

Port Gardner

Regional Background

Supplemental Sampling and Analysis Plan

Technical Update

April 7, 2014

Goals For Today

- Describe the regional background concept.
- Provide context for how and why we're conducting supplemental sampling.
- Share how we made decisions based on your feedback.
- Provide an overview of the supplemental SAP.
- Communicate next steps and our timeline for completing the Port Gardner regional background work.
- Discuss remaining questions and issues.

Context and Decision Making Process to Develop the Supplemental SAP

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Acknowledgements

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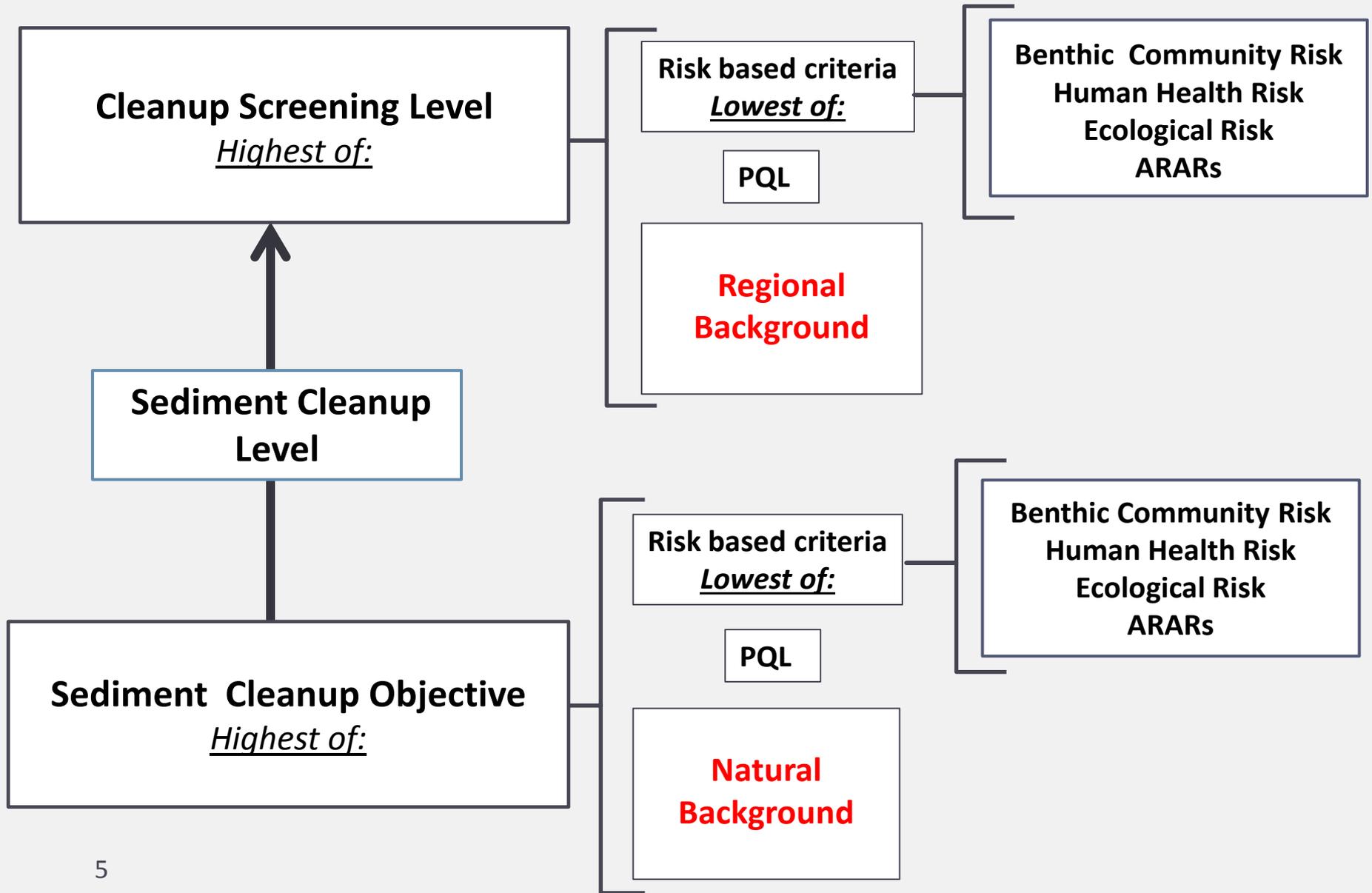
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Background & SMS rule - Establishing Cleanup Levels



Regional Background

How can it be used under the SMS rule?

To establish the **Cleanup Screening Level (CSL)**, if it is higher than risk based concentrations and the practical quantitation limit. The

CSL can be used:

- As the upper bound for establishing a sediment cleanup level.
- To identify a cleanup site – where cleanup needs to be done.
- To identify the areas of a cleanup site for active cleanup.
- To identify areas for interim actions.

SMS Background Definitions (in a nutshell)

- **Natural Background WAC 173-204-505(11):**
 - ...the concentration of a hazardous substance consistently present in the environment that has not been influenced by localized human activities.
- **Regional Background WAC 173-204-505(16):**
 - ...the concentration of a contaminant within a department defined geographic area that is primarily attributable to diffuse sources, such as atmospheric deposition or storm water, not attributable to a specific source or release.
- **Difference:** Globally distributed contaminants from global sources versus locally distributed contaminants primarily from diffuse sources such as storm water, atmospheric deposition, etc.

Intent of Regional Background

- To address the reality of ubiquitous contaminants continuously entering the environment .
- To provide a technically implementable structure to meet and maintain cleanup standards given the potential for recontamination from diffuse and uncontrollable sources.
- Can include some influence from definable sources such as piped stormwater, but not the direct influence (that is, the primary contributor).

Intent of Regional Background

To address the reality of ubiquitous contaminants continuously entering the environment that are:

- Not able to be technically or physically controlled or eliminated:
 - From vessel traffic, automobiles, septic systems, backyards.
 - Contaminants in the atmosphere from diffuse, un-definable sources.
- Not able to be controlled or eliminated in a practicable or timely manner:
 - Contaminants in stormwater that cannot be treated with current technology (due to type of contaminant, load, volume of stormwater, inordinate cost).
 - Contaminants from orphan pilings.

Regional Background - What it is NOT

- Not primary influenced by definable sources (e.g. a cleanup site).
- Not defined by “recontamination potential” that is primarily from definable sources (e.g. a stormwater discharge from a pipe).
- Cannot solely sample within an area of relatively elevated concentrations due to the direct impact of a definable source. For example:
 - Within the depositional zone of an outfall, if a clear depositional zone exists.
 - Within an established cleanup site.
- Not natural background – if there’s a statistically significant difference between regional and natural background.

Ecology's Regional Background Engagement Process

Port Gardner:

- 2013 Draft SAP reviewed by stakeholders/tribes & discussed at a workshop.
- Conducted field sampling March 2013.
- 2013 data package (data and summary statistics) reviewed by stakeholders.

Port Angeles:

- 2013 Draft SAP reviewed by public & discussed at public meetings.
- Conducted field sampling April 2013.
- 2013 data made available to public.

Elliott Bay / Lower Duwamish Waterway:

- September 2013: Technical workshop to discuss establishing regional background and SAP sampling design options due to feedback received for Port Gardner and Port Angeles work.

How Ecology Considered Comments

We considered the collective comments received over the past year to analyze the usefulness and technical feasibility of:

- Developing a conceptual bay model to guide a more appropriate selection of sampling stations representative of regional background.
- Conducting alternate types of sampling (sediment traps).
- Using bay-specific data to define the appropriate distance from the shoreline and historic, current, and potential sources.

Main Changes to the Supplemental SAP

- Developed a Conceptual Bay Model to guide the appropriate selection of sampling stations representative of regional background to define the revised Area of Interest AOI).
- Analyzed all historical data (instead of only data less than 10 years old), total organic carbon and grain size distributions to:
 - Exclude areas from sampling.
 - Determine distance from shoreline for sampling locations.
 - Identify potential sources and direct areas of influence.

These Changes to the Supplemental SAP Resulted In:

- Refined Area of Interest AOI by adding nearshore areas potentially influenced by diffuse urban sources but excluding areas primarily influenced by sites or sources.
- Exclusion of approximately $\frac{1}{2}$ of the original 2013 sampling area (Phase I) to avoid sampling in areas primarily influenced by the Snohomish River delta and Possession Sound as opposed to the urban environment.
- Combined the remaining Phase I AOI with the new Phase II AOI in a statistically appropriate manner.

Why Are We Conducting Supplemental Sampling?

- Port Gardner is essentially our “pilot” embayment – it was our first attempt at establishing regional background.
- Your comments and feedback were very helpful. We realized there was room for improvement with this work.
- You helped us rethink the sampling framework and design as well as the intent and SMS rule definition of regional background.
- We want to get this right to see how the lessons learned can be applied to future regional background work.
- This can be the starting template for future work, with the acknowledgement that bay or area specific flexibility is necessary.

Technical Overview of the Supplemental Sampling and Analysis Plan

Teresa Michelsen, Avocet Consulting

Conceptual Bay Model

The Conceptual Bay Model was developed and used to guide the appropriate selection of sampling stations representative of regional background.

Key features include:

- Hydrology
- Bathymetry
- Known sites
- Known sources
- All existing chemistry data
- Other existing information such as modeling

Conceptual Bay Model

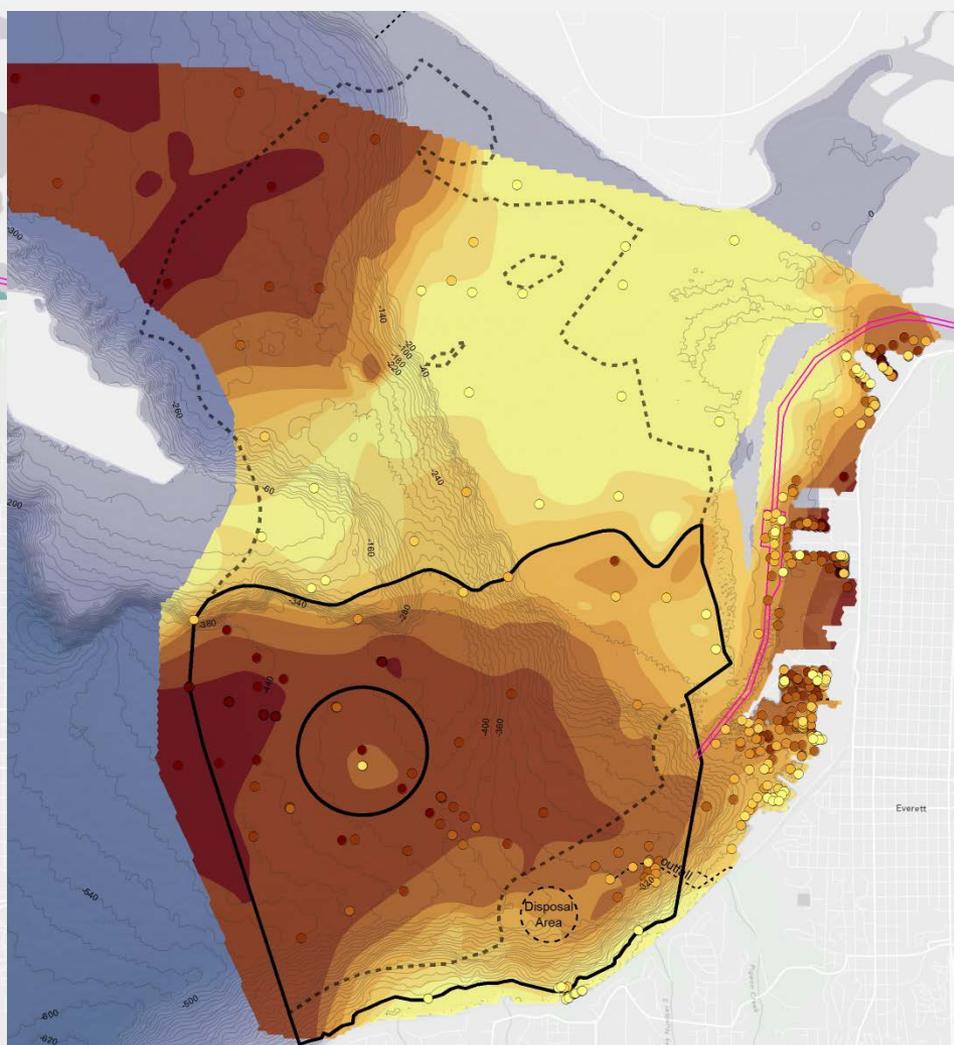
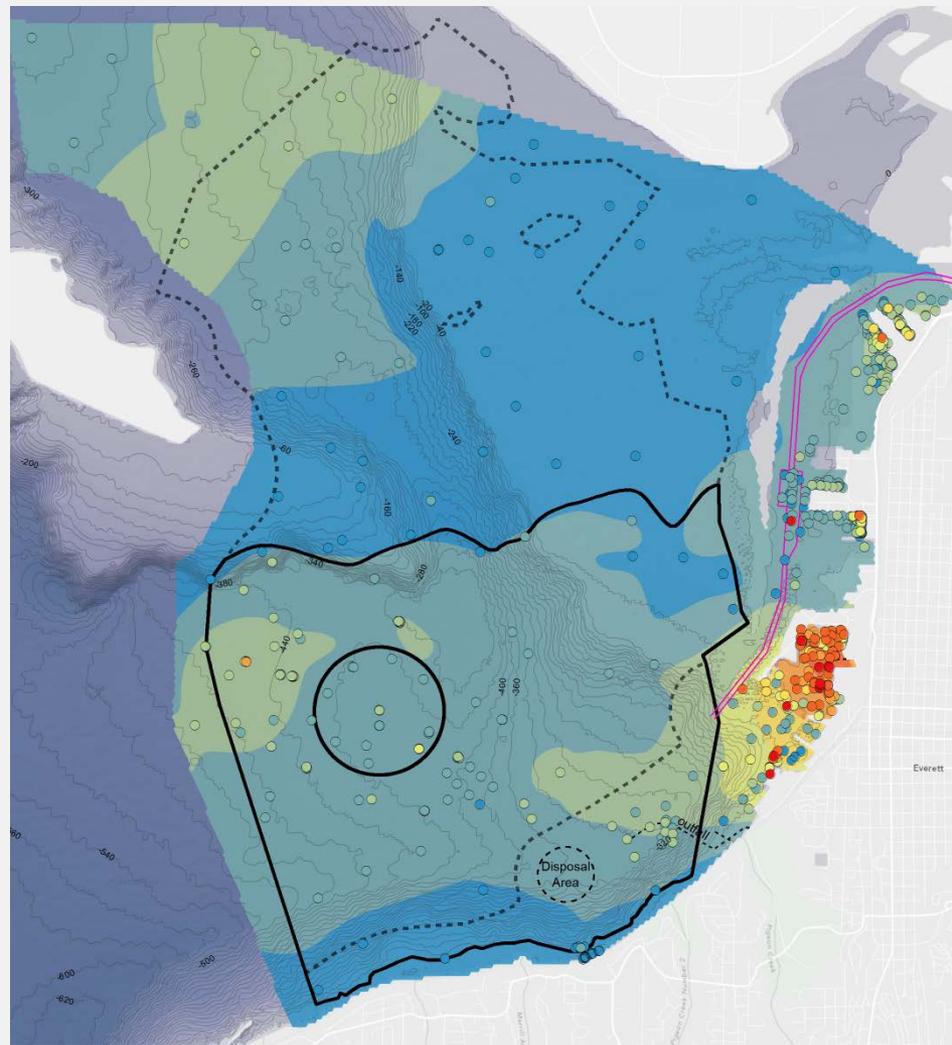
Evaluation of Hydrology and Bathymetry

- Snohomish River Delta consists of relatively coarse-grained sand that is relatively low in chemical concentrations.
- Deeper areas to the northwest are similar to Saratoga Passage in terms of hydrology and bathymetry.
- These two areas were not considered representative of regional background near Everett in Port Gardner Bay

% Total Organic Carbon & Grain Size Distributions

Revised AOI guided by <30% fines and <1% TOC contours (solid line)

Phase I AOI (dotted line)

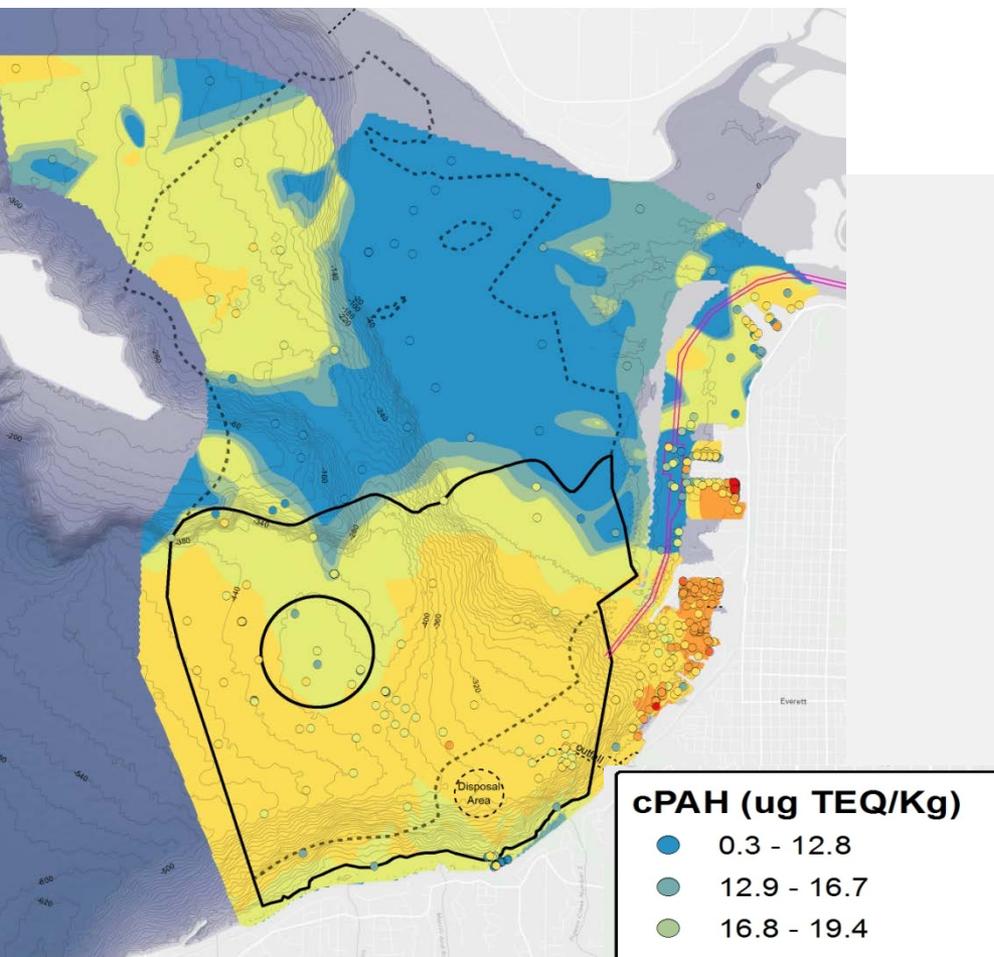


Conceptual Bay Model

Evaluation of Sources, Sites, and Areas of Influence

- Ecology is currently focusing on cleaning up ten identified contaminated sites. The influence of these sites was considered.
- Three additional areas of potential influence were evaluated:
 - Deep water diffuser outfall southwest of Weyerhaeuser Mill A site.
 - Historical disposal area (1954 – 1966) - had not been used.
 - Dredged Material Management disposal site - currently active.

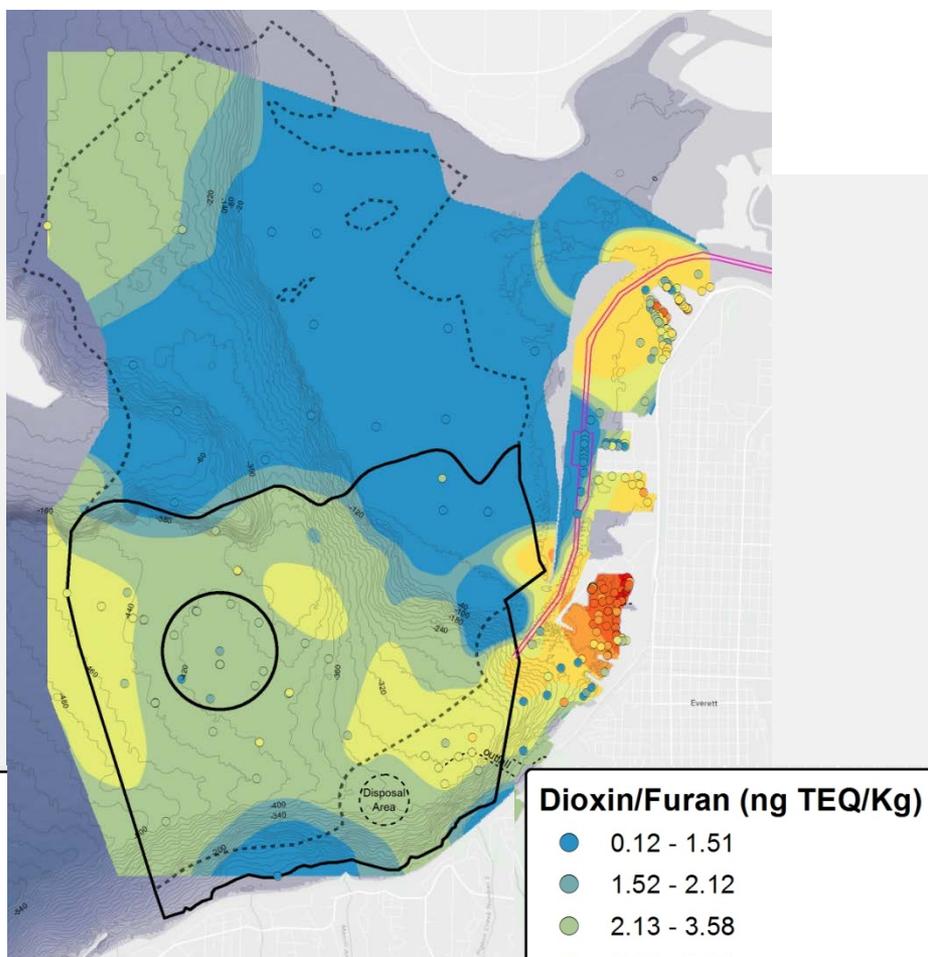
Existing Sediment Concentrations: Dioxins/Furans & cPAHs



cPAH (ug TEQ/Kg)

- 0.3 - 12.8
- 12.9 - 16.7
- 16.8 - 19.4
- 19.5 - 41.8
- 41.9 - 194.8
- 194.9 - 1320.0
- 1320.1 - 2150.0
- 2150.1 - 5915.0

Phase I Boundary
 Phase II Boundary
 Navigation Channel

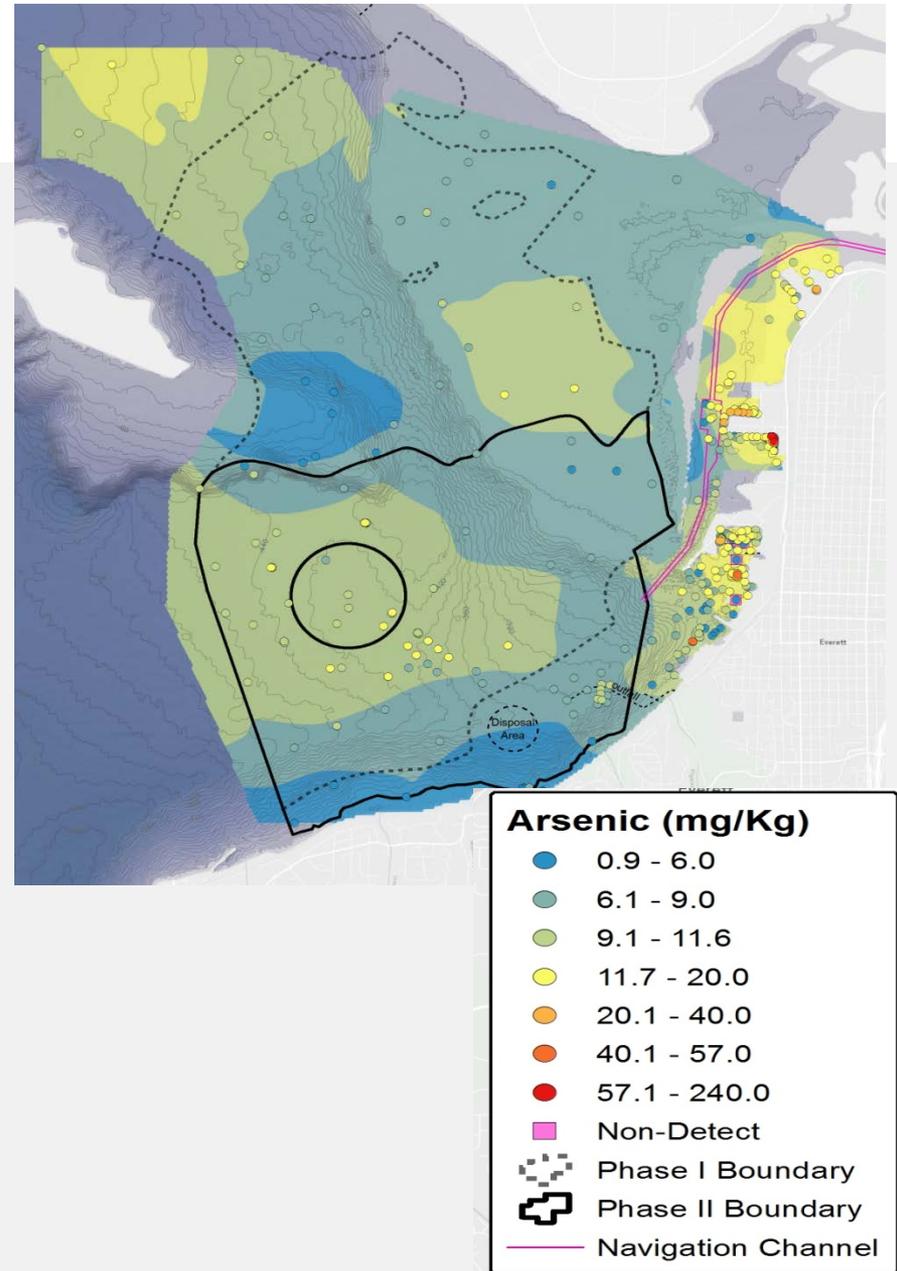
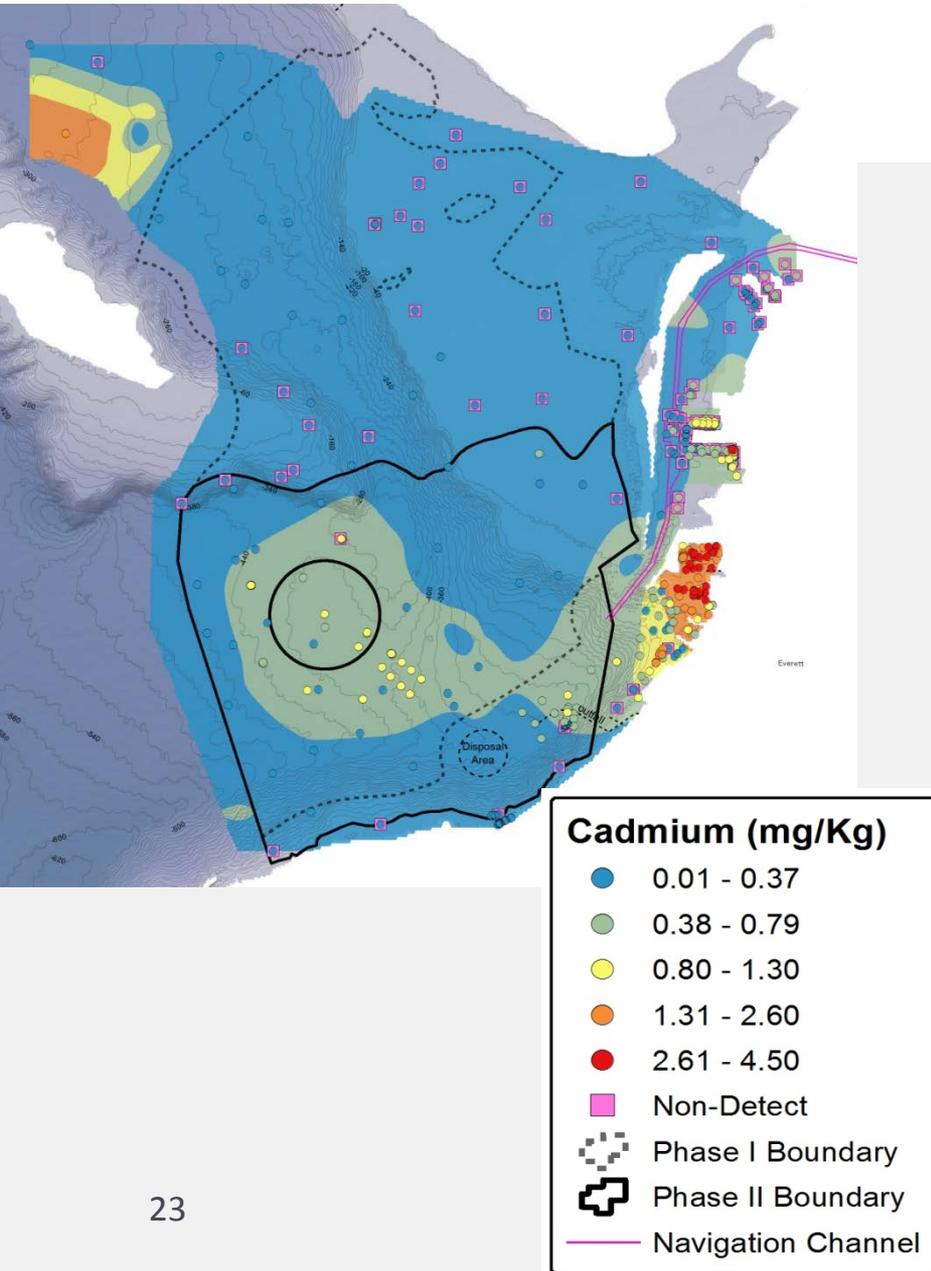


Dioxin/Furan (ng TEQ/Kg)

- 0.12 - 1.51
- 1.52 - 2.12
- 2.13 - 3.58
- 3.59 - 6.69
- 6.70 - 13.91
- 13.92 - 30.34
- 30.35 - 67.73
- 67.74 - 152.83

Phase I Boundary
 Phase II Boundary
 Navigation Channel

Existing Sediment Concentrations: Cadmium & Arsenic



Areas Excluded from the AOI

Areas excluded from the AOI as not representative of Regional Background include:

- Course-grained areas highly influenced by deposition from the Snohomish River.
- Deeper areas to the NW representative of natural background (Saratoga Passage).
- East Waterway, Mill A, and adjacent areas.
- Open-water DMMP disposal site.
- Very shallow nearshore areas (above -6 foot MLLW).
- Area east of Jetty Island – intertidal or part of the navigation channel.

Areas Included in the Revised AOI

Areas included in the AOI as representative of Regional Background include:

- Southeast boundary moved to near the shoreline south of Weyerhaeuser Mill site.
- Outfall diffuser area included – data does not show a chemical influence.
- Historical disposal site was apparently never used.
- Southwestern boundary as in Phase I.

Port Gardner Revised Area of Interest

Original Study Area
(White Dotted Line)

Revised Study Area
(Yellow Solid Line)



Alternative Forms of Assessment

- Sediment sampling is always preferred if the AOI sediments are representative of Regional Background
- No reason to believe sediments within the AOI were not representative
- No remaining major sources within East Waterway that would add to regional background after cleanup
- Use of sediment traps outside East Waterway would likely be dominated by Snohomish River particulates
- Logistical issues with deployment of sediment traps – time, funding, placement issues
- Uncertainty in how to relate sediment trap data to regional background using sediment mixing models
- No clear sources requiring outfall modeling and no models

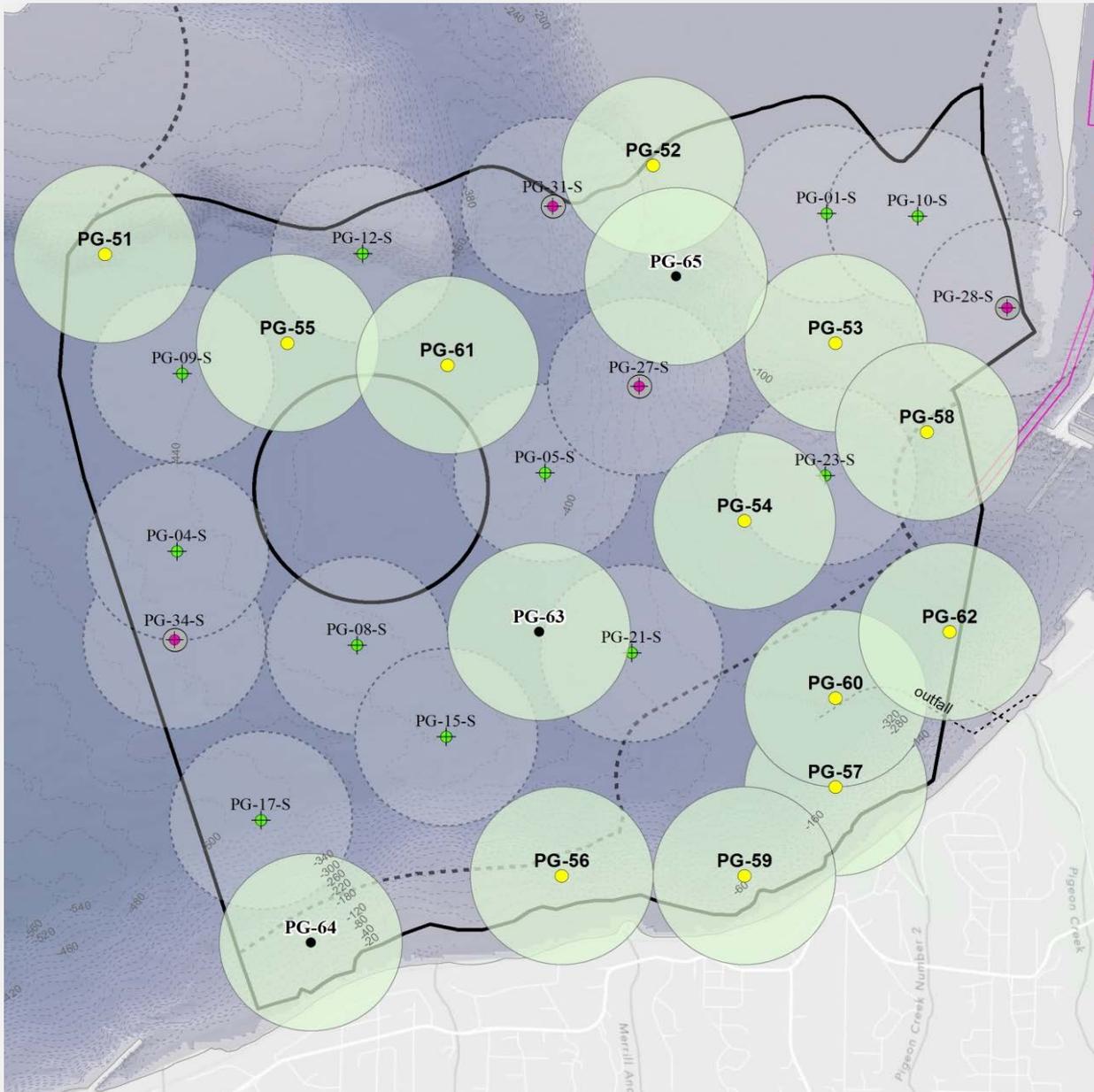
Selection of Supplemental Sampling Stations

Within the Phase II AOI, we used a spatially balanced random sampling design:

- Considered the revised AOI as one stratum.
- GIS algorithm was used to randomly distribute samples with minimum 500 m separation for spatial independence.
- Retained existing Phase I samples and randomly added samples to the new AOI area until sample size was proportional to area.
- Added remaining samples to meet target sample size using the same GIS algorithm applied to the entire AOI.

Determining Number of Samples

- Baseline Sample Size ($n = 27$)
 - Minimum sample size for describing distributional characteristics (shape, mean, variance).
- Secondary Archived Samples ($n = 3$)
 - All samples tested for mercury (short holding time).
 - Archived samples may be tested for other analytes based on precision, PQLs, evaluation of the upper tail of the distribution, etc.
 - See SAP for decision process for analysis of secondary samples.



Phase II Baseline & Secondary Sampling Locations

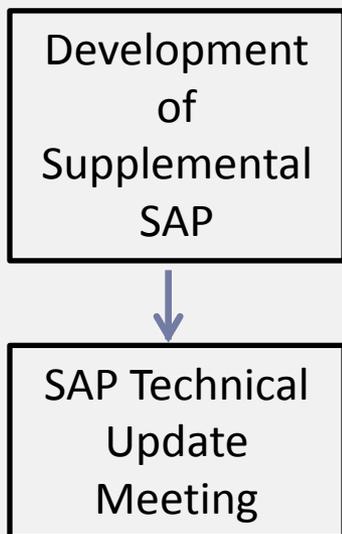
Phase II:
12 Baseline Samples
3 Secondary Samples

Phase I:
15 original samples

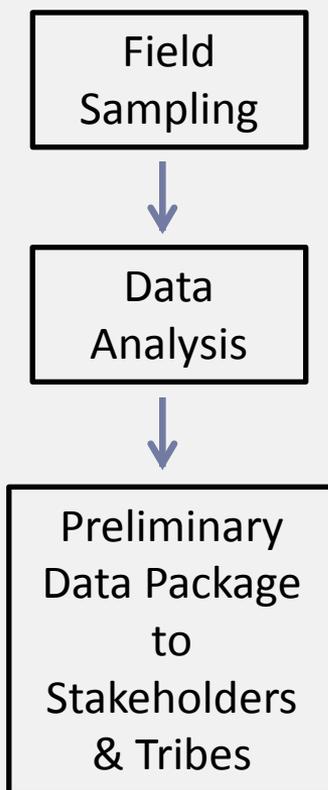
Timeline and Next Steps

Port Gardner Regional Background Timeline & Next Steps

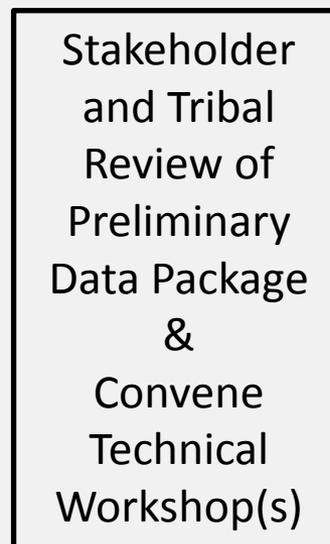
January - April 2014



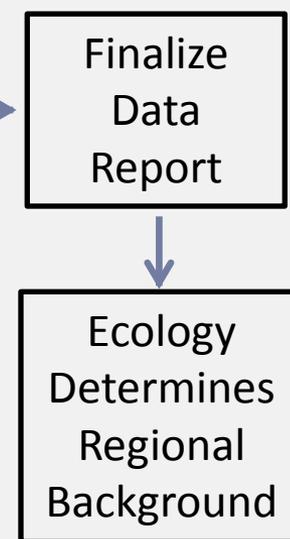
April - July 2014



July - August 2014



Fall 2014



Timeline and Next Steps

Winter 2013/14

March 2014

April 2014

Summer 2014

Fall 2014

Port Gardner:
Supplemental
Sampling &
Analysis Plan
Development

Stakeholder
Engagement
on
Supplemental
Sampling &
Analysis Plan

Field
Sampling

Draft Data
Report and
Conduct
Technical
Workshops
to Discuss
Comments

Finalize
Data
Report

Port Angeles: Finalize Data Summary Report

Lower Duwamish:
•2014 - Continue stakeholder engagement on planning development of SAP
•2015 - Begin SAP development – completion dependent on Green River studies.

Ongoing →

Draft SCUM II Public
Comment Period

SCUM II
Workshops to
Discuss
Comments

Finalize
SCUM II

Discussion

- Conceptual Site Model
- Updated sampling locations
- Stakeholder and Tribal engagement process
- Plans for other embayments