

**SUPPLEMENTAL INFORMATION TO BIOLOGICAL
ASSESSMENT PREPARED FOR NATIONAL MARINE
FISHERIES SERVICE**

**Virgil C. Summer Nuclear Station
Combined License Application**

**U.S. Nuclear Regulatory Commission Combined License Application
Docket No. 52-027 and 52-028
Department of the Army Permit Application
No. SAC 2007-1852-SIR**

1.0 Introduction

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application from South Carolina Electric & Gas (SCE&G) acting for itself and Santee Cooper (the State-owned electric and water utility, formally called the South Carolina Public Service Authority) for combined construction permits and operating licenses (combined licenses or COLs). The proposed actions related to the SCE&G application are (1) NRC issuance of COLs for two new nuclear power reactor units (Units 2 and 3) at the Virgil C. Summer Nuclear Station (VCSNS) site in Fairfield County, South Carolina, and (2) U.S. Army Corps of Engineers (USACE) permit action on a Department of Army Individual Permit application to perform certain activities on the site. The USACE is participating with the NRC in preparing the draft and final environmental impact statement (EIS) for these proposed actions as a cooperating agency and participates collaboratively on the review team.

As part of the NRC's responsibilities under Section 7 of the Endangered Species Act (ESA), the review team prepared a biological assessment (BA) in connection with the VCSNS COLs review (NRC 2010). In the BA, the review team did not consider potential impacts stemming from activities such as installation of water-intake structures in Monticello Reservoir, a discharge structure in Parr Reservoir, and other onsite preparation activities, because the shortnose sturgeon (*Acipenser brevirostrum*) had not been reported to occur in the vicinity of the VCSNS site (FWS 2010). In addition, the Parr Shoals Dam on the Broad River downstream of the VCSNS site prevents upstream migration of this anadromous species (SRBA 2008). The BA did, however, document potential impacts on the shortnose sturgeon as a result of proposed transmission-line routing activities. The NRC submitted the BA to the National Marine Fisheries Service (NMFS) on April 15, 2010. In the BA, the review team concluded that the activities associated with the transmission-line routing (e.g., corridor preparation, tower placement, and maintenance) would not be likely to adversely affect or jeopardize the continued existence of the shortnose sturgeon in Aiken, Calhoun, Colleton, Dorchester, Hampton, Lexington, Orangeburg, or Richland Counties of South Carolina. In its draft EIS (NRC 2010) supporting the review of the COLs application, the review team also analyzed the impacts of transmission-line routing and concluded that transmission-line routing would be unlikely to adversely impact shortnose sturgeon.

The review team has prepared this technical memo to account for new transmission-line routing information provided by the applicant since the initial BA was submitted to the NMFS. In addition, on October 6, 2010, NMFS published in the *Federal Register* (75 FR 61904) a proposed rule for listing the Carolina and South Atlantic distinct population segments of the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) as endangered under the ESA. To address this development, this technical memo describes the potential effect of transmission-line routes associated with VCSNS Units 2 and 3 on the Atlantic sturgeon. In addition, the technical memo provides an evaluation of potential impacts on Federally or proposed Federally listed species near the vicinity of the VCSNS site that may result from future restoration activities in the Broad River basin as well as cumulative impacts on sturgeon from other projects within the basin.

Table 1. Federally Listed and Proposed for Listing Aquatic Species That May Occur in Calhoun, Colleton, Dorchester, Hampton, Lexington, Orangeburg, or Richland Counties, South Carolina

Scientific Name	Common Name	Federal Status	County of Occurrence
<i>Acipenser brevirostrum</i>	Shortnose sturgeon	Endangered	Calhoun, Colleton, Dorchester, Hampton, Lexington, Orangeburg, Richland
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic sturgeon	Proposed Endangered	Calhoun, Colleton, Dorchester, Hampton, Lexington, Orangeburg, Richland *
<i>Caretta caretta</i>	Loggerhead sea turtle	Threatened	Colleton
<i>Lepidochelys kempii</i>	Kemp's ridley sea turtle	Endangered	Colleton
<i>Chelonia mydas</i>	Green sea turtle	Endangered	Colleton
<i>Dermochelys coriacea</i>	Leatherback sea turtle	Endangered	Colleton

Data Source: FWS 2010; * ASSRT 2007

2.0 Proposed Action

Information pertaining to the Broad River, Parr Reservoir, Monticello Reservoir, and onsite streams associated with the VCSNS site was described in the initial BA published in draft NUREG-1939 in April 2010 (NRC 2010). No updates of information about these waterbodies are necessary for this technical memo. In the fall of 2010, the applicant provided final transmission-line routing information for VCSNS Units 2 and 3 and this resulted in a reduction of total acres of freshwater crossed by transmission-line corridors from approximately 98 ac to 53 ac. The six new lines include proposed corridors that would occur in the Southern Outer Piedmont, Sandhills, and Coastal Plain ecoregions of South Carolina (USGS 2001; Pike 2010; MACTEC 2008, 2009; SCE&G 2010a).

The existing transmission system for VCSNS is owned by SCE&G and Santee Cooper. Six new 230-kV transmission lines would be required in addition to the existing transmission infrastructure for transmission of electricity generated by VCSNS with the addition of Units 2 and 3 (SCE&G 2010b). Activities associated with the SCE&G and Santee Cooper transmission systems would include clearing land, installing new poles, hanging new lines, and upgrading existing lines. Figure 1 shows the proposed revised routing for the six new transmission lines. The corridors are described as follows:

- VCSNS-Flat Creek – This line is owned by Santee Cooper and crosses Fairfield, Chester, and Lancaster Counties.
- VCSNS-Varnville – This line is owned by Santee Cooper and crosses Fairfield, Newberry, Richland, Lexington, Calhoun, Orangeburg, Dorchester, Colleton, and Hampton Counties.
- VCSNS-Killian – This line is owned by SCE&G and crosses Fairfield and Richland Counties.

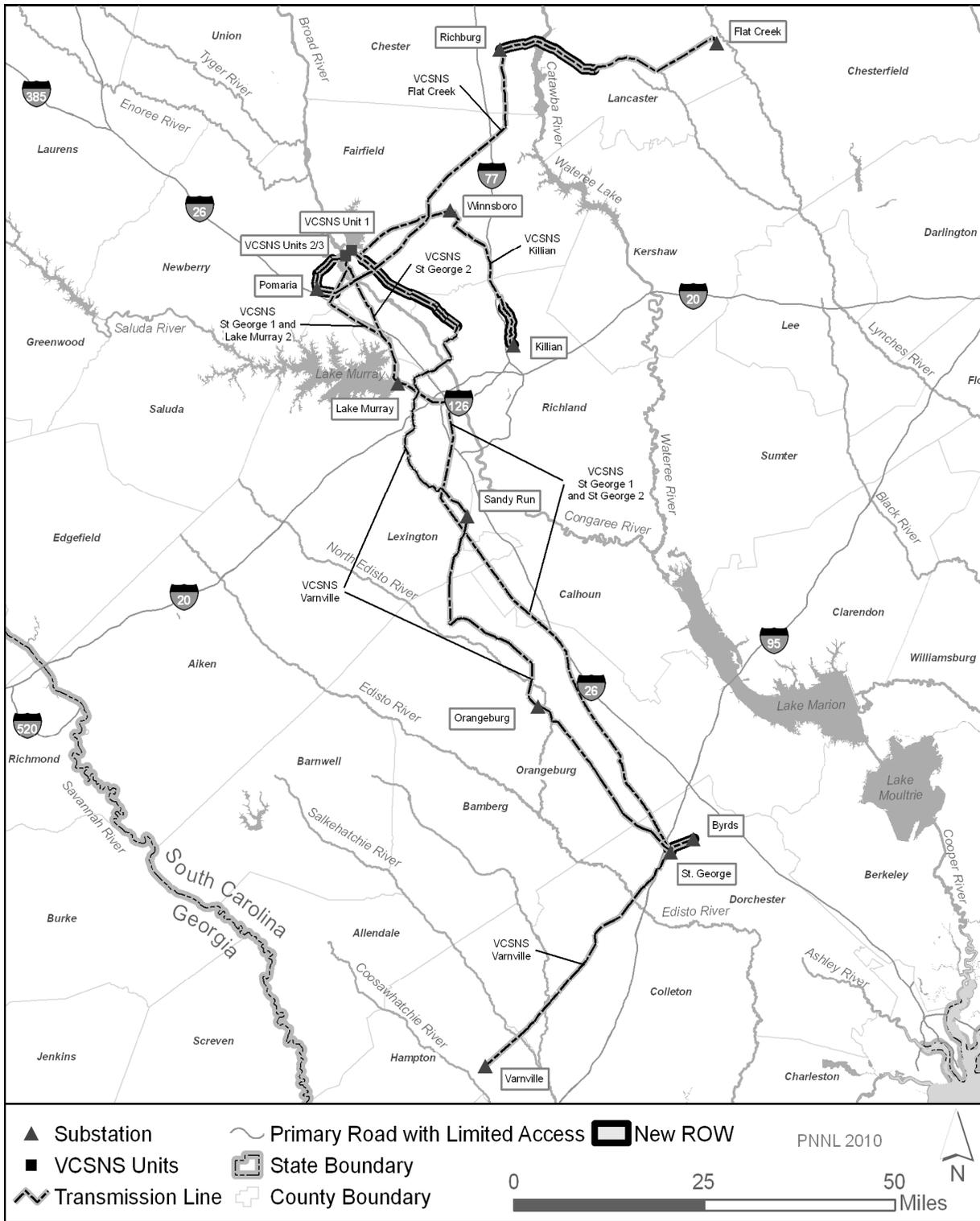


Figure 1. VCSNS Units 2 and 3 expected New Transmission-Line Routes (based on MACTEC 2009 and Pike 2010)

- VCSNS-Lake Murray No. 2 and St. George No. 1 – This line is owned by SCE&G and crosses Fairfield, Richland, and Lexington Counties.
- VCSNS-St. George No. 2 – This line is owned by SEC&G and crosses Fairfield and Lexington Counties.
- VCSNS-St. George No. 1 and No. 2 – This line would be a double-circuit line (two lines) owned by SCE&G and it would cross Fairfield, Newberry, Lexington, Calhoun, Orangeburg, and Dorchester Counties.

Impacts on the waterways associated with transmission-line activities include erosion of soils, potential for pollutant discharge from equipment, and temporary disturbance and/or displacement of aquatic biota. Both SCE&G and Santee Cooper would implement best management practices (BMPs) to minimize adverse conditions for aquatic biota and habitats during transmission-line installation. Examples of BMPs to minimize impacts on streams and open water include establishment of sediment basins, sediment traps, and silt fences to control and divert runoff away from streams, and maintenance of stream buffers (FP&S 2008). In addition, both Santee Cooper and SCE&G have acknowledged the need for acquiring State and Federal permits and the incorporation of BMPs and Storm Water Pollution Prevention Plans (SWPPPs) into said permits (MACTEC 2008; FP&S 2008). SCE&G stated that it “will comply with the S.C. Stormwater Management and Sediment Reduction Act related to water quality protection and will comply with the recommendations of various regulatory agencies, including the S.C. Department of Natural Resources, S.C. Department of Health and Environmental Control, the U.S. Army Corps of Engineers, etc.” (FP&S 2008).

SCE&G Transmission Lines

Four lines occupying three corridors would be required to carry the SCE&G-owned transmission lines. These lines would occupy an estimated 147 mi of existing transmission-line corridors and 6 mi of new corridors (Figure 1). In addition, 5 mi of onsite lines to connect the VCSNS Unit 1 switchyard with the switchyard for VCSNS Units 2 and 3 would include 11 stream crossings (Pike 2010). The new 6-mi segment of the VCSNS-Killian transmission-line corridor does not cross waterbodies with known occurrences of shortnose (FWS 2010) or Atlantic sturgeon (ASSRT 2007), but may have habitat characteristics that could support these species (Palmetto 2010). The activities associated with the remaining 141 mi of existing SCE&G transmission-line corridors would include clearing land, building a new substation, installing new poles, hanging new lines, and upgrading existing lines. The SCE&G transmission lines associated with VCSNS Units 2 and 3 would include 220 stream and river crossings throughout the Piedmont and Coastal Plain ecoregions of South Carolina (Figure 1; Table 2). None of the SCE&G transmission line crossings will span Federal navigable waters requiring authorization pursuant to Section 10 of the Rivers and Harbors Act (SCE&G 2011).

Table 2. Stream Crossings, Open Water, Linear Feet of Stream, and Area Associated with the SCE&G and Santee Cooper Transmission Lines

Transmission-Line Route	Utility	Streams		Number of Stream Crossings	Area to be Cleared Within 100 ft of a Waterbody (ac)
		(linear feet)	Open Water (ac)		
Onsite Connector Lines**	SCE&G	1555 ^(a)	0	11 ^(a)	6.2
VCSNS-Killian**	SCE&G	5194	0.81	45	5.3
VCSNS-Lake Murray No. 2 and VCSNS-St. George No. 1 common corridor	SCE&G	5017	1.09	35	15.3
VCSNS-St. George No. 1 and VCSNS-St. George No. 2 common corridor	SCE&G	20,675	9.9	99	6.9
VCSNS-St. George No. 2	SCE&G	5339	0.35	30	2.2
<i>Sub Total</i>		<i>37,780</i>	<i>12.15</i>	<i>220</i>	<i>35.9</i>
VCSNS-Varnville	Santee Cooper	37,987	17.94	177	^(b)
VCSNS-Flat Creek ^(c)	Santee Cooper	26,491	14.45	151	^(b)
<i>Sub Total</i>		<i>64,478</i>	<i>32</i>	<i>328</i>	^(b)
<i>Grand Total</i>		<i>102,258</i>	<i>45</i>	<i>548</i>	<i>35.9</i>

Source: USACE 2010 except for onsite connector lines, and clearing within 100 ft of a waterbody (Pike 2010).

- (a) Onsite connector lines are located in areas covered by USACE's (2009) onsite wetland jurisdictional determination as well as offsite transmission-line determination (USACE 2010). Stream crossings and lengths for onsite connector lines were obtained by overlaying transmission-line and delineated wetlands GIS layers (SCE&G 2010c).
- (b) Data not provided.
- (c) These transmission-line corridors are not associated with waterbodies that are known to support shortnose and/or Atlantic sturgeon.

Santee Cooper Transmission Lines

Two transmission lines would be installed by Santee Cooper: the VCSNS-Flat Creek and the VCSNS-Varnville lines. The VCSNS-Flat Creek line will extend 72 mi northeast from the VCSNS site to the existing Flat Creek Substation and requires approximately 17 miles of new corridor running adjacent to existing corridor (Figure 1). The VCSNS-Flat Creek line includes a new transmission-line corridor crossing of a Federal navigable water, the Fishing Creek Reservoir (Catawba River impoundment), and will therefore require authorization pursuant to Section 10 of the Rivers and Harbors Act (SCE&G 2011). Nevertheless, the VCSNS-Flat Creek line would not cross waterbodies that are known habitat for shortnose (FWS 2010) or Atlantic sturgeon (ASSRT 2007).

The VCSNS-Varnville line would extend 167 mi south from the VCSNS site to the existing Varnville substation, and require approximately 22 mi of new corridor running adjacent to

existing corridor and approximately 0.5 mi of new corridor not adjacent to existing corridor (Figure 1). The VCSNS-Varnville line includes three new transmission-line corridor crossings of waterbodies: Parr Reservoir (Broad River impoundment) in Fairfield and Newberry Counties, as well as Little River and Cedar Creek, both tributaries to the Broad River, in Richland County (MACTEC 2010). The new VCSNS-Varnville transmission-line corridor in Dorchester County will not cross any river systems that support shortnose sturgeon (MACTEC 2010). Within the existing transmission-line corridors on the VCSNS-Varnville line, crossings of Federal navigable waters are planned in seven existing locations (SCE&G 2011). These crossings will require authorization pursuant to Section 10 of the Rivers and Harbors Act: North Fork Edisto River (two crossings), Edisto River (four crossings), and the Salkehatchie River (SCE&G 2011).

Activities associated with the installation of the Santee Cooper transmission lines would include clearing land, upgrading existing substations, installing new poles, replacing old poles, and hanging new lines on existing supports (MACTEC 2008, 2009). In addition, the proposed new 100-ft-wide Parr Reservoir transmission-line corridor, to be sited adjacent to the existing VCSNS-Varnville line crossing, would require the installation of concrete pile foundations within the reservoir, but no dredging would be required (SCE&G 2009). Santee Cooper would prepare a SWPPP, in accordance with South Carolina Department of Health and Environmental Control (SCDHEC) guidance (SCDHEC 2002), for minimization of impacts on sediment quality during installation activities (MACTEC 2009).

The Santee Cooper transmission lines associated with VCSNS Units 2 and 3 would include 328 stream and river crossings throughout the Piedmont and Coastal Plain ecoregions of South Carolina (Figure 1; Table 2) (MACTEC 2008). An estimated 11 percent of the total Santee Cooper water crossings are associated with new transmission-line corridor (review team analysis of GIS-based routing data supplied by the applicant). A combined 551 linear feet of forested stream habitat would be converted to nonforested stream habitat through preparation of the VCSNS-Varnville transmission-line corridor. Clearing of vegetation associated with Santee Cooper transmission lines would occur within new transmission-line corridors (50 to 125 ft wide) as well as existing corridors (50 to 85 ft wide) (MACTEC 2009).

3.0 Protected Species Descriptions

The initial BA, published in draft NUREG-1939 in April 2010 (NRC 2010) examined the effects of the proposed action on five Federally threatened or endangered aquatic species that are known to occur in several counties in South Carolina proposed for transmission-line corridor routing for transmission of power from VCSNS Units 2 and 3. An additional species – the Atlantic sturgeon – was added since the publication of draft NUREG-1939 as described below (Table 1). The review team determined that all proposed transmission-line routing activities for VCSNS Units 2 and 3 would occur in noncoastal areas of Colleton County, therefore negating potential impacts on sea turtle species. As such, the four Federally listed sea turtles associated with Colleton County were not further considered in the BA. A biological description for shortnose sturgeon was provided in the initial BA and will therefore not be included in this document.

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)

Based on the information published by the Atlantic Sturgeon Status Review Team (ASSRT 2007), the review team identified the Atlantic sturgeon as being present within the Ashepoo-Combahee-Edisto basin. The Atlantic sturgeon is a member of the Order Acipenseriformes, which includes the long-lived sturgeons and paddlefishes. The Atlantic sturgeon is not currently listed as threatened or endangered either Federally or by the State of South Carolina. However, on October 6, 2010, the NMFS published in the *Federal Register* (75 FR 61904) a proposed rule for listing the Carolina and South Atlantic distinct population segments of the Atlantic sturgeon as endangered under the ESA.

Atlantic Sturgeon Biology

Broadly, Atlantic sturgeon exhibit life-history strategies akin to other members of the Family Acipenseridae. These attributes include slow-growing, late-maturing, anadromous fish that spawn in freshwater but make use of estuarine and marine habitats for much of their life cycle (ASSRT 2007). Atlantic sturgeon are opportunistic feeders, targeting a range of prey items within the benthos which includes worms, crustaceans, aquatic insect larvae, and sand lances (Jenkins and Burkhead 1994). Characteristics of the early life-history attributes of Atlantic sturgeon such as age at seaward migration and residence time in freshwater habitats vary within natal streams as well as across geographic regions (Jenkins and Burkhead 1994). Juveniles migrate from spawning areas toward saline habitats where individuals spend months to years rearing in estuarine environments. Migration toward marine environments occurs during subadult life stages when fish achieve sizes ranging from 72 to 92 cm. In marine environments, Atlantic sturgeon make extensive migrations from their natal estuary presumably to productive foraging grounds (ASSRT 2007). The age at maturation is variable and ranges from 10 to 30 years, depending on the sex of a particular organism as well as other environmental and physiological conditions (Jenkins and Burkhead 1994).

Atlantic Sturgeon in South Carolina Rivers

According to ASSRT (2007), it is likely that Atlantic sturgeon once occurred in many riverine and estuarine ecosystems within South Carolina. It is likely that dramatic changes to historic populations of Atlantic sturgeon occurred following the 1800s. Declining populations have been attributed to harvest pressure as well as the loss and degradation of habitats suitable for supporting various life stages of these species. While Atlantic sturgeon have been noted to occur in many South Carolina coastal rivers during the past several decades, specific information detailing population records for each of these rivers is not readily available (ASSRT 2007).

There appears to be little quantitative evidence linking the occurrence of Atlantic sturgeon in specific streams and rivers to spawning populations in South Carolina. However, in the absence of empirical data, the co-occurrence of young-of-the-year (YOY) and adult life stages within a given river provide data to inform hypotheses regarding spawning populations. Subadult and YOY Atlantic sturgeon were captured during 2003 and 2004 in the Waccamaw River. A combination of direct capture and observation records of Atlantic sturgeon has been noted in the Great Pee Dee River. In the Santee and Cooper Rivers, subadult and YOY Atlantic

sturgeon were captured during 1997 and 2004. Carcasses of three adult Atlantic sturgeon were found above the Wilson and Pinopolis dams in Lake Moultrie during the 1990s. However, while a fish lift at the St. Stephen Hydroelectric Project operates to pass fish during the spring, there have been no observations of an adult Atlantic sturgeon passing this facility. A combination of YOY and adult Atlantic sturgeon were captured from the Edisto and Combahee rivers from 1994 to 2001, providing evidence of spawning populations in these rivers. Similarly, YOY and adult Atlantic sturgeon have also been captured in the Savannah River.

South Carolina rivers with recent documented occurrences of Atlantic sturgeon include the Waccamaw, Pee Dee, Santee, Cooper, Edisto, Combahee, Coosawatchie, and Savannah rivers (Figure 2) (ASSRT 2007). Atlantic sturgeon have not been reported to occur in the vicinity of the VCSNS site or in waterbodies (Little River and Cedar Creek which are tributaries to the Broad River, the Broad River, and the Catawba River) that would be crossed by the new transmission-line corridors required for the VCSNS Units 2 and 3. However, Atlantic sturgeon may occur in waterbodies spanned by the existing VCSNS-Varnville transmission-line corridor (MACTEC 2010). The VCSNS-Varnville transmission-line corridor crosses the Edisto River southwest of the St. George substation (Figure 2), which is the only waterbody known to have reported occurrences of Atlantic sturgeon associated with the proposed VCSNS Units 2 and 3 transmission-line systems (ASSRT 2007). The transmission-line routing activity at this location is limited to updating the existing corridor.

4.0 Potential Environmental Effects of the Proposed Actions

This section describes the potential impacts from proposed transmission-line routing activities for VCSNS Units 2 and 3 on Atlantic and shortnose sturgeon in locations that correspond to the overlap between transmission-line crossings and reported occurrences of these two species.

Impacts of Construction

There are presently no records of Atlantic and shortnose sturgeon in the vicinity of the proposed locations for VCSNS Units 2 and 3, therefore potential impacts stemming from activities such as installation of water-intake structures in Monticello Reservoir and a discharge structure in Parr Reservoir, and other onsite preparations are not considered in this analysis. An evaluation of potential impacts on Atlantic and shortnose sturgeon is limited to transmission-line routing activities.

Impacts on the waterways associated with transmission-line routing activities would include erosion of soils, potential for pollutant discharge from equipment, and temporary disturbance and/or displacement of aquatic biota. Both SCE&G and Santee Cooper plan to implement BMPs to minimize adverse conditions for aquatic biota and habitats during transmission-line installation and upgrading activities (e.g., leaving low-growing vegetation intact to provide stream buffer zones, hand clearing vegetation in forested wetlands, leaving root zones intact, setting structures on banks to divert runoff, implementing erosion control techniques) (MACTEC 2009; Pike 2010). In addition, both SCE&G and Santee Cooper have acknowledged the need

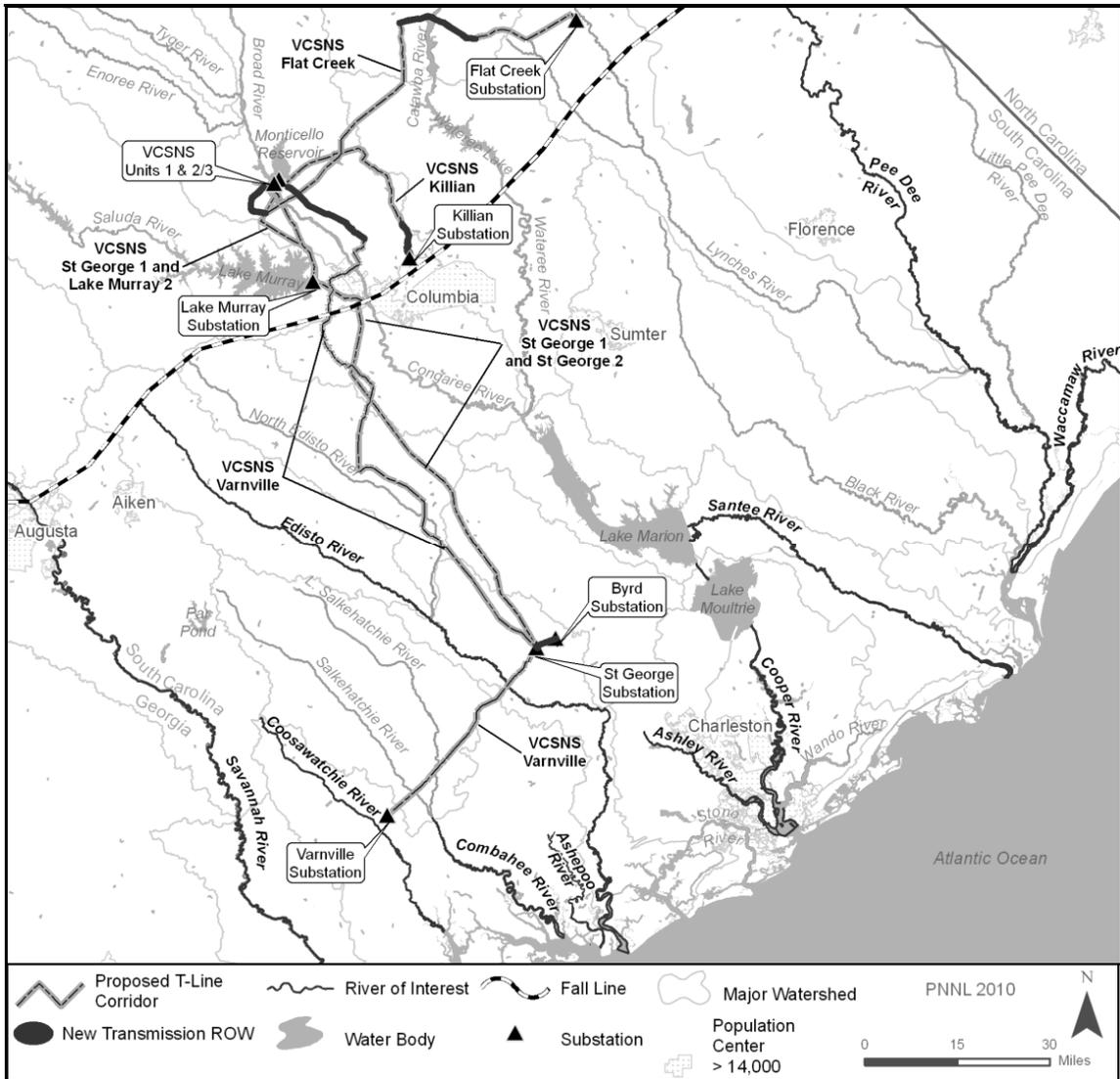


Figure 2. South Carolina Rivers with Recent Documented Occurrences of Atlantic Sturgeon Include Waccamaw, Pee Dee, Santee, Cooper, Edisto, Combahee, Coosawatchie, and Savannah Rivers (ASSRT 2007)

to acquire State and Federal permits and incorporate BMPs and SWPPPs into said permits (MACTEC 2009; Pike 2010). SCE&G states, “SCE&G will comply with the S.C. Stormwater Management and Sediment Reduction Act related to water quality protection and will comply with the recommendations of various regulatory agencies, including the S.C. Department of Natural Resources, S.C. Department of Health and Environmental Control, the U.S. Army Corps of Engineers, etc.” (Pike 2010).

There are few locations in which VCSNS Units 2 and 3 transmission lines would cross waterbodies known to provide habitat for Atlantic and shortnose sturgeon. The lower Edisto River and North Fork Edisto River would be crossed by the VCSNS-Varnville line. However, transmission line crossings within these routes are not associated with clearing new corridors and would be limited to updating or expanding existing infrastructure.

The review team evaluated the potential for shortnose and Atlantic sturgeon to be affected by the installation of new transmission lines. No direct impacts on the waterbodies crossed by the new transmission lines are anticipated; however, indirect impacts (e.g., potential for reduced shading and increased sedimentation) on waterbodies would likely occur in habitats that shift from forested to nonforested. Impacts associated with vegetation clearing are anticipated to be minor and would result in localized impacts adjacent to the waterbodies. By following State and Federal BMPs associated with water quality, the review team concludes that the impacts associated with transmission-line routing activities would be minimal and would not adversely affect aquatic ecosystems.

Impacts of Operations

Maintenance activities associated with transmission lines may lead to temporary impacts on the waterways being crossed (Figure 2). However, the same vegetation-management practices currently used by SCE&G and Santee Cooper for the existing transmission-line corridors would be applied to the proposed new and upgraded transmission-line corridors (MACTEC 2009; Pike 2010). SCE&G and Santee Cooper practices and procedures were developed to ensure impacts on aquatic ecosystems from operation and maintenance of transmission lines would be minimal. Santee Cooper would continue to use its Right-of-Way Management Unit Plan, which addresses vegetation clearing or maintenance for stream buffer zones (MACTEC 2008). Only herbicides approved by the U.S. Environmental Protection Agency and registered for use in wetlands or aquatic sites would be used and their application would be limited to selective low-volume treatments aimed at controlling undesirable woody vegetation while still promoting low-growing native vegetation (MACTEC 2008). Low-growing vegetation along shorelines would be maintained as buffer zones (MACTEC 2008).

The review team concludes that based upon the right-of-way management and maintenance plans followed by SCE&G and Santee Cooper, the impacts of transmission-line corridor maintenance activities on aquatic resources would not adversely affect aquatic ecosystems.

5.0 Cumulative Effect on Diadromous Fish

The Santee-Cooper Basin Diadromous Fish Passage Restoration Plan (Plan) (FWS 2001) and the Santee River Basin Accord (Accord) (SRBA 2008) focus on restoring habitat connectivity for diadromous fish that were historically present within the basin. Target species include American eel (*Anguilla rostrata*), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), hickory shad (*Alosa mediocris*), Atlantic sturgeon, and shortnose sturgeon. Objectives of the restoration plan include (1) increasing upstream passage for target fish species, (2) increasing downstream passage for target fish species, (3) restoring and maintaining adequate instream flows for fish migrations, (4) restoring and maintaining water-quality conditions, and (5) conserving, preserving, and restoring important habitats that support life-history strategies for migratory fish populations (FWS 2001).

Within the Santee-Cooper basin (Basin), the Plan identified the Broad River sub-basin as a high priority for restoration due to the amount of potential habitat available as well as the quality of

existing habitat. There is currently no evidence that the Plan's targeted diadromous fish species reside within the vicinity of the VCSNS, but there are documented historical accounts that these fish migrated to the upper reaches of the Broad River. Future restoration efforts may result in the reestablishment of migratory fish populations upstream of the Parr Shoals Dam.

In response to the Plan, hydroelectric utilities and State and Federal entities have enacted the Accord, which outlines a systematic plan for enhancing and restoring passage at specific dams within the Basin. Several dams along the Broad River are slated for fish passage restoration if biological criteria are met for selected diadromous fish species at downstream monitored locations (SRBA 2008).

With respect to future populations of migratory fish that may become established in the Broad River, impacts stemming from impingement and entrainment associated with VCSNS operations are unlikely because the existing VCSNS Unit 1 intake structure is currently located in Monticello Reservoir and the proposed VCSNS Units 2 and 3 combined intake structure would also be located in Monticello Reservoir. The operation of the multiport diffuser for blowdown effluent from VCSNS Units 2 and 3 would likely exclude access of aquatic biota in the immediate vicinity of the diffuser located in the eastern nearshore area of Parr Reservoir. In addition, many aquatic species are motile and would likely move to adjacent habitat and would not be affected by operational activities. Chemical concentrations in the blowdown effluent would be regulated by a National Pollutant Discharge Elimination System (NPDES) permit (SCE&G 2010b). The discharge of blowdown effluent may result in thermal impacts, but impacts on populations of aquatic biota would likely be minimal.

Cumulative impacts on aquatic resources within Monticello and Parr reservoirs may also include activities or events that are distinct from the VCSNS site. Water quality may be affected by discharges from other plants or facilities that maintain hydrologic connectivity to the Monticello and Parr reservoirs, such as treated wastewater discharge that enters Parr Reservoir through Cannons Creek with the current discharge point approximately 8 mi to the west of the VCSNS site. The Newberry County Water & Sewer Authority (NCW&SA) Broad River Wastewater-Treatment Plant (WWTP) had an active NPDES permit (SC0048020) for discharge of 0.05 million gallons per day (Mgd) to Cannons Creek. This discharge ultimately flowed into Parr Reservoir until cessation of permitted discharge in January of 2008 (EPA 2009a). Currently, the NCW&SA Cannons Creek WWTP has a current NPDES permit (SC0048313) with a discharge of 0.95 Mgd to Cannons Creek (EPA 2009b). Discharge from this operating WWTP is monitored for compliance with NPDES permitting regulations to ensure water-quality metrics do not exceed allowable levels. Given that current discharges do not exceed allowable levels, operation of the NCW&SA Cannons Creek WWTP has minor impacts on aquatic biota. The Blair Quarry, approximately 10 mi north of the VCSNS site in the vicinity of Neal Shoals Dam, has an active permit for granite mining. The Blair Quarry operates under a NPDES permit for minor industrial effluent to Rocky Creek, which feeds into the Broad River (SCDHEC 2007). Cumulative impacts on aquatic biota, including diadromous fish from these sources, are considered minor due to NPDES compliance and minimal effluent discharge.

Five hydropower facilities upstream of VCSNS on the Broad River are not expected to result in cumulative effects on water use because these facilities are run-of-river dams. However, due to the absence of fish passage facilities, these dams prohibit upstream migration of aquatic biota.

Planned diadromous fish restoration activities in the Broad River basin may improve fish passage in the future, which would result in minimal cumulative impacts.

Parr Shoals Dam is located approximately 1 mi downstream from the proposed discharge location (multiport diffuser) for VCSNS Units 2 and 3. The Parr Hydroelectric Plant at the Parr Shoals Dam generates up to 15 megawatts (MW) through operation of six turbine units (SCE&G 2010b). A minimum daily average flow of 800 cubic feet per second (cfs) results in the transport of aquatic biota within the influence of the turbine intake systems downriver below Parr Shoals. The operation of the hydroelectric plant influences aquatic communities within Parr Reservoir by preventing any organisms that pass through the hydropower facility from returning upstream of the facility. Future restoration efforts may result in the reestablishment of migratory fish populations upstream of the Parr Shoals Dam.

The operation of the Fairfield Pumped Storage Facility (FPSF), which can produce over 511 MW of electricity, results in a daily average fluctuation of 4 ft of water elevation in Parr Reservoir as water is pumped from the Parr Reservoir into Monticello Reservoir and then flows back to Parr Reservoir through the hydroelectric turbines (NRC 2004). The intake withdrawal rate from Monticello Reservoir for operation of VCSNS Units 2 and 3 composes a very small fraction of the FPSF pumping rate and would have little to no impact on water use. The combined VCSNS Units 2 and 3 intake rates are approximately 83 (normal) and 138 (max) cfs from Monticello Reservoir (SCE&G 2010b). Toblin (2007) estimates the hourly pumping rate at FPSF to be 19,255 cfs during power generation. Comparison of the VCSNS Units 2 and 3 intake rates (e.g., 83 and 138 cfs) to the FPSF pumping rate of 19,255 cfs shows that VCSNS Units 2 and 3 operations represent less than 1 percent of the flow of the FPSF during pumping operations from Parr Reservoir. It is therefore anticipated that operation of VCSNS Units 2 and 3 would not result in significant cumulative impacts with the current operation of the FPSF.

The cumulative impact of existing water uses on aquatic biota in Parr Reservoir, Monticello Reservoir, and the Broad River during drought conditions has also been considered. The Federal Energy Regulatory Commission (FERC) license for operation of the Parr Shoals Dam requires "...the flow shall be maintained at 1,000 cfs or at the average daily natural inflow into Parr Reservoir...during the striped bass spawning season in March, April, and May in order to protect the fishery of the Broad River" (SCE&G 2010b). The FERC license further states that minimum flow below the dam will be 800 cfs for the remainder of the year. During low-flow conditions in the Broad River, Monticello Reservoir can supply a total of 45,000 ac-ft of usable storage for cooling water for VCSNS Units 1 through 3. If drought conditions in the Broad River persist and the storage water from Monticello Reservoir is used before hydrologic conditions are restored, "...SCE&G would curtail or cease operation of VCSNS until water is available" (SCE&G 2010b). Due to the combination of FERC licensing conditions at the Parr Shoals Dam and the usable volume of water storage in Monticello Reservoir, cumulative impacts on aquatic biota, including diadromous fish, during drought conditions are expected to be minor.

Cumulative impacts on future populations of diadromous fish from operation of VCSNS Units 1 through 3 stemming from impingement, entrainment, and effluent discharge are expected to be minimal. Furthermore, potential impacts stemming from effluent discharge of other facilities in the vicinity of the VCSNS site are anticipated to be minimal as a result of NPDES compliance. FERC regulation of the Parr Shoals Dam during low-flow conditions is also anticipated to

minimize impacts on aquatic biota during drought conditions. Operation of FPSF may affect future diadromous fish populations. While the five hydropower facilities upstream of the VCSNS site prevent upstream access to aquatic habitats, future restoration at these facilities as well as the installation of fish passage facilities at the Parr Shoals Dam may increase habitat connectivity for anadromous fish in the Broad River. With the exception of the FPSF, the cumulative impacts from these past, present, and reasonably foreseeable actions are expected to have minor impacts and may result in potentially favorable conditions for diadromous fish. Impacts on future populations of diadromous fish from operation of FPSF are difficult to predict and when combined with other past, present, and reasonably foreseeable future impacts may or may not result in a noticeable cumulative impact due to the uncertainty involved in the success of habitat restoration and reestablishment by targeted species.

6.0 Conclusions

The potential impacts of proposed transmission-line routing activities for VCSNS Units 2 and 3 on Atlantic and shortnose sturgeon have been evaluated. The known distributions and records of the species and the potential ecological impacts of the construction and operation of VCSNS Units 2 and 3 and associated transmission lines and corridors on the species and its habitat have been considered in this supplement to the BA.

Based on this review, there is little potential for interaction between known habitat associations of Atlantic and shortnose sturgeon and transmission-line upgrades and maintenance proposed for VCSNS Units 2 and 3. While restoration efforts may result in the potential for future interaction between these anadromous species and plant operations, operational conditions, including thermal and chemical blowdown conditions which are regulated via State and Federal agencies, would impose small impacts on aquatic biota. Through implementation of appropriate State and Federal BMPs during transmission corridor preparation, tower placement, and corridor maintenance to protect water quality, the review team concludes that the overall effects of the construction and operation of the proposed new units at the VCSNS site and associated transmission lines and corridors would not be likely to adversely affect or jeopardize the continued existence of the Atlantic and shortnose sturgeon in Calhoun, Colleton, Dorchester, Hampton, Lexington, Orangeburg, or Richland Counties of South Carolina.

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