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

Dominion Energy South Carolina, Inc.
Fish, Wildlife, and Water Quality Resource Conservation Group

March 19, 2024

Final JAG 3/7/25

ATTENDEES:

Amy Bresnahan – DESC
Caleb Gaston – DESC
Ray Ammarell – DESC
Fritz Hoogakker – Dominion
Paul Vidonic – Dominion
Taylor Allen – Dominion
Alison Jakupca – Kleinschmidt
Jason Moak – Kleinschmidt
Jenn Güt – Kleinschmidt
Will Pruitt – Kleinschmidt
Andy Herndon – NMFS
Bjorn Lake – NMFS
Fritz Rohde – NMFS
Kevin Mack – NMFS
Suzy Hill – USACE
Melanie Olds – USFWS
Aaron Gray – GADNR
Bryant Bowen – GADNR
Clint Peacock – GADNR
David Hedeen – GAEPD
Dewey Richardson – GAEPD
Liz Booth – GAEPD
Rusty Wenerick – SCDHEC
Alex Pellet – SCDNR
Bill Post – SCDNR
Elizabeth Miller – SCDNR
Jason Bettinger – SCDNR
Paula Marcinek – TNC

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 and discuss the 2023 Water Quality Study Report (WQ Study) for the Stevens Creek Hydroelectric Project (Project).

Alison, Kleinschmidt, provided a welcome and the meeting attendees each introduced themselves.

Jason, Kleinschmidt, reviewed a slide presentation that included the objective, methods, and results of the WQ Study.

The objective of the WQ Study was to assess dissolved oxygen (DO) dynamics in the Stevens Creek arm of the Project impoundment. To do this, continuous monitors collected hourly temperature and DO at river mile (RM) 0 (mouth of Stevens Creek), RM 4.5, RM 8.5,

and RM 10.5 from May 1 through October 31, 2023. Additionally, specific conductance, pH, and turbidity were measured hourly at RM 0 and RM 4.5. Longitudinal surveys were conducted monthly during the same time period and a total of four off-channel surveys were conducted at the Project which aimed at collecting DO and temperature in 15-minute intervals at six locations in the creek for a 48-hour period.

Jason reviewed the results of the continuous monitoring. Thurmond Dam data was provided by USACE; no data was collected for September or October due to equipment malfunction but seems to follow trends from previous years. Jason noted that there were issues with sediment fouling at the most upstream Stevens Creek sites (RM 8.5 and RM 10.5) which resulted in DO "flatlining"; this data could not be corrected for drift. There was one instance of DO at the mouth of Stevens Creek falling below the state standard of 4 milligrams per liter – a single data point in June.

Bjorn, NMFS, inquired if operations at Thurmond Dam were similar in 2021 and 2023. It is believed that USACE were operating similarly between the two years but Amy, DESC, noted that USACE went into Drought Trigger Level 2 in November 2023, reducing outflows from the dam below 4,000 cubic feet per second (cfs). It was also noted that in 2021, the Project's 4-foot flashboards were tripped (down) for the entire monitoring period, which would have limited the fluctuation range of the reservoir and backwater up Stevens Creek. DESC/Kleinschmidt will add the information on Thurmond Dam operations in 2021 and 2023 to the report.

Liz, GAEPD, asked how far upstream Thurmond Dam water is believed to travel up Stevens Creek. The answer provided was that it varies and is dependent on both flow from Thurmond Dam and flow coming down Stevens Creek; however, there does not appear to be influence from Thurmond Dam on Stevens Creek past 8 RMs upstream.

Jason reviewed graphs that depicted the time of DO minima and maxima occurrence at RM 4.5. The lowest DO occurs at approximately 10:00 AM, and the highest DO occurs in mid- to late-afternoon. Kevin, NMFS, asked if similar figures were created for the 2021 Water Quality Study Report. No, but DESC/Kleinschmidt will add a section to the 2023 report to include the information.

Jason provided some background information for the longitudinal surveys. The upstream tow occurred during the morning from approximately 9:00 AM to 12:00 PM, and the downstream tow occurred from approximately 12:00 PM to 3:00 PM. Jason then reviewed the results from the longitudinal surveys. In general, there was a steady decrease in DO from the mouth of Stevens Creek to approximately RM 4 where DO bottoms out. DO slowly increases as you move from RM 4 upstream. In June and August, DO between RM 0 and RM 4 was super-saturated compared to DO bottoming out in other months. The

super-saturation was believed to be related to vegetation, but it is unclear why the scenario did not occur in other months.

Elizabeth, SCDNR, wanted a reminder of when Thurmond Dam typically generates. Although it can vary, USACE typically begins operating Thurmond Dam around 3:00 PM. Therefore, the longitudinal surveys were all conducted when water was receding from Stevens Creek. Conducting longitudinal surveys while Thurmond Dam is generating would had to have occurred at night, which was deemed too dangerous based on creek conditions. Jason added that on the downstream tow, they did travel across the face of the spillway and were able to determine that DO in that vicinity is typically the same or higher than DO at RM 0.

It was asked if algae or macrophyte data was collected; it was not. Jason noted that, in general, Stevens Creek is very turbid and by the time water reaches the mouth of the creek, some sediment falls out. There is a lot of submerged aquatic vegetation in Stevens Creek as well as on the South Carolina side of the Savannah River. The Project's re-regulation function results in stream flow slowing down and reversing. Liz indicated that RM 4 may be what is commonly referred to as the "big dipper" in estuaries where DO is consistently low. Liz suggested that it may be helpful to include a mileage marker on the report figures to indicate the extent of Thurmond Dam's backwater effect.

The question was raised if the Project ever causes a backwater effect in Stevens Creek. Jason reiterated the Project's re-regulation function. DESC draws the Project reservoir down to make room for Thurmond Dam water but there is not a lot of storage in the Project reservoir. Thurmond Dam typically peaks in the afternoon and stops generating around midnight. The water from Thurmond Dam starts draining from the reservoir after midnight, often not fully receding until mid-afternoon of the following day. Jason noted that it takes an estimated 16 hours for Thurmond Dam water to drain from Stevens Creek. Elizabeth asked for more explanation on the 16 hours retention time. Jason explained that it was anecdotal, and that Thurmond Dam generates for 8 hours or less a day. It has been observed that it takes approximately twice as long for water to recede as filling/generating, which is indicative of the re-regulation function of the Project.

Elizabeth stated that it is assumed the Project boundary extends upstream to the point of Project effects; however, the WQ Study results being discussed appear to indicate the Project's backwater effect is 8 miles compared to the 13 miles of Stevens Creek within the Project boundary. Ray, DESC, was uncertain how the Project Boundary Line (PBL) on Stevens Creek was determined as there is no backwater study.

Kevin, NMFS, pointed out that at least in September there is improvement in DO levels in a matter of hours, which indicates some short-term changes. Liz expounded that the

improvement to DO is not coming from upstream of Stevens Creek based on the continuous water quality data.

The results of the off-channel monitoring were then presented to the group. The water surface elevation presented in the figures is from USGS gage number 021963601 – Stevens Creek at Woodlawn RD NR Murphy Village, SC[1]. Surveys indicated the lowest DO levels occurred at some sites just after sunrise. The highest DO levels occurred at other sites and were, at times, supersaturated. The mass balance is unknown. An analysis of the time of day when minimum and maximum DO levels occurred at the off-channel loggers indicated a majority of the lowest DO levels were around 8:00 AM and highest DO levels at approximately 2:00 PM. Bjorn stated that it may be beneficial to attempt to estimate the volume of water coming out of these off-channel areas with the worst conditions to determine what they may be contributing to the Stevens Creek conditions.

Alex, SCDNR, inquired how the off-channel areas are related to the Project/if they were in the PBL. The off-channel areas that were monitored as part of the study are within the PBL. These off-channel areas are assumed to be natural. There are several private constructed ponds that may be contributing to conditions in Stevens Creek that were not monitored. Amy noted that while the monitored off-channel areas may be within the PBL, DESC owns very little land within the PBL, which does not include the off-channel habitats. DESC has flowage easements for property within the PBL that the company does not own, which allows DESC to operate the Project under various hydrologic conditions but does not imply ownership or other rights beyond inundation.

The question was raised if DESC has any control over the off-channel properties. Amy clarified that the flowage easements simply give DESC the authority to inundate the property. There was some discussion about the possibility of restricting flow to the off-channel areas and if it was beneficial to the Project to flood these areas. Caleb, DESC, stated that the volume within the off-channel areas gives the Project more room to perform its re-regulation function. The group discussed the PBL in further detail. The area DESC is allowed to inundate is larger than the area that actually gets inundated on a regular basis. Ray added that the PBL is usually set for flow conditions and may have been based on the flood of record.

Other details of the off-channel areas were discussed. Most of the channels connecting these areas to Stevens Creek are fairly narrow (approximately 10 feet wide). There are no man-made structures. Amy reminded the group that a flowage easement does not give DESC property-owner rights; they cannot adjust/restrict the channels.

[1] The labeling for the gage is misleading as it is not located near Murphy Village.

Alex asked if there were any sediment studies at the Project that could be referenced and if changes in bathymetry had occurred over time. Jason stated that he is not aware of any sediment studies in the area. However, as a creek within the Piedmont geographic region, Stevens Creek is assumed to have a natural sediment load. Jason noted there may be available studies from the USGS or other similar entities. Bjorn asked if the mouth of Stevens Creek had ever been dredged; DESC is not aware of that ever occurring. Jason commented that he has worked on the Savannah River and its tributaries since 2005 and has not noticed significant changes in sediment load.

Jason reviewed a results figure regarding the Stevens Creek Dam flashboards and water quality. In summary, the 4-foot flashboards on the eastern side of the dam were tripped for a total of 59 days during the 2023 water quality study period. It has been theorized that spilling water over the South Carolina side of the Project spillway might allow low-DO water in the creek to be "flushed" downstream and improve DO in the creek. Based on visual examination of the figure, there does not appear to be an improvement in DO during the times when the flashboards were down or after they were reset. The exception was May 15 to June 5, but the increases in DO at RM 4.5 during that time period are likely due to high inflows to Stevens Creek upstream of this location. Bjorn stated that he believes it to be premature to not investigate mitigation measures further including pneumatic flashboards; the flow contributing to the water quality issues is unknown without hydraulic modeling.

Jason presented a summary of study findings: (1) seasonally low DO releases from the upstream Thurmond Dam; (2) high loads of organic matter from the watershed, especially after rain events; (3) large flows from Thurmond Dam combined with re-regulation by the Project that "trap" sources of biochemical oxygen demand in the middle reaches of the Stevens Creek arm of the impoundment; (4) inputs of low-DO water draining from off-channel areas; and (5) other, unknown upstream contributions. These upstream contributions could include the McCormick wastewater treatment plant and/or private ponds that may have surface drains. Jason noted that an intensive study conducted by the Southeastern Natural Sciences Academy found total organic carbon concentrations in Stevens Creek to be nearly double that found in another Savannah River tributary but similar to a tributary that receives treated wastewater effluent.

Jason reviewed the next steps following the close of the study. Comments to the WQ Study report were requested by March 21, 2024. The final report will be filed with FERC. DESC is planning to petition FERC to reduce the frequency of water quality monitoring. Jason and Amy noted that extensive USGS data has been gathered at the Project during the term of their current license and there is not much else to learn. DESC is planning to fund USGS to add continuous monitoring of DO and water temperature to existing gages at Stevens Creek at Woodlawn (Site No. 021963601) and Savannah River at Hwy 28 (Site No. 02195520). This is the proposed action that is currently being analyzed by FERC.

Following a close of the presentation, Kevin provided a comment regarding the report. It was his hope that the report included a bit more combination of different aspects of the study. For example, the DO values from the continuous monitoring station could be overlayed with the off-channel habitat data. Kevin additionally noted that while he understands the practicality of the methodology of the surveys, the longitudinal surveys would have ideally occurred in the middle of the 48-hour off-channel survey as opposed to the last day. Kevin also noted that a next step regarding water quality in Stevens Creek is to determine if the DO issues are a migration barrier for fish. Jason replied that the study methodology considered practicality (2 days on the water compared to 3 days) and safety (night surveys deemed too dangerous).

Circling back to the Project PBL, Ray said that he was reminded by a co-worker that SCE&G (before they became DESC) purchased the Project from the company that constructed it. The PBL was defined by that company and flowage easements originally acquired by them. It is not believed that the PBL has changed since that time.

Discussion regarding water quality as a fish barrier will be continued under the Fish Passage Technical Working Committee. A Water Quality Adaptive Management Plan was proposed as part of the new license, which will also keep the discussions moving forward.

The meeting was adjourned.

ACTION ITEMS:

- Dominion/Kleinschmidt to revise the 2023 Water Quality Study Report to include the following:
    - Thurmond Dam operations in 2021 and 2023
    - Time of DO minima and maxima occurrence in 2021

2023 Water Quality Study
Stevens Creek Hydroelectric Project

FERC No. 2535

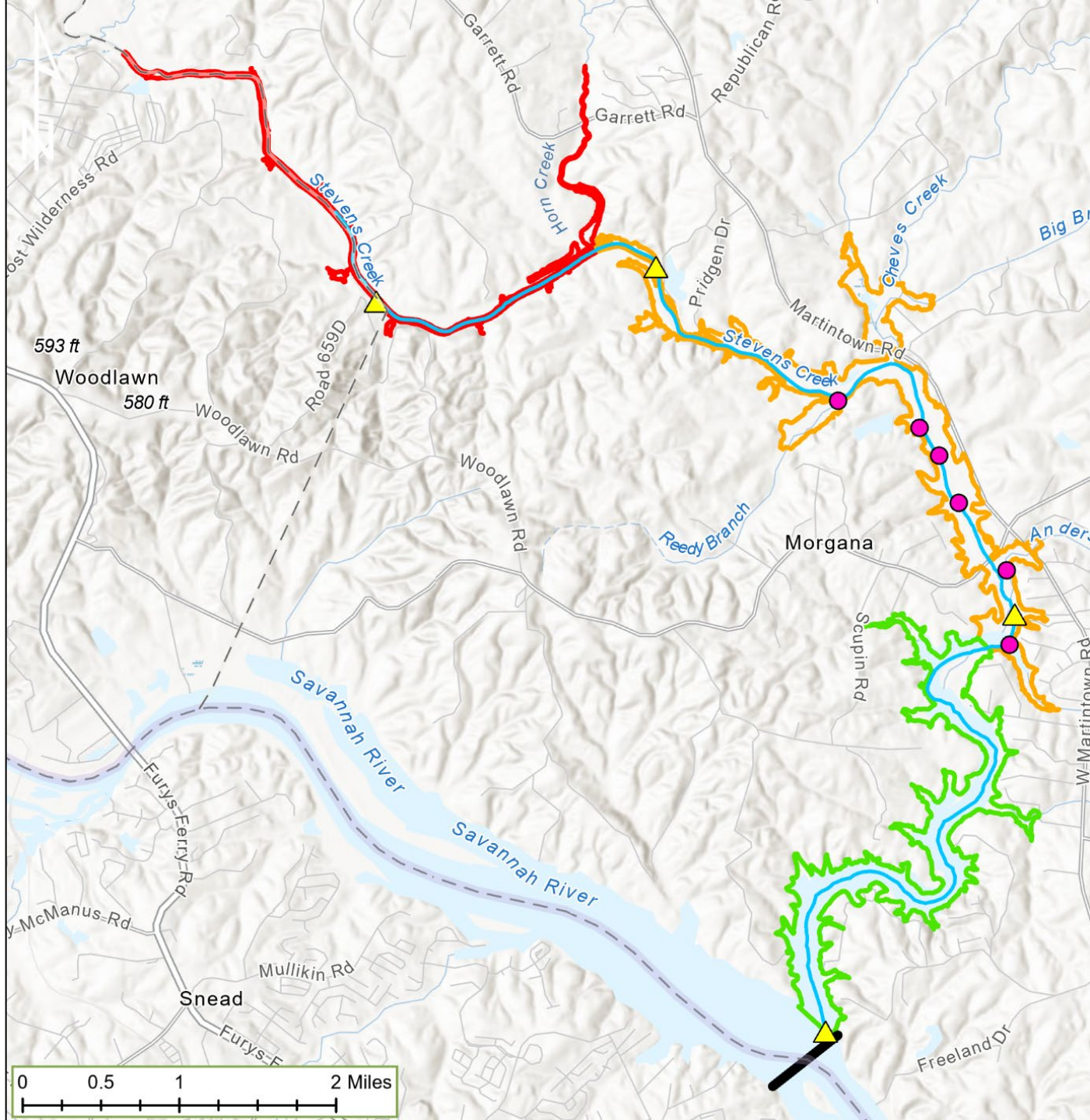
Objective

Assess DO dynamics in the Stevens Creek arm of the Project impoundment

1. Continuous monitoring was used to enable comparisons to monitoring results from 2022, and to track changes in DO as they occurred through the system.
2. Longitudinal surveys were used to determine the upstream extent of hypoxic conditions and to track changes in DO as they occurred through the system.
3. Off-channel surveys were used to pinpoint suspected sources of hypoxic water being flushed into the system.

Methods

- Hourly Temp, DO, Specific Conductance, pH, and Turbidity at RM 0 (mouth) and RM 4.5 from May 1 – October 31
- Hourly Temp and DO at RM 8.5 and RM 10.5 (Stevens Creek) from May 1 – October 31
- Monthly Longitudinal surveys May 1 – October 31
- Off-channel surveys
  - 6 locations
  - At least four (4) 48-hour periods between May 1 and October 31
  - DO and temperature at 15-minute intervals

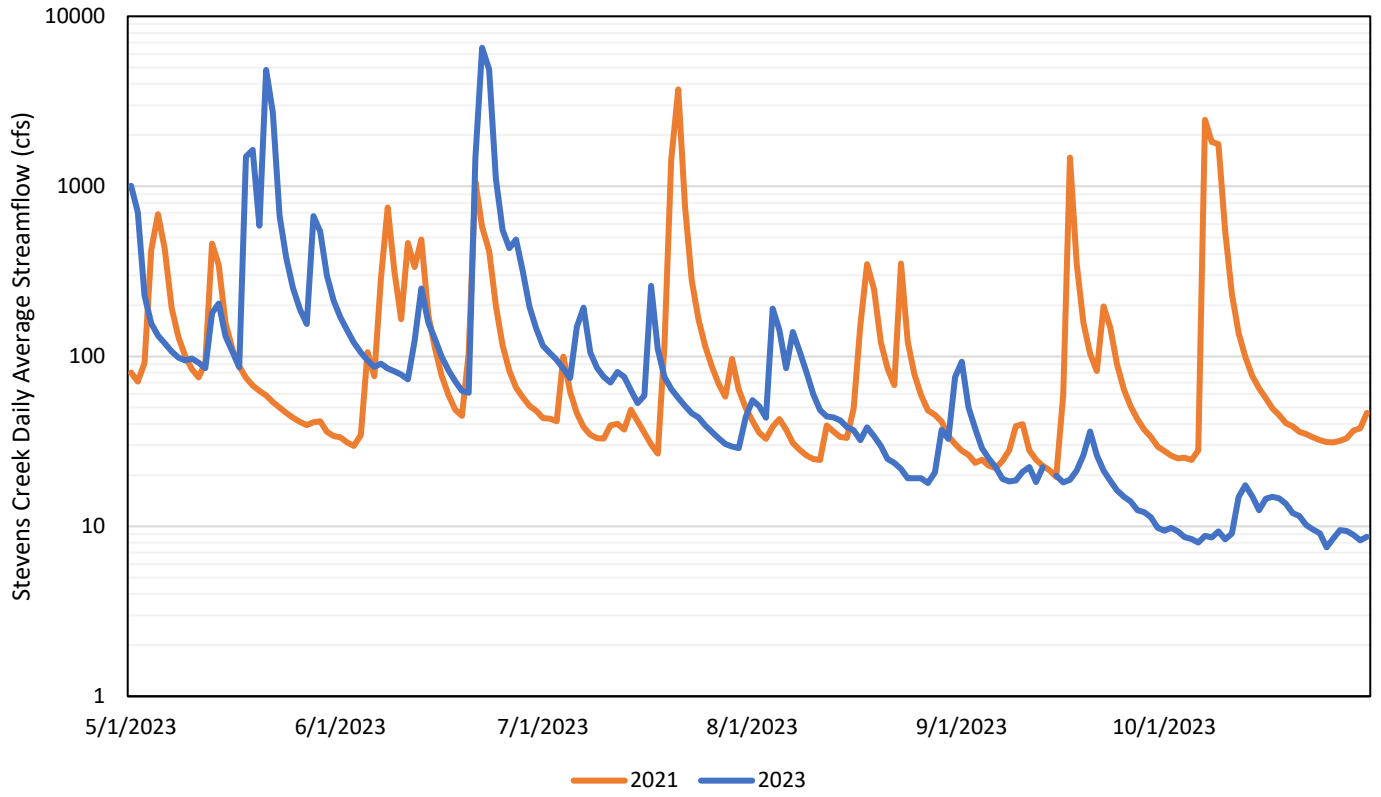


Results – Continuous DO Monitoring

Month		Thurmond Dam	SC RM 0	SC RM 4.5	SC RM 8.5	SC RM 10.5
MAY	min	4.06	4.85	4.26	0.01	0.00
	avg	**5.95**	**7.71**	**6.46**	**3.37**	**4.85**
	max	8.46	10.83	7.99	7.92	8.66
JUN	min	3.02	4.43	3.67	0.01	0.95
	avg	**4.97**	**7.05**	**5.57**	**2.36**	**4.32**
	max	8.01	11.07	9.99	7.57	6.62
JUL	min	2.07	3.93	2.59	0.21	2.86
	avg	**4.09**	**6.56**	**3.84**	**4.16**	**5.79**
	max	6.34	10.97	6.01	6.90	9.28
AUG	min	1.75	4.01	2.15	0.04	1.20
	avg	**3.57**	**6.14**	**3.70**	**3.17**	**4.77**
	max	6.39	8.71	6.90	5.78	7.46
SEP	min	-	4.08	2.71	0.01	1.11
	avg	**-**	**5.54**	**4.13**	**2.04**	**4.87**
	max	-	8.40	6.73	5.03	6.82
OCT	min	-	5.35	3.30	1.35	2.32
	avg	**-**	**6.72**	**4.85**	**4.20**	**5.73**
	max	-	9.15	6.37	6.45	10.51

Results – Continuous DO Monitoring

Month	RM 0		RM 4.5	
	2021	2023	2021	2023
	% of Days Monitored with Daily Average < 5 mg/L			
May	0.0%	0.0%	33.3%	3.2%
Jun	0.0%	0.0%	-	13.3%
Jul	6.5%	0.0%	100.0%	100.0%
Aug	6.5%	0.0%	90.3%	100.0%
Sep	6.7%	3.3%	70.0%	100.0%
Oct	25.8%	0.0%	83.9%	58.1%
	% of Instantaneous Measurements < 4 mg/L			
May	0.0%	0.0%	1.0%	0.0%
Jun	1.0%	0.0%	-	2.5%
Jul	0.5%	0.1%	47.2%	65.1%
Aug	1.5%	0.0%	64.0%	67.7%
Sep	1.9%	0.0%	36.7%	43.9%
Oct	4.2%	0.0%	43.3%	11.2%



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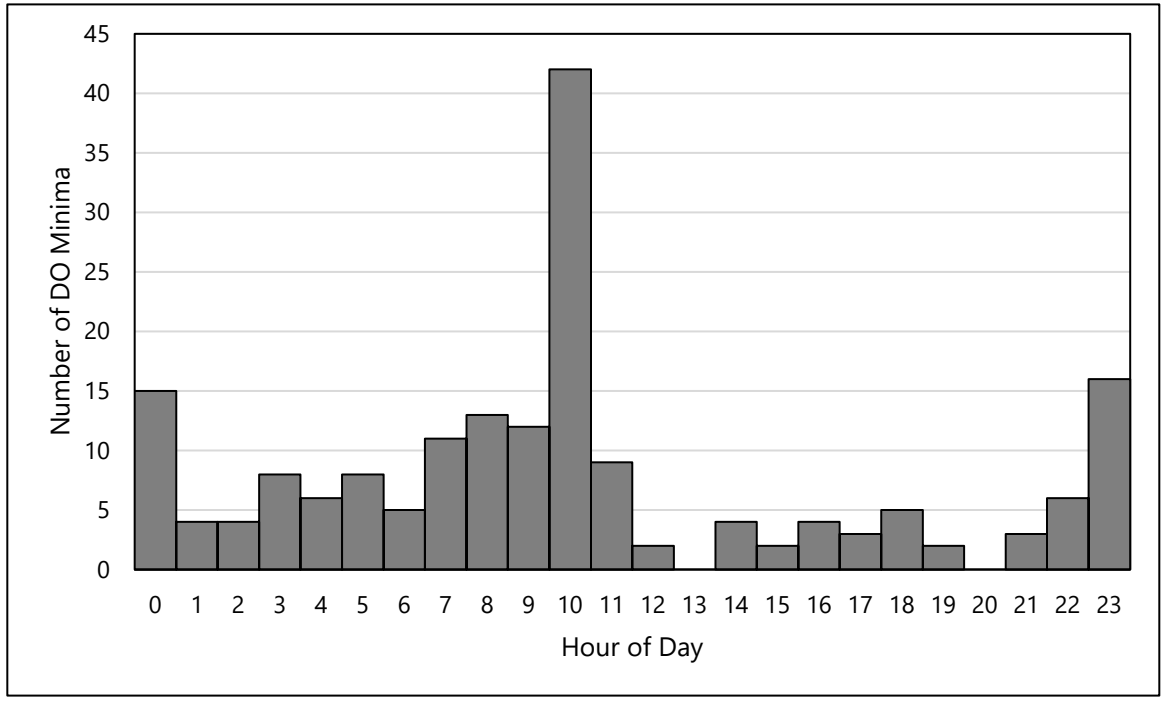
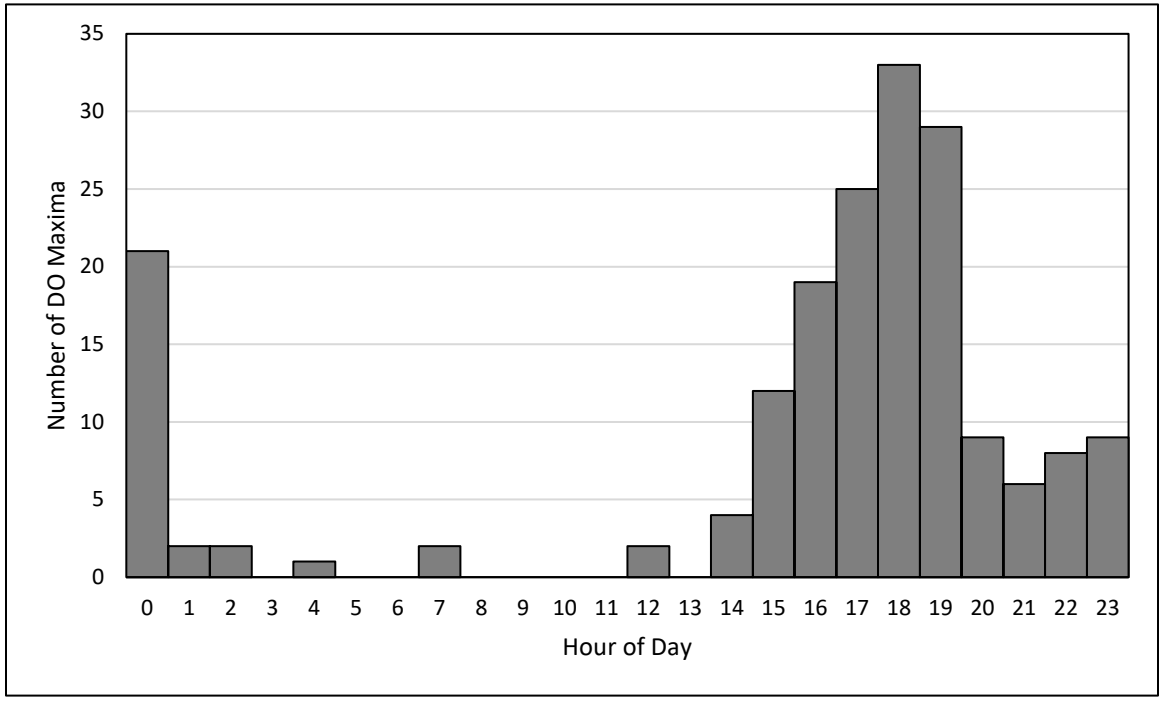
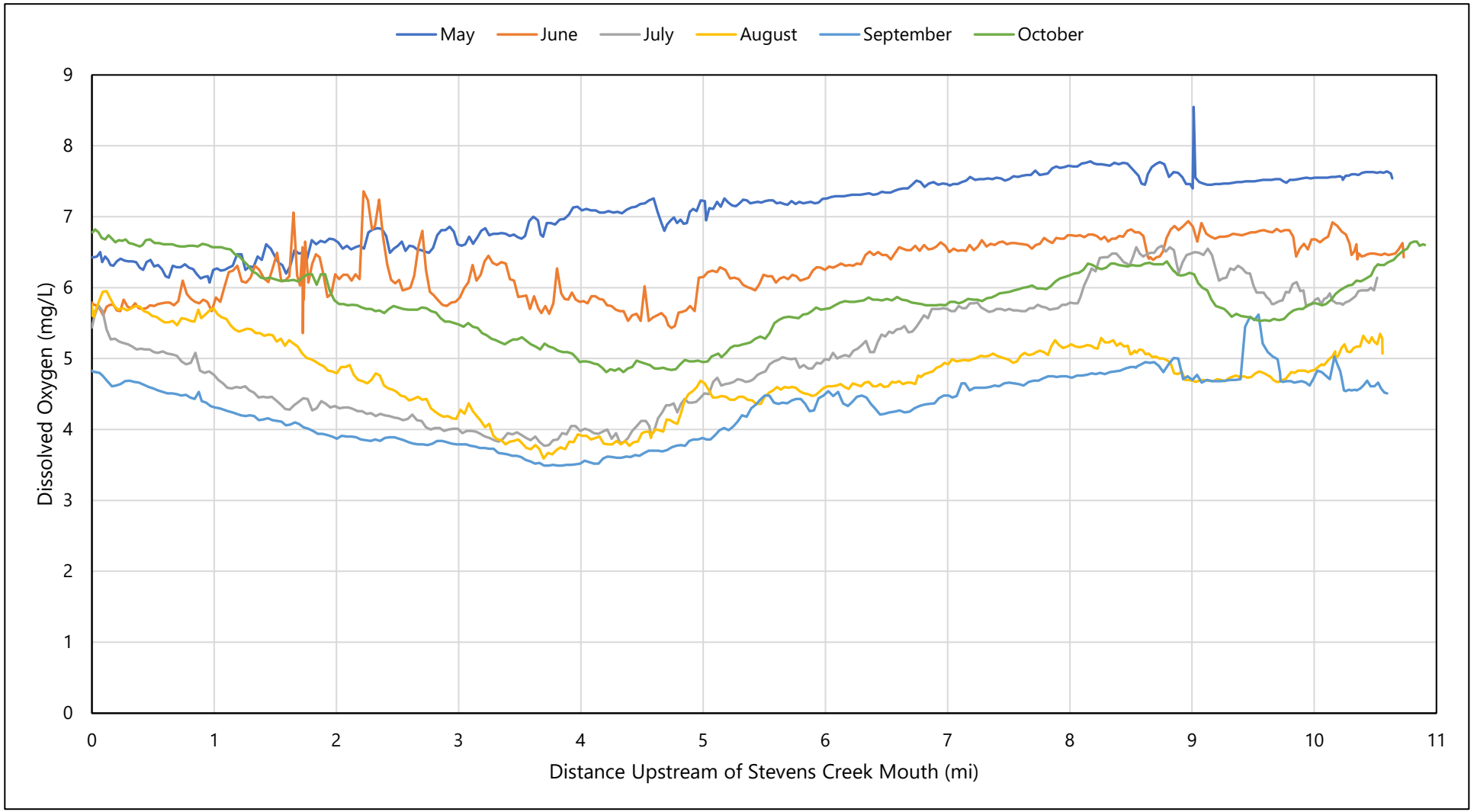




Results – Longitudinal Surveys



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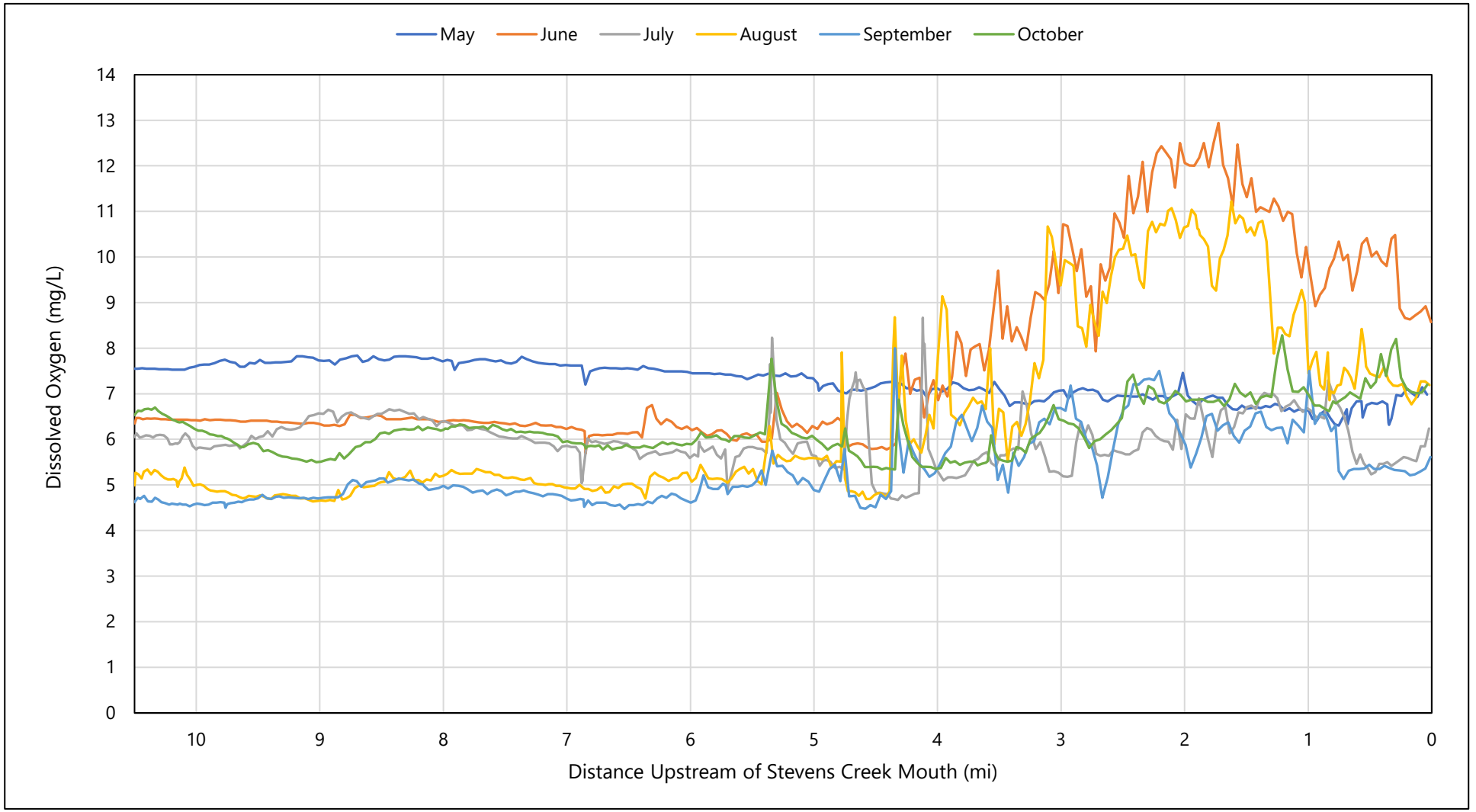

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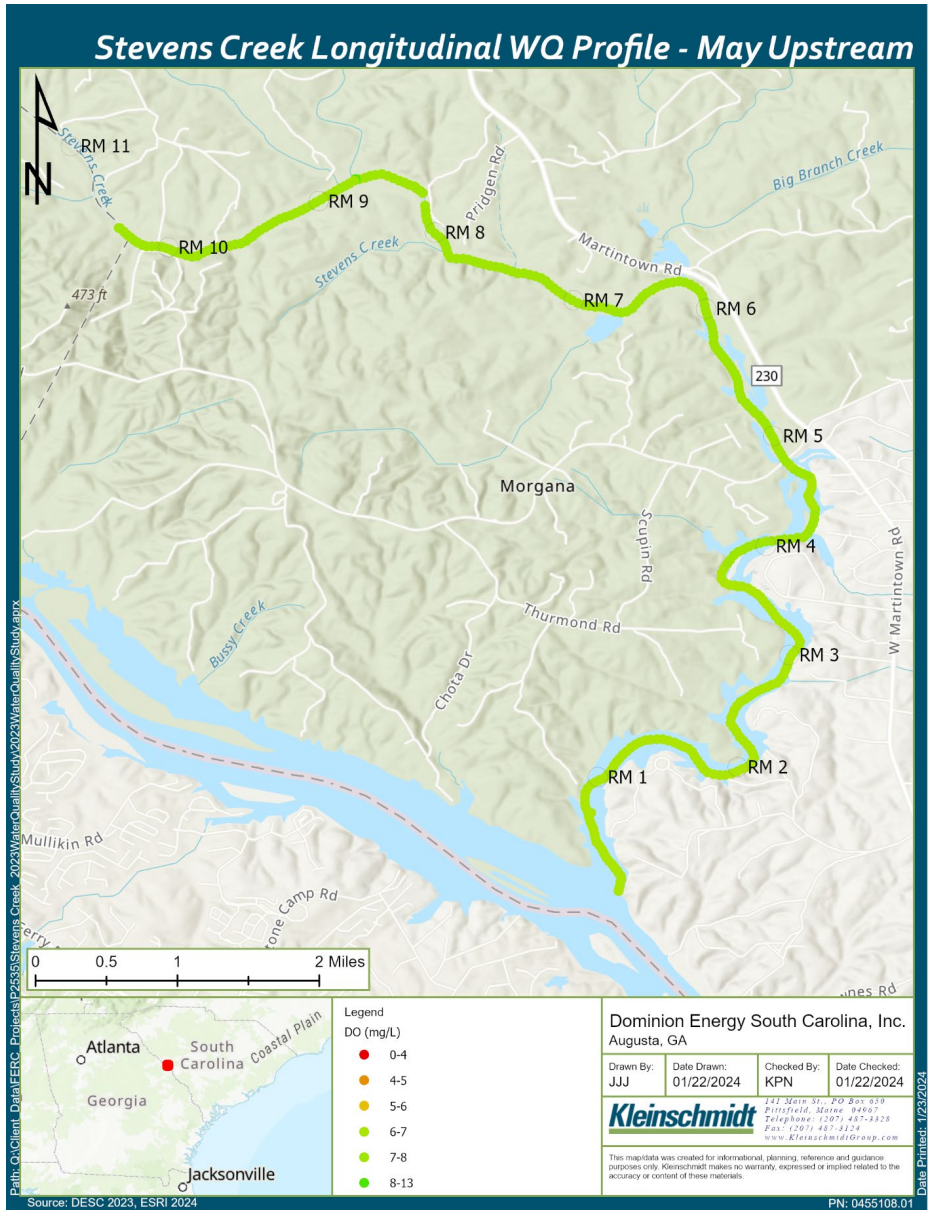

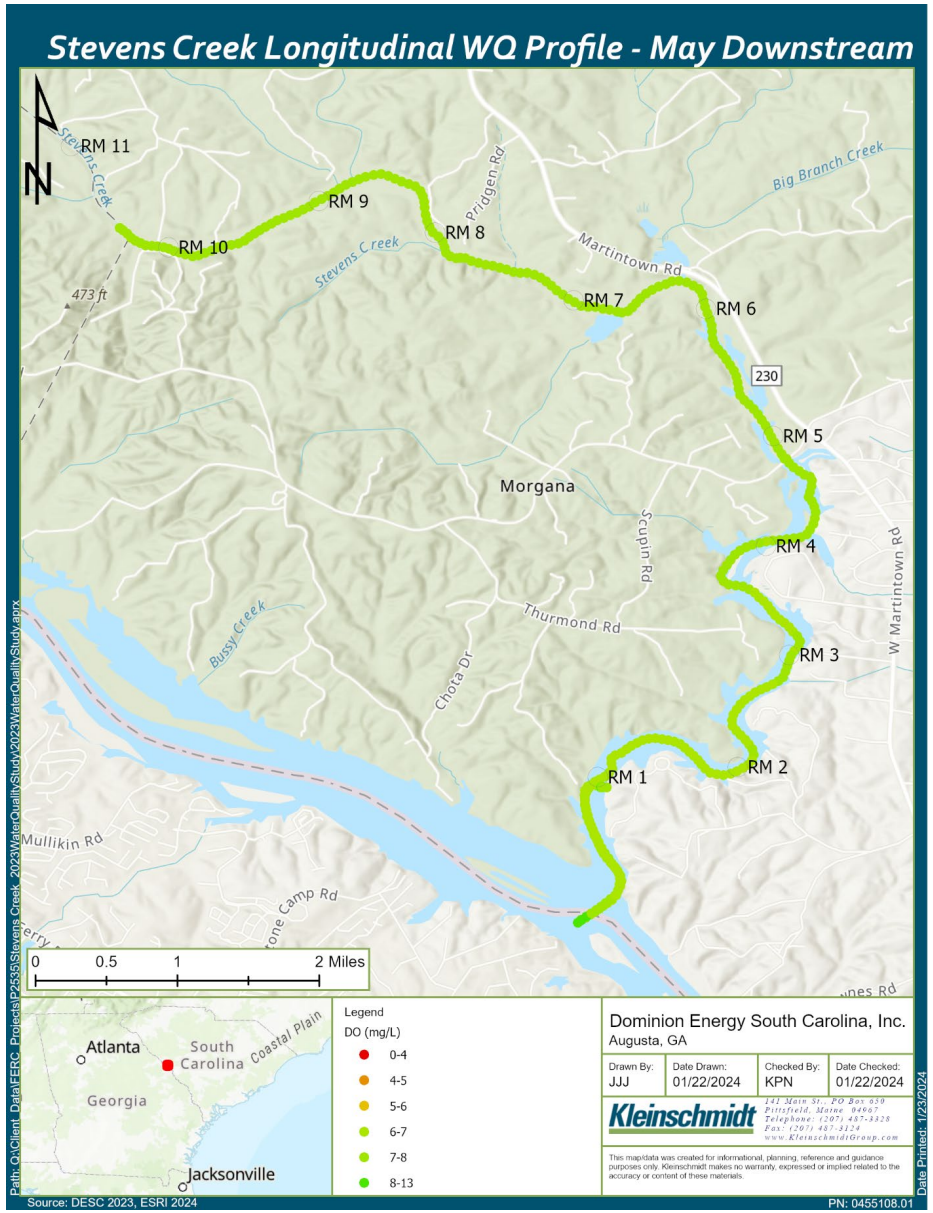

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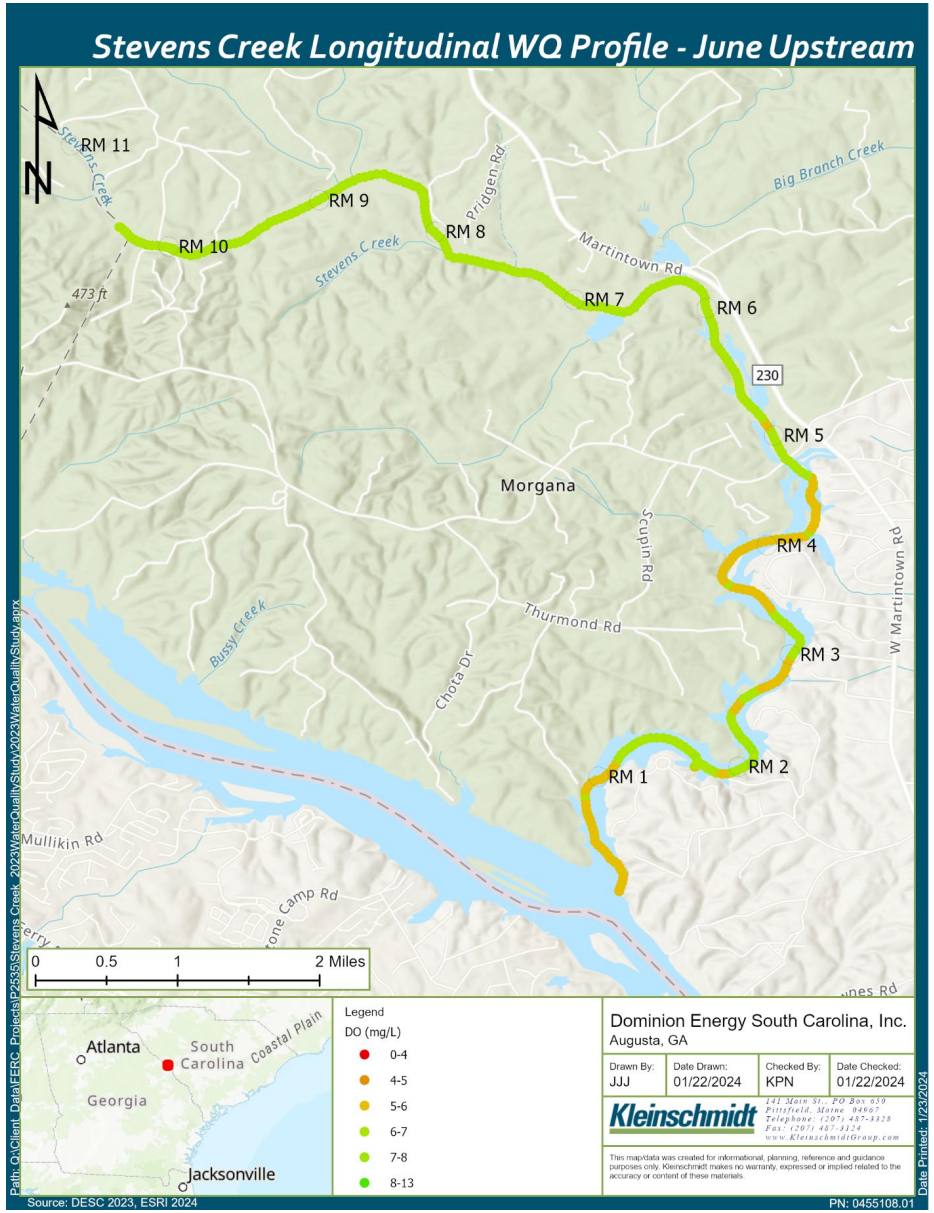

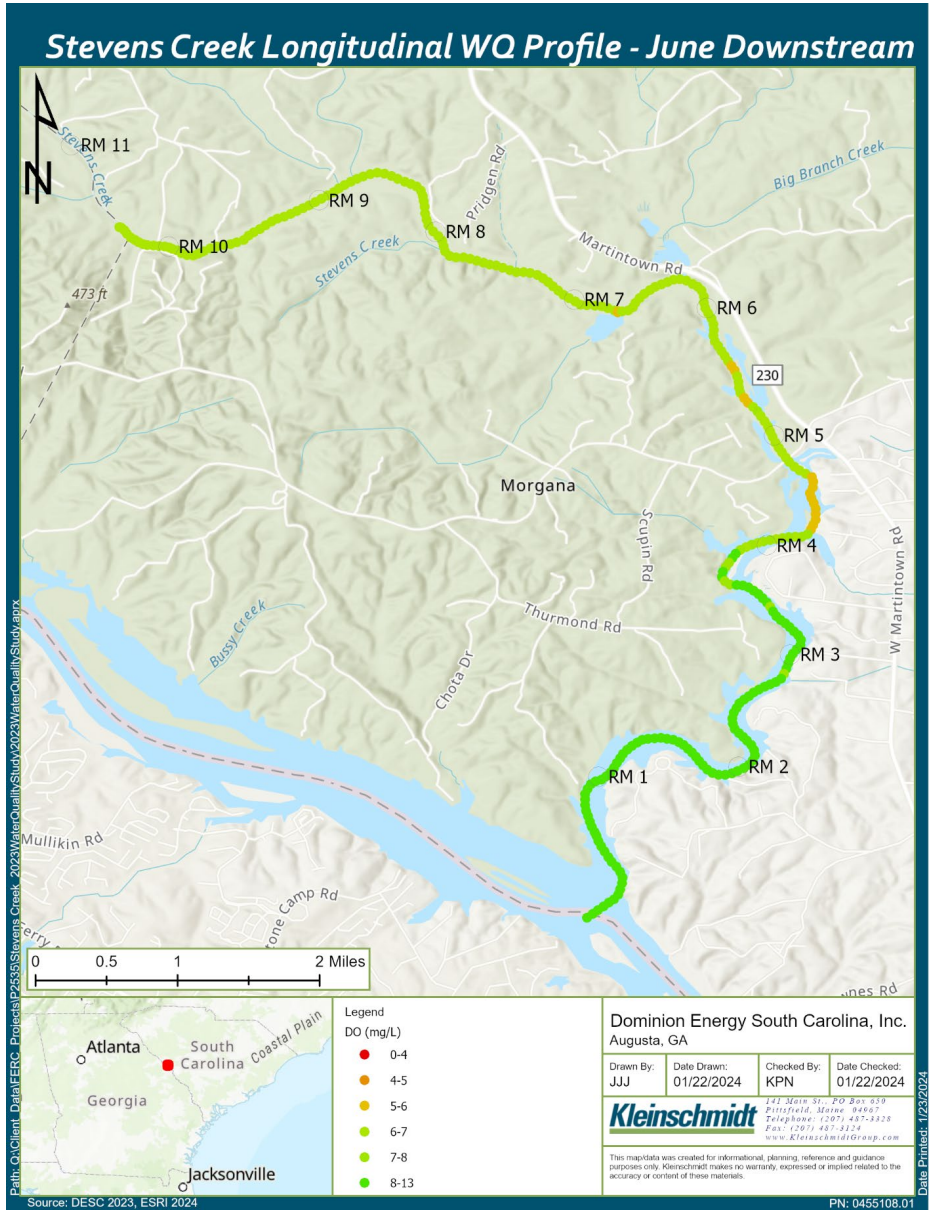

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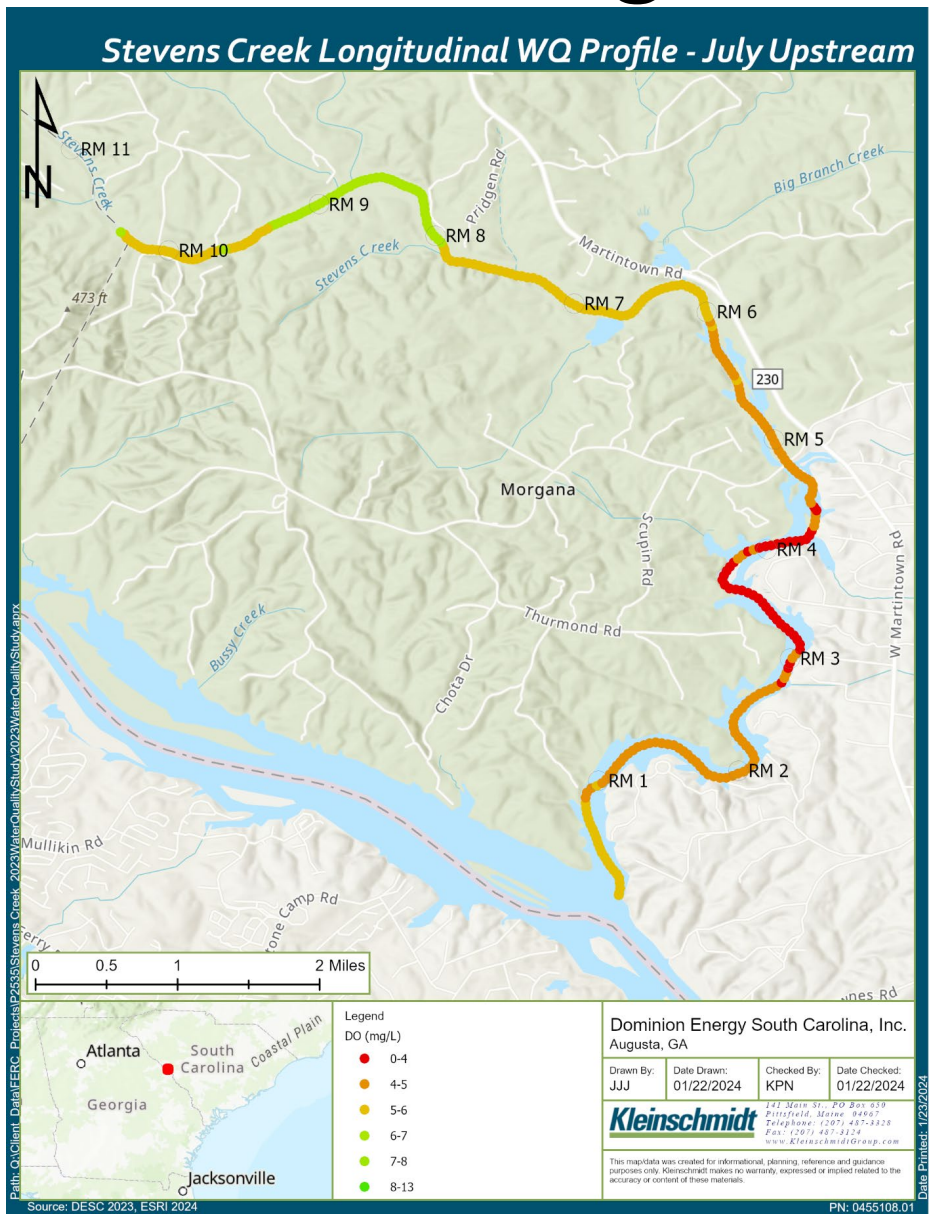

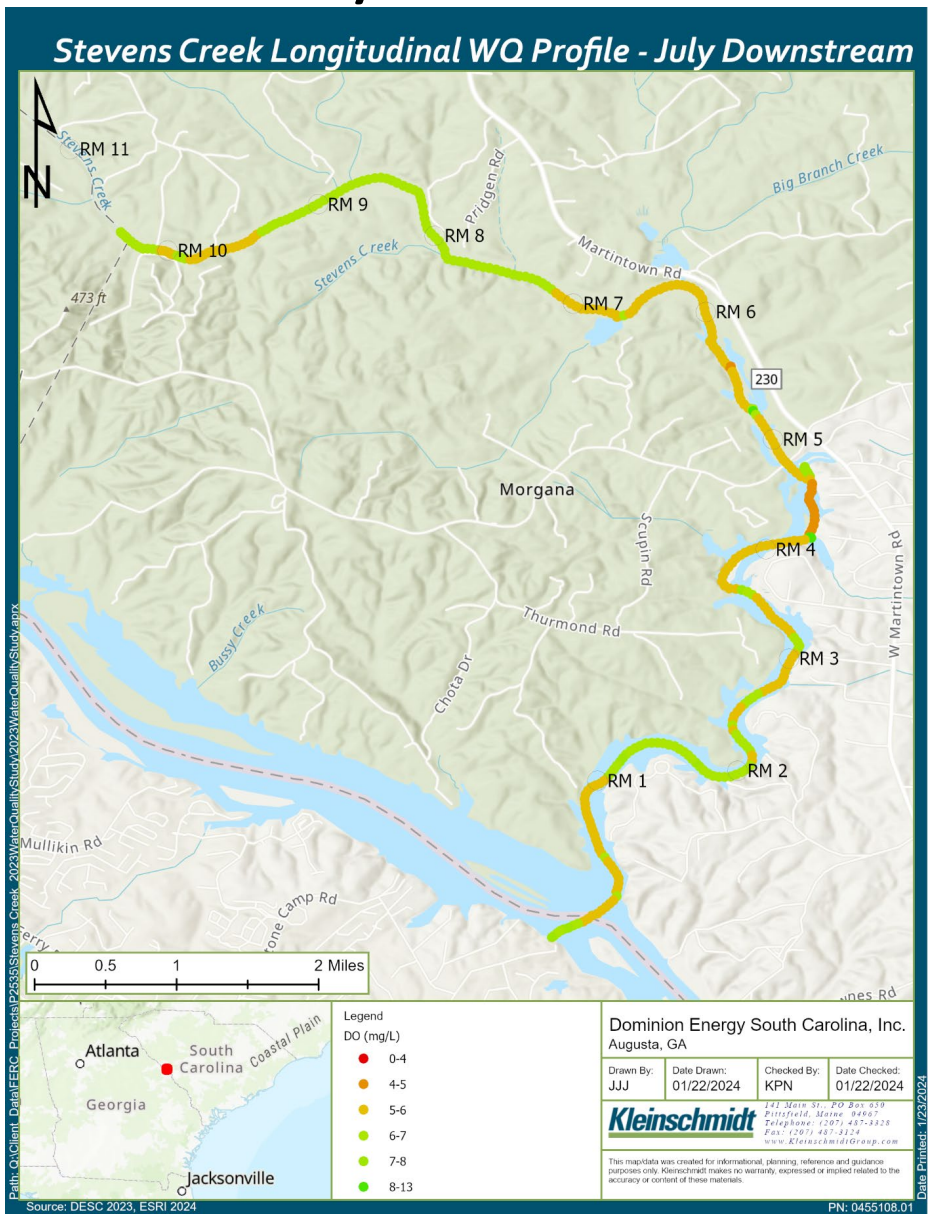

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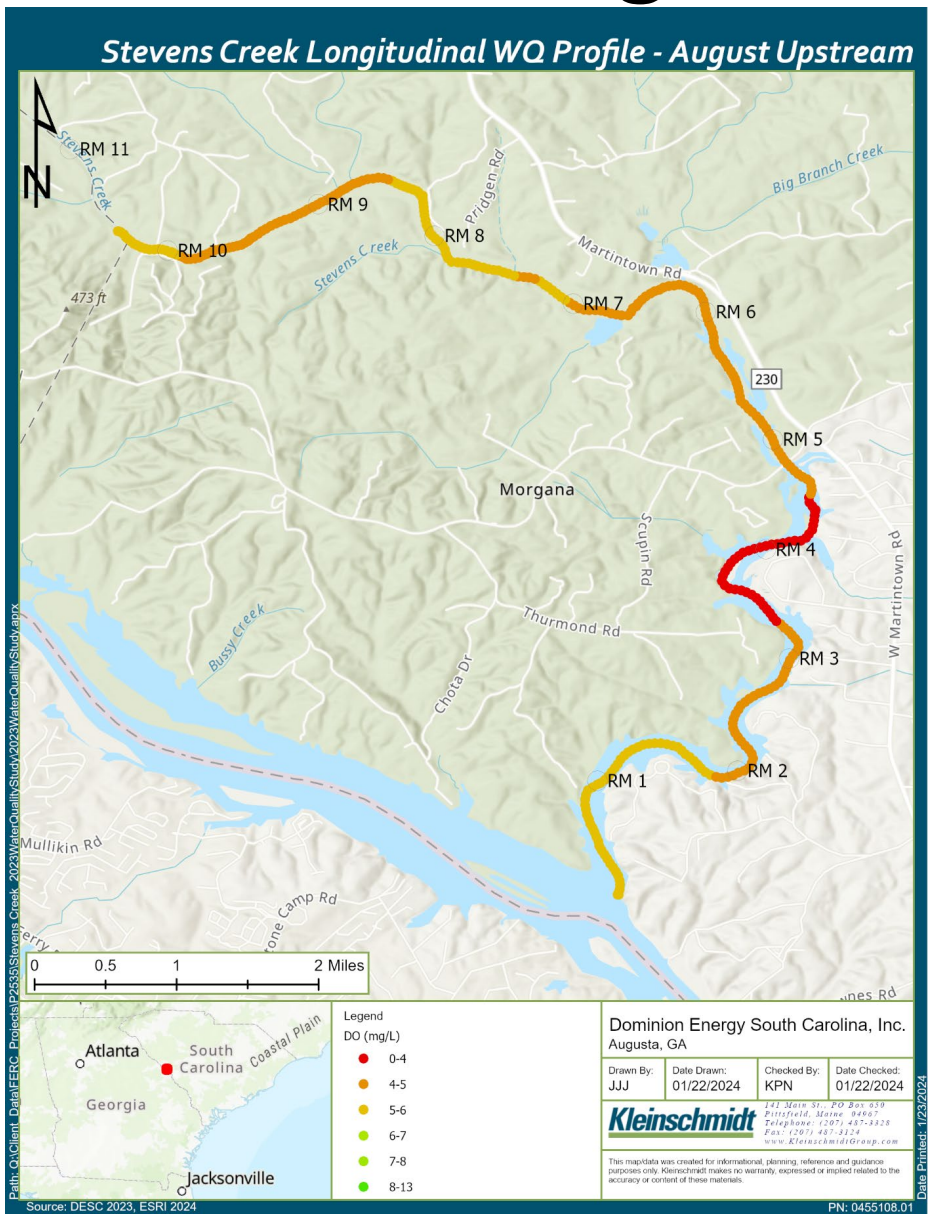

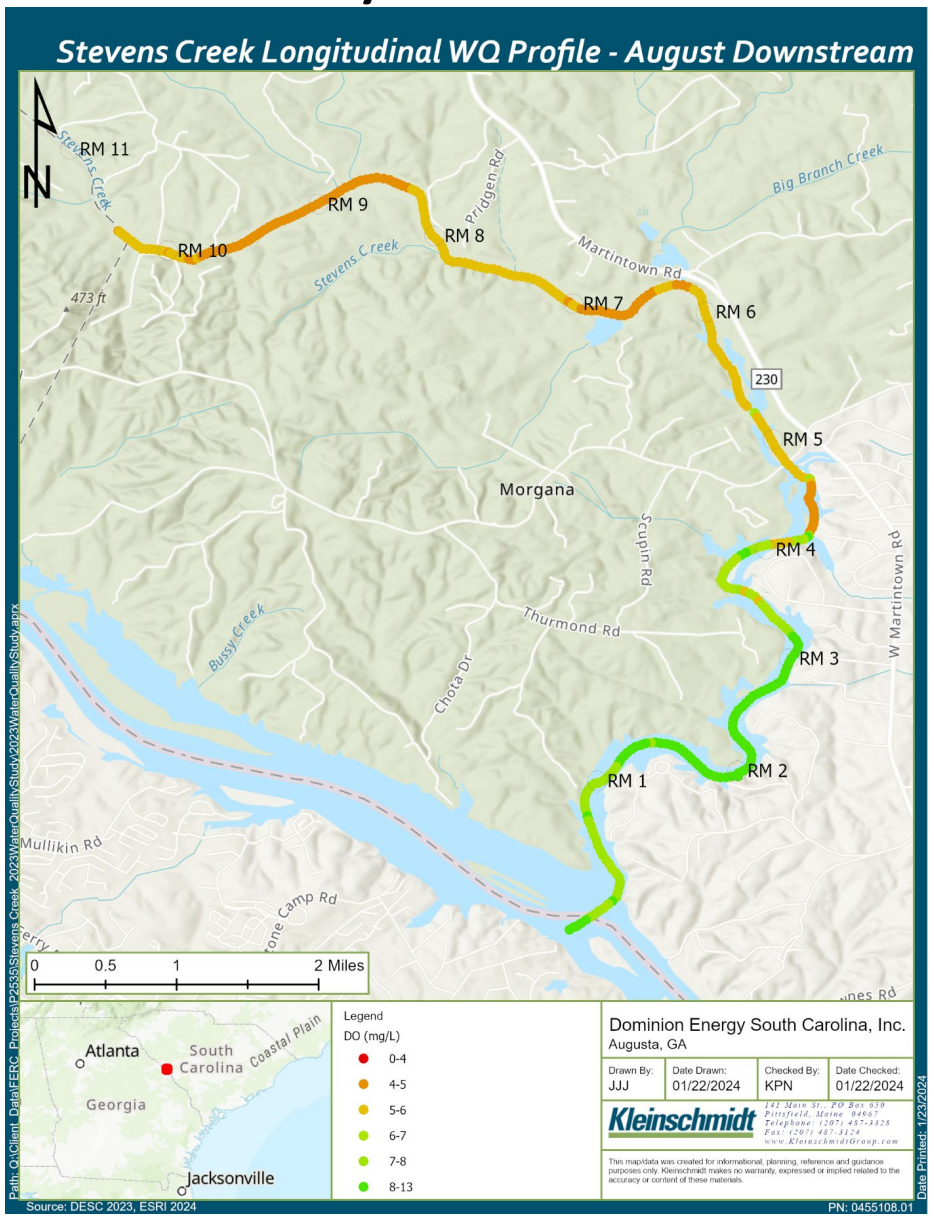

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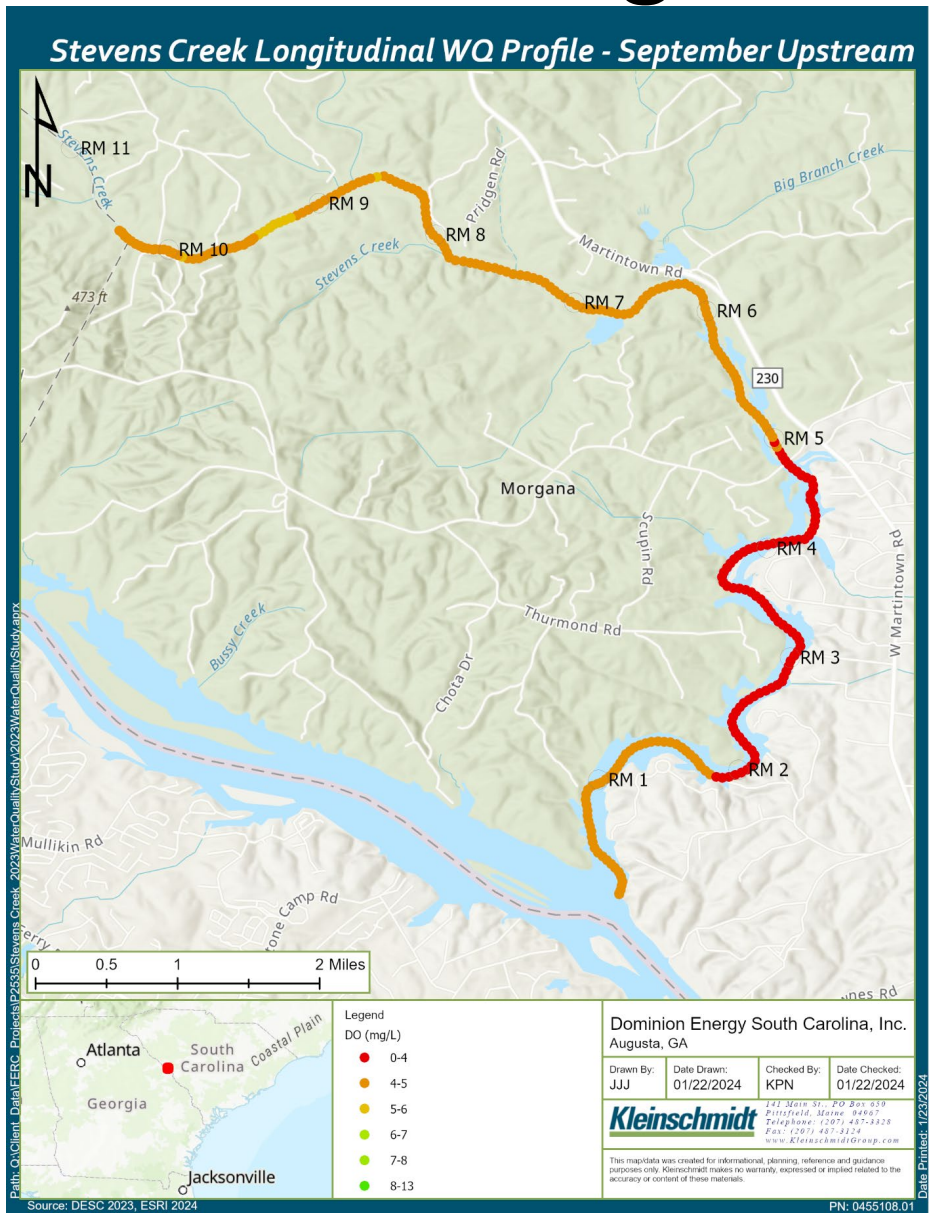

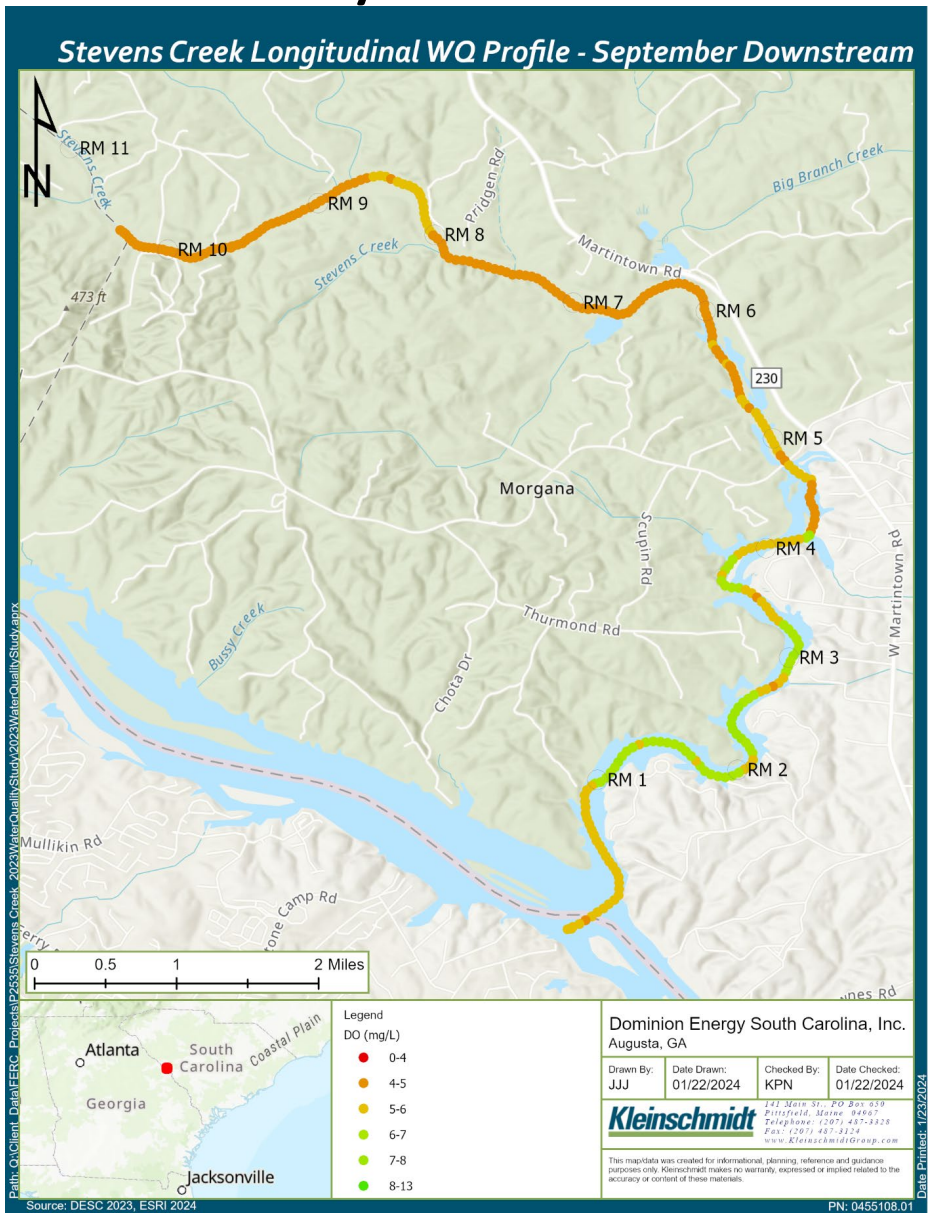

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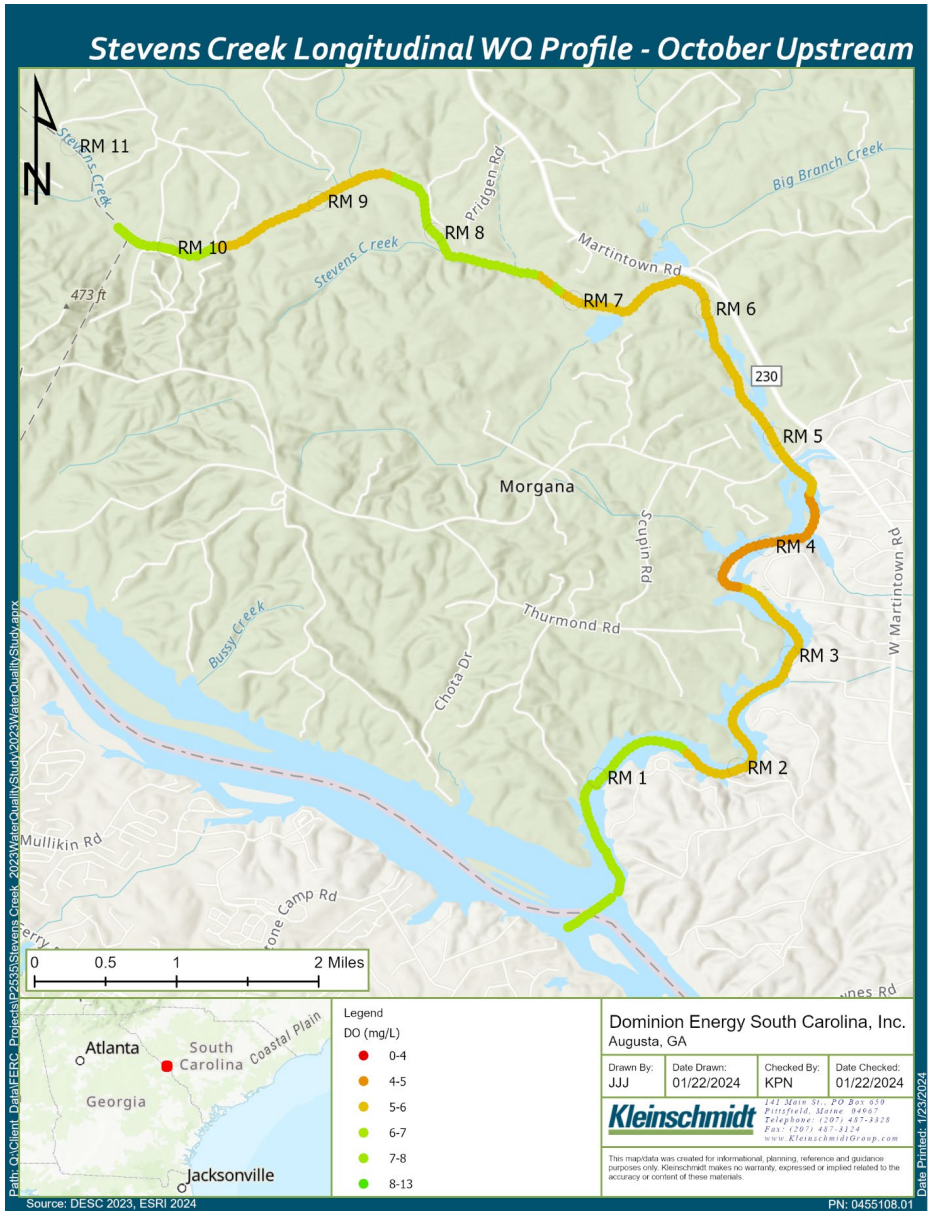
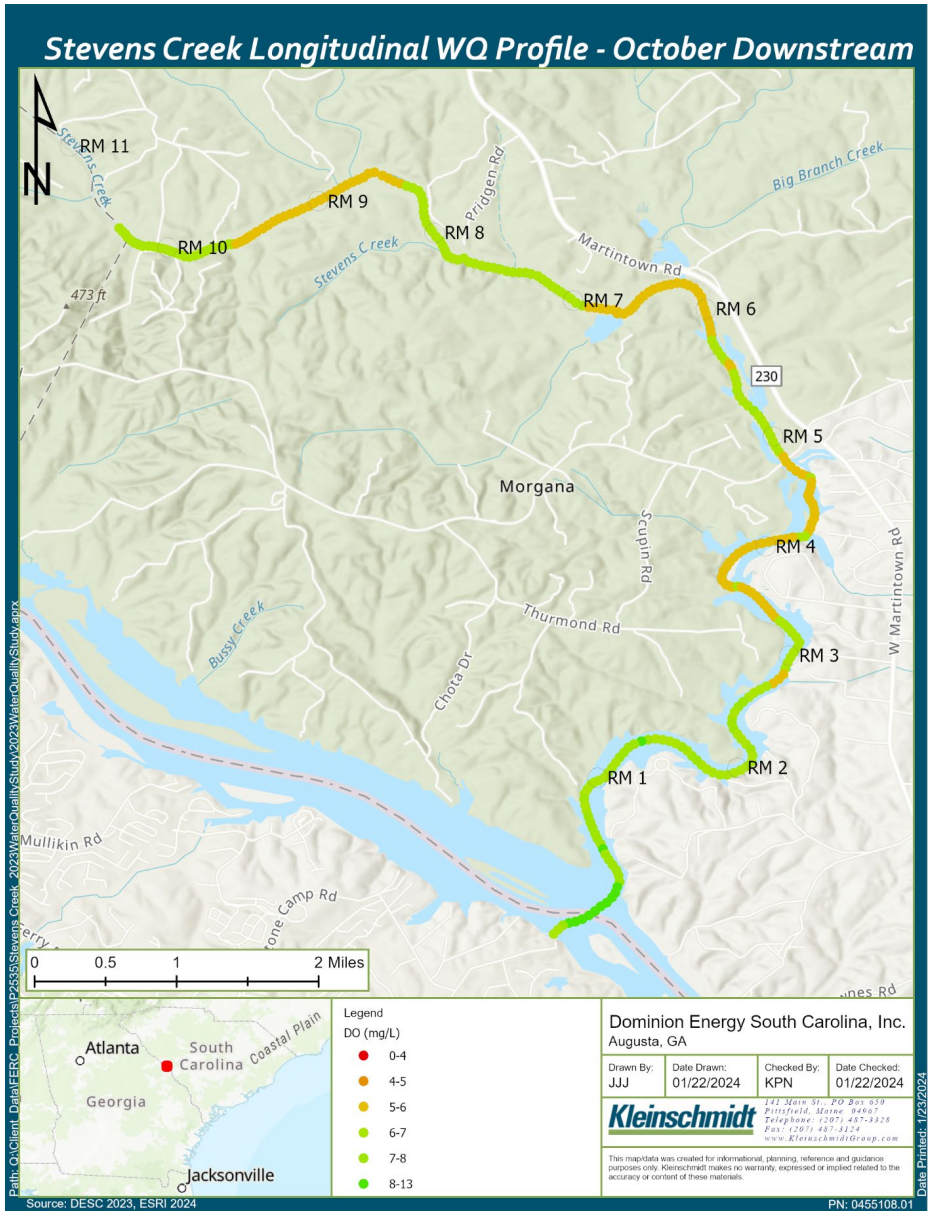
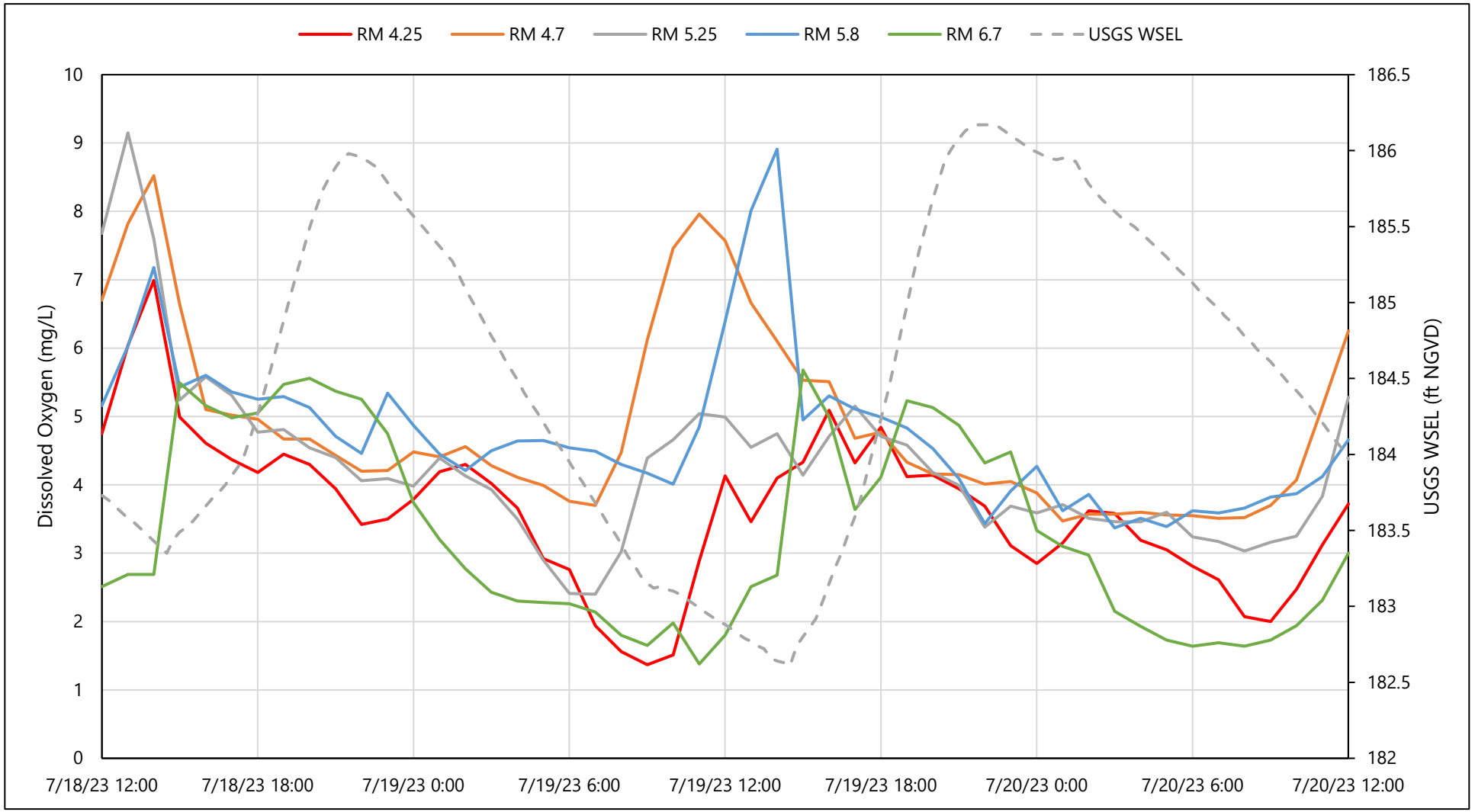
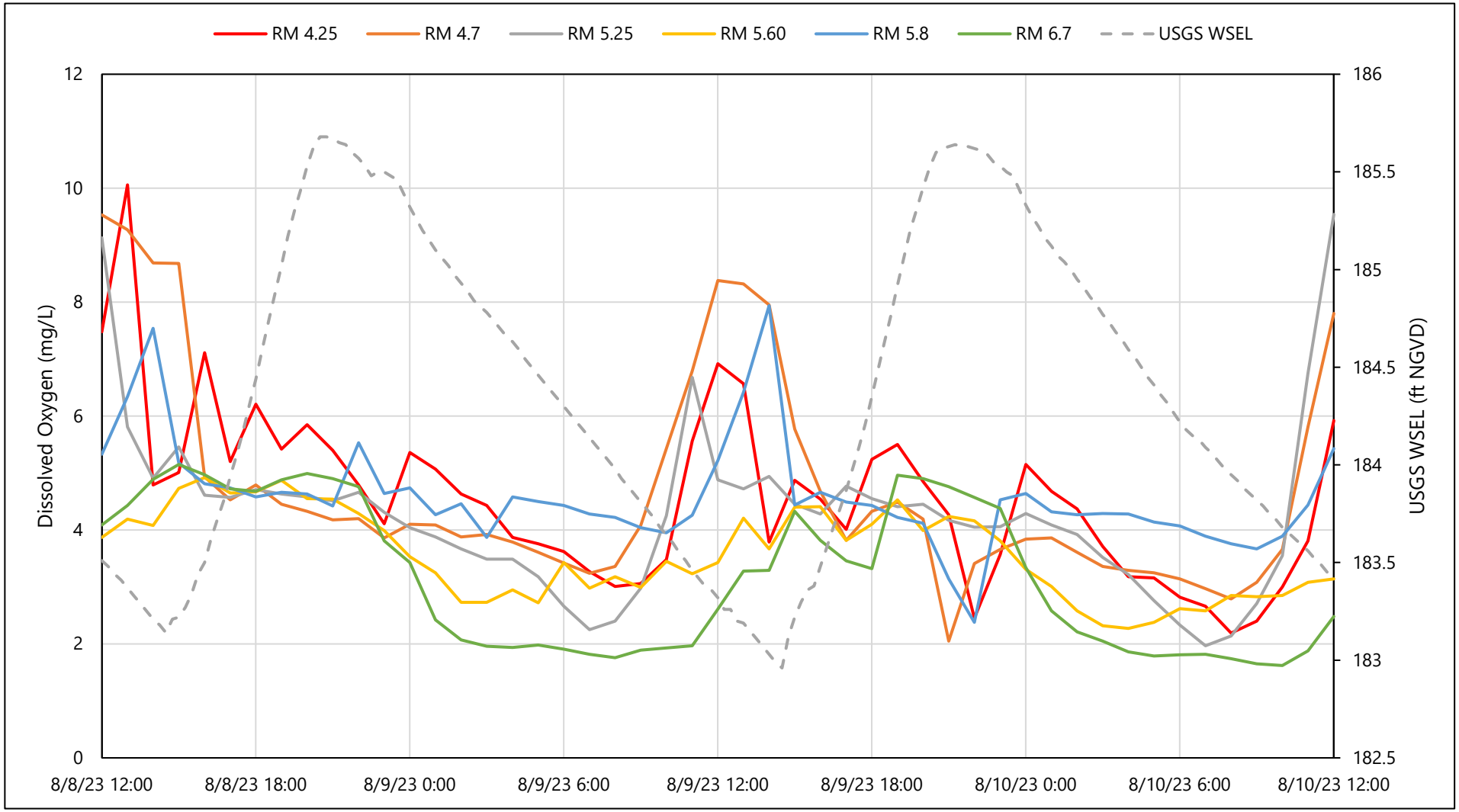




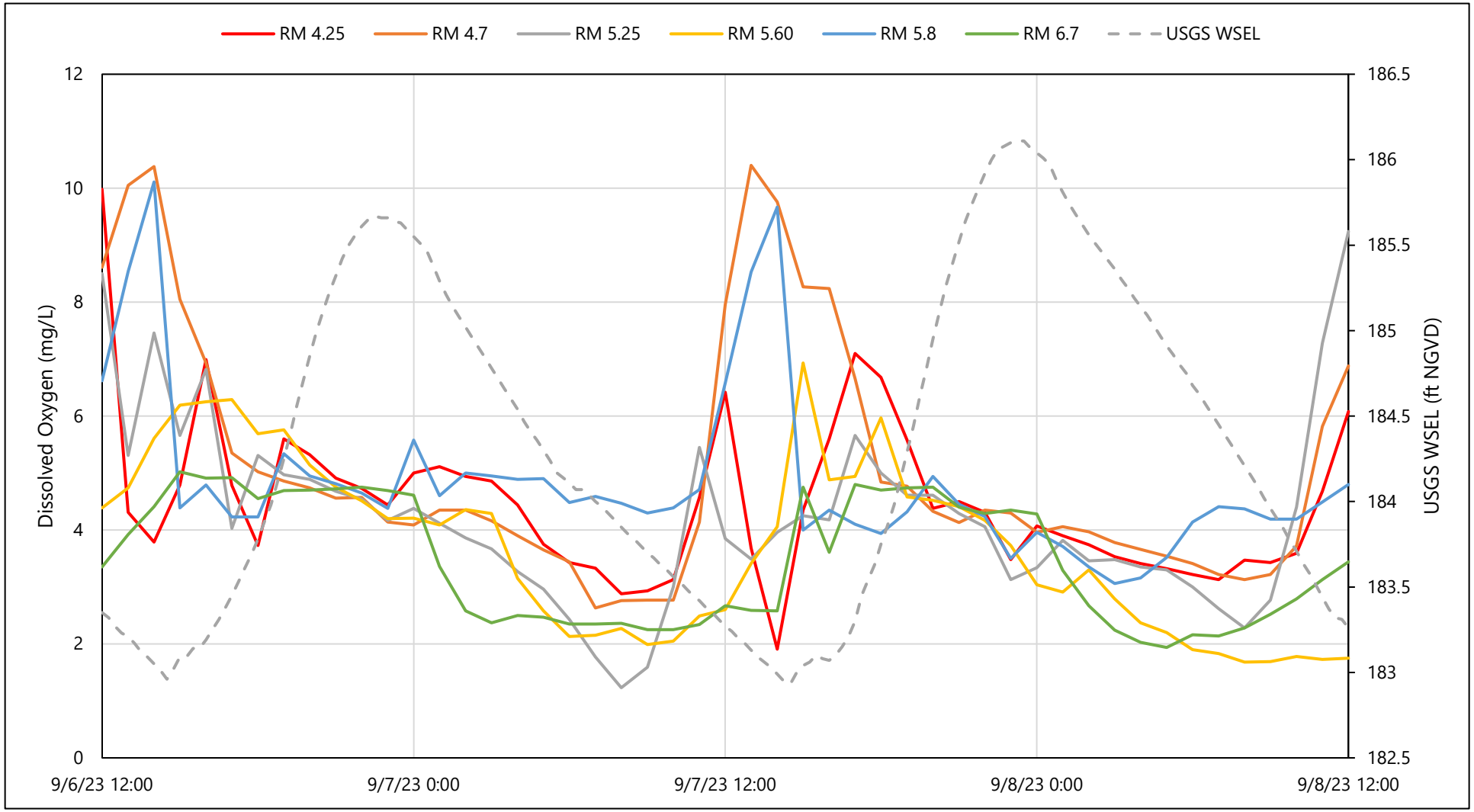
Results – Off-channel Monitoring (July 18-20)



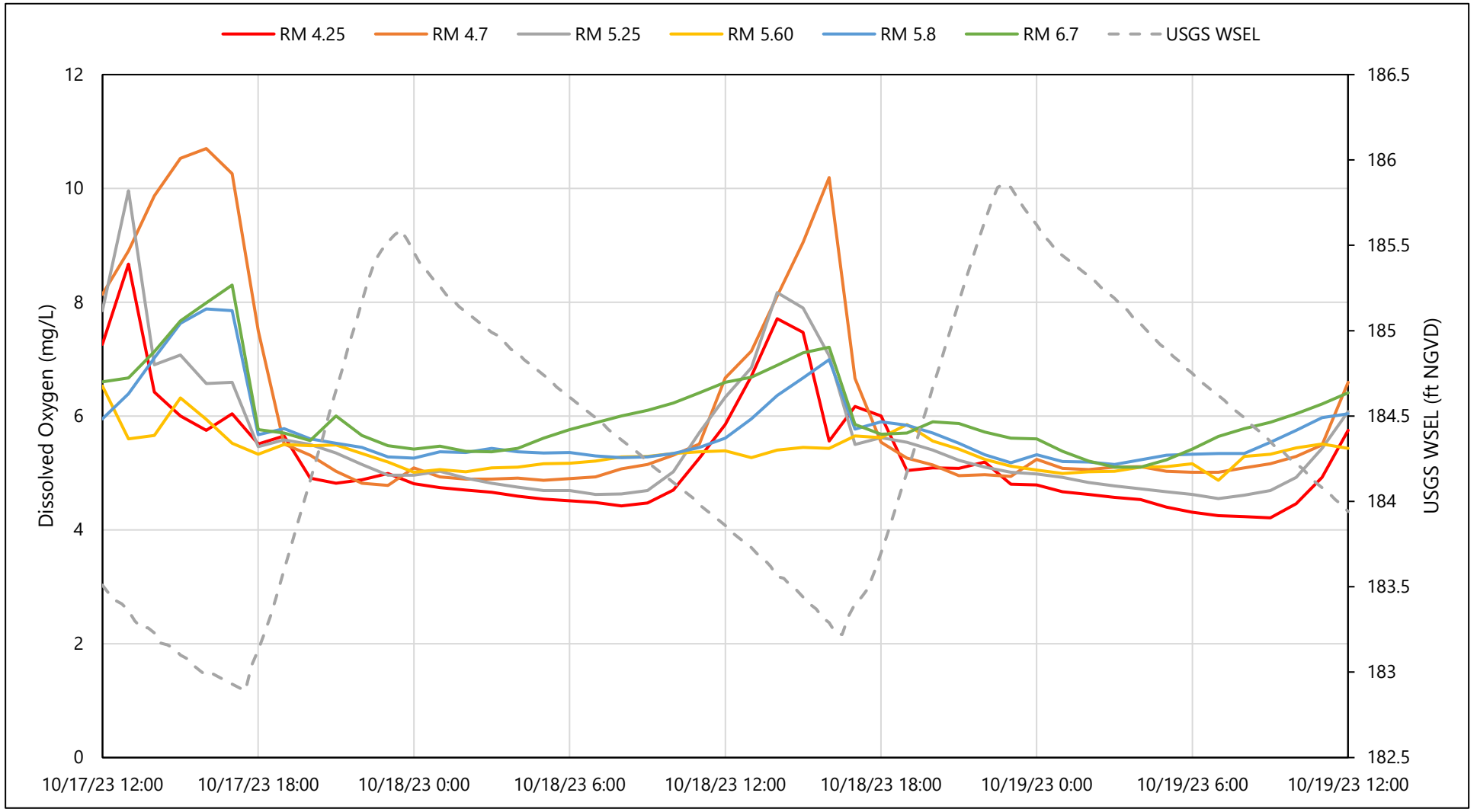
Results – Off-channel Monitoring (Aug 8-10)



Results – Off-channel Monitoring (Sep 6-8)



Results – Off-channel Monitoring (Oct 17-19)



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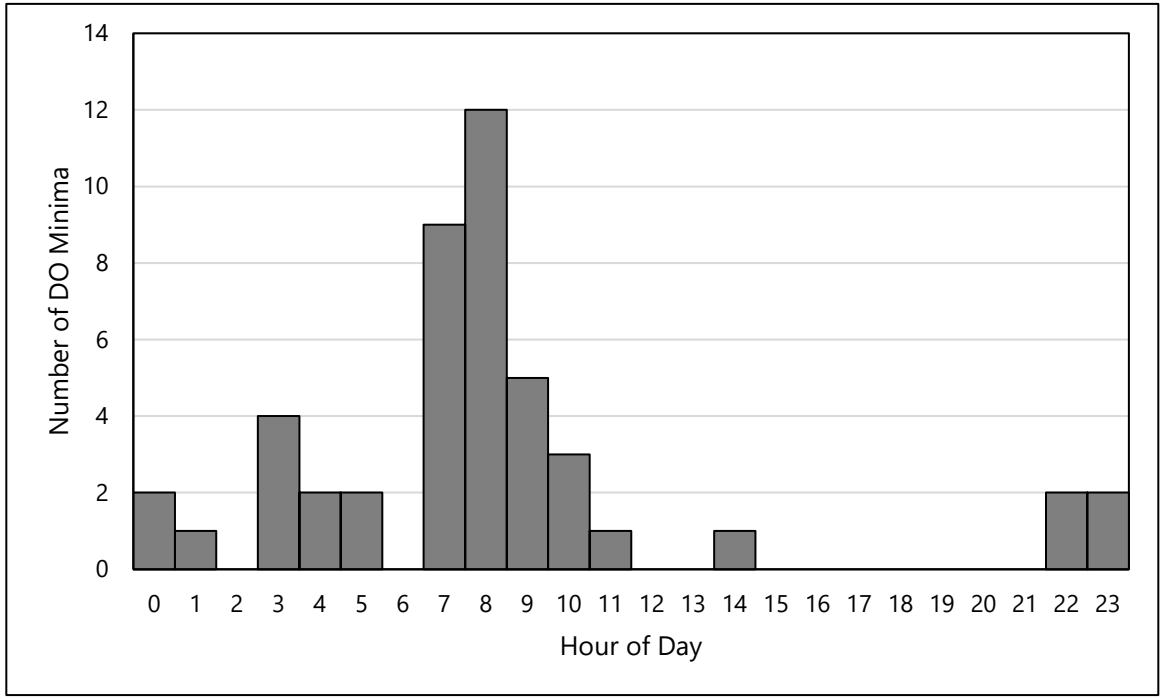
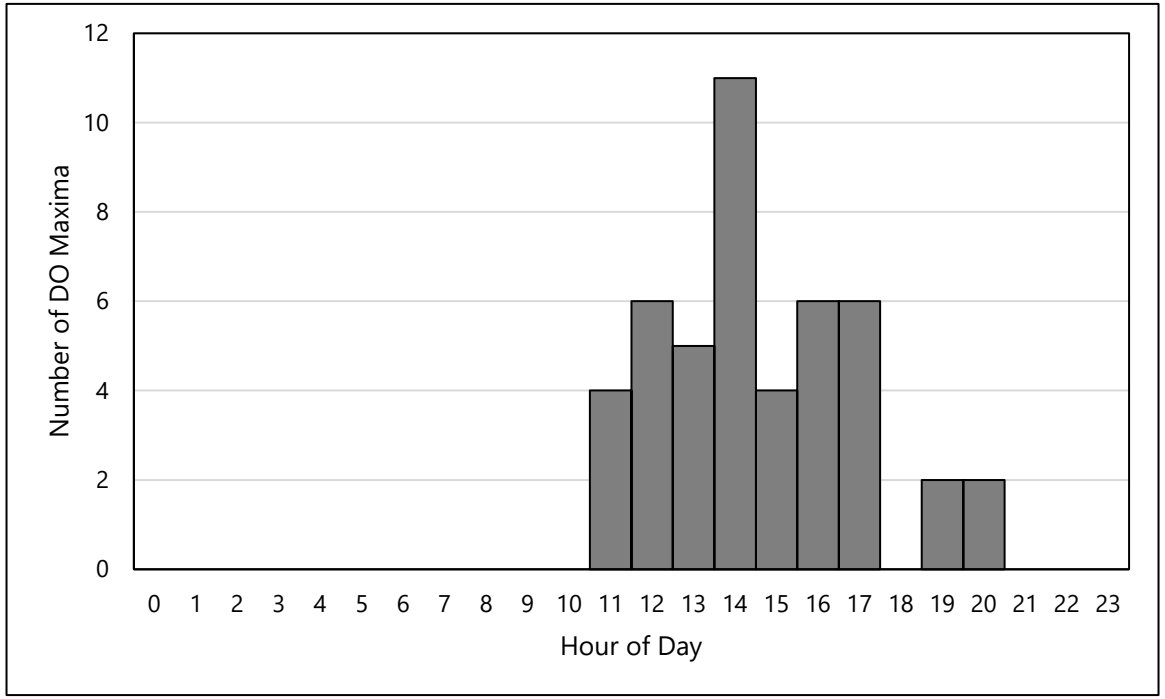
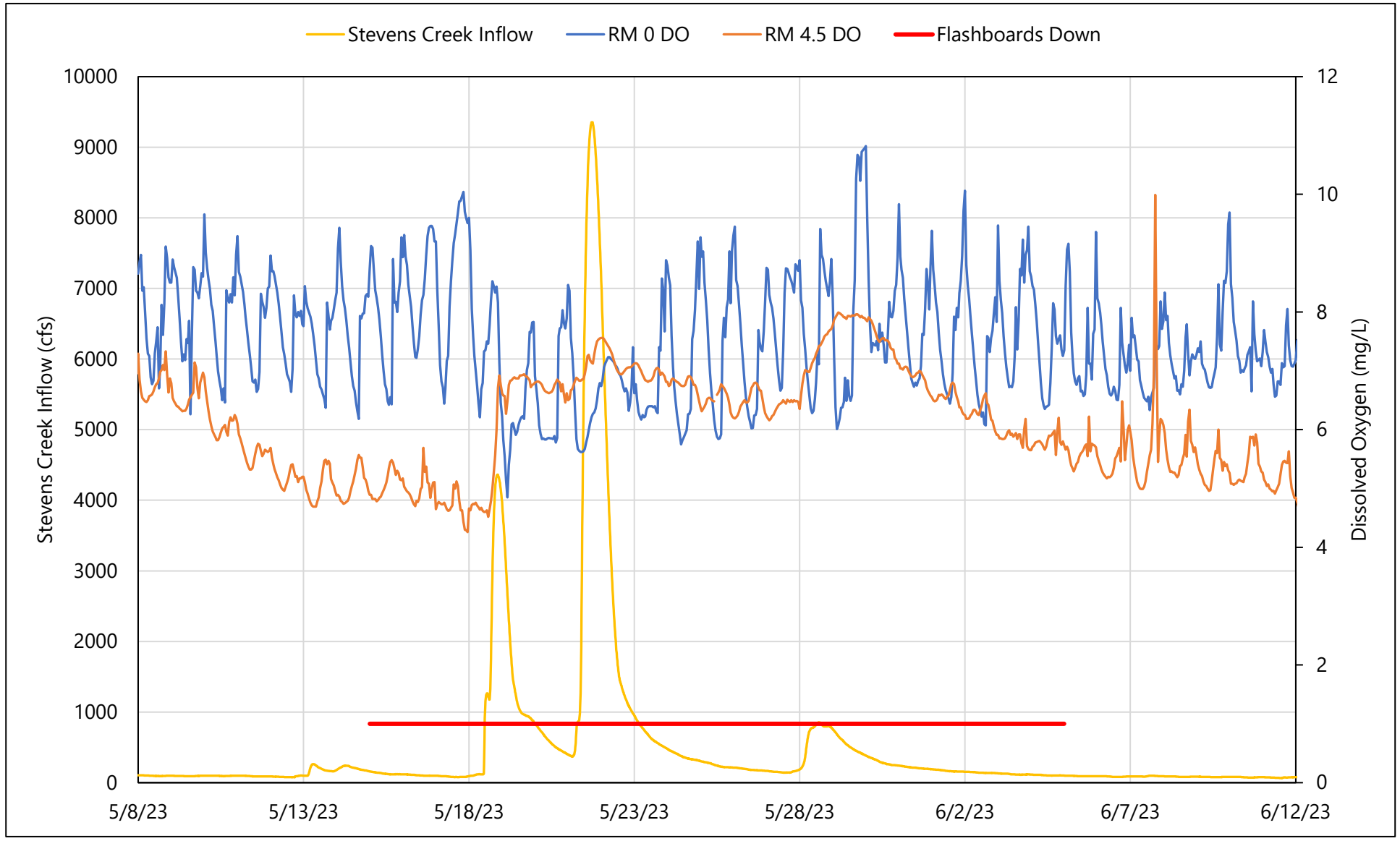




Flashboards and Water Quality



Summary of Study Findings

- Seasonally low DO in releases from the upstream Thurmond Dam;
- High loads of organic matter from the watershed, especially after rain events;
- Large flows from Thurmond Dam combined with re-regulation by the Project that “trap” sources of biochemical oxygen demand in the middle reaches of the Stevens Creek arm of the impoundment;
- Inputs of low-DO water draining from off-channel areas; and
- Other, unknown upstream contributions.

Next Steps

- Comments on 2023 Study Report by March 21
- File 2023 report with FERC
- DESC plans to petition FERC to reduce the frequency of water quality monitoring
- DESC will explore funding USGS to add DO and water temperature to the gauges on Stevens Creek at Woodlawn (Site No. 021963601) and Savannah River at Hwy 28 (Site No. 02195520)


11
10
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Horn Creek
Stevens Creek