

# Native Freshwater Fish Occupancy Model in the Chehalis River Basin

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ASRP Symposium  
Centralia College, WA  
January 7, 2020



# How does restoration impact native freshwater fishes?

- ASRP includes all aquatic species and habitats
- Actions are largely aimed to improve and protect salmon and steelhead habitat
- Relationships between restoration actions and changes to distribution of other native freshwater fishes are poorly understood
- Data gap: Will restoration also have a positive influence on native freshwater fishes?



Speckled dace



Reticulate sculpin



Pacific lamprey

# Occupancy Study – Approach

- Collect presence data to describe current fish occupancy
- Describe relationships between habitat and native freshwater fishes occupancy
- Use relationships to describe if habitat changes (e.g., restoration) will increase abundance or distribution of native freshwater fishes
- Informs status and trends of native freshwater fishes



Speckled dace



Reticulate sculpin



Pacific lamprey

# Occupancy Study – Objectives

1. Describe current occupancy
  - Establish multi-year monitoring program
  - Develop spatially continuous, multi-species occupancy model
2. Describe relationships between habitat and native freshwater fishes



Speckled dace



Reticulate sculpin



Pacific lamprey

# Occupancy Study – ASRP key species

- Pacific lamprey
- Mountain whitefish
- Largescale sucker
- Speckled dace
- Reticulate sculpin
- Riffle sculpin
- Olympic mudminnow
- Western ridged mussel



Speckled dace



Reticulate sculpin



Pacific lamprey

# Occupancy Study – Methods

- Conduct surveys at random sample of sites
- Collect habitat metrics
- Sample aquatic species
  - 2-pass snorkeling
  - Electrofishing
  - eDNA (metabarcoding)



# Methods - eDNA metabarcoding



DNA  
Extraction

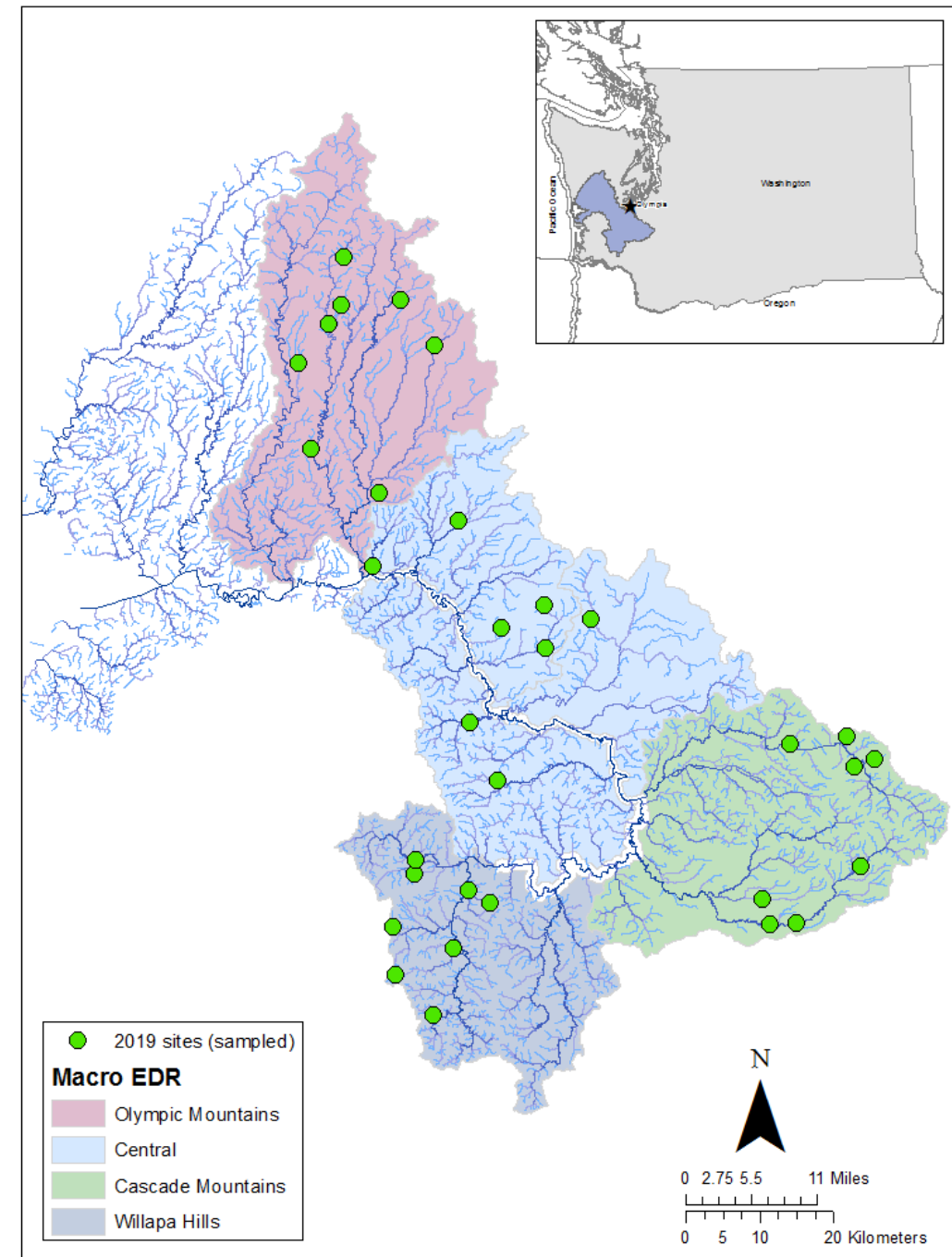
DNA  
Amplification  
via **Universal  
Primers**

Sequencing



# Results 2019

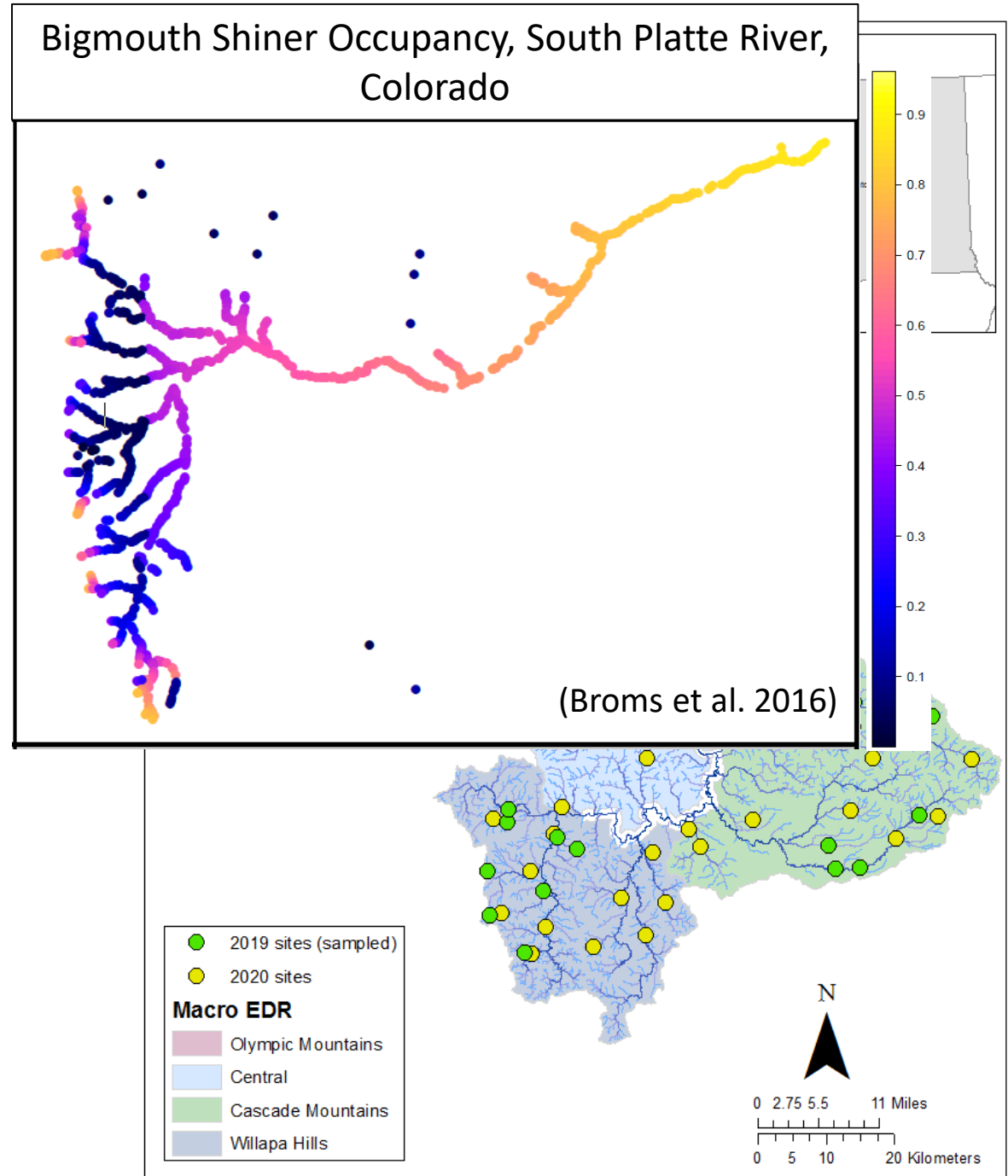
- Collected data at 32 sites
  - Detected presence of 20 aquatic species
  - eDNA results pending
  - Habitat metrics
    - Bankfull width, wetted width, depth substrate, pool count, seep count, tributary inputs, channel type, large wood counts
- Landscape metrics
  - Land use, temperature, elevation (DEM), canopy (NLCD), slope, precipitation, flow, geology, valley width





# Next steps

- Additional data collection (planning 2020 field season now)
- Develop multispecies occupancy model (Broms et al. 2016)
- Investigate relationships between habitat variables and species occupancy
  - Does additional LWD increase likelihood of occupied habitat for Pacific lamprey?
  - Do increased temperatures decrease likelihood of mountain whitefish occupancy?



# Take home

- How will restoration impact other native freshwater fish?
- Collecting presence data to describe current occupancy
- Develop spatially continuous multi-species, probability of occupancy model to establish current occupancy of native fishes
- Describe relationship between native freshwater fish occupancy and habitat restoration



Western pearlshell mussels in  
the Newaukum River

# Acknowledgements

- Field data collection
  - Stephanie Lewis, Callie Miller, Nick Vanbuskirk, Amy Edwards
- WDFW Genetics Lab
- Land access
  - Weyerhaeuser Company, Green Diamond Management Co., Alco Holdings, WA DNR, and private landowners
- Funding: WA State Legislature



Western pearlshell mussels in  
the Newaukum River

