

Appendix A-4
Monticello Reservoir
Fisheries Habitat
Enhancement Plan

MONTICELLO RESERVOIR FISHERIES HABITAT ENHANCEMENT PLAN

PARR HYDROELECTRIC PROJECT

FERC No. 1894

Prepared for:

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

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtGroup.com

October 2017

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SOUTH CAROLINA ELECTRIC & GAS COMPANY

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SOUTH CAROLINA ELECTRIC & GAS COMPANY

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 Shoals Development and the Fairfield Pumped Storage Development. Both 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 between SCE&G, as licensee, and a variety of stakeholders including state and federal resource agencies, state and local government, non-governmental organizations (NGOs), and interested individuals. SCE&G established several Technical Working Committees (TWCs) comprised of interested stakeholders with the objective of identifying Project-related resource issues and impacts.

During issue scoping meetings, the Fisheries TWC identified the need for a Reservoir Fluctuation Study on the Parr and Monticello Reservoirs. The operating regime for the Project consists of a lowering and a refilling of the Project's two reservoirs on a daily basis. Monticello Reservoir is currently permitted to fluctuate up to 4.5 feet. However, the amount that the Project reservoirs fluctuate will vary dependent on load demands and system needs. The magnitude of daily fluctuations also varies seasonally in both impoundments, with the largest average daily fluctuations generally occurring in June, July, and August in both reservoirs (Table 1-1).

TABLE 1-1 MONTICELLO RESERVOIR MONTHLY AVERAGE ELEVATIONS: 2005-2013

MONTHLY AVERAGE RES. ELEV.			
	MAX	MIN	RANGE
Jan	423.92	422.32	1.60
Feb	423.93	422.45	1.49
Mar	423.82	422.18	1.66
Apr	424.08	421.88	2.22
May	424.42	421.64	2.80
June	424.74	421.42	3.33
Jul	424.69	421.38	3.29
Aug	424.71	421.31	3.40
Sep	424.53	421.45	3.06
Oct	424.02	421.83	2.18
Nov	423.61	422.00	1.61
Dec	423.86	422.28	1.58
AVERAGE	424.19	421.84	2.35

During February through April, when many fish species are spawning in shallow water habitat, average daily fluctuations range from 1.6-2.4 feet in Monticello Reservoir (TWC Meeting presentation 12-19-13). Resource agencies and stakeholders expressed concerns that these daily and seasonal fluctuations may be affecting aquatic habitat along the shorelines of the reservoirs and fish spawning and recruitment.

2.0 METHODS

This study report was developed as a result of the Monticello Reservoir Fluctuation Study to assess the effects of fluctuations on reservoir habitat. The bases for this study can be found in the following documents: Fisheries TWC Meeting notes from April 2014, September 2015, March 2016, and May 2016, the Revised Reservoir Fluctuation Study Plan, and the Parr and Monticello Reservoir Fluctuation Study. The April 2014 TWC meeting identified the study objectives relative to each reservoir. It was decided that Monticello would be assessed qualitatively to identify areas that could be candidates for habitat enhancement. The September 2015 meeting identified potential habitat enhancement areas and the types of enhancements that would be explored: spawning, nursery, and deep-water. The subsequent March 2016 meeting involved discussions of the findings of the Reservoir Fluctuation Study and refining of the habitat enhancements for Monticello Reservoir. The group further refined the types of structures that

could be used for each enhancement and the amount of enhancement that could be provided to an identified area. The final TWC meeting in May 2016 involved a site visit to Monticello Reservoir to confirm the potential enhancement sites and the exact location and amount of enhancements that could be installed at a given site.

3.0 RESULTS

The TWC proposed potential fish habitat enhancements to be placed throughout Monticello Reservoir to mitigate for reservoir fluctuation impacts on current shoreline areas. Habitat enhancement structures would be installed to enhance spawning, nursery, and deep-water habitats available within Monticello Reservoir. The habitat enhancement structures would serve two purposes within the reservoir. First, the structures could provide enhanced fish production within the reservoir. Second, they would concentrate fish as an enhancement for recreational fishermen (Wagner 2016). Maps of the proposed locations within Monticello Reservoir for fish habitat enhancement are included in Appendix A. Descriptions for each proposed enhancement and total PM&E installation costs are presented in the following sections.

3.1 SPAWNING HABITAT ENHANCEMENTS

The proposed spawning habitat enhancements could be made by the installation of “spawning bed” structures. These structures would consist of commercially available three-foot diameter plastic pools (of varying color based upon vendor) (Figure 3-1) filled with 3-4 inches (in.) of pea gravel/sand. While the commercially available plastic pools were used for purposes of estimating costs and materials, the TWC suggested that other more permanent spawning structure materials may be considered. There were eight spawning areas identified by the TWC and spawning beds could be installed in each area identified for spawning habitat enhancement. The structures would be constructed on a pontoon style work boat and lowered into place via a three-point attachment rope system and winch. The enhancement locations would be located in areas that are approximately 5 to 6 feet deep when the reservoir is at full pool, leaving the spawning beds 0.5 to 1.5 feet underwater at the lowest reservoir elevation.



FIGURE 3-1 **COMMERCIALY AVAILABLE 3-FOOT DIAMETER PLASTIC POOL**
(Color may vary based upon vendor selected.)

Timing of Installation

Due to TWC concerns over the resilience of the proposed spawning structures, these habitat enhancements will be installed and evaluated in a stepwise approach. The proposed number of spawning structures to be installed during the new license is 360. Based on TWC recommendations, SCE&G will install 15 spawning beds in each of the 8 coves identified for spawning habitat enhancement (Appendix A) within the first three years of the new license. The SCDNR may request to vary the spawning structure material, substrate material, and/or substrate depth to evaluate fish preferences. SCE&G and SCDNR will develop a matrix to test the effects of these variables. The installed spawning beds will be inspected by SCE&G (underwater camera observation) after two spawning seasons for condition and evidence of use by fish. SCE&G will report observations to SCDNR and consult on the installation of up to 240 (30 structures per 8 locations) additional spawning beds to be installed over the following two years.

3.2 NURSERY HABITAT ENHANCEMENTS

Nursery habitat enhancements could be made by the installation of Mossback Safe-Haven structures. The safe-haven structures are made up of three 50 inches tall PVC posts, 72 50 inches long composite limbs, a three-post base, and a three-hole shade top (Mossback 2016) (Figure 3-2). The nursery structures would be constructed on a pontoon style work boat, weighted with a concrete cinder block, and lowered into position via rope. The structures would be installed at a depth sufficient to leave approximately four feet of water above the top of the structure at the lowest reservoir elevation. Three safe-haven structures would be installed at each point marked

by the TWC for nursery habitat enhancement (Appendix A). A total 111 nursery structures would be installed based on TWC recommendations.



FIGURE 3-2 MOSSBACK SAFE-HAVEN KIT

During the Fisheries TWC meeting on September 1, 2016, the SCDNR stated that they would like to investigate periodic “shoreline tree felling” in various areas around the reservoir as an aquatic habitat enhancement. Shoreline trees (including hardwood, pine or cedar trees) would be felled into the lake and cabled to the shoreline to insure they do not become a navigation hazard. SCE&G agreed to coordinate with the SCDNR on their efforts to introduce this aquatic habitat during the new license.

Timing of Installation

Within the first five years of the new license, SCE&G will install three Mossback Safe-Haven (or equivalent) structures for nursery habitat enhancements at each location identified in the Appendix A for a total of 111 structures. These nursery habitat enhancements will require no additional monitoring after installation.

3.3 DEEP-WATER HABITAT ENHANCEMENT

Deep-water habitat enhancements would be made by the installation of Mossback Trophy Tree and Trophy Tree XL structures. As an alternative, structures constructed by SCE&G could be used in place of the Mossback structures (TWC meeting March 2016). The Mossback Trophy Tree structure is made up of three 50 in. tall PVC posts, 36 50 in. long composite limbs, a three-post base, and a three-hole shade top (Mossback 2016) (Figure 3-3). The Mossback Trophy Tree XL structure is approximately eight feet tall and made up of six 50 in. tall PVC posts, with 72 50 in. long composite limbs, a three-post base, and a three-hole shade top (Mossback 2016) (Figure 3-4). The deep-water structures would be constructed on a pontoon style work boat, weighted with a concrete cinder block, and lowered into position via rope. The structures would be installed at a depth sufficient to leave 10-15 feet of water above the top of the structure at the lowest reservoir elevation. The TWC recommended that 15 deep-water enhancement structures would be installed at each location marked for enhancement (Appendix A). The structures would be positioned in a five by three grid around the enhancement area. If Mossback structures are used, the four corners of the grid would be Trophy Tree XL units with the regular Trophy Trees making up the final 11 units within the enhancement area. Each of these areas would be marked with a floating buoy for reference.

Timing of Installation

Within the first five years of the new license, SCE&G will install deep-water habitat enhancements and buoy markers at 13 sites identified by the TWC and presented in Appendix A. Each of these enhancements will consist of 11 Mossback Trophy Tree (or equivalent) structures (143 total) and 4 Mossback Trophy Tree XL (or equivalent) structures (52 total) for a total of 195 structures. These deep-water habitat enhancements will require no additional monitoring after installation.



FIGURE 3-3 MOSSBACK TROPHY TREE KIT



FIGURE 3-4 MOSSBACK TROPHY TREE XL KIT

3.4 INSTALLATION COSTS

Habitat enhancement implementation costs were evaluated to include the costs to purchase the enhancement structure materials and estimated installation costs. Cost evaluations were made using several assumptions. Those assumptions include:

- One work day is 20 man-hours (two people working 10 hours);
- the labor rate used is \$50/hour;
- installation of spawning beds would be 15 units/day;
- nursery habitat structures would be installed at a rate of 10 units/day; and
- deep-water habitat structures would be installed at a rate of 10 units/day.

Costs were evaluated for each individual enhancement structure and then grouped by enhancement type. Total costs for each habitat enhancement type are presented in the sections below. All estimates are based on 2016 prices for materials and labor. More detailed tables and information is presented in Appendix B.

3.4.1 SPAWNING BED MATERIAL COSTS

The cost of the materials for an individual spawning bed are approximately \$16 for the plastic pool, \$10.50 for the pea gravel/sand, and \$2 for the rope. Using these assumptions, we used a value of \$28.50 for the materials for each spawning bed. Installation costs were based on the previous stated assumptions. Total estimated cost including materials and installation for 360 spawning structures is \$34,260 (Table 3-1). This estimate does not include the cost of alternate spawning bed materials or the spawning structure evaluation and consultation with the SCDNR during the license.

TABLE 3-1 SPAWNING HABITAT ENHANCEMENT COSTS

SPAWNING HABITAT ENHANCEMENT	
Structure Costs	\$10,260.00
Labor Costs	\$24,000.00
TOTAL COSTS	\$34,260.00

3.4.2 NURSERY HABITAT ENHANCEMENTS

The cost for materials for an individual Mossback Safe-Haven unit is \$209.99. This includes a discount for bulk orders. Installation costs were based on the previous stated assumptions. Total estimated cost for installation of 111 Safe-Haven structures is \$34,409.89 (Table 3-2).

TABLE 3-2 NURSERY HABITAT ENHANCEMENT COSTS

NURSERY HABITAT ENHANCEMENT	
Structure Costs	\$23,308.89
Labor Costs	\$11,100.00
TOTAL COSTS	\$34,408.89

3.4.3 DEEP-WATER HABITAT ENHANCEMENTS

The cost for materials for an individual Mossback Trophy Tree is \$179 and for an individual Trophy Tree XL is \$359. This includes a discount for bulk orders. Installation costs were based on the previous stated assumptions. Total estimated cost for materials and installation is \$66,365.00. We did not include the price option for SCE&G to construct deep-water structures from recycled materials, but installation costs should be similar. This includes installation of one buoy (\$200) per site. We did not include a cost for periodic replacement of the buoys during the new license.

TABLE 3-3 DEEP-WATER HABITAT ENHANCEMENT COSTS

NURSERY HABITAT ENHANCEMENT	
Structure Costs	\$46,865.00
Labor Costs	\$19,500.00
TOTAL COSTS	\$66,365.00

4.0 DISCUSSION

The TWC recommended aquatic habitat enhancements for Monticello Reservoir that should enhance fish production and recreational fishing on the reservoir. The total costs of implementing these habitat enhancements (based on 2016 costs) is approximately \$135,000 (Appendix B). These enhancements were proposed to offset the impacts of daily reservoir fluctuations and should create spawning and nursery habitat for juvenile fish that is not impacted by the maximum fluctuations. The placement of deep-water enhancements should also improve recreational fishing on the reservoir. Finally, implementation of this enhancement program should help to offset potential entrainment issues related to the operation of the Fairfield Development. Habitat structures have been located further up the lake away from the turbine intakes. Therefore, fish production and survival should be increased in the upper portions of the lake and these fish would be much less susceptible to entrainment by project operations.

5.0 PROTECTION MITIGATION AND ENHANCEMENT MEASURES

SCE&G proposes to provide these fish habitat enhancements on Monticello Reservoir as a Protection, Mitigation, and Enhancement (PME) measure for the renewal of the Parr Hydroelectric Project License.

Installation of both Nursery and Deepwater habitat enhancements are fairly straightforward.

- Within the first five years of the new license, SCE&G will install three Mossback Safe-Haven (or equivalent) structures for nursery habitat enhancements at each location identified in Appendix A of this report - for a total of 111 structures. These nursery habitat enhancements will not be monitored.
- Within the first five years of the new license, SCE&G will install deep-water habitat enhancements and buoy markers at 13 sites identified in Appendix A of this report. Each of these enhancements will consist of 11 Mossback Trophy Tree (or equivalent) structures (143 total) and 4 Mossback Trophy Tree XL (or equivalent) structures (52 total) for a total of 195 structures. These deep-water habitat enhancements will not be monitored.

Installation of the spawning structures will be performed in an adaptive management approach. TWC members expressed concern that the plastic pools might not be resilient or be used by target fish species. Therefore, SCE&G will install these habitat enhancements in a stepwise

approach. Within the first three years of the new license, SCE&G will install 15 spawning beds as described in this report in each of the 8 coves (120 structures total) identified for spawning habitat enhancement as depicted in Appendix A of this report. The SCDNR noted during TWC discussions that they may request an alternate spawning bed material and that a variety of spawning substrate materials (pea gravel/sand) of various sizes and/or depth of substrates within the spawning structure may be evaluated on these initial installations. SCE&G and SCDNR will consult to develop a test matrix to evaluate the effects of these and other variables on the preference of fish to use the structure for spawning. The installed spawning beds will be inspected by SCE&G (possibly by underwater camera) after two spawning seasons for the condition of the structure and evidence of use for fish spawning. SCE&G will report observations to SCDNR and consult on the installation of up to 240 (30 structures per 8 locations) additional spawning beds to be installed over the following two years after completion of consultation. All installed structures will be fitted with labels that include owner information. Signage will be installed at each public boat ramp informing the public that a habitat enhancement program is underway and not to disturb the structures if they encounter them.

6.0 REFERENCES

Kleinschmidt. 2013. *Baseline Fisheries Resources Report: Parr Hydroelectric Project*. Prepared for SCE&G by Kleinschmidt Associates, Lexington, SC. November 2013.

Kleinschmidt. 2016. *Parr and Monticello Reservoir Fluctuation Study*. Prepared for SCE&G by Kleinschmidt Associates, Lexington, SC. February 2016.

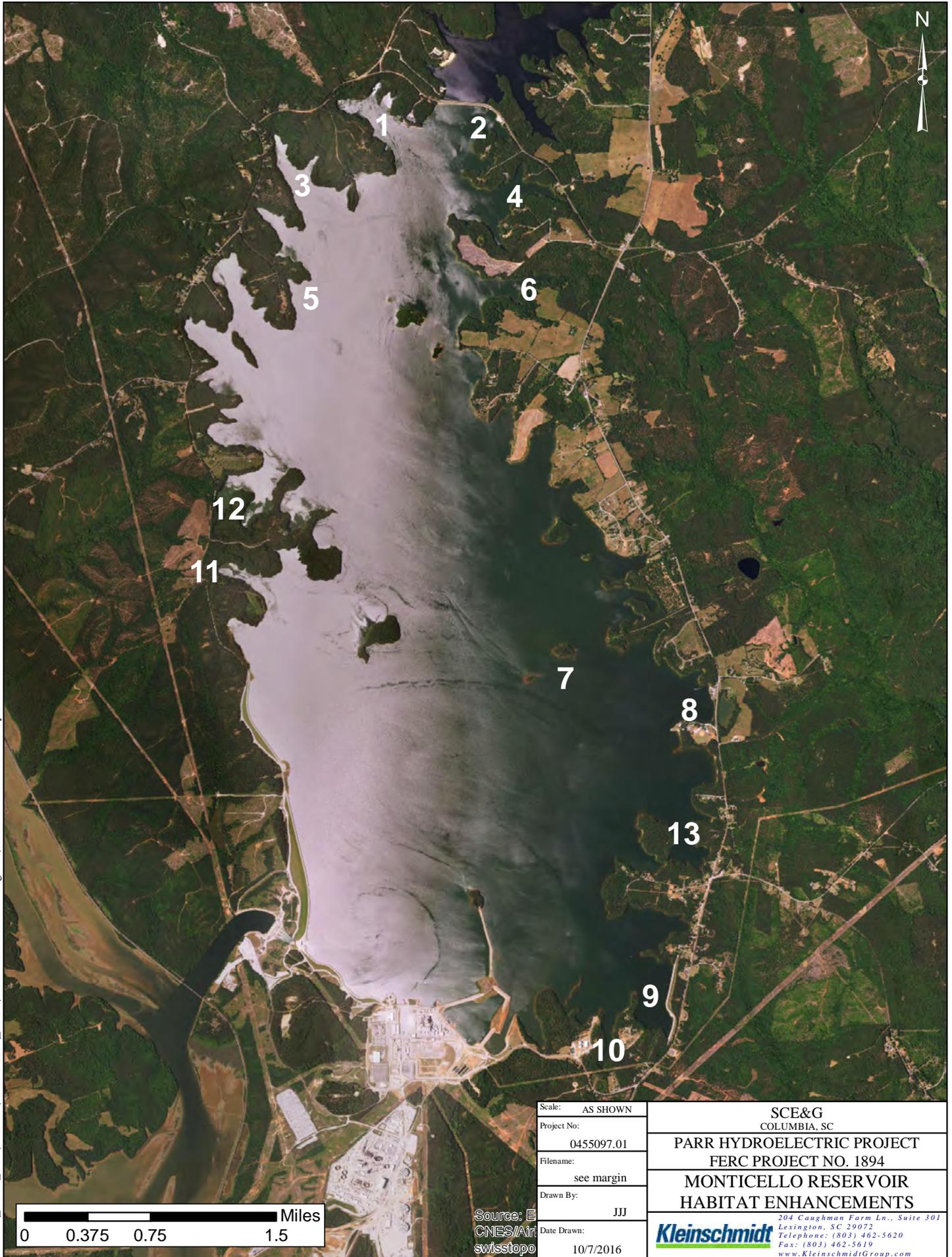
Mossback Fish Habitat. www.mossbackrack.com. Web. January 2016.

Wagner, Eric. "Review of Fish Habitat Improvement Methods for Freshwater Reservoirs." *Utah Division of Wildlife Resources*. N.p., n.d. Web. Apr. 2016.

APPENDIX A

MONTICELLO RESERVOIR FISH HABITAT ENHANCEMENT AREAS

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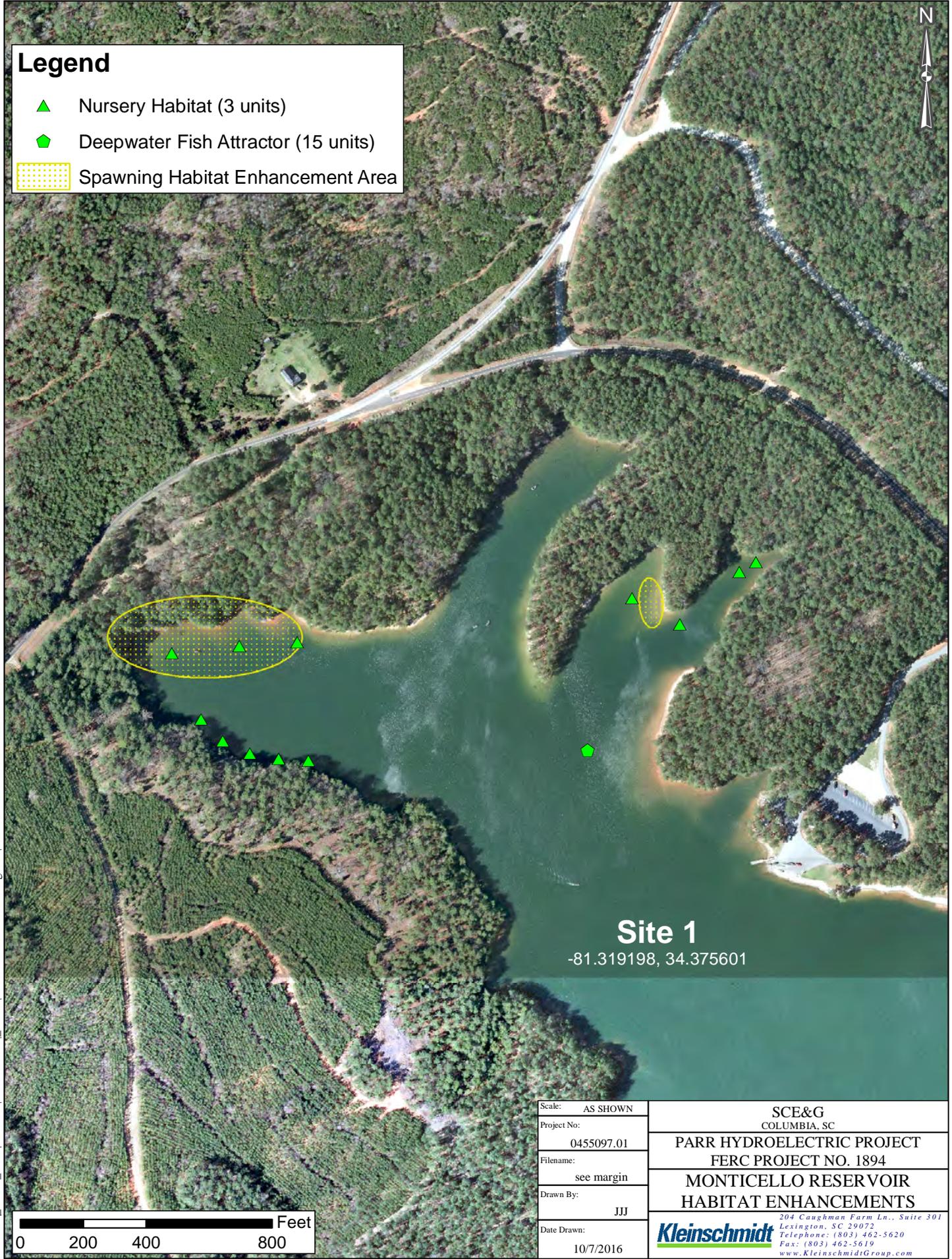


Source: Kleinschmidt, Orbis, SCE&G



Legend

-  Nursery Habitat (3 units)
-  Deepwater Fish Attractor (15 units)
-  Spawning Habitat Enhancement Area



Site 1
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Filename:	see margin	PARR HYDROELECTRIC PROJECT FERC PROJECT NO. 1894
Drawn By:	JJJ	MONTICELLO RESERVOIR HABITAT ENHANCEMENTS
Date Drawn:	10/7/2016	<i>204 Caughman Farm Ln., Suite 301 Lexington, SC 29072 Telephone: (803) 462-5620 Fax: (803) 462-5619 www.KleinschmidtGroup.com</i>



Legend

-  Nursery Habitat (3 units)
-  Deepwater Fish Attractor (15 units)
-  Spawning Habitat Enhancement Area

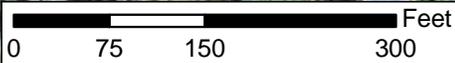
Deepwater enhancements will supplement existing fish attractor.



Site 2

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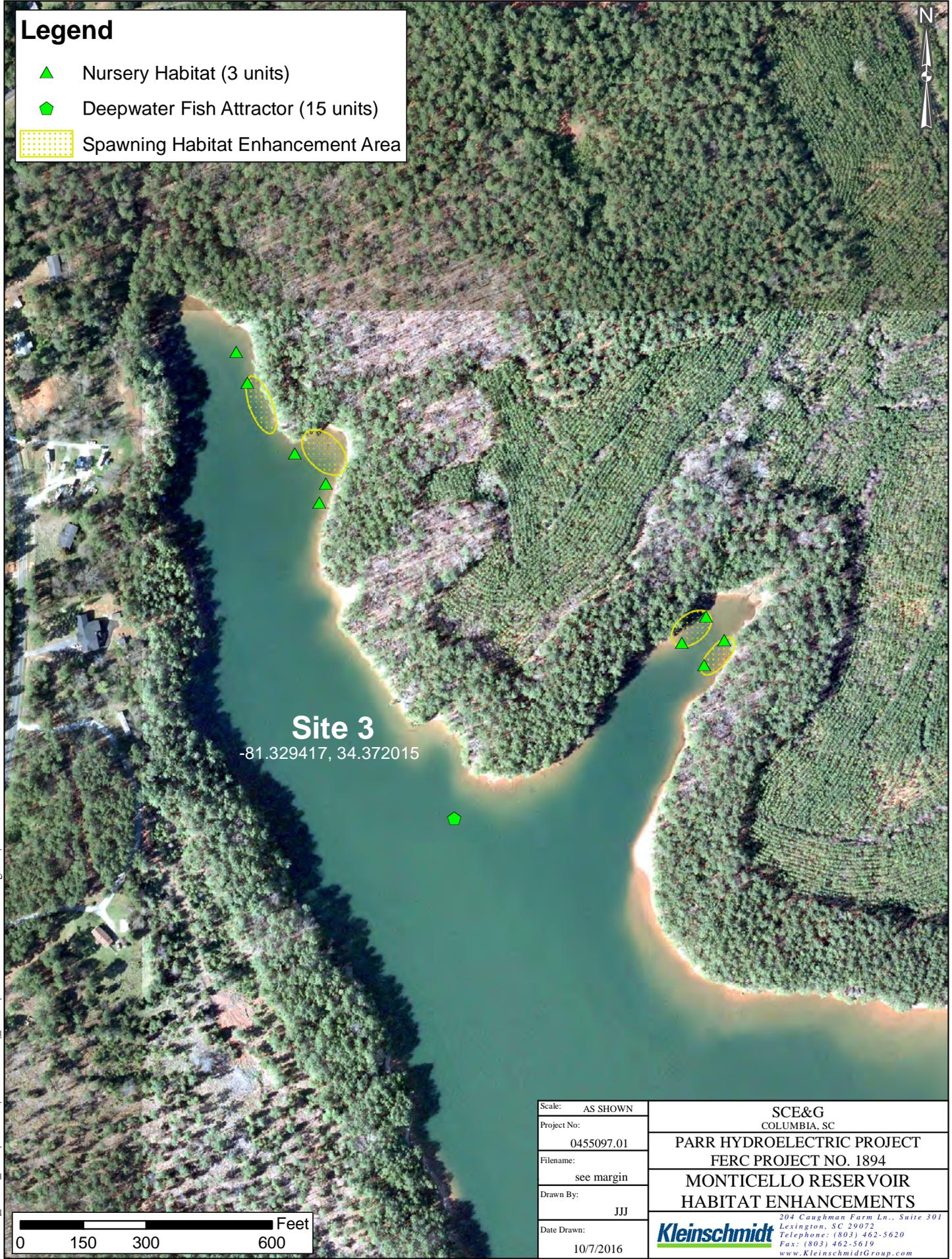


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Drawn By:	JJJ	MONTICELLO RESERVOIR HABITAT ENHANCEMENTS
Date Drawn:	10/7/2016	Kleinschmidt <small>204 Caughman Farm Ln., Suite 301 Lexington, SC 29072 Telephone: (803) 462-5620 Fax: (803) 462-5619 www.KleinschmidtGroup.com</small>



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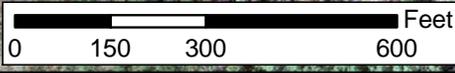
-  Nursery Habitat (3 units)
-  Deepwater Fish Attractor (15 units)
-  Spawning Habitat Enhancement Area



Site 3

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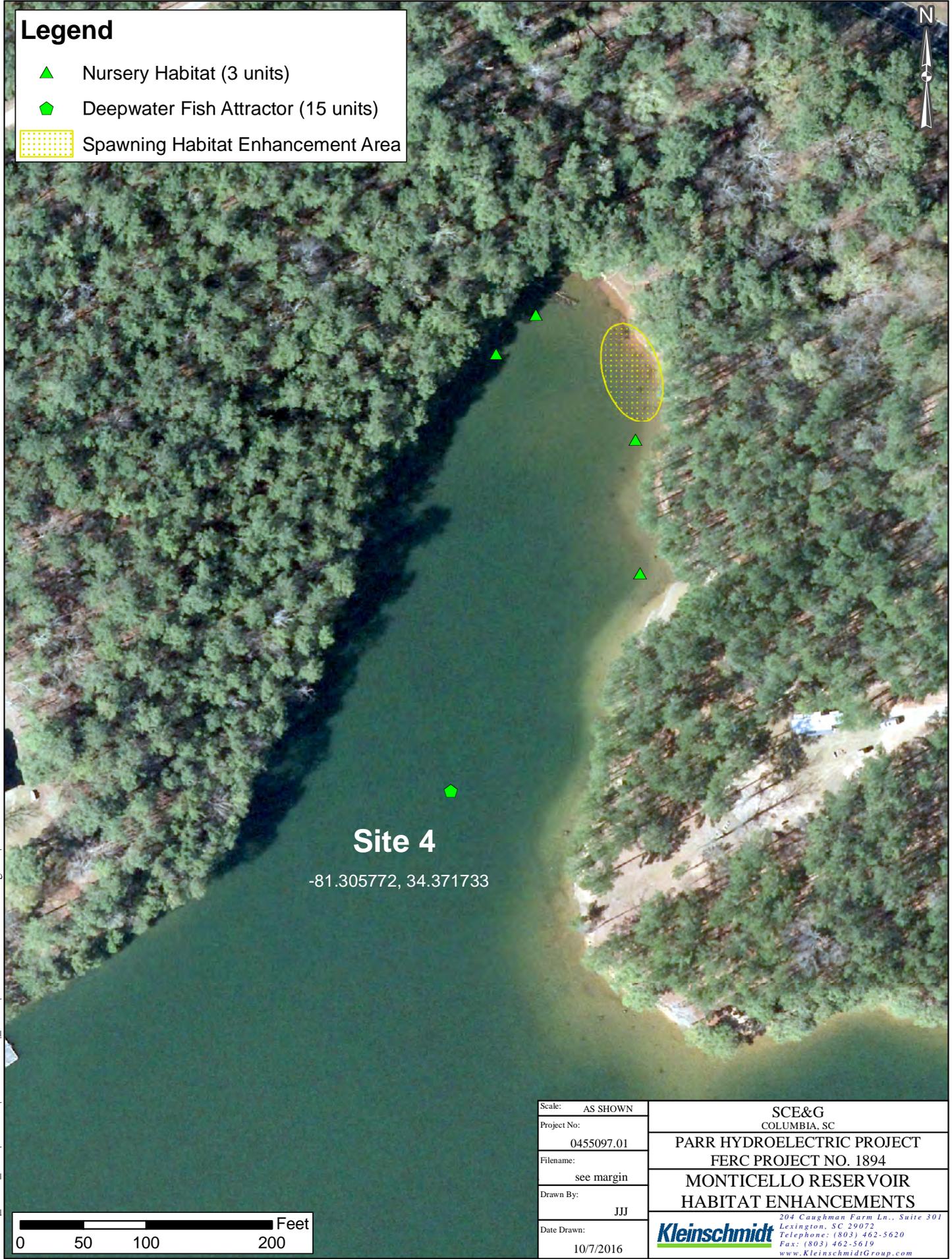


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Date Drawn:	10/7/2016	Kleinschmidt



Legend

-  Nursery Habitat (3 units)
-  Deepwater Fish Attractor (15 units)
-  Spawning Habitat Enhancement Area



Site 4

-81.305772, 34.371733

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Legend

-  Nursery Habitat (3 units)
-  Deepwater Fish Attractor (15 units)
-  Spawning Habitat Enhancement Area



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Site 5

-81.327358, 34.36236



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Legend

-  Nursery Habitat (3 units)
-  Deepwater Fish Attractor (15 units)
-  Spawning Habitat Enhancement Area



Site 6

-81.302466, 34.362986

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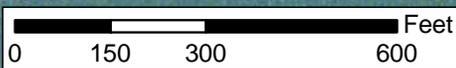
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-  Nursery Habitat (3 units)
-  Deepwater Fish Attractor (15 units)
-  Spawning Habitat Enhancement Area

Site 7

-81.299807, 34.329525

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Date Drawn:	10/7/2016	Kleinschmidt



Legend

- ▲ Nursery Habitat (3 units)
- ◆ Deepwater Fish Attractor (15 units)
- Spawning Habitat Enhancement Area

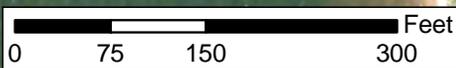
Deepwater enhancements will supplement existing fish attractor.

Site 8

-81.287834, 34.325097



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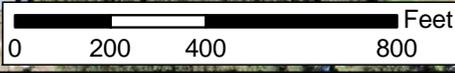
- ▲ Nursery Habitat (3 units)
- ◆ Deepwater Fish Attractor(15 units)
- Spawning Habitat Enhancement Area

Site 9

-81.291424, 34.299092



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Legend

- ▲ Nursery Habitat (3 units)
- ◆ Deepwater Fish Attractor (15 units)
- Spawning Habitat Enhancement Area



Site 9

Site 10

-81.29618, 34.297807

Path: G:_Client_Data\SCE&G\ParrFairfield_MXD\Reservoir Fluctuation Figures\Monticello Area 10 Enhancements.mxd



Scale:	AS SHOWN	SCE&G COLUMBIA, SC
Project No:	0455097.01	
Filename:	see margin	PARR HYDROELECTRIC PROJECT FERC PROJECT NO. 1894
Drawn By:	JJJ	MONTICELLO RESERVOIR HABITAT ENHANCEMENTS
Date Drawn:	10/7/2016	Kleinschmidt <small>204 Caughman Farm Ln., Suite 301 Lexington, SC 29072 Telephone: (803) 462-5620 Fax: (803) 462-5619 www.KleinschmidtGroup.com</small>

Legend

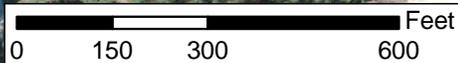
-  Nursery Habitat (3 units)
-  Deepwater Fish Attractor (15 units)
-  Spawning Habitat Enhancement Area



Site 11

-81.333266, 34.33655

Path: G:_Client_Data\SCE&G\ParrFairfield_MXD\Reservoir Fluctuation Figures\Monticello Area 11 Enhancements.mxd



Scale:	AS SHOWN	SCE&G COLUMBIA, SC
Project No:	0455097.01	
Filename:	see margin	PARR HYDROELECTRIC PROJECT FERC PROJECT NO. 1894
Drawn By:	JJJ	MONTICELLO RESERVOIR HABITAT ENHANCEMENTS
Date Drawn:	10/7/2016	<i>204 Caughman Farm Ln., Suite 301 Lexington, SC 29072 Telephone: (803) 462-5620 Fax: (803) 462-5619 www.KleinschmidtGroup.com</i>



Legend

-  Nursery Habitat (3 units)
-  Deepwater Fish Attractor (15 units)
-  Spawning Habitat Enhancement Area

Deepwater enhancements will supplement existing fish attractor.

Site 12

-81.333339, 34.344586

Path: G:_Client_Data\SCE&G\ParrFairfield_MXD\Reservoir Fluctuation Figures\Monticello Area 12 Enhancements.mxd



Scale:	AS SHOWN	SCE&G COLUMBIA, SC
Project No:	0455097.01	
Filename:	see margin	PARR HYDROELECTRIC PROJECT FERC PROJECT NO. 1894
Drawn By:	JJJ	MONTICELLO RESERVOIR HABITAT ENHANCEMENTS
Date Drawn:	10/7/2016	<i>204 Caughman Farm Ln., Suite 301 Lexington, SC 29072 Telephone: (803) 462-5620 Fax: (803) 462-5619 www.KleinschmidtGroup.com</i>



Legend

- ▲ Nursery Habitat (3 units)
- ◆ Deepwater Fish Attractor (15 units)
- Spawning Habitat Enhancement Area



Site 13

-81.28837, 34.313446



Path: G:_Client_Data\SCE&G\ParrFairfield_MXD\Reservoir Fluctuation Figures\Monticello Area 13 Enhancements.mxd



Scale:	AS SHOWN	SCE&G COLUMBIA, SC
Project No:	0455097.01	
Filename:	see margin	PARR HYDROELECTRIC PROJECT FERC PROJECT NO. 1894
Drawn By:	JJJ	MONTICELLO RESERVOIR HABITAT ENHANCEMENTS
Date Drawn:	10/7/2016	Kleinschmidt <small>204 Caughman Farm Ln., Suite 301 Lexington, SC 29072 Telephone: (803) 462-5620 Fax: (803) 462-5619 www.KleinschmidtGroup.com</small>

APPENDIX B

MONTICELLO RESERVOIR FISH HABITAT ESTIMATED ENHANCEMENT COSTS

Monticello Reservoir Fish Habitat Enhancements Costs for Materials and for Installation

June 30, 2016

Enhancement Structure	Enhancement Locations	Structures per Enhancement Area	Total Structures	Costs per Structure	Total Structure Costs
Spawning Bed	8	15	360	\$28.50	\$10,260.00
Safe Haven	37	3	111	\$209.99	\$23,308.89
Trophy Tree	13	11	143	\$179.00	\$25,597.00
Trophy Tree XL	13	4	52	\$359.00	\$18,668.00
Buoy Markers	13	1	13	\$200.00	\$2,600.00
Total					\$80,433.89

Note that these prices are valid for 2016 only and do not include a CPI for future costs.

Labor Costs	Hours/day	\$/hr	\$/day
Person 1	10	\$50	\$500
Person 2	10	\$50	\$500
Total	20	\$50	\$1,000

Installation Assumptions

Day = **20** man-hours
10 nursery structures/day
10 deep-water structures/day
15 spawning structures per day

Enhancement Type	Total Structure Costs	Install Speed (structure/day)	Install Days	Labor Costs (\$/day)	Total Labor Costs	Total PM&E Costs
Spawning Enhancement	\$10,260.00	15	24.0	\$1,000	\$24,000.00	\$34,260.00
Nursery Enhancement	\$23,308.89	10	11.1	\$1,000	\$11,100.00	\$34,408.89
Deep-water Enhancement	\$46,865.00	10	19.5	\$1,000	\$19,500.00	\$66,365.00
Total	\$80,433.89				\$54,600.00	\$135,033.89

Appendix A-5
American Eel Abundance
Monitoring Plan

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

PARR HYDROELECTRIC PROJECT
(FERC No. 1894)

Prepared for:

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

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtGroup.com

September 2017

AMERICAN EEL (*ANGUILLA ROSTRATA*)
ABUNDANCE MONITORING PLAN

PARR HYDROELECTRIC PROJECT
(FERC No. 1894)

Prepared for:

South Carolina Electric & Gas Company
Cayce, South Carolina

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtGroup.com

September 2017

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

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

1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) is the Licensee for the Parr Hydroelectric Project (FERC No. 1894) (Project), which consists of the Parr Shoals Development (Parr Development) and the Fairfield Pumped Storage Development (Fairfield Development). Both developments are located along the Broad River in Fairfield and Newberry counties, South Carolina. The current license for the Project is due to expire on June 30, 2020. SCE&G will file for a new license with the Federal Energy Regulatory Commission (FERC) on or before June 30, 2018.

The Parr Development creates a blockage for upstream fish passage on the Broad River, therefore stakeholders on the Fisheries Technical Working Committee (TWC) requested an assessment of American eel (*Anguilla rostrata*) abundance downstream of Parr Shoals Dam. The study results were used to determine if upstream passage of American eel was warranted at this time or at some point during the term of the new license. SCE&G and the stakeholders reviewed the study results and agreed to develop this American Eel Monitoring Plan to assess densities of American eel downstream of the Parr Shoals Dam during the term of the new license. This plan will be included as a Protection, Mitigation and Enhancement (PM&E) measure in the Comprehensive Relicensing Settlement Agreement (CRSA).

2.0 EXISTING INFORMATION

Information on the distribution and abundance of American eel in the Broad River is not well documented. The South Carolina Department of Natural Resources (SCDNR) currently operates an eel ramp at the St. Stephen Re-diversion Dam, located approximately 135 river miles downstream of the Project. This ramp provides passage of eels into the Santee Cooper Reservoir System, which connects with the Congaree and Wateree rivers. Little is known regarding the extent of passage of American eels upstream beyond the Santee Cooper reservoirs into the Congaree and further upstream above the Columbia Hydroelectric Project into the Broad River and to the base of the Parr Shoals Dam. During relicensing, stakeholders requested a study to assess eel abundance downstream of the Parr Shoals Dam. To fulfill this request, SCE&G conducted American eel surveys during 2015 and 2016. Ramp-style elver traps, a fyke net, and electrofishing efforts were utilized during spring 2015 and fall 2015 (Figure 2-1), and only one eel was collected via backpack electrofishing. Additional backpack and boat electrofishing efforts were performed in spring 2016 (Figure 2-2), which detected two additional eels. A total of three American eels, all in the yellow eel lifestage, were collected or observed during the entire study. All the eels were observed using electrofishing methods (Kleinschmidt 2016).

The SCDNR has conducted two separate American eel abundance studies in the Broad River. During 2010 through 2012, the SCDNR collected 13 eels downstream of the Columbia Hydroelectric Project dam (located on the Broad River 23.5 miles downstream of Parr Shoals Dam) via eel ramps, electrofishing, and Fukui traps. In separate collection efforts during 2009 through 2014, the SCDNR collected a total of 21 yellow eels in the Broad River via boat electrofishing, with 12 of those eels collected immediately downstream of Parr Shoals Dam. Results of these studies suggest that while American eels are present in the Broad River downstream of Parr Shoals Dam, they are not abundant.



FIGURE 2-1 PARR PROJECT AMERICAN EEL SAMPLING LOCATIONS – 2015

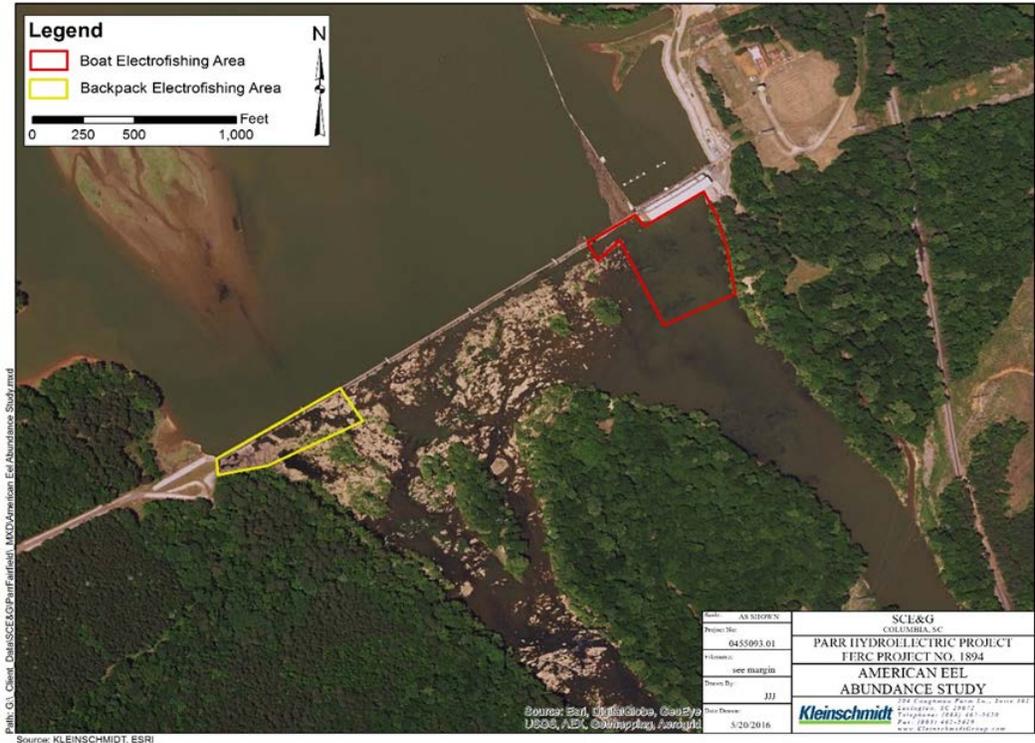


FIGURE 2-2 PARR PROJECT AMERICAN EEL SAMPLING LOCATIONS – 2016

3.0 PROPOSED PM&E MEASURE

Current distribution of American eel downstream of Parr Shoals Dam does not warrant construction of an eel ramp, but densities in the future may increase during the new FERC operating license. To address future concerns, SCE&G will conduct electrofishing sampling efforts to monitor the distribution and abundance of American eels downstream of the Parr Shoals Dam for the duration of their new license for the Project. A study plan detailing monitoring frequency, timing, and location will be developed by the American Eel Review Committee¹ following issuance of the new license. SCE&G will then submit this study plan to FERC for approval. Preliminary methods for American eel monitoring are included below.

3.1 PRELIMINARY AMERICAN EEL MONITORING METHODS

Electrofishing methods will target the yellow eel lifestage and will include backpack electrofishing in pools downstream of Parr Shoals Dam along the west side of the dam and boat electrofishing in the shoal and riffle habitats downstream of the powerhouse, as well as along the face of the dam near the powerhouse. Surveys will be conducted during the first year after the license is issued and the American Eel Monitoring Study Plan has been approved by the FERC; and then every 5 years thereafter (i.e., years 6, 11, 16, etc. after license issuance) (Table 4-1). Sampling will be increased to once every 3 years upon the completion of eel passage at the Santee Cooper Project. During each sampling year, sampling efforts will be conducted over three days in April, May, and June, not necessarily with one day in each month, except during the first year of sampling. After the first year of sampling, the Review Committee will determine when the three days of sampling will occur, to potentially include other months such as October. On each sampling day, backpack electrofishing will occur for ½ hour and boat electrofishing will occur for 1 hour. Sampling locations are outlined in Figure 3-1. The monitoring results will be reported to the Review Committee within two months of the close of monitoring each collection year. Sampling results will be assessed at a Review Committee meeting the February following a monitoring year, and a report will be filed with FERC by April 30 of that year. The Review Committee will use the data collected under this monitoring plan to determine the trigger for

¹ Members of the American Eel Review Committee must be signatories to the CRSA with the exception of National Oceanic and Atmospheric Administration (NOAA) Fisheries, US Fish and Wildlife Service (USFWS) and SCDNR.

construction and implementation of an eel ramp at the Parr Shoals Dam. However, the Project currently has a plan with triggers established for implementing passage of American shad and blueback herring at the Parr Shoals Dam. SCE&G will consider inclusion of an American eel ramp as part of that fishway design and construction when triggers are met for fish passage.

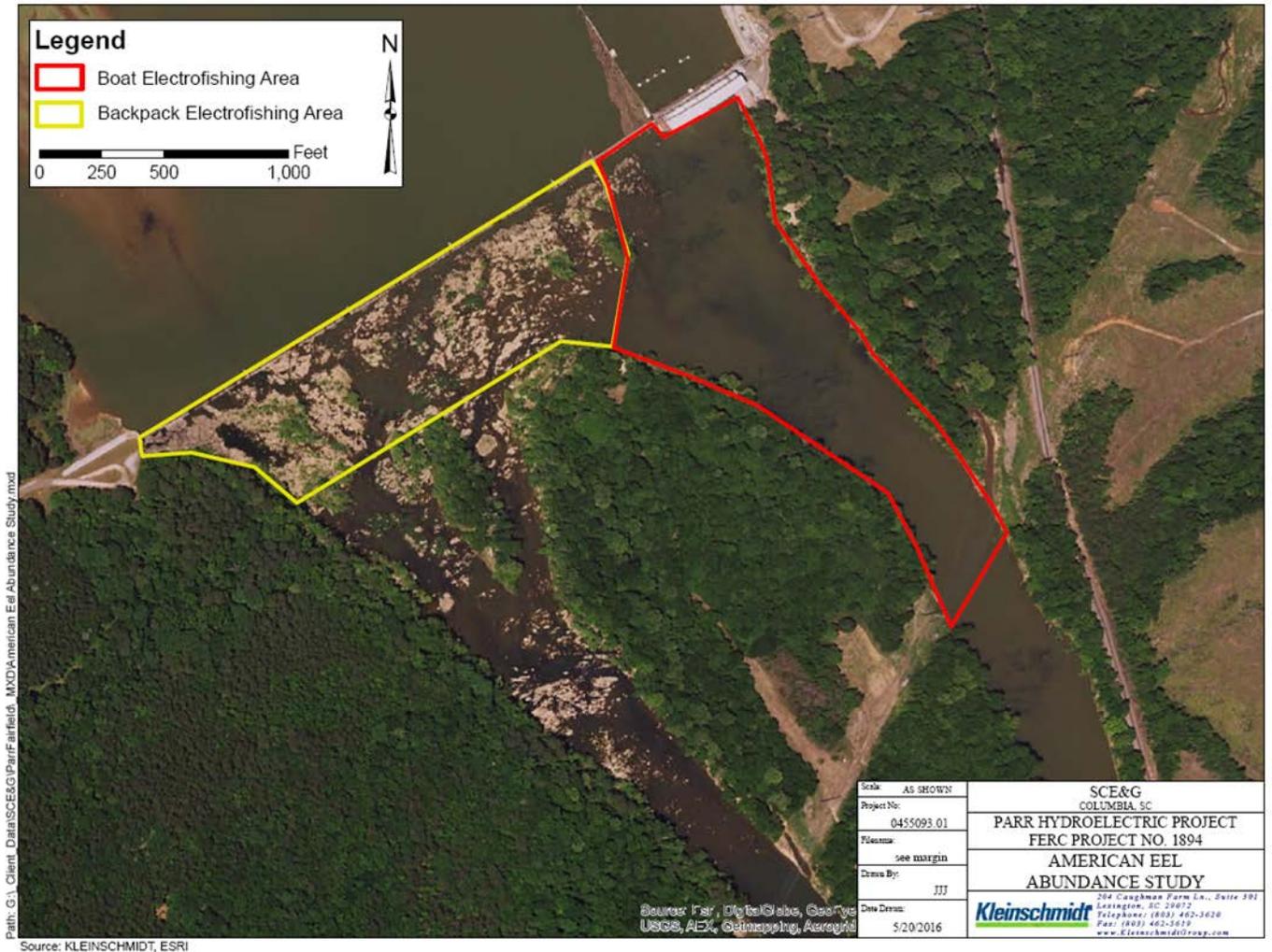


FIGURE 3-1 AMERICAN EEL MONITORING LOCATIONS

4.0 SCHEDULE

The monitoring schedule is described in the table below in relation to the issuance of the license by FERC.

TABLE 4-1 AMERICAN EEL MONITORING PLAN SCHEDULE

PERIOD ²	ITEM
Within 180 days of license issuance	Form Review Committee, review American Eel Monitoring Plan and submit American Eel Monitoring Study Plan to FERC
Year 1 of new license	<ul style="list-style-type: none"> • Conduct 3 surveys - April-June • Report results to Review Committee within 2 months after end of monitoring • Review Committee meeting- February of following year • File Annual Report with FERC- April 30th of following year
Year 6 of new license	<ul style="list-style-type: none"> • Conduct 3 surveys - April-June or other months as determined by Review Committee • Report results to Review Committee within 2 months after end of monitoring • Review Committee meeting- February of following year • File Annual Report with FERC- April 30th of following year
Year 11 of new license	<ul style="list-style-type: none"> • Conduct 3 surveys - April-June or other months as determined by Review Committee • Report results to Review Committee within 2 months after end of monitoring • Review Committee meeting- February of following year • File Annual Report with FERC- April 30th of following year
Year 16 of new license	<ul style="list-style-type: none"> • Conduct 3 surveys - April-June or other months as determined by Review Committee • Report results to Review Committee within 2 months after end of monitoring • Review Committee meeting- February of following year • File Annual Report with FERC- April 30th of following year

² Sampling will increase to once every three years upon completion of eel passage at the Santee Cooper Project.

Year 21 of new license	<ul style="list-style-type: none"> • Conduct 3 surveys - April-June or other months as determined by Review Committee • Report results to Review Committee within 2 months after end of monitoring • Review Committee meeting- February of following year • File Annual Report with FERC- April 30th of following year
Year 26 of new license	<ul style="list-style-type: none"> • Conduct 3 surveys - April-June or other months as determined by Review Committee • Report results to Review Committee within 2 months after end of monitoring • Review Committee meeting- February of following year • File Annual Report with FERC- April 30th of following year
Year 31 of new license ³	<ul style="list-style-type: none"> • Conduct 3 surveys - April-June or other months as determined by Review Committee • Report results to Review Committee within 2 months after end of monitoring • Review Committee meeting- February of following year • File Annual Report with FERC- April 30th of following year

³ Sampling will continue throughout the term of the license. This schedule will be adjusted depending on the license term issued by FERC

5.0 LITERATURE CITED

Kleinschmidt Associates. 2016. American eel (*Anguilla rostrata*) Abundance Study Report.
June 2016.

Appendix A-6
Freshwater Mussel
Monitoring Plan

FRESHWATER MUSSEL MONITORING PLAN

PARR HYDROELECTRIC PROJECT
(FERC No. 1894)

Prepared for:

South Carolina Electric & Gas Company
Cayce, South Carolina

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtGroup.com

December 2017

FRESHWATER MUSSEL MONITORING PLAN

PARR HYDROELECTRIC PROJECT (FERC No. 1894)

Prepared for:

South Carolina Electric & Gas Company
Cayce, South Carolina

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtGroup.com

December 2017

FRESHWATER MUSSEL MONITORING PLAN

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

SOUTH CAROLINA ELECTRIC & GAS COMPANY

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FRESHWATER MUSSEL MONITORING PLAN

PARR HYDROELECTRIC PROJECT (FERC No. 1894)

SOUTH CAROLINA ELECTRIC & GAS COMPANY

1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) is the Licensee for the Parr Hydroelectric Project (FERC No. 1894) (Project). The Project consists of the Parr Shoals Development (Parr Development) and the Fairfield Pumped Storage Development (Fairfield Development). Both developments are located along the Broad River in Fairfield and Newberry counties, South Carolina. The current license for the Project is due to expire on June 30, 2020. Therefore, SCE&G will file for a new license with the Federal Energy Regulatory Commission (FERC) on or before June 30, 2018.

During relicensing efforts, the United States Fish and Wildlife Service (USFWS) requested that SCE&G perform periodic assessments of the composition and abundance of freshwater mussel species in or adjacent to the Project throughout the course of the new license. SCE&G and stakeholders have agreed to develop this Freshwater Mussel Monitoring Plan and it will be included as a Protection, Mitigation and Enhancement (PM&E) measure in the Comprehensive Relicensing Settlement Agreement (CRSA).

2.0 EXISTING INFORMATION

Information on the species composition, abundance, and distribution of mussel species in Monticello Reservoir, Parr Reservoir, and upstream and downstream of Parr Reservoir is documented in several studies (Price 2009; Alderman 2012; Three Oaks Engineering 2016; and Price, et.al. 2016).

The South Carolina Department of Natural Resources (SCDNR) conducted surveys in 2007 and 2008 to assess the status of freshwater mussels on the Broad River and in Parr Reservoir (Price 2009). The SCDNR, led by a licensed malacologist, surveyed 60 sites along the Broad River and five sites on adjacent tributaries. Visual search methods including snorkeling, SCUBA diving, and bathyscopes were utilized. The section of the Broad River between Parr Shoals Dam and the Columbia Dam contained dense populations of mussels, with four species collected. Habitat included relatively clear water and stable substrates that are suitable for numerous mussel species (Price 2009). In 2016, North Carolina State University surveyed 14 sites between the Columbia Dam and the Parr Shoals Dam. Six of the 14 sites corresponded with some of the exact locations surveyed in 2007. The report provides a summary of freshwater mussel species occurrence and abundance changes over the ten-year period (Price et.al. 2016).

SCE&G personnel and Alderman Environmental Services, Inc. conducted freshwater mussel surveys on the Broad River downstream of Parr Shoals Dam in 2012. Thirteen areas were surveyed over two days by a team of four malacologists using bathyscopes and tactile techniques. The highest freshwater mussel diversity in the Broad River sub-basin in North and South Carolina upriver of the Columbia Dam was observed. This survey also found the most upriver occurrence of the yellow lampmussel (*Lampsilis cariosa*) within the Broad River sub-basin to date. Roanoke slabshell (*Elliptio roanokensis*) juveniles, which require an anadromous fish host, was also observed in this stretch of the Broad River. A total of nine mussel species were collected (Alderman and Alderman 2012).

SCE&G and Three Oaks Engineering Personnel conducted freshwater mussel surveys in Monticello Reservoir during 2016. A total of 25 sites were surveyed, and five mussel species were collected. Multiple life stages were observed for all species collected, suggesting that recruitment from juvenile to adult lifestages occurs within the reservoir for all five species

(Three Oaks Engineering 2016). During this study, several individuals were tentatively identified as Carolina creekshell (*Villosa vaughaniana*), a species considered to be critically imperiled by the state of South Carolina (SCDNR 2017). In order to confirm this finding, Three Oaks Engineering performed an additional survey and accompanying genetic analysis during the summer of 2017. The genetic testing confirmed that the Carolina creekshell mussel is present in Monticello Reservoir. The survey and genetic analysis also confirmed that Eastern creekshell (*Villosa delumbis*) and Eastern lampmussel (*Lampsilis radiata*) are also located in Monticello Reservoir, which are listed as apparently secure and imperiled, respectively, by the state of South Carolina (SCDNR 2017).

3.0 PROPOSED PM&E MEASURE

During the new license, SCE&G will perform monitoring of mussel populations in areas of Monticello Reservoir and the Broad River downstream of Parr Shoals Dam. Specific areas of Monticello Reservoir will be monitored with the goal of tracking the distribution and abundance of freshwater mussel species present with an emphasis on Carolina creekshell mussel populations. In addition, more information is required to fully assess how new Project operations of the Parr Shoals Development may influence mussels in the Broad River downstream of the dam. Therefore, freshwater mussels will be monitored for abundance, distribution, and species composition downstream of Parr Shoals Dam during the new license.

A Mussel Review Committee¹ will develop a study plan for these monitoring efforts following issuance of the new license. SCE&G will then submit this study plan to FERC for approval. Preliminary methods for mussel monitoring are included below.

3.1 PRELIMINARY MUSSEL MONITORING METHODS

SCE&G will work with a malacologist (agreed upon by the Review Committee) to monitor abundance, distribution, and species composition of mussel species in Monticello Reservoir and the Broad River downstream of Parr Shoals Dam. Sampling efforts in Monticello will focus on

¹ Members of the Mussel Review Committee must be signatories to the CRSA, with the exception of National Oceanic and Atmospheric Administration (NOAA) Fisheries, USFWS, SCDNR and the South Carolina Department of Health and Environmental Control (SCDHEC).

areas identified during the 2016 and 2017 surveys (Figure 3-1). Specifically, each area surveyed will be sampled by utilizing bathyscopes, snorkeling, and/or tactile searches to locate, identify and enumerate mussel species. Sampling will be performed over a two-day period. Surveys will be designed to identify the diversity, abundance, and size distribution of mussel species present.

Sampling in the Broad River downstream of Parr Dam will focus on the reach of river immediately downstream of the Parr powerhouse and several sections of the west channel of the Broad River. Specifically, one segment immediately downstream of the powerhouse will be surveyed along with three smaller segments on the west side of Hampton Island (Figure 3-2). Within each survey segment, sampling will be conducted by utilizing bathyscopes, snorkeling, and/or tactile searches to locate, identify and enumerate mussel species. Timed searches will be conducted for up to 30 minutes in each of the smaller west channel segments and up to 2 hours in the larger segment downstream of the powerhouse. Surveys will be designed to identify the diversity, abundance, and size distribution of mussel species present.

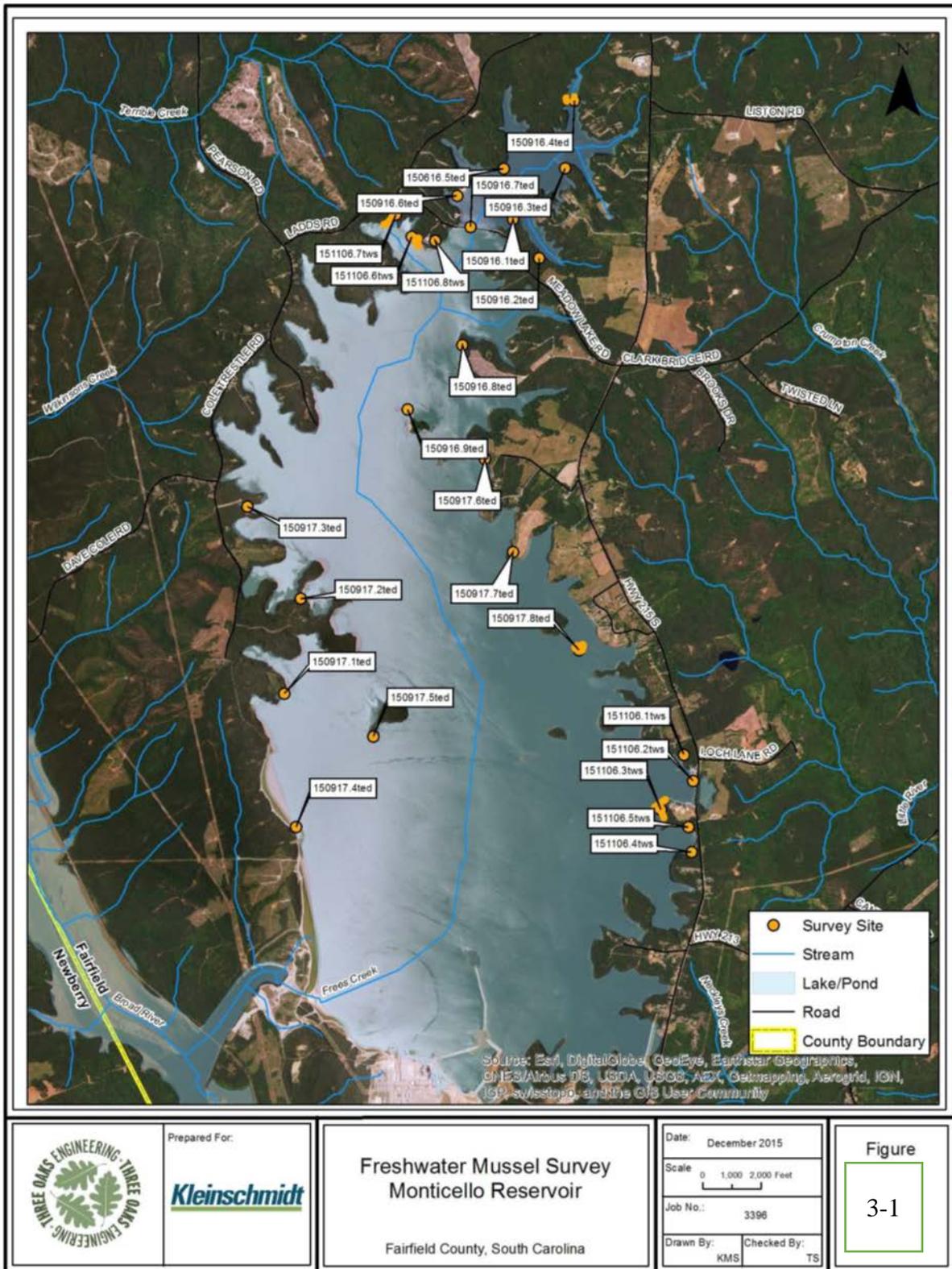


FIGURE 3-1 MUSSEL SAMPLING LOCATIONS IN MONTICELLO DURING 2016 & 2017.

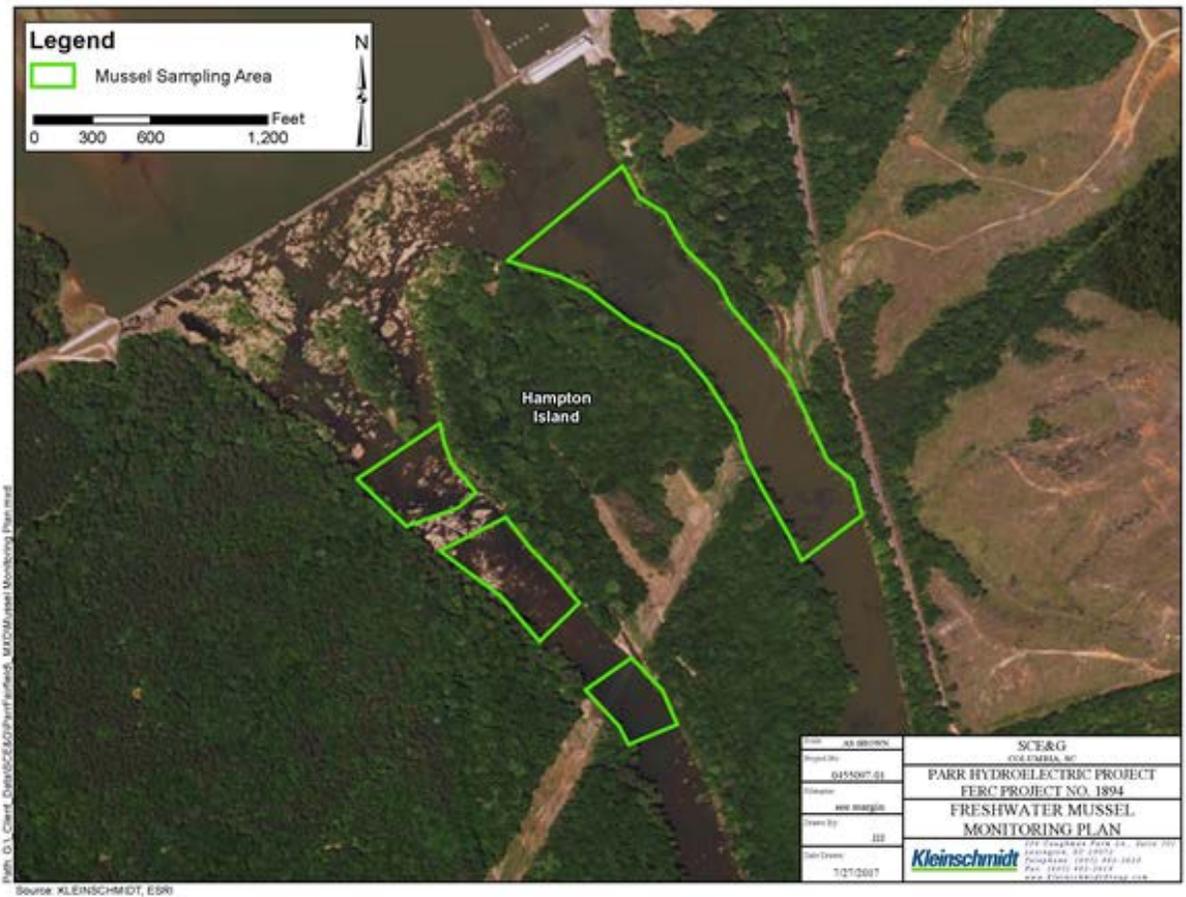


FIGURE 3-2 MUSSEL SAMPLING LOCATIONS IN THE BROAD RIVER DOWNSTREAM OF PARR SHOALS DAM.

Sampling in Monticello Reservoir and in the Broad River downstream of Parr Shoals Dam will occur on the same schedule. The first (baseline) mussel survey will be conducted during the first year after the license has been issued and the Mussel Monitoring Study Plan has been approved by the FERC. The second survey will occur 6 years later (i.e. 7 years after the license is issued). Additional studies will be conducted 10 years thereafter for the course of the new license term. The Review Committee will meet to adjust the frequency of mussel monitoring if fish passage is implemented at the Project. Monitoring results will be distributed to the Review Committee for review and comment by December 31st of each year of sampling. An annual report will be filed with FERC by April 30th of the following year.

Survey methods may be altered if the USFWS develops new standard mussel sampling methods during the term of the license. SCE&G will consult with the Review Committee to potentially update the frequency and location of mussel monitoring in the event that fish passage is installed at the Project during the term of the new license. Fish passage installation would potentially increase the range and abundance of host fish species upstream of the Project, and would be a factor in determining updates to the monitoring plan that may include monitoring within Parr and Monticello reservoirs during the remainder of the license. Another factor that would initiate the Review Committee to amend the study schedule would be observed negative changes in mussel populations. The Review Committee would meet to discuss the potential for increasing monitoring frequency in the event that mussel populations decline when compared to historic or new baseline data.

4.0 SCHEDULE

The monitoring schedule is described in the table below in relation to the issuance of the license by FERC.

TABLE 4-1 FRESHWATER MUSSEL MONITORING PLAN SCHEDULE

PERIOD²	ITEM
Within 180 days of license issuance	Form Review Committee, review Freshwater Mussel Monitoring Plan and submit Mussel Monitoring Study Plan to FERC
Year 1 of new license	<ul style="list-style-type: none"> • Conduct mussel survey • Report results to Review Committee by December 31st • Review Committee meeting- February of following year • File Annual Report with FERC by April 30th of following year
Year 7 of new license	<ul style="list-style-type: none"> • Conduct mussel survey • Report results to Review Committee- by December 31st • Review Committee meeting- February of following year • File Annual Report with FERC by April 30th of following year
Year 17 of new license	<ul style="list-style-type: none"> • Conduct mussel survey • Report results to Review Committee- by December 31st • Review Committee meeting- February of following year

² Sampling frequency will be adjusted if fish passage is installed at the Project during the term of the new license. Sampling frequency may also be adjusted if a decline in mussel population is observed.

	<ul style="list-style-type: none"> • File Annual Report with FERC by April 30th of following year
Year 27 of new license ³	<ul style="list-style-type: none"> • Conduct mussel survey • Report results to Review Committee- by December 31st • Review Committee meeting- February of following year • File Annual Report with FERC by April 30th of following year

³ Sampling will continue throughout the term of the license. This schedule will be adjusted depending on the license term issued by FERC.

5.0 LITERATURE CITED

Alderman, John M. and Joseph D. Alderman. 2012. Freshwater Mussel Surveys within the Broad River, East of Hampton Island. Prepared for SCANA Services, Inc. Alderman Environmental Inc. Pittsboro, NC.

Price, J., Eads, C., and Raley, J. 2009. Fish Passage on the Broad River: an assessment of the benefits to freshwater mussels. Completion Report to the Broad River Mitigation Fund.

Price, J., Eads, C., and Levine, J. 2016. Fish Passage on the Broad River: and Assessment of freshwater mussel distribution after 9 years of fish passage operation. Progress Report to the Broad River Mitigation Fund.

SCDNR. 2017. SC Rare, Threatened & Endangered Species Inventory. [Online] URL: <http://dnr.sc.gov/species/staterank.html>. Accessed November 15, 2017.

Three Oaks Engineering 2016. Freshwater Mussel Survey Report in Monticello Reservoir. Prepared for South Carolina Electric and Gas Company & Kleinschmidt Associates.

Appendix A-7

**Santee River Basin Accord for
Diadromous Fish Protection,
Restoration, and
Enhancement**

SANTEE RIVER BASIN ACCORD FOR DIADROMOUS FISH PROTECTION, RESTORATION, AND ENHANCEMENT

General

The Santee River Basin Accord (“Accord”) is a collaborative approach among utilities with licensed hydroelectric projects, and federal and state resource agencies to address diadromous fish protection, restoration, and enhancement in the Santee River Basin (“Basin”). This Accord supports the *Santee-Cooper Basin Diadromous Fish Passage Restoration Plan* (2001) which was developed by the South Carolina Department of Natural Resources (“SCDNR”), the National Oceanic and Atmospheric Administration’s National Marine Fisheries Service (“NMFS”), and the United States Fish and Wildlife Service (“USFWS”), and was accepted as a Comprehensive Plan by the Federal Energy Regulatory Commission (“FERC”) as noted in the FERC’s letter to the USFWS dated October 3, 2001.

Accord participants and hydroelectric projects (referred to herein singularly as “Project” and together as “Projects”) that are the subject of this Accord include South Carolina Electric & Gas Company (“SCE&G”), licensee of the Saluda Hydroelectric Project No. 516, the Parr Hydroelectric Project No. 1894, and the Neal Shoals Hydroelectric Project No. 2315, and Duke Energy Carolinas, LLC (“Duke”), licensee of the Catawba-Wateree Hydroelectric Project No. 2232, the Ninety-Nine Islands Hydroelectric Project No. 2331, and the Gaston Shoals Hydroelectric Project No. 2332 (SCE&G and Duke referred to herein singularly as “Utility” and together as “Utilities”) and their successors; and the SCDNR, the North Carolina Wildlife Resources Commission (“NCWRC”), and the USFWS (referred to herein singularly as “Agency” and together as “Agencies”) and their successors. Singularly, any Utility or Agency that signs this Accord may be referred to herein as “Party”. Collectively, the Utilities and Agencies that sign this Accord constitute the Cooperative Accord Partnership (“CAP” or “Parties”). The NMFS and the South Carolina Department of Health and Environmental Control (“SCDHEC”) were also involved in the development of this Accord, but neither are currently signatories to the Accord and are therefore not CAP members. Future CAP members, if any, will be limited to federal and state resource agencies with authority for any diadromous fish species and their habitats in the Basin, and to owners of other FERC-licensed hydroelectric projects in the Basin. Non-governmental organizations and the general public will not be members of the CAP, but may participate via consultation with CAP members and may attend CAP meetings in a non-decision-making role. However, all discussions by non-CAP members in CAP meetings will be limited to a short public comment period (to include submission of written comments, if desired) at the start of a meeting, unless the CAP agrees by consensus on a case-by-case basis to do otherwise.

This Accord constitutes an agreement among the CAP members for the protection, restoration, and enhancement of diadromous fish in the Basin through implementation of a 10-year Action Plan (“Plan”) that was initially developed by the USFWS (*Cooperative Accord 10-Year Action Plan For The Restoration and Enhancement of Diadromous Fish In The Santee Basin*—original draft dated January 24, 2007), and that includes no-sooner-than dates and biological triggers for fish passage as specified in this document. Tasks and cost estimates for each activity in the Plan are shown in Appendix A, and no-sooner-than dates, biological triggers, and other agreed-upon actions are noted in Appendix B. The agreements, activities, and biological studies identified in

the Accord, and in Appendices A, B, and C which are hereby incorporated by reference, will be used to support the development of fish passage prescriptions that will protect, restore, and enhance diadromous fish species in the Basin and will be filed with the FERC for inclusion in the new licenses for some of the above-referenced Projects. The CAP members have worked to create this Accord to meet the interests of CAP members while still allowing all Agencies and Jurisdictional Bodies to meet their respective statutory obligations for diadromous fish under §7 of the Endangered Species Act (“ESA”) and under §4(e), §10(a), §10(j), and §18 of the Federal Power Act (“FPA”), and under §401 of the Clean Water Act (“CWA”), for the above-referenced Projects. The CAP has agreed to implement phased, deliberate, and effective activities that will initiate diadromous fish population enhancements in the near-term while collecting data and monitoring diadromous fisheries over a longer period for optimizing further restoration efforts.

Definitions

Consensus—a vote with no dissenting votes; abstention by a member is not a dissenting vote.

Jurisdictional Body—any governmental body, except Agencies, which has the authority to bind the Utilities by imposing requirements affecting the operation of the Projects that are the subject of the Accord.

Existing Project License—the hydropower license that as of the effective date of this Accord has been issued by the FERC for Projects No. 1894, No. 2315, No. 2331, and No. 2332 but does not include subsequent or renewed licenses, or their terms, even if some or all of the terms of a subsequent or renewed license are identical to terms in an Existing Project License.

Inconsistent Act—(A) any requirement, condition, prescription, or recommendation imposed by a Jurisdictional Body pursuant to §§4(e), 10(a), 10(j), or 18 of the FPA, §7 of the ESA, or §401 of the CWA for operation of a Project that materially varies any obligation concerning the restoration of diadromous fish, reservoir elevation limitations, required flow releases, and low inflow protocols or high inflow protocols from those set forth in the Catawba-Wateree Comprehensive Relicensing Agreement (CRA), as amended on December 29, 2006, or in an Existing Project License; or (B) any requirement, condition, prescription, or recommendation imposed by a Jurisdictional Body pursuant to §§4(e), 10(a), 10(j), or 18 of the FPA, §7 of the ESA, or §401 of the CWA that materially varies any obligation from those set forth in this Accord.

Breach—a failure of a Party to comply with the terms of the Accord in a significant and non-trivial manner and includes, but is not limited to: (A) a requirement, condition, prescription, or recommendation for a Project that is imposed by an Agency pursuant to §§4(e), 10(a), 10(j), or 18 of the FPA, or §7 of the ESA that materially varies any obligation set forth in this Accord; or (B) any CAP member’s requesting, promoting, or supporting an Inconsistent Act or other requirements that materially varies any obligation set forth in this Accord.

Materially Vary or Varies—a requirement, condition, prescription, or recommendation materially varies if it imposes additional obligations that in the discretion of the affected Utility are significant and includes, but is not limited to: (A) reservoir elevation limitations; required flow releases; low inflow protocols or high inflow protocols that are significantly different from

those in the CRA or in an Existing Project License (whether by changing the actual obligation or by changing the method of implementing the obligation); (B) upstream or downstream passage of diadromous fish at a Project dam on a schedule different from that identified in the Accord; (C) installation of fishway equipment on a Project dam that is in addition to or different from what is required by the Accord; or (D) fish studies, monitoring, or analyses that are in addition to or different from what is required by the Accord.

Fish Passage Facilities, Fishways, and Prescriptions— defined in *Notice of Proposed Interagency Policy on the Prescription of Fishways Under Section 18 of the Federal Power Act*, (Federal Register/Volume 65, No. 247/Friday, December 22, 2000) for existing hydroelectric projects on the Saluda, Broad, and Catawba-Wateree rivers. These terms are used interchangeably throughout this document.

Key Agreements

The CAP members agree as follows:

General Agreements

1. The Utilities will not pursue Trial Type Hearings (“TTH”) before an Administrative Law Judge pursuant to FPA §§4(e) or 18 to contest the USFWS’s FPA §§4(e) or 18 diadromous fish requirements so long as the USFWS’s ESA §7 requirements, FPA §§4(e) conditions, 10(a) and 10(j) recommendations, and 18 prescriptions do not materially vary reservoir elevation limitations, required flow releases, low inflow protocols or the high inflow protocols as set forth in: (A) the CRA; (B) Existing Project Licenses at the Ninety-Nine Islands and Gaston Shoals Projects; (C) a settlement agreement among the SCDNR, the USFWS, and SCE&G for the Saluda Hydroelectric Project; and (D) this Accord.
2. The Plan, which emphasizes research on fish movement (both upstream and downstream), distribution, and habitat use; fish population enhancement and restoration activities; and related funding responsibilities for American eels, American shad, Atlantic sturgeon, blueback herring, and shortnose sturgeon, will be implemented.
3. The Accord’s no-sooner-than dates and biological triggers (in Appendix B) will be used to initiate conceptual design and subsequent construction of fish passage facilities for existing hydroelectric Projects on the Broad River and the Catawba-Wateree River.
4. The restoration target numbers for adult anadromous American shad and adult anadromous blueback herring restoration in the Broad River are set in Appendix C.
5. Subject to limitations regarding confidential and proprietary information, the CAP will establish and maintain a publicly accessible electronic archive for all data and documents created as a result of the Accord. When requested by a Utility, the Agencies will treat specific data provided by the Utility as confidential and proprietary, to the extent permitted by law. This may include pre-decisional work products, proprietary information, and sensitive resource data. In the event that any confidential or proprietary information is required by law to be released by an Agency, that Agency shall provide

CAP members affected by such a release with at least a 30-day written notice in advance of such release, unless a shorter notice period is required by law. Nothing herein shall be interpreted to prevent any Agency from complying with the Freedom of Information Act and 43 CFR Part 2, Subpart A and B.

6. If any Utility considers an action or omission to be an Inconsistent Act or a Breach, then that Utility may withdraw from this Accord by giving written notice of its intent to withdraw, pursuant to Paragraph 7; provided, however, that in the case of an Inconsistent Act, such notice of withdrawal may not take place until the time period to initiate administrative appeal of the Inconsistent Act has expired.
7. A withdrawing Utility initiates withdrawal by providing written notice of an Inconsistent Act or Breach and its intent to withdraw to all CAP members. This notice must include a brief statement setting forth: (A) the date and nature of the Inconsistent Act or Breach giving rise to the right to withdraw and (B) how the alleged Inconsistent Act or Breach meets the definition of "Inconsistent Act" or "Breach," as defined herein.
8. In the event of an alleged Accord Breach by any CAP member, the CAP member that is alleged to have breached the Accord shall have thirty (30) days after receipt of the notice of Breach within which to cure the Breach. If it is not reasonably possible to cure such Breach within thirty (30) days, the breaching CAP member shall notify the CAP Board ("Board," see Paragraph 26) of the time reasonably necessary to cure such Breach. If the Board can agree on the time reasonably necessary to cure the Breach, the breaching CAP member shall proceed to cure such Breach within such time as the Board shall agree. If the Board is unable to agree on the time reasonably necessary to cure the Breach, the breaching CAP member shall proceed to cure such Breach as soon as reasonably possible. The breaching CAP member(s) shall keep the Board informed of the progress in curing the Breach. Failure of the breaching CAP member to cure a Breach in accordance with this paragraph shall allow the CAP member that is harmed by the Breach to withdraw from the Accord.
9. In the event of a withdrawal by a Utility or the failure of a Utility to cure a Breach of the Accord, the Agencies have the option to reconsider any prior fish passage prescriptions submitted pursuant to FPA §18 for Projects owned by the withdrawing or breaching Utility. Withdrawal relieves the Utility of its performance obligations under this Accord, but will not result in the return of any funds previously contributed pursuant to Paragraph 37.
10. If the Accord Utility membership changes, the Plan will be adjusted by the remaining CAP members to be compatible with funding being provided by the remaining member Utilities.
11. The Agencies and Utilities agree that extension of the Plan beyond 2017 is optional, and the obligation and agreement to comply with the Accord is not conditioned upon a continuation of the Plan beyond the initial 10-year term.

12. The Agencies and the Utilities agree to use their best efforts to make this Accord a success and to participate in all Accord administrative activities at their own expense.

SCE&G Specific Agreements

13. The reservoir elevation limitations, required flow releases, low inflow protocols or high inflow protocols to be developed in a relicensing agreement for the Saluda Hydroelectric Project among the USFWS, SCDNR, and SCE&G along with the reservation by the USFWS of any fishway prescriptions for this Project will be filed with the FERC for the term of the new Saluda Hydroelectric Project license which is anticipated to be issued in 2010.
14. It is the understanding of the CAP that the diadromous fish study needs below the Parr Shoals Development Dam will be addressed through the Accord. Additional diadromous fish studies downstream of Parr Shoals Development Dam will not be required during the relicensing of the Parr Hydroelectric Project. A Fish Passage Feasibility Assessment (an evaluation of the upstream and downstream passage alternatives and their conceptual designs) will be conducted pursuant to the Accord, by SCE&G, and will commence upon attainment of the biological triggers as set out in Appendix B.
15. The Fish Passage Feasibility Assessment will commence at the Parr Shoals Development Dam within one year following passage of 50% of the adult anadromous American shad or adult anadromous blueback herring target restoration numbers as set out in Appendix B, upstream for any three years in a five-year period at the Columbia Diversion Dam Fish Passage Facility. Construction of a fishway at the Parr Shoals Development Dam will be initiated within one year and completed within three years following passage of 75% of the adult anadromous American shad or adult anadromous blueback herring target restoration numbers as described in Appendix B, upstream for any three years in a five-year period at the Columbia Diversion Dam Fish Passage Facility. In no event shall fish passage feasibility assessment or construction of the fishway commence before 2012. No changes will be required in the Parr Hydroelectric Project's current operations until issuance of the new FERC license for this Project. Any fish passage at this Project will not impact generation and pumping operations at the Fairfield Pumped Storage Facility until relicensing studies support the need for such a change and then only with the issuance of the new license for the Parr Hydroelectric Project (anticipated to be issued by FERC in 2020).
16. The USFWS agrees to reserve its FPA §18 authority to prescribe any type of fish passage facilities for sturgeon species at the Parr Shoals Development Dam until the new FERC license is issued for the Parr Hydroelectric Project, anticipated to be in 2020.
17. In the event that SCE&G applies for an amendment to the Parr Hydroelectric Project's current license for construction of a future power plant, the USFWS will reserve its authority under FPA §4(e) and §18 for this license amendment at that Project.
18. The Fish Passage Feasibility Assessment, including conceptual designs, will begin at the Neal Shoals Hydroelectric Project within one year following 50% of target restoration

numbers for adult anadromous American shad or adult anadromous blueback herring, as described in Appendix B, being passed upstream for any three years out of a five-year period at the Parr Shoals Dam. The construction of fish passage facilities at the Neal Shoals Hydroelectric Project will commence within one year and be completed within three years following passage of 75% of target restoration numbers of adult anadromous American shad or adult anadromous blueback herring being passed upstream three years out of a five-year period at the Parr Shoals Development Dam, but in no event shall the fish passage feasibility assessment or construction commence before 2016.

Duke Specific Agreements

19. For the Catawba-Wateree Hydroelectric Project, the obligation to operate a fishway and associated facilities as set out in the Accord will continue for the term of the new license, and the USFWS agrees that the prescription to be filed with the FERC for the new license will include such a provision. A trap and truck fish passage facility (“T&T facility”) for adult anadromous American shad and adult anadromous blueback herring will be designed by Duke, in consultation with the Agencies and with input from the Accord Technical Committee (“TC;” see Paragraph 33), by December 31, 2015, and will commence operation by January 1, 2018, at the Wateree Development of the Catawba-Wateree Hydroelectric Project (see Appendix B). Fish trapped at this T&T facility will be placed in Lake Wateree. The year after the combined annual total catches of adult anadromous American shad and adult anadromous blueback herring equal or exceed 10,000, and in all subsequent years of the term of this Accord, all trapped adult anadromous American shad and adult anadromous blueback herring shall be trucked to upstream areas in the SC portion of the Catawba-Wateree River Basin designated by the TC. If the Accord is not functional, then the USFWS and the SCDNR will designate these upstream reaches in the SC portion of the Catawba-Wateree River Basin by consensus. Effectiveness studies (e.g., usefulness of attraction flows to increase capture of target fish and determination of target fish mortality associated with handling and transportation) for this T&T facility will be conducted by Duke during the first three years of operations, provided sufficient numbers of fish, as determined by the consensus of the Agencies with input from the TC, are available to do so. Information from the effectiveness studies will be used to improve effectiveness of the T&T facility.
20. The Agencies agree that operation of the T&T facility at the Wateree Development, as specified above and as incorporated in the prescription to be filed with the FERC for inclusion in the new license, will fulfill FPA §18 prescriptions and ESA §7 requirements for upstream passage for all adult anadromous fish (including but not limited to American shad, blueback herring, Atlantic sturgeon, and shortnose sturgeon) for all Catawba-Wateree Hydroelectric Project developments for the term of the new license.
21. The SCDNR will issue a scientific collection permit to operate the T&T facility at the Wateree Development pursuant to SC Code §50-11-1180 to ensure that Duke will not be held civilly or criminally responsible for any bycatch mortality, provided Duke is in compliance with its collection permit.

22. The Agencies agree that existing upstream fish passage facilities at the Wateree Development (i.e., partial ramp(s) and manual trap(s) in good repair and similar to that described in David Solomon's 2004 Fish Passage Design for Eels and Elvers) that use manual transport and release of captured American eels into Lake Wateree are sufficient to fulfill FPA §18 upstream prescriptions for catadromous fish (e.g., American eels) at the Wateree Development, when supplemented with additional partial ramp(s)/manual trap(s) determined by the results of partial ramp/manual trapping conducted in all seasons in 2009-2011 in areas adjacent to the spillway (data collected via the Catawba-Wateree River Elver Study in Appendix A). So long as American eels are passed upstream at the Wateree Development in an efficient, safe, and timely manner, Duke, at its sole discretion, may decide to continue operation of the ramp/trap fishway or construct a new passage facility. If Duke chooses to construct a new American eel passage facility at the Wateree Development, Duke will consult with the Agencies and the TC regarding facility design and construction.
23. The Agencies and Duke agree that a series of portable ramp/trap devices will be sufficient for the three-year monitoring studies, and that the studies will be conducted at each development in an orderly upstream sequence of the Catawba-Wateree Hydroelectric Project developments upstream of the Wateree Development. A template for the initial and subsequent studies to ascertain American eel abundance at each tailrace site is set out in the 10-Year Action Plan and is budgeted in Appendix A (location of such studies will occur in an orderly upstream sequence beginning at the Rocky Creek-Cedar Creek Development and ending at the Bridgewater Development at a time to be determined in consultation with the Agencies and with input from the TC). These data will allow effective design and placement of permanent or semi-permanent passage devices for best upstream passage at each development for American eels. Duke will develop a study plan for review and approval by the Agencies with input from the TC prior to commencing any studies at these upstream developments. Information collected from these studies shall include size, seasonality, and location of juvenile American eels in the tailrace areas where these fish may congregate. Captured American eels will be passed into the immediate upstream reservoir. The Agencies and the TC may approve a request for extension of the term of the initial monitoring study in the event few American eels are captured during the study phase.
24. Following the above monitoring for American eels described in Paragraph 23, Duke agrees to design, construct, and operate at each development (in consultation with the Agencies and with input from the TC after a review of the data collected during each three-year study) permanent or semi-permanent upstream passage facilities at each development within two years of completion of the monitoring study at a particular development. So long as American eels are passed upstream at each development in an efficient, safe, and timely manner, Duke, at its sole discretion, may decide to continue operation of the ramp/trap type fishways or construct a new passage facility at each Catawba-Wateree Project development.
25. Duke in cooperation with Agencies and with input from the TC will commence studies in 2024 to address the safe, timely, and effective downstream passage of American eels in the Catawba-Wateree system.

Management and Direction

CAP Board

26. The Accord will be directed by a Board composed of one representative appointed by each CAP member. Each CAP member may designate an alternate who may function as its Board representative in the absence of the appointed Board member. It shall be the responsibility of each CAP member to notify other members in writing within 14 calendar days following any change of the name or contact information for its Board member and/or alternate. On an annual basis, the Board shall elect a chairperson (“Chair”) and may elect other officers as deemed necessary. Initial terms for Board members will be staggered so that there is continuity in the operation of the Accord over the long term, with Duke and USFWS Board members serving three-year initial terms and SCE&G and state agency members serving two-year terms. Successive Board members will serve two-year terms. Meetings by the Board will be held in compliance with the Freedom of Information Act in the jurisdiction where the meeting is held.
27. The initial Board shall establish and schedule at least one meeting of the Board per calendar year (Annual Meeting) for the duration of the Accord. The Chair will select the meeting location and will develop an agenda and provide draft minutes of the previous meeting within two weeks following each meeting and require all members to return their comments within two weeks following receipt of the draft minutes. Additional meetings (Called Meetings) of the Board may be called by the Chair or upon the agreement of at least 25 percent of the Board members, but no Called Meeting that is not called by consensus vote by the Board may be held with less than four weeks prior written notice.
28. A quorum is required for the transaction of business (e.g., official votes) at any Board meeting. A quorum is defined as the presence of a representative or alternate of each CAP member participating in the Accord on the date of the meeting. Once a quorum is established, it may not be broken by departure of one or more members’ representatives or alternates, and voting may occur once a quorum is established.
29. Failure to comply with terms of the Accord, including the prompt payment of a Utility’s annual contributions, will result in the revocation of that member’s right to vote until the failure to comply is remedied.
30. The representatives of the members, or their alternates, may participate, which participation includes voting, in meetings by any means of communication by which all participants may simultaneously hear each other during the meeting. A member’s representative or its alternate participating in a meeting by this means is deemed to be present in person at the meeting. No proxy voting shall be permitted. A member’s alternate shall not vote if that member’s regular representative is present.
31. In addition to conducting its affairs at meetings, the Board may also validly exercise its authority in writing. A proposal may be presented, whether in written or electronic format, to each member’s representative. Upon the approval, whether in written or electronic format, of each member’s representative to that written proposal, the action of

the Board concerning the proposal will constitute a valid exercise of the Board's authority. A complete record of all action taken by the Board without meeting shall be filed with the minutes of the proceedings of the members, whether done before or after the action so taken.

32. Final decisions must be made by consensus of Board members or their alternates.

Technical Committee (TC)

33. A TC comprised of fishery biologists and/or other qualified professionals representing each CAP member will be established by the Board and will advise the Board on technical issues associated with the Accord. The TC will exist for the duration of the Accord.

34. The TC will develop consensus recommendations to the Board and will guide the design and implementation of all Plan tasks for the duration of the Plan. Following the expiration of the term of the Plan, the TC will function as a scientific advisor to the Board regarding all matters related to the restoration of diadromous fish in the Santee Basin.

35. Failure to allocate and disburse funds according to direction of the Board will result in the revocation of that member's right to participate or to vote on matters brought to the TC, until the failure to comply is remedied.

36. For the duration of the Accord, the TC will provide a brief written annual progress report to the Board by February 15 of the following year.

Communications Protocol

The Board will develop a protocol to communicate clearly on all Accord-related resource study, protection, restoration, and enhancement activities occurring in the Basin. All CAP members shall adhere to the Communications Protocol. It is the intent of the Accord to publicly disseminate all technical and scientific findings of its monitoring and study efforts.

Term of the Accord and the 10-year Action Plan

The effective date of this Accord shall be April 15, 2008. The Accord shall terminate for SCE&G at the end of the term of the new FERC license for the Saluda Hydroelectric Project (expected to be issued by the FERC in 2010) and for Duke at the end of the term of the new FERC license for the Catawba-Wateree Hydroelectric Project (expected to be issued in 2009). Each annual extension, if any, of the applicable new licenses by the FERC (commonly referred to as an "annual license") will also extend the term of the Accord for the applicable Utility by one year. Since diadromous fish restoration can be a long-term endeavor, the Board may desire to extend the term of the Plan, or to increase funding during its term. Through a consensus vote of its members, the Board may alter or modify Plan tasks and expenditures within those amounts currently established by the Plan and such Plan modifications do not require new signatures on the Accord from the authorized representative of each CAP member's organization.

The term of the Plan shall be April 15, 2008, through December 31, 2017, unless extended as noted above. The Board shall consider revision or renewal of the Plan in 2015 and shall decide by consensus of its membership if the Plan shall be revised or renewed. A decision not to extend or renew the Plan does not affect the obligations of and agreements among the CAP members contained in the Accord.

Dispute Resolution

Major disputes regarding the Accord, if at all possible, will be resolved by the Board through good-faith negotiations which may be assisted by selecting the services of a neutral mediator (cost of the mediator to be shared as determined by the Board).

Roles and Responsibilities for Implementing the 10-year Action Plan

Utilities

37. Utilities will fund the Plan with SCE&G providing \$200,000 per year (unadjusted annual contribution) and Duke providing \$500,000 per year (contributions expressed in 2008 dollars and to be adjusted annually using the Consumer Price Index). Additional funding secured through grants or other sources by the CAP may be incorporated into the budget and is encouraged. Funding levels provided by the original Utilities are set at that described above. If the costs of proposed activities and studies under the Plan exceed the funding provided by the Utilities, then later activities and studies under the Plan will be abandoned or reduced appropriately as determined by the Board to accommodate the funding level agreed to in this document, unless the necessary additional funding can be obtained by new utility participants, non-CAP member entities, grants and/or existing Fisheries Enhancement Plans from within the Basin. However, funding by non-CAP members will not render otherwise ineligible entities eligible to guide Accord activities or become members of the CAP.
38. In addition to the funding set forth in Paragraph 37, Utilities will provide technical/scientific input to program development, personnel and in-kind services (as appropriate), while conducting some studies, and will provide assistance in the scheduling and conduct of studies.

State and Federal Agencies

39. Agencies will provide technical/scientific input to program development, assistance in the scheduling of studies, personnel and in-kind services (as appropriate) while conducting some studies, and assistance in reporting study results.
40. Agencies will investigate and solicit any sources of supplemental or matching funds.
41. Agencies will assist, to the extent practicable, with the issuance of all applicable permits.

Fund Management

Funds to be contributed by the Utilities shall be maintained by each Utility and accounted for in a separate CAP Fund Account. The CAP Board will develop and adopt procedures concerning when the Utilities will deposit their contributions to this account and how disbursements from this account are approved. Each Utility shall provide annually, no later than March 31, a report of all fund deposits, disbursements, and balances for the previous calendar year. Any funds obtained by a Utility from other sources that are to be used solely in the execution of the Plan shall be included in that Utility's CAP Fund Account and shall be identified in the annual report as a contribution by others. The annual reports provided by the Utilities to the CAP Board will be provided to all CAP members. All such funds, whether contributed by Utilities or others shall be the exclusive property of the CAP to be disbursed and spent according to the Board.

Disbursements from a Utility's CAP Fund Account shall be made only at the consensus direction of the CAP Board. Each Utility owes a fiduciary duty to manage and account for the funds for the benefit of the CAP and to follow the CAP Board's direction for disbursements.

It is the desire of the Utilities that all monies contributed to the Plan be spent during the term of the Plan. In the event that the Plan is not extended and unspent funds are available at the conclusion of the Plan term, the Board will decide by consensus and direct the Utilities to allocate these monies to other ongoing programs of a similar nature and the Utility CAP Fund Accounts will be closed, after which each Utility shall submit to the CAP Board a final accounting report within 60 days following closing its account.

Reserved Authority

The Utilities recognize that the USFWS will reserve authority to alter its FPA §4(e) conditions and FPA §18 prescriptions for diadromous fish. The Agencies and Utilities agree that the Accord provisions are appropriately based on current knowledge of diadromous fisheries in the Santee River Basin. The USFWS believes it will be able to meet its FPA §§ 4(e) and 18 and ESA §7 obligations consistent with its Accord commitments.

State Commitments

The SCDNR agrees to use its best efforts to make this Accord a success. In the event that the USFWS exercises its reserved authority and issues a FPA §18 prescription or a FPA §4(e) condition, or an ESA §7 requirement, or the SCDHEC issues a CWA §401 certification that is inconsistent with, or would impose obligations in addition to those set forth in the Accord or Project settlement agreement with the SCDNR, the SCDNR may exercise any procedural and substantive rights it may have to contest such a prescription, condition, or requirement.

The NCWRC agrees to use its best efforts to make this Accord a success. In the event that the USFWS exercises its reserved authority and issues a FPA §18 prescription or a FPA §4(e) condition, or an ESA §7 requirement, or the North Carolina Division of Water Quality issues a CWA §401 certification that is inconsistent with, or would impose obligations in addition to those set forth in the Accord or Project settlement agreements with the NCWRC, the NCWRC may exercise any procedural and substantive rights it may have to contest such a prescription, condition, or requirement.

Modification of the Accord

This Accord may be modified; however, except for modifications of the Plan as described above, no modification of the Accord will be effective or valid unless it is signed by the authorized representative of each CAP member's organization.

Miscellaneous Agreements

No Admission of Liability – The Accord is a compromise, balancing many interests. The actions taken hereunder are not intended nor shall be construed as an admission on the part of any CAP member, or its agents, representatives, attorneys or employees that such CAP member was so obligated in any manner independent of this Accord. Except as provided herein, no CAP member shall be prejudiced, prevented, or estopped from advocating in any manner or before any entity, including the FERC or any state agency, any position inconsistent with those contained in this Accord regarding the licensing, permitting and license compliance of these or any other hydropower projects other than those addressed in this Accord.

Accord Terms Contractual/Merger – The terms of the Accord are contractual and not mere recitals. This Accord, which includes and fully incorporates any and all Appendices and the Plan, constitutes the entire agreement among the CAP members with respect to the subject matter hereof. All prior contemporaneous or other oral or written statements, representations or agreements by, between or among any of the CAP members, with respect solely to fish passage and fishway prescriptions of the subject Projects are superseded hereby. Nothing herein shall be construed to affect, negate, or supersede obligations and benefits arising from Duke's Comprehensive Relicensing Agreement and SCE&G's potential settlement agreement for the Saluda Hydroelectric Project regarding reservoir elevation limitations, required flow releases, low inflow protocols or high inflow protocols.

Enforceability – All terms of the Accord not incorporated as FERC License Articles shall be enforced through remedies available under applicable state or federal law.

Compliance with Laws – It is the responsibility of the CAP members to comply with all applicable federal, state and local laws, codes, rules, regulations, and orders of any governmental authority, and, except as otherwise provided herein, each CAP member will obtain, at its own expense all permits and licenses pertaining to its obligations under the Accord. The Accord is not intended and shall not be construed as a defense to or a limitation on civil or criminal liability in any action brought by any governmental entity to enforce any law and shall not limit the assessment or award of any fees, fines, penalties, remediation costs or similar liabilities in any such enforcement action.

Force Majeure – The Parties agree that a CAP member shall not be in breach of the Accord to the extent that any delay or default in performance is due to causes beyond the reasonable control of the delayed or defaulting CAP member; provided, that the delayed or defaulting CAP member notifies the other CAP members as soon as possible of: (A) the event; (B) the expected duration of the event; and (C) the delayed or defaulting CAP member's plan to mitigate the effects of the delay or default. Such causes may include, but are not limited to, natural disasters, labor or civil disruption, acts of terrorism, the inability to secure any legal authorization from another entity

(e.g., a permit or license) where such legal authorization is a prerequisite or requirement for complying with the Accord, or breakdown or failure of the affected Project's works, so long as such causes are beyond the reasonable control of the delayed or defaulting CAP member.

Applicable Law and Venue – This Accord shall be governed by the law of the state wherein the subject hydroelectric development is located. Execution of the Accord does not constitute a consent to jurisdiction of any court unless such jurisdiction otherwise exists. Execution of the Accord also does not constitute a waiver of any immunity or privilege except as provided by law.

Waiver Independence – No consent to or waiver of any provision of the Accord shall be deemed either a consent to or waiver of any other provision hereof, whether or not similar, or a continuing consent or waiver unless otherwise specifically provided.

Water Rights Unaffected – Except as between the Parties hereto and as specifically set forth in this Accord, the Accord does not release, deny, grant or affirm any property right, license or privilege in any waters or any right of use in any waters. The Accord does not authorize any person to interfere with the riparian rights, littoral rights or water use rights of any other person. No person shall interpose the Accord as a defense in an action respecting the determination of riparian or littoral rights or other water use rights.

Parties' Own Costs – Except as expressly provided for in the Accord, all CAP members are to bear their own costs of participating in the Accord.

Existing Laws – Unless otherwise noted, any reference to any statute, regulation or other document refers to the statute, regulation or document as it exists on the date of the first signature on the Accord.

No Third-Party Beneficiary – The Accord shall not create any right in any individual or entity that is not a signatory hereto or in the public as a third-party beneficiary. This Accord shall not be construed to authorize any such third party to initiate or to maintain a suit in law or equity or other administrative proceeding.

No Commitment of Funds – Nothing in the Accord shall be construed as obligating any federal, tribal, state, or local agency to expend in any fiscal year any sum in excess of appropriations made by Congress, tribal councils, or state or local legislatures or administratively allocated for the purpose of this Accord for the fiscal year or to involve any federal, tribal, state, or local agency in any contract or obligations for the future expenditure of money in excess of such appropriations or allocations.

No Government Agency Delegation – Nothing in the Accord shall be construed as requiring or involving the delegation by any government agency to any other body of any authority entrusted to it by Congress, tribal council, or by the legislature of any state.

Successors and Assigns – The Accord shall apply to, and be binding on, the CAP members, their successors, transferees and assigns. No change of ownership in a Project or transfer of a license shall in any way modify or otherwise affect any other CAP member's interests, rights, responsibilities, or obligations under the Accord. (See the General section of the Accord for a list of Projects and current licensees.) Unless prohibited by applicable law, the licensee of the

affected Project shall provide in any transfer of the existing or new license for the Project, that such new owner shall be bound by, and shall assume the rights and obligations of the Accord upon completion of the change of ownership. In the event applicable law prohibits the new owner from assuming the rights and obligations of the Accord, any CAP member may withdraw from the Accord. The licensee of the affected Project shall provide written notice to the other CAP members at least 90 days prior to completing such transfer of the license.

Caption Headings – The paragraph titles and caption headings in the Accord are for convenience of reference and organization, are not part of the Accord, and shall not be used to modify, explain, interpret, or define any provisions of the Accord or the intention of the CAP members.

Limitation of Applicability – The CAP members have entered into the negotiations and discussions leading to the Accord with the explicit understanding that all discussions relating thereto are to be considered as settlement negotiations, shall not prejudice the position of any CAP member or entity that took part in such discussions and negotiations, and are not to be otherwise used in any manner in connection with these or any other proceedings. The CAP members understand and agree that execution of the Accord establishes no precedents, does not admit or consent to any fact, opinion, approach, methodology, or principle except as expressly provided herein.

Execution in Counterparts – This Accord may be signed in counterparts to expedite signatures, and shall become binding between the Utilities and the Agencies upon the last signature below by an authorized representative of each.

Full Legal Authority – Each signatory Party to the Accord represents that it has the full legal authority to execute this Accord and to bind the principal who it represents, and that by such representative's signature, such principal shall be bound upon full execution of the Accord.

Notices – Notices in connection with matters under the Accord shall be provided in writing and addressed to:

Hugh Barwick
Senior Environmental Resource Manager
Duke Energy Carolinas, LLC
526 South Church Street, P. O. Box 1006 (EC12Y)
Charlotte, NC 28201-1006
704/382-8614 FAX

William Argentieri, PE
Manager—Civil Engineering F/H Technical Services
South Carolina Electric & Gas Company
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Bennett Wynne
Anadromous Fish Coordinator
NC Wildlife Resources Commission
901 Laroque Avenue
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252/522-9736 FAX

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SC Department of Natural Resources
1771-C Highway 521 By-Pass South
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Tim Hall
USFWS Field Supervisor
176 Croghan Spur Rd., Suite 200
Charleston, SC 29407
843/727-4218 FAX

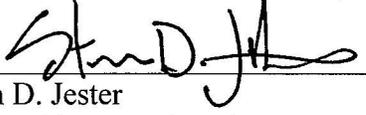
Brian Cole
USFWS Field Supervisor
160 Zillicoa Street
Asheville, NC 28801
828/258-5330 FAX

AGREED TO BY THE AUTHORIZED REPRESENTATIVES OF THE PARTIES NAMED BELOW ON THE DATES SHOWN BY THEIR SIGNATURES:

SOUTH CAROLINA ELECTRIC & GAS COMPANY

By:  Date: 4/18/08
James M. Landreth
Vice President, Fossil Hydro Operations
111 Research Drive
Columbia, SC 29203

DUKE ENERGY CAROLINAS, LLC

By:  Date: 4/10/08
Steven D. Jester
Vice President, Hydro Licensing and Lake Services
526 South Church Street
Charlotte, NC 28202

U.S. FISH & WILDLIFE SERVICE

By:  Date: 4/25/08
Sam Hamilton
Regional Director, Southeast Region
1875 Century Blvd., Suite 400
Atlanta, GA 30345

S.C. DEPARTMENT OF NATURAL RESOURCES

By:  Date: 5/14/08
John Frampton
Director
1000 Assembly Street
Columbia, SC 29202

N.C. WILDLIFE RESOURCES COMMISSION

By:  Date: 4/21/08
Fred Harris
Interim Executive Director
1701 Mail Service Center
Raleigh, NC 27699-1701

Appendix A. Projected annual costs for tasks in the Santee River Basin Cooperative Fish Passage Accord 10-Year Action Plan¹.

Task	Years										Total for all years
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Hatchery Operations	\$ 340,000	\$ 138,000	\$ 142,000	\$ 146,000	\$ 151,000	\$ 155,000	\$ 160,000	\$ 165,000	\$ 170,000	\$ 175,000	\$ 1,742,000
Adult Shad Transport	\$ 77,000	\$ 80,000	\$ 82,000	\$ 84,000	\$ 87,000	\$ 90,000	\$ 92,000	\$ 95,000	\$ 98,000	\$ 101,000	\$ 886,000
Elver Studies/Catawba-Wateree River	\$ 43,000	\$ 64,000	\$ 46,000	\$ 47,000	\$ 75,000	\$ 50,000	\$ 52,000	\$ 82,000	\$ 55,000	\$ 56,000	\$ 570,000
Juvenile Shad Monitoring		\$ 106,000	\$ 109,000	\$ 113,000	\$ 116,000	\$ 119,000	\$ 123,000	\$ 127,000	\$ 130,000	\$ 134,000	\$ 1,077,000
Adult Shad Migration		\$ 159,000						\$ 190,000			\$ 349,000
Sturgeon Studies			\$ 109,000	\$ 113,000	\$ 116,000	\$ 119,000	\$ 123,000				\$ 580,000
Elver Studies/Parr									\$ 65,000	\$ 34,000	\$ 99,000
Estimated Annual Costs	\$ 460,000	\$ 547,000	\$ 488,000	\$ 503,000	\$ 545,000	\$ 533,000	\$ 550,000	\$ 659,000	\$ 518,000	\$ 500,000	\$ 5,303,000
Available Funds	\$ 700,000	\$ 715,000	\$ 730,450	\$ 746,364	\$ 762,755	\$ 779,638	\$ 797,027	\$ 814,938	\$ 833,386	\$ 852,388	\$ 7,731,946
Fund Balance ²	\$ 240,000	\$ 408,000	\$ 650,450	\$ 893,814	\$ 1,111,569	\$ 1,358,207	\$ 1,605,234	\$ 1,761,172	\$ 2,076,558	\$ 2,428,946	

¹ Assumes an annual 3% inflation rate for all items except contributions by South Carolina Electric and Gas Company.

² Fund balance or contingency is the difference between the estimated task costs and available funds for that year, and includes the balance from the previous year.

Appendix B. No-sooner-than dates, total restorational numbers, and biological triggers for construction of fish passage facilities at selected Santee River Basin hydroelectric dams.

Utility	Dam	Date	Total number ¹	50% Trigger ²	75% Trigger ³
SCE&G	Saluda	Deferred	NA ⁴	NA	NA
	Columbia ⁵	2007	92,800 (464,000)	46,400 (185,600)	69,600 (348,000)
	Parr	2012	128,150 (640,750)	64,075 (320,325)	96,112 (480,562)
	Neal Shoals	2016	37,400 (187,000)	18,700 (93,500)	28,050 (140,250)
Duke	Wateree ⁶	2018	NA	NA	NA

¹ Total restoration numbers for adult anadromous American shad (blueback herring) developed by the USFWS from surface acreage calculations of the river (including available tributaries) from that dam to the next dam upstream.

² 50% trigger or when 50% of the total restoration numbers for adult anadromous American shad (blueback herring) for the unblocked reach upstream of the dam are being passed at that dam. This would initiate a Fish Passage Feasibility Assessment at the upstream dam.

³ 75% trigger or when 75% of the total restoration numbers for adult anadromous American shad (blueback herring) for the unblocked reach upstream of the dam are being passed at that dam. This would initiate construction of a Fish Passage Facility at the upstream dam

⁴ NA = Not applicable

⁵ Volitional Fish Passage Facility is operational and passage is currently being evaluated.

⁶ Trap and Truck Fish Passage Facility operational by January 1, 2018.

Appendix C. River miles, surface acreages of the mainstem river and associated tributaries, and restoration numbers (fish/acre) calculated for adult anadromous American shad and blueback herring from selected reaches of the Broad River.

Restoration phase and Reach	River miles	Mainstem acres	Tributary acres	Total acres	Shad ¹	Herring ²
Phase 1						
Columbia Dam to Parr Shoals Development Dam	24	1,758	98	1,856	92,800	464,000
Phase 2						
Parr Shoals Development Dam to Neal Shoals Dam	31	2,106	457	2,563	128,150	640,750

¹ American shad restoration numbers are the product of total acres and 50 fish/acre.

² Blueback herring restoration numbers are the product of total acres and 250 fish/acre.

Appendix A-8
Habitat Enhancement
Program

Habitat Enhancement Program Agreement
Parr-Fairfield Hydroelectric Project Relicensing
June, 2018

In response to Habitat Enhancement Program (HEP) discussions of the August 30, 2017 Comprehensive Relicensing Settlement Agreement (CRSA) meeting (CRSA #3 Meeting), stakeholders are proposing the following topics and related language to 1) be included in the CRSA to address the establishment of a HEP and 2) provide a framework to guide development of a charter for the HEP. Topics addressed in this proposal include:

- Purpose
- HEP funding formula
- Charter to be developed
- Eligible project proposals
 - Geographic area
 - Types of projects
- Proposal review process
- Conditions to limit contributions

Habitat Enhancement Program

Purpose

SCE&G will establish a Habitat Enhancement Program (HEP) for the purpose of restoring, enhancing, and protecting aquatic, wetland, and riparian habitats and the associated natural resources of the Parr-Fairfield Hydroelectric Project (Project) area and portions of the Broad, Saluda, and Congaree River watersheds. The goal of the HEP is to fund on-the-ground conservation actions. The HEP will exist for the term of the new license and be administered by SCE&G to encourage, review, evaluate and fund project proposals to accomplish this purpose.

HEP funding

SCE&G is proposing to make an annual contribution to the HEP equal to the amount deducted from the FERC and other federal agency administrative charges for pumping energy expended, after subtracting 10.6 percent for the cost of Transmission and Distribution (T&D)¹ of the power to Fairfield. Since the fluctuation of Parr Reservoir (and associated unavoidable impacts) during a given year correlates strongly with the amount of pumped storage operation that year, the annual HEP contribution will be greater in years with more pumped storage operation, and smaller in years with less pumped storage operation.

Per 18 CFR 11.1.C.3.iii,

“For a mixed conventional-pumped storage project the charge factor is its authorized installed capacity plus 112.5 times its gross annual energy output in millions of kilowatt-

¹ Based on SCE&G General Service Class Rates 23 & 24 T&D percentage. This will stay constant for the term of the license.

hours less 75 times the annual energy used for pumped storage pumping in millions of kilowatt-hours.”

SCE&G submits annual generation statements to FERC by November 1 of each year, showing generation and pumping energy for the period October 1 of the previous year through September 30 of the current year (the Federal fiscal year). FERC sends an invoice in July of the following year, with payment due by early September of that year. Note the multipliers given in the CFR are equivalent to 11.25 percent of gross energy output in MWH, and 7.5 percent of pumping energy in MWH. FERC also provides Unit Charge Factors each year for its own and other Federal agencies’ estimated administrative charges. These factors are multiplied by the charge factor computed as described in the CFR to compute the total charges payable by the licensee.

These equations are as follows:

FERC Charge Factor (FCF):

$$\text{FCF} = a + (b * c - d * e)$$

a - Authorized KW from License Article 60 (1974 license) on Annual Charge Capacity (526,080)[#]

b - % from 18 CFR 11.1.C.3.i. Conventional Hydro (0.1125)[△]

c - Actual Annual MWH Generated (October 1 - September 30)[£]

d - % from 18 CFR 11.1.C.3.iii Mixed Conventional & Pumped Storage (0.075)[⊖]

e - Generation Used by Pump Storage Facility[£]

Pumping Energy Deduction (PED):

$$\text{PED} = (d * e) * (f + g)$$

d - % from 18 CFR 11.1.C.3.iii Mixed Conventional & Pumped Storage (0.075)[⊖]

e - Generation Used by Pump Storage Facility[£]

f - Current Year FERC Administrative Unit Charge Factor (\$) ^ψ

g - Current Year Other Federal Agencies Administrative Unit Charge Factor (\$) ^ψ

[#] - This value is 526,080 for the current license. This value may change after implementation of the Generator Upgrade or Replacement Plan

[△] - This value is currently equivalent to 11.25 percent of gross energy output in MWH (0.1125)

[£] - This value is provided to FERC by Licensee each October

[⊖] - This value is currently equivalent to 7.5 percent of pumping energy in MWH (0.075)

^ψ - This value is obtained from FERC each year

Habitat Enhancement Funding (HEF):

HEF = PED – h

h - This value is T&D Costs (10.6% of PED value)

For the Parr Hydroelectric Project, the authorized installed capacity is 526,080 KW. For an example year (2012) in which annual energy output was 658,613 MWH and annual energy expended for pumping was 848,474, the charge factor would be computed as follows:

$$\begin{aligned} \text{Charge Factor} &= 526,080 + (0.1125 * 658,613 - 0.075 * 848,474) \\ &= 526,080 + 74,094 - 63,636 \\ &= 536,538 \end{aligned}$$

The deduction from the charge factor for pumping energy expended is 63,636 in this example. For the example year, the FERC provided unit charge factors of 1.546980 for FERC administrative charges, and 0.162896 for Other Federal Agencies (OFA) administrative charges. Multiplying the pumping energy deduction charge factor by the sum of these two unit charge factors gives the dollar amount deducted from the FERC annual charges for pumping energy expended, and subtracting the 10.6% T&D cost gives the HEP contribution:

$$\begin{aligned} 63,636 * (\$1.546980 + \$0.162896) &= \$108,809 \\ \text{Less T\&D Cost @ 10.6\%:} &\quad (\$11,534) \\ \hline \text{Habitat Enhancement Funding:} &\quad \$97,275 \end{aligned}$$

Table 1 below shows the above computation using the generation and pumping energy over the last 14 Federal fiscal years:

Fiscal Year	Pumping Energy (MWH, previous FY)	Charge Factor from 18 CFR	FERC Unit Charge Factor	Other Federal Agencies Charge Factor	Annual Charges Deduction for Pumping Energy Expended	HEP Contribution Net of Transmission & Distribution Cost (10.6%)	Parr Reservoir Average Daily Fluctuation (feet, previous FY/WY)
2004	1,082,358	81,177	1.427823	N/A ²	\$115,906	\$103,620	5.20
2005	1,241,915	93,144	1.540103	N/A	\$143,451	\$128,245	5.73
2006	1,220,472	91,535	1.248321	0.133254	\$126,463	\$113,058	5.61
2007	1,201,038	90,078	1.153142	0.203692	\$122,221	\$109,265	5.77
2008	1,112,467	83,435	1.322620	0.208375	\$127,739	\$114,198	5.57
2009	1,121,484	84,111	1.455633	0.233334	\$142,061	\$127,003	5.41
2010	992,379	74,428	1.449217	0.199028	\$122,676	\$109,673	4.59
2011	833,344	62,501	1.508011	0.161098	\$104,321	\$93,263	4.28
2012	848,474	63,636	1.546980	0.162896	\$108,809	\$97,275	4.33
2013	859,564	64,467	1.500914	0.149766	\$106,415	\$95,135	4.19

² FERC did not provide a unit charge factor for other federal agencies in FY2004 or FY2005.

2014	625,794	49,935	1.402684	0.104162	\$70,723	\$63,226	3.25
2015	538,546	40,391	1.490838	0.088588	\$63,795	\$57,032	2.85
2016	700,422	52,532	1.566760	0.099777	\$87,546	\$78,266	3.69
2017	706,813	53,011	1.714956	0.096266	\$96,015	\$85,837	3.49

Table 1.

Figure 1 below shows the strong correlation over this same time period between pumping energy and average daily Parr Reservoir fluctuation.

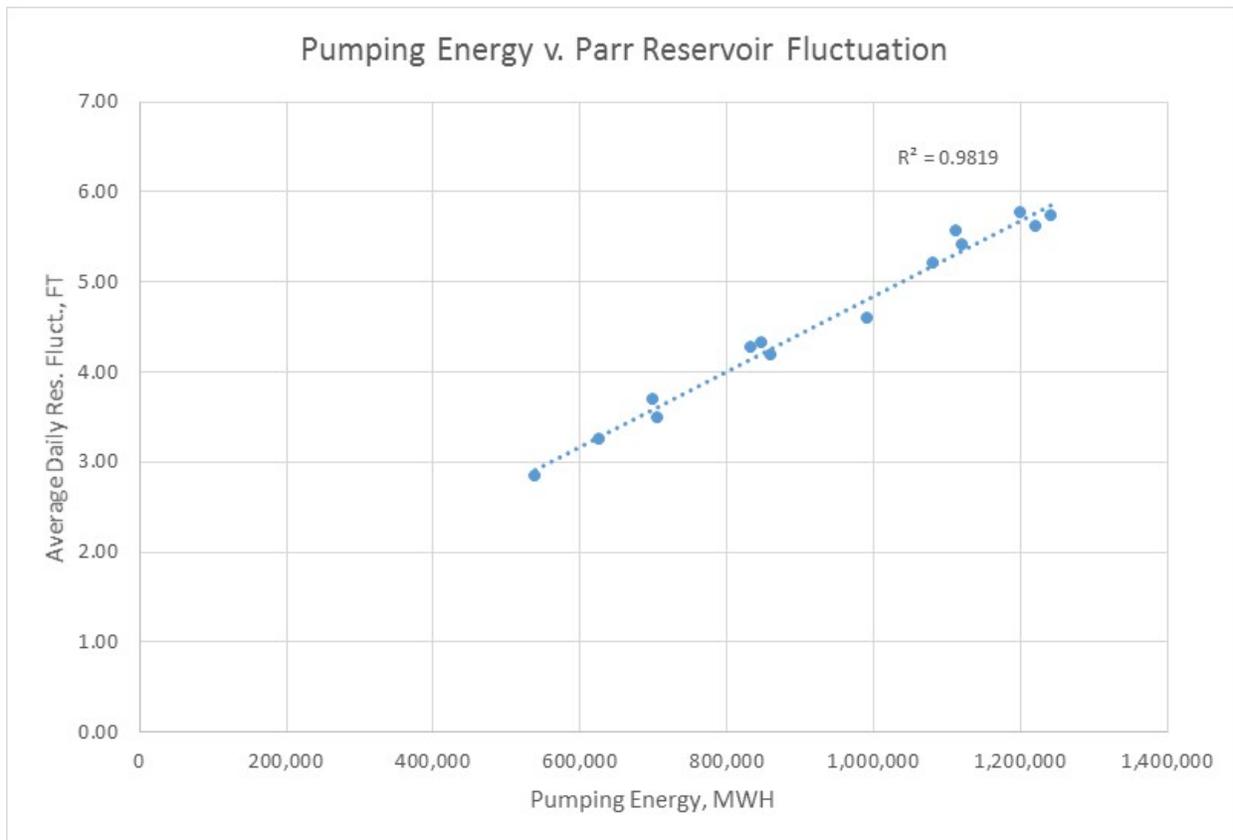


Figure 1.

A minimum annual contribution to the HEP by SCE&G will be established at \$50,000 in the year the license is issued. Every five years, this figure will be adjusted according to the previous five year average of the Producer Price Index (PPI)³. In the event any elements of the HEP formula are changed pursuant to changes in law or FERC regulation, which result in substantial reduction or increase in annual contributions, SCE&G will convene the signatories to the CRSA to adopt an appropriate substitute funding mechanism.

³ This is the Bureau of Labor Statistics Non-Seasonally Adjusted Overall Final Demand, 12-month percent change

Charter to be developed

Administration of the HEP and decisions of how to spend HEP funds will be in accordance with a charter developed by SCE&G in cooperation with other parties to the CRSA. The charter will be developed within one year after FERC issuance of the new Project license. SCE&G proposes to make the HEP contribution during the fourth quarter of the same calendar year in which the annual charges are paid. The funds will be held in an interest bearing account with a third party as agreed to by the Proposal Review Committee (PRC) at the time the charter is being developed.

Proposal Review Committee

A PRC will be established and consist of SCE&G, signatories to the CRSA with knowledge of Project related natural resources issues, and the agencies that may not be signatories to the CRSA but participated in Project relicensing and have regulatory authority relative to Project related natural resources issues. A provision will be included to allow for the addition of new parties if such parties are formed and would provide value to the PRC. The PRC will consist of at least five voting members. SCE&G will act as the administrator of the PRC. SCE&G will establish the PRC in accordance with the HEP charter and convene an initial coordination meeting of the PRC within six months after the charter is finalized by PRC.

Eligible project proposals

The PRC will establish an approach for evaluating and ranking proposals based on their potential to restore, enhance, and protect aquatic, wetland, and riparian habitats and the associated natural resources. Proposals will be accepted from any organization or individual including PRC members; however, if a PRC member submits a proposal then that member must recuse itself from deliberations and voting on the proposal. The PRC will have the flexibility to identify priority areas for funding plus specific criteria and other mechanisms for evaluating proposals; however, eligible projects will be subject to limits of locations and types of projects as described in the subsequent paragraphs.

The location of projects eligible for funding must be within a geographic area defined by the following watersheds or portions of watersheds (and federal hydrologic units codes (HUCs)) of the Broad, Saluda, and Congaree Rivers (see Figure 2 – map of the area):

- Lower Broad River 8 Digit Watershed: HUC 03050106 – entire watershed;
- Tyger River 8 Digit Watershed: HUC 03050107 – that portion downstream of the towns of Pacolet and Woodruff;
- Enoree River 8 Digit Watershed: HUC 03050108 – that portion downstream of the towns of Woodruff and Gray Court;
- Twelvemile Creek – Saluda River 10 digit Watershed: HUC 0305010914 – entire watershed;
- Congaree River 8 Digit Watershed: HUC 03050110 – entire watershed.

(Reference: SCDHEC Watershed Atlas - <https://gis.dhec.sc.gov/watersheds/> – based on the National Watershed Boundary Dataset)

The types of projects eligible for funding will include (may be reevaluated on some frequency):

- Conservation of lands for the purpose of protecting aquatic resources by fee simple acquisition, conservation easements, or other conservation measures agreed to by the PRC;
- Restoration and enhancement of stream channels, stream banks, riparian areas, shorelines, and wetlands;
- Removal of barriers to aquatic species; (This would include voluntary aquatic habitat enhancements that are not compliance related activities such as FERC license or other regulatory agency requirements.)
- Conservation, restoration and enhancement of habitat for threatened and endangered species (T&E) and at-risk species, with an emphasis on aquatic species.
- Conducting research, monitoring, enhancement of T&E and at-risk species' populations, with an emphasis on aquatic species.
- Creation or construction of habitats and nesting boxes to support fish and wildlife species, with an emphasis on aquatic species;
- Fertilizing and aquatic plant control in the Monticello sub-impoundment;
- Conducting research and monitoring to support restoration of migratory fishes and other aquatic resources;
- Developing low-impact facilities to access waterways for fishing and boating; and
- Studies, design/engineering plans, monitoring, etc., are eligible for funding if their purpose is to support projects described in previous bullets.

Proposal review process

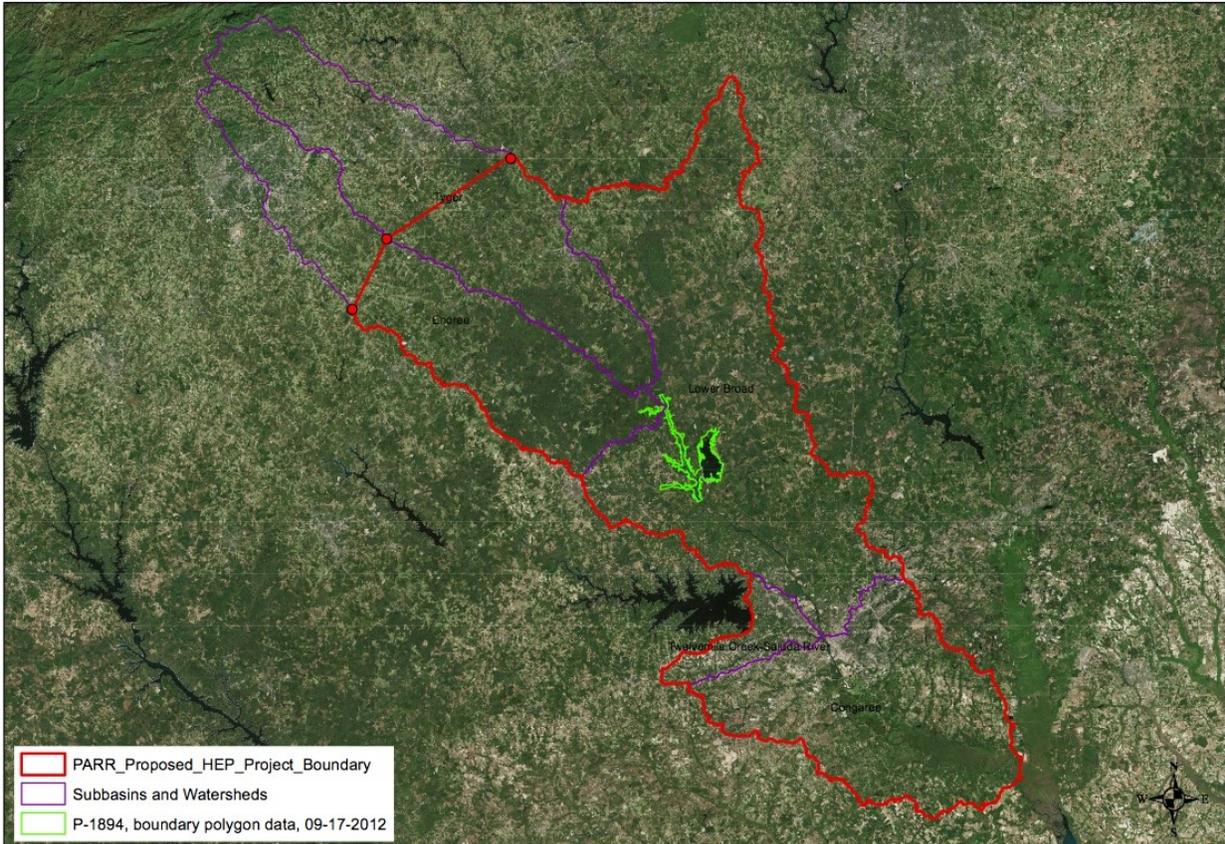
The PRC will review and evaluate all HEP proposals and decide which projects to fund. All PRC decisions will be by three-quarters majority vote (e.g. 4 of 5, 5 of 6, 5 of 7, or 6 of 8 members, etc.).

The PRC will issue an RFP within 60 days after the annual payment is made to the HEP fund. Proposals requesting HEP funds will be submitted to SCE&G. SCE&G will forward all proposals to the PRC for evaluation and recommendations. Final decisions on proposals received will be made by the PRC within three months after the RFP submittal deadline. The distribution of funds will follow invoicing and accounting procedures to be outlined within the charter.

SCE&G will be responsible for the organization and administration of PRC meetings, arranging for dispersal of HEP funds, and collection and distribution of reports for funded projects.

Figure 2. Map of area for eligible HEP projects. The area is defined by the watersheds or portions of watersheds listed above.

Parr Hydroelectric Project - Proposed Habitat Enhancement Program Boundary



Created: September 28, 2017
By: Melanie Olds

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2

Appendix A-9

**Hydroacoustic Estimates and
Distribution of Fish in
Monticello and Parr
Reservoirs in August 2017 -
Protection, Mitigation and
Enhancement Measure
Recommendation**

Hydroacoustic estimates and distribution of fish in Monticello and Parr reservoirs in August 2017

November 13, 2017

Prepared by



and



for

South Carolina Electric & Gas, Company

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 Shoals Development and the Fairfield Pumped Storage Development. Both Developments are located along the Broad River in Fairfield and Newberry Counties, South Carolina.

The Parr Shoals Dam forms the 15-mile-long Parr Reservoir along the Broad River. The Parr Development has 6 vertical-shaft Francis turbines with a combined licensed capacity of 14.9 MW. The maximum hydraulic capacity of each turbine is approximately 1,000 cubic feet per second (cfs), and the minimum unit turndown has an estimated flow of 150 cfs. Parr Development typically operates in a modified run-of-river mode and normally operates continuously to pass Broad River flows.

The Fairfield Development is located directly off of the Broad River and uses the 6,800-acre Monticello Reservoir as its upper pool and Parr Reservoir as the lower pool for pumped storage operations. The Fairfield Development has eight vertical-shaft reversible Francis pump turbines. The turbines have a maximum combined licensed capacity of 511.2 MW. The maximum hydraulic capacity of each pump-turbine in generating mode is 6,300 cfs, and the minimum turndown flow is approximately 2,500 cfs. In pumping mode, the turbines each have an average rated hydraulic capacity of 5,225 cfs across the total dynamic head range of 158 to 173 feet. The Fairfield Development is primarily used for peaking operations, reserve generation, and power usage.

The Project is currently involved in a relicensing process which involves a variety of stakeholders including state and federal resource agencies, state and local government, non-governmental organizations (NGO), and interested individuals. SCE&G established several Technical Working Committees (TWC's) comprised of interested stakeholders with the objective of identifying and addressing environmental issues associated with the Project.

As part of this process, the Fisheries TWC requested a desktop fish entrainment and turbine mortality study be conducted as part of relicensing to determine the potential impacts of operating the two Developments on the fisheries communities in Parr and Monticello reservoirs. That study was performed by Kleinschmidt Associates (2015). A recommendation of the study was to identify potential ways to reduce fish entrainment at the Project. The TWC discussed the reduction of lighting at night in each of the intake areas as a potential way to reduce fish entrainment. To evaluate this measure, SCE&G contracted with Aquacoustics, Inc. to perform hydroacoustic evaluations in each of the Fairfield Development intake areas (conventional and pump-back) at night with lights "on" and lights "off" to determine if reduction of lighting in the intake areas could potentially reduce concentration of fish at the intakes and therefore reduce potential fish entrainment.

This report provides a summary of the hydroacoustic study performed by Aquacoustics.

Methods

Monticello Reservoir and a portion of Parr Reservoir were sampled in August 2017 with a 200-kHz split beam sonar system to estimate the limnetic fish population. The survey goals were:

1. to provide a fish density estimate in Monticello and Parr reservoirs, and
2. to collect fish density data in the Fairfield intake/discharge areas to determine if reduction of lights would reduce fish densities in the intakes.

Sampling for reservoir fish density was conducted in Monticello Reservoir on August 9th after sunset (Figure 1). The Project station did not operate during data collection. Sampling within the Fairfield intake also occurred on August 9th (lights “on”) and was concentrated within the intake structure and along the dam on either side of the intake structure (Figure 2). SCE&G originally proposed that data be collected during both lights “on” and lights “off”. However, the intake structure was not sampled during a lights “off” condition because there was only a single light in the intake and it did not appear to represent an attraction to fish.

The Fairfield tailwater was sampled on August 10th (lights “on”) and 11th (lights “off”) after sunset. The Project did not operate during data collection. Sampling in the tailwater included an S-shaped transect from the railroad trestle upstream to the dam face on August 10th, and 3 replicate transects less than 30 meters from the face of the dam from the river-left bank to the river-right bank (Figure 2). Six tailwater lights were lit during the August 10th sampling. The tailwater lights were turned off during sampling on August 11th (Figure 3) when the 3 replicate transects across the face of the dam were re-sampled.

Hydroacoustic data was collected using a Simrad EK60 sonar system with two 7° circular split beam transducers. Sampling and processing parameters are listed in Table 1. The system was calibrated in situ using a standard 36 mm tungsten carbide sphere, and gain corrections were applied to the data during processing to correct the measured sphere acoustic size to the expected value at the water temperature of 30°C. Sampling was conducted after sunset by randomly traversing the limnetic region of the reservoir at a speed of 2.0 - 2.2 meters/sec. The vertically and horizontally aimed transducers were mounted on poles at a depth of 0.5 and 1 meter, respectively. The top 2 meters of the water column was sampled by the horizontally aimed transducer and the remainder of the water column was sampled with the vertically aimed transducer. A Geographic Positioning System (GPS) with Wide Area Augmentation System (WAAS) differential correction fed location information to the system and was written to the acoustic data files.

The data were processed using EchoView software to output total backscatter from fish targets in 1-meter depth strata for each 250-meter longitudinal distance sampled in Monticello Reservoir. For surveys in the vicinity of the Fairfield intake and discharge targets were summed for each 100-meter distance and 1-meter depths, and the Fairfield lights on/lights off survey used 5-meter intervals and 1-meter depths. The echo integration values were scaled using the mean backscatter (TS/Sigma) for an individual

fish for each area and transducer sampled. The lakewide survey on Monticello reservoir also used different scalars by depth strata because fish size varied by depth in the reservoir. Echoview single target criteria are presented in Table 1.

Results

The lakewide population estimate for Monticello Reservoir is 81,302,857 (Table 2). The lake was stratified into 3 zones for the population estimate; the Upper Lake, Mid-Lake, and the Exclusion Zone (Figure 1). Densities were over 2 times higher in the Upper and Mid-Lake strata than in the Exclusion Zone (Table 2). Densities in the Fairfield intake (Monticello Reservoir) were less than half the densities found in the nearby Exclusion Zone. Densities in the Fairfield discharge (Parr Reservoir) between the dam and the railroad trestle were slightly higher than in the intake area.

The vertical distribution of fish varied by strata with 97% of the fish in the Upper Lake above 10 meters while the Mid-Lake and Exclusion Zone had only 88.3% and 91.8% above 10 meters, respectively (Figure 4). The 10% of the population below 10 meters in the Mid-Lake and Exclusion Zone were also larger fish. Nearly 85% of fish in the top 10 meters were less than 8-cm, while only 50% of the fish below 15 meters were less than 8-cm (Figure 5).

Fish densities measured in and near the Fairfield intake (Monticello Reservoir) structure during lights “on” were lower than in Monticello Reservoir, but the fish were larger (Figure 6). Only 35% of the fish were less than 10-cm and 43% were greater than 30-cm. These larger fish are likely not as susceptible to entrainment because they likely can escape the water velocities produced by generation, but may be in the area to prey upon smaller fish entrained during pump operations.

Sampling the Fairfield discharge (Parr Reservoir) indicated that lights on the dam face were attracting fish to the structure when the hydro was not pumping. We saw a mean density of 12,946 fish/hectare near the face of the structure when the lights were on, but only 3,980 fish/hectare the following night when the lights were off. Fish were also distributed near surface and the lights (Figure 7).

Conclusions

We can make two general remarks based on these hydroacoustic surveys at the Fairfield Project.

The lake-wide estimates on Monticello Reservoir were performed during the time of year that the highest fish (especially shad) densities are expected to be observed. Estimates in the late fall, winter, and early summer would better define the fish densities susceptible to entrainment during other portions of the year. Monthly surveys at other hydroelectric project (Lake Norman and Thurmond Lake) tailwater areas indicate that shad populations decline through the fall (threadfin shad die-off in December or January with colder water

temperatures) and shad recruitment occurs in June, so potential entrainment should oscillate during the year as densities in the reservoir and tailwater change.

Based on our observations, it is reasonable to conclude that lighting reduction in the Fairfield discharge (Parr Reservoir) should reduce the concentration of fish in the immediate intake area. This reduction could reduce the potential of fish entrainment at pump back start up and during some pumping events in that area of the Project.

Protection, Mitigation, Enhancement Measure Recommendation

As a protection and reduction measure for fish entrainment at the Fairfield Development, SCE&G recommends that the Fairfield Development tailrace lights (the lights that are located on the powerhouse intake and shine onto the tailrace intake area) will be turned off under normal operating conditions. The lighting reduction should provide a reduction in future entrainment at the Fairfield Development.

However, should the Department of Homeland Security National Terrorism Advisory System (or an equivalent program) or other law enforcement agency determine that the security threat level should be elevated, these lights may be turned on and may stay on as long as an elevated security threat level is in place. Lights will be turned off again after the threat level is lowered to normal levels.

Table 1. Hydroacoustic data collection and processing parameters.

Sampling Parameter	Setting
Power	60 W
Pulse duration	256 μ sec
Ping rate	5/sec
Processing Parameter	
Minimum threshold	-60 dB
Minimum TS threshold	-60 dB
Sound speed	1509 m/sec
Absorption coefficient	0.006622
Single target detection	
TS threshold	-60 dB
Pulse length determination level	6 dB
Min normalized pulse length	0.5
Max normalized pulse length	1.5
Beam compensation	Simrad LOBE
Max beam compensation	12 dB
Max STD minor angle	0.6
Max STD major angle	0.6

Table 2. Fish density estimates by strata with area for each strata and population estimates with 95% confidence limits.

Strata	Area (ha)	Density (#/ha)	Estimate	Lower 95%	Upper 95%
Monticello Lake					
Upper Lake	835	42,347	35,346,124	26,855,930	46,143,995
Mid-Lake	1407	29,296	41,223,193	30,555,188	54,233,970
Exclusion Zone	332	14,254	4,733,540	3,882,570	5,629,847
Total		28,962	81,302,857	61,293,689	106,007,812
Fairfield					
Fairfield intake (Monticello Res.)	1.5	5,835	8,753	5,586	14,242
Fairfield discharge (Parr Res.)	24.55	7,308	179,401	135,433	228,495

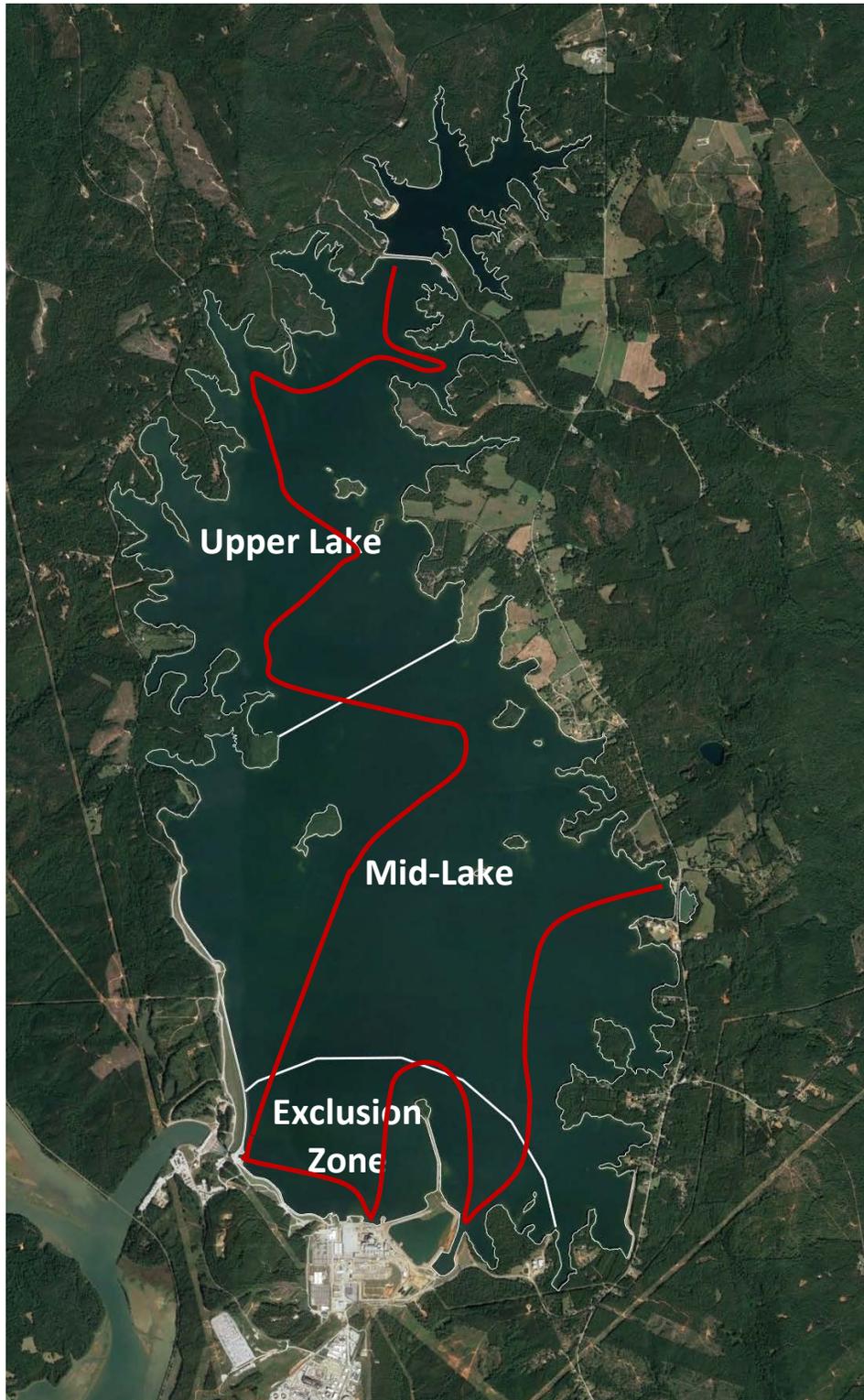


Figure 1. Map of Monticello Reservoir with transect line (red) and zones sampled using hydroacoustics.

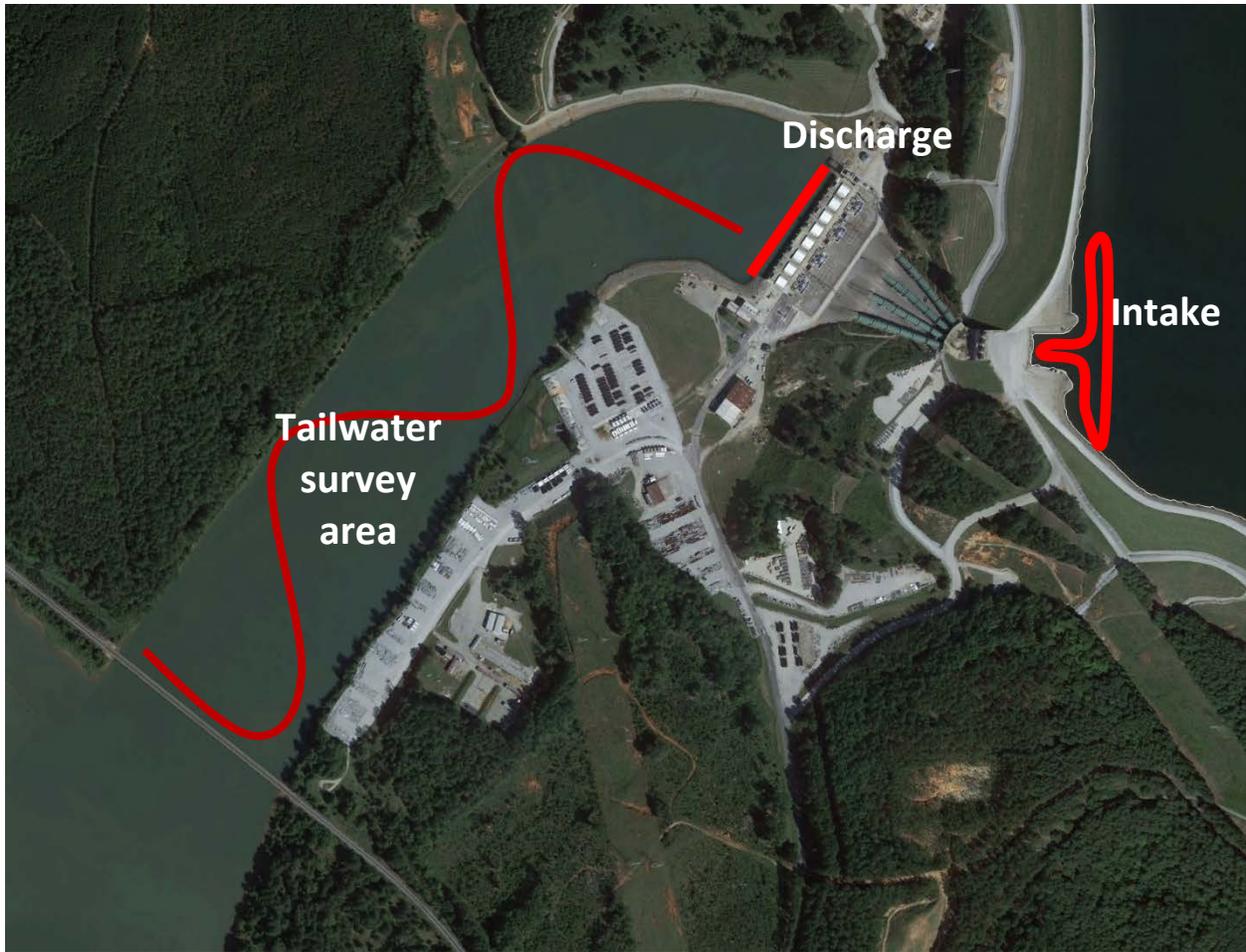


Figure 2. Map of intake, discharge, and tailwater areas sampled with hydroacoustics.

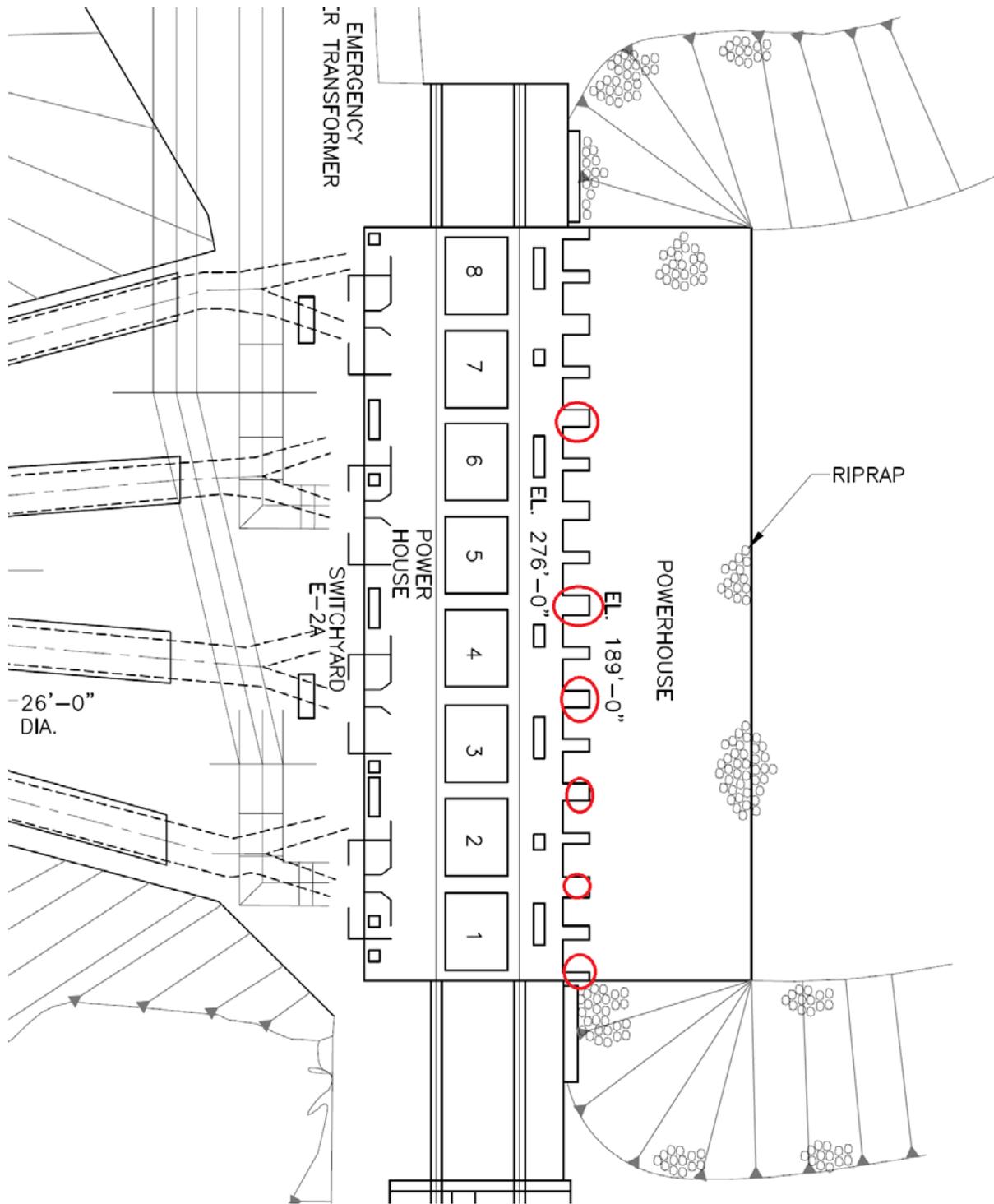


Figure 3. Diagram of Fairfield discharge with locations of lights indicated with red circles.

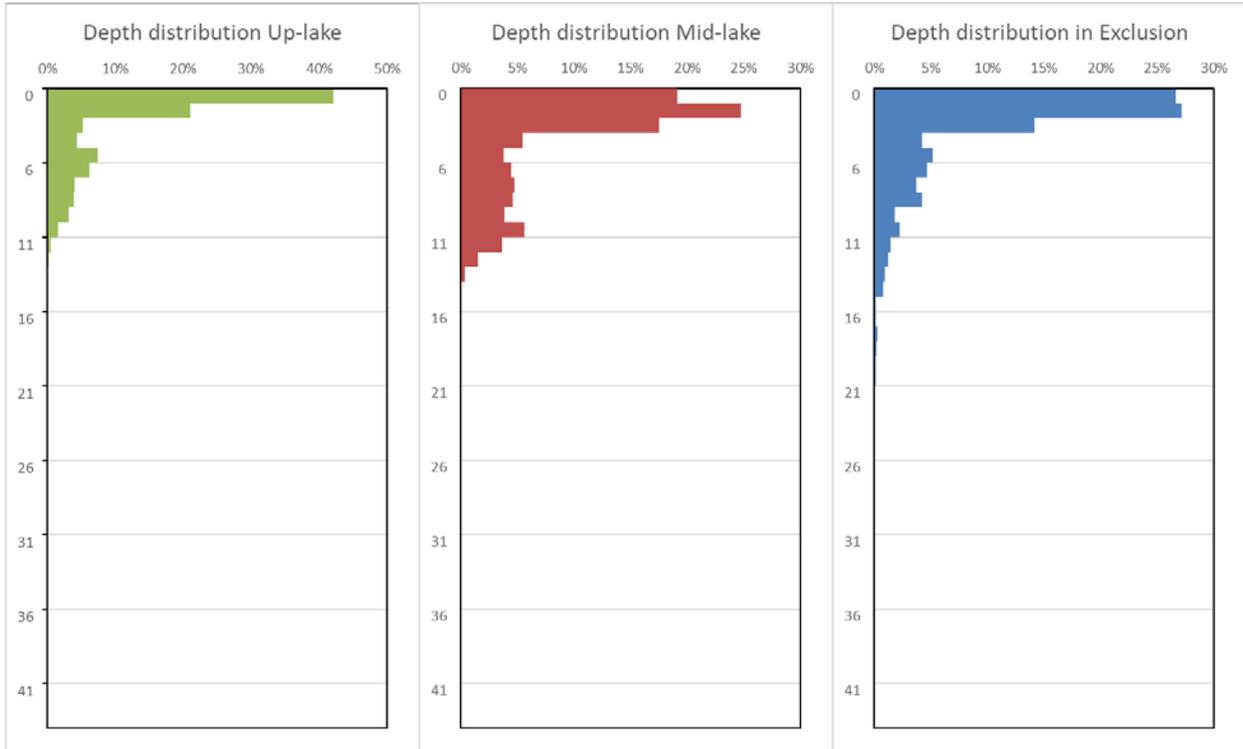


Figure 4. Vertical distribution of fish in the 3 sample strata.

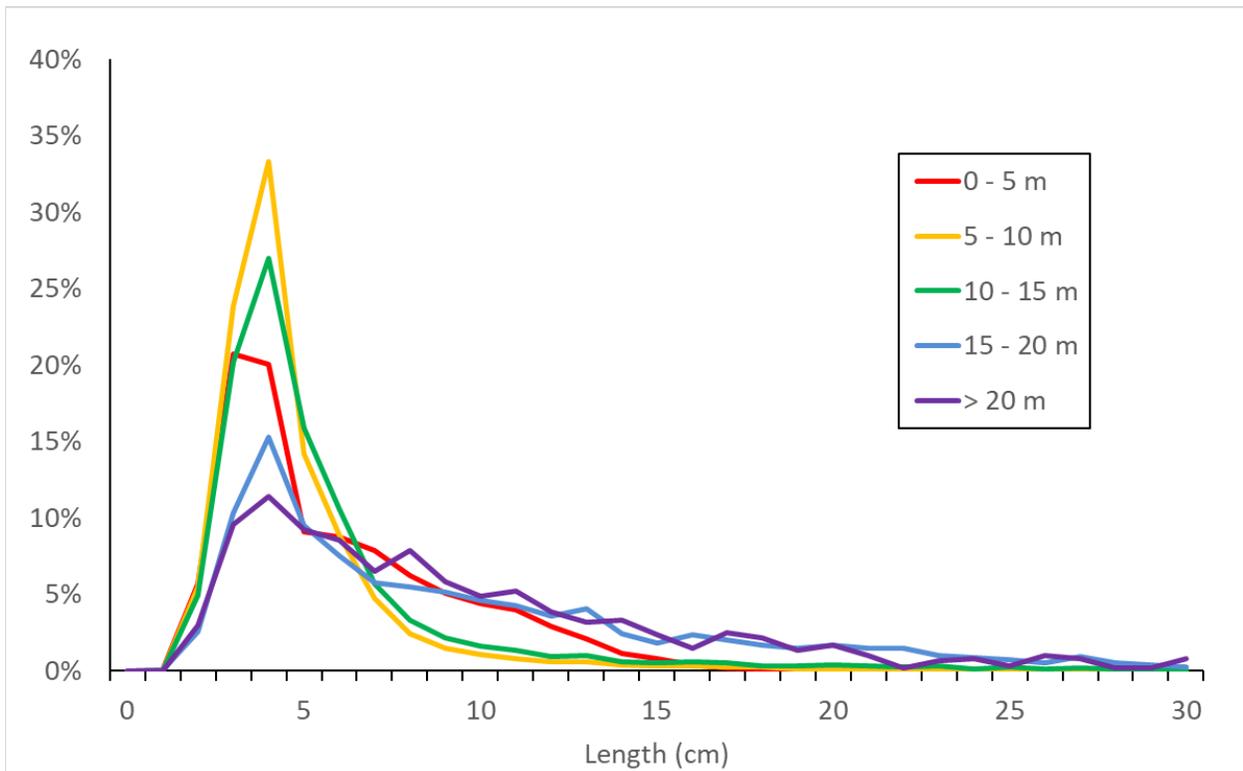


Figure 5. Length frequency of fish targets in Monticello Reservoir by depth strata. Acoustic size converted to fish length using Loves dorsal aspect equation.

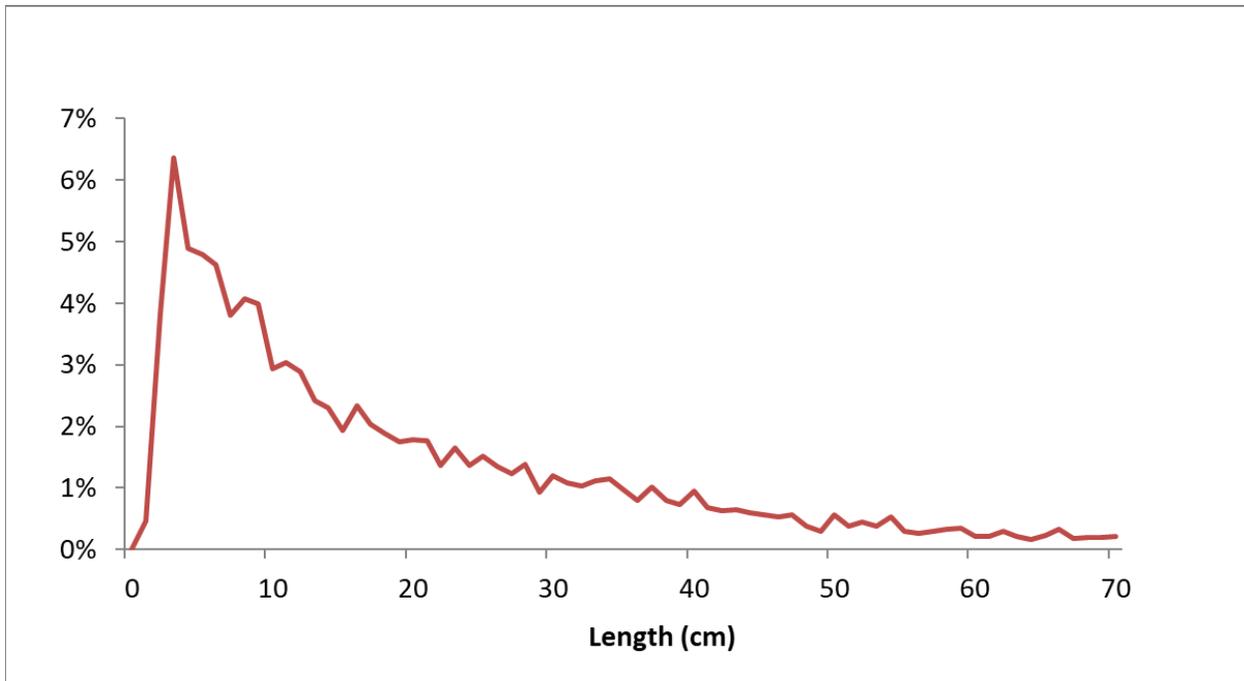
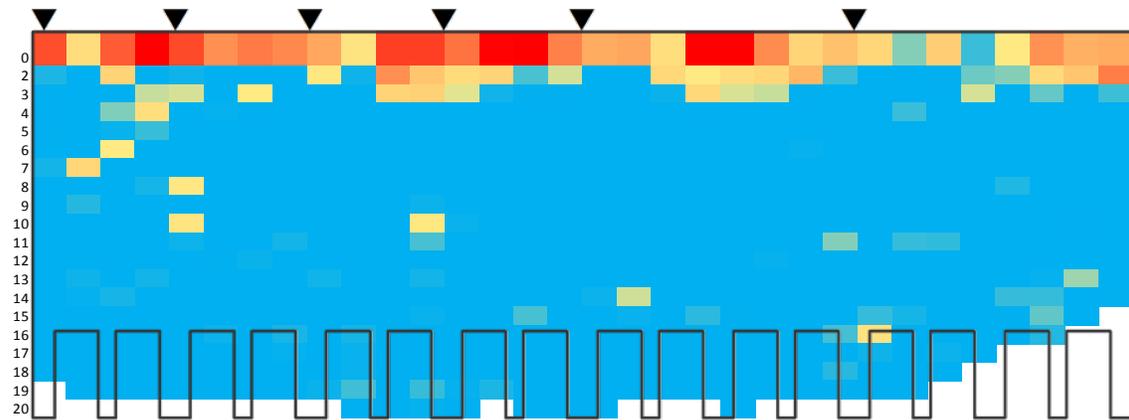


Figure 6. Length frequency distribution of fish in the Fairfield intake. Acoustic size converted to fish length using Loves dorsal aspect equation.

Right bank

Left bank

Density distribution across dam face by depth with lights on



Density distribution across dam face by depth with lights off

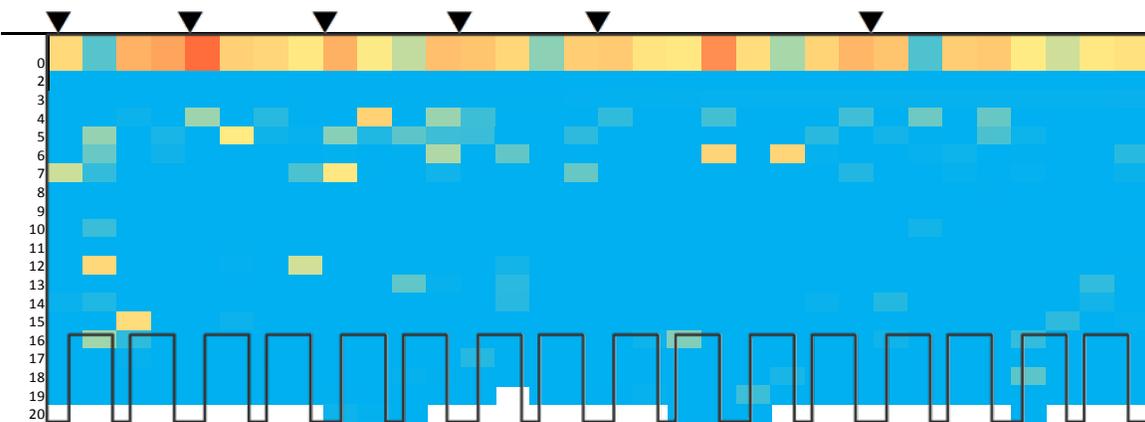


Figure 7. Density distribution of fish in the Fairfield tailrace near the dam on August 10 and 11 when the lights were “on” and “off”, respectively. Graphic shows distribution across the face of the dam from top to bottom. Hot colors indicate higher densities and cooler colors show low densities. White indicates no data. Black triangles near surface indicate the location of the lights that were on during sampling, and the intake bays are near bottom at 16 to 20 meters deep.

Appendix A-10
Enhancements to the West
Channel Downstream of Parr
Shoals Dam Adaptive
Management Plan

ADAPTIVE MANAGEMENT PLAN

**ENHANCEMENTS TO THE WEST CHANNEL
DOWNSTREAM OF PARR SHOALS DAM**

SOUTH CAROLINA ELECTRIC & GAS COMPANY

FERC No. 1894

Prepared by:

South Carolina Electric & Gas Company

June 2018

**ADAPTIVE MANAGEMENT PLAN
FOR
ENHANCEMENTS TO THE WEST CHANNEL
DOWNSTREAM OF PARR SHOALS DAM**

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<u>APPENDIX A</u>	SUMMARY OF CONSULTATION	
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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

Af	acre-foot, the amount of water needed to cover one acre to a depth of one foot
AMP	Adaptive Management Plan
AR	American Rivers
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CRK	Congaree Riverkeeper
CRSA	Comprehensive Relicensing Settlement Agreement
DLA	Draft License Application
DO	dissolved oxygen, generally expressed in units of parts per million or milligrams per liter (mg/L)
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
ft	foot
GPS	Global Positioning System
IFIM	Instream Flow Incremental Methodology
installed capacity	the nameplate megawatt rating of a generator or group of generators
interested parties	individuals and entities that have an interest in a proceeding
kW	Kilowatt
kWh	kilowatt-hour
Licensee	South Carolina Electric & Gas Company
Licensing/Relicensing	the process of acquiring an original FERC license for a new proposed hydropower project; or, the process of acquiring a new FERC license for an existing hydropower project after the previous license has expired.
mg/L	Milligrams per liter
Minimum flow	A continuous flow, measured in CFS that is required to be released from the Project dam during specified periods of time.
Msl	mean sea level
MW	megawatt
MWh	megawatt-hour
NGO	non-governmental organization
NMFS	National Marine Fisheries Services, also known as NOAA Fisheries
NOAA	National Oceanic and Atmospheric Administration, including NMFS
PM&E	protection, mitigation and enhancement measures

Project	Parr Hydroelectric Project (FERC No. 1894)
Project Area	Zone of potential, reasonably direct project effects within the FERC Project Boundary.
Project Boundary	The boundary line defined in the license issued by FERC that surrounds areas needed for Project purposes.
Review Committee	A group, including SCE&G and stakeholders, formed to direct the implementation of the West Channel AMP. Members of the Review Committee must be signatories to the Comprehensive Relicensing Settlement Agreement.
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCE&G	South Carolina Electric & Gas Company
SHPO	State Historic Preservation Officer
Tailrace	Channel through which water is discharged from the turbines
TLP	Traditional Licensing Process
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQTC	Water Quality Technical Working Committee

**ADAPTIVE MANAGEMENT PLAN
FOR
ENHANCEMENTS TO THE WEST CHANNEL DOWNSTREAM OF PARR SHOALS DAM**

1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) will file an application for a new license for its Parr and Fairfield developments on the Broad River with the Federal Energy Regulatory Commission (FERC) in June 2018. The relicensing process was a multi-year cooperative effort between SCE&G and stakeholders, including state and federal resource agencies, non-governmental organizations and concerned citizens, to address operational, recreational and ecological concerns associated with hydroelectric project operations. During the relicensing process the issue of water quality in the West Channel of Broad River downstream of the Parr Shoals Dam was identified by the Water Quality Technical Working Committee (WQTWC) as an issue to resolve. Members of the WQTWC included representatives from SCE&G, South Carolina Department of Natural Resources (SCDNR), South Carolina Department of Health and Environmental Control (SCDHEC), U.S. Fish and Wildlife Service (USFWS), American Rivers and Congaree Riverkeeper. The WQTWC discussed and determined a process for evaluating changes and making decisions based on the best available information. During the WQTWC meetings a framework for a West Channel Adaptive Management Plan (AMP) was developed to address improvement of water quality in the West Channel during the new license term (Appendix A). This AMP describes the water quality issue in the West Channel and SCE&G's proposed actions to improve water quality which will be implemented during the new Parr Hydroelectric Project License (FERC No. 1894).

1.1 PROJECT DESCRIPTION

The Parr Hydroelectric Project, FERC No. 1894 (Project), includes the 14.88-megawatt (MW) Parr Shoals Development (Parr Development) and the 511.2-MW Fairfield Pumped Storage Development (Fairfield Development) located in Fairfield and Newberry County, South Carolina. Parr Reservoir is a 4,400-acre impoundment formed by the Broad River and the Parr Shoals Dam and serves as the lower reservoir for the Fairfield Pumped Storage Development. Monticello Reservoir is a 6,800-acre impoundment formed by a series of four earthen dams and

serves as the upper reservoir for the Fairfield Development. The existing Project license was issued by the Federal Energy Regulatory Commission (FERC or Commission) on August 28, 1974 for a period of 46 years, terminating on June 30, 2020. SCE&G intends to file for a new license with FERC on or before May 31, 2018.

2.0 WEST CHANNEL AMP REVIEW COMMITTEE

2.1 COMMITTEE MEMBERS

A Review Committee will be formed within 120 days of license issuance to direct the implementation of the AMP. Members of the Review Committee must be signatories to the Comprehensive Relicensing Settlement Agreement (CRSA) with the exception of NOAA Fisheries, USFWS, US Forest Service, South Carolina State Historic Preservation Office, SCDHEC and SCDNR.

SCE&G will serve as chairperson of the Review Committee, and be responsible for organizing meetings and distributing documents to committee members. Each entity will have the opportunity to select a representative to the Review Committee from within their organization.

The Review Committee will ultimately work to guide the decision making processes specified in the West Channel AMP. The Review Committee will not make decisions that supersede state or federal law or USFWS Section 7 Authority. The Review Committee's responsibilities may include, but are not limited to:

- Evaluating baseline information and study plans;
- Providing overall guidance for the AMP process;
- Evaluating other study (i.e., existing) information or information which becomes available during the time period of evaluations and would be applicable to the AMP;
- Establishing and documenting the goals and objectives of each action undertaken as part of the AMP and advising when modification to metrics used for evaluation purposes are needed;
- Reviewing and considering long term impacts of operational modifications on the Project and Project economics when evaluating the feasibility of implementing modifications;
- Reviewing the West Channel Annual Report which documents the prior year's AMP activities which SCE&G will file with FERC, making it publicly available; and

- Advising on modifications to the AMP to be presented to FERC and advising if any amendment action is necessary during the license.

2.2 BUDGET/RESOURCES

The responsibility for implementation of this AMP will rest primarily with SCE&G, as licensee for the Parr Project. Annual budgets will be developed by SCE&G relative to the monitoring and study costs as well as administrative costs and expenses. SCE&G will also rely on other resources outside of its establishment including, but not limited to, the following:

- federal, state and local grants
- donated services (federal and state agency involvement)
- equipment (purchases and loaners)
- expertise (governmental, non-governmental, private)

2.3 COMMITTEE MEETINGS

The Review Committee is initially scheduled to consult twice per year via a meeting or conference call. The frequency of meetings may be adjusted based on need. The tentative schedule is provided in Section 6.0 of this plan. Minutes from each meeting, as well as any pertinent materials discussed in the meetings will be filed with FERC as an appendix to the annual report of AMP activities, as described in Section 7.0.

3.0 AMP GOAL

The goal of this AMP is to enhance aquatic habitat in the West Channel through increased year-round stream flows to the area. The stakeholders' desired outcomes of this AMP are to improve water quality year-round (specifically to meet state standards for dissolved oxygen and to improve dissolved oxygen levels in the West Channel during summer/fall periods), to provide a more natural water temperature profile, and to improve water depth and velocity. If the increased stream flows produce the outcomes listed above, it is the opinion of the stakeholders that improved aquatic habitat should result. The methods that will be employed under this AMP to achieve this goal are described in Section 5.0, and the scope of this AMP is limited to the implementation of those measures. The stakeholders agree that if the desired improvements to aquatic habitat in the West Channel are not realized to the extent expected or desired by the

Review Committee despite the implementation of the methods described in Section 5.0, no further action on the part of SCE&G will be required under this AMP.

4.0 BASELINE DATA

4.1 WATER QUALITY

Baseline water quality data was collected in the West Channel during 2015 and 2016 (Kleinschmidt 2016 & 2017). Continuous dissolved oxygen (DO) and temperature data were collected from April 1 through October 15 in 2015 at three monitoring sites in the West Channel and one in the east channel (Figure 4-1).

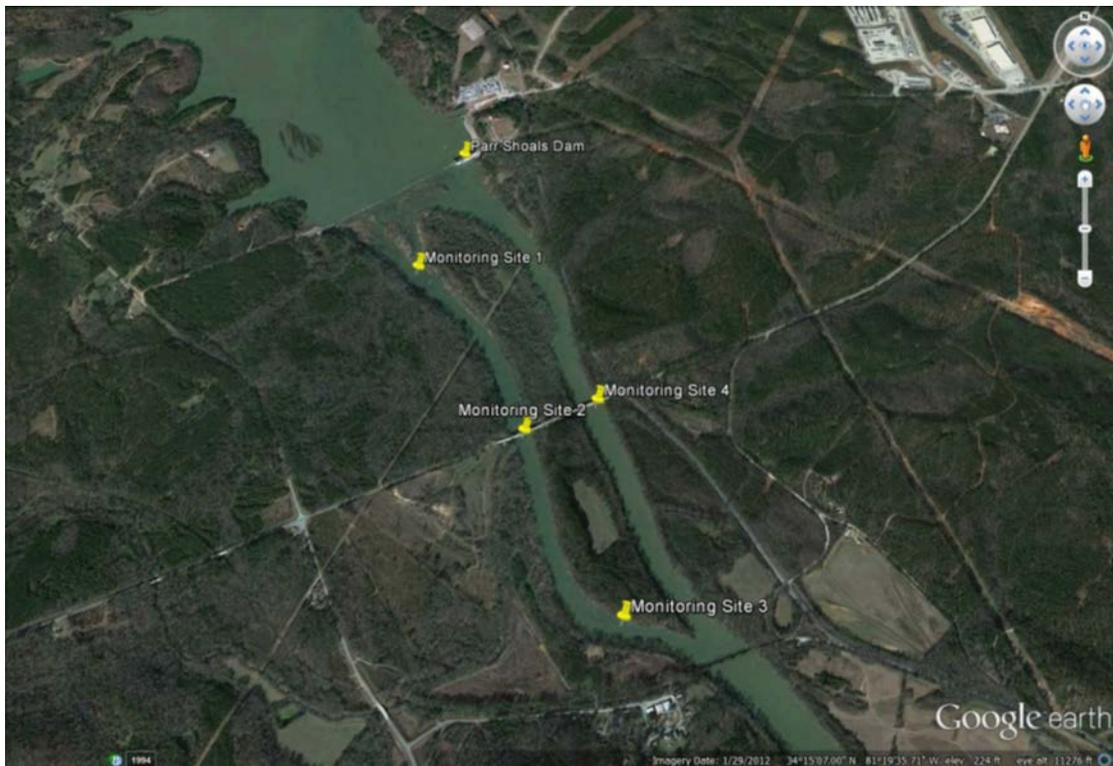


FIGURE 4-1 PARR SHOALS DOWNSTREAM WATER QUALITY MONITORING SITES

Monitoring in 2015 identified DO levels in the West Channel that periodically were below the SCDHEC standard of 4.0 mg/L. Dissolved oxygen levels in the upper West Channel of the Broad River, downstream of Parr Shoals Dam, were consistently lower than those further down the West Channel and in the east channel. This is likely due to the shallow nature of the river in

this area, as well as the presence of dense algal mats. Also, during drier weather conditions, the West Channel does not receive a consistent flow of water.

Based on 2015 monitoring results and WQTWC recommendations, SCE&G performed additional water temperature and DO monitoring during August 2016 to verify baseline conditions and to evaluate how discrete spillway releases or pulses through the spillway gates affect water quality in the West Channel. The pulse flows consisted of distinct releases through spillway gates 1 and 2 for approximately 3 hours. The spills were targeted to release 25 acre-feet of water into the West Channel.

Water temperature and DO were continuously monitored at four sites along the western channel. Water level data were collected at 3 locations in the upper West Channel (Upper Site 1, Upper Site 2, and Upper Site 3), and stream flow measurements were collected at two locations in the upper West Channel (Upper Site 1 and Upper Site 2). Each of the upper West Channel monitoring sites are shown in Figure 4-2.

DO levels generally remained above the SCDHEC standard of 4 mg/L during 2016, with diel fluctuations in both temperature and DO occurring throughout the study. Greater fluctuations in DO were observed later in August as aquatic vegetation increased and spillway flows were curtailed. DO levels in 2016 were generally greater than those observed during 2015. The study also determined that water levels in the West Channel were strongly influenced by flows from the powerhouse and indicate that portions of the tailrace flows from the east channel enter the West Channel. Overall, water quality in the West Channel seems to be most impacted during the later summer months, when stream flows are typically lower, temperatures are warmer, and vegetation growth rates are higher.

4.2 WATER LEVEL AND DISCHARGE

Water level and discharge measurements were collected under several operational scenarios on February 17 and 24, 2017 to investigate the relationship between powerhouse discharge (i.e., east channel discharge) and West Channel discharge. Water levels were recorded at 15-minute intervals at four locations: Upper Sites 1, 2, 4, and 5 (Figure 4-2). Discharge measurements were collected at four powerhouse operation levels, including one, two, three, and five-unit operation. The discharge measurements were collected during stable conditions with no spill at

Upper Sites 1 and 2. Water level logger elevations were determined using a survey-grade GPS and used to calculate water surface elevations. Tailwater elevations and river discharge were obtained from USGS Gage 02160991 (Broad River @ Jenkinsville, SC) and 022161000 (Broad River @ Alston, SC), respectively. Comparisons of water surface elevations during the discharge measurements at the four operational scenarios are depicted graphically in Figure 4-3.

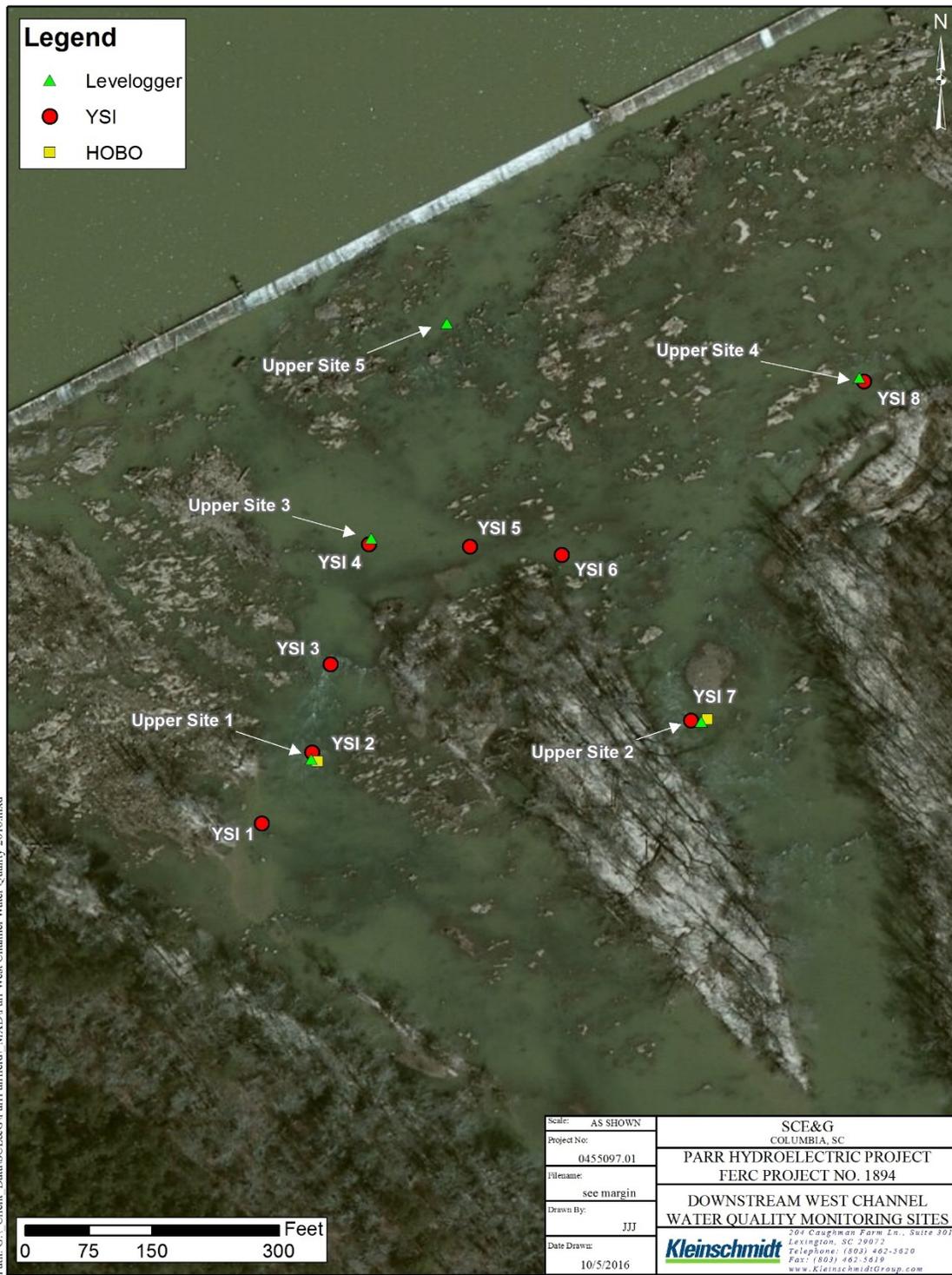


FIGURE 4-2 PARR SHOALS BASELINE MONITORING SITES

TABLE 4-1 RESULTS OF DISCHARGE MEASUREMENTS IN WEST CHANNEL

Operations	Upper Site 1 Discharge	Upper Site 2 Discharge	Total West Channel Discharge	Broad River at Alston
1 Unit	2	0	2	924
2 Unit	23	10	33	1746
3 Unit	47	32	78	2134
5 Unit	100	171	271	3438

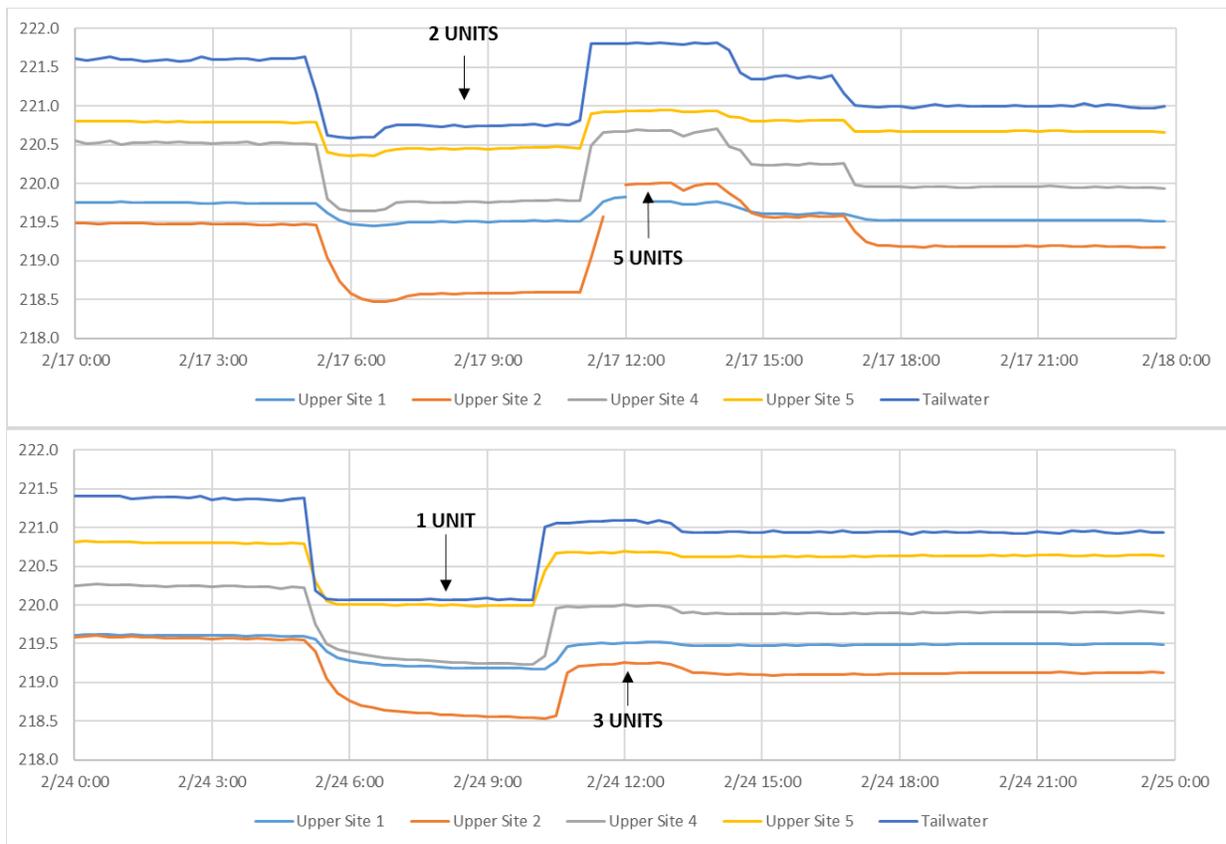


FIGURE 4-3 WATER SURFACE ELEVATIONS AT 1, 2, 3, AND 5 UNIT OPERATIONS

These water surface elevations depicted in Figure 4-3 show the relationship between tailwater elevations and the resulting change at each of the level loggers. This relationship also helps explain why the flows measured in the different channels changed disproportionately as tailwater levels increase with 5-unit flow.

5.0 IMPLEMENTATION

5.1 MANAGEMENT MEASURES

The WQTWC identified several measures to enhance aquatic habitat in the West Channel that will be implemented in the new operating license through the AMP. The WQTWC did not identify the use of an artificial oxygenation system as one of these measures. These measures are described in detail in the sections below.

5.1.1 FLOW TARGET DETERMINATION

The AMP review committee will determine an approximate target flow that it believes will adequately maintain dissolved oxygen levels in the West Channel. The committee will determine this target using data from the 2015 and 2016 monitoring studies and observations made during flow demonstrations for the IFIM study in 2017. Flows between 50 to 200 cfs have been discussed as a target flow in the West Channel during low flow conditions, but no agreement has been reached.

5.1.2 INCREASED FLOWS

The implementation of new instantaneous minimum flows for Parr should result in a more consistent amount of water flowing into the West Channel from the east channel, compared to the previous license requirement of daily average minimum flows. Monitoring, based on a plan agreed to by the Review Committee, will be conducted after implementation of these minimum flows to determine the extent of the benefits to West Channel aquatic habitat.

5.1.3 CHANNEL MODIFICATIONS

If the AMP Review Committee determines that new instantaneous minimum flows will not provide a sufficient flow into the West Channel to maintain DO levels, it will direct efforts to physically modify existing channel(s) leading into the West Channel. Based on current elevation data, modifying existing channels would be the most effective way to increase flows into the West Channel. Contingent upon obtaining permits and approvals from the USACE, SCDHEC, and NMFS the channel(s) will be modified to provide the identified target flow during periods of minimum flow releases. The first channel modification will occur in Year 2 of the AMP (dependent upon permit approval). A second channel modification (if needed) will be

completed in Year 4 of the AMP. Potential channel modifications could include notching or deepening of a small channel at the north tip of Hampton Island, and/or removal of material that currently serves as a hydraulic control closer to the Parr Shoals Dam (Figure 5-1).



FIGURE 5-1 POTENTIAL AREAS FOR CHANNEL MODIFICATION

5.1.4 LOW INFLOW PULSES

If inflows to Parr Reservoir decrease to a point that outflows from the dam do not provide any flows to the West Channel, SCE&G will investigate the use of spillway gates to provide periodic flow pulses to “refresh” the West Channel during periods when dissolved oxygen levels are expected to fall below acceptable levels. During the low inflow period, SCE&G will discuss the use of pulses with the Review Committee to make sure that all downstream resources are considered and releases are distributed in a balanced manner between the main channel and the West Channel.

5.2 MONITORING

During each year of the AMP, monitoring will be conducted from May 15 to September 30. Water Quality (temperature and DO) will be continuously monitored (15-minute intervals) at three sites along the western channel: Sites 1 and 2, just downstream of the Parr Dam, and Site 4, midway down Hampton Island near the Highway 213 bridge (Figure 5-2). Water level data will be collected at Sites 1, 2, and 3 in the upper West Channel. Monitors will be checked and cleaned throughout the study. Every two weeks at minimum, random samples of temperature and DO will be collected within the West Channel. A grid illustrating the sampling area is provided in Figure 5-3. Nine cells (or 10% of the total number of cells within the sampling area) will be chosen at random for each biweekly sample. The random sample will be stratified so that six (or approximately 66% of the total number of sampling cells) sampling cells will be chosen from cells 33-89 above the SC-213 bridge. Three (or approximately 33% of the total number of sampling cells) sampling cells will be chosen from cells 1-32 below the SC-213 bridge. Samples will be collected from anywhere within a chosen cell, due to the presence of islands and bedrock high points. If no water is present in a chosen cell, a preselected alternate cell, selected at the same time as the original nine sampling cells, will be used. Concurrent with the biweekly water quality sampling, stream flow will be measured at Sites 1 and 2 in the upper West Channel. While it will not be a biweekly requirement, enough stream flow measurements will be taken in a given monitoring period to develop a stage-discharge relationship for the West Channel during the sampling period.

5.3 ANALYSIS

Monitoring data will be processed using appropriate quality control/quality assurance measures. Dissolved oxygen data will be summarized to determine the percentage of instantaneous readings above 4 mg/L, and the number of daily average values above 5 mg/L observed during the sampling period. Temperature data will also be summarized to determine the range of water temperatures observed in the West Channel during the sampling period.

The analysis will also include a summary of daily average discharge at the Parr powerhouse and the USGS Gage 02161000 (Broad River at Alston, SC). Water level data from depth loggers in the West Channel will be used to estimate flow in the West Channel during the monitoring period. The Review Committee will compare the West Channel flow estimates with the IFIM data collected in the West Channel during relicensing (Kleinschmidt Associates 2016) to evaluate weighted usable area (WUA) for various species identified for the West Channel. The objective of the IFIM comparison is not to reach a specific WUA value (such as 80%), but to determine what WUA value results from the increased flows in the West Channel. For this evaluation, monitoring data will only be collected during the period of May 15 through September 30 of each year this AMP is implemented.

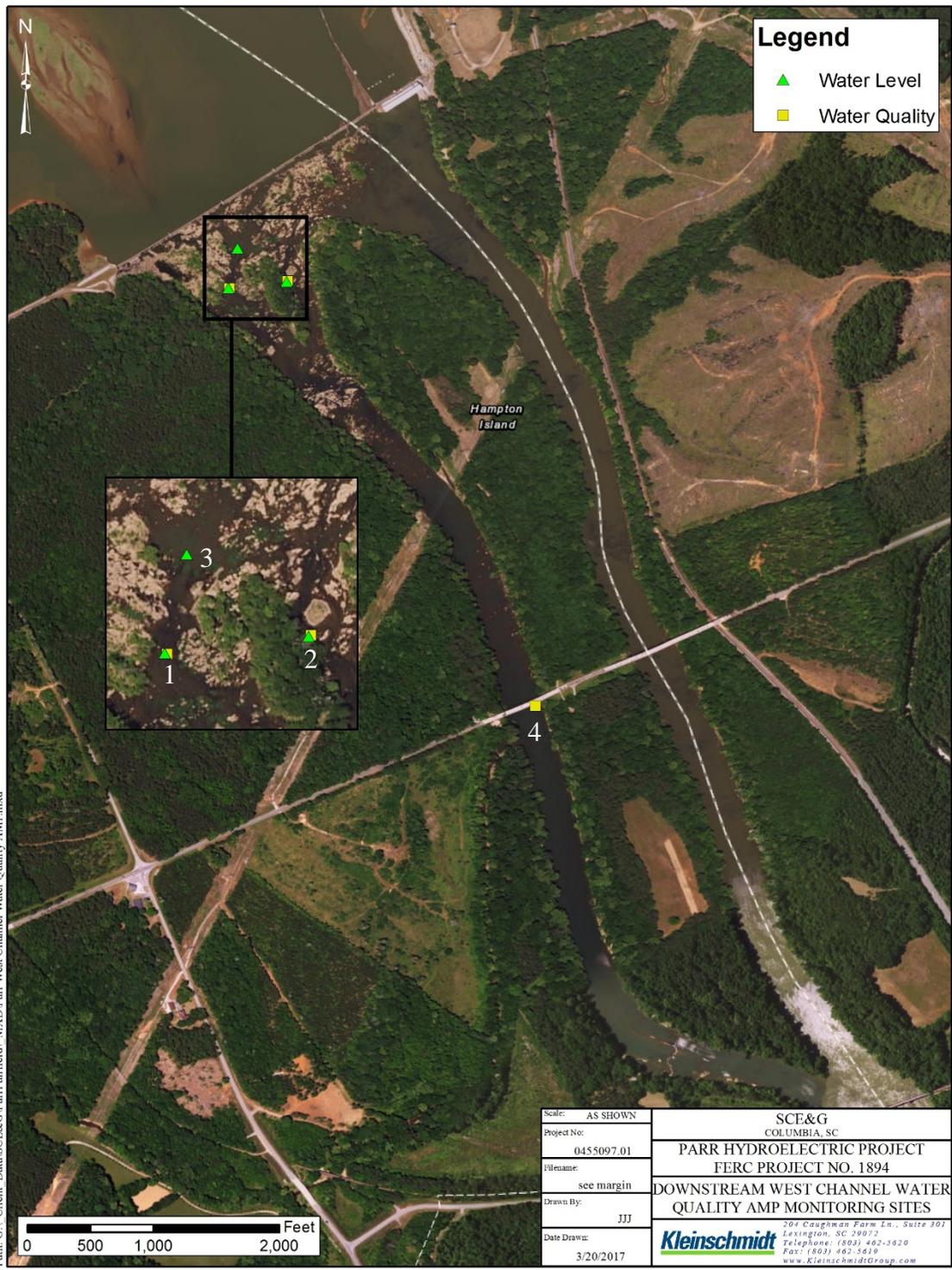


FIGURE 5-2 AMP MONITORING LOCATIONS

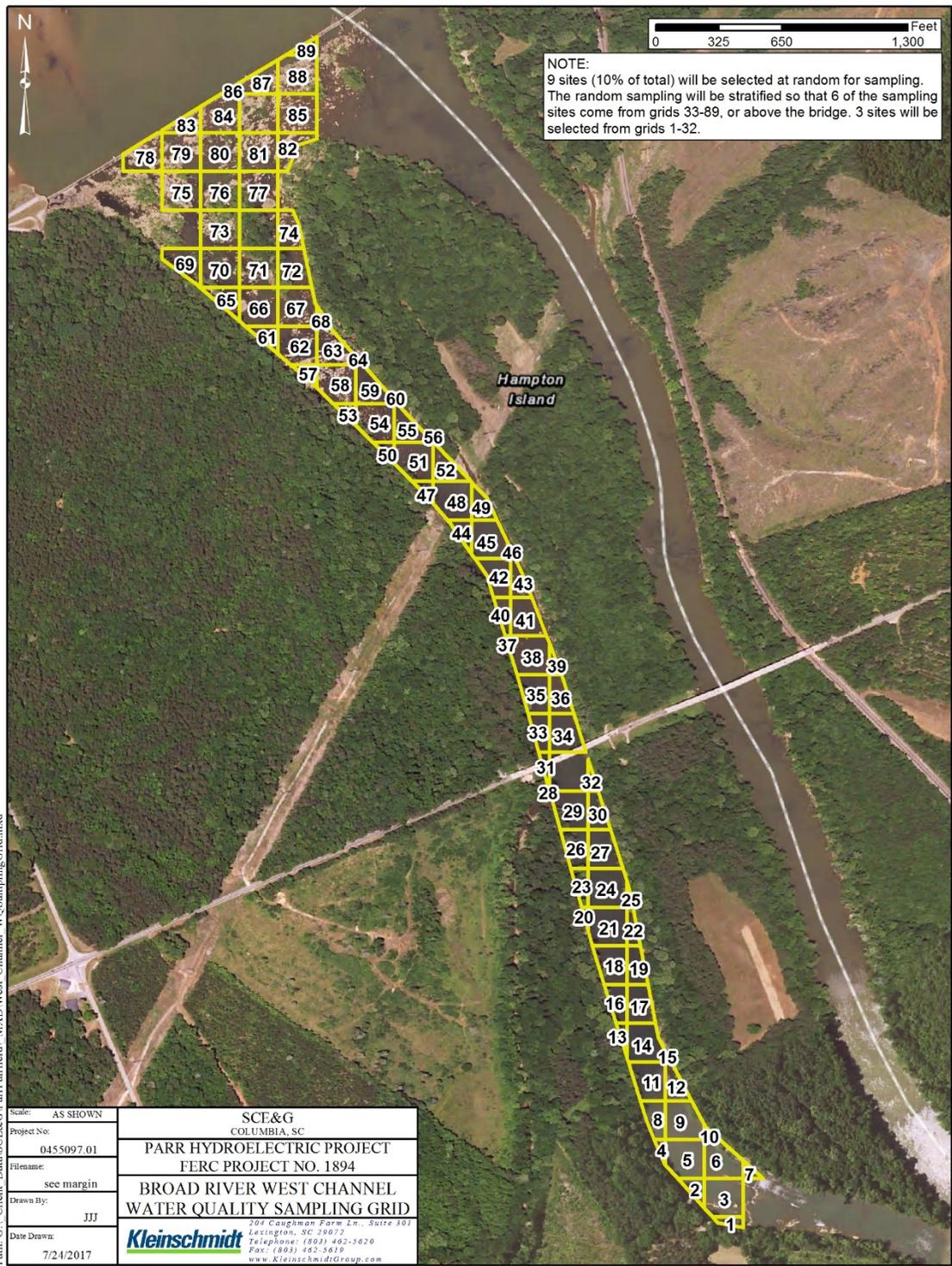


FIGURE 5-3 WEST CHANNEL SAMPLING GRID

6.0 SCHEDULE

The AMP schedule is described in the table below in relation to the issuance of the license by FERC. The dates below are targets and are subject to Review Committee availability.

TABLE 6-1 AMP IMPLEMENTATION SCHEDULE

Period	Item
Within 90 days of license issuance	Submit Final West Channel AMP to FERC
120 days of license issuance	Form Review Committee and review West Channel AMP
Year 1 of new license	<ul style="list-style-type: none"> • Monitoring – May - September • Annual Report – October • Review Committee Meeting – by December 15 • File Annual Report with FERC – April 30 of following year
Year 2 of new license	<ul style="list-style-type: none"> • Review Committee consultation – February • Channel Modifications (if recommended) • Monitoring – May - September • Annual Report – October • Review Committee Meeting – by December 15 • File Annual Report with FERC – April 30 of following year
Year 3 of new license	<ul style="list-style-type: none"> • Review Committee consultation – February • Monitoring – May - September • Annual Report – October • Review Committee Meeting – by December 15 • File Annual Report with FERC – April 30 of following year
Year 4 of new license	<ul style="list-style-type: none"> • Review Committee consultation – by end of March • Second Channel Modification (if needed) • Monitoring – May - September • Annual Report – October • Review Committee Meeting – by December 15 • File Annual Report with FERC – April 30 of following year
Year 5 of new license	<ul style="list-style-type: none"> • Review Committee consultation – by end of March • Monitoring – May - September • Annual Report – October • Review Committee Meeting – by December 15 • Develop recommendation for completion or continuation of AMP • File Annual Report with FERC – April 30 of following year

7.0 COMPLIANCE

Compliance will be based on following the schedule in Section 6.0 and submission of an annual AMP report each year to FERC. The annual report will contain a summary of all AMP activities and data, including an assessment of the extent to which goals and objectives were achieved. The report will be made available to appropriate entities for review and comment at least 30 days prior to being submitted to FERC. All comments on the report, pertinent correspondence, and Review Committee meeting minutes will be appended to the annual report.

At the end of the 5-year AMP period, the Review Committee will provide final recommendations to FERC on extension or completion of the AMP. If the AMP is completed, then final compliance criteria will be proposed by the Review Committee for use during the remainder of the license.

8.0 REFERENCES

Kleinschmidt Associates. 2016. Water Quality in Downstream West Channel Study Report. April 2016.

Kleinschmidt Associates. 2017. West Channel Water Quality Second Year Study Report. January 2017.

APPENDIX A

SUMMARY OF CONSULTATION

Appendix A

The Water Quality TWC, a sub-section of the Water Quality, Fish and Wildlife RCG, convened often throughout the relicensing process to discuss the development of the West Channel AMP. A list of meeting dates pertinent to the development of this AMP is included below. The complete consultation record for the development of this AMP, including notes from the meetings listed below, can be found in Appendix A of the Final License Application's Exhibit E.

- Water Quality TWC Meeting – March 23, 2016
- Water Quality TWC Meeting – June 23, 2016
- Water Quality TWC Meeting – December 14, 2016
- Joint¹ RCG Meeting – March 28, 2017
- Joint RCG Meeting – July 18, 2017

¹ A Joint RCG Meeting refers to a meeting where all RCGs are present, including the Water Quality, Fish and Wildlife RCG, the Lake and Land Management and Recreation RCG, and the Operations RCG.

Appendix A-11
Parr Shoals Dam Turbine
Venting Plan

PARR SHOALS DAM TURBINE VENTING PLAN

PARR HYDROELECTRIC PROJECT

FERC No. 1894

Prepared for:

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

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtGroup.com

April 2017

PARR SHOALS DAM TURBINE VENTING PLAN

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**PARR HYDROELECTRIC PROJECT
FERC No. 1894**

SOUTH CAROLINA ELECTRIC & GAS COMPANY

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2016

PARR SHOALS DAM TURBINE VENTING PLAN

**PARR HYDROELECTRIC PROJECT
FERC No. 1894**

SOUTH CAROLINA ELECTRIC & GAS COMPANY

1.0 INTRODUCTION

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

During relicensing, SCE&G tested all of the Parr turbines for their ability to self-vent and potentially increase the dissolved oxygen in the tailrace during specific periods of the year. An initial test of the turbines' capacity to vent was performed August 2014; a second test to determine which turbines had the most significant impact on increasing dissolved oxygen was performed in July 2015; a third test was completed in August 2016 to assess the initial plan developed for turbine venting. The results of the testing, along with the findings published in the Baseline Water Quality Report, were used to develop a final Turbine Venting Plan, which is included below. This plan will be included as one of the proposed protection, mitigation, and enhancement measures filed with the Final License Application for continued operation of the Project.

2.0 OPERATING PROCEDURES

Turbine venting shall occur continuously during the "venting period" for each calendar year, with vents opened as turbines are started up and brought online. During the venting period, the turbines will be operated with vents opened in a first-on / last-off order as follows: 3, 1, 5, 2, 4, and 6. Exceptions to this operating order shall occur due to equipment maintenance that results in unit outages, emergency conditions, or if additional turbine venting is available in the future.

SCE&G shall follow the venting procedures from June 15 through August 31 of each year. This period captures all of the excursions recorded by the nearby USGS Gage No. 02160991, Broad River near Jenkinsville, SC since the current probe was installed in 2011. However, in the event excursions begin occurring outside of the established turbine venting window, SCE&G will consult with SCDHEC and adjust or extend the window as appropriate.

3.0 DOCUMENTATION

SCE&G shall provide documentation to the South Carolina Department of Health and Environmental Control of hourly dissolved oxygen excursions below the standard within ten days of occurrence. The compliance measurement point for dissolved oxygen will be the USGS Gage No. 02160991, Broad River near Jenkinsville, SC. Should a dissolved oxygen deviation occur, upon request from a consulting agency, SCE&G shall provide hourly operation records to agency representatives to demonstrate adherence to the order of turbine operating during a venting period. Documentation of maintenance activities to justify deviation from the turbine operating order will also be provided, should a deviation occur.

APPENDIX A

PARR SHOALS DAM TURBINE VENTING REPORT

PARR SHOALS DAM TURBINE VENTING REPORT

PARR HYDROELECTRIC PROJECT

FERC No. 1894

Prepared for:

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

Prepared by:

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SOUTH CAROLINA ELECTRIC & GAS COMPANY

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PARR SHOALS DAM TURBINE VENTING REPORT

PARR HYDROELECTRIC PROJECT FERC No. 1894

SOUTH CAROLINA ELECTRIC & GAS COMPANY

1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) is the Licensee for the Parr Hydroelectric Project (FERC No. 1894) (Project). The Project consists of the Parr Shoals Development and the Fairfield Pumped Storage Development. Both 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. SCE&G has established several Technical Working Committees (TWC's) comprised of members from the interested stakeholders. The TWC's objectives include the evaluation of relicensing issues and making recommendations to address these issues in the new license.

Following the completion of the Parr Hydroelectric Project Baseline Water Quality Report, there were questions regarding occasional low dissolved oxygen (DO) in the tailrace downstream of Parr Shoals Dam. At a Water Quality TWC meeting on February 4, 2014, the TWC noted that the Baseline Water Quality Report identified periodic excursions of DO levels less than 4.0 mg/L in the Parr Shoals Dam tailrace, as reported by the USGS station 02160991. In an effort to understand these excursions better, SCE&G consolidated historic USGS data to examine these excursions and issued an addendum to the Baseline Water Quality Report in June 2014. At the request of the Water Quality TWC, SCE&G collected additional water quality data in the summer of 2014 in the tailrace and forebay of Parr Shoals Dam in an attempt to determine whether project operations are causing these excursions. These results were summarized in a memo issued on March 2, 2015 (Appendix A). SCE&G followed up this effort by collecting

another series of water quality data in the Parr forebay from May through mid-October 2015. The results of this data collection effort are summarized in this report.

In addition, SCE&G proposed to test all of the Parr turbines for their ability to self-vent and potentially increase the dissolved oxygen in the tailrace during specific periods of the year. An initial test of the turbines' capacity to vent was performed August 2014; a second test to determine which turbines had the most significant impact on increasing dissolved oxygen was performed in July 2015. The results of the testing, along with the findings published in the Baseline Water Quality Report, were used to develop a Turbine Venting Plan, which is also included in this report.

2.0 OBJECTIVES

Parr forebay data was collected from May through mid-October, 2015 in an effort to determine if low DO in the tailrace was caused by low DO in the forebay as it passed downstream through the powerhouse and turbines. Additionally, the turbine vent testing was performed in the summer of 2015 to determine if turbine venting had a positive impact on DO in the tailrace. The results of the turbine vent testing were used to develop a Turbine Venting Plan for use during periods of the low DO season.

3.0 METHODS

3.1 METHODS USED FOR TURBINE VENTING TESTING

During the 2014 test, the primary objective was to determine the turbines' physical capacity to self-vent. This requires both the presence of vacuum breakers (which are used during dewatering operations) (Photo 3-1), as well as the proper turbine vertical setting and sufficient gross head to draw air into the turbine during operation. With a turbine operating, the vacuum breaker valve is opened, and venting can be audibly determined. Aeration of the water can also be visually observed in the tailrace (Photo 3-2).



PHOTO 3-1 PIPING FOR VACUUM BREAKERS IN HEADCOVER



PHOTO 3-2 TURBINE DISCHARGE WITH VENTS OPEN

Water quality measurements (dissolved oxygen, temperature and percent saturation) were taken using a Hydrolab Surveyor 4a (Photo 3-3). Measurements were made immediately downstream of each turbine both prior to and after the vent was opened. It was verified that the crest gates had not operated within the past several hours, therefore no mechanical aeration influence from spilling was present. Hydrolab readings were allowed to stabilize for several minutes before water quality parameters were recorded.



PHOTO 3-3 MEASURING DO LEVELS DURING TESTING

During the 2014 test, several of the turbines were undergoing maintenance, and testing of all units was not possible. In addition, the tailrace dissolved oxygen and total saturation levels were high prior to opening the vents, which likely reduced the effectiveness of venting. Given these limitations, an effectiveness venting test was planned for summer 2015 when additional turbines could be evaluated. Prior to the 2015 testing date, DO levels were monitored via the downstream USGS Gage No. 02160991, Broad River near Jenkinsville, SC to identify a test period with lower DO conditions.

3.2 METHODS USED FOR FOREBAY DO SAMPLING

Water quality data, including DO and temperature, was collected in the forebay of the Parr Shoals Dam using two HOBO data loggers, with one logger located approximately one foot above the bottom of the reservoir and the other located approximately one foot below the surface of the reservoir. The HOBO data loggers were suspended from the log boom located in the forebay. Data was logged on an hourly basis from May 4, 2015 through October 16, 2015. Hourly data was also collected from the USGS gage at Jenkinsville (02160991), which is located immediately downstream of Parr Shoals Dam near the powerhouse.

4.0 RESULTS

4.1 RESULTS OF TURBINE VENTING

The Parr Shoals powerhouse contains six vertical turbines, five of which have vacuum breakers to facilitate dewatering the draft tube. It was discovered that unit 6, which is nearest the shoreline, does not have a vacuum breaker. During the 2014 test, units 1, 3 and 4 were operable, and the admittance of air was audible when the vacuum breakers were opened. In addition, the tailrace observation clearly indicated the water was being aerated. With the high saturation levels (above 70%), the measured increases in dissolved oxygen were 0.16 and 0.17 mg/L between the initial measurement and the end of the venting test (Appendix A – 2014 report).

During the 2015 test, all turbines were tested except unit 4, which was inoperable due to ongoing maintenance; however, unit 4 had been tested in 2014. Results of the 2015 testing (data included as Appendix B) indicate that unit 3 venting had the most significant increase in dissolved oxygen, followed by units 1, 5 and 2. The increases are shown in Table 4-1.

TABLE 4-1 DISSOLVED OXYGEN MEASUREMENTS (MG/L)

Unit No.	Vent Closed	Vent Open	Increase in DO
1	4.65	5.04	0.39
2	4.60	4.80	0.20
3	4.70	5.15	0.45
4*	5.66	5.82	0.16
5	4.84	5.20	0.36
6**	5.10	N/A	N/A

*test data from 2014

**Unit 6 is not equipped with a vacuum breaker.

While the 2014 test indicated a dissolved oxygen increase of 0.16 mg/L induced by venting unit 4, the increase was hindered by the starting saturation level compared to the testing in 2015. It can be assumed that the lower levels in 2015 would have resulted in better uptake, but the exact level of increase is not known. Operating priority for the Turbine Venting Plan was not modified to arbitrarily place unit 4 above other turbines that have a better demonstrated uptake capacity.

4.2 RESULTS OF FOREBAY SAMPLING

Due to the fluctuations of the reservoir, periods of low inflows, and the general location of the HOB0 loggers in the forebay of the dam, the loggers were highly susceptible to fouling due to debris, sediment, and algae. It appears that after approximately one week of data collection in the reservoir, the HOB0 loggers became severely compromised and no longer collected accurate data. Likewise, as the study season progressed, the accuracy of the HOB0 loggers decreased due to overgrowth with algae and other aquatic debris. At each download, which occurred on a monthly basis, HOB0 loggers were freed of obvious debris as they were removed from the water, making the accuracy of the logger slightly increase for a short period of time, but then fouling quickly afterwards. For that reason, each week after the monthly download is considered to be the most accurate representation of the DO in the Parr forebay. However, the data was compromised during the collection period and is therefore not considered a completely reliable representation of DO in the Parr forebay. Regardless, the one week period following each

download is presented in graphs below (Figure 4-1 through Figure 4-6), along with the corresponding data from the Jenkinsville gage. Data collected during October is not included in this report, as severe flooding occurred in early October resulted in abnormally high flows and irregular DO levels.

Throughout the month of May, DO levels in the forebay, both from the top and bottom of the reservoir, and in the tailrace were consistent with each other, and well above the SCDHEC instantaneous standard of 4.0 mg/L (Figure 4-1 and Figure 4-2) (SCDHEC 2012).

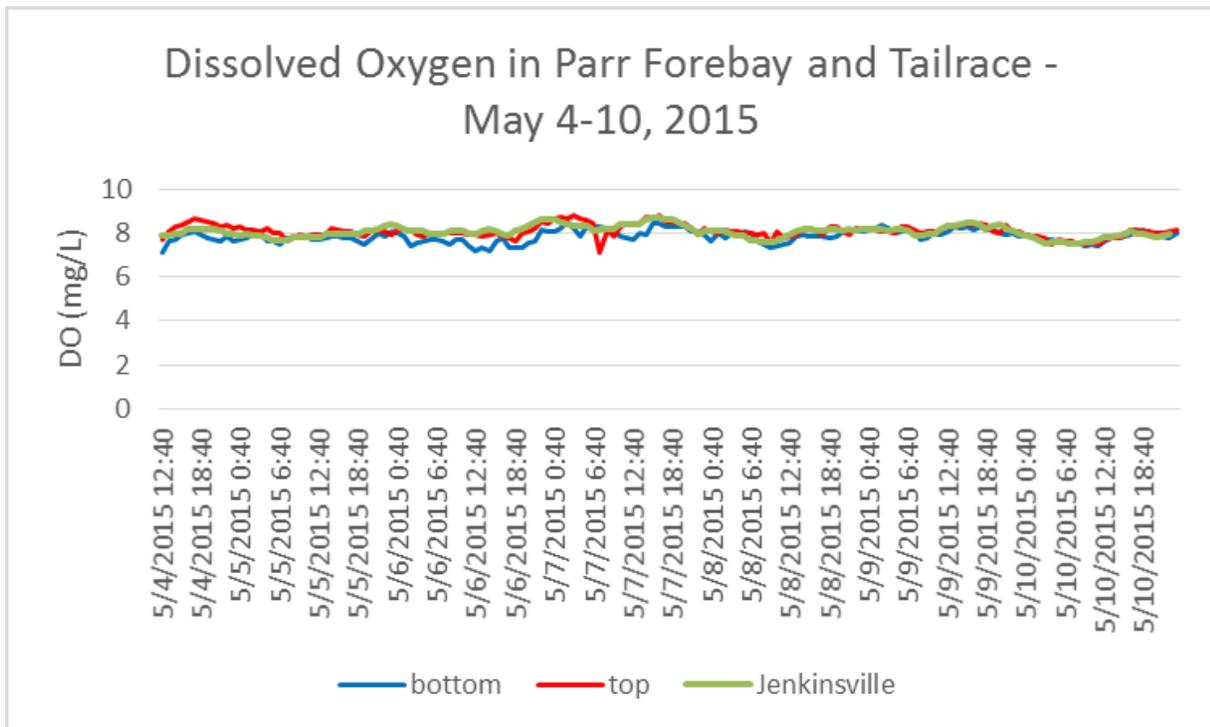


FIGURE 4-1 DISSOLVED OXYGEN IN THE PARR FOREBAY AND TAILRACE – MAY 4-10, 2015

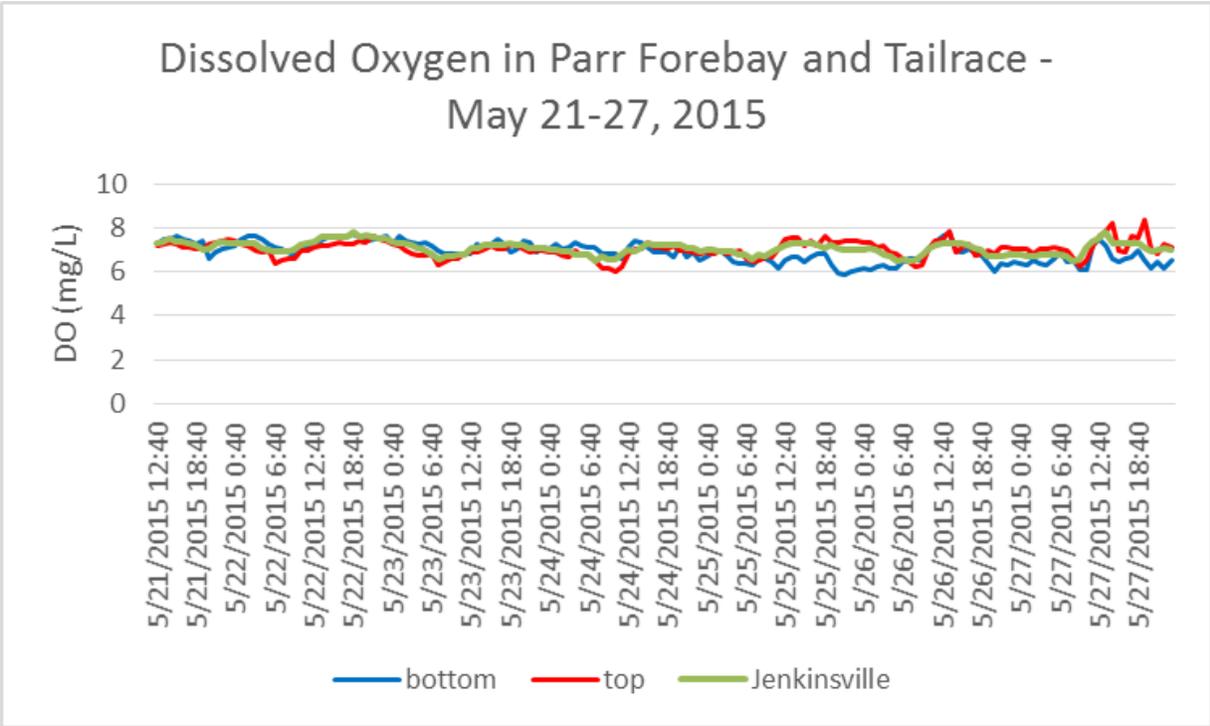


FIGURE 4-2 DISSOLVED OXYGEN IN THE PARR FOREBAY AND TAILRACE – MAY 21-27, 2015

In late June and early July, DO levels began to drop slightly in the forebay and tailrace (Figure 4-3). While the DO levels followed the same general pattern in the forebay as they did in the tailrace, the logger located near the bottom of the reservoir appeared to be affected by algal growth and debris. DO readings collected by the gage at Jenkinsville remain above the standard of 4.0 mg/L.

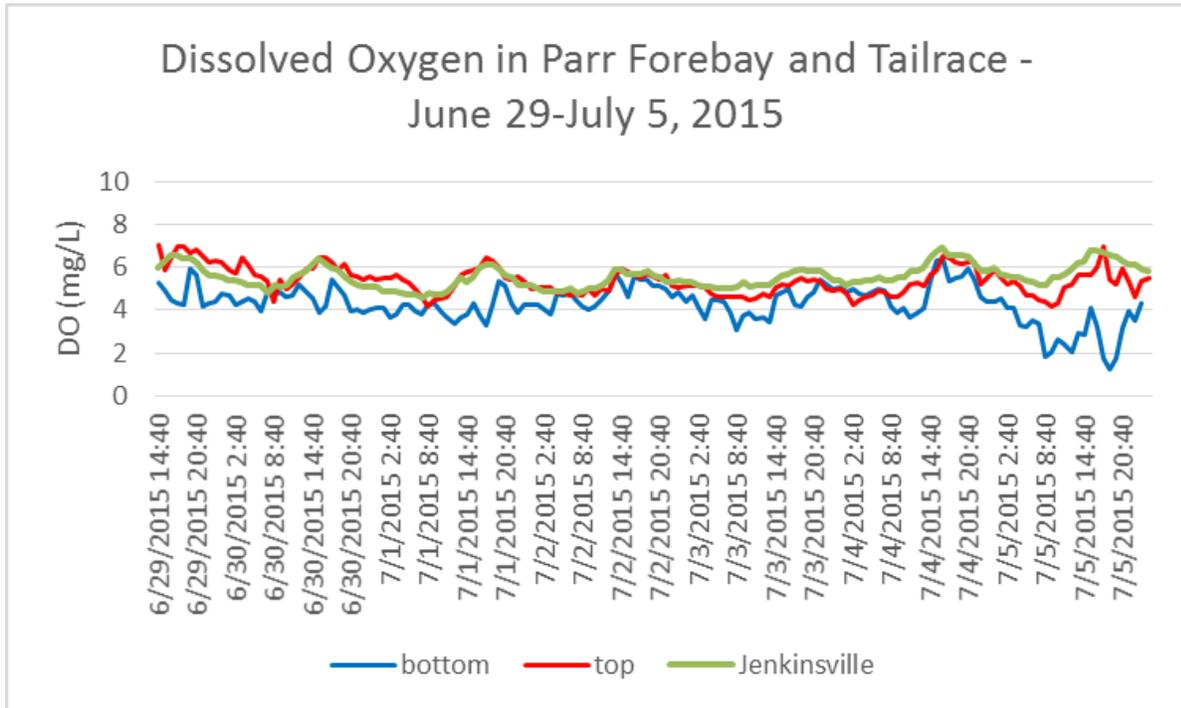


FIGURE 4-3 DISSOLVED OXYGEN IN THE PARR FOREBAY AND TAILRACE – JUNE 29-JULY 5, 2015

In mid-July, DO levels in the tailrace remained constant near 6.0 mg/L (Figure 4-4). DO readings collected in the forebay ranged from near 6.0 mg/L to 0.0 mg/L. Both loggers appeared to be affected by fouling from algae, sediment and other debris located in the forebay, but loggers began to detect a diel pattern typical of day and night shifts in DO levels associated with reservoirs and production and consumption of DO.

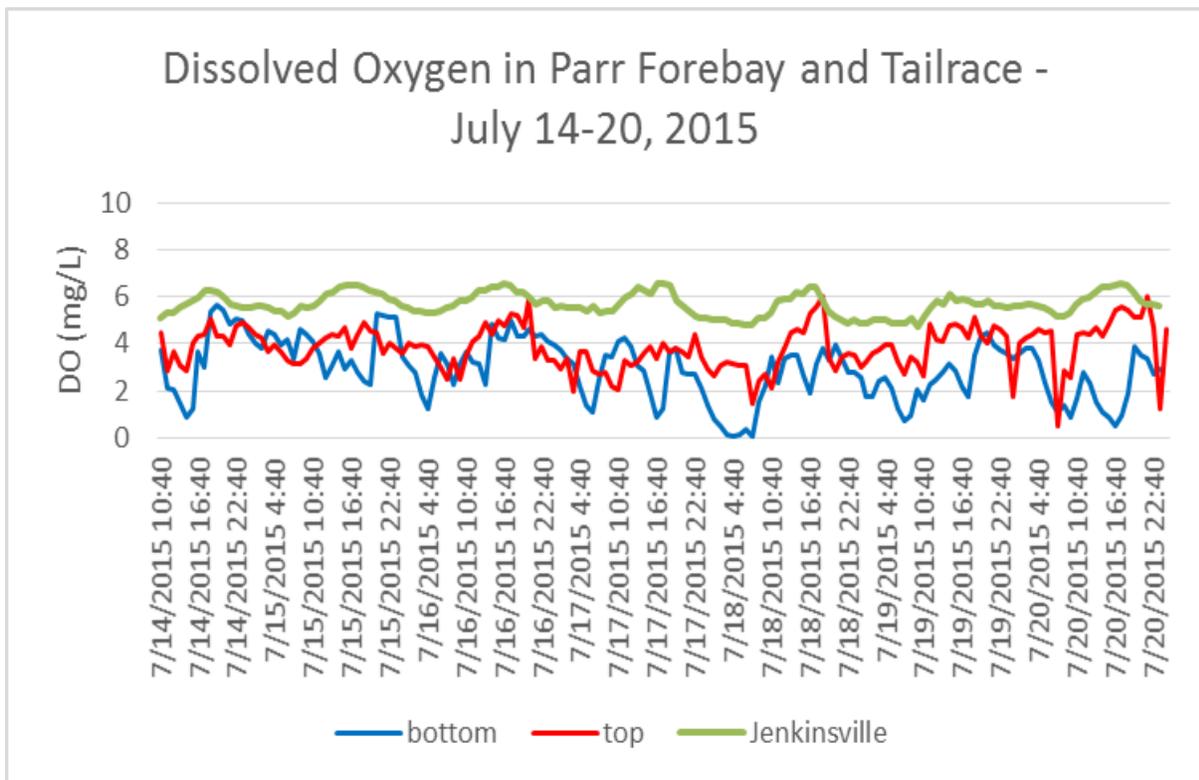


FIGURE 4-4 DISSOLVED OXYGEN IN PARR FOREBAY AND TAILRACE – JULY 14-20, 2015

In mid-August, DO levels in the tailrace continued to remain constant near 6.0 mg/L (Figure 4-5). DO readings collected in the forebay at the top of the reservoir again sporadically range from near 6.0 mg/L to 0.0 mg/L. It is likely that the top HOBO logger became wrapped with debris, causing the unusually low readings. The DO readings collected in the forebay at the bottom of the reservoir were less sporadic, however, they show a downward deterioration of fouling as time progresses, indicating that the longer the loggers were in the water, the more affected they became by algal growth, sediment, and debris.

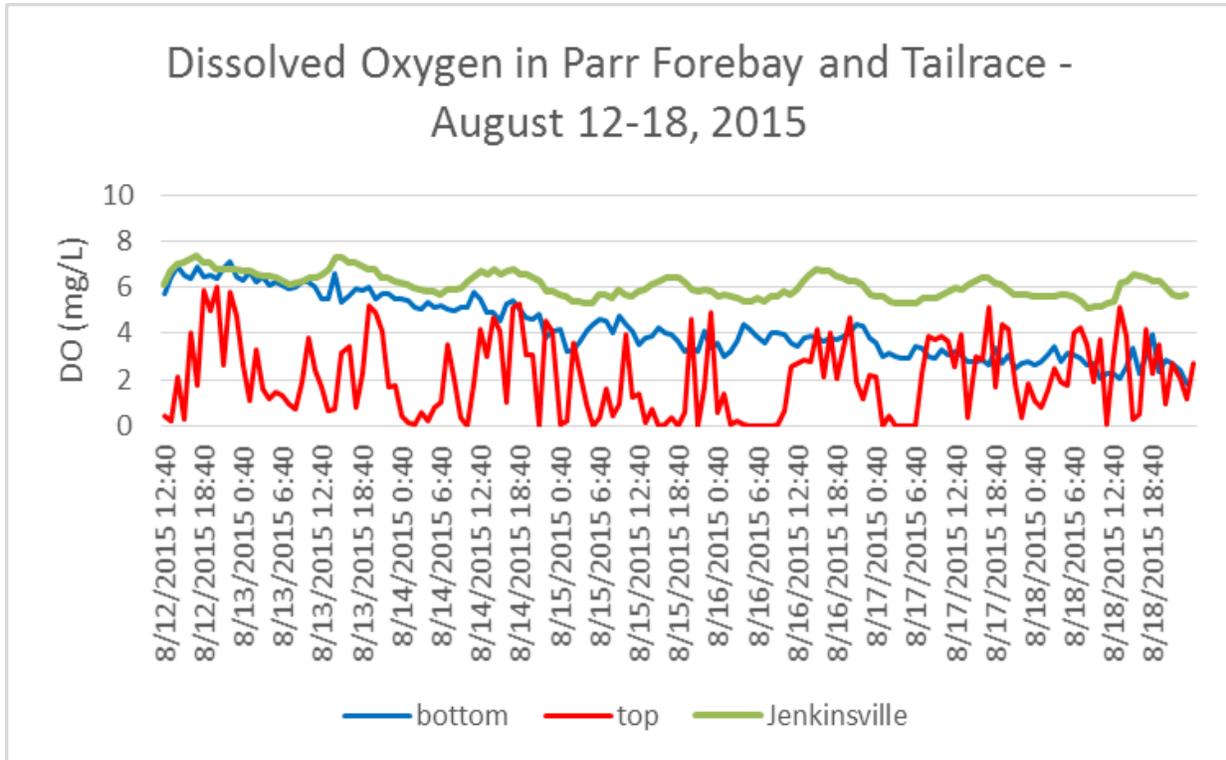


FIGURE 4-5 DISSOLVED OXYGEN IN PARR FOREBAY AND TAILRACE – AUGUST 12-18, 2015

During mid-September, DO levels in the tailrace rose from approximately 6.0 mg/L up to approximately 8.0 mg/L (Figure 4-6). DO readings collected in the forebay range from near 6.0 mg/L to 2.0 mg/L. The loggers again appear to be affected somewhat by algae, sediment and other debris located in the forebay. River flows during this period increased slightly with reoccurrence of rain events in the fall.

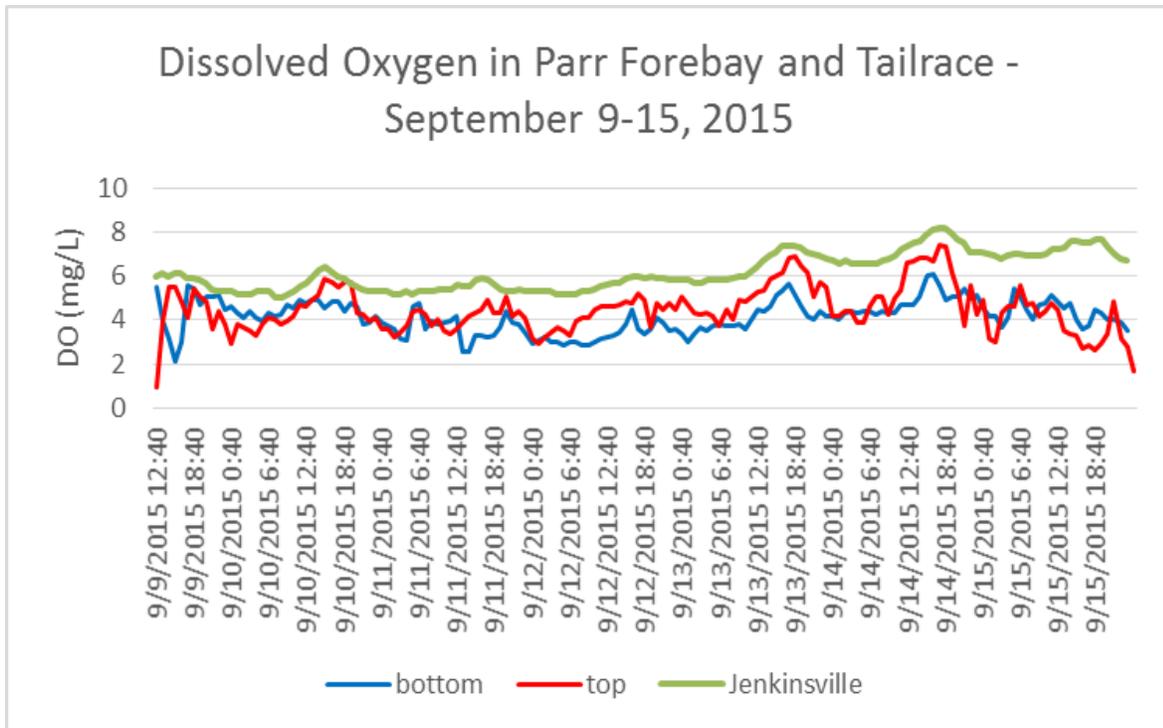


FIGURE 4-6 DISSOLVED OXYGEN IN PARR FOREBAY AND TAILRACE – SEPTEMBER 9-15, 2015

5.0 TURBINE VENTING PLAN

5.1 OPERATING PROCEDURES

Turbine venting shall occur continuously during a “venting period” for each calendar year, with vents opened as turbines are started up and brought online. During the venting period, the turbines will be operated with vents opened in a first-on / last-off order as follows: 3, 1, 5, 2, 4, and 6. Exceptions to this operating order shall occur due to equipment maintenance that results in unit outages, or emergency conditions.

SCE&G shall follow the venting procedures from June 15 through July 31 of each year. This period captures all of the excursions recorded by the nearby USGS Gage No. 02160991, Broad River near Jenkinsville, SC since the current probe was installed in 2011.

5.2 DOCUMENTATION

SCE&G shall provide documentation to DHEC of dissolved oxygen excursions below the standard within ten days of occurrence. Upon request from a consulting agency, SCE&G shall provide hourly records to agency representatives to demonstrate adherence to the order of turbine operating during a venting period. Documentation of maintenance activities to justify deviation from the turbine operating order will also be provided, should a deviation occur.

6.0 DISCUSSION

During two turbine tests at Parr Hydro, it was demonstrated that five of the six turbines have a demonstrated capacity to self-aerate by opening vacuum breaker valves. Effectiveness of the venting appears to vary between turbines, and the results of testing conducted with dissolved oxygen below 5.0 mg/L were used to prioritize an operating sequence. Observations of downstream data trends were used to determine trigger mechanisms for venting, which was combined with the operating sequence for a venting plan.

During 2015, there were no DO levels below 4.2 mg/L detected at the USGS tailrace DO gage. After July 31, there was only one DO reading lower than 5.0 mg/l and that was 4.9 mg/l on August 2. Fouling of DO monitor probes in the Parr forebay made it more difficult to see clear trends in the DO levels experienced in the forebay, but they did detect lower DO levels and a diel shift in DO levels starting at the end of June and extending through the end of September.

This report will be used as part of the 401 water quality certification application for the Parr Hydroelectric Project to demonstrate that the Project will meet the state standards as described by SCDHEC under the new FERC license.

7.0 REFERENCES

SCDHEC. 2012. Water Classifications and Standards (R. 61-68). [Online] URL: <https://www.scdhec.gov/Agency/docs/lwm-regs/r61-68.pdf>. Accessed December 29, 2015.

APPENDIX A

**PARR HYDROELECTRIC PROJECT WATER QUALITY BASELINE MEMORANDUM –
WATER QUALITY REPORT – SUPPLEMENTAL DISSOLVED OXYGEN DATA**

Parr Hydroelectric Project – FERC No. 1894
Water Quality Baseline – Memorandum

TO: Parr/Fairfield Relicensing Water Quality Technical Working Committee (TWC)
FROM: Kelly Miller and Henry Mealing – Kleinschmidt Associates
DATE: March 2, 2015
RE: Water Quality Report – Supplemental Dissolved Oxygen Data

The Parr Hydroelectric Project Baseline Water Quality Report includes analysis of both upstream and downstream water quality associated with the Parr Shoals Development and concluded that project operations could affect water quality downstream of Parr Shoals Dam. At the Water Quality TWC meeting on February 4, 2014, the TWC noted that the Baseline Water Quality Report identified periodic excursions of dissolved oxygen (DO) levels below 4.0 mg/l in the Parr Shoals Dam tailrace, as reported by the USGS station 02160991. In an effort to understand these excursions better, SCE&G contacted USGS and asked if they had any further information on this station. In June of 2011, the USGS installed a new sensor at the station 02160991. From January 2011 through December 2014, there have been approximately 13 hourly excursions in DO below the 4.0 mg/l SCDHEC standard which is approximately 0.04 percent of that period of time. At the request of the Water Quality TWC, SCE&G collected additional water quality data in the tailrace and forebay of Parr Shoals Dam to attempt to determine whether project operations are causing these excursions, and if so, how SCE&G might prevent them from occurring.

Tailrace Data – July – September 2014

Methods

From July through September of 2014, SCE&G collected temperature and DO data at seven sites along the downstream face of the Parr Shoals Dam, adjacent to the USGS station 02160991, and at a location approximately 400 feet downstream of Parr Shoals Dam. Data was collected on a weekly basis, three times per day including one hour before sunrise, at sunrise, and one hour after sunrise. To see if unit location had an effect on DO, the turbine(s) running during collections and the number of any lowered flashboard was also recorded.

Results

SCE&G collected data in the tailrace for two main reasons: (1) to verify the accuracy of the USGS gage station 02160991 and (2) to determine if DO could be correlated to an early morning DO sag or related to which turbine units were running at the time of data collection. During the sampling period, DO levels consistently stayed above 4.0 mg/l. No excursions were recorded by SCE&G or on the USGS gage (Table 1). Data collected by SCE&G at the site of the USGS station 02160991 was consistent with the USGS gage.

TABLE 1 DISSOLVED OXYGEN DATA AT USGS STATION 02160991 AND PARR SHOALS TAILRACE JULY – SEPTEMBER 2014.

Date	USGS Data		SCE&G Data	
	Time	DO mg/l	Time	DO mg/l
7/2/14	5:00 AM	6.2	5:35 AM	6.12
	6:00 AM	6.0	6:37 AM	5.95
	7:00 AM	6.0	7:42 AM	5.86
	8:00 AM	6.0		
7/10/14	5:00 AM	6.0	5:32 AM	6.24
	6:00 AM	5.9	6:27 AM	6.16
	7:00 AM	5.7	7:33 AM	6.08
	8:00 AM	5.5		
7/15/14	5:00 AM	5.5	5:34 AM	5.62
	6:00 AM	5.4	6:32 AM	5.32
	7:00 AM	4.9	7:42 AM	4.91
	8:00 AM	5.0		
7/24/14	5:00 AM	5.2	5:41 AM	5.15
	6:00 AM	5.2	6:51 AM	5.03
	7:00 AM	5.1	7:50 AM	5.49
	8:00 AM	5.3		
7/31/14	5:00 AM	5.8	5:43 AM	5.66
	6:00 AM	5.7	6:42 AM	5.55
	7:00 AM	5.7	7:54 AM	5.53
	8:00 AM	5.7		
8/7/14	5:00 AM	6.0	5:39 AM	5.90
	6:00 AM	6.0	6:48 AM	5.84
	7:00 AM	5.9	7:49 AM	5.74
	8:00 AM	5.9		
8/13/14	5:00 AM	5.9	5:30 AM	5.83
	6:00 AM	5.9	6:33 AM	5.86
	7:00 AM	5.9	7:33 AM	5.83
	8:00 AM	5.9		
8/20/14	5:00 AM	5.8	5:48 AM	5.90
	6:00 AM	5.8	6:46 AM	5.97
	7:00 AM	5.7	7:56 AM	5.86
	8:00 AM	5.7		
8/26/14	5:00 AM	6.3	5:41 AM	6.26
	6:00 AM	6.4	6:51 AM	6.51
	7:00 AM	6.4	7:48 AM	6.35
	8:00 AM	6.3		
9/3/14	5:00 AM	5.7	5:29 AM	6.02
	6:00 AM	5.8	6:40 AM	5.73
	7:00 AM	5.4	7:53 AM	5.46
	8:00 AM	5.4		
9/10/14	6:00 AM	5.6	6:30 AM	5.62
	7:00 AM	5.7	7:46 AM	5.78
	8:00 AM	5.7	8:46 AM	5.71
	9:00 AM	5.7		
9/16/14	6:00 AM	5.0	6:22 AM	4.94

	7:00 AM	5.0	7:24 AM	4.98
	8:00 AM	5.0	8:24 AM	4.92
	9:00 AM	5.0		
9/25/14	6:00 AM	7.3	6:33 AM	7.10
	7:00 AM	7.3	7:34 AM	7.65
	8:00 AM	7.3	8:29 AM	7.62
	9:00 AM	7.3		

Results did not detect a clear correlation between DO readings and the units running at the time of data collection. See Appendix A for a complete list of the data collected during this effort.

Forebay Data – October & November 2014

Methods

Water quality data, including DO and temperature, were collected in the forebay of the Parr Shoals Dam to determine if low DO water is being released through the turbines, causing the DO in the tailrace to drop. The data was collected using two HOBO data loggers, with one logger located approximately one foot above the bottom of the reservoir and the other located approximately one foot below the surface of the reservoir. Data was logged on an hourly basis from October 16, 2014 through December 3, 2014. We had planned to begin collections earlier but did not receive the data loggers until mid-September.

Results

Results showed the expected correlations between DO and temperature and natural diel fluctuations (Figure 1 through Figure 4). DO levels at the bottom of the forebay are consistently slightly lower than those at the top of the forebay, and there was no evidence of stratification in the forebay area of the reservoir. There were no low DO events observed in the tailrace during the monitoring effort.

FIGURE 1 DO AND TEMPERATURE AT BOTTOM OF PARR SHOALS DAM FOREBAY

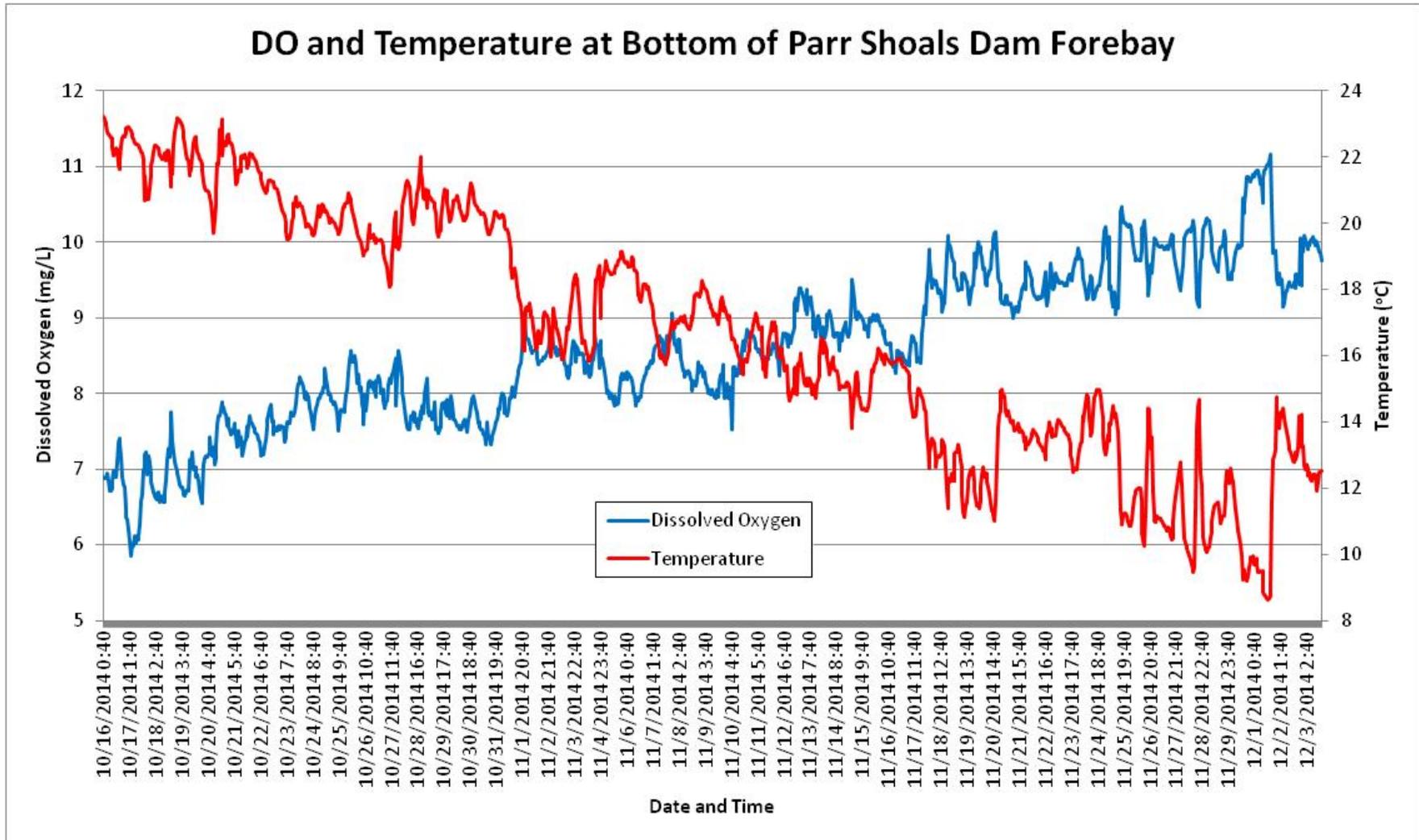


FIGURE 2 DO AND TEMPERATURE AT THE TOP OF PARR SHOALS DAM FOREBAY

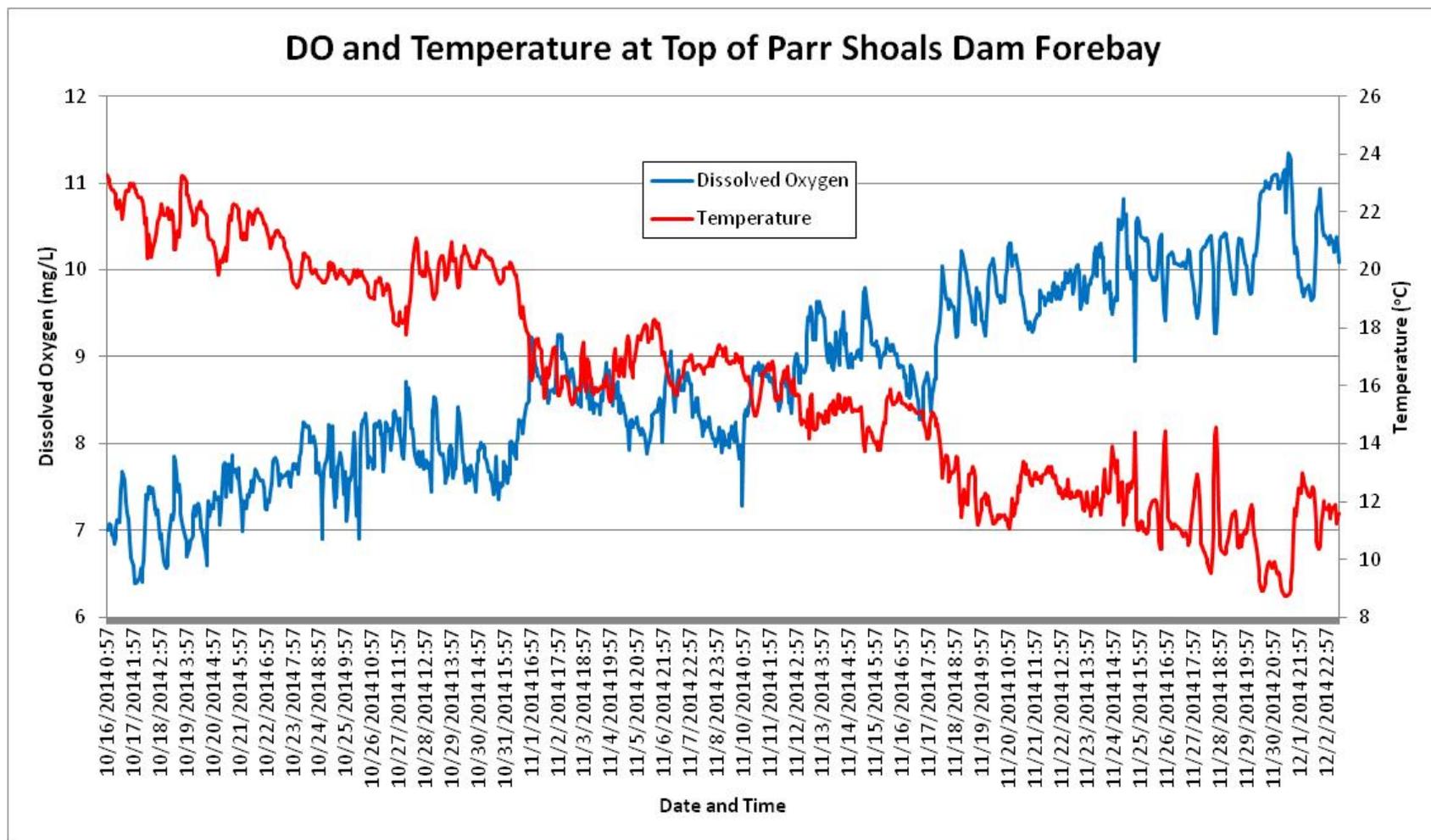


FIGURE 3 PARR SHOALS DAM FOREBAY DISSOLVED OXYGEN

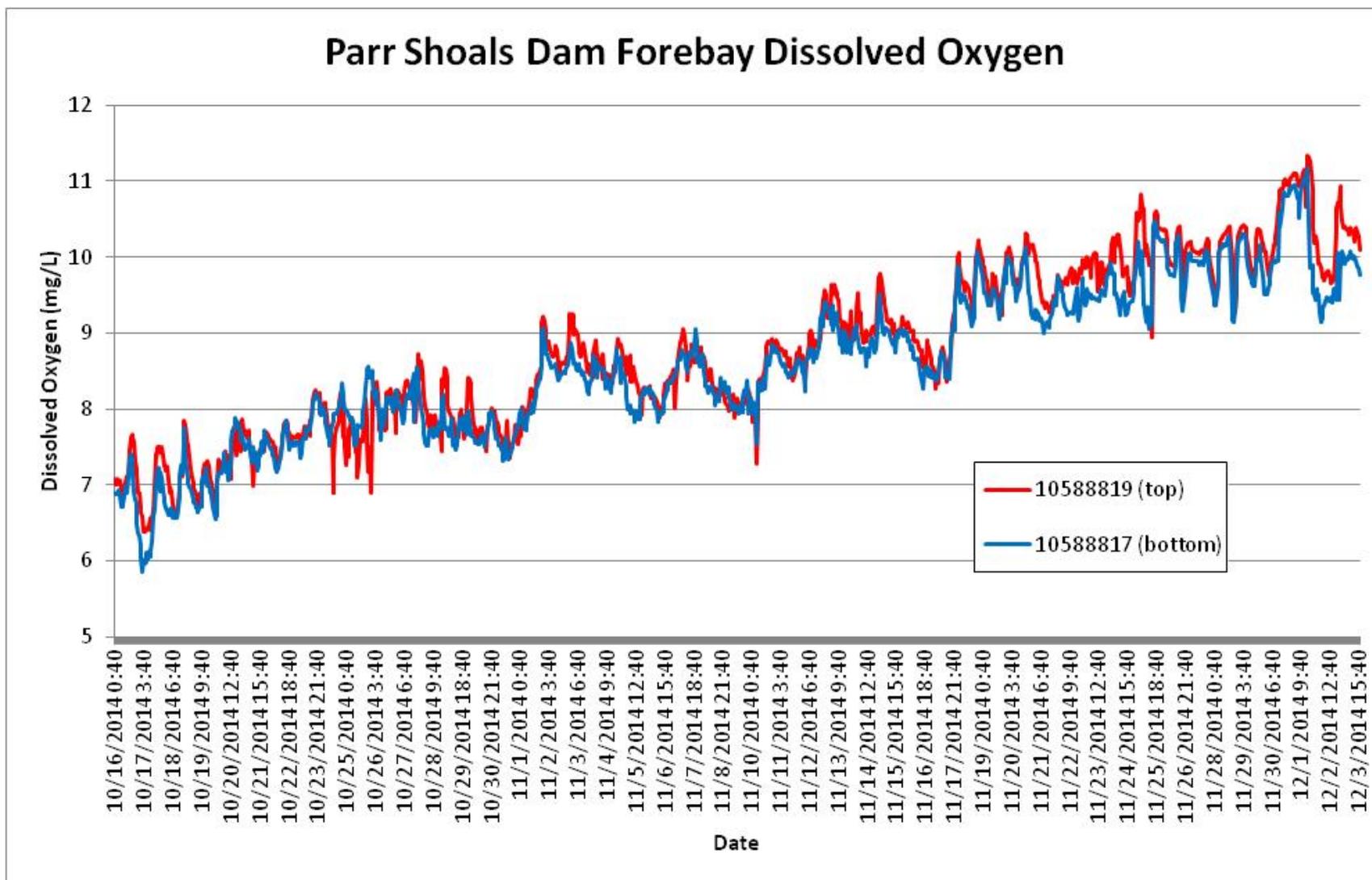
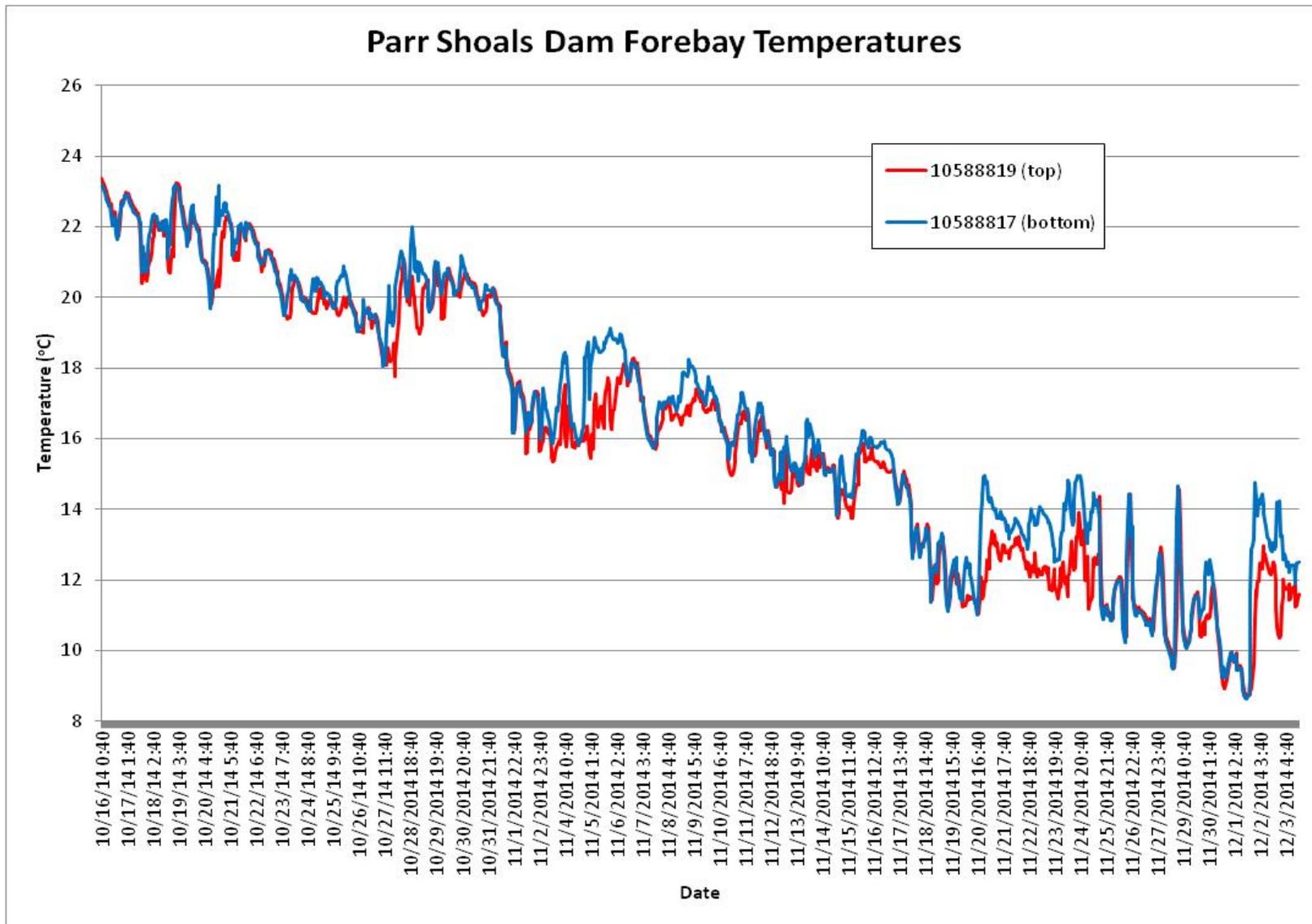


FIGURE 4 PARR SHOALS DAM FOREBAY TEMPERATURES



Parr Aeration Investigation – August 2014

Because of the success with turbine self-venting (or self-aerating) at the Saluda Hydro Project, SCE&G performed some initial investigations to determine if turbine aerating at the Parr Shoals Development was feasible for periodically increasing the tailrace DO levels. Bret Hoffman (Kleinschmidt), Amy Bresnahan (SC&EG), Milton Quattlebaum (SCE&G), and Mike Hall (USGS) performed some initial onsite turbine venting tests at the Parr Shoals Development on the morning of August 20, 2014. The results of their investigation are included below.

During each test run, water quality measurements (DO, temperature, and % DO saturation) were recorded with handheld meters (independent of the permanently installed USGS gage station equipment) in the tailrace at the bay 7 location (which is between the six turbine bays and the shore) and along the shoreline adjacent to the USGS gage. These measurements provided a cursory examination of the ability of the Units to aerate by opening the existing vacuum breaker valves located on the turbine head cover. Only Units 1, 3, and 4 were available for operation testing as the other units were out of service for repair, and Unit 4 could not be shut down because of equipment issues. During testing all river flow was passed through the turbine units and the spillway gates were in the closed (raised) position. Test runs for the water quality measurements were conducted in combinations of turbine operations as described below and were partially dictated by the requirement that Unit 4 could not be shut down. The headpond and tailwater elevations were also recorded, as were individual generator kW and kVar outputs.

Unit 4 - Test

Initially, tailrace readings were collected with only Unit 4 operating, and the vacuum breaker valve closed. Then, the vacuum breaker valve was fully opened to allow aeration, and audibly drew in air. The effects of the introduced air were clearly visible in the tailrace. The initial tailrace reading collected with the valve closed was 5.66 mg/l, the reading at bay 7 with the valve open was 5.82 mg/l. Upon closing the valve, the DO at bay 7 dropped to 5.78 mg/l, although the aerated water may not have had time to flush out from the tailrace area. The USGS measurements on the shore were 5.58 mg/l prior to opening any turbine vents, and 5.75mg/l with the vent open for 25 minutes. The USGS reading did not drop after the valve was closed, and matched the bay 7 reading of 5.78 mg/l, supporting the theory that residual aerated water remained in the immediate tailrace area. Initial saturation was 71% (valve closed), and with the valve open the saturation increased to 74.9%. Saturation levels reported near the USGS gage were within a tenth of a percent of those recorded at bay 7.

Units 1 and 4

Unit 1 was started (valve closed) and allowed to stabilize for 15 minutes. DO readings were collected with Unit 1 valve closed and Unit 4 valve open. The USGS reading increased to 5.84 mg/l, while the bay 7 reading increased from 5.82 mg/l to 5.86 mg/l. The Unit 1 valve was opened and readings were collected after 15 minutes of stabilization. The measurement near the USGS gage was 5.80 mg/l, while the bay 7 reading was 5.88 mg/l. Saturation with Unit 1 (valve

closed) and Unit 4 (valve open) was 73%, which increased to 75.4% with both units' valves open.

Units 1, 3, and 4

Unit 3 was started and operated for 15 minutes with no valve open, while the valves for Units 1 and 4 were left open. The measurements from the USGS site and at bay 7 were both 5.80 mg/l, and the saturation at bay 7 was 74.8%. When the valve was opened on Unit 3, the bay 7 reading was 5.76 mg/l and the USGS reading was 5.75 mg/l with a saturation level of 74.3% - with all three units aerating. USGS took an additional measurement at bay 2 (between units 1 and 3) with all units aerating, which ranged from 6.08 mg/l to 6.15 mg/l; at 6.08 mg/l, saturation was 79%.

One final measurement was taken with all units 1, 3 and 4 operating but all three valves closed. The reading near the USGS gage was 5.71 mg/l while the bay 7 reading was 5.73 mg/l, indicating very minimal reduction from aerating. It is likely that the aerated water in the tailrace area did not flush out and resulted in higher readings. The USGS handheld meter was used to re-sample water quality at bay 2 and the DO dropped to 5.89 mg/l and 75% saturation.

Discussion

The three units tested will aerate with their current valve configurations. The inability to shut down unit 4 likely prevented the aerated flows from units 1 and 3 from reaching the shore, as they are located further toward the middle of the river. While the DO readings with various combinations of valves open for all three units was fairly stable, the initial increase from Unit 4 indicates there is an ability to increase dissolved oxygen by aerating. Saturation was between 71% initial reading (prior to any aeration), and 75% after the valve was opened, indicating an increase in saturation. Saturation levels were near 75% for all readings following the initial valve opening.

Saturation was calculated for all the DO excursions (below 4.0 mg/L) during the past three years as recorded by the USGS gage. While the saturation levels during the aeration testing ranged from 71% (without aerating) up to 76%, the levels calculated for the excursions varied between 44.8% and 51.18%. Water temperatures during the testing ranged between 27.5 and 28.1 °C, while temperature during the excursions was measured at 29.3 to 30.1 °C.

The initial increase in DO measured during testing was approximately 0.17 mg/l. This indicates the turbines have some ability to increase DO by aerating, although the saturation percentage and water temperatures were significantly different during the historic DO excursions. A better determination of effectiveness could be made under lower DO and saturation conditions during the summer. Also, testing during a period when all of the turbine units can be manipulated (turned on/off and aerating on/off) would give more precise information on the performance of each unit.

APPENDIX A
TAILRACE DATA

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 7/2/14

Samplers: Milton Quattlebaum and Kelly Miller

Time	Location	DO (mg/L)	Temp (°C)	Units Running
5:11 AM	Unit 1	5.79	27.30	on
5:16 AM	Unit 2	5.92	27.45	off
5:20 AM	Unit 3	5.90	27.44	on
5:23 AM	Unit 4	6.01	27.69	on
5:26 AM	Unit 5	6.18	27.94	off
5:29 AM	Unit 6	6.14	27.94	off
5:35 AM	At USGS gage	6.12	27.92	
5:41 AM	DWNSTRM Plant	6.09	27.89	
6:16 AM	Unit 1	5.97	27.30	on
6:19 AM	Unit 2	5.89	27.40	off
6:21 AM	Unit 3	5.90	27.48	on
6:23 AM	Unit 4	6.06	27.74	on
6:26 AM	Unit 5	5.99	27.76	off
6:28 AM	Unit 6	5.98	27.79	off
6:33 AM	NPDES 001 sign	6.00	27.62	
6:37 AM	At USGS gage	5.95	27.74	
6:42 AM	DWNSTRM Plant	5.94	27.71	
7:17 AM	Unit 1	5.74	27.25	on
7:22 AM	Unit 2	5.82	27.36	off
7:25 AM	Unit 3	5.84	27.40	on
7:27 AM	Unit 4	6.03	27.64	on
7:30 AM	Unit 5	5.93	27.61	off
7:33 AM	Unit 6	5.89	27.63	off
7:36 AM	NPDES 001 sign	5.93	27.62	
7:42 AM	At USGS gage	5.86	27.56	
7:49 AM	DWNSTRM Plant	5.89	27.57	

Time	Jenksville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenksville	USGS Temp data at Jenksville
5:00 AM	221.37	261.52	258.50	6.2	27.8
6:00 AM	221.35	260.89	262.50	6.0	27.6
7:00 AM	221.65	260.44	258.50	6.0	27.5
8:00 AM				6.0	27.4

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 7/10/14

Samplers: Milton Quattlebaum and Kelly Miller

Time	Location	DO (mg/L)	Temp (°C)	Units Running
5:04 AM	Unit 1	5.73	27.40	on
5:08 AM	Unit 2	5.75	27.45	off
5:11 AM	Unit 3	5.86	27.48	on
5:15 AM	Unit 4	6.09	27.53	on
5:18 AM	Unit 5	6.28	27.69	off
5:21 AM	Unit 6	6.24	27.66	off
5:24 AM	NPDES 001 sign	6.26	27.67	
5:32 AM	At USGS gage	6.24	27.61	
5:35 AM	DWNSTRM Plant	6.24	27.65	
6:07 AM	Unit 1	5.75	27.44	on
6:10 AM	Unit 2	5.82	27.47	off
6:13 AM	Unit 3	5.89	27.51	on
6:15 AM	Unit 4	6.27	27.64	on
6:18 AM	Unit 5	6.24	27.65	off
6:20 AM	Unit 6	6.20	27.64	off
6:22 AM	NPDES 001 sign	6.19	27.65	
6:27 AM	At USGS gage	6.16	27.63	
6:32 AM	DWNSTRM Plant	6.16	27.59	
7:14 AM	Unit 1	5.87	27.50	on
7:16 AM	Unit 2	5.84	27.51	off
7:19 AM	Unit 3	5.91	27.51	on
7:21 AM	Unit 4	6.19	27.59	on
7:23 AM	Unit 5	6.15	27.60	off
7:25 AM	Unit 6	6.16	27.62	off
7:27 AM	NPDES 001 sign	6.13	27.61	
7:33 AM	At USGS gage	6.08	27.61	
7:40 AM	DWNSTRM Plant	6.15	27.50	

*lowered crest gates 5 and 6 at 7:20 am

Time	Jenkinsville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenkinsville	USGS Temp data at Jenkinsville
5:00 AM	221.36	260.89	266.00	6.0	27.6
6:00 AM	221.35	260.57	266.00	5.9	27.5
7:00 AM	221.93	260.59	258.00	5.7	27.5
8:00 AM				5.5	27.4

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 7/15/14

Samplers: Milton Quattlebaum and Kelly Miller

Time	Location	DO		Units Running
		(mg/L)	Temp (°C)	
5:10 AM	Unit 1	5.30	28.19	on
5:14 AM	Unit 2	5.29	28.25	off
5:17 AM	Unit 3	5.30	28.29	on
5:19 AM	Unit 4	5.70	28.42	on
5:22 AM	Unit 5	5.63	28.45	off
5:25 AM	Unit 6	5.54	28.48	off
5:28 AM	NPDES 001 sign	5.64	28.41	
5:34 AM	At USGS gage	5.62	28.34	
5:39 AM	DWNSTRM Plant	5.57	28.41	
6:13 AM	Unit 1	4.77	28.18	on
6:15 AM	Unit 2	4.81	28.21	off
6:18 AM	Unit 3	4.92	28.22	on
6:20 AM	Unit 4	5.19	28.25	on
6:22 AM	Unit 5	5.40	28.16	off
6:25 AM	Unit 6	5.35	28.24	off
6:27 AM	NPDES 001 sign	5.31	28.34	
6:32 AM	At USGS gage	5.32	28.30	
6:36 AM	DWNSTRM Plant	5.33	28.29	
7:22 AM	Unit 1	4.98	28.18	on
7:25 AM	Unit 2	4.94	28.15	off
7:27 AM	Unit 3	4.94	28.11	on
7:30 AM	Unit 4	5.00	28.12	on
7:32 AM	Unit 5	5.18	28.18	off
7:35 AM	Unit 6	5.02	28.19	off
7:37 AM	NPDES 001 sign	5.03	28.16	
7:42 AM	At USGS gage	4.91	28.08	
7:47 AM	DWNSTRM Plant	5.00	28.18	
7:55 AM	Unit 1	4.86	28.12	on

*not spilling while monitoring

Time	Jenksville 02160991	Parr Res. Level 0216099		Parr Crest Gate	USGS DO data at Jenksville	USGS Temp data at Jenksville
		0				
5:00 AM	221.34	258.63		266, except 5&6 at 264	5.5	28.3
6:00 AM	221.31	258.40		266, except 5&6 at 264	5.4	28.2
7:00 AM	221.34	258.68		266, except 5&6 at 264	4.9	28
8:00 AM					5.0	28

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 7/24/14

Samplers: Milton Quattlebaum and Kelly Miller

Time	Location	DO		Units Running
		(mg/L)	Temp (°C)	
5:10 AM	Unit 1	5.23	27.34	off
5:15 AM	Unit 2	5.26	27.32	off
5:17 AM	Unit 3	5.21	27.30	off
5:21 AM	Unit 4	5.43	27.35	on
5:24 AM	Unit 5	5.15	27.32	off
5:29 AM	Unit 6	4.81	27.21	off
5:35 AM	NPDES 001 sign	5.11	27.29	
5:41 AM	At USGS gage	5.15	27.28	
5:46 AM	DWNSTRM Plant	4.70	27.19	
6:27 AM	Unit 1	5.27	27.29	off
6:33 AM	Unit 2	5.26	27.23	off
6:35 AM	Unit 3	5.28	27.28	off
6:38 AM	Unit 4	5.19	27.30	on
6:41 AM	Unit 5	5.09	27.29	off
6:43 AM	Unit 6	4.97	27.27	off
6:46 AM	NPDES 001 sign	5.05	27.21	
6:51 AM	At USGS gage	5.03	27.27	
6:56 AM	DWNSTRM Plant	4.72	27.09	
7:22 AM	Unit 1	5.18	27.24	off
7:32 AM	Unit 2	5.68	27.24	off
7:33 AM	Unit 3	5.68	27.27	off
7:37 AM	Unit 4	5.83	27.26	on
7:40 AM	Unit 5	5.49	27.25	off
7:42 AM	Unit 6	5.43	27.11	off
7:45 AM	NPDES 001 sign	5.50	27.21	
7:50 AM	At USGS gage	5.49	26.68	
7:55 AM	DWNSTRM Plant	5.47	27.06	
8:00 AM	Unit 1	5.63	27.25	off

Time	Jenkinsville 02160991	Parr Res. Level		Parr Crest Gate	USGS DO data at Jenkinsville	USGS Temp data at Jenkinsville
		02160990				
5:00 AM	220.47	260.11		Gates 1, 2, 3, 4: 264	5.2	27.2
6:00 AM	220.47	259.41		Gates 5, 6, 7, 8: 266	5.2	27.2
7:00 AM	220.46	258.97			5.1	27.1
8:00 AM					5.3	27.1

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 7/31/14

Samplers: Milton Quattlebaum

Time	Location	DO (mg/L)	Temp (°C)	Units Running
5:18 AM	Unit 1	5.72		27.49 on
5:21 AM	Unit 2	5.73		27.52 off
5:24 AM	Unit 3	5.73		27.50 off
5:27 AM	Unit 4	5.78		27.51 on
5:30 AM	Unit 5	5.65		27.49 off
5:33 AM	Unit 6	5.60		27.48 off
5:37 AM	NPDES 001 sign	5.67		27.46
5:43 AM	At USGS gage	5.66		27.32
5:50 AM	DWNSTRM Plant	5.54		27.39
6:22 AM	Unit 1	5.71		27.42 on
6:25 AM	Unit 2	5.71		27.47 off
6:28 AM	Unit 3	5.73		27.48 off
6:31 AM	Unit 4	5.81		27.46 on
6:33 AM	Unit 5	5.61		27.42 off
6:36 AM	Unit 6	5.59		27.41 off
6:38 AM	NPDES 001 sign	5.64		27.43
6:42 AM	At USGS gage	5.55		27.32
6:47 AM	DWNSTRM Plant	5.61		27.22
7:32 AM	Unit 1	5.64		27.41 on
7:36 AM	Unit 2	5.69		27.37 off
7:39 AM	Unit 3	5.69		27.42 off
7:41 AM	Unit 4	5.73		27.41 on
7:44 AM	Unit 5	5.63		27.39 off
7:46 AM	Unit 6	5.66		27.38 off
7:49 AM	NPDES 001 sign	5.68		27.38
7:54 AM	At USGS gage	5.53		27.36
7:59 AM	DWNSTRM Plant	5.61		27.32
8:07 AM	Unit 1	5.60		27.49 on
				*no gates spilling

Time	Jenkinsville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenkinsville	USGS Temp data at Jenkinsville
5:00 AM	220.97	260.44	Gates 1, 2, 5, 6, 9, 10: 266	5.8	27.4
6:00 AM	220.99	259.66	Gates 3, 4:264	5.7	27.3
7:00 AM	220.95	259.00	Gates 7, 8: 263	5.7	27.3
8:00 AM				5.7	27.3

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 8/7/14

Samplers: Milton Quattlebaum

Time	Location	DO (mg/L)	Temp (°C)	Units Running
5:14 AM	Unit 1	5.90		27.37 off
5:14 AM	Unit 2	5.92		27.30 off
5:20 AM	Unit 3	6.02		27.32 on
5:23 AM	Unit 4	5.99		27.29 on
5:26 AM	Unit 5	5.92		27.34 off
5:29 AM	Unit 6	5.92		27.33 off
5:33 AM	NPDES 001 sign	5.88		27.30
5:39 AM	At USGS gage	5.90		27.30
5:48 AM	DWNSTRM Plant	5.80		27.18
6:25 AM	Unit 1	5.94		27.33 off
6:29 AM	Unit 2	5.94		27.33 off
6:31 AM	Unit 3	6.02		27.34 on
6:34 AM	Unit 4	5.95		27.32 on
6:36 AM	Unit 5	5.90		27.32 off
6:39 AM	Unit 6	5.86		27.28 off
6:42 AM	NPDES 001 sign	5.90		27.30
6:48 AM	At USGS gage	5.84		27.27
6:58 AM	DWNSTRM Plant	5.68		27.13
7:27 AM	Unit 1	5.82		27.34 off
7:30 AM	Unit 2	5.92		27.29 off
7:33 AM	Unit 3	5.97		27.36 on
7:36 AM	Unit 4	5.95		27.32 on
7:39 AM	Unit 5	5.90		27.27 off
7:42 AM	Unit 6	5.85		27.26 off
7:45 AM	NPDES 001 sign	5.90		27.28
7:49 AM	At USGS gage	5.74		27.21
7:56 AM	DWNSTRM Plant	5.73		27.15
8:03 AM	Unit 1	5.83		27.27 off

*no gates spilling

Time	Jenkinsville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenkinsville	USGS Temp data at Jenkinsville
5:00 AM	220.76	258.89	Gates 1, 2, 9, 10:266	6.0	27.2
6:00 AM	220.75	258.17	Gates 3, 4, 5, 6, 7, 8: 264	6.0	27.2
7:00 AM	220.72	258.02		5.9	27.2
8:00 AM				5.9	27.2

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 8/13/14

Samplers: Milton Quattlebaum and Kelly Miller

Time	Location	DO (mg/L)	Temp (°C)	Units Running
5:09 AM	Unit 1	5.87		26.18 on
5:13 AM	Unit 2	5.85		26.24 off
5:15 AM	Unit 3	5.89		26.26 on
5:18 AM	Unit 4	5.93		26.26 on
5:20 AM	Unit 5	5.80		26.28 off
5:23 AM	Unit 6	5.81		26.27 off
5:25 AM	NPDES 001 sign	5.82		26.27
5:30 AM	At USGS gage	5.83		26.24
5:35 AM	DWNSTRM Plant	5.85		26.23
6:13 AM	Unit 1	5.85		26.20 on
6:16 AM	Unit 2	5.87		26.19 off
6:18 AM	Unit 3	5.85		26.21 on
6:20 AM	Unit 4	5.93		26.19 on
6:23 AM	Unit 5	5.83		26.18 off
6:25 AM	Unit 6	5.81		26.18 off
6:28 AM	NPDES 001 sign	5.83		26.18
6:33 AM	At USGS gage	5.86		26.15
6:38 AM	DWNSTRM Plant	5.87		26.14
7:17 AM	Unit 1	5.86		26.14 on
7:19 AM	Unit 2	5.86		26.15 off
7:21 AM	Unit 3	5.88		26.15 on
7:23 AM	Unit 4	5.94		26.12 on
7:25 AM	Unit 5	5.86		26.10 off
7:27 AM	Unit 6	5.88		26.09 off
7:29 AM	NPDES 001 sign	5.89		26.08
7:33 AM	At USGS gage	5.83		26.07
7:37 AM	DWNSTRM Plant	5.90		26.06
7:41 AM	Unit 1	5.90		26.12 on

*no gates spilling

Time	Jenkinsville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenkinsville	USGS Temp data at Jenkinsville
5:00 AM	221.33	259.89	1, 2, 9, 10: 266	5.9	26.1
6:00 AM	221.33	259.5	3, 4, 5, 6, 7, 8: 261	5.9	26.0
7:00 AM	221.07	259.57		5.9	26.0
8:00 AM				5.9	26.0

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 8/20/14

Samplers: Milton Quattlebaum

Time	Location	DO (mg/L)	Temp (°C)	Units Running
5:24 AM	Unit 1	5.53		27.54 on
5:27 AM	Unit 2	5.88		27.68 off
5:30 AM	Unit 3	5.91		27.65 off
5:33 AM	Unit 4	5.99		27.67 on
5:36 AM	Unit 5	5.92		27.68 off
5:39 AM	Unit 6	5.91		27.64 off
5:42 AM	NPDES 001 sign	5.91		27.64
5:48 AM	At USGS gage	5.90		27.47
5:53 AM	DWNSTRM Plant	5.90		27.55
6:26 AM	Unit 1	5.63		27.70 on
6:29 AM	Unit 2	5.87		27.68 off
6:31 AM	Unit 3	5.86		27.67 off
6:33 AM	Unit 4	5.91		27.66 on
6:35 AM	Unit 5	5.87		27.63 off
6:38 AM	Unit 6	5.86		27.60 off
6:41 AM	NPDES 001 sign	5.93		27.65
6:46 AM	At USGS gage	5.97		27.21
6:50 AM	DWNSTRM Plant	5.86		27.48
7:32 AM	Unit 1	5.67		27.64 on
7:34 AM	Unit 2	5.96		27.57 off
7:38 AM	Unit 3	5.92		27.66 off
7:41 AM	Unit 4	6.02		27.65 on
7:43 AM	Unit 5	5.97		27.64 off
7:45 AM	Unit 6	5.87		27.53 off
7:48 AM	NPDES 001 sign	5.93		27.61
7:56 AM	At USGS gage	5.86		27.47
8:00 AM	DWNSTRM Plant	5.83		27.50
8:09 AM	Unit 1	5.73		27.61 on

*no gates spilling

Time	Jenkinsville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenkinsville	USGS Temp data at Jenkinsville
5:00 AM	220.97	258.50	1, 2, 9, 10: 265	5.8	27.6
6:00 AM	220.96	258.37	3, 4, 5, 6, 7, 8: 266	5.8	27.6
7:00 AM	220.94	258.42		5.7	27.5
8:00 AM				5.7	27.5

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 8/26/14

Samplers: Milton Quattlebaum

Time	Location	DO (mg/L)	Temp (°C)	Units Running
5:17 AM	Unit 1	7.05	28.08	off
5:20 AM	Unit 2	7.02	28.08	off
5:23 AM	Unit 3	7.09	28.07	on
5:26 AM	Unit 4	6.41	28.08	on
5:28 AM	Unit 5	6.29	28.06	off
5:31 AM	Unit 6	6.25	28.03	off
5:34 AM	NPDES 001 sign	6.30	28.04	
5:41 AM	At USGS gage	6.29	27.90	
5:46 AM	DWNSTRM Plant	6.20	27.95	
6:26 AM	Unit 1	7.00	28.02	off
6:29 AM	Unit 2	7.06	28.00	off
6:32 AM	Unit 3	7.03	27.98	on
6:35 AM	Unit 4	6.64	27.90	on
6:38 AM	Unit 5	6.43	27.86	off
6:41 AM	Unit 6	6.41	27.82	off
6:45 AM	NPDES 001 sign	6.50	27.87	
6:51 AM	At USGS gage	6.51	27.82	
6:56 AM	DWNSTRM Plant	6.36	27.61	
7:30 AM	Unit 1	6.74	27.81	off
7:32 AM	Unit 2	6.81	27.79	off
7:34 AM	Unit 3	6.80	27.84	on
7:36 AM	Unit 4	6.68	27.71	on
7:38 AM	Unit 5	6.45	27.74	off
7:42 AM	Unit 6	6.47	27.66	off
7:44 AM	NPDES 001 sign	6.50	27.74	
7:48 AM	At USGS gage	6.35	27.71	
7:53 AM	DWNSTRM Plant	6.29	27.60	
8:01 AM	Unit 1	6.67	27.79	off

*no gates spilling

Time	Jenkinsville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenkinsville	USGS Temp data at Jenkinsville
5:00 AM	221.10	261.50	1, 2, 9, 10: 266	6.3	27.9
6:00 AM	221.10	261.33	3, 4, 5, 6, 7, 8: 265	6.4	27.8
7:00 AM	221.08	261.01		6.4	27.6
8:00 AM				6.3	27.5

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 9/03/14

Samplers: Milton Quattlebaum and Kelly Miller

Time	Location	DO (mg/L)	Temp (°C)	Units Running
5:01 AM	Unit 1	5.88	28.45	on
5:04 AM	Unit 2	5.74	28.41	off
5:10 AM	Unit 3	5.61	28.40	on
5:14 AM	Unit 4	5.75	28.42	on
5:17 AM	Unit 5	5.67	28.49	off
5:19 AM	Unit 6	5.63	28.48	off
5:24 AM	NPDES 001 sign	5.82	28.35	
5:29 AM	At USGS gage	6.02	28.86	
5:35 AM	DWNSTRM Plant	6.11	28.43	
6:19 AM	Unit 1	5.56	28.41	on
6:21 AM	Unit 2	5.58	28.41	off
6:25 AM	Unit 3	5.53	28.42	on
6:27 AM	Unit 4	5.62	28.44	on
6:30 AM	Unit 5	5.73	28.46	off
6:33 AM	Unit 6	5.69	28.47	off
6:35 AM	NPDES 001 sign	5.71	28.46	
6:40 AM	At USGS gage	5.73	28.46	
6:45 AM	DWNSTRM Plant	5.69	28.13	
7:31 AM	Unit 1	5.57	28.61	on
7:36 AM	Unit 2	5.62	28.60	off
7:39 AM	Unit 3	5.63	28.59	on
7:41 AM	Unit 4	5.61	28.57	on
7:44 AM	Unit 5	5.63	28.54	off
7:47 AM	Unit 6	5.56	28.54	off
7:49 AM	NPDES 001 sign	5.53	28.55	
7:53 AM	At USGS gage	5.46	28.51	
7:59 AM	DWNSTRM Plant	5.56	28.30	
8:05 AM	Unit 1	5.55	28.51	on

*no gates spilling

Time	Jenksville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenksville	USGS Temp data at Jenksville
5:00 AM	221.43	259.43	all @ 266	5.7	28.4
6:00 AM	221.38	259.1		5.8	28.4
7:00 AM	221.38	258.74		5.4	28.4
8:00 AM				5.4	28.4

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 9/10/14

Samplers: Milton Quattlebaum

Time	Location	DO (mg/L)	Temp (°C)	Units Running	
6:02 AM	Unit 1	5.90		27.12 on	
6:04 AM	Unit 2	5.82		27.11 off	
6:07 AM	Unit 3	5.71		27.09 off	
6:10 AM	Unit 4	5.77		27.09 on	
6:13 AM	Unit 5	5.62		27.08 off	
6:17 AM	Unit 6	5.61		27.04 off	
6:20 AM	NPDES 001 sign	5.65		27.01	
6:30 AM	At USGS gage	5.62		27.04	
6:35 AM	DWNSTRM Plant	5.64		26.98	
7:22 AM	Unit 1	5.82		26.95 on	
7:26 AM	Unit 2	5.76		26.94 off	
7:29 AM	Unit 3	5.83		26.92 off	
7:32 AM	Unit 4	5.81		26.92 on	
7:35 AM	Unit 5	5.66		26.93 off	
7:38 AM	Unit 6	5.74		26.67 off	
7:41 AM	NPDES 001 sign	5.69		26.90	
7:46 AM	At USGS gage	5.78		26.64	
7:50 AM	DWNSTRM Plant	5.72		26.72	
8:27 AM	Unit 1	5.78		26.81 on	
8:30 AM	Unit 2	5.80		26.87 off	
8:33 AM	Unit 3	5.79		26.85 off	
8:36 AM	Unit 4	5.85		26.85 on	
8:38 AM	Unit 5	5.80		26.86 off	
8:40 AM	Unit 6	5.76		26.83 off	
8:42 AM	NPDES 001 sign	5.78		26.84	
8:46 AM	At USGS gage	5.71		26.75	
8:50 AM	DWNSTRM Plant	5.80		26.80	
9:00 AM	Unit 1	5.65		26.82 on	
				*no gates spilling	
Time	Jenksville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenksville	USGS Temp data at Jenksville
6:00 AM	221.07	259.38	all @ 266	5.6	26.9
7:00 AM	221.05	259.44		5.7	26.8
8:00 AM	221.06	259.43		5.7	26.8
9:00 AM				5.7	26.8

APPENDIX B

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 9/16/14

Samplers: Milton Quattlebaum

Time	Location	DO (mg/L)	Temp (°C)	Units Running
6:01 AM	Unit 1	5.13	26.99	off
6:04 AM	Unit 2	5.37	26.73	off
6:07 AM	Unit 3	5.36	27.06	off
6:09 AM	Unit 4	5.25	27.06	on
6:12 AM	Unit 5	4.95	27.01	off
6:15 AM	Unit 6	4.97	26.96	off
6:18 AM	NPDES 001 sign	4.95	26.84	
6:22 AM	At USGS gage	4.94	26.81	
6:26 AM	DWNSTRM Plant	4.87	26.77	
7:03 AM	Unit 1	5.16	26.99	off
7:05 AM	Unit 2	5.20	26.96	off
7:08 AM	Unit 3	5.34	26.98	off
7:11 AM	Unit 4	5.10	26.99	on
7:13 AM	Unit 5	5.00	26.92	off
7:16 AM	Unit 6	4.97	26.93	off
7:19 AM	NPDES 001 sign	4.81	26.85	
7:24 AM	At USGS gage	4.98	26.80	
7:30 AM	DWNSTRM Plant	4.95	26.83	
8:02 AM	Unit 1	5.18	26.91	off
8:05 AM	Unit 2	5.15	26.92	off
8:08 AM	Unit 3	5.30	26.88	off
8:11 AM	Unit 4	5.24	26.93	on
8:13 AM	Unit 5	4.99	26.93	off
8:15 AM	Unit 6	4.96	26.91	off
8:18 AM	NPDES 001 sign	5.04	26.80	
8:24 AM	At USGS gage	4.92	26.87	
8:28 AM	DWNSTRM Plant	5.12	26.67	
8:39 AM	Unit 1	5.26	26.89	

Time	Jenksville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenksville	USGS Temp data at Jenksville
6:00 AM	220.54	259.57	1, 2, 9, 10 @266	5.0	26.9
7:00 AM	220.54	259.73	3, 4, 5, 6, 7, 8@262	5.0	26.8
8:00 AM	221.44	259.81		5.0	26.9
9:00 AM				5.0	26.8

Parr/Fairfield Relicensing Dissolved Oxygen Study 2014

Date: 9/25/14

Samplers: Milton Quattlebaum

Time	Location	DO (mg/L)	Temp (°C)	Units Running
6:09	Unit 1	7.80	21.40	off
6:11	Unit 2	7.76	21.42	off
6:15	Unit 3	7.81	21.44	on
6:17	Unit 4	7.85	20.90	on
6:21	Unit 5	7.70	21.39	off
6:24	Unit 6	7.65	21.42	off
6:27	NPDES 001 sign	7.66	21.43	
6:33	At USGS gage	7.10	21.40	
6:40	DWNSTRM Plant	7.61	21.36	
7:17	Unit 1	7.69	21.68	off
7:19	Unit 2	7.71	21.67	off
7:21	Unit 3	7.80	21.67	on
7:23	Unit 4	7.70	21.61	on
7:25	Unit 5	7.58	21.57	off
7:27	Unit 6	7.62	21.62	off
7:29	NPDES 001 sign	7.60	21.62	
7:34	At USGS gage	7.65	21.61	
7:39	DWNSTRM Plant	7.31	21.59	
8:13	Unit 1	7.67	21.75	off
8:15	Unit 2	7.65	21.72	off
8:17	Unit 3	7.71	21.75	on
8:19	Unit 4	7.66	21.62	on
8:21	Unit 5	7.65	21.51	off
8:23	Unit 6	7.58	21.59	off
8:25	NPDES 001 sign	7.63	21.60	
8:29	At USGS gage	7.62	21.42	
8:34	DWNSTRM Plant	7.59	21.47	
8:39	Unit 1	7.68	21.65	off

*no gates spilling

Time	Jenksville 02160991	Parr Res. Level 02160990	Parr Crest Gate	USGS DO data at Jenksville	USGS Temp data at Jenksville
6:00 AM	221.06	259.18	all @ 266	7.3	21.5
7:00 AM	221.05	259.2		7.3	21.5
8:00 AM	221.05	259.24		7.3	21.5
9:00 AM				7.3	21.5

APPENDIX B
2015 TURBINE VENTING TEST RESULTS

Parr Aeration Investigation – July 2015

SCE&G initially performed turbine venting testing at the Parr Shoals Development during 2014. Based on the initial success of that testing for periodically increasing dissolved oxygen (DO) levels in the tailrace, SCE&G performed additional turbine venting testing on July 9, 2015. The results of this testing will be used to develop a Turbine Venting Plan for the Parr Shoals Development and submitted as part of the 401 Water Quality Certification application process for the Parr Hydroelectric Project.

During each test run, water quality measurements (DO, temperature, and % DO saturation) were recorded with handheld meters in the tailrace outflow of each unit being tested. Units 1, 2, 3, 5 and 6 were available for testing. Unit 4 was under repair and could not be tested. Unit 6 does not have a vacuum breaker installed on the headcover and cannot be vented, but was tested to determine its aerating capability. During testing all river flow was passed through the turbine units and the crest gates were in the closed (raised) position. The headpond and tailwater elevations were also recorded, as were individual generator kW and kVar outputs (Table 1).

At the beginning of each turbine test, tailrace readings were collected with the unit running and the vacuum breaker closed. After approximately 5 to 10 minutes, the vacuum breaker valve was fully opened to allow aeration. The effects of the introduced air were clearly visible in the tailrace for each unit tested. The unit was allowed to run for another 5 to 10 minutes until tailrace readings stabilized before data was recorded. Each unit was tested in sequence using this same scenario. Unit 6 data was collected to see the DO levels that occurred on that unit with no venting available. Surprisingly, Unit 6 DO levels were fairly high without venting which may be an artifact of its location near the shoreline. Unit 6 may pull water from closer to the surface than the other units located further away from the shoreline.

Discussion

Each of the units 1, 2, 3, and 5 tested will aerate with their current valve configurations and each increased DO levels at a different amounts. Testing showed that the units vent from highest to lowest as follows: 3, 1, 5, 2, 4, and 6. SCE&G will use this information to develop a Turbine Venting Plan for the Parr Shoals Development that will be submitted to South Carolina Department of Health and Environmental Control for discussion and approval.

Table B-1. Summary of Turbine Venting at Parr Shoals Dam July 9, 2015.

Unit Tested	Vent Open/Close	DO (mg/L)	DO Increase (mg/L)	Saturation %	Saturation Increase %	Temp (F)	Gate Setting %	Output (KW)	KVars
1	Close	4.65	-----	59.8	-----	82.9	45	1473	150
1	Open	5.04	0.39	64.3	4.5	83.0	45	1426	145
2	Close	4.60	-----	58.8	-----	82.9	43	1520	144
2	Open	4.80	0.20	61.2	2.4	82.9	43	1475	144
3	Close	4.70	-----	60.0	-----	82.9	45	1370	153
3	Open	5.15	0.45	65.2	5.2	82.9	45	1300	142
5	Close	4.84	-----	62.4	-----	82.9	45	1560	154
5	Open	5.20	0.36	65.6	3.2	82.9	45	1476	150
6	No Vent	5.10	-----	65.2	-----	83.0	39	1426	145

Unit 4 was not available for testing

Unit 6 does not have a vent

Headwater elevation remained stable between 258.1 – 257.9 msl during the test

Tailwater Elevation remained stable between 221.0 – 220.8 msl during the test

APPENDIX B

**PARR HYDROELECTRIC PROJECT – FERC No. 1894 – PARR SHOALS DAM
TURBINE VENTING – 2016 TURBINE VENTING TEST RESULTS – MEMORANDUM –
AUGUST 15, 2016**

PARR HYDROELECTRIC PROJECT – FERC No. 1894
PARR SHOALS DAM TURBINE VENTING – MEMORANDUM

TO: Water Quality Technical Working Committee
FROM: Kleinschmidt Associates
DATE: August 15, 2016
RE: 2016 Turbine Venting Test Results

INTRODUCTION

Following the completion of the Parr Hydroelectric Project Baseline Water Quality Report, there were questions from the Water Quality TWC regarding occasional low dissolved oxygen (DO) in the tailrace downstream of Parr Shoals Dam. At a Water Quality TWC meeting on February 4, 2014, the TWC noted that the Baseline Water Quality Report identified periodic excursions of DO levels less than 4.0 mg/L in the Parr Shoals Dam tailrace, as reported by the USGS station 02160991. In an effort to understand these excursions better, SCE&G consolidated historic USGS data to examine these excursions and issued an addendum to the Baseline Water Quality Report in June 2014. At the request of the Water Quality TWC, SCE&G collected additional water quality data in the summer of 2014 in the tailrace and forebay of Parr Shoals Dam in an attempt to determine whether project operations are causing these excursions. These results were summarized in a memo issued on March 2, 2015. SCE&G followed up this effort by collecting another series of water quality data in the Parr forebay from May through mid-October 2015. The results of this data collection effort was summarized in the Parr Shoals Dam Turbine Venting Report.

In addition, SCE&G proposed to test all of the Parr turbines for their ability to self-vent and potentially increase the dissolved oxygen in the tailrace during specific periods of the year. An initial test of the turbines' capacity to vent was performed August 2014; a second test to determine which turbines had the most significant impact on increasing dissolved oxygen was performed in July 2015. The results of the testing, along with the findings published in the Baseline Water Quality Report, were used to develop a Turbine Venting Plan. At the March 2016 Water Quality TWC meeting, SCE&G proposed to test the Turbine Venting Plan during June 15th through July 31st of 2016. In addition to testing the plan during 2016, SCE&G also conducted a re-test of Unit 4 after installation of the new "air-cooled wooden bearings". The results of each of these tests are presented in this document.

METHODOLOGY AND RESULTS

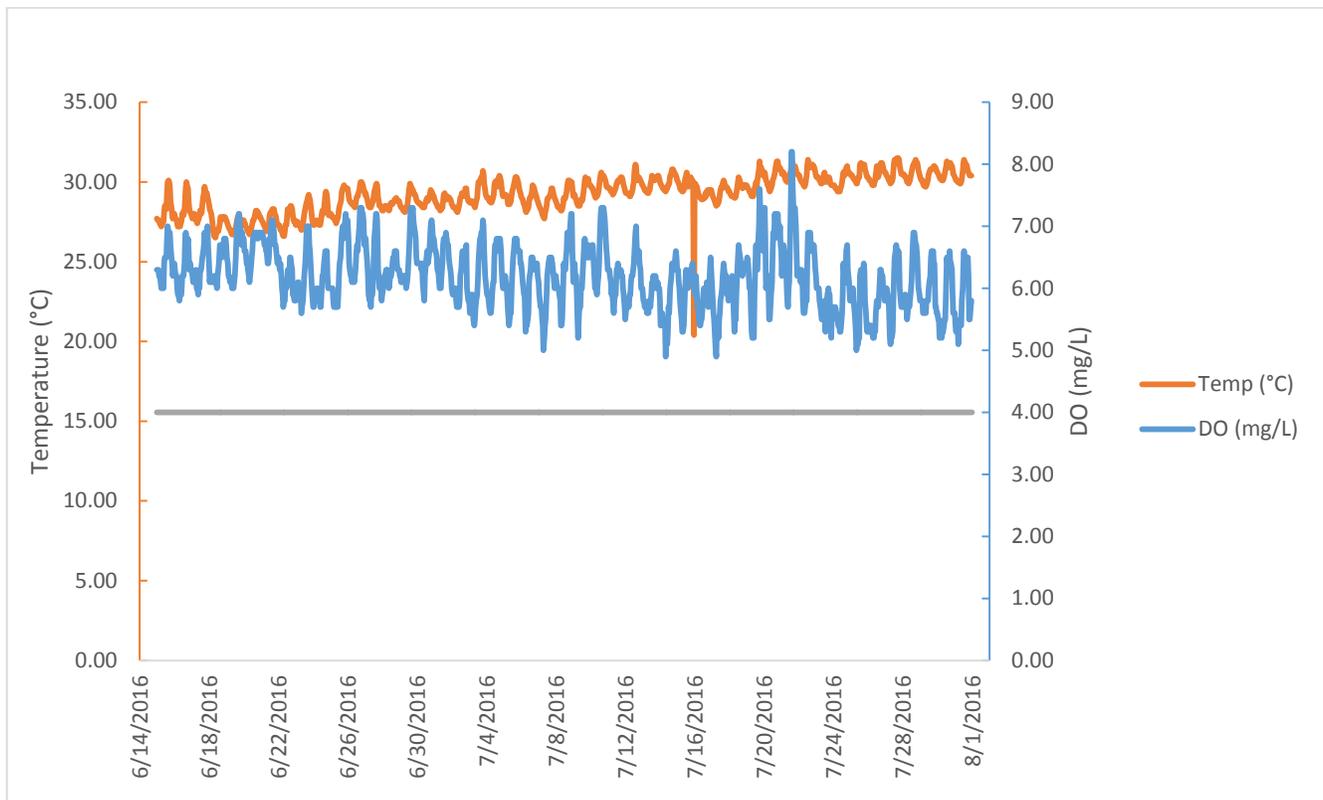
SCE&G implemented the proposed Turbine Venting Plan from June 15 through July 31, 2016. The success of turbine venting was measured at the USGS Gage No. 02160991, Broad River near Jenkinsville, SC.

Dissolved oxygen and temperatures observed in the tailrace are illustrated in Figure 1. No excursions of DO levels less than 4.0 mg/L were observed (Table 1).

Table 1 Parr Shoals Tailrace Maximum and Minimum DO and Temperature

	June		July	
	DO (mg/L)	Temperature (°C)	DO (mg/L)	Temperature (°C)
Maximum	7.30	30.10	8.20	31.50
Minimum	5.60	26.50	4.90	20.40

Figure 1 Parr Shoals Tailrace DO and Temperature



Turbine venting test of Unit 4 are presented in Table 2. The testing noted a DO uptake of approximately 0.20 mg/l. The testing performed during 2014 identified an uptake of 0.16, which is slightly less than the latest testing results.

Table 2 Parr Shoals Turbine Venting Unit 4 Test – August 2016

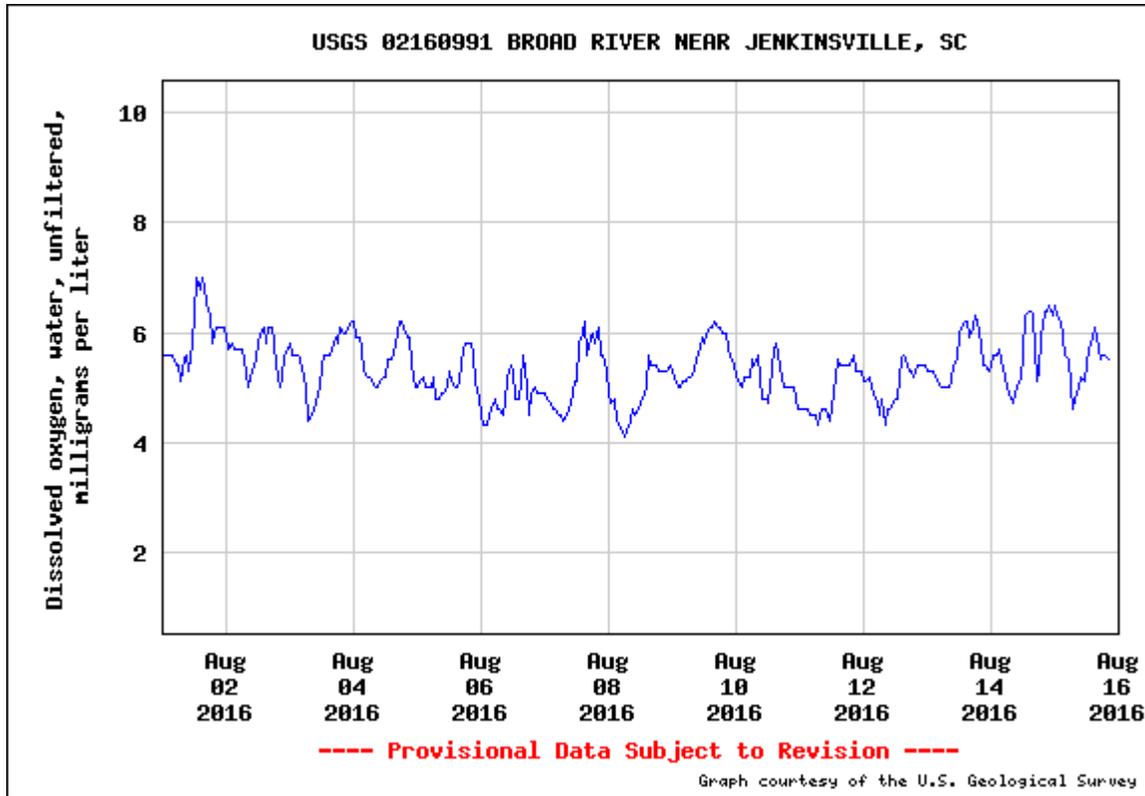
Test #	Time (DST)	Breaker Position Open/Closed	DO (mg/l)	Temp (°C)	TDG	% Sat	HP EI	TW EI	KW	Kvars Act.	Gates Act. (%)	BP
1	9:00	closed	5.08	29.42	713	67.2	257.22	220.70	1360±	150	45	759
2	9:40	open	5.3	29.48	718	70.2	257.53	220.72	1360±	151	46	759

Notes:

Requested plant/system control to have all gates up and a max. of 2 units generating by 07:00 (DST).
 Units 4 & 6 were operating and all gates up upon arrival at the plant. Unit 6 was shutdown at 08:20 (DST).
 Breaker valve on Unit 4 was opened at approx. 09:20 (DST).

Also of note was the general decline in DO levels recorded at the Jenkinsville gage during the first 2 weeks of August, 2016 (Figure 2). We are not sure if this is related to drops associated with the cessation of turbine venting or environmental factors.

Figure 2 Parr Shoals Tailrace DO and Temperature – August 1 – August 16, 2016



CONCLUSION

Based on the results of the 2016 Turbine Venting Plan test, turbine venting at the Parr Shoals Development was successful. Testing of Unit 4 during 2016 showed a slight increase in DO uptake. We also noted a decrease in DO levels during August.

Based on these findings, SCE&G proposes to perform turbine venting tests during 2017 and to extend the venting season to include June 15 through August 31. SCE&G will use the results of the 2016 and 2017 testing and the individual Unit test to update and modify the current Turbine Venting Plan. SCE&G plans to include the updated Turbine Venting Plan as one of the proposed protection, mitigation, and enhancement measures to be included in the Final License Application for continued operation of the Parr Hydroelectric Project (FERC No. 1894).

Appendix A-12
Upgrade/Replacement of
Generators at Parr Shoals
Development
Implementation Plan

IMPLEMENTATION PLAN

**UPGRADE/REPLACEMENT OF GENERATORS
PARR SHOALS DEVELOPMENT**

SOUTH CAROLINA ELECTRIC & GAS COMPANY

FERC No. 1894

Prepared by:

South Carolina Electric & Gas Company

October 2017

**IMPLEMENTATION PLAN
FOR
UPGRADE/REPLACEMENT OF GENERATORS AT PARR SHOALS DEVELOPMENT**

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

AMP	Adaptive Management Plan
AR	American Rivers
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CRK	Congaree Riverkeeper
CRSA	Comprehensive Relicensing Settlement Agreement
DLA	Draft License Application
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
ft	foot
Generator capacity	the maximum amount of electricity that can be produced within the safety limitation of a generator
Head	the difference in the elevation of the upstream reservoir in relation to the tailrace elevation
Hydraulic capacity	the maximum amount of water that can be passed through the Project turbines
IFIM	Instream Flow Incremental Methodology
installed capacity	the nameplate megawatt rating of a generator or group of generators
interested parties	individuals and entities that have an interest in a proceeding
kW	Kilowatt
kWh	kilowatt-hour
Licensee	South Carolina Electric & Gas Company
Licensing/Relicensing	the process of acquiring an original FERC license for a new proposed hydropower project; or, the process of acquiring a new FERC license for an existing hydropower project after the previous license has expired.
Minimum Flow	A continuous flow, measured in CFS that is required to be released from the Project dam during specified periods of time.
Msl	mean sea level
MW	megawatt
MWh	megawatt-hour
Net inflow	The previous day's daily average inflow as calculated using the sum of the three upstream USGS gages (USGS 02156500, Broad River near Carlisle, SC; USGS 02160105, Tyger River near Delta, SC; and USGS 02160700, Enoree River at Whitmire, SC) minus evaporation from the reservoirs.
NGO	non-governmental organization
NMFS	National Marine Fisheries Services, also known as NOAA Fisheries
NOAA	National Oceanic and Atmospheric Administration, including NMFS
normal operating capacity	The maximum MW output of a generator or group of generators under normal maximum head and flow conditions

PM&E	protection, mitigation and enhancement measures
Project	Parr Hydroelectric Project (FERC No. 1894)
Project Area	Zone of potential, reasonably direct project effects within the FERC Project Boundary.
Project Boundary	The boundary line defined in the license issued by FERC that surrounds areas needed for Project purposes.
Review Committee	A group, including SCE&G and stakeholders, formed to direct the implementation of a particular AMP or monitoring plan. Members of a Review Committee must be signatories to the Comprehensive Relicensing Settlement Agreement.
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCE&G	South Carolina Electric & Gas Company
SHPO	State Historic Preservation Officer
Tailrace	Channel through which water is discharged from the turbines
TLP	Traditional Licensing Process
Turbine capacity	maximum shaft horsepower for an individual turbine at full gate
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQFW RCG	Water Quality, Fish and Wildlife Resource Conservation Group
WUA	Weighted Usable Area

**IMPLEMENTATION PLAN
FOR
UPGRADE/REPLACEMENT OF GENERATORS AT PARR SHOALS DEVELOPMENT**

1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) must file an application for a new license for its Parr Hydroelectric Project (Project) (FERC No. 1894) on the Broad River with the Federal Energy Regulatory Commission (FERC) by June 2018. During relicensing, the issue of downstream flow fluctuations associated with Project operations was identified by the Water Quality, Fish and Wildlife Resource Conservation Group (WQFW RCG) as an issue that needed to be addressed. The WQFW RCG includes representatives from SCE&G, South Carolina Department of Natural Resources (SCDNR), U.S. Fish and Wildlife Service (USFWS), South Carolina Department of Health and Environmental Control (SCDHEC), National Oceanic and Atmospheric Administration (NOAA), American Rivers and Congaree Riverkeeper. The WQFW RCG discussed and determined beneficial changes to Project operations to stabilize downstream flows, and a framework for a Downstream Flow Fluctuation Adaptive Management Plan (AMP) was developed to address downstream flow stabilization during the new license term.

One component of that AMP was to upgrade (by rewinding the existing stator) or completely replace the existing generators at the Parr Development, which will allow operation of the turbines at greater gate openings under maximum normal gross head. The gross head was increased following the installation of the spillway crest gates during redevelopment of the project in the 1970s. This proposed modification will allow more water to pass through the turbines, reducing the need for spillage at the Project and reducing the frequency of the resulting downstream flow fluctuations.

This Implementation Plan (IP) outlines SCE&G's proposed scope and schedule for generator upgrades or replacements that will be performed during the term of the new Project license.

1.1 PROJECT DESCRIPTION

The Parr Hydroelectric Project includes the 14.88-megawatt (MW) Parr Shoals Development (Parr Development) and the 511.2-MW Fairfield Pumped Storage Development (Fairfield Development) located in Fairfield and Newberry counties, South Carolina. Parr Reservoir is a 4,400-acre impoundment formed by the Broad River and the Parr Shoals Dam and serves as the lower reservoir for the Fairfield Development's pumped storage operations. Monticello Reservoir is a 6,800-acre impoundment formed by a series of four earthen dams and serves as the upper reservoir for the Fairfield Development's pumped storage operations. The existing Project license was issued by FERC on August 28, 1974 for a period of 46 years, terminating on June 30, 2020. SCE&G intends to file for a new license with FERC on or before May 31, 2018.

2.0 CURRENT OPERATIONS

The original hydraulic capacity (the maximum amount of water that can be passed through the six turbines) of the Parr Development powerhouse was approximately 6,000 cfs. The increase in operating head due to installation of crest gates on the spillway section of Parr Dam during the construction of the Fairfield Development resulted in a turbine capacity (maximum shaft horsepower for an individual turbine at full gate) that exceeded the generator capacity (the maximum amount of electricity that can be produced within the safety limitation of a generator). The generator limitations have reduced the hydraulic capacity of the Parr Development from its original 6,000 cfs to approximately 4,800 cfs, due to the need to operate the turbines at a reduced gate opening. When inflow exceeds the plant's hydraulic capacity, water must be spilled by lowering one or more sets of crest gates. Parr Reservoir level rises and falls during pumped storage cycles at the Fairfield Development, which varies the head on the crest gates when in the lowered position and results in fluctuations in project discharge. Restoring the hydraulic capacity of the six main units to 6,000 cfs or more would reduce the frequency of spilling and of the resulting flow fluctuations.

3.0 UPGRADE OR REPLACEMENT OF UNIT GENERATORS

During the period of the new license issued by the Commission, SCE&G plans to upgrade the existing generators, or if feasible to install new generators of increased capacity. When

completed, the new or upgraded generators will permit operation of the units at increased gate settings using the available hydraulic head, with a corresponding increase in plant hydraulic capacity as described in Section 2.0. Complete replacement of the generators, if feasible, will potentially increase the hydraulic capacity of each unit from approximately 800 cfs at present to between 1,000 and 1,200 cfs. If all six generators are replaced, the plant hydraulic capacity will potentially increase from approximately 4,800 cfs presently to between 6,000 and 7,200 cfs. Replacement of all six generators would also increase the installed capacity of the Parr Development from its present 14.88 MW to an estimated maximum of 22.72 MW. Upgrading the existing generators by rewinding them will result in a smaller increase in both hydraulic capacity and installed generating capacity (estimated to be 10 to 15 percent, possibly greater). Preliminary investigation has indicated that the major turbine components can mechanically withstand the increased shaft horsepower required by the new or upgraded generators, however certain auxiliary electrical equipment (i.e. exciters, switchgear, and bus work) may need to be upgraded or replaced to safely handle the increased electrical power.

4.0 IMPLEMENTATION SCHEDULE

The proposed schedule for changes to the generators is to have all six units upgraded or replaced within ten years after license issuance. The upgrade or replacement of the first unit will be completed within three years from issuance of the license. Subsequent units will be upgraded or replaced one each year, after testing and acceptance of the initial unit. Should reliability, economic advantage, or other issues require it, the schedule may be accelerated at SCE&G's discretion.

Year 1:	Scoping and design including auxiliary equipment and structural/foundation design;
Year 2:	Final design and manufacture of first unit;
Year 3:	Installation and acceptance testing of first unit;
Year 4:	Implement design changes if required based on acceptance tests of first unit;
Year 5:	Manufacture of second unit;
Year 6:	Installation of second unit and manufacture of third unit;
Year 7:	Installation of third unit and manufacture of fourth unit;
Year 8:	Installation of fourth unit and manufacture of fifth unit;
Year 9:	Installation of fifth unit and manufacture of sixth unit;
Year 10:	Installation of sixth unit.

5.0 REFERENCES

Federal Power Commission (FPC). 1974. Order Issuing New License (Major). Authorizing Project Redevelopment, Permitting use of Project Waters for Condenser Cooling Purposes, Vacating Hearing Order, and Permitting Withdrawal of Intervention. (Project No. 1894). Issued August 28, 1974.

Appendix A-13
Shoreline Management Plan
Parr Reservoir

SHORELINE MANAGEMENT PLAN PARR RESERVOIR

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

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

June 2018

SHORELINE MANAGEMENT PLAN
PARR RESERVOIR

PARR HYDROELECTRIC PROJECT
(FERC No. 1894)

South Carolina Electric & Gas Company
Cayce, South Carolina

June 2018

**SHORELINE MANAGEMENT PLAN
PARR RESERVOIR**

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

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**SHORELINE MANAGEMENT PLAN
PARR RESERVOIR**

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

EXECUTIVE SUMMARY

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

The Project developments form two distinct Project reservoirs. Parr Reservoir is located along the Broad River, as impounded by Parr Dam, and functions as the lower reservoir for the Fairfield Development. Monticello Reservoir is located adjacent to the Broad River and functions as the upper reservoir for the Fairfield Development. Both Project reservoirs serve as popular recreation destinations and are used and enjoyed by local residents as well as visitors to the state.

In conjunction with its relicensing activities, SCE&G has assembled a diverse and inclusive group of stakeholders to advise and assist in the development of two Shoreline Management Plans ("SMPs"), each tailored to a specific reservoir. SMPs are comprehensive plans for the management of Project land and adjoining water resources and their uses, consistent with License requirements and broad Project purposes, and appropriately accessible and beneficial to adjacent shoreline residents and the recreating public. A SMP serves to identify existing and appropriate future uses and to provide plans and programs for responsible future use and management of project lands and waters as well as the flora and fauna encompassed within them. This SMP exists specifically to address shoreline uses surrounding Parr Reservoir. A SMP to address Monticello Reservoir is included under separate cover and is available from the SCE&G Lake Management Department (Lake Management).

In addition to a SMP for each Project reservoir, a Shoreline Management Handbook and Permitting Guidelines (Permitting Handbook) was developed for both developments in

consultation with governmental, non-governmental, and individual stakeholders to address activities that will require consultation with and/or permits from SCE&G. These activities include construction, maintenance, and placement of docks on Monticello Reservoir, shoreline stabilization, lake access pathways and other shoreline activities.

The classification of Project lands surrounding Parr Reservoir is described in Section 5.0 and includes three management classifications. These classifications are as follows: Project Operations; Public Recreation; and, Non-Development Areas. Lands reserved for Project operations are those lands that are specifically required for operation of the Project. They include areas such as plant facility locations, dams, electrical substations, etc. Public Recreation land includes land within SCE&G developed recreation areas and islands that are owned by SCE&G. Undeveloped areas are areas protected from development to preserve the environmental resources and aesthetic values. Land use prescriptions associated with these land management classifications are discussed in further detail in Section 6.0. Prescriptions are administered through the Permitting Handbook.

SCE&G maintains a strong commitment to the management of the waters and shoreline of Parr Reservoir, focusing on the social, ecological, and economic impacts of activities on and near the shoreline and water, taking into consideration in particular the environmental, aesthetic, and recreational character of the shoreline and lake. Section 7.0 details the activities and structures on and adjacent to Parr Reservoir that require SCE&G consultation and/or approval. The permitting procedures for shoreline activities or structures are set out in more detail in Section 8.0 and in the Permitting Handbook.

Section 9.0 details SCE&G's fee structure for the shoreline management program. Such fees can be one-time or periodic.

Periodic surveys of the Parr Reservoir shoreline are conducted by SCE&G and include, among other things, inventories of unauthorized structures. These represent violations of the SMP. SMP violations will be dealt with as deemed by SCE&G, in its sole discretion, to be appropriate. Consequences of violations may range from required removal of unauthorized structure, fines, and/or legal action, and are discussed more fully in Section 10.0.

SCE&G Shoreline Management Practices include actions taken to lessen or mitigate for potential impacts to a particular resource resulting from its direct or indirect use. These include but may

not be limited to landowner Best Management Practices ("BMP"). Shoreline Management Practices are further described in Section 11.0 of this document.

Public education and outreach on the protection of valuable shoreline resources is integral to the effectiveness of the SMP. Section 12.0 of this document details specific measures to be undertaken to help educate both adjacent shoreline residents and other Project resource users. Among included objectives will be SMP education and BMP education.

In its Application for New License, SCE&G is proposing 10 year review periods for the SMP. The 10 year SMP review periods provide reasonable opportunities for SCE&G, in concert with governmental, non-governmental, and individual stakeholders, periodically and deliberately to assess new issues that arise as a result of development around the Reservoir, and allow for analyses of cumulative effects. Concurrently with the FERC SMP review process, SCE&G will review the Permitting Handbook with interested stakeholders periodically to ensure its effectiveness; however, changes to the permitting process may be made as it deems necessary and appropriate. This is discussed in Section 13.0.

**SHORELINE MANAGEMENT PLAN
PARR RESERVOIR**

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

1.0 INTRODUCTION

The Parr Hydroelectric Project ("Project") is located on the Broad River in Fairfield and Newberry Counties, South Carolina (Figure 1-1). The Project is located approximately 31 river miles downstream of the Neal Shoals Hydroelectric Project (Federal Energy Regulatory Commission ["FERC"] No. 2315) and 24 river miles upstream of the Columbia Diversion Dam. The Project consists of two developments: the Parr Shoals Development ("Parr Development") and the Fairfield Pumped Storage Development ("Fairfield Development"). Subsequently, two reservoirs are included as part of the Project, Monticello Reservoir¹ and Parr Reservoir. The normal maximum water level in Monticello Reservoir is El. 425.0 feet National Geodetic Vertical Datum ("NGVD"), which corresponds to a surface area of approximately 6,600 acres, and a gross storage of 400,000 acre-feet. Monticello Reservoir has approximately 64 miles of shoreline within the Project boundary². Parr Reservoir's normal maximum water level is at El. 266.0 feet NGVD, with a corresponding surface area of approximately 4,250 acres. The gross storage is estimated to be 32,000 acre-feet. Parr Reservoir has approximately 75 miles of shoreline within the Project boundary.

An active storage of up to 29,000 acre-feet is transferred between the two reservoirs by the pumped storage operations of the Fairfield Development. Fairfield Development's alternate cycles of generation and pumping results in daily fluctuations in the water levels of both Monticello and Parr Reservoirs. Monticello, when beginning at normal maximum pool elevation, drops 4.5 to 5 feet over a 10 to 12 hour period during the generating phase of operation. At the same time, the water from Monticello and from the Broad River is flowing into Parr Reservoir,

¹ The State of South Carolina considers Monticello Reservoir waters of the State and refers to it as "Lake Monticello".

² Standard License Article 5 requires licensees to acquire and retain sufficient property and rights to construct, maintain, and operate their projects, as identified in their specific license, including any property or rights needed to accomplish all designated project purposes. As such, Project lands are those lands within the FERC project boundary owned by SCE&G in fee title and those lands for which SCE&G has acquired or retained an easement.

causing it to rise as much as 10 feet. During the pumping cycle, the reverse occurs – the water level rises in Monticello Reservoir and drops in Parr Reservoir.

The Project boundary encompasses land around each reservoir. South Carolina Electric & Gas Company ("SCE&G") manages SCE&G-owned lands within the Project boundary ("Project property") to comply with the FERC License for the Project (the "Licensee"). The goal of project land management is to serve the public interest by providing recreational access and opportunities, protecting wildlife habitat and water quality, producing electricity, and protecting and preserving cultural and aesthetic resources. The Shoreline Management Plan ("SMP") provides a set of administrative policies, procedures, and practices by which SCE&G seeks to manage the Project shoreline to achieve these goals. Future proposals for specific shoreline related developments or activities will be reviewed for consistency with the SMP.

A draft of the initial Project SMP was filed with the FERC in 1991. After several years of discussion and revisions, the initial SMP was approved by the FERC on June 4, 2001. The history of the Project's SMP is described in more detail in Section 3.0 (History of the Shoreline Management Plan). The current relicensing³ of the Project provides a near term impetus and opportunity for SCE&G to review the existing SMP in cooperation with relicensing stakeholders, including federal and state regulatory agencies, interested non-governmental organizations ("NGO"s), and individuals. Through discussions with these parties, it was decided that the existing FERC approved SMP, which encompasses both Parr and Monticello Reservoirs, should be divided into two distinct SMP's, one for each reservoir. Hence, this SMP has been prepared for Parr Reservoir and is being submitted to FERC as part of SCE&G's Parr Hydroelectric Project comprehensive relicensing package. A SMP for Monticello Reservoir is included under separate cover.

The management guidelines set forth in this SMP are applicable to all lands within the Project boundary surrounding Parr Reservoir. Among other things, the current document includes the following components:

- Detailed descriptions, management prescriptions and mapping of land classifications;
- Summary information on the Permitting Handbook and fee policies;

³ The current operating License for the Project is due to expire on June 30, 2020. As such, SCE&G will file for a new License with FERC on or before June 30, 2018.

- Best management practices ("BMP"s);
- Public education and outreach;
- Reservoir monitoring; and
- A proposed review process.

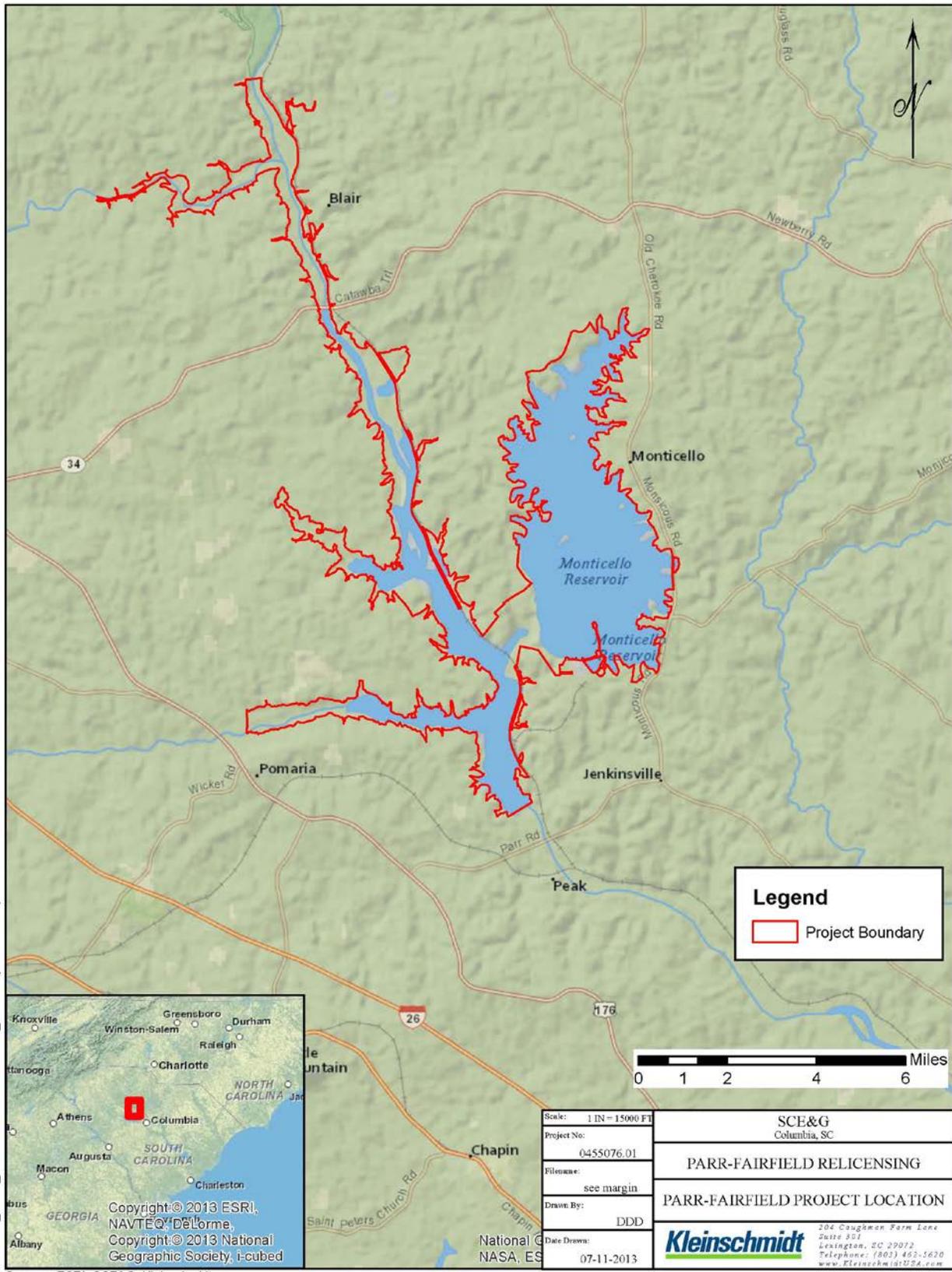


FIGURE 1-1 PROJECT LOCATION AND BOUNDARY MAP

2.0 PURPOSE AND SCOPE OF THE SHORELINE MANAGEMENT PLAN

The Project has served as a major source of power generation for SCE&G's customers and recreation for local residents and visitors to South Carolina for several decades. Consistent with FERC's Standard Land Use Article, a licensee may authorize specific non-project uses and occupancies of a project's shoreline. Examples of non-project uses at Parr Reservoir include access paths across SCE&G property, and water withdrawal. SCE&G has a responsibility to ensure that non-Project uses remain consistent with Project purposes, including protection and enhancement of the Project's scenic, recreational, and environmental values.

As development increases in areas surrounding the Project, so too does stress placed upon Project reservoirs and the surrounding watershed. Thus, a comprehensive SMP for each reservoir that recognizes and addresses sources of potential environmental impact is essential to managing each reservoir for the benefit of all interests and to ensure that non-Project uses remain consistent with the License.

The implementation of the SMP by SCE&G will help to maintain and conserve the area's natural and man-made resources. The SMP will comply with the terms of the License, as well as the regulations and orders of FERC, and is intended to assist in providing a balance between recreational use and development, environmental protection, and energy production.

3.0 HISTORY OF THE SHORELINE MANAGEMENT PLAN

Parr Reservoir is formed by the Parr Shoals Dam ("Dam"), which was originally constructed between 1912 and 1914. The Dam is situated across the Broad River and houses a 14.88 megawatt (MW) hydroelectric facility, located in an integral powerhouse. On August 28, 1974, the Federal Power Commission (FPC), predecessor to the FERC, issued SCE&G a new operating License for the Parr Shoals Development. In addition to relicensing the existing facilities, the new License authorized the construction of the 511.2 MW Fairfield Pumped Storage Development. This resulted in the creation of the Fairfield Development's upper pool, Monticello Reservoir. The new License also authorized the enlargement of the existing Parr Reservoir to serve as the lower pool to the Fairfield Development. This involved raising the height of the Dam approximately 9 feet, thereby nearly doubling Parr Reservoir's surface area. The construction of newly licensed facilities was completed in 1978, with the facilities beginning commercial operation that same year. The newly developed Project, including both Parr and Fairfield Developments, was subsequently referred to as the Parr Hydroelectric Project.

Article 48 of the Project License issued in 1974 required that SCE&G purchase in fee and include within the Project boundary all lands necessary or appropriate for project operations, including lands for recreational use and shoreline control. The lands encompassed by the Project boundary shall include, but not be limited to: the islands in the Parr and Monticello Reservoirs formed by the 266-foot and 425-foot contour intervals, respectively; shoreline lands up to the 270-foot contour, or 50 feet (measured horizontally) from the Parr Reservoir's 266-foot contour, whichever is greater; and, shoreline lands up to the 430-foot contour interval, or 50 feet (measured horizontally) from Monticello Reservoir's 425-foot contour, whichever is greater. Provided that the Project boundary, except with respect to land necessary or appropriate for recreational purposes, shall not exceed 200 feet, horizontally measured, from the 266-foot or the 425-foot contour, unless satisfactory reasons to the contrary are given. The FPC determined that acquiring these lands would provide SCE&G with adequate shoreline control around the reservoirs, in addition to serving the purposes of Project operation and recreation.

Furthermore, Article 20 of the Project License orders that SCE&G allow public access, to a reasonable extent to Project waters and adjacent Project lands (with the exception of lands necessary for the protection of life, health, and property) for navigation and outdoor recreational

purposes. This Article also allows SCE&G to grant permits for public access to the reservoirs subject to FERC approval.

In 1991, SCE&G recognized that appropriate policies and procedures should be in place to govern shoreline activities at the Project. Utilizing experience gained at their Saluda Hydroelectric Project (FERC No. 516), SCE&G filed a proposed SMP with FERC to regulate the use of Project shorelines. After extensive stakeholder consultation, an amended SMP was filed with FERC. It was approved on June 4, 2001. The SMP was included as part of the Project's Exhibit R.

The SMP approved in 2001 primarily covered activities associated with Monticello Reservoir. It dealt with the following matters: water quality management; forest management; waterfowl management; nuclear exclusion zone restrictions for the operation of SCE&G's V.C. Summer Nuclear Station; fishing, boating, and hunting; public access and recreation; private boat docks and access; vegetation removal; erosion control; and, prohibited activities.

In 2006, SCE&G amended the SMP's policy regarding common docks on Monticello Reservoir. The original policy allowed for two to five property owners to share a single common dock if the shoreline frontage requirement of 200 feet was met. The policy was amended to allow no more than two individual, adjacent single family residential lots to share a common dock. The shoreline frontage requirement of 200 feet was retained.

As noted, the previous SMP included very little pertaining to Parr Reservoir. As such, the need for a new SMP specifically pertaining to Parr Reservoir was identified.

3.1 CURRENT SMP DOCUMENT AND SHORELINE CLASSIFICATIONS

The SMP serves as a reference document for SCE&G in implementing the Standard Land Use Article, which authorizes SCE&G to permit certain non-project uses of project lands and waters. FERC did not begin including the Standard Land Use Article in new licenses until the early 1980's; thus, it was not included in the Project License issued in 1974. However, FERC granted SCE&G the authority to permit certain non-Project uses through the approval of the 2001 SMP, and added the Standard Land Use Article to the License (Article 62) in 2011, as revised in 2013 (Article 63). This present document, submitted in conjunction with SCE&G's License application, presents a management plan, covering only Parr Reservoir (a SMP for Monticello

Reservoir is included under separate cover), while adhering to the historical management goals agreed to and developed with agencies and stakeholders.

In addition to an updated SMP for each Project reservoir, a Permitting Handbook was developed in consultation with stakeholders and agencies to address activities requiring consultation with and/or permits from SCE&G. These activities include, but are not limited to the following: shoreline stabilization, access path development, and other shoreline activities. SCE&G will review the Permitting Handbook with interested stakeholders periodically to evaluate its effectiveness; however, SCE&G may make changes to the permitting process at any time as it determines in its sole judgment to be necessary and appropriate.

3.2 PROJECT BOUNDARY

SCE&G owns in fee or obtained flowage rights for all lands necessary or appropriate for project operations, including lands for recreational use and shoreline control. A Project boundary map is included as Figure 1-1.

4.0 SHORELINE MANAGEMENT PLAN GOALS AND OBJECTIVES

The overall goal of this SMP is to define, document, and present the processes and criteria that SCE&G will employ to manage and balance private and public access to and uses of Project lands, specifically including Parr Reservoir's shoreline, consistent with public safety, energy production operations, environmental protection for Project land as well as Project waters, and reasonable recreational opportunities. This SMP will help to ensure the protection and enhancement of the Project's scenic, environmental, recreational, natural and cultural resources over the term of the License.

This SMP represents a consensus-based, updated management plan intended for submittal with the Project No. 1894 License Application. Specific goals relative to the SCE&G relicensing process that are discussed under this SMP include the following:

1. Provide for reasonable current and future public access;
2. Provide for current and future recreational needs within the Project;
3. Protect fish and wildlife habitat;
4. Protect cultural resources;
5. Protect the ability to meet operational needs;
6. Facilitate compliance with License articles;
7. Minimize adverse impacts to water quality;
8. Protect scenic values;
9. Monitor and permit shoreline activities;
10. Provide a summary catalogue of the types and locations of existing recreational opportunities;
11. Establish Land Management Classifications and Land Use Prescriptions to help in the management of non-Project uses of the Parr Reservoir shoreline lands within the Project boundary;
12. Describe the SMP amendment and monitoring process; and
13. Educate and encourage property owners who own property adjacent to or adjoining Project Property (herein referred to as "adjacent property owners") on the use of voluntary BMPs.

4.1 CONSULTATION

The Project relicensing provides an opportunity for SCE&G to seek input on Project-related shoreline management issues from interested stakeholders. SCE&G recognizes that successfully completing the relicensing process requires identifying and resolving Project issues in consultation with federal and state resource agencies, local and national NGOs, homeowner associations, and individuals who have an interest in the Parr Hydroelectric Project (Table 4-1). SCE&G began public outreach efforts in January 2013 by holding a series of public workshops in Winnsboro, Newberry, Columbia, and Jenkinsville, SC. Since that time, SCE&G has sought active public involvement in the process and fostered commitment to issue resolution among SCE&G and stakeholders.

TABLE 4-1 PARTICIPATING GROUPS IN PARR HYDROELECTRIC PROJECT RELICENSING

STAKEHOLDER GROUPS
American Rivers
American Whitewater
Catawba Indian Nation
City of Columbia
Chestnut Hill Plantation HOA
Coastal Conservation League
Congaree Riverkeeper
Environmentalists Inc.
Fairfield County
Gills Creek Watershed
National Marine Fisheries Service
National Park Service
Newberry County
South Carolina Department of Health and Environmental Control
South Carolina Department of Natural Resources
South Carolina Department of Parks, Recreation and Tourism
South Carolina Electric & Gas Company
South Carolina Historic Preservation Office
Town of Winnsboro, SC
Tyger-Enoree River Alliance

STAKEHOLDER GROUPS

United States Fish and Wildlife Service

United States Forest Service

University of South Carolina

4.1.1 RECREATION/LAKE AND LAND MANAGEMENT RESOURCE CONSERVATION GROUP

In support of the relicensing effort, SCE&G formed three Resource Conservation Groups ("RCG"s) to identify, address and resolve Project-related issues by resource area. The RCGs are as follows: the Fish, Wildlife and Water Quality RCG; the Project Operations RCG; and the Lake & Land Management and Recreation RCG. Consideration of potential issues by resource area allows for more focused topic discussion and targeted issue resolution. Some RCGs have established sub-groups, or Technical Working Committees ("TWC"s), for issues requiring special knowledge, education, or experience. Consequently, the Lake & Land Management and Recreation RCG has a Lake and Land Management TWC as well as a Recreation TWC. The Lake and Land Management TWC is discussed further below.

4.1.2 LAKE AND LAND MANAGEMENT TECHNICAL WORKING COMMITTEE

The primary mission of the Lake and Land Management TWC is to revise the existing Parr Hydroelectric Project SMP to provide a management framework within which Project resources can be effectively protected while assuring appropriate public and private access to the Project resources and the recreational opportunities they present. Another important focus of the TWC is to allow interested parties an effective opportunity to provide input on resource issues and the overall future management of shoreline resources. The resulting collaboration has resulted in the contribution of valuable information by entities and individuals familiar with the Project. The forum was instrumental in addressing important issues relevant to the operation and management of the Project over the term of the new License. In working collaboratively, the members of the TWC (Table 4-2) aimed to blend the objectives of the state and federal resource agencies with other stakeholder interests.

TABLE 4-2 ORGANIZATIONS PARTICIPATING ON THE LAKE AND LAND MANAGEMENT TWC

STAKEHOLDER GROUPS
American Rivers
American Whitewater
Coastal Conservation League
Congaree Riverkeeper
Fairfield County
Gills Creek Watershed
Adjacent Property Owners
National Marine Fisheries Service
National Park Service
South Carolina Department of Health and Environmental Control
South Carolina Department of Natural Resources
South Carolina Department of Parks, Recreation and Tourism
South Carolina Electric & Gas Company
Tyger-Enoree River Alliance
United States Fish and Wildlife Service
United States Forest Service

4.1.3 MEETING SCHEDULE

Between October of 2013 and January of 2018, SCE&G has held numerous meetings of the Lake and Land Management and Recreation RCG and Lake and Land Management TWC to discuss the details of the Project SMPs. The efforts of the TWC are reflected herein.

5.0 LAND USE CLASSIFICATIONS

Three distinct land management classifications have been developed for the shorelines surrounding Parr Reservoir. These land management classifications are as follows: Project Operations; Public Recreation; and, Non-Development Areas. The Public Recreation Classification includes designated public recreation areas, WMA and some islands within Parr Reservoir. Although SCE&G intends to manage its lands according to this classification system, the public generally will not be precluded from access to SCE&G-owned lands regardless of classification, with the exception of lands reserved and used for Project operations or other areas specifically protected from public access and posted as such. The sections below explain/define the land management classifications. The acreages and parcels for each of the classifications are provided in Table 5-1. Figure 5-1 depicts their distribution around Parr Reservoir.

TABLE 5-1 SHORELINE MILES AND ACREAGES BY LAND USE CLASSIFICATION⁴

CLASSIFICATION	SHORELINE MILES	ACRES
Project Operations*	0.90	10
Public Recreation ⁵ *	6.97	857
Non-Development Areas*	67.05	2,131
TOTAL	74.91	2,998

*No docks allowed

⁴ Preliminary information; final data will be provided in the final SMP.

⁵ Includes recreation lands and SCDNR-managed waterfowl areas.

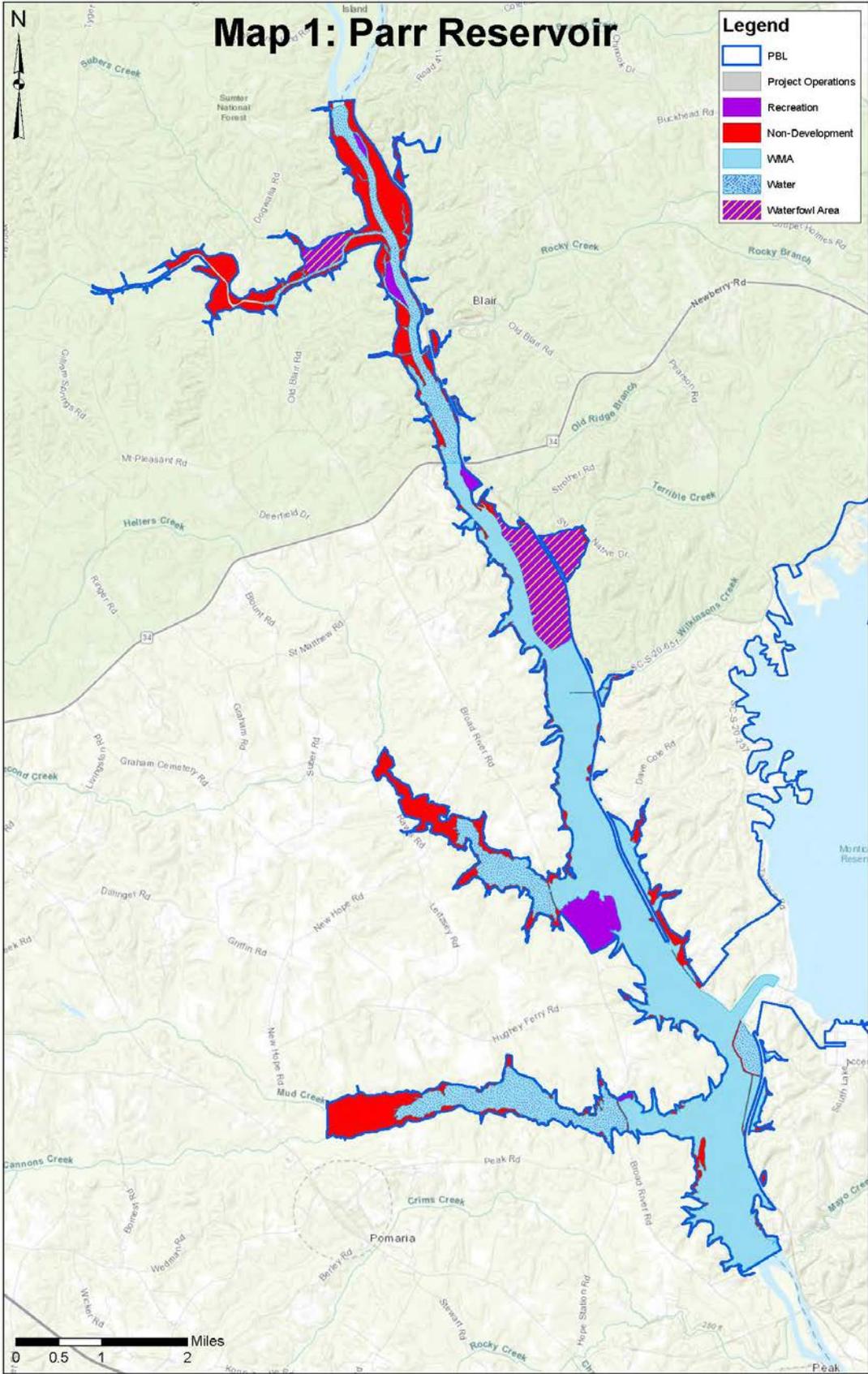


FIGURE 5-1 SHORELINE CLASSIFICATIONS MAP FOR PARR RESERVOIR

5.1 PROJECT OPERATIONS

Areas under this classification include SCE&G-owned and managed lands required for operation of the Parr Development. Public access to these lands is restricted to ensure public safety or to assure the security of the infrastructure system.

5.2 PUBLIC RECREATION

Project lands under this classification serve as recreational resources for the public and include areas managed expressly for recreation as well as those with recreation as a secondary usage. This classification includes South Carolina Department of Natural Resources (SCDNR)-managed waterfowl areas located on Project lands. This classification also includes properties set aside for recreational development. Public Recreation lands include the following sub-classifications:

- Public Access Areas
- Islands owned by SCE&G

5.2.1 PUBLIC ACCESS AREAS

This sub-classification includes public boat launches, and other areas currently being managed for public access. SCE&G has developed and maintains four public access areas and one canoe portage on Parr Reservoir. These include the following:

- Cannon's Creek Recreation Site
- Heller's Creek Recreation Site
- Highway 34 Recreation Site
- Enoree River Bridge Recreation Site
- Parr Shoals Dam Canoe Portage

Each Project recreation site provides facilities for boat launching, courtesy dock(s), and/or picnic facilities for public use.

5.2.2 ISLANDS AND SHOALS

SCE&G-owned islands located within Parr Reservoir are available for public recreational use in accordance with authorized activities (See the Permitting Handbook for authorized activities).

5.3 NON-DEVELOPMENT AREAS

Project lands under this classification are protected from private development. This is done for the protection of the environmental and aesthetic integrity of the shoreline.

6.0 LAND USE PRESCRIPTIONS

Land use prescriptions are based upon and reflect the guiding principles regarding the management of the SCE&G-owned lands within each classification. SCE&G publishes a detailed Permitting Handbook (included under separate cover) that contains descriptions of the permitting processes and specifications for various shoreline developments. Activities that require consultation with and/or permits from SCE&G include the following: construction, maintenance and placement of docks and boat lifts, shoreline stabilization; construction and maintenance of shoreline pathways, and other shoreline activities. Persons interested in shoreline development must contact SCE&G's Lake Management Department (803) 217-9221 to obtain permitting guidance and a copy of the Permitting Handbook. Section 8.0 of this document discusses the Permitting Handbook in greater depth. General information regarding permitting requirements is included where applicable within the scope of each management prescription below.

6.1 PROJECT OPERATIONS

Properties classified as Project Operation contain project works critical to the operation of the Parr Shoals Development. Public access to, or activities upon, these lands is restricted for reasons of safety and security.

6.2 PUBLIC RECREATION

Project lands devoted to public recreation include developed park sites, properties set aside for recreational development and islands and shoals. SCE&G manages the areas based on the specific, designated recreational activities including fishing, picnicking, and boat launching⁶. Primitive overnight camping is allowed on Public Recreation lands surrounding Parr Reservoir in accordance with the policies outlined in the Permitting Handbook. Public hunting may be allowed on specific Public Recreation lands in accordance with state hunting regulations, as expressly discussed under each subsection below. See SCDNR's website for state hunting regulations (<http://dnr.sc.gov>).

⁶ SCE&G manages some of the lands classified for public recreation for timber. Information on SCE&G's forest management practices is included in Section 11.1.1.

6.2.1 PUBLIC ACCESS AREAS

SCE&G maintains four public access areas and one canoe portage on Parr Reservoir. These areas are depicted in Figure 12-1. Primitive overnight camping is allowed at Parr Reservoir Public Access Areas in accordance with the policies outlined in the Permitting Handbook. Private permitted activities are excluded under this classification. Public hunting and shooting are not allowed at SCE&G Public Access Areas.

6.2.2 ISLANDS AND SHOALS

Islands and shoals are located on Parr Reservoir and are open for public recreational use, such as bank fishing, walking, and bird watching. Overnight camping is not allowed on islands and shoals within Parr Reservoir. Hunting is allowed on islands and shoals in accordance with state hunting regulations.

6.3 NON-DEVELOPMENT AREAS

Lands under this classification warrant special protection because they may provide important habitat or aesthetic values. Meandering paths and water withdrawals on lands under this classification may be considered on a case-by-case basis by SCE&G. Primitive overnight camping is allowed on non-development property surrounding Parr Reservoir in accordance with the policies outlined in the Permitting Handbook. Unless otherwise posted, hunting is allowed in non-development areas in accordance with state hunting regulations.

7.0 SHORELINE ACTIVITIES REQUIRING SCE&G APPROVAL

SCE&G maintains a strong commitment to managing the shoreline of Parr Reservoir for multiple resources by considering the impact of various activities on the environmental, aesthetic, and recreational character of the lands. SCE&G owns and manages property around the entire periphery of Parr Reservoir. Thus, any activity occurring on the "shoreline" is occurring on SCE&G property. Activities not in compliance with the shoreline activity parameters outlined in this SMP and in the Permitting Handbook may constitute a trespass which SCE&G may elect to prosecute.

7.1 AUTHORIZED ACTIVITIES REQUIRING APPROVAL THROUGH THE PERMITTING HANDBOOK

Only the following activities and structures may be permitted on Parr Reservoir:

- Construction of a meandering access path; and
- Water withdrawal for non-commercial agricultural/landscaping irrigation purposes.

7.2 PROHIBITED STRUCTURES AND ACTIVITIES

Activities and structures that SCE&G does not allow include, but are not limited to, the following:

Prohibited Structures:

- Private boat docks;
- Private shoreline stabilization;
- Boathouses;
- Private boat ramps;
- Commercial marinas;
- Marine rails;
- Sea walls;
- Fences;
- Electrical service;
- Permanent structures;
- Land-based structures, storage buildings, shelters, patios, gazebos, fences, swimming pools, satellite dishes, signs, storage of boats, canoes or other watercraft or automobiles; and

- Septic tanks and/or drain fields;

Prohibited Activities:

- Jet skiing;
- Water skiing;
- Parasailing;
- Paragliding;
- Mooring;
- Excavations/dredging (except commercial operations permitted by the regulatory authorities);
- Effluent discharges;
- Storage or stockpiling of construction material;
- Livestock access to reservoir⁷;
- Vegetation removal of any type except in a permitted access path to the shoreline;
- Primitive or overnight camping on islands and shoals within Parr Reservoir;
- Use of herbicides: and
- Limbing or trimming of vegetation on Project property to create views or visual corridors.

⁷ Unless grandfathered through deed reservations.

8.0 PERMITTING PROCESS FOR SHORELINE ACTIVITIES OR STRUCTURES

8.1 SHORELINE PERMITTING PROCEDURES

Applicants must obtain the proper permit(s), per the SCE&G's Permitting Handbook, prior to the initiation of any construction or activity on the Parr Reservoir shoreline, which consists of the lands below the 266-foot contour interval and designated Project property. As noted above, some activities may also require local, state, and/or federal permits.

Whether a non-Project use is approved under the Standard Land Use article or through prior FERC approval, SCE&G is responsible for ensuring that the use is consistent with the purposes of protecting or enhancing the scenic, recreational, and other environmental values of the Project. To assist applicants in the permitting process, the staff at the SCE&G Lake Management Department is available to answer questions regarding documentation, permits, and specification requirements for their particular project. Permits from SCE&G are required for the following activities:

- Construction of a meandering access path;
- Water withdrawal for non-commercial agricultural/landscaping irrigation purposes.

It is highly advisable to begin the consultation process with SCE&G Lake Management staff at the planning stage of a project. SCE&G staff will be available to discuss specific permitting requirements with the property owner. Depending on the proposed new facility or activity, local, state and federal resource agencies may impose requirements on construction start/stop dates, the placement of erosion control devices, treatment plans, remedial measures, submittal of start construction notifications, and/or best management practices. Any permit applicant should be aware of such conditions, as violations may nullify a permit.

An overview of permitted activities is included below. Detailed information on SCE&G's permitting process, guidelines, and specifications, is provided in SCE&G's Permitting Handbook available by calling (803) 217-9221, or by writing:

SCE&G Lake Management Department
6248 Bush River Road
Columbia, SC 29212

8.1.1 SHORELINE VEGETATION MANAGEMENT

In general, SCE&G maintains a policy of non-disturbance of any vegetation below the 266-foot contour or on Project property without approval from SCE&G. Permission to remove vegetation within a permitted access path will only be granted by SCE&G Lake Management after a site visit with the applicant. Once clearing of the access path is completed according to the permit, the applicant may maintain the path in the permitted condition utilizing hand held tools and without the use of herbicides. Any unauthorized removal of shoreline vegetation may result in the cancellation of permits issued by SCE&G, as well as legal action. Violators may be required to replant and restore the disturbed area with such plantings and/or shoreline manipulation as SCE&G determines is necessary to mitigate and correct the situation.

8.1.2 ACCESS PATH

A single pedestrian access path may be cleared with hand held tools and without the use of herbicides from the adjacent property owner's land upon approval of SCE&G. The access path must follow a meandering route to prevent erosion and to protect the aesthetics of the shoreline. No trees larger than 10-inches in diameter at breast height may be removed within the access path. A SCE&G Lake Management representative will identify and designate the location of all access paths. Access path restrictions are included in the Permitting Handbook.

8.1.3 WATER WITHDRAWAL

Water withdrawals requiring piping and other transportation/delivery equipment to be placed along the shoreline or in the littoral zone, are managed according to the terms of this SMP. Water withdrawal for residential property must be for irrigation purposes only. Permits are required, and will not be issued for any other purpose. Associated pumps and electrical service must be located outside SCE&G property. SCE&G reserves the right to prohibit withdrawal during times of drought or water drawdown.

Applications for a permit to remove water must be submitted to SCE&G for review. Water withdrawal applications for greater than one million gallons per day (MGD) will be forwarded to the FERC for approval. Requests for withdrawal of one MGD or less may require agency consultation prior to approval. SCE&G may impose limits in granting permits for approved applications (see Permitting Handbook). The applicant may be required to bear the expenses of filing the application and will be required to compensate SCE&G for water withdrawn.

9.0 SCE&G PERMITTING FEE POLICIES

FERC allows licensees the right to charge reasonable fees to cover the costs of administering shoreline management programs, which add management responsibilities and associated costs to project operations. SCE&G administers its SMP in part through a permitting program, which does include a fee component. This ensures that activities occurring within the Project and in particular on Project land, are consistent with the overall goals for the Project, and that SCE&G's customers are not burdened with the full cost of administering programs that also have significant private, and often non-customer, benefit. Permit fees are due with applications and are required for docks, boat lifts, access paths, water withdrawal, and erosion control projects. Should an application be denied, associated permit fees will be returned. Periodic permit renewal fees may be required depending on the shoreline activity. One-time and periodic permit fees for Parr Reservoir shoreline activities are detailed in the Permitting Handbook. Failure to comply with this policy may result in, among other things, revocation of existing permits, fines, or legal action, as well as loss of consideration for future permits.

SCE&G will give reasonable public notice through appropriate communication avenues before changing the fee structure.

10.0 ENFORCEMENT OF SHORELINE MANAGEMENT PLAN

10.1 VIOLATIONS OF SHORELINE MANAGEMENT PLAN

SCE&G conducts periodic surveys of the Parr Reservoir shoreline to inventory and inspect permitted uses throughout the year. Lake Management representatives make note of unauthorized structures that they see, as well as urging residents and Reservoir visitors to report anything they believe to be unauthorized activity below the 266-foot contour, or on designated Project property. Anyone believing that an activity violating the SMP is occurring is urged to contact SCE&G Lake Management at (803) 217-9221.

SCE&G Lake Management representatives will issue Stop Work Directives and or Trespass Notices for any violations detected on SCE&G property. Any unauthorized clearing of trees or underbrush will result in the revocation of any SCE&G issued permits within 30 days if the violation(s) is (are) not corrected or a course of and schedule for corrective action has not been agreed to and approved by SCE&G. SCE&G may also commence legal action, if it deems it necessary, to require re-vegetation of the affected area. Removal of merchantable timber will require reimbursement to SCE&G subject to valuation of the Forestry Operations Department, including legally allowable "penalties." Consequences for violations may also include restrictions of access to SCE&G property, legal actions, fines, and loss of consideration for future permits.

11.0 SHORELINE MANAGEMENT PRACTICES

11.1 SCE&G SHORELINE MANAGEMENT PRACTICES

SCE&G has established a set of management practices that apply to all of the lands included in the Project Boundary. These practices are reflective of each of their developments unique qualities. The current management practices for the Parr Development (which includes Parr Reservoir) are described in this section, but may be reviewed during the period of the FERC license.

11.1.1 FOREST MANAGEMENT/SHORELINE MANAGEMENT PRACTICES

SCE&G manages timber within the Parr Project boundary line in accordance with South Carolina's Best Management Practices for Forestry publication. An online copy of this publication is available at <http://www.state.sc.us/forest/refbmp.htm>.

11.1.2 PROTECTION OF LANDS KNOWN TO PROVIDE IMPORTANT HABITAT VALUES

Reservoirs are dynamic environments and the important natural and cultural values that Parr Reservoir presents, may evolve over time. During the upcoming license term, areas along the shoreline may be found to warrant protection against materially negative impacts from development upon one or more of a variety of ecologically important characteristics. Such characteristics may include, but not be limited to the following: areas known to be occupied by rare, threatened or endangered species; rare or exemplary natural communities; species in the State Wildlife Action Plan; significant land forms and geologic features; wetlands and shallow coves; and other areas, such as spawning and nesting habitat, determined to be critical to the continued existence of native species. In the event that one of the aforementioned species is determined to be present in the Project boundary, SCE&G will consult with SCDNR to determine appropriate management policies.

11.2 LANDOWNER RECOMMENDED BMPs

In addition to development activities, the environment around Parr Reservoir is susceptible to impacts associated with residential and recreational activities. These include, for example only, improper fertilizer/pesticide use, boat maintenance, and debris disposal. Adjacent property owners can mitigate negative impacts otherwise associated with their property uses and instead make significant positive contributions to the Reservoir environment, and ultimately the

watershed, by employing BMPs that preserve bank integrity and minimize non-point sources of pollution and contamination. Adjacent property owners should understand that using BMPs will help to preserve the scenic, environmental, and recreational qualities of the reservoir that they so highly value. Examples of effective BMPs recommended to adjacent property owners are provided in the succeeding section. SCE&G is available to provide more information and to assist landowners in determining effective BMPs for activities on their properties. Also, anyone may contact the Natural Resource Conservation Service or local county extension office (<http://www.sc.nrcs.usda.gov/contact/>).

11.2.1 MINIMIZING NON-POINT SOURCE POLLUTION

Reservoir pollution may result from a variety of activities related to residential development, agriculture, forestry, and construction. Contaminants may enter the reservoir and tributaries via overland flows carrying biological, chemical, and other substances picked up and carried by runoff from rain events. This runoff water may contain sediment, bacteria, oil, grease, detergents pesticides, fungicides, fertilizers, and other pollutants. These pollutants, depending on type, quantities, and concentrations can overwhelm a reservoir's natural ability to filter and process them, thus leading to degraded water quality and aquatic environments.

Although a single point of impact or action may seem insignificant in its effect on the reservoir, the cumulative effects of the resource may be considerable. With this in mind, SCE&G encourages adjacent land owners to be mindful that they are members of a larger community that uses and impacts the reservoir. Employing the following BMPs can go a long way in preserving and improving reservoir water quality:

- Use permeable paving materials and reduce the area of impervious surfaces, particularly driveways, sidewalks, walkways, and parking areas;
- Dispose of vehicle fluids, paints, and/or household chemicals as indicated on their respective labels and do not deposit these products into storm drains, project waters, or onto the ground;
- Use soap sparingly when washing vehicles and wash them on a grassy areas , preferably sloping gently away from the reservoir, so the ground can filter the water naturally;
- Use hose nozzles with triggers to save water and dispose of used soapy water in sinks or other vessels that direct the materials into sewer systems, not in the street;
- Maintain septic tanks and drain fields according to the guidelines and/or regulations established by appropriate regulatory authorities;

- Remove pet waste and dispose of properly in areas that do not drain to the reservoir; and
- Use only low or no phosphorous fertilizer on lawns near the reservoir.

11.3 INVASIVE SPECIES MANAGEMENT AND BMPs

Certain species of aquatic and terrestrial plants and animals can become a significant nuisance to recreation and project operations if their populations are not kept in check. Some of the common aquatic problem species found in the vicinity of the Project include hydrilla and several species of pondweed. Common terrestrial invasive exotic species include kudzu, mimosa, and Japanese honeysuckle. When managing invasive and exotic plants and animals it is important to also protect the ecosystems and habitat for desirable native species. This requires the integration and use of specific BMPs appropriate to the regional and local conditions.

Because weed control techniques can harm fish and native plant species, it is unlawful, per state and federal regulations, for individuals to spray or treat aquatic growth without a permit. Thus, SCE&G asks that any aquatic vegetation problems recognized by lake visitors or back property owners should be reported to SCE&G's Lake Management Department and the SCDNR. In addition, to help curb the spread of invasive species, SCE&G asks that lake visitors and back property owners employ the following BMP's:

- Draining water from boat, motor, bilge, live well and bait containers before leaving a water access site.
- Cleaning and drying boats and fishing equipment using accepted protocols for the prevention of all invasive species before entering any waterbody area.
- Disposing of unwanted bait in trash, including earthworms.
- Avoiding the release of plants and animals into a waterbody unless they originally came from that waterbody.
- Inspect all equipment and vehicles used at the Project for non-native invasive plants and animals.
- Removing visible plants, animals and mud from boat before leaving waterbody.
- Avoid the disturbance of native vegetation.

Individuals may find additional information regarding non-native invasive species at SCDNR's website at: www.dnr.sc.gov.

12.0 PUBLIC EDUCATION AND OUTREACH

This SMP is intended to foster management of shoreline use and development to achieve consistency with the FERC License, as well as the promote protection of public safety and environmental quality (water quality, natural habitat, aesthetics, etc.). To garner support and compliance from the public and lake users, it is key to educate them to the need and means to protect shoreline resources. Additionally, the public must be aware of the management and permitting programs put in place to provide this protection. To accomplish the task of increasing public awareness of the goals and objectives of this SMP SCE&G has developed an education and outreach program that includes the components described below.

12.1 SHORELINE MANAGEMENT PLAN EDUCATION

SCE&G's Public Education and Outreach program seeks to educate the public on various aspects of the management of Parr Reservoir, including the Permitting Handbook, recommended BMP use, relevant Project Operations information, and the Safety Program. To accomplish this, SCE&G uses various public education measures including informational pamphlets, public meetings, newsletters, and an internet webpage.

The Internet, in particular, presents an excellent mechanism for disseminating information and improving awareness. SCE&G maintains a website designed to provide information on the SMP and the Permitting Handbook. Printed copies of the following materials may also be obtained by contacting SCE&G Lake Management at (803) 217-9221. Information and materials that will be available at the website include the following:

- Permitting Handbook;
- Permit application forms;
- Examples and information on BMPs;
- Alternative and example designs for shoreline stabilization on Monticello Reservoir; and
- Useful links and other related information.

Additional outreach mechanisms that SCE&G intends to employ in implementing the SMP include the following:

- Provide speakers for homeowner and other organizations' meetings;

- Provide information to realtors and encourage dissemination of this information to all potential adjacent property buyers; and
- Develop and distribute new, “user friendly” brochures that include general reservoir information, permitting processes, shoreline BMPs, and relevant contact information.

12.2 PUBLIC ACCESS AREA MAPS

A figure depicting Public Access Areas on Parr Reservoir is included as Figure 12-1.

12.3 PUBLIC HUNTING AND FISHING

The SCDNR maintains hunting and fishery management responsibility and state hunting and fishing regulations enforcement on Parr Reservoir. Separate regulations apply to hunting in areas included in the Wildlife Management Area (WMA) program and it is imperative that the individual check WMA regulations and maps prior to hunting. State regulations and maps are available at SCDNR's website at: <http://www.dnr.sc.gov>, or by contacting SCDNR at:

Hunting and Fishing Regulations
S.C. Department of Natural Resources
Wildlife and Fresh Water Fisheries
1000 Assembly Street
Columbia, South Carolina 29201
Telephone: 803-734-3886

12.4 SAFETY PROGRAMS

Due to operation of the pumped storage generating plant, the waters of Parr Reservoir can fluctuate several feet in a matter of a few hours. This rapid fluctuation makes it especially important for boaters and other recreationists to exercise a high degree of care and fully assume personal responsibility for their safety by being especially aware and cautious. For public safety, hazardous areas which are marked should not be entered and any other warnings posted around the reservoir should be observed as well.

SCE&G and SCDNR cooperate to mark shoals and other hazardous areas to increase boating safety. However, boaters should not assume all shoals and hazardous areas have been marked.

SCDNR also enforces the boating laws of South Carolina. Boaters should ensure that watercraft and safety equipment are in good working condition and in compliance with all applicable state laws.

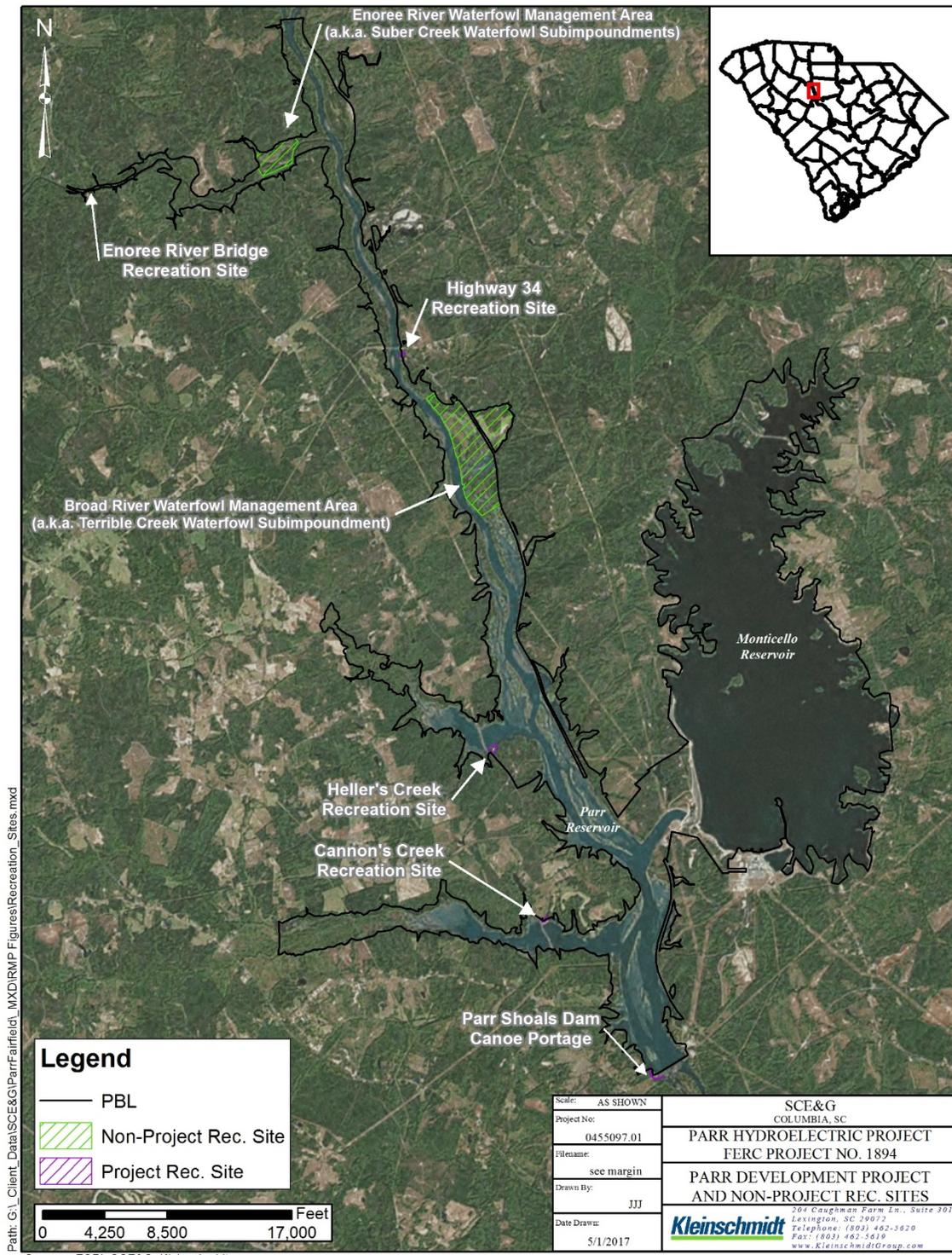


FIGURE 12-1 PARR RESERVOIR PUBLIC ACCESS AREA MAP

13.0 MONITORING AND REVIEW PROCESS

13.1 OVERALL LAND USE MONITORING

As demographics and user groups change within the Project area, changes in residential and commercial areas may occur. Often this type of use change is incremental and cumulative, occurring over a period of years or decades. To monitor land use around Parr Reservoir, SCE&G will employ a geographic information system (GIS) to compare new and existing permit applications against GIS data for the land management classifications. Such monitoring will provide long-term data that should be useful in identifying areas experiencing change. Every 10 years, during the SMP review process (see Section 13.2 on Review Process below), SCE&G will report on changes in land use for the various land management classifications in addition to filing Form 80 surveys. If it is found that material changes within the Project boundary have occurred that are not consistent with the current SMP goals, amendments to the SMP may be warranted. Such situations might include significant changes in land ownership, major commercial upgrades or uses, or new residential uses or pressures.

13.2 REVIEW PROCESS

SCE&G proposes a 10 year SMP review cycle interval. A 10 year SMP review period interval should provide reasonable opportunities for SCE&G, in concert with governmental, non-governmental, and individual stakeholders, periodically and deliberately to assess new issues that arise as a result of development around the Reservoir, and allow for analyses of cumulative effects. The SMP review process will begin sufficiently in advance of the end of each period so that it will be completed within the 10 year time frame. One month prior to the scheduled start of the review process, its occurrence will be advertised in various media formats (e.g., website, newsletter, contact with homeowner associations, etc.). SCE&G will use those same media avenues to issue a report on the outcome of the review process. As in the past, SCE&G will solicit input from interested parties in addressing issues that arise and have a bearing on Reservoir management. This includes keeping lines of communication open during the time between review periods. Concurrently with the FERC SMP review process, SCE&G will review the Permitting Handbook periodically with interested stakeholders to ensure its effectiveness; however, changes to the permitting process may be made periodically, as needed, outside of the scheduled review periods.

14.0 REFERENCES

Federal Power Commission (F.P.C.). 1974. Order Issuing New License for the Parr Hydroelectric Project. August 28, 1974. 52 F.P.C. 537.

Federal Energy Regulatory Commission (FERC). 2012. Guidance for Shoreline Management Planning at Hydropower Projects. Online. [URL]: <http://www.ferc.gov/industries/hydropower/gen-info/guidelines/smpbook.pdf>.

Federal Energy Regulatory Commission (FERC). 2001. Order Approving Land use and Shoreline Management Plan. June 4, 2001. 95 FERC 61,351.

Appendix A-14
Shoreline Management Plan
Monticello Reservoir

SHORELINE MANAGEMENT PLAN MONTICELLO RESERVOIR

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

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

June 2018

SHORELINE MANAGEMENT PLAN
MONTICELLO RESERVOIR

PARR HYDROELECTRIC PROJECT
(FERC No. 1894)

South Carolina Electric & Gas Company
Cayce, South Carolina

June 2018

**SHORELINE MANAGEMENT PLAN
MONTICELLO RESERVOIR**

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

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**SHORELINE MANAGEMENT PLAN
MONTICELLO RESERVOIR**

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

EXECUTIVE SUMMARY

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

The Project developments form two distinct Project reservoirs. Parr Reservoir is located along the Broad River, as impounded by Parr Shoals Dam, and functions as the lower reservoir for the Fairfield Development. Monticello Reservoir is located adjacent to the Broad River and functions as the upper reservoir for the Fairfield Development. Both Project reservoirs serve as popular recreation destinations and are used and enjoyed by local residents as well as visitors to the state.

In conjunction with its relicensing activities, SCE&G has assembled a diverse and inclusive group of stakeholders to advise and assist in the development of two Shoreline Management Plans ("SMPs"), each tailored to a specific reservoir. SMPs are comprehensive plans for the management of Project land and adjoining water resources and their uses, consistent with License requirements and broad Project purposes, and appropriately accessible and beneficial to adjacent shoreline residents and the recreating public. A SMP serves to identify existing and appropriate future uses and to provide plans and programs for responsible future use and management of project lands and waters as well as the flora and fauna encompassed within them. This SMP exists specifically to address shoreline uses surrounding Monticello Reservoir. A SMP to address Parr Reservoir is included under separate cover and available from the SCE&G Lake Management Department (Lake Management).

In addition to a SMP for each Project reservoir, a Shoreline Management Handbook and Permitting Guidelines (Permitting Handbook) was developed for both developments in

consultation with governmental, non-governmental, and individual stakeholders to address activities that will require consultation with and/or permits from SCE&G. These activities include construction, maintenance, and placement of docks, shoreline stabilization, lake access pathways and other shoreline activities.

The classification of Project lands surrounding Monticello Reservoir is described in Section 5.0 and includes five management classifications. These classifications are as follows: Project Operations; Nuclear Exclusion Zone; Shoreline Permitting; Public Recreation; and Non-Development Areas. Lands reserved for Project operations are those lands that are specifically required for operation of the Project. They include areas such as plant facility locations, dams, electrical substations, etc. The Nuclear Exclusion Zone (NEZ) is a defined area surrounding the V.C. Summer Nuclear Station. Within the NEZ, SCE&G, as the licensed nuclear plant operator, has responsibility and the authority to control all activities and has the absolute right to exclude or remove persons and property. Public Recreation land includes land within public parks, SCE&G developed recreation areas, and islands.¹ Non-Development Areas are areas protected from development to preserve environmental resources and aesthetic values. Conversely, lands included within the Shoreline Permitting classification are not automatically excluded from development related shoreline use, and hence may be available for permitted shoreline development such as access paths and docks.

Land use prescriptions associated with these land management classifications are discussed in Section 6.0. Prescriptions are administered through the Permitting Handbook.

SCE&G maintains a strong commitment to the management of the waters and shoreline of Monticello Reservoir, focusing on the social, ecological, and economic impacts of activities on and near the shoreline and water, taking into consideration in particular, the environmental, aesthetic, and recreational character of the shoreline and lake. Section 7.0 details the activities and structures on and adjacent to Monticello Reservoir that require SCE&G consultation and/or approval. The permitting procedures for shoreline activities or structures are set out in more detail in Section 8.0 and in the Permitting Handbook.

Section 9.0 details SCE&G's fee structure for the shoreline management program.

¹ SCE&G owns all land within the Monticello Development, including all islands within Lake Monticello

Periodic surveys of the Monticello Reservoir shoreline are conducted by SCE&G and include, among other things, inventories and inspections of all docks, including those built and permitted throughout the current year. SCE&G also looks for unauthorized structures within the Project property at that time. These represent violations of the SMP. SMP violations will be dealt with as deemed by SCE&G, in its sole discretion, to be appropriate. Consequences of violations may range from dock permit cancellations to fines and/or legal action, and are discussed more fully in Section 10.0.

SCE&G Shoreline Management Practices include actions taken to lessen or mitigate for potential impacts to a particular resource resulting from direct or indirect use. These include but may not be limited to shoreline stabilization and vegetation management, as well as aquatic plant management. Shoreline Management Practices are further described in Section 11.0 of this document.

Public education and outreach on the protection of valuable shoreline resources is integral to the effectiveness of the SMPs. Section 12.0 of this document details specific measures to be undertaken to help educate both adjacent shoreline residents and other Project resource users. Among included objectives will be SMP education and Best Management Practices ("BMP") education.

In its Application for New License, SCE&G is proposing 10 year review periods for the SMP. The 10 year SMP review periods provide reasonable opportunities for SCE&G, in concert with governmental, non-governmental, and individual stakeholders, periodically and deliberately to assess new issues that arise as a result of development around the Reservoir, and allow for analyses of cumulative effects. Concurrently with the FERC SMP review process, SCE&G will review the Permitting Handbook with interested stakeholders periodically to evaluate and improve its effectiveness. SCE&G reserves the right, however to make changes to the permitting process as it deems necessary and appropriate. This is discussed in Section 10.0.

**SHORELINE MANAGEMENT PLAN
MONTICELLO RESERVOIR**

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

1.0 INTRODUCTION

The Parr Hydroelectric Project ("Project") is located on the Broad River in Fairfield and Newberry Counties, South Carolina (Figure 1-1). The Project is located approximately 31 river miles downstream of the Neal Shoals Hydroelectric Project (Federal Energy Regulatory Commission ["FERC"] No. 2315) and 24 river miles upstream of the Columbia Diversion Dam. The Project consists of two developments: the Parr Shoals Development ("Parr Development") and the Fairfield Pumped Storage Development ("Fairfield Development"). Subsequently, two primary reservoirs are included as part of the Project, Monticello Reservoir² and Parr Reservoir. The normal maximum water level in Monticello Reservoir is El. 425.0 feet National Geodetic Vertical Datum ("NGVD"), which corresponds to a surface area of approximately 6,600 acres, and a gross storage of 400,000 acre-feet. Monticello Reservoir has approximately 64 miles of shoreline within the Project boundary. Parr Reservoir's normal maximum water level is at El. 266.0 feet NGVD, with a corresponding surface area of approximately 4,250 acres. The gross storage is estimated to be 32,000 acre-feet. Parr Reservoir has approximately 75 miles of shoreline within the Project boundary.

An active storage of up to 29,000 acre-feet is transferred between the two reservoirs by the pumped storage operations of the Fairfield Development. Fairfield Development's alternate cycles of generation and pumping results in daily fluctuations in the water levels of both Monticello and Parr Reservoirs. Monticello, when beginning at normal maximum pool elevation, drops 4.5 to 5 feet over a 10 to 12 hour period during the generating phase of operation. At the same time, the water from Monticello and from the Broad River is flowing into Parr Reservoir, causing it to rise as much as 10 feet. During the pumping cycle, the reverse occurs – the water level rises in Monticello Reservoir and drops in Parr Reservoir.

² The State of South Carolina considers Monticello Reservoir waters of the State and refers to it as "Lake Monticello".

The Project boundary³ encompasses land around each reservoir. An approximately 300-acre Recreation Sub-impoundment ("Recreation Lake") is situated adjacent to Monticello Reservoir and is included within the FERC Project boundary. This lake was constructed by South Carolina Electric & Gas Company ("SCE&G") solely for recreational use. The Recreation Lake is unaffected by operational reservoir fluctuations on Monticello Reservoir.

SCE&G manages SCE&G-owned lands within the Project boundary ("Project property") to comply with the FERC license for the Project (the "License"). The goal of project land management is to serve the public interest by providing recreational access and opportunities, protecting wildlife habitat and water quality, producing electricity, and protecting and preserving cultural and aesthetic resources. The Shoreline Management Plan ("SMP") provides a set of administrative policies, procedures, and practices by which SCE&G seeks to manage the Project shoreline to achieve these goals. Future proposals for specific shoreline related developments or activities will be reviewed for consistency with the SMP.

A draft of the initial Project SMP was filed with the FERC in 1991. After several years of discussion and revisions, the initial SMP was approved by the FERC on June 4, 2001. The history of the Project's SMP is described in more detail in Section 3.0 (History of the Shoreline Management Plan). The current relicensing⁴ of the Project provides a near term impetus and opportunity for SCE&G to review the existing SMP in cooperation with relicensing stakeholders, including federal and state regulatory agencies, interested non-governmental organizations ("NGO"s), and individuals. Through discussions with these parties, it was decided that the existing FERC approved SMP, which encompasses both Monticello and Parr Reservoirs, should be divided into two distinct SMP's, one for each reservoir. Hence, this SMP has been prepared for Monticello Reservoir and is being submitted to FERC as part of SCE&G's Parr Hydroelectric Project comprehensive relicensing package. A SMP for Parr Reservoir is included under separate cover.

³ Standard License Article 5 requires licensees to acquire and retain sufficient property and rights to construct, maintain, and operate their projects, as identified in their specific license, including any property or rights needed to accomplish all designated project purposes. As such, Project lands are those lands within the FERC project boundary owned by SCE&G in fee title and those lands for which SCE&G has acquired or retained an easement.

⁴ The current operating license for the Project is due to expire on June 30, 2020. As such, SCE&G will file for a new license with FERC on or before June 30, 2018.

The management guidelines set forth in this SMP are applicable to all lands within the Project boundary surrounding Monticello Reservoir. Among other things, the current document includes the following components:

- Detailed descriptions, management prescriptions and mapping of land classifications;
- Summary information on the Permitting Handbook and fee policies;
- Best management practices ("BMP"s);
- Public education and outreach;
- Reservoir monitoring; and,
- A proposed review process.

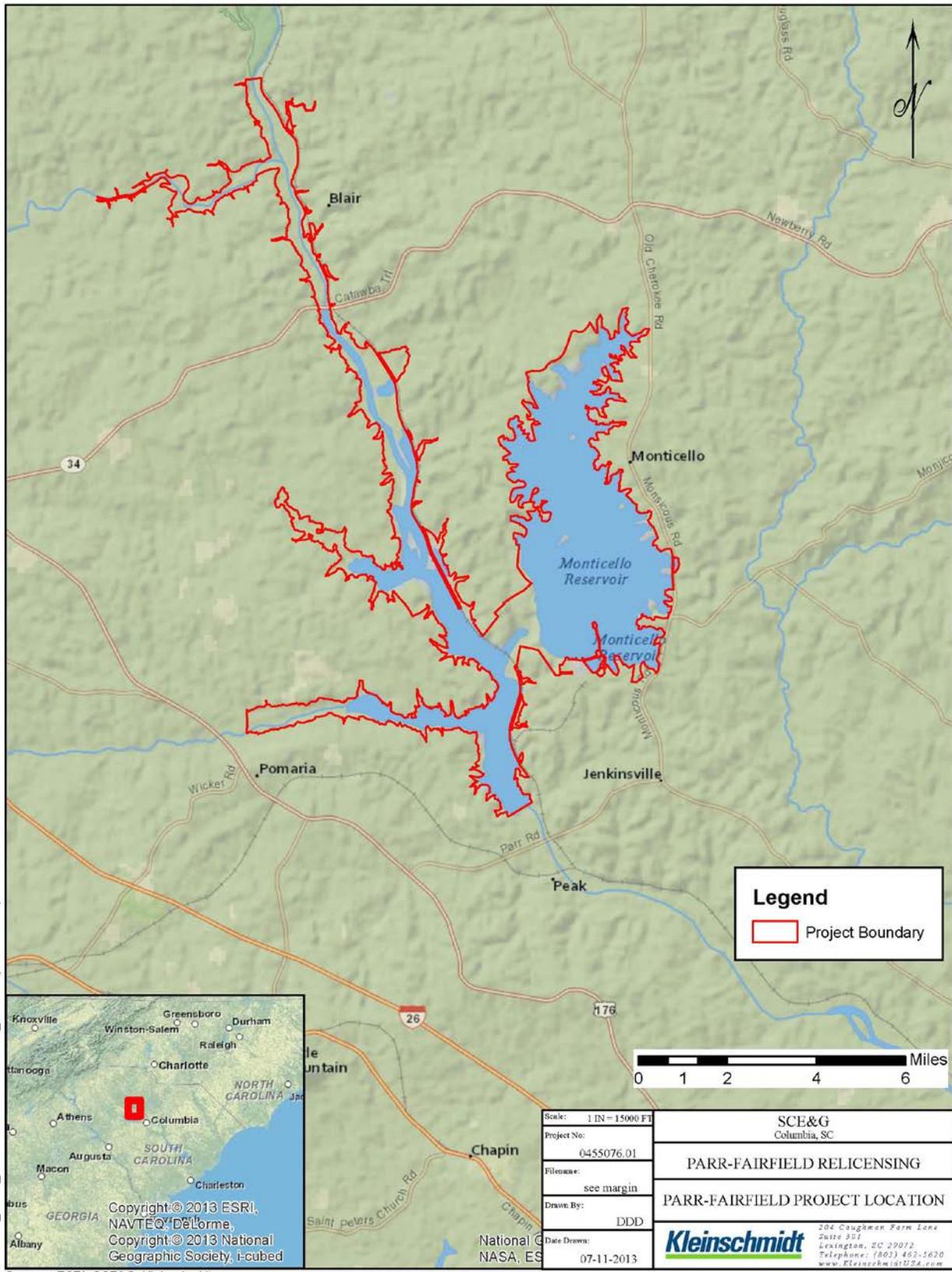


FIGURE 1-1 PROJECT LOCATION AND BOUNDARY MAP

2.0 PURPOSE AND SCOPE OF THE SHORELINE MANAGEMENT PLAN

The Project has served as a major source of power generation for SCE&G's customers and recreation for local residents and visitors to South Carolina for several decades. Consistent with FERC's Standard Land Use Article, a licensee may authorize specific non-project uses and occupancies of a project's shoreline. Examples of non-project uses at Monticello Reservoir include residential boat docks, access paths across Project property, and erosion control structures. SCE&G has a responsibility to ensure that non-Project uses remain consistent with Project purposes, including protection and enhancement of the Project's scenic, recreational, and environmental values.

As development increases in areas surrounding the Project, so too does stress placed upon Project reservoirs and the surrounding watershed. Thus, a comprehensive SMP for each reservoir that recognizes and addresses sources of potential environmental impact is essential to managing each reservoir for the benefit of all interests and to ensure that non-Project uses remain consistent with the License.

The implementation of the SMP by SCE&G will help to maintain and conserve the area's natural and man-made resources. The SMP will comply with the terms of the License, as well as the regulations and orders of FERC, and is intended to assist in providing a balance between recreational use and development, environmental protection, and energy production.

3.0 HISTORY OF THE SHORELINE MANAGEMENT PLAN

On August 28, 1974, the Federal Power Commission (FPC), predecessor to the FERC, issued SCE&G a new License for the Parr Hydroelectric Project. In addition to relicensing the existing 14.88 megawatt (MW) Parr Shoals Development, the new License authorized the construction of the 511.2 MW Fairfield Pumped Storage Development. This resulted in the creation of the Fairfield Development's upper pool, Monticello Reservoir. The new License also authorized the enlargement of the existing Parr Reservoir to serve as the lower pool to the Fairfield Development. This involved raising the height of Parr Dam approximately 9 feet, thereby nearly doubling Parr Reservoir's surface area. The construction of newly licensed facilities was completed in 1978, with the facilities beginning commercial operation that same year.

Article 48 of the Project License issued in 1974 required that SCE&G purchase in fee and include within the project boundary all lands necessary or appropriate for project operations, including lands for recreational use and shoreline control. The lands encompassed by the project boundary shall include, but not be limited to: the islands in the Parr and Monticello Reservoirs formed by the 266-foot and 425-foot contour intervals, respectively; shoreline lands up to the 270-foot contour, or 50 feet (measured horizontally) from the Parr Reservoir's 266-foot contour, whichever is greater; and, shoreline lands up to the 430-foot contour interval, or 50 feet (measured horizontally) from Monticello Reservoir's 425-foot contour, whichever is greater. Provided that the Project boundary, except with respect to land necessary or appropriate for recreational purposes, shall not exceed 200 feet, horizontally measured, from the 266-foot or the 425-foot contour, unless satisfactory reasons to the contrary are given. The FPC determined that acquiring these lands would provide SCE&G with adequate shoreline control around the reservoirs, in addition to serving the purposes of Project operation and recreation.

Furthermore, Article 20 of the Project License orders that SCE&G allow public access, to a reasonable extent to Project waters and adjacent Project lands (with the exception of lands necessary for the protection of life, health, and property) for navigation and outdoor recreational purposes. This Article also allows SCE&G to grant permits for public access to the reservoirs subject to FERC approval.

In 1991, SCE&G recognized that appropriate policies and procedures should be in place to govern shoreline activities at the Project. Utilizing experience gained at their Saluda

Hydroelectric Project (FERC No. 516), SCE&G filed a proposed SMP with the FERC to regulate the use of Project shorelines. After extensive stakeholder consultation, an amended SMP was filed with the FERC. It was approved on June 4, 2001. The SMP was included as part of the Project's Exhibit R.

The SMP approved in 2001 primarily covered activities associated with Monticello Reservoir. It dealt with the following matters: water quality management; forest management; waterfowl management; nuclear exclusion zone restrictions for the operation of SCE&G's V.C. Summer Nuclear Station; fishing, boating, and hunting; public access and recreation; private boat docks and access; vegetation removal; water withdrawal; erosion control; and prohibited activities.

In 2006, SCE&G amended the SMP's policy regarding common docks. The original policy allowed for two to five adjacent property owners to share a single common dock if the shoreline frontage requirement of 200 feet was met. The policy was amended to allow no more than two individual, adjacent single family residential lots to share a common dock. The shoreline frontage requirement of 200 feet was retained.

3.1 CURRENT SMP DOCUMENT AND SHORELINE CLASSIFICATIONS

The SMP serves as a reference document for SCE&G in implementing the Standard Land Use Article, which authorizes SCE&G to permit certain non-project uses of project lands and waters. FERC did not begin including the Standard Land Use Article in new licenses until the early 1980's; thus it was not included in the Project License issued in 1974. However, FERC granted SCE&G the specific authority to permit certain non-Project uses through the approval of the 2001 SMP, and added the Standard Land Use Article to the License (Article 62) in 2011, as revised in 2013 (Article 63). This present document, submitted in conjunction with SCE&G's License application, presents a management plan, covering only Monticello Reservoir (a SMP for Parr Reservoir is included under separate cover), while adhering to the historical management goals agreed to and developed with agencies and stakeholders.

In addition to an updated SMP for each Project reservoir, a Permitting Handbook was developed in consultation with stakeholders and agencies to address activities requiring consultation with and/or permits from SCE&G. These activities include, but are not limited to the following: construction, maintenance, and placement of docks; shoreline stabilization; construction and maintenance of lake access pathways; limited brushing; and other shoreline activities. SCE&G

will review the Permitting Handbook with interested stakeholders periodically to evaluate its effectiveness; however, SCE&G may make changes to the permitting process at any time as it determines in its sole judgment to be necessary and appropriate.

3.2 PROJECT BOUNDARY

SCE&G owns in fee or obtained flowage rights for all lands necessary or appropriate for project operations, including lands for recreational use and shoreline control, as described above in Section 3.0. A Project boundary map is included as Figure 1-1.

4.0 SHORELINE MANAGEMENT PLAN GOALS AND OBJECTIVES

The overall goal of this SMP is to define, document, and present the processes and criteria that SCE&G will employ to manage and balance private and public access to and uses of Project lands, specifically including Monticello Reservoir's shoreline, consistent with public safety, energy production operations, environmental protection for Project land as well as Project waters, and reasonable recreational opportunities. This SMP will help to ensure the protection and enhancement of the Project's scenic, environmental, recreational, natural and cultural resources over the term of the License.

This SMP represents a consensus-based, updated management plan intended for submittal with the Project No. 1894 License Application. Specific goals relative to the SCE&G relicensing process that are discussed under this SMP include the following:

1. Provide for reasonable current and future public access;
2. Provide for current and future recreational needs within the Project;
3. Protect fish and wildlife habitat;
4. Protect cultural resources;
5. Protect the ability to meet operational needs;
6. Facilitate compliance with License articles;
7. Minimize adverse impacts to water quality;
8. Monitor and address erosion;
9. Protect scenic values;
10. Monitor and permit shoreline activities;
11. Provide a summary catalogue of the types and locations of existing recreational opportunities;
12. Establish Land Management Classifications and Land Use Prescriptions to help in the management of non-Project uses of the Monticello Reservoir shoreline lands within the Project boundary;
13. Describe the SMP amendment and monitoring process; and
14. Educate and encourage property owners who own property adjacent to or adjoining Project Property (herein referred to as "adjacent property owners") on the use of voluntary BMPs.

4.1 CONSULTATION

The Project relicensing provides an opportunity for SCE&G to seek input on Project-related shoreline management issues from interested stakeholders. SCE&G recognizes that successfully completing the relicensing process requires identifying and resolving Project issues in consultation with federal and state resource agencies, local and national NGOs, homeowner associations, and individuals who have an interest in the Parr Hydroelectric Project (Table 4-1). SCE&G began public outreach efforts in January 2013 by holding a series of public workshops in Winnsboro, Newberry, Columbia, and Jenkinsville, SC. Since that time, SCE&G has sought active public involvement in the process and fostered commitment to issue resolution among SCE&G and stakeholders.

TABLE 4-1 PARTICIPATING GROUPS IN PARR HYDROELECTRIC PROJECT RELICENSING

STAKEHOLDER GROUPS
American Rivers
American Whitewater
Catawba Indian Nation
City of Columbia
Chestnut Hill Plantation HOA
Coastal Conservation League
Congaree Riverkeeper
Environmentalists Inc.
Fairfield County
Gills Creek Watershed
National Marine Fisheries Service
National Park Service
Newberry County
South Carolina Department of Health and Environmental Control
South Carolina Department of Natural Resources
South Carolina Department of Parks, Recreation and Tourism
South Carolina Electric & Gas Company
South Carolina Historic Preservation Office
Town of Winnsboro, SC
Tyger-Enoree River Alliance

STAKEHOLDER GROUPS

United States Fish and Wildlife Service

United States Forest Service

University of South Carolina

4.1.1 RECREATION/LAKE AND LAND MANAGEMENT RESOURCE CONSERVATION GROUP

In support of the relicensing effort, SCE&G formed three Resource Conservation Groups ("RCG"s) to identify, address and resolve Project-related issues by resource area. The RCGs are as follows: the Fish, Wildlife and Water Quality RCG; the Project Operations RCG; and the Lake & Land Management and Recreation RCG. Consideration of potential issues by resource area allows for more focused topic discussion and targeted issue resolution. Some RCGs have established sub-groups, or Technical Working Committees ("TWC"s), for issues requiring special knowledge, education, or experience. Consequently, the Lake & Land Management and Recreation RCG has a Lake and Land Management TWC as well as a Recreation TWC. The Lake and Land Management TWC is discussed further below.

4.1.2 LAKE AND LAND MANAGEMENT TECHNICAL WORKING COMMITTEE

The primary mission of the Lake and Land Management TWC is to revise the existing Parr Hydroelectric Project SMP to provide a management framework within which Project resources can be effectively protected while assuring appropriate public and private access to the Project resources and the recreational opportunities they present. Another important focus of the TWC is to allow interested parties an effective opportunity to provide input on resource issues and the overall future management of shoreline resources. The resulting collaboration has resulted in the contribution of valuable information by entities and individuals familiar with the Project. The forum was instrumental in addressing important issues relevant to the operation and management of the Project over the term of the new License. In working collaboratively, the members of the TWC (Table 4-2) aimed to blend the objectives of the state and federal resource agencies with other stakeholder interests.

TABLE 4-2 ORGANIZATIONS PARTICIPATING ON THE LAKE AND LAND MANAGEMENT TWC

STAKEHOLDER GROUPS
American Rivers
American Whitewater
Coastal Conservation League
Congaree Riverkeeper
Fairfield County
Gills Creek Watershed
Adjacent Property Owners
National Marine Fisheries Service
National Park Service
South Carolina Department of Health and Environmental Control
South Carolina Department of Natural Resources
South Carolina Department of Parks, Recreation and Tourism
South Carolina Electric & Gas Company
Tyger-Enoree River Alliance
United States Fish and Wildlife Service
United States Forest Service

4.1.3 MEETING SCHEDULES

Between October of 2013 and January of 2018, SCE&G has held numerous meetings of the Lake and Land Management and Recreation RCG and Lake and Land Management TWC to discuss the details of the Project SMPs. The efforts of the TWC are reflected herein.

5.0 LAND USE CLASSIFICATIONS

Five distinct land management classifications have been developed for the shorelines surrounding Monticello Reservoir. These land management classifications are as follows: Project Operations; Nuclear Exclusion Zone; Shoreline Permitting; Public Recreation; and, Non-Development Areas. The Public Recreation Classification includes designated public recreation areas, the Recreation Lake, and all islands on Monticello Reservoir. Although SCE&G intends to manage its lands according to this classification system, the public generally will not be precluded from access to SCE&G-owned lands regardless of classification, with the exception of lands reserved and used for Project operations, lands/areas within the Nuclear Exclusion Zone, or other areas specifically protected from public access and posted as such. The sections below explain/define the land management classifications. The acreages and parcels for each of the classifications are provided in Table 5-1. Figure 5-1 depicts their distribution around Monticello Reservoir.

TABLE 5-1 SHORELINE MILES AND ACREAGES BY LAND USE CLASSIFICATION⁵

CLASSIFICATION	SHORELINE MILES	ACRES
Project Operations*	4.90	186
Nuclear Exclusion Zone *	6.43	203
Shoreline Permitting	22.36	235
Public Recreation*	19.49**	927**
Non-Development*	10.72	151
TOTAL	63.90	1,701

*No docks allowed

** Includes the shoreline surrounding the Recreation Lake and all islands

⁵ Preliminary information; final data will be provided in the final SMP

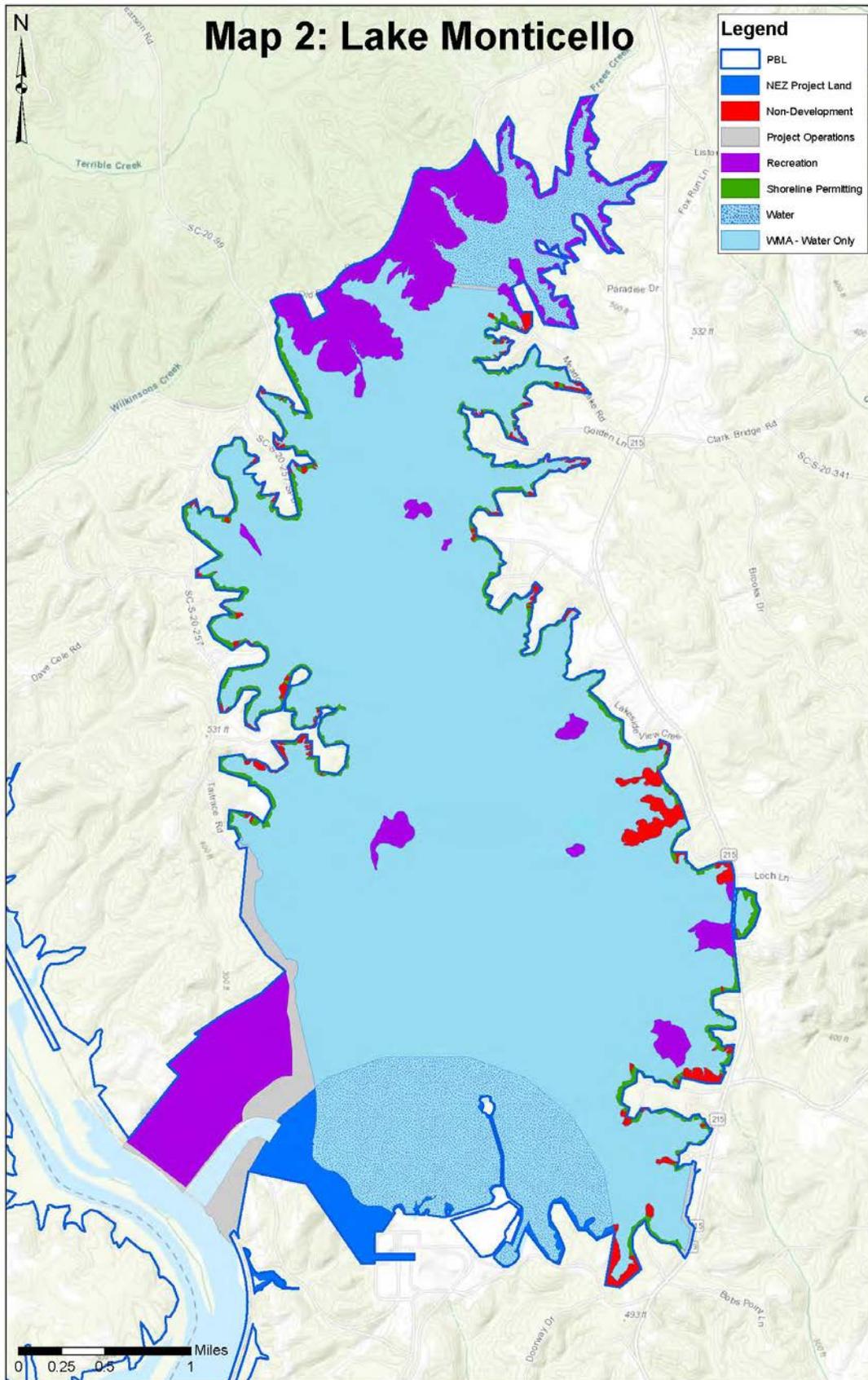


FIGURE 5-1 SHORELINE CLASSIFICATIONS MAP FOR MONTICELLO RESERVOIR

5.1 PROJECT OPERATIONS

Areas under this classification include SCE&G-owned and managed lands required for operation of the Fairfield Development. Public access to these lands is restricted to ensure public safety or to assure the security of the infrastructure system.

5.2 NUCLEAR EXCLUSION ZONE

In addition to its use as part of the Fairfield Development, Monticello Reservoir provides cooling water for the V.C. Summer Nuclear Station located on its shore (authorized under 52 F.P.C. 537 [1974]). The Nuclear Exclusion Zone consists of the area surrounding the V.C. Summer Nuclear Station between the Project boundary line and shoreline and a specified area within Monticello Reservoir where SCE&G as the reactor licensee has the authority to determine all activities, including exclusion or removal of personnel and property. This area is designated by warning signs on the landward side and by buoys on the lakeward side. Admittance to this area is restricted in order to comply with licensing requirements administered by the Nuclear Regulatory Commission.

5.3 SHORELINE PERMITTING

It is the policy of SCE&G to authorize certain private uses of and/or acts on Project property by permit when such uses or acts are consistent with the public interest and comply with the requirements of the Project License. Areas within the Shoreline Permitting Classification may be eligible for certain private residential uses upon approval by SCE&G. This does not include commercial activities (other than commercial water withdrawals).

5.4 PUBLIC RECREATION

Project lands under this classification serve as recreational resources for the public and include areas managed expressly for recreation as well as those with recreation as a secondary usage. This classification also includes properties set aside for recreational development. Public recreation lands include the following sub-classifications:

- Recreation Lake
- Public Access Areas
- Islands on Monticello Reservoir

5.4.1 RECREATION LAKE

The Recreation Lake is located at the north end of Monticello Reservoir and is approximately 300 acres and 10 miles of shoreline. The Recreation Lake was constructed to provide stable water for fisheries and recreation opportunities.

5.4.2 PUBLIC ACCESS AREAS

There are five public parks on Monticello Reservoir. All recreation facilities at Monticello Reservoir are open year-round, except the Recreation Lake Beach Area, which is closed October 1 through March 31. For a list of authorized activities, please see the Permitting Handbook.

5.4.3 ISLANDS

There are 8 islands within Monticello Reservoir, all of which are available for public recreational use in accordance with authorized activities (see Permitting Handbook for authorized activities).

5.5 NON-DEVELOPMENT AREAS

Lands under this classification warrant special protection because they may provide important habitat, aesthetic values, or other significant Project characteristics.

6.0 LAND USE PRESCRIPTIONS

Land use prescriptions are based upon and reflect the guiding principles regarding the management of the SCE&G-owned lands within each classification. SCE&G publishes a detailed Permitting Handbook (included under separate cover) that contains descriptions of the permitting processes and specifications for various shoreline developments. Activities that require consultation with and/or permits from SCE&G include the following: construction, maintenance and placement of docks, shoreline stabilization; construction and maintenance of shoreline pathways, and other shoreline activities. Persons interested in shoreline development must contact SCE&G's Lake Management Department (803) 217-9221 to obtain permitting guidance and a copy of the Permitting Handbook. Section 8.0 of this document discusses the Permitting Handbook in greater depth. General information regarding permitting requirements is included where applicable within the scope of each management prescription below.

6.1 PROJECT OPERATIONS

Properties classified as Project Operation contain project works critical to the operation of the Fairfield Development. Public access and recreation activities on these lands are restricted for reasons of safety and security.

6.2 NUCLEAR EXCLUSION ZONE

Properties and waters classified as Nuclear Exclusion Zone contain project works/areas critical to the operation of the V.C. Summer Nuclear Station. Public access and recreation activities on these lands are restricted for reasons of safety and security.

6.3 SHORELINE PERMITTING

Residential landowners whose property adjoins lands within the Shoreline Permitting classification may be eligible for certain permitted structures only upon written consent from Lake Management. SCE&G strictly regulates the placement and construction of permitted structures. To address aspects of shoreline structures, SCE&G has developed permitting application procedures and associated dock specification guidelines. These guidelines are detailed in SCE&G's Permitting Handbook.

6.4 PUBLIC RECREATION

Project lands devoted to public recreation include developed park sites, properties set aside for future recreational development, and islands on Monticello Reservoir owned by SCE&G⁶. With the exception of the islands, which are maintained in their natural condition, SCE&G manages the areas based on the specific, designated recreational activities for each, including fishing, picnicking, and boat launching⁷. SCE&G developed and maintained access areas on Monticello Reservoir are depicted in Figure 12-1. Private permitted activities, other than those noted under the Recreation Lake (Section 6.4.1) are excluded.

6.4.1 RECREATION LAKE

The park area at the Recreation Lake offers fishing, a beach area and picnic facilities. Regulations for its use are posted at the park site. The beach area is closed October through March. The boat launch area is open every day, all year long. No private docks or boat ramps will be permitted on the shoreline of the Recreation Lake. Meandering paths and water withdrawals, for residential irrigation only, may be considered on a case-by-case basis.

6.4.2 ISLANDS

SCE&G owns all of the islands on Monticello Reservoir and they are available for public recreational use, which includes activities such as fishing, walking and bird watching. Hunting is permitted on the islands in accordance with state hunting regulations.

6.5 NON-DEVELOPMENT AREAS

Lands under this classification warrant special protection because they may provide important habitat or aesthetic values. Non-development Areas are available for passive⁸ public recreational use. SCE&G will not permit private shoreline development for Project lands under this classification.

⁶ SCE&G also manages some of the lands classified as public recreation for timber. Information on SCE&G's forest management practices is included in Section 11.0.

⁷ The waters of Monticello Reservoir, excluding the Recreation Lake, and Monticello Reservoir islands are available for public waterfowl hunting as discussed under Section 12.0.

⁸ Passive recreation use can be defined as those recreation activities that are generally non-consumptive in nature, require a minimum of facilities, and/or have a minimal environmental impact.

7.0 SHORELINE ACTIVITIES REQUIRING SCE&G APPROVAL

SCE&G maintains a strong commitment to managing the shoreline of Monticello Reservoir for multiple resources by considering the impact of various activities on the environmental, aesthetic, and recreational character of the lands. SCE&G owns and manages the Project lands around the entire periphery of Monticello Reservoir and the Recreation Lake. Thus, any activity occurring on the "shoreline" is occurring on SCE&G property. Any activity not in compliance with the shoreline activity parameters outlined in this SMP and in the Permitting Handbook constitutes a trespass which SCE&G may elect to prosecute.

7.1 AUTHORIZED ACTIVITIES REQUIRING APPROVAL THROUGH THE PERMITTING HANDBOOK

Only the following activities and structures may be permitted on Monticello Reservoir:

- Construction or modification to private docks;
- Construction of a meandering access path and associated vegetation removal;
- Shoreline stabilization methods (including rip-rap and bio-engineering); and
- Water withdrawal.

7.2 PROHIBITED STRUCTURES AND ACTIVITIES

Activities and structures that SCE&G does not allow include, but are not limited to, the following:

Prohibited Structures:

- Roofs or covers over docks;
- Boat lifts;
- Boat slips;
- Boathouses;
- Fueling facilities on a dock;
- Private boat ramps;
- Houseboats;
- Watercraft exceeding 30 feet in length;
- Watercraft with marine sanitation devices ("MSD");

- Commercial marinas;
- Marine rails;
- Sea walls;
- Fences;
- Electrical service;
- Permanent structures other than permitted docks;
- Land-based structures, storage buildings, shelters, patios, gazebos, fences, swimming pools, satellite dishes, signs, storage of boats, camper trailers, canoes or other watercraft, motor homes or automobiles; and
- Septic tanks and/or drain fields.

Prohibited Activities:

- Water skiing;
- Jet Skiing;
- Parasailing;
- Paragliding;
- Mooring;
- Excavations/dredging (except commercial operations permitted by the regulatory authorities);
- Effluent discharges;
- Planting of grass except as a permitted bioengineering erosion control measure;
- Storage or stockpiling of construction material;
- Livestock access to reservoir⁹
- Primitive or overnight camping on all Project property, except at Highway 99 West Recreation Site and islands¹⁰;
- Vegetation removal of any type except in a permitted access path to the shoreline;
- Use of herbicides; and,
- Limbing or trimming of vegetation on Project property to create views or visual corridors.

⁹ Unless grandfathered through deed reservations.

¹⁰ Camping must be in accordance with the policies outlined in the Permitting Handbook.

8.0 PERMITTING PROCESS FOR SHORELINE ACTIVITIES OR STRUCTURES

8.1 SHORELINE PERMITTING PROCEDURES

Applicants must obtain the proper permit(s), per the SCE&G's Permitting Handbook, prior to the initiation of any construction or activity on Project property. As noted above, some activities may also require local, state, and/or federal permits

Whether a non-Project use is approved under the Standard Land Use article or through Project-specific FERC approval, SCE&G is responsible for ensuring that the use is consistent with the purposes of protecting or enhancing the scenic, recreational, and other environmental values of the Project. To assist applicants in the permitting process, the staff at the SCE&G Lake Management Department is available to answer questions regarding documentation, permits, and specification requirements for their particular project. Permits from SCE&G are required for the following activities:

- Construction of a meandering access path;
- Water withdrawal;
- Installation/application of shoreline stabilization; and
- Installation of private docks.

It is highly advisable to begin the consultation process with SCE&G Lake Management staff at the planning stage of a project. SCE&G staff will be available to discuss specific permitting requirements with the property owner. Depending on the proposed new facility or activity, local, state and federal resource agencies may impose requirements on construction start/stop dates, the placement of erosion control devices, treatment plans, remedial measures, submittal of start construction notifications, and/or BMPs. Any permit applicant should be aware of such conditions, as violations may nullify a permit.

An overview of permitted activities is included below. Detailed information on SCE&G's permitting process, guidelines, and specifications, is provided in SCE&G's Permitting Handbook available by calling (803) 217-9221, or by writing:

8.1.1 DOCKS

A permit must be obtained from SCE&G Lake Management Department for the construction, installation, replacement of, or addition to any dock prior to the start of the activity. The configuration and location of a dock will be determined during a site visit by an SCE&G representative. At a minimum, dock construction and location must not create a nuisance, or otherwise be incompatible with overall Project recreation use. Impact on navigation or an adjoining property owner will be a strong determining factor. Size, length, or orientation may be restricted, or a permit may be denied if the dock would interfere with navigation or unreasonably impact an adjoining property owner. Dock length may vary depending on curvature or slope of the shoreline or lot line configuration. Any variance (i.e. increase in size or length) from guidelines included in the Permitting Handbook will be evaluated as to the effects on navigation, aesthetic value, or impact on adjacent properties and may be denied if in SCE&G's sole judgment the effects and impacts warrant denial. No dock will be permitted in narrow cove areas, which are defined to be areas where the distance across the water from one shoreline to the other at the 425-foot contour (normal high water level) is less than 200 feet. Only one dock will be permitted on a single-family lot¹¹. Please see the Permitting Handbook for additional requirements.

General boat dock design may involve either fixed or a combination of fixed and floating structures. Common docks are encouraged and may be mandated for all adjacent property owners as an alternative to individual docks and will be required on property with inadequate property line frontage (property line frontage requirements included in Permitting Handbook), or in such other circumstances that SCE&G deems appropriate. Dock layout specifications are included in the Permitting Handbook.

¹¹ SCE&G does not guarantee usable water access to the waters of Monticello Reservoir at any time. Each lot along the shoreline will have different slopes and contours that will determine water depth in front of the lot. The Monticello Reservoir is a pumped storage project that can fluctuate vertically up to 4.5 feet over a 10 to 12 hour period during generation and pumping phases. The fluctuation of the reservoir will, at times, limit or restrict the use of most docks on the Monticello shoreline.

Docks generally will not be permitted on shoreline affected by significant erosion or steep slopes. Applicants may submit a request for approval accompanied by a plan to address shoreline erosion that can be accomplished without the clearing of vegetation or disturbance of shallow water habitat. However, SCE&G reserves the right, in its sole discretion, to deny a permit.

The types of docks permitted include private individual and private common docks. See Permitting Handbook for more details describing dock permitting policies.

8.1.2 SHORELINE VEGETATION MANAGEMENT

In general, SCE&G maintains a policy of non-disturbance of any vegetation within the Project boundary without approval from SCE&G. Permission to remove vegetation within a permitted access path will only be granted by SCE&G Lake Management after a site visit with the applicant. Once clearing of the access path is completed according to the permit, the applicant may maintain the path in the permitted condition utilizing hand held tools and without the use of herbicides. Any unauthorized removal of shoreline vegetation may result in the cancellation of the dock and other permits issued by SCE&G as well as legal action. Violators may be required to replant and restore the disturbed area with such plantings and/or shoreline manipulation as SCE&G determines is necessary to mitigate and correct the situation.

8.1.3 ACCESS PATH

A single access path may be cleared with hand held tools and without the use of herbicides from the adjacent property owner's land upon approval of SCE&G. The access path must follow a meandering route to prevent erosion and to protect the aesthetics of the shoreline. No trees larger than 10-inches in diameter at breast height may be removed within the access path. A SCE&G Lake Management representative will identify and designate the location of all access paths. Access path restrictions are included in the Permitting Handbook.

8.1.4 SHORELINE STABILIZATION

Shoreline erosion occurs in some areas where the reservoir shoreline is exposed to prolonged or recurrent wind and wave action. Such erosion, if significant enough, can lead to sedimentation in those areas of the reservoir, affecting aquatic habitats and drainage channels, stream channels, water intakes, and affecting the character of the reservoir in general. Provided it conforms to good engineering standards, as judged by SCE&G, SCE&G supports voluntary efforts to address shoreline erosion in the immediate area of docks or access path for adjacent property owners. To ensure that appropriate, effective techniques and materials are used, SCE&G monitors and controls erosion control projects on or directly affecting Project Property as detailed in the Permitting Handbook. Owners of property adjoining Project Property who wish to employ erosion control measures on or affecting Project Property must use SCE&G shoreline stabilization practices appropriate for the specific situation.

Because shoreline vegetation serves several important functions (i.e., soil integrity, wildlife habitat, water cleansing functions, and aesthetic value) SCE&G prefers to see employment of vegetative shoreline stabilization techniques to address soil erosion problems, whenever possible. These techniques may be referred to as bioengineering, and consist of installing living plant material as a main component in controlling problems of land instability. Plants used should consist of native species that, ideally, have been collected in the immediate vicinity of a project site to ensure that they are well-adapted to site conditions. The ultimate goal in using bioengineering techniques is to establish diverse plant communities to stabilize erosion prone areas through development of a vegetative cover and a reinforcing root matrix.

Bioengineering techniques are least effective at sites with significant and prolonged exposure to strong currents or wind-generated waves. Stabilization of areas experiencing strong erosion pressure may also require the use of structural erosion control methods such as rip-rap. Areas with high-gradient banks or those in advanced stages of erosion may also benefit from such structural components. The optimal solution at a given location often involves combinations of techniques providing both structural and environmental benefits to the shoreline. A variety of bioengineering methodologies and devices are available to address erosion. Illustrations of erosion control designs that utilize both vegetation and structural elements are provided in Figure 8-1 and Figure 8-2. As depicted in the figures, rip rap can provide immediate shoreline stability, thereby enabling plantings to become established to add root-based soil integrity. Optimal erosion control designs must account for site specific slope and erosion pressure as well as homeowner/landowner preferences. Figure 8-3 illustrates a site at which SCE&G's general guidance on using rip rap is followed. Bricks, blocks, tires, or materials other than rip-rap are prohibited as alternative shoreline stabilization material. SCE&G's Lake Management Department is available to provide the benefit of its knowledge and experience to help homeowners attempting to select the design right for them and the Reservoir environment.

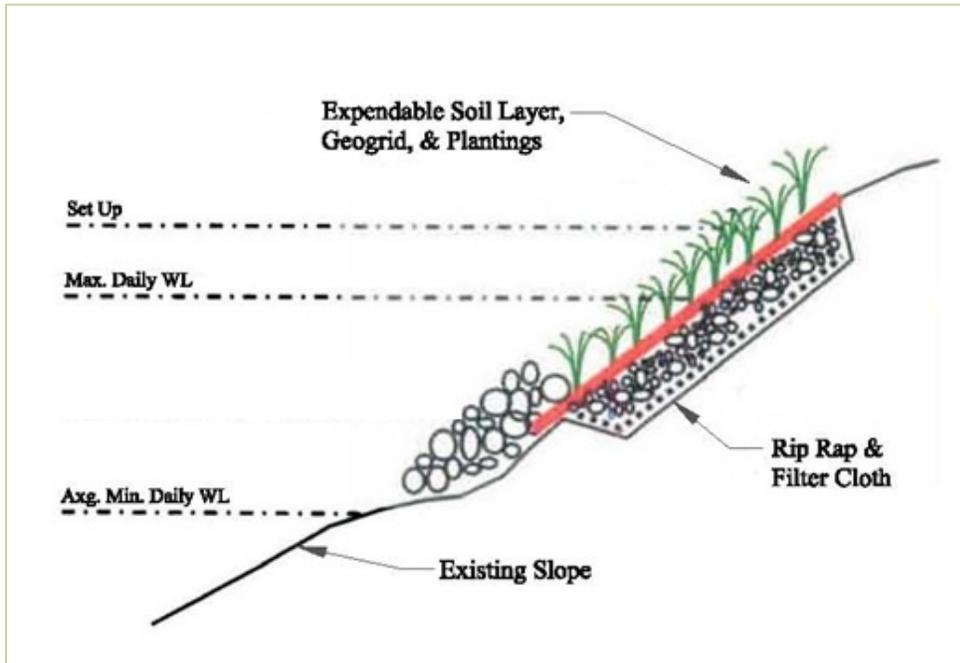


FIGURE 8-1 EXAMPLES OF SHORELINE EROSION CONTROL DESIGNS UTILIZING BIOENGINEERING AND STRUCTURAL TECHNOLOGIES (A)

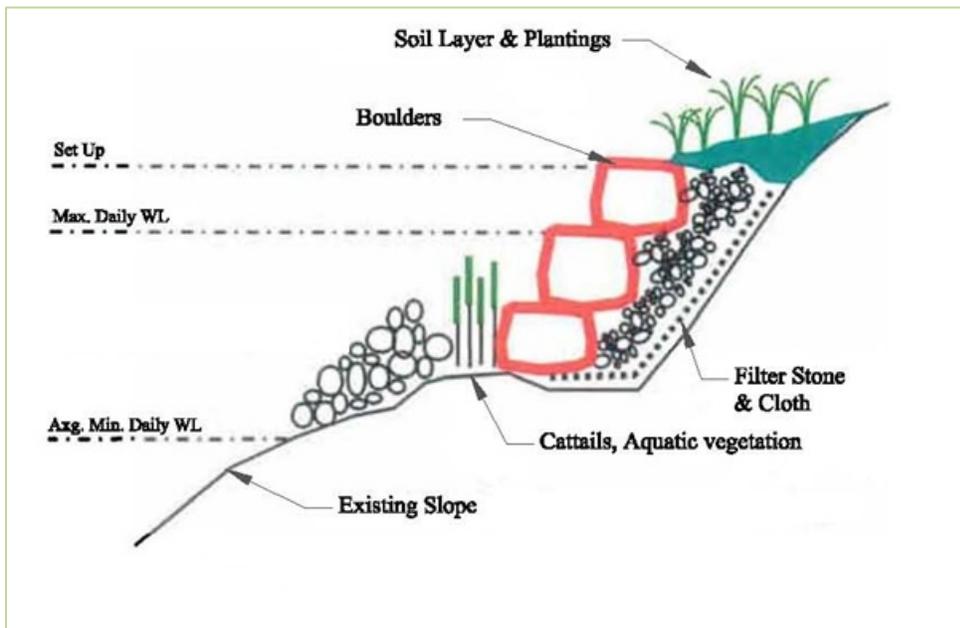


FIGURE 8-2 EXAMPLES OF SHORELINE EROSION CONTROL DESIGNS UTILIZING BIOENGINEERING AND STRUCTURAL TECHNOLOGIES (B)

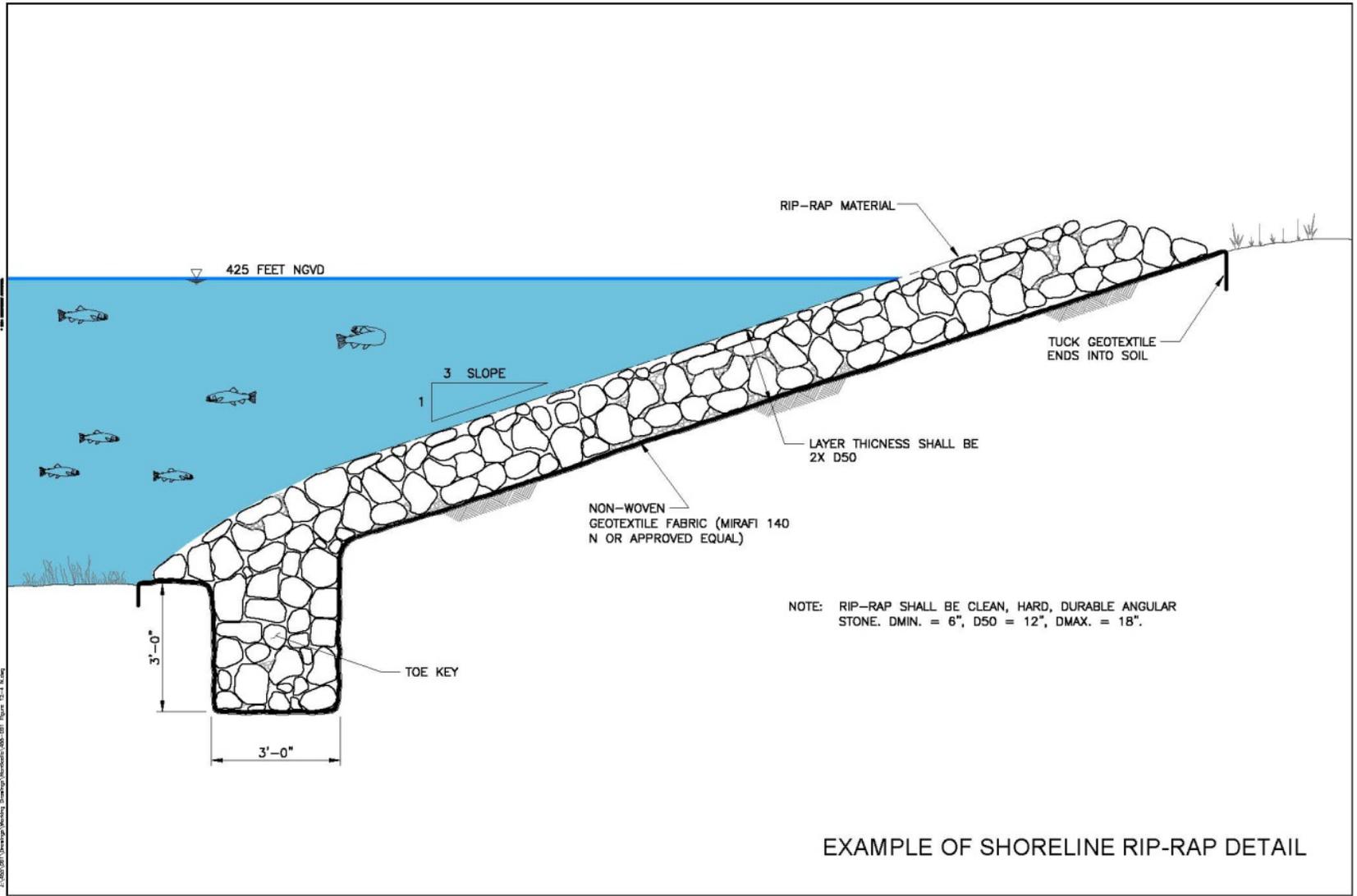


FIGURE 8-3 EXAMPLE OF SHORELINE RIP-RAP DETAIL

8.1.5 WATER WITHDRAWAL

Water withdrawals requiring piping and other transportation/delivery equipment to be placed along the shoreline or in the littoral zone, are managed according to the terms of this SMP. Water withdrawal for residential property must be for irrigation purposes only. Permits are required, and will not be issued for any other purpose. Associated pumps and electrical service must be located outside SCE&G property. SCE&G reserves the right to prohibit withdrawal during times of drought or water drawdown.

Applications for a permit to remove water must be submitted to SCE&G for review. Water withdrawal applications for greater than one million gallons per day (MGD) will be forwarded to the FERC for approval. Requests for withdrawal of one MGD or less may require agency consultation prior to approval. SCE&G may impose limits in granting permits for approved applications (see Permitting Handbook). The applicant may be required to bear the expenses of filing the application and will be required to compensate SCE&G for water withdrawn.

9.0 SCE&G PERMITTING FEE POLICIES

FERC allows licensees the right to charge reasonable fees to cover the costs of administering shoreline management programs, which add management responsibilities and associated costs to project operations. SCE&G administers its SMP in part through a permitting program, which does include a fee component. This ensures that activities occurring within the Project and in particular on Project land, are consistent with the overall goals for the Project, and that SCE&G's customers are not burdened with the full cost of administering programs that also have significant private, and often non-customer, benefit. Permit fees are due with applications and are required for docks, access paths, water withdrawal, and erosion control projects. Should an application be denied, associated permit fees will be returned. Periodic permit renewal fees may be required depending on the shoreline activity. Permit fees for Monticello Reservoir shoreline activities are detailed in the Permitting Handbook. Failure to comply with this policy may result in, among other things, revocation of existing permits, fines, or legal action, as well as loss of consideration for future permits.

SCE&G will give reasonable public notice through appropriate communication avenues before changing the fee structure.

10.0 ENFORCEMENT OF SHORELINE MANAGEMENT PLAN

10.1 VIOLATIONS OF SHORELINE MANAGEMENT PLAN

SCE&G conducts periodic surveys of the Monticello Reservoir shoreline to inventory and inspect docks, access paths, and shoreline erosion control structures/projects. Lake Management representatives make note of unauthorized structures that they see, as well as urging residents and Reservoir visitors to report anything they believe to be unauthorized activity within the Project boundary. Anyone believing that an activity violating the SMP is occurring is urged to contact SCE&G Lake Management at (803) 217-9221.

SCE&G Lake Management representatives will issue Stop Work Directives and/or Trespass Notices for any violations detected on SCE&G property. Any unauthorized clearing of trees or underbrush may result in the revocation of responsible parties' dock permits within 30 days if the violation(s) is (are) not corrected or a course of and schedule for corrective action has not been agreed to and approved by SCE&G. SCE&G may also commence legal action, if it deems it necessary, to require re-vegetation of the affected area. Removal of merchantable timber will require reimbursement to SCE&G subject to valuation of the Forestry Operations Department, including legally allowable "penalties." Consequences for violations may also include restrictions of access to SCE&G property, legal actions, fines, and loss of consideration for future permits.

11.0 SHORELINE MANAGEMENT PRACTICES

11.1 SCE&G SHORELINE MANAGEMENT PRACTICES

SCE&G has established a set of management practices that apply to all of the lands included in the Project boundary. These practices are reflective of each of their developments unique qualities. The management practices for the Fairfield Development (which includes Monticello Reservoir) described herein, may be reviewed and revised periodically during the period of the FERC license.

11.1.1 FOREST MANAGEMENT SHORELINE MANAGEMENT PRACTICES

SCE&G manages timber within the Monticello Project boundary line in accordance with South Carolina's Best Management Practices for Forestry publication. An online copy of this publication is available at <http://www.state.sc.us/forest/refbmp.htm>.

11.1.2 AQUATIC PLANT MANAGEMENT ACTIVITIES

Some species of aquatic plants can become significant nuisances to recreation and Project operations should their populations not be controlled. Some of the common problem species that may be found in Monticello Reservoir include hydrilla, water primrose, and several species of pondweed. When managing invasive and exotic aquatic plants it is important to also protect the aquatic ecosystems and fish habitat. This requires the integration and use of specific BMPs appropriate to the regional and local conditions.

SCE&G's Lake Management Department, in cooperation with the South Carolina Aquatic Plant Management Council, manages the Aquatic Weed Program on Monticello Reservoir. Because some aquatic weed control techniques can harm fish and native plant species if improperly used, it is unlawful, per state and federal regulations, for individuals to spray or treat aquatic growth in the waters of Monticello Reservoir. SCE&G joins with SCDNR to ask that any aquatic vegetation problems recognized by Reservoir visitors or adjacent property owners be reported to SCE&G's Lake Management Department and the SCDNR. In addition, to help curb the spread of invasive aquatic species, SCE&G joins with SCDNR to ask that Reservoir visitors examine their boats and trailers and remove all vegetation and visible mud from boats and trailers before placing them into the waters of Monticello Reservoir and after removing them from Monticello Reservoir. This plea and advice also applies to every body of water in the State. Additional

information on aquatic plant management throughout the state, including Monticello Reservoir, is available at SCDNR's website, <http://www.dnr.sc.gov/invasiveweeds/plan>.

11.1.3 WOODY DEBRIS & STUMP MANAGEMENT

Monticello Reservoir does not have a significant source of woody debris. Woody debris and stump management are discussed in the Permitting Handbook.

11.1.4 AQUATIC HABITAT ENHANCEMENT

SCE&G may partner with SCDNR to enhance fisheries habitat. Enhancing aquatic habitat is an important aspect of freshwater fisheries management. SCDNR and/or SCE&G may establish and maintain aquatic habitat enhancements on Monticello Reservoir such as, but not limited to, vegetation plantings, felled trees cabled along shorelines, spawning and fry rearing enhancements, artificial reefs or "fish attractors." Signage or buoys advising anglers and boaters of enhancement structures in the area may be installed. Structures should be designed and constructed so as not to pose hazards to navigation. At an absolute minimum, they must be designed and constructed to maintain adequate navigation clearance at normal low water elevations. All fisheries habitat enhancement activities will be coordinated with SCDNR and SCE&G.

Additional information on the SCDNR Fish Habitat Enhancement Program can be found online at www.dnr.sc.gov/fish/. For questions regarding an existing fisheries habitat enhancement structure or the notification of a missing buoy/marker, please contact SCDNR at 803-661-4767.

11.1.5 PROTECTION OF LANDS KNOWN TO PROVIDE IMPORTANT HABITAT VALUES

Reservoirs are dynamic environments and the important natural and cultural values that Monticello Reservoir presents may evolve over time. During the upcoming license term, areas along the shoreline may be found to warrant protection against materially negative impacts from development upon one or more of a variety of ecologically important characteristics. Such characteristics may include, but not be limited to the following: areas known to be occupied by rare, threatened or endangered species; rare or exemplary natural communities; species in the State Wildlife Action Plan; significant land forms and geologic features; wetlands and shallow coves; and other areas, such as spawning and nesting habitat, determined to be critical to the continued existence of native species. In the event that one of the aforementioned species is

determined to be present in the Project boundary, SCE&G will consult with SCDNR to determine appropriate management policies.

11.2 LANDOWNER RECOMMENDED BMPs

In addition to development activities, the environment around Monticello Reservoir is susceptible to impacts associated with residential and recreational activities. These include, for example only, improper fertilizer/pesticide use, boat maintenance, and debris disposal. Adjacent property owners can mitigate negative impacts otherwise associated with their property uses and instead make significant positive contributions to the Reservoir environment, and ultimately the watershed, by employing BMPs that preserve bank integrity and minimize non-point sources of pollution and contamination. Adjacent property owners should understand that using BMPs will help to preserve the scenic, environmental, and recreational qualities of the reservoir that they so highly value. Examples of effective BMPs recommended to adjacent property owners are provided in the succeeding section. SCE&G is available to provide more information and to assist landowners in determining effective BMPs for activities on their properties. Also, anyone may contact the Natural Resource Conservation Service or local county extension office (<http://www.sc.nrcs.usda.gov/contact/>).

11.2.1 MINIMIZING NON-POINT SOURCE POLLUTION

Reservoir pollution may result from a variety of activities related to residential development, agriculture, forestry, and construction. Contaminants may enter the reservoir and tributaries via overland flows carrying biological, chemical, and other substances picked up and carried by runoff from rain events. This runoff water may contain sediment, bacteria, oil, grease, detergents pesticides, fungicides, fertilizers, and other pollutants. These pollutants, depending on type, quantities, and concentrations can overwhelm a reservoir's natural ability to filter and process them, thus leading to degraded water quality and aquatic environments.

Although a single point of impact or action may seem insignificant in its effect on the reservoir, the cumulative effects of the resource may be considerable. With this in mind, SCE&G encourages adjacent land owners to be mindful that they are members of a larger community that uses and impacts the reservoir. Employing the following BMPs can go a long way in preserving and improving reservoir water quality:

- Use permeable paving materials and reduce the area of impervious surfaces, particularly driveways, sidewalks, walkways, and parking areas;
- Dispose of vehicle fluids, paints, and/or household chemicals as indicated on their respective labels and do not deposit these products into storm drains, project waters, or onto the ground;
- Use soap sparingly when washing vehicles and wash them on a grassy areas , preferably sloping gently away from the reservoir, so the ground can filter the water naturally;
- Use hose nozzles with triggers to save water and dispose of used soapy water in sinks or other vessels that direct the materials into sewer systems, not in the street;
- Maintain septic tanks and drain fields according to the guidelines and/or regulations established by appropriate regulatory authorities;
- Remove pet waste and dispose of properly in areas that do not drain to the reservoir; and
- Use only low or no phosphorous fertilizer on lawns near the reservoir.

11.3 INVASIVE SPECIES MANAGEMENT AND BMPs

Certain species of aquatic and terrestrial plants and animals can become a significant nuisance to recreation and project operations if their populations are not kept in check. Some of the common aquatic problem species found in the vicinity of the Project include hydrilla and several species of pondweed. Common terrestrial invasive exotic species include kudzu, mimosa, and Japanese honeysuckle. When managing invasive and exotic plants and animals it is important to also protect the ecosystems and habitat for desirable native species. This requires the integration and use of specific BMPs appropriate to the regional and local conditions.

Because weed control techniques can harm fish and native plant species, it is unlawful, per state and federal regulations, for individuals to spray or treat aquatic growth without a permit. Thus, SCE&G asks that any aquatic vegetation problems recognized by lake visitors or back property owners should be reported to SCE&G's Lake Management Department and the SCDNR. In addition, to help curb the spread of invasive species, SCE&G asks that lake visitors and back property owners employ the following BMP's:

- Draining water from boat, motor, bilge, live well and bait containers before leaving a water access site.
- Cleaning and drying boats and fishing equipment using accepted protocols for the prevention of all invasive species before entering any waterbody area.
- Disposing of unwanted bait in trash, including earthworms.

- Avoiding the release of plants and animals into a waterbody unless they originally came from that waterbody.
- Inspect all equipment and vehicles used at the Project for non-native invasive plants and animals.
- Removing visible plants, animals and mud from boat before leaving waterbody.
- Avoid the disturbance of native vegetation.

Individuals may find additional information regarding non-native invasive species at SCDNR's website at: www.dnr.sc.gov.

12.0 PUBLIC EDUCATION AND OUTREACH

This SMP is intended to foster management of shoreline use and development to achieve consistency with the FERC License, as well as to promote protection of public safety and environmental quality (water quality, natural habitat, aesthetics, etc.). To garner support and compliance from the public and lake users, it is key to educate them to the need and means to protect shoreline resources. Additionally, the public must be aware of the management and permitting programs put in place to provide this protection. To accomplish the task of increasing public awareness of the goals and objectives of this SMP SCE&G has developed an education and outreach program that includes the components described below.

12.1 SHORELINE MANAGEMENT PLAN EDUCATION

SCE&G's Public Education and Outreach program seeks to educate the public on various aspects of the management of Monticello Reservoir, including the Permitting Handbook, recommended BMP use, relevant Project Operations information, and the Safety Program. To accomplish this, SCE&G uses various public education measures including informational pamphlets, public meetings, newsletters, and an internet webpage.

The Internet, in particular, presents an excellent mechanism for disseminating information and improving awareness. SCE&G maintains a website designed to provide information on the SMP and the Permitting Handbook. Printed copies of the following materials may also be obtained by contacting SCE&G Lake Management at (803) 217-9221. Information and materials that will be available at the website include the following:

- Permitting Handbook;
- Permit application forms;
- Examples and information on BMPs;
- Alternative and example designs for shoreline stabilization; and
- Useful links and other related information.

Additional outreach mechanisms that SCE&G intends to employ in implementing the SMP include the following:

- Provide speakers for homeowner and other organizations' meetings;

- Provide information to realtors and encourage dissemination of this information to all potential Reservoir shoreline back-property buyers; and
- Develop and distribute new, “user friendly” brochures that include general reservoir information, permitting processes, shoreline BMPs, and relevant contact information.

12.2 PUBLIC ACCESS AREA MAPS

A figure depicting Public Access Areas on Monticello Reservoir is included as Figure 12-1.

12.3 PUBLIC HUNTING AND FISHING

The SCDNR maintains hunting and fishery management responsibility and state hunting and fishing regulations enforcement on Monticello Reservoir. Separate regulations apply to hunting in areas included in the Wildlife Management Area (WMA) program and it is imperative that the individual check WMA regulations and maps prior to hunting. The designation for waterfowl management allows hunting on or in the water and on the islands in Monticello Reservoir, but not on adjacent shoreline land. State regulations and maps are available at SCDNR's website at: <http://www.dnr.sc.gov>, or by contacting SCDNR at:

Hunting and Fishing Regulations
S.C. Department of Natural Resources
Wildlife and Fresh Water Fisheries
1000 Assembly Street
Columbia, South Carolina 29201
Telephone: 803-734-3886

12.4 SAFETY PROGRAMS

Due to operation of the pumped storage generating plant, the waters of Monticello Reservoir can fluctuate several feet in a matter of a few hours. This rapid fluctuation makes it especially important for boaters and other recreationists to exercise a high degree of care and fully assume personal responsibility for their safety by being especially aware and cautious. For public safety, hazardous areas which are marked should not be entered and any other warnings posted around the reservoir should be observed as well.

SCE&G and SCDNR cooperate to mark shoals and other hazardous areas to increase boating safety. However, boaters should not assume all shoals and hazardous areas have been marked.

SCDNR also enforces the boating laws of South Carolina. Boaters should ensure that watercraft and safety equipment are in good working condition and in compliance with all applicable state laws.

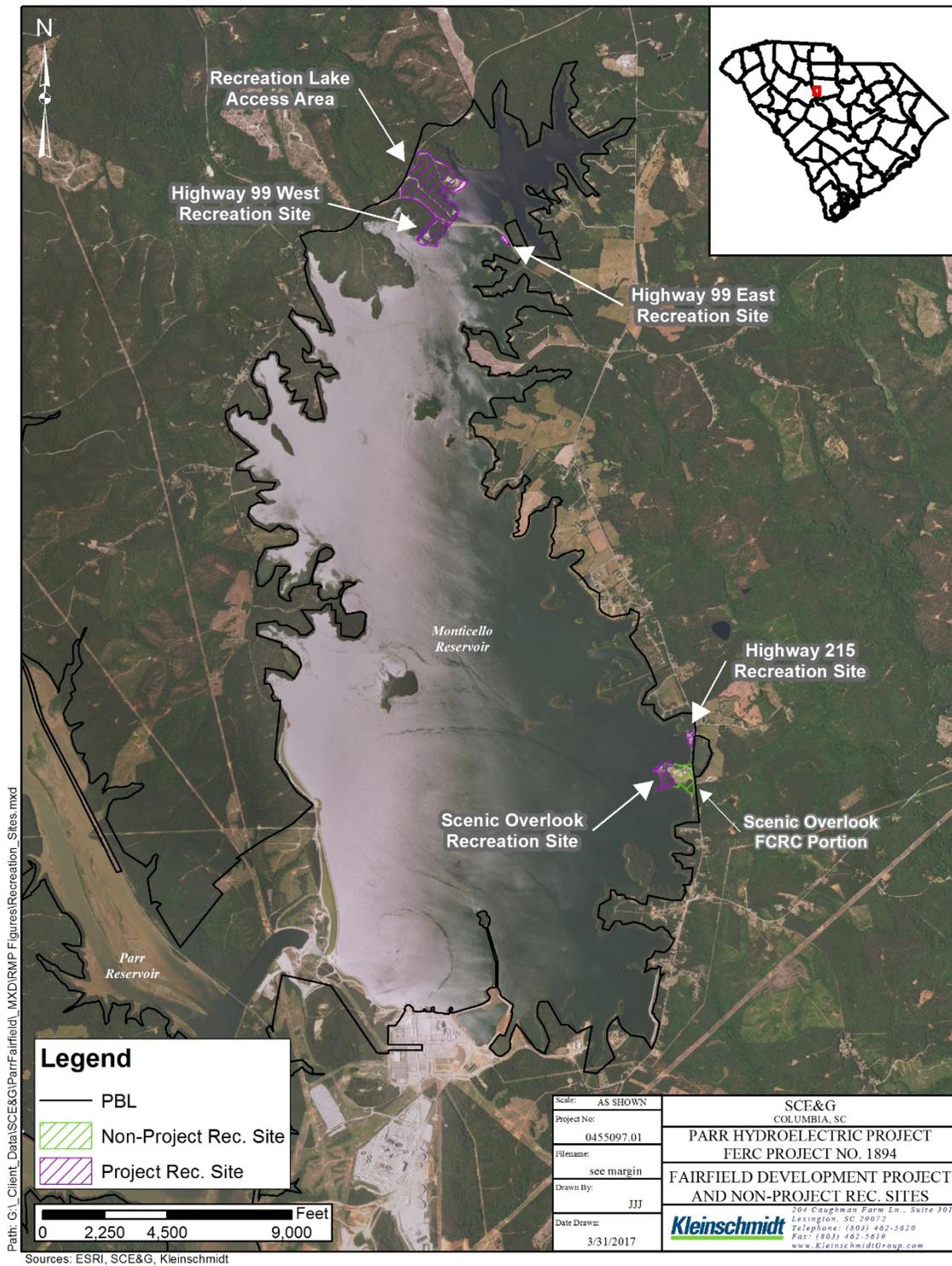


FIGURE 12-1 MONTICELLO RESERVOIR PUBLIC ACCESS AREA MAP

13.0 MONITORING AND REVIEW PROCESS

13.1 OVERALL LAND USE MONITORING

As demographics and user groups change within the Project area, changes in residential and commercial areas may occur. Often this type of use change is incremental and cumulative, occurring over a period of years or decades. To monitor land use around Monticello Reservoir, SCE&G will employ a geographic information system (GIS) to compare new and existing permit applications against GIS data for the land management classifications. Such monitoring will provide long-term data that should be useful in identifying areas experiencing change. Every 10 years, during the SMP review process (see Section 13.2 on Review Process below), SCE&G will report on changes in land use for the various land management classifications. If it is found that material changes within the Project boundary have occurred that are not consistent with the current SMP goals, amendments to the SMP may be warranted. Such situations might include significant changes in land ownership, major commercial upgrades or uses, or new residential uses or pressures.

13.2 REVIEW PROCESS

SCE&G proposes a 10 year SMP review cycle interval. A 10 year SMP review period interval should provide reasonable opportunities for SCE&G, in concert with governmental, non-governmental, and individual stakeholders, periodically and deliberately to assess new issues that arise as a result of development around the Reservoir, and allow for analyses of cumulative effects. The SMP review process will begin sufficiently in advance of the end of each period so that it will be completed within the 10 year time frame. One month prior to the scheduled start of the review process, its occurrence will be advertised in various media formats (e.g., website, newsletter, contact with homeowner associations, etc.). SCE&G will use those same media avenues to issue a report on the outcome of the review process. As in the past, SCE&G will solicit input from interested parties in addressing issues that arise and have a bearing on Reservoir management. This includes keeping lines of communication open during the time between review periods. Concurrently with the FERC SMP review process, SCE&G will review the Permitting Handbook periodically with interested stakeholders to ensure its effectiveness; however, changes to the permitting process may be made, as needed, outside of the scheduled review periods.

14.0 REFERENCES

Federal Power Commission (F.P.C.). 1974. Order Issuing New License for the Parr Hydroelectric Project. August 28, 1974. 52 F.P.C. 537.

Federal Energy Regulatory Commission (FERC). 2012. Guidance for Shoreline Management Planning at Hydropower Projects. Online. [URL]: <http://www.ferc.gov/industries/hydropower/gen-info/guidelines/smpbook.pdf>.

Federal Energy Regulatory Commission (FERC). 2001. Order Approving Land use and Shoreline Management Plan. June 4, 2001. 95 FERC ¶ 61,351.

Appendix A-15
Erosion Monitoring Plan

EROSION MONITORING PLAN

PARR HYDROELECTRIC PROJECT (FERC No. 1894)

Prepared for:

South Carolina Electric & Gas Company
Cayce, South Carolina

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtGroup.com

September 2017

EROSION MONITORING PLAN

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September 2017

EROSION MONITORING PLAN

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EROSION MONITORING PLAN

1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) is the Licensee for the Parr Hydroelectric Project (FERC No. 1894) (Project). The Project consists of the Parr Shoals Development (Parr Development) and the Fairfield Pumped Storage Development (Fairfield Development). Both developments are located along the Broad River in Fairfield and Newberry Counties, South Carolina. The current license for the Project is due to expire on June 30, 2020. Therefore, SCE&G will file for a new license with the Federal Energy Regulatory Commission (FERC) on or before June 30, 2018.

The Project developments form two separate Project reservoirs. Parr Reservoir is formed by Parr Shoals Dam and serves as the lower reservoir for the Fairfield Development. Parr Reservoir has a surface area of 4,400 acres and approximately 88 miles of shoreline¹ within the Project boundary. Monticello Reservoir is formed by a series of four earthen dams and serves as the upper reservoir for the Fairfield Development. Monticello Reservoir has a surface area of 6,800 acres and approximately 57 miles of shoreline². An active storage of up to 29,000 acre-feet is transferred between the two reservoirs by the pumped storage operations of the Fairfield Development. Fairfield Development's alternate cycles of generation and pumping results in daily fluctuations in the water levels of both Parr and Monticello reservoirs. These daily fluctuations, along with unavoidable wind and wave action, have the potential to create erosion along the reservoir shorelines.

SCE&G currently monitors the extent of shoreline erosion at Parr Reservoir annually and Monticello Reservoir biannually. This document describes SCE&G's current shoreline erosion

¹ Parr Reservoir shoreline miles is based on a full pool elevation of 266'. Shoreline inspections are done intentionally when the reservoir is at an elevation lower than full pool in order to visually see erosion areas.

² Monticello Reservoir shoreline miles is based on a full pool elevation of 425' and includes the Recreation Lake. Shoreline inspections are done intentionally when the reservoir is at an elevation lower than full pool in order to visually see erosion areas. The Recreation Lake shoreline is not inspected since it has a more stable water level and is not subject to the erosion found in the main reservoir.

monitoring plan, which SCE&G proposes to continue throughout the term of the new Project license.

2.0 CONSULTATION

As part of the relicensing process for the Project, SCE&G formed Resource Conservation Groups (RCGs) and Technical Working Committees (TWCs) with various stakeholders, including federal and state agencies, non-governmental organizations (NGOs) and interested individuals. These RCGs and TWCs met on a frequent basis throughout relicensing to discuss and address issues related to Project operations. Prior to filing the Pre-Application Document (PAD) with FERC, SCE&G distributed its draft PAD to the RCGs and TWCs for review and comment. During this review, the USFWS requested additional information be included in the PAD regarding erosion within the Project boundary. SCE&G informed the stakeholders that, although it was not a requirement under the current license, they did perform internal erosion studies around the shorelines of Parr and Monticello reservoirs on a regular basis. SCE&G revised the PAD to include the most recent erosion studies that had been completed to date. Later in the relicensing process, during the development of protection, mitigation and enhancement (PM&E) measures to be included in the Draft License Application (DLA) and Final License Application (FLA), SCE&G shared their process for studying erosion at the Project with the RCGs and TWCs during the PM&E meeting held on March 30, 2017. Stakeholders reviewed the information and provided no comments or revisions.

SCE&G recognizes the importance of continuing erosion monitoring at the Project and has developed this Erosion Monitoring Plan for inclusion in the new operating license.

3.0 MONITORING PLAN

3.1 RESPONSIBLE PARTY

The SCE&G Dam Safety Group, in coordination with plant personnel, conducts all inspection activities for both the Parr and Monticello shoreline inspections.

3.2 DATA COLLECTION METHODS

The SCE&G Dam Safety Group employs several methods when completing the shoreline erosion monitoring. Shorelines are visually monitored from a boat and then tracked using a GPS-enabled data collector. Inspectors then classify the level of erosion into one of four categories, listed in Table 3-1.

TABLE 3-1 EROSION CATEGORIES

EROSION CATEGORY	DESCRIPTION
Slight	Persistent woody vegetation, no recent downed trees, little to no active erosion evident.
Moderate	Some persistent woody vegetation, few recent downed trees, presence of active vertical or sloped erosion.
Severe	Little or no persistent woody vegetation, recent downed trees, active erosion undercutting the shoreline.
Rip-Rap	Shoreline with armoring

As the inspector travels the edge of the shoreline, the classification of the shoreline is entered into the GPS. Each section of shoreline is classified into one of the erosion categories listed above. This information is then transferred and overlain onto an aerial map and each classification is totaled for comparison to previous inspections. Areas of erosion which are deemed to be significantly close to affecting the Project boundary, regardless of their actual severity, are always classified as severe and their location is marked for reference.

While efforts are made to be as consistent as possible with the classification of erosion, some variability is expected. This variability can be attributed to the objectivity of the inspector, the time of year and reservoir levels at the time of inspection.

3.3 EROSION REPAIR

Reasons to initiate shoreline erosion repair include: potential encroachment of the Project boundary, protection of infrastructure, protection of significant natural or cultural resources.

When an area of active shoreline erosion is identified with one or more of the above impacts, the management process is initiated as follows:

- Verification – Take measurements or install reference pins and evaluate rate and severity of active erosion quantitatively.
- Plan – Meet with SCE&G management to determine the extent of repairs. Develop plan to repair. Acquire cost estimates.
- Notification – Notify FERC of SCE&G’s intent to repair.
- Budget – The Plant budgets money and time frame to perform the work.
- Permit – Determine what permits are required and prepare applications. Coordinate access with landowners if there is no SCE&G or public access to gain entry to the site.
- Repair – Mobilize workforce, material and equipment to make the repairs. Dam Safety personnel will monitor the work.
- Prepare a close out report and notify all necessary agencies of project completion.

3.4 MONITORING SCHEDULE

The Parr Reservoir shoreline is inspected for erosion on an annual basis, usually during the second quarter of each year. The Monticello Reservoir is inspected for erosion on a bi-annual basis, usually during the second and fourth quarters of each year.

4.0 DOCUMENTATION AND REPORTING

Following each inspection, a report is prepared that includes the details of the inspection and the amount of erosion by category for the entire shoreline. An aerial map is prepared and the shoreline segments are overlain, visually detailing each area of erosion. Totals for each classification group are also calculated and shown on the inspection form. An example inspection form and map are included in Appendix A.

Reports are filed with the FERC Atlanta Regional Office as part of the annual Dam Safety Surveillance and Monitoring Report. When a repair is necessary, SCE&G notifies FERC and any other appropriate government agencies.

APPENDIX A

SAMPLE INSPECTION REPORT FORM AND MAP

Attachment 1: Sample Inspection Report Form and Map

Subject: FERC Project No. 1894
Fairfield Pumped Storage Facility
Monticello Reservoir Routine
Shoreline Surveillance

Date: June 3, 2016

To: Tim Miller

From: Chad Stoudemire

On May 10, 2016 the shoreline of Monticello Reservoir was inspected to determine the extent of erosion. The inspection was conducted by Chad Stoudemire, with assistance from Lawrence Youmans. The areas of erosion are classified in one of three Categories: Severe, Moderate, or Slight. Additionally, the amount of riprap armoring is tracked.

The inspection was performed using the standards of the erosion monitoring program. Shorelines along the Project Boundary Line (PBL) are visually inspected and GPS tracked. During GPS tracking the inspector classifies the area into one of the three categories.

When compared to the inspection of October 2015, conditions remain much the same as reported. Two areas of concern were found to be encroaching along the PBL line and as such, these areas should be closely monitored until such time as a repair plan has been developed.

Overall, the calculations for each category indicate a slight change in the class and percentage of erosion around the lake. The method used for inspection of the shoreline assumes that after more than 35 years of operation all of the shoreline that has not been riprapped has some degree of erosion. The calculations are based on the length of shoreline. The classifications are 64.8% slightly eroded, 16.8% moderately eroded and 3.6% severely eroded.

The erosion (isolated sections around the shoreline) that has occurred along the shoreline has been in depth, slowly advancing in the direction of the PBL. This condition may lead to additional repairs, in the future, as these areas approach and/or encroach onto the PBL.

The noted concern for this inspection is to clearly identify the areas of severe erosion that should have repair plans developed and be scheduled for repair. Furthermore, it is my recommendation that the areas that have been classified as "severe" that are missing their PBL markers have the markers reestablished so that accurate evaluation of repairs can occur. We are still evaluating eroded areas and different repair methods.

Below are the calculations for the inspection of May 10, 2016 and a map showing the shoreline and areas of each classification. The lake elevation was approximately 422.8' during this inspection.

Attachments

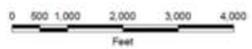
cc: F.H.File	R.R. Ammarell
Joey Bouknight	J.K.Todd
J.C. Knight	G. Delk
T.C. Boozer	W. Argentieri

**EROSION CALCULATIONS
MONTICELLO RESERVOIR
May 10, 2016**

TOTAL SHORELINE	=	224,665 FT	
SLIGHT EROSION	=	145,633 FT	
MODERATE EROSION	=	37,779 FT	
SEVERE EROSION	=	8,140 FT	
TOTAL EROSION	=	191,552 FT	
RIP RAP	=	33,113 FT	
% OF SHORELINE THAT SHOWS SOME SIGN OF EROSION	=	$\frac{191,552 \text{ FT}}{224,665 \text{ FT}}$	= 85.3%
% OF SLIGHT EROSION	=	$\frac{146,663 \text{ FT}}{224,665 \text{ FT}}$	= 64.8%
% OF MODERATE EROSION	=	$\frac{37,779 \text{ FT}}{224,665 \text{ FT}}$	= 16.8%
% OF SEVERE EROSION	=	$\frac{8,140 \text{ FT}}{224,665 \text{ FT}}$	= 3.6%



Legend
Total Shoreline - 224,665 ft.
Classification
Slight - 145,633 ft.
Moderate - 37,779 ft.
Severe - 8,140 ft.
Riprap - 33,113 ft.



LAKE MONTICELLO

Shoreline Inspection
May 2016



Appendix A-16
Historic Properties
Management Plan
Placeholder - Privileged
Document

APPENDIX B

CONTENT OF OFF-LICENSE AGREEMENTS

This Appendix includes off-license agreements made between CRSA signatories. These agreements have been proposed as off-license as they concern matters over which the Commission asserts no jurisdiction, their existence carries no weight in the Commission's consideration of the license application under the Federal Power Act, or there is not a clear and demonstrated nexus between the agreement and the impacts of the Project. The off-license agreements constitute valuable consideration in the parties' agreement to sign the CRSA and the enforceability of off-license conditions is controlled by the law of the State of South Carolina.

1.0 FUNDING FOR BLUE TRAIL RECREATION MAP

American Rivers and Congaree Riverkeeper agree to identify and compile the information it wants for the Blue Trail Recreation Map for the Broad River from Parr Shoals Dam to the Congaree River. SCE&G will then assist with the design, layout and printing of up to 2,500 waterproof, color copies of the map from Parr Shoals Dam to the Congaree River; and printing up to a total of 2,500 waterproof, color copies of the Enoree and upper Broad River maps (developed by Upstate Forever) by providing a onetime funding amount of \$9,500. SCE&G may provide in kind services in lieu of funding for the design, layout and printing of these maps.

2.0 FLOODING AND DRAINING OF BROAD RIVER WATERFOWL MANAGEMENT AREA

SCE&G will cooperate, to the best of its ability, to assist SCDNR in the flooding and draining of the Broad River Waterfowl Management Area (BRWMA). A communications protocol will be developed to determine appropriate contact personnel and will be updated on an annual basis. Since many new operating constraints have been placed on SCE&G through the relicensing process, the SCDNR requested elevations may

be provided in blocks as short as a few hours a day during the time period requested for managing this impoundment. SCE&G will attempt to support this request unless inflow conditions or operational constraints due to implementation of the new license requirements do not allow for the reservoir to achieve the requested elevations. Reservoir levels required by or resulting from compliance with license requirements, or implementation of protection, mitigation, and enhancement measures contained in Adaptive Management Plans implemented under the license, will take precedence over the waterfowl flooding and draining of the BRWMA as described herein.

Flooding - SCDNR needs to have the impoundments flooded by mid-November of each year. Flooding is expected to require about 48 - 72 hours if Parr Reservoir is at a 262 ft surface elevation or higher. Between mid-October and mid-November of each year, SCE&G will attempt to manage Parr Reservoir to maintain or exceed a surface water elevation of 262 ft for as long of a continuous period as possible (up to 72 hours), but may provide the requested elevations for shorter periods over several days. At the beginning of October, SCDNR personnel responsible for the BRWMA flooding will contact the SCE&G representative and provide a time period of when SCDNR will be ready to start flooding the BRWMA. The SCE&G representative will coordinate with the SCDNR representative to provide times when Parr Reservoir will be above 262 ft elevation. SCDNR will notify SCE&G when the impoundments have been flooded.

Draining - SCDNR needs to have the impoundments drained by early March each year. Draining is expected to require approximately 72 hours if Parr Reservoir is at a 258 ft surface elevation or lower. Since this will be very difficult to achieve at this time of year, SCE&G will attempt to manage Parr Reservoir at a surface elevation of 262 feet or lower, for as long of a continuous period as possible (up to 72 hours), but may provide the requested elevations for shorter periods over several days. At the beginning of February, SCDNR personnel responsible for the BRWMA draining will contact the SCE&G representative and provide a time period of when SCDNR will be ready to start draining the BRWMA. The SCE&G representative will coordinate with the SCDNR

representative to provide times when Parr Reservoir will be below 262 ft elevation. SCDNR will notify SCE&G when the impoundments have been drained.

This agreement will be effective for the term of the new FERC license unless terminated by SCDNR. It can be modified by the mutual consent of both parties.

3.0 MARKING OF BOATING HAZARDS IN MONTICELLO RESERVOIR

SCE&G shall cooperate with the SCDNR in the marking of hazardous areas for navigation within Monticello Reservoir. All markings shall be consistent with the Uniform State Marking System. The costs of all materials (up to a maximum of \$10,000 during each consecutive 5 year period of the license term) used in the marking process at these two reservoirs shall be borne by SCE&G if the funding for such materials is not available to SCDNR through state or federal programs.

4.0 AGREEMENT TO LEASE PROPERTY TO SCDNR FOR INCLUSION IN THE WMA PROGRAM

Subsequent to the issuance of the new license by the Commission, SCE&G will offer to SCDNR a lease of approximately 661 acres of property (four parcels in Fairfield County and one parcel in Newberry County), as identified in Appendix B-1, to be placed/maintained in their Wildlife Management Area (WMA) Program as SCDNR elects. The purpose of placing these lands in the WMA Program will be to conserve wildlife habitat, public hunting opportunities, and other compatible WMA uses. The leases will either be co-terminus with the new license issued by the Commission or on an annual basis as SCDNR elects.

APPENDIX B-1

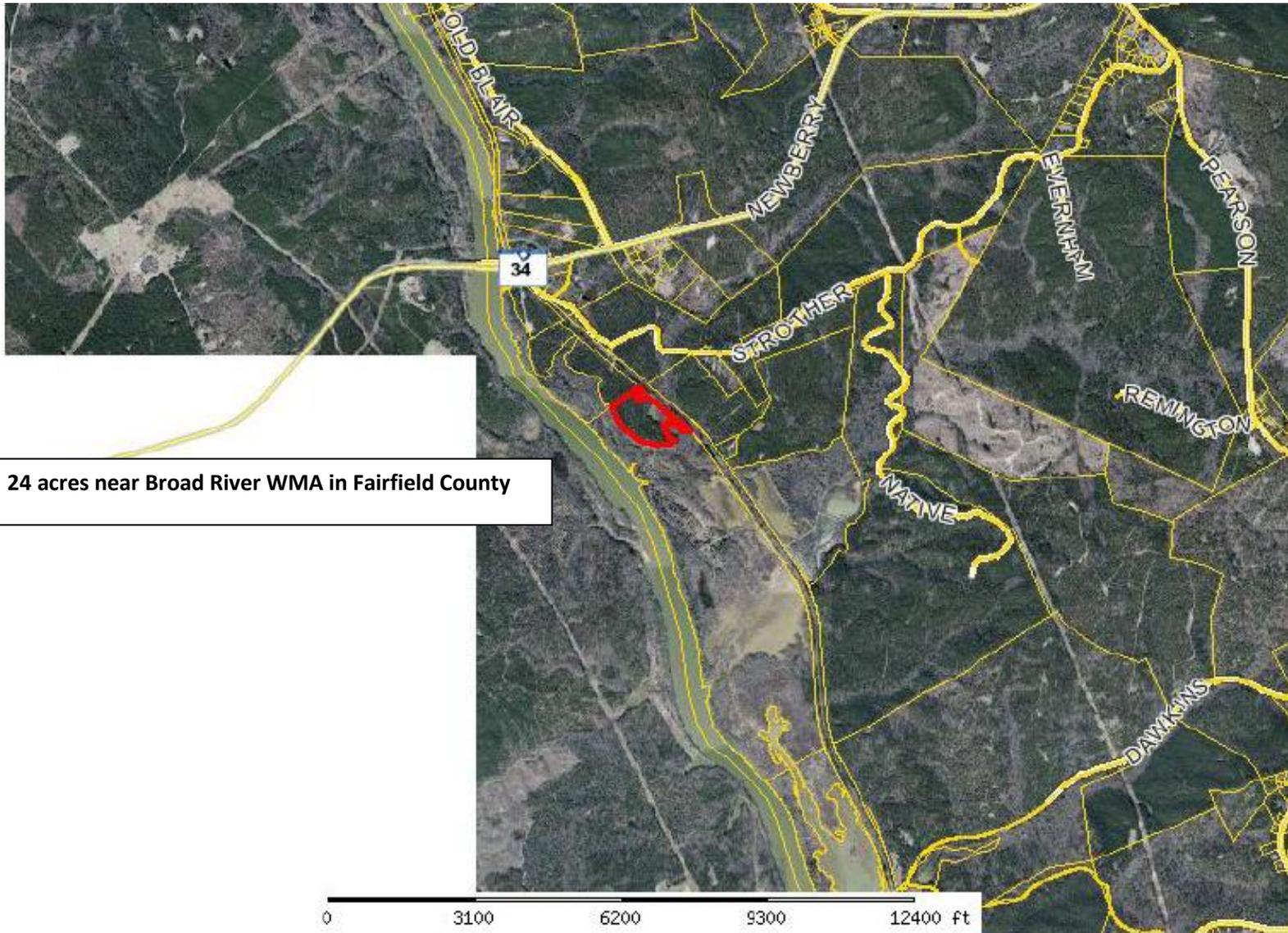
AGREEMENT TO LEASE PROPERTY TO SCDNR FOR INCLUSION IN THE WMA PROGRAM

116 acres	Approximately 113 acres in Fairfield County as referenced on TMS 117-00-00-007-000 and approximately 3 acres in Fairfield County as referenced on TMS 117-00-00-006-000 adjacent to Broad River WMA.
24 acres	Approximately 24 acres in Fairfield County as referenced on TMS 117-00-00-003-000 adjacent to Broad River WMA in Fairfield County.
503 acres	Approximately 503 acres of the Broad River Waterfowl Management Area in Fairfield County as referenced on TMS 117-00-00-008-000. Acreage is determined by actual area owned by SCE&G inside the Parr Project boundary.
18 acres	Approximately 18 acres of the Enoree River Waterfowl Management Area in Newberry County as shown on Exhibit G Sheet 16. Acreage is determined by actual area owned by SCE&G inside the Parr Project boundary.
661 acres	Total approximate acres



Approximately 116 acres adjacent to Broad River WMA in Fairfield County.

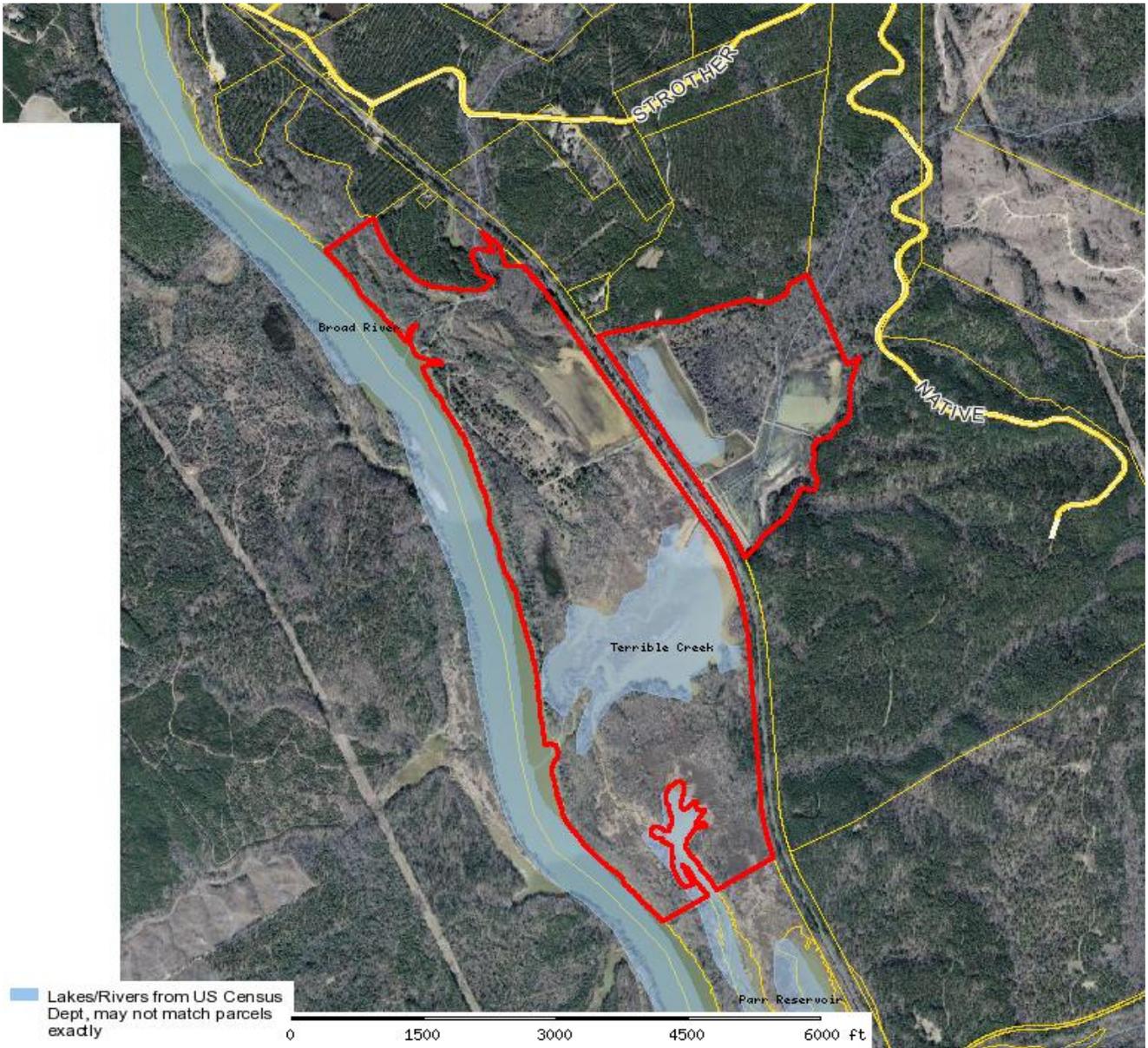




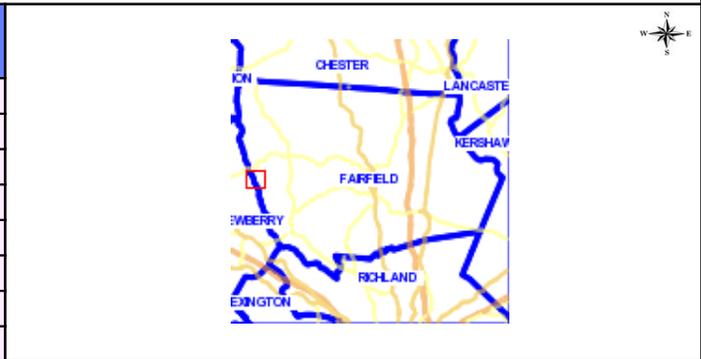
24 acres near Broad River WMA in Fairfield County

24 ac at Broad River WMA			
Parcel: 117-00-00-003-000 Acres: 0			
Name:	S C ELECTRIC & GAS	Land Value	\$0.00
Site:	PART OF B-16328 US FOREST	Improvement Val	\$0.00
Sale:	\$\$1 on 01-1981 Vacant= Qual=9	Accessory Value	\$0.00





Fairfield County Assessor			
Parcel: 117-00-00-008-000 Acres: 522			
Name:	S C ELECTRIC & GAS CO	Land Value	\$828,000.00
Site:	INT S-20-12 & SC 34 S INT	Improvement Val.	\$0.00
Sale:	\$\$1 on 01-1981 Vacant= Qual=9	Accessory Value	\$0.00
Mail:	LAND DEPARTMENT	Total Value	\$828,000.00
	COLUMBIA, SC 29218		



The Fairfield County Assessor's Office makes every effort to produce the most accurate information possible. No warranties, expressed or implied, are provided for the data herein, its use or interpretation. The assessment information is from the last certified taxroll. All data is subject to change before the next certified taxroll. PLEASE NOTE THAT THE PROPERTY APPRAISER MAPS ARE FOR ASSESSMENT PURPOSES ONLY NEITHER FAIRFIELD COUNTY NOR ITS EMPLOYEES ASSUME RESPONSIBILITY FOR ERRORS OR OMISSIONS ---THIS IS NOT A SURVEY---

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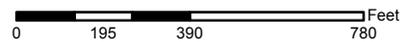


Legend

- Roads
- ▭ Enoree River Waterfowl Management Area



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, AeroGrid, IGN, IGP, swisstopo, and the GIS User Community



APPENDIX C

SIGNATORIES TO THE CRSA

American Rivers

Signature:  Date: 6/25/18

William Robert Irvin
President

American Whitewater

Signature:  Date: 6/20/18

Charlene Coleman
AW Representative

Congaree Riverkeeper

Signature: _____ Date: _____

Bill Stangler
Congaree Riverkeeper

Mr. Jeffrey Carter

Signature: _____ Date: _____

Jeffrey Carter
Individual

NOAA, National Marine Fisheries Service, Southeast Region

Signature: _____ Date: _____

Regional Director

APPENDIX C

SIGNATORIES TO THE CRSA

American Rivers

Signature: _____

Date: _____

William Robert Irvin
President

American Whitewater

Signature: Charlene Coleman

Date: 6/26/18

Charlene Coleman
AW Representative

Congaree Riverkeeper

Signature: William J. Stangler

Date: 6/26/18

Bill Stangler
Congaree Riverkeeper

Mr. Jeffrey Carter

Signature: Jeffrey Carter

Date: 6-26-18

Jeffrey Carter
Individual

NOAA, National Marine Fisheries Service, Southeast Region

Signature: _____

Date: _____

Regional Director

South Carolina Department of Natural Resources

Signature: _____

Date: _____

Alvin A. Taylor
Director

South Carolina Electric & Gas Company

Signature: _____

Date: 6/26/2018

James M. Landreth
Vice President – Fossil & Hydro Operations

United States Fish and Wildlife Service

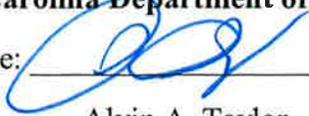
Signature: _____

Date: _____

Mike Oetker
Acting Regional Director

South Carolina Department of Natural Resources

Signature: _____



Alvin A. Taylor
Director

Date: 6-25-2018

South Carolina Electric & Gas Company

Signature: _____

Date: _____

James M. Landreth
Vice President – Fossil & Hydro Operations

United States Fish and Wildlife Service

Signature: _____

Date: _____

Mike Oetker
Acting Regional Director

APPENDIX D

ORGANIZATION DESCRIPTIONS

With diverse backgrounds, and representing local, state, or national constituencies, organizations/entities that have signed this CRSA have a common interest in the Parr Hydroelectric Project and the environmental, recreational and cultural resources contained within and around its borders. Descriptions of many signatory organization/entities are provided below to exhibit some of the multi-faceted interests represented through this process. Please note that this is not an all-inclusive list of participating organizations/entities, as descriptions were not provided by all of the CRSA signatories.

American Rivers

Rivers connect us – to our past, to our future, and each other. American Rivers is the nation’s voice for rivers. We have built deep expertise and success on a wide range of issues from reoperation of hydropower dams to clean drinking water to dam removal to flood protection, and many more. With more than 275,000 supporters, we make a difference every day for clean water, rivers and communities in South Carolina and nationwide.

American Whitewater

Founded in 1954, American Whitewater is a national non-profit organization (Non-profit # 23-7083760) with a mission “to conserve and restore America's whitewater resources and to enhance opportunities to enjoy them safely.” American Whitewater is a membership organization representing a broad diversity of individual whitewater enthusiasts, river conservationists, and more than 100 local paddling club affiliates across America. The organization is the primary advocate for the preservation and protection of whitewater rivers throughout the United States, and connects the interests of human-powered recreational river users with ecological and science-based data to achieve the goals within its mission.

American Whitewater works to protect and restore rivers, maintains a national inventory of whitewater rivers, monitors potential threats to whitewater river resources, publishes information

on river conservation, works with government agencies to protect the ability of the public to have a voice in the management of rivers, advocates for legislation protecting our rivers and their aquatic resources, and provides technical advice to local groups regarding river conservation and management.

American Whitewater is working full-time to assure protection of whitewater rivers and the ability of the public to enjoy clean, free-flowing rivers. This includes our access program that focuses on protecting navigability on our nation's waterways and acquisition of lands that provide public access to rivers. To learn more about our river stewardship program go to the stewardship page.

Congaree Riverkeeper

Congaree Riverkeeper is a grassroots nonprofit organization that works to protect and improve water quality, wildlife habitat, and recreation on the Congaree, Broad, and Lower Saluda Rivers through advocacy, education, and enforcement of environmental laws. Congaree Riverkeeper was established in 2008 and is a member of the Waterkeeper Alliance, a global movement of on-the-water advocates who patrol and protect rivers and coasts all over the world.

Jeffrey Carter

Jeffrey Carter, a concerned individual stakeholder who lives in close proximity to the Parr Reservoir, has been involved with the Parr Project relicensing process since it began in 2012. He attended several relicensing meetings and provided input and comments on documents that are included in Appendix A of the CRSA.

NOAA National Marine Fisheries Service

The National Marine Fisheries Service (NOAA Fisheries) is an office of the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce. NOAA Fisheries is responsible for the stewardship of the nation's ocean resources and their habitat. NOAA Fisheries provides vital services for the nation: productive and sustainable fisheries, safe sources of seafood, the recovery and conservation of protected resources, and healthy ecosystems—all backed by sound science and an ecosystem-based approach to management. For the Parr Hydroelectric Project, the responsibilities of NOAA Fisheries include working with

stakeholders under the Federal Power Act to ensure project operations support migratory fishes and working under the Endangered Species Act to recover protected species, such as Atlantic and shortnose sturgeon, while allowing economic and recreational opportunities.

South Carolina Department of Natural Resources

The South Carolina Department of Natural Resources (SCDNR) is the state agency charged by state law with the management, protection, and enhancement of wildlife, fisheries, and marine resources in South Carolina. SCDNR is responsible for formulating comprehensive policies for water resources through a State Water Plan to address issues affecting water supply, water quality, navigation, hydroelectric power, outdoor recreation, fish and wildlife needs, and other water resource interests. SCDNR is also charged with the statewide responsibilities for regulating watercraft operation and associated recreation on state waters, conducting geological surveys and mapping, promoting soil and water conservation, management of invasive aquatic plants, flood mitigation, drought response planning and coordination, and the state scenic rivers program. SCDNR's mission is to serve as the principal advocate for and steward of South Carolina's natural resources. (SCDNR authorities and responsibilities are described in Titles 48, 49 and 50, South Carolina Code of Laws (1976), as amended.)

South Carolina Electric & Gas Company

SCE&G is a regulated utility that has been providing energy needs to the people of South Carolina for over 150 years. SCE&G chose to conduct a three staged enhanced traditional process that allowed all stakeholders to participate in the Parr Hydroelectric Project relicensing. Our goal in the relicensing process is to secure a new 50-year operating license that maintains operational flexibility for the continued long term viability of the Project while reducing or eliminating environmental impacts from Project operations.

United States Fish and Wildlife Service

The United States Fish and Wildlife Service (Service) is an agency of the federal government within the U.S. Department of the Interior dedicated to the management of fish, wildlife, and natural habitats. The mission of the agency is "working with others to conserve, protect, and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people." The Service administers the Endangered Species Act of 1973 (ESA) which recognizes

that fish, wildlife, and plants "are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people." The FWS works with all partners—States, Tribes, other Federal agencies, non-governmental organizations, industry, private landowners, and other Service programs to meet our conservation objectives.

APPENDIX E

PROPOSED LICENSE ARTICLES

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

South Carolina Electric & Gas Company Project No. 1894

ORDER ISSUING NEW LICENSE

<Date>

Article XXX. Recreation Management Plan: The Recreation Management Plan filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Recreation Management Plan (Plan) upon issuance of the license per the project recreation site enhancement schedule. Within 90 days of completion of improvements or additions to the recreation facilities, the Licensee shall file as-built drawings with the Commission. The as-built drawings shall show the location, type, and layout of all existing and newly constructed facilities with respect to the Parr Hydroelectric Project Boundary. Revisions to the Plan may occur after consultation with the Settlement Agreement signatories and approval by the Commission. The Licensee must include with the revised Plan documentation of consultation, copies of the recommendations on the updated Plan after it has been reviewed by the Settlement Agreement signatories, and specific descriptions of how the Settlement Agreement signatories' comments are accommodated by the Plan or provide a reason for not incorporating them.

Article XXX. Flow Fluctuations Downstream of Parr Shoals Dam Adaptive Management Plan: The Flow Fluctuations Downstream of Parr Shoals Dam Adaptive Management Plan (Flow Fluctuations AMP or AMP) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Flow Fluctuations AMP upon issuance of the license per the implementation schedule. During the first 5 years of the license, the Licensee shall file the annual Flow Fluctuations AMP Report, as described in the AMP, with the Commission by April 30th of the year following monitoring activities. After completion of the final

year of the AMP, the Licensee will file with the Commission the Review Committee recommendation for continuation of the AMP, or that the AMP is final and the Licensee will carry out the recommendation for the remainder of the license. Revisions to the AMP may occur after consultation with the Review Committee and approval by the Commission. The Licensee must include with the revised AMP documentation of consultation, copies of the recommendations on the updated AMP after it has been reviewed by the Review Committee, and specific descriptions of how the Review Committees comments are accommodated by the AMP or provide a reason for not incorporating them.

Article XXX. Minimum Flows Downstream of Parr Shoals Dam Adaptive Management Plan: The Minimum Flows Downstream of Parr Shoals Dam Adaptive Management Plan (Minimum Flows AMP or AMP) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Minimum Flows AMP upon issuance of the license per the implementation schedule. During the first 5 years of the license, the Licensee shall file the annual Minimum Flows AMP Report, as described in the AMP, with the Commission by April 30th of the year following monitoring activities. After completion of the final year of the AMP, the Licensee will file with the Commission the Review Committee recommendation for continuation of the AMP, or that the AMP is final and the Licensee will carry out the recommendation for the remainder of the license. Revisions to the AMP may occur after consultation with the Review Committee and approval by the Commission. The Licensee must include with the revised AMP documentation of consultation, copies of the recommendations on the updated AMP after it has been reviewed by the Review Committee, and specific descriptions of how the Review Committees comments are accommodated by the AMP or provide a reason for not incorporating them.

Article XXX. Monticello Reservoir Habitat Enhancement Plan: The Monticello Reservoir Habitat Enhancement Plan (Plan) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Monticello Reservoir Habitat Enhancement Plan upon issuance of the license, and continue to report observations to and consult with the South Carolina Department of Natural Resources (SCDNR) as outlined in the Plan. Revisions to the document may occur after consultation with the SCDNR and approval by the Commission. The Licensee must include with the revised Plan documentation of consultation, copies of the recommendations on the updated Plan after it has been reviewed

by the SCDNR, and specific descriptions of how the SCDNR comments are accommodated by the Plan or provide a reason for not incorporating them.

Article XXX. American Eel Abundance Monitoring Plan: The American Eel Abundance Monitoring Plan (Plan) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the American Eel Abundance Monitoring Plan upon issuance of the license per the Plan implementation schedule. The Licensee shall file an American Eel Abundance Monitoring Report, as described in the Plan, with the Commission by April 30th of the year following monitoring activities. Revisions to the Plan may occur after consultation with the Review Committee and approval by the Commission. The Licensee must include with the revised Plan documentation of consultation, copies of the recommendations on the updated Plan after it has been reviewed by the Review Committee, and specific descriptions of how the Review Committees comments are accommodated by the Plan or provide a reason for not incorporating them.

Article XXX. Freshwater Mussel Monitoring Plan: The Freshwater Mussel Monitoring Plan (Plan) filed with the Comprehensive Relicensing Settlement Agreement is approved. The Licensee shall implement the Freshwater Mussel Monitoring Plan upon issuance of the license per the Plan implementation schedule. The Licensee shall file a Mussel Monitoring Report, as described in the Plan, with the Commission by April 30th following years that monitoring occurs. Revisions to the Plan may occur after consultation with the Review Committee and approval by the Commission. The Licensee must include with the revised Plan documentation of consultation, copies of the recommendations on the updated Plan after it has been reviewed by the Review Committee, and specific descriptions of how the Review Committees comments are accommodated by the Plan.

Article XXX. Continue Involvement in the Santee Basin Accord for Diadromous Fish Protection: The Licensee shall participate in the Santee River Basin Accord for Diadromous Fish Protection, Restoration, and Enhancement per the terms of the Accord.

Article XXX. Habitat Enhancement Program: The Habitat Enhancement Program (Program) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Program upon issuance of the license. The Licensee, in cooperation with other parties to the Comprehensive Relicensing Settlement Agreement, shall develop a charter within one year after license issuance to administer the Program. A Proposal Review Committee will be established in accordance with the Program charter and an initial coordination meeting will convene within six months after the charter is finalized.

Article XXX. Hydroacoustic Estimates and Distribution of Fish in Monticello and Parr Reservoirs in August 2017 – Protection, Mitigation, Enhancement Measure Recommendation: The Hydroacoustic Estimates and Distribution of Fish in Monticello and Parr Reservoirs in August 2017 – Protection, Mitigation, Enhancement Measure Recommendation (Plan) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Plan upon issuance of the license. Revisions to the Plan may occur after consultation with the U.S. Fish and Wildlife Service and the South Carolina Department of Natural Resources, at a minimum, and approval by the Commission. The Licensee must include with the revised Plan documentation of consultation, copies of the recommendations on the updated Plan after it has been reviewed by the agencies, and specific descriptions of how the agency comments are accommodated by the Plan or provide a reason for not incorporating them.

Article XXX. Enhancements to the West Channel Downstream of Parr Shoals Dam Adaptive Management Plan: The Enhancements to the West Channel Downstream of Parr Shoals Dam Adaptive Management Plan (West Channel AMP or AMP) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. During the first 5 years of the license, the Licensee shall file a report, as described in the AMP, with the Commission by April 30th of the year following monitoring activities. After completion of the final year of the AMP, the Licensee will file with FERC the Review Committee recommendation for continuation of the AMP or that the AMP is final and the Licensee will carry out the recommendation for the remainder of the license. Revisions to the AMP may occur after consultation with the Review Committee and approval by the Commission. The Licensee must include with the revised AMP documentation of consultation, copies of the recommendations on the updated AMP after it has

been reviewed by the Review Committee, and specific descriptions of how the Review Committees comments are accommodated by the AMP or provide a reason for not incorporating them.

Article XXX. Parr Shoals Dam Turbine Venting Plan: The Parr Shoals Dam Turbine Venting Plan (Plan) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Parr Shoals Dam Turbine Venting Plan upon issuance of the license, with continuous turbine venting occurring each year during the timeframes outlined in the Plan. The Licensee shall consult with or provide compliance documentation to the South Carolina Department of Health and Environmental Control (SCDHEC) as outlined in the Plan. Revisions to the Plan may occur after consultation with SCDHEC and approval by the Commission. The Licensee must include with the revised Plan documentation of consultation, copies of the recommendations on the updated Plan after it has been reviewed by SCDHEC, and specific descriptions of how SCDHEC's comments are accommodated by the Plan or provide a reason for not incorporating them.

Article XXX. Upgrade/Replacement of Generators at Parr Shoals Development Implementation Plan: The Upgrade/Replacement of Generators at Parr Shoals Development Implementation Plan (Plan) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Plan upon issuance of the license. All six generator units will be upgraded or replaced within ten years after license issuance. After completion of the Plan, SCE&G will file with the Commission a report detailing the changes made at the Project.

Article XXX. Parr Reservoir Shoreline Management Plan: The Parr Reservoir Shoreline Management Plan (Shoreline Management Plan or SMP) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Shoreline Management Plan upon the issuance of the license. Within ten years following license issuance, and every ten years thereafter for the term of the license, the Licensee must file with the Commission, for approval, a revised SMP. The revised SMP must include a description of any proposed changes to the provisions and classification maps of the existing

approved SMP. If changes are made to the SMP, the filing must include both a clean copy and a red-line copy of the revised SMP so that plan modifications can be easily identified. In developing the revised SMP, the Licensee must, at a minimum, consult with the U.S. Fish and Wildlife Service and South Carolina Department of Natural Resources to review the implementation of the SMP and to recommend potential modifications. The revised SMP must include documentation of consultation with the entities identified above and specific descriptions of how the entities' comments are accommodated. The Licensee must allow a minimum of 30 days for the entities to comment and to make recommendations prior to filing the revised SMP with the Commission. If the Licensee does not adopt a recommendation, the filing must include the Licensee's reasons. The Commission reserves the right to require changes to the revised SMP.

Article XXX. Monticello Reservoir Shoreline Management Plan: The Monticello Reservoir Shoreline Management Plan (Shoreline Management Plan or SMP) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. The Licensee shall implement the Shoreline Management Plan upon the issuance of the license. Within ten years following license issuance, and every ten years thereafter for the term of the license, the Licensee must file with the Commission, for approval, a revised SMP. The revised SMP must include a description of any proposed changes to the provisions and classification maps of the existing approved SMP. If changes are made to the SMP, the filing must include both a clean copy and a red-line copy of the revised SMP so that plan modifications can be easily identified; and include justification of such changes. In developing the revised SMP, the Licensee must, at a minimum, consult with the U.S. Fish and Wildlife Service and South Carolina Department of Natural Resources to review the implementation of the SMP and to recommend potential modifications. The revised SMP must include documentation of consultation with the entities identified above and specific descriptions of how the entities' comments are accommodated. The Licensee must allow a minimum of 30 days for the entities to comment and to make recommendations prior to filing the revised SMP with the Commission. If the Licensee does not adopt a recommendation, the filing must include the Licensee's reasons. The Commission reserves the right to require changes to the revised SMP.

Article XXX. Erosion Monitoring Plan: The Erosion Monitoring Plan (Plan) filed with the Comprehensive Relicensing Settlement Agreement on <Date>, is approved. Each year the Licensee shall file the erosion monitoring reports with the Commission, as described in the Plan. Revisions to the Plan may be filed by the Licensee.

Article XXX. Programmatic Agreement and Historic Properties Management Plan: The Licensee must implement the “Programmatic Agreement Between the Federal Energy Regulatory Commission the South Carolina State Historic Preservation Officer for Managing Historic Properties that May be Affected by Issuing a New License to South Carolina Electric & Gas Company for the Continued Operation and Maintenance of the Parr Hydroelectric Project Located in Fairfield and Newberry Counties, South Carolina” (Programmatic Agreement) issued on <Date>, and including but not limited to the Historic Properties Management Plan (HPMP) for the Project.