ORNL/TM-2009/296

December 2009

Environmental Survey Report for ORNL:

Reptile and Amphibian Abundance and Distribution Survey

OAK RIDGE NATIONAL ENVIRONMENTAL RESEARCH PARK

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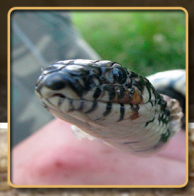
Prepared for Oak Ridge National Laboratory
Managed by UT-Battelle, LLC, for the U.S. Department of Energy under contract DE-AC05-000R22725







Background photo of cave salamanders courtesy of Sarah Brown

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Environmental Survey Report for ORNL: Reptile and Amphibian Abundance and Distribution Survey Oak Ridge National Environmental Research Park 2007–2009

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Date Published: December 2009

Prepared for
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-6283
managed by
UT-BATTELLE, LLC
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-00OR22725

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ACRONYMS

CRESO	Clinch River Environmental Studies Organization
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation

ACKNOWLEDGMENTS

The authors of this study would like to thank Patricia D. Parr, Facilities and Operations Directorate, for facultative and administrative support throughout the study. We would also like to extend special thank to David Page of the Department of Energy for his support during this project. For mapping and graphics we appreciate the help of Harry Quarles, Oak Ridge National Laboratory Environmental Sciences Division, and Sherri Cotter, Facilities Development Division. Data collaboration on turtles in Solway Bend provided by John G. Byrd and his students, Clinch River Environmental Studies Organization, was a great contribution to the study. Jim Evans and Sam Young, Tennessee Wildlife Resources Agency, provided great technical support throughout the entire study. Also, thanks to Oak Ridge National Laboratory and the Department of Energy for allowing the study to be conducted on the Oak Ridge Reservation.

EXECUTIVE SUMMARY

This document summarizes the results of a 3 year Oak Ridge Reservation–wide reptile and amphibian survey. The survey was conducted in the spring and summer of 2007, 2008, and 2009. It was accomplished with the services of interns in the Oak Ridge Institute for Science and Education Higher Education Research Experiences Program. The survey was designed to sample locations that had been sampled in previous surveys as well as certain new locations of interest.

Two supplemental studies were carried out concurrently with the abundance survey. A ranavirus study was conducted in cooperation with the University of Tennessee's Wetlands Diseases Laboratory. The project involved the collection of small samples clipped from the tails of a number of salamanders collected during the ongoing abundance and distribution survey. Supplemental studies were also conducted by the Clinch River Environmental Studies Organization during the 2007–2009 time frame. In a program funded by the Department of Energy, middle and high school students collected data from turtles trapped in hoop nets at the two Solway Bend ponds that were also sampled during the overall study.

Certain sampling sites in the study area are particularly notable for either high capture rates or suitability of habitat for target species. Of those, Amphibian Site 5, Bearden Creek, the mesophytic forest, and Hembree Marsh in particular, should be highlighted as significant locations for the management of reptile and amphibian populations.

ABSTRACT

As a follow-up to a 1996 abundance and diversity study, we conducted reptile and amphibian abundance and diversity surveys during May through July in 2007, 2008, and 2009. The surveys were conducted in the Oak Ridge National Environmental Research Park, located on the U.S. Department of Energy's Oak Ridge Reservation (ORR), in Tennessee. The area encompasses 33,654 acres. Our survey incorporated 20 separate sites on the ORR. The habitats covered during this study ranged from upland forested areas to low bottom wetland and stream areas. Several of the sites included native warm-season grass and old field locations. During the survey all captured reptiles and amphibians were released at the point of capture after identification and recording of measurements. The measurements were taken for future growth data analysis and included the specimen's weight, total length, and snout-to-vent length; for turtles we recorded just the length of carapace (top of the shell), the length of the plastron (bottom of the shell), and the depth of the shell. During the survey we used seven methods of capture: visual encounter surveys, artificial cover objects (wood and metal), pitfall traps with drift fence lines, minnow traps, dip nets, hoop nets, and acoustic surveys. In total, 360 specimens of 35 species were recorded during the survey. Two species of interest that we encountered were the northern cricket frog (*Acris crepitans*) and the four-toed salamander (*Hemidactylium scutatum*).

1. INTRODUCTION

The 2007–2009 reptile and amphibian abundance and diversity survey project was undertaken to update information about reptiles and amphibians on the Oak Ridge Reservation (ORR). The project was managed by UT Battelle and Oak Ridge National Laboratory (ORNL) and was funded through the ORR natural resources budget. Surveys were conducted by interns from the University of North Carolina at Pembroke, the University of Tennessee, Knoxville who were participating in the Oak Ridge Institute for Science and Education Higher Education Research Experiences Program.

The survey was part of an ongoing effort to measure the abundance and diversity of reptiles and amphibians on the ORR. (Complete life histories of the reptiles and amphibians of the ORR are contained within Appendix A.) The surveys were designed to target all reptiles and amphibians that inhabit the ORR. Twenty-three separate sites were surveyed, including upland hardwood forests, bottomland flooded areas, creeks, farm ponds, and caves (Fig. 1). The study was conducted during the spring and summer (May through July) of 2007, 2008, and 2009. Seven inventory methods were used during the study: visual encounter surveys, artificial cover objects (wood and metal), pitfall traps with drift fence lines, minnow traps, dip nets, hoop nets, and acoustic surveys (Appendix B).

The objectives of this study were as follows:

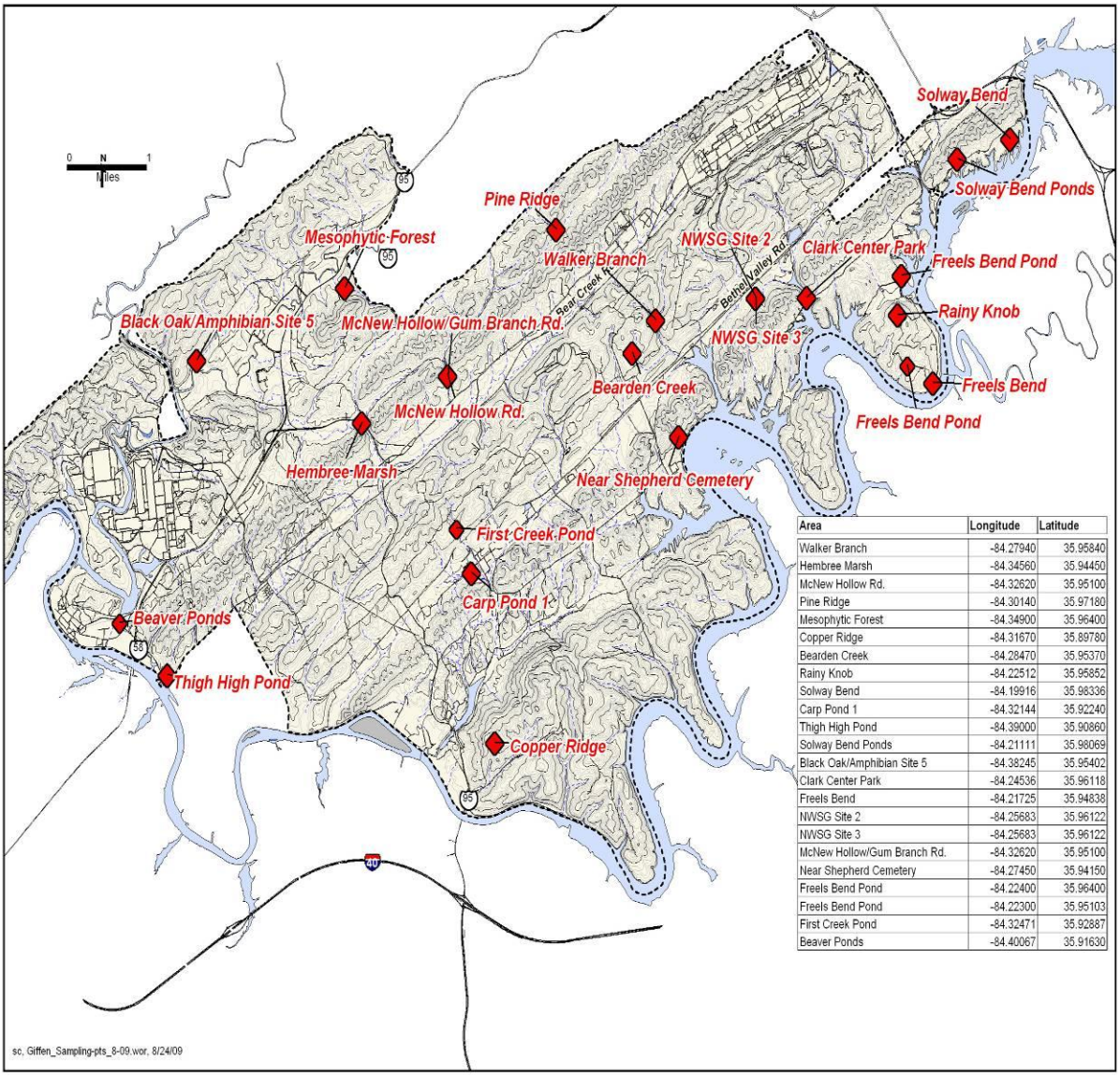
- characterize patterns in the distribution and abundance of reptiles and amphibians in various wetland and upland locations and
- record species and numbers of reptiles and amphibians frequenting the Reservation.

2. METHODS AND MATERIALS

The ORR comprises 33,654 acres of mixed upland hardwoods, pine stands, native warm-season grasslands, maintained power line corridors, and bottomland wetlands. There are several active creeks and springs flowing within the ORR. The area has no silvicultural disturbances, and fire management is restricted to the native warm-season grassland fields (N. R. Giffen, J. W. Evans, and P. D. Parr, 2007. *Wildlife Management Plan for the Oak Ridge Reservation*, ORNL/TM-2006/155, Oak Ridge National Laboratory, Oak Ridge, Tennessee.).

Nine predetermined sites and 14 additional sites were surveyed (Fig. 1).The 2007 survey was limited to eight sites and methods were restricted to visual encounter surveys and dip-netting . In 2008, 8 to 13 wooden cover objects were placed at four sites and five to ten metal cover objects were placed at four additional sites. The type of cover object used was determined by habitat type. Metal cover objects were used in native warm-season grassland fields and old fields. The metal was corrugated roofing tin cut into 4 × 2 ft pieces. Wooden cover objects were used in upland hardwoods, wooded marshes, and wooded creek beds. All cover objects were checked for any activity three times per week throughout the study period.

Seven pitfall traps were installed along both sides of a drift fence line at the Hembree Marsh site, a bottomland wooded marsh. The pitfall buckets were 12 in. in diameter and 12 in. in height. Each bucket was set into the substrate so that the rim was flush with the ground surface. All of the pitfalls were placed along the drift fence, touching the bottom of the fence to ensure capture. Small holes were drilled in the bottom of each bucket to allow drainage. Wet sponges were placed in the buckets to provide moisture for any trapped amphibian species to guard against desiccation. The drift fence



Area	Longitude	Latitude
Walker Branch	-84.27940	35.95840
Hembree Marsh	-84.34560	35.94450
McNew Hollow Rd.	-84.32620	35.95100
Pine Ridge	-84.30140	35.97180
Mesophytic Forest	-84.34900	35.96400
Copper Ridge	-84.31670	35.89780
Bearden Creek	-84.28470	35.95370
Rainy Knob	-84.22512	35.95852
Solway Bend	-84.19916	35.98336
Carp Pond 1	-84.32144	35.92240
Thigh High Pond	-84.39000	35.90860
Solway Bend Ponds	-84.21111	35.98069
Black Oak/Amphibian Site 5	-84.38245	35.95402
Clark Center Park	-84.24536	35.96118
Freels Bend	-84.21725	35.94838
NWSG Site 2	-84.25683	35.96122
NWSG Site 3	-84.25683	35.96122
McNew Hollow/Gum Branch Rd.	-84.32620	35.95100
Near Shepherd Cemetery	-84.27450	35.94150
Freels Bend Pond	-84.22400	35.96400
Freels Bend Pond	-84.22300	35.95103
First Creek Pond	-84.32471	35.92887
Beaver Ponds	-84.40067	35.91630

Fig. 1. Map of sites on the Oak Ridge Reservation sampled during the 2007–2009 reptile and amphibian abundance and distribution survey.

was a 20 ft section of silt fencing. The bottom edge of the drift fence was staked with metal pins to prevent specimens from escaping under the fencing. Other passive trapping efforts included setting minnow traps in marshes and ephemeral pools and the use of hoop nets in ponds. A description of sampling methods is given in Appendix B.

Minnow traps were effective in trapping a variety of amphibians, especially tadpoles and larval salamanders. During the study minnow traps were set in trap lines of 15 to 20 traps per line. The number and placement of minnow traps were based on the size and on the water level of the trapping area. Hoop nets were used in ponds and wetland complexes to capture turtles. Number and placement of the traps were again based on the size of the trapping area and water levels. We used various baits (e.g., canned sausages or sardines) to make the hoop nets more attractive to turtles.

Active trapping was conducted through visual encounter surveys. Throughout all of the sites, visual encounter surveys were conducted on a weekly basis. Logs and rocks were randomly flipped to determine any presence or activity. Surveys were conducted extensively at creek and spring sites in the area. During the creek and spring surveys, both submerged and exposed rocks were randomly flipped, and substrate was sifted through dip nets. Reptiles and amphibians were also incidentally observed out in the open around the survey sites.

Acoustic monitoring for anuran (frog) vocalizations was also conducted during the survey. Ten fixed monitoring locations evenly distributed throughout the ORR were chosen for acoustic monitoring. All of the locations for acoustic monitoring were located near anuran habitat. Monitoring was begun 30 min after sunset. A period of 5 min was assigned to each of the ten fixed locations to listen to and to record any vocalizations heard. A call index scale (from 1, being the least intensive, to 3, being the most intensive) was used to measure the intensity of the vocalizations. A call index of 1 was assigned for vocalization from a specimen of a species. Overlapping vocalizations from the same species received a call index of 2. If calls were overlapping with three or more specimens to a whole chorus, a call index of 3 was recorded. Species recorded of anurans during the survey are represented in Appendix C. Individual anuran captures recorded during all other survey methods is given in Appendix D.

3. SUPPLEMENTAL STUDIES

In 2008, the University of Tennessee's Wetlands Diseases Laboratory requested ORNL's cooperation on a regional ranavirus study. After a review by the ORNL Animal Care and Use Committee and amendment of the Oak Ridge Reservation Reptile and Amphibian Survey Project Animal Care and Use Committee Protocol (#354), a cooperative effort was commenced. The project involved the collection of small samples clipped from the tails of a number of salamanders. The salamanders collected for tail clipping were those caught during the ongoing abundance and distribution survey. After collection, salamanders were placed in individual ziplock bags. Latex gloves were worn, and working surfaces and instruments were sterilized with chlorhexidine between the processing of each specimen to prevent risk of cross contamination. Each specimen was weighed and measured. A very small portion of its tail tip was clipped with standard nail clippers and was transferred into a sterile centrifuge tube. The tubes were placed into a sealed bag and were kept on dry ice until they could be transferred into a subzero freezer at the University of Tennessee.

Additional studies were also conducted by the Clinch River Environmental Studies Organization (CRESO) during the 2007–2009 time frame. This U.S. Department of Energy–funded outdoor studies program serves as an important educational opportunity for middle and high school students as they collect important biological information. The students collected data from turtles trapped in hoop nets at the two Solway Bend ponds that were also sampled during the overall ORR survey. The information collected by CRESO is contained in Appendix E.

4. RESULTS

During the sampling period, we recorded 35 reptile and amphibian species (Table 1). The four-toed salamander, recorded in 2009, is listed by the state of Tennessee as being "in need of management." During 2007, we identified 16 species and recorded between 40 and 100 specimens. In 2008, we identified 32 species and recorded 119 specimens. During 2009 we identified 33 species and recorded 187 specimens. A historical list of species found on ORR is given in Appendix F. A full record of all specimens captured during the study is given in Appendix D. For 2008 and 2009 we logged the sampling effort and time spent in the field. We compared the data with the occurrence of specimens and were able to produce a catch-per-effort analysis (Fig. 2). The visual encounter survey was the most effective sampling method.

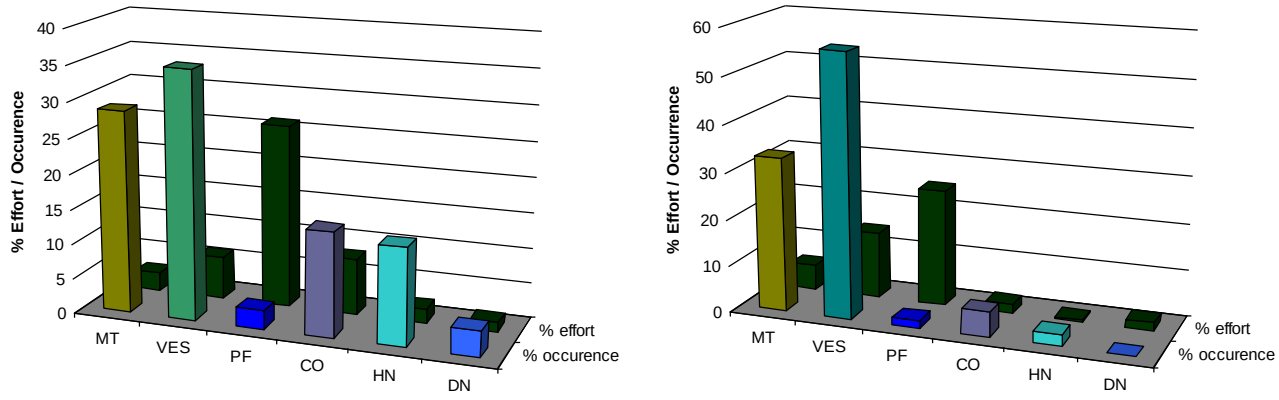


Fig. 2. Comparison of method effort and specimen occurrence. Left: 2008, right: 2009.

5. DISCUSSION

Weather likely had an effect on capture rates, especially for amphibians. Reptile and amphibian encounters were lower than expected for the area during 2007 and 2008. It is believed that drought conditions, particularly in 2007, contributed significantly to the lack of encounters. Amphibian movements, reproduction, and other behaviors can be significantly affected by such conditions. This is particularly true because so many amphibian species depend on adequate water levels for breeding and larval development. Salamander mortality was noted in 2007 in certain streams where larvae were restricted to small stagnant pools of water where water would be flowing in normal conditions. During 2009 the precipitation increased to nearly average levels, and the sampling yield increased over that period.

All of the sampling methods used in the study were standard methods that are commonly used in most presence and abundance studies. Some of the sampling methods were modified to better fit each of the sampling sites in the survey. All of the sites were observed and evaluated prior to the implementation of any sampling method. The type of sampling was determined by habitat type and location. Once each site was assigned a sampling method, that method was used throughout the entire survey.

Upon capture of a specimen, several measurements were collected for future population growth analysis. Subsequent to capture, all individuals were placed into a sampling bag. The individual was first identified to species, if possible. Measurements varied, depending on the group. We measured snout-to-vent lengths (the length from the tip of the snout to the cloaca) of salamanders, lizards, and snakes. We also measured their total length. The total length is measured from the tip of the snout to the tip of the tail.

The measurements were different for turtles. We recorded just the length of carapace (top of the shell), the length of the plastron (bottom of the shell), and the depth of the shell. A complete record of the measurements is given in Appendix D.

Certain sampling sites in the study area were particularly notable for either high capture rates or suitability of habitat for target species. Of those, Amphibian Site 5, Bearden Creek, Hembree Marsh, and the mesophytic forest (Fig. 3), in particular, should be highlighted as significant locations for the management of reptile and amphibian populations.

Table 1. Reptile and amphibian species recorded (2007–2009)

Common name	Genus and species
Salamanders and newts	
Cave salamander	*Eurycea lucifuga*
Marbled salamander	*Ambystoma opacum*
Northern dusky salamander	*Desmognathus fuscus fuscus*
Two-lined salamander	*Eurycea bislineata*
Northern red salamander	*Pseudotriton ruber ruber*
Spotted dusky salamander	*Desmognathus fuscus conanti*
Spotted salamander	*Ambystoma maculatum*
Three-lined salamander	*Ambystoma maculatum*
Long tail salamander	*Eurycea longicauda*
Four toed salamander	*Hemidactylium scutatum*
Red-spotted newt	*Notophthalmus viridescens viridescens*
Lizards	
Five-lined skink	*Eumeces fasciatus*
Southeastern five lined skink	*Eumeces inexpectatus*
Broad head skink	*Eumeces laticeps*
Snakes	
Eastern king snake	*Lampropeltis getula getula*
Ring necked snake	*Diadophis punctatus edwardsii*
Northern brown snake	*Storeria dekayi dekayi*
Northern water snake	*Nerodia sipedon sipedon*
Smooth earth snake	*Virginia valerie*
Northern redbelly snake	*Storeria occipitomaculata*
Northern copperhead	*Agkistrododn contortrix*
Toads and frogs	
American toad	*Bufo americanus*
Eastern narrow-mouthed toad	*Gastrophryne carolinensis*
Southern leopard frog	*Rana utricularia*
Northern cricket frog	*Acris crepitans*
Green frog	*Rana clamitans*
Spring peeper	*Pseudacris crucifer*
Turtles	
Eastern spiny softshell	*Apalone spinifera spinifera*
Eastern box turtle	*Terrapene carolina*
Common musk turtle	*Stenotherus odoratus*
Painted turtle	*Chrysemys spp.*
Snapping turtle	*Chelydra serpentina*
Yellow-bellied slider	*Trachemys scripta scripta*
Cumberland slider	*Trachymes scripta troostii*

6. CONCLUSION

During this study we were able to survey 23 sites distributed throughout the ORR. We evaluated the presence, abundance, and species diversity of aquatic and terrestrial reptiles and amphibians throughout all of the study sites. Out of the sites evaluated, 16 included wetland and other aquatic complexes. During the study we maintained collaboration with the Tennessee Wildlife Resources Agency, CRESO, and the University of Tennessee, Knoxville. Through this study we have been able to start characterizing patterns in the distribution and abundance of certain species on the ORR. An ongoing reptile and amphibian inventory is beneficial to land managers and wildlife biologists for future management considerations on the ORR.

Fig. 3. Significant survey locations. Top: Bearden Creek, middle: mesophytic forest, bottom: Amphibian Site 5.

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APPENDIX A.

LIFE HISTORIES OF THE REPTILES AND AMPHIBIANS OF THE OAK RIDGE RESERVATION

APPENDIX A. LIFE HISTORIES OF REPTILES AND AMPHIBIANS OF THE OAK RIDGE RESERVATION

A.1 AMPHIBIANS

A.1.1 Frogs and Toads

American Toad—*Bufo americanus*

Photo by Robert English, LEAPS Environmental Consulting © 2009

The American toad ranges from as far south as northern Mississippi, west as far as eastern Oklahoma, and as far north as the Canadian border. The American toad is found throughout the Northeast and is considered quite common.

American toads thrive in several habitats, from dense forests to open disrupted areas. They rely on shallow bodies of water, moist cool cover, and an abundant prey base of insects. Young American toads need especially dense vegetation for prey availability and generally are found near and in permanent water sources. During colder months, American toads lie dormant in leaf litter. They will often disperse to a separate area from breeding pools to overwinter.

In the summer months, the toads are most likely found under logs and in other shaded areas. Considered nocturnal, they are most active around dusk, when they come out to forage for insects and worms. The toads remain solitary until breeding season, at which time they then move into large breeding pools.

American toads typically mate from March to April, but breeding has been known to extend until July in colder climates. Males usually arrive at breeding pools early to establish territories and then attract the females with vocalizations. As with most frogs and toads, fertilization is external; the female lays 2,000 to 20,000 eggs in long rows. They are then externally fertilized. Depending on temperature, the eggs hatch within 3 to 12 d. Tadpoles take 40 to 70 d to develop. Sexual maturity occurs at 2 to 3 years.

The lifespan of most American toads never normally exceeds 1 to 2 years. Since they are adaptable to their environment and can thrive in so many locations, they are not at risk of endangerment. The species is stable throughout the eastern United States.

Gray Treefrog—*Hyla versicolor*

Photo by Robert English, LEAPS Environmental Consulting © 2009

The gray treefrog ranges from northern Florida to southern Maine and as far west as central Texas. Large populations have been established in Tennessee and North Carolina. This species is similar to Cope's gray treefrog (*Hyla chrysoscelis)* but can be distinguished by the call. It is possible that these two species have begun to hybridize in certain overlapping locations.

Gray treefrogs generally prefer riparian zones or thick woody stands with in 500 ft of wet areas. They generally remain in trees or taller vegetation, where they are free of most predators and are closer to their food sources. During mating season, they move closer to water sources to lay eggs, usually on trees and bushes that hang over water. During winter, the treefrogs are inactive and use coarse woody debris as cover.

Gray treefrogs are territorial during breeding season, but they group during most of the summer months. Their prey consists of insects, smaller amphibians, and algae.

The gray treefrogs' breeding season runs from April to May. The females are dominant during breeding seasons; they approach males by responding to male vocalizations. The frogs reproduce using external fertilization.

The gray treefrogs are relatively common and appear to be at no risk of extinction. While most individuals are subject to predator-related deaths, along with diseases and other incidents, the treefrogs are known to live up to 7 years (in captivity). This species is stable.

Cope's Gray Treefrog—*Hyla chrysoscelis*

Photo by Scott Reasor

Cope's gray treefrogs are present throughout the eastern United States from central Texas to the Atlantic Ocean. Significant populations are missing in southern Florida and Maine. Cope's gray treefrogs thrive in several habitats, including woodlands, swamps, and even residential areas. They prefer moist slopes in hardwood forests.

The Cope's treefrog breeds from March to August, but breeding can be delayed during drought years. Females lay 20 to 40 eggs in masses and can produce up to 2,000 eggs. The eggs hatch within 2 to 5 d and develop to the tadpole stage after 30 to 60 d. They become sexually mature in 2 years.

Cope's treefrogs feed on insects. Their skin tissue contains antifreeze components, and they are known to survive temperatures below freezing. The treefrogs have very cryptic skin markings, which enable them to avoid predators. The populations appear stable, and their lifespan is up to 7 years.

Upland Chorus frog—*Pseudacris feriarum*

Photo by Robert English, LEAPS Environmental Consulting © 2009

The upland chorus frog ranges from Florida's panhandle to northern New Jersey and as far west as central Texas. Isolated populations have been found on the coastal plains of South Carolina and Georgia. These frogs usually occur at higher elevations.

The upland chorus frogs' habitat varies based on location. In the North, populations are found in moist woodlands and swamps; in the South, they are commonly found in lowlands near rivers and coastal plains.

During the summer, upland chorus frogs inhabit cool, dark areas and emerge at night to forage for small insects and spiders. On very humid days, they may be spotted in the open. Because of their small size, they are difficult to spot, even with their continuous calling throughout the day. Their small size enables them to disperse unnoticed into open meadows, where they have better access to water and food.

During breeding season, from February to May in the North and late winter to early spring in the South, their calls become prevalent both day and night. Males tend to stay at breeding pools throughout the season whereas females arrive to deposit eggs and leave immediately. The population is stable.

Eastern Narrow-Mouthed Toad—*Gastrophryne carolinensis*

Photo by Robert English, LEAPS Environmental Consulting © 2009

The eastern narrow-mouthed toad is known for its distinctive teardrop shape, which is accentuated by a narrow face that ends in a tip at its snout. Another distinctive characteristic is the fold of skin above the eyes.

Found throughout the Southeast, as far south as the Florida Keys and as far west as central Texas, these toads can thrive in almost any habitat. They require only cover, moisture, and a steady insect pray base. Known for their burrowing ability, they are often difficult to locate.

These toads are primarily nocturnal and are most active from March to September. Their diet consists of termites, ants, and beetles. As tadpoles, they rely on small floating organisms for nutrition.

During breeding, the males secrete sticky glue used to help remain on the female during amplexus. Females usually lay 100 to 150 eggs. Males reach maturity in about 1 year; females mature in 1 to 2 years. Currently, the eastern narrow-mouthed toad has stable and growing populations throughout its range.

Green Frog—*Rana clamitans melanota*

Photo by Robert English, LEAPS Environmental Consulting © 2009

Green frogs range from Canada to parts of Florida and as far west as Oklahoma. They do not have established populations in Illinois or Indiana but seem prevalent in all other regions.

Found in permanent and temporary water sources, green frogs are abundant in streams, rivers, bogs, marshes, and ponds. They can sustain themselves wherever fresh, shallow water is available.

Green frogs are dormant in winter, usually burrowing into substrate. During summer, they are most active at night, although they can be heard calling during the day. They feed on insects, snails, slugs, and crayfish as well as smaller frogs and snakes.

During breeding season (from April to August), vocalizations are very distinct, similar to that of a loose banjo string being plucked. During breeding they are territorial, with males making domains approximately 1 to 6 m in diameter. Females choose males based primarily on location (on where their eggs are most likely to succeed). Female green frogs lay 3,000 to 5,000 eggs, which mature after 3 to 22 months.

Green frogs in captivity have lived up to 10 years, but their lifespan in the wild is unknown. Their populations are stable throughout their range.

Pickerel Frog—*Rana palustris*

Photo by Brittany Petersen

Pickerel frogs are commonly found from southern Canada as far south as the Carolinas and as far west as eastern Texas and southeastern Minnesota. There are however, large populations missing from areas in the southern portions of Ohio, Illinois, and Indiana.

Pickerel frogs thrive in areas where they have access to cool, clean spring water. They are found near streams and lime-rich ponds and are often found in caves. During summer, they are usually found near water and are nocturnal. At the end of October they go dormant by burrowing into the sediment at the bottom of ponds or pools of water.

Pickerel frogs' breeding pools are large, with as many as fifteen pairs in just a few square meters. The breeding period occurs from March to May; males attract females with vocalizations that can be recognized underwater. The frogs are larval for 3 months and become sexually mature after 2 years.

When pickerel frogs are attacked, they secrete a poison from specialized glands that makes them distasteful to predators. The secretion can irritate human skin and can be fatal to the pickerel frogs' predators.

Populations are stable, but there is some concern that urbanization will have an impact on their natural habitat.

Southern Leopard Frog—*Rana utricularia*

Photo by Robert English, LEAPS Environmental Consulting © 2009

The southern leopard frog ranges from New Jersey to Florida and as far west as Kentucky and eastern Texas. The frogs breed in aquatic habitats but generally disperse to drier land when they are not breeding. They thrive in moist vegetation and can disperse extended distances (1 to 5 km) away from water.

The southern leopard frogs have a diet consisting of insects. Some larger individuals feed on small invertebrates (this activity is very rare). Southern leopard frogs are primarily nocturnal; during the day, they shelter in vegetation near the water's edge. The frogs escape from predators by either diving below the water's surface or using their powerful hind limbs to distance themselves.

Southern leopard frogs breed throughout the year, primarily when heavy rainfall occurs. Breeding time frames are usually related to location. In the North, the frogs breed in the spring; in the South they breed during winter. Because they can breed throughout the year, some believe that they can breed more than once a year, especially in areas that receive heavy rainfall more than once a year. The eggs hatch in approximately 1 week. The tadpoles develop into frogs in 90 d, and the frogs reach sexual maturity in 1 to 2 years.

Migration patterns in this species have not been considerably studied, but they are believed to disperse long distances from their water sources. Their lifespan in the wild is thought to be 2 to 3 years. The species is considered stable and has large populations where it is found.

Northern Cricket Frog—*Acris crepitans*

Photo by Robert English, LEAPS Environmental Consulting © 2009

Northern cricket frogs are found from New York and Pennsylvania to southern Louisiana and as far west as western Texas and Oklahoma. They are common around sunny ponds and can also be found in dense wetland vegetation. During high humidity, the frogs have been spotted much farther from their ponds, but they usually remain near water.

Northern cricket frogs can be spotted at any time of the day and are active at all hours during warm weather. In cold weather they remain inactive under shelter such as leaf litter or logs. The frogs prey on insects. They are preyed upon by snakes, such as northern watersnakes and garter snakes.

These frogs breed from March to August. The males emit a clicking vocalization to attract females, and, when in a large chorus, the males sound like a group of crickets. Females can produce more than one egg mass each season. The egg masses are laid in shallow pools. The frogs reach sexual maturity in 1 year.

The northern cricket frog was common until the 1970s but has seen continuing population declines since that time. Large populations once existed throughout the Northeast, but now the frog is common in the southern and western portions of its range. In Tennessee, the frogs are not considered as being of special concern, but they are in South Carolina.

A.1.2 Salamanders

Spotted Salamander—*Ambystoma maculatum*

Photo by Scott Dykes ©

Spotted salamanders are found throughout eastern North America. Some regions, including coastal regions, lack large populations of the species, and it is not found in eastern North Carolina. Spotted salamander habitats are abundant in bottomland floodplain with hardwood forests and can be common in upland hardwood forests if they find breeding sites. They breed in temporary pools, low spots in floodplains, ditches, and beaver ponds.

They are aggressive predators and primarily eat earthworms, insects, snails, slugs, millipedes, and some centipedes. As larva, they become cannibalistic when their habitats (vernal pools) dry up and overpopulation occurs.

To mate, males and females gather at breeding ponds and begin nudging each other so they become stimulated and ready to breed. The salamanders remain in their breeding ponds for 2 or 3 d. Males produce spermatophores and deposit them on foliage near the water's surface. Females then pick the spermatophores up using their cloacae and begin internal fertilization. Then females lay egg masses in a hard clear jelly to protect the eggs from predators. Once hatched, the larvae take approximately 6 months to develop.

Spotted salamanders have a long lifespan. However, most do not reach maturity due to predation. The spotted salamander is still a common species, but because it relies heavily on vernal pools for breeding, populations may be declining rapidly.

Marbled Salamander—*Ambystoma opacum*

Photo by Scott Reasor ©

Marbled salamanders have ranges in most regions of the eastern United States. While most populations do not live in mountains, they are present in areas with substantial rainfall. Their habitats include wetlands, which are used during the breeding season, and floodplain bottomlands and mature forests, which are used during dispersal events.

Breeding occurs in vernal pools, such as fish-free ponds and floodplain pools.

Marbled salamanders feed on millipedes, centipedes, worms, spiders, snails, and various insects. They are known as aggressive predators. Larvae feed on zooplankton when they first hatch and subsequently feed on aquatic insects and other amphibians until they reach metamorphosis. They then change their foraging habits to a terrestrial prey base.

Marbled salamanders are unique because they practice parental care. After breeding occurs (from September to November), females lay eggs in areas that will flood in the coming months. Then, the females watch over the eggs to make sure that they do not dry out. Female marbled salamanders also tend to lay fewer eggs than other salamanders. Once the water rises, the eggs hatch into a larval stage.

The marbled salamander has a relatively long life cycle. In some locations, rainfall and temperature variations, primarily in the northern side of its range, are hurting the marbled salamander's population considerably. However, populations in the South remain stable.

Spotted Dusky Salamander—*Desmognathus fuscus conanti*

Study photo

Spotted dusky salamanders have a small range, which includes western Kentucky, eastern Mississippi, Alabama, northern Georgia and the Cumberland Plateau in Tennessee. Spotted dusky salamanders are often found in the water or near the water's edge in swamps, springs, and temporary pools and streams. Spotted dusky salamanders require moisture, but do not rely heavily on it as do some other *Desmognathus* species.

Spotted dusky salamanders feed on a variety of earthworms, spiders, centipedes, millipedes, and insects. They are close in identification to northern dusky salamanders. The two species have overlapping ranges. Since the populations generally do not hybridize, they are recognized as separate species. Spotted dusky salamanders are lighter in color with silver or gray flecking on the sides; northern dusky salamanders are darker with clearer spots along the back.

Breeding occurs from late July to October. Females are known to brood over their small nests of 13 to 37 eggs. Hatching takes 5 to 7 weeks, and maturity occurs after 2 to 3 years after an approximately month long larval period.

Within its range, the spotted dusky salamander has a healthy population, especially around optimal habitats. Its lifespan in the wild remains unknown.

Northern Dusky Salamander—*Desmognathus fuscus fuscus*

Study photo

Northern dusky salamanders range from as far north as Quebec and south to North Carolina and Tennessee. The northern dusky salamander favors habitats with running or seeping water, including streams and waterfalls (where mist is available). They are normally found under rocks and logs along streambeds, and when disturbed they take shelter in the water. During winter, northern dusky salamanders are known to burrow in substrate below the frost line; however, if it does not get too cold, northern dusky salamanders can remain active all year.

The northern dusky salamander feeds on a large variety of invertebrates, including beetles, spiders, earthworms, slugs, snails, centipedes, moths, mayflies, and ants. The lifespan of this species remains unknown. They are believed to live up to a decade or more in the wild because similar species have thrived for that long. Northern dusky salamanders are threatened by habitat destruction but are stable in areas where habitats remain undisturbed.

Southern Two-Lined Salamander—*Eurycea cirrigera*

Photo by Brittany Petersen

The southern two-lined salamander occurs throughout the southeast; however, they do not hybridize with the Blue Ridge two-lined salamander. The southern two-lined salamander's range extends as far north as Ohio, near the southernmost tip of Lake Michigan.

The southern two-lined salamanders like habitats such as small streams, springs, swamps, and hardwood forests surrounding those sites. When not breeding, adults will often burrow in areas far from water, but some salamanders are still found near running water year-round. The salamanders use rocks and logs for protection but will use smaller vegetation when needed. Larvae thrive in a rocky substrate.

Southern two-lined salamanders feed on terrestrial invertebrates such as spiders and insects. Foraging activity decreases in the winter months, but the salamanders feed year-round.

Breeding is not documented well for this species. The salamanders migrate to breeding streams from the end of December to March and lay eggs under submerged rocks in shallow running water. Females usually lay approximately 50 eggs. Females stay with the nests until they hatch. Hatching occurs within a month, and the larval period lasts 1 to 3 years. The salamanders reach maturity after 2 to 4 years.

The southern two-lined salamander is common and stable throughout its range. Its lifespan remains unknown.

Cave Salamander—*Eurycea lucifuga*

Photo by John Leeman, ORNL ESD

Cave salamanders are found in the karst regions of the eastern United States, including Tennessee, Kentucky, southern Ohio, and most of the surrounding states that touch that region.

Cave salamanders live in the twilight zones of caves, where there is still available light but plants can no longer grow. Cave salamanders have also been found up to 1 km away from cave entrances, especially on moist, temperate nights. The salamanders are also known to venture farther into caves, especially during hot, dry days.

The salamanders are primarily nocturnal and are most active on rainy nights. They feed on insects, mites, ticks, and earthworms. Those that feed in the twilight zone usually have a more diverse food base than those that live farther into the caves.

Cave salamanders lay eggs from September to February; the largest populations breed from October to January. Mating occurs during the summer, and eggs are then laid later. The larval period is 6 to 18 months. They reach sexual maturity in 2 years.

The cave salamander's lifespan has not been closely studied due to the environment it thrives in. Cave salamanders are threatened in Kansas and are vulnerable in other portions of their range because of their fragile habitats.

Long-Tailed Salamander—*Eurycea longicauda longicauda*

Photo by Scott Dykes

Long-tailed salamanders thrive in karst topography, including middle and eastern Tennessee, West Virginia, Kentucky, Pennsylvania, Ohio, Illinois, and regions of Missouri and Arkansas.

These salamanders thrive in caves but are also found near springs and in damp areas near ponds and streams. During rainy weather, they can disperse away from water. Larvae are often found in water-filled sinkholes, caves, and some surface streams.

Long-tailed salamanders breed from October to February, and females lay their eggs yearly. Females lay up to 100 eggs but spread them out in small groups. The female salamanders do not guard their eggs until hatching. Eggs hatch after 4 to 12 weeks, and the larvae transform in June and July. They reach sexual maturity after 2 years.

Long-tailed salamanders can be distinguished from cave salamanders primarily by the herringbone markings on the sides of their tails. The markings are absent on cave salamanders, which have spotting along the entire length of the tail.

Longevity of the long-tailed salamander has not been studied. The species is common within its range but is sensitive to disturbance, especially in caves. This makes the population somewhat vulnerable.

Northern Slimy Salamander—*Plethodon glutinosus complex*

Photo by Scott Dykes

Northern slimy salamanders range throughout most of the eastern United States with the exception of areas in the extreme northeast. Populations are also limited in Mississippi, where it is believed that rainfall is destroying some habitat.

Northern slimy salamanders thrive in hardwood forests that contain high moisture. They do not swim and avoid most water, so they usually reside on the higher ends of floodplains and slopes, where water can easily drain. Slimy salamanders spend most of their time underground, although individuals are often spotted aboveground. Once the slimy salamander establishes its habitat it rarely disperses range.

Breeding occurs at differing times of year from that depending on location. In the South, mating usually occurs throughout the spring and summer, and eggs are laid in early fall. Females lay approximately 15 eggs and guard the eggs for 2 to 4 months until hatching. The slimy salamanders have a minimal larval period, and often females will stay with the larvae until metamorphosis is complete. Slimy salamanders reach sexual maturity after 3 years.

Northern slimy salamanders are very territorial and will often fight other species or their own to keep their space. The salamanders prey on ants, earthworms, beetles, and other small insects. Their diet depends on their location and on the season. Northern slimy salamanders are most active on warm rainy nights and take shelter in caves and other underground locations in heat and during heavy rainfall. The slimy salamander's main defense mechanism is its tail, which secretes a gluey, noxious substance. Slimy salamanders are not threatened in their range.

Four-Toed Salamander—*Hemidactylium scutatum*

Photo by Claire Campbell

Four-toed salamanders are believed to range throughout the eastern United States although their populations appear spotty in areas.

Four-toed salamanders thrive in forested wetlands and are usually found in those regions. However, they are known to travel long distances from water as long as the ground is moist and conditions are favorable.

Four-toed salamanders are very secretive and tend to be most active during breeding season (cold weather months) but are sluggish. In warmer weather, they can move more quickly. These salamanders prey on small insects, spiders, and mites. When attacked or handled, they will voluntarily break off their tails, a characteristic not found in many salamanders.

Four-toed salamanders breed from January to March. Females lay eggs adjacent to water sources, and the eggs hatch 1 or 2 months later. The larval period is short, and the juveniles leave the water after 6 weeks. Sexual maturity is reached at 2 years.

Four-toed salamanders are believed to be rare because of their secretive nature and spotty populations. They are believed to be uncommon and are listed as a species in need of management in Tennessee.

Northern Red Salamander—*Pseudotriton ruber ruber*

Photo by Scott Reasor

Northern red salamanders range throughout the southeastern United States and up the eastern seaboard to New York. They are most commonly found in slow-moving permanent streams, near springs, and in some bogs. They rely on heavy leaf litter, logs, and burrows as habitats and can sometimes live in streams that come out of caves.

Northern red salamanders are most active at night and feed on small insects. During rainy nights they will stray far from water. They are known to give off toxic skin secretions when attacked.

Northern red salamanders mate during fall and summer, and eggs are laid in early fall. Females will often bunch nests together for safety. Once hatched, the larvae take 2 years to metamorphose. Sexual maturity is reached after 4 to 6 years. The northern red salamander's population is stable throughout its range.

Red Spotted Newt—*Notophthalmus viridescens viridescens*

Study Photo

Red spotted newts, also known as eastern newts, occur throughout the eastern United States from central Texas to the Atlantic coast. The red spotted newt thrives in a variety of standing freshwater habitats, such as shallow wetlands, beaver ponds, marshes, bays, and artificial ponds.

Red spotted newts have distinct life stages. After hatching, the larvae stay in water for approximately 2 /5 months. Then, the newts transform into their eft stage as juveniles and become terrestrial creatures. After up to 7 years, the efts return to the water as adults. Red spotted newts feed primarily on insects, worms, leeches, larvae, and eggs of amphibians.

Breeding takes place from fall to early summer. Females are attracted to males with their spots and with the chemicals they give off. Amplexus in newts can last several hours, ending when the males release spermatophores on the bottom of the pond. The spermatophores are then picked up by the females. Red spotted newts can live up to 15 years in captivity, but few make it past the larval stage in the wild. Their habitats are plentiful, and they are stable throughout their range.

A.2 REPTILES

A.2.1 Lizards

Five-Lined Skink—*Eumeces fasciatus*

Photo by Claire Campbell

Five-lined skinks are found throughout the eastern United States and as far west as Central Texas. Their range does not extend into the northeast (i.e., most of New York, Maine, Vermont, New Hampshire, and Massachusetts). With such a large range, five-lined skinks rely on a diverse habitat. Most find habitat in wooded areas near the ground in logs, leaf piles, and rocks.

Five-lined skinks change in appearance with age. As juveniles, they show the signature five lines across their backs and have a bright blue tail. As they age, the tail changes to brown or gray, and the lines on the back fade and sometimes disappear.

Five-lined skinks are known to bask on woody debris and are most active on hot days. Adults are active in May; juveniles are active throughout the warm weather months. These lizards are quite skittish and will run from humans and predators. When attacked, they detach their tails, which distract the attacking predator so that the skink can escape.

Five-lined skinks breed in the spring and lay eggs during early summer. Each nest can have up to 14 eggs. Females are protective of their eggs until hatching.

The five-lined skink can live up to 6 years in the wild. The species is experiencing some extirpation because of habitat destruction. The populations are generally stable.

Southeastern Five-Lined Skink—*Eumeces inexpectatus*

Source: *The Florida Scrub*
© 1997–2001.

The southeastern five-lined skink ranges throughout the southeast, especially Florida, Georgia, Alabama, Mississippi, Tennessee, the Carolinas, and regions in Virginia.

Like the common five-lined skink, its habitat includes a diverse range of wooded and disturbed areas. The species tends to bask on woody debris, but it is capable of climbing. It uses crevices and coarse woody debris for cover.

Southeastern five-lined skinks are skittish and are known to climb when they are approached. They also lose their tails when attacked. They are known to eat spiders and some insects, such as crickets and mealworms.

The species breeds in spring and early summer, and the females lay three to eight eggs, sometimes more. The females stay with their eggs until hatching. The species is common in its range. Its lifespan has not been closely studied.

A.2.2 Snakes

Eastern Worm Snake—*Carphophis amoenus amoenus*

Study photo

Eastern worm snakes occur through most of the southeast. Their habitat includes hardwood forests in high elevations, where they can be found under rocks, logs, and debris. While they have been found in forested wetlands, they are most prominent in dry uplands.

Eastern worm snakes spend most of their time underground or in burrows. They remain inactive on hot days, and their activity peaks during the fall. The snakes can remain dormant for up to 2 weeks at a time. Males travel from their home ranges much more than females. Their diet contains earthworms, invertebrates, and some insect larvae. The snakes are very secretive, and their habits are not well documented.

Breeding takes place in spring and fall, and females lay up to a dozen eggs in June and July. The young reach sexual maturity after 3 years.

Because of their secretive nature, little is known about their lifespan and status. The populations are believed to be dense where their habitats are favorable.

Northern Ringneck Snake—*Diadophis punctatus edwardsii*

Photo by Scott Dykes ©

The northern ringneck snake occurs in most of the central and eastern parts of the United States, and its range continues along the western coast. Populations are missing in the northwestern United States but are found almost everywhere else.

Northern ringneck snakes rely on a huge variety of habitats, evident by their large range. They shelter under rocks, logs, and leaf cover. The snakes prefer moist conditions but are known to survive without permanent water sources.

Ringneck snakes are primarily nocturnal; however, individuals can be spotted at all times of day. The species rarely bites in defense against predators, and instead plays dead or flips over to reveal its brightly colored stomach and distract its predators. When attacked, the species gives off a strong-smelling musk. The species does not harm humans.

The ringneck snake breeds during spring and fall, and eggs are laid in June and July. Eggs can be laid in communal nests but only where colonies of the snakes are present. The females lay 3 to 10 eggs, and the eggs hatch in 7 to 8 weeks.

Ringneck snakes are common in their range. The species is believed to live up to 10 years in the wild.

Black Kingsnake—*Lampropeltis getula nigra*

Photo by Brittany Petersen

The range of black kingsnakes spans from the Atlantic coast to the Pacific coast across the United States. The species lives in the southern United States, reaching northern points in New Jersey in the east, in southern Iowa in the central United States, and southwestern Oregon in the west. Kingsnake habitat differs based on location. They are known to thrive in forests, grasslands, wetlands, farmland, deserts, and river bottoms. They are not usually found in dry areas such as sandy banks.

Kingsnakes are active during the day and spend most of their time underground. Their diet consists of small mammals, amphibians, turtles and their eggs, and other snakes. Kingsnakes are constrictors and will often strike their prey and then curl their body up around it. The snakes are known to fold up longer snakes so that they can be eaten.

Kingsnake mating occurs from March to June. Females lay 3 to 30 eggs in moist substrate, and the eggs hatch after 45 to 60 d, depending on temperature of incubation.

The kingsnake is fairly common and is respected by most humans because it eats other snakes. Its lifespan in the wild remains unknown. It is a docile creature that does not harm humans, so generally it is left alone.

Northern Watersnake—*Nerodia sipedon sipedon*

Photo by Brittany Petersen

Northern watersnakes range throughout the northeastern United States. Their range extends westward to western Kansas and south to the Gulf of Mexico in Mississippi and Alabama. The northern watersnakes' habitat includes any aquatic habitat, especially one with still water, such as a small pond or a marsh where amphibians and fish are present. Northern watersnakes are active year-round but can hibernate in cold periods. They are active day and night and hunt by ambushing or actively seeking out prey.

Northern watersnakes breed from March to May, and young are born from July to October. Males reach sexual maturity after 3 years; females reach maturity after 5 to 6 years.

The species is thriving throughout its range despite killings by humans when they are mistaken for venomous species.

Northern Brown Snake—*Storeria dekayi dekayi*

Photo by Dr. Paul Kosnik ©
Pkosnik@TissueGenesis.com

Northern brown snakes have a large range throughout the eastern United States and extending west to central Texas. Populations are notably missing from southwestern Virginia, West Virginia, eastern Kentucky, and the far northeastern corner of Tennessee.

With such a wide range, the species can live in a number of dry, wooded habitats where a fresh water source is present. Brown snakes even tolerate suburban neighborhoods and will seek refuge in woodpiles and gardens.

Northern brown snakes are active throughout day and night and spend most of their time under leaf cover and underground. The snakes are terrestrial. Their diet consists of worms, snails, insects, spiders, amphibians, and fish. They do not use constriction; instead, they swallow their prey whole. Brown snakes are not venomous and will try to flee when threatened. They release a strong smelling musk when handled.

Northern brown snakes breed from March to May. Before they are born, developing brown snakes gain nourishment from a placenta-like structure instead of a traditional embryonic sac. Females usually give birth to about fifteen young.

The species is stable throughout its large range because of its ability to adapt to habitats. There are no records of their lifespan in the wild.

Red-Bellied Snake—*Storeria occipitomaculata*

Photo by Scott Reasor

The red-bellied snake ranges throughout the eastern United States with notably missing populations in Florida, Indiana, Missouri, and Iowa. Its range extends west to eastern Texas and north into Canada.

Red-bellied snakes live in several habitats, including hardwood and pine forests and land surrounding some swamps and wetlands. They are not likely to be found in open fields because they primarily seek shelter in leaf litter, logs, and rocks on the forest floor.

Red-bellied snakes are active during the day and most active in spring and fall. These snakes spend most of their time hiding but travel overland instead of spending time underground. They are very small and will often curl up their lips to show off their teeth to scare predators when they are threatened. These snakes are harmless to humans; their teeth cannot break through human skin.

The red-bellied snake's lifespan in the wild is not known, but in captivity it can live up to 4 years. It is very common in its range. Humans often kill them, fearing that they are venomous.

Smooth Earth Snake—*Virginia valeriae*

Photo by Brittany Petersen

Smooth earth snakes have a spotty range throughout the southeastern United States. Their range extends through the Carolinas, Georgia, Alabama, Mississippi, Arkansas, Missouri, and parts of Oklahoma and Texas; a small population thrives throughout eastern Tennessee.

Smooth earth snakes find habitat in pine and hardwood forests and in fields near woodlands and are known to inhabit suburban areas.

Smooth earth snakes primarily eat earthworms but are known to eat snails and slugs as well. The snakes rarely bite humans and instead rely on releasing musk and hiding for defense.

Smooth earth snakes are fairly common in their range, but there is very limited information on this species because of its secretive nature.

Northern Copperhead—*Akistrodon contortrix mokasen*

Photo by Scott Dykes ©

The northern copperhead's range extends from the Florida panhandle north to Massachusetts and west to central Oklahoma and Kansas. There are many species of copperheads, and the northern copperhead tends to stay in the upper portion of its range.

Copperheads live in forested habitats, especially on rocky hillsides. They have been known to live in some wetlands as well. They live in habitats with lots of cover, especially rocks, leaf litter, and logs. Copperheads are surprisingly common in suburban neighborhoods and can survive even with human development as long as their habitats remain mostly intact.

Copperheads are diurnal during spring and fall but remain nocturnal in the summer. They hibernate in colonies and are considered to be very social snakes. Their diet includes mice, small birds, lizards, amphibians, and some insects, especially cicadas. They will both ambush and forage for food. Juveniles have bright yellow tails, which are used as a lure for some insects.

Copperheads breed in spring and fall; fall-breeding females produce eggs in the springtime. They carry the embryos for 3 to 9 months and give live birth, usually to an average of seven young.

Copperheads are venomous, but their venom is mild compared with that of many other venomous snakes. Copperheads are quite common in their range. They are known to live for up to 18 years.

Black Rat Snake—*Elaphe obsoleta obsoleta*

Photo by Claire Campbell

Black rat snakes are common throughout the eastern United States, from central Texas to the Atlantic and from southern Michigan to the Gulf of Mexico. Black rat snakes are most common in wooded habitats but are also found near wetlands and residential regions. They are known for climbing into abandoned buildings and barns.

Rat snakes mate from April to June and sometimes in the fall. Rat snakes lay anywhere from 4 to 40 eggs, with an average of 15 eggs per breeding season. Females often show fidelity and return to the same breeding site year after year. Sexual maturity is reached in 4 years.

Black rat snakes feed on rodents and amphibians along with birds and their eggs. They will often climb high into trees to reach their prey. Eaten by several forms of predators, the black rat snake is known to kink up its body to give the appearance of a stick for protection. The snakes will bite if handled improperly. They are known to hibernate during the winter for 2 to 4 months. They are most active during the day. Black rat snakes are abundant in their range, but their lifespan has not been closely studied.

A.2.3 Turtles

Common Snapping Turtle—*Chelydra serpentina*

Photo by Brittany Petersen

The common snapping turtle ranges from the Atlantic Ocean west to the Rocky Mountains and from the Gulf of Mexico north to Nova Scotia. Its huge range is due to its ability to adapt to habitats and to its simple need for fresh or brackish water. Females will even live on land during egg-laying seasons.

Snapping turtles are found in and out of water when dispersing between systems. They are omnivorous, eating almost anything they come across in their aquatic habitat. As their common name describes, snapping turtles are aggressive and will often snap at humans or other attackers. Adult snapping turtles have very few predators because of their thick shells and snapping gestures.

Snapping turtles mate from April to November, depending on warmth and location. Females dig nests in loose soil and lay up to 80 eggs. As is true for many turtle species, the sex of the offspring relies on the temperature of the eggs during their incubation. It takes snapping turtles 10 to 15 years to reach sexual maturity.

Common snapping turtles are common in their range. The species is known to live up to 40 years in the wild.

Painted Turtle—*Chrysemys picta*

Photo by Brittany Petersen

Painted turtles range throughout the northern United States and into much of the southeast, excluding Florida and southern Georgia. Painted turtles live in muddy-bottomed ponds with shallow water and thick aquatic vegetation. Ideal habitats include farm ponds, lakes, freshwater marshes, reservoirs, and some slow-moving rivers.

Painted turtles are diurnal and generally are most active in early morning or late afternoon. They bask on logs and rocks and are known to bask in large groups at favorable sites. Painted turtles eat aquatic plants, including algae and duckweed, as well as animals such as aquatic insects, fish, and frogs.

The turtles mate during winter and spring, and females lay eggs from May to July. Females lay clutches of 2 to 14 eggs and are known to lay more than 2 clutches per year. Eggs hatch after 1.5 to 2.5 months. The hatchlings will often double in size over their first year. Males reach maturity at 2 years old; females reach maturity in 6 to 10 years.

Painted turtles are common throughout their range and may be the most common turtle in the United States. Their lifespan has not been closely studied.

Eastern Box Turtle—*Terrapene carolina carolina*

Photo by Scott Reasor

Eastern box turtles have an extensive range. Found from central Texas to the Atlantic Coast and from southern Florida to northern Pennsylvania, they are fairly common in most regions east of the Mississippi River.

Eastern box turtles make their habitats in hardwood forests, fields, and even some coastal plains. During warm weather, the turtles have been known to enter wetlands and shallow ponds to cool off.

During the summer, box turtles are active throughout the day. At night they find shallow pits and cover themselves in leaf litter for protection against predators. The eastern box turtle also practices the burying concept during its dormant months in the winter. Box turtles feed on plant material such as mushrooms, roots, flowers, grasses, and berries. They also feed on insects, worms, and small amphibians.

Box turtles mate during spring; mating can continue into late summer. Box turtles mate on land and usually nest from May to July. Females lay 5 to 10 eggs, depending on how many clutches of eggs they lay. Females can reject mating by closing off their shells and are known to store sperm for up to 4 years. By storing sperm, they do not need to mate and can still lay eggs.

The eastern box turtle has a lifespan of more than 100 years. Many box turtles never live that long due to predation and being run over by vehicles. The turtles are very common, and most threats come from human beings.

Cumberland Slider—*Trachemys scripta troostii*

Photo by Scott Reasor, 2009

The Cumberland slider turtle is found along the Cumberland mountain range in Tennessee, in northern Alabama, and in the southwest corner of Virginia. Although slider turtles are found throughout the Southeast, this is the most common range for the Cumberland subspecies. The Cumberland slider lives in swamps, ponds, slow-moving rivers, and floodplains. The species thrives most in silt-bottomed water with heavy vegetation and log accumulation. They are known to travel overland and to colonize wetlands.

Sliders are active in warm weather, in both summer and winter. They bask on logs, rocks, and floating vegetation. Sliders do not hibernate on land but move to a permanent water source for winter. Sliders as juveniles feed on insects, fish, small mammals, and amphibians. As adults, they become omnivorous and feed primarily on aquatic plants but still feed opportunistically on animals.

Cumberland sliders breed during winter and early spring. The females nest in open areas near wetlands. They can lay several clutches and can produce anywhere from 2 to 20 eggs per season. Males are sexually mature after 2 years; females mature after 8 years.

Slider turtles are known to live up to 40 years, but most do not live for longer than 30 years. The species has been largely affected by humans who move the turtles outside their range and release them. The species is thought to be common in its range.

Common Musk Turtle—*Sternotherus odoratus*

Photo by Brittany Petersen

Common musk turtles thrive in a large range throughout the eastern United States. They are found from central Texas to the Atlantic coast. Populations are notably missing in Pennsylvania and New York, especially along mountainous regions.

The species lives in almost all freshwater habitats, from streams and rivers to reservoirs, anywhere vegetation is available. Their diverse habitats help to keep the species widespread throughout its range.

Common musk turtles are aquatic and will rarely exit water except when nesting. They do not bask in open sun as many other turtles do. Some adults grow algae on their carapaces. The turtles feed on carrion and snails along with many aquatic plants. The common name "musk turtle" comes from their ability to release musk when attacked or handled.

Their lifespan remains unknown, but they reach sexual maturity in approximately 3.5 years. The species is common and has no special conservation status in its range.

Eastern Spiny Softshell Turtle—*Apalone spinifera spinifera*

Photo by Dr. Paul Kosnik ©
PKosnik@TissueGenesis.com

Eastern spiny softshell turtles range throughout Tennessee, north to New York, and as far west as the Mississippi River. There are several subspecies of the spiny softshell turtle, and the eastern spiny softshell may overlap with its fellow subspecies in their range.

The spiny softshell turtle finds its habitats in flowing water, preferably sandy-bottomed rivers that are clear and clean. They do not reside in seasonal wetlands. They are often found in farm ponds and reservoirs, and they will burrow in sandbars.

Spiny softshell turtles are aquatic and are strong swimmers. They bask on rocks and logs and will sometimes remain partly submerged in water while basking. The turtles are primarily carnivorous, eating insects, crayfish, and other aquatic animals.

The species breeds during early spring in deep water and nests from May to June. Females lay up to 18 eggs, and incubation takes up to 3 months. The sex of the hatchlings, unlike that of most turtles, is determined by genes from the parents rather than by egg temperature during incubation.
In captivity spiny softshells live up to 20 years, but in the wild their lifespan may be less. Spiny softshell turtles are abundant where they occur in their range.

A.2.3 References

Conant, R., and J. T. Collins. 1998. *Reptiles and Amphibians—Eastern/Central North America*. Houghton Mifflin Company, New York, New York.

Jensen, J. B., C. D. Camp, W. Gibbons, and M. J. Elliott. 2008. *Amphibians and Reptiles of Georgia.* The University of Georgia Press, Athens, Georgia.

APPENDIX B.

DESCRIPTION OF SAMPLING METHODS

APPENDIX B. DESCRIPTION OF SAMPLING METHODS

B.1 Artificial Cover Objects

Wooden cover object

Tin cover object

Cover objects are artificial material placed in a sampling location to detect any presence of reptiles or amphibians. These objects provide temporary cover for various species and, depending on the type of material, offer a microhabitat that is either moist and cool or dry and warm. The two most common types of cover objects are wooden and metal. Cover objects are set in uniform arrays. Wooden cover objects are generally arranged in a grid of 15 to 25 boards in parallel lines. This allows for a reliable index of population size and a condition of individual populations (Heyer et al. 1994).

Cover object design and placement depend on the goals and objectives of the study. Larger cover objects tend to attract a larger variety of species as well as more individuals (Heyer et al. 1994). Average wooden cover objects are 12 × 12 × 2 in. However, a large object may measure 48 × 48 × 2 in. The material of wooden cover objects is typically treated plywood; however, some researchers use untreated wood to provide more moisture. This would be recommended for shorter study periods due to the relatively rapid decomposition of the cover object. Wooden cover objects are well suited for determining the presence of amphibians and anuran species. Some small mammals also use this type of cover object as nesting habitat, which provides a good prey opportunity for some snake species.

Corrugated tin is one other material commonly used for artificial cover objects. This material is used to target reptile species. Tin cover objects generally measure 48 × 24 in. They are usually arrayed in a straight line of 10 to 15 objects about 10 m apart. Placing the tin cover object along the edge between field and the forest edge will attract any individuals dispersing between the two habitats. These objects may be used through the middle sections of native warm-season grassland fields or old fields. The attraction offered by tin cover objects to reptiles is the warmth created due to their high retention of solar energy. Most reptiles can use the heat collected by the tin to regulate their own core body temperature. This method may provide a good index of reptile populations in the study area.

B.2 Pitfall Traps and Drift Fence Lines

Pitfall trap and drift fence

Drift fence lines are designed to capture species that disperse in and out of breeding pools. There are two major methods used with drift fencing: encompassing drift fencing and straight line drift fencing. The design method of the encompassing drift fence is to completely encompass a breeding site to catch all individuals dispersing to or away from the site. The straight line drift fence is designed to be placed away from a breeding site and to capture individuals from the surrounding habitat. The method of capture used with both of these designs is pitfall traps. Pitfall traps are buckets placed on both sides of the drift fencing 10 m apart. The buckets are placed into the ground along the edges of the drift fence. They are set in flush with the ground so that an individual easily falls into the trap. Many species will innately follow the perimeter of a barrier until they travel around the barrier, so when an individual runs into the drift fencing it will follow the edge until it is captured by a pitfall trap. This method is useful in a long-term study or in a short-term study if the trapping is carried out during the peak of the breeding season (Heyer et al. 1994). The materials used for this method are relatively simple and inexpensive. The drift fencing is general contractor-grade silt fence. Usually the pitfall traps are made from 5 gal buckets. The drift fence may also be constructed from sheet metal. This material is much more durable in most conditions and usually can withstand a fire event. However, the sheet metal alternative is much more expensive.

B.3 Minnow Traps

Minnow trap

Minnow traps are exclusively used in aquatic environments. The target individuals are species that are fully aquatic or that use the water complex for long periods of time. Some species have extended larval periods, or they may overwinter in water complexes. Minnow traps are designed to capture these individuals. Many of the minnow traps used are prefabricated at various companies and come ready to use. The general design of these traps is a medium or large basket made from either metal or plastic. The basket is usually 12 to 14 in. long when fastened together and 6 to 10 in. in diameter. There are funnel-shaped openings at either end of the trap that will draw the individual into the trap. Once inside the trap, the individual cannot escape. The traps have two sides and can be separated in the middle to remove any individuals that are trapped. No bait is required with this method of trapping. When using this method, complete coverage of an area is most effective (Heyer et al. 1994).

B.4 Hoop Net

Hoop nets are primarily aquatic traps, mainly used to capture turtles. Most of these nets come premanufactured. They have a very simple design. A hoop net is constructed of netting material that is stretched over three or more metal hoops that are 16 to 24 in. in diameter. These nets can be as small as 4 ft long and as large as 12 ft long. The larger traps are mainly used in lakes and larger bodies of water. Smaller traps are set in smaller complexes such as ponds. When the trap is set, one end has a funneled opening and the other end tapers shut. This allows turtles to enter the trap but offers no escape. These traps are more effective when used with bait (usually canned meats or sardines).

Hoop net

B.5 Dip Net

Dip-netting is an effective method for sampling the larval inhabitants of a body of water. This method uses a variety of net sizes. The smallest is typically an aquarium net 5 to 10 in. in diameter and the largest is a full size dip pole, generally 5 ft tall with a net diameter of greater than 20 in. The mesh size of the net is important. Smaller net mesh will allow for capture of very small hatchlings. The net also needs to have an effective depth so as to lessen the number of escapes (Heyer et al. 1994).

The amount of dips is variable, depending on the size of the body of water and on the vegetative cover. This method will produce a good index of population and species diversity in larval and hatchling individuals.

Dip net

B.6 Visual Encounter Surveys

The visual encounter survey (VES) is used to detect species presence and diversity in a certain area. The VES is measured in person-hours of search (Heyer et al. 1994). This technique allows for an estimate of the relative abundance of species within an area. VES allows for coverage of a large area in a short time. This method is extremely effective in sampling individuals that are generally active or that use natural debris, rocks, or logs as shelter. VES is often used to survey clear-water streams with varying substrates. There are several methods in conducting VES. In forested areas with little to no ground cover, walking in a straight line and observing any ground movement, turning logs and rocks, and searching through leaf litter and other debris, can produce a good index of

Visual encounter survey

abundance. Walking in obscure patterns through the forest can also be effective. Using VES in stream surveys can be done by segmenting a stream into sections and randomly flipping submerged rocks and logs. There are some general assumptions with VES: all individuals in a given location have an equal chance of being discovered, each species has an equal chance of observation, during the study no individual is observed more than one time, and the results from two or more observers are equal (Heyer et al. 1994). The outcome of a VES is measured by comparing results with the time spent conducting it (Corn and Bury 1990). The number of personnel and time necessary depends on the size of the area.

B.7 Acoustic Monitoring

Monitoring site

Acoustic monitoring can be one of the most effective ways to sample for anuran species. It can provide an annual estimate of population size and species diversity in fixed locations. Call surveys are conducted from January to August. This time frame corresponds to the peak breeding season for most anuran species. Surveys can be conducted once a month during those months. The survey needs to be conducted at night, generally 30 min following sunset. Acoustic surveys are best if set up in fixed locations that are part of a preselected route. The locations along the route should be representative of anuran habitat (i.e., wetland complexes, ponds, lakes, drainage areas). During the survey the observer stops at each fixed location and records any anuran vocalizations. A time frame of at least 5 min should be set at each fixed location. A method of measuring the calls can be expressed as a call index. There are three call indexes. A call index of 1 would be a single individual calling, a call index of 2 would be more than one individual calling, and a call index of 3 would be overlapping calls from one or more species. Reviewing an audio recording made during the survey can help to key out the vocalizations after the survey and catch any that were missed.

B.8 References

Corn, P. S., and R. B. Bury. 1990. Sampling Methods for Terrestrial Amphibians and Reptiles. U.S. Department of Agriculture, Forest Service. General Technical Report PNW-GTR-256.

Heyer, R. W., M. A. Donnelly, R. W. McDiarmid, L. C. Hayek, and M. S. Foster. 1994. *Measuring and Monitoring Biological Diversity Standard Methods for Amphibians*. Smithsonian Institution Press. Washington, D.C.

APPENDIX C.

ACOUSTIC ANURAN SURVEY DATA

APPENDIX C. ACOUSTIC ANURAN SURVEY DATA

Run Information	Start							Finish						
Time (Military)	20:00 pm 6-05-08							21:20pm						
Wind (Beaufort Scale)	0	1	2	3	4	5		0	1	2	3	4	5	
	X													
Sky (See Code Explanations)	0	1	2	4	5	7	8	0	1	2	4	5	7	8
	x													
-optional- # days since last rainfall:	**3**													

PER STOP INFORMATION										
STOP #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
START TIME (MILITARY) -OPTIONAL-	**20:00**	**20:07**	**20:12**	**20:20**	**20:23**	**20:26**	**20:55**	**20:59**	**21:08**	**21:20**
AIR TEMPERATURE *SELECT SCALE* **°C** **°F**										
WAS NOISE A FACTOR? (CHECK IF YES)										
DID YOU TAKE A TIMEOUT? (CHECK IF YES)										
SPECIES ↓ **STOP # →**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
GREEN FROG		1		**1**			**1**			

Run Information	Start							Finish						
Time (Military)	17:33 5-15-08							19:15						
Wind (Beaufort Scale)	0	1	2	3	4	5		0	1	2	3	4	5	
	x													
Sky (See Code Explanations)	0	1	2	4	5	7	8	0	1	2	4	5	7	8
				x										
-optional- # days since last rainfall:	**O**													

Run Information	Start							Finish						
Time (Military)	9:11 5-27-09							10:39						
Wind (Beaufort Scale)	0	1	2	3	4	5		0	1	2	3	4	5	
	x													
Sky (See Code Explanations)	0	1	2	4	5	7	8	0	1	2	4	5	7	8
		x												
-optional- # days since last rainfall:	**Same Day**													

Run Information	Start							Finish						
Time (Military)	9:30 6-10-09							11:45						
Wind (Beaufort Scale)	0	1	2	3	4	5		0	1	2	3	4	5	
	x													
Sky (See Code Explanations)	0	1	2	4	5	7	8	0	1	2	4	5	7	8
				x										
-optional- # days since last rainfall:	**2**													

Run Information	Start							Finish						
Time (Military)	20:00 pm 6-05-08							21:20pm						
Wind (Beaufort Scale)	0	1	2	3	4	5		0	1	2	3	4	5	
	X													
Sky (See Code Explanations)	0	1	2	4	5	7	8	0	1	2	4	5	7	8
	x													
-optional- # days since last rainfall:	**3**													

PER STOP INFORMATION										
STOP #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
START TIME (MILITARY) -OPTIONAL-	**20:00**	**20:07**	**20:12**	**20:20**	**20:23**	**20:26**	**20:55**	**20:59**	**21:08**	**21:20**
AIR TEMPERATURE *SELECT SCALE* **°C** **°F**										
WAS NOISE A FACTOR? (CHECK IF YES)										
DID YOU TAKE A TIMEOUT? (CHECK IF YES)										

SPECIES ↓	**STOP #** →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
GREEN FROG			1		**1**			**1**			

Run Information	Start							Finish						
Time (Military)	17:33 5-15-08							19:15						
Wind (Beaufort Scale)	0	1	2	3	4	5		0	1	2	3	4	5	
	x													
Sky (See Code Explanations)	0	1	2	4	5	7	8	0	1	2	4	5	7	8
				x										
-optional- # days since last rainfall:	**O**													

PER STOP INFORMATION

STOP #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
START TIME (MILITARY) -OPTIONAL-	**17:33**	**17:40**	**17:50**	**18:00**	**18:05**	**18:10**	**18:35**	**18:40**	**19:01**	**19:15**
AIR TEMPERATURE *SELECT SCALE* **°C** **°F**										
WAS NOISE A FACTOR? (CHECK IF YES)										
DID YOU TAKE A TIMEOUT? (CHECK IF YES)										

SPECIES ↓ **STOP # →**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
EASTERN NARROW-MOUTHED TOAD		1						**1**		**1**
Green frog			**1**				**1**			
Gray treefrog				**1**	**1**		**1**	**1**		**1**
American toad										**1**

Run Information	Start						Finish					
Time (Military)	9:11 5-27-09						10:39					
Wind (Beaufort Scale)	0	1	2	3	4	5	0	1	2	3	4	5
	x											
Sky (See Code Explanations)	0	1	2	4	5	7	8	0	1	2	4	5	7	8
		x												
-optional- # days since last rainfall:	**Same Day**													

PER STOP INFORMATION

STOP #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
START TIME (MILITARY) -OPTIONAL-	**9:11**	**9:19**	**9:27**	**9:39**	**9:47**	**9:57**	**10:23**			**10:39**
AIR TEMPERATURE *SELECT SCALE* **°C** **°F**	**68**	**68**	**68**	**67**	**67**	**66**	**66**			**66**
WAS NOISE A FACTOR? (CHECK IF YES)										
DID YOU TAKE A TIMEOUT? (CHECK IF YES)										

SPECIES ↓ **STOP #** →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
SPRING PEEPERS		1			**1**	**1**				**1**
Copes gray treefrog		1	**2**	**1**	**1**	**1**	**1**			**1**
American Bullfrog		1	**1**				**1**			**1**
Eastern Narrow Mouthed Toad		1					**1**			**1**
Green Frog			**1**							**2**
Gray Treefrog										**2**
Northern Cricket Frog										

Run Information	Start						Finish					
Time (Military)	9:30 6-10-09						11:45					
Wind (Beaufort Scale)	0	1	2	3	4	5	0	1	2	3	4	5
	x											
Sky (See Code Explanations)	0	1	2	4	5	7	8	0	1	2	4	5	7	8
				x										
-optional- # days since last rainfall:	**2**													

PER STOP INFORMATION

STOP #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
START TIME (MILITARY) -OPTIONAL-	**9:30**	**9:38**	**9:46**	**9:59**	**10:09**	**10:32**	**10:44**	**11:01**	**11:18**	**11:38**
AIR TEMPERATURE *SELECT SCALE* **°C** **°F**	**85-78 F**									
WAS NOISE A FACTOR? (CHECK IF YES)										
DID YOU TAKE A TIMEOUT? (CHECK IF YES)										

SPECIES ↓ **STOP # →**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
COPE'S GRAY TREEFROG		1		**2**	**3**	**1**		**2**		
Green Frog		1	**1**		**1**	**1**	**1**	**1**	**3**	**2**
American Bullfrog		1	**1**		**1**		**1**	**2**	**2**	
Gray treefrog					**2**		**1**	**2**	**2**	
Pickerel						**1**				
Eastern Narrow Mouth Toad									**2**	
Northern Cricket Frog										**1**

APPENDIX D.

SPECIES ABUNDANCE INVENTORY DATA

Table D.1. 2007 species abundance inventory data

Date	Species	Scientific name	Method[a]	Lat/ long	Area
5/30	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9798/ -84.2794	Walker Branch
5/30	Southern two-lined salamander	*Eurycea cirrigera*	VES	35.9798/ -84.2794	Walker Branch
5/30	Cave salamander	*Eurycea lucifuga*	VES	35.8978/ -84.3167	Copper Ridge Cave
5/31	Red-spotted newt	*Notophthalmus viridescens viridescens*	VES/DN	35.9445/ -84.3456	Hembree Marsh
6/05	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9510/ -84.3262	McNew Hollow/Gum Branch
6/05	Cave salamander	*Eurycea lucifuga*	VES	35.8978/ -84.3167	Copper Ridge Cave
6/06	Red-spotted newt	*Notophthalmus viridescens viridescens*	VES/DN	35.9445/ -84.3456	Hembree Marsh
6/06	Southern leopard frog	*Rana utricularia*	VES	35.9445/ -84.3456	Hembree Marsh
6/08	Eastern box turtle	*Terrapene carolina Carolina*	VES	35.9718/ -84.3014	Pine Ridge
6/08	Northern ringneck snake	*Diadophis punctatus edwardsii*	VES	35.9718/ -84.3014	Pine Ridge
6/08	Northern red salamander	*Pseudotriton ruber ruber*	VES	35.9718/ -84.3014	Pine Ridge
6/08	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9718/ -84.3014	Pine Ridge
6/08	Southern two-lined salamander	*Eurycea cirrigera*	VES	35.9718/ -84.3014	Pine Ridge
6/12	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9640/ -84.3490	Mesophytic Forest
6/13	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9357/ -84.2847	Bearden Creek
6/13	Northern two-lined salamander	*Eurycea cirrigera*	VES	35.9357/ -84.2847	Bearden Creek
6/13	Southern leopard frog	*Rana utricularia*	VES	35.9357/ -84.2847	Bearden Creek
6/13	Green frog	*Rana clamitans melanota*	VES	35.9357/ -84.2847	Bearden Creek
6/14	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9357/ -84.2847	Bearden Creek
6/14	Pickerel frog	*Rana palustris*	VES	35.9357/ -84.2847	Bearden Creek
6/14	Southern two-lined salamander	*Eurycea cirrigera*	VES	35.9357/ -84.2847	Bearden Creek
6/14	American toad	*Bufo americanus*	VES	35.9357/ -84.2847	Bearden Creek
6/14	Green frog	*Rana clamitans melanota*	VES	35.9357/ -84.2847	Bearden Creek
6/20	Eastern box turtle	*Terrapene carolina carolina*	VES	35.9510/ -84.3262	McNew Hollow/Gum Branch
6/20	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9510/ -84.3262	McNew Hollow/Gum Branch
6/20	Northern red salamander	*Pseudotriton ruber ruber*	VES	35.9510/ -84.3262	McNew Hollow/Gum Branch
6/20	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9357/ -84.2847	Bearden Creek
6/20	Long-tailed salamander	*Eurycea longicauda longicauda*	VES	35.9357/ -84.2847	Bearden Creek
6/26	Southern two-lined salamander	*Eurycea cirrigera*	VES	35.9415/ -84.2745	Near Shepard's Cemetery

Table D.1 (continued)

Date	Species	Scientific name	Method[a]	Lat/ long	Area
7/02	Cave salamander	*Eurycea lucifuga*	VES	35.8978/ -84.3167	Copper Ridge Cave
7/02	Northern slimy salamander	*Plethodon glutinosis complex*	VES	35.8978/ -84.3167	Copper Ridge Cave
7/10	Northern watersnake	*Nerodia sipedon sipedon*	VES	35.9357/ -84.2847	Bearden Creek
7/10	Eastern worm snake	*Carphophis amoenus amoenus*	VES	35.9357/ -84.2847	Bearden Creek
7/10	Long-tailed salamander	*Eurycea longicauda longicauda*	VES	35.9357/ -84.2847	Bearden Creek
7/10	Southern two-lined salamander	*Eurycea cirrigera*	VES	35.9357/ -84.2847	Bearden Creek
7/10	Green frog	*Rana clamitans melanota*	VES	35.9357/ -84.2847	Bearden Creek
7/10	Northern ringneck snake	*Diadophis punctatus edwardsii*	VES	35.9357/ -84.2847	Bearden Creek
7/10	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9357/ -84.2847	Bearden Creek
7/10	Eastern box turtle	*Terrapene carolina carolina*	VES	35.9357/ -84.2847	Bearden Creek
7/10	Northern red salamander	*Pseudotriton ruber ruber*	VES	35.9357/ -84.2847	Bearden Creek
7/12	Northern dusky salamander	*Desmognathus fuscus fuscus*	VES	35.9798/ -84.2794	Walker Branch
7/12	Eastern box turtle	*Terrapene carolina carolina*	VES	35.9798/ -84.2794	Walker Branch
7/27	Green frog	*Rana clamitans melanota*	VES	35.8978/ -84.3167	Copper Ridge Cave
7/27	Northern slimy salamander	*Plethodon glutinosis complex*	VES	35.8978/ -84.3167	Copper Ridge Cave
7/27	Cave salamander	*Eurycea lucifuga*	VES	35.8978/ -84.3167	Copper Ridge Cave
7/27	Northern red salamander	*Pseudotriton ruber ruber*	VES	35.8978/ -84.3167	Copper Ridge Cave

[a]Abbreviations:
DN: dip net
VES: visual encounter survey

Table D-2. 2008 species abundance inventory data[a]

Date	Time	Species	Scientific Name	Length		Wt.	Method[a]	Lat./ Long	Area
				Total	SVL				
5/22	10:00AM	Red-spotted newt	*Notophthalmus viridescens viridescens*	108.4	48.55	4.5	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Red-spotted newt	*Notophthalmus viridescens viridescens*	106.4	54.78	5.9	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Red-spotted newt	*Notophthalmus viridescens viridescens*	81.4	37.3	2.9	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Red-spotted newt	*Notophthalmus viridescens viridescens*	109.999	52.35	5.9	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Red-spotted newt	*Notophthalmus viridescens viridescens*	111.1	51.5	5.2	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Red-spotted newt	*Notophthalmus viridescens viridescens*	93.9	47.1	1.85	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Red-spotted newt	*Notophthalmus viridescens viridescens*	81.5	38.85	2.1	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Red-spotted newt	*Notophthalmus viridescens viridescens*				MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	N. dusky salamander	*Desmognathus fuscus fuscus*	123.6	38.85	8.2	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*	51.1	25.8	1	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*	53.4	29.999	1.1	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*	51.8	26.7	1.1	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*	53.3	29.4	1	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*	70.21	42	2.9	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*	47.9	28.2	0.9	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*	52.8	25.1	0.9	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*	46.7	27.8	0.9	MT	35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*	57.2	29.3	1.2	MT	35.9445/ -84.3456	Hembree Marsh

Table D-2 (continued)

Date	Time	Species	Scientific Name	Length		Wt.	Method[a]	Lat./ Long	Area
				Total	SVL				
5/22	10:00AM	Marbled salamander (larval)	*Ambystoma opacum*					35.9445/ -84.3456	Hembree Marsh
5/22	10:00AM	Pickerel frog	*Rana palustris*	35			VES	35.9445/ -84.3456	Hembree Marsh
5/22	2:14PM	Southern leopard frog	*Rana utricularia*	61.8		11.2	VES	35.9537/-84.2847	Bearden Creek
5/22	2:14PM	Southern leopard frog	*Rana utricularia*	39.4		4	VES	35.9537/-84.2847	Bearden Creek
5/22	2:25PM	Northern dusky salamander	*Desmognathus fuscus fuscus*	111.2	119	7.2	VES	35.9537/-84.2847	Bearden Creek
5/22	2:49PM	Northern dusky salamander	*Desmognathus fuscus fuscus*	65.2	39.6	3.5	VES	35.9537/-84.2847	Bearden Creek
5/22	2:53PM	Northern dusky salamander	*Desmognathus fuscus fuscus*	90.97	47.4	3.8	VES	35.9537/-84.2847	Bearden Creek
5/22	2:57PM	Southern leopard frog	*Rana utricularia*	45.2		7.2	VES	35.9537/-84.2847	Bearden Creek
5/22	2:57PM	Southern two-lined salamander	*Eurycea cirrigera*	90.5	43.9	1	VES	35.9537/-84.2847	Bearden Creek
5/22	2:57PM	Northern dusky salamander	*Desmognathus fuscus fuscus*	32.9	16.7	N/A	VES	35.9537/-84.2847	Bearden Creek
5/22	4:44PM	Eastern american toad	*Bufo americanus americanus*	65.3		42	VES	35.954018 / 84.382447	Rainy Knob
5/22	4:44PM	Cave salamander	*Eurycea lucifuga*	145.2	62.5	4.8	VES	35.954018 / 84.382447	Rainy Knob
5/23	10:45AM	Marbled salamander (larval)	*Ambystoma opacum*	51	27.1	1	MT	35.9445/ -84.3456	Hembree Marsh
5/23	10:45AM	Marbled salamander (larval)	*Ambystoma opacum*	55.4	31.1	1	MT	35.9445/ -84.3456	Hembree Marsh
5/23	10:45AM	Marbled salamander (larval)	*Ambystoma opacum*	54.99	30.3	1.1	MT	35.9445/ -84.3456	Hembree Marsh
5/23	10:45AM	Marbled salamander (larval)	*Ambystoma opacum*	53.3	27.4	0.8	MT	35.9445/ -84.3456	Hembree Marsh
5/23	10:45AM	Marbled salamander (larval)	*Ambystoma opacum*	48.7	28.2	0.8	MT	35.9445/ -84.3456	Hembree Marsh

Table D-2 (continued)

Date	Time	Species	Scientific Name	Length		Wt.	Method[a]	Lat./ Long	Area
				Total	SVL				
5/23	10:45AM	Marbled salamander (larval)	*Ambystoma opacum*	47.1	26.3	1	MT	35.9445/ -84.3456	Hembree Marsh
5/23	10:45AM	Red-spotted newt	*Notophthalmus viridescens viridescens*	103.2	48	5.1	MT	35.9445/ -84.3456	Hembree Marsh
5/23	10:45AM	Red-spotted newt	*Notophthalmus viridescens viridescens*	84.2	32.5	2.9	MT	35.9445/ -84.3456	Hembree Marsh
5/23	10:00AM	Five-lined skink	*Eumeces fasciatus*	75.9	45.9	1.2	PF	35.9445/ -84.3456	Hembree Marsh
5/23	3:30PM	Southeastern five-lined skink	*Eumeces inexpectatus*	> 153.0	65.2	9.8	CO	35.983360 / 84.199164	Solway Bend
5/23	3:30PM	Northern brown snake	*Storeria dekayi dekayi*	> 153.0	> 153.0	10	CO	35.983360 / 84.199164	Solway Bend
5/23	3:30PM	Northern brown snake	*Storeria dekayi dekayi*	> 153.0	> 153.0	5.2	CO	35.983360 / 84.199164	Solway Bend
5/27	10:00AM	Smooth earth snake	*Virginia valerie*	> 153.0	> 153.0	4	CO	35.983360 / 84.199164	Solway Bend
5/27	10:00AM	Smooth earth snake	*Virginia valerie*	> 153.0	> 153.0	110.3	CO	35.983360 / 84.199164	Solway Bend
5/27	10:00AM	Northern brown snake	*Storeria dekayi dekayi*	> 153.0	> 153.0	5	CO	35.983360 / 84.199164	Solway Bend
5/27	10:00AM	Northern brown snake	*Storeria dekayi dekayi*	> 153.0	> 153.0	5.2	CO	35.983360 / 84.199164	Solway Bend
5/28	4:57PM	Cumberland slider	*Trachemys scripta troostii*	280		2400	HN	35.922398 / 84.321439	Carp Pond 1
5/29	11:00AM	Painted turtle	*Chrysemys picta*	135		260	HN	35.543073 / 84.231976	Thigh High Pond
5/29	11:00AM	Painted turtle	*Chrysemys picta*	145		275	HN	35.543073 / 84.231976	Thigh High Pond
5/29	11:00AM	Cumberland slider	*Trachemys scripta troostii*	220		920	HN	35.543073 / 84.231976	Thigh High Pond
5/29	11:00AM	Cumberland slider	*Trachemys scripta troostii*	240		1500	HN	35.543073 / 84.231976	Thigh High Pond
5/29	11:30AM	Marbled salamander	*Ambystoma opacum*	51.4	27.9	3	PF	35.9445/ -84.3463	Hembree Marsh
5/30	12:00PM	Eastern box turtle	*Terrapene carolina*	68.5		70	VES		Rte. 95 North

Table D-2 (continued)

Date	Time	Species	Scientific Name	Length		Wt.	Method[a]	Lat./ Long	Area
				Total	SVL				
5/30	1:00PM	Eastern box turtle	*Terrapene carolina*	124.9		415	VES	35.9510 / -84.3262	McNew Hollow Road
5/30	2:20PM	Northern watersnake	*Nerodia sipedon sipedon*	640	630	85	VES	35.9640/ -84.3490	Mesophytic Forest
5/30	2:20PM	Northern ringneck snake	*Diadophis punctatus edwardsii*	122	107.7	1.2	VES	35.9640/ -84.3490	Mesophytic Forest
5/30	2:20PM	Northern dusky salamander	*Desmognathus fuscus fuscus*	32.9	16.6	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
5/30	2:20PM	Northern dusky salamander	*Desmognathus fuscus fuscus*	37.7	19.5	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
5/30	2:20PM	Northern dusky salamander	*Desmognathus fuscus fuscus*	33.6	16.6	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
5/30	2:20PM	Spotted salamander (larval)	*Ambystoma maculatum*	34.7	20.5	0.6	VES	35.9640/ -84.3490	Mesophytic Forest
5/30	2:20PM	Spotted salamander (larval)	*Ambystoma maculatum*	34.1	23.3	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
5/30	2:20PM	Spotted salamander (larval)	*Ambystoma maculatum*	29.2	17.5	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
5/30	2:20PM	Spotted salamander (larval)	*Ambystoma maculatum*	36.1	21.6	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
6/3	10:30AM	Northern dusky salamander	*Desmognathus fuscus fuscus*	76.1	30.3	1.2	VES	35.9537/-84.2847	Bearden Creek
6/3	10:30AM	Northern dusky salamander	*Desmognathus fuscus fuscus*	92.35	43.8	2.8	VES	35.9537/-84.2847	Bearden Creek
6/3	10:30AM	Northern dusky salamander	*Desmognathus fuscus fuscus*	50.08	24.4	0.8	VES	35.9537/-84.2847	Bearden Creek
6/3	2:30PM	Snapping turtle	*Chelydra serpentina*	304.8		3628	HN	35.980686 / 84.211110	Solway Bend Ponds
6/3	2:30PM	Painted turtle	*Chrysemys picta*	170		360	HN	35.980686 / 84.211110	Solway Bend Ponds
6/3	2:30PM	Cumberland slider	*Trachemys scripta troostii*	210		650	HN	35.980686 / 84.211110	Solway Bend Ponds

Table D-2 (continued)

Date	Time	Species	Scientific Name	Length		Wt.	Method[a]	Lat./ Long	Area
				Total	SVL				
6/3	2:30PM	Painted turtle	*Chrysemys picta*	125		165	HN	35.980686 / 84.211110	Solway Bend Ponds
6/3	2:30PM	Painted turtle	*Chrysemys picta*	125		370	HN	35.980686 / 84.211110	Solway Bend Ponds
6/3	2:30PM	Common musk turtle	*Sternotherus odoratus*	135		175	HN	35.980686 / 84.211110	Solway Bend Ponds
6/3	2:30PM	Painted turtle	*Chrysemys picta*	175		410	HN	35.980686 / 84.211110	Solway Bend Ponds
6/3	2:30PM	Painted turtle	*Chrysemys picta*	175		380	HN	35.980686 / 84.211110	Solway Bend Ponds
6/3	2:30PM	Cumberland slider	*Trachemys scripta troostii*	230		1220	HN	35.980686 / 84.211110	Solway Bend Ponds
6/4	4:35PM	Northern red salamander	*Pseudotriton ruber ruber*	93.7	55.2	3	DN	35.954018 / 84.382447	Black Oak/ Amphibian Site 5
6/4	4:35PM	Southern two-lined salamander	*Eurycea cirrigera*	52.8	27.4	0.8	DN	35.954018 / 84.382447	Black Oak/ Amphibian Site 5
6/4	4:35PM	Southern two-lined salamander	*Eurycea cirrigera*	44.9	22.8	0.4	DN	35.954018 / 84.382447	Black Oak/ Amphibian Site 5
6/4	4:35PM	Southern two-lined salamander	*Eurycea cirrigera*	38.9	22.6	0.6		35.954018 / 84.382447	Black Oak/ Amphibian Site 5
6/5	7:49 PM	Black kingsnake	*Lampropeltis getula nigra*	80	73	150	CO	35.983360 / 84.199164	Solway Bend
6/6	2:39PM	Eastern spiny softshell	*Apalone spinifera spinifera*				VES	********** *****	Clark Center Park
6/6	2:00PM	Eastern narrow-mouthed toad	*Gastrophryne carolinensis*				VES	35.983360 / 84.199164	Solway Bend

Table D-2 (continued)

Date	Time	Species	Scientific Name	Length		Wt.	Method[a]	Lat./ Long	Area
				Total	SVL				
6/9	10:00AM	Eastern box turtle	*Terrapene carolina*	123.6		407	VES	35.980686 / 84.211110	Freels Bend
6/9	5:33PM	Cumberland slider	*Trachemys scripta troostii*	191		630	HN	35.954018 / 84.382447	Black Oak/ Amphibian Site 5
6/17	11:00AM	Pickerel frog	*Rana palustris*	26.41		1.2	MT	35.961221 / 84.256830	NWSG site 2
6/17	11:00AM	Pickerel frog	*Rana palustris*	29.65		1.5	MT	35.961221 / 84.256830	NWSG site 3
6/17	12:00PM	Southern two-lined salamander	*Eurycea cirrigera*	81.15	36.41	1	CO	35.9537/-84.2847	Bearden Creek
6/17	12:00PM	Northern red salamander	*Pseudotriton ruber ruber*	65.05	37.4	0.09	VES	35.9537/-84.2847	Bearden Creek
6/17	12:00PM	Spotted dusky salamander	*Desmognathus fuscus conanti*	129.11	63.1	8	VES	35.9537/-84.2847	Bearden Creek
6/18	10:30AM	Pickerel frog	*Rana palustris*	27.3		0.85	MT	35.961221 / 84.256830	NWSG site 2
6/18	10:30AM	Pickerel frog	*Rana palustris*	25.2		0.6	MT	35.961221 / 84.256831	NWSG site 3
6/30	2:16PM	Northern brown snake	*Storeria dekayi dekayi*	180	140	2.6	CO	35.983360 / 84.199164	Solway Bend
6/30	2:16PM	Northern brown snake	*Storeria dekayi dekayi*	225	174	4	CO	35.983360 / 84.199164	Solway Bend
6/30	2:16PM	Northern brown snake	*Storeria dekayi dekayi*	240	200	6.2	CO	35.983360 / 84.199164	Solway Bend
6/30	2:16PM	Smooth earth snake	*Virginia valerie*	190	154.6	4.4	CO	35.983360 / 84.199164	Solway Bend
7/1	3:30PM	Southern two-lined salamander	*Eurycea cirrigera*	84.1	45.8	1.4	VES	35.9640/ -84.3490	Mesophytic Forest
7/1	3:30PM	Southern two-lined salamander	*Eurycea cirrigera*	40.1	23.4	0.4	VES	35.9640/ -84.3490	Mesophytic Forest
7/1	3:30PM	Spotted dusky salamander	*Desmognathus conanti*	108	51.5	4.4	VES	35.9640/ -84.3490	Mesophytic Forest
7/1	3:30PM	Spotted dusky salamander	*Desmognathus conanti*	75.6	36.9	1.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/1	3:30PM	Spotted dusky salamander	*Desmognathus conanti*	102.2	55.3	4.1	VES	35.9640/ -84.3490	Mesophytic Forest

Table D-2 (continued)

Date	Time	Species	Scientific Name	Length		Wt.	Method[a]	Lat./ Long	Area
				Total	SVL				
7/2	11:30AM	Northern brown snake	*Storeria dekayi dekayi*	260	220	7.1	CO	35.983360/84.199164	Solway Bend
7/2	11:30AM	Northern brown snake	*Storeria dekayi dekayi*	220	169	3.9	CO	35.983360/84.199164	Solway Bend
7/2	11:30AM	Southeastern five-lined skink	*Eumeces inexpectatus*	121.1	61.75	6.1	CO	35.983360/84.199164	Solway Bend
7/2	3:06PM	Spotted dusky salamander	*Desmognathus conanti*	128.2	65.4	7.4	VES	35.9537/-84.2847	Bearden Creek
7/2	3:23PM	Spotted dusky salamander	*Desmognathus conanti*	95.1	52.5	5	VES	35.9537/-84.2847	Bearden Creek
7/2	3:23PM	Spotted dusky salamander	*Desmognathus conanti*	85	38.6	2.2	VES	35.9537/-84.2847	Bearden Creek
7/2	3:30PM	Southern two-lined salamander	*Eurycea cirrigera*	51.3	23	0.2	VES	35.9537/-84.2847	Bearden Creek
7/3	11:30AM	Red-bellied snake	*Storeria occipitomaculata*	295	230	2.8	PF	35.9445/-84.3456	Hembree Marsh
7/7	10:30AM	Northern copperhead	*Agkistrodon contortrix mokasen*					**********	Freels Bend
7/14	10:00AM	Spotted dusky salamander	*Desmognathus conanti*	39.3	19.4	1.1	VES	35.9537/-84.2847	Bearden Creek
7/14	10:00AM	Spotted dusky salamander	*Desmognathus conanti*	27.3	13.5	0.8	VES	35.9537/-84.2847	Bearden Creek
7/14	10:00AM	Spotted dusky salamander	*Desmognathus conanti*	85.9	41.3	4.1	VES	35.9537/-84.2847	Bearden Creek
7/14	10:00AM	Spotted dusky salamander	*Desmognathus conanti*	28.1	19.9	0.5	VES	35.9537/-84.2847	Bearden Creek
7/14	10:00AM	Northern dusky salamander	*Desmognathus fuscus fuscus*	98.1	54.3	4	VES	35.9537/-84.2847	Bearden Creek

Table D-2 (continued)

Date	Time	Species	Scientific Name	Length		Wt.	Method[a]	Lat./ Long	Area
				Total	SVL				
7/14	10:00AM	Northern dusky salamander	*Desmognathus fuscus fuscus*	91.8	54.3	4	VES	35.9537/-84.2847	Bearden Creek
7/14	10:00AM	Northern dusky salamander	*Desmognathus fuscus fuscus*	89.8	44.8	3.8	VES	35.9537/-84.2847	Bearden Creek
7/14	10:00AM	Northern dusky salamander	*Desmognathus fuscus fuscus*	41.7	20.8	2.1	VES	35.9537/-84.2847	Bearden Creek

[a]Abbrevations:
CO: cover object
DN: dip net
HN: hoop net
MT minnow trap
PF: pitfall trap
SVL: snout-to-vent length
VES: visual encounter survey

Table D-3. 2009 species abundance inventory data

Date	Time	Species	Scientific name	Total	SVL	Wt.	Method[a]	Lat./Long.	Area
5/11/2009	9:00AM	Northern water snake	*Nerodia sipedon sipedon*	>153	>153		VES	35.9798/-84.2794	Walker Branch
5/14/2009	2:30PM	Two lined salamander	*Eurycea cirrigera*	81.7	35.2	1.15	VES	35.9537/-84.2847	Bearden Creek
5/14/2009	2:30PM	Two lined salamander	*Eurycea cirrigera*	77.2	35.7	1.99	VES	35.9537/-84.2847	Bearden Creek
5/14/2009	3:00PM	Spotted dusky	*D. fuscus conanti*	46.4	22.1	1.2	VES	35.9537/-84.2847	Bearden Creek
5/15/2009	11:00AM	Spotted dusky	*D. fuscus conanti*	75	32.2	1.5	VES	********	Clear Spring Road
5/15/2009	11:30AM	Spotted dusky	*D. fuscus conanti*	25.3	15.5	0.85	VES	********	Clear Spring Road
5/20/2009	9:30AM	Five-lined skink	*Eumeces fasciatus*	93.4	40.2	1.8	CB	35.980686 / 84.211110	Solway/ Lynard Skynard pond
5/20/2009	9:30AM	N. brown snake	*Storeria dekayi dekayi*	>153	>153	7.4	CB	35.980686 / 84.211110	Solway/ Lynard Skynard pond
5/20/2009	10:00AM	Black rat snake	*Elaphe obsoleta*	>153	>153	90	TIN	35.983360 / 84.199164	Solway Bend
5/20/2009	10:00AM	Ringneck snake	*Diadophis punctatus edwardsii*	>153	>153	11	CB	35.983360 / 84.199164	Solway Bend
5/20/2009	10:00AM	Five-lined skink	*Eumeces fasciatus*	124.2	64.5	7.2	VES	35.983360 / 84.199164	Solway Bend
5/21/2009	10:30AM	Northern water snake	*Nerodia sipedon sipedon*	1346.2	1066.8	845	VES	********	Bethel Valley Road
5/22/2009	11:00AM		*Desmognathus*				VES	35.954018 / 84.382447	Amphibian Site 5
5/26/2009	12:30PM	Spiny softshell turtle	*Apalone spinifera spinifera*				VES	********	Fishing Area near Solway
5/26/2009	3:00PM	Northern water snake	*Nerodia sipedon sipedon*				VES	********	Fishing Area near Solway
6/3/2009	1:00PM	Spotted dusky	*D. fuscus conanti*	91.8	46.3	4.3	VES	35.9640/ -84.3490	Mesophytic Forest
6/3/2009	1:00PM	Two lined salamander	*Eurycea cirrigera*	47.8	19.2	1	VES	35.9640/ -84.3490	Mesophytic Forest
6/3/2009	1:00PM	Spotted dusky	*D. fuscus conanti*	31.5	19.2	1.5	VES	35.9640/ -84.3490	Mesophytic Forest
6/3/2009	1:00PM	Spotted dusky	*D. fuscus conanti*	37.5	17.7	1.7	VES	35.9640/ -84.3490	Mesophytic Forest
6/3/2009	1:00PM	Spotted dusky	*D. fuscus conanti*	36.3	18.3	1.9	VES	35.9640/ -84.3490	Mesophytic Forest
6/4/2009	2:30PM	Northern red salamander	*Pseudotriton ruber ruber*	72.3	37.8	1.1	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/4/2009	2:30PM	Northern dusky	*D. fuscus fuscus*	62.3	31.3	1.2	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/4/2009	2:30PM	Northern dusky	*D. fuscus fuscus*	50.5	27.4	1	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/4/2009	2:30PM		*Eurycea*	36.6	20.7	0.2	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/4/2009	3:40PM	Black racer	*Coluber constrictor*	1066.8	888.6	220	VES	********	Bear Creek Road
6/5/2009	3:00PM	Cumberland slider	*Trachemys scripta troostii*				VES		Generator Ponds
6/5/2009	3:15PM	Ringneck snake	*Diadophis punctatus edwardsii*	153.9	137.8	1.3	CB	35.983360 / 84.199164	Solway Bend
6/5/2009	3:30PM	Eastern box turtle	*Terrapene carolina*	122.3		355	VES	36.042956/-84.238514	Bethel Valley Road
6/8/2009	12:30PM	Black rat snake	*Elaphe obsoleta*	628.6	520.7	80	TIN	35.961221 / 84.256830	NWSG site
6/17/2009	12:00PM	Red-spotted newt	*N. viridescens viridescens*	93.8	48.8	3.8	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Marbled/ larval	*Ambystoma opacum*	43.5	25.2	1	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Marbled/ larval	*Ambystoma opacum*	44.2	22.9	0.9	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Marbled/ larval	*Ambystoma opacum*	43.2	22.7	1	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Marbled/ larval	*Ambystoma opacum*	52.6	27.2	1.2	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Marbled/ larval	*Ambystoma opacum*	47.1	27.2	1.1	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Marbled/ larval	*Ambystoma opacum*	41.4	20.2	1.1	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Marbled/ larval	*Ambystoma opacum*	39.1	24.1	1	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Marbled/ larval	*Ambystoma opacum*	46	25.2	1.1	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	3:00PM	Spotted dusky	*D. fuscus conanti*	101	49.1	3.9	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM	Spotted dusky	*D. fuscus conanti*	73.6	32	1.2	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM	Spotted dusky	*D. fuscus conanti*	32.4	17.1	0.1	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM	Northern dusky	*D. fuscus fuscus*	32	17.6	1.2	VES	35.9640/ -84.3490	North HW Cove/Natural Area

Table D-3 (continued)

Date	Time	Species	Scientific name	Total	SVL	Wt.	Method[a]	Lat./Long.	Area
6/17/2009	3:00PM	Spotted dusky	*D. fuscus conanti*	40.8	21	0.4	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM	Spotted dusky	*D. fuscus conanti*	38.7	19.4	0.4	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM	Northern red salamander	*Pseudotriton ruber ruber*	85.6	48.6	2.25	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	12:00PM	Red-spotted newt	*N. viridescens viridescens*	89.4	43.1	3.1	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Red-spotted newt	*N. viridescens viridescens*	97.35	45.9	3.2	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Red-spotted newt	*N. viridescens viridescens*	82.99	43	3.1	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	12:00PM	Red-spotted newt	*N. viridescens viridescens*	101.2	49.5	4.1	MT	35.9445/ -84.3456	Hembree Marsh
6/17/2009	3:00PM	Northern dusky	*D. fuscus fuscus*	34.9	17.6	0.1	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM	Northern dusky	*D. fuscus fuscus*	38.5	18.7	0.8	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM	Northern dusky	*D. fuscus fuscus*	33.9	14.8	0.15	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM		*Desmognathus*	38.6	20.9	0.1	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM	Spotted dusky	*D. fuscus conanti*	37	15.4	0.5	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	3:00PM		*Desmognathus*	31.5	18.2	0.2	VES	35.9640/ -84.3490	North HW Cove/Natural Area
6/17/2009	4:00PM	Northern water snake	*Nerodia sipedon sipedon*	1371.6			VES	********	Bethel Valley Road
6/19/2009	11:30 AM	Ringneck snake	*Diadophis punctatus edwardsii*	177.8	152.4	2.4	CB	35.983360 / 84.199164	Solway Bend
6/19/2009	2:00 PM	Northern dusky	*D. fuscus fuscus*	22.6	12.8	0.15	VES	35.981746/ 84.275870	ESD Stream
6/19/2009	2:00 PM	Northern dusky	*D. fuscus fuscus*	25	14.7	0.4	VES	35.981746/ 84.275870	ESD Stream
6/19/2009	2:00 PM		*Desmognathus*	15.9	9.7	0.2	VES	35.981746/ 84.275870	ESD Stream
6/19/2009	2:00 PM		*Desmognathus*	32.5	15.8	0.1	VES	35.981746/ 84.275870	ESD Stream
6/19/2009	2:00 PM		*Desmognathus*	37.9	20.3	0.6	VES	35.981746/ 84.275870	ESD Stream
6/19/2009	2:00 PM		*Desmognathus*	30	13.4	0.2	VES	35.981746/ 84.275870	ESD Stream
6/19/2009	4:00 PM		*Eurycea*	36.3	17.5	0.1	VES	35.954018 / 84.382447	Amphibian Site 5
6/19/2009	4:00 PM		*Desmognathus*	38	20.3	0.2	VES	35.954018 / 84.382447	Amphibian Site 5
6/19/2009	4:00 PM		*Eurycea*	42.1	18.8	0.8	VES	35.954018 / 84.382447	Amphibian Site 5
6/19/2009	4:00 PM		*Eurycea*	35.2	16.9	0.6	VES	35.954018 / 84.382447	Amphibian Site 5
6/19/2009	4:00 PM	Northern two lined salamander	*Eurycea cirrigera*	42.2	18.4	0.8	VES	35.954018 / 84.382447	Amphibian Site 5
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	46.2	27.3	0.8	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	47.4	28.2	0.6	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	53.5	29.4	0.8	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	43.3	25.8	0.6	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	43.6	23.4	0.7	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	47.1	23.2	1	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	45.1	25.1	0.9	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	45.2	24.9	1	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	50.03	26.8	0.7	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	40.04	26.4	1.1	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	39.9	20.08	1	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	50.01	25.6	1.1	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	50	27.6	1.2	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	45.7	22.6	1.2	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	51.6	22.7	1.3	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Marbled/ larval	*Ambystoma opacum*	48.2	24.1	1.4	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Red-spotted newt	*N. viridescens viridescens*	103.5	45.6	5.2	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Red-spotted newt	*N. viridescens viridescens*	86.2	40.8	3.4	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Red-spotted newt	*N. viridescens viridescens*	103.3	53.6	7.6	MT	35.9445/ -84.3456	Hembree Marsh

Table D-3 (continued)

Date	Time	Species	Scientific name	Total	SVL	Wt.	Method[a]	Lat./Long.	Area
6/23/2009	12:00 PM	Red-spotted newt	*N. viridescens viridescens*	88.6	48.8	5.6	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Red-spotted newt	*N. viridescens viridescens*	95.9	51.1	6.2	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Red-spotted newt	*N. viridescens viridescens*	102.9	47.3	5	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Red-spotted newt	*N. viridescens viridescens*	87.9	51.3	3.4	MT	35.9445/ -84.3456	Hembree Marsh
6/23/2009	12:00 PM	Northern water snake	*Nerodia sipedon sipedon*			50	MT	35.9445/ -84.3456	Hembree Marsh
6/25/2009	2:00 PM	Pickerel frog	*Rana palustris*	60.09		18	VES	35.954018 / 84.382447	Rainy Knob
6/25/2009	2:00 PM	Cave salamander	*Eurycea lucifuga*	63.8	30.03	0.9	VES	35.954018 / 84.382447	Rainy Knob
6/25/2009	2:00 PM	Green frog	*Rana clamitans melanota*	36.3		5.7	VES	35.954018 / 84.382447	Rainy Knob
6/26/2009	12:30 PM	Marbled/ larval	*Ambystoma opacum*	45.9	24.7	0.08	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30 PM	Marbled/ larval	*Ambystoma opacum*	51.3	25.7	1.2	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30	Marbled/ larval	*Ambystoma opacum*	50.07	27.3	1.2	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30 PM	Marbled/ larval	*Ambystoma opacum*	41.6	23.7	0.09	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30 PM	Marbled/ larval	*Ambystoma opacum*	54.3	30.04	1.6	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30 PM	Marbled/ larval	*Ambystoma opacum*	51.1	26.4	1.4	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30 PM	Marbled/ larval	*Ambystoma opacum*	39.4	23	1	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30 PM	Marbled/ larval	*Ambystoma opacum*	46.6	25.7	1.2	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30 PM	Marbled/ larval	*Ambystoma opacum*	43.9	24.8	0.9	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30 PM	Marbled/ larval	*Ambystoma opacum*	50.6	28.2	1.4	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	12:30 PM	Red-spotted newt	*N. viridescens viridescens*	94.3	41.5	4.2	MT	35.9445/ -84.3456	Hembree Marsh
6/26/2009	2:00 PM		*Pseudacris*	27.2		1.1	MT	35.915208/ 84.399810	Freels Bend Pond 1
6/26/2009	2:00 PM		*Rana*	87.2	30.08	4.9	MT	35.915208/ 84.399810	Freels Bend Pond 1
6/26/2009	2:00 PM		*Rana*	75.6	29	5.1	MT	35.915208/ 84.399810	Freels Bend Pond 1
6/26/2009	2:00 PM	Green frog	*Rana clamitans melanota*	35.4		5.1	MT	35.915208/ 84.399810	Freels Bend Pond 1
6/26/2009	2:00 PM	Green frog	*Rana clamitans melanota*	36.1		3.4	MT	35.915208/ 84.399810	Freels Bend Pond 1
6/30/2009	1:30 PM	Spotted dusky	*D. fuscus conanti*	85.2	42.7	3.6	VES	35.9798/-84.2794	Walker Branch
6/30/2009	1:30 PM	Spotted dusky	*D. fuscus conanti*	32	17.8	0.3	VES	35.9798/-84.2794	Walker Branch
6/30/2009	1:30 PM	Two lined salamander	*Eurycea cirrigera*	44.9	23	0.4	VES	35.9798/-84.2794	Walker Branch
6/30/2009	1:30 PM	Spotted dusky	*D. fuscus conanti*	99.2	48.7	4	VES	35.9798/-84.2794	Walker Branch
6/30/2009	1:30 PM	Northern dusky	*D. fuscus fuscus*	66.1	30.4	0.9	VES	35.9798/-84.2794	Walker Branch
7/1/2009	2:00 PM	Marbled salamander	*Ambystoma opacum*	48.4	24.8	0.8	PF	35.9445/ -84.3456	Hembree Marsh
7/1/2009	2:00 PM	Marbled salamander	*Ambystoma opacum*	46.4	25.1	0.6	PF	35.9445/ -84.3456	Hembree Marsh
7/1/2009	2:00 PM	Marbled salamander	*Ambystoma opacum*	49.5	26.3	0.9	PF	35.9445/ -84.3456	Hembree Marsh
7/2/2009	1:30 PM	Marbled/ larval	*Ambystoma opacum*	50.4	27.5	1.1	MT	35.9445/ -84.3456	Hembree Marsh
7/2/2009	1:30 PM	Marbled/ larval	*Ambystoma opacum*	54.9	28.8	1.4	MT	35.9445/ -84.3456	Hembree Marsh
7/2/2009	1:30 PM	Marbled/ larval	*Ambystoma opacum*	45.6	24	1.1	MT	35.9445/ -84.3456	Hembree Marsh
7/2/2009	1:30 PM	Marbled/ larval	*Ambystoma opacum*	49.8	25	1	MT	35.9445/ -84.3456	Hembree Marsh
7/2/2009	1:30 PM	Marbled/ larval	*Ambystoma opacum*	52.5	29.6	1.2	MT	35.9445/ -84.3456	Hembree Marsh
7/2/2009	1:30 PM	Marbled/ larval	*Ambystoma opacum*	49.3	27.4	1.1	MT	35.9445/ -84.3456	Hembree Marsh
7/2/2009	1:30 PM	Marbled/ larval	*Ambystoma opacum*	50.03	29.4	0.9	MT	35.9445/ -84.3456	Hembree Marsh
7/2/2009	1:30 PM	Marbled/ larval	*Ambystoma opacum*	51.4	26.6	1.4	MT	35.9445/ -84.3456	Hembree Marsh
7/2/2009	1:30 PM	Red-spotted newt	*N. viridescens viridescens*				MT	35.9445/ -84.3456	Hembree Marsh
7/6/2009	9:30 AM	Northern brown snake	*Storeria dekayi dekayi*	228.6	177.8	4.6	TIN	35.980686 / 84.211110	Solway/ Lynard Skynard pond
7/6/2009	12:30 PM	Ringneck snake	*Diadophis punctatus edwardsii*	285.75	215.9	4.6	CB	35.9537/-84.2847	Bearden Creek
7/6/2009	1:30PM	Pickerel frog	*Rana palustris*	51.5		15.6	VES	35.9537/-84.2847	Bearden Creek
7/6/2009	1:30 PM	Northern dusky	*D. fuscus fuscus*	45.8	24.5	0.4	VES	35.9537/-84.2847	Bearden Creek
7/6/2009	1:30 PM	Two lined salamander	*Eurycea cirrigera*	58.6	30.5	0.8	VES	35.9537/-84.2847	Bearden Creek
7/7/2009	3:15 PM	Ringneck snake	*Diadophis punctatus edwardsii*	304.8	234.95	6.9	CB	35.9445/ -84.3456	Hembree Marsh
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	75.55	34.05	0.09	VES	35.9640/ -84.3490	North HW Cove/Natural Area

Table D-3 (continued)

Date	Time	Species	Scientific name	Total	SVL	Wt.	Method[a]	Lat./Long.	Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	79.2	35.1	1.6	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	72.9	33	1.2	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	57.4	29.5	1.25	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	33.2	18.6	0.2	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	30.4	15.3	0.2	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	28.2	19.7	0.2	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	39.05	20.2	0.4	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	28.9	17.2	0.3	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Desmognathus	*Desmognathus*	38.5	19.3	0.3	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	78.7	39.1	1.7	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	90.4	43.9	3.8	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	10:30 AM	Spotted dusky	*D. conanti*	108.1	50.4	3.6	VES	35.9640/ -84.3490	North HW Cove/Natural Area
7/8/2009	12:00 PM	Spotted salamander	*Ambystoma maculatum*	40.5	22.4	0.6	VES	35.954018 / 84.382447	Amphibian Site 5
7/8/2009	12:00 PM		*Eurycea*	39.9	20.7	0.5	VES	35.954018 / 84.382447	Amphibian Site 5
7/9/2009	10:30 AM		*Desmognathus spp.*	46.7	23.4	0.1	VES	35.9537/-84.2847	Bearden Creek
7/9/2009	10:30 AM		*Desmognathus spp.*	35.8	21.5	0.2	VES	35.9537/-84.2847	Bearden Creek
7/9/2009	10:30 AM	Spotted dusky	*D. conanti*	45.2	22.7	0.1	VES	35.9537/-84.2847	Bearden Creek
7/9/2009	10:3 AM	Spotted dusky	*D. conanti*	59.4	26.1	1.1	VES	35.9537/-84.2847	Bearden Creek
7/9/2009	10:30 AM	Spotted dusky	*D. conanti*	89.9	45.4	3.2	VES	35.9537/-84.2847	Bearden Creek
7/9/2009	10:30 AM	Spotted dusky	*D. conanti*	74.6	40.02	2.2	VES	35.9537/-84.2847	Bearden Creek
7/9/2009	10:30 AM	Northern dusky	*D. fuscus*	110.2	49.2	4.1	VES	35.9537/-84.2847	Bearden Creek
7/9/2009	10:30 AM	Spotted dusky	*D. conanti*	77.5	34.9	1	VES	35.9537/-84.2847	Bearden Creek
7/9/2009	10:30 AM	Spotted dusky	*Desmognathus spp.*	27.9	13.3	0.1	VES	35.9537/-84.2847	Bearden Creek
7/9/2009	2:00 PM	Spotted dusky	*D. conanti*	43.9	18.8	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	2:00 PM	Spotted dusky	*D. conanti*	31	16.9	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	2:00 PM	Spotted dusky	*D. conanti*	41.8	20.5	0.1	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	2:00 PM	Spotted dusky	*D. conanti*	38.2	29.3	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	2:00 PM	Northern dusky	*D. fuscus*	37.8	27.6	1	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	2:00 PM	Spotted dusky	*D. conanti*	90.01	38.4	2.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	2:00 PM	Spotted dusky	*D. conanti*	76.1	32.6	1.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Spotted dusky	*D. conanti*	30.01	17.3	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Spotted dusky	*D. conanti*	41	21.3	0.1	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Northern dusky	*D. fuscus*	99.1	35.6	2.6	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Spotted dusky	*D. conanti*	37.1	19.2	0.1	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Spotted dusky	*D. conanti*	37.3	17.05	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Spotted dusky	*D. conanti*	36.6	18.9	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Northern red	*P. ruber*	49.5	29.3	1.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Northern dusky	*D. fuscus*	60.05	31.6	1	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Spotted dusky	*D. conanti*	30.05	16.7	0.4	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Spotted dusky	*D. conanti*	36.4	21.8	0.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Northern dusky	*D. fuscus*	76.1	31.9	1	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Northern dusky	*D. fuscus*	58.7	29.2	1	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Spotted dusky	*D. conanti*	63.5	32.1	1.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/9/2009	3:00 PM	Spotted dusky	*D. conanti*	67.4	30.05	1.2	VES	35.9640/ -84.3490	Mesophytic Forest
7/14/2009	10:00 AM	Four toed salamander	*Hemidactylium scutatum*	78.2	30.06	1.4	VES	35.954181/84.302790	SNS
7/17/2009	10:00 AM	Cope's gray treefrog					VES	35.954181/84.302790	SNS
7/17/2009	11:00 AM	Cumberland slider	*Trachemys scripta troostii*			1620	HN	35.9160/84.40067	Beaver Ponds ETTP
7/17/2009	11:30 AM	Snapping turtle	*Chelydra serpentina*			22680	HN	35.9160/84.40067	Beaver Ponds ETTP

Table D-3 (continued)

Date	Time	Species	Scientific name	Total	SVL	Wt.	Method[a]	Lat./Long.	Area
7/17/2009	11:30 AM	Snapping turtle	*Chelydra serpentina*			9071.8	HN	35.9160/84.40067	Beaver Ponds ETTP
7/17/2009	11:30 AM	Painted turtle	*Chrysemys picta*				HN	35.9160/84.40067	Beaver Ponds ETTP
7/17/2009	11:30 AM	Cumberland slider	*Trachemys scripta troostii*				HN	35.9160/84.40067	Beaver Ponds ETTP

[a]Abbrevations:
CO: cover object
DN: dip net
HN: hoop net
MT: minnow trap
PF: pitfall trap
VES: visual encounter survey

APPENDIX E.

CLINCH RIVER ENVIRONMENTAL STUDIES ORGANIZATION (CRESO) RESULTS

Table E.1 Solway and Freels Bend turtle inventory/monitoring summary, 2007–2008

Captures		*n*		Length (cm)						Weight (g)				
				Mean			Range			Mean			Range	
Total	Individual	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Male	Female
Painted turtle[a]														
72	22	12	10	12.1	11.2	13.2	9.6–14.6			369.3	234.2	369.3	158–381	300–430
Cumberland slider[a]														
50	21	10	10	18.57	16.7	20.5	14–22			1,080	940	1,468	501–1,417	1,097–1,800
Common snapping turtle[b]														
31	12	7	5	31.3	35	26.8	24–38	32–38	24–29	7,929	10,079	4,920	6,790–12,200	3,530–5,990
Common musk turtle[b]														
12	10	9	3	10.7	10	11	9.9–11.5			169	175	155	135–195	147–166

[a]Plastron length.
[b]Carapace length.

Table E.2 Solway and Freels Bend turtle inventory/monitoring summary, 2009

Captures		*n*		Length (cm)						Weight (g)				
				Mean			Range			Mean			Range	
Total	Individual	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Male	Female
Painted turtle[a]														
99		44	50	12.19	11.41	13.03	9.6–14.6			309.37	246.73	371.48	158–392	287–600
Cumberland slider[a]														
65		26	38	18.27	15.71	20.38	5.2–22.4			1,199.92	790.81	1,506.75	34–1,417	375–1.955
Common snapping turtle[b]														
46		33	4	30.41	30.99	26.7	24.2–37.5	24.2–37.4	24.2– 29.1	6,749.3	7,399.6	3,680.99	3.96–12,900	3.96–5,990
Common musk turtle[b]														
14		10	4	10.2	10.1	6.97	7.4–11.5			152.6	148.7	162.5	64–195.1	147–185

[a]Plastron length.
[b]Carapace length.

APPENDIX F.

REPTILES AND AMPHIBIANS OF THE OAK RIDGE RESERVATION

APPENDIX F. REPTILES AND AMPHIBIANS OF THE OAK RIDGE RESERVATION

Amphibians and Reptiles of the Oak Ridge Reservation [a,b]

Family	Scientific Name	Common Name
	AMPHIBIANS: ORDER Caudata	
Ambystomatidae	*Ambystoma maculatum*	Spotted salamander
	Ambystoma opacum	Marbled salamander
	Ambystoma tigrinum tigrinum	Eastern tiger salamander
Cryptobranchidae	*Cryptobranchus alleganiensis*	Hellbender
Plethodontidae	*Aneides aeneus*	Green salamander
	Desmognathus fuscus	Dusky salamander, Northern dusky salamander
	Desmognathus conanti	Spotted dusky salamander
	Eurycea cirrigera	Southern two-lined salamander, Two-lined salamander
	Eurycea longicauda	Long-tailed salamander
	Eurycea lucifuga	Cave salamander
	Gyrinophilus porphyriticus	Spring salamander
	Hemidactylium scutatum	Four-toed salamander
	Plethodon cinereus	Eastern red-backed salamander, Red-backed salamander, Redback salamander
	Plethodon glutinosus	Northern slimy salamander, Slimy salamander
	Pseudotriton montanus	Mud salamander
	Pseudotriton ruber ruber	Northern red salamander
Salamandridae	*Notophthalmus viridescens viridescens*	Red-spotted newt
	AMPHIBIANS: ORDER Anura	
Bufonidae	*Bufo americanus americanus*	Eastern American toad
	Bufo fowleri	Fowler's toad
Hylidae	*Acris crepitans crepitans*	Eastern cricket frog, Northern cricket frog
	Hyla versicolor	Gray treefrog
	Pseudacris crucifer crucifer	Northern spring peeper
	Pseudacris feriarum feriarum	Upland chorus frog
Microhylidae	*Gastrophryne carolinensis*	Eastern narrow-mouthed toad
Ranidae	*Rana catesbeiana*	American bullfrog, Bullfrog
	Rana clamitans melanota	Green frog, Northern green frog
	Rana palustris	Pickerel frog
	Rana pipiens	Northern leopard frog
	Rana sphenocephala	Southern leopard frog
	Rana sylvatica	Wood frog
Scaphiopodidae	*Scaphiopus holbrookii*	Eastern spadefoot

Amphibians and Reptiles of the Oak Ridge Reservation [1, 2] (Continued)

Family	Scientific Name	Common Name
	REPTILES: ORDER Testudines	
Chelydridae	*Chelydra serpentina serpentina*	Common snapping turtle
Emydidae	*Chrysemys picta*	Painted turtle
	Graptemys geographica	Common map turtle
	Graptemys ouachitensis	Ouachita map turtle
	Graptemys pseudogeographica	False map turtle
	Pseudemys concinna concinna	Eastern river cooter
	Terrapene carolina carolina	Eastern box turtle
	Trachemys scripta elegans	Red-eared slider
	Trachemys scripta troostii	Cumberland slider
Kinosternidae	*Sternotherus minor*	Loggerhead musk turtle
	Sternotherus odoratus	Common musk turtle
Trionychidae	*Apalone spinifera spinifera*	Eastern spiny softshell turtle
	REPTILES: ORDER Squamata	
Colubridae	*Carphophis amoenus amoenus*	Eastern worm snake
	Cemophora coccinea	Scarlet snake
	Coluber constrictor	Black Racer, Racer
	Diadophis punctatus edwardsii	Northern ringneck snake
	Elaphe guttata guttata	Corn snake
	Elaphe obsoleta	Rat snake, Texas rat snake
	Heterodon platirhinos	Eastern hog-nosed snake
	Lampropeltis calligaster rhombomaculata	Mole kingsnake
	Lampropeltis getula nigra	Black kingsnake
	Lampropeltis triangulum triangulum	Eastern milk snake
	Nerodia sipedon	Northern watersnake
	Opheodrys aestivus	Rough green snake, Rough greensnake
	Regina septemvittata	Queen snake, Queensnake
	Storeria dekayi	Brown snake, Dekay's brown snake, Dekay's brownsnake
	Storeria occipitomaculata occipitomaculata	Northern red-bellied snake
	Thamnophis sirtalis sirtalis	Common garter snake
	Virginia valeriae valeriae	Eastern earth snake
Phrynosomatidae	*Sceloporus undulatus hyacinthinus*	Northern fence lizard
Scincidae	*Eumeces fasciatus*	Five-lined skink
	Eumeces inexpectatus	Southeastern five-lined skink
	Eumeces laticeps	Broad-headed skink
	Scincella lateralis	Ground skink, Little brown skink
Teiidae	*Cnemidophorus sexlineatus*	Six-lined racerunner
Viperidae	*Agkistrodon contortrix mokasen*	Northern copperhead

[a] Updated October 2008
[b] Taxonomic source: Integrated Taxonomic Information System, http://www.itis.gov

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