

# USING AN ESTABLISHED MORPHOMETRIC MODEL TO ASSESS FIELD BASED SEXING OF ARCTIC GRAYLING

Paul Lecheung-Singleton<sup>1</sup>, D. Strohm<sup>2</sup>

<sup>1</sup>University of Alaska Fairbanks, CFOS <sup>2</sup>Alaska Cooperative Fish and Wildlife Research Unit



## Background

- Mature Arctic grayling (*Thymallus arcticus*) display sexual dimorphism in their dorsal fin size and shape
- A recent study created a model to determine grayling sex using 22 morphometric measurements
- The model is fairly reliable for mature fish greater than 250 mm in fork length; however, it requires all of the fish fins to be spread out on a flat surface and is not practical for field studies with live fish
- The dorsal fin height measurement is more applicable when using field-observations with only two measurements

## Objectives

- Using the established morphometric model as reference, we will compare the dorsal fin model to field based fish sexing

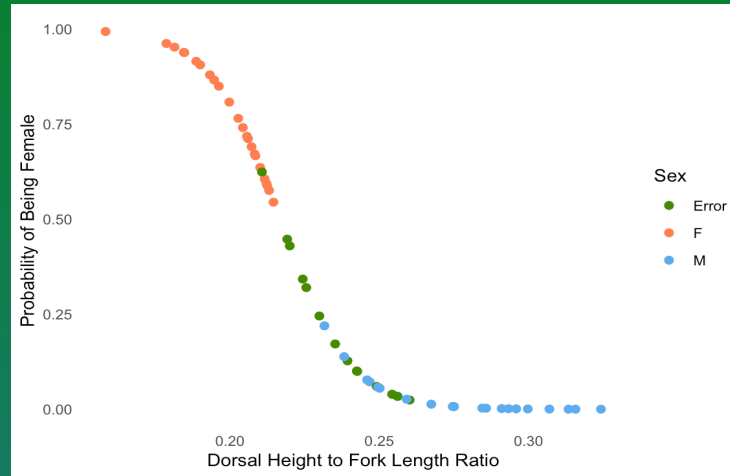


Figure 2. The points express probability of being a female ( 0.5 - 1.0; orange), male (0.49 - 0; blue), or error (green) using the morphometric model from Samuel et al. 2024.

## Methods

- Captured photos of Arctic Grayling dorsal fin spread out while in the field (n = 61)
- Two separate observers determined sex based on visual size and shape of dorsal fin
- Used tpsDig2 software to measure dorsal height and fork length for each specimen (Figure 1)
- Calculated the probability of the fish being female using the posterior dorsal height model in program R
- Compared model predictions to field based- sex identification

## Results

- Out of the 61 grayling sex ID's, 14 field sex-ID predictions differed from the model predictions (Figure 3)
- 13 of the field-observations we predicted as female were predicted as males by the model
- The fish in the photos where the model predicted male and the field observation predicted as female did not have a definitive shaped dorsal fin to correctly identified as males

## Discussion

- The dorsal height model has 15 % error rate (Samuel et al. 2024)
- The sex of our grayling is unknown so we cannot determine the error rate of our field-observations
- Males that do not have a pronounced dorsal shape may be more difficult to accurately identify
- Ensuring the fish's dorsal fin is properly spread out and laying flat when taking measurements

## Literature Cited

Samuel, W. T., L. E. Yancy, E. G. Hinkle, and J. A. Falke. 2024. Validating morphometrics as a nonlethal tool to determine Arctic Grayling sex. *North American Journal of Fisheries Management* 44(1):70-78.

## Acknowledgements

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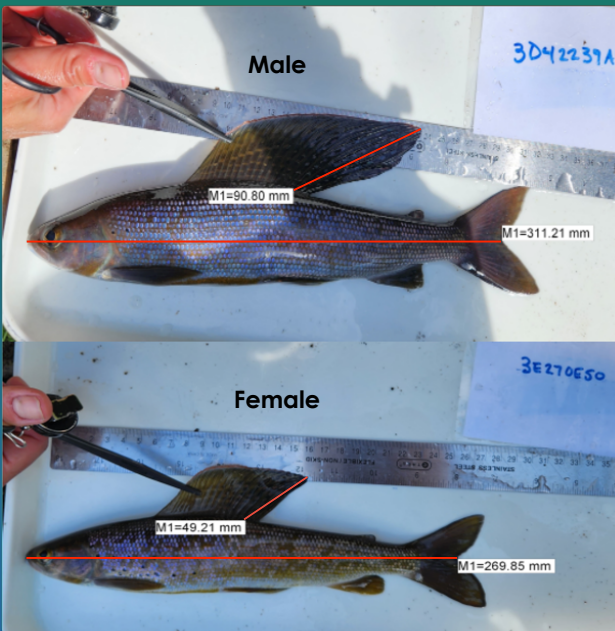


Figure 1. Measuring male (top) and female (bottom) Arctic Grayling using dorsal fin length and fork length.

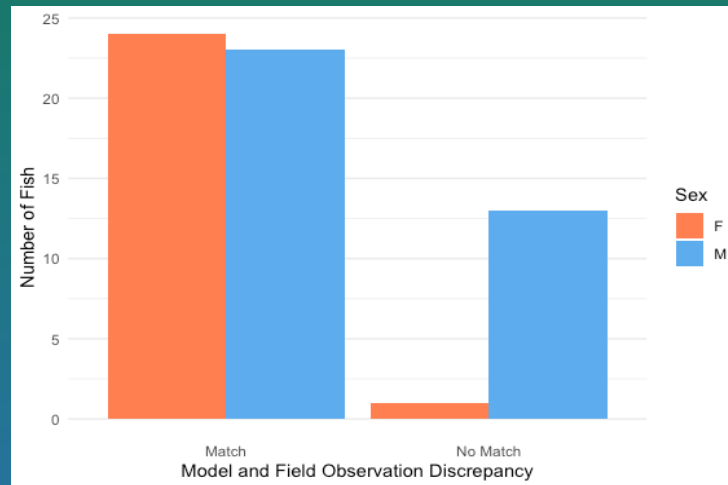


Figure 3. The bar graph is the total number of specimens both model and our observation were correct (Match). The mismatch (No Match) were our observation that differ from the model's prediction.