Welcome to the September 13, 2018 Water Quality Partnership

Agenda Topics

Opening Statements	Heather Bartlett	10:00 – 10:10 am
Discussion of Ecology's proposed updates to UIC guidance for managing stormwater	Chad Brown, Mary Shaleen Hansen, & Doug Howie	10:10 – 11 am
Introduction to Environmental Assessment Program Who they are and what work they do.	Jessica Archer & Will Hobbs	11:00 – 11:15 am
EAP - **Assessment of Low-level Sampling Methods** What is this report, why was it done, and how will it be used	Will Hobbs	11:15 – 11:45 am (present and Q/A)
Updates: General permits out for review Water Quality Assessment Recreational Criteria Update	WQ Program Vince McGowan & Melissa Gildersleeve	11:45 – 11:55 am
Closing wrap up	Heather Bartlett	11:55 – 12 pm

Opening Statements

Heather Bartlett

Discussion of UIC Wells and WA State Stormwater Manuals

Water Quality Partnership Meeting
September 13, 2018

Mary Shaleen-Hansen and Doug Howie

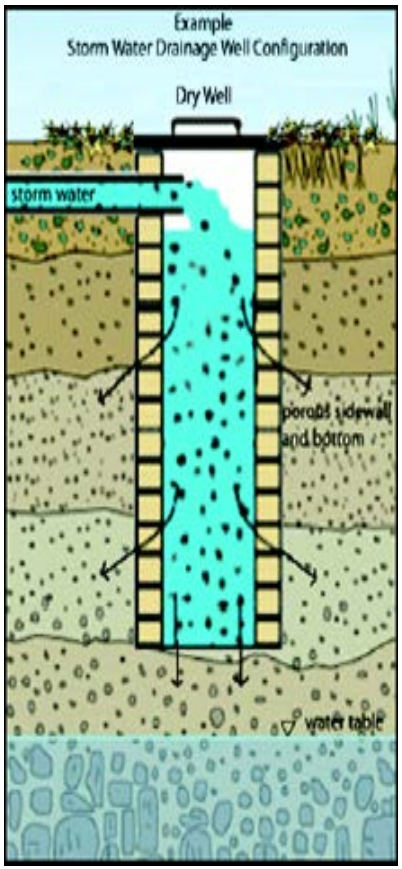
DEPARTMENT OF ECOLOGY
State of Washington

What we will talk about today

- UIC Program Basics
- Summary of WA DOH and WASWD concerns with current UIC approval process and well use
- Stormwater Management in Washington State
- Stormwater Program Basics
- Summary of Stormwater manual revisions

What is a UIC well?

UIC wells are manmade structures deeper than the largest surface dimension or



Drywell

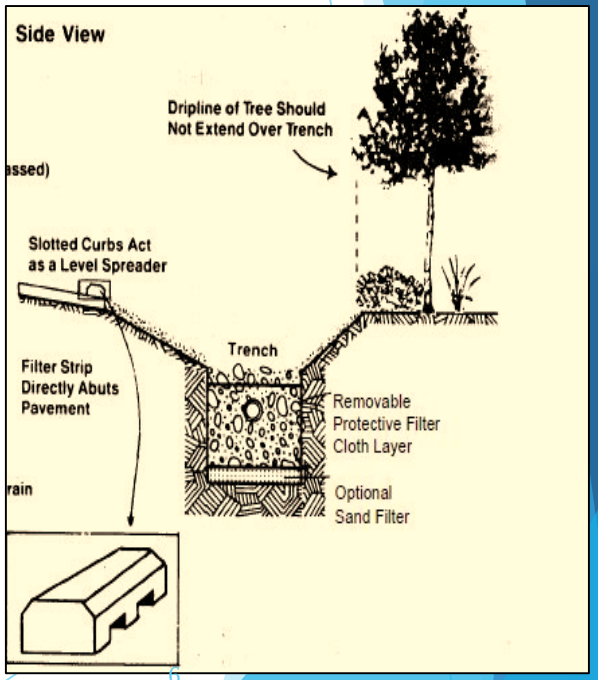
What is a UIC well?

Contains perforated pipe or a similarly acting structure

Infiltration trench

Stormchamber - temporary storage before infiltration

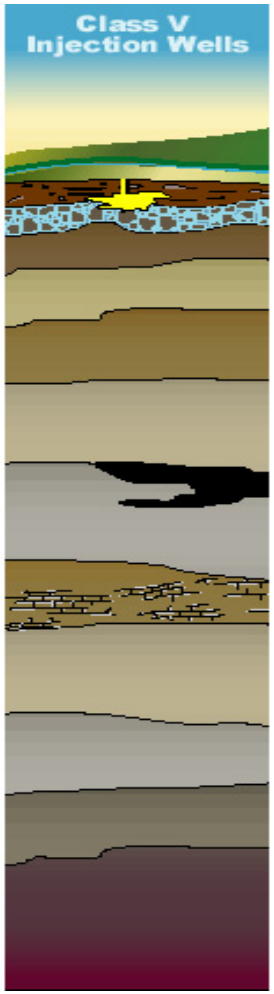
90% of registered wells are < 20 feet deep



Underground Injection Control (UIC) Program

- The goal of Washington's UIC Program is to protect groundwater quality by regulating discharges from the land surface to UIC wells.
- The majority of UIC wells are used to manage stormwater from roads, parking areas, and building roofs., cleanup groundwater, and aquifer storage.
- Spokane, Pierce, Clark County and the Tri-Cities areas use 1,000's of UIC wells to manage their stormwater.

UIC Program Laws & Regulations



- Federal Safe Drinking Water Act
- In 1984, Ecology received authority from the USEPA to regulate UIC wells
  - Chapter 90.48 WAC –

    WA State Water Pollution Control Act
  - Chapter 173-218 WAC –

    UIC Program
  - Chapter 173-200 WAC –

    Groundwater Quality Standards (GWQS)

UIC Program Basics

Meet the rule requirements = **Rule Authorization**:

- Register UIC wells with Ecology
  - New wells- before use, design phase
  - Older/existing wells should be registered ASAP
- Groundwater protection - Apply **A**ll, **K**nown, **A**vailable and **R**easonable methods of prevention, control and **T**reatment (AKART). Stormwater BMPs are considered AKART.
- If the 2 requirements are not met, then a state waste discharge permit is required to operate the well.

UIC rule requires discharges from UIC wells to protect Groundwater Quality.

- Separation between the UIC well base and the top of the groundwater table
- BMPs - Stormwater treatment, source control
  - Source control prevents contact with pollutants.
  - Treatment reduces contaminant concentrations.
- UIC program prohibits discharges
- Meet local ordinances

- UIC registration – includes site questions to determine if UIC rule requirements are met

Summary of WA DOH and WASWD concerns with current UIC approval process and well use

- UIC wells constructed using the current standards and stormwater BMPs will not protect drinking water sources
- Lack of groundwater and stormwater monitoring
- Lack of notification and consultation with water purveyors when deep UIC wells are proposed in a public water supply groundwater protection area
- Additional evaluation of vulnerable water supplies.
- Sanitary control area setback is needed
- Prohibit UIC well depths > than 20 feet
- Is appeal process available for UIC rule authorizations?

Stormwater Management in Washington State

Ecology regulates stormwater using the following regulatory programs:

- National Pollutant Discharge Elimination System (NPDES) Stormwater Permit Program or the
- Underground Injection Control (UIC) Program

- The two programs overlap. The UIC program borrows the design, construction, operation, and maintenance BMPs from the Stormwater Program to fulfill the AKART requirements of the UIC rule.

Stormwater

- Stormwater is rain and snow melt that runs off rooftops, pavement, roads, parking lots and landscapes.
- As it runs off, it can pick up pollution such as oil, fertilizers, pesticides, soil, trash, metals, and animal manure.
- Typical pollutant in road runoff are:
  - Oil and grease
  - Polycyclic aromatic hydrocarbons (PAH's)
  - Metals - lead, zinc, copper, cadmium
  - Sediments (soil particles)
  - Road salts

Stormwater NPDES Permit Program

- In 1995, Ecology received authority from EPA to administer the Clean Water Act's NPDES Stormwater Permit Program.
- Goals of the stormwater program –
  - To protect beneficial uses of our waters and
  - To reduce stormwater pollution to surface and groundwater.
- Impacts are controlled by the application of best management practices (BMPs), considered AKART - found in Ecology's stormwater manuals and guidance.
- BMPs are defined as schedules of activities, prohibitions of practices, maintenance procedures, and structural and/or managerial practices to prevent or reduce the release of pollutants and other adverse impacts to waters of Washington State.

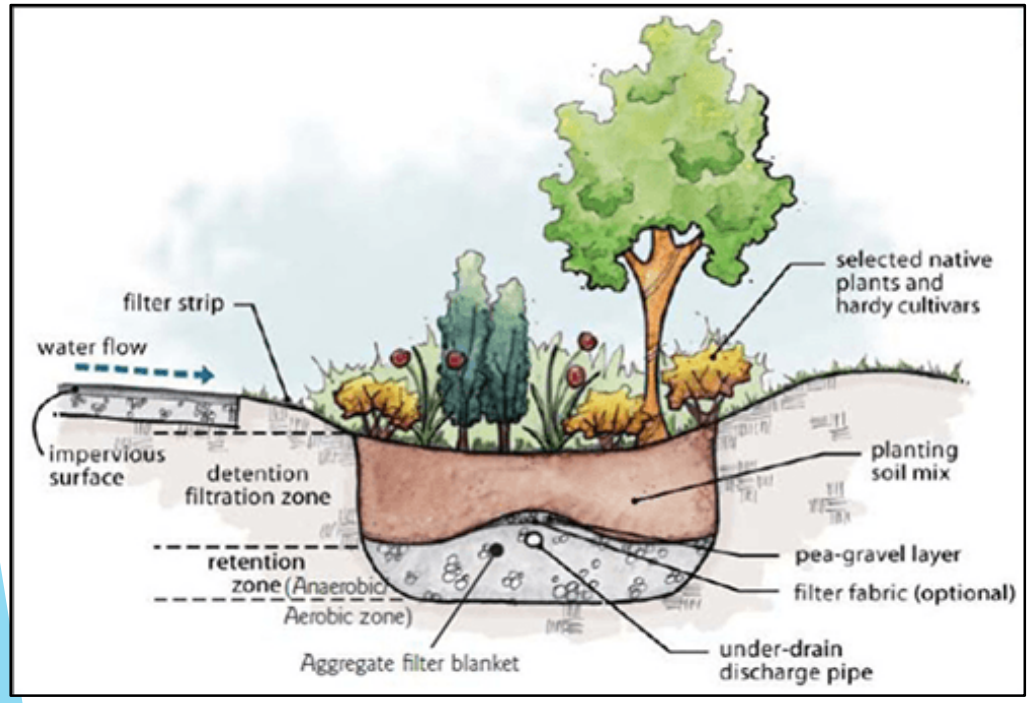
Presumptive Approach

- Discharges allowed under a general stormwater permit or a UIC well rule authorization are given a presumption of compliance with Water Quality Standards if they meet all permit conditions, or for UIC wells the UIC rule requirements, and

- All applicable and appropriate on-site pollution control BMPs contained in the Ecology manual/guidance (or an approved equivalent manual) are fully implemented.

- Site-specific discharge violations will remove this presumption of compliance.

Stormwater Treatment for UIC Wells and other Stormwater Structures



- **Treatment types**
  - Pretreatment,
  - Oil,
  - Basic (total suspended solids),
  - Enhanced (dissolved copper and zinc),
  - Total phosphorus, and
  - Sediment control during project construction.

Treatment is determined by the contaminants associated with the different landuses.

Stormwater Treatment for UIC Wells and other Stormwater Structures

Runoff volume is considered:

The size of the treatment BMP structure is based on the size of the average storm event or volume.

Treatment BMPs are built to treat 91% of a storm event. The majority of contaminants are contained in this % of stormwater.

How Treatment is determined for new Drywells

- Stormwater from roads, parking lots and roof runoff for solids, metals and oil
- Vadose Zone treatment capacity,
  - High to none treatment – depends on geologic material type, saturated hydraulic conductivity, adsorption, CEC and thickness above water table. If thickness is less than required – NONE treatment
- Pollutant Loading Classification
  - Low to high. Based on average daily traffic.
- Use pollutant load and vadose zone classification to determine level of treatment – treatment choices in stormwater manuals

UIC Well Revisions in Ecology's draft Stormwater Manuals

- Updated vadose zone treatment capacity tables
  - Specifies field tested saturated hydraulic conductivity
- Increased treatment for many of the pollutant loading/treatment capacity vadose zone combinations
- Prohibition of UIC wells in public water supply well sanitary control areas
- Added drinking Water well section requirements to the deep UIC well section

UIC Well Revisions in Ecology's draft Stormwater Manuals

- More specifics for deep UIC well requirements.
  - Infiltration testing
  - Vadose zone attenuation analysis
  - Well seal and sealing off perched zones
  - State waste discharge permit considered on a site-by-site basis
- Appeal UIC rule authorizations to the Pollution Control Hearings Board or superior court under Administrative Procedures Act
- Maintenance for deep drywells - cleanout choices exist. Bail, air or suction

Revisions to the UIC BMPs in Ecology's stormwater manuals

- Notification of UIC well proposals
  - Require UIC registration submittal at least 30 days prior to construction.
  - UIC proponent of deep injection well proposals located in well head protection area should notify/consult with water purveyor in design phase.
  - Ecology online search tool updated to list pending UIC well sites/proposed UIC wells.

WA UIC Program Contact

Mary Shaleen-Hansen
Washington Department of Ecology
P. O. Box 47600
Olympia, WA 98504-7600

Questions, call (360) 407-6143 or
maha461@ecy.wa.gov

Ecology's UIC website:
https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Underground-injection-control-program

Environmental Assessment Program

Environmental Assessment Program

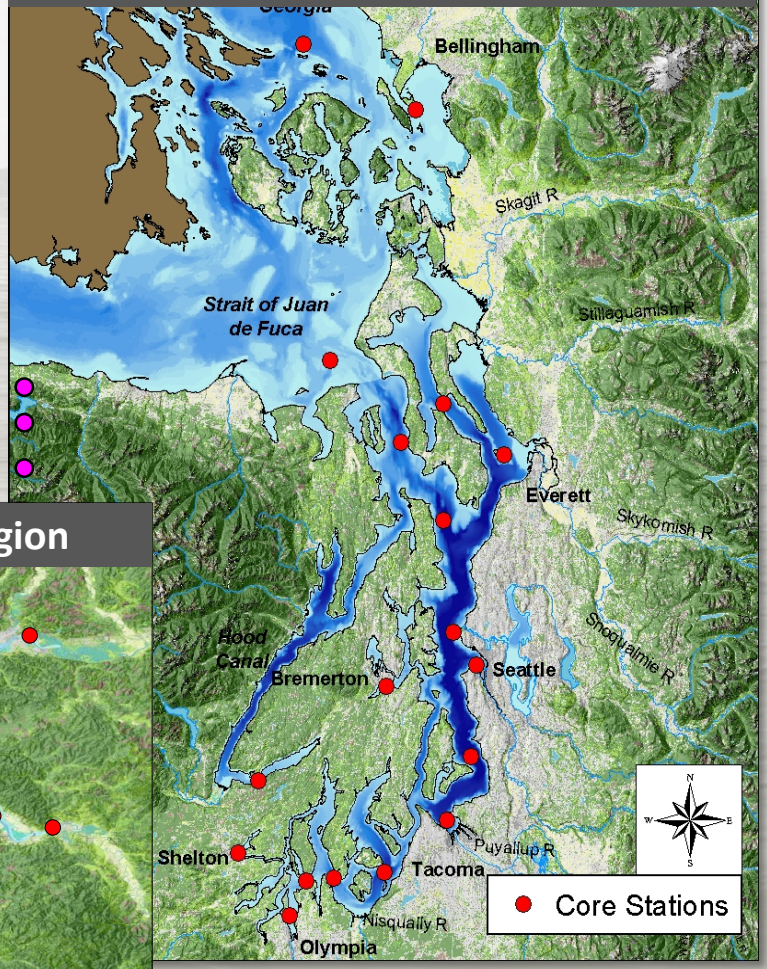
Our Environmental Assessment Program's mission is to measure, assess, and communicate environmental conditions in Washington.

EAP Environmental Monitoring

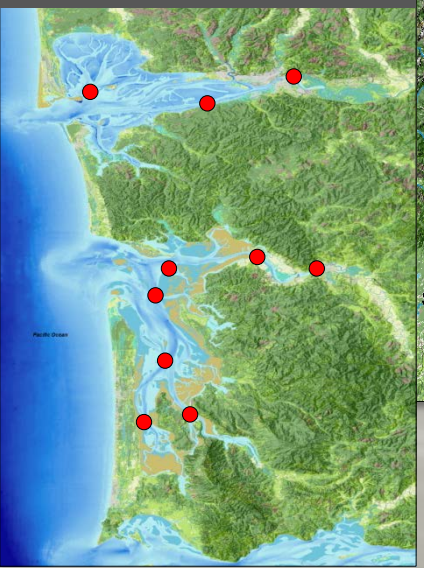
- We “take the pulse” of Washington State’s environmental conditions:
  - Puget Sound and Coastal
    - Marine waters
    - Marine beaches
    - Marine sediments
  - Rivers and Streams
  - Groundwater
  - Toxics cleanup sites

Monitoring Marine Waters: Reporting on Current Conditions & Long-Term Trends

Greater Puget Sound region



Coastal region

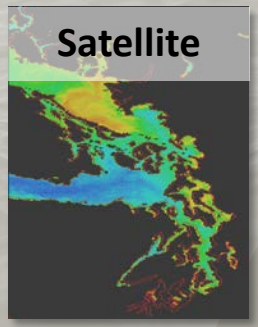


Water Quality variables measured monthly at 27 stations (monthly baselines 1999-2008)

Seaplane

Ferry

Satellite



Physical variables

- Temperature
- Salinity
- Density

Chemical variables

- Oxygen
- Nitrate
- Silicate
- Phosphate
- Ammonium
- Nutrient ratios
- pH

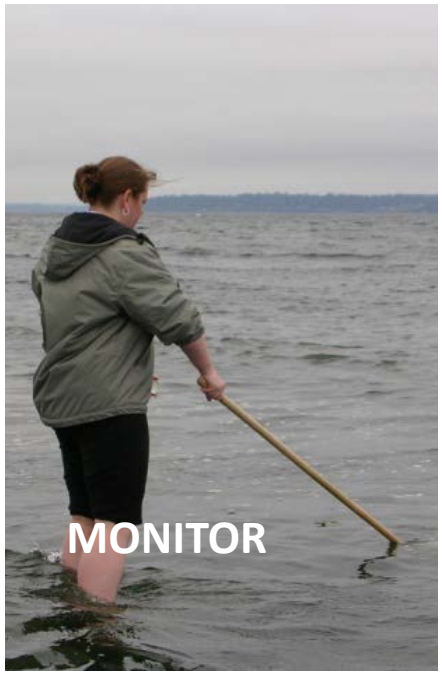
Bio-optical variables

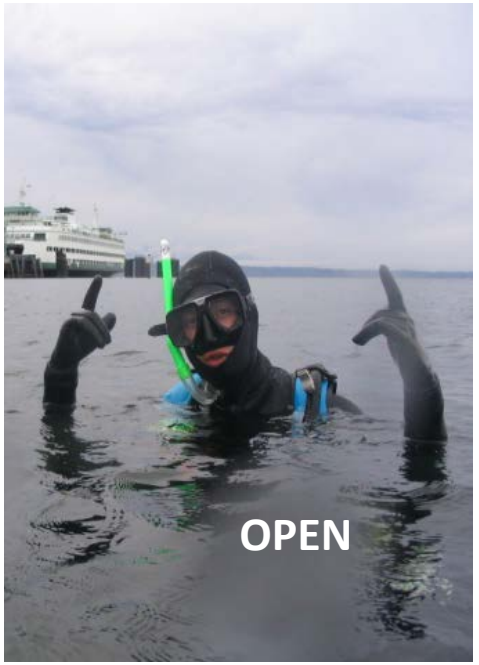
- Water clarity
- Chlorophyll a
- Euphotic depth

BEACH Program

Beach Environmental Assessment, Communication, & Health

Bacteria monitoring to protect surfers, swimmers, and other beach goers





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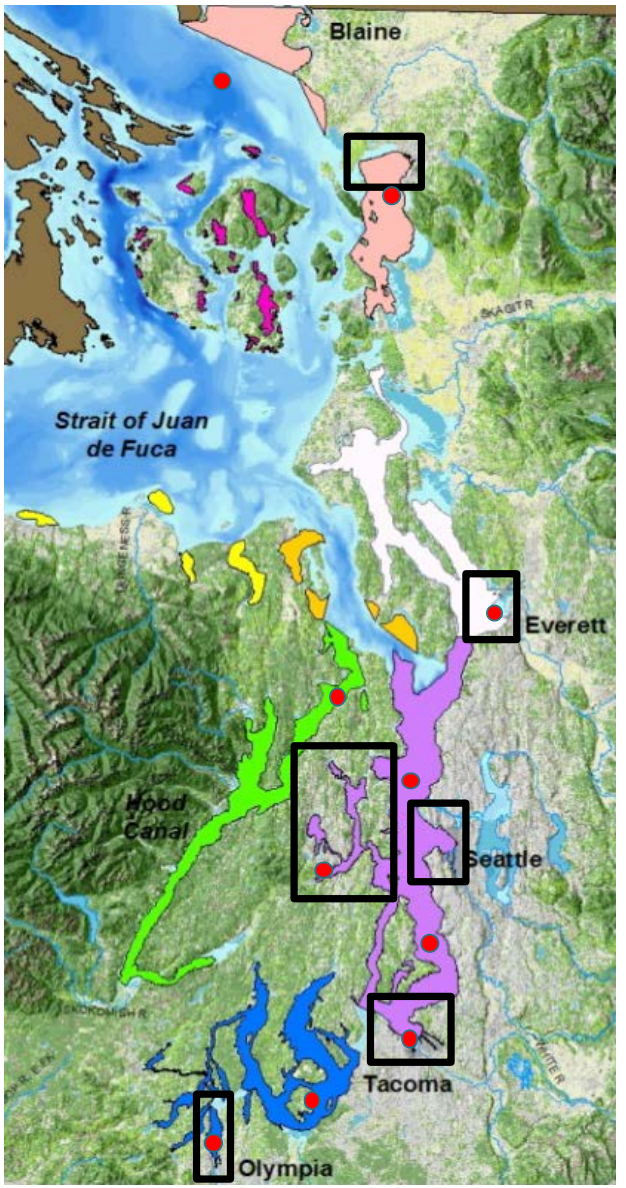
State of Washington

Washington State Department of Health

Sediment Monitoring

Assessing Puget Sound Sediment Quality since 1989 through analysis of:

- *Sediment Chemistry*
- *Toxicity Testing*
- *Benthic Invertebrate Communities*



Sampling:

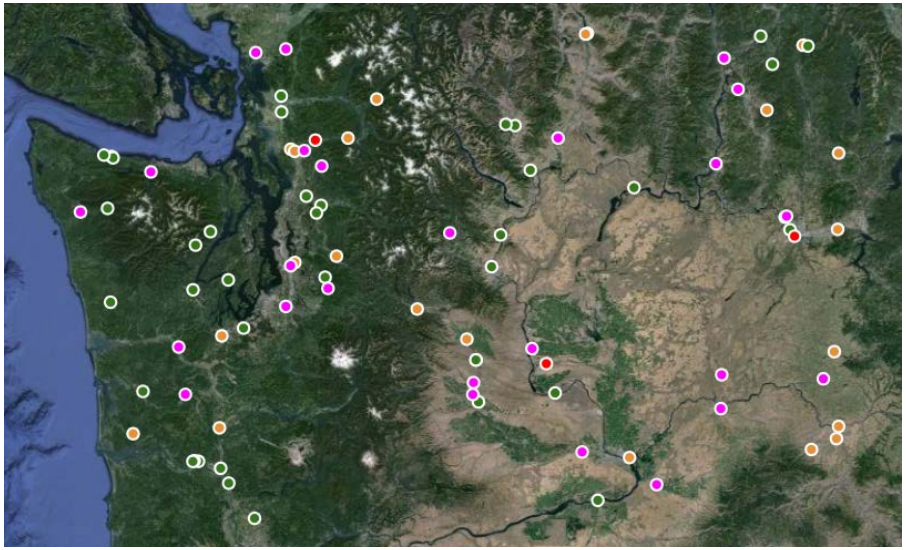
- 8 Regions
- 6 Urban Bays
- 10 Long-Term Stations

www.ecy.wa.gov/programs/eap/sediment

Blog:
Eyes Under Puget Sound

River & Stream Ambient Monitoring

- Monthly sampling at 62 long-term stations (typically major river mouths)
- Monthly sampling at 20 basin stations
- Nutrients, suspended sediment, turbidity, bacteria, temperature, pH, conductivity, oxygen, metals at select stations
- Continuous temperature and water quality metrics being developed



Bill Ward

Biological & Watershed Health Monitoring

Watershed Health Monitoring

Goal: To provide quantitative, statistically valid, & consistent estimates of the status & trends in physical, chemical, & biological conditions of Washington's rivers & streams.

Information collected

Water quality, stream flow, sediment, habitat, & biological health

Information usage

To support CWA, ESA, & salmon recovery efforts

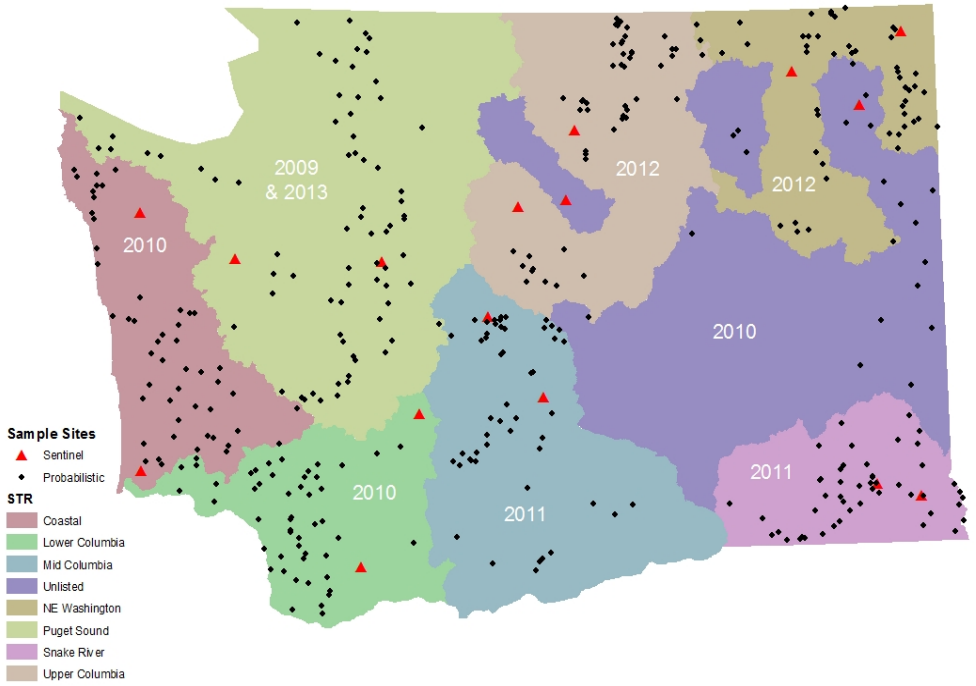
Monitoring Sites

8 Status & Trends Region (50 sites + 5 repeats/region and 16 Sentinel sites/year)

Funding

Environmental Legacy Stewardship Account (**$950,000/year**).

WHM Samples by Status and Trends Region (STR)



2009 - 2013
Sentinel – 16 sites
Watershed Health – 394 sites

Effectiveness Monitoring

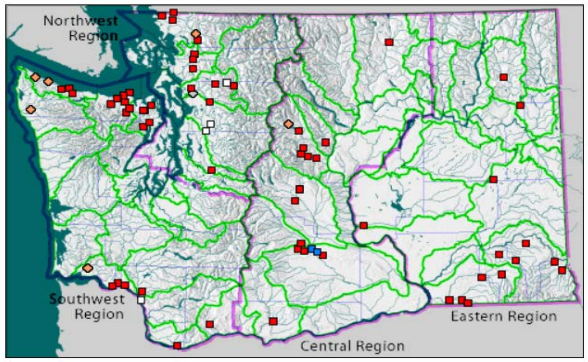
Goal: To measure the effectiveness of actions intended to improve water quality and/or environmental health.

Information collected

Water quality, stream flow, sediment, habitat, & biological health

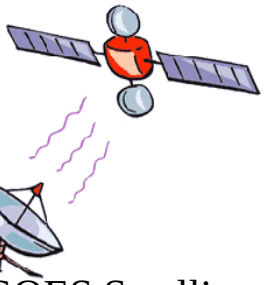
Information usage

To support decisions around which Best Management Practices are providing the greatest benefit.



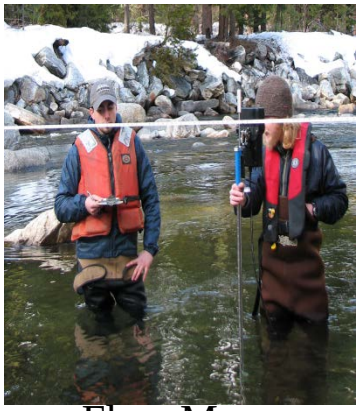
Ecology's Statewide Stream Flow Monitoring Network

EAP Stream Gage



GOES Satellite

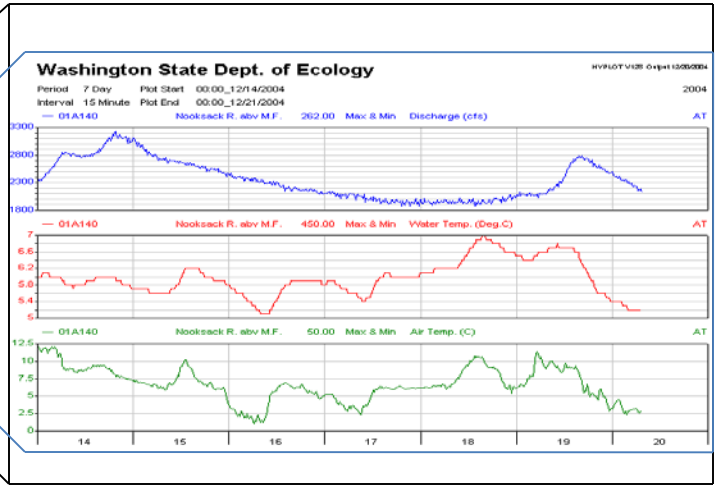
Ecology Staff



Stream Flow Measurements

ECY's Web Page

End User



Near Real-Time Stream Data

Streamflow Gaging

- River Stage -15 Minutes
- Data is transmitted on 1-3 hr cycle

Groundwater

Agricultural Nutrient Studies & Technical Support

- Long-term monitoring of nitrate conditions in the Sumas-Blaine Aquifer in Whatcom County and Lower Yakima Valley,
- Confined Animal Feeding Operations literature review

Support for freshwater Studies

- Characterizing groundwater / surface water interactions in support of water quality studies.

Toxics Monitoring Programs

Freshwater Fish Contaminant Monitoring Program

- Exploratory (5-10 sites annually)
- Trends (1-2 watersheds per year)

Persistent Bioaccumulative Toxics Monitoring Programs

- Lead Trends (12 freshwater sites/2x per year)
- Mercury Trends (6 sites/year)
- Contaminant Trends in Sediment Cores (3 lakes/year)
- Product Testing
- Emerging Chemicals

Focused Studies

- TMDLs
- CAPs
- Stormwater Studies
- Specific projects to support agency initiatives

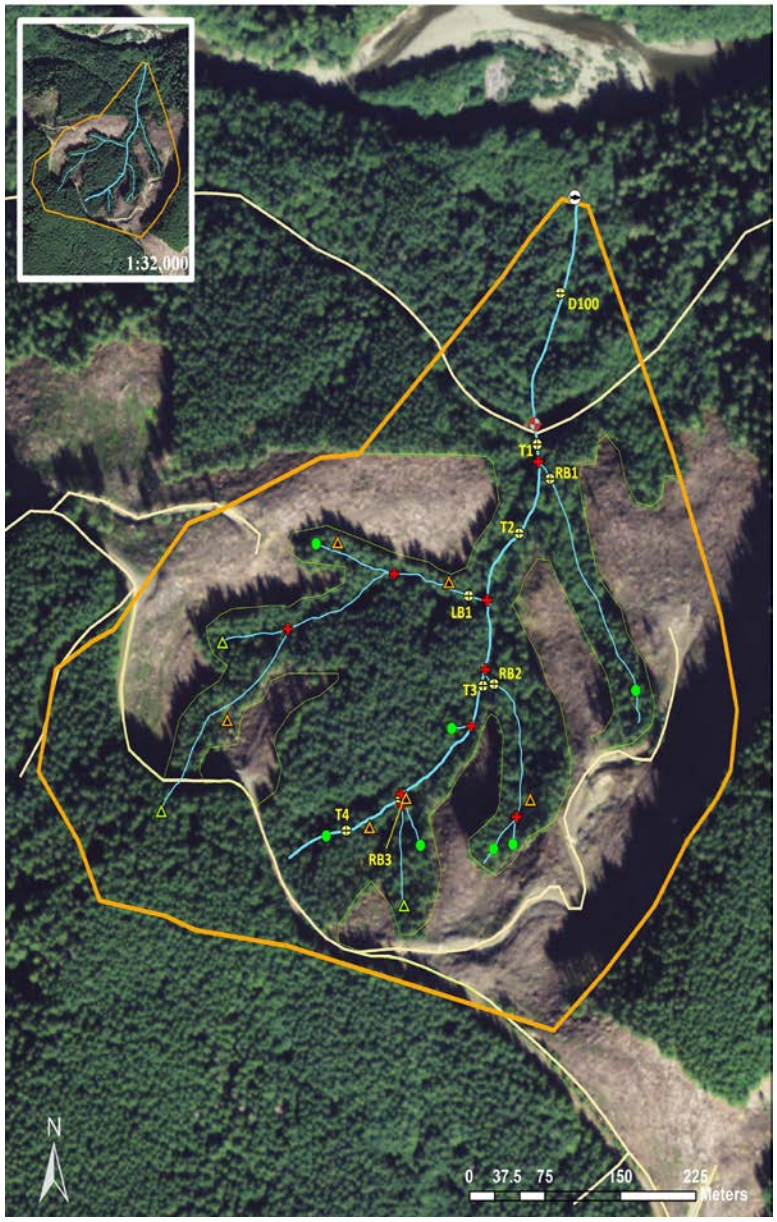
Forests & Fish

Forest Practices Effectiveness Monitoring

- We design & conduct rigorous scientific studies of the effectiveness of water quality-related forest practices.

EAP's role

- Principal investigators on projects
- Conduct field work to estimate effects on stream temperature, nutrient & sediment export, & turbidity
- Data analysis & reporting
- Advise on study design & data analysis



Modeling & TMDL
Example: Total Maximum Daily Load Studies.
TMDLs need supplemental data & models to diagnose unique problems

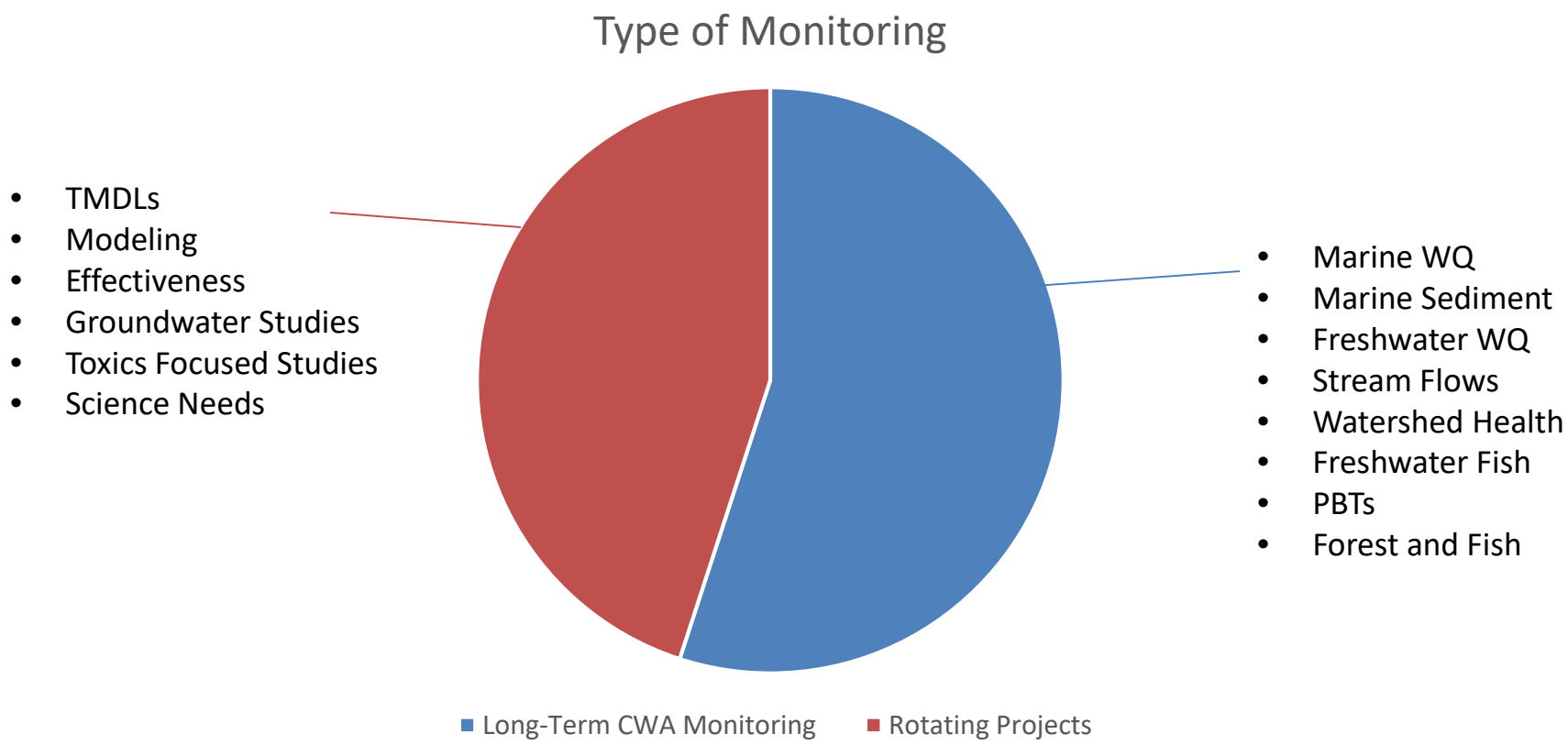
- Ambient data – *checking the pulse*
- Supplemental data – *CAT scans*
- Models – *adjusting controls in a flight simulator*

TMDLs drive multi-million dollar decisions

Manchester Environmental Laboratory and Laboratory Accreditation Unit

- Located near Manchester, WA (near Port Orchard)
- Lab: 26 Full time staff of chemists, scientists and support.
- Lab Accreditation: 6 staff.

Project Selection



- TMDLs
- Modeling
- Effectiveness
- Groundwater Studies
- Toxics Focused Studies
- Science Needs

- Marine WQ
- Marine Sediment
- Freshwater WQ
- Stream Flows
- Watershed Health
- Freshwater Fish
- PBTs
- Forest and Fish

Project Selection Process

Regulatory client solicitation → Identify carryover work → Identify capacity → Regulatory clients prioritize work → Fit priorities to: 1) Capacity 2)Expertise 3) Lab budget → Finalize project list

Environmental Assessment Program

Evaluation of Low-Level Field Sampling Methods for PCBs and PBDEs in Surface Waters

William Hobbs
Environmental Assessment Program

Study Intent

To evaluate 3 field methods of actively sampling ambient waters (not effluents) for low levels of two bioaccumulative toxics (PCBs and PBDEs).

Why?

- PCBs and PBDEs bioaccumulate. They are very low in surface waters, but can accumulate to harmful levels in fish.

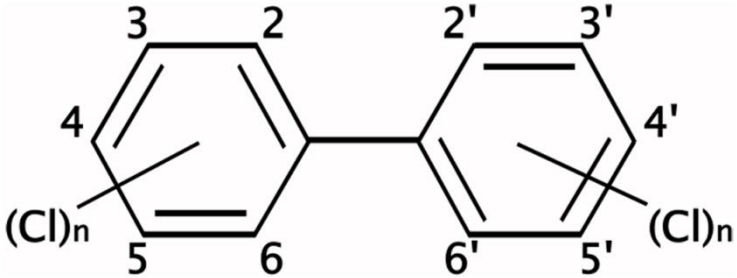
- We use multiple field methods to measure PCBs and PBDEs – this study tests the efficacy of 3 methods.

Study proposed and designed internally to improve our ability to measure low concentrations of PCBs and PBDEs.

Parameters of Interest

PCBs (Polychlorinated biphenyls)

- consists of 209 congeners (compounds)
- 'Aroclor' mixtures are the US tradename (e.g. Aroclor 1254 = 54% chlorine)
- created as an electrical insulating fluid
- banned in the 1970s
- generally hydrophobic; lipophilic
- move around the environment by volatilization, spills to land and water, and accumulation in organisms

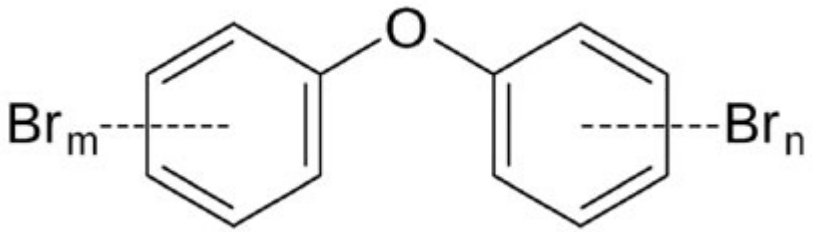


Basic structure: 1 to 10 Chlorine atoms

Parameters of Interest

PBDEs (Polybrominated biphenyls)

- consists of 209 congeners (compounds)
- manufactured as flame retardants
- used in a large variety of products (e.g., plastics, furniture, upholstery, electrical equipment, and textiles)
- manufacturers of PBDEs voluntarily ceased production of octa- and deca-BDEs in 2004 following human health concerns
- generally hydrophobic; lipophilic = bioaccumulation
- generally discharged from urban sources



Basic structure: 1 to 10 Bromine atoms

Methods: Lab and Field

Field	Type
Discrete grab sample	Active-instantaneous
Composite grab sample (manually or automated)	Active-composite
Centrifugation (sediment and water sampling)	Active-continuous/ composite
In situ solid-phase extraction	Active – continuous
Low-density polyethylene	Passive
Semi-permeable membranes	Passive
Polyoxymethylene	Passive
Polydimethylsiloxane/solid-phase microextraction	Passive

Laboratory (PCBs)
EPA 1668
SW-846 8082
608

- The field sampling method does not dictate the laboratory method.
- The laboratory method is based on the needs of the sampling program.

Methods: Lab and Field

PCBs

Method	Resolution	Detection Limits	Sample Volume
EPA 1668	Congeners	0.2 pg/L per congener	1-2 liters
SW-846 8082	Aroclors	500 – 1,000 pg/L per Aroclor	1-2 liters
608	Aroclors	500 – 1,000 pg/L per Aroclor	1-2 liters

PBDEs

Method	Resolution	Detection Limits	Sample Volume
EPA 1614	Congeners	0.2 pg/L per congener	1-2 liters
EPA 8270	Homologs or groups of congeners	~1,000 pg/L per congener	1-2 liters

Methods: Lab and Field

High-resolution (congener) methods necessary to measure at low concentrations and characterize PCB-PBDE congeners

- Analysis by a contract lab
- Internal validation of analysis and results
- Extensive quality assurance/quality control program

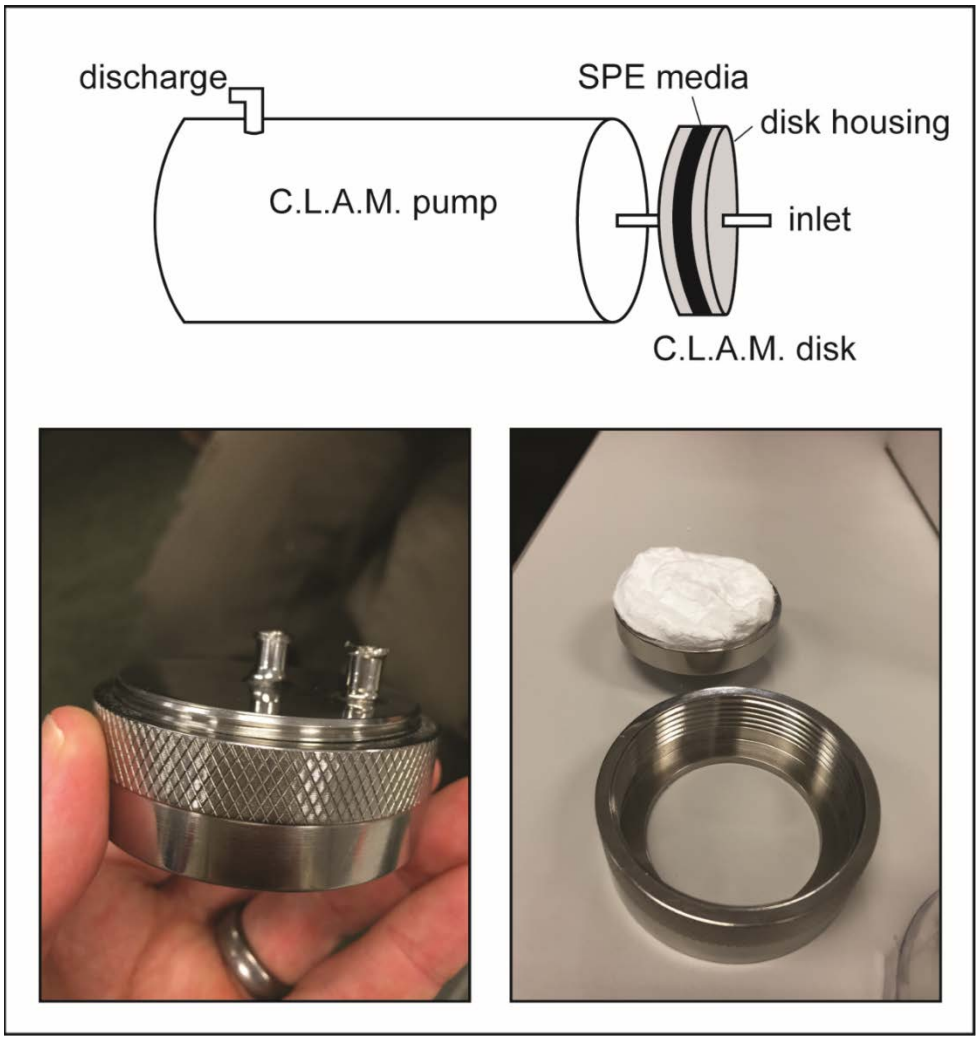
Methods: Lab and Field

Main objective of study to test efficacy of field methods

3 sample methods tested:

- *In situ* pumps with extraction media
- Large volume (20L) composite grab sample – extraction in the lab
- High flow centrifuge system with collection of water

In Situ SPE



- Pulls a known volume of water through solid-phase extraction media to bind PCBs.
- 15 to 42L of water continuously sampled over 8-46hr period.

SPE = solid-phase extraction media

Centrifugation

Sediments and water separated and measured for PCBs and PBDEs.

1,700 to 8,300L of water sampled over 8-46hr period.

Composite Grab Sample

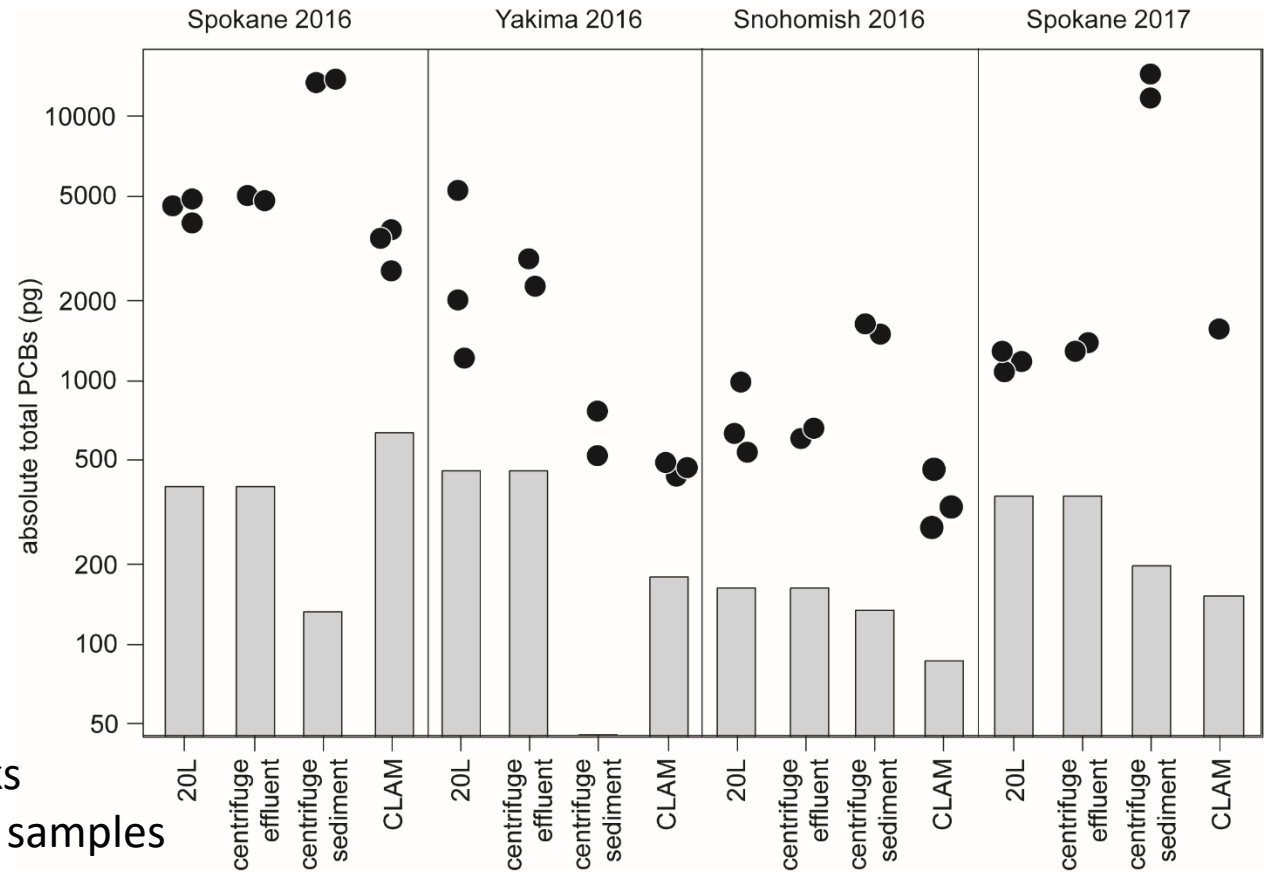
20L stainless steel keg

- 10-12 aliquots (~2L)
- 20L of water sampled over 8-46hr period.
- Extracted using XAD resin or liquid-liquid extraction by aliquots

Findings

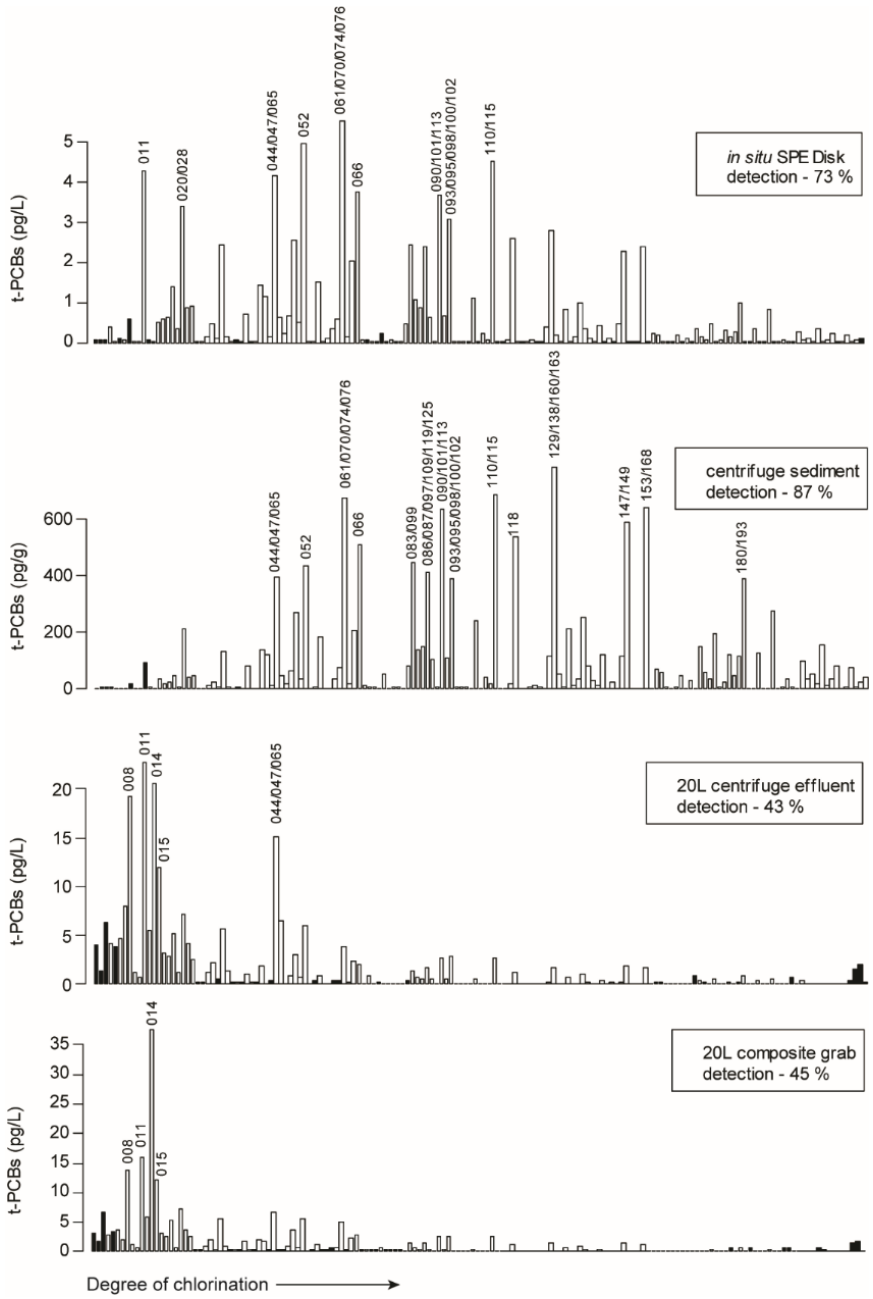
- A rigorous quality assurance program is necessary to account for lab and field contamination of equipment and media.

- Informs us about how sensitive the method is.



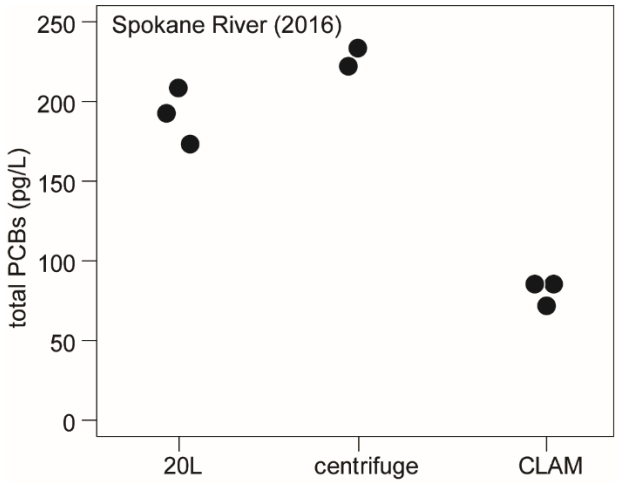
Grey bars = blanks
Black dots = field samples

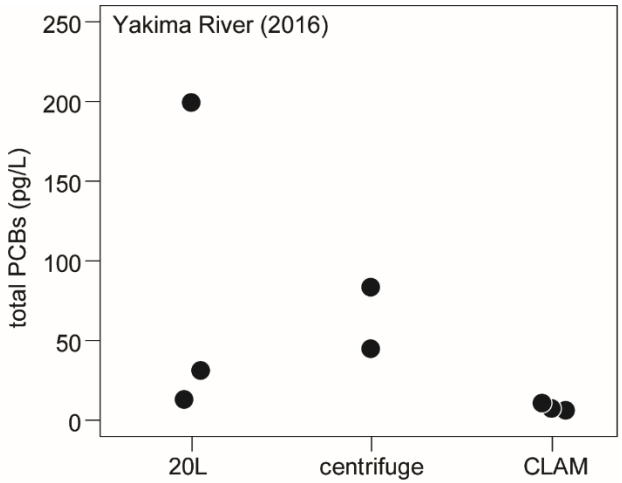
Findings

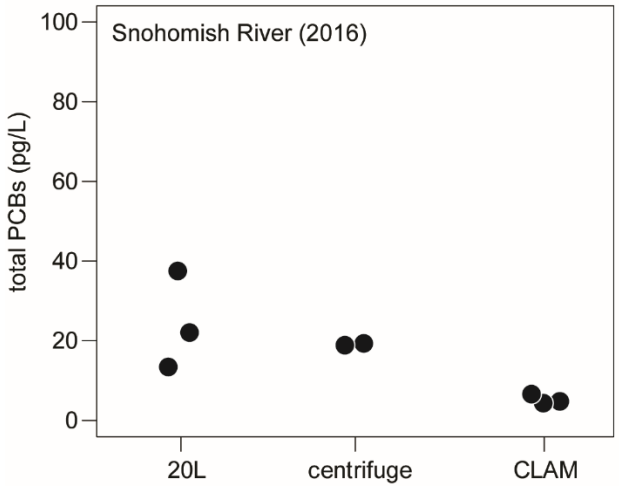


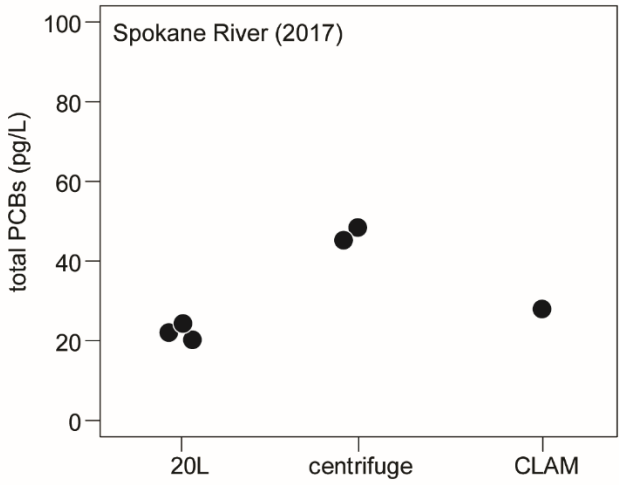
- Not all field methods are able to capture the same thing.
- Informs us of possible sample bias.

Findings





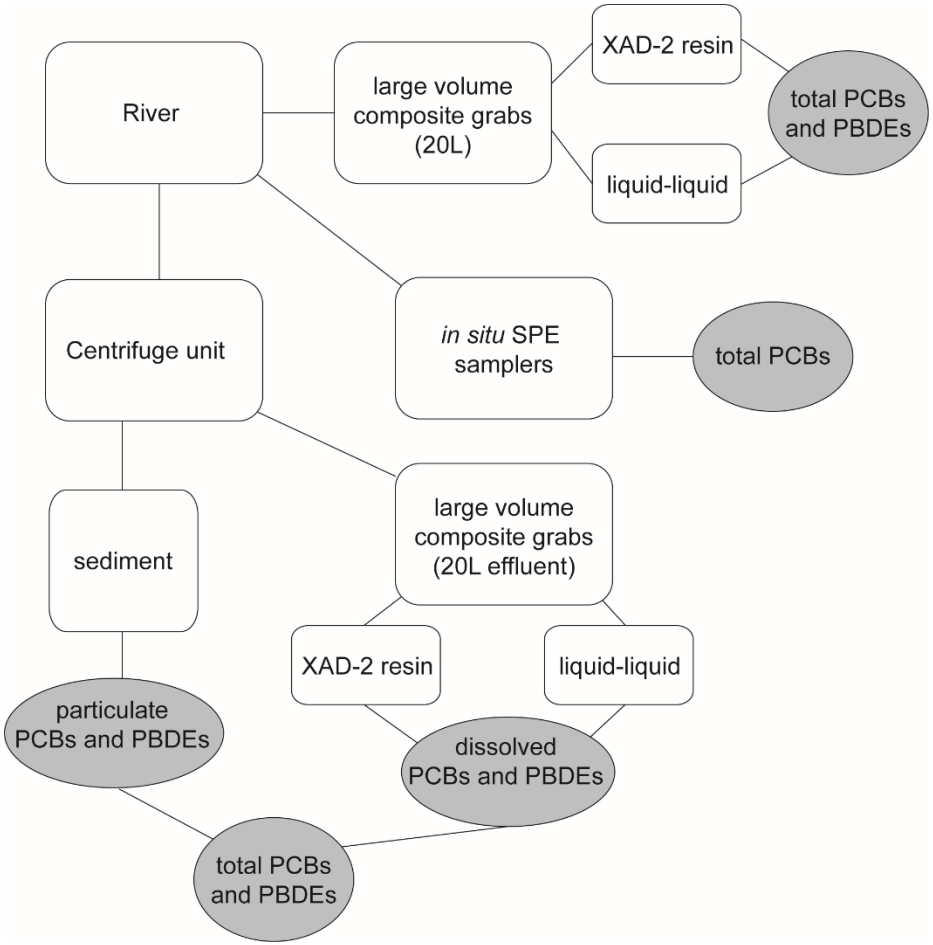




- The precision of measured PCBs and PBDEs among the field methods varies.
- Generally the precision within a method was good.

Summary

What was the intent (goal) of this report?



- To evaluate 3 field methods of actively sampling ambient waters (not effluents) for low levels of PCBs and PBDEs.

Summary

Why was the study completed?

- PCBs and PBDEs bioaccumulate. They are very low in surface waters, but can accumulate to harmful levels in fish.

- EAP currently uses a number of methods to measure PCBs and PBDEs in surface waters – this study evaluates 3 of those methods.

- Evaluation included blank contamination (sensitivity), representativeness among methods (bias), and replication (precision).

Summary

What did you find and how will it be used?

- Source identification – *in situ* SPE disks are reliable
  - Discrete grab samples and passive sampling methods can be considered.
- Large composite methods are reliable only when concentrations are well above analytical reporting limits and background contamination.
  - Discrete water samples can also be considered
- This study will be used internally to inform EAP in monitoring Washington's rivers and lakes.

Questions

William Hobbs
Toxic Studies Unit, Environmental Assessment Program
whob461@ecy.wa.gov
360-407-7512

Updates:

Vince McGowan
Melissa Gildersleeve

Closing Wrap Up:

Heather Bartlett