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*A Report to the Division of Natural Heritage,  
Illinois Department of Natural Resources on  
Project #98-015*

An Assessment of the Conservation Status of the  
Western Hognose Snake and Ecological Integrity  
of the Sand Prairie Ecosystems in Big River State Forest,  
Henderson County, Illinois

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For over two years we have studied the conservation status of a population of the western hognose snake (*Heterodon nasicus*) in optimal habitat in Big River State Forest, Henderson County, Illinois (Figure 1). This species is listed as "threatened" in Illinois by the Illinois Department of Natural Resources (Herkert, 1992).

Since the western hognose snake is a stenotopic species associated with open sand prairie communities (Smith, 1961; Ernst and Barbour, 1989), our primary study area was a 20 acre sand prairie (hereafter termed "southern sand prairie" in this report) located just north of the southern border of Big River State Forest (sections 20D, 20F in Figure 2; Figure 3). Our observations indicated that this small remnant of sand prairie presently represents the largest expanse of habitat suitable to this threatened species and other xeric biota in the entire 3000 acre state forest. Historically, sand prairie communities were much more extensive in the forest.

Our findings in 1995 and 1996 (see report by Markezich and Horger, 1997) indicated an extremely and dangerously low population size, insufficient habitat size, and poor habitat quality subject to various forms of human abuse. Our primary conclusion was that this species is in critical endangerment in Big River State Forest and will likely become extinct if measures pertaining to sand prairie preservation and long term conservation are not implemented.

The present report details our studies on the western hognose snake in this area through 1997 and a limited portion of 1998, and its purpose is to: (1) report new populational data and compare it with those obtained in previous years; (2) report the consequences of prairie burning taken by the Illinois Department of Natural Resources upon the population of western hognose snakes under study; (3) report how previous recommendations concerning preservation and conservation have been addressed by the IDNR; and (4) make further recommendations pertaining to the conservation of this species and its sand prairie habitat.

## Results & Discussion

**Population in the south sand prairie, BRSE:** Despite similar amounts of effort spent in 1997 as in the previous year (Tables 1 and 2), only one specimen (Table 3) was observed in 1997 in the south sand prairie which represents the largest area of suitable habitat for this threatened species in Big River State Forest. The only specimen observed in 1997 was a recapture of the first specimen captured in 1996 (Table 4), and was found in approximately the same location in the prairie which was in an area south of the area which was burnt by the IDNR in early spring, 1997 (Figure 3). With this recapture, analysis indicates a population size of four in the south sand prairie which presently appears to be an extremely optimistic estimate.

Most of the specimens in 1996 were observed north of the diagonal sand road in this prairie (Fig. 3) and it is extremely interesting that none were observed here in 1997. The major change in this area north of the diagonal road was a prairie burn done by the Illinois Department of Resources in early spring, 1997. This gross, unselective burn likely caused several deleterious affects upon the western hognose snake populations in this area most of which are related to the elimination of select microhabitat. The species is not a desertic form which relies only on open sand dunes with low vegetation (Smith, 1961; Ernst and Barbour, 1989), but rather requires bushes and other vegetation for both thermoregulation and protection from avian predators. Also, the species has a relatively small home range (Platt, 1969).

The burn of 1997 served to reduce these microhabitat components in the northern portion of the sand prairie. No specimen ever observed by us in Henderson County, Illinois nor by Jim Christiansen in Big Sand Mound prairie in Iowa was far from some type of shade related to a tall bush, usually a *Rhus aromatica* shrub but occasionally a blackjack oak or limb and brush piles, which were also destroyed by the gross burn of the south sand prairie in 1997.

What other evidence exists that gross habitat restoration without regard to microhabitat maintenance has a deleterious affect upon reptile populations? In several studies by Block and in particular a study of microhabitat and its conservation implications in California oak woodlands, he and Morrison (1998; p. 59)

concluded that their study ".....underscores the need to maintain specific microhabitats as opposed to simply maintaining "oak woodland" per se for conservation of many of these species, especially if the goal is to maintain their population throughout an area." The relevance of these scientific findings to the gross burn of the south sand prairie in 1997 without appropriate regard to select microhabitats is quite obvious. The northern section of the south sand prairie did not require burning but several sections of the southern part of it did; we advised the IDNR about this situation several times in reports (see recommendations in Markezich and Horger, 1996, 1997) and in phone calls. The maintenance of "sand prairie" on a gross level was the goal, and our data from 1997 indicate that the western hognose snake abundance in the burned area was zero. Perhaps a skeptic may raise objections related to less activity in 1997 than in 1996 by western hognose snakes in this area, but see next section.

**Western hognose snakes from other areas in Henderson County in 1997:** Four more western hognose snakes were observed in 1997 (Table 5) in areas other than the south sand prairie in Henderson County. Several comments are in order. The only other specimen observed in BRSF was near the headquarters; personnel have not observed this species there for at least 5-6 years, and it is likely that there is not a healthy, viable population in this area.

The healthiest population indicated by our 1997 data exists on private, minimally-managed, agricultural land in Hoskins Blueberry farm, about 1 mile south of BRSF. Two specimens were observed here, and the rows of blueberry bushes presumably provide the appropriate microhabitat mentioned above necessary for this species survival.

The fact that these specimens were observed in and around BRSF suggest that there wasn't a reduction of activity by this species in the area and substantiate our conclusion that the 1996 burn adversely affected the populations in the south sand prairie.

**Snake activity in the south sand prairie in 1998:** No grant was applied for in 1998 as one of us (ALM) was engaged in research in South America during most of the late spring. However, we managed to log approximately 20 hours of survey in the south sand prairie in May and June, 1998, and the results were extremely disappointing. The area south of the diagonal sand road through the prairie (Fig. 3) was burnt in Spring, 1998, by the IDNR in an unselective manner similar to the burn of the other section in the previous year. No snakes of any species were observed in the south sand prairie during these 20 observational hours. This was particularly unusual, as species other than the western hognose snake, specifically blue racers and bull snakes, were commonly observed in the sand prairie. This may be related to the destruction of microhabitat discussed above; the latter two species utilize microhabitats for shade and protection as does the hognose snake.

**Recommendations: Preservation and Conservation.** We repeat, for the third time (see Markezich and Horger, 1996, 1997), these recommendations related to the acute preservation and long-term conservation of the western hognose snake in Big River State Forest. None of these have been implemented by the IDNR, even though the urgency has been emphasized by us for several years.

**Acute, Immediate Measures.** To preserve the remaining restricted gene pool of this species and to restore the general ecological health of the sand prairie ecosystem, we recommend the following *immediate* preservation measures for the 20 acre southern sand prairie and surrounding area:

- 1.) Clear signage which prohibits horseback riding on this prairie. There is no such signage at present, and we, after spending so much time in the area, are still unclear as to where horseback riding is allowed with respect to the prairie and surrounding fire lanes. It is unreasonable to expect a few people on a day's outing to read an hour's worth of regulations at the forest headquarters where they are posted.

Also, the sign pertaining to "Natural Area" designation of the south sand prairie has been removed, presumably by BRSF workers (was this related to adverse publicity about contradictory signage as part of a story concerning our conservation efforts which appeared in a Galesburg and Quad City newspaper in July,

1997??). The only sign remaining says "Hunters Parking" which directly contradicts all of our recommendations made after two and a half years of field work in this area.

2.) Elimination of hunting, skeet shooting, etc. on the prairie. While a skeet shooting area exists near the forest headquarters, there is a sign for "Hunter's Parking" in the parking lot of the sand prairie (next to a sign which says "Natural Area..."). Clearly, hunters may reasonably assume that skeet shooting is allowed here if hunting is. Prohibiting only skeet shooting will not eliminate the hunters who actively kill snakes. Again, we emphasize that hunters have the remaining area of the forest, approximately 3000 acres, for their activities.

3.) A fence around the sand prairie to eliminate off-road vehicles and other unnatural and potentially catastrophic disturbances. One vehicle going through this area at the wrong time may reduce the snake and endangered plant populations by a significant amount.

4.) Increased vigilance around the area. In all our hours on this site, no one in any official capacity ever inquired about our activities. Official presence is critically important to thwart human abuse.

5.) Continued monitoring of the viability of the population and habitat.

Long-term Conservation Measures. The main requirement for successful long-term conservation of the sand prairie ecosystems and their associated biota in Big River State Forest involves restoration of more sand prairie areas, particularly in areas in the southern portion of the forest. The southern sand prairie can easily serve as a "source" for populations to repopulate adjacent sand prairies if restoration is done intelligently and with migration corridors in mind. Source populations have been drawn upon in other conservation efforts involving various animal species (Caughley and Gunn, 1996; Meffe et al., 1997).

Restoring prairie adjacent to the southern sand prairie should be viewed as a viable long-term conservation goal and we recommend that a minimum size should be 100-120 acres of continuous sand prairie in this area.

An area to the northwest of the southern sand prairie almost serves as a prepatterned blueprint for immediate and easy restoration. This area resulted from the former railroad right-of-way mentioned above in this report and consists of two wide fire lanes running roughly parallel, with the western one curving to the west for a distance and then back east (see Fig. 3 of Markezich and Horger, 1997). In between these two fire lanes several open areas contain healthy sand prairie and can easily serve as a nucleus for restoration.

It is recommended that one of these fire lanes (two are obviously not necessary for fire control), either the eastern or western one pending evaluation, be discontinued as a fire lane and left undisturbed and that the adjacent vegetational island be burned. This measure will restore a significant amount of sand prairie which will be continuous with the southern sand prairie and can serve as a potential migration corridor to other restored sand prairies to the north in the forest in the future.

Several small sand prairies, resulting from fairly recent logging operations, exist in the southern portion of Big River State Forest (e.g., section 17H in Fig. 2). These should be maintained and hopefully can be connected to an expanding sand prairie, with the southern sand prairie as a source nucleus, by various other corridors.

### Summary

1.) The conservation status of the threatened western hognose snake in Big River State Forest, Henderson County, Illinois is highly negative and is likely related to deficiencies in the quantity and quality of appropriate sand prairie habitat. Only 4 specimens were observed in 1996, 1 (a recapture) in 1997, and none in 1998 in the south sand prairie.

- 2.) This species and likely other stenotopic sand prairie biotic elements will become *extinct there if acute preservation measures are not quickly implemented* followed by long-term conservation measures involving restoration of more sand prairie communities.
- 3.) Recent prairie restoration efforts by gross, unselective burning in the south sand prairie have likely caused further reduction in the population of western hognose snakes and perhaps other snake species in the south sand prairie. This gross burning did not consider microhabitat retention which has been indicated as critically important in the scientific literature for several years.
- 4.) Specific recommendations related to acute preservation and long-term conservation of the sand prairie biota in Big River State Forest are made.
- 5.) No progress has been made by the IDNR with respect to preservation and conservation recommendations made by us for the past two years (Markezich and Horger, 1996, 1997) concerning the future of the western hognose snake in Big River State Forest. There is no room for this apathy with respect to the future of a threatened species in Illinois.

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TABLE 1

Survey man-hours and trap-hours in 20 acre southern sand prairie in Big River State Forest, Keithsburg, Illinois, in various months in 1997.

Month	Survey Man-hours <sup>a</sup>	Trap-hours <sup>b</sup>
May, 1997	18.5	490
June, 1997	120.0	995
July, 1997	75.0	580
Aug., Sept., 1997	30.0	580
<b>TOTAL</b>	<b>243.5</b>	<b>2645</b>

<sup>a</sup> survey man-hours = sum of (number of hours spent in visual surveying by each individual).

<sup>b</sup> trap-hours = number of traps x hours in which they were activated.

TABLE 2

Survey man-hours and trap-hours in 20 acre southern sand prairie in Big River State Forest, Keithsburg, Illinois, in various months in 1995 and 1996.

Month	Survey Man-hours <sup>a</sup>	Trap-hours <sup>b</sup>
Sept., Oct. 1995	14	0
May, 1996	16.5	0
June, 1996	154.75	1,992
July, 1996	75.5	1,884
Aug., Sept., 1996	23.0	80
<b>TOTAL</b>	<b>269.75</b>	<b>3,956</b>

<sup>a</sup> survey man-hours = sum of (number of hours spent in visual surveying by each individual).

<sup>b</sup> trap-hours = number of traps x hours in which they were activated.

TABLE 3

Collection and other data of the only Western Hognose snake observed in southern sand prairie, Big River State Forest, in 1997.

Specimen #	Sex	SVL <sup>a</sup>	Tail L <sup>b</sup>	Date	Time	Marked <sup>c</sup>	Trap or Visual
1	F	400	55	6/14/97	1010	V-1, L (recapture of 1996- 1)	Trap

<sup>a</sup> snout-vent length in millimeters.

<sup>b</sup> tail length in millimeters.

<sup>c</sup> Number following "V" indicates number of ventral scale anterior to anal plate. The left half of this scale was clipped off following the methods of Brown and Parker (1976).

TABLE 4

Collection and other data of four Western Hognose snakes observed in southern sand prairie, Big River State Forest, in 1996.

Specimen #	Sex	SVL <sup>a</sup>	Tail L <sup>b</sup>	Date	Time	Marked <sup>c</sup>	Trap or Visual
1	F	300	35	6/21/96	0955	V-1, L	Visual
2	M	300	75	6/27/96	1915	V-2, L	Trap
3	F	195	27.5	6/24/96	2000	No	Visual
4	F	330	50	7/7/96	0845	V-3, L	Visual

<sup>a</sup> snout-vent length in millimeters.

<sup>b</sup> tail length in millimeters.

<sup>c</sup> Number following "V" indicates number of ventral scale anterior to anal plate. The left half of this scale was clipped off following the methods of Brown and Parker (1976).

TABLE 5

Other western hognose snakes observed in localities other than the south sand prairie in 1997.

Locality	Sex	SVL <sup>a</sup>	Tail L <sup>b</sup>	Date	Time/ Comments	Marked <sup>c</sup>
Hoskins blueberry farm, 1 mi. S Big River State Forest	M	305	80	6/25/97	4 PM; collected by Hoskins family	V-12, L
Big River State Forest, 200 m N of headquarters office	M	330	75	7/10/97	afternoon; found in a pile of wood chips; accidentally injured by workers	V-7, L
Gladstone Lake	M	370	80	7/16/97	Noon; found as fresh DOR on road bordering lake to south. Frozen tissue and preserved specimen in INHS collections	No
Hoskins blueberry farm, 1 mi. S Big River State Forest	F	600	81	8/4/97	1000 hours, collected by Hoskins family	V-10, L

<sup>a</sup> snout-vent length in millimeters.

<sup>b</sup> tail length in millimeters.

<sup>c</sup> Number following "V" indicates number of ventral scale anterior to anal plate. The left half of this scale was clipped off following the methods of Brown and Parker (1976).



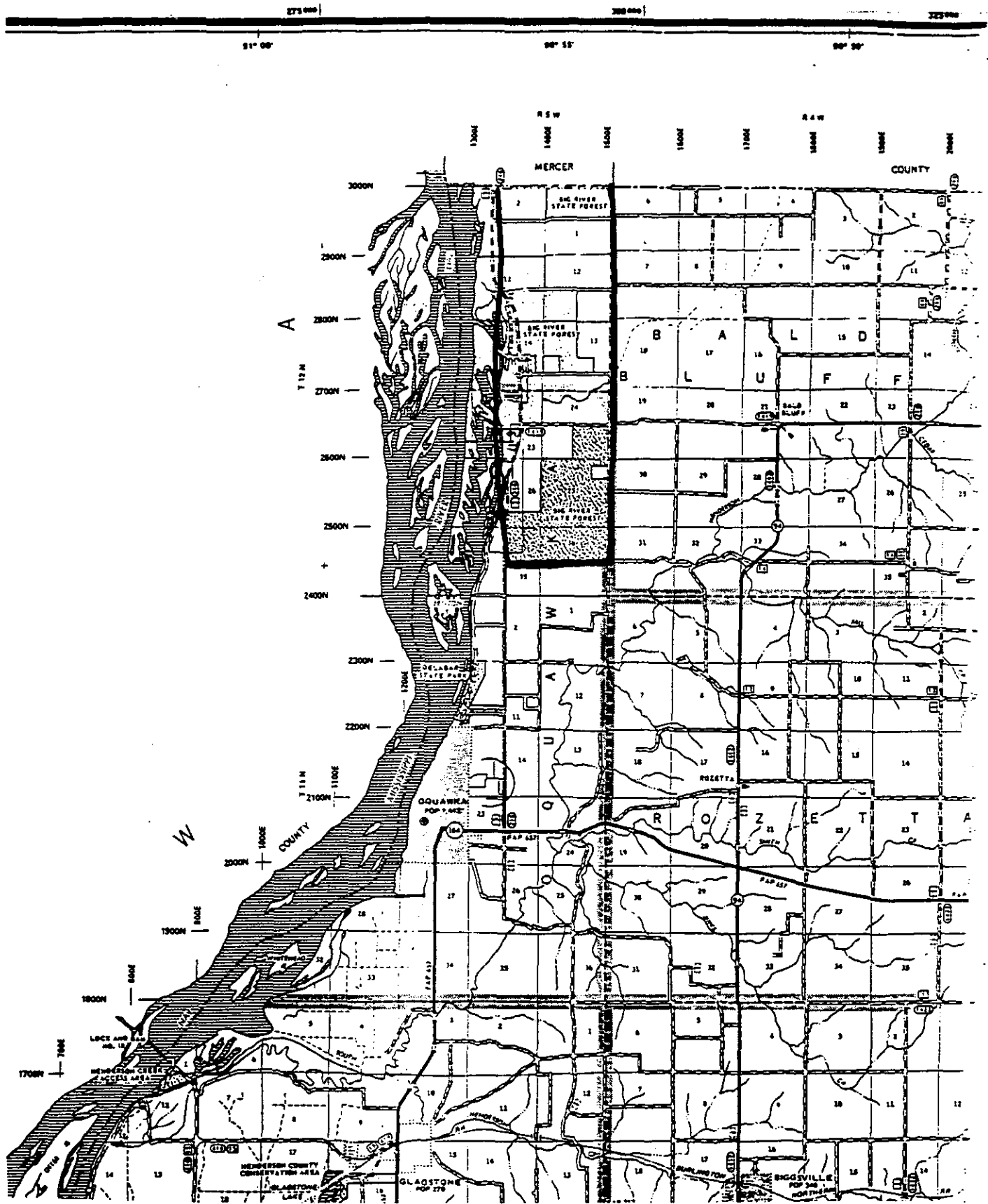


Figure 1. Section of Henderson County highway map showing location of Big River State Forest.

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Figure. 2. Aerial view of the southern portion Big River State Forest. Southern sand prairie is in sections 20D and 20F along southern boundary. Dashed lines indicate State Forest boundaries.