

# **Eulachon Energetics:** Phenology of Their Energy Reserves and Potential Survival Bottlenecks in British Columbia Marine and Freshwater Systems

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## Eulachon – “the savior fish”

- Small anadromous smelt that returns to rivers to spawn every 3-5 years
- Serve as an important forage fish species
- Have a high fat content and are nutrient dense
- Very culturally important to coastal Indigenous communities



S. Sharron 2025



## Big questions for a small fish

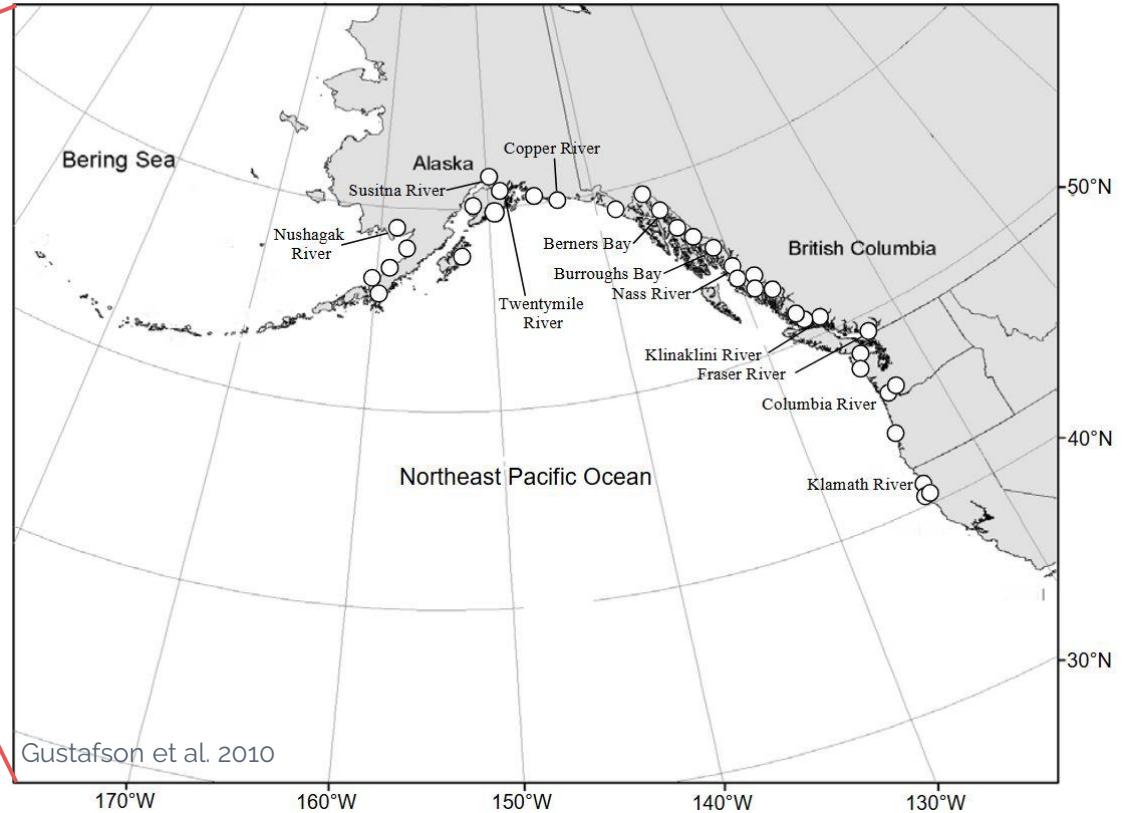
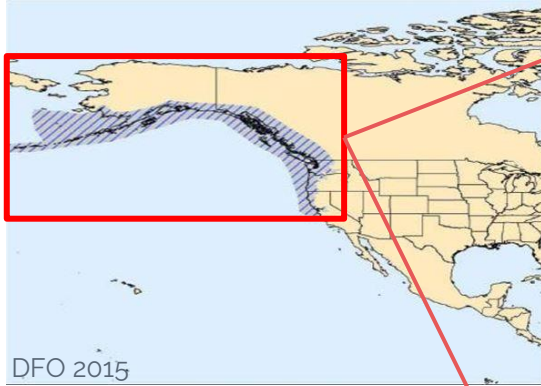
- Eulachon have experienced sharp declines in numbers across their range
- Despite their importance, there are lots of knowledge gaps for Eulachon
- Understanding and quantifying body composition and energy stores as a snapshot into their lives



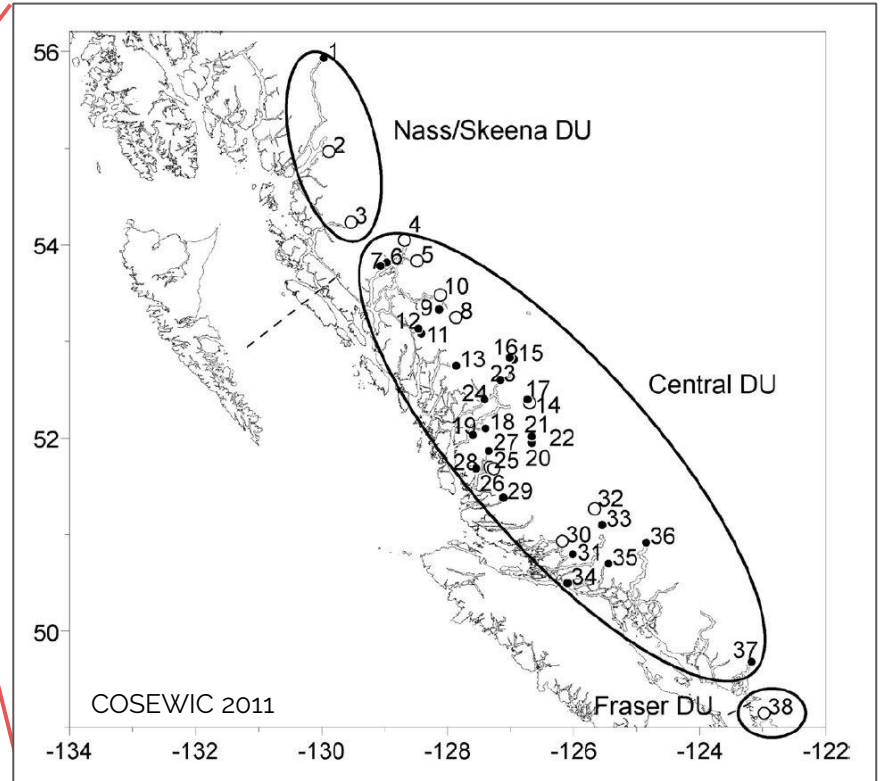
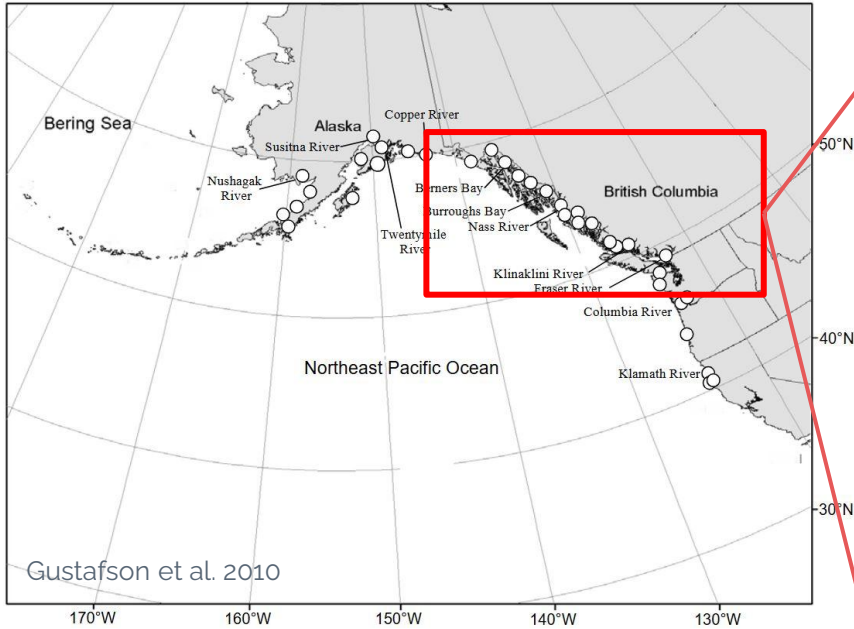
## Research Objectives

1. Use various methods to measure Eulachon energetic attributes
2. Describe Eulachon body composition across their life histories & various systems in BC
3. Analyze results to determine potential survival bottlenecks and critical life history points

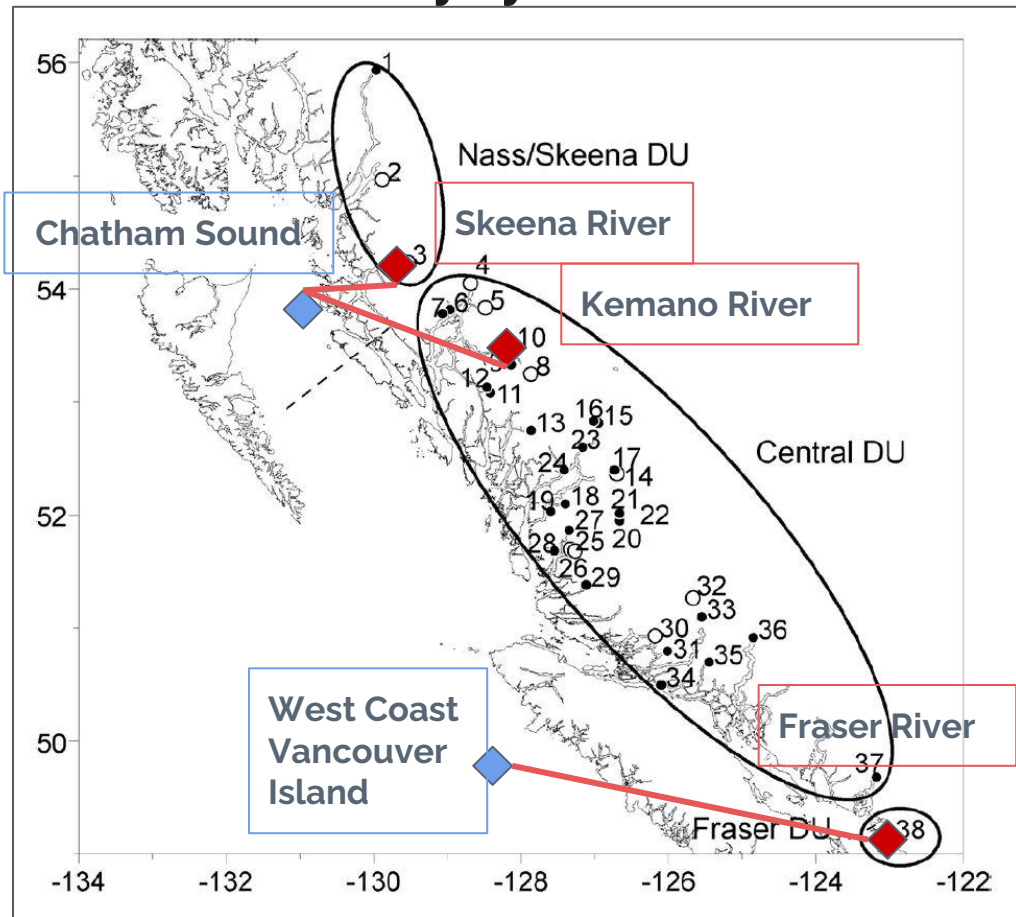
# Species range and distribution



# Species range and distribution - British Columbia



# Study systems





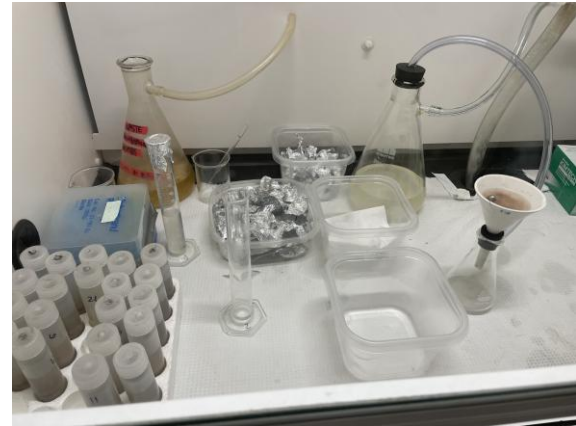
## Fish collection & field work

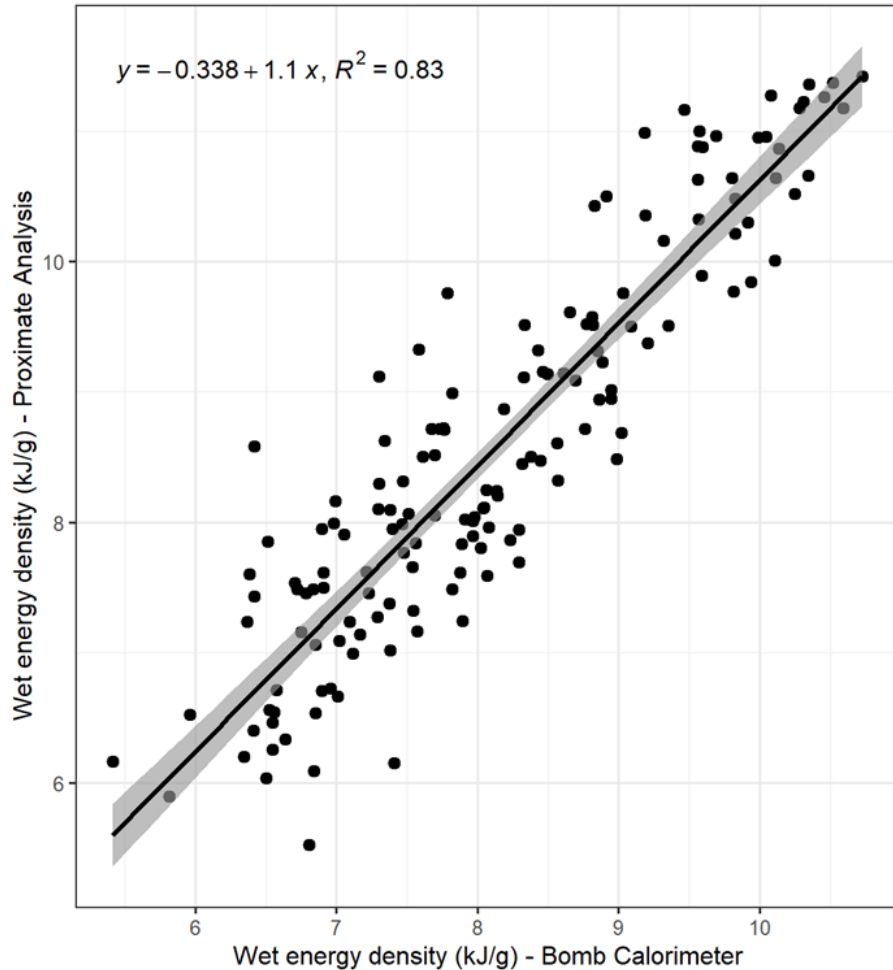
- Fish were sampled in collaboration with Indigenous communities, consultants, and Fisheries and Oceans Canada (DFO)
- Most impactful part of my research experience was connecting with and learning alongside Indigenous communities



## Lab work & energetic analyses

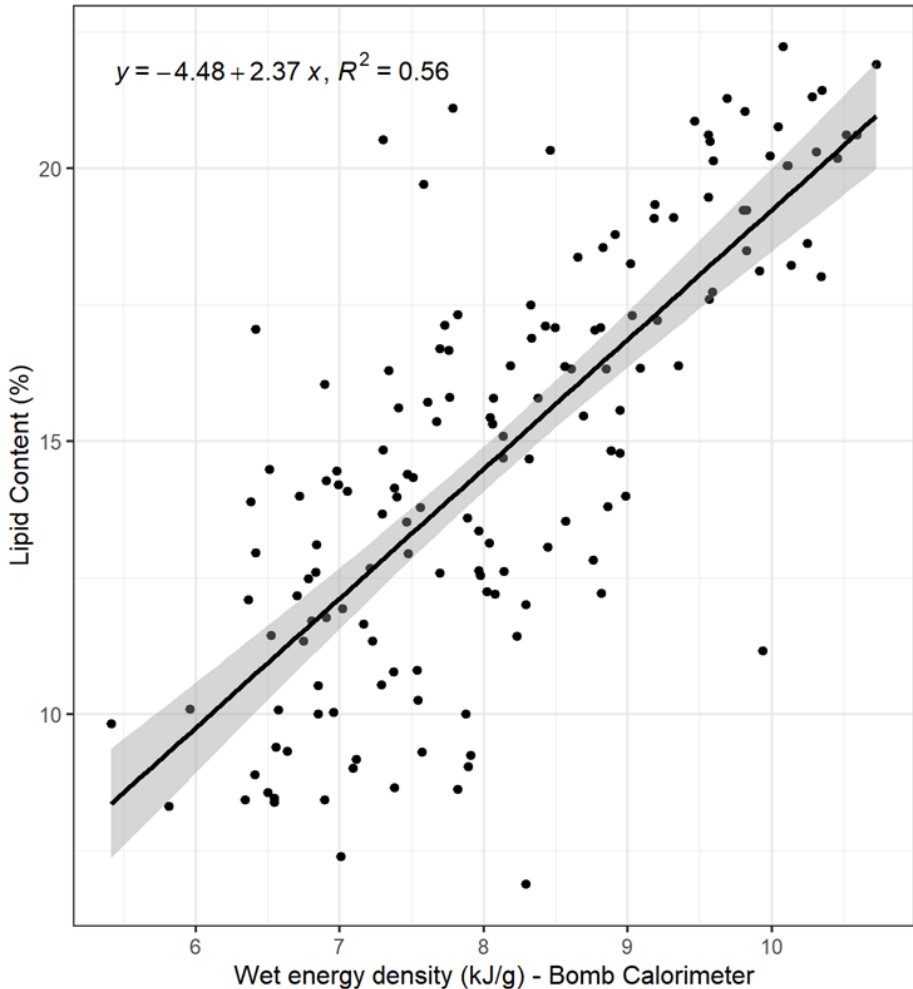
- Collected basic biological information on all fish
- Bomb calorimetry
- Proximate composition analysis





## Comparing measured vs. predicted wet energy density

- Very strong relationship between wet energy density directly measured using bomb calorimetry and that predicted by existing salmonid model used by DFO
- Signifies that existing energetic models have good potential to apply to Eulachon as well



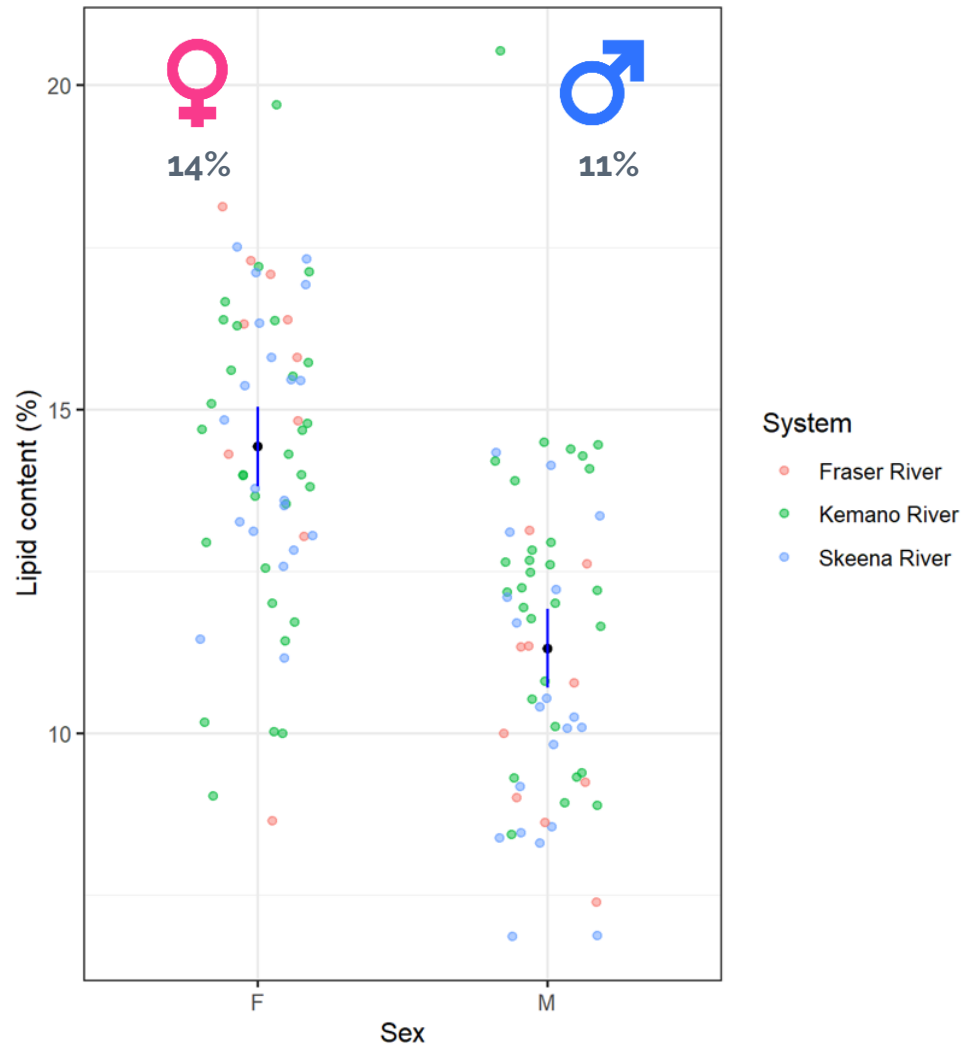
## Relationship between fat content and wet energy density

- Fat content and wet energy density have significant relationship to one another ( $p < 0.01$ )
- As the two values are closely linked, we will be analyzing various factors using fat content from here on

## Fat Content -> Marine vs. Freshwater

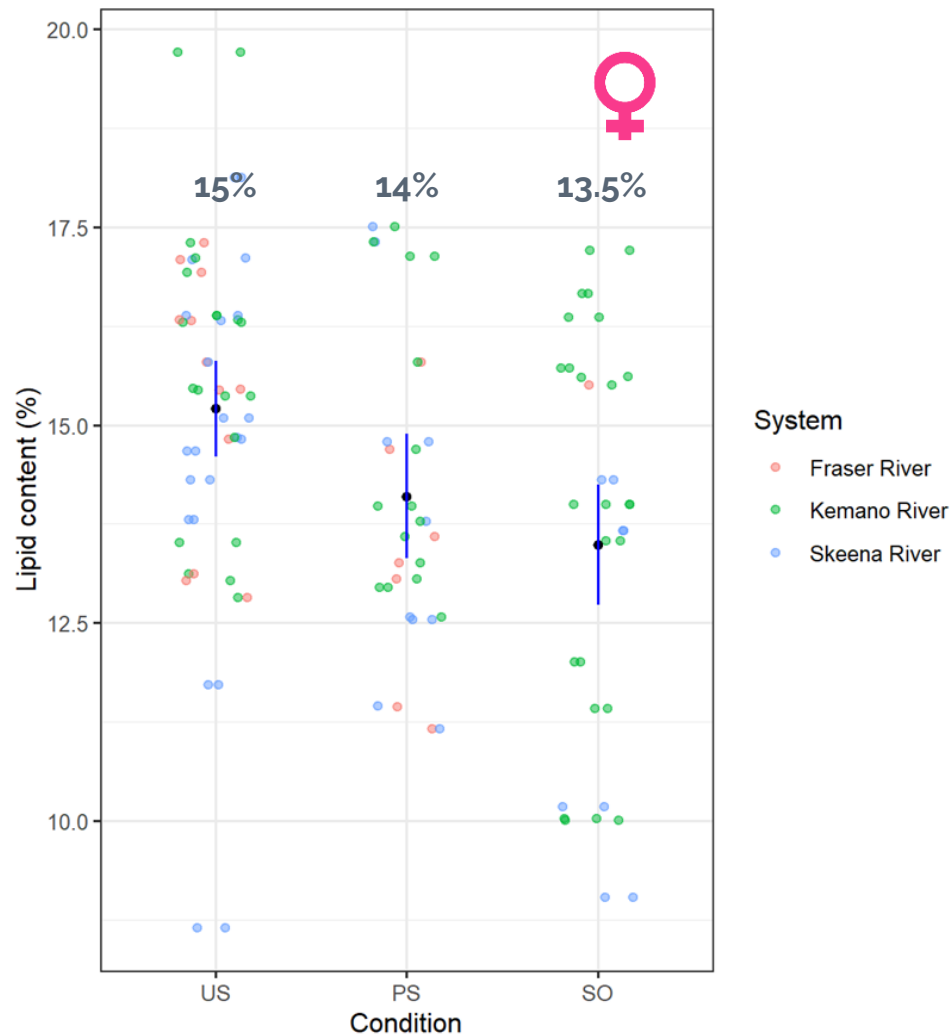


- Research supports previous findings of very high fat content
- Immature marine Eulachon have significantly higher fat content ( $p < 0.01$ )
- Mature spawning freshwater Eulachon lower in fat content but still well above the survival minimum (~3%)



## Fat Content -> Males vs. Females

- Mature female Eulachon significantly higher in fat content than males in all systems ( $p < 0.01$ )



## Fat Content -> Various Spawning Conditions in Females

- Lipid content decreases as mature females use energy to spawn
- Could not create this for males due to difficulty in assessing spawning condition
- Even for spawned out females, lipid content is well-above survival minimum documented for other species



## Takeaways

- Eulachon have a very high fat content, interesting for a fish that is believed to be semelparous
- Potential survival bottleneck as Eulachon mature and return to spawn but more data needed
- Various methods for measuring energetic attributes allows for wide applicability of results

## Acknowledgements



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# Questions?

