



A Levee Runs Through It: Habitat Use by Northern Watersnakes (*Nerodia sipedon*) in an Aquatic Mosaic

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Introduction:

Although more attention has been paid to amphibian species declines, many reptile species are also experiencing dramatic global population declines. Several causes have contributed to declines in reptile populations, but anthropogenic habitat loss and alteration are arguably the factors having the greatest impact. During the last 200 years, an estimated 53% of the wetlands in the United States have been destroyed and in parts of the Midwest, the losses have been even more extensive. Wetlands are of particular importance for many aquatic and semi-aquatic reptiles because of the essential habitat they provide. We used radio-telemetry and geographic information system (GIS) to examine the patterns of habitat use by a population of *Nerodia sipedon* during their activity season along a levee system in east-central Illinois.

Objectives:

- Determine what type of habitat *N. sipedon* is using during the activity season.
- Calculate home range size for each subject.
- Determine the maximum distance each subject dispersed away from the levee.
- Compare ambient air and body temperatures for each snake.

Methods:

Lake Charleston is 8 km south-east of Charleston in Coles County, Illinois, and is separated from the Embarras River by a levee (composed of rip-rap). Surveys for snakes were made several times a week during Spring 2006. We recorded mass (± 0.5 g), sex, snout-vent length (± 1 mm) and tail length (± 1 mm) of every captured specimen. Adults were brought back to the lab and implanted with radio transmitters. Snakes were individually marked with PIT tags and clipped scales, and released at site of capture. During the activity season, snakes having radio transmitters were located twice weekly. Some radio transmitters were temperature sensitive -- ambient air and snake body temperatures were recorded with each relocation point. Each point was recorded using a global positioning system (GPS unit). Using GIS, relocation points were then plotted to calculate the home range size for each snake following the minimum convex polygon (MCP) method. Ambient air and snakes' body temperatures were analyzed using multiple paired t-tests.

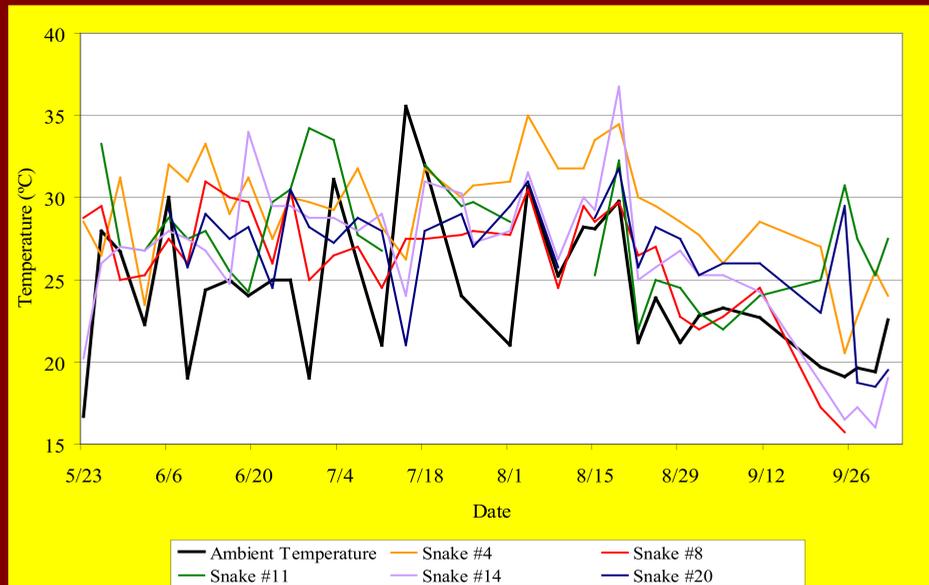


Fig. 1: Snake body temperature compared to ambient air temperature during the 2006 activity season

Results:

- A total of 53 (33 female; 20 male) snakes were caught during spring and summer 2006.
- 6 females and 1 male were successfully implanted with transmitters and tracked all season; of these, 5 females had temperature sensitive transmitters.
- All snakes used the levee as their primary habitat for the activity season. We did not observe any dispersal away from the levee until fall when subjects sought hibernation sites.
- Mean home range during the activity season was 0.64 ha (range: 0.34-1.30 ha).
- Mean body temperature for all subjects was 27.07 ± 1.11 °C.
- There were differences between ambient air and snake body temperatures ($t = 2.89$; $p = 0.006$ in all cases).

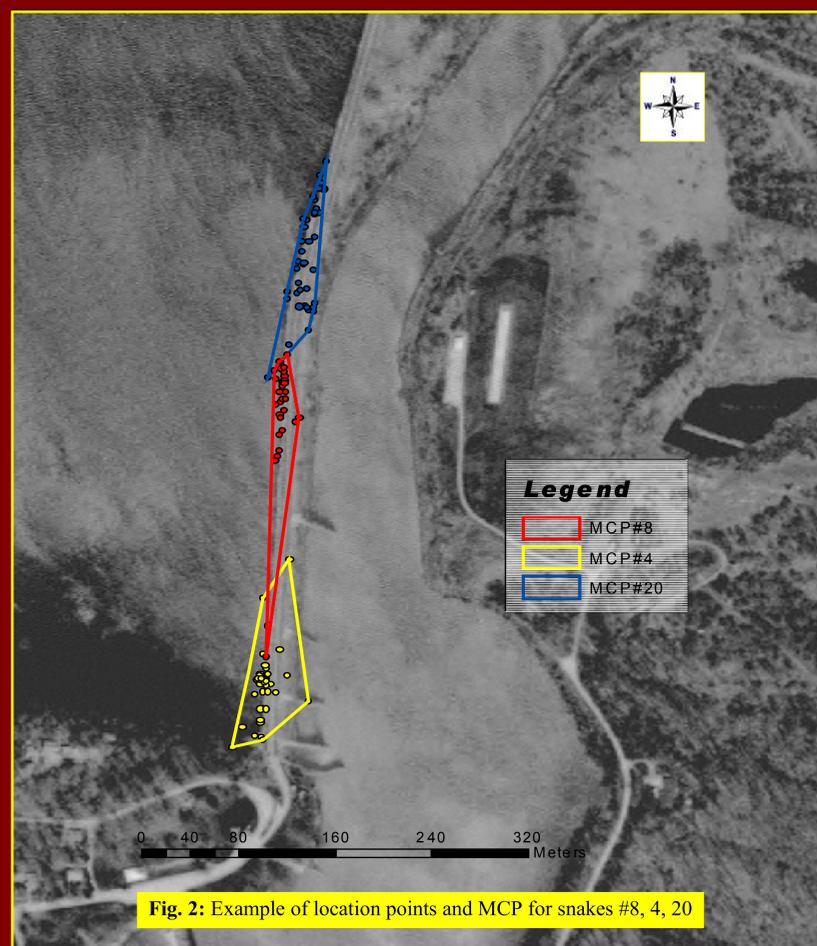


Fig. 2: Example of location points and MCP for snakes #8, 4, 20

Discussion:

All organisms have basic habitat requirements that meet their ecological and physiological needs. Habitat selection and spatial patterns are fundamental for a species' survival and often reflect the availability and distribution of resources. The levee is an important habitat for this population of *N. sipedon* because it provides the basic resources needed for survival, such as foraging opportunities within both lake and river habitats, basking sites, and cover from predators within the rip-rap on the levee.

Differences between ambient air and subject body temperatures indicate that watersnakes at this site are behaviorally thermoregulating so as to achieve physiologically-optimal body temperatures. The mean body temperature observed in this study is consistent with what has been previously reported.

Overall, understanding how a species such as *N. sipedon* uses altered habitat can help identify aspects of its ecology that make it susceptible to habitat loss and fragmentation. This is a critical step in limiting the impacts of future alterations within the species' range.

Continuing Research:

- Determine over wintering sites for this population of *N. sipedon*.
- Examine and describe the characteristics of hibernacula sites.
- Examine dispersal patterns from hibernacula following spring emergence.
- Determine what proportion of the snakes using one over-wintering site return the following year to the same specific location prior to the next winter season.

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