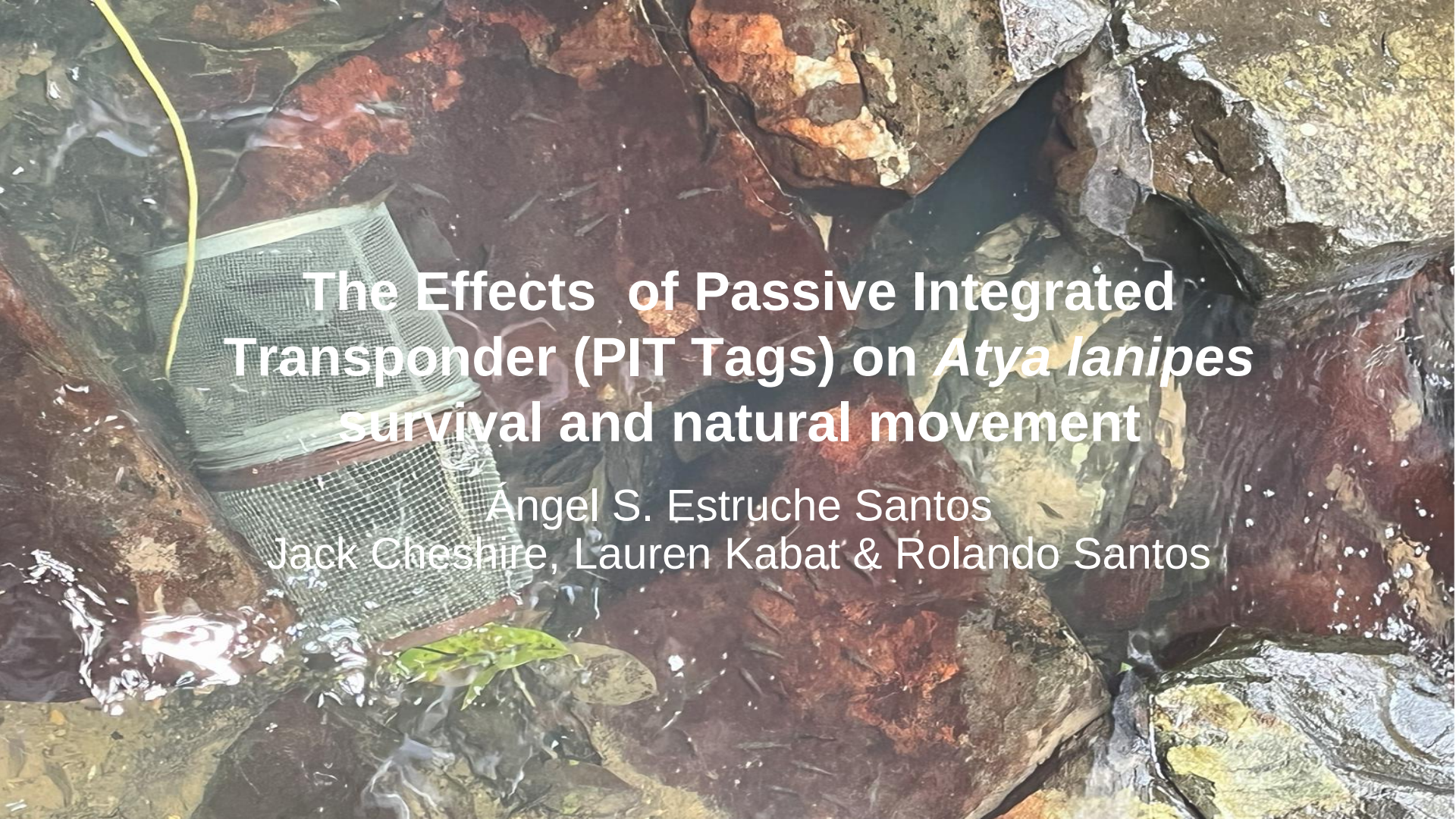


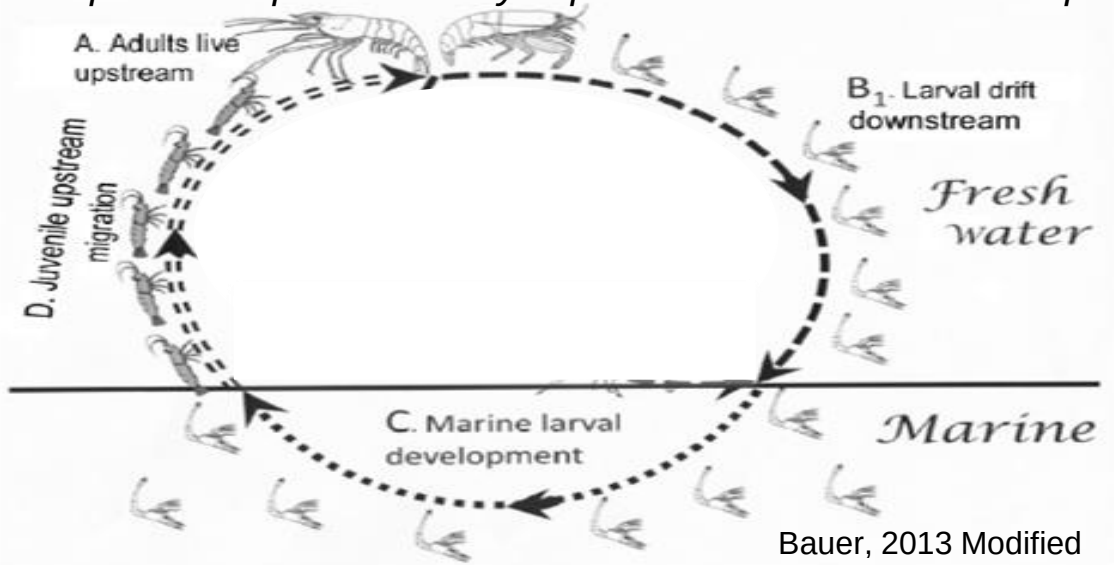
The Effects of Passive Integrated Transponder (PIT Tags) on *Atya lanipes* survival and natural movement

Ángel S. Estruche Santos
Jack Cheshire, Lauren Kabat & Rolando Santos

Shrimp Movement and Tracking in PR

- In search of the *How*, *Why*, *When*, *Where* of shrimp distribution
- Movement -> Resource distribution -> Abiotic Resources + Organisms movement + Anthropogenic Impact
- Freshwater shrimp as sensitive bioindicators

Xiphocaris sp. *Atya sp.* *Macrobrachium sp.*

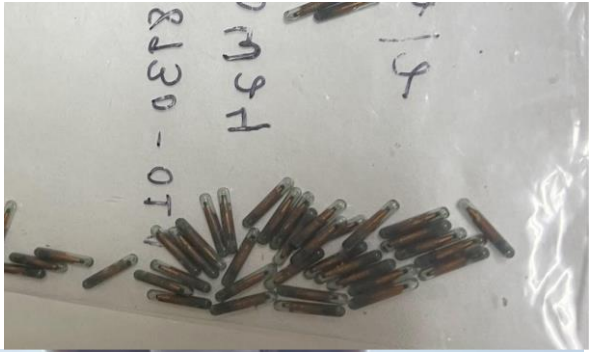


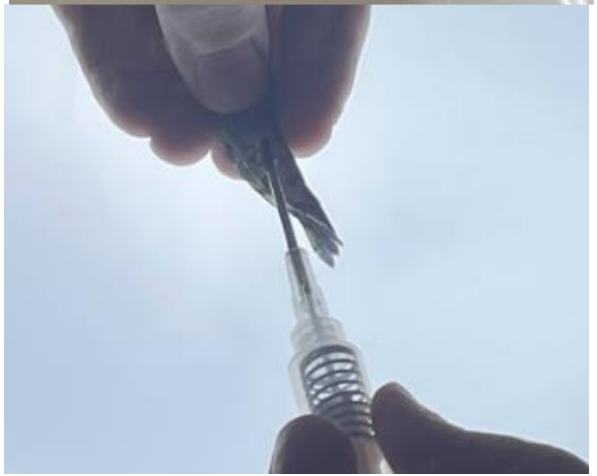
Bauer, 2013 Modified

Atya lanipes, gata or chágara

- Broad scale distribution influenced by environmental factors
- Freshwater shallow pool and consistent flow and leaf litter
- Ecological role
    - Filter feeders and grazers

Tagging Techniques





VI Alphanumeric Tags (Alpha)

Visible Implant Elastomer (VIE)

Passive Integrated Transponder (PIT)

Question

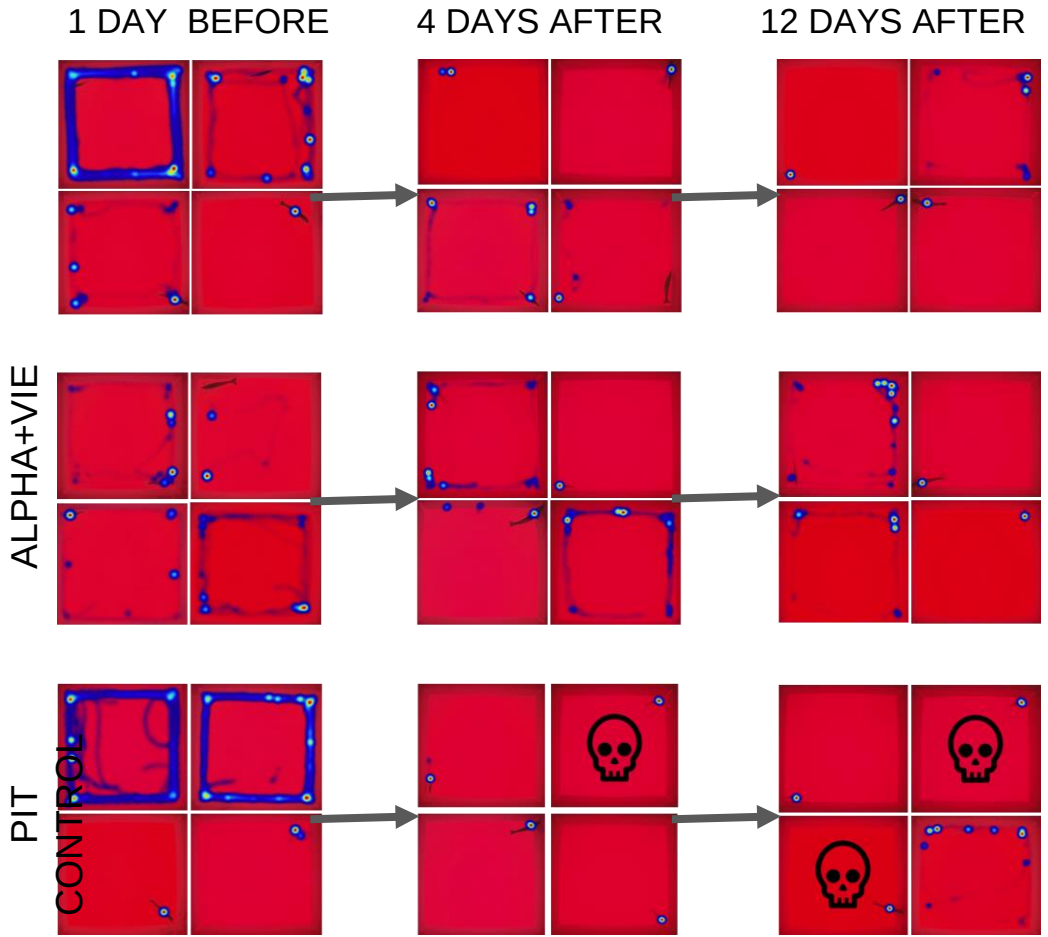
How do minimally invasive commercial tags affect the survival and movement of *A. lanipes*?

- Assess A. lanipes health and fitness through survivorship analysis and movement parameters(total distance moved, cumulative time movement, mean velocity,etc.)



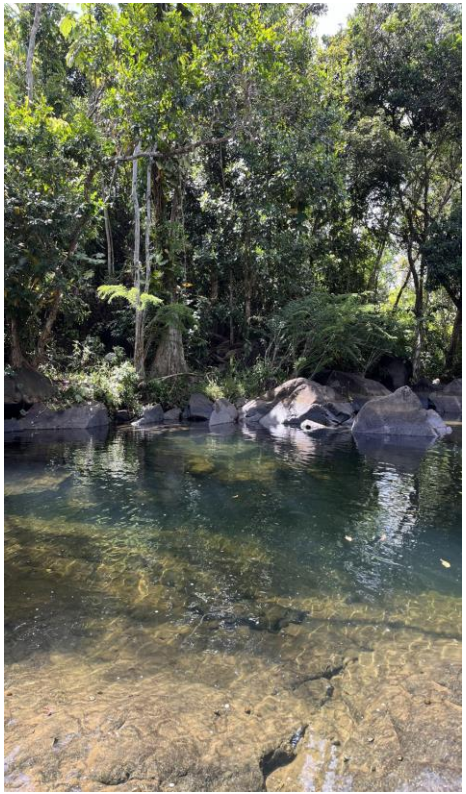
Methods: Framework

- Video recording of individuals
  - *Atya lanipes*: 10 control
  - *Atya lanipes*: 10 with Alpha and VIE markers
  - *Atya lanipes*: 10 with PIT tag
- Heatmaps as movement visuals
- Repeated Measures Anova



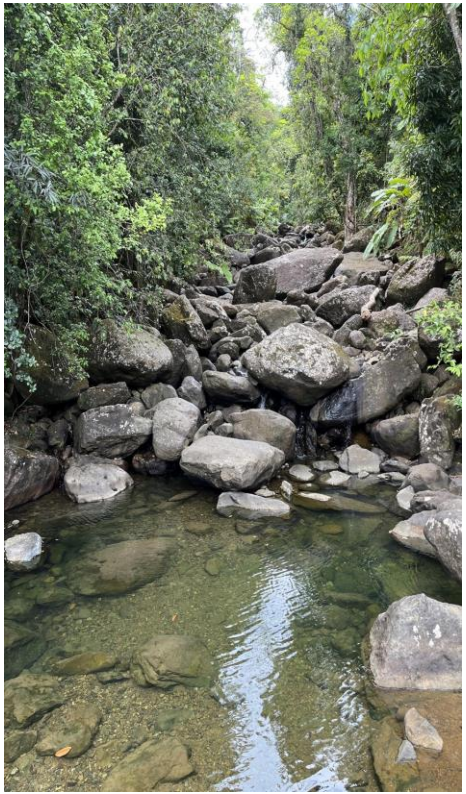
Methods: Sample Site

a) El Yunque National Forest



b) Rio Espiritu Santos

c) Quebrada Prieta Pool -9



d) Quebrada Sonadora

Methods: Sample Collection

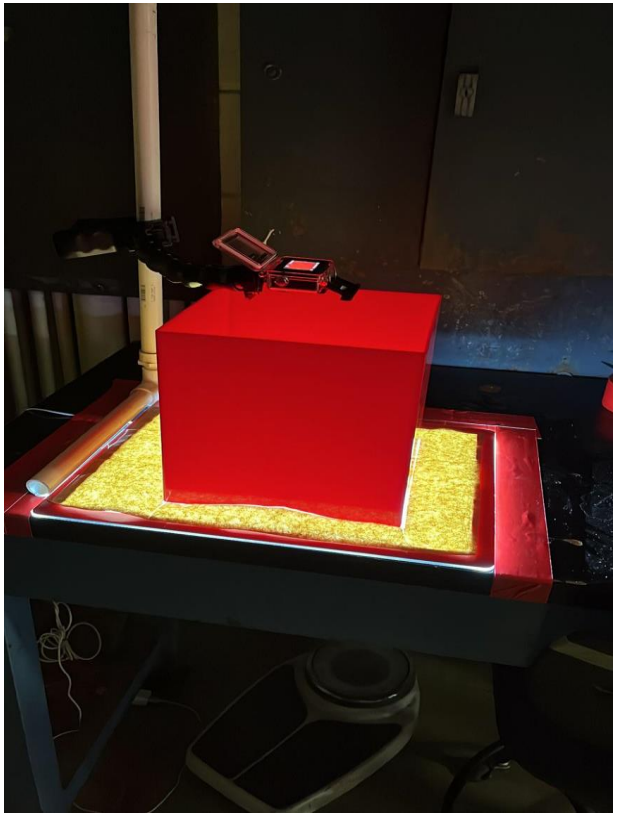
1) Sampling pool at Prieta -9

2) Wire funnel traps during 24 hour

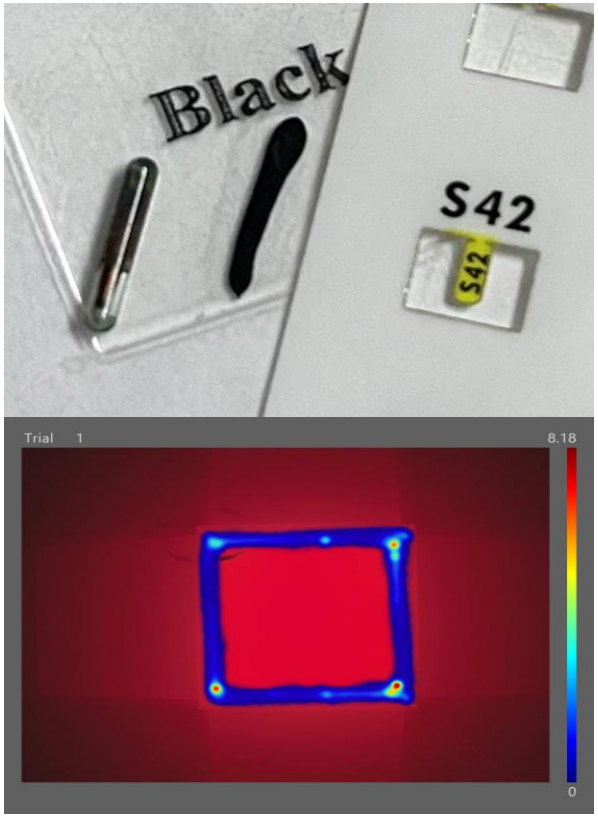
3) Identication and measurment

Methods: Behavior Analysis

4) Monitoring, Care, and Initial Movement



5)Movement Assessment after Tagging



6) EthoVision and R studio analysis

Results

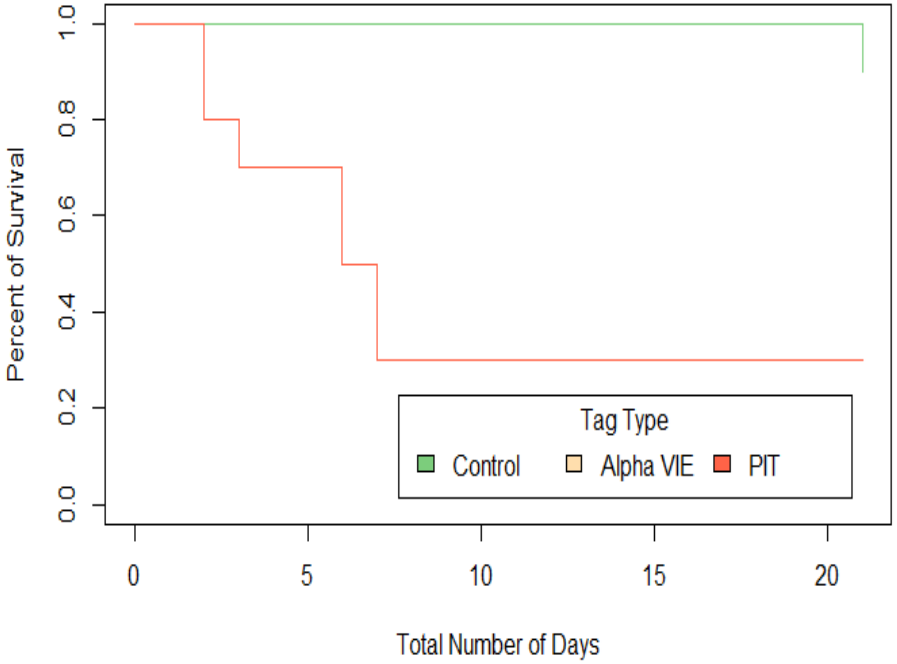


Fig.1: Survivorship Curve

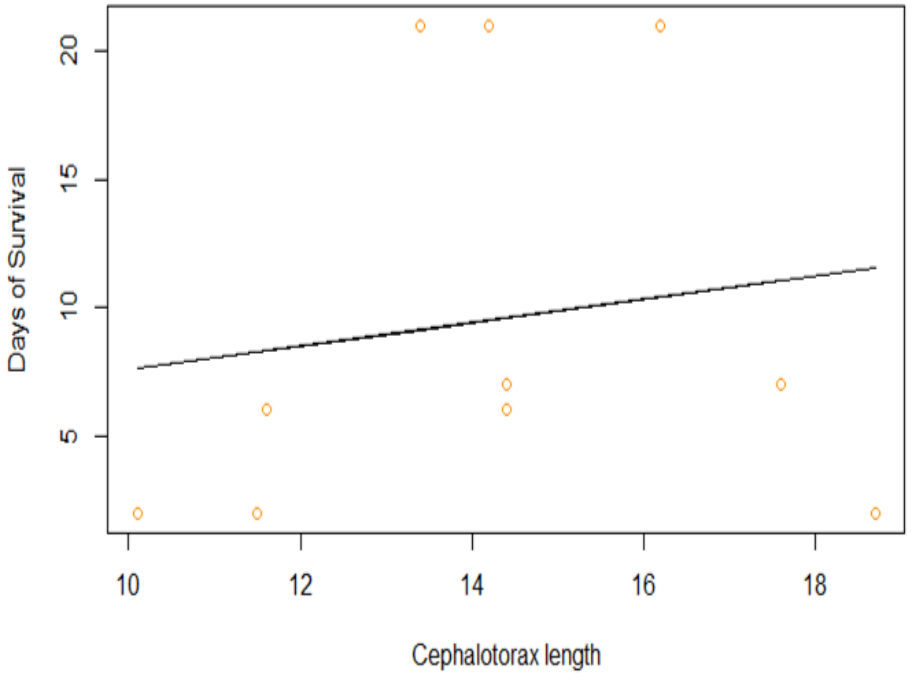


Fig.2: Survivorship & Size Relation

Results

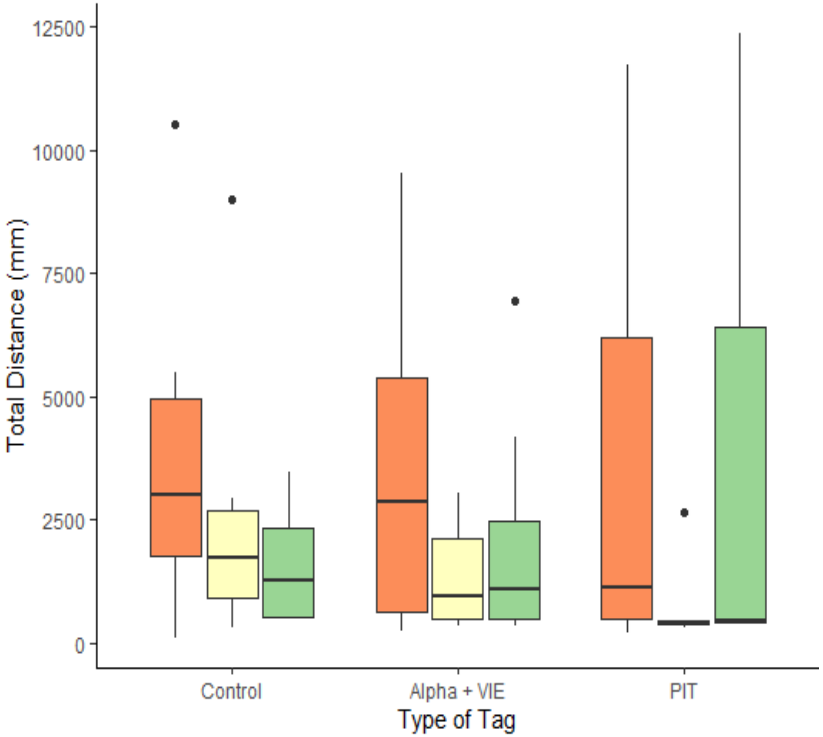


Fig.1: Total Distance Moved

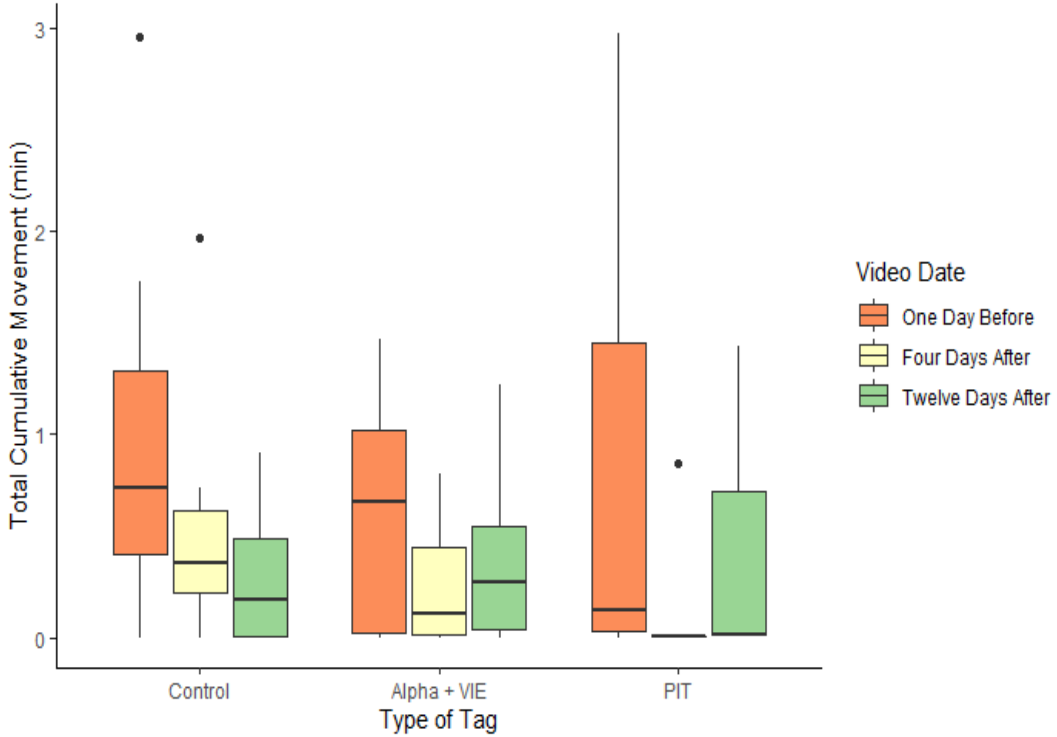


Fig.2: Cumulative Time Movement

Conclusion

PIT tagged group:

- 50% mortality in the first week after tagging, however mortality was not related to individual size
- Lowest movement percentage, mean velocity, total distance, and cumulative movement duration out of all experimental groups, lack of statistical significance is possibly due to decreasing sample size
- More research is needed to allow the safe and proper use of PIT tags in organisms like A. lanipes

Alpha and VIE tagged group:

- 100% survival rate thought the complete experimental period
- Movement parameters showed no statistical differences compared to control group
- Alpha and VIE markers are practical mark and recapture tags to use in field studies with A. lanipes

SCAN FOR A COOL VIDEO ON SHRIMP, SHRIMP, & MORE SHRIMP!!!

Special thanks to collaborators:
Lauren Kabat, Jack Cheshire, Rolando Santos, Omar Pérez-Reyes, Marla Santos and the UPR Shrimp and Fish Ecology Lab

Contact: angel.estruche@upr.edu
angelestruche@gmail.com

SHRIMP & FISH ECOLOGY LABORATORY

UNIVERSIDAD DE PUERTO RICO • RECINTO DE RIO PIEDRAS • 1903 •

LUQUILLO Long Term Ecological Research

NSF

FIU Institute of Environment

References

Abrahms, B., Aikens, E. O., Armstrong, J. B., Deacy, W. W., Kauffman, M. J., & Merkle, J. A. (2021). Emerging perspectives on resource tracking and animal movement ecology. *Trends in Ecology & Evolution*, *36*(4), 308-320.

Bauer, R. T. (2013). Amphidromy in shrimps: a life cycle between rivers and the sea. *Latin American Journal of Aquatic Research*, *41*(4), 633-650

Benstead, J. P., March, J. G., & Pringle, C. M. (2000). Estuarine larval development and upstream post-larval migration of freshwater shrimps in two tropical rivers of Puerto Rico. *Biotropica*, 545-548..

Covich, A. P., Crowl, T. A., Alexander Jr, J. E., & Vaughn, C. C. (1994). Predator-avoidance responses in freshwater decapod-gastropod interactions mediated by chemical stimuli. *Journal of the North American Benthological Society*, *13*(2), 283-290.

Covich, A. P., Crowl, T. A., & Scatena, F. N. (2003). Effects of extreme low flows on freshwater shrimps in a perennial tropical stream. *Freshwater Biology 48, 1199–1206*.

Covich, A. P., & Crowl, T. A. (2002). Reorganization of benthic stream food webs in response to drought-altered population densities: effects on rainforest streams. *Internationale Vereinigung für theoretische und angewandte Limnologie: Verhandlungen*, *28*(3), 1172-1175.

Hongjamrassilp, W., & Blumstein, D. T. (2022). Humans influence shrimp movement: a conservation behavior case study with “Shrimp Watching” ecotourism. *Current zoology*, *68*(2), 169-176.

Perez-Reyes, O., Crowl, T. A., Hernandez-Garcia, P. J., Ledesma-Fuste, R., Villar-Fornes, F. A., & Covich, A. P. (2013). Freshwater decapods of Puerto Rico: a checklist and reports of new localities. *Zootaxa*, *3717*(3), 329-344.

Riotte-Lambert, L., & Matthiopoulos, J. (2020). Environmental predictability as a cause and consequence of animal movement. *Trends in ecology & evolution*, *35*(2), 163-174.