Senior Thesis Proposal

Compiling and Analyzing the Official Guide to Captive Rearing Gopher Frogs in Georgia

Morgan Kaplan

Warnell School of Forestry & Natural Resources

University of Georgia

Athens, GA 30602

Dr. John Maerz and Vanessa Terrell

October 25, 2024

General Background

The University of Georgia has hosted a captive-rearing and translocation project of *Rana capito,* or Gopher frogs, since 2009. Gopher frogs are suffering from population declines due to the loss of Longleaf pine ecosystems (Cork, 2019). The ongoing captive-rearing project aims to identify suitable habitats for these frogs and translocate them to these areas to improve and sustain their population sizes. Throughout the last fifteen years of experimentation, researchers have tried various methods of captive rearing including differing clutch sizes, habitats, and aquaculture tank setups. Morphological abnormalities have been observed in *R. capito* after captive rearing, but the causes are unclear; researchers are not sure if they are due to captive-rearing conditions or if they are naturally occurring (McFall, 2023). Weather data including humidity and rainfall trends, along with genetic information from clutches, have not been analyzed for their effect on the survival rates and success of *R. capito* metamorphs.

Problem Statement, Research Objectives, and Hypotheses

Morphological abnormalities and unexplained fatalities have been observed in captive-reared members of *R. capito*, but the reasoning behind these issues is unclear. Through this project, I aim to find out if these variables of humidity, rainfall, and clutch data influence *R. capito* success rates. I predict that years with higher levels of humidity and greater rainfall result in healthier frogs as this weather mimics the frogs' natural environments more closely than dry seasons with low humidity. Additionally, frogs that come from certain clutches may have better success rates than others due to genetic factors, but I have not yet formed a hypothesis on this variable. Rearing fewer tadpoles in each mesocosm seems to help promote the success of metamorphs, so I plan to investigate the intersection between differing tank populations, rainfall, humidity, and genetic clutch factors.

Methodology

In this thesis, I will combine the captive rearing data from the University of Georgia from 2009-2024, excluding 2014 and 2020 when no data was collected, into a master datafile that includes information about date of metamorphosis, mass at metamorphosis, year, and fate comments or other additional morphological notes. After I compile this dataset, I will look for patterns associated with how long it took for metamorphosis to occur versus the fate of each frog, along with the fate associated with different masses. I will then gather data on humidity and rainfall to see if there are any patterns between these variables and time to metamorphosis and mass at metamorphosis, along with any fate associations. I am hoping to gather information about clutch genetics as well, but I am not currently sure how much information I can get at this point in time. I will then compile a comprehensive guide to captive-rearing Gopher frogs in Georgia that can be followed by others who wish to captive-rear these frogs. I will include my analysis of different variables in the guide in order to promote the highest success rates of other captive-rearing projects as well as our own.

Anticipated Results and Significance of Research

I anticipate the results to align with my previously discussed hypotheses. This research is significant as there has not yet been a published official guide to captive-rearing these frogs in Georgia. Having access to this compilation and analysis will help future researchers in their captive-rearing endeavors and allow them to build knowledge off of the basis of my thesis.

Prior Research Experience

I conducted captive-rearing undergraduate research through the Maerz Lab in Spring 2023. Because I helped raise frogs from an egg ball to metamorphs firsthand, I have a strong

grasp on how the process works and the importance of each step I will analyze. I was also responsible for caring for adult frogs that lived in the field lab prior to translocation, so I am familiar with their needs and regular behaviors and morphology. I have additionally helped with research projects on salamanders and terrapins, so my general herpetological knowledge may also assist me with my thesis.

Literature Cited

Cork, E. (2019). *Modeling occupancy and habitat suitability to guide management for the gopher frog (Rana capito) in South Georgia* (Master's thesis). University of Georgia. Athens, GA.

Graham, K. M. (2015). *Conserving the Mississippi gopher frog (Lithobates sevosa) through the use of assisted reproductive technologies* (Master's thesis). Mississippi State University. Mississippi State, MS.

McFall, A. J., Nelson, K. N., Stonecypher, E. T., Swartzbaugh, C. S., Allender, M. C., Burrell, C. E., Yabsley, M. J., & Lance, S. L. (2023). Morphological abnormalities in the gopher frog (*Lithobates capito*) during a headstarting event. *Herpetological Conservation and Biology* 18(3), 436-449.

Traci D. Castellón, Anna C. Deyle, Anna L. Farmer, Javan M. Bauder, Elizabeth A. Roznik, Steve A. Johnson; Effects of Translocation on Gopher Frog Survival and Movement. *Herpetologica* 1 September 2022; 78 (3): 161–168. doi: https://doi.org/10.1655/Herpetologica-D-20-00061