

**AVIAN SURVEY OF THE WILLIAM S. LEE III NUCLEAR STATION;
CHEROKEE COUNTY, SOUTH CAROLINA**



Solitary Sandpiper (*Tringa solitaria*)



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EXECUTIVE SUMMARY

Duke Energy Carolinas, LLC (Duke Energy) is in the planning phase for the potential development of the William States Lee III Nuclear Station (Project) located in east-central Cherokee County, South Carolina.

The objective of this study was to characterize the existing breeding and migratory bird communities of the Project area. Avian transects and point counts focused on representative and high-value habitat areas located within the Project boundary.

The methodology for this study involved two primary tasks. The first task was to prepare a list of the avian species known to occur or potentially occurring in the Project area. The second task was to inventory and characterize the existing migratory and breeding avian communities. The migratory and breeding bird study was conducted during the spring migration period (May 12, 26, and 27, 2009) and summer breeding period (June 16 and July 1 and 2, 2009).

A total of 102 avian species were observed during the surveys, 70 of which are known to breed in South Carolina. The average number of avian species documented was 25 per survey. The second spring migration survey and the second breeding survey had the highest average species counts of any of the surveys. Of all the habitats noted, the upland scrub/wetland/open water habitat had the greater number of species throughout the entire survey on average. This could be attributed to the fact that the upland scrub/wetland habitat is very diverse, and these habitats tend to create a significant amount of edge effect (i.e., changing of habitats) associated with this habitat type.

The surveys uncovered some anomalies in the observed species. Of the 14 species of warbler noted to breed within the county and vicinity, only eight of those species were observed to breed within or adjacent to the Project area. Of the 11 raptor species noted to occupy the area (hawks, owls, etc.), only five of those species were observed on the Project site during the breeding season. The family including buntings, sparrows, and relatives are known to have nine species breeding in Cherokee County or in the vicinity of the Project site. Of those nine known species, only four species were observed.

The habitat shown to have the highest species diversity is the riparian/wetland/open water habitat, which could be associated with any of the open water areas located on or adjacent the subject property. Any significant clearing of this habitat for the development of the Project would have a significant effect on the avian species diversity as well as limiting the amount of breeding habitat for the birds that utilize this habitat.

If the proposed Lee Nuclear Station Project were to be rated on the overall quality of habitat for avian species, not including the riparian wetlands and open water, it would be considered poor. The reasoning behind this is the significant amount of disturbance due to past/present construction, low quality grassland and shrub/scrub habitats, and the minimal size and fragmentation of the higher quality habitats found within the Project

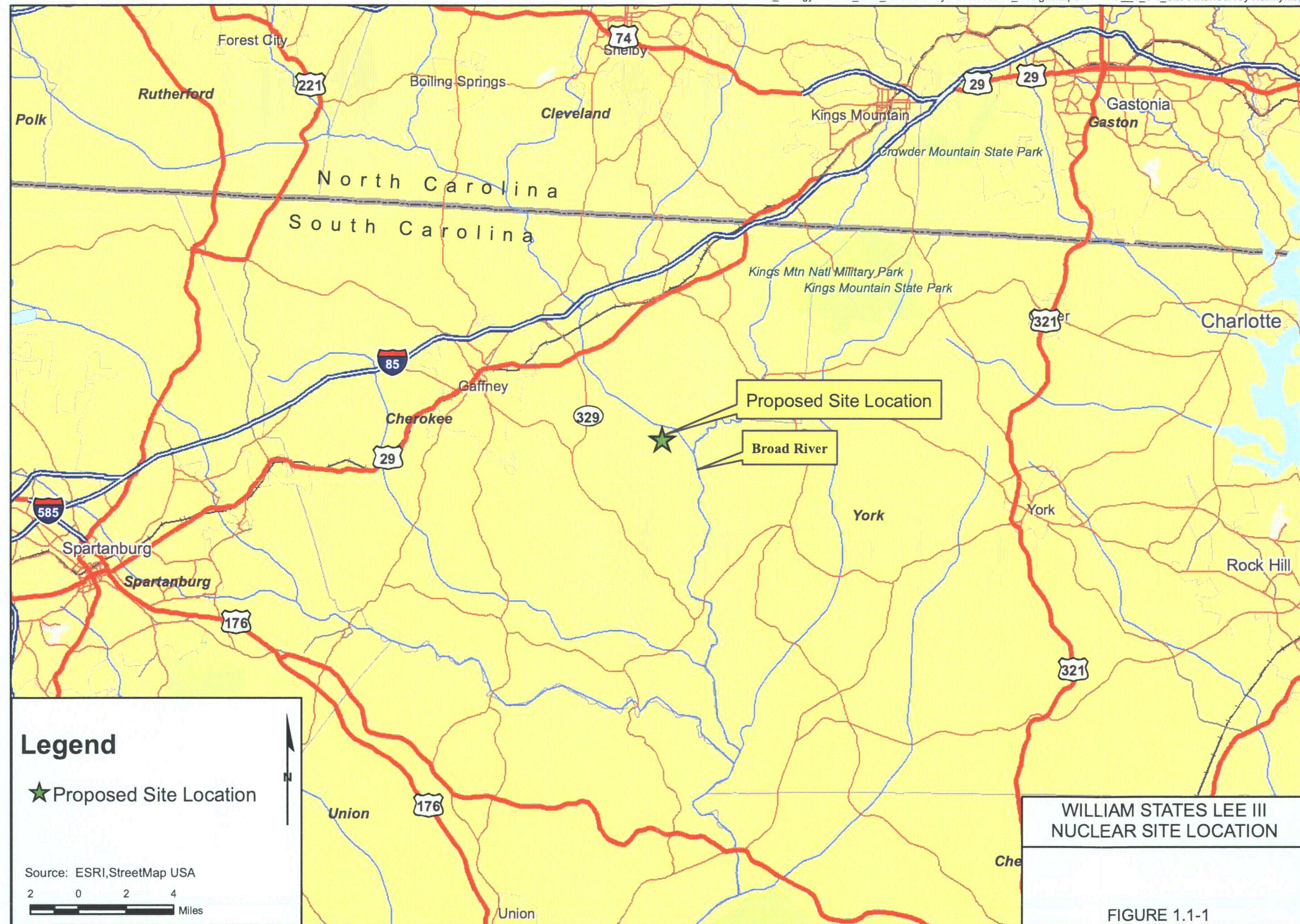
site. In addition, the planting of exotic and invasive species has diminished the habitat for grassland and pasture nesting/foraging species.

1.0 INTRODUCTION

The proposed William States Lee III Nuclear Station (Project) is located in east-central Cherokee County, South Carolina (Figure 1.1-1). Duke Power Company conducted partial construction of the proposed Cherokee Nuclear Station on this site from 1977-1982. The Project today consists of approximately 2,068 acres (836.9 ha) of disturbed/man-made and natural communities owned by Duke Energy Carolinas, LLC (Duke Energy). The development of this nuclear station may require the altering of the local environs and the possible destruction of various terrestrial and aquatic habitats. The purpose of this report is to provide information that will help evaluate the potential impacts of construction and development activities on the avifauna on the site.

The majority of land found within the Project site includes mixed hardwoods forest, variations of mixed pine/hardwood forest, upland scrub, open/field/meadow, and wetland/ open water habitat (Duke 2007). Most of these habitat types have varying degrees of disturbance due to past land uses.

In association with the overall Project, avian, amphibian/reptile botanical, and wetland investigations were performed during 2009. The purpose of these studies was to characterize selected fauna and the flora of the Project. The purpose of this avian study is to characterize the existing breeding and migratory avian communities of the Project area and assess the potential effects of proposed Project-related impacts on the breeding and migratory species and communities. The study focused on representative and high-value habitat areas located within the Project area. The migration and breeding bird study was conducted during the spring migration period (May 12, 26, and 27, 2009) and summer breeding period (June 16 and July 1 and 2, 2009).



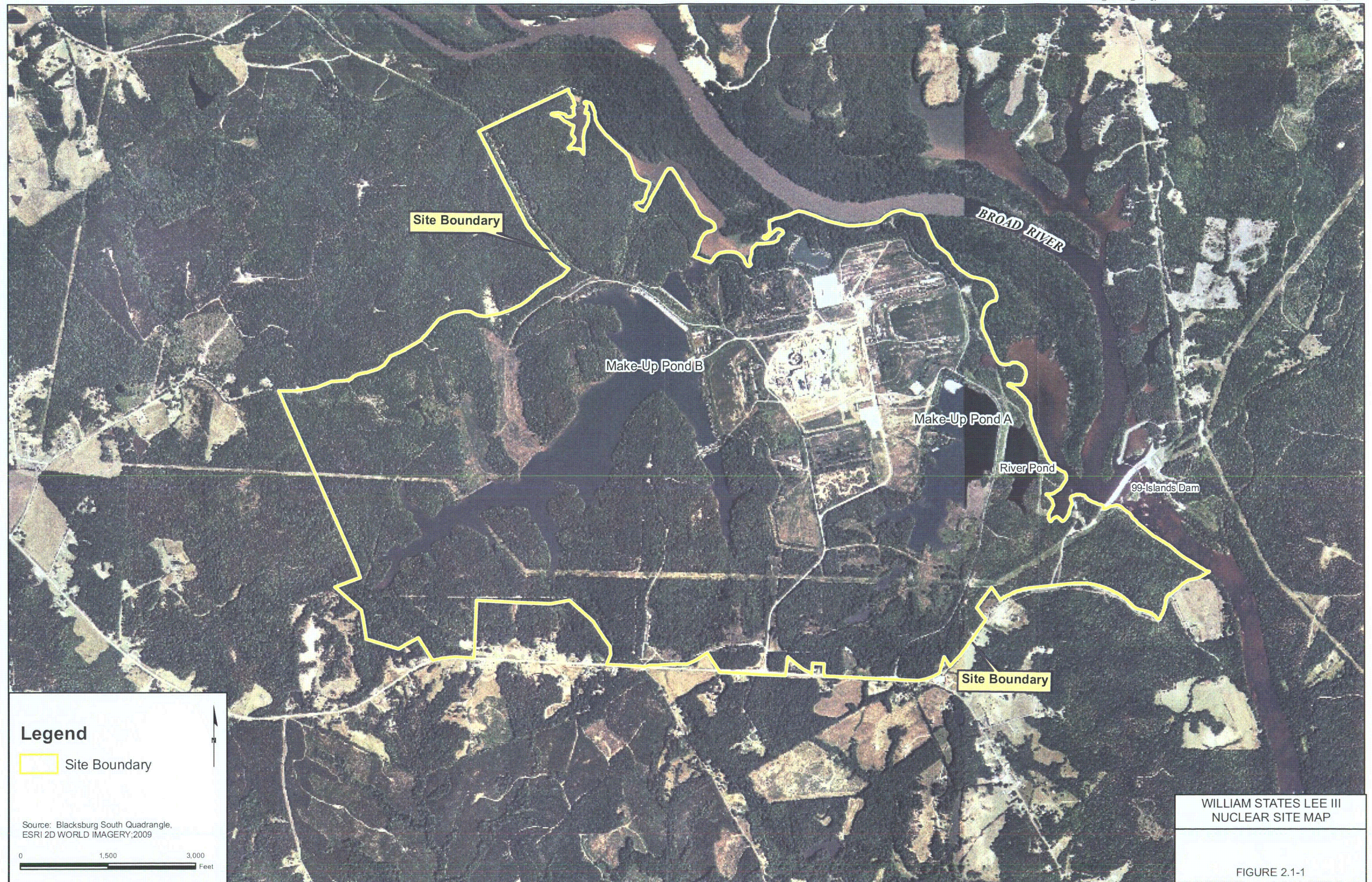
2.0 STUDY AREA

2.1 Project Location

The proposed Project is located on the west side of the Broad River in Cherokee County, South Carolina, approximately 6.5 miles (10.5 km) southeast of the city of Gaffney, South Carolina (Figure 2.1-1). The Project study area is in the Piedmont physiographic province of the Appalachian Mountain system and is comprised of existing habitats within the property boundary of the Project and consists of approximately 2,068 acres of land and open water habitats.

2.2 Location Descriptions

Surveys for avian resources were conducted through use of visual and audible bird identification counts along established transects in a variety of accessible habitats on the Project property (Cooperrider et al. 1986). The study area involved five transects and two point count stations located in various portions of the site. These transects were located within five different habitat types: mixed hardwoods forest, variations of mixed pine/hardwood forest, upland scrub, open/field/meadow, and wetland/ open water habitat (Duke 2007). The two point count stations were located in mixed habitats of upland scrub, open water, and mixed hardwood pine habitat. Figures 2.2-1a - 2.2-1e present an overview map of the transects and point count locations. A description of each transect and point count is provided in the following sections, including the location of the transect/point count, the approximate length of the transects, and the dominant vegetation of each transect/point count.





2.2.1 Transect #1

Transect #1 begins along the southern property boundary and runs north up McKown's Mountain (Figure 2.2-1). Transect #1 is located along an unimproved road that provides access to the ridgeline of McKown's Mountain with an approximate length of 4,232 feet (1.29 kilometers). This transect has one main habitat type, mixed hardwood forest (see photograph below; Duke 2007).

The dominant vegetation located along Transect #1 includes chestnut oak (*Quercus prinus*), water oak (*Quercus nigra*), red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), hickory (*Carya* ssp.), red cedar (*Juniperus virginiana*), red maple (*Acer rubrum*), white oak (*Quercus alba*), post oak (*Quercus stellata*), sourwood (*Oxydendrum arboreum*), black cherry (*Prunus serotina*), and some shortleaf pine (*Pinus echinata*) in the canopy. Mountain laurel (*Kalmia latifolia*), highbush blueberry (*Vaccinium corymbosum*), sassafras (*Sassafras albidum*), hog plum (*Prunus umbellata*), and red bud (*Cercis canadensis*) are present within the shrub/sapling layer. In addition, smooth sumac (*Rhus glabra*), sericea lespedeza (*Lespedeza cuneata*), blackberry (*Rubus* sp.), and Japanese honeysuckle (*Lonicera japonica*) are present in the understory.



Photograph of Mixed Hardwood Forest Habitat in Transect #1

2.2.2 Transect #2

Transect #2 is located in the northwest corner of the subject property, west of Pond B (Figure 2.2-1). Transect #2 starts at the edge of an open field and runs along an unimproved road that ends on the banks of Make-Up Pond B with an approximate length of 2,204 feet (0.67 kilometer). This transect is made up of variations of mixed pine/hardwood forest, which are commonly found in the piedmont of South Carolina (see photograph below; Nelson 1986).

The dominant vegetation located along Transect #2 includes red oak, red cedar, Virginia pine (*Pinus virginiana*), shortleaf pine, water oak, sweetgum (*Liquidambar styraciflua*), and hickories in the canopy and sapling layers. American holly (*Ilex opaca*) and red cedar make up a majority of the shrub/scrub layer, with smooth sumac, sericea lespedeza, green briar (*Smilax* ssp.), blackberry, and Japanese honeysuckle comprising the understory.



Photograph of Mixed Pine/Hardwood Forest in Transect #2

2.2.3 Transect #3

Transect #3 is located in the south central portion of the subject property, south of the old dismantled reactor housing site (Figure 2.2-1). Transect #3 starts in a power line right-of-

way and runs south and then northeast, ending in a field adjacent to the temporary construction trailers with an approximate length of 4,104 feet (1.25 kilometers). This transect is noted to be within the open/field/meadow habitat type (Duke 2007); however the community appears to be consistent with the upland scrub habitat type. A majority of the vegetation in this transect is shrub-seedling stage with areas of old disturbed field vegetation interspersed. This type of habitat is commonly found in areas of past disturbance or abandoned fields (see photograph below).

The dominant vegetation located along Transect #3 includes pasture grasses, broomsedge (*Andropogon virginicus*) blackberry, young Virginia pine, red cedar, sweetgum, tulip poplar (*Liriodendron tulipifera*), persimmon (*Diospyros virginiana*), red maple, smooth sumac, sericea lespedeza, and Japanese honeysuckle.



Photograph of Open Field/Meadow/Upland Scrub Habitat in Transect #3

2.2.4 Transect #4

Transect #4 is located in the central portion of the subject property in the maintained fields west of Make-Up Pond A (Figure 2.2-1). This transect runs between two existing meteorological towers with an approximate length of 4,344 feet (1.32 kilometers). This transect has one main habitat type, open field meadow, which is commonly found around

urban development associated with maintained pasture/fields in the piedmont of South Carolina (see photograph below).

The dominant vegetation located along Transect #4 includes maintained (mowed) pasture grasses, broomsedge, fescue (*Festuca* sp.), sericea lespedeza, blackberry, and sneezeweed (*Helenium* sp.). There is some small edge habitat containing persimmon, eastern cottonwood (*Populus deltoides*), catalpa (*Catalpa speciosa*), and sweetgum.



Photograph of Open/Field/Meadow Habitat in Transect #4

2.2.5 Transect #5

Transect #5 is located in the southeastern portion of the subject property. The transect runs along the southern and western edge of Make-Up Pond A (Figure 2.2-1) with an approximate length of 3,887 feet (1.84 kilometers). This transect is located within a combination of habitat types: pine mixed hardwood/upland scrub/wetland/open water (Duke 2007). The open water/wetland areas on the site are associated with the fringes of Make-up Pond A's open water (see photograph below).

The dominant vegetation located along Transect #5 is eastern cottonwood, boxelder (*Acer negundo*), black willow (*Salix nigra*), red cedar, winged elm (*Ulmus alata*), sweetgum, tulip poplar, red maple, silky dogwood (*Cornus amomum*), Virginia pine, and river birch

(*Betula nigra*) in the canopy and sapling layers. The herbaceous layer is comprised mostly of Japanese honeysuckle, fescue, Virginia creeper (*Parthenocissus quinquefolia*), blackberry, browntop (*Microstegium vimineum*), false nettle (*Boehmeria cylindrica*), muscadine (*Vitis rotundifolia*), poison ivy (*Toxicodendron radicans*), golden-rod (*Solidago* sp.), sedges (*Carex* ssp.), soft rush (*Juncus effusus*), broomsedge, and spiderwort (*Tradescantia* ssp.).



Photograph of Upland Scrub/Wetland/Open Water Habitat in Transect #5

2.2.6 Point Counts #1 and #2

The Make-Up Pond B Point Count and the River Pond Point Count are practically the same habitats but located in different locations within the subject property. The Make-Up Pond B Point Count is located in the northwest corner of the Project on a gravel road between an open water pond and a backwater area of the Broad River (see photograph below; Figure 2.2-1). The River Pond Point Count is located along the eastern boundary of the subject property on a gravel road between the River Pond and a backwater area of the Broad River (see photograph below; Figure 2.2-1). The sites generally consist of open water with riparian and bottomland hardwood forest on the edges of the ponds and river.

The dominant vegetation located at both point counts includes sericea lespedeza, sneezeweed, asters (*Aster* spp.), eastern cottonwood, American sycamore (*Platanus occidentalis*), sweetgum, red maple, tulip poplar, black willow, and wiregrass (*Cynodon dactylon*).



Photograph of the Make-Up Pond B Point Count



Photograph of River Pond Point Count

3.0 STUDY METHODOLOGY

3.1 Site Selection/Landscape Analysis

As described in Section 2.0, the five transects selected for this survey were located in representative and high-value habitat areas within the Project area. The habitat at each station was described on field sheets based on categories such as location, community type, vegetation type, vegetation, and other information. The two point counts were located in areas adjacent to several smaller sized important habitats and did not allow for transect placement.

3.2 Survey Methods

The methods used to inventory and characterize the avian resources associated with the Project area included compiling existing information, inventorying and characterizing the avian community, and determining potential Project-related effects on these communities and species. The first task was to compile existing information, which included preparing a list of the avian species known to occur or potentially occurring in the Project area, as well as their preferred habitats. There are 108 avian species that could potentially occur in the Project area (Table 3.2-1). Existing information was gathered from various sources, including field guides, breeding bird surveys in the vicinity of the Project area, regional and state bird lists, and the South Carolina Breeding Bird Atlas (BBA).

The second task was to inventory and characterize the existing migratory and breeding avian communities. This task provided necessary baseline information regarding the existing avian community. Avian species observed (seen and/or heard) during the spring counts were considered migratory species that would utilize the habitat within the Project for resting and foraging before continuing to their breeding grounds. The avian species observed during the summer breeding counts, after spring migration had finished, were considered to be species that utilize the habitat within the Project as their breeding ground.

TABLE 3.2-1
LIST OF POTENTIALLY OCCURRING AND RECORDED AVIAN SPECIES IN
THE PROPOSED PROJECT AND ITS VICINITY

Common Name	Scientific Name	Status
Acadian Flycatcher	<i>Empidonax alnorum</i>	Recorded
American Crow	<i>Corvus brachyrhynchos</i>	Recorded
American Goldfinch	<i>Carduelis tristis</i>	Recorded
American Kestrel	<i>Falco sparverius</i>	Recorded
American Robin	<i>Turdus migratorius</i>	Recorded
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Recorded
Barn Owl	<i>Tyto alba</i>	Recorded
Barn Swallow	<i>Hirundo rustica</i>	Recorded
Barred Owl	<i>Strix varia</i>	Possible/Probable
Belted Kingfisher	<i>Ceryle alcyon</i>	Possible/Probable
Black Vulture	<i>Coragyps atratus</i>	Recorded
Black-and-white Warbler	<i>Mniotilta varia</i>	Possible/Probable
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Recorded
Black-throated Green Warbler	<i>Dendroica virens</i>	Recorded
Blue Grosbeak	<i>Passerina caerulea</i>	Recorded
Blue Jay	<i>Cyanocitta cristata</i>	Recorded
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	Recorded
Blue-headed Vireo	<i>Vireo solitarius</i>	Recorded
Broad-winged Hawk	<i>Buteo platypterus</i>	Possible/Probable
Brown Thrasher	<i>Toxostoma rufum</i>	Recorded
Brown-headed Cowbird	<i>Molothrus ater</i>	Recorded
Brown-headed Nuthatch	<i>Sitta pusilla</i>	Recorded
Canada Goose	<i>Branta canadensis</i>	Recorded
Carolina Chickadee	<i>Poecile carolinensis</i>	Recorded
Carolina Wren	<i>Thryothorus ludovicianus</i>	Recorded
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	Recorded
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Recorded
Chimney Swift	<i>Chaetura pelagica</i>	Recorded
Chipping Sparrow	<i>Spizella passerina</i>	Recorded
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	Recorded
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Recorded
Common Grackle	<i>Quiscalus quiscula</i>	Recorded
Common Yellowthroat	<i>Geothlypis trichas</i>	Recorded
Cooper's Hawk	<i>Accipiter cooperii</i>	Recorded
Downy Woodpecker	<i>Picoides pubescens</i>	Recorded
Eastern Bluebird	<i>Sialia sialis</i>	Recorded
Eastern Kingbird	<i>Tyrannus tyrannus</i>	Recorded
Eastern Meadowlark	<i>Sturnella magna</i>	Recorded
Eastern Phoebe	<i>Sayornis phoebe</i>	Recorded

Common Name	Scientific Name	Status
Eastern Screech-Owl	<i>Megascops asio</i>	Recorded
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	Recorded
Eastern Wood-Pewee	<i>Contopus virens</i>	Recorded
European Starling	<i>Sturnus vulgaris</i>	Recorded
Field Sparrow	<i>Spizella pusilla</i>	Recorded
Fish Crow	<i>Corvus ossifragus</i>	Recorded
Golden-crowned Kinglet	<i>Dendroica pensylvanica</i>	Recorded
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Recorded
Gray Catbird	<i>Dumetella carolinensis</i>	Recorded
Great Blue Heron	<i>Ardea herodias</i>	Recorded
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Recorded
Great Horned Owl	<i>Bubo virginianus</i>	Recorded
Green Heron	<i>Butorides virescens</i>	Recorded
Hairy Woodpecker	<i>Picoides villosus</i>	Recorded
Hooded Warbler	<i>Wilsonia citrina</i>	Recorded
Horned Lark	<i>Eremophila alpestris</i>	Possible/Probable
House Finch	<i>Carpodacus mexicanus</i>	Recorded
House Sparrow	<i>Passer domesticus</i>	Recorded
House Wren	<i>Troglodytes aedon</i>	Recorded
Indigo Bunting	<i>Passerina cyanea</i>	Recorded
Kentucky Warbler	<i>Oporornis formosus</i>	Recorded
Killdeer	<i>Charadrius vociferus</i>	Recorded
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Recorded
Louisiana Waterthrush	<i>Seiurus motacilla</i>	Recorded
Magnolia Warbler	<i>Dendroica magnolia</i>	Recorded
Mourning Dove	<i>Zenaida macroura</i>	Recorded
Northern Bobwhite	<i>Colinus virginianus</i>	Recorded
Northern Cardinal	<i>Cardinalis cardinalis</i>	Recorded
Northern Flicker	<i>Colaptes auratus</i>	Recorded
Northern Mockingbird	<i>Minus polyglottos</i>	Recorded
Northern Parula	<i>Parula americana</i>	Recorded
Orchard Oriole	<i>Icterus spurius</i>	Recorded
Osprey	<i>Pandion haliaetus</i>	Recorded
Ovenbird	<i>Seiurus aurocapillus</i>	Recorded
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Possible/Probable
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Recorded
Pine Warbler	<i>Dendroica pinus</i>	Recorded
Prairie Warbler	<i>Dendroica discolor</i>	Recorded
Prothonotary Warbler	<i>Protonotaria citrea</i>	Recorded
Purple Martin	<i>Progne subis</i>	Recorded
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	Recorded
Red-eyed Vireo	<i>Vireo olivaceus</i>	Recorded

Common Name	Scientific Name	Status
Red-shouldered Hawk	<i>Buteo lineatus</i>	Recorded
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Recorded
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Recorded
Rock Pigeon	<i>Columba livia</i>	Recorded
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Recorded
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Recorded
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Recorded
Ruffed Grouse	<i>Bonasa umbellus</i>	Recorded
Scarlet Tanager	<i>Piranga olivacea</i>	Recorded
Song Sparrow	<i>Melospiza melodia</i>	Recorded
Summer Tanager	<i>Piranga rubra</i>	Recorded
Swamp Sparrow	<i>Melospiza georgiana</i>	Recorded
Tufted Titmouse	<i>Baeolophus bicolor</i>	Recorded
Turkey Vulture	<i>Cathartes aura</i>	Recorded
Whip-poor-will	<i>Caprimulgus vociferus</i>	Recorded
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Recorded
White-eyed Vireo	<i>Vireo griseus</i>	Recorded
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Recorded
Wild Turkey	<i>Meleagris gallopavo</i>	Recorded
Wood Duck	<i>Aix sponsa</i>	Recorded
Wood Thrush	<i>Hylocichla mustelina</i>	Recorded
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	Possible/Probable
Yellow Warbler	<i>Dendroica petechia</i>	Possible/Probable
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Recorded
Yellow-breasted Chat	<i>Icteria virens</i>	Recorded
Yellow-throated Vireo	<i>Vireo flavifrons</i>	Recorded
Yellow-throated Warbler	<i>Dendroica dominica</i>	Recorded

Recorded = has been observed/confirmed by the Breeding Bird Atlas of South Carolina, Survey for Breeding and Migratory Avian Species Associated With London Creek, and the North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Chesnee Route.

Possible/Probable = should breed within South Carolina, Breeding Bird Atlas of South Carolina,

Using the information gathered in the first and second tasks, field surveys were conducted to determine the composition and distribution of avian species in the Project area. These surveys were performed using established transects and point counts, whereby qualified observers surveyed along an established transect and recorded all the birds seen and heard over the length of the transects (Cooperrider et al. 1986). Along with the avian species noted within the Project corridor, any species seen or heard was recorded.

The transects and point counts for migratory species began at sunrise and continued through the day in an effort to capture both passerine and non-passerine species. Breeding bird surveys focused on the time period from sunrise through approximately 11:00 AM, to coincide with the territorial males' peak singing time. The order in which

the transects and point counts were surveyed was changed when possible from survey to survey to reduce temporal bias. Any bird species seen or heard within the breeding and migratory surveys were recorded. Incidental flyovers and miscellaneous observations were documented as well. Point counts were completed by surveying for avian fauna at established sample station and recording all birds seen and heard over a 10-minute period (Cooperrider et al. 1986).

Each transect and point count was visited twice during the spring migration period and the breeding period. The migration surveys during the spring coincided, to the extent possible, with the passage of weather fronts (i.e., warm fronts in the spring). During the spring period, the National Weather Service's Next Generation Radar (NEXRAD) was accessed to determine when large flights were crossing the Gulf of Mexico. Surveys were not conducted when rain or wind interfered with the audibility of bird sounds, or when fog or rain interfered with visual identification of species.

3.3 Historical Context

The South Carolina BBA was reviewed for historic occurrences of the possible avian species that could be found during the breeding surveys. The BBA Project was originally designed to increase public knowledge of the state's breeding bird distribution and status through systematic surveys over a fixed period of time. Breeding criteria in the BBA are based on field observations and are grouped into three main categories: possible, probable, and recorded breeding. The surveys were conducted between 1989 and 1995, during which time approximately 165 different avian species were noted to breed in South Carolina (BBA 1995). Understandably not all of the 165 species would be seen within the Project area; however, the BBA assisted this survey by noting potential species occurrences. Through further research, 108 species (Table 3.2-1) were observed (confirmed) to breed or noted to be possible/probable breeders within the county or vicinity (DTA 2008; BBA 1995; Sauer et al. 2008). Table 3.2-1 does not take into account the number of avian species that would be migrating through the Project Area.

4.0 RESULTS AND DISCUSSION

As stated in Sections 2.0 and 3.0, the surveys for avian resources were conducted through use of established transects in the Project area (Figure 2.2-1; Cooperrider et al. 1986). The five transects measured a total of approximately 18,760 linear feet (5.72 kilometers) and were located within five different habitats. The observations and data collected during the point counts were used as miscellaneous data for the presence/absence surveys.

4.1 Data Collected – Overview of Observed Species

As shown below in Table 4.1-1, 102 avian species (migratory and breeding) were observed (seen or heard) during the spring migration and breeding surveys. The species indicated in this table are species that are representative of the ecoregion. Furthermore, none of the species observed were state or federal species of concern or classified as rare,

threatened, or endangered with the exception of several spring (non-breeding) observations of an American Kestrel (*Falco sparverius*) a non-regulated federal species of concern (AOU 2008).

TABLE 4.1-1
LIST OF SPECIES OBSERVED DURING THE 2009 LEE NUCLEAR STATION
SURVEYS

Common Name	Scientific Name
Acadian Flycatcher	<i>Empidonax alnorum</i>
American Crow	<i>Corvus brachyrhynchos</i>
American Goldfinch	<i>Carduelis tristis</i>
American Kestrel	<i>Falco sparverius</i>
American Redstart	<i>Setophaga ruticilla</i>
American Robin	<i>Turdus migratorius</i>
Barn Swallow	<i>Hirundo rustica</i>
Belted Kingfisher	<i>Ceryle alcyon</i>
Black Vulture	<i>Coragyps atratus</i>
Black-and-White Warbler	<i>Mniotilta varia</i>
Blue Grosbeak	<i>Guiraca caerulea</i>
Blue Jay	<i>Cyanocitta cristata</i>
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>
Blue-headed Vireo	<i>Vireo solitarius</i>
Brown Thrasher	<i>Toxostoma rufum</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Brown-headed Nuthatch	<i>Sitta pusilla</i>
Canada Goose	<i>Branta canadensis</i>
Cape May Warbler	<i>Dendroica tigrina</i>
Carolina Chickadee	<i>Poecile carolinensis</i>
Carolina Wren	<i>Thryothorus ludovicianus</i>
Cedar Waxwing	<i>Bombycilla cedrorum</i>
Chimney Swift	<i>Chaetura pelagica</i>
Chipping Sparrow	<i>Spizella passerina</i>
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Common Grackle	<i>Quiscalus quiscula</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Dickcissel	<i>Spiza americana</i>
Double-crested Cormorant	<i>Phalacrocorax auritus</i>
Downy Woodpecker	<i>Picoides pubescens</i>
Eastern Bluebird	<i>Sialia sialis</i>
Eastern Kingbird	<i>Tyrannus tyrannus</i>
Eastern Meadowlark	<i>Sturnella magna</i>

Common Name	Scientific Name
Eastern Phoebe	<i>Sayornis phoebe</i>
Eastern Towhee	<i>Pipilo erythrophthalmus</i>
Eastern Wood-Pewee	<i>Contopus virens</i>
European Starling	<i>Sturnus vulgaris</i>
Field Sparrow	<i>Spizella pusilla</i>
Fish Crow	<i>Corvus ossifragus</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Gray Catbird	<i>Dumetella carolinensis</i>
Great Blue Heron	<i>Ardea herodias</i>
Great Crested Flycatcher	<i>Myiarchus crinitus</i>
Green Heron	<i>Butorides virescens</i>
Hairy Woodpecker	<i>Picoides villosus</i>
House Finch	<i>Carpodacus mexicanus</i>
Indigo Bunting	<i>Passerina cyanea</i>
Killdeer	<i>Charadrius vociferus</i>
Least Sandpiper	<i>Calidris minutilla</i>
Lesser Yellowlegs	<i>Tringa flavipes</i>
Louisiana Waterthrush	<i>Seiurus motacilla</i>
Mallard	<i>Anas platyrhynchos</i>
Mourning Dove	<i>Zenaida macroura</i>
Northern Bobwhite	<i>Colinus virginianus</i>
Northern Cardinal	<i>Cardinalis cardinalis</i>
Northern Harrier	<i>Circus cyaneus</i>
Northern Mockingbird	<i>Minus polyglottos</i>
Northern Parula	<i>Parula americana</i>
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
Orchard Oriole	<i>Icterus spurius</i>
Osprey	<i>Pandion haliaetus</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Pied-billed Grebe	<i>Podilymbus podiceps</i>
Pileated Woodpecker	<i>Dryocopus pileatus</i>
Pine Warbler	<i>Dendroica pinus</i>
Prairie Warbler	<i>Dendroica discolor</i>
Prothonotary Warbler	<i>Protonotaria citrea</i>
Purple Martin	<i>Progne subis</i>
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>
Red-breasted Merganser	<i>Mergus serrator</i>
Red-eyed Vireo	<i>Vireo olivaceus</i>
Red-shouldered Hawk	<i>Buteo lineatus</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Rock Dove	<i>Columba livia</i>

Common Name	Scientific Name
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>
Ruby-crowned Kinglet	<i>Regulus calendula</i>
Ruby-throated Hummingbird	<i>Archilochus colubris</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
Savannah Sparrow	<i>Passerculus sandwichensis</i>
Scarlet Tanager	<i>Piranga olivacea</i>
Semipalmated Sandpiper	<i>Calidris pusilla</i>
Solitary Sandpiper	<i>Tringa solitaria</i>
Song Sparrow	<i>Melospiza melodia</i>
Spotted Sandpiper	<i>Actitis macularia</i>
Summer Tanager	<i>Piranga rubra</i>
Tufted Titmouse	<i>Baeolophus bicolor</i>
Turkey Vulture	<i>Cathartes aura</i>
Western Sandpiper	<i>Calidris mauri</i>
White-eyed Vireo	<i>Vireo griseus</i>
Wild Turkey	<i>Meleagris gallopavo</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
Wilson's Snipe	<i>Gallinago delicata</i>
Wood Duck	<i>Aix sponsa</i>
Wood Thrush	<i>Hylocichla mustelina</i>
Yellow Warbler	<i>Dendroica petechia</i>
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>
Yellow-breasted Chat	<i>Icteria virens</i>
Yellow-throated Vireo	<i>Vireo flavifrons</i>
Yellow-throated Warbler	<i>Dendroica dominica</i>

After each survey, the total number of species was tabulated (Table 4.1-2). The total species count includes all bird species observed along the transect route and miscellaneous species observations. The total number of bird species observed during the surveys was 102 (Table 4.1-1). The average number of species was 25 per survey. In addition, after the transect breeding bird surveys were completed, the number of species assumed to be breeding in the area was tabulated. As per the breeding surveys, 70 (Table 4.2-1) separate bird species were assumed to be breeding within or in the vicinity of the Project area.

TABLE 4.1-2
TOTAL BIRDS AND SPECIES PER SEASON OBSERVED DURING
2009 SURVEYS AT LEE NUCLEAR STATION

Survey Period	Total Species
1 st Spring	64
2 nd Spring	64
1 st Summer (Breeding)	51
2 nd Summer (Breeding)	59

The tables and figures in the following sections depict the findings of the total species observations per survey and entire study, average species on transect per survey, common species per transect, and breeding species per transect.

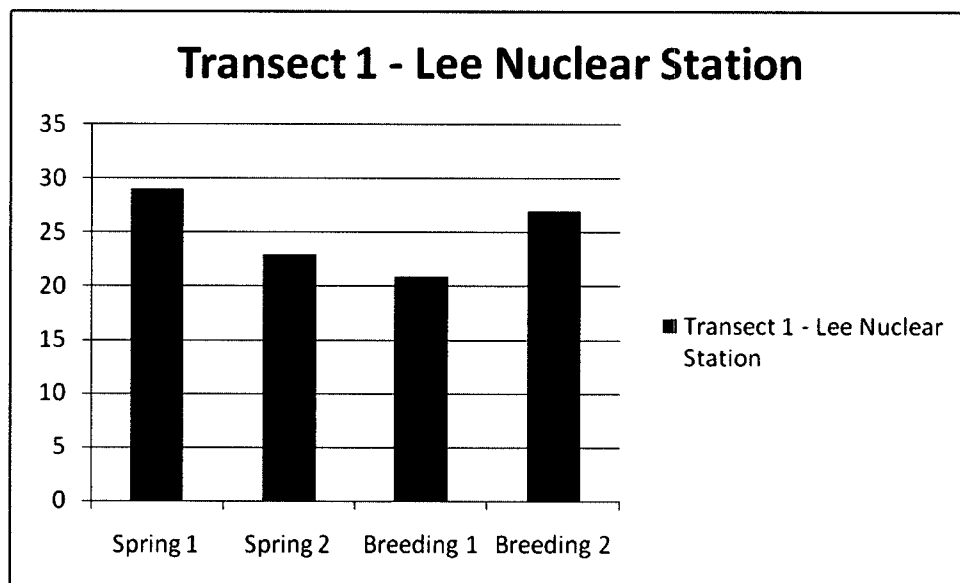
4.1.1 Transect #1

Transect #1 exhibited a total of 45 bird species, of which 33 were assumed to be breeding. An average number of 25 species seen or heard (observed) per survey. Some of the common species observed were the American Crow (*Corvus brachyrhynchos*), Blue Jay (*Cyanocitta cristata*), Blue-gray Gnatcatcher (*Polioptila caerulea*), Carolina Wren (*Thryothorus ludovicianus*), Downy Woodpecker (*Picoides pubescens*), Mourning Dove (*Zenaida macroura*), Northern Cardinal (*Cardinalis cardinalis*), Red-eyed Vireo (*Vireo olivaceus*), Summer Tanager (*Piranga olivacea*), Tufted Titmouse (*Baeolophus bicolor*), Yellow-throated Vireo (*Vireo flavifrons*) and Yellow-billed Cuckoo (*Coccyzus americanus*).

Table 4.1-3 lists the 33 species observed and assumed to be breeding along the transect during the surveys. The figure below this table indicates that the Transect #1 surveys had the lowest number of species occurring during the second migration and first breeding survey.

TABLE 4.1-3
BREEDING AVIAN SPECIES ALONG LEE NUCLEAR STATION
TRANSECT #1

American Crow	Indigo Bunting
American Robin	Mourning Dove
Black Vulture	Northern Cardinal
Blue Jay	Northern Mockingbird
Blue-gray Gnatcatcher	Northern Parula
Brown Thrasher	Purple Martin
Carolina Chickadee	Red-bellied Woodpecker
Carolina Wren	Red-eyed Vireo
Chimney Swift	Red-shouldered Hawk
Common Grackle	Scarlet Tanager
Downy Woodpecker	Summer Tanager
Eastern Towhee	Tufted Titmouse
Eastern Wood-Pewee	Turkey Vulture
Field Sparrow	Wood Thrush
Fish Crow	Yellow-billed Cuckoo
Great Crested Flycatcher	Yellow-throated Vireo
Hairy Woodpecker	



4.1.2 Transect #2

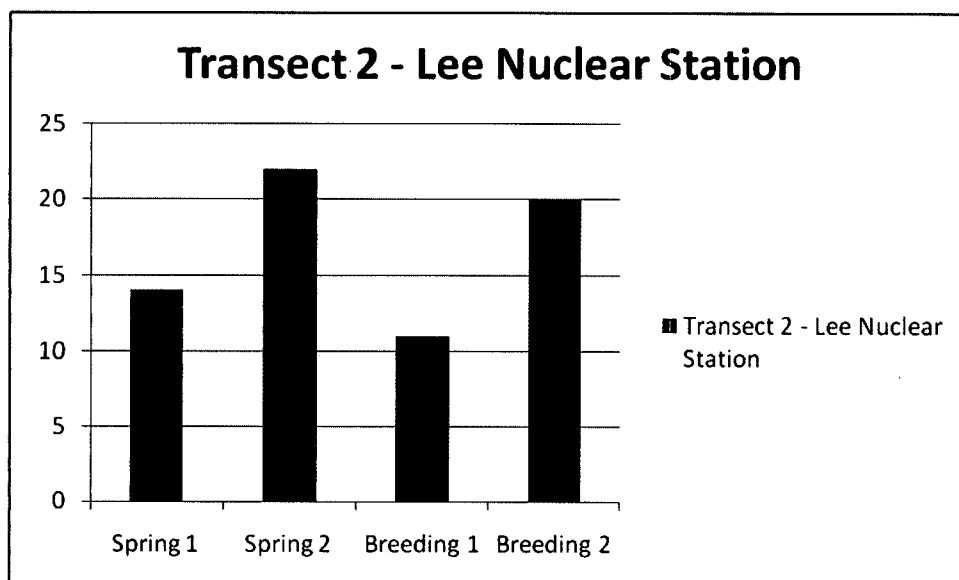
Transect #2 documented a total of 42 species, of which 24 were assumed to be breeding. An average number of 16.8 species were observed per survey. Some of the most common species observed were the American Crow, American Goldfinch (*Carduelis tristis*), Blue Jay, Blue-gray Gnatcatcher, Carolina Wren, Mourning Dove, Northern

Cardinal, Red-eyed Vireo, Summer Tanager (*Piranga olivacea*), White-eyed Vireo (*Vireo griseus*), and the Yellow-breasted Chat (*Icteria virens*).

Table 4.1-4 lists the 24 species observed and assumed to be breeding along the transect during the surveys. The figure below this table indicates that the Transect #2 surveys had the highest number of species occurring during the second spring migration and the second breeding surveys.

TABLE 4.1-4
BREEDING AVIAN SPECIES ALONG LEE NUCLEAR STATION
TRANSECT #2

Acadian Flycatcher	Eastern Towhee
American Crow	Great Blue Heron
American Goldfinch	Green Heron
Belted Kingfisher	Indigo Bunting
Blue Grosbeak	Killdeer
Blue-gray Gnatcatcher	Mourning Dove
Carolina Wren	Northern Cardinal
Chuck-will's-widow	Northern Parula
Cliff Swallow	Red-eyed Vireo
Common Yellowthroat	Ruby-throated Hummingbird
Eastern Bluebird	Yellow-billed Cuckoo
Eastern Phoebe	Yellow-breasted Chat



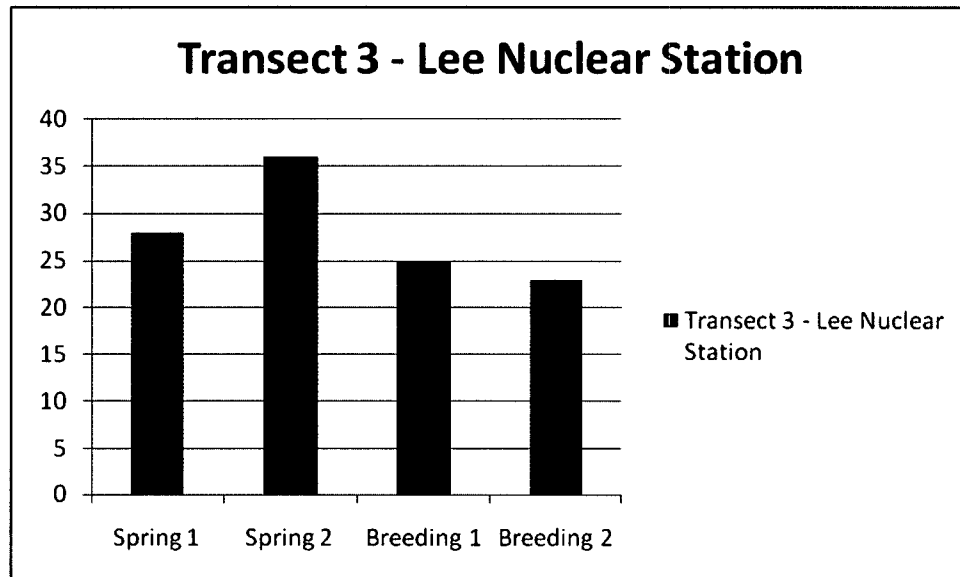
4.1.3 Transect #3

Transect #3 resulted in a total of 58 bird species, of which 37 were assumed to be breeding. An average number of 28 species were seen or heard per survey. Some of the common species observed were the American Crow, Barn Swallow (*Hirundo rustica*), Black-and-white Warbler (*Mniotilta varia*), Blue Jay, Blue-gray Gnatcatcher, Brown-headed Cowbird (*Molothrus ater*), Carolina Wren, Common Yellow-throat (*Geothlypis trichas*), Eastern Bluebird (*Sialia sialis*), Eastern Towhee (*Pipilo erythrophthalmus*), Field Sparrow (*Spizella pusilla*), Northern Cardinal, Summer Tanager, Northern Mockingbird (*Mimus polyglottos*), Tufted Titmouse, White-eyed Vireo (*Vireo griseus*), and Yellow-breasted Chat.

Table 4.1-5 lists the 37 species observed (seen and heard) and assumed to be breeding along the transect during the surveys. The figure below this table indicates that Transect #3 consistently had the highest number of species occurring during the spring migration surveys.

TABLE 4.1-5
BREEDING AVIAN SPECIES ALONG LEE NUCLEAR STATION
TRANSECT #3

American Crow	Indigo Bunting
American Robin	Killdeer
Barn Swallow	Louisiana Waterthrush
Black-and-white Warbler	Mourning Dove
Blue Grosbeak	Northern Cardinal
Blue Jay	Northern Mockingbird
Blue-gray Gnatcatcher	Orchard Oriole
Brown Thrasher	Prairie Warbler
Brown-headed Cowbird	Prothonotary Warbler
Carolina Chickadee	Red-eyed Vireo
Carolina Wren	Red-tailed Hawk
Common Yellowthroat	Red-winged Blackbird
Downy Woodpecker	Rock Dove
Eastern Bluebird	Summer Tanager
Eastern Meadowlark	Tufted Titmouse
Eastern Towhee	Turkey Vulture
Field Sparrow	White-eyed Vireo
Grasshopper Sparrow	Yellow-breasted Chat
Gray Catbird	



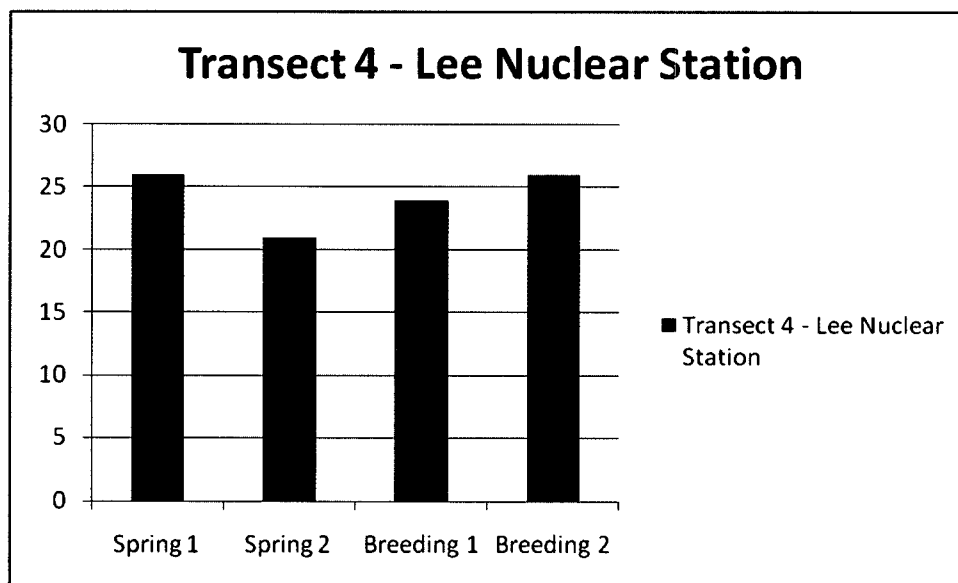
4.1.4 Transect #4

Transect #4 exhibited a total of 46 bird species observed, of which 34 were assumed to be breeding. An average number of 24.3 species were observed per survey. Some of the most common species observed were the American Crow, American Goldfinch, Blue-gray Gnatcatcher, Carolina Chickadee (*Poecile carolinensis*), Carolina Wren, Common Grackle (*Quiscalus quiscula*), Field Sparrow, Mourning Dove, Northern Cardinal, Pine Warbler (*Dendroica pinus*), Red-eyed Vireo, Summer Tanager, Tufted Titmouse, Wild Turkey (*Meleagris gallopavo*) and Yellow-billed Cuckoo.

Table 4.1-6 lists the 34 species assumed to be breeding along the transect during the surveys. The figure below this table indicates that Transect #4 surveys had the highest number of species occurring during the first spring migration survey and the two breeding surveys.

TABLE 4.1-6
BREEDING AVIAN SPECIES ALONG LEE NUCLEAR STATION
TRANSECT #4

American Crow	Grasshopper Sparrow
American Goldfinch	Indigo Bunting
Blue Grosbeak	Killdeer
Blue Jay	Mourning Dove
Blue-gray Gnatcatcher	Northern Cardinal
Canada Goose	Northern Mockingbird
Carolina Chickadee	Osprey
Carolina Wren	Pine Warbler
Chimney Swift	Purple Martin
Common Grackle	Red-eyed Vireo
Common Yellowthroat	Red-tailed Hawk
Eastern Bluebird	Red-winged Blackbird
Eastern Kingbird	Summer Tanager
Eastern Meadowlark	Tufted Titmouse
Eastern Phoebe	Wild Turkey
Eastern Towhee	Yellow-billed Cuckoo
Field Sparrow	Yellow-breasted Chat



4.1.5 Transect #5

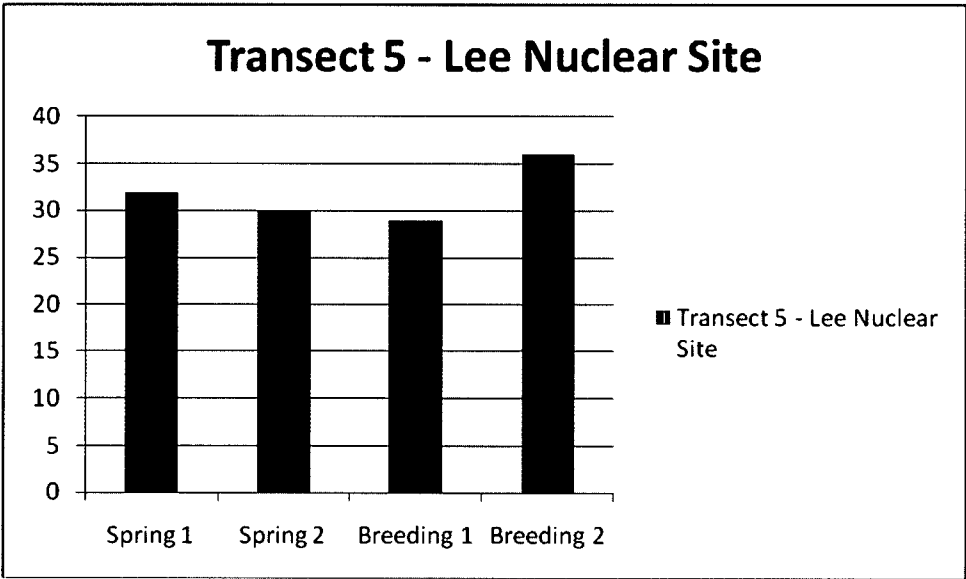
Transect #5 exhibited a total of 54 bird species observed, of which 43 were assumed to be breeding. An average number of 31.8 species were observed per survey. Some of the

common species observed were the American Crow, Blue Jay, Carolina Wren, Eastern Bluebird, Indigo Bunting, Mourning Dove, Northern Cardinal, Orchard Oriole (*Icterus spurius*), Red-bellied Woodpecker (*Melanerpes carolinus*), Yellow-breasted Chat, Yellow-throated Vireo and Tufted Titmouse.

Table 4.1-7 lists the 43 species observed and assumed to be breeding along the transect during the surveys. The figure below this table indicates that the Transect #5 surveys that had the highest number of species occurring during the first spring migration survey and the second breeding survey.

TABLE 4.1-7
BREEDING AVIAN SPECIES ALONG LEE NUCLEAR STATION
TRANSECT #5

American Crow	Indigo Bunting
American Goldfinch	Killdeer
Belted Kingfisher	Mourning Dove
Black-and-white Warbler	Northern Cardinal
Blue Grosbeak	Northern Mockingbird
Blue-gray Gnatcatcher	Northern Parula
Brown Thrasher	Northern Rough-winged Swallow
Canada Goose	Orchard Oriole
Carolina Chickadee	Osprey
Carolina Wren	Prothonotary Warbler
Cedar Waxwing	Purple Martin
Common Grackle	Red-bellied Woodpecker
Common Yellowthroat	Red-eyed Vireo
Downy Woodpecker	Red-tailed Hawk
Eastern Bluebird	Red-winged Blackbird
Eastern Kingbird	Ruby-throated Hummingbird
Eastern Phoebe	Tufted Titmouse
Eastern Towhee	White-eyed Vireo
Field Sparrow	Wood Duck
Great Blue Heron	Yellow-billed Cuckoo
Green Heron	Yellow-breasted Chat
Hairy Woodpecker	



4.2 Data Collected – Overview of Breeding Surveys

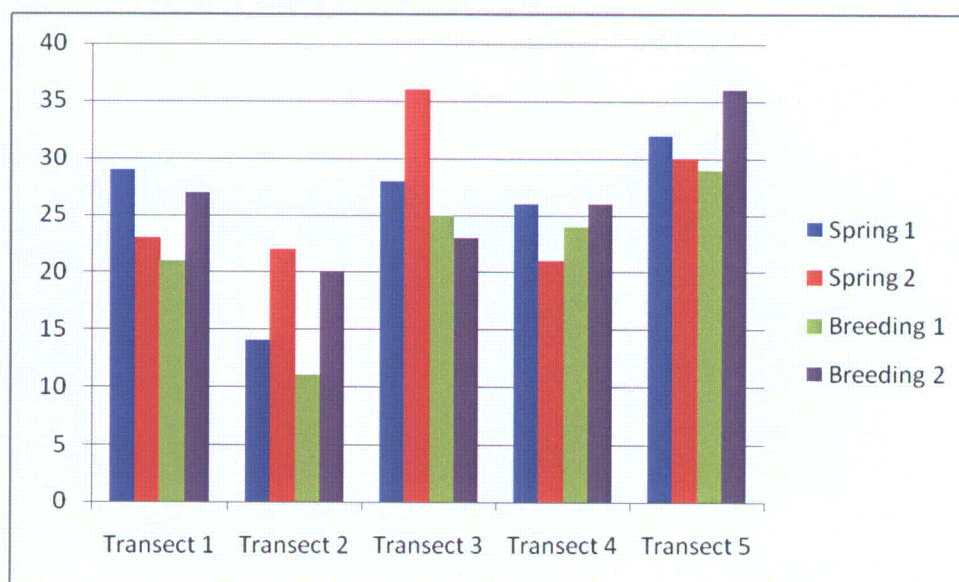
Seventy of the 165 bird species known to breed in South Carolina were observed during the breeding surveys (BBA 1995). Table 4.2-1 lists the 70 species observed during the breeding surveys that are assumed to be breeding within the Project area.

TABLE 4.2-1
BREEDING AVIAN SPECIES WITHIN LEE NUCLEAR STATION
PROJECT AREA

Acadian Flycatcher	Green Heron
American Crow	Hairy Woodpecker
American Goldfinch	Indigo Bunting
American Robin	Killdeer
Barn Swallow	Louisiana Waterthrush
Belted Kingfisher	Mallard
Black Vulture	Mourning Dove
Black-and-white Warbler	Northern Cardinal
Blue Grosbeak	Northern Mockingbird
Blue Jay	Northern Parula
Blue-gray Gnatcatcher	Northern Rough-winged Swallow
Brown Thrasher	Orchard Oriole
Brown-headed Cowbird	Osprey
Canada Goose	Pine Warbler
Carolina Chickadee	Prairie Warbler
Carolina Wren	Prothonotary Warbler
Cedar Waxwing	Purple Martin
Chimney Swift	Red-bellied Woodpecker
Chuck-will's-widow	Red-eyed Vireo
Cliff Swallow	Red-shouldered Hawk
Common Grackle	Red-tailed Hawk
Common Yellowthroat	Red-winged Blackbird
Downy Woodpecker	Rock Dove
Eastern Bluebird	Ruby-throated Hummingbird
Eastern Kingbird	Scarlet Tanager
Eastern Meadowlark	Summer Tanager
Eastern Phoebe	Tufted Titmouse
Eastern Towhee	Turkey Vulture
Eastern Wood-Pewee	White-eyed Vireo
Field Sparrow	Wild Turkey
Fish Crow	Wood Duck
Grasshopper Sparrow	Wood Thrush
Gray Catbird	Yellow-billed Cuckoo
Great Blue Heron	Yellow-breasted Chat
Great Crested Flycatcher	Yellow-throated Vireo

With the information gathered during the surveys, it could be determined which surveys had the highest species count as well as the habitat(s) with the highest species count. The following figure indicates that the second spring migration survey and the second breeding survey had some of the highest average species counts of any of the surveys. The figure also shows that the pine-mixed hardwood/upland scrub/wetland/open water habitat (Transect 5) has the greater number of species throughout the entire survey on average. This could be attributed to the fact that the riparian/wetland habitat is a very diverse habitat and these habitats tend to create a significant amount of edge effect (i.e., changing of habitats) associated with this habitat type.

Avian Species per Survey Per Transect at Lee Nuclear Station



4.3 Protected Species Survey

During the migration and breeding surveys, habitats that correspond with those of known federal protected or avian species of concern, such as the Bald Eagle (*Haliaeetus leucocephalus*), and species of concern Henslow's Sparrow (*Ammodramus henslowii*), Loggerhead Shrike (*Lanius ludovicianus*), and American Kestrel were searched for by visual methods and response to call back recordings (Sutherland 1996). The federally endangered Red-cockaded Woodpecker (*Picoides borealis*) was not searched for due to the lack of necessary habitat to support the woodpecker within and in the vicinity of the Lee Nuclear Project. After checking visually in potential habitat, a call back recording was played for the species of interest. Each call back recording was played three times with continued visual inspections during the playback. After the third playback, an additional visual survey was completed. If no individuals of interest were heard or seen, the species was noted as "absent".

No federally protected or avian species of concern was noted during the migration or breeding surveys as well as during miscellaneous observations with the previously noted

exception of several sightings of an American Kestrel during the late winter/spring months. No sightings were made during breeding season nor were any nest-building activities observed.

5.0 CONCLUSIONS

Based on HDR|DTA's survey, the transect with the highest species diversity was the Transect #5 with the pine-mixed hardwood/upland scrub/wetland/open water habitat, which would could be associated with any of the open water areas located on or adjacent to the subject property. This habitat has some of the highest avian species diversity, but appears to be one of the smallest natural communities found within the Project area. The clearing of this habitat for the development of the Project would have a significant effect on the avian species diversity as well as limiting the amount of breeding habitat for the birds that utilize this habitat. For example, the Prothonotary Warbler (*Protonotaria citrea*) is a small bird that utilizes wooded wetlands, bottomland hardwood forests, and cypress swamps for foraging and nesting. Essential habitat requirements for this species are water, shade, and older trees that provide nesting holes (NatureServe 2009).

The major threat to the Prothonotary Warbler is the loss, degradation, and fragmentation of habitat as many wetlands are either permanently drained or flooded (NatureServe 2009). With any conversion or impacts to the wetland habitat that exists on the site, the number of Prothonotary Warblers that will nest in the Project area will likely be negatively affected.

The only known comparative avian study in the vicinity of the Project was the London Creek Avian Study (DTA 2008). After reviewing this study, the historical Breeding Bird Surveys (Chesnee, South Carolina route), and the results from the BBA for Cherokee County, there were some anomalies that mirrored the results of the London Creek Reservoir Avian Study (DTA 2008). Of the 14 species of warbler noted to breed within the county and vicinity, only eight of those species were observed to breed within or adjacent to the Lee Nuclear Station Project area. Some of the notably missing species include Hooded Warbler (*Wilsonia citrina*), Ovenbird (*Seiurus aurocapillus*), Yellow Warbler (*Dendroica petechia*), and Kentucky Warbler (*Oporornis formosus*). Of the 11 raptor species noted to occupy the area (hawks, owls, etc.), only five were observed on the Lee Nuclear Station Project site during the breeding season. Some of the missing species include Great Horned Owl (*Bubo virginianus*), Cooper's Hawk (*Accipiter cooperii*), Barn Owl (*Tyto alba*), and Broad-winged Hawk (*Buteo platypterus*). Finally, the family including buntings, sparrows, and relatives are known to have nine species breeding in Cherokee County or in the vicinity of the Lee Nuclear Station Project site. Of those nine known species, only four species were observed. The only breeding species were Indigo Bunting, Field Sparrow, Eastern Towhee, and Blue Grosbeak (*Passerina caerulea*).

Similar to the London Creek Avian Study habitats, the Project habitats rated poor overall on the quality of habitat for avian species. The reasoning behind this is the significant amount of disturbance due to past/present construction, low quality grassland and

shrub/scrub habitats, and the minimal size and fragmentation of the higher quality habitats found within the Project site. In addition, the planting of exotic and invasive species (e.g., sericea lespedeza) has diminished the habitat for grassland and pasture nesting/foraging species. However, there is some high quality habitat for avian species within the Project area. These habitats include riparian, wetland, and bottomland hardwoods and special emphasis should be placed on their preservation.

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