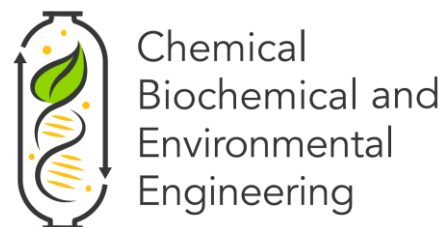




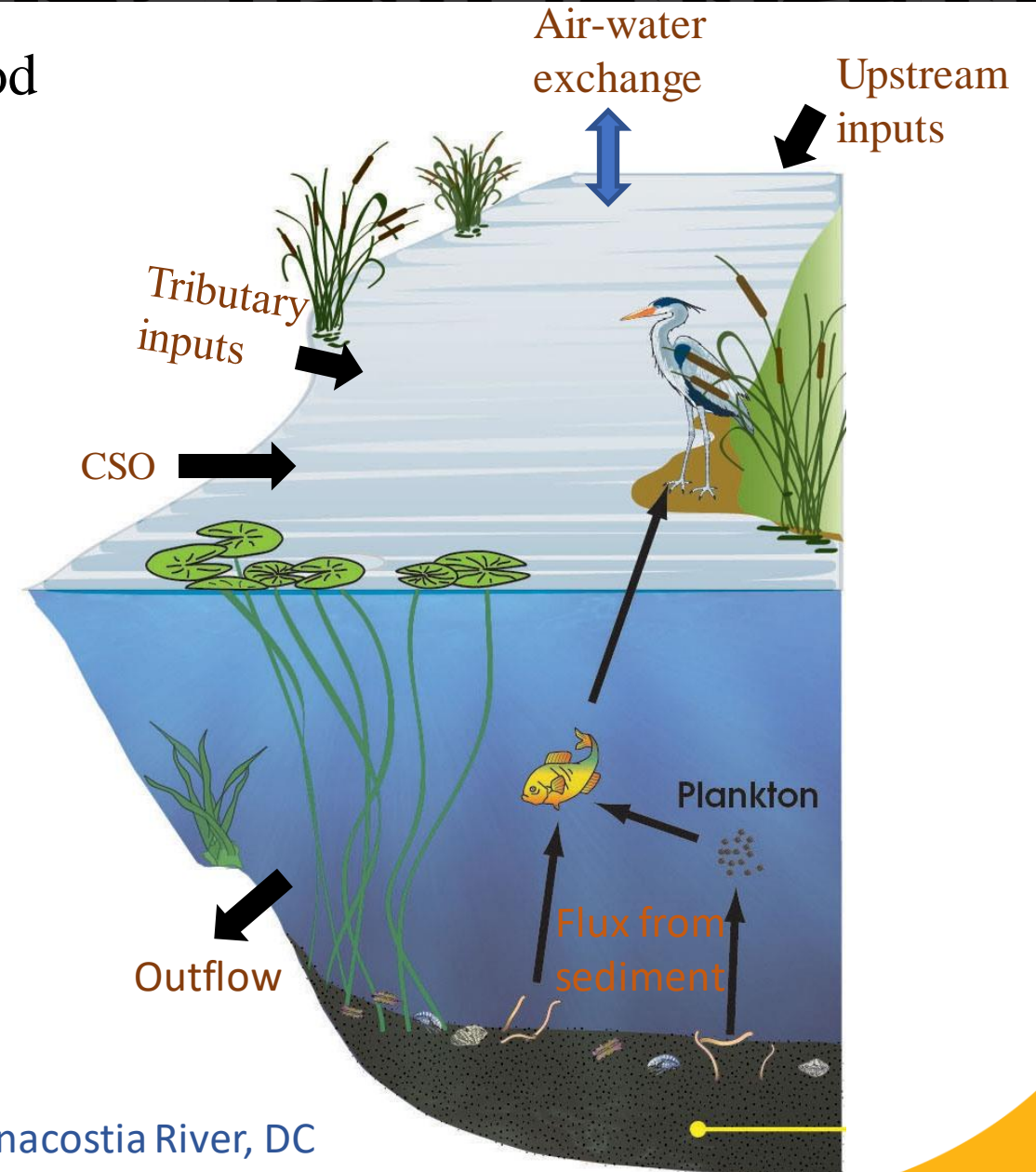
Importance of Upland Contaminant Source Control

Restoring Wilmington's Rivers:
A Plan for Remediation, Restoration, and Resilience
of the Christina and Brandywine Rivers (CBR4)
January 26, 2023



Upal Ghosh, UMBC

- Human exposure to PCBs primarily through food web
- **Dissolved concentrations control exposure**
- Contributions to water from:
 - 1) Bed sediments
 - 2) Inputs from tributaries and outfalls
 - 3) Air-water exchange
- Correct problem definition critical before selecting solutions
- Site Conceptual model should adapt with new information
- **Good accounting**



Anacostia River, DC




Passive Sampling

PASSIVE SAMPLING FOR MEASURING CONCENTRATIONS IN SURFACE WATER, POREWATER, AND AIR

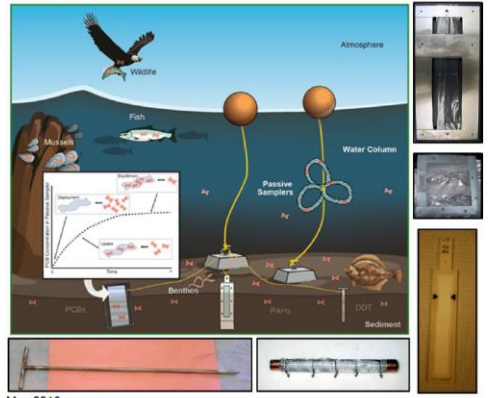
- Samplers deployed in: surface water, sediment porewater, and air
- Follow latest procedures for passive sampling and data interpretation



EPA/600/XX-15/071

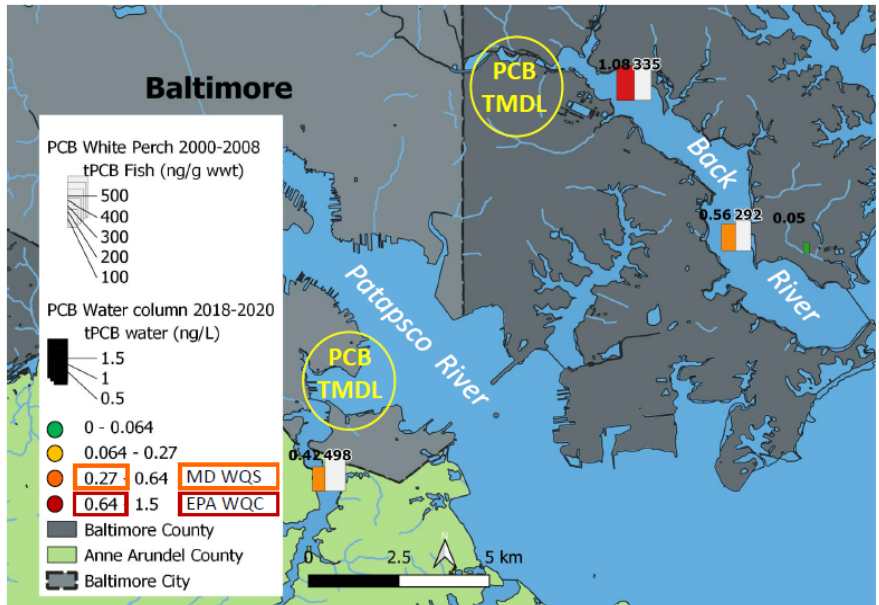
Laboratory, Field, and Analytical Procedures for Using Passive Sampling in the Evaluation of Contaminated Sediments: User's Manual



May 2016

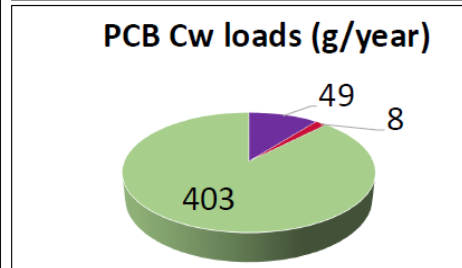
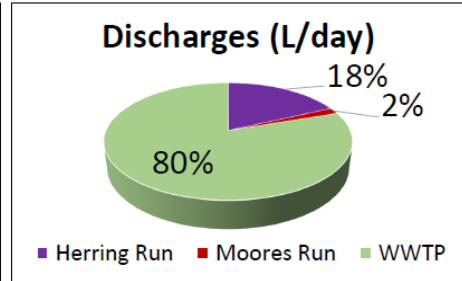
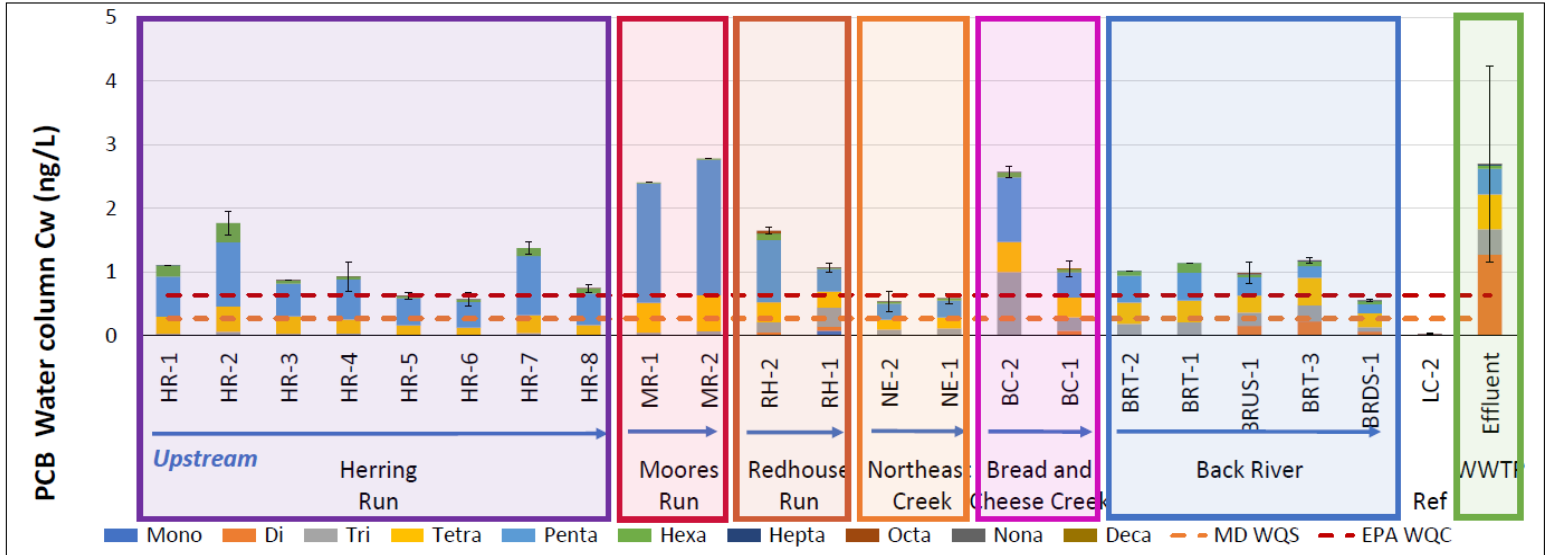
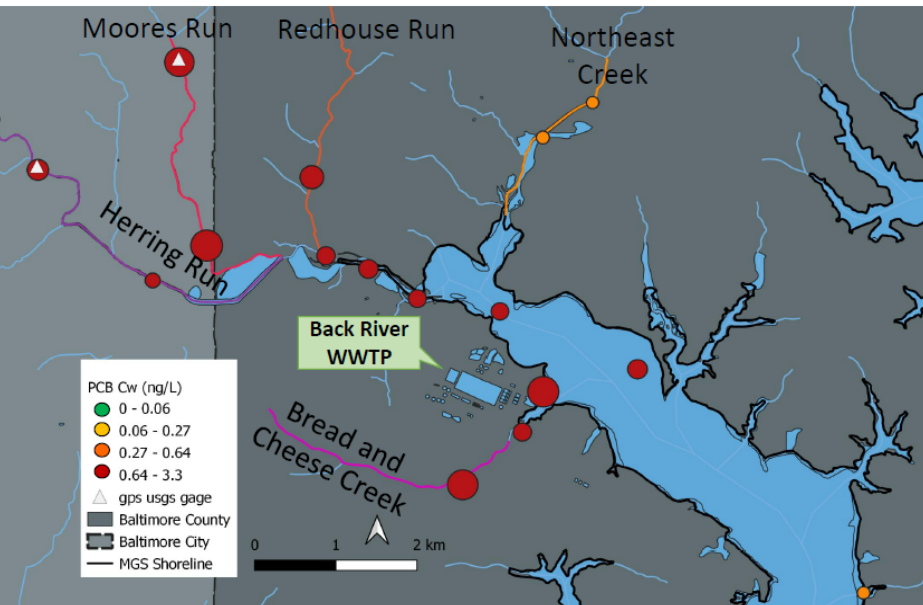
New approach: Integrative passive sampling

Impact of Remediation Strategies on PCBs in Fish

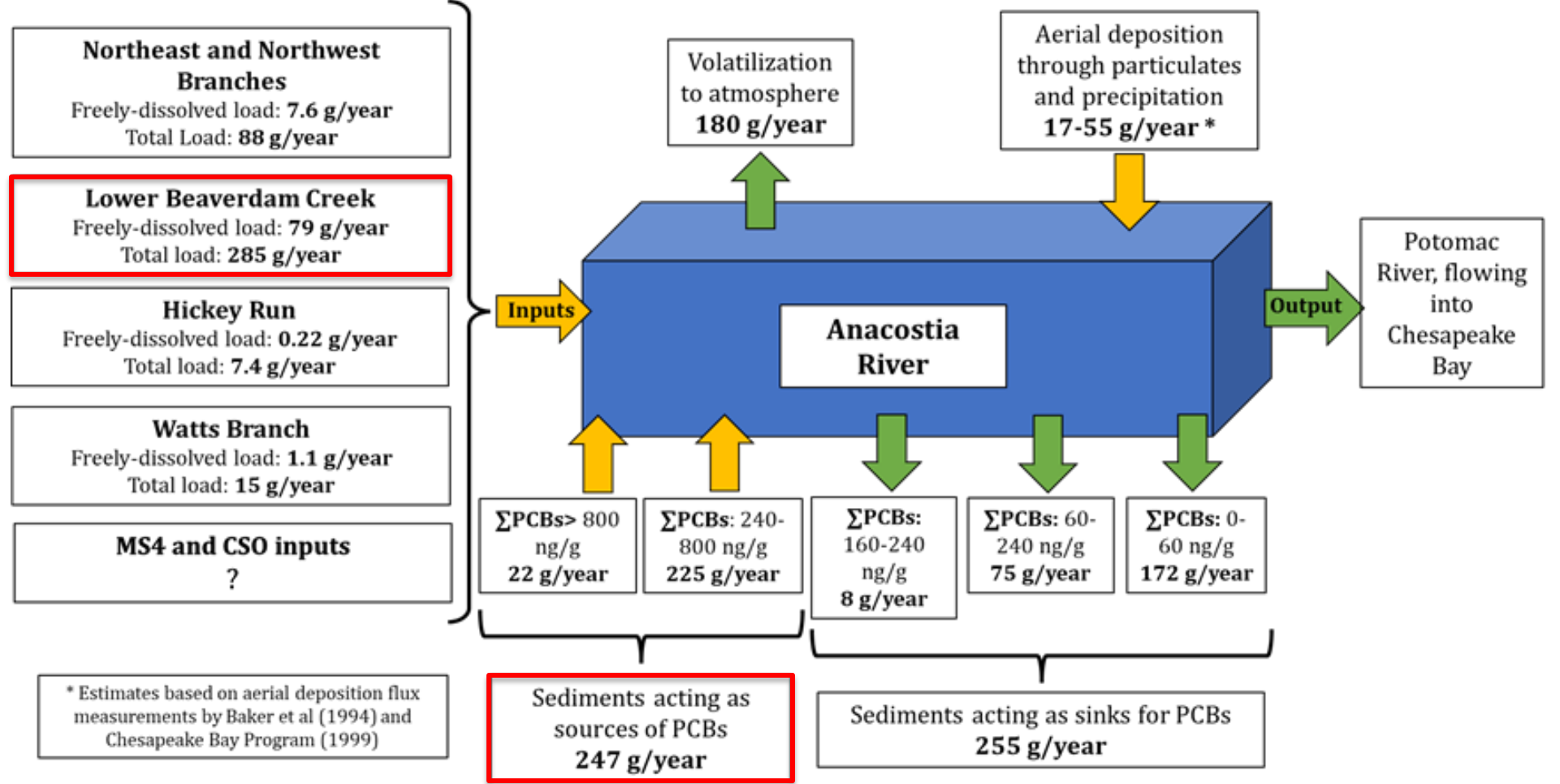
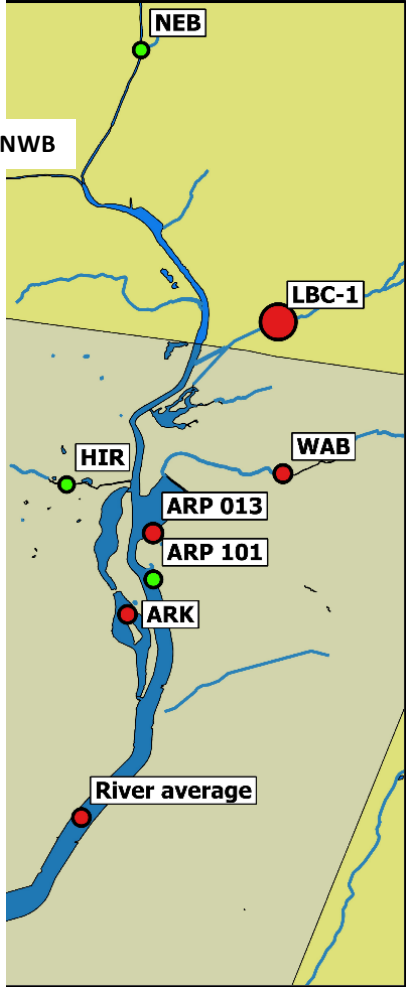


← Highest freely dissolved PCB concentrations Cw (4 x WQS) in upper Back River.

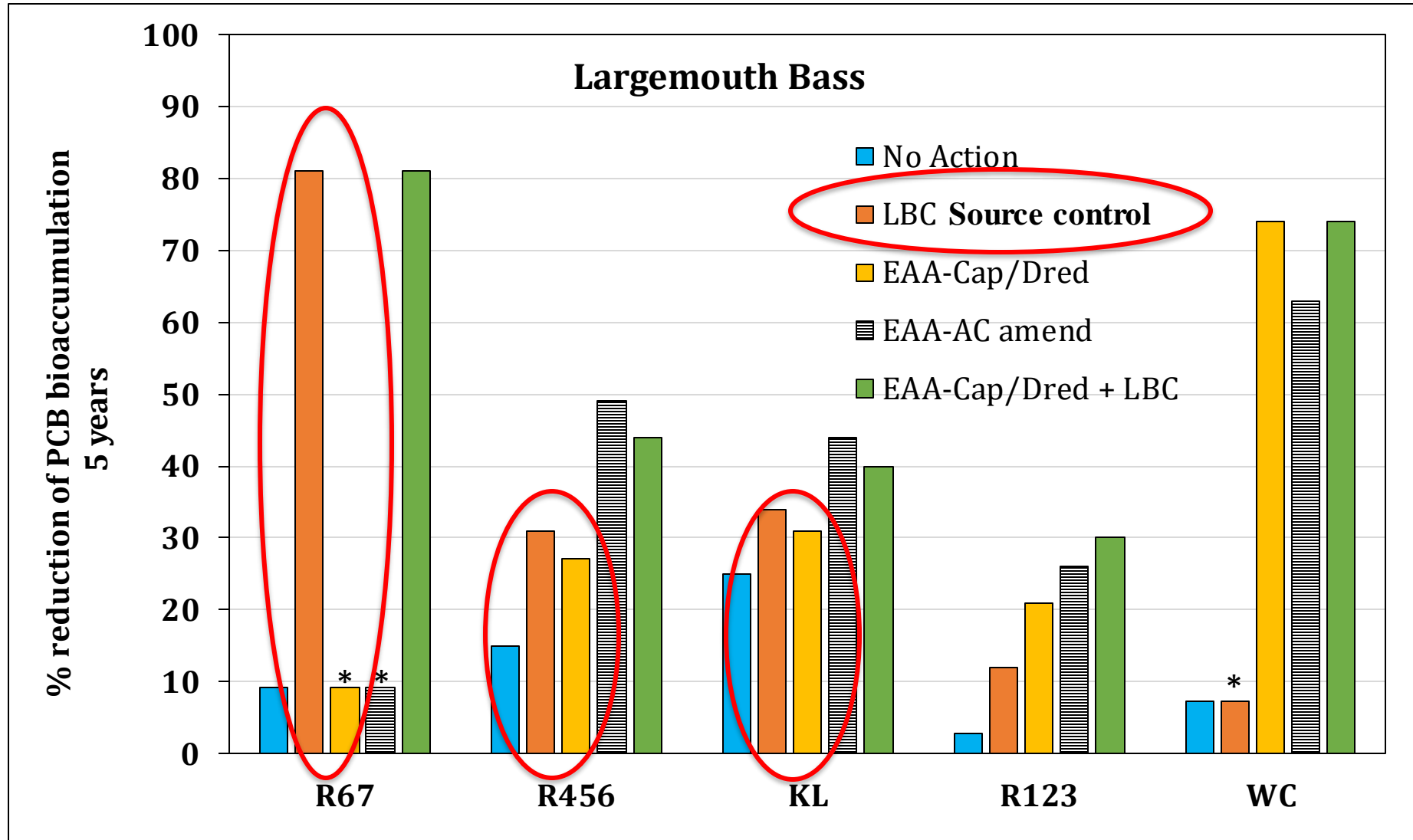
Concentrations above MD WQS and EPA WQC in water column of most tributaries and WWTP effluent →



- High PCB Cw measured in Moores Run, but PCB Cw loading is negligible due to low discharges.
- High PCB Cw and loads from the WWTP, plus similar homolog profile to that of Back River, suggesting WWTP as an important PCB contributor.



- Sediment hotspots and Lower Beaverdam Creek contribute most of the dissolved PCBs
- Link with aquatic food web model to predict concentrations in fish



* Reduction due to natural attenuation

- Ongoing input critical to control in the upper river
- Small impact of sediment remediation on the upper reaches and segments
- Legacy sediment impact dominates in the lower river
- Reduction of ongoing inputs critical to reduce PCB bioaccumulation in fish