



# Lower Duwamish Waterway Update

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EPA Region 10

May 7, 2014



# Key parts of the Duwamish cleanup



# Lower Duwamish Waterway – what's new

- Boeing Plant 2 cleanup underway
- Terminal 117 cleanup underway
- Jorgensen Forge cleanup to start 2104
- Fishers Study underway
- Clam arsenic laboratory study completed
- Carbon amendment pilot study in initial stages
- Numerous source control activities and studies underway (Ecology)
- EPA is considering public comments on Proposed Cleanup Plan and developing draft Record of Decision

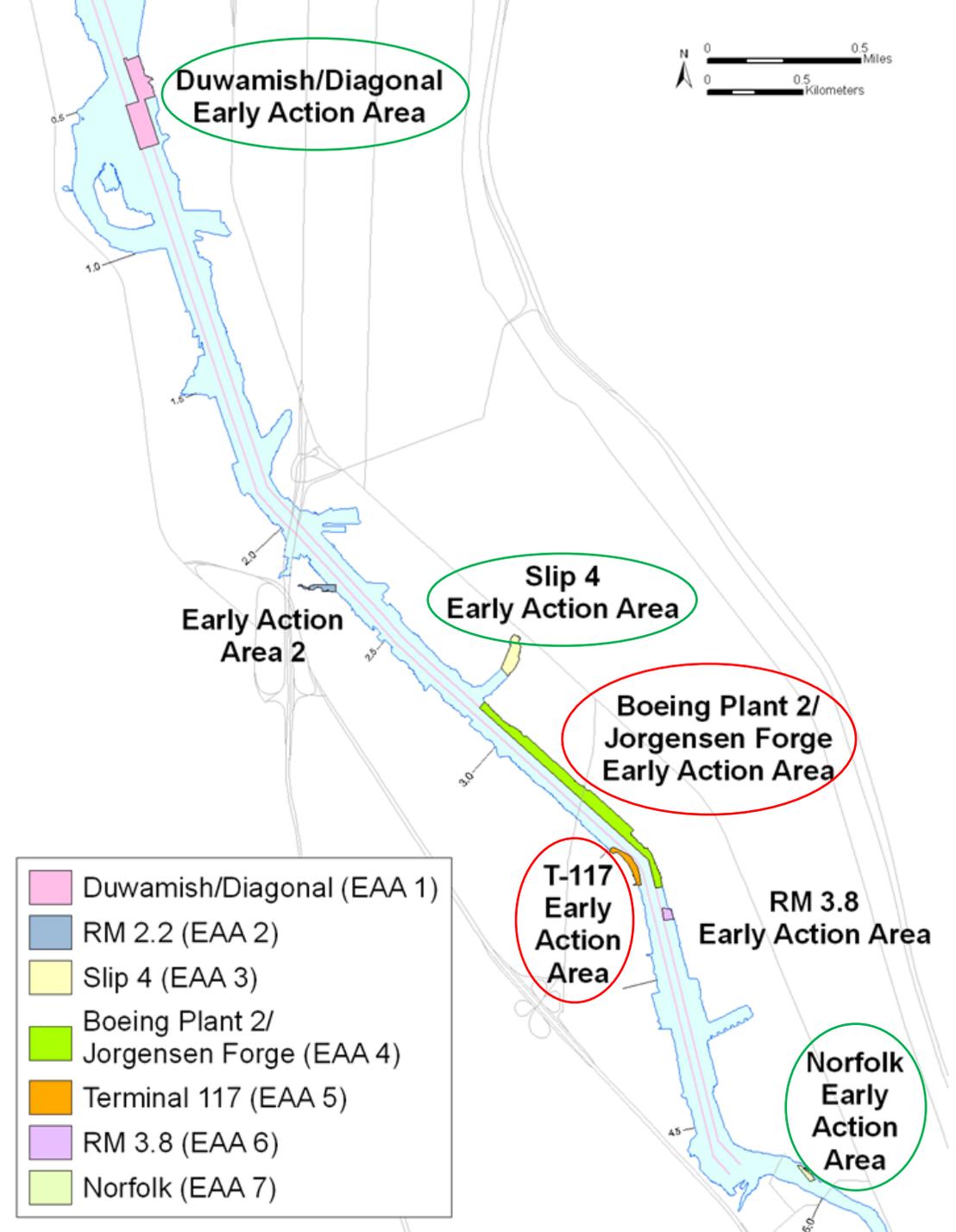
# Lower Duwamish Waterway Project Team

- EPA:
  - Melissa Blankenship - Boeing Plant 2
  - Piper Peterson - Terminal 117
  - Becky Chu - Jorgensen Forge, Fishers Study, Source Control coordination
  - Bruce Duncan – Clam Arsenic study
  - Allison Hiltner - Carbon Amendment Pilot Study, Record of Decision
- Ecology: Dan Cargill, Rick Thomas, Rachel McCrea, Ron Timm and many others – Source Control
- Corps of Engineers tech support: John Wakeman, Kristen Kerns, Veronica Henzi, Mandy Michalsen
- Lower Duwamish Waterway Group: Port of Seattle, City of Seattle, King County, The Boeing Company

# Lower Duwamish Early Action Areas

- Norfolk completed 1999 (King County)
- Duwamish/Diagonal completed 2005 (King County)
- Slip 4 completed 2012 (City of Seattle and King County)
- Boeing Plant 2 to be completed 2015 (Boeing)
- Terminal 117 to be completed 2014 (Port and City of Seattle)
- Jorgensen Forge to be completed 2015

(Green = completed Red = underway)



# Lower Duwamish Early Action Activity



# Boeing Plant 2 Progress



# Boeing Plant 2

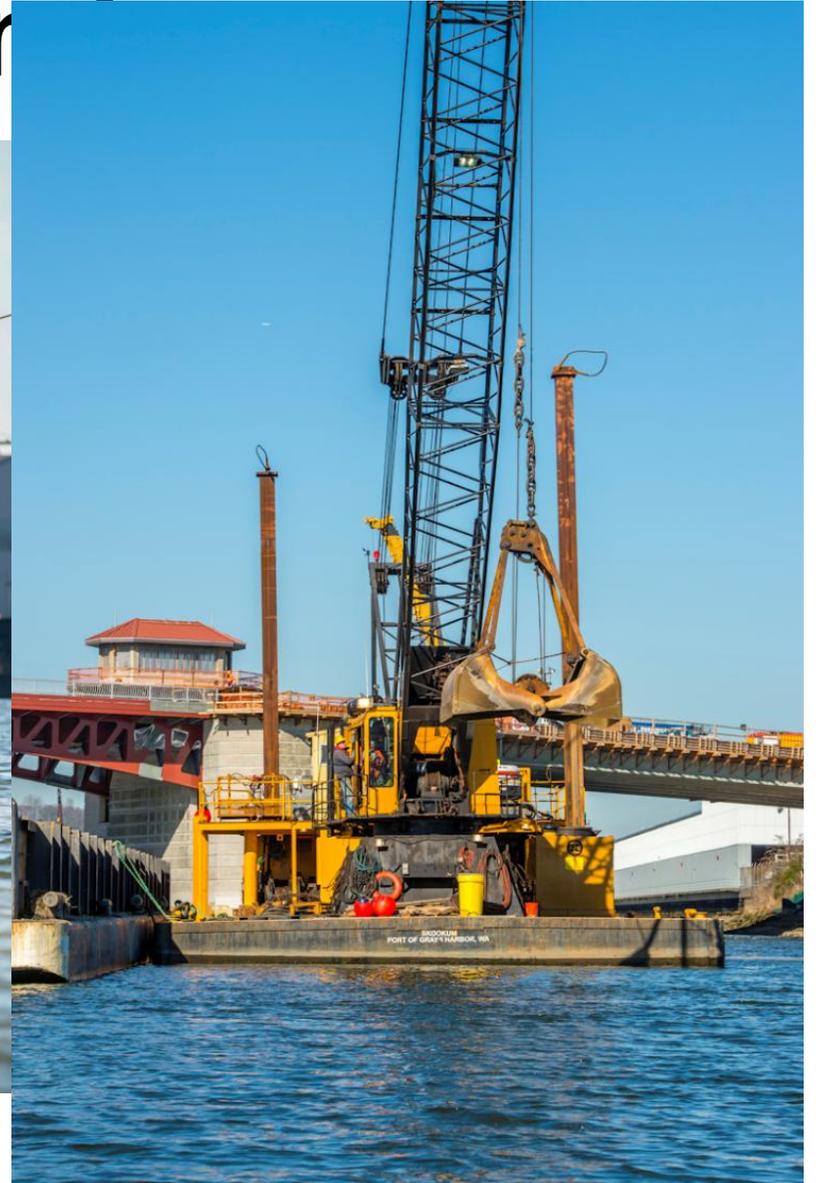
Two Seasons of Dredging Completed



# Boeing Plant 2 | Dredging Overview



# Backfilling with Clean Sand

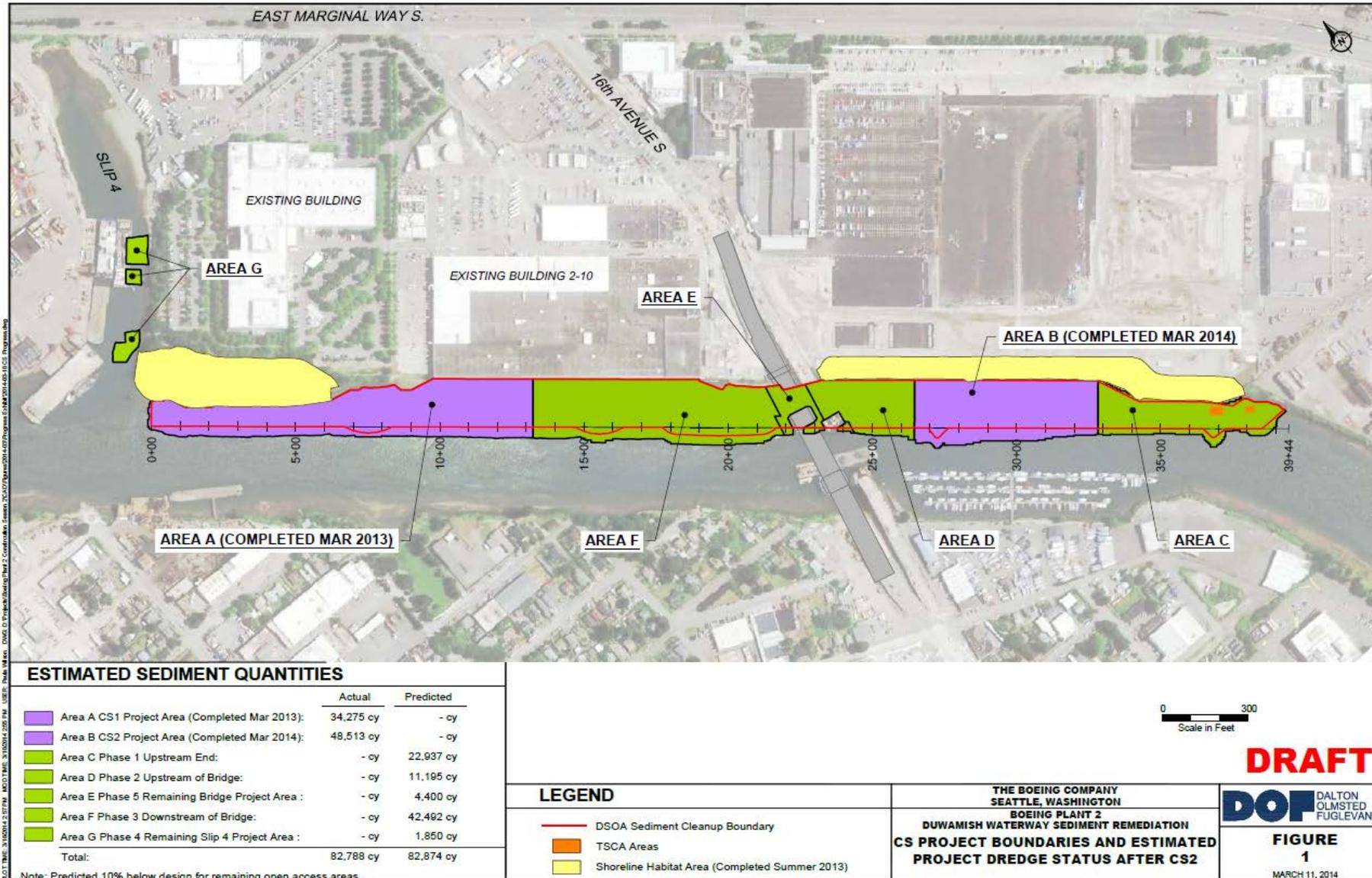


# Boeing Plant 2

## Construction Season 2 Production Summary

<b>Construction Season 2 Production Summary</b>		
<b>Parameter</b>	<b>Units</b>	<b>Productivity</b>
<b>Dredging</b>		
a. Quantity - Actual	CY	48,513
b. Quantity - Planned	CY	46,312
<b>Backfilling</b>		
a. Initial Backfill	Tons	6,155
b. Average Thickness	Feet	0.5
c. Intermediate Backfill	Tons	49,247
<b>Transload</b>		
a. Barges	Barges	178
b. Quantity	Tons	66,990.00
c. Rail Cars to Landfill	Cars	617
d. Trucks to Landfill	Trucks	38
<b>Water Treatment</b>		
a. DRWTS Treated	Gallons	9,299,800
b. Solids Disposal	Tons	1705

# Boeing Plant 2 | Project Status



# New Fish & Wildlife Habitat

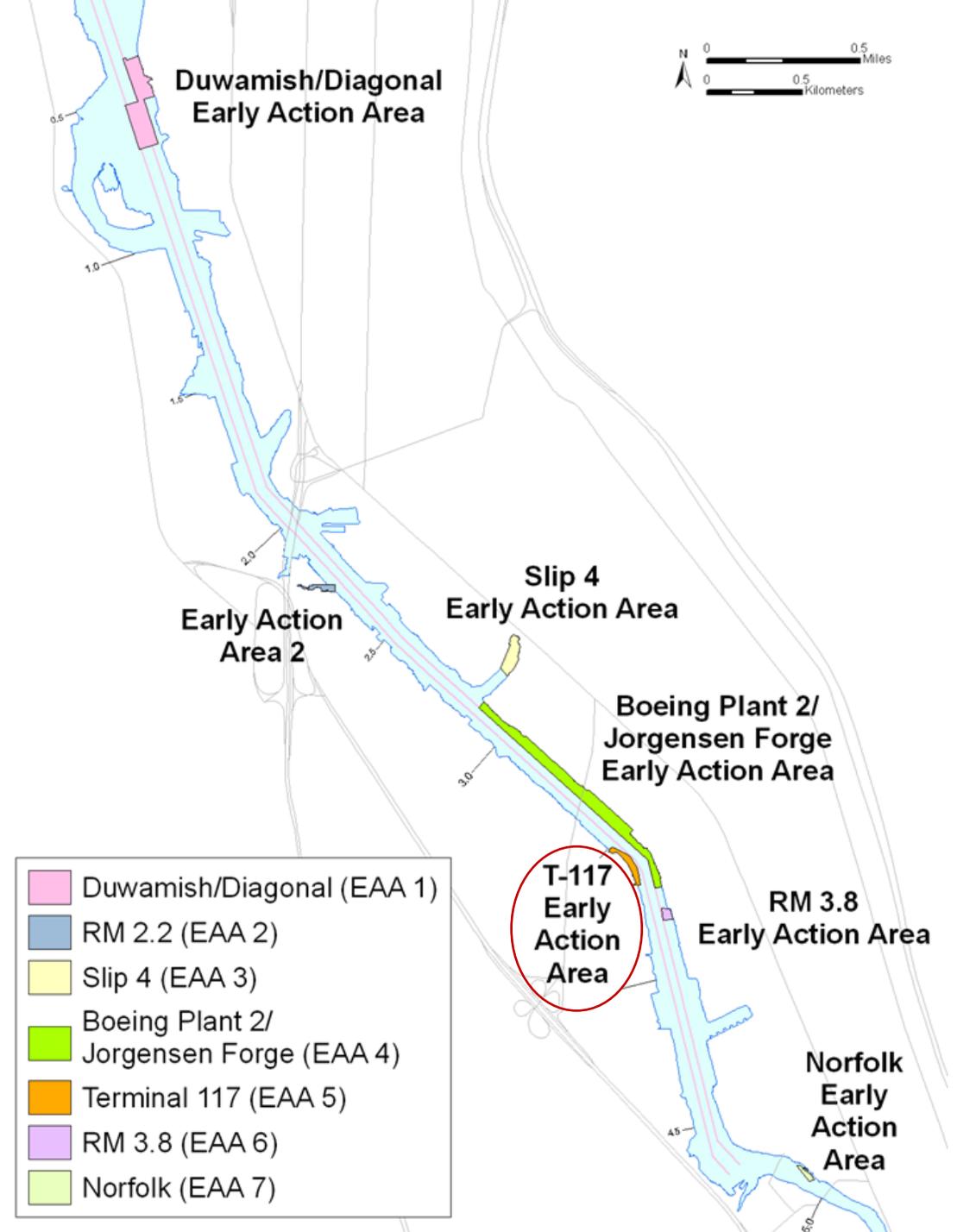


# New Fish & Wildlife Habitat



# Terminal 117 project status

- Dredged 10,000 cy
- Will complete backfill/capping this year
- 12 acre restoration project to be built summer 2016





T-117 uplands/sediments cleanup, looking east



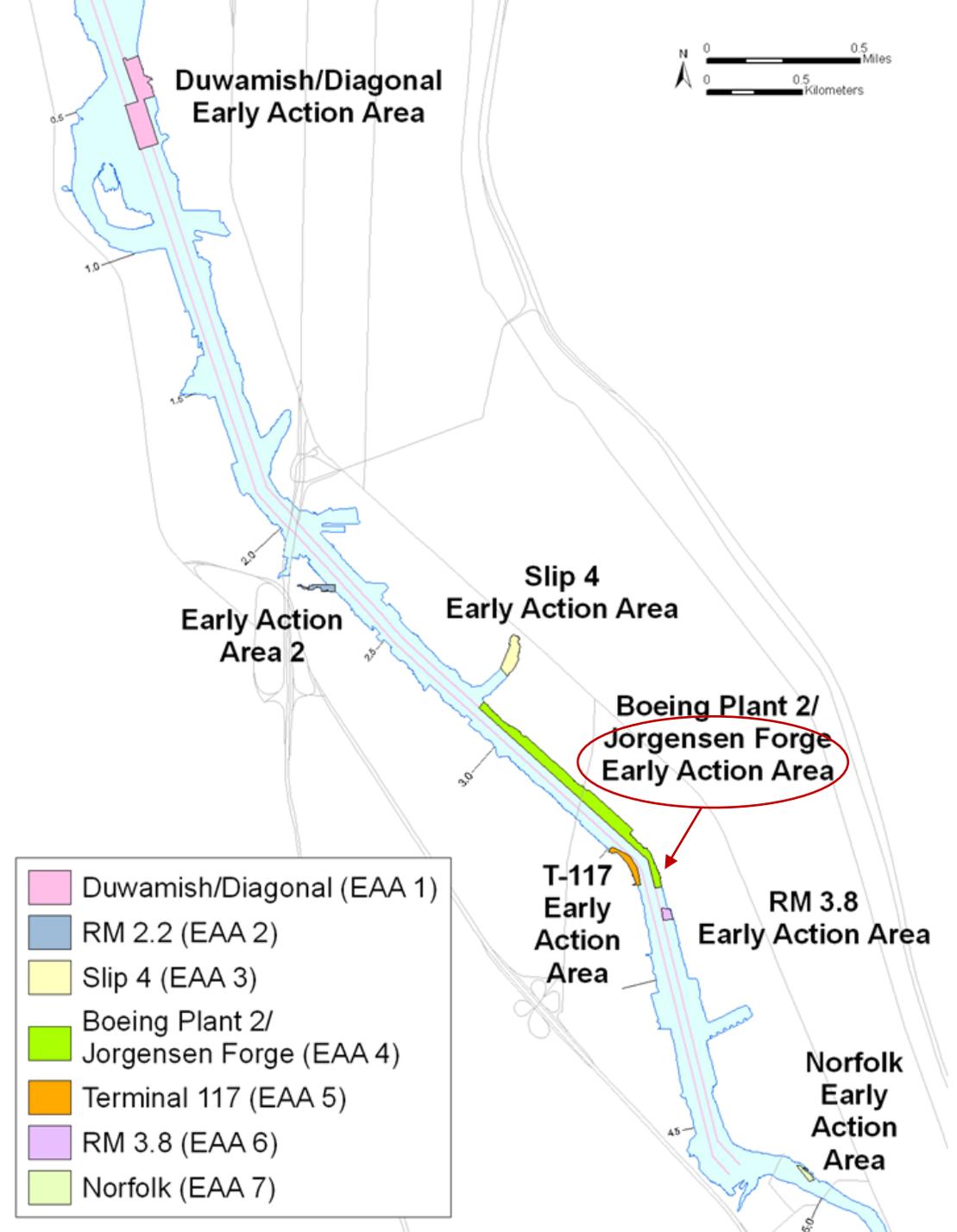
T-117 uplands/sediments cleanup, looking NE to Boeing Plant 2



T-117 uplands/sediments cleanup, looking north to South Park bridge

# Jorgensen Forge

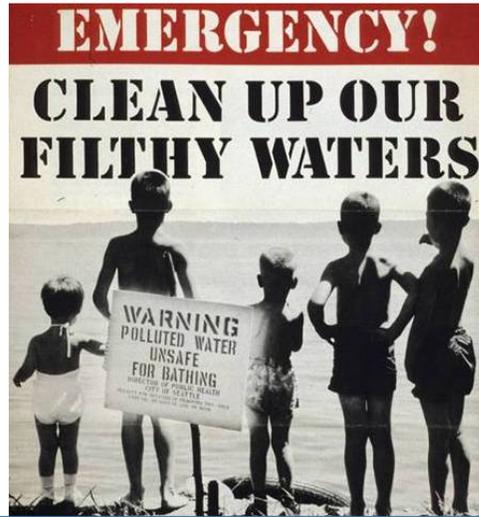
- Completed a sheet pile wall this spring
- Construction will start July 20; to be completed by Sept 7
- Will dredge 15,000 cy and backfill



# LDW Early Action Overview

- In 2013/14 dredging season – 48,000 cy contaminated sediments removed from Boeing Plant 2 and 10,000 cy from T-117
- Remaining contaminated sediments will be removed by the end of the 2015/16 dredging season
- Overall, Early Actions will:
  - Clean up 29 acres of contaminated sediments
  - Remove over 300,000 cy of contaminated sediments from the LDW
  - Reduce PCB concentrations in surface sediments by 50%

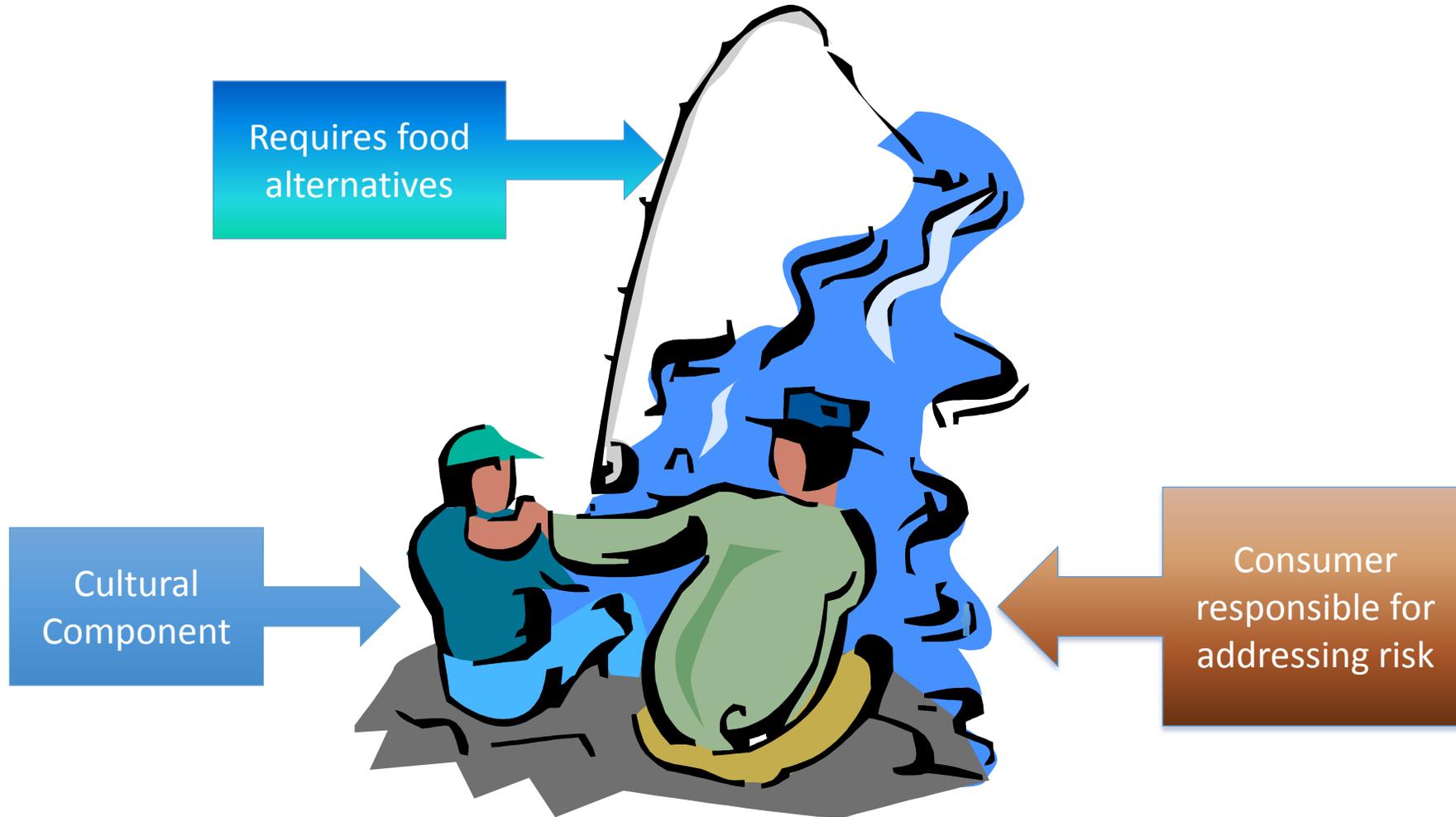
# Protecting Fish Consumers in EPA's Superfund Cleanup – the LDW Fishers Study



# Do Advisories Work?



# Why don't advisories work?



# What's Next?

Finalize Implementation Plan

Pilot Project

Initiate Study



DRCC

# Activated Carbon Pilot Study

- LDW proposed plan calls for placing sand + activated carbon (AC) if pilot studies are successful
- EPA, Ecology, and LDWG are discussing doing some of the groundwork to implement pilot studies prior to issuing EPA's Record of Decision
- EPA and Ecology are consulting with Tribes and other stakeholders
- Currently discussing Scope of Work
- Plan is to initiate the pilot studies in 2015/16 dredging season

# Evaluation of Exposure to Arsenic of the Eastern Soft Shell Clam

## Regional Applied Research Effort (RARE):

“Bioaccumulation of Arsenic in *Mya arenaria* Exposed for 60 Days to Suspended Sediments and Undisturbed Bed Sediments from the Lower Duwamish Waterway”

# Lab-Based Questions

Experimental objective: half of the risk from seafood consumption arises from clam inorganic arsenic; so, lab studies asked:

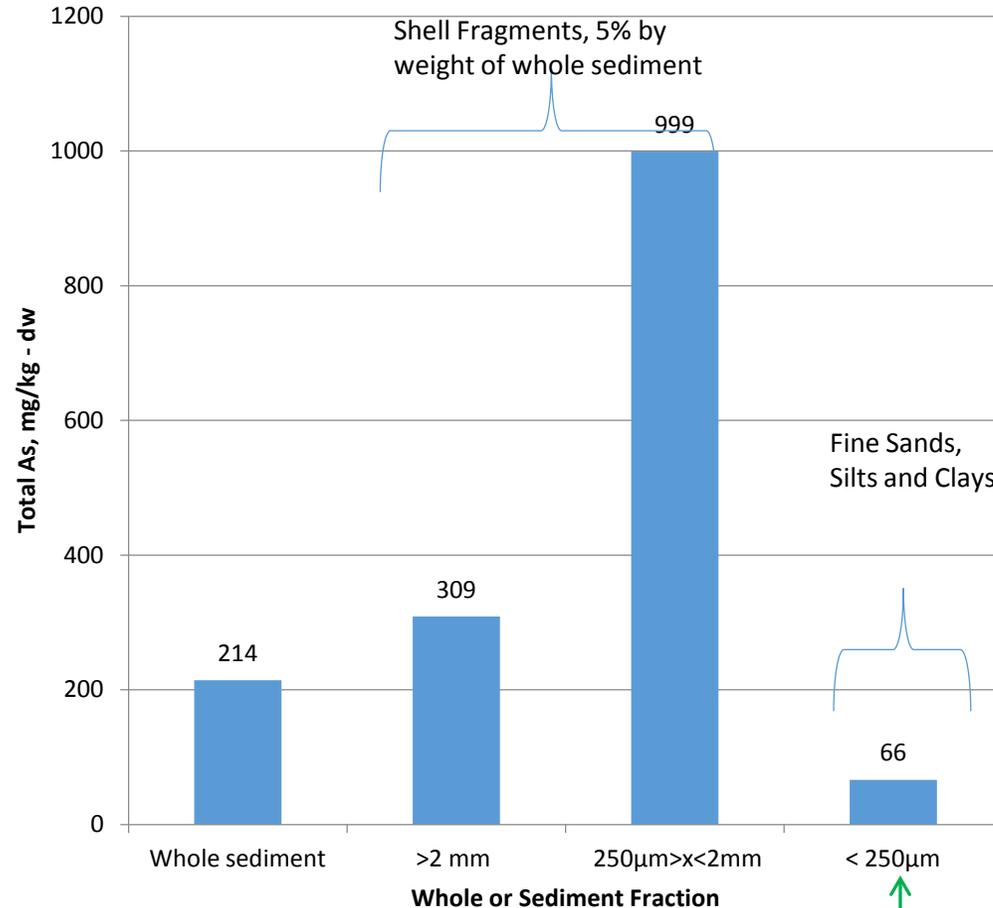
1. Which is a more important exposure route: suspended material or sediment? (→If sediment, a better likelihood of remedial intervention.)
2. Is high inorganic arsenic a *Mya* pattern or a site-specific pattern? (→Is there something special going on in the LDW?)

# Sediment Collections Fractions

Intertidal collections:

- North of Kellogg Island
- Slip 1
- ~60% inorganic arsenic in composite sample shown
- Bulk of arsenic was in shell fragments!

# Sediment

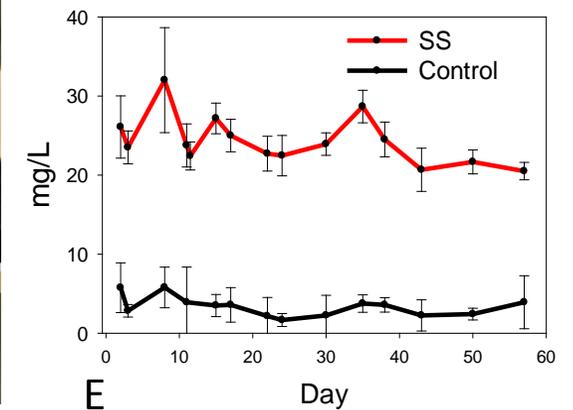


Used for suspended and bedded exposures

# Exposure Methods

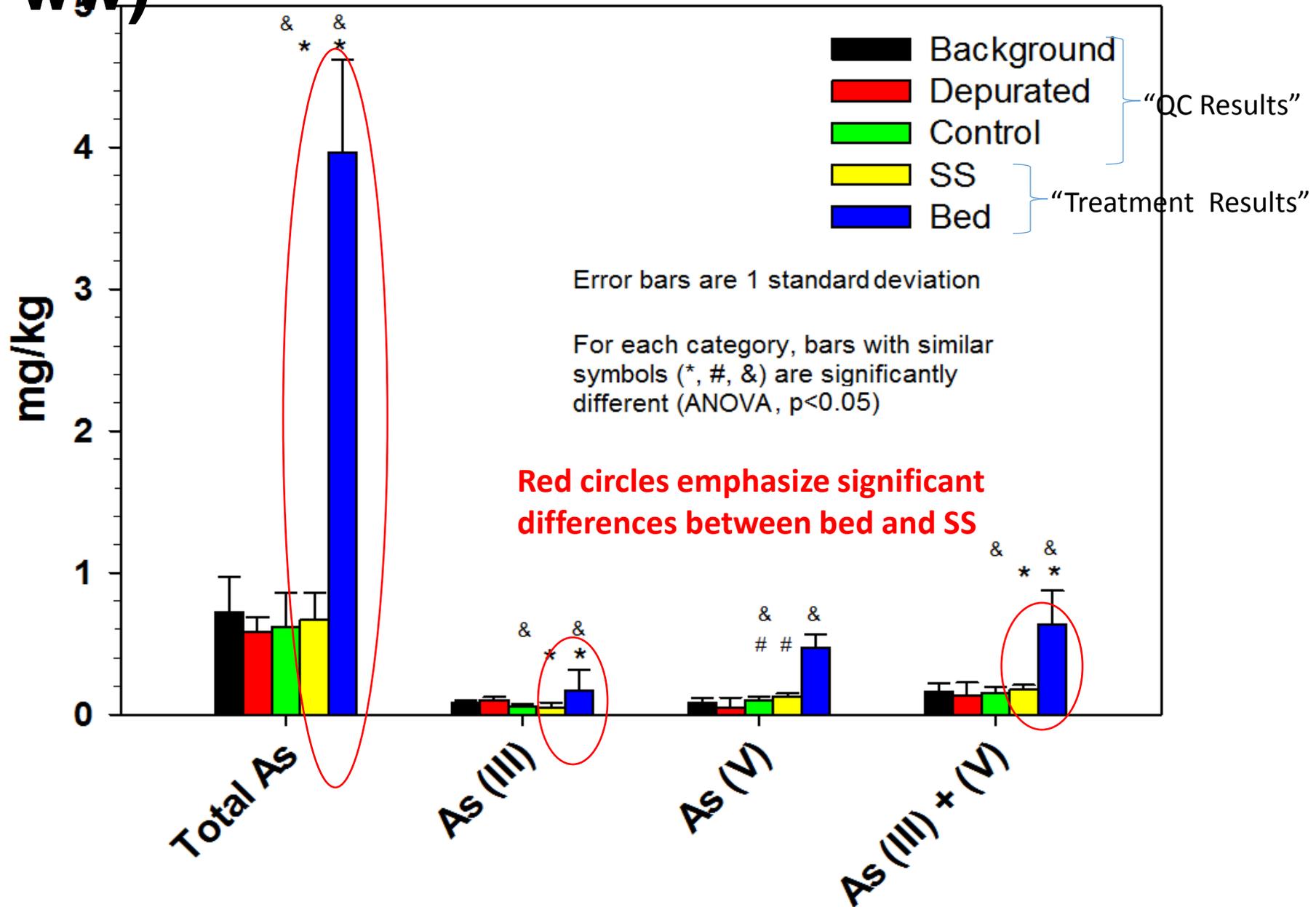


- A – Depuration
- B – Exposure to “BED”
- C – Clam “sandwich”
- D – Exposure to Suspended Solids (SS) @ 30 mg/L in FLEES\*
- E – SS and Control suspended sediment monitoring in FLEES



\*Fish Larvae and Egg Exposure System (FLEES, Lutz et al. 2012):  
NTU measured by optical backscatter every 3 minutes

# Tissue Results Comparison (mg/kg ww)



# Source Control



DEPARTMENT OF  
**ECOLOGY**  
State of Washington



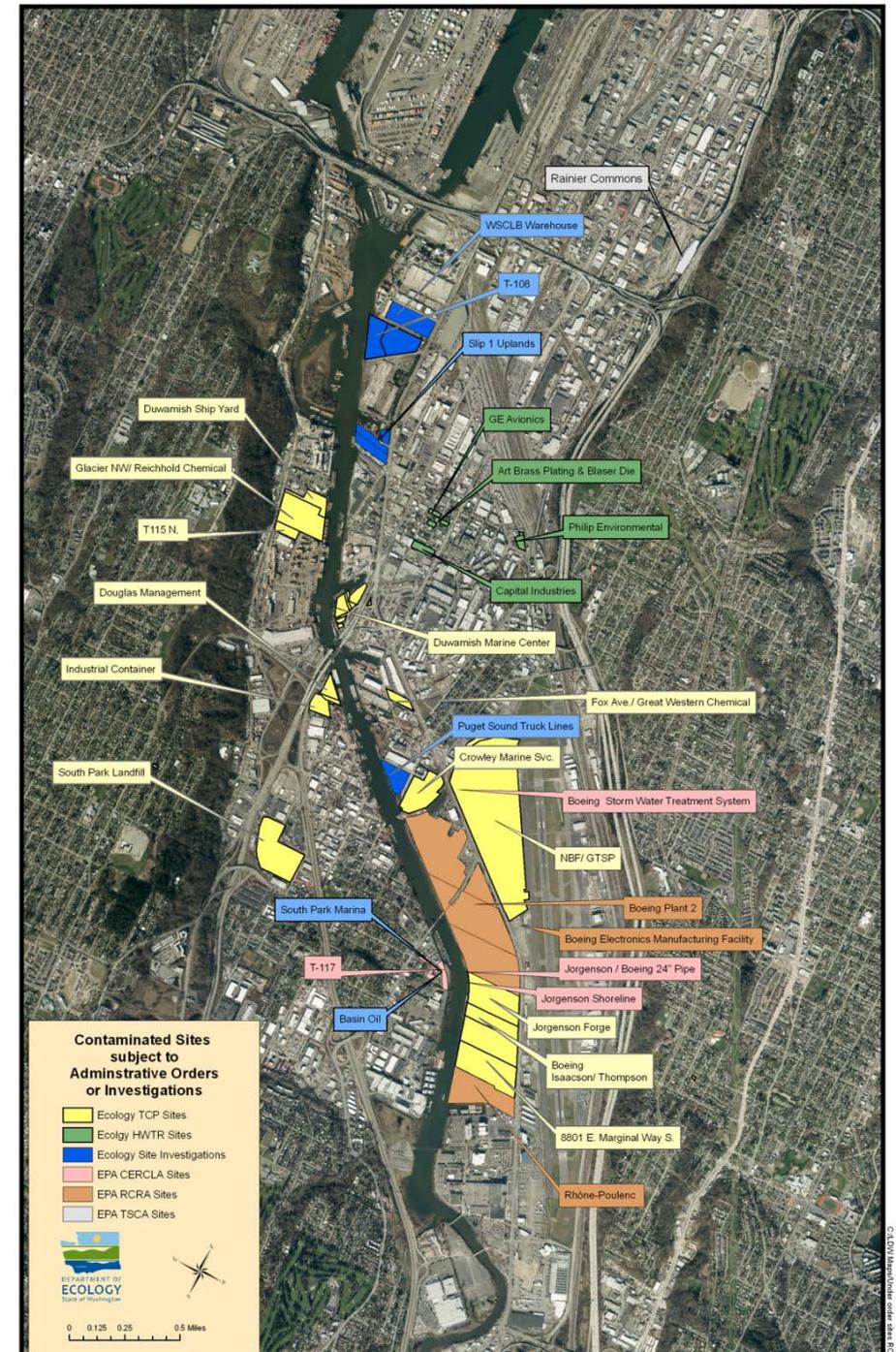
# Site Cleanup & Inspections:

## Ecology

- 18 facilities with Agreed Orders
  - 13 in Toxics Cleanup Program
  - 5 in Hazardous Waste Program
- 6 site investigations
- 4 voluntary cleanup program sites

## EPA

- 6 facilities with CERCLA, RCRA or TSCA orders



# Site Cleanup & Inspections Compliance Assurance



- **Business Inspections – 2013**
- **Seattle – 284** inspections at **177** businesses
- **Ecology Urban Waters – 207** Inspections at **176** businesses
- **King County - 15** Inspections at **12** businesses
- Level III stormwater treatment
- Engineering design reviews

**“Source control is like laundry. It is never finished.”** *(Kris Flint, USEPA, retired)*

# Source Control Studies

- Air Deposition
- Stormwater Pollution Prevention Plans & Outfall Inventory
- Industrial Facilities Stormwater Characterization Study
- Green-Duwamish River Scoping Study
- Green-Duwamish River Loading Study
- Cement Kiln Dust
- Site Hazard Assessments
- King county also conducting numerous studies in Green/Duwamish



# Record of Decision

- Public comment period on proposed cleanup plan Feb – June 2013
- EPA received 2327 public comments on the Proposed Plan
- We are considering public comments as we develop our Record of Decision (ROD)
- ROD will be issued by the end of 2014
  - Will include summary of all significant comments and responses

# For More Information

- EPA's web site: [www.epa.gov/region10/duwamish.html](http://www.epa.gov/region10/duwamish.html)  
(for April 15 presentations, click on "documents", scroll to bottom of page)
- Ecology's web site:  
[http://www.ecy.wa.gov/programs/tcp/sites\\_brochure/lower\\_duwamish/lower\\_duwamish\\_hp.html](http://www.ecy.wa.gov/programs/tcp/sites_brochure/lower_duwamish/lower_duwamish_hp.html)
- Terminal 117 updates: [www.t117.com](http://www.t117.com)