

MASSASAUGA REPATRIATION ON A RESTORED WET PRAIRIE

— The massasauga (*Sistrurus catenatus*) is a small rattlesnake that occurs from Texas to New York (Schmidt and Davis 1941, Conant and Collins 1991, Szymanski 1998). In Missouri, the Eastern massasauga rattlesnake (EMR; *S. c. catenatus*), a subspecies of the massasauga, occurs north and east of the Missouri River, is a former candidate for listing under the United States Endangered Species Act (Code of Federal Regulations 64 FR 57534; Szymanski 1998), and is listed as a state endangered species (Missouri Natural Heritage Program 2011). Missouri currently harbors five extant EMR populations (Johnson 2000, Durbian et al., unpublished report, J. Briggler, Missouri Department of Conservation, personal communication). The decline of this subspecies can be attributed to habitat loss and fragmentation, over utilization for commercial, recreational, scientific or educational purposes, predation due to habitat fragmentation, inadequacy of existing regulatory mechanisms, and indiscriminant or accidental killing (Szymanski 1988).

In Missouri, the EMR utilizes a combination of mesic and xeric bottomland prairie habitats and is typically associated with wetlands (Seigel 1986, Johnson et al. 2000). Over the past century, 87% of the wetland habitat has been lost in Missouri (Dahl 1990); however, current restoration efforts will enable EMRs to repatriate sites that are adjacent to existing populations. Repatriation of restored habitat has been documented for many other species groups including amphibians (Lehtinen and Galatowitsch 2001) and birds (Gardali et al. 2006), however, we were unable to find evidence in the literature involving snakes. Therefore, our objective was to document repatriation of restored habitat by EMRs on Squaw Creek National Wildlife Refuge (SCNWR) located in northwestern Missouri.

Our study site consisted of a 14 ha restored wet prairie located on SCNWR that was historically used for agricultural row crops and converted back to native wet prairie in 2001 (R. Bell, United States Fish and Wildlife Service, personal communication). The south boundary of the site was across a gravel road and immediately adjacent to the northeast corner of a 398 ha wet prairie that contained a large EMR population (Szymanski 1998, Johnson 2000). The north and east sides were bordered by agricultural fields and the west side was bordered by a cottonwood dominated bottomland forest. Since restoration in 2001, management has consisted of summer mowing in 2002–2004 to control weeds and prescribed burning in late winter 2006 to stimulate native grass growth.

On 17 April 2006 from 1130 to 1400 hours, we searched the entire site 3 weeks after prescribed burning, by walking 20 m-wide transects. Weather variables were recorded using a handheld weather meter. Winds were calm, the relative humidity was 53% and the air temperature was 24.6 °C. The search resulted in the capture of one adult female and five adult male EMRs; one male and the female were

found copulating near a crayfish burrow. All specimens were weighed, measured and released at the point of capture. Although home ranges of EMRs occupying the adjacent 398 ha wet prairie site were large enough to include the 14 ha restored site (Durbian et al. 2007), we believe these captured individuals hibernated on this site based on their location and short time since emergence. Emergence from hibernacula typically occurs near the first week of April (Johnson et al. 2000) and all individuals were captured 7–10 days after emergence. Therefore, we believe these individuals represent repatriation of this restored prairie rather than spring migration from the adjacent occupied site. Future research should examine the potential ability of snakes to repatriate restored habitat with emphasis on monitoring changes in habitat characteristics and prey density (number of suitable EMR prey/ha) post restoration to evaluate the time period needed to restore suitable habitat. —Francis E. Durbian^{1,5}, Brian N. Lomas¹, Jeff Briggler², Paul McKenzie³, and Tom Nagel⁴. ¹Squaw Creek NWR, PO Box 158, Mound City, Missouri 64470, USA; ²Missouri Department of Conservation, 2901 West Truman Blvd., PO Box 180, Jefferson City, Missouri 65102, USA; ³USFWS, Columbia, Missouri, USA; ⁴Missouri Department of Conservation, St. Joseph, Missouri, USA. ⁵Corresponding author e-mail address: frank_durbian@fws.gov.

LITERATURE CITED

Conant, R. C., and J. T. Collins. 1991. A field guide to reptiles and amphibians: eastern and central North America. Third edition. Mifflin, Boston, Massachusetts, USA.

Dahl, T. E. 1990. Wetland losses in the United States 1780s to 1980s. United States Fish and Wildlife Service, Washington, D.C., USA.

Durbian, F. E., R. S. King, T. Crabill, H. Lambert-Dohertyand, and R. A. Seigel. 2007. Massasauga home range patterns in the Midwest. *Journal of Wildlife Management* 72:754–759.

Gardali, T., A. L. Holmes, S. L. Small, N. Nur, G. R. Geupel, and G. H. Golet. 2006. Abundance patterns of landbirds in restored and remnant riparian forests on the Sacramento River, California, USA. *Restoration Ecology* 14:391–403.

Johnson, G., B. Kingsbury, R. King, C. Parent, R. Seigel, and J. Szymanski. 2000. The eastern Massasauga rattlesnake: a handbook for land managers. United States Fish and Wildlife Service, Ft. Snelling, Minnesota, USA.

Johnson, T. R. 2000. The Amphibians and Reptiles of Missouri, 2nd Edition. Missouri Department of Conservation, Jefferson City, USA.

Lehtinen, R. M., and S. M. Galatowitsch. 2001. Colonization of restored wetlands by amphibians in

- Minnesota. *American Midland Naturalist* 145:388–396.
- Missouri Natural Heritage Program. 2011. Missouri species and communities of conservation concern checklist. Missouri Department of Conservation, Jefferson City, USA.
- Schmidt, K. P., and D. D. Davis. 1941. *A field book of snakes of the United States and Canada*. Putnam Company, New York, New York, USA.
- Seigel, R. A. 1986. Ecology and conservation of an endangered rattlesnake, *Sistrurus catenatus*, in Missouri, USA. *Biological Conservation* 35:333–346.
- Szymanski, J. 1998. Status assessment for the eastern Massasauga (*Sistrurus c. catenatus*) 1998. United States Fish and Wildlife Service, Ft. Snelling, Minnesota, USA.
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