

Noise pollution and the long term effects on the *Astatotilapia burtoni* fighting behavior

Sarah Gross and Nancy McWilliams

Reed College, Bio 342

- ❖ Motivations: As the region of Lake Tanganyika becomes more developed, more motor powered boats have been introduced to the lake and there have been increases in both noise and oil pollution.
- ❖ Anthropogenic noise pollution has shown to have an effect on cichlid endocrine stress levels and their hearing sensitivity.
- ❖ Cichlid social behaviors are often negatively affected with the increased noise pollution, like digging behaviors, protection of offspring from predators, and aggressive behaviors



Are fish able to habituate to the stress of noise pollution when exposed to it over a long period of time? Do different noises have different effects on fish?

Experimental Design and Results

- ❖ Cichlids were treated in tanks by playing motor boat noises or “human” noise for 5 hours, M-F, for 3 weeks
- ❖ Control fights were for no noise, human noise, and boat noise
- ❖ 15-minute long fights were recorded through focal sampling, with the noises playing that matched the treated fishes noise treatment
- ❖ Ethogram focused on aggressive behaviors: threat, bite, chase, and jawlock

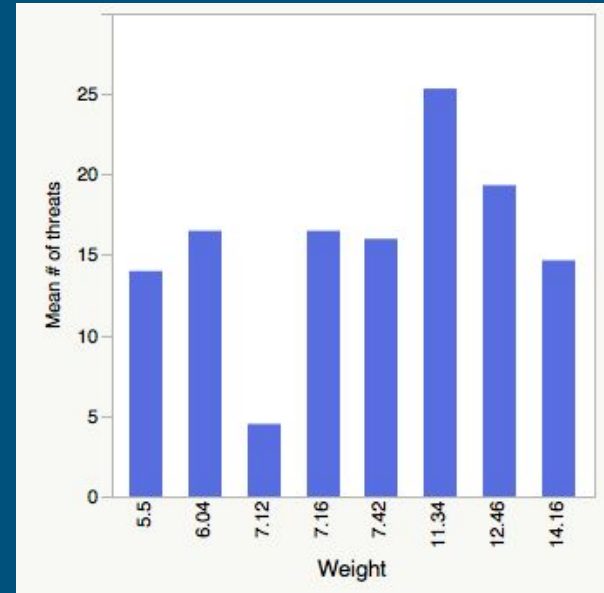


Figure 1. Weight of fish against average number of threats over all fights.

Results Cont'd

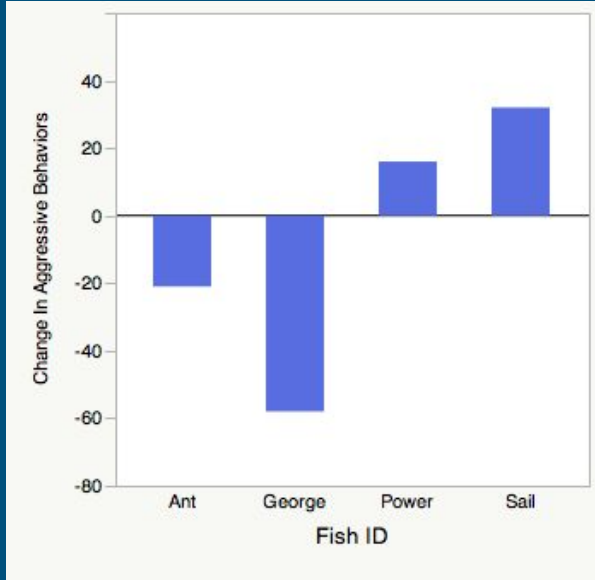
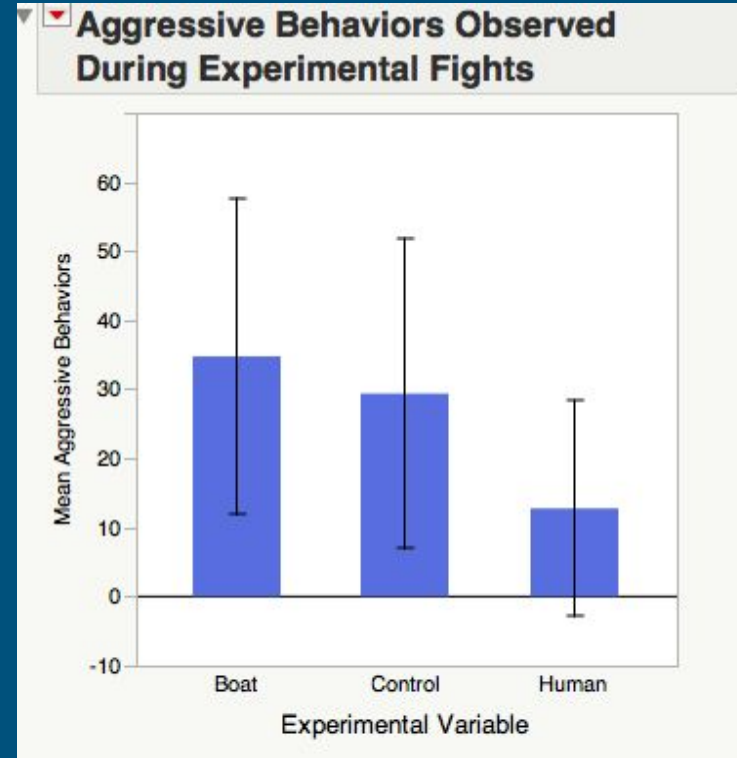


Figure. 2 Change in aggressive behaviors (threat, chase, bite, jaw lock) exhibited between control fight and fight 1 among four focal fish.

Boat treated fish more aggressive over time; weight plays no difference on threats; noise has no significant effect on aggressive behaviors

Figure 3. Mean number of aggressive behavior (threat, chase, bite, jaw lock) exhibited in both control and experimental fish under the different experimental conditions



Conclusions

— We found that from control fight to fight 1, boat noise treated fish exhibited more aggression, while human noise treated fish exhibited drastically less.

We also found that size of the fish had no significant effect on number of threats exhibited by the fish.

There was no statistically significant evidence that fish were able to habituate to the effects of noise in the experimental fights.

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Further Research

We propose a hormone study to determine if there is higher levels of testosterone in fish treated under these noise conditions.

We also propose a longer experimental study with cichlids that live in environments that have the risk of increased noise pollution to determine if the effects of noise pollution on fighting behaviors are truly “longterm”.

References

- Codarin, Antonio, Lidia E. Wysocki, Friedrich Ladich, and Marta Picciulin. "Effects of Ambient and Boat Noise on Hearing and Communication in Three Fish Species Living in a Marine Protected Area (Miramare, Italy)." *Marine Pollution Bulletin* (2009): n. pag. Elsevier. University of Vienna. Web. 12 Dec. 2016.
- Kunc, Hansjoerg P. "Aquatic Noise Pollution: Implications for Individuals, Populations, and Ecosystems." *Proceedings of the Royal Society B: Biological Sciences*. The Royal Society, 17 Aug. 2016. Web. 16 Nov. 2016.
- Ladich F, Schulz-Mirbach T (2013) Hearing in Cichlid Fishes under Noise Conditions. PLoS