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May 1st, 1:30 PM - 3:00 PM

The Lake Washington PCB/PBDE Study: Concentrations Measured in Stormwater and Other Major Pathways to the Lake Washington Watershed

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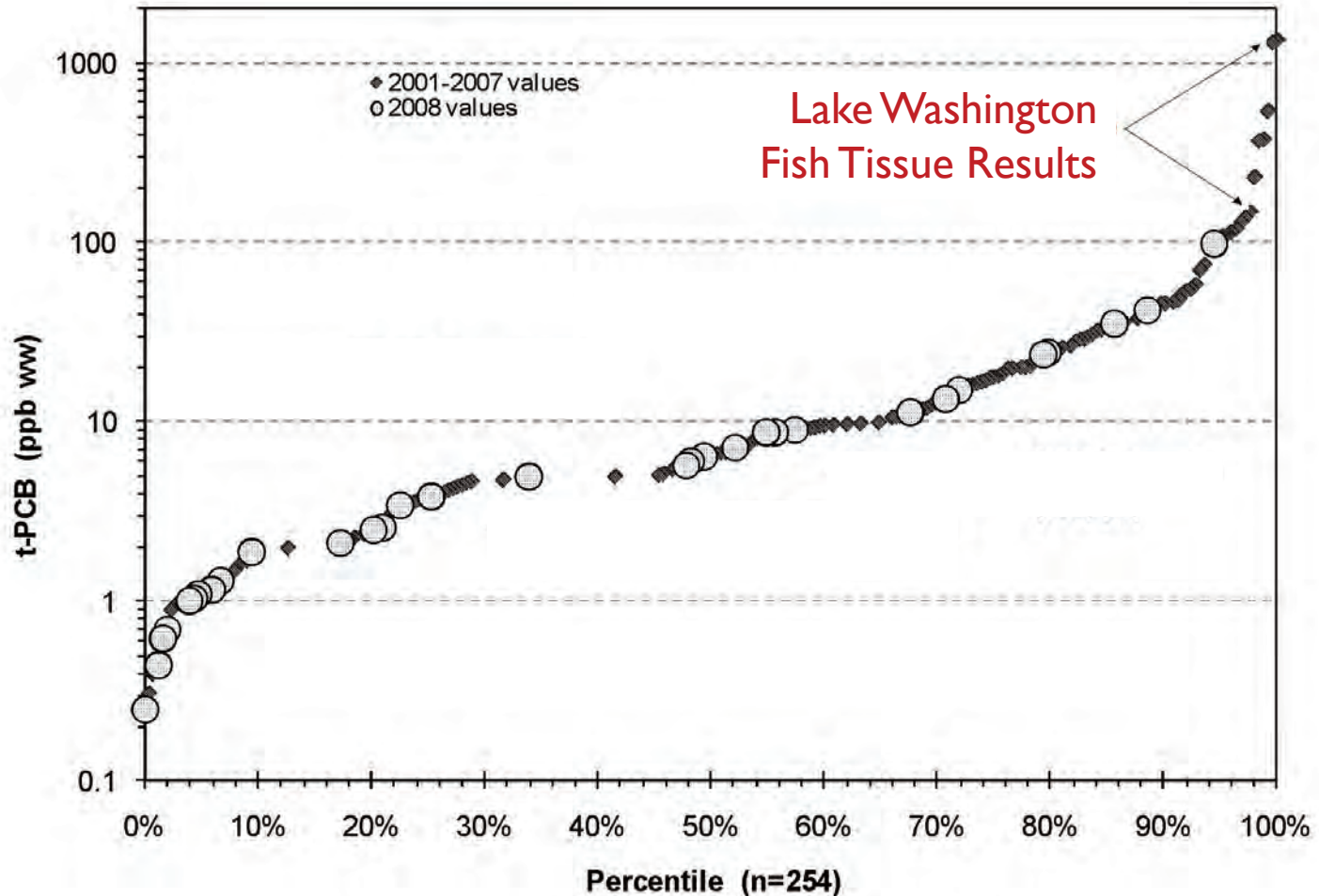
The Lake Washington PCB/PBDE Study: Concentrations Measured in Stormwater and Other Major Pathways to the Lake Washington Watershed

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Carly Greyell

Science and Technical Support Section
King County Water and Land Resources Division
Department of Natural Resources and Parks

May 1, 2014

Problem: Lake Washington Fish are Contaminated



PCB Concentrations in Freshwater Fish Across Washington State

Modified from Ecology (2010)

Lake Washington PCB/PBDE Loadings Study

- Objectives
 - Estimate PCB and PBDE loadings to Lakes WA and Union, to Puget Sound
 - Determine key pathways (CSO, stormwater, streams, air, rivers, bridge runoff) to Lakes
 - Model response time from any total PCB load reduction
 - What total PCB load reduction is needed to reach safe levels in Lake WA fish?

Lake WA Project Components

- Field study (Pathway sampling of PCB and PBDE congeners)
- Loadings estimates (PCBs & PBDEs)
- PCB modeling
- PCB load scenarios for Lake WA
- Findings and recommendations



Lake WA Advisory Panel

- Fred Bergdolt, WA Dept. of Transportation
- Betsy Cooper, King County Wastewater Treatment Division
- Jonathan Frodge, Seattle Public Utilities
- Jenny Gaus, City of Kirkland
- Joan Hardy, WA Dept. of Health
- Rachel McCrea, WA Dept. of Ecology
- Doug Navetski, King County Stormwater Management
- Andy Rheume, City of Redmond
- Ronald Straka, City of Renton
- Heather Trim, People for Puget Sound/FutureWise
- Bruce Tiffany, King County Wastewater Treatment Division
- Patrick Yamashita, City of Mercer Island



FIELD STUDY

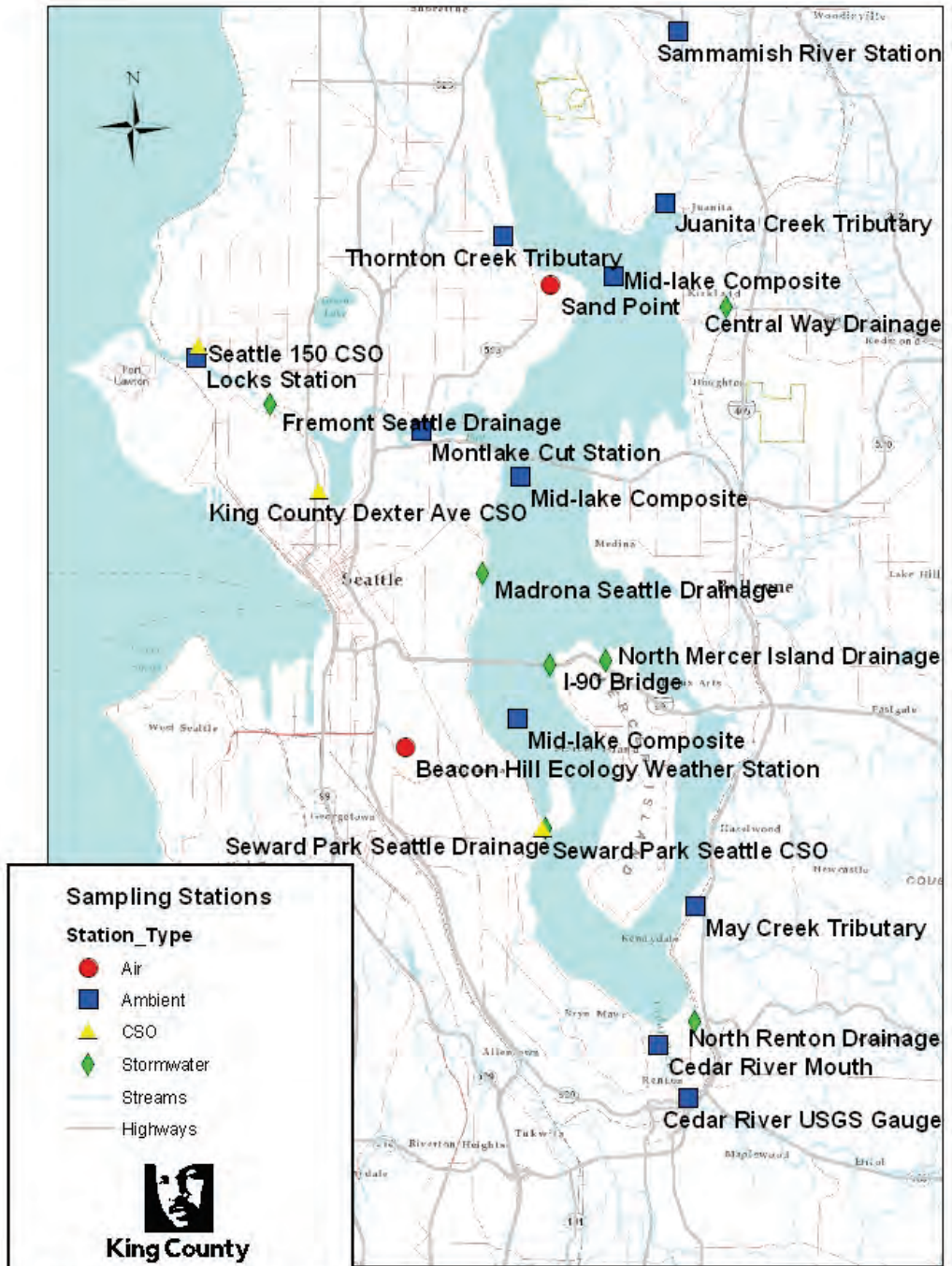


Air deposition sampler

Field Study

- Sampled one year (2011/2012)
- 209 PCB and 9 PBDE congeners in
 - CSOs (1 King County, 2 Seattle)
 - Stormwater (storm and baseflow, 6 stns)
 - Streams (storm and baseflow, 3 stns)
 - Sammamish and Cedar Rivers (3 stns)
 - I-90 Bridge runoff
 - Atmospheric deposition (wet and dry, 2 stns)
 - Lake Washington and Ship Canal inlet and outlet

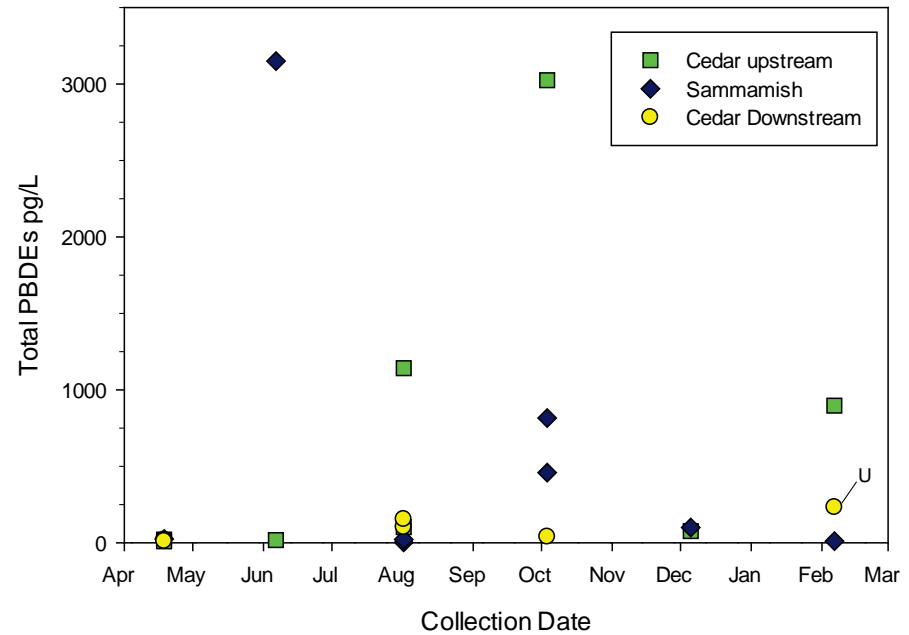
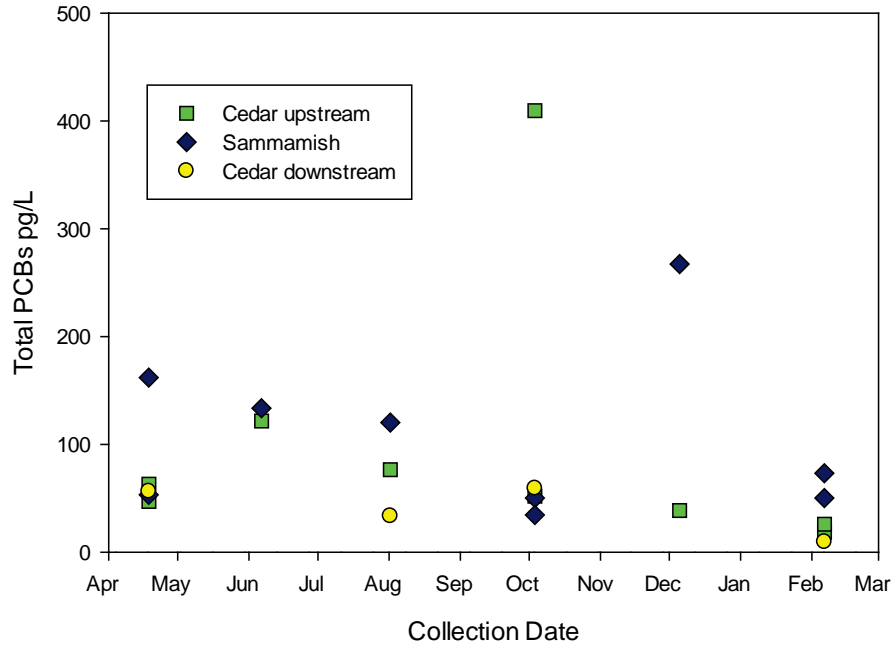
Sampling Stations



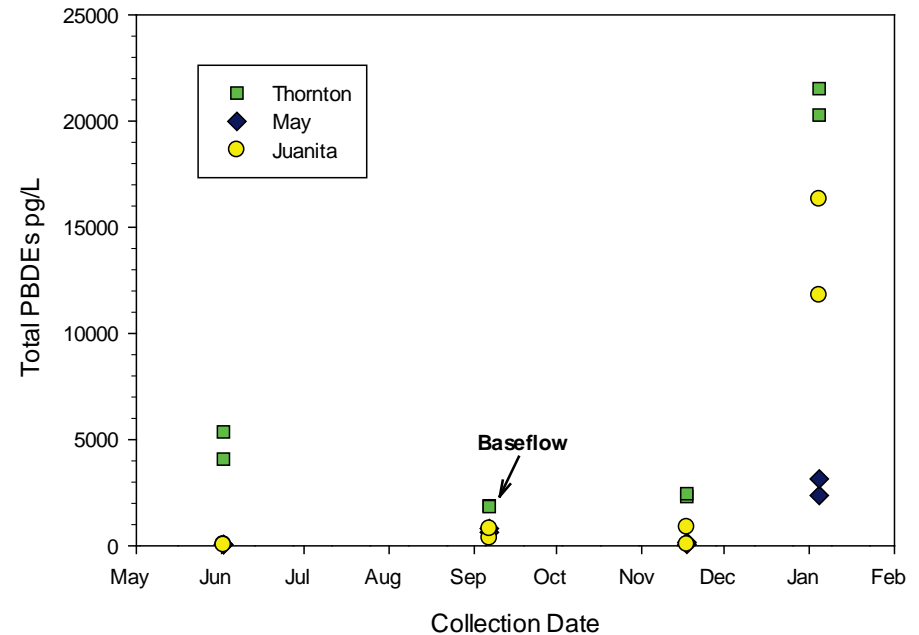
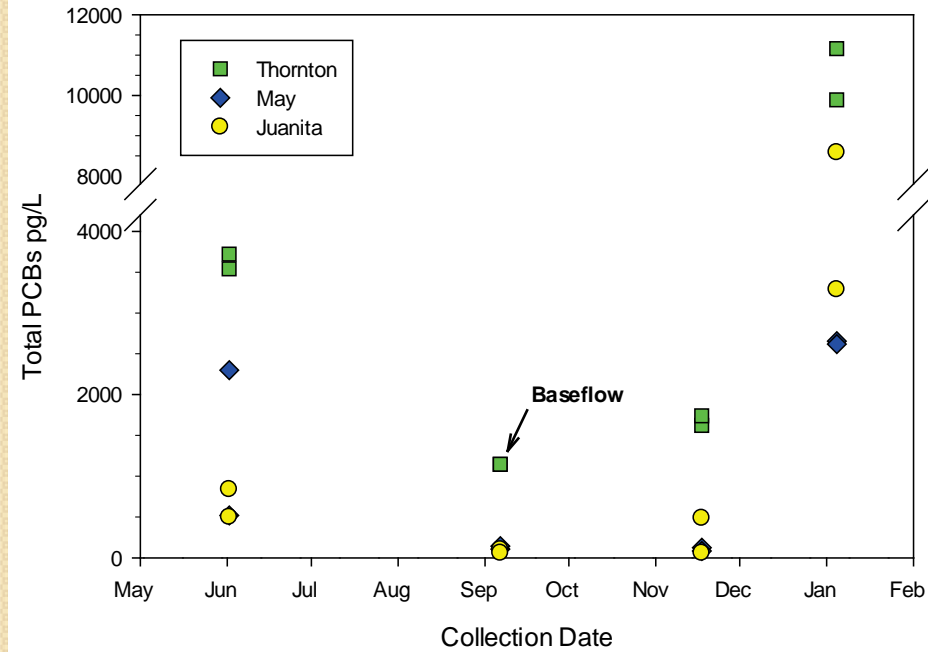
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Concentrations in Rivers

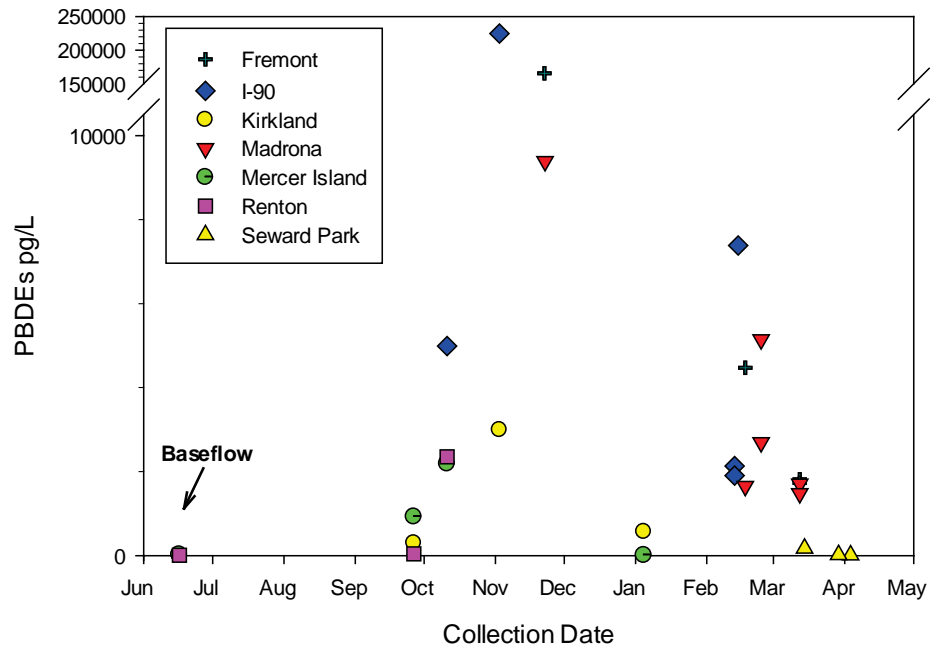
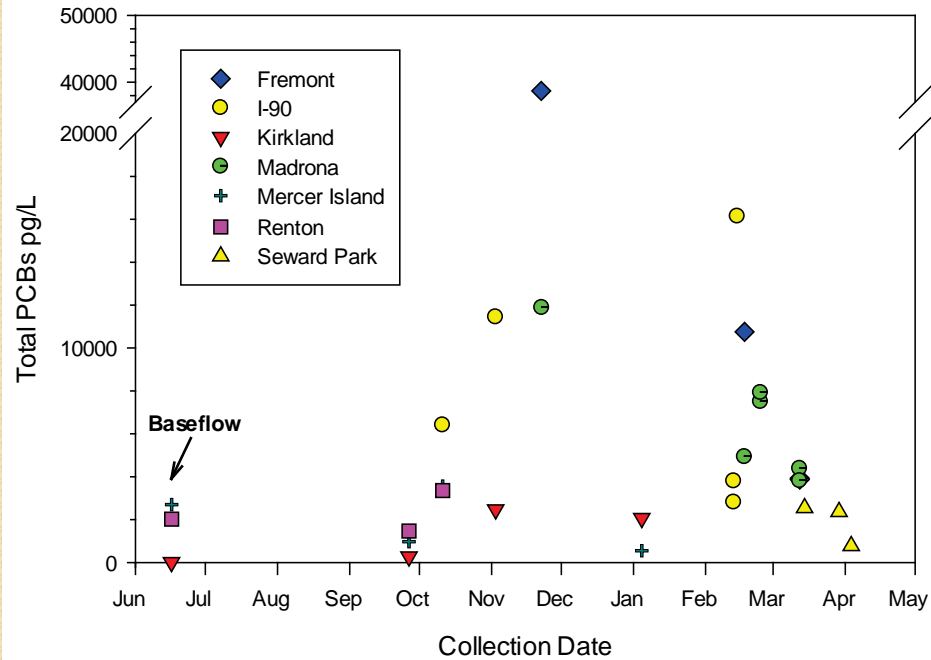
Base and storm flows not specifically targeted



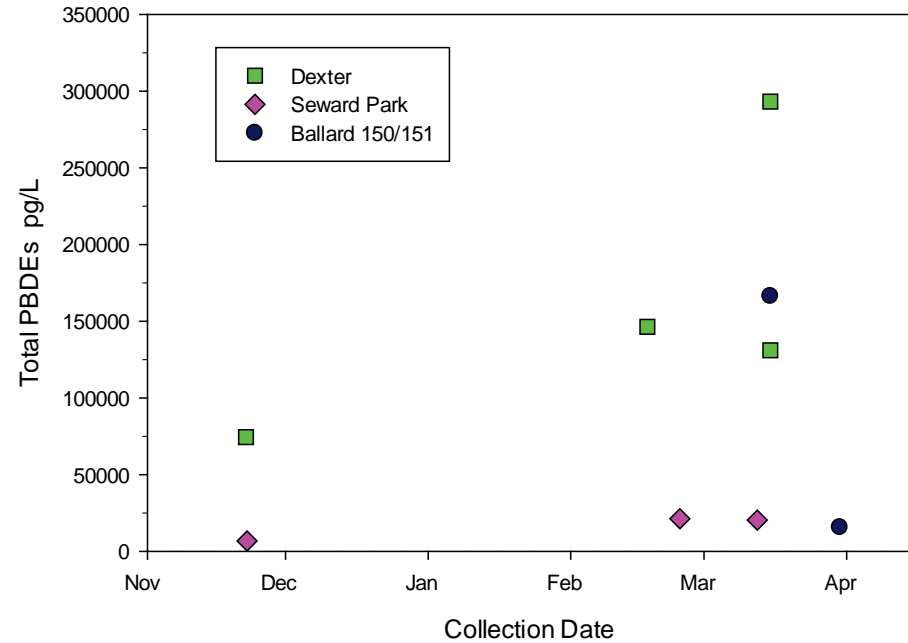
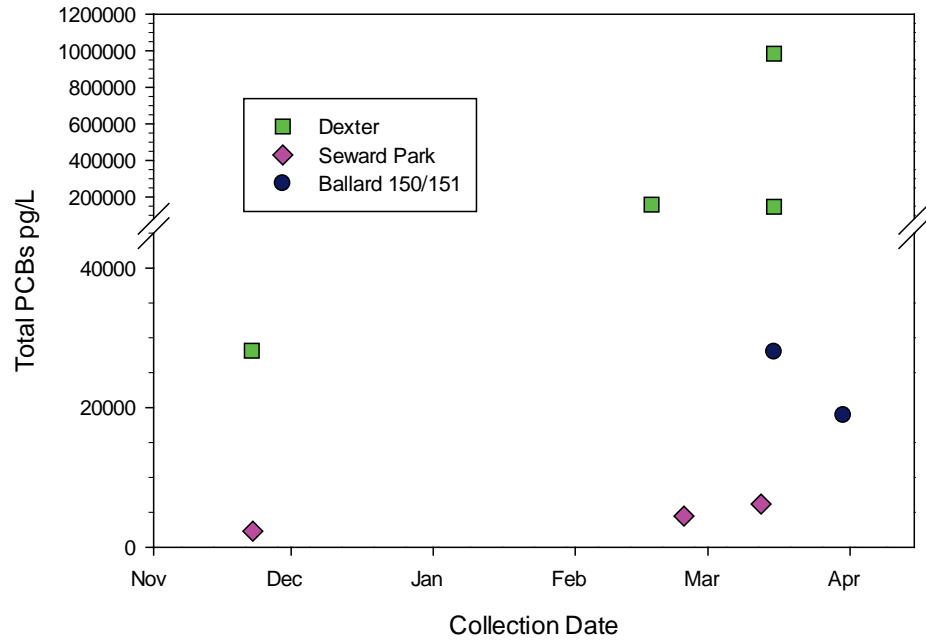
Concentrations in Tributaries



Concentrations in Stormwater

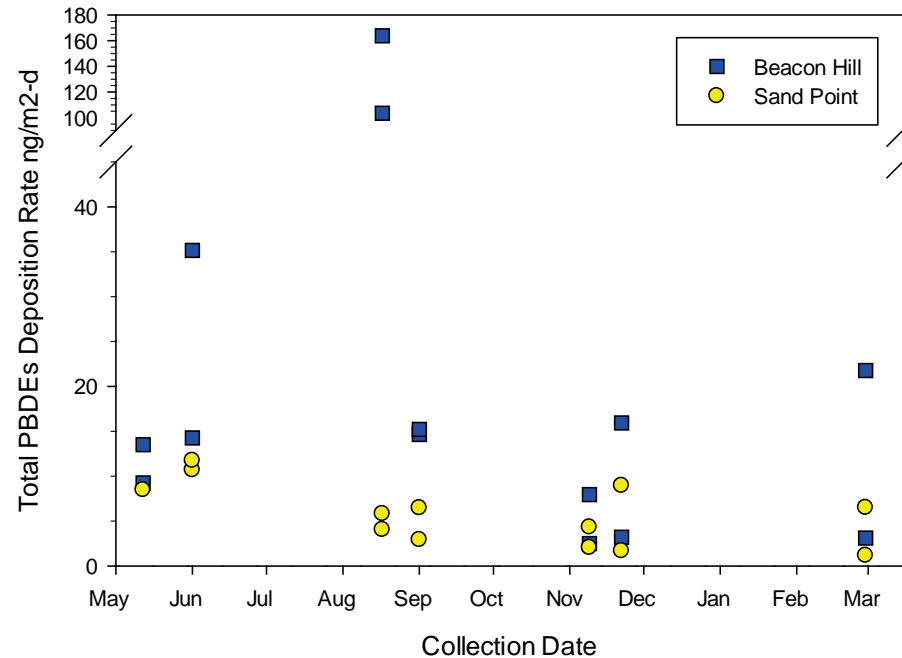
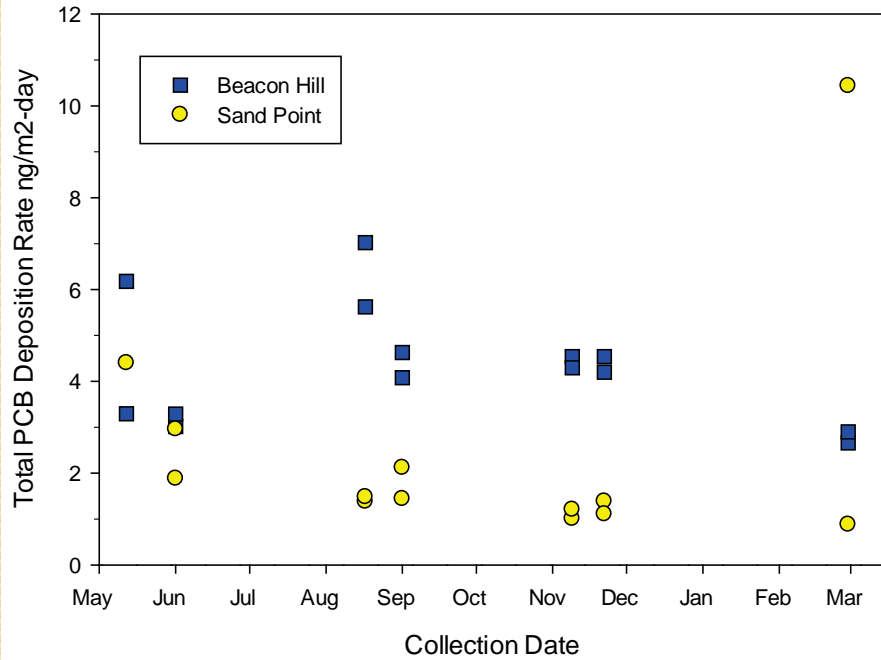


Concentrations in CSOs

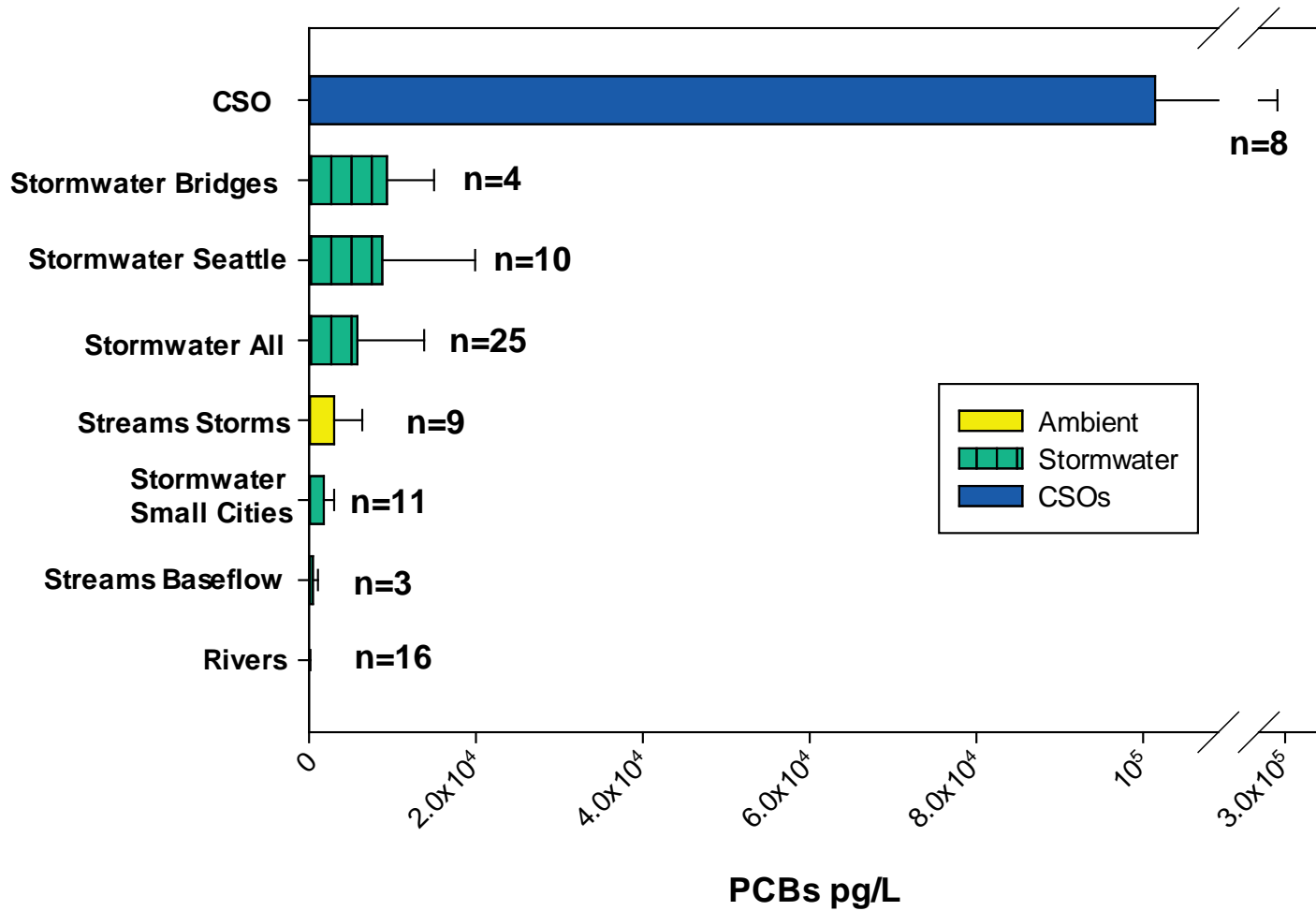


Atmospheric Deposition Rates

Units are $\text{ng}/\text{m}^2/\text{day}$



Measured Water Concentrations



Conclusions

- CSO concentrations highest, up to order of magnitude
- River concentrations lowest
- Seattle stormwater concentrations higher than smaller cities
- Use these data to estimate loadings to Lakes Washington and Union



Acknowledgements

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- King County Field Services Unit and Analytical Lab Staff
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- WSDOT: Archie Allen
- City of Kirkland: Jenny Gaus
- City of Mercer Island: Patrick Yamashita
- City of Renton: Ron Straka
- City of Seattle: Jonathan Frodge, Laura Reed
- AXYS Analytical