Home Ranges & Movement Patterns of Wood Turtles (Glyptemys insculpta) in Connecticut and the Use of Rarefaction for Improving Study Design

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Why Study Wood Turtles?

- Wood turtles are among a few endangered North American freshwater turtle species
- Species numbers have declined 50% in the last century, with those losses largely irreversible

Researchers can collect too many or too few data, with large variation between home range & movement studies

- The breadth of tracking data used in this study allows for the creation of a technique to maximize the efficiency of tracking data collection and make future results more accurate and comparable

Methods

Radio tracking data collected at a study site in western Connecticut: 27 turtles over 6 years = 147% total location points

Habitat & Movement Analyses

- Minimum Convex Polygon
- Kernel Density Estimation
- Proximity to Roads
- Seasonal Population Movements

Other Analyses

- Home Range Analyses
- Other Analyses
- Chronological Randomization
- Random Rarefaction

Describes how home range area estimation increases with the addition of each sequential location point

Estimates home range size as a function of number of random location points selected from the total pool

Home Range Fidelity

- MCP
- KDE
- T-LoCoH

Habitat & Movement Results

- Mean total home range (95%): 3.14-7.82 ha
- Mean core home range (50%): 0.47-1.69 ha
- Males had significantly larger (50%) home ranges

No difference in total (95%) home range sizes between sexes

Turtles averaged 53.3% yearly home range overlap

Core (50%, blue) and total (95%, red) home range sizes using three different methods

- MCP
- KDE
- T-LoCoH

Individuals with < 40 points are not sufficiently tracked

For turtles with a sufficient amount of tracking data, it took on average 55 points collected over 2.5 years to reach 90% of their estimated full (100%) home ranges (as per methods of Plotz et al., 2016)

Rarefaction Curves

- 127 location points
- 107 points over 6 years
- 93 points over 5 years

Individual variation must be considered: more points + more time does not necessarily equal better results

- 71 points & 2.9 years to reach 90% of full HR
- 38 points & 2.1 years to reach 90% of full HR

Future home range studies should collect at least 40 points per individual over at least 2.5 years

Discussion

- Larger male core (50%) home ranges but no difference between sexes for total (95%) suggest males move greater distance on a day-to-day basis, while females travel further on rare occasions

Small average home range compared to other wood turtle populations suggest habitat lands may be abundant in resources

Rarefaction results show that previous home range studies may not have collected sufficient tracking data

Recommendations

- Future plans for allocating land for conservation should consider that wood turtles use at least 3 hectares of land each, but that individual home ranges often overlap
- Sections of road which intersect the study site should be monitored carefully to ensure safe passage for turtles

References


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