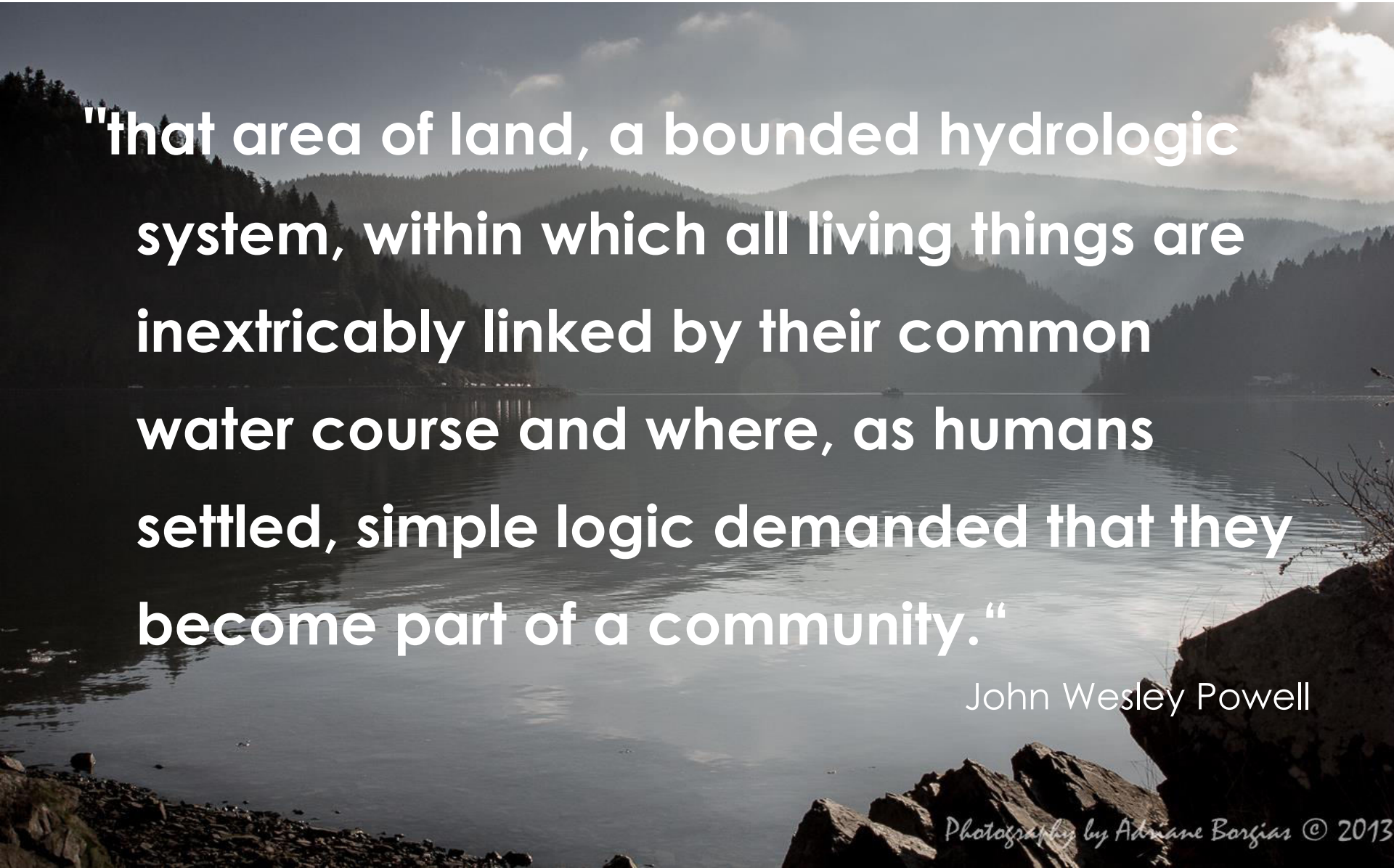
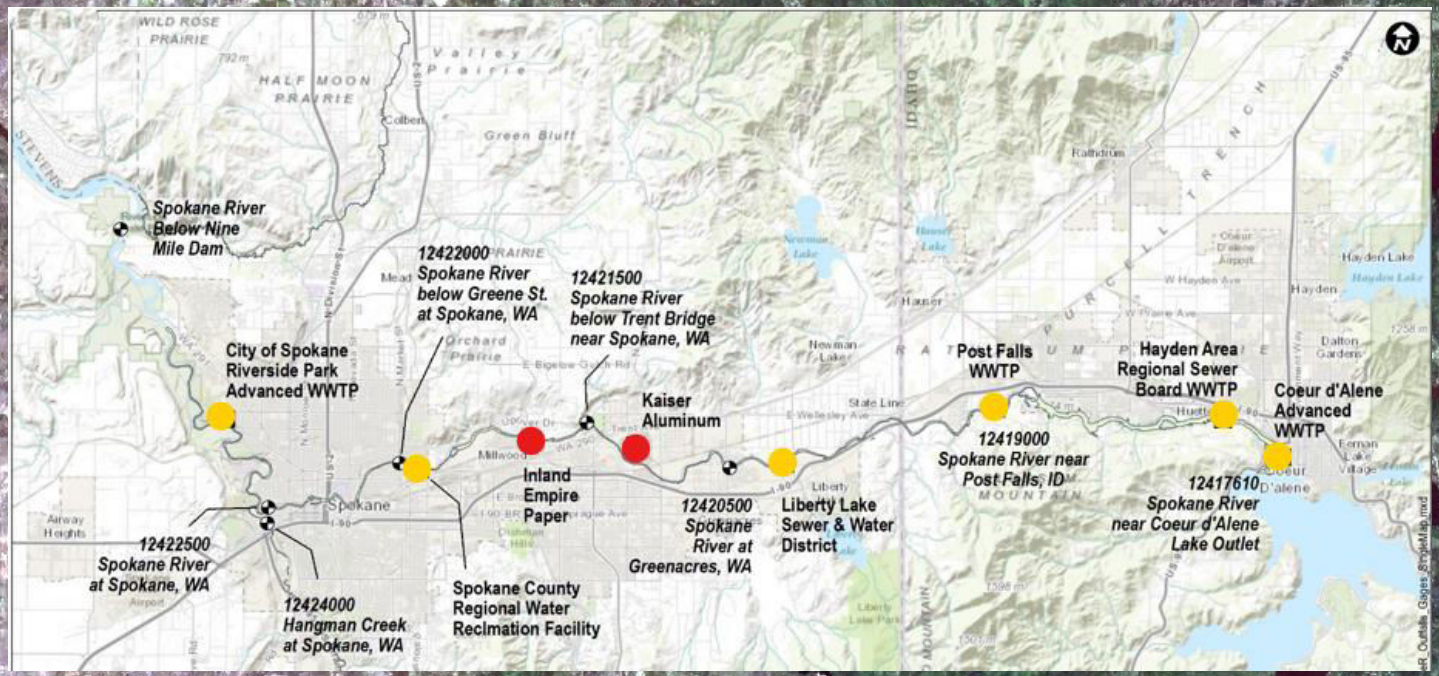
Solutions at the Watershed Level



Spokane River

Collaborative Problem Solving
at the Community Level

- A Historical Perspective -


Spokane River Below Nine Mile Dam
12422000 Spokane River below Greene St. at Spokane, WA
12421500 Spokane River below Trent Bridge near Spokane, WA
City of Spokane Riverside Park Advanced WWTP
Kaiser Aluminum
Post Falls WWTP
Hayden Area Regional Sewer Board WWTP
Coeur d'Alene Advanced WWTP
12419000 Spokane River near Post Falls, ID
Inland Empire Paper
12420500 Spokane River at Greenacres, WA
Liberty Lake Sewer & Water District
12417610 Spokane River near Coeur d'Alene Lake Outlet
12422500 Spokane River at Spokane, WA
12424000 Hangman Creek at Spokane, WA
Spokane County Regional Water Reclmation Facility
WILD ROSE PRAIRIE
HALF MOON PRAIRIE
Valley Prairie
Green Bluff
Colbert
Mead
Orchard Prairie
Spokane
Liberty Lake
Hayden
Post Falls
Coeur d'Alene
PURCELL TRENCH
IDAHO


NRS
FLOW

The Problem (in 2012)

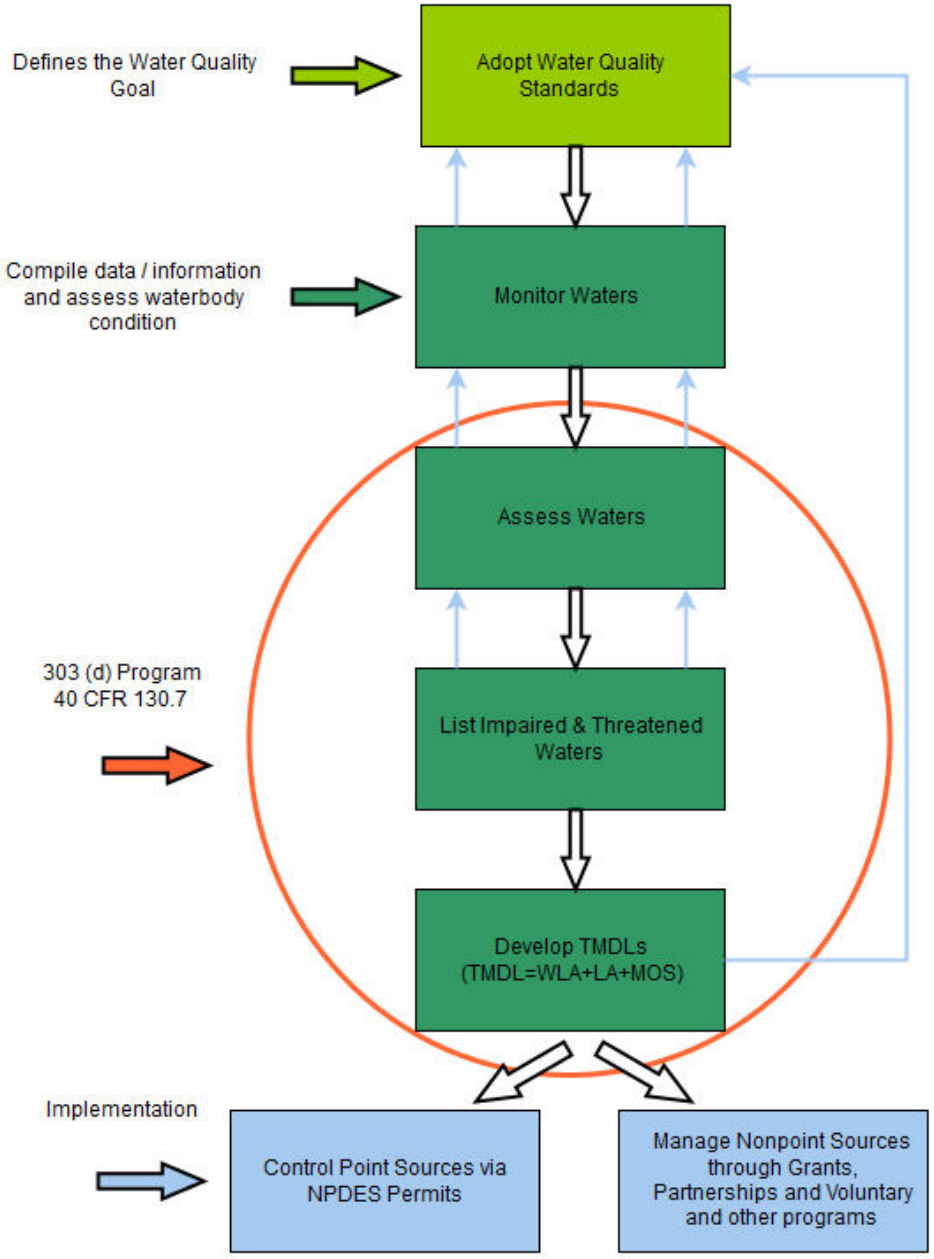
Spokane River does not meet water quality standards for PCBs

- Washington = 170 ppq (2010)
  = 7 ppq (2022)
- Spokane Tribe = 1.34 ppq (downstream standard)

The Regulatory Context

- States set standards and assess waters.
- “Listed waters”: Section 303(d)
- Total Maximum Daily Load = a “pollution budget”
- Implementation
  - Pre TMDL
  - Post TMDL

“Direct to Implementation” approach - This does not replace a TMDL but can shorten the time needed to achieve clean water.



SPOKANE RIVER
REGIONAL TOXICS TASK FORCE

COLLABORATION INNOVATION PROGRESS

Community Based Problem Solving

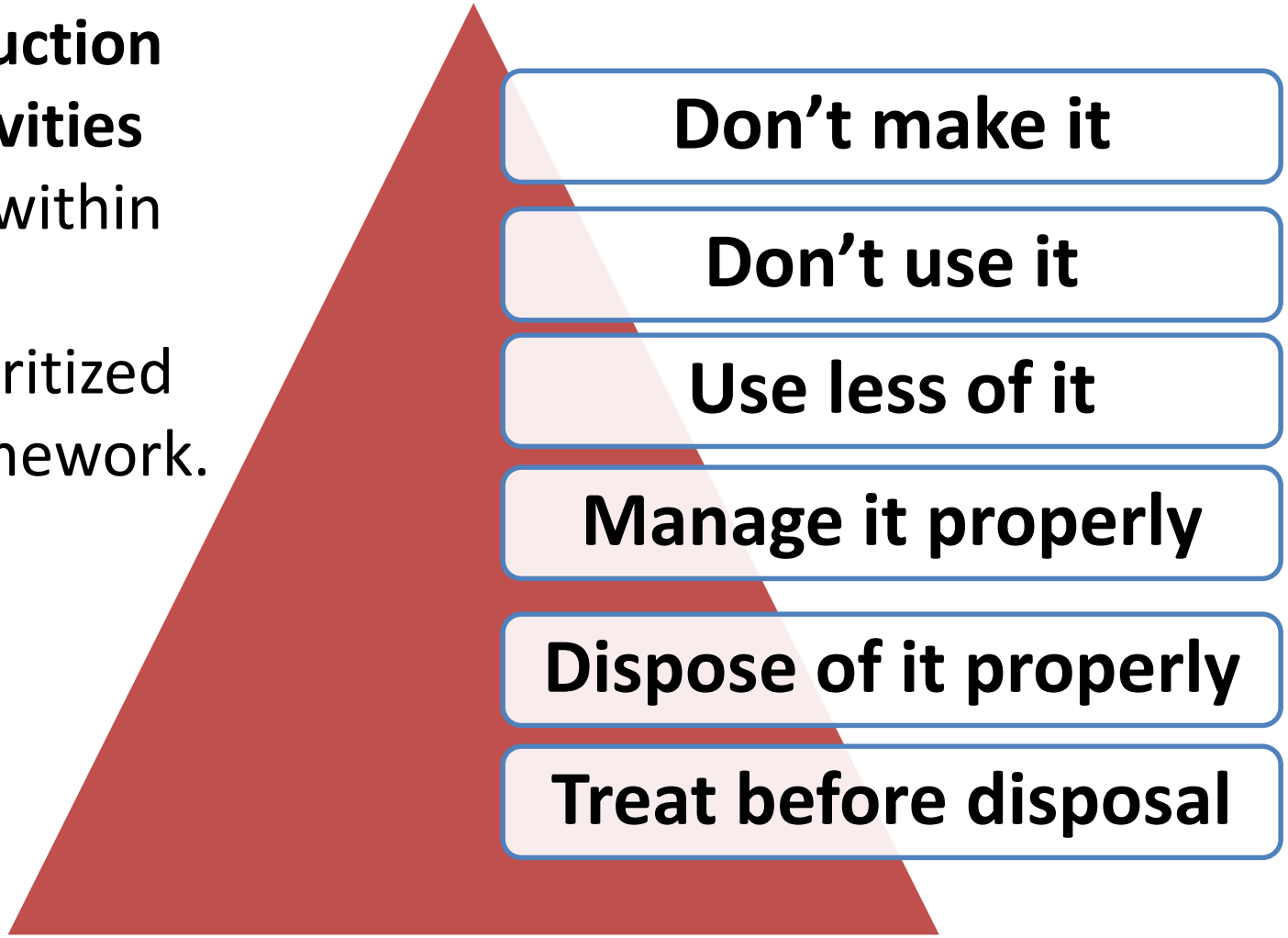
The Spokane River Regional Toxics Task Force: Key Members & Participants

Principles of Collaboration

The Moving Pieces

"Out of the Box"

All **source reduction activities** fall within this prioritized framework.



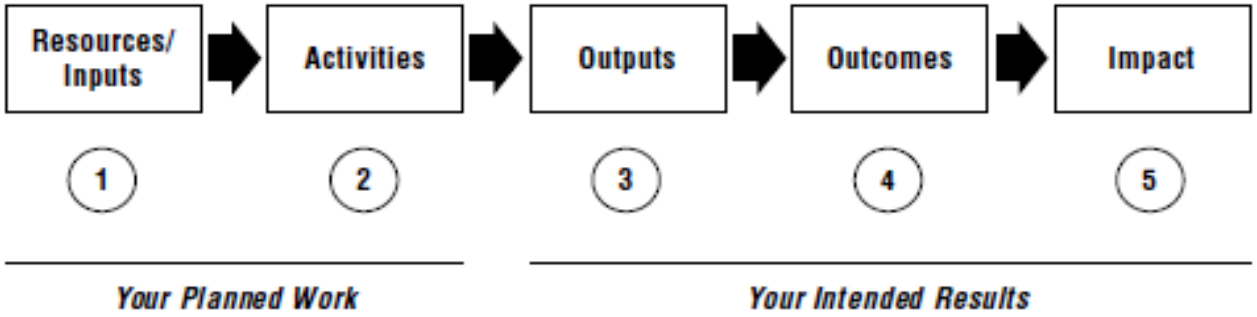
https://srrttf.org/wp-content/uploads/2016/04/2016_Comp_Plan_Final_Approved.pdf

Table 9. Initial Summarization of Control Actions

Control Action	Magnitude of Pathway	Reduction Efficiency	Cost	Implementing Entity	Pollution Prevention Hierarchy	Ancillary Benefit	Overlap w/Existing Efforts	Time Frame for Implementation	Timeframe for Response
Waste disposal assistance									
LID ordinance									
Leaf removal									
Street sweeping									
Catch basin/pipe cleanout									
Purchasing standards									
Survey of local electrical equipment									
Regulation of waste disposal									
Removal of carp from L. Spokane									
Building demolition and renovation									
PCB product labeling law									
Leak prevention/detection									
Accelerated sewer construction									
PCB Identication during inspections									
Regulatory rulemaking									
Compliance with PCB regulations									
Support of green chemistry alternatives									
Survey schools and public buildings									
Education/outreach on PCB sources									
Education on septic discharge									
Education on filtering post-consumer									
PCB product testing									
Stormwater - pipe entrance									
Stormwater - pipe system									
Stormwater - end of pipe									
Wastewater treatment									
Identication of contaminated sites									
Clean up of contaminated sites									

Key	
Unknown	
Magnitude of Pathway	
>1% of total load	
0.1 - 1% of total load	
<0.1% of total load	
Reduction Efficiency	
>50% reduction	
10-50% reduction	
<10% reduction	
Cost	
<$100k	
$100k-$1M	
>$1M	
Implementing Entity	
Identified and willing	
identified	
None identified	
Pollution Prevention Hierarchy	
Controls production or use	
Manages mobility	
End of pipe control	
Ancillary Benefit	
Significant	
Some	
Minimal	
Existing Controls	
Not currently being addressed	
Expands upon existing controls	
Redundant	
Time Frame	
W/in two years	
W/in five years	
> five years	

How Do We Know it is Working?

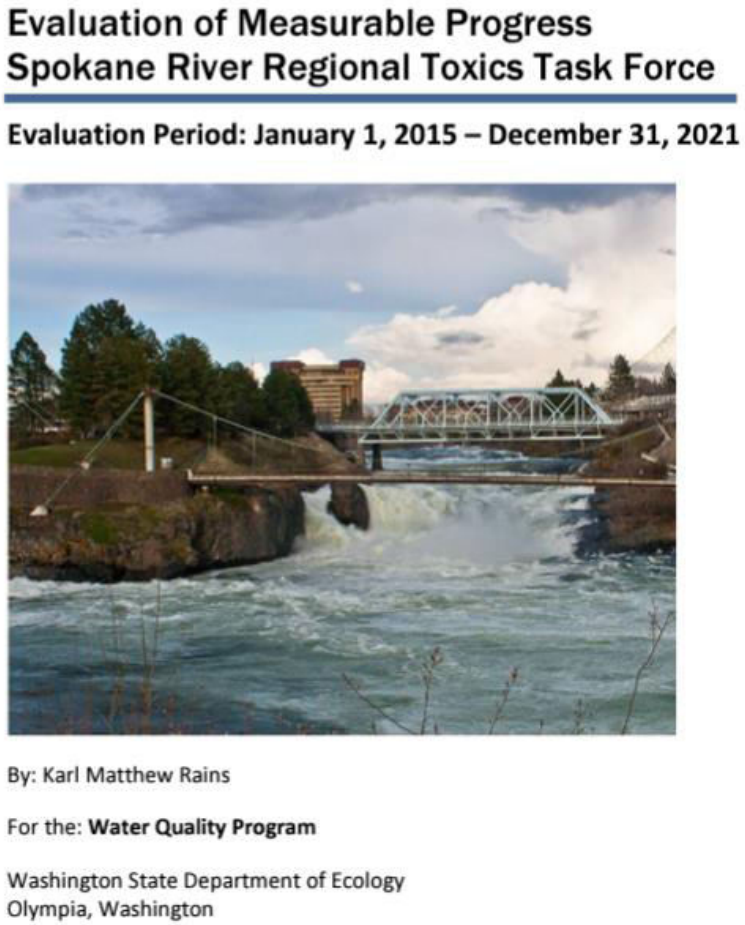


Definition of **Measurable Progress**

- Are we working together? (inputs)
- Are we doing things? (outputs)
- Are we seeing results? (outcomes)

What Success Looks Like

- 10 years: fully funded and functional
- Cutting edge work in sampling, analysis and source identification
- Regulatory influence:
  - Washington products containing PCBs
  - Toxic Substances Control Act petition
- Inspired major clean up activities
  - Kaiser Aluminum – new groundwater treatment technologies
  - EPA emergency action removed 5000 pounds of PCBs
- Spokane River achieved the EPA milestone of 170 ppq PCB



The EPA PCB TMDL

EPA to develop (2024)

- TMDL =
  - Waste Load Allocations
  - Load Allocations
  - Margin of Safety
  - Reserve Capacity
  - Reasonable Assurances

Ecology to develop (2026)

  - PCB TMDL Implementation Plan

Spokane River Technical Perspective

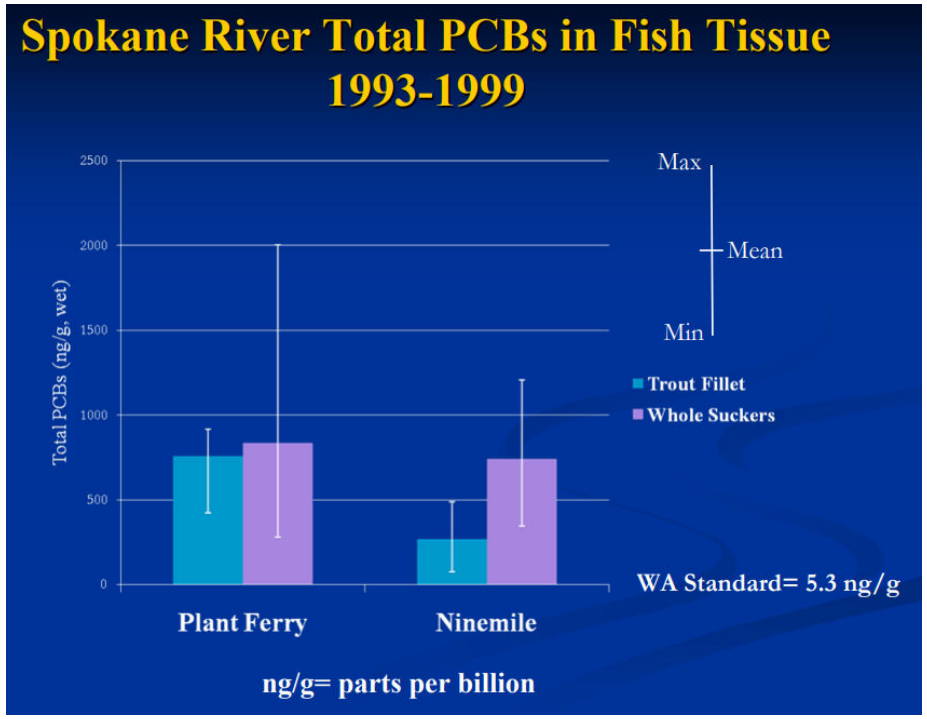
David Dilks, PhD
LimnoTech
Ann Arbor MI

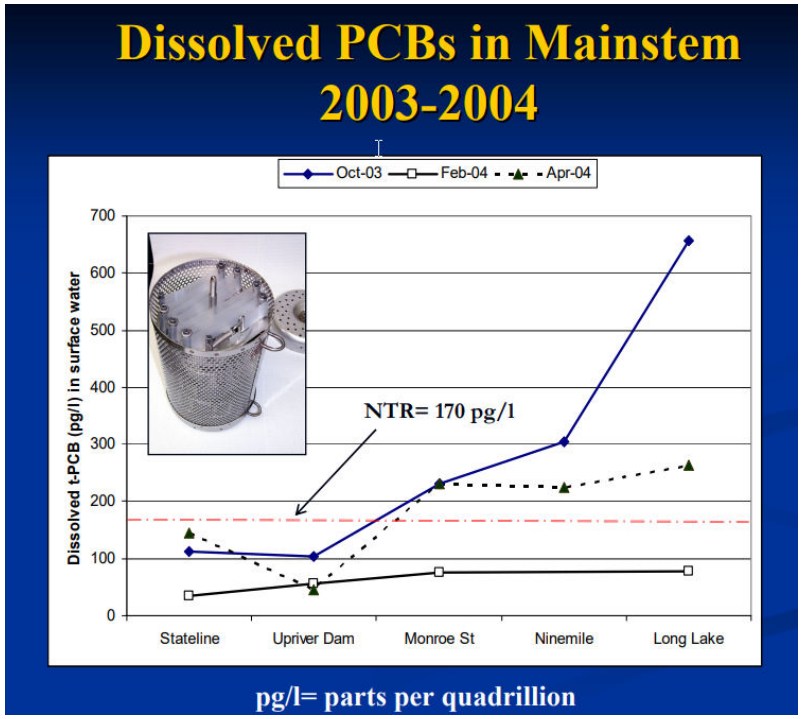
Outline

- Historical assessments
- Task Force technical activities
- Takeaways/future challenges

Historical PCB Status

- Comprehensive assessment of historical PCB status conducted by Ecology prior to formation of Task Force

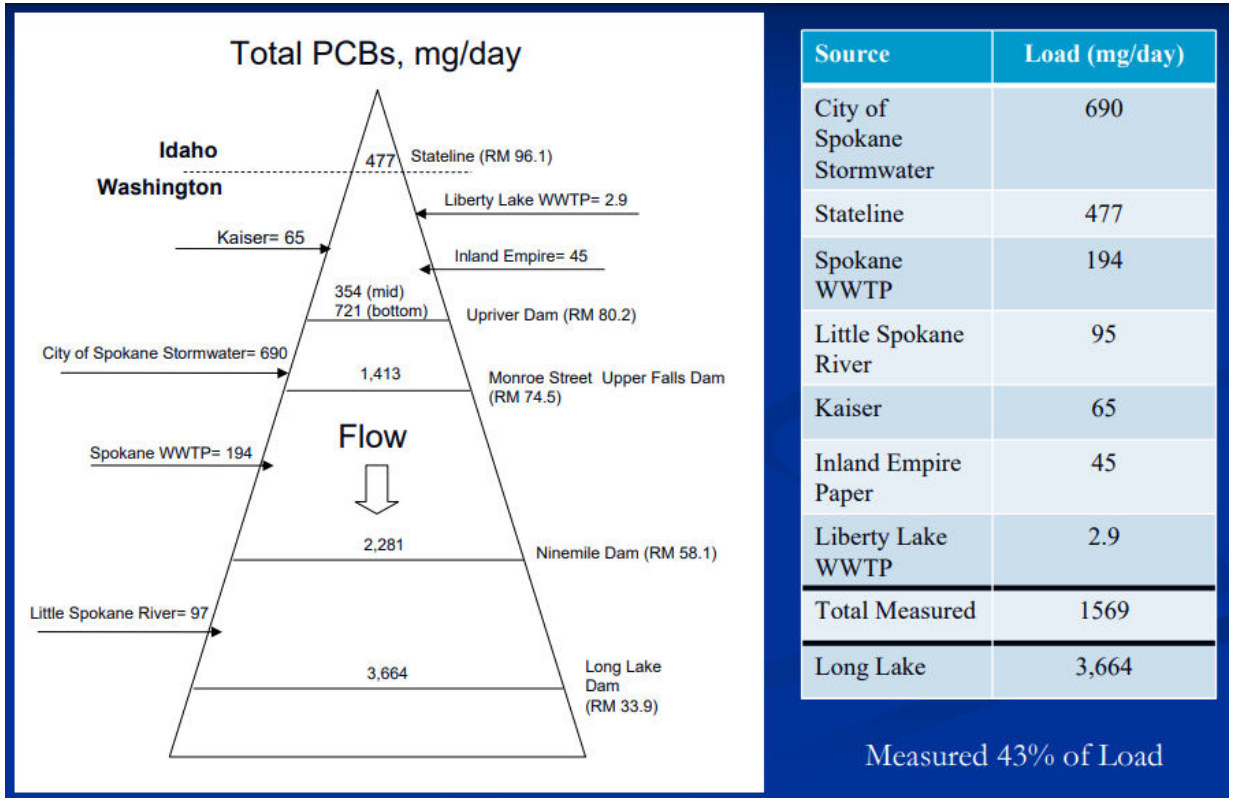




(Source: Ecology, 2011)

Historical Loading Assessment

- Ecology also performed a system-wide PCB loading estimate
  - External and in-river loads estimated from flow and PCB concentrations
  - Cumulative external load was only 43% of the calculated in-river load



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

(Source: Ecology, 2011)

Outline

- Historical assessments
- Task Force technical activities
- Takeaways/future challenges

Technical Focus of the Task Force

- Follows from Mission Statement

  The Regional Toxics Task Force will work collaboratively to characterize the sources of toxics in the Spokane River and identify and implement appropriate actions needed to make measurable progress towards meeting applicable water quality standards for the State of Washington

Task Force Technical Activities

- Characterize the sources of PCBs
- Develop a comprehensive plan for PCB control
- Continue source identification
- Support status and trends assessment

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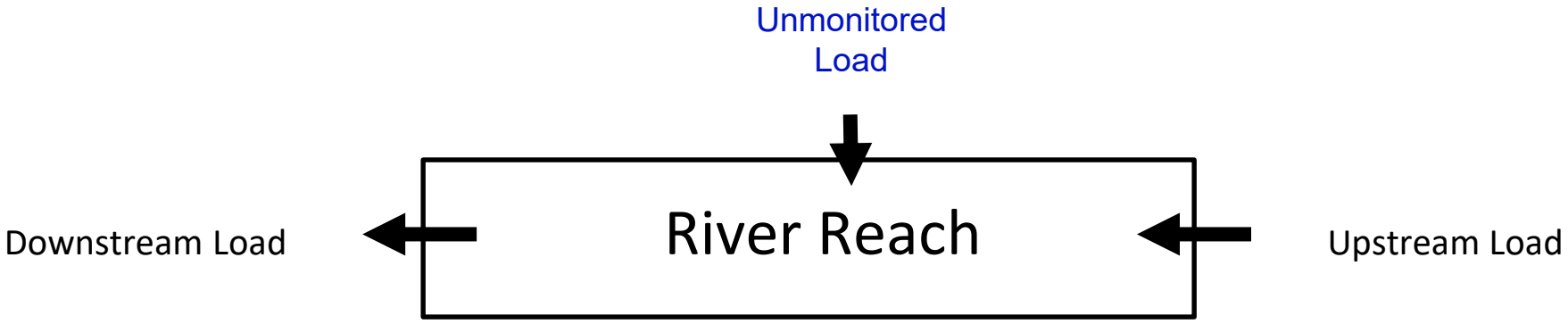
Characterize Sources of PCBs via Mass Balance Approach

- Measure flow and concentration of known loading sources
  - Point source, tributaries
- Calculate presence of unmonitored load entering the river between upstream and downstream stations
  - Measure flows and concentrations during steady state conditions
  - Unmonitored load = Downstream load – upstream load



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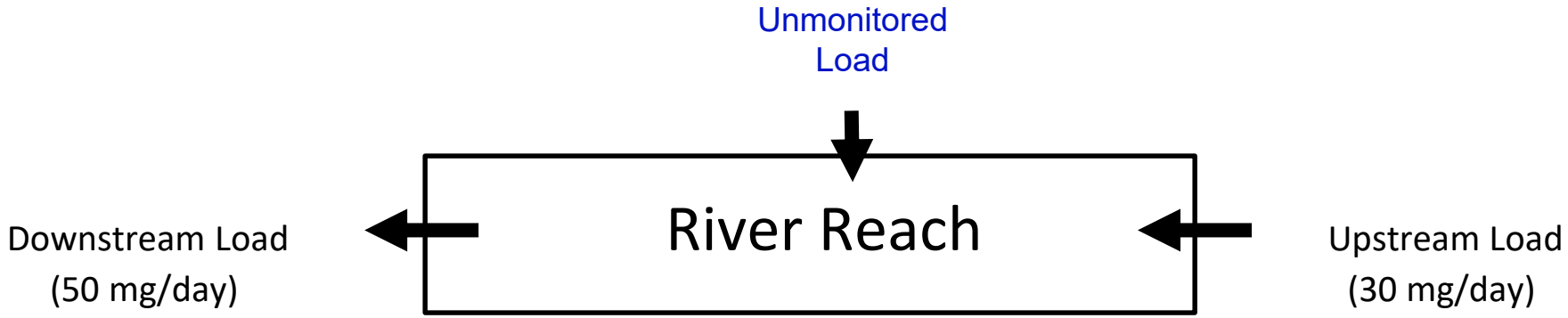

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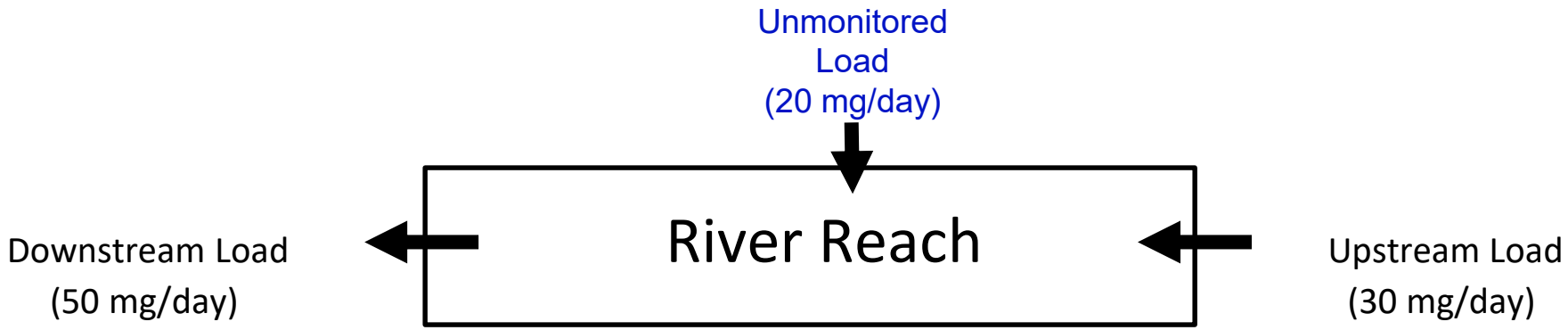

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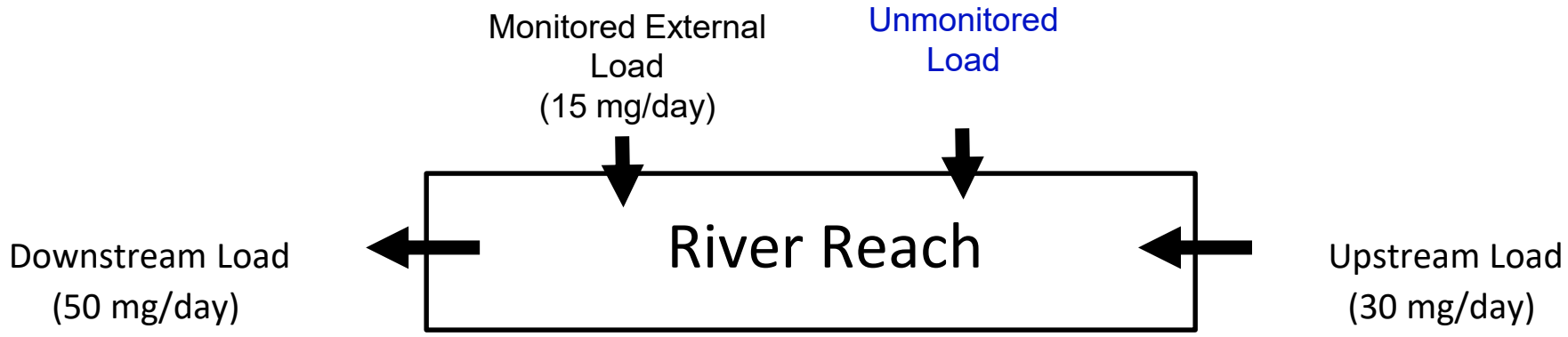

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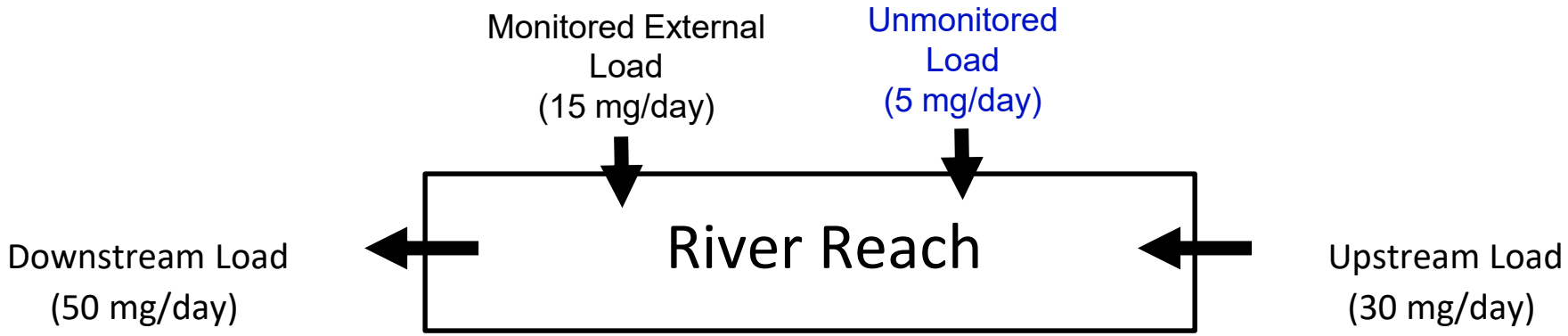
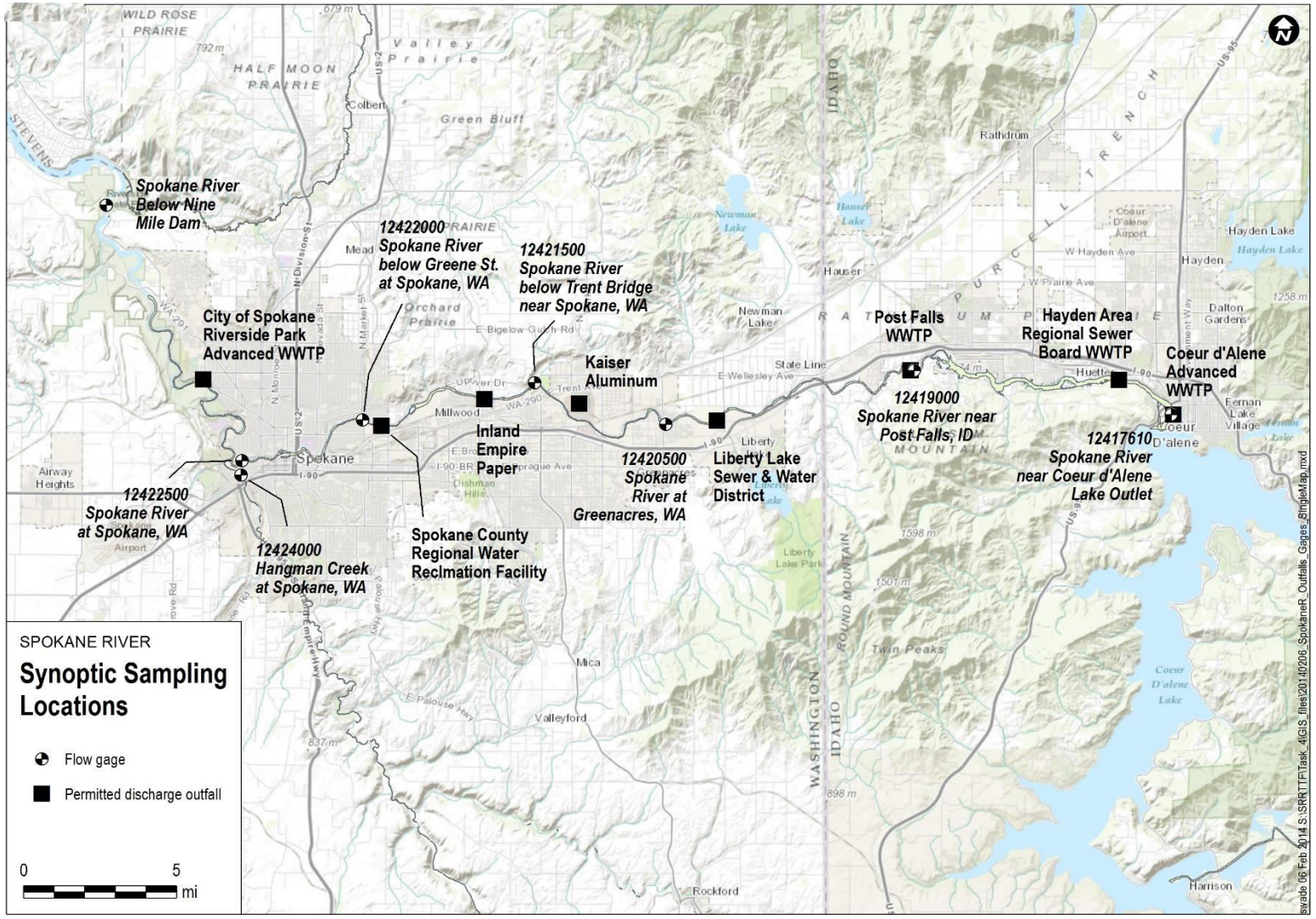


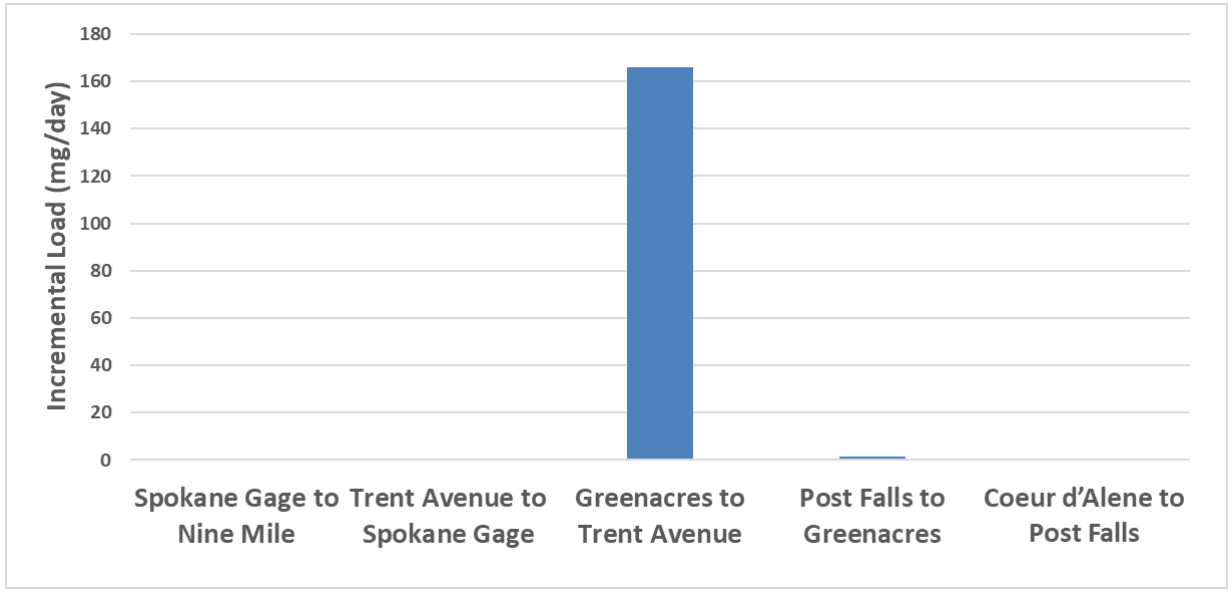
Synoptic Survey – 2014

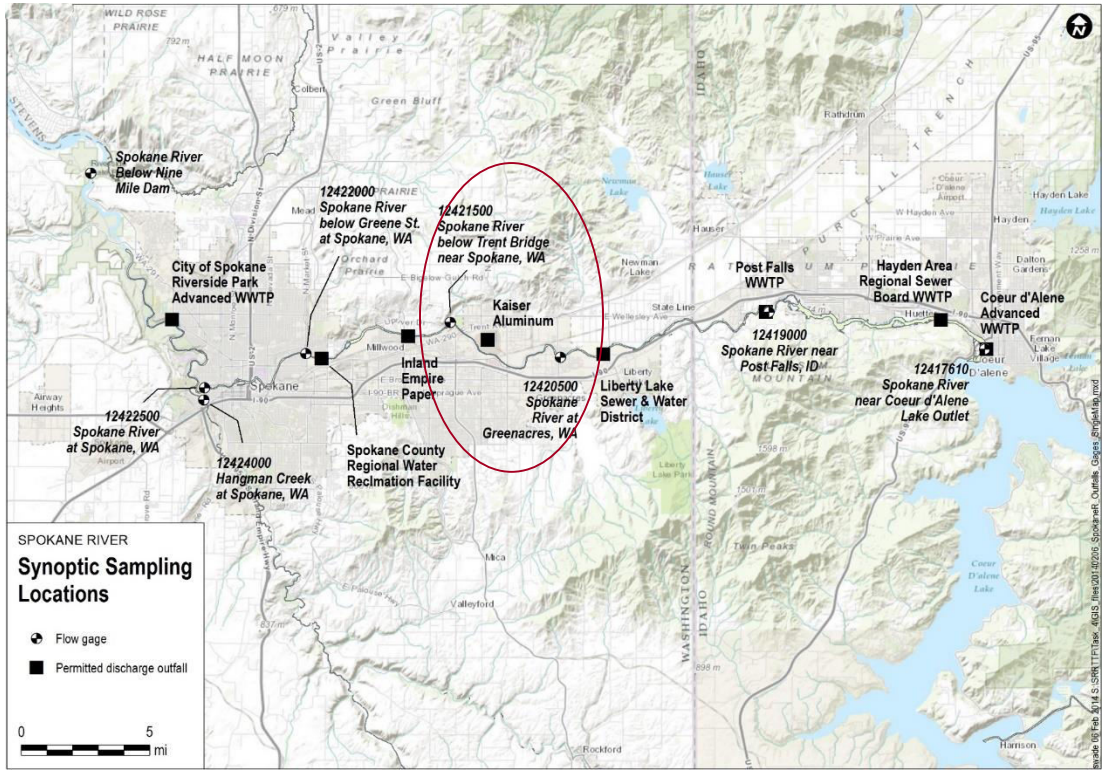
- Week-long survey during summer low flow
- Measure flows and loads from Lake Coeur d'Alene outlet to Nine Mile Dam



2014 Mass Balance Results

- Indication of a large unmonitored load entering the river between Greenacres and Trent Avenue

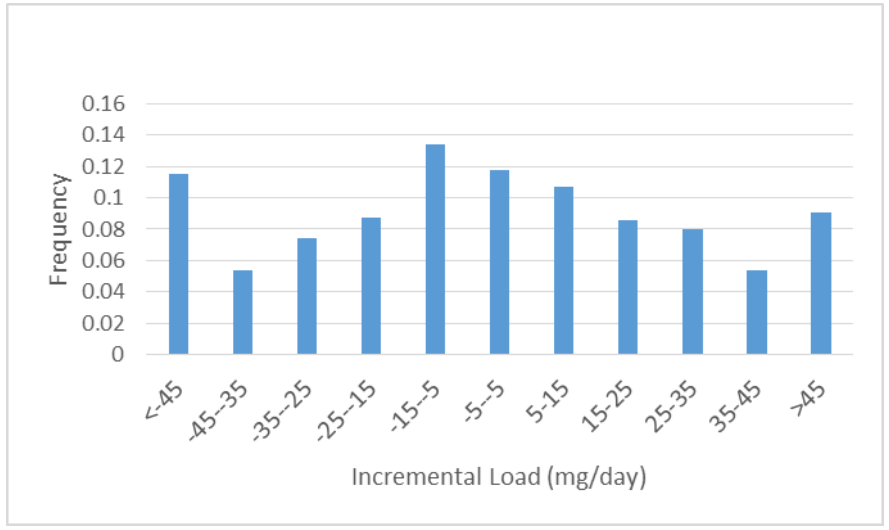




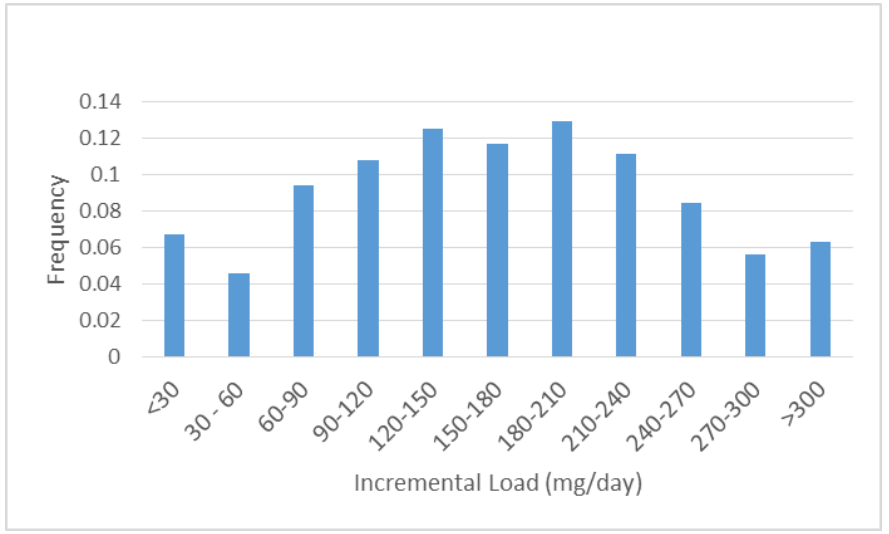
2014 Mass Balance Uncertainty Analysis

- Recognized that results were uncertain due to river PCB concentrations being only slightly larger than laboratory blank concentrations
  - Uncertainty analysis conducted as part of mass balance
  - Results for some segments were more conclusive than other

Inconclusive: Coeur d'Alene to Post Falls

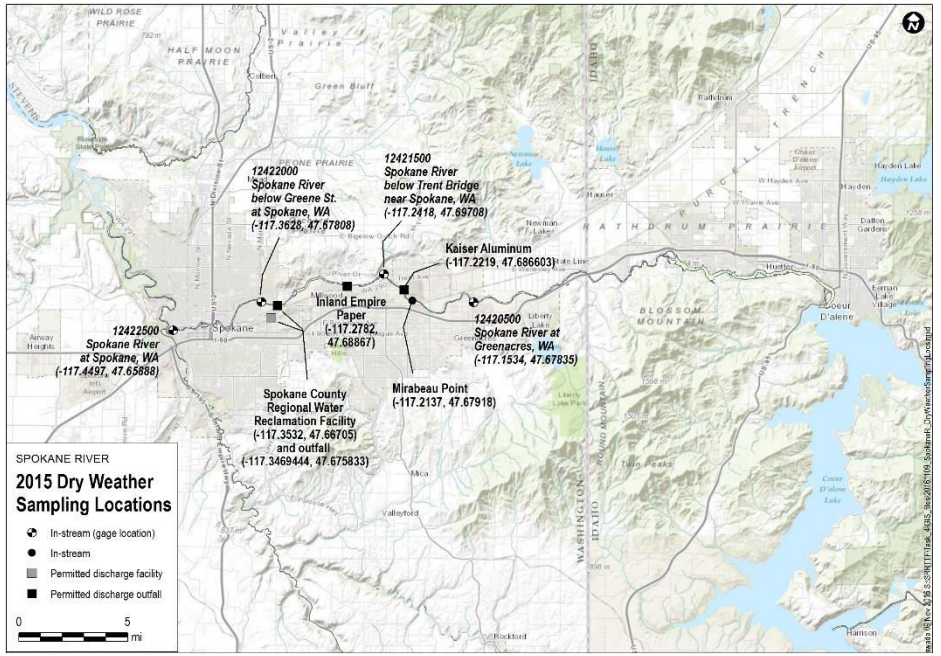


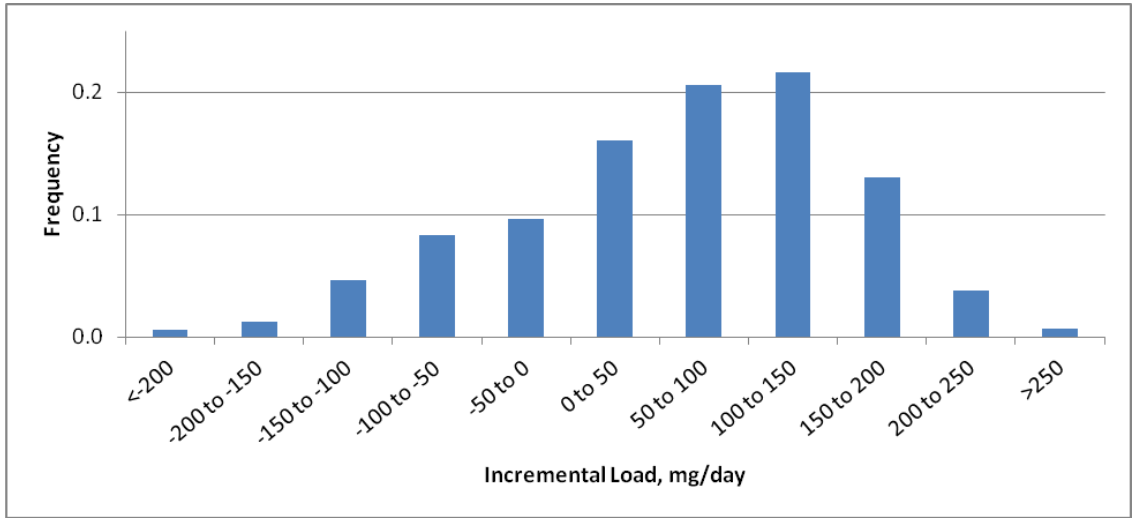
More conclusive: Greenacres to Plantes Ferry



Synoptic Surveys – 2015 and 2018

- Additional surveys conducted to supplement 2014 mass balance
  - Results consistently suggest presence of an unmonitored load entering the river near the Kaiser facility





Task Force Technical Activities

- Characterize the sources of PCBs
- Develop a comprehensive plan for PCB control
- Continue source identification
- Support status and trends assessment

Comprehensive Plan

- Data collected by the Task Force was used to develop a Comprehensive Plan to describe:
  - *Source Assessment* of the magnitude of all known PCB sources
  - *PCB Control Actions* under consideration, and their expected costs and removal efficiency
  - *Implementation Plan* defining specific management practices, the schedule for their implementation, and measurable milestones to assess effectiveness
  - *Future Studies* designed to fill identified data gaps

Comprehensive Plan: Source Assessment

- Loading dominated by five sources:
  - Groundwater loading near Kaiser facility
  - Upstream Lake Coeur d'Alene
  - Two industrial wastewater facilities
  - One municipal wastewater facility

Comprehensive Plan: Control Actions

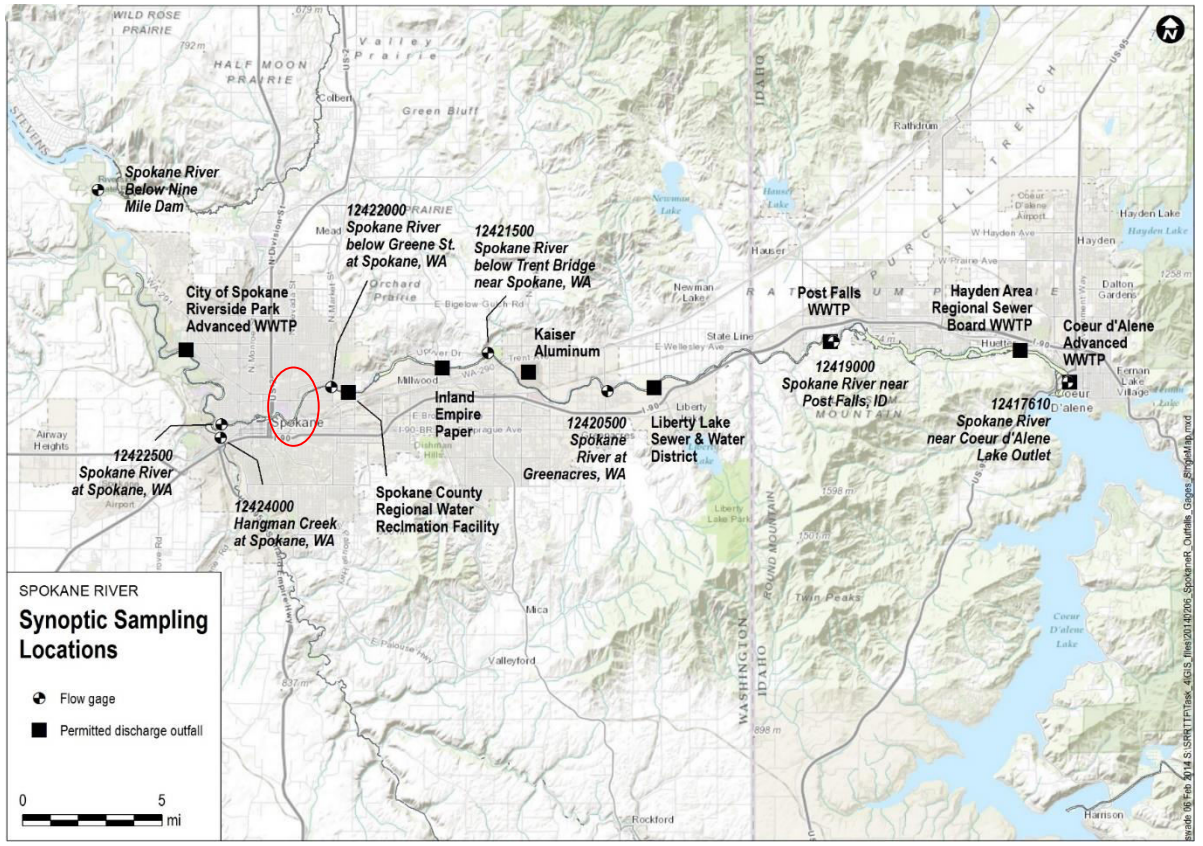
- Loading dominated by five sources:
  - Groundwater loading near Kaiser facility
    - Clean-up occurring under Consent Order
  - Upstream Lake Coeur d'Alene
    - None
  - Wastewater facilities
    - Installing (or have installed) next level of treatment

Task Force Technical Activities

- Characterize the sources of PCBs
- Develop a comprehensive plan for PCB control
- Continue source identification
- Support status and trends assessment

Further Source Identification

- Monitoring of PCBs in biofilm by Ecology in 2018 and 2019 showed elevated PCB concentrations in what is termed the Mission Reach



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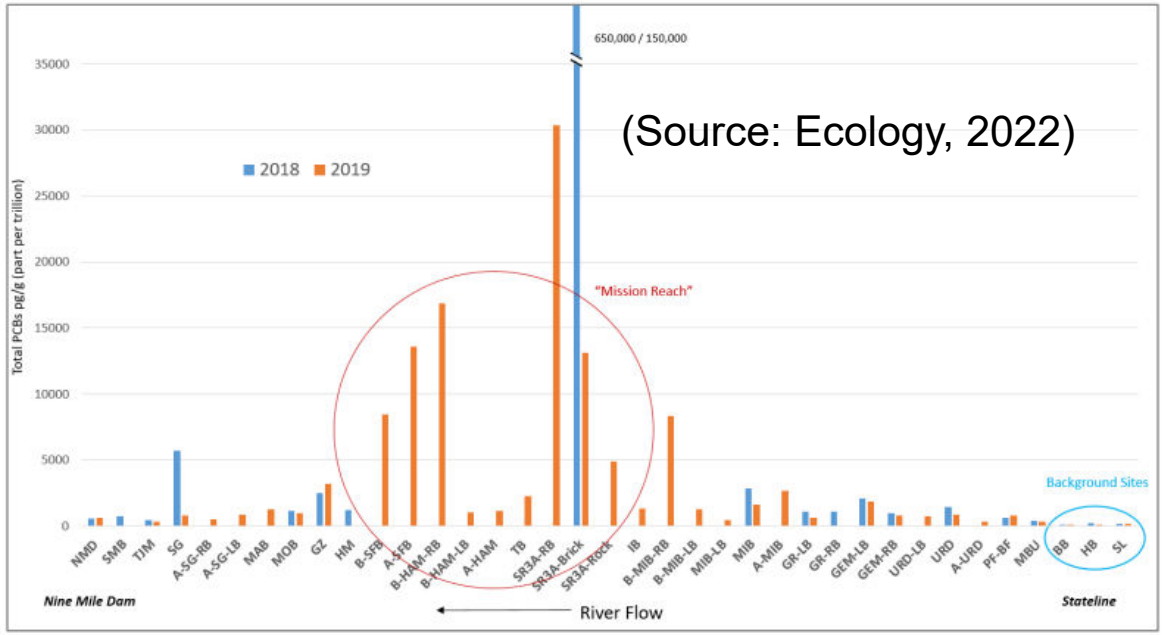


  - Not correlated to water column concentration or any known load to the water column
  - Consistent with historical observations of elevated fish tissue PCB concentrations in the Mission Reach

Further Source Identification

- Potential explanations for Mission Reach biofilm contamination
  - Legacy sediment contamination from historical upstream sources
  - Buried PCB-containing objects
  - PCB-contaminated artificial bottom fill
  - Contaminated groundwater
  - Contaminated stormwater

Further Source Identification

- Several actions undertaken/ongoing to identify Mission Reach source
  - Buried PCB-containing objects
    - Object detection survey defined the presence of buried metallic objects
    - Follow-up sediment and biofilm sampling in direct vicinity of identified objects
  - PCB-contaminated artificial bottom fill
    - Sampling of concrete and brick obtained from river bottom
  - Contaminated groundwater
    - Historical source assessment
  - Contaminated stormwater
    - Stormwater catch-basin sampling in area of suspected contamination

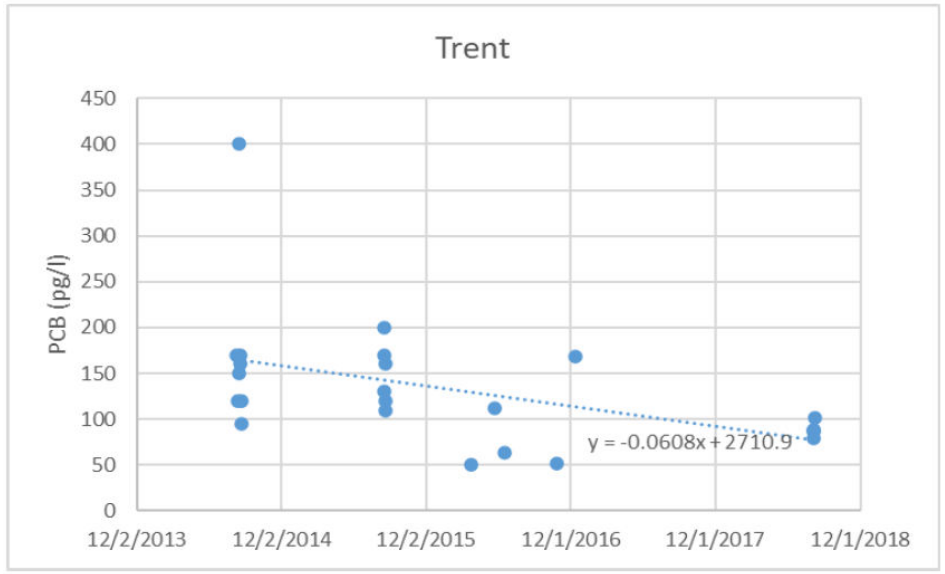
Task Force Technical Activities

- Characterize the sources of PCBs
- Develop a comprehensive plan for PCB control
- Continue source identification
- Support status and trends assessment

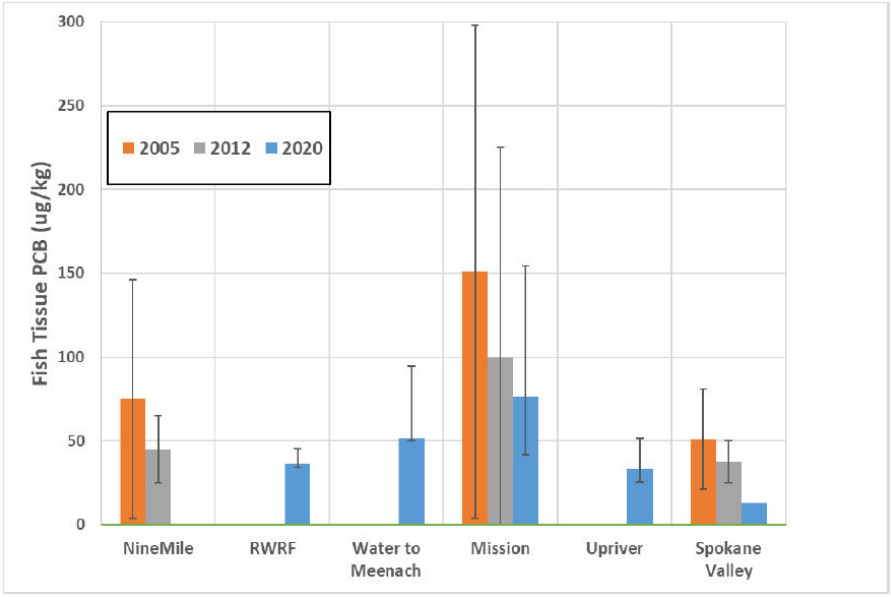
Status and Trends

- Water column and fish tissue PCB data suggest that concentrations are decreasing over time
  - Data are generally very noisy and not always consistently collected/analyzed

Water Column



Fish Tissue



Status and Trends

- Task Force has implemented consistent sampling programs to support future trend assessment
- Month-long deployment of semi-permeable membrane devices during three different seasonal flow regimes of each year
  - 2020-2021, 2022-2023
- Fish tissue sampling of juvenile redband trout
  - Fall 2020, Fall 2022

Outline

- Historical assessments
- Task Force technical activities
- Takeaways/future challenges

Takeaway Messages/Future Challenges

- Mass balance assessment can be effective in identifying PCB sources
- Smaller sources are more difficult to define
- Trend assessment requires a lot of data
- Attaining water quality standards will be extremely challenging

Takeaway Messages/Future Challenges

- Mass balance assessment can be effective in identifying PCB sources
  - If the source is large enough
- Smaller sources are more difficult to define
- Trend assessment requires a lot of data
- Attaining water quality standards will be extremely challenging

Takeaway Messages/Future Challenges

- Mass balance assessment can be effective in identifying PCB sources
- Smaller sources are more difficult to define
  - Biofilm monitoring can identify PCB sources not found by water column sampling
- Trend assessment requires a lot of data
- Attaining water quality standards will be extremely challenging

Takeaway Messages/Future Challenges

- Mass balance assessment can be effective in identifying PCB sources
- Smaller sources are more difficult to define
- Trend assessment requires a lot of data
  - Especially as concentrations decrease
- Attaining water quality standards will be extremely challenging

Takeaway Messages/Future Challenges

- Mass balance assessment can be effective in identifying PCB sources
- Smaller sources are more difficult to define
- Trend assessment requires a lot of data
- Attaining water quality standards will be extremely challenging
  - Feasible level of control for identified sources
  - Unidentified sources

Questions?