



DEPARTMENT OF
ECOLOGY
State of Washington

Turning Uncertainty into Action: Bringing applied research to the street

2024 ACWA National Stormwater Roundtable

October 24, 2024

Introductions



Chelsea Morris
Stormwater Scientist



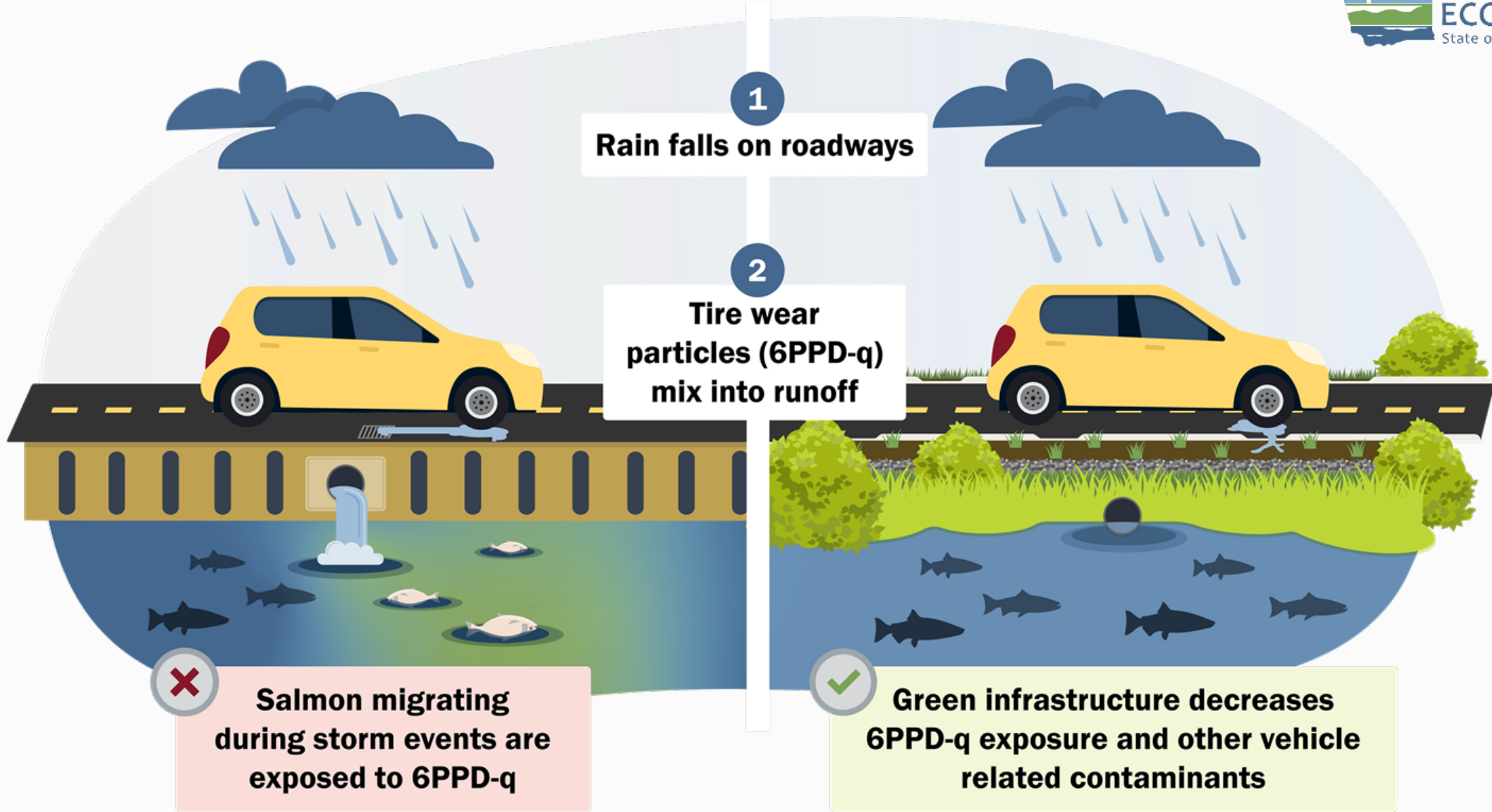
Abbey Stockwell
Municipal Stormwater Permit
Writer



What is 6PPDQ?

Photo: Coho returning to spawn
(courtesy of USFWS, 2018)





Aquatic Organisms

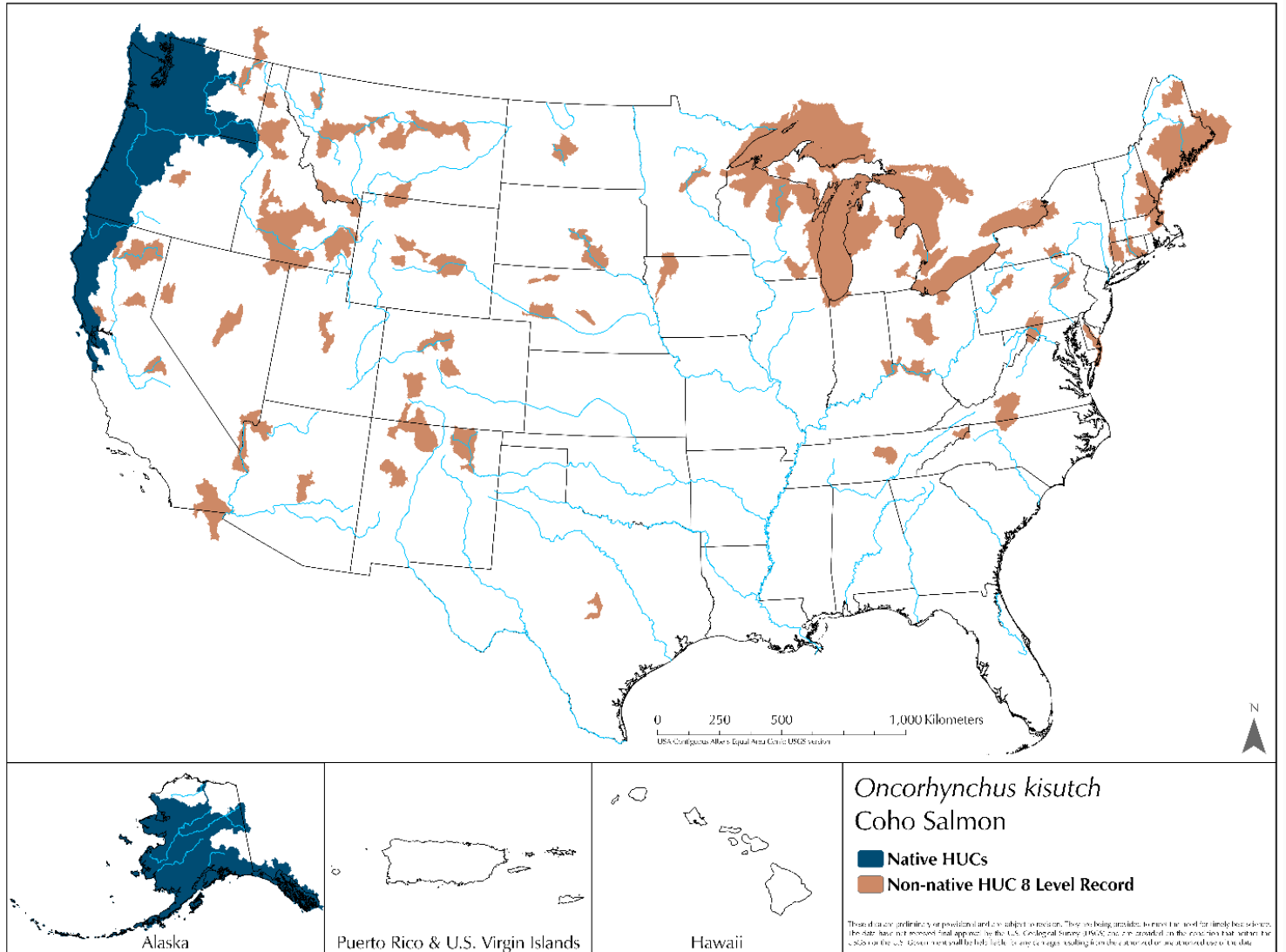
- Most studies have focused on acute toxicity to fish
- Closely related fish have different responses
- Disruption of the blood-brain barrier¹

¹Greer et al 2023

Data Table: McIntyre et al., 2022
Memo for 6PPD Proviso,
Brinkmann et al., 2022

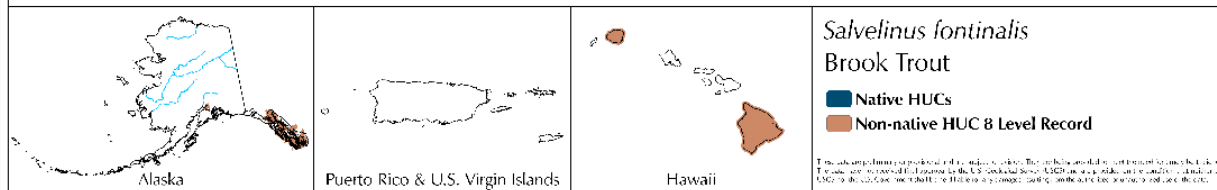
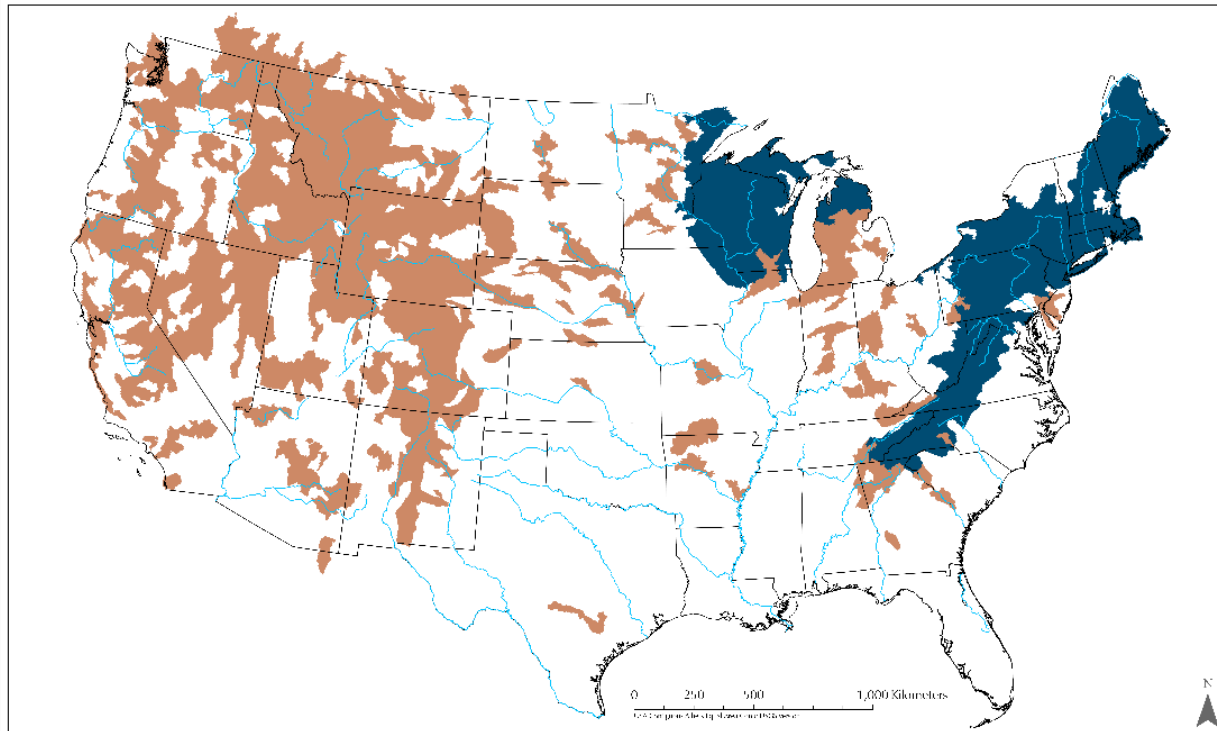
Common Name	LC ₅₀ (µg/L)
Coho salmon	< 0.10
White-spotted char	0.51
Steelhead/rainbow trout	0.60
Brook trout	0.59 – 1.00
Chinook salmon	> 10.00
Sockeye salmon	> 10.00
Zebrafish	> 10.00
Arctic char & white sturgeon	Not acutely toxic at 14.20

Distribution of Species

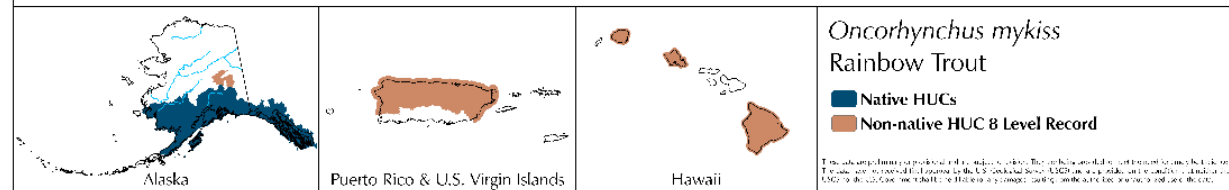
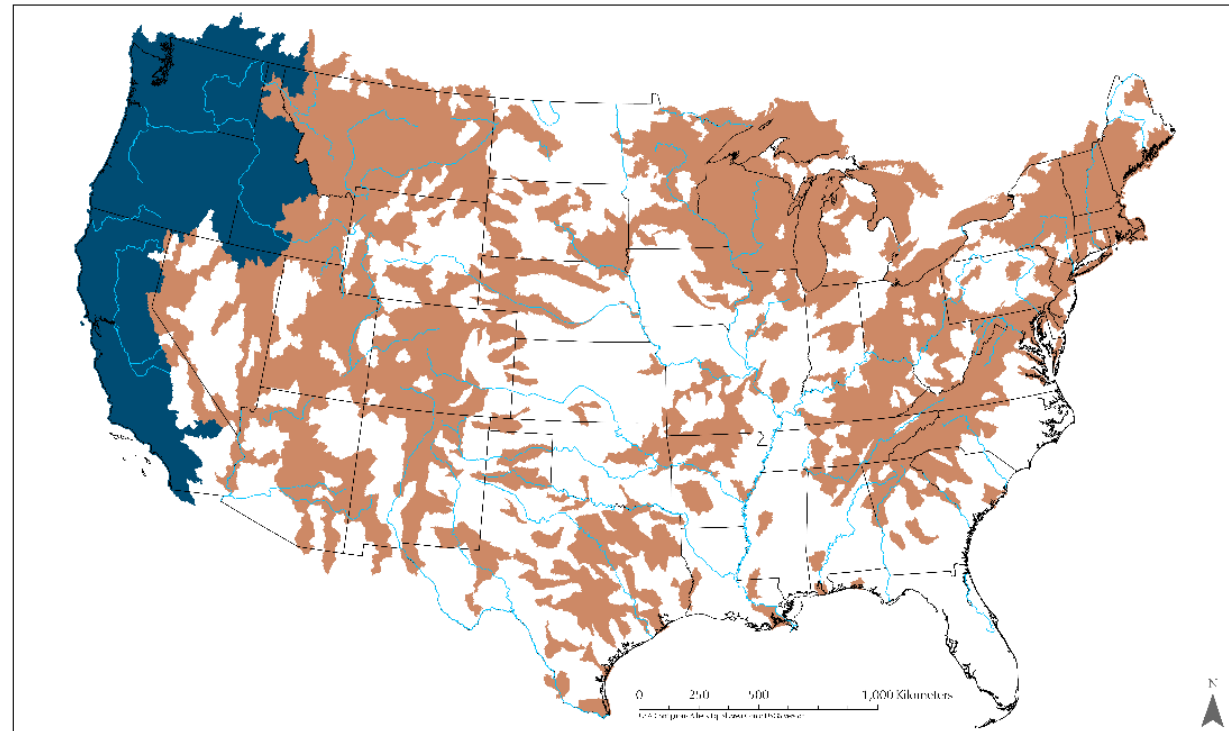


Coho salmon,
USGS

Distribution of Species



Brook trout, USGS



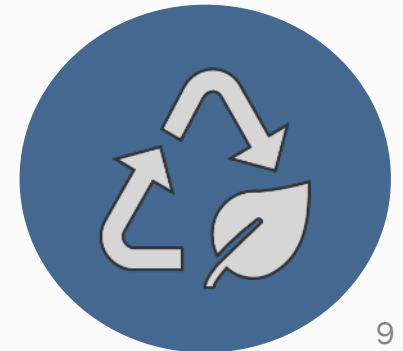
Rainbow/steelhead trout, USGS

What do we do about 6PPDQ?



Ecology's Agency Strategy

- Reducing sources of 6PPD and evaluating safer alternatives
- Mapping and monitoring to support stormwater planning
- Researching and implementing stormwater best management practices (BMPs)
- Beginning to evaluate tire recycling and disposal impacts



Literature review describing potential BMP effectiveness¹

Source Control BMPs



High Potential:
Street sweeping,
cleaning roadside ditches,
catch basins, storm drains

Medium Potential:
Education and outreach

Flow Control BMPs



High Potential:
Bioretention, infiltration
basins

Medium Potential:
Detention ponds, permeable
pavement

Runoff Treatment BMPs



High Potential:
Sorbent media, bioretention
soil mix, media filters

Medium Potential:
Sand filters

¹[Navickis-Brasch, et al., 2022](#)

Our Research Projects

21 contracted research projects

- Developing sampling and analytic methods
- Stormwater characterization for different land uses
- Testing BMP Effectiveness
- Testing runoff from crumb rubber mulch or turf

Street Sweeping Projects

City of Redmond – Monitoring contaminant reductions in receiving waters due to street sweeping

City of Seattle – Estimating load of 6PPDQ removed with street sweeping

Pierce County - Full-scale decant facility removal of 6PPDQ, including assessing the effectiveness of granular activated carbon

Bioretention Projects

King County – Testing 4 High Performance Bioretention Soil Mixes (HPBSM) testing



WSU-Puyallup – Testing the longevity of bioretention media



King County - Testing high performance bioretention soil media at a full-scale facility

Spokane – Testing high performance bioretention soil media at a full-scale facility without plants

Photo: Shelby Giltner



Sorption Studies & Other Treatment Projects

UW-Tacoma – Compared the contaminant capture of engineered medias, commercial sorbent components, and simplified soils



Herrera – Testing influent and effluent with proprietary devices for removal of 6PPD-q in Seattle and Portland

EA Engineering - Comparing the persistence and reduction of 6PPDQ in unamended and amended soils and evaluating potential uptake in vegetation

Snoqualmie Tribe - Characterizing parking lot runoff and assessing the effectiveness of floating wetlands, swales, and native vegetation

What is the End Goal?

- Continue to share research findings publicly, e.g. [6PPD Stormwater Research](#)
- Update [Stormwater Management Manuals](#) with effective BMPs
- Update [Stormwater Permits](#) with effective requirements

Municipal Stormwater Permits

What's new in 2024 permits





Phase I

Western
Phase II

Eastern Phase
II

Municipal Stormwater Permits

Permit History

Phase I

(Issued 1995,
reissued 2007, 2012,
2019, 2024)

- King, Snohomish, Pierce, & Clark Counties; Cities of Seattle & Tacoma

Western WA Phase II

(Issued 2007,
reissued 2012, 2019,
2024)

- 85 cities and parts of 5 counties

Eastern WA Phase II

(Issued 2007,
reissued 2012, 2019,
2024)

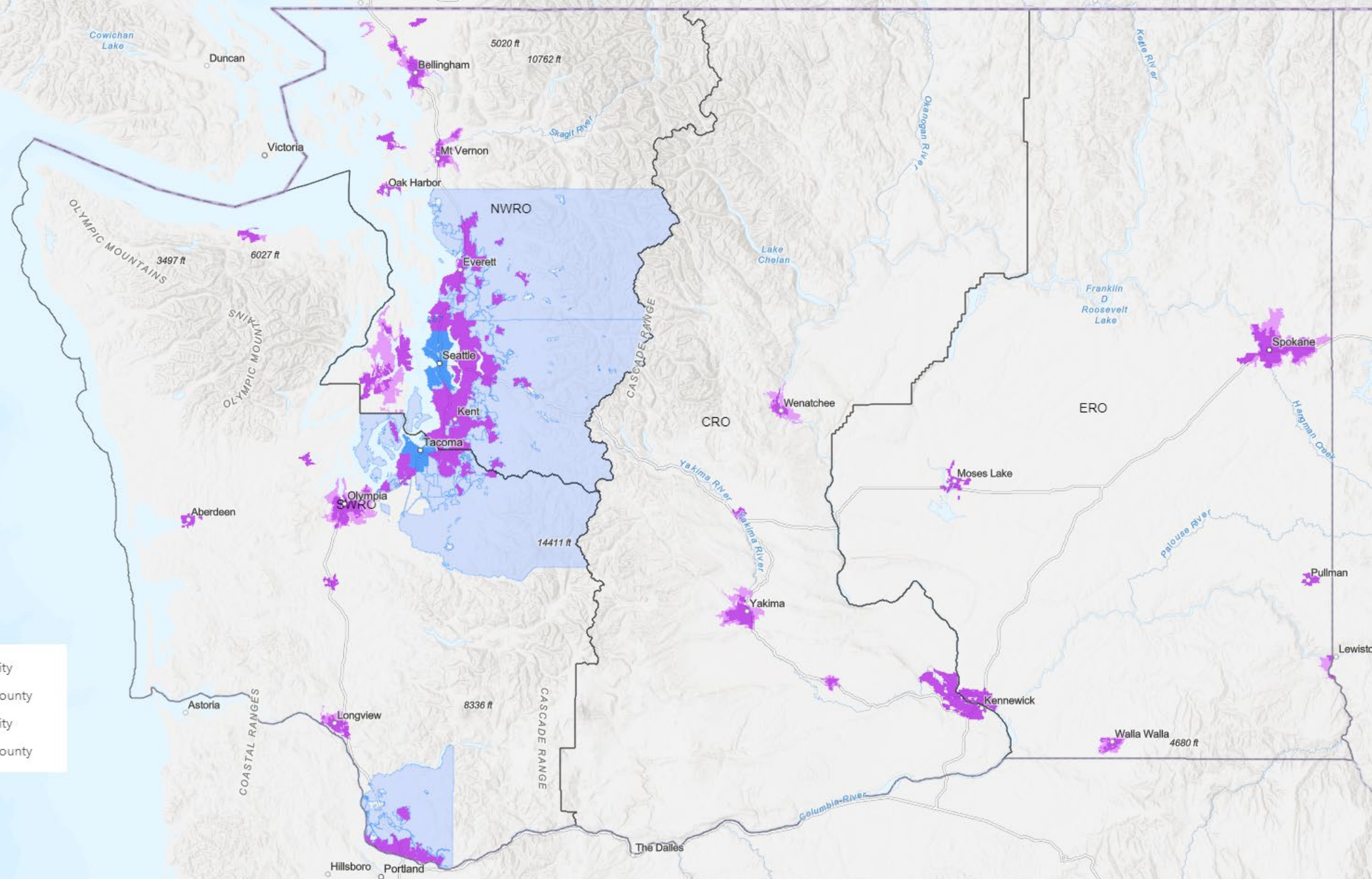
- 19 cities and parts of 6 counties

Phase I&II permits
include **Secondary
Permittees**

- 47 Ports, Schools, Irrigation Districts, etc.



-  phase1, city
-  phase1, county
-  phase2, city
-  phase2, county



Stormwater Management Program



Stormwater Planning

Mapping

Public Education & Outreach

Public Involvement

Illicit Discharges Detection & Elimination (IDDE)

Controlling Runoff from New Development

Stormwater Management for Existing Development (SMED)

Source Control for Existing Development

Operations & Maintenance (O&M)

Total Maximum Daily Loads (TMDLs)

Monitoring & Assessment



2024 Significant Updates

- Address tire wear research findings
- Update Stormwater “Retrofit” programs
- Enhance Source Control requirements
 - Street sweeping program
 - PCBs in building materials
 - PFAS in firefighting foams

Address road runoff

Tire wear research





Stormwater Planning and Source Control

- Planning for high traffic areas
- Sweeping requirements

Lower thresholds = more required controls





Stormwater Management for Existing Development



Enhance Source Control requirements

Street sweeping program

PCBs in building materials

PFAS

Street Sweeping



For Water Quality

Source control for PCBs in building materials

- Preventing movement of PCB's from buildings into stormwater
- Target: Exterior building materials for those built between 1950-1980



A firefighter in full gear, including a yellow helmet and dark uniform with reflective stripes, is shown from the side, spraying a thick stream of white foam onto a damaged vehicle on a road. The vehicle is heavily charred and partially obscured by the foam. The background shows a road with white lane markings and some greenery. The overall scene is dimly lit, suggesting an overcast day or a shaded area.

Source Control – PFAS management

Key Takeaways

- Ongoing research is helping **fill the many knowledge gaps** and inform sound policy and technical decisions
- Close coordination between research and regulators creates a streamlined response and builds confidence in BMPs to address problem



Questions?



ADA Accessibility

The Department of Ecology is committed to providing people with disabilities access to information and services by meeting or exceeding the requirements of the Americans with Disabilities Act (ADA), Section 504 and 508 of the Rehabilitation Act, and Washington State Policy #188.

To request an ADA accommodation, contact Ecology by phone at 360-407-6831 or email at ecyadacoordinator@ecy.wa.gov. For Washington Relay Service or TTY call 711 or 877-833-6341. Visit [Ecology's website](#) for more information.

For more information:

Madison Rose Bristol

6PPD Stormwater Planner

madison.bristol@ecy.wa.gov