

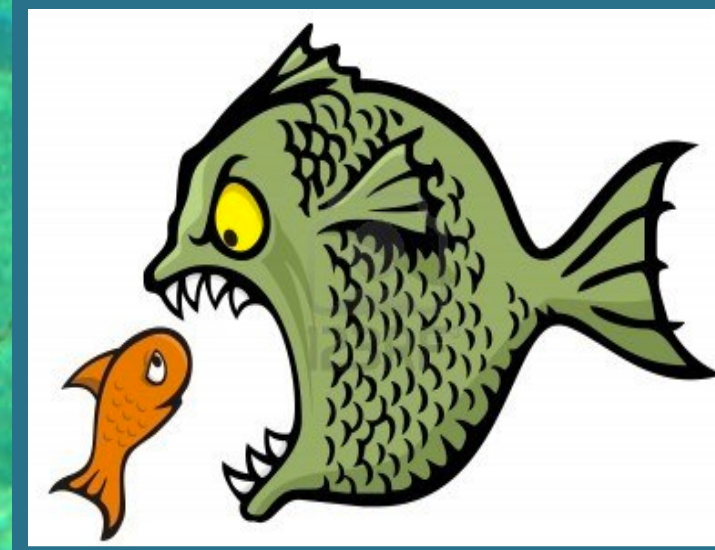
Fearful Feeding Frenzy: Do predator cues affect the eating habits of Guppies? (*Poecilia reticulata*)

Liz Pekarskaya and Chrissy Schmidt

Reed College Bio342

Behavioral changes in response to visual and olfactory predator cues have been shown in several fish species. However there has been little research in non-wild animal behavior in response to predator cues. We chose to observe ultimate (evolutionary) changes in fish-predator response.

“GUPPYS AND CICHLIDS: NATURAL ENEMIES” [1]



Poecilia reticulata

- Easy to observe
- Few complex behaviors
- Bred for several generations in captivity

Astatotilapia Burtoni

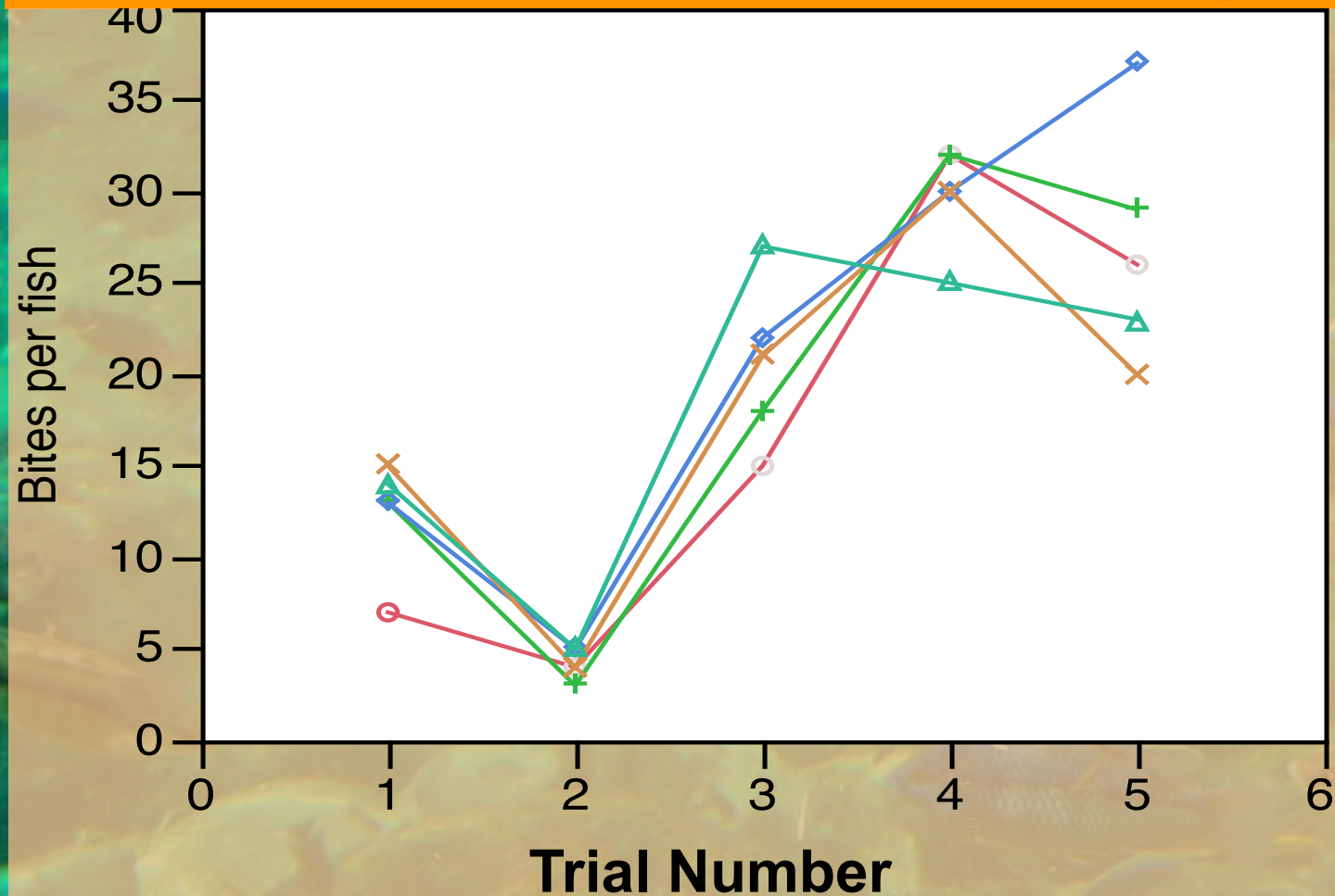
- Commonly known as an African cichlid
- Very aggressive
- Natural predator of wild guppies



Experimental Design and Results:

They can see you, they can smell you, and they want to eat you. What are you going to do about it?

Hypothesis: Guppies will alter their feeding behavior in response to visual and chemical predator cues^[2]



Four guppies were placed into five tanks with a clear plastic perforated separator. A male and female cichlid was placed in each experimental tank.

- Five 6-minute feeding sessions were observed (Before predator introduction, day 1, week 1, week 2, week 3)
- Number of 'bite-and-let-go' actions for each tanks (one control tank, and four experimental tanks) were recorded and divided by the number of fish in each tank.^[3]

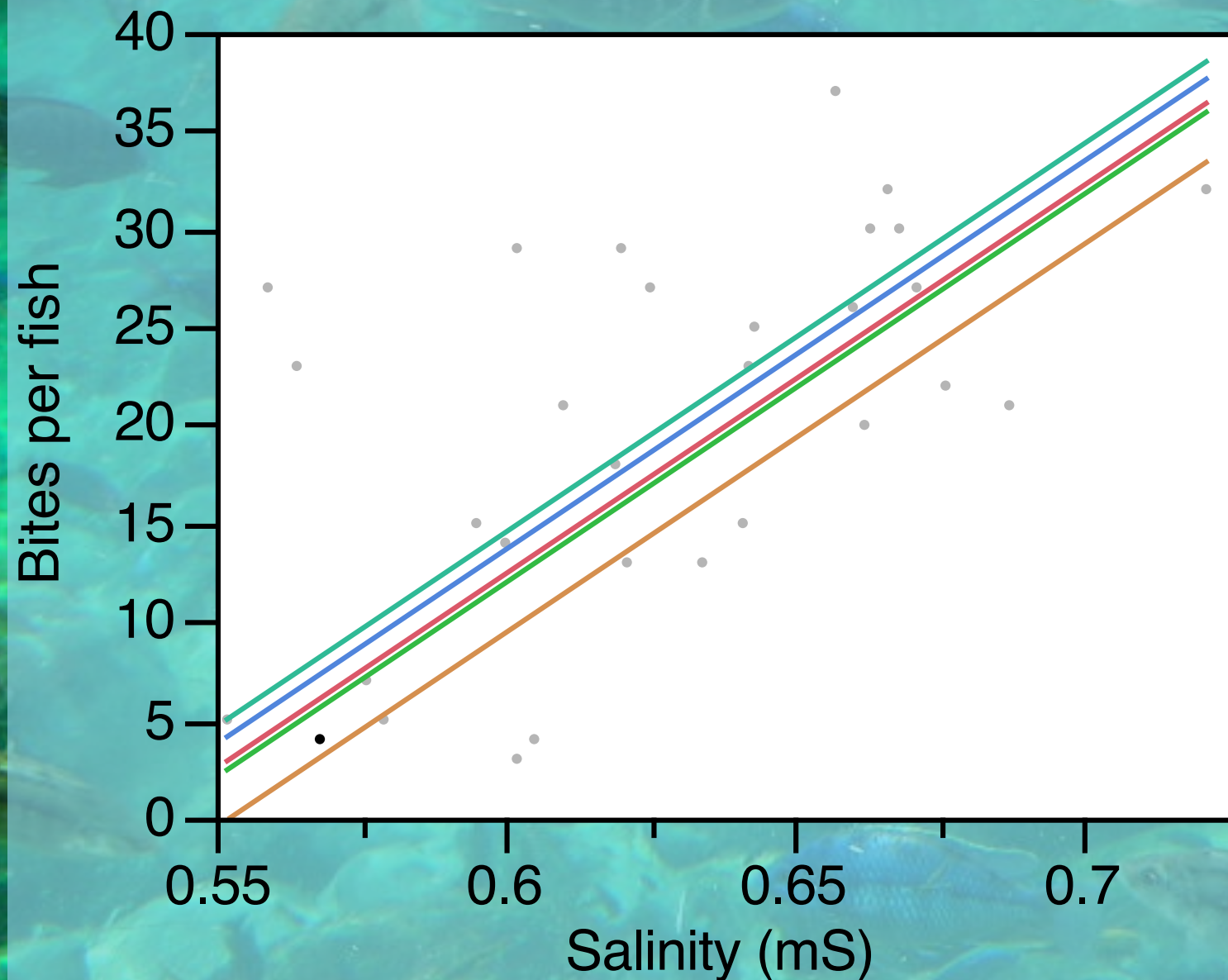
“Null hypothesis was not disproven”

Figure 1: The number of bites per fish in each tank at each trial day.

Each line represents a different tank of fish.

There was no significant difference between the control and any tank on any trial day ($p > 0.5$).

Surprising Results



Salinity and feeding behavior were surprisingly well correlated ($p < 0.0009$) in all tanks.



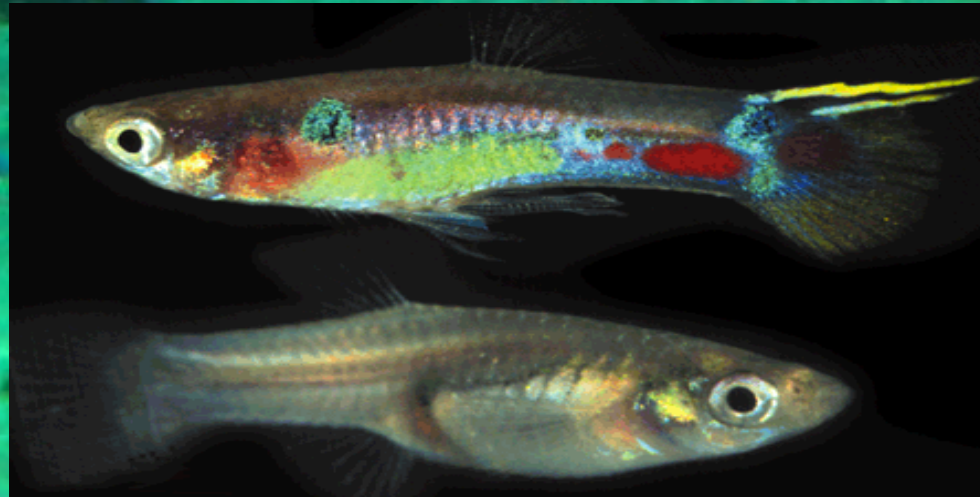
Future study:

- Proper controls (0% salinity, LD 50 salinity)
- More variance in mS (100, 200, 300, 400, 500, 600, 700, 800, 900, 10000)
- Development within different salinity levels (is there something else at work?)

Figure 2. Number of bites per fish per tank in different salinity levels. Each colored slope represents a different tank. There is no control for this results as this was not the focus of this experiment but a results noticed after data collection.

We Conclude that:

Looks like it's back to the drawing board



There is no significant relationship between the predatory cue and guppy feeding behavior in the three week study.

Future Directions:

Some future studies that look at development and predation cue learning would be helpful to understand our results. For example a look at feeding behavior in baby guppies and tracking growth over a 3-6 month period [3].

Much of the research on predatory cues is focused on catfish (*Pseudoplatystoma corruscans*) or sticklebacks (*Gasterosteus aculeatus*), and understanding our domesticating effect on guppies could provide insightful information for ultimate (evolutionary) survival changes. Our experiment did find that there was a significant correlation between feeding behavior in guppies and the salinity levels, and constructing an experiment using the suggestions we have made could also show the effect of mechanical and chemical changes on behavior.

References:

- [1] Godin & McDonough (2002) Predator preference for brightly colored males in the guppy: a viability cost for a sexually selected trait. *Behavioral Ecology*. 14(2):194-200
- [2] Giaquinto & Hoffman (2010) Role of olfaction and vision cues in feeding behavior and alarm reaction in the catfish pintado, *Pseudoplatystoma corruscans*. *J Ethol*. 28:21-27
- [3] Harpaz et al. (2005) Effect of feeding guppy fish fry (*Poecilia reticulata*) diets in the form of powder versus flakes. *Aquaculture Research*. 36:996-1000

Acknowledgements:

Thank you Professor Suzy Renn, laboratory associate Gene Olson, and our animal behavior lab TA, Caitlin.