

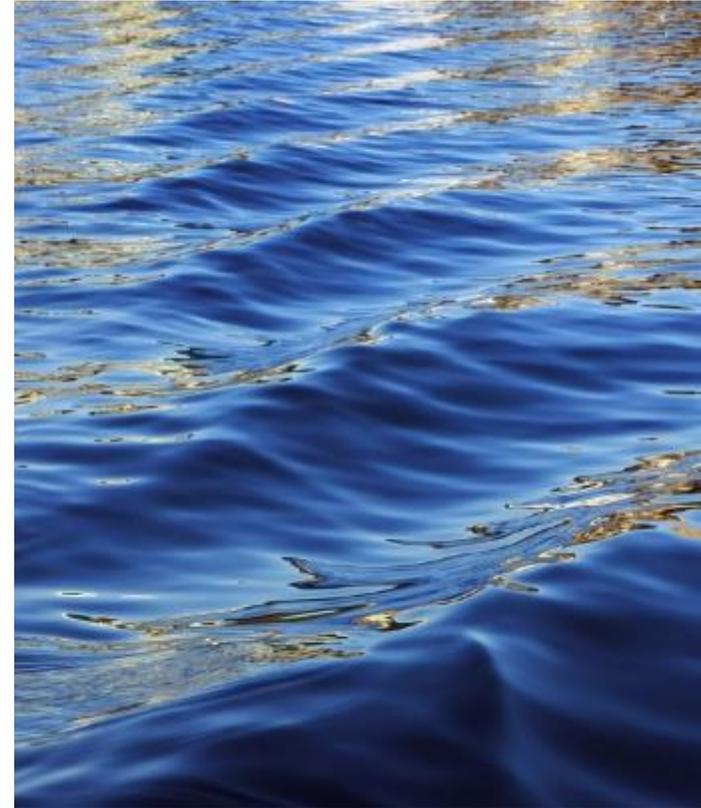
What's floating amongst  
the floaters? Investigating  
fecal bacteria on the  
Snoqualmie River

Science Seminar  
November 2019

Water and Land Resources Division

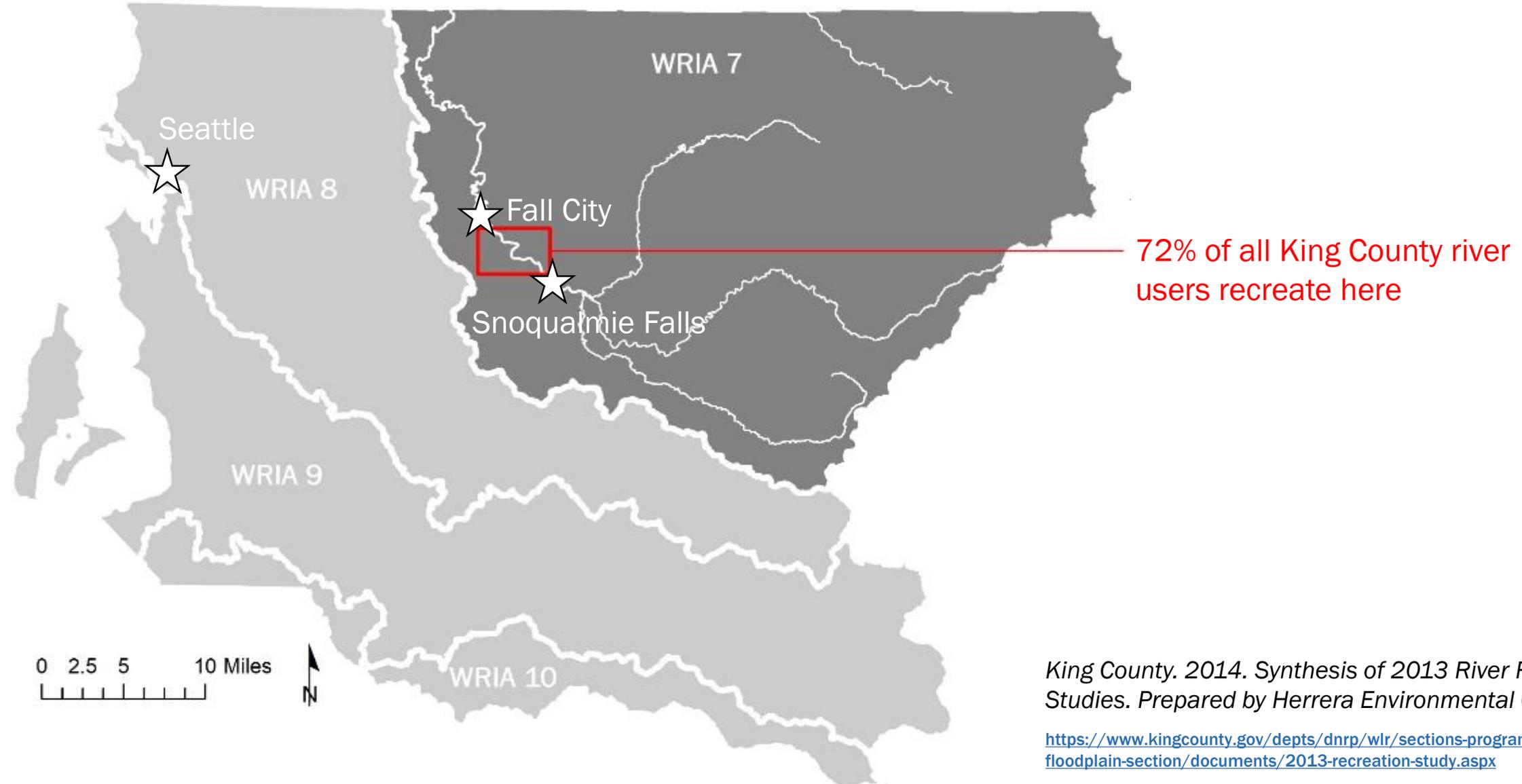


**King County**



## What's floating amongst the floaters?

- Many people recreate on King County's rivers during summer months
- A majority of those people go to the reach between Snoqualmie Falls and Fall City





**The Snoqualmie River below Snoqualmie Falls**

**July – August**

# What's floating amongst the floaters?

## A brief history...

- River recreation increases dramatically in the mid-2000s
- Volunteers valiantly try to manage trash/information/parking
- 2015 Fall City Floating takes over operations and has been gradually making improvement each year:
  - Trash pickup
  - Shuttles/parking management
  - River patrol
  - Better tubes

Lots of strong opinions on heavy recreation on Snoqualmie River around Fall City...

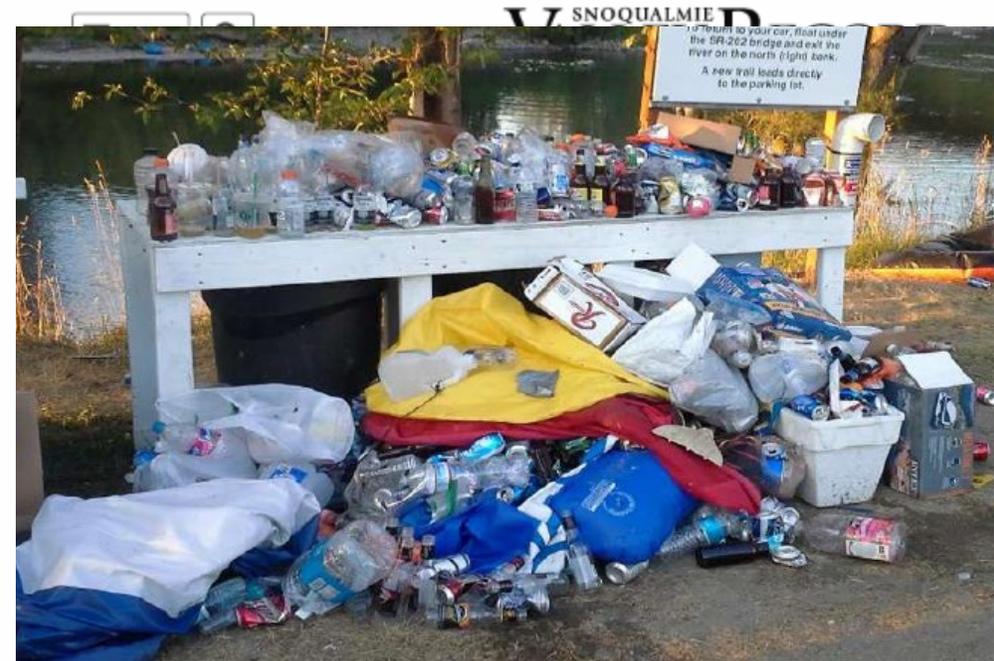


Thomas [redacted]  
1 review

★★★★★ 7 months ago

Awful detriment to the Valley and to Fall City. This business offers no positive impact to our town and the environment. The cost for by our taxes is not acceptable and should be removed from place. This business is hated and conditions are not safe to see it go down in flames. When an event is held, residents and business owners in this town

👍 2



## INTENSE USAGE OF RIVERS FOR RECREATION

### BENEFITS

- Happy and healthy citizens
- Vigilance over bad actors
- Customers for local businesses
  
- Increased awareness of environment
- Increased desire to protect environment
- Increased support of County programs to restore and preserve our water and land

### IMPACTS

- Quality of life
  - Trash
  - Parking
  - Traffic
  - Noise
  
- Quality of environment
  - Trash / plastics in river
  - Disturbance of river/riparian habitat
  - Disturbance to salmon spawning
  - CECs from sunscreen, lotion, urine
  - Fecal pollution from users

### RISKS

- Injury to inexperienced / intoxicated swimmers (or worse)
- Impaired driving
- Exposure to fecal bacteria and viruses in environmental waters

What's floating amongst the floaters?

King County monitors and manages risk on lakes



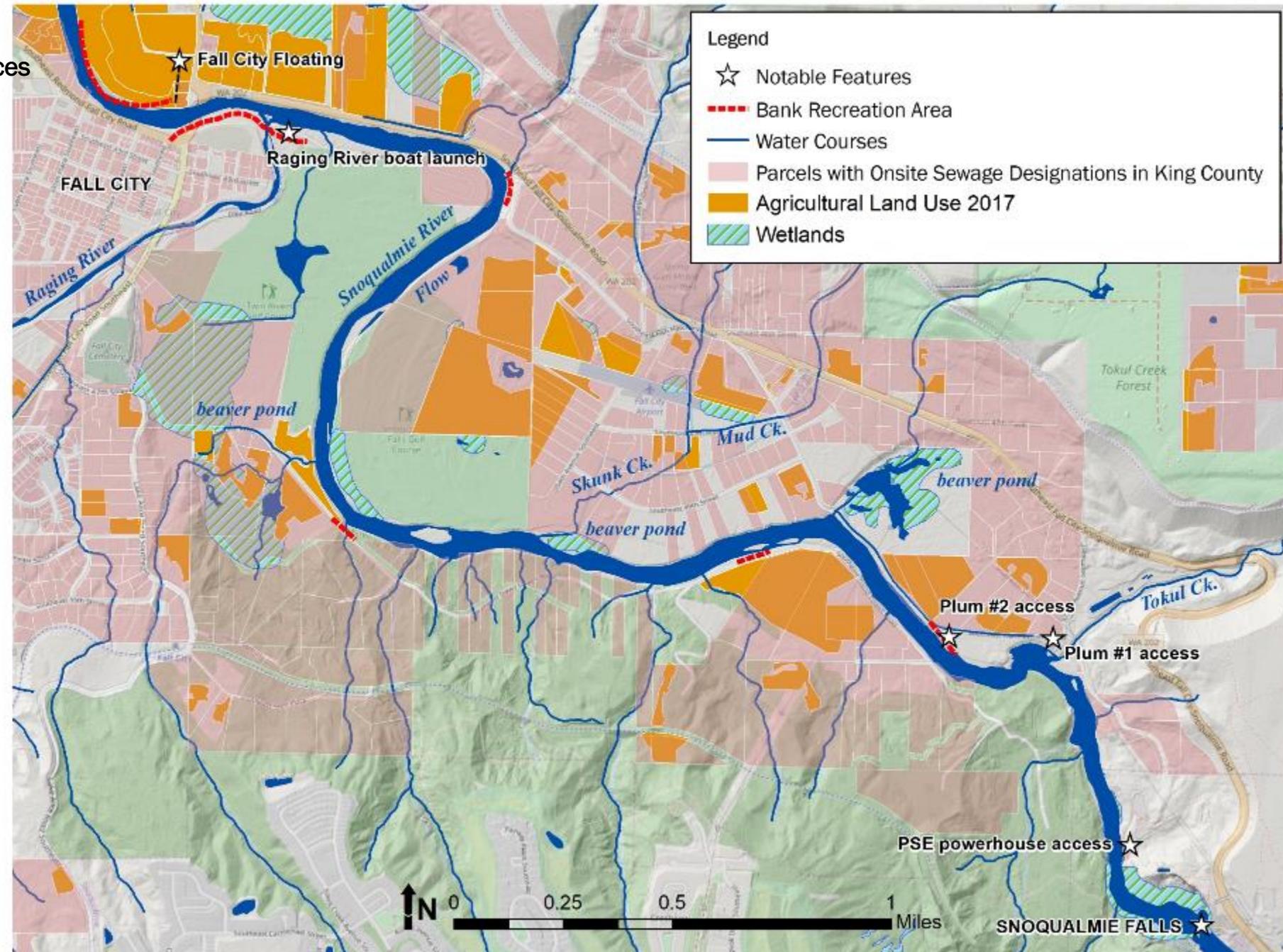
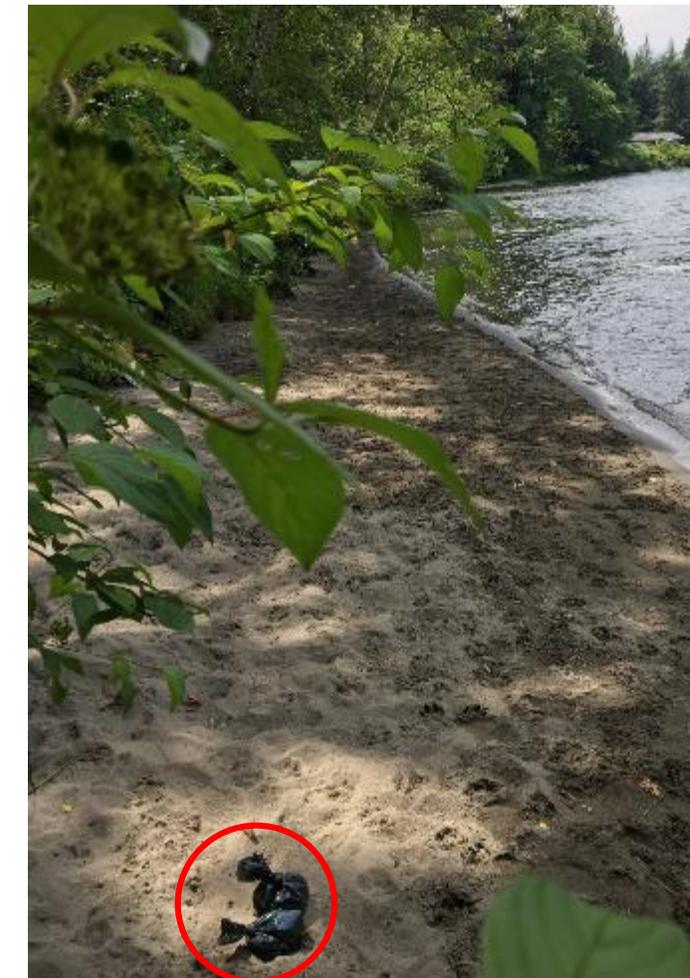
The screenshot shows the King County website with a navigation menu at the top. The main content area is titled "Freshwater Swimming Beach Bacteria and Algal Toxin Levels, and Water Temperature". It includes a map of King County with sampling stations marked by 'x' and red diamonds. A sidebar on the left lists various lake-related services, with "Swimming beach data" highlighted. On the right, there are sections for "Stay Informed" with alert and status buttons, "Current Beach Closures" listing Green Lake Duck Island Launch, Green Lake-East, and Green Lake-West, and a "Green Lake - Toxic Algal Warning" section.

King County monitors fecal bacteria on rivers but not specifically through lens of river recreation

# What's floating amongst the floaters?

The landscape is dotted with potential sources

- Septic fields
- Agriculture
- Wetlands
- Rec users?

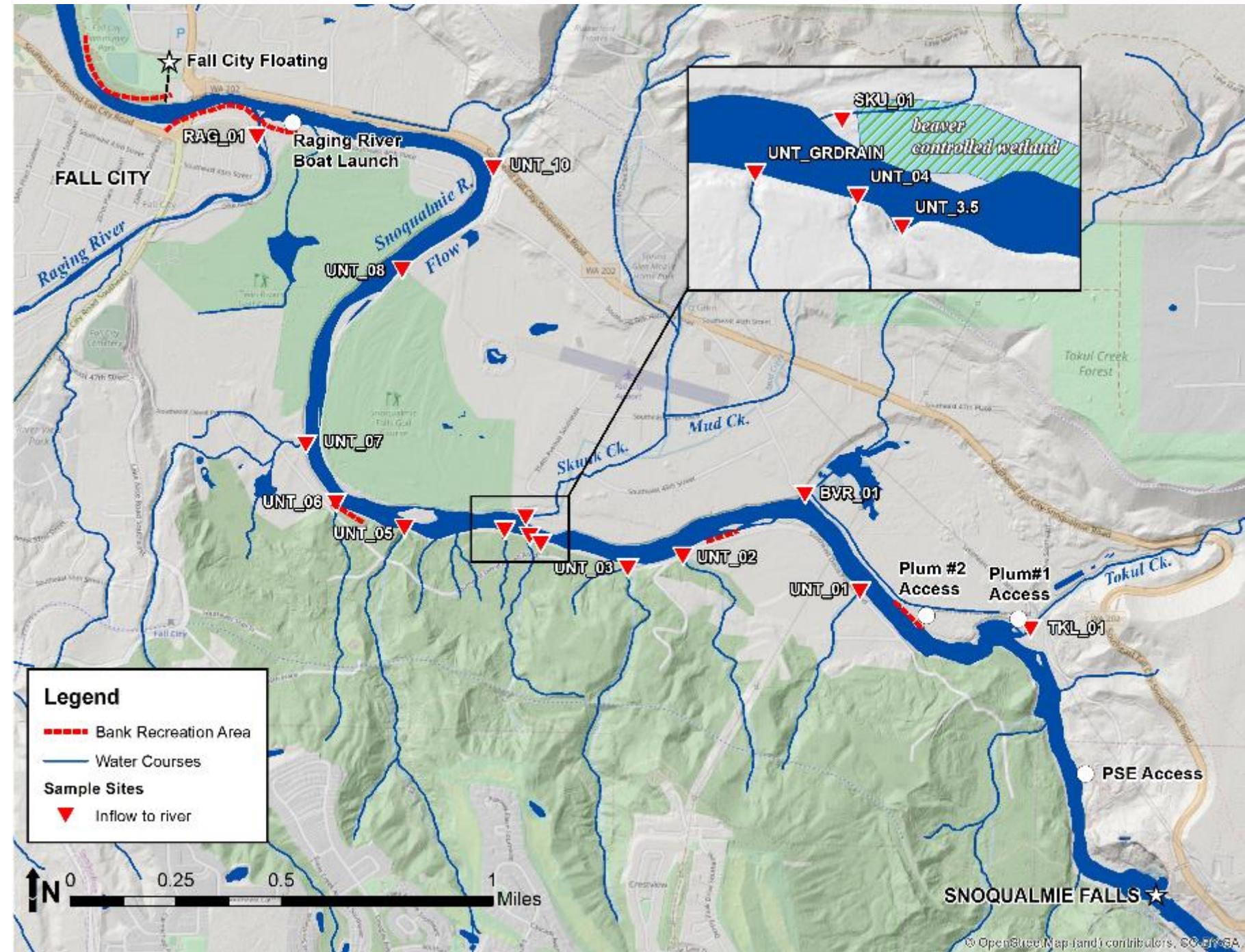


What's floating amongst the floaters?

Where did we sample?

In the Snoqualmie River  
15 locations  
1 above reach / 2 below

Tributaries to the Snoqualmie River  
15 locations



# What's floating amongst the floaters?

## When did we sample?

1

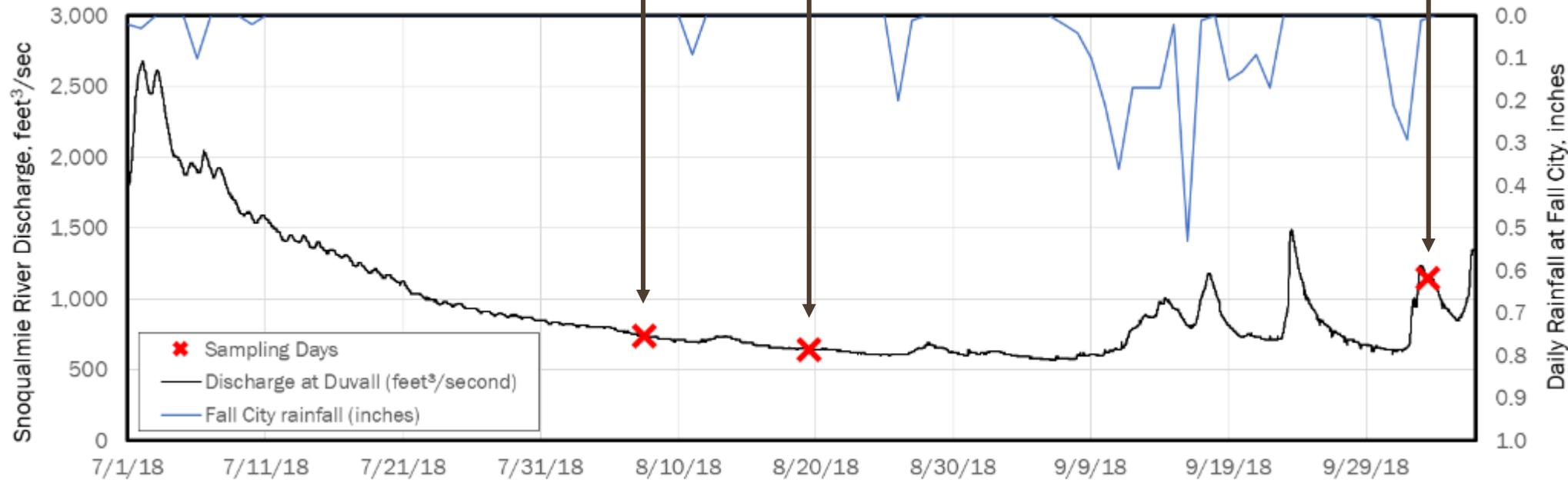
**August 7<sup>th</sup>**  
Tuesday  
Flow at Duvall:  
742 feet<sup>3</sup>/sec  
Fall City Floating  
shuttle riders: 375  
High temperature:  
85.3 °F  
Rainfall in two  
preceding days:  
0 inches

2

**August 19<sup>th</sup>**  
Sunday  
Flow at Duvall:  
642 feet<sup>3</sup>/sec  
Fall City Floating  
shuttle riders: 679  
High temperature:  
70.7 °F  
Rainfall in two  
preceding days:  
0 inches

3

**October 3<sup>rd</sup>**  
Wednesday  
Flow at Duvall:  
1,150 feet<sup>3</sup>/sec  
Fall City Floating  
shuttle riders: 0  
High temperature:  
53.4 °F  
Rainfall in two  
preceding days:  
0.50 inches

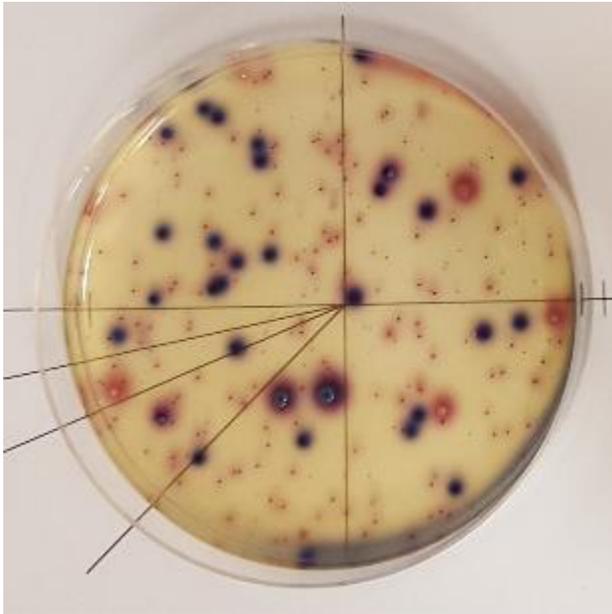


## What's floating amongst the floaters?

### What did we sample?

#### Fecal indicator bacteria (FIB)

- *Escherichia coli* (*E. coli*)
- Fecal coliform



- intestinal bacteria in warm blooded animals
- used to indicate presence of fecal waste
- not specific to respective animals

#### Quantitative Polymerase Chain Reaction (qPCR)

- Human marker
- Dog marker
- Ruminant marker (cows, sheep, deer)



- uses genetic marker to target specific section of DNA from a genus of bacteria
- specific to certain animals: human, dog, ruminants

## What's floating amongst the floaters?

### Driving Questions

- 1 *Are recreational users of the Snoqualmie River exposed to harmful concentrations of fecal bacteria?*
- 2 *Do recreational users contribute fecal bacteria to the Snoqualmie River?*
- 3 *If there are problems, can we fix them?*

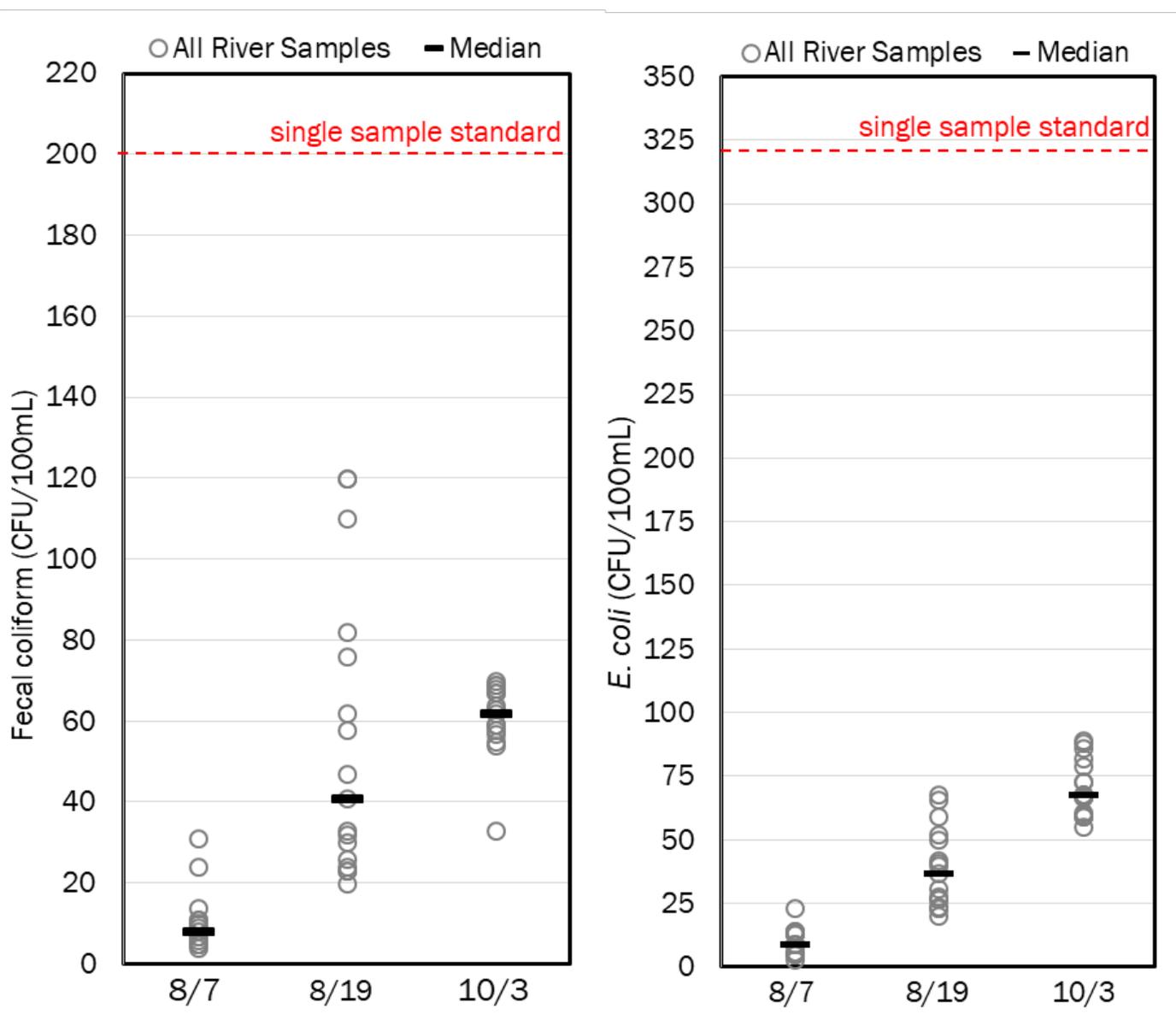
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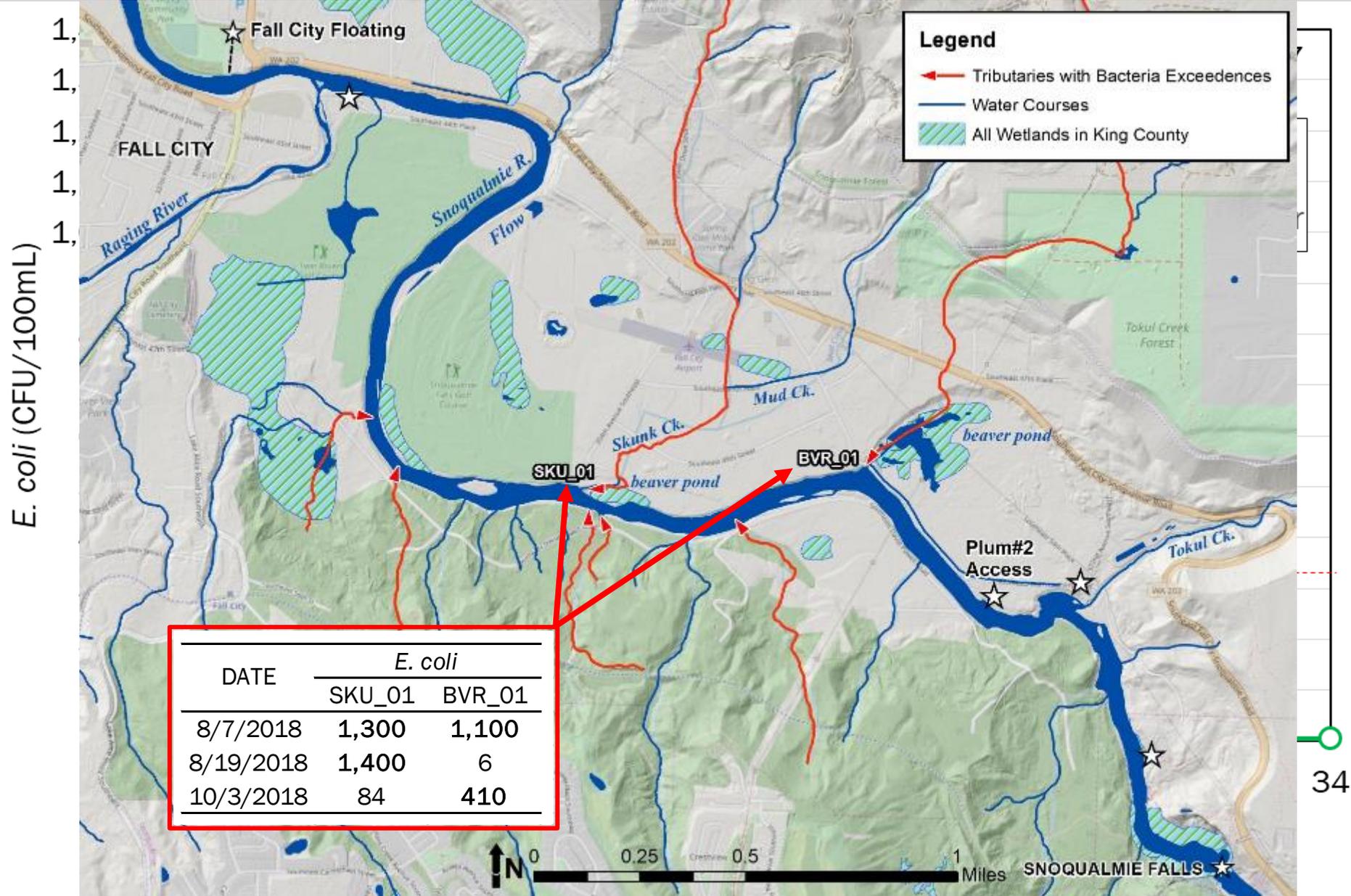
# What's floating amongst the floaters?

## River vs State Quality Standards



# What's floating amongst the floaters?

## Tributaries vs State Standards

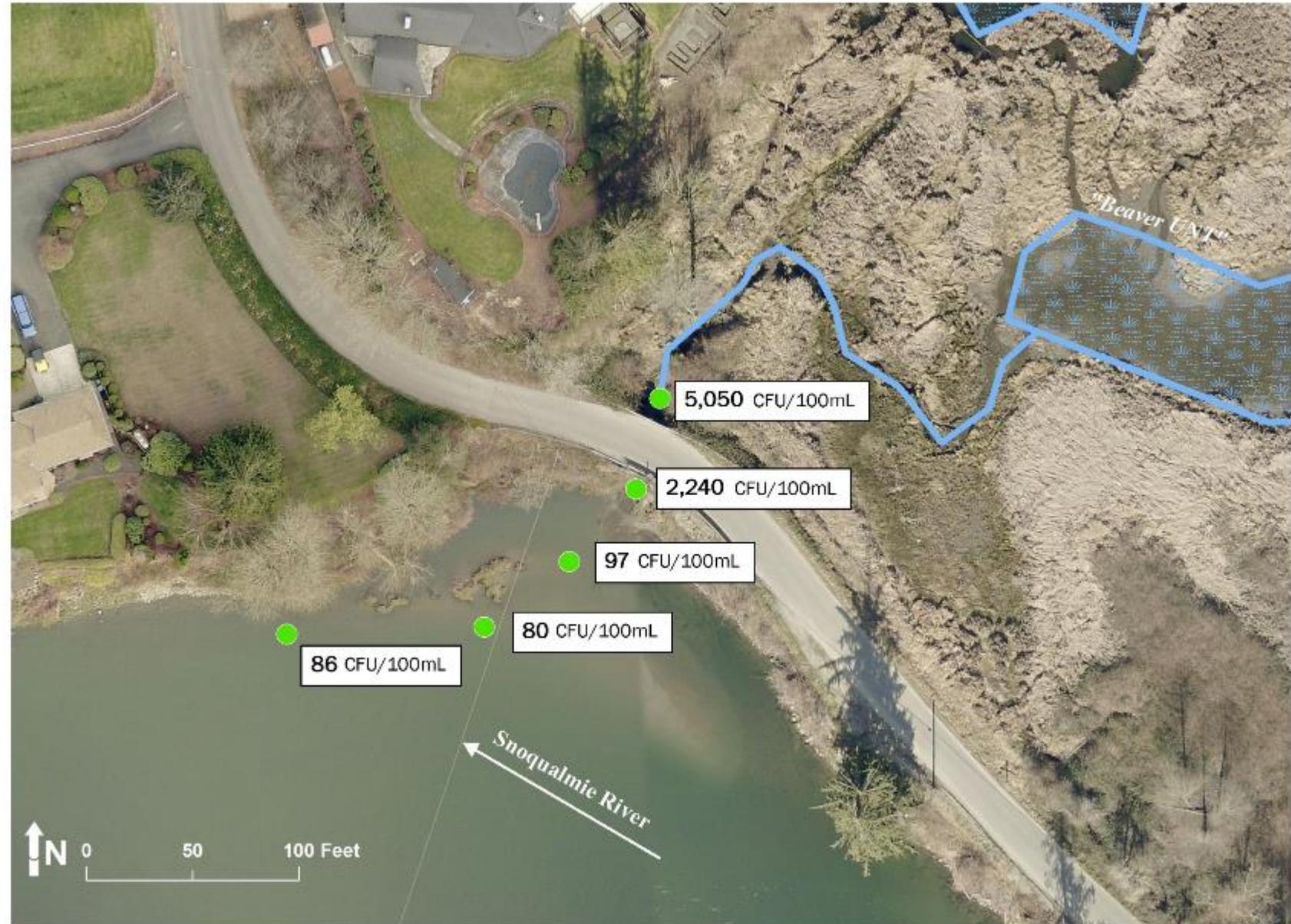


## What's floating amongst the floaters?

### Dilution of tributaries

2019 Follow-up:

- Mixing zone in river?



## What's floating amongst the floaters?

### Dilution of tributaries

2019 Follow-up:

- Mixing zone in river?



July 2018 blowout of dam at  
beaver pond

## What's floating amongst the floaters?

### Driving Questions

① *Are recreational users of the Snoqualmie River exposed to harmful concentrations of fecal bacteria?*

**UNLIKELY UNLESS SPECIAL CIRCUMSTANCES (e.g., dam failure)**

② *Do recreational users contribute fecal bacteria to the Snoqualmie River?*

③ *If there are problems, can we fix them?*

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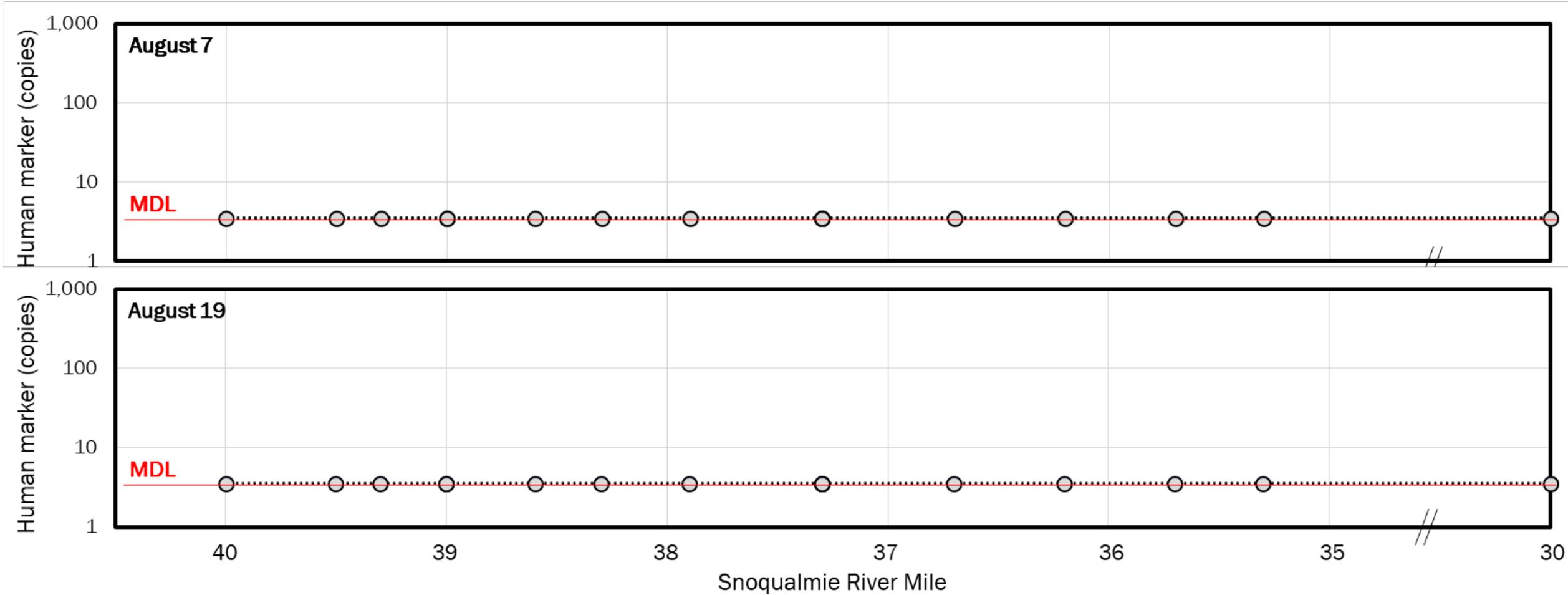
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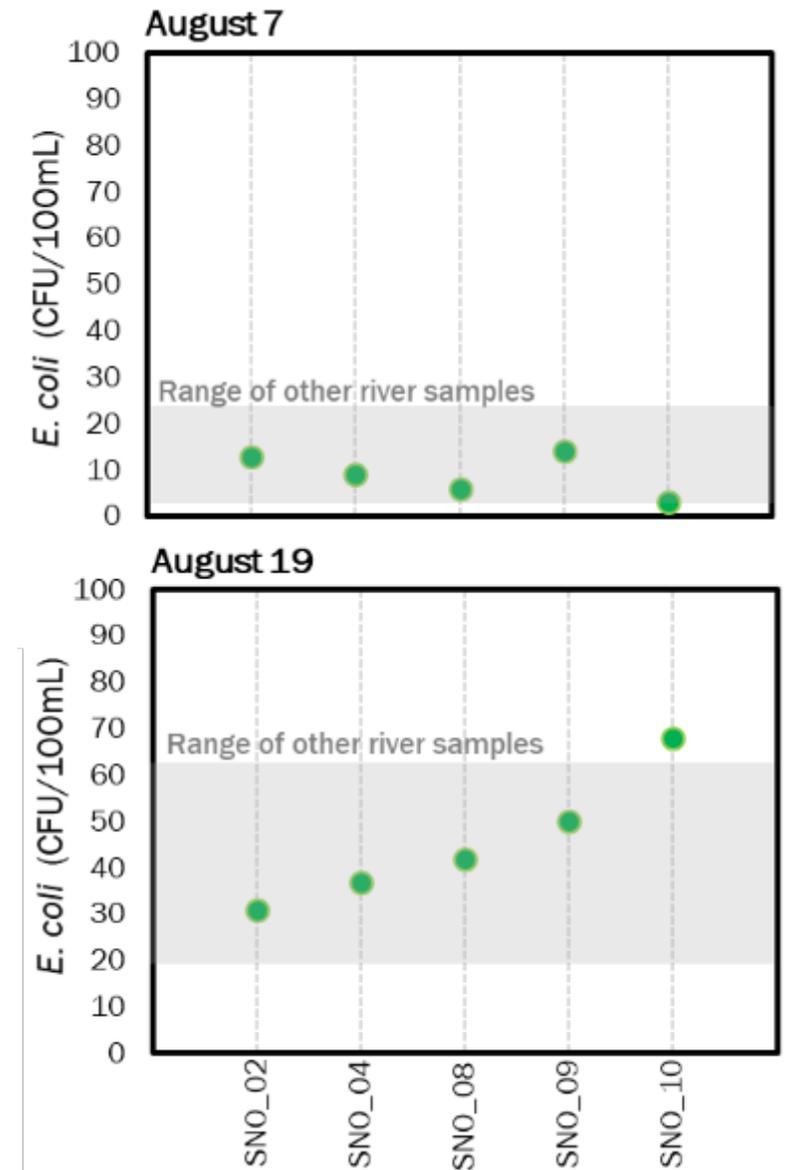
## Human and canine markers...



...all below detection limit for river sites

# What's floating amongst the floaters?

## *E. coli* samples downstream of beaches



## What's floating amongst the floaters?

### Driving Questions

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**UNLIKELY TO BE SIGNIFICANT ACCORDING TO OUR DATA**

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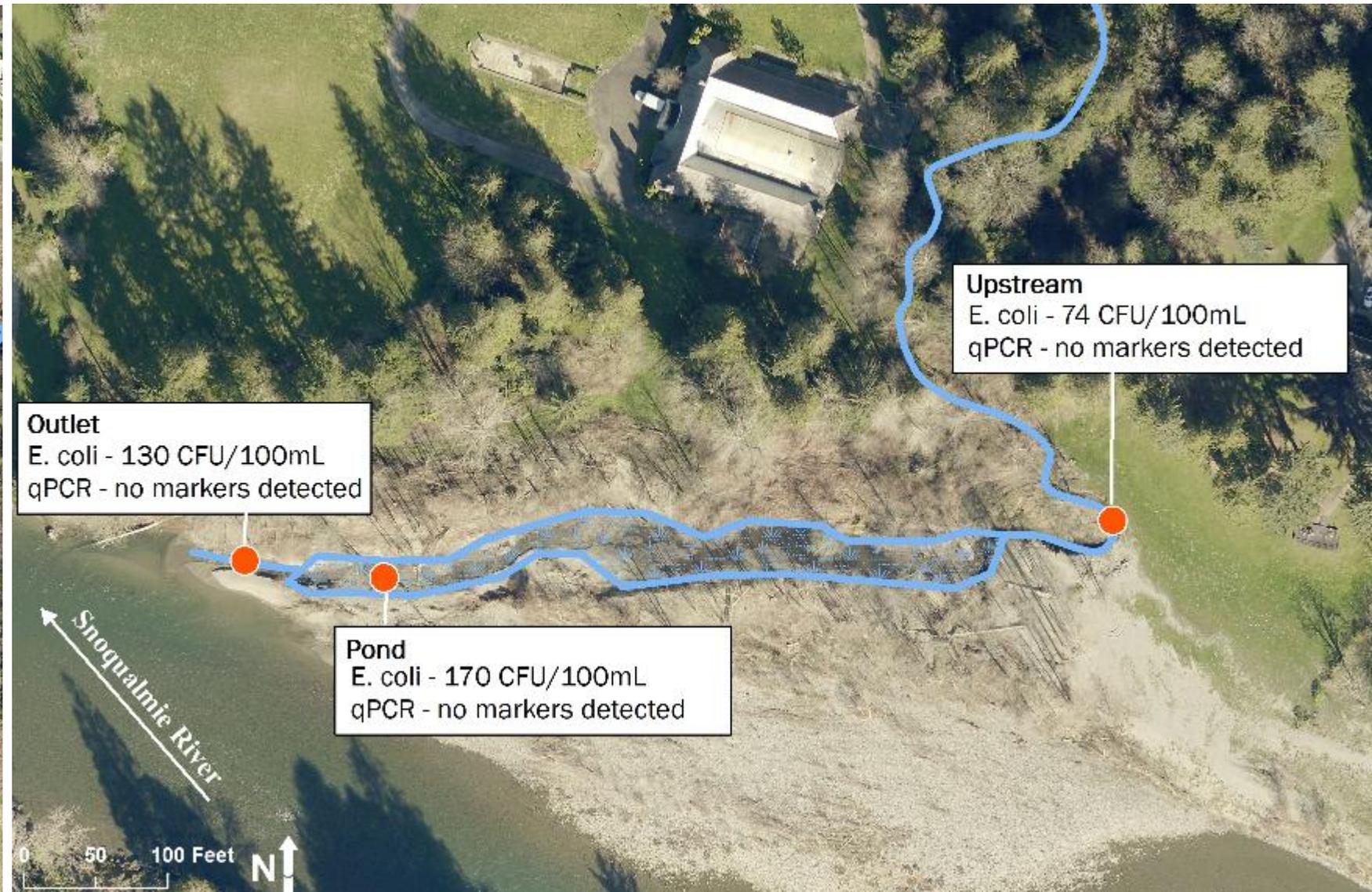
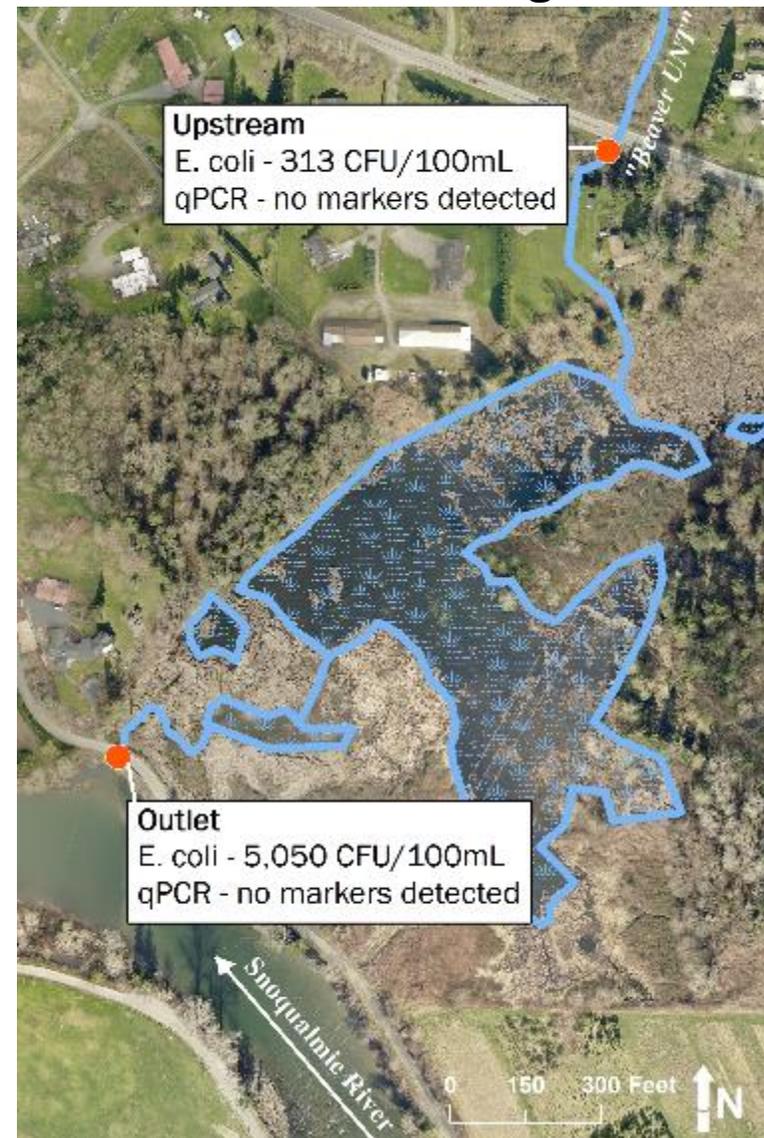
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## What's floating amongst the floaters?

### Further investigation of tributaries

2019 Follow-up:

- Further source tracking on “Beaver Trib” and Skunk Creek



## What's floating amongst the floaters?

### Driving Questions

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**MOST LIKELY SOURCE IS WILDLIFE**

**What's floating amongst the floaters?**

## **CONCLUSIONS**

### **What's floating amongst the floaters?**

- Thankfully, not much in the way of fecal bacteria.
- River samples below state standards, tributaries quickly diluted

### **Can we blame the floaters?**

- On this matter, probably not

### **What to do about those tributaries?**

- Further investigation indicated major source was wetlands
- Be wary of outflows after blowouts



**King County**



Thank you.

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Water and Land Resources Division  
King County Department of Natural Resources and Parks

