

Baseline Surveys for the Massasauga Rattlesnake in Minnesota, 2002 & 2003



Prepared for the

Minnesota Department of Natural Resources

May, 2004





May 15, 2004

Richard Baker
Department of Natural Resources
500 Lafayette Rd.
Box 25
St. Paul MN, 55155

RE: Baseline Surveys for the Massasauga Rattlesnake in Minnesota
Final Project Report
Contract No. A36561

Dear Mr. Baker:

We are pleased to submit to you the final report for the *Baseline Surveys for the Massasauga Rattlesnake in Minnesota*. This report is the culmination of a 2-year field survey project conducted during 2002 and 2003. The project was funded by the Minnesota Department of Natural Resources.

This report documents the methodology and results of our field survey efforts. In addition to the contract specified final report elements, also enclosed is a CD containing the GIS data assembled for this project and electronic images taken during field surveys.

Special thanks goes to yourself, Carol Hall and other members of the MNDNR staff who assisted with this effort. In addition, the advice and training provided to our survey team by Robert Hay, WS DNR and Eric McCumber was invaluable.

Even though no evidence of massasaugas were found in the survey area, we sincerely hope the information contained herein, will aid in future herpetile survey efforts within southeast Minnesota.

Respectfully Submitted,

Jason R. Naber

Michael J. Majeski

Anthony R. DeMars

Making A Difference Through Integrated Resource Management

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Project Digital Information Provided on CD

GIS Database

Digital Photography

Abstract

In the state of Minnesota the current status of the eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*) is listed as “endangered”. Evidence supporting this species’ existence in Minnesota is not well documented. A previous study conducted by John Levell documented the historical massasauga records in Minnesota. Field surveys conducted in Houston, Winona and Wabasha counties as part of Levell’s study in 1993 did not produce any massasauga evidence. Known populations of massasauga rattlesnakes exist on the east side of the Mississippi River in Wisconsin but historical records can not confirm a population in Minnesota. Our study was conducted to establish a baseline effort for which future survey efforts may be conducted to help determine the official status of the massasauga in Minnesota. Our extensive survey efforts conducted in 2002 and 2003 field seasons focused on areas containing suitable massasauga habitat and historic record locations identified by Levell. A GIS was used to assemble historical record data, aerial photography and land cover to help prioritize survey sites. Surveys were conducted over a two-year period in Houston, Winona and Wabasha counties. Survey methods focused on searching meadows and forest edges along the Mississippi River and its major tributaries. Special attention was given to brush piles and basking sites that through our experience in Wisconsin have been found to be frequently used by massasaugas. Although suitable habitat exists in Minnesota and viable populations are known in adjacent Wisconsin, the survey efforts conducted as part of this baseline project did not produce any evidence of massasaugas in Minnesota. It is recommended that priority sites be resurveyed in upcoming years to help determine this species’ official status in Minnesota.

Introduction

The objective of this project is to expend sufficient effort on massasauga rattlesnake (*Sistrurus catenatus catenatus*) surveys in Minnesota to help determine the status of this species in the state.

There has been little research done on the massasauga in Minnesota, likely because of a lack of reliable evidence indicating that a viable population of snakes exists. Moreover, the only documented specimen known from the state is from a snake caught in Wabasha County near Wabasha on June 15, 1936. The exact location of this discovery remains unknown (Levell 1994, Breckenridge 1938). John Levell and MCBS staff conducted the only documented research on massasaugas in Minnesota in 1993. Their search efforts in southeastern Minnesota produced no massasauga sightings. The information provided in their final report was a very useful tool in survey planning for this study.

EOR staff gained experience surveying for massasaugas by assisting with the massasauga telemetry study in [REDACTED]. The study was very useful in understanding snake behavior and habitat use in southwestern Wisconsin. Observed habitat requirements and activity periods of the Wisconsin snakes as well as protocol from Casper et al. (2001) aided in fine-tuning the survey protocol used for this study. Jason Naber, Mike Majeski and Tony DeMars of EOR completed field surveys and habitat assessments for this project.

Materials and Methods

Three counties in the southeast corner of the state were included in the survey area: Wabasha, Winona and Houston counties. Initial prioritization of survey sites was based on past massasauga surveys conducted in Minnesota. Site evaluations completed in Wabasha, Winona, and Houston counties by Levell (1994) were used to highlight the best potential habitat within the survey areas. The recommendations and historic sightings stated in Mr. Levell's report were taken into account when identifying the highest priority sites. Also, favorable habitat types were identified using digital aerial imagery, Minnesota County Biological Survey (MCBS) data, National Wetland Inventory (NWI) data, and digital topographic maps. A GIS was used to organize the data and aided in prioritizing survey sites.

Based on information from past massasauga surveys in Minnesota and map data, 12 areas having the highest potential for massasaugas were delineated. Detailed information on each survey site can be found in Appendix 1. Each site was surveyed at least once during the 2002 or 2003 field season and notes were taken on habitat quality. Information collected from each site included time and date of survey, weather conditions, brief description of dominant plant species, and a tally of herpetiles found during the survey. A field guide by Oldfield and Moriarty (1994) was useful in identifying herpetile specimens encountered. The areas that contained the best potential habitat were visited at a greater frequency than other sites. In addition, special attention was paid to the presence of crawfish burrows at each site since massasaugas have used these burrows for winter hibernation in Wisconsin (personal observation). Site conditions observed in 2002 helped narrow our search areas in 2003 and allowed for greater concentration on areas that seemed to have the greatest potential for the existence of a remnant or dislocated population of snakes.

Using the survey protocol from Casper et al. (2001) as a guide, openings in the floodplain and lowland hardwood forests and their associated edges were surveyed whenever possible. Based on our experiences from surveying snakes [REDACTED], greater survey effort was applied when brush piles, logs, matted vegetation, and other basking sites. Boards, sheet metal, and large flaps of bark were also flipped over whenever these “terrestrial refuges” were found in the field.

Accounts by Levell (1994) suggest that historical sightings [REDACTED] may be the result of snakes that have rafted across the Mississippi River from Wisconsin. If such were the case, the best chance for locating a rafting individual would be [REDACTED].

Results

Surveys conducted in 2002 and 2003 did not produce any evidence of massasaugas. Field work was planned around local forecasted weather conditions. More time was spent on field surveys in 2003 compared to 2002 since time was needed in 2002 for map creation and site prioritization. Habitat quality varied from site to site from monotypic reed canary grass meadows to diverse wet meadows, lowland hardwoods and shrub-carrs. Although massasaugas were not encountered in either year of this study, 19 species of herpetiles were recorded (Table 1).

Table 1. Herpetofauna found during 2002 & 2003 surveys.

Species	2002	2003	2004	2005	2006	2007
Leopard Frog	X	X	X		X	X
Green Frog		X			X	
Gray Tree Frog					X	
Bull Frog						
American Toad				X		
Common Garter Snake	X	X	X	X	X	
Gopher Snake			X			
Fox Snake					X	
Red-bellied Snake*						
Northern Water Snake		X		X		
Brown Snake*					X	
Eastern Hognose Snake						
Six-lined Racerunner						
Snapping Turtle				X	X	
Map Turtle**			X			
False Map Turtle						X
Smooth Softshell Turtle						
Painted Turtle	X				X	
Blanding's Turtle					X	

* Non-confirmed sighting

** Exact species not confirmed

Table 1 Continued.

Species	■	■	■	■	■	■
Leopard Frog	X	X	X	X	X	X
Green Frog		X		X	X	X
Gray Tree Frog			X		X	
Bull Frog					X	X
American Toad			X	X	X	
Common Garter Snake	X	X	X	X	X	X
Gopher Snake						
Fox Snake		X		X		
Red-bellied Snake*					X	
Northern Water Snake					X	
Brown Snake*			X		X	
Eastern Hognose snake		X				
Six-lined Racerunner					X	
Snapping Turtle		X				
Map Turtle**			X		X	X
False Map Turtle					X	
Smooth Softshell Turtle					X	
Painted Turtle		X				X
Blanding's Turtle						

* Non-confirmed sighting

** Exact species not confirmed

Discussion

Based on personal experience from the telemetry study in Wisconsin, there appears to be small windows of opportunity for finding massasaugas, particularly in basking situations. Some literature suggests, as Casper et al. (2001) that preferred survey times are during the morning and evening hours. Hay and McCumber (2000) found capture rates were relatively equal throughout different times of the day when favorable weather conditions existed, but on sunny days when temperatures were above 85°F, snakes were only found basking in the morning before 9:30 a.m. and after 5:00 p.m. Daytime temperatures for this survey ranged from the mid 50's to mid 80's in both years. Gravid females appeared to tolerate longer basking sessions than other snakes in all weather conditions, even during rainfall. It was relatively common for gravid females to show basking site fidelity, using the same basking sites for weeks in a row before moving on. The likelihood of seeing a snake concealed in cover was near impossible. Even in an area with a large population of snakes, vegetation height and density significantly obscured visibility. Late season surveying proved most difficult as vegetative growth reached its maximum, creating dense, tangled groundcover and shading out small early season basking sites.

To improve the odds for finding massasaugas in Minnesota, effort was made to survey during the morning hours when there was the greatest potential for finding snakes. However, not all suitable habitat could be surveyed during the prime hours of the day and inevitably some areas were surveyed in the afternoon. Therefore, multiple site visits were needed in order to reduce the bias produced from the order of survey site selection. If an individual snake or a remnant population of snakes existed in one of the sites, it could have been easily overlooked depending on the time of the survey and weather conditions.

Other factors that may have affected the outcome of this study are flooding events and drought. The snake populations in Wisconsin were negatively impacted after prolonged flooding of the Mississippi River in 2001 (Hay and McCumber, 2002). Although the actual cause for low snake numbers after the flood was not determined, there appeared to be a strong correlation between the loss of snakes and the severity of the flood. If there were massasaugas within the Mississippi River floodplain in southeastern Minnesota before the 2001 flood, it is possible these snakes would experience a similar population decline after the flood.

Karns (1986) observed that herpetiles seemed to vanish when drought conditions exist. From July to October of 2003, southeastern Minnesota experienced one of the driest periods on record (personal communication, MN DNR State Climatology Office). It is unknown if drought would negatively effect massasaugas in Minnesota.

Recommendations

It is difficult and improper to determine the status of any population of animals with limited research, especially one as elusive as the massasauga. Casper et al. (2001) recommend a survey effort for a minimum of ten years before concluding the possibility of population extirpation. As this being a two-year study, we can only conclude that massasaugas were not found because of climatic factors, chance, or low numbers of snakes. Suitable habitat in southeastern Minnesota is extensive and requires multiple site visits over several years to thoroughly assess for the presence of massasaugas. We highly recommend “seeding” basking structures, such as brush piles, in areas that house few basking sites, especially vast reed canary meadows where thick vegetation

makes for difficult traversing and surveying. Those basking sites should be constructed and mapped using GPS. Follow up surveys should then focus on intensive searches around the constructed basking sites. From our field work and our simple ranking matrix identified in Appendix 1 of this report, we recommend seeding sites [REDACTED].

References

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[REDACTED]

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[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

Appendix 2: Color Slides



1. Jason Naber, [REDACTED]



2. [REDACTED]



3. Tony DeMars, [REDACTED]



4. [REDACTED]



5. Tony DeMars, [REDACTED]



6. [REDACTED]



7. Jason Naber, [REDACTED]



8. [REDACTED]



9. Mike Majeski, Gopher Snake, [REDACTED]



10. Fox Snake, [REDACTED]



11. Snapping Turtle, [REDACTED]



12. Fox Snake, [REDACTED]



13. Eastern Hognose Snake, [REDACTED]



14. Leopard Frog, [REDACTED]



15. Blanding's Turtle, [REDACTED]



16. Northern Water Snake, [REDACTED]