Disposal Site Monitoring Results

Celia Barton, WDNR
David Fox, USACE

SMARM
May 7, 2014

United States Environmental Protection Agency

Department of Ecology

Washington State Department of Natural Resources

Highlights of 2014

- Multibeam and SPI at Elliott Bay and Commencement Bay
- Partial Monitoring at Elliott Bay
- Targeted Disposal at Elliott Bay
- Multibeam at Anderson/Ketron
- Disposal modeling at Anderson/Ketron
- Future trawls at Anderson/Ketron

EPA United States Environmental Protection Agency

Department of Ecology

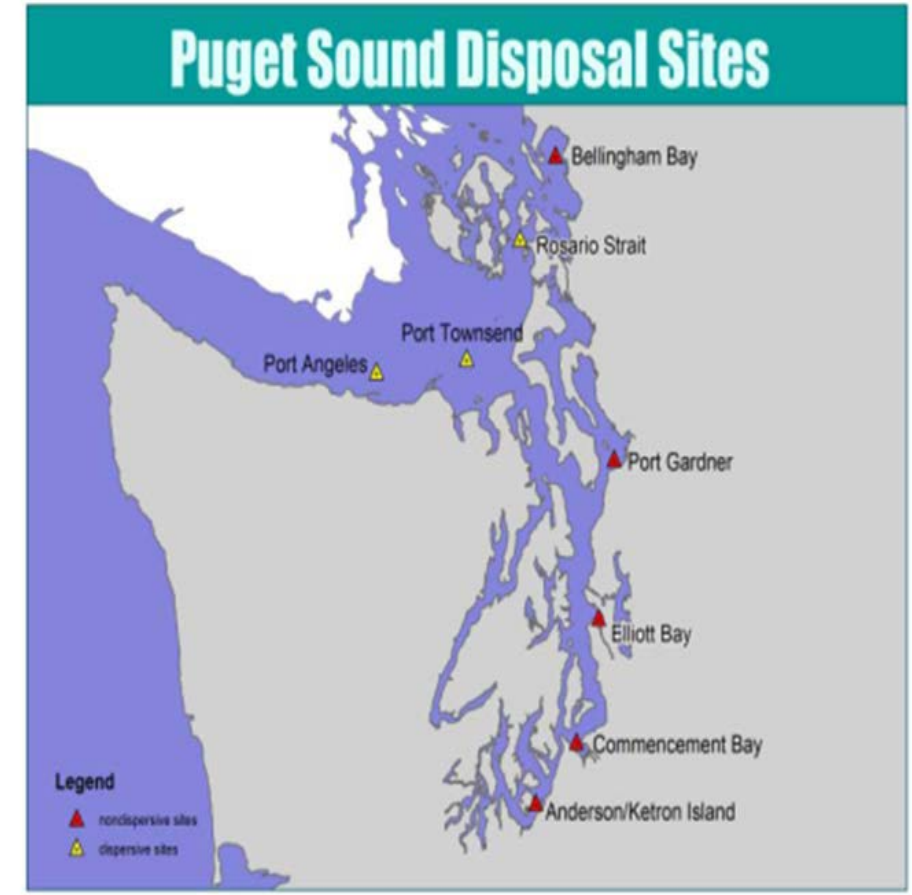
WASHINGTON STATE DEPARTMENT OF Natural Resources

Puget Sound:

- 8 disposal sites
  - 5 non-dispersive sites
  - 3 dispersive sites

Grays Harbor / Willapa:

- 4 estuarine and 1 ocean disposal sites
  - All dispersive sites



United States Environmental Protection Agency

Department of Ecology

Washington State Department of Natural Resources

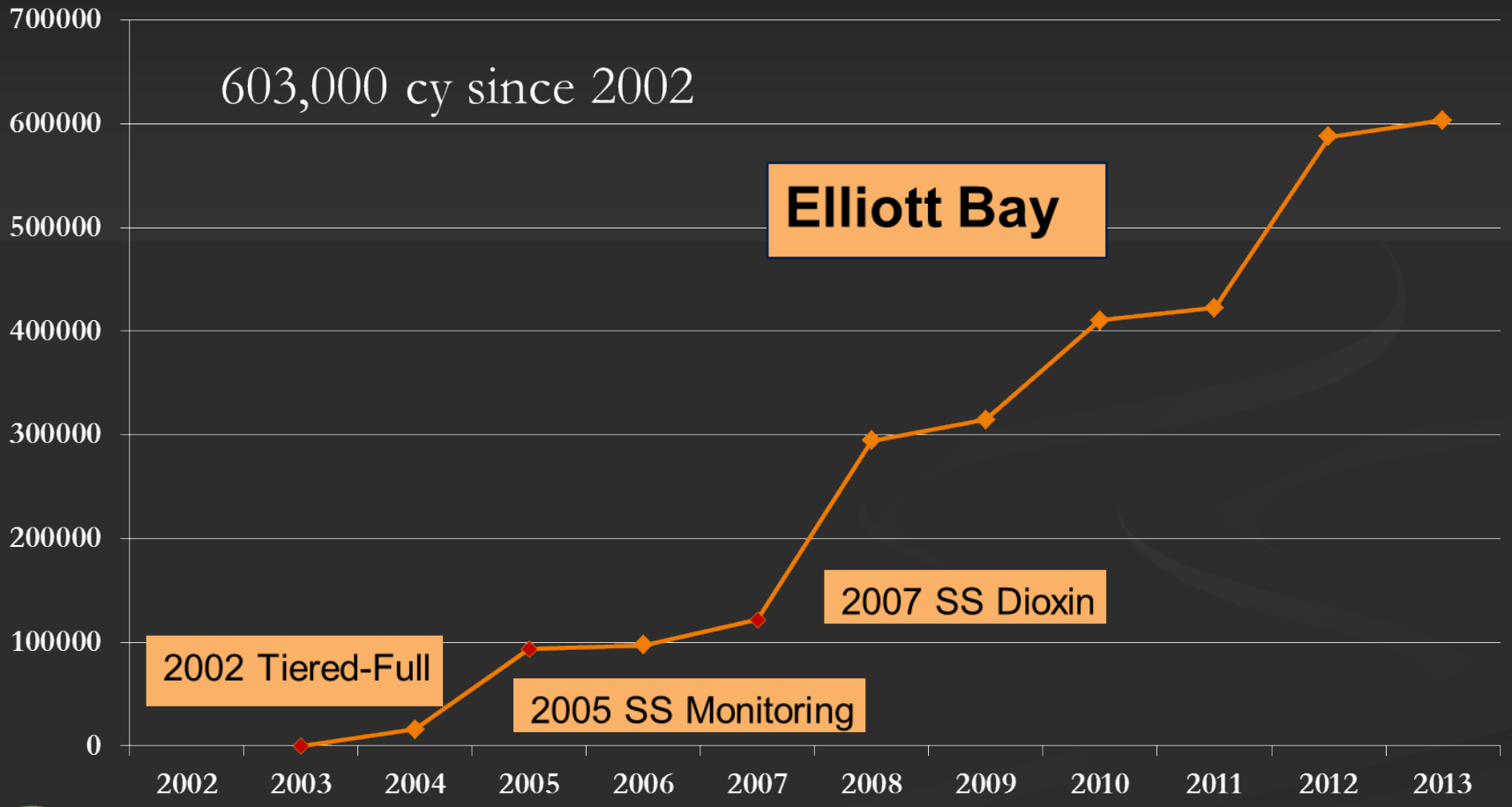
Site Monitoring

Moved to volume based monitoring trigger in 1997 and reduced frequency and scope of monitoring based on past documented compliance with site management objectives.

- Following 2002 SMARM increased disposal volume trigger to 500,000 cubic yards at Commencement Bay, Elliott Bay and Port Gardner

- Corps lead on Physical Monitoring, DNR lead on Chemical and Biological Monitoring

Cumulative Volumes Since Last Monitoring



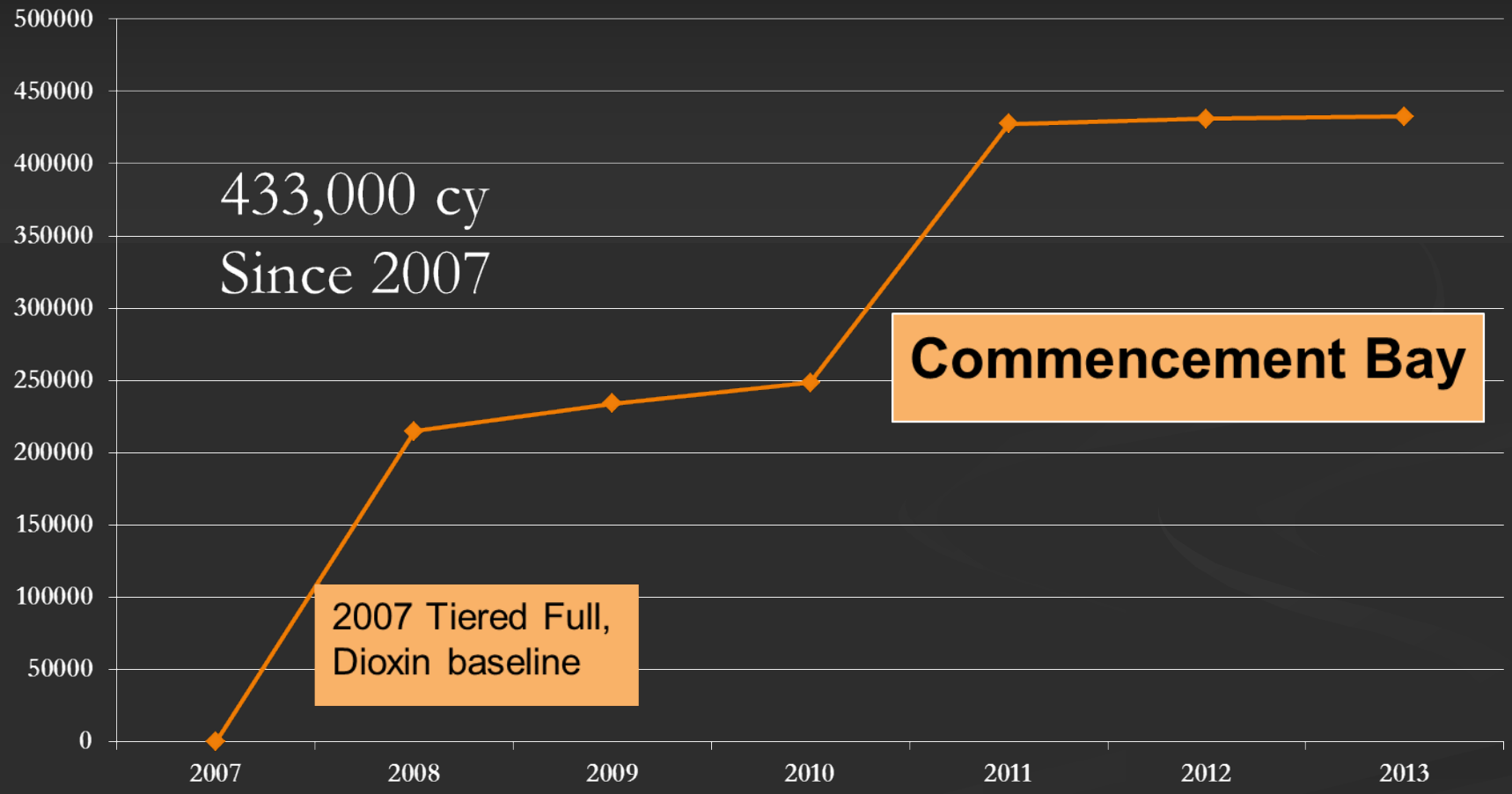
SEATTLE DISTRICT

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

Cumulative Volumes Since Last Monitoring



SEATTLE DISTRICT
SERVICE TO THE NORTHWEST

EPA United States Environmental Protection Agency

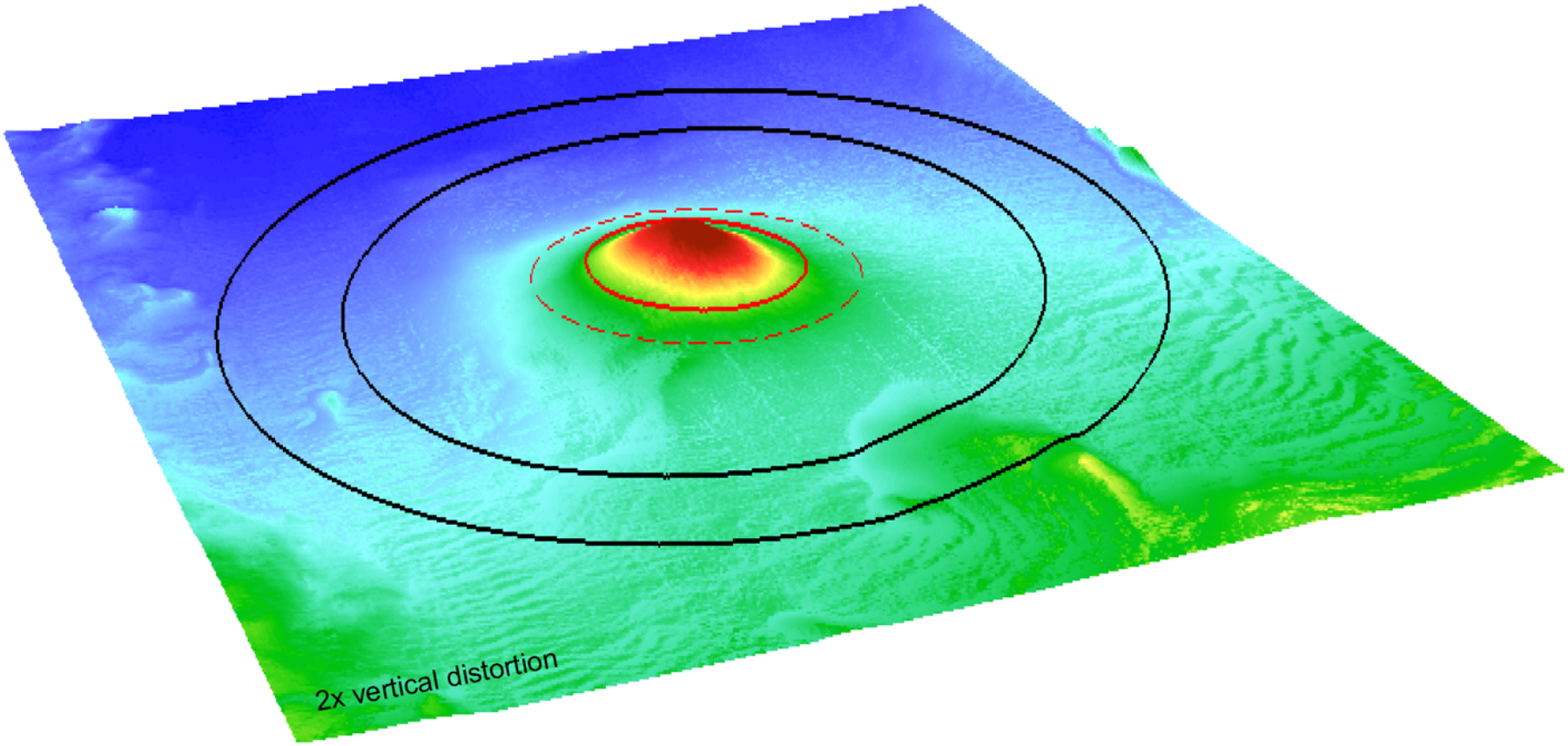
Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

Monitoring in DY14

- Volume trigger met at Elliott Bay
  - Partial Monitoring
    - 25 year monitoring history, effectiveness of characterization
    - Physical and Environmental monitoring
- Disposal coordinates at Commencement Bay site target were shifted in 2007
  - 565 feet southeast of center
  - Physical monitoring in 2014 to check on effects

2013 Commencement Bay Multibeam Survey
Corps of Engineers



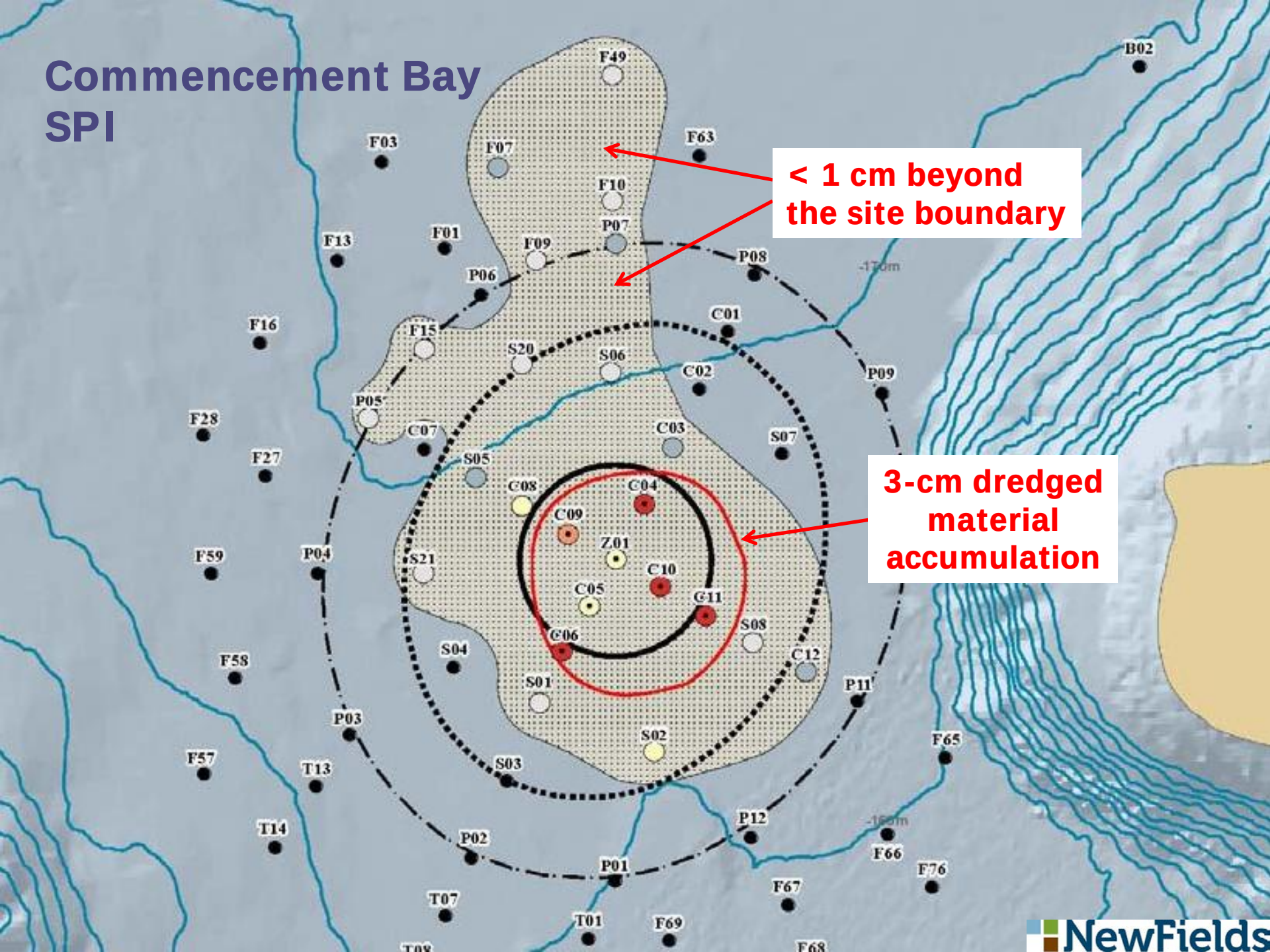
-560 -540 -520 -500 -480 -460 -440 -420

DEPTH (FT, MLLW)

DISPOSAL ZONE (1800' DIAMETER)
& TARGET AREA (1200' DIAMETER)

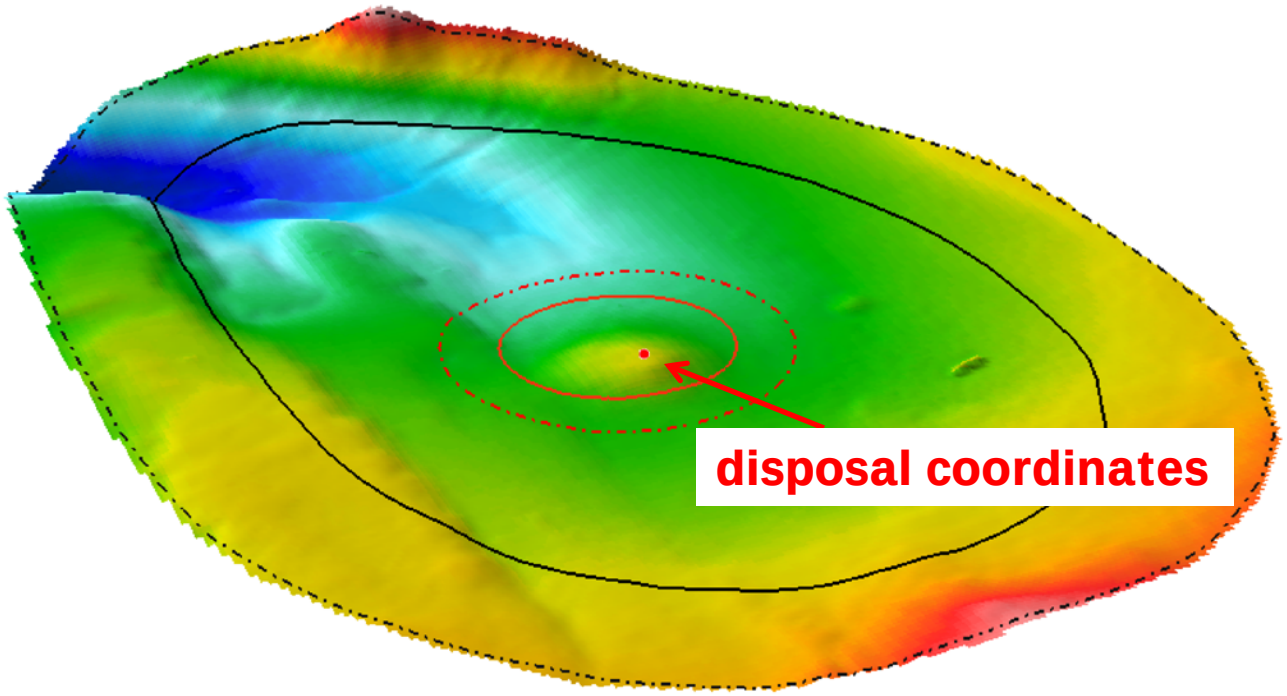
SITE BOUNDARY AND SITE PERIMETER

Commencement Bay SPI



NewFields

2013 Elliott Bay Multibeam Survey
Corps of Engineers



2x vertical distortion

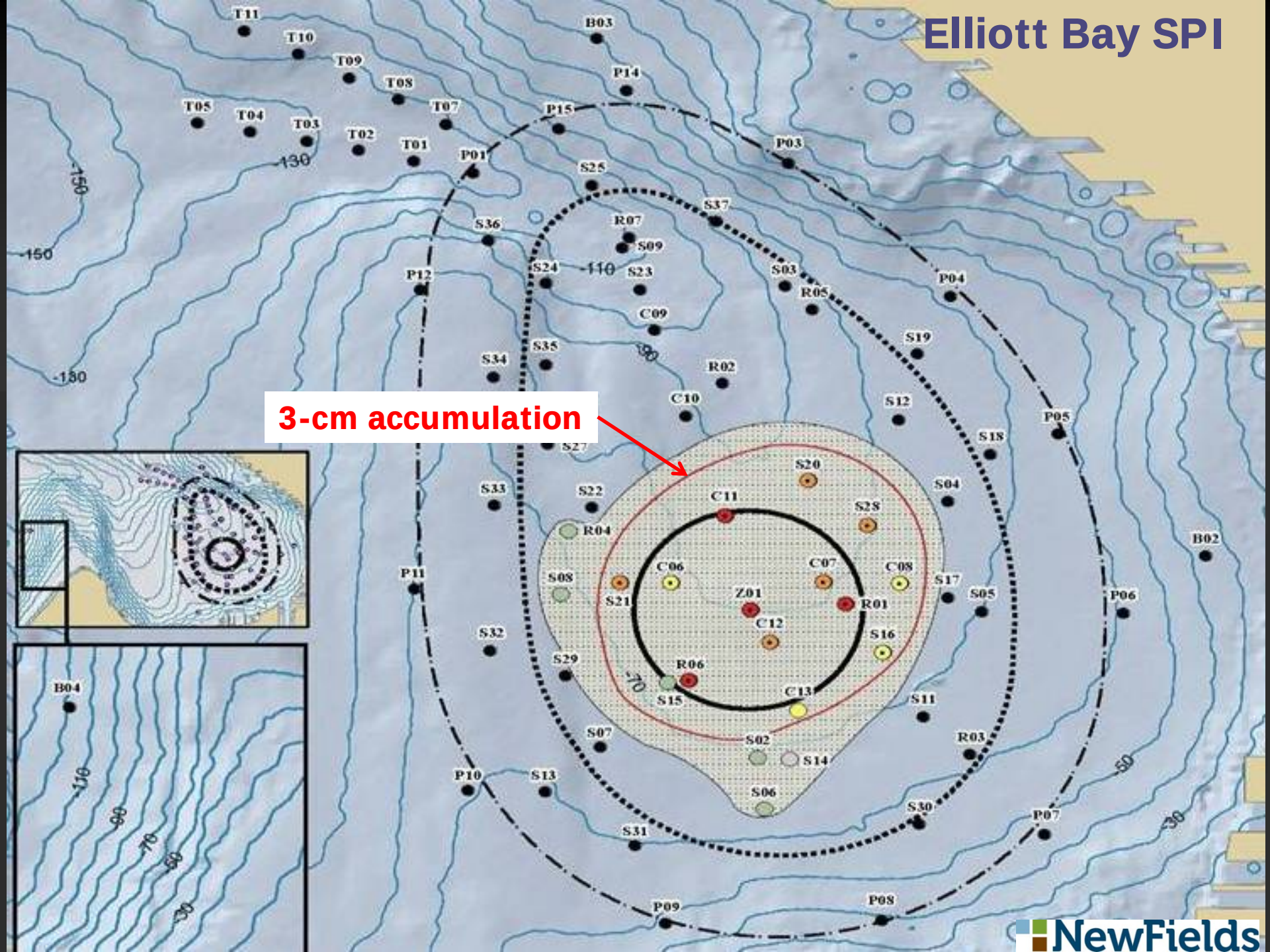
-420 -335 -250 -165 -80

Depth (ft MLLW)

DISPOSAL ZONE &TARGET AREA

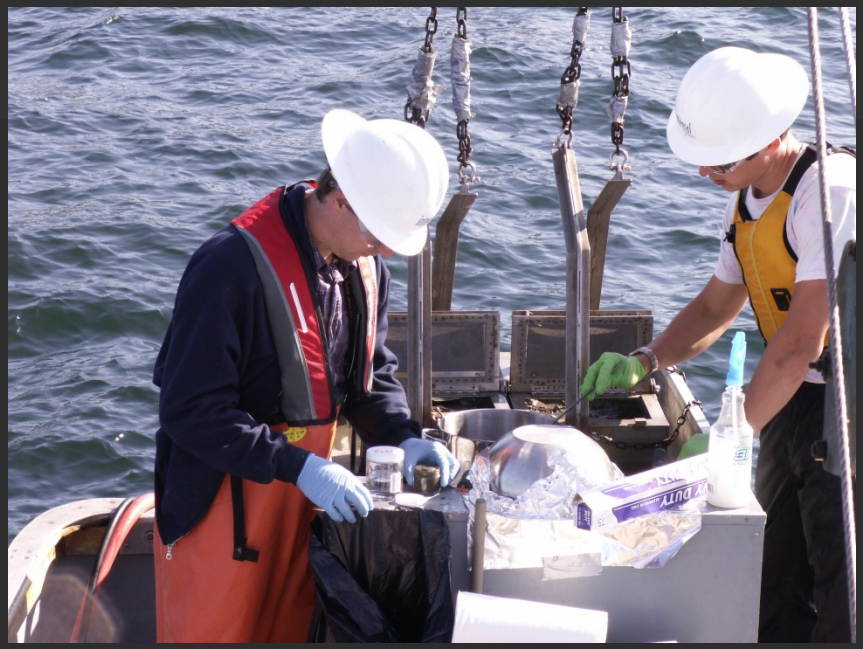
SITE BOUNDARY & SITE PERIMETER

Elliott Bay SPI



2013 Elliott Bay Partial Monitoring

- PSDDA Monitoring Framework
- 2013 Findings
- Recommendations
- Report finalized and posted after SMARM
- Data is in EIM



United States Environmental Protection Agency

Department of Ecology

Washington State Department of Natural Resources

PSDDA Monitoring Framework

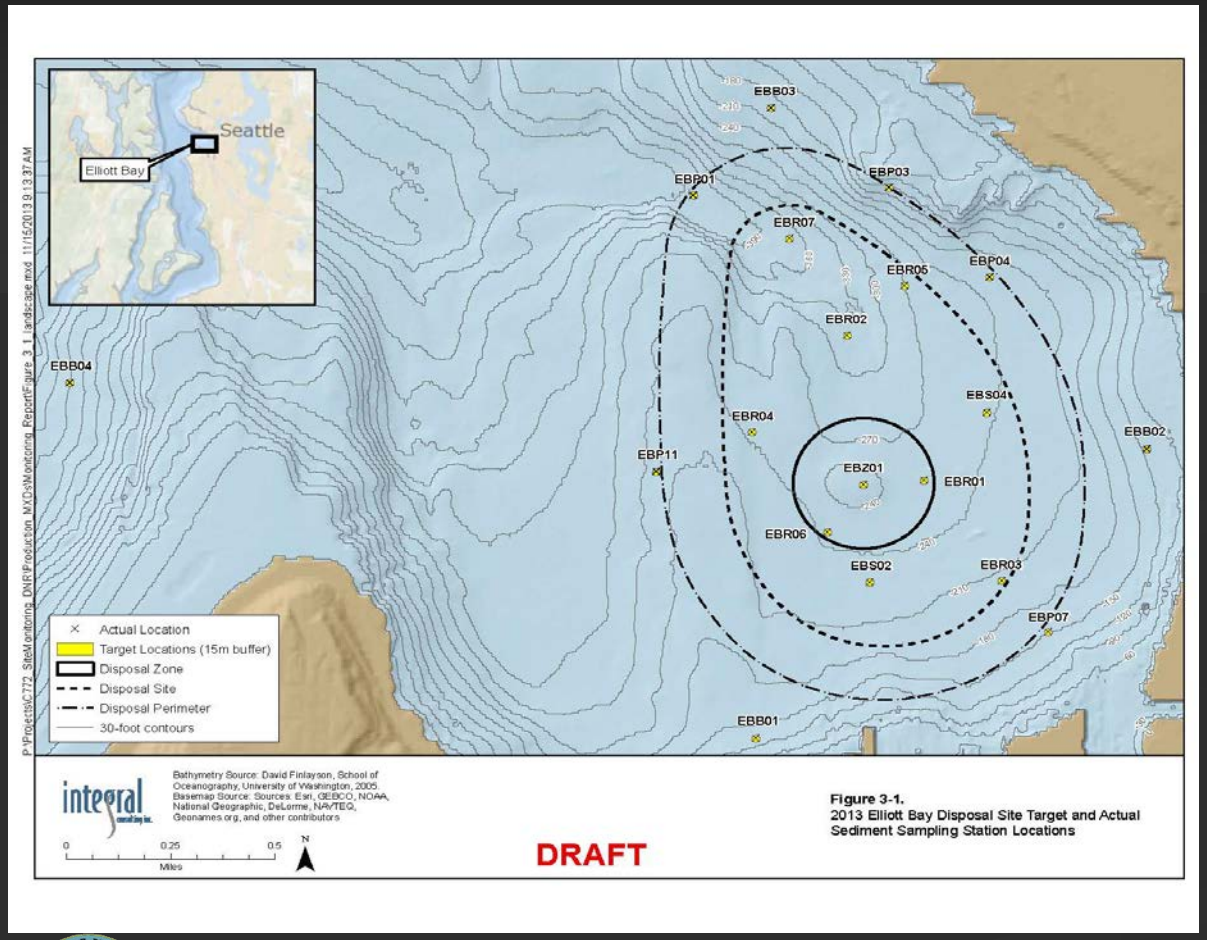
1. Does dredged material remain onsite?
2. Have biological effects conditions been exceeded?
3. Any adverse effects to offsite biological resources?

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

2013 Sediment Sampling



- Integral Consulting, Inc
- Conducted August 5–14
- 19 Elliott Bay Stations
- 2 Carr Inlet Reference Stations

SEATTLE DISTRICT

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

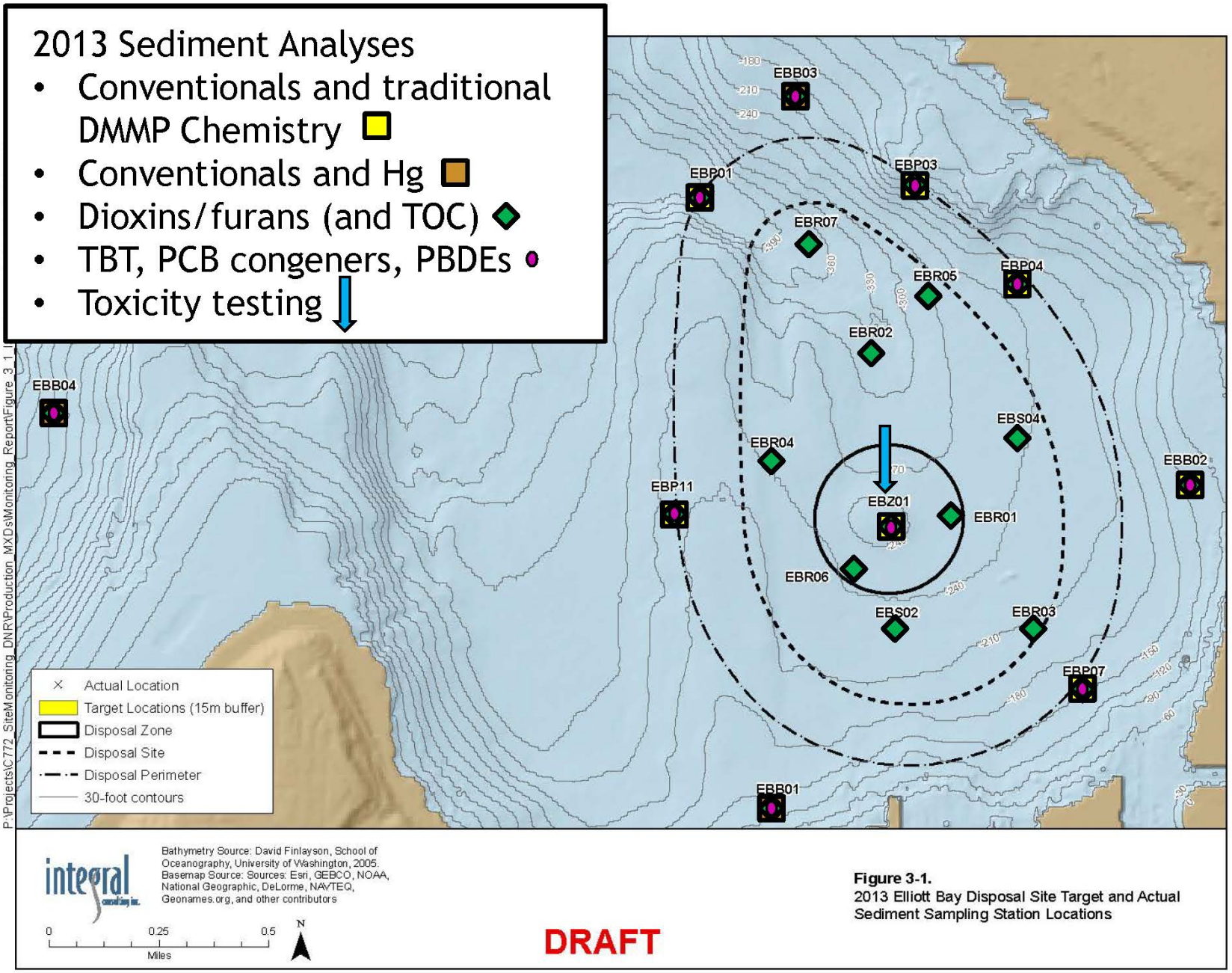


Figure 3-1.
2013 Elliott Bay Disposal Site Target and Actual Sediment Sampling Station Locations

2013 Results – Chemistry

- No SL exceedances at the on-site station Z01
- Mercury > SL at some perimeter and benchmark stations
- PCB Aroclors > SL at some perimeter stations
- Elevated mercury and PCBs are widespread in Elliott Bay and there is no evidence of off-site movement of these chemicals
- Dioxins/furans – addressed on a later slide

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

Chemical Tracking System (CTS) Evaluation

- Statistical time-trend analysis at perimeter stations
- Some statistically significant increasing and decreasing trends for individual chemicals
- Nothing alarming – the chemicals with SL exceedances (Hg and Aroclors) did not show statistically significant increasing trends
- Chemical concentrations are lower in onsite sediment than in perimeter stations on average, suggesting that statistically significant increases are due to sources other than dredged material

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

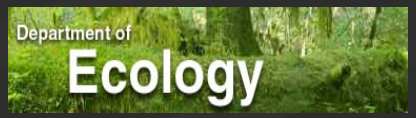
2013 Results - Bioassays

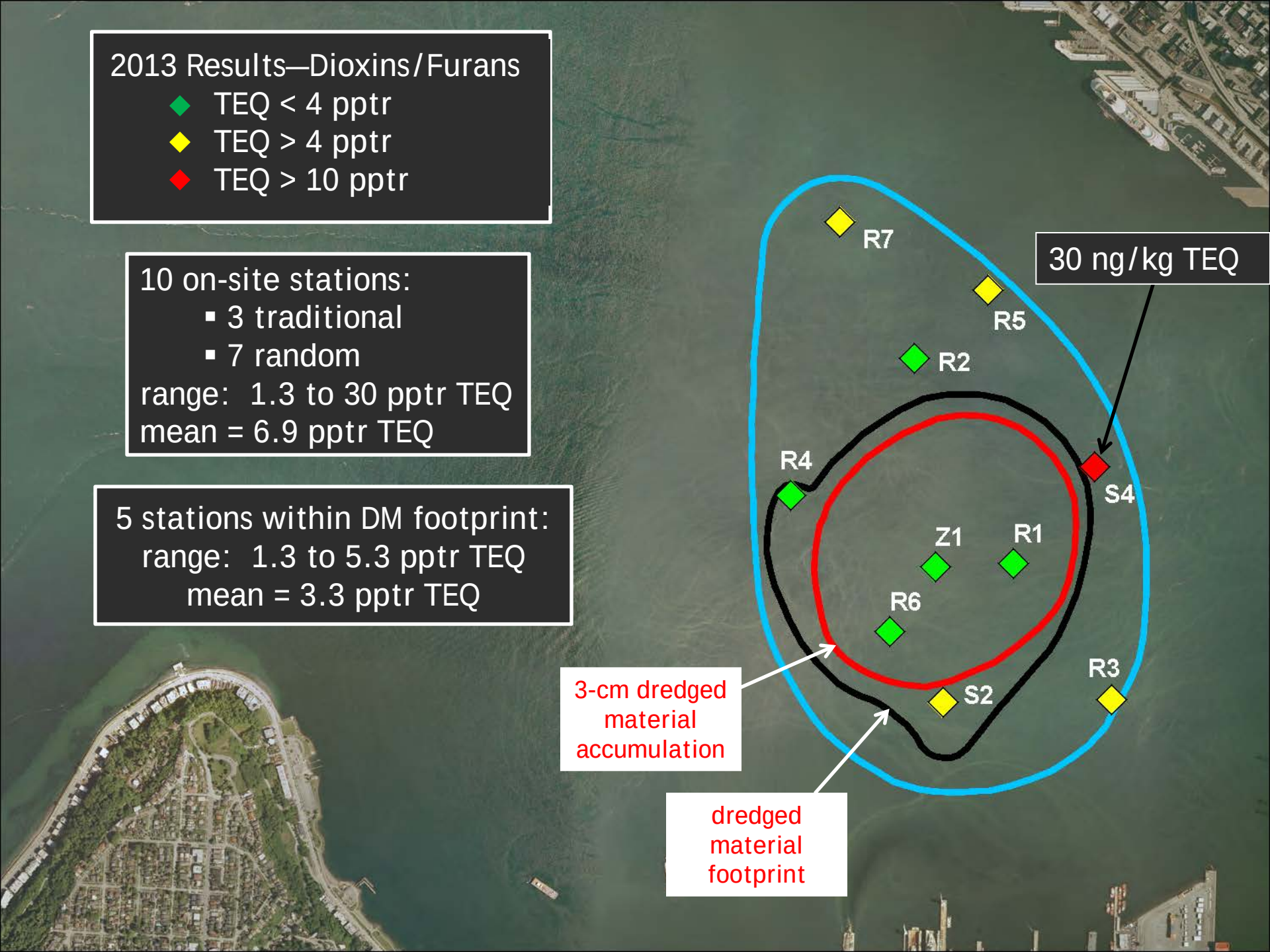
- Bioassays test results for Station EBZ01
  - Amphipod mortality: 14 percent
  - Larval normalized combined mortality and abnormality: 10 percent
  - *Neanthes* growth: 0.77 mg/individual-day (or 0.63 mg/individual-day on an AFDW basis)

- EBZ01 passed DMMP non-dispersive disposal site interpretation guidelines.

2010 Dioxin Guidelines

- Site management objective = 4 pptr TEQ
- Up to 10 pptr TEQ allowed at non-dispersive sites as long as the project volume-weighted average <= 4 pptr TEQ
- 4 pptr TEQ maximum at dispersive sites
- Updated monitoring design for non-dispersive sites




2013 Results—Dioxins/Furans
TEQ < 4 pptr
TEQ > 4 pptr
TEQ > 10 pptr
10 on-site stations:
3 traditional
7 random
range: 1.3 to 30 pptr TEQ
mean = 6.9 pptr TEQ
5 stations within DM footprint:
range: 1.3 to 5.3 pptr TEQ
mean = 3.3 pptr TEQ
30 ng/kg TEQ
R7
R5
R2
R4
S4
Z1
R1
R6
R3
S2
3-cm dredged material accumulation
dredged material footprint

2013 Monitoring Conclusions

Hypothesis No.1: Dredged material remains within the disposal site boundary.

- SPI Survey: 3-cm dredged material boundary is within the disposal site perimeter.

Hypothesis No. 1 is not rejected

2013 Monitoring Conclusions

Hypothesis No. 2: Chemical concentrations at offsite stations do not measurably increase over time due to dredged material disposal.

- CTS evaluation: dredged material placement is not contributing to increased off-site chemistry

Hypothesis No. 2 is not rejected

EPA United States Environmental Protection Agency

2013 Monitoring Conclusions

Hypothesis No. 3: Sediment chemical concentrations at the onsite monitoring stations do not exceed chemical concentrations associated with PSDDA Site Condition II guidelines due to dredged material disposal.

- Sediment Chemistry (Onsite station): COCs < MLs,

Hypothesis No. 3 is not rejected.

United States Environmental Protection Agency

Department of Ecology

Washington State Department of Natural Resources

2013 Monitoring Conclusions

Hypothesis No. 4: Sediment toxicity at the onsite stations does not exceed the PSDDA Site Condition II biological response guidelines due to dredged material disposal.

- Sediment Toxicity: Onsite sediment met bioassay interpretive criteria

Hypothesis No. 4 is not rejected.

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

Recommendations

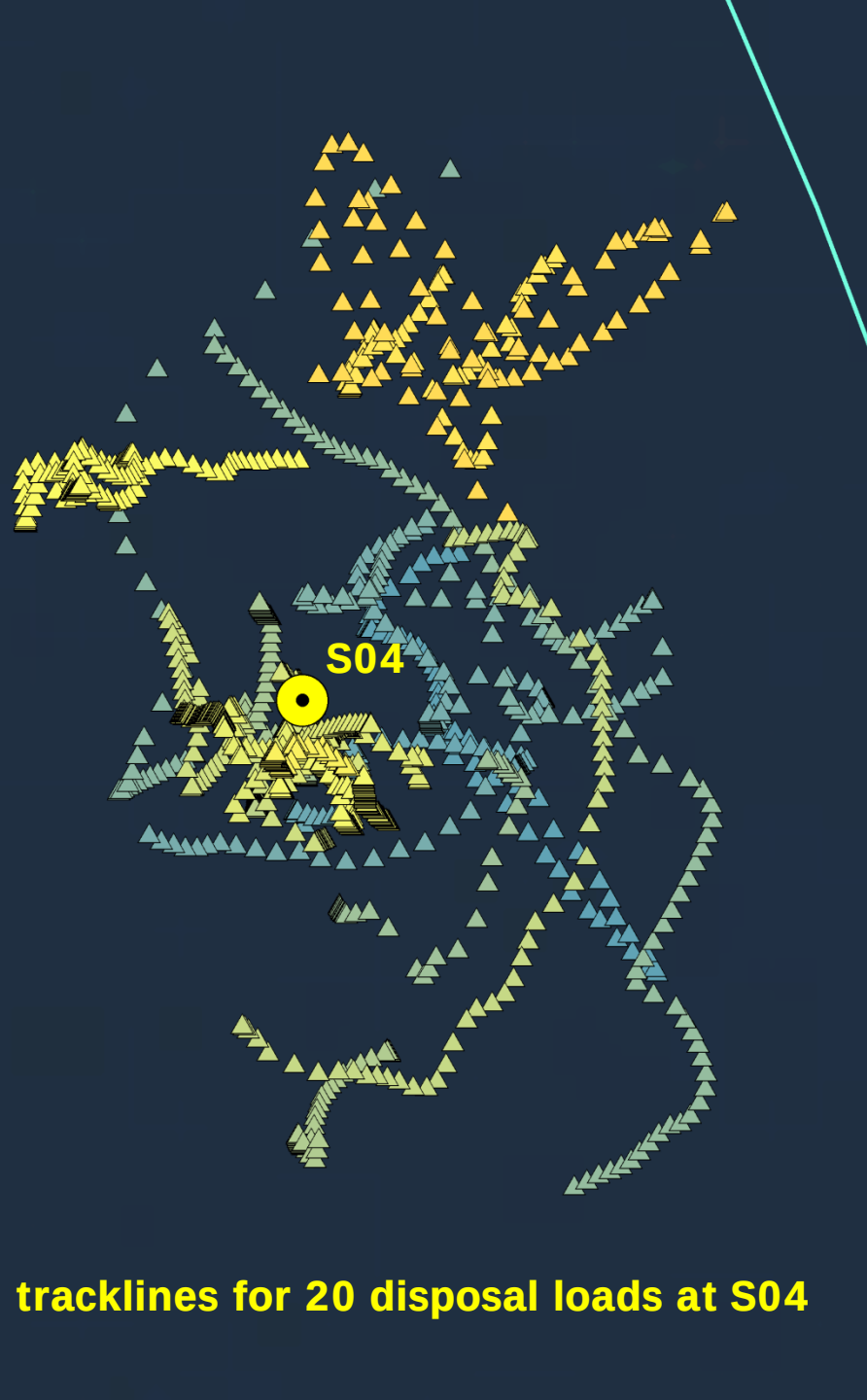
1. Consider Replacing Station EBP03 with EBP04
2. Consider update to CTS Software
3. Move disposal target eastward to manage dioxin/furan concentrations (next slide)
4. Look at DMMP disposal site management objectives and revised SMS
5. Comprehensive Program Review

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

Targeted Disposal at Dioxin Hotspot



tracklines for 20 disposal loads at S04

Shoreline Permit

- Anderson/Ketron site (Pierce Co) extended to expire Sept 2014
- Public process to secure new permit
- Have received public comments from use of the site
  - Sand waves
  - Impacts to biological resources
  - Offsite movement due to currents
- Additional work has been / will be done
- Apply for new Shoreline Permit in 2015

EPA United States Environmental Protection Agency

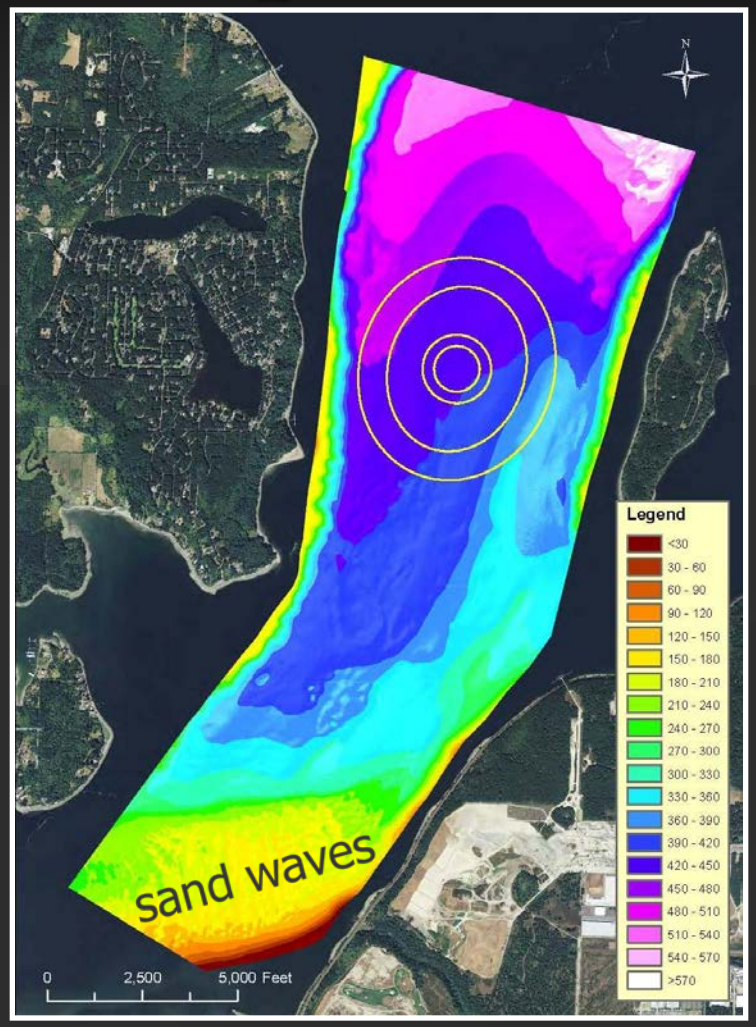
Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

Anderson/Ketron Disposal Site

Work done in 2014

- Corps Multibeam survey of disposal site and adjacent area
  - Site remains in intact
  - Sand waves to South
- Corps fate and transport modeling (next slides)



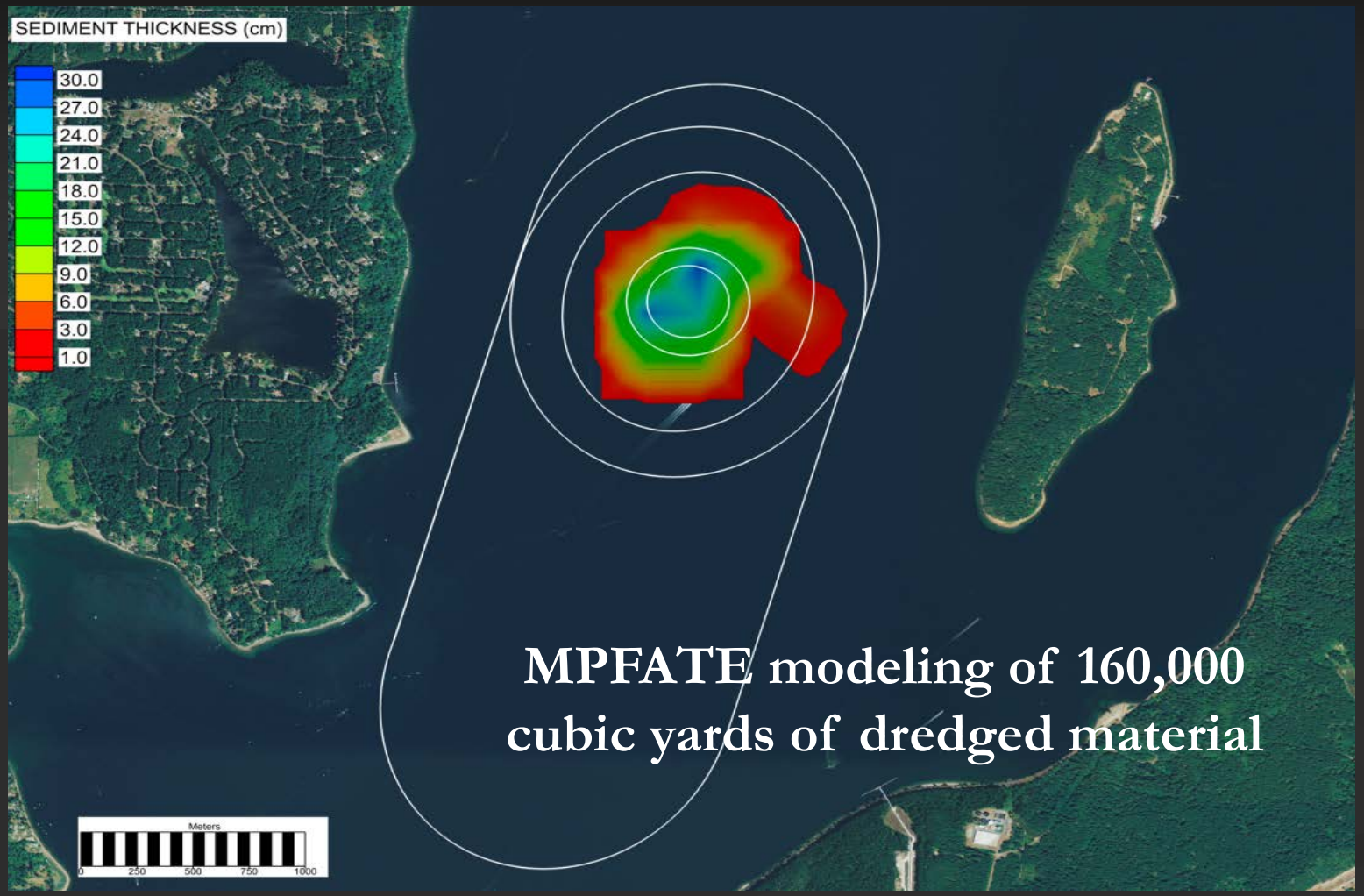
SEATTLE DISTRICT

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

A-K Fate and Transport Modeling



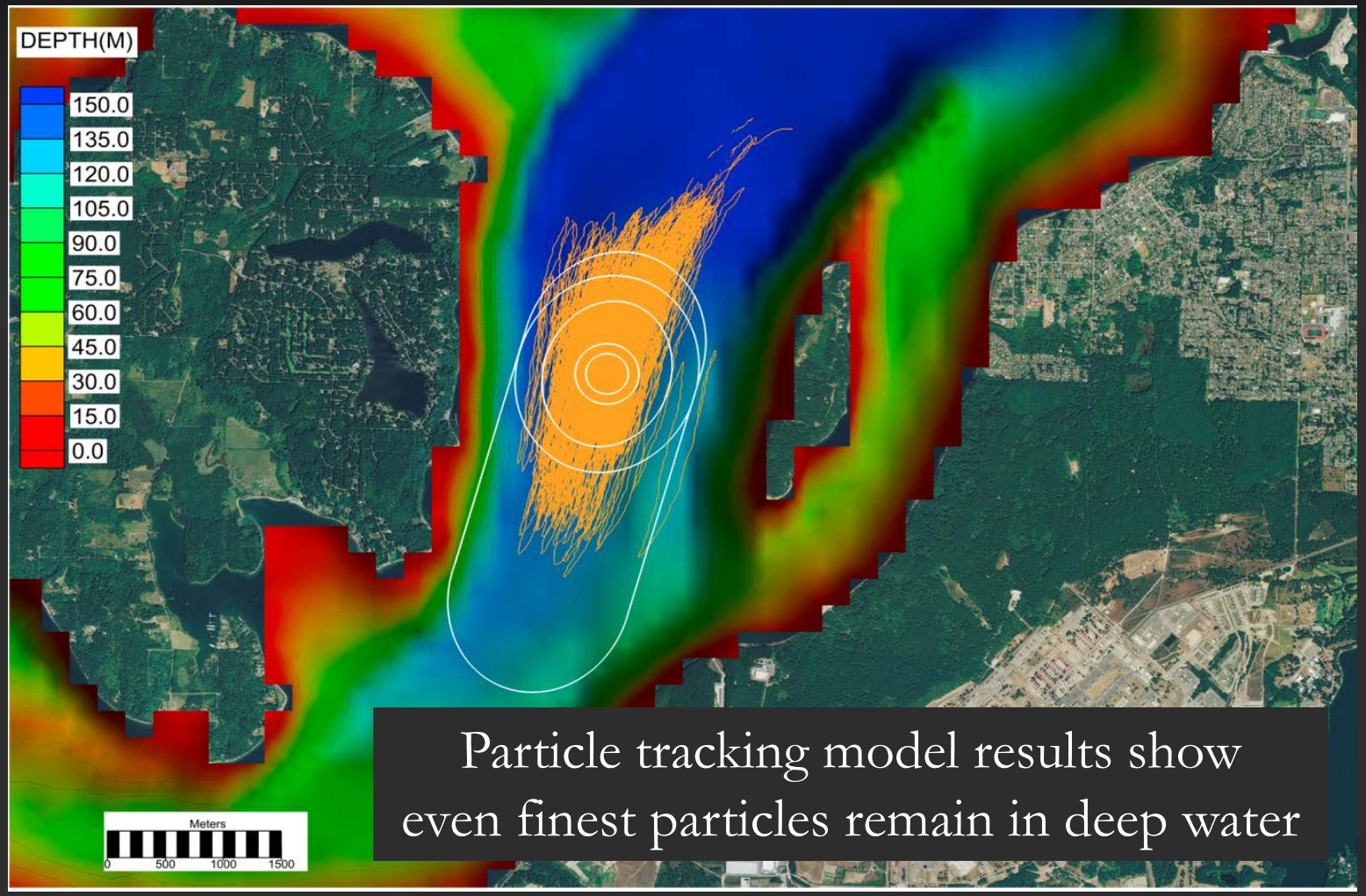
SEATTLE DISTRICT

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

A-K Fate and Transport Modeling



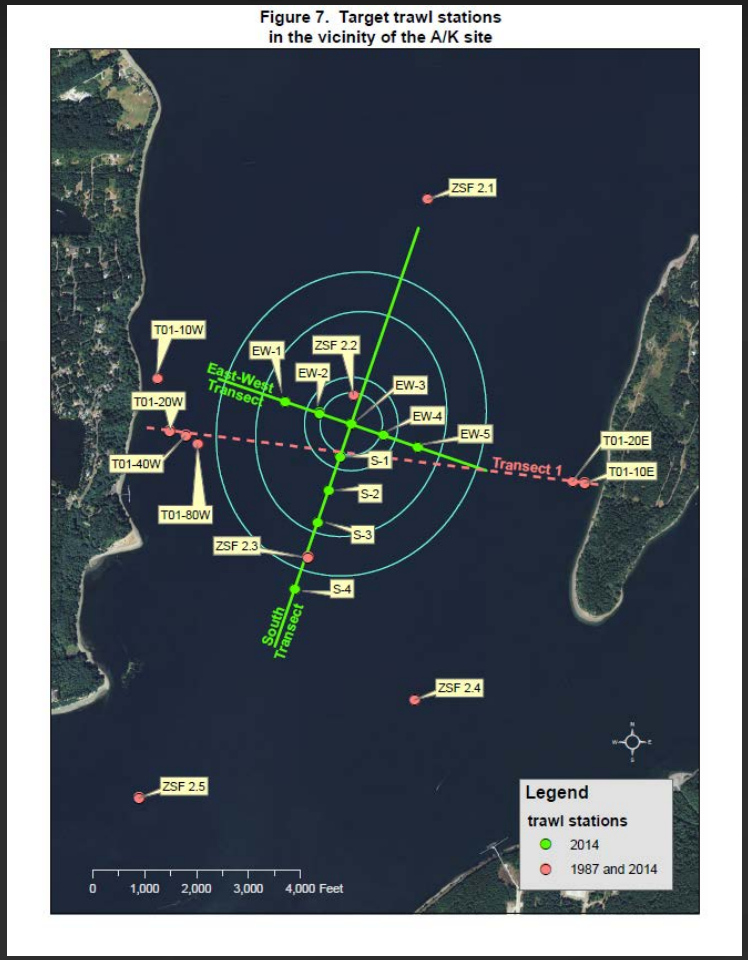
United States Environmental Protection Agency

Department of Ecology

Washington State Department of Natural Resources

Anderson/Ketron Disposal Site

- Corps will conduct a 4 season study of demersal resources in area
  - Based on original siting information
  - Beam trawl
- Working with WDFW
  - ROV survey



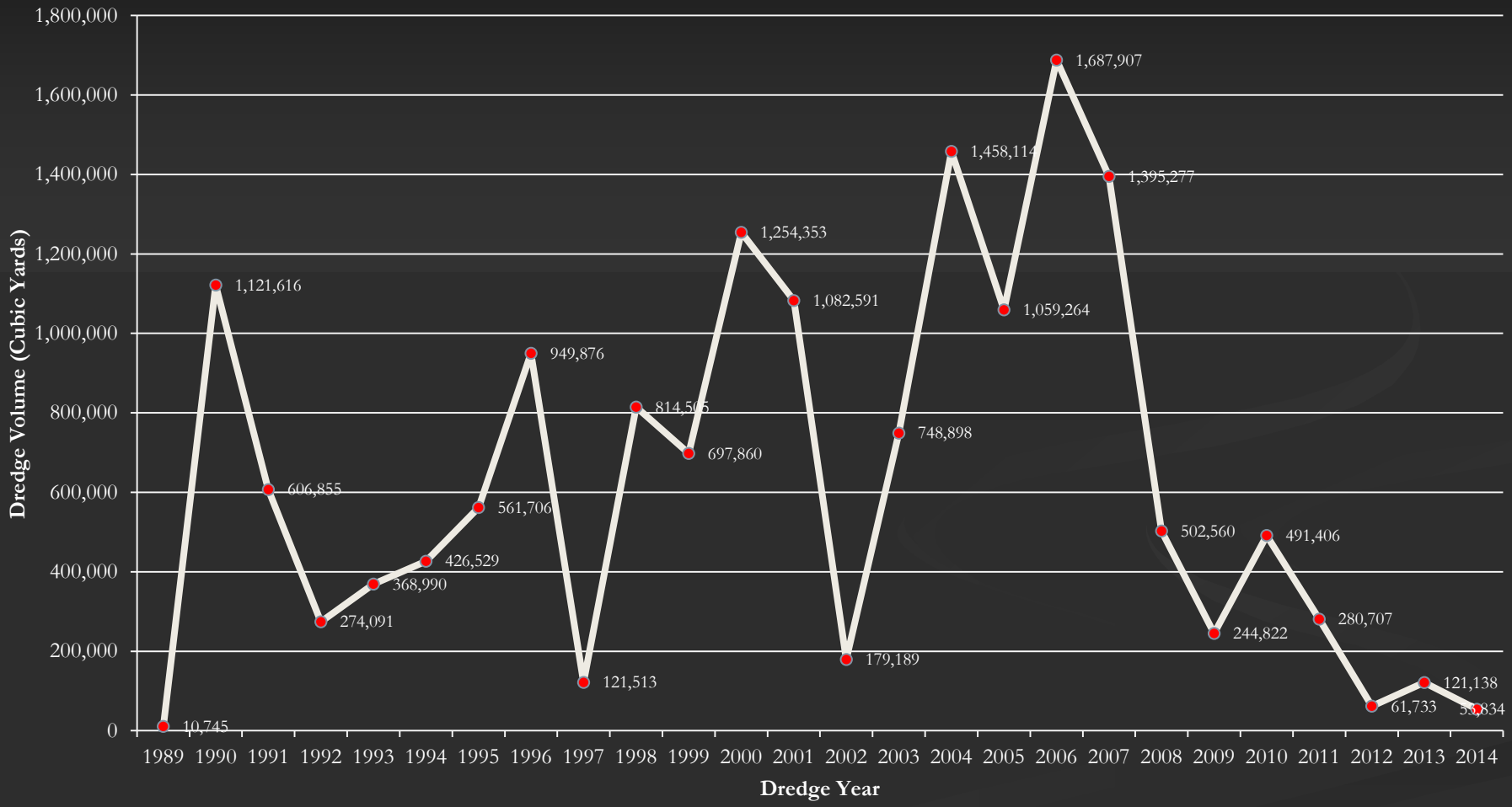
United States Environmental Protection Agency

Department of Ecology

Washington State Department of Natural Resources

DNR Managed Disposal

Puget Sound Annual Dredge Volumes



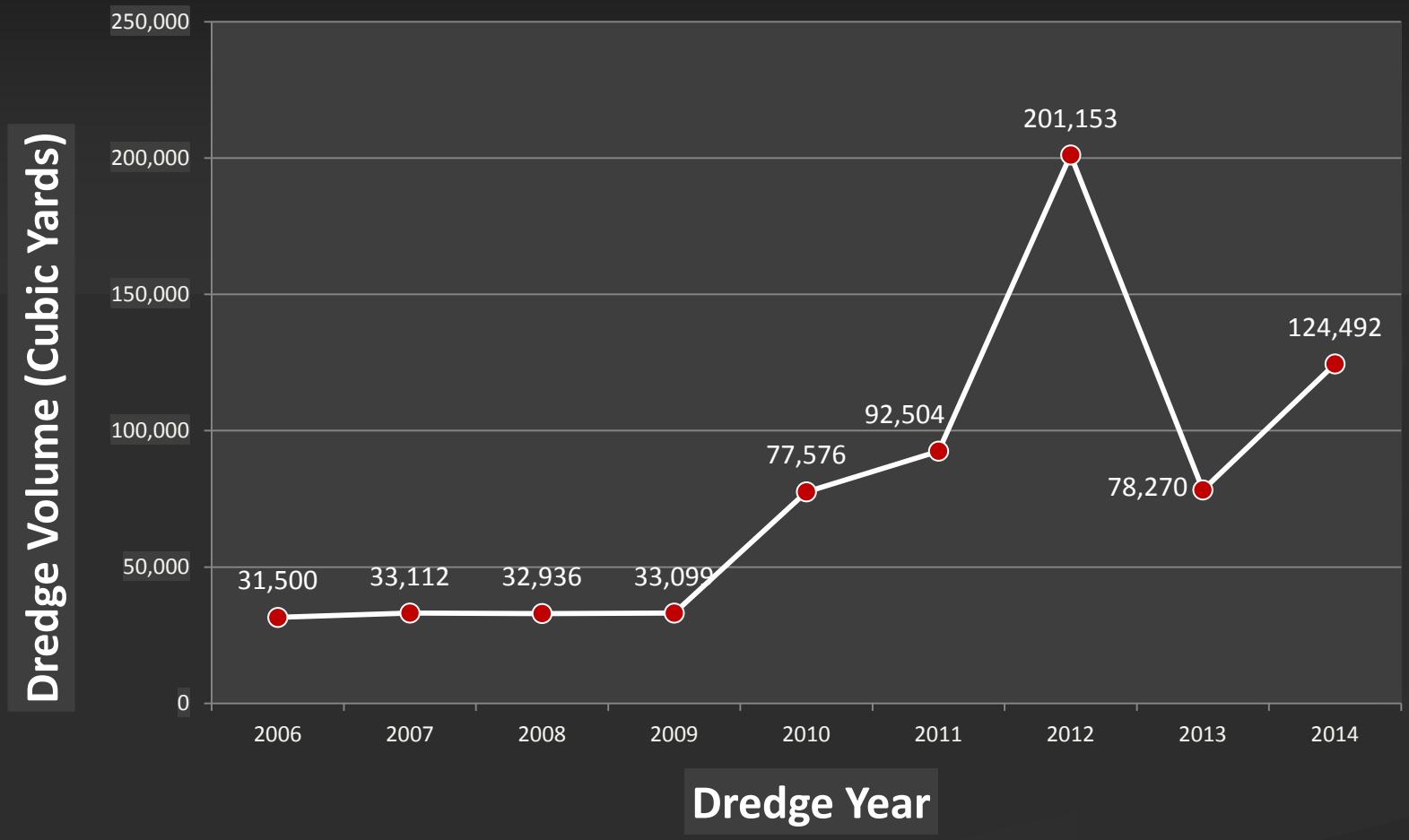
SEATTLE DISTRICT

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources

Grays Harbor DNR Volumes



United States Environmental Protection Agency

Department of Ecology

Washington State Department of Natural Resources

Questions?

SEATTLE DISTRICT
SERVICE TO THE NORTHWEST

EPA United States Environmental Protection Agency

Department of Ecology

WASHINGTON STATE DEPARTMENT OF Natural Resources