



**ANDREW M. CUOMO**  
Governor

**NY Power  
Authority**

**JOHN R. KOELMEL**  
Chairman

**GIL C. QUINIONES**  
President and Chief Executive Officer

May 18, 2021

**VIA ELECTRONIC FILING**

Secretary Kimberly D. Bose  
Federal Energy Regulatory Commission  
888 First Street, N.E.  
Washington, DC 20426

Crescent Hydroelectric Project, FERC Project No. 4678-052  
Vischer Ferry Hydroelectric Project, FERC Project No. 4679-049  
Response to ISR Comments and Submission of Revised Study Plan

Dear Secretary Bose:

The Power Authority of the State of New York (Power Authority) is relicensing the Crescent and Vischer Ferry Hydroelectric Projects (Projects), FERC Nos. 4678 and 4679, respectively, using the Federal Energy Regulatory Commission's (FERC or Commission) Integrated Licensing Process (ILP). Pursuant to the ILP, after completing its first study season, the Power Authority filed its Initial Study Report (ISR) with the Commission on February 19, 2021. On March 3, 2021, the Power Authority held a virtual meeting to discuss the ISR. On March 16, 2021, the Power Authority filed its ISR Meeting Summary (Meeting Summary) with the Commission. Comments on the ISR and Meeting Summary were filed by the following stakeholders:

- Federal Energy Regulatory Commission (April 13, 2021)
- New York Department of Environmental Conservation (April 16, 2021)
- Riverkeeper (April 19, 2021)

Pursuant to the Commission's regulations, 18 CFR 5.15(c)(5), and in accordance with the ILP schedule issued by FERC as part of Scoping Document 2, the Power Authority offers the following response to the ISR comments. The Power Authority is also enclosing a study plan for a requested second year water quality study, which is discussed further below.

***Water Quality Study***

**Comment 1:** FERC (4/13/2021) notes turbine flow data were not provided for the following sampling dates at the Vischer Ferry impoundment: June 12, June 25, July 2, and July 9, and requests the information be provided.

**Response 1:** The Power Authority inadvertently left out a page from the previously filed Water Quality Study report that contained the requested turbine flow data on the sampling dates. The

missing page containing the requested flow data is provided in the attached revised Appendix B to the Water Quality Study report (Attachment 1).

**Comment 2:** NYSDEC (4/16/2021) requests that the Power Authority graph the total prorated flow that passes the Projects with generation flow included. NYSDEC notes that this will provide a more complete understanding of flows at the Projects, how they are being utilized, and confirm that the minimum flows are also being provided.

**Response 2:** The Power Authority has developed the requested graphs of prorated flows (based on drainage area) at the Vischer Ferry and Crescent Projects, using the flow data from the upstream USGS gage (no. 01354500) on the Mohawk River at Freeman's Bridge (Attachment 2). The drainage area at the USGS gage is 3,310 sq. mi. and proration factors used were 1.02 for the Vischer Ferry Project and 1.05 for the Crescent Project. Also shown on the flow graphs is elevation data for the two Project impoundments. As shown, impoundment fluctuations were minimal throughout the study period, demonstrating that the Projects were operating as run-of-river throughout the study season.

**Comment 3:** NYSDEC (4/16/2021) requests further investigation to ensure that the Projects do not have a negative impact on the local water quality of the Mohawk River. NYSDEC expressed concern regarding localized dissolved oxygen (DO) stratification in the forebays. NYSDEC noted that there was "some evidence of erratic DO changes" in the data set, but it is unclear if this is a characteristic of the Mohawk River or a function of Project operations.

**Response 3:** The results of the Water Quality Study demonstrate that operation of the hydropower projects is not adversely affecting DO conditions in the powerhouse discharges or downstream tailwater areas. The Power Authority acknowledges that the 2020 study season was a low-flow year and representative of low-flow/warm temperature conditions typically desired for examining potential worst-case water quality conditions. Additionally, there was some localized DO stratification in the Vischer Ferry forebay, and erratic DO changes recorded in both Project forebays. However, the observed conditions in the forebays did not translate downstream, and discharges from both the Vischer Ferry and Crescent powerhouses, as measured in the tailwaters, consistently met or exceeded minimum DO standards, regardless of observed forebay conditions. Recognizing that 2020 was a low-flow year, however, and in response to NYSDEC's request for follow-up water quality data collection in 2021, the Power Authority is proposing a second year water quality study designed to collect additional DO and temperature data from the Project forebays and impoundments. The Power Authority's proposed study plan for collecting additional impoundment temperature and DO data in 2021 is provided in Attachment 3.

**Comment 4:** NYSDEC (4/16/2021) and Riverkeeper (4/19/2021) requests a second year water quality study. NYSDEC recommends that the study should include continuous water temperature and dissolved oxygen (DO) data collection and discrete measurements (i.e. temperature, DO, pH, and conductivity) monthly from June 1 to October 31. NYSDEC states this information is needed to ensure compliance with water quality standards and to identify potential impacts to the fish community (Blueback Herring). NYSDEC notes that an additional year of monitoring is needed based on a review of the first year's study result that there was some evidence of local DO

stratification and erratic values. NYSDEC recommends that data should be collected from a location in the impoundments, the forebay, and the tailrace; and that water quality information collected should be summarized in a manner that will allow appropriate analysis of the current flow regime. NYSDEC also suggests that methods for mitigating water quality problems (i.e. modifications to infrastructure, or changes to existing operations) should be fully explored and modeled as to their potential effectiveness. Riverkeeper also requests a second year water quality study and recommends that during the second year of study, a sampling location should be installed further upstream at each project, to obtain information that is more representative of conditions in the impoundments. According to NYSDEC, DO data collected at both projects, and the positioning of the upstream sampling stations, leave open questions about the representativeness of the sampling locations upstream of the projects. NYSDEC comments that the number of days on which DO fell below the NYS standard, along with the uncertainty around causes of DO fluctuations, show that more information is needed about water quality.

**Response 4:** As noted above, the 2020 Water Quality Study indicated some DO stratification in the Vischer Ferry forebay location, and some erratic changes in DO conditions in both Project forebays. As no other impoundment water quality data was collected as part of the study, it is unknown whether the DO stratification and erratic changes in DO concentrations observed in the forebays in 2020 are representative of broader impoundment conditions (perhaps influenced by the presence of extensive stands of water chestnut) or just a very localized phenomenon in the forebays. To address this question, and in response to NYSDEC's request for follow-up water quality data collection in 2021, the Power Authority is proposing to do a second year water quality study designed to collect additional DO and temperature data from the Project forebays and impoundments. The Power Authority's proposed study plan for collecting additional impoundment temperature and DO data in 2021 is provided in Attachment 3.

### ***Fish Community Study***

**Comment 5:** FERC (4/13/2021) notes that the Fish Community Study report has a table that reports Catch per unit effort (CPUE) data that is pooled across both the Crescent and Vischer Ferry impoundments and includes general groupings such as 'other centrarchids,' 'cyprinids,' and 'all other species.' FERC asks if the Power Authority can calculate and report the impoundment-specific CPUE values of each fish species based on this dataset (e.g., the CPUE of smallmouth bass in the Vischer Ferry impoundment as well as the Crescent impoundment).

**Response 5:** The Power Authority reviewed the fisheries datasets that were used to develop the Fish Community Study report, and has determined that the data sets used to develop the pooled CPUE values shown in the report, do not allow a breakdown as requested. Should the necessary data become available, the Power Authority will provide the requested information to FERC.

### ***Blueback Herring Downstream Migration Study***

**Comment 6:** NYSDEC (4/16/2021) comments that delays or outages of the acoustic guidance system and how such events may impact safe and effective downstream passage should be accounted for in the evaluation of Blueback Herring downstream migration of the Projects.

Although this may be a rare occurrence, NYSDEC notes that in recent years, there has been some problematic occurrences in the operation of the acoustic guidance system including complications with vendor contracts, timing of deployment, and damage to the submerged cable compromising strength of the acoustics.

**Response 6:** The acoustic guidance system is an important part of downstream fish passage at the Crescent and Vischer Ferry Projects. As such, the Power Authority works diligently to keep the system in good working order, and to ensure it is deployed and operational during the fish passage season. This includes annual maintenance as well as repair and replacement of components as needed. The recent issues referenced in the NYSDEC comment are a rare occurrence. These included an approximate 1-month installation delay in 2019, and system malfunctions at Vischer Ferry for most of the 2020 season. The Crescent system, however, was fully operational during the 2020 season. The delayed opening of the barge canal in 2020 due to the Covid-19 pandemic, however, did not provide access for upstream migrating Blueback Herring to spawn. Therefore, downstream migrating adult and juvenile Blueback Herring were not present upstream of the Projects. The NYSDEC concurred with the Power Authority's decisions on system operation in 2020. In all cases, the Power Authority collaborated with the NYSDEC and USFWS to keep the parties apprised of issues as they arose and to make informed decisions. That said, when deploying electronic equipment in a dynamic, riverine environment, such periodic outages and required maintenance are to be expected.

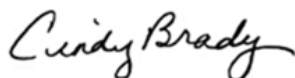
#### ***Other Comments***

**Comment 7:** FERC (4/13/2021) requested that the Power Authority file, within 30 days of the issuance date of FERC's April 13, 2021 comments letter, a schedule for providing the Commission with the results of the Ice Jam Modeling Study conducted as part of the Reimagine the Canals initiative.

**Response 7:** The Power Authority responded to this request in a separate letter filed with the Commission on May 12, 2021.

If you have any questions, please do not hesitate to contact me.

Sincerely,



Cindy Brady  
Manager, Licensing

New York Power Authority  
123 Main Street  
White Plains, New York 10601  
Telephone: (315) 323-4443  
Email: [cynthia.brady@nypa.gov](mailto:cynthia.brady@nypa.gov)

Attachments:

Attachment 1 – Revised Appendix B of the Water Quality Study Report

Attachment 2 – Prorated Flow Plots for Crescent and Vischer Ferry Projects

Attachment 3 – Proposed Second Year Water Quality Study Plan

## **Attachment 1 – Revised Appendix B of the Water Quality Study Report**

## Appendix B – Vertical Profile Data

Table B-1: Vischer Ferry Forebay Vertical Profile Data

Vischer Ferry Forebay								Begin Time:	13:34	End Time:	13:45	Meter:	YSI PRODSS
6/12/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	23.2	7.81	90.6	7.99	440.9	9.1		Weather:	partly cloudy, hot, windy on forebay				
1	23.2	7.84	90.9	8.01	441.1	9.4		Total Turbine Flow @ 14:00 = 2067 cfs					
2	23.2	7.83	90.8	8.00	440.7	9.4		Notes:	Logger installed at depth = 4 m				
3	23.2	7.82	90.7	8.01	441.3	9.7			Bottom depth = 8.2m				
4	23.2	7.81	90.6	8.00	441.8	8.9		Staff:	JG, BS				
5	23.2	7.80	90.4	8.00	442.1	8.8							
6	23.2	7.80	90.4	7.99	442.0	9.0							
7	23.2	7.79	90.3	7.99	441.9	9.2							
7.5	23.2	7.77	90.1	7.78	441.9	10.0							
Vischer Ferry Forebay								Begin Time:	11:20	End Time:	11:38	Meter:	YSI PRODSS
6/25/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	27.5	14.17	178.0	8.86	393.6	<del>86.8</del>		Weather:	sunny, light breeze, ~80F				
1	27.5	14.16	177.3	8.84	392.9	<del>58.6</del>		Total Turbine Flow @ 12:00 = 408 cfs					
2	27.2	11.53	144.4	8.54	397.9	<del>63.1</del>		Notes:	Installing upstream boat barrier				
3	27.1	10.75	134.2	8.45	399.0	<del>65.4</del>							
4	26.9	9.24	114.4	8.14	400.8	<del>70.1</del>		Staff:	MN, MF				
5	26.9	8.99	111.9	7.98	400.7	<del>72.4</del>							
6	26.9	9.12	113.7	8.02	400.5	<del>70.1</del>		QA:	Reject Turbidity - bad calibration. JPG				
7	26.9	9.17	114.3	8.02	400.4	<del>69.3</del>							
7.5	26.9	9.18	114.3	8.01	400.5	<del>65.2</del>							
Vischer Ferry Forebay								Begin Time:	11:32	End Time:	11:50	Meter:	YSI PRODSS
7/2/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	25.6	8.34	101.9	7.88	375.1	4.7		Weather:	sunny, hot				
1	25.2	7.89	95.7	7.80	375.1	4.6		Total Turbine Flow @ 12:00 = 0 cfs					
2	24.7	7.29	87.5	7.72	374.8	3.3		Notes:					
3	24.2	5.72	68.1	7.57	376.1	3.6							
4	24.2	6.02	71.6	7.59	377.4	6.9		Staff:	JG, MN, MF				
5	24.1	6.13	72.9	7.57	377.6	7.5							
6	24.1	5.96	70.7	7.50	377.8	6.9							
7	24.1	5.11	60.7	7.41	378.4	6.3							
7.5	24.1	4.79	56.9	7.34	378.4	5.7							
Vischer Ferry Forebay								Begin Time:	10:20	End Time:	10:37	Meter:	YSI PRODSS
7/9/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	26.3	12.08	148.5	8.54	343.3	3.2		Weather:	sunny, calm, hot				
1	26.1	11.46	140.3	8.45	344.1	3.7		Total Turbine Flow @ 11:00 = 0 cfs					
2	26.0	10.30	125.6	8.30	345.6	3.5		Notes:	Not generating				
3	25.8	8.81	107.3	8.00	347.3	3.4							
4	25.5	6.38	77.0	7.60	351.2	5.5		Staff:	MN, MF				
5	25.2	4.23	50.8	7.38	353.8	6.2							
6	25.1	2.97	35.7	7.27	355.2	5.5							
7	24.9	1.44	17.2	7.18	358.8	7.3							
7.5	24.8	0.63	7.4	7.14	362.1	5.8							



Crescent and Vischer Ferry Hydroelectric Projects (FERC Nos. 4678 and 4679)  
Water Quality Study

Vischer Ferry Forebay								Begin Time:	11:18	End Time:	11:38	Meter:	YSI PRODSS
7/24/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	27.0	4.72	58.1	7.55	415.5	2.2		Weather:	sunny, hot				
1	27.0	4.76	59.0	7.54	415.8	2.6		Total Turbine Flow @ 12:00 = 0 cfs					
2	26.7	6.33	77.8	7.72	417.4	3.6		Notes:					
3	26.6	6.66	82.0	7.78	421.7	3.5		Staff:	MN, MF				
4	26.6	6.46	79.4	7.75	423.5	5.4							
5	26.5	5.92	72.8	7.68	421.9	5.2							
6	26.5	6.08	74.7	7.69	421.9	6.2							
7	26.5	6.36	78.3	7.74	422.6	7.6							
7.5	26.4	5.75	70.6	7.65	422.6	7.7							
Vischer Ferry Forebay								Begin Time:	12:05	End Time:	12:20	Meter:	YSI PRODSS
8/4/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	27.1	6.28	78.5	7.00	381.4	6.8		Weather:	cloudy, light rain				
1	27.1	6.22	77.8	6.98	381.7	8.6		Total Turbine Flow @ 1:00 = 2282 cfs					
2	27.1	6.20	77.4	7.01	381.4	7.9		Notes:	213' on rod				
3	27.1	6.12	76.5	7.02	382.4	9.7		Staff:	MN, MF, JG				
4	27.1	6.11	76.4	7.12	382.3	9.7							
5	27.1	6.11	76.4	7.19	382.6	9.5							
6	27.1	6.10	76.4	7.22	382.7	9.0							
7	27.1	6.09	76.2	7.24	382.7	10.1							
7.5	27.1	6.09	76.2	7.29	382.7	9.7							
Vischer Ferry Forebay								Begin Time:	11:28	End Time:	11:39	Meter:	YSI PRODSS
8/20/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	24.9	4.97	59.4	7.53	345.6	4.2		Weather:	Sunny, 70F				
1	24.9	4.99	59.7	7.53	345.1	4.2		Total Turbine Flow @ 12:00 = 238 cfs					
2	24.6	4.83	57.2	7.51	344.8	4.7		Notes:					
3	24.3	4.10	48.5	7.41	344.8	4.9		Staff:	MN, CD				
4	24.3	3.70	43.8	7.36	344.2	5.6							
5	24.3	3.78	44.7	7.37	344.2	5.6							
6	24.2	3.67	43.3	7.33	344.4	5.6							
7	24.2	3.55	42.0	7.33	344.5	5.6							
7.5	24.2	3.53	41.7	7.33	344.5	5.5							
Vischer Ferry Forebay								Begin Time:	11:35	End Time:	11:58	Meter:	YSI PRODSS
9/3/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	22.9	6.87	79.7	7.73	334.9	6.1		Weather:	Sunny, warm				
1	22.8	6.92	80.2	7.73	334.9	6.5		Total Turbine Flow @ 12:00 = 972 cfs					
2	22.9	6.88	79.8	7.71	334.8	6.5		Notes:	Logger stuck was unable to be retrieved.				
3	22.9	6.89	79.8	7.71	334.9	6.6		New logger launched at 4m at 3:27pm					
4	22.9	6.91	80.1	7.73	334.9	6.0		Staff:	MN, MF				
5	22.9	6.93	80.4	7.74	335.0	6.3							
6	22.8	6.97	80.8	7.74	335.1	7.3							
7	22.8	6.98	80.9	7.74	335.1	6.8							
8	22.8	6.96	80.7	7.73	335.2	7.0							

Crescent and Vischer Ferry Hydroelectric Projects (FERC Nos. 4678 and 4679)  
Water Quality Study

Vischer Ferry Forebay								Begin Time:	12:13	End Time:	12:37	Meter:	YSI PRODSS
9/18/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	20.0	6.79	73.8	7.69	381.8	3.5		Weather: Sunny, cool. Light breeze					
1	20.1	6.84	74.7	7.72	381.9	3.3		Total Turbine Flow @ 1:00 = 378 cfs					
2	20.1	6.80	74.2	7.71	381.9	3.1		Notes:					
3	20.1	6.79	74.1	7.71	382.0	3.1							
4	20.1	6.79	74.3	7.71	382.0	2.9		Staff: MN, MF					
5	20.1	6.63	72.3	7.68	381.6	2.3							
6	20.0	6.66	72.6	7.69	381.8	3.2							
7	20.0	6.75	73.3	7.70	382.1	4.8							
8	19.9	6.49	70.4	7.66	382.0	4.8							
Vischer Ferry Forebay								Begin Time:	10:09	End Time:	10:23	Meter:	YSI PRODSS
10/2/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	18.7	7.66	81.5	7.76	371.5	5.2		Weather: Cloudy, light rain, calm					
1	18.7	7.61	80.9	7.77	371.6	5.1		Total Turbine Flow @ 11:00 = 1650 cfs					
2	18.7	7.60	80.8	7.70	371.6	5.5		Notes:					
3	18.7	7.57	80.5	7.76	371.1	5.5							
4	18.8	7.57	80.5	7.76	371.2	5.4		Staff: MN, MF					
5	18.7	7.56	80.4	7.76	371.3	5.6							
6	18.7	7.54	80.2	7.75	371.3	5.7							
7	18.7	7.49	79.7	7.75	371.2	5.7							
8	18.7	7.49	79.7	7.74	371.1	5.7							
Vischer Ferry Forebay								Begin Time:	11:41	End Time:	12:01	Meter:	YSI PRODSS
10/12/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	15.8	8.63	85.6	7.81	359.0	2.3		Weather: Partly cloudy					
1	15.8	8.62	85.5	7.81	359.1	2.2		Total Turbine Flow @ 12:00 = 592 cfs					
2	15.8	8.56	84.9	7.82	359.2	2.2		Notes:					
3	15.8	8.64	85.7	7.82	359.0	2.4							
4	15.8	8.58	85.2	7.81	359.3	2.4		Staff: MN, MF					
5	15.9	8.61	85.5	7.82	359.0	2.3							
6	15.9	8.49	84.1	7.78	359.0	2.1							
7	15.8	8.34	82.9	7.77	359.2	2.1							
8	15.8	8.24	81.8	7.75	359.5	2.4							
Vischer Ferry Forebay								Begin Time:	10:20	End Time:	10:35	Meter:	YSI PRODSS
11/3/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	6.7	11.99	97.4	7.33	381.4	2.8		Weather: Windy, cold, sunny					
1	6.8	11.95	97.1	7.51	381.8	2.6		Total Turbine Flow @ 11:00 = No Data					
2	6.8	11.96	97.2	7.68	381.7	2.9		Notes: Pond at Dam Crest (Flashboard removal in process)					
3	6.8	11.96	97.3	7.75	381.5	2.7							
4	6.8	11.96	97.3	7.80	381.7	2.6		Staff: MN, MF					
5	6.8	11.93	97.1	7.83	381.6	2.7							
6	6.8	11.94	97.2	7.85	381.7	2.6							
7	6.8	11.93	97.1	7.85	381.6	2.9							
8	6.8	11.92	97.0	7.84	381.6	2.7							

Table B-2: Vischer Ferry Tailrace Vertical Profile Data

Vischer Ferry Tailrace								Begin Time:	14:30	End Time:	14:34	Meter:	YSI PRODSS
6/12/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	23.4	7.92	92.0	8.02	445.0	6.1		Weather:	Mostly sunny				
1	23.4	7.90	91.7	8.02	445.0	6.2		Total Turbine Flow @ 13:00 = 2034 cfs					
2	23.4	7.88	91.5	8.02	445.0	6.3		Notes:	Logger installed at depth = 2 m				
3	23.4	7.86	91.3	8.02	445.0	6.1		Bottom depth = 3.6 meters					
								Staff:	JG, BS				
Vischer Ferry Tailrace													
6/25/2020								Begin Time:	12:15	End Time:	12:22	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	27.3	10.40	130.3	8.41	398.2	56.7		Weather:	Sunny, hot				
1	27.3	10.39	130.2	8.41	398.2	56.4		Total Turbine Flow @ 13:00 = 307 cfs					
2	27.3	10.32	129.2	8.40	398.3	59.5		Notes:	Flashboards installed, no spill and very little generation				
3	27.3	10.38	129.9	8.40	398.2	58.2							
								Staff:	MN, MF				
								QA:	Reject Turbidity - bad calibration. JPG				
Vischer Ferry Tailrace													
7/2/2020								Begin Time:	13:18	End Time:	13:22	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	25.5	8.43	102.5	8.11	378.8	5.1		Weather:	Sunny, hot, light breeze				
1	25.4	8.19	99.4	8.01	378.5	4.8		Total Turbine Flow @ 14:00 = 0 cfs					
2	25.3	8.18	99.3	8.03	378.5	5.1		Notes:					
3	25.3	8.14	98.7	7.96	378.4	4.9							
								Staff:	JG, MN, MF				
Vischer Ferry Tailrace													
7/9/2020								Begin Time:	11:25	End Time:	11:34	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	26.3	8.36	102.4	8.46	340.9	3.8		Weather:	Sunny, hot, light breeze				
1	26.3	8.23	100.9	8.47	341.8	3.7		Total Turbine Flow @ 12:00 = 0 cfs					
2	26.3	8.24	101.0	8.49	340.6	3.9		Notes:	No generation				
3	26.3	8.15	100.0	8.40	342.0	3.9							
								Staff:	MN, MF				
Vischer Ferry Tailrace													
7/24/2020								Begin Time:	12:10	End Time:	12:18	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	27.0	8.10	99.9	8.03	420.8	3.2		Weather:	Sunny, hot				
1	27.0	8.02	99.5	8.01	420.8	3.1		Total Turbine Flow @ 13:00 = 0 cfs					
2	27.0	8.07	100.0	8.03	420.9	3.2		Notes:	Minimal generation				
3	27.0	7.95	98.1	8.00	420.8	3.2							
								Staff:	MN, MF				
Vischer Ferry Tailrace													
8/4/2020								Begin Time:	12:38	End Time:	12:45	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	27.1	6.99	87.2	7.58	381.7	5.4		Weather:	Cloudy, rain				
1	27.1	6.38	81.5	7.54	381.7	5.4		Total Turbine Flow @ 13:00 = 2378 cfs					
2	27.1	6.58	81.6	7.54	381.8	5.4		Notes:	Strong current				
3	27.1	6.41	79.8	7.53	381.7	5.5							
								Staff:	MN, MF, JG				

Crescent and Vischer Ferry Hydroelectric Projects (FERC Nos. 4678 and 4679)  
Water Quality Study

Vischer Ferry Tailrace								Begin Time:	12:16	End Time:	12:27	Meter:	YSI PRODSS
8/20/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	24.8	5.41	64.2	7.50	344.3	4.9		Weather:	Cloudy, 75F				
1	24.7	5.75	68.3	7.53	344.5	4.9		Total Turbine Flow @ 13:00 = 238 cfs					
2	24.6	5.43	64.8	7.47	344.5	4.8		Notes:	Water chestnut build-up on bouy and logger cable				
3	24.7	5.71	67.8	7.48	344.4	5.0		Staff:	MN, CD				
Vischer Ferry Tailrace													
9/3/2020								Begin Time:	12:57	End Time:	13:04	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	23.1	7.34	85.6	7.76	334.9	5.6		Weather:	Overcast, warm				
1	23.0	7.32	85.3	7.74	334.9	6.0		Total Turbine Flow @ 13:00 = 598 cfs					
2	23.0	7.36	85.4	7.74	335.0	6.0		Notes:					
3	23.1	7.44	86.9	7.74	334.9	5.9		Staff:	MN, MF				
Vischer Ferry Tailrace													
9/18/2020								Begin Time:	13:20	End Time:	13:28	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	20.3	8.46	92.7	7.82	381.3	2.6		Weather:	Sunny, 65F				
1	20.3	8.27	90.5	7.78	381.5	3.2		Total Turbine Flow @ 14:00 = 377 cfs					
2	20.3	8.50	92.9	7.80	381.3	2.7		Notes:	Mild biofouling, logger covered in veg				
3	20.3	8.40	91.9	7.81	381.3	2.6		Staff:	MN, MF				
Vischer Ferry Tailrace													
10/2/2020								Begin Time:	11:00	End Time:	11:05	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	18.6	7.72	81.9	7.72	370.1	4.9		Weather:	Cloudy, rain				
1	18.6	7.70	81.7	7.76	370.1	4.8		Total Turbine Flow @ 12:00 = 1654 cfs					
2	18.6	7.69	81.6	7.76	370.1	4.9		Notes:					
3	18.6	7.69	81.6	7.75	370.1	4.9		Staff:	MN, MF				
Vischer Ferry Tailrace													
10/12/2020								Begin Time:	12:43	End Time:	13:00	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	15.9	9.08	90.2	7.80	359.5	2.2		Weather:	Sunny, cool				
1	15.9	8.92	88.5	7.78	359.1	2.2		Total Turbine Flow @ 13:00 = 672 cfs					
2	15.9	8.92	88.7	7.77	359.1	2.3		Notes:					
3	15.9	8.96	89.2	7.77	359.1	2.4		Staff:	MN, MF				
Vischer Ferry Tailrace													
11/4/2020								Begin Time:	14:54	End Time:	5:03:00 PM	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	6.6	11.79	94.4	7.88	380.8	2.6		Weather:	Sunny, cool				
1	6.6	11.78	94.3	7.86	380.8	2.6		Total Turbine Flow @ 15:00 = No Data					
2	6.6	11.79	94.5	7.85	380.9	2.6		Notes:	2m				
3	6.6	11.78	94.3	7.84	380.8	2.6		Staff:	MN, MF				

**Table B-3: Crescent Forebay Vertical Profile Data**

Crescent Forebay								Begin Time:	12:09	End Time:	12:16	Meter:	YSI PRODSS
6/12/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	23.3	8.04	93.2	7.94	386.0	4.9		Weather:	Sunny, hot				
1	23.3	7.92	291.6	7.94	385.8	4.6		Total Turbine Flow @ 13:00 = 2000 cfs					
2	23.2	7.92	91.8	7.93	385.6	4.4		Notes:	Logger installed at depth = 2 m				
3	23.2	7.94	92.4	7.94	385.8	4.5			Bottom depth = 3.5 meters				
								Staff:	JG, BS				
Crescent Forebay								Begin Time:	10:15	End Time:	10:22	Meter:	YSI PRODSS
6/25/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	26.4	9.59	117.9	8.40	407.7	69.1		Weather:	Sunny, hot, light breeze				
1	26.3	9.52	117.3	8.38	407.6	72.9		Total Turbine Flow @ 11:00 = 2723 cfs					
2	26.3	9.51	117.1	8.38	407.6	71.5		Notes:					
2.8	26.3	9.51	117.1	8.38	407.8	69.6							
								Staff:	MN, MF				
								QA:	Reject Turbidity - bad calibration. JPG				
Crescent Forebay								Begin Time:	10:24	End Time:	10:28	Meter:	YSI PRODSS
7/2/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	25.5	5.11	62.0	7.60	350.7	2.9		Weather:	Sunny, light breeze, ~80F				
1	25.1	5.05	60.9	7.58	349.9	2.4		Total Turbine Flow @ 11:00 = 0 cfs					
2	25.0	5.65	68.3	7.65	350.1	4.0		Notes:					
2.8	24.9	5.06	60.6	7.59	350.3	2.7							
								Staff:	JG, MN, MF				
Crescent Forebay								Begin Time:	9:31	End Time:	9:37	Meter:	YSI PRODSS
7/9/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	26.4	8.59	105.7	8.09	359.5	3.4		Weather:	Warm, humid, ~85F				
1	26.3	6.47	79.5	7.68	359.1	1.3		Total Turbine Flow @ 10:00 = 0 cfs					
2	26.2	5.52	67.6	7.59	358.7	1.0		Notes:					
2.8	26.1	6.27	76.7	7.68	358.6	1.3							
								Staff:	MN, MF				
Crescent Forebay								Begin Time:	10:28	End Time:	10:34	Meter:	YSI PRODSS
7/24/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	27.1	10.24	127.1	8.41	401.9	4.1		Weather:	Sunny, light breeze				
1	27.1	10.36	128.6	8.43	402.2	4.1		Total Turbine Flow @ 11:00 = 351 cfs					
2	27.1	10.23	127.0	8.42	402.3	4.2		Notes:					
2.8	27.1	9.94	123.7	8.38	402.4	3.6							
								Staff:	MN, MF				
Crescent Forebay								Begin Time:	13:58	End Time:	14:02	Meter:	YSI PRODSS
8/4/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	26.8	4.93	61.5	7.37	394.2	6.5		Weather:	~70F, cloudy, heavy rain starting				
1	26.8	4.90	61.1	7.36	394.5	6.4		Total Turbine Flow @ 14:00 = 2410 cfs					
2	26.8	4.73	59.2	7.34	394.4	6.1		Notes:					
2.8	26.8	4.73	59.0	7.32	394.5	6.4							
								Staff:	MN, MF, JG				

Crescent and Vischer Ferry Hydroelectric Projects (FERC Nos. 4678 and 4679)  
Water Quality Study

Crescent Forebay								Begin Time:	10:43	End Time:	10:48	Meter:	YSI PRODSS
8/20/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	25.5	7.31	88.2	7.69	362.9	6.4		Weather:	Sunny, 70F				
1	25.5	7.25	87.4	7.66	362.8	6.5		Total Turbine Flow @ 11:00 = 291 cfs					
2	24.8	5.95	70.8	7.49	363.0	8.6		Notes:					
2.8	24.8	5.91	70.3	7.49	362.9	8.9							
								Staff:	MN, CD				
Crescent Forebay													
9/3/2020								Begin Time:	10:40	End Time:	10:51	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	22.9	6.19	70.6	7.60	338.7	4.8		Weather:	Overcast, ~70F				
1	22.8	6.39	74.0	7.66	339.1	7.2		Total Turbine Flow @ 11:00 = 744 cfs					
2	22.8	6.30	72.9	7.63	339.1	5.2		Notes:					
3	22.9	6.37	73.6	7.63	339.1	6.1							
								Staff:	MN, MF				
Crescent Forebay													
9/18/2020								Begin Time:	10:50	End Time:	11:00	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	19.6	9.84	105.5	8.09	390.6	7.8		Weather:	Cool, breezy, partly sunny				
1	19.6	9.66	104.5	8.08	390.2	6.0		Total Turbine Flow @ 11:00 = 346 cfs					
2	19.6	9.78	105.6	8.12	390.5	7.0		Notes:					
3	19.6	9.79	105.6	8.12	390.6	7.6							
								Staff:	MN, MF				
Crescent Forebay													
10/2/2020								Begin Time:	9:19	End Time:	9:28	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	19.0	7.44	79.4	7.78	373.6	5.8		Weather:	Cloudy, light rain, calm				
1	19.0	7.56	80.8	7.75	373.7	6.3		Total Turbine Flow @ 10:00 = 1855 cfs					
2	19.0	7.57	80.9	7.74	373.7	6.4		Notes:					
3	19.0	7.54	80.5	7.73	373.7	6.6							
								Staff:	MN, MF				
Crescent Forebay													
10/12/2020								Begin Time:	10:45	End Time:	10:55	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	15.7	8.17	80.7	7.75	355.8	4.2		Weather:	Cloudy, cold				
1	15.7	7.94	78.7	7.73	355.2	3.6		Total Turbine Flow @ 11:00 = 422 cfs					
2	15.7	8.19	81.0	7.77	355.9	3.7		Notes:					
3	15.7	8.05	79.6	7.74	355.6	3.9							
								Staff:	MN, MF				
Crescent Forebay													
11/4/2020								Begin Time:	13:40	End Time:	13:43	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	7.2	11.25	91.4	7.88	408.3	4.6		Weather:	Sunny, clear, windy				
1	7.2	11.25	91.4	7.85	408.4	4.3		Total Turbine Flow @ 14:00 = No Data					
2	7.2	11.26	91.5	7.84	408.4	4.5		Notes:					
3													
								Staff:	MN, MF				

Table B-4: Crescent Tailrace Vertical Profile Data

Crescent Tailrace								Begin Time:	11:05	End Time:	11:11	Meter:	YSI PRODSS
6/12/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	23.1	7.81	90.1	7.91	385.7	4.5		Weather:	sunny, warm				
1	23.2	7.75	89.6	7.90	385.7	4.1		Total Turbine Flow @ 12:00 = 1914 cfs					
2	23.2	7.76	89.6	7.90	385.6	4.0		Notes:	Logger installed at depth = 3 m				
3	23.2	7.73	89.2	7.88	385.5	3.9			Bottom depth = 6 meters				
4	23.1	7.61	88.0	7.87	385.3	3.7		Staff:	JG, BS				
5	23.1	7.57	87.4	7.86	385.2	3.7							
5.5	23.2	7.65	88.2	7.89	385.3	3.7							
Crescent Tailrace													
6/25/2020								Begin Time:	9:24	End Time:	9:37	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	26.1	7.89	96.8	7.92	399.7	57.4		Weather:	Sunny, light breeze				
1	26.2	7.85	96.3	8.00	399.5	55.2		Total Turbine Flow @ 10:00 = 2771 cfs					
2	26.2	7.80	95.8	8.00	398.7	53.5		Notes:					
3	26.2	7.79	95.5	7.90	399.0	56.2							
4	26.2	7.82	95.8	7.80	400.2	58.5		Staff:	MN, MF				
5	26.2	7.85	96.4	7.77	399.8	61.1							
5.5	26.2	7.76	95.0	7.77	399.4	58.7		QA:	Reject Turbidity - bad calibration. JPG				
Crescent Tailrace													
7/2/2020								Begin Time:	9:50	End Time:	10:00	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	25.0	6.37	77.6	7.71	350.0	3.2		Weather:	Sunny, light breeze, ~75F				
1	24.9	6.31	75.8	7.66	350.1	3.4		Total Turbine Flow @ 10:00 = 0 cfs					
2	24.8	6.89	82.5	7.68	349.8	3.2		Notes:	No generation at Crescent, spilling				
3	24.8	6.96	83.5	7.64	349.7	3.3							
4	24.7	6.90	82.8	7.60	349.7	3.4							
5	24.7	6.74	80.8	7.58	350.0	3.7		Staff:	JG, MN, MF				
5.5	24.7	6.46	77.2	7.54	350.2	3.5							
Crescent Tailrace													
7/9/2020								Begin Time:	8:59	End Time:	9:09	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	26.1	7.14	87.2	7.80	359.9	2.8		Weather:	Warm, humid, ~80F				
1	26.1	7.06	86.3	7.84	359.9	2.8		Total Turbine Flow @ 10:00 = 0 cfs					
2	26.0	6.88	83.9	7.80	360.0	2.8		Notes:					
3	26.0	6.77	82.7	7.73	360.0	2.8							
4	26.0	6.72	81.9	7.68	360.1	2.8		Staff:	MN, MF				
5	26.0	6.64	81.0	7.67	360.6	2.8							
5.5	26.0	6.58	80.2	7.66	362.1	2.9							

Crescent and Vischer Ferry Hydroelectric Projects (FERC Nos. 4678 and 4679)  
Water Quality Study

Crescent Tailrace								Begin Time:	9:43	End Time:	10:00	Meter:	YSI PRODSS
7/24/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	26.8	8.69	107.1	7.95	402.8	3.1		Weather:	Sunny, light breeze				
1	26.9	8.83	109.7	8.17	403.2	3.2		Total Turbine Flow @ 10:00 = 351 cfs					
2	26.9	8.34	103.3	8.13	403.3	3.2		Notes:	Low generation, spill				
3	26.9	8.46	104.0	8.15	403.2	3.0							
4	26.9	8.52	105.2	8.19	403.3	3.0		Staff:	MN, MF				
5	26.9	7.98	97.4	8.11	403.4	2.9							
5.5	26.9	8.25	103.0	8.15	403.3	2.9							
Crescent Tailrace													
8/4/2020								Begin Time:	13:28	End Time:	13:45	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	26.9	5.54	69.2	7.43	397.3	7.4		Weather:	Heavy rain starting				
1	26.9	5.54	69.1	7.41	397.4	7.6		Total Turbine Flow @ 14:00 = 2410 cfs					
2	26.9	5.56	69.4	7.41	397.5	6.6		Notes:					
3	26.9	5.52	68.8	7.40	397.5	6.5							
4	26.9	5.53	69.1	7.40	397.5	6.2		Staff:	MN, MF, JG				
5	26.9	5.50	68.5	7.40	397.5	7.3							
5.5	26.9	5.43	67.7	7.39	397.5	6.3							
Crescent Tailrace													
8/20/2020								Begin Time:	10:09	End Time:	10:18	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	24.8	6.26	74.5	7.41	362.4	6.4		Weather:	Sunny, 70F				
1	24.8	6.27	74.4	7.45	362.4	6.6		Total Turbine Flow @ 11:00 = 291 cfs					
2	24.8	6.27	74.6	7.46	362.1	6.0		Notes:					
3	24.8	6.30	74.9	7.48	362.2	6.1							
4	24.8	6.28	74.7	7.48	362.2	6.1		Staff:	MN, CD				
5	24.8	6.32	75.2	7.48	362.1	6.0							
5.5	24.8	6.33	75.3	7.49	362.0	6.0							
Crescent Tailrace													
9/3/2020								Begin Time:	9:57	End Time:	10:18	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	22.7	6.59	76.1	7.60	337.8	8.0		Weather:	Overcast, ~70F				
1	22.8	6.56	75.7	7.59	337.7	8.1		Total Turbine Flow @ 10:00 = 743 cfs					
2	22.7	5.59	75.9	7.57	337.8	8.2		Notes:					
3	22.7	6.68	76.6	7.57	337.4	8.1							
4	22.7	6.58	76.0	7.58	337.5	8.3		Staff:	MN, MF				
5	22.7	6.52	75.2	7.58	337.5	7.9							
5.5	22.7	6.51	75.2	7.60	337.6	8.4							

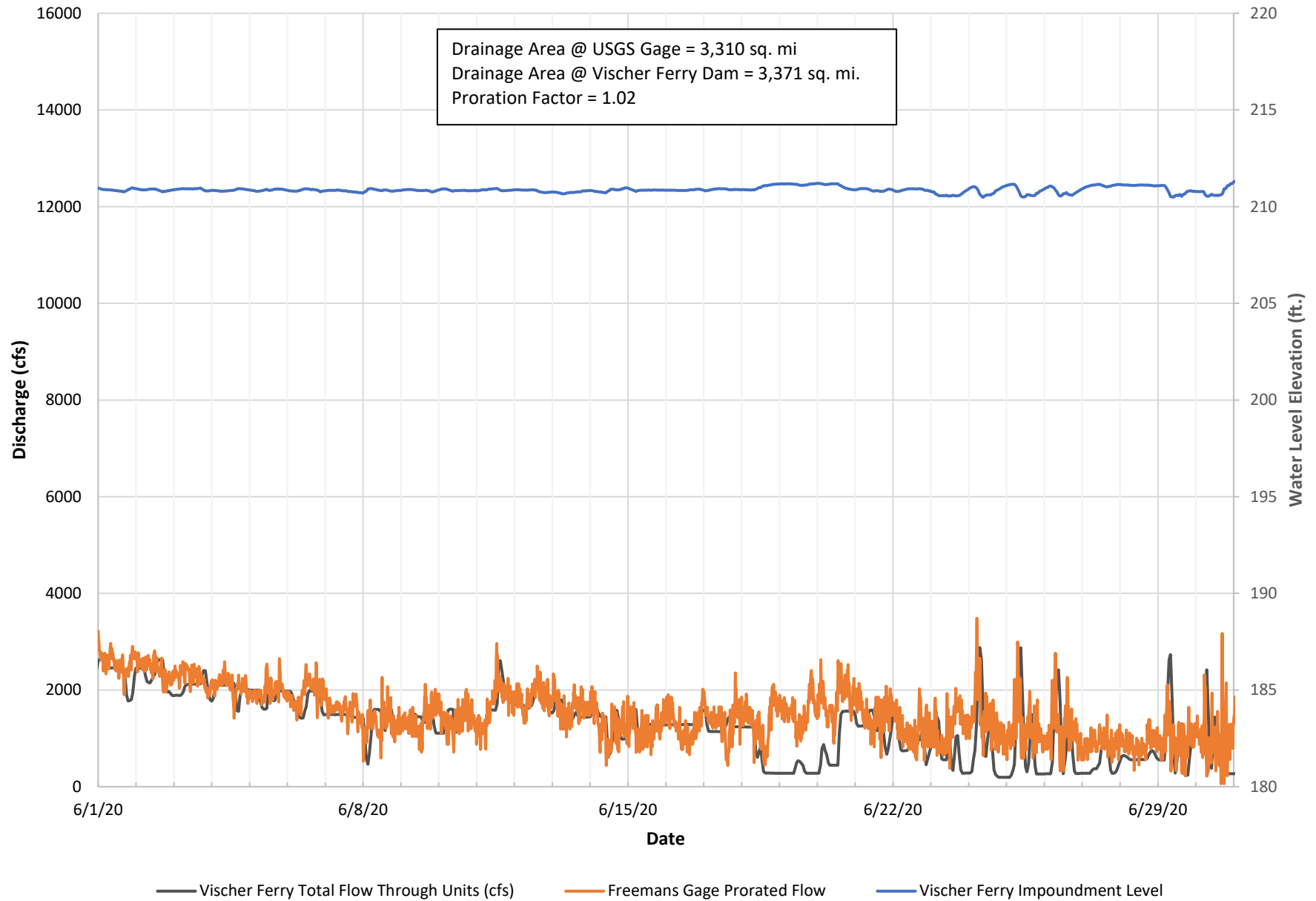


Crescent and Vischer Ferry Hydroelectric Projects (FERC Nos. 4678 and 4679)  
Water Quality Study

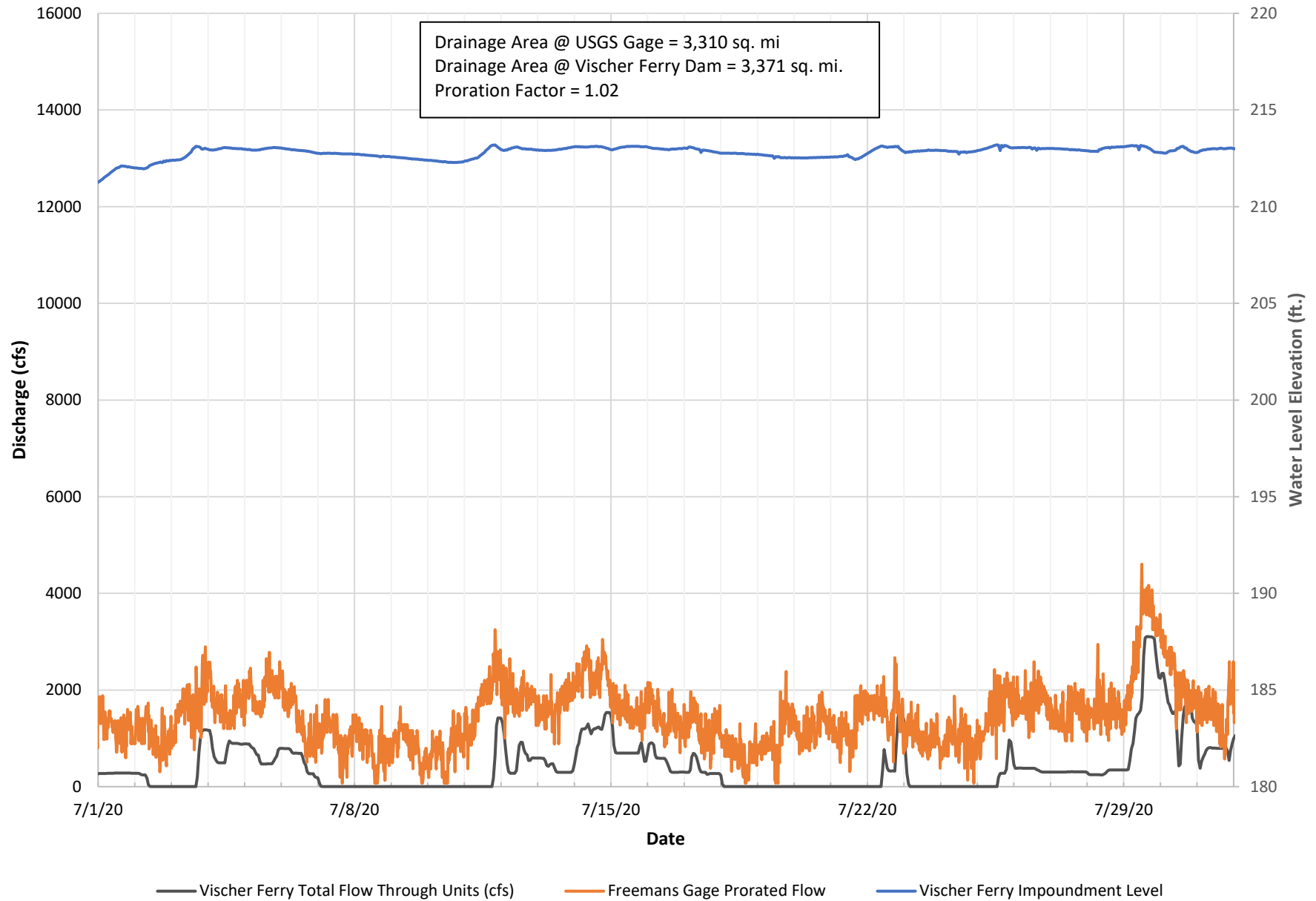
Crescent Tailrace								Begin Time:	10:00	End Time:	10:21	Meter:	YSI PRODSS
9/18/2020													
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	19.5	8.93	96.0	7.73	387.9	5.1		Weather:	Cool, light breeze, partly sunny				
1	19.6	8.83	95.3	7.84	388.2	5.1		Total Turbine Flow @ 11:00 = 346 cfs					
2	19.6	8.76	94.5	7.89	388.2	5.2		Notes:					
3	19.6	8.68	93.5	7.90	388.2	5.7							
4	19.6	8.64	93.2	7.90	388.1	5.5		Staff:	MN, MF				
5	19.6	8.62	92.8	7.90	388.1	5.6							
5.5	19.6	8.74	94.1	7.91	388.2	5.4							
Crescent Tailrace													
10/2/2020								Begin Time:	8:30	End Time:	8:47	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	19.1	7.76	83.1	7.58	373.1	6.1		Weather:	Rain, cloudy, no wind				
1	19.1	7.70	82.3	7.69	373.2	6.0		Total Turbine Flow @ 9:00 = 1849 cfs					
2	19.1	7.67	82.0	7.75	373.3	6.2		Notes:					
3	19.1	7.66	81.9	7.75	373.4	6.3							
4	19.1	7.65	81.8	7.75	373.2	6.3		Staff:	MN, MF				
5	19.1	7.63	81.6	7.75	373.3	6.2							
6	19.1	7.61	81.3	7.73	373.1	6.4							
Crescent Tailrace													
10/12/2020								Begin Time:	9:44	End Time:	10:10	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	15.7	8.37	82.7	7.47	355.7	3.9		Weather:	Cloudy, cool				
1	15.7	8.29	81.8	7.63	355.8	3.9		Total Turbine Flow @ 10:00 = 491 cfs					
2	15.7	8.52	83.8	7.63	355.4	3.7		Notes:					
3	15.7	8.32	82.2	7.62	355.7	3.7							
4	15.7	8.38	82.6	7.62	355.6	3.9		Staff:	MN, MF				
5	15.7	8.35	82.4	7.63	355.7	3.8							
5.5	15.7	8.42	83.2	7.63	355.6	3.7							
Crescent Tailrace													
11/4/2020								Begin Time:	12:53	End Time:	13:11	Meter:	YSI PRODSS
Depth (m)	Temp (°C)	DO (mg/L)	DO (% Sat)	pH	Conductivity	Turbidity (FNU)	Notes						
0.1	7.2	11.18	90.6	7.80	409.6	3.7		Weather:	Sunny, windy, cool				
1	7.2	11.16	90.4	7.75	409.7	3.6		Total Turbine Flow @ 13:00 = No Data					
2	7.2	11.16	90.5	7.72	409.6	3.6		Notes:					
3	7.2	11.16	90.5	7.71	409.6	3.5							
4	7.2	11.17	90.6	7.70	409.6	3.9		Staff:	MN, MF				
5	7.2	11.15	90.4	7.70	409.5	3.6							
5.5	7.2	11.14	90.3	7.71	409.6	3.4							

## **Attachment 2 – Prorated Flow Plots for Crescent and Vischer Ferry Projects**

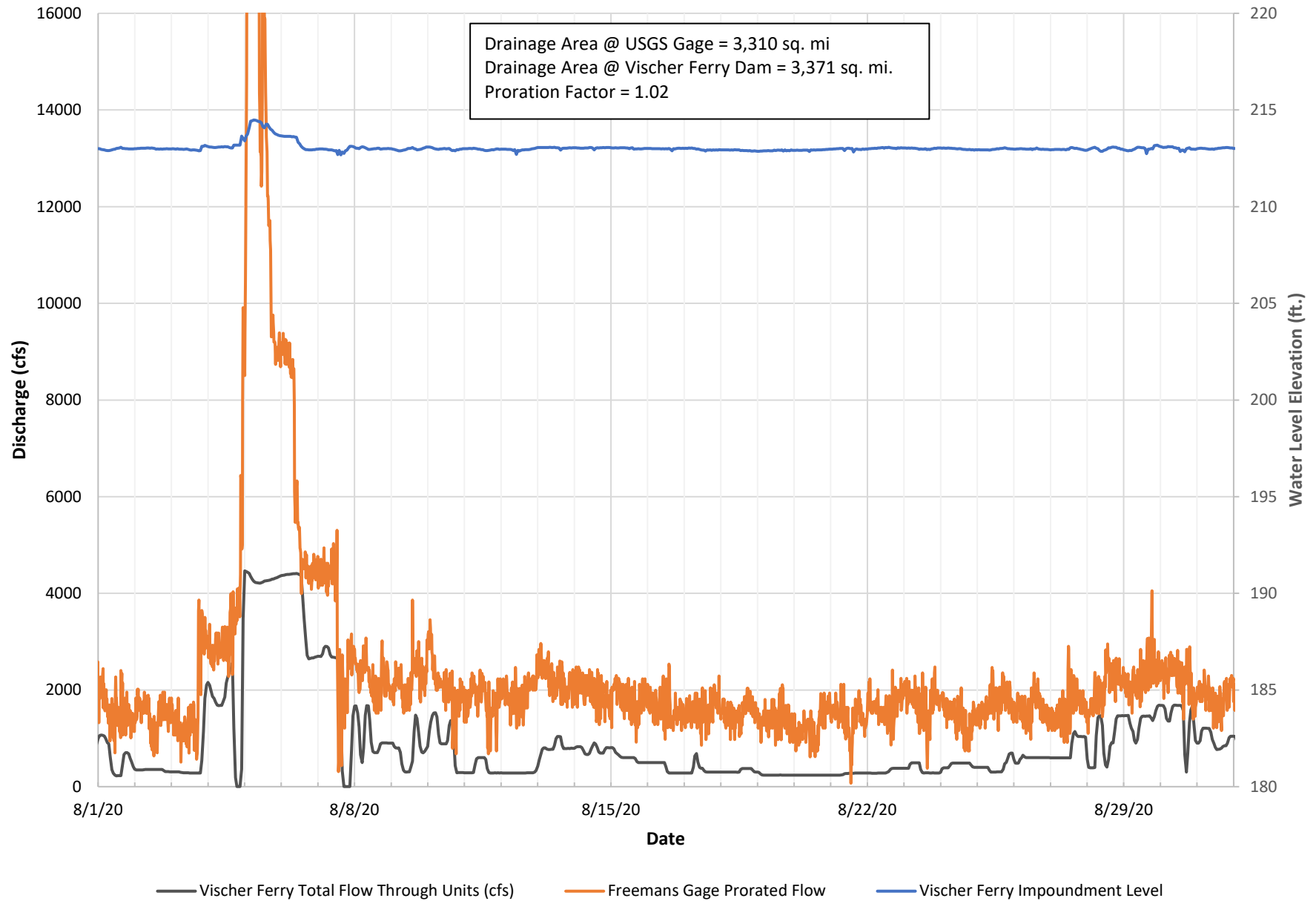
## Vischer Ferry Project Flow and Water Level - June, 2020



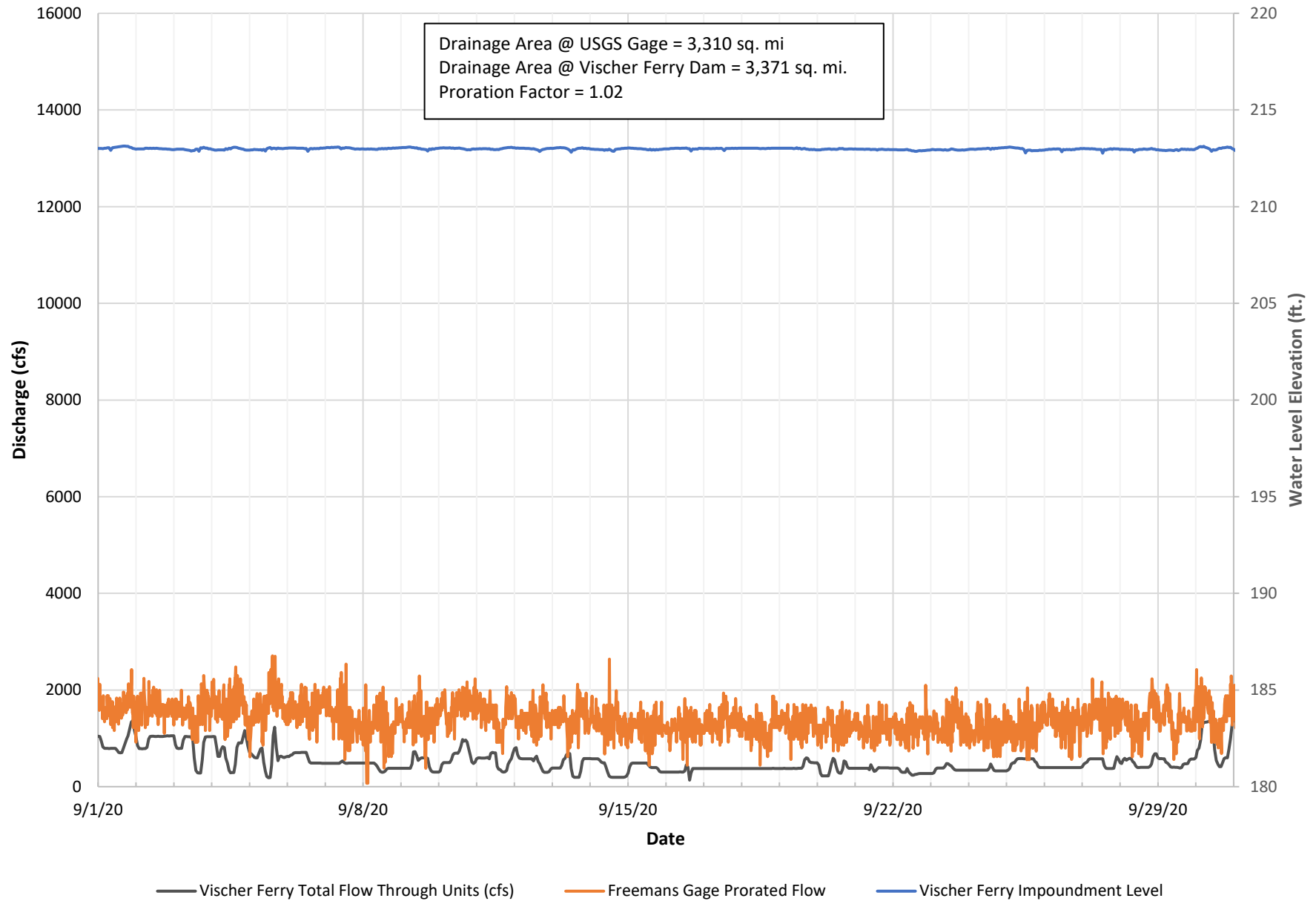
## Vischer Ferry Project Flow and Water Level - July, 2020



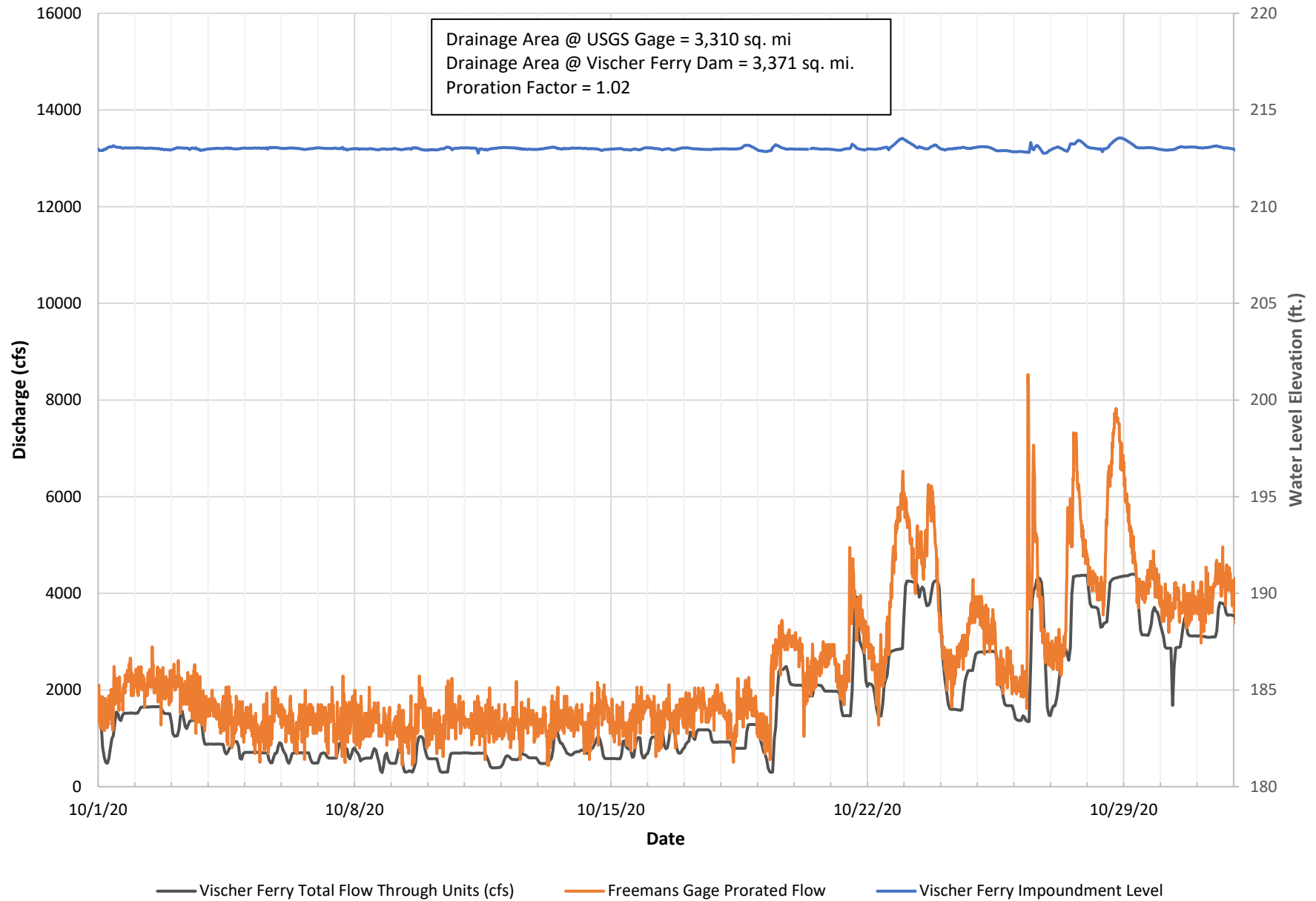
## Vischer Ferry Project Flow and Water Level - August, 2020



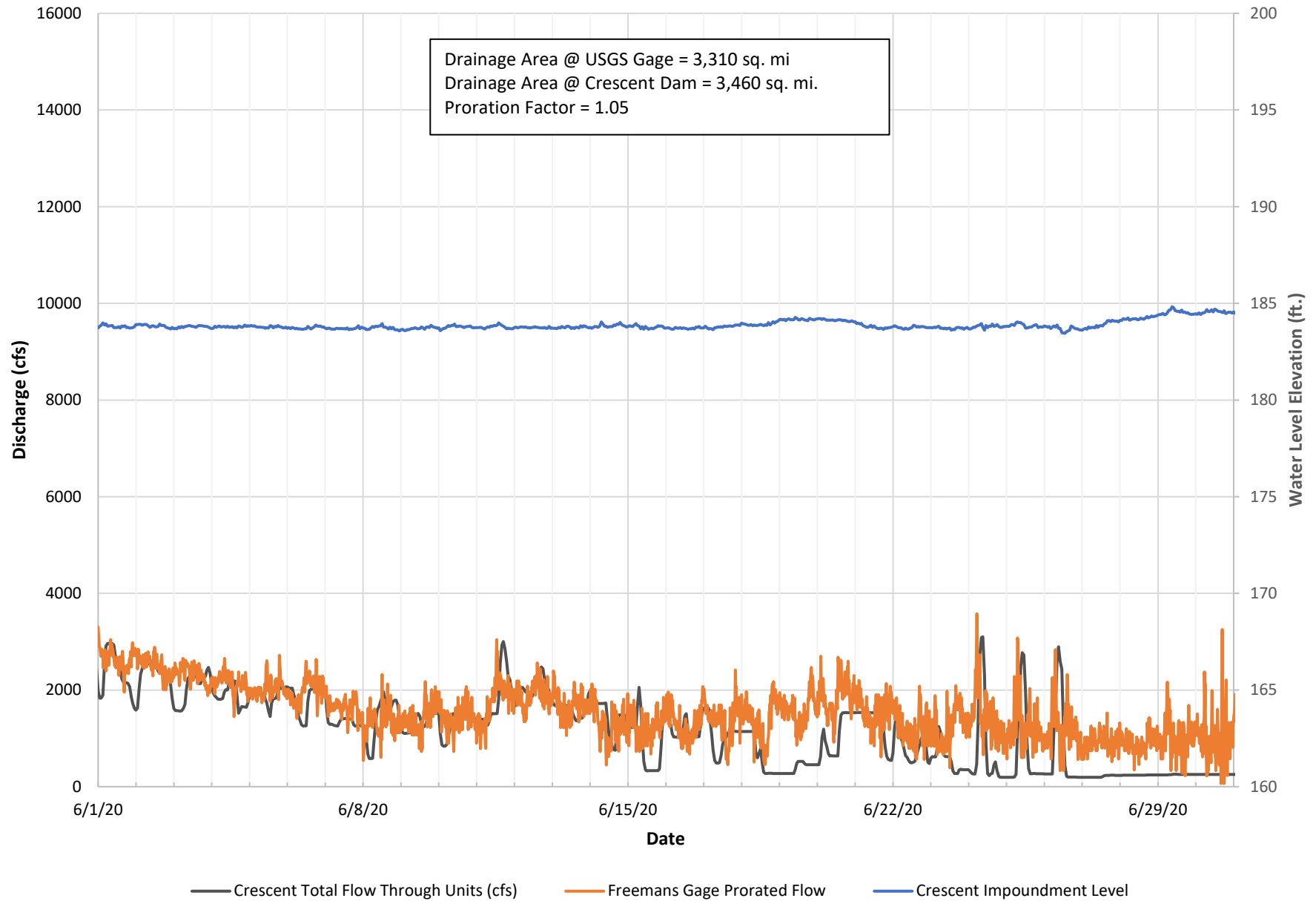
## Vischer Ferry Project Flow and Water Level - September, 2020



## Vischer Ferry Project Flow and Water Level - October, 2020

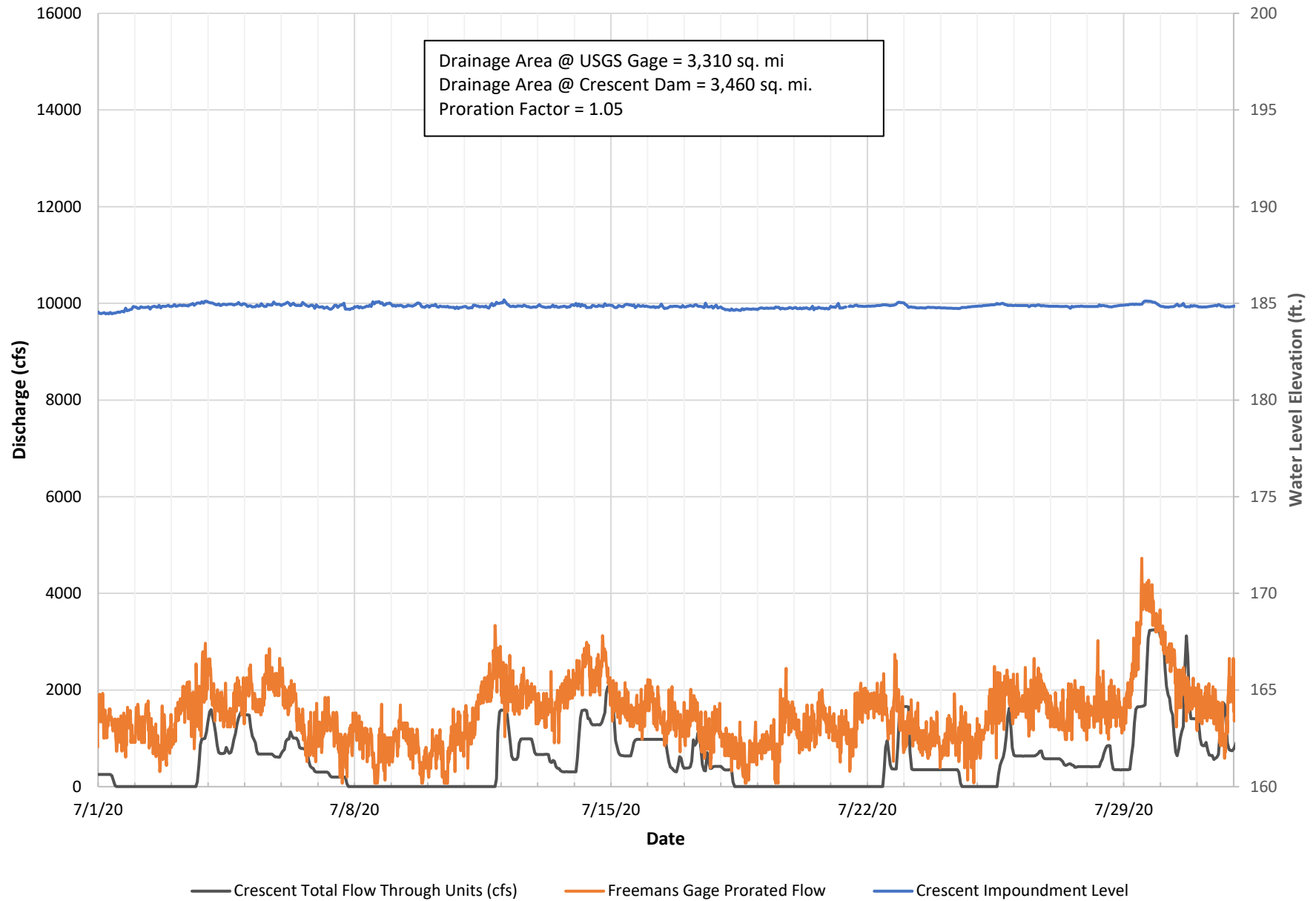


## Crescent Project Flow and Water Level - June, 2020

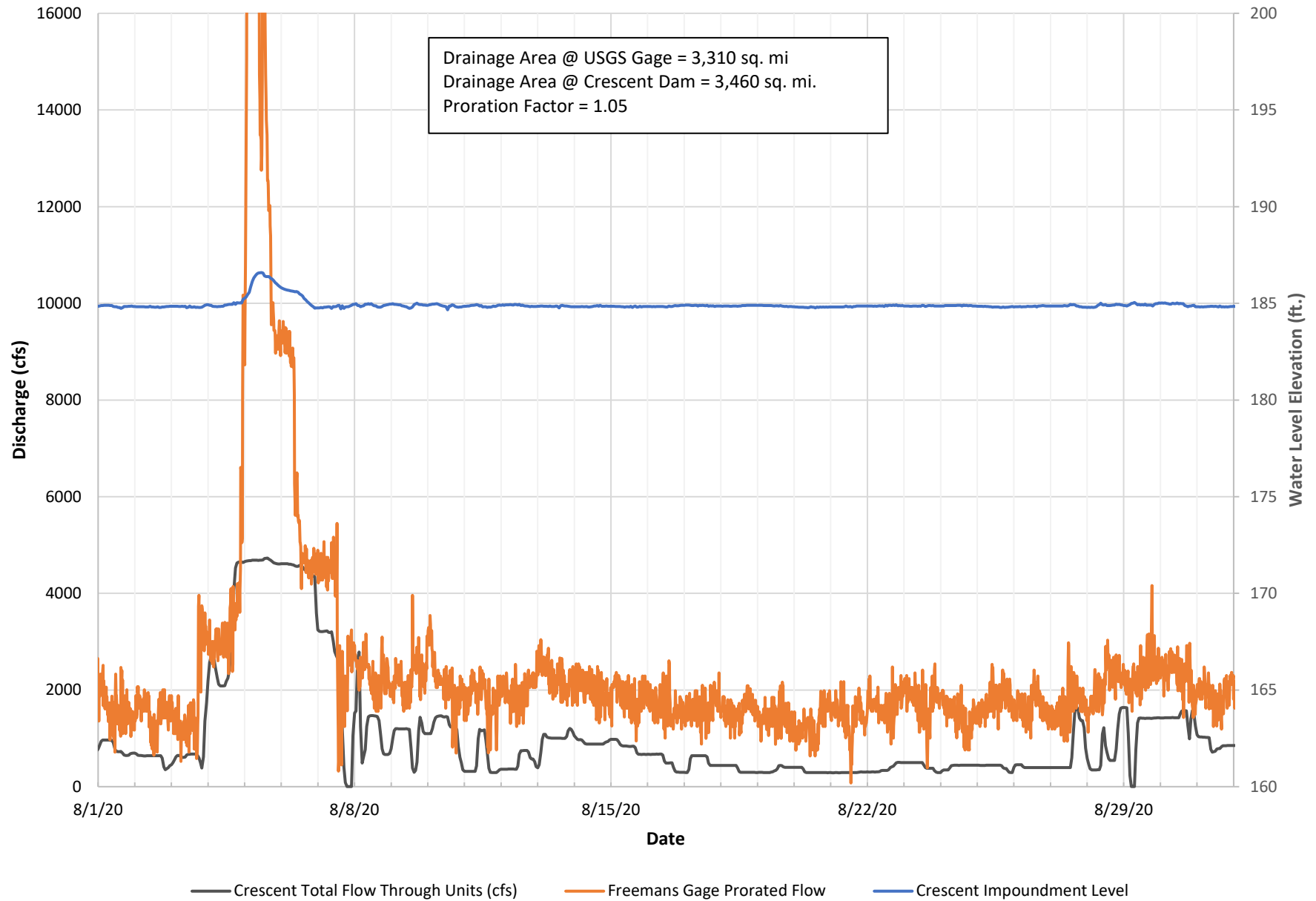




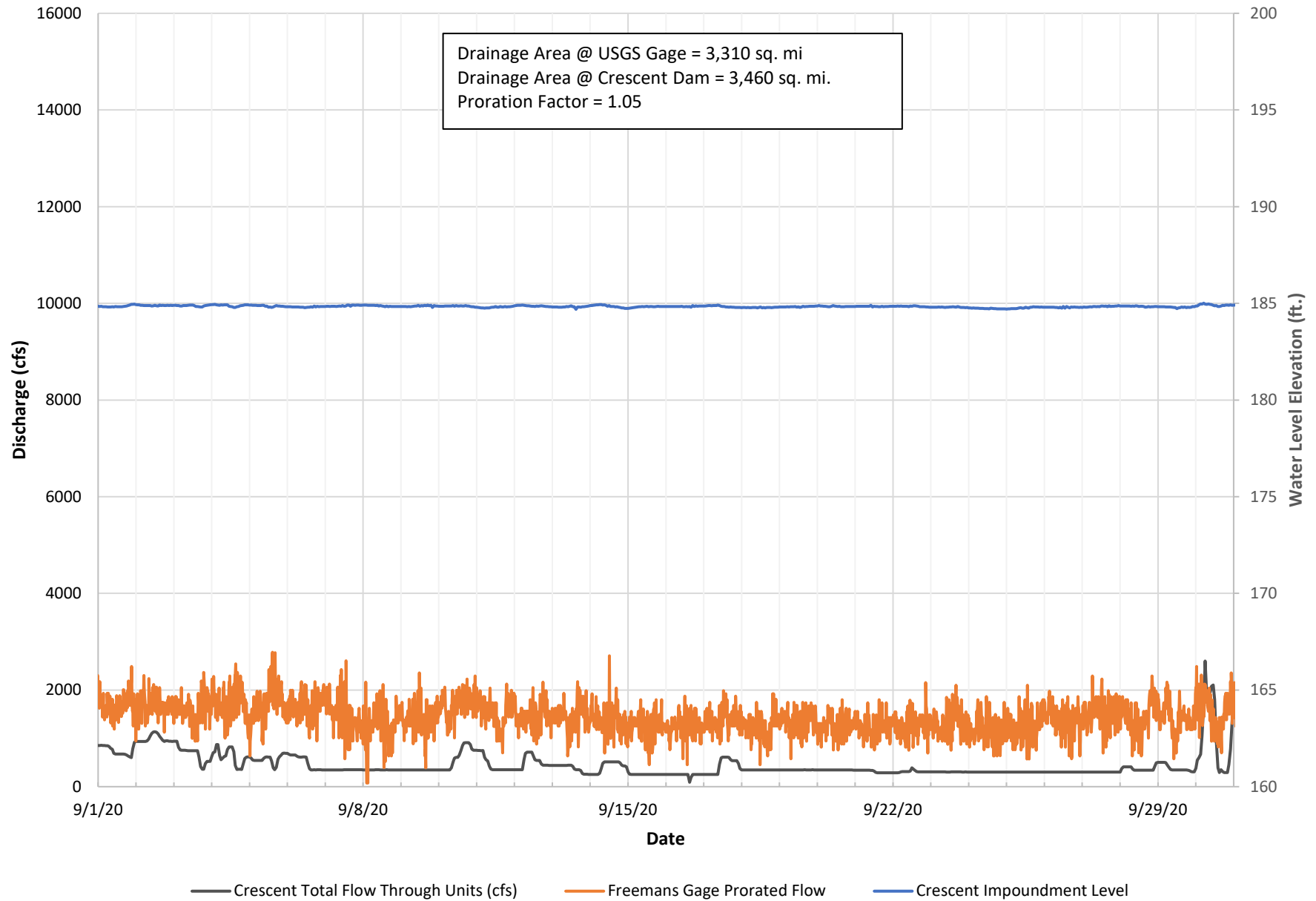
## Crescent Project Flow and Water Level - July, 2020



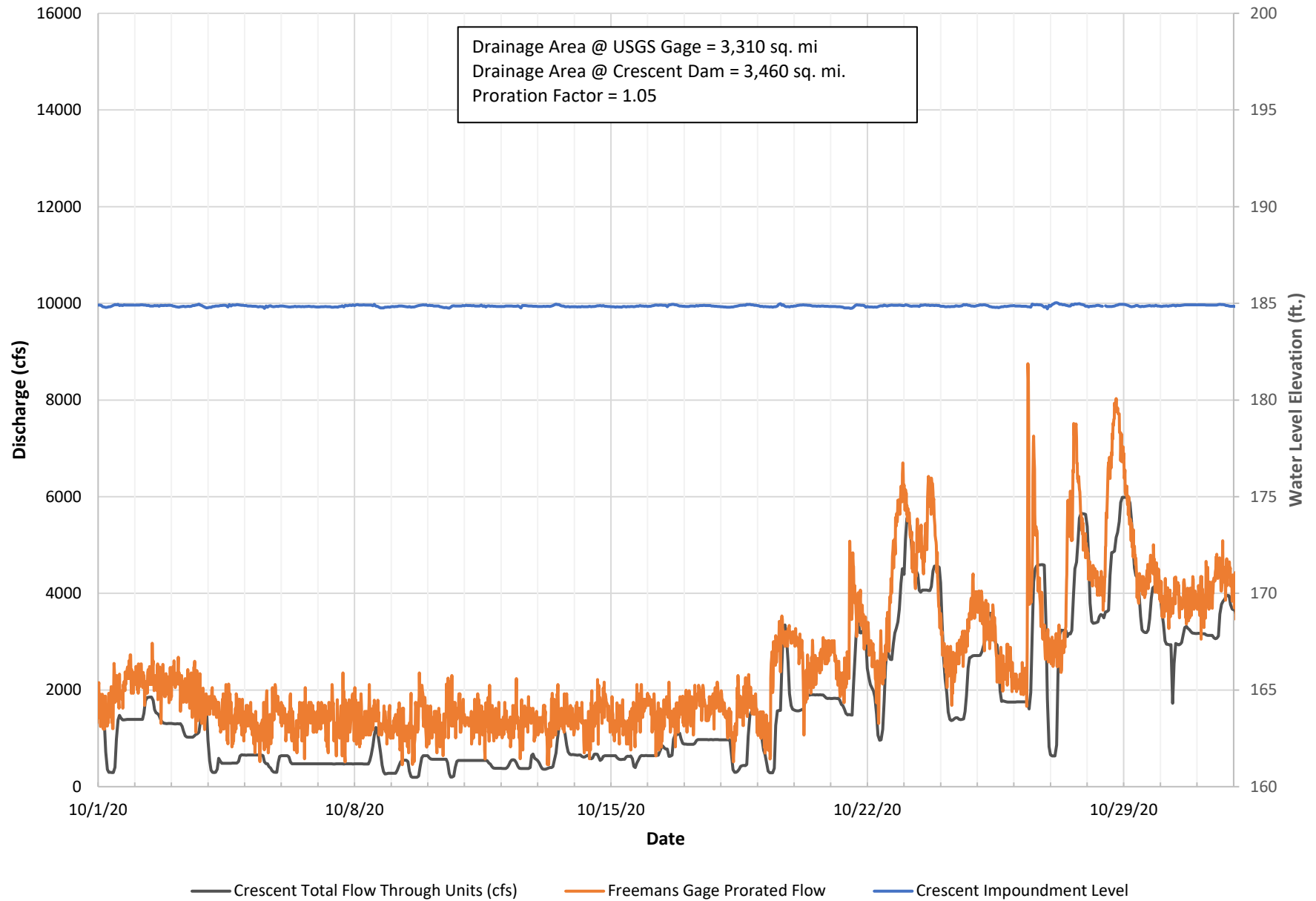
## Crescent Project Flow and Water Level - August, 2020



## Crescent Project Flow and Water Level - September, 2020



## Crescent Project Flow and Water Level - October, 2020



## **Attachment 3 – Proposed Second Year Water Quality Study Plan**

# 2021 RELICENSING STUDY PLAN

FOR THE

## CRESCENT AND VISCHER FERRY HYDROELECTRIC PROJECTS FERC NO. P-4678 AND P-4679



*Prepared for:*



*Prepared by:*



**Kleinschmidt**

2021

## TABLE OF CONTENTS

### LIST OF ABBREVIATIONS..... I

<b>1</b>	<b>2021 PROPOSED STUDIES.....</b>	<b>1</b>
1.1	Water Quality Study .....	1
1.1.1	General Description of Proposed Study.....	1
1.1.2	Geographic Scope.....	2
1.1.3	Study Goals and Objectives .....	2
1.1.4	Relevant Resource Management Goals and Public Interest Considerations .....	2
1.1.5	Existing Information and Need for Additional Information .....	3
1.1.6	Project Nexus.....	3
1.1.7	Methodology.....	4
1.1.8	Proposed Deliverables and Schedule.....	5
1.1.9	Level of Effort and Cost.....	5

### LIST OF TABLES

Table 1:	Proposed Vertical Profile Sites.....	6
----------	--------------------------------------	---

### LIST OF FIGURES

Figure 1:	Crescent Project Bathymetric Map and Proposed Water Quality Monitoring Locations .....	7
Figure 2:	Vischer Ferry Project Bathymetric Map and Proposed Water Quality Monitoring Locations .....	8
Figure 3:	2021 Proposed Crescent Water Quality Monitoring Sites.....	9
Figure 4:	2021 Proposed Vischer Ferry Water Quality Monitoring Sites .....	10

## LIST OF ABBREVIATIONS

DO	dissolved oxygen
FERC or Commission	Federal Energy Regulatory Commission
ISR	Initial Study Report
NYSDEC	New York State Department of Environmental Conservation
PAD	Pre-Application Document
Power Authority	New York Power Authority
SD1	Scoping Document 1
USR	Updated Study Report



## **1 2021 PROPOSED STUDIES**

### **1.1 Water Quality Study**

#### **1.1.1 General Description of Proposed Study**

The Power Authority conducted a water quality study in 2020 in accordance with the Revised Study Plan and the Federal Energy Regulatory Commission's (FERC) Study Plan Determination. The 2020 study involved collecting continuous data on water temperature and dissolved oxygen (DO) from the Projects' forebays and tailwater areas from June – October 2020. Additional data collection included bi-weekly vertical profile of temperature, DO, pH, turbidity and conductivity from the same four sampling locations.

The Power Authority filed its Initial Study Report (ISR) for the Projects on February 19, 2021 and held its ISR Meeting on March 3, 2021. Comments on the ISR were filed by FERC, the New York State Department of Environmental Conservation (NYSDEC) and Riverkeeper. Specifically, the NYSDEC and Riverkeeper requested collection of additional water quality data at the Projects in 2021.

The 2020 Water Quality Study indicated some DO stratification in the Vischer Ferry forebay location and some erratic changes in DO conditions in both Project forebays. As no other impoundment water quality data was collected as part of the study, it is unknown whether the DO stratification and erratic changes in DO concentrations are representative of broader impoundment conditions (perhaps influenced by the presence of extensive stands of water chestnut) or just a very localized phenomenon in the forebays. To address this question, and in response to NYSDEC's request for follow-up water quality data collection in 2021, the Power Authority is proposing to perform a second-year water quality study designed to collect additional DO and temperature data from the Project impoundments.

The purpose of the 2021 water quality study is to collect additional data in the Projects' impoundments and forebay areas to characterize DO and temperature conditions in the impoundments, and to determine if DO and temperature stratification occur. The Power Authority is not proposing additional continuous data collection in 2021 and believes the continuous data collected in 2020 sufficiently demonstrated the water quality conditions of the Project tailwater discharges.

### **1.1.2 Geographic Scope**

The focus of the 2021 study is on the Projects' forebay and the lower impoundment areas closest to the dams. The Power Authority reviewed the bathymetric conditions (see Figures 1 and 2) in the Projects' forebays and impoundments and selected proposed monitoring locations for the 2021 effort.

### **1.1.3 Study Goals and Objectives**

The goals of the 2021 water quality monitoring study are to a) determine if the DO patterns observed in the Projects' forebays in 2020 occur in the Mohawk River upstream of the Projects' forebays or if the conditions are localized to the Projects' forebays, and b) evaluate whether the Projects' forebays are representative of DO and temperature conditions elsewhere in the impoundment.

The objectives of this study are to collect vertical profile DO and temperature data in the Projects' impoundments and forebays during the summer months sufficient to characterize current DO and temperature conditions at each Project impoundment, and to compare the water quality data to concurrent river flow, weather conditions and Project operations.

### **1.1.4 Relevant Resource Management Goals and Public Interest Considerations**

The Mohawk River at the Crescent and Vischer Projects is classified by NYSDEC as Class A waters, except for the Barge Canal section associated with the Crescent Project, which is classified as Class C waters. The Barge Canal section classified as Class C includes the Waterford Flight portion of the canal from Lock E-6 where it joins the Mohawk River at the Crescent Project down to Lock E-2, approximately 1.5 miles further down the canal.

NYSDEC's stated mission is "to conserve, improve and protect New York's natural resources and environment and to prevent, abate and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well-being." The natural resource management goals within the Mohawk River Watershed will be consistent with the Department's mission while focusing on protecting and enhancing fish and wildlife habitat and improving public access.

### **1.1.5 Existing Information and Need for Additional Information**

Existing water quality information for the Mohawk River in the vicinity of the Projects was gathered during the Pre-Application Document (PAD) development. The 2020 water quality study obtained continuous data on water temperature and DO from the Projects' forebays and tailwater areas from June – October 2020. Additional data collection included bi-weekly vertical profile of temperature, DO, pH, turbidity and conductivity from the same four sampling locations.

The 2020 study season was a low-flow year and representative of low-flow/warm temperature conditions typically desired for examining worst-case water quality conditions.<sup>1</sup> The results of the 2020 Water Quality Study demonstrated that operation of the hydropower projects is not adversely affecting DO conditions of the powerhouse discharges or downstream tailwater areas.

The NYSDEC requested additional data collection to understand the water quality dynamics of the Projects' forebays and impoundment areas. The 2020 Water Quality Study indicated some DO stratification in the Vischer Ferry forebay location and some erratic changes in DO conditions in both Projects' forebays. As no other impoundment water quality data was collected as part of the study, it is unknown whether the DO stratification and erratic changes in DO concentrations are representative of broader impoundment conditions, or just a very localized phenomenon in the forebays. To address this question, and in response to NYSDEC's request for follow-up water quality data collection in 2021, the Power Authority is proposing to perform a second-year water quality study designed to collect additional DO and temperature data from the Project impoundments.

### **1.1.6 Project Nexus**

The Project Dams impound water from the Mohawk River. These impoundments and releases have the potential to impact such water quality factors as temperature and DO, which are critical to the quality of the aquatic habitat, especially during low flow summer periods.

The proposed 2021 water quality study will evaluate DO and temperature conditions in the Projects' impoundments.

---

<sup>1</sup> In a letter dated April 14, 2021, NYSDEC noted that 2020 could be considered a low-flow, dry year, and is likely a good representative of the poor conditions that could be present at the Projects.

### **1.1.7 Methodology**

#### ***Task 1. Field Work***

The water quality monitoring locations the Power Authority has proposed in this plan have been chosen to be as representative of lower impoundment and forebay conditions as possible, while ensuring the safety and security of the instruments and monitor operations/maintenance personnel. The Power Authority will consult with NYSDEC water quality staff regarding the final locations of the impoundment monitoring locations in 2021, prior to initiating sampling.

The Power Authority will collect water quality profiles at three locations in the lower portion of each Project impoundment. The approximate sampling locations are listed in Table 1 and illustrated in Figures 3 and 4. Data will be collected at 1-meter intervals from the surface to the bottom. Data collected will include DO and water temperature using a hand-held multiprobe.

Vertical profiles will be collected approximately once per week from late June – September.

The Power Authority will also obtain river flow data from the USGS Freeman's Bridge gage, hourly turbine discharges, and daily weather data (i.e., rainfall, air temperature) which will be used to evaluate DO and water temperature conditions in relation to Project discharges, river flow and weather conditions.

#### ***Task 2. Data Analysis***

The Power Authority will review the DO and temperature profile data following standard quality assurance/quality control protocols, and any anomalous or erroneous data will subsequently be removed from the final dataset. Removed data will be documented with the reasons for removal. Collected data will be entered into a spreadsheet for plotting and analysis.

Collected data will be analyzed along with information on river flow, rainfall, and air temperature data to evaluate trends in DO and temperature conditions at each site. Concurrent Project operations data will also be assessed to determine any observable changes in DO and temperature conditions that may be attributable to Project operations.

### **Task 3. Study Report**

The Power Authority will prepare a water quality study report. The final study report will be included in the Updated Study Report (USR) which is scheduled to be filed with FERC by February 19, 2022.

#### **1.1.8 Proposed Deliverables and Schedule**

The Power Authority proposes to perform this study in 2021. Study reporting will be conducted in accordance with the Process Plan and Schedule (18 C.F.R. § 5.6(d)(1)), as provided in the PAD, and the FERC's SD1.

<b>Task</b>	<b>Schedule</b>
Task 1. Field Work	June-September 2021
Task 2. Data Analysis	Fall 2021
Task 3. Study Report	February 2022 (as part of USR)

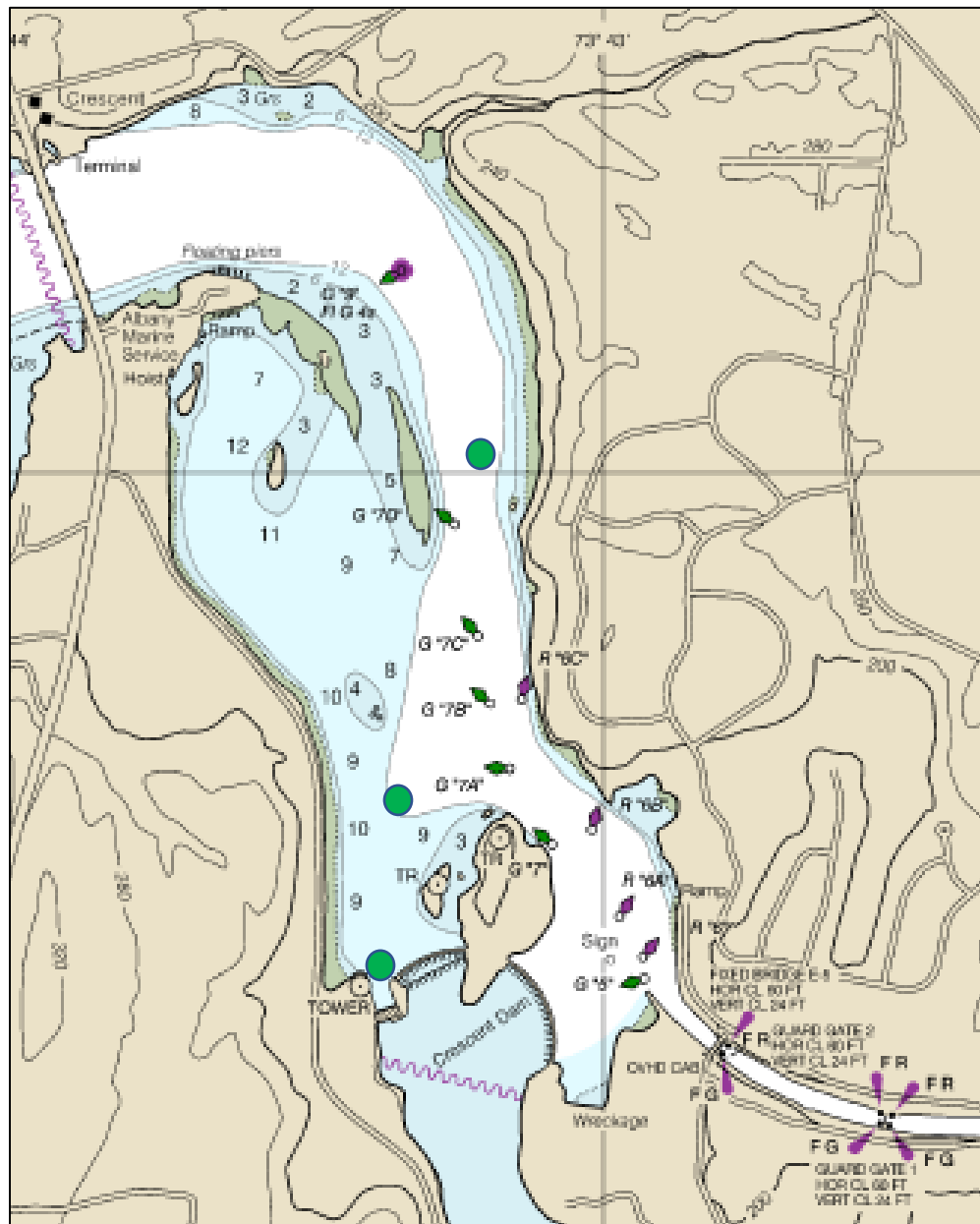
#### **1.1.9 Level of Effort and Cost**

The estimated cost for the 2021 water quality study at the Crescent and Vischer Ferry Projects is approximately \$50,000.

**Table 1: Proposed Vertical Profile Sites**

<b>Site Name</b>	<b>Location</b>
1 - Crescent Forebay	Upstream end of Forebay - Same general location as 2020 sampling location.
2 - Crescent Impoundment A	800 feet upstream of Crescent Dam and intake channel.
3 - Crescent Impoundment B	Navigation channel approximately 0.6 miles upstream of Crescent Dam. This area is 25-30 feet deep in spots.
4 - Vischer Ferry Forebay	Upstream end of Forebay - Same general location as 2020 sampling location.
5 - Vischer Ferry Impoundment A	Navigation Channel approximately 0.4 miles upstream of Vischer Ferry Dam and intake channel.
6 - Vischer Ferry Impoundment B	Navigation Channel approximately 0.8 miles upstream of Vischer Ferry Dam.

**Figure 1: Crescent Project Bathymetric Map and Proposed Water Quality Monitoring Locations**



● Proposed 2021 Profile Locations

Map Source: NOAA Nautical Chart 14786. 15<sup>th</sup> Edition. Chart E-40

**Figure 2: Vischer Ferry Project Bathymetric Map and Proposed Water Quality Monitoring Locations**

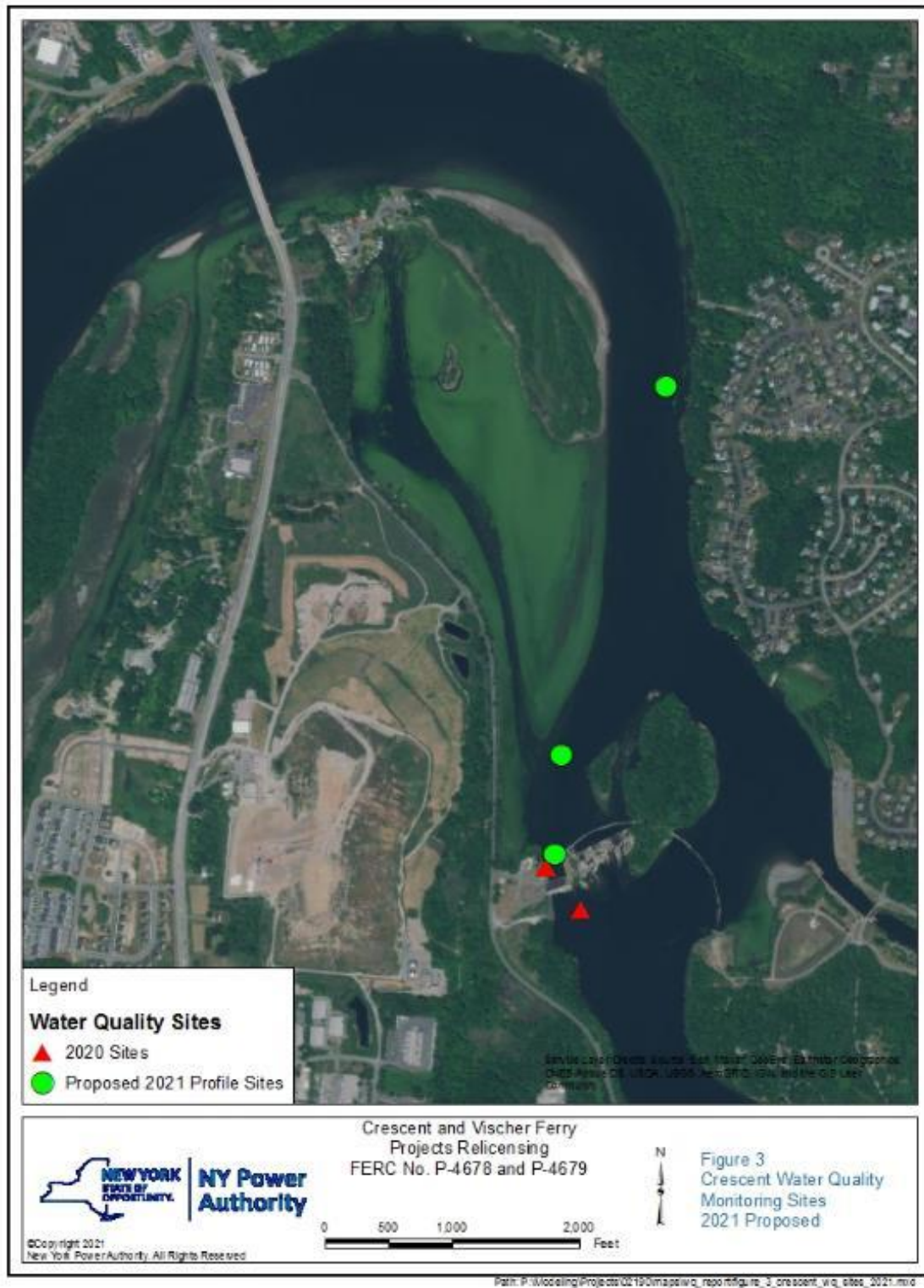


● Proposed 2021 Profile Locations

Map Source: NOAA Nautical Chart 14786. 15<sup>th</sup> Edition. Charts E-38 and E-39.



**Figure 3: 2021 Proposed Crescent Water Quality Monitoring Sites**



**Figure 4: 2021 Proposed Vischer Ferry Water Quality Monitoring Sites**

