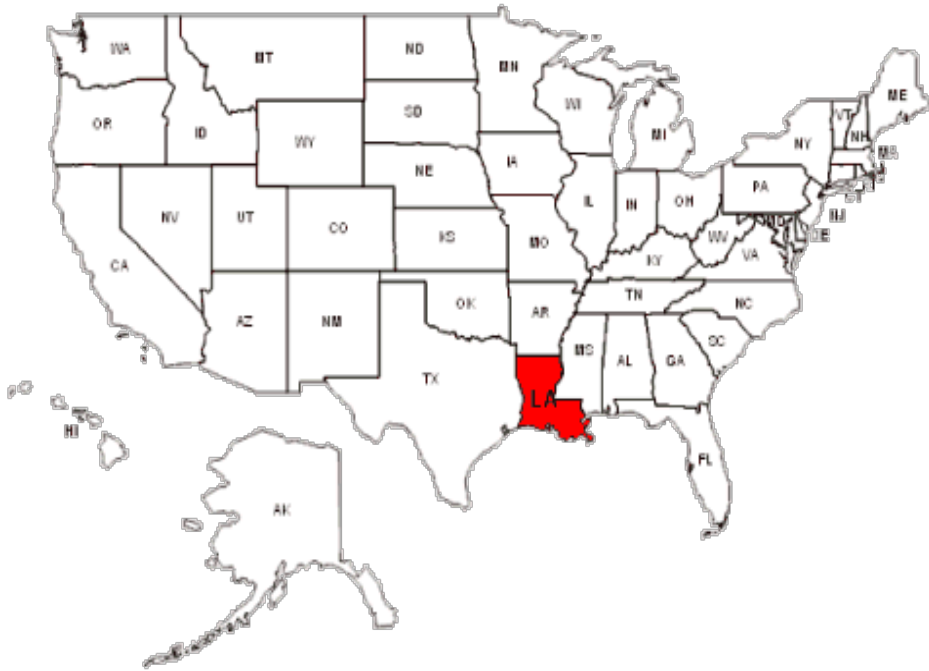


Previous and Ongoing Behavioral Studies of Invasive Cichlids in Louisiana



Manalle Al-Salamah

History of Invasive Cichlid in Louisiana:

- Rio Grande cichlid (*Herichthys cyanoguttatus*) introduced about 20-30 years ago into New Orleans.
- Have spread and increased in numbers since 1997.
- Dense populations in canal system and commonly found to be most abundant fish species.
- Increasingly found beyond canal system.



Range and Expansion of Cichlids:



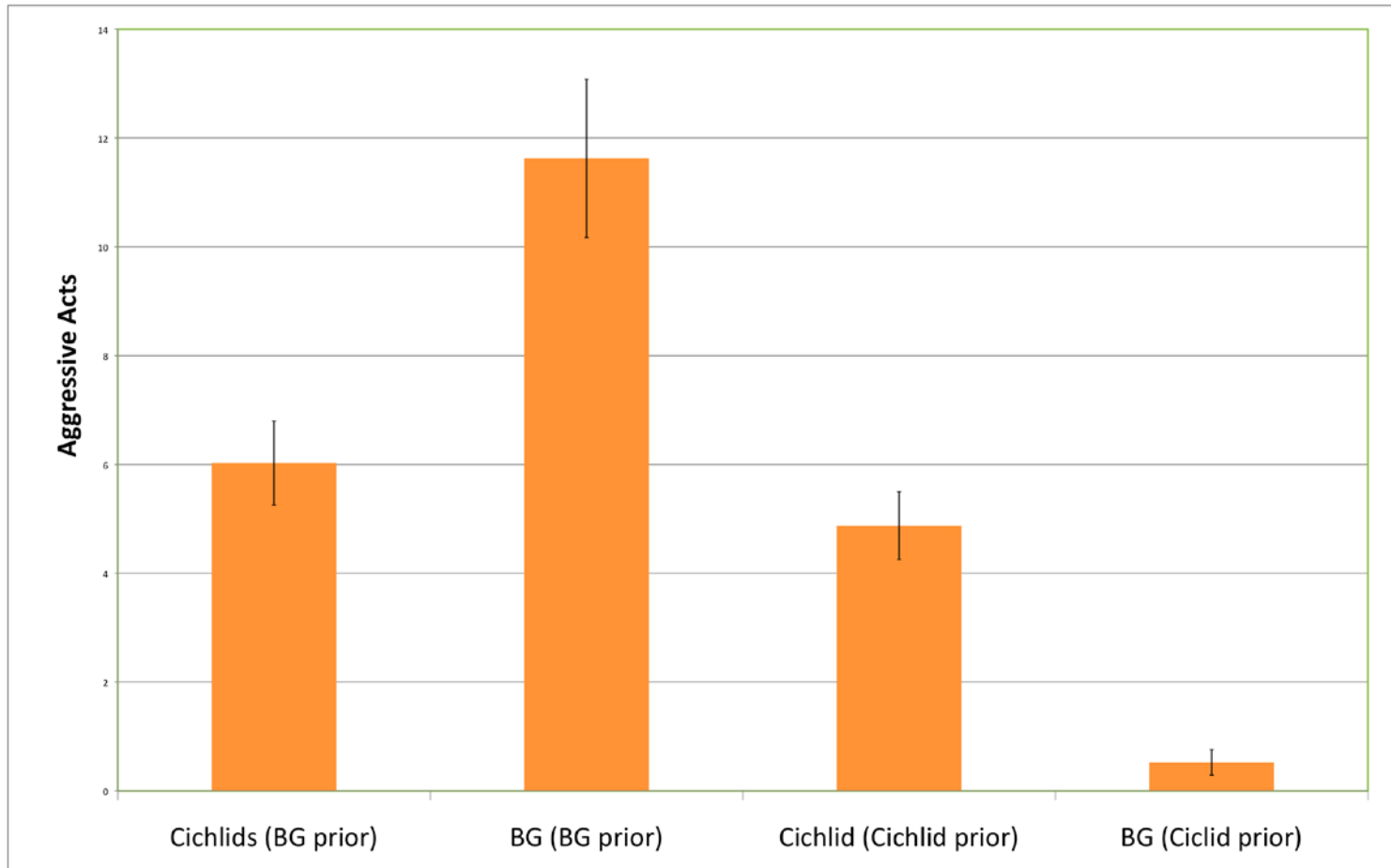
Previous Studies:

Interactions between Rio Grande cichlids and bluegills

(*Lepomis macrochirus*) (O. Thomas Lorenz, Martin T. O'Connell and Pamela J. Schofield)



Overview:

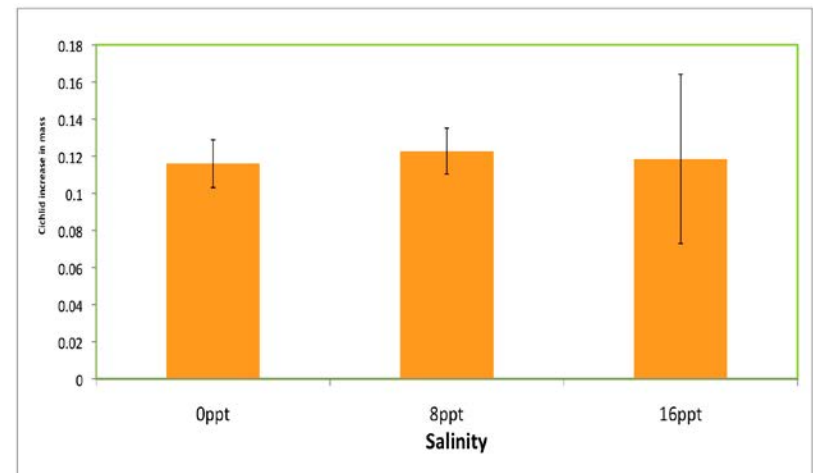


- Cichlids are hawk-like: always attack regardless of state of residency.
- Bluegill are bourgeois-like: behave like hawks as prior residents, but do not escalate as invader.

Cont. Previous Studies on Cichlids:

Effects of salinity on growth.

- Salinity has little effect on cichlid growth up to at least 16 ppt
- Other invasive cichlids have been shown to tolerate salinities above 35 ppt.
- Mayan (*Cichlasoma urophthalmus*) and jewel cichlids (*Hemichromis letourneuxi*) have been shown to tolerate 40 and 50 ppt respectively. (Martinez-Palacios et al. 1990, Langston et al. 2010)
- Rio Grande cichlids might be able to withstand higher salinities.



Ongoing Studies:

Pit tag array:

- Temperature variation and low temperatures during the winter may affect cichlid survival outside of the city.
- Possibility of thermal refuge.
- Tagging of cichlids, creating artificial canal and culvert, setting up array.
- Can indicate ideal places to manage populations during colder months.
- Measure movements into and out of a culvert.
- Males, females, bluegill.

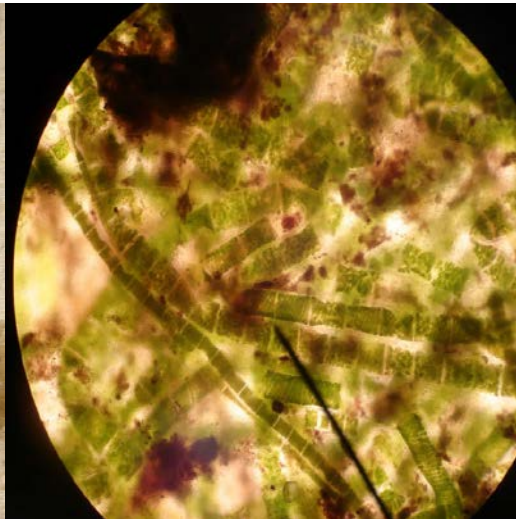
Pit Tag Array Progress:



Cont. Ongoing Studies:

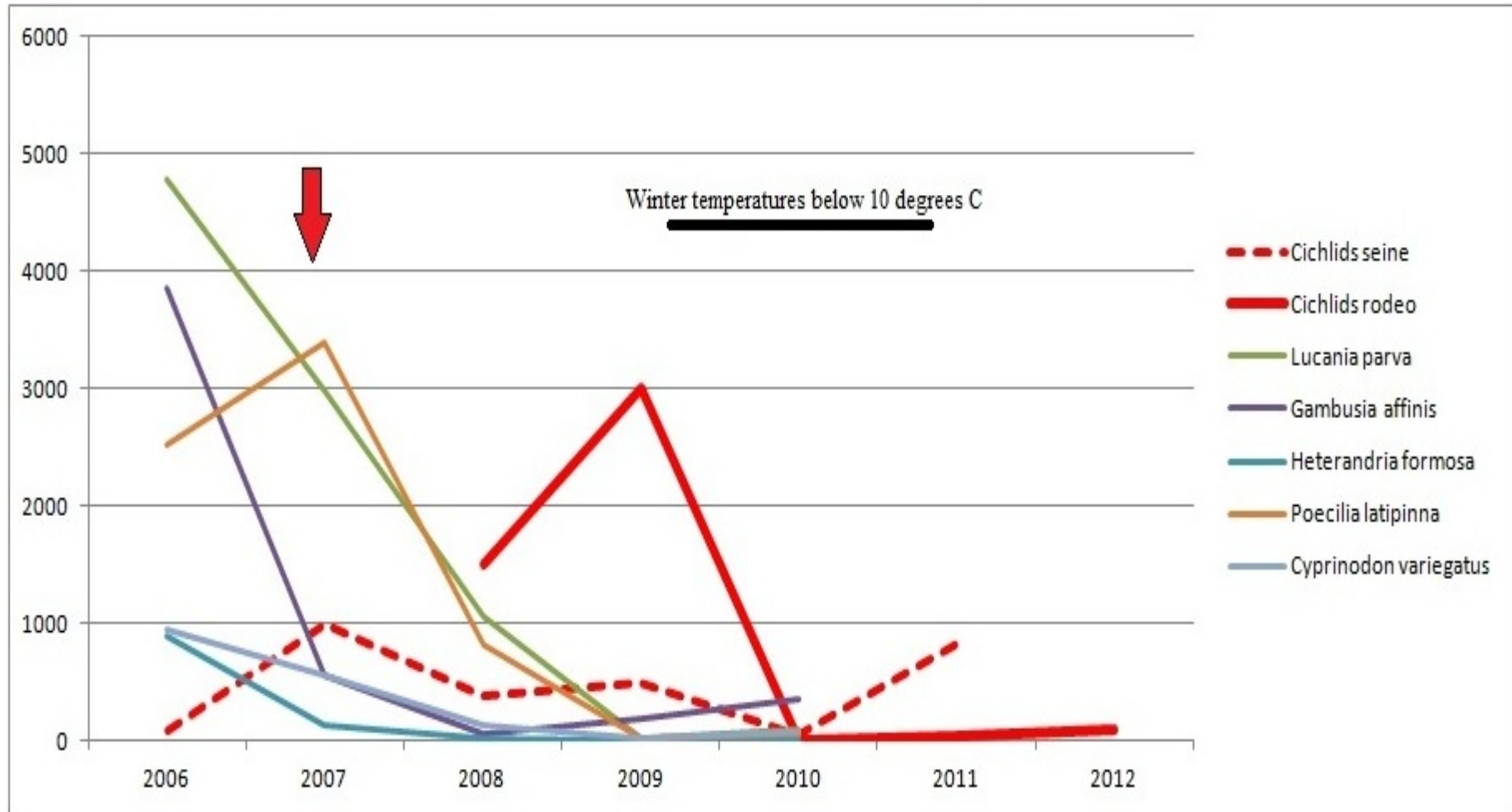
Diet and impact on smaller species:

- Preliminary data shows that diet varies dramatically between sites.
- Canals appear to be algae-based
- More natural habitats have more animal matter.
- Potentially see an overlap with diets of native species and consumption of native species.
- Fish collected by rodeo events, cast net, hook and line.

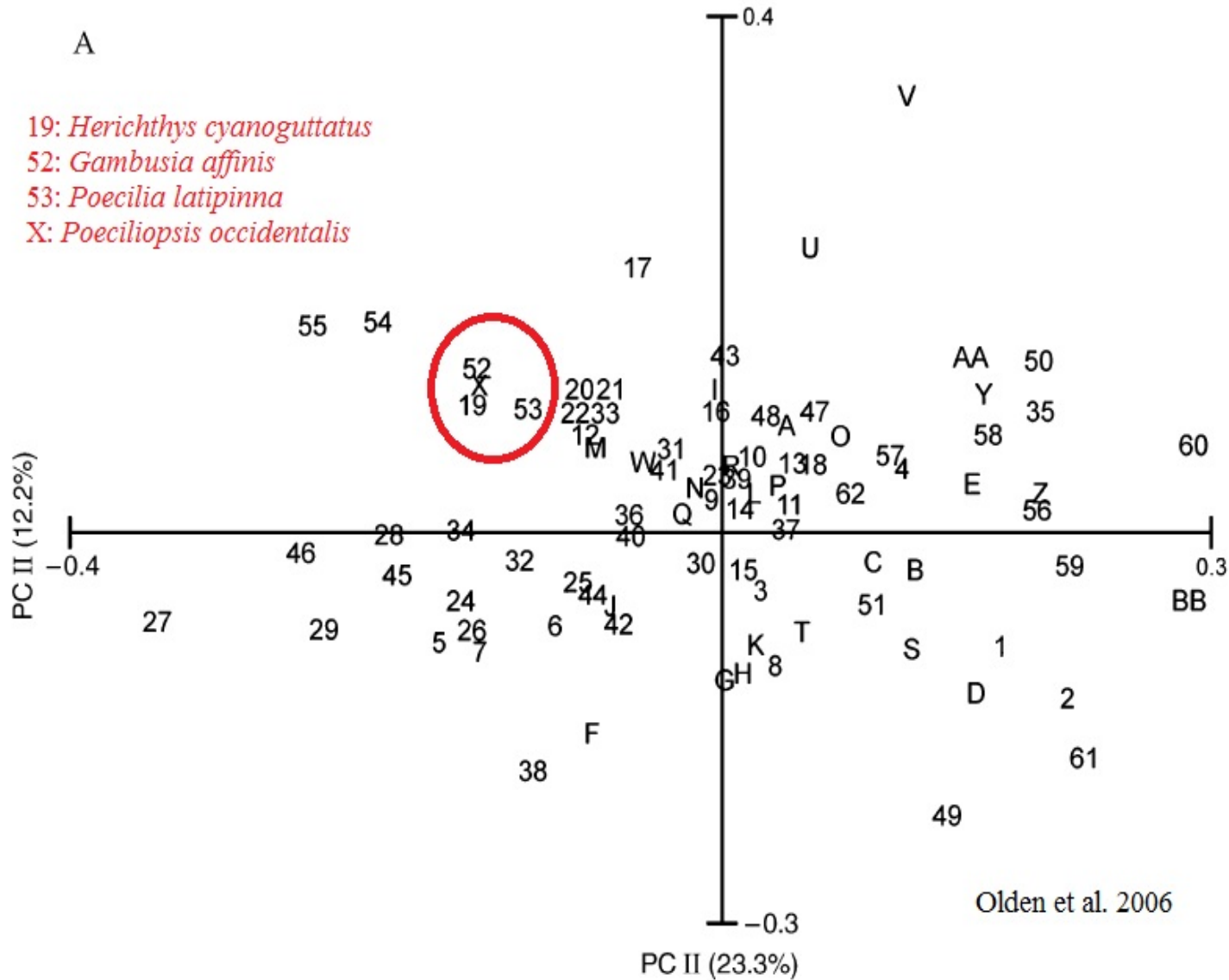


Small Fish Population Decline:

City Park/Bayou Saint John fish sampling 2006-2012



Overlap Between Species:

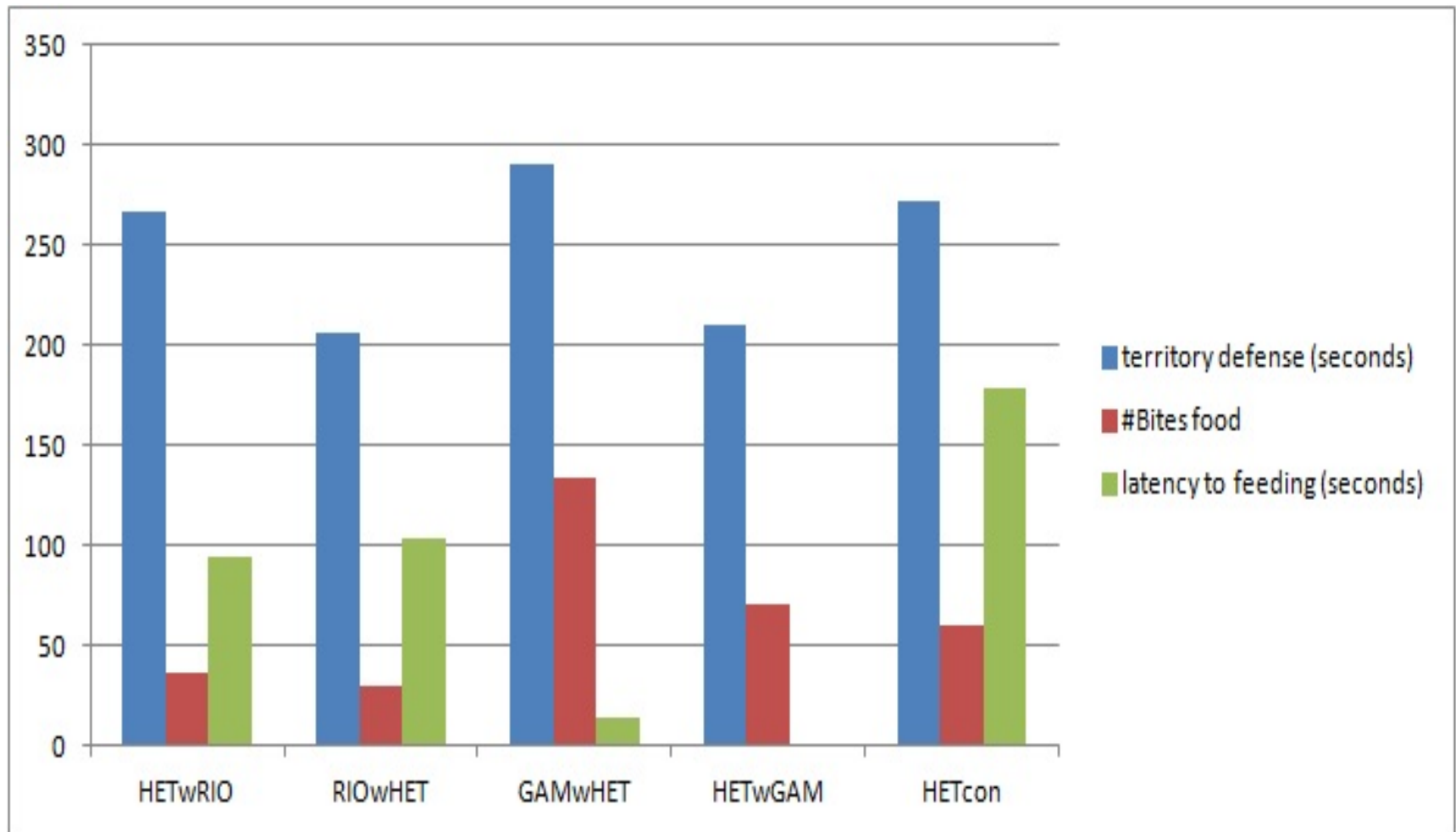


Cont. Ongoing Studies:

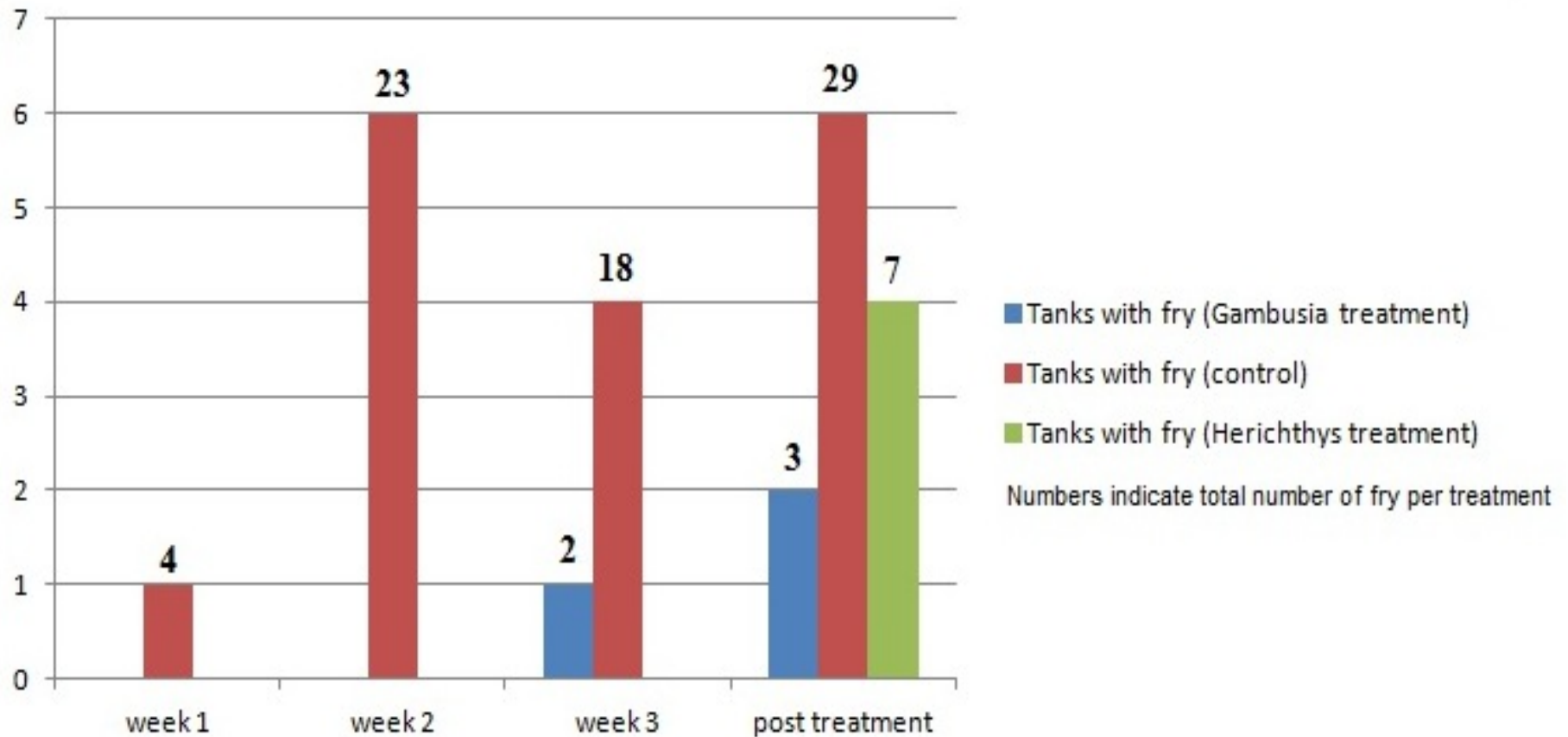
Other impacts on smaller species:

- Test effects cichlids have on native Poeciliids such as *Heterandria*.
- Juvenile cichlids used.
- Control with native *Gambusia* and no treatment.
- Measure weight, fecundity of *Heterandria* before and after introduction to cichlids.
- Can demonstrate whether or not cichlids have effect on *Heterandria* stress levels which may be causing disappearance.
- Possibility of delaying parturition.
- Recorded trials to observe behaviors.

Preliminary Data:



Fecundity of *Heterandria*:



Future Studies:

- **Genetic studies:** Multiple introductions or all one population, spreading?
- **Further salinity studies:** Potential to live in seawater will be tested, measure resulting behaviors.
- **Further diet studies:** More cichlids to be caught and dissected from different populations to fully understand diet and overlap of diet with native species.

Acknowledgements:

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Thank you! Any Questions?

