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Tracking Movements of *Ambystoma tigrinum* Using Radio Telemetry

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Figure 1. Pepperton Waterfowl Production Area. Circled regions designate salamander range in telemetry study.

Introduction

The eastern tiger salamander (*Ambystoma tigrinum*) is a widely distributed amphibian ranging from Northern Minnesota, down to Florida, and over to the east coast of the United States (Oldfield and Moriarty, 1994). As populations within the species are diverse and seldom studies have been done in the area of radio telemetry in tiger salamanders, there is a need for information in this field. This project was the first of its kind to be implemented in Minnesota.

In an effort to more fully understand the ecology of this species, this research attempts to provide vital information that will allow a better understanding of the tiger salamander and how the species utilizes the habitat around them. This research will provide important information regarding conservation management and land use methods, as these amphibians have specific habitat needs, such as vegetative structure, moisture requirements, and corridors for dispersal (Dodd and Seigel, 1991).

Materials and Methods

The study took place during the summer of 2013 and is currently ongoing. The region of Stevens County, Minnesota, specifically the Pepperton Waterfowl Production Area (PWPA), was chosen because of its ratio of prairie pothole ponds to upland grass habitats. This allows salamanders to breed in the ponds in early spring and migrate to the nearby fields in late fall.

Three methods of capturing adult tiger salamanders were employed. The first method consisted of using aluminum flashing. The flashing was placed into the ground so that 35 centimeters remained above the surface. The flashing was paired with funnel traps made of screen set approximately 1.5 meters apart. The trap lines were placed about 20 meters from the edge of a small pond. For the period of the study, this method did not yield any adult tiger salamanders.

The second method consisted of minnow traps made of screen, placed inside and around pond edges. For the length of the study, this method yielded one adult female salamander, which was used for radio telemetry. The third method involved capturing salamanders during their fall migration. This method yielded three adult tiger salamanders which were used for telemetry.

Each captured salamander was taken to the University of Minnesota Morris Herpetology Laboratory for implant surgery. Surgical procedures followed those outlined by Madison and Faccio. After surgical insertion of the Holohil radio transmitter into the abdominal cavity of the salamanders, the salamanders were monitored until deemed fit for release at the point of capture. After release, a Global Positioning System (GPS) unit has been used to collect position information on the tracked salamander. Weather conditions and temperatures are collected along with cover type information, depending on the salamander's position.

Results

The first salamander was released 13 July 2013 and was tracked to the last location 15 September 2013. The salamander seemed to stay within a burrow system anywhere from a few days to several weeks, until moving to another area, typically around the time of a precipitation event and usually during the night. It is noted that because the salamander appeared to be in the water, a precise location for GPS point R2 could not be determined. The dominant cover types were big blue stem grass and cattails. Each time the salamander was tracked, visual contact was never made. Instead, the salamander appeared to be underground, most likely in burrows created by small rodents.

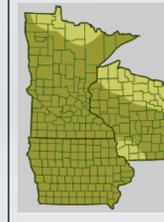
The second salamander was released 19 September 2013. However, the radio signal from the salamander was lost after release, and therefore did not provide movement data to the study.

The third salamander was released on 2 October 2013 and was tracked to the last known location before the radio signal was lost on 6 November 2013. The salamander's movements were short and appeared to take place during the night. No visuals were made, and after five days, the salamander chose a burrow system and remained inside until the radio signal was lost. The dominant cover types were typical upper grassland grass species.

The fourth salamander was released on 16 October 2013 and was tracked to the last location on 27 October 2013. This salamander went immediately into a burrow system upon release, and has therefore not contributed movement data to the study.



Figure 2. Movement pattern of the first released adult tiger salamander tracked at Pepperton Waterfowl Production Area using GPS data



USGS distribution map

Tiger Salamander (*Ambystoma tigrinum*)

- *Ambystoma tigrinum* is the most widely distributed North American salamander and ranges throughout much of the United States except New England and the west coast (Petranka, 1998)
- Adult tiger salamanders spend most of their lives underground in upland, terrestrial habitat
- Little information can be found on habitat features that salamanders require (amount of habitat, cover types, and pond connections), especially during temperature extremes

Discussion

The information that can be concluded from this study is as follows, adult eastern tiger salamanders in the PWPA utilize the terrestrial environments around them for burrowing and traveling from place to place. The maximum distance traveled by the first released salamander was 164 meters. The third salamander's maximum distance traveled was 74 meters. These numbers are comparable to previous research (Madison and Farrand, 1998). We speculate that because the third salamander was released later in the year, its movement pattern reflects that of a salamander searching for an overwintering burrow.

The data gathered from the first salamander reflects previous research that has found that adult salamanders typically choose to move during or after a substantial precipitation event and usually at night. This may be because the rain allows them to stay hydrated, and moving at night gives them protection from the heat of the day.

The last salamander, which was released the latest in the year, did not provide us with movement data. However, it has allowed us to gain insight on overwintering preferences, as the salamander never left the burrow system it was released next to. During the spring migration in 2014, we hope to recapture and track this salamander to give us insight on breeding habits.

Radio telemetry allows for the location of a species that is not commonly seen. As this study has only gained significant data on three salamanders, further research will be implemented in order to link multiple tiger salamander populations together and to gain a further understanding of their unique lives. Thus far, the tracking of the salamanders used in this study has provided information that has never been collected in this region before.

References and Acknowledgements

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