Extension of an existing salamander hybrid zone in Northeast Georgia

Jillian Dixon & Joseph Pechmann

Biology Department, College of Arts and Sciences, Western Carolina University, Cullowhee, NC, 28723

INTRODUCTION

- Hybridization among Plethodontid salamander species is not uncommon
- Complex hybrid zone occurring in northeast Georgia involving:
  - *Plethodon chattahoochee*: Chattahoochee slimy salamander
  - *Plethodon shermani*: red-legged salamander
  - *Plethodon teyahalee*: southern Appalachian salamander

Figure 1. *Plethodon chattahoochee*

Figure 2. *Plethodon teyahalee*

Figure 3. *Plethodon shermani*

- Range of *P. shermani* in Georgia: extreme northeast Towns County, along GA-NC state line
  - "Pure" individuals and hybrids with *P. chattahoochee* (Highton and Peabody 2000, Jensen et al. 2008)
- Evidence of introgression in *P. chattahoochee* from *P. shermani* and *P. teyahalee* outside accepted ranges (Pierson et al. 2023)
- Visual observations of salamanders exhibiting characteristics inconsistent with "pure" *P. chattahoochee* also recorded outside documented hybrid zones
- Aberrant *P. chattahoochee* have distinct grey cheeks, minimal lateral spotting, and red pigmentation on legs; some also have varying degrees of dorsal spotting or brassy flecking
- I hypothesize that these aberrant phenotypes are a result of hybridization among *P. chattahoochee*, *P. shermani* and *P. teyahalee* outside the known ranges of *P. shermani*, *P. teyahalee*, and *P. shermani-chattahoochee* hybrids in Georgia

METHODS

- Nocturnal surveys conducted along trails and Forest Service roads in Chattahoochee National Forest
- Lowest survey stop at 915 meters in elevation; difference between each site is 25 meters in elevation
- At each site, 10 Chattahoochee slimy salamanders or hybrids captured and measured
- Each salamander phenotypically scored in five categories:
  a) Lateral spotting, including color: 0-5
  b) Dorsal spotting, including color: 0-6
  c) Red pigment on legs: 0-8
  d) Prominence of grey cheek: 0-5
  e) Amount of gold/brassy flecking: 0-5

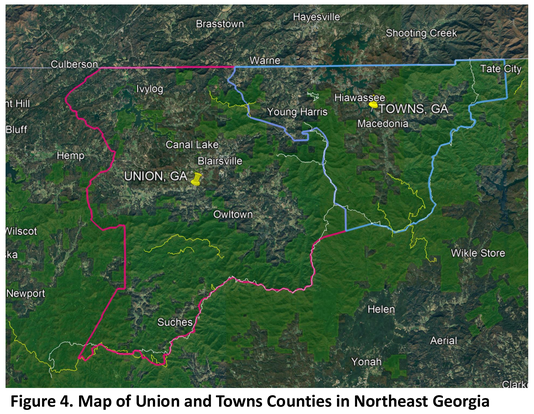

Figure 4. Map of Union and Towns Counties in Northeast Georgia

Figure 5. Collecting a tail clip sample from an adult Chattahoochee slimy salamander

- Two individuals photographed and tail clip taken
- DNA will be extracted from tail clips and sequenced using 3RAD sequencing (Pierson et al. 2023)

RESULTS

- Project is ongoing; field work will resume once nighttime weather conditions become suitable
- Preliminary results show wide range of scores in all categories except dorsal spotting
- Many individuals observed with red welts or lesions, typically on feet and limbs; some are missing entire digits (Figure 10)

Figure 6. Photos showing range of lateral spotting observed

Figure 7. Photos displaying the range of grey cheek distinctness

Figure 8. Photos of the range of red leg pigmentation observed

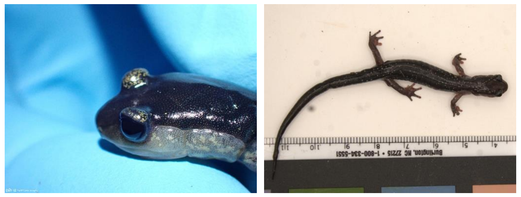

Figure 9. Photos showing varying amounts of brassy flecking

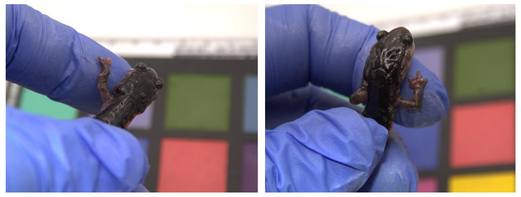

Figure 10. Photos displaying digit loss due to trombiculid mites

CONCLUSIONS AND RECOMMENDATIONS

- Current data limited but many phenotypes inconsistent with "pure" *P. chattahoochee* individuals observed
- Will begin recording data on location and severity of chigger mite lesions
- Aim to finish surveys by July 2025 to begin genetic analysis at Kennesaw State University under guidance of Dr. Todd Pierson
- Results will provide proportion of each salamander's ancestry by species

References

Highton, R., and R. B. Peabody. Geographic protein variation and speciation in salamanders of the *Plethodon jordani* and *Plethodon glutinosus* complexes in the southern Appalachian Mountains with the description of four new species. Pages 31-93 *in* R. C. Bruce, R. G. Jaeger, and L. D. Houck, editors. The Biology of Plethodontid Salamanders. Springer, Boston, Massachusetts, USA.

Jensen, J. B., C. D. Camp, W. Gibbons, and M. J. Elliot. 2008. Amphibians and Reptiles of Georgia. University of Georgia Press, Athens, Georgia, USA.

Pierson, T. W., C. D. Camp, J. Cross, J. A. Wooten, J. B. Jensen, and M. J. Elliot. 2023. Revisiting a cryptic species complex: interspecific gene flow among woodland salamanders in the Blue Ridge Mountains of northern Georgia, USA. Biological Journal of the Linnean Society 2023:1-8.

Acknowledgements

Thank you to Matt Zimmerman, Haven Guinn, Carter Ricks, Deven Hall, Alyssa Johnson, Robert Carlin, Celelan Garriot, Sarah D'Ercole, Kyra Fowler, Cindy Coffey, Trevor Ogilvie, and anyone else who contributed their time and effort to this project. Additionally, thank you to Carter Ricks and Todd Pierson for their photographs.