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

The Lake Washington PCB/PBDE Study: Reductions Required and Recommendations

Richard Jack
King County (Wash.). Water and Land Resources Division, richard.jack@kingcounty.gov

Jenee Colton
King County (Wash.). Water and Land Resources Division

Curtis DeGasperi
King County (Wash.). Water and Land Resources Division

Carly Greyell
King County (Wash.). Department of Natural Resources and Parks

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

PCB LOAD REDUCTION SCENARIOS

Richard Jack, Jenée Colton, Curtis DeGasperi, and Carly Greyell

Science and Technical Support Section
King County Water and Land Resources Division Department of Natural Resources and Parks
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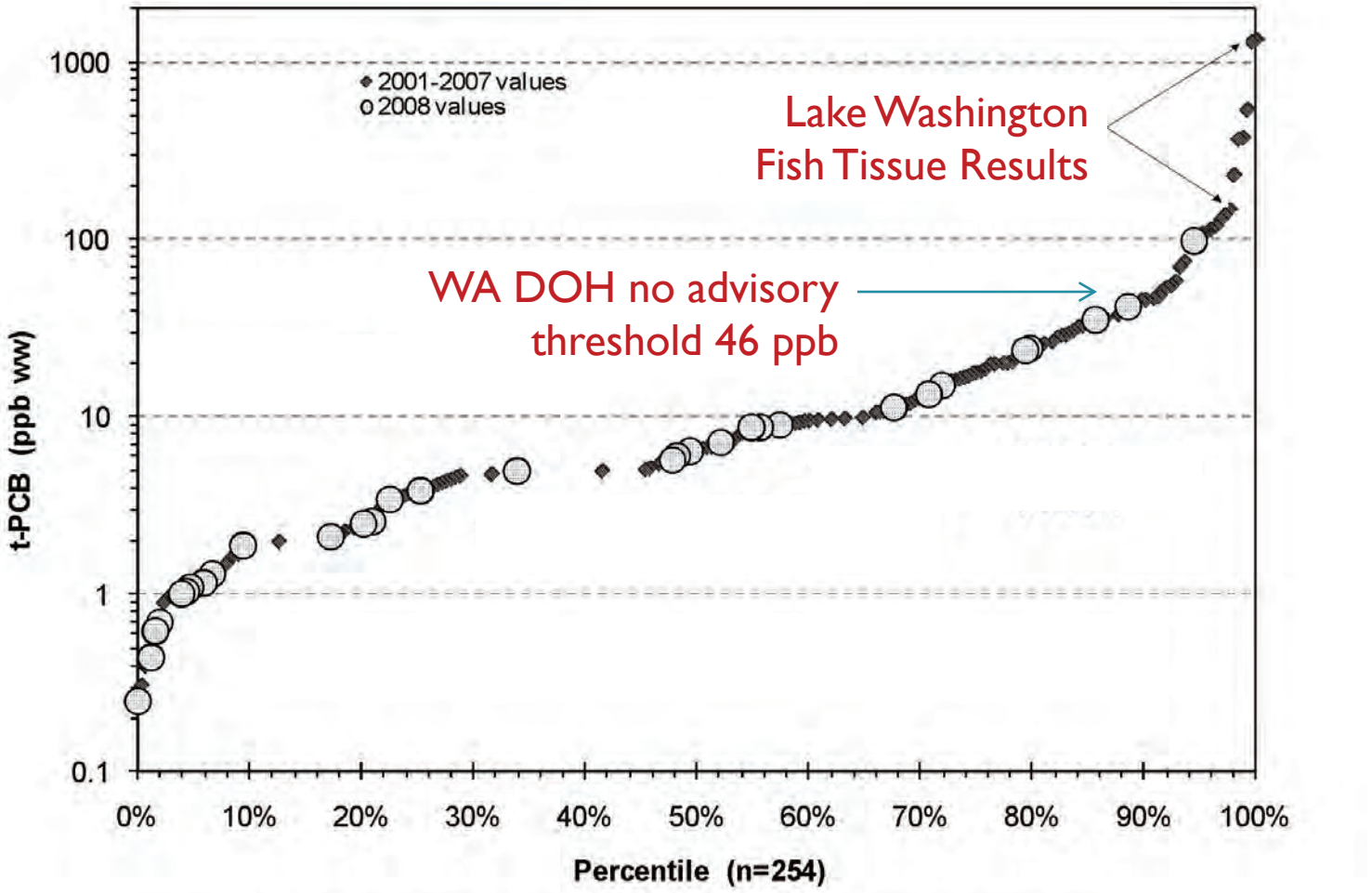
Problem: Lake Washington Fish are Contaminated

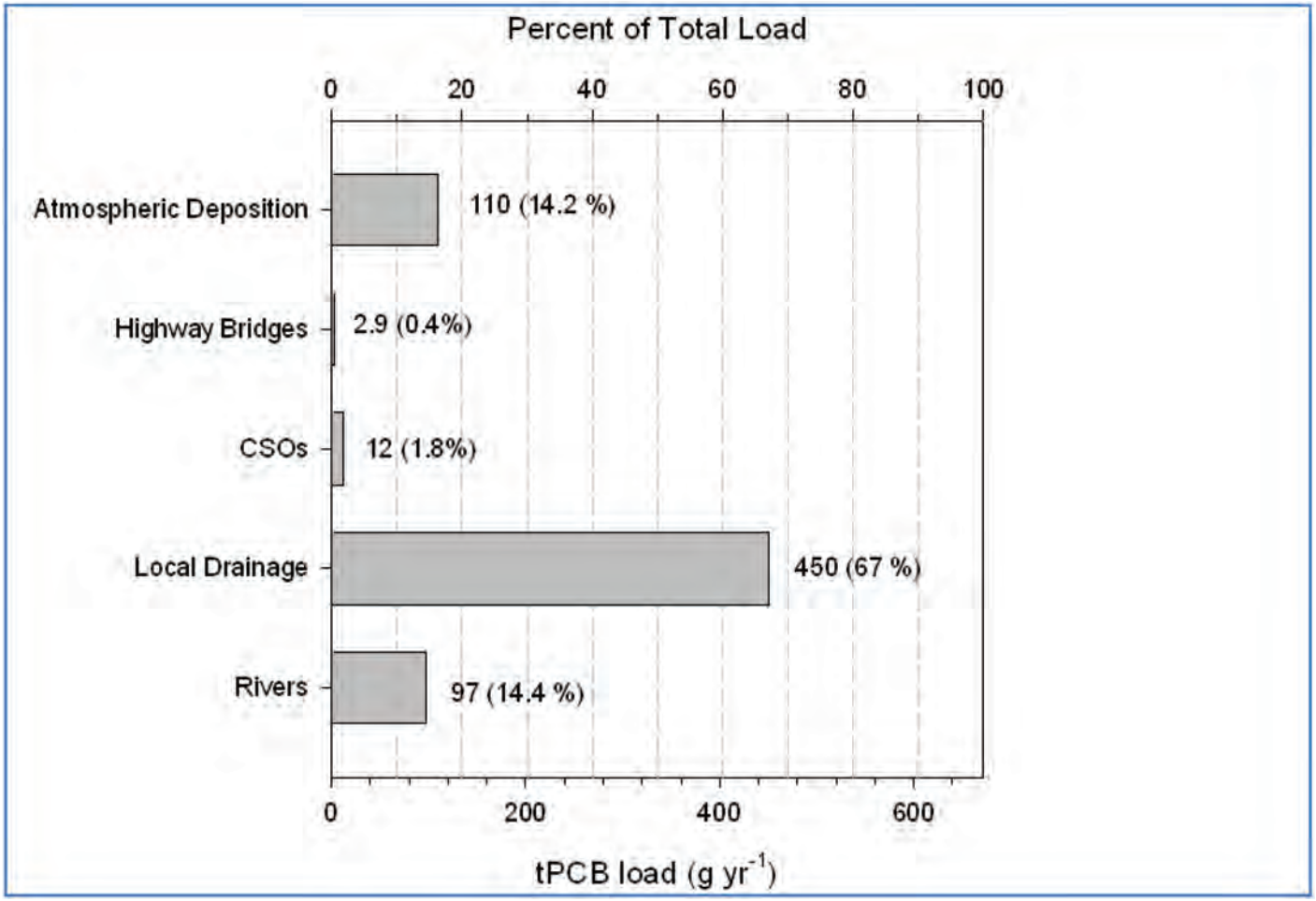


PCB Concentrations in Freshwater Fish Across Washington State

Modified from Ecology (2010)

Current PCB Loading Estimates

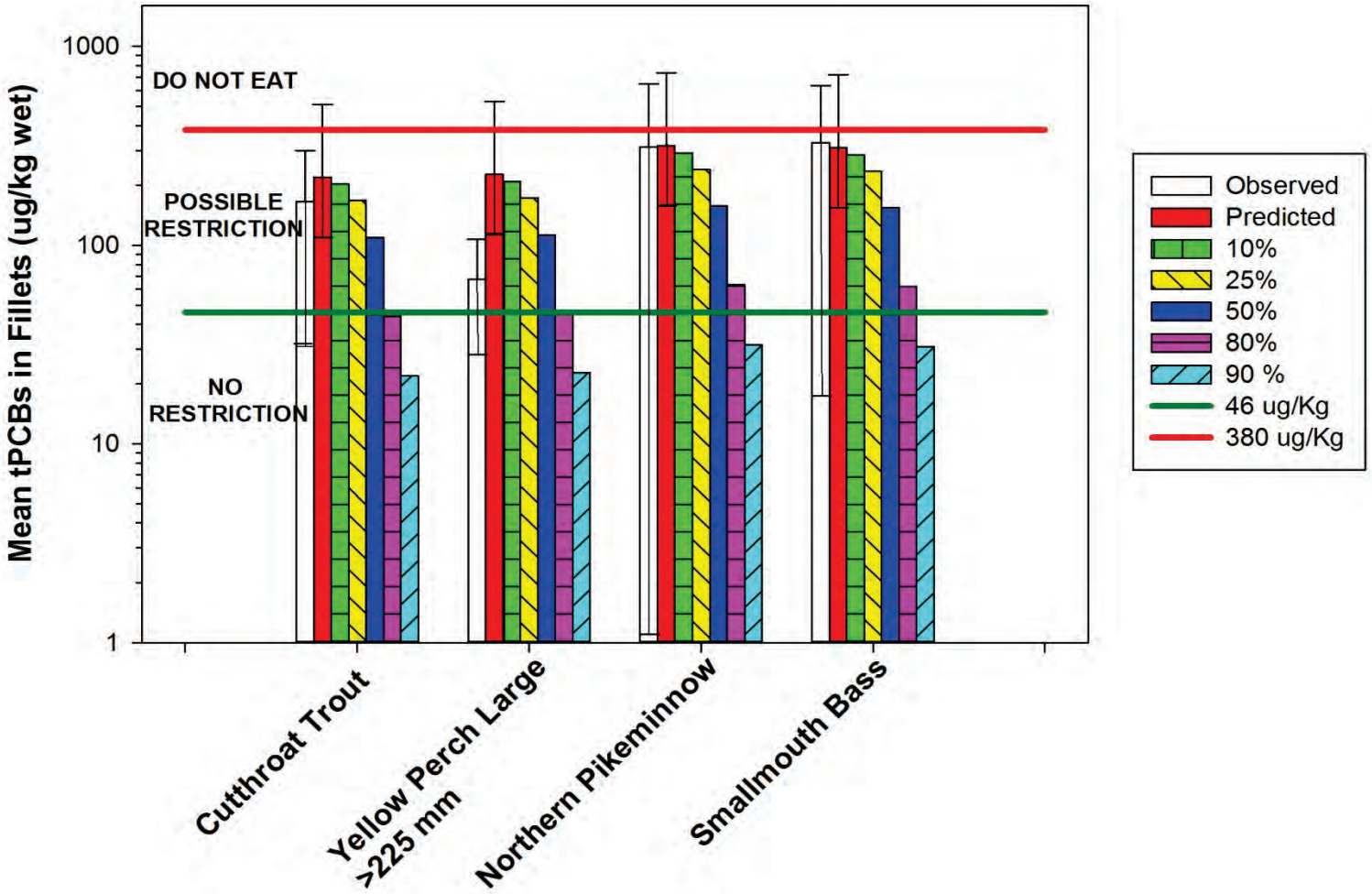
672 g yr^{-1} to Lake Washington
140 g yr^{-1} exits Lake Washington
360 g yr^{-1} to Puget Sound



Load Reduction Scenarios

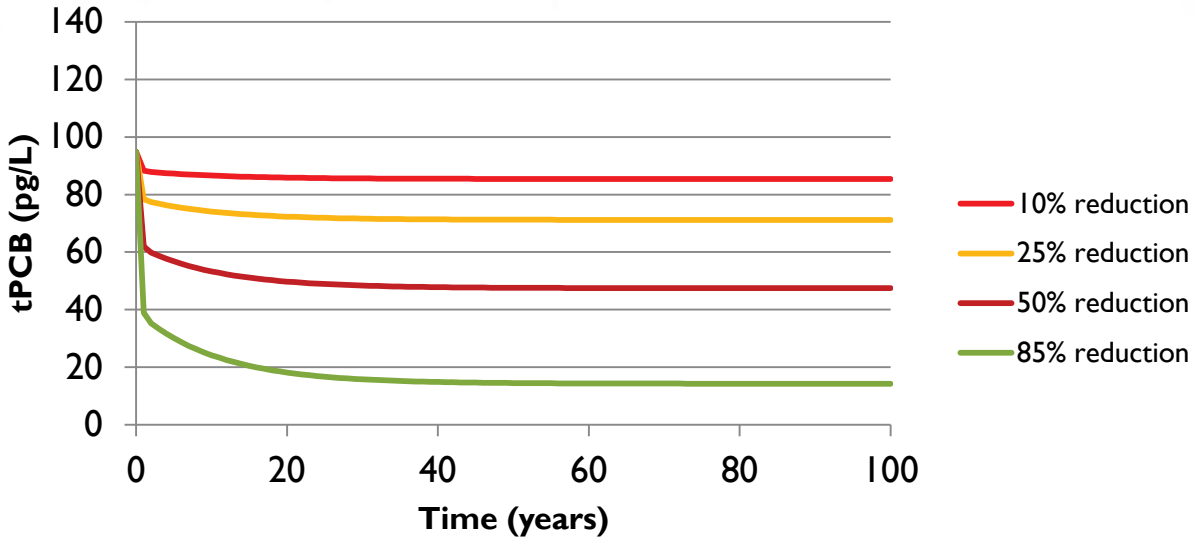
- Modeled PCBs only in Lake Washington
- PCB total load reduced by 10, 25, 50, 80, 90%
- Fate model re-run with reduced total load
- Fate model water and sediment concentrations served as bioaccumulation model inputs to yield predicted whole body fish tissue concentrations

Predicted Fillet Concentrations with Various Total PCB Load Reductions



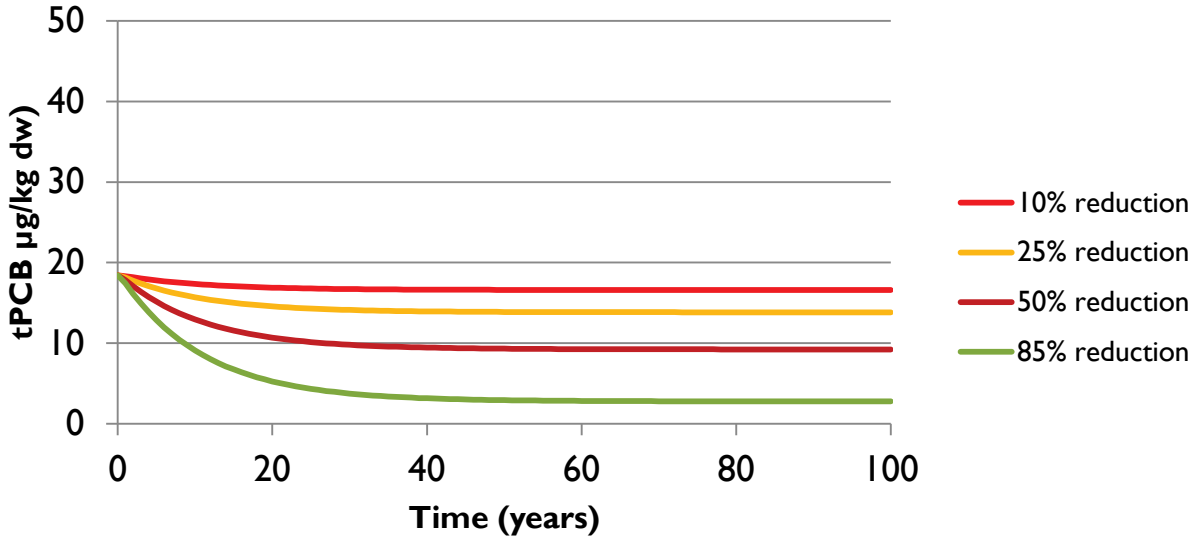
Error bars on Observed are standard deviations on the mean. Error bars on Predicted are tissue concentrations using low and high tPCB load estimates.

Response Time After Load Reduction



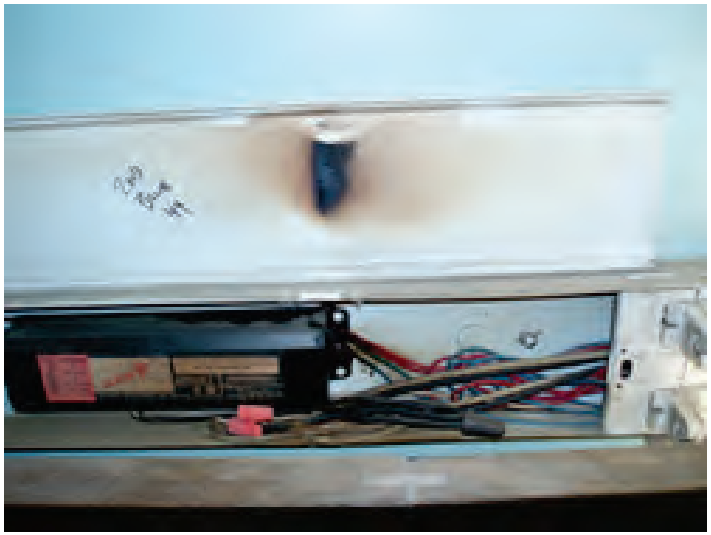
Water –
10 to 20 years

Sediment –
20 to 40 years



Conclusions: Field Data

- Ongoing loadings
  - In use PCB materials are more important than historic discharges buried in sediment
  - E.g. Paints, caulks, ballasts and capacitors



Conclusions: Loadings and Fate

- Stormwater is the most important loading pathway to Lake WA
- Rivers and air deposition are significant despite very low concentrations
- CSOs and highway bridges are small fraction of Lake WA load but more significant to Lake Union
- Lake WA is partial sink as well as source to Lake Union, Ship Canal and Puget Sound
- Response time 5-20yrs for water, 10-40 for sediment

Conclusions: Reduction Scenarios

- In optimal (instantaneous) scenario, declines in load should be measurable in <20 yr, 40 yr to reach equilibrium
- More realistic scenario would be longer
- Despite 1970s era ban, ~85 % load reductions are still required to achieve "safe" levels in fish

Next steps

- Public outreach and education on widespread existing sources, e.g.
  - Contractor requirements for safe renovations of commercial, industrial and institutional buildings constructed or renovated between 1950 and 1979.
  - EPA safe schools program to remove in-use caulks and ballasts
- Source control: urban inventory of existing stocks
  - Needed to reach long term goal of source control
  - Locate stored and active sources and develop long-term removal strategy

Next steps

- PCB cycling: washoff model development
  - Estimate atmospheric deposition to stormwater from land
  - Volatilization/atmospheric recycling potentially important
- Treatment strategies:
  - Need to know the efficacy for PCB removal, particularly stormwater BMPs like bioswales, rain gardens, permeable pavement etc.

More Information

Website (Loadings and Data Reports)

- http://www.kingcounty.gov/environment/watersheds/cedar-river-lake-wa/pcb-pbde-loadings.aspx (or Google "King County PCBs in Lake Washington")