SOUTH CAROLINA ELECTRIC & GAS COMPANY

COLUMBIA, SC

SALUDA HYDROELECTRIC PROJECT

FERC NO 516

EVALUATION OF USAGE OF THE LOWER SALUDA RIVER BY INMIGRATING JUVENILE AMERICAN EELS

2007 FINAL SUMMARY REPORT

JANUARY 2008

Prepared by:

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TABLE OF CONTENTS

LIST OF PHOTOS

LIST OF APPENDICES

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1.0 INTRODUCTION

The American eel is the only catadromous fish species in North America. While specific information regarding the spawning of American eel is limited, it has been documented that spawning grounds are located in the Sargasso Sea of the Atlantic Ocean. Due to their highly migratory behavior, eels utilize a variety of habitat types to complete their life cycle. Necessary habitat types include both open ocean and large coastal tributaries, as well as small freshwater streams, lakes and ponds. The life cycle of the American eel consist of several distinct stages which include larval, glass eel (elvers), yellow eel (immature adult) and silver eel (sexually mature) stages. The majority of an eel's life is spent in freshwater systems. Generally, environmental cues such as water chemistry, photoperiod, lunar phase, air temperature and water temperature potentially trigger upstream migration (Walsh et al. 1983, Parker and McCleave 1997, and Wippelhauser and McCleave 1988). The American eel is known to occur throughout much of the Santee-Cooper River Basin of South Carolina. Within the basin, American eel have been documented in portions of the Catawba, Broad, Pacolet, Tyger, Enoree, and Saluda rivers (USFWS et al. 2001).

Over the past two decades, American eel populations have declined along the east coast primarily from extensive overharvesting, degradation of habitat, pollution and/or migration barriers. As a result of these declines, the American eel is among the species identified by the National Marine Fisheries Service (NMFS), South Carolina Department of Natural Resources (SCDNR), and the U.S. Fish and Wildlife Service (USFWS) as a target species in the "Santee Cooper Basin Diadromous Fish Passage Restoration Plan" (USFWS at al. 2001), which was submitted and accepted by the FERC as a Comprehensive Plan under Section 10 (a)(2)(a) of the Federal Power Act. In response to comments and study requests provided by the USFWS,

NMFS, and SCDNR during initial stages of the Saluda Hydro Relicensing Project, SCE&G conducted sampling in the lower Saluda River (LSR). The overall study objective was to determine the presence/absence of inmigrating juvenile American eels (Anguilla rostrata) in the LSR downstream of the Saluda Hydro Project.

2.0 METHODOLOGY

Experimental eel sampling ramps were deployed at the USGS gage (# 02168504) located on the LSR's mainstem downstream of the Saluda Hydro Project Dam (Photo 1 and 2) and at the Saluda Hydro Project Spillway (Photo 3 and 4). The experimental eel ramps sampled continuously at the spillway and USGS location from September of 2006 through the end of October 2007. To ensure that no American eel were harmed, the two experimental eel ramps were checked weekly (two days per week) throughout the study period.

Eel ramps were constructed of corrugated plastic pipe. To provide an attraction flow and to protect ascending eels from desiccation, a continuous flow was provided using a pump at the USGS location and a gravity feed flow at the spillway location. Ramps were anchored such that the downstream end remained submerged under normal low flow conditions (approximately 450 cfs). The upstream opening extended above normal high water and was outfitted with a secured holding chamber of sufficient design to minimize predation or other mortality of captured animals (Kleinschmidt 2006).

Photo 1: Experimental Eel Ramp Located at the Tailrace of the Saluda Hydro Project

Photo 2: Experimental Eel Ramp Located at the Tailrace of the Saluda Hydro Project

Photo 3: Experimental Eel Ramp Located at the Spillway of the Saluda Hydro Project

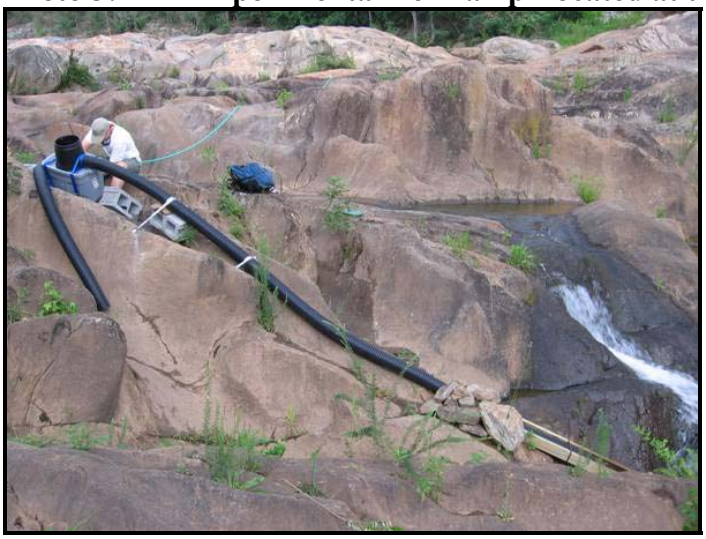

Photo 4: Experimental Eel Ramp Located at the Spillway of the Saluda Hydro Project

3.0 RESULTS

The experimental eel ramps were fished continuously from September 2006 through the end of October 2007 with an approximate total of 10,176 sampling hours. No American eel were caught during the year long study period in the LSR.

4.0 DISCUSSION

No American eel were captured in the experimental eel ramps from September 2006 through October 2007. The results of this study were consistent with the American eel surveys conducted on the LSR in 2005 and 2006 (Kleinschmidt 2005 & 2006). The 2005 and 2006 survey sampled five locations along the LSR by using eel pots, and no American eels were captured.

Existing fishery data indicate that American eels in the LSR may be uncommon or rare. American eels are occasionally captured along the LSR during standardized sampling performed by SCE&G and SCDNR. Hal Beard of SCDNR indicated that during his 2005 fall sampling period he collected a total of three eels while electrofishing at ten sites along the LSR (H. Beard, SCDNR, Pers. Comm., as in Kleinschmidt 2005). Similarly, Steve Summer of SCANA Services, Inc., noted that he captured one eel during standardized electrofishing conducted during April of 2005 (S. Summer, SCANA Services, Inc., Pers. Comm., as in Kleinschmidt 2005). This information coupled with the results of our sampling to date suggests that the distribution of eels in the LSR may be fairly low.

Low abundance of American eel in the LSR may be in part due to water temperature preferences. Studies have shown that upstream migration of yellow-phase eels usually occurs during spring when water temperatures range between 10-16˚C (Solomon and Beach 2004). Spring (March, April, May) water temperatures for the LSR averaged approximately 11˚C during 2007 (Walsh et al. 1983). Although this coincides with the range of preferred water temperatures for migrating eels, the water temperature of the LSR typically is lower than that of the Congaree and Broad rivers due to release of hypolimnetic waters through the Saluda Hydro Dam. As such, inmigrating eels may chose the warmer waters of the Broad River over the LSR.

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APPENDIX A

STUDY PLAN: EVALUATION OF USAGE OF THE LOWER SALUDA RIVER BY INMIGRATING JUVENILE AMERICAN EEL (*ANGUILLA ROSTRATA*)

SALUDA HYDROELECTRIC PROJECT (FERC NO. 516)

STUDY PLAN: EVALUATION OF USAGE OF THE LOWER SALUDA RIVER BY INMIGRATING JUVENILE AMERICAN EELS (*ANGUILLA ROSTRATA*)

Diadromous Fish Technical Working Committee
May 23, 2006

I. Study Objective

To determine presence/absence of inmigrating juvenile American eels (*Anguila rostrata*) in the Lower Saluda River (LSR) downstream of the Saluda Hydroelectric Project.

II. Geographic and Temporal Scope

Sampling for juvenile eels (elvers) will focus on the LSR immediately downstream of the Saluda Hydroelectric Project (from the project spillway upstream to the Saluda Dam).

Sampling is slated to begin in May 2006, or as soon as experimental eel sampling ramps can be installed (see Section III for additional detail), and will continue through October 2007.

III. Methodology

Experimental eel sampling ramps will be deployed at Saluda Project spillway (Figure 1) and at the USGS gage located on the LSR's mainstem downstream of the Saluda Project Dam (# 02168504; Figure 2). Eel ramps will be constructed of corrugated plastic pipe (4' to 10' diameter) or similar materials; a continuous flow will be provided using a pump or gravity feed to provide an attraction flow and to protect ascending eels from desiccation. Ramps will be anchored such that the downstream end remains submerged under normal low flow conditions (approximately 450 ft^3/second). The upstream opening will extend above normal high water and will be outfitted with a secured holding chamber of sufficient design to minimize predation or other mortality of captured animals. Captured eel will be counted, photo-documented, and measured, if size allows.

Figure 1: Potential Eel Ramp Location: Saluda Spillway

Figure 2: Potential Eel Ramp Location – USGS Gage Below Saluda Dam (# 02168504)

IV. Schedule and Required Conditions

Sampling will begin in May 2006, or as soon as experimental eel sampling ramps can be installed, and will continue through October 2007. Diadromous Fish TWC members will be notified via e-mail in the event that juvenile eels are captured, and an e-mail update will be issued monthly thereafter. A final report summarizing the study findings will be issued upon completion of the study period. All data collected will be provided in electronic format to agencies and interested stakeholders. Study methodology, timing, and duration may be adjusted based on consultation with the resource agencies and interested stakeholders.

V. Use of Study Results

Study results will be used as an information resource during discussion of relicensing issues with the SCDNR, USFWS, NOAA – Fisheries (National Marine Fisheries Service), Fish & Wildlife RCG, Diadromous Fish TWC, and other relicensing stakeholders.

VI. Study Participants

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