LimnoTech
Water Environment | Scientists Engineers

Comprehensive Plan to Control PCBs in the Spokane River Watershed

Dave Dilks

Spokane River Regional Toxics Task Force Workshop

February 10, 2016

Outline

- Background on Comprehensive Plan

1. Sources and Pathways of PCBs
   - Categories
   - Magnitude
2. Best Management Practices to Control PCBs
   1. Universe of Options
   2. Cost and effectiveness
3. Selection of BMPs for Implementation in Spokane
4. Development of Comprehensive Plan

Outline

- Background on Comprehensive Plan

1. Sources and Pathways of PCBs
2. Best Management Practices to Control PCBs
3. Selection of Best Management Practices for Implementation in Spokane
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Driving Forces for Comprehensive Plan

- Spokane River and Lake Spokane are impaired due to elevated PCB concentrations in fish
- PCBs come from many sources
  - Many sources are poorly understood
  - Many sources not readily controlled
  - Situation not amenable to typical TMDL
- Comprehensive plan provides a means to start controlling controllable sources

Comprehensive Plan Background

- Definition (from 2012 Task Force Work Plan)
  - **Comprehensive Plan** means a report that:
    - describes the data and the analytical process,
    - identifies available Best Management Practices (BMPs) and assesses their potential effectiveness, and
    - recommends a plan for implementation of BMPs that are potentially suitable in the Spokane River Watershed

Comprehensive Plan Process

- Make our best determination of where PCBs are coming from
- Evaluate spectrum of Best Management Practices to address these PCB sources
- Attain consensus on specific controls to be included in the Plan
- Develop Comprehensive Plan

Outline

- Background on Comprehensive Plan

1. Sources and Pathways of PCBs
   - Where are PCBs coming from, and how are they getting delivered to the River?
2. Best Management Practices to Control PCBs
3. Selection of Best Management Practices for Implementation in Spokane
4. Development of Comprehensive Plan

1. Sources and Pathways

- Sources
  - Mechanisms by which PCBs get introduced into the Spokane River watershed
- Pathways
  - Mechanisms by which PCBs get transported to the Spokane River
- Both will be assessed in two steps
  - What are all of the potential categories?
  - What do we know about their magnitude?

Categories of Sources

- Legacy
  - Previously produced PCBs located in the watershed
- Ongoing
  - Sources continuing to be directly introduced to the watershed via inadvertent production
- Non-Local Environmental Transport
  - Sources transported into the watershed study area by air or water

Legacy Sources

- Previously produced PCBs located in the watershed
- Divided into three major categories

Buildings	Environmental	Industrial Equipment
Fixed Non-Fixed	Surface soils Subsurface soil/ groundwater Aquatic sediments	Electrical transformers Electrical capacitors Hydraulic equipment

Ongoing Sources

- Sources continuing to be directly introduced to the watershed via inadvertent production
- Divided into three major categories

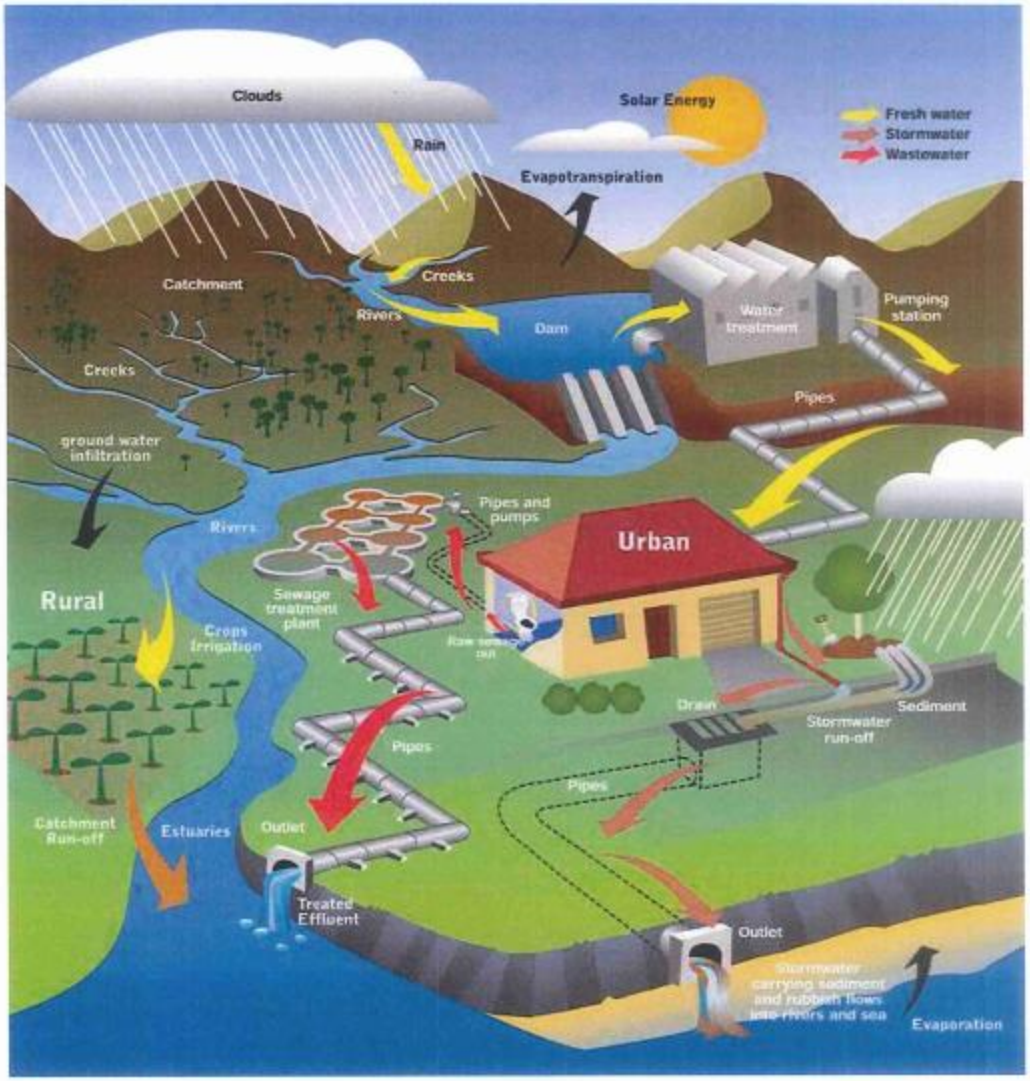
Printed Materials/Fabrics	Paints	Other
Newsprint Commercial Packaging Colored Clothing	Architectural paint Road paint	Silicone Motor oil Agricultural chemicals

Non-Local Environmental Transport

- Sources transported into the watershed study area by air or water
  - "Non-Local" term recognizes that that there are two sources of PCBs to the local atmosphere over the Spokane watershed
    - Volatilization of PCBs from land-based sources in the Spokane watershed
    - Long-range transport of PCBs originating outside the watershed
  - PCBs coming out of Lake Coeur d'Alene

PCB Pathways

- How do PCB sources get to the river?
  - Several mechanisms exist
- Categories can be defined using a conceptual model

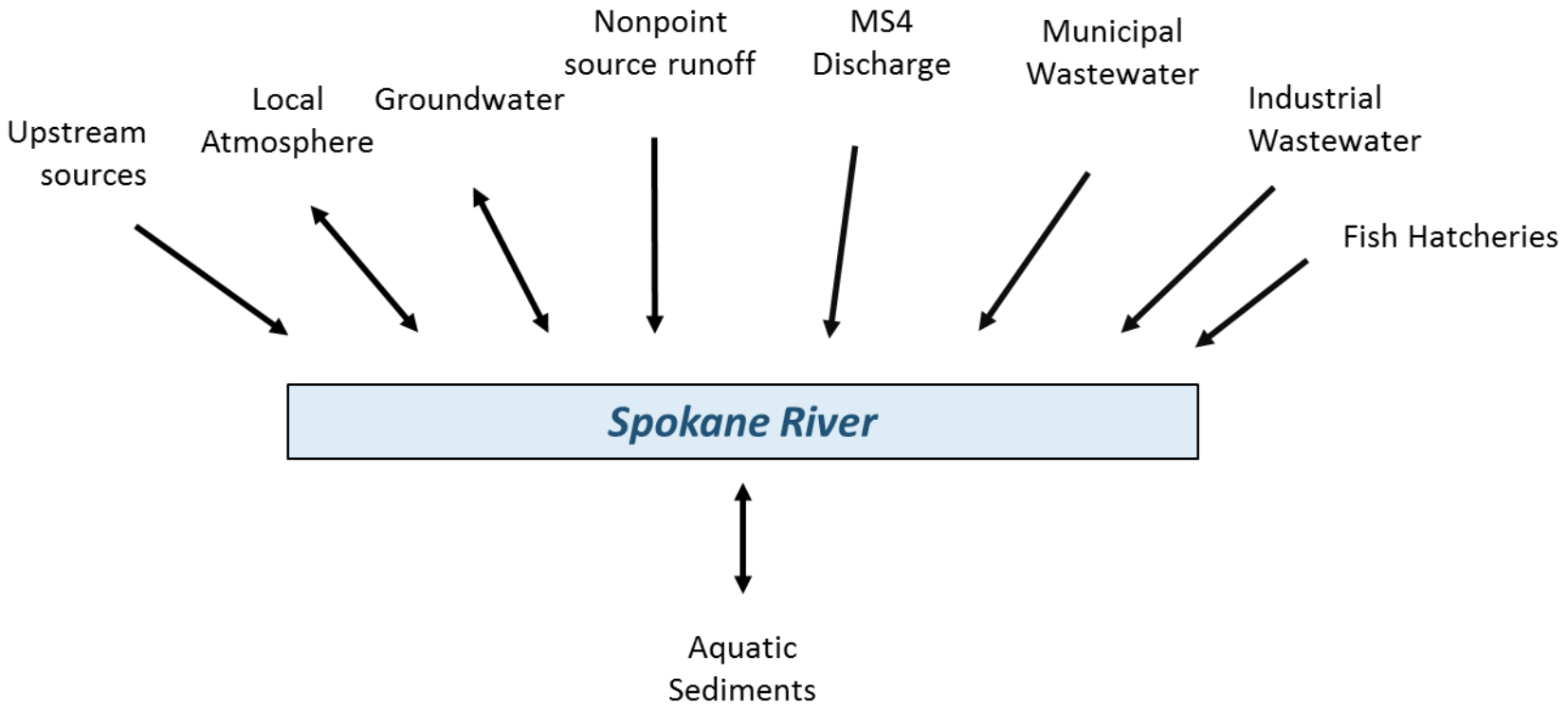


Conceptual Model Gets Messy Quickly

- Products known to contain PCBs:
  - Adhesives and tapes
  - Antifouling compounds
  - Asphalt
  - Brake linings
  - Ceiling tiles
  - Coal-tar enamel coatings
  - Electrical cable insulation
  - Fabric
  - Flame retardant coatings
  - Floor tiles, waxes and sealers
  - Foam
  - Glues
  - Grout
  - HVAC components
  - Insulation
  - Lubricants
  - Pesticide extenders
  - Plastics
  - Roofing
  - Roughcast plaster
  - Rubber gaskets/parts
  - Siding
  - Sound-proofing materials
  - Varnish
  - Waterproofing compounds
  - Window glazing

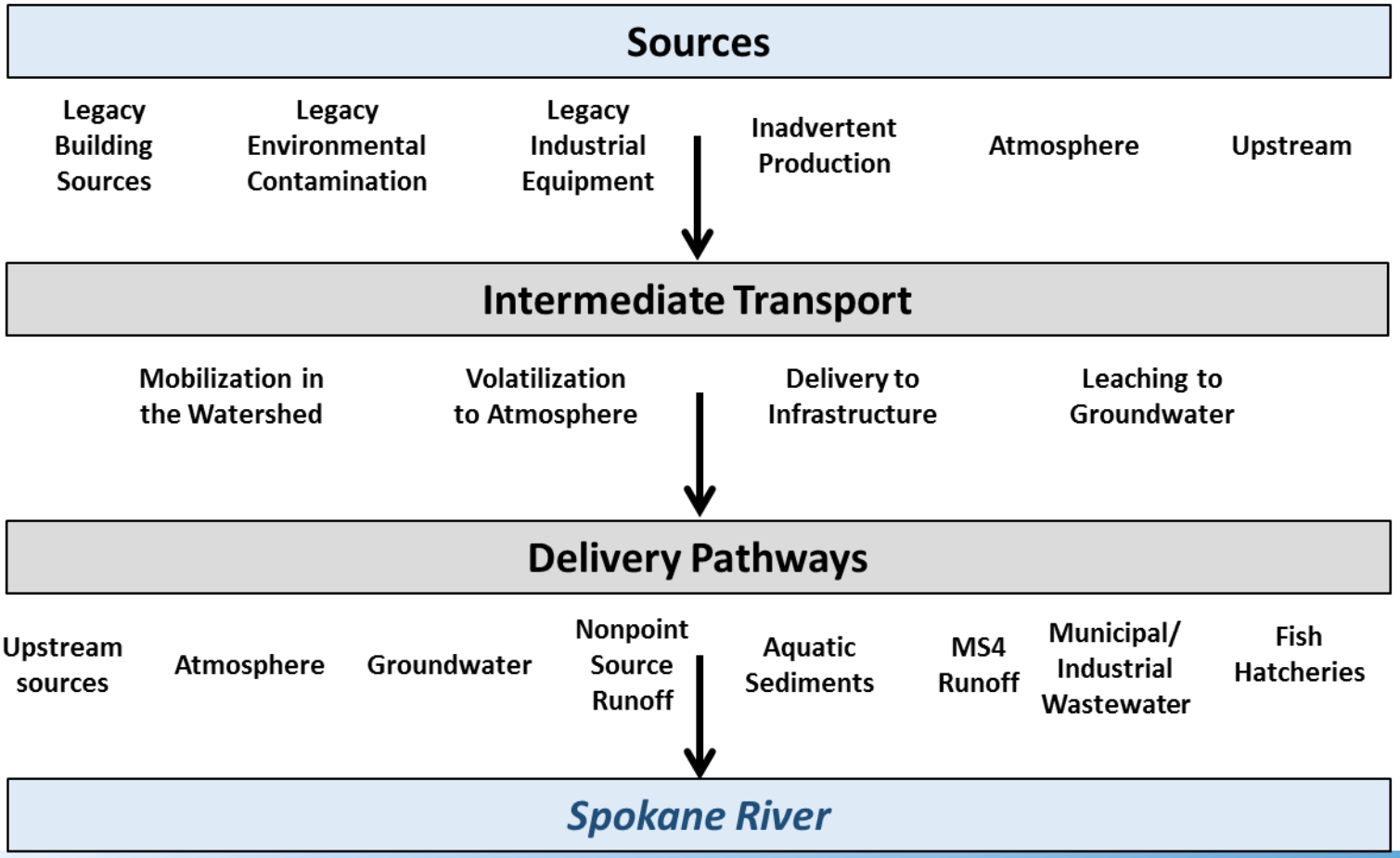
Divide Conceptual Model into Components

Delivery Mechanisms to the River



PCB Pathways

- Many intermediate mechanisms

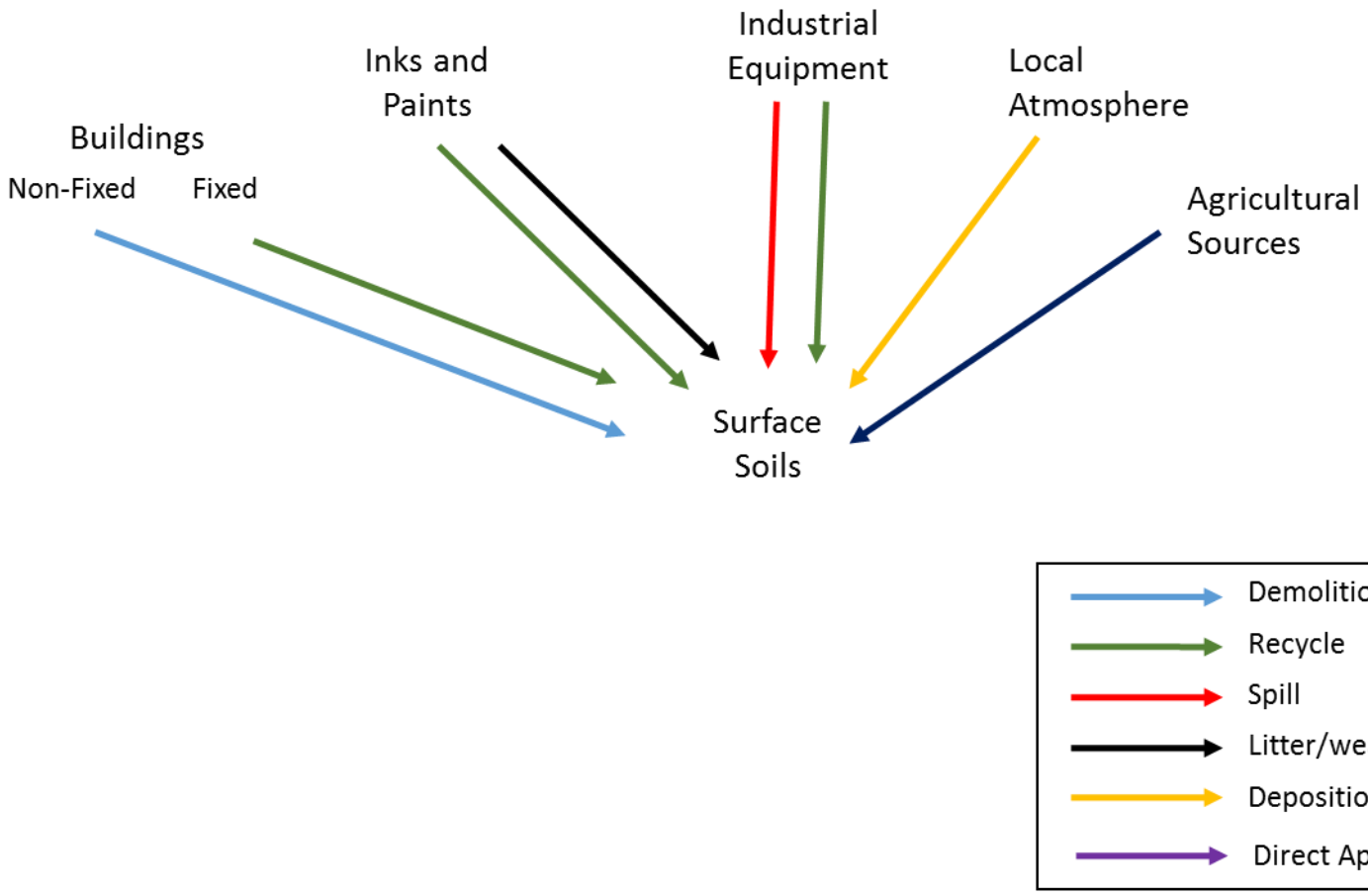


Intermediate Transport Pathways

- Conduit between sources and delivery mechanisms
  - Mobilization in the watershed
  - Volatilization to the atmosphere
  - Delivery to sewer infrastructure
  - Leaching to groundwater

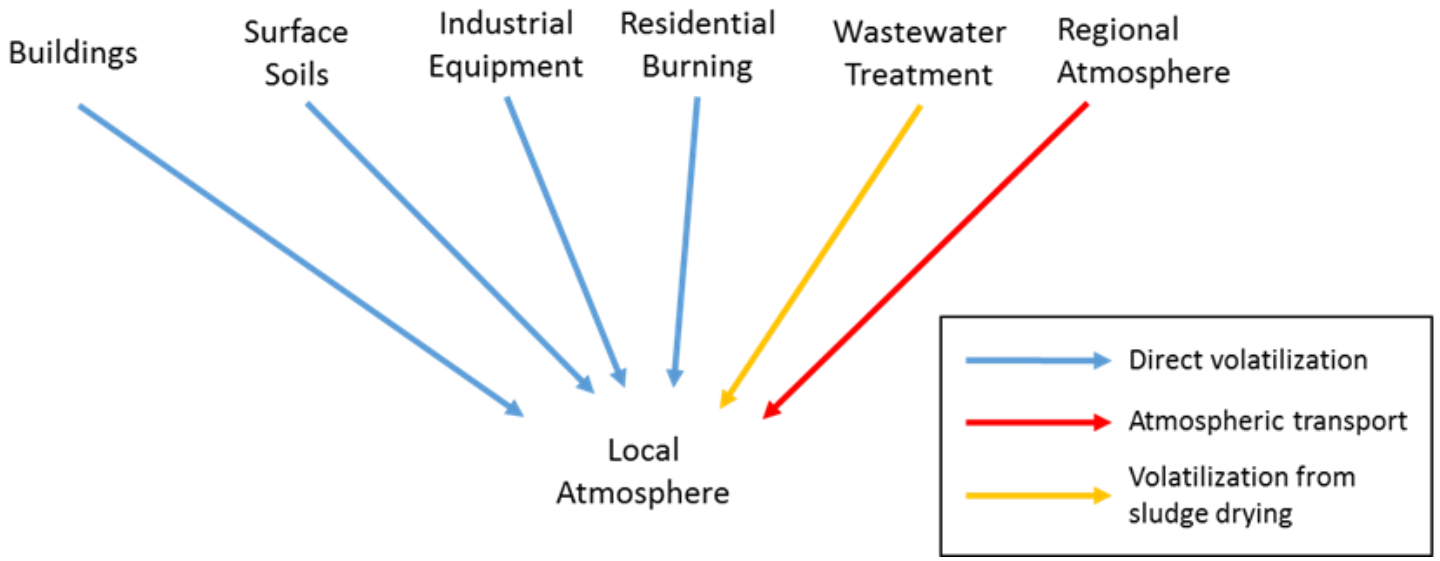
Mobilization in the Watershed

- Conduit between sources and surface soils



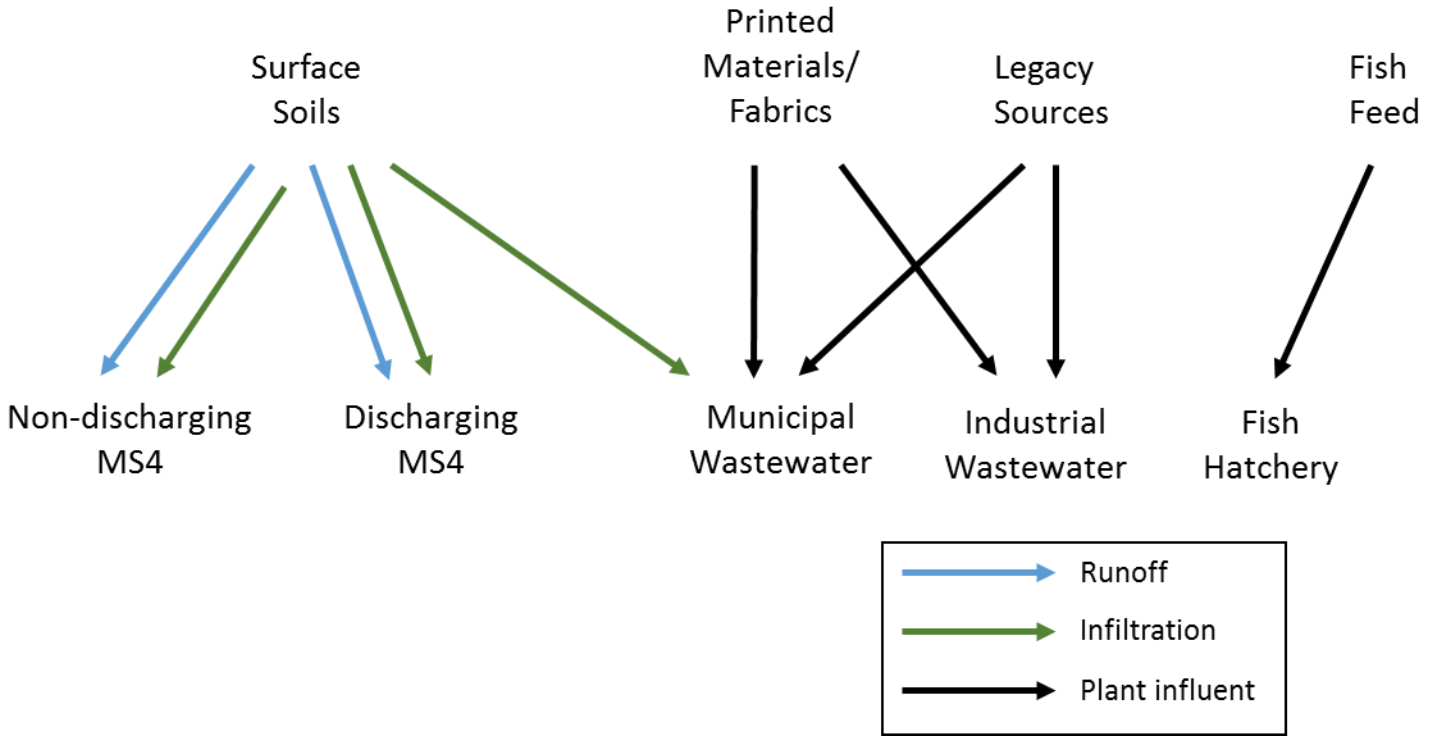
Volatilization to the Atmosphere

- Conduit between sources and atmosphere

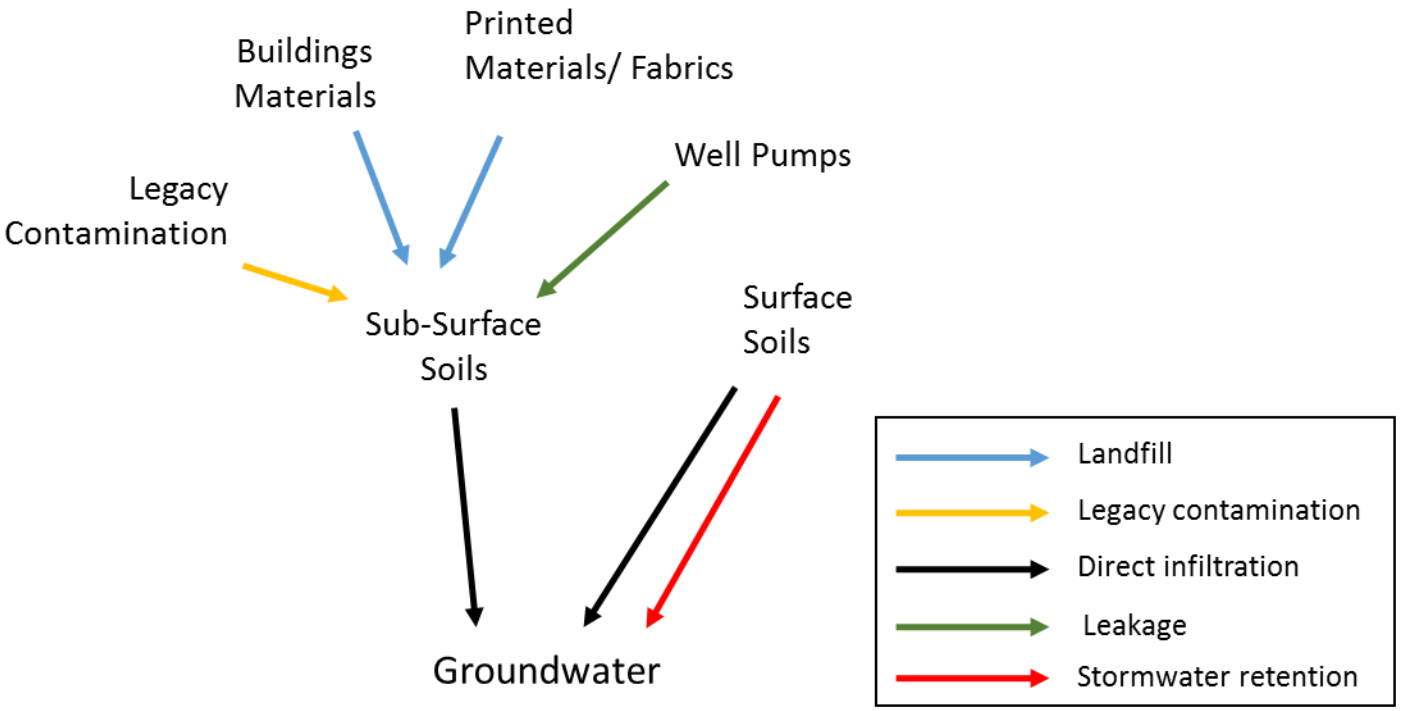


Delivery to Sewer Infrastructure

- Includes stormwater, municipal, industrial, and fish hatchery



Leaching to Groundwater



Sources and Pathways

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Magnitude of PCB Sources and Pathways

- Task is just getting underway
- Categories of understanding
  - Things we know fairly well
  - Things we are beginning to understand
  - Things we can estimate from the literature
  - Things we know relatively little about
- Know more about delivery mechanisms to the river than sources or intermediate pathways

Sources and Pathways We Know Fairly Well

- PCB loading from wastewater treatment plants discharging to the Spokane River
- Relative magnitude of concentrations coming out of Lake Coeur d'Alene

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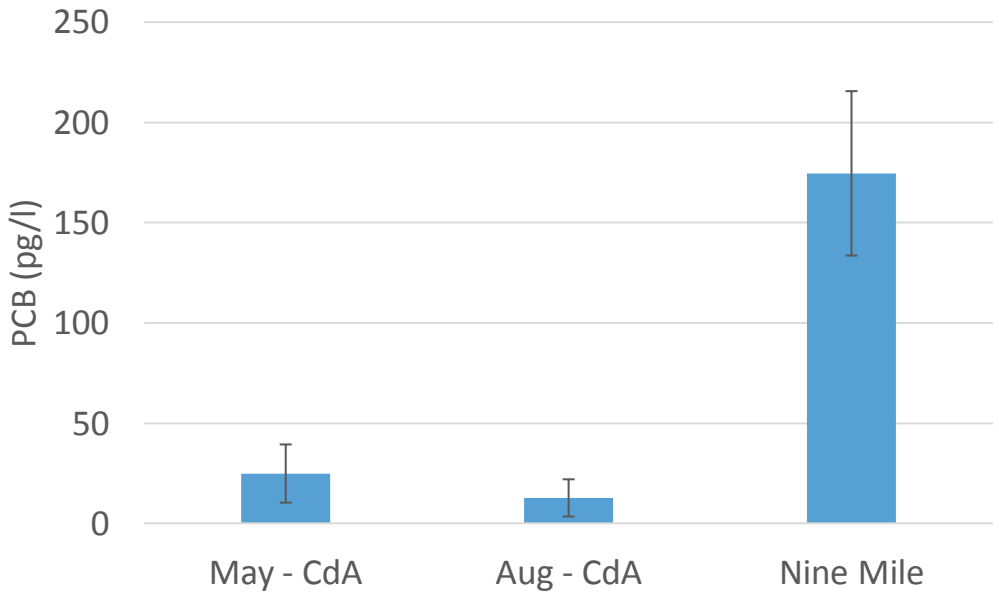

Sources and Pathways We Are Beginning to Understand

- PCB load from City of Spokane stormwater
- Groundwater load between Barker and Trent
- PCB loading from the Spokane Fish Hatchery
- Seasonal variability in loading from Lake Coeur d'Alene

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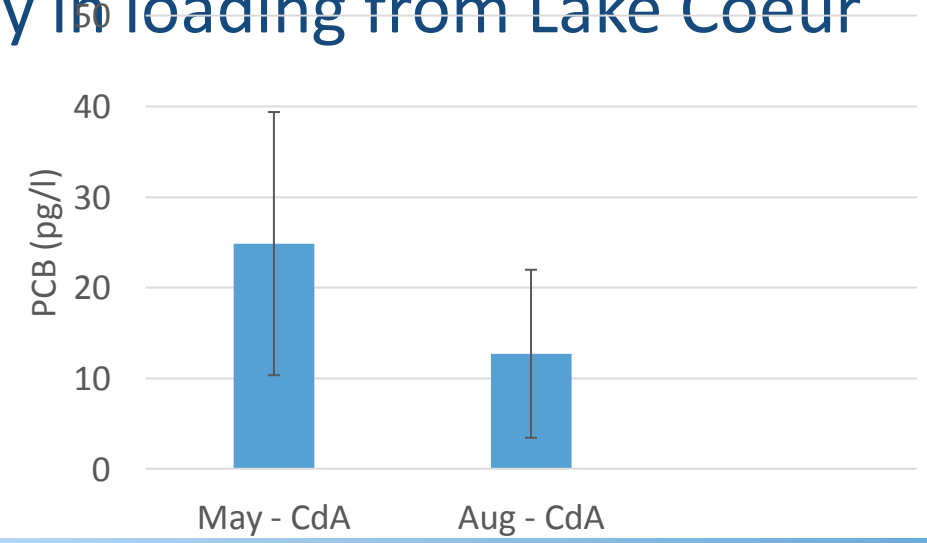

Sources and Pathways We Can Estimate from the Literature

- Legacy soil contamination
- PCB contribution to the local atmosphere
- Atmospheric deposition to the water column
- Importance of sediment vs. water column sources in fish tissue

Sources and Pathways We Know Relatively Little About

- Everything else
  - If it is any consolation, we aren't alone
- "Key" uncertainties
  - What are the sources contributing to soil contamination?
    - Are they controllable?
  - What are the sources contributing to fish?
  - How important is "other" groundwater?

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2. BMP Options

- Can be divided into four categories
  - Institutional BMPs
    - Information sharing and governmental practices to avoid, or dispose of, products containing PCBs
  - Stormwater Treatment
  - Wastewater Treatment
  - Site Remediation

Institutional BMPs – Governmental

- Take-back programs to accept PCB-containing waste
- Targeted street sweeping
- Purchasing standards/product testing
- Controls on building remodeling or demolition
- Review/revise laws regulating waste disposal
- Survey of utilities to confirm the presence of PCBs in transformers
- Survey PCB-containing lamp ballasts in schools/public buildings

Institutional BMPs – Educational

- Education about legacy sources (caulks, ballasts) of PCBs, and how to manage/replace them
- Education about ongoing sources of PCBs, and safer alternatives

Stormwater Treatment BMPs

- Controls at pipe entrance
  - Capturing solids/PCB prior to entering the stormwater system
- Controls in the pipe system
- Controls at end-of-pipe
  - Sedimentation basins, constructed wetlands

Wastewater Treatment BMPs

- PCB minimization in influent
- Treatment processes

Site Remediation BMPs

- Identification and elimination of storage or use of PCBs
- Identifying older buildings that may contain PCBs

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Assessing Appropriateness of Each BMP

- How much pollutant does it remove?
  - As a percentage of a given pathway
  - As a total overall mass reduction
- How much does it cost?
  - Initial capital costs
  - Ongoing operation and maintenance
- Is there a suitable party to take responsibility for implementing it?

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3. Selection of BMPs for Implementation in Spokane

- Work from Task 2 will generate a menu of BMP options defining:
  - Effectiveness, cost, responsible party(ies)
- Task Force members will choose among options
  - Workshop to prioritize alternatives, and identify implementing parties to be held in July
  - Follow-up meetings through August
- Consensus-based recommendations made

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Development of Comprehensive Plan

- Document assessment and agreed-upon actions into a formal document
- Sections describing
  - Watershed Characterization
  - PCB Source Assessment
  - PCB Best Management Practices.
  - Information/Education
  - Recommended Implementation Plan
  - Future Studies

Schedule

Task: Deliverable	Completion Date
1: Draft memorandum defining inventory of known sources and pathways	January 22, 2016
1: Final memorandum defining inventory of known sources and pathways	February 19, 2015
1: Draft memorandum defining magnitude of loading from each source and pathway	March 28, 2016
1: Final memorandum defining magnitude of loading from each source and pathway	May 18, 2016
2: Draft memorandum defining inventory of BMPs to be considered	February 19, 2016
2: Final memorandum defining inventory of BMPs to be considered	May 18, 2016
2: Draft memorandum defining appropriateness of each BMP.	June 1, 2016
2: Final memorandum defining appropriateness of each BMP.	July 14, 2016
3: Workshop to prioritize alternatives, and identify implementing parties	July 22, 2016
4: Draft comprehensive plan	September 15, 2016
4: Final comprehensive plan	December 16, 2016