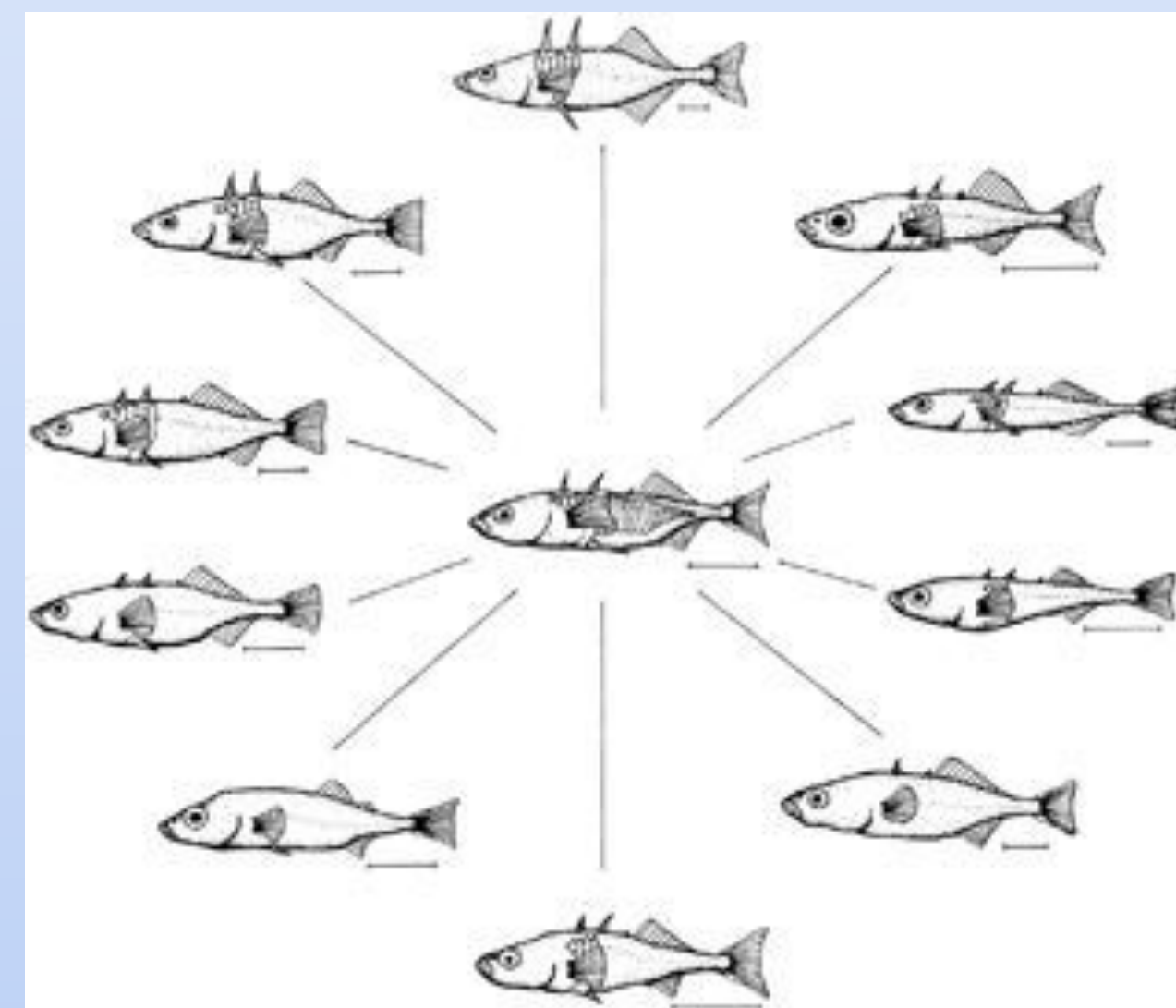


Background

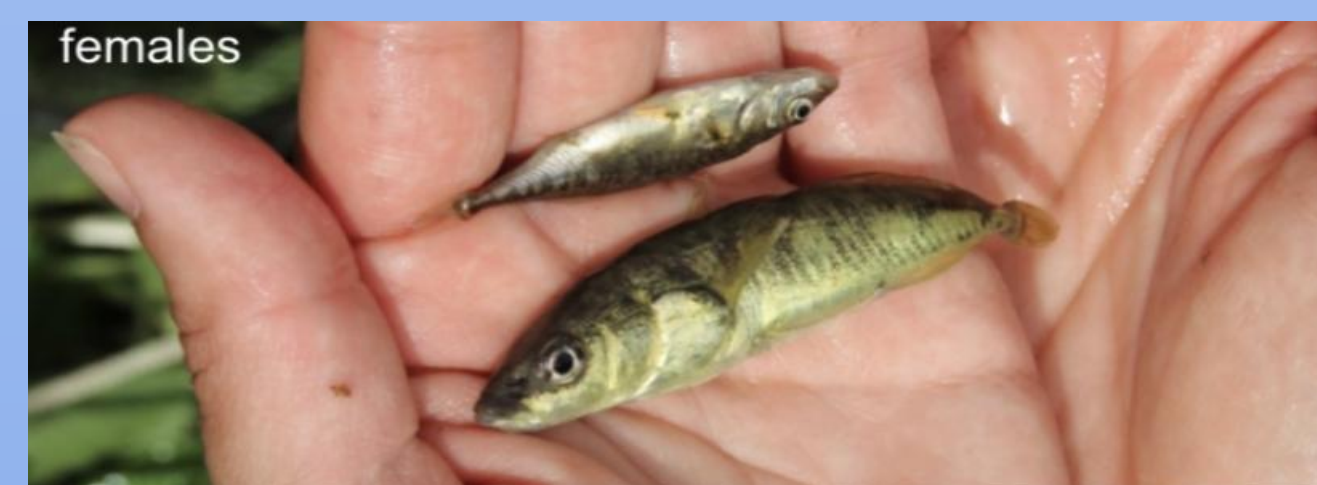
Stickleback are an excellent model system to study contemporary evolution

- Exhibit natural variation
- Adaptive radiation of morphology and behavior



Case Study: Alaska Railroad and Seward Highway

- 1914 - Alaska Railroad constructed
- 1960 - Seward Highway constructed
- Several lakes formed following their construction
- Smaller freshwater stickleback that recently descended from anadromous migrants permanently reside in lakes
- Stickleback body size is a strong selective trait in mate preference (Boughman et al. 2005).
- Body size is phenotypically plastic, dependent on the fish's ecotype (Conte and Schluter 2012).



Research Objectives

1. Determine whether positive assortative mating is the result of plastic differences in body size that arose from the construction of the Alaska railroad and Seward highway
2. Determine the feasibility of our methodology prior to large scale data collection

Experimental Design

- Prior to study, fish were brought to reproductive condition
- Fish from several anadromous and freshwater populations
- Male sticklebacks allowed to build nest in experimental tanks, then female placed in tank to begin experimental trial



Experimental set up of mating trials

Data Collection and Analysis

- Behavioral interactions of male and female stickleback recorded using JWatcher software
- Standard lengths measured for male and female stickleback
- Behavioral data analyzed through ANOVA tests and linear models using R Programming

Results - Female

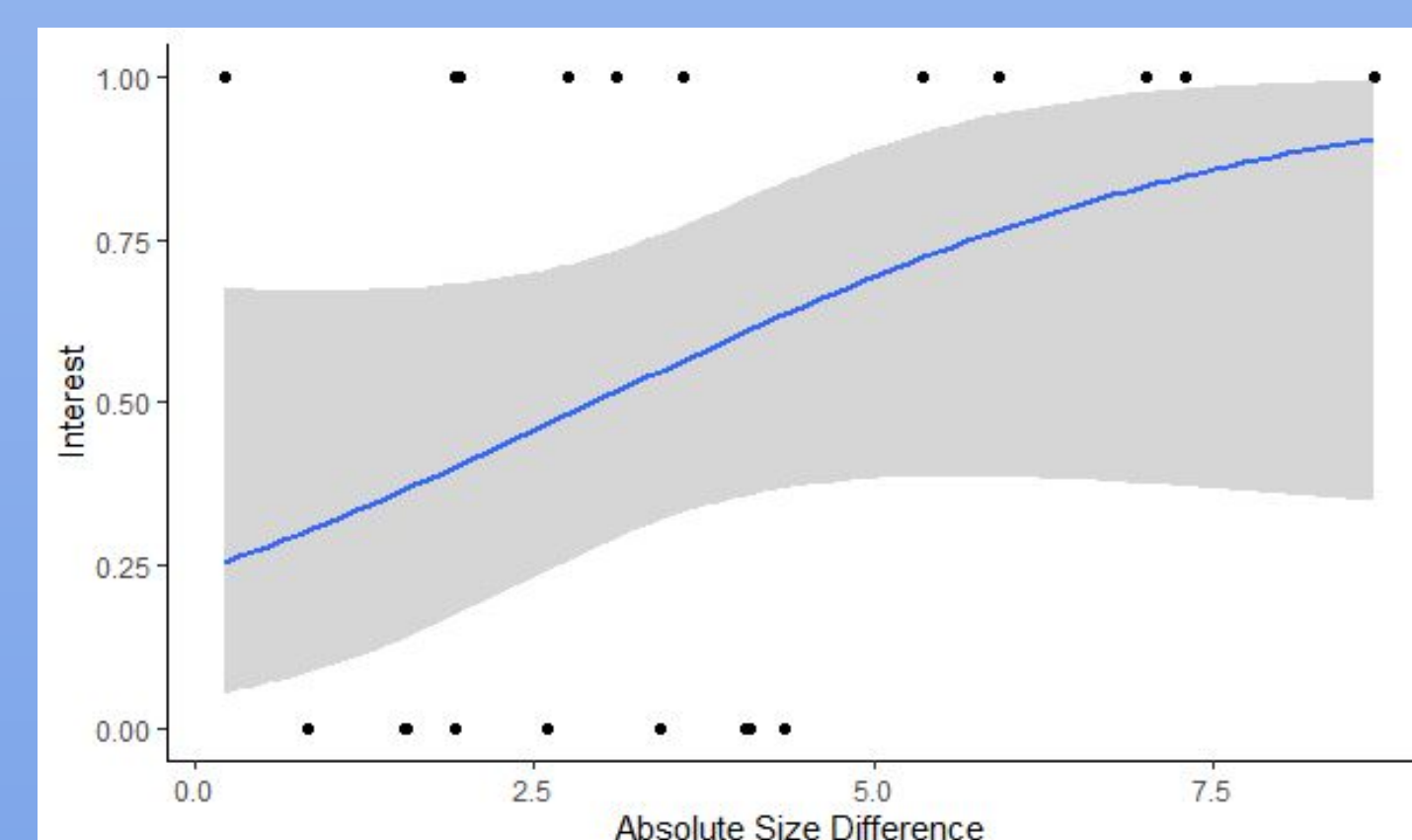


Figure 1. Binomial plot displaying if a female stickleback showed interested in a male at various levels of absolute body size difference

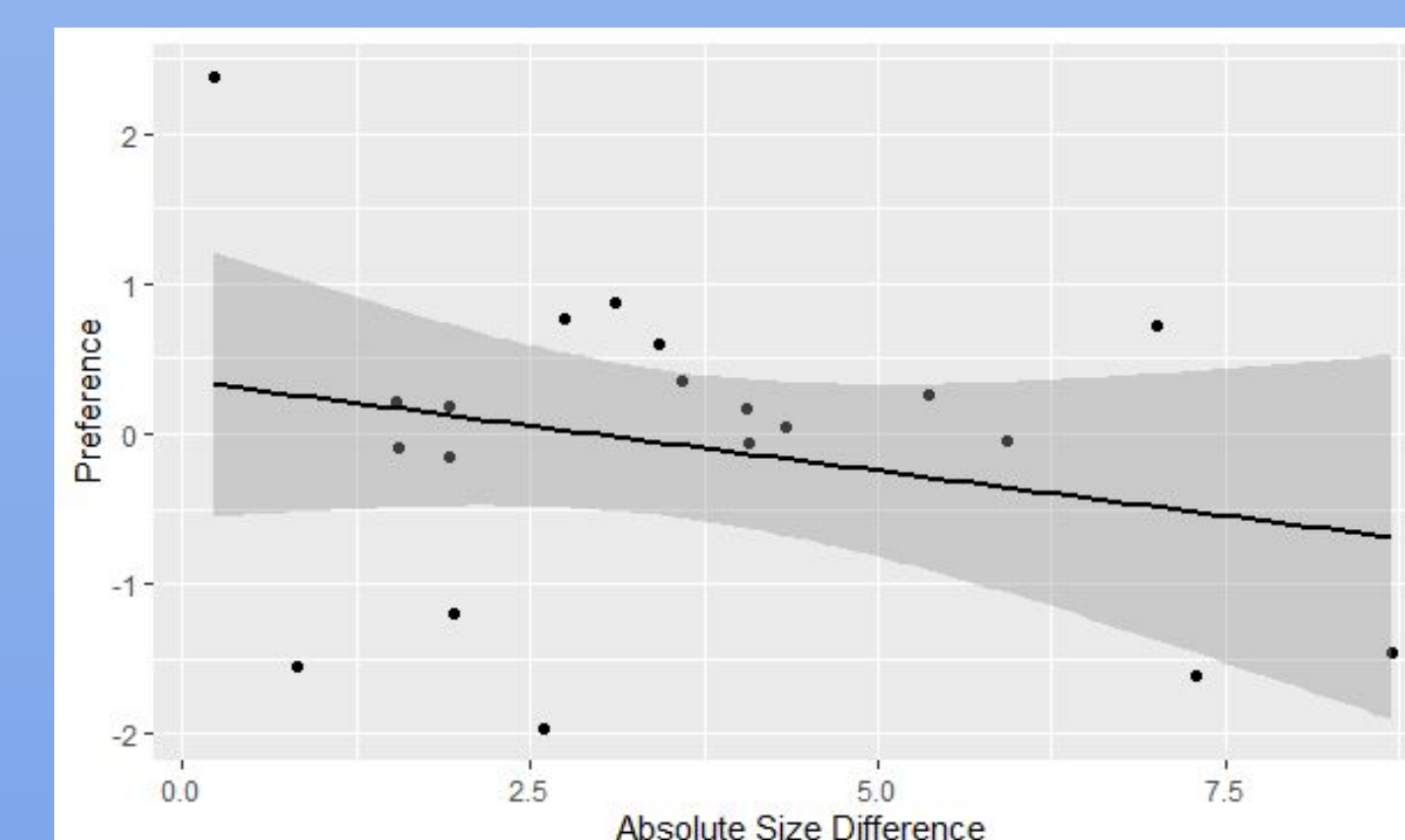


Figure 2. Relationship in a linear model between absolute size difference and female stickleback preference of a male. (P= 0.2634)

Results - Male

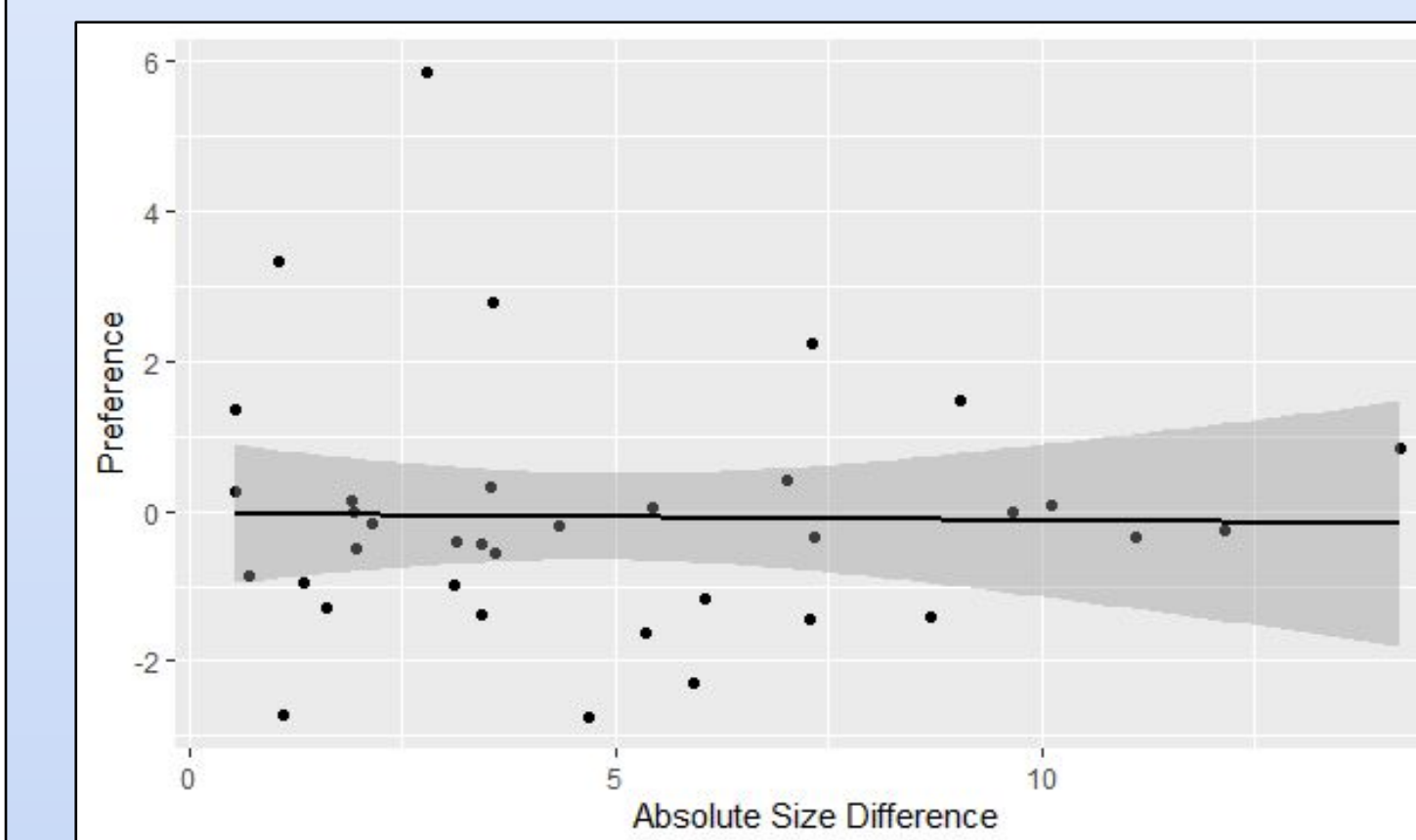


Figure 3. Linear model displaying relationship between absolute size difference and male stickleback preference of a female. (P= 0.9102)

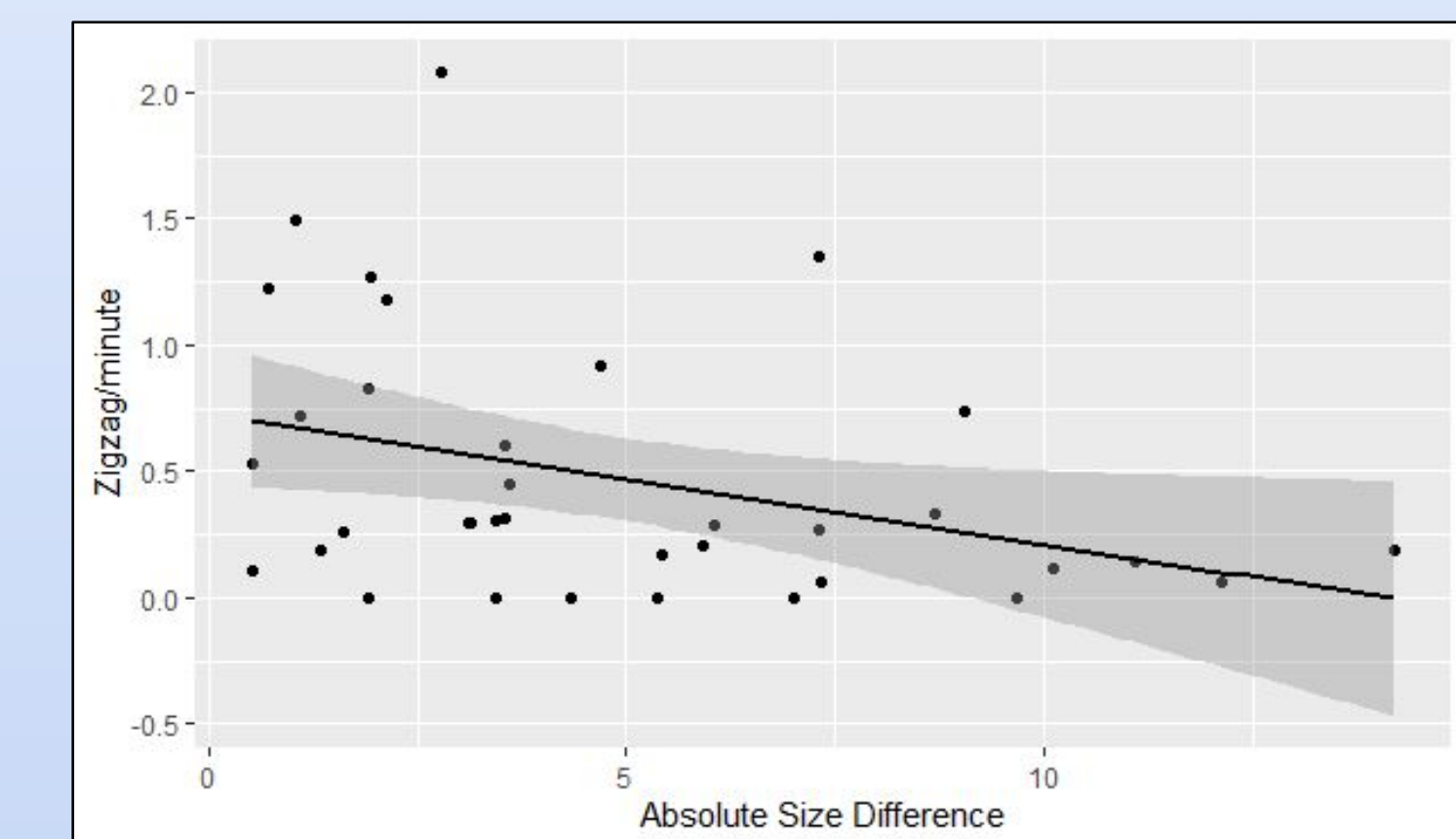


Figure 4. Relationship between absolute size difference and zigzag dances per minute performed by male stickleback (P= 0.0322)

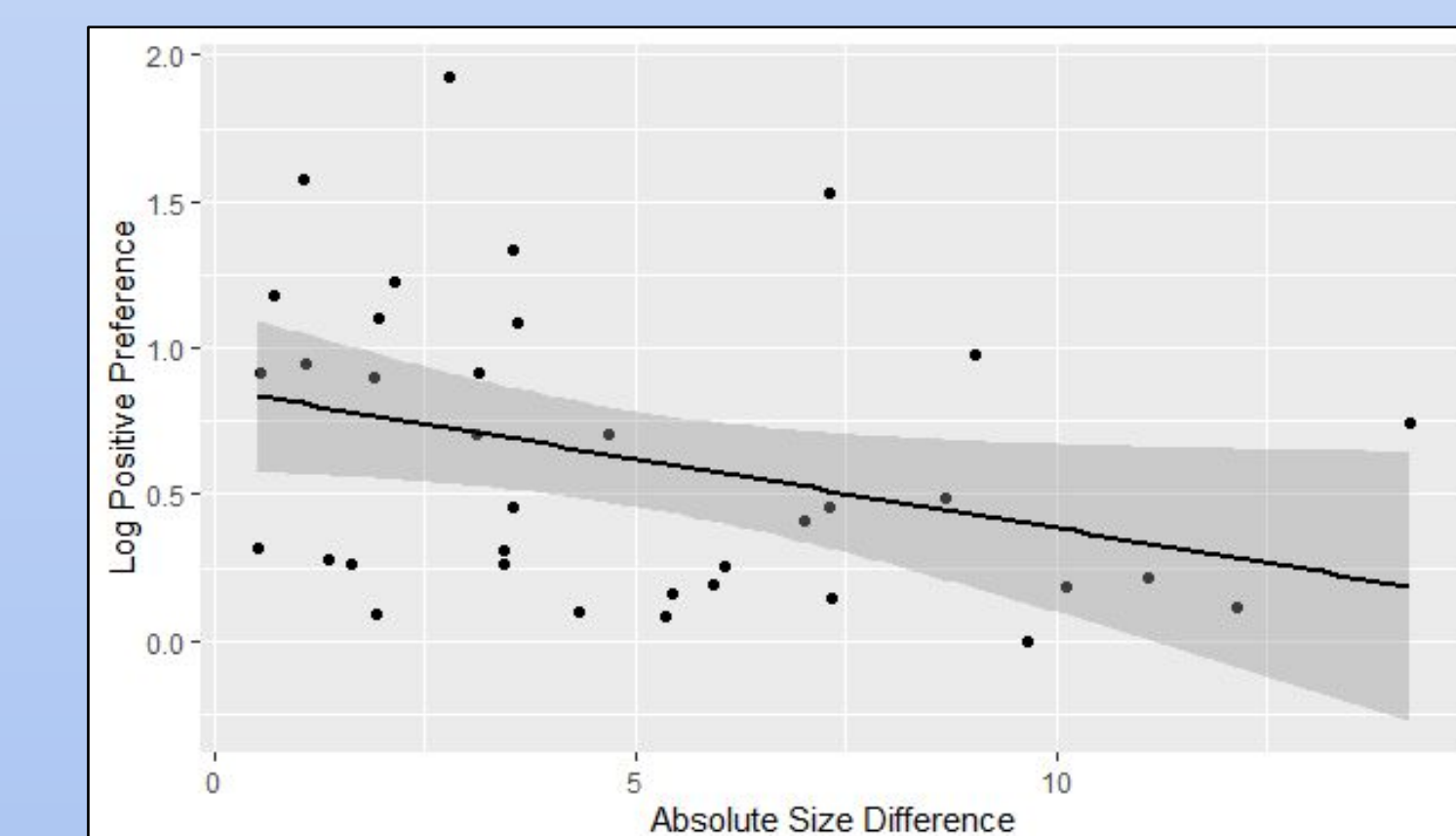


Figure 5. Linear model for the relationship between absolute size difference and log scale positive preference of a male stickleback for a female (P= 0.04452)

Conclusions

- A significant negative relationship between body size difference and the intensity of positive courtship behaviors was observed in males.
- Females similarly displayed a negative relationship between body size difference and preference for males.
- Future directions:
 - Score the remainder of the mating trial videos
 - Repeat the experiment with the freshwater and anadromous fish from the highway lakes of interest

References and Acknowledgement

Boughman, J.W., H. D. Rundle, and D. Schluter. 2005. Parallel evolution of sexual isolation in sticklebacks. *Evolution* 59: 361-373.

Conte, G.L., and D. Schluter. 2012. Experimental confirmation that body size determines mate preference via phenotype matching in a stickleback species pair. *Evolution* 67: 1477-1484

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