The Effect of Harvest and Variable Food on Reproductive Investment of *H. formosa*

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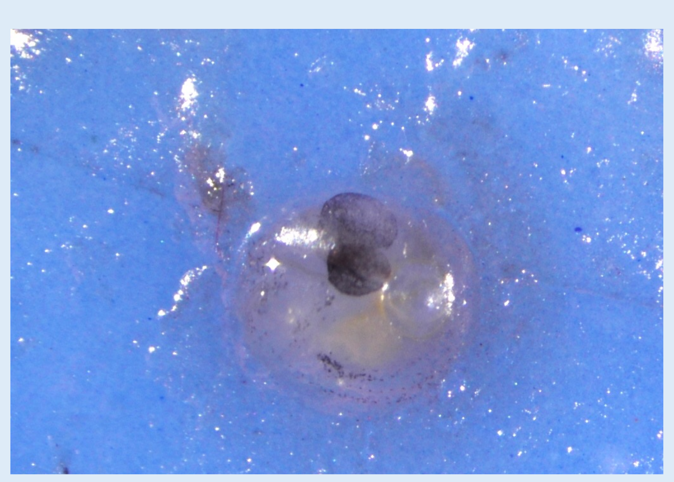
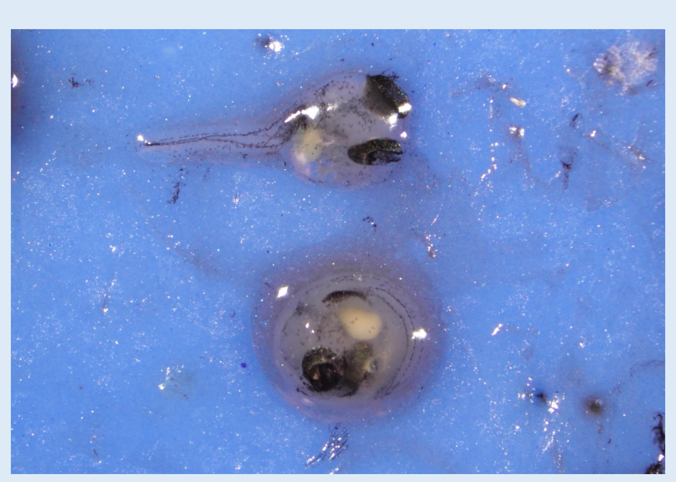
Introduction

- Existing studies suggest that harvesting and environmental variability of food can affect the life history of fish.
- *Heterandria formosa* are a small freshwater species of fish and they are matrotrophic and display superfetation.
- The objective was to investigate if varying conditions of harvest and food levels affect how much energy female *H. formosa* invest into reproduction.
- Hypothesis: Females in size-selective harvest populations allocate a greater amount of energy into reproduction due to the reduction in biomass and food demand; Under conditions of variable food, less energy will be invested into reproduction and growth.

Populations experience constant food (300 g) daily and a nonselective harvest; constant food and a size-selective harvest; variable food (10g or 590g) and a nonselective harvest; variable food and a size-selective harvest. (12 populations were not subject to any harvest).



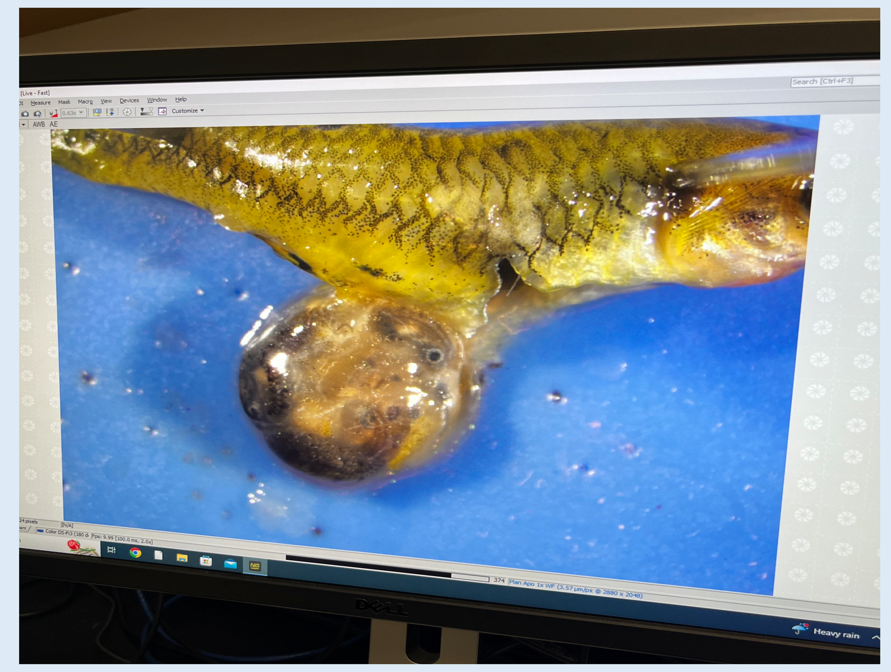
Stage F



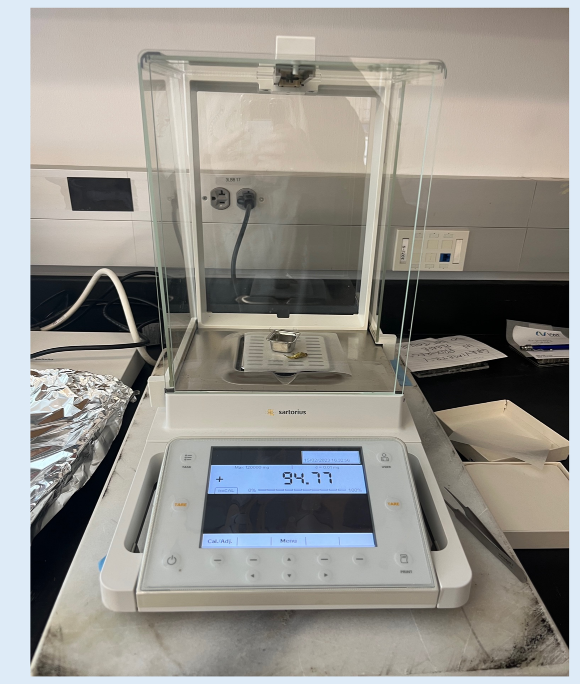
Stage 1 (G)

Stage 2 (H)

Stage 3 (I/J)



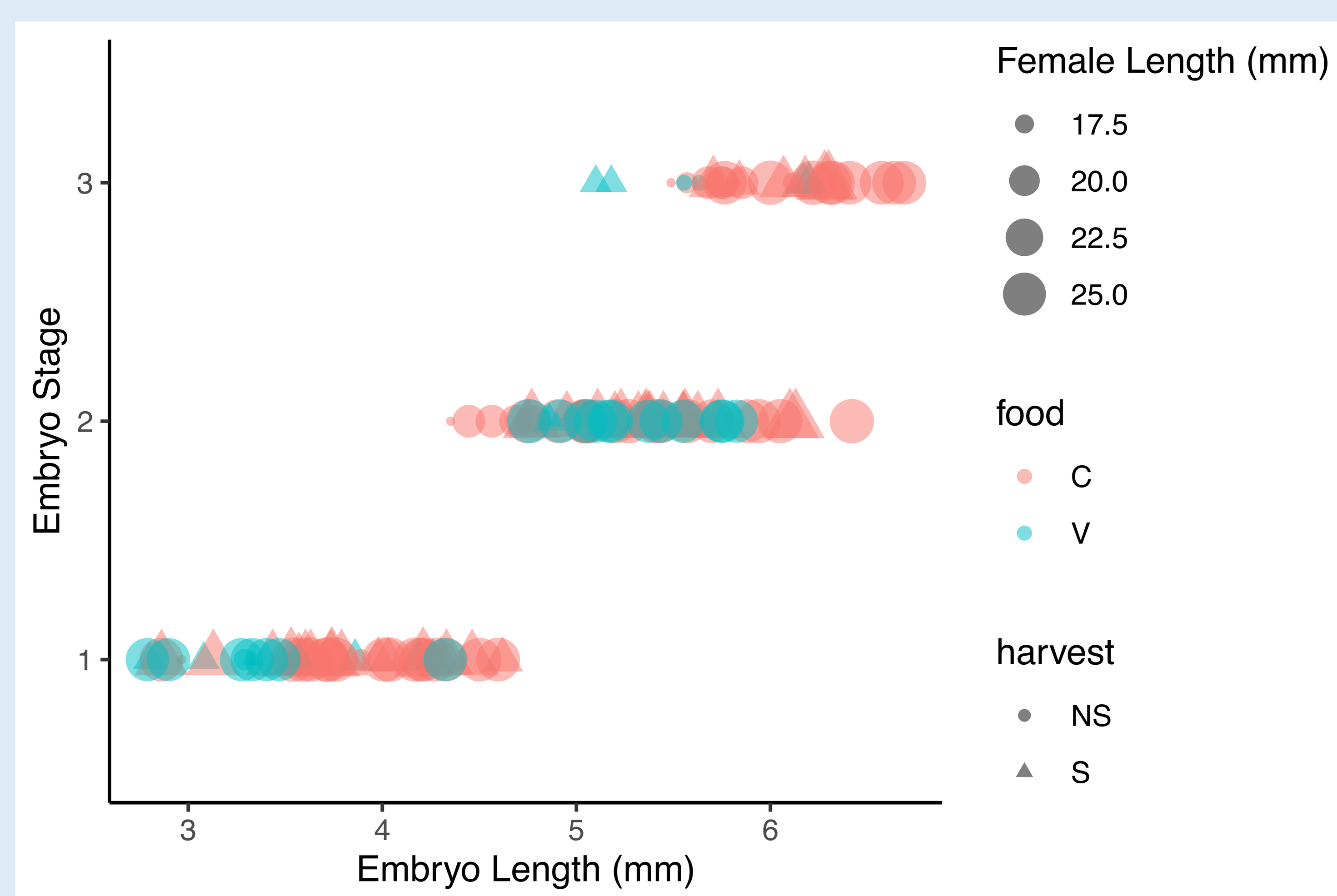
Magnified view of dissected female with multiple embryos.



Digital scale used to weigh the dry mass of females (without embryos) and the embryos.

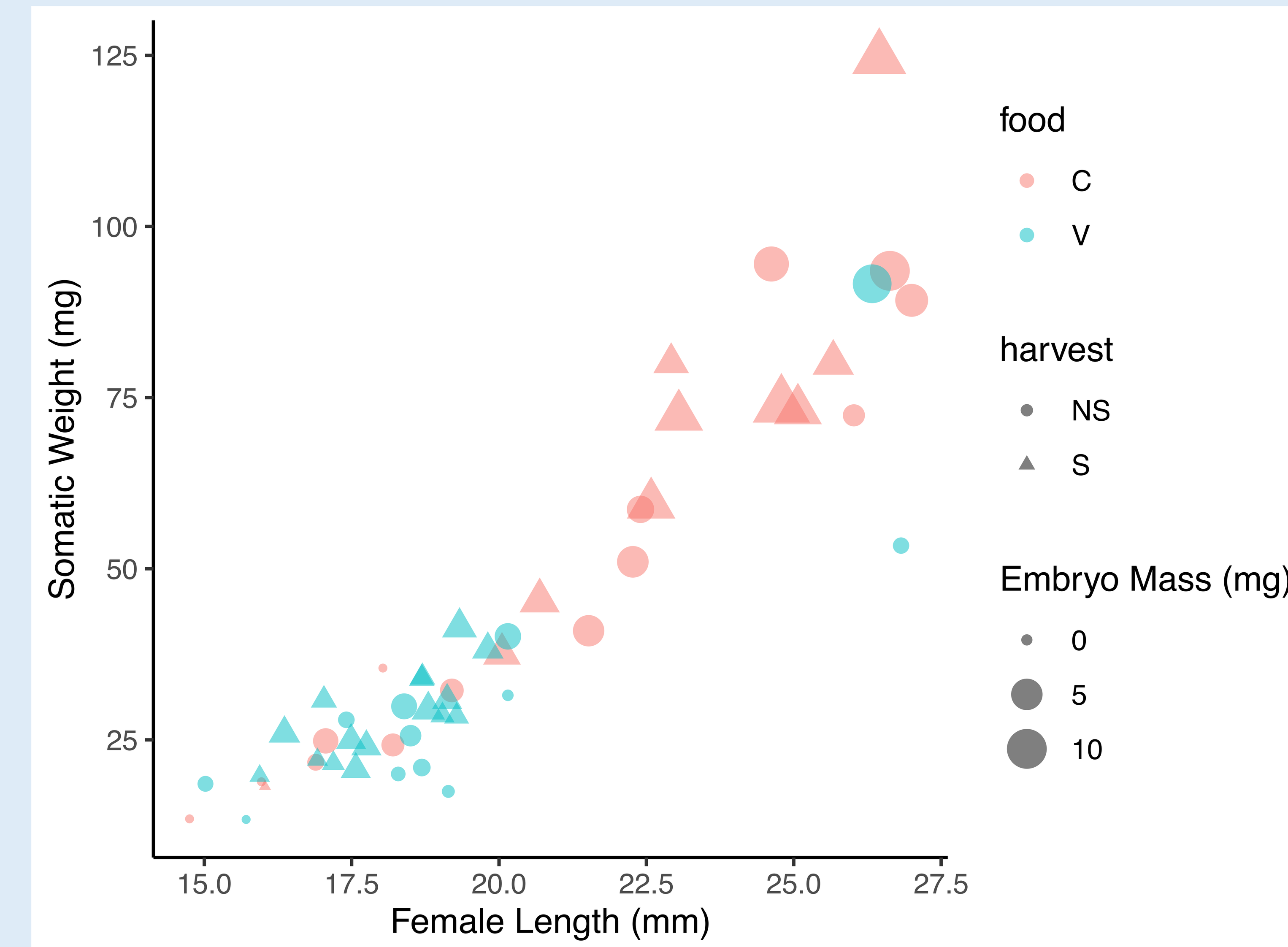
Methods

- Fish were derived from 24 populations under different conditions of harvesting and food variability.
- Harvested female fish greater than 15mm in length were measured from the head to the caudal peduncle.
- Each fish was dissected at the midsection and the embryos were removed and identified as to what stage of embryonic development they were in.
- The fish and embryos were placed in separate tubes and freeze dried in a lyophilizer.
- The somatic and reproductive mass was derived for each fish.



	Slope	Standard Error	P-value
Variable food	-0.8730096	0.3676	**0.0416***
Size-selective Harvest	0.1508823	0.352205	0.6784

Figure and table 1. Embryo developmental stage plotted against embryo length. The table shows a linear mixed effects model with embryo length as the outcome variable and population as a random effect. Female length was also a significant covariate.



	Slope	Standard Error	P-value
Size-selective Harvest	0.13923	0.04952	**0.00493***
Variable Food	-0.18600	0.06160	**0.00253***

Figure and table 2. Somatic weight plotted against female length. The table shows a log-link generalized linear mixed effects model with somatic weight as the outcome variable and population as a random effect. Female length was also a significant covariate.

Discussion

Food variability negatively influences both embryonic length and adult weight, suggesting that reliable food availability allows for a greater investment in growth. While selective harvesting did not impact embryonic development, it increased growth, possibly due to the decrease in competition within these populations. Overall, both variables have the potential to affect life history and population dynamics of species.

References

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Acknowledgements

Special thanks to Matthew Schumm and Dr. Daniel Okamoto for your support and guidance throughout this research experience.