



# Performance of the Natural Recovery Component of the Upper Hudson River Remedy



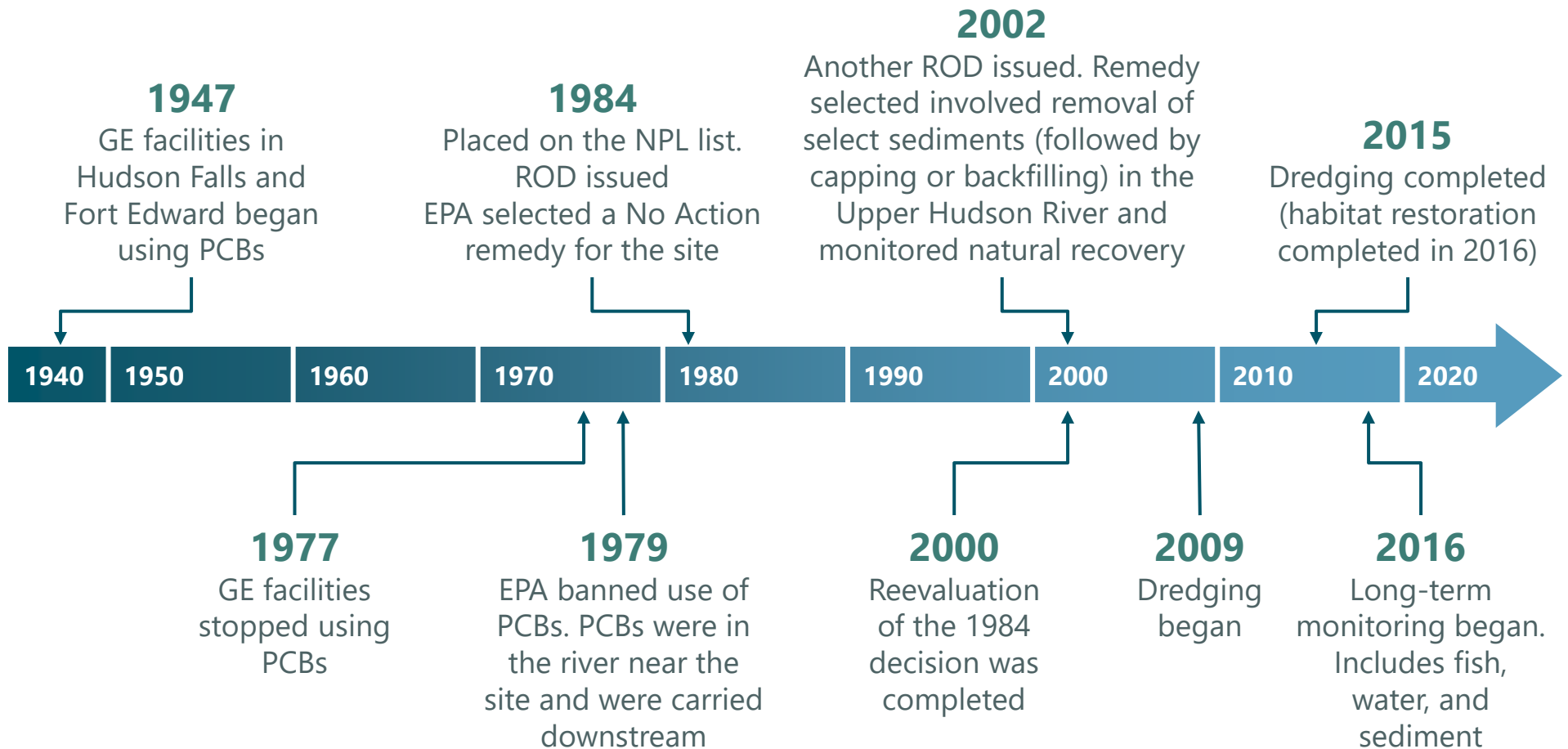
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# Hudson River

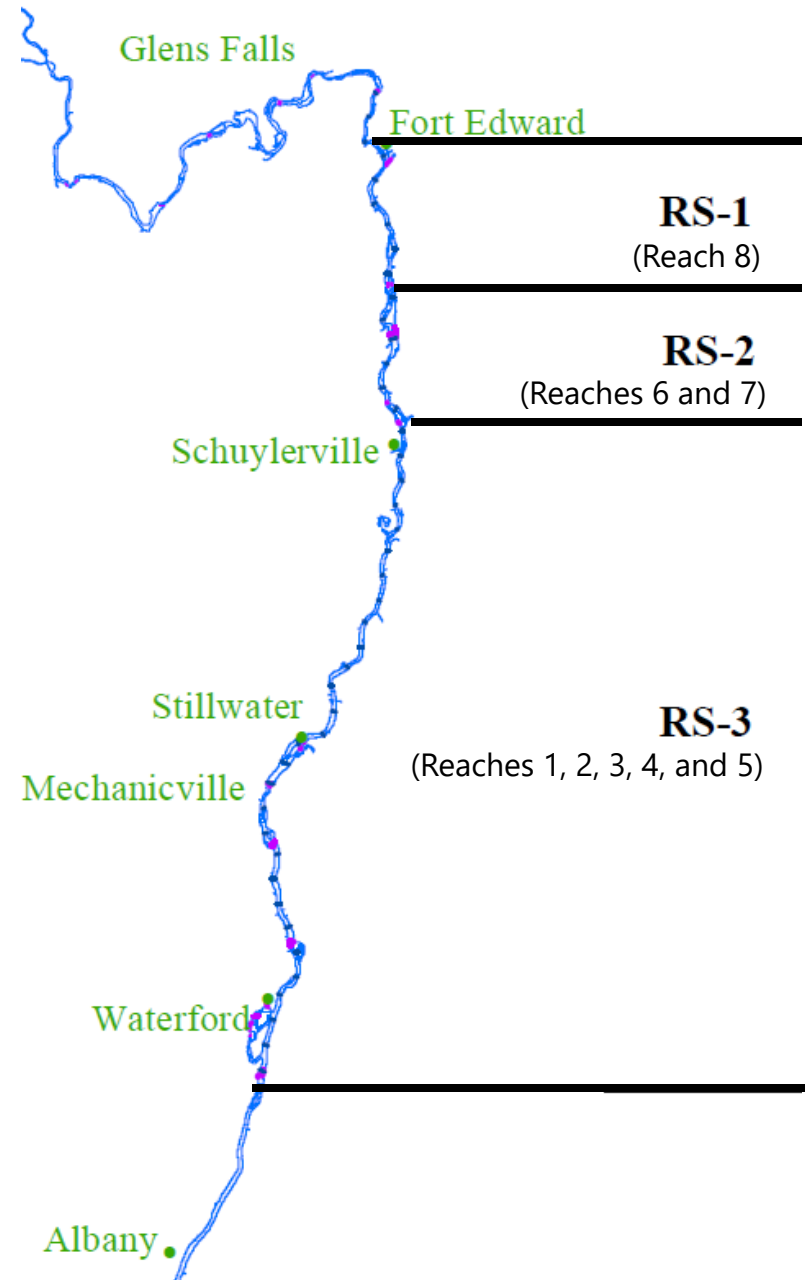


# Timeline



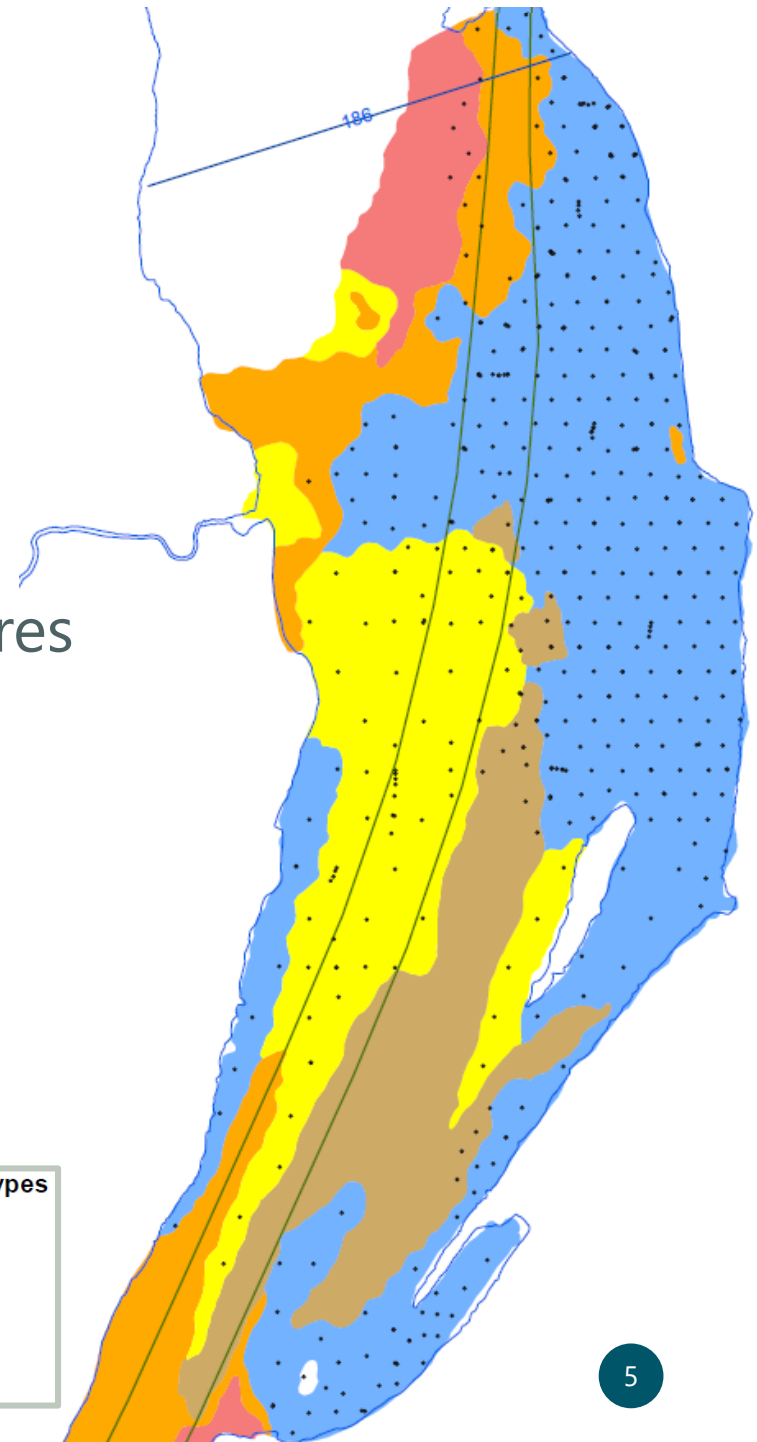
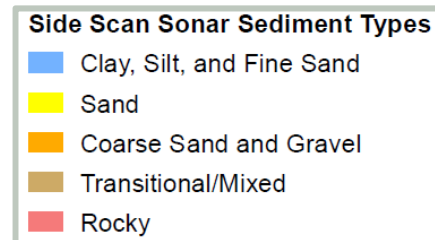
# Components of the Remedy

- 2002 ROD
  - Dredge to remove sediments of the Upper Hudson River above ROD thresholds
  - Monitored natural attenuation of PCBs remaining in the river after dredging



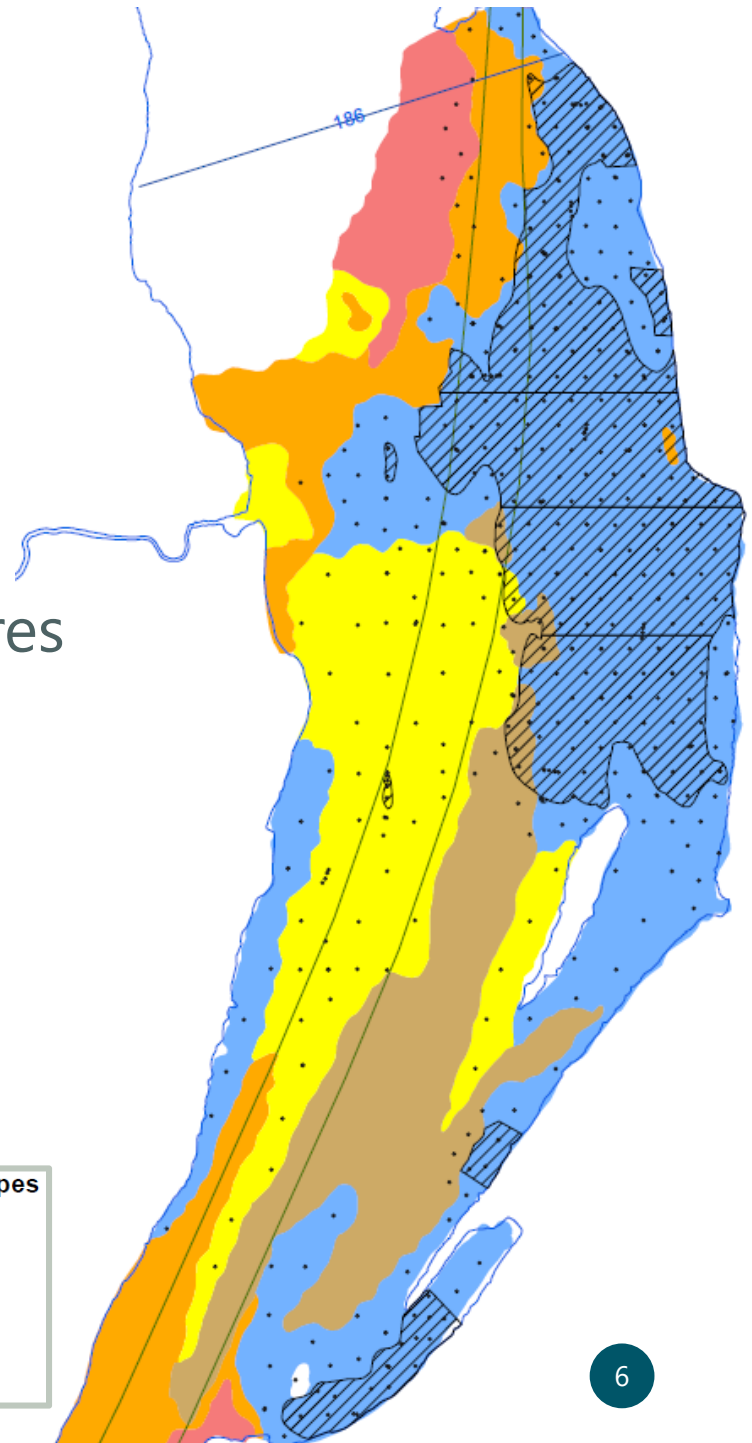
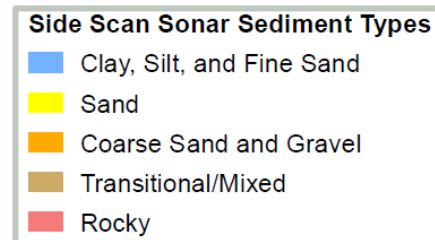
# Available Data

- Design data
  - Collected 2002 through 2012
    - Majority collected between 2002 and 2005
  - More than 10,000 sediment cores
  - Characterize surface and deep sediment as part of remedial design
  - Identify and delineate areas where PCBs exceeded the ROD thresholds



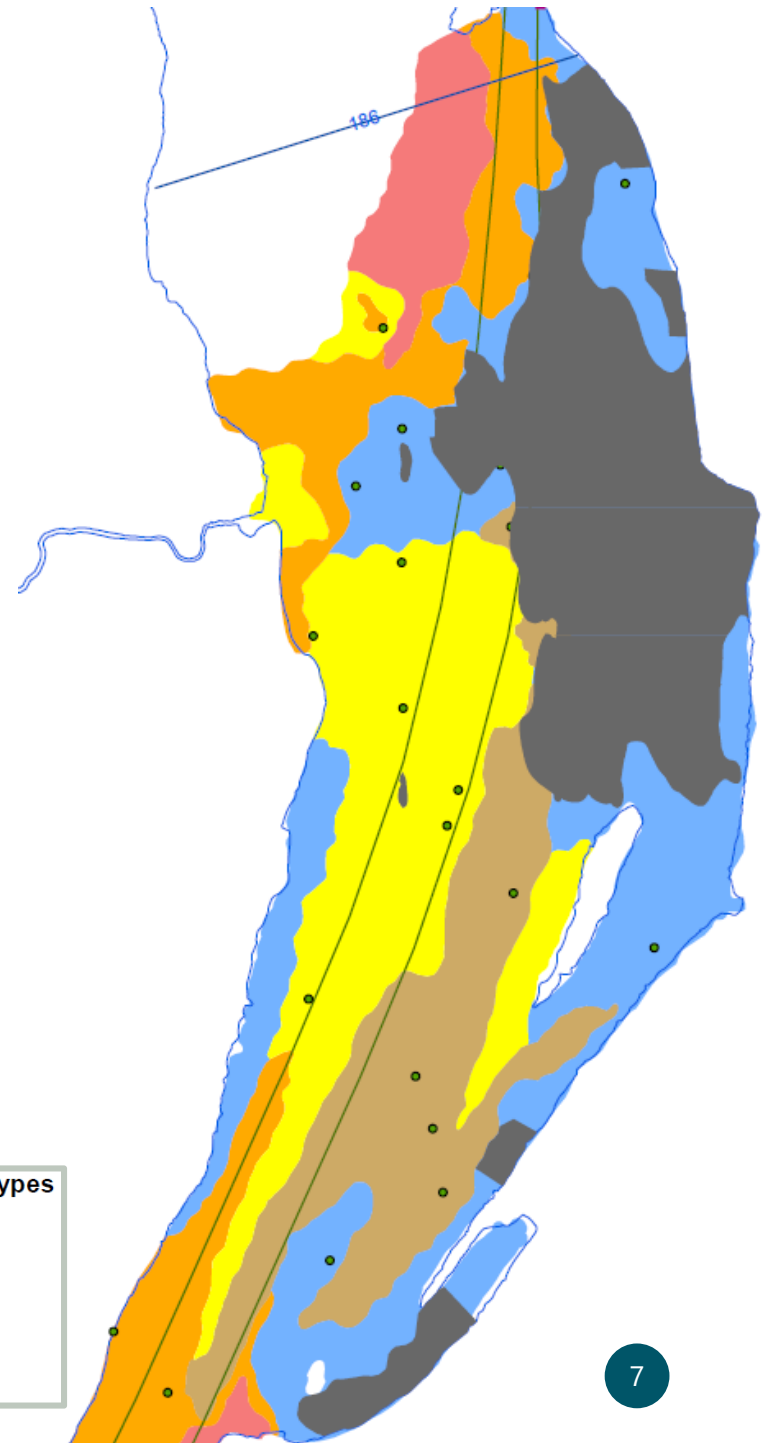
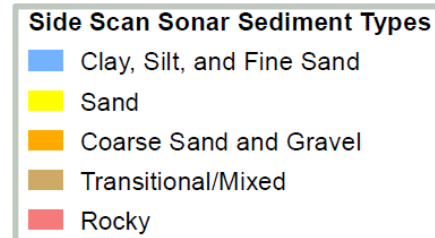
## Available Data (cont.)

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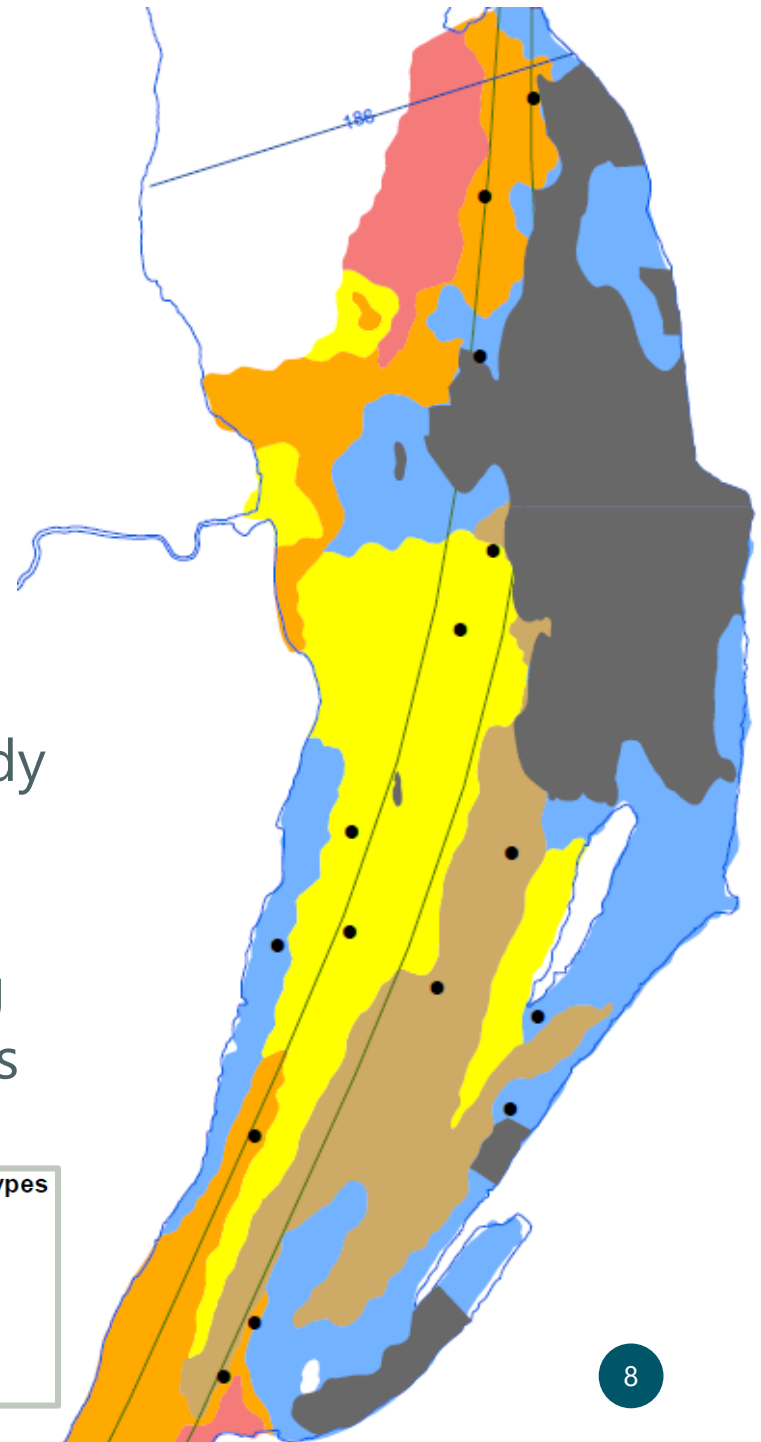
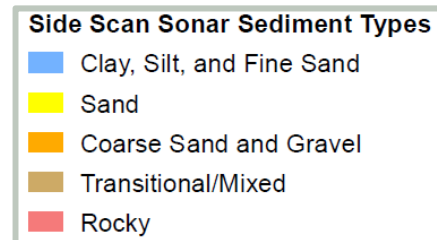
## Available Data (cont.)

- Post-dredge monitoring data (GE)
  - Collected in 2016 and 2017
  - 215 surface sediment samples outside of dredge areas
  - Establish baseline post-remediation PCB concentrations to be used as a point of comparison for future sediment sampling to evaluate recovery rates



## Available Data (cont.)

- Post-dredge monitoring data (NYSDEC)
  - Collected in 2017
  - 1,135 surface sediment samples; 890 samples outside of dredge areas
  - To evaluate performance of remedy
  - Establish baseline post-dredging PCB concentrations to use as comparison points in determining estimated sediment recovery rates

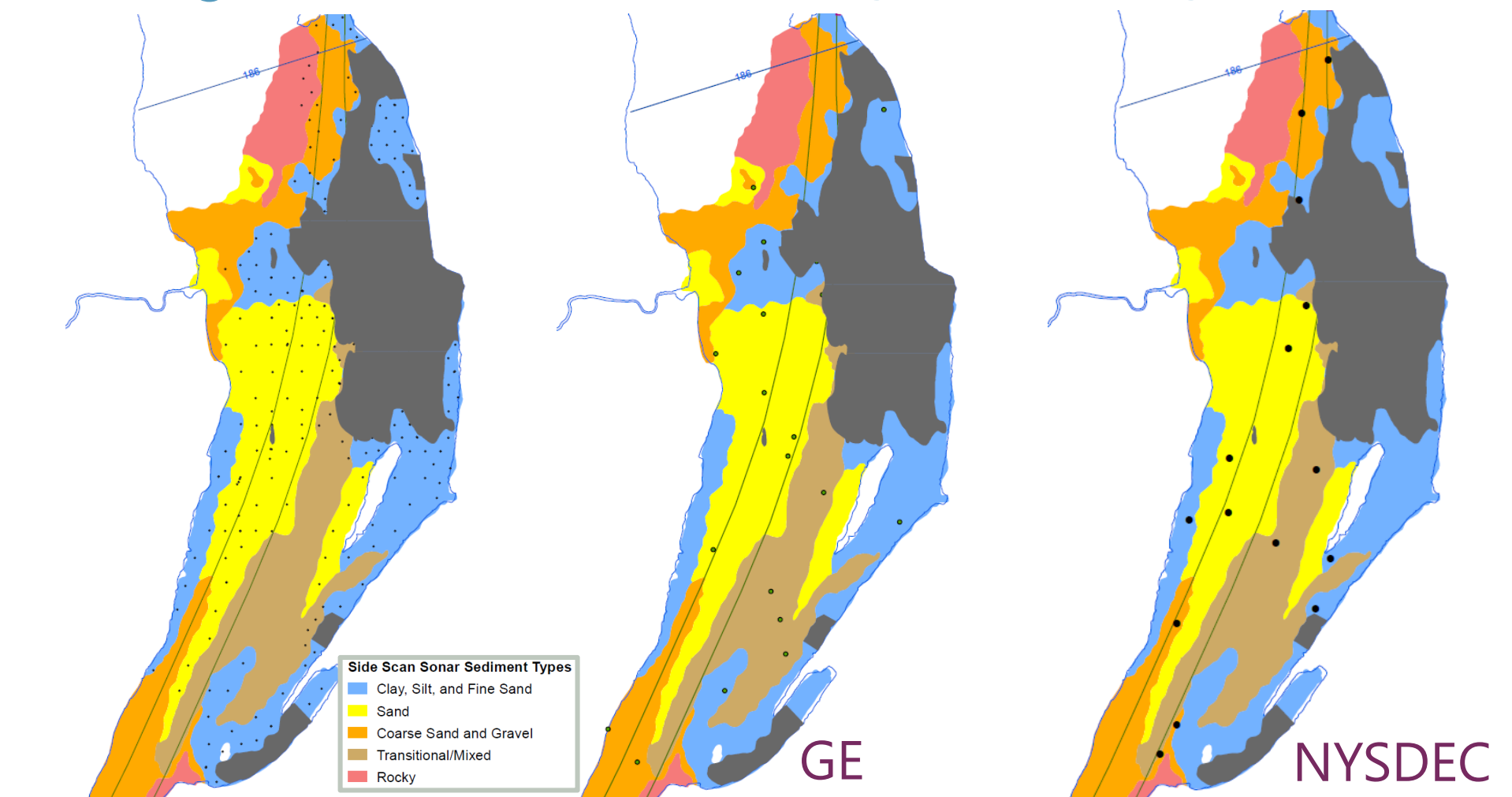


Source: EA Engineering, P.C. (2017)

# How Do We Make These Data Comparable?

## Design Data

## Post-Dredge Monitoring Data



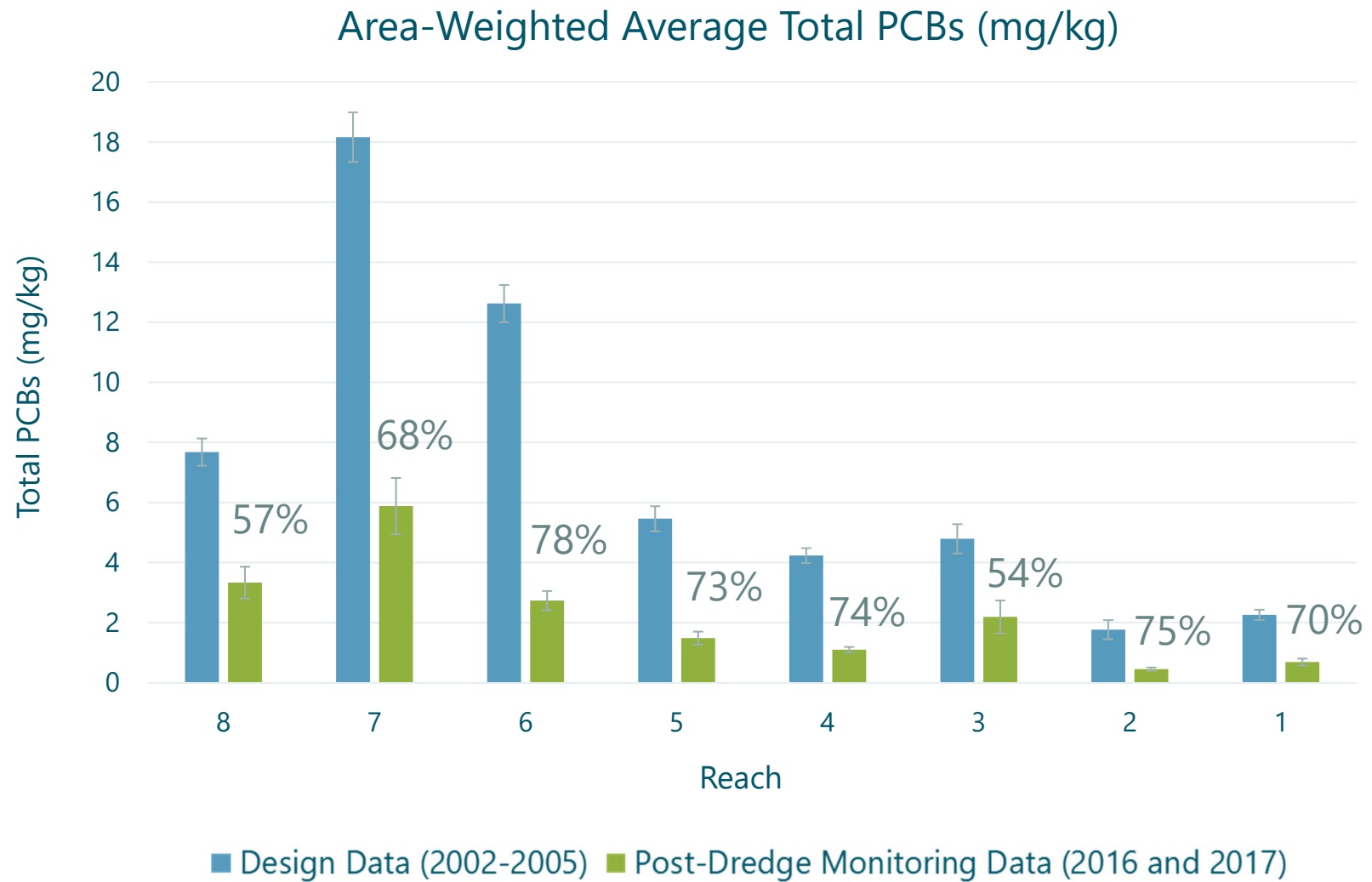
# Data Comparability

- Proper evaluation of the data must account for difference in sample collection programs
- Data treatment and bias correction
  - Area-weighted averages by sediment type
  - Area-weighted averages by reach
  - Bedrock areas excluded
  - Abandoned locations – design data
    - Set to 0 mg/kg if <6 inches of probing depth
    - Set to reach average if >6 inches of probing depth
  - Abandoned locations – Post-dredge data
    - Not included

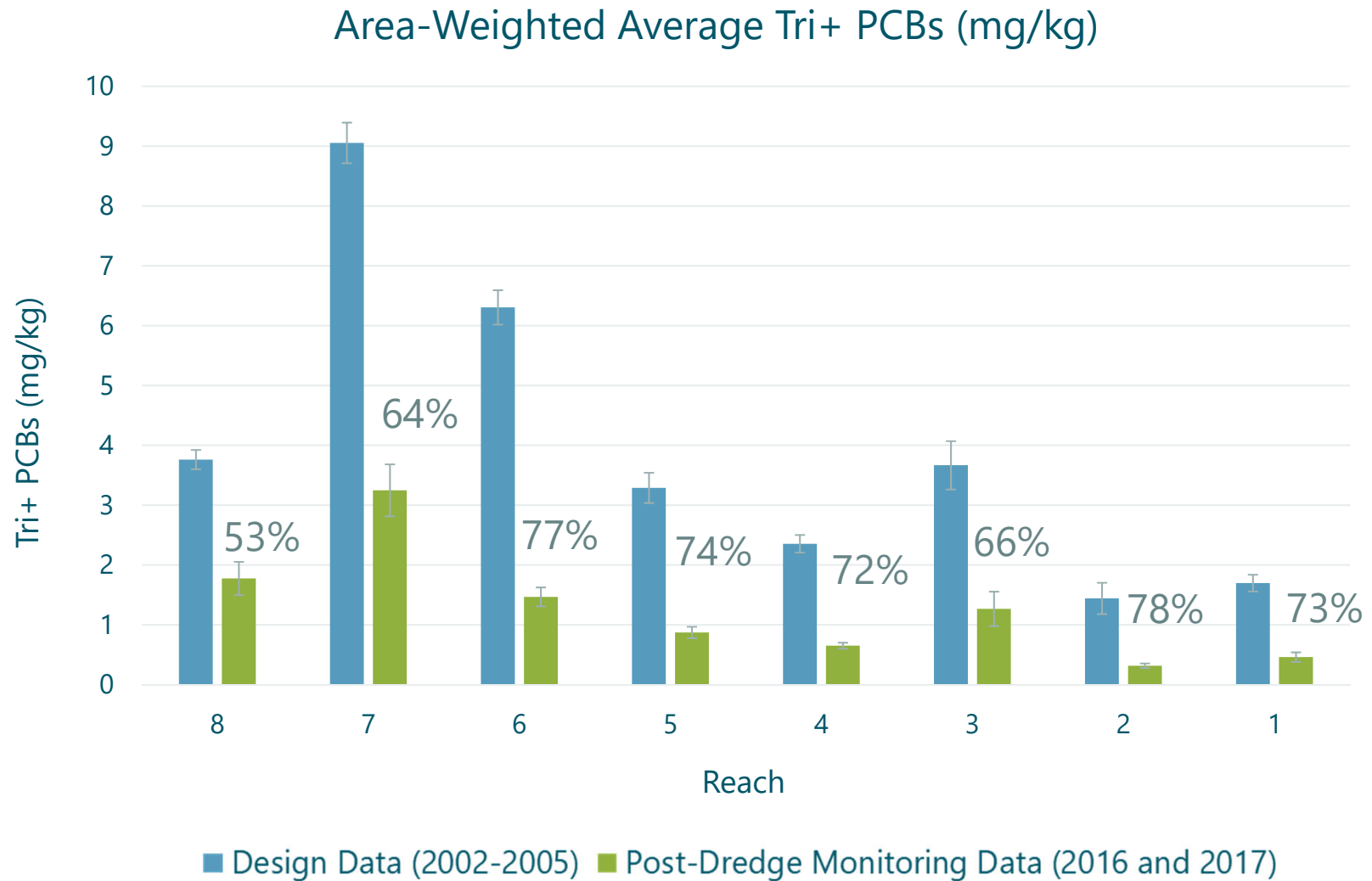
# Importance of Data Comparability

Reach	Absolute Difference (%) Between Reductions With and Without Bias Correction
8	1.7
7	1.0
6	3.4
5	0.5
4	12.9
3	0.7
2	7.4
1	0.4

# Total PCBs in Non-Dredge Areas

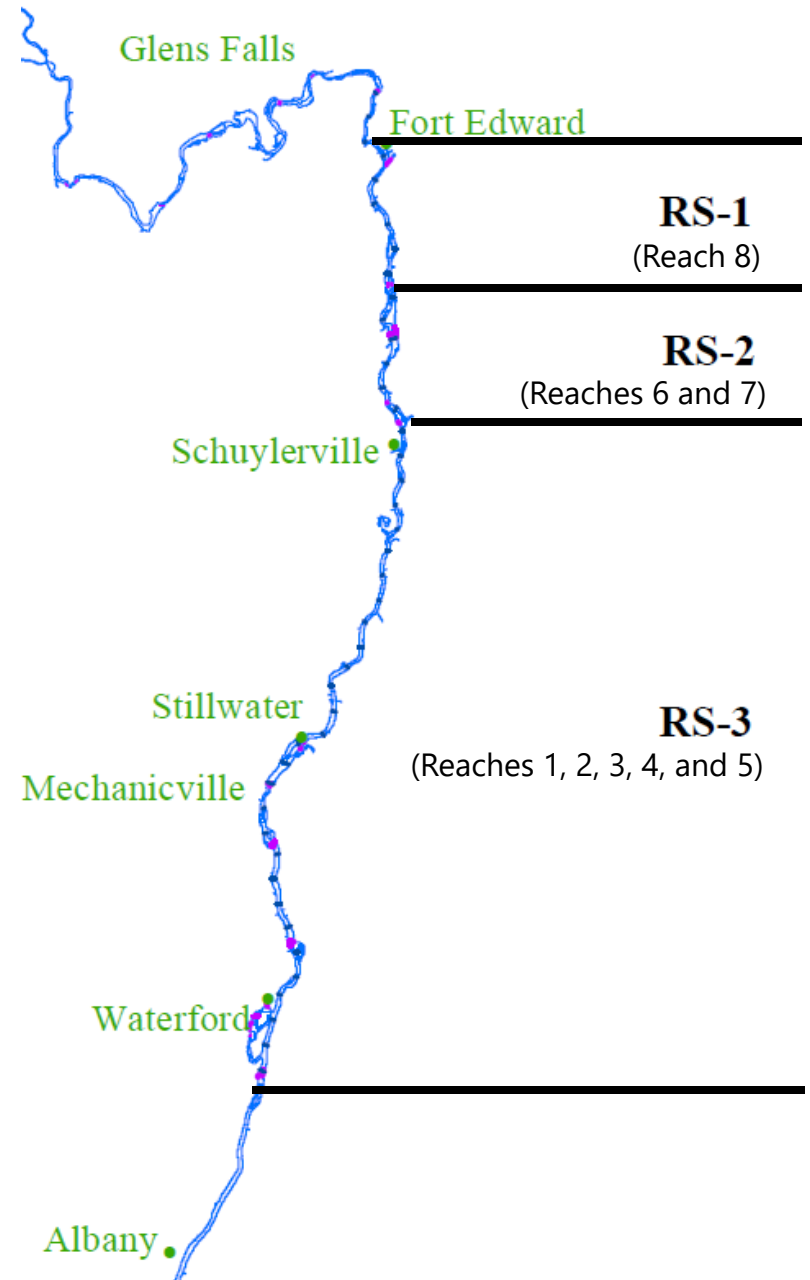


# Tri+ PCBs in Non-Dredge Areas

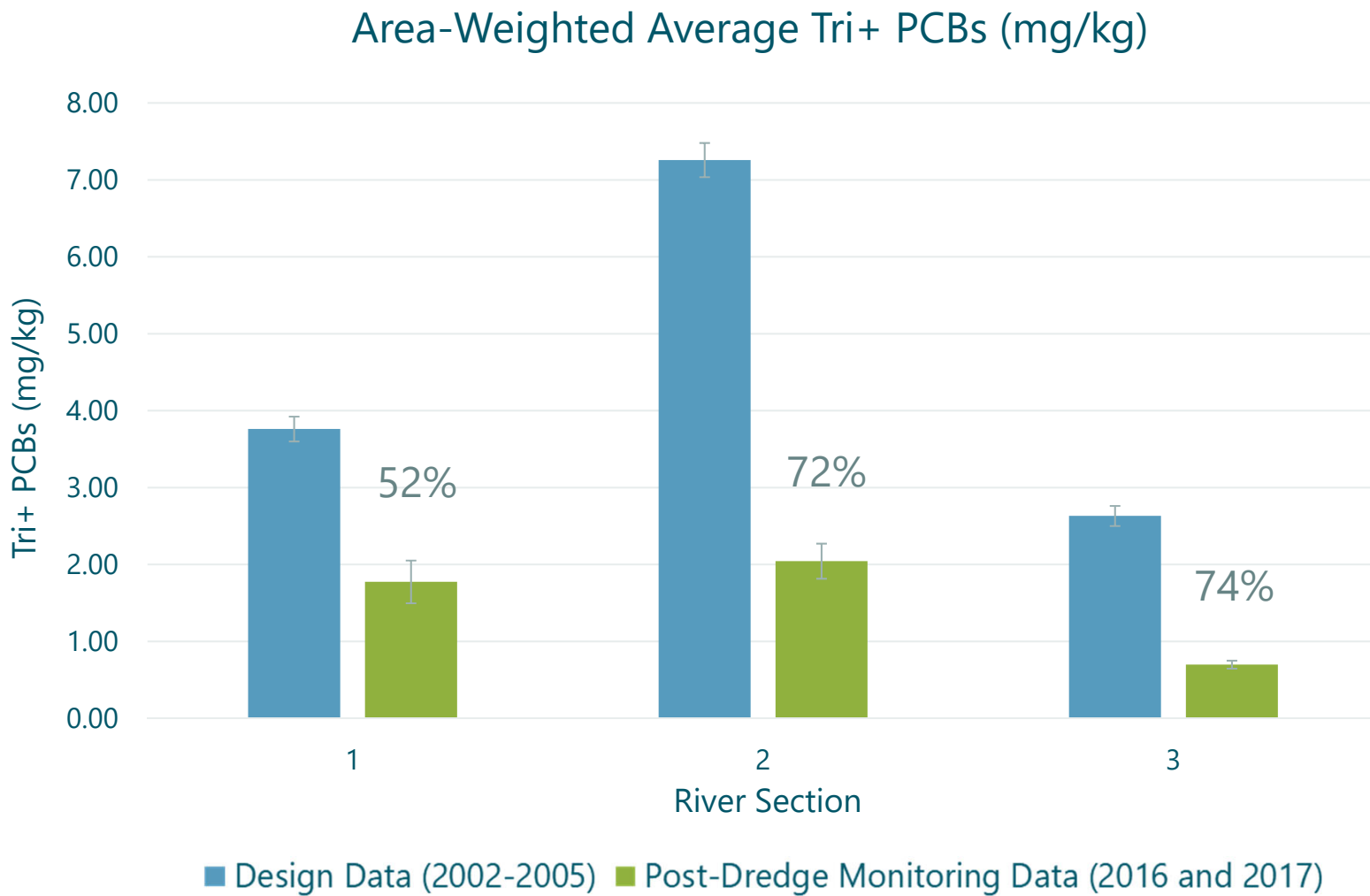


# Components of the Remedy

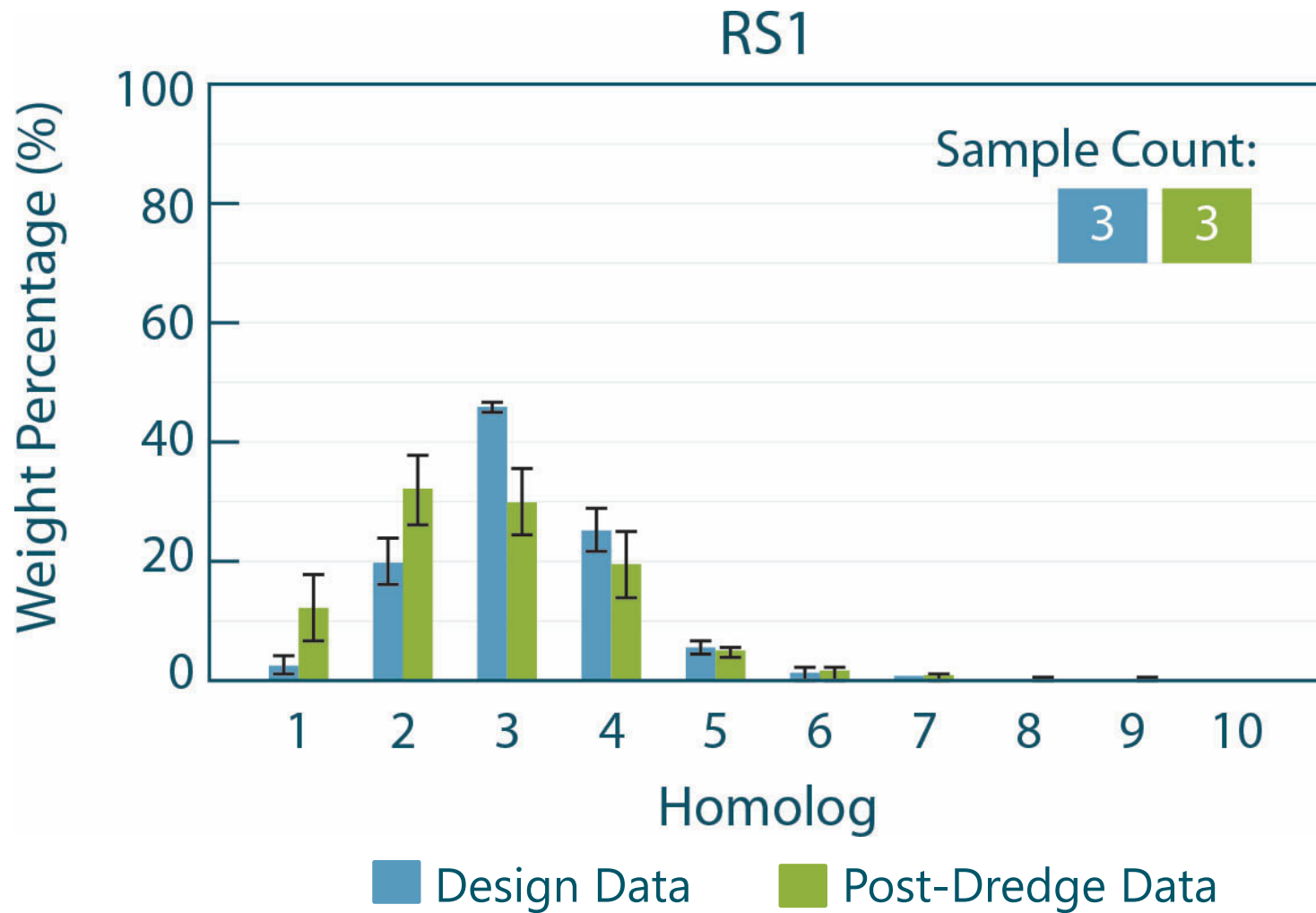
- Components of the remedy selected in the 2002 ROD are described by River Section
- Remedy will be evaluated on a River Section-basis
- Remedy will be evaluated on a Tri+ PCB basis



# Tri+ PCBs in Non-Dredge Areas



# Homolog Patterns



# Summary

- Interpretation of the declines required development of data treatments for comparability between sampling programs
- Declines in Total PCB and Tri+ PCB concentrations were generally greatest downstream
- Results suggest that the natural recovery component of the remedy is functioning, and support continued monitoring to assess long-term trends

# Questions/Discussion



# References

- EA Engineering, P.C., 2017. *Operation, Maintenance and Monitoring Letter Work Plan*. EA Science and Technology. June 2017. (Slide 8)