Introduction

Background

• PCB source identification studies in the Spokane River:
  • 2011 PCB Source Assessment by Ecology
  • Ecology’s Urban Waters Program
  • Dry weather synoptic sampling by LimnoTech
  • Stormwater
  • Groundwater
  • Atmospheric deposition
  • Fish hatcheries
  • Fingerprinting (e.g., PMF)

Goal

• Assess presence of previously unidentified sources of PCBs in the Spokane River
Introduction: Biofilms

• Complex, diverse assemblages of algae, microbes, fine sediments

• Attached to each other and surfaces via secretion of mucilage

• Base of aquatic food webs

• Can act as natural passive samplers

• Previously used in PCB source identification (Hobbs, 2018)
Spokane River: 2018 Biofilm Sampling

Sampling Sites
- 19 biofilm
- 3 sediment
- 2 macroinvertebrate
Methods

Biofilm

1. Scrape rocks
   • Cobble-sized
   • Brown, flocculent appearance

2. Composite & mix
   • Use decontaminated equipment (stainless steel bowls, spoons, blades)

3. Scoop mixture into certified clean glass jars
Methods

Sediment
1. Scoop top ~2 cm
2. Composite & mix
3. Clean glass jar

Invertebrates
1. Caddisfly larvae
2. Remove casing
3. Homogenize tissue
4. Clean glass jar
Methods

Ancillary Data

• Biomass (Biofilm)
• Algal Taxonomy (Biofilm)
• C & N Isotopes (Biofilm & Invertebrates)
• TOC (Sediment)
• Grain Size (Sediment)
QAQC, Lab Method, & Censoring

**QAQC**
- Field Splits
- Method Blanks

**Lab Method**
- EPA 1668C

**Censoring**
- Exclusion of non-detects
- Inclusion of NJ qualified data
- 3 x censoring
Results: Biofilm

Biofilm Total PCB (pg/g)
- 95 - 168
- 169 - 948
- 949 - 2042
- 2043 - 4567
- 4568 - 630368

Provisional Data - Subject to Change
Total PCBs: Biofilm - 50000
50000
150000
250000
350000
450000
550000
650000

0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000

SL
HB
BB
MBU
PF-BF
URD
GEM-LB
GEM-RB
GR-LB
GR-RB
MIB
SR3A
GZ-BF
SG
HM-BF
TJM
SMB
NMD

Rough Comparison to Wenatchee River

90 – 170
370 – 4500 (excluding SR3A)

Max
Mean

Provisional Data – Subject to Change
Homolog Patterns: Biofilm

[Bar chart showing homolog patterns]
Comparisons to Aroclors
Upstream to Downstream Comparisons: Biofilm

Provisional Data – Subject to Change
Right & Left Bank Comparisons: Biofilm

Provisional Data – Subject to Change
Sediment

**Total PCB (pg g⁻¹)**

- **PF**: 10000
- **GZ**: 120000
- **HM**: 5000

**PCB Homologs (Relative %)**

- **PF**
  - Monochloro: 10%
  - Dichloro: 20%
  - Trichloro: 40%
  - Tetrachloro: 10%
  - Pentachloro: 10%
  - Hexachloro: 0%
  - Heptachloro: 0%
  - Octachloro: 0%
- **GZ**
  - Monochloro: 0%
  - Dichloro: 5%
  - Trichloro: 40%
  - Tetrachloro: 30%
  - Pentachloro: 10%
  - Hexachloro: 5%
  - Heptachloro: 0%
  - Octachloro: 0%
- **HM**
  - Monochloro: 10%
  - Dichloro: 20%
  - Trichloro: 40%
  - Tetrachloro: 10%
  - Pentachloro: 10%
  - Hexachloro: 0%
  - Heptachloro: 0%
  - Octachloro: 0%

Provisional Data – Subject to Change
Invertebrates

**SG**
- Pupa
  \((Hydropsychidae \text{ and } Limnephilidae)\)

**GEM**
- Larvae
  \((Hydropsychidae \text{ and } Limnephilidae)\)

---

Provisional Data – Subject to Change

![Graph showing Total PCB (pg g⁻¹) for GEM-INVERT, SG-INVERT, and SG-INVERT-DUP.]

- **GEM-INVERT**
- **SG-INVERT**
- **SG-INVERT-DUP**

**PCB Homologs (Relative %)**

- Decachloro
- Nonachloro
- Octachloro
- Heptachloro
- Hexachloro
- Pentachloro
- Tetrachloro
- Trichloro
- Dichloro
- Monochloro
Next Steps

• Final Report

• Follow-up Biofilm Sampling: Summer 2019

• Continue to work with SRRTTF