

**Attachment D**

*Biological Assessment for Endangered, Threatened, and Noteworthy Species, Wetlands,  
and Significant Natural Areas  
in Association With McGuire Nuclear Station and Related Power Transmission Lines,*

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BIOLOGICAL ASSESSMENT FOR  
ENDANGERED, THREATENED, AND NOTEWORTHY SPECIES,  
WETLANDS, AND SIGNIFICANT NATURAL AREAS  
IN ASSOCIATION WITH  
MCGUIRE NUCLEAR STATION  
AND RELATED POWER TRANSMISSION LINES

prepared for

Duke Power Company

Charlotte, North Carolina

by

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### Project Description

The action proposed by Duke Energy Corporation is the continued operation of the McGuire Nuclear Station located north of Charlotte in Mecklenburg County, North Carolina under a renewed license of the Nuclear Regulatory Commission. In addition to the Nuclear Station, 2.8 miles (4.5 km) of transmission line that were associated with the McGuire Nuclear Station in the original environmental impact analysis (U. S. Nuclear Regulatory Commission, 1976) will continue to be operated and maintained. No new construction will be carried out as part of this action.

### Project Area

McGuire Nuclear Station is located approximately 16 miles (26 km) north-northwest of Charlotte, North Carolina. The station is just east of the Cowans Ford Dam on the Catawba River in northwestern Mecklenburg County. McGuire was constructed on the southern shores of Lake Norman, which was impounded by Cowans Ford Dam.

The McGuire site is found in the Piedmont physiographic province of North Carolina. The study area harbors typical Piedmont plant communities such as pine, pine-mixed hardwoods, mixed hardwoods, and bottomland mixed hardwoods. According to the Mecklenburg County soil survey (U. S. Department of Agriculture, 1980), Cecil sandy loam is the predominant soil of the study area with some Monacan clay loam found along the Catawba River. A belt of the circumneutral to basic Iredell-Mecklenburg soil association is found a few miles south of the McGuire Site, but is not in the study area.

The change in percentage cover of each general landscape type from at the site of the McGuire Nuclear Station is presented in Table 1. The 1963 data are preconstruction percentages; the 1974 percentages are from after site clearing and plant construction; and the 2000 data, compiled from Figure 1 herein, reflects the recovery of various plant communities in the 26 years since site disturbance took place. Twenty-five percent of the McGuire site was originally mixed young pine and eighteen percent was mixed hardwood. Much of this pine and hardwood was cleared between 1963 and 1974; the remainder is now older and has become dominated by mixed hardwood and middle-aged mixed hardwood-pine and pine-mixed hardwood communities (the latter two of which are grouped under "Mixed Hardwood-Pine" herein). The amount of mixed hardwood-pine has increased from 10% to 27% of the site, while the amount of pine has decreased from 25% to 1% of the study area. The total area of cleared land at the site has dramatically decreased since 1974 as mixed hardwood and mixed hardwood-pine communities have invaded unmanaged open areas.

Table 1. Plant community and percentage cover at the site of the  
McGuire Nuclear Station: 1963—2000.<sup>1</sup>

PLANT COMMUNITY/COVER TYPE	1963 % COVER	1974 % COVER	2000 % COVER
OAK-HICKORY (MIXED HARDWOOD)*	18	0	5*
SHORTLEAF PINE-OAK (MIXED HARDWOOD- PINE)	10	11	27
SHORTLEAF PINE-VIRGINIA PINE (PINE)	25	2	1
MARSH (MARSH)	3	2	<1
OTHER WETLANDS (TOTAL ACRES)	0	0	2
WETLAND MIXED HARDWOOD	0	0	1
WETLAND MIXED HARDWOOD-MARSH	0	0	<1
MARSH-WETLAND MIXED HARDWOOD- OPEN WATER	0	0	<1
CLEARED LAND (INCLUDING CONSTRUCTION SITE)	44	72	28
OPEN WATER	32	34	34

<sup>1</sup> This table was compiled from data collected by Duke Power Company in 1963 and 1974 (U. S. Nuclear Regulatory Commission, 1976) and from data presented herein in Figure 1, the 2000 plant community map of the McGuire Site. Because the total areas from which the data were taken were slightly different, percentages are used for comparative purposes.

\*Estimated; not mapped in Figure 1.

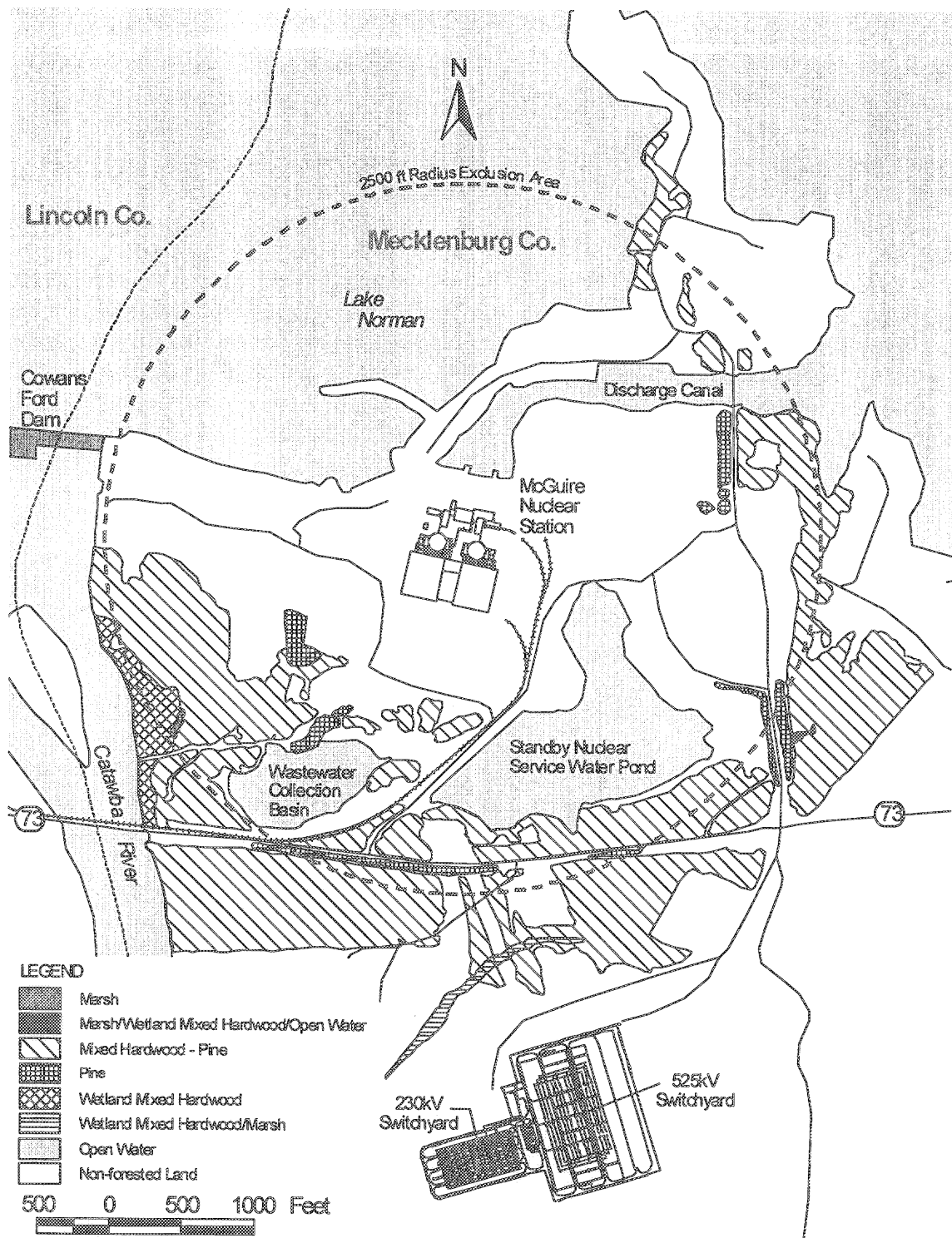


Figure 1

The Exclusion Area is the study area for the McGuire relicensing project. It is a circle with a 2500-foot (757.6 m) radius from a center point located between the two reactor buildings. The total area of the Exclusion Area is 450.5 acres (182.4 ha). Of this total, 102.4 acres (41.0 ha) are composed of the waters of Lake Norman, and 14.3 acres (5.7 ha) is the McGuire Discharge canal. Two man-made bodies of water on the site—the Standby Nuclear Service Water Pond [32.9 ac (13.3 ha)] and the Wastewater Collection Basin [10.2 ac (4.1 ha)]—total 43.3 acres (17.3 ha). In addition to the Exclusion Area around the McGuire site, 2.8 miles (4.5 km) of transmission lines are associated with the proposed action. There are two 525-kV lines 3300 feet (1 km) long for a total of 6600 feet (2.0 km) and two 230-kV lines 4000 feet (1.2 km) long for a total of 8000 feet (2.4 km). These lines and their rights-of-way, which are 500 feet (151.5 m) (525-kV) and 200 feet (60.6 m) (230-kV) wide, respectively, extend from the McGuire Nuclear Station reactor buildings to the McGuire Switching Station south of the Exclusion Area (Figure 2). Duke Energy has a well-established set of management practices for transmission line right-of-way maintenance (Duke, 1996). These best management practices include: vegetation management, erosion and sediment control, soil stabilization, stream and wetland protection, and protection of sensitive areas and sensitive species. Vegetation is controlled along the rights-of-way by herbicide spraying and mowing.

### Methodology

Fieldwork for this project began in June 2000 and continued into the autumn of 2000. All communities and cover types within the Exclusion Area were thoroughly inventoried, with the exception of the industrial areas in the immediate center of the site near the station. The four power line rights-of-way were walked in their entirety.

Black and white and natural color aerial photographs were used, supplemented by extensive fieldwork, to compile Figure 1—the 2000 vegetation map of the McGuire Site. A rough cover map was drawn and then checked in the field for accuracy, and then the final map was generated.

Table 2, a list of all endangered, threatened, and noteworthy species, habitats, and special areas from Lincoln and Mecklenburg counties, was compiled prior to the initiation of the fieldwork. This list was consulted during the floristic and faunistic fieldwork, which lasted from late June through September. A checklist of the vascular plants of the site is included in the Appendix. Areas that appeared to be reasonable habitat for federally- and state-listed species were intensively inventoried in the summer and in the early autumn.

**Table 2. Endangered, threatened, and noteworthy species, communities, and  
habitats known to occur in**

**Mecklenburg and Lincoln counties, North Carolina.<sup>1</sup>**

Scientific Name	Common Name	Taxon. Group	Status State	Fed.	Rank State	Fed.	County/Status
<i>Alasmidonta robusta</i>	Carolina elktoe	mollusk	EX		SX	GX	Mecklen./H
<i>Anemone caroliniana</i>	prairie anemone	vasc. plant	C		S1	G5	Mecklen./C
<i>Aster georgianus</i>	Georgia aster	"	T	FC	S2	G2G3	Mecklen./C
<i>Aster mirabilis</i>	Piedmont aster	"	C		S2	G2G3	Mecklen./C
<i>Baptisia albescens</i>	wild indigo	"	SR		S2	G4	Mecklen./H
<i>Botrycium jenmanii</i>	Alabama grape fern	"	SR		S1	G3G4	Mecklen./H
<i>Cardamine dissecta</i>	dissected toothwort	"	C		S2	G4	Mecklen./H
<i>Carex projecta</i>	necklace sedge	"	C		S1	G5	Mecklen./H
<i>Carpiodes velifer</i>	highfin carpsucker	fish	SC		S2	G4G5	Mecklen./C
<i>Cirsium carolinianum</i>	Carolina thistle	vasc. plant	C		S1	G5	Mecklen./H
<i>Condylura cristata</i> pop. 1	star-nosed mole- Coastal Plain pop.	mammal	SC		S2	G5T2Q	Mecklen./H
<i>Cyprinella zanema</i> pop. 1	Santee chub— Piedmont popul.	fish	SR		S3	G3T3Q	Lincoln/C Mecklen./O
<i>Delphinium exaltatum</i>	tall larkspur	vasc. plant	SSC		S1	G3	Mecklen./H
<i>Desmodium</i> <i>sessilifolium</i>	sessile beggar- ticks	"	C		SH	G5	Mecklen./H
<i>Dodecatheon meadia</i>	shooting star	"	SR		S2	G2T5	Mecklen./H
<i>Draba reptans</i>	creeping draba	"	C		SH	G5	Lincoln/H
<i>Echinata laevigata</i>	smooth coneflower	"	ESC	E	S1	G2	Mecklen./C
<i>Etheostoma collis</i> pop. 1	Carolina darter— Central Pied. pop.	fish	SR		S3	G3T3	Mecklen./C
<i>Gnaphalium helleri</i>	Heller's rabbit tobacco	vasc. plant	SR		S2	G4G5T3	Mecklen./C
<i>Haliaeetus</i> <i>leucocephalus</i>	bald eagle	bird	E	T	S3B, S3N	G5T2Q	Mecklen./C
<i>Helenium pinnatifidum</i>	bog sneezeweed	vasc. plant	SR		S2	G4	Lincoln/H
<i>Helianthus</i> <i>schweinitzii</i>	Schweinitz' sunflower	"	E	E	S2	G2	Mecklen./C
<i>Hexalectris spicata</i>	crested coralroot	"	SR		S2	G5	Mecklen./H

<i>Hexastylis naniflora</i>	dwarf-flowered heartleaf	"	T	T	S2	G2	Lincoln/C
<i>Isoetes virginica</i>	Virginia quillwort	"	C		SRD	G1	Mecklen./H
<i>Lanius ludovicianus</i>	loggerhead shrike	reptile	SC		S3B, 3N	G5T5	Lincoln/C Mecklen./C
<i>Lasmigona decorata</i>	Carolina heelsplitter	mollusk	E	E	S1	G1	Mecklen./H
<i>Lotus helleri</i>	Heller's trefoil	vasc.plant	C		S3	G5T3	Mecklen./C
<i>Rhachithecium perpusillum</i>	budding tortula	moss	C		S1S2	G3?	Mecklen./H
<i>Rhus michauxii</i>	Michaux's sumac	vasc.plant	ESC	E	S2	G2	Mecklen./H Lincoln/H
<i>Silphium perfoliatum</i>	northern cup-plant	"	SR		S1	G5	Mecklen./H
<i>Silphium terebinthinaceum</i>	prairie dock	"	C		S2	G4G5	Mecklen./C
<i>Solidago rigida</i> ssp. <i>glabrata</i>	SE bold goldenrod	"	SR		S2	G5T4	Mecklen./H
<i>Smilax biltmoreana</i>	Biltmore carrion-flower	"	C		S3	G3G4	Lincoln/H
<i>Triaenodes marginata</i>	a caddisfly	insect	SR		S3	G?	Mecklen./C
<i>Triodopsis fulcidens</i>	dwarf threetooth	mollusk	SC		S2	G?	Mecklen./O
<i>Villosa delumbis</i>	eastern creekshell	"	SR		S3	G4	Mecklen./C
<i>Villosa vaughaniana</i>	Carolina creekshell	"	SC		S2	G2	Mecklen./C
Basic Mesic Forest (Piedmont Subtype)		plant community			S2	G5T3	Lincoln/C
Basic Oak-Hickory Forest		"			S3	G4	Mecklen./C
Mesic Mixed Hardwood Forest (Piedmont Subtype)		"			S4	G5T5	Mecklen./C Lincoln/C
Piedmont/Low Mountain Alluvial Forest		"			S5	G5	Mecklen./C
Upland Depression Swamp Forest		"			S2	G3	Mecklen./C
Xeric Hardpan Forest		"			S3	G3G4	Mecklen./C
Wading Bird Rookery		special habitat			S3	G5	Mecklen./C

<sup>1</sup> STATUS: E-endangered; T-threatened; C-candidate; SC-special concern; SR-significantly rare; EX-extirpated; D-delisted. RANK: G-global; S-state; 1-critically imperiled; 2-imperiled; 3-rare or uncommon; 4-apparently secure; 5-secure globally, though may be rare locally; X-extirpated; H-historic; B-breeding; N-nonbreeding; G\_Q-questionable taxonomic status; G\_T-status of variety or subspecies. Bold types indicates listing by Fish and Wildlife Service.



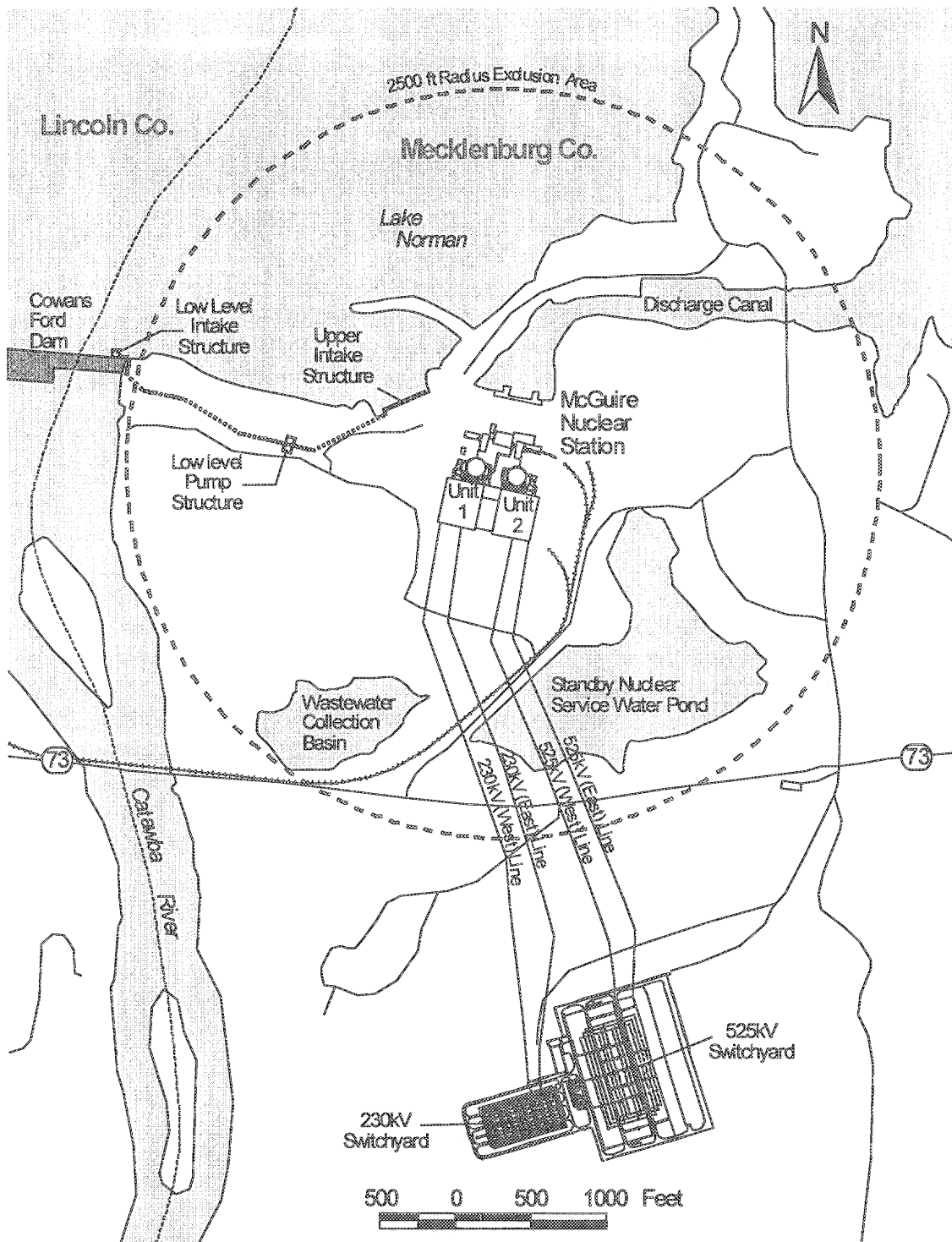


Figure 2

### Description of Plant Communities and Habitats Present within the Project Area

Seven cover types were recognized on the McGuire site (Figure 1): 1) marsh; 2) marsh/wetland mixed hardwood/open water; 3) mixed hardwood pine; 4) pine; 5) wetland mixed hardwood; 6) wetland mixed hardwood/marsh; and 7) open water. Six of these types are forested and one is open water. Most of the study area—the area within the dashed 2500-foot (757.6 m) radius line—is open water and cleared land, which appears as white on Figure 1. Table 1 gives the relative percentage cover of the following vegetation types at the McGuire site from 1963-2000. About 35 percent of the of the 2500-foot (757.6 m) radius exclusion area is forested (Table 1). The cover types are discussed in detail below:

**Marsh.** This cover type consists of a nonforested plant community found along the margin of the floodplain of the Catawba River, in the western portion of the study area. Here, black willow (*Salix nigra*), tag alder (*Alnus serrulata*), a mallow (*Hibiscus* sp.), false nettle (*Boehmeria cylindrica*), fringed sedge (*Carex crinita*), cattails (*Typha latifolia*), rice cut-grass (*Leersia oryzoides*), and the exotic Asiatic dayflower (*Analeima keisak*) were the dominant plant species. Other species present here are included in the appended species list. This marsh is found at the point where a small seepage stream enters the floodplain and appears to be a remnant of much larger marsh area that was mapped on Figure 2.14, The McGuire Site Vegetation Map compiled in December of 1974 (Figure 3) herein.

**Marsh/Wetland Mixed Hardwood/Open Water.** This cover type designation is used to describe a small wetland just along the eastern edge of the Exclusion Area boundary. Here, a power line passes over a small stream that has been altered by beavers (*Castor canadensis*). A shallow open water pond is present under and to the east of the power line right-of-way. A small marsh, dominated by common needlerush (*Juncus effusus*), sedges (*Carex* spp.), and false nettle (*Boehmeria cylindrica*), is present on the backwaters of the pond. Willow (*Salix nigra*), tag alder (*Alnus serrulata*), and sycamore (*Platanus occidentalis*) are found in the wetland mixed hardwood zone upstream from the pond.

**Mixed Hardwood-Pine.** The mixed hardwood-pine plant community is the most widespread forest cover type on the McGuire site. This type includes some stands that are predominantly mixed hardwood with scattered pines. Dominant species here are: white oak (*Quercus alba*), red oak (*Quercus rubra*), tulip poplar (*Liriodendron tulipifera*), post oak (*Quercus stellata*), hickories (*Carya* spp.), shortleaf pine (*Pinus echinata*), and Virginia pine (*Pinus virginiana*). Most of the mixed hardwood-pine stands are dry-site communities found on upper slopes or ridges. In these stands, species richness is low and xeric species such as post oak, shortleaf pine, scarlet oak (*Quercus coccinea*), sourwood (*Oxydendrum arboreum*), sparkleberry (*Vaccinium arboreum*), and acidic woods herbs such as spotted wintergreen (*Chimaphila maculata*) are the dominant species. In the western portion of the Exclusion Area, however, there are some moderately rich bluffs with a dominance of mixed hardwood species. Here, white oak, red oak, white ash (*Fraxinus americana*), sweet gum (*Liquidambar styraciflua*), American beech (*Fagus grandifolia*), and tulip poplar are found in the canopy. The understory is rich with dogwood (*Cornus florida*), redbud (*Cercis canadensis*), big-leaved styrax (*Stryax grandifolia*), pawpaw (*Asimina triloba*), broad beech-fern (*Thelypteris hexagonoptera*), false Solomon's seal (*Smilacina racemosa*), hound's-tongue (*Cynoglossum virginianum*), enchanter's nightshade (*Circaea lutetiana* ssp. *canadensis*), bloodroot (*Sanguinaria canadensis*), mayapple (*Podophyllum peltatum*), black cohosh (*Cimicifuga racemosa*), Jack-in-the-pulpit (*Arisaema triphyllum*), Canada horsebalm (*Collinsonia canadensis*), Virginia snakeroot (*Aristolochia serpentaria*), and common heartleaf (*Hexastylis arifolia*).

**Pine.** The pine community/cover type is an early successional type that appears in disturbed areas and forest edges. Most of the pine communities at the McGuire site appear to have been planted. The dominant pine species in the pine type is loblolly pine (*Pinus taeda*); there are, however, a few Virginia and shortleaf pines scattered here and there in the stands. The understory and herbaceous layer of this type is fairly low in species.

**Wetland Mixed Hardwood.** This type is found in the floodplain of the Catawba River along the western edge of the Exclusion Area. According to the 1974 McGuire vegetation map, this area had much more open marsh than it does now. Sweet gum, red maple (*Acer rubrum*), American elm (*Ulmus americana*), river birch (*Betula nigra*), and sycamore (*Platanus occidentalis*) dominate the canopy here; box elder (*Acer negundo*) is the overwhelming understory dominant. The forest floor is covered with sedges (*Carex* spp.) and the exotics Japanese honeysuckle (*Lonicera japonica*) and Vietnam grass (*Microstegium vimineum*). Near the transitional area where the Wetland Mixed Hardwood type meets the Mixed Hardwood-Pine bluff, the most mesic of the Mixed Hardwood-Pine community, plant species richness is extremely great. Here, a canopy of upland or mesic mixed hardwoods (tulip poplar, red oak, white ash, etc.) mixes

with that of a rich bottomland/wetland hardwoods type [sweet gum, water oak (*Morus rubra*), green ash (*Fraxinus pennsylvanica*), box elder, beech, and red elm (*Ulmus rubra*)]. This area is probably the richest forested zone in the study area.

**Wetland Mixed Hardwood/Marsh.** Just south of the Exclusion Area, several power lines pass over a small creek flowing into the Catawba River. Here, under the power lines, marsh communities are interspersed with adjacent wetland mixed hardwood communities. Sycamore, black willow, tag alder, and sweet gum grow in the forested bands of wetland with Vietnam grass and cutgrass (*Leersia* sp.) in the understory, while false nettle, common needlerush (*Juncus effusus*), climbing hempweed (*Mikania scandens*), leafy bulrush (*Scirpus polyphyllus*), and groundnut (*Apios americana*) grow in the marshy openings.

### Federally-Listed Species Known From Mecklenburg and Lincoln Counties

Table 2 is a complete list of federally- and state-listed endangered, threatened, and otherwise noteworthy species (species that are not listed by federal or state officials but those that the author or Duke Energy has deemed noteworthy) known from Mecklenburg and Lincoln counties, North Carolina. Federally-listed species (species listed by the Fish and Wildlife Service of the U. S. Department of the Interior) are printed in bold type. Six federally-listed species are known to occur or to have occurred in Mecklenburg or Lincoln counties, and one federal candidate species has been found in Mecklenburg County. They are: smooth coneflower (*Echinacea laevigata*)(Endangered), bald eagle (*Haliaeetus leucocephalus*) (Threatened), Schweinitz' sunflower (*Helianthus schweinitzii*)(Endangered), dwarf-flowered heartleaf (*Hexastylis naniflora*)(Threatened), Carolina heelsplitter (*Lasmigona decorata*)(Endangered), Michaux's sumac (*Rhus michauxii*)(Endangered), and Georgia aster (*Aster georgianus*)(Candidate). The possible presence of these species at the McGuire Site is discussed below:

**Smooth Coneflower.** Smooth coneflower, listed as endangered by the Fish and Wildlife Service, is generally found in open, glade-like woods or in nonforested areas over magnesium- and calcium-rich soils such as the Iredell and Mecklenburg types. No such soils were found within the McGuire study area or along the associated transmission lines. A population of smooth coneflower is found a few miles south of the study area on a transmission right-of-way, but no habitat or plants of the coneflower were found at the McGuire site or on its related power transmission rights-of-way.

**Bald Eagle.** Although habitat for the threatened bald eagle exists around Lake Norman, no nesting sites are currently known at the McGuire Site or its environs.

**Schweinitz' sunflower.** Schweinitz' sunflower, listed as endangered by the Fish and Wildlife Service, is also found on Iredell and Mecklenburg soils on roadside and in barren glades. There is a population of the sunflower a few miles south of McGuire on a transmission line right-of-way. No habitat or plants of this species were seen within the McGuire project area.

**Dwarf-flowered Heartleaf.** The threatened dwarf-flowered heartleaf is found in Lincoln County west of the study area. This forest herb has never been found east of the Catawba River. Only marginal habitat for the plant exists at the McGuire Site. No round-leaved *Hexastylis* of any species (*H. minor* or *H. naniflora*) were found in the study area or along its related power transmission rights-of-way.

**Michaux's Sumac.** Historic records for the endangered Michaux's sumac are known from both Mecklenburg and Lincoln counties. The species is reported to grow in xeric, sandy woodlands and woodland margins. No plants were found to occur within the project area.

**Carolina Heelsplitter (*Lasmigona decorata*).** The Carolina heelsplitter is an endangered mollusk historically known from tributaries of the Catawba River in southern Mecklenburg County. The mollusk has not been seen in Mecklenburg County in recent years. No reasonable habitat for the species is found in the project area.

**Georgia Aster.** Georgia aster is a "candidate" species for listing by the Fish and Wildlife Service. This status means that the Fish and Wildlife Service has already determined that it should be listed; this action is presently being considered. It is known from the Piedmont of North Carolina and South Carolina on Iredell, Mecklenburg, and other basic and circumneutral soils. Georgia aster is found in openings and in disturbed areas. Although marginal habitat for the species exists within the project area, no plants of this species were seen.

#### State-Listed Species Known from Mecklenburg and Lincoln Counties

Table 2 also lists 31 state-listed species that are known to occur or have occurred in Mecklenburg and Lincoln counties. Of these 31 species, 21 species are plants (20 vascular plants and one moss), four are mollusks, three are fish, one is a mammal, and one is an insect. Of the state-listed mollusks reported from Mecklenburg and Lincoln counties, *Alasmidonta robusta* (Carolina elktoe) is considered to be extirpated from the area, and *Triodopsis fulcidens* (dwarf threetooth), *Villosa delumbis* (eastern creekshell), and *Villosa vaughaniana* (Carolina creekshell) are not reported from the Lake Norman South quadrangle, according to the North Carolina State Parks Heritage database ([www.ncsparks.net/nhp/search.html](http://www.ncsparks.net/nhp/search.html)).

According to Menhinick's (Menhinick, 1991) atlas of the freshwater fishes of North Carolina, there are only historic stream records of the Santee chub (*Hybopsis zanema*) in the vicinity of Lake Norman (north of the study area) and the Carolina darter (*Etheosoma collis*) does not occur in the Catawba River drainage system in northern Mecklenburg County. Finally, Menhinick (1991) lists the highfin carpsucker (*Carpiodes velifer*) from Lake Norman considerably north of the study area (see Table 2).

Fieldwork revealed that no state-listed plant species are found within the McGuire Project area. Marginal habitat exists for shooting star (*Dodecatheon meadia*) and Biltmore carrion-flower (*Smilax biltmoreana*) (Table 2), but neither of these vascular plants was found there.

### Wetlands of the Project Area

Figure 1 illustrates four wetlands on the McGuire Site. On the western edge of the Exclusion Area, along the Catawba River, a 6.0-acre (2.4 ha) area of wetland mixed hardwoods is found. According to data in the 1976 final environmental impact statement, this area was predominantly marsh in the 1960s and 1970s. In 1963 and 1974, there were no wetland mixed hardwoods on the site. It appears that the marsh areas have been invaded by box elders (*Acer negundo*) and other bottomland hardwood species. Only a small area of pure marsh remains at the McGuire site (Figure 1).

Just east of the Exclusion Area is a small beaver pond complex with marsh, open water, and wetland mixed hardwoods. South of the Exclusion Area, on a creek along the four power line rights-of-way, a zone of mixed wetland hardwoods and marsh is found; the marsh occurs under the power lines, and the wetland mixed hardwoods occur adjacent to the rights-of-way. All wetland communities are discussed in detail above in "Description of Plant Communities and Habitats Present Within the Project Area."

### Significant Natural Areas

Only one area of the McGuire Site was significant enough to be called a "natural area." This area occurs on the bluffs adjacent to the small marsh and wetland mixed hardwood community within the mixed hardwood-pine community on Figure 1. Here, a well-developed mixed hardwood forest with scattered mature trees (some > two feet (61 cm) in diameter) is found overlooking the floodplain of the Catawba River. Tulip poplar, white oak, red oak, white ash, and hickories dominate the canopy of this area, and dogwood, sourwood, strawberry bush (*Calycanthus floridus*), and big-leaved storax (*Styrax grandifolia*) are found in the understory and shrub layer. The herbaceous layer is populated by spring-flowering and rich woods herbs such as: Jack-in-the-pulpit, enchanter's nightshade, uncommon in the lower Piedmont, bloodroot, black cohosh, Canada horsebalm, bloodroot, and mayapple.

## SUMMARY AND CONCLUSIONS

The McGuire Site consists of a circular Exclusion Area of 450.5 acres (182.4 ha) and four associated transmission line rights-of-way of 2.8 miles (4.5 km) in length. The findings of an inventory for endangered species, wetlands, and natural areas conducted in the summer and fall of 2000 are summarized below:

1. Six plant communities/habitat types were found within the Exclusion Area. The plant communities of the McGuire site have essentially recovered from construction disturbances. In 1963, 43 percent of the site was forested; presently, about 35 percent of the McGuire site is woodland.
2. Four wetlands composed of marsh and wetland mixed hardwood consisting of 8.6 acres (3.4 ha) now occur in the project area. One significant natural area dominated by middle-aged mixed hardwoods and a diverse understory of rich-site herbaceous species was also found within the project area.
3. No federally- or state-listed species or critical habitat for such species was found within the McGuire Site Exclusion Area or along related power transmission rights-of-way.

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## APPENDIX

## VASCULAR PLANTS OF MCGUIRE NUCLEAR PLANT AND ENVIRONS

### COMMUNITIES

P—Pine

MHP—Mixed Hardwoods-Pine

WMH—Wetland Mixed Hardwoods

MA—Marsh

ROW/CL—Power Line Rights-of-Way/Cleared Areas

\*Introduced species

*Acer negundo* (box elder) WMH  
*Acer rubrum* (red maple) MHP, WMH  
*Agrimonia* sp. (agrimony) WMH  
\**Albizzia julibrissin* (mimosa) ROW  
*Allium bivalve* (false garlic) ROW  
*Alnus serrulata* (tag alder) MA  
*Amelanchier arborea* (sarvisberry) MHP  
\**Analeima keisak* (Asiatic dayflower) MA  
*Andropogon virginicus* (broomsedge) ROW  
*Antennaria plantaginifolia* (pussy-toes) MHP  
*Apios americanus* (ground nut) MA  
*Apocynum androsaemifolia* (dogbane) MHP  
*Apocynum cannabinum* (hemp dogbane) ROW  
*Arisaema triphyllum* (Jack-in-the-pulpit) MHP  
*Aristolochia serpentaria* (Virginia snakeroot) MHP  
*Asimina triloba* (pawpaw) MHP  
*Asplenium platyneuron* (ebony spleenwort) MHP, P  
*Aster divaricatus* (white-topped aster) MHP  
*Aster solidagineus* (goldenrod aster) ROW  
*Athyrium asplenoides* (southern lady fern) WMH  
*Baccharis halimifolia* (salt bush) ROW  
*Baptisia cinerea* (wild indigo) MHP  
*Betula nigra* (river birch) WMH  
*Bidens* sp. (Spanish needles) MA  
*Bignonia capreolata* (cross-vine) ROW  
*Boehmeria cylindrica* (false nettle) MA  
*Botrychium virginianum* (rattlesnake fern) MHP  
*Callicarpa americana* (American beautyberry) MHP, P  
*Calycanthus floridus* (sweetshrub) MHP  
*Campsis radicans* (trumpet creeper) ROW

*Carduus* sp. (thistle) ROW  
*Carex abscondita* (thicket sedge) WMH  
*Carex caroliniana* (Carolina sedge) MA  
*Carex comosa* (bottlebrush sedge) MA  
*Carex crebriflora* (a woodland sedge) MHP  
*Carex crinita* (fringed sedge) MA  
*Carex digitalis* (slender wood sedge) MHP  
*Carex laxiculmis* (loose-stemmed sedge) WMH  
*Carex lurida* (shallow sedge) MA  
*Carex nigromarginata* (black-edged sedge) MHP, P  
*Carex retroflexa* (reflexed sedge) WMH  
*Carex scoparia* (broom sedge) WMH  
*Carex tonsa* (Piedmont sedge) MHP  
*Carex typhina* (cattail sedge) WMH  
*Carpinus caroliniana* (ironwood) MHP  
*Carya glabra* (pignut hickory) MHP, P  
*Carya tomentosa* (mockernut hickory) MHP, P  
*Celtis laevigata* (sugarberry) WMH  
*Celtis occidentalis* (hackberry) MHP  
*Cercis canadensis* (redbud) MHP  
*Chimaphila maculata* (pipsissewa) MH, P  
*\*Chrysanthemum leucanthemum* (ox-eye daisy) ROW  
*Cimicifuga americana* (black cohosh) MHP  
*Circaea lutetiana* ssp. *canadensis* (false enchanter's nightshade) MHP, WMH  
*Cocculus carolina* (coral beads) ROW  
*Collinsonia canadensis* (Canada horsebalm) MHP  
*Cornus florida* (dogwood) MHP  
*Cryptotaenia canadensis* (cryptotaenia) MHP  
*Cynoglossum virginianum* (Virginia hound's-tongue) MHP  
*Danthonia* sp. (oat grass) ROW, P  
*Daucus carota* (Queen Anne's lace) ROW  
*Desmodium nudiflorum* (beggar-ticks) MHP, P  
*Dioscorea villosa* (wild yam) MHP  
*Diospyros virginiana* (persimmon) P, MHP, ROW  
*Duchesnea indica* (Indian strawberry) ROW, P  
*Elephantopus* (elephant's foot) sp. ROW  
*Eragrostis* sp. (love grass) ROW  
*Erechtites hieracifolia* (fireweed) ROW  
*Erigeron pulchellus* (daisy fleabane) MHP  
*Euonymus americanus* (hearts-a-bursting) MHP  
*Eupatorium album* (white thoroughwort) MHP  
*Eupatorium rotundifolium* (round-leaved thoroughwort) ROW  
*Fagus grandifolia* (American beech) MHP  
*\*Festuca* sp. (fescue) ROW  
*Fraxinus americana* (white ash) MHP  
*Fraxinus pennsylvanica* (green ash) WMH

*Galium circaezans* (bedstraw) MHP  
*Galium* sp. (bedstraw) MA  
*Gelsemium sempervirens* (yellow jessamine) ROW  
*Glyceria striata* (manna grass) WMH  
*Gnaphalium* sp. (rabbit tobacco) ROW  
*Halesia* sp. (silverbell) MHP  
*Helianthus* sp. (sunflower) ROW  
*Heliathus microcephalus* (small-headed sunflower) MHP, P, ROW  
*Hexastylis arifolia* (common heartleaf) MH  
*Hibiscus* sp. (mallow) MA  
*Hypericum hypericoides* (St. Johns-wort) MHP, P, ROW  
*Ilex opaca* (American holly) MHP  
*Impatiens capensis* (jewelweed) MA  
*Juglans nigra* (black walnut) MHP  
*Juncus effusus* (common needlerush) MA  
*Juniperus virginiana* (eastern red cedar) MHP  
*Leersia oryzoides* (rice cutgrass) MA  
*Leersia virginica* (Virginia cutgrass) MA  
*Lespedeza cuneata* (sericea) ROW  
*Liatris graminifolia* (grass-leaved blazing star) ROW  
*Liatris squarrosa* (spreading blazing star) ROW  
*\*Ligustrum sinensis* (Chinese privet) ROW  
*Liquidambar styraciflua* (sweet gum) MHP, MA  
*Liriodendron tulipifera* (tulip poplar) MHP  
*\*Lonicera japonica* (Japanese honeysuckle) MHP, P, ROW  
*Lycopodium flabelliforme* (ground cedar) P  
*Lycopus virginicus* (bugleweed) MA  
*Melica mutica* (melic grass) MHP  
*\*Microstegium vimineum* (Vietnam grass) MHP, WMH  
*Mikania scandens* (climbing hempweed) MA  
*Morus rubra* (red mulberry) MHP  
*Myrica cerifera* (wax myrtle) P, MA  
*Nyssa sylvatica* (black gum) MHP  
*Onoclea sensibilis* (sensitive fern) MA  
*Oxydendrum arboreum* (sourwood) MHP  
*Panicum boscii* (Bosc's panic grass) MHP  
*Panicum dichotomum* (fall panicum) MHP  
*Parthenium auriculatum* (fever weed) ROW  
*Parthenocissus quinquefolia* (Virginia creeper) MHP, ROW, MA  
*Passiflora lutea* (yellow passion flower) MHP  
*Phryma leptostachya* (phryma) MHP  
*Physalis* sp. (ground cherry) ROW  
*Pinus echinata* (shortleaf pine) P, MHP  
*Pinus taeda* (loblolly pine) P  
*Pinus virginiana* (Virginia pine) P  
*Plantago lanceolata* (lance-leaved plantain) ROW

*Plantago* sp. (plantain) ROW  
*Platanus occidentalis* (sycamore) WMH, MA  
*Polygonatum biflorum* (Solomon's seal) MHP  
*Polygonum sagittatum* (tearthumb) MA  
*Polystichum acrostichoides* (Christmas fern) MHP  
*Populus deltoides* (cottonwood) WMH  
*Prenathes* sp. (rattlesnake root) P  
\**Prunella vulgaris* (heal-all) ROW  
*Prunus serotina* (black cherry) ROW, P, MHP  
*Quercus alba* (white oak) MHP  
*Quercus coccinea* (scarlet oak) MHP  
*Quercus falcata* (southern red oak) MHP  
*Quercus nigra* (water oak) MHP  
*Quercus phellos* (willow oak) WMH  
*Quercus prinus* (chestnut oak) MHP  
*Quercus rubra* (red oak) MHP  
*Quercus stellata* (post oak) MHP  
*Quercus velutina* (black oak) MHP  
*Rhus glabra* (smooth sumac) ROW  
*Rhus radicans* (poison ivy) WMH, MHP, ROW  
*Robinia pseudoacacia* (black locust) ROW  
*Rubus* sp. (blackberry) ROW  
*Ruellia* sp. (wild petunia) ROW  
*Sabatia angularis* (square-stemmed rose-gentian) ROW  
*Salix nigra* (black willow) MA  
*Salvia urticifolia* (nettle-leaved salvia) MHP (outside of Exclusion Area)  
*Sambucus canadensis* (elderberry) MA  
*Sanguinaria canadensis* (bloodroot) MHP  
*Sanicula* sp. (snakeroot) MHP  
*Scirpus cyperinus* (woolgrass bulrush) MA  
*Scirpus polyphyllus* (many-leaved bulrush) MA  
*Scirpus validus* (soft-stemmed bulrush) MA  
*Scleria triglomerata* (whip nutrush) P, MHP  
*Senecio anonymus* (Small's ragwort) ROW  
*Shrankia microphylla* (sensitive brier) ROW  
*Sium suave* (water parsnip) MA  
*Smilacina racemosa* (false Solomon's seal) MHP  
*Smilax glauca* (greenbrier) MHP  
*Smilax rotundifolia* (round-leaved greenbrier) P, MHP  
*Smilax* sp. (greenbrier) MHP  
*Solidago arguta* (summer goldenrod) ROW  
*Solidago* sp. (goldenrod) ROW  
*Sparganium americanum* (bur-reed) MA  
*Styrax grandifolia* (large-leaved storax) MHP  
*Thelypteris hexagonoptera* (broad beech fern) MHP  
*Tilia* sp. (basswood) WMH

Tristachyum sp. (joint grass) ROW  
Typha latifolia (cattail) MA  
Ulmus alata (winged elm) MHP  
Ulmus americana (American elm) MA, MHP  
Ulmus rubra (slippery elm, red elm) WMH, MHP  
Uvularia sessifolia (sessile-leaved bellwort) MHP  
Vaccinium arboreum (sparkleberry) P, MHP  
Verbascum sp. (mullein) MHP  
Verbesia officinalis (chaffseed) P, ROW  
Viburnum prunifolium (black haw) MHP, P  
Vitis aestivalis (summer grape) MHP  
Vitis rotundifolia (muscadine) MHP  
Yucca filamentosa (Spanish bayonet) MHP