

The Temporal Dynamics of Walleye Prey Availability in the Snake River

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ORIGINAL PAPER



Complementary prey phenologies enhance invasional meltdown: a case study in the Columbia River Basin

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Open Access

<https://link.springer.com/article/10.1007/s10530-026-03805-7>

Columbia Basin Walleye Ecology – What we know

Cool water non-native predator

Habitat

- Found in the Columbia River Mainstem and several tributaries
- Mostly located near the bottom, but will suspend in the water column
- Can occupy temperatures to up 32°C (90°F) but prefer 20-25°C (68-77°F)

Reproduction

- Broadcast spawn over gravel and cobble
- High fecundity (20-30K per pound of body weight)
- Short hatch time (7-25 days)

Feeding

- Ambush predator using current breaks and structure to hold and feed
- Can become piscivorous as early as age-0
- Feed year-around with greatest metabolic demand at 22°C (72°F)

Columbia Basin Walleye Life History – What we do know

- Walleye are expanding their range
 - Walla Walla
 - Tucannon River
 - Clearwater
 - Snake River to Hells Canyon Dam
 - Salmon River to Riggins

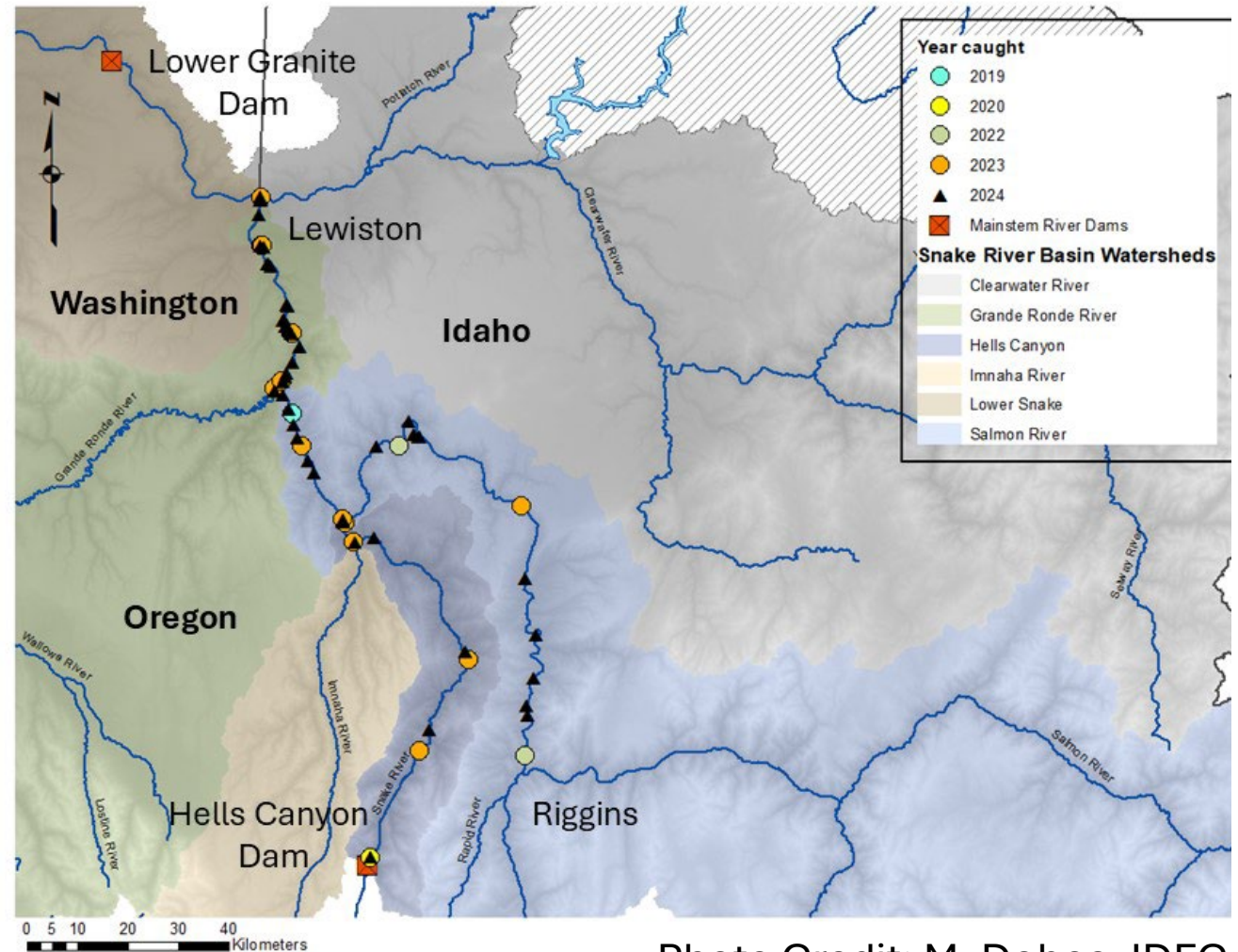


Photo Credit: M. Dobos, IDFG

Columbia River Basin Walleye Life History – What we don't know

Spawning migrations*

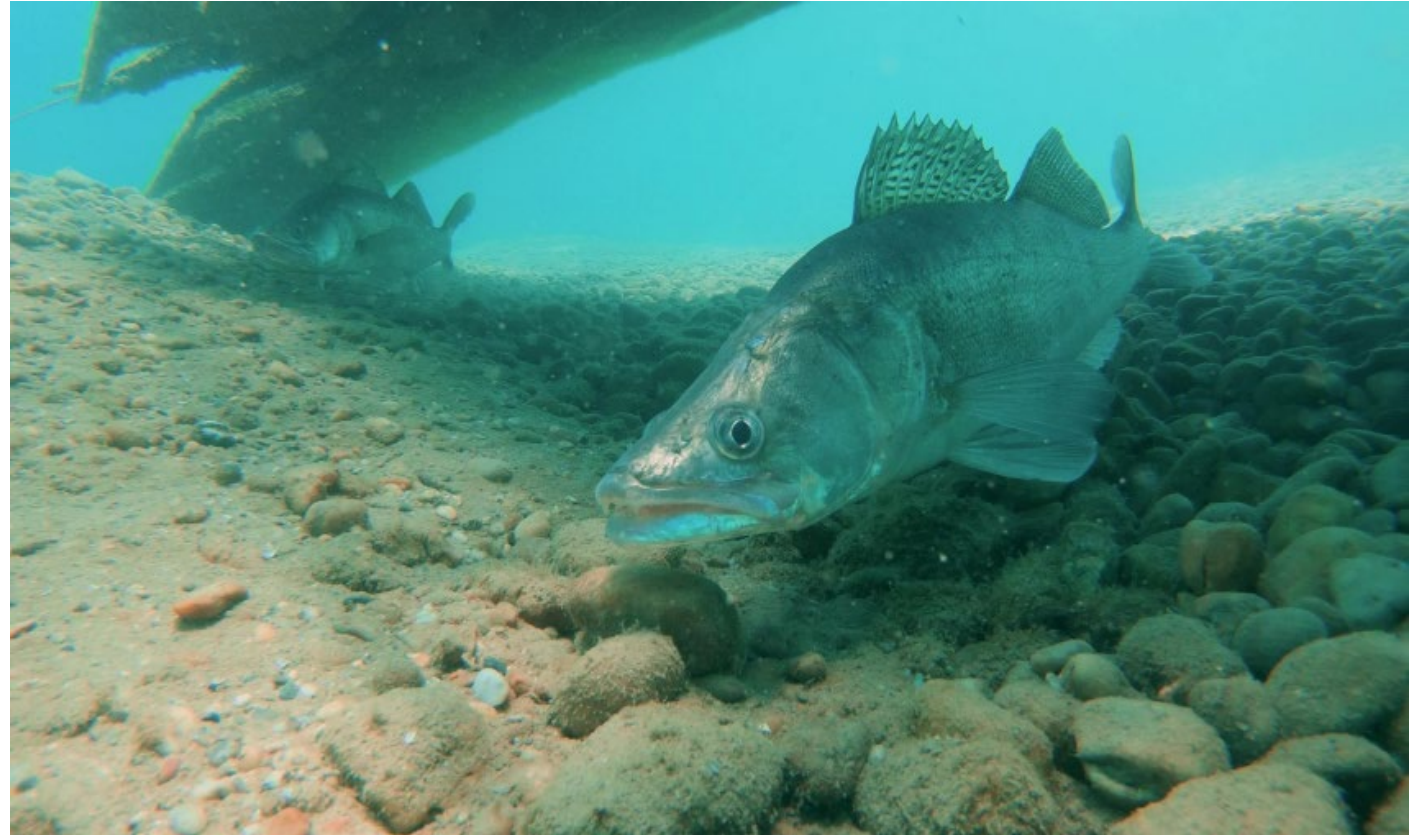
Spawning locations*

Abundance*

Population Trends*

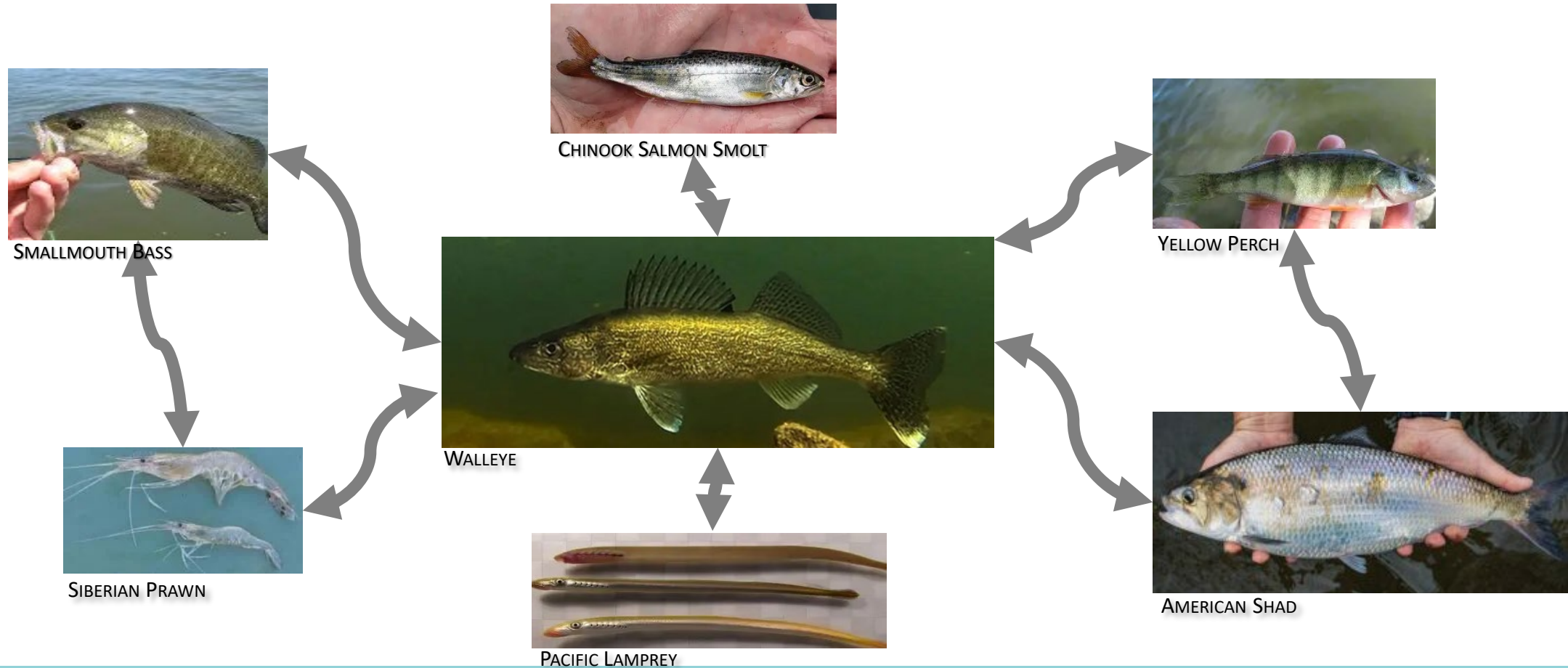
Food Web (this study)

***Ongoing WDFW studies**

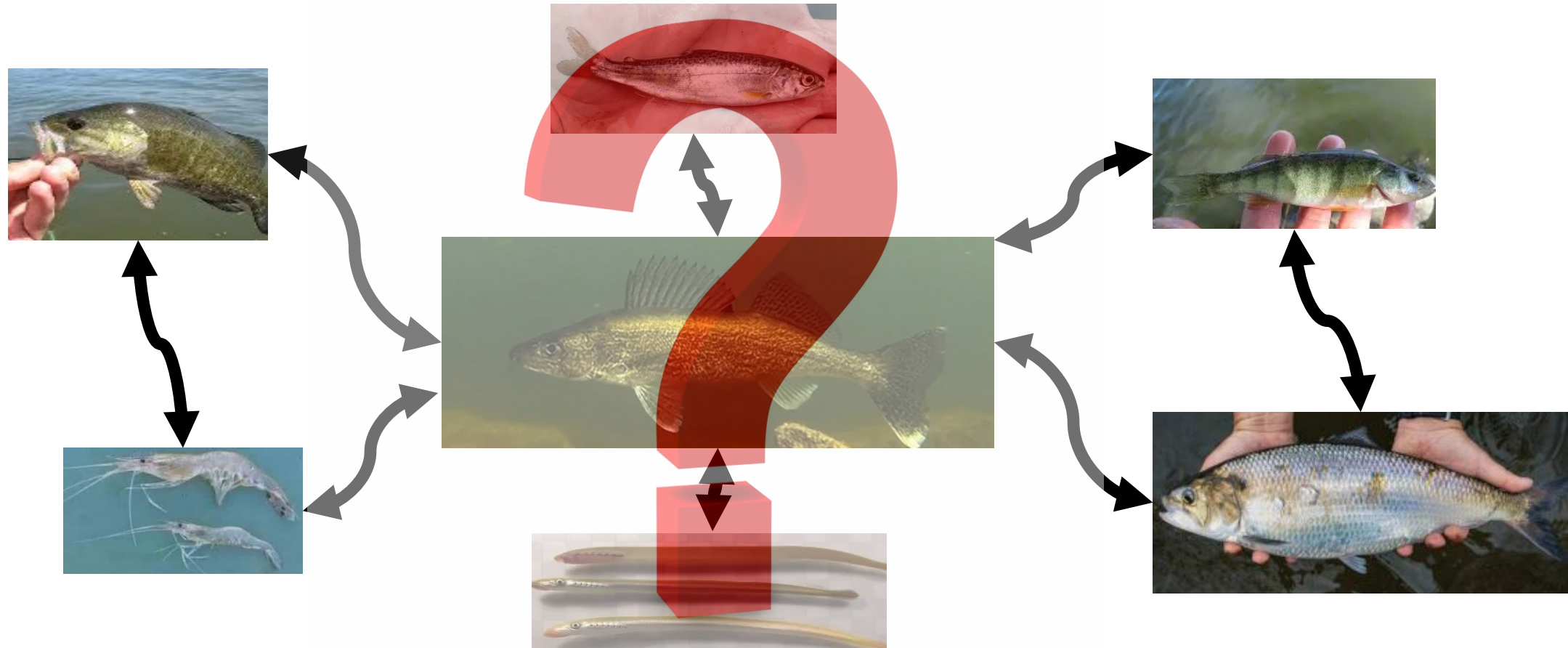


Invasional Meltdown Hypothesis: Invasive species alter the food web in a way that benefits other invaders

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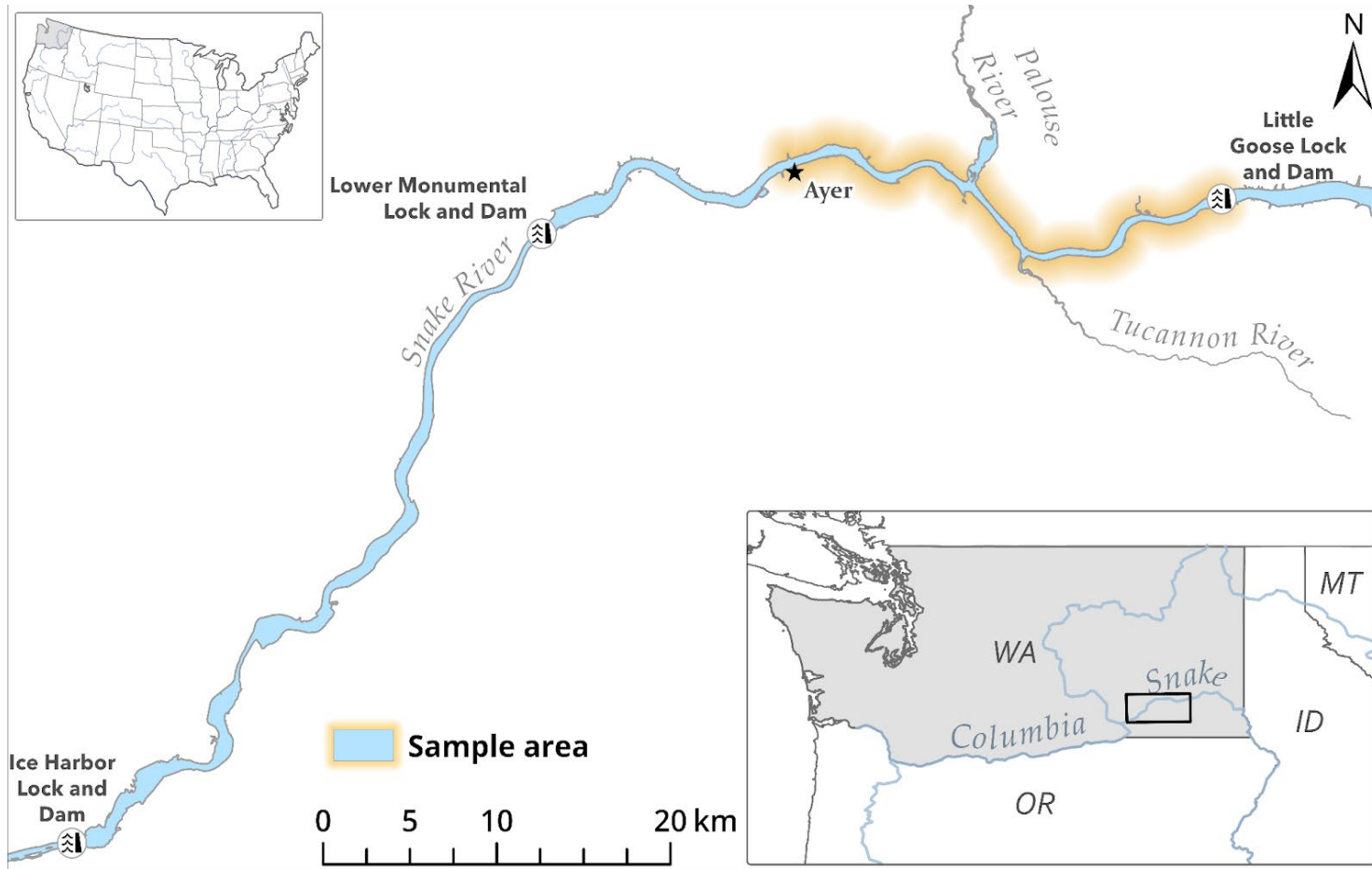


Project Objective:

Evaluate how Walleye utilize both invasive prey and native prey species throughout the year.



Study Area



Armstrong et al. 2026

Walleye Diet Collections

- Walleye diets collected 4-5 days each month for one year to describe seasonality of prey types
- Prey tissue samples collected via angling, smolt traps, electrofishing, and Little Goose Dam juvenile bypass.



Walleye Diet and Stable Isotope Analysis

Diet Analysis

- Collected stomach contents using gastric lavage
- Identify contents to lowest taxonomic level based on morphology and diagnostic bones

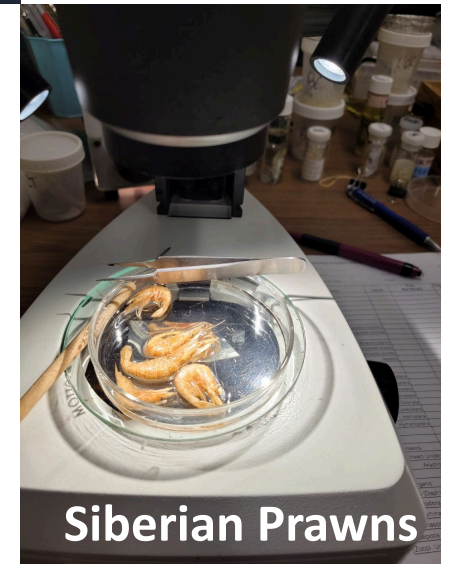


Stable Isotope Analysis

- Collected fin tissue
- Analysis of carbon, nitrogen isotopes identifies food sources that contribute to Walleye energy budget (OSU).

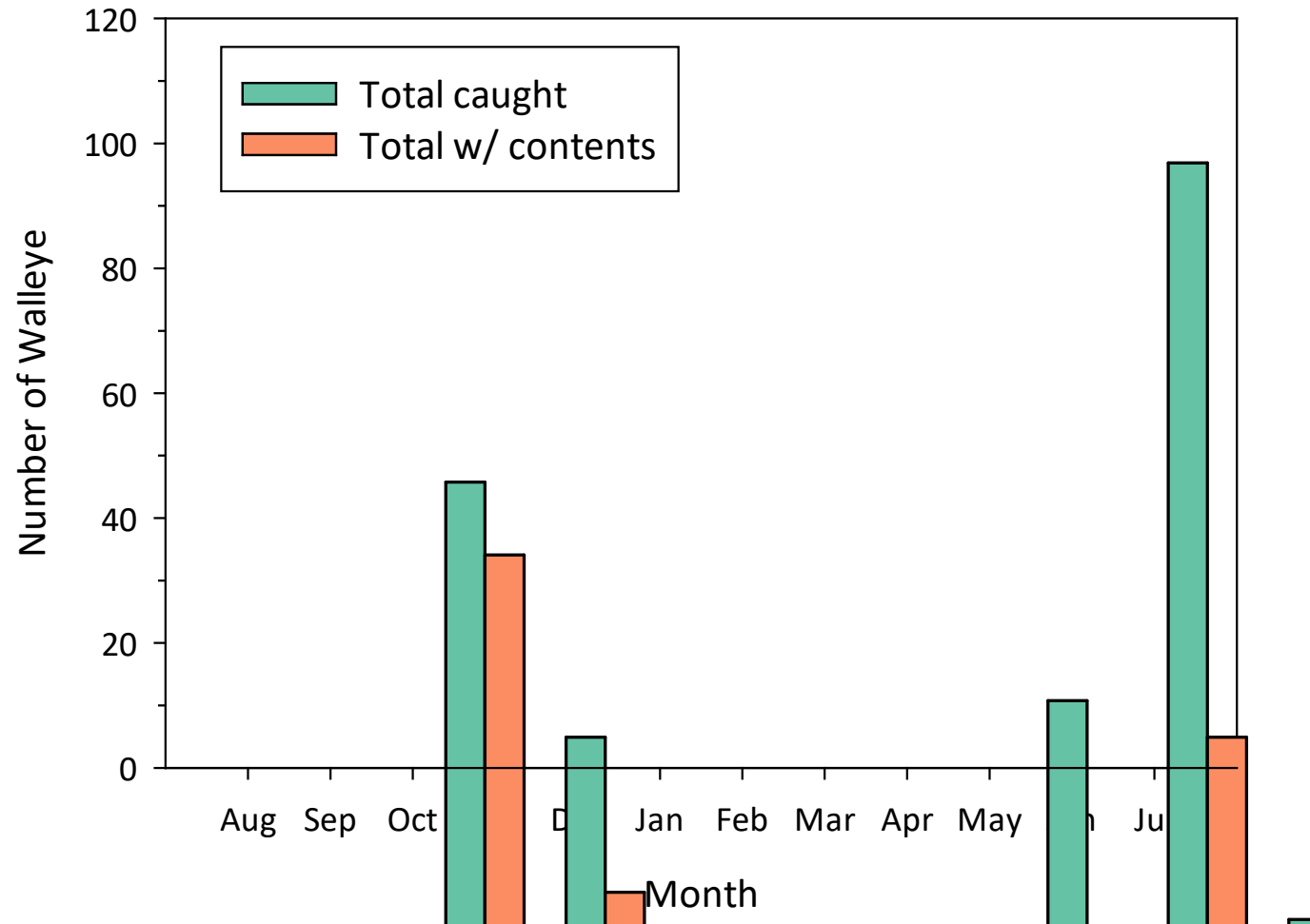


Salmonid



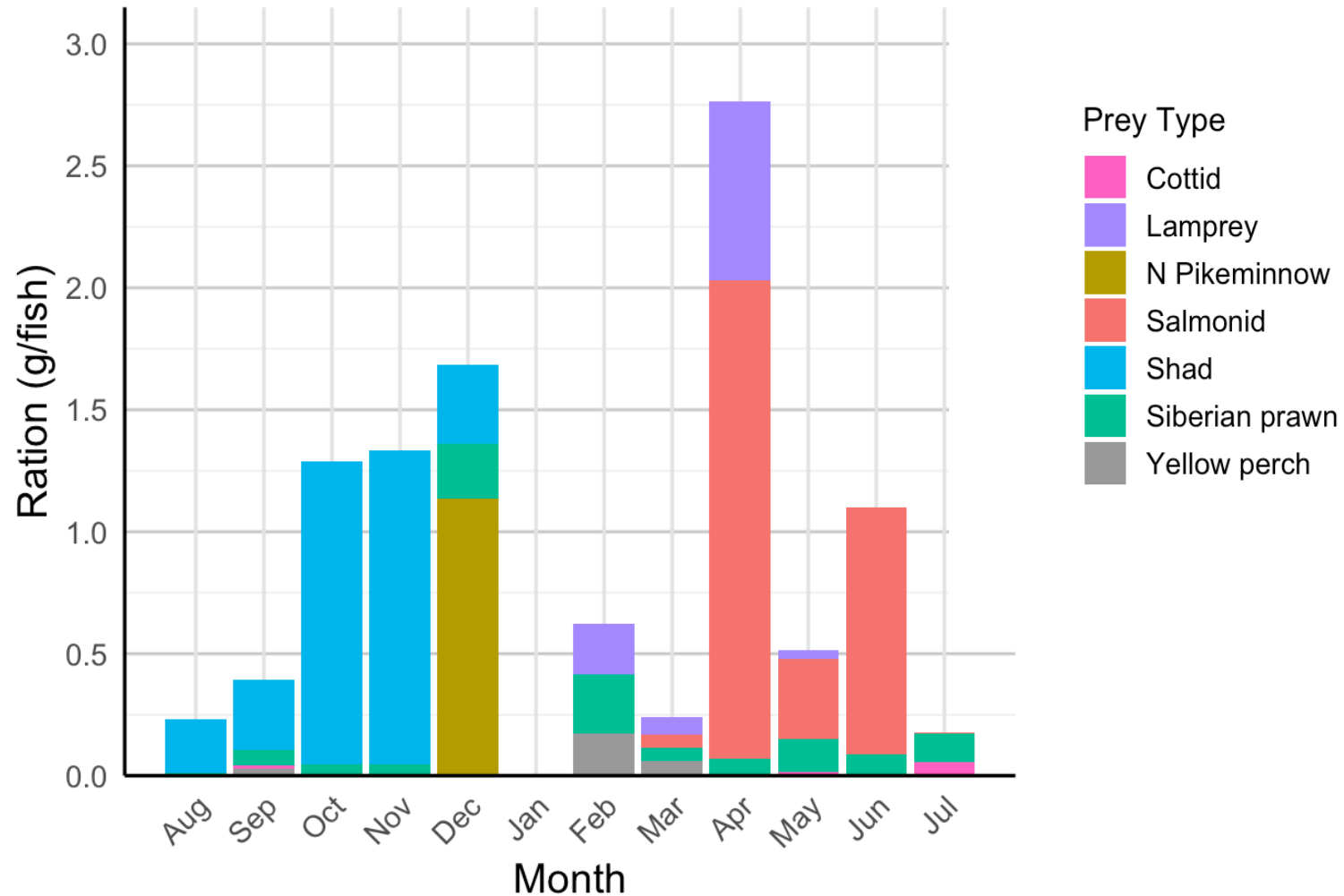
Siberian Prawns

Results – Walleye Catch



525 fish were caught
318 diets analyzed

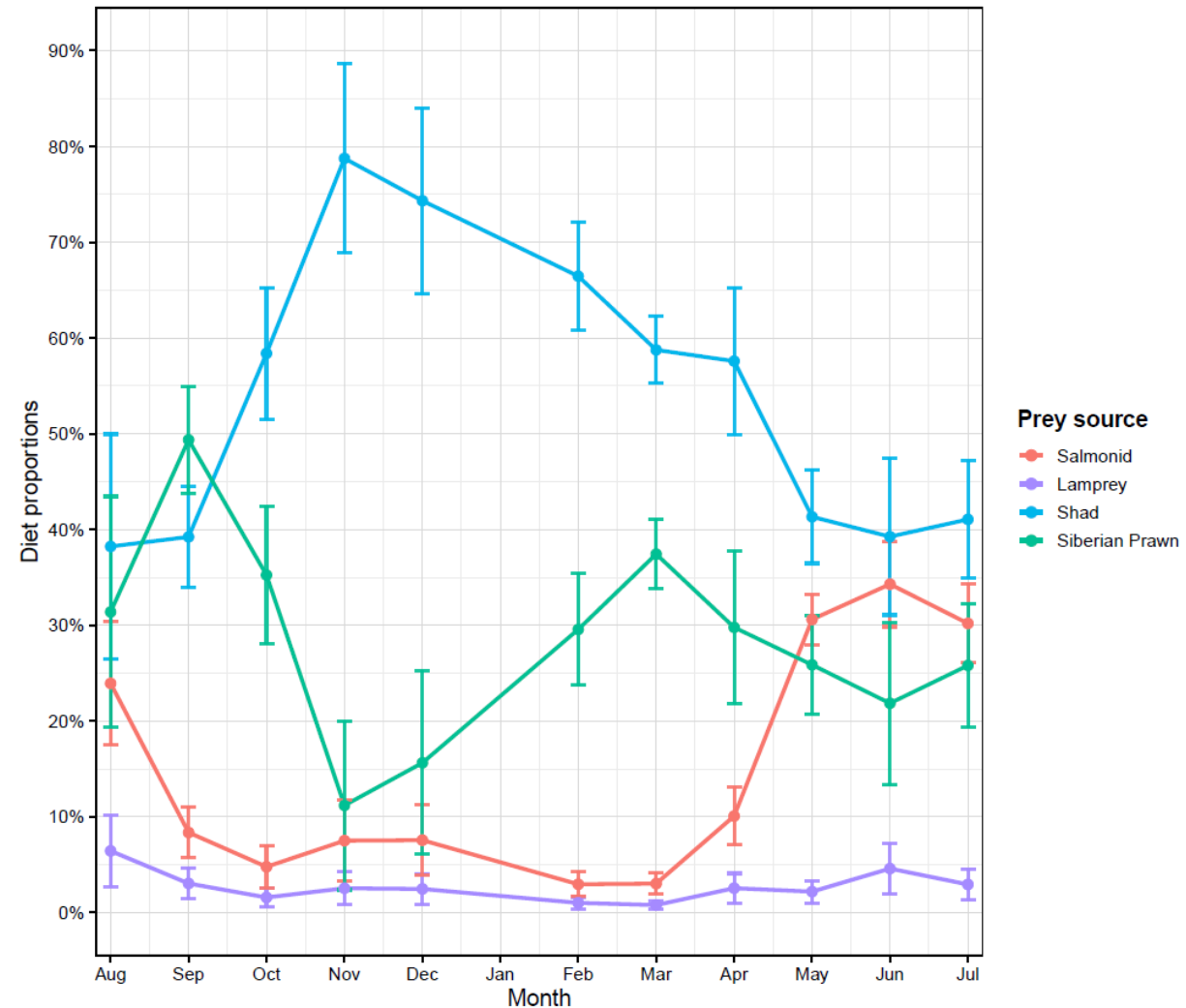
Walleye Prey Biomass



Since the size of each prey type was different, we looked at the grams of prey eaten each month.

Walleye Seasonal Prey Using Stable Isotopes

- Diet analysis represents a snapshot in time (1-2 d)
- Stable isotopes provide a longer term (~ 35 d) understanding of prey types

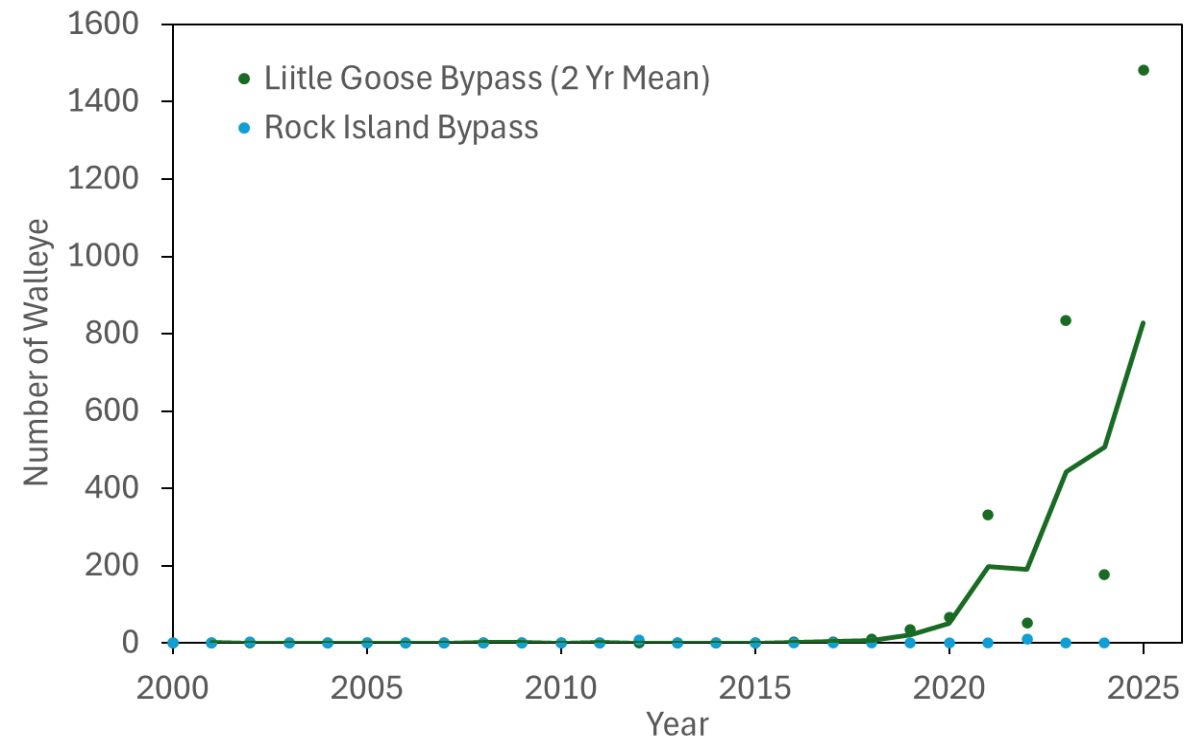


Conclusion

- Walleye population dynamics are driven by year-round abundant prey
 - Mostly native species (Apr-Jun)
 - Mostly non-native species (Jul – Mar)
- Both diet and SIA results indicated that invasive prey species extended seasonal foraging opportunities
- Data support the invasional meltdown hypothesis

Conclusion

- Walleye are expanding their range and their impact on native species
- Non-native prey species promote walleye population growth
- Snake River (Little Goose Bypass):
 - Walleye population is increasing
 - Shad + Siberian Prawn → More Walleye
- Upper Columbia (Rock Island Bypass):
 - Walleye population appears more stable at lower abundance levels
 - No Shad + No Siberian Prawn → Fewer walleye



Acknowledgments

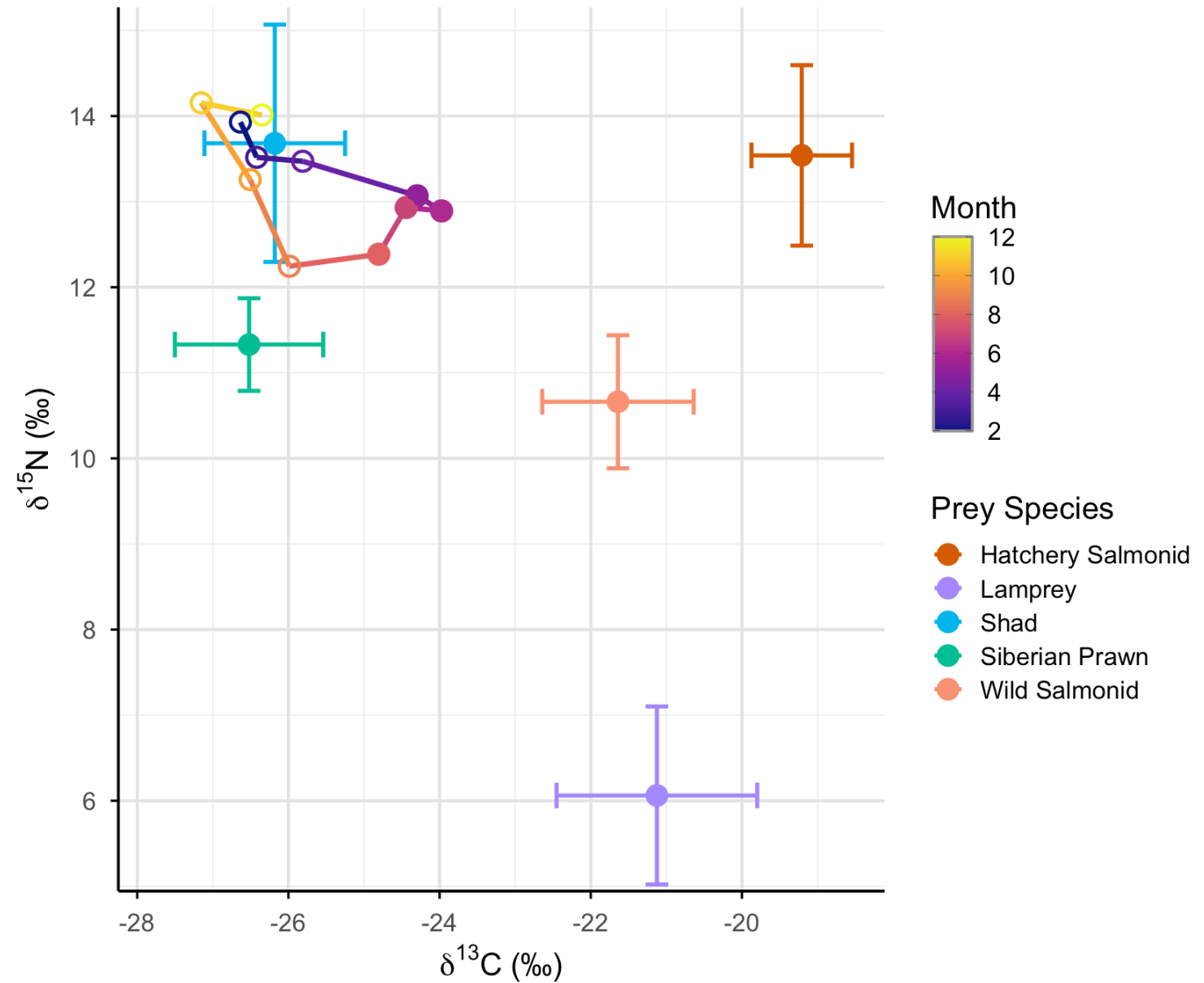
We thank regional WDFW staff, Snake River Lab staff, and Lyons Ferry Hatchery staff for assistance in sampling Walleye. Funding for this project was provided by State General Funds and Climate Commitment Act funding from the Washington State Legislature.



Questions?



Results – Stable Isotope Analysis



Results – Walleye Prey

