



Characterization of Reproductive Systems of Returning Adult Arctic Lamprey, *Lethenteron camtschaticum*



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Introduction and Objective

Introduction:

Arctic lamprey are jawless fish with a circumpolar range that can be found in Alaska. They are anadromous and semelparous, entering freshwater for their return journey around September/October and spawning around May/June. Historically, indigenous communities relied on Arctic lamprey on the Yukon River. In the past five years, the poor run strength has put a strain on local indigenous communities as well as commercial, personal, and subsistence lamprey fisheries. Lamprey populations in Alaska are poorly studied, making it difficult to apply appropriate management strategies and conservation efforts.

Objective:

Develop a baseline understanding of returning adult Arctic lamprey, particularly in regards to reproductive condition.

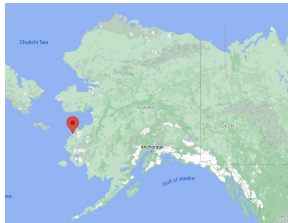


Figure 1 (left): An adult Arctic lamprey collected from the Emmonak test fishery for this study

Figure 2 (right): A map of Alaska marking the location of the test fishery in the village of Emmonak at the mouth of the Yukon River.

Methods

- Specimens were collected during the spawn run (October 2022) using fyke nets at a test fishery site in Emmonak, Alaska (see Figure 2) and frozen for preservation
- Length, weight, gonad weight, and liver weight were recorded
- Ovary subsamples were collected and fixed in 10% formalin
- Subsamples will be used to determine fecundity and egg size
- Remaining ovary tissue was freeze dried for proximate composition analysis

$$\text{Gonadosomatic Index (GSI)} = \frac{\text{Gonad Weight}}{\text{Total Body Weight}} \times 100$$

$$\text{Hepatosomatic Index (HSI)} = \frac{\text{Liver Weight}}{\text{Total Body Weight}} \times 100$$



Figure 3 (left): Initial lab work-up of lamprey

Figure 4 (middle): The Soxhlet extraction apparatus used for extracting lipids from female Arctic lamprey gonads

Figure 5 (right): A pellet made from female Arctic lamprey gonads prepared for bomb calorimetry

Preliminary Results, Implications, and Future Research

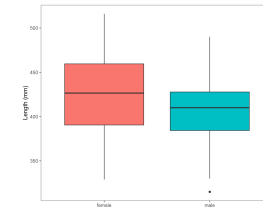


Figure 6: Total body lengths of pre-spawn adult Arctic lamprey by sex.

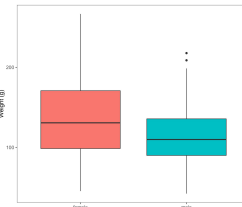


Figure 7: Total body weights of pre-spawn adult Arctic lamprey by sex.

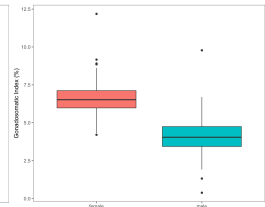


Figure 8: Gonadosomatic index of pre-spawn adult Arctic lamprey by sex.

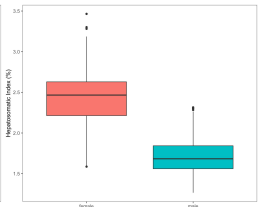


Figure 9: Hepatosomatic index of pre-spawn adult Arctic lamprey by sex.

Preliminary Results:

- Average moisture content of female gonads 62.03% (n=74, se=0.67)
- Average lipid content of female gonads 55.31% of dry weight (n=74, se=1.03)

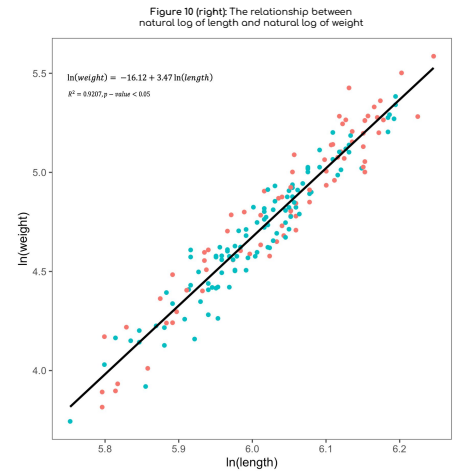


Figure 10 (right): The relationship between natural log of length and natural log of weight

Implications and Future Research:

Reproductive biology data from this study will provide Alaska-specific insight for a widely distributed species that can be used towards management and conservation decisions. Proximate composition data will be used towards studying the bioenergetic cost of various life history strategies of different species of lamprey (e.g. Alaskan brook and Pacific lamprey)

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References

Map created using Google Maps

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