

Evaluating the spatial ecology of Eastern Hellbenders (*Cryptobranchus alleganiensis alleganiensis*) in Tennessee

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Introduction

- Amphibian populations across the world are experiencing precipitous declines due to habitat loss, disease, and climate change.¹ In response to these declines, translocations of species coupled with radio-telemetry has become a common conservation strategy to augment vulnerable populations.²
- Translocations can be especially important in areas where animal dispersal is limited by habitat fragmentation, and for species that have low mobility. For aquatic species in lotic systems, their movements are already constricted to waterways, and thus fragmentation of habitat (e.g. via dams) can quickly isolate populations and cause rapid declines.
- The Eastern Hellbender (*Cryptobranchus a. alleganiensis*) is a fully aquatic, long lived salamander that can reach over 2 ft. (60 cm) in length. Hellbender populations have been drastically reduced from their historic ranges, and are currently endangered in Tennessee³.
- Here we present results from the first part of a study done to gather spatial ecology data on *C. a. alleganiensis*. Our goal is to translocate 30 hellbenders from two healthy stream populations in southeast Tennessee to two streams with declining populations.

Results

- Our study animals have an average home range size of 181 m (Tumbling Creek) and 94 m (Hiwassee River)
- Individuals will stay under the same cover object for multiple weeks
- One female has moved >3 km upstream (Tumbling Creek)
- Sex does not necessarily determine home range size
- Larger hellbenders may have larger home ranges
- Hellbenders have overlapping home ranges in areas with suitable habitat
- Three individuals have been subject to predation at Hiwassee River

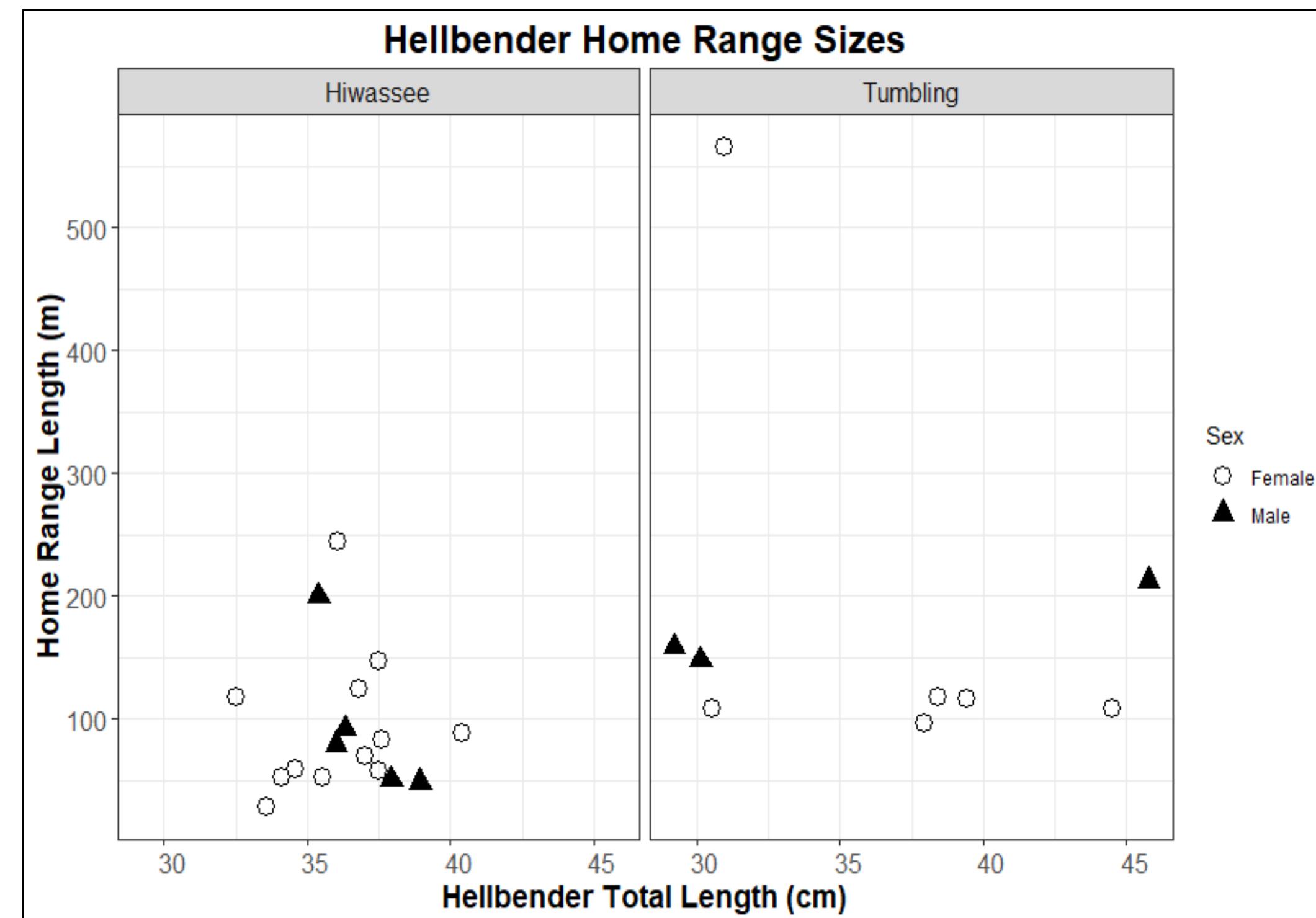


Figure 2. Hellbender home range size (m) for male and female individuals at Tumbling Creek and Hiwassee River, TN.

Materials and Methods

Hellbenders were captured in June 2018 at Tumbling Creek and Hiwassee River by snorkeling stream reaches and lifting cover objects. Once captured, animals were anesthetized, and surgically implanted with radio transmitters and PIT tags. After recovering from surgery, individuals were placed under the same cover object where they were initially found. In total, 27 animals received transmitters, (n = 10) Tumbling Creek and (n = 17) Hiwassee River. All hellbenders were tracked 2-3 times weekly using radio-telemetry throughout the summer (June-August), and are currently being tracked monthly while weather permits. GPS co-ordinates of each animal was recorded upon location; along with meso-habitat, substrate type and size, and abiotic conditions.

Minimum convex polygons were calculated in ArcGIS Pro to analyze the home range sizes of hellbenders. Statistical analysis were done in R version 3.5.0.

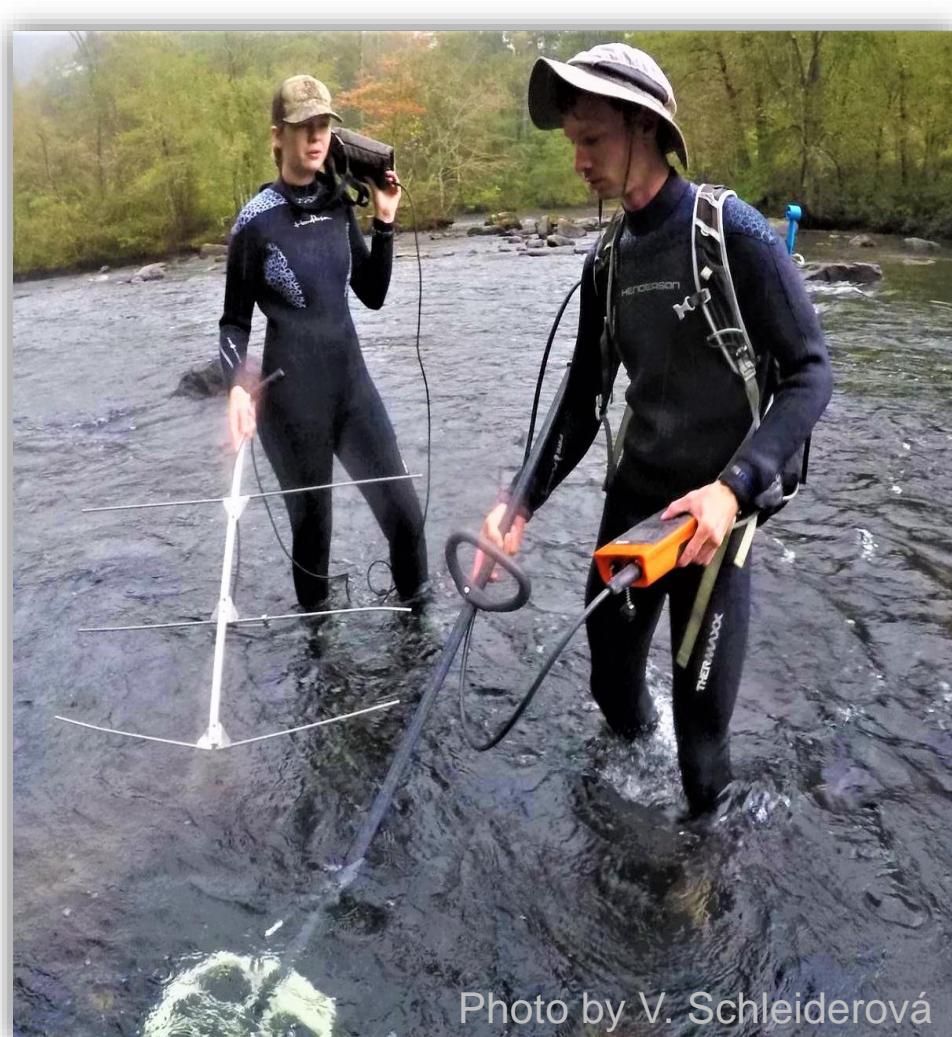


Figure 1. Using radio-telemetry to track hellbenders in the Hiwassee River.
Photo by V. Schleiderová

Literature cited

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Photo by E. Nolan



Figure 4. Eastern Hellbender (*Cryptobranchus alleganiensis*)

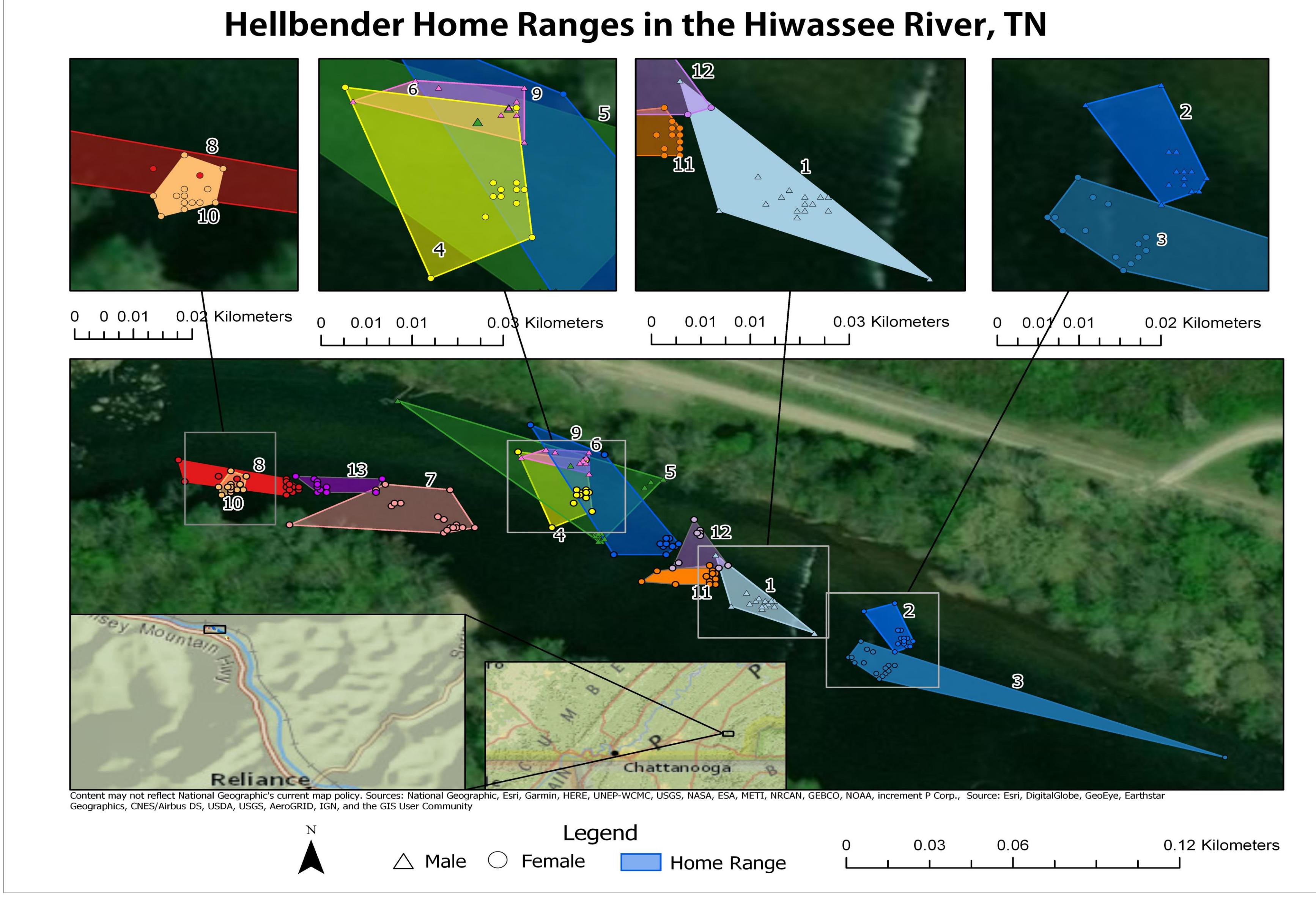


Figure 3. Hellbender home range sizes in a section of the Hiwassee River, calculated using minimum convex polygons

Conclusions

- This study provides successful methods for radio telemetry in *C. alleganiensis*, and provides baseline spatial ecology data for this species in Tennessee. This information will be used to analyze the success of future translocation efforts for these hellbender populations.
- Hellbenders tend to have small home ranges (<500 m²), and are often found under the same cover objects repeatedly. Therefore, we predict a successful translocation would involve hellbenders quickly locating suitable habitat and having similar sedentary movement patterns.
- Large moves could be dispersal events, particularly for the small female (T8) that moved over 3 km in Tumbling Creek. Other animals made large moves (>500 m), and then returned to their previous locations. This could be an indication of a mating event, as we tended to notice these movements in the fall which is the breeding season of the hellbenders.
- We will continue to track these individuals until next spring, at which point they will be translocated to two new streams with declining populations. Their spatial ecology will be compared to the data presented here to evaluate the success of these translocations.

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