

Electronically Filed

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March 25, 2025

Debbie-Anne Reese, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Subject: Dominion Energy South Carolina, Inc.
Stevens Creek Hydroelectric Project
FERC Project No. 2535-129
Response to Additional Information Request dated November 25, 2024

Dear Secretary Reese:

Dominion Energy South Carolina, Inc. (DESC) hereby files electronically its response to the Federal Energy Regulatory Commission (FERC) November 25, 2024 Additional Information Request for the Stevens Creek Hydroelectric Project (P-2535-129) new license application. Attachment A lists each item included in FERC's Schedule A: Requests for Additional Information followed by DESC's response.

If you have any questions about this filing, please contact me by email at Amy.Bresnahan@dominionenergy.com.

Sincerely,

A handwritten signature in blue ink that reads "Amy Bresnahan".

Amy Bresnahan
Relicensing Project Manager

Attachment: A. Response to Additional Information Request

cc: Alison Jakupca, Kleinschmidt

RESPONSE TO ADDITIONAL INFORMATION REQUEST

TABLE OF CONTENTS

LIST OF TABLES

Table 1	Summary of Flashboard Tripping Events at the Stevens Creek Project from 1998 - 2023.....	2
Table 2	Summary of Savannah River Water Level Fluctuation Frequency Versus Stevens Creek Project Flashboard Status.....	5

LIST OF FIGURES

Figure 1	Stevens Creek Project Daily Generation Versus Flashboard Status	6
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LIST OF APPENDICES

Appendix A	Consultation Documentation	
Appendix B	Draft Stevens Creek Project Water Quality Adaptive Management Plan, Revised March 2025	

RESPONSE TO ADDITIONAL INFORMATION REQUEST

Project Operations

1. **As required under Article 403, an operating plan was developed in 1996 and is updated every 5 years, with the most recent plan filed in 2023. In addition to the plan, Dominion Energy files operation reports, annually, to identify and explain any deviations from normal operations the previous year. Staff's review of recent annual reports show that the flashboards continue to fail multiple times a year, and in some cases are down for over 2 weeks before they are repaired.**

In order for staff to assess the extent and duration of flashboard failure, please:

- (a) Compile a summary of operation and inflow data at the time of flashboard failure, since implementing the operating plan in 1996; and**
- (b) Include the frequency, duration, and cause of flashboard failure or removal of the flashboards at the project (recognizing that the flashboards could be down for multiple reasons including unusually high inflows, debris accumulation, maintenance or repairs, and study needs).**

DESC Response:

DESC has compiled available data on downed (or tripped)¹ flashboard status (Table 1). Several characteristics of the data should be noted. First, flashboard status reports were only available dating back to 1998. Second, plant operators typically only noted whether there were flashboards down in terms of a 'yes' or 'no' question. Operators typically did not document details such as the number or type (i.e., four-foot vs. five-foot boards), or the exact time they were tripped (therefore, daily average inflow is provided in Table 1 below for the first day of the failure event). Third, operators did not consistently record the reasons for flashboard tripping (e.g., "high river flow" or "heavy rain"). Lastly, two construction efforts affected operations from 2019 to 2021: the flashboard replacement project was initiated in October 2018 and completed in October 2019; the spillway anchoring project was initiated in June 2020 and completed in November 2021.

It should also be noted that once the three upstream reservoirs owned by the U.S. Army Corps of Engineers enter into spawning season (approximately 4-6 weeks during the spring), these reservoirs are maintained within a 0.6-foot fluctuation limit. Should a rainfall event occur that would impact reservoir limitations, the additional water is passed downstream of the J. Strom Thurmond Dam therefore impacting water levels at the Stevens Creek Project.

¹ Although the Commission referred to flashboard tripping or activation as "failure" in the AIR, DESC wishes to point out that the flashboards are designed to rotate about a horizontal shaft by water pressure on the boards when the headwater rises a few inches above the top of the flashboards when in the fully raised position. The boards do not fail but merely rotate as designed (which DESC has always referred to as "tripping") and can be reset to the upright position manually from a boat or barge once any accumulated debris has been removed.

There was a total of 71 flashboard tripping events between 1998 and 2023. The average duration of each event was 47 days and ranged from a minimum of 1 day to a maximum of 367 days. Approximately 71 percent of the flashboard tripping events had a duration of 30 days or less.

TABLE 1 SUMMARY OF FLASHBOARD TRIPPING EVENTS AT THE STEVENS CREEK PROJECT FROM 1998 - 2023

Start Date	End Date	Duration (days)	Inflow¹ (cfs)	Generation² (kWh)
01/01/98	05/28/98	147	26,111	225,000
10/26/98	10/29/98	3	19,728	NA*
02/02/99	02/27/99	25	10,328	344,000
01/24/00	02/02/00	9	8,206	304,000
09/23/00	09/28/00	5	6,260	255,060
02/23/01	03/01/01	6	5,630	287,837
03/04/01	03/08/01	4	8,428	254,234
03/20/01	03/28/01	8	5,110	186,835
03/29/01	04/23/01	25	5,676	212,381
06/13/01	06/20/01	7	5,123	NA*
03/06/03	04/01/03	26	19,154	350,379
04/08/03	08/01/03	115	14,497	318,275
08/04/03	09/01/03	28	13,088	317,652
12/09/03	01/01/04	23	10,655	275,282
02/21/04	03/01/04	9	13,889	329,633
03/15/04	03/18/04	3	15,771	362,161
09/10/04	09/21/04	11	16,014	187,505
09/28/04	10/19/04	21	16,679	280,483
11/16/04	12/01/04	15	11,051	194,411
12/13/04	01/01/05	19	14,820	284,804
01/12/05	01/29/05	17	12,450	260,273
02/22/05	03/08/05	14	13,622	249,142
03/17/05	04/18/05	32	18,128	324,335
04/22/05	04/26/05	4	9,989	322,237
05/02/05	05/05/05	3	14,160	344,357
05/18/05	06/01/05	14	7,491	286,400
06/02/05	07/13/05	41	12,996	348,664
07/18/05	09/01/05	45	5,796	327,158
09/06/05	09/08/05	2	8,404	252,182
09/28/05	10/20/05	22	8,793	228,085
11/29/05	12/07/05	8	8,865	120,269
12/16/05	02/22/06	68	4,692	160,297
02/27/06	03/07/06	8	13,284	374,408
03/19/06	03/28/06	9	12,095	185,000
03/02/07	03/10/07	8	3,352	347,323

Start Date	End Date	Duration (days)	Inflow ¹ (cfs)	Generation ² (kWh)
11/01/07	11/09/07	8	3,660	86,038
03/06/08	03/25/08	19	4,480	267,789
03/01/09	03/04/09	3	9,852	339,904
03/28/09	03/29/09	1	4,258	145,802
04/01/09	04/07/09	6	4,047	120,075
10/31/09	12/01/09	31	9,373	219,682
12/05/09	04/01/10	117	19,070	286,891
04/27/10	05/01/10	4	11,493	257,390
04/05/11	05/05/11	30	12,508	302,254
07/09/11	08/23/11	45	7,045	210,238
08/13/12	09/06/12	24	3,882	177,830
02/24/13	04/02/13	37	6,235	254,253
04/28/13	10/12/13	167	4,133	149,911
12/20/13	03/02/14	72	12,092	251,945
03/19/14	03/31/14	12	10,074	388,681
04/08/14	04/15/14	7	25,725	392,646
04/21/14	04/23/14	2	14,606	360,336
05/01/14	05/05/14	4	7,141	208,042
12/24/14	04/30/15	127	4,910	218,961
06/04/15	03/12/16	282	9,448	341,138
09/29/16	01/01/17	94	7,924	137,748
05/20/18	10/28/18	161	10,330	341,939
10/29/18	10/31/19	367	3,878	186,987
12/14/19	12/21/19	7	8,802	152,689
01/07/20	04/21/20	105	15,009	263,459
05/21/20	06/10/20	20	15,673	345,103
08/22/20	04/21/21	242	13,472	157,237
05/01/21	04/27/22	361	3,923	143,029
07/19/22	08/15/22	27	8,481	247,509
08/18/22	08/31/22	13	7,413	232,352
12/11/22	02/28/23	79	4,297	124,016
04/22/23	04/26/23	4	7,879	299,615
05/15/23	06/06/23	22	8,764	305,057
07/07/23	07/19/23	12	7,441	216,561
08/01/23	08/20/23	19	8,090	294,653
09/01/23	09/11/23	10	5,975	174,874

¹ Inflow data shown constitutes the daily average inflow on the first day of the tripping event as the exact time of tripping was not recorded for the period of record.

² Generation value is the total generation for the day of flashboard tripping.

* NA: Not Available

2. **The flashboards provide between 3.5 and 4 feet of usable storage in the Stevens Creek reservoir, which could be available to regulate flow releases and help reduce downstream flow fluctuations in the Savannah River. When the flashboards are down, this storage is lost, with a commensurate reduction in re-regulation benefits.**

In order for staff to assess how current operations affect the project's ability to re-regulate downstream flows, please:

- (a) Provide an analysis that quantifies how often and to what degree flashboards-down affect the range of water level fluctuations downstream in the Savannah River; and**
- (b) Provide an analysis of the generation losses when flashboard-down conditions occur.**

DESC Response:

- (a) It should be noted that water level fluctuations in the Savannah River downstream of the Stevens Creek Project are dependent on several factors: (1) operations at J. Strom Thurmond Dam (2) status of flashboards at Stevens Creek Dam; (3) operation of the Augusta Canal at the Augusta Diversion Dam; and (4) operations at New Savannah Bluff Lock and Dam (NSBLD). The nearest Savannah River stream gauge downstream of Stevens Creek Dam, is located approximately 8.5 river miles downstream (United States Geological Survey [USGS] Station No. 02196670). This gauge is located within the pool created by NSBLD and has been in operation since November 2016.

It should also be noted that the width of the Savannah River at the location of this gauge is approximately 700 feet, while the width of the river in the Augusta Shoals ranges from 1,000 to 1,800 feet. Also, due to the bed elevation gradient within the shoals, water levels measured at the gauge located in the NSBLD pool are not indicative of water levels within most of the five-mile-long shoals.

DESC analyzed daily water level fluctuations at this gauge in comparison to Project flashboard status for the period of 2017 to 2023 (Table 2). During this period, the average daily water level fluctuation at the gauge was 0.73 feet when flashboards were up versus 1.53 feet when flashboards were down. Approximately 90 percent of the daily water level fluctuations were equal to or less than 1.5 feet when the flashboards were up, and approximately 91 percent of the daily water level fluctuations were equal to or less than 3 feet when the flashboards were down. In summary, based on 7 years of data, daily water level fluctuations in the Savannah River downstream of Stevens Creek Dam were, on average, only 0.8 feet (9.6 inches) greater when flashboards were tripped.

Additionally, the Fish Passage Technical Working Committee performed an in-depth analysis of flow fluctuations downstream of the Project. The National Oceanic and Atmospheric Administration, National Marine Fisheries Service and Kleinschmidt

Associates, on behalf of DESC, presented information regarding water level fluctuations in the Augusta Shoals as they relate to reregulation of J. Strom Thurmond flows. See Appendix A for related meeting notes and presentations.

TABLE 2 SUMMARY OF SAVANNAH RIVER WATER LEVEL FLUCTUATION FREQUENCY VERSUS STEVENS CREEK PROJECT FLASHBOARD STATUS

Daily Fluctuation (ft)	Flashboards Down		Flashboards Up	
	Frequency	Cumulative Frequency	Frequency	Cumulative Frequency
0.0	0.21%	0.2%	0.00%	0.0%
0.5	10.01%	10.2%	51.91%	51.9%
1.0	23.34%	33.6%	29.18%	81.1%
1.5	23.84%	57.4%	8.91%	90.0%
2.0	15.44%	72.8%	4.45%	94.5%
2.5	11.85%	84.7%	2.00%	96.5%
3.0	6.70%	91.4%	1.00%	97.5%
3.5	4.72%	96.1%	0.64%	98.1%
4.0	2.54%	98.7%	0.82%	98.9%
4.5	0.92%	99.6%	0.45%	99.4%
5.0	0.28%	99.9%	0.18%	99.5%
5.5	0.14%	100.0%	0.09%	99.6%
6.0	0.00%	100.0%	0.18%	99.8%
6.5	0.00%	100.0%	0.00%	99.8%
7.0	0.00%	100.0%	0.09%	99.9%
7.5	0.00%	100.0%	0.09%	100.0%
8.0	0.00%	100.0%	0.00%	100.0%

- (b) The 1992 Engineering Analysis (Stone and Webster 1992) estimated a reduction in generation due to flashboard tripping of approximately 23 percent. The primary factor that would result in lost generation is reduced head. However, this is likely an overestimation of losses as many flashboard tripping events occur due to high river flows when head would not be reduced for a period of time. A more accurate estimation of generation losses would require a detailed and sophisticated modeling exercise at fine scale that appears outside the scope of this request. Generally, the Stevens Creek Project generates more electricity when the flashboards are tripped. DESC compared periods from 1998 to 2023 when both daily generation and flashboard status was available. Generation during periods when flashboards were down averaged 226,578 kilowatts (kWh) per day versus 161,469 kWh per day when flashboards were up – a difference of approximately 40 percent (Figure 1). As indicated, higher generation during flashboard tripped events is assumed to be due in large part to the higher flow availability and the gross head of the Stevens Creek Dam during the early part of the periods when the flashboards were down.

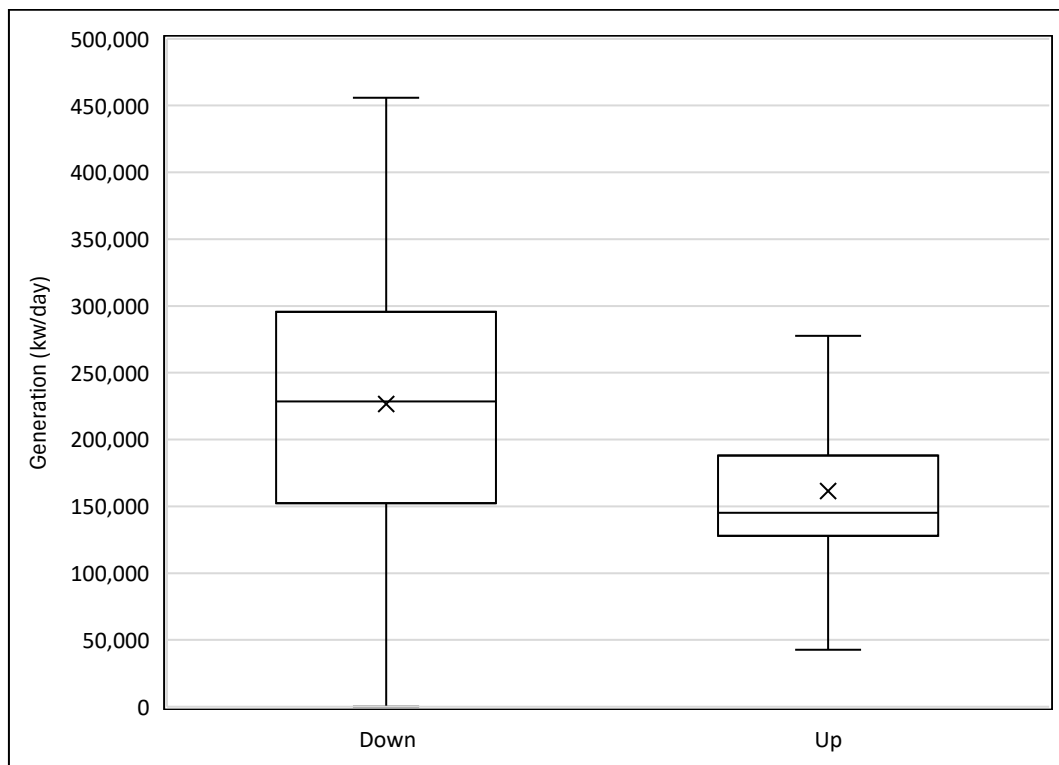


FIGURE 1 STEVENS CREEK PROJECT DAILY GENERATION VERSUS FLASHBOARD STATUS

3. **Dominion Energy’s January 8, 2024 letter, in response to NMFS request for additional studies, mentions reviewing the 1992 Engineering Analysis (Stone and Webster, 1992) and notes that the analysis assumed that no modifications to the dam crest would be necessary for potential installation of inflatable dam sections. However, Dominion Energy indicates that additional dam crest stability analyses would be necessary to understand if the existing anchoring system at the spillway would resist additional forces associated with a gate system. Staff understands that new rock anchors were installed at the project 2021.**

To help staff determine the engineering feasibility of replacing or partially replacing the flashboards with adjustable gates, please:

- (a) **Update the 1992 study to determine if the new rock anchors could withstand additional forces generated by replacing or partially replacing the flashboards with adjustable crest gates; and**
- (b) **Include any estimated cost associated with replacing the flashboards with adjustable crest gates.**

DESC Response:

- (a) The 1992 Stone and Webster study (S&W Study) only evaluated the energy benefits and costs associated with increased control of the spillway to reduce flashboard outages via replacement of varying lengths of the five-foot high flashboard system. None of the evaluated alternatives considered the need for dam stabilization.

The current consideration of the flashboard replacement is for the four-foot-high section, which would be replaced by equal height inflatable bladder gates. Some modification to the spillway crest is necessary for anchoring the inflatable bladder onto the structure, which may have slightly negative (but not significant) implications on dam stability. The exact location of a replacement bladder could also have impact on dam stability, as a location downstream of the existing boards would increase water weight atop the structure, increasing stability.

One other alternative examined in the S&W Study was replacement with an eight-foot-high inflatable bladder associated with demolition of the spillway crest, for a shorter spillway length than other four-foot-high bladder alternatives. The eight-foot-high alternative reduces the weight of the spillway due to concrete removal and would thus reduce dam stability. It is unlikely that this alternative would be favorable due to both dam stability implications as well as significant costs associated with the extent of spillway demolition.

Regardless of any potential replacement, a proposed modification would necessitate stability analysis of the affected structure as well as a crest stability analysis. Results of the analyses would be presented with the proposed design for spillway modification. While a cursory examination suggests dam stability implications would be insignificant, verification of such would require performing this analysis.

- (b) Quotes obtained for spillway modification alternatives for a hydroelectric project similar to the Stevens Creek Project were examined for a cost comparison of inflatable bladder versus steel hinged crest gates. The results indicate that crest gates have a capital cost approximately 65 percent higher than bladder options. The S&W Study had a best-case benefit/cost ratio of 0.33, which must exceed 1.0 for a project to be deemed economical. Multiple factors affect the economics associated with crest modification, including cost and life expectancy of the replacement systems, energy value, and energy benefits derived from reduced flashboard outages. Crest gates have a much longer life expectancy than inflatable bladders, but a much higher cost. Equipment cost for both bladder and crest gates have significantly increased since the 1992 study, yet value of project energy has only slightly increased on average (assumed at \$29 per megawatt-hour [MWh] in the S&W Study versus the current average value of \$32.82 per MWh). In addition, the S&W Study used a single year for outage estimates, which was lower than average based on records for multiple recent years. A full economic analysis would be required to determine the benefit/cost ratio with current values and updated flashboard outages.

Additional costs that should be considered related to this type of construction are the challenges of water management to ensure crew safety while working on the dam. High water delays occurred during the Stevens Creek Dam anchoring installation during 2020 – 2021 which resulted in a significant unexpected cost. The upstream U.S. Army Corps of Engineers J. Strom Thurmond hydroelectric facility has a hydraulic capacity that far exceeds that of the Stevens Creek Project which can cause elevated

reservoir levels and spillway flows for extended periods depending on the rainfall in the basin.

Water and Aquatic Resources

- 4. Water quality data suggests that the Stevens Creek Project waters and discharge are generally consistent with state water quality standards except in the Stevens Creek arm of the project reservoir, where dissolved oxygen (DO) concentrations are frequently low, which can alter the quality and chemistry of the water, as well as affect the growth and survival of aquatic organisms in Stevens Creek and potentially downstream.**

Section 3.2.1.3, Water Quality PM&E Measures, of the license application's Exhibit E, states that Dominion Energy has developed a draft Stevens Creek Water Quality Adaptive Management Plan (AMP) that it proposes be incorporated into any new license issued for the Stevens Creek Project. The draft water quality AMP (a) describes existing project operations and the goals of the plan, (b) includes provisions for establishing a review committee, and (c) outlines a schedule for filing a final plan within 90-days of license issuance and implementing the plan's provisions. However, section 5 of the plan does not contain any details of the measures that would be implemented within the framework of the Stevens Creek Water Quality AMP.

To ensure that details of the Stevens Creek Water Quality AMP are available for review by Commission staff, and that staff has sufficient information to inform an environmental analysis of the plan, please provide a detailed description of the measures that may be included in Section 5.0 of the plan.

DESC Response:

DESC and stakeholders met on January 30, 2025, to discuss the Stevens Creek Project Water Quality Adaptive Management Plan (AMP). In addition to DESC and its consultant, staff from the following agencies were in attendance: Georgia Department of Natural Resources, Environmental Protection Division; Georgia Department of Natural Resources, Wildlife Resources Division; National Oceanic and Atmospheric Administration, National Marine Fisheries Service; South Carolina Department of Environmental Services; South Carolina Department of Natural Resources; United States Army Corps of Engineers; and United States Forest Service. The group discussed including the following measures in Section 5.0 Implementation of the AMP: 1) continuous water quality monitoring; 2) water quality monitoring data review; 3) modeling assessment; 4) annual AMP consultation and reporting; and 5) development of a Water Quality Management Plan. A revised draft of the Water Quality AMP has been included as Appendix B and includes a more detailed description of the five implementation measures. Consultation documentation is attached to the AMP.

5. **Appendix E-8 of the license application and the July 24, 2024, Water Quality Report include tables and figures summarizing the results of the two water quality studies conducted at the project in 2021 and 2023. To facilitate Commission staff's review of the study results, please provide the water temperature and DO data for the two studies in electronic (excel) format.**

DESC Response:

The requested data has been filed electronically with this response.

Appendix A

Consultation Documentation



Stevens Creek Project AIR - Intent to Consult

From Jennifer Gut <Jennifer.Gut@KleinschmidtGroup.com>

Date Tue 11/26/2024 2:09 PM

To Aaron Gray - GADNR <aaron.gray1@dnr.ga.gov>; Bryant Bowen - GADNR <bryant.bowen@dnr.ga.gov>; Clint Peacock - GADNR <Clint.Peacock@dnr.ga.gov>; David Hedeem - GAEPD <david.hedeem@dnr.ga.gov>; Derrick Miller - USFS <derrick.miller@usda.gov>; Dewey Richardson - GAEPD <dewey.richardson@dnr.ga.gov>; Elizabeth Booth - GAEPD <booth.elizabeth@dnr.ga.gov>; Elizabeth Miller - SCDNR <millere@dnr.sc.gov>; Eric Bauer - USFWS (GA) <eric_bauer@fws.gov>; Fritz Rohde - NMFS <Fritz.Rohde@noaa.gov>; Keith Whalen - USFS <james.whelen@usda.gov>; Jamie Sykes - USACE <James.A.Sykes@usace.army.mil>; Jason Bettinger - SCDNR <bettingerj@dnr.sc.gov>; Jeffery Williams - GADNR <Jeffery.Williams@dnr.ga.gov>; Kevin Mack - NMFS <kevin.mack@noaa.gov>; Garvey, Kimberly L CIV USARMY CESAS (USA) <kimberly.l.garvey@usace.army.mil>; Melanie Olds - USFWS (SC) <melanie_olds@fws.gov>; Pace Wilber - NMFS <Pace.Wilber@noaa.gov>; William R. "Rusty" Wenerick <Rusty.Wenerick@des.sc.gov>; Stan Simpson - USACE <Stanley.L.Simpson@usace.army.mil>

Cc Amy Bresnahan (DESC Generation - 8) <amy.bresnahan@dominionenergy.com>; Andrew Rollins (DESC Generation - 8) <andrew.rollins@dominionenergy.com>; Caleb Gaston (Services - 6) <caleb.gaston@dominionenergy.com>; Alison Jakupca <Alison.Jakupca@KleinschmidtGroup.com>; 'Jeanne Edwards' <Jeanne.Edwards@ferc.gov>

 1 attachment (275 KB)

FERC_AIR No.2_20241125-3055_P-2535-129_Stevens_Creek.pdf;

Good afternoon all,

I hope this email finds you well. The attached Additional Information Request (AIR) was issued by the Federal Energy Regulatory Commission (Commission) November 25, 2024, for the relicensing of the Stevens Creek Hydroelectric Project (FERC No. 2535). Within the AIR, the Commission requested that Dominion Energy provide a detailed description of the implementation measures for the proposed Water Quality Adaptive Management Plan (WQ AMP). To address this request, Dominion Energy intends to convene a meeting with WQ AMP Committee Members in early 2025, which includes this group. I will reach out again within the next several weeks with a scheduling poll.

Thanks, and I hope you have a wonderful Thanksgiving Holiday!

Best,

Jenn

Jennifer A. Güt

Regulatory Consultant

Kleinschmidt

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MEETING NOTES
Stevens Creek Hydroelectric Project (FERC No. 2535)

Dominion Energy South Carolina, Inc.
Fish Passage Technical Working Committee

December 4, 2024

Final JAG 3/7/25

MEETING ATTENDEES¹:

Taylor Allen ^a – Dominion Energy	Alison Jakupca – Kleinschmidt
Ray Ammarell – Dominion Energy	Bjorn Lake ^a – NMFS
Eric Bauer ^a – USFWS	Kevin Mack – NMFS
Audrey Bauhan – Dominion Energy	Paula Marcinek ^{a,b}
Jason Bettinger ^a – SCDNR	Elizabeth Miller – SCDNR
Bryant Bowen ^a – GAWRD	Jason Moak ^a – Kleinschmidt
Amy Bresnahan – Dominion Energy	Bill Post – SCDNR
Caleb Gaston – Dominion Energy	Will Pruitt ^a – Kleinschmidt
Aaron Gray ^a – GAWRD	Fritz Rohde – NMFS
Jenn Güt – Kleinschmidt	Andrew Rollins – Dominion Energy
Andy Herndon ^a – NMFS	Paul Vidonic – Dominion Energy
Fritz Hoogakker – Dominion Energy	Ellen Waldrop ^a – SCDNR

^a attended virtually

^b outside expert as outlined in the FPTWC Rules of Operation

Not in Attendance: USFS

These notes are a summary of the major points presented during the meeting and are not intended to be a transcript or analysis of the meeting.

MEETING PURPOSE: The purpose of the meeting was to review the process and planning/siting study development of fish passage for the Stevens Creek Hydroelectric Project (Project).

Alison, Kleinschmidt, began the meeting with a welcome and led introductions of the Fish Passage Technical Working Committee (FPTWC, group, or committee). Amy, Dominion

¹ Abbreviations/Acronyms: GAWRD = Georgia Wildlife Resources Department; Kleinschmidt = Kleinschmidt Associates; NMFS = National Marine Fisheries Service; SCDNR = South Carolina Department of Natural Resources; USFWS = United States Fish and Wildlife Service; USFS = United States Forest Service

Energy, provided relevant information about the meeting building to in-person attendees and led a safety moment.

NSBLD/ADD Update

Kevin, NMFS, provided an update on the trial-type hearing regarding the Augusta Diversion Dam (ADD). The trial-type hearing has concluded, and the ALJ² has made the decision to dismiss the City of Augusta's hearing request. The case files were provided to FERC³ on December 3, 2024, and the decision is now on the ADD docket. Bjorn, NMFS, added that the next steps are up to FERC; FERC will either issue the license for ADD or re-do their NEPA⁴ process. It is anticipated that the City of Augusta will take FERC to circuit court to continue to challenge the ADD license.

Andy, NMFS, provided an update on the New Savannah Bluff Lock and Dam (NSBLD). On December 3, 2024, the Federal House and Senate reconciled the competing Water Resources Development Act (WRDA) amendment as it relates to the Savannah Harbor Expansion Project and fish passage at NSBLD. Significant changes were made regarding the requirements for NSBLD; there is no longer language in WRDA requiring a full-width rock-ramp arch, just a bypass around the dam. There was also revised language regarding maintaining the pool elevation and repairing the dam. The revised WRDA amendment is vastly different than what NMFS was anticipating.

Flows Analysis

Kevin provided a presentation titled "Potential Impacts to Diadromous Fish Habitats in the Middle Savannah River", which included an analysis of flows at the Project. This information was filed on the Project FERC docket on October 2, 2024, by NMFS in response to Scoping Document 2.

In summary, flow duration curves for the period from 2017 to 2023 were generated using sub-daily measures of discharge recorded every 15 minutes for Stevens Creek and the Savannah River using the Upper Stevens Creek and NSBLD gages (USGS⁵ gage nos. 021960000 and 02197000, respectively). The disparity in flows and peaking operations at J. Strom Thurmond dam (JST), which is operated by the United States Army Corps of Engineers (USACE), results in pulses of water in the Savannah River reaching the Project dam and back watering the mouth of Stevens Creek. According to NMFS, the unusual hydrology contributes to poor water quality in the Project impoundment and interrupts sediment transport in and from Stevens Creek. The flow duration curve for the Savannah River

² ALJ = Administrative Law Judge

³ FERC = Federal Energy Regulatory Commission

⁴ NEPA = National Environmental Policy Act

⁵ USGS = United States Geological Survey

indicates discharges from JST exceed the Project capacity of 8,300 cubic feet per second (cfs) for about 32 percent of the year. Sub-daily variations in water level greater than 1 foot occur on 46 percent of days during the period of record (2017 to 2023), and water levels vary by 2 feet or more on 18 percent of days. Sub-daily range in gage height at the Augusta Shoals was higher on days when flashboards were down at the Project compared to days when all flashboards were up. During the spawning periods for the endangered Atlantic sturgeon (ATS) and shortnose sturgeon (SNS), who are expected to use the Augusta Shoals as spawning habitat following passage implementation at NSBLD, sub-daily variations in water level greater than 1 foot occur on 44 percent of days during the period of record; water levels vary by 2 feet or more on 16 percent of days. For the purposes of data visualization, May 10, 2023, was classified as an "average day" and July 11, 2023, as a "non-average day", which is when Project flashboards were down.

Elizabeth, SCDNR, asked if NMFS's analysis considers Stevens Creek flows, which it does. Jason added that the NSBLD gage would also capture flows from Horse Creek. The data was pro-rated accordingly.

According to NMFS, the biggest concern with large water level fluctuations (greater than 2 feet) is if the fluctuation happens quickly, larvae and juveniles could be stranded. Fritz H., Dominion Energy, noted that similar case studies exist where the tidal range reaches 2 feet; Fritz H. asked if those case studies had been reviewed, which they have not been. Fritz H. stated that it appears that there are reduced changes at the Augusta Shoals, which is a direct function of reregulation at the Project.

Ray explained the typical spring and summer peaking operations at JST and reregulation at the Project. While JST is not generating, the Project reservoir is depleting as operators attempt to release the daily average flow. As the reservoir depletes, Project generation is reduced to wait for the release from JST to occur. Project operators adjust wicket gates rather than turn on and off turbines. The Project typically receives more than its capacity of 8,300 cfs from JST instantaneously. What Project operators are trying to prevent is the flashboards from tripping when the slug of water from JST is released.

Kevin clarified that he presented data in both water elevation and discharge metrics but not all gages measure discharge. Ray added that there is a time lapse between what is occurring at the Project and the NSBLD gage, which is currently unknown. Kevin further explained that NMFS established ideal water level ranges based on the variation in available data; there is not a report that NMFS has found that discusses how/what water level fluctuations affect ATS and SNS. The issue of concern is a rapid decline in water levels; for example, water in the Augusta Shoals declined 3 feet in 11 hours on the "non-average day" (July 11, 2023), which is when Project flashboards were down. Fritz H. asked the frequency of tripped flashboards during sturgeon spawning season. The answer varies, but in the case of July 11, 2023, the flashboards were down for 11 days. Ray added that the flashboards can be down

for a while in the winter and spring due to high flows. Fritz H. to investigate the frequency of flashboards down during sturgeon spawning season. Bill, SCDNR, inquired if GAWRD had any environmental data in the Augusta Shoals during July 2023 to determine if there is high temperature and/or low dissolved oxygen. Bryant, GAWRD, responded that Georgia Southern University has been handling data collection in the Augusta Shoals; GAWRD will attempt to receive the data from the university. Bryant clarified that GAWRD typically collects samples in the spring and fall. Andy added that some applicable data may be available in the ADD Biological Opinion (BiOp) issued by NMFS.

Amy pointed out that during 2020 and 2021, anchoring was being conducted at the Project. These years were wet years, and the flashboards were down a good amount, which indicate 2020 and 2021 were not “typical” years in terms of tripped flashboards.

Bill asked when ATS and SNS are present in the Augusta Shoals. Andy responded that the ADD BiOp assumed a broad range with SNS present from January through March along with some ATS. The month of June was also included based on tracking data. It is unclear whether there is a spring run of ATS but there is some evidence elsewhere to suggest the possibility. There is definitely a fall run of ATS up the Savannah River occurring from August through October. Bill added that there is evidence of spring spawning based on telemetry data; SCDNR is currently trying to verify the ATS spring spawning run with genetics.

Andy stated that NMFS is assuming there will eventually be fish passage at NSBLD, and sturgeon will be passed upstream to the Augusta Shoals. NMFS further expects that there will be requirements from the City of Augusta and/or Dominion Energy to pass a certain amount of water over the Augusta Shoals, which would not be triggered until work is completed at NSBLD.

Kevin concluded that the intent of NMFS’s comments on Scoping Document 2 was to inform FERC; however, it also provided beneficial knowledge for NMFS. Fritz H. stated that he would like to explore the biological implications of Kevin’s work in further detail. Caleb, Dominion Energy, added that comparing what is happening at the Jefferson Davis Bridge gage (USGS gage no. 02196670) is helpful for the Project, which is likely a better task for the Water Quality Adaptive Management Plan (AMP) group.

Alison spoke of the NMFS analysis being helpful for Dominion Energy in analyzing flows at the Project, leading Dominion Energy to discover more information regarding flows. Jason, Kleinschmidt, provided a presentation which discussed the additional flow analysis for the Project. Dominion Energy has at its disposal HEC-RAS⁶ transect data through the Augusta

⁶ HEC-RAS = Hydrologic Engineering Center River Analysis System; HEC-RAS is simulation software used in computational fluid dynamics – specifically, to model the hydraulics of water flow through natural rivers and other channels; HEC-RAS was developed by the United States Army Corps of Engineers.

Shoals; the cross sections were provided by USACE. Jason highlighted that the last visible section of shoals on Google Earth is approximately 4.6 miles downstream from the ADD. There is an approximately 40-foot decrease in elevation between the most upstream and downstream portions of the Augusta Shoals. In reality, the shoals are step-pool in nature; the cross sections were conducted 0.5 miles apart from one another. On an “average day” (May 10, 2023), an approximately 0.2-mile stretch of the Augusta Shoals (7 hectares; 2.8 percent of total area) is affected by water level fluctuations. Andy asked how the highest water level recorded at the gage transfers to the Augusta Shoals. Jason responded that the highlighted areas are likely to experience the most effects from fluctuations. Bjorn added that from his perspective the area below the “Gauge Lo” elevation is less affected than the area upstream of the “Gauge Lo” elevation. Andy added that the percentage of shoals affected would change based on the flow fluctuations.

Elizabeth inquired of the type of gage at the Jefferson Davis Bridge and how it was deployed. Jason responded that it is either a sonic or radar gage and is deployed on the bridge pointing down at the water surface. He believes the gage is relatively center on the bridge. Jason added that the width of the river in that area is approximately 600 feet; the river can reach up to approximately 1,200 feet in width within the Augusta Shoals.

On a “non-average day” (July 11, 2023), there is a bigger difference between the high and low water surface elevations which equates to 5.5 percent (13.8 hectares) of the Augusta Shoals being impacted.

Jason reviewed the results from the Augusta Shoals IFIM⁷ study that was conducted in the early 2000s. In summary, a 1-foot increase in depth equates to an approximately 4,000 cfs increase in flow. Therefore, an increase from 1 foot to 3 feet in Augusta Shoals water levels would represent a 26,000 cfs fluctuation.

Jason then reviewed some results from the Southeastern Natural Sciences Academy (SNSA) Augusta Shoals Flow Pilot Study. In summary, over 90 percent of daily water fluctuations were less than 1 foot during the 10-month period in 2008 that SNSA continuously monitored the shoals; there were no instances of water level fluctuations over 2 feet. The highest flows may have been approximately 26,000 cfs. It was noted that 2008 was a record-breaking drought year and is likely not representative of an average year.

Jason concluded that data from the Jefferson Davis Bridge gage is indicative of only a small portion of the Augusta Shoals. In addition, 90 percent of water level fluctuations were less than 1 foot; 10 percent is a pretty small percentage to mitigate. Jason added that one thing that was not considered in the flows analysis but likely has an effect is the Augusta Canal. The canal gates usually stay at a consistent height; however, as sections are closed/re-

⁷ IFIM = Instream Flow Incremental Methodology

opened from work, it could look like fluctuations in the Augusta Shoals. Kevin noted that there is good news in that it appears that the Project is not having as big of an impact on the Augusta Shoals as perhaps previously believed. NMFS has been able to confirm that there is a connection between available gage data and what is happening at the Augusta Shoals. Jason believes that the gage data and flows analysis can help determine the biological relevance of water level fluctuations in the Augusta Shoals.

Fritz H. inquired about the availability of imagery in the Project area that might help answer questions about water level. Jason replied that while there have been advances in AI⁸ in aerial imagery to estimate river flows, the methodology requires calibration data, which does not currently exist for the Project area.

American Eel Passage

Caleb provided an overview of the Spring 2025 Eel Study Plan. The study plan was developed in consultation with Kevin M. and Fritz R. from NMFS. Dominion Energy staff executed preliminary surveys for upstream-migrating eels at the Project dam in April and August of 2024. Dominion Energy will continue to investigate American eel population in the vicinity of the Project in March through May 2025. In summary, sampling efforts will include boat electrofishing below the dam, deployment of eel pots above and below the dam, and a temporary eel ramp installed below the powerhouse. All eels captured below the Project dam will be marked with coded wire tags and those captured above the dam would be fin clipped; all eels will be released at the site of capture.

Dominion Energy will conduct electrofishing of seven transects once in each two-week period from March through May 2025 and will attempt to target sampling during the new moon phase. Dominion Energy will place three eel/elver pots, one per site, in the Stevens Creek mouth. The remaining two pots will be placed along the Georgia shoreline. The FPTWC discussed bait options for the elver pots. Blue crab was very successful at Roanoke Rapids, but it was agreed that crab may be difficult to obtain and that the bait used should be something more readily available; herring was selected, which was amenable with NMFS. The pots will be deployed for one night in each two-week period from March through May.

The temporary eel ramp will be installed along the exposed shoreline on the Georgia side of the Savannah River, with hopeful anchoring. Attraction flow will be provided from the collection tank and from the tailrace. Caleb asked the group if the source of the attraction flow was important to them. Kevin responded that using flow from the collection tank is best because eels can smell other eels. Bill added that attraction flow from collection will be essential for a permanent structure but recognizes that it may not be feasible for the

⁸ AI = Artificial Intelligence

temporary eel ladder. Bjorn agreed with Bill that Dominion Energy should try to cycle the collection trap water as much as possible.

Taylor, Dominion Energy, explained that the temporary eel trap is made of metal (never wood) and consists of 30-foot sections that fall into a trashcan. Bjorn is favorable of using material that will last and potentially re-using it for a permanent structure. Bjorn suggested that Dominion Energy should consider some anti-predation measures for the ramp and ensure the trap reservoir is tightly contained so eels do not escape. Bill added that a channel of Enkamat should also be deployed on the temporary eel ramp to assist the navigation of smaller eels. NMFS stated their interest in reviewing proposed eel ramp designs.

Elizabeth asked what the elevation fluctuation is where the ramp is proposed to be deployed. Ray will investigate and inform the committee.

Dominion Energy will need to be permitted through the USDA⁹ to use AQUI-S, a solution for anesthetizing eels. Dominion Energy will begin the permitting process soon. Bill noted that Dominion Energy will need a collection permit from both South Carolina and Georgia to conduct the study.

Elizabeth suggested monitoring the water temperature of the collection basin to ensure it does not get too warm. The committee discussed that the collection basin will have circulating flow. A cooler could also be used instead of a trashcan to reduce temperatures. Dominion Energy will deploy a temperature logger in the vicinity of the tailrace during the monitoring period. It was confirmed that the target angle for the temporary eel ladder is 45 degrees.

The group discussed that the next FPTWC meeting could be held during the eel study plan season and be a Project site visit.

Alison asked NMFS if the Spring 2025 Eel Study Plan will collect data that is informative for NMFS to develop the Project fish passage prescription (Rx). Kevin replied that, yes, the study could help with developing targets. Pace, NMFS, added that NMFS will have another chance to modify the Rx to tie it to FERC's Environmental Assessment, which would be after the Ready for Environmental Assessment (REA) notice. Alison commented that the FPTWC could continue to add to and edit the Fish Passage AMP, which could discuss the eel study plan; Alison added that the AMP will be the most helpful for FERC to reference.

Kevin is comfortable with the proposed Spring 2025 Eel Study Plan but noted that the FPTWC previously discussed some alternative methods to the temporary eel ramp such as trying to locate eels on the face of the Project dam. Caleb replied that some considerations were

⁹ USDA = United States Department of Agriculture

eliminated for various reasons. For example, Dominion Energy opted to do daytime sampling due to safety concerns and staff availability.

Elizabeth asked if backpack electrofishing could be conducted at the Project. Caleb responded that the topography of the Project area does not lend itself to backpack electrofishing.

Caleb will make minor edits to the Spring 2025 Eel Study Plan and distribute it to the FPTWC.¹⁰ Alison asked if/when the committee felt comfortable including the study plan in the Fish Passage AMP. Kevin responded that including it could be useful for the group, but NMFS believes that it is pre-mature to file the Fish Passage AMP with FERC.

Alosine Passage

Fritz H. provided a presentation to the FPTWC about a Stevens Creek Habitat Suitability Study. In summary, Hightower et al. 2012¹¹ updated American shad HSI¹², and that model is currently considered the most accurate. Dominion Energy proposes to apply the Hightower et al. 2012 methodology to the Stevens Creek watershed through measuring habitat values, such as substrate, mean depth, and mean current velocity. Temperature was removed in Hightower et al. 2012's application because of high Spring variability; Dominion Energy is proposing to collect temperature for the study but not use it for the HSI model. Dominion Energy proposes a dissolved oxygen cut-off of 5.0 milligrams per liter. Other parameters recorded would include wetted width, pH, conductivity, types of cover present, and turbidity. Dominion Energy proposes to sample 30 stations located on Stevens Creek and Turkey Creek; 9 stations were identified in the 2005 Diadromous Fish Restoration Plan and the remaining 21 stations will be assigned for every 2.5 river kilometers of Stevens Creek. However, Dominion Energy noted that they are still working through access of Stevens Creek and Turkey Creek sampling stations, and as such they may not be able to sample the upper approximately 5 miles of Turkey Creek or Price's Mill in Stevens Creek. Fritz H. anticipates two to three days of field work for the study and proposes to conduct it on representative days during the American shad spawning period.

Fritz H. commented that this data collection could also be useful for investigating robust redhorse potential habitat in the future should the FPTWC desire. Bill to send Fritz H. a paper regarding robust redhorse spawning analysis.

¹⁰ The final Spring 2025 Eel Study Plan was distributed to the FPTWC via email by Caleb on December 17, 2024.

¹¹ Hightower, J.E., J.E. Harris, J.K. Raabe, P. Brownell, and C.A. Drew. 2012. A Bayesian spawning habitat suitability model for American shad in southeastern United States rivers. *Journal of Fish and Wildlife Management* 3(2):184-198. doi: <https://doi.org/10.3996/082011-JFWM-047>.

¹² HSI = Habitat Suitability Index

Kevin asked for further details on what work would occur at a sampling station. Fritz H. responded that they would sample transects to obtain mean depth. They may also attempt to calculate mean velocity but may choose to present maximum velocity. Fritz H. proposes to sample quadrats across the wetted width to record sediment but may conduct a sediment grab depending on water depth. The committee discussed the possibility of using side-scan sonar, but the topography is likely not conducive for the methodology. It was noted that during the 2023 Water Quality Study for the Project, scientists were able to travel up Stevens Creek past the confluence with Horn Creek but not as far as the confluence with Lloyd Creek.

Paul, Dominion Energy, inquired of the group if changes are anticipated in the future since Stevens Creek is a flashy system, and thus, would the study need to be repeated. Fritz H. explained that 30 sampling stations will allow them to collect from variable areas. Fritz H. believes that they may record sediment differences spatially but not temporally.

Bjorn asked for more detail on what Dominion Energy considers a representative day during the American shad spawning period. Bjorn explained that depth and velocity is dictated by flow. Fritz H. responded that Dominion Energy is seeking guidance on such considerations. They would ideally aim for flows that were on the high end but safe enough to still conduct the study.

Elizabeth inquired if there was a plan to account for flows coming from JST. Caleb replied that they will track the time of measurements and look at JST flows during that time accordingly. Fritz H. added that no matter what JST is doing, the velocity will be extremely low to the point where the variation is likely less than the error. Either way, he does not believe the mouth of Stevens Creek will be suitable spawning habitat.

Dominion Energy is aiming to conduct the Stevens Creek Habitat Suitability Study in Spring 2025. Paul added that it will be ideal to obtain GPS¹³ coordinates of the sampling stations. Fritz H. discussed that they may use a canoe for sampling as some online guidance states Stevens Creek is accessible that far upstream on small, floating vessels.

Alison commented that USFS may have ideas for put-in locations. She also noted to Fritz H. that Jason may have some contact information for landowners in Stevens Creek.

Both NMFS and USFWS agree that the Stevens Creek Habitat Suitability Study could provide useful information for the FPTWC. Fritz H. concluded that he would draft a study plan for distribution and added that Dominion Energy would like to use the results from the study to inform high-level conversations about opening up Stevens Creek to shad and other, potentially invasive, species.

¹³ GPS = Global Positioning System

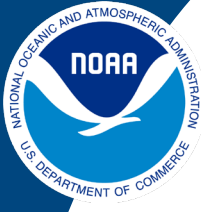
Alison asked the FPTWC if the flow discussions that took place during the first part of the meeting was an evolving topic. Kevin responded that as a member of the Water Quality AMP, NMFS wants to respond to FERC's Additional Information Request as completely as possible, but they recognize that FERC and the committee will likely require some additional analysis. The FPTWC will continue to remain informed on flows in the Project area.

The next meeting was scheduled for Thursday, March 20, 2025, at the Project.

The meeting was adjourned.

ACTION ITEMS:

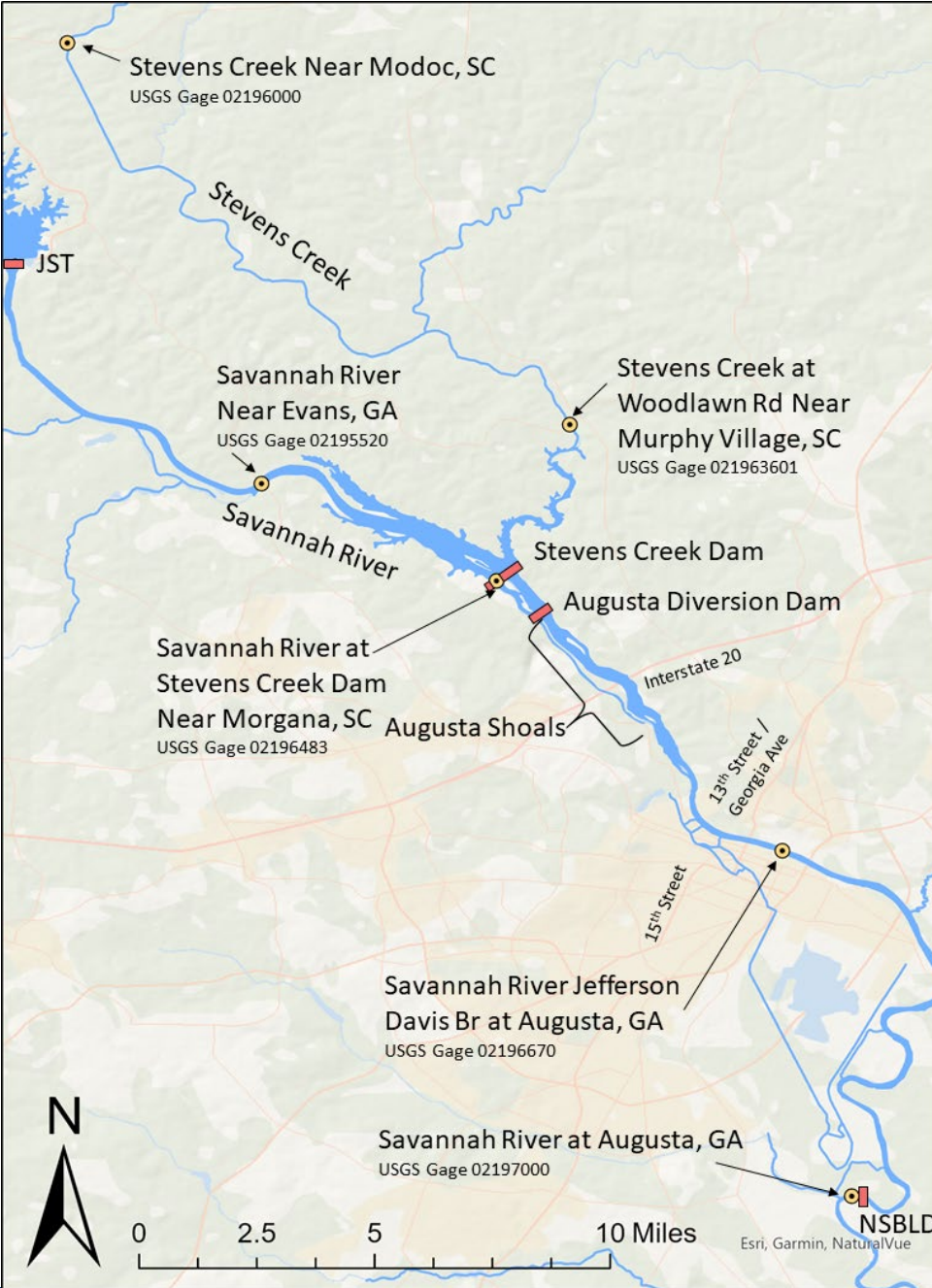
- Dominion Energy/Kleinschmidt to investigate the lag time between measured inflow and outflow for the Project.
- GAWRD to request Augusta Shoals data from Georgia Southern University.
- Dominion Energy to investigate elevation fluctuations in the area where the temporary eel ladder is proposed to be installed.
- SCDNR to provide Dominion Energy with science paper/article that discusses robust redhorse spawning analysis in the Savannah River.



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Potential Impacts to Diadromous Fish Habitats in the Middle Savannah River

Stevens Creek Fish Passage TWC Meeting
December 4, 2024



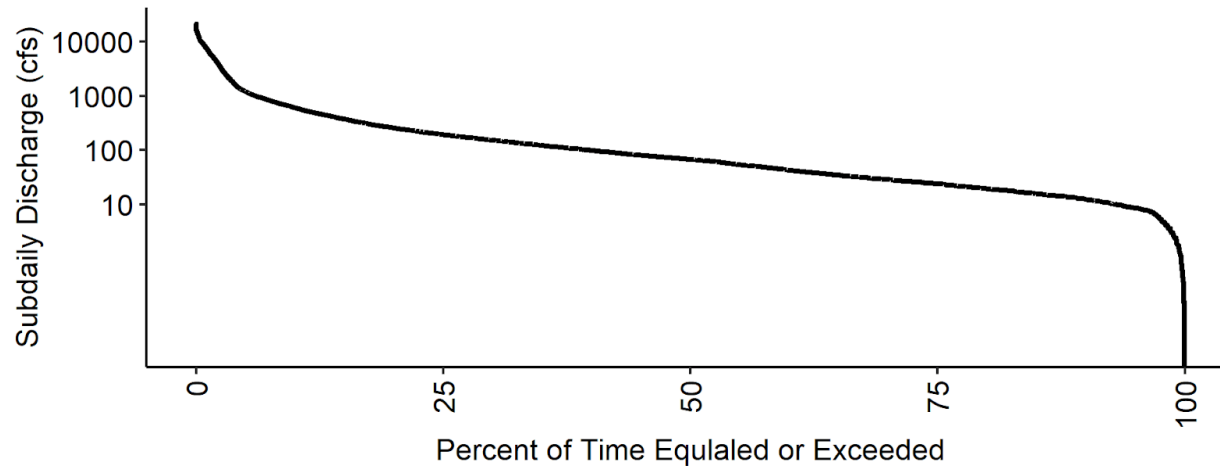
River	Name	Location	Gage Number	Discharge	Gage Height	Surface Elevation NAVD 1988	Surface Elevation above datum
Stevens Creek	Upper Stevens Creek	Near Modoc, SC	02196000	1986	2007	2021	N/A
	Lower Stevens Creek	Woodlawn Rd Near Murphy Village, SC	021963601	N/A	2019	2021	N/A
Savannah River	Below JST	Near Evans, GA	02195520	N/A	2007	N/A*	N/A
	Stevens Creek Dam	Near Morgana, SC	02196483	N/A	N/A	2021	2007
	Augusta Shoals	Jefferson Davis Bridge at Augusta, GA	02196670	2016	2016	2021	N/A
	NSBLD	Augusta, GA	02197000	1986	2007	2021	N/A



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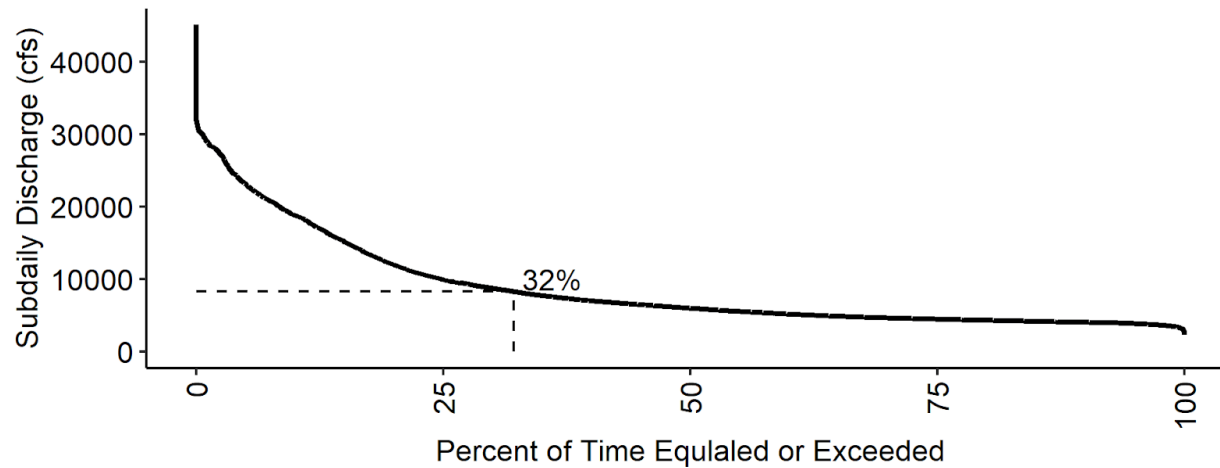
Stevens Creek Flow Duration Curve

USGS No 02196000



Savannah River Flow Duration Curve

USGS No 02197000, Prorated for SCP

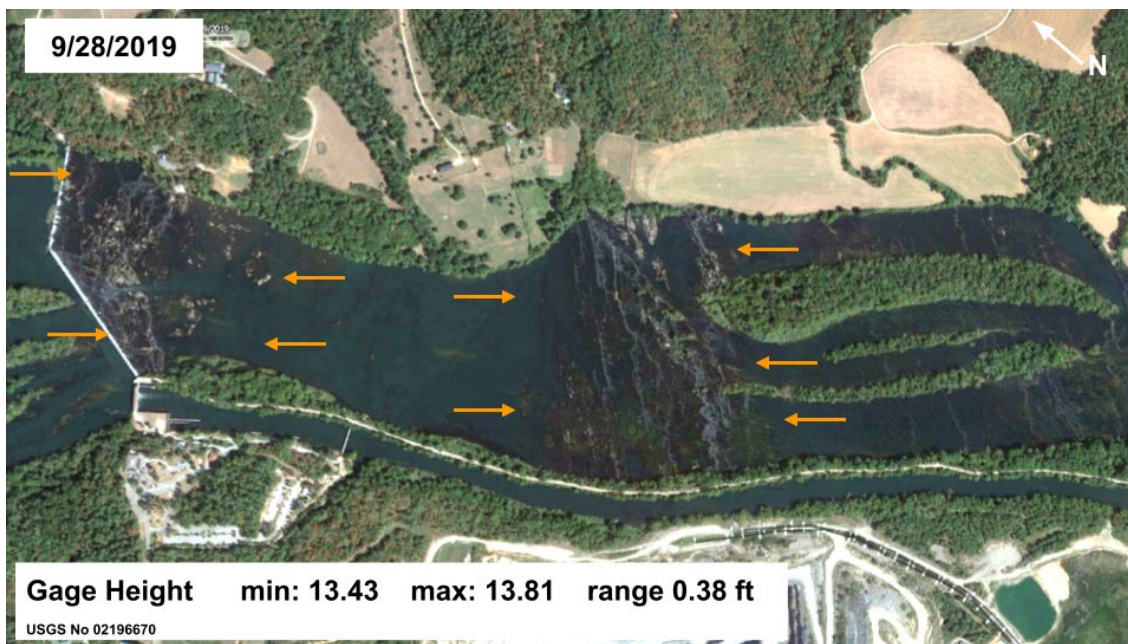


2/28/1999



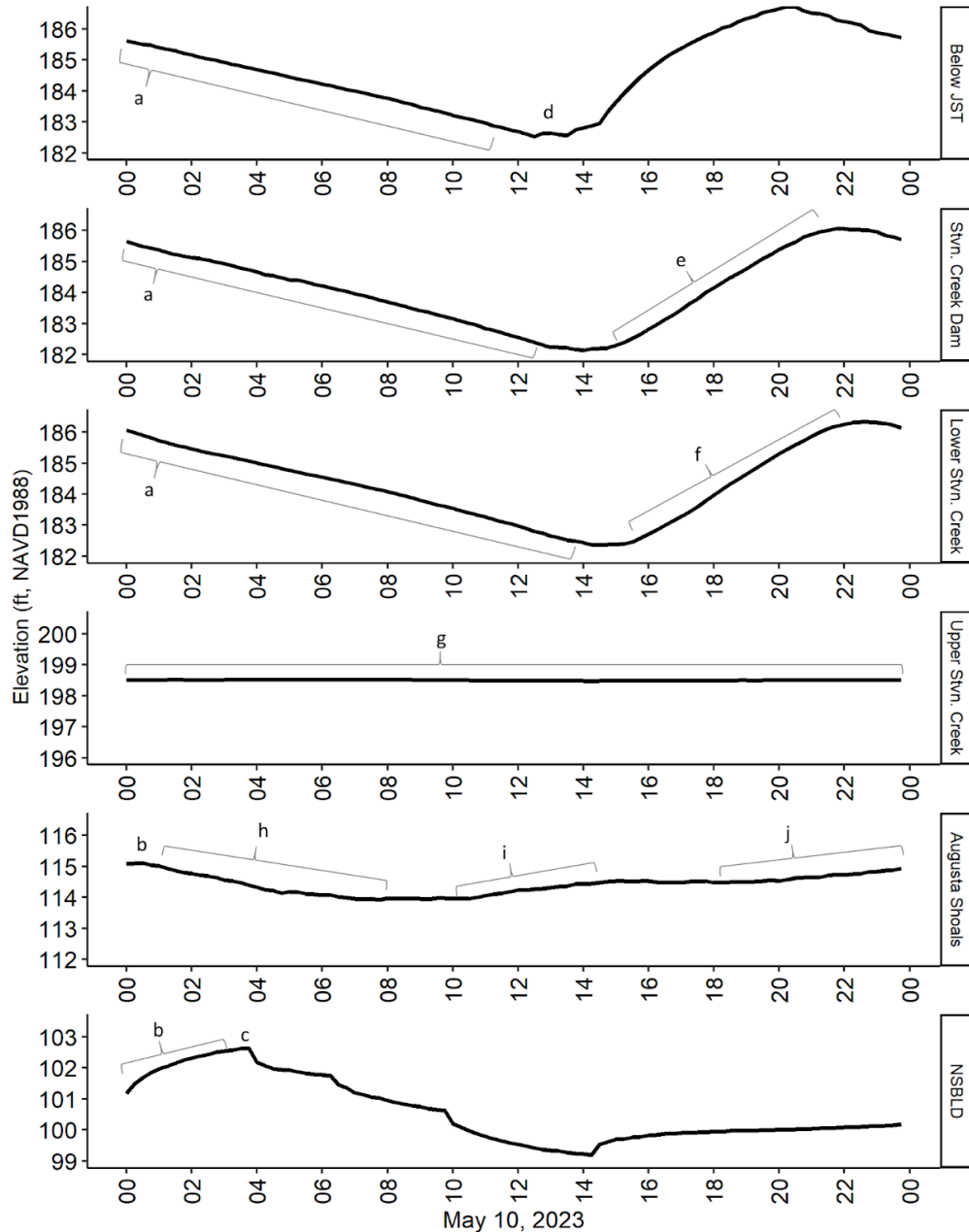
1/20/2020



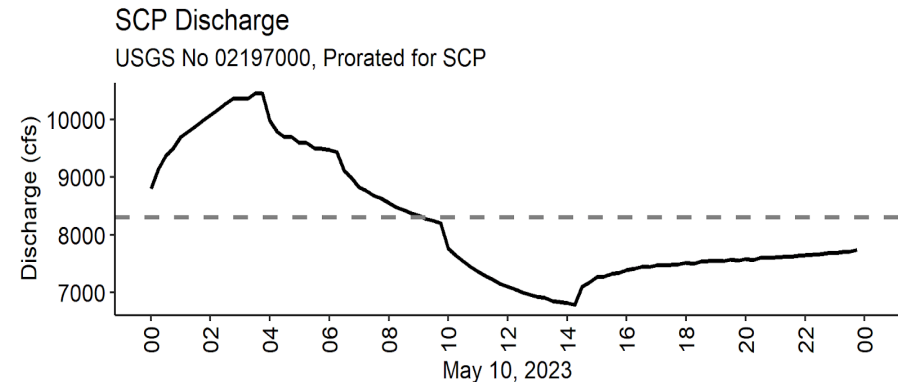


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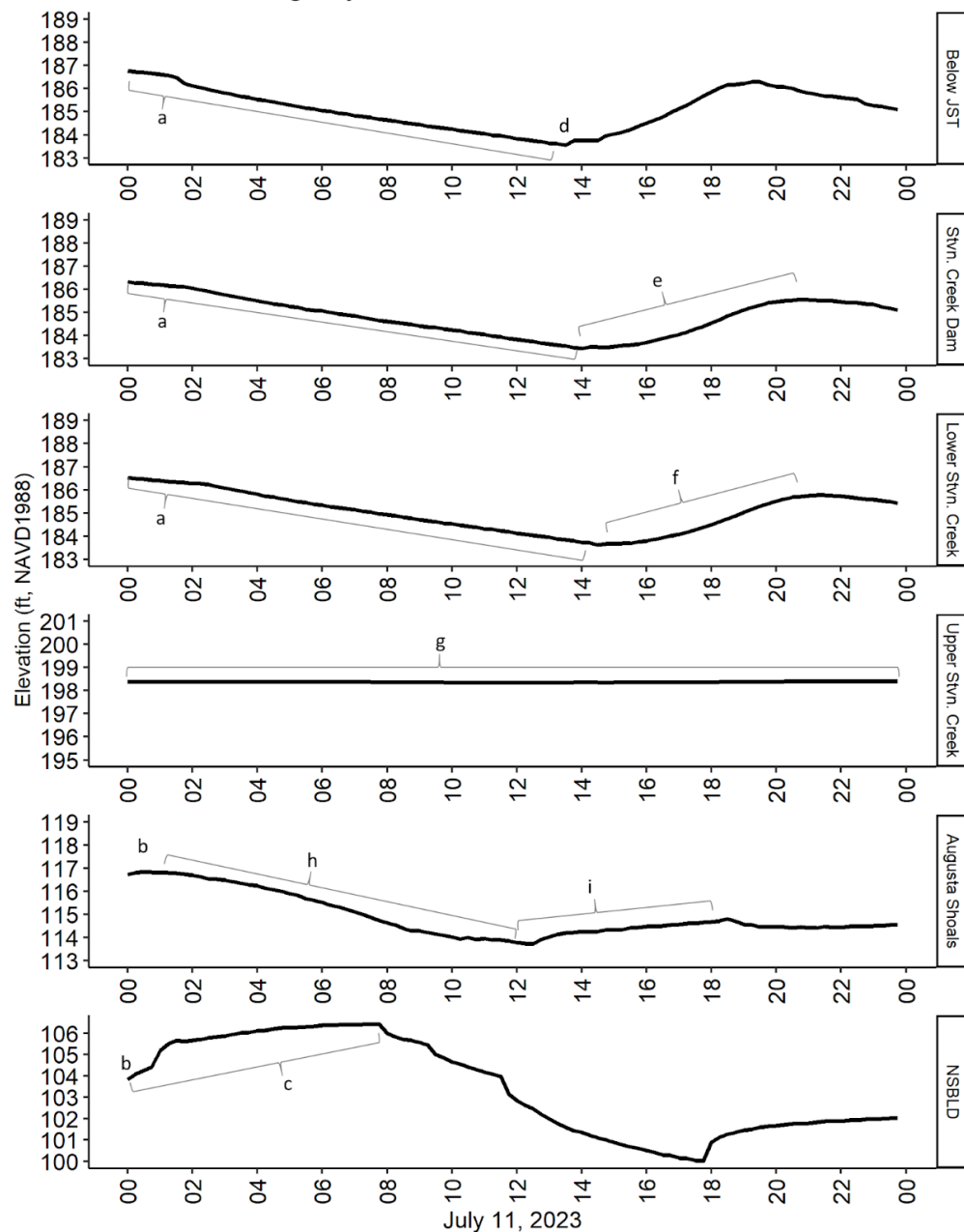
JST Flows through System



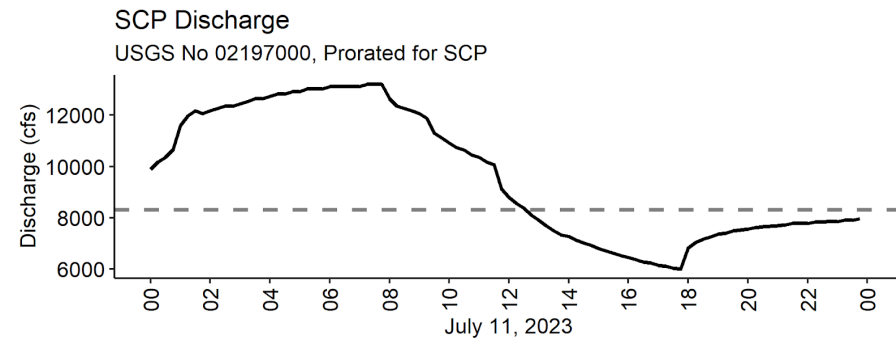
- Water levels declined throughout the morning at the gages upstream of SCP.
- At Augusta Shoals and NSBLD, the previous day's discharges were still moving downstream at midnight.
- At NSBLD, water level peaked a little before 4 am, then began to fall.
- Around 12:30 pm, water levels below JST stabilized, then started to rise as JST began to generate to meet energy demand.
- Water levels begin to rise at SCP around 3 pm and increase by 3.91 feet over about 7 hours. As JST discharges interact with SCP, they are diverted up Stevens Creek, slowing and reversing flow.
- At the Lower Stevens Creek gage water levels began to rise after 3 pm and increase by 3.97 feet over the next 8 hours.
- The Upper Stevens Creek gage experienced very little variation in water level, fluctuating by less than 0.1 feet.
- At the Augusta Shoals, water levels declined by 1.8 feet over a period of about 7 hours from 1 am to 8 am.
- Water levels began to rise a little after 10 am.
- Water levels rose again at the shoals in the evening as JST discharges entered the system from 6 pm to midnight.



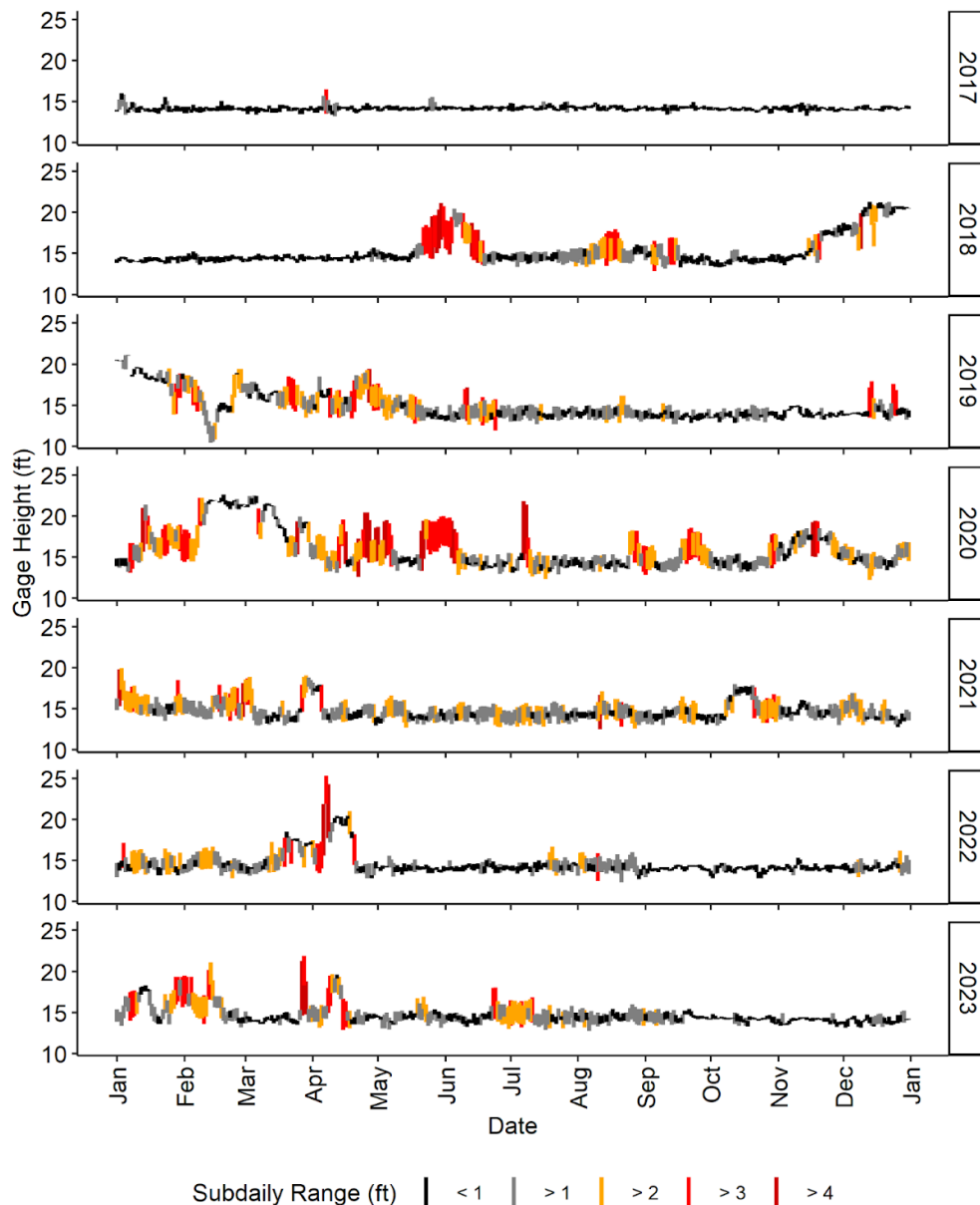
JST Flows through System



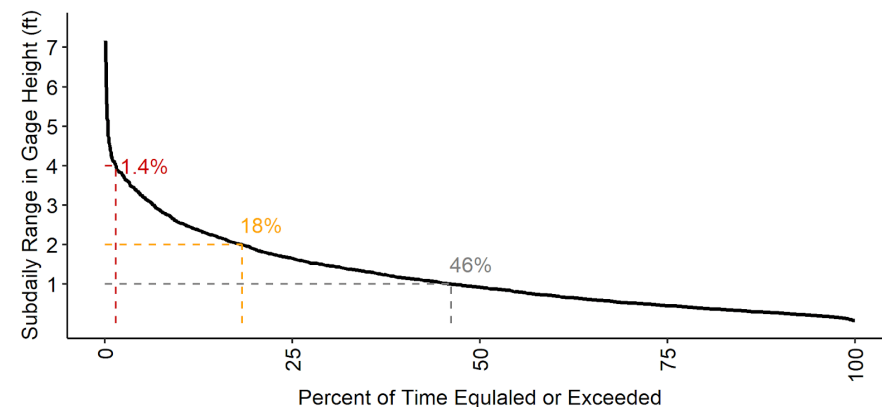
- Water levels declined throughout the morning at the gages upstream of SCP.
- At Augusta Shoals and NSBLD, the previous day's discharges were still moving downstream at midnight.
- At NSBLD, water level continued to rise until about 8 am.
- Around 1:30 pm, water levels below JST started to rise as JST began to generate.
- JST discharges reached SCP around 2 pm and water levels increased by 2.21 feet over about 7 hours.
- At Lower Stevens Creek gage water levels began to rise after 3 pm and increased by 2.15 feet over the next 7 hours.
- The Upper Stevens Creek gage recorded stable water levels throughout the day.
- At the Augusta Shoals, water levels declined by 3.13 feet over a period of about 11 hours from 1 am to 12 pm.
- Then, water levels began to rise from about 12:30 pm to 6 pm.



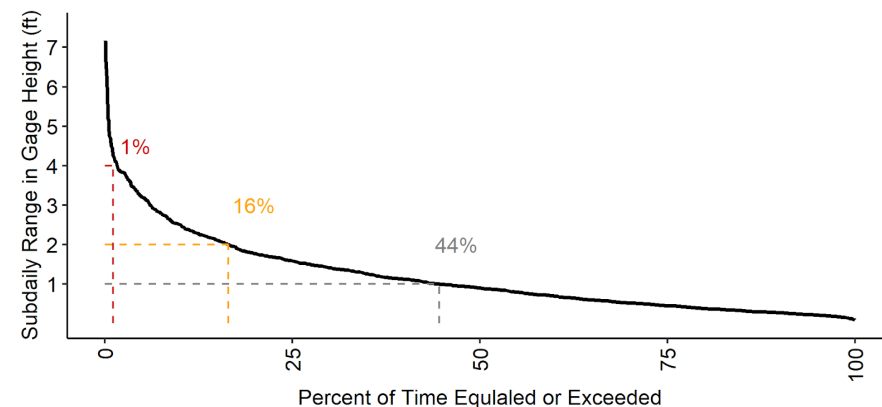
Augusta Shoals USGS No 02196670



Augusta Shoals USGS No 02196670



Augusta Shoals: ATS Present USGS No 02196670



Augusta Shoals: SNS Present USGS No 02196670

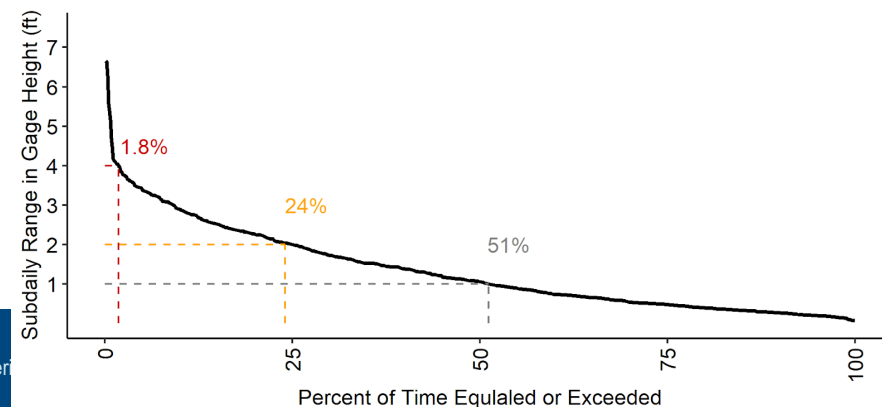
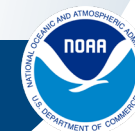
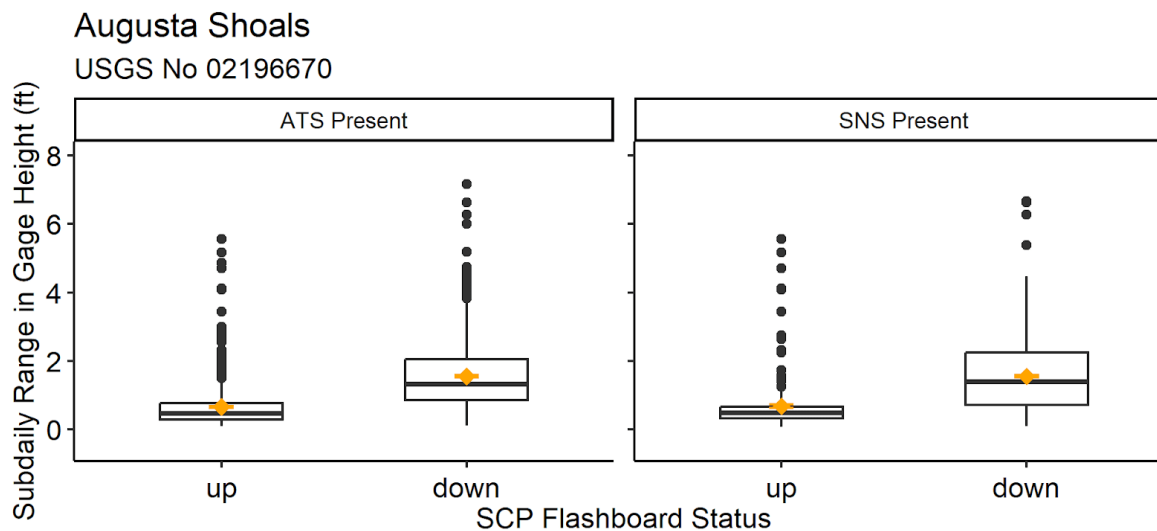
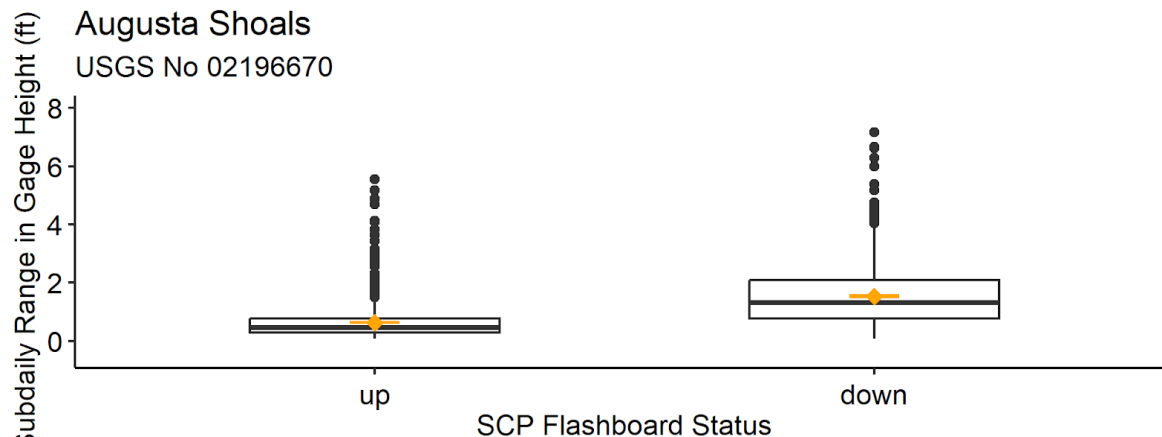


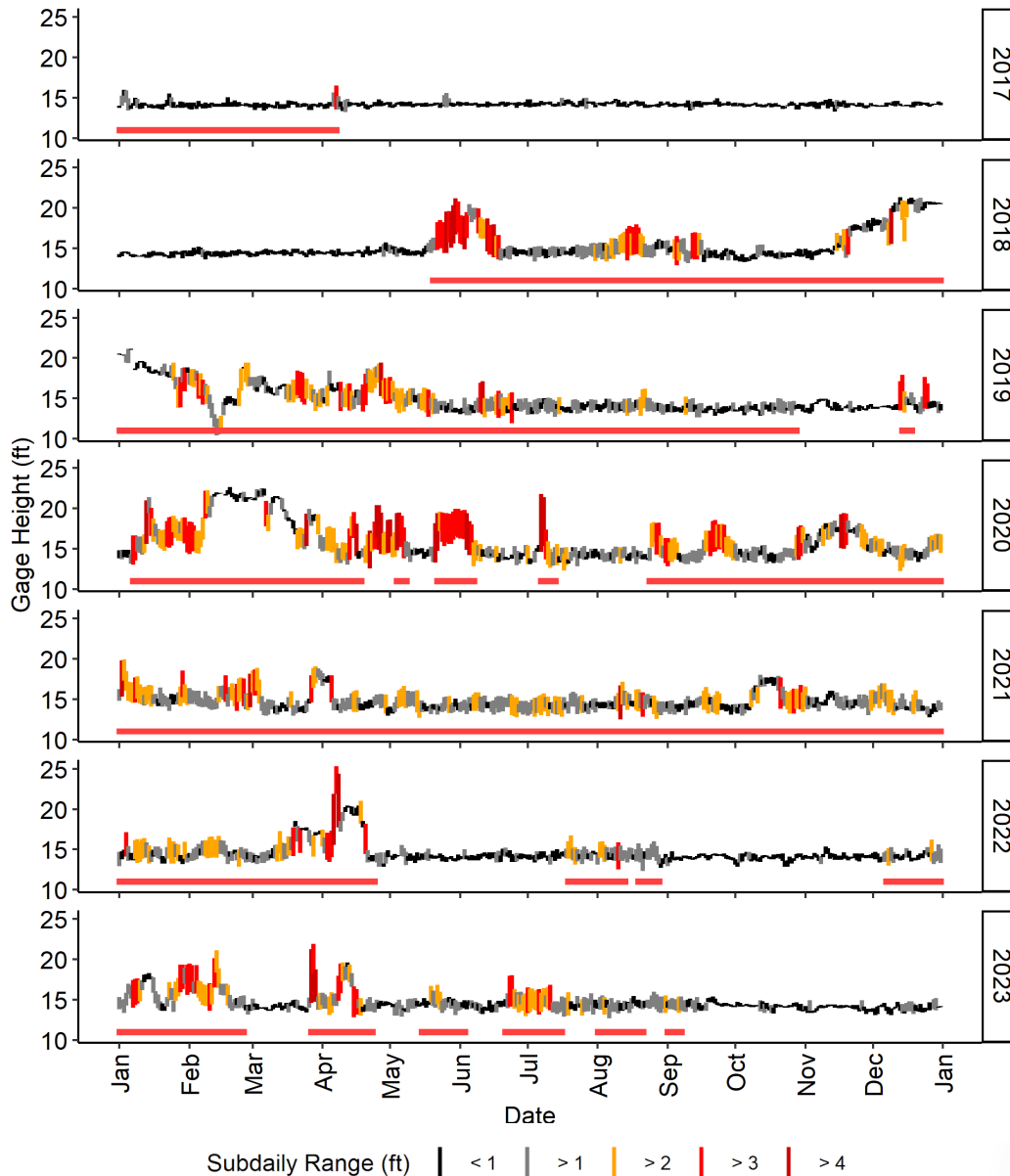
Table 2. Days the flashboards were up and down at SCP during 2017 to 2023.

	2017	2018	2019	2020	2021	2022	2023
Up	266	139	55	96	0	184	195
Down	99	226	308	269	365	181	170



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Augusta Shoals
USGS No 02196670

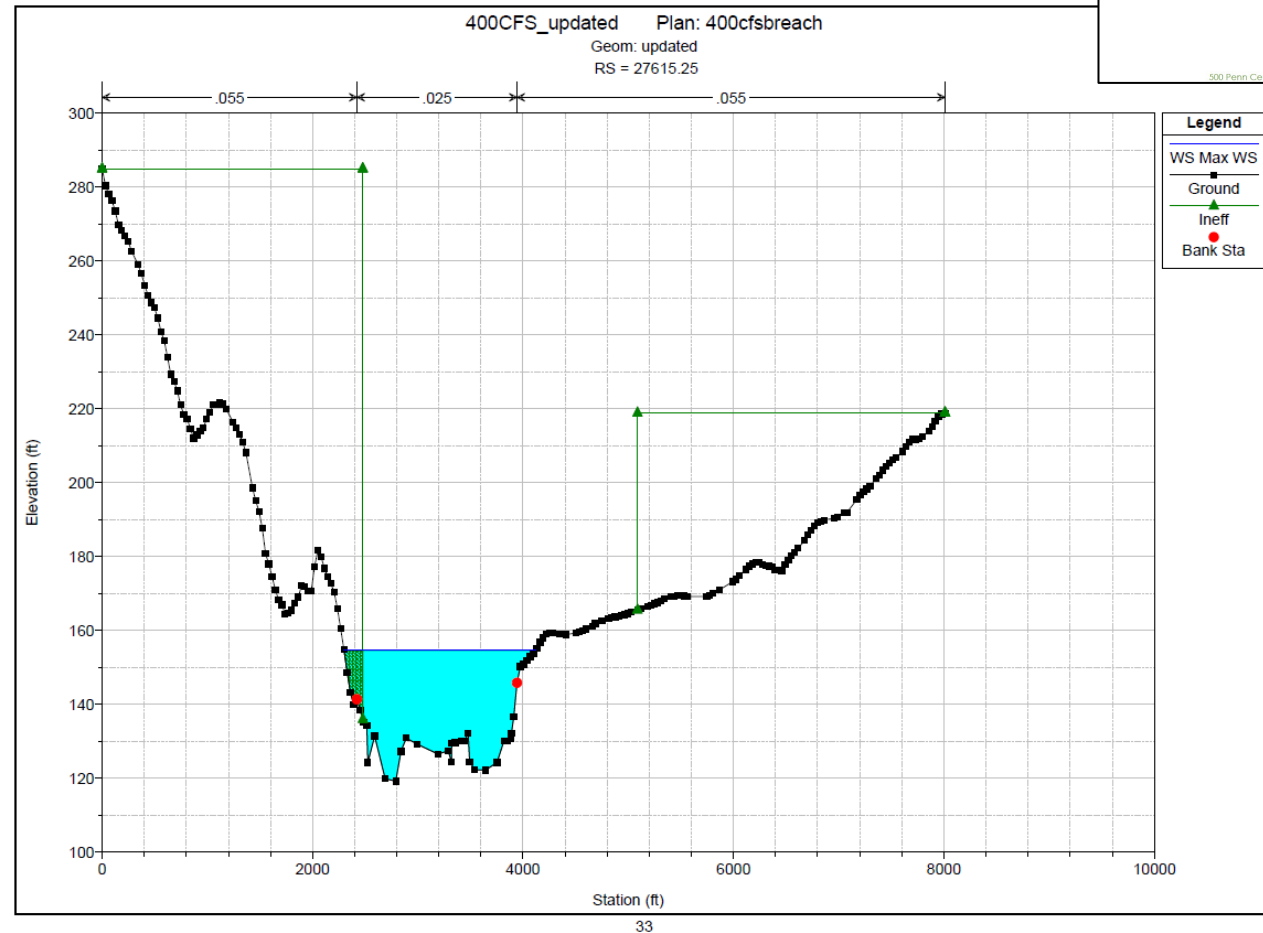
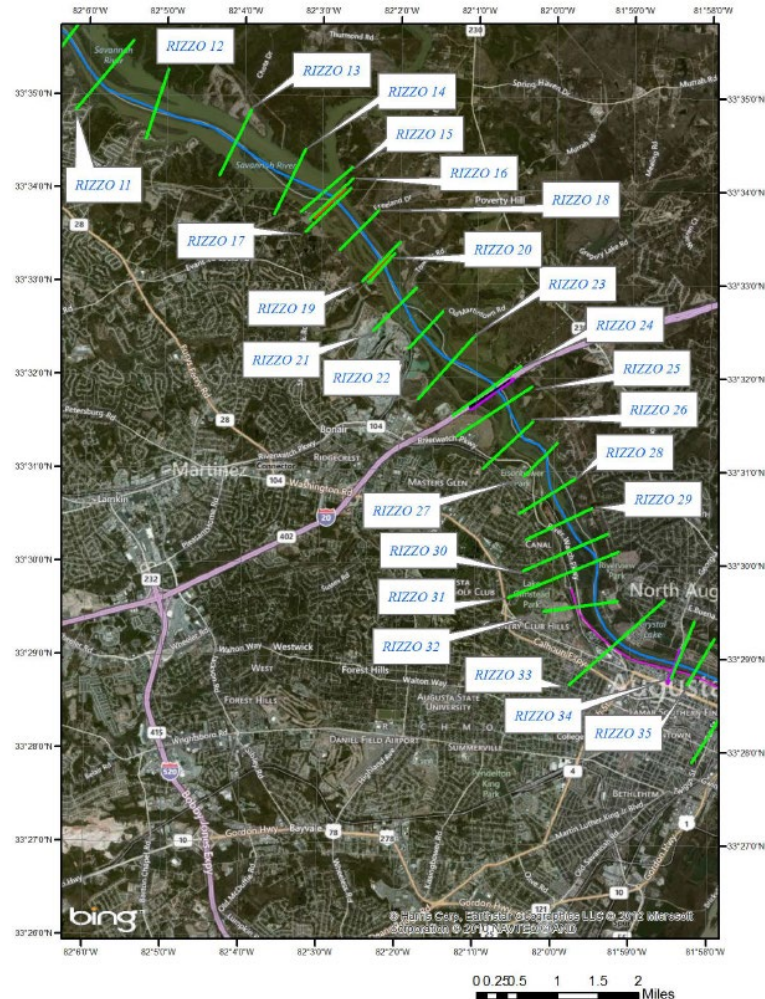


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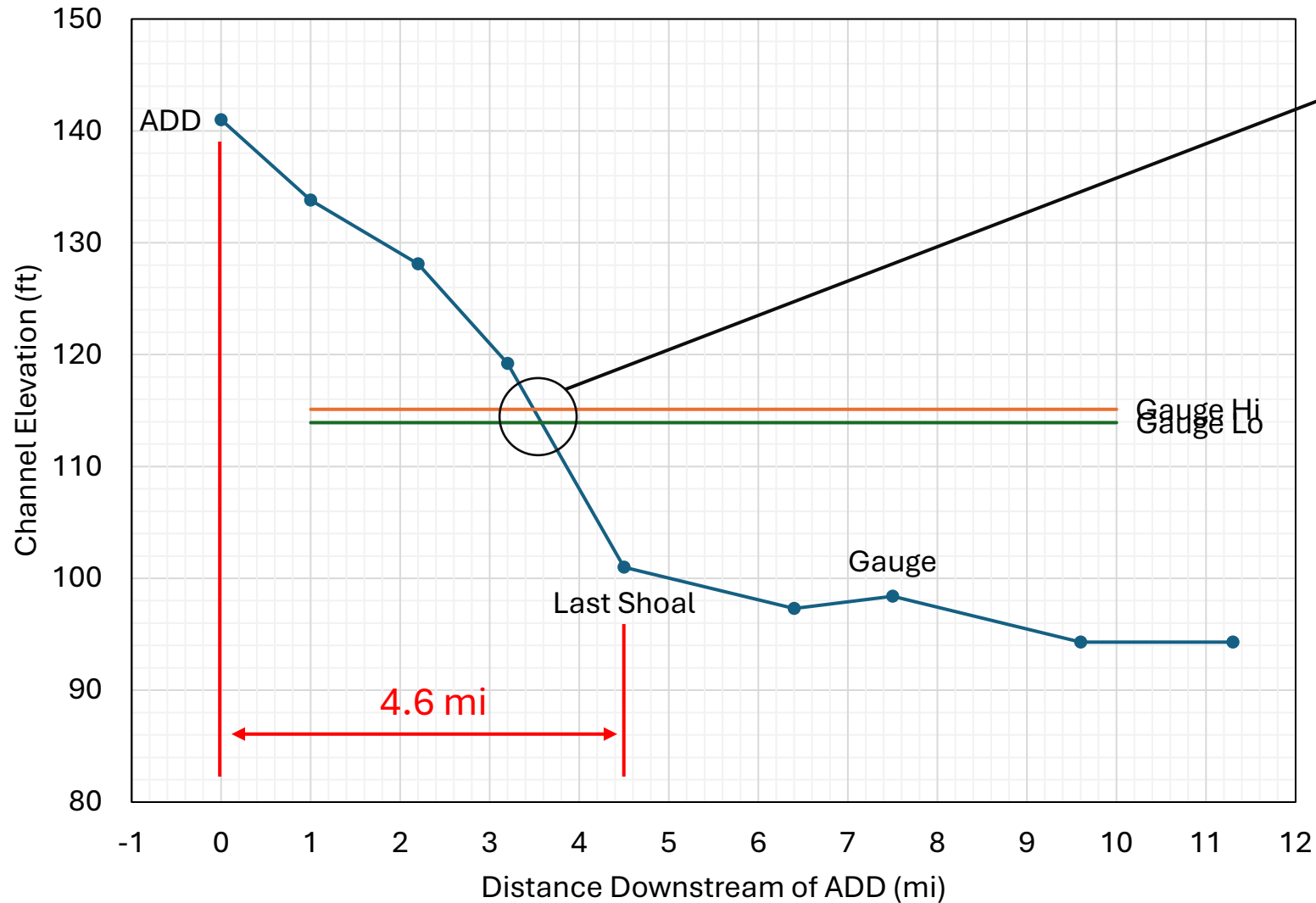
Additional Flows Analysis

Prepared by: Kleinschmidt Associates

HEC-RAS Transect Data



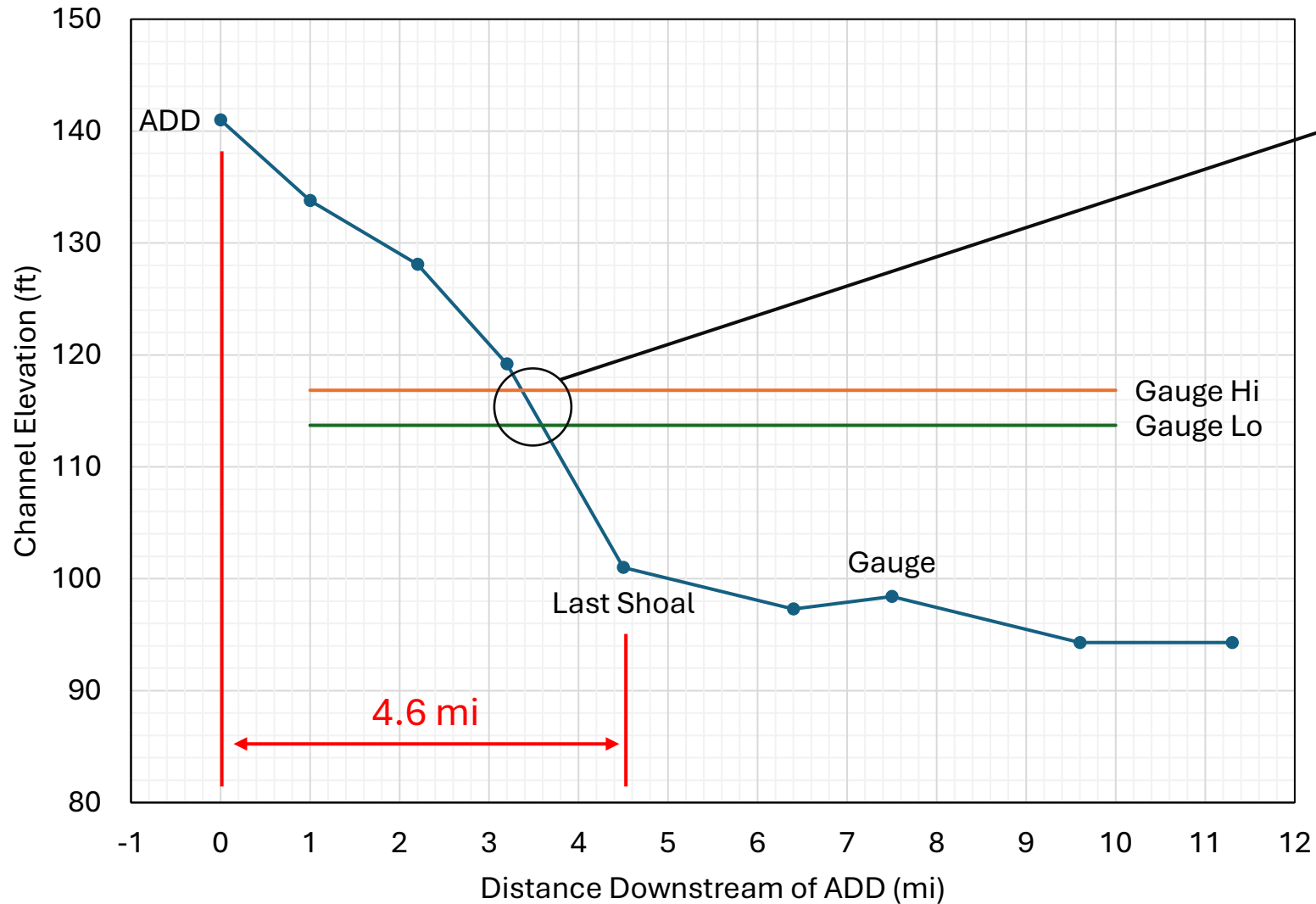
May 10, 2023: Normal Day



Affected Reach Length = 0.2 mi
Affected Area = 7 ha (2.8% of Total Shoals Area)



July 11, 2023: Flashboards Down

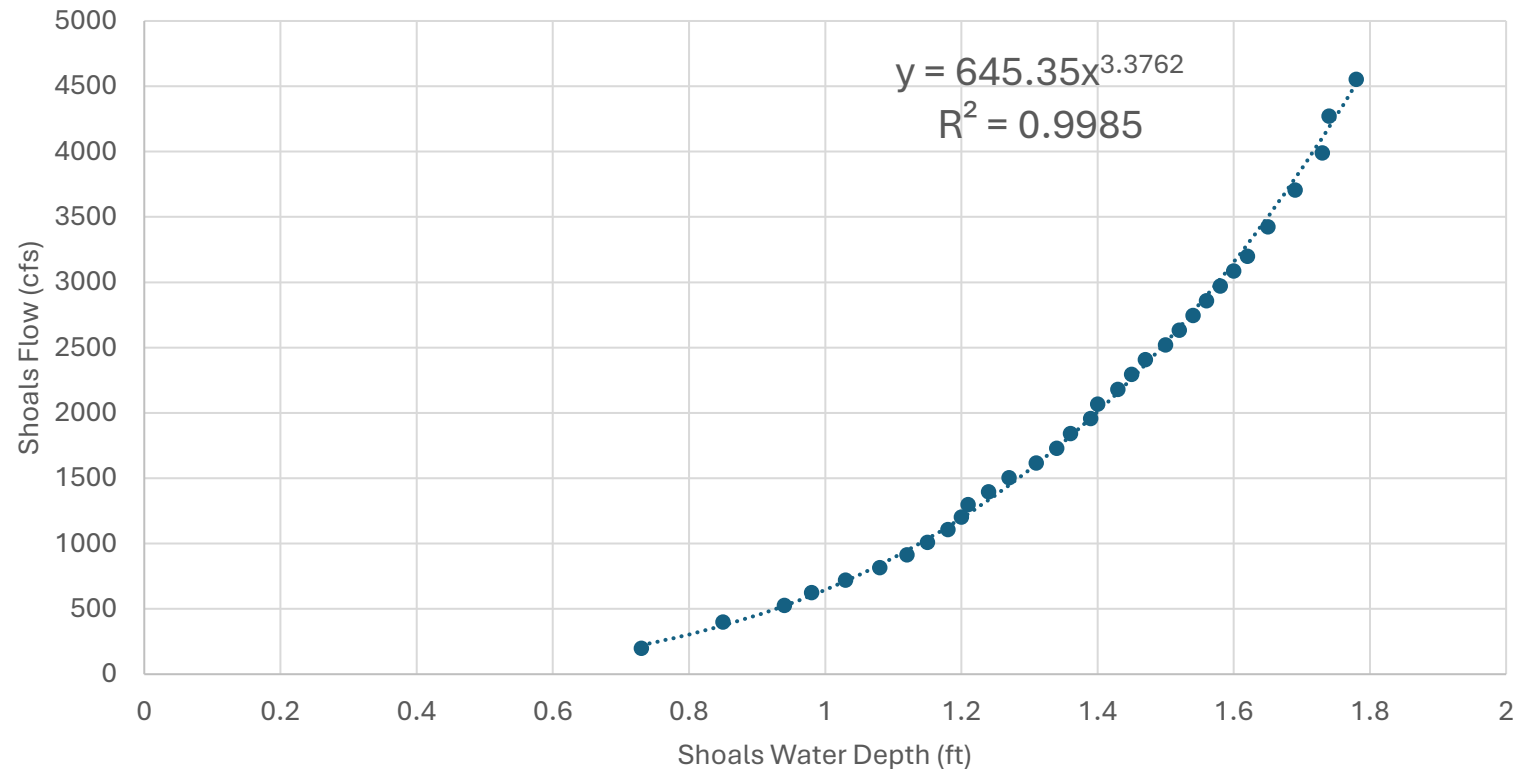


Affected Reach Length = 0.4 mi
Affected Area = 13.8 ha (5.5% of total Shoals Area)



Augusta Shoals IFIM Data

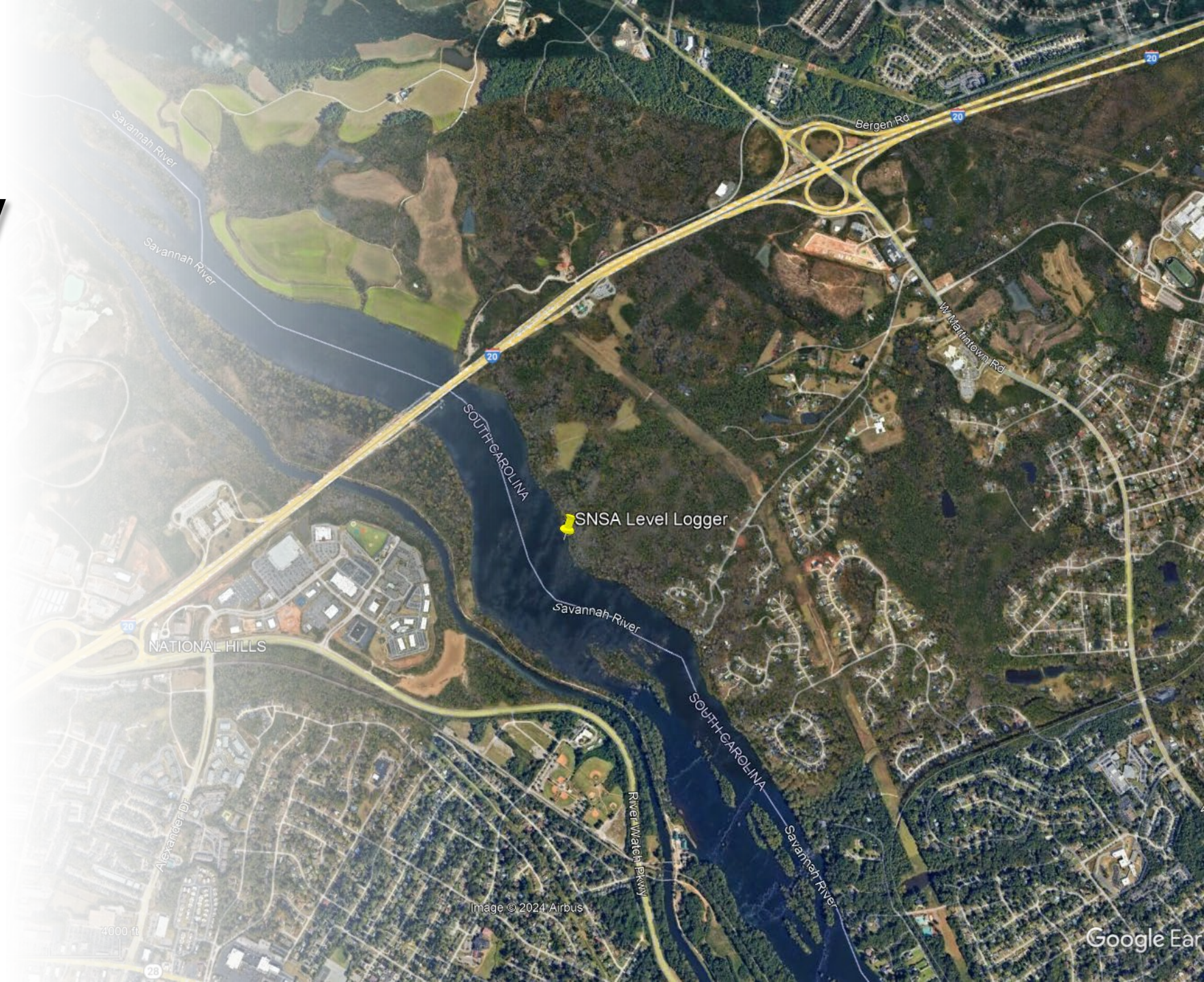
Shoals Flow (cfs)	Depth (ft)
200	0.73
400	0.85
528	0.94
625	0.98
721	1.03
817	1.08
914	1.12
1010	1.15
1107	1.18
1203	1.2
1299	1.21
1396	1.24
1505	1.27
1618	1.31
1731	1.34
1844	1.36
1957	1.39
2069	1.4
2182	1.43
2295	1.45
2408	1.47
2521	1.5
2634	1.52
2747	1.54
2860	1.56
2973	1.58
3086	1.6
3199	1.62
3425	1.65
3707	1.69
3990	1.73
4272	1.74
4554	1.78



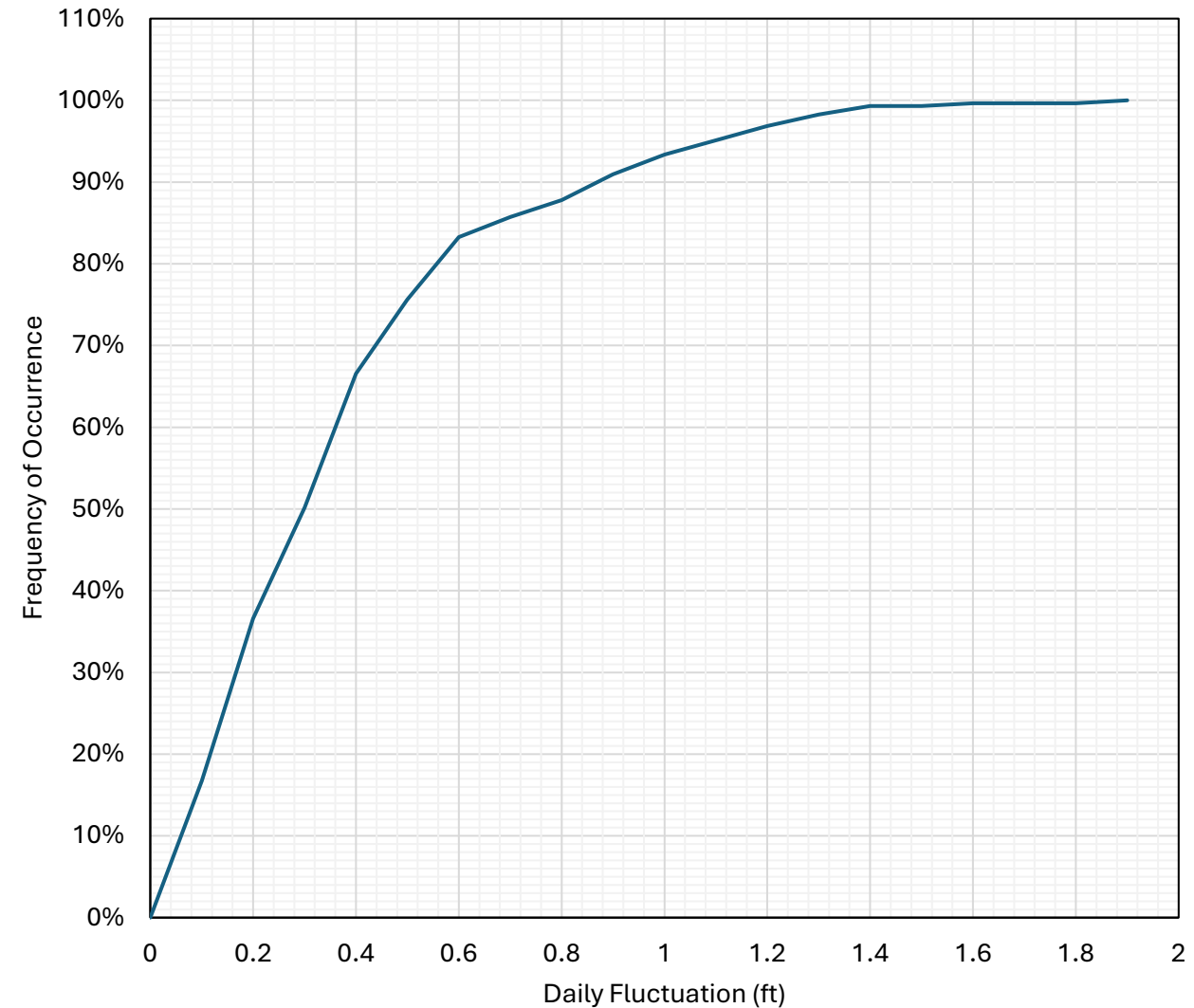
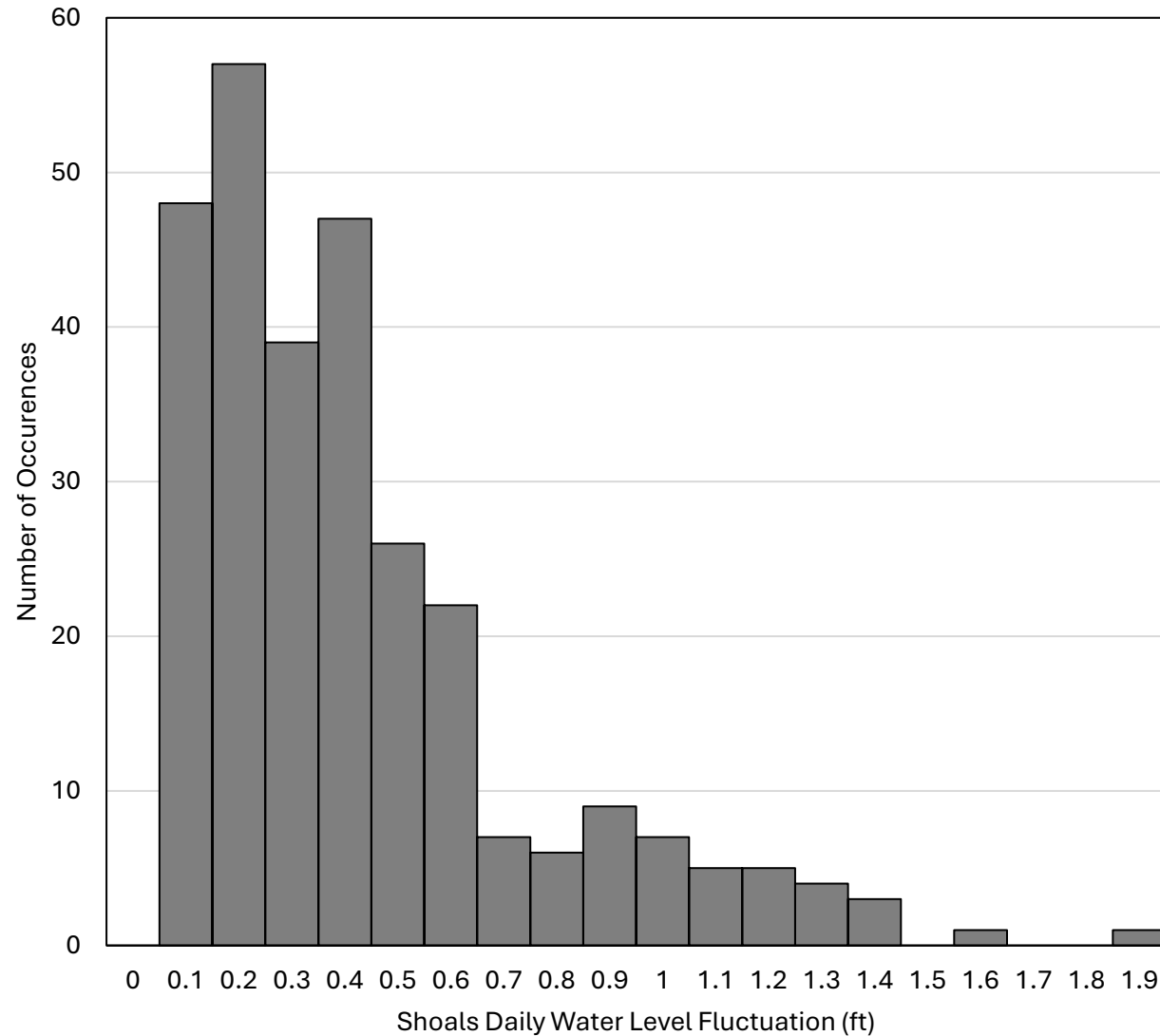
- 1 ft increase in depth = ~ 4,000 cfs increase in flow
- An increase from 1 ft to 3 ft in Shoals water levels (2 ft change) would represent a 26,000 cfs fluctuation

SNSA Shoals Flow Pilot Study

- Depth Measurements at 15-minute intervals
- 9/19/2008 to 7/2/2009
- Analyzed Shoal Water Level Fluctuation Frequencies
- Compared Shoals and Pool Level Daily Fluctuation



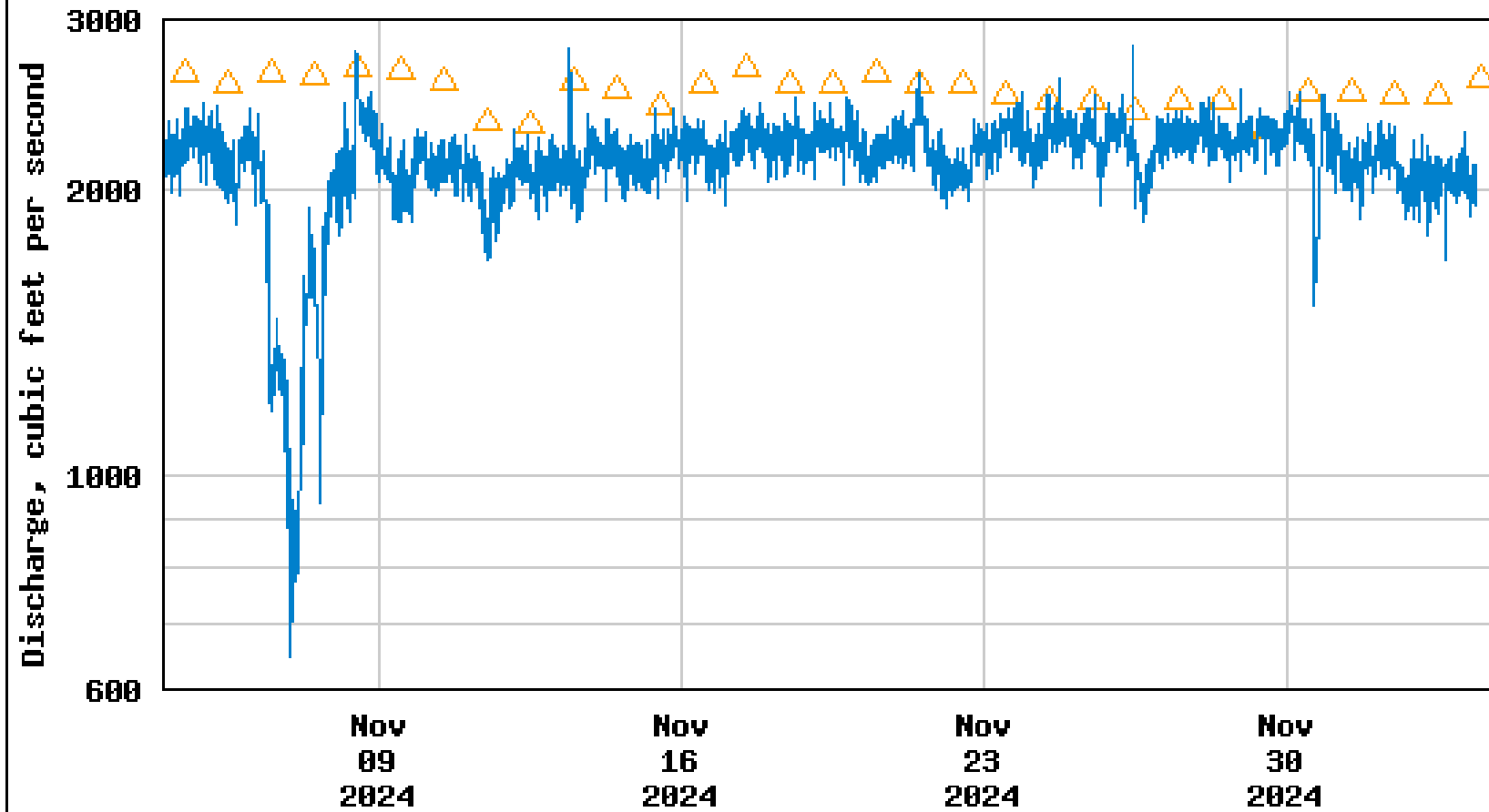
Shoals Fluctuation Frequency Analysis



Summary

- Empirical water level and bathymetric survey data show that the gauge at Jefferson Davis Bridge (02196670) is only representative of what is happening in small fraction of the shoals
- SNSA shoals water level data showed 91% of fluctuations < 1 ft
- Flow diversions into the Augusta Canal were not considered, but likely have effects
 - Avg daily diversion from 10/1996 to Present is ~ 2,500 cfs
 - Draining/refilling of canal can result in fluctuations in the shoals

USGS 02196485 AUGUSTA CANAL UPPER NR AUGUSTA, GA



---- Provisional Data Subject to Revision ----

△ Median daily statistic (23 years) — Discharge

Graph courtesy of the U.S. Geological Survey

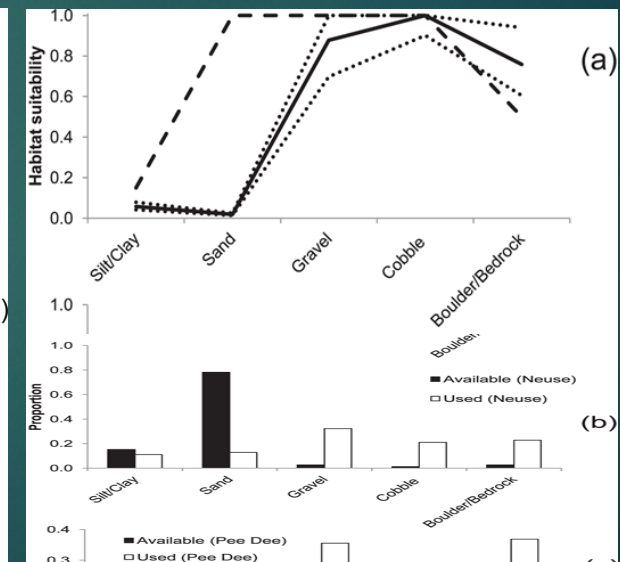
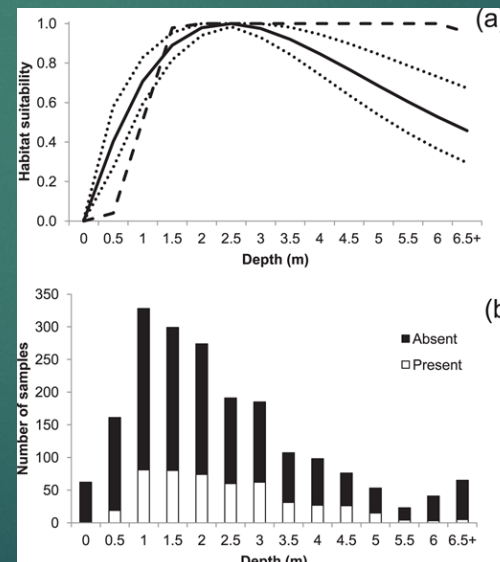
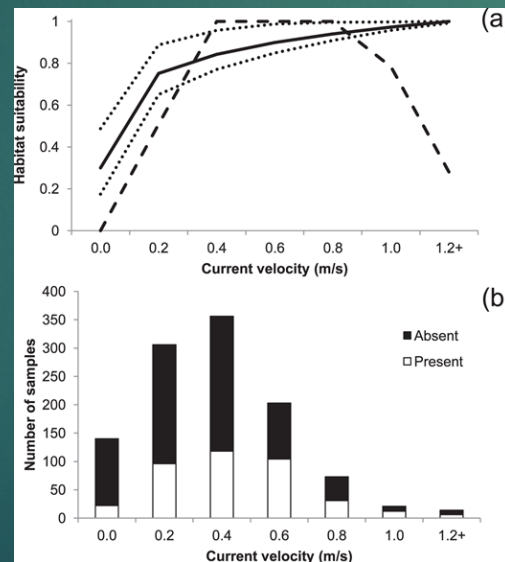
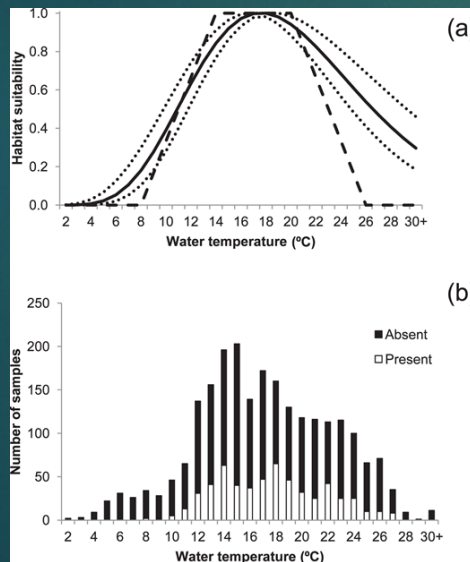


Stevens Creek Habitat Suitability Study

PREPARED BY: DOMINION ENERGY CORPORATE BIOLOGY

Habitat Suitability Model

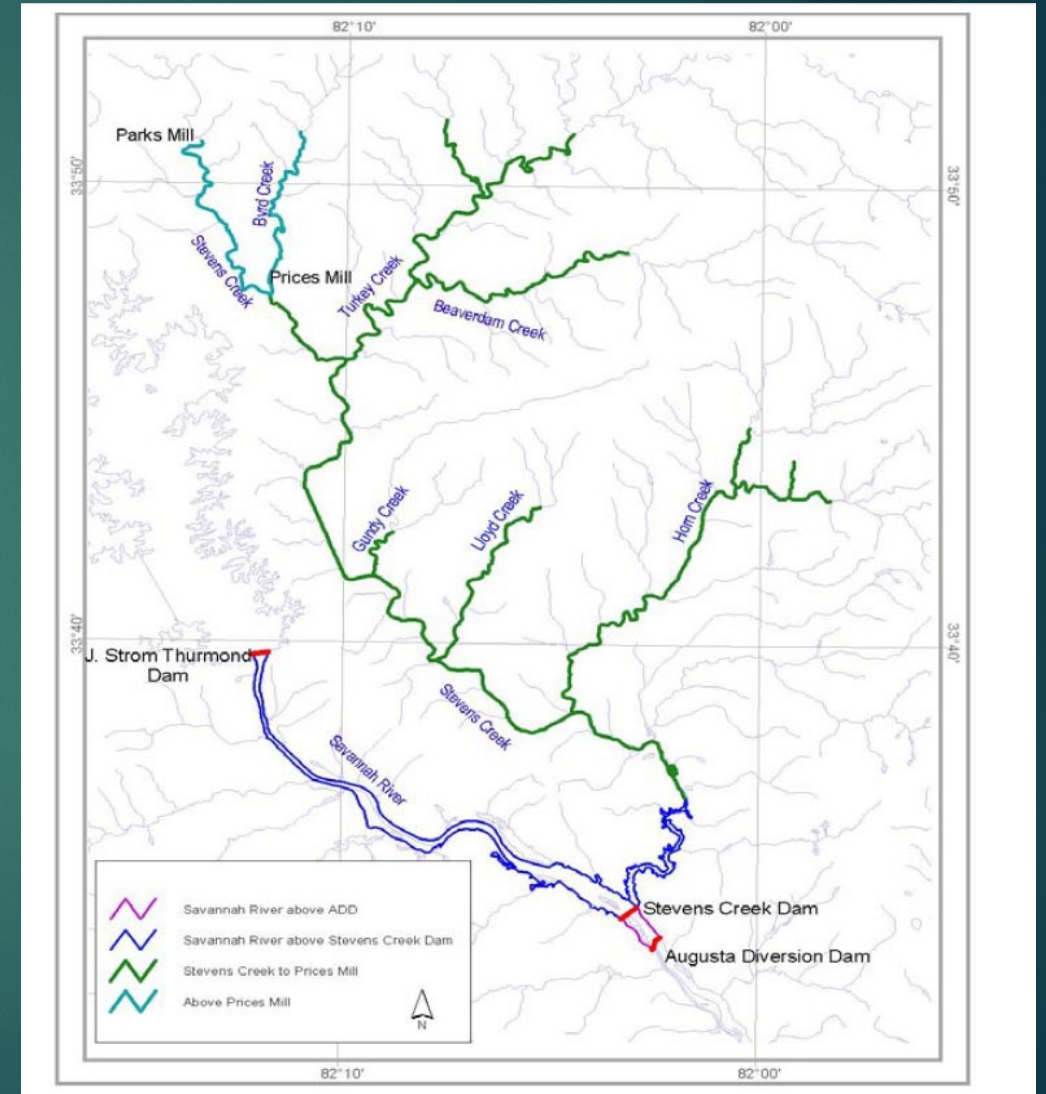
- ▶ Hightower et al. 2012 updated American Shad HSI from Stier and Crance (1985)
- ▶ Currently considered most accurate HSI for American Shad
- ▶ Uses geometric mean of resource selection function values to assign a suitability of 0-1



Joseph E. Hightower, Julianne E. Harris, Joshua K. Raabe, Prescott Brownell, C. Ashton Drew; A Bayesian Spawning Habitat Suitability Model for American Shad in Southeastern United States Rivers. *Journal of Fish and Wildlife Management* 1 December 2012; 3 (2): 184–198. doi: <https://doi.org/10.3996/082011-JFWM-047>

Methods

- ▶ Will be applied to Stevens Creek watershed through measuring habitat values used in the resource selection functions throughout the potentially suitable that would be made available by passage.
 - ▶ Substrate (% by type)
 - ▶ Mean depth
 - ▶ Mean current velocity
 - ▶ Temperature?
 - ▶ Removed in Hightower's example application because of high Spring variability
 - ▶ DO cutoff of 5.0 mg/L
 - ▶ Any station where lower DO detected would have suitability automatically set to 0
 - ▶ Other parameters recorded would include wetted width, PH, Conductivity, types of cover present, and Turbidity



USFWS and NMFS Diadromous Fish Restoration Plan for the Middle Savannah River: Strategy and Implementation Schedule. (2005)

Sampling Locations

- ▶ 30 sampling stations located on Stevens Creek and Turkey Creek
 - ▶ 9 Stations identified in 2005 Diadromous Fish Restoration Plan
 - ▶ 21 other stations every 2.5 rkm for the 55 km of Stevens Creek and Turkey Creek identified as potential habitat in the Diadromous Fish Restoration Plan

Table 2. 2004 Field Data for Stevens Creek and Turkey Creek.

Creek	Substrate	Avg. Width (ft)	Avg. Depth (ft)	Mean Spring Flow (cfs)	Mean Spring Flow (ft/sec)	Mean Summer Flow (cfs)	Mean Summer Flow (ft/sec)	Mean Fall Flow (cfs)	Mean Winter Flow (cfs)
Stevens Creek at Price's Mill	Bedrock, cobble, gravel, coarse sand	80	3	253	1.1	74	0.31	67	256
Stevens Creek at Modoc	Large cobble, gravel, coarse sand	30	7	641	3	186	0.89	169	650
Stevens Creek at Gundy Creek	Small gravel, coarse sand	40	>1.0	665	N/A	193	N/A	175	674
Stevens Creek at Lloyd Creek	Small gravel, coarse sand	40	>1.0	690	N/A	201	N/A	182	700
Stevens Creek at Horn Creek	Small gravel, coarse sand	40	>1.0	794	N/A	231	N/A	209	805
Stevens Creek at reservoir	Sand, gravel	80	>1.0	854	N/A	248	N/A	225	866
Turkey Creek at SSR 35	Cobble, gravel, sand	30	6	236	1.3	69	0.05	62	240
Turkey Creek at Beaverdam Creek	Bedrock, gravel	30	6	322	1.8	94	0.52	85	327
Turkey Creek at Stevens Creek	Bedrock, gravel	30	6	628	3.5	183	1.02	166	637

*Winter = Dec.-Feb., Spring = Mar.-May, Summer = Jun.-Aug., Fall = Sep.-Nov.

**Mean seasonal flows were derived through IHA analysis using the USGS 02196000 Stevens Creek near Modoc, SC.

USFWS and NMFS Diadromous Fish Restoration Plan for the Middle Savannah River: Strategy and Implementation Schedule. (2005)

Appendix B

Draft Stevens Creek Project Water Quality Adaptive Management Plan, Revised March 2025

ADAPTIVE MANAGEMENT PLAN

STEVENS CREEK WATER QUALITY

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

Prepared by:

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

March 2025

**ADAPTIVE MANAGEMENT PLAN
FOR
WATER QUALITY AT THE STEVENS CREEK PROJECT**

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	PROJECT OPERATIONS.....	2
2.0	STEVENS CREEK AMP REVIEW COMMITTEE.....	3
2.1	COMMITTEE MEMBERS	3
2.2	BUDGET/RESOURCES	3
2.3	COMMITTEE MEETINGS.....	4
3.0	AMP GOAL.....	5
4.0	BASELINE DATA	6
5.0	IMPLEMENTATION.....	9
6.0	SCHEDULE.....	11
7.0	COMPLIANCE.....	12
8.0	REFERENCES	13

LIST OF TABLES

TABLE 6-1	AMP IMPLEMENTATION SCHEDULE.....	11
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LIST OF APPENDICES

APPENDIX A	SUMMARY OF CONSULTATION	
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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

A

AMP Adaptive Management Plan

B

BOD biochemical oxygen demand

C

cfs cubic feet per second

Commission Federal Energy Regulatory Commission

Conductivity a measure of the ability of water to pass an electrical current; impacted by the presence of inorganic dissolved solids as well as temperature

D

DESC Dominion Energy South Carolina Inc.; Licensee for the Stevens Creek Project

DO dissolved oxygen

F

FERC Federal Energy Regulatory Commission

G

GAEPD Georgia Department of Natural Resources, Environmental Protection Division

GAWRD Georgia Department of Natural Resources, Wildlife Resources Division

L

Licensee Dominion Energy South Carolina, Inc.

M

mg/L milligram per liter; used as a unit of measurement for DO and, in this case, ammonia, nitrate-nitrite, orthophosphate, phosphorus, and TKN

MW megawatt

N

NGO Non-Governmental Organization

NMFS National Marine Fisheries Service, housed within the U.S. Department of Commerce's National Oceanic and Atmospheric Administration

P

pH	a term used to indicate the alkalinity or acidity of a substance as ranked on a scale from 1.0 to 14.0
Project	Stevens Creek Hydroelectric Project, FERC No. 2535
<i>R</i>	
RCG	Resource Conservation Group
<i>S</i>	
SCDES	South Carolina Department of Environmental Services
SCDNR	South Carolina Department of Natural Resources
Study Plan	Stevens Creek Water Quality Study Plan
<i>T</i>	
Thurmond Dam	J. Strom Thurmond Dam; also known as Clarks Hill Dam; built and managed by USACE
TKN	Total Kjeldahl Nitrogen; the total concentration of organic nitrogen and ammonia
<i>U</i>	
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

**ADAPTIVE MANAGEMENT PLAN
FOR
WATER QUALITY AT THE STEVENS CREEK PROJECT**

1.0 INTRODUCTION

Dominion Energy South Carolina, Inc. (DESC; Licensee) is the Licensee of the Stevens Creek Hydroelectric Project (Federal Energy Regulatory Commission [FERC] No. 2535; Project). The Project has an installed capacity of 17.28 megawatts (MW). It is located in Edgefield and McCormick counties, South Carolina, and Columbia County, Georgia, at the confluence of Stevens Creek and the Savannah River. The Project's dam (Stevens Creek Dam) is located approximately 1 mile upstream of the Augusta Diversion Dam and approximately 13 miles downstream of the United States Army Corps of Engineers (USACE) J. Storm Thurmond Dam (Thurmond Dam).

DESC is currently administrating a multi-year relicensing process for the Project, which is anticipated to culminate with the issuance of a new Project license by FERC on or before October 31, 2025. The relicensing has involved a cooperative effort between DESC and stakeholders, including state and federal resource agencies, non-governmental organizations, (NGOs), and concerned citizens, to address the operational, recreational, and ecological resources associated with the Project. During the relicensing process, the issue of water quality in the Stevens Creek arm of the Project impoundment was identified by the Water Quality Resource Conservation Group (RCG) as an issue to further investigate. Members of the RCG include representatives from the following entities: DESC; Georgia Department of Natural Resources, Wildlife Resources Division (GAWRD); Georgia Department of Natural Resources, Environmental Protection Division (GAEPD); South Carolina Department of Environmental Services (SCDES); South Carolina Department of Natural Resources (SCDNR); United States Fish and Wildlife Service (USFWS); National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS); United States Forest Service (USFS), the Savannah Riverkeeper, and the City of Augusta, Georgia.

Water quality studies have been ongoing prior to and throughout the relicensing process. Similarly, continued consultation with the RCG was necessary subsequent to filing the Final License Application for the Project to review the results of targeted water quality surveys. DESC has prepared this Adaptive Management Plan (AMP) framework to outline a process for evaluating the results of water quality studies and making decisions based on the best available information with a subset of the RCG, the AMP Review Committee (see Section 2.1).

1.1 PROJECT OPERATIONS

The Stevens Creek Reservoir is approximately 25 miles long, extending upstream to the Thurmond Dam and 12 miles up Stevens Creek. The reservoir's surface area at normal full pond level (elevation of 187.5 feet) is 2,400 acres. The Project drainage area is approximately 7,173 square miles. DESC operates the Project to generate clean, renewable energy and re-regulate highly variable river flows discharged by the USACE from the Thurmond Dam. The Stevens Creek Project is operated in accordance with an Operating Plan on file with FERC. The plan was developed in consultation with the USACE, USFWS, GAWRD, SCDNR, and the City of Augusta. The normal operating target range for the Stevens Creek Project is to provide an hourly discharge of ± 15 percent of the scheduled daily average discharge from the Thurmond Dam, if the actual discharge from the Thurmond Dam is within 500 cubic feet per second (cfs) of the scheduled discharge.

2.0 STEVENS CREEK 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 will include state and federal resource agencies charged with managing aquatic resources within the Savannah River Basin, including: GAEPD, GAWRD, NMFS, SCDES, SCDNR, USACE, USFS, and USFWS.

DESC 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 discussions and decision-making processes (as appropriate) specified in the Water Quality 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 reports;
- Providing overall guidance for the AMP process;
- Evaluating other study (i.e., existing) information or information that 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 Project economics during decision-making processes;
- Reviewing the Water Quality AMP Annual Report, which documents the prior year's AMP activities, which DESC 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 DESC as Licensee for the Stevens Creek Project. Annual budgets will be developed by DESC relative to the monitoring and study costs as well as administrative costs and expenses. DESC 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 overall goal of this AMP is to evaluate water quality in the Stevens Creek Reservoir and provide guidance on potential measures for water quality improvement during the new license term. The members' 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 Stevens Creek arm of the reservoir during summer/fall periods). The result of this AMP is the development of a Water Quality Management Plan, as discussed under Section 5.0, to guide operation of the Project in unison with other projects in the basin to benefit water quality for the term of the new license. The measures employed under this AMP to achieve the desired goal and result are described in Section 5.0, and the scope of this AMP is limited to the implementation of those measures.

4.0 BASELINE DATA

Water quality has been extensively monitored during the term of the existing FERC license. As required by license articles 404 and 405, DESC has been responsible for collecting and synthesizing dissolved oxygen (DO), pH, conductivity, and water temperature data for the past 25 years at eight monitoring locations throughout the Stevens Creek Reservoir and in the tailwater. These articles were developed to specifically address water quality issues identified at the Stevens Creek Project prior to the USACE's implementation of oxygenation.

From January 2021 to February 2022, DESC monitored water quality according to a Study Plan developed in consultation with the RCG. DO levels measured in 2021 at DESC water quality study sites in the Savannah River portion of the Stevens Creek Reservoir (Deep Step, Above Powerhouse, and Above Spillway monitoring sites) were occasionally below the 5 milligrams per liter (mg/L) average, but measurements below 4 mg/L were rare. DO levels in the Stevens Creek arm of the reservoir were the lowest among all sites. During the study, daily average DO was below 5 mg/L on 89 days, and 1,133 of 7,194 (15.7 percent) measurements were below 4 mg/L.

DO levels in the Savannah River immediately downstream of the Stevens Creek powerhouse and below the spillway near the South Carolina side were above the daily average and instantaneous minimum DO for the entire monitoring period. The monitoring data demonstrate that re-oxygenation occurs as water passes through the Stevens Creek Reservoir, powerhouse, and over the spillway. Additionally, values for temperature, pH, and specific conductivity were within the normal range through the main body of the reservoir and below the Stevens Creek Project.

Several factors may be responsible for the low DO levels observed in Stevens Creek proper. The magnitude of releases from Thurmond Dam and the presence of Stevens Creek Dam cause water levels in Stevens Creek to rise and flow upstream for several miles. As water levels in Stevens Creek rise, shallow, off-channel areas that were dry become wetted. Dead and decaying materials in these previously dry areas likely exhibit some level of oxygen demand that manifests within the creek. A previous study found high levels of biochemical oxygen demand (BOD) within this vicinity of Stevens Creek (SNSA 2008). Additionally, a study by the United States Geological Survey (USGS) on the Roanoke River in Virginia found that DO sags were correlated with

decreasing river flows and drainage of high-BOD waters from off-channel areas (Bales and Walters 2003).

DESC, in consultation with the RCG, conducted., a targeted water quality study in 2023 to better understand the potential mechanisms affecting DO in Stevens Creek within the Project boundary. The study was conducted through October 31, 2023. The overall objective of the study was to assess the DO dynamics in the Stevens Creek arm of the Project impoundment as well as the temporal and longitudinal extent of low DO levels. This was accomplished through continuous monitoring at four locations, longitudinal surveys within a 10.5-mile reach of Stevens Creek, and periodic off-channel monitoring at six locations.

Continuous Monitoring:

Data from 2023 showed a lower frequency of DO excursions at the mouth of Stevens Creek (RM 0) but an increase at RM 4.5 compared to 2021. Sediment fouling impacted some monitoring efforts. The 2023 study also recorded more significant rainfall events, potentially increasing organic matter input and oxygen demand. Analysis of DO fluctuations contradicted prior assumptions that DO maxima occur at night and minima during the day. Rather, DO fluctuates with peaking operations at Thurmond Dam. Minimum DO levels typically occurred in the morning, at or before 10 am, as the Stevens Creek Reservoir drained from the previous day's flows. Highest DO values were recorded between 4 pm and 7 pm as new flows backwater the mouth of Stevens Creek.

Longitudinal Surveys:

These surveys tracked DO changes along the creek. Early-season surveys (May-June) showed uniform DO levels, while later surveys (July-October) indicated declines between RM 2 and RM 5, particularly in September. Supersaturated DO levels were noted in June and August, likely due to photosynthesis of aquatic vegetation.

Off-Channel Surveys:

Off-channel areas within the project boundary contribute hypoxic water (<2 mg/L DO), to the main channel as the reservoir rises and falls each day. In these areas, minimum DO levels occurred between 7 am and 9 am, a few hours before they were detected in the main channel. Highest DO values were recorded in the afternoon, around 2 pm and at times, photosynthesis in

these areas contributed to supersaturated levels of DO, which were detected by the latitudinal surveys.

Influence of Inflows and Flashboards:

Thurmond Dam outflows were significantly higher than Stevens Creek inflows. There was little evidence that flashboard status improved DO levels, except for a brief period in May-June 2023, which may have been influenced by increased upstream inflows. However, flashboard status may influence the location of low DO water within Stevens Creek. For example, all 4-foot flashboards were down during the 2021 study, which likely reduced the backwater effect at RM 4.5 and increased the backwater effect at RM 0 in 2021 compared to 2023.

Key Findings:

Multiple factors contribute to seasonally low DO, including:

- Low DO in Thurmond Dam releases, despite mitigation efforts.
- High organic carbon loads from the watershed, especially after rain events.
- Large Thurmond Dam releases, combined with DESC's re-regulation and hypoxic inflows from off-channel areas, trapping oxygen-demanding substances in Stevens Creek.
- Potential additional unknown upstream sources, including phosphorus from wastewater discharge.

Overall, while some improvements have been made, seasonal DO depletion remains a challenge in Stevens Creek.

5.0 IMPLEMENTATION

During the new license term, DESC as administrator of this AMP, will work together with the Review Committee to perform the following measures to evaluate water quality at the Stevens Creek Project.

1.0 Continuous Water Quality Monitoring

DESC will contract with USGS to implement continuous DO and temperature monitoring at USGS gage no. 02195520 (Savannah River Near Evans, GA) and USGS gage no. 021963601 (Stevens Creek at Woodlawn Rd nr Murphy Village, South Carolina). Data from additional monitoring that may occur during this AMP may also be considered.

2.0 Water Quality Monitoring Data Review

During the term of this AMP, the AMP Review Committee will meet annually to review the continuous water quality monitoring data, as collected by the USGS gage no. 02195520 (Savannah River Near Evans, GA) and USGS gage no. 021963601 (Stevens Creek at Woodlawn Rd nr Murphy Village, South Carolina), and additional data that may be obtained during the AMP.

DO data will be summarized to determine percentage of instantaneous readings below 4 mg/L, and the number of daily average values below 5 mg/L. Temperature data will also be summarized to determine range of water temperatures observed. Additional data to be reviewed by the Review Committee could include information on flows from Thurmond Dam and an analysis of flashboard data.

3.0 Modeling Assessment

During Year 1 of this AMP, the Review Committee will hold a meeting with water quality modeling experts to assess the feasibility of modeling the dynamics of the Stevens Creek system. The goal is to assess whether the seasonally low DO levels identified within Stevens Creek could potentially be addressed through Project operations. This process will also help the Review Committee identify the data needed to refine flow and operational scenario modeling.

Should the Review Committee determine it appropriate and feasible, a water quality model and necessary supporting data will be further explored to better understand the system's dynamics and assess the potential for meaningful improvements through Project operations.

4.0 Annual AMP Consultation and Reporting

During the term of this AMP, DESC will administer an annual meeting of the Review Committee, to review the data collected under Section 1.0. It is understood that the Review Committee is comprised of state and federal resource agency representatives with knowledge on the water quality resources of the Project area and basin. The annual meeting will be held in February of each year, or at another mutually agreed-upon time by the Review Committee members.

In addition to reviewing water quality data, the Review Committee may develop an annual workplan outlining water quality-related activities performed under the AMP. To ensure flexibility in response to changing basin conditions and emerging information, specific workplan activities beyond those identified in Section 1.0 through 3.0 are not detailed in this document.

An annual report will be filed with FERC by June 1st of each year of the AMP, will include a summary of activities and water quality information collected during the previous year's implementation, as well as planned activities for the upcoming year.

5.0 Development of Water Quality Management Plan

The Review Committee will continue the AMP annually until it determines that sufficient information has been gathered to develop a Water Quality Management Plan. This plan will guide Project operations in coordination with other basin projects to improve water quality throughout the new license term. Once completed, the plan will be filed with the Commission, marking the conclusion of the AMP.

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 AMP member availability.

TABLE 6-1 AMP IMPLEMENTATION SCHEDULE

Period	Item
Within 90 days of license issuance	Submit Final Stevens Creek Water Quality AMP to FERC
120 days of license issuance	Confirm members of the Review Committee and, if applicable, review FERC-proposed changes to the Stevens Creek Water Quality AMP
Year 1 of new license	• Implement Year 1 of AMP in accordance with Section 5.0 • Hold Review Committee annual meeting in February of following year • File Annual Report with FERC by June 1st of the following year after the Review Committee meeting
Year 2 of new license	• Implement Year 2 of AMP • Hold Review Committee annual meeting in February of following year • File Annual Report with FERC by – June 1st of the following year after the Review Committee meeting
Annually, through close of AMP	• Continue AMP implementation • Hold Review Committee annual meeting in February of the following year during each year of the AMP • File Annual Report with FERC – by June 1st after the Review Committee meeting • Annually assess the continued need for the AMP or develop the Water Quality Management Plan.

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 summarize AMP activities during the previous year. 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.

The Review Committee will provide recommendations to FERC annually on the extension or completion of the AMP through development of a Water Quality Management Plan.

8.0 REFERENCES

Bales, J.D., and D.A. Walters. 2003. Relations Among Floodplain Water Levels, Instream Dissolved-Oxygen Conditions, and Streamflow in the Lower Roanoke River, North Carolina, 1997 – 2001. U.S. Geological Survey Water-Resources Investigations Report 03-4295, 81 p.

Kleinschmidt Associates. 2024. 2023 Water Quality Study Report: Stevens Creek Hydroelectric Project (FERC No. 2535). Prepared for Dominion Energy South Carolina, Inc. May 2024.

Southeastern Natural Sciences Academy (SNSA). 2008. Savannah River at RiskSM, Final Report, February 2006 – January 2008, Section 104 (b) CP964507-06. September 30, 2008.

APPENDIX A

SUMMARY OF CONSULTATION

MEETING NOTES
Stevens Creek Hydroelectric Project (FERC No. 2535)

Dominion Energy South Carolina, Inc.
Water Quality Technical Working Committee

July 1, 2024

Final JAG 3/7/25

ATTENDEES¹:

Amy Bresnahan – DESC
Caleb Gaston – DESC
Ray Ammarell – DESC
Fritz Hoogakker – Dominion Energy
Paul Vidonic – Dominion Energy
Taylor Allen – Dominion Energy
Alison Jakupca – Kleinschmidt
Jason Moak – Kleinschmidt
Jenn Güt – Kleinschmidt
Will Pruitt – Kleinschmidt
Andy Herndon – NMFS
Bjorn Lake – NMFS
Fritz Rohde – NMFS

Kevin Mack – NMFS
Eric Bauer – USFWS
Aaron Gray – GADNR
Bryant Bowen – GADNR
Clint Peacock – GADNR
David Hedeon – GAEPD
Dewey Richardson – GAEPD
Rusty Wenerick – SCDES
Alex Pellet – SCDNR
Elizabeth Miller – SCDNR
Jason Bettinger – SCDNR
Paula Marcinek

Not in Attendance: USACE, USFS

These notes are a summary of the major points presented during the meeting and are not intended to be a transcript or analysis of the meeting.

The purpose of the meeting was to review revisions to the Stevens Creek 2023 Water Quality Study Report (Water Quality Report) and continue development of the Stevens Creek Hydroelectric Project (Project) Water Quality Adaptive Management Plan (Water Quality AMP).

¹ Acronyms: DESC = Dominion Energy South Carolina; GADNR = Georgia Department of Natural Resources; GAEPD = Georgia Environmental Protection Division; NMFS = National Marine Fisheries Service; SCDES = South Carolina Department of Environmental Services; SCDNR = South Carolina Department of Natural Resources; USACE = United States Army Corps of Engineers; USFS = United States Forest Service; USFWS = United States Fish and Wildlife Service

Following a welcome and introduction, Alison, Kleinschmidt, stated the purpose of the meeting and reviewed the agenda. No additions to the agenda were noted by any member of the Water Quality Technical Working Committee (WQTC, group, or committee).

Revised Water Quality Report

Alison discussed the distribution of the revised Water Quality Report on May 15, 2024, by Kleinschmidt. The deadline for submitting additional comments on the Water Quality Report was extended to July 5, 2024, to allow the WQTC to ask questions during the present meeting prior to submitting comments.

Jason M., Kleinschmidt, reviewed the significant changes made to the Water Quality Report. In summary, the following was added: information about the water quality data collected by USGS² and USACE; time stamps for the longitudinal and off-channel surveys; figures with data points from longitudinal surveys; results of the time of dissolved oxygen (DO) minima and maxima analysis for 2021 and 2023; comparison of off-channel DO to in-channel DO collected during longitudinal surveys; and figures that include Stevens Creek inflows. Kevin, NMFS, thanked Kleinschmidt and DESC for their efforts on revising the Water Quality Report, and noted that the additions improved the report significantly and provided more clarity about water quality within Stevens Creek.

Fritz R., NMFS, referenced Figure 3-3 (Time of Dissolved Oxygen Minimum Occurrence at RM³ 4.5 in May to October 2021 and 2023) and inquired if there were any ideas as to why the DO minimum occurred around 10:00 AM. Jason responded that the answer likely depends on a number of factors; however, one of the causes they were looking at were the transient off-channel areas on Stevens Creek. Thurmond Dam operates late in the afternoon through the evening, and the Project reservoir does not typically drain until early morning. It was noted that during one of the off-channel surveys, low DO water was logged coming from one of the off-channel areas around 8:00 AM; two hours later at 10:00 AM the water passed through RM 4.5.

Kevin commented that Figure 3-3 included a correction compared to a previous report regarding what Kleinschmidt/DESC was presuming to happen in Stevens Creek. Jason replied that analysis was hampered somewhat in 2021 due to the lost data when low DO is typically seen in the system, and the 2023 data allowed the water quality dynamics to be teased out a bit more.

Water Quality AMP

² United States Geological Survey

³ River Mile

Alison reviewed the draft Water Quality AMP that was filed with the Project Final License Application. Alison stated that water quality was worked through during the previous relicensing as it primarily related to low DO water coming from Thurmond Dam. Since the previous license was issued, USACE has installed oxygen infusers in Thurmond Lake, which has improved the water quality entering the Project. Water quality discussions have since shifted during the current relicensing to focus on the Stevens Creek arm.

Alison noted that a lot of the boiler plate information in the Water Quality AMP was pulled from the Parr Hydroelectric Project West Channel Adaptive Management Plan. She commented that DESC is open to accepting comments on the Water Quality AMP should members of the WQTWC have any. Alison discussed the Review Committee members, which consists of state and federal resource agencies charged with managing aquatic resources within the Savannah River Basin, including: GADNR, GAEPD, NMFS, SCDHEC⁴, USACE, USFS, and USFWS.

The overall goal of the Water Quality AMP is to evaluate water quality in the Project reservoir and provide guidance on potential measures for water quality improvement during the new license term. The members' desired outcomes of this AMP are to improve water quality year-round (specifically to meet state standards for DO and to improve DO levels in the Stevens Creek arm of the reservoir during summer/fall periods).

Alison commented on the 25 plus years of water quality data collected by the Licensee and USGS through the current license term as required by license articles 404 and 405. Additional water quality data was collected from January 2021 to February 2022 and again from May through October 2023 within the Project reservoir. Kleinschmidt and DESC will revise the Water Quality AMP to include this most recent baseline data. The WQTWC will work together to develop Section 5.0 Implementation of the Water Quality AMP and to identify measures necessary to evaluate water quality during the new license term through this AMP.

Alison noted that DESC is proposing to fund measuring additional water quality parameters at existing USGS gages. DESC is consulting with USGS regarding adding instruments to measure water temperature and DO levels at USGS gage 02195520 (Savannah River Near Evans, GA) and USGS gage 021963601 (Stevens Creek at Woodlawn Rd nr Murphy Village, South Carolina). Alison suggested that one of the first implementations the committee could enact is to analyze the available water quality data from those continuous gages. Amy, DESC, stated that the data that USGS collects under the current license includes specific conductance and pH in addition to water temperature

⁴ Effective July 1, 2024, SCDHEC became two separate agencies. Consultation regarding the Stevens Creek Hydroelectric Project will be conducted through the South Carolina Department of Environmental Services (SCDES) moving forward.

and DO and inquired of the group if they believed there was a need to measure specific conductance and pH continuously at the USGS gages as well. Alison added that the USGS annual reports provide a great baseline of some of the main water quality parameters in the Project reservoir. However, it was noted that there is a limited baseline regarding the Project's re-regulation function due to the dam work (replacing flashboards; rock anchors) that has been ongoing over the past several years, and perhaps the WQTC can look further into how the Project's re-regulation function impacts conditions both upstream and downstream of the Project dam. Kevin responded that NMFS recognizes that re-regulation was not the original intent of the Project, and NMFS is trying to consider things from a basin-wide perspective. FERC⁵ added the re-regulation function to the Project, which NMFS believes is a good thing that benefits downstream species and infrastructure. The water quality data collected in 2021 and 2023 prove that the re-regulation function is being realized and the Project is releasing water that meets state standards. Kevin believes collecting continuous DO and water temperature data at the existing gages makes sense, particularly where flow data is collected.

Alison spoke of the water quality data monitoring that has been historically conducted under the Project's current license. There is discussion in the current license that if USACE puts in oxygenation and improvements are seen in the system, DESC could request to have the USGS monthly profile and annual report modified. DESC understands that still being able to monitor water quality at the Project is important and believes that proposing the continuous monitors will provide the necessary information. The USGS annual report process is now a relic of the previous relicensing, and DESC is looking for efficiencies in providing necessary water quality data during the new license term if amenable to resource agencies. Kevin responded that the current USGS data collection has been useful in documenting the change in water quality once the oxygenators were put in place in Thurmond Lake. The group is still looking to Thurmond Lake as the source of water quality issues, but it is now more complex than low DO water. He added that set stations with continuous monitoring is going to be a better long term data set than monthly snapshots which is currently done, and NMFS believes that that is a reasonable switch to make. Kevin noted that he was curious about GAEPD's and SCDES's thoughts on the discontinuation of USGS sampling and adding the continuous monitors; no replies from the agencies were received.

Alison noted that DESC is planning to petition FERC to discontinue the USGS monitoring beginning in 2025. The license article allows DESC to request to modify the article on the annual reporting requirements, but if the committee could potentially make that modification sooner rather than later, that would allow the continuous monitors to be installed sooner and collecting data, which is beneficial from a resource agency perspective. Alison added that it would be important to FERC that DESC has support from

⁵ Federal Energy Regulatory Commission

the resource agencies on the discontinuation and requested that GAEPD and SCDES, specifically, consider the options. Amy thanked Kevin/NMFS for their support, and she noted that she will be distributing an email to the resource agencies to request their concurrence or comments.⁶

Alison reviewed the schedule with the group. As previously noted, comments on the Water Quality Report were requested by July 5, 2024. DESC will re-distribute the Water Quality AMP for a minimum 30-day review period, and then schedule another WQTWC meeting. However, Alison requested that should group members have initial thoughts on the Water Quality AMP, comments on the structure, or any implementation goals, to please provide comments by July 31, 2024. As previously noted, DESC will distribute an email to resource agencies for support on the discontinuation of the USGS monitoring and will request replies to be sent within 30 days. DESC will file the letter with FERC once that consultation is received.

The meeting was adjourned.

ACTION ITEMS:

- DESC to distribute an email to WQTWC Members requesting concurrence or comments on the discontinuation of USGS data collection and addition of continuous monitoring equipment to existing USGS gages.
- WQTWC Members to provide any initial comments on the Water Quality AMP, its structure, and/or implementation measures by July 31, 2024.
- DESC/Kleinschmidt will re-distribute a revised Water Quality AMP to the WQTWC for a minimum 30-day review period.
- DESC/Kleinschmidt will schedule a WQTWC meeting after the review period.

⁶ The referenced email was distributed by Amy Bresnahan, DESC, on July 3, 2024, with a request for concurrence or comments from the Water Quality Technical Working Committee Members by August 9, 2024.

MEETING NOTES
Stevens Creek Hydroelectric Project (FERC No. 2535)

Dominion Energy South Carolina, Inc.
Water Quality Adaptive Management Plan

January 30, 2025

Final JAG 3/7/25

MEETING ATTENDEES¹:

Ray Ammarell – Dominion Energy
Will Barnes – Dominion Energy
Jason Bettinger – SCDNR
Amy Bresnahan – Dominion Energy
Caleb Gaston – Dominion Energy
Aaron Gray – GAWRD
Jenn Güt – Kleinschmidt
David Hedeon* – GAEPD
Andy Herndon* – NMFS
Suzy Hill* – USACE
Fritz Hoogakker* – Dominion Energy
Alison Jakupca – Kleinschmidt

Kevin Mack – NMFS
Elizabeth Miller – SCDNR
Jason Moak – Kleinschmidt
Clint Peacock – GAWRD
Will Pruitt* – Kleinschmidt
Dewey Richardson* – GAEPD
Fritz Rohde* – NMFS
Darrel Shier* – Dominion Energy
Jamie Sykes* – USACE
Paul Vidonic* – Dominion Energy
Rusty Wenerick* – SCDES
Keith Whalen – USFS

* attended virtually

Not in Attendance: USFWS

These notes are a summary of the major points presented during the meeting and are not intended to be a transcript or analysis of the meeting.

MEETING PURPOSE: The purpose of the meeting was to develop the implementation measures for the Stevens Creek Hydroelectric Project (Project) Water Quality Adaptive Management Plan (AMP).

¹ Abbreviations/Acronyms: GAPED = Georgia Environmental Protection Division; GAWRD = Georgia Wildlife Resources Department; Kleinschmidt = Kleinschmidt Associates; NMFS = National Marine Fisheries Service; SCDES = South Carolina Department of Environmental Services; SCDNR = South Carolina Department of Natural Resources; USACE = United States Army Corps of Engineers; USFWS = United States Fish and Wildlife Service; USFS = United States Forest Service

Alison, Kleinschmidt, began the meeting with a welcome and led introductions of meeting attendees. Ray, Dominion Energy, provided relevant safety information about the meeting building to in-person attendees and led a safety moment about winter weather.

Section 5.0 of the draft AMP that was included in the Project's Final License Application (FLA) filed with FERC² was reserved for further discussion with the AMP following the completion of the 2023 Water Quality Study. In a recent Additional Information Request, FERC asked that implementation measures be further clarified with the Review Committee. Therefore, the primary objective of the present meeting was to deliberate potential implementation measures for the AMP in enough detail to allow for FERC analysis.

Continuous water quality monitoring was added as an implementation measure under Section 5.0 to reflect what Dominion Energy proposed in the Project FLA. Dominion Energy has contracted with USGS³ to implement continuous dissolved oxygen (DO) and temperature monitoring at USGS gage no. 02195529 (Savannah River Near Evans, GA⁴) and USGS gage no. 021963601 (Stevens Creek at Woodlawn Rd nr Murphy Village, SC⁵). Both gages have been installed and are collecting data.

Kevin, NMFS, asked if there has been any correspondence from FERC on Dominion Energy being allowed to discontinue the water quality monitoring effort under Article 405 of the Project's current license. NMFS again expressed their support of discontinuing the current monitoring. Dominion Energy had not received anything from FERC to date; therefore, they contracted with Kleinschmidt to collect the January 2025 data and are working with USGS to continue data collection as required until FERC has provided notice.

Kevin commented that the current USGS dataset from the Project is robust, and one potential use of the Project's Fishery Resources Enhancement Fund (Enhancement Fund) could be to review the data and analyze how the watershed has changed since the monitoring began; the analysis would likely show the installation of the oxygenation system in the upstream Thurmond Dam reservoir. Amy, Dominion Energy, noted that the Enhancement Fund group is due to convene, and Kevin's project idea is something that could be discussed. However, Amy was not sure if analyzing the dataset would qualify as eligible under the Enhancement Fund. Keith, USFS, remarked that it would be good to compare the USGS historical data with the continuous gages for a year or two. Jason M., Kleinschmidt, added that such a comparison would likely not need to be for all gages and/or data, but a subset.

Alison discussed the proposal of water quality monitoring data review. Dominion Energy could provide a brief a yearly report/memorandum that summarizes DO data to determine

² FERC = Federal Energy Regulatory Commission

³ USGS = United States Geological Survey

⁴ GA = Georgia

⁵ SC = South Carolina

the percentage of instantaneous readings below 4.0 milligrams per liter (mg/L), and the number of daily average values below 5.0 mg/L. Temperature data could also be summarized to determine the range of water temperatures observed throughout the year. Additional data could include information on flows from Thurmond Dam and/or an analysis of Project flashboards; Alison noted the Review Committee could determine what information could be the most useful. Amy added that she is working with the Project plant staff to gather more information on when and how the flashboards trip so that dataset will be more robust moving forward.

Alison stated that in addition to reviewing the water quality data, the Review Committee could choose to develop an annual work plan outlining water quality-related activities performed under the AMP; however, it was noted that this may not be enough level of detail for FERC. The current due date listed for the annual report to be filed with FERC is April 30th, but Alison suggested the group consider a different date since April 30th is the due date for the Parr Hydroelectric Project annual adaptive management plan reports, of which many meeting attendees were also a part of. The annual consultation under the Project AMP would also include a meeting to occur in the early part of each year.

Kevin commented that NMFS is still interested in spill flow and/or hydraulic modeling to determine if water quality conditions in Stevens Creek are improved under certain flow conditions over the Project dam. The group discussed whether a CE-QUAL-W2 model⁶ could produce results that would help inform the Review Committee; more information was determined to be needed. Elizabeth, SCDNR, inquired if Dominion Energy would be amenable to having a firm attend a meeting and present to the Review Committee the different options for modeling conditions at the Project. Ray responded that they were open to it, but it would need to be discussed with management. The group discussed how that measure would be incorporated into the AMP. It was noted that additional data would likely need to be collected in order to conduct a model, such as sediment oxygen demand. The AMP was revised to reflect that should the Review Committee determine a model is appropriate, a water quality model and necessary supporting data would be further explored.

Jason M. stated that there are inputs from municipalities upstream of the Project boundary, and the group could lean on SCDES for assistance to determine what these inputs consist of and any potential mitigation measures. Rusty, SCDES, responded that if water quality issues are determined to be watershed-wide, this could be addressed through a TMDL⁷; however, the group would likely meet resistance from the permitted dischargers. Rusty added that it would be imperative to have a good understanding of the issue before taking this step. Keith commented that since the biggest issue is DO levels, it may be helpful to have long-term

⁶ CE-QUAL-W2 is a water quality and hydrodynamic model in 2D (longitudinal-vertical) for rivers, estuaries, lakes, reservoirs, and river basin systems. W2 models basic eutrophication processes such as temperature-nutrient-algae-dissolved oxygen-organic matter and sediment relationships.

⁷ TMDL = Total Maximum Daily Load

monitoring upstream of the Project boundary. Jason M. noted that some data regarding volumes of wastewater discharge is available via the USEPA⁸, but he noted that they may need assistance from SCDES in navigating the dataset. Kevin added that if the group is considering contributions from Stevens Creek, it is also reasonable to discuss contributions from the Savannah River side of the Project. Language regarding the modeling assessment implementation measure was drafted, reviewed, and revised in real-time. Ray added that if the group decides on a modeling effort, Dominion Energy could solicit proposals and provide those to the Review Committee. Elizabeth commented that SCDNR would like to see actual action in the AMP. Keith responded that it was important to consider that the group should not advocate for a model just for the sake of modeling because the experts could determine that there is not a good model for answering the questions about the Project. Elizabeth noted that modeling is a rapidly developing industry and would like to see the effort re-explored in 5 to 10 years if modeling cannot answer the question now. This was amenable to Dominion Energy. Elizabeth would also like to see some monitoring proposed post AMP.

Elizabeth stated that she does not believe the water quality issue at the Project will be resolved within 5 years, and thus, language limiting the AMP period to such should be removed. Alison commented that there will need to be some sort of clause that closes the AMP. Keith noted that the group could decide to extend out the schedule of the AMP beyond 5 years. Kevin asked how 10j recommendations would be incorporated into the AMP. Alison replied that ideally the 10j recommendations would be consistent with the AMP. Clint, GAWRD, suggested that instead of attempting to define a time period for the AMP, the annual report could include a component in which the Review Committee decides each year whether or not the AMP will continue the following year. This was agreeable to Dominion Energy.

Elizabeth requested some discussion on the development of a Water Quality Management Plan (WQMP) instead of just an AMP. It was concluded that the WQMP would be the closure for the AMP, which was agreeable to the group.

It was agreed among the group that June 1st would be the filing date for the annual report with FERC as opposed to April 30th.

Keith asked if during the AMP process, it is discovered that Project operations are causing a DO issue, but modeling indicates that there are no solutions, could there be a Habitat Enhancement Program (HEP) fund developed to conduct work in the watershed to improve DO. Amy responded that Dominion Energy discussed continuing the Enhancement Fund moving forward. The decided mechanism can be discussed in the WQMP. Alison believes

⁸ USEPA = United States Environmental Protection Agency

that FERC would not include a HEP fund in the Project license so the group should have flexibility to develop and manage such a program.

Kevin suggested adding more specificity to the schedule for Year 1 and Year 2 since there is more understanding of some work that could be conducted those years.

Kevin asked Dominion Energy if they expected the agencies to review information related to FERC's Additional Information Request. Alison responded that that is not anticipated.

Jason M. asked Keith if the USFS has been able to assess the full impact of Hurricane Helene on the area. Keith responded that they are still removing trees and clearing roads, so no, an assessment of the hurricane's impact has not yet been conducted. Jason M. noted that a lot of the decaying matter resulting from the hurricane will likely enter the Stevens Creek watershed and create or further exacerbate water quality issues.

David, GAEPD, provided a comment that the AMP does not mention continuing water quality monitoring directly up- and downstream of the Project (at USGS sites 2 and 3), and that is what GAEPD is currently requesting and will request as part of the 401 Water Quality Certification (WQC). Dominion Energy does not currently have water quality monitors in those locations. The continuous water quality data collected in 2021 and 2023 indicates that there is good DO water being released from the Project, but Dominion Energy understands GAEPD's position that the compliance point for the WQC is downstream of the Project. GAEPD's preference is that the continuous monitors are installed on the Georgia side of the river. Jason M. reflected that installing a monitor directly downstream of the powerhouse should be achievable but there would be some vegetation issues to navigate with installing a monitor directly upstream of the Project powerhouse. Alison noted that Dominion Energy intends to hold a WQC meeting with the GAEPD ahead of the Ready for Environmental Analysis to be issued by FERC.

The meeting was adjourned.

ACTION ITEMS:

- Kleinschmidt to revise the AMP and distribute it to the group for a 30-day review.