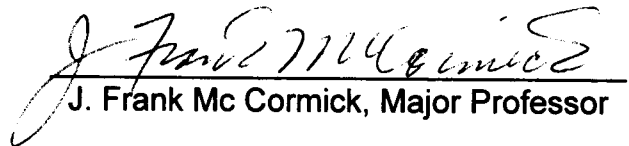
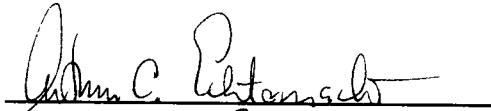
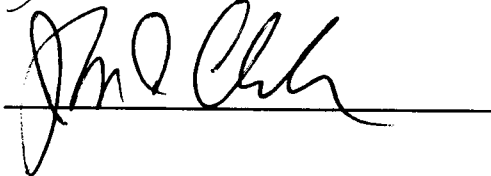


To the Graduate Council:

I am submitting herewith a thesis by Cynthia Lefever Gabrielsen entitled "Preliminary Assessment of Current Threatened and Endangered Vertebrates on the Oak Ridge Reservation." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Ecology.


J. Frank Mc Cormick, Major Professor

We have read this thesis
and recommend its acceptance:

Accepted for the council:


Associate Vice Chancellor and
Dean of The Graduate School

**PRELIMINARY ASSESSMENT OF CURRENT
THREATENED AND ENDANGERED VERTEBRATES ON
THE OAK RIDGE RESERVATION**

**A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville**

**Cynthia Lefever Gabrielsen
May 1997**

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DEDICATION

I dedicate this work to the glory and honor of my Lord and Savior, Jesus Christ. His love sustained me and He carried me through when I was unable to continue.

My family is a source of love and strength for me. My parents, Mary and Phares Lefever, knew education was essential. Love and encouragement from them sparked a thirst for knowledge in me. They taught me that with hard work and perseverance, anything was possible. They made it possible for me to pursue a college education. I thank them for their love, patience, guidance and support. I also greatly appreciate the love and encouragement always given by my daughter, Page, and her husband, Todd.

Kory, my beloved husband, is the reason this thesis is a reality. He is my best friend, closest confidant and my life partner. He is always there to encourage and support me. His love, patience, understanding and respect give me the courage to take the risks necessary to fulfill my dreams. When everything falls apart and seems broken, he is the glue that patiently puts it all back together. Thank you, Kory. I love you. I could not and would not have completed this thesis without you. I share this degree with you.

I am blessed with a wonderful heavenly Father and earthly family and I dedicate my thesis to them.

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CHAPTER I

INTRODUCTION

A number of environmental regulations mandated the need for identification and protection of diminishing wildlife resources. For example the National Environmental Policy Act of 1970 (NEPA) established the need for identifying and preserving our vanishing natural resources. Several laws emphasized the need for protection of wildlife species. Notable statutes, the Fish and Wildlife Coordination Act of 1934 (amended 1965) and the Endangered Species Act of 1973 were enacted. The Endangered Species Act identified certain species, which without careful management were in danger of becoming extinct. In addition to Federal laws, State laws, like the Tennessee Non-game and Endangered or Threatened Wildlife Species Conservation Act of 1974, that include not only federally listed species but also species of special concern within the state, were passed. The State laws of Tennessee classified plant and animal species as threatened, endangered or in-need-of-management. State laws recognized the necessity for careful habitat management to protect these animals.

On December 19, 1994, the Department of Energy (DOE) adopted a policy that land management was to be based upon principles of ecosystem

management and sustainable development. To accomplish this management approach, an assessment of the threatened and endangered species of the Oak Ridge Reservation was necessary. The objectives of this study were to design, implement, and test procedures and methods for surveying threatened and endangered vertebrate species and, to provide a preliminary assessment of the current status of threatened and endangered vertebrates species on the Oak Ridge Reservation. Response to this policy revision by the Oak Ridge Reservation was demonstrated by surveys of threatened and endangered plant (Awl et al., 1996) and animal (Mitchell et al., 1996) species and their habitats.

This study had added significance because it took place on lands under DOE stewardship. For the past half-century the DOE was the steward of more than 2,400,000 acres of land at 30 laboratories throughout North America (DOE, 1994). Most of this land was passively managed and had highly protected buffer zones located between production facilities and public lands. Consequently much of this land included higher quality habitats than could be found in less well-protected public or private lands. For example, six sites were recognized as Tennessee State Natural Areas (Pounds et al., 1993) in the 15,000 acre Oak Ridge Reservation, which is 70% forested. These sites included cedar barrens, river bluffs and wetlands, critical habitats for many threatened and endangered species. The Oak Ridge Reservation has served as a refugium of species and a source of species recruitment into surrounding lands (Mann et al., 1995).

Identifying threatened and endangered vertebrate species that reside on, use or migrate through the Oak Ridge Reservation was necessary to comply with regulatory mandates to protect these species. Identification of threatened and endangered species was and continues to be of fundamental importance to the National Environmental Research Park on the Oak Ridge Reservation, and to the Southern Appalachian Man and Biosphere (SAMAB) reserve, of which Oak Ridge Reservation is a component. Previous animal studies provided a historical index to the Oak Ridge Reservation fauna. Data also provided insight for identifying threatened and endangered animal species that could occur on the Oak Ridge Reservation (Howell & Dunaway 1958, Howell 1958, Johnson 1964, Kroodsma 1987, Ryon & Loar 1988, Klein 1989, Kroodsma 1993, Kroodsma, R. L., Rosensteel, B. A., Ryon, M. G., and Smith, J. G., 1993). Some areas surveyed in earlier studies were substantially altered. New surveys were necessary to identify threatened and endangered animals currently using the Oak Ridge Reservation. Without this information, valuable habitats could unknowingly be irreparably damaged and or lost resulting in the inadvertent extirpation of some endemic threatened or endangered species.

CHAPTER II

IDENTIFICATION OF THREATENED & ENDANGERED VERTEBRATE SPECIES LIKELY TO PRESENTLY OCCUR ON THE OAK RIDGE RESERVATION

A list of eleven (Table 1) threatened and endangered species which currently might occur on the Oak Ridge Reservation was derived from comparisons of the following sources of information:

- A) Lists of all reptile, amphibian, bird, and mammalian species previously observed on the Oak Ridge Reservation (Appendix A).
- B) List of threatened and endangered wildlife species previously determined to occur or possibly occur on the Oak Ridge Reservation (Appendix B).
- C) Updated summary of Tennessee threatened and endangered wildlife species (Appendix C).
- D) Updated summary of Tennessee wildlife species in need of management (Appendix D).

The list of eleven threatened and endangered vertebrate species which might be expected to occur on Oak Ridge Reservation is considerably shorter than lists prior to the 1994 revision (Appendix B). Only two endangered species are likely to presently occur on the Oak Ridge Reservation, both are bats. Only seven threatened species are likely to occur on the Oak Ridge Reservation;

Table 1. Threatened and Endangered Vertebrate Species Which Might Presently Occur on the Oak Ridge Reservation and Their Preferred Habitats

Common Name	Scientific Name	Likely Location/habitat	Status
<u>Reptiles</u>			
Northern Pine Snake	<i>Pituophis melanoleucus melanoleucus</i>	Possibly in dry well drained mountain ridges, scrub pine secretive burrowing	Threatened
<u>Amphibians</u>			
Tennessee Cave Salamander	<i>Gyrinophilus pallescens</i>	Possibly in streams pools, limestone caves.	Threatened
<u>Birds</u>			
Golden Eagle	<i>Aquila chrysaetos</i>	Widely dispersed, Possibly in winter	Threatened
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Observed Melton Hill Lake and Clinch River, Likely	Threatened
Osprey	<i>Pandion haliaetus</i>	Observed Melton Hill Lake and Clinch River nest sites, Likely	Threatened
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Meadows, grassy fields, Likely	Threatened
Lark Sparrow	<i>Chondestes grammacus</i>	Meadows and fields, Unlikely	Threatened
<u>Mammals</u>			
Indiana Bat	<i>Myotis sodalis</i>	East fork Poplar Creek, riparian forest, observed in upland forest, Possibly in summer	Endangered
Gray Bat	<i>Myotis grisescens</i>	Caves, Possibly Clinch River	Endangered
River Otter	<i>Lutra canadensis</i>	Possibly streams, rivers and lakes	Threatened
Red Wolf	<i>Canis rufus</i>	Forests, Unlikely	

No threatened and endangered fish species are likely to occur on the Oak Ridge Reservation

including four species of birds, the River Otter, Northern Pine Snake, and the Tennessee Cave Salamander. By comparison, prior to the 1994 revision (Appendices C and D) 38 vertebrate species were listed as possibly occurring on the Oak Ridge Reservation (Appendix B). These included 15 birds, 14 mammals, eight amphibians, and reptiles, and one fish species. Reference information for species of special interest is provided in the bibliography.

CHAPTER III

IDENTIFICATION OF SITES FOR FIELD SURVEYS OF THREATENED AND ENDANGERED VERTEBRATE SPECIES ON THE OAK RIDGE RESERVATION

Review of locations and habitats most likely to include threatened and endangered vertebrate species (Table 1) revealed that monitoring should focus upon lake, river and stream sites. Other important habitats included caves, meadows, open fields, and scrub pine forests. Not surprisingly, preferred habitats of threatened and endangered species are among those most in jeopardy in the region.

A total of 14 sites were selected for monitoring of threatened and endangered species (Fig. 1). Survey sites included as many preferred habitats as could be located on the Oak Ridge Reservation (Table 2). Most sites included more than one habitat type. Often, the dominant habitat type was bordered by others. The fourteen sites included most of the habitat types which occur on the Oak Ridge Reservation.

FIGURE 1: Map of Site Locations Monitored for Threatened and Endangered Vertebrate Species, Oak Ridge Reservation, Spring-Summer, 1994.

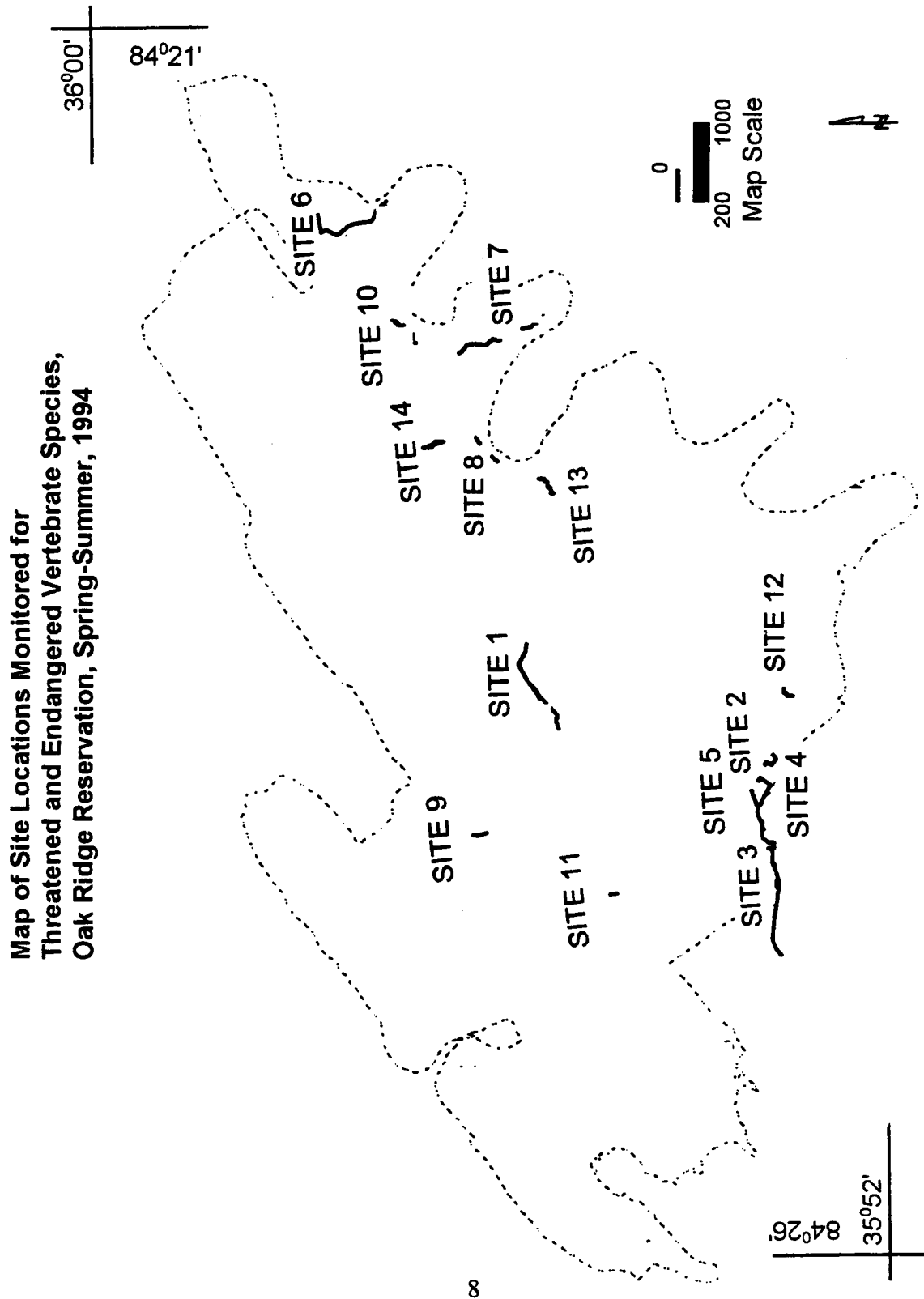


Table 2: Habitat Types Included in Monitoring Sites on the Oak Ridge Reservation

Site#	Lake or River	Streams	Marsh	Cave	Open Fields Grasslands	Deciduous Forest	Pine-Hardwood Forest	Pine Forest
1					X		X	X
2					X		X	X
3	X							
4	X				X		X	
5			X				X	
6					X			
7	X				X	X	X	
8	X					X		
9		X				X		
10	X				X	X		
11		X				X		
12				X				
13	X	X				X		
14		X				X		

SITE DESCRIPTIONS

Site 1. *Gasline Road. Contains grass-shrub, pine and deciduous forest habitats.*

Gasline Road is a 20 m wide stretch of grass and shrub within a mixed pine and hardwood forest. The area is dominated by pine trees to the south and deciduous trees to the north. Canopy trees stand approximately 10 to 15 meters high.

Site 2. *An open field on the road to Building 0855.*

The area is an open field consisting of grasses, blackberry (*Rubus argutus*), and small trees that are one to two meters in height. It is bordered by a pine and hardwood forest that stands 20 to 30 meters. There is considerable human activity in this area (Table 3).

Site 3. *Jones Island Road bordered by the Clinch River.*

The area has a deciduous forest to the North and is bordered by the Clinch River on the South. The trees are approximately 20 to 30 meters in height. There is diverse ground cover throughout the sites.

Site 4. *An open field near Building 0800.*

This site is an old field surrounded by a mixed pine and hardwood forest. The trees stand approximately 20 to 30 meters high.

Table 3: List of Habitat Analysis Plants from the Oak Ridge Reservation, Spring-Summer, 1994

<u>GENUS SPECIES</u>	<u>COMMON NAME</u>	<u>FAMILY</u>
<i>Acer negundo</i>	Boxelder	Aceraceae
<i>Acer rubrum</i>	Red Maple	Aceraceae
<i>Alnus serrulata</i>	Common Alder	Betulaceae
<i>Ambrosia artemisifolia</i>	Ragweed	Asteraceae
<i>Ambrosia trifida</i>	Ragweed	Asteraceae
<i>Asimina triloba</i>	Paw-Paw	Annonaceae
<i>Bidens frondosa</i>	Beggar's Tick	Asteraceae
<i>Carex unidentified</i>	Cyperaceae unknown species	Cyperaceae
<i>Carya</i> (unknown species)	Hickory	Juglandaceae
<i>Carya cordiformis</i>	Bitternut Hickory	Juglandaceae
<i>Celtis occidentalis</i>	Hackberry	Ulmaceae
<i>Cercis canadensis</i>	Redbud	Fabaceae
<i>Chimaphila maculata</i>	Pipsissewa	Ericaceae
<i>Cornus florida</i>	Dogwood	Cornaceae
<i>Diodia virginiana</i>	Virginia Button Bush	Rubiaceae
<i>Diodia virginiana</i>	Sweet Yellow Clover	Fabaceae
<i>Euonymus americanus</i>	Strawberry Bush	Celastraceae
<i>Fagus grandifolia</i>	American Beech	Fagaceae
<i>Festuca pratensis</i>	Fescue	Poaceae
<i>Festuca elatior v. arundinacea</i>	Fescue	Poaceae
<i>Festuca pratensis</i>	Fescue	Poaceae
<i>Festuca elatior</i>	Fescue	Poaceae
<i>Fragaria virginiana</i>	Wild Strawberry	Rosaceae
<i>Fraxinus pennsylvanica</i>	Green Ash	Oleaceae
<i>Hexastylis arifolia</i>	Little Brown Jugs	Aristolochiaceae
<i>Juglans niger</i>	Black Walnut	Juglandaceae
<i>Juglans cinerea</i>	Butternut	Juglandaceae
<i>Juniperus Virginiana</i>	Red Cedar	Cupressaceae
<i>Kummerowia stipulacea</i>	Clover	Fabaceae
<i>Kummerowia striata</i>	Lespedeza	Fabaceae
<i>Ligustrum sinense</i>	Hedge Privet	Oleaceae
<i>Lindera benzoin</i>	Spicebush	Lauraceae
<i>Liquidambar styraciflua</i>	Sweetgum	Hamamelidaceae
<i>Liriodendron tulipifera</i>	Yellow Poplar (Tulip tree)	Magnoliaceae
<i>Lonicera prolifera</i>	Honeysuckle (bush)	Caprifoliaceae
<i>Lonicera japonica</i>	Honeysuckle (vine)	Caprifoliaceae
<i>Melilotus officinalis</i>	Sweet Yellow Clover	Fabaceae
<i>Microstegium vimineum</i>	Nepal Grass	Poaceae
<i>Morus rubra</i>	Mulberry	Moraceae
<i>Ostrya virginiana</i>	Ironweed	Betulaceae
<i>Oxydendrum arboreum</i>	Sourwood	Ericaceae
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	Vitaceae
<i>Pinus taeda</i>	Loblolly Pine	Pinaceae
<i>Pinus virginiana</i>	Virginia Pine	Pinaceae
<i>Pinus echinata</i>	Short-leaf Pine	Pinaceae

Site 5. *Muskrat Marsh, bordering the Clinch River.*

This is a marshy area that borders the Clinch River. It is surrounded by a mixed pine and hardwood forest that stands approximately 20 to 30 meters high. The understory consists of spicebush (*Lindera benzoin*), hedge privet (*Ligustrum sinense*), greenbrier (*Smilax rotundifolia*), and poison ivy (*Rhus radicans*) (Table 3). The water levels fluctuate frequently in this area because the water level of the Clinch River is regulated by TVA. It is probable that this large fluctuation in water levels affects animal activity.

Site 6. *Freel's Bend, grassland and shrub habitat.*

This is open grassland with brush and small trees.

Site 7. *Bull Bluff, old fields and deciduous forest along the Clinch River.*

The Bull Bluff area consists of a mixed pine and hardwood forest that borders old field areas. This is a grassy field area with patches of blackberry that is bordered to the Southeast by the Clinch River (Table 3). A deciduous forest that stands 20 to 30 meters high is also included

Site 8. *Shepherd Cemetery, deciduous forest adjacent to Melton Hill Lake.*

The area is a deciduous forest bordered to the Southeast by Melton Hill Lake. The trees stand approximately 20 to 30 meters and ground vegetation

includes poison ivy, Virginia creeper (*Parthenocissus quinquefolia*), and Greenbrier (Table 3).

Site 9. *McNew Hollow, forest and stream habitats.*

McNew Hollow a deciduous forest area with a permanent small stream. The canopy is approximately 20 to 30 meters high with sparse undergrowth of greenbrier and poison ivy (Table 3).

Site 10. *Deer Check Station, open grassland and deciduous forest habitats adjacent to a Clinch River embayment.*

Sparse patches of blackberry (Table 3) are interspersed in this grassland area. The field is bordered by deciduous trees that stand 20 to 30 meters high. A small inlet of water from the Clinch River, called McCoy Branch, is included in the site.

Site 11. *Bear Creek, deciduous forest.*

Bear Creek is surrounded by a deciduous forest, with a canopy 20 to 30 meters high.

Site 12. *Flashlight Heaven Cave*

This cave is just outside the fence line along highway 95. A deciduous forest with a canopy of 10 to 20 meters surrounds the area. The immediate site is a densely covered grassy area that contains poison ivy and periwinkle (*Vinca minor*), (Table 3).

Site 13. *Bear Creek, at its confluence with the Clinch River.*

Off the Clinch River is a small inlet of water called Bear Creek. It is surrounded by a hardwood forest.

Site 14. *Walker Branch, deciduous forest and stream.*

The Walker Branch site is a hardwood forest with trees standing 20 to 30 meters. A small creek runs through the site.

CHAPTER IV

HABITAT DESCRIPTION OF SURVEY SITES

Methods

Physical and biotic characteristics of survey sites were analyzed in order to relate species presence to habitat characteristics. Physical characteristics included latitude, longitude, slope, and aspect. Topography was described and proximity to water and anthropogenic disturbance was recorded. Biotic characteristics included presence of canopy and ground level plant species, canopy height, percent cover, and litter depth. Percent canopy cover was estimated using a densiometer. This and other methods employed were described in Cox (1990).

The point-intercept method (Cox, 1990) was used to determine the relative abundance of vascular species in each habitat. A minimum of three 50 meter transects were surveyed in each site. If sites included more than one habitat type, three 50 meter transects were surveyed in each habitat type. Data were collected at 10 meter intervals along each transect. Vascular plants which intercepted transects were identified and recorded according to their occurrence in either the canopy, the subcanopy, or ground cover strata. Sample field data sheets are presented in Appendix F.

Data Analysis

The number of individuals of each species was divided by the sum of all the individuals of all species to obtain an estimate of species' relative abundance in each stratum.

Results

Habitat analysis is provided for five of the sampling sites in Appendix F. Relative abundance of vascular species in each stratum has been accumulated and presented as a "vegetation profile". Vegetation profiles, accompany vegetation descriptions for sample sites 4, 7, 9, 10, and 12. Time constraints prohibited the collection of habitat data for all sites sampled.

Habitat analysis provided a quick "picture" of the habitats sampled. The data collected provided an easy way to compare different habitats with each other based upon the relative abundance of each animal species' preferred forage plants.

CHAPTER V

SURVEY OF THREATENED AND ENDANGERED VERTEBRATE SPECIES

Methods

Survey Design for Threatened and Endangered Amphibians and Reptile Species

Amphibian and reptile species were surveyed in several different ways. Turtles were trapped in hoop-net traps baited with cat food, watermelon rinds, sardines or other odorous materials. The trap consisted of three parallel 1.1m metal hoops connected together by netting with 3.8 cm holes. Turtles as well as some fish species swam into the trap and were unable to escape. Floats were placed in the traps to provide air pockets for turtles. Two to three hoop-net traps were opened and baited at each location. Small rivers, inlets, and somewhat protected coves with slow moving water were the major waterways sampled for turtles. Most of the ten sites sampled for turtles were adjacent to or in the vicinity of the sample sites used for the other species. However, several sites were only used for turtle trapping.

These traps were opened and baited at the first of the week, checked daily (early morning, afternoon, and early evening) and closed over the weekends. Some pre-baiting was done in several of the areas. Species trapped were identified, marked for recapture identification, and then released.

Photographs were taken to document species of interest and to aid in the identification of questionable captures. Unidentifiable species were identified later by comparing the photograph to photographs of identified species. Data sheets included all species observed and information about the location, time of day, and weather conditions (Appendix E). Once the Cumberland Slider, *Trachemys scripta troostii*, was captured and positively identified by the Tennessee Aquarium, turtle sampling ceased.

Artificial cover made from wooden boards was placed at selected sample locations. This is a "passive" trapping method relying on animal preference for food and habitat and requiring minimal human participation once established. At least 10 boards were placed in a line at each of the sampling areas. Normally, the boards were placed in transition zones and two lines of boards were established on either side of a natural break between the areas in transition. The boards were placed at roughly 10 meter intervals. At least 237 boards were placed in 13 of the sample sites. Boards were commonly placed in areas where drift fences and pitfall traps were located. When the boards were placed in conjunction with a mammal trapping transect line, one board was placed on either side of the transect line at the 10 meter trap placement intervals. Twenty boards were usually placed with each trap line. Each board was placed between 1.5 meters to 3.0 meters away from the center of the transect line. This placement lessened the traffic around and the disturbance to the boards. Each board measuring approximately one square meter (9 square feet) was numbered

for identification (Karns, 1986). The boards were left undisturbed for at least a month to entice animals to use the boards for resting, nesting, and or foraging. These boards which provided shelter for reptiles, amphibians, and small mammals, were placed in areas likely to have snakes (like the Northern Pine Snake), lizards, skinks, salamanders, shrews, moles and voles. Once placed, the boards were checked at weekly or biweekly intervals for reptiles, amphibians and mammals (Heyer, 1994).

Additionally, drift fences with pitfall traps were located at 7 of the 14 selected sample sites. Drift fences were constructed from garden netting, cut into 30 cm strips. Each strip was from 30 to 100 m long and had pitfall traps (20 liter buckets, such as cafeteria pickle and five gallon paint buckets were used) located at approximately 3 meter intervals. Pitfall traps were located on both sides of the drift fence and holes were excavated to accommodate each trap so the trap opening was flush with ground level.

Care had to be taken to minimize the death of captured animals because of the protection afforded by law to the protected species. Measures taken to minimize the stress on and the possible death of protected species included drilling holes through the bottoms of the pitfall traps so rain or other liquids would pass through without significant accumulation. Additionally, nesting materials and bait, such as bugs, peanuts and grain, were placed in the bottom of the trap to entice and sustain captured animals for short periods of time. Because most of the species potentially captured by this method had very high metabolic rates,

the traps were checked at various times of the day and night (usually 2 to 3 hour intervals) to minimize possible animal death. When the area was not able to be checked every 2 to 3 hours during the day or night, the traps were covered to prevent the accidental capture and or death of animals.

Reptiles and amphibians were surveyed at critical times throughout the spring and summer of 1994 with the intention that surveys would be continued in future years.

Survey Design for Threatened and Endangered Bird Species

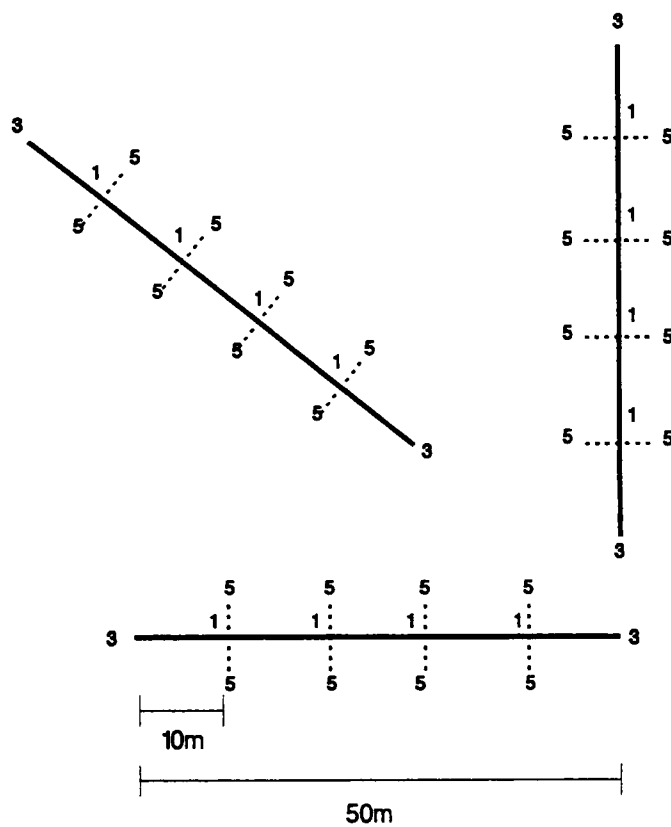
Birds were surveyed using the Emlen strip transect method. Since bird vocalizations resound for great distances, survey points were separated by 140 to 150 meters reducing redundant bird counts. At each point birds were surveyed for 15 minutes (Cox, 1990). Birds were identified by distinguishing physical characteristics, audible vocalizations (both songs and calls), body shape, sample location and specific behavioral characteristics. Usually birds were heard more often than seen. Bird identification by songs and calls was essential. Unfamiliar or unidentifiable vocalizations were audio recorded and later identified by comparing the field recording to professional audio field guide recordings. All species seen or heard within the 15 minute time intervals were identified and recorded. Photographs were taken when possible, if identification was questionable. Data sheets included the species observed and information about the location, time of day and weather conditions (Appendix G).

Surveys were conducted throughout the spring and summer of 1994 with the intention that surveys would be continued in the future.

Survey Design for Threatened and Endangered Mammalian Species

Mammals were surveyed by the placement of collapsible Sherman live traps along transect lines. Each trap was approximately 7.6 cm wide by 24 cm long. This sized trap accommodated all small mammal species expected to be captured during this survey. Fifty meters of 1.3cm thick yellow polypropylene cord knotted at 10 meter intervals was used as a physical transect line. It was easy to see and follow when checking traps at night with a flashlight in unfamiliar areas. Forestry flags were placed at each end of the line to mark the beginning and end. Mammals were surveyed by setting 50 traps per 50m transect line. A total of ten live traps were placed along either side of the transect line at 10 m intervals (M. Kennedy, pers. comm). The traps were placed near natural or manmade features used or frequented by the species of interest. These features such as downed trees, burrowing holes, or abandoned buildings were either intersected by or within 10 m of either side of the transect line. Three transect lines were placed in each area surveyed (Fig.1). Two of the three transects were positioned perpendicularly to one another while the third transect was positioned tangentially. This trap arrangement was chosen to improve trapping coverage of

**FIGURE 2: EXAMPLE OF TRANSECT LINE PLACEMENT
AND TRAP PLACEMENT**



Transect line: 

10 Meter Interval: 

Number of Live
Traps Placed: 5 or 1

the survey area to increasing capture success (M. Kennedy, pers. comm.). A total of 150 traps were set each night per area. Surveys were conducted in each area for three consecutive nights. A total of 450 trap nights per survey area per survey period was accumulated. Normally two separate sites were sampled within one sampling period.

Transect lines and closed pre-baited traps were placed at the sample site at least 48 hours prior to the initiation of trapping. Extra bait was placed around and in front of the closed traps. Bait used for trapping was a combination of raw peanuts, oats, bird seed, and extra sunflower seeds (M. Kennedy, pers. comm.). Hulls from the raw peanuts were left in the bait mixture to provide some bedding material for captured animals. Traps were baited and set in the early evening on the first day of a three day survey period. Since several listed animals, such as the shrews, possessed very high metabolic rates, the traps were checked throughout the night to minimize animal mortality.

Species trapped were identified and released. Photographs were taken to document species of interest and to aid in the identification of questionable captures. Data sheets included not only the species observed but also information about the location, time of day and weather conditions (Appendix E).

Wooden boards placed at various locations in survey sites provided shelter for small mammals as well as reptiles and amphibians (Dunaway, pers. Comm.). Boards were checked weekly or biweekly for mammals, reptiles and amphibians and the species observed were recorded. Additionally, drift fences

with pitfall traps, which were located in several survey areas, were used to trap small mammals like shrews.

Bats presented a special problem. They could not be identified while in flight so it was necessary to either locate a roosting area or trap them. Two, two line bank harp traps (Best, pers. comm., Francis, 1989) were built for the live capture and release of bats (Fig. 3). Each of the traps consisted of two frames (approximately 1.25 m wide by 1.8 m tall) that were strung with 2.7 kg test (6 pound) monofilament line. The monofilament lines were stretched taut from the top to the bottom of the frame (like a harp) and were spaced at approximately 2.5 cm intervals. These strung frames of line were positioned parallel to one another approximately 7.5 cm apart. Line spacing of the parallel frames were off-set by approximately 1.25 cm. A holding bag was positioned at the bottom of the frames to collect bats confounded by the apparatus. The collection bag was ventilated to prevent accidental asphyxiation of captured bats. Successful use of the trap depended on placement. Entrances to a roost cave or within a flyway altered to direct the flight of the bats into the trap were preferred locations (Best,

FIGURE 3: HARP TRAP DIAGRAM

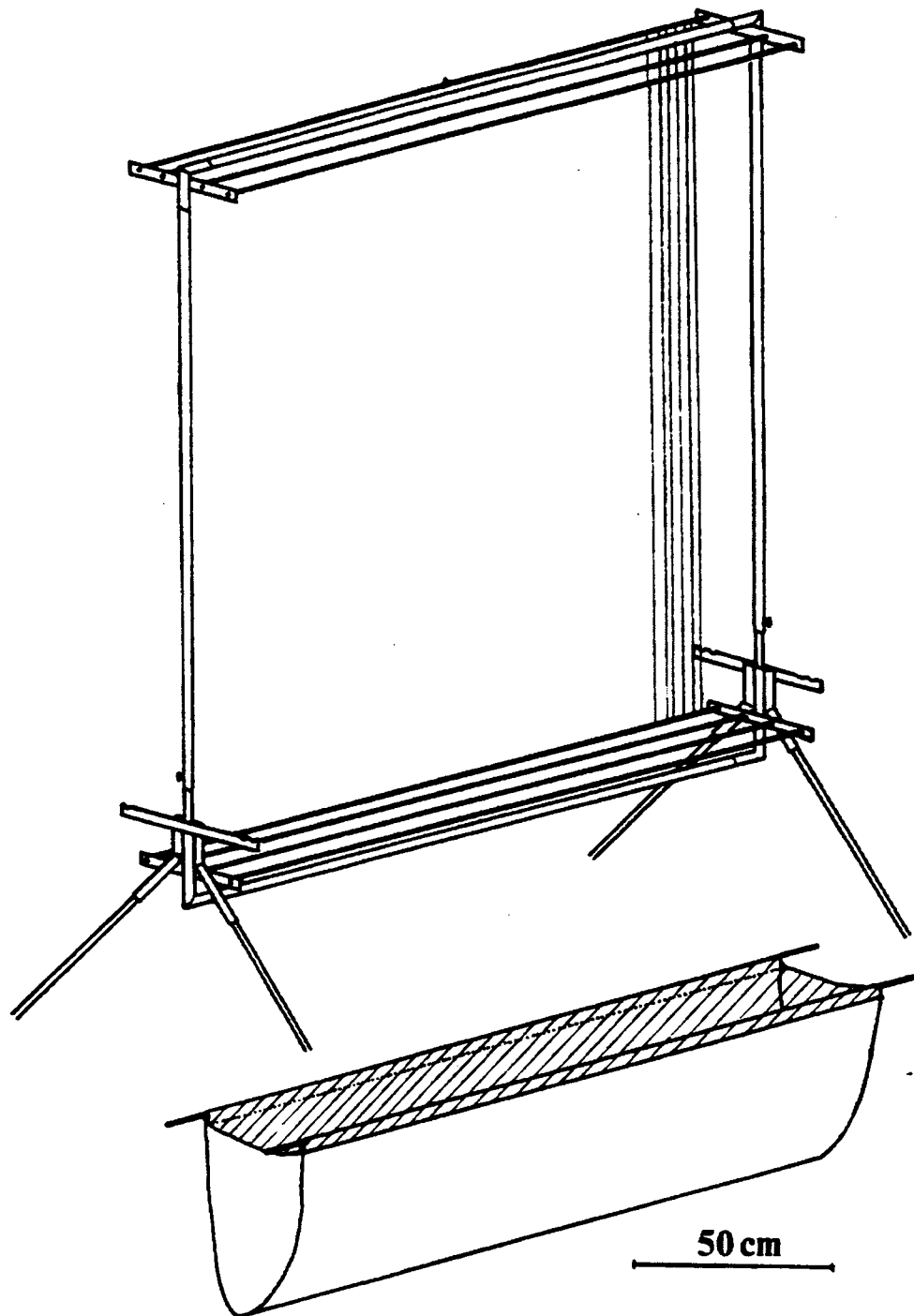


Diagram of a four-bank harp showing: a, the assembled trap; b, the capture bag. Most of the fishing lines are omitted for clarity. The hatched area on the bag indicates plastic flaps used to keep bats from escaping. In operation, the capture bag, is suspended from the notched bars at the bottom of the trap (J. Mamm.,1986).

pers. comm.). Mammals were to be surveyed at critical times throughout the spring and summer of 1994, with the intention that surveys would be continued.

Results

Species Observed on the Oak Ridge Reservation, Spring—Summer, 1994

Reptile species observed on the Oak Ridge Reservation, Spring—Summer,

1994. Eleven reptile species were observed at various sample sites. No Federally listed threatened and endangered species were observed. One species observed, the Cumberland Slider, was on the State Threatened and Endangered List prior to the 1994 revision (Table 4).

Amphibian species observed on the Oak Ridge Reservation, Spring—Summer,

1994. Nine amphibian species were observed at various sample sites. No threatened and endangered species were observed (Table 5).

Bird species sighted on the Oak Ridge Reservation, Spring—Summer, 1994.

Seventy-four avian species were observed at various survey sites (Table 6). Only two threatened and endangered species were observed, the Bald Eagle and the Osprey. Eight species were observed which were on the state threatened and endangered list prior to the 1994 revision.

Mammal species observed on the Oak Ridge Reservation, Spring—Summer,

1994. A total of twenty-three mammalian species were observed at various survey sights. (Table 7).

In summary, two threatened and endangered species were observed. Nine species were observed which were on the State Threatened and Endangered List prior to the 1994 revision.

**Table 4: Reptile Species Sighted on the Oak Ridge Reservation,
Spring—Summer, 1994**

	Common Name	Genus
1.	Snapping turtle	<i>Chelydra serpentina</i>
2.	Eastern box turtle	<i>Terrapene carolina carolina</i>
3.	Eastern painted turtle	<i>Chrysemys picta picta</i>
4.	Pond Slider	<i>Trachemys scripta</i>
5.	Cumberland slider ^a	<i>Trachemys scripta troostii</i>
6.	Red-eared slider	<i>Trachemys scripta elegans</i>
7.	Ground skink	<i>Scincella lateralis</i>
8.	Five-lined skink	<i>Eumeces fasciatus</i>
9.	Eastern worm snake	<i>Carphophis amoenus amoenus</i>
10.	Northern brown snake	<i>Storeria dekayi dekayi</i>
11.	Northern ringneck snake	<i>Diadophis punctatus</i>
12.	Northern copperhead	<i>Agkistrodon contortrix mokasen</i>
^a Listed prior to fall 1994 revision		

**Table 5: Amphibian Species Sighted on the Oak Ridge
Reservation, Spring—Summer, 1994**

	Common Name	Genus
1.	Woodland salamander	<i>Plethodon</i> unidentifiable species
2.	Slimy salamander	<i>Plethodon glutinosus glutinosus</i>
3.	Cave salamander	<i>Eurycea lucifuga</i>
4.	Eastern spadefoot toad	<i>Scaphiopus holbrookii holbrookii</i>
5.	American toad	<i>Bufo americanus</i>
6.	Gray tree frog	<i>Hyla versicolor</i>
7.	Bull frog	<i>Rana catesbeiana</i>
8.	Green frog	<i>Rana clamitans melanota</i>
9.	Southern leopard frog	<i>Rana utricularia</i>

**Table 6: Bird Species Sighted on Oak Ridge Reservation,
Spring—Summer, 1994**

	Common Name	Genus
1.	Double-crested cormorant ^a	<i>Phalacrocorax auritus</i>
2.	Black-crowned night-heron ^a	<i>Nycticorax nycticorax</i>
3.	Green-backed heron	<i>Butorides striatus</i>
4.	Great egret	<i>Casmerodius albus</i>
5.	Great blue heron	<i>Ardea herodias</i>
6.	Canada goose	<i>Branta canadensis</i>
7.	Mallard	<i>Anas platyrhynchos</i>
8.	Wood duck	<i>Aix sponsa</i>
9.	Killdeer	<i>Charadrius vociferus</i>
10.	Turkey vulture	<i>Cathartes aura</i>
11.	Black vulture ^a	<i>Coragyps atratus</i>
12.	Bald eagle	<i>Haliaeetus leucocephalus</i>
14.	Northern harrier ^a	<i>Circus cyaneus</i>
15.	Red-shouldered hawk ^a	<i>Buteo lineatus</i>
16.	Red-tailed hawk	<i>Buteo jamaicensis</i>
17.	Osprey	<i>Pandion haliaetus</i>
18.	American kestrel	<i>Falco sparverius</i>
19.	Northern bobwhite	<i>Colinus virginianus</i>
20.	Wild turkey	<i>Meleagris gallopavo</i>
21.	Mourning dove	<i>Zenaida macroura</i>
22.	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
23.	Great horned owl	<i>Bubo virginianus</i>
24.	Barred owl	<i>Strix varia</i>
25.	Common nighthawk	<i>Chordeiles minor</i>
26.	Ruby-throated hummingbird	<i>Archilochus colubris</i>
27.	Belted kingfisher	<i>Ceryle alcyon</i>
28.	Red-bellied woodpecker	<i>Melanerpes carolinus</i>
29.	Northern flicker	<i>Colaptes auratus</i>
30.	Red-headed woodpecker ^a	<i>Melanerpes erythrocephalus</i>
31.	Downy woodpecker	<i>Picoides pubescens</i>
32.	Hairy woodpecker	<i>Picoides villosus</i>
33.	Pileated woodpecker	<i>Dryocopus pileatus</i>
34.	Eastern kingbird	<i>Tyrannus tyrannus</i>
35.	Eastern phoebe	<i>Sayornis phoebe</i>
36.	Acadian flycatcher	<i>Empidonax virescens</i>
37.	Rough-winged swallow	<i>Stelgidopteryx serripennis</i>
38.	Cliff swallow	<i>Hirundo pyrrhonota</i>
39.	Barn swallow	<i>Hirundo rustica</i>

Table 6: (continued)

	Common Name	Genus
40.	Blue Jay	<i>Cyanocitta cristata</i>
41.	American crow	<i>Corvus brachyrhynchos</i>
42.	Tufted titmouse	<i>Parus bicolor</i>
43.	Carolina chickadee	<i>Parus carolinensis</i>
44.	House wren	<i>Troglodytes aedon</i>
45.	Carolina wren	<i>Thryothorus ludovicianus</i>
46.	Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
47.	Eastern bluebird	<i>Sialia sialis</i>
48.	Wood thrush	<i>Hylocichla mustelina</i>
49.	American robin	<i>Turdus migratorius</i>
50.	Northern mockingbird	<i>Mimus polyglottos</i>
51.	Brown thrasher	<i>Toxostoma rufum</i>
52.	Cedar waxwing	<i>Bombycilla cedrorum</i>
53.	European starling	<i>Sturnus vulgaris</i>
54.	White-eyed vireo	<i>Vireo griseus</i>
55.	Solitary vireo	<i>Vireo solitarius</i>
56.	Red-eyed vireo	<i>Vireo olivaceus</i>
57.	Northern parula	<i>Parula americana</i>
58.	Prairie warbler	<i>Dendroica discolor</i>
59.	Pine warbler	<i>Dendroica pinus</i>
60.	Hooded warbler	<i>Wilsonia citrina</i>
61.	Worm-eating warbler	<i>Helmitheros vermivorus</i>
62.	Louisiana waterthrush	<i>Seiurus motacilla</i>
63.	Northern cardinal	<i>Cardinalis cardinalis</i>
64.	Indigo bunting	<i>Passerina cyanea</i>
65.	Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>
66.	Song sparrow	<i>Melospiza melodia</i>
67.	Field sparrow	<i>Spizella pusilla</i>
68.	Chipping sparrow	<i>Spizella passerina</i>
69.	Eastern meadowlark	<i>Sturnella magna</i>
70.	Red-winged blackbird	<i>Agelaius phoeniceus</i>
71.	Brown-headed cowbird	<i>Molothrus ater</i>
72.	Common grackle	<i>Quiscalus quiscula</i>
73.	Scarlet tanager	<i>Piranga olivacea</i>
74.	Summer tanager	<i>Piranga rubra</i>
75.	American goldfinch	<i>Carduelis tristis</i>
^a Listed prior to fall 1994 revision Bold Type Threatened or endangered		

**Table 7: Mammal Species Sighted on the Oak Ridge Reservation,
Spring—Summer, 1994**

	Common Name	Genus
1.	Opossum	<i>Didelphis marsupialis</i>
2.	Short-tailed shrew	<i>Blarina brevicauda</i>
3.	Little brown bats	<i>Myotis lucifugus</i>
4.	Raccoon	<i>Procyon lotor</i>
5.	Mink	<i>Mustela vison</i>
6.	Stripped skunk	<i>Mephitis mephitis</i>
7.	Coyote	<i>Canus latrans</i>
8.	Red fox	<i>Vulpes fulva</i>
9.	Gray fox	<i>Urocyon cinereoargenteus</i>
10.	Woodchuck	<i>Marmota monax</i>
11.	Eastern chipmunk	<i>Tamias striatus</i>
12.	Eastern gray squirrel	<i>Sciurus carolinensis</i>
13.	Beaver	<i>Castor canadensis</i>
14.	Eastern harvest mouse	<i>Reithrodontomys humulis</i>
15.	Deer mouse	<i>Peromyscus maniculatus</i>
16.	White-footed mouse	<i>Peromyscus leucopus</i>
17.	Golden mouse	<i>Peromyscus nuttalli</i>
18.	Hispid cotton rat	<i>Sigmodon hispidus</i>
19.	Muskrat	<i>Ondatra zibethica</i>
20.	Meadow vole	<i>Microtus pennsylvanicus</i>
21.	Pine vole	<i>Pitymys pinetorum</i>
22.	Eastern cottontail	<i>Sylvilagus floridanus</i>
23.	Whitetail deer	<i>Odocoileus virginianus</i>

Species observed at specific habitats, Spring—Summer, 1994.

Tables 8-21 present species observed at the 14 survey sites. Variations in sampling intensity, duration, and weather conditions challenged efforts to draw conclusions regarding similarities or differences between site specific results.

The objectives of this project were to design and implement procedures for preliminary surveying for threatened and endangered species on the Oak Ridge

Reservation. Acquisition of results from which significant conclusions may be derived will require additional seasons of field work.

Table 8: Site 1. Gasline Road, Grass-shrub, Pine and Deciduous Forests, Spring—Summer 1994.

	Common Name	Genus
1.	Great blue Heron	<i>Ardea herodias</i>
2.	Black vulture ^a	<i>Coragyps atratus</i>
3.	Red-shouldered hawk ^a	<i>Buteo lineatus</i>
4.	Mourning dove	<i>Zenaida macroura</i>
5.	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
6.	Barn swallow	<i>Hirundo rustica</i>
7.	American crow	<i>Corvus brachyrhynchos</i>
8.	Cedar waxwing	<i>Bombycilla cedrorum</i>
9.	Red-eyed vireo	<i>Vireo olivaceus</i>
10.	Northern Cardinal	<i>Cardinalis cardinalis</i>
11.	Indigo bunting	<i>Passerina cyanea</i>
12.	Common grackle	<i>Quiscalus quiscula</i>
^a Listed prior to the fall 1994 revision		

**Table 9: Site 2. Road to Building 0855. An Open Field
Species Observed, Spring—Summer 1994**

	Common Name	Genus
1.	American toad	<i>Bufo americanus</i>
2.	Gray tree frog	<i>Hyla versicolor</i>
3.	Green frog	<i>Rana clamitans melanota</i>
4.	Great blue heron	<i>Ardea herodias</i>
5.	Canada geese	<i>Branta canadensis</i>
6.	Northern bobwhite	<i>Colinus virginianus</i>
7.	Eastern wild turkey	<i>Meleagris gallopavo</i>
8.	Belted kingfisher	<i>Ceryle alcyon</i>
9.	Red-bellied woodpecker	<i>Melanerpes carolinus</i>
10.	Pileated woodpecker	<i>Dryocopus pileatus</i>
11.	American Crow	<i>Corvus brachyrhynchos</i>
12.	Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
13.	European Starling	<i>Sturnus vulgaris</i>
14.	Red-eyed vireo	<i>Vireo olivaceus</i>
15.	Northern parula	<i>Parula americana</i>
16.	Prairie warbler	<i>Dendroica discolor</i>
17.	Northern cardinal	<i>Cardinalis cardinalis</i>
18.	Indigo bunting	<i>Passerina cyanea</i>
19.	Rufus-sided towhee	<i>Pipilo erythrophthalmus</i>
20.	Field sparrow	<i>Spizella pusilla</i>
21.	Common grackle	<i>Quiscalus quiscula</i>
22.	American Goldfinch	<i>Carduelis tristis</i>
23.	Raccoon	<i>Procyon lotor</i>
24.	Woodchuck	<i>Marmota monax</i>
25.	Eastern cottontail rabbit	<i>Sylvilagus floridanus</i>
26.	White-tailed deer	<i>Odocoileus virginianus</i>

Table 10: Site 3. Jones Island Road. Deciduous Forest Bordered by the Clinch River, Spring—Summer 1994

	Common Name	Genus
1.	Cumberland slider ^a	<i>Pseudemys scripta troostii</i>
2.	Black-crowned night-heron ^a	<i>Nycticorax nycticorax</i>
3.	Great blue heron	<i>Ardea herodias</i>
4.	Wood duck	<i>Aix sponsa</i>
5.	Osprey	<i>Pandion haliaetus</i>
6.	Northern bobwhite	<i>Colinus virginianus</i>
7.	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
8.	Belted kingfisher	<i>Ceryle alcyon</i>
9.	Pileated woodpecker	<i>Dryocopus pileatus</i>
10.	Downy woodpecker	<i>Picoides pubescens</i>
11.	Eastern phoebe	<i>Sayornis phoebe</i>
12.	Swallow	<i>Hirundinidae</i>
13.	Cliff swallow	<i>Hirundo pyrrhonota</i>
14.	Blue jay	<i>Cyanocitta cristata</i>
15.	American crow	<i>Corvus brachyrhynchos</i>
16.	Tufted titmouse	<i>Parus bicolor</i>
17.	Carolina chickadee	<i>Parus carolinensis</i>
18.	Wood thrush	<i>Hylocichla mustelina</i>
19.	White-eyed vireo	<i>Vireo griseus</i>
20.	Red-eyed vireo	<i>Vireo olivaceus</i>
21.	Northern parula	<i>Parula americana</i>
22.	Prairie warbler	<i>Dendroica discolor</i>
23.	Northern cardinal	<i>Cardinalis cardinalis</i>
24.	Indigo bunting	<i>Passerina cyanea</i>
25.	Rufus-sided towhee	<i>Pipilo erythrophthalmus</i>
26.	Eastern Meadowlark	<i>Sturnella magna</i>
27.	Chipping sparrow	<i>Spizella passerina</i>
28.	Beaver	<i>Castor canadensis</i>

^a Listed prior to fall 1994 revision

Bold Type Threatened or endangered

Table 11: Site 4. Near Building 0800. An Open Field Bordered by Pine Forests. Species Observed, Spring—Summer 1994

	Common Name	Genus
1.	Red-bellied woodpecker	<i>Melanerpes carolinus</i>
2.	Pileated woodpecker	<i>Dryocopus pileatus</i>
3.	Blue jay	<i>Cyanocitta cristata</i>
4.	American crow	<i>Corvus brachyrhynchos</i>
5.	Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
6.	Wood thrush	<i>Hylocichla mustelina</i>
7.	Red-eyed vireo	<i>Vireo olivaceus</i>
8.	Northern Cardinal	<i>Cardinalis cardinalis</i>
9.	Indigo bunting	<i>Passerina cyanea</i>
10.	Chipping sparrow	<i>Spizella passerina</i>
11.	Common grackle	<i>Quiscalus quiscula</i>

**Table 12: Site 5. Muskrat Marsh Bordering the Clinch River
Species observed, Spring—Summer 1994**

	Common Name	Genus
1.	Eastern box turtle	<i>Terrapene carolina carolina</i>
2.	Five-lined skink	<i>Eumeces fasciatus</i>
3.	Northern brown snakes	<i>Storeria dekayi dekayi</i>
4.	Northern ringneck snake	<i>Diadophis punctatus</i>
5.	Eastern worm snakes	<i>Carphophis amoenus amoenus</i>
6.	Bald eagle	<i>Haliaeetus leucocephalus</i>
7.	Red-headed woodpecker ^a	<i>Melanerpes erythrocephalus</i>
8.	American crow	<i>Corvus brachyrhynchos</i>
9.	Pine warbler	<i>Dendroica pinus</i>
10.	Rufus-sided towhee	<i>Pipilo erythrophthalmus</i>
11.	Short-tailed shrew	<i>Blarina brevicauda</i>
12.	Beaver	<i>Castor canadensis</i>
13.	Deer mouse	<i>Peromyscus maniculatus</i>
14.	Golden mouse	<i>Peromyscus nuttalli</i>
15.	Meadow vole	<i>Microtus pennsylvanicus</i>
16.	Muskrat	<i>Ondatra zibethica</i>
^a Listed prior to fall 1994 revision		
Bold Type Threatened or endangered		

**Table 13: Site 6. Freel's Bend. Grassland/shrub habitat
Species Observed, Spring—Summer 1994**

	Common Name	Genus
1.	Black-crowned night-heron ^a	<i>Nycticorax nycticorax</i>
2.	Green-backed heron	<i>Butorides striatus</i>
3.	Great blue heron	<i>Ardea herodias</i>
4.	Black vulture ^a	<i>Coragyps atratus</i>
5.	Northern bobwhite	<i>Colinus virginianus</i>
6.	Mourning dove	<i>Zenaida macroura</i>
7.	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
8.	Red-bellied woodpecker	<i>Melanerpes carolinus</i>
9.	Downy Woodpecker	<i>Picoides pubescens</i>
10.	Eastern phoebe	<i>Sayornis phoebe</i>
11.	Acadian flycatcher	<i>Empidonax virescens</i>
12.	Barn swallow	<i>Hirundo rustica</i>
13.	Rough-winged swallow	<i>Stelgidopteryx serripennis</i>
14.	American crow	<i>Corvus brachyrhynchos</i>
15.	Tufted titmouse	<i>Parus bicolor</i>
16.	Carolina chickadee	<i>Parus carolinensis</i>
17.	Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
18.	Eastern bluebird	<i>Sialia sialis</i>
19.	Wood thrush	<i>Hylocichla mustelina</i>
20.	Solitary vireo	<i>Vireo solitarius</i>
21.	Red-eyed vireo	<i>Vireo olivaceus</i>
22.	Northern parula warbler	<i>Parula americana</i>
23.	Northern cardinal	<i>Cardinalis cardinalis</i>
24.	Indigo bunting	<i>Passerina cyanea</i>
25.	Rufus-sided towhee	<i>Pipilo erythrophthalmus</i>
26.	Chipping sparrow	<i>Spizella passerina</i>
27.	Red-winged blackbird	<i>Agelaius phoeniceus</i>
28.	American goldfinch	<i>Carduelis tristis</i>

^a Listed prior to fall 1994 revision

**Table 14: Site 7. Bull Bluff. Old Field and Deciduous Forest
Along the Clinch River. Species Observed,
Spring—Summer 1994**

	Common Name	Genus
1.	Great blue heron	<i>Ardea herodias</i>
2.	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
3.	Great horned owl	<i>Bubo virginianus</i>
4.	Barred owl	<i>Strix varia</i>
5.	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>
6.	Pileated Woodpecker	<i>Dryocopus pileatus</i>
7.	Blue jay	<i>Cyanocitta cristata</i>
8.	Tufted titmouse	<i>Parus bicolor</i>
9.	Carolina Chickadee	<i>Parus carolinensis</i>
10.	Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
11.	White-eyed vireo	<i>Vireo griseus</i>
12.	Red-eyed vireo	<i>Vireo olivaceus</i>
13.	Northern cardinal	<i>Cardinalis cardinalis</i>
14.	Indigo bunting	<i>Passerina cyanea</i>
15.	Eastern harvest mice	<i>Reithrodontomys humulis</i>
16.	Hispid cotton rat	<i>Sigmodon hispidus</i>

Table 15: Site 8. Shepherd Cemetery. Deciduous Forest Adjacent to Melton Hill Lake. Species Observed, Spring—Summer 1994

	Common Name	Genus
1.	Cumberland slider ^a	<i>Trachemys scripta troostii</i>
2.	Ground skink	<i>Scincella lateralis</i>
3.	Eastern worm snakes	<i>Carphophis amoenus amoenus</i>
4.	Northern copperhead	<i>Agkistrodon contortrix mokasen</i>
5.	Woodland salamander	<i>Plethodon</i> (unknown species)
6.	Eastern spadefoot toad	<i>Scaphiopus holbrookii holbrookii</i>
7.	Southern leopard frog	<i>Rana utricularia</i>
8.	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
9.	Great horned owl	<i>Bubo virginianus</i>
10.	Wood thrush	<i>Hylocichla mustelina</i>
11.	Eastern chipmunk	<i>Tamias striatus</i>
12.	White-footed mouse	<i>Peromyscus leucopus</i>
13.	Pine vole	<i>Microtus pinetorum</i>
^a Listed prior to fall 1994 revision		

Table 16: Site 9. McNew Hollow. Forest and Stream Habitat Species Observed, Spring—Summer 1994

	Common Name	Genus
1.	Northern ringneck snake	<i>Diadophis punctatus</i>
2.	Eastern worm snake	<i>Carphophis amoenus amoenus</i>
3.	American toad	<i>Bufo americanus</i>

**Table 17: Site 10. Deer Check Station. Open Grassland,
Deciduous Forest and Clinch River Embayment.
Species Observed, Spring—Summer 1994**

	Common Name	Genus
1.	Pond sliders	<i>Trachemys scripta</i> (undetermined)
2.	Eastern painted turtles	<i>Chrysemys picta picta</i>
3.	Turkey vulture	<i>Cathartes aura</i>
4.	Black vulture ^a	<i>Coragyps atratus</i>
5.	Mourning dove	<i>Zenaida macroura</i>
6.	Red-bellied woodpecker	<i>Melanerpes carolinus</i>
7.	Barn swallow	<i>Hirundo rustica</i>
8.	American crow	<i>Corvus brachyrhynchos</i>
9.	Carolina chickadee	<i>Parus carolinensis</i>
10.	Eastern bluebird	<i>Sialia sialis</i>
11.	Northern cardinal	<i>Cardinalis cardinalis</i>
12.	Indigo bunting	<i>Passerina cyanea</i>
13.	Rufus-sided towhee	<i>Pipilo erythrophthalmus</i>
14.	Field sparrow	<i>Spizella pusilla</i>
15.	Chipping sparrow	<i>Spizella passerina</i>
16.	Eastern meadowlark	<i>Sturnella magna</i>
17.	Red-winged blackbird	<i>Agelaius phoeniceus</i>
18.	Summer tanager	<i>Piranga rubra</i>
19.	American goldfinch	<i>Carduelis tristis</i>
^a Listed prior to the fall 1994 revision		

**Table 18: Site 11. Bear Creek. Deciduous Forest
Species Observed, Spring—Summer 1994**

Common Name	Genus
Eastern box turtle	<i>Terrapene carolina carolina</i>

**Table 19: Site 12. Flashlight Heaven Cave
Species Observed, Spring—Summer 1994**

Common Name	Genus
Slimy salamander	<i>Plethodon glutinosus glutinosus</i>

**Table 20: Site 13. Bear Creek at its junction with the Clinch River
Species Observed, Spring—Summer 1994**

	Common Name	Genus
1.	Snapping turtle	<i>Chelydra serpentina</i>
2.	Pond Sliders	<i>Trachemys scripta</i>
3.	Eastern painted turtle	<i>Chrysemys picta picta</i>

**Table 21: Site 14. Walker Branch Deciduous Forest and Stream
Species Observed, Spring—Summer 1994**

	Common Name	Genus
1.	Northern bobwhite	<i>Colinus virginianus</i>
2.	Eastern wild turkey	<i>Meleagris gallopavo</i>
3.	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
4.	Pileated woodpecker	<i>Dryocopus pileatus</i>
5.	Tufted titmouse	<i>Parus bicolor</i>
6.	Red-eyed vireo	<i>Vireo olivaceus</i>
7.	Louisiana waterthrush	<i>Seiurus motacilla</i>
8.	Northern cardinal	<i>Cardinalis cardinalis</i>

CHAPTER VI

DISCUSSION

Procedures and methods developed in this study provided the foundation for subsequent, longer-term surveys of protected vertebrate species on the Oak Ridge Reservation (Mitchell et al., 1996). Most sites selected in this study were used in the continuing studies reported by Mitchell (1996). In subsequent studies (Mitchell et al., 1996 and Ayl et al., 1996) critical habitats, such as caves and wetlands, were represented by additional study sites. Initial short-term (two month) sampling in this study revealed the occurrence of two threatened and endangered species, the Bald Eagle and Osprey. Subsequent studies by Mitchell et al., detected two additional threatened and endangered species, the Gray Bat and Peregrine Falcon. Continuing studies focused upon a total of sixty-nine species recognized by state and federal agencies as threatened, endangered or in-need of management. Twenty species occurring on this longer list were identified on the Oak Ridge Reservation between 1994 and 1996.

In retrospect, what might have been done differently? The primary revision would be to analyze species habitats in terms of dominance and diversity rather than relative abundance. Given more time, species relative

importance values would be used to express dominance and the Shannon Index (Cox, 1990) would be used to express diversity. Species abundance was sufficient to categorize sites by habitat types but is of limited value when comparing Oak Ridge Reservation sites to those described by others working elsewhere.

CHAPTER VII

CONCLUSION

Preliminary assessment procedures designed and implemented in this study proved to be feasible, appropriate, reproducible and productive. This conclusion is based upon initial short-term sampling of threatened and endangered vertebrate species in this study and longer term sampling in continued studies by Mitchell et al., (1996).

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APPENDICES

APPENDIX A

APPENDIX A **Amphibians of the Oak Ridge Reservation**

	Common Name	Genus
1	Eastern Hellbender	<i>Cryptobranchus alleganiensis</i> (Daudin)
2	Marbled Salamander	<i>Ambystoma opacum</i> (Gravenhorst)
3	Spotted Salamander	<i>Ambystoma maculatum</i> (Shaw)
4	Red-spotted Newt	<i>Notophthalmus viridescens</i> (Rafinesque)
5	Dusky Salamander	<i>Desmognathus fuscus</i> (Green)
6	Red-backed Salamander	<i>Plethodon cinereus</i> (Green)
7	Slimy Salamander	<i>Plethodon glutinosus</i> (Green)
8	Green Salamander	<i>Aneides aeneus</i> (Cope & Packard)
9	Spring Salamander	<i>Gyrinophilus porphyriticus</i> (Green)
10	Eastern Mud Salamander	<i>Pseudotriton montanus</i> (Baird)
11	Red Salamander	<i>Pseudotriton ruber</i> (Latreille)
12	Two-lined Salamander	<i>Eurycea bislineata</i> (Green)
13	Long-tailed Salamander	<i>Eurycea longicauda</i> (Green)
14	Cave Salamander	<i>Eurycea lucifuga</i> (Rafinesque)
15	Eastern Spadefoot Toad	<i>Scaphiopus holbrookii</i> (Harlan)
16	American Toad	<i>Bufo americanus</i> (Holbrook)
17	Fowler's Toad	<i>Bufo woodhouseii</i> (Girard)
18	Northern Cricket Frog	<i>Acris crepitans</i> (Baird)
19	Gray Treefrog	<i>Hyla versicolor</i> (Le Conte)
20	Spring Peeper	<i>Pseudacris crucifer</i> (Wied)
21	Upland Chorus Frog	<i>Pseudacris triseriata</i> (Wied)
22	Eastern Narrowmouth Toad	<i>Gastrophryne carolinensis</i> (Holbrook)
23	Bullfrog	<i>Rana catesbeiana</i> (Shaw)
24	Green Frog	<i>Rana clamitans</i> (Latrielle)
25	Southern Leopard Frog	<i>Rana utricularia</i>
26	Pickerel Frog	<i>Rana palustris</i> (Le Conte)

APPENDIX A

Reptiles of the Oak Ridge Reservation

	Common Name	Genus
1	Snapping turtle	<i>Chelydra serpentina</i> (Linnaeus)
2	Eastern musk turtle	<i>Sternotherus odoratus</i> (Latrielle)
3	Stripe-necked musk turtle	<i>Sternotherus minor</i> (Smith & Glass)
4	Eastern box turtle	<i>Terrapene carolina</i> (Linnaeus)
5	Map turtle	<i>Graptemys geographica</i> (Le Sueur)
6	False map turtle	<i>Graptemys pseudogeographica</i> (Gray)
7	Yellowbelly slider	<i>Trachemys scripta</i> (Schoepff)
8	River cooter	<i>Pseudemys concinna</i> (Le Conte)
9	Painted turtle	<i>Chrysemys picta</i> (Schneider)
10	Eastern spiny softshell turtle	<i>Apalone spiniferus</i> (Le Sueur)
11	Eastern fence lizard	<i>Sceloporus undulatus</i> (Green)
12	Six-lined racerunner	<i>Cnemidophorus sexlineatus</i> (Linnaeus)
13	Ground skink	<i>Scincella lateralis</i> (Say)
14	Five-lined skink	<i>Eumeces fasciatus</i> (Linnaeus)
15	Broadheaded skink	<i>Eumeces laticeps</i> (Schneider)
16	Eastern water snake	<i>Nerodia sipedon</i> (Linnaeus)
17	Queen snake	<i>Regina septemvittata</i> (Say)
18	Northern brown snake	<i>Storeria dekayi</i> (Holbrook)
19	Redbelly snake	<i>Storeria occipitomaculata</i> (Storer)
20	Eastern garter snake	<i>Thamnophis sirtalis</i> (Linnaeus)
21	Smooth earth snake	<i>Virginia valeriae</i> (Baird & Girard)
22	Eastern hognose snake	<i>Heterodon platyrhinos</i> (Latrielle)
23	Ringneck snake	<i>Diadophis punctatus</i> (Linnaeus)
24	Worm snake	<i>Carphophis amoenus</i> (Say)
25	Black racer	<i>Coluber constrictor</i> (Linnaeus)
26	Rough green snake	<i>Opheodrys aestivus</i> (Linnaeus)
27	Corn snake	<i>Elaphe guttata</i> (Linnaeus)
28	Black rat snake	<i>Elaphe obsoleta</i> (Say)
29	Eastern kingsnake	<i>Lampropeltis getulus</i> (Yarrow)
30	Milk snake	<i>Lampropeltis triangulum</i> (Lacepede)
31	Mole snake	<i>Lampropeltis calligaster</i> (Holbrook)
32	Scarlet snake	<i>Camphora coccinea</i> (Blumenbach)
33	Copperhead	<i>Agkistrodon contortrix</i> (Daudin)

APPENDIX A

Birds of the Oak Ridge Reservation

	Common Name	Genus
1	Common loon	<i>Gavia immer</i>
2	Pied-billed grebe	<i>Podilymbus podiceps</i>
3	Double-crested cormorant	<i>Phalacrocorax auritus</i>
4	Whistling swan	<i>Olor columbianus</i>
5	Canada goose	<i>Branta canadensis</i>
6	American Black duck	<i>Anas rubripes</i>
7	Gadwall	<i>Anas strepera</i>
8	Mallard	<i>Anas platyrhyncho</i>
9	Northern pintail	<i>Anas acuta</i>
10	American wigeon	<i>Anas americana</i>
11	Wood duck	<i>Aix sponsa</i>
12	Blue-winged teal	<i>Anas discors</i>
13	Green-winged teal	<i>Anas crecca</i>
14	Canvasback	<i>Aythya valisineria</i>
15	Redhead	<i>Aythya americana</i>
16	Ring-necked duck	<i>Aythya collaris</i>
17	Lesser scaup	<i>Aythya affinis</i>
18	Common goldeneye	<i>Bucephala clangula</i>
19	Bufflehead	<i>Bucephala albeola</i>
20	Ruddy duck	<i>Oxyura jamaicensis</i>
21	Common merganser	<i>Mergus merganser</i>
22	Red-breasted merganser	<i>Mergus serrator</i>
23	Hooded merganser	<i>Lophodytes cucullatus</i>
24	American coot	<i>Fulica americana</i>
25	Common gallinule	<i>Gallinula chloropus</i>
26	Herring gull	<i>Larus argentatus</i>
27	Ring-billed gull	<i>Larus delawarensis</i>
28	Black tern	<i>Chlidonias niger</i>
29	Great blue heron	<i>Ardea herodias</i>
30	Great egret	<i>Casmerodius albus</i>
31	Cattle egret	<i>Bubulcus ibis</i>
32	Black-crowned night-heron	<i>Nycticorax nycticorax</i>
33	Yellow-crowned night-heron	<i>Nyctanassa violacea</i>
34	Green-backed heron	<i>Butorides striatus</i>
35	Kildeer	<i>Charadrius vociferus</i>
36	American woodcock	<i>Philohela minor</i>
37	Common snipe	<i>Capella gallinago</i>
38	Spotted sandpiper	<i>Actitis macularia</i>

APPENDIX A
Birds of the Oak Ridge Reservation (continued)

	Common Name	Genus
39	Wild turkey	<i>Meleagris gallopavo</i>
40	Ruffed grouse	<i>Bonasa umbellus</i>
41	Common bobwhite	<i>Colinus virginianus</i>
42	Sharp-shinned hawk	<i>Accipiter striatus</i>
43	Cooper's hawk	<i>Accipiter cooperii</i>
44	Northern harrier	<i>Circus cyaneus</i>
45	Red-tailed hawk	<i>Buteo jamaicensis</i>
46	Red-shouldered hawk	<i>Buteo lineatus</i>
47	Broad-winged hawk	<i>Buteo platypterus</i>
48	Bald eagle	<i>Haliaeetus leucocephalus</i>
49	Osprey	<i>Pandion haliaetus</i>
50	Turkey vulture	<i>Cathartes aura</i>
51	Black vulture	<i>Coragyps atratus</i>
52	American kestrel	<i>Falco sparverius</i>
53	Eastern screech owl	<i>Otus asio</i>
54	Great Horned Owl	<i>Bubo virginianus</i>
55	Barred owl	<i>Strix varia</i>
56	Barn owl	<i>Tyto alba</i>
57	Mourning dove	<i>Zenaida macroura</i>
58	Rock dove	<i>Columba livia</i>
59	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
60	Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
61	Common nighthawk	<i>Chordeiles minor</i>
62	Whip-poor-will	<i>Caprimulgus vociferus</i>
63	Chuck-will's-widow	<i>Caprimulgus carolinensis</i>
64	Ruby-throated hummingbird	<i>Archilochus colubris</i>
65	Belted kingfisher	<i>Ceryle alcyon</i>
66	Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
67	Pileated woodpecker	<i>Dryocopus pileatus</i>
68	Yellow-shafted flicker	<i>Colaptes auratus</i>
69	Red-bellied woodpecker	<i>Melanerpes carolinus</i>
70	Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
71	Downy woodpecker	<i>Picoides pubescens</i>
72	Hairy woodpecker	<i>Picoides villosus</i>
73	Eastern kingbird	<i>Tyrannus tyrannus</i>
74	Great crested flycatcher	<i>Myiarchus crinitus</i>
75	Eastern phoebe	<i>Sayornis phoebe</i>

APPENDIX A
Birds of the Oak Ridge Reservation (continued)

	Common Name	Genus
76	Eastern pewee	<i>Contopus virens</i>
77	Acadian flycatcher	<i>Empidonax virescens</i>
78	Least flycatcher	<i>Empidonax minimus</i>
79	Horned lark	<i>Eremophila alpestris</i>
80	Purple martin	<i>Progne subis</i>
81	Cliff swallow	<i>Hirundo pyrrhonota</i>
82	Barn swallow	<i>Hirundo rustica</i>
83	Rough-winged swallow	<i>Stelgidopteryx serripennis</i>
84	Bank swallow	<i>Riparia riparia</i>
85	Chimney swift	<i>Chaetura pelagica</i>
86	American crow	<i>Corvus brachyrhynchos</i>
87	Blue jay	<i>Cyanocitta cristata</i>
88	Carolina chickadee	<i>Parus carolinensis</i>
89	Tufted titmouse	<i>Parus bicolor</i>
90	White-breasted nuthatch	<i>Sitta carolinensis</i>
91	Red-breasted nuthatch	<i>Sitta canadensis</i>
92	Brown creeper	<i>Certhia familiaris</i>
93	House wren	<i>Troglodytes aedon</i>
94	Winter wren	<i>Troglodytes troglodytes</i>
95	Bewick's wren	<i>Thryothorus bewickii</i>
96	Carolina wren	<i>Thryothorus ludovicianus</i>
97	Ruby-crowned kinglet	<i>Regulus calendula</i>
98	Golden-crowned kinglet	<i>Regulus satrapa</i>
99	Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
100	Brown thrasher	<i>Toxostoma rufum</i>
101	Gray catbird	<i>Dumetella carolinensis</i>
102	Northern mockingbird	<i>Mimus polyglottos</i>
103	Eastern bluebird	<i>Sialia sialis</i>
104	American robin	<i>Turdus migratorius</i>
105	Gray-cheeked thrush	<i>Catharus minimus</i>
106	Swainson's thrush	<i>Catharus ustulatus</i>
107	Hermit thrush	<i>Catharus guttatus</i>
108	Wood thrush	<i>Hylocichla mustelina</i>
109	Loggerhead shrike	<i>Lanius ludovicianus</i>
110	Cedar waxwing	<i>Bombycilla cedrorum</i>
111	Red-eyed vireo	<i>Vireo olivaceus</i>
112	Yellow-throated vireo	<i>Vireo flavifrons</i>
113	White-eyed vireo	<i>Vireo griseus</i>

APPENDIX A
Birds of the Oak Ridge Reservation (continued)

	Common Name	Genus
114	Solitary vireo	<i>Vireo solitarius</i>
115	Northern parula warbler	<i>Dendroica petechia</i>
116	Yellow-throated warbler	<i>Dendroica dominica</i>
117	Black-throated green warbler	<i>Dendroica virens</i>
118	Prothonotary warbler	<i>Protonotaria citrea</i>
119	Black-and-white warbler	<i>Mniotilta varia</i>
120	Blackpoll warbler	<i>Dendroica striata</i>
121	Cerulean warbler	<i>Dendroica cerulea</i>
122	Magnolia warbler	<i>Dendroica magnolia</i>
123	Yellow-rumped warbler	<i>Dendroica coronata</i>
124	Cape may warbler	<i>Dendroica tigrina</i>
125	Chestnut-sided warbler	<i>Dendroica pensylvanica</i>
126	Bay-breasted warbler	<i>Dendroica castanea</i>
127	American redstart	<i>Setophaga ruticilla</i>
128	Pine warbler	<i>Dendroica discolor</i>
129	Prairie warbler	<i>Dendroica discolor</i>
130	Blue-winged warbler	<i>Vermivora pinus</i>
131	Swainson's warbler	<i>Limnothlypis swainsonii</i>
132	Worm-eating warbler	<i>Helmitheros vermivorus</i>
133	Tennessee warbler	<i>Vermivora peregrina</i>
134	Hooded warbler	<i>Wilsonia citrina</i>
135	Golden-winged warbler	<i>Vermivora chrysoptera</i>
136	Kentucky warbler	<i>Oporornis formosus</i>
137	Common yellowthroat	<i>Geothlypis trichas</i>
138	Yellow-breasted chat	<i>Icteria virens</i>
139	Louisiana waterthrush	<i>Seiurus motacilla</i>
140	Ovenbird	<i>Seiurus aurocapillus</i>
141	Red-winged blackbird	<i>Agelaius phoeniceus</i>
142	Brown-headed cowbird	<i>Molothrus ater</i>
143	Common grackle	<i>Quiscalus quiscula</i>
144	Eastern meadowlark	<i>Sturnella magna</i>
145	European starling	<i>Sturnus vulgaris</i>
146	Orchard oriole	<i>Icterus spurius</i>
147	Baltimore oriole	<i>Icterus galbula</i>
148	Summer tanager	<i>Piranga rubra</i>
149	Scarlet tanager	<i>Piranga olivacea</i>
150	House sparrow	<i>Passer domesticus</i>
151	Dark-eyed junco	<i>Junco hyemalis</i>

APPENDIX A
Birds of the Oak Ridge Reservation (continued)

	Common Name	Genus
152	Northern cardinal	<i>Cardinalis cardinalis</i>
153	Red crossbill	<i>Loxia curvirostra</i>
154	House finch	<i>Carpodacus mexicanus</i>
155	Purple finch	<i>Carpodacus purpureus</i>
156	Evening grosbeak	<i>Hesperiphona vespertina</i>
157	American goldfinch	<i>Carduelis tristis</i>
158	Pine siskin	<i>Carduelis pinus</i>
159	Blue grosbeak	<i>Guiraca caerulea</i>
160	Indigo bunting	<i>Passerina cyanea</i>
161	Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
162	Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>
163	White-throated sparrow	<i>Zonotrichia albicollis</i>
164	Chipping sparrow	<i>Spizella passerina</i>
165	Field sparrow	<i>Spizella pusilla</i>
166	Grasshopper sparrow	<i>Ammodramus savannarum</i>
167	Bachman's sparrow	<i>Aimophila aestivalis</i>
168	Fox sparrow	<i>Passerella iliaca</i>
169	Song sparrow	<i>Melospiza melodia</i>
170	Henslow's sparrow	<i>Ammodramus henslowii</i>

APPENDIX A

Mammals of the Oak Ridge Reservation

	Common Name	Genus
1	Opossum	<i>Didelphis marsupialis</i>
2	Southeastern shrew	<i>Sorex longirostris</i>
3	Least shrew	<i>Cryptotis parva</i>
4	Short-tailed shrew	<i>Blarina brevicauda</i>
5	Eastern mole	<i>Scalopus aquaticus</i>
6	Little brown bats	<i>Myotis lucifugus</i>
7	Gray myotis	<i>Myotis grisescens</i>
8	Keen's Myotis	<i>Myotis keeni</i>
9	Silver haired bat	<i>Lasionycteris noctivagans</i>
10	Indiana Myotis	<i>Myotis sodalis</i>
11	Small-footed myotis	<i>Myotis subulatus</i>
12	Eastern Pipistrelle	<i>Pipistrellus subflavus</i>
13	Big brown bat	<i>Eptesicus fuscus</i>
14	Red bat	<i>Lasiurus borealis</i>
15	Hoary Bat	<i>Lasiurus cinereus</i>
16	Eastern big-eared bat	<i>Plecotus rafinesquei</i>
17	Evening bat	<i>Nycticeius humeralis</i>
18	Raccoon	<i>Procyon lotor</i>
19	Long tailed weasel	<i>Mustela frenata</i>
20	Mink	<i>Mustela vison</i>
21	River otter	<i>Lutra canadensis</i>
22	Beaver	<i>Castor canadensis</i>
23	Stripped skunk	<i>Mephitis mephitis</i>
24	Coyote	<i>Canus latrans</i>
25	Red fox	<i>Vulpes fulva</i>
26	Gray fox	<i>Urocyon cinereoargenteus</i>
27	Bobcat	<i>Lynx rufus</i>
28	Woodchuck	<i>Marmota monax</i>
29	Eastern chipmunk	<i>Tamias striatus carnivora</i>
30	Southern Flying Squirrel	<i>Glaucomys volans</i>
31	Eastern harvest rat	<i>Reithrodontomys humulis</i>
32	Deer mouse	<i>Peromyscus maniculatus</i>
33	Gray squirrel	<i>Sciurus carolinensis</i>
34	White-footed mouse	<i>Peromyscus leucopus</i>
35	Golden mouse	<i>Ochrotomys nuttalli</i>
36	Marsh rice rat	<i>Oryzomys palustris</i>
37	Hispid cotton rat	<i>Sigmodon hispidus</i>
38	Meadow Vole	<i>Microtus pennsylvanicus</i>
39	Pine Vole	<i>Pitymys pinetorum</i>
40	Muskrat	<i>Ondatra zibethicus</i>

APPENDIX A
Mammals of the Oak Ridge Reservation (continued)

	Common Name	Genus
41	Norway rat	<i>Rattus norvegicus</i>
42	House Mouse	<i>Mus musculus</i>
43	Eastern Cottontail	<i>Sylvilagus floridanus</i>
44	Whitetail deer	<i>Odocoileus virginianus</i>

APPENDIX B

APPENDIX B
LIST OF THREATENED OR ENDANGERED AMPHIBIANS AND REPTILES
PREVIOUSLY DETERMINED TO OCCUR OR LIKELY TO OCCUR ON THE
OAK RIDGE RESERVATION

APPENDIX B
List of Threatened or Endangered Amphibians and Reptiles Previously Determined to Occur
Or Likely to Occur on the Oak Ridge Reservation**

Common Name	Scientific Name	Rating*			Status	Location	Source
		Federal	State	I			
Cumberland Slider	<i>Pseudemys scripta troosti</i>	n/a	I		Have population integration with red-eared turtle	Clinch River Slow-moving ponds, lots of logs	K1, K
Six-lined racer/runner	<i>Cnemidophorus sexlineatus</i>	n/a	I		Here	Dry open areas Railroad tracks Cedar glade Rocky areas Fence lizards	K1, K
Eastern slender glass lizard	<i>Opisaurus attenuatus longicaudus</i>	n/a	I		Possible	Grasslands Old fields Pastures Power line right of way	K1, K
Northern pine snake	<i>Pituophis malanoleucus malanoleucus</i>	C	T		Possible	Dry, well-drained soil Mountain ridges Scrub pines Secretive, burrowing below ground	K1, K

APPENDIX B
LIST OF THREATENED OR ENDANGERED AMPHIBIANS AND REPTILES
PREVIOUSLY DETERMINED TO OCCUR OR LIKELY TO OCCUR ON THE
OAK RIDGE RESERVATION (continued)

APPENDIX B
List of Threatened or Endangered Amphibians and Reptiles Previously Determined to Occur
Or Likely to Occur on the Oak Ridge Reservation**

Common Name	Scientific Name	Rating*			Status	Location	Source
		Federal	State	I			
Hellbender	<i>Cryptobranchus alleganiensis</i>	C	I	Likely		Clear, oxygenated water Medium movement Rock bottoms Possible Clinch River major tributaries	K1, K
Mole salamander	<i>Ambystoma talpoideum</i>	n/a	I	Not expected		Flood plain with standing water	K1, K
Green salamander	<i>Aneides aeneus</i>	C	I	Here		Caves Wet slopes Cave outside fence Highway 95 Shelter but not hidden	K1, K
Tennessee cave salamander	<i>Gyrinophilus palleucus</i>	C	T	Possible Roane County		Permanent streams Pools Limestone caves	K1, K

* C Candidate
T Threatened
Draft list generated 12/14/93

I In need of Management
n/a Not applicable
Reviewed by Warren Webb 12/17/93

** This list was completed prior to the September 1994 revision to threatened or endangered status of species in Tennessee.

APPENDIX B **LIST OF THREATENED ENDANGERED FISH PREVIOUSLY** **DETERMINED TO OCCUR OR LIKELY TO OCCUR ON THE OAK RIDGE** **RESERVATION**

APPENDIX B **List of Threatened or Endangered Fish Previously Determined to Occur,** **or Likely To Occur on the Oak Ridge Reservation*****

Common Name	Scientific Name	Rating*			Status	Location**	Source
		Federal	State	I			
Tennessee dace	<i>Phoxinus</i> <i>tennesseensis</i>	n/a		I	Here	Oak Ridge Reservation streams Bear Creek—Mill Creek Ish Creek—Later introduced into White Oak Creek	K, R

* I In need of Management
n/a Not applicable

**1984: Found in surveys of Bear Creek
1987-1988: Oak Ridge Reservation wide survey located Dace in Ish
Creek, Mill Creek, etc.
1993: Found in surveys of Bear Creek and Oak Ridge Reservation streams

*** This list was completed prior to the September 1994 revision
to threatened or endangered status of species in Tennessee.
Draft list generated 12/14/93
Reviewed by Mike Ryon 12/17/93

APPENDIX B
LIST OF THREATENED OR ENDANGERED BIRDS PREVIOUSLY
DETERMINED TO OCCUR OR LIKELY TO OCCUR ON THE OAK RIDGE
RESERVATION

APPENDIX B
List of Threatened or Endangered Birds Previously Determined to Occur
or Likely to Occur on the Oak Ridge Reservation**

Common Name	Scientific Name	Rating*			Status	Location	Source
		Federal	State	I			
Double-crested cormorant	<i>Phalacrocorax</i>	n/a	I	Possible		Migrant winter resident Clinch River area Melton Hill Lake	<i>Guide to Birds of North America; Bent Series</i>
Black vulture	<i>Coragyps atratus</i>	n/a	I	Here all year		Entire Oak Ridge Reservation—Nest site on Chestnut Ridge between Highway 95 and New Zion Patrol Road	K, G
Golden eagle	<i>Aquila chrysaetos</i>	n/a	E	Possible winter			<i>Guide to Birds of North America; Bent Series</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>	E	E	Here winter, few summer		Melton Hill Lake—Non-nesting residents on Clinch River	K
Osprey	<i>Pandion haliaetus</i>	n/a	E	Here spring and fall migration		Melton Hill Lake—Clinch River Nests on Melton Hill Lake	K
Sharp-shinned hawk	<i>Accipiter striatus</i>	n/a	T	Here all year		Jones Island Grubb Island 500 kV power line	K
Cooper's hawk	<i>Accipiter cooperi</i>	n/a	T	Here		Entire Oak Ridge Reservation	K

APPENDIX B
LIST OF THREATENED OR ENDANGERED BIRDS PREVIOUSLY
DETERMINED TO OCCUR OR LIKELY TO OCCUR ON THE OAK RIDGE
RESERVATION (continued)

APPENDIX B
List of Threatened or Endangered Birds Previously Determined to Occur
or Likely to Occur on the Oak Ridge Reservation**

Common Name	Scientific Name	Rating*			Status	Location	Source
		Federal	State	I			
Red-shouldered hawk	<i>Buteo lineatus</i>	n/a	I	I	All year	Entire Oak Ridge Reservation	Guide to Birds of North America; Bent Series
Black-crowned night heron	<i>Nycticorax nycticorax</i>	n/a	I	I	Here- Spring and fall migration, possible summer	Clinch River—Breeding on Watts Bar Lake	K
Common barn owl	<i>Tyto alba</i>	n/a	I	I	Possible all year	Old buildings Freels Bend and vicinity	K
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	n/a	I	I	Possible all year	Open deciduous woods	Guide to Birds of North America; Bent Series
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	n/a	I	I	Possible winter	Wooded areas	Guide to Birds of North America; Bent Series
Grasshopper sparrow	<i>Ammodramus saviannarum</i>	n/a	T	T	Possible Summer	Grassy areas	K
Henslow's sparrow	<i>Ammodramus henslowii</i>	C	n/a	n/a	Possible spring and fall migration	Broomsedge fields	Guide to Birds of North America

APPENDIX B
LIST OF THREATENED OR ENDANGERED BIRDS PREVIOUSLY
DETERMINED TO OCCUR OR LIKELY TO OCCUR ON THE OAK RIDGE
RESERVATION (continued)

APPENDIX B
List of Threatened or Endangered Birds Previously Determined to Occur
or Likely to Occur on the Oak Ridge Reservation**

Common Name	Scientific Name	Rating*		State	Status	Location	Source
		Federal					
Vesper sparrow	<i>Pooecetes</i>	n/a	I		Possible summer, highly unlikely	Meadows and fields	<i>Guide to Birds of North America</i>
Lark sparrow	<i>Chondestes grammacus</i>	n/a	I		Possible summer, highly unlikely	Meadows and fields	<i>Guide to Birds of North America</i>

86 • C Candidate G Cindy Gabrielsen K Roger Kroodasma T Threatened
 E Endangered I In need of management n/a Not applicable

Draft list generated 12/14/93
 Reviewed by Roger Kroodasma 12/20/93
 **This list was completed prior to the September 1994 revision to threatened or endangered species in Tennessee.

APPENDIX B
LIST OF THREATENED ENDANGERED MAMMALS PREVIOUSLY
DETERMINED TO OCCUR OR LIKELY TO OCCUR ON THE OAK RIDGE
RESERVATION

APPENDIX B
List of Threatened or Endangered Mammals Previously Determined to Occur,
Or Likely to Occur on the Oak Ridge Reservation**

Common Name	Scientific Name	Rating*			State	Status	Location	Source
		Federal	E	E				
Gray bat	Myotis grisescens	E	E	E	E	Maybe	Caves—May feed over Clinch River adjacent to site	D, K
Indiana bat	Myotis sodalis	E	E	E	E	Maybe, summer resident	East Fork Poplar Creek Riparian Forest Could and has been found in upland forests	D, K
Eastern small-footed bat	Myotis leibii	C	I	I	I	Maybe	Caves	D, K
Rafinesque big-eared bat	Plecotus rafinesquii	C	I	I	I	Maybe	Caves Old buildings Forests	D, K
Southeastern shrew	Sorex longirostris		I	I	I	Here	Flood plains River swamps Grassy marshes Old fields Pine woods	D, K
Long-tailed shrew	Sorex dispar	C	I	I	I	Maybe	Cool, moist taluses in wooded areas	K
Smokey shrew	Sorex fumeus		I	I	I	Maybe	Moist woodlands having rocks and decaying logs Moist grassy areas along streams	K

APPENDIX B
LIST OF THREATENED OR ENDANGERED MAMMALS PREVIOUSLY
DETERMINED TO OCCUR OR LIKELY TO OCCUR ON THE OAK RIDGE
RESERVATION (continued)

APPENDIX B
List of Threatened or Endangered Mammals Previously Determined to Occur,
Or Likely to Occur on the Oak Ridge Reservation**

Common Name	Scientific Name	Rating*			Status	Location	Source
		Federal	State	I			
Masked shrew	Sorex cinereus		I		Maybe	Deep moist forests to open fields and marshy areas	K
River otter	Lutra canadensis		T		Maybe	Streams, rivers lakes Reintroduced in the Smoky Mountains	D, K
Red Wolf	Canis rufus	E			Possible transient, but highly unlikely	Forested areas Reintroduced at Cades Cove	D
Mountain lion; Eastern cougar	Felix concolor cougar		E		Possible transient	Probably extirpated	D
Southern bog lemming	Synaptomys cooperi		I		Maybe	Bluegrass in moist areas, bogs, swamps, marshy meadows, and damp woods.	K
Meadow jumping mouse	Zapus hudsonius		I		Maybe	Open grassy fields Thick vegetation near ponds, streams, and marshes in woodland areas	K
Woodland jumping mouse	Napaeozapus insignis		I		Maybe	Spruce-fir, hemlock hardwood forest	K

- C Candidate
 - D Paul Dunaway
 - E Endangered
 - I In need of Management
 - K Roger Kroodsmas
 - T Threatened
- ** This list was completed prior to the September 1994 revision to threatened or endangered status of species in Tennessee.

APPENDIX C

APPENDIX C

SUMMARY OF PROCLAMATION 94-17

Robert M. Hatcher, Endangered Species Coordinator
Tennessee Wildlife Resources Agency

September 27, 1994 (Approved by Commission today)

Proc. 94-17 repeals and supplants Proc. 86-30 by deleting all previously-listed "Endangered & Threatened Wildlife" and replaces them. A total of 52 changes are made. Highlights include:

- revision of 11 species' names due to official nationwide name changes,
- addition of 15 new mollusk species due to prior Federal listings.
- delisting of Chittenango ovate amber snail due to change in its taxonomic classification,
- uplisting from "In Need of Management" or T to E status the: bluemask darter and palezone shiner, and duskytail darter,
- addition of 6 fish species due to prior Federal listing (4) and expert recommendation,
- down listing of Mississippi Kite from Endangered to "In Need of Management",
- down listing from Threatened to "In Need of Management" the: Sharp-shinned Hawk, Cooper's Hawk, Grasshopper Sparrow, and Northern Harrier; and
- down listing from Endangered to Threatened the: Bald Eagle, Golden Eagle, Common Raven, and Osprey,
- addition of the Red Wolf as Endangered, as limited to its experimental range in GSMNP.

Changes by wildlife class are:

	Mollusk		Fish		Amphib		Reptile		Birds		Mam.		Crus.		Total	
Numbers by	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T
Former	24	1	10	14	0	1	0	3	9	5	4	1	1	0	48	25
Proposed	37	2	17	15	0	1	0	3	4	6	5	1	1	0	64	28
Retained	24	0	10	13		1		3	4	1	4	1	1		43	19
Delisted	0	1	0	0		0		0	0	0	0	0	0		0	1
Down listed*	0	0	0	0		0		0	5	8	0	0	0		5	8
Uplisted*	0	0	3	1		0		0	0	1	0	0	0		3	2
New Listings	13	2	4	2		0		0	0	0	1	0	0		18	4
Name Change	8	0	0	1		0		1	1	0	0	0	0		9	2
Fed. Status	36	1 2- c1	10	3	0	0 1- c2	0	0 2- c2	4	1	4	0	1	0	55 2- c2	7 3- c2

*Up listings and down listings may be counted twice, one at T status and one at E status; or they may involve similar pairing (uplisting or down listing) with "In Need of Management" status.

APPENDIX C
TENNESSEE WILDLIFE RESOURCES COMMISSION
PROCLAMATION
ENDANGERED OR THREATENED SPECIES

Pursuant to the authority granted by Tennessee Code Annotated, Sections 70-8-105 and 70-8-107, the Tennessee Wildlife Resources Commission does hereby declare the following species to be endangered or threatened subject to the regulations as herein provided.

SECTION I *.ENDANGERED OR THREATENED SPECIES
MOLLUSCS

ENDANGERED

Common Name	Scientific Name	Fed**
Appalachian elktoe	<i>Alasmidonta raveneliana</i>	c1
Birdwing pearly mussel	<i>Conradilla caelata</i> (=Limiox rimosus)	E
Fanshell Mussel	<i>Cyproganina stegaria</i> (=irrorata)	E
Dromedary pearly mussel	<i>Dromus dromas</i>	E
Yellow-blossom pearly mussel	<i>Epioblasma</i> (=Dysnomia) <i>florentina florentina</i>	E
Upland combshell	<i>E. metastrata</i>	E
Southern acomshell	<i>E. othcaloogensis</i>	E
Green-blossom pearly mussel	<i>E. (=Dysnomia) torulosa gubernaculum</i>	E
Tuberculed-blossom pearly mussel	<i>E. (=Dysnomia) torulosa torulosa</i>	E
Turgid-blossom pearly mussel	<i>E. (=Dysnomia) turgidula</i>	E
Tan riffleshell	<i>E. (=Dysnomia) walkeri</i>	E
Purple Cat's Paw Pearlymussel	<i>E. (=Dysnomia) obliquata obliquata</i> (=E. sulcata sulcata)	E
Fine-rayed pigtoe	<i>Fusconaia cuneolus</i>	E
Shiny pigtoe	<i>F. Cor</i> (=edgariana)	E
Cracking pearly mussel	<i>Hemistena</i> (=Lastena) <i>lata</i>	E
Pink Mucket pearly mussel	<i>Lampsilis abrupta</i> (=orbiculata)	E

Proc. 94-17

APPENDIX C

ENDANGERED (Mollusks, continued)

Common Name	Scientific Name	Fed**
Alabama lamp pearly mussel	<i>L. Virescens</i>	E
Coosa moccasin shell	<i>Medionidus parvulus</i>	E
Ring pink mussel	<i>Obovaria retusa</i>	E
Little-wing pearly mussel	<i>Pegias fabula</i>	E
White warty-back pearly mussel	<i>Plethobasus cicatricosus</i>	E
Orange-footed (=pimpleback) pearly mussel	<i>P. cooperianus</i>	E
Clubshell	<i>Pleurobema clava</i>	E
Southern clubshell	<i>P. decisum</i>	E
Southern pigtoe	<i>P. georgianum</i>	E
Cumberland pigtoe (=Cumberland) pigtoe mussel)	<i>P. gibberum</i>	E
Ovate clubshell	<i>P. perovatum</i>	E
Rough pigtoe pearly mussel	<i>P. plenum</i>	E
Triangular kidneyshell	<i>Ptychobranthus greeni</i>	E
Cumberland monkeyface pearly mussel	<i>Quadrula intermedia</i>	E
Winged mapleleaf mussel	<i>Q. fragosa</i>	E
Appalachian monkeyface pearly mussel	<i>Q. sparsa</i>	E
Pale lilliput pearly mussel	<i>Toxolasma (=Carunculina) cylindrella</i>	E
Cumberland bean pearly mussel	<i>Villosa (=Micromya) trabalis</i>	E
Painted snake coiled forest snail	<i>Anguispira picta</i>	T
Anthony's riversnail	<i>Atheamnia anthonyi</i>	E
Royal Snail	<i>Pyrgulopsis (=Marstonia) ogmorhaphes</i>	E

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APPENDIX C

THREATENED (Mollusks, continued)

Common Name	Scientific Name	Fed**
Alabama moccasinshell	<i>Medionidus acutissimus</i>	T
Fine-line pocketbook	<i>Lampsilis altilis</i>	T

FISH

ENDANGERED

Common Name	Scientific Name	Fed**
Lake Sturgeon	<i>Acipenser fulvescens</i>	c2
Tuckasegee Darter	<i>Etheostoma blenniodes gutselli</i>	--
Bluemask (=jewel) Darter	<i>E. (Doration) sp</i>	E
Duskytail Darter	<i>E. (=Catonotus sp.)</i>	E
Crown Darter	<i>E. (=Catonotus sp.) corona</i>	--
Barrens Darter	<i>E. (=Catonotus sp.) forbesi</i>	--
Egg-mimic Darter	<i>E. (Catonotus) pseudovulatum--</i>	E
Boulder Darter	<i>E. (Nothonotus) wapiti</i>	E
Spotfin Chub	<i>Cyprinella (=Hybopsis) monacha</i>	T
Blue Shiner	<i>Cyprinella (-notropis) caerulea</i> (=caeruleus)	T
Palezone Shiner	<i>Notropis sp. (cf. N. procne)</i>	E
Smoky Madtom	<i>Noturus baileyi</i>	E
Yellowfin Madtom	<i>Noturus flavipinnis</i>	T
Pygmy Madtom	<i>Noturus stanauli</i>	E
Amber Darter	<i>Percina antesella</i>	E
Conasauga (=Reticulate) Logperch	<i>P. jenkinsi</i>	E
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	E

APPENDIX C

THREATENED (FISH continued)

Common Name	Scientific Name	Fed**
Western Sand Darter	<i>Ammocrptta clara</i>	--
Blue Sucker	<i>Cycleptus elongatus</i>	c2
Slender Chub	<i>Erimystax (=Hybopsis) cahni</i>	T
Slackwater Darter	<i>Etheostoma boschungii</i>	T
Coldwater Darter	<i>E. ditrema</i>	c2
Trispot Darter	<i>E. trisella</i>	c2
Coppercheek Darter	<i>E. aquali</i> (cf. <i>E. Maculatum</i>)	c2
Holliday (=Ellijay) Darter	<i>E. (=Ulocentra) sp.</i>	--
Barrens Topminnow	<i>Fundulus julisia</i> (cf. <i>F. albolineatus</i>)	c2
Silverjaw Minnow	<i>Notropis (=Ericymba) buccata</i>	--
Frecklebelly Madtom	<i>Noturus munitus</i>	c2
Duck River Saddled Madtom	<i>Noturus sp. (=elegans)</i>	c2
Longhead Darter	<i>Percina macrocephala</i>	c2
Snail Darter	<i>P. tanasi</i>	T
Blackside Dace	<i>Phoxinus cumberlandensis</i>	T

AMPHIBIANS

THREATENED

Common Name	Scientific Name	Fed**
Tennessee Cave Salamander	<i>Gyrinophilus pallescens</i>	c2

REPTILES

THREATENED

Common Name	Scientific Name	Fed**
Bog Turtle	<i>Clemmys muhlenbergi</i>	c2
Northern Pine Snake	<i>Pituophis m. melanoleucus</i>	c2
Western Pigmy Rattlesnake	<i>Sistrurus miliarius streckeri</i>	--

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APPENDIX C

BIRDS

ENDANGERED

Common Name	Scientific Name	Fed**
Bachman's Sparrow	<i>Aimophila aestivalis</i>	c2
Peregrine Falcon	<i>Falco peregrinus</i>	T
Red-cockaded Woodpecker	<i>Picoides (=Dendrocopos) borealis</i>	E
Least Tern	<i>Sterna antillarum</i>	E
Golden Eagle	<i>Aquila chrysaetos</i>	--
Lark Sparrow	<i>Chondestes grammacus</i>	--
Common Raven	<i>Corvus corax</i>	--
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T
Osprey	<i>Pandion haliaetus</i>	--
Bewick's Wren	<i>Thryomanes bewickii</i>	c2

MAMMALS

ENDANGERED

Common Name	Scientific Name	Fed**
Red Wolf (where listed as "Experimental population" in Tennessee)	<i>Canis rufus</i>	E
Eastern Cougar	<i>Felis concolor cougar</i>	E
Carolina Northern Flying Squirrel	<i>Glaucomys sabrinus coloratus</i>	E
Gray Myotis	<i>Myotis grisescens</i>	E
Indiana Myotis	<i>M. Sodalis</i>	E

THREATENED

Common Name	Scientific Name	Fed**
River Otter (Except west of Kentucky & Pickwick Lakes)	<i>Lutra canadensis</i>	--

APPENDIX C
CRUSTACEANS

ENDANGERED

Common Name	Scientific Name	Fed**
Nashville Crayfish	<i>Orconectes shoupi</i>	E

**Fed: E=Fed. End., T=Fed. Threat.,
c2=Candidate for Possible Federal Listing

c1=Candidate for Likely Federal Listing;

APPENDIX C

SECTION II. REGULATIONS

Except as provided in the Tennessee Code Annotated, Section 70-8-106 (d) and (e), it shall be unlawful for any person to take, harass, or destroy wildlife listed as threatened or endangered or otherwise to violate terms of Section 70-8-105 © or to destroy knowingly the habitat of such species without due consideration of alternatives for the welfare of the species listed in (1) of this proclamation, or (2) the United States list of Endangered fauna.

SECTION III. REPEAL OF PRIOR PROCLAMATIONS

This proclamation repeals Proclamation 86-30, dated November 14, 1986, as amended.

TENNESSEE WILDLIFE RESOURCES COMMISSION

Chairman

I certify that this is an accurate and complete copy of the proclamation lawfully promulgated and adopted by the Tennessee Wildlife Resources Commission on the 27th of September, 1994.

Secretary

Subscribed and sworn before me this the ____ day of _____, 1994.

Notary Public

My commission expires on the ____ day of _____, 199__.

Proclamation No 94-17 received and recorded this ____ day of _____, 199__.

Riley C. Darnell, Secretary of State

Proc. 94-17

APPENDIX D

APPENDIX D

SUMMARY OF PROCLAMATION 94-16

Robert M. Hatcher, endangered Species Coordinator

Tennessee Wildlife Resources Agency

September 27, 1994 (approved by Commission today)

Proclamation 94-16 repeals supplants Proc. 86-29 by deleting all previously-listed "Wildlife in Need of Management" and replacing them. A total of 36 changes are shown below:

No. By:	Fish	Amphi	Reptile	Birds	Mam	Tot
Former Sp.	38	6	6	14	13	77
Proposed	40	11	5	19	14	89
Retained	36	5	4	9	13	67
Delisted	0	1 Green Sala.	2 Cumb. Slider; 6-lined Race'r	4 Red-sh'ldered Hk; Black Vulture; Red-headed Woodpecker; Bl-Cr Night Heron	0	3
Uplisted (To T or E)	2 Bluemask; Palezone	0	0	1 Lark Sparrow	0	3
Downiest (to this level)	0	0	0	5 Sharp-shinned Hk; Cooper's Hawk Grasshopper Sp.; Northern Harrier; Miss. Kite	0	5
New Listings	4 Smoky Dace, Firebelly Darter, Bigmouth Shiner, N. Madtom	6 Seepage Salam., Bl'kbelly Salam., Pygmy S, Junaluska Wellers S.; Wehrie's	1 Coal Skink	5 N. Saw-whet Owl Olive-sided Flycatcher Little Blue Heron Snowy Egret King Rail	1 Rock Vole	17
Name Change	4	0	0	0	9	4

RMH:bh01066/data/wildlife/hatcher/list/94-16Sum.wp

APPENDIX D
TENNESSEE WILDLIFE RESOURCES COMMISSION
PROCLAMATION
WILDLIFE IN NEED OF MANAGEMENT

SECTION I. SPECIES

FISH

Alabama Shad	<i>Alosa alabamae</i>
Crystal Darter	<i>Ammocrypta asprella</i>
Naked Sand Darter	<i>A. beani</i>
Scaly Sand Darter	<i>A. vivax</i>
Highfin Carpsucker	<i>Carpionodes velifer</i>
Smoky Dace	<i>Clinostomus sp. cf. funduloides</i>
Sharphead Darter	<i>Etheostoma acuticeps</i>
Emerald Darter	<i>E. baileyi</i>
Teardrop Darter	<i>E. barbouri</i>
Splendid Darter	<i>E. barrenense (Ulocentra, sp.)</i>
Orangefin Darter	<i>E. bellum</i>
Ashy Darter	<i>E. cinereum</i>
Redband Darter	<i>E. luteovinctum</i>
Finescale Darter	<i>E. microlepidum</i>
Firebelly Darter (=Red Snubnose Darter)	<i>E. pyrrhogaster [=E. (Ulocentra)]</i>
Arrow Darter	<i>E. sagitta</i>
Striated (Duckriver Barcheek) Darter	<i>E. striatulum</i>
Tippecanoe Darter	<i>E. tippecanoe</i>
Tuscumbia Darter	<i>E. tuscumbia</i>
Golden Topminnow	<i>Fundulus chrysotus</i>
Flame Chub	<i>Hemitremia flammea</i>
Plains Minnow	<i>Hybognathus placitus</i>
Southern Brook Lamprey	<i>Ichthyomyzon gagei</i>
Silver Lamprey	<i>I. unicuspis</i>
Lined Chub	<i>Notropis lineapunctatus</i>

APPENDIX D

SECTION 1. SPECIES

FISH (continued)

Harelip Sucker	<i>Lagochila lacera</i>
Alligator Gar	<i>Lepisosteus spatula</i>
Sturgeon chub	<i>Macrohybopsis gelida</i>
Sicklefin Chub	<i>M. meeki</i>
Blackfin Sucker	<i>Moxostoma atripinne</i>
Bigmouth Shiner	<i>Notropis dorsalis</i>
Roseface Shiner	<i>N. r. rubellus</i>
Bedrock Shiner	<i>N. rupestris</i>
Northern Madtom	<i>Noturus stigmosus</i>
Tangerine Darter	<i>Percina aurantiaca</i>
Blotchside Logperch	<i>P. burtoni</i>
Blackfin Darter	<i>P. (Odontophilus) sp.</i>
Slenderhead Darter	<i>P. phoxocephala</i>
Tennessee (=Mountain Redbelly) Dace	<i>Phoxinus tennesseensis</i>
Southern Cavefish	<i>Typhlichthys subterraneus</i>

AMPHIBIANS

Mole Salamander	<i>Ambystoma talpoideum</i>
Hellbender	<i>Cryptobranchus a. alleganiensis</i>
Seepage Salamander	<i>Desmognathus aeneus</i>
Black-bellied Salamander	<i>D. quadramaculatus</i>
Black Mountain Dusky Salamander	<i>D. welteri</i>
Pygmy Salamander	<i>D. wrighti</i>
Junaluska Salamander	<i>Eurycea junaluska</i>
Four Toed Salamander	<i>Hemidactylium scutatum</i>
Barking Treefrog	<i>Hyla gratiosa</i>
Weller's Salamander	<i>Plethodon welleri</i>

APPENDIX D
REPTILES

Wehrle's Salamander	<i>P. wehrlei</i>
Green Anole	<i>Anolis carolinensis</i>
Coal Skink	<i>Eumeces anthracinus</i>
Alligator Snapping Turtle	<i>Macrochelys temminckii</i>
Green Water Snake	<i>Nerodia (Natrix) cyclopion</i>
Eastern Slender Glass Lizard	<i>Ophisaurus attenuatus longicaudus</i>

BIRDS

Sharp-shinned Hawk	<i>Accipiter striatus</i>
Cooper's Hawk	<i>A. cooperii</i>
Northern Saw-Whet Owl	<i>Aegolius acadicus</i>
Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Anhinga	<i>Anhinga anhinga</i>
Great Egret	<i>Casmerodius albus</i>
Northern Harrier	<i>Circus cyaneus</i>
Olive-sided Flycatcher	<i>Contopus borealis</i>
Little Blue Heron	<i>Egretta caerulea</i>
Snowy Egret	<i>E. thula</i>
Sandhill Crane	<i>Grus canadensis</i>
Mississippi Kite	<i>Ictinia mississippiensis</i>
Least Bitten	<i>Ixobrychus exilis</i>
Swainson's Warbler	<i>Limnithlypis swainsonii</i>
Double-crested Cormorant	<i>Phalacrocorax auritus</i>
Vesper Sparrow	<i>Pooecetes gramineus</i>
King Rail	<i>Callus elegans</i>
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>
Common Barn-Owl	<i>Tyto alba</i>

APPENDIX D

MAMMALS

Star-nosed Mole	<i>Condylura cristata</i>
Yellownose (=Rock) Vole	<i>Microtus chrotorrhinus</i>
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>
Small-footed Bat	<i>Myotis leibii</i>
Eastern Woodrat	<i>Neotoma floridana</i>
Hairy-tailed Mole	<i>Parascalops breweri</i>
Rafinesque's (=Eastern) Big-eared Bat	<i>Plecotus rafinesquii</i>
Masked Shrew	<i>Sorex cinereus</i>
Longtail Shrew	<i>S. dispar</i>
Smoky Shrew	<i>S. fumeus</i>
Southeastern Shrew	<i>S. longirostris</i>
Water Shrew	<i>S. palustris</i>
Southern Bog Lemming	<i>Synaptomys cooperi</i>
Meadow Jumping Mouse	<i>Zapus hudsonius</i>

Section II. REGULATIONS

- (1) Pursuant to Tennessee Code Annotated, Section 70-8-104(b):
 - (a) It shall be unlawful for any person to knowingly destroy the habitat of "Wildlife in Need of Management."
 - (b) The Executive Director of the Tennessee Wildlife Resources Agency may permit the taking, possession, transportation, exportation or shipment of species or subspecies on the list of "Wildlife in Need of Management" for scientific or educational purposes, for propagation in captivity or for other purposes to benefit the species.
 - (c) Upon good cause shown, and where necessary to alleviate damage to property, to protect human health and safety, "Wildlife in Need of Management" may be removed, captured, or destroyed but only pursuant to a permit issued by the Executive director, and by and under supervision of an agent of the agency; provided these species may be removed, captured, or destroyed without permit by any person in emergency situations involving immediate threat to human life; provided that such unpermitted actions are immediately reported to a wildlife officer.

APPENDIX E

APPENDIX E

CODES

Wind	0 = Calm 1 = Light air (leaves rustle) 2 = Light breeze (twigs rustle) 3 = Gentle breeze (branches rustle) 4 = Moderate breeze (tops bend)
Precipitation	0 = None 1 = Drizzle 2 = Light rain 3 = Moderate to heavy
Habitat	1 = Soft edge 2 = Hard edge 3 = Pine 4 = Hardwood 5 = Mixed Pine/Hardwood 6 = Stream (a) = fast running (b) = slow running 7 = Pond/Lake 8 = Marsh 9 = Old field/grassland 10= River 11= Riparian 12= Shrub < 2 meters 13= Cave 14= Newly cut
Age Class	1 = Grass/Forbes 2 = Shrub/seedling/sapling (Height <10', dbh <10cm) 3 = Pole/medium tree (Height 10'-30', dbh <10-20cm) 4 = Large Trees (Height >30', dbh > 20cm)
Estimated Plant Diversity	0 = 0-5 species 1 = 6-10 species 2 = 11-15 species 3 = 16-20 species 4 = 21-30 species 5 = 31-40 species 6 = 41-50 species 7 = >50
Fog	1 = Light, sporadic 2 = Dense in patches 3 = Dense everywhere
General Condition	1 = Healthy appearance 2 = Moderate appearance 3 = Poor appearance 4 = Dead

APPENDIX E

DATA SHEET: BIRDS

Date: _____ Site# _____ Transect # _____
 Time start _____ Time end: _____
 Field temp. (F) start: _____ Field temp. (F) end: _____ Aspect: _____
 Wind: _____ Precip.: _____ Cloudcover (%) _____ Veg. Ht (m) _____
 Open/forest: _____ Habitat: _____ Age class: _____ Diversity: _____

Species	Seen	Heard	Fly-over	Rec	Comments
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					

Comments: _____

Recorded by: _____ Date _____

Witnessed by: _____ Date _____

APPENDIX E

DATA SHEET: REPTILES , AMPHIBIANS AND MAMMALS

Date: _____ Site# _____ Transect # _____
 Time start _____ Time end: _____ Fog _____
 Field temp. (F) start: _____ Field temp. (F) end: _____ Aspect: _____
 Wind: _____ Precip.: _____ Cloudcover (%) _____ Veg. Ht (m) _____
 Open/forest: _____ Habitat: _____ Age class: _____ Diversity: _____

Species	Trans #	Trap #	Length (mm)	Weight (g)	Sex	Gen. Conds.
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						

Comments: _____

Recorded by: _____ Date _____

Witnessed by: _____ Date _____

APPENDIX E

HABITAT DATA PROTOCOL

SITE #

Actual site surveyed.

TRANSECT#

Each site will generally consist of three transects. This should have already been assigned.

UTM COORDINATES

These coordinates should be taken from Oak Ridge Reservation Map S-16A with grid lines established. It may be possible to record this information for each transect.

AREA

This is a general name for the area where sites are located. One or more sites could be located in an area. e.g. Bull's Bluff.

LATITUDE AND LONGITUDE

Taken with ground positioning unit.

DEVELOPMENT

Is the closest distance between a transect and any type of human development, recorded in Kilometers.

PERCENT SLOPE

The percentage of slope across the transect. This is not necessarily the slope of the steepest portion in the transect. This percentage should be taken using a clinometer. Holding the clinometer at eye level and finding a point on a tree at same height as eye level, at the end of the transect, should provide the correct percentage in the right side of the window of the clinometer.

ASPECT

Direction in which the slope of the land is facing, using the four cardinal directions.

LITTER DEPTH

The depth of the organic matter measured in centimeters. Use a stick to measure depth, then measure the stick on a tape measure.

CANOPY HEIGHT

Measured in Meters, by selecting a tree in the upper canopy that is representative of the height of all dominant trees along the transect. Measured with a clinometer and tape.

GROUND COVER HEIGHT

Measured in meters. Generally including vegetation that is less than 2m. Select ground vegetation that is a representative height along the transect

SUBCANOPY HEIGHT

Measured in meters. Generally including vegetation at least 3-4m tall. Select a tree in the subcanopy that a representative height for all subcanopy trees along the transect

APPENDIX E

Habitat Data Protocol (continued)

AGE CLASS

Gives a general age description of a timber stand and can be recorded as follows.

1 = Grass/Forbes

2 = Shrub/Seedling/Sapling (Ht. < 3m, dbh < cm)

3 = Pole/Medium Tree (Ht. 3-10m, dbh 10-20cm)

4 = Large trees (Ht. >10m', dbh > 20cm)

BASAL AREA

Measured in m^2 /ha, this will estimate the cross-sectional area of a tree at breast height, by using a cruz-all.

PRESENT CANOPY COVER

Should be expressed using a percentage taken from a densiometer. Observing the number of squares filled on the densiometer.

FEATURES

Closest structure, excluding roads, to the transect should be recorded along with proximity.

TOPOGRAPHY

A thorough description of the general lay of the land. e.g. rolling slopes, river boundary, rocky cliffs, roads, distances, etc.

GENERAL DESCRIPTION

Any description that may not be included in other information. e.g. appearance, access, activity, etc.

NOTES

Any information pertinent to characterizing or describing things such as habitat, features, animals, etc.

NAME(S) AND DATE

Recorded each time data is taken.

SPECIES

The species of vegetation, common name, measured should be recorded. List each species as it is measured. A species may appear several times along the transect.

LENGTH

Used for measuring ground vegetation and is recorded in meters. e.g. Greenbrier, vines, Hedge Privet, etc.

dbh

(Diameter breast height) The diameter of a tree at breast height (4.5 ft.), measured by a diameter tape, usually expressed in cm.

n/a

(Not applicable) this notation should be used on the data sheet when one of the above characters can not be recorded because of absence. Otherwise, if a blank space is left on the data sheet it can be assumed that those variables have not yet been measured or recorded.

APPENDIX E

HABITAT DATA

SITE#: _____ TRANSECT# _____ UTM X: _____ Y: _____

AREA: _____ COVER TYPE: _____

LATITUDE: _____ LONGITUDE: _____

DEVELOPMENT (km): _____ % SLOPE: _____ ASPECT: _____

LITTER DEPTH (cm): _____ CANOPY HT. (m): _____

GROUND VEG. HT. (m): _____ SUBCANOPY HT. (m): _____

AGE CLASS: _____ BASAL AREA (m² / ha): _____

% CANOPY COVER: _____

FEATURES:

TOPOGRAPHY:

GENERAL DESCRIPTION:

NOTES:

NAME(S): _____

DATE: _____

VEGETATION DATA

DATE:

Canopy (C)
Subcanopy (S)
Groundcover (G)

111

APPENDIX F

APPENDIX F

HABITAT DATA

SITE#: 4 TRANSECT# 1 UTM X: _____ Y: _____

AREA: 0800 Area COVER TYPE: Pine Plantation

LATITUDE: _____ LONGITUDE: _____

DEVELOPMENT (km): <1km % SLOPE: 2 ASPECT: SW

LITTER DEPTH (cm): 6cm CANOPY HT. (m): _____

GROUND COVER HT. (m) 1 SUBCANOPY HT. (m): _____

AGE CLASS: 4 BASAL AREA (m² / ha): _____

% CANOPY COVER: 97

FEATURES:

Old building located no farther than 50m from these transects. <1km from buildings at 0855. WAG site 13 located close to these areas. Gravel road, main road, <.5km West of this site.

TOPOGRAPHY:

Area is generally flat. Clinch River is located about .5km to the West of this site. Possibly this area was irradiated before it was turned into a pine plantation.

GENERAL DESCRIPTION:

This area is active. Little traveled within the site occurs. However much travel takes place along the adjacent roads. There is another old WAG site >.5km and a biomass study which contains Sycamore, Sweetgum and Switch Grass crops growing about 10m from the site.

NOTES: This site is located in a pine plantation, but border a field. Several canopy openings were found from blown down trees. Some bare spots were evident in the plantation (pine needed only).

NAME(S): Research Assistant

DATE 10/10/94

APPENDIX F

VEGETATION DATA

SITE#: 4

Transect #: 1

Date: 10/11/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Nepal Grass	7.8m		G
0m	Boxelder	.2m		C
0m	Poison Ivy	7m		G
0m	Loblolly Pine	7m	20cm	C
10m	Bare Ground	5.3m		G
10m	Loblolly Pine	10m	31cm	C
20m	Nepal Grass	10m		G
20m	Red Cedar	1m		S
20m	Loblolly Pine	10m	27cm	C
30m	Gap	5.9m		G
30m	Loblolly Pine	10m	35cm	C
30m	Nepal Grass	8.3m		G
40m	Honeysuckle	.6m		G
40m	Unknown Vine	.7m		G
40m	Loblolly Pine	10m	40cm	C
50m	Nepal Grass	2.3m		G
50m	Honeysuckle	.2m		G
50m	Loblolly Pine	10m	36cm	C

APPENDIX F

HABITAT DATA

SITE#: 4 TRANSECT# 2 UTM X: _____ Y: _____

AREA: 0800 Area COVER TYPE: Pine Plantation

LATITUDE: _____ LONGITUDE: _____

DEVELOPMENT (km): <1km % SLOPE: 2 ASPECT: SW

LITTER DEPTH (cm): 7cm CANOPY HT. (m): _____

GROUND COVER HT. (m) 1 m SUBCANOPY HT. (m): _____

AGE CLASS: 4 BASAL AREA (m² / ha): 29

% CANOPY COVER: 96

FEATURES:

Old building located no farther than 50m from these transects. <1km from buildings at 0855. WAG site 13 located close to these areas. Gravel road, main road, <.5km West of this site.

TOPOGRAPHY:

Area is generally flat. Clinch River is located about .5km to the West of this site. Possibly this area was irradiated before it was turned into a pine plantation.

GENERAL DESCRIPTION:

This area is active. Little traveled within the site occurs. However much travel takes place along the adjacent roads. There is another old WAG site >.5km and a biomass study which contains Sycamore, Sweetgum and Switch Grass crops growing about 10m from the site.

NOTES: This site is located in a pine plantation, but border a field. Several canopy openings were found from blown down trees. Some bare spots were evident in the plantation (pine needed only).

NAME(S): Research Assistant

DATE: 10/10/94

APPENDIX F

VEGETATION DATA

SITE#: 4

Transect#: 2

Date: 10/10/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Loblolly Pine	9.6m	16cm	C
10m	Nepal Grass	3.9m		G
10m	Opening	1.9m		G
10m	Boxelder	.5m	26cm	C
20m	Red Cedar		9cm	S
20m	Mulberry	9.3m	12.5cm	C
20m	Boxelder	4m		S
20m	Dogwood	2.77m	4cm	S
20m	Nepal Grass	10m		G
30m	Spicebush	.15m		S
30m	Honeysuckle	.4m		G
30m	Dogwood	1m		S
30m	Loblolly Pine	10m	31cm	C
40m	Southern Red Oak	.2m		S
40m	Black Cherry	.2m		S
40m	Loblolly Pine	10m	15cm	C
50m	Nepal Grass	.6m		G
50m	Christmas Fern	.3m		G
50m	Wild Strawberry	.9m		G
50m	Loblolly Pine	10m	41cm	C
50m	Honeysuckle	1.1m		G

APPENDIX F

HABITAT DATA

SITE#: 4 TRANSECT# 3 UTM X: _____ Y: _____

AREA: 0800 Area COVER TYPE: Pine Plantation

LATITUDE: _____ LONGITUDE: _____

DEVELOPMENT (km): <1km % SLOPE: 3 ASPECT: SW

LITTER DEPTH (cm): 5cm CANOPY HT. (m): _____

GROUND COVER HT. (m): _____ 1 m SUBCANOPY HT. (m): _____

AGE CLASS: 4 BASAL AREA (m² / ha): 32

% CANOPY COVER: 98

FEATURES:

Old building located no farther than 50m from these transects. <1km from buildings at 0855. WAG site 13 located close to these areas. Gravel road, main road, <.5km West of this site.

TOPOGRAPHY:

Area is generally flat. Clinch River is located about .5km to the West of this site. Possibly this area was irradiated before it was turned into a pine plantation.

GENERAL DESCRIPTION:

This area is active. Little traveled within the site occurs. However much travel takes place along the adjacent roads. There is another old WAG site >.5km and a biomass study which contains Sycamore, Sweetgum and Switch Grass crops growing about 10m from the site.

NOTES: This site is located in a pine plantation, but border a field. Several canopy openings were found from blown down trees. Some bare spots were

NAME(S): Research Assistant

DATE 10/10/94

APPENDIX F

VEGETATION DATA

SITE#: 4

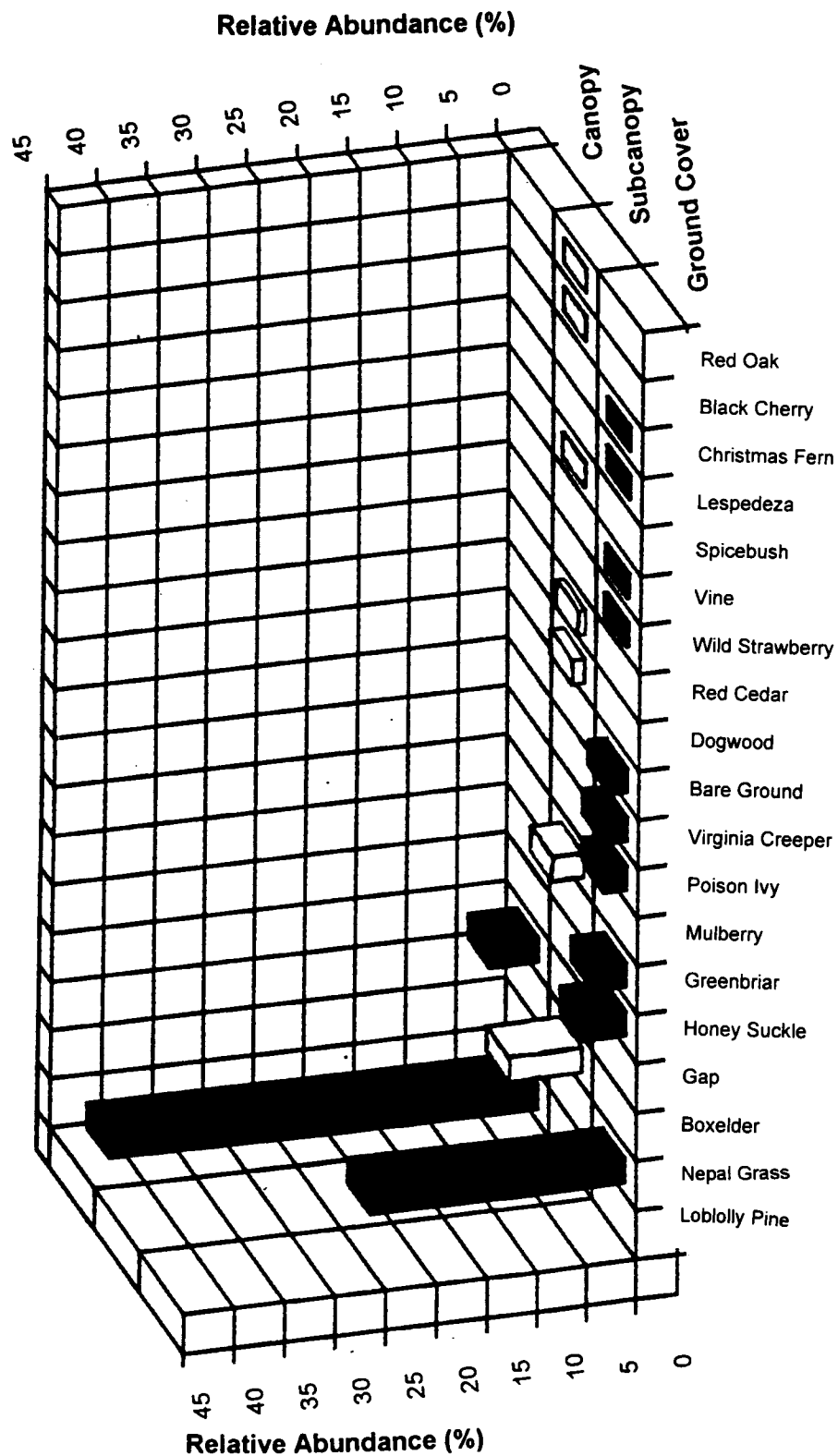
Transect#: 3

Date: 10/10/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Nepal Grass	4.7m		G
0m	Loblolly Pine	10m	25cm	C
10m	Nepal Grass	.1m		G
10m	Spicebush	.4m		S
10m	Loblolly Pine	10m	28cm	C
20m	Gap	1m		G
20m	Honeysuckle	.5m		G
20m	Loblolly Pine	10m	15cm	C
30m	Gap	6.1m		G
30m	Nepal Grass	10m		G
30m	Honeysuckle	10m		G
30m	Greenbrier	10m		G
30m	Loblolly Pine	10m	31cm	C
30m	Lespedeza	.3m		G
40m	Honeysuckle	.5m		G
40m	Nepal Grass	10m		G
40m	Boxelder	10m	26cm	S
40m	Virginia Creeper	6.8m		G
50m	Nepal Grass	10m		G
50m	Boxelder	8m	34.5cm	S
50m	Loblolly Pine	10m	70cm	C

APPENDIX F
FIGURE 4: SITE 4: 0800 AREA VEGETATION PROFILE

SITE 4: 0800 AREA VEGETATION PROFILE



APPENDIX F

HABITAT DATA

SITE#: 5 TRANSECT# 1 UTM X: 748010.375 Y: 177987.063

AREA: Muskrat Marsh COVER TYPE: Hardwood

LATITUDE: _____ LONGITUDE: _____

DEVELOPMENT (km): <.5 % SLOPE: _____ ASPECT: NE

LITTER DEPTH (cm): _____ CANOPY HT. (m): _____

GROUND COVER HT. (m) 1.5 SUBCANOPY HT. (m): _____

AGE CLASS: 2 - 3 BASAL AREA (m² / ha): 11

% CANOPY COVER: 44

FEATURES:

Site is located 5.5km from building 0855 Area. Site Jones Island Road is to the West.

TOPOGRAPHY:

This a low-lying site that is flooded periodically by water control efforts of TVA.

The area has vegetation that is commonly found in wet areas. The site is bordered by Muskrat Marsh and the Clinch River <.5km.

GENERAL DESCRIPTION:

Area begins as a thin early sucssional forest and moved into a well developed pine plantation. Easily accessible. Traffic through this area comes usually by vehicles using Jones Island Road.

NAME(S): Research Assistant

DATE 10/24/94

APPENDIX F

VEGETATION DATA

SITE# 5

TRANSECT # 1

DATE: 10/11/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Nepal Grass	10m		G
0m	Hackberry	2.2m	6cm	S
0m	Poison Ivy	.5m		G
0m	Boxelder	2.4m	16cm	S
0m	Spicebush	1.5m		S
10m	Hedge Privet	3m		G
10m	Nepal Grass	10m		G
10m	Honeysuckle	2m		G
10m	Weed	2m		G
20m	Hedge Privet	.2m		G
20m	Nepal Grass	10m		G
20m	Greenbrier	1.3m		G
20m	Green Ash	8m	12cm	C
20m	Wild Strawberry	.2m		G
30m	Boxelder	2m	10cm	C
30m	Black Willow	4.2m	14cm	C
30m	Nepal Grass	10m		G
30m	Hedge privet	1m		G
40m	Boxelder	2.4m	4cm	S
40m	Nepal Grass	.3m		G
40m	Silver Maple	12.5m	23cm	C
50m	Nepal Grass	10m		G
50m	Silver Maple	6.2m	6cm	S
5m	Loblolly Pine	11.3m	50cm	C

APPENDIX F

HABITAT DATA

SITE#: 5 TRANSECT# 2 UTM X: _____ Y: _____

AREA: Muskrat Marsh COVER TYPE: Hardwood

LATITUDE: _____ LONGITUDE: _____

DEVELOPMENT (km): <.5 % SLOPE: 0 / 1 ASPECT: NE

LITTER DEPTH (cm): 2 CANOPY HT. (m): _____

GROUND COVER HT. (m) 2 SUBCANOPY HT. (m): _____

AGE CLASS: 3 BASAL AREA (m² / ha): 11

% CANOPY COVER: 48

FEATURES:

Site is located <.5km from 0855 Area. Site also is bordered by Jones Island Road on the West.

TOPOGRAPHY:

This a low-lying site that is flooded periodically by water control efforts of TVA.

The area has vegetation that is commonly found in wet areas. The site is bordered by Muskrat Marsh and the Clinch River.

GENERAL DESCRIPTION:

Area begins as a thin early sucessional forest and moved into a well developed pine plantation. Easily accessible. Traffic through this area comes usually by vehicles using Jones Island Road.

NAME(S): Research Assistant

DATE: 10/11/94

APPENDIX F

VEGETATION DATA

SITE# 5

TRANSECT # 2

DATE: 10/11/97

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Alder	2m		G
0m	Silver Maple	6m	27cm	C
0m	Red Cedar	4.4m	21cm	C
0m	Spicebush	3.2m		S
0m	Nepal Grass	10m		G
0 m	Poison Ivy	.1m		G
10m	Sycamore	7.9m	43.5cm	S
10m	Sycamore	12m	47.5cm	C
10m	Nepal Grass	10m		G
10m	Hedge Privet	.7m		G
10m	Honeysuckle	.1m		G
20m	Honeysuckle	.4m		G
20m	Nepal Grass	10m		G
20m	Honeysuckle	1.5m		G
20m	Nepal Grass	10m		G
20m	American Elm	2.9m	24.5	C
30m	Boxelder	.6m		G
30	Nepal Grass	10m		G
30m	Hedge Privet	.3m		G
30m	American Elm	9m	27cm	C
30m	Boxelder	6m	12.5cm	S
30m	Moss	.6m		G

APPENDIX F

HABITAT DATA

SITE#: 5 TRANSECT# 3 UTM X: _____ Y: _____

AREA: Muskrat Marsh COVER TYPE: Hardwood

LATITUDE: _____ LONGITUDE: _____

DEVELOPMENT (km): <.5 % SLOPE: 2 ASPECT: NE

LITTER DEPTH (cm): 2 CANOPY HT. (m): _____

GROUND COVER HT. (m) 1 - 2 SUBCANOPY HT. (m): _____

AGE CLASS: 3 BASAL AREA (m² / ha): 21

% CANOPY COVER: 97

FEATURES:

Site located >.5km from building 0855. Site also borders Jones Island Road to the West.

TOPOGRAPHY:

This a low-lying site that is flooded periodically by water control efforts of TVA.

The area has vegetation that is commonly found in wet areas. The site is bordered by Muskrat Marsh and the Clinch River.

GENERAL DESCRIPTION:

Transition into pine plantation. The beginning of the transect has many saplings and appears that it was drastically thinning at some time. Area easily accessible. Much traffic on Bear Creek Road.

NOTES:

NAME(S): Research Assistant

DATE 10/24/94

APPENDIX F

VEGETATION DATA

SITE# 5

TRANSECT # 3

DATE: 10/13/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Loblolly Pine	10.3m	42cm	C
0m	Loblolly Pine	7.7m	38cm	C
0m	Nepal Grass	.1m		G
0m	Boxelder	5.8m	6cm	S
10m	Sweetgum	5.5m	6cm	S
10m	Loblolly Pine	7.5m	43cm	C
10m	Yellow Poplar	5.2m	18cm	C
10m	Honeysuckle	1.m		G
20m	Loblolly Pine	8.7m	39cm	C
20m	Honeysuckle	10m		G
20m	American Elm	9.2m	19cm	C
30m	Spicebush	3m		G
30m	Hackberry	6.8m	11cm	S
30m	Sycamore	9.3m	33cm	C
30m	Loblolly Pine	9.1m	38cm	C
30m	Yellow Poplar	7.9m	28cm	C
30m	Nepal Grass	10m		
30m	Honeysuckle	.8m		G
40m	Nepal Grass	10m		G
40m	Poison Ivy	.3m		G
40m	Honeysuckle	3m		G
40m	Gap	6.1m		G
40m	Boxelder	5.5m	32cm	C
50m	Shortleaf Pine	10m		C

APPENDIX F

VEGETATION DATA

SITE# 5

TRANSECT # 3

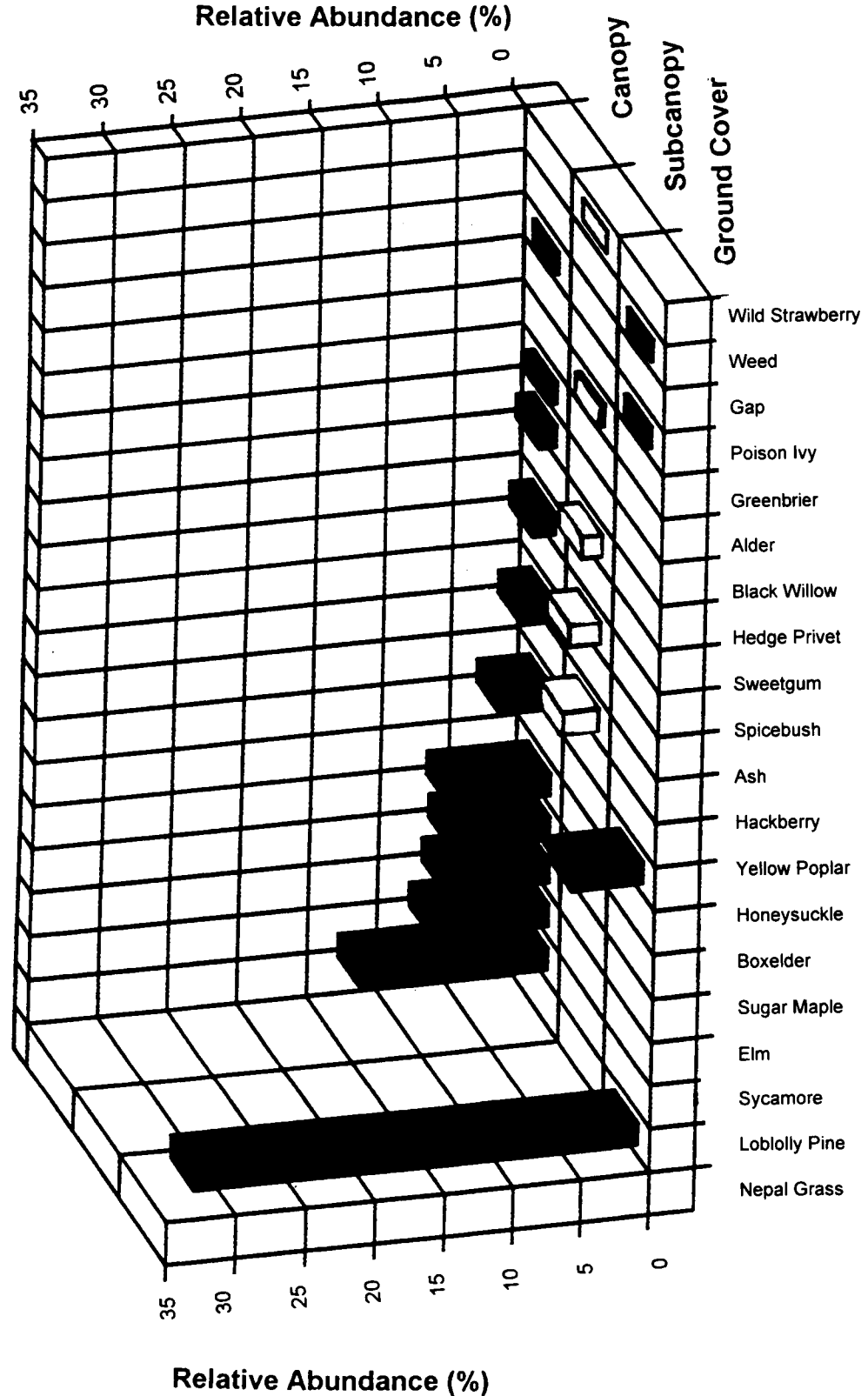
DATE: 10/13/94

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APPENDIX F

FIGURE 5: SITE 5: MUSKRAT MARSH VEGETATION PROFILE

SITE 5: MUSKRAT MARSH VEGETATION PROFILE



APPENDIX F

HABITAT DATA

SITE#: 7 TRANSECT# 1 UTM X: 757803.375 Y: 180463.984
AREA: Bull's Bluff COVER TYPE: Old Field / Grassland
LATITUDE: 355649.7 LONGITUDE: 84152.91
DEVELOPMENT (km): 1 % SLOPE: 3 ASPECT: NE
LITTER DEPTH (cm): 4.5 CANOPY HT. (m): n/a
GROUND COVER HT. (m) 1.4 SUBCANOPY HT. (m): n/a
AGE CLASS: n/a BASAL AREA (m² / ha): n/a
% CANOPY COVER: 0

FEATURES:

The closest features appears to be development across Melton Hill Lake, about 1km. About 2.5 km from Clark Park

TOPOGRAPHY:

Melton Hill Lake is located directly to the east of this site, about 200 meters.
The transects are separated by a gravel road which runs between them,
Gallahar Bend Road. This site is generally flat, but slopes toward the east.

GENERAL DESCRIPTION:

This area is easily accessible. Dense ground vegetation covers the site, with a mixture of Greenbrier, weeds, etc. This appears to be an abandoned field possibly mowed every 2-3 years. Relatively few people travel through this area.
This transect begins along gravel road and runs east toward Melton Hill Lake.

NOTES: This site is an old field but is bordered by pine and hardwood forest.

NAME(S): Research Assistant DATE 10/11/94

APPENDIX F

VEGETATION DATA

SITE# 7

TRANSECT# 1

DATE: 10/11/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Fescue	1m		G
10m	Honeysuckle	4m		G
10m	Milo	.75m		G
10m	Fescue	10m		G
20m	Ironweed	.3m		G
20m	Milo	.8m		G
20m	Honeysuckle	4m		G
20m	Greenbrier	.2m		G
30m	Fescue	10m		G
30m	Milo	.3m		G
30m	Lespedeza	2.6m		G
30m	Honeysuckle	.12m		G
40m	Milo	.3m		G
40m	Fescue	10m		G
40m	Lespedeza	10m		G
40m	Unknown	.2m		G
50m	Milo	.65m		G
50m	Honeysuckle	10m		G
50m	Fescue	10m		G
50m	Lespedeza	10m		G

APPENDIX F

HABITAT DATA

SITE#: 7 TRANSECT# 2 UTM X: 757803.375 Y: 180463.984
AREA: Bull's Bluff COVER TYPE: Old field / grassland
LATITUDE: 355649.7 LONGITUDE: 84152.91
DEVELOPMENT (km): 1 % SLOPE: 3 ASPECT: NE
LITTER DEPTH (cm): 4 CANOPY HT. (m): n/a
GROUND COVER HT. (m) 1.4 SUBCANOPY HT. (m): n/a
AGE CLASS: n/a BASAL AREA (m² / ha): n/a
% CANOPY COVER: 0

FEATURES:

The closest features appears to be development across Melton Hill Lake, about 1km and Clark Park 2.5 km.

TOPOGRAPHY:

Melton Hill Lake is located directly to the east of this site, about 100m. This transect parallels the gravel road, Gallagher Bend Road. This site is generally flat, but slopes towards the east.

GENERAL DESCRIPTION:

This site is easily accessible. Dense ground vegetation covers the site, with a mixture of Greenbrier, weeds, etc. This appears to be an abandoned field, possibly mowed every 2-3 years. Relatively few people travel through this area. The transect begins along the gravel road and runs east towards Melton Hill Lake

NOTES: This site is an old field, but is bordered by pine and hardwood forest.

NAME(S): Research Assistant DATE 10/10/94

APPENDIX F

VEGETATION DATA

SITE#: 7

TRANSECTS#: 2

DATE: 10/10/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Fescue	10m		G
0m	Lespedeza	10m		G
0m	Greenbrier	.4m		G
10m	Milo	1.2m		G
10m	Lespedeza	1.2m		G
10m	Fescue	10m		G
20m	Milo	1.1m		G
20m	Lespedeza	10m		G
20m	Fescue	10m		G
30m	Milo	.8m		G
30m	Sedge	2.4m		G
30m	Fescue	10m		G
30m	Lespedeza	10m		G
40m	Milo	.3m		G
40m	Greenbrier	1.4m		G
40m	Lespedeza	10m		G
40m	Fescue	10m		G
50m	Milo	.3m		G
50m	Fescue	10m		G

APPENDIX F

HABITAT DATA

SITE#: 7 TRANSECT# 3 UTM X: 757803.375 Y: 180463.984
AREA: Bull's Bluff COVER TYPE: Old Field / Grassland
LATITUDE: 355649.7 LONGITUDE: 84152.91
DEVELOPMENT (km): 1 % SLOPE: 4.5 ASPECT: SW
LITTER DEPTH (cm): 4 CANOPY HT. (m): n/a
GROUND COVER HT. (m) 1.4 SUBCANOPY HT. (m): n/a
AGE CLASS: n/a BASAL AREA (m² / ha): n/a
% CANOPY COVER: 0

FEATURES:

The closest features appears to be development across Melton Hill Lake about 1km and Clark Park 2.5km.

TOPOGRAPHY:

Melton Hill Lake is located directly to the west of this site, about 100km. This transect is perpendicular to the gravel road, Gallagher Bend Road. This site is generally flat, but slopes toward the west.

GENERAL DESCRIPTION:

This site is easily accessible. Dense ground vegetation covers the site, with a mixture of Greenbrier, weeds, etc. This appears to be an abandoned field, possibly mowed every 2-3 years. Relatively few people travel through this area. This transect begins along the gravel road and runs west towards Melton Hill Lake.

NOTES: This site is an old field, but is bordered by Pine and Hardwood forest.

NAME(S): Research Assistant

DATE 10/11/94

APPENDIX F

VEGETATION DATA

SITE#: 7

TRANSECTS#: 3

DATE: 10/11/94

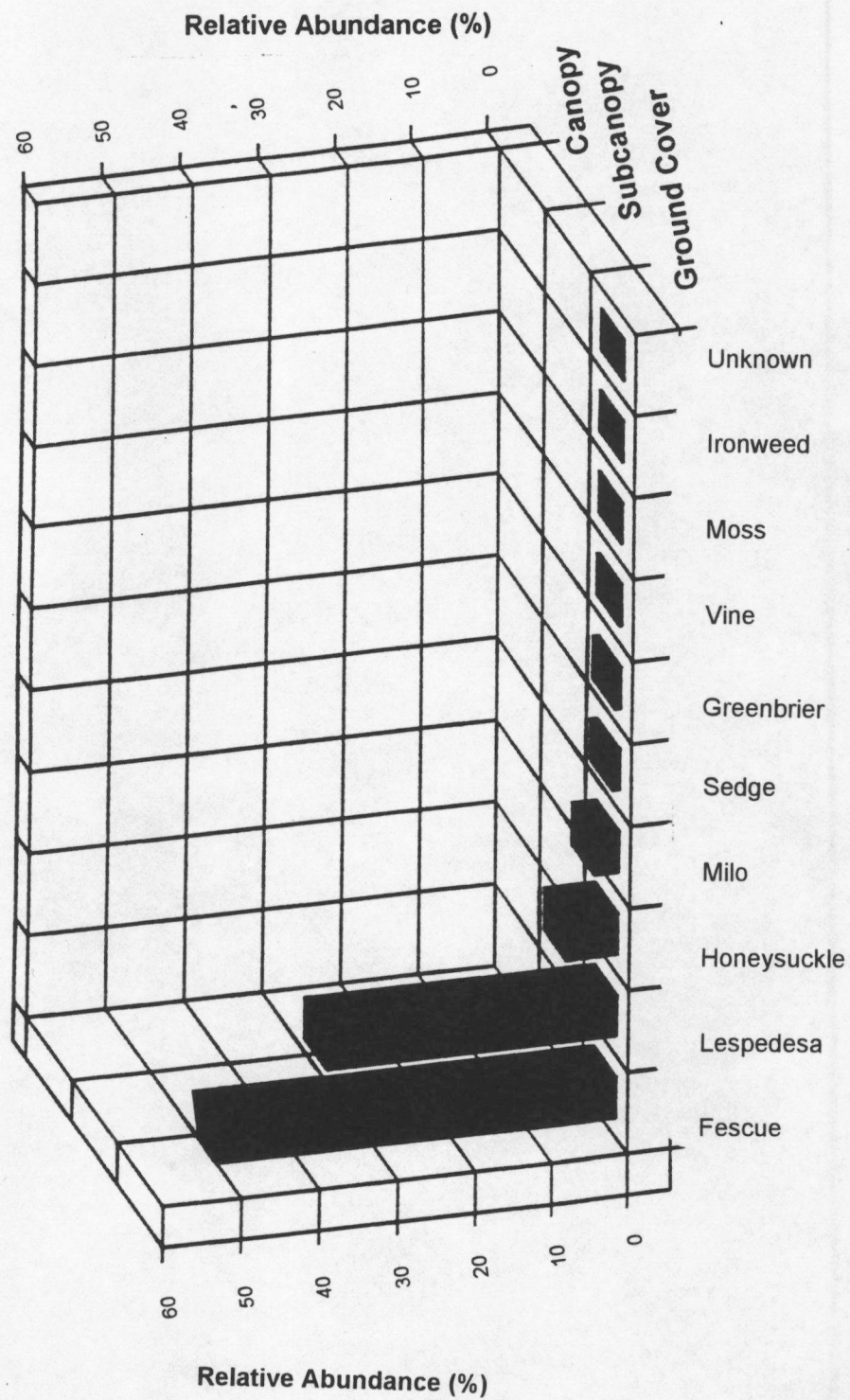
Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Unknown Vine	.2m		G
0m	Lespedeza	10m		G
0m	Fescue	10m		G
10m	Milo	.5m		G
10m	Fescue	10m		G
10m	Lespedeza	10m		G
20m	Milo	.5m		G
20m	Lespedeza	10m		G
20m	Fescue	10m		G
30m	Milo	.2m		G
30m	Vine	.2m		G
30m	Fescue	10m		G
30m	Lespedeza	10m		G
40m	Milo	.75m		G
40m	Vine Unknown	.4m		G
40m	Fescue	10m		G
40m	Unknown Moss	.3m		G
50m	Honeysuckle	.3m		G
50m	Fescue	10m		G

SOUTHWORTH
PARCHMENT DEED
100% COTTON

APPENDIX F

FIGURE 6: SITE 7: BULL'S BLUFF VEGETATION PROFILE

SITE 7: BULL'S BLUFF VEGETATION PROFILE



APPENDIX F

HABITAT DATA

SITE#: 9 TRANSECT# 1 UTM X: 749116.688 Y: 180365.828
AREA: McNew Hollow COVER TYPE: Mixed; Pine/Hardwood
LATITUDE: 355651.4 LONGITUDE: 842049.4
DEVELOPMENT (km): > .5km % SLOPE: 1 ASPECT: SW
LITTER DEPTH (cm): 2 CANOPY HT. (m): _____
GROUND COVER HT. (m) .60 SUBCANOPY HT. (m): _____
AGE CLASS: 3 BASAL AREA (m² / ha): 7
% CANOPY COVER: 89

FEATURES:

Less than 50m from Highway 95. > .5km from a radioactive burial facility. Snag standing at end of transect. Stream also runs through transect.

TOPOGRAPHY:

Area generally hilly with steep slopes. This transect in a low lying area very close to Hembree Marsh.

GENERAL DESCRIPTION:

This transect begins about 10m west on small bridge on Old County road. Road runs almost parallel with transect. Fairly active area road traveled frequently, easily accessible. Transect borders stream. Boards placed in this area. Pitfalls placed in this area.

NOTES: Location close to Hembree Cemetery.

NAME(S): Research Assistant

DATE 09/14/94

APPENDIX F

VEGETATION DATA

SITE#: 9

Transect#: 1

Date: 09/14/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Nepal Grass	7.3m		G
0m	Greenbrier	.3m		G
0m	Weed	.21m		G
0m	Hedge Privet	2m		G
10m	Virginia Pine	7m	33cm	C
10m	Weed	.24m		G
10m	Virginia Creeper	.16m		G
10m	Honeysuckle vine	.4m		G
20m	Yellow Poplar	6.8m	19cm	S
20m	Nepal Grass	.28m		G
20m	Greenbrier	.13m		G
20m	Dogwood	1.1m		S
30m	Yellow Poplar	4.8m	11cm	C
30m	Prison Ivy	.6m		G
30m	Wild Strawberry	.2m		G
30m	Nepal Grass	.9m		G
40m	Nepal Grass	4.1m		G
40m	Sweetgum	2m		S
40m	American Beech	4m		C
50m	Nepal grass	6m		G
50m	Red Maple	.5m		G
50m	Honeysuckle	.1m		G

APPENDIX F

HABITAT DATA

SITE#: 9 TRANSECT# 2 UTM X: 749116.688 Y: 180365.828

AREA: McNew Hollow COVER TYPE: Mixed; Pine/Hardwood

LATITUDE: 355651.4 LONGITUDE: 842049.4

DEVELOPMENT (km): >.5km % SLOPE: 6 ASPECT: W

LITTER DEPTH (cm): 3.5 CANOPY HT. (m):

GROUND COVER HT. (m): .4 SUBCANOPY HT. (m):

AGE CLASS: 4 BASAL AREA (m² / ha): 19

% CANOPY COVER: 97

FEATURES:

Less than 50m from Highway 95. >.5km from a radioactive burial facility.

Location close to Hembree Cemetery.

TOPOGRAPHY:

Transect located in a hilly area with steep slopes rolling into a stream . Transect about 80m from Hembree Marsh.

GENERAL DESCRIPTION:

Transect runs parallel to the stream on the East side. The transect os located along side a hill. Boards placed in this area. Pitfall traps placed in this area.

Road (Old County Rd.) Runs parallel with transect. Area easily accessible.

NOTES:

NAME(S): Research Assistant

DATE 09/14/94

APPENDIX F

VEGETATION DATA

SITE#: 9

Transect #: 2

Date: 09/14/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Shortleaf Pine	5.94m	18cm	C
0m	American Beech	5m	1cm	S
0m	Sweetgum	5.5m	18cm	C
0m	Strawberry Bush	.8m		G
0m	Red Maple	1.7m		S
10m	Red Maple	1.3m		G
10m	Southern Red Oak	5.6m	23cm	C
10m	American Beech	2.0m	27cm	C
10m	Honeysuckle Vine	.81m		G
10m	Red Cedar	1.6m	6.5cm	S
10m	Virginia Pine	3.0m	10cm	C
20m	Virginia Pine	25.5	6.4cm	C
20m	Red Maple	1.8m	1.5cm	C
20m	Red Maple	2.3m		S
20m	Black Cherry	2.2m		S
20m	Pipsissewa	.4m		G
20m	Honeysuckle	4.2		G
30m	Shortleaf Pine	8.8m	33.8cm	C
30m	Dogwood	4.8	5.3m	S
30m	Blackgum	.16m		S
40m	American Beech	7.6m	27.5cm	C
40m	White Oak	11m	33.0m	C
50m	Sourwood	11.8m	6.4cm	S
50m	Chestnut Oak	5m	20cm	C

APPENDIX F

HABITAT DATA

SITE#: 9 TRANSECT# 3 UTM X: 749116.688 Y: 180365.828

AREA: McNew Hollow COVER TYPE: Mixed; Pine / Hardwood

LATITUDE: 355651.4 LONGITUDE: 842049.4

DEVELOPMENT (km): >.5km % SLOPE: 1 ASPECT: W

LITTER DEPTH (cm): 4 CANOPY HT. (m):

GROUND COVER HT. (m) .4 SUBCANOPY HT. (m):

AGE CLASS: 4 BASAL AREA (m² / ha): 17

% CANOPY COVER: 90

FEATURES:

150m from Highway 95. >.5km from a radioactive burial facility.

TOPOGRAPHY: Transect located on a shoulder at the bottom of a large hill.

Area hilly with steep slopes.

GENERAL DESCRIPTION:

Transect runs parallel with stream. Transect crosses stream towards the end.

Located on West side of bridge on Old County road. Area active and traveled frequently. Boards and pitfall traps placed in this area. Some large snags just outside the transect.

NOTES: Location close to Hembree Cemetery. About 100m from Hembree Marsh.

NAME(S): Research Assistant

DATE 09/14/94

APPENDIX F

VEGETATION DATA

SITE#: 9

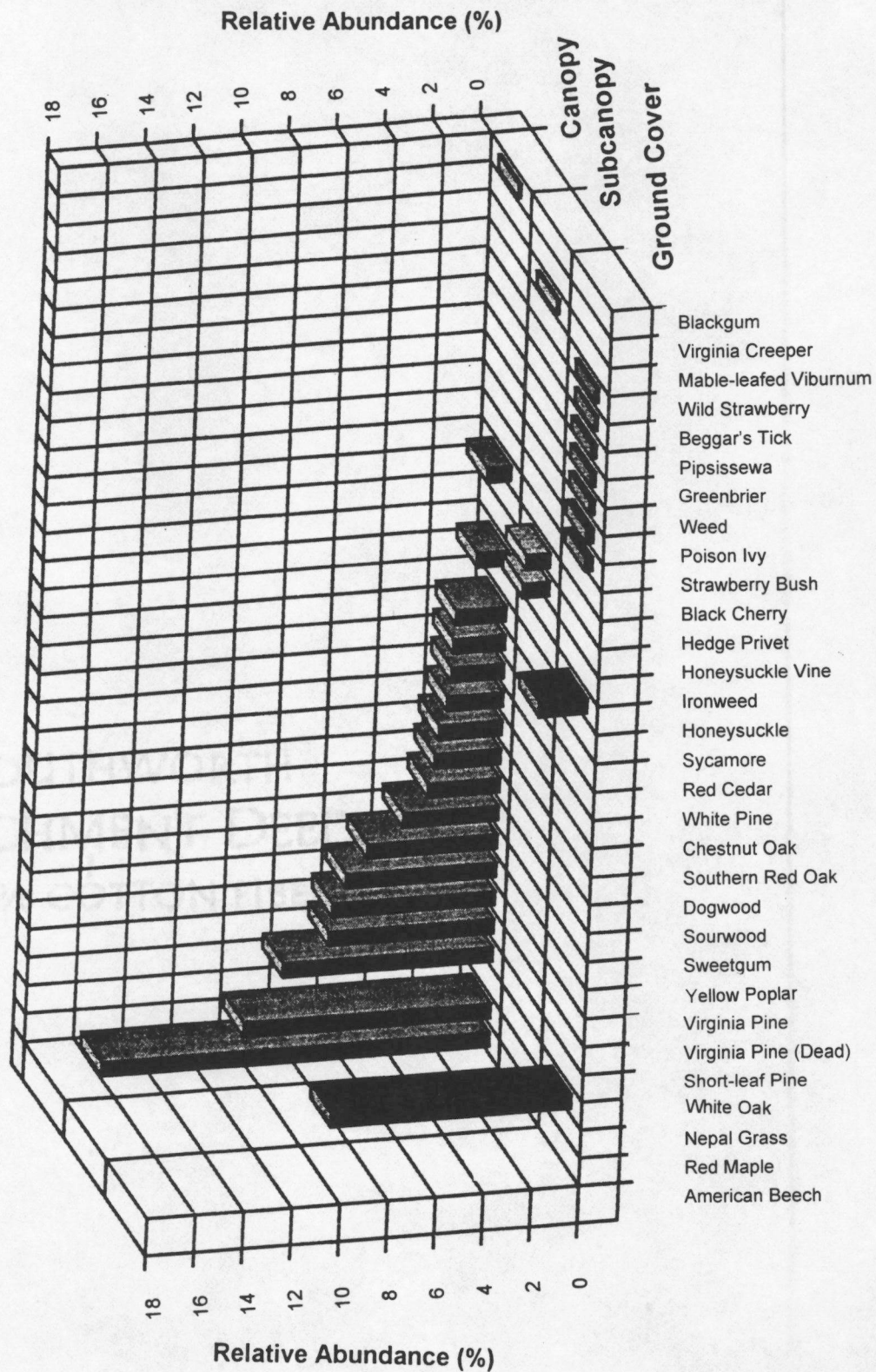
Transect #: 3

Date: 09/14/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Red Maple	4m	8m	S
0m	Red Cedar	1.1m	5.3m	S
0m	Sweetgum	.4m	4cm	S
10m	Red Maple	2.6m	34.5cm	C
10m	Ironwood	2.0m	1.5cm	C
10m	Virginia Pine (dead)	11.8m	40.5cm	C
10m	Honeysuckle	.9m		G
10m	Mapleleafed Virburnum	.18m		G
20m	White Pine	4.7m	185cm	C
20m	Red Maple	4.6m	9.5cm	S
20m	American Beech	4.7m	2.7cm	G
30m	Red Maple	3.1m	14cm	S
30m	Red Cedar	1.9	8.8cm	S
40m	Sycamore	4.4m	18.3cm	C
40m	Beggar's Tick	2m		G
40m	American Beech	2.6m		G
50m	Nepal Grass	2.9m		G
50m	Beggar's Tick	.05		G
50m	American Beech	8.5m	6.3cm	G
50m	Sweetgum	.6m		S
50m	White Oak	7.7m	38cm	C

APPENDIX A
FIGURE 7: SITE 9: MCNEW HOLLOW VEGETATION PROFILE

SITE 9: MCNEW HOLLOW VEGETATION PROFILE



APPENDIX F

HABITAT DATA

SITE#: 10 TRANSECT# 1 UTM X: 757908.625 ; Y: 182314.797
AREA: Deer Checking Station COVER TYPE: Old field / Grassland
LATITUDE: 355749.7 LONGITUDE: 841457.4
DEVELOPMENT (km): >1 % SLOPE: 1 ASPECT: SE
LITTER DEPTH (cm): 2 CANOPY HT. (m): N/A
GROUND COVER HT. (m) .5 SUBCANOPY HT. (m): N/A
AGE CLASS: 1 BASAL AREA (m² / ha): N/A
% CANOPY COVER: 0

FEATURES:

Power lines and Telephone poles run over this transect. Deer Checking Station and barns with Silo are > 1km.

TOPOGRAPHY:

Transect Borders Melton Hill Lake. Some rolling hills, area around transects generally flat with soft edges. Melton Hill Lake is to the South.

GENERAL DESCRIPTION:

Clark Park is located > 1km. Tall weeds and grasses make-up most of this area. Some human activity found commonly in this area. Boards placed in this area. Bethal Valley Road > .5km.

NOTES:

NAME(S): Research Assistant

DATE 9/12/94

APPENDIX F

VEGETATION DATA

SITE# 10

TRANSECT # 1

DATE: 9/12/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Ironweed	24cm		G
0m	Lespedeza	17cm		G
10m	Sweet Yellow Clover	9cm		G
10m	Lespedeza	32cm		G
10m	Ironweed	23cm		G
20m	Ironweed	12cm		G
20m	Virginia Button Weed	40cm		G
30m	Lespedeza	41cm		G
30m	Virginia Button Weed	8cm		G
40m	Nepal Grass	18cm		G
40m	Ironweed	9cm		G
40m	Beggars' Tick	6cm		G
40m	Lespedeza	13cm		G
40m	American Button Weed	50cm		G
40m	Grass	29cm		G
50m	Nepal Grass	76cm		G
50m	Ironweed	15cm		G

APPENDIX F

HABITAT DATA

SITE#: 10 TRANSECT# 2 UTM X: 757908.625 ; Y: 182314.797

AREA: Deer Checking Station COVER TYPE: Old field / Grassland

LATITUDE: 355749.7 LONGITUDE: 841457.4

DEVELOPMENT (km): >1 % SLOPE: 1 ASPECT: SE

LITTER DEPTH (cm): 2 CANOPY HT. (m): N/A

GROUND COVER HT. (m) .5 SUBCANOPY HT. (m): N/A

AGE CLASS: 1 BASAL AREA (m² / ha): N/A

% CANOPY COVER: 0

FEATURES:

Transect runs directly under telephone wires. Deer Checking Station located less than 1km.

TOPOGRAPHY:

Transect Borders Melton Hill Lake is due South. Round hills, area around transects mostly flat. Soft edges.

GENERAL DESCRIPTION:

Clark Park is located less than 1km. Tall weeds and grasses make-up most of this area. Some human activity found commonly in this area. Boards placed in this area. Bethal Valley Road >.5km.

NOTES:

NAME(S): Research Assistant

DATE 9/12/94

APPENDIX F

VEGETATION DATA

SITE# 10

TRANSECT # 2

DATE: 9/12/94

[illegible]

APPENDIX F

HABITAT DATA

SITE#: 10 TRANSECT# 3 UTM X: 757908.625 ; Y: 182314.797

AREA: Deer Checking Station COVER TYPE: Old field / Grassland

LATITUDE: 355749.7 LONGITUDE: 841457.4

DEVELOPMENT (km): >1 % SLOPE: 1 ASPECT: SE

LITTER DEPTH (cm): 2 CANOPY HT. (m): N/A

GROUND COVER HT. (m) .35 SUBCANOPY HT. (m): N/A

AGE CLASS: 1 BASAL AREA (m² / ha): N/A

% CANOPY COVER: 0

FEATURES:

Transformer wires run over the transect. Deer Checking Station and Clark Park
>1km.

TOPOGRAPHY:

Melton Hill Lake due South. Area around transects mostly flat. Soft edges.
Water >10m.

GENERAL DESCRIPTION:

Tall weeds and thick grass cover most of the area. Common human activity.
Boards in this area. Bethal Valley Road >.5km.

NOTES:

NAME(S): Research Assistant

DATE 9/12/94

APPENDIX F

VEGETATION DATA

SITE# 10

TRANSECT # 3

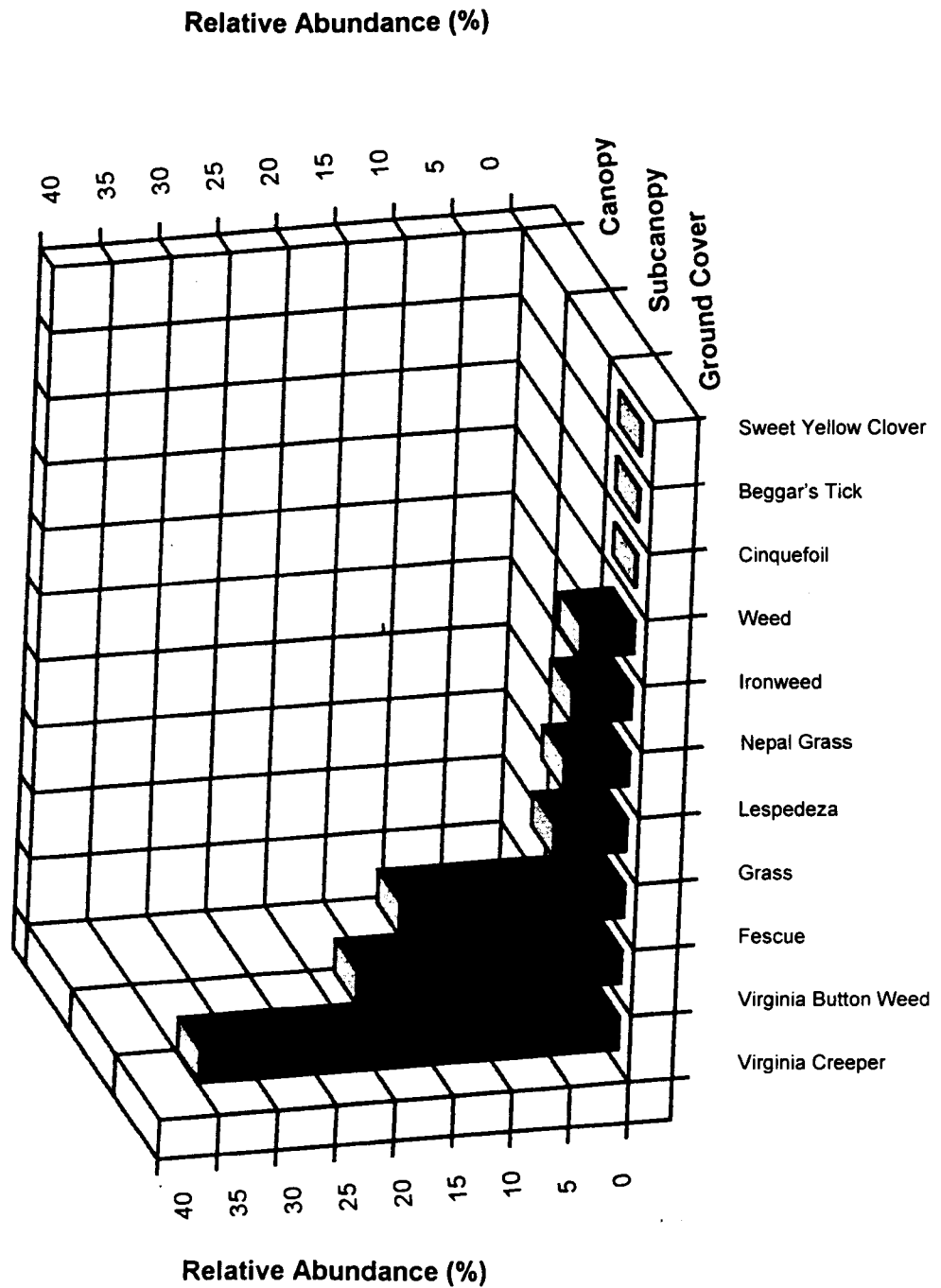
DATE: 9/12/94

[illegible]

APPENDIX F

FIGURE 8: SITE 10: DEER CHECK VEGETATION PROFILE

SITE 10: DEER CHECK STATION VEGETATION PROFILE



APPENDIX F

HABITAT DATA

SITE#: 12 TRANSECT# 1 UTM X: _____ Y: _____
AREA: Flashlight Heaven Cave COVER TYPE: Mixed pine/hardwood
LATITUDE: _____ LONGITUDE: _____
DEVELOPMENT (km): <.2 % SLOPE: 10 ASPECT: W/NW
LITTER DEPTH (cm): 1 CANOPY HT. (m): 36
GROUND COVER HT. (m) .3 SUBCANOPY HT. (m): _____
AGE CLASS: 3 BASAL AREA (m² / ha): 17
% CANOPY COVER: 92

FEATURES:

Highway 95 runs adjacent to this site. Fence from tower shielding runs parallel with this transect. Flashlight Heaven Cave within a few meters of transect.

TOPOGRAPHY:

Transect runs NW to SE. Rolling slopes area around cave come off of a steep hill towards Highway 95. Very rocky area. Cave opening at the south end of the transect.

GENERAL DESCRIPTION:

Area along this transect is mowed along the fence. Thus, low grasses and other vegetation is very low. This first transect is located in a somewhat open area. Downed trees are common here. Highway 95 is only about 50m from this transect. Canopy cover does not exist in some parts of the transect.

NOTES: Mixed hardwood pine forest surrounds this area.

NAME(S): Research Assistant

DATE: 10/11/94

APPENDIX F

VEGETATION DATA

SITE# 12

TRANSECT # 1

DATE: 10/11/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Honeysuckle	.36m		G
0m	Nepal Grass	10m		G
0m	Yellow Poplar	4.3m	31cm	C
10m	Periwinkle	9.8m		G
10m	Yellow Poplar	4m	14.5cm	C
10m	Shortleaf Pine	8m	36cm	C
10m	American Elm	2.3m		C
20m	Honeysuckle	10m		G
20m	Redbud	.5m		S
20m	Nepal Grass	10m		G
20m	Shortleaf Pine	8.6m	27cm	C
20m	Shortleaf Pine	10m	33cm	C
30m	Grass	2.5m		G
30m	Nepal Grass	10m		G
30m	Honeysuckle	.4m		G
30m	Shortleaf Pine	6.9m	19cm	C
40m	Redbud	.16m		S
40m	Nepal Grass	1.3m		G
40m	American Elm	5.6m		C
40m	American Beech	6.25	15cm	C
40m	Black Oak	9.1m	21cm	C
40m	Yellow Poplar	2m	25cm	C
50m	Honeysuckle		.3cm	G
50m	Nepal Grass		.5cm	G

APPENDIX F

VEGETATION DATA

SITE# 12

TRANSECT # 1

DATE: 10/11/94

[illegible]

Several downed trees on site.

APPENDIX F

HABITAT DATA

SITE#: 12 TRANSECT# 2 UTM X: _____ Y: _____
AREA: Flashlight Heaven Cave COVER TYPE: Mixed pine/hardwood
LATITUDE: _____ LONGITUDE: _____
DEVELOPMENT (km): <.2 % SLOPE: 10 ASPECT: W by NW
LITTER DEPTH (cm): 2 CANOPY HT. (m): 36m
GROUND COVER HT. (m) 1 SUBCANOPY HT. (m): 25m
AGE CLASS: 3 BASAL AREA (m² / ha): 14m²/ha
% CANOPY COVER: 95

FEATURES:

Highway 95 runs adjacent to this site. Fence from tower shielding runs parallel with this transect. Flashlight Heaven Cave within a few meters of transect.

TOPOGRAPHY:

Transect runs NW to SE. Rolling slopes area around cave come off of a steep hill towards highway 95. Very rocky area. Cave opening at the south end of the transect.

GENERAL DESCRIPTION:

Area along this transect is mowed along the fence. This transect is within 50m from fence and 50m from road within the forested area. This transect is within Oak/Poplar.

NOTES: There were only two transects at this site.

NAME(S): Research Assistant DATE: 10/11/94

APPENDIX F

VEGETATION DATA

SITE# 12

TRANSECT # 2

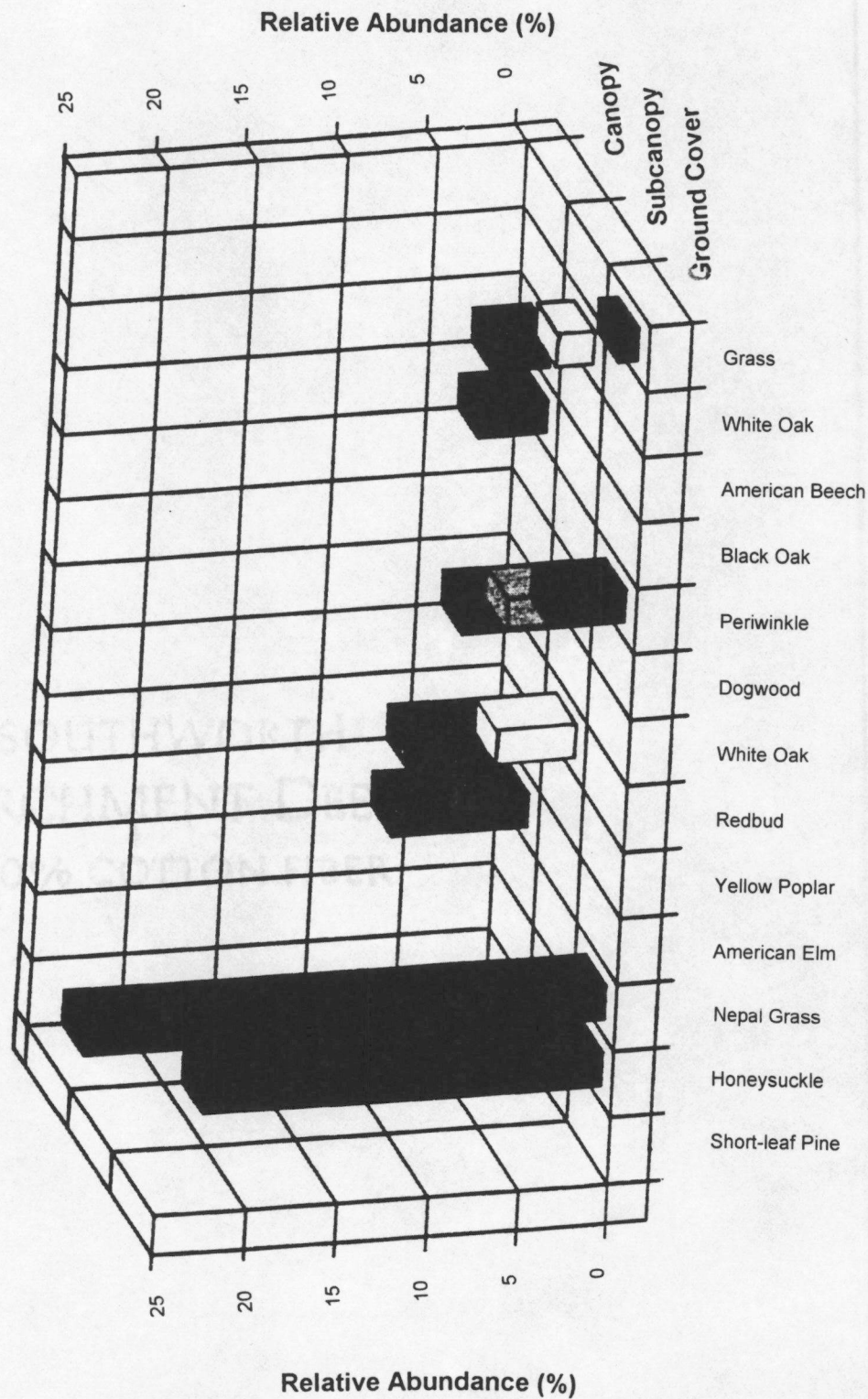
DATE: 10/11/94

Point of Intersection	Species	Length (m)	dbh (cm)	Canopy (C) Subcanopy (S) Groundcover (G)
0m	Honeysuckle	10m	10cm	G
0m	White Oak	10m	10cm	C
10m	Redbud	.4m	.4cm	S
10m	Honeysuckle	10m		G
10m	White Oak	5m		S
20m	American Beech	1.4m		S
20m	Shortleaf Pine	5.5m	27cm	C
20m	Shortleaf Pine	8.2m	33cm	C
20m	Honeysuckle	10m		G
30m	Shortleaf Pine	9.7m	33cm	C
30m	Yellow Poplar	5.3m	10cm	C
30m	Honeysuckle	10m		G
40m	Honeysuckle	10m		G
40m	Dogwood	4m	6.5cm	C
40m	Redbud	9.6	17cm	C
40m	American Elm	10m	35cm	C
50m	Honeysuckle	2m		G
50m	Dogwood	6m	6cm	C
50m	Yellow Poplar	5m	22cm	C

APPENDIX F

FIGURE 9: SITE 12: FLASHLIGHT HEAVEN CAVE

SITE 12: FLASHLIGHT HEAVEN CAVE VEGETATION PROFILE



VITA

VITA

Cynthia Lefever Gabrielsen was born in Lancaster, Pennsylvania to Mary K. And Pharnes H. Lefever. She graduated from J. P. McCaskey High School. Her college experience began at Radford College in Radford, Virginia. In 1975 Cynthia, graduated from Cameron University in Lawton, Oklahoma with a bachelor of science degree in Biology. A second bachelor of science degree in Chemistry was earned at Cameron in 1979. She later entered the graduate program in Ecology at the University of Tennessee, Knoxville.