THE WINTER AND SPRING HERPETOFAUNA OF THE WARNER PARKS IN DAVIDSON COUNTY, TENNESSEE

ANDREA LYNNE HOPKINS

THE WINTER AND SPRING HERPETOFAUNA OF THE WARNER PARKS IN DAVIDSON COUNTY, TENNESSEE

An Abstract

Presented to the

Graduate and Research Council of

Austin Peay State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

---

by

Andrea Lynne Hopkins

December 1990

ABSTRACT

A preliminary inventory of the herpetofauna of Percy and Edwin Warner parks was conducted from February through June 1990. Six major habitats (forests, fields, a cedar-glade-area, springs, permanent streams, and intermittent streams) were identified and examples of each studied. A combination of sampling techniques was employed. Terrestrial habitats were sampled mainly by hand and with drift fences, but also by road cruising on selected rainy nights. A total of 341 records, representing 25 species (12 amphibians and 13 reptiles) was logged. By major groups, these included seven salamanders, five frogs, four turtles, one lizard, and eight snakes. The most frequently encountered amphibian was the dusky salamander (Desmognathus fuscus), whereas softshell turtles (Apalone sp.) were the reptiles most often observed.

THE WINTER AND SPRING HERPETOFAUNA OF THE WARNER PARKS IN DAVIDSON COUNTY, TENNESSEE

A Research Paper

Presented to the

Graduate and Research Council of

Austin Peay State University

---

in Partial Fulfillment

of the Requirements for the Degree

Master of Science

---

by

Andrea Lynne Hopkins

December 1990

To the Graduate and Research Council:

I am submitting herewith a Research Paper written by Andrea Lynne Hopkins entitled "The Winter and Spring Herpetofauna of the Warner Parks in Davidson County, Tennessee." I have examined the final copy of this paper for form and content, and I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Biology.

A. Floyd Scott

A. Floyd Scott
Major Professor

Accepted for the

Graduate Council:

William H. Ellis

Dean of the Graduate School

ACKNOWLEDGEMENTS

Numerous friends and co-workers helped make this research project possible. Special appreciation to Sandy Bivens, Director of the Warner Park Nature Center, for her continuous moral support, arranging my flexible work schedule and allowing Nature Center staff to assist in data collection. Thanks to Bob Parrish, Superintendent of the Warner Parks, for his support and for allowing research to be conducted in the parks and Georgeanne Chapman, Executive Director of Friends of the Warner Parks, for allowing me to publicize research results in the "Friends" newsletter and for moral support throughout the project and at the seminar presentation. The Nature Center staff contributed greatly to this effort. Deb Beazley photographed specimens and study areas, David Vogt assisted in opportunistic collecting, and special thanks to Brian Bowen for opportunistic collecting and accompanying me while driving park roads on rainy evenings. Sincerest thanks to Bob English for helping collect plant community data and providing technical assistance on audio visual materials. Special gratitude to Mike Hopkins for his patience and understanding during this project. And last but not least, deepest appreciation to Dr. Floyd Scott, Associate Professor of Biology, Austin Peay State University, for his direction, advice, and guidance.

TABLE OF CONTENTS

CHAPTER		PAGE
1.	INTRODUCTION	1
2.	METHODS	5
3.	RESULTS	9
4.	DISCUSSION	13
5.	CONCLUSIONS	18
LITERATURE CITED		19

LIST OF TABLES

TABLE		PAGE
1.	Revised Warner Parks Nature Center amphibian and reptile list	4
2.	Brief description of Warner Parks herpetofaunal study areas including dominant tree species for each	8
3.	Amphibians encountered in the Warner Parks from February to June 1990	10
4.	Reptiles encountered in the Warner Parks from February to June 1990	11

LIST OF FIGURES

FIGURE		PAGE
1.	The natural features of the Warner Parks	2
2.	Map of the Warner Parks showing study areas and road loop sampled for amphibians and reptiles from February through June 1990	6
3.	Percent of total sample found in each of the major habitat types and broken down by major groups	14
4.	Percent of total species complement in each habitat type by major herptile groups represented	15

CHAPTER 1

INTRODUCTION

Percy and Edwin Warner parks are comprised of 1078.5 hectares (2665 acres) located in the outer Central Basin in Southwest Davidson County, Tennessee. These parks are managed by Nashville's Metropolitan Board of Parks and Recreation as one large urban park. The Warner Parks are composed of rugged, wooded hills, fields, intermittent streams, springs, a large pond, and the flood plains of the Little Harpeth River which flows along the southern boundaries of Edwin Warner Park (Figure 1). These parks are unique in their natural character and were listed in the Tennesee Register of Natural Areas in 1980.

The mission of the Warner Parks is to provide the public with relief from the intensity of urban life, to provide a wide range of recreation choices, and to celebrate the beauty of the natural environment (Johnson and Armistead 1986). Types of recreation in these parks include hiking, horseback riding, picnicking, softball, scenic driving, biking, golf, model airplane flying, and nature study. These parks also serve as an ecological island in an area of Nashville that is quickly being developed into housing projects and shopping centers.

The increased development surrounding the parks and an increase in park users threaten the natural qualities which make the Warner Parks unique. Because of this, the Warner Parks Preservation Plan was compiled (Johnson and Armistead 1986). An important element of

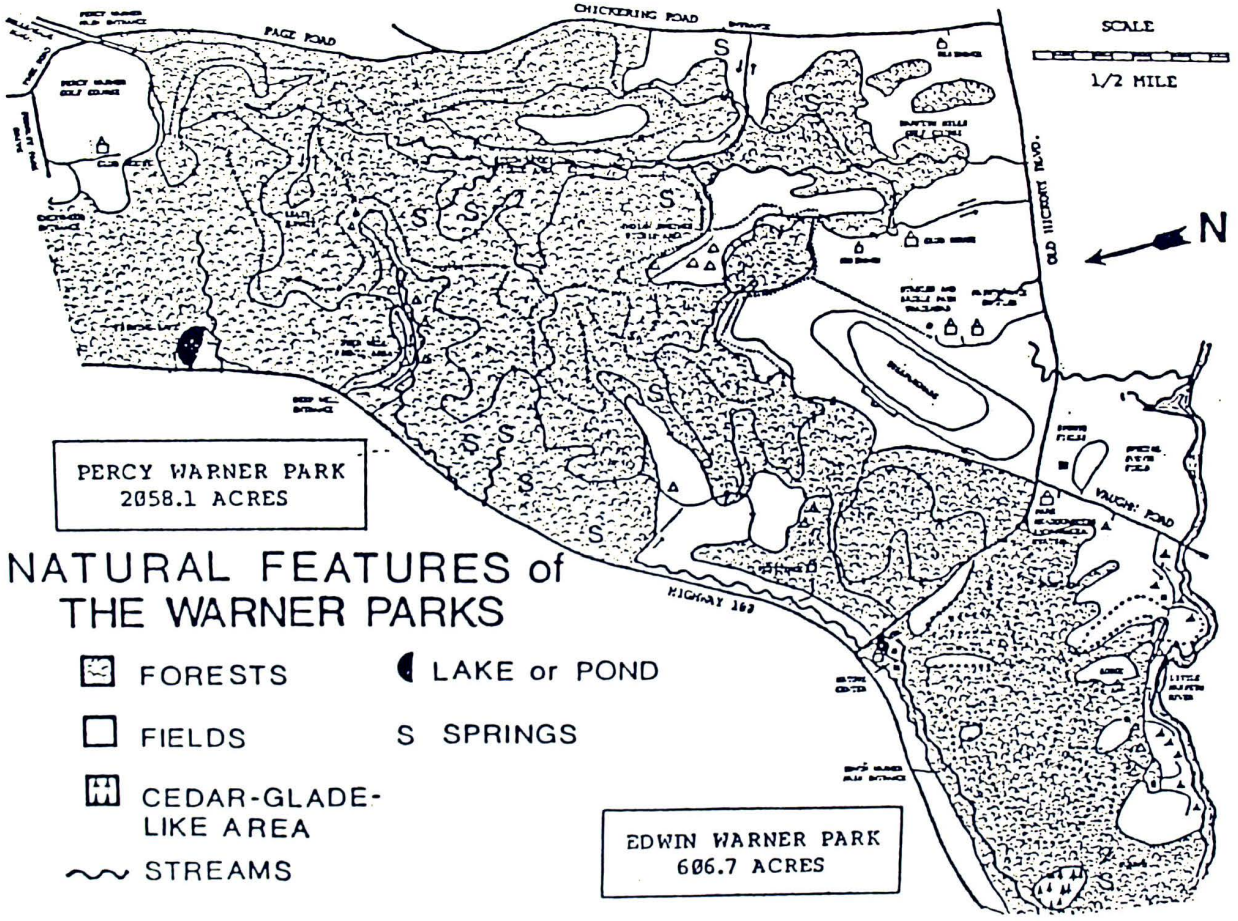


Figure 1. The natural features of the Warner Parks.

this report was the natural resources management plan. This plan recommended the Warner Parks' staff compile a natural resources data base including a detailed floral, faunal, and natural features inventory. These recommendations were also supported in the Warner Parks Master Plan (Johnson et al. 1987).

The objectives of this report are:

1. to provide an inventory of the winter and spring herpetofauna of the Warner Parks,

2. to determine the richness and relative abundance of herptile species in each habitat surveyed and

3. to contribute to the natural resources data base of the Warner Parks with the information obtained.

No previous herpetofauna studies have been conducted specifically for the Warner Parks. However the Warner Parks Nature Center staff has been recording amphibians and reptiles encountered in the parks since the mid-1970's (Table 1).

Table 1. Revised Warner Parks Nature Center amphibian and reptile list.

The following reptiles and amphibians have been recorded within the boundaries of Edwin and Percy Warner Parks. Many other species occur in the Middle Tennessee area and may very likely be found in the Warner Parks. Therefore we stress that this list is not complete and encourage visitors to report sightings of unlisted species to the Warner Park Nature Center.

FROGS AND TOADS

* 1) American Toad
Bufo americanus

2) Northern Cricket Frog
Acris crepitans

* 3) Upland Chorus Frog
Pseudacris feriarum

* 4) Cope's Gray Treefrog
Hyla chrysoscelis

* 5) Bullfrog
Rana catesbeiana

**6) Pickerel Frog
Rana palustris

SALAMANDERS

7) Tiger Salamander
Ambystoma tigrinum

* 8) Dusky Salamander
Desmognathus fuscus

* 9) Northern Two-lined Salamander
Eurycea bislineata

* 10) Longtail Salamander
Eurycea longicauda

* 11) Cave Salamander
Eurycea lucifuga

* 12) Zigzag Salamander
Plethodon dorsalis

* 13) Northern Slimy Salamander
Plethodon glutinosus

**14) Eastern Newt
Notophthalmus viridescens

TURTLES

* 15) Spiny Softshell
Apalone spinifera

16) Snapping Turtle
Chelydra serpentina

* 17) Eastern Box Turtle
Terrapene carolina

* 18) Slider
Trachemys scripta

* 19) Painted Turtle
Chrysemys picta

LIZARDS

20) Southeastern Five-lined Skink
Eumeces inexpectatus

* 21) Broadhead Skink
Eumeces laticeps

22) Fence Lizard
Sceloporus undulatus

SNAKES

* 23) Common Garter Snake
Thamnophis sirtalis

24) Smooth Earth Snake
Virginia valeriae

* 25) Northern Water Snake
Nerodia sipedon

* 26) Queen Snake
Regina septemvittata

* 27) Ringneck Snake
Diadophis punctatus

28) Worm Snake
Carphophis amoenus

29) Eastern Hognose Snake
Heterodon platirhinos

* 30) Common Kingsnake
Lampropeltis getulus

31) Milk Snake
Lampropeltis triangulum

* 32) Rat Snake
Elaphe obsoleta

* 33) Rough Green Snake
Opheodrys aestivus

* 34) Racer
Coluber constrictor

35) Timber Rattlesnake
Crotalus horridus

* Found in Current Study
** Species Added to List Due to Study

CHAPTER 2

METHODS

This study was conducted from February through June 1990. A total of 83 collecting trips was made. All major habitat types of the parks were sampled. Manual collecting was augmented by drift fences and pit traps. Three sets of drift fences each equipped with 14 equally spaced pitfalls (19-liter (5-gallon) buckets) were used. All were "I" shaped with two 7.6-meter (24.9-feet) sections at each end of a 15.2-meter (49.8-feet) section. Pitfalls were installed at each end of both short sections and at intervals of approximately 1.5 meters (4.9-feet) along the long section.

A total of 15 sampling areas was selected (Figure 2). Each week of each month a different set of habitats was surveyed. The pit traps were checked daily during the entire study. Sampling in terrestrial habitats took place along six, 90-meter (295.3-feet) transects. These transects were in a cedar-glade-like area, a cedar woods, a north-facing wooded slope, a south-facing wooded slope, a ridgetop, and a mowed field. Collecting in stream and river habitats occurred along preselected 25-meter (82.0-feet) stretches of the Little Harpeth River and two intermittent streams. Other aquatic habitats sampled included two springs, a wet-weather spring, and a shale seep. All were surveyed monthly. The large pond along State Route 100 was also seined once a month.

A complementary plant community study was conducted to provide

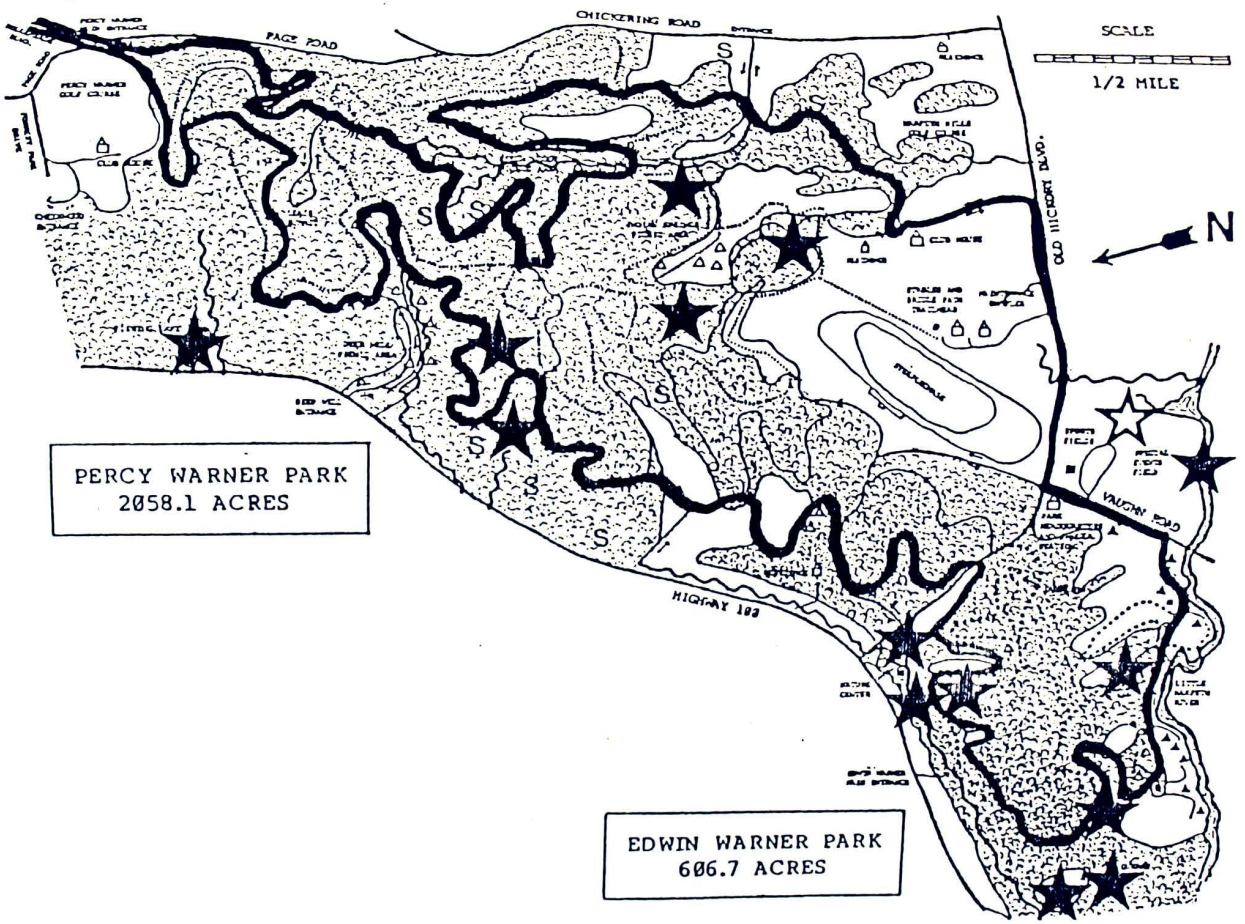


Figure 2. Map of the Warner Parks showing study areas and road loop sampled for amphibians and reptiles from February through June 1990.

more information about each habitat. A 0.04-hectare (0.1-acre) circular plot was established in the center of each study area. All trees greater than 2.54-centimeters (one-inch) at 1.37-meters (4.5-feet) above ground were identified and diameter at breast height (dbh) recorded. At the center of each of these plots, a 0.04-hectare (0.01-acre) plot was nested and shrubs, woody vines, and tree seedlings in it identified and counted. From these data, species density and dominance for each study area were determined. The results appear in Table 2.

On six rainy nights an 8.6-kilometer (13.8-mile) loop of park road (Figure 2) was driven in search of herptiles.

Attempts were also made to collect Necturus maculosus from the Little Harpeth River. This effort involved setting limblines (baited with beef and chicken liver) and seining at night in February.

During the last week of the study, minnow and turtle traps were placed in the river and large pond and were checked daily.

Opportunistic collecting occurred throughout the study period.

A limited number of specimens was collected and preserved as vouchers. This collection remains at the Warner Parks Nature Center to be used for environmental education purposes.

Table 2. Brief description of Warner Parks herpetofaunal study areas including dominant tree species for each.

Study Area	Elevation	Soil Type	Slope	Dominant Tree Species
Cedar Glade-like	640'	Mimosa Silt Loam	12-25%	Eastern Red Cedar *Juniperus virginiana*
Cedar Woods	680'	Mimosa Silt Loam	12-25%	Eastern Red Cedar *Juniperus virginiana*
North Slope	800'	Bodine Sulfura Complex	20-50%	White Ash *Fraxinus americana*
South Slope	720'	Mimosa Silt Loam	12-25%	White Oak *Quercus alba*
Ridge	860'	Bodine Cherty Loam	5-20%	Sassafras *Sassafras albidum*
Succeeded Field (Pit Traps)	560'	Byler Silt Loam	2-5%	White Ash *Fraxinus americana*
Cedar Glade Spring	560'	Mimosa Silt Loam	12-25%	Eastern Red Cedar *Juniperus virginiana*
Nature Center Spring	580'	Mimosa Silt Loam	2-12%	Hackberry *Celtis occidentalis*
Wet Weather Spring	740'	Bodine Sulfura Complex	20-50%	Sugar Maple *Acer saccharum*
Vaughn Creek	600'	Limestone Bed	NA	White Ash *Fraxinus americana*
Dripping Springs (Shale Seep)	760'	Bodine Sulfura Complex	20-50%	Tulip Poplar *Liriodendron tulipfera*
Intermittent Stream	690'	Mimosa Silt Loam	2-12%	Slippery Elm *Ulmus rubra*
Little Harpeth River	550'	Limestone Bed	NA	Slippery Elm *Ulmus rubra*
Hwy 100 Large Pond	580'	Mimosa Silt Loam	5-12%	Eastern Cottonwood *Populus deltoides*

CHAPTER 3

RESULTS

A total of 341 records, representing 25 species was logged. These are listed by major groups, species, and habitat types in Tables 3 and 4.

Amphibians

Three hundred and seven individual amphibians were found. These included 12 species from five families. Seven species of salamanders were encountered, most in springs or streams. One species, Notophthalmus viridescens, was an addition to the parks' amphibian and reptile species list. Desmognathus fuscus was the most collected species. No members of the family Ambystomidae were recorded, although one specimen of Ambystoma tigrinum was found April 1989 in the Warner Parks Nature Center organic garden. Despite much effort, Necturus maculosus was not encountered nor were Pseudotriton montanus or Pseudotriton ruber. Gentry (1955) reported both of these species to be common in lower elevations of Middle Tennessee. Ashton (1966) reported Pseudotriton ruber to be common in the Outer Basin areas of Davidson County. Sinclair (1950) also recorded the Red Salamander in Davidson County.

Five species of frogs and toads were found. Rana palustris was a new species for the parks. All 33 Bufo specimens were Bufo americanus. Hyla crucifer and Acris crepitans were not seen or heard. The Hyla chrysoscelis was heard but not seen. However, an

Table 3. Amphibians encountered in the Warner Parks from February to June 1990.

		Cedar Glade	Cedar Woods	Forested Slopes	Ridge	Fields and Grounds	Springs	Streams	River	Ponds	Roads	Total
Salamanders												
Notophthalmus viridescens	Eastern Newt	-	-	-	-	-	-	-	-	1	-	1
Desmognathus fuscus	Dusky Salamander	-	-	-	-	-	203	17	-	-	-	220
Eurycea bislineata	N. Two-lined Salamander	-	-	-	-	-	1	9	-	-	-	10
Eurycea longicauda	Long-tailed Salamander	1	-	1	-	-	-	2	-	-	-	4
Eurycea lucifuga	Cave Salamander	1	-	-	-	-	19	-	-	-	-	20
Plethodon dorsalis	Zigzag Salamander	1	-	-	3	-	2	-	-	-	-	6
Plethodon glutinosus	N. Slimy Salamander	-	-	1	1	-	1	-	-	-	-	3
Unidentified		-	-	-	-	-	-	4	-	-	-	4
Subtotal		3	-	2	4	-	226	32	-	1	-	268
Frogs & Toads												
Bufo americanus	American Toad	-	-	-	-	15	-	-	-	3	13	31
Bufo sp.	Toad	-	-	-	-	-	-	-	-	-	1	1
Hyla chrysoscelis	Cope's Gray Treefrog	-	-	-	-	3	-	-	-	-	-	3
Pseudacris feriarum	Upland Chorus Frog	-	-	-	-	1	-	-	-	-	-	1
Rana catesbeiana	Bullfrog	-	-	-	-	-	-	-	1	1	-	2
Rana palustris	Pickerel Frog	-	-	-	-	-	-	-	-	-	1	1
Subtotal		-	-	-	-	19	-	-	1	4	15	39
Totals		3	0	2	4	19	226	32	1	5	15	307

Table 4. Reptiles encountered in the Warner Parks from February to June 1990.

		Cedar Glade	Cedar Woods	Forested Slopes	Ridge	Fields and Grounds	Springs	Streams	River	Ponds	Roads	Total
TURTLES												
Chrysemys picta	Painted Turtle	-	-	-	-	-	-	-	-	1	-	1
Trachemys scripta	Slider	-	-	-	-	-	-	-	1	-	-	1
Terrapene carolina	Eastern Box Turtle	-	-	-	-	-	-	-	-	1	-	1
Apalone sp.	Softshell	-	-	-	-	-	-	-	6	-	-	6
Unidentified		-	-	-	-	-	-	-	-	12	-	12
Subtotal		-	-	-	-	-	-	-	7	14	-	21
LIZARDS												
Eumeces laticeps	Broadhead Skink	1	-	-	-	-	-	-	-	-	-	1
Subtotal		1	-	-	-	-	-	-	-	-	-	1
SNAKES												
Coluber constrictor	Racer	1	-	-	-	-	-	-	-	-	-	1
Diadophis punctatus	Ringneck Snake	-	-	-	-	-	1	-	-	-	-	1
Elaphe obsoleta	Rat Snake	-	-	-	-	1	-	-	-	-	-	1
Lampropeltis getulus	Common Kingsnake	1	-	-	-	1	-	-	-	-	-	2
Nerodia sipedon	N. Water Snake	-	-	-	-	-	-	1	1	-	-	2
Opheodrys aestivus	Rough Green Snake	-	-	-	-	1	-	-	-	-	-	1
Regina septemvittata	Queen Snake	-	-	-	-	-	-	-	1	-	-	1
Thamnophis sirtalis	Common Garter Snake	-	-	-	-	-	1	-	-	-	-	1
Unidentified		-	-	-	-	-	-	-	2	-	-	2
Subtotal		2	-	-	-	3	2	1	4	-	-	12
	Totals	3	0	0	0	3	2	1	11	14	0	34

individual of this species was captured shortly before this research project began.

Reptiles

Thirty-four individual reptiles were recorded. Represented among these were four species of turtles, one lizard, and eight species of snakes. Four reptile families were represented. All of the turtle species encountered were expected. All species of turtles on the Reptiles and Amphibians of the Warner Parks list were found except Chelydra serpentina. Gentry (1956) reported collecting most of his specimens of Graptemys geographica in Middle Tennessee. However, this species has never been logged in the Warner Parks. The order Squamata was represented by only one species, Eumeces laticeps. Mason Sinclair reported in a recent phone conversation that Sceloporus undulatus was once so abundant in the parks that one could drive the roads and easily collect numerous specimens from the park fences (Numerous fence lizards were seen September 1990).

Eight species of snakes were found. No venomous snakes were encountered. Agkistrodon contortrix has never been recorded in the parks and only one specimen of Crotalus horridus has been encountered (Two separate unverified Timber Rattlesnake sightings were reported shortly after this study in August of 1990 in Percy Warner Park).

CHAPTER 4

DISCUSSION

Salamanders were the most abundant herptiles of the Warner Parks making up 79% of the total sample. Figure 3 depicts the remaining percentages of each herptile group.

As seen in Figure 3, the springs and streams yielded 77% of all herps encountered. However, the cedar-glade-like area proved richest yielding 6 species (Tables 3 and 4).

Samples from the terrestrial habitats were made up of 47% toads followed by 28% salamanders (Figure 4). All of the toads from terrestrial habitats were collected from the pit traps in the old-field area. Turtles were the most common herptile encountered in the large, aquatic habitats (river and ponds) making up 68% of their total yield (Figure 4). However, 60% of the herps found at the Nature Center pond were toads. Springs and streams were dominated by salamanders (99%). The remaining 1% was represented by the one Diadophis punctatus found in the study (Figure 4). The 8.6-kilometer (13.8-mile) loop of park road yielded Bufo americanus (93%) and Rana palustris (7%) (Figure 4).

Twenty-three of the 33 species (70%) previously listed in the Nature Center's Reptiles and Amphibians of the Warner Parks (Table 1) were observed. Two species (Notophthalmus viridescens and Rana palustris) were added to this list. The 10 species on the list that were not encountered in this study could probably be found if research was continued through the fall and winter breeding periods.

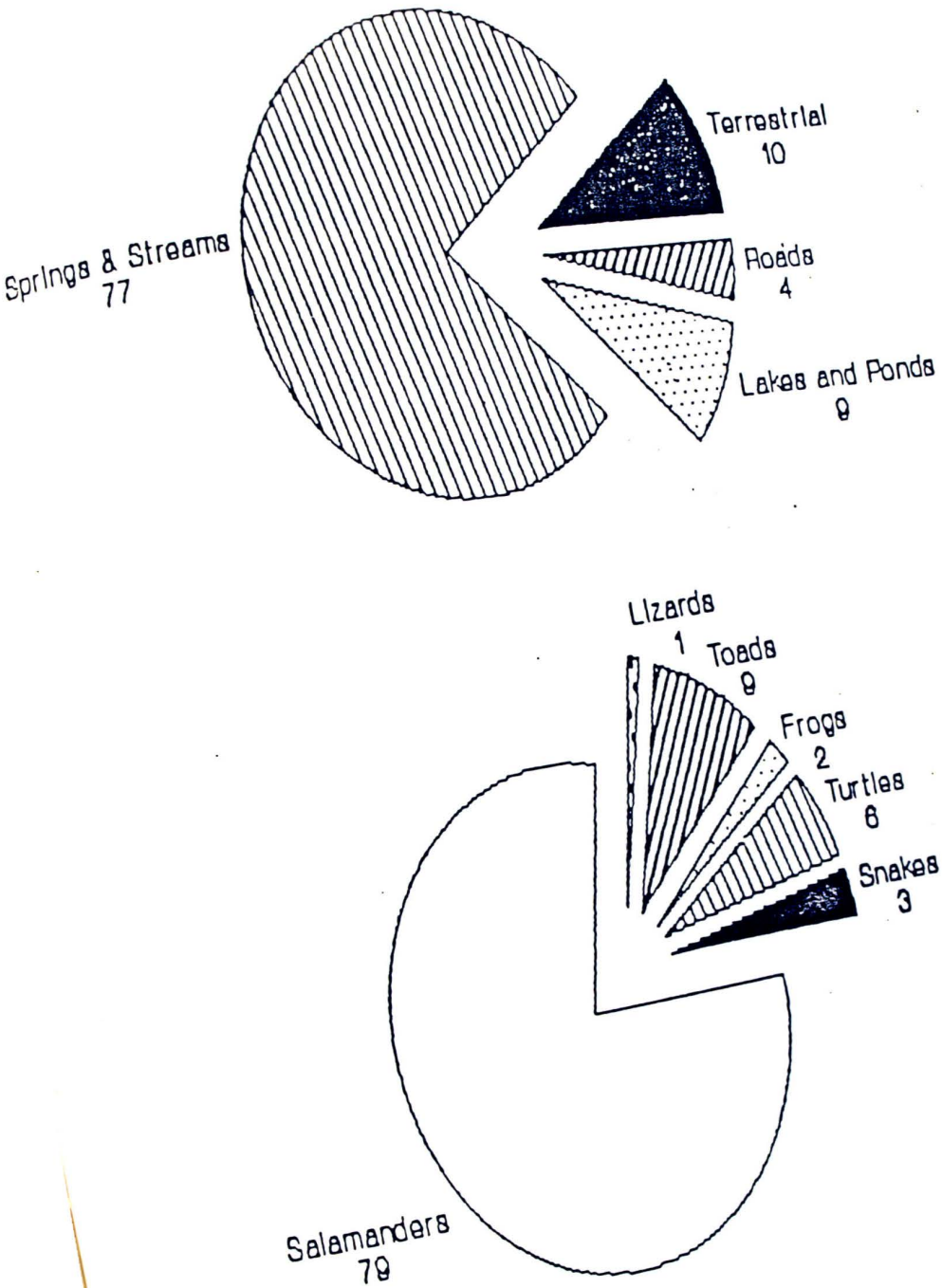
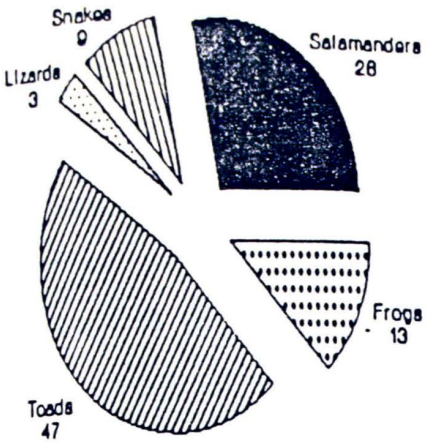
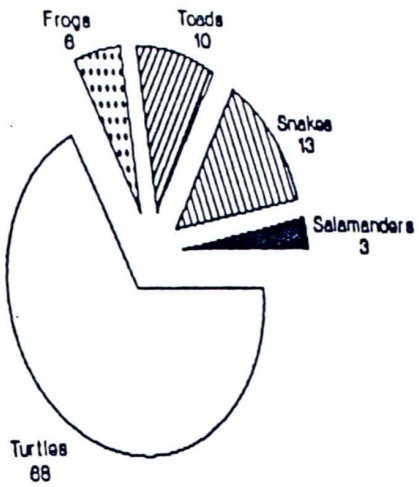


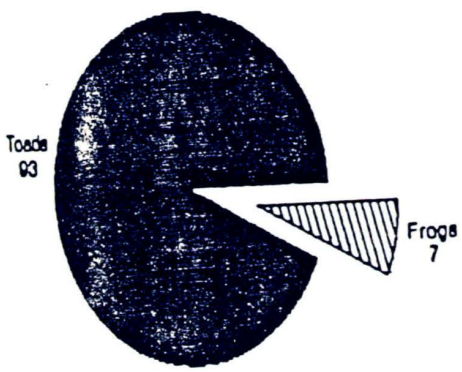
Figure 3. Percent of total sample found in each of the major habitat types (top) and broken down by major groups.



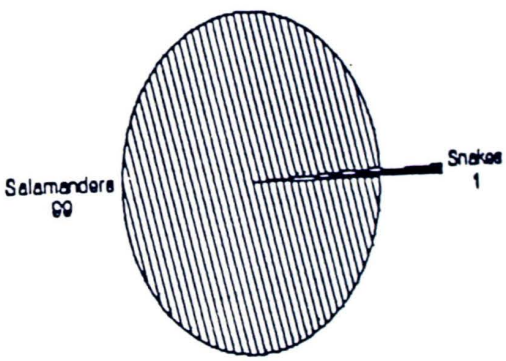
Terrestrial



Lakes, Pond, and River



Park Roads



Springs and Streams

Figure 4. Percent of total species complement in each habitat type by major herptile groups represented.

There are several species of herptiles that have never been recorded in the Warner Parks but appear in the literature for Davidson County. The salamanders of Middle Tennessee received much attention in the 1950's and 60's. Sinclair (1950), Gentry (1955), and Ashton (1966) all reported Necturus maculosus as common components of the Davidson County river systems. Seining the Little Harpeth River from November through February could prove more fruitful in this quest. Gentry (1955) described Cryptobranchus alleganiensis as common throughout the Cumberland River system of which the Little Harpeth River is a part. Ashton (1966), however did not find this species in Davidson County. Both Ashton and Gentry found Ambystoma maculatum and A. opacum to be numerous and widespread throughout Davidson County. Collecting trips in October should increase the chances of finding A. opacum. Sinclair (1950) collected one Ambystoma texanum in a plant hotbed under the ground in Green Hills of Davidson County, approximately five miles from Percy Warner Park.

Several species of frogs found near, but not in, the Warner Parks should be looked for there. I have heard Hyla crucifer's early spring call over much of Middle Tennessee, but I have never heard it in Percy or Edwin Warner Park. H. crucifer seems to prefer shallow water with an abundance of vegetation, a habitat not common in the Warner Parks. Another frog with this habitat preference known in Davidson County (Gentry 1955) but not in the Parks is Gastrophryne carolinensis. Rana clamitans, R. sylvatica, and R. pipiens should also be sought in the Warner Parks. These species are common

throughout most of Middle Tennessee (Gentry 1955). I have seen the wood frog in fair numbers at Marrowbone Lake, a Tennessee Wildlife Resources Agency impoundment in Northwest Davidson County.

Reptiles not reported but probable in the Warner Parks include Sternotherus odoratus and Kinosternon subrubrum. Both were described by Gentry (1955) as common throughout Tennessee. Storeria dekayi's range also covers Tennessee (Gentry 1955) and should be found in the the Parks.

The cedar glade-like habitat found in the Warner Parks does not meet the criteria of a true cedar glade. However, its xeric, limestone, open, conditions with red cedar (Juniperus virginiana) as the dominant tree make it very similar to a glade environment. Jordan et al. (1968) studied the amphibians and reptiles of a Middle Tennessee cedar glade in Cedars of Lebanon State Forest. Three glade herptiles that were found to be common and should be pursued in the Warner Parks' glade-like habitat include Tantilla coronata, Sceloporus undulatus, and Cnemidophorus sexlineatus.

Chapter 5

Conclusions

The results of this research project represent a preliminary inventory of the herpetofauna of the Warner Parks. The following conclusions can be drawn from this study:

1. The Warner Parks serve as a refuge for a rich winter and spring herpetofauna typical of the outer Central Basin.

2. A complete year-round survey of the area's herpetofauna is needed to fully document its richness and diversity.

3. Continuation of the parks' natural resources inventory will provide the data base needed for sound management decisions and future studies.

4. The Warner Parks are an ideal setting for studies on the influence of urban pressures on the health of natural ecosystems.

Literature Cited

Ashton, T.E. 1966. An annotated check list of order Caudata (Amphibia) of Davidson County, Tennessee. J. Tenn. Acad. Sci. 41:106-111.

Gentry, G. 1955 and 1956. An annotated checklist of the amphibians and reptiles of Tennessee. J. Tenn. Acad. Sci. 30:168-176 and 31:242-251.

Johnson, W.J. and T.C. Armistead. 1986. The Warner Parks preservation plan. William J. Johnson Assoc. Inc. with Tara C. Armistead Landscape Architects. Nashville, TN. 81 pp.

Johnson, W.J. and T.C. Armistead. 1987. The Warner Parks master plan. William J. Johnson and Assoc., Hodgson and Douglas Landscape Architecture, Planning and Urban Design, and Tara C. Armistead Landscape Architects. Nashville, TN. 193 pp.

Jordan, R.O., J.S. Garton, and R.F. Ellis. 1968. The amphibians and reptiles of a middle Tennessee cedar glade. J. Tenn. Acad. Sci. 43:72-78.

Sinclair, R.M. 1950. Notes on some salamanders from Tennessee. Herpetologica 6:49-51.