Saluda Hydro Project (FERC No. 516)

Study Plan: 2007 Diadromous Fish Studies
American Shad Telemetry Study for the Lower Saluda, Congaree and Broad Rivers

Diadromous Fish Technical Working Committee
Final – January 23, 2007

I. Study Objective

The objective of this study will be to characterize the movements of migrating American shad (*Alosa sapidissima*) in the Lower Saluda (LSR), Congaree, and Broad Rivers for purposes of determining:

- usage of the lower Saluda River (LSR) downstream of Saluda Hydro dam;
- potential usage of the Columbia Hydro tailrace;
- potential usage of the Columbia fish passage facility on the Broad River; and
- migration upstream of the Columbia Hydro Project to the base of Parr Hydro.

II. Basis

Enhancement and restoration of anadromous Alosids to South Carolina waters has become an important objective of resource agencies. Each spring, efforts to pass migrating American shad and blueback herring are undertaken at the first barriers to migration in the Santee-Cooper system. Once passed, these fish have several migration pathways from which to choose. One potential pathway could result in these fish entering the LSR near Columbia. The relative abundance and potential spawning of this segment of the population is of particular interest to managers.

Another pathway would result in fish entering the Broad River, also located near Columbia. Recently, South Carolina Electric and Gas (SCE&G) installed a fish passage facility at the Columbia Hydro diversion dam. The fish passage facility was constructed to allow target fish species, such as American shad and blueback herring, to migrate upstream over the diversion dam to reach spawning grounds. The success of passing diadromous species through the Columbia fish passage facility is of importance to resource agencies and interested stakeholders.

During the relicensing process of Columbia Hydro, resource agencies expressed interest in the potential for American shad to utilize the tailwaters of the project. Agencies were concerned that during times of high power generation, American shad may be influenced and be attracted to the tailrace as opposed to migrating up the bypass reach towards the fish way. Further, the agencies indicated that if significant numbers of Alosids utilize the Columbia tailrace then reductions in project operations may be necessary to re-direct shad in the tailrace to the bypass reach.

III. Geographic and Temporal Scope

The telemetry study will focus on the Congaree River near the downstream extent of the Congaree National Park, upstream of Highway 601 Bridge; the LSR from downstream of the Saluda Hydro Dam to its confluence with the Broad River; and the Broad River from the Parr Shoals Dam to its confluence with the LSR.

The study will be conducted during Spring 2007, when American shad would be expected to undertake their upstream spawning migrations. Study timing will be based on passage numbers at the St Stephens Fish Ladder located downstream at the Santee Cooper Project (FERC Project No. 299). Duration of the study may be adjusted based on battery life of transmitters, mortality of target species and/or consultation with resource agencies and interested stakeholders. It is anticipated the study will last through August 2007.

IV. Methodology

Tagging

Approximately 40 - 50 American shad will be collected from the Congaree River in the vicinity of the Highway 601 Bridge during the 2007 inmigrating spawning season. Both male and female will be captured depending on availability. To facilitate collections, the SCDNR will notify Kleinschmidt Associates and/or SCE&G when significant numbers of Alosids begin to move through St. Stephens Fish Lift at Pinopolis Dam. Collections will be by standard boat electrofishing methods, and captured fish will be dip netted and placed in a live well. Each captured fish will be measured (mm) and a VemcoV-9 coded acoustic transmitter will be inserted through the esophagus into the upper alimentary canal via a slender wooden probe (Olney et al. 2006). Each transmitter will be coated with glycerin to reduce abrasion of the esophagus (Beasley et al. 2000). Dry weight of acoustic transmitters will not exceed 2% of fish wet weight. Tagged American shad will be placed in a holding pen for a short observation period to ensure recovery and then released.

Monitoring

The SCNDR has installed an array of receivers in the lower Saluda and Congaree Rivers. To expand the current SCDNR study and conduct the scope of this study, additional receivers will be installed at locations in the Broad River and below the Columbia Hydro Powerhouse. Acoustic equipment for this study will include Vemco V-9 coded acoustic transmitters (69 kHz) and Vemco VR2 ultrasonic receivers (Vemco, Shad Bay, Nova Scotia). The transmitters will relay an acoustic ping to the Vemco receiver(s), which will be programmed to record the transmitter code, time of passage, depth, and location of each shad. Data will be downloaded from receivers on a bi-monthly basis.

Locational data will be recorded from an array of Vemco receivers deployed (or will be deployed prior to tagging) at the following locations (Attachment A):

- Congaree River near Highway 601 Bridge;
- Congaree River at the upstream extent of the Congaree National Park;
- Congaree River near Carolina Eastman;
- Congaree River in the vicinity of the Rosewood Boat Landing;
- LSR below Lake Murray Dam;
- LSR near Corley Mill Island;
- LSR adjacent to the Radio Towers;
- LSR adjacent to Riverbanks Zoo;
- Broad River in the vicinity of Columbia Hydro tailrace;
- Broad River below the diversion dam;
- Broad River in the vicinity of Harbison State Park; and
- Broad River below Parr Shoals Dam.

Data Retrieval

Data will be retrieved from the receivers on a bi-monthly basis by SCDNR, SCE&G or Kleinschmidt personnel. Data retrieved from the receivers will be given a unique file name which includes receiver location and date.

V. Schedule and Required Conditions

Sampling for American shad in the lower Saluda, Broad, and Congaree Rivers will be conducted during spring 2007 when significant number of American shad reaches the St. Stephens fish lift at Pinopolis Dam. A draft report summarizing the results will be issued in October 2007. The report will contain information on spatial and temporal movements of tagged fish and contain any appropriate maps or GIS information.

VI. Use of Study Results

Results of the telemetry study will be used as an information resource during discussion of relicensing issues with the SCDNR, NMFS, USFWS, relicensing issue working groups, and other relicensing stakeholders.

VI. Study Participants

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VII. List of Attachments

ATTACHMENT A: Map of receiver monitoring stations on the lower Saluda, Broad, and Congaree rivers.

VIII. List of References

Beasley, C. A. and J. E. Hightower. 2000. Effects of a Low-Head Dam on the Distribution and Characteristics of Spawning Habitat Used by Striped Bass and American Shad. Transactions of the American Fisheries Society 129:1316-1330.

Olney, J.E., R.J. Latour, B.E. Watkins, and D.G. Clarke. 2006. Migratory Behavior of American Shad (*Alosa sapidissima*) in the York River, Virginia with Implications for Estimating in-River Exploitation from Tag-Recovery Data. Transactions of the American Fisheries Society 135:889-896.

VEMCO. 2004. Coded Acoustic Tag Technical Information Website. Available: http://www.vemco.com/products/transmitters/index.php. Accessed: December 21, 2006.

ATTACHMENT A

MAP OF RECEIVER MONITORING STATIONS ON THE LOWER SALUDA, BROAD, AND CONGAREE RIVERS

Attachment A: **Receiver Monitoring Stations on the Lower Saluda, Broad, and Congaree Rivers**