

# Roads to Sea

Rhea Smith

Toxics Studies Unit

Environmental Assessment Program

April 27, 2022



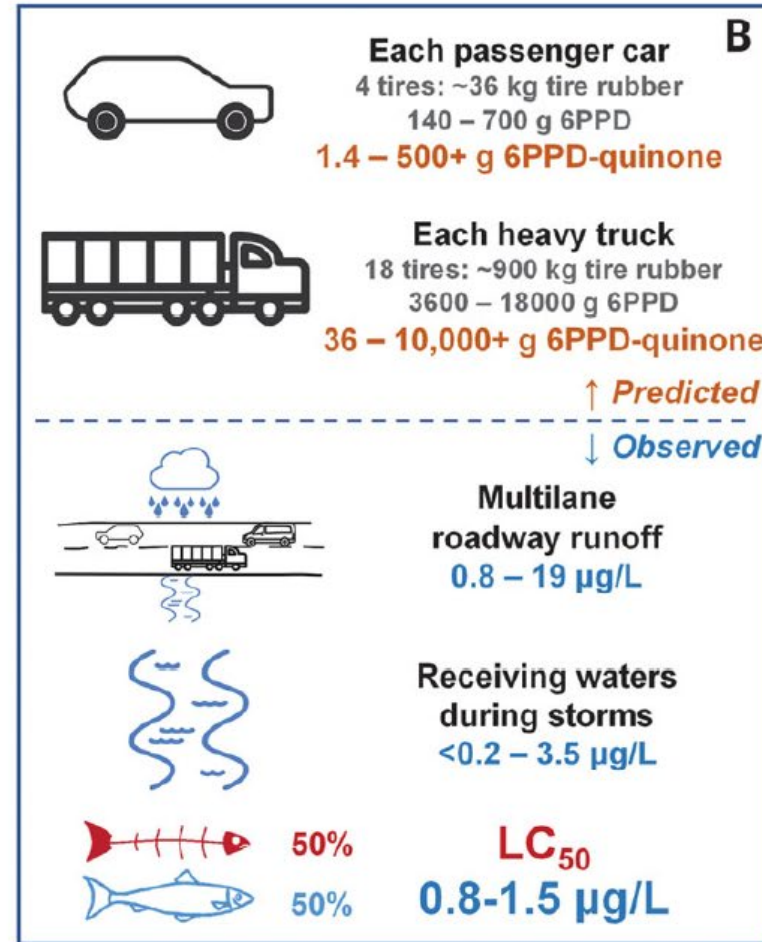
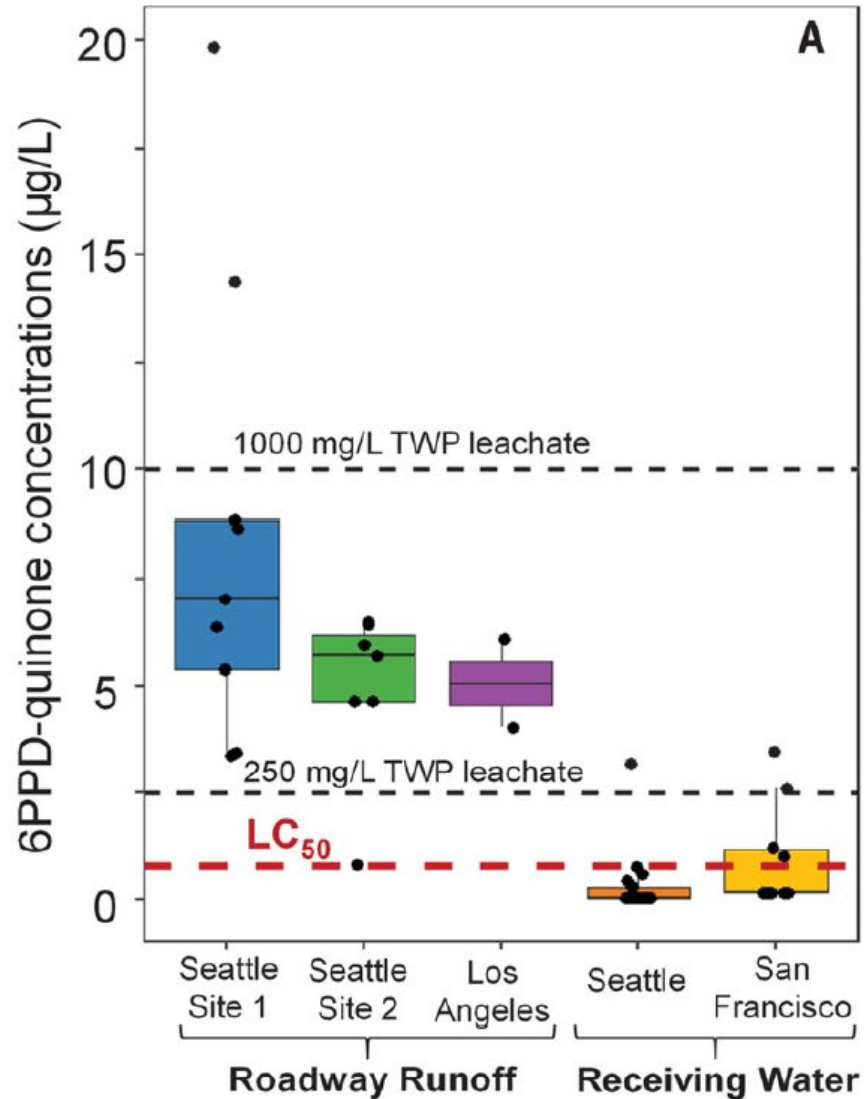
DEPARTMENT OF  
**ECOLOGY**  
State of Washington



# Table of Contents

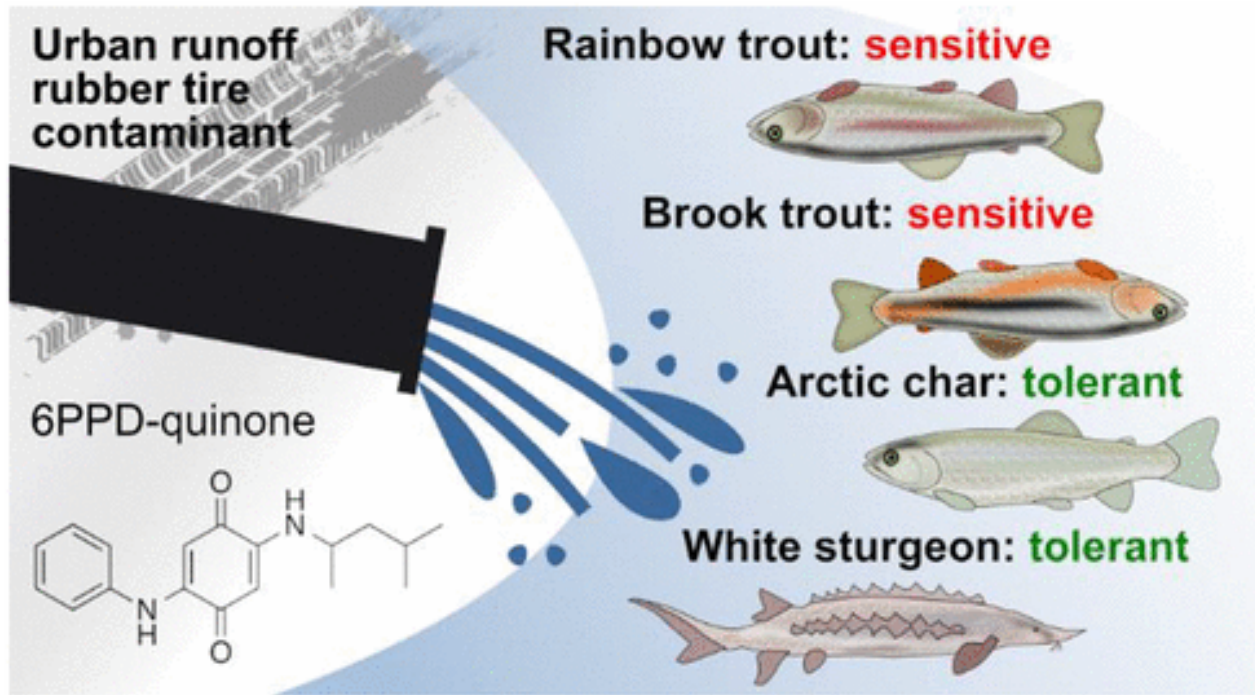
- 1 Problem: Toxic Tire Chemicals
- 2 Process: Research to Action
- 3 Report: Model Toxics Control Act Proviso
- 4 Research: 6PPD Data Visualization
- 5 Research: Monitoring Strategies
- 6 Response: Ecology Wide

# The Problem: Toxic Tire Chemicals

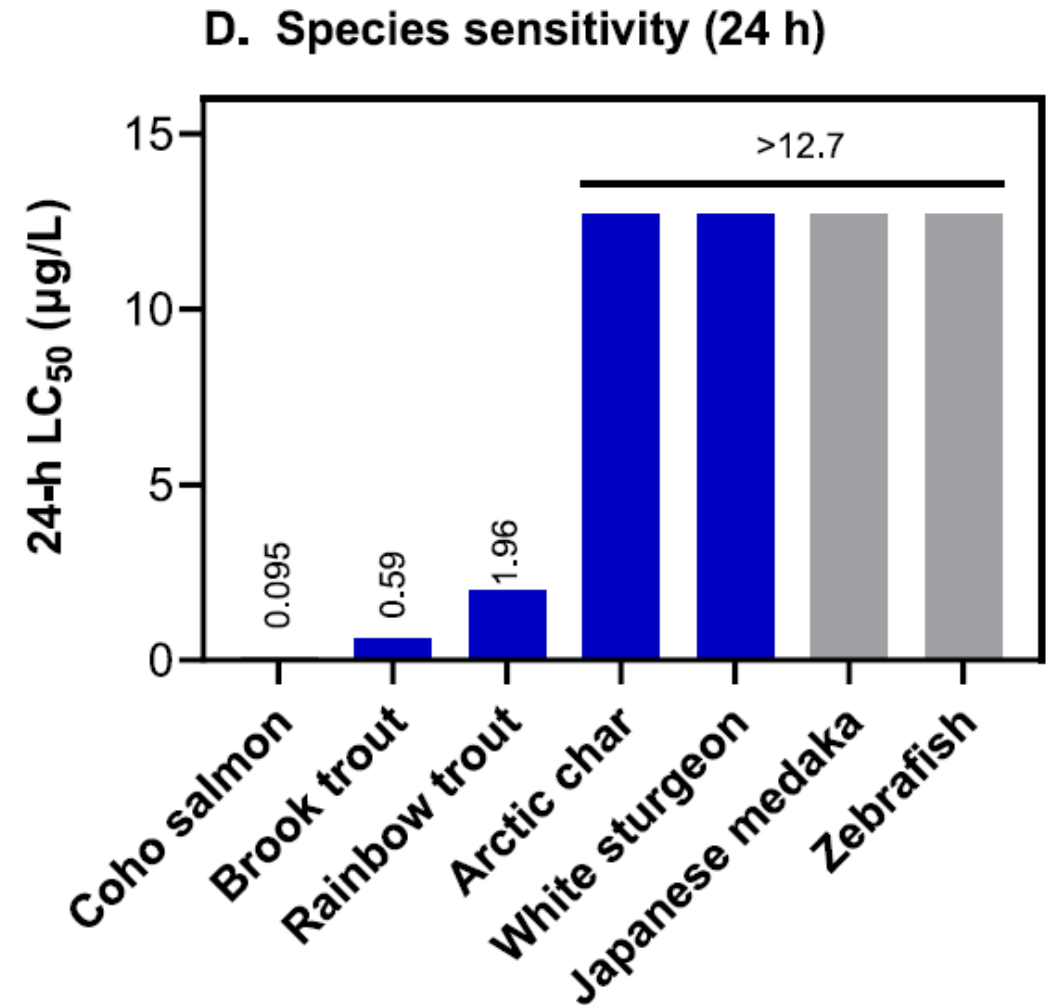


Tian et al. 2020, 2022

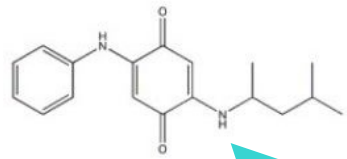
# Variable Sensitivities to 6PPD-Quinone



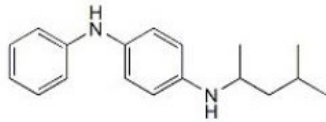
*Brinkmann et al. 2022*



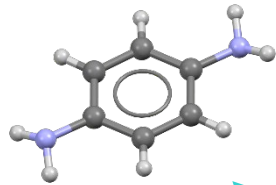
# The Problem: “We live in a chemical world”



6PPD - Quinone -  $C_{18}H_{22}N_2O_2$



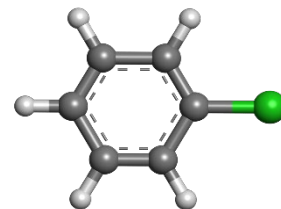
6PPD - ( $N^1$ -(4-Methylpentan-2-yl)- $N^4$ -phenylbenzene-1,4-diamine) -  $C_{18}H_{24}N_2$



PPD - p-Phenylenediamine -  $C_6H_4(NH_2)_2$



PNCBO - 4-Nitrochlorobenzen -  $ClC_6H_4NO_2$

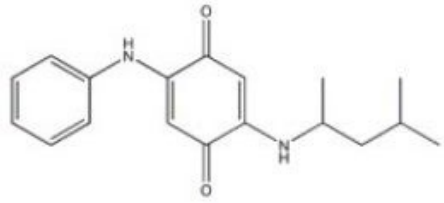


Chlorobenzene -  $C_6H_5Cl$

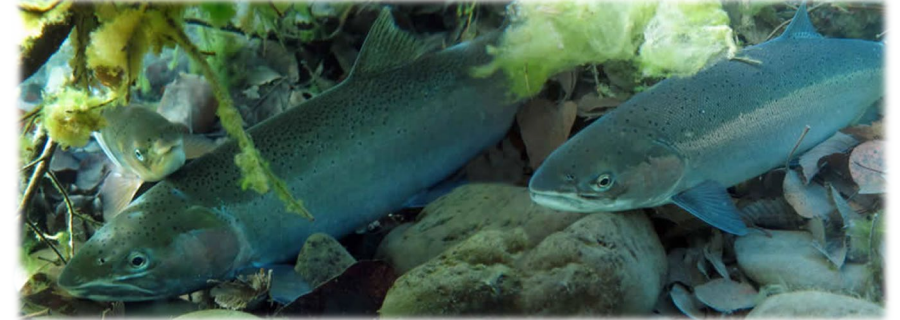


DEPARTMENT OF  
**ECOLOGY**  
State of Washington

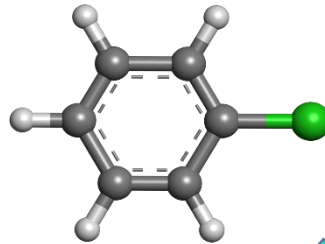
# The Problem: Collateral damage



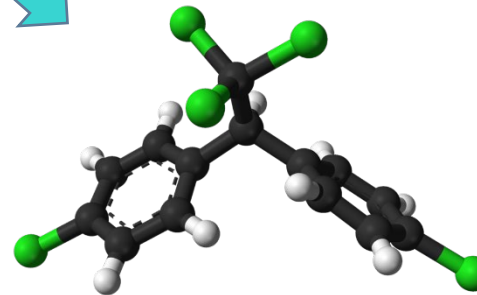
6PPD -  
Quinone -  
 $C_{18}H_{22}N_2O_2$



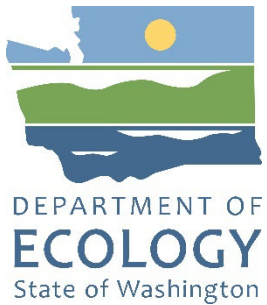
Toxic Cousins



Chlorobenzene -  $C_6H_5Cl$



DDT -  $C_{14}H_9Cl_5$



# Ecology 6PPD **Science** Review

---

## ACTIONS

Reviewing alternative preservative chemicals for tires

Working with our partner agencies and organizations to coordinate action plans

Sharing new and developing information with partners

Interstate and international coordination on method development and environmental research

Spatial data compilation of toxics and vulnerable aquatic habitats for the State of Washington

Non-point source “hot spot” spatial mapping and modeling framework to support toxic reduction planning

Stormwater engineers are assessing best management practices on short-term and long-term time scales

# Ecology 6PPD **Science** Review

## ACTIONS

Reviewing alternative preservative chemicals for tires

Working with our partner agencies and organizations to coordinate action plans

Sharing new and developing information with partners

Interstate and international coordination on method development and environmental research

Spatial data compilation of toxics and vulnerable aquatic habitats for the State of Washington

**Non-point source “hot spot” spatial mapping and modeling framework to support toxic reduction planning**

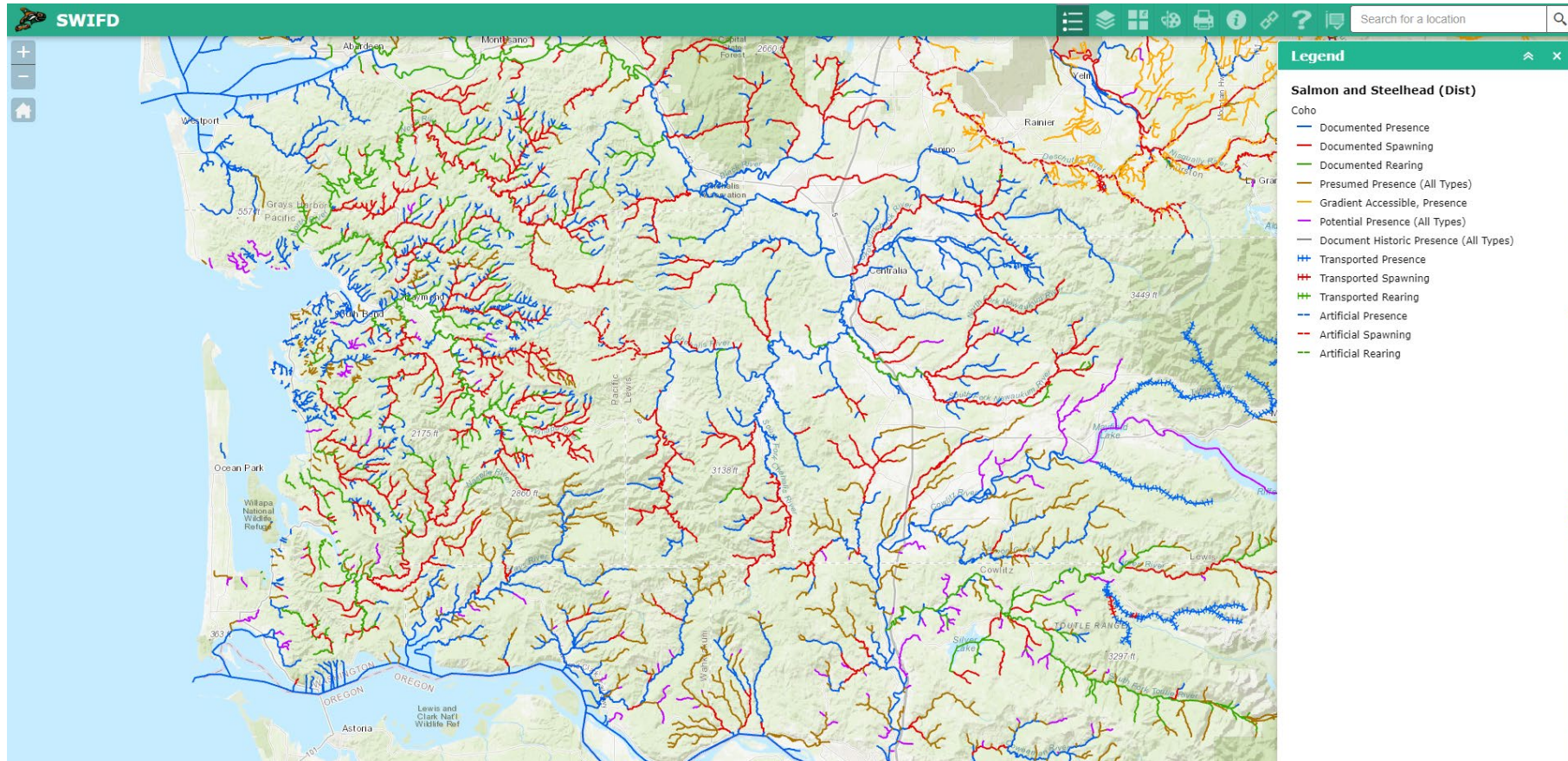
Stormwater engineers are assessing best management practices on short-term and long-term time scales



# Wild Salmon habitat is co-managed with WA Tribes

- Ecology works with Tribes in a government-to-government relationship to protect and manage shared natural resources and to cooperate across jurisdictions. The unique legal status of Tribes and the presence of treaty-reserved rights and cultural interests throughout the state create a special relationship between Tribes and agencies responsible for managing and protecting the state's natural resources.
- Tribes retained about 6 million acres of reservation land and specifically retained the right to take fish in their “usual and accustomed” areas along with the privilege of hunting on “open and unclaimed lands,” among other things.
- Tribes possess property and self-government rights that are guaranteed under treaties and federal laws and each tribal reservation in the state constitutes a bordering jurisdiction subject to federal and tribal environmental laws.

# Where are the fish? SWIFD ([nwifc.org](http://nwifc.org))



**Statewide Salmonid Habitat Mapping Portal - NWIFC\* and WDFW co-managed**

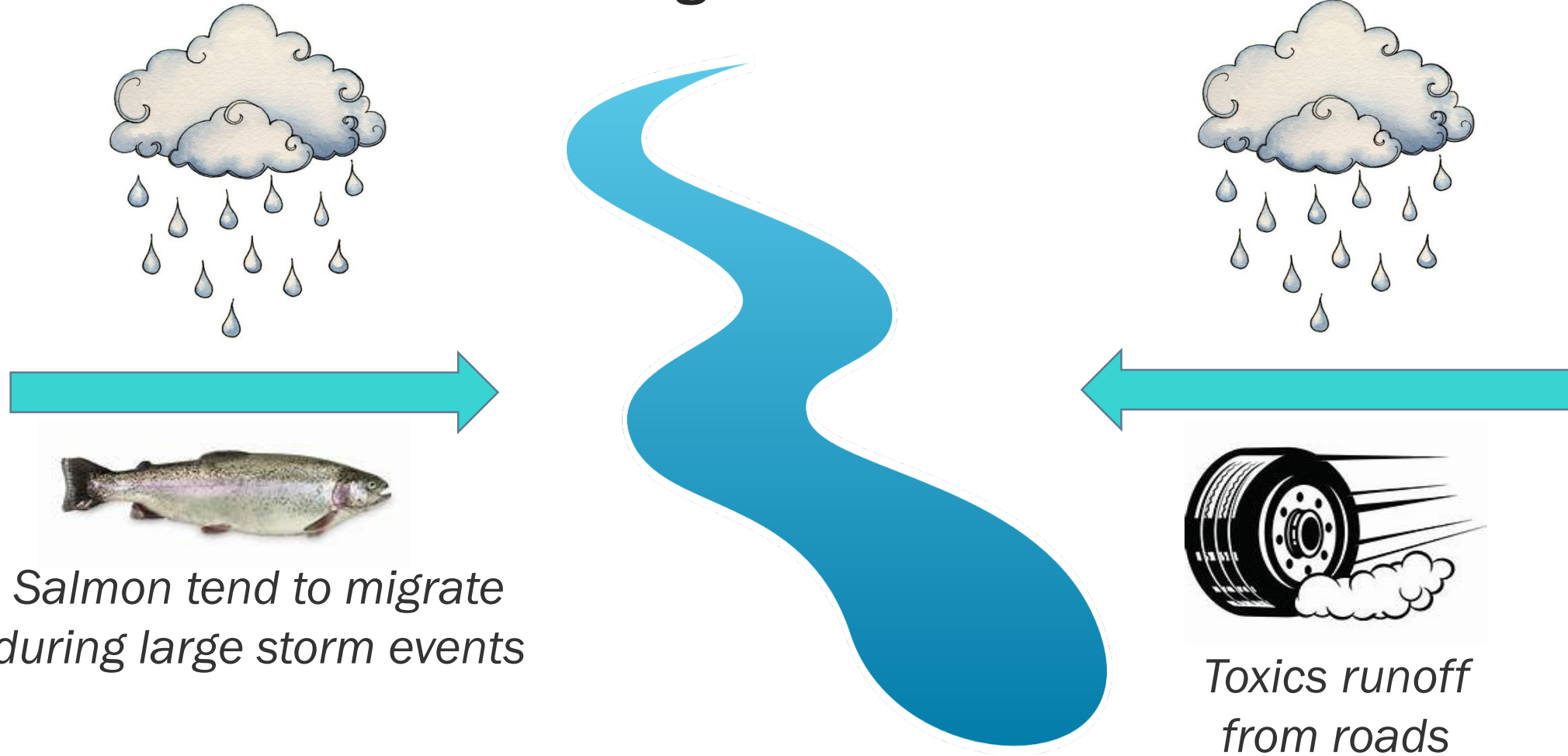
\* NWIFC is a natural resources management support service governed by the Western WA Treaty Tribes

# Visualization Tools for the Puget Sound

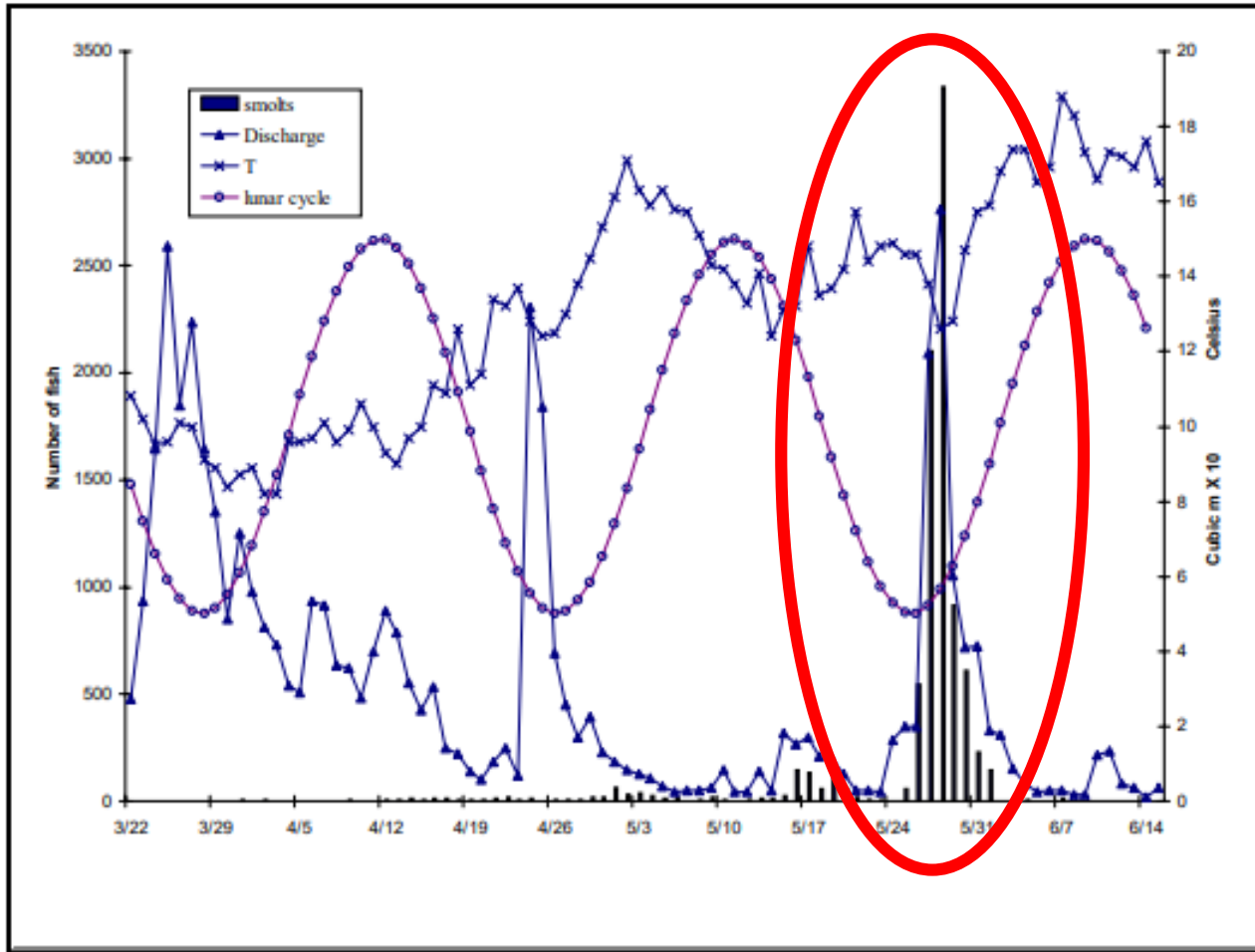
## Conservation mapping & modeling efforts

Tool	POC Organizations
Stormwater Heatmap	TNC & Geosyntec
Roads to Ruin Vulnerability Mapping	NOAA, USFW, CUW, WSC
Prioritizing conservation actions in urbanizing landscapes	TNC & NOAA
Watershed Characterization Project	SEA Program, Ecology
High Resolution Change Detection	WDFW
Puget Sound Mapping Project	Department of Commerce
StreamCAT	EPA
Freshwater Explorer	EPA
VELMA	EPA
SWIFD aka Salmonscape	NWIFC, WA Tribes & WDFW

# Modeling and monitoring Strategies: Salmon and car habitat convergence



# Salmon and Storm Phenology



**Figure 1.** Temporal distribution of coho, cutthroat and steelhead smolt outmigration with respect to temperature, discharge, and lunar cycle from Squalicum Creek between 22 March and 15 June 1998. Maxima of lunar cycle series correspond to full moons and minima correspond to new moons.

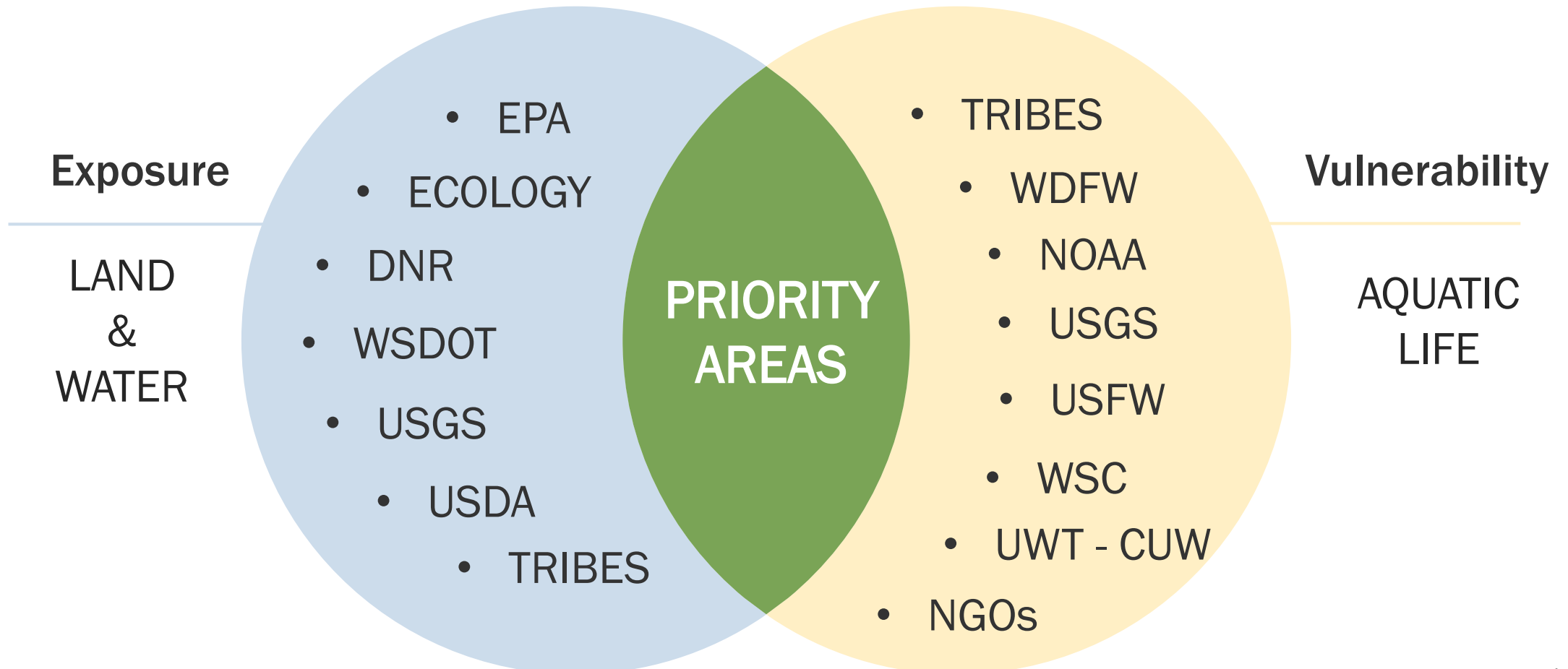
## Smolt outmigration timing

1. Large rain event
2. Stream discharge high peak
3. New moon
4. Rapid temperature change

*Downen & Mueller 1999*

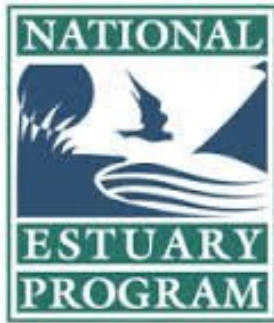
# Exposure & Vulnerability Action Planning

Need both to effectively accomplish environmental goals





DEPARTMENT OF  
**ECOLOGY**  
State of Washington



# Thank you

Rhea Smith

[Rhea.smith@ecy.wa.gov](mailto:Rhea.smith@ecy.wa.gov)

*There will be a 6PPD Panel discussion  
at Salish Sea Conference, hope to see  
you there!*



# Ecology's strategic priorities



Support and engage our communities, customers, and employees



Reduce and prepare for climate impacts



Prevent and reduce toxic threats and pollution



Protect and manage our state's waters



Protect and restore Puget Sound