

2021 MUSSEL STUDY EXECUTIVE SUMMARY

**STEVENS CREEK HYDROELECTRIC PROJECT
(FERC No. 2535)**

Prepared for:

**Dominion Energy South Carolina, Inc.
Cayce, South Carolina**

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtGroup.com

October 2023

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1.0 INTRODUCTION

Dominion Energy South Carolina, Inc. (DESC) is the licensee for the Stevens Creek Hydroelectric Project (FERC No. 2535) (Project). On November 22, 1995, the Federal Energy Regulatory Commission (FERC) issued a 30-year license scheduled to expire on October 31, 2025. DESC intends to file an application for a new license with FERC on or before October 31, 2023. DESC is currently progressing through a relicensing process for the Project, which involves cooperation and collaboration between DESC, as licensee, and a variety of stakeholders, including state and federal resource agencies, state and local government, non-governmental organizations, and interested individuals. DESC established a Water Quality, Fish and Wildlife Resource Conservation Group (RCG) with interested stakeholders to address Project issues related to aquatic and terrestrial resources. During an RCG meeting on November 13, 2019, the U.S. Fish and Wildlife Service (USFWS) formally requested a freshwater mussel study at the Project, particularly in the Stevens Creek arm of the reservoir. In a letter dated June 10, 2020, the Georgia Department of Natural Resources (GADNR) requested that the large tributaries on the Georgia side of the Savannah River be included in the study. The mussel study plan was developed in consultation with the USFWS, GADNR, South Carolina Department of Natural Resources (SCDNR), and the RCG. This document summarizes the mussel survey that was conducted in 2021.

2.0 STUDY OBJECTIVE

The purpose of this study was to gather quantitative and qualitative data on the diversity, spatial distribution, and relative abundance of the mussel fauna occurring in portions of Stevens Creek, Little Kiokee Creek, and Uchee Creek within the Stevens Creek Project boundary.

3.0 GEOGRAPHIC AND TEMPORAL SCOPE

Mussel surveys focused on selected habitats within the Stevens Creek Project boundary that were more likely to support populations of native freshwater mussels. Due to the accumulation of silt in the lower portions of Stevens Creek, a majority of the surveys took place in the upper portion of Stevens Creek within the Project boundary. USFWS requested that surveys include the reach between the upstream extent of the Stevens Creek Reservoir and the confluence with Horn Creek (Figure 3.1). In addition, GADNR requested that surveys include representative sites in the portions of Little Kiokee Creek and Uchee Creek within the Project boundary. Specific survey points were identified in the field by the lead malacologist performing the study. Surveys were conducted in October 2021. Surveys were focused during non-rainy periods when water clarity and temperatures were sufficiently high to support wading, snorkeling, and other in-water survey methods.

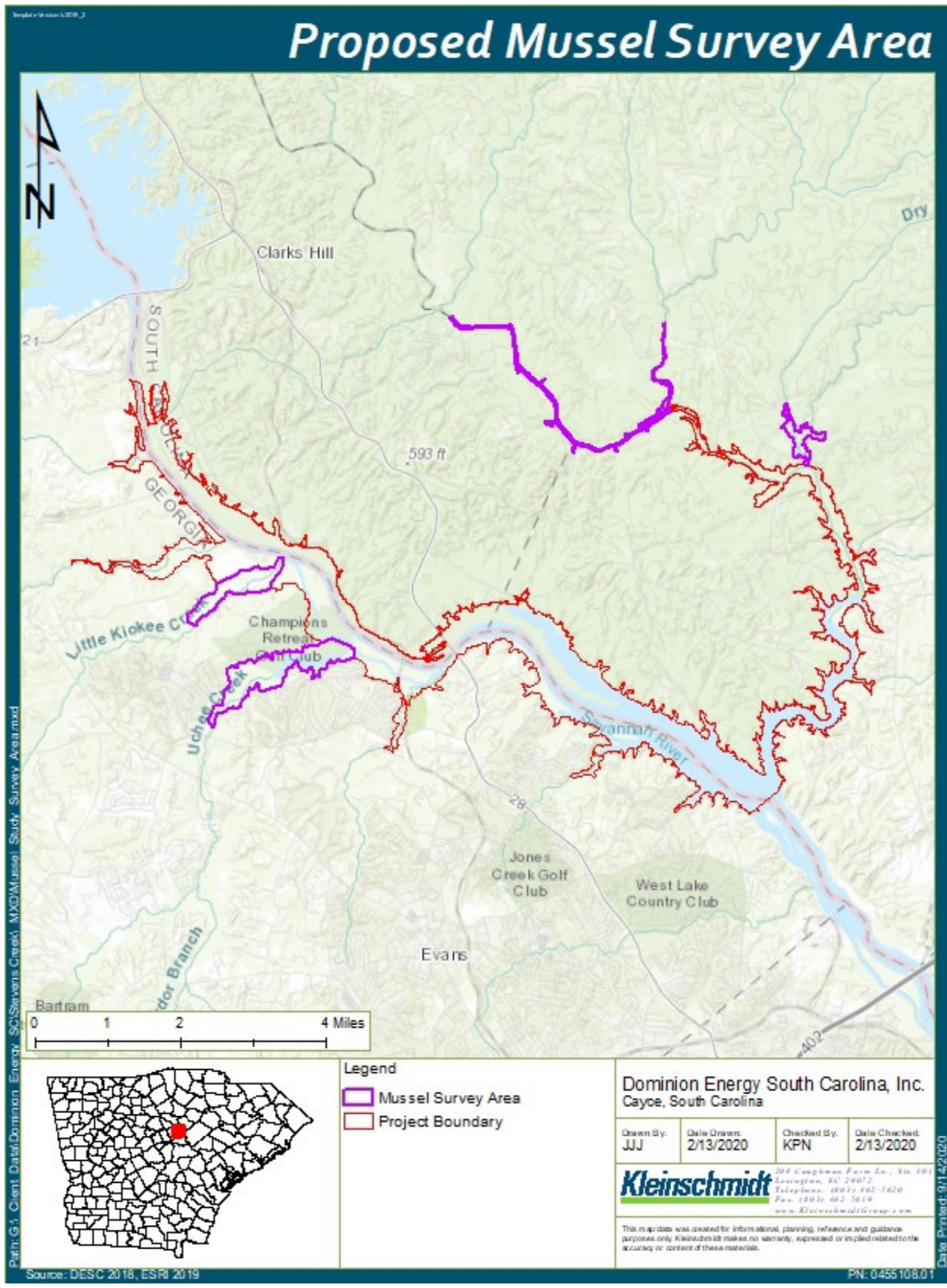


Figure 3.1 Mussel Study Area

4.0 DATA COLLECTION METHODS

Freshwater mussel surveys in Stevens Creek, Little Kiokee Creek, and Uchee Creek involved habitat reconnaissance and timed visual and tactile inspections of potentially suitable habitats for the presence of live freshwater mussels and/or shell material.

Field survey methods followed freshwater mussel survey standard operating procedures established by the SCDNR and were conducted by a qualified malacologist. The number and specific location of qualitative survey points were refined in the field based on the professional judgement of the lead malacologist, with four representative sites along Stevens Creek, two representative sites in Uchee Creek, and one site in Little Kiokee Creek. Substrates and mussel habitats were assessed at each sample location. The species collected during the survey were noted and photo-documented.

5.0 RESULTS AND DISCUSSION

Two freshwater mussel species were documented as extant within the areas surveyed for this Project (Appendix A). In general, lotic habitats were of poor quality, with slow flows or stagnant conditions across all sampling locations. Three mussel shells were found within Stevens Creek, but no live specimens were observed at any sampling location.

Stevens Creek

Habitat reconnaissance for Stevens Creek involved a 12-mile kayak paddle through the Stevens Creek Project area. During reconnaissance and mussel surveys, it was observed that Stevens Creek has poor lotic habitat with little flow and unconsolidated organic-rich substrate. Loose, sandy substrates appear to shift frequently and do not provide stable substrates for mussels. Although habitat was poor through Stevens Creek within the Project area, the locations with potentially suitable mussel habitat were selected for mussel surveys during the 12-mile reconnaissance. After approximately 2.6 hours of effort, three shells and shell fragments were found during the mussel survey: one eastern elliptio (*Elliptio complanate*) and two eastern creekshell (*Villosa delumbis*). The only live bivalve specimens found were the invasive Asiatic clam (*Corbicula fluminea*), which was limited to a couple of individuals.

Although poor mussel habitats were observed within the Project area, it should be noted that a portion of the Stevens Creek watershed, farther upstream from the surveyed reach, outside of the Project boundary and the effects of impoundment, is of global conservation significance because of its high mussel diversity and presence of many rare species. Tributaries, such as Mountain Creek, Little Stevens Creek, and Sleepy Creek, provide habitat for the federally listed Carolina heelsplitter (*Lasmigona decorata*). Stevens Creek, upstream from the Project boundary, and many of its headwater tributaries also provide habitat for several mussel taxa of significant conservation concern.

Uchee Creek

Approximately 1 mile of Uchee Creek was visually assessed for suitable mussel habitat, with some potentially suitable locations physically spot-checked to further examine habitat suitability. Two locations within Uchee Creek were surveyed using a four-person survey team, totaling about 1.7 person-hours of effort. Although these two sample locations represented the best available habitat, the vast majority of Uchee Creek exhibited poor lotic habitat conditions. This was indicated by clay, silt, and organics as the substrate in the first location (Site 211027.2). The second survey location (Site 211027.3)

consisted mostly of an artificial bed from a boulder fill (i.e., an armored area to protect an underwater sewer line), which created moderate-to-good potential mussel habitat with stable coarse substrates and pockets of softer sediments. No evidence of freshwater mussels (live or dead) was documented in the Uchee Creek survey areas, with only a few Asiatic clams found within the second survey location.

Little Kiokee Creek

Accessible portions of Little Kiokee Creek exhibited poor mussel habitat, with slick, dense clay substrates and steep banks. A total effort of 0.7 person-hours yielded no evidence of freshwater mussels in the survey area. The only living bivalves found were Asiatic clams.

Conclusion

Stevens Creek and accessible portions of Uchee Creek and Little Kiokee Creek within the Project area exhibited poor mussel habitat. In general, these impounded areas exhibit low base flow but are subject to flashy flows during rain events and water levels and flow rates that fluctuate during power generation activities at J. Strom Thurmond Dam. Additionally, poor substrates (i.e., loose, sandy substrate; heavy silt and sediment loads; and/or compacted clay) did not provide suitable mussel habitats within the Project area. Although the majority of areas investigated were unsuitable for mussels, the areas with the greatest potential suitability were surveyed. However, no live mussels were observed.

6.0 REFERENCES

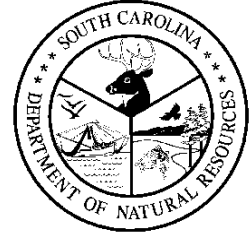
Federal Energy Regulatory Commission (FERC). 1995. Final Environmental Assessment for Hydropower License. Filed November 7, 1995. Kleinschmidt. 2020. Stevens Creek Hydroelectric Project FERC No. 2535: Rare, Threatened, and Endangered Species Whitepaper. February 2020.

South Carolina Department of Natural Resources (SCDNR). 2020. Freshwater Mussel Survey Protocol. March 2020.

APPENDIX A

CONSULTATION DOCUMENTATION

South Carolina Department of Natural Resources



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PO Box 167
Columbia, SC 29202
843-953-3881 Office
millere@dnr.sc.gov

Robert H. Boyles, Jr.
Director

Lorianne Riffin
Director, Office of
Environmental Programs

September 2, 2022

Ms. Jennifer A. Güt
Staff Licensing Coordinator
Kleinschmidt
204 Caughman Farm Lane, Suite 301
Lexington, SC 29072

REFERENCE: Comments on the Stevens Creek Hydroelectric Project (P-2535)
Freshwater Mussel, Recreation Use and Needs, and Water Quality Study
Reports.

Dear Ms. Güt:

The South Carolina Department of Natural Resources (SCDNR) has reviewed the Stevens Creek Hydroelectric Project's (P-2535) Freshwater Mussel, Recreation Use and Needs, and Water Quality Study Reports and offer the following comments.

Freshwater Mussel Study Report

The SCDNR notes that the two species collected during the survey were *Elliptio complanata* and *Villosa delumbis*, which are both moderate priority species in the South Carolina State Wildlife Action Plan (SWAP). The SCDNR has records of *Lampsilis cariosa*, a highest priority SWAP species, at Stevens Creek Heritage Preserve, located less than four miles upstream of the Project Boundary in the Stevens Creek arm. SCDNR also has records of *Uniomerus carolinianus*, *Elliptio angustata*, and *Elliptio producta* in the surrounding area. Additionally, the SCDNR notes that since deeper pools were not sampled during the survey, *Lampsilis cariosa* could have been missed due to their habitat preference.

Recreation Use and Needs Study Report

The SCDNR finds the data collected during the Recreational Use and Needs (RUN) Study Report support the need for additional recreational enhancements at the Stevens Creek Project.

The SCDNR requests the licensee further discuss Goal 2 of the RUN Study by identifying ways to improve recreational access and amenities in the Project Area.

The SCDNR continues to support the licensee providing downstream portage opportunities for the public around the Stevens Creek dam. The findings in Section 4.5.2 indicate that 79 percent of recreationists at the Betty's Branch Recreation Site and 11 percent of recreationists at Stevens Creek Recreation Site identified non-motorized watercraft as their primary recreation activity. Further, 71 percent of the recreationists at Betty's Branch and 62 percent of recreationists at Stevens Creek Recreation Site indicated that they were likely to very likely to utilize a portage around the dam.

The SCDNR agrees with partner resource agencies, tribes, and other stakeholders that looting of Stallings Island is a concern and looks forward to developing protective measures to preserve the island's cultural resources. Public recreational access to the Savannah River below Stevens Creek dam currently exists; therefore, the public's access around the dam should not be limited due to these concerns.

Water Quality Study Report

Data presented in the Water Quality Study Report indicate that poor water quality conditions frequently occur in the Stevens Creek arm. One main objective of the study was to assess the water quality in the Stevens Creek arm. However, the report does not make note of any contributing factors leading to the poor water quality. USGS station 021963601 located near Study Site 5 suggests a direct effect of the Stevens Creek reservoir level on flow fluctuations in the Stevens Creek arm. SCDNR staff would like an assessment of how flow dynamics and hydraulic residency may be altering instream flows, sediment transport, nutrients, and water quality in the Stevens Creek arm.

The Executive Summary states that there were several dissolved oxygen excursions throughout the study period, particularly at Site 4 and the J. Strom Thurmond (JST) Dam Tailrace. However, Section 5.0 states that dissolved oxygen excursions were most prevalent below the JST Dam and at Site 5, with Site 1 having the third most excursions at the Project. The Executive Summary should be corrected to reflect the results of the study.

The Water Quality Study Plan developed in consultation with the resource agencies and stakeholders stipulates that all continuous data will be analyzed by computing daily and monthly minimum, maximum, and average values for DO and water temperature. Please include the applicable daily water quality parameters in the report. This information will be a useful tool in determining the duration of low DO excursions at each of the Study Sites.

The SCDNR requests that the GPS coordinates and approximate depth ranges of all Study Sites be included in the report.

If possible, the SCDNR recommends that the licensee include bathymetry data around the Stevens Creek dam in the report to better understand the effects of sediment deposition on water quality.

The SCDNR requests further information and discussion regarding why the dissolved oxygen level dropped at Study Site 4 in October 2021.

To better understand the Stevens Creek Project's effects on water quality, the SCDNR requests an extension of the current water quality study for an additional 12-month period. As indicated in the report, Study Site 5 is only 4.5 miles upstream of the confluence with the Savannah River at Stevens Creek Dam. Since the Project Boundary extends 12 miles upstream of the confluence, SCDNR requests additional study sites within the Stevens Creek arm in the second period of the study to better understand the physical extent of the poor water quality. Further, the SCDNR requests additional study sites in the vicinity of Site 5 to determine if the low dissolved oxygen is creating a barrier to fish passage.

The SCDNR recommends the licensee work with the resource agencies and stakeholders to develop PM&E measures to include in the license application to minimize these water quality issues and prevent negative impacts on fish passage.

Thank you for the opportunity to review the study reports and provide comments. Should you have any questions or need additional information, please do not hesitate to contact me by email at MillerE@dnr.sc.gov or by phone at 843.953.3881.

Sincerely,

A handwritten signature in black ink that reads "Elizabeth C. Miller". The signature is written in a cursive style with a large initial "E".

Elizabeth C. Miller
FERC Coordinator, SCDNR

APPENDIX B

FRESHWATER MUSSEL SURVEYS WITHIN SAVANNAH RIVER BASIN - ALDERMAN ENVIRONMENTAL SERVICES

**FRESHWATER MUSSEL SURVEYS
WITHIN
SAVANNAH RIVER BASIN
STEVENS CREEK HYDROELECTRIC
PROJECT 2535**

Prepared for

Kleinschmidt Group

by

Joseph D. Alderman
and
John M. Alderman

Alderman Environmental Services, Inc.
Hillsborough, NC

3 November 2021

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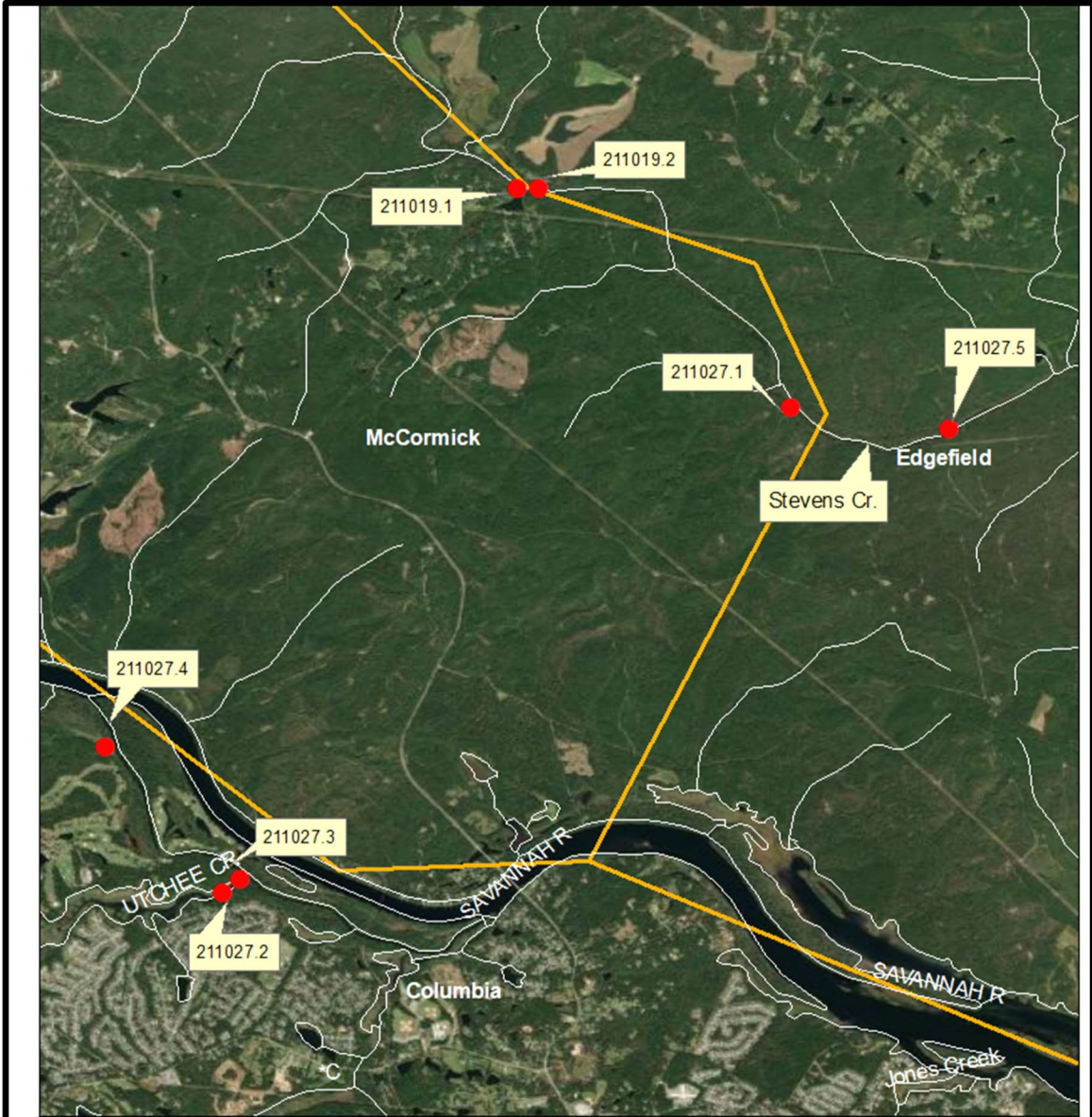
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Introduction

More than 300 recognized species and subspecies of freshwater mussels are known from North America north of Mexico. Nearly 72% of these taxa are considered endangered, threatened, or of special concern to the scientific community (Williams et al. 1992).

Within the Savannah River Basin, Johnson (1970) lists 21 species from the basin. Because of incorrect synonymies, *Lasmigona decorata*, *Elliptio producta*, *E. angustata*, and *E. fisheriana* are now known to occur within the basin, and *E. arctata* is considered not present on the Atlantic Slope. During the past 30 years, *Ligumia nasuta* has been documented from the basin and, because of recent taxonomic work, is now known as Santee Pondmussel (*Sagittunio aldermani* Watters 2018). Therefore, there are currently 26 recognized freshwater mussel species from the Savannah River Basin (Table 1).

Alderman Environmental Services, Inc. was contracted by Kleinschmidt Group to perform a freshwater mussel survey during October 2021. The survey areas are located in Stevens Creek, South Carolina, and two tributaries of Stevens Creek Reservoir in Georgia (Figure 1).



**Freshwater Mussel Survey
FERC Project No. 2535
Georgia and South Carolina**

Figure 1

- Survey Areas
- Streams
- Counties



11/3/2021

Methods

Survey conditions were good to excellent during the survey period. Water was mostly clear to slightly turbid in most areas surveyed. Flows were maintained by Dominion Energy at low levels to facilitate the surveys. Two areas were surveyed by two biologists and five areas were surveyed by 4 biologists for freshwater mussels using visual (bathyscopes) and tactile techniques. Specific sites within survey areas or reaches were selected based upon various mussel species' microhabitat needs.

Results and Discussion

Two freshwater mussel species were documented as extant within the areas surveyed for this project (Table 1, Figure 1, and Appendix): Eastern Elliptio (*Elliptio complanata*) and Eastern Creekshell (*Villosa delumbis*). No live individuals were documented and only a few shells were found within Stevens Creek. No evidence of freshwater mussels was documented within the two Savannah River Georgia tributaries surveyed. All areas surveyed had very little flow and had significant sediment loads. Such conditions limit most lotic mussel taxa populations.

However, it should be noted that the Stevens Creek Subbasin, farther upstream from the surveyed reach, is of global conservation significance because of its high mussel diversity and presence of many rare species. Tributaries, such as Mountain Creek, Little Stevens Creek, and Sleepy Creek, provide habitat for the federally listed Carolina Heelsplitter mussel. Stevens Creek, upstream from the surveyed reach, and many of its headwater tributaries also provide habitat for several mussel taxa of significant conservation concern (Table 1).

Acknowledgement

Will Pruitt and Nicole Haibach with Kleinschmidt Group provided significant administrative and logistical assistance with this project.

References

Alderman Environmental Services, Inc. 2021. 1986 - 2021 survey data records.

Bogan, A.E. and J.M. Alderman. 2004. Workbook and key to the freshwater bivalves of South Carolina. North Carolina Museum of Natural Sciences, Raleigh, NC 64 pp, 5 color plates.

Johnson, R.I. 1970. The systematics and zoogeography of the Unionidae (Mollusca: Bivalvia) of the Southern Atlantic Slope region. Bull. Mus. Comp. Zoo. 140(6):263-449.

NatureServe. 2021. NatureServe Explorer: An online encyclopedia of life [web application]. (Accessed: November 2021).

Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1992. Conservation status of freshwater mussels of the United States and Canada. Fisheries. 18(9):6-22.

Table 1. The freshwater mussels of the Savannah River Basin

Species Historically or Recently Documented from Within the Savannah River Basin	Within Dominion Surveyed Study Area	Upcreek within Stevens Creek Subbasin	2021 Status (NatureServe)*
<i>Elliptio congaraea</i>			G3
<i>E. complanata</i>	X	X	G5
<i>E. roanokensis</i>			G3
<i>E. icterina</i>		X	G5
<i>E. angustata</i>		X	G4
<i>E. fisheriana</i>			G4
<i>E. producta</i>		X	G3
<i>Unio merus carolinianus</i>		X	G4
<i>Fusconaia masoni</i>			G1
<i>Lasmigona decorata</i>		X	G1, Fed. E
<i>Alasmidonta undulata</i>			G4
<i>A. triangulata</i>			G1
<i>A. varicosa</i>		X	G3
<i>Sagittunio aldermani</i>			undetermined
<i>Pyganodon cataracta</i>		X	G5
<i>Utterbackia imbecillis</i>		X	G5
<i>Utterbackiana couperiana</i>			G4
<i>Utterbackiana implicata</i>			G5
<i>Strophitus undulatus</i>		X	G5
<i>Toxolasma pullus</i>			G2
<i>Villosa vibex</i>		X	G5
<i>V. delumbis</i>	X	X	G4
<i>V. constricta</i>			G3
<i>Leptodea ochracea</i>			G3
<i>Lampsilis cariosa</i>		X	G3
<i>L. splendida</i>			G3

*** Species statuses according to NatureServe:**

NatureServe G Ranks:

G1 Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

G2 Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4 Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 Secure—Common; widespread and abundant.

APPENDIX – Survey station results from Savannah River
Basin



Alderman Environmental Services, Inc.

19 October 2021

PROJECT: Dominion Energy Steven Creek Hydroelectric Project freshwater mussel survey

SITE NUMBER: 211019.1

TARGET SPECIES: Inventory Survey

BIOLOGISTS: Joseph Alderman
John Alderman

U.S. FISH AND WILDLIFE SERVICE ES PERMIT: TE065756-3

LOCATION: Stevens Creek, 33.655531 N, 82.122784 W

SURVEY DATE: 19 October 2021

COMMENTS: Site within ~12 mile kayak habitat evaluation survey of Stevens Creek; poor lotic taxa habitat; little flow; organic rich substrate; note, on 10/19/2021 the ~ 12 mile inventory reach upstream from the Stevens Creek Reservoir was kayaked to assess overall habitat quality (poor throughout)

HABITAT:

WATERBODY TYPE:	Stream
FLOW:	Slack
RELATIVE DEPTH:	Shallow
DEPTH (%<2 FEET):	20
SUBSTRATE:	Silt, sand , mud, organics
COMPACTNESS:	Normal and unconsolidated
SAND/GRAVEL BARS:	None
WOODY DEBRIS:	High

HABITAT (CONTINUED):

BEAVER ACTIVITY: Evidence (gnawed sticks)
WINDTHROW: Moderate
TEMPORARY POOLS: None documented
CHANNEL WIDTH: 20 m
BANK HEIGHT: 2.5 m
BANK STABILITY: Some erosion/undercutting
BUFFER WIDTH: Varies
RIPARIAN VEGETATION: Wooded, shrub-brush, grass
LAND USE: Natural, timber, rural
PERCENT COVER: 30
WOODLAND EXTENT: Varied
NATURAL LEVEES: At least one
VISIBILITY: Slightly turbid
WATER LEVEL: Low
WEATHER: Sunny, cool

TECHNIQUES: Visual/tactile

SURVEY TIME: 0.3 person-hour

FRESHWATER MUSSELS:

None Documented

OTHER DOCUMENTED TAXA:

Corbicula fluminea



Alderman Environmental Services, Inc.

19 October 2021

PROJECT: Dominion Energy Steven Creek Hydroelectric Project freshwater mussel survey

SITE NUMBER: 211019.2

TARGET SPECIES: Inventory Survey

BIOLOGISTS: Joseph Alderman
John Alderman

U.S. FISH AND WILDLIFE SERVICE ES PERMIT: TE065756-3

LOCATION: Stevens Creek, 33.655503 N, 82.120843 W

SURVEY DATE: 19 October 2021

COMMENTS: Site within ~12 mile kayak habitat evaluation survey of Stevens Creek; poor lotic taxa habitat; little flow; organic rich substrate

HABITAT:

WATERBODY TYPE:	Stream
FLOW:	Slack
RELATIVE DEPTH:	Shallow
DEPTH (%<2 FEET):	20
SUBSTRATE:	Silt, sand , mud, organics
COMPACTNESS:	Normal and unconsolidated
SAND/GRAVEL BARS:	None
WOODY DEBRIS:	High

HABITAT (CONTINUED):

BEAVER ACTIVITY: Evidence (gnawed sticks)
WINDTHROW: Moderate
TEMPORARY POOLS: None documented
CHANNEL WIDTH: 20 m
BANK HEIGHT: 2.5 m
BANK STABILITY: Some erosion/undercutting
BUFFER WIDTH: Varies
RIPARIAN VEGETATION: Wooded, shrub-brush, grass
LAND USE: Natural, timber, rural
PERCENT COVER: 30
WOODLAND EXTENT: Varied
NATURAL LEVEES: At least one
VISIBILITY: Slightly turbid
WATER LEVEL: Low
WEATHER: Sunny, cool

TECHNIQUES: Visual/tactile

SURVEY TIME: 0.3 person-hour

FRESHWATER MUSSELS:

Elliptio complanata – 1 shell
Villosa delumbis – 2 shells

OTHER DOCUMENTED TAXA:

Corbicula fluminea



Alderman Environmental Services, Inc.

PROJECT: Dominion Energy Stevens Creek Hydroelectric Project freshwater mussel survey

SITE NUMBER: 211027.1

TARGET SPECIES: Inventory Survey

BIOLOGISTS: Joseph Alderman
John Alderman
John Fridell
Kim Morgan

U.S. FISH AND WILDLIFE SERVICE ES PERMIT: TE065756-3

LOCATION: Stevens Creek, 33.635743 N, 82.098014 W

SURVEY DATE: 27 October 2021

COMMENTS: Site within ~12 mile kayak habitat evaluation survey of Stevens Creek; very poor lotic mussel taxa habitat

HABITAT:

WATERBODY TYPE:	Stream
FLOW:	Slack
RELATIVE DEPTH:	Shallow
DEPTH (%<2 FEET):	5
SUBSTRATE:	Poor quality lotic mussel substrate – silt, woody debris, organics
COMPACTNESS:	Normal, unconsolidated
SAND/GRAVEL BARS:	None
WOODY DEBRIS:	High

HABITAT (CONTINUED):

BEAVER ACTIVITY: Evidence (gnawed sticks)
WINDTHROW: Moderate
TEMPORARY POOLS: None observed
CHANNEL WIDTH: 30 m
BANK HEIGHT: 2.5 m
BANK STABILITY: Mostly stable
BUFFER WIDTH: Wide
RIPARIAN VEGETATION: Wooded, shrub-brush
LAND USE: Natural, timber, rural
PERCENT COVER: 30
WOODLAND EXTENT: Mostly extensive
NATURAL LEVEES: At least one
VISIBILITY: Turbid
WATER LEVEL: Normal
WEATHER: Sunny, cool

TECHNIQUES: Visual/tactile

SURVEY TIME: 1 person-hour

FRESHWATER MUSSELS:

None documented

OTHER DOCUMENTED TAXA:

None documented



Alderman Environmental Services, Inc.

PROJECT: Dominion Energy Stevens Creek Hydroelectric Project freshwater mussel survey

SITE NUMBER: 211027.5

TARGET SPECIES: Inventory Survey

BIOLOGISTS: Joseph Alderman
John Alderman
John Fridell
Kim Morgan

U.S. FISH AND WILDLIFE SERVICE ES PERMIT: TE065756-3

LOCATION: Stevens Creek, 33.635743 N, 82.098014 W

SURVEY DATE: 27 October 2021

COMMENTS: Site within ~12 mile kayak habitat evaluation survey of Stevens Creek; very poor lotic mussel taxa habitat

HABITAT:

WATERBODY TYPE:	Stream
FLOW:	Slack
RELATIVE DEPTH:	Shallow
DEPTH (%<2 FEET):	5
SUBSTRATE:	Poor quality lotic mussel substrate – silt, muck, woody debris, organics
COMPACTNESS:	Normal, unconsolidated
SAND/GRAVEL BARS:	None
WOODY DEBRIS:	High

HABITAT (CONTINUED):

BEAVER ACTIVITY: Evidence (gnawed sticks)
WINDTHROW: Moderate
TEMPORARY POOLS: None observed
CHANNEL WIDTH: 30 m
BANK HEIGHT: 2.5 m
BANK STABILITY: Mostly stable
BUFFER WIDTH: Wide
RIPARIAN VEGETATION: Wooded, shrub-brush
LAND USE: Natural, timber, rural
PERCENT COVER: 30
WOODLAND EXTENT: Mostly extensive
NATURAL LEVEES: At least one
VISIBILITY: Turbid
WATER LEVEL: Normal
WEATHER: Sunny, cool

TECHNIQUES: Visual/tactile

SURVEY TIME: 1 person-hour

FRESHWATER MUSSELS:

None documented

OTHER DOCUMENTED TAXA:

Campeloma decisum
Corbicula fluminea



Alderman Environmental Services, Inc.

PROJECT: Dominion Energy Stevens Creek Hydroelectric Project freshwater mussel survey

SITE NUMBER: 211027.2

TARGET SPECIES: Inventory Survey

BIOLOGISTS: Joseph Alderman
John Alderman
John Fridell
Kim Morgan

U.S. FISH AND WILDLIFE SERVICE ES PERMIT: TE065756-3

LOCATION: Utchee Creek, Georgia; 33.59192 N, 82.149483 W

SURVEY DATE: 27 October 2021

COMMENTS: Poor lotic mussel habitat

HABITAT:

WATERBODY TYPE:	Stream
FLOW:	Slack
RELATIVE DEPTH:	Shallow
DEPTH (%<2 FEET):	5
SUBSTRATE:	Clay, silt, woody debris, organics
COMPACTNESS:	Normal and unconsolidated
SAND/GRAVEL BARS:	None
WOODY DEBRIS:	Average

HABITAT (CONTINUED):

BEAVER ACTIVITY: None
WINDTHROW: Low
TEMPORARY POOLS: Present
CHANNEL WIDTH: Varies
BANK HEIGHT: 0.5 m
BANK STABILITY: Very stable
BUFFER WIDTH: Wide
RIPARIAN VEGETATION: Wooded, shrub-brush
LAND USE: Natural, timber, rural near stream
PERCENT COVER: 10
WOODLAND EXTENT: Mostly extensive
NATURAL LEVEES: None
VISIBILITY: Clear to slightly turbid
WATER LEVEL: Low
WEATHER: Sunny, warm

TECHNIQUES: Visual/tactile

SURVEY TIME: 0.7 person-hours

FRESHWATER MUSSELS:

None documented

OTHER DOCUMENTED TAXA:

Corbicula fluminea



Alderman Environmental Services, Inc.

PROJECT: Dominion Energy Stevens Creek Hydroelectric Project freshwater mussel survey

SITE NUMBER: 211027.3

TARGET SPECIES: Inventory Survey

BIOLOGISTS: Joseph Alderman
John Alderman

U.S. FISH AND WILDLIFE SERVICE ES PERMIT: TE065756-3

LOCATION: Utchee Creek, Georgia; 33.593094 N, 82.147921 W

SURVEY DATE: 27 October 2021

COMMENTS: Mostly artificial bed from boulder fill; relatively good potential mussel habitat

HABITAT:

WATERBODY TYPE:	Stream
FLOW:	Run
RELATIVE DEPTH:	Shallow
DEPTH (%<2 FEET):	40
SUBSTRATE:	Boulder with accumulated finer substrates
COMPACTNESS:	Normal
SAND/GRAVEL BARS:	None
WOODY DEBRIS:	Average

HABITAT (CONTINUED):

BEAVER ACTIVITY: None
WINDTHROW: Low
TEMPORARY POOLS: None
CHANNEL WIDTH: Varies
BANK HEIGHT: Varies
BANK STABILITY: Mostly stable
BUFFER WIDTH: Wide
RIPARIAN VEGETATION: Wooded, shrub-brush
LAND USE: Natural, timber, rural
PERCENT COVER: 20
WOODLAND EXTENT: Mostly extensive
NATURAL LEVEES: None
VISIBILITY: Clear
WATER LEVEL: Normal
WEATHER: Sunny, warm

TECHNIQUES: Visual/tactile

SURVEY TIME: 0.7 person-hour

FRESHWATER MUSSELS:

None documented

OTHER DOCUMENTED TAXA:

Corbicula fluminea
Ferrissia rivularis
Hydrobiidae



Alderman Environmental Services, Inc.

PROJECT: Dominion Energy Stevens Creek Hydroelectric Project freshwater mussel survey

SITE NUMBER: 211027.4

TARGET SPECIES: Inventory Survey

BIOLOGISTS: Joseph Alderman
John Alderman

U.S. FISH AND WILDLIFE SERVICE ES PERMIT: TE065756-3

LOCATION: Little Kikoee Creek; 33.604997 N, 82.160171 W

SURVEY DATE: 27 October 2021

COMMENTS: Slick dense clay banks; dropped off quickly; no washout shells

HABITAT:

WATERBODY TYPE:	Stream
FLOW:	Run/Slack
RELATIVE DEPTH:	Shallow
DEPTH (%<2 FEET):	30
SUBSTRATE:	Clay, silt, organics
COMPACTNESS:	Normal
SAND/GRAVEL BARS:	Present
WOODY DEBRIS:	Average

HABITAT (CONTINUED):

BEAVER ACTIVITY: Evidence (gnawed sticks)
WINDTHROW: Moderate
TEMPORARY POOLS: Present
CHANNEL WIDTH: Varies
BANK HEIGHT: Varies
BANK STABILITY: Mostly stable
BUFFER WIDTH: Wide
RIPARIAN VEGETATION: Wooded, shrub-brush
LAND USE: Natural, timber, rural
PERCENT COVER: 90
WOODLAND EXTENT: Mostly extensive
NATURAL LEVEES: None
VISIBILITY: Clear
WATER LEVEL: Low
WEATHER: Sunny, warm

TECHNIQUES: Visual/tactile

SURVEY TIME: 0.7 person-hours

FRESHWATER MUSSELS:

None documented

OTHER DOCUMENTED TAXA:

Corbicula fluminea