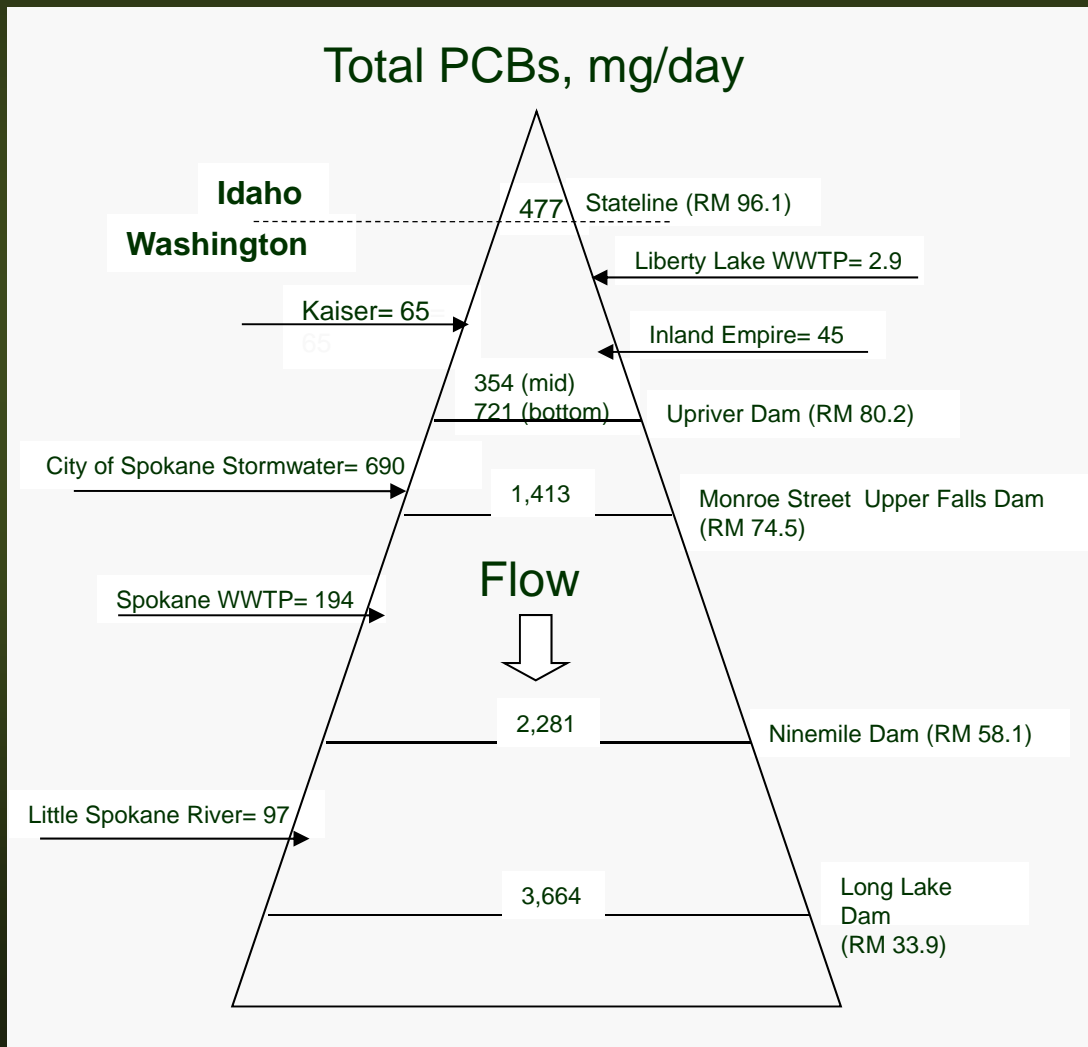


Spokane River Regional Toxics Task Force

Work Session #1: Source
Identification and Reduction

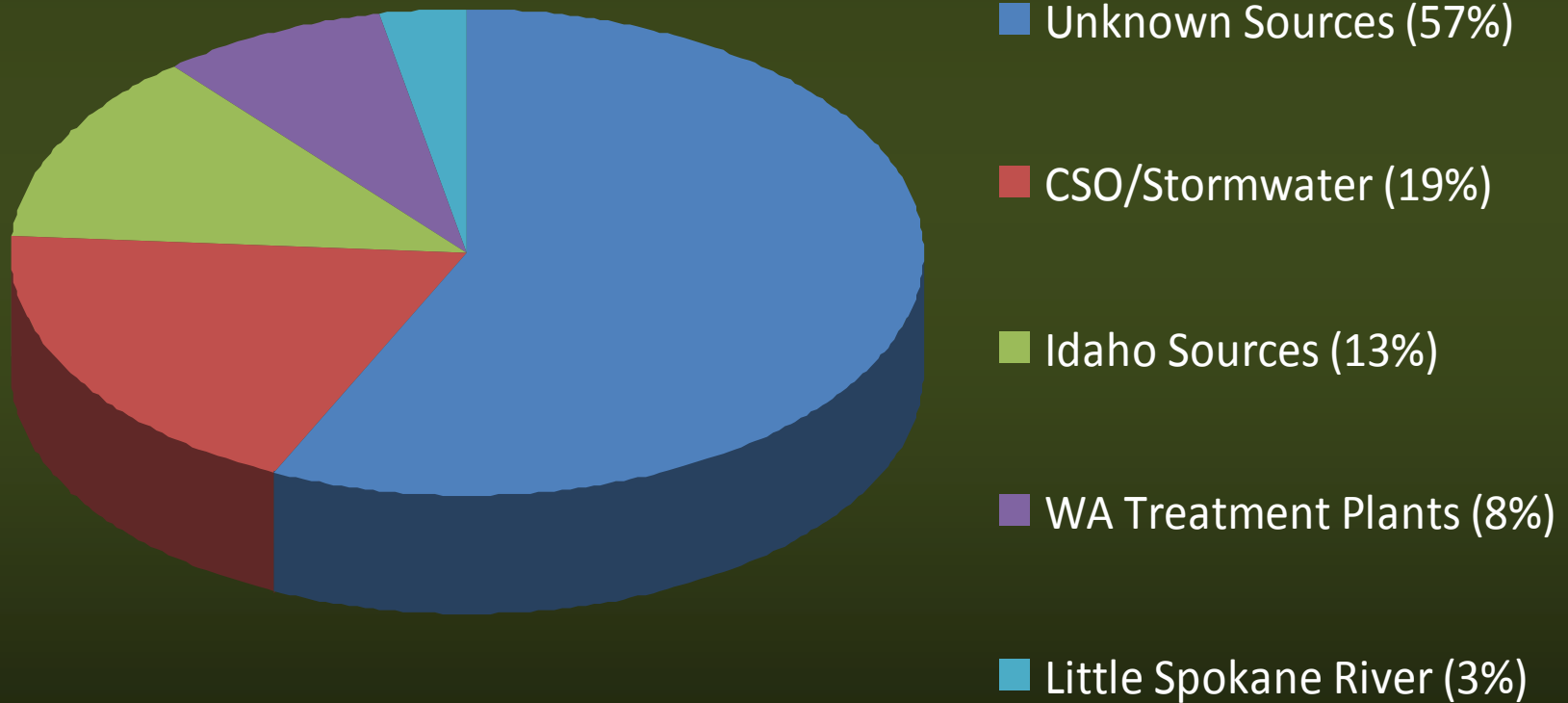
PCB Loading in Spokane River Ecology 2011 PCB Source Assessment



Source	Load (mg/day)
City of Spokane Stormwater	690
Stateline	477
Spokane WWTP	194
Little Spokane River	95
Kaiser	65
Inland Empire Paper	45
Liberty Lake WWTP	2.9
Total Measured	1569
Long Lake	3,664

Measured 43% of Load

PCB Sources to Spokane River



Reductions Needed to Meet Standards

Location on Spokane River	Current t-PCB Load (mg/day)	Target t-PCB Load (mg/day) at Water Quality Criterion		t-PCB Load Reduction Required to Meet Water Quality Criterion	
		NTR (170 pg/l)	Spokane Tribe (3.37 pg/l)	NTR	Spokane Tribe
Stateline	477	766	15	none required	97%
Upriver Dam	537	780	15		97%
Monroe St.	1,413	1,208	24	15%	98%
Ninemile	2,281	1,243	25	46%	99%
Little Spokane River	97	83	2	15%	98%
Lake Spokane (lower)	3,664	1,562	31	57%	99%
Little Falls	3,664	1,562	31	57%	99%
Spokane Arm	3,664	1,562	31	57%	99%

Planned and Potential 2014 Source Identification Activities

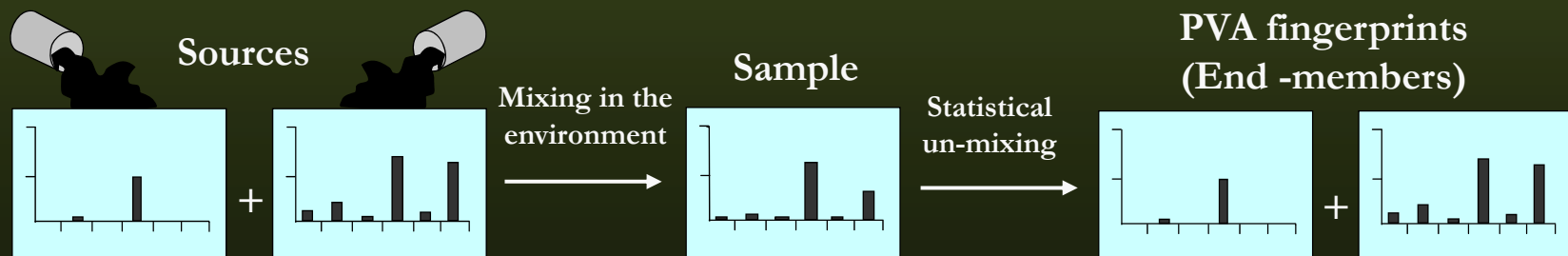
- Planned Activities
 - Evaluation of baseline sampling results
 - City of Spokane grant to evaluate municipal products

- Discretionary or recommended activities
 - Source fingerprinting of existing datasets (stormwater, WWTP discharge, industrial discharge, contaminated sites)
 - Source fingerprinting of backbone sampling result
 - Additional stormwater sampling
 - Biota sampling
 - Research into atmospheric deposition

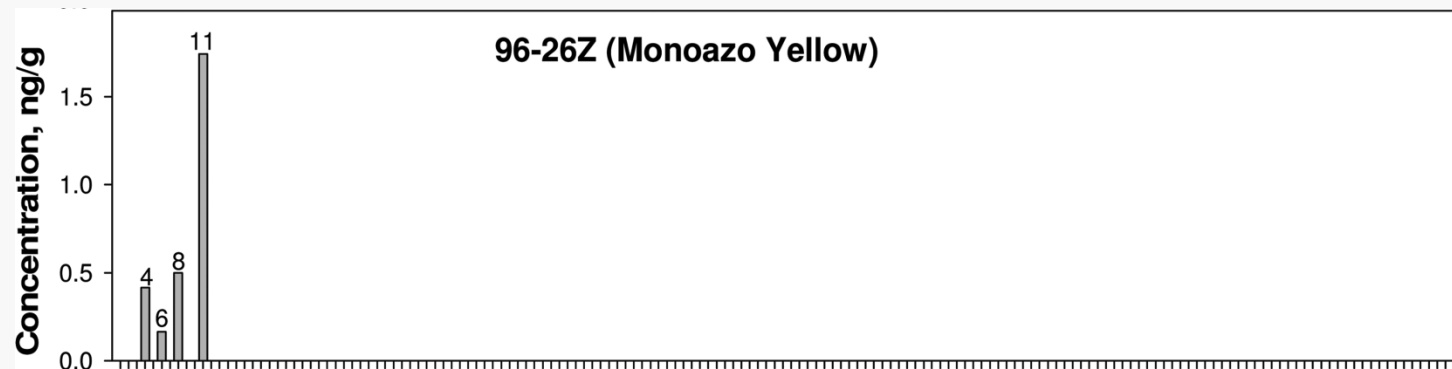
Source Fingerprinting

- PCB Sources have characteristic fingerprints - a composition of PCB congeners
- Individual source compositions mix in the environment, leading to different patterns measured in sediment samples
- Correlations among the chemicals help establish which congeners occur together in stable compositions
- “Un-mixing” models such as Polytopic Vector Analysis decomposes each sample into these stable compositions, or end-members

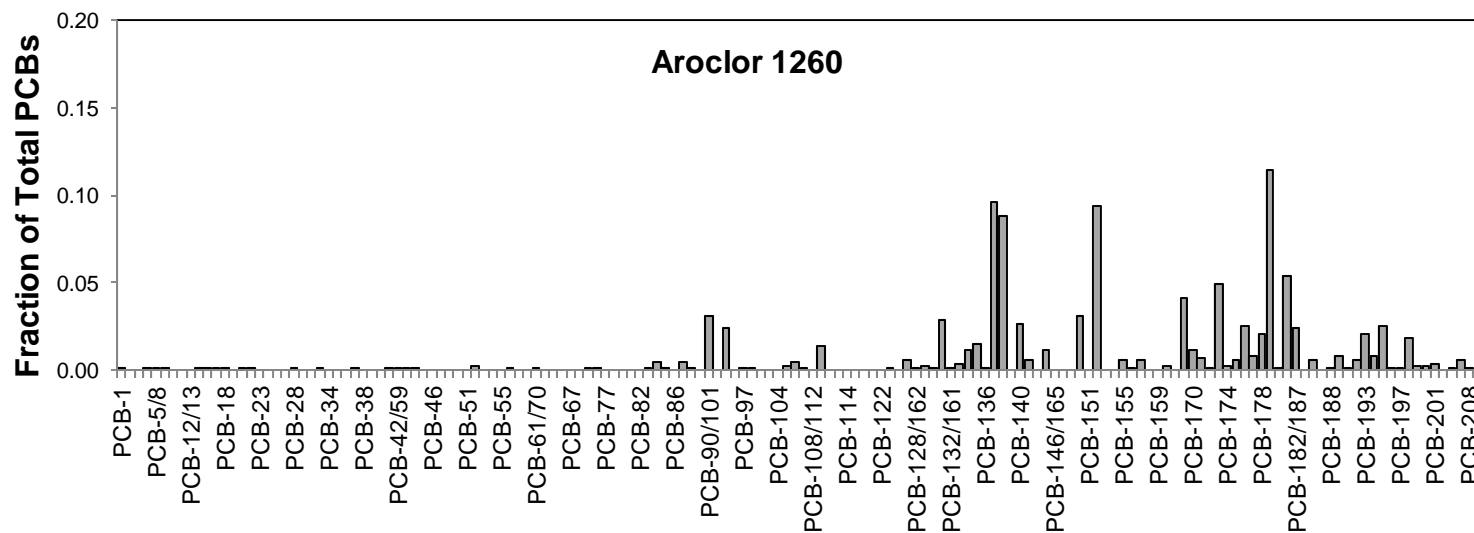
Polytopic Vector Analysis



Example Source Fingerprints



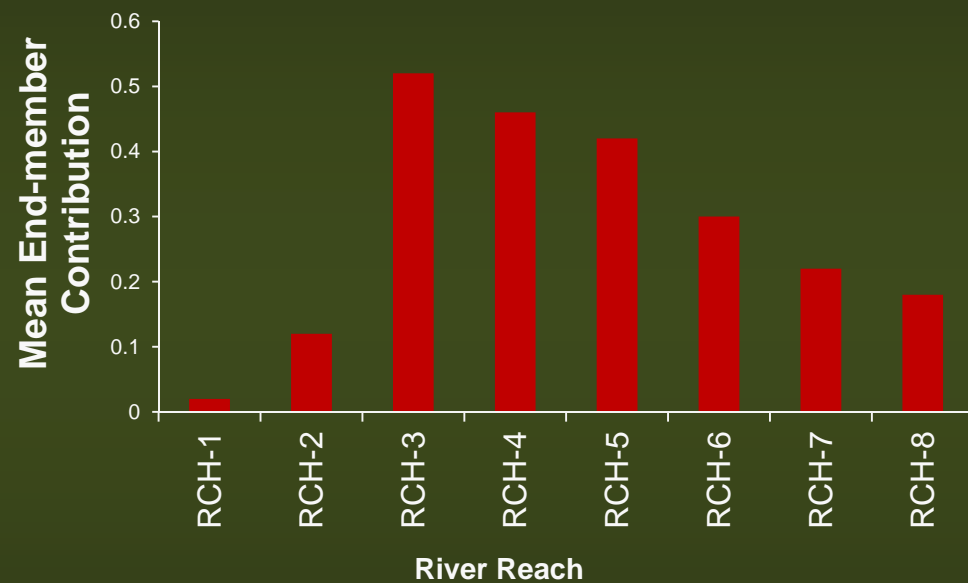
Hu and Hornbuckle, 2009



Frame et al , 1996

Evaluation of End-members

- The spatial distribution of each end-member will be examined to identify potential sources



City of Spokane Grant

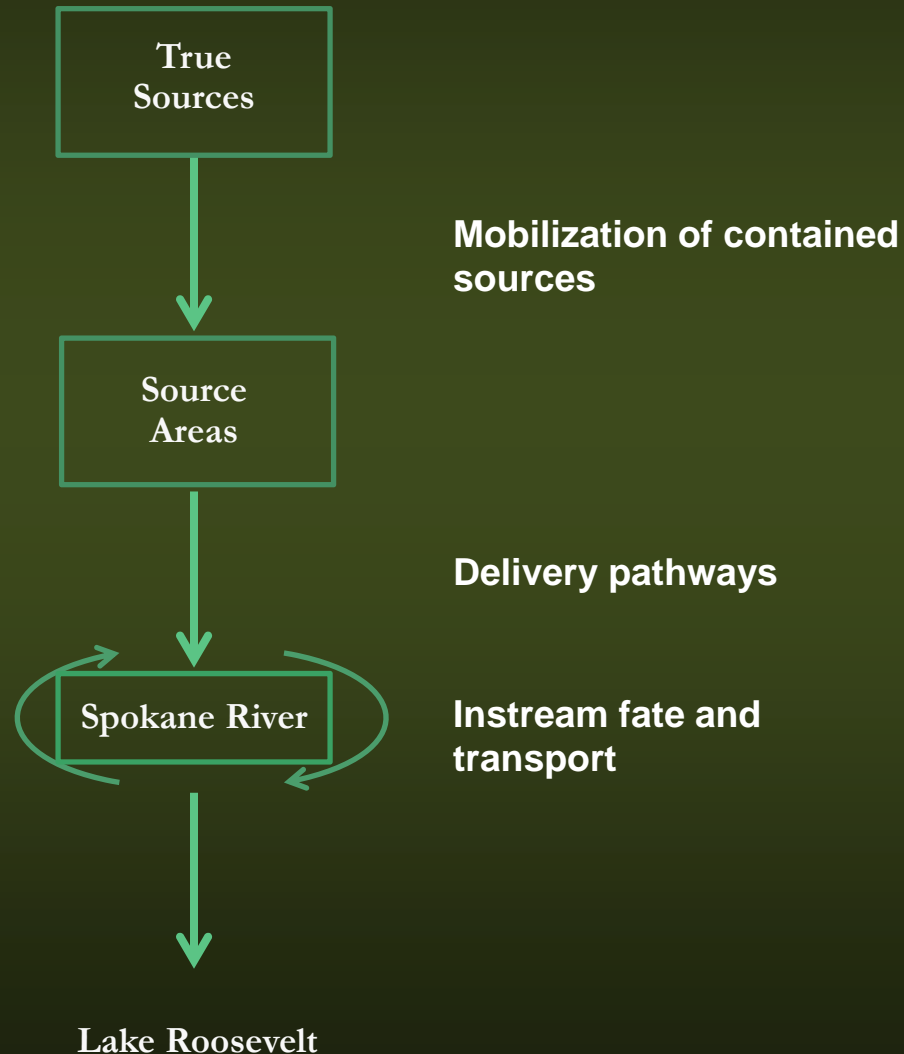
- City of Spokane was recently awarded a grant to support pollution prevention measures and aid in illicit discharge detection and elimination by identifying PCBs in commonly used municipal products that come into contact with stormwater, possibly including:
 - Road paint
 - Asphalt sealers
 - De-icer
 - Adhesives
 - Caulk
 - Lubricants
 - Pesticides
 - Vehicle wash soap
- A maximum of 25 products will be sampled

Atmospheric Deposition

- Atmospheric deposition monitoring is not included in current 2014 monitoring strategy
 - Era-Miller (2011) conducted a literature review of atmospheric PCB deposition rates for sites around the world and reported deposition rates that varied by several orders of magnitude between sites
 - TMDLs that have considered atmospheric sources have typically only explicitly focused on the direct exchange between the atmosphere and surface waters, and have not quantified atmospheric PCB contributions to the watershed itself
 - Additional research recommended prior to monitoring

Planned 2014 Activities in Context of Conceptual Model

- City of Spokane grant
- Atmospheric deposition research
- Source fingerprinting of industrial discharge and contaminated site data
- Source fingerprinting of stormwater, WWTP, recycling facilities, groundwater data
- Source fingerprinting of backbone monitoring data



Source Identification Session Focus

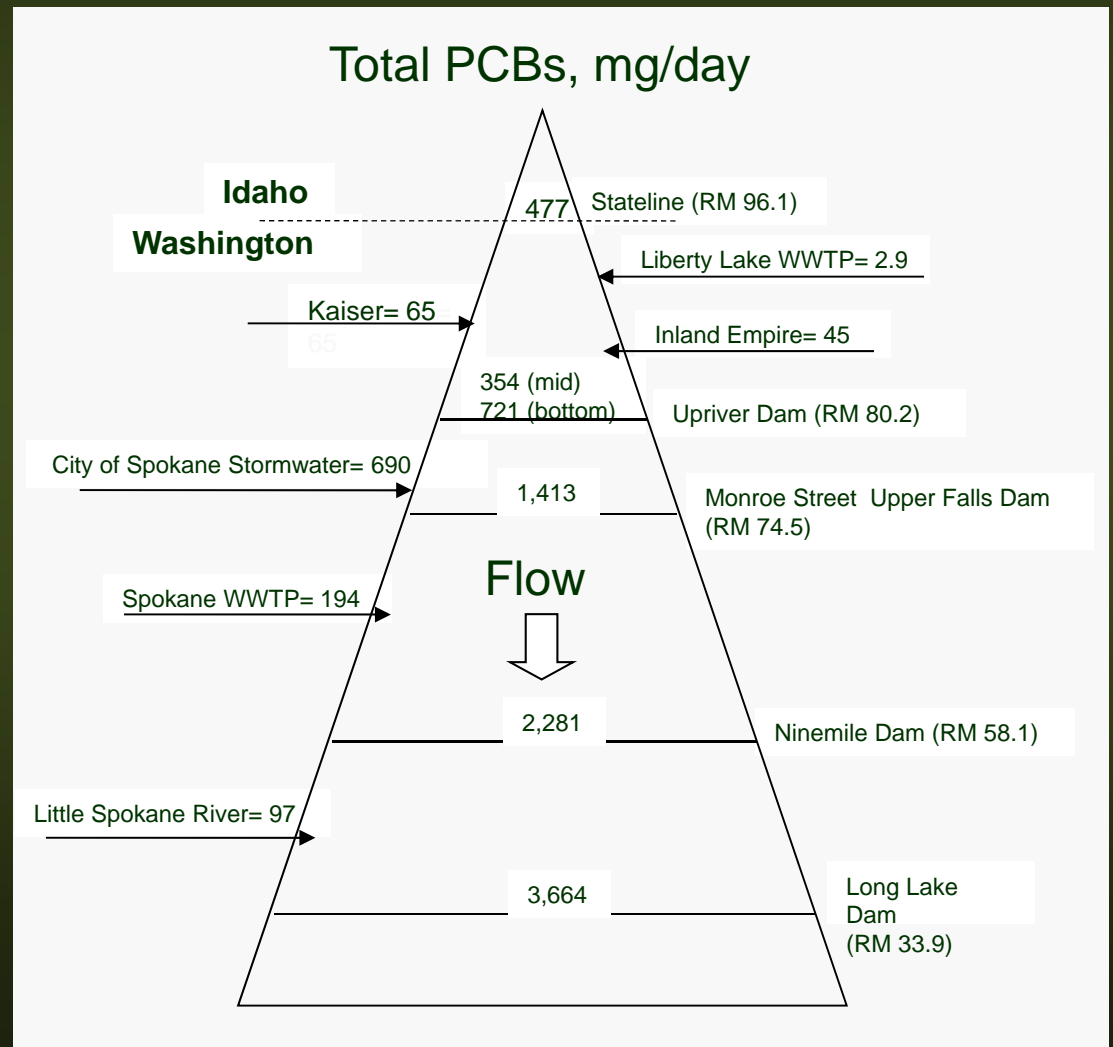
- Solicit feedback from SRRTTF and visiting experts on potential 2014 activities and develop longer-term framework for identifying potential upland or in-river PCB sources

Discussion Questions

- What level of atmospheric deposition exists in each river segment and what is it relative to regional background?
 - What is contributing, wet deposition, dry deposition, gaseous flux or a combination?
 - Over what duration, frequency, and periods should samples be collected?
 - How should samples be collected and analyzed?
 - Are there preliminary samples we can collect in 2014 to supplement planned research activities?

Discussion Questions

- Based on the design of the river monitoring plan, what is the inventory of potential PCB sources in each river segment?
 - What other appropriate data on potential PCB sources should be collected to define the current state? (Consider land use, aerial deposition, and other factors in determining the rationale for the monitoring plan.)



Discussion Questions

- What specific types of potential sources are present in each river segment?
- What are the concentrations and congener distribution patterns at various locations?

Discussion Questions

- Is there a good inventory of hazardous waste sites (e.g., Superfund and state sites) that have known or suspected PCB contamination? Are there pathways from these sites to the river?