

FINAL REPORT

**SURVEY OF THE AMPHIBIANS AND REPTILES
OF
VICKSBURG NATIONAL MILITARY PARK**

(CONTRACT NUMBER P5600010019)

by

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FINAL REPORT**

ABSTRACT: *This is a survey of the amphibians and reptiles of Vicksburg National Military Park (VNMP). The field studies were periodic, beginning on 1 March 2001 and terminating on 10 May 2002. The survey located extant area specimens in major regional museums and found six salamander, 12 frog and toad, nine turtle, four lizard, and 14 snake species within the park boundaries. No federal or state threatened or endangered species were found within the park. Voucher specimens were collected and will be housed at the Mississippi Museum of Natural Science in Jackson, Mississippi.*

INTRODUCTION

This report summarizes the results of a survey of the amphibians and reptiles of Vicksburg National Military Park (VNMP). Assessment of relevant literature and locality records of selected museums preceded the field survey. Field work to locate species within the park boundaries began on 1 March 2001 and terminated on 10 May 2002. The survey inventoried and assessed the herpetozoan species found within the boundaries of the park. Voucher specimens and appropriate data were collected for each species found during the field survey. The park and its major roads and railroads are shown in Fig. 2, p.10.

Vicksburg National Military Park was established in 1899 to commemorate the siege of Vicksburg in 1863. The major portion of the park's approximately 1,800 acres lies within the northeastern section of the city of Vicksburg in Warren County, Mississippi.

Satellite sections of the park (Louisiana Circle, South Fort, and Navy Circle), are found along south Vicksburg's Washington Street and in Madison Parish, Louisiana at the community of Delta (Grant's Canal). Although there were several brief visits to the satellite sites, the major emphasis of the survey was directed within the approximately 1798 acres in northeastern Vicksburg.

VNMP is reasonably close to the Gulf of Mexico and its generally mild and humid temperatures are influenced by air movements inland from the Gulf. The mean annual temperature is 67 degrees Fahrenheit and the mean annual precipitation is about 50 inches (Irish, et al., 2002) to 60 inches (Walker, 1997). Summer temperatures are high, with an average of 95 days per year reaching 90 degrees Fahrenheit (Irish, *et al.*, 2002) Winters are moderate, with temperatures only rarely going below freezing.

The Mississippi lands of the park are located primarily on the Blufflands, a wide, north-south belt of loess-based hills bordering the alluvial valley of the Mississippi River. The northwest section of the main park west of the U.S. highway 61 and the Louisiana satellite are located on the Mississippi River alluvial plain. Soils are predominately easily eroded sandy-clays on the hill tops and slopes, and clays or sandy clays on the valley floors.

The major lands of the park are in the shape of a boomerang or reversed "C." The park boundaries enclose an inner and outer range of steep bluffs. These are roughly aligned west to east in the northern third of the park and north to south in the more southern sections. Deep valleys lie between the bluff hills. Most of the valleys and slopes are covered by well-developed, mesophytic forests which have resulted from Civilian Conservation Corps plantings during the 1930's. These plantings were intended to stop severe erosion of the previously cleared bluff lands.

The paved roads of the park are mostly on the bluff ridges. The roads are typically bordered by lawn-like grass borders of varying width. The "lawns," in turn, are bordered closely by forests in most of the park. Bluff slopes are covered with mowed forbs and grasses at several park localities (e.g., Hovey's Approach, Thayer's Approach, along Graveyard Road, and along much of Connecting Road and the Cairo Museum area). According to an environmental assessment report prepared by VNMP personnel (Irish, *et al.*, 2002, p. 13), the park is 70% forested and 30% open.

White oak (*Quercus alba*), black oak (*Quercus velutina*), northern red oak (*Quercus rubra*), white oak (*Quercus alba*), sugar maple (*Acer barbatum*), and basswood (*Tilia americana*) are among the species dominating the overstory. Smaller trees, as sassafras (*Sassafras albidum*), dogwood (*Cornus florida*), redbud (*Cercis canadensis*), box elder (*Acer negundo*), red maple (*Acer rubrum*), red cedar (*Juniperus virginiana*), and saplings of the overstory trees usually make up much of the understory. Walker (1997) reported on the park's vascular plants.

Glass Bayou and Mint Springs Creek, tributaries of the Mississippi River, are the major drainage streams of the park.

Mint Springs Creek is usually a shallow, clear water creek that lies almost entirely within the park and has two significant (dispersal-limiting) waterfalls produced by rock outcroppings. The lower stretches of the creek flow year-around, but the upper portions are reduced to a series of shallow pools during dry weather. During especially heavy rains, lower Mint Springs Creek becomes a raging torrent that rises well above its normal banks. When the Yazoo Canal and Mississippi River reach flood stages, the waters of Mint Springs are deeply flooded all the way to the western waterfall.

Glass Bayou is usually a shallow, clear water creek which, according to available maps, flows primarily south of and along new Jackson Road. Two small tributaries parallel Jackson Road on

the north for short distances within the park. However, a tributary running northeast from Glass Bayou has deeper pools. This tributary crosses Union Avenue near the Boy Scout trail north of the Wisconsin Monument. The deep pools are considerably southwest of the tributary intersection with Union Avenue. Unfortunately, the shallow bed of this tributary where it approaches Jackson Road does not suggest the deep pools to the north and the pools were not discovered until the last trip to VNMP. Water flow in Glass Bayou increases considerably during and after heavy rains.

Dibble and Smiley (1999) provided detailed data on the physical aspects of Glass Bayou and Mint Springs Creek.

A small portion of the park west of Washington Avenue and the paralleling railroad embankment is on the Mississippi River flood plain. During high waters of the river and the Yazoo Canal, this part of the park becomes a flood plain swamp dominated by willow trees (*Salix sp.*). Flood waters reach the railroad embankment and gradually recede, usually over a period of several weeks. Eventually, the flood plain becomes dry and remains so until the next flood. The exact park boundaries on the flood plain vary on the four maps available to me and the precise limits could not be determined during field studies.

Other than isolated pools within the stream systems, the park has no ponds, lakes or other small bodies of permanent non-flowing water. Two off-site permanent ponds are near the boundaries. One of these is east of Union Road and immediately northeast of the junction with the park's main service road. The other lies in the lowlands northeast of the Navy Monument.

Three of the park satellites (Louisiana Circle, South Fort, and Navy Circle), lie along the city bluffs overlooking the Mississippi River. They border the west side of Washington Street. All are less than an acre in size. They consist of closely cropped

mowed grassy lawns on the crests and more or less open woodlands on the bluff slopes.

Grant's Canal in Monroe Parish, Louisiana borders the Mississippi River levee. This satellite is mostly a mowed lawn with a small, nearby closely-cropped low area that occasionally holds a temporary pool of water. During this study, water was observed in this low area only on the last visit to the site. Grant's canal is approximately ½ acre in size.

VNMP ASPECTS SIGNIFICANT TO THE SURVEY

Certain aspects of VNMP were particularly significant to the outcome of this survey of amphibians and reptiles.

The main section of the park and its satellites in Mississippi are completely surrounded by the city of Vicksburg. Numerous homes and businesses lie within a short distance of the park's boundaries. The forested slopes east of Union Drive and south and west of Confederate Drive, e.g., are but a thin veneer of woodlands. The forested lands are more extensive in the north than elsewhere in the park, but they are also bordered by residential areas. For the most part, the park's herpetofauna is relatively isolated from nearby populations and corridors for population exchanges are limited.

The extant forests were clear-cut during the civil war and extensive erosion of the slopes occurred. Extensive reforestation did not take place until the 1930's. The clear-cutting and severe slope erosion during the siege itself would have devastated most local populations of amphibians and reptiles. In subsequent years, the continued growth of the City of Vicksburg, cultivation and clearing of surrounding lands, and continuing hillside erosion and accumulation of siltation with park streams would have further eroded the habitats in the park and adjacent areas. Repopulation would have been delayed and hindered for years after the civil war, including during the early years of reforestation. It is likely that most of the park's herpetofaunal species have established (or reestablished) their park populations within the last 50 or 60 years.

The absence of ponds, lakes, or other permanent bodies of standing water on park lands is significant. Both of the extralimital ponds adjacent to the park have park ditches draining into them but these are mostly dry except for brief periods following heavy rains. Dry ditches are less likely to provide dispersal routes for amphibian species associated with these ponds.

Only two shallow woodland pools were found within the park boundaries north of Mint Springs Creek. Both pools proved attractive to breeding amphibian species and small reptiles. Both were ideal locations for drift fences. Inquiries of park personnel at the initiation of the study did not reveal either of these pools. One pool was not discovered by the principal investigator until half way through the survey and the other was found near the end of the project.

Both pools were observed to be oviposition sites for several species of frogs and salamanders. Unfortunately for their larvae, these pools rarely persisted long enough for metamorphosis to take place during the survey period. Literally thousands of dead frog, toad, and salamander larvae accumulated on the drying mud of one pool on three occasions. Additional thousands of dead salamander and frog larvae were found drying on the mud of the second pool on the last day of the study. No metamorphs were found under cover objects at either site, although recently metamorphosed bufonids and spadefoot toads were seen on a dry pool substrate on one occasion. For varying reasons, no other park sites proved suitable for drift fence installation. It was unfortunate that these pools were not known at the beginning of the study. Properly constructed

drift fences and associated locating devices would undoubtedly have revealed additional species.

Another major factor affecting detection of reptiles and amphibians was the extensive ground cover of tangled vines and other plants on the majority of the park's hilltops and down slopes. Movements up and down most park slopes were typically difficult and noisy, thus not conducive to seeing or catching herpetozoans. Some slopes, on the other hand, were free of heavy ground cover and easy to traverse. These were exceptions, however.

Despite the ground cover, hillside erosion is still considerable at many places in the park. Large trees often fall and their roots exposed the loess which then erodes rapidly downhill. By the time, the fallen trees decay sufficiently to become habitat cover for small amphibians and reptiles, their logs are half-buried deeply within the soil and the exposed portions are covered with vines. The overall result is that despite the fallen trees, few decaying logs can be turned or otherwise examined for their resident herpetozoans.

The vicinity of Mint Springs Creek seems, on casual inspection, to be an exceptionally good area to search for reptiles and amphibians. Unfortunately, the

borders of the creek are often densely populated with scouring rush (*Equisetum hyemale*) or often impenetrable, stands of large-spined trifoliate orange (*Poncirus trifoliata*). Beyond these stands, the hillsides and low grounds of the lower creek are completely covered by English ivy (*Hedera helix*), while the lands of the upper reaches of the creek often have a heavy ground cover of vines such as poison ivy (*Toxicodendron radicans*), honeysuckle (*Lonicera sp.*), Virginia creeper (*Parthenocissus quinquefolia*), and other species. Ground cover such as described makes field techniques such as land-cruising, cover boards, and various trapping methods almost impossible. While the immediate vicinity of the stream itself is collectible, the occasional severe floods remove natural cover objects and man-made devices (e.g., cover boards and traps) designed to detect amphibians and reptiles.

While the immediate borders of Glass Bayou are often thickly overgrown with shrubs and vines, the adjacent valleys typically have fewer tangles of vines and other ground-level plants than the borders of Mint Springs Creek. They are thus easier to traverse providing one enjoys moving up steep inclines through moderately abundant tangles of low canopy trees and a multitude of ground-level vines.

The valley floors between Union Drive and Confederate Drive are drained by small, sporadically flowing rivulets emerging from deeply eroded ravines. Incoming silts have kept these upper stretches waters in shallow channels, but further downstream, the streams often have very high banks. Old bottles and other man-made items can often be seen emerging from the stream banks at depths of six feet or more. During heavy rainfalls, these small rivulets often flood the valley floors, sweeping them clean of woody plant debris in many areas.

The periodically flooded willow swamp at the extreme northwest section of the park is bordered by a very steep railroad embankment. The sides of this embankment, within the park, are covered with large limestone rocks. Along much of the embankment, huge piles of old railroad ties lie on

top of these rocks. Where the embankment is exposed to the sun, these barriers are covered by kudzu (*Pueraria lobata*). In shaded areas, small trees, bushes, and vines cover them. Moving up and down the embankment is typically very difficult for both animals and man. Many river turtles seeking nesting sites get trapped within the rocks and logs and die. Very few can negotiate their way to more suitable nesting sites within the park.

Another park area that should have been an excellent source of amphibians and reptiles was rendered almost useless by extensive growths of kudzu. The railroad right-of-way within the south loop of the Park has numerous discarded ties along the sides and adjacent hillsides. Such ties are often excellent cover for various amphibians and reptiles. The few that could be turned revealed a number of small salamanders and lizards. Most, however, were overgrown by kudzu.

The park, protected from hunting for many years, harbors a considerable

population of predatory mammals. Raccoons (*Procyon lotor*) patrol the streams nightly searching for frogs, crayfish, and other mammals, particularly armadillos (*Dasyus novemcinctus*), opossums (*Didelphis virginiana*), various canids (*Canis sp.*) and felids (*Felis catus*) prowl the stream beds on a less frequent basis. Night lighting along waterways usually produces considerable numbers of ranid frogs. This is not the case at VNMP. Adult ranids in park streams tend to leave the streams and spend their nights within dense stands of stream-side scouring rush or other bordering vegetation rather than in the water.

The paved roads within the park produced a number of dead specimens (DOR's) during daylight hours, but few dead reptiles or amphibians were found at night. DOR's were found except on very rainy nights. On several occasions near twilight, park rangers called and informed me of the location of road-killed snakes. In every case, these were gone by the time I reached the site. The dead snakes were undoubtedly removed by night-moving predators. It was a rare night within the park, when I failed to see two or three red foxes (*Vulpes fulva*), several raccoons, striped skunks (*Mephitis mephitis*), and opossums prowling the roads.

Coyotes (*Canis latrans*) are either residents or transients particularly within the north park. These plus domestic dogs (*Canis familiaris*) and domestic cats (*Felis catus*) from numerous homes adjacent to the park, roam the park roads at night. They remove herpetofaunal carrion from the roads and occasionally devour living reptiles and amphibians. At least one feral dog (*Canis familiaris*) was living in the woodlands of the north park and was seen prowling the roads at dusk.

MUSEUMS SURVEYED AND PRIOR STUDIES

No published herpetofaunal surveys have taken place within VNMP boundaries. Walker (1997) studied the vascular flora of the park. There are ongoing studies of stream physicochemistry, fishes, and macroinvertebrates (Harrel and Dibble, 1998; Dibble and Harrel, 1998; and Dibble and Smiley, 1999). The park has published anonymously-authored brochures on park wildflowers, birds, and mammals (Anonymous, Undated a, b, c) but no brochures on reptiles and/or amphibians. These brochures were based on published general distribution summaries and not on actual surveys within park boundaries.

Prior to the initiation of field studies, letters were sent to curators of collections

considered to be the most likely the repositories for reptiles and amphibians collected within the vicinity of VNMP.

A copy of this letter is included as Appendix A. The letter requested museum numbers and locality data for specimens from Warren County, Mississippi and Madison Parish, Louisiana.

The museums and universities surveyed by mail were:

American Museum of Natural History
Smithsonian National Museum of Natural History
Louisiana State University Museum of Zoology
Mississippi Museum of Natural Science
University of Louisiana at Lafayette
University of Louisiana at Monroe
Tulane University

The American Museum of Natural History had no specimens from these two areas. The collections of the University of Louisiana at Lafayette were donated to the Louisiana State University Museum of Zoology and data were not available. The University of Louisiana at Monroe and Tulane University supplied data only on the computer-cataloged portions of their collections.

As might be anticipated, the Smithsonian National Museum of Natural History and the Mississippi Museum of Natural Science possessed the majority of listed specimens from Warren County and Madison Parish.

Locality records for Madison Parish prior to 1988 are mapped in Dundee and Rossman (1989).

The locality records in this book summarize records from Louisiana State University, Tulane University, and other museums and universities.

Museum specimen records for sites within or near the park will be discussed under the individual species accounts.

METHODS

Six trips involving 36 days for the Vicksburg National Military Park survey were proposed in the research funding proposal. Nineteen trips involving 57 days were necessary. These trips were made on the following days:

May 1-4, 2001 (4 days)
March 8-10, 2001 (5 days)
March 30-31, 2001 (2 days)

April 6-8, 2001 (3 days)
April 20-22, 2001 (3 days)
April 27-29, 2001 (3 days)
May 10-13, 2001 (4 days)
May 21-25, 2001 (5 days)
June 8-10, 2001 (3 days)
June 28-July 1, 2001 (4 days)
July 20-22, 2001 (3 days)
September 20-23, 2001 (4 days)
October 18-20, 2001 (3 days)
February 1-2, 2002 (2 days)
March 13-14, 2002 (2 days)
April 11-14, 2002 (3 days)
April 19-21, 2002 (3 days)
May 10, 2002 (1 day)
September 6, 2002 (to MMNS, not VNMP)

Search methods were designed to locate salamanders, frogs, turtles, lizards, and snakes under the various conditions encountered in the park. Preliminary field surveys identified and located most major habitat types on the site. Habitat-specific and species-specific survey techniques designed to verify the occurrence and probable distribution of the site's species were then utilized. Aquatic and terrestrial habitats were examined visually, repeatedly, and by various methods. Field methods were adjusted to weather conditions as much as possible.

Park rangers were urged to report their observations on living and dead species when possible and a formaldehyde-filled bucket was provided to them for road-kill depositions during my absence from the park. A data sheet (Attachment B) clipboard accompanied the bucket. Ranger Bob Irish was particularly helpful in this regard. Brian Cage, Amanda Cage, and Mike Harrell assisted with the collecting during trip three.

Linear and habitat-focused walking transects involving surface searches and searches under cover objects were done by day and at night. Searches were designed so as to uncover eggs, larvae, juveniles, subadults, adults, and other evidence of species presence. Eggs and larvae were identified in the field or in my University of Mississippi laboratory. Nikon 10X/50 and Fujinon

8X/40 binoculars and a Fujinon, tripod-mounted, 20X-60X Super 80mm telescope were used to facilitate field observations. Road-cruising by vehicle was also used extensively. A Radio Shack Stereo Amplifier Listener was used to improve detection of night calling frogs.

A Garmin 12 XL GPS meter was used for recording precise locality data. Several cameras, including a Nikon F70, and associated close-up and telephoto lenses provided photographic evidence of species. Night lights included a one million candle power 12 V search light and a Koehler head lamp. Dipnets, seines, glue traps, Pillstrom tongs, field

cover rakes, were used as necessary. Forty-eight two foot square, 1/4" masonite cover boards plus assorted sizes of other boards were utilized in various park locations.

An electric shocker was not utilized because of research conflicts with Dr. Eric Dibble's (Department of Wildlife and Fisheries, Mississippi State University) ongoing fish and invertebrate studies in Mint Springs and Glass Bayou. Dr. Dibble did provide comments on the presence and absence of amphibians and reptiles resulting from his own electro-shocking within the park boundaries. A drift fence was planned but not utilized because a suitable site was not uncovered until midway through the survey.

Chromosome analyses for a small sample of frogs of the *Hyla chrysoscelis/versicolor* complex was done by Dr. Steve D'Surney and his graduate students of the University of Mississippi Department of Biology. The report on this sample is summarized within the species accounts and included as Appendix C.

Field notes were recorded on a Hewlett-Packard Jornada Pocket PC. These were transferred to a HP laptop computer each night. A binder of species locality maps was carried into the field and site records were usually recorded on appropriate maps at the time of the observation.

Collins (1997) is the usual citation for nomenclature of North American amphibians and reptiles. A newer version (Collins and Taggart, 2002) has yet to become available. In order to use the most current nomenclature, technical and vernacular names utilized in this report are those listed on the Common and Scientific Names lists of the Center for North American Herpetology (CNAH) ([Http://www.naherpetology.org](http://www.naherpetology.org)). The date and specific internet address are indicated within the appropriate taxonomic headings. My usage of these names does not necessarily imply my agreement with the CNAH nomenclatural choices.

Voucher specimens were taken and data on these are summarized in Appendix D. Specimens were road kills or skeletal material when possible. Live specimens were dispatched with anesthetic overdoses, fixed in 10% formalin, and, except for larvae, stored in 55% isopropyl alcohol. Larvae were stored in 10% formalin.

SALAMANDERS (ORDER CAUDATA)

A. GENERAL COMMENTS

Salamander field techniques involved day and night searches within aquatic and

terrestrial habitats for eggs, larvae, and adults. Dip netting, night lighting along stream beds, searches under natural cover objects (*e.g.*, rotting logs, wood piles), and researcher-placed cover boards proved to be the most effective methods. Several salamanders were found on park roads during heavy night rainstorms.

Salamander nomenclature followed in the report was taken from the CNAH internet site: <http://www.naherpetology.org/nameslist.asp?id=5> on August 13, 2002.

B. SPECIES FOUND AT VNMP

Five species were found within the boundaries of VNMP during this survey:

Ambystoma maculatum (Spotted Salamander)
Ambystoma talpoideum (Mole Salamander)
Desmognathus conanti (Spotted Dusky Salamander)
Eurycea longicauda guttolineata (Three-lined Salamander)
Plethodon mississippi (Mississippi Slimy Salamander)

An additional specimen remains unidentified and is listed as “*Ambystoma sp.*” in the following Species Accounts.

C. SPECIES ACCOUNTS

1. SPOTTED SALAMANDER (*Ambystoma maculatum*)

TAXONOMIC COMMENTS: No subspecies have been defined.

VNMP DISTRIBUTION MAP: Fig. 2

ESTIMATE OF ABUNDANCE AT VNMP: Common within preferred habitats.

VNMP HABITAT: Adults, eggs and larvae known only from two large woodland rain pools peripheral to tributaries of Mint Springs Creek north of Union Drive.

COMMENTS: Eggs and larvae were conspicuous during late winter and early spring months of 2001 and 2002. Adults seen in woodland pools during February, 2002 visits to park. These pools dry quickly and literally thousands of dead spotted salamander larvae covered the muck floor on several occasions during both years of the survey. Surviving metamorphs were never observed under nearby cover boards although these were used by adults and other species.

2. MOLE SALAMANDER (*Ambystoma talpoideum*)

TAXONOMIC COMMENTS: No subspecies have been described.

VNMP DISTRIBUTION MAP: Fig. 3

ESTIMATE OF ABUNDANCE AT VNMP: As judged by collection records:
uncommon.

However, a drift fence around the two large Mint Springs Creek tributary large woodland pools would probably produce sufficient captures to indicate that the species is moderately common within its preferred habitats.

VNMP HABITAT: Eggs and larvae known only from temporary woodland rain pools peripheral to tributaries of Mint Springs Creek north of Union Drive.

COMMENTS: Larvae were found on several occasions during late winter and early spring months of 2002. No egg masses, metamorphs or adults were seen at any time even though the woodland pools were checked on rainy nights during the breeding season. These pools dry quickly and more than 50 larvae were found dead on the damp muck floor on two occasions. On no occasion did either of the pools endure long enough for metamorphosis to occur.

3. UNKNOWN MOLE SALAMANDER (*Ambystoma sp.*)

TAXONOMIC COMMENTS: See remarks under “Comments.”

VNMP DISTRIBUTION MAP: Fig. 4

ESTIMATE OF ABUNDANCE AT VNMP: Common if species is *A. maculatum*.
Unknown if otherwise.

VNMP HABITAT: The single individual was lying in the shallow water of a large woodland rain pool north of the east/west section of Union Drive. The GPS reading for this locality was: N 32 deg. 22.511', W 090 deg. 51.107'.

COMMENTS: This specimen was collected as voucher specimen **EDK-12130**. The salamander had been killed by a predator and was bloated from decomposition gases when located. The pool

contained 41 egg plinths of *Ambystoma maculatum*. The individual was solid gray-black with no trace of yellow spotting. Melanistic spotted salamanders are unusual, but I have seen two previously in north Mississippi.

In the field, I noted that the specimen had an unusually small head, too large to be *Ambystoma texanum* and, seemingly, too small for *A. maculatum* or *Ambystoma tigrinum*. When I returned to my University of Mississippi laboratory and checked the

specimen against the few *A. maculatum* available, the head of EDK-112130 was considerably smaller and the rear toes were longer and more pointed than the toes of all the *A. maculatum*. The tongue and palatal teeth were identical to *A. maculatum* and not *A. texanum*. Because of predator damage to the head and distortion of the body, costal groove counts could not be made.

On September 6, I drove to Jackson to show the specimen to Dr. Bob Jones of the Mississippi Museum of Natural Science. Dr. Jones immediately saw the identification problems. I then measured the body proportions of the MMNS *A. maculatum* collection and only one specimen had head and body proportions similar to EDK-112130. All others had considerably larger heads. None had matching toes for length or slenderness.

My feeling is that EDK-112130 is *A. maculatum* and that the elongated, pointed rear toes are an artifact of death and drying, preservation, or both. However, attempts should be made to obtain additional specimens from this site. Pending further studies of the specimen (X-rays, etc.) and additional samples from the site, it seems best to consider the specimen as *Ambystoma sp.* at this time..

4. SPOTTED DUSKY SALAMANDER (*Desmognathus conanti*)

TAXONOMIC COMMENTS: The majority of park specimens collected appear to be this species, although there was considerable variation in color patterns. No subspecies have been described. This species is sometimes considered to be the subspecies *Desmognathus fuscus conanti* (e.g., Petranka, 1998). Titus and Larson (1996) recognized *conanti* as a distinct species and Bonnett (2002) confirmed their designation. Warren County museum specimens cataloged as *D. fuscus* are most probably *D. conanti*. Some park individuals had color patterns that made species determination impossible. Range maps of some authors place the park within the range of *Desmognathus auriculatus*. Most authorities have difficulties identifying salamanders in the *D. auriculatus/conanti/fuscus* complex (e.g. Dundee and Rossman, 1989) and while no typically-patterned *D. auriculatus* were found during the survey, the possibility of *D. auriculatus* within the park cannot be discounted.

VNMP DISTRIBUTION MAP: *Fig. 5*

ESTIMATE OF ABUNDANCE AT VNMP: Abundant within preferred habitat.

VNMP HABITAT: Adults and young were common within and along the shorelines of Mint Springs Creek, Glass Bayou, and their tributaries. Individuals were occasionally found in tributaries of other shallow streams and under rotting logs on the low hillsides. They were most common in and near lotic waters. No individuals were found in woodland rain pools.

COMMENTS: Larvae and metamorphs were found on several occasions in Mint Springs and Glass Bayou and their tributaries. Nests are usually near shorelines but none were found.

5. LONGTAIL SALAMANDER (*Eurycea longicauda*)

TAXONOMIC COMMENTS: The subspecies in VNMP is *Eurycea longicauda guttolineata*, the Three-lined salamander. Carlin (1997) considered this subspecies to be a distinct species, *Eurycea guttolineata*.

VNMP DISTRIBUTION MAP: Fig. 6

ESTIMATE OF ABUNDANCE AT VNMP: Abundant

VNMP HABITAT: Adults and young were common within and along the shorelines of Mint Springs Creek, Glass Bayou, and their tributaries. They were also abundant in most seepage areas and around the margins of the larger temporary woodland rain pools. Individuals were occasionally found in tributaries of other shallow streams and under rotting logs on the low hillsides. Surprisingly, several were found on the flood plain west of U.S. Highway 61. Two healthy adults were found under logs only a few days after the logs were under several feet of flood waters.

COMMENTS: Larvae were found in Mint Springs tributaries and in one shallow woodland rain pool. The two foot square cover boards were very effective in locating these salamanders.

6. MISSISSIPPI SLIMY SALAMANDER (*Plethodon mississippi*)

TAXONOMIC COMMENTS: No subspecies have been defined.

VNMP DISTRIBUTION MAP: Fig. 7

ESTIMATE OF ABUNDANCE AT VNMP: Common with preferred habitats

VNMP HABITAT: Typically found under and within logs and other cover objects located on wooded hillsides and adjacent wooded ravines. Within the VNMP, they were usually under cover objects in sun-exposed areas adjacent to the Southern Railroad of Mississippi tracks.

COMMENTS: Juveniles and adults were common only under rotting logs and partially buried railroad ties adjacent to the railroad tracks south of U.S. Route 80. This area is sun-exposed and mostly overgrown by kudzu. A few individuals were found within the deciduous woodlands on the adjacent hillsides. Several were also found on wooded

hillsides just north of the park's main service road and one was found south of Union Drive in a tributary stream bed of Mint Springs Creek.

D. OTHER POSSIBLE VNMP SPECIES

It is likely that other species will eventually be found within the park boundaries. Records for other species are currently known from elsewhere in Warren County, Mississippi and Madison Parish, Louisiana.

The Mississippi Museum of Natural Science houses Warren County specimens of the following species:

Ambystoma maculatum (MMNH-3177)

Amphiuma tridactylum (MMNH-3178)

Desmognathus fuscus (MMNH-3156, 3172, 3174, 3175, 6015, 6016, 6017, 6018, 6019, 6020, 6021, 6022, 6023, 6024, 6025, 6026, 6027, 6028, 6029)

Eurycea longicauda (MMNH-6434, 6438, 6444, 6447)

Necturus maculosus (MMNH-1779)

The Louisiana State University Museum of Zoology has Warren County, Mississippi records for the following species:

Desmognathus fuscus (LSUMZ-15937, 16032, 16054, 160056, 16075, 58737)

Ambystoma maculatum (LSUMZ-58628)

Ambystoma opacum (LSUMZ-58671)

The L.S.U. Museum of Zoology has Madison Parish, Louisiana records for these species:

Ambystoma opacum (LSUMZ-23912, 23913, 23914)

Ambystoma talpoideum (LSUMZ-23915, 23926, 23935)

Notophthalmus viridescens (LSUMZ-23947, 23948)

Tulane University reported only *Ambystoma opacum* from Madison Parish (TU-4179-4183, 4225-4226). The Smithsonian Institution (United States National Museum) reported no Warren County salamanders but listed a number of *Ambystoma opacum* specimens from Madison Parish (USNM-099185, 099186, 118395, 118396, 118397, 308880, 376539, 308881). The University of Louisiana at Monroe and the American Museum of Natural History reported no salamanders from Warren County or Madison Parish.

Of the known county museum records, only the following species were not taken within VNMP:

Ambystoma opacum
Amphiuma tridactylum (= *A. means tridactylum* above)
Notophthalmus viridescens
Necturus maculosus
Eurycea quadridigitata (= *Manculus quadridigitatus* above)

Cook's (1957) study on Mississippi salamanders cited Warren County survey records for the following species:

Ambystoma texanum
Amphiuma means tridactylum (= *A. tridactylum*)
Desmognathus fuscus brimlyorum (probably = *D. conanti*)
Eurycea longicauda guttolineata
Manculus quadridigitatus (= *Eurycea quadridigitata*)

Cliburn (1972) reported *Ambystoma opacum*, *Ambystoma talpoideum*, and *Notophthalmus viridescens* from a loess bluff pool in Warren County, Mississippi.

Cliburn and Carey (1975) reported ***Ambystoma talpoideum*** from a small permanent pool near Vicksburg in Warren County, Mississippi.

Available literature sources suggest other possibilities. The report of the Rare and Endangered Species Committee (1975) listed the following "rare and threatened" Mississippi salamanders not found in this survey, as having ranges which might include VNMP:

Ambystoma tigrinum
Hemidactylium scutatum

Cliburn (1976) noted Mississippi ranges which included VNMP for the following species which were not found in the park during the present survey:

Amphiuma tridactylum
Siren intermedia
Notophthalmus viridescens
Ambystoma opacum
Ambystoma texanum
Ambystoma tigrinum
Eurycea quadridigitata
Pseudotriton ruber
Eurycea bislineata cirrigera
Desmognathus auriculatus

The distribution maps of Lohoefer and Altig(1983) which included the Vicksburg area, had the following species which were not found within the park in the present study:

Ambystoma opacum
Ambystoma texanum
Amphiuma tridactylum
Eurycea cirrigera (= *E. bislineata* in their paper)
Notophthalmus viridescens
Pseudotriton ruber
Siren intermedia

Lohoefer and Altig's "Group Two" species had ranges ending near but not including VNMP.

These salamanders included:

Amphiuma means
Desmognathus auriculatus
Eurycea quadridigitata

Distribution maps of Conant and Collins (1998) show the following species as having range distributions which include VNMP:

Amphiuma tridactylum
Siren intermedia
Ambystoma opacum
Ambystoma texanum
Notophthalmus viridescens
Plethodon websteri
Eurycea cirrigera
Eurycea quadridigitata

Petranka (1998) included the following species not found during the park survey, as having ranges that include VNMP:

Ambystoma opacum
Amphiuma tridactylum
Eurycea bislineata cirrigera
Eurycea quadridigitata
Plethodon websteri
Notophthalmus viridescens
Siren intermedia

Petranka's maps excluded VNMP from the ranges of the following species:

Amphiuma means

Desmognathus auriculatus

Pseudotriton ruber

Madison Parish, Louisiana salamander locality records were summarized by Dundee and Rossman (1989). They noted only *Ambystoma opacum* for this parish:

The *Desmognathus conanti* collected within the park during the 2001-2 survey was previously known as *D. fuscus conanti*. Although I have not seen the specimens listed above as *D. fuscus*, they are probably *D. conanti*.

The absence of *Ambystoma opacum* and *Notophthalmus viridescens* from the survey was surprising and it is very likely that both will be added to the park's herpetofauna. The absence of permanent lentic waters within the park may account for the absence of *N. viridescens* in my park sampling. I had no opportunity to check the two near-park ponds for this species, but would presume at least one of these would serve as sites for the aquatic stages of this salamander. If so, the eft stage should eventually be found within the park although I would not expect it to be abundant. The two large but temporary woodland rain pools within the park should suffice as oviposition sites for *Ambystoma opacum*, although during the survey, these ponds were usually dry during the late fall months.

Eurycea quadridigitata may be anticipated on or near the park flood plain west of U.S. Highway 61. *Necturus maculosus* is known from the Mississippi River "just north of Vicksburg" (MMNS-1779) and while the park has a general absence of suitable habitats, the species may well enter the park's boundaries along lower Mint Springs Creek during periods of flooding.

The aquatic *Amphiuma tridactylum* and *Siren intermedia* were anticipated as possible species within Mint Springs Creek and Glass Bayou. However these were not found during my searches nor have they been located by the extensive stream electro-shocking of Dr. Eric Dibble. This suggests but does not insure their absence. Petranka's 1998 range map excludes *Amphiuma means* from the park and the results of the survey supports this exclusion.

Eurycea cirrigera is often found in the same habitats as *Eurycea longicauda guttolineata*. The abundance of the latter and the presence of numerous clear streams in the park suggest a possibility of the former although *E. cirrigera* may be excluded by factors specific to the loess hills.

Ambystoma tigrinum and *Hemidactylium scutatum* are uncommon in Mississippi and have relictual distributions. I would not predict their occurrence at VNMP, but would not be surprised if one or both species were found there. *Pseudotriton ruber*, elsewhere in Mississippi, is sometimes found in habitats similar to those in the park and might be another possible park species.

Plethodon websteri is known from nearby Hinds County (and elsewhere) in Mississippi and might

be another possibility. However, the extensive clear-cutting and erosion during and after the 1860's and probable absence of nearby source populations may negate the presence of this species within the VNMP boundaries.

Determination of desmognathine species is often difficult even for the experts.

Desmognathus conanti is abundant in park streams, but many individuals encountered had obscure markings and patterns and were assigned to *D. conanti* only because of the absence of individuals with typical *D. auriculatus* color patterns. Petranka (1998) excluded *D. auriculatus* from the vicinity of Warren County and VNMP but noted relictuall outlying populations in Mississippi and elsewhere.

D. auriculatus probably does not occur within the park but the possibility cannot be disregarded.

E. SALAMANDER SUMMARY

Five species were found within the boundaries of VNMP during this survey. These were:

Ambystoma maculatum (Spotted Salamander)
Ambystoma talpoideum (Mole Salamander)
Desmognathus conanti (Spotted Dusky Salamander)
Eurycea longicauda guttolineata (Three-lined Salamander)
Plethodon mississippi (Mississippi Slimy Salamander)

A single salamander remains unidentified as *Ambystoma sp.* at this time. Species most likely to be added to the VNMP salamander faunal list are:

Ambystoma opacum
Eurycea cirrigera
Eurycea quadridigitata
Notophthalmus viridescens
Pseudotriton ruber

Somewhat less likely, but also possible are:

Amphiuma tridactylum
Hemidactylium scutatum
Necturus maculosus
Plethodon websteri
Siren intermedia

Unlikely species, although some range maps may include VNMP, include:

Amphiuma means
Desmognathus auriculatus

FROGS AND TOADS (ORDER ANURA)

A. GENERAL COMMENTS

Frog and toad field collecting techniques involved day and night searches within aquatic and terrestrial habitats for eggs, larvae, and adults. Dipnetting, night lighting along stream beds, and searches under natural cover objects (*e.g.*, rotting logs, wood piles) and cover boards, and road collecting at night proved to be effective methods. The use of frog vocalizations to detect individuals proved invaluable.

Anuran nomenclature in this report was taken from the Center for North American Herpetology internet site: <http://www.naherpetology.org/nameslist.asp?id=3> on August 13, 2002.

B. SPECIES FOUND AT VNMP

The following twelve species were found within the boundaries of VNMP during this survey:

Acris crepitans (Northern Cricket Frog)
Bufo americanus (American Toad)
Bufo fowleri (Fowler's Toad)
Gastrophryne carolinensis (Eastern Narrowmouth Toad)
Hyla chrysoscelis (Cope's Gray Treefrog)
Hyla cinerea (Green Treefrog)
Hyla versicolor (Gray Treefrog)
Pseudacris crucifer (Spring Peeper)
Rana catesbeiana (Bullfrog)
Rana clamitans (Green Frog)
Rana sphenoccephala (Florida Leopard Frog)
Scaphiopus holbrookii (Eastern Spadefoot)

C. SPECIES ACCOUNTS

1. NORTHERN CRICKET FROG (*Acris crepitans*)

TAXONOMIC COMMENTS: The subspecies within VNMP is *Acris crepitans crepitans*, the Northern Cricket Frog.

VNMP DISTRIBUTION MAP: Fig. 8

ESTIMATE OF ABUNDANCE AT VNMP: Species present and moderately common in only a

few habitats.

VNMP HABITAT: Primarily restricted to stream beds at only a few sites within the park. No individuals were found in the vicinity of temporary rain pools.

COMMENTS: Only adults were found during this survey and they were commonly seen during early spring months and only rarely seen during the summer. Individuals, when approached, typically jumped into heavy shoreline vegetation rather than into the clear stream water.

Although these frogs are often easy to locate at night, they were not seen along stream banks at night despite numerous night searches. Judging by their frequent entries at twilight into shoreline vegetation such as horsetails, it is presumed that they spend warm weather nights on shore rather than in the water. The apparent scarcity of this usually abundant species at many park sites is presumed to be due to the clear waters of streams and the exceptional abundance of predators (*e.g.*, raccoons) searching shorelines on a nightly basis. It is also noteworthy that no cricket frogs were heard calling in the park at any time during the survey.

2. AMERICAN TOAD (*Bufo americanus*)

TAXONOMIC COMMENTS: No subspecies have been described

VNMP DISTRIBUTION MAP: Fig. 9

ESTIMATE OF ABUNDANCE AT VNMP: Abundant, particularly during late winter and early spring months.

VNMP HABITAT: Mating choruses have been observed in Mint Springs and its tributaries, Glass Bayou and its tributaries, springs draining into other systems, and in temporary rain pools.

Many individuals rest on the park's paved roads at night. They can be found under and within rotting logs and other cover objects, in small substrate holes, or in roadside drains.

COMMENTS: These are the first toads to call in late winter and they remain the most abundant callers well into April. During April, *Bufo fowleri* becomes a more dominant caller. Both species continue to call, though in fewer numbers, during and after heavy midsummer rains. Larvae of **B. americanus** have been found in nearly all park streams and in many temporary rain pools. Adult *B. americanus* apparently interbreed with *Bufo fowleri* and numerous intermediate individuals were found.

3. FOWLER'S TOAD (*Bufo fowleri*)

TAXONOMIC COMMENTS: No subspecies have been described

VNMP DISTRIBUTION MAP: Fig. 10

ESTIMATE OF ABUNDANCE AT VNMP: Exceptionally abundant.

VNMP HABITAT: These toads can be found almost anywhere within the park. They occur in woodlands, grass and forbs fields, and on lawn-like grassy road borders. They can be found under and within decaying logs and other cover objects, in small substrate holes, or in roadside drains. They frequent streams, temporary rain pools, and shorelines. They are common around lighted park buildings at night.

COMMENTS: Fowler's toads call and oviposit in park streams and in the park's larger, ephemeral rain pools. They will sometimes oviposit egg streams in small rain pools, but these are doomed to early death. Metamorphs are frequently encountered in large numbers along stream banks and in nearby areas.

4. EASTERN NARROWMOUTH TOAD (*Gastrophryne carolinensis*)

TAXONOMIC COMMENTS: No subspecies are recognized.

VNMP DISTRIBUTION MAP: Fig. 11

ESTIMATE OF ABUNDANCE AT VNMP: Abundant within preferred habitats.

VNMP HABITAT: These frogs were typically found at sites where dense, waist-high, vegetation closely borders or encroaches into pools and water-filled ditches. They were also found in the pool under the Union Avenue Bridge about 1/8 mile north of Pemberton Road and just south of the Clay Street underpass.

COMMENTS: Eggs and tadpoles can be found in shallow, stream pools bordered by heavy vegetation. Such pools are typically isolated and lentic, but may have currents and connect with other pools during and following heavy rains.

5. COPES GRAY TREEFROG (*Hyla chrysoscelis*)

TAXONOMIC COMMENTS: Two sibling species, *Hyla chrysoscelis* and *Hyla versicolor*, occur within the park. In the field, these can only be discriminated by call frequency (Conant and Collins, 1998) and accuracy in this method of identification depends upon frequency-analysis instrumentation not available to this investigator. Body size has been considered a field factor, but this is unreliable. Many authors (*e.g.*, Dundee and Rossman, 1989) simply refer to both species as the "*Hyla chrysoscelis-versicolor*"

Complex.” See further details under Taxonomic Comments of

the *Hyla versicolor* species account.

VNMP DISTRIBUTION MAP: Fig. 12 (*Hyla chrysoscelis*), Fig. 13 (*Hyla chrysoscelis/H. versicolor complex*).

ESTIMATE OF ABUNDANCE AT VNMP: Members of the two species complex are exceptionally abundant. *H. chrysoscelis* is the species known statewide while *H. versicolor* is known only from Warren County (Dundee, 1988). Judging by body size and aural judgement of calls, *H. chrysoscelis* is the most abundant of the two species within the park. Five specimens collected at random were submitted to a University of Mississippi genetics laboratory for chromosome and cell analyses. The laboratory report (Appendix C) revealed that four of these were *H. chrysoscelis*.

VNMP HABITAT: The frogs of this species complex are arboreal during much of the year, occupying both overstory and lower canopy layers and also dense woodland border thickets. During warm, rainy weather, many individuals can be found along the shorelines of permanent and around rain pools of all shapes and sizes. At these times, they can be found in dense clusters of forbs and grasses, or within clusters of scouring rush or climbing vines along stream borders.

COMMENTS: Amplexed pairs and egg masses of this species complex were found in Mint Springs Creek, Glass Bayou, and tributary streams and in large and small ephemeral rain pools. They also deposit eggs in water-filled tire ruts.

6. GREEN TREEFROG (*Hyla cinerea*)

TAXONOMIC COMMENTS: No subspecies are recognized

VNMP DISTRIBUTION MAP: Fig. 14

ESTIMATE OF ABUNDANCE AT VNMP: Common but infrequently encountered in VNMP.

VNMP HABITAT: Individuals were found on and near the alluvial plain west of U.S. Route 61, along the margins of the park cemetery, and along lower Mint Spring Creek. Despite frequent road driving at night during and after heavy rains, green treefrogs were not seen or heard elsewhere in the park.

COMMENTS: Only isolated individuals were found or heard calling. Even when the alluvial plain of the park was under water, all calling males were high in the willow trees and calling only sporadically. No park choruses were heard and no egg masses, tadpoles,

or juveniles were found. Suitable breeding sites are probably not available within the park. However, a very large distant chorus was heard on or near the oxbow forming part of Vicksburg Harbor and the Yazoo Canal west of the north end of the park and this could be the source of immigrant individuals into the

northwestern section of the park. They were not found elsewhere.

6. GRAY TREEFROG (*Hyla versicolor*)

TAXONOMIC COMMENTS: Dundee (1988) reported this species from 13 km SE of Vicksburg, in Warren Co., Mississippi. The specimen was taken on 18 May 1987. Cell size measurements and voice recognition were used to determine the species. This was the first report of this species in Mississippi. The proximity of this locality to VNMP suggested the occurrence of this species within the park.

Unfortunately for field identifications, a morphologically similar species, ***Hyla chrysoscelis***, is abundant in Warren County as well as elsewhere in Mississippi. ***H. chrysoscelis*** is diploid with 24 chromosomes and ***H. versicolor*** is tetraploid with 48.

In the field, these two species can only be discriminated by call frequency (Conant and Collins, 1998). ***H. chrysoscelis*** trills range between 29 and 64 notes per second and ***H. versicolor***, from 16 to 35. Accuracy in call identification depends upon frequency-analysis instrumentation not available to this investigator during the park survey.

Body sizes have been considered field factors (***H. versicolor*** tending to be larger), but this is unreliable at best. ***H. versicolor*** also has larger body cells and cell nuclei. Powell, *et al.* (1998) noted that ***H. versicolor*** may sometimes have a dark bar on the rear of the thigh, while ***H. chrysoscelis*** may not have this bar. This bar, however, is not a dependable trait. Body size has been considered a field factor (***H. versicolor*** adults tend to be larger), but this is unreliable.

Many authors (*e.g.*, Dundee and Rossman, 1989; Conant and Collins, 1998; Hulse, *et al.*, 2001) simply refer to both species as the “***Hyla chrysoscelis-versicolor*** Complex.”

In order to clarify the situation regarding park populations, a small sample was collected and sent to a laboratory for chromosome analysis. All the specimens were lost prior to analysis. A second sample of five specimens was then given to Dr. Steven J. D’Surney, a genetics professor at the University of Mississippi. Dr. D’Surney’s report is included within the appendix as Attachment C. In brief, four of the frogs proved to be diploid (= ***H. chrysoscelis***) and one diploid (= ***H. versicolor***). Thus both species are found within the park. Unfortunately, a laboratory assistant was not told to save the identified specimens and four (all ***H. chrysoscelis***) were discarded.

VNMP DISTRIBUTION MAP: Fig. 15 (***Hyla versicolor***), Fig. 13 (***Hyla***

chrysozelis/H. versicolor complex)

ESTIMATE OF ABUNDANCE AT VNMP: The species complex is abundant. Judging by size and aural differentiation of calls, *H. versicolor* is less abundant than *H. chrysozelis*.

VNMP HABITAT: The frogs of this species complex are arboreal during much of the year, occupying both overstory and lower canopy layers and also dense woodland border thickets. During warm, rainy weather, many individuals can be found along the shorelines of permanent and around rain pools of all shapes and sizes. At these times, they can be found in dense clusters of forbs and grasses, or within clusters of scouring rush or climbing vines along stream borders.

COMMENTS: Amplexed pairs and egg masses of this species complex were found in Mint Springs Creek, Glass Bayou, and tributary streams and in large and small ephemeral rain pools. They also deposit eggs in water-filled tire ruts

8. SPRING PEEPER (*Pseudacris crucifer*)

TAXONOMIC COMMENTS: This species was once considered to be in the genus *Hyla*.

A single subspecies, *Pseudacris crucifer crucifer*, the Northern Spring Peeper, is found within the park.

VNMP DISTRIBUTION MAP: Fig. 16

ESTIMATE OF ABUNDANCE AT VNMP: Abundant. The largest populations are east of Union drive in the southern 2/3 of the park (roughly from Confederate Drive south). A second large population lies north of the east-west branch of Union Drive in the vicinity of the two large woodland rain pools.

VNMP HABITAT: Adults were found along the woodland margins of Union and Confederate Drives and in the forests and fields of the ravines. They can also be found moving across fields with waste-high forbs and grasses and mowed areas such as lawns. During night rains, they were occasionally seen on Union Drive but never on Confederate Drive.

COMMENTS: Males began calling in choruses when the late winter rains and above freezing temperatures arrived and they continued through the rainy nights of spring. They are fairly easy to locate when chorusing. During summer and fall months, individuals called sporadically before, during, and after rains. In the park, they deposit eggs in almost any rain-filled ditch and in stream pools where currents are absent or slight. Eggs, tadpoles, and metamorphs were found.

9. BULLFROG (*Rana catesbeiana*)

TAXONOMIC COMMENTS: No subspecies have been described.

VNMP DISTRIBUTION MAP: Fig. 17

ESTIMATE OF ABUNDANCE AT VNMP: A single juvenile was taken during this study. Uncommon within the park.

VNMP HABITAT: Found only in the shallow pool under the Union Drive bridge just northeast of the junction with Pemberton Drive.

COMMENTS: Bullfrogs are common and abundant throughout Mississippi and I had anticipated finding them in large numbers within the park. This was not the case. Only a single juvenile was found and no bullfrogs were heard calling. No eggs or tadpoles were found. The absence of permanent bodies of lentic waters within the park's boundaries would possibly explain the absence of adults. However, I am aware of two ponds near the boundary. One is a short distance east of Union Drive and north of the Memorial Arch. The other is north of and downhill from the Navy Monument. Either or both of these ponds undoubtedly have bullfrog populations. Immigrants into the park should be common.

Bullfrogs were heard calling external to the park boundaries when I was working the flood plain at night, but not one was seen or heard within the park when the lowlands were flooded.

The near absence during this study could have been an unusual occurrence created by unknown factors or due in part to the park's exceptional abundance of nightly shoreline predators.

10. GREEN FROG (*Rana clamitans*)

TAXONOMIC COMMENTS: The subspecies in the park is *Rana clamitans clamitans*, the Bronze Frog. Unfortunately, the name of the species is Green Frog. This causes considerable confusion, even among specialists, as to the vernacular name of this frog.

VNMP DISTRIBUTION MAP: Fig. 18

ESTIMATE OF ABUNDANCE AT VNMP: Moderately abundant.

VNMP HABITAT: One specimen was found moving across Union Drive during a rain storm. Most were found only in or near stream beds or the two large woodland rain pools. Quite a few were also seen on the flood plain. Many of the latter retreated into stranded

water under an abandoned barge when the flood waters receded. Several adults were observed in a temporary rain pool at Grant's Canal in Louisiana.

COMMENTS: Disturbed Bronze (Green) Frogs typically enter the water and burrow into the bottom mud. Individuals can usually be located in abundance at night. This was not the case along park streams and tributaries. Bronze Frogs were almost never seen at night. Neither did they typically enter the water when disturbed. While a few did this, most individuals were seen entering shoreline vegetation and sometimes calling on the edge of this vegetation. Presumably, the vegetation may provide a degree of protection from predators such as raccoons. Both Mint Springs Creek and Glass Bayou have mostly hard mud and rock-lined bottoms that are probably hard to penetrate when escaping from predators. Moving into damp shoreline vegetation is probably being favored as an alternative survival method within the park habitats.

Tadpoles were found in both creeks and their tributaries although never in abundance. They were also found in both of the large woodland pools. Males called occasionally throughout the spring and summer months.

11. FLORIDA LEOPARD FROG (*Rana sphenoccephala*)

TAXONOMIC COMMENTS: The subspecies in the park is *Rana sphenoccephala utricularius*, the Southern Leopard Frog. As with the Bronze/Green frog names mentioned previously, the correct name of the species is not the correct name for the subspecies.

VNMP DISTRIBUTION MAP: Fig. 19

ESTIMATE OF ABUNDANCE AT VNMP: Moderately abundant within preferred habitats.

VNMP HABITAT: Leopard frogs were found mostly within and along the shorelines of park streams. They were most abundant along Mint Springs Creek. None were found in isolated rain pools. Several adults and numerous tadpoles were observed in a temporary rain pool at Grant's Canal in Louisiana.

COMMENTS: As with park bronze frogs, leopard frogs also tend to be difficult to locate along streams at night and possibly for the same reasons. Both species apparently escape into and probably spend warm nights in thick shoreline vegetation. This behavior is more typical of leopard frogs, which often escape overland anyway. In the park, individuals often leave the water and move into rock crevices or holes under or near bridges. Eggs, tadpoles and metamorphs have been found within the park.

11. EASTERN SPADEFOOT (*Scaphiopus holbrookii*)

TAXONOMIC COMMENTS: No subspecies are currently recognized.

VNMP DISTRIBUTION MAP: Fig. 20

ESTIMATE OF ABUNDANCE AT VNMP: Abundant

VNMP HABITAT: Found within and near lowland ravine forests bordering park streams.

COMMENTS: On March 3, 2001, a large chorus was calling on a dirt service road just north of the Memorial Arch during a rainstorm. The service road was inundated by the heavy rains. The next morning, nearly the entire rain pool was covered with closely packed egg masses. I had no measuring device with me at the time, but the pool egg masses were in an area nine paces long and four paces wide. I returned to the park on March 8, 2001. The dried masses of dead eggs carpeted the former pool bottom. On two subsequent visits to a woodland rain pool in the dying tadpoles and live metamorphs were found on the substrate of a damp, almost dry woodland rain pool. Juveniles and adults were often found on Union Drive on rainy spring nights. Only two adults were found on Confederate Drive.

D. OTHER POSSIBLE VNMP SPECIES

It is likely that other species will eventually be found within the park boundaries. Records for other species are currently known from elsewhere in Warren County, Mississippi and Madison Parish, Louisiana.

The Mississippi Museum of Natural Science houses Warren County specimens of the following species:

Rana catesbeiana (MMNS-6102, 6111, 6290, 8291)

Rana utricularia [= *R. sphenocphala utricularius*] (MMNS-3139)

The Louisiana State University Museum of Zoology has Warren County records for the following species:

Hyla cinerea (LSUMZ-59372)

Hyla (= *Pseudacris*) *crucifer* (LSUMZ-59420)

Rana sphenocphala (LSUMZ-59549)

The L.S.U. Museum of Zoology has Madison Parish records for these species:

Acris crepitans (LSUMZ-15128, 23964-7)

Gastrophryne carolinensis (LSUMZ-15144)

Hyla versicolor (LSUMZ-15445)

Hyla chrysoscelis (LSUMZ-80554)
Pseudacris triseriata (LSUMZ-15139, 23909)
Rana clamitans (LSUMZ-63906-8)
Rana catesbeiana (LSUMZ-69102)

Tulane University reported the following from Warren County:

Bufo woodhousei (TU-20665-7)
Hyla versicolor (TU-20664)
Rana clamitans (TU-22249-50)
Rana catesbeiana (TU-22251)

The Smithsonian Institution (United States National Museum) reported from Madison Parish:

Acris crepitans (USNM-118387)

Bufo americanus (USNM-064967-064984)
Gastrophryne carolinensis (USNM-100806)
Hyla crucifer (USNM-490068-490070)
Pseudacris feriarum (USNM-118388-90,
Rana sphenocephala (USNM-118392-3)
Rana clamitans (USNM-118391)

Of the above listed museum records, only *Pseudacris feriarum* was not taken within the VNMP during this study. This species will be discussed subsequently in this section.

Boyd (1964) studied cricket frog distribution in Mississippi and noted only *Acris crepitans* in "... stream bottoms that connected with the Delta..." Boyd noted *Acris gryllus* in the narrow zone of overlap at the edge of the range of bluffs designated as the Loess Hills.

Cliburn (1972) reported *Rana pipiens* (= *Rana sphenocephala utricularius*), *Rana clamitans*, *Hyla* (= *Pseudacris*) *crucifer*, and *Pseudacris triseriata* in a rain pool in Warren County, Mississippi.

Cliburn (1976) noted Mississippi ranges which included VNMP for the following species which were not found in the park during the present survey:

Acris gryllus
Hyla avivoca
Hyla squirella
Pseudacris triseriata feriarum
Rana areolata
Rana palustris

The distribution maps of Lohoefener and Altig(1983) which included the Vicksburg area, had the following species which were not found within the park in the present study:

Acris gryllus
Bufo terrestris
Hyla avivoca

Lohoefener and Altig's "Group Two" species had ranges ending near but not including VNMP.

These frogs were:

Bufo quercicus
Hyla femoralis
Hyla gratiosa
Hyla squirella
Pseudacris nigrita

Distribution maps of Conant and Collins (1998) show the following species as having range distributions which include VNMP:

Acris gryllus
Hyla squirella
Hyla avivoca
Pseudacris triseriata feriarum
Rana palustris

Madison Parish, Louisiana anuran locality records were summarized by Dundee and Rossman (1989). The only species not found in the present survey was *Pseudacris triseriata*.

E. FROG AND TOAD SUMMARY

Twelve species of anurans were found within the boundaries of VNMP during this survey. These were:

Acris crepitans
Bufo americanus
Bufo fowleri
Gastrophryne carolinensis
Hyla chrysoscelis
Hyla cinerea
Hyla versicolor
Pseudacris crucifer

Rana catesbeiana
Rana clamitans
Rana sphenoccephala
Scaphiopus holbrookii

Each of the following species, not recorded during the 2001-2 survey, must be considered as possible future additions to the park herpetofauna:

Acris gryllus
Bufo quercicus
Bufo terrestris
Hyla avivoca
Hyla femoralis
Hyla gratiosa
Hyla squirella
Pseudacris feriarum
Rana areolata

Rana palustris

Given the numerous rainy days and nights involved in this study, it is highly unlikely that the distinctive calls of the above species would have been missed had they called in chorus when I was present. An individual or two might possibly have been overlooked in large mixed choruses so a Radio Shack stereo sound enhancement device was used on some nights. During the early months 2001 and 2002, I even made special trips to the park to search for frogs on rainy nights.

The range maps of Conant and Collins (1998) are probably closer to reality than those of earlier authors. If accepted at face value, the most likely anurans to be added to the park's faunal list in the near future would be:

Acris gryllus
Hyla squirella
Hyla avivoca
Pseudacris feriarum
Rana palustris

and the least likely would be:

Bufo quercicus
Bufo terrestris
Hyla femoralis
Hyla gratiosa
Rana areolata

During a hard rain on the night of 2 March 2001, I heard a small but loud frog chorus,

down a steep ravine. The chorus sounded like nothing I had heard before, but remotely like *Rana palustris*. Unfortunately, my portable field lights were out and I would not have been able to locate the frogs had I descended down the steep bluff in the dark. The site was east of Union Drive between mile marker three and the Iowa monument. The GPS reading from the road was:

N 32 deg. 21.894', W 090 deg. 50.359'

An inspection of the ravine the next morning revealed a heavily eroded temporary drainage stream and no standing pools of water. No frogs or egg masses were found. The record was therefore disregarded.

On the rainy afternoon of 12 May 2001, I was walking down a hillside on Confederate Drive as a thunderstorm approached and heard two calls of what I then thought was *Hyla squirella*. The frog never called again and I subsequently heard no other calls that might be this species.

TURTLES (ORDER CHELONIA)

A. GENERAL COMMENTS

Turtle field collecting techniques involved day and night searches within aquatic and terrestrial habitats for nests, predator-exposed egg shells, juveniles, and adults. Hoop nets and use of a tripod mounted telescope were the most effective means of turtle sampling. Dipnetting and night lighting along stream beds and swamplands were utilized but these revealed no turtles.

Turtle nomenclature in this report was taken from the Center for North American Herpetology internet site: <http://www.naherpetology.org/nameslist.asp?id=7> on August 17, 2002.

B. SPECIES FOUND AT VNMP

The following nine species of turtles were found within the boundaries of VNMP during this survey:

Chelydra serpentina (Snapping Turtle)
Chrysemys picta (Painted Turtle)
Graptemys ouachitensis (Ouachita Map Turtle)
Graptemys pseudogeographica (False Map Turtle)
Macrochelys temminckii (Alligator Snapping Turtle)
Pseudemys concinna (Eastern River Cooter)
Sternotherus odoratus (Common Musk Turtle)
Terrapene carolina (Common Box Turtle)
Trachemys scripta (Slider)

C. SPECIES ACCOUNTS

1. SNAPPING TURTLE (*Chelydra serpentina*)

TAXONOMIC COMMENTS: The subspecies within VNMP is *Chelydra serpentina serpentina*, the Common Snapping Turtle.

VNMP DISTRIBUTION MAP: Fig. 21

ESTIMATE OF ABUNDANCE AT VNMP: This is probably a common species within the flood plain of the northwest park during flood season. It is uncommon elsewhere in the park, although occasional individuals may be anticipated.

VNMP HABITAT: Primarily restricted to stream beds and the flood plain willow swamps during flood season although wandering individuals may occasionally be expected on higher grounds and crossing park roads.

COMMENTS: Two large adults (18 and 22 lbs) were taken in hoop nets on the flood plain and another large adult (estimated at 16-18 lbs.) was taken with Pillstrom tongs in an upper Mint Springs tributary during this survey. Unfortunately, these were much too large to retain for voucher specimens under the circumstances. I do have photographs of the Mint Springs tributary specimen.

2. PAINTED TURTLE (*Chrysemys picta*)

TAXONOMIC COMMENTS: The subspecies found within VNMP boundaries is *Chrysemys picta dorsalis*, the Southern Painted Turtle.

VNMP DISTRIBUTION MAP: Fig. 22

ESTIMATE OF ABUNDANCE AT VNMP: This is a common species within the flood plain of the northwest park during flood season. It would not be an unexpected transient on the park satellites.

VNMP HABITAT: Flood water willow swamp lands west of the railroad embankment bordering U.S. highway 61.

COMMENTS: Several individuals were observed in floodwaters immediately west of the railroad embankment paralleling U.S. Route 61.. They were basking on floating logs. All had prominent mid-dorsal orange stripes. Occasional individuals probably enter Mint Springs Creek during flood season and might possibly remain in deeper waters below the major waterfall after the high waters recede.

3. OUACHITA MAP TURTLE (*Graptemys ouachitensis*)

TAXONOMIC COMMENTS: The subspecies found within VNMP is *Graptemys pseudogeographica kohnii*, the Mississippi Map Turtle.

VNMP DISTRIBUTION MAP: Fig. 23

ESTIMATE OF ABUNDANCE AT VNMP: Probably abundant periodically within the lowland floodwaters.

VNMP HABITAT: Known only from flooded lowlands immediately west of the railroad embankment and near the mouth of Mint Springs Creek.

COMMENTS: Several individuals were observed basking on floating logs immediately west of the railroad embankment. An occasional transient might be anticipated on or near the park satellites, particularly Grant's Canal.

4. FALSE MAP TURTLE (*Graptemys pseudogeographica*)

TAXONOMIC COMMENTS: The subspecies found within VNMP is *Graptemys pseudogeographica kohnii*, the Mississippi Map Turtle.

VNMP DISTRIBUTION MAP: Fig. 24

ESTIMATE OF ABUNDANCE AT VNMP: Abundant on the park floodplain during periodical flooding.

VNMP HABITAT: Found within the lowland floodwaters and in the canal waters adjacent to the mouth of Mint Springs Creek.. An occasional individual could possibly enter Mint Springs Creek as far as the first waterfall during periods of high water. Nest seeking females may occasionally wander onto the park satellites.

COMMENTS: This is a prominent, usually easily identifiable species

within the park's flood plain waters. The crescent posterior to the white eyes was prominent in all observed individuals.

5. ALLIGATOR SNAPPING TURTLE (*Macrochelys temminckii*)

TAXONOMIC COMMENTS: No subspecies are recognized. Webb (1995) demonstrated that the name *Macrochelys* Gray has precedence over the name *Macroclemys* Gray.

VNMP DISTRIBUTION MAP: Fig. 25.

ESTIMATE OF ABUNDANCE AT VNMP: Probably a fairly common periodical transient.

VNMP HABITAT: Within floodwaters on the flood plain. Rare to absent elsewhere..

COMMENTS: Floodwaters inundated my hoop nets to a depth of 8 to 10 feet on 23 May 2001. I was unable to retrieve most of my nets until 20 July 2001. When recovered, the nets contained a number of gar and turtle skeletons and one had disarticulated elements of *Macrochelys temminckii*. This was the only specimen of this species collected.

An additional specimen was reported to me by a VNMP ranger. It was seen crossing the road just northeast of the Shirley House. There is no suitable park habitat anywhere near this locality but, if the identification was correct, the turtle may have entered the park from an external source unknown to me. I did not see this specimen.

6. EASTERN RIVER COOTER (*Pseudemys concinna*)

TAXONOMIC COMMENTS: No subspecies are recognized

VNMP DISTRIBUTION MAP: Fig. 26

ESTIMATE OF ABUNDANCE AT VNMP: This is a common species within the flood plain of the northwest park during flood season. It would not be an unexpected transient on the riverside slopes of the park satellites.

VNMP HABITAT: Floodwater, willow swamp lands west of the railroad embankment bordering U.S. highway 61. A single adult female was found on the mowed lawn at Grant's Canal.

COMMENTS: A number of individuals were observed on various days. They were basking on floating logs immediately west of the railroad embankment.

6. COMMON MUSK TURTLE (*Sternotherus odoratus*)

TAXONOMIC COMMENTS: No subspecies are recognized.

VNMP DISTRIBUTION MAP: Fig. 27

ESTIMATE OF ABUNDANCE AT VNMP: Although only a single specimen was taken, this is very common Mississippi species and it is probably a fairly common species in its preferred park habitat.

VNMP HABITAT: The single specimen was taken in floodwaters bordering the railroad track embankment paralleling U.S. Route 61. Although none were found, it was anticipated in the deeper pools of Mint Springs Creek and Glass Bayou.

COMMENTS: In view of the extensive sampling, the rarity of this species in the collections was very surprising.

8. BOX TURTLE (*Terrapene carolina*)

TAXONOMIC COMMENTS: The subspecies found within the park is *Terrapene carolina triunguis*, the Three-toed Box Turtle.

VNMP DISTRIBUTION MAP: Fig. 28

ESTIMATE OF ABUNDANCE AT VNMP: Abundant.

VNMP HABITAT: This is a terrestrial turtle that will freely enter both lotic and lentic waters.

It may be found in nearly every conceivable park land habitat, from deep ravines to the hilltops.

Individuals are most common in woodlands but they wander through high grasses and forbs and over mowed lawns. During drier weather, they may spend their time under water in isolated stream pools.

COMMENTS: This is the most frequently observed turtle in the park. Individuals often cross park roads during daylight hours.

9. SLIDER (*Trachemys scripta*)

TAXONOMIC COMMENTS: The subspecies found within the park is *Trachemys scripta elegans*, the Red-eared Slider.

VNMP DISTRIBUTION MAP: Fig. 29

ESTIMATE OF ABUNDANCE AT VNMP: Abundant seasonally within preferred park habitats.

VNMP HABITAT: This is an abundant species within the flood plain of the northwest park during flood season. It was also seen in Mint Springs Creek and in an off-site pond flooding onto park land.

COMMENTS: Individuals were observed in Mint Springs as far inland as the large waterfall. At least one remained in the waterfall pool after floodwaters receded. It would be an infrequent but expected transient on the riverside slopes of the park satellites and at Grant's Canal. An adult individual was seen north northeast of the Navy monument in pond that had overflowed onto park property after a heavy rain storm. Several park rangers have told me of sightings of this turtle along Union and Confederate drives although I did not see any in these areas. Sliders often roam a mile or more overland during nesting season.

D. OTHER POSSIBLE VNMP SPECIES

The Mississippi Museum of Natural Science houses Warren County specimens of the following species:

Apalone mutica (MMNS-2538)
Apalone spinifera (MMNS-2540, 3293)
Chelydra serpentina (MMNS-3285-7, 4208, 4208)
Chrysemys picta (MMNS-4483, 4484,
Deirochelys reticularia (MMNS-3877)
Graptemys ouachitensis (MMNS-5784-5)
Graptemys pseudogeographica (MMNS-2963, 3247, 3366, 4018, 4022, 5782,
5783)
Kinosternon subrubrum (MMNS-3779, 3781-2, 3784
Macrochelys temminckii (= *Macrochelys temminckii*)(MMNH-3252, 4205)
Terrapene carolina (MMNH-3341, 3343, 3345)
Trachemys scripta (MMNH-3300, 3329, 3332)

The museum also has Mississippi Heritage program records for the following Warren County species:

Macrochelys temminckii
Graptemys pseudogeographica

The Louisiana State University Museum of Zoology has Madison Parish records for the following species:

Apalone spinifera (LSUMZ-29553, 75139-40)

Trachemys scripta (LSUMZ-74491, 75152-3)

Graptemys kohnii (= *Graptemys pseudogeographica kohnii*) (LSUMZ-74738)

Tulane University reported only *Apalone mutica* (TU-21817) Warren County:

The Smithsonian Institution (United States National Museum) reported only *Apalone spinifera* (USNM-083985) from Madison Parish. This museum provided information on *Sternotherus carinatus* (USNM-059958-9) from Warren County:

The University of Louisiana at Monroe reported the following turtles from Madison Parish:

Pseudemys concinna (ULM-2753)

Graptemys kohnii (ULM-2754-5)

Sternotherus carinatus (ULM-2756)

Trachemys scripta (ULM 2760)

Cliburn (1976) and Lohofener and Altig (1983) noted Mississippi ranges which included VNMP for a single additional species, *Pseudemys floridana*, which was not found in this 2001-2 park study or represented by local museum specimens. Rightly or wrongly, Mississippi **P. floridana-like** individuals are now considered to be *Pseudemys concinna* (Ward, 1984; Ernst, et. al., 1994; Conant and Collins, 1998). Unfortunately, many Mississippi turtles possess coloration characteristics diagnostic for *P. floridana* (Dundee and Rossman, 1989; Keiser, 1991, 1994, 2000, 2001; Keiser and Lago, 1991, 1998). As long as most authorities exclude this species from Mississippi, it is not considered possible within VNMP. Also, all turtles observed during this study appeared to be typical *P. concinna*.

Lohofener and Altig (1983) included *Graptemys pulchra* in their Group Two assemblage of southern Mississippi species with range edges just south of Warren County. Auburn University (not surveyed) has five specimens of *G. pulchra* from Butler's Lake, 9.0 mi. south of Natchez (Wilson, 1997; Mississippi Herpetological Atlas, 1997). Lovich and McCoy (1992), however, considered *Graptemys pulchra* to be a complex of three species, one of which is *Graptemys gibbonsi*, the Pascagoula map turtle, which is in the Pearl and Pascagoula river systems of Mississippi. *G. pulchra*, according to Lovich and McCoy, does not even occur in Mississippi. If the *G. pulchra* site of the Auburn specimens is correct and the specimens are correctly identified, it is likely that the species would be *G. gibbonsi*. If the collection data can be taken literally, the site is in the drainage of the Homochitto River. Regardless of the accuracy of the identification or locality of collection, it is unlikely that *G. gibbonsi* or *G. pulchra* would occur in any part of VNMP. Distribution maps of Ernst, Barbour, and Lovich (1994) and Conant and Collins (1998) reinforce this speculation.

TURTLE SUMMARY

The following nine species were found within the boundaries of VNMP during this survey:

Chelydra serpentina (Snapping Turtle)
Chrysemys picta (Painted Turtle)
Graptemys ouachitensis (Ouachita Map Turtle)
Graptemys pseudogeographica (False Map Turtle)
Macrochelys temminckii (Alligator Snapping Turtle)
Pseudemys concinna (Eastern River Cooter)
Sternotherus odoratus (Common Musk Turtle)
Terrapene carolina (Common Box Turtle)
Trachemys scripta (Slider)

Warren County and Madison Parish museum specimens are available for the following species which were not found within the park:

Apalone mutica
Apalone spinifera
Deirochelys reticularia
Kinosternon subrubrum
Sternotherus carinatus

All of these species must be considered as possible future additions to the VNMP chelonian faunal list. These species should be anticipated during flood season within the flood plain west of the railroad embankment paralleling U.S. Route 61. Any or all of the five species may be expected to enter Mint Springs Creek, possibly as far as the first waterfall. *Kinosternon subrubrum* typically wanders considerable distances overland and may well be in Mint Springs Creek and its tributaries and in Glass Bayou and its tributary streams. *Sternotherus carinatus* is less likely to wander but may not be excluded from consideration in deep pools elsewhere in the park.

CROCODYLIANS (ORDER CROCODYLIA)

A. GENERAL COMMENTS:

Night lighting with headlamps and a one million candle power search light was the primary method of searching. This method is usually very effective in detecting the highly reflective tapetum lucidum membrane of crocodilian eyes, if individuals are

present and active within a given habitat. Daylight searches were also made. Hoop nets were used extensively within the flood water swamp lands for turtles and crocodilians.

Crocodylian nomenclature in this report was taken from the Center for North American Herpetology internet site: <http://www.naherpetology.org/nameslist.asp?id=2> on August 26, 2002.

Numerous sources (Cook, 1942; Rare and Endangered Species Committee, 1975; Cliburn, 1976; Lohofener and Altig, 1983; and Conant and Collins, 1998 all include VNMP within the range of *Alligator mississippiensis*.

Cook (1942, p.1) stated: "From popular reports alligators were formerly found 15 or more feet long in the southern part of Mississippi and in the Yazoo-Mississippi Delta." Cook further noted the range as being (p. 2): "... along the Mississippi River and its tributaries from the southern boundary of the state north to Coahoma County; ..." Dundee and Rossman (1989) spotted a locality in Tensas Parish, immediately south of Madison Parish.

Of all the museums reporting specimens, only the Mississippi Museum of Natural Science noted alligators from Warren County, Mississippi or Madison Parish, Louisiana. This series of 21 specimens (MMNS-5673-5693) was collected at "Duck Puddle southeast of Eagle Lake" in 1984. Eagle Lake is about five miles northwest of VNMP.

It is likely that the American alligator may appear as an occasional transient into the flood water willow swamp west of the railroad track embankment bordering U.S. Highway 61. During peak flooding which extends under the highway to the first large waterfall on Mint Springs Creek, river turtles often move as far inland as the falls. While less likely, an occasional young alligator might also enter the stream for brief periods. Rarely at best, individuals might be brief transients or bask on or near the park satellites bordering the river. The metropolitan nature of the Mississippi satellites would tend to discourage such movements, as would the "mowed lawn" of Grant's Canal. There are no habitats within the park or its satellites which might attract resident alligators.

LIZARDS (ORDER SQUAMATA, SUBORDER SAURIA)

A. GENERAL COMMENTS

Lizard field collecting techniques involved daylight searches within

various terrestrial habitats for nests, predator-exposed egg shells, juveniles, and adults. Rotting logs, stumps, and other natural cover objects were turned and probed with a potato rake. Glue traps and 2' X 2' Masonite cover boards proved to be effective in some situations. Binoculars were used to examine likely habitats from a distance.

Lizard nomenclature in this report was taken from the Center for North American Herpetology internet site: <http://www.naherpetology.org/nameslist.asp?id=4> on August 17, 2002.

B. SPECIES FOUND AT VNMP

The following four species were found within the boundaries of VNMP during this survey:

Anolis carolinensis (Green Anole)
Eumeces fasciatus (Five-lined Skink)
Eumeces laticeps (Broadhead Skink)
Scincella lateralis (Ground Skink)

C. SPECIES ACCOUNTS

1. GREEN ANOLE (*Anolis carolinensis*)

TAXONOMIC COMMENTS: The subspecies within VNMP is *Anolis carolinensis carolinensis*, the Northern Green Anole.

VNMP DISTRIBUTION MAP: Fig. 30

ESTIMATE OF ABUNDANCE AT VNMP: Despite relatively few sightings, this is undoubtedly a common species within the park.

VNMP HABITAT: Primarily restricted to sun-exposed, fairly dense, lower vegetative canopy cover along park roads, railroads, and stream beds. Occasional individuals will move onto roads and bridge abutments. They can also be anticipated on the sides of park buildings.

COMMENTS: Anoles are primarily a boundary species and the usually dense cover in such areas of the park often makes locating these lizards difficult.

2. FIVE-LINED SKINK (*Eumeces fasciatus*)

TAXONOMIC COMMENTS: No subspecies are recognized.

VNMP DISTRIBUTION MAP: Fig. 31

ESTIMATE OF ABUNDANCE AT VNMP: This is a commonly encountered, abundant species.

VNMP HABITAT: Five-lined skinks occupy a variety of habitats but are primarily a woodland margin species. Individuals can also be found in rocky creek beds exposed to considerable sunlight, around bridge abutments, and under and within rotting logs, stumps, and various other cover objects. They can also be located under peeling bark of upright dead trees. They will often take up residence in cracks of buildings and the larger monuments.

COMMENTS: Females attending nests and nests with hatchlings were found on several occasions. They seem to prefer rotting logs and rotting centers of upright stumps for nesting. Glue traps and cover boards were particularly effective in capturing these lizards.

BROADHEAD SKINK (*Eumeces laticeps*)

TAXONOMIC COMMENTS: No subspecies are recognized.

VNMP DISTRIBUTION MAP: Fig. 32

ESTIMATE OF ABUNDANCE AT VNMP: Uncommon.

VNMP HABITAT: Two were found as road kills, the third was taken under collapsed erosion control sheeting on the downslope of a grassy hillside with a fairly open, wooded canopy. Both road kills were on roads with mowed grass borders and nearby high-canopy woodlands.

COMMENTS: These are secretive lizards that are, in my experience, infrequently encountered in Mississippi. While only three specimens were found, the park population is probably within levels necessary for continuing survival of the species.

4. GROUND SKINK (*Scincella lateralis*)

TAXONOMIC COMMENTS: No subspecies are recognized.

VNMP DISTRIBUTION MAP: Fig. 33

ESTIMATE OF ABUNDANCE AT VNMP: This is undoubtedly the most abundant lizard species within the park.

VNMP HABITAT: This is a lizard of woodland and field ground litter.

Individuals occur inside well-shaded, high canopy woodlands and within the heavily vegetated sun-penetrated borders. They are most common on hilltops and slopes, but also occur in the ravines and along rocky stream beds. periphery. Some individuals even enter the stream waters when disturbed and may even take refuge on mud bottoms under several inches of water. Some live in cracks along the sides of paved roads or at the bases of monuments. They can be found in high forbs and grasses complexes or on mowed lawns. They are common on parking lots and around park buildings.

COMMENTS: Any small brown lizard scurrying among woodland leaf litter is almost certainly this species. They are easily attracted to cover boards and glue traps.

D. OTHER POSSIBLE VNMP SPECIES:

The Mississippi Museum of Natural Science houses Warren County specimens of the following species:

Hemidactylus turcicus (MMNS-2585-9)

The Louisiana State University Museum of Zoology has Madison Parish records for the following species:

Scincella lateralis (LSUMZ-17601, 23938, 51712)

Anolis carolinensis (LSUMZ-17614, 51762-3)

Eumeces laticeps (LSUMZ-43177-8, 72058)

Eumeces fasciatus (LSUMZ-43179, 71710, 71727)

The Smithsonian Institution (United States National Museum) reported the following from Madison Parish:

Anolis carolinensis (USNM-118398)

Scincella lateralis (USNM-099187)

and the following species from Warren County:

Eumeces fasciatus (USNM-100809)

Scincella lateralis (USNM-100807, 100808)

The University of Louisiana at Monroe reported only *Eumeces fasciatus* (ULM-366) from Madison County.

Cook (1942: p. 9) noted that *Sceloporus undulatus* was “Well distributed in all faunal regions of the state, but more abundant in Long Leaf Pine, Coastal Pine Meadows, and the southern half of the Loess Bluff Regions.” For *Ophisaurus ventralis*, Cook stated (p. 11): “... northward throughout the state, including all faunal regions.” Her table on page 18 indicated Warren County collection records for *Sceloporus*

undulatus, *Lygosoma laterale* (= *Scincella lateralis*), and *Eumeces fasciatus*.

In revisionary comments, Cook (1966) modified her previous range of *S. undulatus* to the “Northern 2/3 of state.” She also added *Eumeces inexpectatus* to the state list with the notation: “All except extreme northern part.”

Cliburn (1976) noted (p. 41) the possible presence of *Phrynosoma cornutum* “locally throughout the state.” He considered the following to have statewide distributions:

Ophisaurus ventralis
Ophisaurus attenuatus
Cnemidophorus sexlineatus
Sceloporus undulatus

Cliburn mapped the Mississippi range of *Eumeces inexpectatus* and included Warren County at the periphery. Cliburn and Jackson (1975, p. 18) noted the range of *Eumeces anthracinus* as being “East Central Mississippi south to coast and into extreme southwestern Mississippi.”

Lohofener and Altig (1983) considered the following species to have distributions which included VNMP:

Cnemidophorus sexlineatus
Eumeces inexpectatus
Ophisaurus attenuatus
Sceloporus undulatus

They included *Ophisaurus ventralis* as a Group Two species with a distribution terminating just south of VNMP.

Dundee and Rossman (1989) mapped Madison Parish locality records for:

Anolis carolinensis
Eumeces fasciatus
Eumeces laticeps
Scincella lateralis

Wilson (1997) mapped a single locality record for *Anolis carolinensis* from Warren County.

Conant and Collins (1998) included these species with ranges including VNMP:

Sceloporus undulatus

Cnemidophorus sexlineatus
Ophisaurus attenuatus

These authors excluded the following species from Warren County:

Eumeces inexpectatus
Eumeces anthracinus
Ophisaurus ventralis

Including museum and literature records, the following species must be discussed as possibilities for future additions to the VNMP fauna:

Cnemidophorus sexlineatus
Eumeces inexpectatus
Eumeces anthracinus
Hemidactylus turcicus
Ophisaurus ventralis
Ophisaurus attenuatus
Phrynosoma cornutum
Sceloporus undulatus

Trauth and McAllister (1996) listed no locality records anywhere near VNMP for *Cnemidophorus sexlineatus*. Their distribution map, in fact, shows a range hiatus which suggests the absence of this lizard in the loess bluffs and alluvial plain. Steiner (1986) shows a locality record for *Eumeces inexpectatus* that is near the park. Walley (1998) shows no records for *Eumeces anthracinus* anywhere near the park. *Hemidactylus turcicus*, a well established immigrant, is well known from Vicksburg and the species very likely occurs in at least one of the park satellites. I was, however, unable to find it in the main park or the satellites. *Phrynosoma cornutum* is a western species only possible in the park as an escapee. Holman (1971a, 1971b) has distribution maps which include VNMP in the range of *Ophisaurus attenuatus* but restricts *O. ventralis* to the southeastern corner of Mississippi.

LIZARD SUMMARY:

The following four species were found within the boundaries of VNMP during this survey:

Anolis carolinensis
Eumeces fasciatus
Eumeces laticeps

Scincella lateralis

Hemidactylus turcicus has been taken in Warren County and is a likely

candidates for addition to the park's herpetofauna. This is an introduced species that has become widely distributed in the southern United States. The park lies within the range of *Sceloporus undulatus*, *Cnemidophorus sexlineatus*, and *Ophisaurus attenuatus*, and the possible presence of these in the park cannot be disregarded. On the other hand, the methods in the present survey would undoubtedly have revealed these species had they been even moderately abundant. In addition, the latter two species are most frequently associated with areas having sandy soils and such soils were not observed within the park.

Among the less likely species are: *Eumeces inexpectatus*, *Eumeces anthracinus*, and *Ophisaurus ventralis* which could be excluded because their ranges, as presently known, are extra-limital. Of these three, *E. anthracinus* is uncommonly encountered in Mississippi, and, judging by its habitats elsewhere in the state, is the most likely of these to eventually be found in the park.

SNAKES (ORDER SQUAMATA, SUBORDER SERPENTES)

A. GENERAL COMMENTS

Snake field collecting techniques involved daylight and night searches within various terrestrial and aquatic habitats for nests, predator-exposed egg shells, juveniles, and adults. Rotting logs, stumps, and other natural cover and man-made objects were turned and probed with a potato rake. Glue traps and 2' X 2' Masonite cover boards proved to be effective in some situations. Binoculars were used to examine likely habitats from a distance.

Snake nomenclature in this report was taken from the Center for North American Herpetology internet site: <http://www.naherpetology.org/nameslist.asp?id=6> on August 17, 2002.

B. SPECIES FOUND AT VNMP

The following fourteen species, listed alphabetical by genus, were found within the boundaries of VNMP during this survey:

Agkistrodon contortrix (Copperhead)
Agkistrodon piscivorus (Cottonmouth)
Carphophis amoenus (Eastern Worm Snake)
Coluber constrictor (Eastern Racer)
Crotalus horridus (Timber Rattlesnake)
Diadophis punctatus (Ringneck Snake)
Elaphe guttata (Corn Snake)

Elaphe obsoleta (Eastern Rat Snake)
Lampropeltis getula (Common Kingsnake)
Nerodia erythrogaster (Plainbelly Water Snake)
Nerodia sipedon (Northern Water Snake)
Opheodrys aestivus (Rough Green Snake)
Storeria occipitomaculata (Redbelly Snake)
Thamnophis sirtalis (Common Garter Snake)

C. SPECIES ACCOUNTS

1. COPPERHEAD (*Agkistrodon contortrix*)

TAXONOMIC COMMENTS: The subspecies within VNMP is *Agkistrodon contortrix contortrix*, the Southern Copperhead.

VNMP DISTRIBUTION MAP: Fig. 34

ESTIMATE OF ABUNDANCE AT VNMP: Abundant.

VNMP HABITAT: Primarily a woodland species, found mostly on the hilltops and slopes but also in the deep ravines. They often cross park roads and may occasionally be found in close proximity to park buildings.

COMMENTS: This is a venomous species which should be treated with respect by visitors and park employees. Fortunately, they are not aggressive. Several park specimens were even docile when handled. Copperheads appeared to be more abundant than the park's other two venomous species and were the second most frequently encountered snake species.

2. COTTONMOUTH (*Agkistrodon piscivorus*)

TAXONOMIC COMMENTS: The subspecies within VNMP is *Agkistrodon piscivorus leucostoma*, the Western Cottonmouth.

VNMP DISTRIBUTION MAP: Fig. 35

ESTIMATE OF ABUNDANCE AT VNMP: This snake was infrequently encountered and it did not appear to be particularly abundant within the park during the survey.

VNMP HABITAT: Park cottonmouths were found inside an open shed, crossing Union Drive, and in a shallow stream bed of Glass Bayou.

COMMENTS: This is a venomous species that should be avoided, if possible, by park employees and the general public. Fortunately, while they may often hold their ground and engage in what appears to be threatening behavior, most individuals are reluctant to bite large animals like humans unless unduly provoked.

Finding only a few individuals was a surprise. In my experience, cottonmouths have been the most frequently encountered species, both in Mississippi and in Louisiana. Their low numbers at VNMP may be due in part to the absence of permanent lentic bodies of water. They were anticipated in considerable numbers in lower Mint Springs Creek and, when flood waters were present, on the flood plain. This did not prove to be the case.

3. EASTERN WORM SNAKE (*Carphophis amoenus*)

TAXONOMIC COMMENTS: The subspecies found within the park is *Carphophis amoenus helenae*, the Midwest Worm Snake.

VNMP DISTRIBUTION MAP: Fig. 36

ESTIMATE OF ABUNDANCE AT VNMP: Known only from two specimens. This is usually a highly secretive, burrowing species that typically stays under ground during hot weather. It is undoubtedly more abundant than the small number of encounters suggests.

VNMP HABITAT: This is a woodland species. It is more commonly found on the low slopes of the bluff than on the crests or the water-scoured bottomland. It often moves under and into rotting logs in search of invertebrate prey.

COMMENTS: These are small, harmless snakes with brownish or blackish dorsum and a pink belly. The pink coloration extends onto the first row of dorsal scales.

4. EASTERN RACER (*Coluber constrictor*)

TAXONOMIC COMMENTS: The subspecies within the park should be *Coluber constrictor latrunculus*, the Blackmask Racer. This was true of one specimen encountered on the flood plain. A second specimen found along Glass Bayou and a third just east of the park, were much darker and seemed to indicate moderate influence from *Coluber constrictor priapus*, the Southern Black Racer.

VNMP DISTRIBUTION MAP: Fig. 37

ESTIMATE OF ABUNDANCE AT VNMP: A common snake within

the park.

VNMP HABITAT: This is a snake of woodlands and fields. They can be anticipated inside well-shaded, high canopy woodlands, within the heavily vegetated sun-penetrated forest borders, in fields with unmowed grasses and forbs, and even on lawns. They often move along hilltops, slopes, and in ravines.

COMMENTS: This is a harmless, slender-bodied, rapidly moving, black or gray-brown snake, usually possessing a black mask-like dark area on each side of the head. An occasional individual may become aggressive if provoked..

5. TIMBER RATTLESNAKE (*Crotalus horridus*)

TAXONOMIC COMMENTS: No subspecies are currently recognized.

VNMP DISTRIBUTION MAP: Fig. 38

ESTIMATE OF ABUNDANCE AT VNMP: Probably a moderately common snake within the park.

VNMP HABITAT: This is a snake of extensive woodlands and woodland borders. All four specimens taken were road kills. Two additional specimens were reported to me by park rangers. These were also on park roads.

6. RINGNECK SNAKE (*Diadophis punctatus*)

TAXONOMIC COMMENTS: The subspecies found in the park is *Diadophis punctatus stictogenys*, the Mississippi Ringneck Snake.

VNMP DISTRIBUTION MAP: Fig. 39

ESTIMATE OF ABUNDANCE AT VNMP: Probably a moderately common snake within the park.

VNMP HABITAT: This is a snake of woodlands and woodland borders. Individuals are often associated with rotting logs in ravines. It is most often found under and within rotting logs or under other cover objects..

COMMENTS: This is a small, harmless snake. Cover boards were particularly effective in capturing these snakes.

7. CORN SNAKE (*Elaphe guttata*)

TAXONOMIC COMMENTS: No subspecies are currently recognized.

VNMP DISTRIBUTION MAP: Fig. 40

ESTIMATE OF ABUNDANCE AT VNMP: Probably a moderately common snake within the park. Because of its habits, this species is usually more common than collection records indicate.

VNMP HABITAT: This is a snake of woodlands, woodland borders, and fields. Individuals are often associated with dead trees with peeling bark. They are arboreal but spend considerable time moving through underground rodent burrows.

COMMENTS: This is a large, harmless snake. Because of its unusually colorful pattern, it is one of the most beautiful snakes in the U.S. and individuals are prized in the pet trade. Most adults are docile when captured.

8. EASTERN RAT SNAKE (*Elaphe spiloides*)

TAXONOMIC COMMENTS: There are no currently recognized subspecies. (Burbrink, 2001; Collins and Taggart, 2002).

VNMP DISTRIBUTION MAP: Fig. 41

ESTIMATE OF ABUNDANCE AT VNMP: Probably a common snake within the park. Because of its life style, this species is usually more common than collection records indicate.

VNMP HABITAT: This is a snake of woodlands, woodland borders, and open fields with scattered trees. Individuals are often associated with dead trees with peeling bark. They are arboreal but spend a great of time moving along the ground. This is the most likely Mississippi snake to be found within buildings, and particularly in attics or lofts..

COMMENTS: This is a very large, harmless snake. Many individuals are docile when captured.

While arboreal, many individuals spend a great of time moving through underground rodent burrows. One was seen searching through abandoned, partially buried pipe.

9. COMMON KINGSNAKE (*Lampropeltis getula*)

TAXONOMIC COMMENTS: The subspecies found within the park is *Lampropeltis getula holbrooki*, the Speckled Kingsnake.

VNMP DISTRIBUTION MAP: Fig. 42

ESTIMATE OF ABUNDANCE AT VNMP: Moderately common

VNMP HABITAT: This is a snake of open woodlands, woodland borders, and open fields with or without scattered trees. They are often found around buildings.

COMMENTS: This is a large, harmless snake. Many individuals are docile when captured. These snakes often prey upon other snakes, including those that are venomous.

10. PLAINBELLY WATERSNAKE (*Nerodia erythrogaster*)

TAXONOMIC COMMENTS: The subspecies found within the park is *Nerodia erythrogaster flavigaster*, the Yellowbelly Water Snake.

VNMP DISTRIBUTION MAP: Fig. 43

ESTIMATE OF ABUNDANCE AT VNMP: Moderately common

VNMP HABITAT: This is a snake of woodland and open field streams and small bodies of temporary standing water near these streams. They appeared to be more common along Mint Springs Creek and its tributaries than elsewhere in the park.

COMMENTS: This is a large, dark heavy-bodied, water snake. Although non-poisonous, large specimens can produce a freely bleeding bite. These snakes are often mistaken for the venomous cottonmouth.

11. NORTHERN WATER SNAKE (*Nerodia sipedon*)

TAXONOMIC COMMENTS: The subspecies found within the park is *Nerodia sipedon pleuralis*, the Midland Water Snake. One individual collected had a color pattern suggesting the possibility of influence from *Nerodia fasciata*, although the pattern leaned heavily toward *N. sipedon*.

VNMP DISTRIBUTION MAP: Fig. 44

ESTIMATE OF ABUNDANCE AT VNMP: Moderately common.

VNMP HABITAT: This is a snake of woodland and open field streams and small bodies of temporary standing water near these streams. They appeared to be common along Mint Springs Creek and Glass Bayou than elsewhere in the park.

COMMENTS: This is a large, prominently patterned, heavy-bodied, water snake. Although non-poisonous, large specimens can produce a freely bleeding bite. These snakes are often mistaken for the venomous cottonmouth.

12. ROUGH GREEN SNAKE (*Ophedrys aestivus*)

TAXONOMIC COMMENTS: No subspecies are presently recognized.

VNMP DISTRIBUTION MAP: Fig. 45

ESTIMATE OF ABUNDANCE AT VNMP: Exceptionally common for this species.

VNMP HABITAT: This is an elongated, slender, vividly green, arboreal snake that inhabits the thick borders of park woodlands and open fields having considerable numbers of small trees.

COMMENTS: This long, slender, vivid green, harmless snakes. Fourteen were found within the park. In my experience, this is an unusually high figure for this snake since it blends well into the foliage it occupies. I assume this reflects the extensive shrub, small tree, and vine tangled low canopy cover that is available with the park.

13. REDBELLY SNAKE (*Storeria occipitomaculata*)

TAXONOMIC COMMENTS: The subspecies found within the park is *Storeria occipitomaculata obscura*, the Florida Redbelly Snake.

VNMP DISTRIBUTION MAP: Fig. 46

ESTIMATE OF ABUNDANCE AT VNMP: Although only two were taken during the survey, this snake is probably moderately common within its preferred habitat.

VNMP HABITAT: This is a snake of hilly woodlands and woodland borders. It can usually be found under and within rotting logs and under other cover objects.

COMMENTS: This is a small, secretive, harmless snake that has a spotty

distribution pattern within Mississippi.

14. COMMON GARTER SNAKE (*Thamnophis sirtalis*)

TAXONOMIC COMMENTS: The subspecies found within the park is *Thamnophis sirtalis sirtalis*, the Eastern Garter Snake.

VNMP DISTRIBUTION MAP: Fig. 47

ESTIMATE OF ABUNDANCE AT VNMP: Although only two were taken, this snake is probably moderately common within its preferred habitat.

VNMP HABITAT: This is a snake of fields, open woodlands, and woodland borders. It can usually be found along small marshy plots and stream borders. Individuals will often move across mowed lawns.

COMMENTS: This is a moderate-size, harmless snake that many people refer to as a “garden snake.”

D. OTHER POSSIBLE VNMP SPECIES

The Mississippi Museum of Natural Science houses Warren County specimens of the following species:

Agkistrodon piscivorus (MMNS-2093-4, 2103, 2107, 2218, 2219, 2221, 2472)
Crotalus adamanteus (MMNS-1412)
Crotalus horridus (MMNS-1178, 1182, 5790)
Elaphe guttata (MMNS-3120)
Elaphe obsoleta (MMNS-3514, 3534, 3536, 3539, 3553, 3557, 3561)
Farancia abacura (MMNS-3447, 5379)
Heterodon platirhinos (MMNS-3641, 3701-3)
Lampropeltis getula (MMNS-2345, 2379, 2389, 2397, 2400)
Lampropeltis triangulum (MMNS-2296, 2360, 5638, 5718)
Nerodia erythrogaster (MMNS-3076, 5235, 5237, 5370-2)
Nerodia rhombifer (MMNS-1987-8, 4800, 4867)
Tantilla coronata (MMNS-2280)
Thamnophis proximus (MMNS-2642-5, 2647)
Thamnophis sauritus (MMNS-2621)
Thamnophis sirtalis (MMNS-5249, 5250)

Of the above snakes, one *Agkistrodon piscivorus* above (MMNS-2219, was taken on May 22, 1937 at Spanish Fort, which is possibly within the park.

The Louisiana State University Museum of Zoology has Madison Parish records for the following species:

Agkistrodon contortrix (LSUMZ-24016, 24240, 81041-3)
Coluber constrictor (LSUMZ-43517)
Diadophis punctatus (LSUMZ-23989)
Lampropeltis getula (LSUMZ-24110, 73580, 73582)
Storeria dekayi (LSUMZ-46953, 77845)
Thamnophis proximus (LSUMZ-24013-4)
Thamnophis sauritus (LSUMZ-8302)

and a single specimen of *Nerodia rhombifer* from Warren County.

The Smithsonian Institution (United States National Museum) reported the following from Madison Parish:

Thamnophis sirtalis (USNM-083984)

and these from Warren County:

Regina grahamii (USNM-126138)
Scincella lateralis (USNM-099187)
Thamnophis proximus (USNM-017958, 017965)

The University of Louisiana at Monroe reported the following species from Madison Parish:

Agkistrodon contortrix (ULM-494)
Coluber constrictor (ULM-500)
Crotalus horridus (ULM-2853)
Elaphe obsoleta (ULM-707)
Natrix sipedon (ULM-1397)

Cliburn (1959) mentioned a Mississippi Southern College (= University of Southern Mississippi) specimen of *Crotalus horridus* from Warren County.

Cook (1943, 1954, 1962) produced publications on the snakes of Mississippi. Her third revised version (1962) noted the following species, not taken during this 2001-02 survey, as having ranges which possibly included the VNMP area:

Crotalus adamanteus
Farancia abacura
Haldea valeriae (= *Virginia valeriae*)
Haldea striatula (= *Virginia striatula*)
Heterodon simus
Heterodon platyrhinos (= *Heterodon platirhinos*)

Lampropeltis doliata (= *Lampropeltis triangulum*)
Masticophis flagellum
Micrurus fulvius
Natrix grahami (= *Regina grahamii*)
Natrix sipedon fasciata (= *Nerodia fasciata*)
Natrix sipedon confluens (= *Nerodia fasciata*)
Natrix rhombifera (= *Nerodia rhombifer*)
Natrix cyclopion (= *Nerodia cyclopion*)
Sistrurus miliarius
Storeria dekayi
Tantilla coronata
Thamnophis sauritus
Thamnophis sauritus proximus (= *Thamnophis proximus*)

Cook (1962) presented a list of species by county on pages 38 through 42. She noted the presence of two faunal regions in Warren County. These were the Loess or Bluff Region and the Yazoo-Mississippi Delta & Mississippi Delta regions. She noted Warren County records for the following species not taken in the present study:

Heterodon platyrhinos (= *Heterodon platirhinos*)
Lampropeltis doliata (= *Lampropeltis triangulum*)
Masticophis flagellum
Natrix grahami (= *Regina grahamii*)
Natrix rhombifera (= *Nerodia rhombifer*)
Storeria dekayi
Tantilla coronata
Thamnophis sauritus

Rossmann (1970a) mapped a locality near Vicksburg for *Thamnophis proximus* and (1970b), a near-Vicksburg locality for *Thamnophis proximus*.

Rare and Endangered Species Committee (1975: p 18) noted *Farancia erythrogramma* “south of a line from approximate vicinity of Vicksburg to Columbus.” This publication also listed *Regina rigida* as “Southwestern half of state,” *Lampropeltis doliata* (= *L. triangulum*) and *Cemophora coccinea* as “Statewide,” and *Micrurus fulvius* as being in the “Southern three-fourths of the state.”

Cliburn (1976) excluded *Sistrurus miliarius*, *Crotalus adamanteus*, *Farancia erythrogramma*, and *Drymarchon corais* (= *Drymarchon couperi*) from the park area but noted ranges including VNMP for the following species not currently known in the park:

Cemophora coccinea
Farancia abacura
Heterodon platyrhinos (= *Heterodon platirhinos*)
Lampropeltis triangulum

Masticophis flagellum
Micrurus fulvius
Natrix cyclopion (= *Nerodia cyclopion*)
Natrix fasciata (= *Nerodia fasciata*)
Natrix grahami (= *Regina grahamii*)
Natrix rhombifera (= *Nerodia rhombifer*)
Natrix rigida (= *Regina rigida*)
Natrix septemvittata (= *Regina septemvittata*)
Storeria dekayi
Tantilla coronata
Thamnophis sauritus
Thamnophis proximus
Virginia striatula
Virginia valeriae

Blaney and Blaney (1979) mapped Warren County localities for *Nerodia sipedon pleuralis* and *Nerodia sipedon fasciata* (= *Nerodia fasciata*), but supported the view that these were conspecific.

Roze (1983) mapped all known records of *Micrurus fulvius* and all collection localities were far removed from the vicinity of VNMP.

Cliburn (1979) reported the subspecies *Coluber constrictor latrunculus* in Warren County and had this to say (pps. 34-35) about the Mississippi range of *Crotalus adamanteus*:

“If the old records from southwestern Mississippi are accepted, *C. adamanteus* seems to have been eliminated and no longer occurs there. Its Mississippi distribution is probably restricted to areas where longleaf pine (*Pinus palustris*) is common, and its elimination from southwestern Mississippi may be related to removal of the original longleaf pine forest. It is not possible to determine the historical range of *C. adamanteus* in southwestern Mississippi nor the extent of the original longleaf pine forest. ...”

“The present range of *Crotalus adamanteus* in Mississippi is restricted to include only that area east of the Pearl River and south of a line including Jefferson Davis and Wayne Counties.”

Lohofener and Altig (1983) considered the following species not presently known in VNMP as having ranges including the park:

Cemophora coccinea
Farancia abacura
Heterodon platyrhinos (= *Heterodon platirhinos*)
Lampropeltis calligaster
Lampropeltis triangulum
Masticophis flagellum
Nerodia cyclopion
Nerodia fasciata

Regina grahami (*Regina grahamii*)
Nerodia rhombifera (= *Nerodia rhombifer*)
Storeria dekayi
Tantilla coronata
Thamnophis sauritus
Thamnophis proximus
Virginia striatula
Virginia valeriae

These authors included *Crotalus adamanteus*, *Farancia erythrogramma*, *Heterodon simus*, *Micrurus fulvius*, *Pituophis melanoleucus*, and *Regina rigida* to be Group Two species having range limits falling just south of VNMP. *Regina septemvittata* and *Drymarchon corais* (= *D. couperi*) were Group Nine species defined as having ranges which could not be determined.

Dundee and Rossman (1989) mapped the following Madison Parish, Louisiana records:

Agkistrodon contortrix
Agkistrodon piscivorus
Coluber constrictor
Crotalus horridus
Diadophis punctatus
Elaphe obsoleta
Lampropeltis getulus (= *Lampropeltis getula*)
Nerodia fasciata
Nerodia erythrogaster
Nerodia rhombifera (= *Nerodia rhombifer*)
Storeria dekayi
Thamnophis proximus

Of these, only *Nerodia fasciata*, *Nerodia rhombifer*, *Storeria dekayi*, and *Thamnophis proximus* have not been recorded within VNMP boundaries.

Conant and Collins (1998) mapped the following species not presently found in VNMP, as having ranges which include the park:

Cemophora coccinea
Farancia abacura
Heterodon platirhinos
Lampropeltis calligaster
Lampropeltis triangulum
Nerodia cyclopion
Nerodia fasciata
Nerodia rhombifer
Regina grahamii

Storeria dekayi
Thamnophis proximus
Virginia valeriae

Conant and Collins excluded: *Masticophis flagellum*, *Micrurus fulvius*, *Regina septemvittata*, *Tantilla coronata*, and *Farancia erytrogramma*, and possibly, *Sistrurus miliarius*, but indicated a range for *Regina rigida* terminating just north of Warren County and range edges for *Virginia striatula* and *Thamnophis sauritus* ending very near the county line.

SNAKE SUMMARY:

The following fourteen species were found in VNMP during the survey.

Agkistrodon contortrix

Agkistrodon piscivorus
Carphophis amoenus
Coluber constrictor
Crotalus horridus
Diadophis punctatus
Elaphe guttata
Elaphe obsoleta
Lampropeltis getula
Nerodia erythrogaster
Nerodia sipedon
Opheodrys aestivus
Storeria occipitomaculata
Thamnophis sirtalis

The following species are those most likely to be added to the VNMP resident herpetofauna in the future:

Cemophora coccinea
Heterodon platirhinos
Lampropeltis triangulum
Lampropeltis calligaster
Masticophis flagellum
Storeria dekayi
Tantilla coronata
Thamnophis proximus
Thamnophis sauritus
Virginia valeriae
Virginia striatula

The following are the species most likely to be added to the VNMP herpetofauna as temporary flood plain high water residents:

Farancia abacura:
Nerodia fasciata
Nerodia rhombifer
Nerodia cyclopion
Regina grahamii

The following species, while considered by some authors as occurring in the park vicinity, are less likely to be added to the park faunal list:

Drymarchon couperi
Farancia erythrogramma

Heterodon simus
Micrurus fulvius
Pituophis melanoleucus
Regina rigida
Regina septemvittata
Sistrurus miliarius

THREATENED AND ENDANGERED PARK SPECIES

The following Mississippi and Louisiana listings on U.S. threatened and endangered species were downloaded from

http://ecos.fws.gov/webpage/webpage_region_lists.html?lead_region=4 on 16 August 2002:

TESS-LISTED AMPHIBIANS

Frog, Mississippi Gopher (*Rana capito sevosa*) E (West of Mobile, Tombigbee Rs.)

TESS-LISTED REPTILES

Alligator, American (**Alligator mississippiensis**) T(S/A)
Sea turtle, green (*Chelonia mydas*) T (Except where endangered)
Sea turtle, hawksbill (*Eretmochelys imbricata*) E
Sea turtle, Kemp's Ridley (*Lepidochelys kempii*) E
Sea turtle, Leatherback (*Dermochelys coriacea*) E
Sea turtle, Loggerhead (*Caretta caretta*) T
Tortoise, Gopher (*Gopherus polyphemus*) T (W of Mobile, Tombigbee Rs.)
Turtle, Ringed Map (*Graptemys oculifera*) T
Turtle, Yellow-blotched Map (*G. flavimaculata*) T

No species on the above list were found within Vicksburg National Military Park. Of those listed above, only the American Alligator, **Alligator mississippiensis**, is likely to be added to the list in the future.

The list of Mississippi amphibians and reptiles under state protection were downloaded from:

<http://www.mdwfp.com/museum/html/heritage/tandelist.pdf> on 31 August 2002. The list is cited as Mississippi Natural Heritage Program (2002). All federal species listed above, except for the delisted American Alligator are also on the state list. In addition, Mississippi protects the following species:

One-Toed Amphiuma (*Amphiuma pholeter*) [S1]
Green Salamander (*Aneides aeneus*) [S1]
Cave Salamander (*Eurycea lucifuga*) [S1]
Spring Salamander (*Gyrinophilus porphyriticus*) [S1]
Dark Gopher Frog (*Rana sevosa*) [S1]

Yellow-blotched Map Turtle (*Graptemys flavimaculata*) [S2]
Black-knobbed Map Turtle (*Graptemys nigrinoda*) [S2]
Southern Hognose Snake (*Heterodon simus*) [SH]
Black Pine Snake (*Pituophis melanoleucus lodingi*) [S2]
Mississippi Redbelly Turtle (*Pseudemys sp.*) [S1]
Eastern Indigo Snake (*Drymarchon corais couperi*) [S1]
Rainbow Snake (*Farancia erytrogramma*) [S2]

No species on the above Mississippi list were found within the park boundaries and none have ranges and habitat preferences which make them likely to be future additions to the park fauna.

GENERAL SUMMARY

Five species of salamanders, 12 frogs and toads, nine turtles, no crocodilians, four lizards, and 14 species of snakes were found within the park boundaries during the 2001-2002 survey. A list of these follows.

SALAMANDERS:

Ambystoma maculatum (Spotted Salamander)
Ambystoma talpoideum (Mole Salamander)
Desmognathus conanti (Spotted Dusky Salamander)
Eurycea longicauda guttolineata (Three-lined Salamander)
Plethodon mississippi (Mississippi Slimy Salamander)

FROGS AND TOADS:

Acris crepitans (Northern Cricket Frog)
Bufo americanus (American Toad)
Bufo fowleri (Fowler's Toad)
Gastrophryne carolinensis (Eastern Narrowmouth Toad)
Hyla chrysoscelis (Cope's Gray Treefrog)
Hyla cinerea (Green Treefrog)
Hyla versicolor (Gray Treefrog)
Pseudacris crucifer (Spring Peeper)
Rana catesbeiana (Bullfrog)
Rana clamitans (Green Frog)
Rana sphenoccephala (Florida Leopard Frog)
Scaphiopus holbrookii (Eastern Spadefoot)

TURTLES:

Chelydra serpentina (Snapping Turtle)
Chrysemys picta (Painted Turtle)
Graptemys ouachitensis (Ouachita Map Turtle)
Graptemys pseudogeographica (False Map Turtle)
Macrochelys temminckii (Alligator Snapping Turtle)
Pseudemys concinna (Eastern River Cooter)
Sternotherus odoratus (Common Musk Turtle)
Terrapene carolina (Common Box Turtle)
Trachemys scripta (Slider)

LIZARDS:

Anolis carolinensis (Green Anole)

Eumeces fasciatus (Five-lined Skink)
Eumeces laticeps (Broadhead Skink)
Scincella lateralis (Ground Skink)

SNAKES:

Agkistrodon contortrix (Copperhead)
Agkistrodon piscivorus (Cottonmouth)
Carphophis amoenus (Eastern Worm Snake)
Coluber constrictor (Eastern Racer)
Crotalus horridus (Timber Rattlesnake)
Diadophis punctatus (Ringneck Snake)
Elaphe guttata (Corn Snake)
Elaphe obsoleta (Eastern Rat Snake)
Lampropeltis getula (Common Kingsnake)
Nerodia erythrogaster (Plainbelly Water Snake)
Nerodia sipedon (Northern Water Snake)
Opheodrys aestivus (Rough Green Snake)
Storeria occipitomaculata (Redbelly Snake)
Thamnophis sirtalis (Common Garter Snake)

The following species have habitat requirements and ranges which suggest that they will eventually be found within the park:

SALAMANDERS:

Ambystoma opacum (Marbled Salamander)
Eurycea cirrigera ((Southern Two-lined Salamander)
Eurycea quadridigitata (Dwarf Salamander)
Notophthalmus viridescens (Eastern Newt)
Pseudotriton ruber (Red Salamander)

FROGS AND TOADS:

Acris gryllus (Southern Cricket Frog)
Hyla squirella (Squirrel Treefrog)
Hyla avivoca (Bird-voiced Treefrog)
Pseudacris feriarum (Upland Chorus Frog)
Rana palustris (Pickeral Frog)

CROCODILIANS:

Alligator mississippiensis (American Alligator)

TURTLES:

Apalone mutica (Smooth Softshell)
Apalone spinifera (Spiny Softshell)
Deirochelys reticularia (Chicken Turtle)
Kinosternon subrubrum (Eastern Mud Turtle)
Sternotherus carinatus (Razorback Musk Turtle)

LIZARDS:

Hemidactylus turcicus (Mediterranean Gecko)
Sceloporus undulatus (Fence Lizard)

SNAKES

Cemophora coccinea (Scarlet Snake)
Farancia abacura: (Mud Snake)
Heterodon platirhinos (Eastern Hognose Snake)
Lampropeltis calligaster (Prairie Kingsnake)
Lampropeltis triangulum (Milk Snake)
Masticophis flagellum (Coachwhip)
Nerodia fasciata (Southern Water Snake)
Nerodia rhombifer (Diamondback Water Snake)
Nerodia cyclopion (Mississippi Green Water Snake)
Regina grahamii (Graham's Crayfish Snake)
Storeria dekayi (Brown Snake)
Tantilla coronata (Southeastern Crowned Snake)
Thamnophis proximus (Western Ribbon Snake)
Thamnophis sauritus (Eastern Ribbon Snake)
Virginia valeriae (Smooth Earth Snake)
Virginia striatula (Rough Earth Snake)

The following species have habitat requirements and ranges which suggest that they are unlikely members of the VNMP fauna but they cannot be discounted as occasional transients or restricted habitat residents within the park:

SALAMANDERS:

Amphiuma tridactylum (Three-toed Amphiuma)
Hemidactylium scutatum (Four-toed Salamander)
Necturus maculosus (Common Mudpuppy)
Plethodon websteri (Webster's Salamander)
Siren intermedia (Lesser Siren)

FROGS AND TOADS

Bufo quercicus (Oak Toad)
Bufo terrestris (Southern Toad)
Hyla femoralis (Pine Woods Treefrog)
Hyla gratiosa (Barking Treefrog)
Rana areolata (Crawfish Frog)

TURTLES

None

LIZARDS

Eumeces anthracinus (Coal Skink)
Eumeces inexpectatus (Southeastern Five-lined Skink)
Cnemidophorus sexlineatus (Six-lined Racerunner)
Ophisaurus attenuatus (Slender Glass Lizard)

SNAKES

Drymarchon couperi (Eastern Indigo Snake)
Farancia erythrogramma (Rainbow Snake)
Heterodon simus (Southern Hognose Snake)
Micrurus fulvius (Eastern Coral Snake)
Pituophis melanoleucus (Eastern Pine Snake)
Regina rigida (Glossy Crayfish Snake)
Regina septemvittata (Queen Snake)
Sistrurus miliarius (Pigmy Rattlesnake)

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I am certain I do not at this time recall the names of all who helped with some phase of this project and for this mental lapse, I apologize.

THREATENED AND ENDANGERED PARK SPECIES

The following Mississippi and Louisiana listings on U.S. threatened and endangered species were downloaded from http://ecos.fws.gov/webpage/webpage_region_lists.html?lead_region=4 on 16 August 2002:

TESS-LISTED AMPHIBIANS

Frog, Mississippi Gopher (*Rana capito sevosa*) E (West of Mobile, Tombigbee Rs.)

TESS-LISTED REPTILES

Alligator, American (*Alligator mississippiensis*) T(S/A)

Sea turtle, green (*Chelonia mydas*) T (Except where endangered)

Sea turtle, hawksbill (*Eretmochelys imbricata*) E
Sea turtle, Kemp's Ridley (*Lepidochelys kempii*) E
Sea turtle, Leatherback (*Dermochelys coriacea*) E
Sea turtle, Loggerhead (*Caretta caretta*) T
Tortoise, Gopher (*Gopherus polyphemus*) T (W of Mobile, Tombigbee Rs.
Turtle, Ringed Map (*Graptemys oculifera*) T
Turtle, Yellow-blotched Map (*G. flavimaculata*) T

No species on the above list were found within Vicksburg National Military Park. Of those listed above, only the American Alligator, *Alligator mississippiensis*, is likely to be added to the list in the future.

The list of Mississippi amphibians and reptiles under state protection were downloaded from:

<http://www.mdwfp.com/museum/html/heritage/tandelist.pdf> on 31 August 2002. The list is cited as Mississippi Natural Heritage Program (2002). All federal species listed above, except for the delisted American Alligator are also on the state list. In addition, Mississippi protects the following species:

One-Toed Amphiuma (*Amphiuma pholeter*) [S1]
Green Salamander (*Aneides aeneus*) [S1]
Cave Salamander (*Eurycea lucifuga*) [S1]
Spring Salamander (*Gyrinophilus porphyriticus*) [S1]
Dark Gopher Frog (*Rana sevosia*) [S1]

Yellow-blotched Map Turtle (*Graptemys flavimaculata*) [S2}
Black-knobbed Map Turtle (*Graptemys nigrinoda*) [S2]
Southern Hognose Snake (*Heterodon simus*) [SH]
Black Pine Snake (*Pituophis melanoleucus lodingi*) [S2]
Mississippi Redbelly Turtle (*Pseudemys sp.*) [S1]
Eastern Indigo Snake (*Drymarchon corais couperi*) [S1]
Rainbow Snake (*Farancia erytrogramma*) [S2}

No species on the above Mississippi list were found within the park boundaries and none have ranges and habitat preferences which make them likely to be future additions to the park fauna.

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