

**AMERICAN EEL (*ANGUILLA ROSTRATA*)
ABUNDANCE
STUDY PLAN**

**PARR HYDROELECTRIC PROJECT
(FERC No. 1894)**

Prepared for:

**South Carolina Electric & Gas Company
Cayce, South Carolina**

Prepared by:

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Lexington, South Carolina
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September 2014

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1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) is the Licensee of the Parr Hydroelectric Project (FERC No. 1894) (Project). The Project consists of the Parr Hydro Development and the Fairfield Pumped Storage Development. The developments are located along the Broad River in Fairfield and Newberry Counties, South Carolina.

The Project is currently involved in a relicensing process which involves cooperation and collaboration between SCE&G, as licensee, and a variety of stakeholders including state and federal resource agencies, state and local government, non-governmental organizations (NGO), and interested individuals. Collaboration and cooperation is essential for the identification of and treatment of operational, economic, and environmental issues associated with a new operating license for the Project. SCE&G has established several Technical Working Committees (TWC's) with members from among the interested stakeholders with the objective of achieving consensus regarding the identification and proper treatment of these issues in the context of a new license.

The Fisheries TWC has requested that American eel (*Anguilla rostrata*) studies be performed in 2015 to document the relative abundance of this species in the Broad River, directly downstream of the Parr Shoals Dam.

2.0 RELEVANT LIFE HISTORY INFORMATION

The American eel, *Anguilla rostrata*, is a catadromous species known to occur within river systems in South Carolina. Mature American eels spawn in the ocean and the egg and pre-larval stages mature into the leptocephalus stage, where they drift with ocean currents for approximately a year before metamorphosing into the glass eel stage. Glass eels migrate across the continental shelf, eventually entering estuaries and tidal rivers, where they mature into elvers.

Elvers migrate primarily at night and are able to overcome obstacles that often times prevent passage of other aquatic species. Vertical obstacles, such as a dam, can be traversed by small eels as long as the surface of the structure is textured and remains wet. As the small eels continue to mature into yellow eels, they may gradually move upstream over many years, with the greatest movement occurring during the moderate water temperatures of spring and fall (ASMFC 2000). Upstream migrations of small eels in the southeast appear to increase as water temperatures reach 15°C and continue until water temperatures reach approximately 22 °C (USFWS 2014 and Haro 1991).

Although the American eel currently does not have special status under state or federal regulations, it has been identified by the South Carolina Department of Natural Resources (SCDNR) as a priority species (SCDNR 2005). The federal status of this species is currently under review by the U.S. Fish and Wildlife Service(USFWS) and has been reviewed by the USFWS and National Marine Fisheries Service (NMFS) several times over the past decade.

3.0 STUDY OBJECTIVE

The objective of this study is to document the relative abundance, size, and movement patterns of the American eel in the Broad River in the immediate area downstream of Parr Dam through the use of elver traps, elver fyke net, and electrofishing methods.

4.0 GEOGRAPHIC SCOPE

The study will focus on the Broad River immediately downstream of Parr Shoals Dam. Three to five elver traps of standard design will be positioned at two sites along the base of the dam located near the west bank and one site on the east bank of the Broad River, directly downstream of the powerhouse. Site selection was based on dam leakage, current flow, and safety for access and sampling. One elver trap will be placed in each area at the start of sampling and two additional traps (for a total of 5 traps) may be added to these areas during the sampling period based on the collection or observations of elvers (in the traps or during electrofishing) in those areas. An elver fyke net will be positioned in the west channel that drains a large portion of the leakage from the Parr Dam. Backpack electrofishing efforts will be performed in the pools and channel areas on the west side of the river and directly downstream of the dam with a focus on areas near each of the elver traps (Figure 1).



FIGURE 1. PARR PROJECT AMERICAN EEL – ELVER TRAP AND FYKE NET LOCATIONS

5.0 METHODOLOGY AND TEMPORAL SCOPE

Passive collection methods for elvers will consist of a metal ramp lined with landscape fabric climbing substrate (Enkamat or Akwadrain), an attraction flow, and a covered collection bucket with aeration or flow-through water supply. Ramp attraction flow will be provided by either gravity fed or pumped water supply (Figure 2). Elver traps in areas 2 and 3 will be fitted with double ramps that will sample in opposite directions to increase the chances of elvers using the ramp. The area 1 trap will only be fitted with a single ramp. An elver fyke net will also be used to collect eels moving upstream through the west channel area (Figure 3). We have identified an area of laminar flow, level bottom, and depths of approximately 2 to 3 feet that will be ideal for use of a fyke net. Spare equipment will be kept on hand in order to replace damaged or lost traps and nets to reduce “down time” and safely complete the study following subsidence of spill events.

American eel studies performed by the SCDNR on the Broad River, below the Columbia Diversion Dam, have indicated that the greatest frequency of catch occurs during April - June. However, a review of temperature data at the Parr Dam indicates water temperatures of 15°C could occur as early as the beginning of March. Therefore elver ramp traps will be deployed at the end of February 2015 and will be monitored beginning on March 2, 2015 and ending on June 15, 2015. Monitoring will also be performed in the fall during October 5 to November 15, 2015 (Figure 4). Monitoring during the spring period will occur once a week until water temperature reaches 15°C, then traps will be monitored three times a week (Monday, Wednesday, and Friday) until temperatures reach 22°C, and then spring monitoring will be discontinued. The elver traps will be placed back in position on October 5th and monitoring of the traps will occur three times per week until November 15 or until the water temperature drops below 15°C, and monitoring will be discontinued for the year. Trap entrances and attraction flows will be checked and repositioned as needed during each trap check event.



FIGURE 2. EXAMPLE OF A PORTABLE ELVER RAMP TRAP USED AT THE DOMINION PROJECT TAILRACE.



FIGURE 3. EXAMPLE OF AN ELVER FINE MESH FYKE NET PRODUCED BY FILMAR, INC.

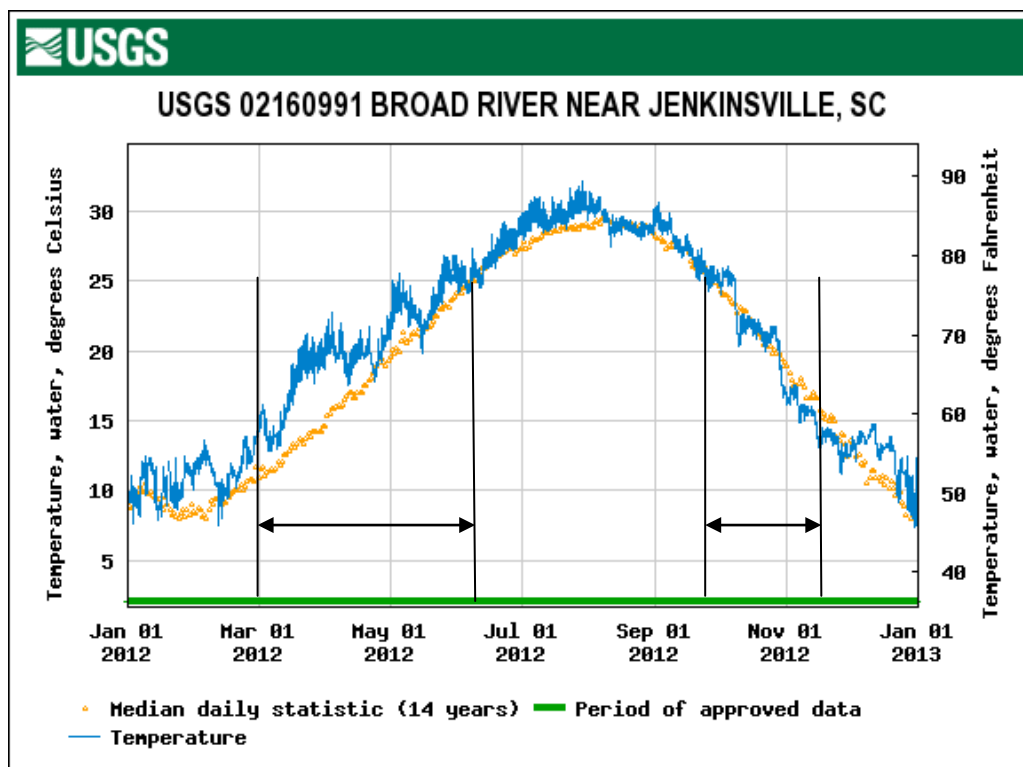


FIGURE 4. BROAD RIVER WATER TEMPERATURE AT PARR DAM – MEDIAN OVER 14 YEARS AND FOR 2012

Backpack electrofishing will be conducted once in late March, April, and May, 2015 and one sample in October during the fall period. Since American eels can be difficult to catch by electrofishing methods, one person will operate the backpack shocker and two additional people

will assist in collecting eels during the effort. Backpack shocking will be conducted in the pools and runs located in the west channel side of the dam with a focus on areas close to the traps.

All eels collected will be measured, checked for visual implant elastomer (VIE) tags, recorded, and released to the Broad River upstream of Parr Dam. If the color of the VIE tag cannot be positively determined (especially pink or orange) the eels will be kept and preserved for dissection and color determination.

6.0 PRODUCTS

A final report summarizing the study findings will be issued within 120 days of completion of field work in 2015. Study methodology, timing and duration may be adjusted based on consultation with resource agencies and interested stakeholders.

7.0 USE OF STUDY RESULTS

Study results will be used as an information resource during discussion of relicensing issues and developing potential Protection, Mitigation and Enhancement measures with the South Carolina Department of Natural Resources, USFWS, Fisheries TWC, and other relicensing stakeholders.

8.0 REFERENCES

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