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Amphibians and Reptiles in Three State Parks in East Central Illinois

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INTRODUCTION

Surveys of biota are critical in determining the relationships among and between animals and plants found in a particular habitat and provide an understanding of what interactions might exist between the surveyed species (Platt et al. 1999). Biotic surveys are the most fundamental method of determining what organisms are found in a certain area. Knowing both the geographic location and habitat use of a species is necessary for properly conserving and managing those species.

Reptiles and amphibians are significant biota in a given habitat as they play important roles in the dynamics of the food web (Smith 1961). Furthermore, amphibians are widely recognized as indicators of environmental quality because of their permeable integument (Carey et al. 2001, Halliday et al. 1997). As important as they may be, there is a lack of historical knowledge of the distribution and community composition of herpetofauna in east-central Illinois making it difficult to study changes in herpetofaunal communities over time. Our purpose is to describe species diversity in each of three state parks in order to provide a basis for future studies concerning trends in community composition in this region.

We surveyed the herpetofauna at three state parks: Walnut Point State Park (WPSP, 270.6 ha), Douglas County, Lincoln Trail State Park (LTSP, 412.5 ha), Clark County, and the north annex of Fox Ridge State Park (FRSP, 658.0 ha), Coles County, all in east-central Illinois. No similar surveys have been carried out at WPSP or LTSP and little is known about herpetofaunal richness at these sites (R. Szafoni, pers. comm.). The state parks surveyed were in relatively close proximity to one another (< 50 km between sites). However, LTSP lies in a different drainage system and has different dominant vegetative cover than that found at either FRSP or WPSP (see Schwegman 1973 for a detailed description). In addition to describing the composition of the reptile and amphibian communities at each of these sites, we also report morphometric values for captured individuals at these sites.

MATERIALS AND METHODS

Study Sites

We assessed the coverage of eight different habitat types using IDNR aerial photographs of each park. The vegetation is similar at FRSP and WPSP with oak-hickory forests being

the dominant habitat type. However, beech-maple forests dominate at LTSP with a mix of other deciduous species and conifers. Large man-made lakes are present in LTSP and WPSP, 58.9 ha and 23.8 ha, respectively. A ridge-valley system with steep slopes characterizes FRSP and LTSP, while WPSP is relatively flat. Predominant land use surrounding WPSP is row-crop agricultural; FRSP and LTSP are in a more diverse landscape with row-crops, grazing, private forested lands, and rural home sites. The Embarras River is the north and west boundary of FRSP and the southern boundary of WPSP. Previous to this study, areas within each of the sites had been subjected to prescribed burn regimes to control exotic vegetation (R. Szafoni, pers. comm.); the most recent of these burns occurred at WPSP in October 2000. Complete habitat assessment estimations for all three parks are given in Table 1.

Surveys

We conducted this study between 30 May and 15 August 2001. We haphazardly selected areas of each site to be surveyed for herpetofauna. The majority of the searching used simple hand collecting techniques and visual encounter surveys (VES; overturning rocks and logs, peeling bark off trees, etc.). Binoculars were used to identify amphibians and/or reptiles at a distance that could not be captured by hand such as basking turtles. In addition to VES, auditory cues were used to determine the presence of certain amphibian species and their abundance (Scott 1998). Road kills were also documented. Effort was recorded in man-hours for each site but was not recorded separately by habitat type.

All captured individuals were measured to determine mass (± 0.1 g), snout-vent length (±□ mm SVL), and tail length (± 1 mm) where appropriate, before being released.

RESULTS

Approximately 120 h was spent in the field with similar amounts of time spent at each site (i.e., 40 h at each site). During our surveys, individuals captured per hour (cph) were 1.35 cph at LTSP, 1.00 cph at FRSP, and 0.88 cph at WPSP. No correlation was found between the park size and the cph ($r^2 = 0.01$, $p = 0.94$). No pattern was found between the abundance of herpetofauna and date of capture (Figures 1, 2, 3). Sixteen species in eight families were observed. Of the three sites surveyed, LTSP had the highest species diversity. In contrast, WPSP had the lowest diversity with only seven species in four families (Table 2). The families Bufonidae, Hylidae, Ranidae, and Colubridae were found at FRSP. Hylidae, Ranidae, Emydidae, and Colubridae were found at WPSP. In addition to these families, Plethodontidae, Chelydridae, and Scincidae were found at LTSP.

The majority of species found at FRSP were captured in deciduous forest (Table 2). At LTSP, most species were found in mixed beech-maple forest (Table 2. At WPSP, most species were observed near the riparian zone (Table 2). Because of the small sample size, morphological data for all species was pooled across all sites (Table 3).

DISCUSSION

Different habitat types at each study site probably account for the observed variation in species richness. LTSP is dominated by a mixed forest and has greater amounts of subordinate habitat types, which may support larger species diversity (Fox & Fox 2000). Low

species diversity at WPSP might be due to fragmentation of habitat (the park being surrounded by agricultural fields). Low diversity could also be a result of habitat management at WPSP (i.e., prescribed burning) as prescribed burns can have short-term negative effects (Russell et al. 1999). Several empty carapaces (Terrapene) were found in recently burned areas of this park.

Our observations update post-1980 county records for several taxa (Phillips et al. 1999). In Coles County, no records of Storeria o. occipitomaculata, Opheodrys aestivus, or Lampropeltis triangulum syspila were reported after 1980. A skink (Eumeces spp.) was observed but not captured at LTSP. No scincid has been reported in Clark County after 1980. Hyla versicolor-chrysoscelis has no reported post-1980 sightings in Clark, Coles or Douglas, but was found in all three counties. No occurrence of Thamnophis s. sirtalis has ever been reported for Clark County (Phillips et al. 1999).

The occurrence of several species that have not been reported in the last 20 years indicates that more intensive surveys (i.e., more time, more area, additional sampling methods) should be conducted in these three counties. Phillips et al. (1999) acknowledge a lack of recent fieldwork results in misleading interpretations of trends in herpetofaunal populations. More accurate and current county records exist near cities and universities because of greater collection efforts (Phillips et al., 1999).

More surveys, and their comparisons with previous surveys (Phillips et al. 1999, Smith 1961), might indicate radiation of several species of herpetofauna. A better understanding of these dispersal events could be applied to studies in evolutionary ecology such as changes in habitat use and interspecific mating. Our results can serve as the basis for resource management decisions at these state parks as well as others in the region having similar habitat characteristics. Further assessment of species abundance and species dispersal can not only indicate the health of populations, but also indicate the carrying capacity of herpetological species in a particular area. Our results provide a baseline for future studies concerning trends in disturbance and abundance in this region.

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Table 1. Habitat assessment estimations of Fox Ridge State Park (FRSP), Lincoln Trail State Park (LTSP), and Walnut Point State Park (WPSP), Illinois (all sizes reported in ha). [1 = mowed grass; 2 = old field; 3 = shrub/young forest; 4 = deciduous forest; 5 = mixed forest; 6 = stream/creek; 7 = lake/pond; other = roads, buildings, trash piles, etc.].

	FRSP			**LTSP**			**WPSP**	
Habitat type	Size	Percent coverage	Habitat type	Size	Percent coverage	Habitat type	Size	Percent coverage
1	7.1	1.1	1	14	3.3	1	4.7	1.7
2	95.1	14.5	2	11	2.7	2	16.1	6.0
3	15.9	2.4	3	47.5	11.4	3	16.8	6.2
4	507.1	77.1	4	--	--	4	200	74.2
5	--	--	5	270	65.1	5	--	--
6	18.7	2.8	6	1.5	0.4	6	2.5	0.9
7	7.3	1.1	7	62	14.9	7	26.2	9.7
Other	6.8	1.0	Other	9	2.2	Other	3.4	1.3
Total:	658.0	100	Total:	415	100	Total:	269.7	100

Table 2. Habitat use by amphibian and reptile species in Walnut Point State Park (WPSP), Fox Ridge State Park (FRSP), and Lincoln Trail State Park (LTSP), Illinois between May and August 2001. [Same key is used as with Table 1.]

	Habitat Types																									
	WPSP								**FRSP**								**LTSP**							
Taxon	1	2	3	4	5	6	7	Other	1	2	3	4	5	6	7	Other	1	2	3	4	5	6	7	Other
Amphibia																								
Eurycea cirrigera																						X		
Plethodon cinereus																						X		
Bufo americanus												X										X		
Bufo woodhousii fowleri										X		X				old road, trash pile					X		X	
Acris crepitans blanchardi							X														X		X	
Hyla versicolor-chrysoscelis				X								X		X	X							X		
Pseudacris crucifer																						X		
Rana catesbeiana						X	X					X		X	X						X		X	
Rana clamitans melanota																						X		
Rana sphenocephala																					X		X	
Reptilia																								
Chelydra s. serpentina																							X	
Chrysemys picta marginata						X	X																	
Terrapene c. carolina																					X	X	X	road
Diadophis punctatus										X						trash pile					X	X		road
Elaphe o. obsoleta												X												
Lampropeltis triangulum syspila												X				trash pile								
Nerodia sipedon							X															X		
Opheodrys aestivus												X												
Storeria dekayi wrightorium				X						X		X				road								
Storeria o. occipitomaculata											X													
Thamnophis s. sirtalis										X		X									X		X	

Table 3. Morphometrics of species found in Fox Ridge, Lincoln Trail, and Walnut Point State Parks, Illinois, between May and August, 2001 (mean ± 1 standard deviation). [TL = Total Length. *Speciman exceeds *E. obsoleta* reported by Smith (1061) with a TL of 1725 mm.]

Taxon	(N)	SVL (mm)	tail length (mm)	mass (g)
Amphibia				
Eurycea cirrigera	3	35 ± 8.8	39.3 ± 16.3	
Bufo americanus	1	51		15
Bufo woodhousii fowleri	16	44.7 ± 8.2		9 ± 5.3
Hyla versicolor-chrysoscelis	12	24.4 ± 2.2		1.6 ± 0.4
Rana clamitans melanota	1	75		25
Reptilia				
Chrysemys picta marginata	1	143		
Terrapene c. carolina	6	133.8 ± 12.3		481.7 ± 67.5
Diadophis punctatus	21	253.3 ± 69.8	41.2 ± 30.1	7.2 ± 3.8
*Elaphe o. obsoleta**	1	1803 (TL)		1100
Lampropeltis triangulum syspila	1	690	N/A	51.5
Nerodia sipedon	2	143.5 ± 115.3	43 ± 33.9	9.25 ± 2.5
Opheodrys aestivus	1	130	70	3
Storeria dekayi wrightorium	1	210	110	5
Thamnophis s. sirtalis	2	640 ± 169.7	200 ± 70.7	71.5 ± 23.3
Storeira o. occipitomaculata	1	215	45	7

Figure 1. Number of herpetofaunal captures per hour of search effort on given dates at Fox Ridge State Park, Coles County, Illinois, between 5 May and 15 August 2001.

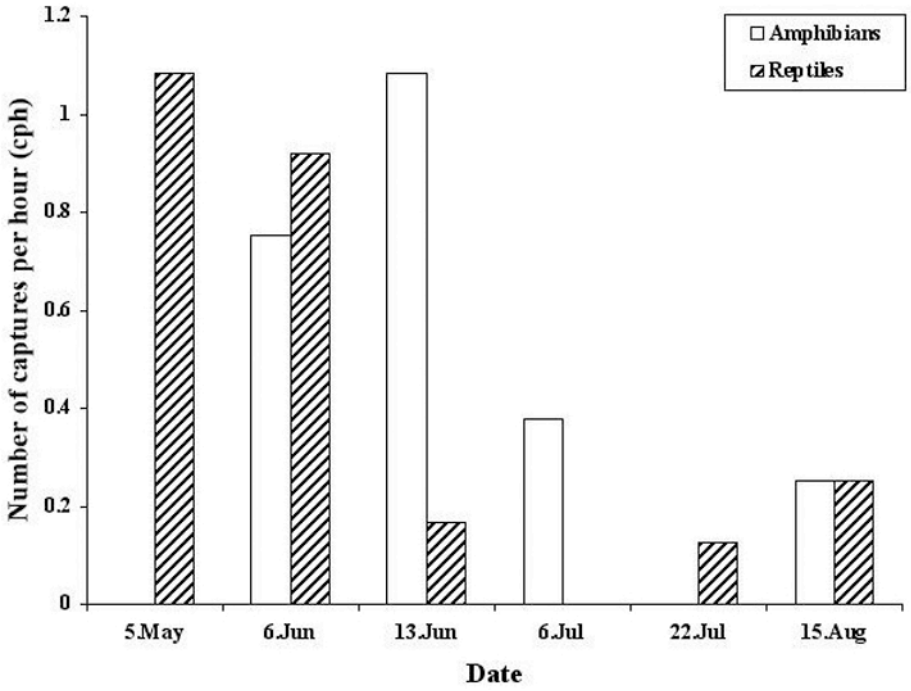

Figure 2. Number of herpetofaunal captures per hour of search effort on given dates at Walnut Point State Park, Douglas County, Illinois, between 30 May and 2 August 2001.

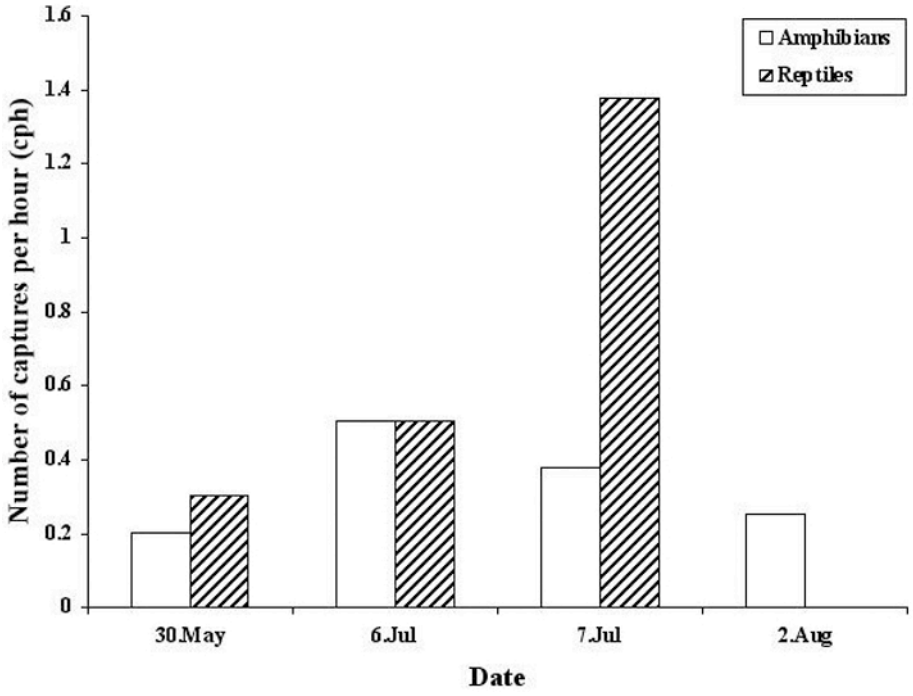

Figure 3. Number of herpetofaunal captures per hour of search effort on given dates at Lincoln Trail State Park, Clark County, Illinois, between 7 May and 12 July 2001.