

# Drinking Water Quality

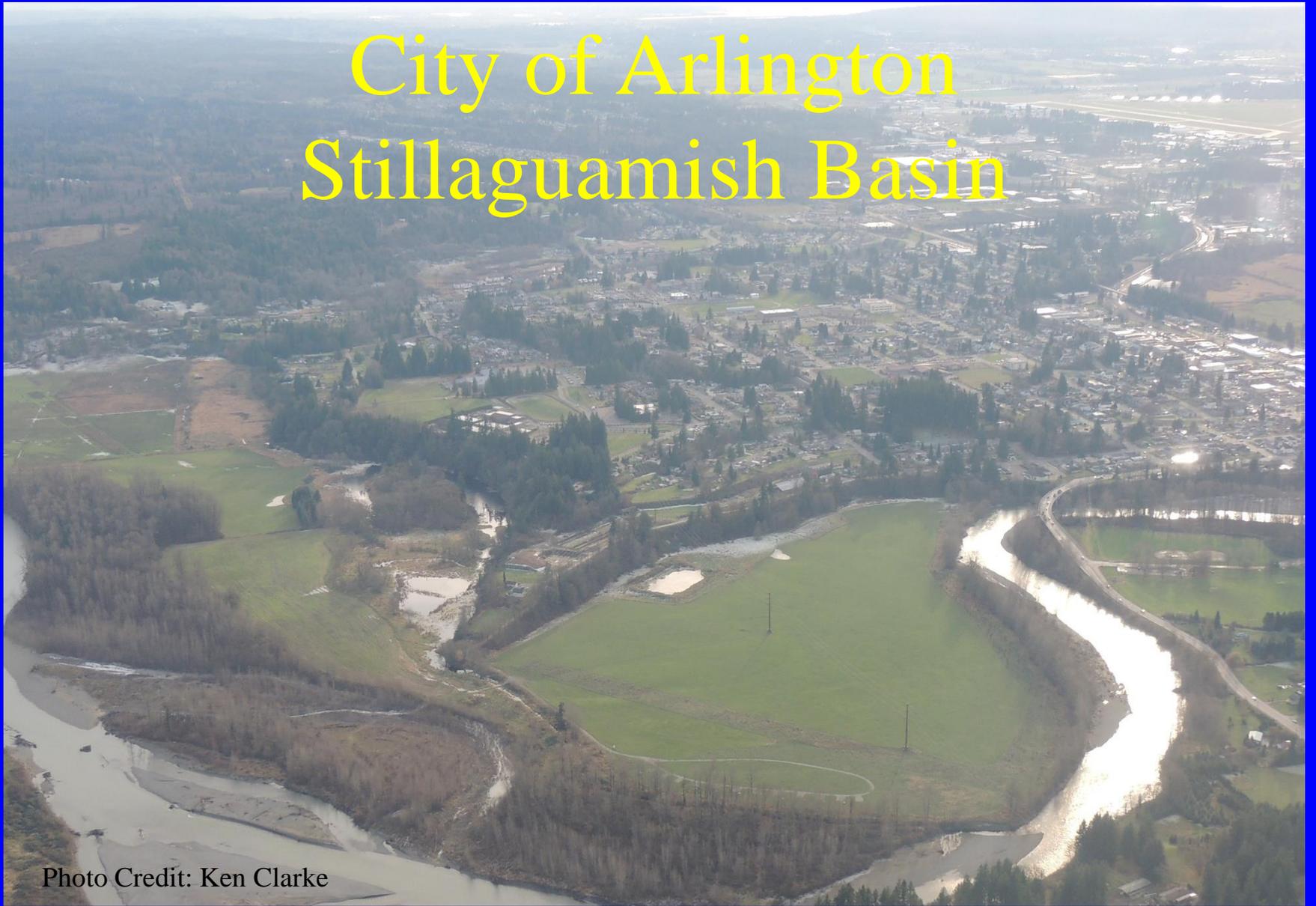
**“It’s a whole lot easier when you start with a great water source!”**

**Mike Wolanek, City of Arlington  
Source Water Protection Workshop  
Tuesday, April 16, 2019**

Image Landsat / Copernicus

# City of Arlington Stillaguamish Basin

Photo Credit: Ken Clarke

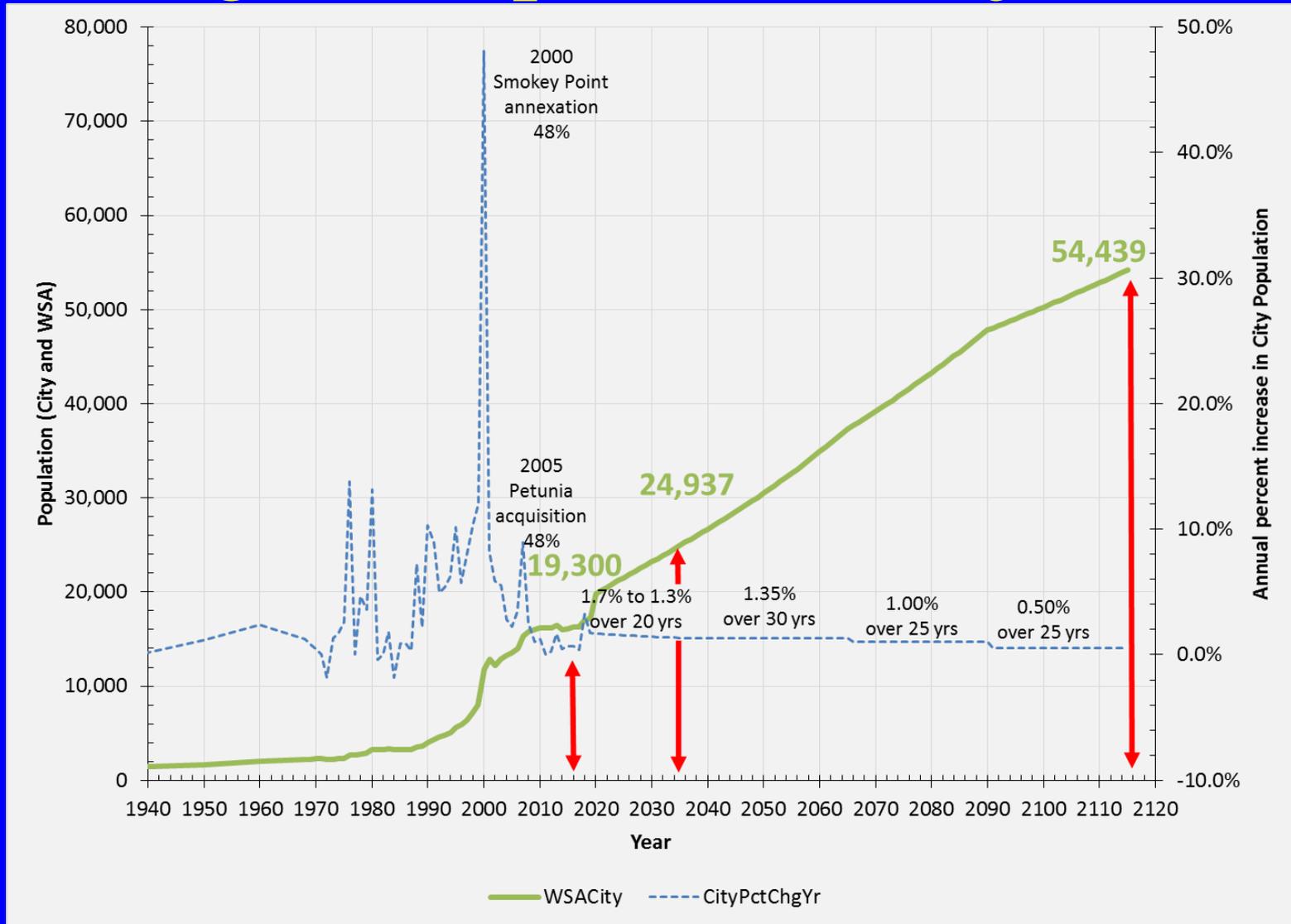


# City of Arlington Stillaguamish Basin

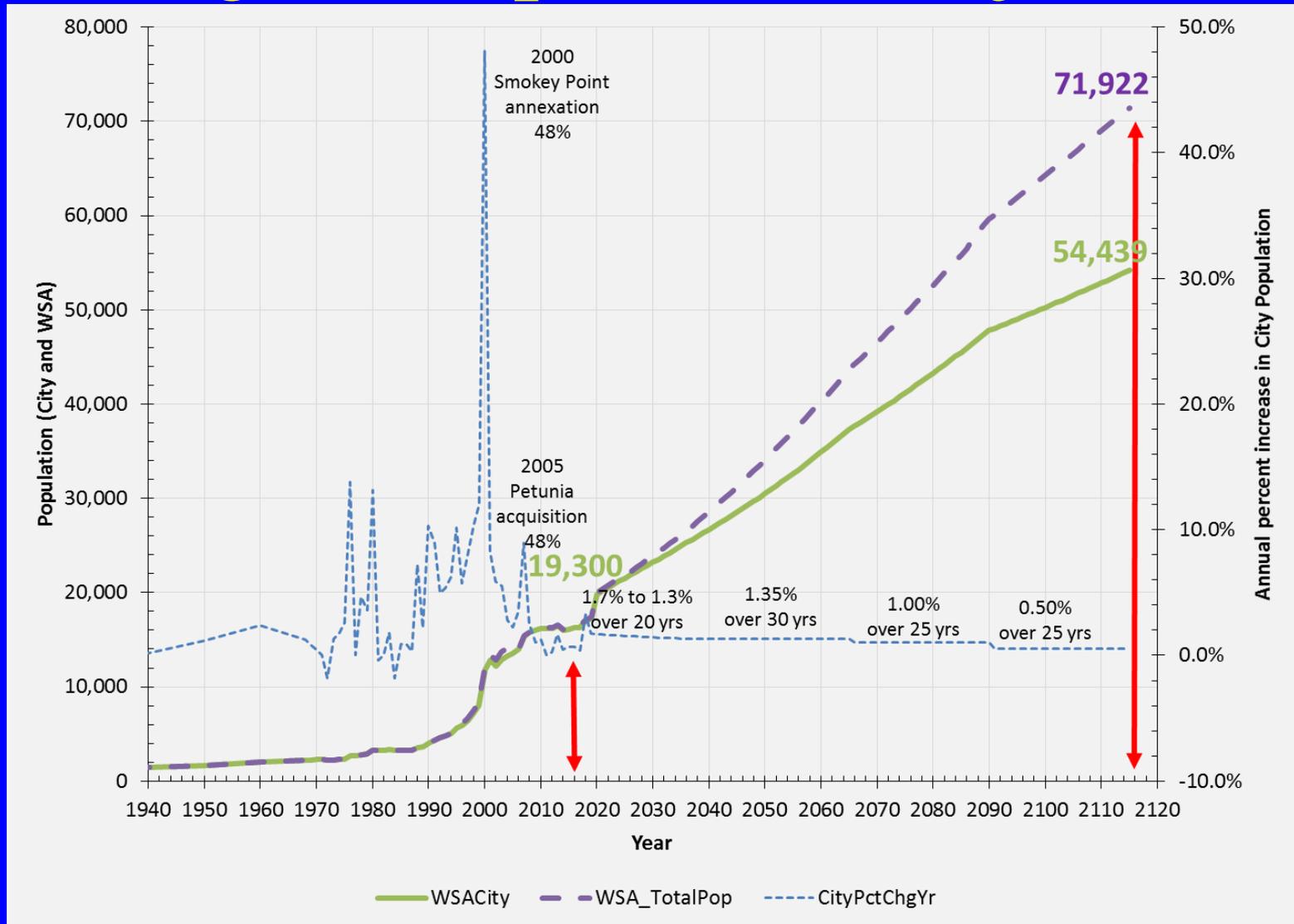
Photo Credit: Dave Ryan



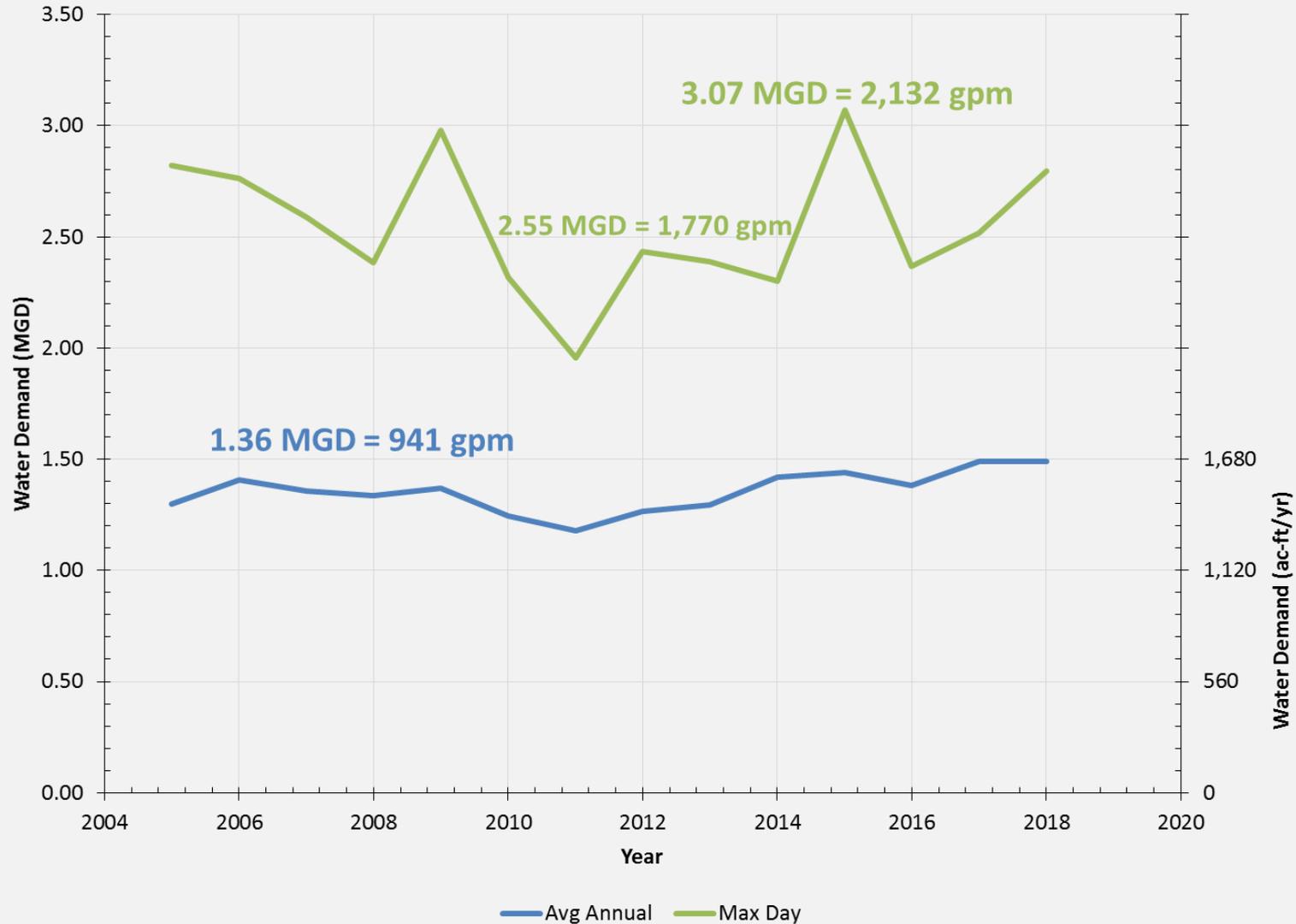
# Arlington Population Projections



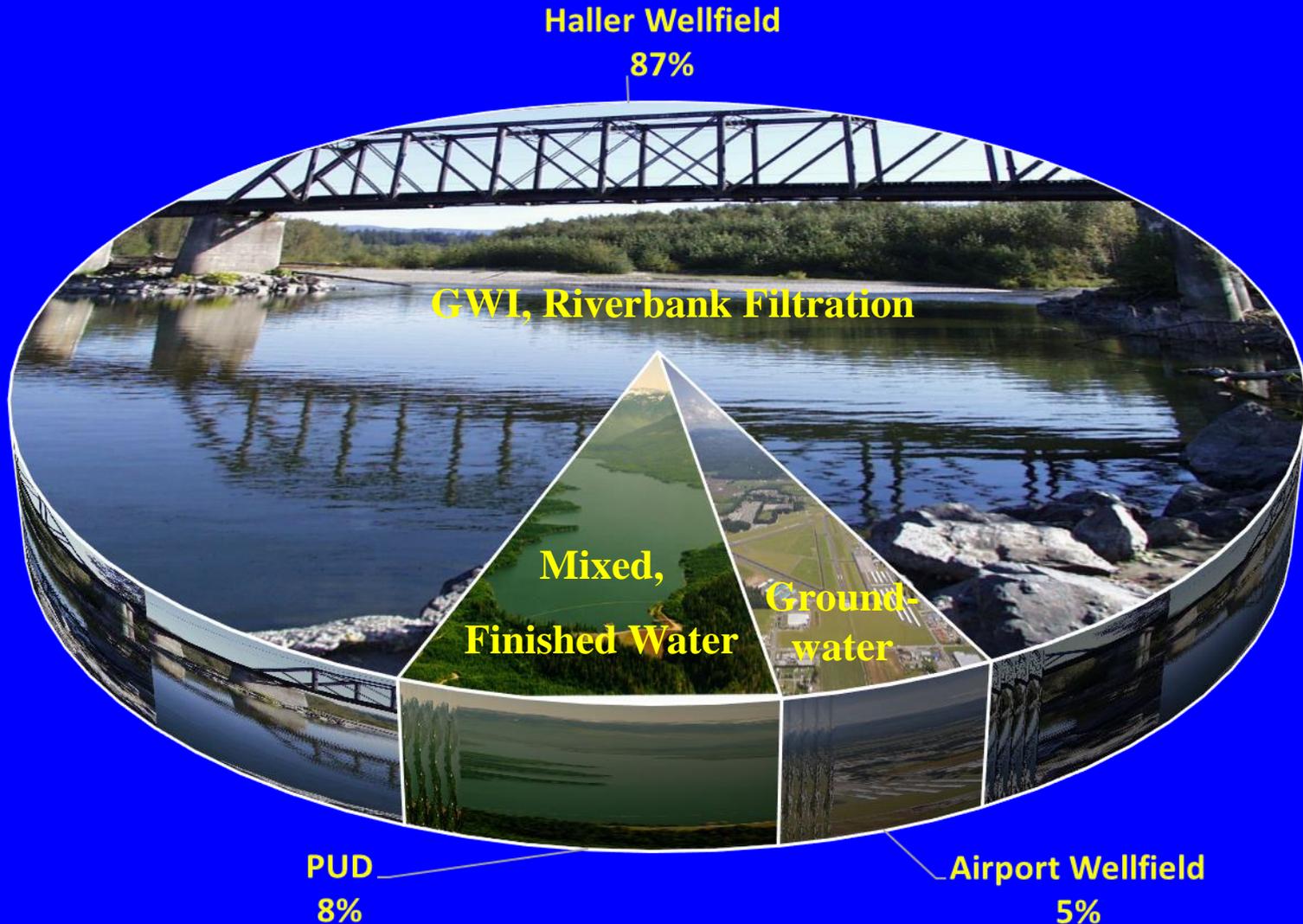
# Arlington Population Projections



# Water Demand via 6,000 Connections



# Total Water Production by Source





**Stillaguamish  
River**

**South Fork  
Stillaguamish**

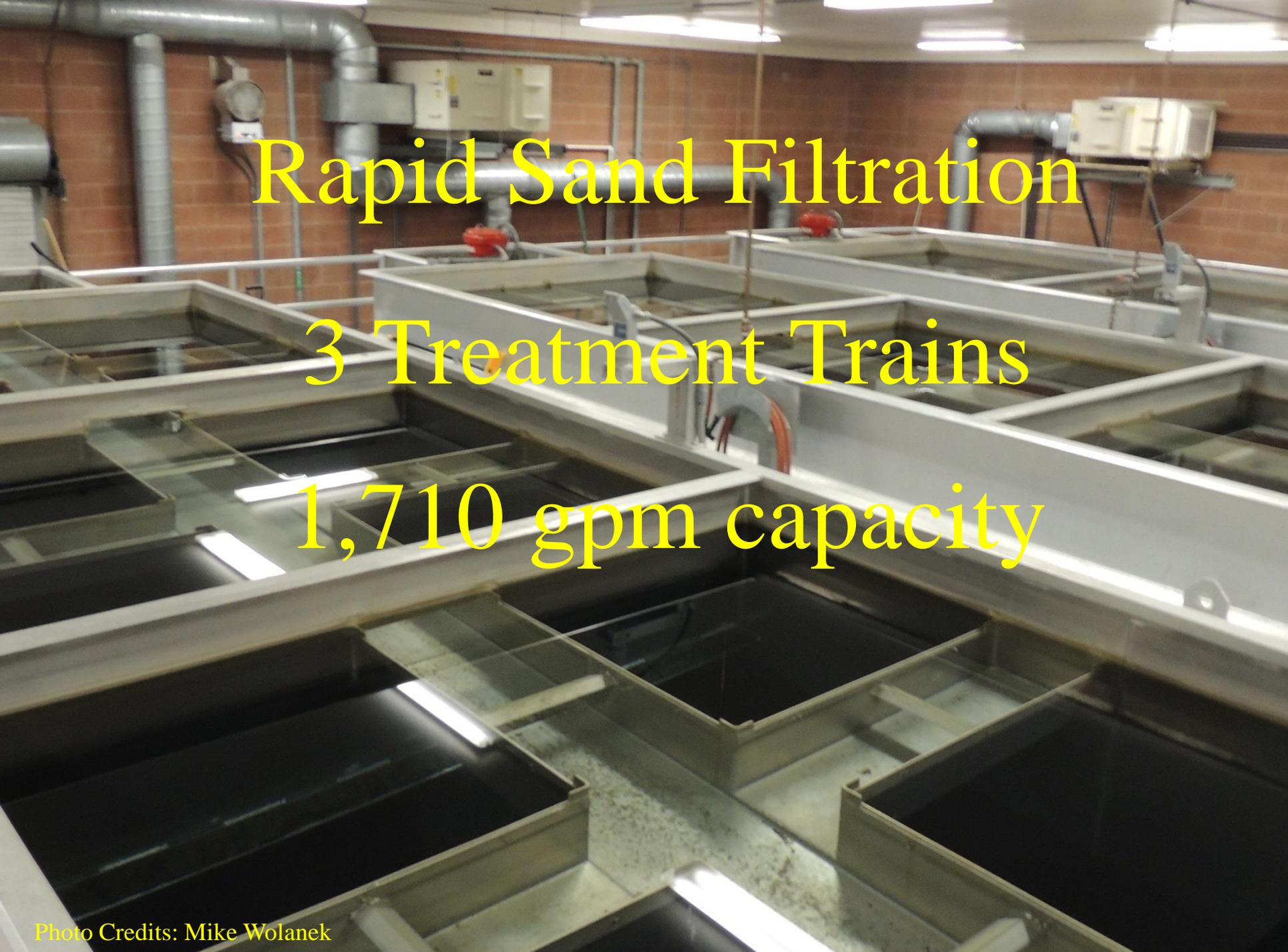
**Haller  
Well Field**

**North Fork  
Stillaguamish**



Photo Credits: Mike Wolanek

# Rapid Sand Filtration

The image shows a large industrial facility, likely a water treatment plant, with several rows of rectangular rapid sand filtration tanks. The tanks are arranged in a grid pattern and are filled with water. The background features brick walls, large pipes, and electrical control panels. The lighting is bright, coming from overhead fixtures.

3 Treatment Trains

1,710 gpm capacity

# Treatment Optimization Program

- Department of Health program, est. 2001
- A level (target) above regulatory minimum standards for surface water filtration facilities
  - Turbidity Monitoring
  - Filtration Effectiveness
  - Disinfection Contact Times

# Performance of Rapid Rate Filtration Plants in Washington

<https://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/SourceWater/RapidRateFiltration>

## Congratulations, 2017 TOP Performers!

Results for 2017 are in! Turbidity monitoring data show that our conventional and direct filtration surface water treatment plants continue to perform above regulatory standards—and provide better public health protection.

Four systems are continuing their run of excellence and are now at 17 consecutive years of optimization! We also award bronze, silver, and gold certificates to systems the first time they meet the turbidity goals for 3-, 5-, and 10-consecutive years, respectively.

This year, two systems earned a gold award, one earned a silver award and seven earned a bronze award. Congratulations!

### Platinum Award (15 or more years)

- Arlington Water Department (2001-2017)
- Lake Whatcom Water and Sewer District – South Shore Water System (2001-2017)
- Pasco Water Department (2001-2017)
- Skagit County PUD #1 – Judy Reservoir System (2001-2017)

3 of 4 systems  
start with  
riverbank  
filtration

# Water Quality Risks Remain for Haller Wellhead Protection

- DOH-recognized GWI source
- Aquifer transmissivity 700,000 gal/ft
- Same day water: river to well
- History of aquifer disturbance
- SWAP identified as highly susceptible to contamination

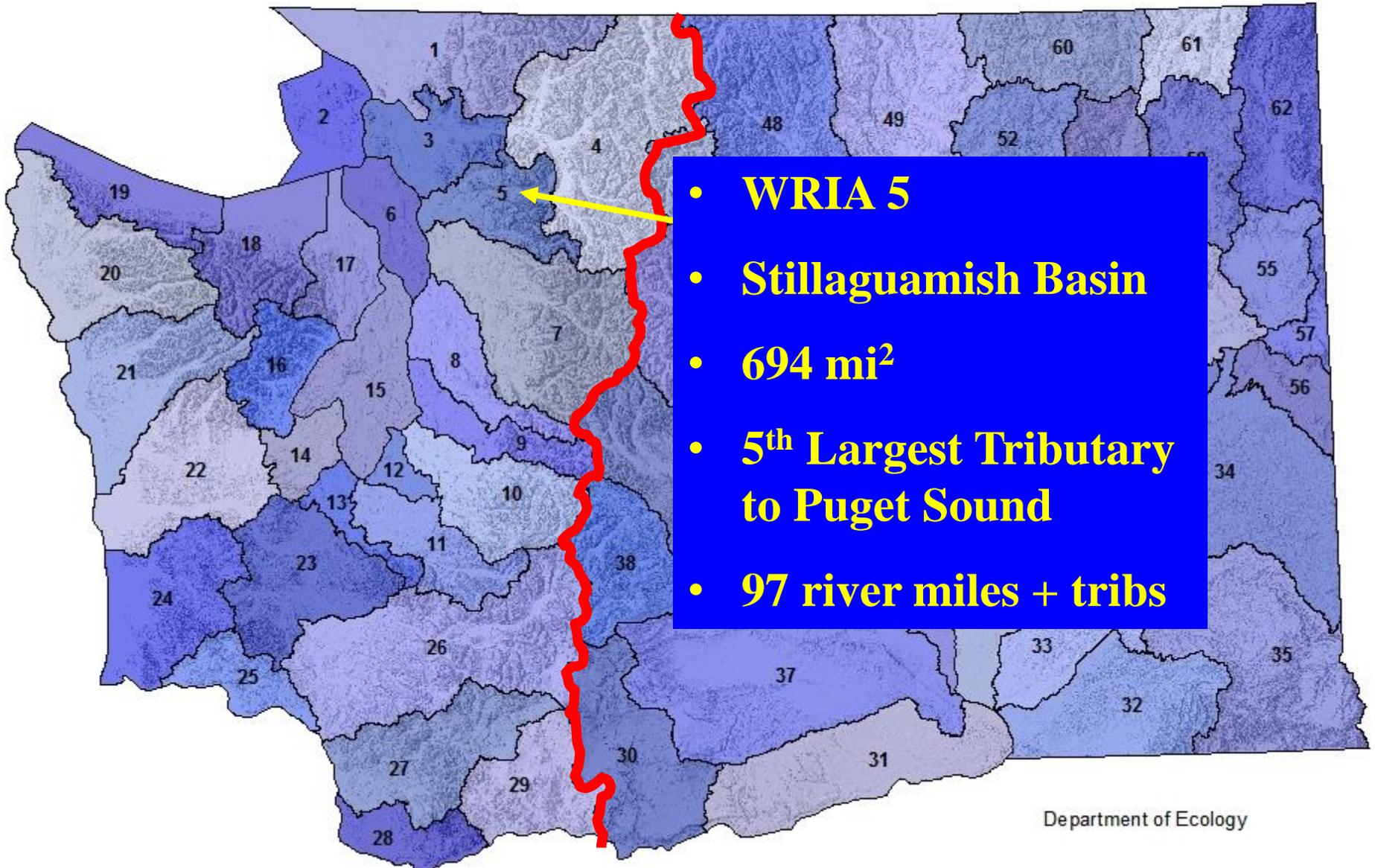


# Water Quality Risks Remain for Haller Watershed Control

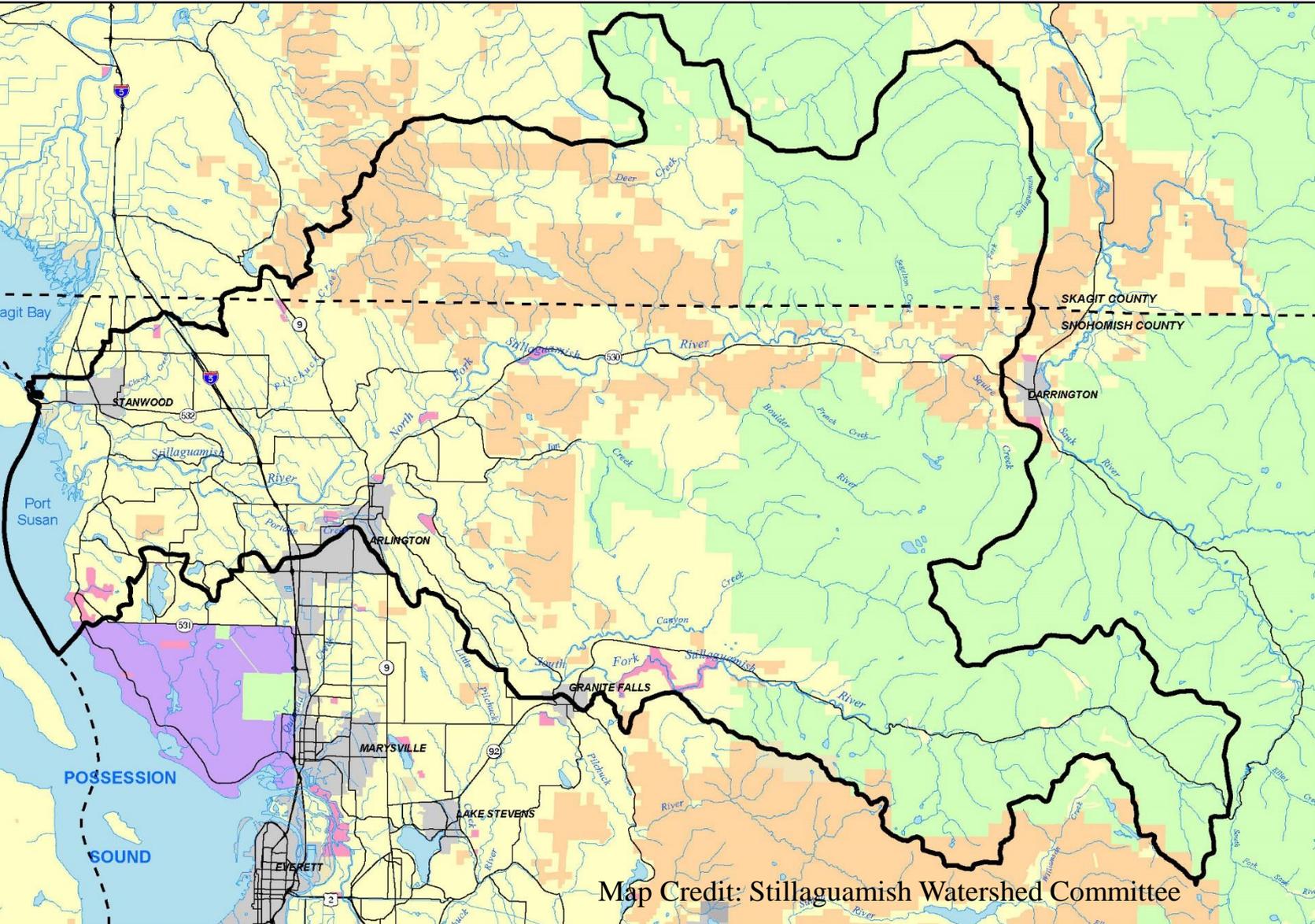
- No headwaters reservoir = no source water storage
- Lower elevation = little snowpack storage
- No secure municipal land-holdings
- Multiple, diverse land owners & land use
- SWAP-identified potential contamination sources

# Water Resource Inventory Areas - WRIA

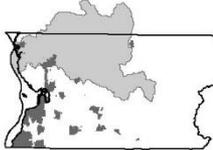
Washington State



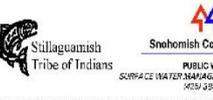
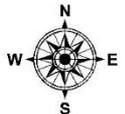
# Figure 1: Stillaguamish Watershed Jurisdictions



- Legend**
- WRIA 5 Boundary
  - - - County Boundary
  - Major Roads
  - Rivers
  - Lakes
  - Private Lands
  - Federal Lands
  - State Lands
  - Tribal Lands
  - County Lands
  - Urban Areas



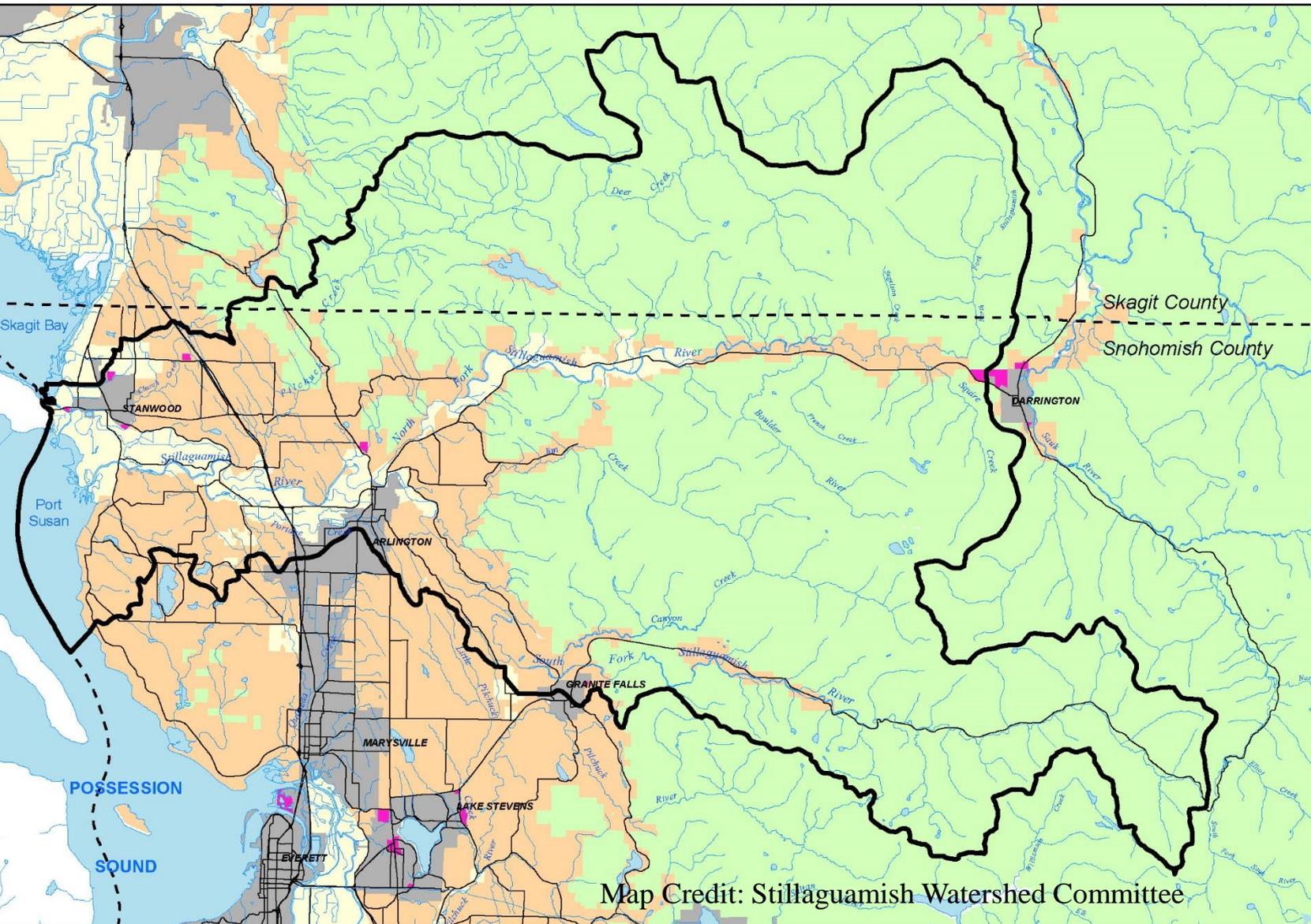
Snohomish County, Washing



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Map Credit: Stillaguamish Watershed Committee

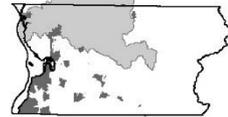
# Figure 4: Stillaguamish Watershed Future Land Use



## Legend

- WRIA 5 Boundary
- County Boundary
- Major Roads
- Rivers
- Lakes
- Agriculture
- Commercial/Other
- Forest
- Rural
- Urban Areas

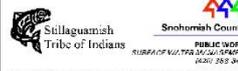
\*Note: Land Use type derived from Snohomish & Skagit County Comprehensive Plans.



Snohomish County, Washington



1 0.5 0 1 2 3 4 5 Miles



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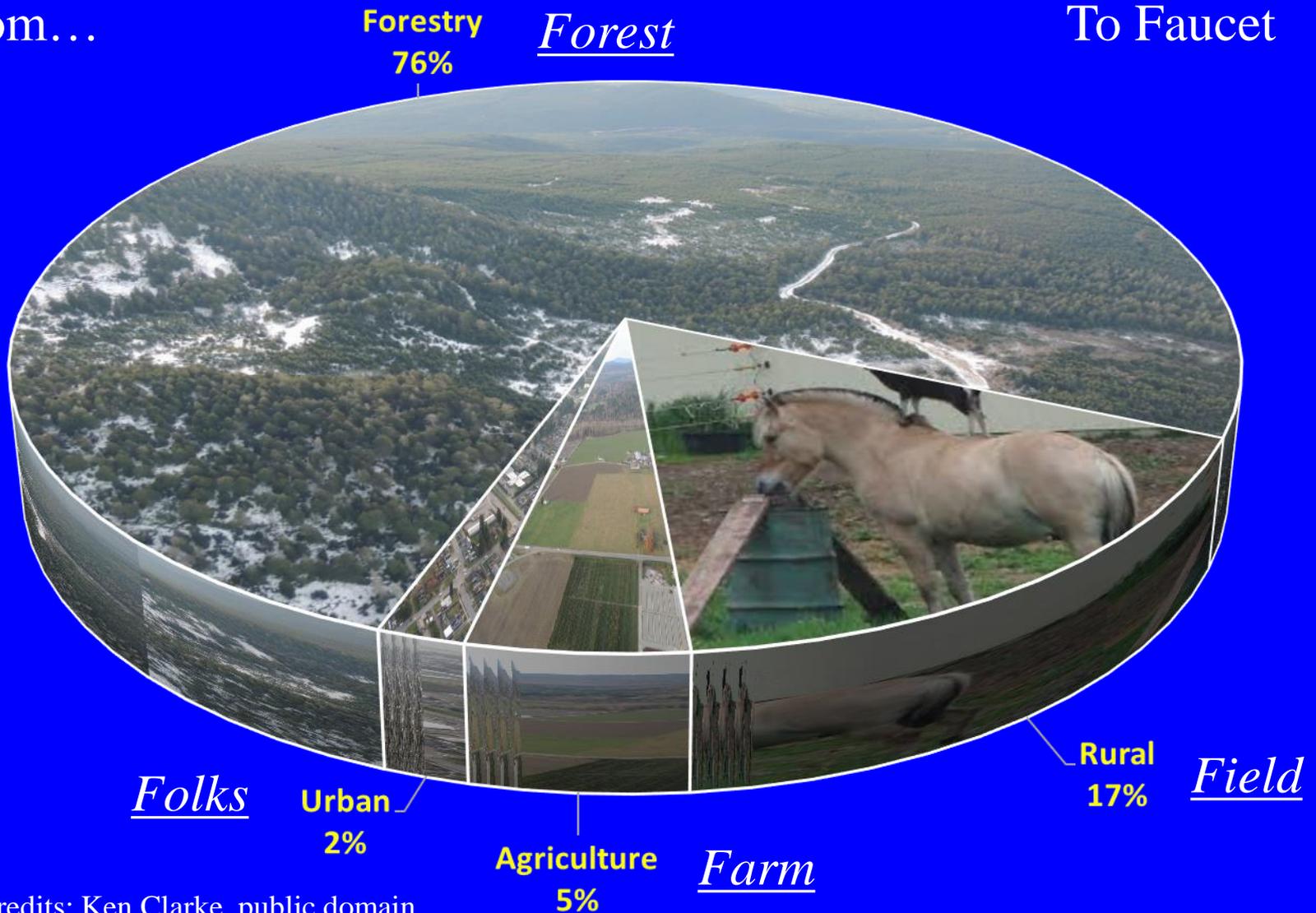
Map Credit: Stillaguamish Watershed Committee

# Stillaguamish Basin Land Use

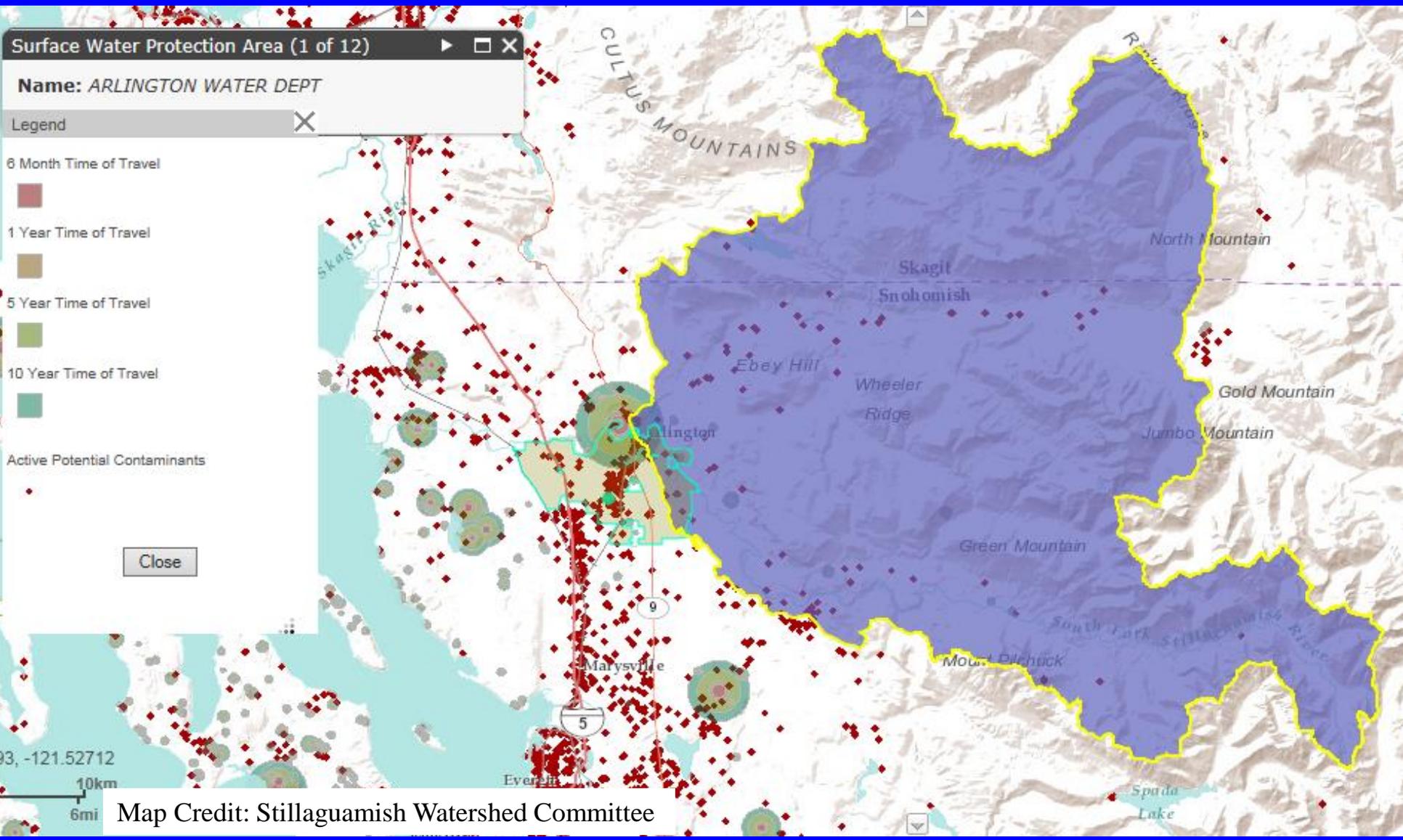
539 mi<sup>2</sup> above Haller Wellfield

From...

To Faucet



# DOH SWAP Application



# Potential Contaminant Types

Type (Potential)	Count
Active, long-term, (high)	89
Active, temporary, (low)	20
Inactive (low)	84
<b>Total</b>	<b>193</b>

Interaction Status		A	
Potential Contaminant Source	Count		
Dairy	11		
Dairy Unpermitted	1		
Emergency/Haz Chem Rpt TIER2	14		
Enforcement Final	6		
Independent Cleanup	1		
LUST Facility	3		
Non Enforcement Final	7		
NONPOINT	5		
Recycling	1		
Revised Site Visit Program	2		
Sand and Gravel GP	13		
SEA Project Site	3		
State Cleanup Site	9		
Underground Injection Control	1		
Underground Storage Tank	10		
Upland Fish Hatchery GP	2		
<b>Grand Total</b>	<b>89</b>		

# Source Water Concerns for Sediment and Metals

- Sediment
  - Affects raw water turbidity into WTP
  - Attached contaminants “lodged” in aquifer
- Metals
  - Dissolved fraction—immediate impact
  - Particulate fraction—long-term storage and dispersed impact in wellfield aquifer
  - Includes concern for wastewater operations

# Source Water Concerns for Sediment and Metals

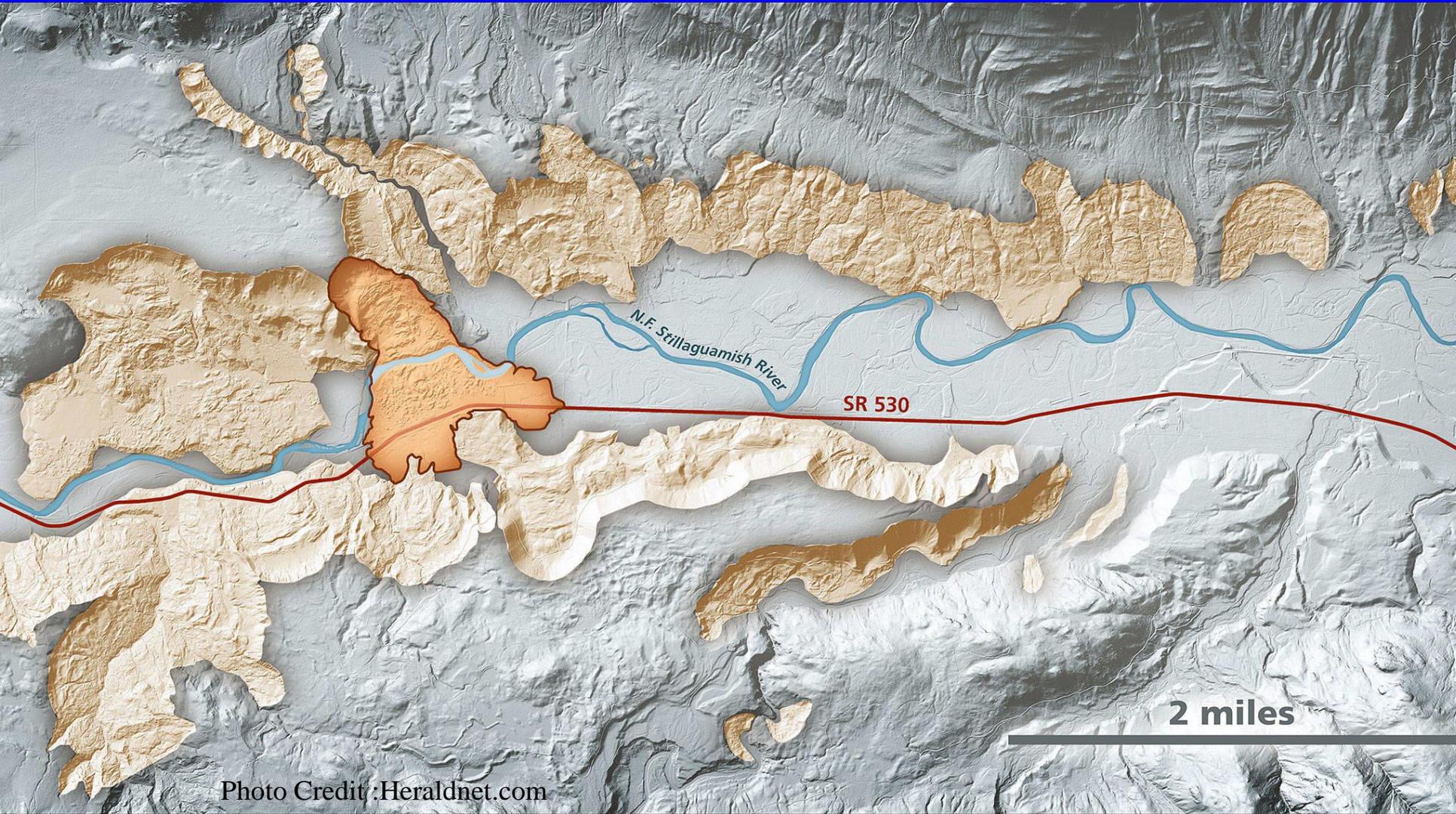
- Sediment
  - Landslides
  - Surface Mines
  - Roads under forest management
- Metals
  - Arsenic (elevated in the Stilly; WTP)
  - Iron, Manganese (WTP)
  - Copper (WTP, WWTP)
  - Zinc (WWTP)
  - Others

# Landslides



# Landslides

(some things you just can't manage)

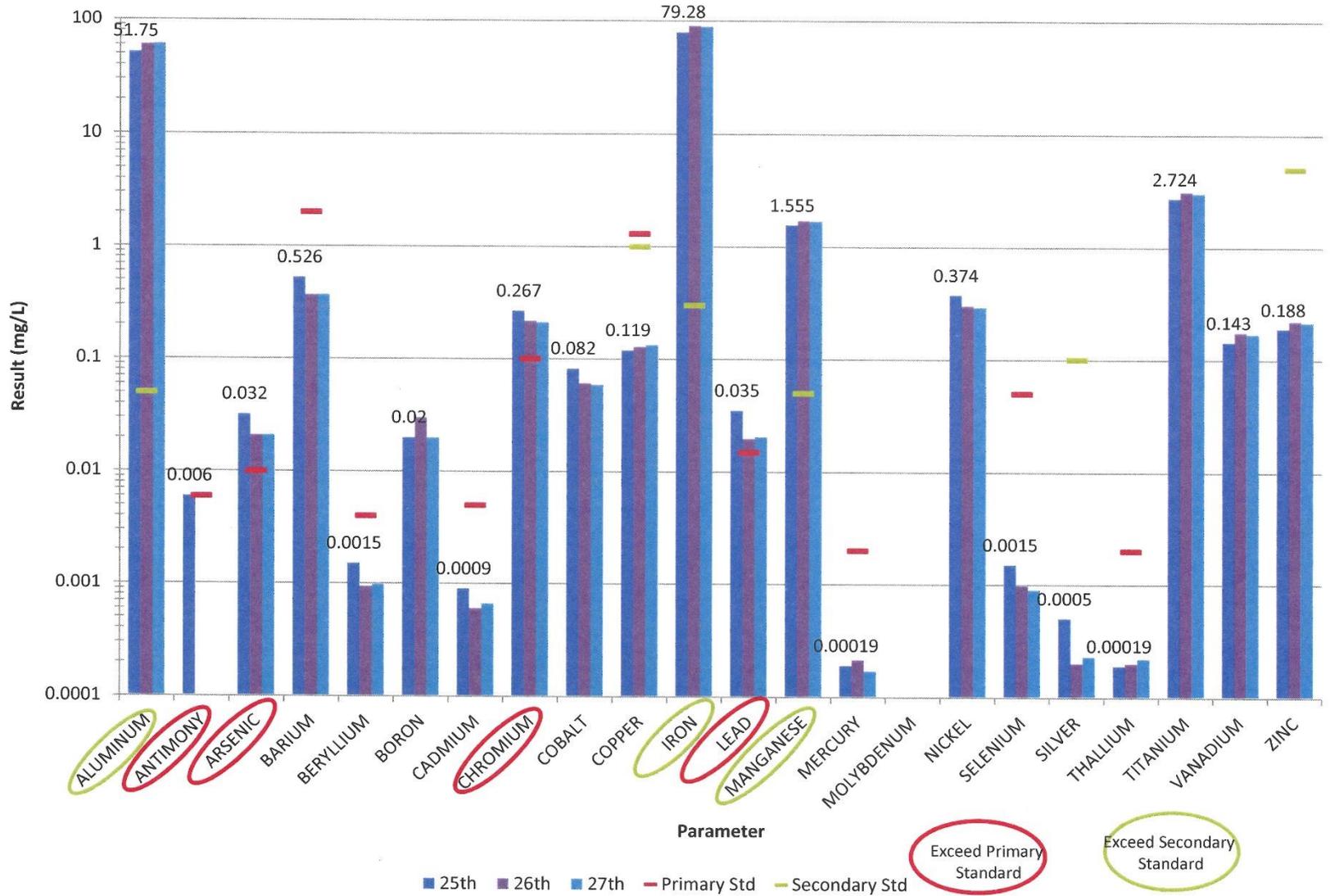


# Oso Landslide, March 22, 2014

## Video at Arlington on March 24



# Metals in Stillaguamish River at Arlington, March 25-27, 2014



# Landslides

- Oso, Gold Basin
  - Monitor
  - Anticipate mitigative responses
- Trangen Meander, numerous smaller sediment source areas
  - Track and comment on land use applications
  - Riparian restoration projects
  - Public education

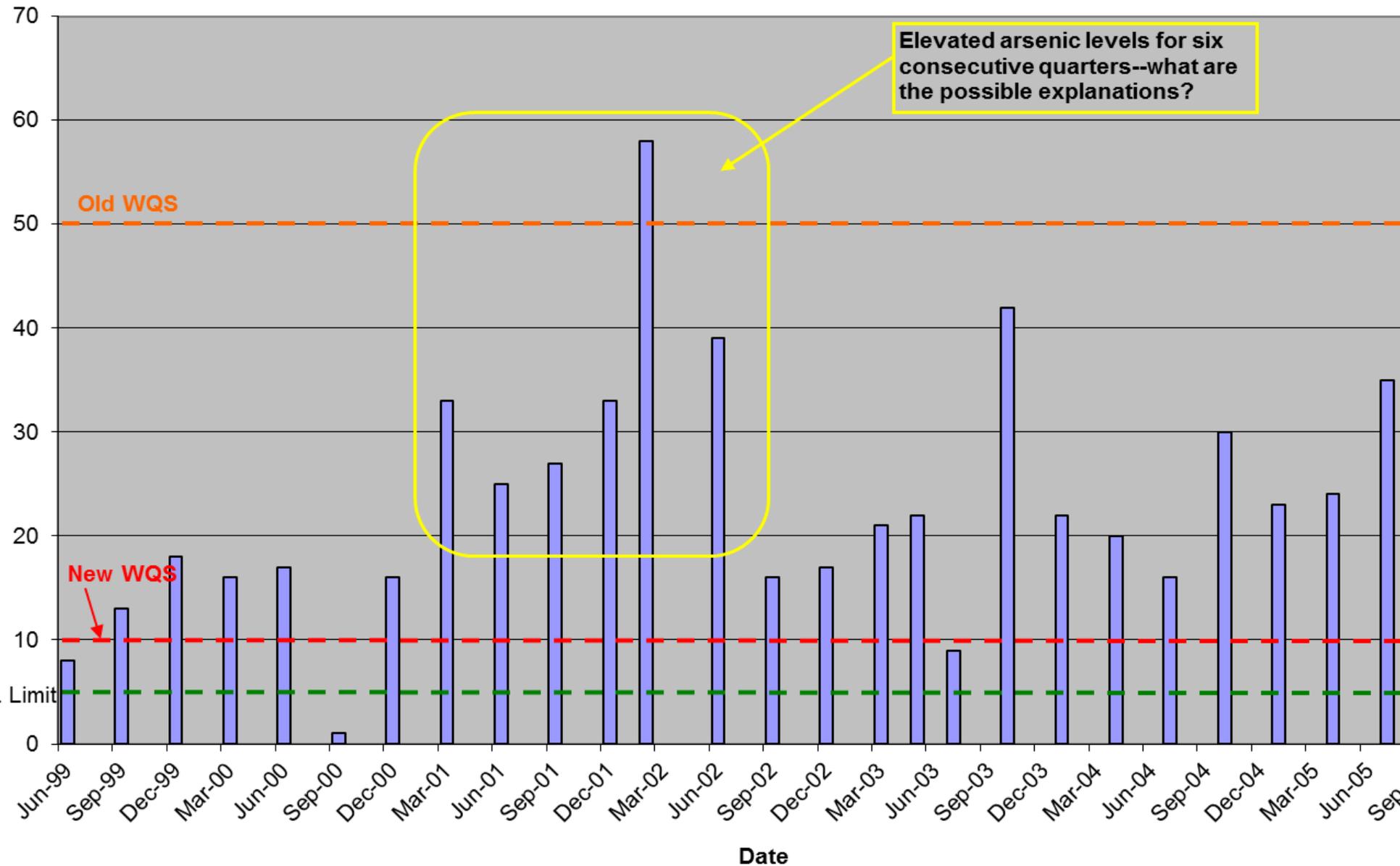


# Sand and Gravel Operations



# Arsenic Levels in Rinker Monitoring Well 1A

(all other monitoring wells have arsenic below or near detection limits)



# Sand and Gravel Operations

- 13 permitted in Stillaguamish basin
- Increased concern with lower arsenic standard
  - Track and comment on land use applications
  - Request monitoring reports



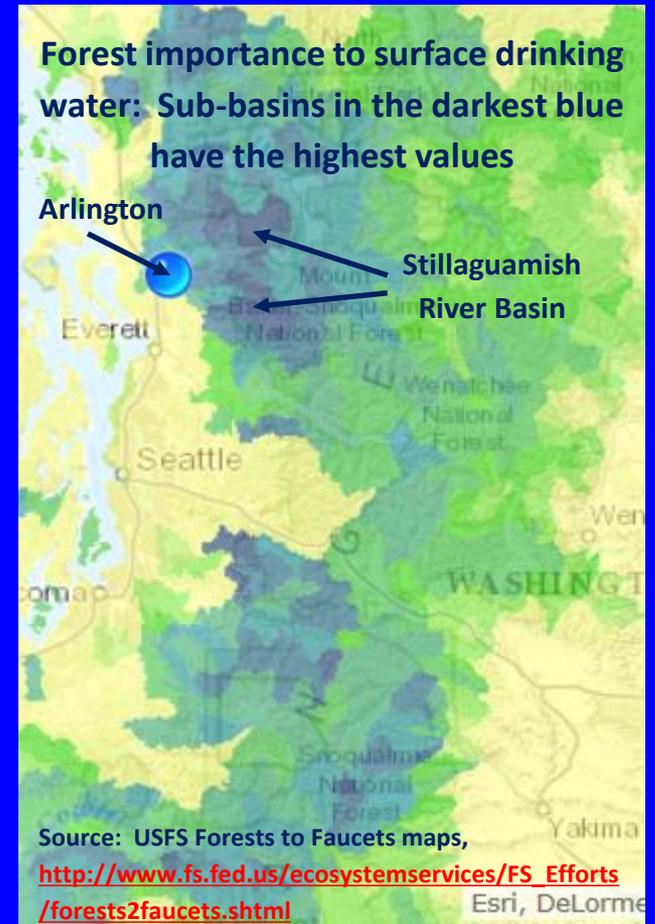
Photo Credit: Cadman

# Road Management

- Comment on forest management activities

## 2014 MBS Sustainable Roads Analysis

“...The Forest Service-produced map at right demonstrates that *the Stillaguamish basin is as valued as any other basin* in the Washington Cascades for potable water supply. However, unlike the larger surface water systems in the region which have restricted-access watersheds, *Arlington's largest source is subject to land use decisions, actions, and events outside of its control. ...*”



# Source Water Concerns for Organics

- Petroleum hydrocarbons and synthetic organic compounds
  - Interrupts processes, efficiencies of intended treatments
  - WWTP design does not include removal of SOC's
  - Includes concern for wastewater operations, stormwater treatment wetland, reclaimed water

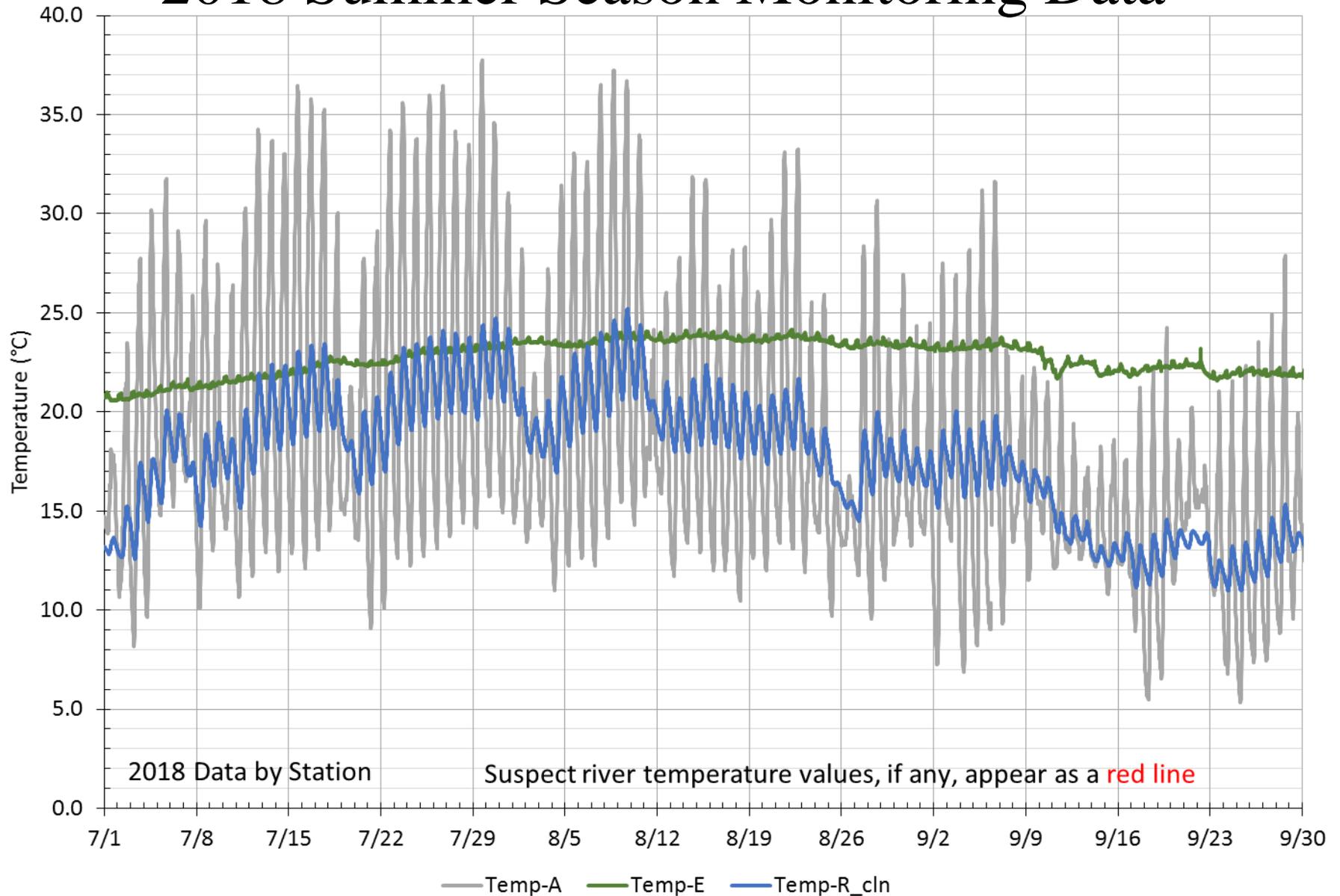
# Source Water Concerns for Organics

- Petroleum hydrocarbons
  - Transportation accidents and spills at stream crossings
  - “Arlington who?”
  - “What water supply?”
  - Outreach
  - Track JARPA applications
- SOCs
  - Riparian pesticide use
  - Emerging contaminants, USGS study w/ Stilly Tribe
  - Education

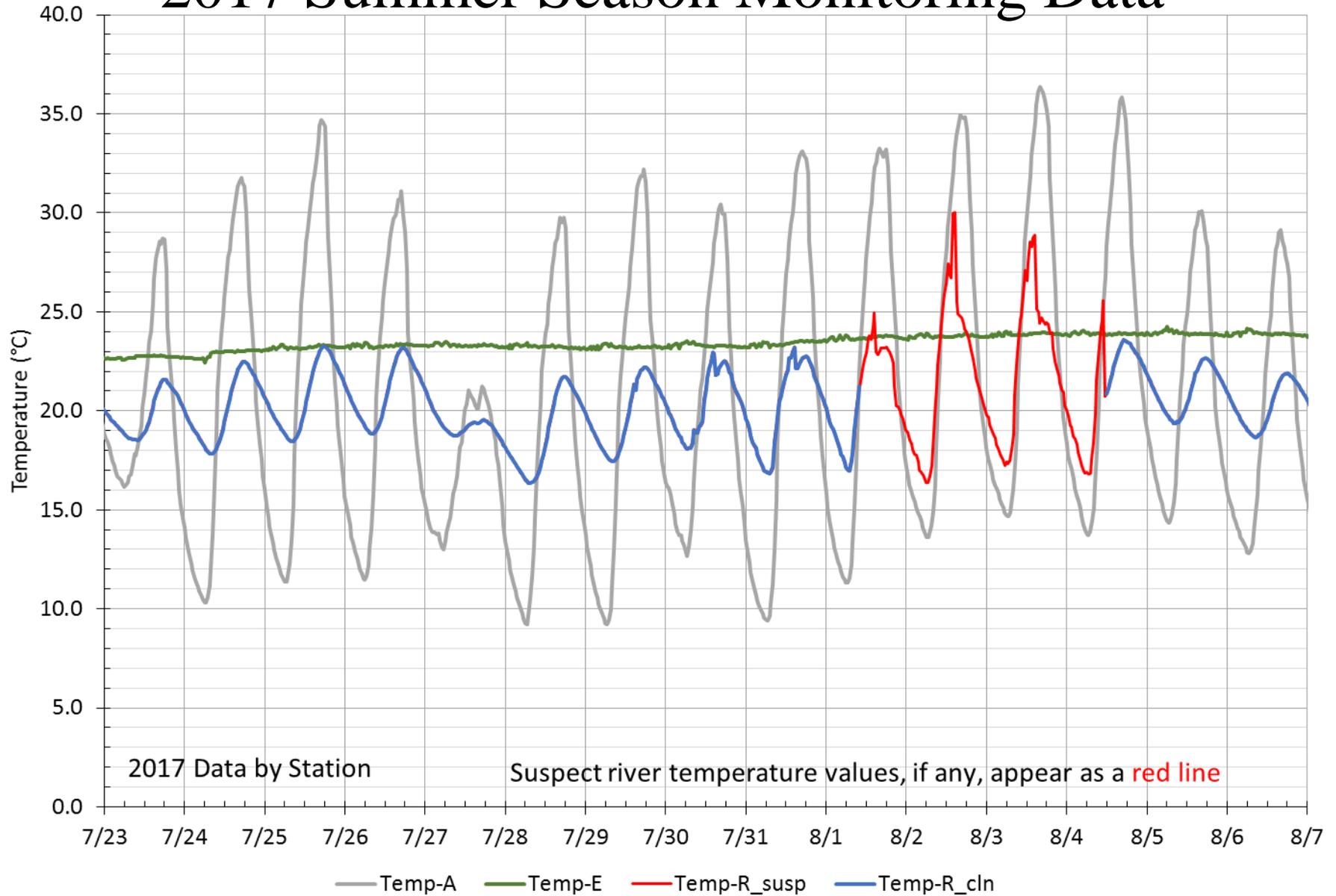
# Source Water Concerns for Temperature

- Effects on WTP operations are manageable
  - Cooler water increases disinfection contact time
  - Cooler water reduces/affects corrosion rates
- Effects on WWTP (reclamation) primary concern
  - Water quality standards restrict temperature increases associated with wastewater and reclaimed water discharges
  - Endangered Species Act concerns for listed salmon species

# 2018 Summer Season Monitoring Data



# 2017 Summer Season Monitoring Data



# Source Water Concerns for Temperature

- Support for up-basin riparian and instream habitat projects associated with Stillaguamish Watershed Committee
  - Tree and shrub planting
  - Riparian land acquisition projects
  - Protect and enhance “gaining reaches” with cooler groundwater discharge; e.g., LWD scour pools
- Adaptive Management using constructed wetland for temperature reduction

# Other Source Water Concerns

- Invasive Species—Quagga/Zebra Mussels
  - Track WDFW checkpoint reports
  - Signs for education at recreation sites



Photo Credit: Marrone Bio Innovations, Inc.

## STOP



Aquatic Plants

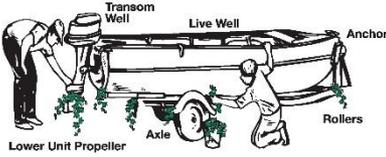


Zebra/Quagga  
Mussels

**It is ILLEGAL to transport or spread  
Aquatic Invasive Species!**

**Before Launching & Before Leaving**

**You Must Remove ALL  
Plants & Animals from Watercraft, Trailer and Gear.  
You Must Drain ALL  
Water from Fish/Live Wells, Holds and Bilges.**



Transom Well   Live Well   Anchor  
Lower Unit Propeller   Axle   Rollers

Clean and drain requirements - RCW 77.135.110  
Unlawful to transport conveyances not meeting clean and drain requirements RCW 77.15.160 (4)  
Unlawful use of invasive species - RCW 77.15.809 and 77.15.811

**To obtain information on free boat inspections, Report a sighting or  
Find out more about Aquatic Invasive Species:  
Call 1-888-WDFW-AIS (933-9247) or go to [www.WDFW.WA.GOV/AIS](http://www.WDFW.WA.GOV/AIS)**



Washington  
Department of  
FISH and  
WILDLIFE





**STOP AQUATIC  
HITCHHIKERS!**

# Other Source Water Concerns

- Climate change
  - Wildfire
  - Cyanotoxins
  - Monitor, educate
- Increasing outdoor recreation
  - Education

The Stilly in the news (2016)



**“The west is so dry....  
a fire broke out in a river!”**

Photo Credit: High Country News

A lush, mossy forest stream with large tree roots and ferns. The scene is a dense, green forest with a small stream flowing through it. The water is clear and reflects the surrounding greenery. Large, moss-covered tree roots are prominent in the foreground and middle ground. The background is filled with tall, thin trees and a thick canopy of green leaves. The overall atmosphere is serene and natural.

Questions?

Mike Wolanek

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