Survey and Status of the Eastern massasauga (*Sistrurus c. catenatus*) and Kirtland's snake (*Clonophis kirtlandii*) at Robert Allerton Park, Piatt County, Illinois

ILLINOIS
NATURAL
HISTORY
SURVEY

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INTRODUCTION

At the time of European settlement, the Eastern Massasauga Rattlesnake, *Sistrurus catenatus catenatus*, (EMR) was distributed throughout the northern two-thirds of Illinois. Early inhabitants of the state reported seeing up to 20 or more EMR in one season (Hay, 1893). The habitat conversion that followed settlement, such as draining of prairie marshes and intensive agriculture may have contributed to the EMR's decline. As early as 1866, the EMR was noted as declining (Atkinson and Netting, 1927). In 1994 the EMR was listed as an endangered species in Illinois (Herkert, 1994) and is now a candidate for listing at the federal level (USFWS, 1999). The persecution of the EMR by the unenlightened, uninformed human population has lead to only a few widely scattered populations remaining. Smith (1961) stated that there were 25 extant populations of the EMR at that time. Recent studies have found that only two to five of the previous 25 remain (Beltz, 1992). One of these occurs at Allerton Park, near Monticello, Illinois.

The Kirtlands snake, *Clonophis kirlandii*, (KS) also abundant at the time of settlement has suffered serious declines over the past century. The KS is distributed through the middle one-third to the northeast corner of Illinois (Phillips *et al.,* 1999). Garman (1892) stated that tiling, ditching and cultivation of the soil have nearly destroyed its habitat. The KS is listed as threatened in Illinois and Ohio and endangered in Indiana and Michigan. The KS is offered no protection at the federal level. A total of 70 historical localities are known in Illinois; a 1985 survey found individuals in only 20 of these sites (Wilsmann and Sellers, 1988). One of these localities is Allerton Park, near Monticello, Illinois. Between June, 1991 and May, 1993, 33 historic locations were surveyed and KS were encountered at only two, Effingham and Lake Sangchris (Bavetz, 1994).

The objectives of this study were to 1) determine the status of the EMR and KS at Robert Allerton Park through visual encounter searches 2) Survey sites where the eastern massasauga and kirtland's snake are known to occur 3) Evaluate the quality of surrounding sites and 4) Survey sites with suitable habitat.

MATERIALS AND METHODS

Study Organisms

Eastern massasauga rattlesnake: The EMR has a range that includes the states of Illinois, Indiana, Iowa, Michigan, Missouri, New York, Ohio, Pennsylvania, Wisconsin, and across the Canadian border into the province of Ontario. Preferred habitat of the EMR ranges from lowland forest and grasslands in the midwestern United States and western Great Lakes to mixed deciduous/coniferous forest in Ontario to peat bogs in New York (Wright, 1941; Smith, 1961; Reinert and Kodrich, 1982; Seigel, 1986; Weatherhead and Prior, 1992; Johnson and Leopold, 1998). The EMR has four activity periods. Emergence (egress) begins when the snake leaves its hibernacula to thermoregulate adjacent to the entrance, occurring late March to mid-April and ending when the snake leaves the vicinity of the hibernacula. The primary activity period begins when the snake moves to its foraging area and ends when the snake moves back to the vicinity of its hibernacula area, approximately mid-October. Entrance (ingress) involves the snake

locating a suitable burrow. The snake may shuttle between several crayfish burrows until a suitable one is found concluding this period. Winter dormancy ends the season for the EMR. During this period, the snake remains underground, in the burrow, until mid-March to mid-April. The primary activity period is punctuated by mating season, mid-July through August.

Kirtland's snake: The KS range includes the states of Ohio, Indiana, extreme southern Michigan and extreme northern Kentucky. A disjunct population occurs in western Pennsylvania and northeastern Missouri. The KS historically occurred in open habitats (Conant 1943). This includes wet grasslands, margins of streams, lakes, swamps and meadowlands. Present habitat consists mainly of open low grassy areas at the margins of creeks, ponds or ditches (Bavetz 1994). Populations at the periphery of the range occur in relatively open woods while those in the core are more commonly found in urban or floodplain habitats (Conant 1943). Life history information is lacking on the KS, but what little exists states that the KS is very secretive and most likely nocturnal, possibly aestivating during the hotter part of the summer (Conant 1943, Smith 1961).

Study Site

Robert Allerton Park, located SW of Monticello Il, was donated to the University of Illinois by Robert Henry Allerton in 1946 for use as an educational and research center (Plate 1). The park's 1500 acres contain woodland, riparian and prairie areas of such high quality they have been designated a National Natural Landmark. Upper Sangamon Land and Water Reserve's ~600 acres was dedicated in 2004 for its high quality upland, wet-mesic, and floodplain forest that borders the Sangamon River (Plate 1). The Old Rt. 47 survey site (Plate 1) is a power line and out of service railway right of way. This right of way contains patches of native prairie that are of relatively high quality. We searched for snakes at seven sites in and around Robert Allerton Park and Upper Sangamon Land and Water Reserve: two restored prairies within Robert Allerton Park; two cattle pastures, one grassland planting, and one forest planting within Upper Sangamon Land and Water Reserve; and one relict prairie at Old Rt. 47.

Survey Methods

Snakes were collected using visual encounter surveys and drift fences. Visual encounter surveys were conducted in early spring during egress at the Prairie restoration and Old Rt. 47. Surveyors walked areas at each site were surface vegetation had been removed using prescribed burning, checking under cover objects such as logs, grass clumps, and debris. The burned area was searched more intensively due to higher detection probabilities in areas where vegetative cover has been removed. Drift fences were checked everyday during the activity season after visual encounter surveys had ceased (mid-May through mid-September).

Captured snakes were individually marked by implanting passive integrated transponder (PIT) tags subdermally. Scale clipping (Brown and Parker 1976) was used to mark individuals too small for PIT tags. All snakes were sexed by cloacal probing and weighed to the nearest gram with a Pesola spring scale. Snout vent length (SVL) was

obtained using the average of three measures within 0.5 cm with a flexible tape. Tail length was determined by measuring to the nearest 0.5 cm with a ruler.
For VES snakes, recorded environmental variables were amount of cloud cover and presence/intensity of precipitation, shaded air temperature (to the nearest 0.1 ºC), relative humidity and max wind speed were determined with a Kestrel 3000. Substrate temperature ~1cm below the surface (to the nearest 0.5 ºC) using a Fieldpiece digital thermometer.

RESULTS

Visual Encounter Surveys

The prairie restoration and Old Rt. 47 were searched for 92 man-hrs with the effort concentrated in the burned area. No eastern massasauga or Kirtland's snake were encountered.

Other snake species encountered included *Lampropeltis calligaster* (n = 4), *Thamnophis sirtalis* (n = 1), and *Coluber constrictor* (n = 5).

Drift Fence Surveys

Surveying took place for 6318 trap nights over the seven sites. Kirtland's snake encounters totaled seven (7), with no eastern massasauga encounters.

Other snake species encountered included *Coluber constrictor* (n=29), *Elaphe vulpina* (n=15), *Heterodon platirhinos* (n=1), *Lampropeltis calligaster* (n=8), *Storeria dekayi* (n=17), *Thamnophis sirtalis* (n=109).

RECOMMENDATIONS

At the Prairie Restoration, maintaining the level of search effort and continuing to burn while the snakes are still in hibernacula will aid in encountering new EMRs and recapturing known snakes. Recaptures are important for estimating population size and survivorship.

At Old Rt. 47, there are numerous burrows for hibernacula. The scope of mowing into the right of way needs to be minimized to prevent potential mortality to remaining EMS. Removal of woody invasive plants would improve the quality of the site and offer more suitable EMS habitat. Prescribed burns should continue to progress east and west in order to determine the total occurrence of EMRs in the right of way.

At Upper Sangamon Land and Water Reserve, the retention pond dam should be repaired to restore the aquatic habitat required for amphibian reproduction. Increasing the local soil moisture would be beneficial for both the KS and EMR. Crayfish would increase in the area providing possible EMR with hibernacula and provide the KS with its preferred habitat type.

Overall, it is recommended that agricultural lands adjacent to Allerton Park be restored to natural prairie habitats through conservation easements or outright purchase.

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