Schoolfield Hydroelectric Project
(FERC No. 2411)

FINAL

Application for New License
Major Water Power Project 10 Megawatts or Less

Exhibit E – Environmental Report

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1 GENERAL DESCRIPTION OF PROJECT LOCALE

The Schoolfield Hydroelectric Project (Project) (FERC No. 2411) is located on the Dan River at approximately river mile (RM) 60.1 near the City of Danville, Virginia (Figure 1-1).[1] The headwaters of the Dan River originate on the eastern slopes of the Blue Ridge Mountains in Patrick County, Virginia. From its headwaters, the river flows in a general eastward direction approximately 210 river miles, traversing both the Blue Ridge and Piedmont physiographic provinces, to its terminus at the Kerr Reservoir, near South Boston, Virginia.

The Dan River watershed covers approximately 3,300 square miles in south-central Virginia and north-central North Carolina. The entire Dan River basin contains a total of 19,137 miles of streams and 108 square miles of lakes and reservoirs. The Dan River upstream of the Project dam drains an area of approximately 1,900 square miles. There are approximately 10,930 miles of stream but only 17 square miles of lake and reservoir area upstream of the Project dam. The Project reservoir receives inflow from Dan River upstream of the Project dam as well as several unnamed tributaries, both perennial and intermittent.

In addition to the Project, there is one other operating FERC-licensed hydroelectric project on the Dan River mainstem, the Pinnacles Hydroelectric Project (FERC No.10896). The Pinnacles Hydroelectric Project consists of two developments: Townes and Talbott, both of which are peaking facilities. Three other hydroelectric projects are located on the Smith River, the U.S. Army Corp's Philpott Dam Hydroelectric Project, the City of Martinsville, Virginia's Martinsville Hydroelectric Project, and the Eden Hydroelectric Project[2]. Two other FERC licensed hydroelectric projects, the Avalon Hydroelectric Project (P-11169), owned by Avalon Hydropower, LLC, and the Mayo Hydroelectric Project (P-11219), owned by Mayo Hydropower, LLC are located on the Mayo River. Figure 1-1 shows the locations of these hydroelectric projects as well as other non-hydropower dams on the mainstem of the river.

The climate of the area is characterized by mild winters and warm, humid summers. In the summer months, air temperatures may rise to over 100 degrees Fahrenheit (°F), whereas during the winter air temperatures may fall to near 0°F. The average annual liquid precipitation is 43.6 inches, with average annual snowfall of about 4.3 inches. Precipitation varies markedly, however, with elevation and location within the gorge that cuts through the Blue Ridge Mountains. Exceptionally heavy rains can occur in the Project vicinity when Atlantic storms move inland and encounter the sharply rising Appalachian Mountains to the west.

The topography of the Dan River basin varies throughout the two physiographic provinces that it spans. The Blue Ridge Province, a remnant of a former highland is a province of rugged terrain with steep slopes and narrow ridges in the north and broad moderate slopes in the south. The Piedmont Province has scattered hills and small mountains, gradually turning into gently rolling slopes and lower elevation in the eastern portion of the province. In the Project area, topography consists of low, rounded hills with gentle slopes and a few isolated ridges. The most prominent peak in the Project vicinity is Whiteoak Mountain, which is a long ridge extending in a northeastward direction through Pittsylvania County with a maximum elevation of 1,140 feet

[1] River mile as calculated from the mouth of the Dan River.
[2] The Martinsville and Eden Hydroelectric Projects are hydroelectric projects that are not regulated by FERC.

NGVD 29 (Legrand, 1960; Meyertons, 1963). The land surface slopes eastward from approximately 900 feet NGVD 29 in western Pittsylvania County to near 500 feet above msl near the boundary with Halifax County (Legrand, 1960). Local relief at the Project is typically 400 to 600 feet (NGVD29).

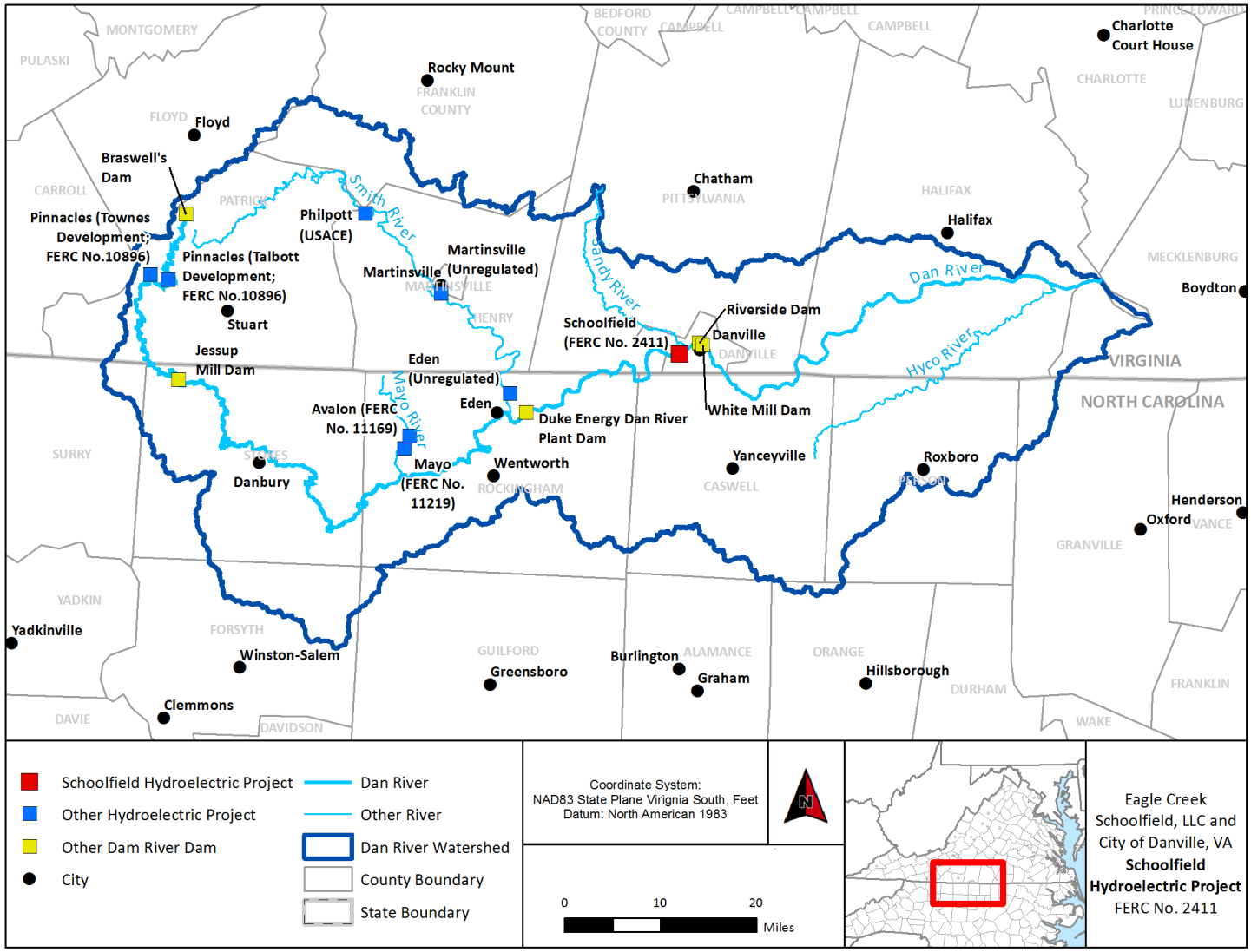


Figure 1-1. Location of the Schoolfield Hydroelectric Project and other dams.

2 GEOLOGY AND SOIL RESOURCES

2.1 Geology

The Project area is underlain by ancient igneous and metamorphic rocks and sediment of the Triassic age. During the Triassic period, sediments were deposited inland that extend from Nova Scotia to South Carolina, which formed geologic basins of clay, silts, and sands. In the Project vicinity is the Danville Triassic Basin, which is several miles wide, and extends along the western edge of the Project boundary in a northeasterly direction (Legrand, 1960).

The process of erosion has been continually active in Danville Triassic Basin (Legrand, 1960). As such, the rocks within the geologic basin are some of the youngest consolidated sediments in Pittsylvania County. These sediments are composed of sandy shale siltstone, sandstone, arkosic sandstone, conglomerate, and a few thin beds of coal. Noteworthy features of the Triassic rocks that underlay the Project area are: (1) the red stick soils and red color of most rocks; (2) the high degree of consolidation of the sandstones and conglomerates; (3) the ridge forming character of the thicker arkosic sandstone beds; (4) the low-relief and gentle slopes of the red shales and other fine-grained sediment; and (5) the alignment of streams with the strike of the rock beds (Legrand, 1960).

Figure 2.1-1 illustrates the bedrock lithography of the Project vicinity. Bedrock of the Project vicinity is entirely amphibolite, biotite gneiss, felsic volcanic rock, and schist formed during the Cambrian era.

2.1.1 Seismicity and Active Faults

Seismically quiet when compared to the active plate boundaries of the western United States, the east coast of the United States is a passive tectonic plate boundary located on the "trailing edge" of the North American continental plate. However, earthquakes primarily from trailing edge tectonics and residual stress released from past, mountain-building events, do occur in the eastern United States (FERC, 2020).

Seismic risk can be quantified by the motions, such as shaking, experienced at the ground surface or by structures during a given earthquake in terms of *g,* acceleration as a percent of gravity. The USGS National Seismic Hazard Probability Mapping shows that, for the Project area, within a 50-year period, there is a 2% probability of an earthquake with an effective peak ground acceleration (PGA) of 6 to 10% *g* being exceeded. Similarly, within a 50-year period, there is 10% probability of an earthquake with a PGA of 2 to 3% *g* being exceeded (USGS, 2018). According to FERC (2020), a PGA of 10% *g* (0.1 *g*) is generally considered the minimum threshold for damage to older structures or structures not constructed to resist earthquakes. Based on the Richter Scale, which is a measure of the size of the earthquake at its source, the largest earthquake within a 50-mile radius of the Project dam had a magnitude of 2.7, approximately 28 miles to the east-southeast near Pleasant Grove, NC.[3] Another earthquake of 2.7 magnitude occurred near Greensboro, NC,[4] approximately 43 miles west-southwest of the Project dam (USGS, n.d(a)).

[3] Occurred on February 25, 1978, at a depth of 4.97 miles.
[4] Occurred on July 12, 1993, at a depth 3.11 miles.

USGS maintains a Quaternary fault and fold database of the United States with evidence of deformation in the past 1.6 million years (USGS, n.d(b)). Those faults where there has been displacement in the previous 10,000 years are considered to be active (USGS, 2019b). The Project does not overlie any Quaternary faults (USGS, n.d(b)). The nearest fault zone relative to the Project is the Pembroke Fault near Blacksburg, VA, approximately 70 miles northwest of the Project.

2.2 Soils

Table 2.2-1 list the soil types within the current and proposed Project boundary, and Figure 2.2-1 shows the location of the different soil series in the vicinity of the Project. Overall, there are 12 soil types in the current Project boundary and eight within the proposed Project boundary. The top five most abundant soil types in the current Project boundary are: Toccoa fine sandy loam (34.7%), Chenneby loam (17.8%), Riverview silt loam (6.4%), Pacolet fine sandy loam (4.9%), and Fairview fine sandy loam (2.4%). These same five soil types are also the top five most abundant soil types within the proposed Project boundary. Erodibility (K-Factor whole soil)[5] of the soils in the current and proposed Project boundary range from 0.17 to 0.49 and 0.24 to 0.49, respectively. K-Factors within these ranges indicate that the soils in the Project area have low to moderate susceptible to erosion by water (Table 2.2-1) (USDA, 2017).

2.2.1 Soil Sampling and Trace-Element Testing

In February of 2014, a stormwater pipe beneath the primary ash pond of Duke Energy's Dan River Steam Station burst and resulted in the accidental release of nearly 39,000 tons of coal ash into the Dan River. To understand the scope of the impact from the coal ash release, Hesterberg et al. (2016) performed an assessment of agricultural soils to determine whether the release significantly increased the presence of metal trace-element contents within agricultural soils along a 57-mile stretch of the Dan River over a two year period.[6] The metals tested for include: aluminum, iron, arsenic, barium, cadmium, chromium, copper, germanium, manganese, nickel, lead, selenium, strontium, uranium, and zinc. More than 1000 soils samples were collected and analyzed. In the Project area three sites were sampled (Figure 2.2-2). Results of the study indicate that trace-element contents of the samples collected upstream of the release were similar those collected downstream. Hesterberg et al. (2016) concluded that the release had no impact on trace element contents of soil in the 57-mile reach studied. Hesterberg et al. (2016) also noted irrigation and flooding, which are two potential pathways trace-elements could be transported from the Dan River to agricultural soils, was minimal during the study period.

[5] K-Factor whole soil estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (K_{sat}). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.
[6] Trace-elements of those elements that are normally in very low concentrations in the environment.

Table 2.2-1. Soil series and their characteristics within the current and proposed Project boundary.

Soil Map Unit Symbol	Map Unit Name and Description	Current Project Boundary Area		Proposed Project Boundary Area		Erodibility (K-Factor, whole soil)[17]
		Acres	Percent	Acres	Percent	
38A	Toccoa fine sandy loam, 0 to 2% slopes, occasionally flooded, well-drained	233.89	34.7	21.0	8.9	0.32
W	Water[1]	220.26	32.7	183.6	78.0	-
7A	Chenneby loam, 0 to 2% slopes, occasionally flooded, somewhat poorly drained	119.87	17.8	21.5	9.1	0.49
33A	Riverview silt loam, 0 to 2% slopes, occasionally flooded, well drained	42.89	6.4	3.9	1.6	0.43
26E	Pacolet fine sandy loam, 25 to 45% slopes, well drained	33.27	4.9	2.1	0.9	0.28
26D	Fairview fine sandy loam, 15 to 25% slopes, well drained	15.93	2.4	0.7	0.3	0.24
8A	Chenneby-Toccoa complex, 0 to 2% slopes, frequently flooded, somewhat poorly drained	2.47	0.4	0	0	0.49
5C3	Cecil sandy clay loam, 7 to 15% slopes, severely eroded, well drained	2.07	0.3	0	0	0.17
40	Urban land[1]	1.70	0.3	1.4	0.6	-

[7] Water and Urban land do not have K-Factors.

Soil Map Unit Symbol	Map Unit Name and Description	Current Project Boundary Area		Proposed Project Boundary Area		Erodibility (K-Factor, whole soil)[17]
		Acres	Percent	Acres	Percent	
2E	Ashlar fine sandy loam, 35 to 50% slopes, excessively drained	1.63	0.2	1.1	0.5	0.32
3B	Bolling fine sandy loam, 2 to 7% slopes, moderately well-drained	0.25	0.0	0	0	0.28
16B	Helena sandy loam, 2 to 7% slopes, moderately well drained	0.02	0.0	0	0	0.28
35B	State sandy loam, 0 to 4% slopes, rarely flooded, well drained	0.02	0.0	0	0	0.28

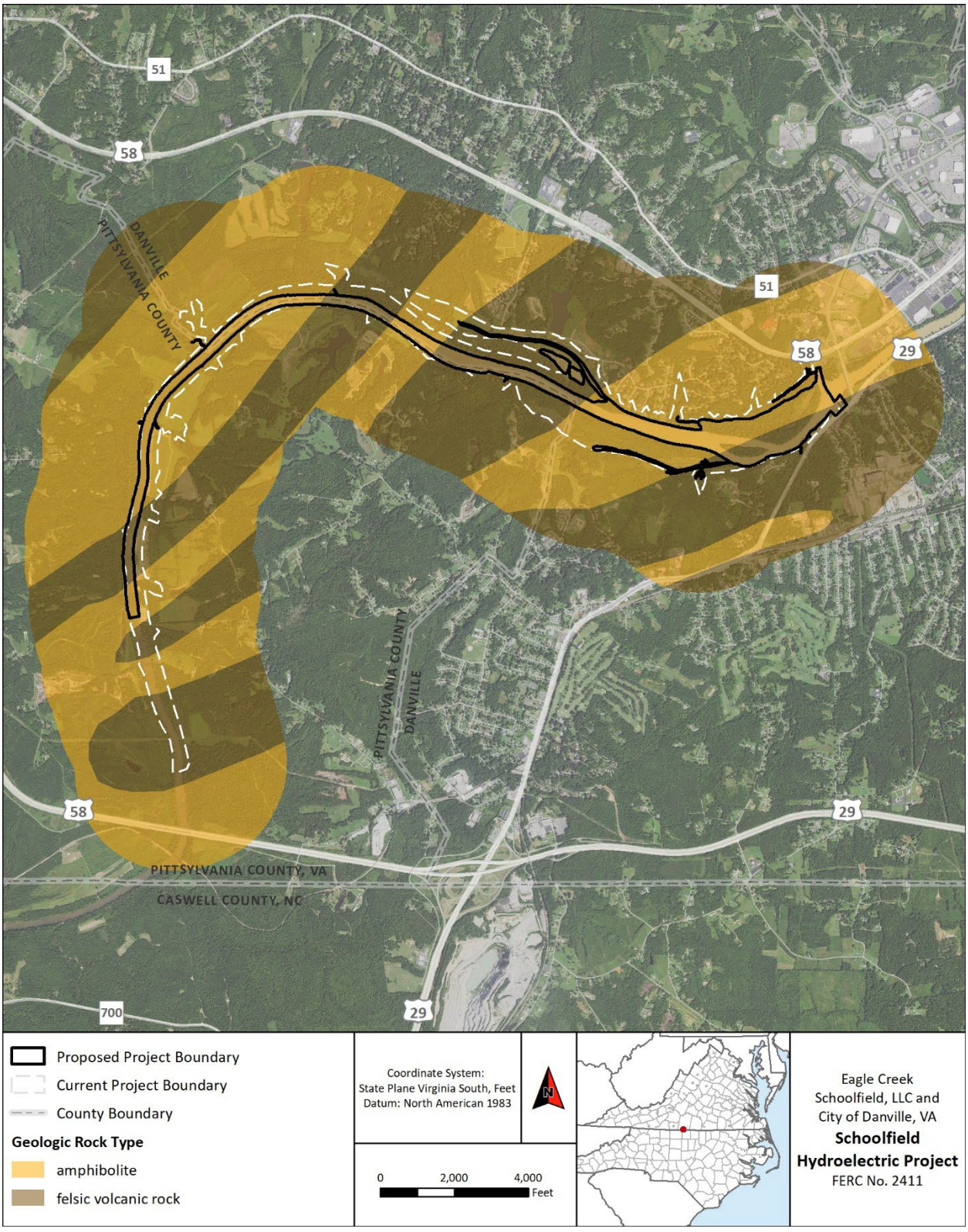
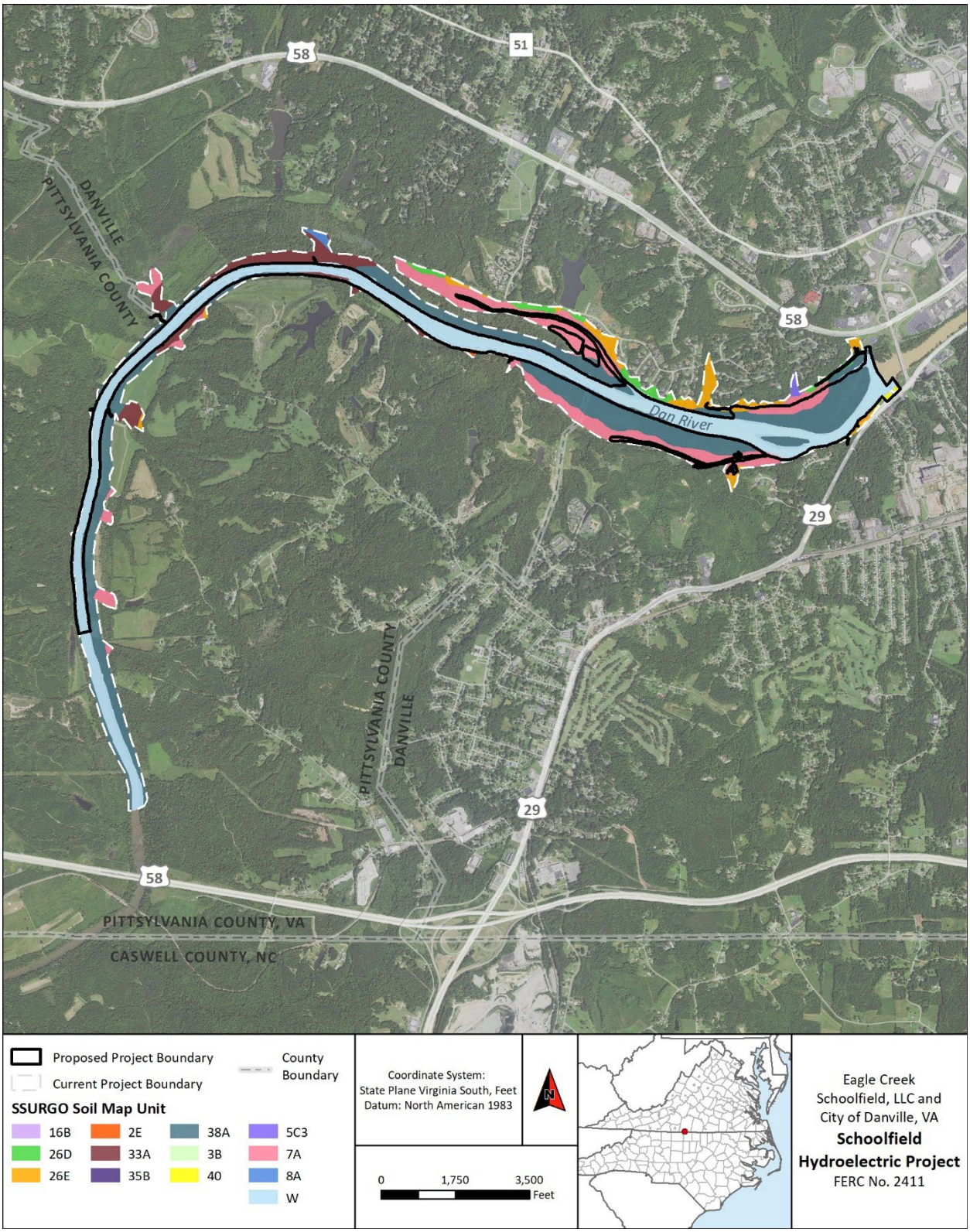


Figure 2.1-1. Bedrock lithography of the Project vicinity.



Note: For SURGO Soil Map Unit descriptions see Table 2.2-1.

Figure 2.2-1. Soils within the current and proposed Project boundary.

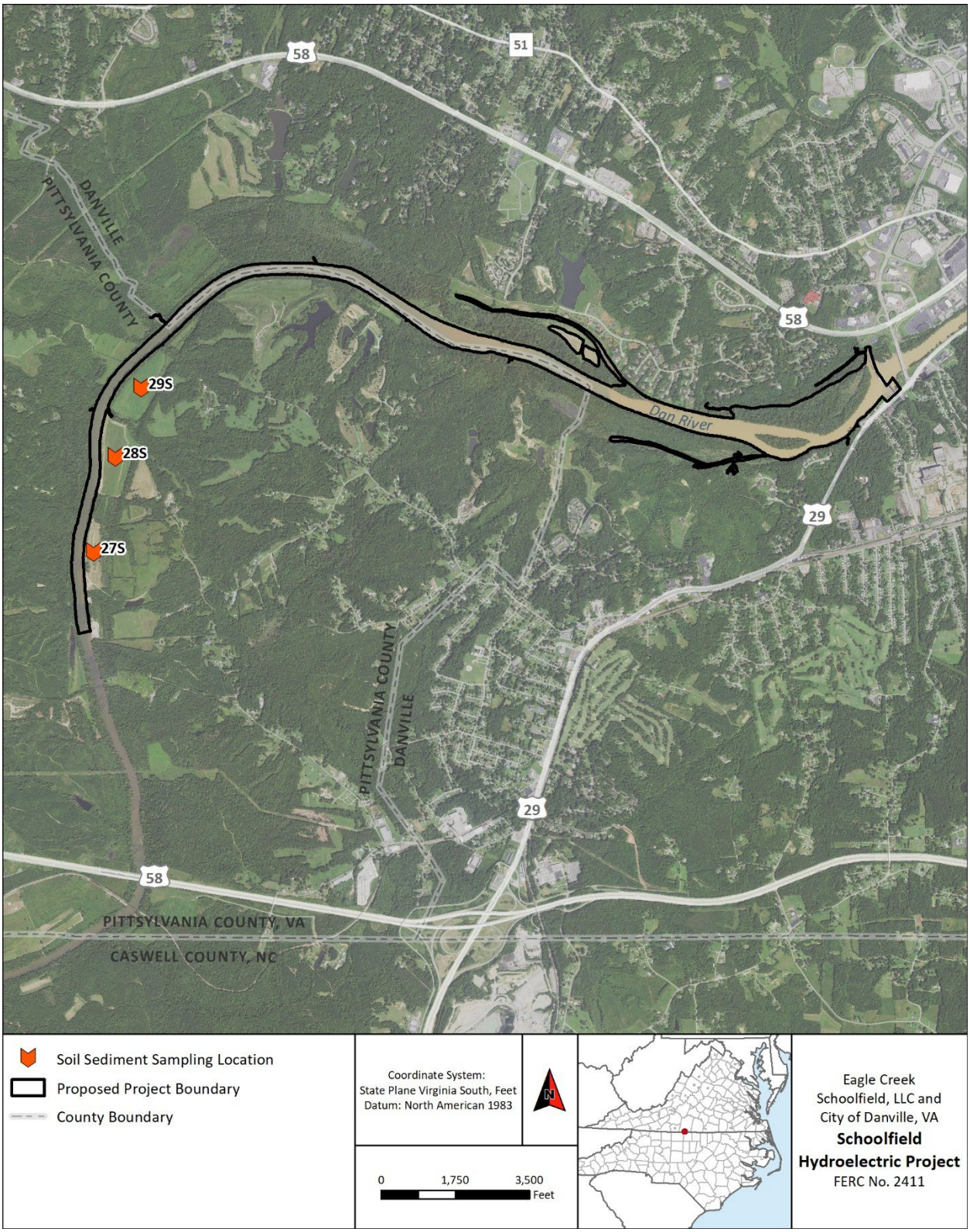


Figure 2.2-2. Soil sediment sampling locations.

2.3 Geology and Soils Resources Study Requests and Results

The co-Licensees did not receive any study requests pertaining to geology and soil resources.

2.4 Proposed Protection, Mitigation, and Enhancement Measures for Geology and Soil Resources

The co-Licensees propose to continue to operate the Project in a run-of-river mode, with outflow from the Project approximating inflow, as well as continue to provide the continuous year-round minimum flow of 300 cfs or inflow, whichever is less downstream of the Project. The co-Licensees do not propose any other protection, mitigation, and/or enhancement measures (PME) for geology and soil resources. No resource agency or other entity has proposed any PME for geology and soil resources at this time.

2.5 Description of Continuing Impacts on Geology and Soils Resources by Continued Project Operation

2.5.1 Operations and Maintenance Activity

Soil instability in the Project area is not a concern, likely due to well-established riparian and upland vegetation and the low to moderate susceptibility of the soils in the Project area to erosion by water. For instance, as part of the various environmental resource studies that Duke Energy funded because of the 2014 coal ash spill from their Dan River Steam Station, Alderman Environmental Services (2014) determined that the shoreline and banks in the vicinity of the Project are very stable. Coupled with stable shoreline, existing run-of-river operation limits large water surface elevation fluctuation, which protects the reservoir shoreline from erosion. Therefore, effects on geology and soils of continued Project operation would reflect the existing condition because the co-Licensees are not proposing changes in how the Project is operated. The co-Licensees are not proposing any activities, such as construction requiring ground disturbance, at this time that would adversely impact geology and soils resources in the Project area.

3 WATER RESOURCES

3.1 Water Quantity

The Schoolfield Hydroelectric Project is located on the Dan River at approximately river mile (RM) 60.1 near the City of Danville, Virginia (Figure 1-1).[8] The headwaters of the Dan River originate on the eastern slopes of the Blue Ridge Mountains in Patrick County, Virginia. From its headwaters, the river flows in a general eastward direction approximately 210 river miles, traversing both the Blue Ridge and Piedmont physiographic provinces, to its terminus at the Kerr Reservoir, near South Boston, Virginia. The Project receives most of it flow from the Dan River upstream of the Project as well as several unnamed perennial and intermittent stream (Figure 3.1-1).

Approximately 5.2 river miles downstream of the Project, the USGS operates a streamflow gage, on the Dan River (USGS Gage No. 02075045 Dan River at STP near Danville, VA), that records gage elevation and streamflow. The gage has a drainage area of 2,116 square miles. The gage has a period of record from October 19, 1995 to present for discharge, and October 1, 2007 to present for gage height. Table 3.1-1 provides average, median, maximum, and minimum annual and monthly flows of the Dan River at the Project dam from January 1, 1996 through December 31, 2020 prorated by 0.90 to account for the intervening drainage between the gage and the Project dam.[9] From January 1996 through December 2020, the monthly average flows at the Project ranged from 1,276 to 2,714 cfs. For the same period, the monthly median flows at the Project ranged from 893 to 2,309 cfs. Over the period of record analyzed, the average annual flow was 2,102 cfs, and the instantaneous peak flow was 45,270 cfs. Typically, December through May have the highest average flows whereas August through November exhibit the lowest flows (Figure 3.1-2). Figures 3.1-3 through 3.1-6 present monthly flow duration curves for the Dan River at the Project dam.

The 7-day average low flow, with a 10-year recurrence interval (7Q10) is a statistical measure of the magnitude and frequency of low flow in a stream or river. According to Austin et al. (2011), the 7Q10 flow at the USGS Gage No. 02075045 Dan River at STP near Danville, VA gage is 265 cfs. [10] Prorated to account for the area of the intervening drainage between the Project dam and gage, the 7Q10 flow at the Project dam would be 239 cfs. A flow of this magnitude is equaled or exceed approximately 99% of the time (Figure 3.1-7).

The Project dam impounds the Dan River that creates a reservoir that has a surface area of approximately 287 acres and a gross storage capacity 1,952 acre-ft at a normal water surface elevation of 437.7 feet NGVD 29. At an average annual inflow of 2,102 cfs about 4,206 acre-ft of water passes the Project daily. Because the Project is operated in run-of-river mode, the Project reservoir is likely a steady-state system. Therefore, the residence time of water within the reservoir can be estimated as the volume of the reservoir divided by inflow or outflow rate. Therefore, at the mean annual flow, the residence time is approximately 10.6 hours.

[8] River mile as calculated from the mouth of the Dan River.
[9] The intervening drainage between the USGS gage and the Project dam is 216 square miles and represents approximately 10% of the total drainage area upstream of the gage.
[10] Based on Log-Pearson Type III distribution to calculate the 7Q10 flow.

Table 3.1-1. Average, median, maximum, and minimum flows estimated at the Project based on flows measured at the USGS Gage No. 02075045, Dan River at STP near Danville, VA, from January 1, 1996 through December 31, 2020.[1]

Month	Flow (cfs)			
	Mean	Median	Maximum	Minimum
January	2,610	1,692	31,860	410
February	2,714	1,778	37,440	464
March	2,578	2,016	33,390	470
April	2,695	2,039	32,670	499
May	2,538	1,800	36,900	518
June	1,911	1,364	15,390	234
July	1,276	1,044	15,390	153
August	1,337	963	20,070	94
September	1,692	893	37,350	154
October	1,590	927	39,690	184
November	1,907	1,035	34,830	308
December	2,369	1,548	27,630	385
Average Annual	2,102	1,386	39,690	94

1. Flow statistics based on a period of record of 15-minute data from January 1, 1996 through December 31, 2020.
2. Based on calendar years 1996 through 2020.

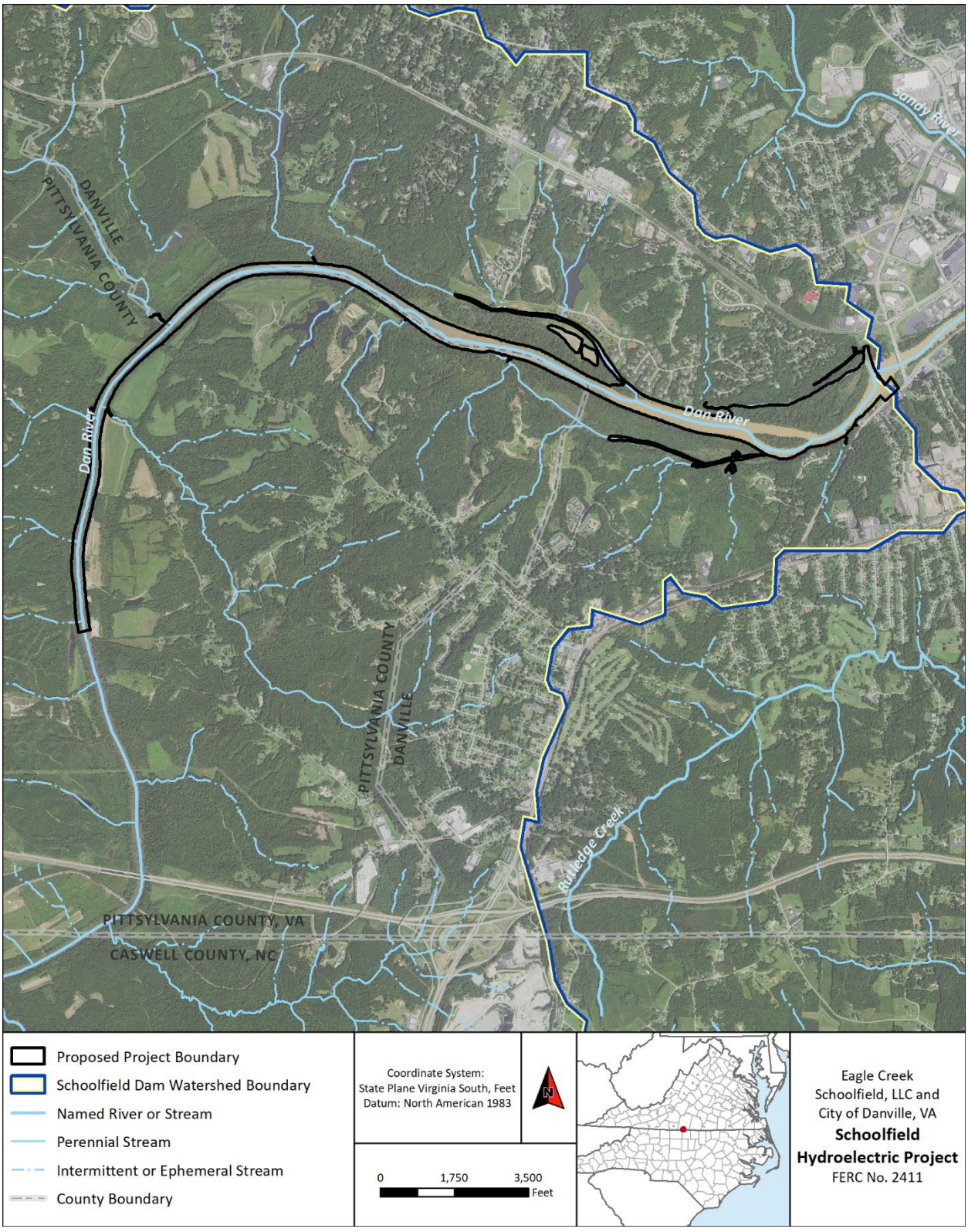
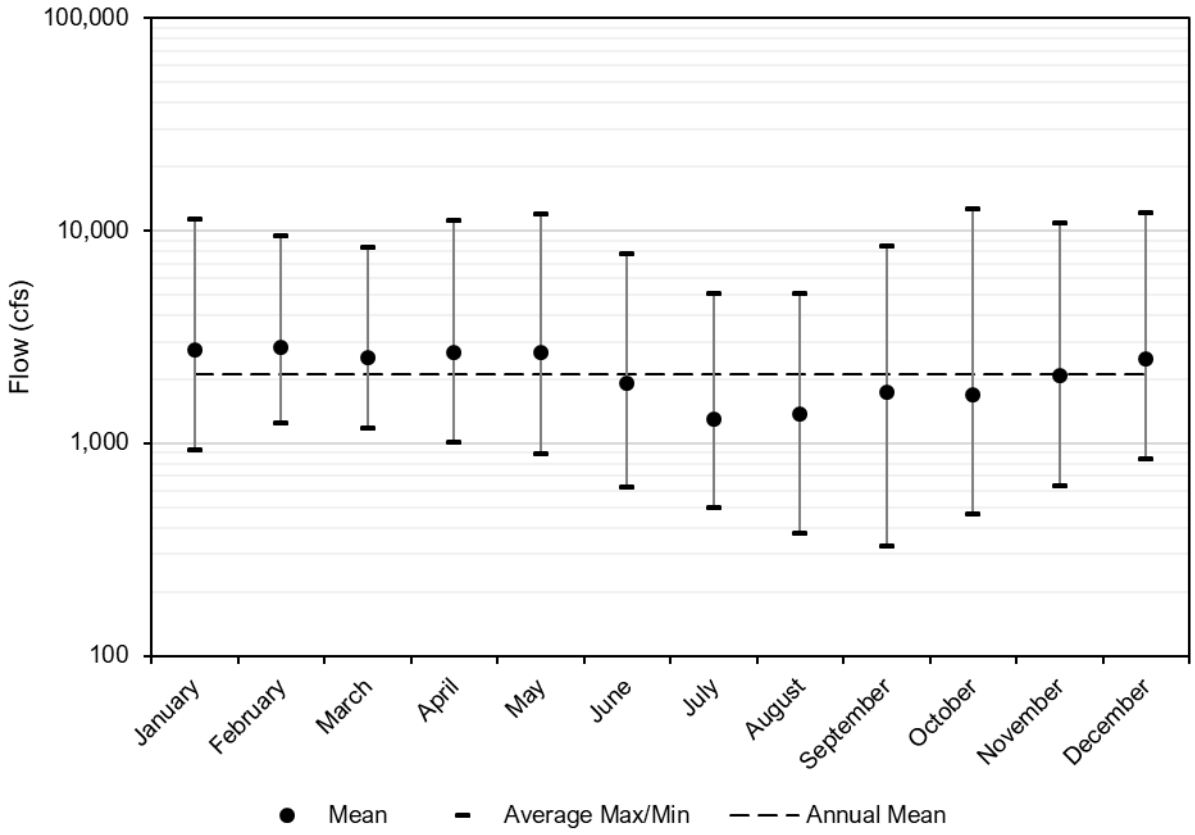


Figure 3.1-1. Waterbodies that contribute inflow to the Project area.



Note: Flow analysis is based on a period of record of 15-minute data from January 1, 1996 through December 31, 2020 from USGS Gage No. 02075045, Dan River at STP near Danville, VA.

Figure 3.1-2. Dan River monthly flow pattern at the Project dam.

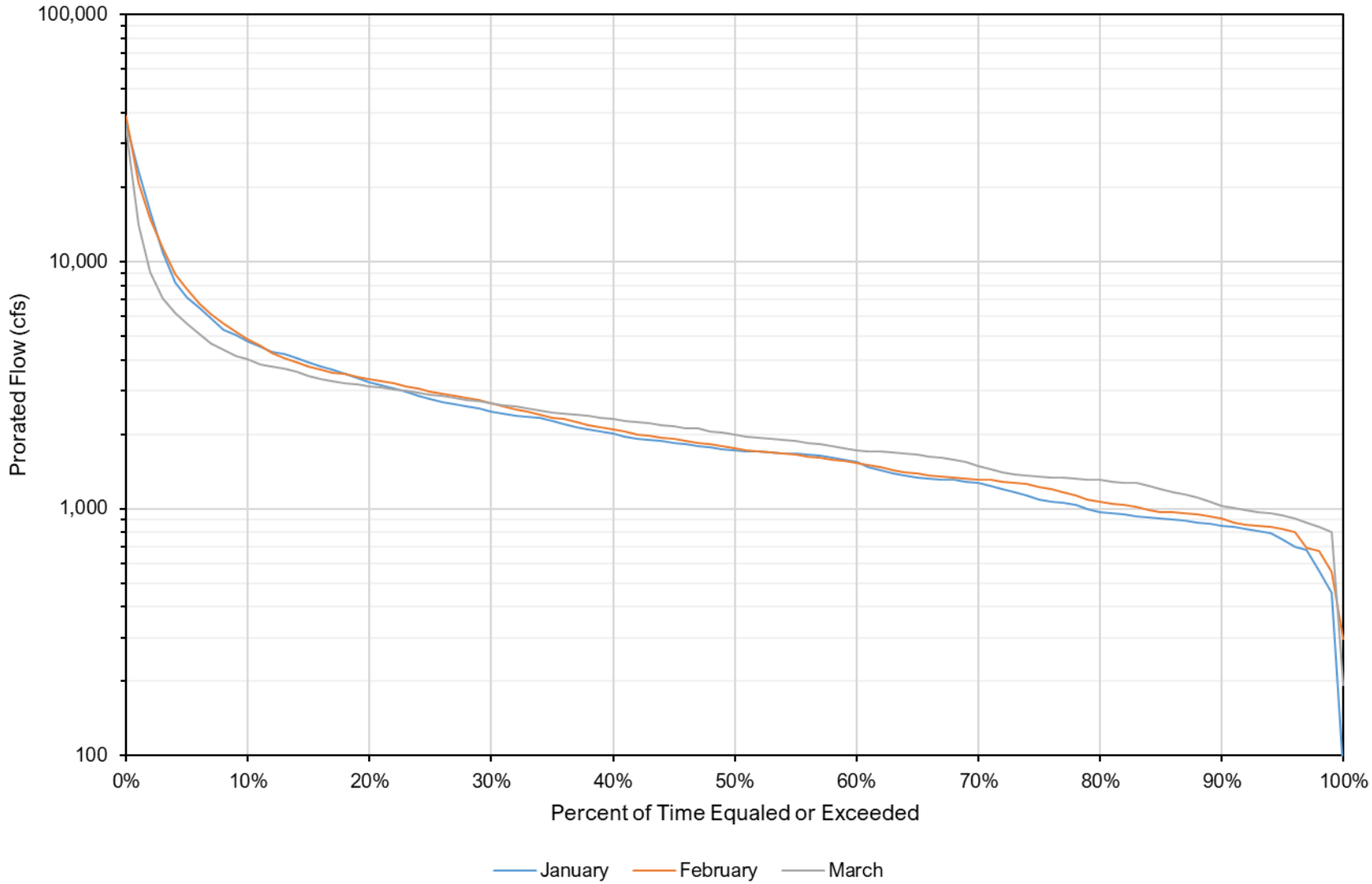


Figure 3.1-3. Flow duration curves of the Dan River at the Project dam for January, February, and March (January 1996 – December 2020).

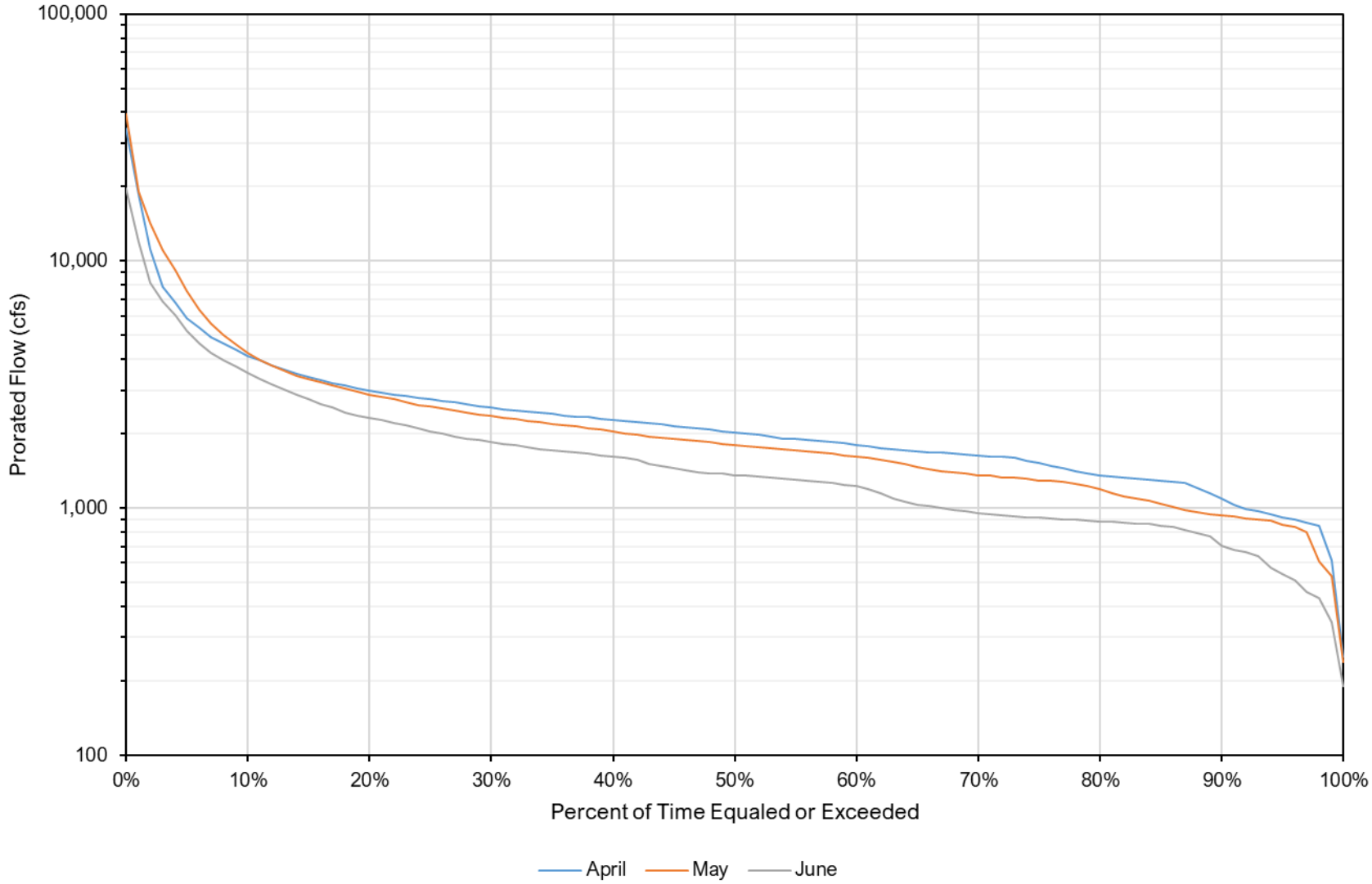


Figure 3.1-4. Flow duration curves of the Dan River at the Project dam for April, May, and June (January 1996 – December 2020).

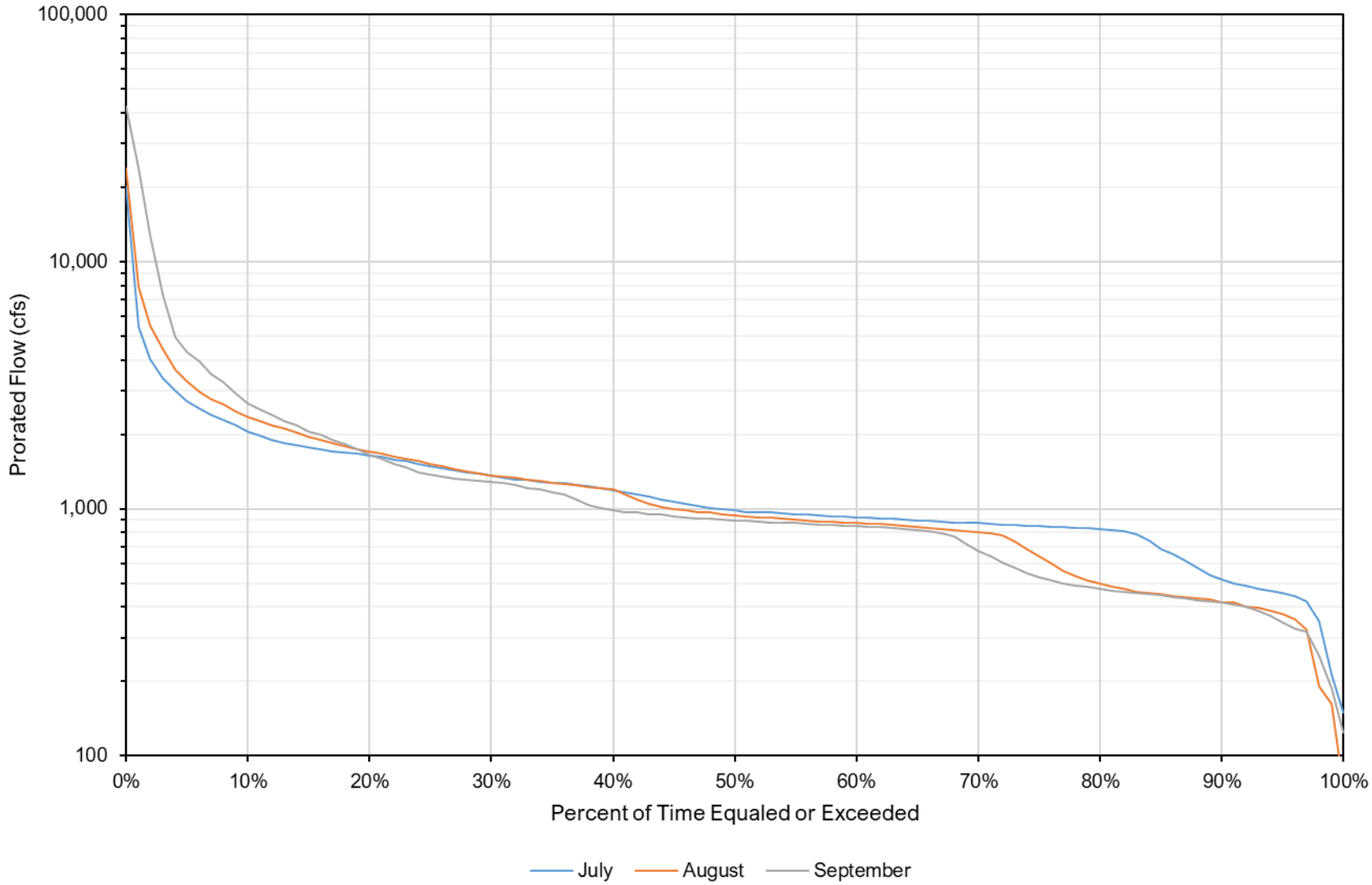


Figure 3.1-5. Flow duration curves of the Dan River at the Project dam for July, August, and September (January 1996 – December 2020).

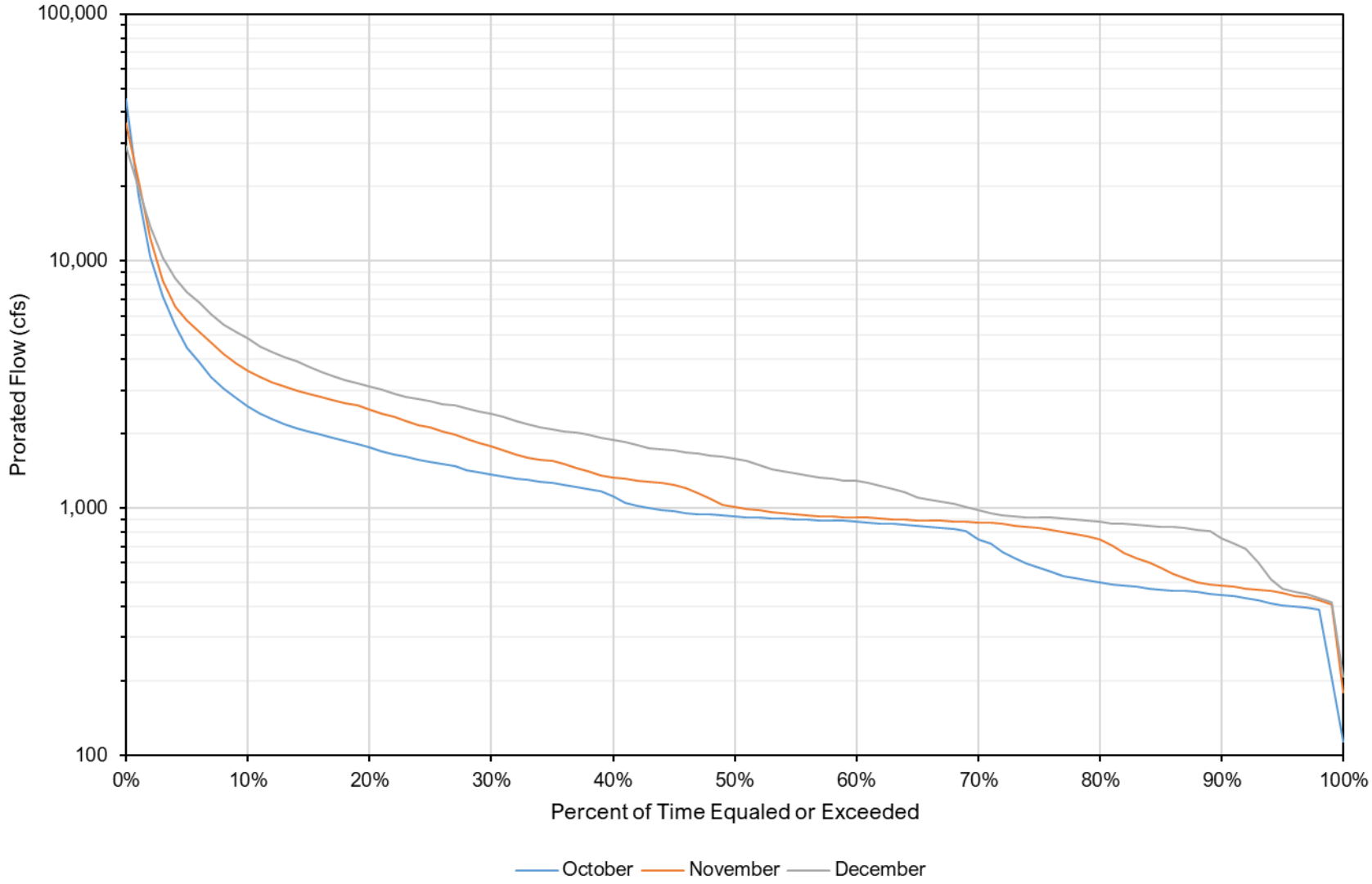


Figure 3.1-6. Flow duration curves of the Dan River at the Project dam for October, November, and December (January 1996 – December 2020).

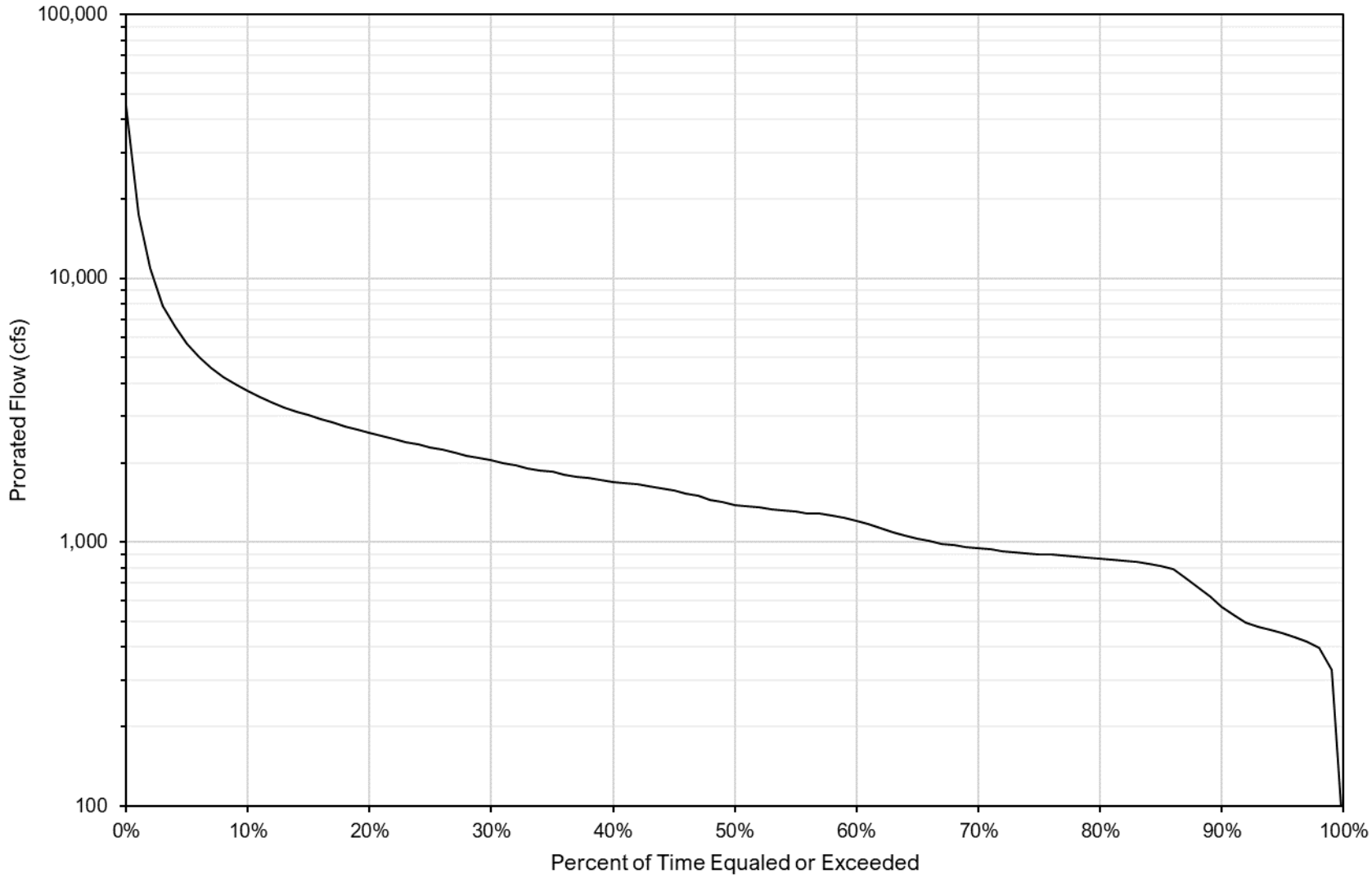


Figure 3.1-7. Flow duration curve of the Dan River at the Project dam based on 15-minute flow measurements from January 1, 1996 through December 31, 2020.

3.2 Water Use

Project waters are used for hydroelectric generation, municipal water supply and public recreation. Future population estimates by the Virginia Employment Commission show a minimal population increase in the Project area is expected over the next 20 years (2010-2030) (City of Danville, n.d.). In addition, the City of Danville has not faced significant pressure to develop lands with more limited access to public water and sewer (City of Danville, n.d.). Therefore, the need to expand access to public water and sewer is minimal. The co-Licensees do not expect existing uses of Project waters to substantially change over the next license term. Furthermore, the co-Licensees are unaware of other future water uses upstream of downstream of the Project.

3.2.1 Water Discharges and Withdrawals

Section 402 of the Clean Water Act established the National Pollutant Discharge Elimination System (NPDES) program to limit pollutant discharges into streams, rivers, and bays. In the Commonwealth of Virginia, VDEQ administers the program as the Virginia Pollutant Discharge Elimination System (VPDES), and in North Carolina NCDEQ administers the North Carolina Pollutant Discharge Elimination System permitting. Both NCDEQ and VDEQ issue permits for all point source discharges to surface waters. Both agencies issue two types of permits: individual and general permits. Individual permits are issued to both municipal and industrial facilities on a case-by-case basis. Individual permit requirements include special conditions, effluent limitations and monitoring requirements for each facility on a site-specific basis in order to meet applicable water quality standards. Examples of individual permits are those issued to wastewater and sewage treatment facilities. General permits are permits written for a general class of dischargers, which include single family home septic, seafood processing, petroleum contaminated sites and hydrostatic tests, stormwater discharge, non-metallic mineral mining, animal feed operations, concrete facilities, vehicle wash and laundry, non-contact cooling water, pesticides, nutrient trading, and potable water treatment. The EPA maintains authority to review applications and permits for "major" dischargers, a distinction based on discharge quantity and content.

VDEQ maintains a list of individual and general permit holders as well as provides an online interactive map that shows the outfall locations of each individual and general permit (http://www.deq.virginia.gov). Similarly, NCDEQ also maintains a list of permittees at https://deq.nc.gov. Figure 3.2.1-1 shows the location of active VPDES and NCPDES individuals permits in the Dan River watershed upstream of the Project dam. The nearest individual permit facility upstream of the Project is the Duke Energy's Dan River Steam Station in Eden, NC (NCPDES Permit No. NC0003468), which is approximately 24 river miles upstream of the Project dam. The Dan River Steam Station is authorized to discharge cooling water, filtered plant effluent, ash basin discharge, and overflow from yard sumps.

Water of the Project reservoir serves as the City of Danville's municipal water supply. The water supply intake is located approximately 440 feet upstream of the Project powerhouse. Currently, the City of Danville typically withdraws, on average, 8.0 mgd from the Project reservoir, and is authorized to withdraw up to 18 mgd. To protect the water supply intake, the Project operates in run-of-river mode, as required by license article 402. In addition, the City of Danville inspects the water supply intake infrequently and on an as needed basis (the last inspection took place in 2016), which requires the reservoir to be lowered. License article 403 requires a 24-hour average

minimum flow of 440 cfs through the Project during reservoir refilling following inspection to protect aquatic resources. The water supply intake inspections occur approximately every 5 years. During the inspection, the reservoir is drawn down to an elevation of approximately 423 feet NGVD 29 over the course of approximately 3 hours. The inspection activities take approximately 3 hours, and the reservoir refill takes approximately 4 hours. There are no other known water withdrawals from the Project reservoir. There is, however, an active sand mining operation performed under VPDES General Permit No. VAG840219 issued to the Adams Construction Company (Figure 3.2.1-1). Within the reservoir, sand mining in principally done 4.3 river miles upstream of the Project reservoir.

3.2.2 Hydropower

In addition to the Project, there is one other operating FERC-licensed hydroelectric project on the Dan River mainstem, the Pinnacles Hydroelectric Project (FERC No.10896). The Pinnacles Hydroelectric Project consists of two developments: Townes and Talbott, both of which are peaking facilities. Peaking flows from the Pinnacles Project, however, are largely attenuated by the time the flow pulses reach the USGS flow gage near Wentworth, NC (USGS 02071000 Dan River near Wentworth, NC). However, peaking flows from two hydroelectric projects located on the Smith River, the U.S. Army Corp's Philpott Dam Hydroelectric Project and the City of Martinsville, Virginia's Martinsville Hydroelectric Project, [11] affect inflow into the Project. Figure 3.2.2-1 shows the locations of the hydroelectric projects discussed above.

[11] The Martinsville Hydroelectric Project is a hydroelectric project that is not regulated by FERC.

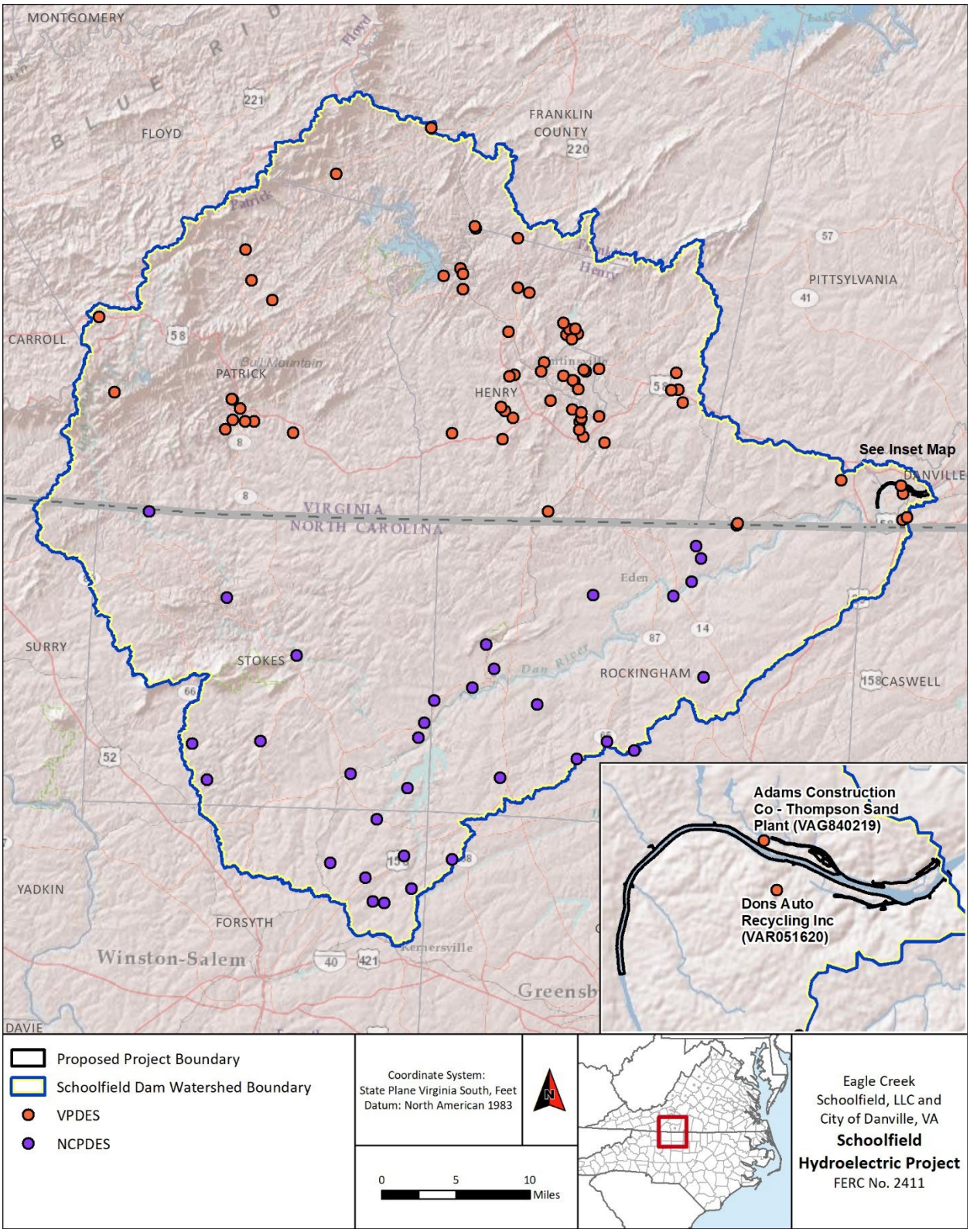


Figure 3.2.1-1. Active VPDES and NCPDES permittees in the Dan River basin upstream of the Project.

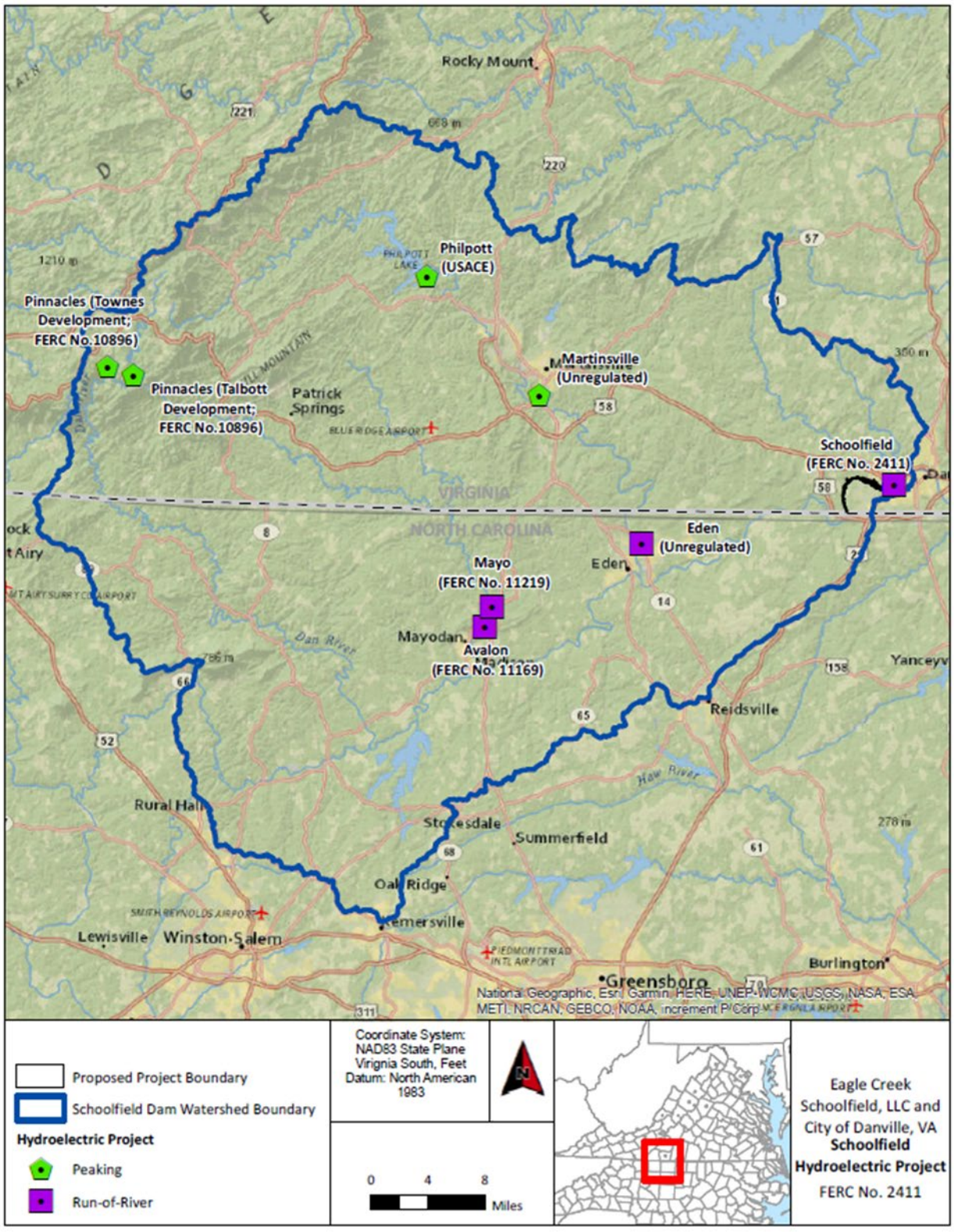


Figure 3.2.2-1. Hydroelectric projects upriver of the Project.

3.3 Water Quality

3.3.1 Water Quality Standards

The State Water Control Law mandates the protection of existing high-quality state waters and provides for the restoration of all other state waters so they will permit reasonable public uses and will support the growth of aquatic life. The adoption of water quality standards under Section 62.1-44.15(3a) of the law is one of the State Water Control Board's methods of accomplishing the law's purpose. Water quality standards consist of statements that describe water quality requirements. They also contain numeric limits for specific physical, chemical, biological or radiological characteristics of water. These statements and numeric limits describe water quality necessary to meet and maintain uses such as swimming and other water-based recreation, public water supply, and the propagation and growth of aquatic life. Standards include general and specific descriptions because not all requirements for water quality protection can be numerically defined.

The reach of the Dan River upstream and downstream of the Project is classified as Section 3a, Class III (Nontidal Waters Coastal and Piedmont Zones), under the Virginia Water Quality Standards 9 VAC 25-260-450 (Commonwealth of Virginia, 2019). These reaches in the vicinity of the Project include the Dan River mainstem from its confluence with the Sandy River upstream to the Virginia-North Carolina state line. All state waters, including wetlands, are designated for the following uses: recreational uses (e.g., swimming and boating), the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources (e.g., fish and shellfish). Numeric and descriptive water quality standards associated with non-tidal waters are included in Table 3.3.1-1.

3.3.2 Historic and Existing Water Quality Data

Water quality of the Dan River has been monitored by VDEQ, USGS, EPA, and other entities since the Project was licensed. Below is a summary of the existing water quality data collected by the various entities in the Project vicinity on the Dan River since the previous license issuance.

Instantaneous Monitoring

VDEQ maintains a water quality monitoring station on the Dan River approximately 6.2 river miles upstream of the Project, near the U.S. Route 58 Bypass Bridge. VDEQ also maintains a monitoring station within the Project reservoir at the City of Danville's water supply intake, located approximately 0.1 river miles upstream of the Project powerhouse. Approximately 5.2 river miles downstream of the Project, VDEQ also maintains a monitoring station near the USGS Dan River at STP near Danville, VA gage (USGS Gage No. 02075045). Collectively, these monitoring stations encompass the entire Project area. Figure 3.3.2-1 and Table 3.3.2-1 provide the location and period of record of water quality data available at these locations.

Table 3.3.2-2 summarizes the available water quality data from 2007 through 2018 for the three VDEQ monitoring stations that encompass the Project. Over the past ten years, 44 different parameters have been collected or measured in the Dan River in the vicinity of the Project. These

include various metals, organics, nutrients, solids, and other chemical and physical properties. These data indicate that water temperatures, dissolved oxygen concentrations, and pH level in the Project area range from 2.0 to 29.2°C, 7.3 to 15.1 mg/L, and 5.9 to 8.6 respectively. Furthermore, between the three stations, mean water temperature, dissolved oxygen, and pH levels range from 14.4 to 17.7°C, 8.9 to 11.1 mg/L mg/L, and 6.9 to 7.7, respectively. These data collected by VDEQ indicate waters of the Dan River in the vicinity of the Project are generally consistent with the water temperature, dissolved oxygen, and pH state surface water quality standards for non-tidal waters (see section 3.3.1, Water Quality Standards). Of note is the intensive and robust sampling for metals that was performed at station 21VASWCB-4ADAN059.97, upstream of the Project dam near the City of Danville's water supply intake in response to the coal ash spill at Duke Energy's Dan River Steam Station in February 2014. Within the Schoolfield reservoir, sediment was also sampled and analyzed for metals, which is discussed below in Sediment Dredging and Sampling.

Continuous Monitoring

The USGS continuously monitored water temperature (°C) and specific conductivity (µS/cm) daily at the USGS Dan River at STP near Danville, VA gage (USGS Gage No. 02075045) downstream of the Project starting in mid-February of 2006 through mid-February 2009. The continuous water temperature data demonstrates seasonal warming and cooling of the Dan River in the vicinity of the Project (Figure 3.3.2-2). The warmest average water temperatures are observed in July and August whereas the coolest occur in January (Figure 3.3.2-2; Table 3.3.2-3). Specific conductivity in the vicinity of the Project appears to be variable, but values are typically between 50 and 200 µS/cm with monthly averages ranging between 105 to 221 µS/cm (Figure 3.3.2-2; Table 3.3.2-3).

Sediment Dredging and Sampling

In response to the coal ash spill at Duke Energy's Dan River Steam Station on February 2, 2014, Duke Energy removed approximately 4,000 cubic yards of sediment from the Dan River (EPA, 2015). The areas where sediment was removed that had accumulated because of the spill included: forebay of Schoolfield Dam, near the City of Danville's water supply intake facility within the Project reservoir, at the Town Creek Sand Bar, and at South Boston's Water Treatment Facility. The sediment removal was performed as part of an Administrative Order on Consent between the EPA and Duke Energy and was completed in July 2014. Water quality and sediment sampling was performed following the sediment removal and indicated no exceedances of human health or ecological screening thresholds were observed; therefore, there is no further sediment removal planned (EPA, 2015).

Since the Duke Energy coal ash spill in February of 2014, the VDEQ has intermittently sampled sediment of Dan River within the Project reservoir for metals from 2014 to 2018 at the City of Danville's water supply intake. Table 3.3.2-4 presents summary statistics of the concentration of metals within the sediment samples collected within the Project reservoir. These data indicate that metal concentrations of sediment within the Project reservoir from the most recent sampling performed by VDEQ are below both EPA and VDEQ screening levels for risk assessment.

Duke Energy (2019) also sampled and analyzed sediments of the Project reservoir for trace elements to assess effects of the coal ash spill. From 2015 through 2017, the Project reservoir was

sampled six times per year for fifteen trace elements.[12] According to Duke Energy (2019), the primary indicators of sediment contaminations from the coal ash spill would be elevated levels of arsenic and selenium. However, over the three years of sampling, no sample produced arsenic levels greater than the ecological screening value of 9.8 µg/g wet weight, and or selenium levels greater than the ecological screening value of 2.0 µg/g wet weight within the Project reservoir. Table 3.3.2-5 presents results of Duke Energy (2019) sediment sampling for metals within the Project reservoir.

3.3.3 Clean Water Act, Section 303(d) Listing of Impaired Waters, and Section 305(d) Assessment and Reporting

Under section 303(d) of the CWA, and in adherence with federal water quality planning and management regulations (40 C.F.R. Part 130), all states are required to develop lists of impaired waters, commonly referred to as the 303(d) list. The list includes lakes, ponds, rivers, and streams whose water quality does not meet state-defined water quality standards. Each state's list must be updated every two years and submitted to the United States Environmental Protection Agency (EPA) for approval. The CWA requires a Total Maximum Daily Load plan (TMDL) to be developed for waters on the list and to provide a schedule for TMDL completion. A TMDL is a regulatory term of the CWA that describes a plan for bringing impaired waters into compliance with approved water quality standards and designated uses. TMDLs specify the maximum amount of a pollutant a waterbody can receive while still attaining the approved water quality standards and designated uses.

VDEQ is responsible for water monitoring, water quality assessments, and water regulations of the Commonwealth. VDEQ, based on EPA guidance, created a categorical classification to determine whether a water body or water body segment attain all water quality standards and applicable designated uses. Each water body or water body segment may be listed in one of five categories with associated subcategories.

Section 305(b) of the CWA directs states to periodically prepare a report that provides the water quality assessment results in a state. The most recent report for the Commonwealth of Virginia is the final 2020 Water Quality Assessment Integrated Report, which provides the results of Virginia's water quality assessments during the period January 1, 2013, through December 31, 2018, and describes the extensive efforts to monitor, assess, and improve water quality in the waters of the Commonwealth (VDH, VDEQ and VDCR, 2020).

Near the Project, there are three surface water body assessment units that encompass Project waters (Figure 3.3.3-1). Assessment Unit ID VAW-L57R_DAN03A00 extends 4.2 river from the Virginia-North Carolina state line to the impounded backwaters of Schoolfield Dam. The second assessment unit is VAW-L57R_DAN02A00 and extends 2.5 from the backwaters of the Schoolfield Dam impoundment to the Schoolfield Dam. The third assessment unit is VAW-L57R_DAN01A00 and extends 1.2 river miles from Schoolfield Dam downstream to the Dan River's confluence with the Sandy River, which in relation to Project-affected reaches includes the tailrace and the Dan River immediately below the Schoolfield Dam.

[12] Duke Energy (2019) did not list or present results for all constituents analyzed in the sediments sampled. Duke Energy (2019) only reported results for aluminum, barium, manganese, arsenic, and selenium.

The three assessment units of the Dan River that encompass the Project from upstream to downstream are all listed as Category 5A[13]. Assessment unit VAW-L57R_DAN03A00 was previously listed as Category 2A[14] in the 2018 draft Water Quality Assessment Integrated Report, but since been listed as Category 5A because of mercury in fish tissue (VDH, VDEQ and VDCR, 2020). Assessment unit VAW-L57R_DAN02A00 that is listed as Category 5A fully supports aquatic life, is impaired for fish consumption due to mercury in fish tissue, and fully supports wildlife and recreation designated uses. The assessment unit downstream of the Schoolfield Dam (VAW-L57R_DAN01A00) is listed as Category 5A because mercury and PCB in fish tissue impairs the fish consumption designated use. (VDH, VDEQ and VDCR, 2020).

The impairment in assessment unit VAW-L57R_DAN03A00 is due to two species that exceeded the mercury water quality standard-based tissue value of 0.3 ppm: Largemouth Bass (1 fish) at 0.49 ppm, (1 fish) at 0.39 ppm, and (1 fish) at 0.39 ppm; and Quillback Carpsucker (1 fish) at 0.46 ppm. Exceedance of the mercury water quality standard-based tissue value of 0.3 ppm and the Virginia Department of Health screening value of 0.5 ppm was found in one species from 2018 collections: Largemouth Bass (2 fish) at 0.61 ppm. One species exceeded the mercury water quality standard-based tissue value of 0.3 ppm: Largemouth Bass (3 fish) at 0.32 ppm, (3 fish) at 0.34 ppm (VDH, VDEQ and VDCR, 2020). The fish consumption use impairment in assessment unit VAW-L57R_DAN02A00 is based on elevated levels of mercury in fish tissue from smallmouth and largemouth bass collected in 2016 that exceeded 0.3 ppm (VDEQ, 2019). The source of the elevated levels of mercury in assessment unit VAW-L57R_DAN02A00 is unknown. Similarly, assessment unit VAW-L57R_DAN01A00 is also impaired for fish consumption because elevated levels of mercury were found in fish tissue in 2016. These tissue samples collected from largemouth bass, walleye, and flathead catfish have elevated levels of mercury that were higher than 0.3 ppm (VDEQ, 2019). The assessment unit is also impaired for fish consumption due to elevated levels of PCBs found in samples of fish tissue collected from the reach in 2007 (one species) and 2015 (four species) (VDEQ, 2019).[15] The source of cause of elevated levels of mercury in PCB tissue in this reach of the Dan River is unknown (VDEQ, 2019).

Total Maximum Daily Load

Assessment unit VAW-L57R_DAN02A00 was listed as impaired for fish consumption in 2018. Although the assessment unit requires a TMDL, VDEQ lists the priority to develop a TMDL for the reach as "low (VDH, VDEQ and VDCR, 2020). Similarly, and although first listed as impaired for fish consumption in 2010, VDEQ lists the priority to develop a TMDL for assessment unit VAW-L57R_DAN01A00 also as "low" (VDH, VDEQ and VDCR, 2020). Assessment unit VAW-L57R_DAN03A00, which was re-categorized as 5A in 2020, also has a "low" priority rating for developing a TMDL (VDH, VDEQ and VDCR, 2020).

[13] Category 5A is defined as meaning a water quality standard is not attained. The water is impaired or threatened for one or more designated uses (excluding shellfish use) by a pollutant(s) and requires a TMDL (303d list).
[14] Category 2 is defined as meaning available data and/or other information indicate that some, but not all of the designated uses are supported.
[15] The specific species that contained elevated levels of PCBs in their tissue were not reported.

Table 3.3.1-1. Applicable water quality standards for non-tidal waters.

Parameter	Administrative Code	Criteria
General Criteria	9VAC25-260-20	State waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life. Specific substances to be controlled include, but are not limited to: floating debris, oil, scum, and other floating materials; toxic substances (including those which bioaccumulate); substances that produce color, tastes, turbidity, odors, or settle to form sludge deposits; and substances which nourish undesirable or nuisance aquatic plant life. Effluents which tend to raise the temperature of the receiving water will also be controlled. Conditions within mixing zones established according to 9VAC25-260-20 B do not violate the provisions of this subsection.
Streamflow	9VAC25-260-40	Man-made alterations in stream flow shall not contravene designated uses including protection of the propagation and growth of aquatic life.
Dissolved Oxygen	9VAC25-260-50	Instantaneous minimum not less than 4.0 mg/L Daily average not less than 5.0 mg/L
pH	9VAC25-260-50	No less than 6.0 and not greater than 9.0
Water Temperature	9VAC25-260-50	Maximum not to exceed 32°C
	9VAC25-260-60	Any rise above natural temperature shall not exceed 3°C except in the case of Class VI waters (natural trout waters), where it shall not exceed 1°C. However, the Board can, on a case-by-case basis, impose a more stringent limit on the rise above natural temperature. Natural temperature is defined as that temperature of a body of water (measured as the arithmetic average over one hour) due solely to natural conditions without the influence of any point-source discharge.
	9VAC25-260-70	The maximum hourly temperature change shall not exceed 2°C, except in the case of Class VI waters (natural trout waters) where it shall not exceed 0.5°C. These criteria shall apply beyond the boundaries of mixing zones and are in addition to temperature changes caused by natural conditions.
Bacteria	9VAC25-260-170	*E. coli* bacteria shall not exceed a monthly geometric mean of 126 CFU/100 ml in freshwater. If there are insufficient data to calculate monthly geometric means in freshwater, no more than 10% of the total samples in the assessment period shall exceed 235 *E. coli* CFU/100 ml. If there are insufficient data to calculate monthly geometric means in transition and saltwater, no more than 10% of the total samples in the assessment period shall exceed enterococci 104 CFU/100 ml.
Methylmercury (Fish Tissue)	9VAC25-260-140	No greater than 0.30 µg/L

Table 3.3.2-1. Project area water quality monitoring stations.

Organization	Station No.	Station Location		Distance from Project Dam	Period of Record
		Latitude	Longitude		
VDEQ	21VASWCB-4ADAN053.40	36.5627	-79.3696	5.2 river miles downstream	2007 to 2021
VDEQ	21VASWCB-4ADAN059.97	36.5759	-79.4339	0.1 river miles upstream	2014 to 2018
VDEQ	21VASWCB-4ADAN066.41	36.544	-79.493	6.2 river miles upstream	2014 to 2015
USGS	USGS Gage No. 02075045	36.5627	-79.3696	5.2 river miles downstream	2006 to 2009

Source: NWQMC (2019).

Table 3.3.2-2. Summary statistics of surface water quality monitoring data collected at stations in the Project area.[1]

Parameter	Units	21VASWCB-4ADAN053.40 (2007-2021)				21VASWCB-4ADAN059.97 (2014-2018)				21VASWCB-4ADAN066.41 (2014-2015)			
		N	Min	Max	Mean	N	Min	Max	Mean	N	Min	Max	Mean
Alkalinity, total	mg/L					40	19.1	29.7	26.1				
Aluminum	µg/L					122	0.09	2120	142.6				
Ammonia	mg/L	5	0.04	0.09	0.05								
Antimony	µg/L					122	0.002	0.500	0.078				
Arsenic	µg/L					122	0.050	0.680	0.249				
Barium	µg/L					122	0.010	31.000	13.629				
Beryllium	µg/L					122	0.010	0.300	0.111				
Biochemical oxygen demand	mg/L					40	0.300	2.700	1.275				
Cadmium	µg/L					122	0.020	0.300	0.092				
Calcium	mg/L					122	0.010	11.900	4.864				
Chloride	mg/L					40	4.030	20.200	8.461				
Chromium	µg/L					122	0.040	3.080	0.447				
Copper	µg/L					122	0.030	2.200	0.592				
Dissolved oxygen (DO)	mg/L	12	7.3	15.1	11.1	4	8.14	9.49	8.9				
Escherichia coli	cfu/ 100ml	24	20	6867	467					13	10	2000	210

Parameter	Units	21VASWCB-4ADAN053.40 (2007-2021)				21VASWCB-4ADAN059.97 (2014-2018)				21VASWCB-4ADAN066.41 (2014-2015)			
		N	Min	Max	Mean	N	Min	Max	Mean	N	Min	Max	Mean
Fecal Coliform	cfu/ 100ml									1	75	75	75
Fixed suspended solids	mg/L					40	2	25	8.68				
Hardness, Ca, Mg	mg/L	5	20	26	22.4								
Hardness, carbonate	mg/L					122	1	49	20.2				
Inorganic nitrogen (nitrate and nitrite)	mg/L	5	0.26	0.44	0.36								
Iron	µg/L					122	1.9	2360.00	283.897				
Lead	µg/L					122	0.01	1.250	0.166				
Magnesium	mg/L					122	0.01	4.640	1.894				
Manganese	µg/L					122	0.02	151.000	26.136				
Mercury	ng/L					122	0.2	46.000	1.435				
Nickel	µg/L					122	0.02	1.470	0.302				
Nitrogen	mg/L	23	0.21	1.6	0.6	25	0.3	0.7	0.4	15	0.1	1.3	0.5
pH	None	23	6.7	8.6	7.7	80	5.9	8.5	6.9	12	7.1	7.8	7.5
Phosphorus	mg/L	24	0.01	0.42	0.1	26	0.0	0.1	0.0	15	0.0	0.4	0.1
Potassium	mg/L					122	0.01	2.600	1.182				
Selenium	µg/L					122	0.1	1.350	0.373				

Parameter	Units	21VASWCB-4ADAN053.40 (2007-2021)				21VASWCB-4ADAN059.97 (2014-2018)				21VASWCB-4ADAN066.41 (2014-2015)			
		N	Min	Max	Mean	N	Min	Max	Mean	N	Min	Max	Mean
Silver	µg/L					122	0.003	0.100	0.021				
Sodium	mg/L					81	0.004	6.710	3.219				
Specific conductance	µS/cm	24	52.0	128.0	88.6	80	61.0	149.0	92.6	12	55.0	107.0	89.9
Strontium	µg/L					48	31.9	69.800	45.525				
Sulfate	mg/L					40	3.17	7.440	4.954				
Temperature, water	ºC	24	3.7	27.9	17.7	40	2.0	29.2	16.8	12	2.2	27.2	14.4
Thallium	µg/L					122	0.002	0.100	0.014				
Total fixed solids	mg/L					39	41	79.000	59.231				
Total solids	mg/L					79	50	112.00	74.71				
Total suspended solids	mg/L	5	3	12	7.2	40	3	30.000	11.075				
Total volatile solids	mg/L					79	1	50.000	12.101				
Turbidity	NTU	5	6.5	12	9.9	40	3.21	44.300	11.386				

Source: NWQMC (2021)

1. Empty cells indicate no water quality data was collected for the associated parameter.

Table 3.3.2-3. Monthly summary statistics for continuous water temperature and specific conductivity collected at USGS Gage No. 02075045 Dan River at STP near Danville, VA from February 2006 to February 2009.

Month	Water Temperature (ºC)				Specific Conductivity (µS/cm)			
	Minimum	Maximum	Mean	Median	Minimum	Maximum	Mean	Median
Jan	10.9	1.3	5.6	5.3	139	39	105	115
Feb	10.7	2.7	6.5	6.7	138	73	119	122
Mar	18.8	8.2	12.2	11.8	149	47	110	114
Apr	21.6	11.8	16.3	16.2	148	74	109	106
May	27.0	16.9	20.9	20.6	147	70	117	122
Jun	30.4	22.8	27.3	27.2	190	110	145	152
Jul	29.4	24.3	27.1	27.2	367	103	173	151
Aug	31.8	20.5	27.4	28.0	349	95	221	174
Sep	28.0	17.7	23.3	23.4	179	90	127	125
Oct	25.4	9.7	18.1	18.6	179	69	141	147
Nov	14.1	4.7	10.3	11.0	141	92	121	120
Dec	14.3	3.5	7.4	7.1	143	52	111	115

Source: USGS (2019)

Table 3.3.2-4. Results of VDEQ sediment sampling for metals within the Schoolfield Reservoir from 2014 to 2018.

Analyte (mg/kg)	Screening Levels (mg/kg)		2014				2015				2016				2017				2018			
	EPA[1]	VDEQ[2]	N	Min	Max	Mean	N	Min	Max	Mean	N	Min	Max	Mean	N	Min	Max	Mean	N	Min	Max	Mean
Aluminum	-	77,000	11	8,970	38,800	17,643	12	9,020	25,100	16,860	11	12,300	38,200	21,645	4	13,900	27,000	20,550	2	31,800	35,400	33,600
Antimony	2	31[3]	11	0.10	5.00	1.50	12	0.09	0.20	0.15	11	0.04	0.13	0.09	4	0.06	0.15	0.10	2	0.06	0.07	0.07
Arsenic	9.8	35[4]	11	0.56	7.72	3.15	12	1.34	2.92	2.06	11	0.96	3.32	2.01	4	1.34	3.52	2.62	2	2.43	2.74	2.59
Beryllium	-	160	11	0.50	5.00	1.92	12	0.57	1.11	0.83	11	0.50	1.29	0.89	4	0.50	1.18	0.96	2	1.03	1.16	1.10
Cadmium	0.99	-	11	0.02	1.00	0.33	12	0.02	0.42	0.26	11	0.18	0.39	0.26	4	0.17	0.39	0.31	2	0.47	0.67	0.57
Chromium	43.4	-	11	18.30	48.30	29.40	12	24.20	42.40	32.54	11	22.30	39.50	33.92	4	21.80	39.30	34.55	2	43.10	43.40	43.25
Copper	31.6	3,100	11	9.64	32.50	17.23	12	13.00	22.50	17.72	11	9.60	23.90	17.52	4	9.44	22.40	18.61	2	20.00	23.50	21.75
Iron	20000	55,000	11	14,200	35,000	23,073	12	19,100	39,900	26,717	11	15,300	34,900	26,200	4	14,900	31,600	27,175	2	32,500	41,200	36,850
Lead	35.8	4,000	11	7.99	17.50	11.26	12	8.48	17.10	12.92	11	7.01	17.70	12.75	4	7.25	19.20	14.91	2	16.20	19.40	17.80
Manganese	460	1,800[5]	11	189	697	426	12	309	978	488	11	264	803	560	4	336	831	637	2	376	431	404
Mercury	0.18	11[6]	11	0.00	0.10	0.04	12	0.00	0.06	0.02	11	0.01	0.08	0.03	4	0.01	0.06	0.04	2	0.03	0.05	0.04
Nickel	22.7	820[7]	11	7.72	27.60	13.51	12	8.59	16.70	12.67	11	8.59	23.30	14.25	4	8.85	17.10	14.21	2	17.30	17.50	17.40
Selenium	2	390	11	0.30	2.00	0.76	12	0.30	1.35	0.88	11	0.47	1.27	0.78	4	0.44	1.00	0.82	2	1.02	1.18	1.10
Silver	1	390	11	0.20	1.00	0.46	12	0.04	0.20	0.10	11	0.05	0.13	0.08	4	0.06	0.10	0.07	2	0.07	0.20	0.14
Thallium	-	-	11	0.20	5.00	1.56	12	0.17	0.36	0.26	11	0.14	0.38	0.26	4	0.17	0.34	0.29	2	0.37	0.44	0.41
Zinc	121	23,000	11	29.20	68.60	48.14	12	39.40	64.40	52.62	11	30.90	71.00	52.59	4	32.20	67.00	57.00	2	55.30	56.80	56.05

Source: NWQMC (2019)

1. EPA (2006)
2. VDEQ (2018)
3. As Antimony (metallic)
4. As Arsenic (inorganic)
5. As Manganese (non-diet)
6. As Mercury (elemental)
7. As refinery dust

Table 3.3.2-5. Number of sediment samples collected within the Project reservoir from 2015 through 2017 with metal concentrations greater than ecological screening values and the respective range (in parentheses).

Year	Sample Size	Metal				
		Aluminum (3,200 µg/g)	**Arsenic (9.8 µg/g)**	**Barium (60 µg/g)**	**Manganese (460 µg/g)**	**Selenium (2 µg/g)**
2015	3	3 (10,049 – 12,226)	NR	3 (76 – 91)	0 (291 – 322)	NR
2016	3	3 (9,410 – 10,140)	NR	3 (67-83)	0 (330 – 338)	0 (1.46- 1.83)
2017	3	3 (6,795 -7,956)	NR	2 (55 – 62)	0 (182 – 212)	NR

Source: Appendices M, N, O, P QW, and R in Duke Energy (2019).

1. Indicates "Not Reported" in the source.

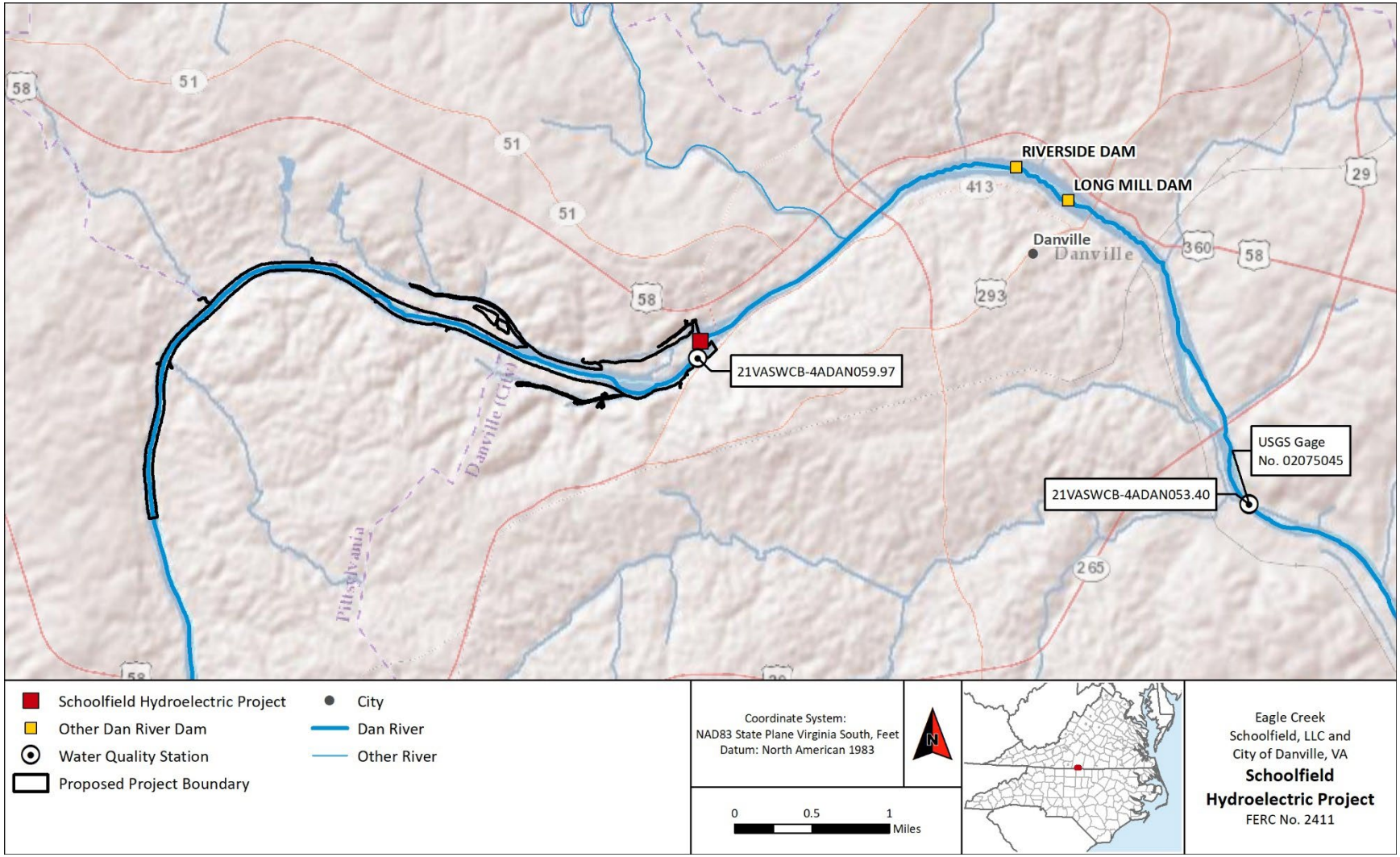


Figure 3.3.2-1. Water quality monitoring locations.

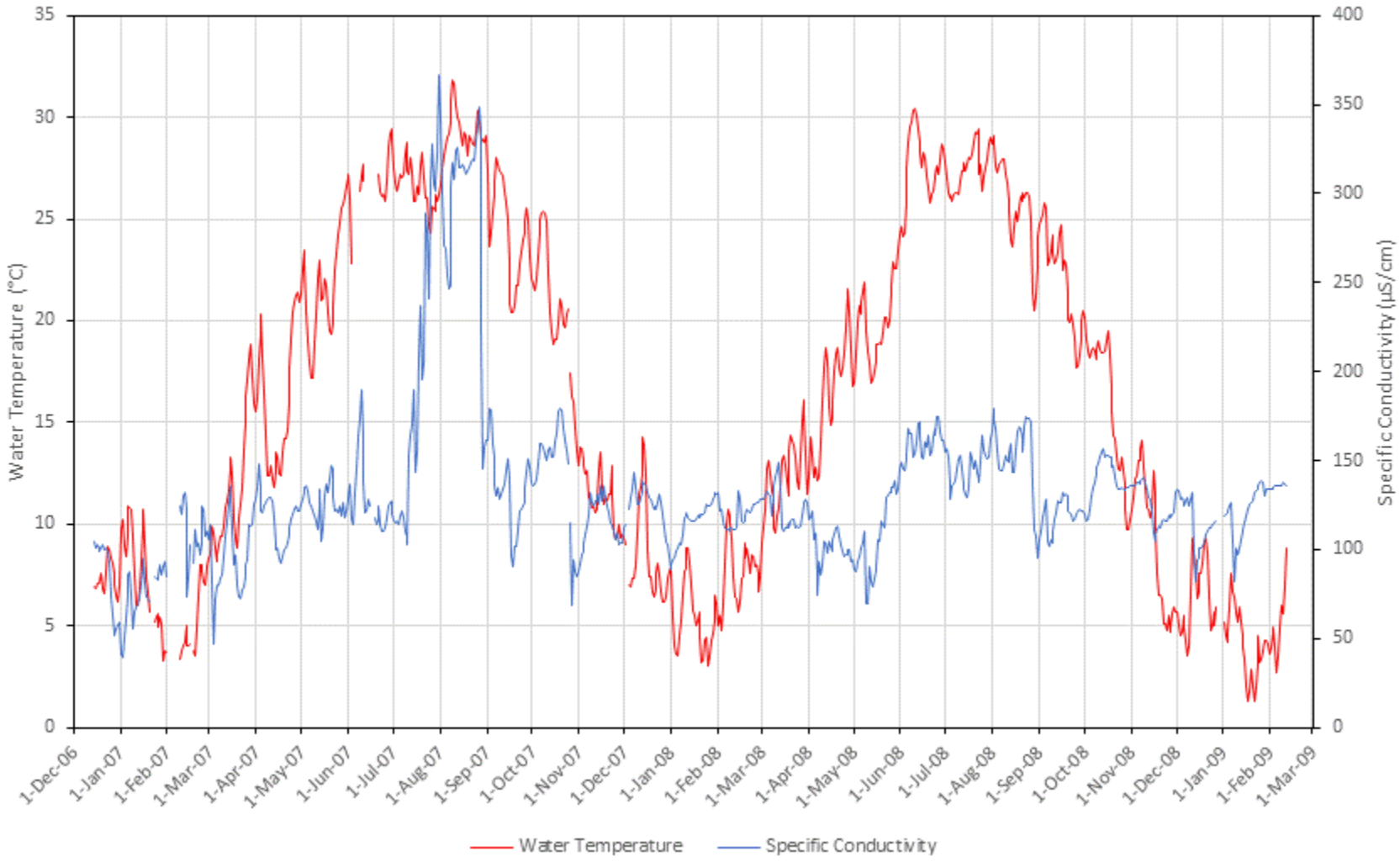


Figure 3.3.2-2. Continuous water temperature and specific conductivity data collected at USGS Gage No. 02075045 Dan River at STP near Danville, VA from February 2006 to February 2009.

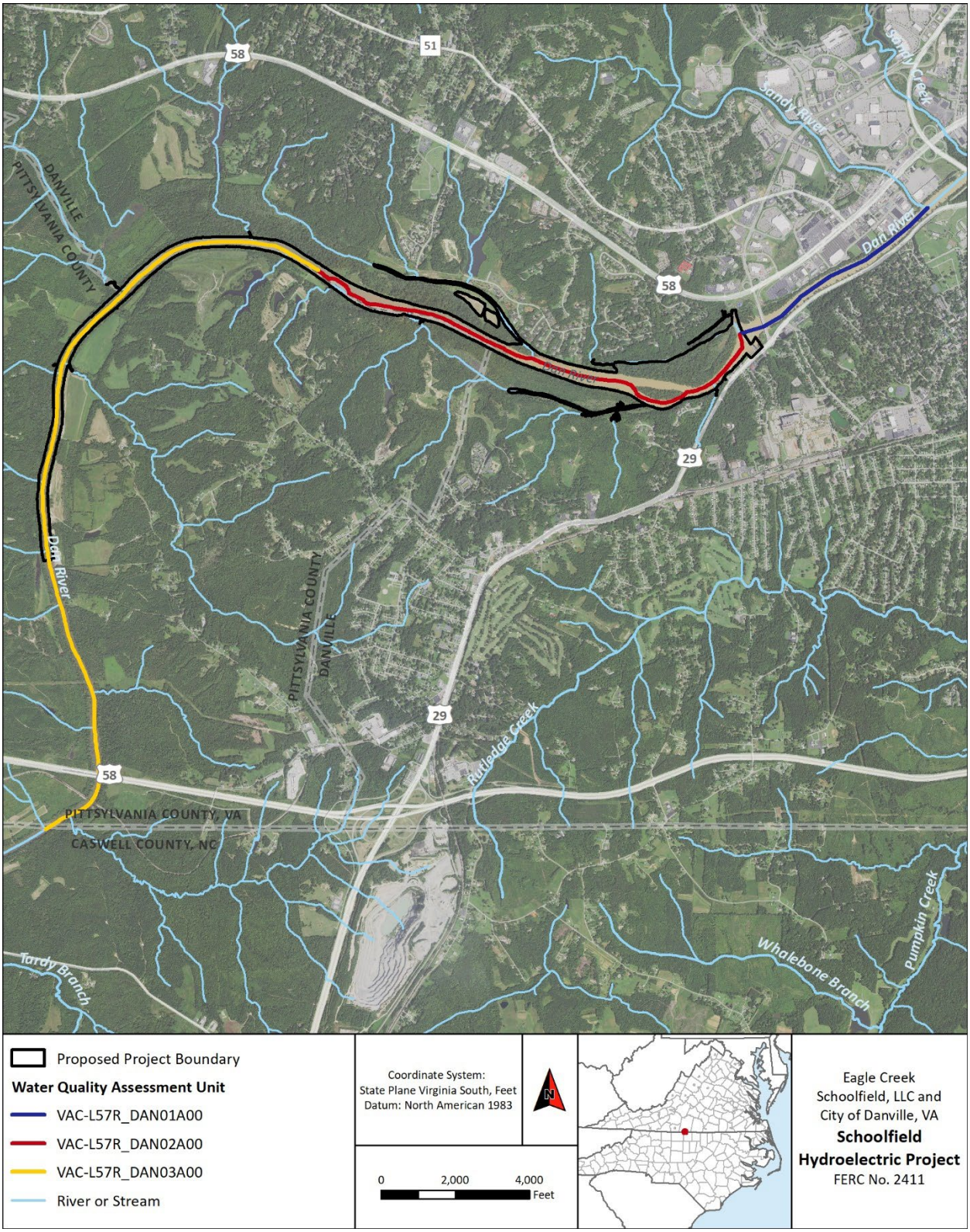


Figure 3.3.3-1. Waterbody assessment units of the Dan River in the Project area.

3.4 Water Resources Study Requests

The co-Licensees received two study requests related to water resources. Both the North Carolina Wildlife Resource Commission (NCWRC) and Virginia Department of Wildlife Resources' (VDWR),[16] requested the co-Licensees perform a study that seeks to understand how Project operations and downstream flows are affected by Project inflows. The United States Fish and Wildlife Service (USFWS) also requested a baseline water quality monitoring study. The goal of the USFWS water quality study request was to determine the effects operation of the Project may have on water quality. In summary, the co-Licensees performed a flow assessment study and baseline water quality monitoring study, but with modification. The co-Licensees' justification for adopting the study with modification is provided in section 2.1 of the Draft Study Plan (DSP), submitted to the resource agencies (Attachment 1). The co-Licensees subsequently held a study plan conference call with stakeholders, received comments on DSP, and prepared and distributed to the resource agencies a Final Study Plan (FSP), which contained responses to comments on the draft study plan (see section 2.0 of the FSP [Attachment 2]). As a result of the study planning and consultation process. the co-Licensees performed an Operations and Inflow Assessment Study and Baseline Water Quality Monitoring Study with modification.

3.4.1 Operations and Inflow Assessment Study

The Operations and Inflow Assessment Study was performed from June through October 2020 following the methods detailed in the FSP (Attachment 2) and the study report (Attachment 3). The goal of the study was to document the effect inflows have on Project operations, and was achieved by accomplishing the following objectives: (1) describe how the Project's six fixed-output turbines and three generators are typically operated; (2) collect continuous water level data at a representative location upstream of the Project reservoir and downstream of the Project dam from June 1 through October 31; and (3) characterize and compare water levels of the Dan River upstream of the Project reservoir with operations and water levels downstream. The data collected were obtained from water level loggers deployed upstream of the Project (outside the influence of backwater effects from the Project dam) and downstream of the Project (upstream of the influence of the next downstream impoundment) (Figure 3.4.1-1). The operations data used to elucidate the effects of inflow on operations and downstream water levels were obtained from station logs.

The Project rarely changed the number of turbine units operating during the study period, (2.7%), and water levels upstream and downstream of the Project exhibited similar patterns (Figure 3.4.1-2). When increasing or decreasing generation was necessary, typically one and two turbine units at the Project were cycled on and off. The turning on and off of the units occurred approximately 1.6 and 0.7% of the time over the study period, respectively. As a result, the water levels downstream of the Project typically changed by ±0.2 feet. When generation increased or decreased by two turbine units, the water levels downstream changed by approximately ±0.4 foot. Infrequently, generation changed by three turbine units (0.1% of the time), which resulted in downstream water levels increasing or decreasing by 0.8 foot. These changes in water surface elevations downstream of the Project were most noticeable when flows were usually less than 3,000 cfs. Only during high flow events (0.3% of the time) did the number of turbine units change from four to zero or from five to zero before returning to operating four or five turbine units. These

[16] As of July 1, 2020, the Virginia Department of Game and Inland Fisheries has been renamed VDWR.

high-flow operations typically resulted in negligible change in the water surface elevations downstream of the Project. A representative example of the above effects is presented in Figure 3.4.1-3. In summary, the cycling of the Project turbine units in response to inflow appears to have a minor effect on water level fluctuations downstream of the Project, with typical changes that range from ±0.2 to 0.8 feet.

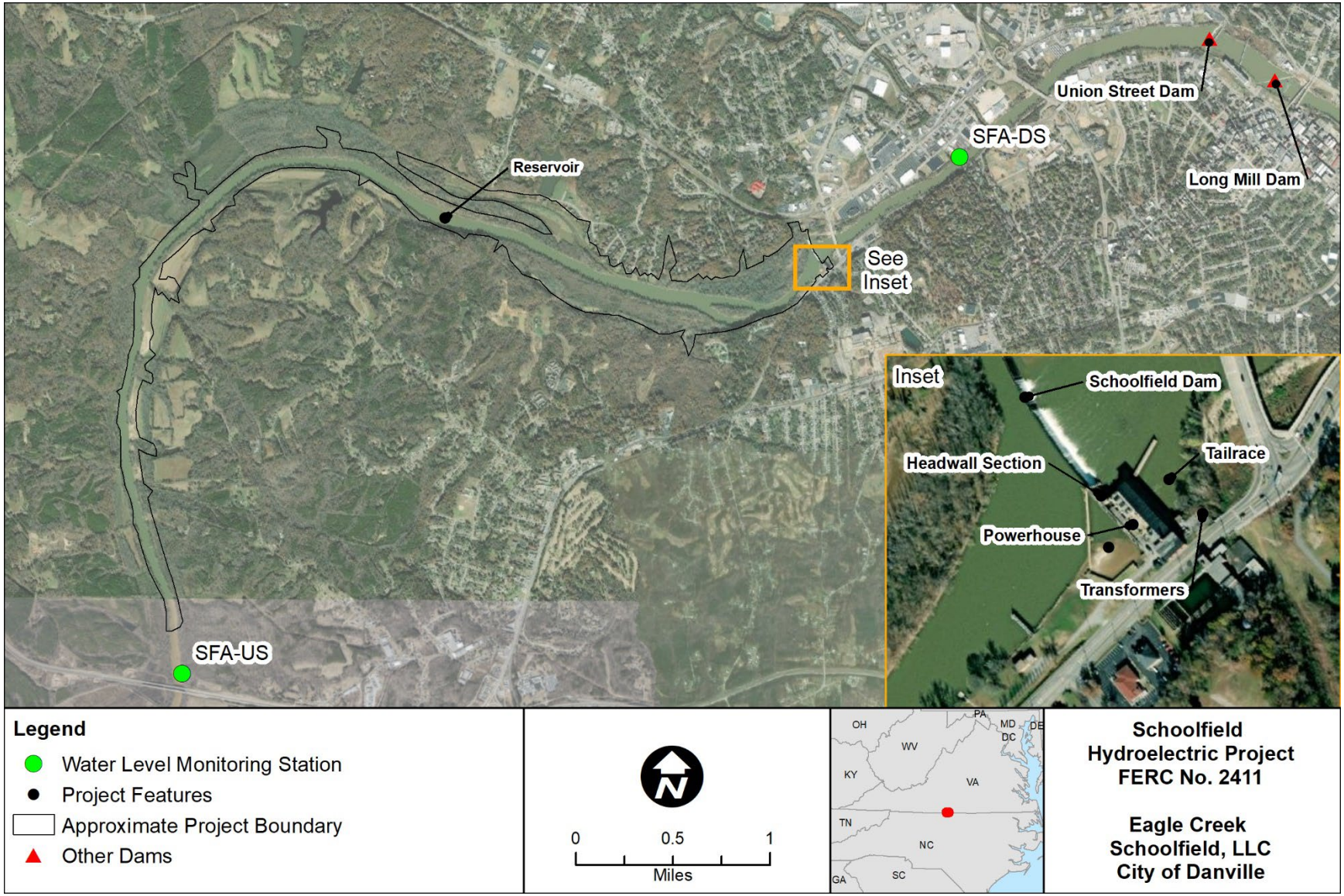


Figure 3.4.1-1. Location of the Project, Project features, and water level monitoring stations.

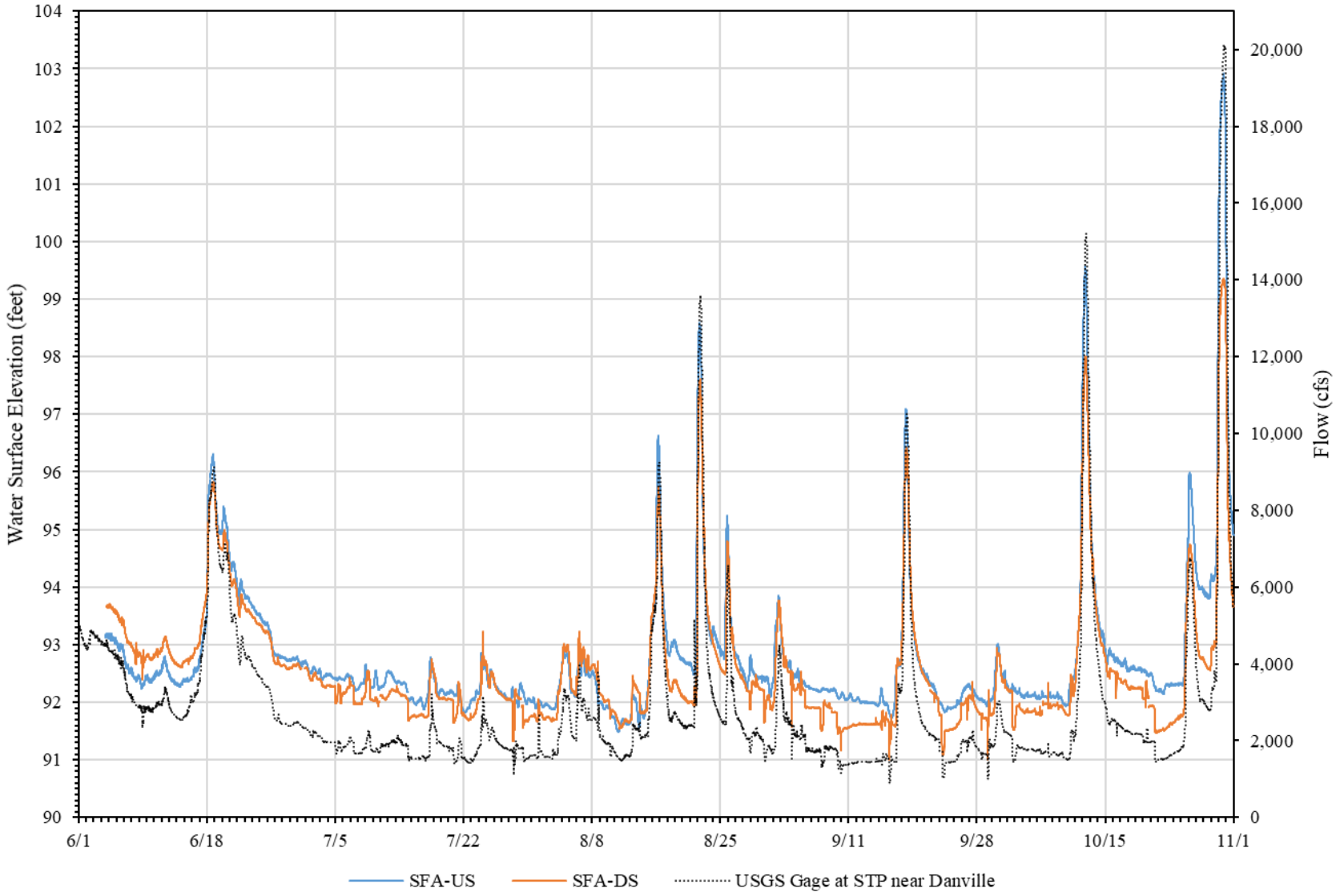


Figure 3.4.1-2. Water level time-series upstream (SFA-US) and downstream (SFA-DS) of the Project over the study period.

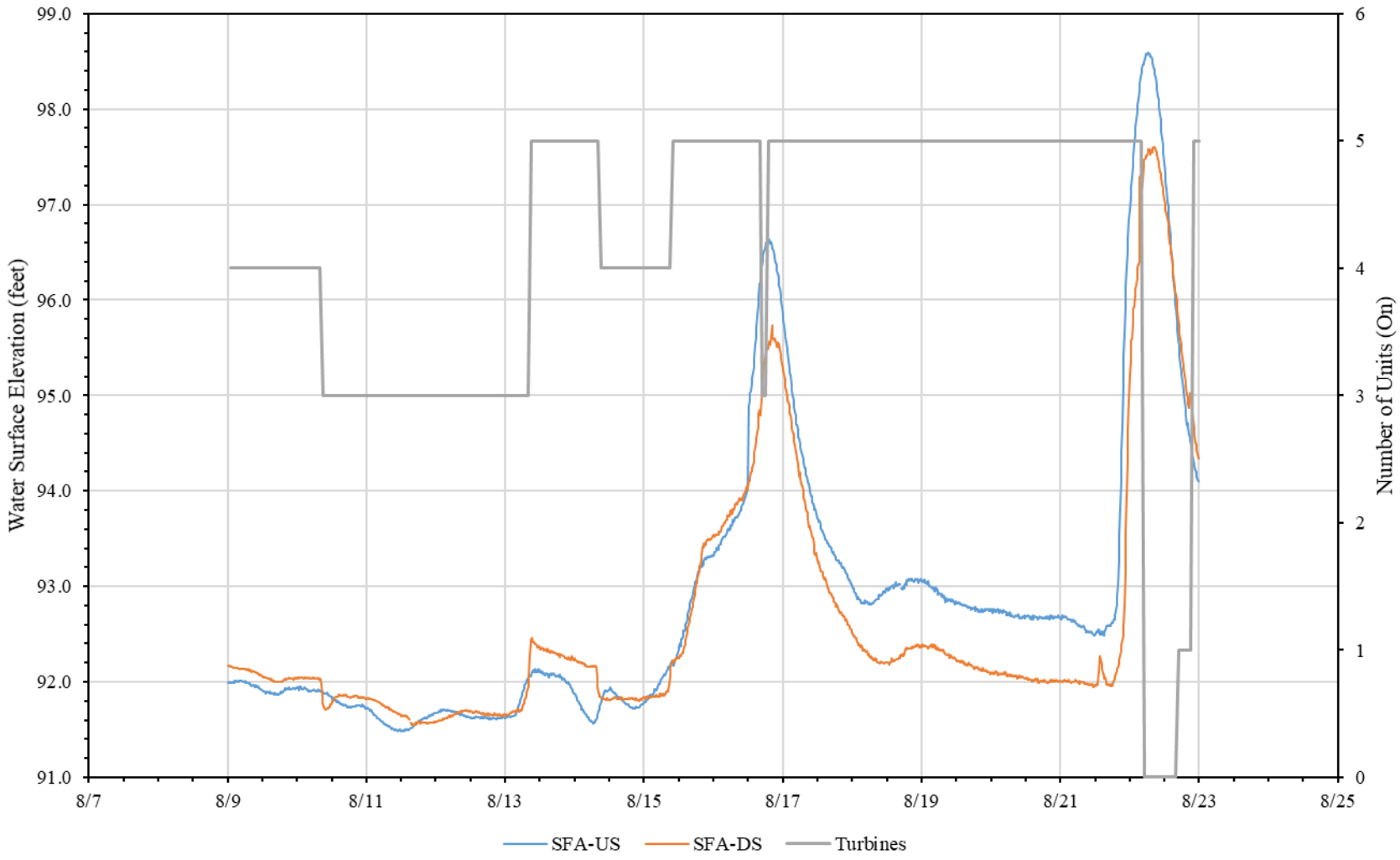


Figure 3.4.1-3 Water surface elevation of the Dan River downstream of the Project response in relation to inflow and generation.

3.4.2 Baseline Water Quality Monitoring Study

The baseline water quality monitoring study involved the continuous monitoring of water temperature and dissolved oxygen (DO), and discrete measurements of water temperature, pH, and water clarity throughout the study area (Figure 3.4.2-1).[17] The goals of the study were to document the existing water quality conditions in the Project area and determine whether the water quality of Project-affected reaches of the Dan River are consistent with Virginia water quality standards and designated uses. The Baseline Water Quality Monitoring Study is presented in Attachment 3, and a summary of the study results are provided below.

The study was implemented following the final study plan from June through October of 2020 (Attachment 2). Overall, the continuous water temperature and dissolved oxygen exhibited similar levels, temporal and diel trends among the Project forebay, tailrace, upper reservoir, and upstream and downstream areas (Figures 3.4.2-2 and 3.4.2-3). These water quality parameters appear to be influenced more by precipitation events, and diurnal cycles rather than by Project operations (see Appendices C, D, and E of the study report presented in Attachment 3). Only during prolonged periods of little to no rain or substantial changes in inflow did water temperatures exhibit a slight longitudinal warming trend from upstream to the Project's tailrace and by no more than 0.5ºC (Figure 3.4.2-4). Dissolved oxygen levels, however, never fell below 6.5 mg/L nor did the Project reservoir stratify by water temperature or dissolved oxygen (Figure 3.4.2-3; Figures 3.4.2-5 and 3.4.2-6). Therefore, these data indicate that Project operations are unlikely to adversely affect water temperatures and dissolved oxygen levels of the Dan River in the Project vicinity. The pH data indicate that waters of the Project area are slightly basic (Table 3.4.2-1).

The evaluation of the Dan River in the vicinity of the Project shows consistency with State surface water quality standards throughout the study period. The results of this analysis suggest that operation of the Project does not affect attainment of State surface water quality standards over a range of flow and weather conditions- particularly when water temperatures are relatively high and river flows are relatively low- as were the conditions during data collection in July through early-August. Therefore, consistency with water temperature, dissolved oxygen, and pH State surface water quality standards is likely to be maintained throughout the year.

[17] Water clarity was only measured at the Project forebay station using a Secchi disk.

Table 3.4.2-1. pH levels of the Project area over the study period.

Station	Month				
	Jun	**Jul**	**Aug**	**Sep**	**Oct**
SFA-US	7.1	7.9	na[1]	7.6	7.5
SWQ-US[1]	7.1	7.7	7.5	7.6	7.5
SWQ-FB	7.3	7.3	7.5	7.6	7.6
SWQ-TR	7.3	7.7	7.6	7.8	7.5
SFA-DS	na[2]	8.1	7.7	7.6	7.6

[1.] indicates no pH was taken because the river was too shallow to reach the station.

[2.] pH was not taken at SFA-DS during the month of June.

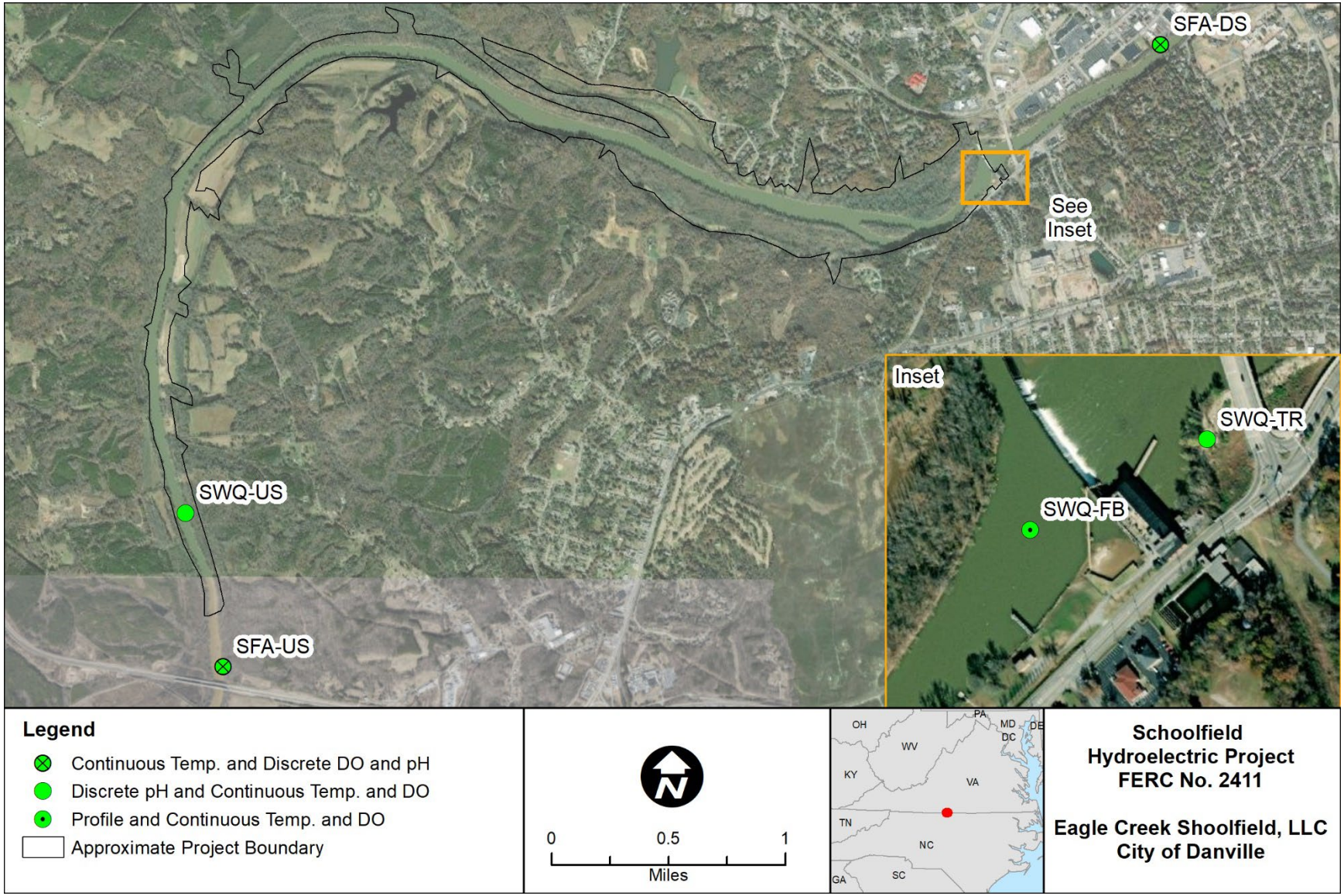


Figure 3.4.2-1. Locations of the water quality monitoring stations.

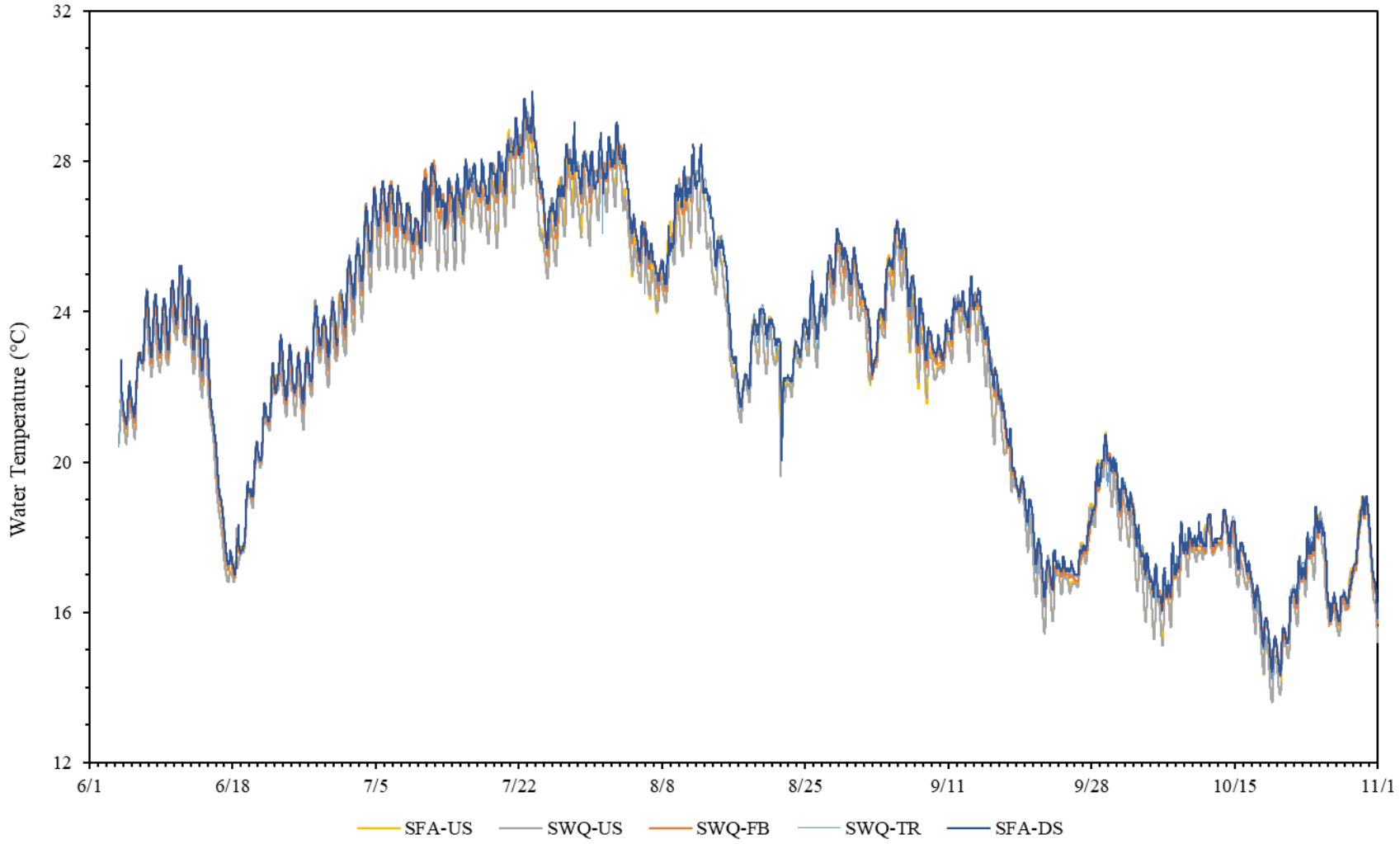


Figure 3.4.2-2. Water temperatures (°C) of the Dan River upstream of the Project, Project's upper reservoir, forebay, tailrace, and downstream of the Project.

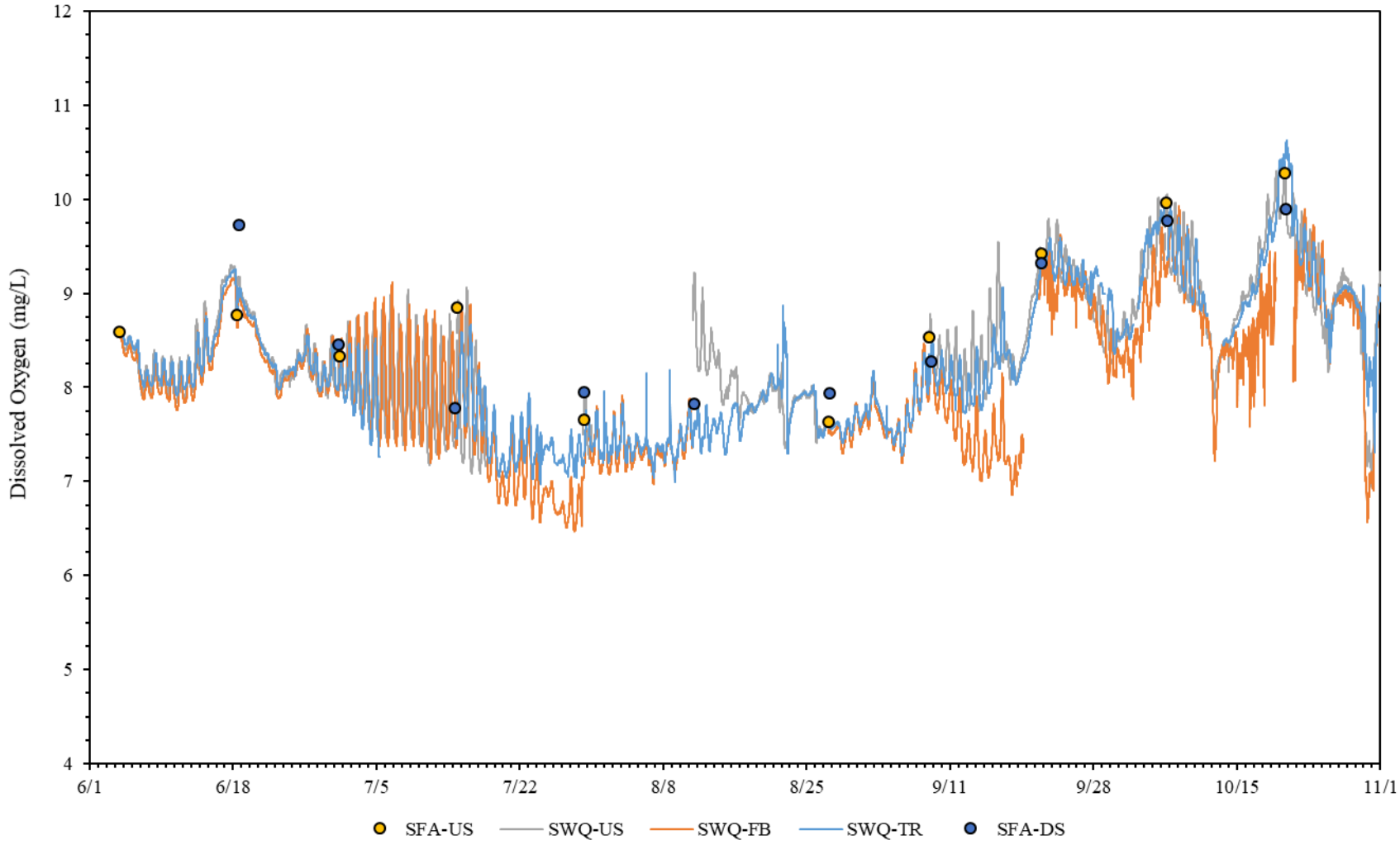


Figure 3.4.2-3. Dissolved oxygen concentrations (mg/L) of the Dan River upstream of the Project, Project's upper reservoir, forebay, tailrace, and downstream of the Project.

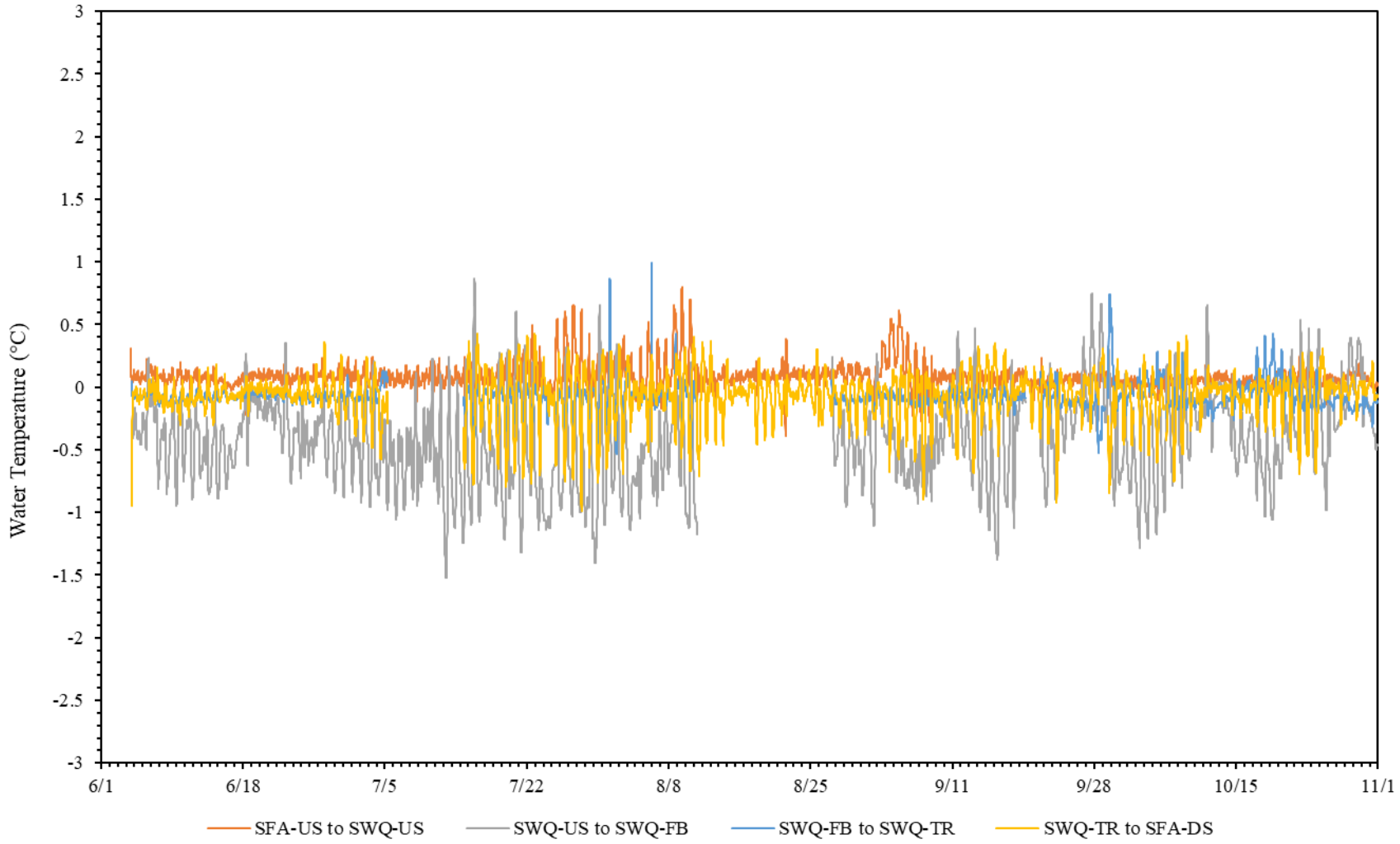


Figure 3.4.2-4. Hourly average water temperature change between upstream of the reservoir and the upper reservoir, the upper reservoir to the forebay, the forebay to the tailrace, and the tailrace to downstream of the Project.

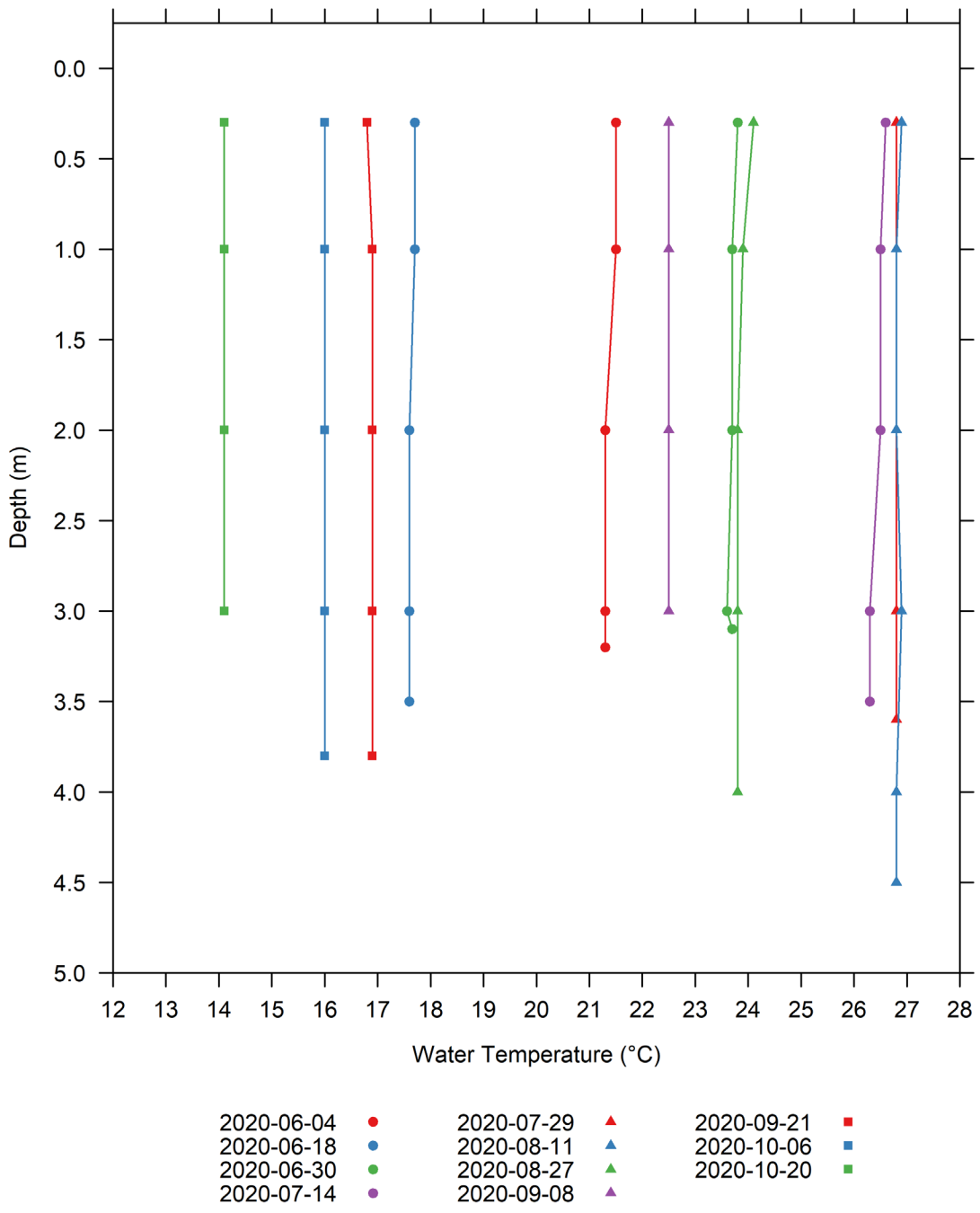


Figure 3.4.2-5. Water temperature vertical profiles collected in the forebay area of the Project.

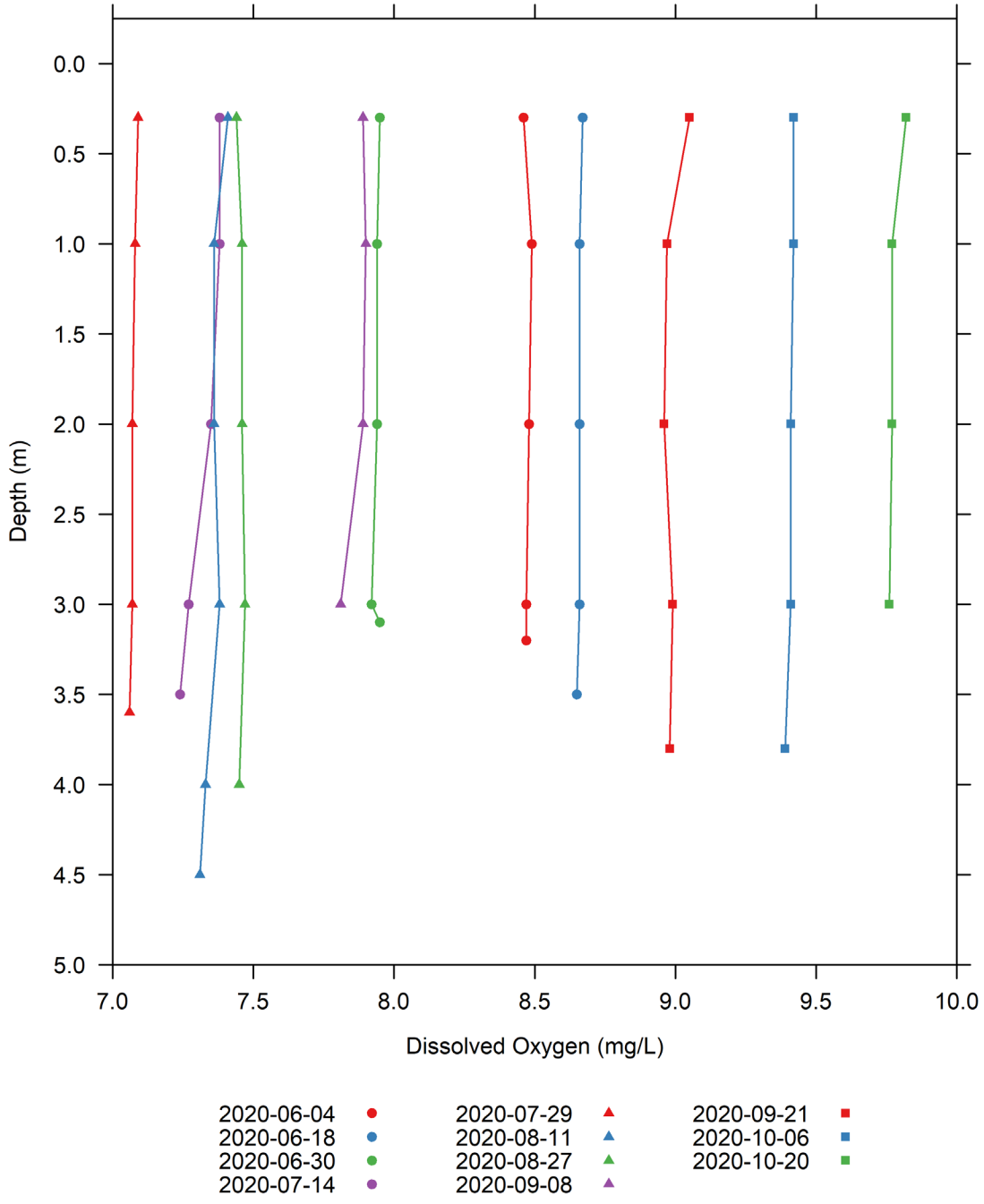


Figure 3.4.2-6. Dissolved oxygen concentration (mg/L) vertical profiles collected in the forebay area of the Project.

3.5 Proposed Protection, Mitigation, and Enhancement Measures for Water Resources

The co-Licensees propose to continue to provide an instantaneous minimum flow of 300 cfs or inflow, whichever is less downstream of the Project. During occurrences of reservoir lowering to facilitate the City of Danville's water supply intake inspection and subsequent refilling, the co-Licensees propose to continue to provide an average 24-hr minimum flow of 440 cfs and notify the resource agencies as required by existing License Article 403. During refill periods, the instantaneous minimum flow of 300 cfs, or inflow would be maintained at all times.

The co-Licensees propose to continue operations related to reservoir dewatering and refilling to perform inspection and maintenance of the City of Danville's water supply intakes (License Article 403). These operations would occur less frequently (on an as-needed basis rather than annually), and only during the November 1 through February 28 period to avoid impacts on aquatic biota.

The co-Licensees propose to continue to implement the Sediment Flushing Plan as approved by the Commission by Order Amending and Approving Sediment Flushing Plan dated September 14, 1995 but modifying the timing of the sediment flushing to only occur during the November 1 through February 28 period to avoid impacts on aquatic biota .

In their June 20, 2022, comment letter, the NCWRC recommended that sediment flushing and refilling should only occur between November 1 and the end of February.

In their June 24, 2022, comment letter, the USFWS recommended time-of-year-restrictions be included as a PME measure for sediment flushing and refilling.

3.6 Description of Continuing Impacts on Water Resources by Continued Project Operation

3.6.1 Water Quantity and Project Operations

The data collected from *Operations and Inflow Assessment Study*, discussed above, and presented in Attachment 3, indicate that as the Project did turn on or off the fixed-output turbine units the water level changes downstream typically ranged between 0.2 and 0.8 ft. This effect on downstream water levels, however, was most noticeable when inflows in the Dan River were less than 3,000 cfs, but the effect observed downstream encompassed a similar range of water level fluctuations observed upstream of the Project. Therefore, the data from the study indicates that the downstream flow pattern is largely dependent on the inflow pattern, with some differences arising from the adding or dropping a fixed-output turbine generator unit to adjust for the inflow.

These water level fluctuations likely correspond to relatively minor changes in wetted width, average channel velocity, and wetted perimeter. Other water level fluctuations along the Dan River could result in part from operations at other water withdrawal and discharge facilities. In recent licensing proceedings, FERC has acknowledged[18] the inherent lag times associated with the

[18] FERC 2019. Final Environmental Assessment for Hydropower Licenses, Piedmont, Upper Pelzer, and Lower Pelzer Hydroelectric Projects. https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15396195.

passive release of flow from an elevation-stabilized impoundment. FERC determined that precise instantaneous matching of outflows to inflows is not practicable. Therefore, run-of-river operation should be defined as when outflows from a given project are released to approximate inflow. FERC also recognized as project operation changes, some flexibility regarding flow fluctuations downstream is needed to allow for brief delays between change in operation and attenuation of the flow. With the co-Licensees' proposal to continue to operate the Project in run-of-river mode with the same minimum flow regiment required by existing License Article 403 described above and in Exhibit A, existing water levels of the Project reservoir, downstream and Project outflows would likely reflect the existing condition over the next license term.

3.6.2 Water Quality and Project Operation

Under the current condition, reservoir and downstream water quality are consistent with VDEQ water quality standards. With DO concentrations typically greater than 6.0 mg/L, the water quality of Project-affected reaches of the Dan River would continue to support freshwater fish growth, reproduction, and survival (EPA, 1986). Furthermore, given the short water residence time and shallow average depth of the Project reservoir, stratification is unlikely, as confirmed by the measured temperature and DO profiles gathered during the *Baseline Water Quality Study* summarized in Section 3.4.2 and presented in Attachment 3. As a result, continued run-of-river operations would maintain existing water quality conditions and designated uses in the reservoir and the downstream reach of the Dan River.

3.6.3 Sediment Flushing

The impetus for the current Sediment Flushing Plan was to provide a mode to clear sediment that had accumulated near the City of Danville's water supply intakes adjacent to the Project intakes. The current Sediment Flushing Plan consists of flushing sediment three to four times per year when flows at the Project dam are greater than 3,000 cfs by opening the Project's low-level release gates for approximately 24 hours. However, the City of Danville has since relocated their water supply intakes upriver so as not to be as affected by sediment deposition near the Project dam and has sealed the water intakes at the dam. As such, the annual frequency of sediment flushing at the Project is no longer needed, but still may need to occur occasionally over the license term to remove accumulated sediment from near the Project's intakes. The co-Licensees' proposal to perform sediment flushing when flows at the Project are greater than 3,000 cfs, on an as-needed basis would provide a similar level protection to water resources as to what is currently afforded under the existing license. However, as with all sediment flushing activity, it can be expected that short increases in turbidity downstream of the release would occur above ambient levels. Given the proposed modifications to the current Sediment Flushing Plan, the co-Licensees anticipate any effect from sediment flushing activity during the new license term would reflect the existing condition or be minor and short in duration. The co-Licensees also anticipate there would be no passage of contaminated sediment as Duke Energy had dredged areas of the Project reservoir and conducted sediment testing for metals that revealed no accumulation of contaminated sediment within the reservoir has occurred. We address effects of Sediment Flushing on aquatic biota in section 4.8 *Description of Continuing Impacts on Aquatic and Fisheries by Continued Project Operation*.

3.6.4 Reservoir Dewatering

As stipulated in License Article 403, the reservoir may be dewatered to facilitate the inspection and maintenance of the City of Danville's water supply intakes. License Article 403 requires notification and coordination among resource agencies and the USACE and provide a downstream minimum flow of 440 cfs as a 24-hour average during reservoir refilling. At the time the License Order was issued, the City of Danville's water supply intakes were immediately next to the Project turbine intakes. Since then, the City of Danville relocated their municipal water supply intake approximately 0.1 river mile upstream of the Project and sealed off the intakes at the Project's powerhouse. The relocated intake is constructed in such a manner that dewatering the reservoir will be needed less frequently for maintenance and inspections. The co-Licensees' proposal to perform reservoir dewatering on an as-needed basis, rather than annually, would provide a similar level protection to water resources as to what is currently afforded under the existing license. The co-Licensees anticipate any impacts would reflect the existing condition or be minor and short in duration.

4 AQUATIC AND FISHERIES RESOURCES

4.1 Aquatic Habitat

4.1.1 Reservoir

At its normal water surface elevation of 437.7 feet, NGVD 29, the reservoir extends approximately 5.9 river miles upstream of the Project dam and has a surface area of 90 acres. The channel bed slope of the Dan River within the Project boundary is about 0.05%. The river within the reservoir is near 18 feet in depth behind the Schoolfield Dam, and at the upper end of the Project boundary, the channel depth is approximately less than 3.5 feet in depth at the normal water surface elevation (FEMA, 2021). Substrate within the reservoir is primarily sand intermixed with some boulder, gravel, pebble, and scoured bedrock. FEMA (2010) estimates the Dan River within the Project boundary has a Manning's n coefficient of between 0.025 to 0.100.

At the upstream of extent of the Project boundary, the reservoir is riverine with run and riffle habitats, stable banks and well-established riparian vegetation (AES, 2014). Near the Project dam, the Project reservoir is lacustrine. A complex of islands along the river left bank are just upstream of the Project dam with some small backwater sloughs. Approximately 0.5 river miles upstream of Project dam is an island within the main channel that is 5.2 acres in area. Figure 4.1.1-1 through 4.1.1-3 presents a photograph of the Project reservoir, and Figure 4.1.1-4 shows the locations of where Figures 4.1.1-1 through 4.1.1-3 were taken.

4.1.2 Tailrace

The 9.0-acre tailrace area includes the Project tailrace, where flows from the Powerhouse are passed and the portion of the Dan River immediately downstream of the Schoolfield Dam. Substrate of the tailwater area is mostly sand and pebble, with cobble and boulder intermixed. Figure 4.1.2-1 presents a photograph of the Project tailwater area.

4.1.3 Downstream Area

From the tailrace area downstream approximately 1.0 river mile, is a riverine portion of the Dan River that ends at the upper extent of the next downstream impoundment created by the Riverside Dam. This one-mile reach of the Dan River is a slow run that averages approximately 310 feet in width. Substrate consists of silt, sand, gravel, pebble, cobble, and boulder. Figure 4.1.3-1 presents a photograph of the downstream area.

Figure 4.1.1-1. Representative photograph of the upper Project reservoir riverine area (November 4, 2020).

Note: Left of center is the water quality monitoring buoy.

Figure 4.1.1-2. Representative photograph of the lower Project reservoir lacustrine area (October 6, 2020).

Figure 4.1.1-3. Representative photograph of a backwater slough of lower reservoir (October 20, 2020).

Note: Impoundment level was at the spillway crest (434.7 ft, NGVD 29) for flashboard repair at the time of photograph was taken.

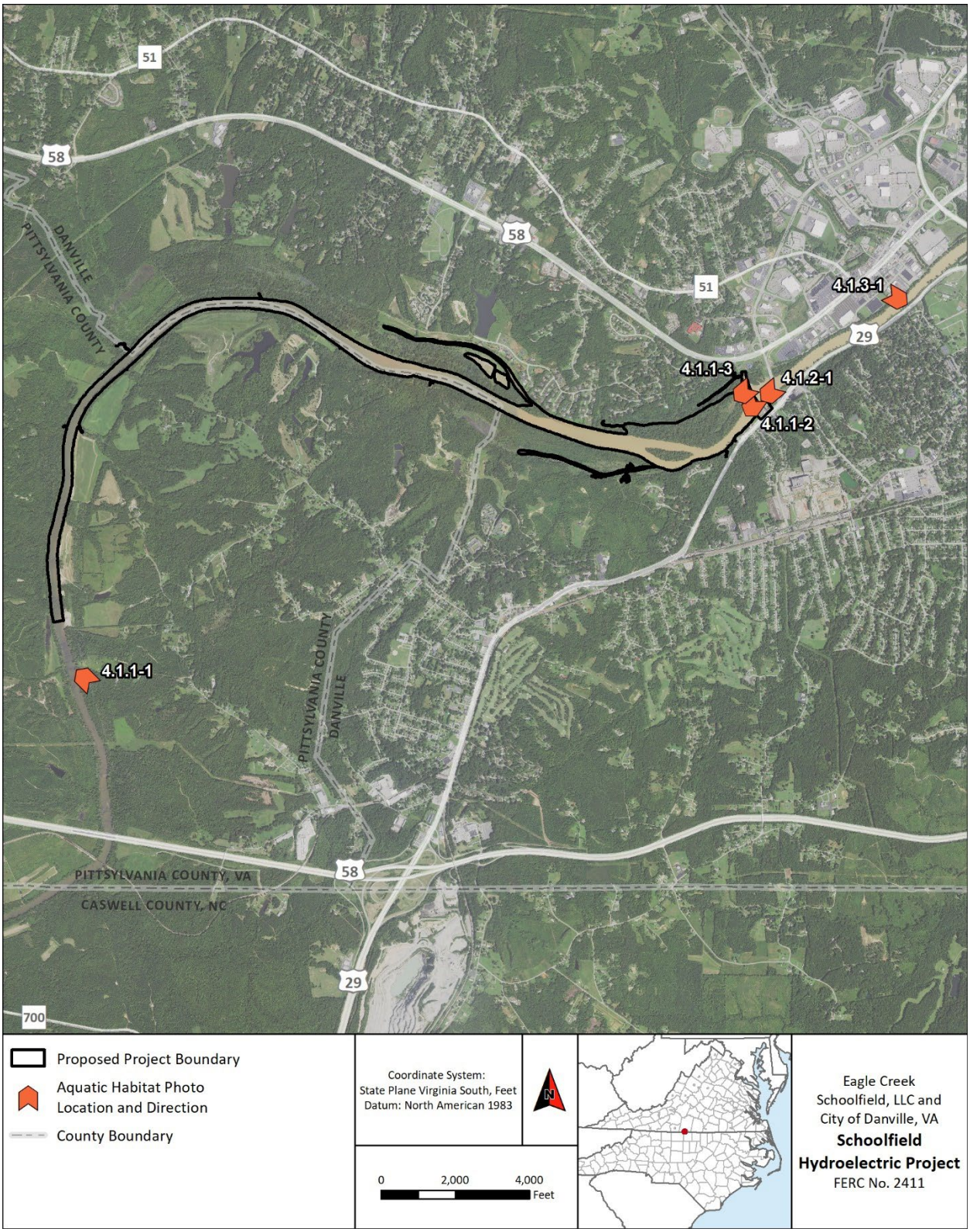


Figure 4.1.1-4. Aquatic habitat photograph location map.

Figure 4.1.2-1. Representative photograph of the reservoir tailwater area (August 11, 2021).

Note: Photograph taken 0.9 miles downstream of the Project dam.

Figure 4.1.3-1. Representative photograph of the Dan River downstream of the Project (July 29, 2020).

4.2 Fish Community

4.2.1 Resident

The Dan River watershed is a part of the larger Roanoke River basin. The Dan River supports a variety of resident game and non-game species. From 2015 through 2017, Duke Energy performed quarterly fisheries sampling of the Dan River using multiple gears from near Eden, NC to the Kerr Reservoir, including the Project reservoir. Within the Project reservoir, boat electrofishing was performed four times per year for three years along two transects parallel to each shore with three 200 to 300 m long stations per transect. Figure 4.2.1-1 presents the approximately boat electrofishing transects within the Project reservoir. In summary, the sampling by Duke (2019) indicates the fish community of the Project reservoir is comprised of eight families and 36 unique species.[19] Over three consecutive years of quarterly sampling of the reservoir, the over 60% of the total catch consisted of bluegill, redbreast sunfish, golden redhorse, spottail shiner, and redear sunfish. Table 4.2.1-1 presents the results of the Duke (2019) fish sampling of the Project reservoir.

In addition, as a part of the Roanoke Logperch Assessment (see Section 8, *Rare, Threatened and Endangered Species*), the co-Licensees sampled using backpack electrofishing and seining the first run-riffle section upstream of the Project reservoir as well as a run-riffle section in the Project's tailwater area. Although none of the species collected were enumerated, this sampling effort determined that seven other species are present in the Project area that were not previously collected by Duke (2019). Most of these species are primarily benthic oriented and include fantail darter, riverweed darter, blacktip jumprock, swallowtail shiner, margined madtom, chainback darter, and Roanoke darter. Table 4.2.1-2 presents a summary of the co-Licensees' fish sampling effort upstream of the Project reservoir and within the Project's tailwater areas.

Two species of importance due to their rare, threatened or endangered status that inhabit or could inhabit the Project reservoir are the snail bullhead, *Ameiurus brunneus*, and the Roanoke logperch, *Percina rex*. The snail bullhead, identified as a species "of greatest conservation need" in the Virginia Wildlife Action Plan, occurs in the Project reservoir (VDGIF, 2015). The Roanoke logperch was not collected in the Project reservoir (see results of Roanoke Logperch Assessment study).

4.2.2 Game Species

Of the 36 species collected by Duke (2019), 18 are game species (Table 4.2.1-1). Comprising 91% of the game species collected were bluegill (35%), redbreast sunfish (23%), redear sunfish (15%), largemouth bass (11%), and channel catfish (7%); the other remaining games species comprised 3% of the game species catch. In addition, Duke (2019) presented length-frequency distributions and relative weights of some of the game species from their sampling of the Dan River. This information was only available for one game species that was collected in the Project reservoir

[19] Excludes a sunfish hybrid, unidentifiable minnows and suckers.

(Figure 4.2.2-1)[20], redbreast sunfish, which had a reported mean relative weight (W_r)[21] from 97 to 103.

4.2.3 Fish Tissue

VDEQ has sampled fish from the Dan River and analyzed their tissue for metals annually from 2014 through 2017 in response to the coal ash spill at Duke Energy's Dan River Steam Station near Eden, NC (VDEQ (2017).[22] Table 4.2.3-1 summarize the results VDEQ's 2017 fish tissue sampling at four sites in the vicinity of the Project, and Figure 4.2.3-1 shows the location of the four sampling areas. Overall, 14 species were collected and analyzed for concentrations of 17 metal analytes. Out of the 17 metal analytes, only arsenic and mercury were found to exceed VDEQ and VDGH screening levels in the tissues of some largemouth and smallmouth bass, quillback, golden redhorse sucker, carp, redear sunfish, and striped bass sampled (Table 4.2.3-1).

Duke Energy (2019) also analyzed the fish tissue of several species of fish collected from the Project reservoir in 2015, 2016, and 2017 for concentrations of cobalt, copper, thallium, mercury, and lead. Results of these analyses are summarized in Table 4.2.3-2. Overall, exceedance relative to 2021 EPA Region III Regional Screening Values for fish tissue were observed most frequently for cobalt and thallium.

[20] The co-Licensees requested from Duke Energy the raw fisheries data collected from the Project Reservoir, including length and weight, but Duke Energy declined the data request.
[21] Relative weight is the ratio of an individual fish to a "standard weight" of a fish of the same length multiplied by 100.
[22] Results for years 2014 through 2016 are summarized and available at: https://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityMonitoring/FishTissueMonitoring/FishTissueResults.aspx.

Table 4.2.1-1. Fish taxa collected from the Project reservoir by Duke (2019) in 2015, 2016, and 2017.

Scientific Name	Common Name	2015		2016		2017		Total N	Game Species[1]
		N	%	N	%	N	%		
Lepisosteidae									
Lepisosteus osseus	Longnose Gar	1	0.1	0	0	0	0	1	Yes
Clupeidae									
Dorosoma cepedianum	Gizzard Shad	45	5	73	8.1	76	8.5	194	No
Cyprinidae									
N. hudsonius	Spottail Shiner	146	16.3	90	10	99	11	335	No
Cyprinus carpio	Common Carp	40	4.5	80	8.9	54	6	174	No
Notropis amoenus	Comely Shiner	14	1.6	78	8.7	38	4.2	130	No
Unidentified cyprinds	Unidentified cyprinds	51	5.7	0	0	0	0	51	No
Luxilus albeolus	White Shiner	27	3	17	1.9	3	0.3	47	No
Lythrurus ardens	Rosefin Shiner	33	3.7	12	1.3	0	0	45	No
C. analostana	Satinfin Shiner	8	0.9	10	1.1	4	0.4	22	No
N. raneyi	Bull Chub	11	1.2	1	0.1	9	1	21	No
Notemigonus crysoleucas	Golden Shiner	1	0.1	2	0.2	1	0.1	4	No
Nocomis leptocephalus	Bluehead Chub	0	0	2	0.2	0	0	2	No
Hybognathus regius	Est. Silvery Minnow	2	0.2	0	0	0	0	2	No
Ctenopharyngodon idella	Grass Carp	0	0	0	0	1	0.1	1	Yes
Catostomidae									
M. erythrurum	Golden Redhorse	82	9.2	134	15	183	20.4	399	No
Carpiodes cyprinus	Quillback	3	0.3	96	10.7	24	2.7	123	No
M. pappillosum	V-Lip Redhorse	4	0.4	3	0.3	13	1.5	20	No
M. collapsum	Notchlip Redhorse	1	0.1	11	1.2	1	0.1	13	No

Scientific Name	Common Name	2015		2016		2017		Total N	Game Species[1]
		N	%	N	%	N	%		
Catostomus commersonii	White Sucker	6	0.7	2	0.2	0	0	8	No
Hypentelium nigricans	Northern Hog Sucker	5	0.6	0	0	0	0	5	No
Unidentified Maxostoma	Unidentified Maxostoma	0	0	0	0	1	0.1	1	No
Ictaluridae									
I. punctatus	Channel Catfish	15	1.7	48	5.4	65	7.3	128	Yes
A. nebulosus	Brown Bullhead	2	0.2	4	0.4	7	0.8	13	Yes
A. catus	White Catfish	0	0	6	0.7	5	0.6	11	Yes
Ameiurus brunneus	Snail Bullhead	0	0	7	0.8	3	0.3	10	Yes
Ictalurus furcatus	Blue Catfish	0	0	0	0	1	0.1	1	Yes
Poeciliidae									
Gambusia holbrooki	Eastern Mosquitofish	1	0.1	0	0	1	0.1	2	No
Centrarchidae									
Lepomis macrochirus	Bluegill	158	17.6	212	23.7	248	27.7	618	Yes
L. auritus	Redbreast Sunfish	94	10.5	180	20.1	135	15.1	409	Yes
L. microlophus	Redear Sunfish	39	4.4	138	15.4	95	10.6	272	Yes
Micropterus salmoides	Largemouth Bass	67	7.5	63	7	58	6.5	188	Yes
Pomoxis nigromaculatus	Black Crappie	28	3.1	29	3.2	0	0	57	Yes
L. cyanellus	Green Sunfish	2	0.2	11	1.2	3	0.3	16	Yes
P. annularis	White Crappie	5	0.6	8	0.9	1	0.1	14	Yes
M. dolomieu	Smallmouth Bass	1	0.1	3	0.3	6	0.7	10	Yes
L. (Hybrid)	Sunfish (Hybrid)	1	0.1	4	0.4	0	0	5	No
L.gibbosus	Pumpkinseed	1	0.1	1	0.1	1	0.1	3	Yes
L. gulosus	Warmouth	1	0.1	2	0.2	0	0	3	Yes

Scientific Name	Common Name	2015		2016		2017		Total N	Game Species[1]
		N	%	N	%	N	%		
Percidae									
Perca flavescens	Yellow Perch	1	0.1	6	0.7	3	0.3	10	Yes
Number of Taxa		**33**	**–**	**31**	**–**	**29**	**–**	**39**	**–**
Total Catch		**896**	**–**	**1,333**	**–**	**1,139**	**–**	**3,368**	**–**

Source: Appendices II, JJ, and KK in Duke (2019), as modified by the co-Licensees.

1. Games species were defined as those that are explicitly listed in VDWR's 2021 Creel and Length Limits Regulations.

Table 4.2.1-2. Summary of fishes collected within the downstream and upstream reaches in Dan River near Danville, Virginia, on July 16, 2021, and August 5, 2021.

Scientific Name	Common Name	Downstream Reach	Upstream Reach
Ameiurus brunneus	Snail Bullhead	X	X
Ameiurus platycephalus	Flat Bullhead	X	X
Cyprinella analostana	Satinfin Shiner	X	X
Etheostoma flabellare	Fantail Darter	--	X
Etheostoma podostemone	Riverweed Darter	X	X
Hypentelium nigricans	Northern Hog Sucker	X	X
Lepomis auritus	Redbreast Sunfish	X	X
Luxilus albeolus	White Shiner	X	X
Lythrurus ardens	Rosefin Shiner	--	X
Micropterus dolomieu	Smallmouth Bass	X	--
Moxostoma cervinum	Blacktip Jumprock	X	X
Nocomis raneyi	Bull Chub	X	X
Notropis amoenus	Comely Shiner	X	X
Notropis hudsonius	Spottail Shiner	X	--
Notropis procne	Swallowtail Shiner	--	X
Noturus insignis	Margined Madtom	X	X
Percina nevisense	Chainback Darter	X	X
Percina roanoka	Roanoke Darter	X	X
Total Number of Species		**15**	**16**
Electrofishing Seconds		**1,083**	**1,711**
Stationary Seine Hauls		**30**	**30**

Table 4.2.3-1. Results of 2017 VDEQ fish tissue analysis for specimens collected from the Dan River in the vicinity of the Project.

Station ID	Species	Sample Size	Summary Statistic	Metal Analyte[1] (ppm)															
				Be	Al	V	Cr	Mn	Ni	Cu	Zn	As	Se	Ag	Cd	Sb	Ba	Hg	Tl	Pb
4ADAN075.22	Bluegill Sunfish	1	Min	0.00	0.13	-0.01	1.46	0.27	0.28	0.16	7.33	0.01	0.28	0.00	0.00	0.00	0.02	0.09	-0.02	0.00
			Max	0.00	0.13	-0.01	1.46	0.27	0.28	0.16	7.33	0.01	0.28	0.00	0.00	0.00	0.02	0.09	-0.02	0.00
	Golden Redhorse Sucker	2	Min	0.00	-0.03	-0.03	0.00	0.51	0.00	0.34	6.46	0.03	0.42	-0.01	0.00	-0.01	0.20	0.14	-0.03	0.00
			Max	0.00	-0.02	-0.02	0.10	1.46	0.01	0.34	7.12	0.04	0.43	0.00	0.01	0.00	0.21	0.29	-0.01	0.00
	Largemouth Bass	3	Min	0.00	-0.05	-0.18	0.00	0.06	0.00	0.22	5.05	0.00	0.36	-0.01	0.00	-0.01	0.00	0.29	-0.03	0.00
			Max	0.00	0.04	-0.02	0.01	0.08	0.01	0.24	5.25	0.01	0.40	0.00	0.00	0.00	0.01	***0.66***	0.00	0.00
	Redbreast Sunfish	1	Min	0.00	-0.08	-0.01	0.00	0.15	-0.02	0.14	5.16	0.01	0.56	0.00	0.00	-0.01	0.01	0.07	-0.03	0.00
			Max	0.00	-0.08	-0.01	0.00	0.15	-0.02	0.14	5.16	0.01	0.56	0.00	0.00	-0.01	0.01	0.07	-0.03	0.00
4ADAN060.16	Bluegill Sunfish	1	Min	0.00	0.04	-0.08	0.13	0.14	0.04	0.27	12.10	-0.01	0.27	-0.03	0.00	-0.02	0.05	0.05	-0.01	0.00
			Max	0.00	0.04	-0.08	0.13	0.14	0.04	0.27	12.10	-0.01	0.27	-0.03	0.00	-0.02	0.05	0.05	-0.01	0.00
	Carp	4	Min	0.00	-0.01	-0.18	0.00	0.08	0.00	0.31	6.19	0.02	0.50	-0.01	0.00	-0.01	0.01	0.10	-0.02	0.00
			Max	0.00	0.12	-0.01	0.02	0.82	0.01	0.46	9.32	0.07	0.86	0.02	0.00	0.01	0.61	0.24	0.02	0.01
	Channel Catfish	4	Min	0.00	-0.02	-0.10	0.00	0.11	0.00	0.15	3.68	-0.01	0.17	-0.03	-0.01	-0.02	-0.01	0.10	-0.01	0.00
			Max	0.00	0.25	0.09	0.00	0.15	0.00	0.40	7.11	0.00	0.25	0.00	0.00	-0.01	0.02	0.21	0.00	0.01
	Golden Redhorse Sucker	3	Min	0.00	-0.05	-0.06	0.00	0.76	0.00	0.20	6.38	0.01	0.41	-0.01	-0.01	-0.02	0.19	0.13	-0.01	0.00
			Max	0.00	0.09	0.04	0.12	0.84	0.03	0.27	6.68	0.02	0.44	0.05	0.00	0.00	0.24	0.22	0.00	0.00
	Largemouth Bass	5	Min	0.00	0.01	-0.09	0.00	0.04	0.00	0.13	3.48	0.00	0.38	-0.03	0.00	-0.02	-0.01	**0.39**	-0.01	0.00
			Max	0.00	0.10	0.01	0.02	0.09	0.01	0.23	6.26	0.00	0.50	0.00	0.00	-0.01	0.01	***0.61***	0.01	0.01
	Quillback Carpsucker	1	Min	0.00	0.06	-0.08	0.04	0.17	0.00	0.33	4.55	0.00	0.53	-0.02	0.00	-0.02	0.23	**0.46**	0.00	0.00
			Max	0.00	0.06	-0.08	0.04	0.17	0.00	0.33	4.55	0.00	0.53	-0.02	0.00	-0.02	0.23	**0.46**	0.00	0.00
	Redbreast Sunfish	2	Min	0.00	0.14	-0.05	0.01	0.23	0.00	0.15	6.47	0.01	0.46	0.00	0.00	-0.01	0.05	0.11	0.01	0.00
			Max	0.00	0.14	-0.02	0.01	0.27	0.00	0.29	7.09	0.01	0.65	0.08	0.00	-0.01	0.07	0.13	0.02	0.00
	Redear Sunfish	2	Min	0.00	-0.06	-0.05	0.00	0.06	0.00	0.17	7.49	0.06	0.55	0.00	0.00	-0.01	0.00	0.19	0.01	0.00
			Max	0.00	0.14	0.03	0.05	0.06	0.00	0.20	9.35	***0.37***	0.68	0.00	0.00	-0.01	0.01	0.19	0.01	0.00
4ADAN056.80	Carp	5	Min	0.00	-0.01	-0.13	0.00	0.08	0.00	0.26	6.70	0.00	0.44	-0.02	0.00	-0.02	0.00	0.10	0.00	0.00
			Max	0.01	0.29	-0.03	0.09	1.09	0.09	0.76	10.40	*0.18*	0.69	0.00	0.01	-0.01	0.53	0.19	0.01	0.01
	Golden Redhorse Sucker	4	Min	0.00	-0.07	-0.18	0.00	0.14	0.00	0.22	5.81	0.03	0.32	-0.01	0.00	-0.01	0.06	0.25	-0.02	0.00
			Max	0.00	0.34	-0.01	0.05	1.23	0.03	0.30	8.52	0.06	0.34	0.00	0.00	-0.01	0.22	**0.35**	0.00	0.00
	Largemouth Bass	2	Min	0.00	-0.05	-0.11	0.00	0.06	0.00	0.17	5.28	0.01	0.45	0.00	0.00	-0.02	0.00	**0.36**	-0.01	0.00
			Max	0.00	-0.04	0.03	0.02	0.08	0.00	0.20	5.42	0.02	0.48	0.00	0.00	-0.01	0.00	**0.46**	0.01	0.00

Station ID	Species	Sample Size	Summary Statistic	Metal Analyte[1] (ppm)															
				Be	Al	V	Cr	Mn	Ni	Cu	Zn	As	Se	Ag	Cd	Sb	Ba	Hg	Tl	Pb
	Redbreast Sunfish	7	Min	0.00	-0.04	-0.07	0.00	0.14	0.00	0.12	5.40	0.00	0.40	-0.04	-0.01	-0.02	0.00	0.06	-0.01	0.00
			Max	0.01	0.14	0.07	0.07	0.48	0.00	0.22	6.97	0.01	0.49	0.00	0.00	0.00	0.09	0.10	0.01	0.01
	Smallmouth Bass	1	Min	0.00	-0.08	-0.10	0.01	0.08	0.00	0.27	5.76	0.02	0.27	0.00	0.00	-0.01	0.01	**0.32**	0.00	0.00
			Max	0.00	-0.08	-0.10	0.01	0.08	0.00	0.27	5.76	0.02	0.27	0.00	0.00	-0.01	0.01	**0.32**	0.00	0.00
	White Sucker	3	Min	0.00	0.04	-0.10	0.00	0.26	0.00	0.28	4.81	0.00	0.34	0.00	-0.01	-0.02	0.14	0.09	-0.01	0.00
			Max	0.00	0.17	0.03	0.02	0.46	0.00	0.36	6.49	0.01	0.36	0.03	0.00	-0.02	0.16	0.10	0.01	0.00
4ADAN054.03	Blue Catfish	5	Min	0.00	-0.06	-0.16	0.00	0.17	0.00	0.18	3.88	0.00	0.23	-0.01	0.00	-0.01	0.00	0.12	-0.02	0.00
			Max	0.00	0.02	0.09	0.00	0.35	0.00	0.36	6.90	0.03	0.34	0.00	0.00	-0.01	0.02	0.16	0.00	0.01
	Carp	3	Min	0.00	-0.01	-0.17	0.00	0.15	0.00	0.35	8.29	*0.12*	0.52	-0.01	0.00	-0.01	0.00	0.17	0.00	0.00
			Max	0.00	0.09	-0.06	0.31	1.36	0.09	1.25	19.10	*0.15*	0.56	0.01	0.01	-0.01	0.37	0.27	0.01	0.01
	Channel Catfish	6	Min	0.00	-0.06	-0.19	0.00	0.22	0.00	0.20	4.78	0.00	0.19	-0.01	0.00	-0.01	0.00	0.06	-0.03	0.00
			Max	0.00	0.07	-0.01	0.02	0.48	0.01	0.31	6.64	0.01	0.29	0.00	0.01	-0.01	0.03	0.18	0.00	0.00
	Golden Redhorse Sucker	1	Min	0.00	0.18	-0.01	0.00	0.14	0.00	0.37	7.84	0.04	0.46	-0.01	0.00	-0.01	0.10	0.18	-0.02	0.00
			Max	0.00	0.18	-0.01	0.00	0.14	0.00	0.37	7.84	0.04	0.46	-0.01	0.00	-0.01	0.10	0.18	-0.02	0.00
	Quillback Carpsucker	1	Min	0.00	0.05	-0.10	0.00	0.20	0.00	0.38	3.96	0.04	0.40	0.00	0.00	-0.01	0.06	0.12	0.00	0.00
			Max	0.00	0.05	-0.10	0.00	0.20	0.00	0.38	3.96	0.04	0.40	0.00	0.00	-0.01	0.06	0.12	0.00	0.00
	Shorthead Redhorse Sucker	1	Min	0.00	0.07	-0.05	0.00	1.89	0.01	0.19	6.31	0.03	0.35	0.00	0.01	-0.01	0.27	0.20	0.01	0.00
			Max	0.00	0.07	-0.05	0.00	1.89	0.01	0.19	6.31	0.03	0.35	0.00	0.01	-0.01	0.27	0.20	0.01	0.00
	Smallmouth Bass	1	Min	0.00	-0.05	-0.11	0.02	0.06	0.00	0.33	6.17	*0.18*	0.39	0.00	0.00	-0.01	0.00	**0.40**	0.00	0.00
			Max	0.00	-0.05	-0.11	0.02	0.06	0.00	0.33	6.17	*0.18*	0.39	0.00	0.00	-0.01	0.00	**0.40**	0.00	0.00
	Spotted Bass	1	Min	0.00	0.01	-0.03	0.01	0.07	0.00	0.22	4.77	0.08	0.29	-0.01	0.00	-0.01	0.00	0.17	0.00	0.00
			Max	0.00	0.01	-0.03	0.01	0.07	0.00	0.22	4.77	0.08	0.29	-0.01	0.00	-0.01	0.00	0.17	0.00	0.00
	Striped Bass	1	Min	0.00	0.04	-0.02	0.00	0.10	0.00	0.30	4.36	0.08	0.48	-0.01	0.00	-0.01	-0.01	***0.56***	-0.03	0.00
			Max	0.00	0.04	-0.02	0.00	0.10	0.00	0.30	4.36	0.08	0.48	-0.01	0.00	-0.01	-0.01	***0.56***	-0.03	0.00
Method Detection Limit (ppm_				0.02	0.20	0.10	0.01	0.10	0.09	0.08	0.70	0.05	0.20	0.02	0.02	0.02	0.20	0.01	0.03	0.02
VDEQ Screening Value (ppm)				8	4000	40	12	560	80	40	1200	0.27	20	20	4	1.6	800	0.30	0.272	NA
VDH Screening Value (ppm)				NA	5286	NA	4.76	53	NA	52	1585	0.09	26	NA	0.53	NA	NA	0.50	NA	NA

Source: VDEQ (2017)

[1.] Values in bold indicate value exceeds VDEQ screening value, values in italics indicate value exceeds VDH screening values, values in bold and italics exceed both VDEQ and VDH screening values.

Table 4.2.3-2. Metal concentrations within the tissue of fish collected from the Project reservoir by Duke Energy (2019).

Species	N	Metal[1]				
		Cobalt (0.46 µg/g)[2]	Copper (62.0 µg/g)	Mercury (0.15 µg/g)	Thallium (1.5 ng/g)	Lead (no RSV; ng/g)
2015						
Golden redhorse	10	0.10 - 1.09	0.23 - 0.41	NR	0.7 - 3.9	NR[3]
Largemouth bass	10	0.22 -0.39	0.2 - 1.31	NR	0.9 – 4.5	NR
Redbreast sunfish	10	0.09 - 1.49	0.20 - 0.36	NR	0.8 – 3.4	NR
2016						
Golden redhorse	9	0.07 - 0.36	NR	NR	0.5 – 1.8	NR
Largemouth bass	9	0.04 - 1.03	NR	NR	0.5 – 3.8	NR
Bluegill	2	0.11 - 0.30	NR	NR	0.5 – 3.9	< 2.4 - 7.3
Redbreast sunfish	7	0.04 - 0.83	NR	NR	0.5 -6.7	< 2.4 -5.2
2017						
Golden redhorse	10	NR	NR	0.10 - 0.35	1.9 – 2.8	< 2.4 – 7.8
Largemouth bass	10	NR	NR	0.17 – 0.42	2.3 – 6.7	< 2.4 – 4.3
Bluegill	4	NR	NR	0.02 – 0.07	1.8 – 2.4	NR
Redbreast sunfish	4	NR	NR	0.04 – 0.10	2.3 – 2.4	NR
Redear sunfish	3	NR	NR	0.03 – 0.08	2.3 – 4.8	< 2.4 – 2.5

Source: Appendices BB, DD, and FF in Duke Energy (2019)

1. Values reported in the table are of the same units reported for the RSV.
2. Value reported in "( )" indicates Regional Screen Value based on EPA Region III Regional Fish Consumption Screening Levels (Spring 2021).
3. "NR" indicates range for specified analyte was not report.

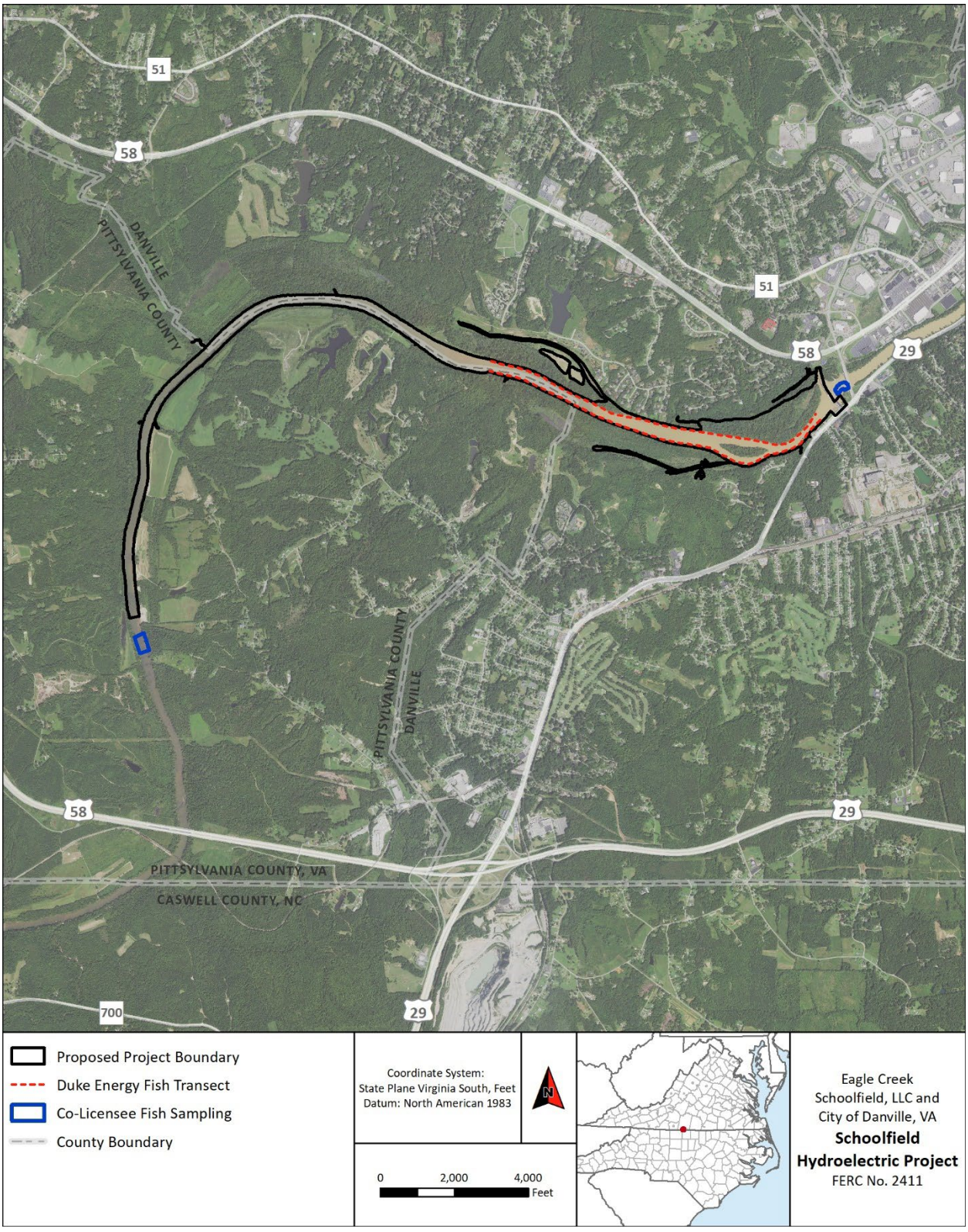


Figure 4.2.1-1. Duke Energy (2019) boat electrofishing transects within the Project reservoir and the co-Licensees' fish sampling areas upstream and downstream of the Project.

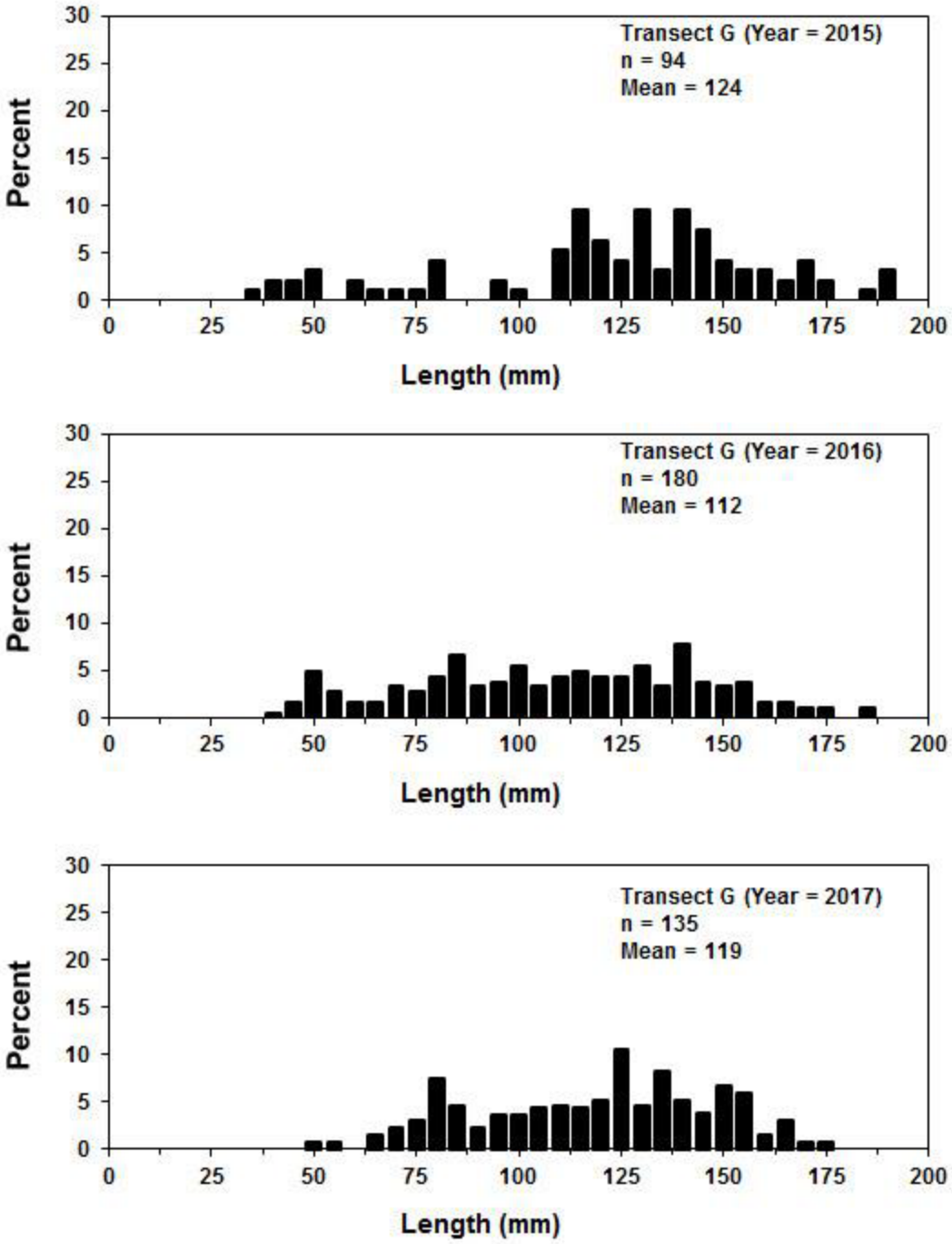


Figure 4.2.2-1. Length frequency distribution of redbreast sunfish collected from the Project reservoir as reported in Duke (2019).

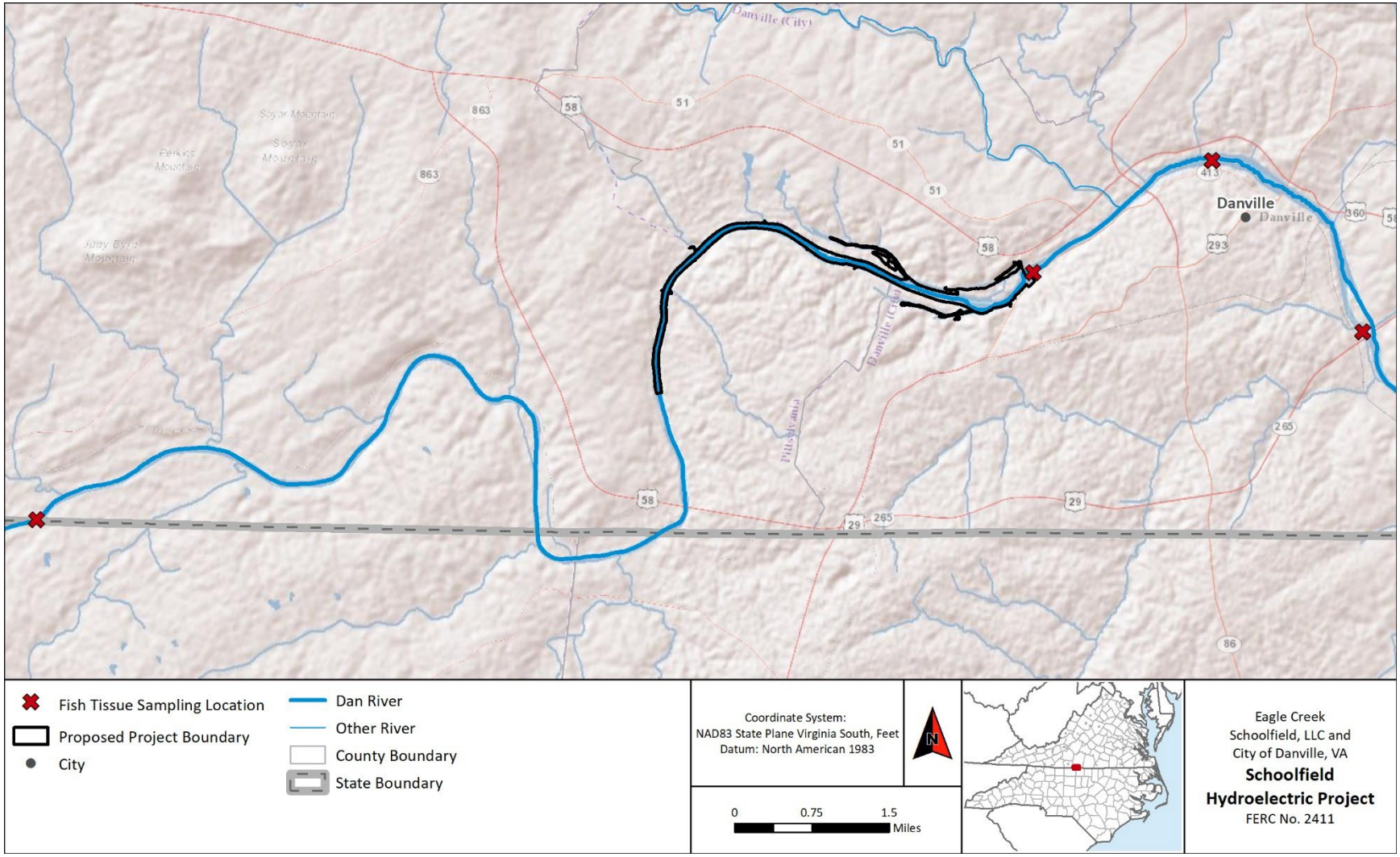


Figure 4.2.3-1. Location of VDEQ 2017 Dan River fish tissue sampling locations in the vicinity of the Project

4.3 Freshwater Mussels

In response to the coal ash spill at Duke Energy's Dan River Steam Station, Duke Energy funded a freshwater mussel survey of the Dan River from the river's confluence with Snow Creek in Stokes County, NC, to its terminus at the Kerr Reservoir in Halifax County, VA (AES, 2014). In total, 39 sites were surveyed, in which ten species were documented. These species include common elliptio (*Elliptio complanata*), variable spike (*Elliptio icterina*), Carolina lance (*Elliptio angustata*), Roanoke slabshell (*Elliptio roanokensis*), Raleigh slabshell (*Elliptio raleighensis*), Atlantic pigtoe (*Fusconaia masoni*), triangle floater (*Alasmidonta undulata*), green floater (*Lasmigona subviridis*), notched rainbow (*Villosa constricta*), and yellow lampmussel (*Lampsilis cariosa*) (AES, 2014).

The nearest survey locations relative to the Project are located approximately 7.5 river miles upstream and 4.8 river miles downstream of the Project dam (Table 4.3-1; Figure 4.3-1). Only one mussel species, common elliptio, was documented at the upstream site. Habitat in this area is mostly boulder with some gravel and silt, and the overall estimated catch per unit effort (CPUE) of the common elliptio is 4.0 (AES, 2014).[23] At the downstream site, two mussel species were documented: 26 individuals the common elliptio and one specimen of the triangle floater. CPUE for these two species at the site downstream of the Project are 3.7 and 0.1, respectively. Habitat of the downstream survey site was mostly gravel with some pebble and silt (AES, 2014). Other mollusk species documented in the Project vicinity include the freshwater snail crested mudalia (*Leptoxis carinata*) and the Asian clam (*Corbicula fluminea*) (AES, 2014).

The co-Licensees also performed a freshwater mussel survey of the Project reservoir and within a one-mile reach of the Dan River downstream of the Project. The results of this study are discussed in Section 4.6 *Aquatic and Fisheries Resources Study Requests and Results* below.

23 Catch per unit effort (CPUE) is expressed at the number of mussels of a specific species document per person-hours extended searching.

Table 4.3-1 Results of a 2014 freshwater mussel survey of the Dan River in the vicinity of the Project.

Site Number	Sample Date	Person Hours	Freshwater Mussel Species	Mussel Count	Catch per Unit Effort (CPUE)
140904.3	September 4, 2014	1.5	Common elliptio	6	4.0
140905.1	September 5, 2014	7.0	Common elliptio	26	3.7
			Triangle floater	1	0.1

Source: AES (2014)

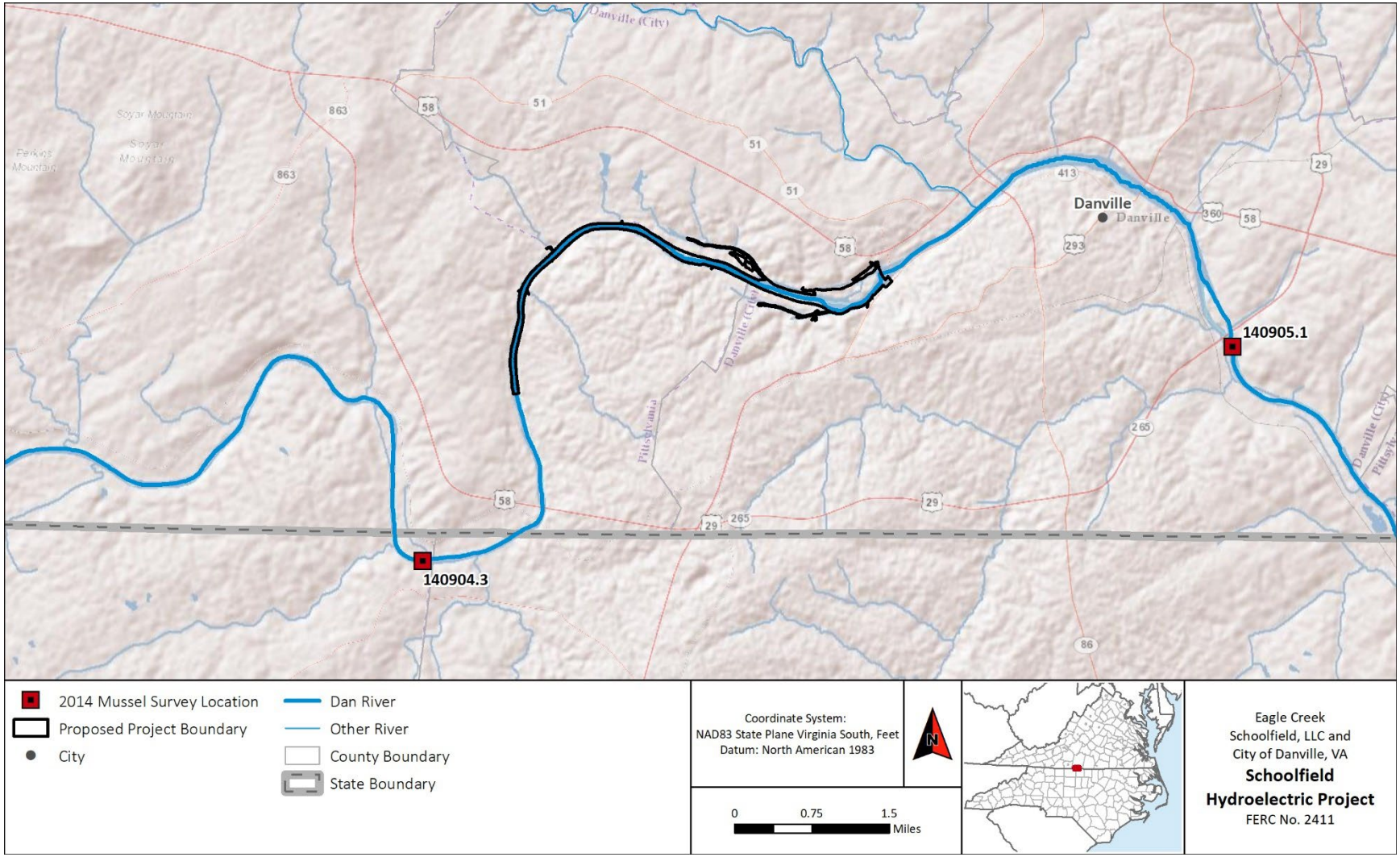


Figure 4.3-1. Freshwater mussel sample site locations of the 2014 Dan River mussel survey in the vicinity of the Project.

4.4 Other Benthic Macroinvertebrates

Duke (2019) sampled the Project reservoir for benthic macroinvertebrates (BMI) using a petit Ponar grab sampler, once annually during the summer months in 2015, 2016, and 2017. Table 4.4-1 presents the results of that sampling. In total, Duke (2019) identified 42 to 44 unique taxa present in the Project reservoir. However, without additional information regarding the specific species collected and respective counts of unique taxa present in the samples as presented in Duke (2019), metrics of biotic and other community indices cannot be calculated. Nonetheless, from these data as presented by Duke (2019), the most informative data are the number of Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa present in the sample (EPA taxa richness). Using the bioclassification criteria defined in NCDEQ (2016) for piedmont streams, waters of the Project reservoir would have a classification of "Fair," having 9 to 11 EPT taxa.

Table 4.4-1. Benthic macroinvertebrate descriptive metrics of the Project area for 2015, 2016, and 2017.

Descriptor	Year		
	2015	2016	2017
Total number of taxa	44	42	43
Total number of *Ephemeroptera*	6	6	8
Total number of *Plecoptera*	0	0	1
Total number of *Trichoptera*	3	4	2
Total number of EPT	9	10	11
Percent EPT of total taxa	20.5%	23.8%	25.6%
Total number of Intolerant taxa (0.0 - ≤ 3.3 TV)	3	2	2
Percent Intolerant taxa of total taxa	6.8%	4.8%	4.7%
Total number of Intermediate taxa (3.3 - ≤ 6.7-TV)	15	16	20
Percent Intermediate taxa of total taxa	34.1%	38.1%	46.5%
Total number of Tolerant taxa (6.8 - ≤ 10-TV)	13	12	11
Percent Tolerant taxa of total taxa	29.5%	28.6%	25.6%
Number of taxa with no established TV	13	11	14
Percent total taxa with no TV	29.5%	26.2%	32.6%
Number of EPT with no TV	1	2	2

Source: Appendix HH in Duke (2019).

4.5 Coastal Zone Management Act

VDEQ is the state agency that requires all federal actions in the Virginia's coastal zone, or ones that may affect coastal resources, are consistent with Virginia's coastal laws and enforceable policies under the Coastal Zone Management Act (CZMA). By e-mail dated July 22, 2022, the co-Licensees requested Coastal Zone Management Act consistency review from VDEQ. By e-mail dated July 22, 2022, VDEQ concluded that since the Project is located well outside of Virginia's Coastal Zone Management Area, it is unlikely to have reasonably foreseeable effects on Virginia's coastal resources or uses. and the Project is not subject to review under the enforceable policies of the Virginia Coastal Zone Management Program. Documentation of this consultation activity is provided in Appendix A to this Exhibit E.

4.6 Aquatic and Fisheries Resources Study Requests and Results

The co-Licensees received six study requests regarding aquatic and fisheries resources. The studies requests and respective requestors are listed below:

1. Aquatic Fauna Survey (NCWRC)
2. Fish Survey (USFWS, VDWR)
3. Mussel Survey (USFWS, VDWR)
4. Fish Passage and Protection Assessment (USFWS, VDWR); and,
5. Entrainment and Impingement Study (USFWS)
6. Roanoke Logperch Assessment (VDWR)

In summary, the co-Licensees elected to perform a freshwater mussel survey, a desktop entrainment and turbine survival study, and a Roanoke logperch Assessment, [24] but with modification. The co-Licensees' justification for adopting the study with modification is provided in section 2.1 of the Draft Study Plan (DSP), submitted to the resource agencies (Attachment 1). The co-Licensees subsequently held a study plan conference call with stakeholders, received comments on DSP, and prepared and distributed to the resource agencies a Final Study Plan (FSP), which contained responses to comments on the draft study plan (see section 2.0 of the FSP [Attachment 2]). In response to the distribution of the FSP, the USFWS provided the co-Licensees with additional comments concerning their request for a fish survey. The co-Licensees provided a response to the USFWS and included that response as a supplement to the FSP in Attachment 2. As a result of the study planning and consultation process, the co-Licensees performed a Desktop Entrainment and Turbine Survival Study and Freshwater Mussel Survey.

[24] Because the Roanoke logperch is a federally listed species, we discuss that study in Section 8 *Rare, Threatened, and Endangered Species*.

4.6.1 Desktop Entrainment and Turbine Survival Study

The USFWS requested an entrainment and impingement study. The study report for this effort is included in Attachment 3. The goals of this study were to evaluate the potential of fish entrainment and turbine survival at the Project by achieving the following objectives: 1) Describe the existing physical, operational, and environmental characteristics of the Project; 2) characterize the species composition of the fish community in the vicinity of the Project; 3) select target species and life-stages to be evaluated in consultation with the Agencies; 4) describe species-specific information that includes life history, habitat requirements, and swimming performance criteria for the target species and life stages; 5) qualitatively assess entrainment and impingement potential for each target species and life stage by comparing physical, operational, and environmental attributes of the Project with species-specific information; 6) estimate the turbine survival rate for the selected target species using a blade strike model; 7) discuss impacts to the fish community and populations of the Dan River resulting from entrainment, impingement, and turbine survival.

The target species of the study included: bighead chub, comely shiner, common carp, gizzard shad, bluegill, largemouth bass, channel catfish, white sucker, white shiner, snail bullhead, and green sunfish. These species were selected based on the fish species documented in the Project area and in consultation with the Agencies. Each of these species represents a functional group based upon ecological guilds and those that are recreationally important.

Based on the analyses conducted for the desktop entrainment and protection study, the Project appears to have limited impacts on fisheries resources. Although there is potential for some species to occur near the intake trashracks, the potential for entrainment remains low (Table 4.6.1-1). The life stages of the target species susceptible to entrainment exhibit swimming capabilities that allow them to escape the intake trashracks approach velocity.

For all target species life stages susceptible to entrainment, passage survival would be expected to range from 89.5% (juvenile largemouth bass 8-inches in length) to 99.3% for all individuals 1-inch in length (Table 4.6.1-2). Individuals that entrain into the Project turbines would experience high passage survival, > 89.5%. Given the low entrainment potential and high turbine passage survival, the expected impact on the existing fish community of continued operation of the Project over the next license term is negligible.

Table 4.6.1-1. Overall entrainment and impingement potential of the target species at the intake trashracks.

Species	Life stage	Potential to Occur Near Intake	Impingement Potential	Entrainment Potential
Bluehead chub	Adult	None	None	None
	Juvenile	None		None
Comely shiner	Adult	None	None	None
	Juvenile	None		None
Common carp	Adult	High	Low	None
	Juvenile	High		Low
Gizzard shad	Adult	High	None	None
	Juvenile	High		Low
Bluegill	Adult	High	None	None
	Juvenile	High		Low
Largemouth bass	Adult	High	Low	None
	Juvenile	High		Low
Channel catfish	Adult	High	Low	None
	Juvenile	Moderate		Low
White sucker	Adult	Low	None	None
	Juvenile	Low		Low
White shiner	Adult	None	None	None
	Juvenile	None		None
Snail bullhead	Adult	Low	None	Low
	Juvenile	Low		Low
Green sunfish	Adult	High	None	Low
	Juvenile	High		Low

Table 4.6.1-2. Turbine passage survival rates for the life stages of the target species susceptible to entrainment.

Species	Life Stage	Approximate Length Range (inches)[1]	Predicted Turbine Passage Survival (%)	
			λ= 0.1	**λ = 0.2**
Common carp	Juvenile	1 – 7	95.4 - 99.3	90.8 – 98.7
Gizzard shad	Juvenile	1 – 7	95.4 - 99.3	90.8 – 98.7
Bluegill	Juvenile	1 – 3	98.0 – 99.3	96.1 – 98.7
Largemouth bass	Juvenile	1 – 8	94.7 – 99.3	89.5 – 98.7
Channel catfish	Juvenile	3 – 7	95.4 – 98.0	90.8 – 96.1
White sucker	Juvenile	1 – 7	95.4 - 99.3	90.8 – 98.7
Snail bullhead	Juvenile	1 – 5	96.7 – 99.3	93.4 – 98.7
	Adult	5 – 7	95.4 – 96.7	90.8 – 93.4
Green sunfish	Juvenile	1 – 3	98.0 – 99.3	96.1 – 98.7
	Adult	3 – 7	95.4 – 98.0	90.8 – 96.1

1. Fish length range from one inch to the maximum fish length susceptible to entrainment based on proportional body widths measurements discussed in section 3.5.2, Target Species, but no greater than the typical maximum fish length for the life stage of the species. One-inch was selected as the minimum value of the range because fish less than one-inch in length have a survival > 99% at $\lambda = 0.1$ and 0.2.

4.6.2 Freshwater Mussel Survey

A freshwater mussel survey was conducted in late-June 2021 in the Project area and downstream following the methods detailed in the FSP to achieve the study goals and objectives (Figure 4.6-1). The goals and objectives of the study were: (1) perform a literature review to determine those freshwater mussel species likely to occur within the Dan River in the vicinity of the Project and describe their physical habitat requirements; (2) perform a reconnaissance survey of the Project reservoir periphery and tailwater for potential suitable mussel habitat and evidence of mussel presence; (3) identify the freshwater mussel sampling areas within the Project reservoir and tailwater; (4) conduct a qualitative mussel survey to determine the presence and abundance of freshwater mussels in the Project reservoir and tailwater at the selected survey areas; and (5) summarize the mussel collections and describe the physical habitat surveyed. The Freshwater Mussel Survey report is presented in Attachment 3.

All sites surveyed were shallow and had predominantly silt and sand substrate (Table 4.6.2-1). Water depths along entire sampling transects were not recorded. However, all live mussels that were discovered were in less than 3 feet of water. In total, qualified malacologist expended 22 person-hours of search time, yielding five live specimens of two species— Eastern elliptio (*Elliptio complanata*) and the variable spike (*Elliptio icterina*). The Eastern elliptio was found at two sites (05-US-2 [n=3] and 05-DS-1 [n=1]), while the variable spike was only found at one site (05-US-2 [n=1]) (Figure 4.6.2-1). Therefore, the overall abundance of live freshwater mussels in the study area was 0.2. The shell length for variable spike was 92 mm. For Eastern elliptio 3 of the 4 live mussels caught for that species were measured. Their shell lengths were 59, 66, and 82 mm.

Other non-target mollusks were observed during the survey. These included: the Asian clam (*Corbicula fluminea*), limpet (*Ferrissia rivularis*), and crested mudalia snail (*Leptoxis carinata*). The Asian clam was present throughout the study area, with varying levels of abundance among the surveyed sites. It was most common at the 05-US-2 and 05-DS-1 sites, and few to rare at the others. The *Ferrissia rivularis* limpet and the crested mudalia snail were only observed at the downstream site (05-DS-1).

Despite more than 22 person hours of search time, only a few individuals of two common freshwater mussel species were found, indicating that mussel abundance in the Project area is low. Mussels were only found in the riverine portion of the reservoir and downstream of the dam. The qualified malacologist determined that mussel habitat in these areas was marginal and good; however, mussel habitat is mostly of poor quality in lacustrine areas of the Project reservoir. Overall, the results of the study suggest that continued operation of the Project is unlikely to affect rare mussel species as none were found in Project-affected reaches of the Dan River, and continued operation of the Project will likely continue to support low abundances of the common Eastern elliptio and variable spike freshwater mussel species.

Table 4.6.2-1. Habitat description and the species and number of freshwater mussels observed at each survey site.

Site	Habitat Types	Dominant Substrate	Habitat Quality	Search Time (person-hours)	Count of Live Mussels	Catch per Unit Effort	Mussel Taxa Observed (Live)
05-US-1	Pool	Silt/sand	Poor	1	0	0	None
05-US-2	Run/Pool	Silt/Sand Pebble Gravel Cobble Boulder	Marginal	4	4	1.0	*Elliptio complanata* (n=3) *Elliptio icterina* (n=1)
05-US-3	Pool	Silt/Sand	Poor	1	0	0	None
05-US-4	Pool	Silt	Poor	1	0	0	None
05-DS-1	Run/Riffle	Silt/Sand Pebble Gravel Cobble Boulder	Good	15	1	0.07	*Elliptio complanata* (n=1)

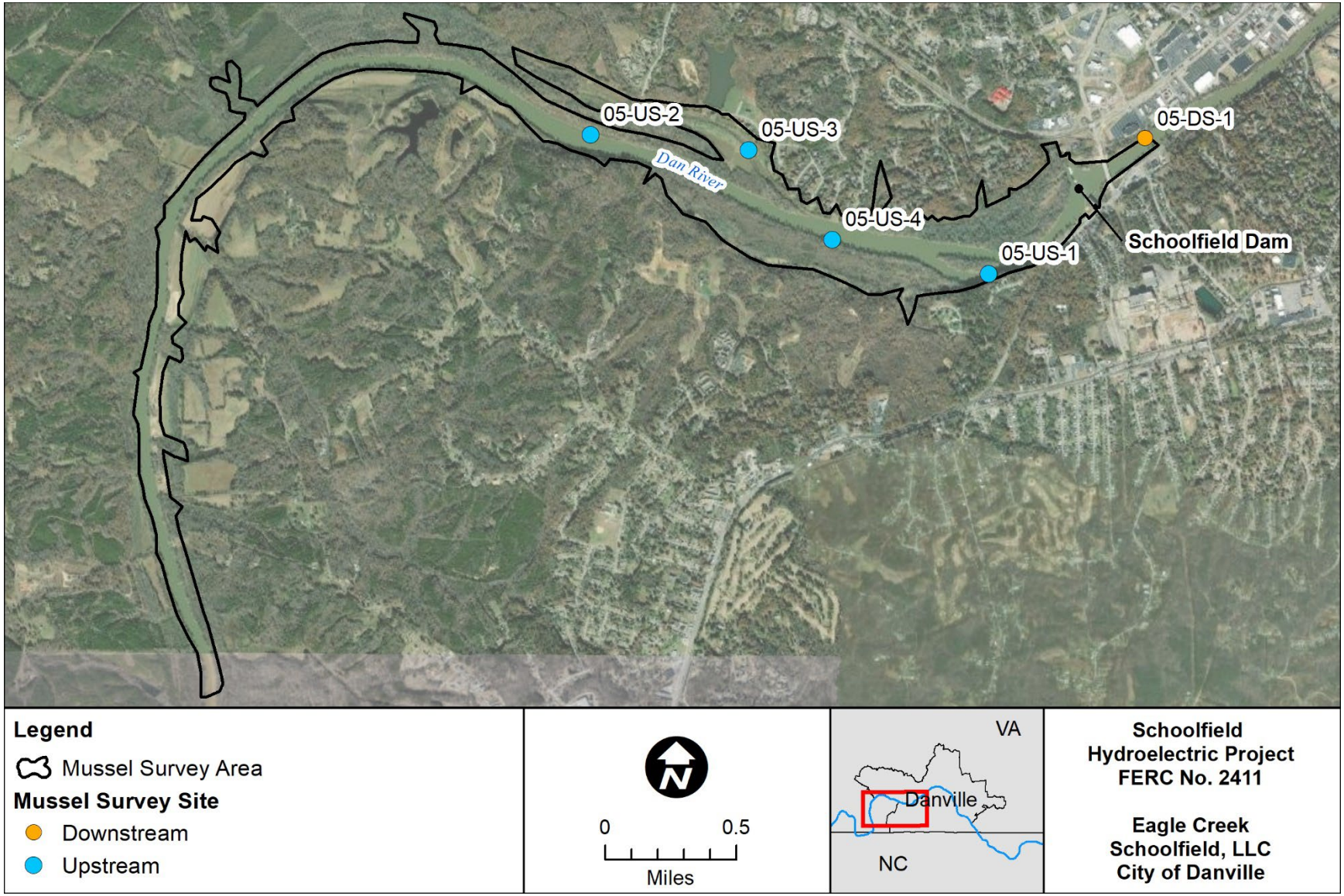


Figure 4.6.2-1. Freshwater mussel survey area.

4.7 Proposed Protection, Mitigation, and Enhancement Measures for Aquatic and Fisheries Resources

The co-Licensees propose to continue to provide an instantaneous minimum flow of 300 cfs or inflow, whichever is less downstream of the Project. During occurrences of reservoir lowering to facilitate the City of Danville's water supply intake inspection and subsequent refilling, the co-Licensees propose to continue to provide an average 24-hr minimum flow of 440 cfs and notify the resource agencies as required by existing License Article 403. During refill periods, the instantaneous minimum flow of 300 cfs, or inflow would be maintained at all times.

The co-Licensees propose to continue operations related to reservoir dewatering and refilling to perform inspection and maintenance of the City of Danville's water supply intakes (License Article 403). These operations would occur less frequently (on an as-needed basis rather than annually), and only during the November 1 through February 28 period to avoid impacts on aquatic biota.

The co-Licensees propose to continue to implement the Sediment Flushing Plan as approved by the Commission by Order Amending and Approving Sediment Flushing Plan dated September 14, 1995 but modifying the timing of the sediment flushing to only occur during the November 1 through February 28 period to avoid impacts on aquatic biota.

In their June 20, 2022, comment letter, the NCWRC recommended that sediment flushing and refilling should only occur between November 1 and the end of February.

In their June 24, 2022 comment letter, the USFWS recommended that the reservoir dewatering and refilling and sediment flushing should not be conducted between March 15 and September 30 in order to protect aquatic and fisheries resources.

4.8 Description of Continuing Impacts on Aquatic and Fisheries by Continued Project Operation

4.8.1 Fisheries, Aquatic Habitat, and Minimum Flow

The existing fish community in the vicinity of the Project is mostly warm water species, with no diadromous species. Data collected by Duke (2019) and the co-Licensees indicate the existing fish community is diverse, with the most prevalent species being the sunfishes. Continuation of run-of-river operations would maintain stable reservoir elevations so that aquatic habitat, such as those important for sunfish spawning, would be protected and be similar to the existing condition. Likewise, release of the 300 cfs minimum flow downstream would ensure that aquatic habitats of the downstream area would also be maintained and reflect existing conditions over the future license term.

4.8.2 Entrainment and Turbine Survival

Downstream resident fish entrainment potential and eventual turbine passage exists at the Project. However, the data and analysis presented by the co-Licensees presented in the *Desktop Entrainment and Turbine Survival Study* and briefly discussed above indicate the risk of entrainment for each target species is greatest for the smaller size species and individuals (such as

juveniles) that occur near the reservoir shore and that lack the swimming ability to overcome intake velocities. Nonetheless, the overall potential for entrainment is 'low' because most individuals of the target species exhibit swimming performance that would allow them to overcome the intake velocity and are not likely to reside in the powerhouse intake area.

For the species and life stages or sizes of individuals that do pass downstream via turbines, the blade strike model developed by Franke et al. (1997) demonstrate passage survival ranges from 89.5% (juvenile largemouth bass 8-inches in length) to 99.3% for all individuals 1-inch in length. All individuals that entrain into the Project turbines would experience high passage survival, greater than 89.5%.

Therefore, because the co-Licensees are not proposing changes to the Project layout or how the Project is operated, entrainment potential during the next license term would continue to be low and reflect the existing condition. For those species that become entrained, high turbine passage survival is expected. As such, the expected impact on the existing fish community of continued operation of the Project over the next license term would be negligible and reflect the existing low entrainment potential and high turbine passage survival.

4.8.3 Freshwater Mussels, Other Benthic Macroinvertebrates, and Minimum Flow

Past and recent mussel surveys performed throughout the Dan River and in Project area revealed that the freshwater mussel species present are native and relatively common. Because the Project is proposing to continue to operate in run-of-river mode as currently licensed, the Project will likely have no effect on the existing freshwater mussel and BMI communities in the vicinity of the Project and provide a similar level of protection as the existing condition.

4.8.4 Sediment Flushing

Potential effects associated with sediment flushing activities would primarily be related to the deposition and siltation of aquatic habitats used by species that construct nests for spawning downstream of the Project, such as centrarchids. Under the co-Licensees' proposal, sediment would be passed at flows higher than 3,000 cfs, and during the November 1 through February 28 period to avoid impacts on aquatic biota, and less frequently than currently licensed. Flushing the sediment during high flows would reduce the risk of adverse impacts attributable to deposition and siltation because under higher flows, the sediment transport capacity is higher, and would be dispersed more widely. Likewise, flushing sediment and during the November 1 through February 28 period would protect aquatic habitat from siltation and smothering during critical life cycle periods. Performing sediment flushing on an as-needed basis over the license term rather than annually would also provide a greater level of protection because the frequency of the effects of sediment flushing, albeit minor and short in duration. would be further reduced.

4.8.5 Reservoir Dewatering

The co-Licensees propose to continue the current license condition (License Article 403) related to reservoir dewatering to inspect the City of Danville's municipal water supply intakes. License Article 403 requires notification and coordination among resource agencies and the USACE and to provide a downstream minimum flow of 440 cfs as a 24-hour average during reservoir refilling.

During refill periods, the instantaneous minimum flow of 300 cfs, or inflow would be maintained at all times. In addition, dewatering and refilling is proposed to only occur during the November 1 through February 28 period to avoid impacts on aquatic biota. At the time the License Order was issued, the City of Danville's water supply intakes were immediately next to the Project turbine intakes. Since then, the City of Danville relocated their municipal water supply intake approximately 0.1 river mile upstream of the Project and sealed off the intakes at the Project's powerhouse. The relocated intake is constructed in such a manner that dewatering the reservoir will be needed less frequently for maintenance and inspections. The co-Licensees' proposal to perform reservoir dewatering on an as-needed basis, rather than annually, would provide a similar level protection to water resources as to what is currently afforded under the existing license. The co-Licensees anticipate any impacts would reflect the existing condition or be minor and short in duration.

5 WILDLIFE RESOURCES

The upland habitat along the approximate reservoir shoreline of the Dan River consists of oak-hickory forests, within sparsely developed suburban areas with some open fields and more rural farmland. A diversity of animals could be expected to occur in the Project vicinity. A list of mammals, amphibians, reptiles, and bird species that may occur in the Project area was compiled using the VDWR's Virginia Fish and Wildlife Information Service on-line tool (http://vafwis.org/fwis), using a 3-mile search radius around the mid-point of the Project reservoir (36.584130, -79.482776), which encompasses the current Project boundary (Tables 5-1 through 5-4). Wildlife likely to occur in the Project vicinity include white-tailed deer, eastern cottontail rabbit, gray fox, raccoon, eastern gray squirrel, various songbirds, and waterfowl (FERC, 1994). While conducting water and fisheries resources field studies, biologists observed muskrats, evidence of beaver in the form of large, gnawed trees, tracks of deer, racoon, and opossum along the shore, and northern water snakes basking on ledge outcrops near the upper reservoir.

5.1 Bald and Golden Eagles

During the installation of the water level and water quality monitoring equipment in June of 2020 as a part of the flow assessment and water quality studies, the co-Licensees contracted biologists observed a single bald eagle perched in a tree along the shoreline of the Project reservoir. In addition, the e-bird data mapping tool (ebird.org) indicates regular observations of bald eagles along the Dan River in the Project vicinity; as recent as October 7, 2021.[25] The e-bird data mapping tool indicated no observation of golden eagles in the Project vicinity.

While implementing the flow assessment and water quality monitoring studies, no bald eagle nests were observed by boat along the Project reservoir. In addition, no eagle nests were observed along the Project reservoir while traveling by boat to reach the upstream Roanoke logperch sampling reach (see section 8.3, *Roanoke Logperch Survey and Habitat Assessment*) in the summer of 2021. An examination of the Center for Conservation Biology's (CCB) Eagle Nest Locator (https://www.ccbbirds.org/maps/) indicates there are no reported bald eagle nests in the Project area. The CCB Eagle Nest Locator indicates the closet bald eagle nest relative to the Project is near South Boston, VA (36.72407, -78.816905)[26] along the Banister River.

5.2 Wildlife Habitat Plan

In accordance with existing license article 405, the co-Licensees implement a revised Wildlife Habitat Plan (WHP) filed with the Commission on March 22, 1995, and by order Modifying and Approving Revised Wildlife Habitat Plan dated January 18, 1996.[27] Under the WHP, the co-Licensees provided and maintained 30 wood duck nesting boxes in clusters of three spaced approximately every 50 to 100 feet between clusters along the Project's islands and backwater areas. The WHP required the nesting boxes to be cleaned yearly by the removal of old nests, eggshells, and replacement of nesting material in December. The WHP also required monthly monitoring of the nesting boxes during the nesting season (January to July) to determine the extent

[25] Observed by J. Blalock from the Riverwalk Trail near the Main Street Bridge.
[26] The last year this nest was checked was in 2016 and was observed to be occupied.
[27] FERC Accession No. 19950327-0387.

of use. After five years of implementing the WHP, the co-Licensees filed a monitoring report with the USFWS and VDWR as well as with the Commission to document the success of the WHP. That report indicates that no wood duck used the nesting boxes.

Table 5-1. Mammal species with the potential to occur in the Project area.

Common Name	Scientific Name
Opossum, Virginia	*Didelphis virginiana virginiana*
Shrew, southeastern	*Sorex longirostris longirostris*
Shrew, American pygmy	*Sorex hoyi*
Shrew, northern short-tailed	*Blarina brevicauda kirtlandi*
Shrew, least	*Cryptotis parva*
Mole, eastern	*Scalopus aquaticus aquaticus*
Bat, little brown	*Myotis lucifugus*
Bat, northern long-eared	*Myotis septentrionalis*
Bat, silver-haired	*Lasionycteris noctivagans*
Bat, tri-colored[1]	*Perimyotis subflavus*
Bat, big brown	*Eptesicus fuscus*
Bat, eastern red	*Lasiurus borealis*
Bat, hoary	*Lasiurus cinereus*
Bear, American black	*Ursus americanus*
Raccoon	*Procyon lotor lotor*
Weasel, least	*Mustela nivalis allegheniensis*
Weasel, long-tailed	*Mustela frenata noveboracensis*
Mink, common	*Neovison vison mink*
Otter, northern river	*Lontra canadensis lataxina*
Skunk, striped	*Mephitis mephitis mephitis*
Fox, red	*Vulpes vulpes fulva*
Fox, common gray	*Urocyon cinereoargenteus cinereoargenteus*
Bobcat	*Lynx rufus rufus*
Woodchuck	*Marmota monax monax*
Chipmunk, Fisher's eastern	*Tamias striatus fisheri*
Squirrel, eastern gray	*Sciurus carolinensis carolinensis*
Squirrel, eastern fox	*Sciurus niger vulpinus*
Squirrel, southern flying	*Glaucomys volans volans*
Beaver, American	*Castor canadensis*
Mouse, eastern harvest	*Reithrodontomys humulis humulis*
Mouse, northern white-footed	*Peromyscus leucopus noveboracensis*
Mouse, common white-footed	*Peromyscus leucopus leucopus*
Mouse, Lewis' golden	*Ochrotomys nuttalli nuttalli*

Common Name	**Scientific Name**
Rat, hispid cotton	*Sigmodon hispidus virginianus*
Vole, meadow	*Microtus pennsylvanicus pennsylvanicus*
Vole, southern red-backed	*Myodes gapperi*
Vole, common pine	*Microtus pinetorum pinetorum*
Muskrat, large-toothed	*Ondatra zibethicus macrodon*
Rat, Norway	*Rattus norvegicus norvegicus*
Mouse, house	*Mus musculus musculus*
Mouse, meadow jumping	*Zapus hudsonius americanus*
Cottontail, eastern	*Sylvilagus floridanus mallurus*
Deer, white-tailed	*Odocoileus virginianus*
Beaver, Carolina	*Castor canadensis carolinensis*
Coyote	*Canis latrans*

Source: VDGIF (2019)

Table 5-2. Bird species with the potential to occur in the Project area.

Common Name	Scientific Name
Grebe, pied-billed	*Podilymbus podiceps*
Cormorant, double-crested	*Phalacrocorax auritus*
Heron, great blue	*Ardea herodias herodias*
Heron, green	*Butorides virescens*
Egret, cattle	*Bubulcus ibis*
Egret, great	*Ardea alba egretta*
Night-heron, black-crowned	*Nycticorax nycticorax hoactii*
Night-heron, yellow-crowned	*Nyctanassa violacea violacea*
Goose, Canada	*Branta canadensis*
Mallard	*Anas platyrhynchos*
Duck, American black	*Anas rubripes*
Teal, green-winged	*Anas crecca carolinensis*
Duck, wood	*Aix sponsa*
Vulture, turkey	*Cathartes aura*
Vulture, black	*Coragyps atratus*
Hawk, sharp-shinned	*Accipiter striatus velox*
Hawk, Cooper's	*Accipiter cooperii*
Hawk, red-tailed	*Buteo jamaicensis*
Hawk, red-shouldered	*Buteo lineatus lineatus*
Hawk, broad-winged	*Buteo platypterus*
Hawk, rough-legged	*Buteo lagopus johannis*
Eagle, bald	*Haliaeetus leucocephalus*
Harrier, northern	*Circus cyaneus*
Osprey	*Pandion haliaetus carolinensis*
Kestrel, American	*Falco sparverius sparverius*
Grouse, ruffed	*Bonasa umbellus*
Bobwhite, northern	*Colinus virginianus*
Pheasant, ring-necked	*Phasianus colchicus*
Turkey, wild	*Meleagris gallopavo silvestris*
Rail, king	*Rallus elegans*
Rail, Virginia	*Rallus limicola*
Moorhen, common	*Gallinula chloropus cachinnans*

Common Name	**Scientific Name**
Coot, American	*Fulica americana*
Killdeer	*Charadrius vociferus*
Sandpiper, upland	*Bartramia longicauda*
Yellowlegs, greater	*Tringa melanoleuca*
Sandpiper, solitary	*Tringa solitaria*
Sandpiper, spotted	*Actitis macularia*
Woodcock, American	*Scolopax minor*
Snipe, Wilson's	*Gallinago delicata*
Dowitcher, short-billed	*Limnodromus griseus*
Gull, great black-backed	*Larus marinus*
Gull, herring	*Larus argentatus*
Tern, Caspian	*Sterna caspia*
Pigeon, rock	*Columba livia*
Dove, mourning	*Zenaida macroura carolinensis*
Cuckoo, yellow-billed	*Coccyzus americanus*
Owl, barn	*Tyto alba pratincola*
Screech-owl, eastern	*Megascops asio*
Owl, great horned	*Bubo virginianus*
Owl, barred	*Strix varia*
Owl, short-eared	*Asio flammeus*
Chuck-will's-widow	*Antrostomus carolinensis*
Whip-poor-will, Eastern	*Antrostomus vociferus*
Nighthawk, common	*Chordeiles minor*
Swift, chimney	*Chaetura pelagica*
Hummingbird, ruby-throated	*Archilochus colubris*
Kingfisher, belted	*Ceryle alcyon*
Flicker, northern	*Colaptes auratus*
Woodpecker, pileated	*Dryocopus pileatus*
Woodpecker, red-bellied	*Melanerpes carolinus*
Woodpecker, red-headed	*Melanerpes erythrocephalus*
Sapsucker, yellow-bellied	*Sphyrapicus varius*
Woodpecker, hairy	*Picoides villosus*
Woodpecker, downy	*Picoides pubescens medianus*
Kingbird, eastern	*Tyrannus tyrannus*

Common Name	**Scientific Name**
Flycatcher, great crested	*Myiarchus crinitus*
Phoebe, eastern	*Sayornis phoebe*
Flycatcher, Acadian	*Empidonax virescens*
Pewee, eastern wood	*Contopus virens*
Lark, horned	*Eremophila alpestris*
Swallow, northern rough-winged	*Stelgidopteryx serripennis*
Swallow, barn	*Hirundo rustica*
Martin, purple	*Progne subis*
Jay, blue	*Cyanocitta cristata*
Raven, common	*Corvus corax*
Crow, American	*Corvus brachyrhynchos*
Crow, fish	*Corvus ossifragus*
Chickadee, Carolina	*Poecile carolinensis*
Titmouse, tufted	*Baeolophus bicolor*
Nuthatch, white-breasted	*Sitta carolinensis*
Nuthatch, red-breasted	*Sitta canadensis*
Nuthatch, brown-headed	*Sitta pusilla*
Creeper, brown	*Certhia americana*
Wren, house	*Troglodytes aedon*
Wren, winter	*Troglodytes troglodytes*
Wren, Carolina	*Thryothorus ludovicianus*
Mockingbird, northern	*Mimus polyglottos*
Catbird, gray	*Dumetella carolinensis*
Thrasher, brown	*Toxostoma rufum*
Robin, American	*Turdus migratorius*
Thrush, wood	*Hylocichla mustelina*
Thrush, hermit	*Catharus guttatus*
Bluebird, eastern	*Sialia sialis*
Gnatcatcher, blue-gray	*Polioptila caerulea*
Kinglet, golden-crowned	*Regulus satrapa*
Kinglet, ruby-crowned	*Regulus calendula*
Waxwing, cedar	*Bombycilla cedrorum*
Shrike, migrant loggerhead	*Lanius ludovicianus migrans*
Shrike, loggerhead[1]	*Lanius ludovicianus*

Common Name	Scientific Name
Starling, European	*Sturnus vulgaris*
Vireo, white-eyed	*Vireo griseus*
Vireo, yellow-throated	*Vireo flavifrons*
Vireo, blue-headed	*Vireo solitarius*
Vireo, red-eyed	*Vireo olivaceus*
Vireo, warbling	*Vireo gilvus gilvus*
Warbler, black-and-white	*Mniotilta varia*
Warbler, prothonotary	*Protonotaria citrea*
Warbler, worm-eating	*Helmitheros vermivorus*
Warbler, blue-winged	*Vermivora cyanoptera*
Warbler, Nashville	*Oreothlypis ruficapilla*
Parula, northern	*Setophaga americana*
Warbler, yellow	*Setophaga petechia*
Warbler, magnolia	*Setophaga magnolia*
Warbler, black-throated blue	*Setophaga caerulescens*
Warbler, yellow-rumped	*Setophaga coronata*
Warbler, black-throated green	*Setophaga virens*
Warbler, cerulean	*Setophaga cerulea*
Warbler, yellow-throated	*Setophaga dominica*
Warbler, chestnut-sided	*Setophaga pensylvanica*
Warbler, blackpoll	*Setophaga striata*
Warbler, pine	*Setophaga pinus*
Warbler, prairie	*Setophaga discolor*
Warbler, palm	*Setophaga palmarum*
Ovenbird	*Seiurus aurocapilla*
Waterthrush, northern	*Parkesia noveboracensis*
Waterthrush, Louisiana	*Parkesia motacilla*
Warbler, Kentucky	*Geothlypis formosa*
Yellowthroat, common	*Geothlypis trichas*
Chat, yellow-breasted	*Icteria virens virens*
Warbler, hooded	*Setophaga citrina*
Warbler, Canada	*Cardellina canadensis*
Redstart, American	*Setophaga ruticilla*
Sparrow, house	*Passer domesticus*

Common Name	Scientific Name
Meadowlark, eastern	*Sturnella magna*
Blackbird, red-winged	*Agelaius phoeniceus*
Oriole, orchard	*Icterus spurius*
Oriole, Baltimore	*Icterus galbula*
Blackbird, rusty	*Euphagus carolinus*
Grackle, common	*Quiscalus quiscula*
Cowbird, brown-headed	*Molothrus ater*
Tanager, scarlet	*Piranga olivacea*
Tanager, summer	*Piranga rubra*
Cardinal, northern	*Cardinalis cardinalis*
Grosbeak, rose-breasted	*Pheucticus ludovicianus*
Grosbeak, blue	*Guiraca caerulea caerulea*
Bunting, indigo	*Passerina cyanea*
Dickcissel	*Spiza americana*
Grosbeak, evening	*Coccothraustes vespertinus*
Finch, purple	*Haemorhous purpureus*
Finch, house	*Haemorhous mexicanus*
Siskin, pine	*Spinus pinus*
Goldfinch, American	*Spinus tristis*
Crossbill, white-winged	*Loxia leucoptera*
Towhee, eastern	*Pipilo erythrophthalmus*
Sparrow, savannah	*Passerculus sandwichensis*
Sparrow, grasshopper	*Ammodramus savannarum pratensis*
Sparrow, vesper	*Pooecetes gramineus*
Junco, dark-eyed	*Junco hyemalis*
Sparrow, chipping	*Spizella passerina*
Sparrow, field	*Spizella pusilla*
Sparrow, white-crowned	*Zonotrichia leucophrys*
Sparrow, white-throated	*Zonotrichia albicollis*
Sparrow, fox	*Passerella iliaca*
Sparrow, swamp	*Melospiza georgiana*
Sparrow, song	*Melospiza melodia*

Source: VGIF (2019)

Table 5-3. Amphibian species with the potential to occur in the Project area.

Common Name	Scientific Name
Bullfrog, American	*Lithobates catesbeianus*
Treefrog, Cope's gray	*Hyla chrysoscelis*
Treefrog, gray	*Hyla versicolor*
Frog, green	*Lithobates clamitans*
Frog, eastern cricket	*Acris crepitans*
Frog, pickerel	*Lithobates palustris*
Frog, Coastal Plains leopard	*Lithobates sphenocephalus utricularius*
Frog, upland chorus	*Pseudacris feriarum*
Frog, wood	*Lithobates sylvaticus*
Salamander, mole	*Ambystoma talpoideum*
Salamander, four-toed	*Hemidactylium scutatum*
Salamander, marbled	*Ambystoma opacum*
Salamander, northern dusky	*Desmognathus fuscus*
Salamander, eastern red-backed	*Plethodon cinereus*
Salamander, spotted	*Ambystoma maculatum*
Salamander, southern two-lined	*Eurycea cirrigera*
Salamander, three-lined	*Eurycea guttolineata*
Toad, eastern American	*Anaxyrus americanus americanus*
Toad, eastern narrow-mouthed	*Gastrophryne carolinensis*
Spadefoot, eastern	*Scaphiopus holbrookii*
Toad, Fowler's	*Anaxyrus fowleri*
Newt, red-spotted	*Notophthalmus viridescens viridescens*
Salamander, eastern mud	*Pseudotriton montanus montanus*
Salamander, northern red	*Pseudotriton ruber ruber*
Peeper, spring	*Pseudacris crucifer*
Salamander, seal	*Desmognathus monticola*
Salamander, northern spring	*Gyrinophilus porphyriticus porphyriticus*
Salamander, white-spotted slimy	*Plethodon cylindraceus*

Source: VGIF (2019)

Table 5-4. Reptile species with the potential to occur in the Project area.

Common Name	Scientific Name
Lizard, eastern fence	*Sceloporus undulatus*
Skink, common five-lined	*Plestiodon fasciatus*
Skink, southeastern five-lined	*Plestiodon inexpectatus*
Skink, broad-headed	*Plestiodon laticeps*
Skink, little brown	*Scincella lateralis*
Racerunner, eastern six-lined	*Aspidoscelis sexlineata sexlineata*
Rattlesnake, timber	*Crotalus horridus*
Copperhead, eastern	*Agkistrodon contortrix*
Scarletsnake, northern	*Cemophora coccinea copei*
Racer, northern black	*Coluber constrictor constrictor*
Wormsnake, eastern	*Carphophis amoenus amoenus*
Snake, northern ring-necked	*Diadophis punctatus edwardsii*
Cornsnake, red	*Pantherophis guttatus*
Ratsnake, eastern	*Pantherophis alleghaniensis*
Snake, eastern hog-nosed	*Heterodon platirhinos*
Kingsnake, eastern	*Lampropeltis getula*
Kingsnake, northern mole	*Lampropeltis calligaster rhombomaculata*
Milksnake, eastern	*Lampropeltis triangulum*
Kingsnake, scarlet	*Lampropeltis elapsoides*
Snake, queen	*Regina septemvittata*
Watersnake, northern	*Nerodia sipedon sipedon*
Greensnake, northern rough	*Opheodrys aestivus aestivus*
Brownsnake, Dekay's	*Storeria dekayi*
Snake, northern red-bellied	*Storeria occipitomaculata occipitomaculata*
Snake, southeastern crowned	*Tantilla coronata*
Gartersnake, eastern	*Thamnophis sirtalis sirtalis*
Ribbonsnake, common	*Thamnophis sauritus sauritus*
Earthsnake, eastern smooth	*Virginia valeriae valeriae*
Turtle, snapping	*Chelydra serpentina*
Turtle, southeastern mud	*Kinosternon subrubrum subrubrum*
Turtle, eastern musk	*Sternotherus odoratus*

Common Name	**Scientific Name**
Cooter, eastern river	*Pseudemys concinna concinna*
Turtle, eastern painted	*Chrysemys picta picta*
Turtle, woodland box	*Terrapene carolina carolina*

Source: VGIF (2019)

5.3 Wildlife Resources Study Requests and Results

The co-Licensees received one study request related to wildlife resources: the USFWS requested the co-Licensees perform a survey for bald eagle nests in the Project area. The co-Licensees elected to adopt with modification the requested bald eagle survey. The co-Licensees' justification for adopting the study with modification is provided in section 2.1 of the Draft Study Plan (DSP), submitted to the resource agencies (Attachment 1). The co-Licensees subsequently held a study plan conference call with stakeholders, received comments on DSP, and prepared and distributed to the resource agencies a Final Study Plan, which contained responses to comments on the draft study plan (see section 2.0 of the FSP [Attachment 2]). As a result of the study planning and consultation process, the co-Licensees did not perform a bald eagle survey but rather allocated the cost and effort to other adopted studies.

5.4 Proposed Protection, Mitigation, and Enhancement Measures for Wildlife Resources

If the co-Licensees are notified that a bald eagle nest is confirmed to be within 660 ft of the Project boundary, the co-Licensees will, in consultation with the resource agencies, discuss the need to prepare a bald eagle management plan.

In their June 24, 2022 comment letter, the USFWS recommended that a bald eagle management plan be developed as part of a protection, mitigation, or enhancement measure so that the co-Licensees will have a plan in place if/when a bald eagle is encountered within or near the Project boundary.

The co-Licensees do, however, propose to remove the requirement for License Article 405. License Article 405 required a Wildlife Habitat Plan that concerned wood duck nesting boxes and monitoring. The co-Licensees propose to remove this license article from the future license because no wood duck was observed using the nesting boxes.

5.5 Description of Continuing Impacts on Wildlife Resources by Continued Project Operation

5.5.1 Operation and Maintenance Activity

The co-Licensees propose to continue to operate the Project in a run-of-river mode with a 300 cfs minimum flow requirement and will continue to maintain the Project consistent with current practices. Therefore, effects due to Project operation and maintenance on wildlife resources would be negligible and similar to existing conditions.

5.5.2 Bald Eagles

Incidental observations of bald eagles by the co-Licensees' consultant field staff and birding hobbyists indicate that protected birds frequent the Danville area. However, no bald eagle nests have been observed by either the co-Licensees' consultant field staff or the CCB, which suggests the bald eagles observed in the area do not have a nest in the immediate Project area. Because existing information indicates that bald eagles do occur around the Project boundary, but no nests

have been confirmed, the co-Licensees affirm that continued operation and maintenance activities would not adversely impact the bald eagles that venture into the Project boundary. If, however, the resource agencies notify the co-Licensees that a bald eagle nest is confirmed to be within 660 ft of the Project boundary, the co-Licensees will, in consultation with the resource agencies, discuss the need to prepare a bald eagle management plan.

5.5.3 Wildlife Habitat Plan

The co-Licensees' proposal to remove the License Article 405 will not impact the wildlife habitat it was originally intended to enhance (wood duck nesting) because no wood duck utilized the nesting boxes installed, monitored, and maintained by the co-Licensees.

6 BOTANICAL RESOURCES

The Project is situated within the Northern Inner Piedmont ecoregions (Wood et al. 1999). The Piedmont ecoregion is typically defined as being an oak and hickory dominated forest with tree species varying due to soil moisture and their position on slope. Dominant tree species include hickory (*Carya* spp.), shortleaf pine (*Pinus echinata*), loblolly pine (*Pinus taeda*), white oak (*Quercus alba*) and post oak (*Quercus stellata*) (Woods et al. 1999). Other trees commonly found in the Piedmont ecoregion of the Project area are maple, tulip poplar, sycamore, black walnut, butternut, black willow, box elder, red cedar, black locust, wildcherry, hickory, American beech, red maple, black gum, white oak, post oak, chestnut oak, black oak, red oak, Virginia pine, shortleaf pine, white pine, loblolly pine, mulberry, hemlock, sourwood, and persimmon. Major understory species include dogwood, American holly, American redbud, honeysuckle, papaw, musclewood, sassafras, huckleberry, hackberry, elderberry, gooseberry, pokeberry, Queen Anne's lace, ironweed, white fringe, juniper, goldenrod, moccasin flower, rhododendron, laurel, flaming azalea, milkweed, ferns, mosses, liverworts, and a myriad of small flowering plants (VDCR, 2016a). Vines that are common to the area are wild yam, greenbrier, trumpet vine, Virginia creeper, wild grape, poison ivy, honeysuckle, virgin's bower, yellow jasmine, and blackberry (VDCR, 2016b).

6.1 Invasive Species

To determine if any invasive species have been observed in the Project area, the Early Detection and Distribution Mapping System (EDDMaps.org), which is a tool for citizen scientists, students, and volunteer projects for basic mapping of invasive species locations, was queried. This search revealed that within the EDDMaps.org database there were over 200 reported invasive aquatic and terrestrial plant species occurring within Pittsylvania County (Table 6.1-1). The closest observations to the Project were common chickweed, white clover, and henbit, which were recorded approximately 6 miles to the north of the Project. In addition, Callery Pear was recorded approximately 10 miles to the east of the Project.

6.2 Botanical Resources Study Requests and Results

The co-Licensees did not receive any study requests pertaining to botanical resources within the Project area.

6.3 Proposed Protection, Mitigation, and Enhancement Measures for Botanical Resources

The co-Licensees do not propose any PME measures relative to botanical resources.

In their June 24, 2022 comment letter, the USFWS recommended that a PME measure be included in the license that includes the development of an Invasive Species Management Plan.

6.4 Description of Continuing Impacts on Botanical Resources by Continued Project Operation

6.4.1 Operation and Maintenance Activity

The co-Licensees propose to continue to operate the Project in a run-of-river mode with a 300 cfs minimum flow requirement and will continue to maintain the Project consistent with current practices. Most of the upland area within the Project boundary is located around the Project dam, forebay, access road and powerhouse areas, as the Project boundary follows the shoreline elevation of the reservoir. Existing vegetation management activities at the Project include mowing, which occurs approximately every week, in grassy areas within the Schoolfield parcel along the access road to the powerhouse and forebay area, as well as near the substation, which is located just downstream of the powerhouse. Mowing typically occurs in the months of April through October. Vegetation on the northerly Project dam abutment and within sediment filled areas adjacent to and within the forebay are treated with an environmentally safe, aquatic-friendly herbicide, typically twice a year (once in spring and once in fall). Therefore, effects due to Project operation and maintenance on botanical resources would be negligible and similar to the existing condition.

Table 6.1-1: Invasive Aquatic and Terrestrial Plants in the Vicinity of the Project

Common Name	Scientific Name
alfalfa	*Medicago sativa*
alsike clover	*Trifolium hybridum*
annual bluegrass	*Poa annua*
annual wormwood	*Artemisia annua*
apple-of-Peru	*Nicandra physalodes*
Asiatic dayflower	*Commelina communis*
asparagus	*Asparagus officinalis*
bald brome	*Bromus racemosus*
barnyardgrass	*Echinochloa crus-galli*
bermudagrass	*Cynodon dactylon*
big chickweed	*Cerastium fontanum ssp. vulgare*
big periwinkle	*Vinca major*
birdsrape mustard	*Brassica rapa*
bittersweet nightshade	*Solanum dulcamara*
black medic	*Medicago lupulina*
bouncingbet	*Saponaria officinalis*
bristlegrass	*Setaria spp.*
broadleaf dock	*Rumex obtusifolius*
buckhorn plantain	*Plantago lanceolata*
buckwheat	*Fagopyrum esculentum*
bulbous buttercup	*Ranunculus bulbosus*
bull thistle	*Cirsium vulgare*
bush honeysuckles (exotic)	*Lonicera spp.*
bushy wallflower	*Erysimum repandum*
butternut canker	*Ophiognomonia clavigignenti-juglandacearum*
Callery pear (Bradford pear)	*Pyrus calleryana*
Canada bluegrass	*Poa compressa*
catnip	*Nepeta cataria*
cheatgrass, downy brome	*Bromus tectorum*
chestnut blight or canker	*Cryphonectria parasitica*
chicory	*Cichorium intybus*
chinaberry	*Melia azedarach*
Chinese privet	*Ligustrum sinense*
Chinese silvergrass	*Miscanthus sinensis*
Chinese yam	*Dioscorea polystachya*
coltsfoot	*Tussilago farfara*
common chickweed	*Stellaria pallida*
common cornsalad	*Valerianella locusta*
common dandelion	*Taraxacum officinale ssp. officinale*

Common Name	**Scientific Name**
common groundsel	*Senecio vulgaris*
common mallow	*Malva neglecta*
common mouse-ear chickweed	*Cerastium fontanum*
common mullein	*Verbascum thapsus*
common periwinkle	*Vinca minor*
common salsify	*Tragopogon porrifolius*
common speedwell	*Veronica officinalis*
common St. Johnswort	*Hypericum perforatum*
common velvetgrass	*Holcus lanatus*
common vetch	*Vicia sativa*
common viper's bugloss, blueweed	*Echium vulgare*
corn chamomile	*Anthemis arvensis*
corn cockle	*Agrostemma githago*
corn gromwell	*Buglossoides arvensis*
corn poppy	*Papaver rhoeas*
corn speedwell	*Veronica arvensis*
cornflower	*Centaurea cyanus*
creeping yellow loosestrife, creeping Jenny	*Lysimachia nummularia*
cucurbit downy mildew	*Pseudoperonospora cubensis*
curly dock	*Rumex crispus ssp. crispus*
curly leaf pondweed	*Potamogeton crispus*
cutleaf geranium	*Geranium dissectum*
cypress spurge	*Euphorbia cyparissias*
dallisgrass	*Paspalum dilatatum*
Deptford pink	*Dianthus armeria*
doubtful knight's-spur	*Consolida ajacis*
Elaeagnus	*Elaeagnus spp.*
everlasting peavine	*Lathyrus latifolius*
false strawberry	*Potentilla indica*
field bindweed	*Convolvulus arvensis*
field brome	*Bromus arvensis*
field madder	*Sherardia arvensis*
field pennycress	*Thlaspi arvense*
field pepperweed	*Lepidium campestre*
foxtail millet	*Setaria italica*
garlic mustard	*Alliaria petiolata*
germander speedwell	*Veronica chamaedrys*
giant foxtail	*Setaria faberi*
goosegrass	*Eleusine indica*
greater celandine	*Chelidonium majus*

Common Name	Scientific Name
green bristlegrass	*Setaria viridis var. viridis*
green foxtail	*Setaria viridis*
ground ivy	*Glechoma hederacea*
hairy cat's ear	*Hypochaeris radicata*
hairy galinsoga	*Galinsoga quadriradiata*
hairy nightshade	*Solanum physalifolium*
hairy vetch	*Vicia villosa*
hare's ear	*Bupleurum rotundifolium*
hedge bindweed	*Calystegia sepium*
hedge mustard	*Sisymbrium officinale*
henbit	*Lamium amplexicaule*
hop clover	*Trifolium aureum*
hydrilla	*Hydrilla verticillata*
ivyleaf morning-glory	*Ipomoea hederacea*
ivyleaf speedwell	*Veronica hederifolia*
Japanese clover	*Kummerowia striata*
Japanese honeysuckle	*Lonicera japonica*
Japanese hop	*Humulus japonicus*
Japanese knotweed	*Reynoutria japonica*
Japanese privet	*Ligustrum japonicum*
Japanese stiltgrass	*Microstegium vimineum*
jimsonweed	*Datura stramonium*
johnsongrass	*Sorghum halepense*
junglerice	*Echinochloa colona*
kingdevil hawkweed	*Hieracium piloselloides*
Korean lespedeza	*Kummerowia stipulacea*
kudzu	*Pueraria montana var. lobata*
kudzu	*Pueraria montana*
Kummerowia	*Kummerowia spp.*
ladysthumb	*Persicaria maculosa*
lambsquarters	*Chenopodium album*
large crabgrass	*Digitaria sanguinalis*
large hop clover	*Trifolium campestre*
leatherleaf mahonia	*Mahonia bealei*
lesser swinecress	*Coronopus didymus*
little starwort	*Stellaria graminea*
meadow fescue	*Festuca pratensis*
meadow hawkweed	*Hieracium caespitosum*
mexicantea	*Dysphania ambrosioides*
mimosa	*Albizia julibrissin*

Common Name	**Scientific Name**
Morrow's honeysuckle	*Lonicera morrowii*
moth mullein	*Verbascum blattaria*
motherwort	*Leonurus cardiaca*
mugwort	*Artemisia vulgaris*
multiflora rose	*Rosa multiflora*
musk thistle, nodding thistle	*Carduus nutans*
orchardgrass	*Dactylis glomerata*
Oriental lady's thumb	*Polygonum posumbu*
Oriental lady's thumb	*Persicaria longiseta*
oxeye daisy	*Leucanthemum vulgare*
paper-mulberry	*Broussonetia papyrifera*
peppermint	*Mentha x piperita*
perennial ryegrass	*Lolium perenne*
perilla mint	*Perilla frutescens*
periwinkle	*Vinca spp.*
Phytophthora root rot	*Phytophthora cinnamomi*
plumeless thistle	*Carduus spp.*
poison hemlock	*Conium maculatum*
prickly lettuce	*Lactuca serriola*
princesstree	*Paulownia tomentosa*
privet	*Ligustrum spp.*
prostrate knotweed	*Polygonum aviculare*
purple crown-vetch	*Securigera varia*
purple deadnettle	*Lamium purpureum*
quackgrass	*Elymus repens*
Queen Anne's lace, wild carrot	*Daucus carota*
rabbitfoot clover	*Trifolium arvense*
rattail fescue	*Vulpia myuros*
red clover	*Trifolium pratense*
red morning-glory	*Ipomoea coccinea*
red sorrel	*Rumex acetosella*
redstem filaree	*Erodium cicutarium*
redstem stork's bill	*Erodium cicutarium ssp. cicutarium*
redtop	*Agrostis gigantea*
reed canarygrass	*Phalaris arundinacea*
rescuegrass	*Bromus catharticus*
roughstalk bluegrass	*Poa trivialis*
scarlet pimpernel	*Anagallis arvensis*
Scotch broom	*Cytisus scoparius*
sericea lespedeza	*Lespedeza cuneata*

Common Name	Scientific Name
shepherd's-purse	*Capsella bursa-pastoris*
shrubby lespedeza	*Lespedeza bicolor*
small carpetgrass, joint-head grass	*Arthraxon hispidus*
small hop clover	*Trifolium dubium*
smallflower sweetbrier	*Rosa micrantha*
smallseed falseflax	*Camelina microcarpa*
smooth crabgrass	*Digitaria ischaemum*
spiny sowthistle	*Sonchus asper*
spotted knapweed	*Centaurea stoebe ssp. micranthos*
spring whitlowgrass	*Draba verna*
starch grape hyacinth	*Muscari neglectum*
star-of-Bethlehem	*Ornithogalum umbellatum*
sticky chickweed	*Cerastium glomeratum*
stinking chamomile	*Anthemis cotula*
sulfur cinquefoil	*Potentilla recta*
summer snowflake	*Leucojum aestivum*
sweet cherry	*Prunus avium*
sweet vernalgrass	*Anthoxanthum odoratum*
tall fescue	*Festuca arundinacea*
tall morning-glory	*Ipomoea purpurea*
tall oatgrass	*Arrhenatherum elatius*
tawny daylily	*Hemerocallis fulva*
thoroughwort pennycress	*Microthlaspi perfoliatum*
thymeleaf sandwort	*Arenaria serpyllifolia*
thymeleaf speedwell	*Veronica serpyllifolia*
thymeleaf speedwell	*Veronica serpyllifolia ssp. serpyllifolia*
tree-of-heaven	*Ailanthus altissima*
trifoliate orange	*Citrus trifoliata*
vaseygrass	*Paspalum urvillei*
velvetleaf	*Abutilon theophrasti*
Venice mallow	*Hibiscus trionum*
wallflower mustard	*Erysimum cheiranthoides*
western salsify	*Tragopogon dubius*
white campion	*Silene latifolia*
white clover	*Trifolium repens*
white cockle	*Silene latifolia ssp. alba*
white mulberry	*Morus alba*
white poplar	*Populus alba*
wild garlic	*Allium vineale*
wild radish	*Raphanus raphanistrum*

Common Name	**Scientific Name**
winter creeper	*Euonymus fortunei*
wisterias	*Wisteria spp.*
yellow devil hawkweed	*Hieracium x floribundum*
yellow foxtail	*Setaria pumila*
yellow rocket	*Barbarea vulgaris*
yellow sweet-clover	*Melilotus officinalis*
yellow toadflax	*Linaria vulgaris*

7 WETLANDS, RIPARIAN AND LITTORAL HABITAT RESOURCES

Wetland, riparian, and littoral habitats within the Project boundary are associated with the margin and nearshore areas of the impoundment, bypassed reach, and downstream of the Project powerhouse. The USFWS classification scheme for wetlands serves as the national standard for wetland classification and has been used to classify wetlands appearing in the National Wetlands Inventory (NWI). USFWS (Cowardin et al. 1979) defines wetlands as

> [...] lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. For the purpose of the classification, wetlands must have one or more of these three attributes: (1) at least periodically, the land must support predominantly wetland plants; (2) the substrate is predominantly undrained hydric soil; and (3) rocky, gravelly, or sandy areas that are saturated with or covered by shallow water at some time during the growing season.

Information with regard to the location and spatial extent of wetland resources in the current Project boundary were obtained from the NWI and are presented in Figure 7-1 and summarized in Table 7-1. Within the current Project boundary there are three wetland types: riverine (233.2 acres), freshwater forested/shrub (6.6 acres), and freshwater emergent (1.8 acres). Within the proposed Project boundary there are two wetland types: freshwater emergent (0.8 acres) and riverine (194.8 acres). A desktop analysis using aerial imagery observed two pond areas near Shoreham Rd (shown on Map 2 of Figure 7-1) that is not included in NWI data. These two pond areas, which are within the proposed Project boundary, total approximately 7.0 acres. The current Project boundary includes 1.3 acres of these ponds.

Riparian habitat is located along streams and rivers and provides important ecosystem functions related to hydrology and flooding, nutrient cycling, and plant and wildlife habitat. Vegetated riparian habitat within the Project vicinity is primarily forested and intact except the shoreline in the immediate vicinity along river right shoreline upstream of the powerhouse. Figures 7-2 to 7-5 show the intact forested riparian shoreline of the Project reservoir, tailwater area, and downstream.

Littoral habitat in the Project area occurs in the reservoir, tailrace, and downstream of the Project where light can penetrate to the bottom and rooted vegetation can survive.

Table 7-1. NWI Wetlands within the current and proposed Project boundary.

NWI Type	NWI Code	NWI Description	Area in Project Boundary (acres)		
			Existing [1]	Proposed	Difference
Freshwater Emergent Wetland	PEM1/FO1A	Palustrine, emergent, persistent, forested, broad-leaved deciduous, temporary flooded	1.0	0.5	-0.5
	PEM1C	Palustrine, emergent, persistent, seasonally flooded	0.5	0.3	-0.2
	PEM1Cx	Palustrine, emergent, persistent, seasonally flooded, excavated	0.3	0	-0.3
	Total Area		1.8	0.8	-1.0
Freshwater Forested/Shrub Wetland	PFO1A	Palustrine, forested, broad-leaved deciduous, temporary flooded	2.2	0	-2.2
	PFO1C	Palustrine, forested, broad-leaved deciduous, seasonally flooded	4.2	0	-4.2
	PFO1Ch	Palustrine, forested, broad-leaved deciduous, seasonally flooded, diked/impounded	0.2	0	-0.2
	PSS1C	Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded	0.1	0	-0.1
	Total Area		6.6	0	-6.6
Riverine	R2UBH	Riverine, lower perennial, unconsolidated bottom, permanently flooded	227.8	191.8	-36.0
	R2UBHx	Riverine, lower perennial, unconsolidated bottom, permanently flooded, excavated	2.0	1.9	-0.1
	R2USA	Riverine, lower perennial, unconsolidated shore, temporary flooded	0.7	0.7	0.0
	R4SBC	Riverine, intermittent, streambed, seasonally flooded	1.3	0.1	-1.2
	R5UBH	Riverine, unknown perennial, unconsolidated bottom, permanently flooded	1.4	0.3	-1.1
	Total Area		233.2	194.8	-38.4

1. Area of NWI wetlands within the current project boundary are from STS and City (2019).

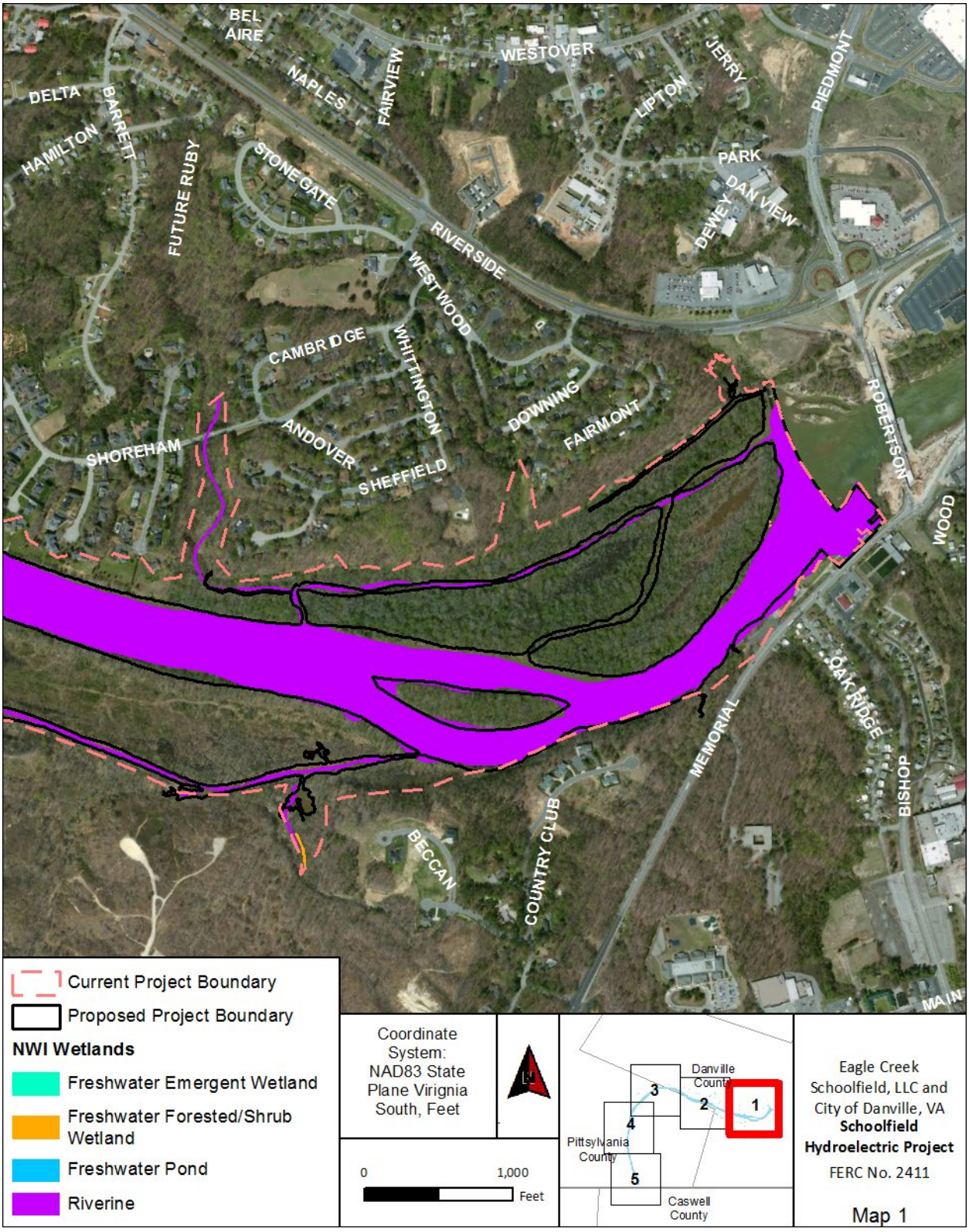


Figure 7-1. Wetlands in the current and proposed Project boundary Map 1.

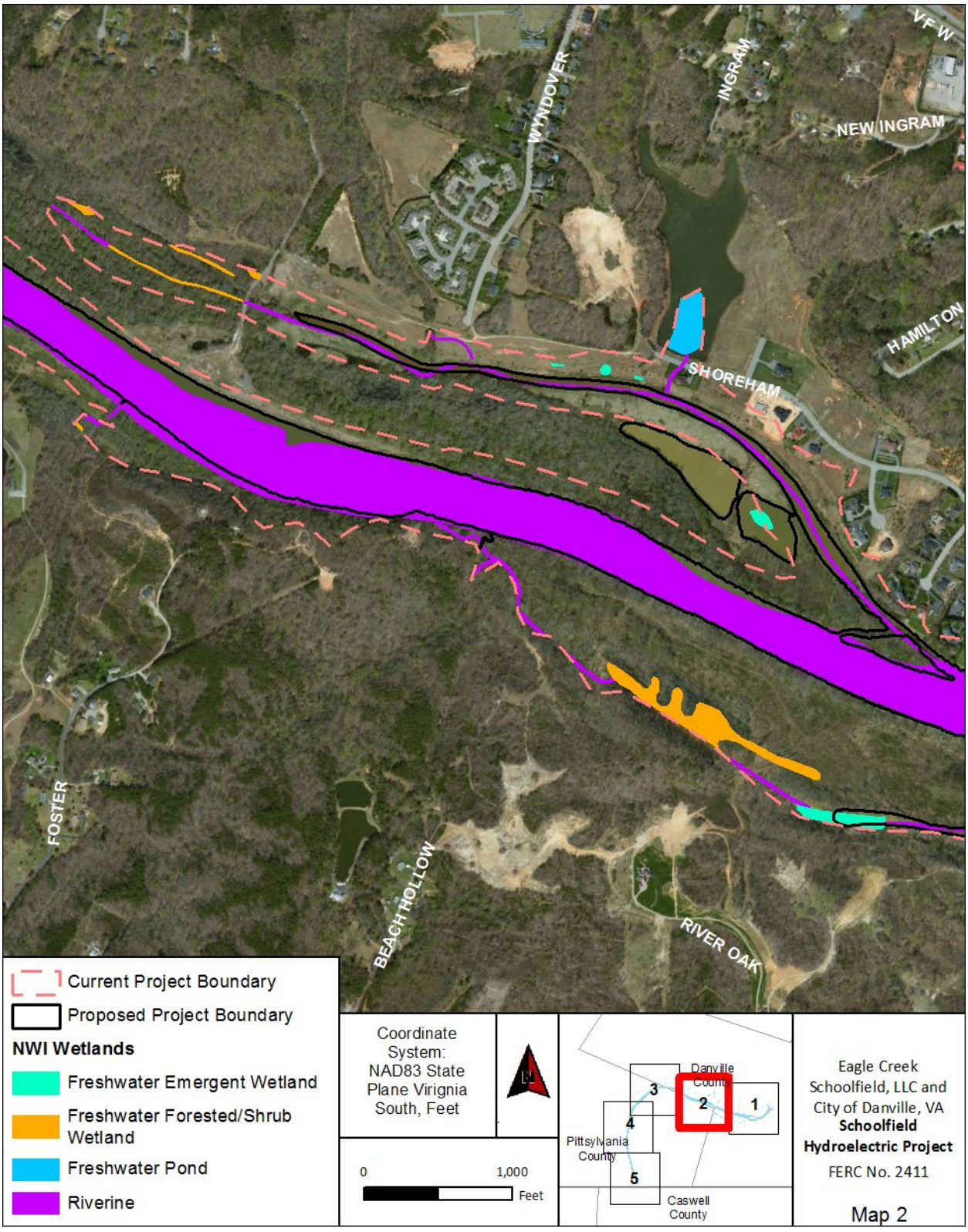


Figure 7-1. Wetlands in the current and proposed Project boundary Map 2

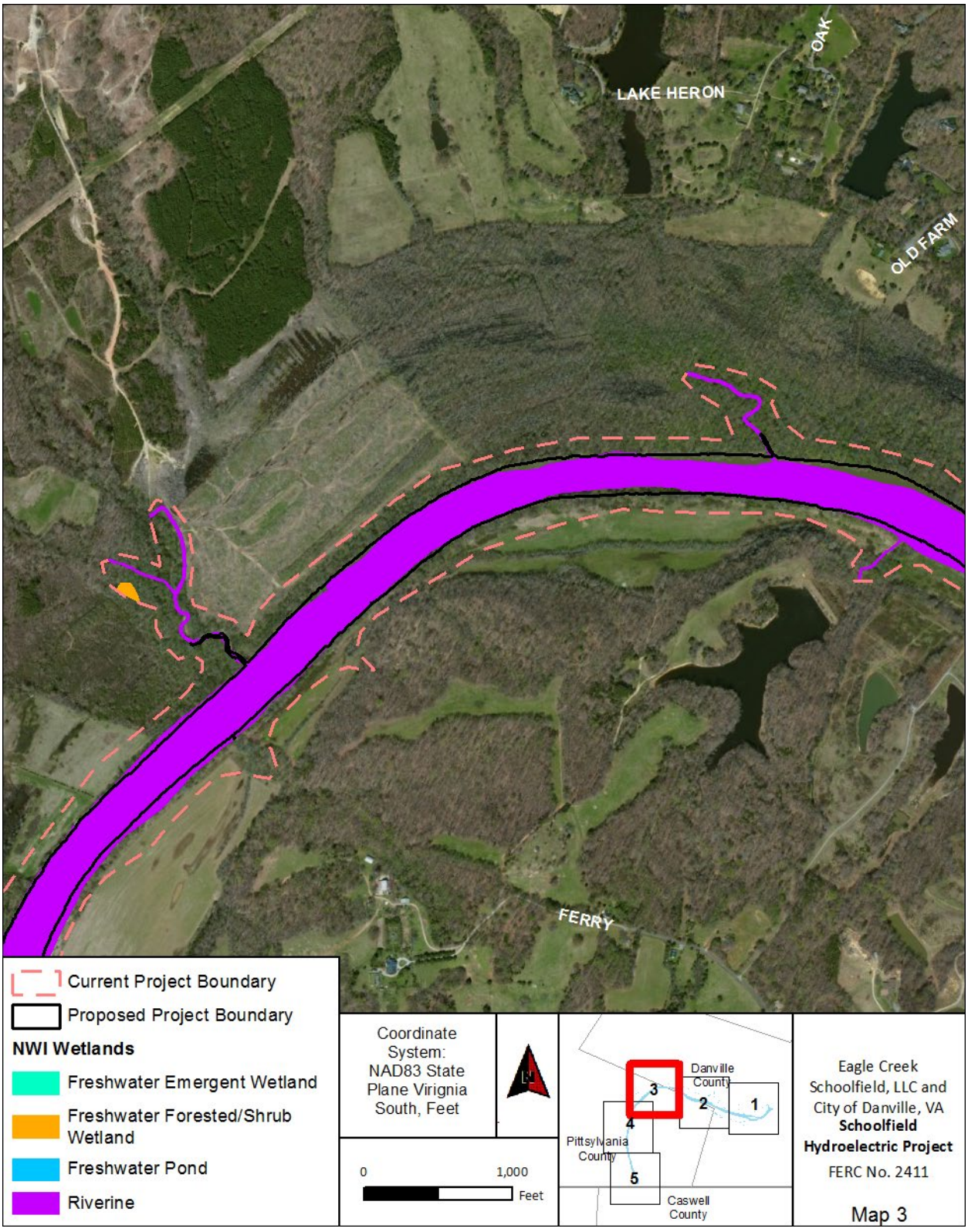


Figure 7-1. Wetlands in the current and proposed Project boundary Map 3

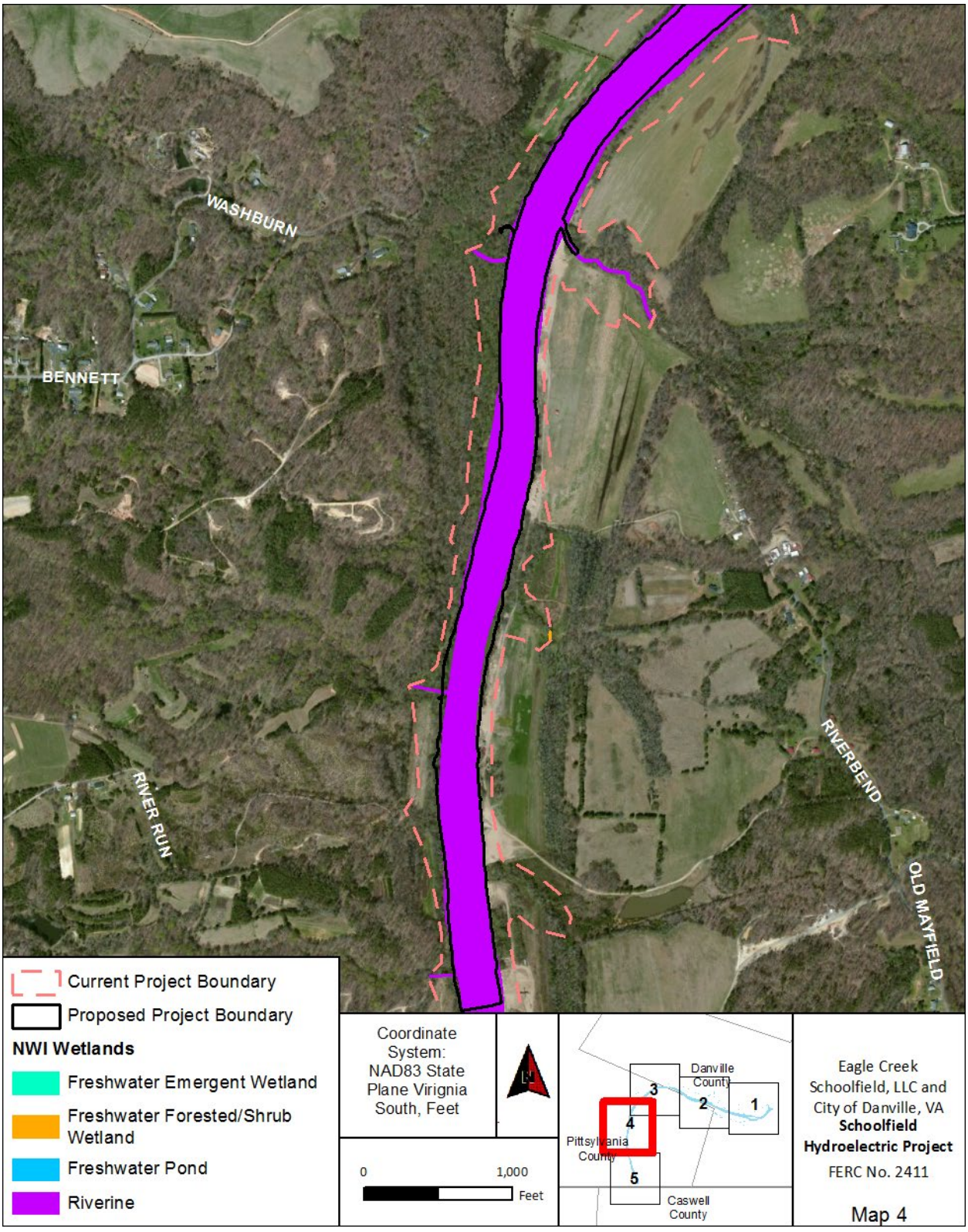


Figure 7-1. Wetlands in the current and proposed Project boundary Map 4

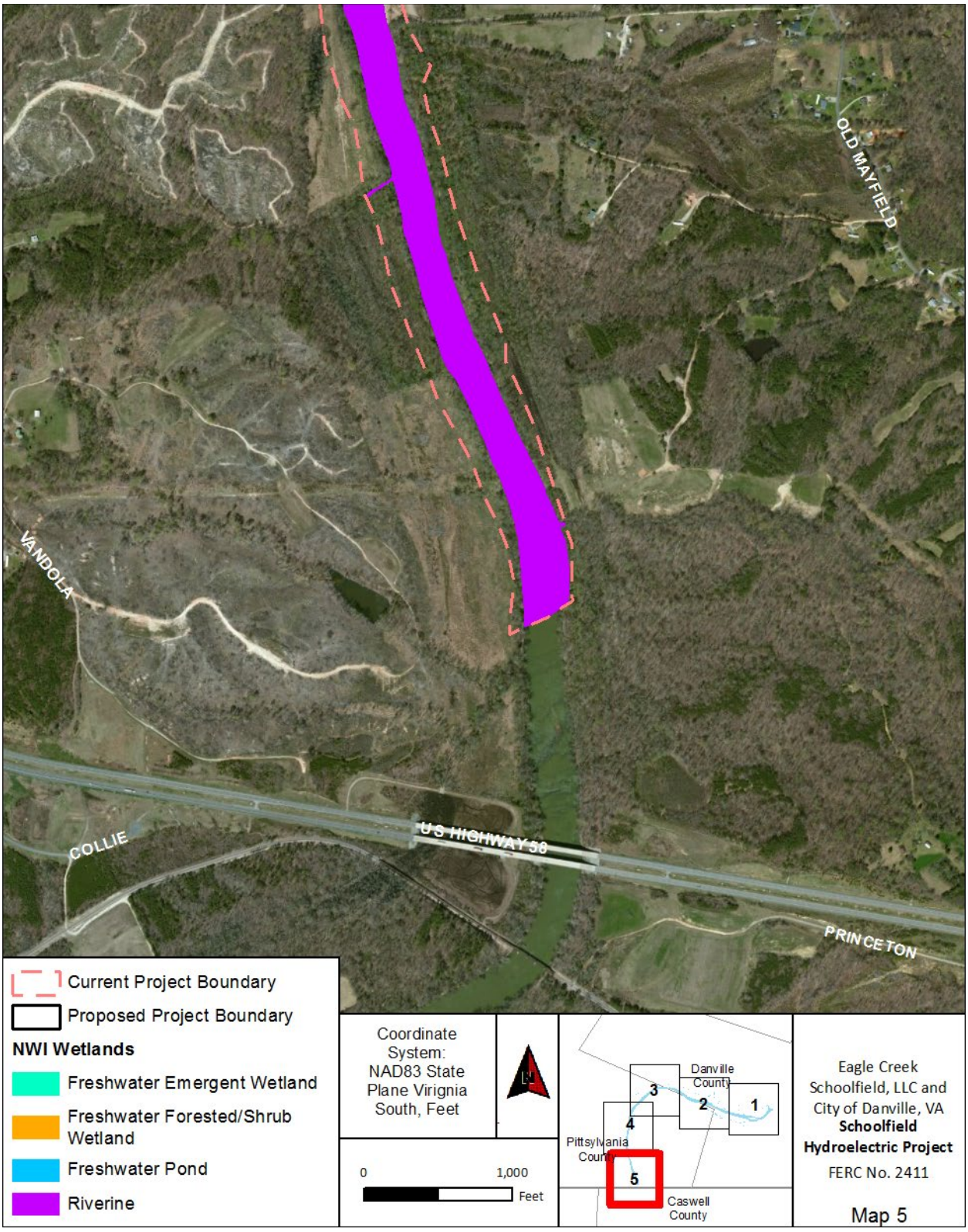


Figure 7-1. Wetlands in the current and proposed Project boundary Map 5

Figure 7-2. Representative photograph of the Project reservoir shoreline near the forebay (October 6, 2020).

Figure 7-3. Representative photograph of the Project's reservoir shoreline near the upper extent of the Project boundary (October 6, 2020).

Figure 7-4. Representative photograph of the river shoreline in the vicinity of the Project's tailwater (July 29, 2020).

Figure 7-5. Representative photograph of the river shoreline downstream of the Project dam (August 11, 2020).

7.1 Wetlands, Riparian, and Littoral Habitat Study Requests and Results

The co-Licensees did not receive any study requests regarding wetland, riparian, or littoral habitat resources within the Project area.

7.2 Proposed Protection, Mitigation, and Enhancement Measures for Wetland, Riparian, and Littoral Habitat Resources

The co-Licensees do not propose any PME measures related to wetland, riparian, or littoral habitat resources. No resource agency or other entity has proposed any PME measures for wetland, riparian, or littoral habitat resources at this time.

7.3 Description of Continuing Impacts on Wetland, Riparian, and Littoral Habitat Resources by Continued Project Operation

7.3.1 Operation and Maintenance Activity

The co-Licensees propose to continue to operate the Project in a run-of-river mode with a 300 cfs minimum flow requirement and will continue to maintain the Project consistent with current practices and license requirements. Therefore, effects due to normal Project operation and maintenance on wetland, riparian, and littoral habitat resources would be negligible and similar to the existing condition.

7.3.2 Sediment Flushing

As described in section *3.5 Proposed Protection, Mitigation, and Enhancement Measures for Water Resources*, the co-Licensees would continue to flush sediment at flows greater 3,000 cfs, but with reduced frequency, and outside the spawning season of centrarchids. The co-Licensees believe the proposed change in sediment flushing activity would not impact existing wetland resources of the Project area.

7.3.3 Reservoir Dewatering

As discussed in section *3.6 Description of Continuing Impacts on Water Resources by Continued Project Operation, Reservoir Dewatering*, the co-Licensees propose to continue the current license condition (License Article 403) related to reservoir dewatering to inspect the City of Danville's municipal water supply intakes. License Article 403 requires notification and coordination among resource agencies and the USACE and to provide a downstream minimum flow of 440 cfs as a 24-hour average during reservoir refilling. During refill periods, the instantaneous minimum flow of 300 cfs, or inflow would be always maintained. In addition, dewatering and refilling is proposed to only occur during the November 1 through February 28 period to avoid impacts on aquatic biota. Drawdowns are expected to occur infrequently on an as needed basis. The duration of drawdowns is expected to be less than 24 hours. The most recent reservoir drawdown was down to elevation 423.12 feet. The co-Licensees are proposing to restrict drawdowns to the November 1 to February 28 period.

At the time the License Order was issued, the City of Danville's water supply intakes were immediately next to the Project turbine intakes. Since then, the City of Danville relocated their municipal water supply intake approximately 0.1 river mile upstream of the Project and sealed off the intakes at the Project's powerhouse. The relocated intake is constructed in such a manner that dewatering the reservoir will be needed less frequently for maintenance and inspections. The co-Licensees' proposal to perform reservoir dewatering on an as-needed basis, rather than annually, would provide a similar level protection to wetland and littoral habitat as to what is currently afforded under the existing license. The co-Licensees anticipate any impacts would reflect the existing condition or be minor and short in duration.

7.3.4 Change in Project Boundary

As discussed in Exhibit A and Exhibit G, the co-Licensees are proposing to reduce the spatial extent of the current Project boundary around the Project reservoir based on recent and more accurate survey data. This proposal would reduce the amount of wetland resources within the Project boundary by 38.4 acres (Table 7-1). However, this effect is an artifact of redrawing the Project boundary using recent and accurate survey data and will have no impact on wetland resources.

8 RARE, THREATENED, AND ENDANGERED SPECIES

8.1 Federal Species

The co-Licensees consulted the USFWS Information for Planning and Consultation (IPaC) online tool using the existing Project boundary to identify federally listed species that have the potential to occur in the Project vicinity. The official species list is dated September 28, 2021, a copy of which is provided in Appendix A. The official species list indicates one mammal and one mollusk are threatened and proposed as threatened under the Endangered Species Act (ESA), respectively, have the potential to occur in the vicinity of the Project. In addition, the official species list identified one insect as a candidate species. These species are listed below:

- Northern Long-eared bat (*Myotis septentrionalis*) – Threatened
- Atlantic Pigtoe (*Fusconaia masoni*) – Proposed as Threatened
- Monarch butterfly (*Danaus plexippus*) – Candidate

Furthermore, the official species discussed in the Pre-Application Document listed the federally endangered Roanoke logperch (RLP) as having the potential to occur in the Project vicinity (STS and City, 2019). We note that for the Pre-Application Document the existing Project boundary (same as above) was used to delineate the spatial area for which the official species list was generated. As result, the co-Licensees interpret that because the RLP is no longer included in the official species list, the USFWS determined the RLP is not present in the area of the Project boundary. Nonetheless, in the acknowledgment that RLP are known to occur in the Roanoke River basin, of which the Dan River is a part of, the co-Licensees included below a discussion of the RLP.

8.1.1 Northern Long-eared Bat

The northern long-eared bat is a medium sized, tawny brown bat that has a typical body length and wingspan of 3.7 inches and 9 to 10 inches, respectively. As its name implies, the bat is characterized by its distinctive long ears. Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. These hibernacula are various sized caves or mines with constant temperatures, high humidity, and no air currents. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats are likely flexible in selecting roosts based on suitability to retain bark or provide cavities or crevices, but are rarely found roosting in man-made structures, such as barns and sheds. These bats breed in late-summer and early-fall and give birth in the spring. Furthermore, the bats, like others, feed primarily on flying insects during dusk (USFWS, 2015).

The most significant threat to the northern long-eared bat is White Nose Syndrome (WNS). WNS is an emergent fungal disease that infects the skin of the hibernating bat's muzzle and wings. Other threats include degradation of hibernacula and roost habitat, and wind farm operation. The USFWS indicates that degradation of hibernacula stems mostly from gates or other structures at

the entrance of hibernacula, which can prevent bats from entering and can change the air circulation patterns within the hibernacula. Degradation to roost habitat is mostly from the removal of trees for construction and forest management. Impacts from wind farm operation consist of mortality associated with blade strike (USFWS, 2015).

Figure 8.1.1-1 shows the locations of known northern long-eared bat hibernacula and maternity roost trees in Virginia in relation to the Project. In addition, Figure 8.1.1-2 shows known occurrences of the northern long-eared bat in North Carolina relative to the Project. Both Figures 8.1.1-1 and 8.1.1-2 indicate there are no known northern long-eared bat hibernacula, maternity roost trees, or known occurrences in the Project vicinity. The IPaC also indicates there are no designated critical habitat for northern long-eared bat near the Project.

8.1.2 Atlantic Pigtoe

The Atlantic pigtoe is a small freshwater mussel with a somewhat rhombus-like shaped shell, that is generally taller than long (USFWS, 2019a; AES, 2014). Although larger specimens exist, the Atlantic pigtoe rarely exceeds two inches in length (USFWS, 2019). The Atlantic pigtoe is dependent on clean, moderate flowing water with high dissolved oxygen content in creek and riverine environments. Historical records indicate the best populations existed in creeks and rivers with excellent water quality, where stream flows were sufficient to maintain clean, silt-free substrates (AES, 2014). Current data supports that the species prefers pristine conditions, which typically occur in headwater streams and rural watersheds. Within these systems, the mussel often is associated with gravel and coarse sand substrates at the downstream end of riffles. It has also been found in cobble, silt, or sand-detritus substrate complexes, but much less commonly (Bogan and Alderman, 2008). The largest threats to the future viability of the Atlantic pigtoe consist of habitat degradation from stressors influencing water quality, water quantity, instream habitat, and habitat connectivity (USFWS, 2018).

The USFWS believes that approximately seven river miles (in aggregate) of the Dan River contain all of the physical and biological features essential to the conservation of the clam. Important habitat requirements of the Atlantic pigtoe include: (1) connected instream habitats characterized by suitably sized substrates of run, riffles, and pools with geomorphically stable stream channels and banks; (2) a flow regime that maintains the suitable instream habitats; (3) suitable water quality; and (4) the presence and abundance of host fishes necessary for the recruitment of the clam (USFWS, 2018). As such, the USFWS proposes to designate the aforementioned seven river miles of the Dan River as critical habitat for the species. The reach proposed as critical habitat extends from the Stateline Bridge Road in Pittsylvania County, Virginia, downstream to the confluence with Williamson Creek in Rockingham County, North Carolina (USFWS, 2018). This section of the Dan River is upstream of the Project and ends approximately 2.0 river miles upstream of the existing extent of the Project Boundary (Figure 8.1.2-1). Atlantic pigtoe has been documented in Pittsylvania (VA), and Rockingham (NC) counties but not documented in the Dan River from its confluence with Williamson Creek to the USGS Gage 02075045 Dan River at STP near Danville, VA (USFWS, 2019; AES, 2014).

8.1.3 Monarch Butterfly

The monarch butterfly (*Danaus plexippus*) is a large butterfly that lives in a variety of habitats throughout North America and various additional locations across the globe. In the United States there are three populations, two that are migratory and one that is stationary. The two migratory populations reside east and west of the Rocky Mountains, respectively; the stationary population occurs in Florida (USFWS, 2020a). The population that occurs in the Project area is referred to as the Eastern North America Population (ENA), which migrates during the autumn months to Mexico to overwinter, subsequently returning to breeding areas in the spring. Based on the past annual census data, the eastern North American population has been generally declining over the last 26 years (USFWS, 2020b). Adult monarch butterflies feed on nectar from a wide variety of flowers. Reproduction is dependent on the presence of milkweed, the sole food source for larvae. The primary threats to the monarch's biological status include loss and degradation of habitat from conversion of grasslands to agriculture, widespread use of herbicides, logging/thinning at overwintering sites in Mexico, senescence, and incompatible management of overwintering sites in California, urban development, and drought exposure to insecticides and effects of climate change (Federal Registrar, 2020). After a thorough review of the best available scientific and commercial information, the USFWS found that listing the monarch butterfly as an endangered or threatened species is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants (Federal Registrar, 2020). As such, the monarch butterfly remains a candidate species.

8.1.4 Roanoke Logperch

The Roanoke logperch (RLP) is a federal endangered species that can be found in the Roanoke River Basin. In Virginia, the RLP is known to occur in the upper Roanoke, Smith, Pigg, Otter, and Nottoway River systems, while in North Carolina the fish can be found in the Dan, Mayo, Smith River systems, as well as the Big Beaver Island Creek. The RLP is a large darter that can grow up to six inches in length. The RLP prefers large sized warm and clear streams with riffles, runs, and pools and sand gravel and boulder substrate (USFWS, 2019b). On August 18, 1989 the USFWS listed the RLP as endangered under the ESA. Currently, the range-wide status of the species is improving, although the geographic range remains small, the populations in Virginia seem to be stable or increasing (USFWS, 2007). The primary factors influencing the status include risks posed by large dams and reservoirs, small dams and barriers, watershed urbanization, agricultural and silvicultural activities, channelization, roads, toxic spills, riparian/woody debris loss, and water withdrawals (USFWS, 2007). According to the USFWS's most recent official rare, threatened, and endangered (RTE) species list for the Project area, the RLP is not present in the Project boundary and there is no designated critical habitat for the RLP in the Project vicinity.[28]

[28] Dated September 28, 2021, a copy of which is provided in Appendix A.

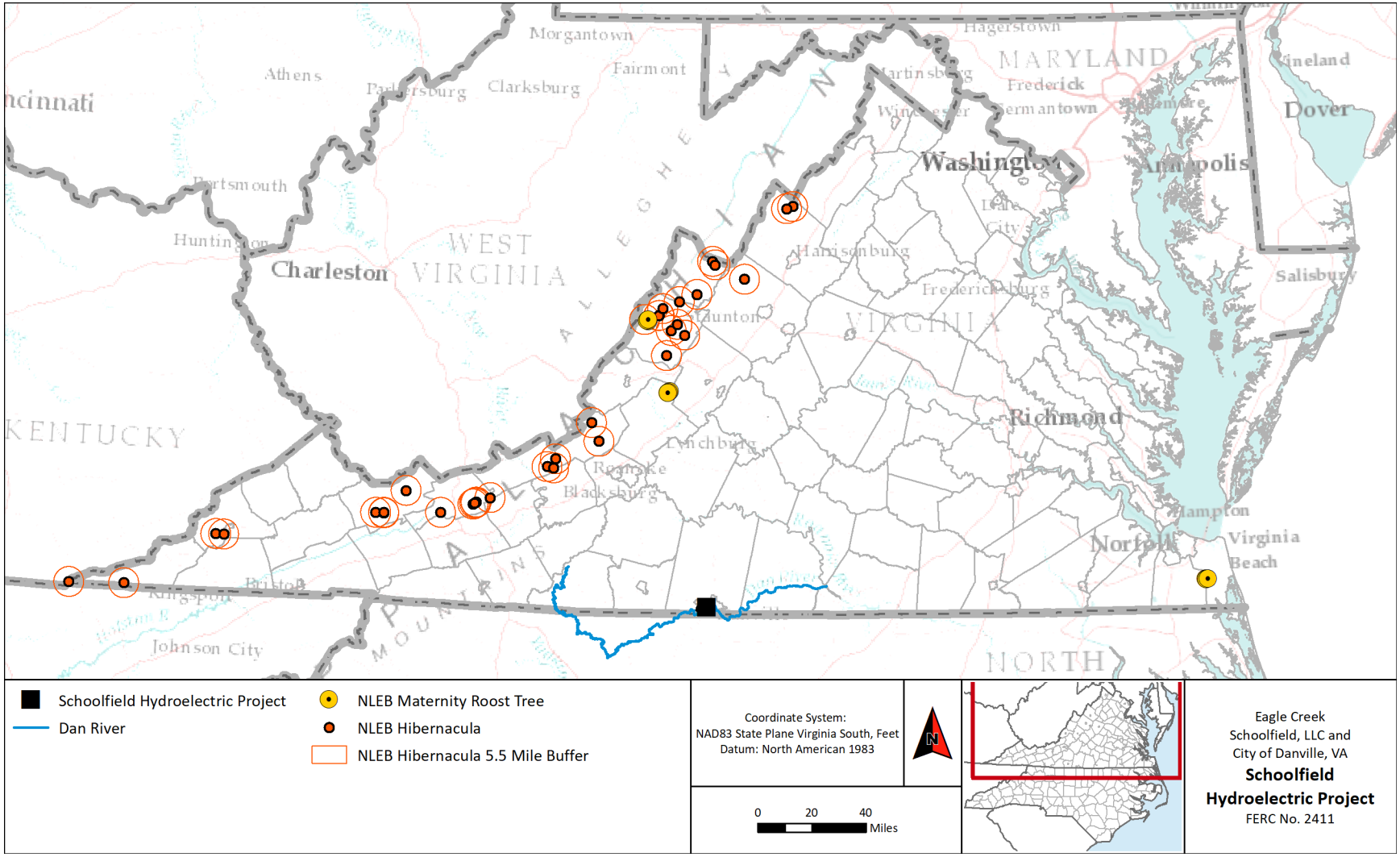
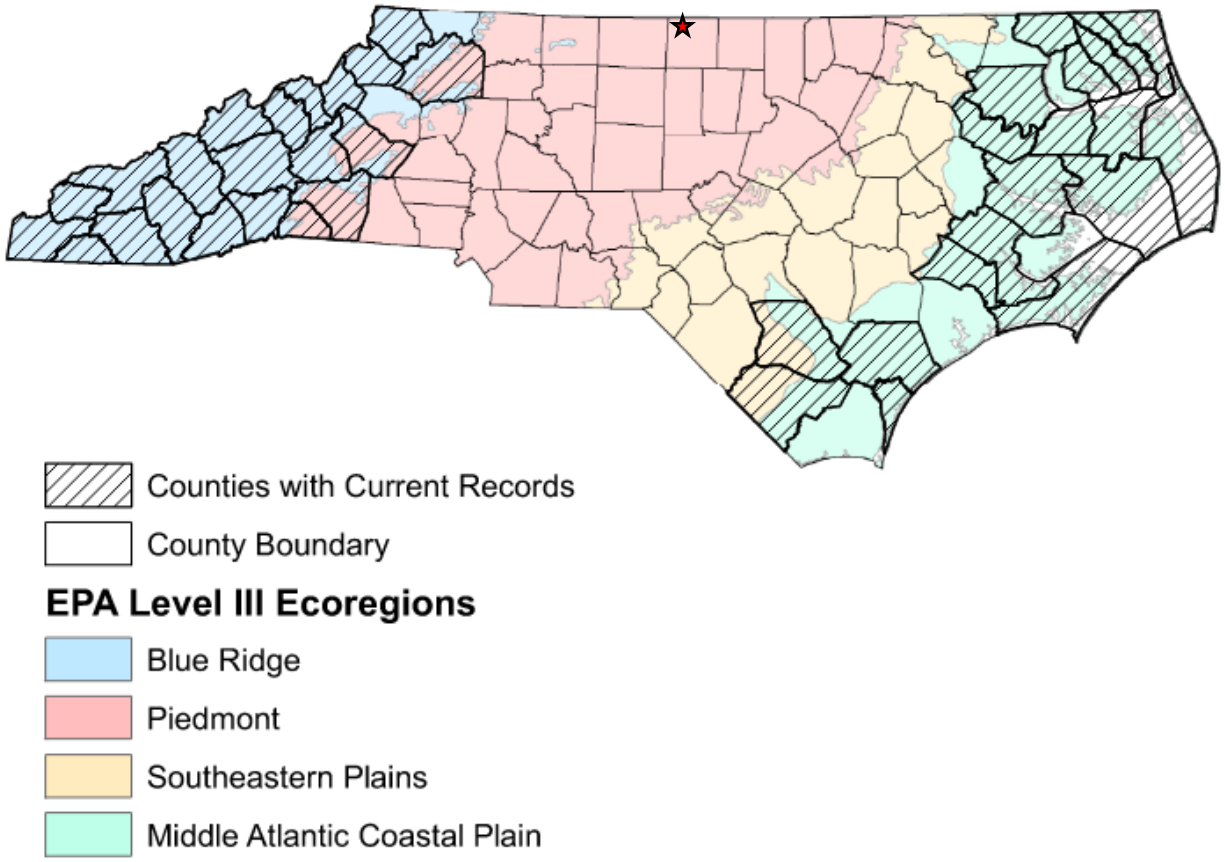


Figure 8.1.1-1. Location of known Northern long-eared bat hibernacula and maternity roost trees relative to the Project in Virginia.



Source: USFWS (2020c), as modified by the co-Licensees

Note: The "★" indicates the approximate location of the Project.

Figure 8.1.1-2. North Carolina counties with current records of northern long-eared bat occurrences.

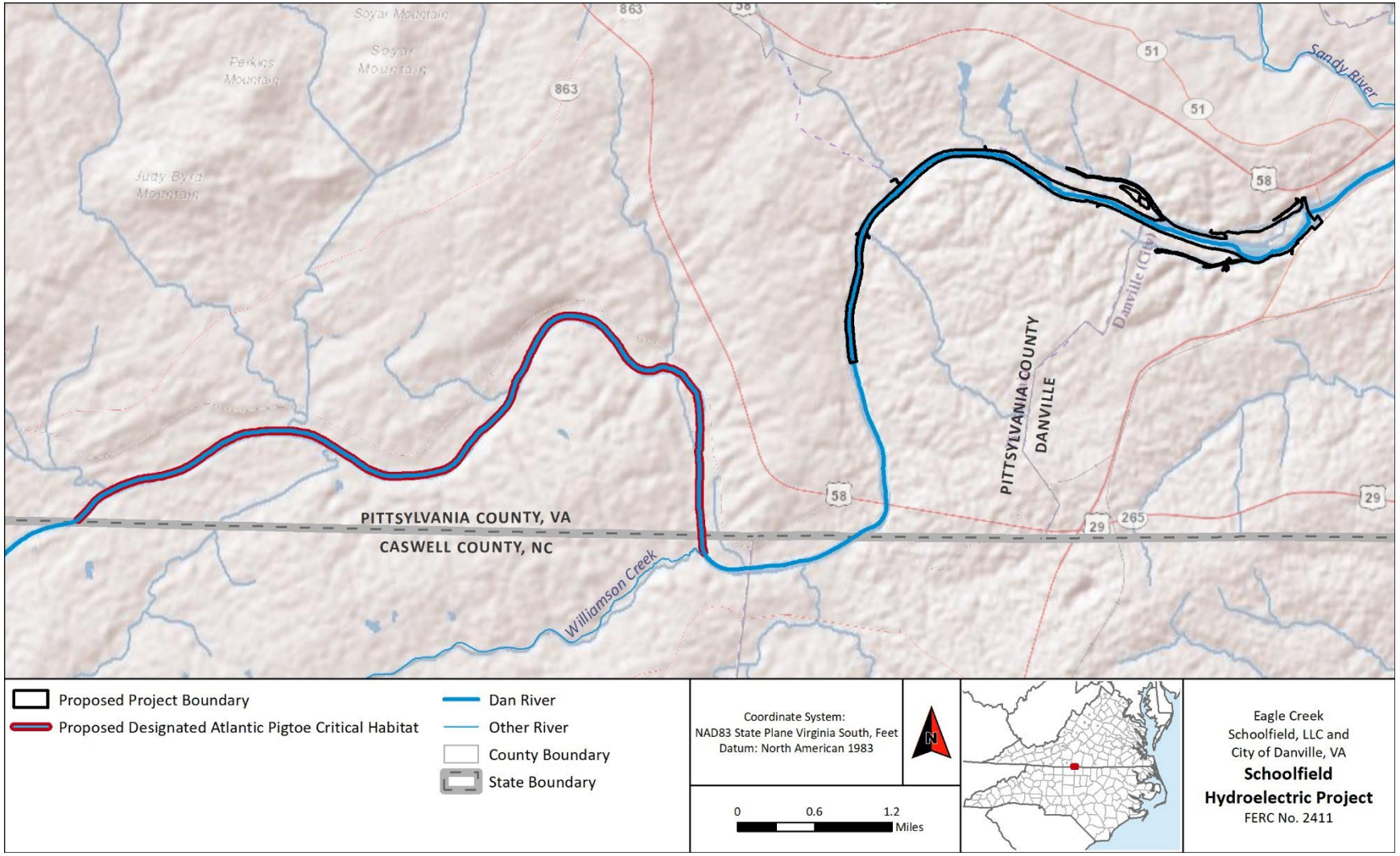


Figure 8.1.2-1. USFWS proposed designated critical habitat for the Atlantic pigtoe in the Dan River in relation to the current Project boundary.

8.2 State Species

The co-Licensees referenced VDCR's Natural Heritage Data Explorer to determine whether certain state listed RTE species have the potential to occur in the Project vicinity. For this query, the co-Licensees assumed the Project vicinity is the HUC12 watershed Otter Creek-James River (HUC12 030101030906) in the data explorer. In summary, VDCR's Natural Heritage Data Explorer indicates there no state-listed threatened or endangered species in the Project vicinity. However, the data explorer indicates there is one rare plant, the Mountain camellia (*Stewartia ovata*), that may be in the HUC 12 sub-basin where the Project resides (VDCR, 2021). The Mountain camellia is a deciduous shrub native to the piedmont and mountains of North Carolina. In nature, it can be found in mesic forests, especially acidic bluffs, and often in the openings of rhododendron thickets (NCSU Extension, n.d.). There are 13 populations in Virginia, and it is considered imperiled but has no legal status (VDCR, 2021). The co-Licensees received a letter dated, June 29, 2022, from VDCR, which administers the Natural Heritage Program. The letter indicated that there are no State Natural Area Preserves in the Project vicinity, and that no state-listed plants or insects will be impacted by the Project activity. This letter is included in Appendix A to this Exhibit E.

In addition, there is one fish species, the snail bullhead (*Ameiurus brunneus*), that has been identified as a species "of greatest conservation need" in the Virginia Wildlife Action Plan and occurs in the Project reservoir and tailwater areas (VDGIF, 2015).

Also, state-listed rare, threatened, or endangered species that could occur or have the potential to occur in the Project area were identified by using the VDGIF Virginia Fish and Wildlife Information Service to conduct a geographic search of a 3-mile radius around the project. State-listed rare, threatened, or endangered species that could occur or have the potential to occur in the Project vicinity include: three mammal species (Northern Long-eared Bat, Little Brown Bat, and Tri-colored Bat), one bird species (Loggerhead Shrike), four freshwater mollusk species (James Spinymussel, Atlantic Pigtoe, Green Floater, and Spirit Supercoil), one fish (Roanoke Logperch) and two reptiles (Timber Rattlesnake, Scarlet Kingsnake).

8.3 Rare, Threatened, and Endangered Species Study Requests and Results

The VDWR requested the co-Licensees perform a survey for RLP in areas of the Dan River affected by the Project. In summary, the co-Licensees elected to perform a RLP survey and habitat assessment. The co-Licensees' justification for adopting the study with modification is provided in section 2.1 of the Draft Study Plan (DSP), submitted to the resource agencies (Attachment 1). The co-Licensees subsequently held a study plan conference call with stakeholders, received comments on DSP, and prepared and distributed to the resource agencies a Final Study Plan (FSP), which contained responses to comments on the draft study plan (see section 2.0 of the FSP [Attachment 2]). In response to the distribution of the FSP, the USFWS provided the co-Licensees with additional comments concerning the RLP survey and habitat assessment. The co-Licensee then provided a response to the USFWS and included that response as a supplement to the FSP, which also included in Attachment 2.

8.3.1 Roanoke Logperch Survey and Habitat Assessment

The RLP survey and habitat assessment was performed during the summer of 2021 following methods generally accepted by the scientific community as detailed in the study report (Attachment 3). The goal of the study was to determine whether suitable RLP habitat is present in the Project study area and to evaluate the presence/absence of RLP in the Project study area, which were accomplished by achieving the following objectives: (1) reviewed aerial imagery to identify probable RLP habitat and potential survey reaches in the Project area; (2) conducted field-based reconnaissance to assess the relative habitat quality within potential survey reaches identified in objective 1; (3) based on objective 2, selected two sites to target for RLP sampling, with one site immediately upstream of the Project reservoir and one site downstream of the Project dam; (4) conducted a presence/absence survey for RLP at the two selected sites; and (5) performed a habitat assessment of the two sites surveyed for RLP.

The achievement of objectives 1 and 2 resulted in the selection of sampling sites upstream and downstream of the Project (Figure 8.3-1). These two sampling areas were sampled for RLP by backpack electrofishing into stationary seines. Overall, no RLP were collected despite expending a total of 1,083 electrofishing seconds and 30 stationary bag seine hauls within the downstream reach, and 1,711 electrofishing seconds and 30 stationary bag seine hauls within the upstream reach. This sampling did, however, collect 18 other species, including two species commonly associated with RLP— the chainback and Roanoke darters.[29]

The habitat of the selected RLP sampling reaches was assessed using habitat suitability indices developed by Anderson (2016) for the rare fish based on substrate, water velocity, water depth, and percent silt cover. A total of 28 and 32 1-m^2 habitat cells were measured at the upstream and downstream reaches (Figures 8.3-2 and 8.3-3). The result of these measurements indicates that the overall habitat suitability for RLP upstream and downstream of the Project is "fair." Overall, the data collected indicate RLP in the Dan River are exceedingly rare and likely do not occur in the immediate Project vicinity despite the presence of suitable habitat.

[29] See Table 4.2.1-2 in section 4.2.1, Fish Community Resident Species.

Note: Habitat transects and 1-m^2 cells are approximate; the 1-m^2 depicted are not to scale.

Figure 8.3-1. Roanoke logperch sampling reaches.

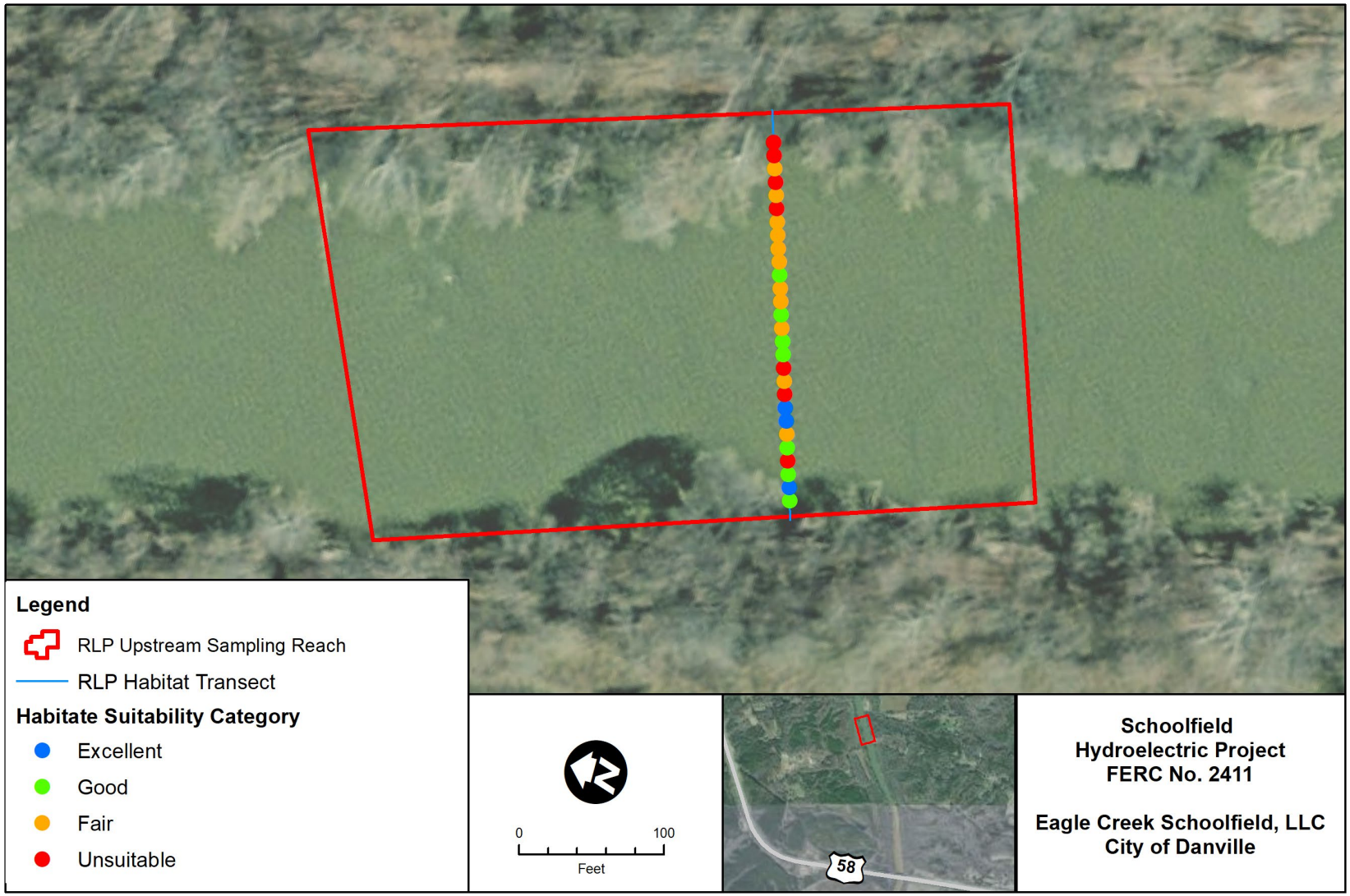


Figure 8.3-2. Approximate spatial location and associated habitat suitability of each habitat cell within the upstream reach.

Figure 8.3-3. Approximate spatial location and associated habitat suitability of each habitat cell within the downstream reach.

8.4 Proposed Protection, Mitigation, and Enhancement Measures for Rare, Threatened, and Endangered Species

The co-Licensees propose to continue to provide an instantaneous minimum flow of 300 cfs or inflow, whichever is less downstream of the Project. During occurrences of reservoir lowering to facilitate the City of Danville's water supply intake inspection and subsequent refilling, the co-Licensees propose to continue to provide an average 24-hr minimum flow of 440 cfs and notify the resource agencies as required by existing License Article 403. During refill periods, the instantaneous minimum flow of 300 cfs, or inflow would be always maintained. In addition, dewatering and refilling is proposed to only occur during the November 1 through February 28 period to avoid impacts on aquatic biota.

In their June 24, 2022 comment letter, the USFWS recommended that a northern long-eared bat management plan be developed as part of a PME measure to protect this species.

In their June 20, 2022 comment letter, NCWRC recommended that sediment flushing and refilling should only occur between November 1 and the end of February.

In their June 24, 2022 comment letter, the USFWS recommended that the reservoir dewatering and refilling and sediment flushing should not be conducted between March 15 and September 30.

8.5 Description of Continuing Impacts on Rare, Threatened, and Endangered Species by Continued Project Operation

8.5.1 Northern Long-eared Bat

No critical habitat of the northern long-eared bat was determined to be in the vicinity of the Project. In addition, the northern long-eared bat is not known to occur in Pittsylvania County, Virginia, where the Project is located. Therefore, continued operation of the Project as currently licensed is not expected to affect the northern long-eared bat. The co-Licensees will consult with the USFWS regarding consistency with the 4(d) ruling for the northern long-eared bat (50 CFR Part 17 2016-00617). Most of the upland area within the Project boundary is located around the Project dam, forebay, access road and powerhouse areas, as the Project boundary follows the shoreline elevation of the reservoir. Tree removal is not conducted at the Project as part of normal vegetation management and operation practices.

8.5.2 Atlantic Pigtoe

Critical habitat for the Atlantic pigtoe has been proposed by the USFWS. With the nearest area of critical habitat being greater than two river miles upstream of the upper extent of the Project reservoir, operation and backwatering effects from the Project are likely not to adversely affect the proposed critical habitat. Furthermore, given that past and the freshwater mussel surveys conducted as a part of this licensing proceeding did not document any RTE mussel species in the Project area, continued Project operation may affect, but is not likely to adversely affect RTE mussel species. In addition, because the co-Licensees are not proposing any changes in operations or maintenance activities, the extent of Project-effects on RTE mussel species would be consistent

with the existing condition. The co-Licensees will consult with the USFWS regarding effects on the Atlantic pigtoe.

8.5.3 Monarch Butterfly

No critical habitat has been designated for the Monarch butterfly throughout its range, therefore, none exists in the Project area. Occurrence of the Monarch butterfly in the Project area is likely limited to transient individuals during their migration to breeding and overwintering habitats.

Most of the upland area within the Project boundary is located around the Project dam, forebay, access road and powerhouse areas, as the Project boundary follows the shoreline elevation of the reservoir. Existing vegetation management activities at the Project include mowing, which occurs approximately every week, in grassy areas within the Schoolfield parcel along the access road to the powerhouse and forebay area, as well as near the substation, which is located just downstream of the powerhouse. Mowing typically occurs in the months of April through October. Vegetation on the northerly Project dam abutment and within sediment filled areas adjacent to and within the forebay are treated with an environmentally safe, aquatic-friendly herbicide, typically twice a year (once in spring and once in fall).

Under the existing condition, effects to monarch habitat, primarily to milkweed, would be confined to maintenance activity related to vegetative management within these areas. Because this activity is existing, milkweed has not become established, nor would it be expected to become established. Therefore, continued operation of the Project is not likely to impact the Monarch butterfly.

8.5.4 Roanoke Logperch

No critical habitat for the RLP has been designated; therefore, none exists in the Project area. Given that no RLP were documented during the field survey for the species, and suitable habitat was determined to be present, continued Project operation may affect but is not likely to adversely affect RLP. In addition, because the co-Licensees are not proposing any changes in operations or maintenance activities, the extent of the effect on RLP and the suitable habitat present in the Project area would be the existing condition. The co-Licensees will consult with the USFWS regarding effects on RLP.

9 HISTORICAL, CULTURAL, AND TRIBAL RESOURCES

9.1 Precontact and Historic Period Cultural Overview

The Project is situated on the Dan River, along the boundary of the Ridge and Valley and Blue Ridge physiographic regions in south/central Virginia. Like other parts of Virginia, this region has witnessed well over 10,000 years of Native American occupation. The earliest well-documented Native American settlements in the region date to the Paleoindian Period (ca. 11,500–8000 B.C.), although there are increasing data suggestive of pre-Paleoindian settlements as well. Paleoindian populations were highly mobile, although many Paleoindian sites, such as the Thunderbird complex near Front Royal, are situated near areas of high quality lithic raw materials; in that case, Flint Run jasper (Gardner 1989; Wittkofski and Reinhart 1989). A typical model of Paleoindian settlement in the region would include the establishment of base camps on well drained upland surfaces near the major rivers and their larger tributaries as well as in upland settings near outcrops of high quality cryptocrystalline lithic material.

The subsequent Archaic period (generally divided into the Early [8000–6500 B.C.], Middle [6500–3000 B.C.], and Late Archaic [3000–1200 B.C.] subperiods) witnessed a relatively long and successful broad spectrum foraging adaptation, with subsistence based on hunting, fishing, and the collection of wild plant resources. Populations were organized into small bands that exploited the game, fish, and wild plants of their surroundings in a restricted wandering pattern; that is, hunting and foraging trips stemmed from base camps located near critically important resources. The period also is characterized by generally increasing population densities, and there is increasing evidence of sedentism by the end of the period. Plant domestication, primarily that of Chenopodium, squash, and gourds, also appears in the Eastern Woodlands by the Late Archaic period (Reinhardt and Hodges 1990 1991; Wall 1991).

The Woodland period (1200 B.C. to A.D. 1600) witnessed the widespread introduction of ceramic technology along with increased sedentism. Woodland period settlement patterns in the region show primarily an alluvial bottomland settlement preference in larger valleys and within the larger tributary systems; upland areas most frequently utilized include rockshelters and hillside benches. Diets became increasingly diversified, with increased use of a variety of cultivated plants; by the end of this period maize, beans, and squash were established as the three primarily cultigens. As a result, most substantial sites were situated on fertile floodplains or adjacent, higher terraces, with some nucleated villages fortified by palisades (Egloff and Woodward 1992; Reinhardt and Hodges 1992).

Euro-American explores and settlers began to enter the are in the late seventeenth century, over 60 years after the first settlements were established at Jamestown, Virginia. At that time the area was home to several Native American tribes. Settlement of the area did not develop until the 1720s. The remainder of the 18th century witnessed increasing Euro-American settlement as well as friction with the regional Native American populations, and by the early 1800s several named settlements were present.

The area was affected by the Civil War, but the agricultural-based economy had largely rebounded by the 1880s. The remainder of the 19th century witnessed increased population growth, and the increasing development of milling and tanneries as local industries. The dam, powerhouse, and

fish passage facilities at the Project were originally constructed between 1902 and 1904. In the late 1800s, just prior to this time, the City of Danville's enterprising citizens founded the Riverside Cotton Mills (DHS, nd). By the early 1900s the Project was being constructed. The Riverside Cotton Mills in Danville became the largest textile mill in the southern United States. As a result, a small village called Schoolfield emerged to support the burgeoning mills. The Village of Schoolfield is located just south of the Project dam and was subsequently annexed by the City of Danville in 1951 (DHS, nd). Adjacent to the village is the Schoolfield Mill, which began operating in 1904 when the hydroelectric Project was complete and able to provide power to the mill. In 2006, the mill closed. Prior to the issuance of the existing license, the licensee at the time renovated the generation equipment in 1990 and 1991, replacing all the original equipment.

9.2 Cultural Resources

The Virginia Cultural Resource Information System (VCRIS) map was referenced to identify any historic and archeological sites in the vicinity of the Project boundary. The only site the VCRIS identifies that is within the Project boundary is the Project dam and powerhouse (DHR ID: 108-0068) (VDHR, 2020).

The Virginia Landmark Register (VLR) and the National Register of Historic Places (NRHP) were also reviewed to determine if any listed properties are in the Project vicinity. The review indicates there is one property near the vicinity to the Project boundary that is listed on the National Register of Historic Places – Dan's Hill (Registration No. 79003067). Dan's Hill is a historic home that was built in 1833. It is a 2 1/2-story, five bay Federal style brick dwelling. Figure 9.2-1 presents a picture of Dan's Hill. The historic building is approximately 2.8 miles west of the Project powerhouse and 0.5 miles from the proposed Project boundary (Figure 9.2-2).

The Project is also within the Schoolfield Historic District, listed on the NRHP (Registration No. SG100005881)[30] and the VLR. The historic district is approximately 512-acres, and includes the remaining buildings associated with the mill village of Schoolfield. The village was developed by the textile giant Dan River Mills. The district was developed southwest of downtown Danville beginning in 1903. The district had 1,005 historical buildings, largely retaining their original footprint and character, which exemplify the industrial, commercial, community, and residential components of a southern mill village. Figure 9.2-3 present an aerial photograph of the historic district. According to the VDHR (2021): Schoolfield mills attracted workers, including many women, from the surrounding countryside seeking alternatives to farm work. Schoolfield Village provided for their economic, domestic, social, physical, religious, and educational welfare. The commercial core of the village survives as testimony to Schoolfield's identity as an independent and self-sufficient community. The district's residential section of wood-frame housing for workers reflects the company's decision in 1917 to hire professional planners and landscape architects to develop a "New Company Town," one that eliminated the mill as the village focal point through the placement of trees and shrubs or built structures that obscured sight of the mills from the residential area. Between 1919 and 1930, the company experimented with "industrial democracy" to give workers a voice in the mill operations. Despite this progressive policy, the management and workers of the mill actively excluded African Americans through the company's

[30] The Schoolfield Historic District was listed to the NRHP on December 3, 2020 (https://www.dhr.virginia.gov/wp-content/uploads/2020/09/108-5065_Schoolfield_HD_2020_NRHP_FINAL.pdf).

employment and housing policies. Management at the Schoolfield mills maintained a white majority population and political control in Danville almost as long as Dan River Mills existed. The surviving section of Mill No. 5, a power plant and dam, water filtration plant, pump house and office, two warehouses, and various other supporting buildings and structures illustrate industrial design during the first half of the 20th century as well as the mill's operation as it evolved throughout the 20th century. Schoolfield's two office buildings–the Italian Renaissance Revival-style 1903 main office and the 1967 Modernist Miesian-style Executive Office Building–represent the very different periods in which each was constructed. The district also contains the previously listed three-building Schoolfield School Complex and the Schoolfield Welfare Building as well as six churches and a large cemetery. The Schoolfield dam and powerhouse were evaluated as part of the NRHP listing of the Schoolfield Historic District. Both the dam and powerhouse were found to be contributing resources to the Schoolfield Historic District when it was listed on the National Register of Historic.

9.2.1 Area of Potential Effects

The Area of Potential Effects (APE) is "The geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for various kinds of effects caused by the undertaking" [36 CFR Part 800.16(d)]. In short, the APE is the maximum geographic area where a project could potentially have an effect on historic properties, if any are present.

For the purpose of the Section 106 consultation process, the co-Licensees propose the APE to be the proposed Project boundary, as depicted in Exhibit G and Figure 9.2-2. The Project boundary is an appropriate APE because it encompasses the full nature and extent of the Project as described in Exhibit A. In brief, the Project boundary encompasses all the lands necessary for Project operation and maintenance activity. For instance, the Project boundary is where any ground disturbing activities would occur and encompasses where the Project structures are visible. Therefore, all effects on any potential historical, cultural, or tribal resource that may be present would occur within the Project boundary.

9.2.2 Section 106 of the National Historic Preservation Act of 1966

Federal agencies are required by the National Historic Preservation Act, the National Environmental Policy Act, and other provisions of Federal law to consider historic resources in the planning and execution of their projects. Section 106 of the National Historic Preservation Act and its implementing regulations at 36 CFR Part 800 requires Federal agencies to—clearly define the scope of their undertaking; develop an Area of Potential Effects; make a reasonable and good-faith effort to identify and evaluate historic properties; and assess the project's effects when historic properties are present. Consultation takes place with Virginia Department of Historic Resources (VDHR), which serves as the State Historic Preservation Office (SHPO) in Virginia.

The co-Licensees have requested section 106 consultation and submitted a review package to VDHR on July 14, 2022 (VDHR File No. 2022-4384) via their Electronic Project Information Exchange (ePIX) system (https://epix.dhr.virginia.gov/) to fulfill the consultation requirements of Section 106 of the National Historic Preservation Act of 1966. Included in Appendix A to this

Exhibit E is an e-mail confirmation that VDHR received the co-Licensees request for consultation and review package. At present, the co-Licensees have not received a response from VDHR. Documentation of VDHR's determination regarding the Project's consistency, as proposed, with the National Historic Preservation Act will be filed with the Commission promptly after receipt.

Source: VDHR (2018)

Figure 9.2-1. Photograph of Dan's Hill historic home.

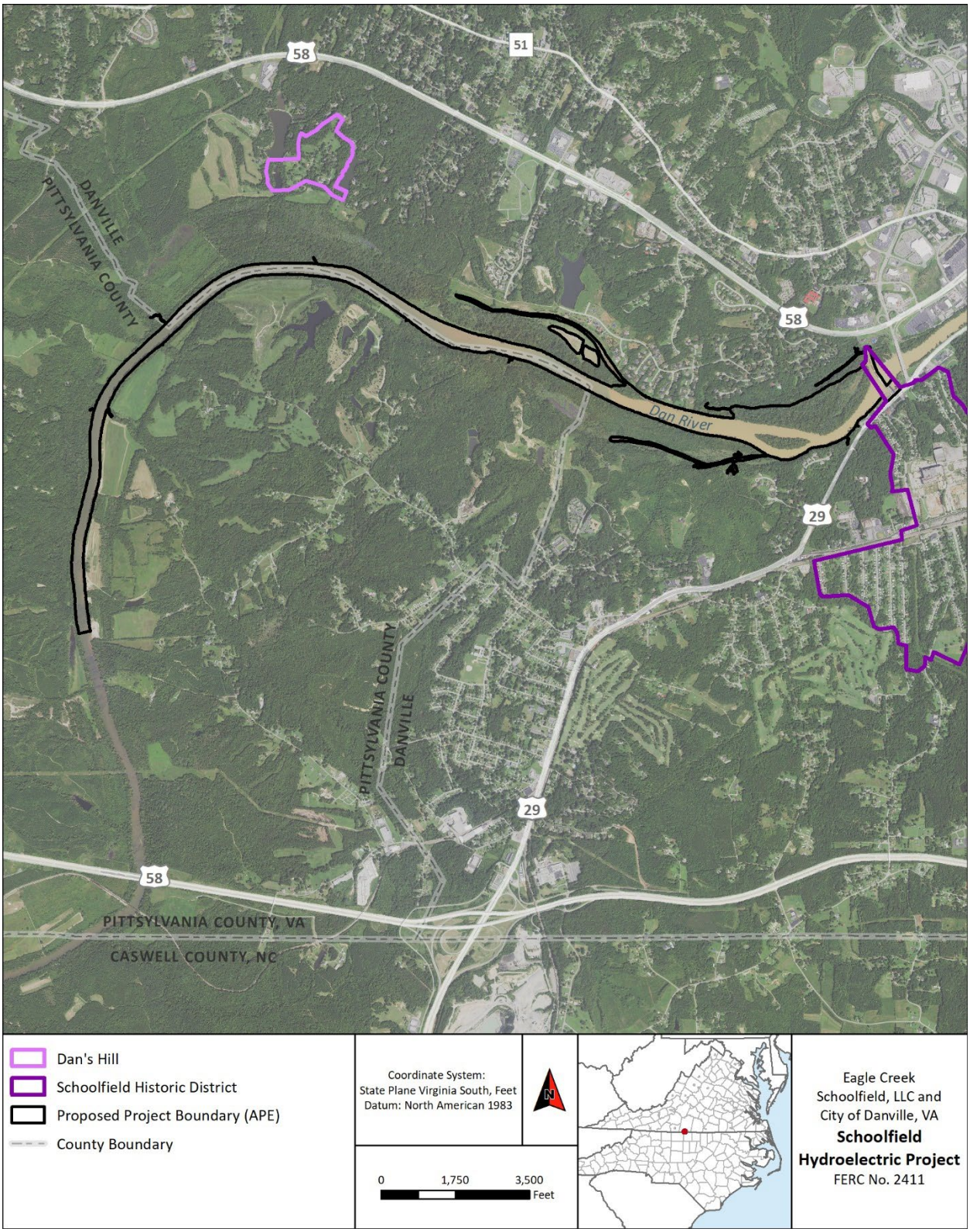


Figure 9.2-2. Location of historic properties in relation to the Project.

Note: The Project is located in the top-center of the photograph.

Figure 9.2-3. Aerial photograph of the Schoolfield Historic District.

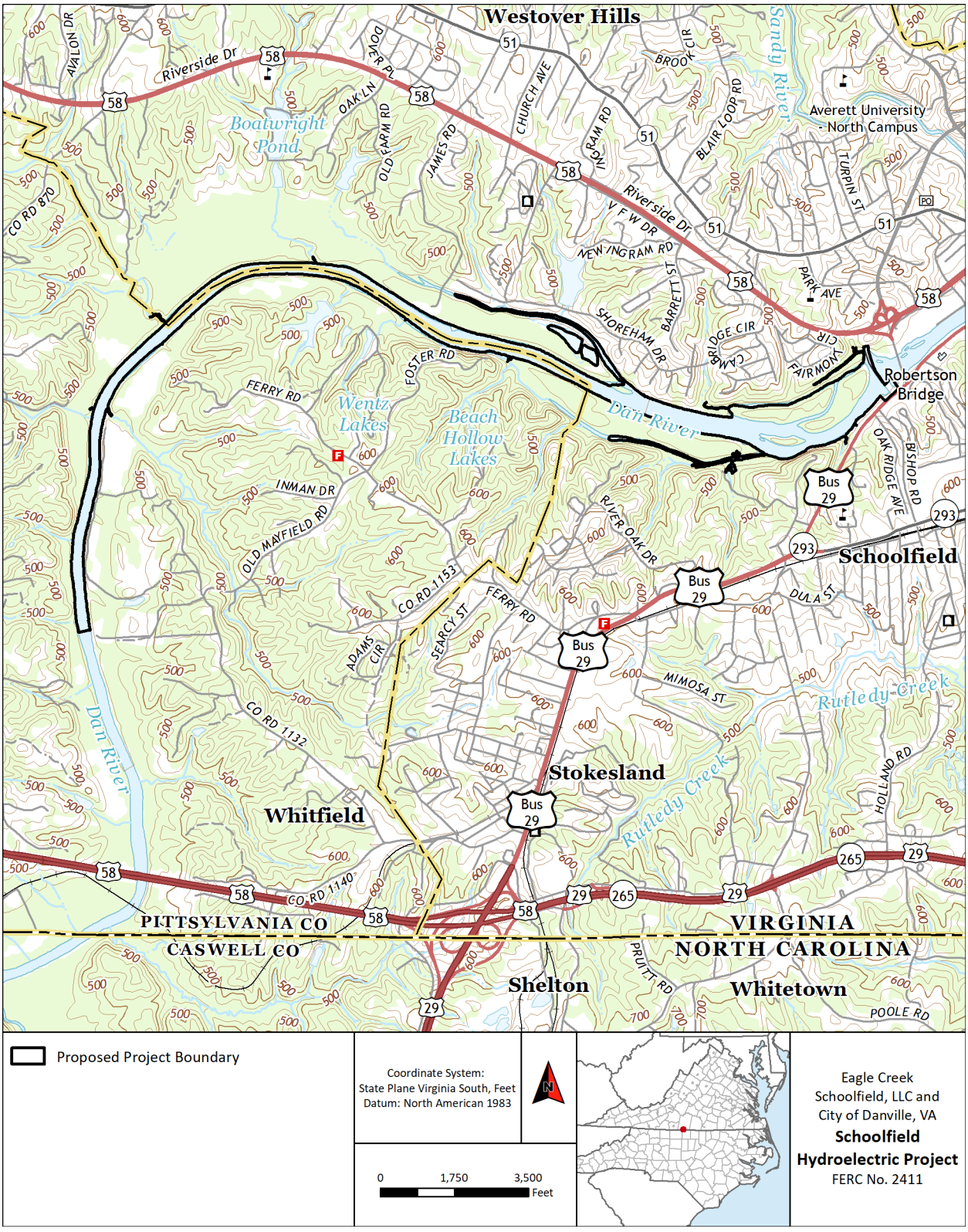


Figure 9.2.1-1. The Schoolfield Hydroelectric Project (FERC No. 2411) proposed APE (corresponds with Proposed Project Boundary).

9.3 Tribal Resources

There are no known tribal lands, tribal cultural sites, or tribal interests located in the immediate vicinity of the Project. The co-Licensees are aware of a known Monacan burial mound located approximately 2.8 miles east-southeast of the Project.

9.4 Historical, Cultural and Tribal Study Requests and Results

The co-Licensees did not receive any study requests pertaining to historical, cultural or tribal resources.

9.5 Proposed Protection, Mitigation, and Enhancement Measures for Historical, Cultural and Tribal Resources

No Project impacts on cultural resources are anticipated, and specific mitigation measures are not proposed. However, co-Licensees are proposing to consult with the Virginia SHPO before beginning any major ground-disturbing activities or alterations to known historic structures within the Project boundary. If the consulted parties agree that there will be no adverse impacts to any cultural resources, the proposed work will proceed. If the consulted parties conclude there may be adverse impacts, the co-Licensees will consult with the SHPO to develop alternatives for avoiding, minimizing, or mitigating the adverse effects.

9.6 Description of Continuing Impacts Historical, Cultural and Tribal Resources by Continued Project Operation

9.6.1 Operation and Maintenance Activity

No potential impacts to the dam and powerhouse, or the larger Schoolfield Historic District from a cultural resources' perspective are anticipated, as the co-Licensees propose to continue to operate the Project as a run-of-river facility, which will minimize water level fluctuations in the reservoir and help maintain shoreline stability. In addition, no significant construction and/or modifications to Project facilities are proposed at this time for continued Project operation. Therefore, there are no anticipated impacts on any potential historical, cultural, and tribal resources that may be within the vicinity of the Project and APE resulting from normal operations.

10 RECREATION RESOURCES

10.1 Regional and Area Recreation

According to VDCR (2018), the Project is located within the West Piedmont Recreational Planning Region. There are numerous local, state and national parks and recreation areas. The Project is a short commute to Hanging Rock State and Mayo River State Park in North Carolina and Philpott Lake, Fairystone State Park, the Blue Ridge Parkway and Rocky Knob National Recreation Area in Virginia. Table 10.1-1 list the top ten recreational activities and their respective use in the West Piedmont Planning Region.

Opportunities for fishing and paddling within the Dan River basin has greatly increased because of the growing number of river access points. The Dan River offers conditions that accommodate paddlers of any nature. For instance, the fast-moving whitewater runs of the Dan River in Kibler Valley eventually turn into slow, relaxing floats as the Dan crosses the Virginia/North Carolina border. In addition, many lakes and reservoirs of the basin serve as attractions for those that enjoy fishing, paddling, boating, or wildlife viewing. There are also numerous trails that offer a plethora of hiking opportunities, and river-walks. Figure 10.1-1 shows the location of local recreation facilities and river access points in the Project area. Of those facilities shown in Figure 10.1-1, Table 10.1-2 lists those sites amenities.

The Project also has one State trail system that goes through the Project boundary. The trail system is the Dan River Water Trail, which is the Dan River itself and portions of the Smith River. This water trail meanders through both Virginia and North Carolina. From upstream to downstream, the water trail runs nearly 64 miles from near the VA-NC border near NC Highway 14 to the VA-NC border near Milton, NC. The Dan River from near Milton, NC to its confluence with the Banister River is a proposed river trail. From its confluence with the Banister River to the Kerr Reservoir, the Dan River is a designated river trail.

Not related to the Project, the City of Danville has a plan to develop the river front area downstream of the Project between the Riverside and Long Mill Dams, which has the possibility of including a whitewater recreation area or park (City, 2019).

10.1.1 Project Vicinity Recreation Needs Identified in Management Plans

- 2018 Virginia Outdoors Plan[31]

  The Virginia Outdoors Plan is the state's comprehensive plan for land conservation, outdoor recreation and open-space planning. It includes outdoor recreation issues, trends, and survey findings, as well as land conservation, green infrastructure, recreation programs and initiatives, and outdoor recreation planning and related issues. The co-Licensees' proposal to continue to operate the Project in a run-of-river mode will continue to maintain the Project consistent with current practices. Therefore, effects due to Project operation and maintenance on recreation resources would reflect the existing condition. The existing recreational resources provided to the public at the Project fall under the overarching

[31] https://www.dcr.virginia.gov/recreational-planning/vop.

objectives of public participation and outdoor recreational access contained in the Virginia Outdoors Plan.

- Danville Parks and Recreation Comprehensive Master Plan[32]

  The City of Danville commissioned this plan to better understand existing community needs and how to address future needs within the next 5-10 years. The plan is meant to provide a flexible guideline for making positive changes, and continually consider current trends, changing public opinions, and available funding sources. The goals of the plan are the following.

  - Identify opportunities and constraints facing the City Department of Recreation.
  - Address shortfalls in amenities and programming.
  - Understand needs and sentiments through public input.
  - Make recommendations for addressing current and future needs.
  - Prioritize those recommendations.
  - Understand how cost and budgets will be affected by those recommendations and priorities.

  While there were no specific recommendations in the plan relative to the Project or its facilities, the co-Licensees' proposals to continue run-of-river operation and provide recreational use and access to Project lands and waters will complement the overall goals contained within the Master Plan.

- 2017 Danville River District Green Space Plan[33]

  In 2016, the City of Danville began conceptualizing a 4-acre Riverfront Park within the Dan River District, located approximately 3 miles downstream of the Project. The River District Green Space Plan outlined a foundational vision for the future of parks and green spaces within the River District. The goals of the plan including the following.

  - To provide guidance for the redevelopment of the Danville River District that balances green spaces with economic benefits to ensure that the River District is a healthy and sustainable place to live, work, and play.
  - To create a green space road map for City and community leaders to thoughtfully connect citizens to green spaces and the opportunities they offer.

[32] 15-16-065-Danville-Parks-and-Recreation-Comprehensive-Master-Plan (danvilleva.gov).
[33] https://www.danville-va.gov/DocumentCenter/View/28511/Green-Space-Plan.

- To dive deeper into an understanding of green space opportunities by using recent developments, studies, reports, and recommendations within the River District as a jumping off point.

- To promote Danville and its River District as a regional and national thought leader in integrated community-focused redevelopment.

The Project is located outside of the Danville River District; however, the co-Licensees' proposals to continue run-of-river operation and provide recreational use and access to Project Lands will complement the overall goals contained within District Green Space Plan.

- Virginia's Scenic Rivers

Virginia Scenic Rivers Program's intent is to identify, designate and help protect rivers and streams that possess outstanding scenic, recreational, historic, and natural characteristics of statewide significance for future generations. This program is managed by the state and is separate from the federal Department of the Interior's Wild and Scenic Rivers Program. Approximately 64 river miles of the Dan River are designated as a Blueway Water Trail. Additionally, the reach upstream of the Dan River from the North Carolina state line to Abreu Grogan Park, which is located approximately 1,000 feet upstream of the Project dam, is designated as a Scenic River. The reach of the Dan River downstream from Abreu Grogan Park is categorized as qualifying as a Scenic River. The co-Licensees' proposal to continue to operate the Project in a run-of-river mode will continue to maintain the Project consistent with current practices. Therefore, effects due to Project operation and maintenance on Blueway Water Trail and Scenic River reach would reflect the existing condition. The existing Project recreational use and access points would continue to provide opportunities for use and access to Blueway Water Trail and Scenic River reach.

- U.S. Fish and Wildlife Service's Recreational Fisheries Policy

This comprehensive plan provides general goals for the entire United States (nationwide improvement of recreational fisheries opportunities). The Dan River above and below the Project provides many recreational fisheries opportunities. The regulatory agencies actively manage this recreational fisheries resource through various regulations related to catch limits and seasonal fishing restrictions. Public access to the Project and recreational fisheries opportunities are consistent with this plan and will continue to be provided over the term of a new license.

Table 10.1-1. Outdoor recreation activities by percent of household participation in the West Piedmont Recreation Planning Region.

Activity	Percent of Households (%)
Driving for pleasure	70
Visiting natural areas	60
Walking for pleasure	58
Visiting parks (local, state, and national)	41
Swimming (outdoor pool)	39
Freshwater fishing	38
Swimming (beach/lake/river)	35
Sunbathing/Beach	33
Viewing water	31
Outdoor festivals (music, outdoor-themed, extreme sports, etc.).	31

Source: VDCR (2018), as modified by the co-Licensees.

Table 10.1-2. List of amenities of the recreation sites shown in Figure 10.1-1.

Site	Amenities/Description
Coates Bark Park	Dog park includes separate areas for large and small breeds and dog-friendly amenities including a doggie water fountain and benches.
H.B. Moorefield Park	Two picnic tables, grills, and a parking area
Ballou Park	A 27-hole disc golf course, softball/baseball field, tennis courts, playground, nature trail, picnic shelters, and picnic sites. The nature trail is .75 miles, with interpretive markers and signage that highlights the flora and fauna found along this forested hillside path.
Druid Hills Park	Two playgrounds, benches, walking path and picnic area.
Hylton Avenue Park	Water fountain, benches, ballfield, picnic shelter, and grills
Abreu-Grogan Park	Fishing platform, kayak launch, public boat launch, restrooms, boat house with kayak, canoe, and paddle board rentals.

Source: City of Danville (n.d)(b).

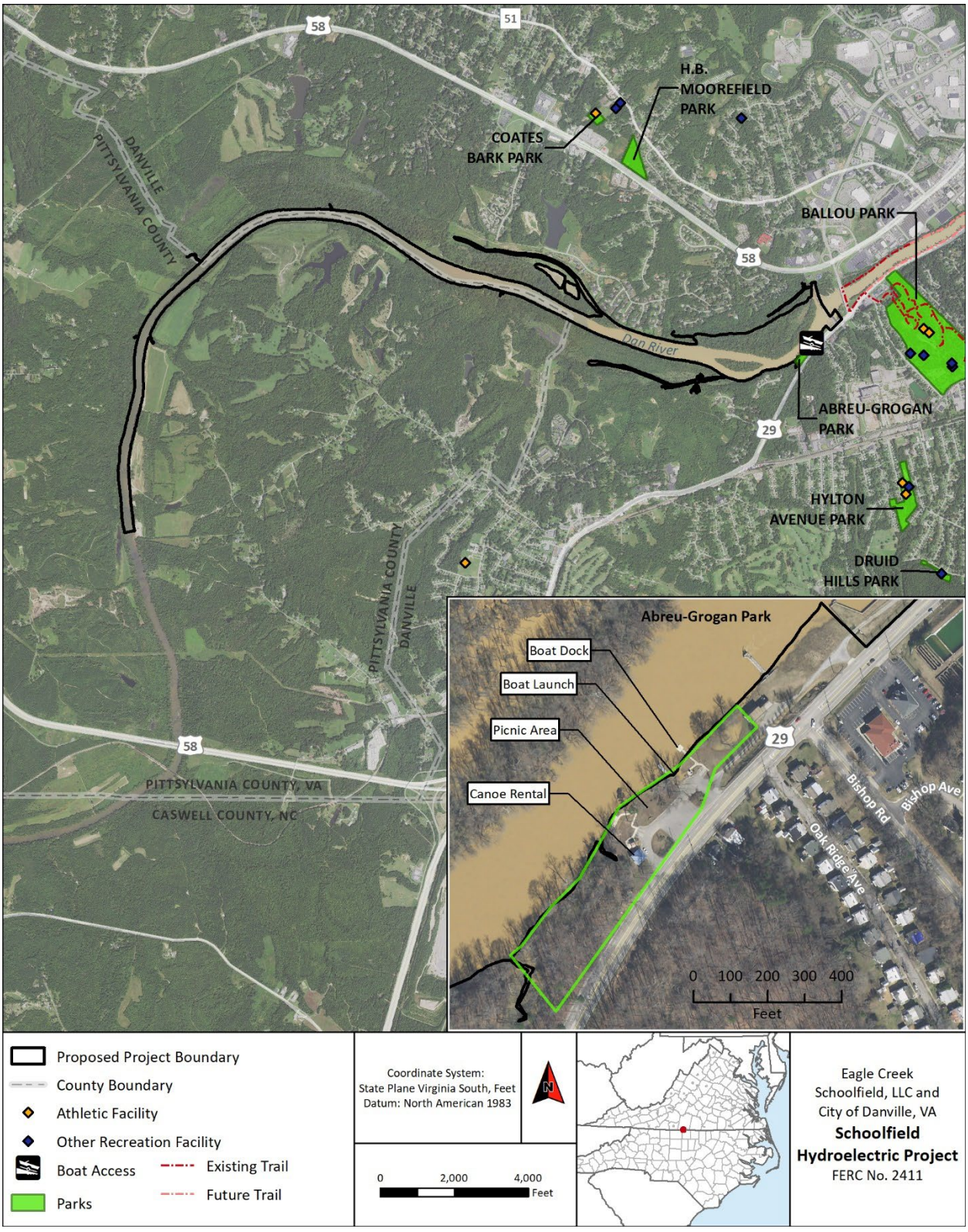


Figure 10.1-1. Public recreation features near the Project.

10.2 Project Facilities and Use

10.2.1 Project Recreation Facilities

There are no developed recreation sites at the Project. Article 407 of the current license required the co-Licensees to file a plan to provide a canoe portage at the Schoolfield Project. After consultation with resource agencies, and other interested parties, it was decided in the mid-1990s that no location would be appropriate for such canoe portage due to conflict with the wildlife habitat management plan (article 405) and the local terrain. As such, Article 408 requiring construction of the canoe portage was deleted by Commission in an order issued on November 9, 1995. The Commission instead required the co-Licensees to contribute money in lieu of construction of a canoe portage for improvements at a city owned park upstream of the Project (Abreu-Grogan) where there is a boat launch, picnic area, boat dock, fishing platform, and canoe, kayak, and paddle board rental operation (Figure 10.1-1). The Commission accepted materials associated with the documentation of transfer of funds on May 7, 1998. This recreation site is not part of the Project; however, it does contribute the boating activity in and around the Project. Figure 10.2.1-1 through 10.2.1-7 presents photographs of the amenities at Abreu-Grogan Park.

10.2.2 Project Recreation Use

Recreational use at the Project area is primarily boating related, and the co-Licensees allow access to the banks for fishing and removing boats (FERC, 2012). Abreu-Grogan Park, which is open to the public, is three acres in size and provides a recreation resource in the vicinity of the Project. The Park is owned and operated by the City of Danville and is open year-round, sunrise to sunset, but is mostly utilized between May and October. In addition to general use, there are seasonal programs and rentals through the warmer months with approximately 500-600 people in attendance for these programs which typically include personal watercraft equipment rentals of canoes, kayaks, and standup paddle boards. The Park was recently renovated over approximately two months and reopened on May 26, 2016. The renovation was a part of Duke Energy's mitigation for the coal ash spill from their Dan River Stem Station in Eden, NC that occurred in 2014. Appendix A - *Abreu Grogan Park Amenity Summary* in DRNRTC (2019)[34] provides photograph documentation of the renovation and existing condition of the park.

[34] Available for download from: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwj1ion4lvn4AhXAkIkEHQ6-BjUQFnoECA4QAQ&url=https%3A%2F%2Fwww.cerc.usgs.gov%2Forda_docs%2FDocHandler.ashx%3Ftask%3Dget%26ID%3D5538&usg=AOvVaw2vYSyIqqpNmNe2WD1Z0SjA.
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Source: DRNRTC (2019).

Figure 10.2.1-1. Representative photograph of the floating dock and canoe/kayak launch.

Source: DRNRTC (2019).

Figure 10.2.1-2. Representative photograph accessible parking and accessible sidewalk leading to the floating dock and canoe launch.

Source: DRNRTC (2019).

Figure 10.2.1-3. Representative photograph information kiosk, sidewalk, and waste bin.

Source: DRNRTC (2019).

Figure 10.2.1-4. Representative photograph of the existing boat dock and public boat ramp.

Source: DRNRTC (2019).

Figure 10.2.1-5. Representative photograph of the existing fishing platform.

Source: DRNRTC (2019).

Figure 10.2.1-6. Representative photograph of the existing boat rental operation and restrooms.

Source: DRNRTC (2019).

Figure 10.2.1-7. Representative photograph of the existing picnic area.

10.3 Recreation Resources Study Requests and Results

The VDWR requested the co-Licensees perform a recreation use and enhancement study that seeks the enhancement of recreation access at the Project, or at a location outside the Project boundary, if enhancements within the Project boundary are not feasible. In short, the co-Licensees elected to not to adopt the request recreation study. The co-Licensees' justification for not adopting the study is provided in section 2.2.3 of the Draft Study Plan (DSP), submitted to the resource agencies (Attachment 1). The co-Licensees subsequently held a study plan conference call with stakeholders, received comments on DSP, and prepared and distributed to the resource agencies a Final Study Plan (FSP), which contained responses to comments on the draft study plan (see section 2.0 of the FSP [Attachment 2]).

10.4 Proposed Protection, Mitigation, and Enhancement Measures for Recreation Resources

The co-Licensees do not propose any PME measures related to recreation resources. No resource agency or other entity has proposed any PME measures for recreation resources at this time.

10.5 Description of Continuing Impacts on Recreation by Continued Project Operation

10.5.1 Operation and Maintenance Activity

The co-Licensees propose to continue to operate the Project in a run-of-river mode with a 300 cfs minimum flow requirement and will continue to maintain the Project consistent with current practices. Therefore, effects due to Project operation and maintenance on recreation resources would reflect the existing condition.

11 LAND USE AND AESTHETIC RESOURCES

11.1 Land Use

Land use within the existing Project boundary is predominantly deciduous forest and open water (Table 11.1-1; Figure 11.1-1). Within the proposed Project boundary land use is similar to the existing project boundary, with the overall total area of each land use type being less. (Table 11.1-1). Adjacent to the Project area the land use is a mixture of deciduous forest, developed open-space and low intensity areas, with some pasture, and grassland areas.

Table 11.1-1. Existing land use and land cover within the existing and proposed Project boundary.[1]

Land Use Class	Area in Existing Project Boundary		Area in Proposed Project Boundary		Change in Area from Current to Proposed Project Boundary	
	Acres	%	Acres	%	Acres	%
Deciduous Forest	313.6	46.5	84.3	29.4	-229.3	-73.1
Developed, High Intensity	0.2	0.0	0.2	0.1	0.0	1.4
Developed, Low Intensity	11.4	1.7	4.1	1.4	-7.4	-64.5
Developed, Medium Intensity	2.0	0.3	1.3	0.5	-0.7	-33.7
Developed, Open Space	33.1	4.9	4.6	1.6	-28.5	-86.0
Emergent Herbaceous Wetlands	0.1	0.0	0.0	0.0	0.0	-47.9
Grassland/Herbaceous	13.5	2.0	2.0	0.7	-11.5	-85.4
Mixed Forest	17.7	2.6	9.1	3.2	-8.6	-48.8
Open Water	227.7	33.8	179.3	62.4	-48.4	-21.3
Pasture/Hay	42.3	6.3	2.1	0.7	-40.2	-95.1
Shrub/Scrub	10.2	1.5	0.0	0.0	-10.2	-99.6
Woody Wetlands	2.5	0.4	0.3	0.1	-2.2	-89.4
Total	**674.3**	**100**	**287.3**	**100**	**-387.0**	**-57.4**

1. Land use and land cover obtained from USGS (2016).

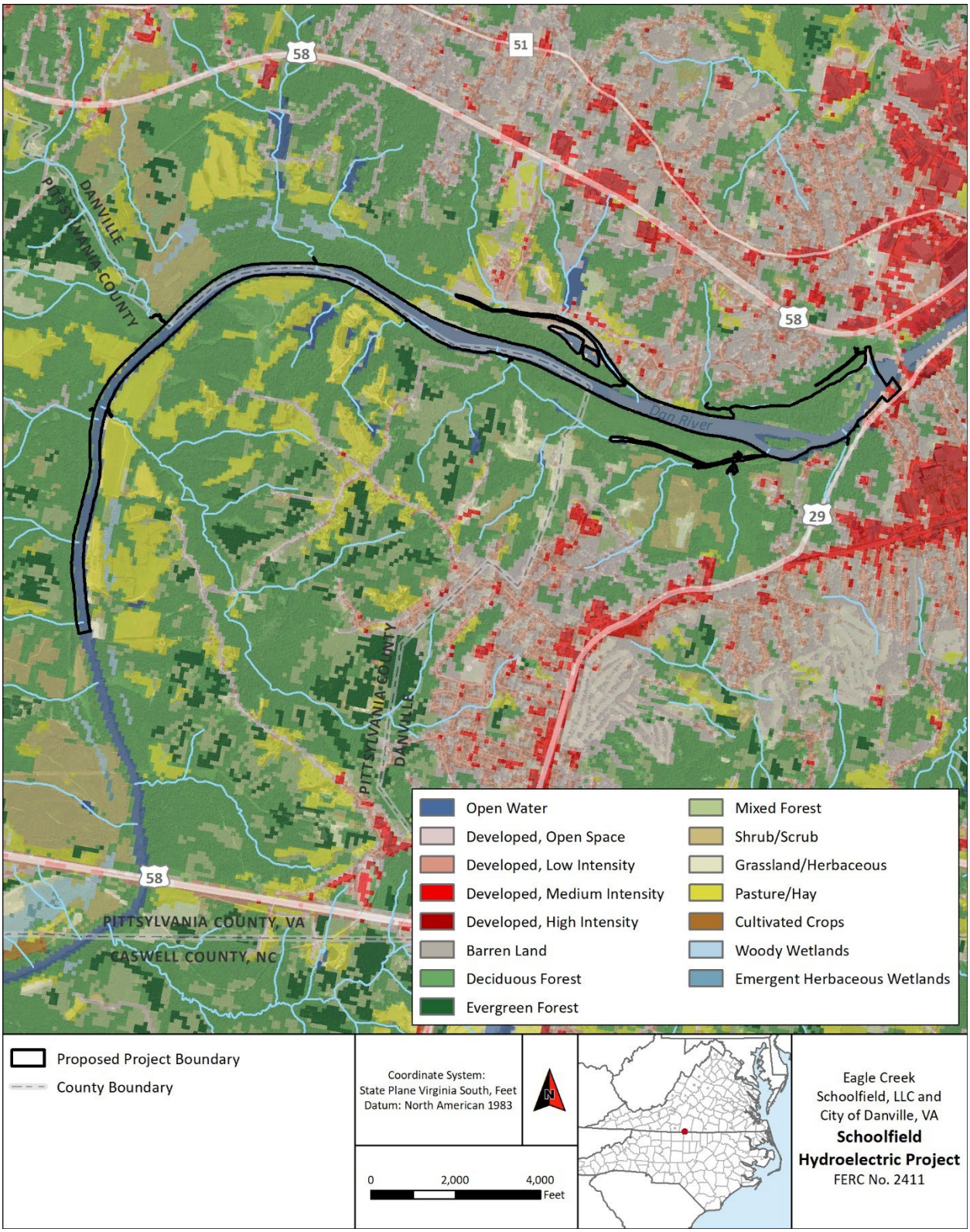

Figure 11.1-1. Existing land use and land cover in the Project vicinity.

11.2 Aesthetic Resources

Aesthetic value is preserved by classifying a waterway as a "Wild and Scenic River" or by designating a road as a scenic byway. The Dan River in the vicinity of the Project is not classified as a National Wild and Scenic River. However, the Commonwealth of Virginia has designated a 15-river mile reach of the Dan River as a Scenic River. This 15-mile reach extends from the Route 880 at Berry Hill Road bridge to the City of Danville's Abreu-Grogan Park, which includes nearly the entire Project reservoir (VDCR, 2017). Figure 11.2-1 presents a picture of the designated segment upstream of the upper extent of the Project boundary.

Public views of the Project are generally limited to near the powerhouse and along a small section of the Project reservoir just upstream of the powerhouse. Figure 11.2-2 shows where the public can view the Project. The public can view the Project from the Piedmont Drive Bridge that crosses the Dan River approximately 700 feet downstream of the Schoolfield Dam, and along Virginia Route 29 from the Powerhouse to approximately 0.2 miles south-west to Abreu-Grogan Park. Figures 11.2-3 through 11.2-5 presents representative photographs the Project from the public viewpoint shown in Figure 11.2-2.

Source: GoogleEarth (2019a)

Figure 11.2-1. Photograph of the Dan River upstream of the upper extent of the Project boundary designated by the State of Virginia as a Scenic River.

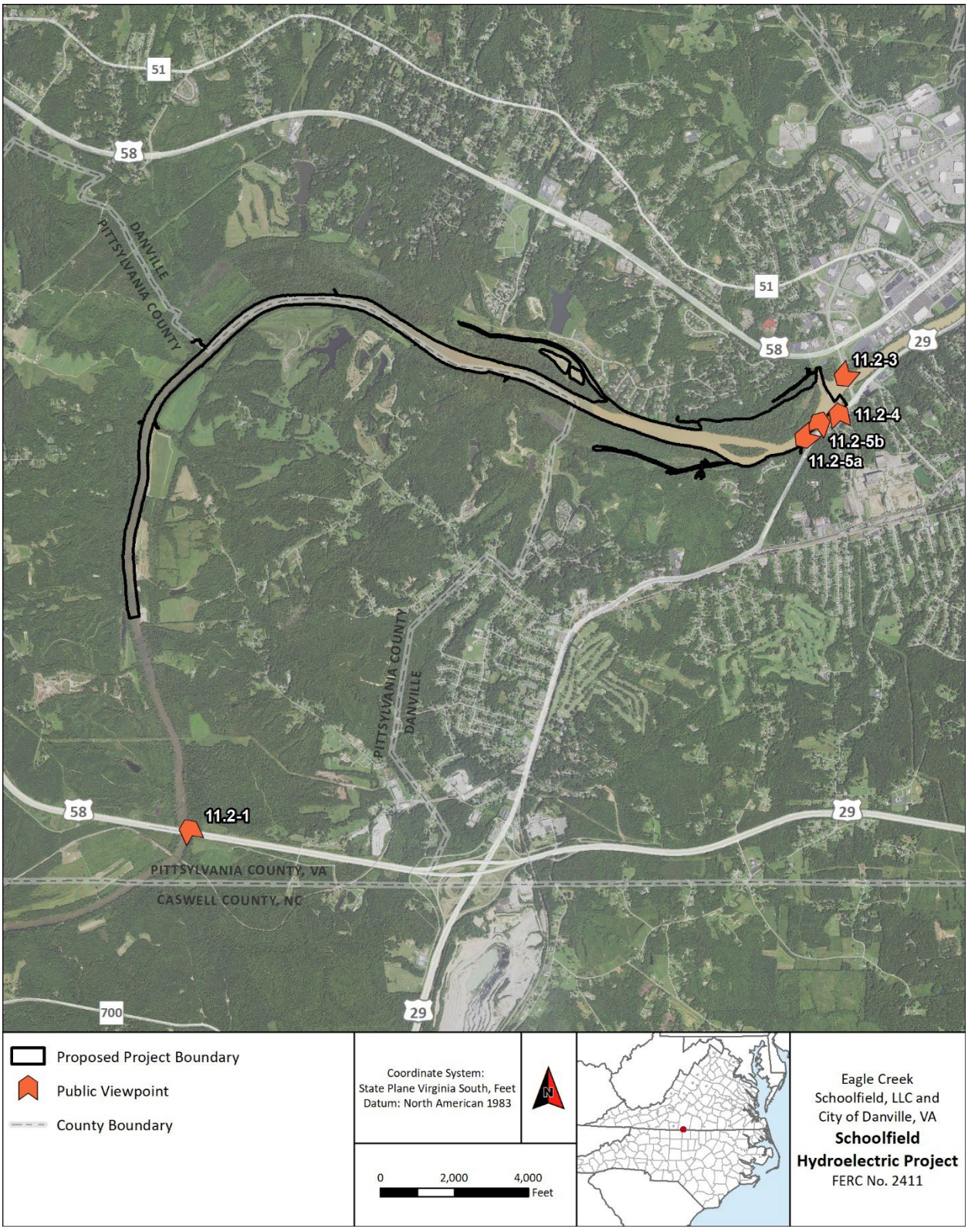

Figure 11.2-2. Location of public viewpoints of the Project works and lands.

Source: GoogleEarth (2019b)

Figure 11.2-3. Photograph of the Project powerhouse and dam from the Piedmont Drive Bridge.

Source: GoogleEarth (2019c)

Figure 11.2-4. Photograph of the Schoolfield powerhouse from Virginia Route 29.

Source: GoogleEarth (2022)

Figure 11.2-5. View of the Project reservoir from Abreu-Grogan Park.

11.3 Land Use and Aesthetics Resources Study Requests and Results

The co-Licensees did not receive any study requests pertaining to land use or aesthetic resources.

11.4 Proposed Protection, Mitigation, and Enhancement Measures for Land Use and Aesthetic Resources

The co-Licensees propose to manage Project lands consistent with past uses and maintenance activities. No major construction or operational changes are being proposed as part of the licensing. The co-Licensees propose to continue to allow use and access of Project lands, to a reasonable extent, as is currently required by Standard License Article 18.

11.5 Description of Continuing Impacts on Land Use and Aesthetic Resources by Continued Project Operation

11.5.1 Operation and Maintenance Activity

Because the co-Licensees are proposing to continue to operate the Project as it is currently licensed, any adverse impacts germane to existing land use and aesthetic resources are not anticipated.

11.5.2 Change in Project Boundary

As discussed in Exhibit A and Exhibit G, the co-Licensees are proposing to reduce the spatial extent of the current Project boundary around the Project reservoir based on recent and more accurate survey data. This proposal would reduce the amount of land use resources within the Project boundary by 385.8 acres (Table 11.1-1). However, this effect is an artifact of redrawing the Project boundary using recent and accurate survey data and is expected to have no impact on land use or aesthetic resources.

12 SOCIOECONOMIC RESOURCES

The Project is located within both Pittsylvania County, Virginia near the City of Danville, Virginia. According to the U.S. Census Bureau (2019a), the population of Pittsylvania County is approximately 63,500, or 66 persons per square mile. There are 31,659 housing units in Pittsylvania County, or 33 housing units per square mile. Each housing units has an average household size of 2.3 persons (U.S. Census Bureau, 2019a). In addition, the City of Danville, Virginia is the most populated area near the Project, and has a population of approximately 42,600, or approximately 1,000 persons per square mile. There are approximately 22,500 housing units within the City of Danville, or approximately 511 units per square mile. Each housing unit has an average household size of 2.2 persons (U.S. Census Bureau, 2019a). According to the U.S. Census Bureau (2019b,c) the median household income for Pittsylvania County and the City of Danville are $47,690 and $37,203, respectively. As of August 2021, the BLS (2021) estimates the unemployment rate for Pittsylvania County and the City of Danville were 3.8 and 6.2%, respectively. Table 12-1 provides socioeconomic indicators of Pittsylvania County and the City of Danville, Virginia.

The nearest population center to the Project is the City of Danville, Virginia, which is also the largest population center near the Project. Table 12-2 list and provides the population characteristics for populations centers within a 25-mile radius of the Project.

Table 12-3 presents sources of employment for the population of Pittsylvania County and the City of Danville. The primary sources of employment for Pittsylvania County are: (1) education, health care, social services; (2) manufacturing; and (3) retail. In Pittsylvania County, these industries employ 22.2, 18.9, and 13.4% of the labor force, 16 years of age and older, respectively (U.S. Census Bureau, 2019b). The primary sources of employment within the City of Danville are also (1) education, health care, social services; (2) manufacturing; and (3) retail. In City of Danville, these industries employ 30.8, 15.3, and 11.6% of the labor force 16 years of age and older, respectively (U.S. Census Bureau, 2019c).

Table 12-1. Socioeconomic indicators for Pittsylvania County and the City of Danville, Virginia.

Indicator	Pittsylvania County	City of Danville
Area	969 square miles	43 square miles
Population	63,501	42,590
Population Density	65.5 persons per square mile	990.4 persons per square mile
Population Growth Rate (2010 to 2019)	- 4.9%	- 7.0%
Housing Units	31,659	21,932
Per Capita Income	$26,032	$22,826
Median Household Income	$47,690	$37,203
People with incomes below poverty level	15.1%	23.5%
Unemployment rate	6.7%	10.1%

Source: U.S. Census Bureau (2021); U.S. Bureau of Labor Statistics (2021).

Table 12-2. Population centers within a 25-mile radius of the Project dam.

City/Town	Distance and Direction from Project Dam	Area (square miles)	Population
Danville, VA	0	44	43,055
Chatham, VA	16 miles north	2	1,269
Eden, NC	20 miles east-southeast	13	15,421
Ridgeway, VA	23 miles east	1	742
Gretna, VA	25 miles north	2	1,267

Source: U.S. Census Bureau (2019a)

Table 12-3. Sources of employment of the civilian population 16-years of age and older for Pittsylvania County and the City of Danville, VA.

Industry	Pittsylvania County (%)	City of Danville (%)
Agriculture, forestry, fishing and hunting, and mining	2.1	0.8
Construction	7.0	5.4
Manufacturing	18.9	15.3
Wholesale trade	2.9	1.2
Retail trade	13.4	11.6
Transportation, warehousing, utilities	5.9	3.3
Information	1.2	0.7
Finance and insurance, and real estate and rental and leasing	3.5	4.5
Professional, scientific, and management, and administrative and waste management services	7.3	7.5
Educational services, and health care and social assistance	22.2	30.8
Arts, entertainment, and recreation, and accommodation and food services	5.4	9.9
Other services, except public administration	6.0	3.9
Public administration	4.2	5.2

Source U.S. Census Bureau. 2019b; U.S. Census Bureau. 2019c.

12.1 Socioeconomic Resources Study Requests and Results

The co-Licensees did not receive any study requests pertaining to socioeconomic resources within the Project area.

12.2 Proposed Protection, Mitigation, and Enhancement Measures for Socioeconomic Resources

The co-Licensees do not propose any measures to mitigate effects of the Project germane to socioeconomic resources because the co-Licensees are not proposing any action that would affect existing socioeconomic resources.

12.3 Description of Continuing Impacts on Socioeconomic Resources by Continued Project Operation

12.3.1 Operation and Maintenance Activity

Because the co-Licensees are proposing to continue to operate and maintain the Project as it is currently licensed, the co-Licensees do not anticipate any adverse impacts germane to socioeconomic resources.

13 ENVIRONMENTAL JUSTICE

Executive Order 12898 directs federal agencies to identify and address "disproportionately high and adverse human health or environmental effects" of their actions on minority and low-income populations (i.e., environmental justice communities).[35]

Executive Order 14008 also directs agencies to develop "programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts."[36] Environmental justice is "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."

Consistent with Council on Environmental Quality (CEQ)[37] and EPA[38] guidance, FERC considers: (1) whether environmental justice communities (e.g., minority or low-income populations)[39] exist in the Project area; (2) whether impacts on environmental justice communities are disproportionately high and adverse; and, if so, (3) what mitigation measures might be needed. FERC uses the 50% and the meaningfully greater analysis methods to identify minority populations. Using this methodology, minority populations have been defined as block groups within the area of study where: (1) the aggregate minority population of the block group in the affected area exceeds 50 percent; or (2) the aggregate minority population in the block group affected is 10 percent higher than the aggregate minority population percentage in the county.

CEQ's Environmental Justice Guidance also recommends low-income populations to be identified based on the annual statistical poverty thresholds from the U.S. Census Bureau. Low-income populations are identified as block groups where the percent of low-income population in the identified block group is equal to or greater than that of the county.

To identity potential environmental justice communities, the co-Licensees used 2020 and 2019 U.S. Census American Community Survey data[40] for the race, ethnicity, and poverty data at the block group level.[41]

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[35] Exec. Order No. 12,898, 59 Fed. Reg. 7629 (Feb. 16, 1994).
[36] Exec. Order No. 14,008, 86 Fed. Reg. 7619 (Feb. 1, 2021).
[37] CEQ, Environmental Justice: Guidance Under the National Environmental Policy Act 4 (Dec. 1997) (CEQ's Environmental Justice Guidance), https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf.
[38] EPA, Promising Practices for EJ Methodologies in NEPA Reviews (Mar. 2016) (Promising Practices), https://www.epa.gov/sites/default/files/2016-08/documents/nepa_promising_practices_document_2016.pdf.
[39] Exec. Order No. 12,898, 59 Fed. Reg. 7629 (Feb. 16, 1994). Minority populations are those groups that include American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic (CEQ, 1997 at 25).
[40] U.S. Census Bureau, American Community Survey 2020 and 2019 ACS 5-Year Estimates Detailed Tables, File# B17017, Poverty Status in the Past 12 Months by Household Type by Age of Householder, https://data.census.gov/cedsci/table?q=B17017; File #B03002 Hispanic or Latino Origin By Race, https://data.census.gov/cedsci/table?q=b03002.
[41] The co-Licensees chose a 1-mile radius around the Project boundary as the area of study. A 1-mile radius is the appropriate unit of geographic analysis given the limited scope of the project proposal and concentration of Project-related effects on the segment of the Dan River.

Within the study area, the co-Licensees identified 13 census block groups in which the populations qualify as environmental justice communities with minority populations meaningfully greater than the minority population within their county (Table 13-1). A total of 11 block groups met the threshold for environmental justice communities based on low-income status (Table 13-1).

13.1 Description of Continuing Impacts on Environmental Justice Communities by Continued Project Operation

No new project-related construction activities are being proposed as part of the Project, so there are no anticipated impacts on environmental justice communities related to new construction.

The co-Licensees are proposing no changes to Project operation that would adversely affect environmental resources, including erosion or sedimentation of private properties; groundwater or other drinking water sources; subsistence fishing, hunting, or plant gathering; access for recreation; housing or industries of importance to environmental justice communities; and construction-or operation-related air quality, noise, and traffic. Operating the Project in a run-of-river mode would continue to maintain stable impoundment levels and minimize effects on environmental resources and land along the shoreline of the impoundment and the Dan River downstream of the Project.

Due to the limited scope of the proposed Project, the co-Licensees have not identified issues that indicate this Project would result in a disproportionately high and adverse impact on environmental justice communities present within the Project area.

13.2 Public Outreach to Environmental Justice Communities

No entity provided comments or recommendations regarding the effects of the Project on environmental justice communities during development of the license application.

No specific outreach was conducted with environmental justice communities during the development of the license application, other than those specifically required by the regulations. No future public outreach is planned. Due to the limited scope of impact associated with the continued operation of the Project, the co-Licensees are not proposing any mitigation measures associated with environmental justice communities.

No specific outreach with non-English speaking groups located in the Project area was conducted. No future outreach is planned. Due to the limited scope of impact associated with the continued operation of the Project, the co-Licensees are not proposing any mitigation measures associated with non-English speaking groups.

Table 13-1. Total population, minority population, and households in poverty data for Androscoggin County (Source: U.S. Census Data, n.d.)

	RACE AND ETHNICITY DATA										LOW-INCOME DATA
Geography	**Total Population (count)[a]**	**White Alone Not Hispanic (count) [a]**	**African American (count) [a]**	**Native American/ Alaska Native (count) [a]**	**Asian (count) [a]**	**Native Hawaiian & Other Pacific Islander (count) [a]**	**Some Other Race (count) [a]**	**Two or More Races (count) [a]**	**Hispanic or Latino (count) [a]**	**Total Minority (%) [a]**	**Below Poverty Level (%) [b]**
Virginia	8,509,358	5,209,336	1,590,974	16,856	564,706	4,680	26,839	285,197	810,770	39%	10%
Pittsylvania County *	60,867	44,975	12,248	26	262	0	29	1,673	1,674	26%	16%
Block Group 2, Census Tract 112, Pittsylvania County, Virginia	721	593	128	0	0	0	0	0	0	18%	10%
Block Group 3, Census Tract 112, Pittsylvania County, Virginia	864	684	170	0	0	0	0	5	5	21%	19%
Block Group 3, Census Tract 2, Danville city, Virginia	1,588	905	517	0	6	10	0	22	128	43%	32%
Block Group 3, Census Tract 3, Danville city, Virginia	717	158	532	0	0	0	8	5	14	78%	30%
Block Group 3, Census Tract 4, Danville city, Virginia	873	375	495	0	0	0	0	3	0	57%	24%
Block Group 1, Census Tract 5, Danville city, Virginia	348	53	292	0	0	0	0	0	3	85%	57%

	RACE AND ETHNICITY DATA										LOW-INCOME DATA
Geography	**Total Population (count)[a]**	**White Alone Not Hispanic (count) [a]**	**African American (count) [a]**	**Native American/ Alaska Native (count) [a]**	**Asian (count) [a]**	**Native Hawaiian & Other Pacific Islander (count) [a]**	**Some Other Race (count) [a]**	**Two or More Races (count) [a]**	**Hispanic or Latino (count) [a]**	**Total Minority (%) [a]**	**Below Poverty Level (%) [b]**
Block Group 2, Census Tract 5, Danville city, Virginia	1,464	476	750	6	18	0	0	197	17	67%	24%
Block Group 1, Census Tract 6, Danville city, Virginia	737	24	635	0	0	0	0	0	78	97%	33%
Block Group 2, Census Tract 6, Danville city, Virginia	469	68	390	0	0	0	0	11	0	86%	31%
Block Group 1, Census Tract 7, Danville city, Virginia	1,617	1,031	432	4	8	6	0	53	83	36%	11%
Block Group 2, Census Tract 7, Danville city, Virginia	637	570	29	0	27	0	0	11	0	11%	10%
Block Group 1, Census Tract 8, Danville city, Virginia	158	90	21	0	0	0	0	47	0	43%	27%
Block Group 2, Census Tract 8, Danville city, Virginia	1,330	456	835	0	0	0	0	39	0	66%	21%
Block Group 3, Census Tract 8, Danville city, Virginia	1,056	505	361	0	133	0	0	0	57	52%	14%

	RACE AND ETHNICITY DATA										LOW-INCOME DATA
Geography	**Total Population (count)[a]**	**White Alone Not Hispanic (count) [a]**	**African American (count) [a]**	**Native American/ Alaska Native (count) [a]**	**Asian (count) [a]**	**Native Hawaiian & Other Pacific Islander (count) [a]**	**Some Other Race (count) [a]**	**Two or More Races (count) [a]**	**Hispanic or Latino (count) [a]**	**Total Minority (%) [a]**	**Below Poverty Level (%) [b]**
Block Group 1, Census Tract 9, Danville city, Virginia	1,714	794	755	2	0	0	0	153	10	54%	14%
Block Group 1, Census Tract 13.02, Danville city, Virginia	888	417	291	0	0	0	0	32	148	53%	18%
Block Group 2, Census Tract 14, Danville city, Virginia	1,863	1,456	232	0	14	0	0	0	161	22%	14%

* Reference Community

[a] Percent of Total Population (Table B03002 – Hispanic or Latino Origin by Race. 2019 ACS 5-Year Estimates Detailed Tables. U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates: https://data.census.gov/cedsci/table?d=ACS%205-Year%20Estimates%20Detailed%20Tables&tid=ACSDT5Y2019.B03002). Accessed July 14, 2022.

[b] Percent of Households (Table B17017 – Poverty Status in the Past 12 Months by Household Type and Age of Householder. 2019 ACS 5-Year Estimates Detailed Tables. U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates: https://data.census.gov/cedsci/table?d=ACS%205-Year%20Estimates%20Detailed%20Tables&tid=ACSDT5Y2019.B17017). Accessed July 14, 2022.

Blue shading denotes an Environmental Justice community.

14 COMPLIANCE WITH COMMISSION-RECOGNIZED COMPREHENSIVE PLANS

14.1 Relevant Comprehensive Waterway Plans

Section 10(a)(2)(A) of the Federal Power Act (FPA), 16 United States Code (USC) § 803(a)(2)(A), requires the Federal Energy Regulatory Commission (FERC or the Commission) to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway affected by the project.

FERC Order No. 481-A, issued on April 27, 1988, established that the Commission will accord FPA Section 10(a)(2)(A) comprehensive plan status to any federal or state plan that:

- is a comprehensive study of one or more of the beneficial uses of a waterway or waterways;
- specifies the standards, the data, and the methodology used; and
- is filed with the Secretary of the Commission.

Based on the Commission's September 2021 revised list of comprehensive plans for the Commonwealth of Virginia, 9 of the 62 listed comprehensive plans pertain to the Dan River watershed. The Project's continued run-of-river operation and the associated environmental PME measures proposed and analyzed herein would ensure continued consistency with the uses outlined in the plans listed below. No inconsistencies were found.

- National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.

  The Nationwide Rivers Inventory is a listing of free-flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. In its Nationwide Rivers Inventory, the National Park Service listed a 27 mile stretch of the Dan River from the North Carolina State line near Milton, North Carolina to South Boston, Virginia for outstanding recreational value. The National Park Service describes the segment as accessible to the nationally significant and registered Danville Historic District and within the proximity of the population centers of Danville and Martinsville, Virginia, and Greensboro and Winston-Salem, North Carolina. In the Dan River in the vicinity of the Project, existing recreational amenities include a boat launch, canoe rental, picnic area, a hiking trail, and several parks.

- U.S. Fish and Wildlife Service. 1992. Roanoke Logperch Recovery Plan. Annapolis, Maryland. March 20, 1992.

  The Roanoke Logperch was listed as an endangered species on August 18, 1989. This recovery plan delineates the reasonable actions needed to recover and/or protect the Roanoke Logperch. The recovery plan includes the habitat requirements and limiting factors, recovery objectives, criteria for down listing, and the conservation actions needed

for the species. According to the USFWS most recent official RTE species list for the Project area, the Roanoke Logperch is not present in the Project boundary and there is no designated critical habitat for the Roanoke Logperch in the Project vicinity. Surveys completed by the co-Licenses did not indicate the presence of Roanoke Logperch in the Project area. The Project is consistent with this recovery plan as the co-Licensees are not proposing any changes in operations or maintenance activities, therefore the extent of the effect on Roanoke Logperch and the suitable habitat present in the Project area would be the existing condition.

- U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986.

  This plan is an international partnership that conserves and protects wetland and upland habitats, and associated waterfowl populations. The plan focuses on the value of maintaining an adequate habitat base to ensure perpetuation of North American waterfowl populations. The plan provides species specific habitat priorities, including goals to restoring and improving breeding, migrating, and wintering habitat. Recommendations for future actions, including both general and specific recommendations for habitat, as well as population management and research, are additionally included in the plan. The proposed continuation of Project operation will continue to provide habitat to waterfowl.

- U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.

  This comprehensive plan provides general goals for the entire United States (nationwide improvement of recreational fisheries opportunities). The Dan River above and below the Project provides many recreational fisheries opportunities. Government and other interest actively manage this recreational fisheries resource. Public access to the Project and recreational fisheries opportunities are consistent with this plan and will continue to be provided over the term of a new license.

- Virginia Department of Conservation and Recreation. The 2007 Virginia outdoors plan (SCORP). Richmond, Virginia.

  The Virginia Outdoors Plan is the state's comprehensive plan for land conservation, outdoor recreation and open-space planning. It includes outdoor recreation issues, trends, and survey findings, as well as land conservation, green infrastructure, recreation programs and initiatives, and outdoor recreation planning and related issues. The co-Licensees propose to continue to operate the Project in a run-of-river mode will continue to maintain the Project consistent with current practices. Therefore, effects due to Project operation and maintenance on recreation resources would reflect the existing condition. The existing recreational resources provided to the public fall under the overarching objectives of public participation and outdoor recreational access contained in the SCORP.

- Virginia Department of Conservation and Historic Resources. n.d. Virginia's scenic rivers. Richmond, Virginia.

Virginia Scenic Rivers Program's intent is to identify, designate and help protect rivers and streams that possess outstanding scenic, recreational, historic, and natural characteristics of statewide significance for future generations. This program is managed by the state and is separate from the federal Department of the Interior's Wild and Scenic Rivers Program. Approximately 64 river miles of the Dan River are designated as a Blueway Water Trail. Additionally, the reach upstream of the Dan River from the North Carolina state line to Abreu Grogan Park, which is located approximately 1,000 feet upstream of the Project, is designated as a Scenic River. The reach of the Dan River downstream from Abreu Grogan Park is categorized as qualifying as a Scenic River.

- Virginia Department of Environmental Quality. 2015. Commonwealth of Virginia State Water Resources Plan. Richmond, Virginia. October 2015.

  The State Water Resources Plan (State Plan) is published at five-year intervals and compiles information provided by localities through Local and Regional Water Supply Plans, Annual Water Withdrawal Reporting, and Surface & Groundwater permitting into a central document. The State Plan takes an extensive look at surface water and groundwater sources currently being used in the Commonwealth and assesses the capacity of these sources relative to all beneficial uses. All beneficial uses of water are examined, both current use and projected water demand to 2040, and an assessment of the ability of current sources to meet the future need is detailed. The co-Licensees propose to continue to operate the Project in a run-of-river mode and as a result the co-Licensees' do not expect existing uses of Project water's to substantially change over the next license term.

- Virginia Department of Game and Inland Fisheries. 2015. Virginia's 2015 Wildlife Action Plan. Henrico, Virginia. September 1, 2015.

  Wildlife Action Plans serve as the foundation of wildlife and natural habitat conservation planning in each state and are required by Congress for eligibility of State Wildlife Grant Funding. The Virginia Wildlife Action Plan was updated in 2015. Part of revising the plan required review of the 2005 plan to determine changes and updates. The updated Action Plan identifies species that are in decline, assess the greatest conservation challenges impacting those species, and identifies strategies to conserve and restore the species in Virginia. In addition to statewide summaries, the Action Plan includes developed strategies for 21 multi-county planning regions. The Action Plan identifies priority places for either conservation or restoration within each planning region, programs working to address threats or define best management practices, and data that could be used to document and evaluate the success of conservation actions. Finally, the updated Action Plan describes climate trends that have been projected for Virginia and identifies actions that can be taken to conserve wildlife under changing climatic conditions. The proposed continued run-of-river Project operations will ensure the protection of aquatic and terrestrial resources.

- Virginia State Water Control Board. 1986. Minimum instream flow study – final report. Annandale, Virginia. February 1986.

  Instream beneficial uses include, but are not limited to, the protection of fish and wildlife habitat, maintenance of waste assimilation, recreation, navigation, and cultural and

aesthetic values. The co-Licensees propose to continue to operate the Project in a run-of-river mode with a 300 cfs minimum flow requirement and will continue to maintain the Project consistent with current practices

15 DRAFT LICENSE APPLICATION COMMENTS AND RESPONSE SUMMARY

Attachment 4 of the Final License Application summarizes the co-Licensees' responses to Stage 2 Consultation comments on the Draft License Application received from stakeholders. Copies of the stakeholders' comment letters are provided in the Final License Application, Exhibit E, Appendix A.

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APPENDIX A

Pre-Filing Consultation Summary

SUMMARY OF CONSULTATION WITH RESOURCE AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

Stage 1 Requirements

The co-Licensees commenced the relicensing process by filing a Notice of Intent (NOI) to relicense the Project, TLP authorization request, and Pre-Application Document (PAD) with the Commission on May 31, 2019.[42] These documents were distributed to the resource agencies, tribes, and other stakeholders via e-mail on May 31, 2019. On June 27, 2019, the co-Licensees filed with the Commission proof that a public notice was published in a local newspaper notifying the public that the co-Licensees filed the NOI and PAD.[43] NCWRC and VDWR filed comments on the PAD with the Commission on June 21, 2019,[44] and July 1, 2019,[45] respectively. On July 24, 2019, the Commission issued a notice of the NOI and PAD filing, and approved use of the TLP.[46] The co-Licensees subsequently consulted with the resource agencies, tribes, and other stakeholders regarding the scheduling of a Joint Meeting and Site Visit via e-mail on August 14, 2019. The co-Licensees then scheduled a Joint Meeting and Site Visit, and filed with the Commission on September 3, 2019 notice of the Joint Meeting and Site Visit.[47] The co-Licensees held the Joint Meeting and Site Visit on September 18, 2019 and filed a meeting and site visits summary and audio recording of the meeting with the Commission on March 11, 2022[48], which also includes proof that a public notice of the joint meeting and site visits was published in the local paper. Subsequently, the co-Licensees received comments and study requests from the NCWRC,[49] USFWS,[50] and VDWR[51] on November 15, 2019. The co-Licensees prepared a Draft Study Plan (Attachment 1), consulted with the resource agencies regarding scheduling a conference call to discuss the draft study plan,[52] and held a conference call on April 23, 2020, with the stakeholders to discuss the Draft Study Plan. The co-Licensees received comments on the Draft Study Plan from the resource agencies, which were filed with the Commission,[53] and then prepared a Final Study Plan (Attachment 2). The Final Study Plan was distributed to the resource agencies via e-mail on July 21, 2020. Comments on the FSP were then filed by the USFWS with

[42] FERC Accession No. 20190531-5457

[43] FERC Accession No. 20190627-5052

[44] FERC Accession No. 20190621-5048

[45] FERC Accession No. 20190701-5120

[46] FERC Accession Nos. 20190724-3024 and 20190724-3062

[47] FERC Accession No. 20190903-5103

[48] FERC Accession No. 20220311-5255

[49] FERC Accession No. 20191115-5099

[50] FERC Accession No. 20191115-5067

[51] FERC Accession No. 20191115-5234

[52] See emails dated March 26, 2020, and April 16, 2020, below

[53] FERC Accession Nos.: 20200512-5132 (USFWS), 20200513-5190 (NCWRC), and 20200515-5018 (VDWR)

the Commission,[54] and provided to the co-Licensees. The co-Licensees provided a response letter to the USFWS via e-mail dated June 8, 2021.

Stage 2 Requirements

The Draft License Application and Draft Study Reports were provided to stakeholders on March 31, 2022. Comments were received from the USFWS, NCWRC, VDWR, and VDCR.

Stage 3 Requirements

This Final License Application has been distributed to the resource agencies, tribes, and other stakeholders concurrent with filing of the Final License Application with the Commission. A list of those entities that received a copy of the Final License Application in attached to the transmittal letter of this Final License Application.

[54] FERC Accession No. 20201008-5114

Appendix A – Table 1: Correspondence Record

Date	Subject	Type	From	To
Stage 1 Consultation				
March 29, 2019	Request for Information	Email	co-Licensees	Stakeholder List
March 29, 2019	Response to Request for Information	Email	Virginia State Corporation Commission	co-Licensees
April 1, 2019	Response to Request for Information	Email	USFWS	co-Licensees
April 12, 2019	Response to Request for Information	Email	VDCR	co-Licensees
April 23, 2019	Response to Request for Information	Email	VMRC	co-Licensees
April 25, 2019	Response to Request for Information	Email	VDWR	co-Licensees
April 29, 2019	Response to Request for Information	Email	Virginia Department of Health	co-Licensees
April 29, 2019	Response to Request for Information	Email	Virginia Department of Agriculture and Consumer Services	co-Licensees
May 31, 2019	NOI and PAD filing	Email and FERC eFiling	co-Licensees	Stakeholder List, FERC
June 21, 2019	Comments on NOI and PAD filing	FERC eFiling	NCWRC	FERC
June 27, 2019	Newspaper Notice of PAD filing	Email and FERC eFiling	co-Licensees	FERC
July 1, 2019	Comments on NOI and PAD filing	FERC eFiling	VDWR	FERC
July 24, 2019	Notice of NOI and PAD and approval to use TLP	FERC eFiling	FERC	co-Licensees
August 14, 2019	Email re: scheduling of Joint Meeting and Site Visit	Email	co-Licensees	Stakeholder List
September 3, 2019	Notice of Joint Meeting and Site Visit	FERC eFiling	co-Licensees	Stakeholder List, FERC
September 18, 2019	Joint Meeting	Meeting	co-Licensees	
Stage 2 Consultation				
November 15, 2019	Study Requests	FERC eFiling	USFWS	FERC
November 15, 2019	Study Requests	FERC eFiling	NCWRC	co-Licensees
November 15, 2019	Study Requests	FERC eFiling	VDWR	FERC
April 16, 2020	Distribute Draft Study Plans	Email	co-Licensees	Stakeholder List
April 23, 2020	Draft Study Plan Meeting	Meeting	co-Licensees	Stakeholder List
May 12, 2020	Comments on Draft Study Plans	FERC eFiling	USFWS	FERC

May 13, 2020	Comments on Draft Study Plans	FERC eFiling	NCWRC	FERC
May 15, 2020	Comments on Draft Study Plans	FERC eFiling	VDWR	FERC
July 21, 2020	Distribute Final Study Plans	Email	co-Licensees	Stakeholder List
October 7, 2020	Comments on Final Study Plans	FERC eFiling, Email	USFWS	FERC, co-Licensees
June 8, 2021	Response Letter to Comments on Final Study Plans	Email	co-Licensees	USFWS
March 11, 2022	Filing of meeting recording from Joint Meeting	FERC eFiling	co-Licensees	FERC
March 31, 2022	Distribute Draft License Application and Draft Study Reports	FERC eFiling, Email	co-Licensees	Stakeholder List, FERC
June 20, 2022	Comments on Draft License Application and Draft Study Reports	Email	NCWRC	co-Licensees
June 24, 2022	Comments on Draft License Application and Draft Study Reports	FERC eFiling	USFWS	FERC
June 29, 2022	Comments on Draft License Application and Draft Study Reports	FERC eFiling	VDWR	FERC
June 29, 2022	Comments on Draft License Application and Draft Study Reports	FERC eFiling	VDCR	FERC
July 14, 2022	Section 106 Consultation	Electronic Submission, Email	co-Licensees	VDHR
July 18, 2022	IPaC Report	Electronic Submission	co-Licensees	
July 22, 2022	CZMA Consultation	Email	co-Licensees	VDEQ
Stage 3 Consultation				
July 29, 2022	Final License Application Submitted	FERC eFiling and email	co-Licensees	Stakeholder List, FERC