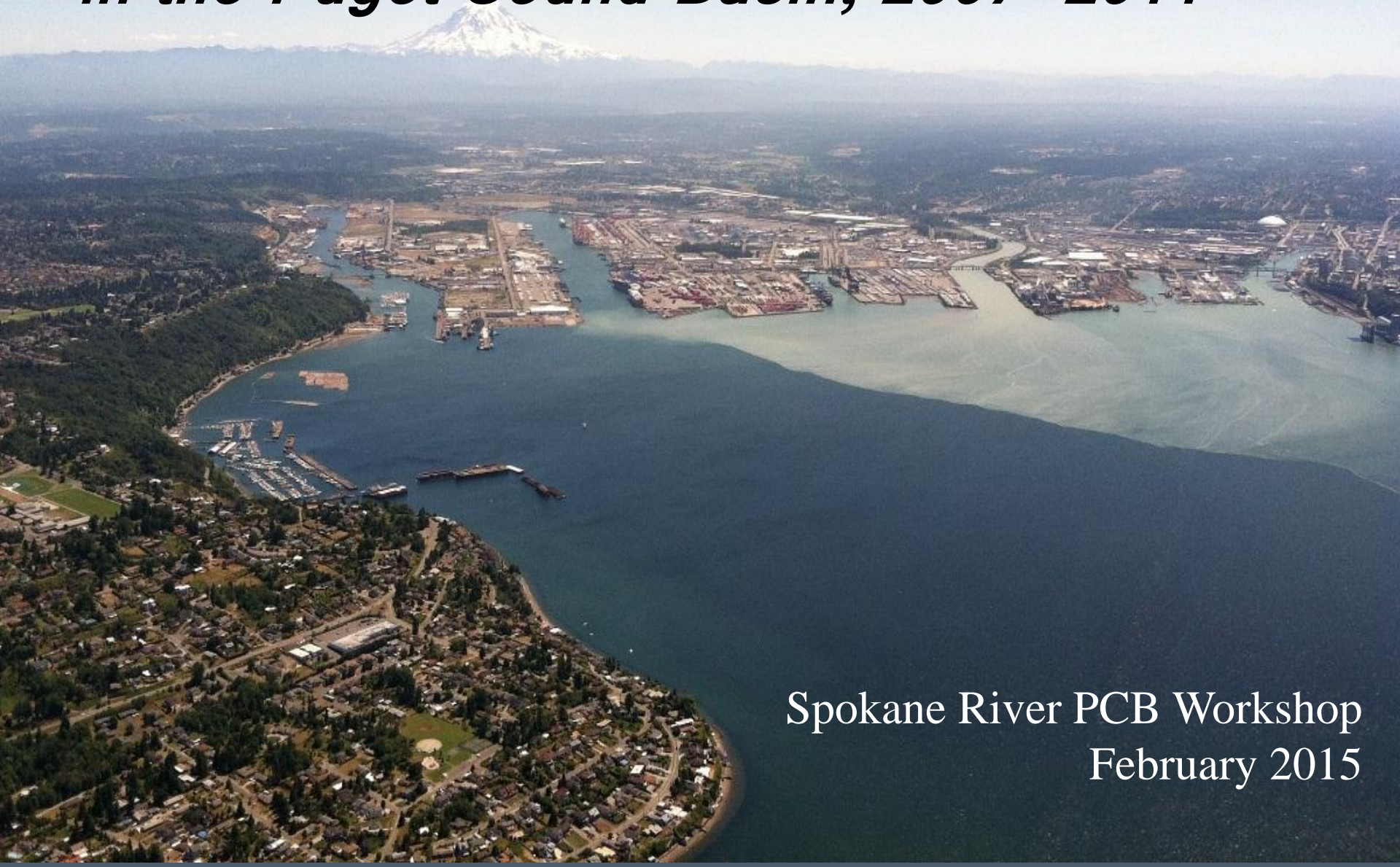


Assessment of Selected Toxic Chemicals in the Puget Sound Basin, 2007–2011



Spokane River PCB Workshop
February 2015

Assessment of Toxics Chemicals in Puget Sound

- Multi-agency effort over 4 years
- Approximately \$4,000,000
- Key elements of the assessment
 - Sources
 - Loading and pathways
 - Hazard evaluation

Phased Approach

Targeting Priority Toxic Sources (2008-2011)

- Surface runoff
- Atmospheric deposition
- Wastewater discharges
- Ocean exchange
- Groundwater
- Pelagic Food Web
- PPCPs in WWTPs
- Primary Sources

New Monitoring Data

Improved load estimates (2008-2010)

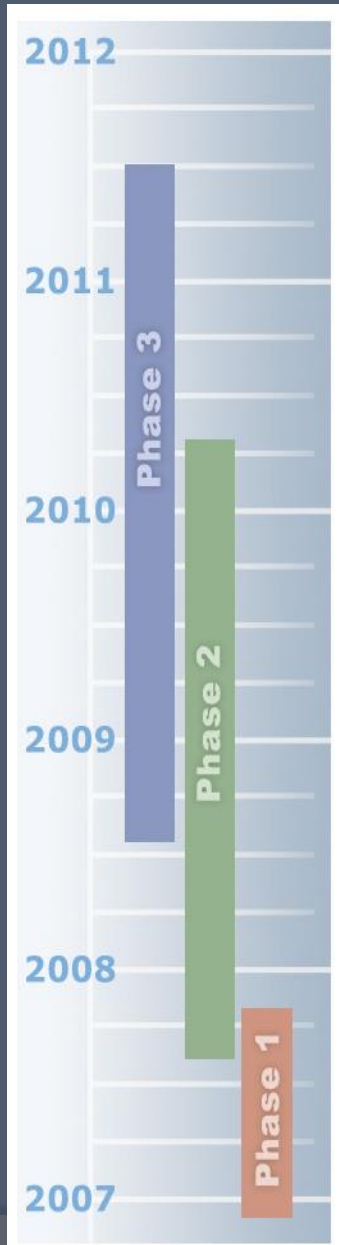
- Surface runoff
- Wastewater discharges
- Review of Ocean data
- Sediment-Biota Flux

Existing Data and Modeling

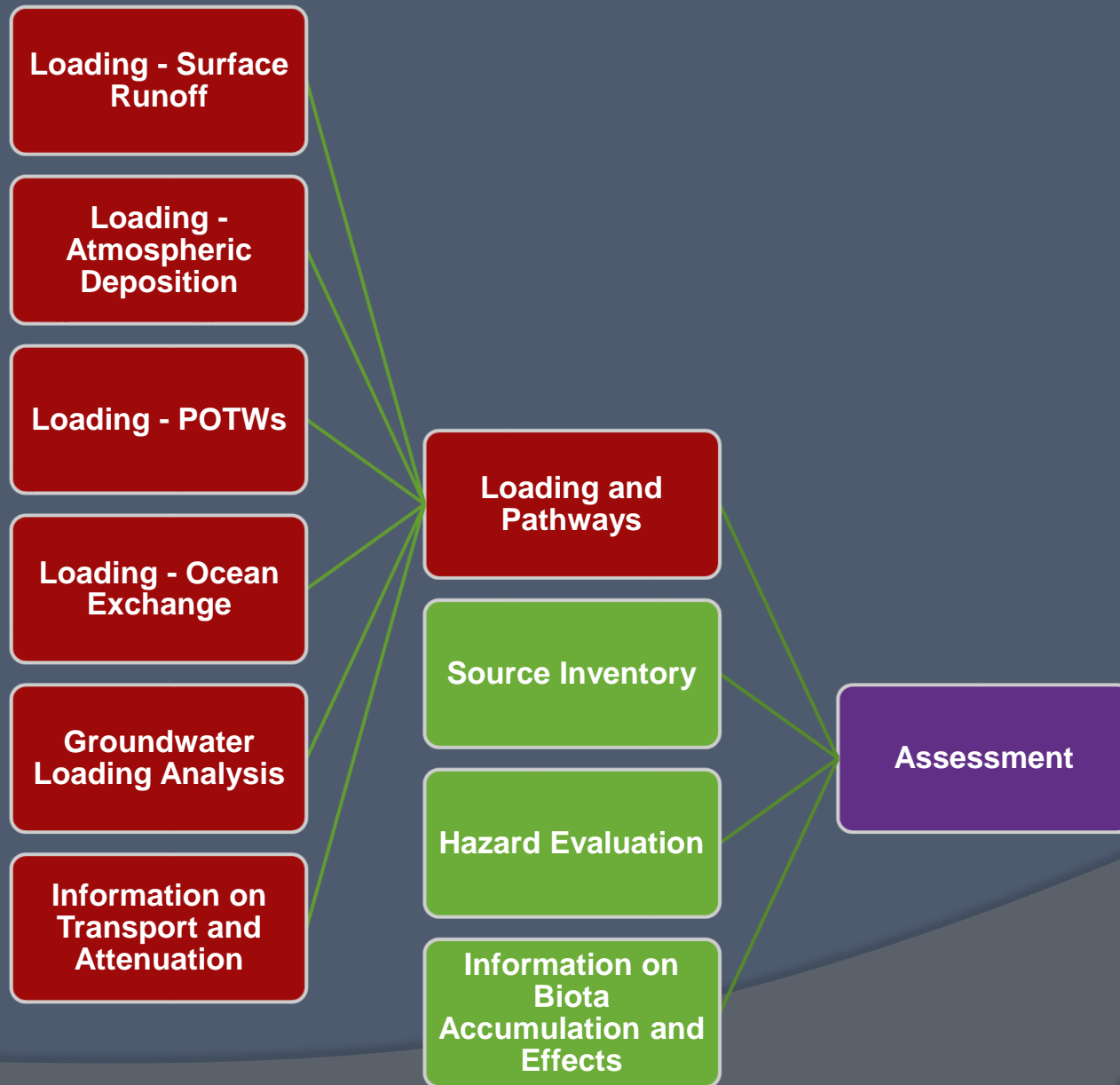
Initial estimates and data gaps (2007)

- Surface runoff
- Atmospheric deposition
- Wastewater discharges
- Combined sewer overflows
- Spills to marine waters

Existing Data



Phase 3 Components Targeting Priority Toxic Sources



Chemicals Evaluated

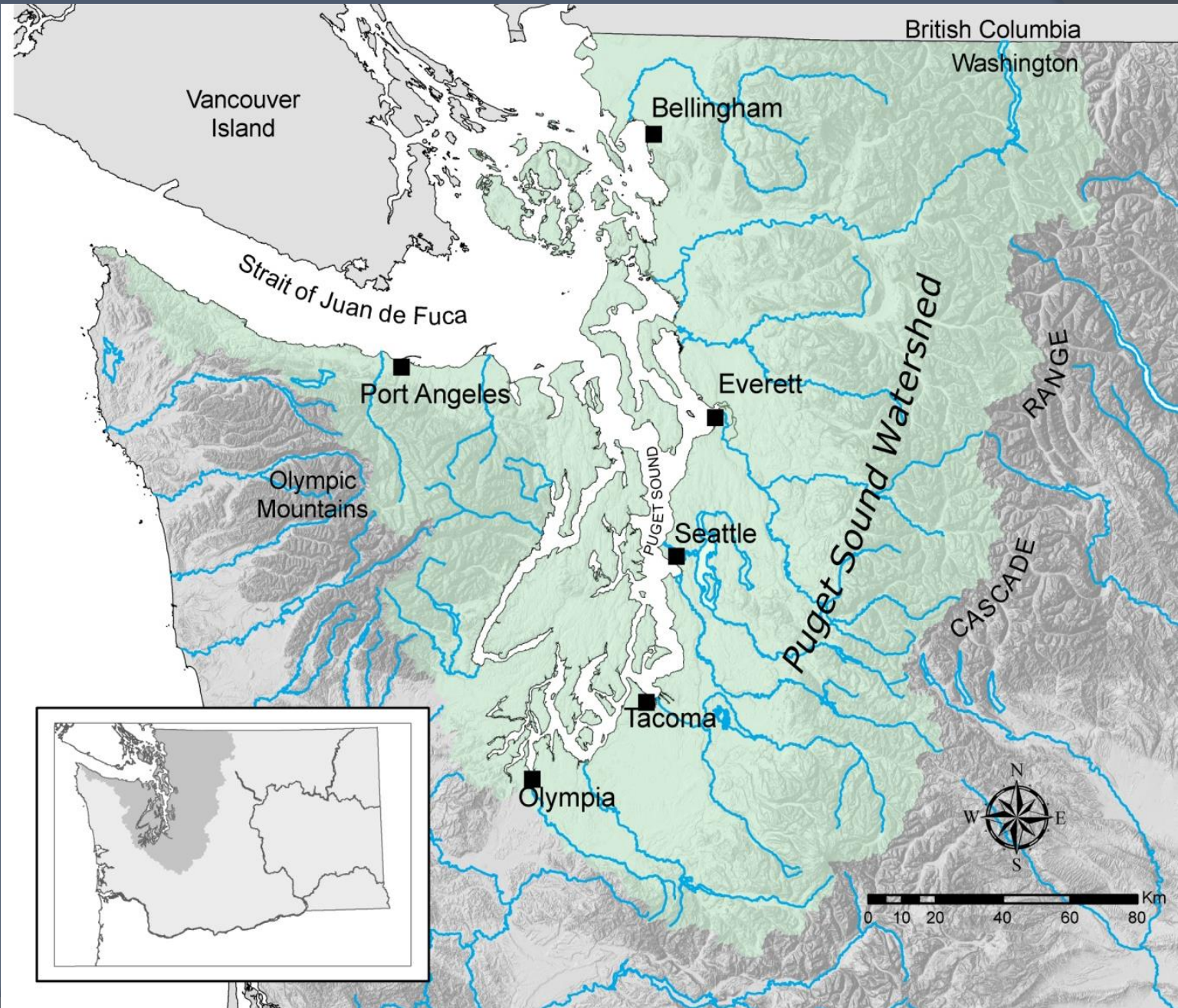
Metals

- Arsenic
- Cadmium
- Copper
- Lead
- Mercury
- Zinc

Organics

- PCBs
- PBDEs
- Dioxins and Furans
- DDT and metabolites (DDD and DDE)
- PAH (LPAHs, HPAHs, and cPAHs)
- Bis (2-ethylhexyl) phthalate
- Triclopyr
- Nonylphenol
- Petroleum

Known or suspected to cause harm in Puget Sound
Representative of pathways
Data available to evaluate



Primary Sources

Initial release estimate from sources

- Release estimate for unit or activity x number of units or activity in study area
- Example: brake pad wear x number of vehicle miles traveled

Did not include:

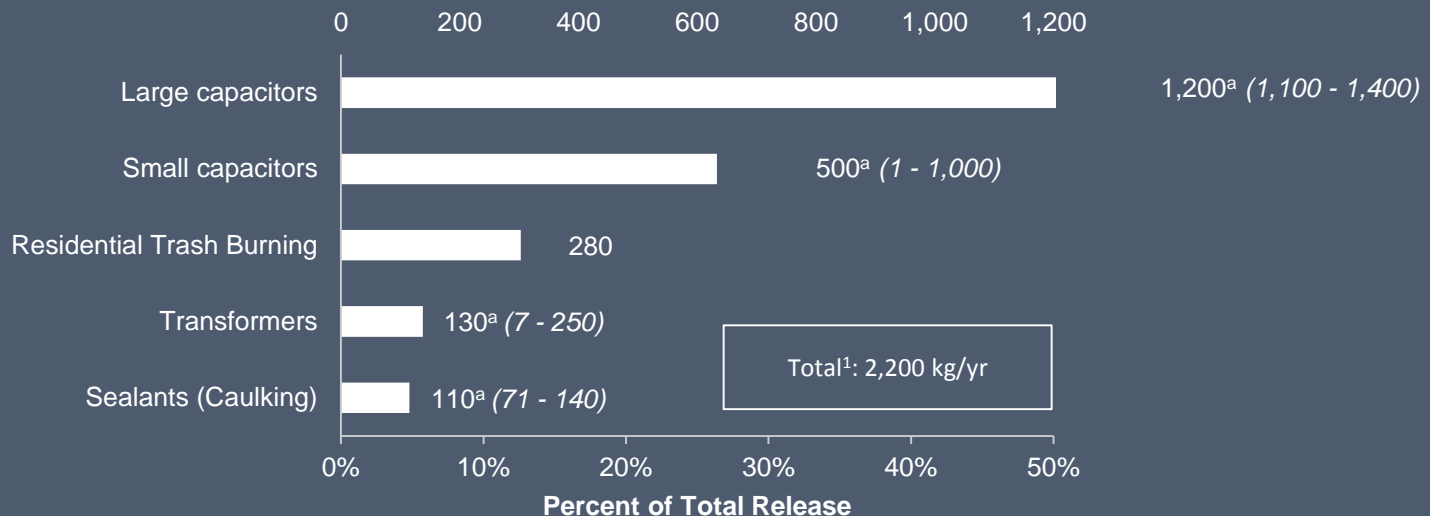
- Pathways (e.g. surface runoff, WWTP)
- Natural sources (e.g. forest fires, volcanos)
- Release from historical contamination (e.g. clean-up sites)

Puget Sound Loading

- Surface runoff, WWTPs, atmospheric deposition (direct deposition to water surface) and direct GW discharge
- Surface runoff monitored in two watersheds
 - Snohomish R
 - Puyallup R
- Four land uses
 - Forest
 - Agriculture
 - Residential
 - Commercial/Industrial
- Unit area loads calculated for each land use then used land use coverage's to scale up to watershed and Puget Sound wide scales

Estimated Annual PCB Releases to the Puget Sound Basin (kg/yr)

Total estimated releases= 1500 to 3100 kg/yr

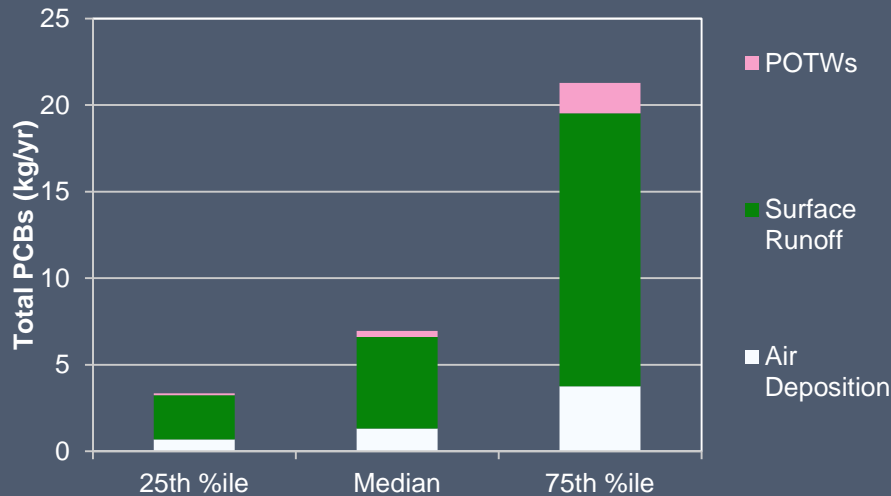


1= sum of best estimate (either mean, midpoint or most reasonable)

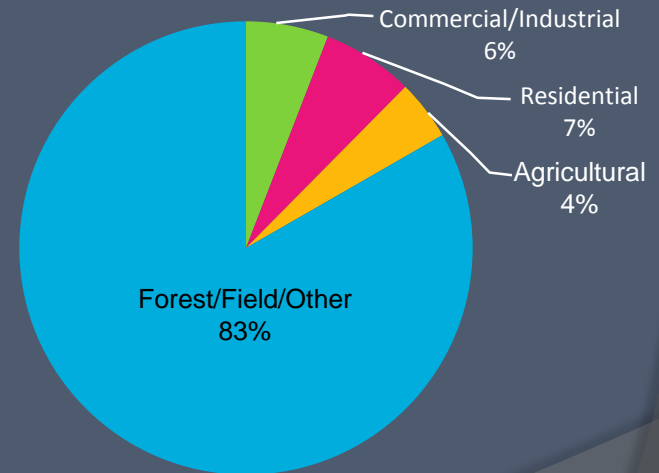
a= mid-point of range

Estimated Puget Sound PCB Loading (kg/yr)

Loading by pathway



Relative contribution to total surface runoff loading by land use



Estimated total loading= 3-22 kg/yr

Summary for PCBs

- Largest reservoir of potential sources are electrical equipment (closed systems)
- Highest concentrations were seen in commercial/industrial land use
- Surface runoff most important delivery pathway (>70%)
- Releases were estimated to be two to three orders of magnitude greater than loadings
- Large degree of uncertainty due to size of geographic area evaluated and amount of data needed to characterize variability