

PATTERNS OF MERCURY AND PCB ACCUMULATION IN SMALL FISH

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RMP REGIONAL MONITORING PROGRAM
ANNUAL MEETING
Pollutant Effects on Aquatic Life



Outline

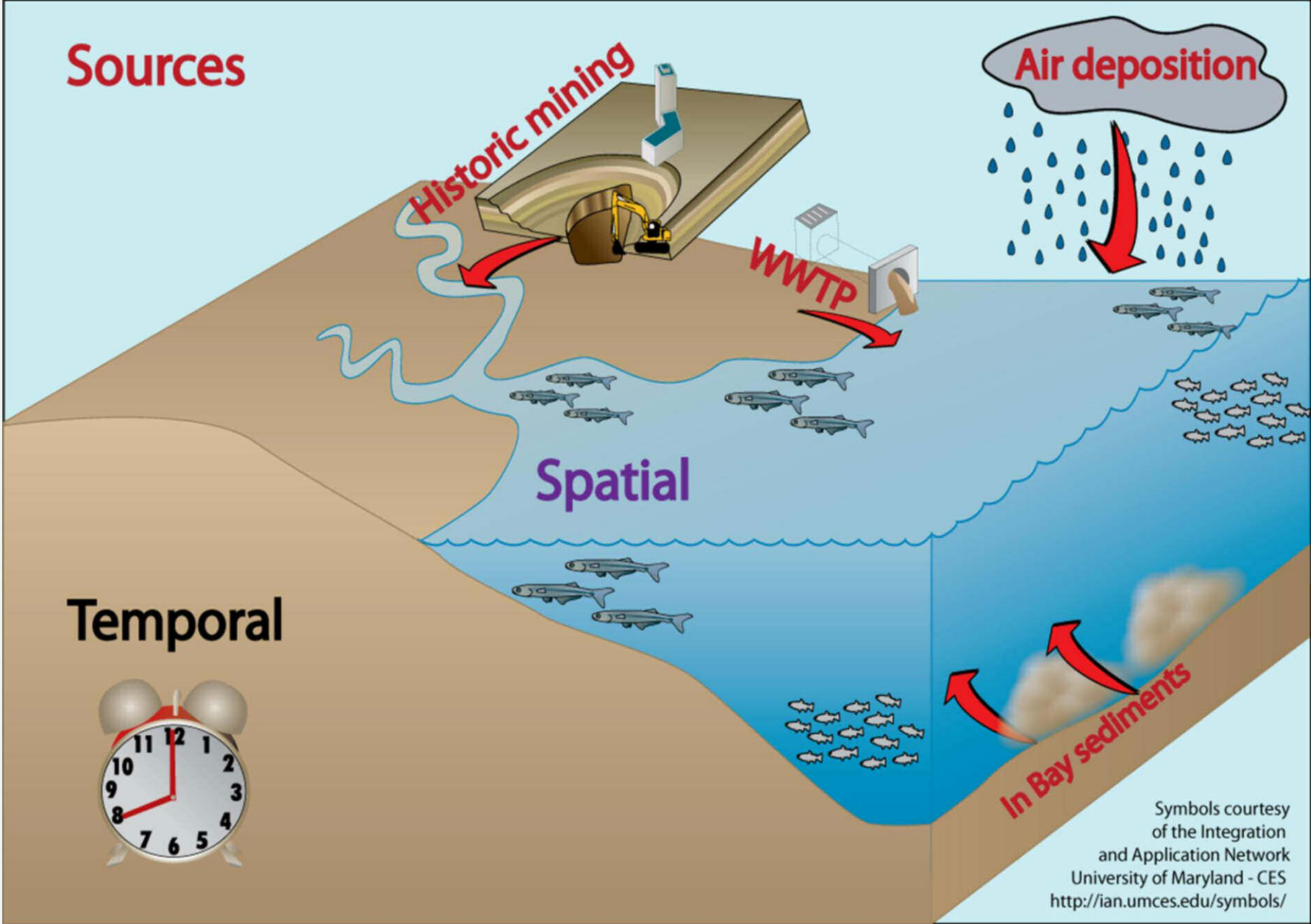
- Conceptual model
- Mercury
 - Spatial patterns
 - Sources
 - Temporal trends
- PCBs



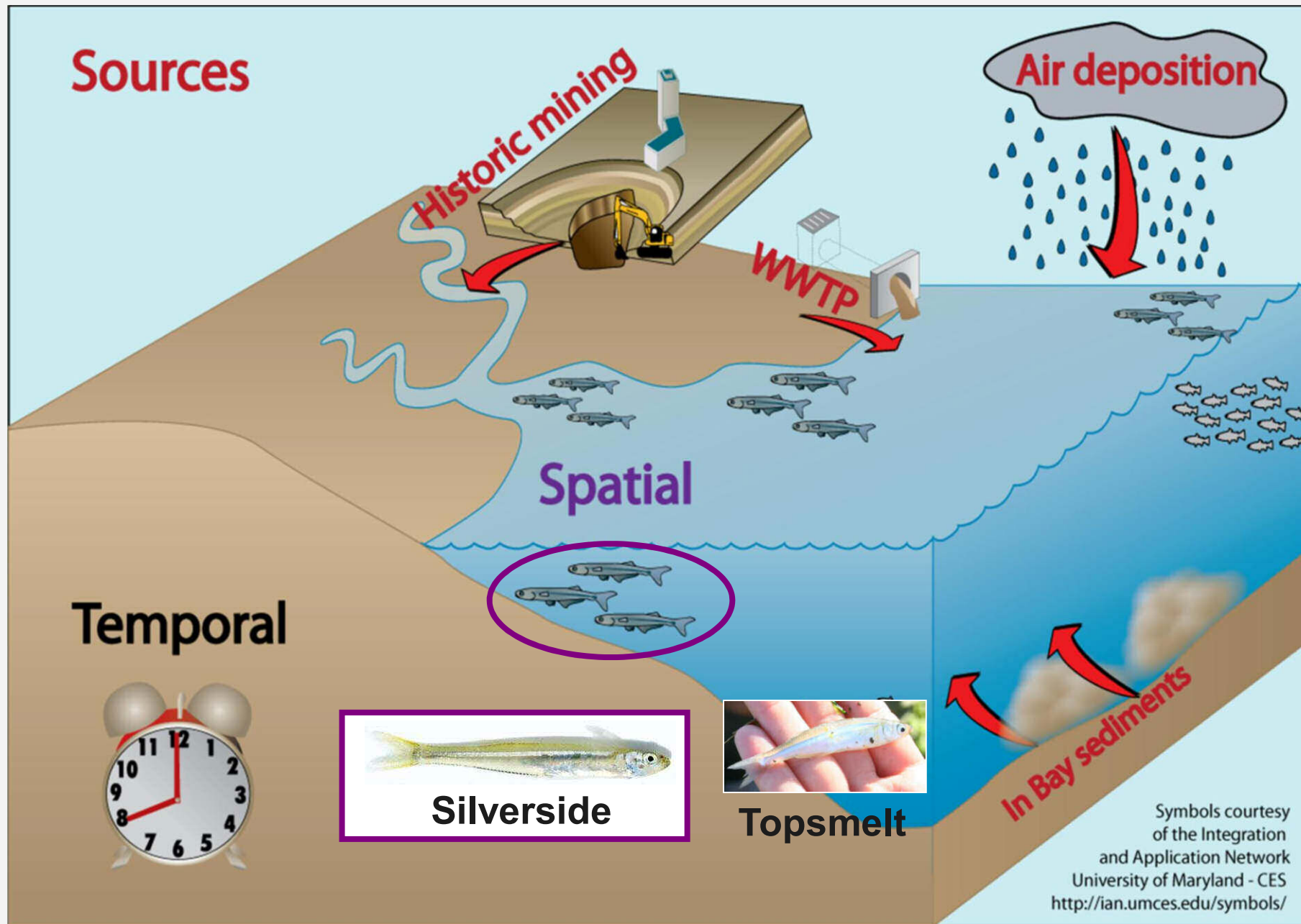
RMP Mercury Strategy Questions

1. *Where (and when) is mercury entering the Bay food web?*
2. *What processes, sources, and pathways contribute disproportionately to food web accumulation?*

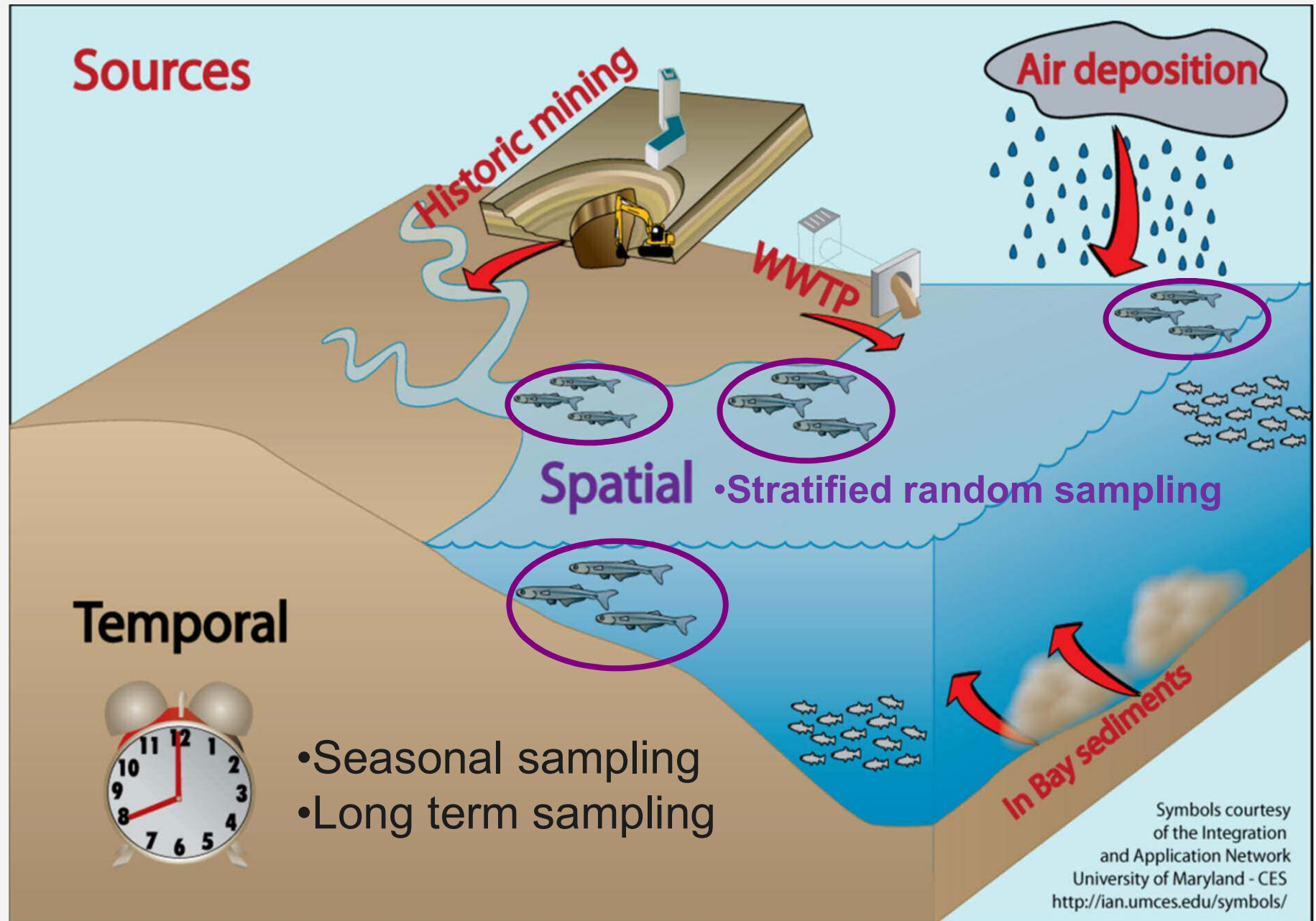
Conceptual model



General approach



General approach



General approach

Sources

- Targeted sampling
- Mercury isotopes
- Diffusive gradient in thinfilm

Historic mining

WWTP

Air deposition

Spatial • Stratified probabilistic sampling

Temporal



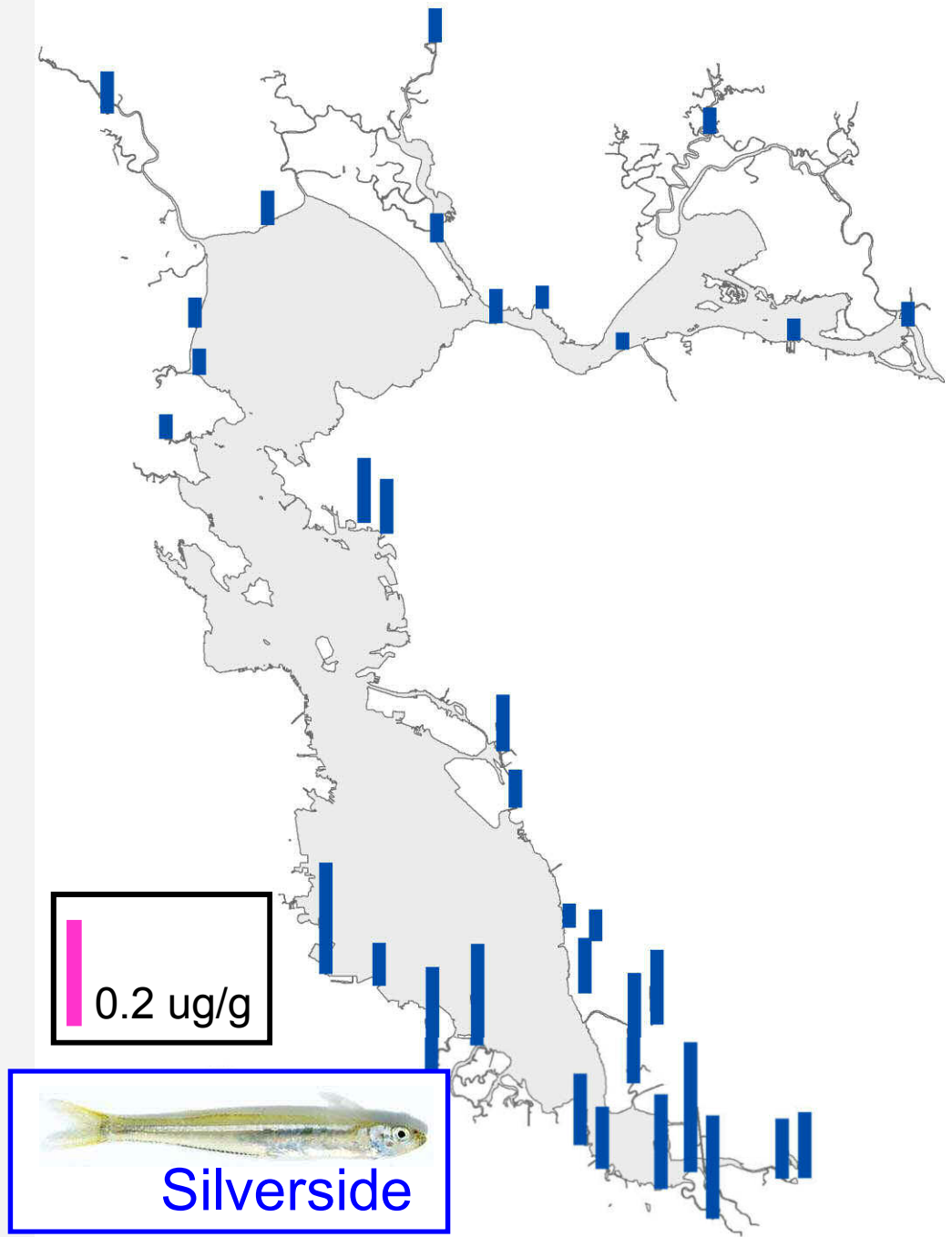
- Seasonal sampling
- Long term sampling

In Bay sediments

Mercury Spatial Patterns

1. *Where is mercury entering the Bay food web?*

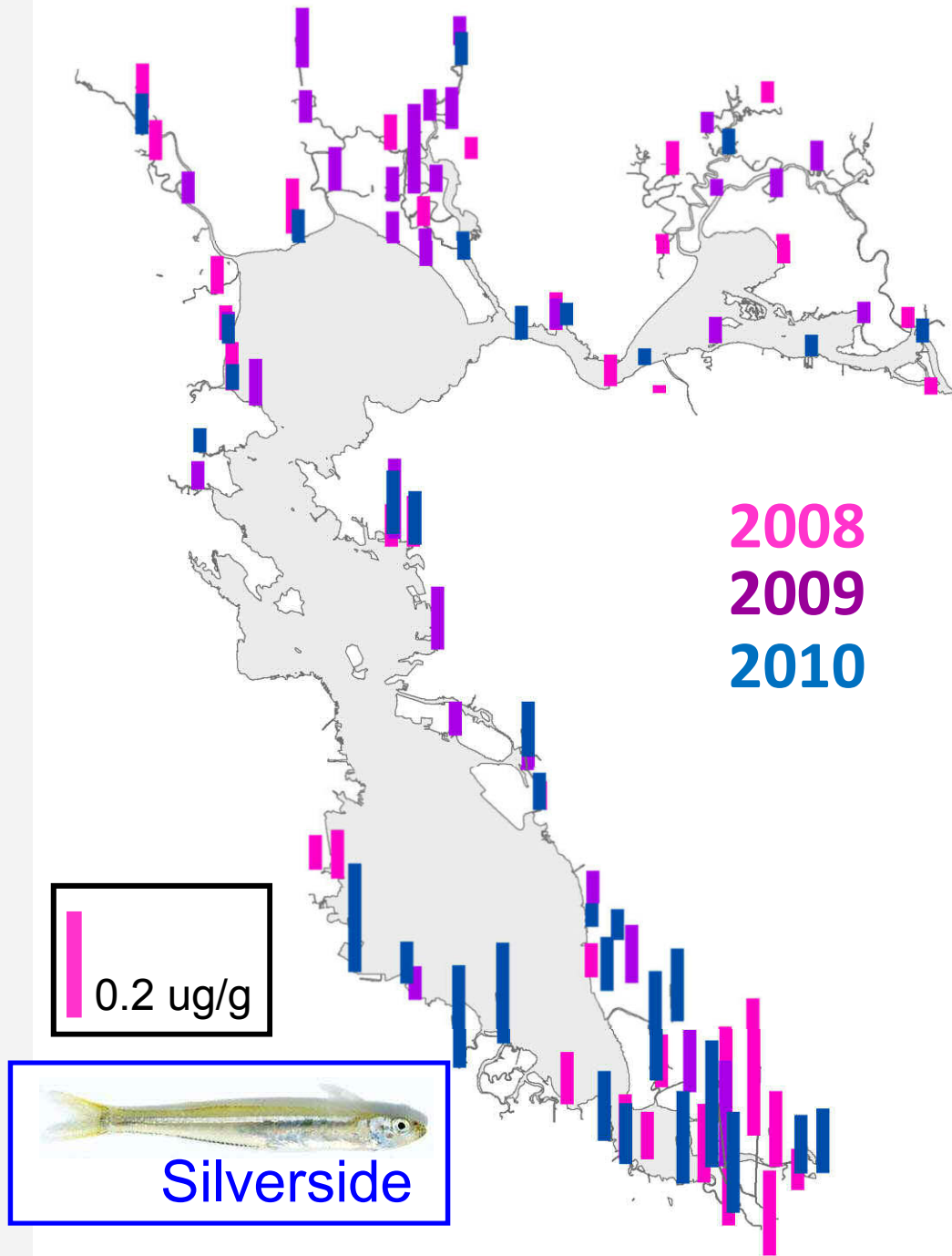


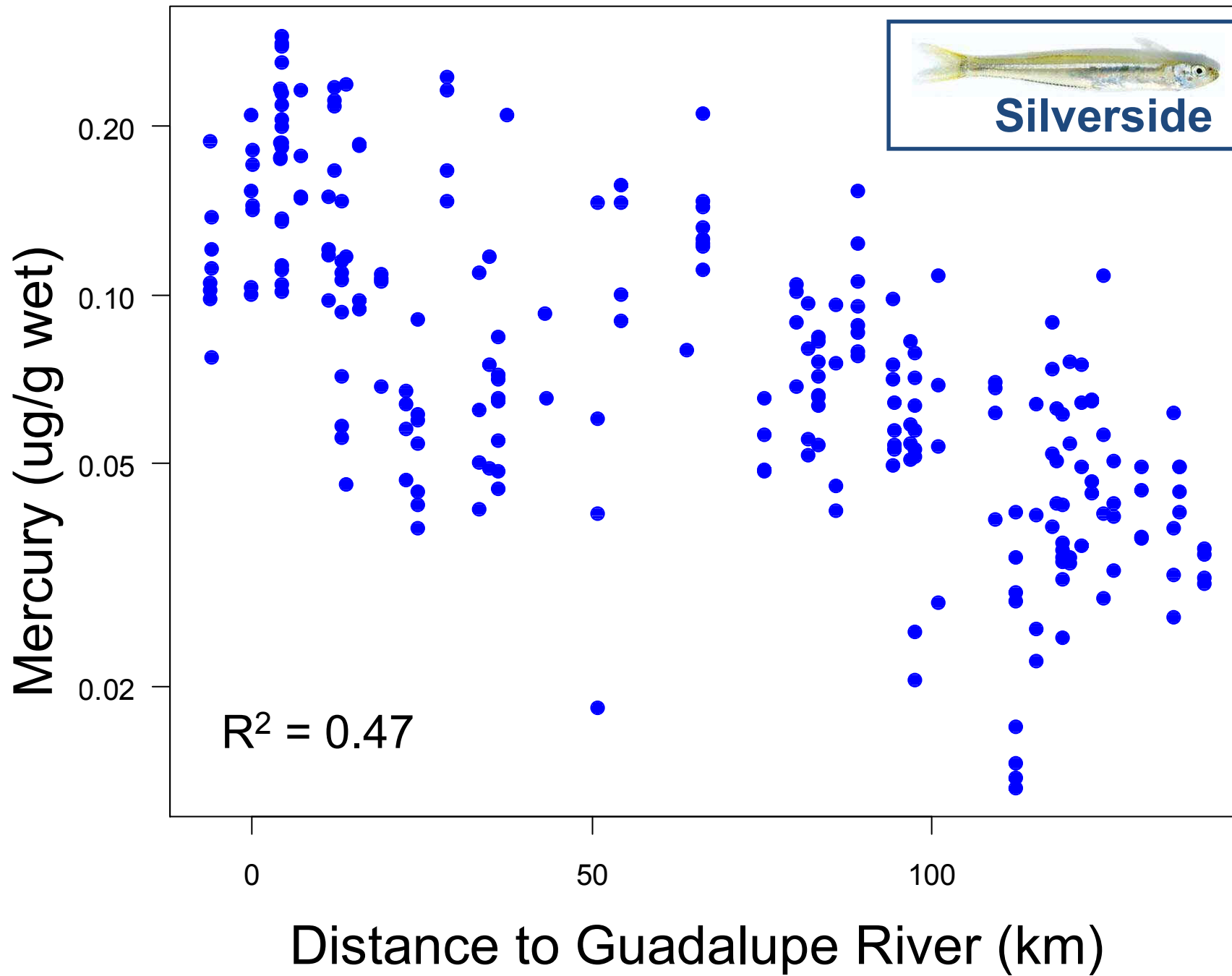


2010

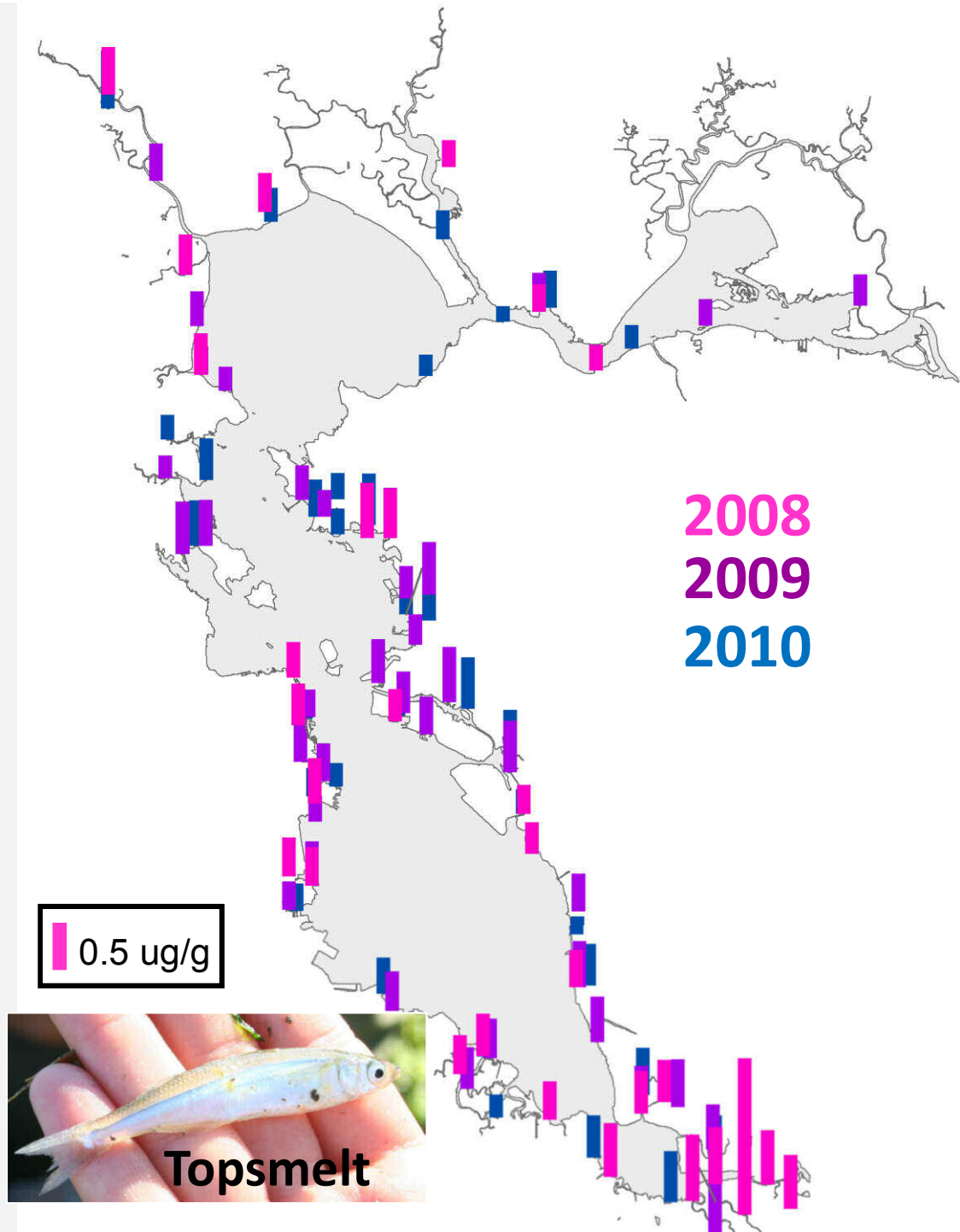


Silverside All years





Topsmelt All years



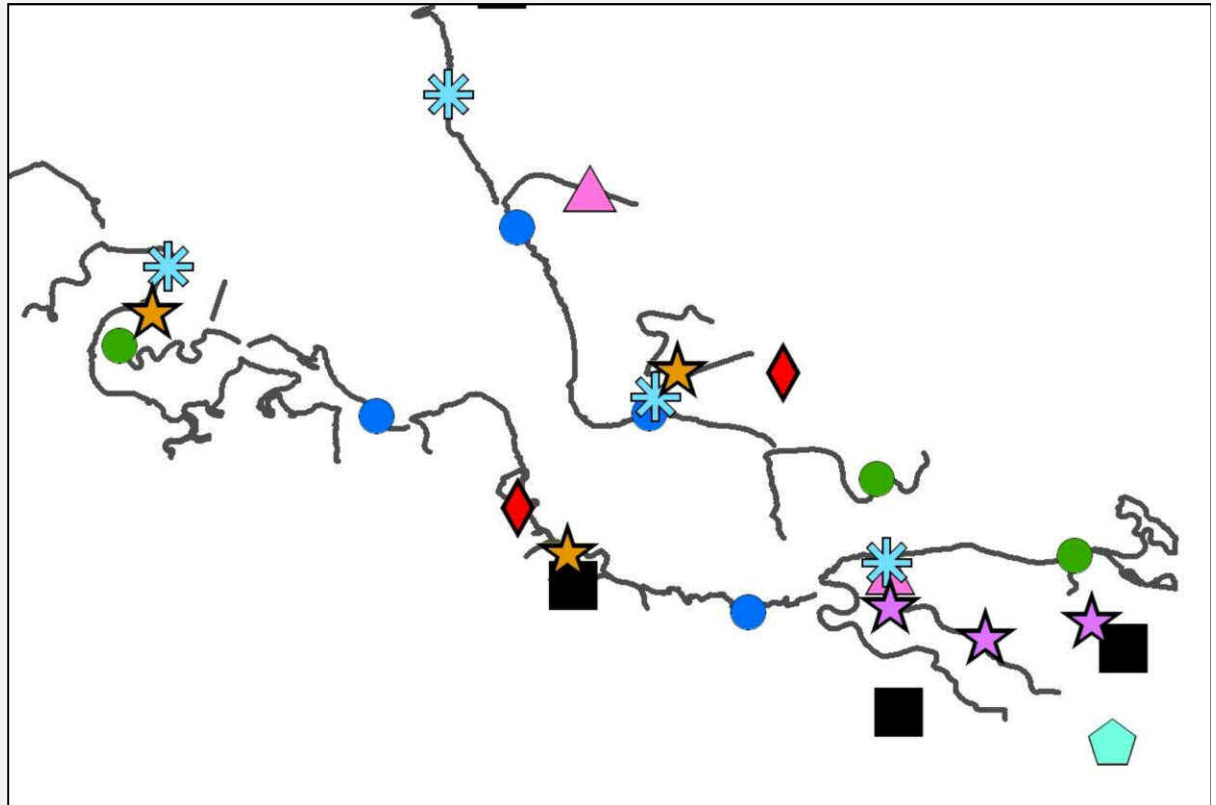
Mercury Sources

1. *Where is mercury entering the Bay food web?*
2. *What processes, sources, and pathways contribute disproportionately to food web accumulation?*

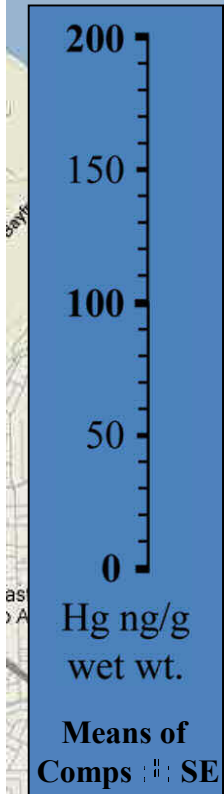
Stratified Random Design

- **What kinds of sites high Hg food web uptake**

- Random Bay shoreline?
- Contaminated Sediments?
- Waste water treatment plants (WWTP)?
- Industrial Watershed drainages?
- Hg Mine drainages?

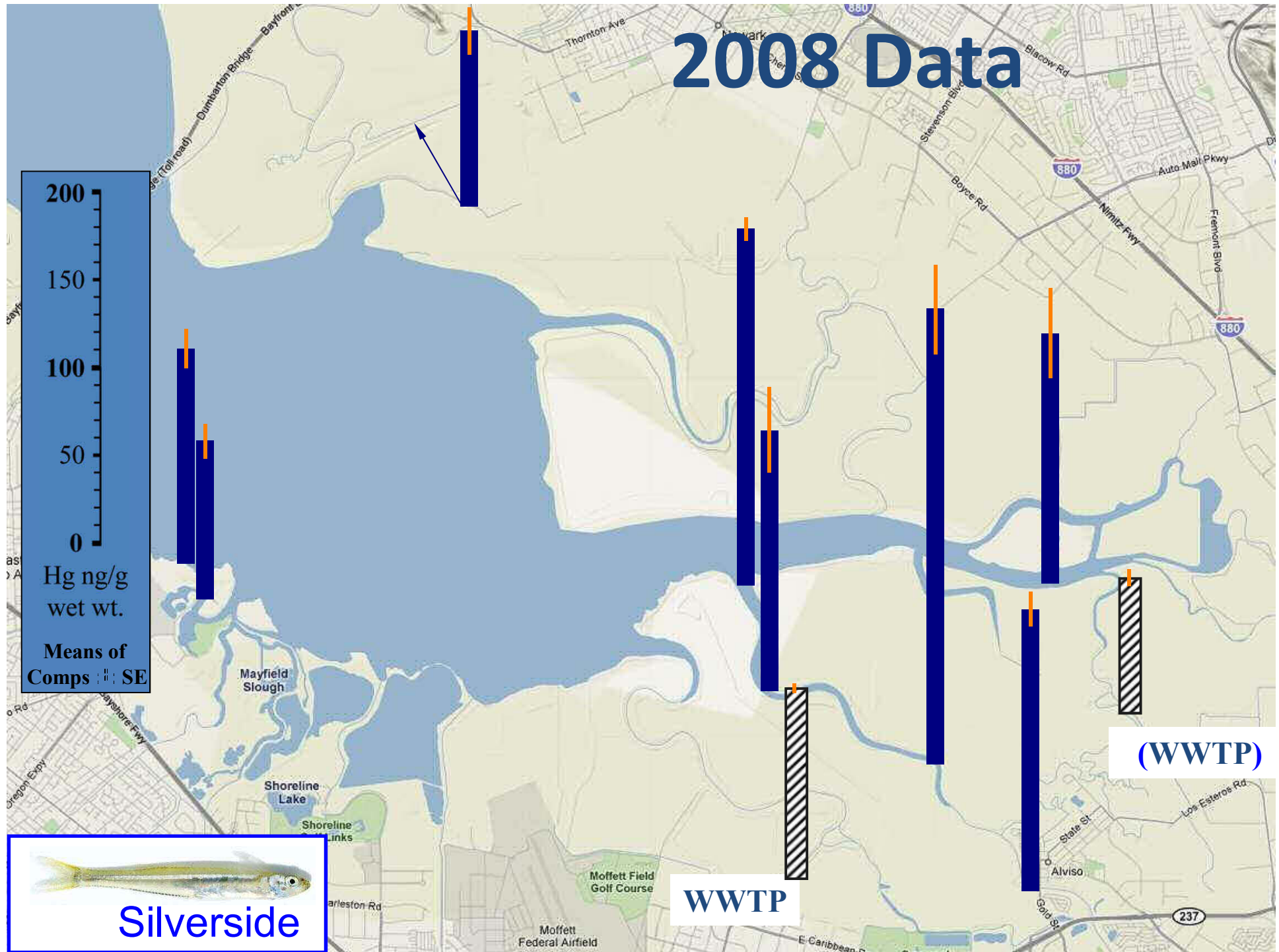


2008 Data

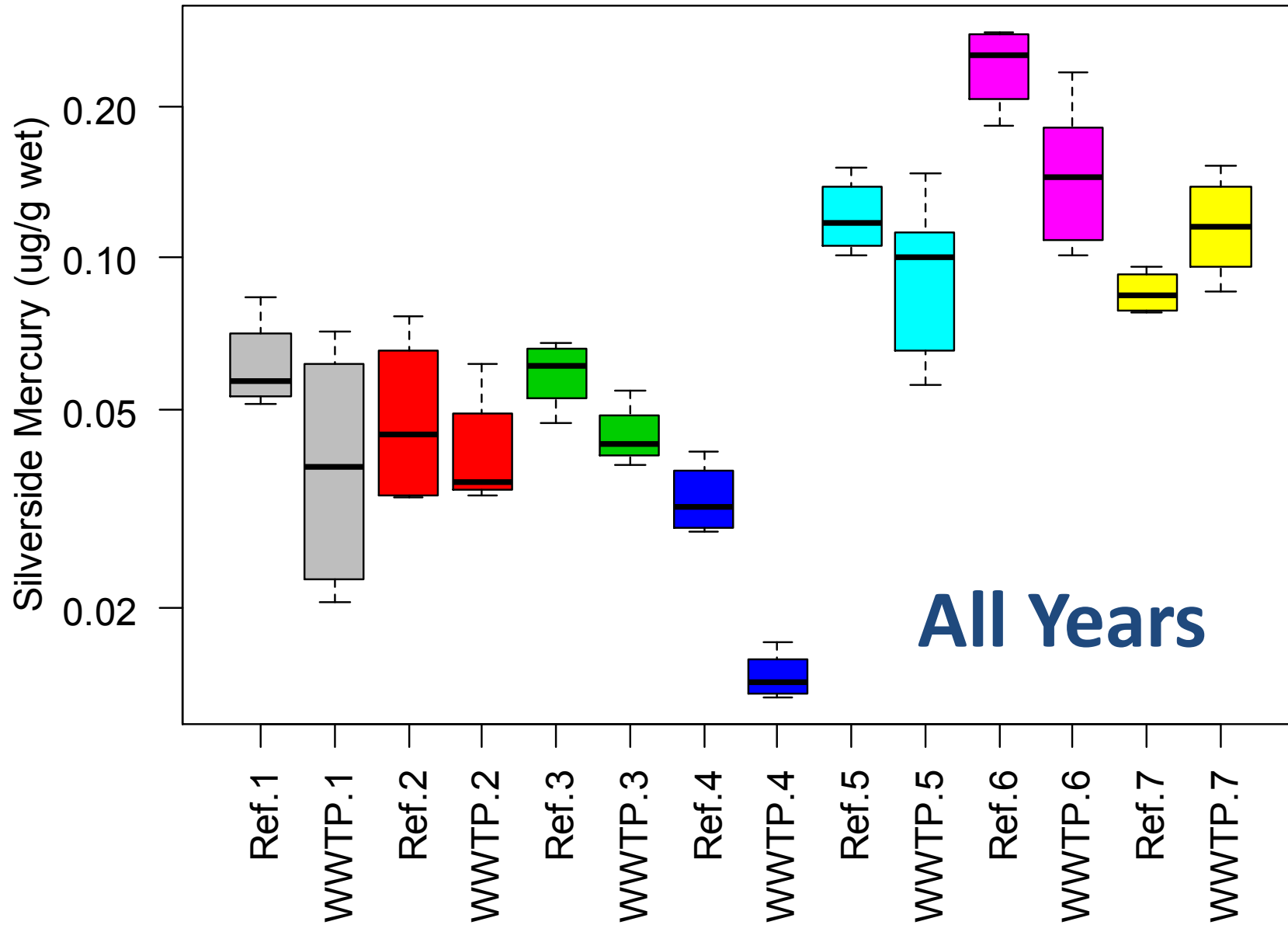


WWTP

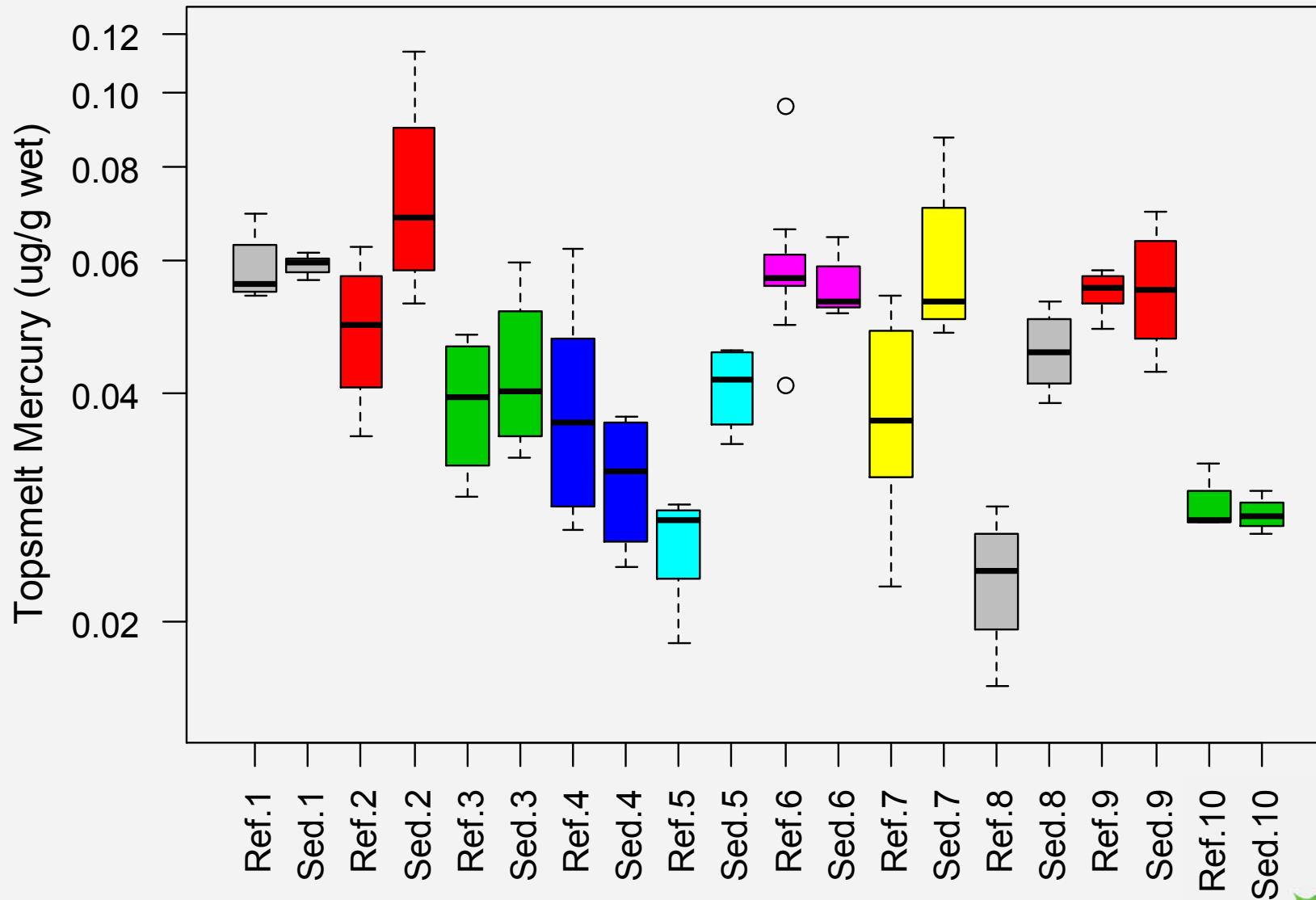
(WWTP)



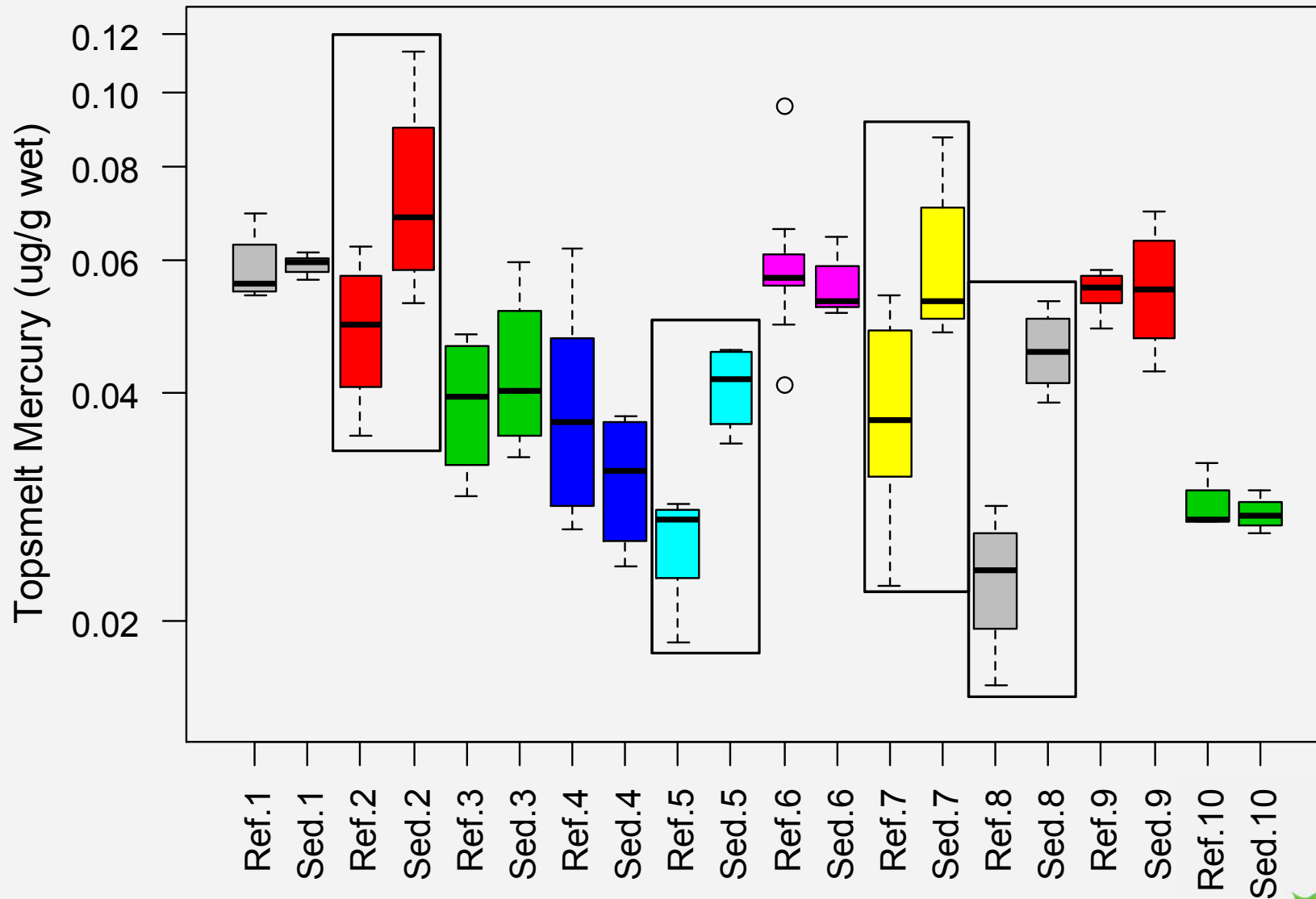
Waste Water Treatment Plants



Contaminated Sediment



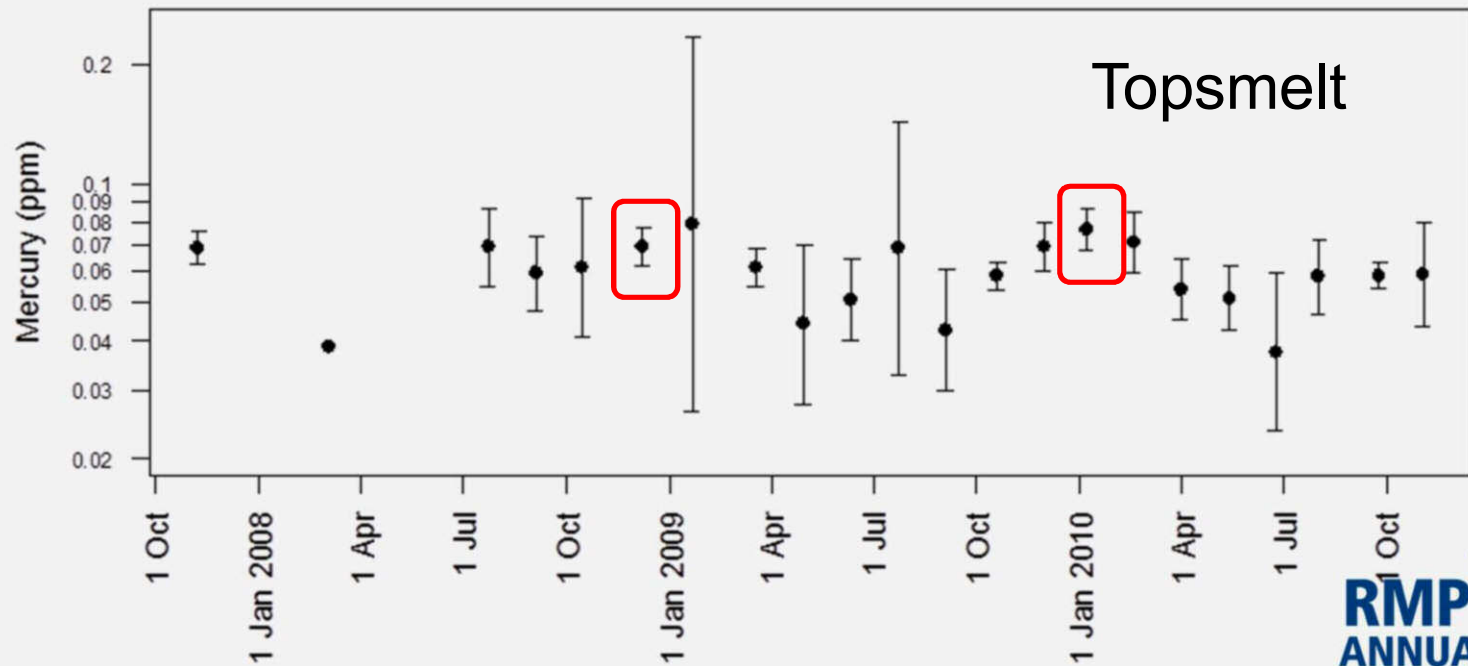
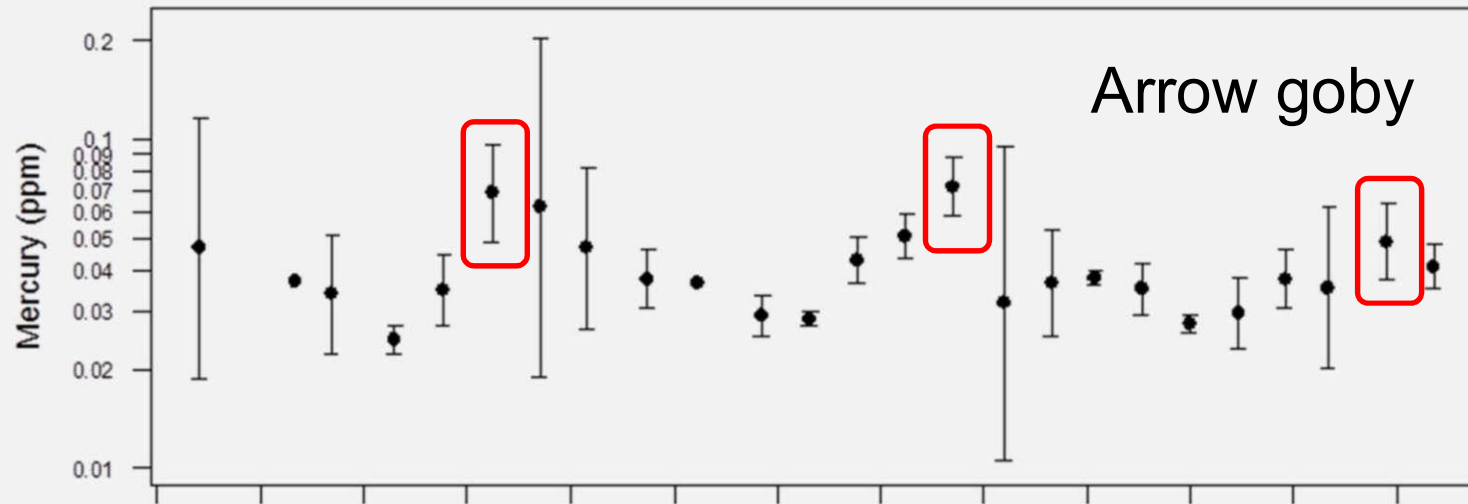
Contaminated Sediment



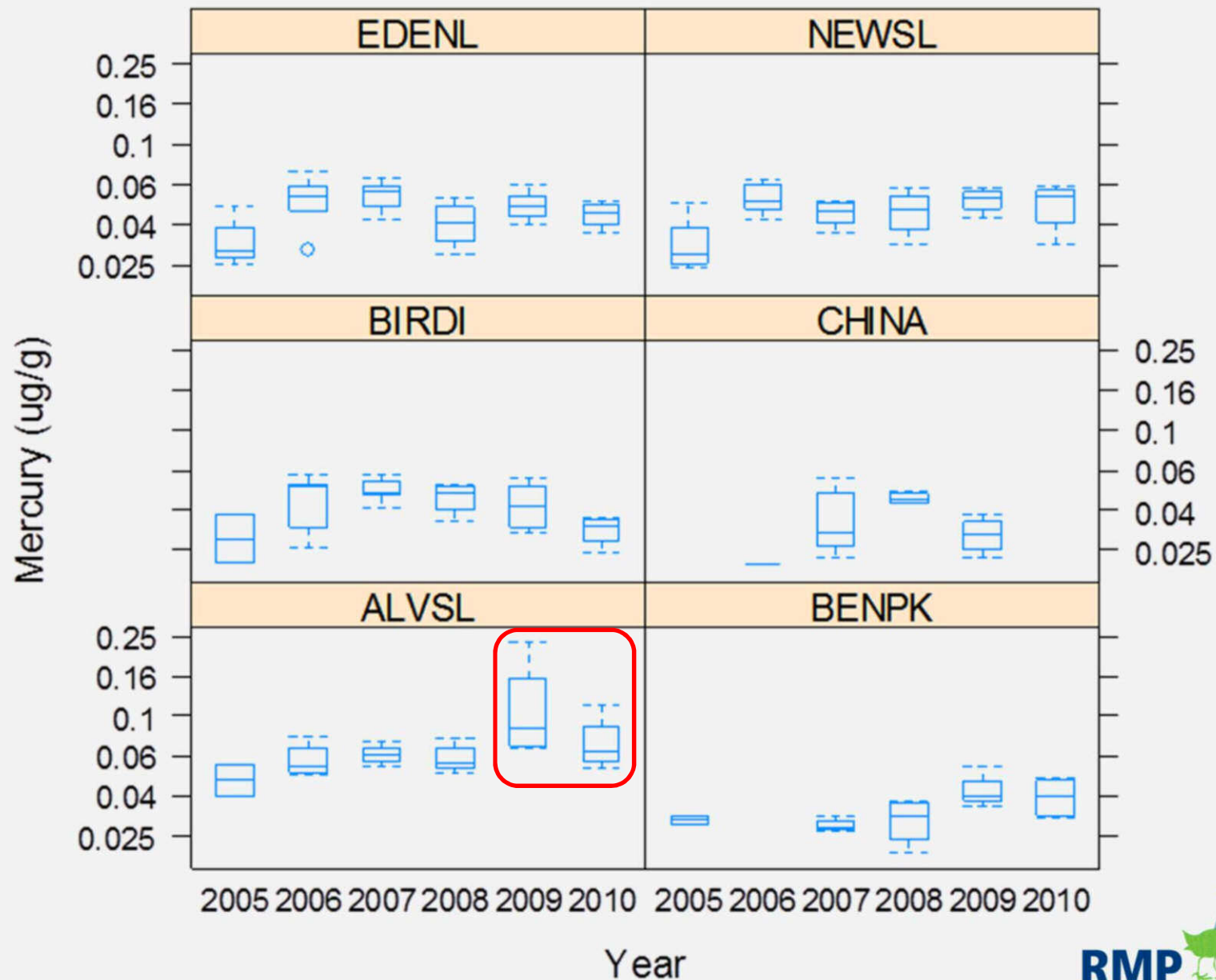
Mercury Trends

1. *When* is mercury entering the Bay food web?
2. *What processes, sources, and pathways contribute disproportionately to food web accumulation?*

Seasonal Trends



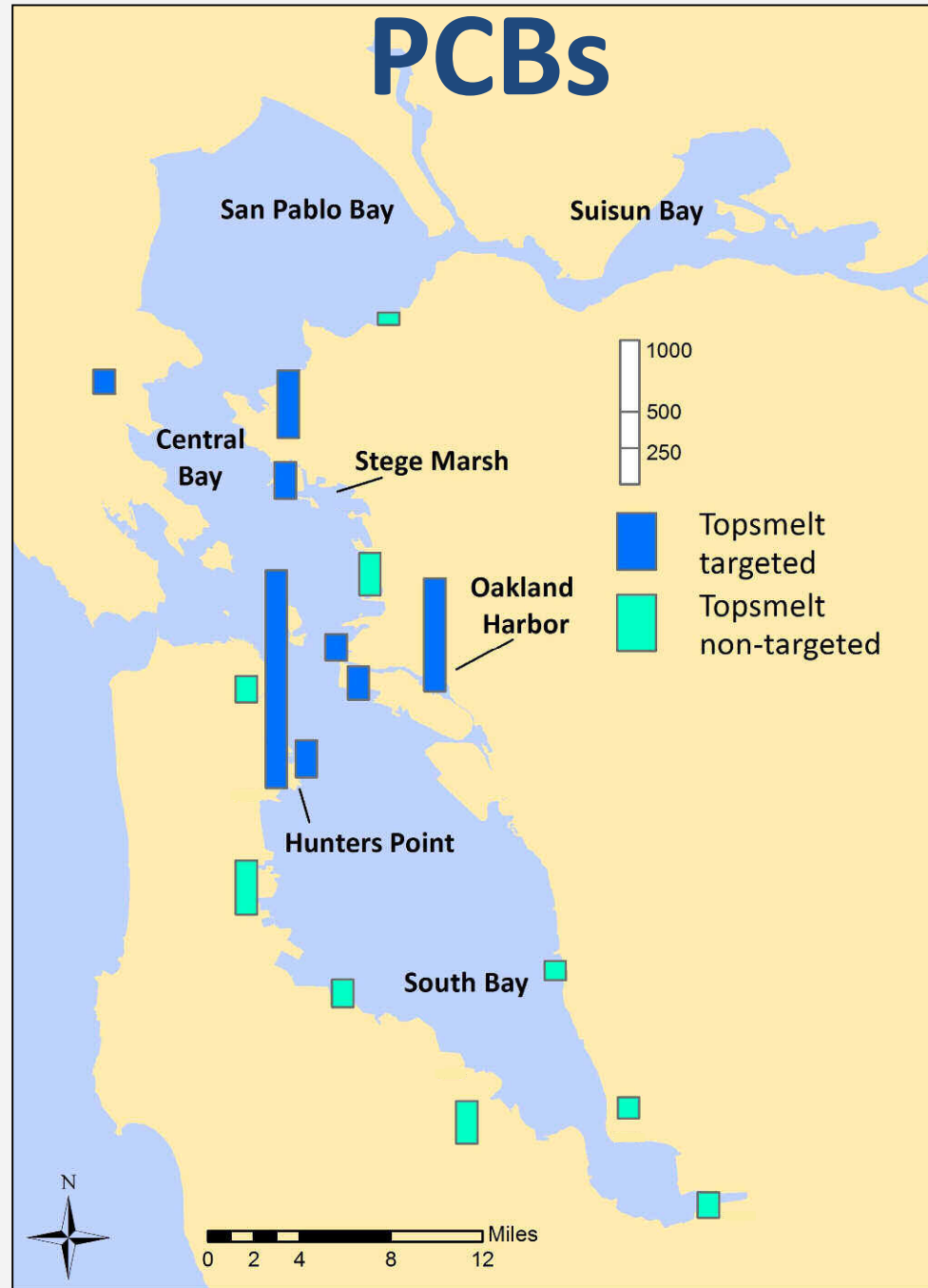
Interannual Trends

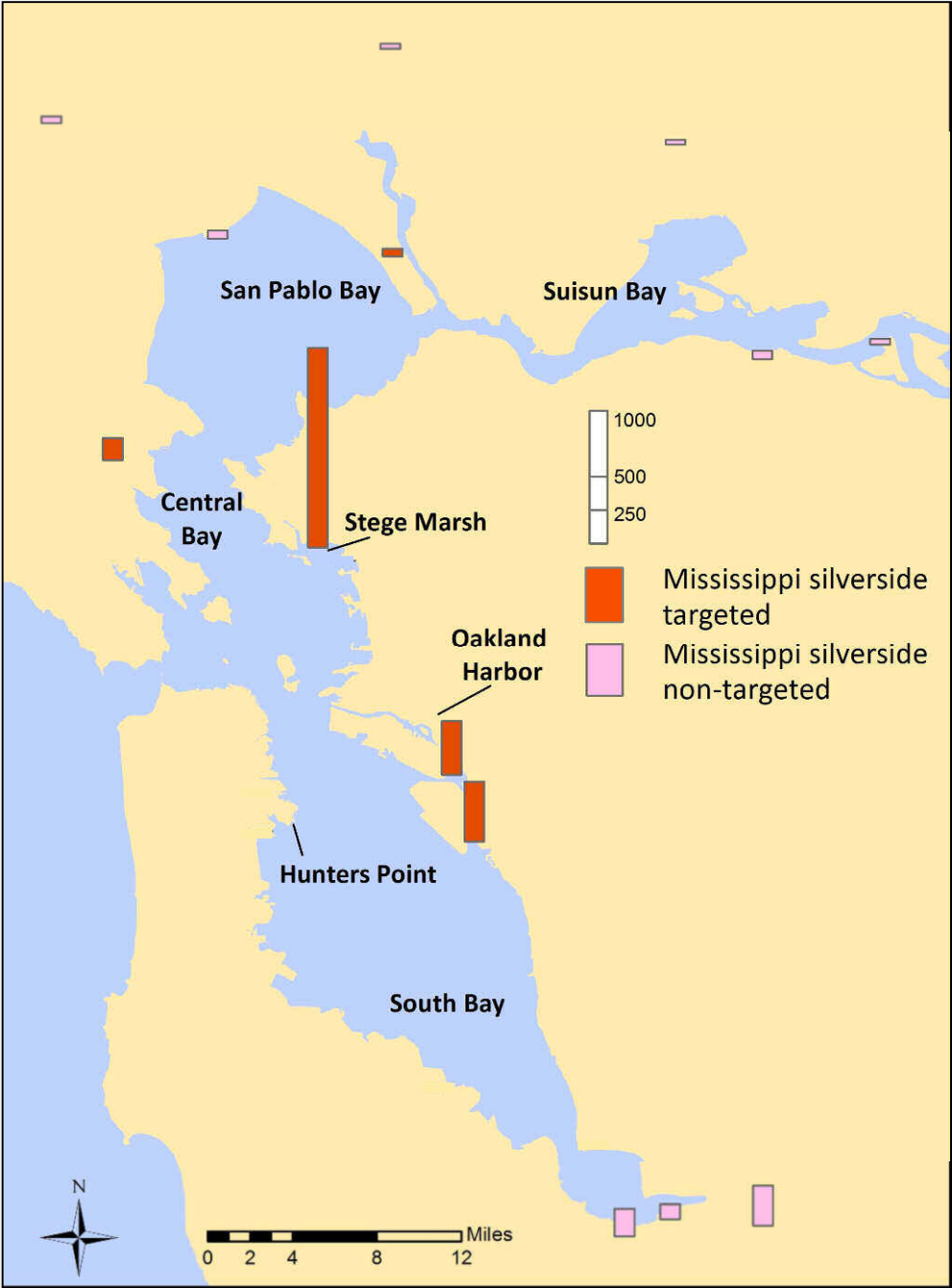


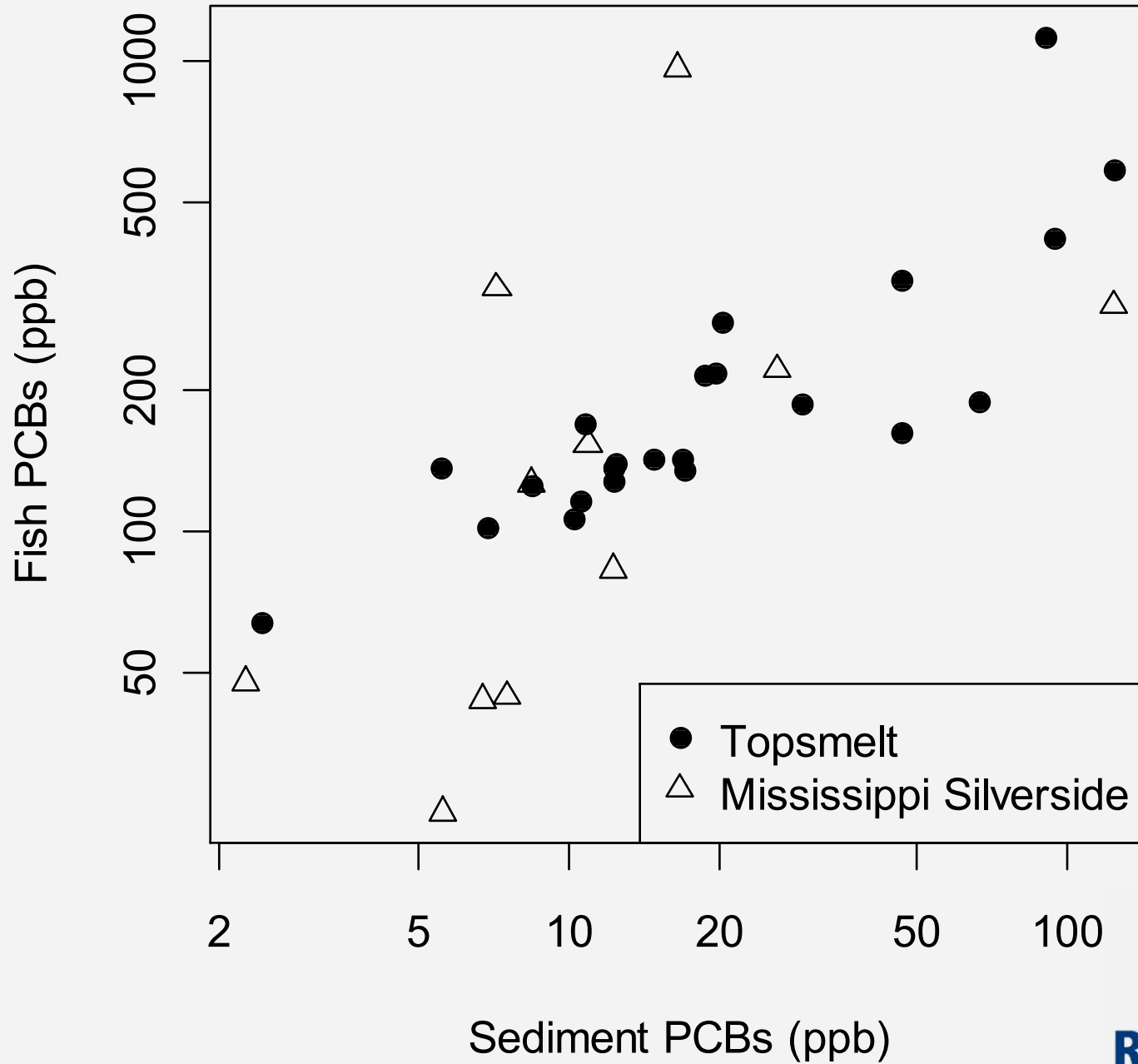
Summary: Mercury

1. *Where and when is mercury entering the Bay food web?*
 - Spatial gradient –Lower South Bay peak
 - Species specific seasonal variation
 - Interannual trend at Alviso Slough
2. *What processes, sources, and pathways contribute disproportionately to food web accumulation?*
 - WWTPs – lower
 - Contaminated sediments – higher sometimes

PCBs







Summary: PCBs

- Elevated PCBs in small fish
 - 30 to 1347 ppb
- Targeted sites (PCB in soils or sediments) elevated in small fish
 - Stronger pattern than Hg
- At least one site has unique fingerprint



Recommendations

- Continue annual Hg monitoring for long term trends
 - Will indicate region-specific trends (South Bay, San Pablo Bay, etc.)
- Understand why South Bay Hg higher
 - Study Hg methylation and food web uptake
 - Mechanistic models
- Consider additional PCBs, other compounds



Collaborators

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- Mark Sandheinrich, **UW – La Crosse**
- Jim Griswold, **West-Inc.**

