SOUTH CAROLINA ELECTRIC & GAS COMPANY

COLUMBIA, SOUTH CAROLINA

SALUDA HYDROELECTRIC PROJECT

SALUDA RIVER AND UPPER CONGAREE RIVER DIADROMOUS FISH SAMPLING

2006 SUMMARY REPORT

OCTOBER 2006

Prepared by:

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EXECUTIVE SUMMARY

A survey of the fish population of the lower Saluda River below Lake Murray Dam and the Congaree River near the Rosewood Boat Ramp was conducted by South Carolina Cooperative Fish and Wildlife Research Unit staff in the spring of 2006 between February 9 and June 27. Fish were collected using 50 – foot by 6 – foot sinking gill nets of 2 – and 5 – inch stretch mesh. Nets were generally fished twice weekly during the month of February through June. A single net of each mesh size was fished at each of four locations. Nets were fished an average of 1 hour during daylight hours for a total sampling effort of 156 net sets for a total of 156 net hours. A total of 85 fish representing 14 species was collected for an average catch per unit effort of 0.54 fish per net hour. No American shad, hickory shad, blueback herring, shortnose sturgeon or American eel, and one striped bass were collected.

An attempt was made to collect ichthyoplankton using a 0.5 m plankton net fitted with 0.505 mm mesh. The net was deployed midway between the surface and the bottom at each station for 3 minutes during daylight hours while gillnets were fished. A total of 132 net sets representing 9,350 m^3 of filtered water produced only two spotted sucker larvae. Nets routinely clogged with filamentous algae and particulate organic matter.

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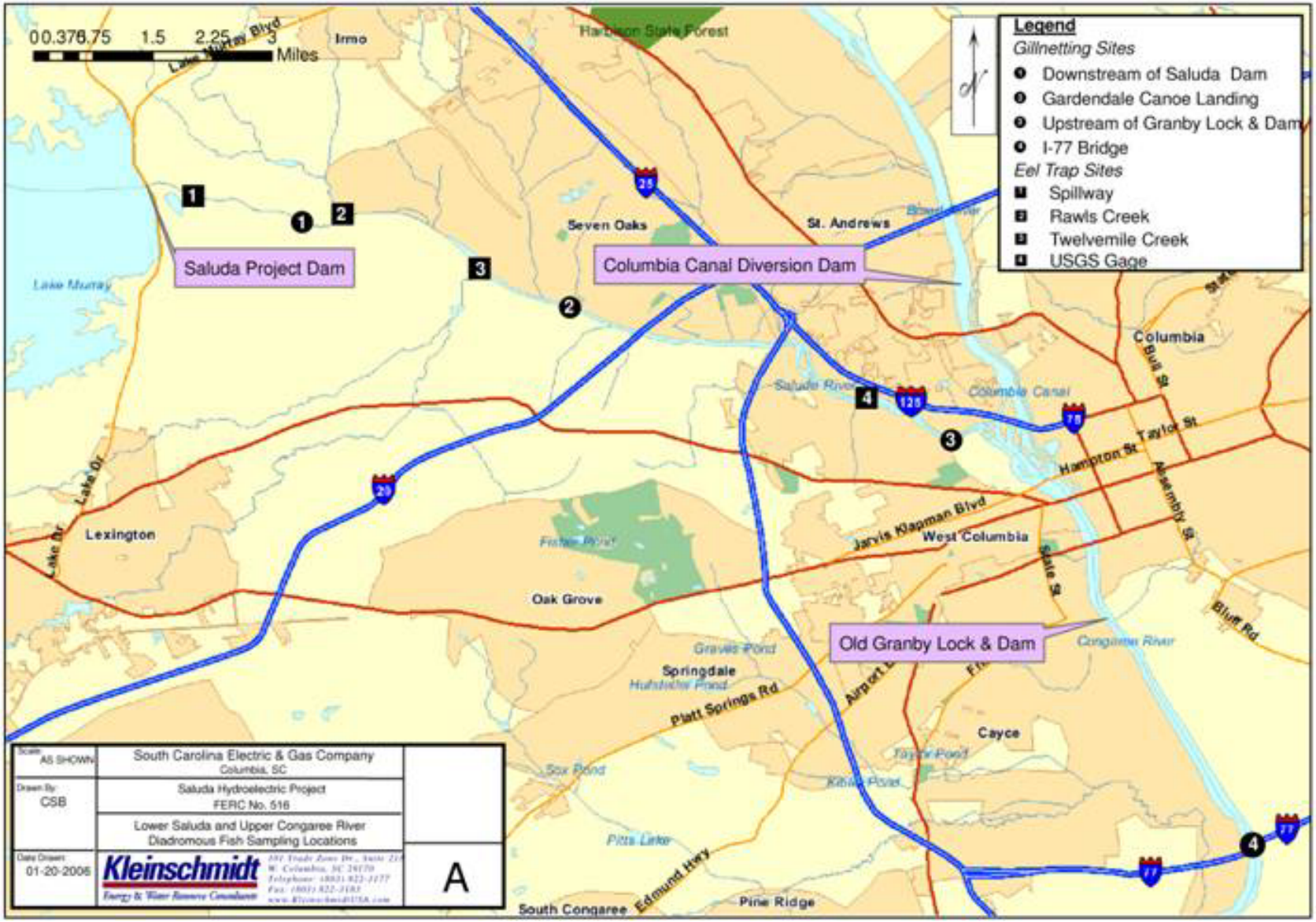
1.0 INTRODUCTION

Restoration of anadromous clupeids to South Carolina waters has become an important objective of resource agencies. Each spring, efforts to pass migrating American shad, hickory 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 such pathway results in these fish entering the lower Saluda River near Columbia. The relative abundance and potential spawning of this segment of the population is of particular interest to managers. The objective of this study is to determine the relative abundance of adult American shad, hickory shad and blueback herring during the spring migratory period, and to document spawning by these species in the lower Saluda River relative to the Congaree River.

Figure 1: Diadromous Fish Sampling Locations



2.0 METHODS

A survey of the fish population of the lower Saluda River below Lake Murray Dam and the Congaree River near the Rosewood Boat Ramp was conducted by South Carolina Cooperative Fish and Wildlife Research Unit staff in the spring of 2006 between February 9 and June 27. Fish were collected using 50 – foot by 6 – foot sinking gill nets of 2 – and 5 – inch stretch mesh. Nets were fished weekly during the month of February and twice per week for the remainder of the study. A single net of each mesh size was fished at each of four locations; the 2 – inch mesh net was always fished upstream of the 5 – inch mesh net. Nets were deployed from shore to near the midpoint of the river perpendicular to the current. Nets were fished an average of 1 hour during daylight hours.

Sampling locations included sections of the Saluda River adjacent to Saluda Shoals Park, Radio Tower Fish Camp, Riverbanks Zoo, and a section of the Congaree River adjacent to Rosewood Boat ramp (Figure 1). All samples were collected from 10 to 200 m below natural shoal habitat in pool or run habitat. All fish were identified to species, measured (mm TL) and returned alive in the field.

Ichthyoplankton was sampled using a 0.5 m plankton net fitted with 0.505 mm mesh. The net was deployed from the boat midway between the surface and the bottom at each station for 3 minutes during daylight hours while gillnets were fished. After large debris was removed, samples were preserved in 90% ethanol and returned to the laboratory for processing. Larvae were removed, identified to the lowest taxon and stored in 90% ethanol.

Monthly attempts to collect American and hickory shad and blueback herring were also made using standard boat electrofishing. Electrofishing was conducted for approximately 30 minutes of pedal time at each location when water levels permitted. In addition, a sample was collected near the end of the sampling period on the Congaree River below highway 601 in attempt to verify that failure to collect American shad, hickory shad and blueback herring within the study area was not the result of sampling bias.

3.0 RESULTS

Gill nets were fished an average of 1 hour per set during daylight hours for a total sampling effort of 156 net sets for a total of 156 net hours. A total of 85 fish representing 14 species was collected for an average catch per unit effort of 0.54 fish per net hour. No American shad, hickory shad, blueback herring, shortnose sturgeon or American eel, and one striped bass were collected. Catches were dominated by stream-resident species (Table 1). Spotted sucker accounted for 36% of fish collected. Spotted sucker, largemouth bass, and gizzard shad accounted for 52% of fish collected.

A total of 132 net sets representing 9,350 m^3 of filtered water produced only two fish larva. Two spotted sucker were collected on 4 May 2006. A total of 24 ichthyoplankton samples were not collected. Ichthyoplankton samples were not collected prior to March 15.

Monthly electrofishing failed to produce American shad, hickory shad, or blueback herring in the study area; however, a single electrofishing sample collected on the Congaree River below highway 601 produced greater than 200 American shad and greater than 50 blueback herring.

Table 1: Numbers by Location of Fish Caught in 2" and 5" Gillnets Combined in the Saluda and Congaree Rivers in Spring 2005

SPECIES	LOCATION				
	SALUDA SHOALS	RADIO TOWER	ZOO	ROSEWOOD	TOTAL
spotted sucker	4	6	18	3	31
gizzard shad	0	0	0	7	7
quillback	0	0	0	4	4
chain pickerel	6	9	0	0	15
rainbow trout	4	0	0	0	4
threadfin shad	0	0	1	0	1
northern hog sucker	1	0	0	0	1
striped bass	0	0	0	1	1
largemouth bass	0	1	5	0	6
carp	0	0	3	1	4
channel catfish	0	0	1	6	7
redbreast sunfish	2	0	0	0	2
yellow perch	1	0	0	0	1
striped jumprock	0	0	1	0	1
brassy jumprock	0	0	0	1	1
TOTAL	**18**	**16**	**29**	**23**	**86**

4.0 DISCUSSION

Although total catch and catch per unit effort in gill net samples was relatively low, species diversity was high. No species are conspicuously absent. However, American shad, hickory shad and blueback herring are know to migrate past the Rosewood Boat Ramp site and were expected in those samples. The lack of American shad, hickory shad and blueback herring in the Congaree River samples, however; is not totally unexpected. River velocities combined with the high amount of debris in this section made sampling problematic for this gear. In many cases, the gear did not remain stationary during the sampling period. Nets often drifted down stream or the outer or upper end was swept until the net was repositioned parallel to the current. Also, the necessary shortness of the net, and deployment with one end attached to the shore resulted in a net that did not effectively sample to the thalweg. As American shad, hickory shad and blueback herring are know to migrate in the deepest portion of the river channel during daylight hours, the relatively shallow net placement may account for the lack of the species in Congaree River samples. This was not the case; however, with lower Saluda River samples. Nets effectively sampled at least 50% of the river channel during most sampling events. As with nets set in the Congaree River, fouling of nets by debris and vegetation resulted in a rapid reduction in net efficiency, even over the relatively short 1 hour set time. As gizzard shad are similar in body configuration and habitat preference, the lack of American shad, hickory shad and blueback herring in samples containing gizzard shad suggests that American shad, hickory shad and blueback herring are either absent or in such low densities as to result in a low probability of capture. Similarly, shortnose sturgeon are readily caught in gill nets. The absence of shortnose sturgeon from samples suggests that the species is absent or rare in the lower Saluda River.

Although gill net sampling is routinely used to collect American shad, hickory shad, blueback herring and shortnose sturgeon, the method is primarily employed in low-gradient or low-velocity rivers during periods of slack or low flow. The efficiency of gill nets deployed in fast-flowing water is substantially reduced. First, the net itself disrupts the flow, resulting in turbulence that makes the net readily detectable, and therefore; avoidable. Second, the continuous fouling of the net by debris increases this effect. Although not ideal, few other options are available.

As American shad, hickory shad and blueback herring can be collected by electrofishing, attempts were made monthly to collect fish using this technique. No American shad, hickory shad and blueback herring were observed or collected using this technique in the study area. However, near the end of the study, we deployed our system in an area where American shad, hickory shad and blueback herring had previously been observed. Within minutes, we were able to capture large number of both American shad and blueback herring.

One other factor could have significantly affected the migration of American shad, hickory shad and blueback herring into the study area in 2006. During the study period, flows and water levels were low within the study area. It is likely that the reduced flows resulted in behavioral effects on migratory species and reduced the number of fish approaching the study area. Results of this study suggest that American shad, hickory shad and blueback herring failed to migrate into the lower Saluda River or migrated in relatively low numbers during the spawning season of 2006. The lack of larval fish in samples suggests the lower Saluda River is not a primary spawning site for any species with semi-pelagic larvae.

APPENDIX A

DAILY GILLNET CATCH DATA AND MONTHLY ELECTROFISHING DATA BY DATE AND LOCATION FOR SALUDA RIVER SAMPLES IN SPRING 2006

DAILY GILLNET CATCH DATA

DATE	LOCATION	2" SPECIES	TL (mm)	5" SPECIES	TL (mm)	ICHTHYO SPECIES	NUMBER	COMMENTS
02/09/06	Congaree							
02/09/06	Radio Tower	chain pickerel	360	spotted sucker	430			
02/09/06	Radio Tower	chain pickerel	310					
02/09/06	Radio Tower	chain pickerel	420					
02/09/06	Radio Tower	chain pickerel	260					
02/09/06	Radio Tower	chain pickerel	400					
02/09/06	Radio Tower	chain pickerel	400					
02/09/06	Saluda Shoals	rainbow trout	270					
02/09/06	Zoo							
02/12/06	Congaree							
02/12/06	Radio Tower							
02/12/06	Saluda Shoals							
02/12/06	Zoo							
02/15/06	Congaree							
02/15/06	Radio Tower							
02/15/06	Saluda Shoals							
02/15/06	Zoo							
02/21/06	Congaree							
02/21/06	Radio Tower	chain pickerel	230					
02/21/06	Radio Tower	chain pickerel	230					
02/21/06	Saluda Shoals	rainbow trout	230	spotted sucker	440			
02/21/06	Saluda Shoals	rainbow trout	240					
02/21/06	Saluda Shoals	rainbow trout	270					
02/21/06	Zoo							
02/26/06	Congaree			spotted sucker	485			
02/26/06	Radio Tower	chain pickerel	300					
02/26/06	Saluda Shoals			spotted sucker	470			
02/26/06	Zoo							
03/05/06	Congaree							
03/05/06	Radio Tower							
03/05/06	Saluda Shoals							
03/05/06	Zoo							
03/06/06	Congaree							
03/06/06	Radio Tower							
03/06/06	Saluda Shoals							
03/06/06	Zoo			spotted sucker	430			
03/12/06	Congaree							
03/12/06	Radio Tower							
03/12/06	Saluda Shoals							
03/12/06	Zoo							
03/13/06	Congaree							
03/13/06	Radio Tower							
03/13/06	Saluda Shoals							
03/13/06	Zoo			carp	560			
03/13/06	Zoo			spotted sucker	428			
03/13/06	Zoo			spotted sucker	420			
03/18/06	Congaree			channel catfish	400			

DAILY GILLNET CATCH DATA

DATE	LOCATION	2" SPECIES	TL (mm)	5" SPECIES	TL (mm)	ICHTHYO SPECIES	NUMBER	COMMENTS
03/18/06	Radio Tower							
03/18/06	Saluda Shoals							
03/18/06	Zoo			largemouth bass	410			
03/18/06	Zoo	spotted sucker	320	spotted sucker	400			
03/18/06	Zoo			spotted sucker	420			
03/19/06	Congaree							
03/19/06	Radio Tower							
03/19/06	Saluda Shoals	chain pickerel	320					
03/19/06	Zoo							
03/25/06	Congaree			carp	620			
03/25/06	Radio Tower							
03/25/06	Saluda Shoals							
03/25/06	Zoo			largemouth bass	420			
03/26/06	Congaree							
03/26/06	Radio Tower			spotted sucker	470			
03/26/06	Radio Tower			spotted sucker	460			
03/26/06	Saluda Shoals	chain pickerel	310					
03/26/06	Zoo			spotted sucker	440			
03/26/06	Zoo			spotted sucker	430			
04/02/06	Congaree							
04/02/06	Radio Tower							
04/02/06	Saluda Shoals							
04/02/06	Zoo	striped jumprock	221					
04/03/06	Congaree							
04/03/06	Radio Tower			largemouth bass	440			
04/03/06	Saluda Shoals							
04/03/06	Zoo							
04/09/06	Congaree			quillback	450			
04/09/06	Radio Tower			spotted sucker	420			
04/09/06	Saluda Shoals	chain pickerel	260					
04/09/06	Zoo			spotted sucker	420			
04/10/06	Congaree	brassy jumprock	270	spotted sucker	470			
04/10/06	Radio Tower							
04/10/06	Saluda Shoals							
04/10/06	Zoo			spotted sucker	410			
04/10/06	Zoo			spotted sucker	430			
04/17/06	Congaree			quillback	370			
04/17/06	Congaree			quillback	360			
04/17/06	Radio Tower							
04/17/06	Saluda Shoals							
04/17/06	Zoo			largemouth bass	410			
04/18/06	Congaree	channel catfish	220	channel catfish	640			
04/18/06	Congaree	channel catfish	220					
04/18/06	Radio Tower			spotted sucker	420			
04/18/06	Saluda Shoals	chain pickerel	270					
04/18/06	Zoo			spotted sucker	470			
04/18/06	Zoo			spotted sucker	490			
04/25/06	Congaree							

DAILY GILLNET CATCH DATA

DATE	LOCATION	2" SPECIES	TL (mm)	5" SPECIES	TL (mm)	ICHTHYO SPECIES	NUMBER	COMMENTS
04/25/06	Radio Tower			spotted sucker	330			
04/25/06	Saluda Shoals							
04/25/06	Zoo			largemouth bass	360			
04/26/06	Congaree			quillback	350			
04/26/06	Radio Tower			spotted sucker	370			
04/26/06	Radio Tower							
04/26/06	Saluda Shoals			spotted sucker	400			
04/26/06	Zoo			spotted sucker	430			
04/26/06	Zoo			spotted sucker	410			
05/04/06	Congaree							
05/04/06	Radio Tower	.						locked out
05/04/06	Saluda Shoals							
05/04/06	Zoo	threadfin shad	10			spotted sucker	2	
05/05/06	Congaree							
05/05/06	Radio Tower	.						locked out
05/05/06	Saluda Shoals							
05/05/06	Zoo			channel catfish	400			
05/08/06	Congaree							
05/08/06	Radio Tower	.						locked out
05/08/06	Saluda Shoals							
05/08/06	Zoo			spotted sucker	400			
05/09/06	Congaree							
05/09/06	Radio Tower	.						locked out
05/09/06	Saluda Shoals			chain pickerel	420			
05/09/06	Zoo							
05/16/06	Congaree			channel catfish	730			
05/16/06	Radio Tower							
05/16/06	Saluda Shoals	redbreast sunfish	160					
05/16/06	Zoo			spotted sucker	390			
05/17/06	Congaree							
05/17/06	Radio Tower							
05/17/06	Saluda Shoals	chain pickerel	240	spotted sucker	410			
05/17/06	Zoo			largemouth bass	380			
05/22/06	Congaree			gizzard shad	230			
05/22/06	Congaree			striped bass	370			
05/22/06	Radio Tower							
05/22/06	Saluda Shoals							
05/22/06	Zoo							
05/23/06	Congaree			gizzard shad	280			
05/23/06	Congaree			gizzard shad	290			
05/23/06	Congaree			gizzard shad	280			
05/23/06	Congaree			gizzard shad	300			
05/23/06	Congaree			gizzard shad	270			
05/23/06	Congaree			gizzard shad	270			
05/23/06	Radio Tower							
05/23/06	Saluda Shoals							
05/23/06	Zoo							

DAILY GILLNET CATCH DATA

DATE	LOCATION	2" SPECIES	TL (mm)	5" SPECIES	TL (mm)	ICHTHYO SPECIES	NUMBER	COMMENTS
05/30/06	Congaree							
05/30/06	Radio Tower							
05/30/06	Saluda Shoals	northern hog sucker	250					
05/30/06	Zoo							
05/31/06	Congaree							
05/31/06	Radio Tower							
05/31/06	Saluda Shoals							
05/31/06	Zoo			carp	440			
05/31/06	Zoo			spotted sucker	400			
06/05/06	Congaree							
06/05/06	Radio Tower							
06/05/06	Saluda Shoals							
06/05/06	Zoo							
06/06/06	Congaree							
06/06/06	Radio Tower							
06/06/06	Saluda Shoals							
06/06/06	Zoo							
06/13/06	Congaree							
06/13/06	Radio Tower							
06/13/06	Saluda Shoals							
06/13/06	Zoo							
06/14/06	Congaree	channel catfish	170	spotted sucker	460			
06/14/06	Radio Tower							
06/14/06	Saluda Shoals							
06/14/06	Zoo							
06/19/06	Congaree							
06/19/06	Radio Tower							
06/19/06	Saluda Shoals	redbreast sunfish	220					
06/19/06	Zoo			carp	480			
06/21/06	Congaree							
06/21/06	Radio Tower							
06/21/06	Saluda Shoals							
06/21/06	Zoo							
06/27/06	Congaree							
06/27/06	Radio Tower							
06/27/06	Saluda Shoals							
06/27/06	Zoo							

MONTHLY ELECTROFISHING DATA BY DATE AND LOCATION

DATE	LOCATION	NUMBER	
		AM. SHAD	BB HERRING
04/03/06	Saluda Shoals	0	0
04/03/06	Radio Tower	0	0
04/03/06	Zoo	0	0
04/03/06	Congaree below Rosewood	0	0
05/06/06	Saluda Shoals	0	0
05/06/06	Radio Tower	0	0
05/06/06	Zoo	0	0
05/06/06	Congaree below Rosewood	0	0
06/07/06	Saluda Shoals	0	0
06/07/06	Radio Tower	0	0
06/07/06	Zoo	0	0
06/07/06	Congaree below Rosewood	0	0
06/21/06	Saluda Shoals	0	0
06/21/06	Radio Tower	0	0
06/21/06	Zoo	0	0
06/21/06	Congaree below Rosewood	0	0
06/21/06	Congaree below HW 601	200	100