

# Research Update: Smallmouth Bass Distribution in the Chehalis River



(Photo: Eric Walther)

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# Background

- Non-native sport fish introduced in late 1800s and early 1900s in Pacific Northwest for fishing opportunities
  - Smallmouth bass, largemouth bass, walleye, among others
- Range of non-native fish has expanded since introduction
  - Increased range correlated with stream temperature warming
- Ecological impacts on native fish including direct predation
- Yakima River adult smallmouth bass have been estimated to consume up to 35% of the subyearling Chinook outmigration in a given year (Fritts and Pearson 2004)

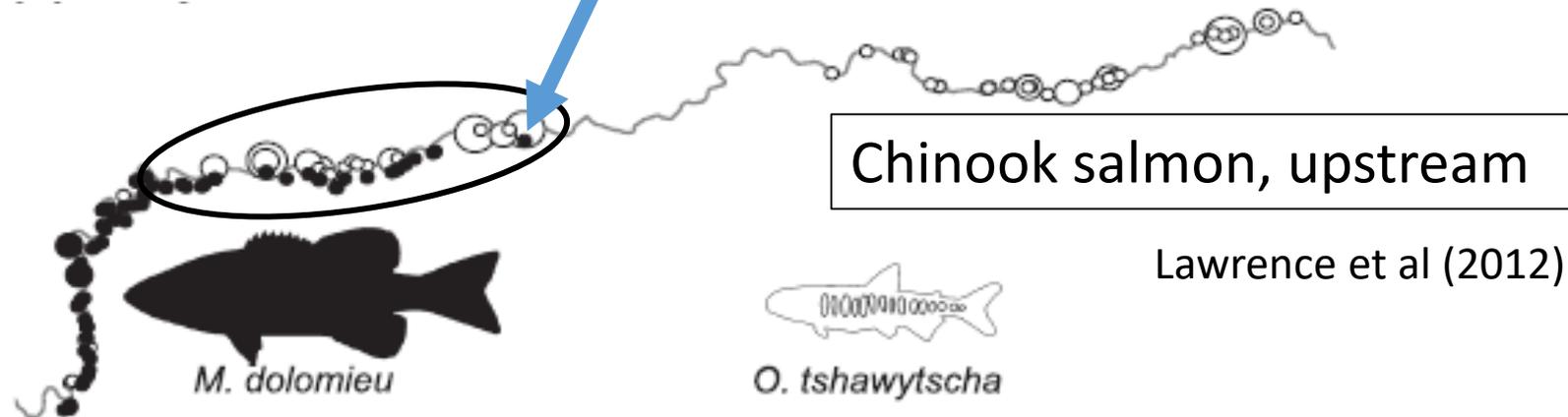


# Smallmouth bass (*Micropterus dolomieu*)

- Distribution, survival, growth, spawning, positively correlated with stream temperature
- Cooler water preferences compared to other non native fish
- Preference for river habitat vs. lake or pond
- Predator
- Warming stream temperatures creating more suitable habitat and growth conditions



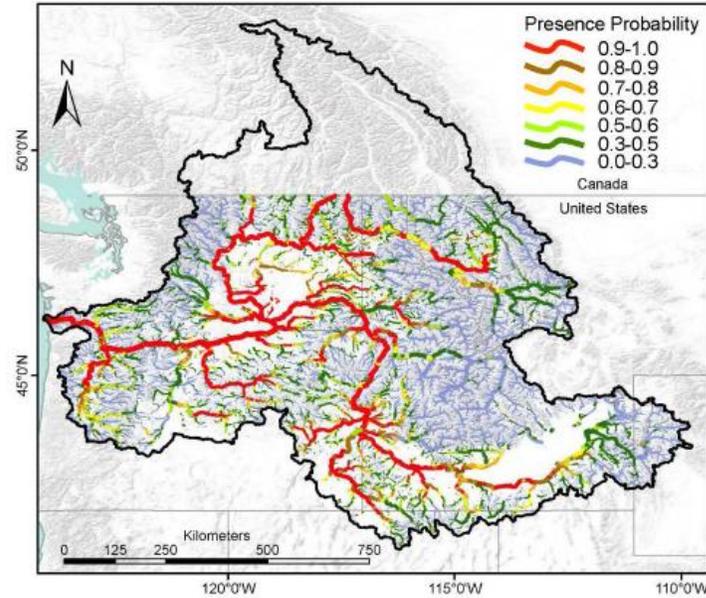
**Upstream edge boundary** – anticipated to push upstream under climate change scenarios



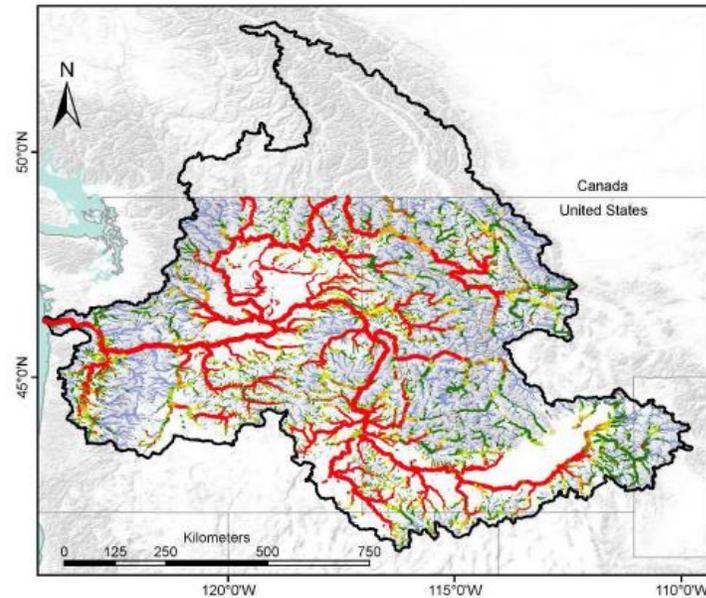
Smallmouth bass, downstream

# Smallmouth bass distribution expansion under climate change

Present Columbia River  
distribution model  
~17,000 km  
Rubenson and Olden (2019)



2080 Columbia River  
distribution model  
~29,000 km



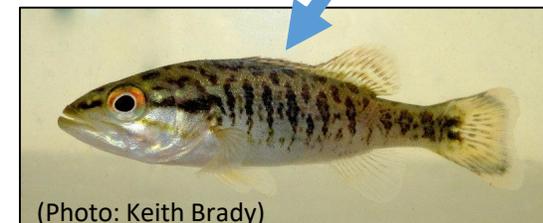
# Objective

- Describe the summer distribution and upstream edge boundary of smallmouth bass in the Chehalis River and tributaries



# Methods – Environmental DNA (eDNA)

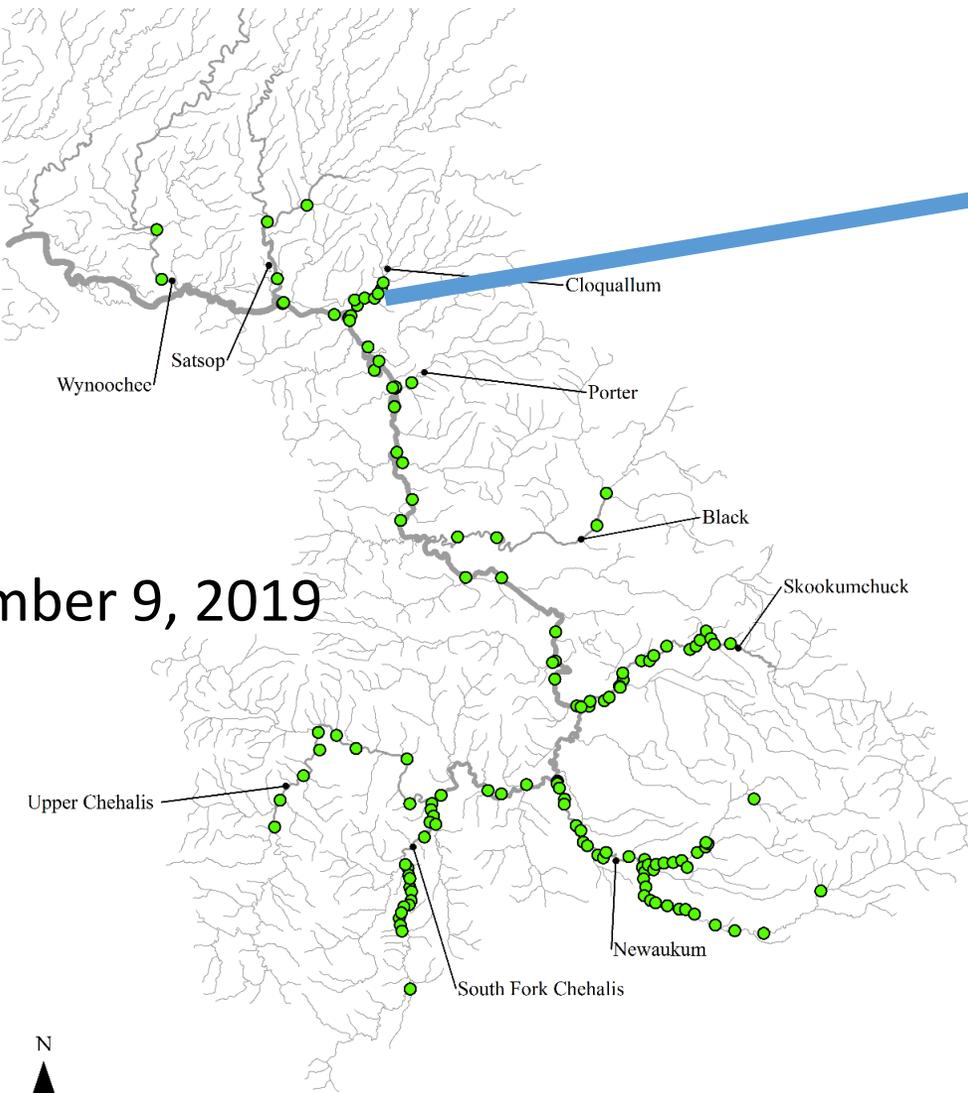
- DNA released by an organism into environment (cells, mucus, gametes, etc)
- Pros:
  - Non invasive
  - Rapid, efficient, repeatable sampling
  - Species presence
  - Sensitive (higher probability of detecting cryptic species)
- Cons:
  - Degradation of DNA in environment
  - Contamination risk high
  - No individual data (presence/absence only)



(Photo: Keith Brady)



# Methods



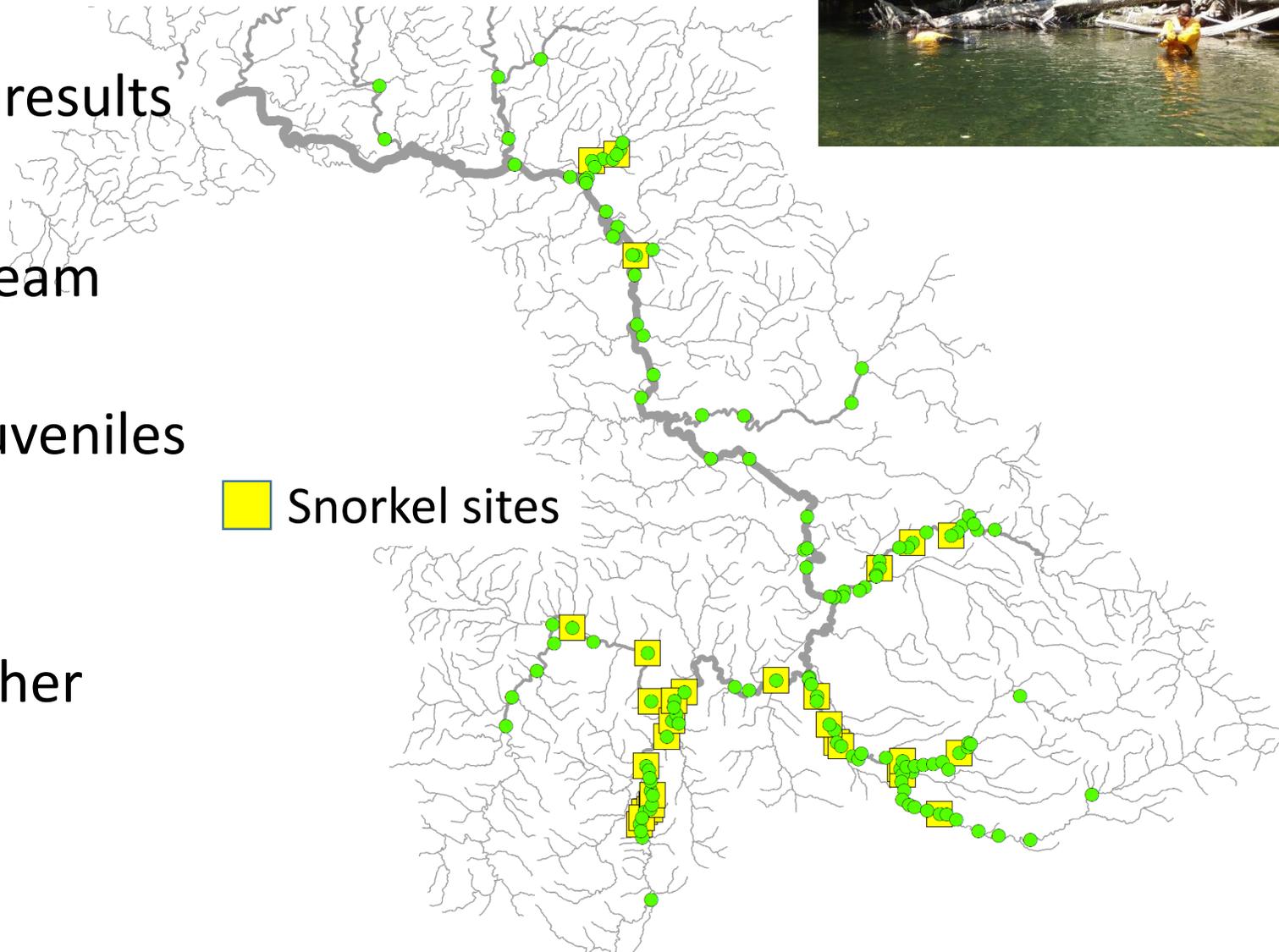
- 135 sites
- July 31 – September 9, 2019



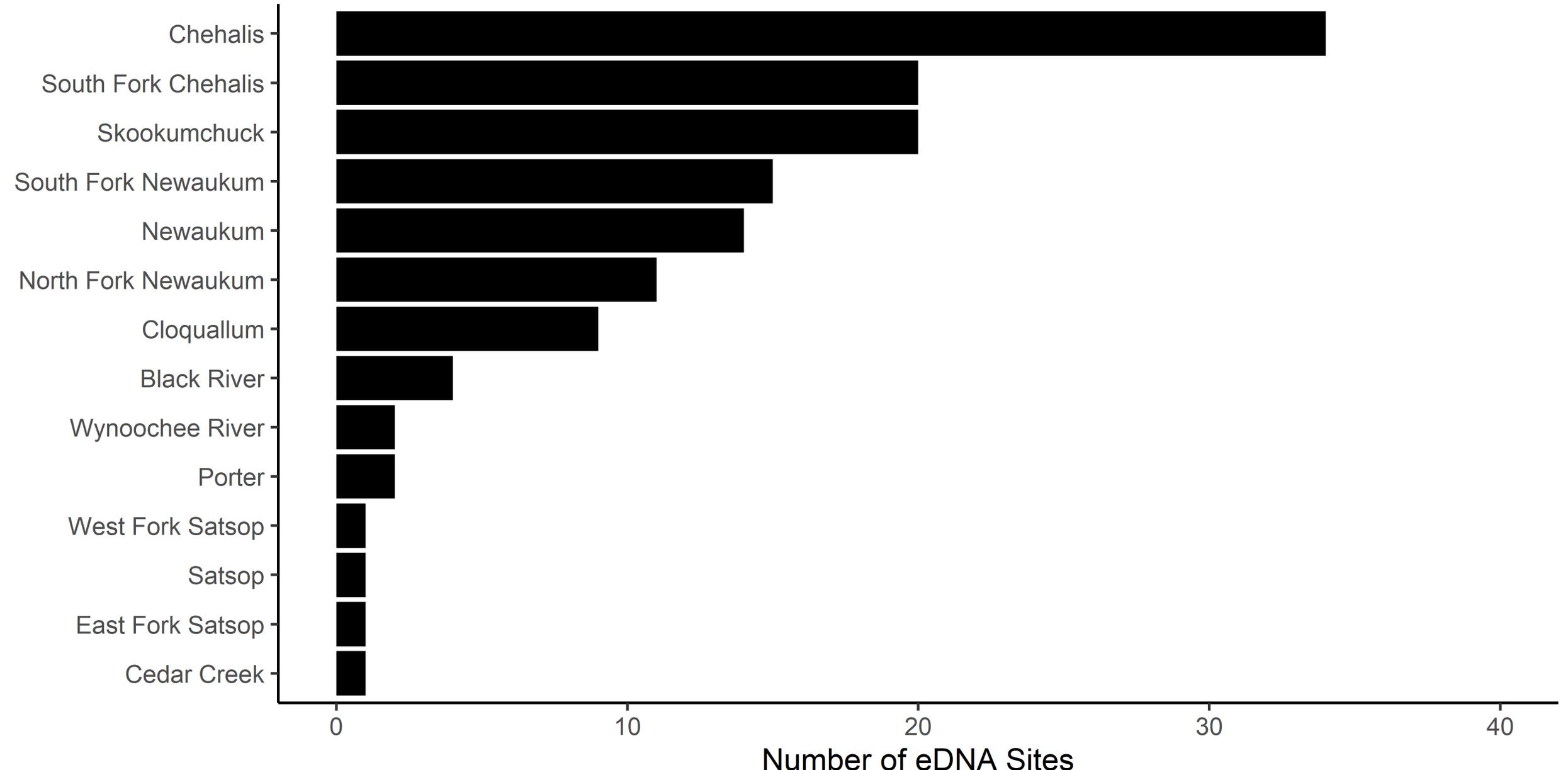
(Photo: Keith Brady)

# Methods - snorkel

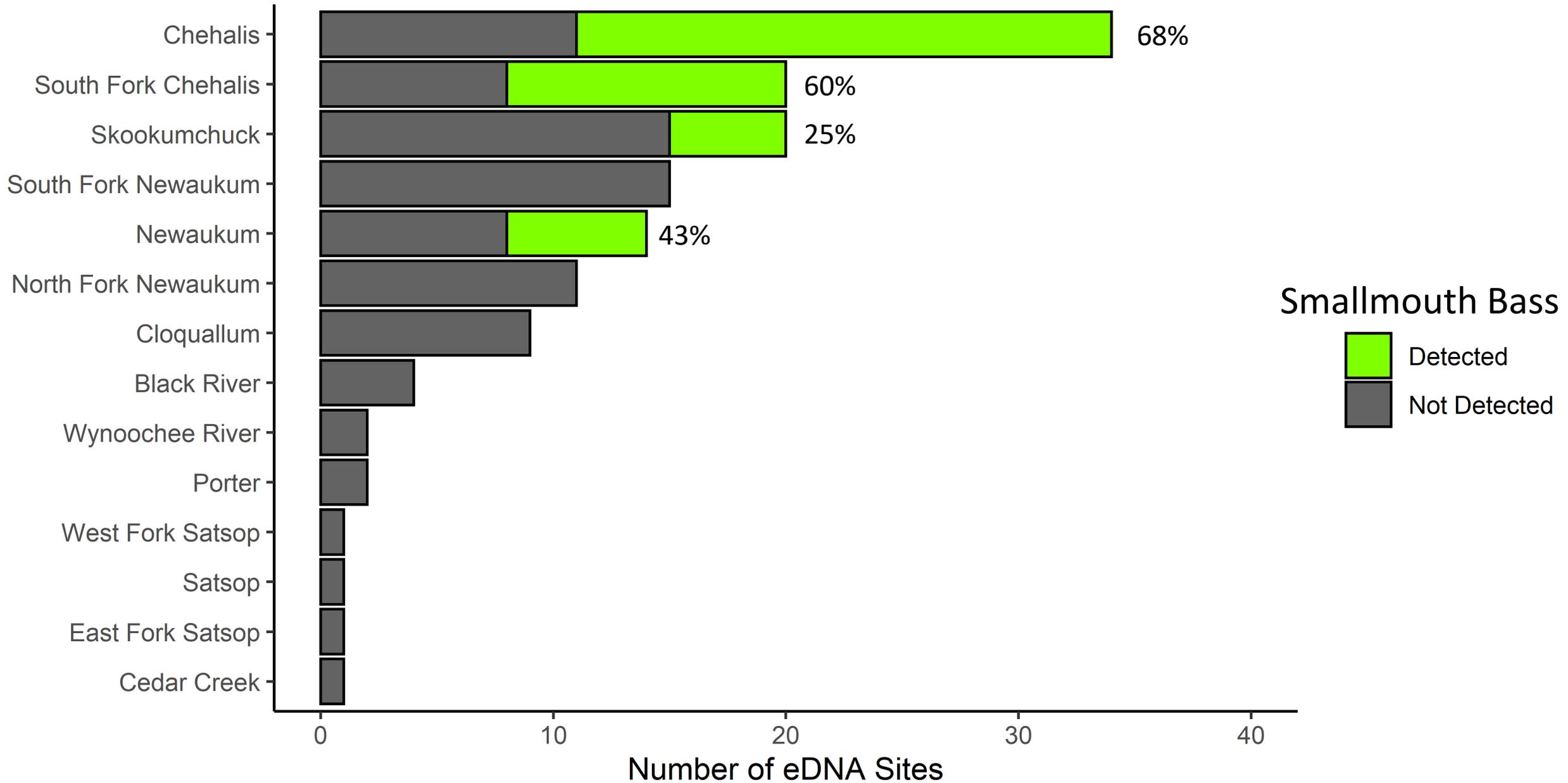
- Compare snorkel and eDNA results
- 30 sites
- Snorkeled 1 kilometer upstream from eDNA collection point
- Counted smallmouth bass juveniles and adults
- Counted all salmonids
- Documented presence of other species



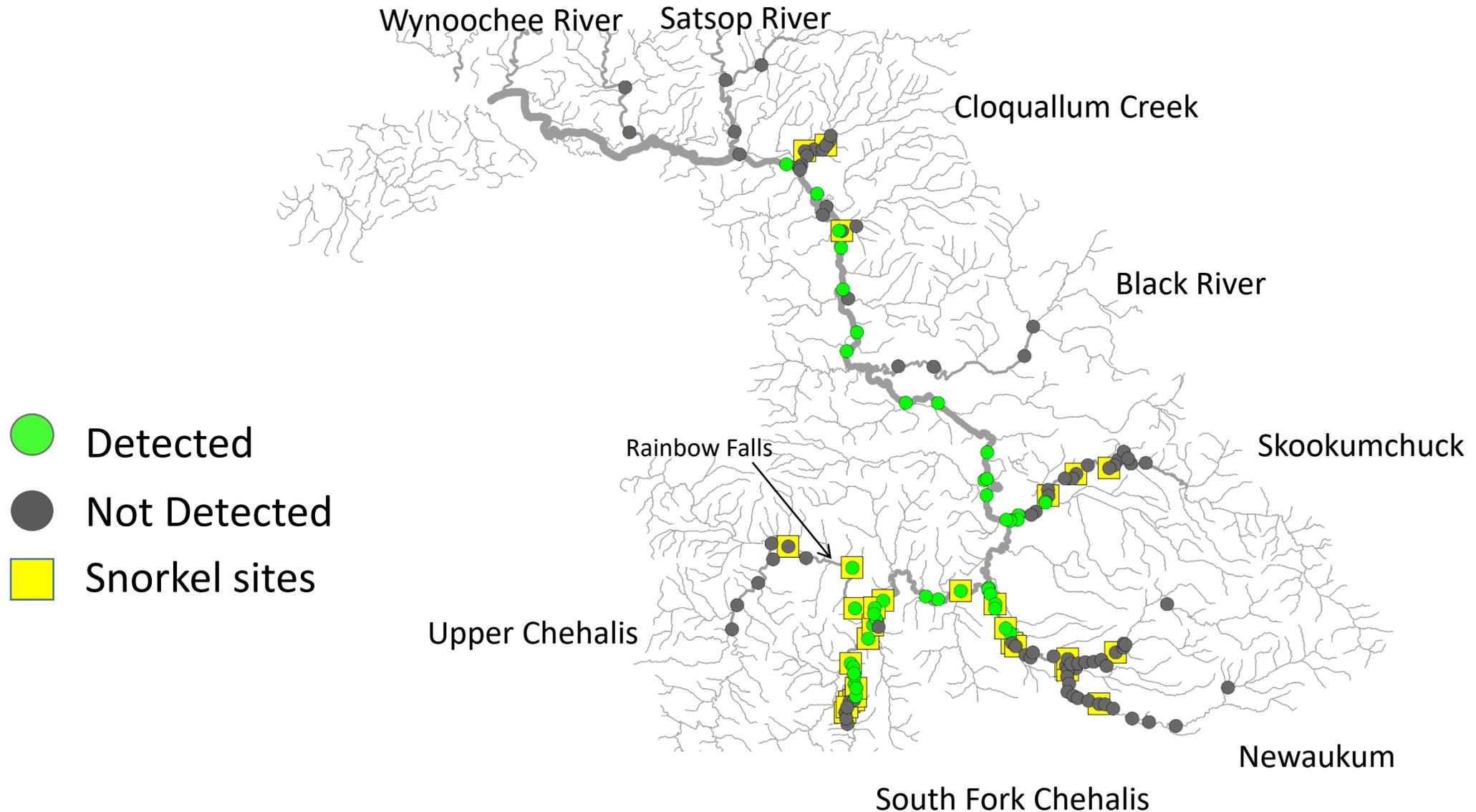
# eDNA sites by basin



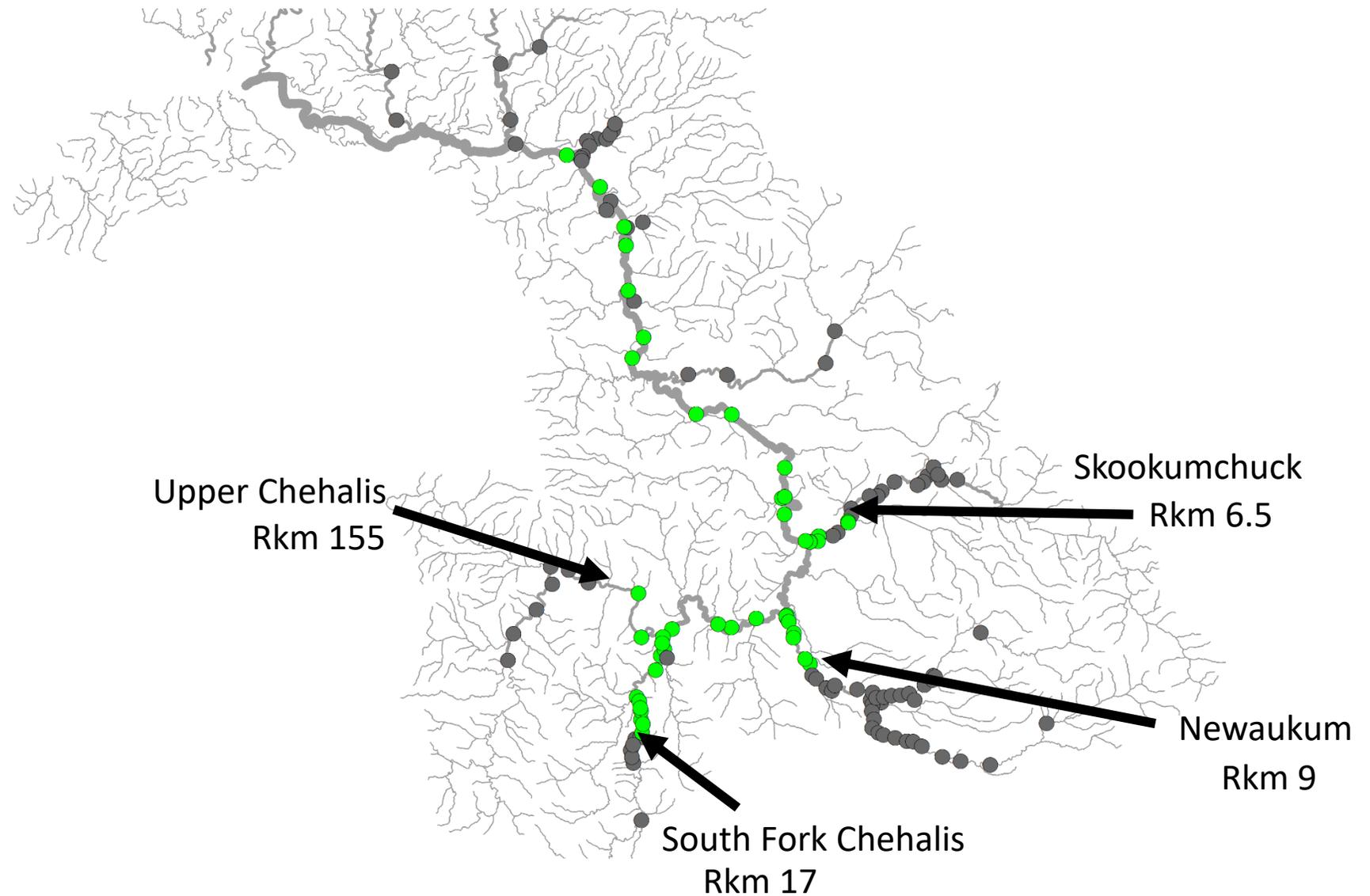
# Smallmouth bass eDNA results by basin



# Results – 2019 smallmouth bass distribution



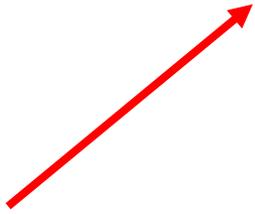
# Results – 2019 upstream edge boundary



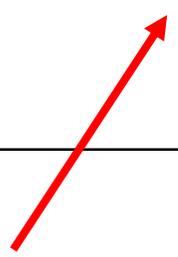
# Results – eDNA vs. snorkel

	eDNA Detected	eDNA Not Detected
Snorkel Detected	11	4
Snorkel Not Detected	1	14

Poor visibility  
(1.2 meters or 4 feet)



3 or less fish



# Results – eDNA vs. snorkel

	eDNA Detected	eDNA Not Detected
Snorkel Detected	11	4
Snorkel Not Detected	1	14

# Discussion

- eDNA good tool for detecting smallmouth bass
- Smallmouth bass widely distributed in Chehalis River
- Smallmouth bass detected in main stem Chehalis, South Fork Chehalis, Newaukum, Skookumchuck
- Upstream edge boundary in 2019 detected in main stem and 3 major tributaries
- No detections in Olympic Mountain tributaries, Black River, Cloquallum Creek, Porter Creek, Cedar Creek
- Smallmouth bass not detected upstream of Rainbow Falls



# Next Steps

- Collect additional year of distribution information
  - Distribution varies seasonally and annually and is correlated with stream temperature
- Link distribution information with **Chehalis Thermalscape** to identify stream temperature associations
- Develop spatially continuous probability of occurrence maps for Chehalis



# What do we need to know about smallmouth bass in context of restoration?

- How many salmon smolts do smallmouth bass consume in the Chehalis?
  - (e.g. Yakima River see Fritts and Pearsons 2004)
- What are the environmental characteristics associated with seasonal distribution patterns?
  - (Rubenson and Olden 2017)
- How does smallmouth bass distribution expand under climate change scenarios?
  - (Columbia River; Rubenson and Olden 2019)
- What environmental characteristics associated with juvenile smallmouth bass growth and survival?
  - (Lawrence and Olden 2015)

# Acknowledgements

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Thank you!

