

# ***ADAPTIVELY MANAGING CLEANUP OF THE ANACOSTIA RIVER IN WASHINGTON, DC***

SMWG 2025 FALL SPONSOR FORUM

Mark Shupe, PG

October 21, 2025

# Outline

- Project Background
- River-wide vs Hot Spot-early action area (EAA) Cleanup
- Interim Record of Decision (ROD)
- Interim ROD Early Actions
- Baseline and Performance Monitoring
- Lessons Learned

# Project Background

- **General characteristics**

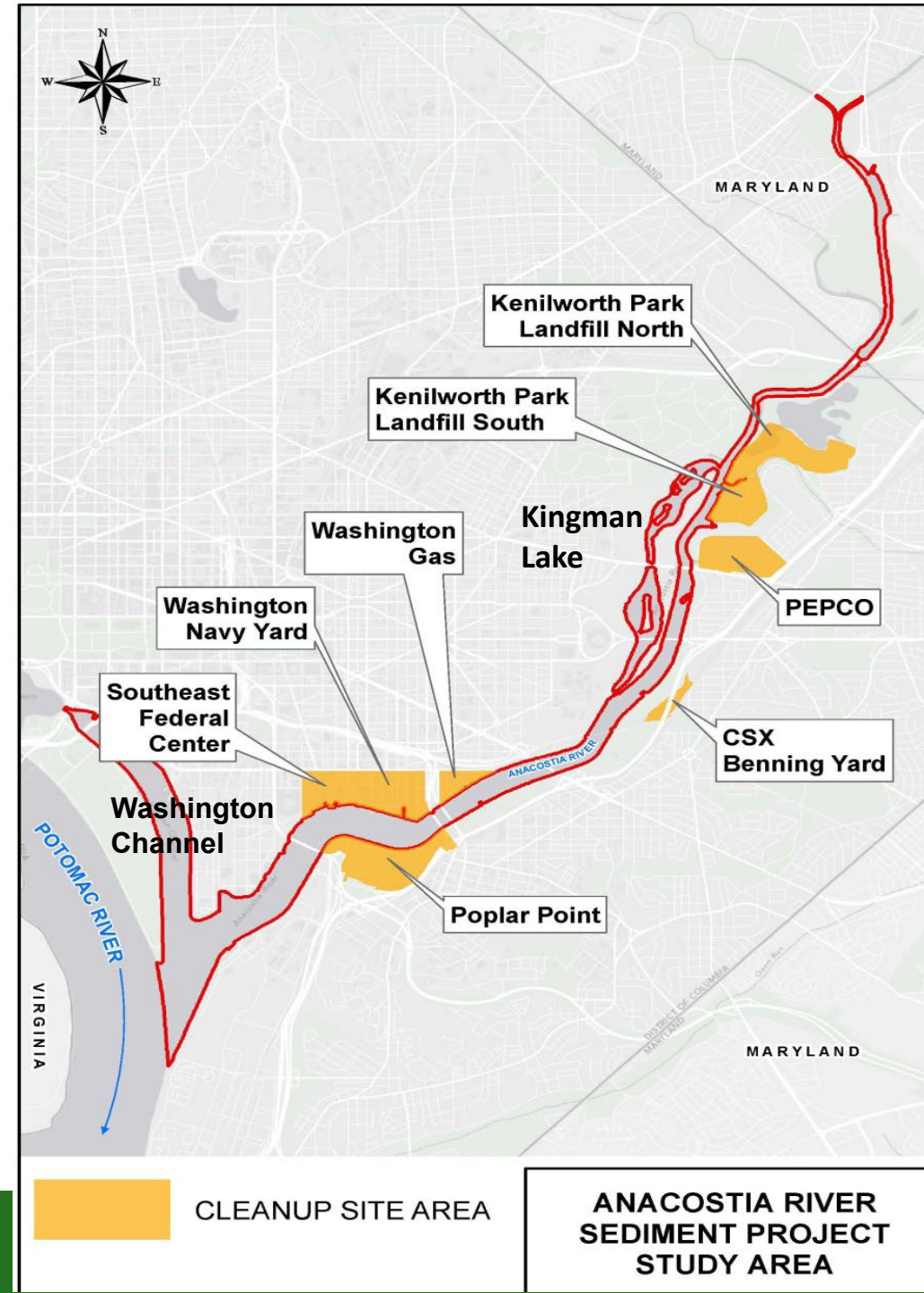
- Densely populated urban area
- Multiple former and active industrial/military facilities
- Anacostia Watershed: 176 square miles with 80% of watershed in MD
- Tidal Anacostia River or Main Stem operable unit (OU) (9 miles)
- Kingman Lake OU (1.8 miles)
- Washington Channel OU (2 miles)

- **Potential Contaminant Sources**

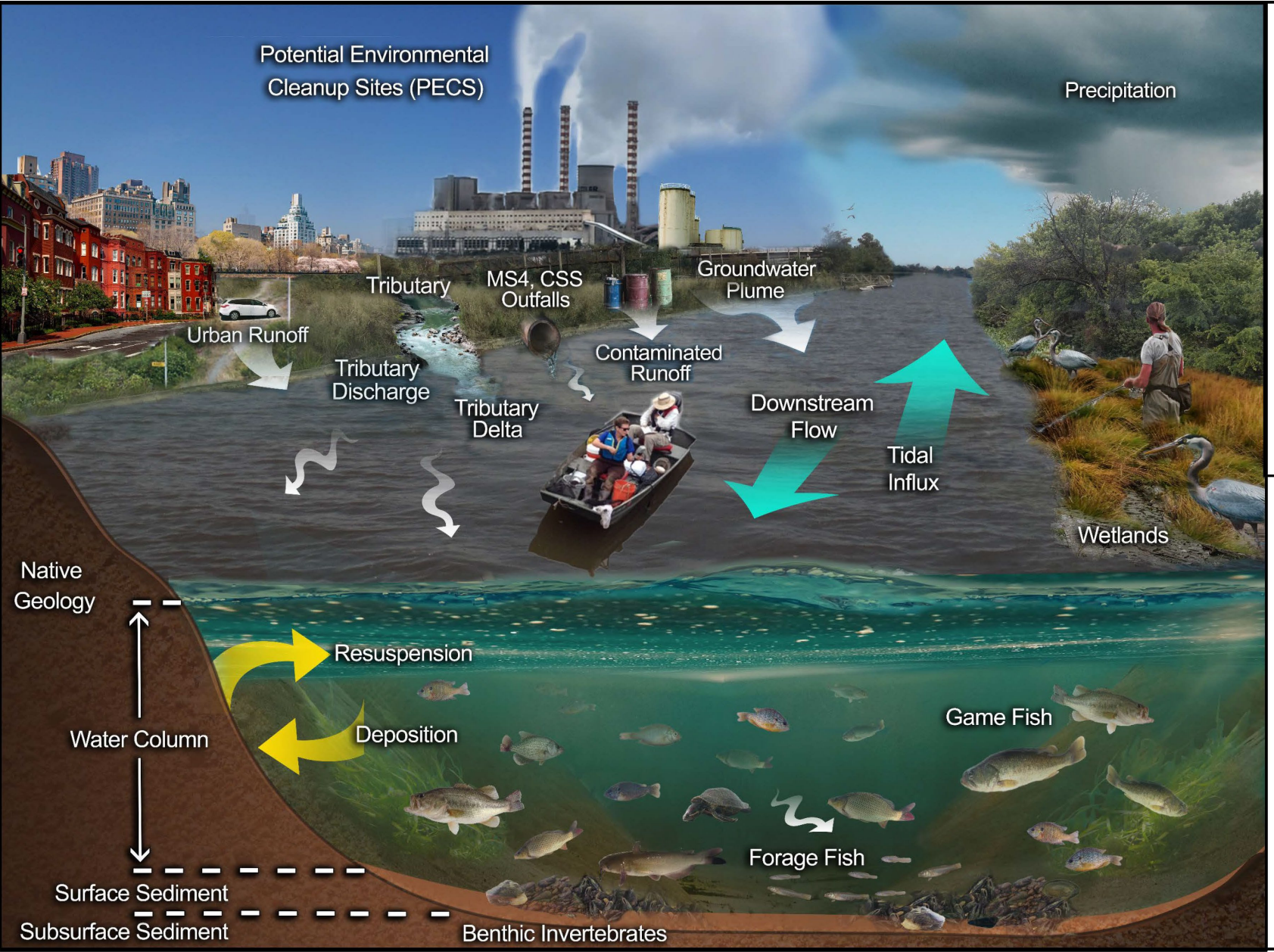
- >128 storm water (MS4) outfalls
- 16 Combined sewer system outfalls (reduced by 2018 tunnel project)
- 14 Tributary streams
- 15 legacy industrial cleanup sites/former landfills

- **Risk Driving Contaminants**




- Human Health: PCBs (contaminated tissue consumption)
- Ecological: Dioxin and Chlordane



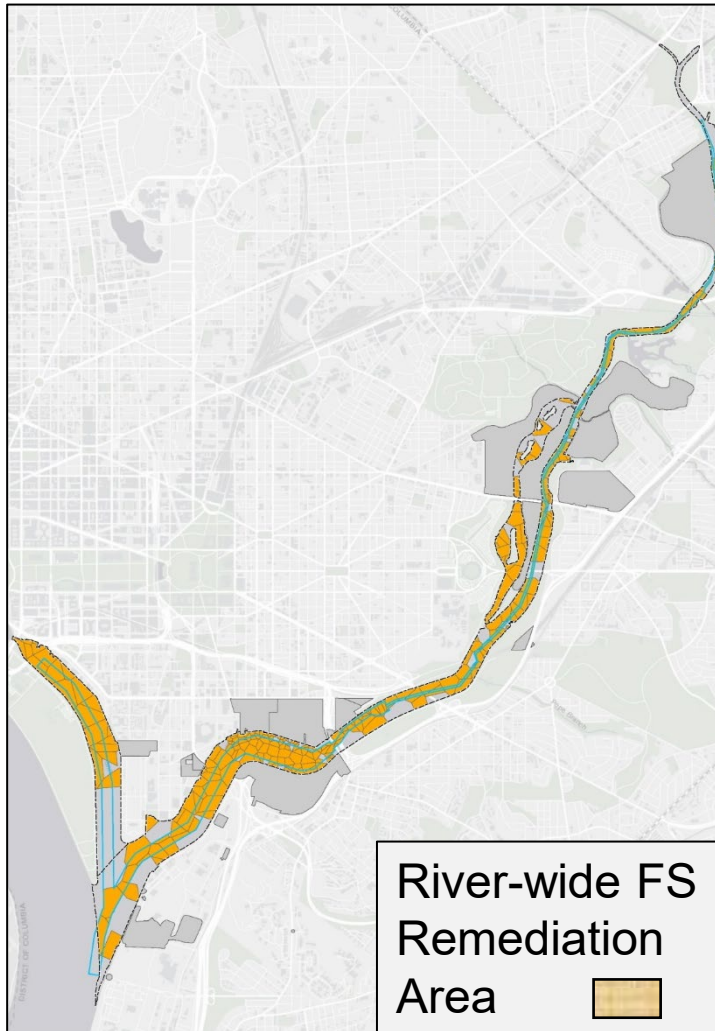
# Anacostia River CSM



**LEGEND**

-  RESUSPENSION
-  DEPOSITION
-  SUSPENDED SEDIMENT

# Cleanup the Entire River vs. Hot Spots



- River-wide FS results
  - Cleanup level for total PCBs (PRG): 65  $\mu\text{g}/\text{kg}$  (200  $\mu\text{g}/\text{kg}$  on site-wide SWAC basis)
  - 700-acre cleanup area addressing sediment (combination MNR, EMNR, selective dredging, containment, beneficial use, depending on OU)
  - \$465 Million and 10 years to complete
- Concerns with river-wide approach (shared by DOEE and stakeholders)
  - Strength of the link between sediment PCB concentrations and fish tissue PCB concentrations
  - Uncertainties regarding PCB sources
  - Legacy site cleanups
  - ***Take away: River-wide cleanup – uncertainties could outweigh potential benefits***

# Strategic Shift from River-wide to Interim Actions

- Process to shift from river-wide to interim actions through adaptive management approach
  - Engage with federal partners and conduct four monthly meetings
  - Meetings resulted in exchanging ideas and gain consensus toward interim actions
  - Engage with Leadership Council Members and conduct three monthly meetings to seek consensus on interim actions
  - Despite strategic shift, most importantly, the mandated council deadline for proposed plan/ROD was met
- Selected Path Forward – Interim ROD
  - Focus cleanup on PCB hot spots (>600 µg/kg) - \$61 Million and ~3 years to complete
  - Adaptive management based on robust baseline and performance monitoring
  - Consider additional sediment cleanup if trends are not favorable
  - Decision to transition to Final ROD based on monitoring results

# Interim and Final Clean-up Goals

- Preliminary Remedial Goals (PRGs) of 65 parts per billion (ppb) for PCBs will be achieved over time
- The interim site-wide average Remedial Action Level (RAL) is 200 ppb for PCBs
- DOEE established an ARSP-wide “hot-spot” clean-up goal for PCBs, based on detailed evaluation. Selected a multiple of the RAL (3X200= 600 ppb) with stakeholders' concurrence
- PRP-specific (i.e., WGL, Pepco, WNY) interim Remedial Action Levels (RALs) may be established ( $\leq 600$  ppb) through the consent decree process
- Estimated Fish Ingestion Rates (FIR) was adjusted based on stakeholder RI comments: 65 grams/day for adult subsistence fishers

# RAL vs. Cost, EAA Area, and Risk Reduction

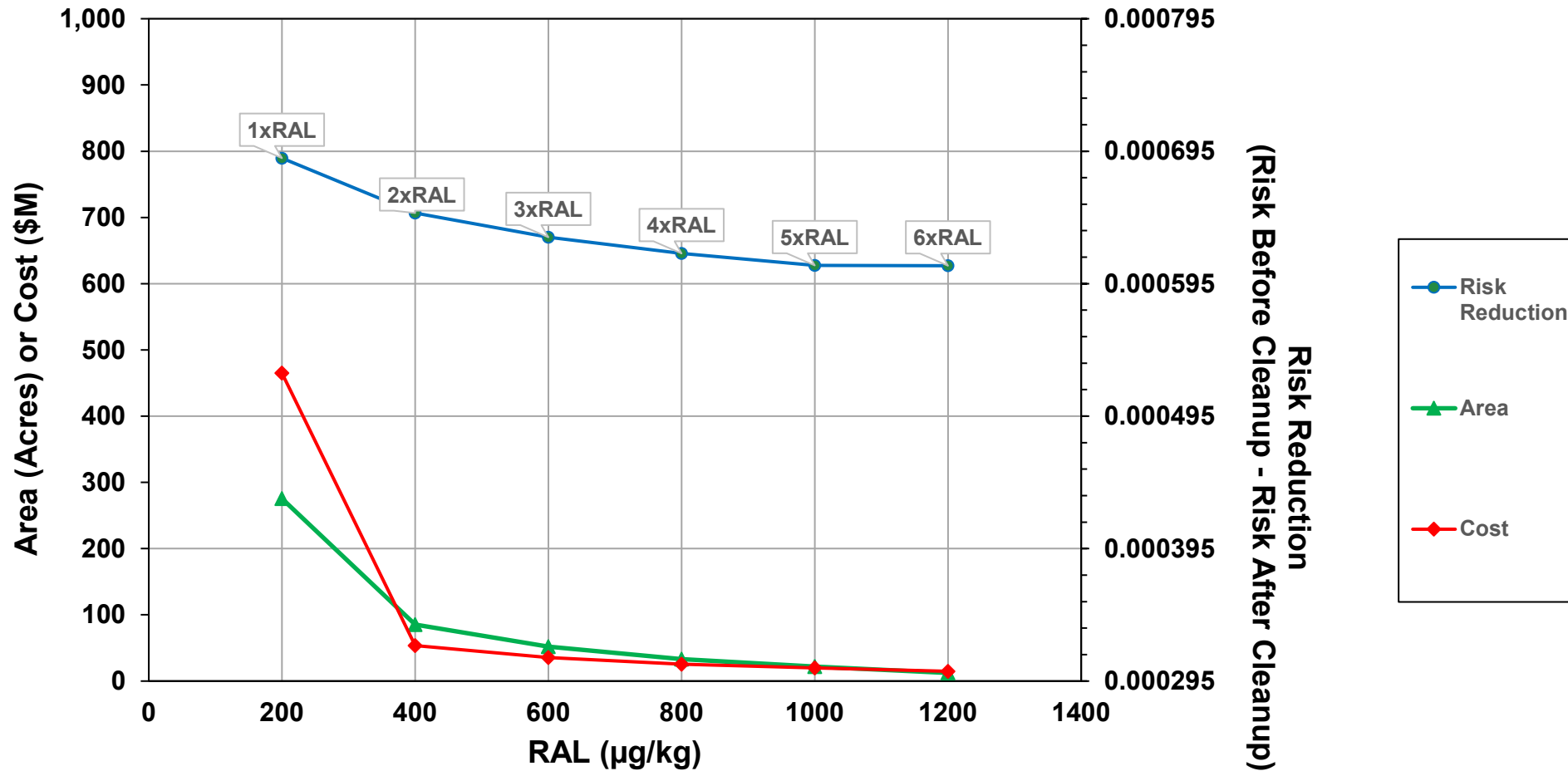


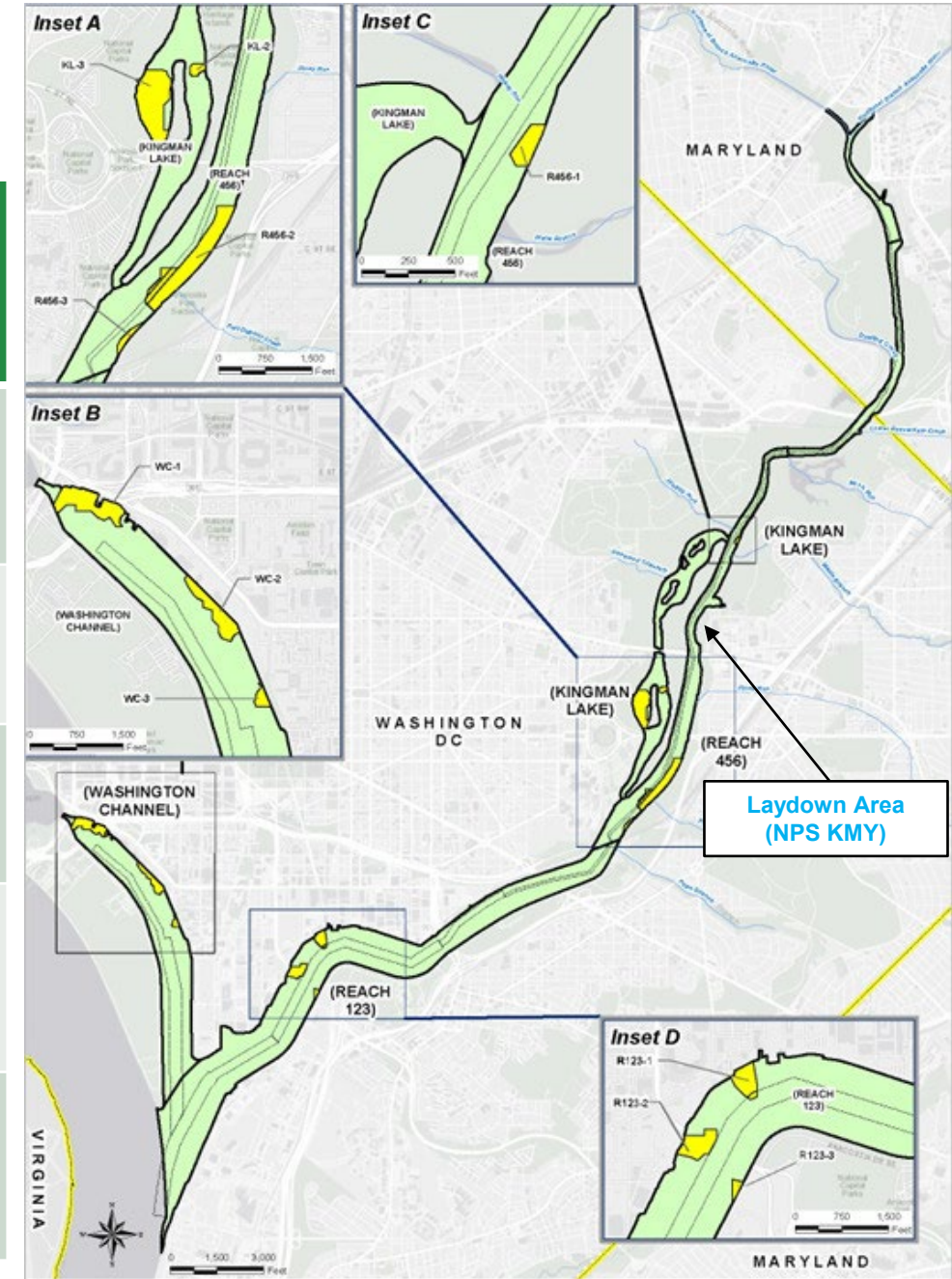
Figure B 3.1.2. Plot of RAL Versus Cost, Area Size, and Risk Reduction

# Adaptive Management-Interim ROD

- Describes early action(s) for each OU
- Specifies OU interim clean-up goals (RALs) using surface weighted average concentrations (SWACs) for COCs
- Establish trends in risk reduction from baseline and performance monitoring data – evaluate progress toward a final ROD
- Allows the remedy to be managed adaptively based on observed data trends
- As required by CERCLA, a final ROD will be prepared to include final remedial goals that are protective of human health and the environment

# Summary of Design

Operable Unit	Number of EAAs	Total EAA Acreage	Design Component
Kingman Lake (A)	2	12.0	In-situ Treatment, Capping Channel Dredging
Washington Channel (B)	3	14.3	Capping
Main Stem Reach 456 (A & C)	3	14.3	Dredging, Capping
Main Stem Reach 123 (D)	3	9.0	Dredging, Capping
<b>Totals</b>	<b>11</b>	<b>49.6</b>	In-situ Treatment: 11 acres Capping: 38.6 acres Dredging: 35,000 CY



# Total Cost and Time Comparison

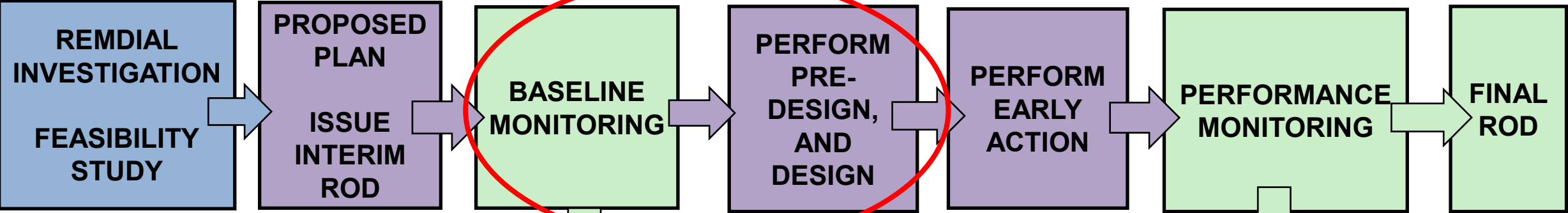
OU	River-wide Remedy: RAL 200 µg/kg PCBs		Interim ROD Remedy: RAL 600µg/kg PCBs	
	Cost (\$)	Construction Time	Cost (\$)	Construction Time
Main Stem	\$361 M	10 years	\$18.9 M	1 year
Kingman Lake	\$61 M		\$16.5 M	
Washington Channel	\$38 M		\$10.2 M	

**Total**

**\$460 M**

**\$45.6 M**

# Early Action and Adaptive Management Process to establish Final ROD



We are here

**DATA-DRIVEN ADAPTIVE MANAGEMENT**

Matrices Monitored, Baseline & Performance with metrics

✓ • Surface Sediment	• Game Fish Tissue ←
✓ • Tributaries	✓ • Forage Fish Tissue
✓ • Surface Water	✓ • Benthic Invertebrate Tissue
✓ • Porewater	✓ • Benthic Community

# Interim ROD/Early Action: Monitoring and Remedy Performance

- Data collection is being performed to establish baseline conditions and track progress (consistent with EPA directives)
- Final design will be issued later this year
- Obtaining various permits, remedy construction expected in 2026
- Post remedy performance monitoring (every 2 to 3 years) –establish trends key indicator parameters, specially forage fish and bioaccumulation
- Look for correlations and eliminate redundant parameters
- Considers lessons learned to design a future remedy and final ROD

# Adaptations to the Remedy to Date

- EAA boundary confirmation sampling (total PCB congeners) during PDI resulted in the elimination of one EAA and improved delineations
- Design assumes off-site disposal of dredged sediment as a worst case, but can be refined for upland beneficial use as options evolve over the months prior to remedy construction
- Comparison of baseline surface sediment sampling results to EAA delineation – need to consider differing sampling approaches
  - Baseline samples are composite samples from polygons defined over the entire area
  - EAAs are defined based the discrete sampling conducted for the RI

# Lessons Learned/Take Away Message

- Maintain robust Conceptual Site Model and track key uncertainties
  - Strength of link between sediment to fish tissue concentrations
  - Source control in upland areas and tributaries
- Seek stakeholder input and feedback throughout the RI/FS, Proposed Plan process
  - Include comment and response on the RI and FS Reports and supporting documents
  - Convene stakeholder meetings including commercial, governmental, and NGOs
- Interim ROD with adaptive management approach addresses the most contaminated areas and minimizes exposure potential
- Conserves time and money - allows for remedy adjustment and avoids over-remediating
- Trended monitoring results (baseline and performance) directly document remedy effectiveness and progress toward a final ROD

# For more information

Contact: Dev Murali, PG, RPM

Department of Energy & Environment

1200 First Street, Washington DC 20002

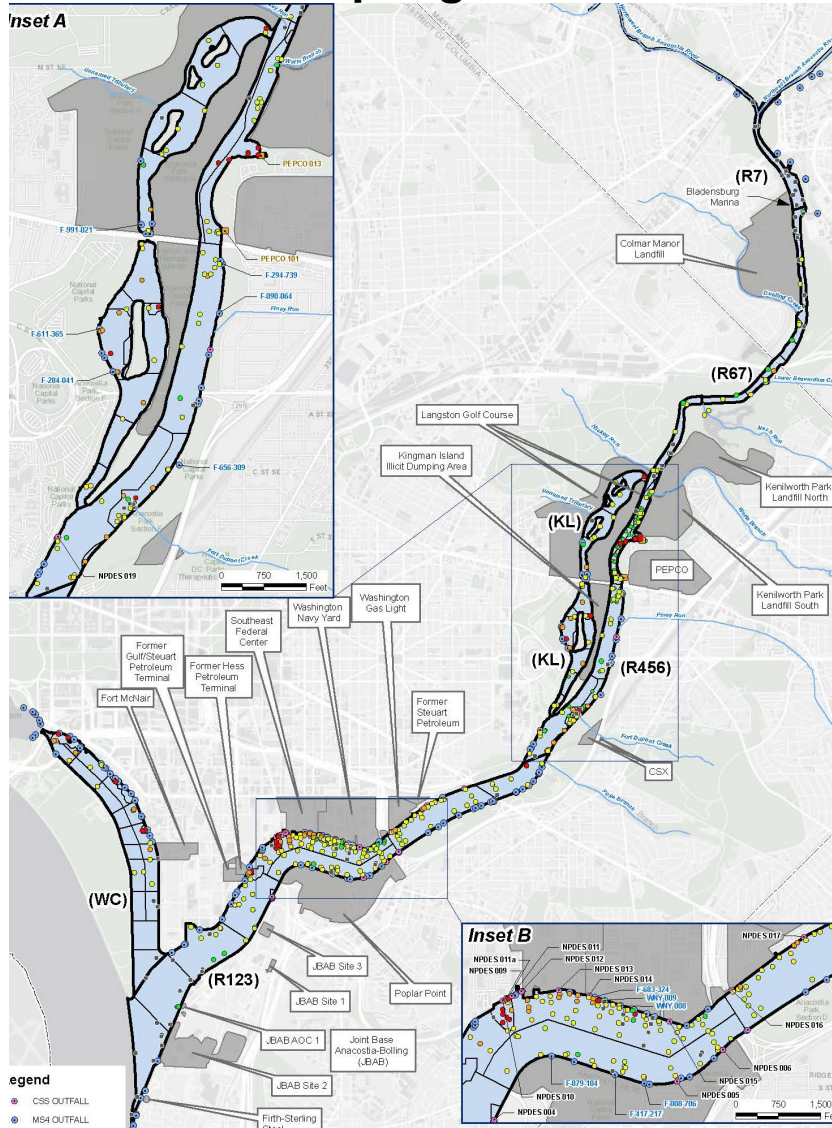
[Dev.murali@dc.gov](mailto:Dev.murali@dc.gov)

<https://restoretheanacostiariver.com/>

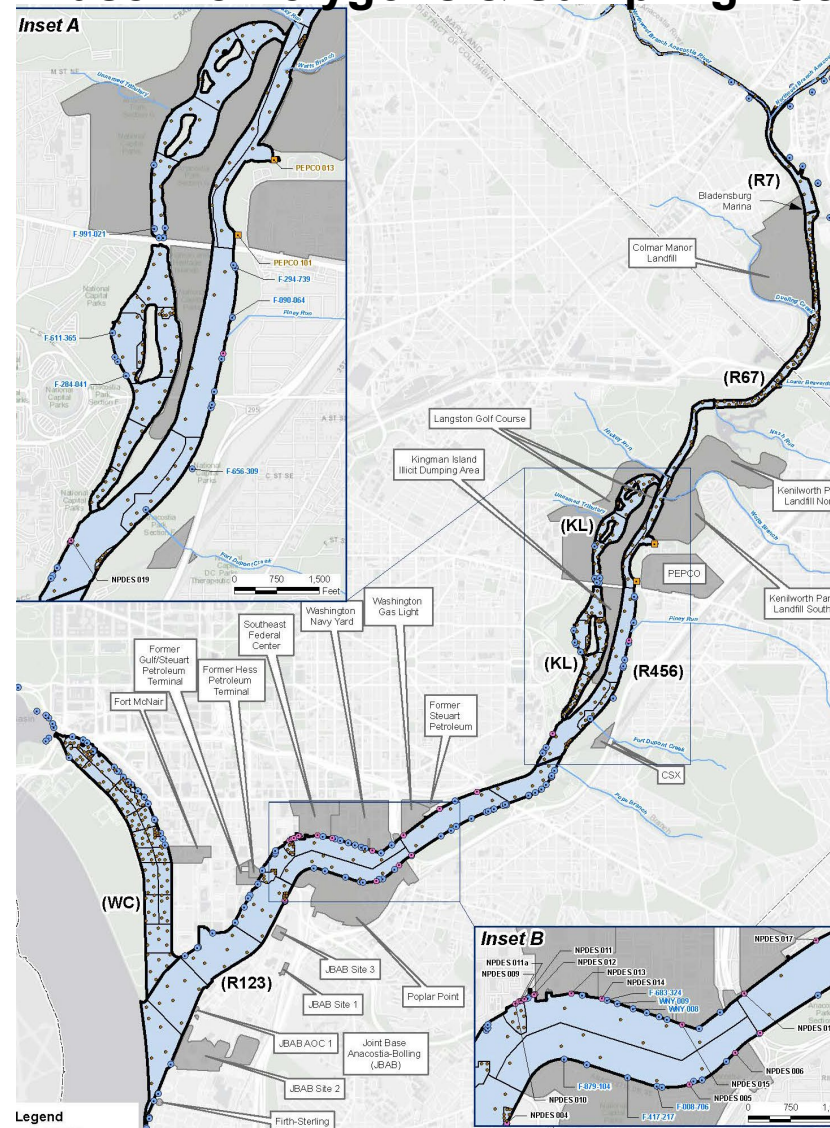
Coauthors: Mark Shupe ([mark.shupe@tetrattech.com](mailto:mark.shupe@tetrattech.com)), Rebecca Zvoleff ([rebecca.zvoleff@tetrattech.com](mailto:rebecca.zvoleff@tetrattech.com))

# Baseline Sampling Polygons vs. Discrete Samples from RI

## RI Sampling Locs.



## Baseline Polygons & Sampling Locs.



- Discrete samples were biased to contaminant sources leaving broad areas unsampled
- Baseline samples are composites (six-aliquots) from polygons covering the entire river
- Inconsistencies between baseline and RI results can result