SOUTH CAROLINA ELECTRIC & GAS COMPANY

COLUMBIA, SOUTH CAROLINA

SALUDA HYDROELECTRIC PROJECT

(FERC NO. 516)

RARE, THREATENED AND ENDANGERED SPECIES ASSESSMENT

SEPTEMBER 2007

Prepared by:

Kleinschmidt

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1.0 INTRODUCTION

The Saluda Hydro project is a 202.6 megawatt (MW) licensed hydroelectric facility located on the Saluda River in Lexington, Newberry, Richland, and Saluda counties of South Carolina and is owned and operated by South Carolina Electric & Gas (Figure 1). The project consists of Lake Murray, the Saluda Dam, the new back-up Saluda Berm, spillway, powerhouse, intakes, and penstocks. The project is currently licensed by the Federal Energy Regulatory Commission (FERC No. 516) and the present license is due to expire in the year 2010.

To initiate the Project relicensing process, SCE&G prepared and issued the Initial Consultation Document (ICD) on April 29, 2005. The Licensee submitted the document to a number of state and federal resource agencies for their review and comment. In response to the ICD, the United States Fish and Wildlife Service (USFWS), South Carolina Department of Natural Resources (SCDNR), National Marine Fisheries Service (NMFS), and several Non-governmental Organizations (NGO's) requested a number of studies to assess the potential impacts of Project operations on natural resources, including an assessment of potential impacts to rare, threatened and endangered species.

1.1 Consultation History

In comments issued in response to the ICD, the USFWS provided a list of all known rare, threatened and endangered (RT&E) species occurring in the four county region surrounding the Project (See letter dated August 1, 2005; Appendix A). This list included all known species that are currently listed as federally endangered or threatened, species that are candidates for federal listing, as well as federal species of concern. The USFWS suggested that the Licensee conduct a literature-based review to determine

habitat requirements for these species and compare these with available habitat types in the Project area. The USFWS indicated that field surveys for these species should be performed if suitable habitat is found to exist in the Project area.

As part of relicensing, SCE&G formed a Rare, Threatened and Endangered Species Technical Working Committee (RT&E TWC) to determine any impacts to rare, threatened and endangered species with respect to continued operation of the Project. The RT&E TWC is comprised of representatives from state and federal resource agencies (i.e., SCDNR, NMFS and USFWS), representatives from several NGO's, and other stakeholders. The TWC has met three times thus far during relicensing to discuss the status of RT&E species occurring in the Project vicinity and potential strategies for addressing issues related to RT&E species. A comprehensive listing of RT&E TWC meetings held to date is provided in Table 2.

1.2 Species Included in Assessment

This assessment includes the 12 species provided by the USFWS for the four counties surrounding the Saluda Hydro Project that are federally listed as threatened or endangered or are candidates for federal listing (Letter dated August 1, 2005). In addition, the assessment includes three federal species of concern for which state and federal agencies indicated have potential to occur in the Project area or are otherwise of conservation concern during the consultation process. Bald eagle, which was recently de-listed under the Endangered Species Act of 1973, is included in this assessment due to its protection under the Bald and Golden Eagle Protection Act of 1938. Species covered by this assessment are summarized in Table 1.

Table 1: Federally Listed Species, Candidate Species, and Selected Federal Species of Concern Occurring or Potentially Occurring in the Four County Region Surrounding the Saluda Hydroelectric Project (FERC No. 516) (Source: USFWS letter dated August 1, 2005, Charleston Field Office, Charleston, South Carolina, as modified by Kleinschmidt based on consultation with USFWS)

COMMON NAME	*SCIENTIFIC NAME*	FEDERAL STATUS[1]	COUNTIES
	Birds		
Bald eagle	*Haliaeetus leucocephalus*	P[2]	Lexington, Newberry, Richland, Saluda
Red-cockaded woodpecker	*Picoides borealis*	E	Lexington, Richland, Saluda
Wood stork	*Mycteria americana*	E	Newberry
	Fish		
Robust Redhorse Sucker	*Moxostoma robustum*	SC	Lexington (possible)
Saluda darter	*Etheostoma saludae*	SC	Lexington, Richland, Saluda, Newberry
Shortnose sturgeon	*Acipenser brevirostrum*	E	Lexington (possible), Richland
	Invertebrates		
Carolina heelsplitter	*Lasmigona decorata*	E	Lexington (possible), Newberry (possible), Richland (possible), Saluda (possible)
Saluda crayfish	*Distocambarus youngineri*	SC	Newberry
	Plants		
Canby's dropwort	*Oxypolis canbyi*	E	Richland
Georgia aster	*Aster georgianus*	C	Richland
Little amphianthus	*Amphianthus pusillus*	T	Saluda
Piedmont bishop-weed	*Ptilimnium nodosum*	E	Saluda
Rough-leaved loosestrife	*Lysimachia asperulaefolia*	E	Richland
Schweinitz's sunflower	*Helianthus schweinitzii*	E	Lexington
Rocky Shoal's spider-lily	*Hymenocallis coronaria*	SC	Lexington, Richland
Smooth coneflower	*Echinacea laevigata*	E	Lexington (possible), Richland

1 Federal Status – E (listed as Endangered under ESA); T (listed as Threatened under ESA); C (Candidate for Federal listing); SC (Federal Species of Concern); P (Federally protected).

2 Bald eagle was removed from the list of federally threatened and endangered species on June 28, 2007; however, the species remains federally protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Table 2: Summary of Saluda Hydro Relicensing Rare, Threatened and Endangered Species Technical Working Committee Meetings

MEETING DATE	LOCATION	TOPICS DISCUSSED
July 26, 2006	SCE&G Offices at Carolina Research Park, Columbia, SC	Rocky Shoals Spider Lily, Species tracking
May 3, 2006	SCE&G Offices at Carolina Research Park, Columbia, SC	Wood Stork, Species tracking
March 8, 2006	SCE&G Lake Murray Training Center, Columbia, SC	Status of key species, strategies for addressing species in relicensing

Figure 1: Location Map for the Saluda Hydroelectric Project (FERC No. 516)

2.0 SPECIES DESCRIPTIONS AND ANALYSES

2.1 Bald Eagle

Bald eagles may be found throughout North America, typically around water where they feed primarily on fish and scavenge carrion. The species thrives around bodies of water where adequate food exists and human disturbance is limited. Eagles nest in large trees near water and typically use the same nest for several years, making repairs to it annually (Degraaf and Rudis, 1986).

Status in the Project Area

Foraging habitat for bald eagle is abundant in the Project area, and bald eagle sightings are common around both Lake Murray and the lower Saluda River. In addition, there are seven active documented bald eagle nests on Lake Murray as well as one active nest on the lower Saluda River (SCDNR, unpublished data).

Determination of Effect

Bald eagles inhabiting the Lake Murray and lower Saluda River are well habituated to and are tolerant of the presence of human activity; thus continued use of the reservoir and river for recreation are not expected to result in any negative effects to this species.

2.2 Red-Cockaded Woodpecker

The red-cockaded woodpecker (RCW) is endemic to open, mature, and old growth pine ecosystems in the southeastern United States (USFWS, 2003). Over 97% of the pre-colonial era RCW population has been eradicated, leaving only 14,000 RCWs living in 5,600 colonies scattered across eleven states, including South Carolina. RCW decline is generally attributed to a loss of suitable nesting and foraging habitats, including longleaf pine systems, due to logging, agriculture, fire suppression, and other factors (USFWS, 2003). Suitable nesting habitat generally consists of open pine forests and

savannahs with large, older pines and minimal hardwood midstory or overstory. Living trees, especially older trees that are susceptible to red-heart disease making them more easily excavated, provide the RCWs preferred nesting cavities. Suitable foraging habitat consists of open-canopy mature pine forests with low densities of small pines, little midstory vegetation, limited hardwood overstory, and abundant bunchgrass and forb groundcover (USFWS, 2003).

Status in the Project Area

There are no known reports of red-cockaded woodpeckers from areas surrounding Lake Murray or the lower Saluda River. Further, there is no known longleaf pine savannah habitat in the Project vicinity.

Determination of Effect

Based on this lack of suitable habitat, it is very unlikely that this species occurs in the Saluda Project vicinity and thus would not be affected by continued operation of the Project.

2.3 Wood Stork

Wood storks are colonial waterbirds that typically nest in large rookeries and feed in flocks (USFWS, 1997). Typical foraging habitats include narrow tidal creeks, flooded tidal pools, and freshwater marshes and wetlands. Like most other wading birds, storks feed primarily on small fish. However, because wood storks feed by tactilocation, depressions where fish become concentrated during periods of falling water levels are particularly attractive sites (USFWS, 1997). Storks typically use tall cypresses or other trees near water for colonial nest sites. Nests are usually located in the upper branches of large trees and several nests are typically located in each tree. Trees utilized for nesting and roosting typically provide easy access from the air and an abundance of lateral limbs (USFWS, 1997). Currently, nesting of the species in the U.S. is thought to be limited to the coastal plain of South Carolina, Georgia, and Florida (USFWS 1997).

Status in the Project Area

Although they are primarily birds of freshwater and brackish wetlands along the coastal plain, wood storks were reported from several locations in the Lake Murray area in recent years. Specifically, a local resident reported observing wood storks feeding at several locations in the Bush River and Big Creek embayments of upper Lake Murray during the period from approximately 2000 through 2004. In addition, approximately 60 storks were observed feeding at various locations in the middle Saluda River and the upper portion of Lake Murray during an aerial survey for bald eagles performed by the SCDNR in early August 2004. In response to these sightings, SCE&G, in coordination with the USFWS and SCDNR, conducted an aerial reconnaissance survey in the upper portions of Lake Murray on August 27, 2004. During this survey, biologists from SCDNR and Kleinschmidt documented approximately 60 wood storks foraging within the Saluda Project Boundary, as well as two potential nesting sites along the floodplain of the middle Saluda River (Tosity Creek and Silverstreet).

Under the current FERC operating license, SCE&G is required to submit 5 year updates to the Lake Murray Shoreline Management Plan (FERC Order ¶ 61,332, June 1, 1984). In an order approving and amending SCE&G's most recent update, which was submitted on February 1, 2000, the FERC requested that SCE&G designate the two identified wood stork "roosting and foraging habitats" near Bush River as "conservation areas" (FERC Order No. 20040623-3015). Further, the order required that these areas, as well as all other wood stork roosting and foraging habitat identified within the project boundary, remain protected and undeveloped until new evidence is submitted to indicate that protection of these areas is not warranted. In response to the wood stork sightings on Lake Murray and the subsequent FERC order, SCE&G initiated consultation efforts with the SCDNR and USFWS and developed a study plan aimed at documenting where and under what conditions wood storks were utilizing habitats within the Saluda Hydro Project Boundary and in the project vicinity (Kleinschmidt, 2004).

In accordance with the Lake Murray Wood Stork Study Plan (Kleinschmidt 2004), aerial surveys were performed monthly during February through November of 2005 and 2006. No wood storks were observed during more than 13 hours of aerial

surveys during 2005 (Kleinschmidt, 2005). A limited number of storks were observed in the Project area during August and September of the 2006 survey season (Kleinschmidt, 2007). Specifically, a single juvenile wood stork was observed soaring above the Saluda River upstream of Lake Murray during the August survey, and an additional 10 – 12 were observed in the same general area during the September 15, 2006 survey - 6 foraging in a farm pond off of the Saluda mainstem just downstream of the Highway 121 bridge and 4 to 6 (4 confirmed, 2 suspected) soaring and feeding in wetlands adjacent to the wood chipping plant near Silverstreet.

The surveys likewise failed to document nesting of wood storks in the study area. Study results found the Tosity Creek or Silverstreet sites, which were identified as being potential wood stork nesting areas during reconnaissance surveys and associated agency consultation, to be great blue heron nests, with both nesting adults and pre-flight juveniles observed during both 2005 and 2006 (Kleinschmidt, 2005; 2007). The lack of nesting in the study area is consistent with the known life-history of wood storks as a coastal nesting species (USFWS, 1997). In South Carolina, all nesting colony sites currently known are located in the coastal plain, and primarily in the coastal counties (Murphy, 2005).

Timing of wood stork observations during 2006 (August and September), suggested that these were likely post-dispersal migrants from coastal nesting sites. During the late-summer/early-fall period, when chicks have fledged and adults are no longer tied to the nest site by chick rearing, adult and juvenile wood stork dispersing from nesting colonies often undertake extensive migrations to exploit ephemeral food resources prior to returning to coastal areas for the winter months. In South Carolina and Georgia, young-of-year storks typically fledge during July and August, but return to the nest for an additional 3 to 4 weeks to be fed before finally dispersing from the colony site in August and September (USFWS, 1996). Storks dispersing post-breeding from southern US colonies (Florida, Georgia, and South Carolina) have been documented as far north as North Carolina and as far west as Mississippi and Alabama (USFWS, 1996).

SCE&G met with representatives from the USFWS and SCDNR via conference call on February 8, 2007, to discuss the status of wood stork monitoring on Lake Murray.

Both SCDNR and USFWS concurred with the findings of the 2006 Wood Stork Monitoring Report (Kleinschmidt, 2007), agreeing that no nesting of wood stork in the Project area was evident based on study results. Due to the limited nature of stork activities observed in the Project vicinity, the agencies concurred with recommendations to discontinue further wood stork surveys on Lake Murray and that continued protection of the areas identified in the FERC order as wood stork "conservation areas" was no longer warranted or necessary.

Determination of Effect

Wood stork usage of the Saluda Project area appears sporadic and extremely limited in nature and thus is unlikely to be affected by operation of the Project.

2.4 Shortnose Sturgeon

Much of the Santee Basin, including the portion of the Saluda Basin encompassed by the Saluda Project, is thought to be within the historic range of the shortnose sturgeon (Welch, 2000; Newcomb and Fuller; 2001). In the Santee Basin, the shortnose sturgeon is believed to be estuarine anadromous, migrating to inland rivers on annual spawning runs (NMFS, 1998). Migratory spawning runs of this species usually occur in early February to mid-March when water temperatures approach 9 – 14° C. Shortnose sturgeon spawning habitat in the southeastern rivers is characterized as "curves with gravel/sand/log substrate" (Hall et al., 1991; Smith et al., 1993). Shortly after spawning, shortnose sturgeon leave spawning grounds and migrate downstream, with most leaving freshwater by May (Hall et al. 1991).

Status in the Project Area

Populations of shortnose sturgeon are known from downstream of the Santee-Cooper dams (lakes Marion and Moultrie) in the lower reaches of the Santee basin (Collins et al., 2003). An additional dam-locked population of shortnose sturgeon has been documented within and upstream of the Santee-Cooper Lakes, with Lake Marion and its tributaries harboring the most significant population. Radio-telemetry studies

conducted by the SCDNR have documented migration of Lake Marion shortnose sturgeon as far upstream as the old Granby Lock and Dam on the Congaree (J. Gibbons, SCDNR, Pers. Comm.). Presence of shortnose sturgeon in the vicinity of Granby Lock and Dam was also confirmed by collection of a single specimen during sampling related to relicensing of Duke Power's Catawba-Wateree Project in March 2004 (Duke Power, 2004). The old Granby Lock and Dam is located adjacent to downtown Columbia, approximately 11 miles downstream of the Saluda powerhouse.

In response to anadromous fish studies requested by the NMFS and SCDNR during the initial stages of the Saluda Project relicensing, SCE&G developed and implemented a Shortnose Sturgeon Study Plan (Kleinschmidt, 2006). The primary objective of this study is to document whether or not shortnose sturgeon are utilizing areas of the lower Saluda and upper Congaree rivers immediately downstream of the Project. Implemented during the 2007 migratory season, the study includes gillnet sampling for adult and juvenile sturgeon, as well as D-net sample for eggs and larvae, at four downstream locations: two in the lower Saluda and two in the upper Congaree (immediately upstream and downstream of the Granby Lock and Dam). Approximately 400 hours of gillnetting during the 2007 season resulted in no captures of adult or juvenile sturgeon; likewise, no eggs or larval sturgeon were captured during the sampling period (Kleinschmidt, 2007). Although additional sampling may be warranted, these data suggest that shortnose sturgeon are absent from areas immediately downstream of the Saluda Hydro Project or are present in extremely low numbers. These findings are consistent with preliminary results of telemetry studies being conducted by the SCDNR, which found that none of the Lake Marion sturgeon implanted with sonic transmitter were detected in the LSR despite the presence of a receiver array (J. Gibbons, SCDNR, Pers. Comm.).

Determination of Effect

Due to the lack of occurrence of shortnose sturgeon in the lower Saluda River Downstream of Saluda Hydro, continued operation of the Project is likely to result in No Effect on this species.

2.5 Robust Redhorse Sucker

The robust redhorse is a large, heavy-bodied sucker which was presumed extinct until being "rediscovered" during the initial stages of relicensing at Georgia Power's Sinclair Hydroelectric Project (FERC No. 1951), fisheries scientists knew little about its life history and habitat requirements. As a result, Georgia Power Company, along with state and federal resource agencies, other hydropower interests and the Georgia Wildlife Federation, formed the Robust Redhorse Conservation Committee (RRCC) in 1995 to guide recovery efforts for the species in lieu of listing under the Endangered Species Act (ESA). Subsequent research has produced valuable information about robust redhorse and its habitat requirements. However, much research is still needed as little is known about the habitat preferences of juvenile robust redhorse.

Based on recent studies, it appears that adult robust redhorse typically inhabit areas of the river where the current is moderately swift. Preferred habitat is riffle areas or in/near outside bends where depths are greater and accumulations of logs and other woody debris are present (Evans, 1997). Spawning typically occurs at water temperatures from 18 – 24° C, usually over gravel substrate in deep and shallow water (Hendricks, 1998).

Status in the Project Area

There are no known collections of robust redhorse from the lower Saluda River. Juvenile robust redhorse have been stocked by the SCDNR in the adjacent Broad River Basin below the Neal Shoals dam and below the Parr Shoals dam. In addition to stocking in the Broad River, juvenile robust redhorse have also been stocked by SCDNR in the Wateree River in the Santee Basin (SCDNR, 2005).

Determination of Effect

Due to lack of occurrence of this species in the Project area, continued operation of the Saluda Hydro Project is likely to result in No Effect on this species.

2.6 Saluda Crayfish

The Saluda crayfish is a terrestrial burrowing crayfish of the genus *Distocambarus* and is endemic to South Carolina (Eversole, 2007). Although knowledge of its habitat requirements is limited, the Saluda crayfish typically has been found in poorly drained areas where the ground is saturated during the rainy season (November – March) (Eversole, 2007, Hobbs and Carlson, 1985). Saluda crayfish have been documented from a range of site types including low, moist woodlands; a machine-maintained powerline; and a manicured lawn. Sites are generally isolated from floodplains and streams, although some have been found in low moist areas near the headwaters of streams (colluvial valleys). Analyses performed by Eversole (Welch and Eversole, 2002) found a close association between occurrence of Saluda Crayfish and the presence of a perched water-table. Soils found in association with Saluda crayfish burrows include Chewacla, Worsham, Toccoa-Cartecay, Enon, and Sedgefield (Eversole, 2007).

Status in the Project Area

Currently, the Saluda crayfish is known from only 14 sites, all of which are located in Newberry County (Eversole, 2007). The known range of the species encompasses portions of the Tyger, Enoree, Lower Broad and Saluda River Basins. The closest confirmed Saluda crayfish site to the Project area (Georges Loop) is approximately 1.2 miles from the Project boundary in a wooded site at the headwaters of a small tributary to Beaverdam Creek (approximately 0.3 miles south of the State Secondary Road 83 crossing at Beaverdam Creek) (Eversole, 2007). Recent surveys aimed at expanding the range further into the Saluda Basin were not successful (Eversole, 2007).

Determination of Effect

As previously noted, Saluda crayfish are generally found on moist, isolated sites and are not typically associated with floodplains or streams. This suggests that the

species is unlikely to occur in areas directly adjacent to Lake Murray and thus would not be affected by continued Project operations.

2.7 Carolina Heelsplitter

The Carolina heelsplitter is the only South Carolina freshwater mussel currently listed as federally endangered (Price, 2005). Although it was once found in large rivers and streams, the Carolina heelsplitter is now restricted to cool, clean, shallow, heavily shaded streams of moderate gradient. Stable streambanks and channels, with pool, riffle and run sequences, little or no fine sediment, and periodic natural flooding, appear to be required for the Carolina heelsplitter (USFWS, 2002).

Status in the Project Area

A freshwater mussel survey of Lake Murray, its tributaries, and the lower Saluda and upper Congaree rivers was conducted during summer 2006 in support the Saluda Hydro Project relicensing (Alderman, 2006). The survey found 15 species of native freshwater mussels within the study area; however, Carolina heelsplitter was not among the species found. A separate survey conducted in fall 2006 in support of a South Carolina Department of Transportation project found Carolina heelsplitter in Clouds Creek, approximately five miles upstream of Lake Murray (J. Alderman, Pers. Comm.).

Determination of Effect

Since Carolina heelsplitter has not been documented in the Project area, continued operation of the Project is expected to result in No Effect on the species.

2.8 Saluda Darter

Saluda darter was first described as a separate species in 1935 (Hubbs and Cannon, as cited in Rankin and Bettinger, 2005). However, after considerable debate through the years regarding its taxonomic status, Saluda darter is currently considered conspecific with the Carolina darter (*Etheostoma collis*) (Jenkins and Burkhead, 1994;

Robins et al, 1991; Rohde et al., 1994; Nelson et al., 2004, as cited in Rankin and Bettinger 2005). The Carolina (Saluda) darter is generally thought to inhabit sluggish to calm areas in clear to slightly turbid small streams with a substrate of mud, sand, gravel and/or bedrock; however, in Wateree Creek, a large South Carolina stream, the Carolina (Saluda) darter has also been found in moderate gradient among coble and leaf packs (Rankin and Bettinger 2005).

Status in the Project Area

The Carolina (Saluda) darter has been collected from several Saluda River Basin tributaries upstream of Lake Murray, including Richland, Red Bank, Indian, Rocky and Mills creeks (H. Beard, SCDNR, unpublished data). However, due to this species' intolerance of impounded conditions, it would not be expected to occur within the influence of the Lake Murray pool. Sampling efforts by SCDNR in Kinley, Rawls, and Twelvemile Creek, tributaries to the lower Saluda River downstream of the Project, have failed to document this species (H. Beard, SCDNR, Pers. Comm.). Likewise, the species has not been collected from the lower Saluda River mainstem, although SCDNR staff have expressed that the gear used for period fish community sampling (boat electrofishing) may not be suitable for detecting darter species (H. Beard, SCDNR, Pers. Comm.).

Determination of Effect

Best available data suggest that the Saluda (Carolina) darter may not occur in the Saluda Project vicinity; therefore continued operation of the Project is expected to have No Effect on the species.

2.9 Canby's Dropwort

Canby's dropwort is a perennial plant that grows in coastal plain habitats including wet meadows, wet pineland savannas, ditches, sloughs, and around the edges of Cypress-pine ponds (USFWS, 1990a). The healthiest populations seem to occur in open bays or ponds which are wet most of the year and have little or no canopy cover. Ideal

soils for Canby's dropwort have a medium to high organic content and a high water table. They are also acidic, deep, and poorly drained.

Status in the Project Area

Canby's dropwort is a coastal plain species and thus would not be expected to occur in the Project area.

Determination of Effect

Because Canby's dropwort is not expected to occur in the Project area, continued operation of the Project would likely result in No Effect on the species.

2.10 Georgia Aster

Georgia aster is a relict species of post oak savanna/prairie communities that existed in the southeast prior to widespread fire suppression and extirpation of large native grazing animals (USFWS, 2001). Typical habitat consists of dry oak-pine flatwoods and uplands in the piedmont of North Carolina, South Carolina, Georgia, and Alabama. Georgia aster occupies a variety of dry, upland habitats. The primary controlling factor appears to be the availability of light. The species is a good competitor with other early successional species, but tends to decline when shaded by woody species. Populations can persist for some undetermined length of time in the shade, but these rarely flower, and reproduce only by rhizomatous expansion. Soils vary from sand to heavy clay, with pH ranging from 4.4 to 6.8 (USFWS, 2001).

Status in the Project Area

There are no populations of Georgia aster known from the Saluda Project area. However, consultation with SCDNR Heritage Staff revealed that some potential exists for this species to occur in frequently disturbed sites, such as transmission line rights-of-way and frequently mowed road shoulders (B. Pittman, SCDNR, Pers.Comm.).

Determination of Effect

Populations of Georgia aster potentially inhabiting the Saluda Project area could be affected by use of herbicides during roadside and transmission line right-of-way maintenance. Routine mowing of these areas would not be expected to result in negative effects, as mowing is generally thought to benefit this species by removing woody competitors (USFWS, 2001).

2.11 Little Amphianthus

Little amphianthus is a rooted aquatic plant restricted to eroded depressions on flat-to-doming granitic (either granite or granite-gneiss) outcrops (USFWS, 1993). These outcrops are similar in appearance, but may differ geologically as igneous, quartzitic, gneissic, or porphyritic granite. These endemics typically occur in shallow flat-bottomed pools found on the crest and flattened slopes of unquarried outcrops. These pools range in size from 0.3 square meters to 10 square meters; the vast majority of these pools range from 0.5 to 1 square meter. These pools retain water for several weeks following heavy rains and completely dry out with summer droughts. They are usually several meters in diameter and are circular or irregularly-shaped due to the coalescence of adjacent pools. This species is typically found in association with two other granite outcrop species: black-spored quillwort (*Isoetes melanospora*) and mat-forming quillwort (*Isoetes tegetiformans*), all of which are restricted to the Piedmont physiographic province of the southeastern U.S. (USFWS, 1993).

Status in the Project Area

There are no populations of this species known from the Saluda Project area. Further, consultation with SCDNR Heritage Program staff confirmed that occurrence of this species in the Piedmont of South Carolina is restricted to eroded pools on flat or domed granitic outcrops, and that suitable habitat for the species likely does not occur in the Project vicinity (B. Pittman, SCDNR, Pers. Comm.).

Determination of Effect

Continued operation of the Saluda Project is expected to result in No Effect on this species due to lack of occurrence in the Project area.

2.12 Piedmont Bishop-Weed

Piedmont bishop-weed (also know as harperella) is a slender, erect annual herb (to 47 in. in height) with hollow quill-shaped leaves and clusters of small white flowers that bloom in July and August (USFWS, 1990b). It typically occurs in two habitat types: (1) rocky or gravel shoals and margins of clear, swift-flowing stream sections; and (2) edges of intermittent pineland ponds in the coastal plain. In both habitats, occurrence is limited to a narrow range of water depths, as the species is intolerant of both dry conditions and deeper water. In addition, harperella appears to be particularly dependant on moderately intensive spring floods for germination, seed dispersal, and control of competing species. It is readily eliminated from its habitat by alterations of the water regime, which result from impoundments, water withdrawal, and drainage, or deepening of ponds. Other factors such as siltation, pollution, and shoreline development have also been cited as threats to harperella populations (USFWS, 1990b).

Status in the Project Area

Potential habitat for Piedmont bishop-weed is restricted to gravel shoal areas of the lower Saluda River; however, numerous aquatic vegetation surveys conducted on the lower Saluda in recent decades have failed to document the species. Although aimed at documenting the extent of invasive aquatic species in the river, these surveys would have documented Piedmont bishop-weed, if it were present (C. Aulbach, South Carolina Botanical Services, Pers. Comm.).

Determination of Effect

Continued operation of the Saluda Project is expected to result in No Effect on this species due to lack of occurrence in the Project area.

2.13 Rough-Leaved Loosestrife

This species generally occurs in the ecotones or edges between longleaf pine uplands and pond pine pocosins (areas of dense shrub and vine growth usually on a wet, peaty, poorly drained soil) on moist to seasonally saturated sands and on shallow organic soils overlaying sand (USFWS, 1995). Rough-leaf loosestrife has also been found on deep peat in the low shrub community of large Carolina bays (shallow, elliptical, poorly drained depressions of unknown origin). The grass-shrub ecotone, where rough-leaf loosestrife is found, is fire-maintained, as are the adjacent plant communities (longleaf pine - scrub oak, savanna, flatwoods, and pocosin). Suppression of naturally-occurring fire in these ecotones results in shrubs increasing in density and height and expanding to eliminate the open edges required by this plant.

Status in the Project Area

The pine pocosin and Carolina bay environments required by this species do not occur in the Piedmont; therefore, rough-leaved loosestrife is extremely unlikely to occur in the Saluda Project vicinity.

Determination of Effect

Continued operation of the Saluda Project is expected to result in No Effect on this species due to lack of occurrence in the Project area.

2.14 Schweinitz's Sunflower

It is believed that this species formerly occupied prairie like habitats or Post Oak - Blackjack Oak savannas that were maintained by fire (USFWS, 1994). Current habitats include roadsides, power line clearings, old pastures, woodland openings and other sunny or semi-sunny situations. Schweinitz's sunflower is known from a variety of soil types but is generally found growing on shallow, poor, clayey and/or rocky soils, especially those derived from mafic rocks. In the few sites where Schweinitz's sunflower occurs in

relatively natural vegetation, the natural community is considered a Xeric Hardpan Forest.

Status in the Project Area

There are no populations of Schweinitz's sunflower known from the Saluda Project area. Further, consultation with SCDNR Heritage Program staff revealed that suitable habitat for the species likely does not occur in the Project vicinity (B. Pittman, SCDNR, Pers. Comm.).

Determination of Effect

Continued operation of the Saluda Project is expected to result in No Effect on this species due to lack of occurrence in the Project area.

2.15 Rocky Shoals Spider Lily

Rocky shoals spider lily (RSSL), also referred to as Cahaba lily, is a perennial that typically inhabits large streams and rivers at or above the fall line. These areas usually consist of rocky shoals and bedrock outcrops, substrates which provide anchor points for the RSSL's roots and bulbs (Patrick et al., 1995). RSSL grows best in constantly flowing water with relatively low sediment loads and water depths (to bulb) of 4 – 12 inches (Aulbach-Smith, 1998).

Status in the Project Area

Personnel for the USFWS, SCDNR, and other member of the RT&E TWC surveyed the lower Saluda River downstream of the Project for presence of rocky shoals spider lily (RSSL) on May 30th, 2006 (Kleinschmidt, 2006). Two suspected RSSL plants were observed in the Ocean Boulevard Rapid area of the lower Saluda, but were not in bloom and appeared stunted compared to RSSL plants observed farther downstream in the confluence of the Saluda and Broad rivers.

Determination of Effect

No viable populations of RSSL were documented during the May 2006 survey; therefore continued operation of the Project is expected to have No Effect on the species.

2.16 Smooth Coneflower

Smooth coneflower is typically found in open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium and calcium rich soils associated with amphibolite, dolomite or limestone (in Virginia), gabbro (in North Carolina and Virginia), diabase (in North Carolina and South Carolina), and marble (in South Carolina and Georgia) (USFWS, 1995). Smooth coneflower occurs in plant communities that have been described as xeric hardpan forests, diabase glades or dolomite woodlands. Optimal sites are characterized by abundant sunlight and little competition in the herbaceous layer. Natural fires, as well as large herbivores, historically influenced the vegetation in this species' range. Many of the herbs associated with smooth coneflower are also sun-loving species that depend on periodic disturbances to reduce the shade and competition of woody plants.

Status in the Project Area

There are no populations of smooth coneflower known from the Saluda Project area. Further, the diabase glade habitat required by this species is not known to occur in areas around Lake Murray or in the lower Saluda River. Consultation with SCDNR Heritage Program staff confirmed that suitable habitat for smooth coneflower is unlikely to occur in the areas around Lake Murray or the lower Saluda River (B. Pittman, SCDNR, Pers. Comm.).

Determination of Effect

Continued operation of the Saluda Project is expected to result in No Effect on this species due to lack of occurrence in the Project area.

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APPENDIX A

CORRESPONDENCE

United States Fish & Wildlife Service Letter Commenting on Initial Consultation Document and Requesting Rare, Threatened and Endangered Species Assessment