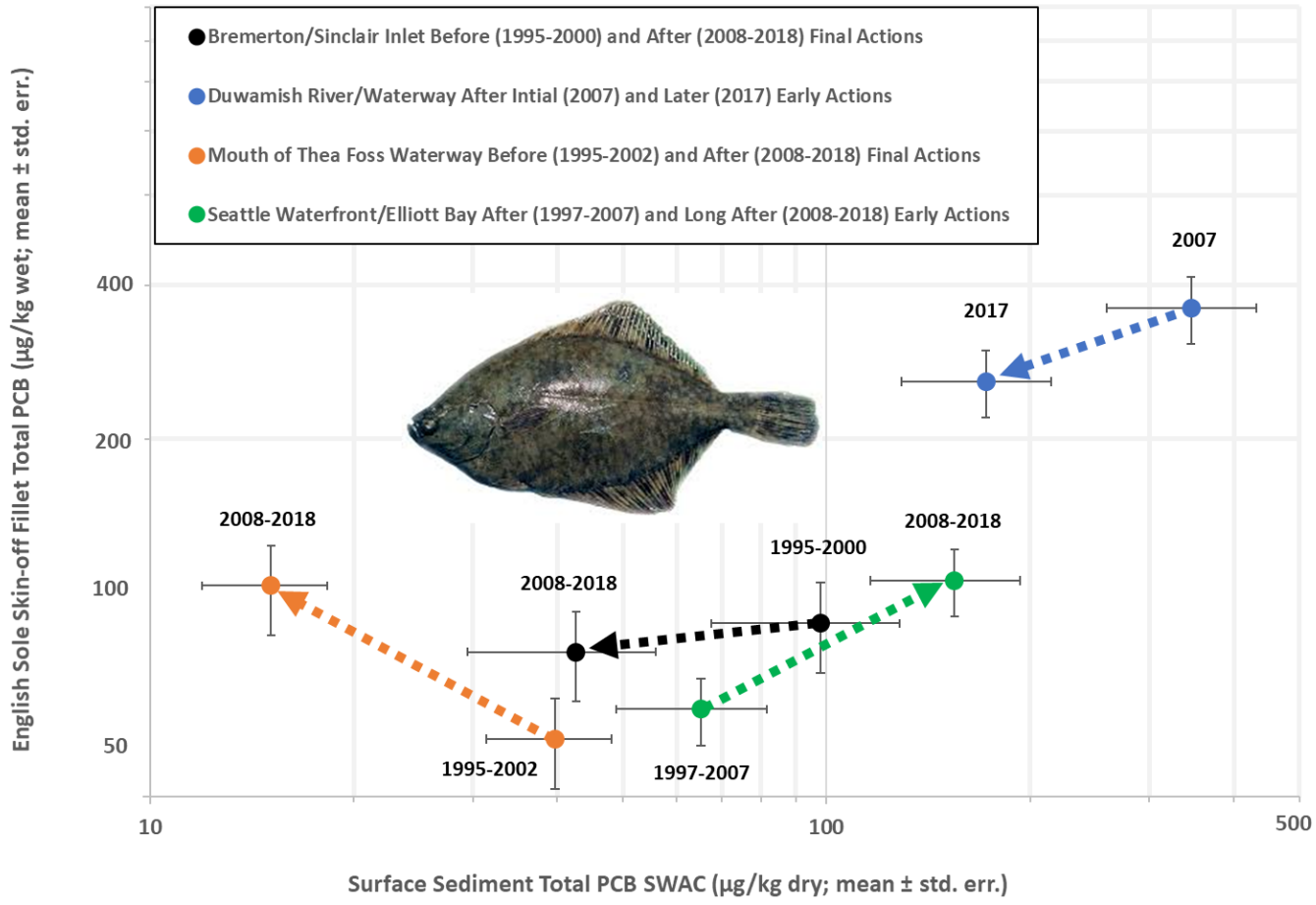
- Source control, dredge, cap, and natural recovery remedy
  - 225,000 cubic yards dredged (2000-2001)
- Source control, source control, ….
  - Continuous process improvements
- The remediated environment is not static
- Design remedies that work with nature
- Be a life-long learner



Relationship Between Sediment and Bottom Fish Tissue PCB Levels in Puget Sound Urban Areas

Clay Patmont, Anchor QEA

- Changes in English sole PCB levels not proportional to sediment trends
  - Diminishing returns at lower sediment cleanup levels?
- Additional monitoring and focused research needed to tease out linkage(s)



Common Case Study Themes

- Cooperative projects lead to more action and results
- Source control is of primary importance, and can be challenging
- Early actions can yield significant progress toward objectives
- Remedy modifications can deal with an evolving conceptual site model and changing site conditions
- Remedial technologies effective at reducing sediment concentrations
- Mixed remedy effectiveness at reducing water and biota exposures
  - Variable understanding of what controls biota contaminant levels
  - Ongoing sources can be important
- Robust, long-term monitoring data are needed to understand linkages