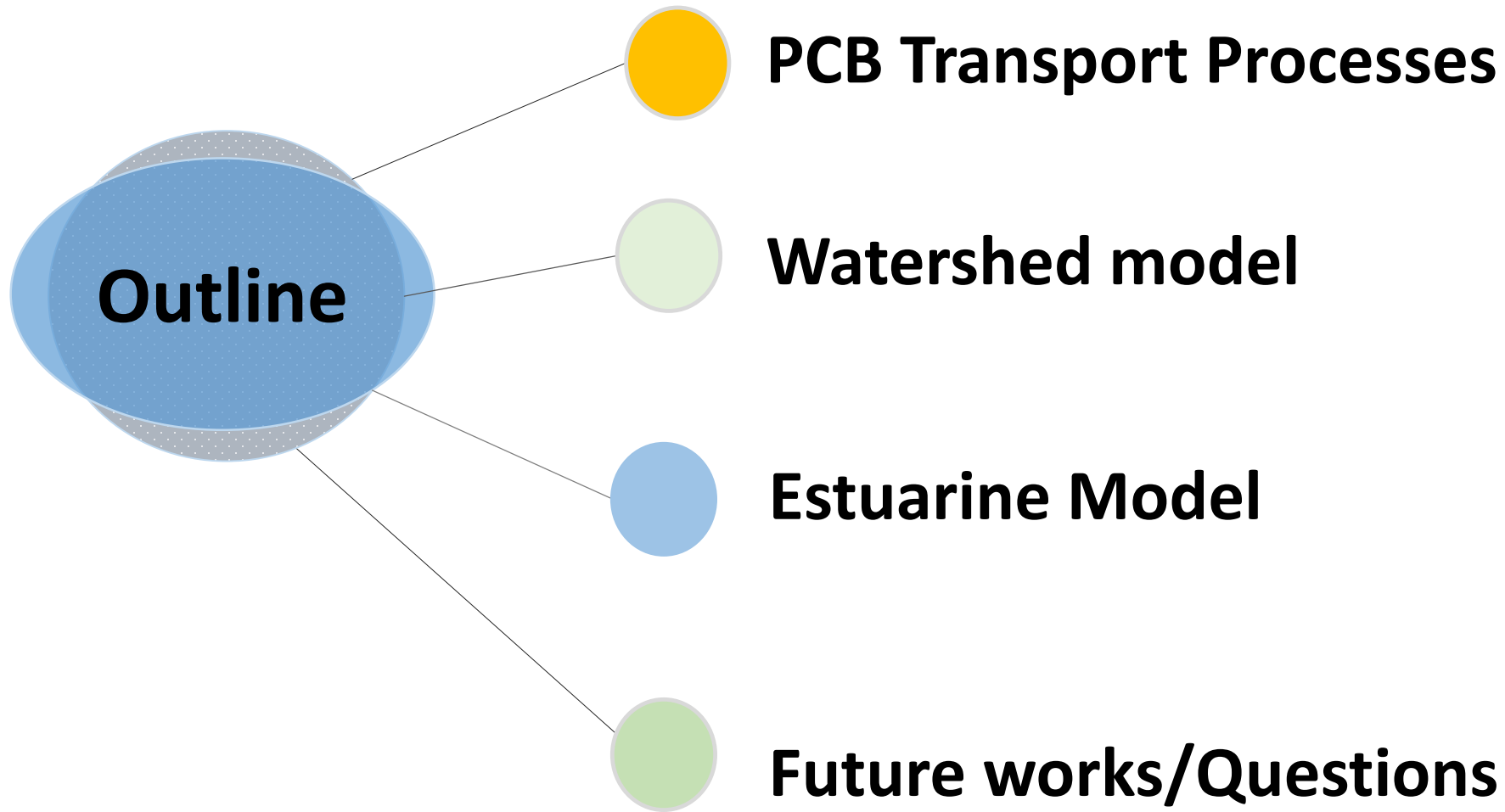


James River PCB Project

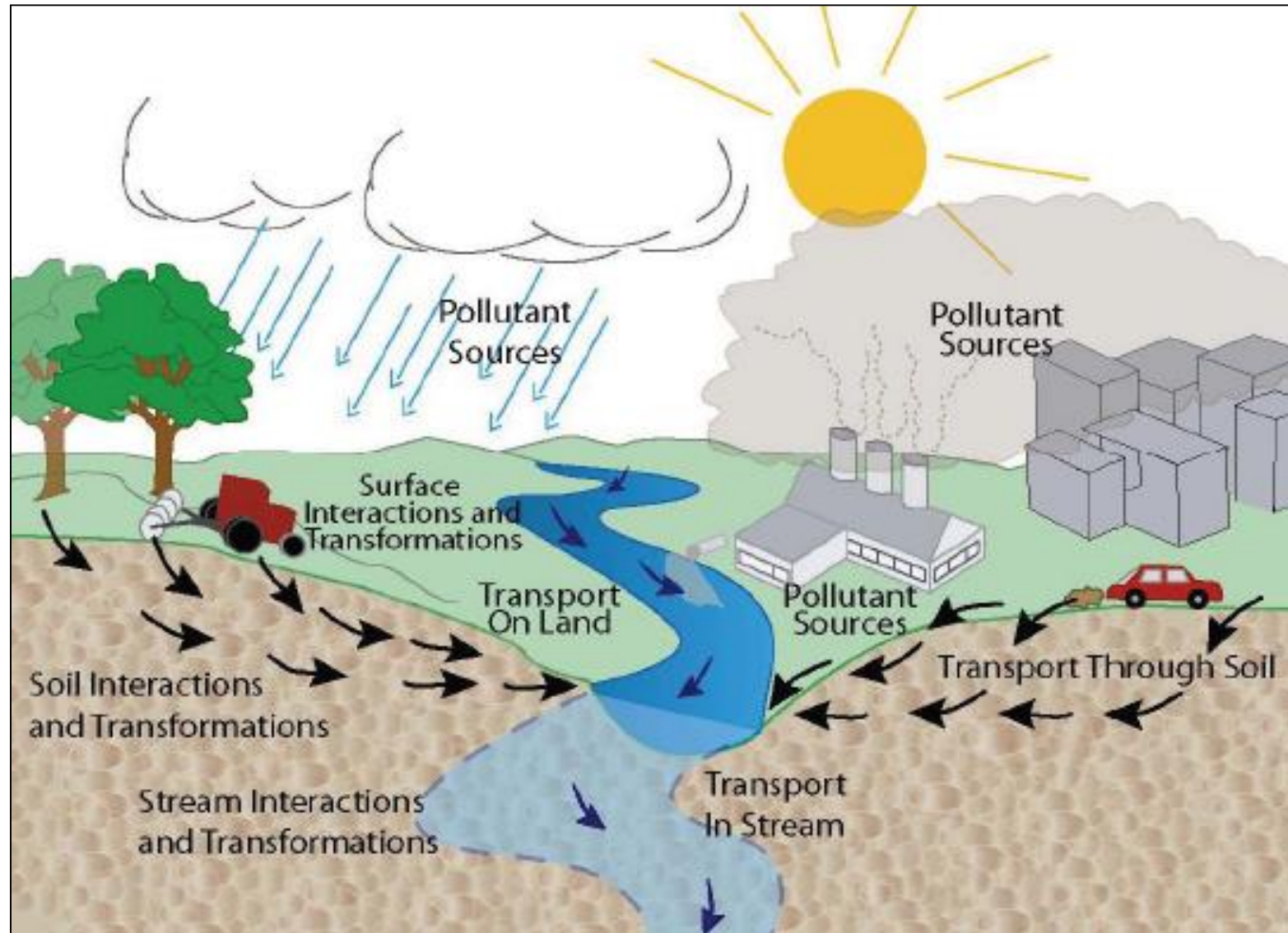
Jian Shen

Virginia Institute of Marine Science

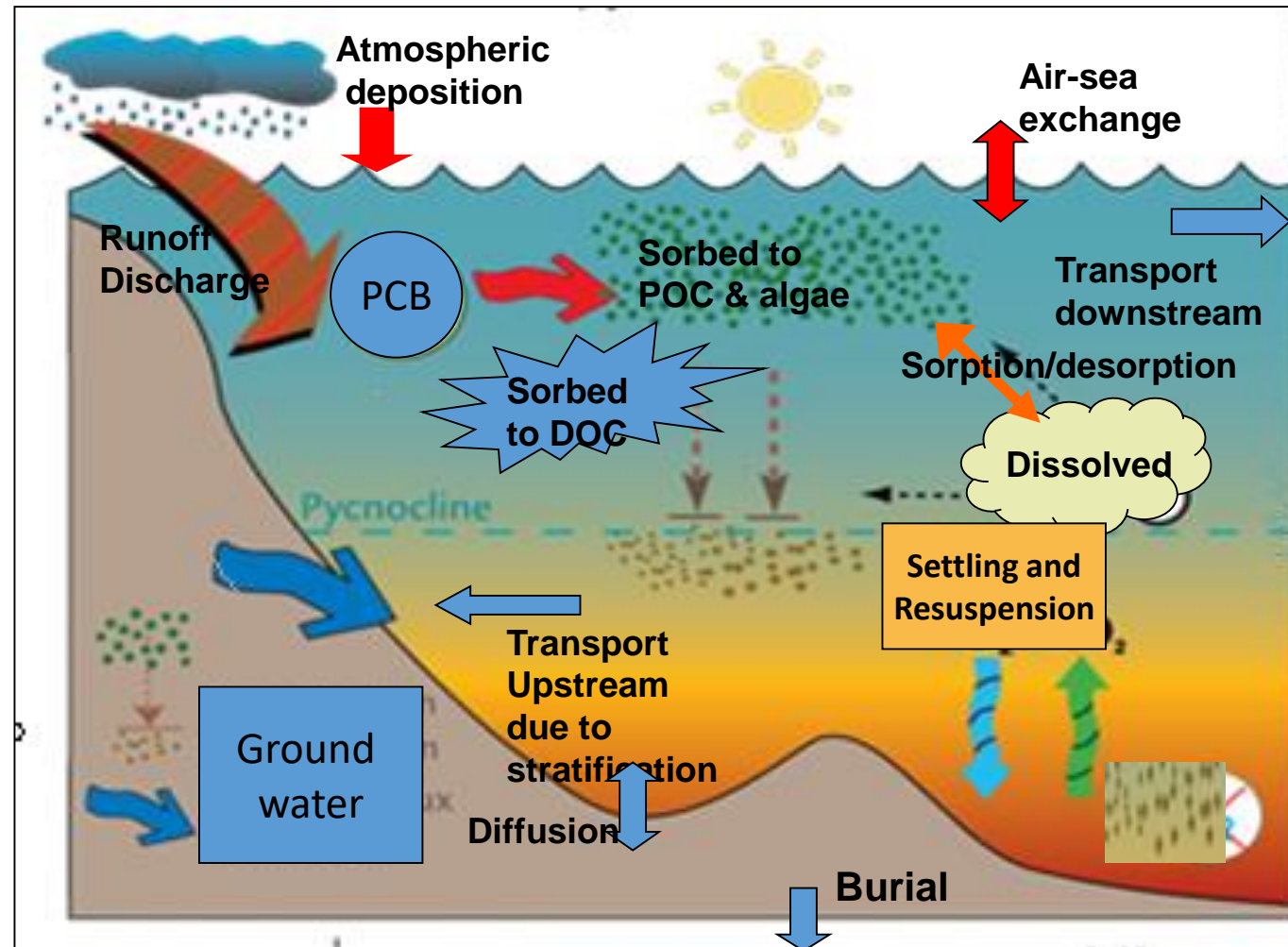
January 26, 2021



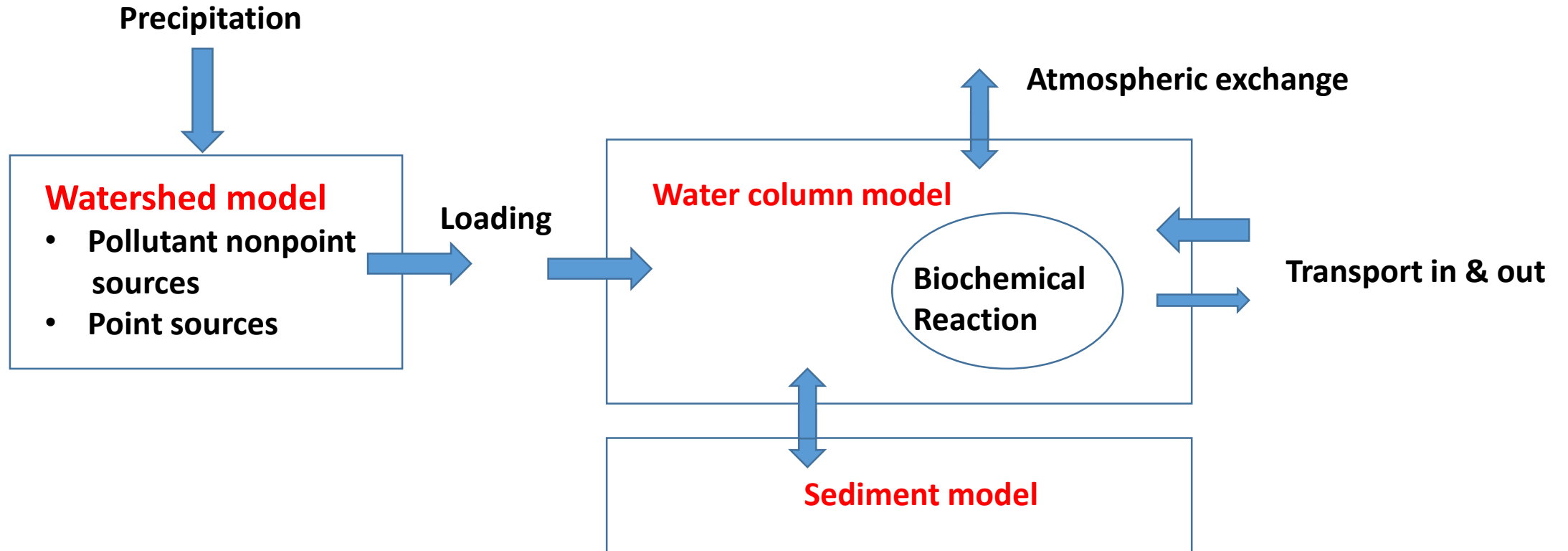
PCB Transport Processes in Watershed



PCB Transport Processes in Estuary

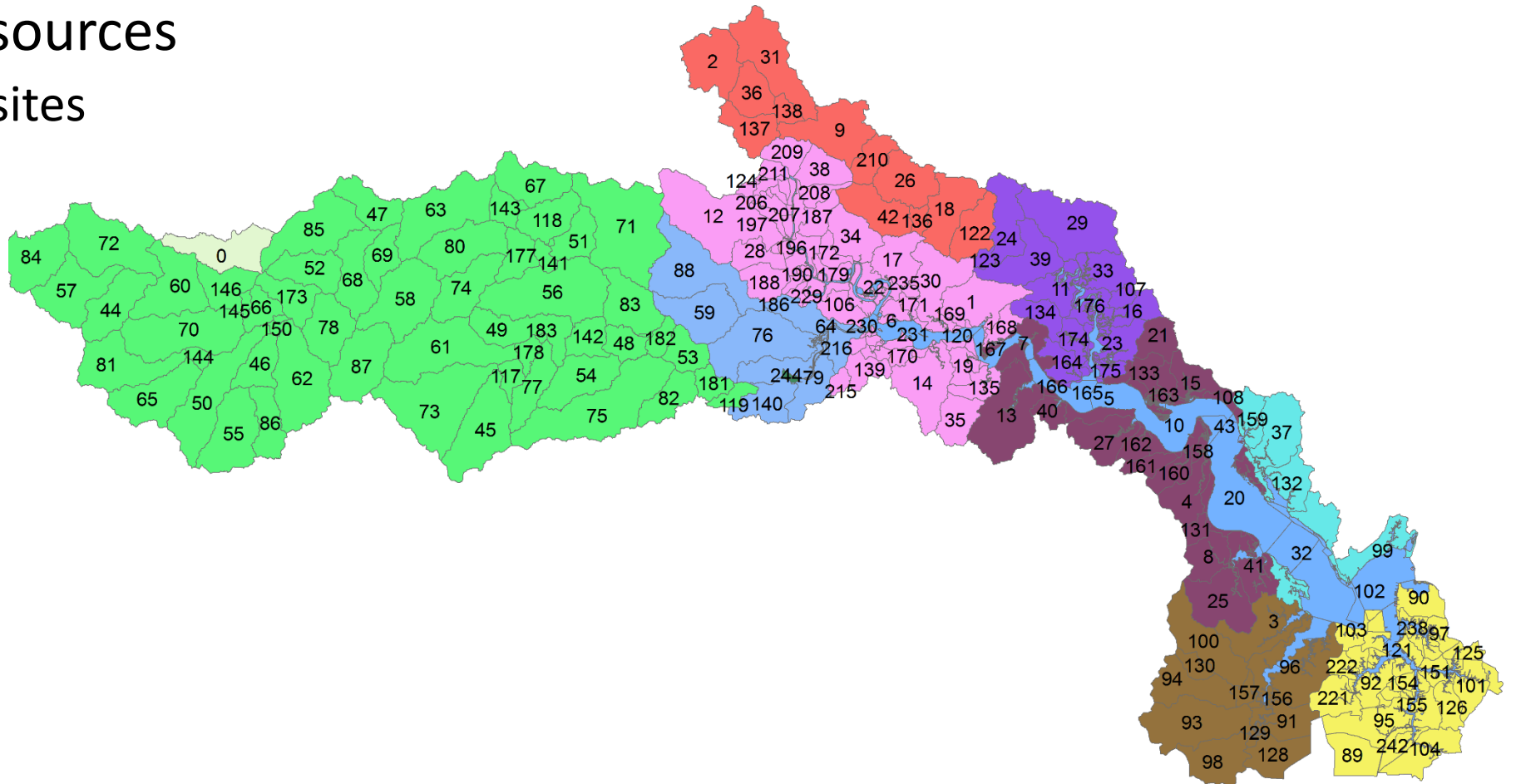


Modeling Framework of PCB Transport

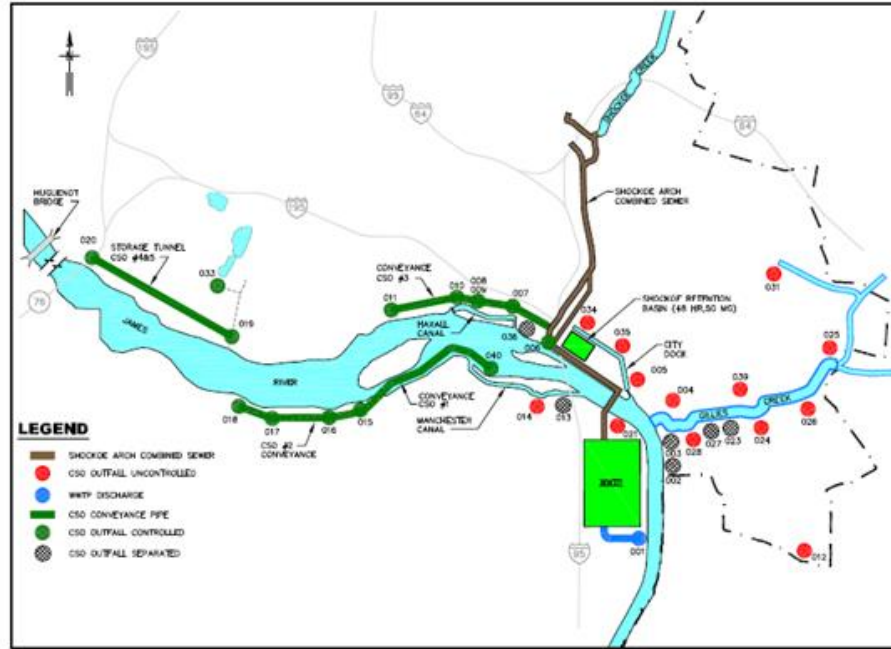


Watershed model

- Watershed are divided into multiple segments
- Major pollutant sources
 - Contamination sites
 - Point source
 - Direct discharge
 - Storm water



Watershed model: CSOs (Richmond)

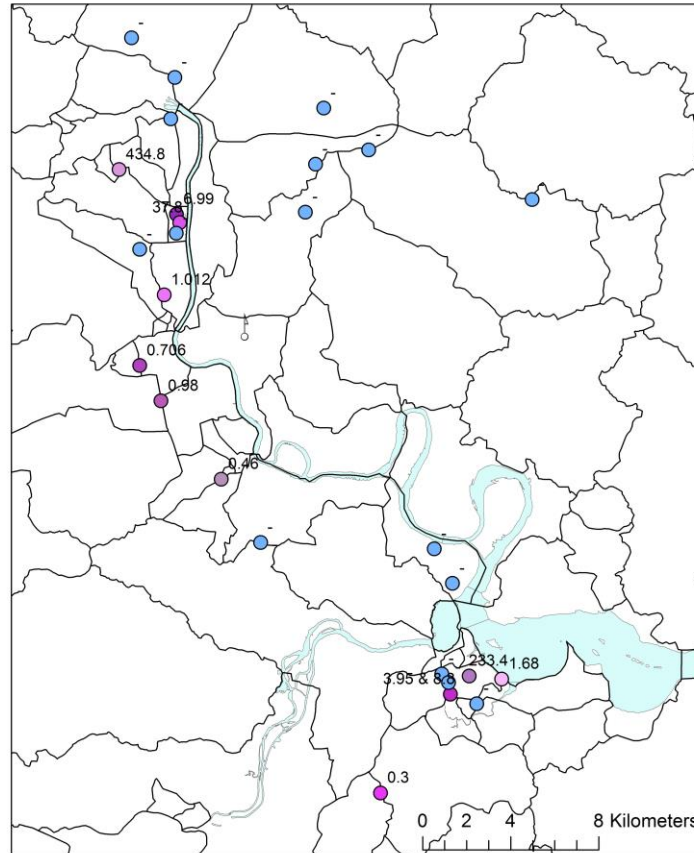


938 pg/L

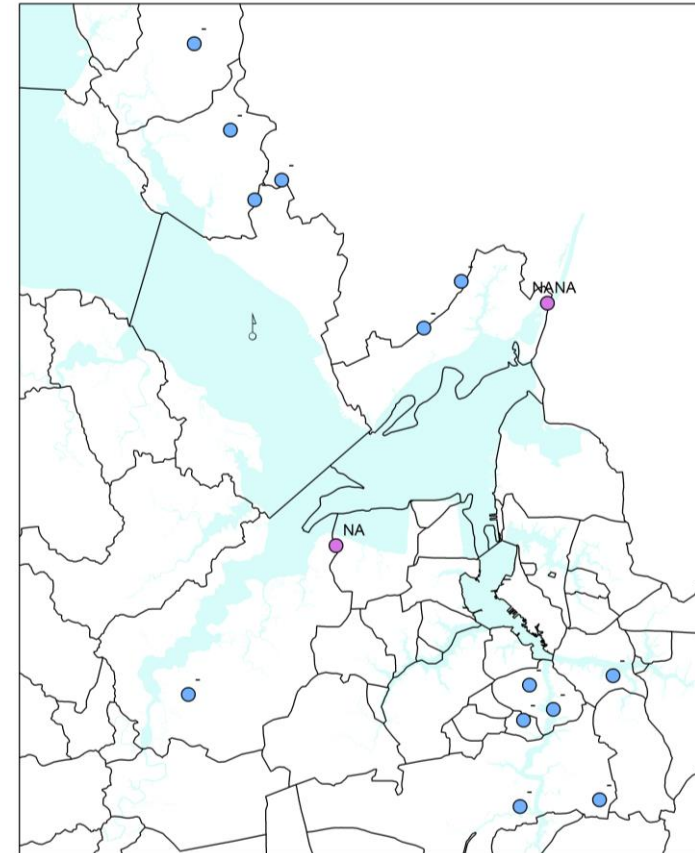
64,367 pg/L

- Loadings Derivation Current Condition
 - utilize monthly average flows (10 yr. period) and mean PCB concentration
 - WLA - substitute TMDL endpoint for PCB concentration

Watershed model: Contaminated and Remediated Sites



PCB Impaired Area
PCB Stormwater Stations (pg/L)

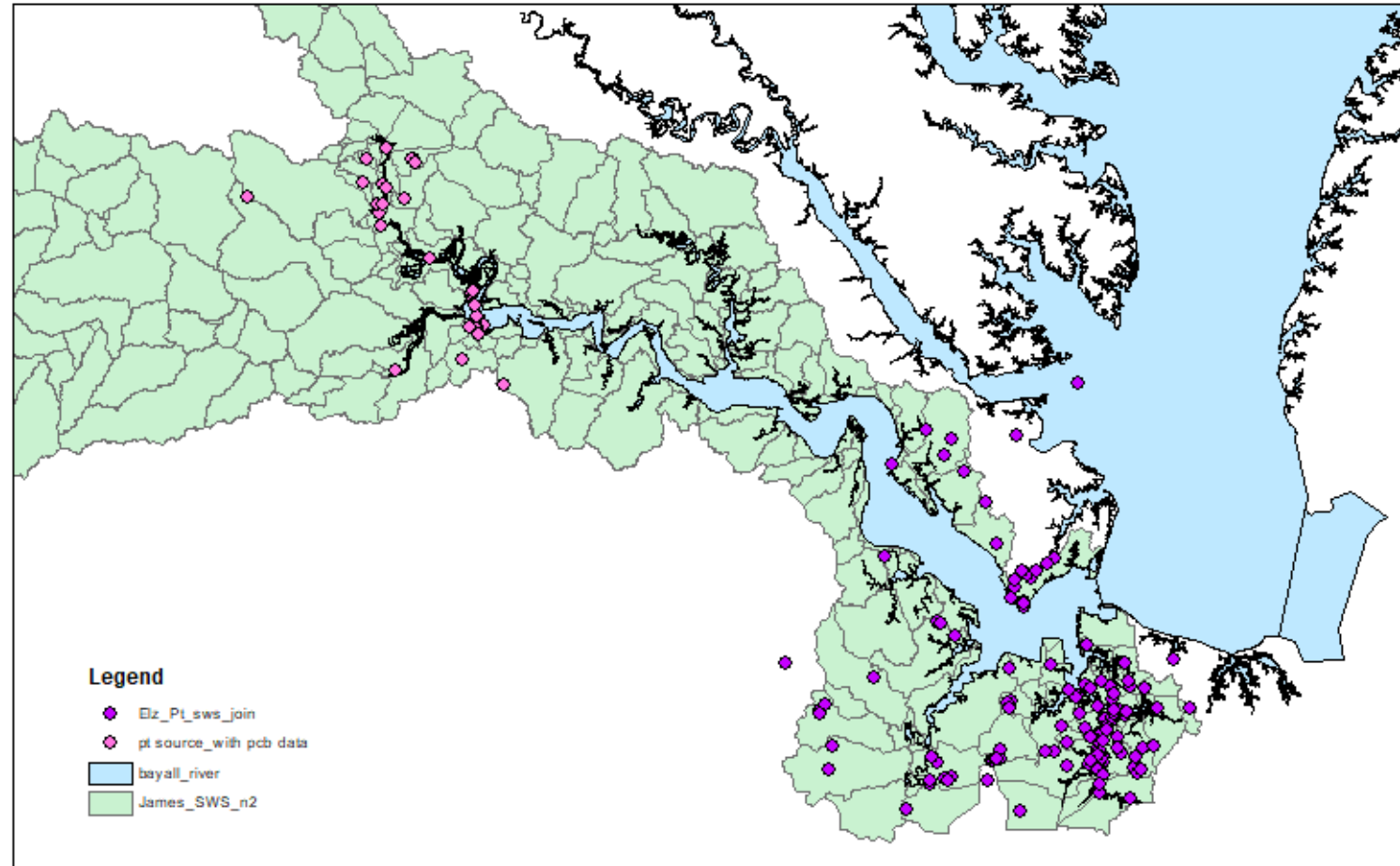


PCB Impaired Area
PCB Stormwater Stations (pg/L)

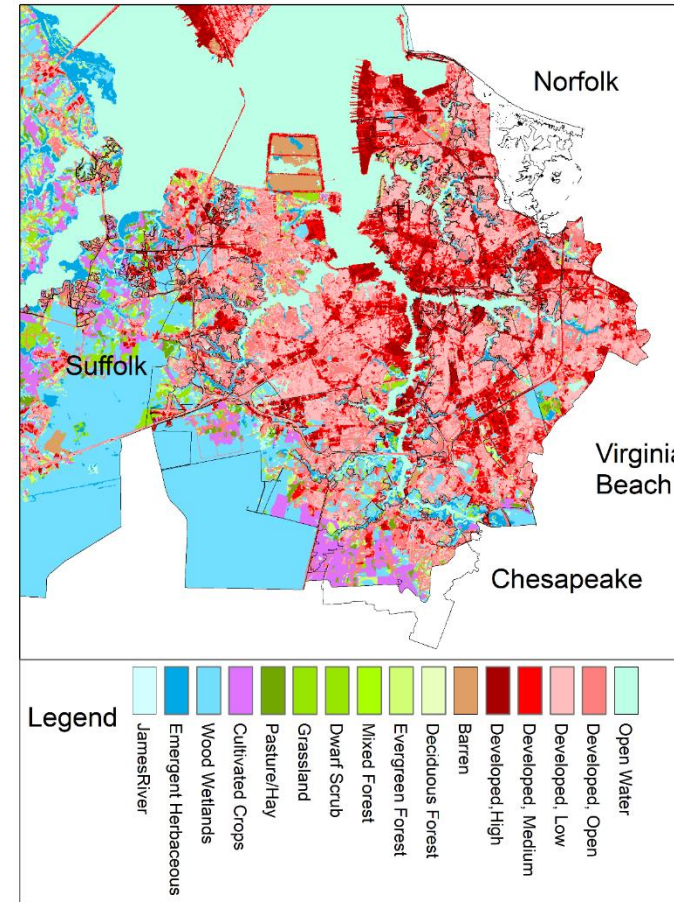
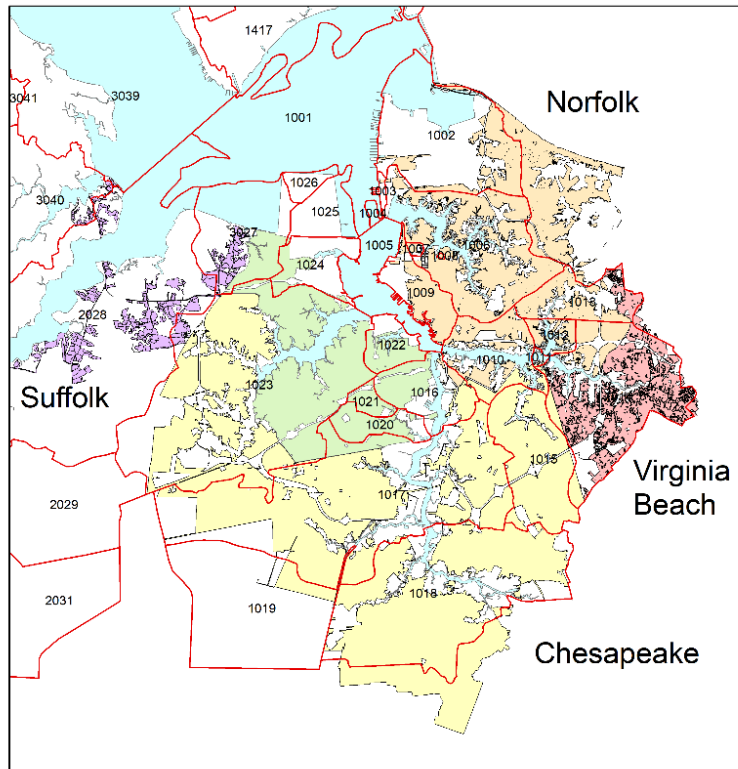
- 11 sites have PCB concentration (●)
- Using watershed modeled flow and area, the loading can be estimated assuming PCB concentration is constant

Watershed model: Point Sources

- Upper JR for PRO mtg - 145 facilities; Lower JR and Eliz River - 177 facilities
- combined = 322

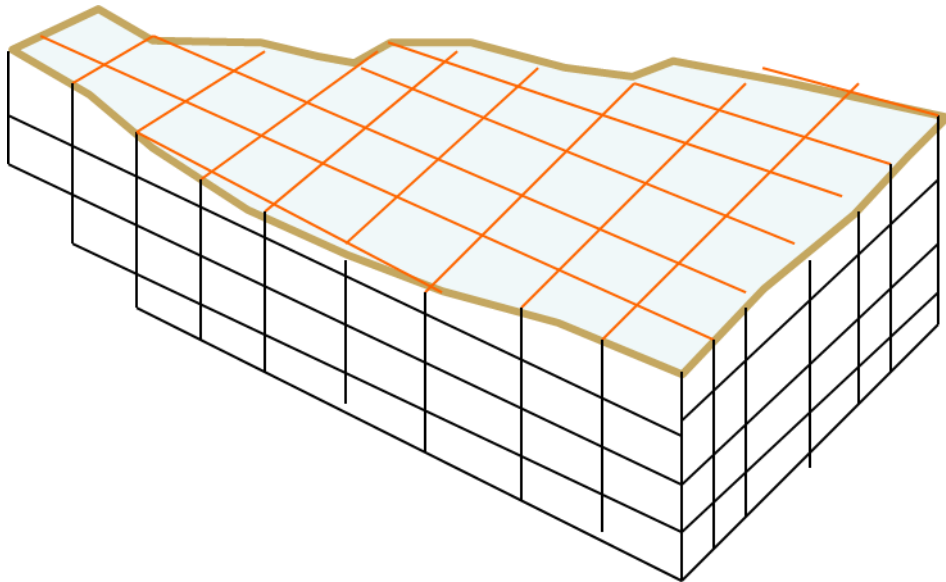


Watershed model: Using land use

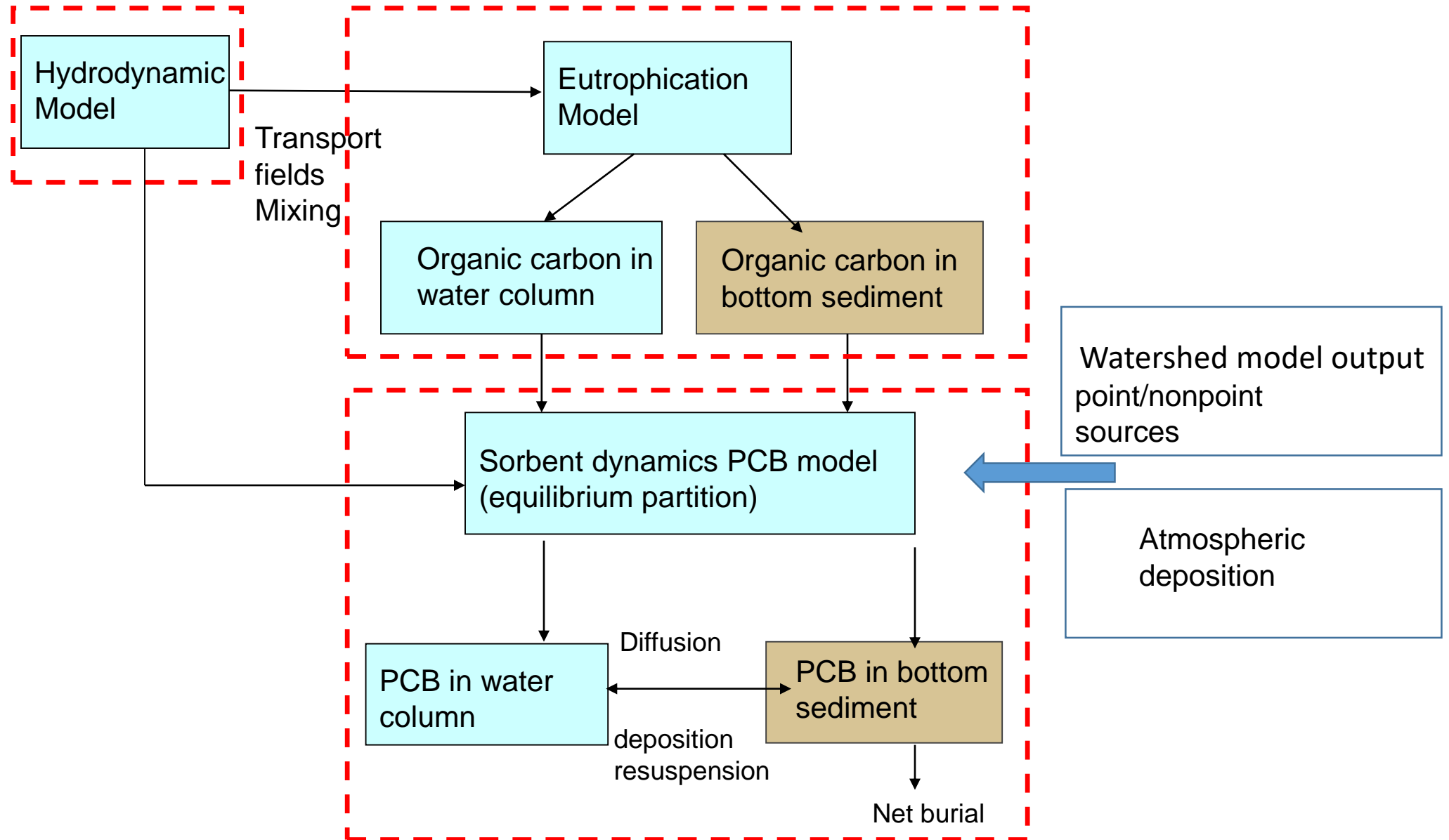


Estuarine Model: Environmental computer model

- Environmental computer models are mathematical representations of real-world conditions and are used to estimate environmental events and future changes.

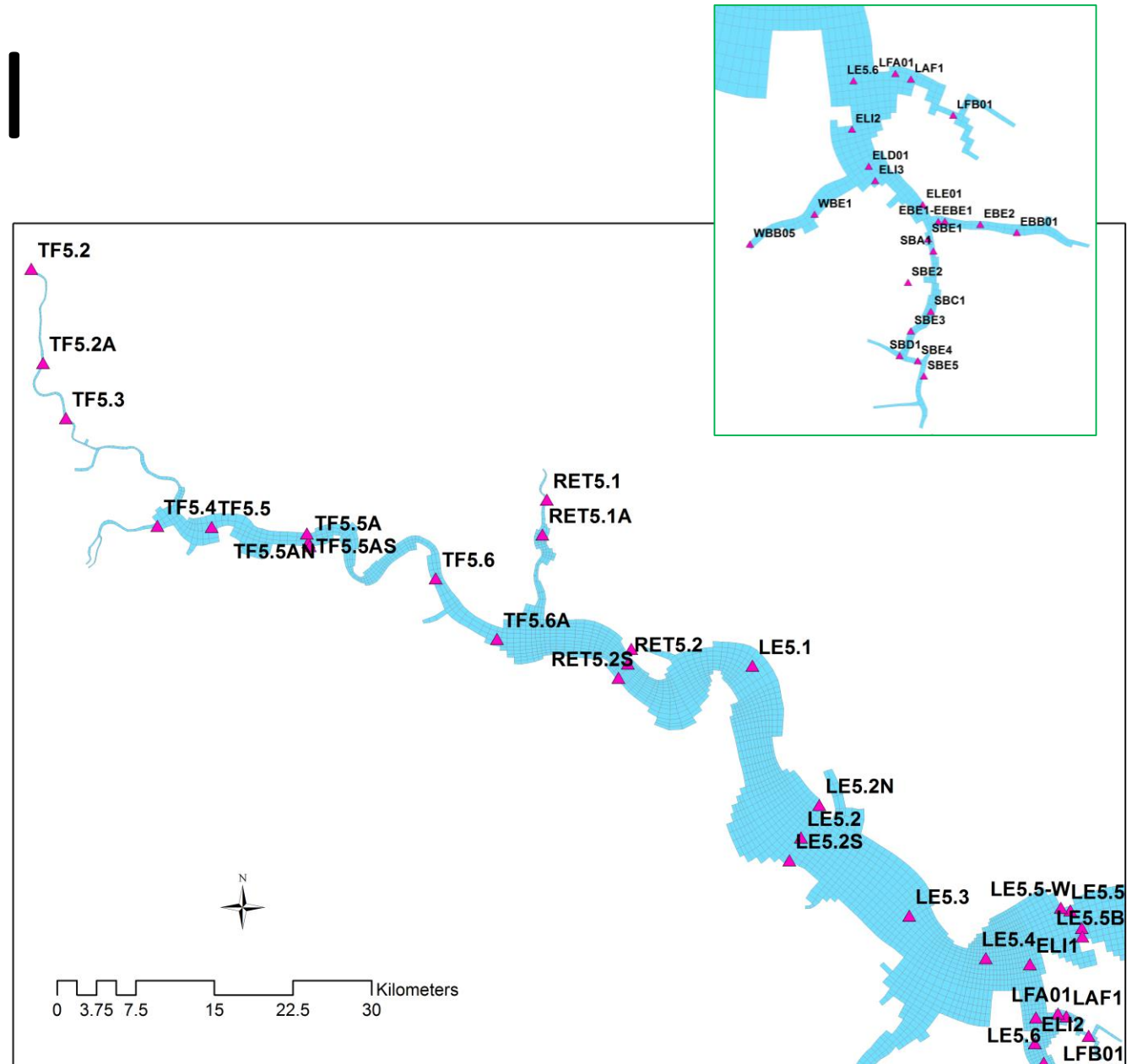


Estuarine Model

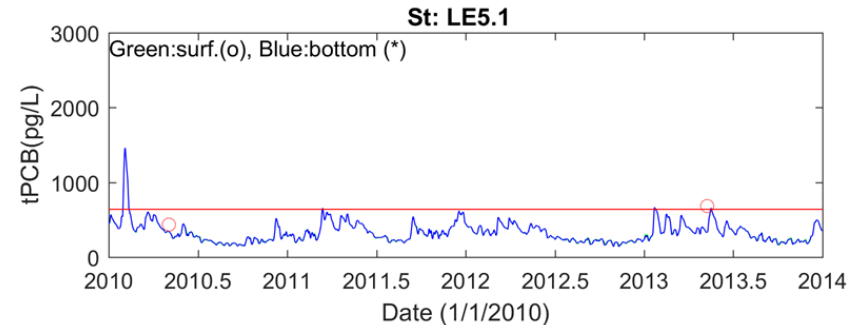
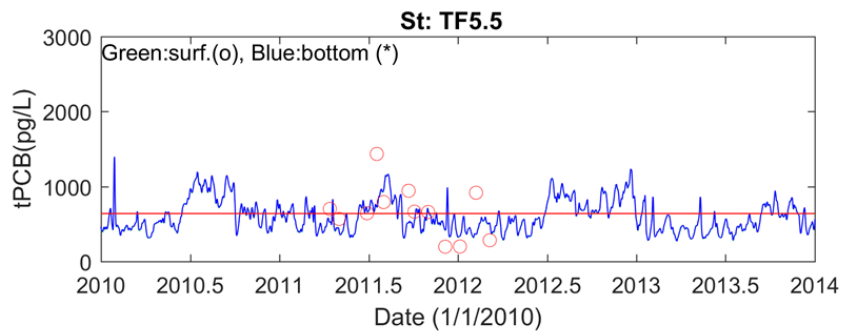
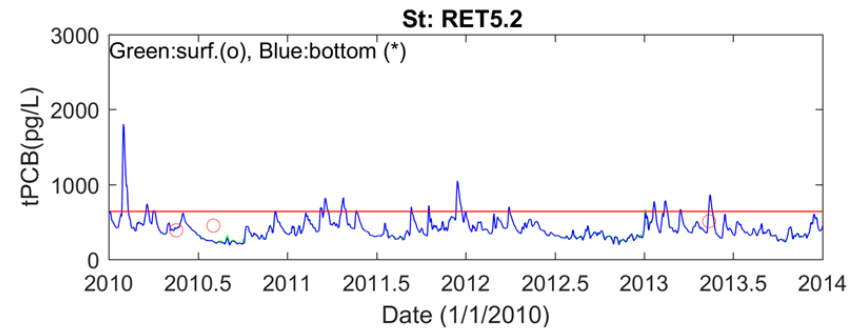
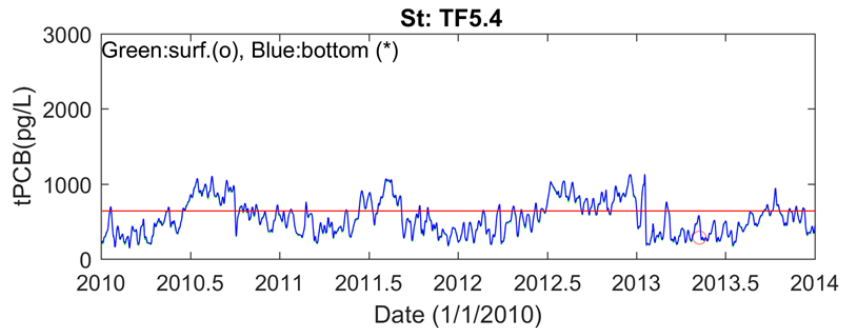
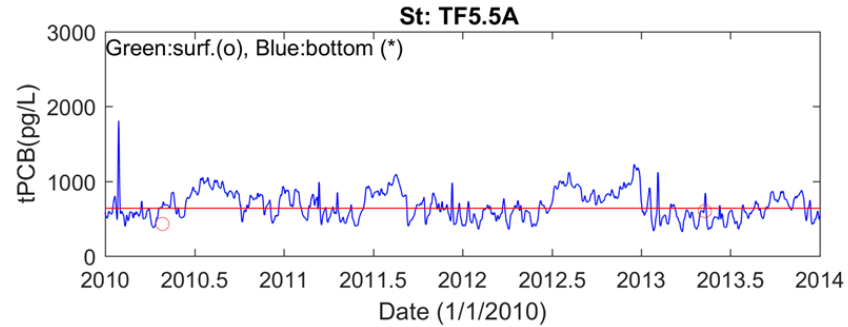
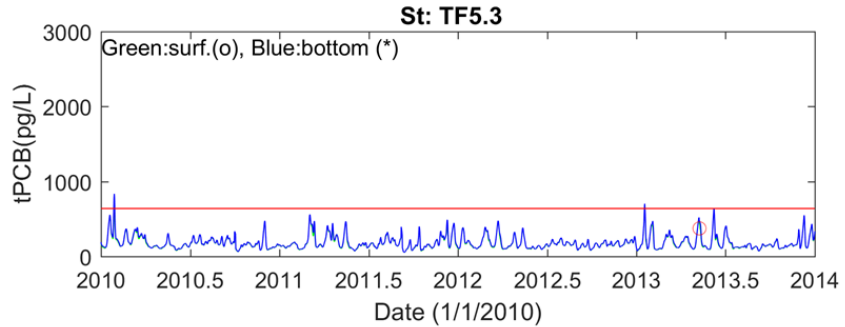


Estuarine Model

- Using observations for model calibration



Estuarine Modeling: Example



Future works and Questions

- Complete watershed model
- Calibrate estuary PCB model
- Conduct loading allocation and develop TMDLs