Identification of Newt Species Using Morphometrics

Monica Morales, Jessica Saavedra, Daniel Hudson, Jeff Wilcox, Derek Girman
Sonoma State University, Biology Department

Objective

Our purpose for this project is to take morphometric measurements of the two Pacific Newts from the Genus *Taricha* in two different locations to identify if species differences can be based on analysis of these measurements.

Figure 1. Two Pacific Newts on the left *T. granulosa* and *T. torosa*

Background

- The two California coastal newt species we worked with include *Taricha granulosa* and *Taricha torosa.*
- These two species are an ideal to study because they are abundant and easy to collect.
- *T. granulosa and T. torosa* are found in ponds and streams of Mendicino and Sonoma County (Figure 2)
- Identification of species based on field markings has been a challenge for many field biologist.
- Previous studies have shown, that morphometrics can be used to identify differences in salamander species (Adams, 2004).
- Morphometric analysis can be used to identify slight difference in closely related species.

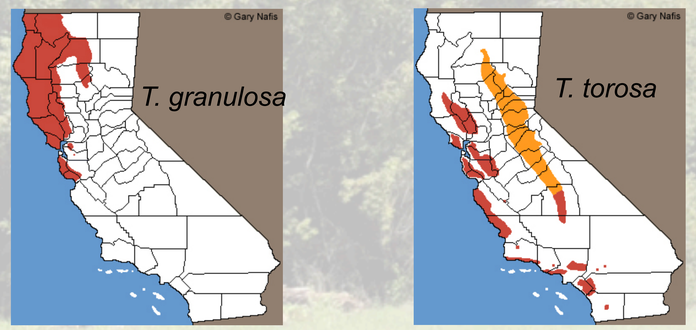


Figure 2. Shows the distribution of *T. granulosa* and *T. torosa* in California

Figure 3. On the left, Monica is dip netting for newts. On the right, Jessica Is measuring a newt.

Methods

- Field site was Sonoma Mountain Ranch. Sonoma Mountain specimen were caught from three main sites, Leaky Lake, Bonnie's Pond and Turtle Pond.
- Newts were captured by dip net or minnow traps depending on the water depth.
- After newts were captured, they were placed in different containers to keep each population separated.
- We used tricaine methane sulfonate also known as MS.222 to relax the specimen before taken the measurements.
- Measurements were taken using a ruler and calipers to the nearest 0.1 mm. Our measurements included: snout to vent length (SVL), eye to eye, head- length, head- width, tail length and weight.
- Statistical analysis was run using JMP13.0 with a bivariate model.

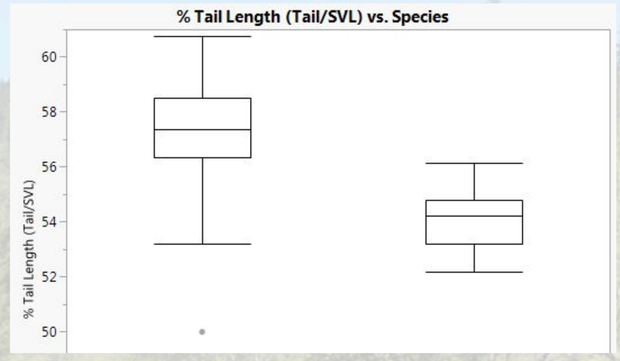
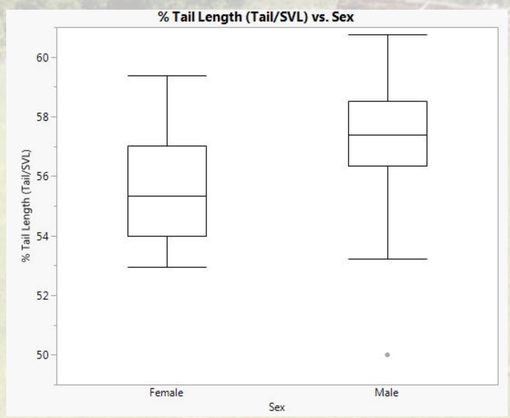
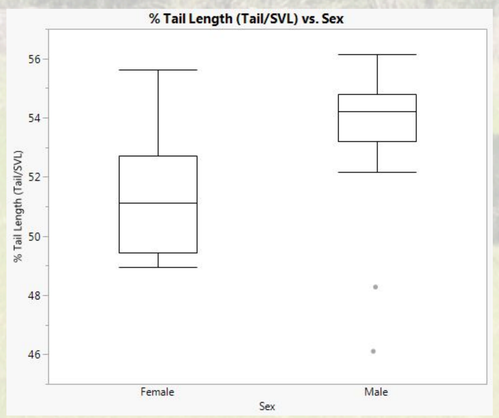


Figure 4. Species differences according to % tail length relative SVL



T. granulosa

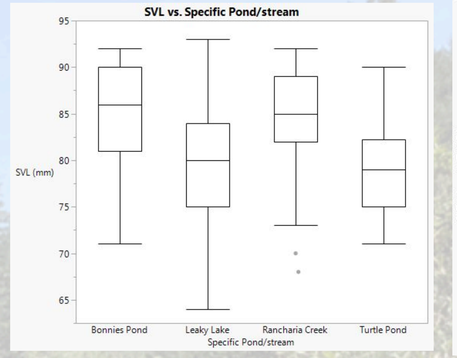


T. torosa

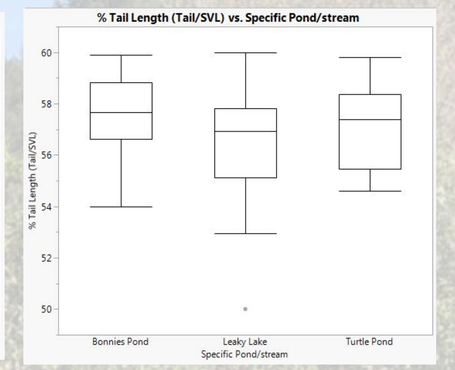
Figure 5. Differences between sexes according to % tail length relative SVL for each species.

Results

- *Male T. torosa* and *T. granulosa* were significantly different in %tail length relative to body length (SVL) (F=116.256, P<0.0001)
- In *T. torosa*, females had significantly longer tail lengths per body length (F=10.622, P=0.0021).
- In *T. granulosa*, females also had significantly longer tail lengths per body length (F=17.475, P<0.0001).
- We found significant differences in body size (SVL) between pond sites in both *T. torosa* (F=9.369, P=0.0002). and *T. granulosa* (F=8.658, P<0.0001).



T. granulosa



T. torosa

Figure 6.Differences between pond sites according to SVL (mm) for each species.

Discussion

- We found that *T. granulosa* could be distinguished from *T. torosa* using measurements of tail length and SVL, with *T. granulosa* having longer tails per body length.
- Males had significantly longer tails per body length than females, which may be associated with the fact that males seek females for mating opportunities.
- We found dramatic differences in the body sizes in different ponds in each species which may be associated with demographic differences in each ponds population.

References

Adams, Dean C. “Character Displacement Via Aggressive Interference In Appalachian Salamanders.” *Ecology*, vol. 85, no. 10, 2004, pp. 2664–2670., doi: 10.1890/04-0648.

Acknowledgements

We want to thank both the Nowick program and the WATERS collaborative for funding in recent years.