

# Non-native fish predators of the Chehalis River



ASRP Symposium

April 2022

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# Background

- Non-native sport fish introduced in late 1800s and early 1900s in Pacific Northwest for fishing opportunities
- Range of non-native fish has generally expanded since introduction
- Ecological impacts on native fish including direct predation
- Smallmouth bass consumed up to 35% of the subyearling Chinook salmon outmigration (Fritts and Pearson 2004)



# Key questions

- What non-native predatory fish are present in the Chehalis River?
- Where are they distributed?
  - What are the associated environmental covariates?
  - Where might they be distributed in the future via climate change?
- How many are present?
- What are they eating?
- When and where are they consuming species of interest including juvenile Chinook salmon?
  - What are the associated environmental covariates?
- How many Chinook salmon are they eating?

# Key question

- What non-native predatory fish are present in the Chehalis River?



# Smallmouth bass (*Micropterus dolomieu*)



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# Largemouth bass (*Micropterus salmoides*)





# Rock bass (*Ambloplites rupestris*)



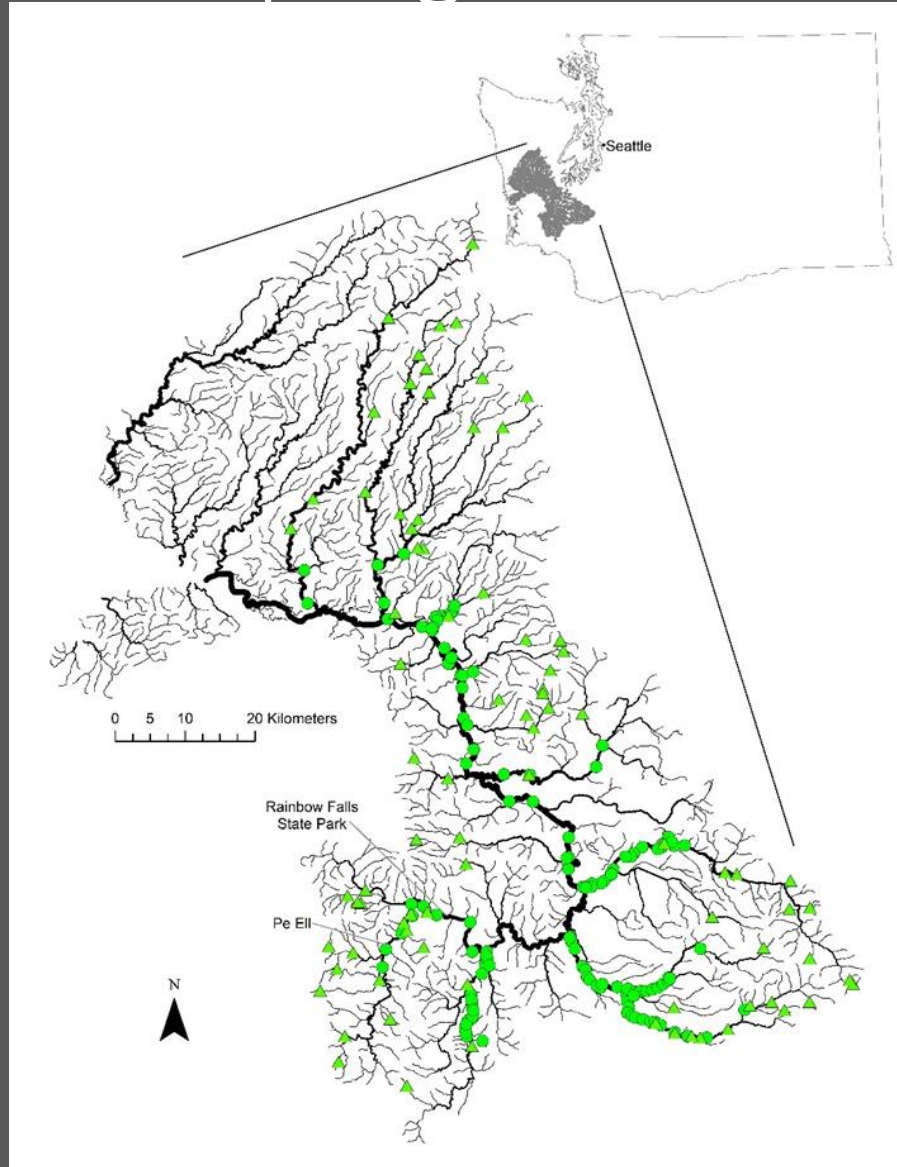
# Where are they distributed?

- Fundamental to understanding impacts of non-native fish is knowledge of their spatial distribution





# Spatial distribution sampling – environmental DNA (eDNA)



# 9 Smallmouth bass spatial stream network distribution model

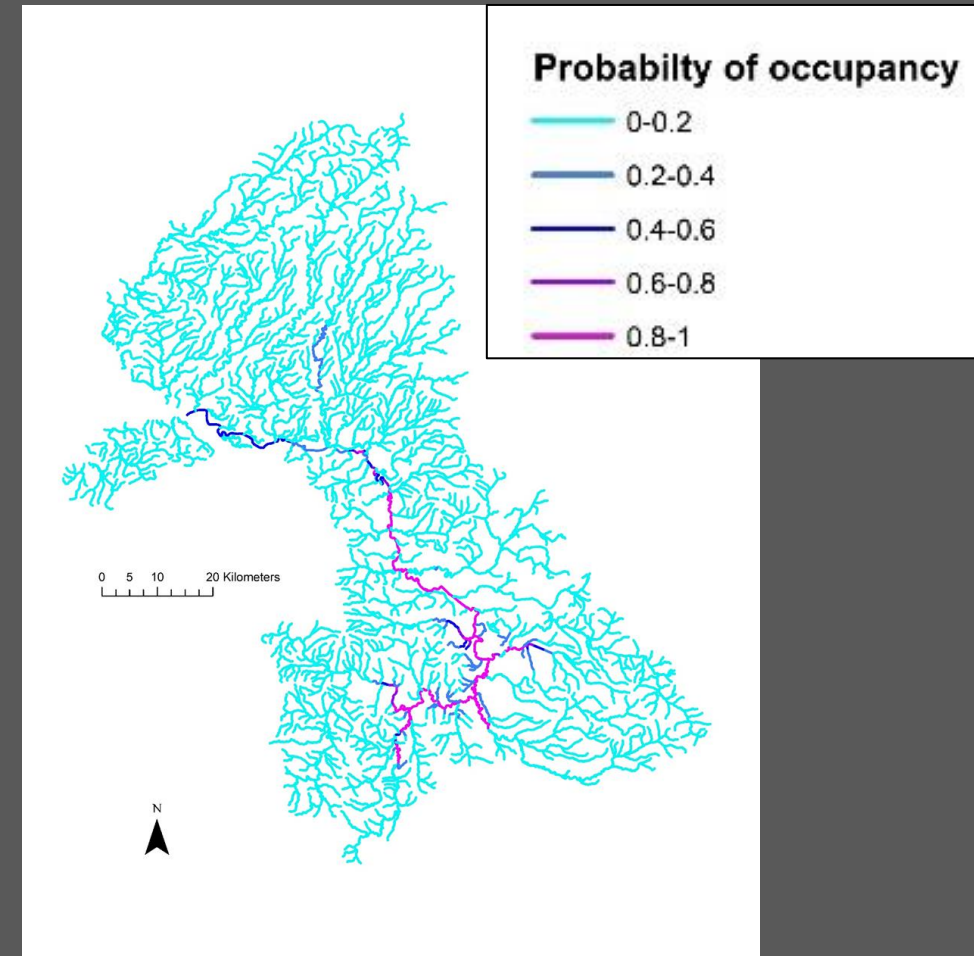
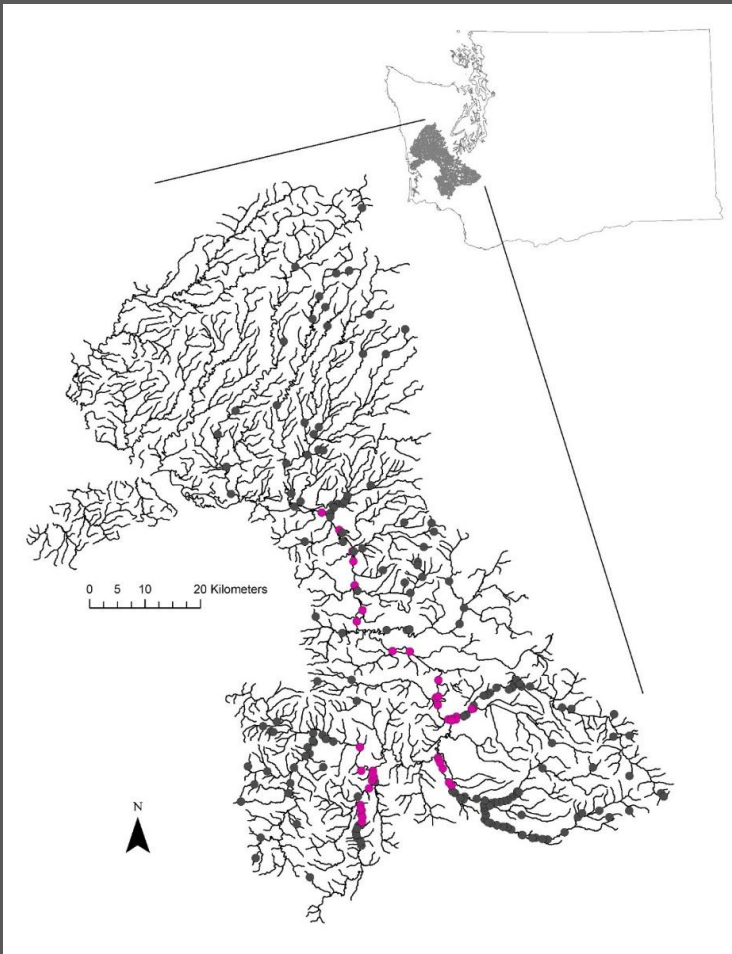
- Predicted occupancy = 242 km of habitat

AUC = 0.98

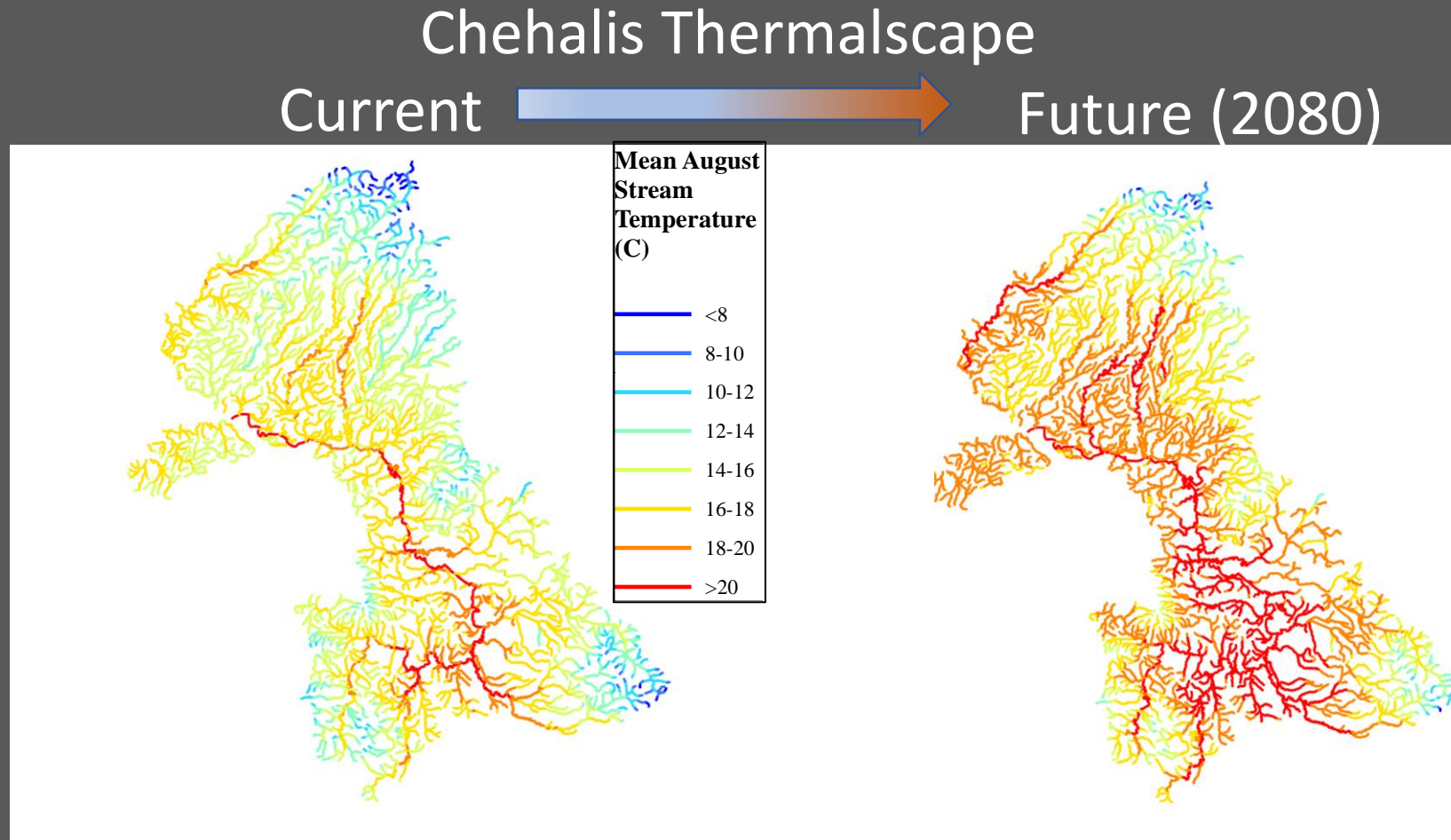
Accuracy = 0.96

Sensitivity = 0.98

Specificity = 0.88



# How might smallmouth bass distribution look under climate change?

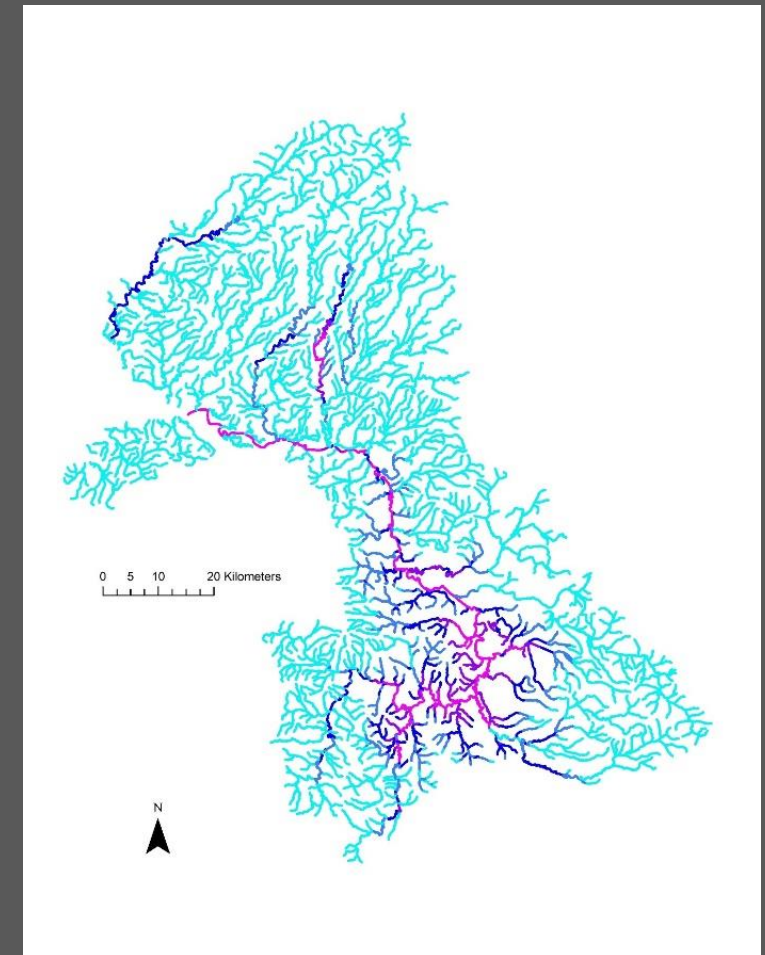
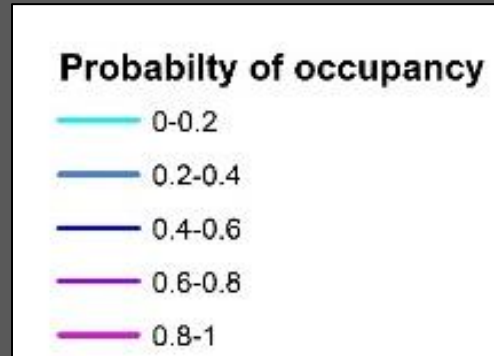
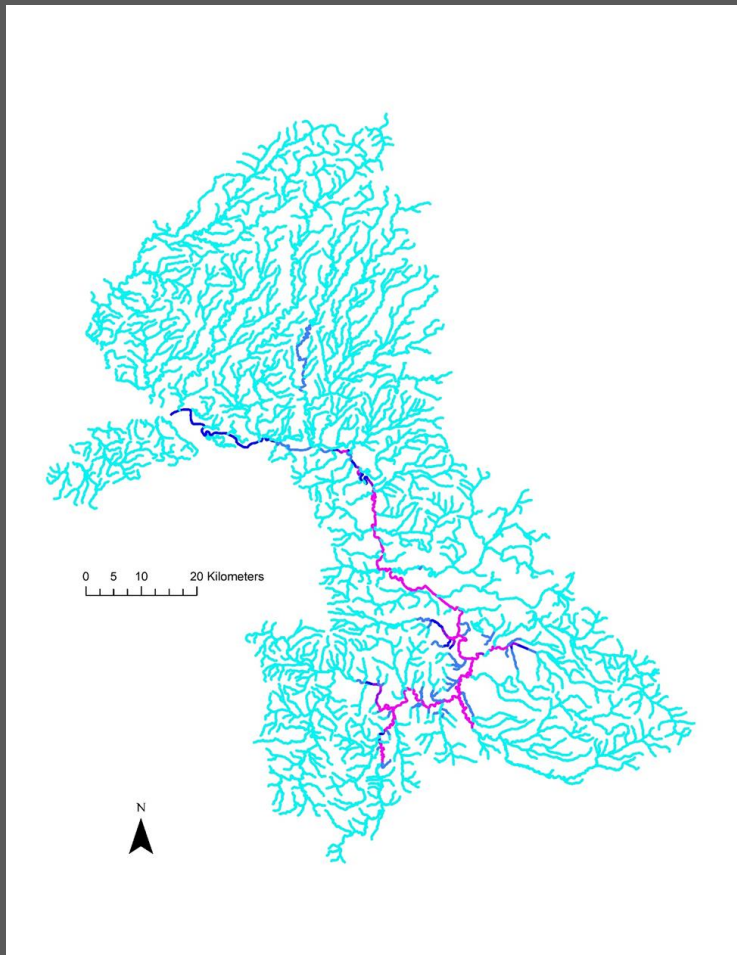




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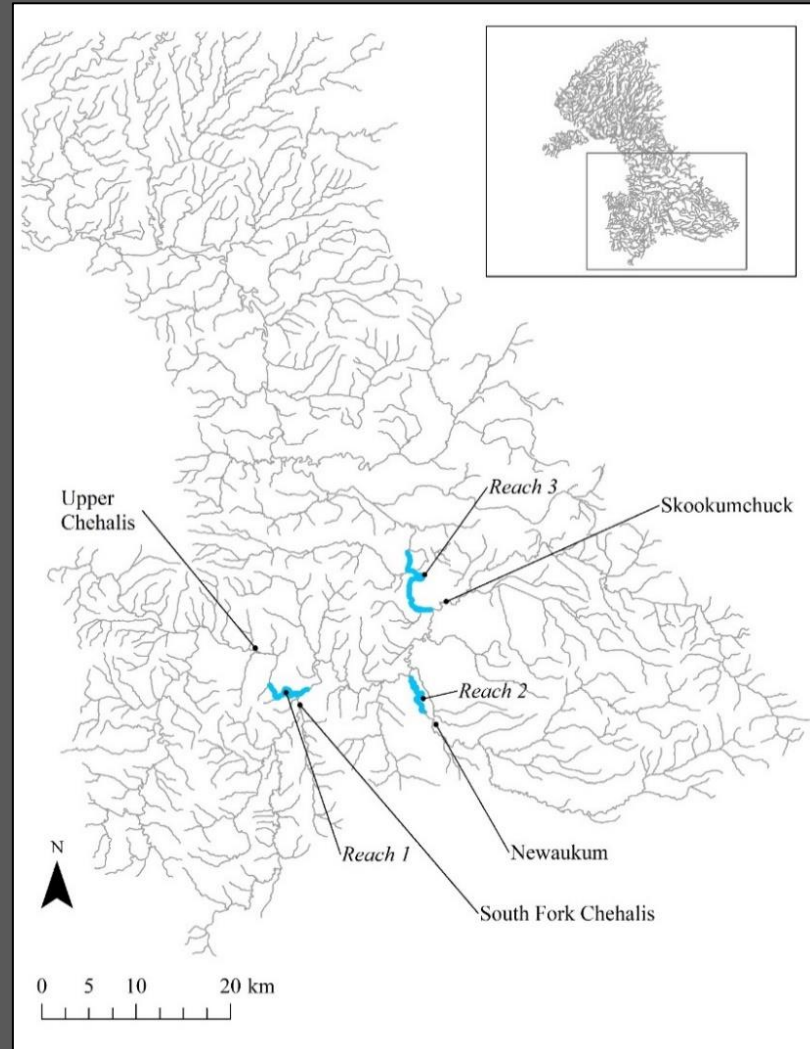
# Smallmouth bass distribution late century - 2080

- Predicted occupancy = 1,146 km of habitat
- Four-fold increase from current conditions

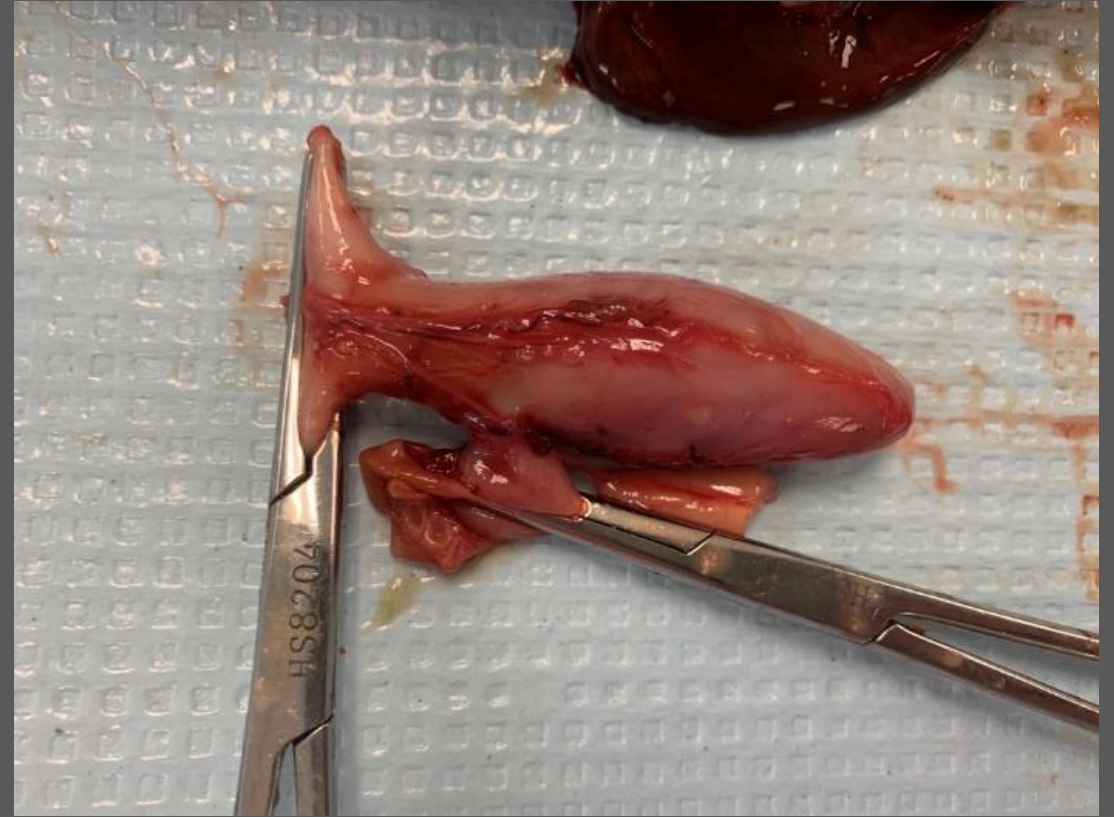


# What do they eat? Smallmouth diet pilot study

- Fundamental to understanding impacts of non-native fish is knowledge of their diet



# Smallmouth diet study – DNA metabarcoding





# Top smallmouth bass diet items

Prey item	Percentage of samples (%)
Largemouth bass	100
Largescale sucker	96
Chinook	93
Insect	79
Signal crayfish	72
Longnose dace	68
Sculpin sp	53
Prickly sculpin	41
Cyprinid sp	25
Coho	21

# Next steps

- Describe spatial distribution of other non-native predators
  - Predation risk maps – hotspots and cool-spots
- What do the other non-native predators eat?
  - When and where
- How many do they eat?
  - DNA mixture modeling to determine total number of Chinook salmon in stomach contents



Rock bass



# Acknowledgements

- Field Data: Matt Duddy, Amy Edwards, Curt Holt, Andrew Kirwan, Shayne Noble, Dan Olson, Sam Williams, Carson Swart, Nick Hickman, Andy Oppliger, Ryan Struble, Nick VanBuskirk
- Analysis/study design: Dr. Julian Olden (UW), WDFW Genetics lab
- Private landowners
- Funding: Washington State Legislature

