East Waterway Anthropogenic Background

Small Group Meeting #4
Anthropogenic Background
AB Calculation and Sensitivity Analysis

East Waterway Group

December 4, 2020

Meeting Agenda

Topics

- AB Dataset Decisions
- Arsenic
- Sensitivity Analysis
- Work products for Meeting #5

Meeting Schedule

- Memorandum annotated outline and key tables and figures *(Dec. 9, 10-11:30)*
- Large group meeting *(Jan. 13, 10-12)*

AB Dataset Decisions

Summary of EPA Small Group Preference (from EPA Word Doc, Dec. 01, 2020)

- No Aroclors
- No outliers
- No sediment traps
- No fines normalization
- No river condition/ flow event weighting
- Dioxin/furan individual congeners
- ND = 0 * RV for non-detected PCB and dioxin/furan congeners

Shaded cells = brief discussion

Results

Chemical	n	Mean	UCL 95
Total PCBs (ug/kg)	49	17.0	22.4
Arsenic (mg/kg)	52	17.2	19.2
1,2,3,4,6,7,8-HpCDD (ng/kg)	54	129	161
1,2,3,4,6,7,8-HpCDF (ng/kg)	54	28.8	36.9
1,2,3,4,7,8,9-HpCDF (ng/kg)	54	1.70	2.26
1,2,3,4,7,8-HxCDD (ng/kg)	54	2.39	3.31
1,2,3,4,7,8-HxCDF (ng/kg)	54	2.16	2.82
1,2,3,6,7,8-HxCDD (ng/kg)	54	5.88	7.48
1,2,3,6,7,8-HxCDF (ng/kg)	54	1.30	1.68
1,2,3,7,8,9-HxCDD (ng/kg)	54	5.42	6.91
1,2,3,7,8,9-HxCDF (ng/kg)	54	0.19	0.31
1,2,3,7,8-PeCDD (ng/kg)	54	1.26	1.59
1,2,3,7,8-PeCDF (ng/kg)	54	0.57	0.74
2,3,4,6,7,8-HxCDF (ng/kg)	54	1.22	1.58
2,3,4,7,8-PeCDF (ng/kg)	54	0.70	0.88
2,3,7,8-TCDD (ng/kg)	54	0.44	0.54
2,3,7,8-TCDF (ng/kg)	54	0.69	0.89
OCDD (ng/kg)	54	1,002	1,262
OCDF (ng/kg)	54	78.2	106.2
Dioxin/Furan TEQ (on Congener Statistics) (ng/kg)	54	5.8	7.3

Note: DF are based on KM/ ProUCL; PCBs and As are non-parametric bootstrap – we will present distributions next small group meeting.

Fines Normalization Clarification

- From EPA Letter:

  "Normalizing sediment data may still erroneously give some weight to the heavier fractions which do not appear to contribute to the EWG sediment load."

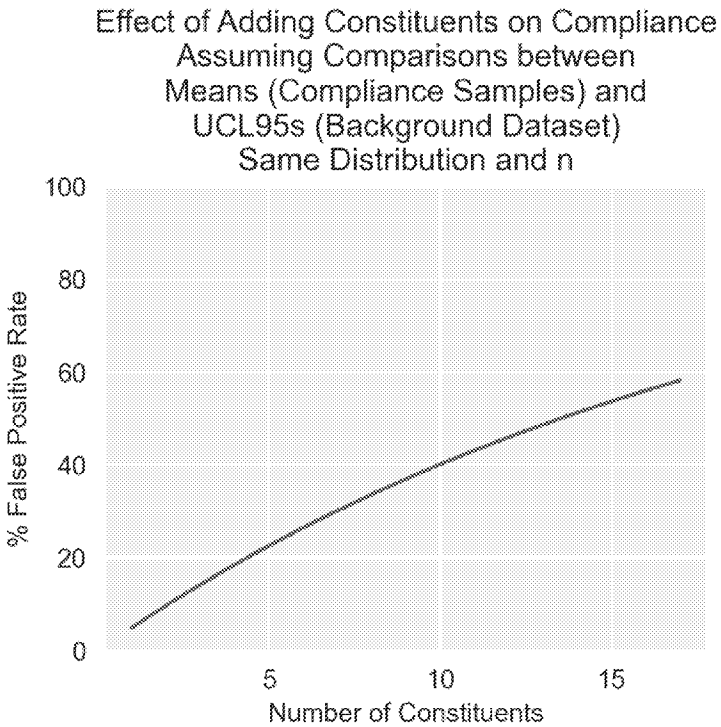
- Validity of fines normalization
  - Contaminants are associated with fine-grained particles
  - Only fine-grained particles make it to the EW
- Potential addition analyses
  - Adjustment that accounts for sand fraction contribution
  - Consideration of particle size and surface area

Dioxin/Furan Discussion

- Appendix C of the EW SRI (Food Web Model and Dioxins BSAF)
  - Presents dioxin/furan congener patterns in EW tissue and sediment samples
  - Presents primary contributors to dioxin TEQ
  - Calculates risk-based threshold concentrations (RBTCs) for sediment using site-specific biota-sediment-accumulation-factors
- Comparison of sediment RBTCs to AB values
  - Four congeners were determined to be primary contributors to TEQ risk for seafood consumption pathway
  - One of four congeners has AB value below sediment RBTC

Dioxin/Furan Discussion

- EWG believes using TEQ calculated from congener statistics for compliance is the best approach
- Validity/ benefits of a TEQ approach:
  - Focus on congeners that are highest risk (TEQ method accounts for relative toxicity) while including all congeners
  - Minimize potential to base future decisions on congeners that do not present a risk
  - Consistency with LDW use of TEQ
  - Improved risk communication
  - Minimize potential for false positives during compliance

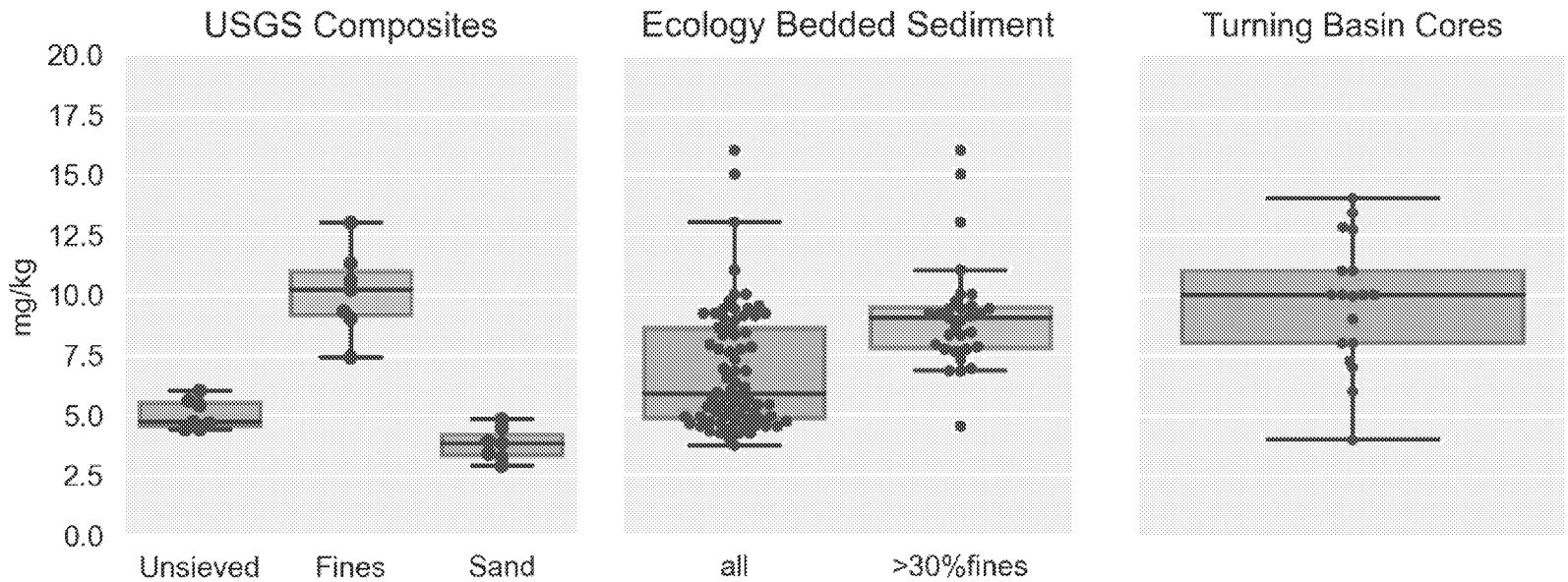


Arsenic

Arsenic Background is Higher than EW Site SWACs

- Suspended solids mean = 17.2 mg/kg
- Baseline (from EW Feasibility Study)
  - SWAC = 9.0 mg/kg
  - Mean = 11 mg/kg
- Potential explanations:
  - Arsenic associated with finer-grained suspended solids does not settle in the EW
  - Biogeochemical reactions in sediment once material deposits

Arsenic Green River Bedded Sediment



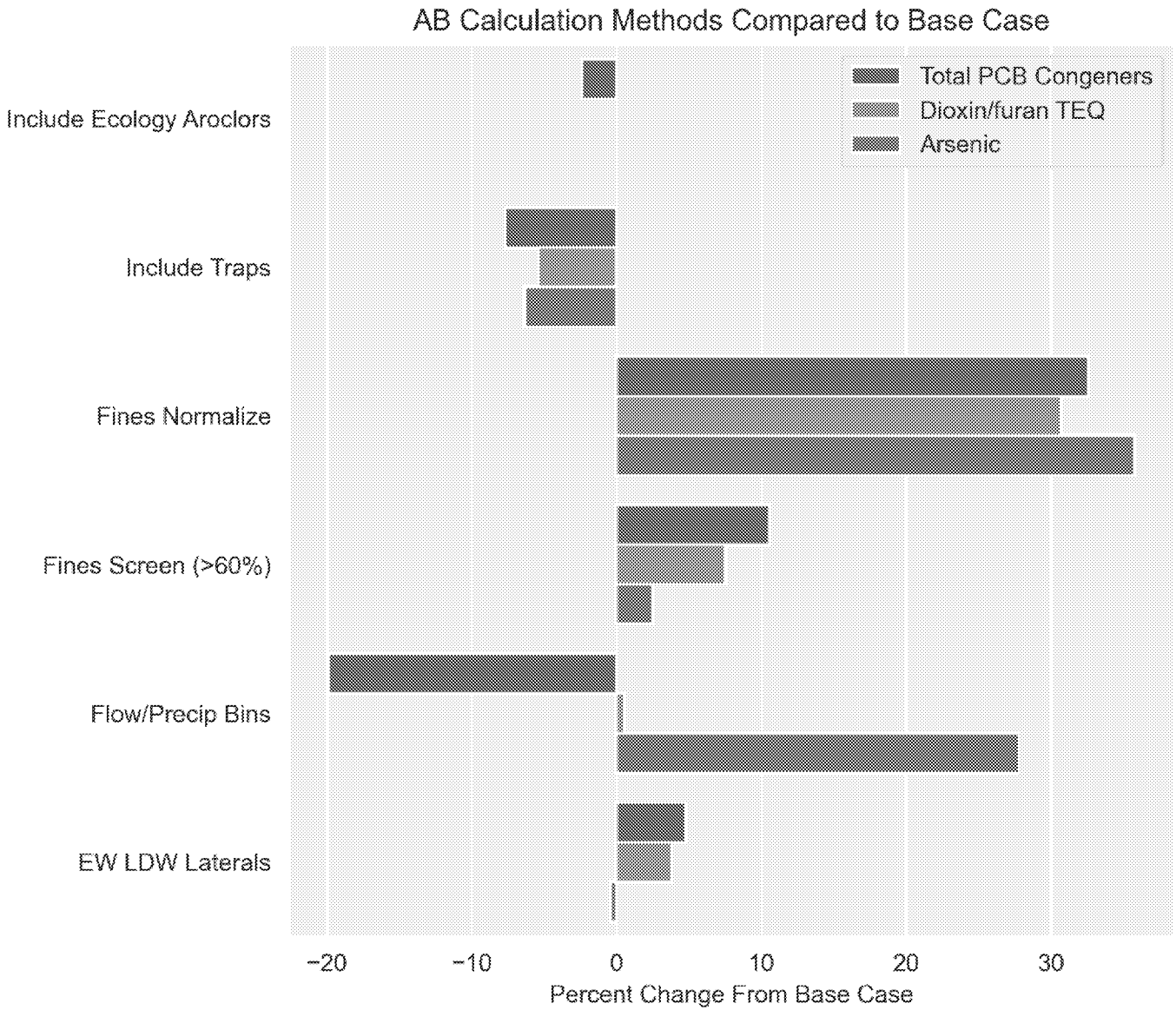
Study	Samples	n	Mean
USGS Composites	Unsieved	7	5.0
	Fines (Sieved)	7	10.1
Ecology Upstream of LDW	All Locations	74	6.8
	>30% Fines	31	9.0
Turning Basin Cores	2019 LDW DER Report	18	9.7

Arsenic Concentrations for Cleanup Sites (Post-remediation) and Elliott Bay

Location and Description	Mean (mg/kg)	n	Sample Year
Sediment Remediation Sites			
Pier 53-55, Elliott Bay, Post-remediation cap and ENR surface	6.0	7	2002
Lockheed, Shipyard No. 1, West Waterway, Open channel remediation areas (dredge with/without ENR)	9.4	5	2012
Duwamish Diagonal, Lower Duwamish Waterway, Caps A and B	9.8	8	2009
Elliott Bay (2007 Ecology Study)			
All Elliott Bay	8.6	18	2007
Inner Elliott Bay	9.0	13	2007
Outer Elliott Bay	7.3	5	2007

Datasets listed in EW FS Appendix A Table 2

Sensitivity Analysis


AB Calculation Methods Compared to Base Case
Total PCB Congeners
Dioxin/furan TEQ
Arsenic
Include Ecology Aroclors
Include Traps
Fines Normalize
Fines Screen (>60%)
Flow/Precip Bins
EW LDW Laterals
−20
−10
0
10
20
30
Percent Change From Base Case

Chemical	Method	Mean	PCT Change Base
Total PCB Congeners	Flow/Precip Bins	13.6	-20
	Include Traps	15.7	-8
	Include Ecology Aroclors	16.6	-2
	Base Case	17.0	0
	EW LDW Laterals	17.8	5
	Fines Screen (>60%)	18.8	11
	Fines Normalize	22.6	33
Dioxin/furan TEQ	Include Traps	5.8	-5
	Base Case	6.1	0
	Flow/Precip Bins	6.2	1
	EW LDW Laterals	6.4	4
	Fines Screen (>60%)	6.6	7
	Fines Normalize	8.0	31
Arsenic	Include Traps	16.2	-6
	EW LDW Laterals	17.2	0
	Base Case	17.2	0
	Fines Screen (>60%)	17.7	2
	Flow/Precip Bins	22.0	28
	Fines Normalize	23.4	36

Work Products for Meeting #5