

# A Survey of Amphibians and Reptiles on a 318-Acre Dry Grassland Property in La Crosse County, Wisconsin

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## ABSTRACT

Reptiles and amphibians are beneficial organisms in many ecosystems because their diet of insects and small rodents helps control populations of these animals often considered as pests. Alteration of natural habitat may disturb this balance in ecosystem diversity. Baseline data sets of composition and populations of organisms should be recorded for present and future use to ensure a fit habitat for all organisms. The goal of the Mississippi Valley Conservancy to restore a 318 acre oldfield grassland, located in La Crosse County, Wisconsin, to native sand prairie vegetation, includes concern for maintenance of species composition and diversity. In a limited study in 2001 using cover objects, Ruhser found one individual of each of two species: common garter snake, *Thamnophis sirtalis*, and leopard frog, *Rana pipiens*. In this expanded study, conducted during 2002, two survey methods were used, with more frequent checks over a longer period of time. The array of 72 cover objects used in the 2001 survey were also used during this study; in addition, two drift fences with pitfalls were used. Drift fences yielded a much higher rate of return per unit effort, compared to cover objects: 0.041% for cover boards, 2.273% for drift fences. Four different animals were encountered during the 2002 survey: three eastern American toads, *Bufo americanus*, and a common garter snake, *Thamnophis sirtalis*. Incidental encounters with mammals were noted, but no data were recorded on these animals.

## INTRODUCTION

Reptiles and amphibians are beneficial organisms in many ecosystems. Their diet of insects and small rodents contributes to control of these animals that are often thought of as pests in crops and homes (Knopf 1988). Passage of not only Federal but also State laws has limited the acquisition of most species of reptiles and amphibians, but the greatest hazard to this population--habitat destruction--is poorly controlled (Smith and Brodie 1982). Alteration of natural habitat is one way of disturbing the balance of ecosystem diversity. Any environmental modification has the potential of eliminating any given species of reptile or amphibian. A difficult problem in conservation biology is the lack of baseline data against which to measure changes in populations (Busby and Parmelee 1996). Baseline data sets should be obtained to be used for comparison with both past and future data sets to ensure a fit habitat for future populations. The data sets of this research project were collected on a private, midwestern grassland. Restoration of native sand prairie vegetation is the goal for a future project on the grassland provided species diversity and composition remain undisturbed. Information on populations currently inhabiting the grassland should be obtained and understood before restoration of native sand prairie vegetation. Surveying current populations is the goal for this undergraduate research project.

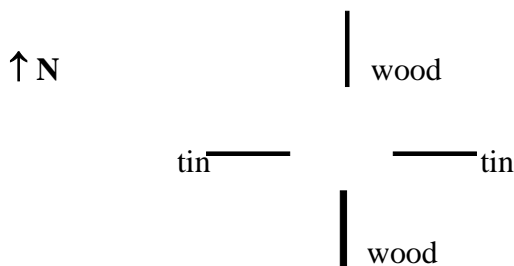
The Mississippi Valley Conservancy is planning to restore a 318 acre oldfield grassland to native sand prairie vegetation during the next twenty years. The grassland, which is currently part of the Conservation Reserve Program (CRP), is located near Holmen, WI in La Crosse County. A limited study using cover boards was done in 2001 to survey the herptiles living on the grassland. This research, conducted by Jean Ruhser, found one individual of each of two species of herptiles: a common garter snake, *Thamnophis sirtalis*, and a leopard frog, *Rana pipiens*, and is referenced in her report for the Mississippi Valley Conservancy entitled "Northern Engraving Grasslands Bird Survey Report 2001."

Minimal material and methods in addition to infrequent sampling may not yield accurate estimates of the population or diversity of organisms inhabiting the grassland. It is difficult to obtain a reasonable sample of herptiles where species diversity and populations are low, such as in the dry habitat of these grasslands on sandy soils, where conditions are not optimal for amphibians. To improve knowledge of species currently inhabiting the area, and the effects of prairie vegetation restoration on those species, two types of surveys were conducted more frequently over a longer period of time during this project. The use of drift fences and pitfalls in addition to the

existing cover boards were the methods used in this research project to encounter herptiles. Although the focus of this research was to survey herptiles, small mammals were encountered and are noted in the results.

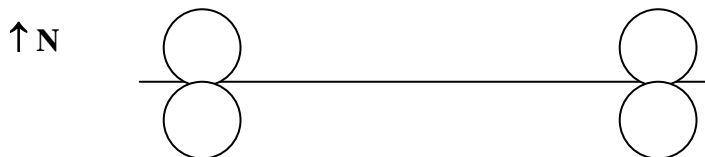
### MATERIALS AND METHODS

The array of seventy-two cover boards used in the 2001 research project was used again this year. Cover boards were placed in groups of four, in a cross-like arrangement. Materials used included wood and tin, with like materials arranged opposite each other (Figure 1). This survey technique required less maintenance and sampling effort, however only those reptiles and amphibians using the cover boards at the time of sampling were encountered. Cover boards were also used to monitor changes in use of the grassland underneath them. The cover board technique can provide a means to observe patterns in herpetofaunal relative abundance, composition, and diversity (Parmelee and Fitch 1995).



**Figure 1.** Arrangement of cover boards used in survey of herptiles on grassland vegetation. Wood and tin boards were arranged opposite at north and south ends of each transect.

In addition to cover boards, drift fences and pitfalls were used this year to capture and survey reptiles and amphibians. These semi permanent fences are essentially walls that most small herptiles cannot jump or climb over. The fence forces the animals to crawl along it, seeking an opening. Along the length of the fence, pitfalls are installed so an animal looking for a way around the fence falls into a pitfall and cannot escape. The two fences used in this project were constructed of aluminum flashing fifty feet in length and twenty-five inches high. The fences ran east-west and the pitfalls were placed on each side of each fence at opposite ends, for a total of four pitfalls per fence. Pitfalls consisted of either large tin cans or five-gallon buckets, both containing small amounts of dirt, water and leaf litter (Figure 2). The traps were opened within two hours before darkness and checked and closed the next morning at least an hour before noon. When the traps were not being used, they were covered with large boards to prevent small animals from falling in and being subjected to dehydration, starvation, and predation (Matsuda and Richardson 1999).



**Figure 2.** Model of drift fences used in survey of herptiles on grassland vegetation. Pitfalls were made of either five-gallon buckets or large tin cans. Aluminum flashing measuring fifty feet in length and twenty-five inches in height was used to construct the fences.

## RESULTS

Four different animals were encountered, three of which were of the same species, during this survey. On July 10 a large eastern American toad, *Bufo americanus*, was captured in the northwestern pitfall at drift fence number two (DF2). On July 19, a smaller, younger *B. americanus* was captured at the southwestern pitfall of the same fence. In late summer on August 8, a common garter snake, *Thamnophis sirtalis*, was encountered under the wood cover board located on the west side of the cover board array at transect three north (T3N). *T. sirtalis* was not captured and therefore snout-vent length, sex, and mass were not determined. During the last survey of the year, on October 14, a large *B. americanus* was captured near DF2. The smaller individual of *B. americanus*, captured on July 19, appeared to have a short tail still remaining, which along with its overall size, indicated that it was still very young. A number of small mammals including meadow voles, field mice, and moles were encountered both under cover boards and in pitfalls but specific details such as species, sex, and mass were not recorded. Also observed on the grassland, but not directly related to herpetile surveying techniques were deer, and a mother coyote and six pups.

The cover board surveys in this research were conducted over a period of 26 weeks with 29 complete surveys and one partial survey. In this time, 72 cover objects were checked 29 times totaling 2088 checks. During the partial survey, 64 more checks were made for a total of 2152 checks. Surveys done by Ruhser contributed four additional complete surveys and 288 checks. The only herpetile encountered under the cover boards was a common garter snake, *T. sirtalis*. This individual was encountered as the sun was setting and the temperature had fallen from 23°C at the time the survey began to 21°C at the time of the encounter. The rate of return per unit effort for the cover board method is calculated by taking the number of captures divided by the number of checks done (Grant et al 1992). The rate for this project was 0.041% (1/2440).

The drift fences were used during 21 weeks of this research. The 8 pitfalls were opened and checked a total of 132 times over the course of this research. Ruhser did not check the pitfalls during her surveys. Three individual toads of species *B. americanus* were encountered in pitfalls. These individuals were each encountered during morning pit checks on different survey dates, however all were observed at the same location (Table 1). The first toad was observed in a pit that had been hidden with vegetation the night before. The temperature during this survey was 19°C. The small toad was encountered on the opposite side of the fence an hour before noon and the temperature was 27°C. The last toad encountered was found in the same pit as the first one and the observed temperature was 17°C. The color of this individual was significantly darker than the toad encountered on July 10, however the two were similar in size and mass. The rate of return per unit effort was calculated again for the drift fence method and was 2.273% (3/132).

**Table 1.** Summary of results of surveys conducted at Northern Engraving Grassland.

Date	Transect	Method	Cover	Species
5/1	T9S	cover board	wood	meadow vole
	T4N	cover board	wood	meadow vole
5/2	T9N	cover board	wood	meadow vole
	T6S	cover board	wood	meadow vole
5/8	T5N	cover board	wood	meadow vole
	T9S	cover board	wood	meadow vole
5/24	T9S	cover board	wood	meadow vole
5/30	T9N	cover board	tin	2 meadow voles
6/12	T1S	cover board	wood	field mouse
6/18	T9S	cover board	wood	field mouse
	DF2	drift fence	SE pit	meadow vole
6/28	T6S	cover board	tin	field mouse
7/10	DF2	drift fence	NW pit	eastern American toad
7/19	DF2	drift fence	NW pit	eastern American toad
8/8	DF2	drift fence	NW pit	mole
	DF2	drift fence	NE pit	mole
8/22	T3S	cover board	wood	garter snake
	T1S	cover board	wood	meadow vole
8/29	T9N	cover board	wood	meadow vole
9/4	T9S	cover board	wood	2 meadow voles
9/18	T5N	cover board	wood	field mouse
10/14	DF2	drift fence	NW pit	eastern American toad

The drift fences used in this research yielded a significantly higher return in herptile encounters per unit effort. Three individuals were encountered with 132 pit checks completed. Only one herptile was observed under the cover boards. Although both percentages were low, as was expected, a new species was encountered, *B. americanus*, in this year's survey that had not been seen in surveys done in 2001.

## DISCUSSION

A small number of individual animals, if any, are expected in surveys of this type. Although often seen in many different habitat types, herptiles, especially amphibians, are usually located in habitats with at least semi-permanent water, which is essential for reproduction. The pitfalls in this survey provided a small source of water, which may not be considered sufficient for reproduction. The many insects and small animals found in pitfalls and under cover objects indicated an abundant source of food for any reptiles and amphibians inhabiting the grassland; therefore food is not considered a limiting factor to their populations.

It is not known whether the garter snake encountered by Ruhser in 2001 is the same snake encountered in this survey. The two locations where the snake was observed are a considerable distance apart, however it is not uncommon for a snake to travel a great distance in one year (Zimmerman 2002). In both situations the snake was not captured and therefore data such as sex and mass were not determined and not available for comparison.

The presence of a smaller individual of *B. americanus* on July 19 is a sign consistent with the breeding season of the species. The toads breed in spring around April and May with the female releasing up to 20,000 eggs and the male fertilizing them externally. The black tadpoles morph into toadlets in July and are dark brown or black with little red spots (LeClere 2002). It is also unknown whether the larger *B. americanus* is the same individual or two different toads. A mark-and-recapture method was not used in this research because a high number of herptiles was not expected. Both individuals were female and similar data was collected for both including weight, snout-vent length, and location of encounter (Table 2). The greatest difference in the two was coloration. The first individual encountered was noticeably lighter in color in comparison to the individual observed on October 14. The color of an individual may change throughout the year in response to changes in temperature or humidity or as a reaction to stress (Cogger 1999).

## LIMITATIONS

A mark-and-recapture method would have been useful in determining if the two individuals of *B. americanus* were in fact two different toads. Data collected this year could also have been used in comparisons of individual species in future surveys. This method, however, was not included in this year's surveys due to the expectation of a low return per unit effort. Replacement of existing cover objects may have an effect on the herptiles currently inhabiting the grassland and should be considered for future surveys. The larger pitfalls used at fence number two yielded all of the toads encountered. The smaller pits used at fence number one may have been small enough for herptiles to escape or even avoid. Pitfalls the size of five-gallon buckets were still easy to use but were also large enough to keep the animals from escaping.

## ACKNOWLEDGMENTS

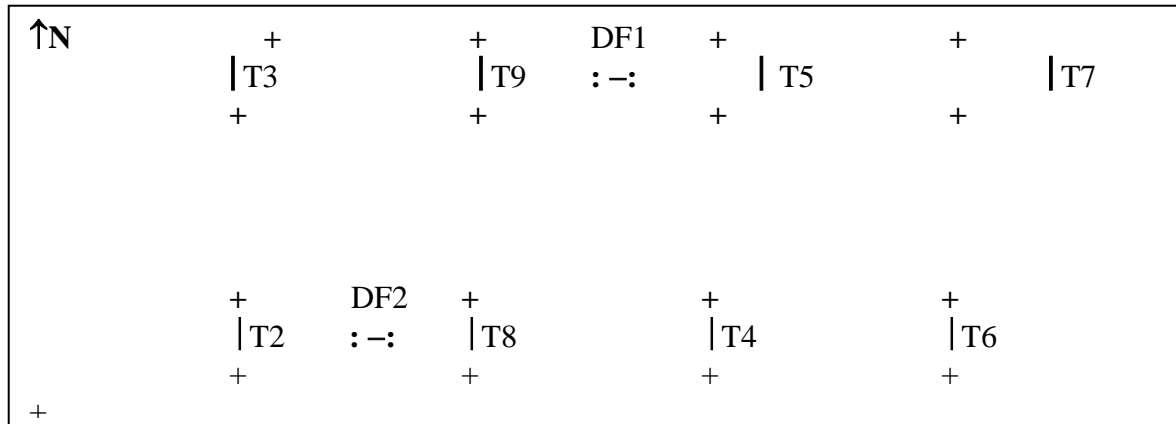
I would like to thank Jean Ruhser, University of Wisconsin-La Crosse, for advising me during the course of this project. Suggestions on drift fence use and construction were provided by Shawn Weick, USGS Upper Midwest Environmental Sciences Center. Thank you also to Cynthia Olmstead of the Mississippi Valley Conservancy for permission to implement this study on the Northern Engraving Grasslands property. Funding for this project was provided by a University of Wisconsin-La Crosse Undergraduate Research Grant.

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### APPENDIX

#### Map of Northern Engraving Grassland



T represents transect number  
F represents drift fence number  
+ symbolizes cover board array  
: -: symbolizes drift fence with pitfalls