

**MASSASAUGA SURVEYS IN PIATT COUNTY
FINAL REPORT**

**Illinois Natural History Survey
Center for Biodiversity Technical Report No. 2004 (8)**

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Background Information 2002

The eastern massasauga rattlesnake (*Sistrurus c. catenatus* Rafinesque) is a cryptic, sit-and wait predator that inhabits wet and mesic prairies. The range of the eastern massasauga extends from southern Ontario in the north to southern Illinois in the south, Missouri in the west to Pennsylvania in the east. The eastern massasauga is protected over the entirety of its range and is a candidate for federal protection.

The Piatt County massasauga population at Robert Allerton Park was previously thought to be one of the largest in state. The current population estimate for the Allerton Park population is thought to be 15 - 20 individuals.

On 13 April 2002 an adult male massasauga was encountered and captured at a prairie restoration in Allerton Park. It was taken to the lab and the appropriate morphological measurements were taken, and a PIT Tag was injected. The decision was made to implant a radio transmitter into this individual (snake #001) in the hopes of finding other individuals in the population and to monitor its behavior and movement patterns. He underwent implantation surgery at the St. Louis Zoological Park on 18 April 2002. He was released at his original point of capture on 24 April 2002 and tracked every other day until the end of October and then weekly throughout the winter. He was captured and weighed in the field approximately once a month throughout the activity period.

On 25 July 2002 a gravid adult female massasauga (snake #002) was encountered in accompaniment with snake #001. On 26 July 2002, she was brought into the lab. On August 5 2002, snake #002 gave birth to one live neonate (snake #003) and one stillborn, then had complications with the parturition. The appropriate morphological measurements were taken on the living neonate. The small size of neonates precludes implanting PIT Tags, but each neonate was photographed and a written description of the dorsal pattern was recorded. A blockage formed and snake #002 was taken to the Small Animal Clinic at the University of Illinois College of Veterinary Medicine on 9 August. The remaining dead young were removed and she was treated for sepsis and a ruptured uterus. She ate 2 adult mice (26 August & 30 August) and 2 fuzzies (9 September) and appeared to be recovering well. She weighed 137 g and was 52 cm SVL, 46 cm tail length after eating the second adult mouse. She was released at the site of her original capture (Site #46) on 10 September 2002. She weighed 147 g at the time of her release. Her single surviving neonate (snake #003) was released along with snake #004 and her 8 neonates on 20 August 2002 at the site of #004's initial capture (site #58).

On 8 August 2002 a second gravid adult female (snake #004) was found in accompaniment of snake #001 and was immediately brought into the lab. She gave birth to eight live neonates (snakes 005 - 012) on 9 August 2002. The appropriate morphological measurements were taken on all neonates. The small size of neonates precludes implanting PIT Tags, but each neonate was photographed and written descriptions of the dorsal patterns were recorded. The female and all 8 neonates (plus the neonate from snake #002) were released at the site of #004's original capture (site #58)

on 20 August 2002. Snake #004 was found in accompaniment of snake #001 for 4 days; from 22 to 25 August 2002. Copulation was observed on 22 August 2002. Snake #001 first entered his hibernaculum on 1 October 2002. He was visible in his burrow until 27 October 2002.

An adult female was discovered dead on the road along Old Rt 47 (0.6 km W of Co. Rd. 600E) adjacent to an abandoned railroad right-of-way on 7 September 2002.

2003

Snake #001 was first visible in his hibernaculum burrow on 14 April 2003. On 2 June 2003 snake #001 was captured and brought to the lab for weighing. He underwent his second implantation surgery at the University of Illinois College of Veterinary Medicine on 2 June 2003. He was released at his most recent capture site on 11 June 2003 and his movement was monitored for a second year. He was captured and weighed in the field approximately once a month throughout the activity season. Snake #001 accompanied snake #002 on 31 July 2003. She was taken to the lab where she was weighed and measured. She was returned to the vicinity of snake #001 later in the same day. Snake #001 accompanied snake #004 on 8 August 2003. On 9 August they were together again so she was captured, weighed in the field and returned to the vicinity of snake #001 within 10 minutes. They were found coiled together again on 10 August 2003. Snake #001 was found coiled with snake #002 on 13 and 14 August 2003. Neither female appeared gravid at any time during this season. Snake #001 entered his hibernaculum on 1 October 2003. He was visible in his burrow until 3 December 2003.

2004

Snake #001 was first visible in his hibernaculum burrow on 5 April 2004. On 8 April he was captured and brought to the lab for weighing. He underwent his third implantation surgery at the University of Illinois College of Veterinary Medicine on 22 April 2004. He was released at his most recent capture site on 9 May 2004 and is still being monitored as of this writing. He has been captured and weighed in the field approximately once a month.

The abandoned railroad right-of-way adjacent to Old Rt. 47 was burned on 14 April 2004. Four massasauga rattlesnakes were found on 16 April 2004: snake #013 was a juvenile male, snake #014 a non-gravid female, snake #015 a non-gravid female, and snake #016 a gravid female. Snake #013 escaped into a crayfish burrow. The other snakes were brought into the lab and the appropriate morphological measurements were taken and PIT Tags were injected. Snake #013 was captured on 18 April 2004 by Fran Hardy and brought to the lab. Appropriate morphological measurements were taken but the snake was too small to receive a PIT Tag. Numbers 013, 015, and 016 were released at their capture locations on 6 May 2004.

Snake #014 underwent implant surgery on 22 April 2004 at UIUC VetMed. She was released at her initial capture point on 12 May 2004 and tracked until 9 July 2004 when she was found dead near the south edge of the right-of-way. It appeared she had been struck by a vehicle.

Snake #016 was recaptured and on 28 June 2004 and brought into the lab. She gave birth to a brood of 10 on 22 July 2004. The appropriate morphological measurements were taken on all neonates. The small size of neonates precludes

implanting PIT Tags, but each neonate was photographed and written descriptions of the dorsal patterns were recorded for each. Number 016 was released with her neonates at her most recent capture point on 6 August 2004.

Spatial Analysis of Piatt County Massasaugas (*Sistrurus c. catenatus*), Allerton Population

E. J. Menzel

Introduction

This study analyzes spatial ecology of two *S. catenatus* individuals from the Robert Allerton Park population; snake #001, an adult male, and #014, an adult non-gravid female. Snake #001 has been monitored from 29 April 2002 until present. Snake #014 was monitored from 13 May 2004 until 9 July 2004 when she was found dead.

The study site for this project is University of Illinois's Robert Allerton Park and its surrounding area in Piatt County Illinois, specifically, the prairie restoration in Allerton Park and an abandoned railroad right-of-way approximately 3 km to the north. The prairie area is a recreation of a tall grass prairie surrounded by and oak-hickory upland forest. The railroad right-of-way is predominantly old field dotted with some shrubs and trees. Sites were chosen because of incidental encounters of *S. catenatus* on or adjacent to the areas. Snake #001 is located in the prairie restoration and Snake #014 was located in the railroad right-of-way.

Methods and Materials

The telemetered individuals were implanted with transmitters following the protocol of Reinert and Cundall (1982). Snake #001 was implanted on 18 April 2002 with a Holohil SI-2T transmitter at the St. Louis Zoo. Surgery to replace the initial transmitter with a Holohil SB-2T transmitter took place on 2 June 2003 at the University of Illinois School of Veterinary Medicine (VetMed). Implantation of snake #014 with a Holohil SI-2T and the replacement of the Holohil SB-2T transmitter in snake #001 with a Holohil SI-2T took place on 22 March 2004 at VetMed.

The individuals were located using radio telemetry every other day during the activity season, every day during mating season, and once a week during the dormant period. The activity season is defined by movement out and away from the immediate vicinity of the hibernation site (egress). Mating season for the massasauga runs from July into the beginning of September, and is characterized by more frequent and longer movements. Hibernation begins with ingress, movement into a burrow. Once the individual was located behavioral data and environmental data were taken and the site was flagged for later measurement of habitat data. Behavioral data consists of posture (straightened out, coiled loose, coiled tight, looped, etc.), position in available cover (completely covered, partially covered, etc.), presence in burrow, posture and position of body in burrow (head out but body in burrow, part of body visible in burrow, etc.), rattling or not rattling, and position in sun, shade or partial. Environmental data consists of pulse rate (if applicable), substrate temperature (SUB), shaded air temperature (SAT), maximum wind speed (Wind) relative humidity (HUM), approximate percentage of cloud

cover (CC), and presence and type of precipitation. Habitat data consists of percent rock, leaf, vegetation, and log cover, number of woody stems, and distance to nearest retreat (crayfish burrow or log) within 1 m radius; distance to nearest tree (diameter at breast height (DBH) > 7.5cm) and shrub within 30 m radius in each of four quadrants and mean of these observations; and distance to nearest forest edge and distance to the nearest road.

Data and spatial analysis was completed using Microsoft Excel®, ArcView 3.2® and FileMaker Pro 6®. Both snake #001 and snake #014's movement patterns were analyzed using non-unique and unique locations separately. Snake #001's movement patterns were also broken down into activity seasons of 2002, 2003 and 2004 through 31 July. Kernel estimates for 95, 75 and 50% probability were calculated in addition to home range estimates.

Results

Using non-unique sites, snake #001 had 97 radio telemetry sites in 2002, 113 sites in 2003, and 55 sites in 2004. Unique sites for snake #001 were 96 in 2002, 106 in 2003 and 53 in 2004. The maximum distances between sites were 300.128 m, 249.900 m, and 301.159 m for 2002, 2003 and 2004, respectively. Using the counts for non-unique and unique radio locations it was determined that in 2002 snake #001 moved 98.97% of its activity season, 93.81% in 2003, and 96.36% in 2004. In total, movement comprises 96.22% of snake #001's activity during the activity season.

Snake #014 had 31 non-unique radio location and 25 unique sites. The maximum distance between points was 36.06 m. Movement comprised 80.65% of snake #014's activity during the activity season.

In both individuals home range was largest when calculated with unique radio locations. The minimum convex polygon (MCP) covering all years for snake #001 was 14.27ha (142767.00m²). The MCP for snake #014 was 0.24ha (2449m²).

Literature Cited

Reinert, H. K. and D. Cundall. 1982. An improved surgical implantation method for radio-tracking snakes. *Copeia*. 1982:702-705.