Cleaning Up the Duwamish

Draft Feasibility Study

May 5, 2009

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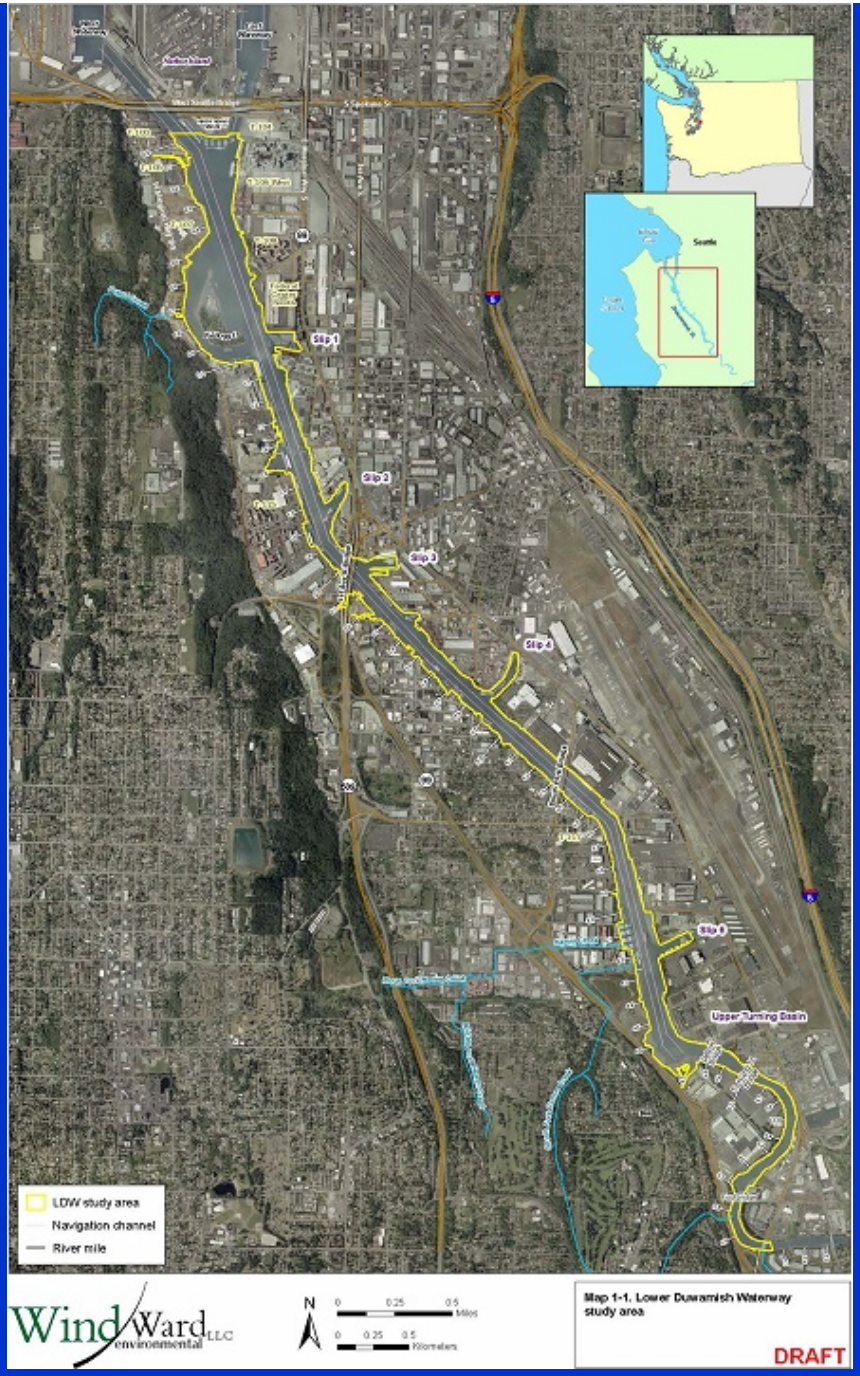
The Lower Duwamish Waterway Group (LDWG)

- Partners:

  King County
  City of Seattle
  Port of Seattle
  Boeing

- Formed in 2000 - prior to the Duwamish Superfund listing in 2001



Where are we today

2001-2002 | 2007 | 2009 | 2011

There's a Problem

Superfund List (NPL)

Washington Hazardous Sites List

What and Where is the Risk?

Remedial Investigation (RI) & Risk Assessments

How Could it be Cleaned Up?

Feasibility Study (FS)

Proposal to Clean it Up

Proposed Plan

Cleanup Action Plan

Decision: How it will be Cleaned Up

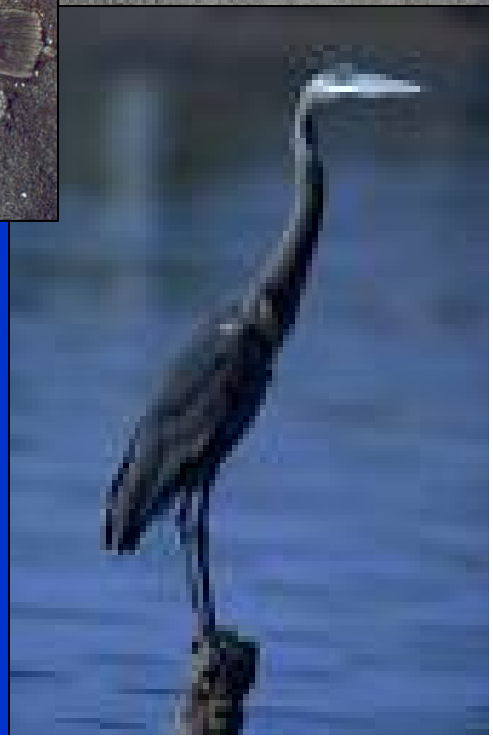
Record of Decision (ROD)

Baseline Human Health Risks

- Highest risk from eating resident fish and shellfish
- Risk from direct exposure much lower

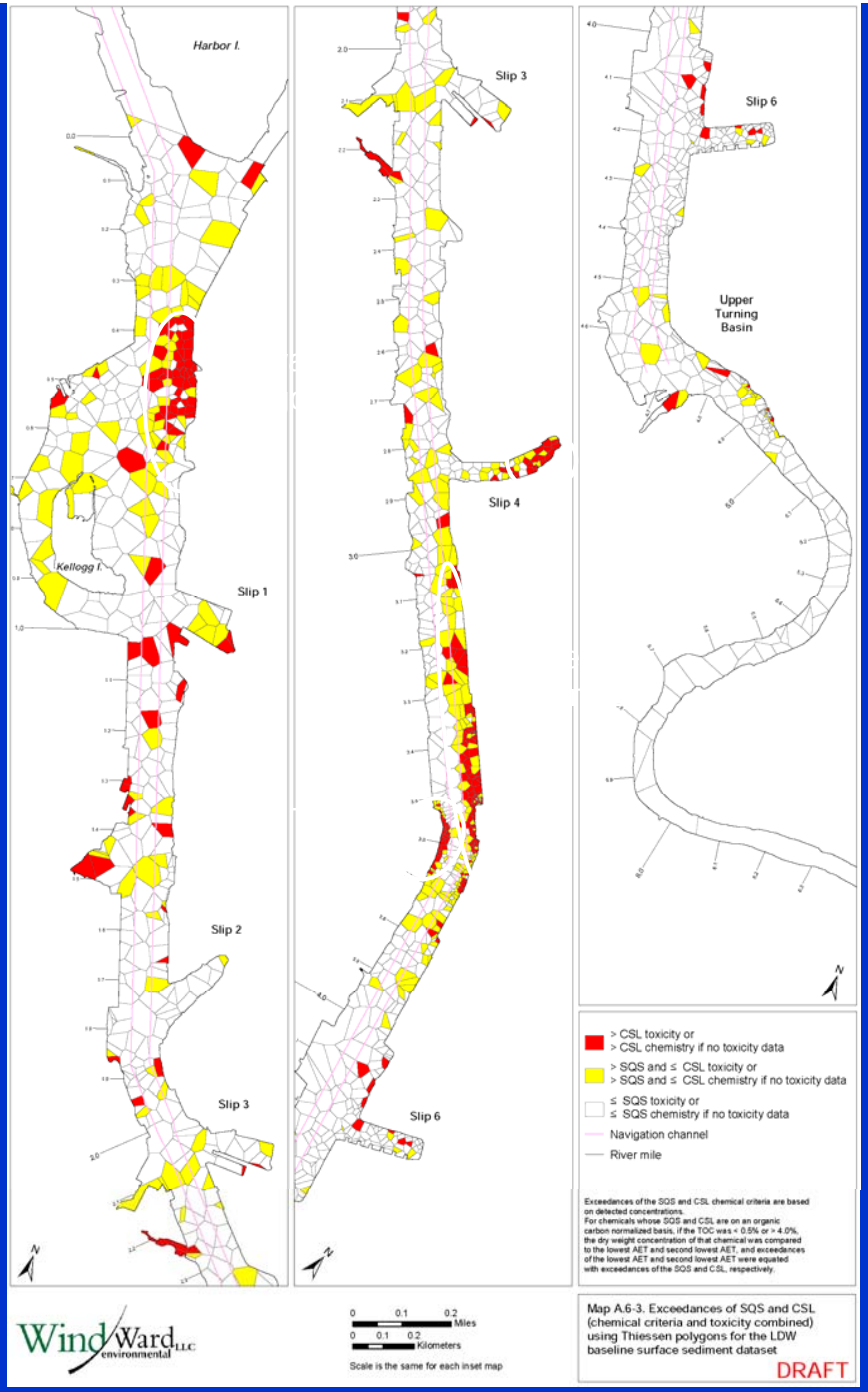
Baseline Ecological Health Risks

- Relatively low risk for crabs, fish, wildlife
- Risk for benthic community in some areas



Sediment Contamination

- Risk Drivers
  - PCBs
  - Arsenic
  - cPAHs
  - Dioxins/furans
  - 40 State "Sediment Management Standard" chemicals



Feasibility Study

- Remedial Action Objectives and Preliminary Remediation Goals
- Natural Recovery Potential
- Sediment Management Areas
- Available Cleanup Technologies
- Remedial Action Levels and Cleanup Alternatives
- Evaluate and Compare Alternatives

Remedial Action Objectives: Cleanup Goals

- Seafood Consumption

- Direct Contact with Sediments

- Benthic Invertebrates

- Fish and Wildlife

Cleanup goal is to reduce risk

Preliminary Remediation Goals

Risk Driver Chemicals	Units	HH Seafood Consumption	HH Direct Contact	Wildlife
PCBs	ug/kg dw	50-100*	500-1700	128
Arsenic	mg/kg dw	10-15*	10-15*	n/a
cPAHs	ug TEQ/kg dw	100-300*	100* to 380	n/a
Dioxins/Furans	ng TEQ/kg dw	5-10*	13-37	n/a

* Based on Anthropogenic Background Range

Benthic Coummunity goals set at Sediment Management Standards

Natural Recovery Potential

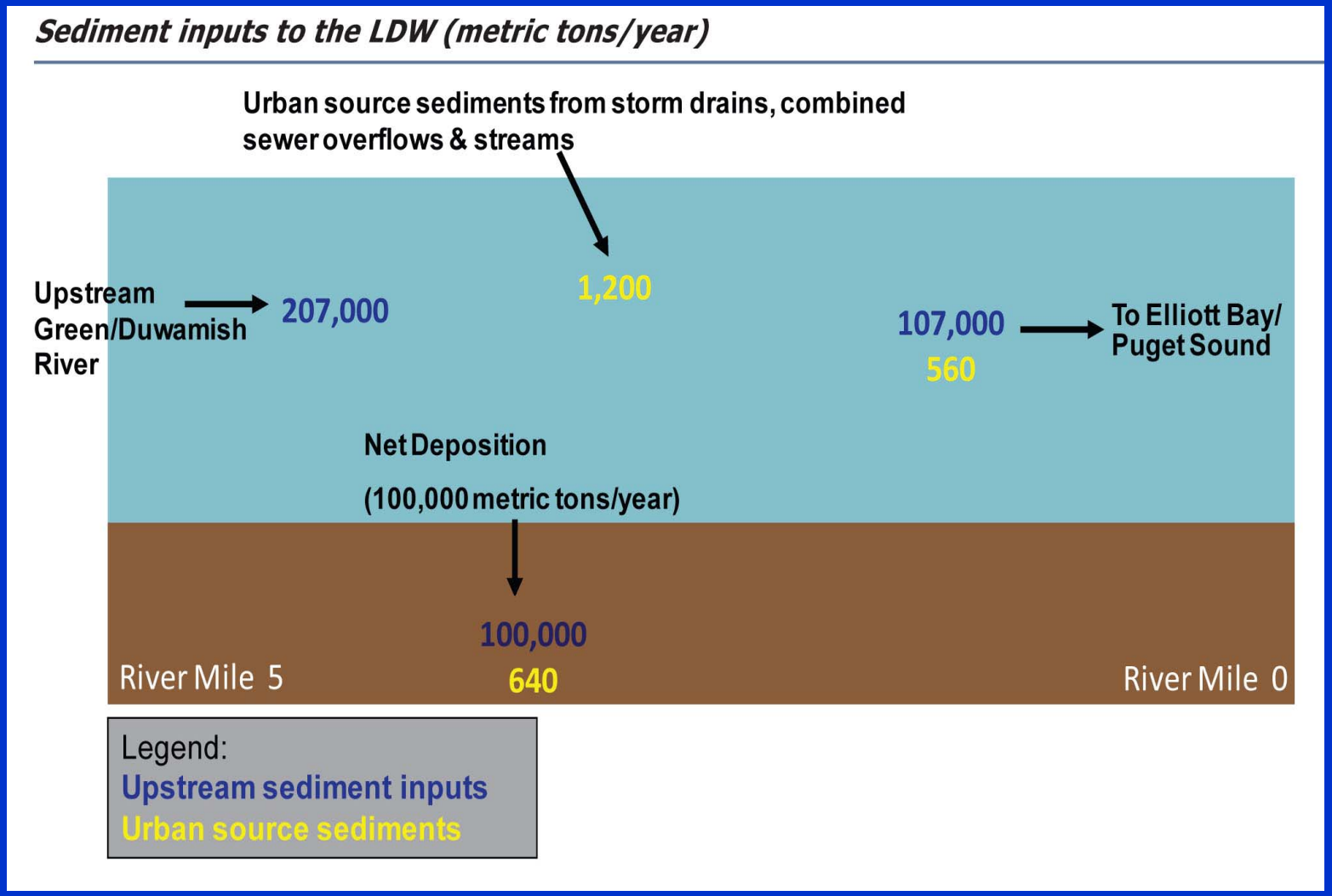
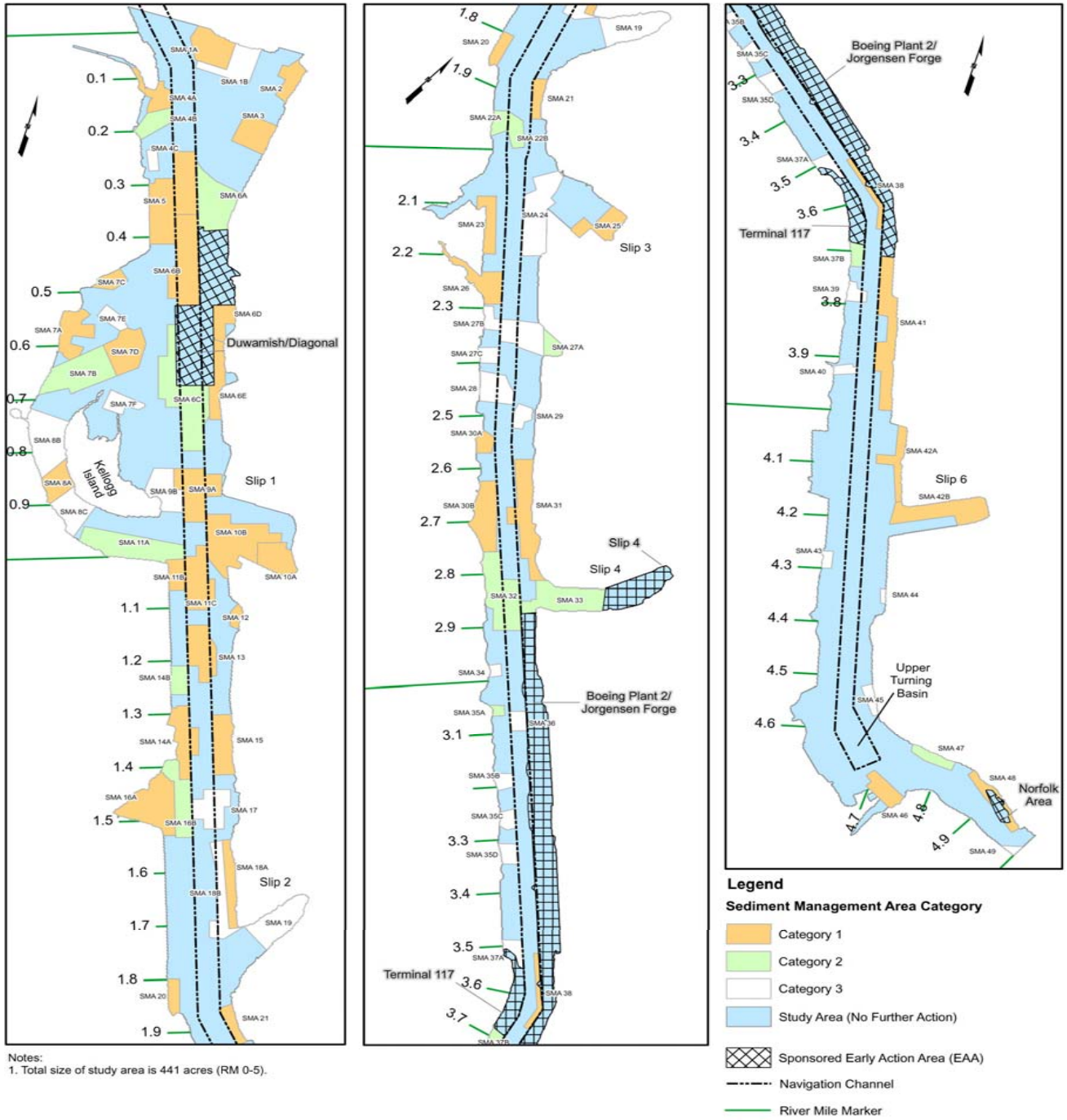
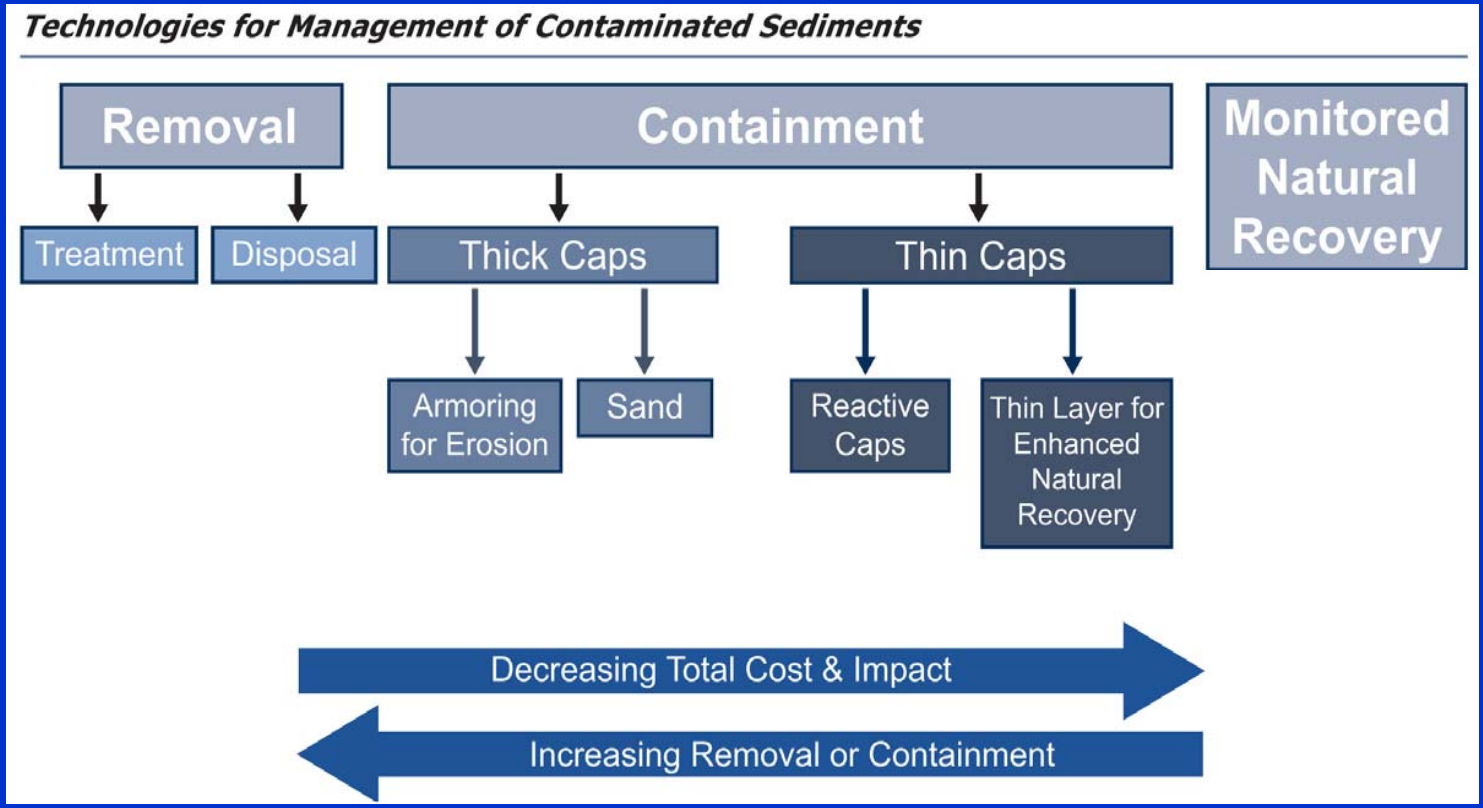


Figure ES-3: Sediment Management Areas



Notes:
1. Total size of study area is 441 acres (RM 0-5).

Multiple Technologies Available



Cleanup Alternatives

- Alt 1: No Further Action (sponsored EAAs)
- Alt 2: Focused Removal and CAD
- Alt 3: Increasing Active Cleanup – Emphasis on Containment
- Alt 4: Increasing Active Cleanup – Emphasis on Removal and Upland Disposal
- Alt 5: Max Removal and Upland Disposal

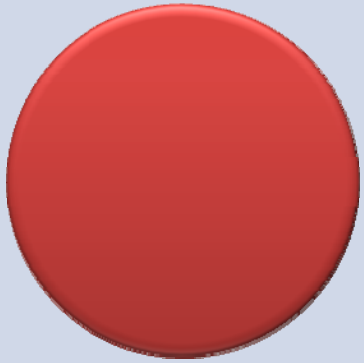
Remedial Action Levels

- Active cleanup: capping, dredging, ENR

PCBs µg/kg dw

- Alt 2: **2,200** – CSL Year 10
- Alt 3a/4a: **1,300** – CSL Year 0
- Alt 3b/4b: **700** – SQS Year 10
- Alt 3c/4c: **480** – SQS Year 10
- Alt 3d/4d: **240** – SQS Year 0
- Alt 5: **100** – Background Year 0

Alternative Highlights

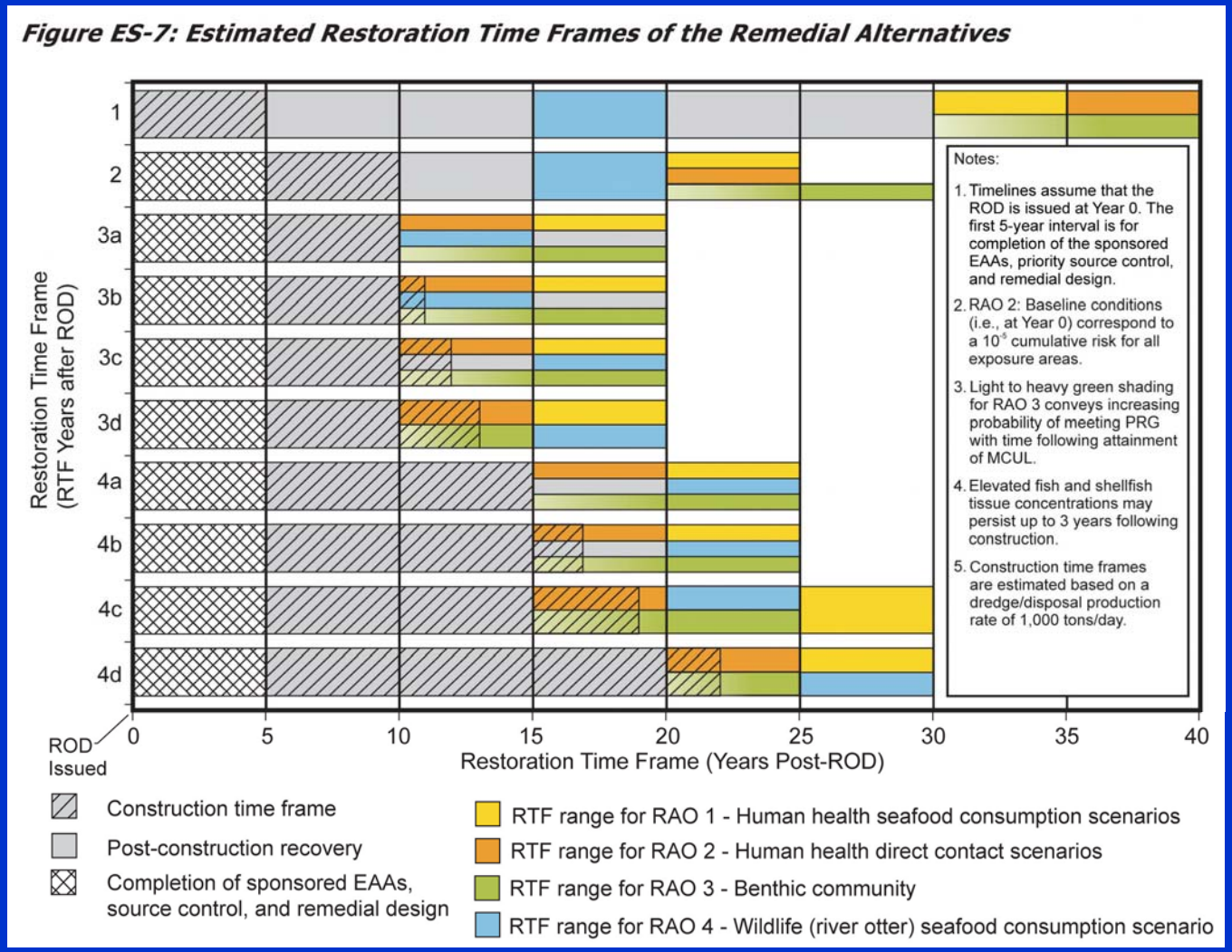
Early Actions Only	Focused Removal	Containment Focus	Removal Focus	Maximum Removal
				
Acres Managed : 34	Acres Managed : 193	Acres Managed: 193	Acres Managed: 193	Acres Managed: 315
Estimated Cost: $50 million	Estimated Cost: $220 million	Estimated Cost: $270 million	Estimated Cost: $480 million	Estimated Cost: $1.2 billion
Years to Complete: 5	Years to Complete:10	Years to Complete: 11	Years to Complete: 17	Years to Complete: 41
Goals: 35-40 years	Goals: 25-30 years	Goals: 15-20 years	Goals: 20-25 years	Goals: 45-50 years

Early Action & Dredging

Containment

Monitoring and Natural Recovery

How Long To Reach Goals



Alternative Selection Criteria

Protection of human health and the environment
Consistent with all other agency standards

Effective Long Term

Construction Time & Impacts

Includes Treatment

Ability to Get It Done

Cost

Acceptance from community, state and tribal nations

Comparisons of Alternatives

- Greater removal results in more permanence but more removal is harder to implement
- Longer construction times result in more short-term impacts to workers, community and environment
- More containment, and more monitoring, has lower overall costs
- All alternatives reach the same risk levels, but the time to achieve cleanup goals is different

How Do Alternatives Compare

Figure ES-6a: Comparative Analysis of Cleanup Alternatives

Alternative	Cost (Net Present Value)	CERCLA Evaluation of Alternatives [a]						
		Overall Protection of Human Health and the Environment	Compliance with ARARs	Reduction in Toxicity, Mobility or Volume Through Treatment [b]	Long-term Effectiveness	Short-term Effectiveness	Implementability	Cost
1	$50 M	●	●	●	●	◒	◉	◉
2	$220 M	○	◉	●	○	○	◒	◉
3a	$250 M	◉	◉	●	◓	◉	◉	◉
3b	$270 M	◉	◉	●	◓	◉	◉	◉
3c	$310 M	◓	◉	●	◓	◓	◓	◓
3d	$340 M	◓	◉	●	◓	◓	◓	◓
4a	$420 M	◓	◉	●	◉	○	◓	○
4b	$480 M	◓	◉	●	◉	○	○	○
4c	$530 M	○	◉	●	◉	◒	○	◒
4d	$650 M	○	◓	◒	◉	◒	◒	◒

Notes:

State, tribal, and community acceptance will be evaluated following formal public comment on the FS and EPA's proposed plan.

[a] *Ratings based on rankings shown in Table 10-1.*

[b] *Treatment is only a component of Alternative 4d, which uses soil washing technology.*

◉ - *Ranks very high compared to other alternatives*

◓ - *Ranks relatively high compared to other alternatives*

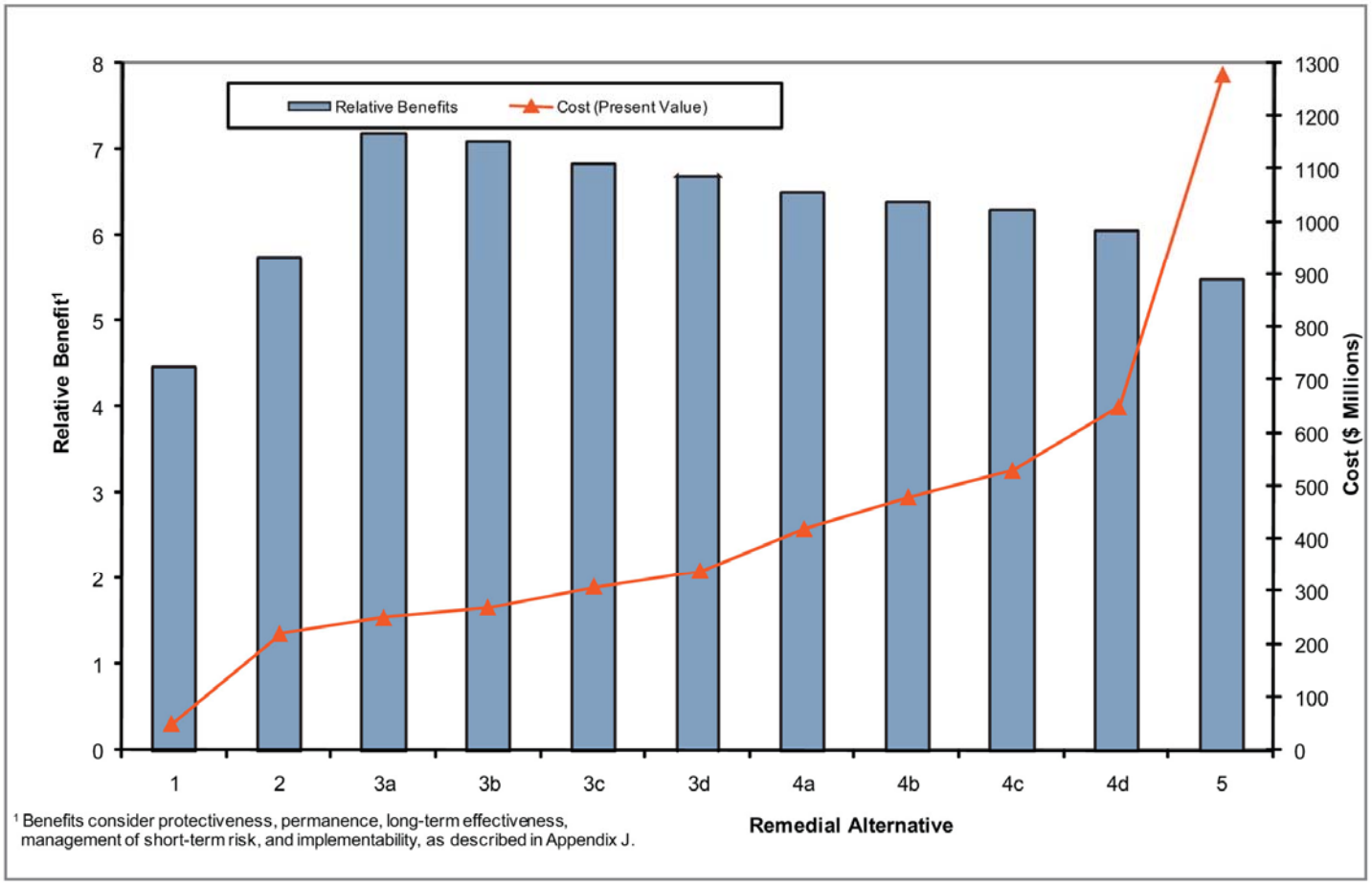
○ - *Ranks average compared to other alternatives*

◒ - *Ranks low-moderate compared to other alternatives*

● - *Ranks low compared to other alternatives*

Benefits vs. Costs

Figure ES-5: Total Benefits and Costs of Cleanup Alternatives



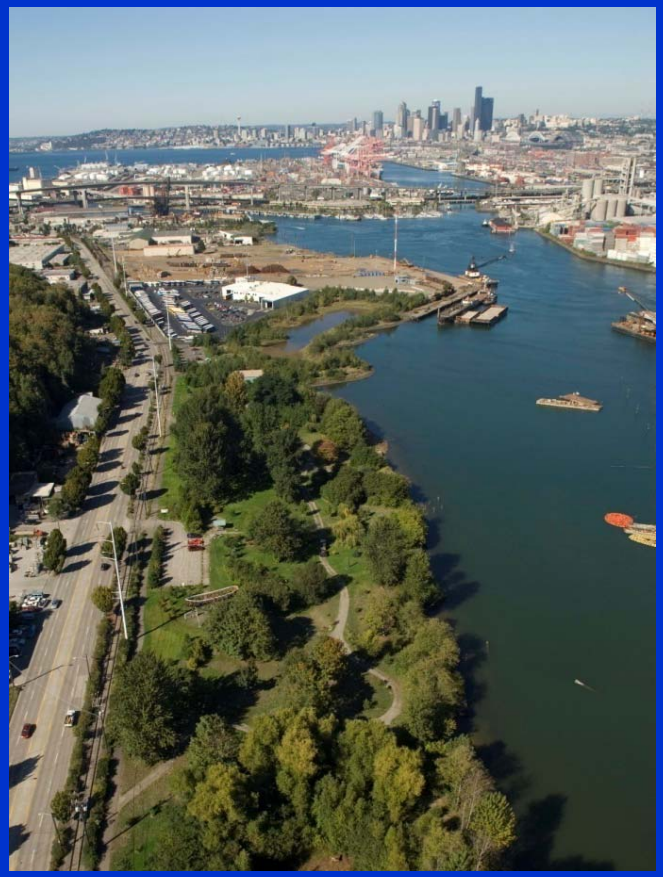
[1] Benefits consider protectiveness, permanence, long-term effectiveness, management of short-term risk, and implementability, as described in Appendix J.

Summary

- All alternatives reach same risk level with time
- All alternatives will be protective and meet goals but at different times
- Consumption advisories will likely remain, regardless of the alternative selected
- Monitored natural recovery is a cost effective and necessary component of the remedy

Recommended Approach

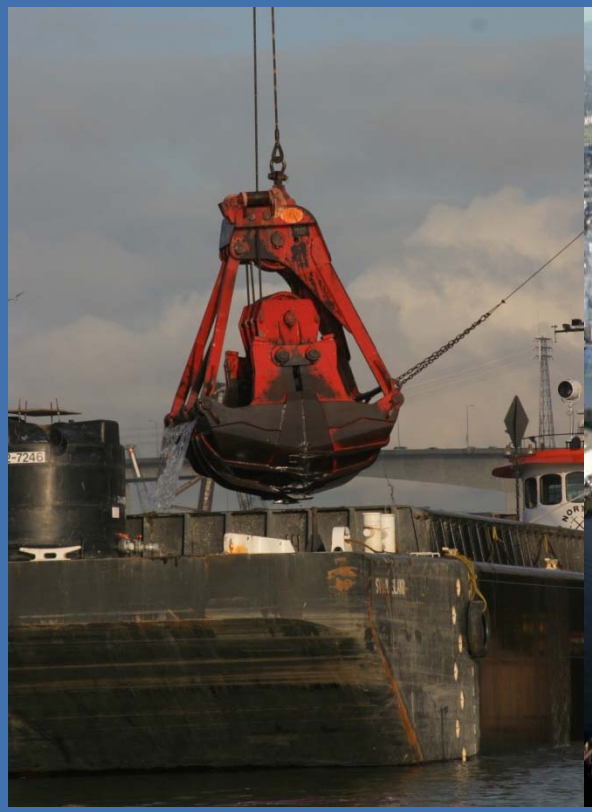
- Adaptive Management
  - "Worst First" to achieve greatest risk reduction as soon as possible
  - Monitor site
  - Take additional actions as needed

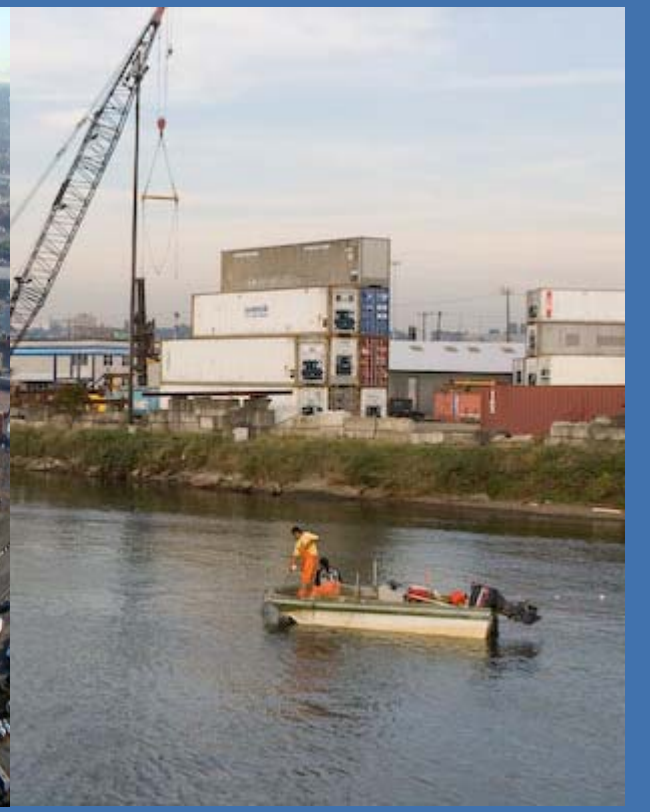


Key Decisions

- Is it worth spending more money and suffering higher short-term risk to permanently remove more contamination from the waterway?
- Is higher uncertainty acceptable if it results in potential cost savings to reach the same level of protection?
- How do we balance the wish to remediate sediment as soon as possible with remaining uncertainties regarding source control?
- How do we balance these cleanup costs with broader funding need to clean up Puget Sound?

Questions?





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