Introduction and Approaches

Existing King County EFDC model was used to perform the sensitivity analysis task. The existing model doesn't turn on the lateral inflow (lateral discharges = 0), and all lateral PCBs concentrations are set to 0. In addition, we broke down the task into the following 8 subtasks:

1. Sediment Classification Sensitivity (Table 1)
2. Upstream boundary flow -/+ 50%
3. Upstream boundary cohesive sediment concentration -/+ 50%
4. Upstream boundary Total PCBs concentration -/+ 50%
5. LDW Sediment bed PCBs Concentrations:
    a) 130 µg/kg dw, and
    b) 2 µg/kg dw
6. Including the Lateral PCBs loads - with PCBs concentrations of: 1) 0 µg/L, 2) 0.01 µg/L, 3) 0.014 µg/L, 4) 0.03 µg/L, 5) 0.1 µg/L, and 6) 0.2 µg/L, respectively. The difference between the Existing model and the 0 µg/L scenario is the 0 µg/L scenarios has the lateral discharges (non-zero discharge, 0 PCBs and non-zero sediment concentration). Three sediment bed PCBs conditions are considered:
    a) Existing bed PCBs
    b) 130 µg/kg dw
    c) 2 µg/kg dw
7. Steady-State flow scenarios (Table 2)
    a) Upstream discharge (average, 90th and 10th percentile discharge) scenarios, and
    b) Open boundary water surface elevation (median, 90th and 10th percentile) scenarios
8. Model Parameters Sensitivity (Table 3)

Notes:

- All 360-Day EFDC runs in Subtask 1 were cold-started from Day 0. Compare the Scenario and Existing model results at Day 360.
- Steady-State flow scenarios (Subtask 7) were cold-started from Day 0. Compare the results at Day 11.
- All 90-Day runs (Day 360 – 450) for the rest of the sensitivity Subtasks are hot-started based on the specific restart files at Day 360. Compare the results at Day 400.

MODEL SENSITIVITY ANALYSIS

Table 1. Sediment Classification Sensitivity

Existing Model Information	Senarios
Existing Model: 2 cohesives and 1 noncohesive (2+1) **3** Classes: Clay (< 4 µm); Silt (4 - 63 µm); Sand (63 - 500 µm)	1. (1+1) Combine Clay and Silt into one Cohesive Class. **2** Classes: Clay and Silt (< 63 µm); Sand (63 - 500 µm)
	2. (3+1) Split Silt into 2 Cohesive Classes. **4** Classes: Clay (< 4 µm); Fine and Medium Silt (4 - 20 µm); Coarse Silt (20 - 63 µm); Sand (63 - 500 µm)
	3. (2+2) Split Sand into 2 Noncohesive Classes. **4** Classes: Clay (< 4 µm); Silt (4 - 63 µm); Fine Sand (63 - 250 µm); Medium Sand (250 - 500 µm)
	4. (3+2) Split Silt into 2 Cohesive Classes and split Sand into 2 Noncohesive Classes. **5** Classes: Clay (< 4 µm); Fine and Medium Silt (4 - 20 µm); Coarse Silt (20 - 63 µm); Fine Sand (63 - 250 µm); Medium Sand (250 - 500 µm)

Table 2. Steady-State Flow Scenarios (Upstream Discharge and Downstream Water Surface Elevation)

Upstream Flow Scenarios	Upstream Discharge (cfs)	Open Boundary Elevation (ft MSL)
1. Average	1,340	0.00
2. Wet (90th percentile)	2,720	0.00
3. Dry (10th percentile)	280	0.00
Open Boundary Scenarios	**Upstream Discharge (cfs)**	**Open Boundary Elevation (ft MSL)**
1. Median Stage	1,340	0.72
2. High Stage (90th percentile)	1,340	4.12
3. Low Stage (10th percentile)	1,340	-5.37

MODEL SENSITIVITY ANALYSIS

Table 3. EFDC Model Parameter Scenarios

Model Parameter	Description	Base Value	Senarios
Settling Velocity (m/s), W_s	Clay (1 - 4 µm)	1.0×10^{-10}	5.0×10^{-11}
			1.5×10^{-10}
	Silt (4 - 63 µm)	2.0×10^{-4}	1.0×10^{-4}
			3.0×10^{-4}
	Sand (63 - 500 µm)	0.04	0.02
			0.06
Critical Shear Stress for Deposition (Pa), τ_{cd}	Clay (1 - 4 µm)	0.10	0.05
			0.15
	Silt (4 - 63 µm)	0.10	0.05
			0.15
Critical Shear Stress for Resuspension (Pa), τ_{ce}	Clay (1 - 4 µm)	0.30	0.15
			0.45
	Silt (4 - 63 µm)	0.30	0.15
			0.45
Sediment Bed Reference Surface Erosion Rate (g/m^2-s), ER	Clay (1 - 4 µm)	2.0E-04	1.0E-04
			3.0E-04
	Silt (4 - 63 µm)	2.0E-04	1.0E-04
			3.0E-04
Critical Shear Stress for Noncohesive (Pa), τ_c	Sand (63 - 500 µm)	0.16	0.08
			0.24
Partitioning Coefficient at Water Column (L/mg), K_{pw}	Clay (1 - 4 µm)	5.5×10^{-3}	2.75×10^{-3}
			8.25×10^{-3}
	Silt (4 - 63 µm)	5.5×10^{-3}	2.75×10^{-3}
			8.25×10^{-3}
	Sand (63 - 500 µm)	0	------
Partitioning Coefficient at Sediment Bed (L/mg), K_{pb}	Clay (1 - 4 µm)	1.4×10^{-2}	7×10^{-3}
			2.1×10^{-2}
	Silt (4 - 63 µm)	1.4×10^{-2}	7×10^{-3}
			2.1×10^{-2}
	Sand (63 - 500 µm)	0	------
Sediment-Water Interface Flux Rate (m/s), D_{bw}	------	1.0×10^{-6}	5.0×10^{-7}
			1.5×10^{-6}
Particle Mixing Diffusion Coefficient in Sediment Bed (m^2/s), D_{pb}	------	1.0×10^{-6}	5.0×10^{-7}
			1.5×10^{-6}
Particle Mixing Depth (m), D_{pm}	------	0.10	0.05
			0.15