ornl

OAK RIDGE NATIONAL LABORATORY

LOCKHEED MARTIN

MANAGED AND OPERATED BY
LOCKHEED MARTIN ENERGY RESEARCH CORPORATION
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

ORNL-27 (3-96)

RECEIVED ORNL/TM-13216

JUN 21 1996

OSTI

1995 BIRD SURVEY
FOOTHILLS PARKWAY SECTION 8B
NATIONAL PARK SERVICE, TENNESSEE

M. C. Wade
ORNL Staff Member

N. R. Giffen
LMES Staff Member

B. A. Wade
Private Consultant

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED *etc*

This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from the Office of Scientific and Technical Information, P. O. Box 62, Oak Ridge, TN 37831; prices available from (423) 576-8401, FTS 626-8401.

Available to the public from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government of any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

**1995 BIRD SURVEY
FOOTHILLS PARKWAY SECTION 8B
NATIONAL PARK SERVICE, TENNESSEE**

M. C. Wade
ORNL Staff Member

N. R. Giffen
LMES Staff Member

B. A. Wade
Private Consultant

May 1996

Prepared by the
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
managed by
LOCKHEED MARTIN ENERGY RESEARCH CORP.
for the
U.S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-96OR22464

CONTENTS

LIST OF TABLES	v
1. INTRODUCTION	1
2. PURPOSE	1
3. METHODS	1
3.1 BIRD SURVEY METHOD	3
3.2 HABITAT DESCRIPTION METHOD	3
4. RESULTS	5
4.1 BIRDS	5
4.1.1 Webb Creek (B1)	5
4.1.2 Sheep Pen Branch (B2)	7
4.1.3 Webb Mountain (B3)	7
4.1.4 Lower Webb Mountain (B4)	10
4.1.5 Branam Hollow Road (B5)	12
4.1.6 Rocky Flats Road (B6)	13
4.1.7 Apple Tree Lane (B7)	14
4.1.8 Cosby (B8)	15
4.1.9 Little Pigeon River (LPR)	16
4.1.10 Matthews Branch (MB)	17
4.1.11 Costner Road (CR)	18
4.2 VEGETATION	19
4.2.1 Circular Plot Sites	19
4.2.1.1 Webb Creek (B1)	19
4.2.1.2 Sheep Pen Branch (B2)	19
4.2.1.3 Webb Mountain (B3)	20
4.2.1.4 Lower Webb Mountain (B4)	20
4.2.1.5 Branam Hollow Road (B5)	20
4.2.1.6 Rocky Flats Road (B6)	20
4.2.1.7 Apple Tree Lane (B7)	21
4.2.1.8 Cosby (B8)	21
4.2.2 Non-circular Plot Sites	21
4.2.2.1 Little Pigeon River (LPR)	22
4.2.2.2 Matthews Branch (MB)	22
4.2.2.3 Costner Road (CR)	22
5. CONCLUSIONS	22
6. REFERENCES	23
APPENDIX A: LISTING OF ALL BIRDS	25
APPENDIX B: VEGETATION PLOT RESULTS	31
APPENDIX C: VEGETATION ANALYSIS FIELD SHEETS	35

LIST OF TABLES

Table 1. Bird survey results for B1 (Webb Creek)	6
Table 2. Bird survey results for the Sheep Pen Branch area	8
Table 3. Bird survey results for the Webb Mountain area	9
Table 4. Bird survey results for Lower Webb Mountain (B4)	11
Table 5. Bird survey results for Branam Hollow Road (B5)	12
Table 6. Bird survey results for Rocky Flats Road (B6)	13
Table 7. Bird survey results for Apple Tree Lane (B7)	14
Table 8. Bird survey result for Cosby (B8)	15
Table 9. Bird survey results for Little Pigeon River (LPR)	16
Table 10. Bird survey results for Matthews Branch (MB)	17
Table 11. Bird survey results for Costner Road (CR)	18

1. INTRODUCTION

The Foothills Parkway Section 8B right-of-way (ROW) is a stretch of land between Pittman Center and Cosby, Tennessee that is approximately 14.2 miles long and 1,000 ft wide, with a considerably wider section on Webb Mountain (Fig. 1). A breeding bird survey was conducted at selected sample points along the ROW (Wade et al. 1994).

2. PURPOSE

The intent of the survey was to identify bird communities, area sensitive species (i.e., birds dependent on extensive forest systems for all their needs, Robbins 1979), and endangered, threatened, federal candidate, and state "*In need of management*" species now using the ROW. The survey also provides baseline data to assess future habitat impacts as well as cumulative impacts of the project.

3. METHODS

A field reconnaissance of the area was conducted in April of 1995 along the Section 8B right-of-way. A total of eight widely placed survey stations were selected for intensive bird observation. Five stations were chosen in forest habitat since this is the predominant right-of-way habitat (B3, B4, B5, B7, B8). Three additional locations were chosen in other representative habitats [one in a forested wetland (B6), one in a late successional old field (B1), and one in a forest/riparian habitat (B2)] (Figure 1)¹.

Three additional locations (LPR-Little Pigeon River Floodplain, MB-Matthews Branch, and CR-Costner Road) were also surveyed three times during the survey period (Fig. 1). These stations were added to increase sample diversity of habitats and elevations. Due to time constraints these stations were not surveyed as intensively as B1-B8 nor were circular plots established. General habitat descriptions were documented for these locations, however, and are included in Section 4.2 below.

¹B1—Webb Creek, B2—Sheep Pen Branch, B3—Webb Mountain, B4—Lower Webb Mountain, B5—Branam Hollow Road, B6—Rocky Flats Wetlands, B7—Appletree Lane, B8—Cosby Floodplain.

Figure 1. Bird observation stations.

3.1 BIRD SURVEY METHOD

Birds were censused using the variable circular-plot method (Reynolds et al. 1980). In the variable circular-plot method, stations are established within a plant community either at equal intervals along a transect or placed at distances which minimize the possibility of counting the same bird twice. Each bird seen or heard during a specified time period is counted and the horizontal distance from the point to the bird is estimated and recorded.

To assure that all birds would be counted within the survey station area, the maximum listening time of 10 minutes as described by Reynolds et al. 1980 was used. All surveys were conducted within 3.5 to 4.5 hours of local sunrise, the time of greatest bird activity (Robbins 1981). Each station was censused at least five times April 27 through June 19, 1995, to adequately assess breeding bird populations (Alsop 1991, National Geographic Society 1987, Robbins et al. 1981). The direction from which the bird was seen or heard was also recorded. Birds were recorded as singing males, nonsinging males, females, immatures, or birds of unknown sex or age. Flyovers were recorded incidentally when sighted. Additional birds were recorded from walking transect surveys of Webb Mountain (between sites B3 and B4) and the hike into Sheep Pen Branch (B2), because the areas were to be hiked anyway in order to access sites B3 and B2, respectively.

One nocturnal survey for owls was completed at Webb Creek (B1). Webb Creek was chosen because it contained the best owl feeding area habitat (i.e., both clearings and forest) of all the survey stations. This survey was conducted between 8:00 pm and 9:30 pm, on May 2, 1995. A recorded audio tape of owl species that could be using the area was played continuously at the B1 survey point during this period.

3.2 HABITAT DESCRIPTION METHOD

It was determined that it would be reasonable to gather habitat information to correlate habitat to bird observations. This information provides baseline data and will be used for future analysis, as appropriate.

Quantitative vegetation data was collected at each of eight bird survey points (B1 through B8) using a modification of the .04 hectare circular plot method (James and Shugart 1970, Noon 1980, Lent et al. 1984). A circular plot was centered on each bird survey point to define an area in which numerous measurements of habitat structure would be taken. The circular plot method chosen is a standard and reproducible method of measuring habitat parameters. It could easily be duplicated in the future to document any habitat changes. It has the advantage over a qualitative method in that it provides actual numbers for comparative purposes. The results can be used to monitor changes in cover, tree species composition, shrub density, etc. This information can be directly correlated with changes in bird populations, which are measured at the same exact locations.

The circular plot was divided into four quadrants (northeast, northwest, southeast and southwest); within each maximum vegetation height (canopy height) was measured in meters (m) using a rangefinder. For each measurement, it was noted whether the vegetation being measured was coniferous or deciduous.

The diameter at breast height (dbh) 1.3 m above the ground of all saplings (i.e., small trees no greater than 10 cm thick) and trees (perennial woody plant with an evident trunk and generally thicker than 10 cm) within the plot was measured in nine size categories (see Appendix B) using a forester's diameter tape. These size classes follow those of James and Shugart (1970) and Noon (1980).

Shrub (i.e., a wood perennial, smaller than a tree, and usually containing several stems) density at breast height was measured along north-south and east-west running transects (each 22.6 meters long) established through the circular plot. All stems of saplings or shrubs less than 3 cm dbh including the mainstem and those stems branching from the mainstem below breast height were counted. This was accomplished by walking each transect with outstretched arms and counting all woody stems which intercepted either the arms or the body.

Herbaceous cover was measured by establishing four 1/2 m square plots along each 22.6 m transect. The percentage of each plot occupied by a particular herbaceous species was noted along with percentages for leaf litter, bare ground, etc.

Canopy cover and ground cover (1 m in height and below) were measured utilizing a modification of the crosswire sighting tube (Winkworth 1962). The measurements were taken with an ocular tube

consisting of a cardboard cylinder with cross hairs at one end. The observer walked along each 22.6 m transect sighting straight up for canopy cover and downward for shrub and other vegetation cover recording a total of 20 plus or minus readings for each transect indicating the presence or absence of green vegetation. A plus was recorded where green vegetation intercepted the crosshairs. The presence of deciduous, coniferous or evergreen vegetation was specifically noted.

General notes were taken within each circular plot of the presence of any additional low shrubs or herbaceous vegetation.

4. RESULTS

4.1 BIRDS

Bird surveys were conducted from April 27 to June 19, 1995. The survey results for each station appear below. A total of 63 species were identified during the survey and are listed in Appendix A. Along with the term area-sensitive (birds dependent on extensive forest systems for all their needs) the terms forest-dependent and forest-edge bird species are referred to throughout this section. The definition of forest-dependent birds are those dependent on forest habitats for most of their needs (Robbins 1979). For the purposes of this report, forest-edge species will be considered those dependent on forests for part of their needs but also may require field, old field, suburban, or forest-edge (the meeting of field and forest) habitats.

It should be noted that frequencies (observed per visit) of each species are listed for Tables 1–11. Frequency is commonly recorded when listing bird survey results and can indicate a number of things related to the use of a habitat by a particular species.

4.1.1 Webb Creek (B1)

With the exception of pileated woodpecker, wood thrush, hooded warbler, red-eyed vireo, and northern parula, all other birds identified at Webb Creek (B1) prefer forest edge or field habitats (Table 1). Owl tapes were used for the owls that could be using the area [i.e., barred (*Strix varia*), great-horned, eastern screech (*Otus asio*), short-eared (*Asio flammeus*), long-eared (*Asio otus*), and state “In need of

management" species northern saw-whet (*Aegolius acadicus*) and common barn (*Tyto alba*) owls]. One great-horned owl was identified by using this method.

Table 1. Bird survey results for B1 (Webb Creek)

Common name	Frequency (observed/visits)
Northern Cardinal	5/5
Indigo Bunting	4/5
Pileated Woodpecker	3/5
American Crow	3/5
Wood Thrush	3/5
White-eyed Vireo	3/5
Hooded Warbler	3/5
Carolina Wren	2/5
Blue-gray Gnatcatcher	2/5
Common Yellowthroat	2/5
Red-eyed Vireo	2/5
Rufous-sided Towhee	2/5
Rock Dove	1/5
Mourning Dove	1/5
Northern Flicker	1/5
Barn Swallow	1/5
Carolina Chickadee	1/5
Northern Parula	1/5
White-throated Sparrow	1/5
American Goldfinch	1/5
Great-horned Owl	N/A

N/A = Identified by nocturnal survey using owl tapes

4.1.2 Sheep Pen Branch (B2)

Eleven species of birds were identified at Sheep Pen Branch (B2). Eight of the 11 were area-sensitive, forest-dependent birds (worm-eating, black-throated green, and black and white warblers, red-eyed vireo, ovenbird, scarlet tanager, pileated woodpecker, and yellow-billed cuckoo) (Table 2, Part A). Additional forest-dependent species found along the hike into B2 (i.e., Sheep Pen Branch transect) include hooded warbler, northern parula, wood thrush, Louisiana waterthrush, solitary vireo, eastern wood pewee, and red-tailed hawk (Table 2, Part B). A Cooper's hawk was observed south of the Sheep Pen Branch area. Ruffed grouse drumming was heard during a visit to Sheep Pen Branch in early April of 1995.

4.1.3 Webb Mountain (B3)

The birds recorded at B3 included many area-sensitive species including ovenbird, red-eyed vireo, pileated woodpecker, wood thrush, worm-eating, black-throated green, and black and white warblers, eastern wood pewee, scarlet tanager, and yellow-billed cuckoo (Table 3, Part A). It is interesting to also note that some forest-edge type species were found on Webb Mountain including indigo bunting, Carolina wren, and tufted titmouse. The existence of dead pine snags (i.e., a standing dead tree often with the top broken out) have probably created openings necessary for these species. Additional birds noted on the transect of Webb Mountain include Carolina and black-capped chickadees, solitary vireo, and pine warbler. The solitary vireo and pine warbler are area-sensitive, forest-dependent bird species. Four different woodpeckers were recorded along the transect, also possibly due to the presence of the pine snags. The majority of the birds recorded along the Webb Mountain transect were forest-edge species (Table 3, Part B).

Additional observations on Webb Mountain outside of the survey period include hairy woodpeckers in March of 1994 and a broad-headed skink (*Eumeces laticeps*) in April of 1995.

Table 2. Bird survey results for the Sheep Pen Branch area

Common name	Frequency (observed/visits)
Part A—Sheep Pen Branch (B2)	
Red-eyed Vireo	4/5
Tufted Titmouse	3/5
Worm-eating Warbler	3/5
American Crow	2/5
Black & White Warbler	2/5
Black-throated Green Warbler	2/5
Ovenbird	2/5
Yellow-billed Cuckoo	1/5
Pileated Woodpecker	1/5
Carolina Chickadee	1/5
White-breasted Nuthatch	1/5
Scarlet Tanager	1/5
Part B—Sheep Pen Branch Transect	
Hooded Warbler	5/5
Pileated Woodpecker	4/5
Blue-gray Gnatcatcher	4/5
Northern Parula	4/5
Ovenbird	4/5
Carolina Chickadee	3/5
Wood Thrush	3/5
Red-eyed Vireo	3/5
Black & White Warbler	3/5
Louisiana Waterthrush	3/5
Indigo Bunting	3/5
Rufous-sided Towhee	3/5
Downy Woodpecker	2/5
American Crow	2/5
Tufted Titmouse	2/5
Solitary Vireo	2/5
Black-throated Green Warbler	2/5
Worm-eating Warbler	2/5
Northern Cardinal	2/5
Scarlet Tanager	2/5
Red-tailed Hawk	1/5
Mourning Dove	1/5
Yellow-billed Cuckoo	1/5
Chimney Swift	1/5
Red-bellied Woodpecker	1/5
Hairy Woodpecker	1/5
Eastern Wood Pewee	1/5
Blue Jay	1/5
White-breasted Nuthatch	1/5
American Goldfinch	1/5
Cooper's Hawk	N/A

N/A = Seen on road driving up to site

Table 3. Bird survey results for the Webb Mountain area

Common name	Frequency (observed/visits)
Part A—Webb Mountain (B3)	
Red-eyed Vireo	6/6
Ovenbird	6/6
Eastern Wood Pewee	4/6
American Crow	4/6
Black & White Warbler	4/6
Yellow-billed Cuckoo	3/6
Downy Woodpecker	3/6
Scarlet Tanager	3/6
Pileated Woodpecker	2/6
Indigo Bunting	2/6
Northern Flicker	1/6
Blue Jay	1/6
Tufted Titmouse	1/6
Carolina Wren	1/6
Wood Thrush	1/6
Black-throated Green Warbler	1/6
Worm-eating Warbler	1/6
Brown-headed Cowbird	1/6
Part B—Webb Mountain Transect	
Pileated Woodpecker	6/6
Black & White Warbler	6/6
Hooded Warbler	6/6
Worm-eating Warbler	6/6
Indigo Bunting	6/6
Rufous-sided Towhee	6/6
Eastern Phoebe	5/6
Black-capped Chickadee	5/6
Red-eyed Vireo	5/6
Ovenbird	5/6
Northern Flicker	4/6
Downy Woodpecker	4/6
Tufted Titmouse	4/6
Solitary Vireo	3/6

Table 3. Continued

Common name	Frequency (observed/visits)
Black-throated Green Warbler	3/6
Scarlet Tanager	3/6
American Crow	2/6
White-breasted Nuthatch	2/6
Wood Thrush	2/6
Yellow-rumped Warbler	2/6
Turkey Vulture	1/6
Mourning Dove	1/6
Chimney Swift	1/6
Hairy Woodpecker	1/6
Eastern Wood Peewee	1/6
Blue Jay	1/6
Carolina Chickadee	1/6
Red-breasted Nuthatch	1/6
Carolina Wren	1/6
Blackburnian Warbler	1/6
Pine Warbler	1/6
Rose-breasted Grosbeak	1/6
Northern Cardinal	1/6
White-throated Sparrow	1/6
Brown-headed Cowbird	1/6

4.1.4 Lower Webb Mountain (B4)

The most frequently (more than one observation) identified forest dependent birds at B4 were pileated woodpecker, wood warblers (hooded, black and white, black-throated green, and worm-eating), ovenbird, and red-eyed vireo. Forest-dependent birds recorded only one time include blackburnian warbler, wood thrush, solitary vireo, yellow-billed cuckoo, and scarlet tanager. Fourteen of 25 species encountered at B4 were forest-edge species including rufous-sided towhee, American crow, indigo bunting, Carolina wren, and blue jay.

Table 4. Bird survey results for Lower Webb Mountain (B4)

Common name	Frequency (observed/visits)
American Crow	6/6
Ovenbird	6/6
Rufous-sided Towhee	6/6
Red-eyed Vireo	4/6
Indigo Bunting	4/6
Black-throated Green Warbler	3/6
Worm-eating Warbler	3/6
Downy Woodpecker	2/6
Pileated Woodpecker	2/6
Blue Jay	2/6
Carolina Wren	2/6
Black & White Warbler	2/6
Hooded Warbler	2/6
Yellow-billed Cuckoo	1/6
Northern Flicker	1/6
Eastern Phoebe	1/6
Tufted Titmouse	1/6
Carolina Chickadee	1/6
White-breasted Nuthatch	1/6
Wood Thrush	1/6
Solitary Vireo	1/6
Blackburnian Warbler	1/6
Yellow-rumped Warbler	1/6
Northern Cardinal	1/6
Scarlet Tanager	1/6

4.1.5 Branam Hollow Road (B5)

Birds recorded at B5 are very similar to those identified at B4. Exceptions to that are brown thrasher, red-breasted nuthatch, pine warbler, and American robin which were encountered at B5 and not B4.

Table 5. Bird survey results for Branam Hollow Road (B5)

Common name	Frequency (observed/visits)
American Crow	5/5
Rufous-sided Towhee	5/5
Black-throated Green Warbler	4/5
Hooded Warbler	4/5
Ovenbird	4/5
Pileated Woodpecker	3/5
White-breasted Nuthatch	3/5
Northern Flicker	2/5
Downy Woodpecker	2/5
Tufted Titmouse	2/5
Carolina Wren	2/5
Red-eyed Vireo	2/5
Black & White Warbler	2/5
Indigo Bunting	2/5
Blue Jay	1/5
Carolina Chickadee	1/5
Red-breasted Nuthatch	1/5
Wood Thrush	1/5
Brown Thrasher	1/5
American Robin	1/5
Solitary Vireo	1/5
Pine Warbler	1/5
Northern Cardinal	1/5
Scarlet Tanager	1/5

4.1.6 Rocky Flats Road (B6)

Ten out of 14 birds recorded more than once at B6 were forest-edge species. The four forest-dependent species identified more than once were ovenbird, wood thrush, yellow-billed cuckoo, and red-eyed vireo. Other birds observed include the only Kentucky warbler heard during the bird survey.

Table 6. Bird survey results for Rocky Flats Road (B6)

Common name	Frequency (observed/visits)
Ovenbird	6/7
Northern Cardinal	6/7
Yellow-billed Cuckoo	5/7
American Crow	5/7
Wood Thrush	5/7
Red-eyed Vireo	5/7
Indigo Bunting	5/7
Blue Jay	4/7
Pileated Woodpecker	3/7
Chimney Swift	2/7
Northern Flicker	2/7
Tufted Titmouse	2/7
Carolina Chickadee	2/7
American Robin	2/7
Song Sparrow	2/7
Common Grackle	2/7
Mourning Dove	1/7
Eastern Wood Pewee	1/7
Blue-gray Gnatcatcher	1/7
Gray Catbird	1/7
Brown Thrasher	1/7
Black-throated Green Warbler	1/7
Yellow Warbler	1/7
Kentucky Warbler	1/7
Hooded Warbler	1/7
Scarlet Tanager	1/7

4.1.7 Apple Tree Lane (B7)

Birds identified at B7 were a fairly even mixture of forest-dependent versus forest-edge species (14 vs. 11). The species recorded are similar to those of B4 and B5. The only record of Acadian flycatcher during the survey was at B7.

Table 7. Bird survey results for Apple Tree Lane (B7)

Common name	Frequency (observed/visits)
Ovenbird	6/6
Hooded Warbler	5/6
American Crow	4/6
Pileated Woodpecker	3/6
Carolina Chickadee	3/6
Carolina Wren	3/6
Red-eyed Vireo	3/6
Yellow-billed Cuckoo	2/6
Eastern Phoebe	2/6
Blue Jay	2/6
Tufted Titmouse	2/6
Wood Thrush	2/6
Black & White Warbler	2/6
Northern Cardinal	2/6
Scarlet Tanager	2/6
Northern Flicker	1/6
Downy Woodpecker	1/6
Hairy Woodpecker	1/6
Acadian Flycatcher	1/6
American Robin	1/6
Gray Catbird	1/6
Northern Parula	1/6
Black-throated Green Warbler	1/6
Indigo Bunting	1/6
Common Grackle	1/6

4.1.8 Cosby (B8)

The majority (18 out of 22) of the bird species observed at B8 were forest-edge species. These included yellow-breasted chat, common yellowthroat, and northern bobwhite. The four forest-dependent species were ovenbird, yellow-billed cuckoo, red-eyed vireo, and pileated woodpecker.

Table 8. Bird survey result for Cosby (B8)

Common name	Frequency (observed/visits)
Carolina Wren	6/6
Northern Cardinal	6/6
Indigo Bunting	6/6
Northern Bobwhite	5/6
Yellow-billed Cuckoo	5/6
Tufted Titmouse	5/6
Blue-gray Gnatcatcher	5/6
Red-eyed Vireo	5/6
Yellow-breasted Chat	4/6
Pileated Woodpecker	3/6
American Crow	3/6
Rufous-sided Towhee	3/6
Chimney Swift	2/6
Eastern Phoebe	2/6
Carolina Chickadee	2/6
White-eyed Vireo	2/6
Brown-headed Cowbird	2/6
Red-bellied Woodpecker	1/6
Blue Jay	1/6
Ovenbird	1/6
Common Yellowthroat	1/6
White-throated Sparrow	1/6

4.1.9 Little Pigeon River (LPR)

Only three (northern parula, red-eyed vireo, and pileated woodpecker) of 22 species recorded at LPR are forest-dependent. The rest include forest-edge as well as wetland/stream (i.e., mallard, belted kingfisher) species. LPR was the only site where the eastern meadowlark and northern mockingbird were identified. Prior to the survey in April 1995 wood ducks were seen near LPR.

Table 9. Bird survey results for Little Pigeon River (LPR)

Common name	Frequency (observed/visits)
Carolina Chickadee	3/3
Northern Parula	3/3
Northern Cardinal	3/3
Indigo Bunting	3/3
American Crow	2/3
Red-eyed Vireo	2/3
Song Sparrow	2/3
Mallard	1/3
Turkey Vulture	1/3
Mourning Dove	1/3
Chimney Swift	1/3
Belted Kingfisher	1/3
Northern Flicker	1/3
Pileated Woodpecker	1/3
Blue Jay	1/3
Carolina Wren	1/3
Gray Catbird	1/3
Northern Mockingbird	1/3
White-eyed Vireo	1/3
Yellow Warbler	1/3
Eastern Meadowlark	1/3
Red-winged Blackbird	1/3

4.1.10 Matthews Branch (MB)

The birds documented during the survey at MB were also observed at B4 with the exception of the indigo bunting. In April of 1994 a hen ruffed grouse and chicks were seen in the Matthews Branch drainage.

Table 10. Bird survey results for Matthews Branch (MB)

Common name	Frequency (observed/visits)
Black & White Warbler	3/3
Hooded Warbler	3/3
Ovenbird	2/3
Northern Flicker	1/3
Downy Woodpecker	1/3
American Crow	1/3
Tufted Titmouse	1/3
Carolina Wren	1/3
Black-throated Green Warbler	1/3
Worm-eating Warbler	1/3
Indigo Bunting	1/3
Rufous-sided Towhee	1/3

4.1.11 Costner Road (CR)

The bird species of CR are similar to those of Webb Mountain and Branam Hollow. During a walk through of Section 8B in May of 1993 a ruffed grouse nest with eggs was observed on Big Ridge near the CR site.

Table 11. Bird survey results for Costner Road (CR)

Common name	Frequency (observed/visits)
Red-eyed Vireo	3/3
Hooded Warbler	2/3
Worm-eating Warbler	2/3
Ovenbird	2/3
Turkey Vulture	1/3
Mourning Dove	1/3
Yellow-billed Cuckoo	1/3
Pileated Woodpecker	1/3
American Crow	1/3
Tufted Titmouse	1/3
Carolina Chickadee	1/3
Carolina Wren	1/3
Black & White Warbler	1/3
Northern Cardinal	1/3
Rufous-sided Towhee	1/3
Scarlet Tanager	1/3

4.2 VEGETATION

The following is a brief summation of the general habitat and vegetation data collected during field visits between 4/7/95 and 5/23/95.

4.2.1 Circular Plot Sites

This section summarizes the vegetative habitat of each site for which circular plots were completed. The results from the circular plots are included in Appendix B and C.

4.2.1.1 Webb Creek (B1)

This site is located alongside Webb Creek. Approximately one half of it is disturbed edge habitat and the other half is open field habitat. The disturbed edge habitat has a small amount of canopy cover comprised of black walnut and yellow buckeye. Beneath this it is overgrown with multiflora rose and blackberry bushes. Several kinds of herbaceous species are abundant in this area as well. They include Miami mist, speedwell, sandwort, and pasture grass species. The open field habitat has no canopy or shrub species. It is comprised entirely of herbaceous species (pasture grasses and flowering plants). Fescue grasses and *agrostis* species of grasses along with red clover, vetch, tumble mustard, Miami mist, and others appear to be the most abundant species in this section.

4.2.1.2 Sheep Pen Branch (B2)

Sheep Pen branch flows between steep slopes through this moist mixed hardwood/hemlock forest site. The canopy cover is thick, being comprised mainly of hardwood species such as black birch, tulip poplar, red oak, red maple, and sourwood. The hemlocks in the canopy are located along the edge of the branch. Hemlocks make up most of the subcanopy with rhododendrons, flowering dogwoods, and red maples being present also. Poison ivy, Virginia creeper, and smilax occur but are not abundant. Ground cover species are diverse but are not abundant. Plants observed included Christmas and cinnamon fern, striped pipsissewa, violet, elephant's foot, rattlesnake plantain, aster, foamflower, nightshade, and speedwell.

4.2.1.3 Webb Mountain (B3)

This predominantly hardwood forest is located at the top of Webb Mountain. The canopy cover is thick and dominated by mainly chestnut oak and secondarily by northern red oak. Other canopy species include red maple and mockernut hickory. Snags are also common in the area. Both live and dead table mountain pine are present in the surrounding area. Sourwood is common in the subcanopy along with chestnut oak and snags. The most common low shrub species is chestnut oak with table mountain pine, American chestnut, alternate leaf dogwood, tulip poplar, red maple, striped maple, mockernut hickory, sassafras, blueberry, and snags also present. Groundcover is sparse, consisting mainly of bracken fern.

4.2.1.4 Lower Webb Mountain (B4)

This young hardwood forest sits atop a ridge. The canopy cover is dense and has a variety of species. Chestnut oak is the most abundant canopy species with striped maple, flowering dogwood, sourwood, tupelo, northern red oak, red maple, and others filling in the lower level of the canopy. Shrub species in the subcanopy include buffalo-nut, blueberry, grape, and smilax. These are sparse in their coverage. Ground cover was sparse. Solomon's seal, false Solomon's seal, and striped pipsissewa are the most common herbaceous species on the plot. Christmas fern, bracken fern, and rattlesnake plantain are sparsely scattered on the plot.

4.2.1.5 Branam Hollow Road (B5)

This survey point is a hardwood/pine forest habitat located on a slope. Red maple is the dominant hardwood canopy species although scarlet oak, chestnut oak, blackgum, and sourwood are present as well. The two evergreen canopy species are eastern hemlock and Virginia pine. The main subcanopy species present are rosebay rhododendron and mountain laurel. Galax, clubmoss, and striped pipsissewa were the only ground cover species identified. Leaf litter covers the ground on this site.

4.2.1.6 Rocky Flats Road (B6)

This site is hemlock/hardwood forest. It is in a low-lying wet area with a small stream flowing through it. The eastern hemlocks present in the canopy are large (one measuring over 50 inches in diameter).

Tulip poplars are interspersed among the hemlocks. Two small white ashes are located at the edge of the plot. The main subcanopy species are American holly, eastern hemlock, rosebay rhododendron, and privet. Honeysuckle, poison ivy, and Virginia creeper are abundant as well. Herbaceous ground covers are abundant in the moist habitat. Clubmoss, Christmas fern, bracken fern, periwinkle, partridgeberry, *microstegium*, and several species of violets are included in this category.

4.2.1.7 Apple Tree Lane (B7)

Located on a flat area near the base of a forested slope and within sight of a small creek, this survey plot has a diversity of vegetation species. In this hardwood forest habitat, the main canopy species are red maple and tulip poplar. Sweetgum, sweet birch, river birch, flowering dogwood, and sourwood are also present. The subcanopy consists of saplings of the species listed above along with eastern hemlock, holly, Virginia creeper, and an abundance of poison ivy. The ground cover species are many including *microstegium*, cinquefoil, violet species, false Solomon's seal, and clubmoss species.

4.2.1.8 Cosby (B8)

This survey plot is old field habitat (a successional stage between open field and hardwood forest). The canopy trees are young and the majority of them are either black locust or boxelder. Black cherry, tulip poplar, and sweetgum are on the plot as well. There are some areas of dense shrubby vegetation. Multiflora rose, poison ivy, and honeysuckle constitute the vegetation types in these areas. The ground cover is dense throughout the site. The alien grass, *microstegium*, is thick in the more open areas. Vegetation such as bedstraw, bittercress, and *glechoma* dominate much of the site. There are other numerous herbaceous species present.

4.2.2 Non-circular Plot Sites

This section summarizes the vegetative habitat of each site for which circular plots were not completed.

4.2.2.1 Little Pigeon River (LPR)

This small disturbed piece of land lies between State Route 416 and the Little Pigeon River. Representative tree species along the riverbank are tulip poplar, river birch, sycamore, and hackberry. The vegetation under these trees and along the road edge are typical disturbed area species such as multiflora rose, honeysuckle, poison ivy, and various species of sedges, grasses, and wildflowers. Miami-mist, wild geranium, sage, dog violet, and aster species were abundant.

4.2.2.2 Matthews Branch (MB)

Located at the bottom of slopes where a drainage swale intersects Matthews Branch is a moist hardwood forest habitat. It is close (i.e., less .25 mile) to the Lower Webb Mountain site. The hardwood canopy consists mainly of northern red and chestnut oak with red maples and flowering dogwoods in the understory. Other subcanopy species include eastern hemlock, rosebay rhododendron, flame azalea, and buffalo-nut. False Solomon's seal, galax, Christmas fern, cinnamon fern, violets, coreopsis, whorled loosestrife, and wild hydrangea are representative of the ground cover species.

4.2.2.3 Costner Road (CR)

This hardwood forest habitat lies between steep slopes which form a drainage swale. The canopy trees are large and consist almost exclusively of tulip poplars. In the lower canopy black birch is present. Shrubs such as black cohosh and wild hydrangea are found along the edge of the swale. The ground cover species include an abundance of wild geranium along with Christmas, cinnamon and bracken fern, whorled loosestrife, white snakeroot, false Solomon's seal, orchid, and elephant's foot. Most of these species are located along the drainage swale also.

5. CONCLUSIONS

Section 8B of the Foothills Parkway is frequented by typical forest and forest-edge avian species. No threatened, endangered, or federal candidate species were identified during the survey. One Cooper's hawk (Tennessee species "*In need of management*") was identified near the Sheep Pen Branch area.

It is noteworthy that along the ridges and on Webb Mountain there has been a dieoff of most of the pine trees. This has created openings for forest-edge bird species such as the indigo bunting and Carolina wren. Prior to the pine dieoff these areas did not provide as much habitat for forest-edge species. As hardwoods replace the pines in the future, the area will return to a predominantly forested habitat.

Encroachment of residential development is evident in many areas adjacent Section 8B. This development has fragmented the forest habitats in the area. As development increases fragmentation of the forest will also increase.

The predominant habitat present on the Section 8B ROW is contiguous forest. Many forest dependent (area-sensitive) bird species use the ROW. It is important that the Environmental Impact Statement for Section 8B analyze the impacts of the proposed action and alternatives on these forest habitats and the birds that live there, along with the cumulative impacts of this action in association with other disturbance activities in the area.

6. REFERENCES

- Alsop, F. J., III. 1991. *Birds of the Smokies*. Great Smoky Mountains Natural History Association, Gatlinburg, Tenn., 167 p.
- James, F. C., and H. H. Shugart. 1970. *A quantitative method of habitat descriptions*. Audubon Field Notes 24:727-736.
- Lent, R. A., T. S. Litwin, and N. R. Giffen. 1984. *Bird population relationships as a guide to ecologically-based-management at Floyd Bennett Field, Gateway National Recreational Area*. A Research Report of The Seatuck Research Program, Cornell Laboratory of Ornithology.
- National Geographic Society. 1987. *Field Guide to the Birds of North America*, ed. S. L. Scott, National Geographic Society, Washington, D.C.
- Noon, B. R. 1981. *Techniques for sampling avian habitats*. Pages 42-52 in D. Capen (editor), *The Use of Multivariate Statistics in Studies of Wildlife Habitat*. USDA Forest Service General Technical Report RM-87.
- Reynolds, R. T., J. M. Scott, and R. A. Nussbaum. 1980. *A variable circular-plot method for estimating bird numbers*. Condor 82:309-313.

- Robbins, C. S. 1981. *Effect of time of day on bird activity*. Studies in Avian Biology 6:275-286.
- Robbins, C. S., B. Bruun, and H. S. Zim. 1981. *Birds of North America*. Golden Press, New York, N.Y.
- Wade, M. C., et al. 1994. *Study Plan for Preparing an Environmental Report on Section 8B of the Foothills Parkway*, ORNL/M-3756, Oak Ridge National Laboratory, Oak Ridge, Tennessee. August.
- Winkworth, R. E., and D. W. Goodall. 1962. *A crosswire sighting tube for point quadrat analysis*. Ecology 43:383-393.

APPENDIX A

LISTING OF ALL BIRDS

Species ¹	Forest								Riparian		Field	Floodplain	Wetland
	B2T	B3	B3T	B4	B5	B7	B8	CR	B2	MB	B1	LPR	B6
Mallard <i>Anas platyrhynchos</i>												X	
Turkey Vulture <i>Cathartes aura</i>			X					X				X	
Cooper's Hawk ² <i>Accipiter cooperii</i>	X												
Red-tailed Hawk <i>Buteo jamaicensis</i>	X												
Northern Bobwhite <i>Colinus virginianus</i>							X						
Rock Dove <i>Columba livia</i>											X		
Mourning Dove <i>Zenaida macroura</i>	X		X					X			X	X	X
Yellow-billed Cuckoo <i>Coccyzus americanus</i>	X	X		X		X	X		X	X			X
Great-horned Owl ³ <i>Bubo virginianus</i>											X		
Chimney Swift <i>Chaetura pelagica</i>	X		X				X					X	X
Belted Kingfisher <i>Ceryle alcyon</i>												X	
Red-bellied Woodpecker <i>Melanerpes carolinus</i>	X						X						
Northern Flicker <i>Colaptes auratus</i>		X	X	X	X	X				X	X	X	X
Downy Woodpecker <i>Picoides pubescens</i>	X	X	X	X	X	X				X			

Species ¹	Forest								Riparian		Field	Floodplain	Wetland
	B2T	B3	B3T	B4	B5	B7	B8	CR	B2	MB	B1	LPR	B6
Hairy Woodpecker <i>Picoides villosus</i>	X		X			X							
Pileated Woodpecker <i>Dryocopus pileatus</i>	X	X	X	X	X	X	X	X	X		X	X	X
Eastern Wood-Pewee <i>Contopus virens</i>	X	X	X										X
Eastern Phoebe <i>Sayornis phoebe</i>			X	X		X	X						
Acadian Flycatcher <i>Empidonax virens</i>						X							
Barn Swallow <i>Hirundo rustica</i>											X		
Blue Jay <i>Cyanocitta cristata</i>	X	X	X	X	X	X	X					X	X
American Crow <i>Corvus brachyrhynchos</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
Tufted Titmouse <i>Parus bicolor</i>	X	X	X	X	X	X	X	X		X			X
Carolina Chickadee <i>Parus carolinensis</i>	X		X	X	X	X	X	X	X		X	X	X
Black-capped Chickadee <i>Parus atricapillus</i>			X										
White-breasted Nuthatch <i>Sitta carolinensis</i>	X		X	X	X				X				
Red-breasted Nuthatch <i>Sitta canadensis</i>			X		X								
Carolina Wren <i>Thryothorus ludovicianus</i>		X	X	X	X	X	X	X		X	X	X	

Species ¹	Forest								Riparian		Field	Floodplain	Wetland
	B2T	B3	B3T	B4	B5	B7	B8	CR	B2	MB	B1	LPR	B6
Blue-gray Gnatcatcher <i>Poliopitila caerulea</i>	X						X				X		X
Wood Thrush <i>Hylocichla mustelina</i>	X	X	X	X	X	X					X		X
American Robin <i>Turdus migratorius</i>					X	X							X
Gray Catbird <i>Dumetella carolinensis</i>						X						X	X
Northern Mockingbird <i>Mimus polyglottos</i>												X	
Brown Thrasher <i>Toxostoma rufum</i>					X								X
White-eyed Vireo <i>Vireo griseus</i>							X				X		
Solitary Vireo <i>Vireo solitarius</i>	X		X	X	X								
Red-eyed Vireo <i>Vireo olivaceous</i>	X	X	X	X	X	X	X	X	X		X	X	X
Northern Parula <i>Parula americana</i>	X					X					X	X	
Black & White Warbler <i>Mniotilta varia</i>	X	X	X	X	X	X		X	X	X			
Blackburnian Warbler <i>Dendroica fusca</i>			X	X									
Yellow-rumped Warbler <i>Dendroica magnolia</i>			X	X									
Black-throated Green Warbler <i>Dendroica virens</i>	X	X	X	X	X	X			X	X			X

Species ¹	Forest										Field		Floodplain		Wetland	
	B2T	B3	B3T	B4	B5	B7	B8	CR	Riparian		B1		LPR		B6	
Pine Warbler <i>Dendroica pinus</i>			X		X											
Yellow Warbler <i>Dendroica petechia</i>													X		X	
Kentucky Warbler <i>Oporornis formosus</i>															X	
Hooded Warbler <i>Wilsonia citrina</i>	X		X	X	X	X		X		X	X				X	
Worm-eating Warbler <i>Helminthos vermivorus</i>	X	X	X	X				X		X						
Ovenbird <i>Seiurus aurocapillus</i>	X	X	X	X	X	X	X	X		X					X	
Louisiana Waterthrush <i>Seiurus motacilla</i>	X															
Common Yellowthroat <i>Geothlypis trichas</i>							X				X					
Yellow-breasted Chat <i>Icteria virens</i>							X									
Rose-breasted Grosbeak <i>Phoebeastacus ludovicianus</i>			X													
Northern Cardinal <i>Cardinalis cardinalis</i>	X		X	X	X	X	X	X			X		X		X	
Indigo Bunting <i>Passerina cyanea</i>	X	X	X	X	X	X				X	X		X		X	
Rufous-sided Towhee <i>Pipilo erythrophthalmus</i>	X		X	X	X		X	X		X	X					
Song Sparrow <i>Melospiza melodia</i>													X		X	

Species ¹	Forest								Riparian		Field	Floodplain	Wetland
	B2T	B3	B3T	B4	B5	B7	B8	CR	B2	MB	B1	LPR	B6
White-throated Sparrow <i>Zonotrichia leucophrys</i>			X				X				X		
Eastern Meadowlark <i>Sturnella magna</i>												X	
Red-winged Blackbird <i>Agelaius phoeniceus</i>												X	
Brown-headed Cowbird <i>Molothrus ater</i>		X	X				X						
Common Grackle <i>Quiscalus quiscula</i>						X							X
Scarlet Tanager <i>Piranga olivacea</i>	X	X	X	X	X	X		X	X				X
American Goldfinch <i>Carduelis tristis</i>	X										X		

Key to Symbols:

B1—Webb Creek, B2—Sheep Pen Branch, B2T—Sheep Pen Branch transect, B3—Webb Mountain, B3T—Webb Mountain transect, B4—Lower Webb Mountain, B5—Branam Hollow Road, B6—Rocky Flats Road, B7—Apple Tree Lane, B8—Cosby, LPR—Little Pigeon River, MB—Matthews Branch, CR—Costner Road

¹Latin names and systematic order according to National Geographic Society 1987

²Seen on road driving up to site.

³Identified by nocturnal survey using owl tapes.

APPENDIX B

VEGETATION PLOT RESULTS

The following summarizes the results of the .04 hectare plots established to measure vegetation structural parameters for each survey area. A complete description of the methods used can be found in Section 3 of this report. The raw data sheets follow this summary.

WEBB CREEK B1

The most frequently encountered tree species (greater than or equal to 3 cm dbh) on the site was black walnut in the >8–15 cm size class. The most common shrub (<3 cm dbh) species at B1 was multiflora rose with a count of 23 stems along the shrub transects. Privet was almost as prevalent with a stem count of 17. *Festuca* species was the dominant herbaceous species accounting for an average of 33% across the 8 half meter square plots. Miami mist was the second most prevalent herbaceous species averaging 16.8% across all of the plots. All canopy cover (measured as a percentage) was deciduous and recorded at 35%. Groundcover (measured in percent, 1 m in height and below) was all deciduous and recorded at 95%. The entirely deciduous canopy averaged 5.75 m in height, with a maximum height of 10 m.

SHEEP PEN BRANCH B2

The most frequently encountered tree species at B2 were eastern hemlock and black birch in the 3–8 cm and >8–15 cm size categories. Flowering dogwood, rosebay rhododendron and snags were also prevalent in the 3–8 cm size category. The most prevalent shrub was rosebay rhododendron with a count of 11 stems. Leaf litter dominated the herbaceous plots averaging 81.3% across all plots. Total canopy cover was recorded at 97.5%, consisting of 67.5% deciduous cover and 30% coniferous cover. Total groundcover was recorded at 32.5%, consisting of 10% deciduous cover and 22.5% evergreen cover. The mixed deciduous/coniferous canopy averaged 15.6 m in height, with a maximum coniferous tree height of 19 m.

WEBB MOUNTAIN B3

The most frequently encountered tree species at B3 was chestnut oak in the >15–23 cm and >23–38 cm size categories. Northern red oak was also present, mainly in the >23–38 cm size category. Sourwood and snags were present in the 3–8 cm category and >8–15 cm category. The dominant shrub was chestnut oak with a stem count of 6. Leaf litter dominated the herbaceous plots, averaging 99.5%. The entirely deciduous canopy cover was recorded at 90%. The entirely deciduous groundcover was recorded at 17.5%. The deciduous canopy averaged 18 m in height with a maximum height of 19 m.

LOWER WEBB MOUNTAIN B4

The most frequently encountered tree species was chestnut oak present in the 3–8 cm, >8–15 cm and >15–23 cm size categories. Striped maple and snags were also common in the 3–8 cm size categories. Dominant shrubs were flowering dogwood and striped maple with counts of 12 and 8 stems, respectively. Herbaceous plots were dominated by leaf litter which averaged 86.75% for all plots. The entirely deciduous canopy cover was recorded at 100%. The entirely deciduous groundcover was recorded at 15%. The deciduous canopy averaged 12.5 m in height with a maximum height of 13 m.

BRANAM HOLLOW ROAD B5

The most frequently encountered tree species was rosebay rhododendron present almost exclusively in the 3–8 cm size category. Red maple was also fairly common in the 3–8 cm and >8–15 cm size categories, along with eastern hemlock mainly in the >8–15 cm size category. Dominant shrubs were mountain laurel and rosebay rhododendron, each having stem counts of 5. Leaf litter was dominant in the herbaceous plots, averaging 92.5% across all plots. Total canopy cover was recorded at 100%, with deciduous cover accounting for 10% and coniferous cover accounting for 90%. Total groundcover was recorded at 12.5%, with deciduous cover accounting for 7.5% and evergreen cover accounting for 5%. The mixed deciduous/coniferous canopy averaged 15 m in height with a maximum deciduous and coniferous tree height of 15 meters.

ROCKY FLATS ROAD B6

The most frequently encountered tree species was eastern hemlock, mainly in the 3–8 cm, >8–15 cm and >15–23 cm size categories. Tulip poplar was also quite common in the >8–15 cm and >15–23 cm size categories. Dominant shrub species were rosebay rhododendron and eastern hemlock with stem counts of 10 and 7, respectively. Herbaceous plots were dominated by leaf litter, averaging 76% across all plots. Club moss was also common in patches, averaging 15% across all plots. Total canopy cover was recorded at 97.5%, with deciduous cover accounting for 17.5% and coniferous cover accounting for 80%. Total groundcover was recorded at 35%, with deciduous cover accounting for 22.5% and evergreen cover accounting for 12.5%. The mixed deciduous/coniferous canopy averaged 15.75 m in height, with a maximum coniferous tree height of 17 m.

APPLE TREE LANE B7

The most frequently encountered tree species was red maple, predominantly in the 3–8 cm size category. Tulip poplar was also common in the >23–38 cm size category. Flowering dogwood was also common in the 3–8 cm and >8–15 cm size categories. The most common shrub encountered was red maple with a stem count of 7. Herbaceous plots were dominated by leaf litter, averaging 79% across all plots. The entirely deciduous canopy cover was recorded at 100%. The entirely deciduous groundcover was recorded at 32.5%. The deciduous canopy averaged 17.75 m in height, with a maximum height of 20 m.

COSBY B8

The most frequently encountered tree species was black locust, predominantly in the >8–15 cm and >15–23 cm size categories. Box elder was also common in the 3–8 cm and >8–15 cm size categories. The most common shrub species was multiflora rose with a stem count of 95. Leaf litter dominated the herbaceous plots, averaging 56.25% across all plots. Bedstraw species and *Microstegium vimineum* were also common, averaging 18% and 10% across all plots, respectively. The entirely deciduous canopy cover was recorded at 67.5%. The entirely deciduous groundcover was recorded at 100%. The deciduous canopy averaged 10.3 m in height.

APPENDIX C

VEGETATION ANALYSIS FIELD SHEETS

VEGETATION ANALYSIS FIELD SHEET

LOCATION: <u>B-1 Webb Creek</u>	NEAREST TOWN:
DATE: <u>5/2/95</u>	LAT/LONG:
HABITAT DESCRIPTION:	TOPOGRAPHY:

04 HA CIRCLES (TREES > 3 cm DBH)										
SPECIES	3-8 cm	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102	
Black Walnut	1	6	2							
Snag	3									
Y. Buckeye	2									

SHRUBS (# OF WOODY STEMS < 3 cm DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)					Additional species
SPECIES	N	S	E	W	
Privet	7	0	10	0	Fleabane
M. Rose	23	↓		↓	Fescue
Blackberry	2		2		Pokeweed
					Purple dead-nettle
					Purple dead-nettle

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)									
SPECIES	N		S		E		W		
	1	2	1	2	1	2	1	2	
Miami mist	90%		5%		10%	30%			
Speedwell	10%				50%				
Sandwort					40%				
Leaf Litter		5%		23%		50%			
Clearweed						5%			
Grass (Agrostis sp.)		5%				15%			

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)					GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)				
	N	S	E	W		N	S	E	W
DECID.	+++++	=====	=====	+++++		+++++	+++++	+++++	+++++
CONIF.						+++++	+++++	+++++	+++++

CANOPY HT (MAX CANOPY HT IN METERS)				
	NE	NW	SE	SW
DECID.	8	10	5	0
CONIF.				

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-1 cont. Webb Creek

DATE: 5/2/95

NEAREST TOWN:

LAT/LONG:

HABITAT DESCRIPTION:

TOPO GRAPHY:

.04 HA CIRCLES (TREES $\geq$ 3 cm DBH)

SPECIES	3-8 cm	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102	

SHRUBS (# OF WOODY STEMS < 3 cm. DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)

SPECIES	N	S	E	W		

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)

SPECIES	N		S		E		W		
	1	2	1	2	1	2	1	2	
Tumble mustard				1%					

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)

GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)

	N	S	E	W		N	S	E	W
DECID.						DECID			
CONIF.						EVERG.			

CANOPY HT (MAX CANOPY HT IN METERS)

	NE	NW	SE	SW	
DECID.					
CONIF.					

VEGETATION ANALYSIS FIELD SHEET

LOCATION: <u>B-2 Sheep Pen Branch</u>	NEAREST TOWN: _____
DATE: <u>5/1/95</u>	LAT/LONG: _____
HABITAT DESCRIPTION: _____	TOPO. GRAPHY: _____

04 HA CIRCLES (TREES ≥ 3 cm DBH)										
SPECIES	3-8 cm	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102	
E. Hemlock	7	5	1	1	1					
Snag	7	2		1						
Tupelo		1								
Black Birch	5	7	3	1						
Tulip Poplar	1	1	1	1						
Fraser Magnolia	1									
Red Maple	1		1							

SHRUBS (# OF WOODY STEMS < 3 cm. DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)					Additional Species	
SPECIES	N	S	E	W		
E. Hemlock	0		2	4	Foamflower	Strawberry tree
R. Rhododendron	↓	11			Nightshade (Circaea sp.)	Blackberry
E. Dogwood			1		Speedwell (Veronica sp.)	Virginia creeper
					Witch hazel	Golden roset
					Poison ivy	Striped maple
					Smilax sp.	Chestnut oak
					Cinnamon fern	

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)								
SPECIES	N		S		E		W	
	1	2	1	2	1	2	1	2
Aster sp.	2%							
C. cinquefoil	1%							
R. plantain	1%	3%					2%	
Viola sp. 1	1%							
Leaf litter	95%	91%	75%		100%	99%	100%	90%
Viola sp. 2		5%				1%		2%

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)					GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)				
	N	S	E	W		N	S	E	W
DECID.	+++	++++	++++	++++	DECID.	==+==	+--+	-----	-----
CONIF./Evergreen	++++	++		+++	EVERG.	+	++-	++-+-	++-+-

CANOPY HT (MAX CANOPY HT IN METERS)				
	NE	NW	SE	SW
DECID.	14		15	14.5
CONIF.		19		

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-2, cont. Sheep Pen Branch	
DATE: 5/1/95	
HABITAT DESCRIPTION:	
04 HA CIRCLES (TREES ≥ 3 cm DBH)	
NEAREST TOWN:	TOPO GRAPHY:
LAT/LONG:	

SPECIES	3-8 cm	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102
F. Dogwood	8	2							
R. Rhododendron	7								
Sourwood			1						
Red Oak	2	1							
Black Locust		1							

SHRUBS (# OF WOODY STEMS < 3 cm DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)

SPECIES	N	S	E	W
V. Creeper				

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)

SPECIES	N	S	E	W
V. Creeper	1	2	1	2
Christmas fern			1%	
S. pipsissewa			25%	99%
Rock				

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)

SPECIES	N	S	E	W
DECID.				
CONF.				

CANOPY HT (MAX CANOPY HT IN METERS)

SPECIES	N	S	E	W
DECID.				
CONF.				

VEGETATION ANALYSIS FIELD SHEET

LOCATION: <u>B-3 Webb Mountain</u>	NEAREST TOWN:
DATE: <u>4/27/95</u>	LAT/LONG:
HABITAT DESCRIPTION: <u>Oak Forest</u>	TOPOGRAPHY:

04 HA CIRCLES (TREES ≥ 3 cm DBH)										
SPECIES	3-8 cm	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102	
Chestnut Oak	11		5	6	1					
Sourwood	8	6								
Red Maple	3									
Snag	10	4	3		1					
N. Red Oak	2	1	1	5		2				
A.L. Dogwood	1									
M. Hickory	2									

SHRUBS (# OF WOODY STEMS < 3 cm DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)						
SPECIES	N	S	E	W		
Chestnut Oak	3		3			* Chestnut saplings in plot.
Snag	1					
Am. Chestnut	1	1				
A.L. Dogwood				2		
T.M. Pine			1	3		
Tulip Poplar				1		

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)								
SPECIES	N		S		E		W	
	1	2	1	2	1	2	1	2
Leaf litter	100%	100%	100%	98%	100%	99%	99%	100%
Unknown 1							1%	
Bracken Fern				2%		1%		

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)					GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)				
	N	S	E	W		N	S	E	W
DECID.	+++++	---++	+++++	+++++	DECID.	--- --	+++--	++---	--- --
CONIF.	+++	+++	+++	+++	EVERG.				

CANOPY HT (MAX. CANOPY HT IN METERS)				
	NE	NW	SE	SW
DECID.	16	19	18	19
CONIF.				

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-3 cont. Webb Mountain	NEAREST TOWN:
DATE: 4/27/95	LAT/LONG:
HABITAT DESCRIPTION: Oak forest	TOPO GRAPHY:

04 HA CIRCLES (TREES > 3 cm DBH)										
SPECIES	3-8 cm	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102	
T.M. Pine	1									
Sassafras	1									
V. Pine	1									

SHRUBS (# OF WOODY STEMS < 3 cm DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)					
SPECIES	N	S	E	W	
Red Maple				1	
Striped Maple				1	
M. Hickory				1	
Sassafras			1		
Blueberry		1			

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)									
SPECIES	N		S		E		W		
	1	2	1	2	1	2	1	2	

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)					GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)				
	N	S	E	W		N	S	E	W
DECID.					DECID.				
CONIF.					EVERG.				

CANOPY HT (MAX CANOPY HT IN METERS)				
	NE	NW	SE	SW
DECID.				
CONIF.				

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-4 cont. Lower Webb Mountain	NEAREST TOWN:
DATE: 5/2/95	LAT/LONG:
HABITAT DESCRIPTION:	TOPOGRAPHY:

04 HA CIRCLES (TREES ≥ 3 cm DBH)										
SPECIES	3-8 cm	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102	
Chestnut Oak	12	14	10	3						
Striped Maple	22	1								
F. Dogwood	10	1								
Snag	23	4	1							
N. Red Oak	5	3	1							
T. M. Pine	1									
? Serviceberry	3									

SHRUBS (# OF WOODY STEMS < 3 cm DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)					Additional Species	
SPECIES	N	S	E	W		
Chestnut Oak	1				False Solomon's seal	Bracken fern
Striped Maple	4		4		Rattlesnake plantain	
Red Maple	1	1	1	2	Striped pipsissewa	
F. Dogwood	1		12		Smilax sp.	
Blueberry	2				Grape	
E. Hemlock			3		Christmas fern	
					Viburnum sp.	

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)									
SPECIES	N		S		E		W		
	1	2	1	2	1	2	1	2	
Solomon's Seal	1%				1%				
Leaf Litter	99%	100%	100%	1%	94%	100%	100%	100%	
Clubmoss									
Bare ground				99%					

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)					GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)				
	N	S	E	W		N	S	E	W
DECID.	+++++	+++++	+++++	+++++	DECID.	-----+	-----+	-----+	-----+
CONIF.					EVERG.				

CANOPY HT (MAX CANOPY HT IN METERS)				
	NE	NW	SE	SW
DECID.	13	13	12	12
CONIF.				

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-5

DATE: 5/1/95

HABITAT DESCRIPTION:

04 HA CIRCLES (BRES-3 cm DBH)

NEAREST TOWN:

LAT/ONG:

TOP SECRET:

[illegible]

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-5 cont. Branam Hollow Rd.	NEAREST TOWN:
DATE: 5/1/95	LAT/LONG:
HABITAT DESCRIPTION:	TOPOGRAPHY:

04 HA CIRCLES (TREES ≥ 3 cm DBH)										
SPECIES	3-8 cm	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102	
Fraser Magnolia	1									
Blackgum	1	1	1							
Sourwood			1							
N. Red Oak		1								
White Oak	1									

SHRUBS (# OF WOODY STEMS ≤ 3 cm DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)					
SPECIES	N	S	E	W	

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)									
SPECIES	N		S		E		W		
	1	2	1	2	1	2	1	2	

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)					GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)				
	N	S	E	W		N	S	E	W
DECID.						DECID			
CONIF.						EVERG			

CANOPY HT (MAX CANOPY HT IN METERS)				
	NE	NW	SE	SW
DECID.				
CONIF.				

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-10 Rocky Flats Rd.
 DATE: 5/2/95
 NEAREST TOWN:
 LAITONG:
 TOPOGRAPHY:

HABITAT DESCRIPTION:
 04 HA CIRCLES (THREE 3 cm DBH)

SPECIES	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102
E. Hemlock	6	7	6	4	1			
Tulip Poplar	1	8	6			1		
Snaag	6	2	1	2				
White Ash	2							
Am. Holly		1	1					
R. Rhododendron	7							

SHRUBS (# OF WOODY STEMS < 3 cm DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)

SPECIES	N	S	E	W	Additional species
E. Hemlock	3	1	3		Cinnamon fern
R. Rhododendron	4	1	1	4	Partridgeberry
Am. Holly	1				Marsh blue violet
Privet				1	

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ. PLOTS)

SPECIES	N	S	E	W	
Poison ivy	5%				
Bracken fern	1%				
Clubmoss	1%				
Viola sp.	2%	1%	1%		
Unknown 1					2%
Unknown 2	5%				40%

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)

SPECIES	N	S	E	W	GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)
DECID.	+++	++	+	+	+
CONIF./Evergreen	+++	+++	+++	+++	+

CANOPY HT (MAX CANOPY HT IN METERS)

DECID.	NE	NW	SE	SW
DECID.		15	17	15
CONIF.	16			

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-10 cont. Rocky Flats Rd.

DATE: 5/2/95

HABITAT DESCRIPTION:

04 HA CIRCLES (TBES-3 cm DBH)

SPECIES

3-8 cm	
--------	--

91-86	
-------	--

15-23	
-------	--

23-38	
-------	--

38-53

69-69

69-84	
-------	--

84-102	
--------	--

2012

NEAREST TOWN:

LATLONG:

TOPOGRAPHY:

48

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-7	DATE: 5/2/95	NEAREST TOWN:	HABITAT DESCRIPTION:
Apple Tree Lane		LAT/LONG:	TOPO GRAPHY:

SPECIES				SPECIES			
3-8 cm	> 8-15	> 15-23	> 23-38	> 38-53	> 53-69	> 69-84	> 84-102
River Birch	1	5	1	2			
Red Maple	16	5	1	2			
Tulip Poplar		2	16	1			
Flowering Dogwood	5	5	1				
Smag		5					
Am. Holly	1						
Sourwood	1						

SPECIES				SPECIES			
N	S	E	W	1	2	3	4
E.R. Cedar	1	1	2	2	Red maple	3	Virginia creeper
Flowering Dogwood			1	1	Solomon's seal		Black cherry
Tulip Poplar				1			Clubmoss
Red Maple	2		1				Shining clubmoss
White Ash							Northern red oak

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)				GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)			
	N	S	E		N	S	E
Leaf litter	10%	92%	87%	99%	93%	63%	99%
Cinquefoil	1%	5%	2%	1%	5%		90%
Unknown	1%		1%		5%		
Periwinkle		2%			2%		
Violet	2%	1%			2%		
Rotting tree bark	86%						

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)				CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)			
	N	S	E		N	S	E
DECID.	++ ++ ++ ++ ++	++ ++ ++ ++ ++	++ ++ ++ ++ ++	++ ++ ++ ++ ++	++ ++ ++ ++ ++	++ ++ ++ ++ ++	++ ++ ++ ++ ++
CONIF.							
CANOPY HT (MAX CANOPY HT IN METERS)				CANOPY HT (MAX CANOPY HT IN METERS)			
DECID.	17	16	20	18			
CONIF.							

VEGETATION ANALYSIS FIELD SHEET

LOCATION: <u>B-7 Apple Tree Lane</u>	NEAREST TOWN: _____
DATE: <u>5/2/95</u>	LAT/LONG: _____
HABITAT DESCRIPTION: _____	TOPOGRAPHY: _____

04 HA CIRCLES (TREES ≥ 3 cm DBH)										
SPECIES	3-8 cm	8-15	15-23	23-38	38-53	53-69	69-84	84-102	102	
Sweetgum				3						
Sweet Birch	1									
R. Rhododendron	1									

SHRUBS (# OF WOODY STEMS < 3 cm DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)					
SPECIES	N	S	E	W	

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)									
SPECIES	N		S		E		W		
	1	2	1	2	1	2	1	2	
Tree stump						35%			
Violet (V. tricolor)			3%						
Unknown			4%						
Nightshade (Circaea sp.)			5%						
Grass			2%						

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)					GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)				
DECID.	N	S	E	W	DECID.	N	S	E	W
CONIF.					EVERG.				

CANOPY HT (MAX CANOPY HT IN METERS)				
DECID.	NE	NW	SE	SW
CONIF.				

VEGETATION ANALYSIS FIELD SHEET

LOCATION: <u>B-8</u> <u>Cosby</u>	NEAREST TOWN:
DATE: <u>5/1/95</u>	LAT/LONG:
HABITAT DESCRIPTION:	TOPO GRAPHY:

04 HA CIRCLES (TREES ≥ 3 cm DBH)										
SPECIES	3-8 cm	>8-15	>15-23	>23-38	>38-53	>53-69	>69-84	>84-102	>102	
Boxelder	7	6	1	1						
Black locust	1	9	9	3						
Black cherry		1								
Tulip Poplar			1							
Sweetgum	1									
Snag		1								

SHRUBS (# OF WOODY STEMS < 3 cm. DBH INTERCEPTED IN 2 ARM LENGTH TRANSECTS)					Additional Species
SPECIES	N	S	E	W	
M. Rose	35	43	13	4	Poison ivy
Boxelder	2			1	Honeysuckle
Black locust		1			

HERBACEOUS (% COVER BY SPECIES IN 8 HALF METER SQ PLOTS)								
SPECIES	N		S		E		W	
	1	2	1	2	1	2	1	2
Morning glory		1%						
Leaf Yitter	100%		63%	71%	91%	63%	34%	28%
Microstegium		80%						
Bittercress		19%						
Bedstraw			30%	15%		10%	60%	30%
Purple dead-nettle			2%	2%	2%	1%	1%	2%

CANOPY COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)					GROUND COVER (40 + OR - SIGHTINGS THRU AN OCULAR TUBE)				
	N	S	E	W		N	S	E	W
DECID.	++-++-++	+--+++-+	++-++-++	++-++-++		++-++-++	++-++-++	++-++-++	++-++-++
CONIF.									

CANOPY HT (MAX CANOPY HT IN METERS)				
	NE	NW	SE	SW
DECID.	10.2	11.5	9.4	10
CONIF.				

VEGETATION ANALYSIS FIELD SHEET

LOCATION: B-8 cont. Cosby

DATE: 5/1/95

HABITAT DESCRIPTION:

04 HA CIRCLES (TREES-3 cm DBH)

NEAREST TOWN:

LATLONG:

TOPOGRAPHY:

SPECIES

3-8 CM

8-15

15-23

23-38

38.

69-53-69

69-84

84-102

202

52

INTERNAL DISTRIBUTION

1. G. E. Courville
2. J. T. Ensminger
3. N. R. Giffen
4. L. K. Mann
5. C. I. Moser
6. H. D. Quarles
7. R. M. Reed
8. R. B. Shelton
- 9-14. M. C. Wade
15. ORNL Patent Office
16. Document Reference Section
17. Central Research Library
- 18-20. Laboratory Records
21. Laboratory Records (Record Copy)

EXTERNAL DISTRIBUTION

22. T. E. Drabek, Professor, Department of Sociology, University of Denver, Denver, Colorado 80208-0209.
23. Dr. Stephen G. Hildebrand, Director, Environmental Sciences Division, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, Tennessee 37831-6037.
24. J. H. Reber, Natural Resource Specialist, United States Department of Interior, National Park Service, Denver Service Center, 12795 W. Alameda Parkway, P. O. Box 25287, Denver, Colorado 80225-0287.
25. G. F. Sowers, P.E., Senior Vice President, Law Companies Group, Inc., 114 Townpark Drive, Suite 250, Kennesaw, Georgia 30144-5599.
26. B. A. Wade, 2714 Stubbs Bluff Road, Knoxville, Tennessee 37932.
27. C. M. Walton, Paul D. and Betty Robertson Meek Centennial Professor and Chairman, Department of Civil Engineering, College of Engineering, University of Texas at Austin, Cockrell Hall, Suite 4.2, Austin, Texas 78712.
28. ORNL Site Manager, U.S. Department of Energy, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, Tennessee 37831-6269.
- 29-31. OSTI, U.S. Department of Energy, P.O. Box 62, Oak Ridge, Tennessee 37831.