UNITED STATES OF AMERICA

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

DRAFT APPLICATION FOR NEW LICENSE FOR MAJOR PROJECT - EXISTING DAM

EXHIBIT E – ENVIRONMENTAL REPORT

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December 2021

CRESCENT AND VISCHER FERRY HYDROELECTRIC PROJECTS RELICENSING

FERC NO. 4678 AND 4679




NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

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List of Abbreviations

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
Barge Canal System	New York State Canal System/Barge Canal System
BCD	Barge Canal Datum
°C	Degrees Celsius
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter
Commission	Federal Energy Regulatory Commission
Crescent Project	Crescent Hydroelectric Project
CRIS	New York State Cultural Resource Information System
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DHP	Division for Historic Preservation
DLA	Draft License Application
DO	Dissolved oxygen
DOC	Department of Commerce
DOI	Department of Interior
El.	elevation
EFH	Essential Fish Habitat
EPT	Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies)
ESA	Federal Endangered Species Act
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FPA	Federal Power Act
ft	foot/feet
HPMP	Historic Properties Management Plan
ILP	Integrated Licensing Process
IPaC	Information for Planning and Consultation
ISR	Initial Study Report
m	meter
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act

MGD	Million Gallons per Day
mg/L	Milligram per Liter
mi	mile
mL	milliliter
MW	megawatt
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NRHP or National Register	National Register of Historic Places
NRE	properties determined eligible for the NR
NRL	National Register List
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Unit
NWI	National Wetland Inventory
NWSRS	National Wild and Scenic River System
NY or NYS	New York State
NYISO	New York Independent System Operator
NYNHP	New York Natural Heritage Program
NYPA	New York Power Authority
NYSCC	New York State Canal Corporation
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	The New York State Department of State
NYSDOT	New York State Department of Transportation
NYSTA	New York State Thruway Authority
OPRHP	New York State Office of Parks, Recreation, and Historic Preservation
PAD	Pre-Application Document
PM&E or PME	protection, mitigation, and enhancement
PRISM	Partnerships for Regional Invasive Species Management
PSP	Proposed Study Plan
REA Notice	Ready for Environmental Analysis
RSP	Revised Study Plan
RTE	Rare, Threatened and Endangered
SAV	submerged aquatic vegetation

SCORP	Statewide Comprehensive Outdoor Recreation Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SD3	Scoping Document 3
Section 106	Section 106 of the National Historic Preservation Act
SHPO	State Historic Preservation Officer
SPD	Study Plan Determination
TCPs	traditional cultural properties
The Applicant	The Power Authority of the State of New York/ New York Power Authority
The Power Authority	The Power Authority of the State of New York/ New York Power Authority
The Projects	Crescent and Vischer Ferry Hydroelectric Projects
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Society
Vischer Ferry Project	Vischer Ferry Hydroelectric Project
WI/PWL	Waterbody Inventory/Priority Waterbodies List
WSRRA	Wild, Scenic and Recreational Rivers Act

1 Introduction

The Power Authority of the State of New York (New York Power Authority, Power Authority, NYPA, or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the Crescent Hydroelectric Project (Crescent Project) (FERC No. 4678) and the Vischer Ferry Hydroelectric Project (Vischer Ferry Project) (FERC No. 4679) (herein, collectively referred to as the "Projects"). The Projects are located adjacent to one another on the Mohawk River in New York at river miles 4 and 14, respectively. The upstream project boundary of the Crescent Project is the downstream project boundary of the Vischer Ferry Project. Both Projects generally consist of a dam, powerhouse, impoundment, and appurtenant facilities.

Both Project dams were originally constructed as part of the New York State Barge Canal System[1] (Barge Canal System[2]) to 'canalize' the Mohawk River from Scotia to Crescent, providing navigable conditions for barges and vessels and facilitating water level control and lock operations. Both Projects have the same license expiration date of May 31, 2024. As required by the Federal Power Act (FPA), the Power Authority must file with the Commission its application for a new license for each of the Projects on or before May 31, 2022.

1.1 Application

FERC issued separate licenses for the Projects on June 26, 1984, and both licenses expire on May 31, 2024. The Power Authority is preparing its new license application for the Projects in accordance with FERC's Integrated Licensing Process (ILP). The Power Authority proposes to continue operating the Projects as they are currently operated, with no new capacity and no new construction. The Power Authority has prepared this Exhibit E Environmental Exhibit as part of the Draft License Application (DLA) and, in accordance with 18 C.F.R. §5.18(b), following the Commission's Preparing Environmental Assessments: Guidelines for Applicants, Contractors, and Staff.

1.2 Purpose of Action and Need for Power

FERC must determine whether to issue a license to the Power Authority for each of the Projects and what conditions should be placed in any license issued. In deciding whether to issue a license, FERC must determine that the Projects will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the developmental purposes for which licenses are issued, FERC must give equal

[1] The existing Barge Canal System was created following the passage of the Barge Canal Act in 1903. However, some portions of the original Erie Canal built between 1817 and 1825 still exist. For the purposes of this document, the Licensee will consistently refer to the portions of the Barge Canal or Erie Canal adjacent to the Projects as the Barge Canal System.

[2] The Barge Canal System is owned by the People of the State of New York and operated by the New York State Canal Corporation (NYSCC), which was created by the New York State Legislature in 1992 as a subsidiary of the New York State Thruway Authority (NYSTA). Prior to 1992, the operations of the Barge Canal System fell under the New York State Department of Transportation. On January 1, 2017, the NYSCC became a subsidiary of the Power Authority (N.Y. Public Authorities Law § 1005-b).

consideration to the purposes of energy conservation; the protection, mitigation or damage to, and the enhancement of fish and wildlife (including related spawning grounds and habitat); the protection of recreational opportunities; and the preservation of other aspects of environmental quality.

FERC's issuance of new licenses for the continued operation of the Projects will allow the Power Authority to continue producing electric power from a renewable resource for the term of the new licenses, while addressing environmental, land use, public recreation, and cultural resources in accordance with license conditions. Exhibit E was prepared consistent with the ILP requirements as set forth in 18 C.F.R. §5.18(b) and is designed to support FERC's required analysis under the National Environmental Policy Act (NEPA), as amended. Because the Projects are located adjacent to each other, operate in close coordination with each other, and follow the same relicensing schedule, this single Exhibit E was developed for both Projects. In this Exhibit E, the Applicant assesses the environmental and economic effects of continuing to operate the Projects as proposed herein. The Applicant also considers the effects of the no-action alternative for both Projects.

The Projects are used by the Power Authority to meet its statutory and contractual obligations to its customers and provides cost saving benefits to the statewide grid and consumers. The primary purpose of the Projects is to supply energy and capacity to the New York Independent System Operator (NYISO), a regional transmission organization that coordinates the generation and transmission of wholesale electricity within the state of New York. The Projects are operated as run-of-river projects and play a role in New York's renewable energy portfolio providing low-cost emissions free, baseload power.

1.3 Public Review and Comment

FERC's regulations for the ILP require applicants to consult with appropriate resource agencies, Native American tribes, and other entities before filing an application for a license. Pre-filing consultation must be completed and documented according to FERC's regulations.

1.3.1 Scoping

The Power Authority filed a Notice of Intent (NOI) and Pre-Application Document (PAD) for each of the Projects on May 3, 2019, which included preliminary study plans for the Projects. The PAD provided summaries of existing, relevant, and reasonably available information related to the Projects that was in the Applicant's possession or was obtained with the exercise of due diligence. The purpose of the PAD was to provide participants in the relicensing proceeding with a summary of the information necessary to identify issues and related information needs and develop study requests and study plans.

FERC published Scoping Document 1 (SD1) for the Projects on June 10, 2019. Scoping meetings were then held by FERC on July 10 and 11, 2019, during which time potential issues were identified by agencies, stakeholders and the public. Following the scoping meetings, the Commission issued its Scoping Document 2 (SD2) on September 20, 2019. FERC issued Scoping Document 3 (SD3) on January 25, 2021.

1.3.2 Studies

The Power Authority received comments on the PAD and the study plans as well as requests for additional studies. The Power Authority reviewed these comments and study requests, developed a Proposed Study Plan (PSP) for the Projects, which served to address and respond to all comments and study requests received. The Power Authority filed the PSP with FERC on September 23, 2019. The Power Authority then

held a PSP Meeting on October 23, 2019 to provide a presentation on each individual study plan and to provide an opportunity for meeting attendees to ask questions related to the proposed studies. FERC staff and stakeholders attended this meeting. Stakeholders provided comments to the Power Authority on the PSP on or before December 22, 2019. The Power Authority filed a Revised Study Plan (RSP) on January 21, 2020. On February 20, 2020, FERC issued its Study Plan Determination (SPD) for the Projects approving the following studies:

- Water Quality Study
- Fish Entrainment Study
- Blueback Herring Downstream Migration Study
- Fish Community Study
- Aquatic Mesohabitat Study[3]
- Bald Eagle Study
- Recreation Study
- American Eel Study

The Power Authority filed an Initial Study Report (ISR) on February 19, 2021, and held a virtual ISR Meeting, due to COVID-19, on March 6, 2021. The ISR contained final study reports for five of the FERC-approved studies and a status update report for the remaining studies. Studies which had been completed and for which final reports were provided included: Water Quality Study, Fish Entrainment Study, Blueback Herring Downstream Migration Study, Fish Community Study, and Aquatic Mesohabitat Study. The Bald Eagle Study, Recreation Study, and American Eel Study required additional efforts in 2021. The Updated Study Report (USR) containing the final study reports for these three studies will be filed with the Commission on February 19, 2022, and the Power Authority will host the USR meeting within 15 days of the filing of the USR with FERC. The Commission is due to issue its Determination on Requests for Study Modifications for the Projects on June 19, 2022.

[3] The Project Boundary for the Crescent Project shown in the PAD and used for the 2020 Aquatic Mesohabitat Study is slightly different from the proposed Project Boundary as depicted in Exhibit G and described herein. As a result, acreages reported for the wetlands and other resources evaluated as part of the Aquatic Mesohabitat for the Crescent Project are slightly different than the acreages describing Project lands and waters within the proposed Project boundary.

2 Statutory and Regulatory Requirements

FERC's issuance of new licenses for the Projects is subject to certain requirements under the FPA and other applicable statutes. The major requirements are described below. The actions that the Power Authority has taken to address these requirements are also described below.

2.1 Federal Power Act

2.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA, 16 U.S.C. § 811, states that FERC shall require construction, maintenance, and operation by a licensee of such fishways as the secretaries of the Department of Commerce (DOC) and the Department of the Interior (DOI) may prescribe. Due to the Projects' inland location and lack of marine and anadromous species, the National Marine Fisheries Service (NMFS) has not been a participant in the licensing proceeding and, therefore, has not raised any issues pertaining to fish passage. The United States Fish and Wildlife Service (USFWS) requested that the Power Authority examine issues related to fish passage at the Projects. In response, the Power Authority conducted the Assessment of Fish Entrainment, Fish Community, Turbine Survival and Blueback Herring Downstream Migration, and American Eel studies which are discussed in Section 4.5.

Under the Commission's ILP regulations, 18 C.F.R. §5.23(a), fishway prescriptions, if any, will be filed within 60 days after FERC's Notice for Acceptance and Ready for Environmental Analysis (REA Notice) following the Power Authority's filing of the Final License Application (FLA) for each Project.

2.1.2 Section 10(j) Recommendations

Under the provisions of Section 10(j) of the FPA, each hydroelectric license issued by FERC is required to include conditions based on recommendations of federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the project, unless FERC determines they are inconsistent with the purpose and requirements of the FPA or other applicable laws. During the relicensing, the Power Authority consulted with those agencies with authority to recommend Section 10(j) conditions, including USFWS and the New York State Department of Environmental Conservation (NYSDEC). Under the Commission's ILP regulations, 18 C.F.R. §5.23(a), federal and state fish and wildlife agencies will have 60 days following the REA Notice to submit Section 10(j) recommendations.

2.2 Clean Water Act

Under Section 401 of the Clean Water Act (CWA), any federal license or permit to conduct any activity that may result in a discharge into navigable waters requires a certification from the state in which the discharge originates that such discharge will comply with the applicable provisions of the CWA, unless such certification is waived. Therefore, a Section 401 Water Quality Certification or waiver is required prior to FERC's issuance of a new license for the Projects. The NYSDEC is the state agency designated to carry out the certification requirements prescribed in Section 401 of the CWA. Pursuant to 18 C.F.R. §5.23(b), the Power Authority will request Section 401 Water Quality Certification from NYSDEC within 60 days of FERC's REA Notice.

2.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally listed endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. The Power Authority was granted designation as FERC's non-federal representative for ESA consultation on June 10, 2019.

During development of the PAD, the Power Authority reviewed the USFWS's Information for Planning and Consultation (IPaC) database to identify species that may exist within the Project boundaries that are listed as threatened or endangered under the ESA. At that time, the IPaC database indicated that the federally protected northern long-eared bat may be present in each Project area. During development of this draft license application, a subsequent IPaC report and associated species list was completed in November 2021. In this more recent species list, the monarch butterfly (*Danaus plexippus*) (a federal candidate species) was identified as a species that may utilize habitat within the Project boundaries for Crescent and Vischer Ferry Projects. This species is not currently listed as threatened or endangered and no critical habitat has been designated.

The results of the updated IPaC inquiry indicated again that the federally protected northern long-eared bat may be present in each Project area. This is discussed further in Section 4.8.

2.4 Coastal Zone Management Act

Under Section 307 (c)(3) of the Coastal Zone Management Act (CZMA), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification. The New York State Department of State (NYSDOS) is the agency responsible for implementing New York's coastal management program.

The Projects are not located within and do not affect the designated coastal zone or coastal resources of the State of New York. Therefore, the Projects are not subject to coastal zone management review and no consistency certification is needed for the Commission's relicensing of the Projects. In an email dated May 23, 2019, the Power Authority received concurrence from NYSDOS that the Commission's licensing of the Projects will not affect New York's coastal zone, pursuant to 18 C.F.R. §5.18(b)(3)(iv).

2.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (Section 106) requires federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such actions. Historic properties include significant sites, buildings, structures, districts, and individual objects that are listed in or eligible for inclusion in the National Register of Historic Places (NRHP or National Register). FERC's issuance of a new license for the Projects is considered an undertaking subject to the regulations and requirements of Section 106 and its implementing regulations at 36 C.F.R. Part 800.

The Power Authority was designated as FERC's non-federal representative for Section 106 consultation on June 10, 2019. As part of its role as FERC's non-federal representative, the Power Authority consulted with the New York State Historic Preservation Office and Native American Nations. This consultation is discussed in Section 4.12.

2.6 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires federal agencies to consult with NMFS on all actions that may adversely affect Essential Fish Habitat (EFH). Per NOAA Fisheries EFH Mapping Tool,[4] no designated species or habitats designated under the Magnuson-Stevens Act occur within the Project boundaries; therefore, this act is not applicable to the relicensing of the Projects.

[4] NOAAs Fisheries EFH Mapping Tool: https://www.fisheries.noaa.gov/national/habitat-conservation/essential-fish-habitat

3 Proposed Actions and Alternatives

This section outlines the No-Action Alternative as defined by FERC, the Power Authority's Proposed Action, and alternatives considered by the Power Authority but eliminated from further analysis.

3.1 No-Action Alternative

The No-Action Alternative would allow the Power Authority to continue operation of the Projects under the terms of the current licenses, including maintaining the current Project boundaries, facilities, and operation and maintenance procedures. No new environmental protection, mitigation, or enhancement measures would be implemented. FERC uses this alternative to establish baseline environmental conditions for comparison with other alternatives.

3.1.1 Existing Projects Locations and Lands

The Crescent and Vischer Ferry Projects are located adjacent to one another on the Mohawk River in New York at river miles 4 and 14, respectively. The upstream Project boundary of the Crescent Project is the downstream project boundary of the Vischer Ferry Project.

3.1.1.1 Crescent Project

The Crescent Project is an 11.8 MW conventional hydroelectric project located on the Mohawk River, approximately 4 miles upstream from its confluence with the Hudson River. The Crescent Project is located in Saratoga, Albany, and Schenectady Counties, New York, and in the Towns of Waterford, Colonie, Halfmoon, Clifton Park, and Niskayuna (Figure 3-1 and Figure 3-2). It is located 2 miles upstream of the School Street Hydroelectric Project (FERC No. 2539) owned by Erie Boulevard Hydropower, L.P. The Crescent impoundment is approximately 10 miles long and the upstream terminus of the impoundment is located at the Vischer Ferry Project Dam.

The Crescent Project Boundary generally follows the shoreline of Mohawk River and encompasses a total of approximately 2,283 acres and approximately 10 miles of shoreline along each bank of the Mohawk River.

3.1.1.2 Vischer Ferry Project

The Vischer Ferry Project is an 11.8 MW conventional hydroelectric project located on the Mohawk River, approximately 14 miles upstream from its confluence with the Hudson River, and approximately 10 miles upstream of the Crescent Project. The Vischer Ferry Project is located in Saratoga and Schenectady Counties, New York, in the Towns of Clifton Park and Niskayuna and the City of Schenectady (Figure 3-1 and Figure 3-3). The Vischer Ferry impoundment is 10.3 miles long and the upstream terminus of the impoundment is located at Lock E-8 in Schenectady.

The Vischer Ferry Project Boundary generally follows the shoreline of Mohawk River and encompasses a total of approximately 1,156 acres and approximately 10.3 miles of shoreline along each bank of the Mohawk River.

Figure 3-1 Locations of Crescent and Vischer Ferry Projects

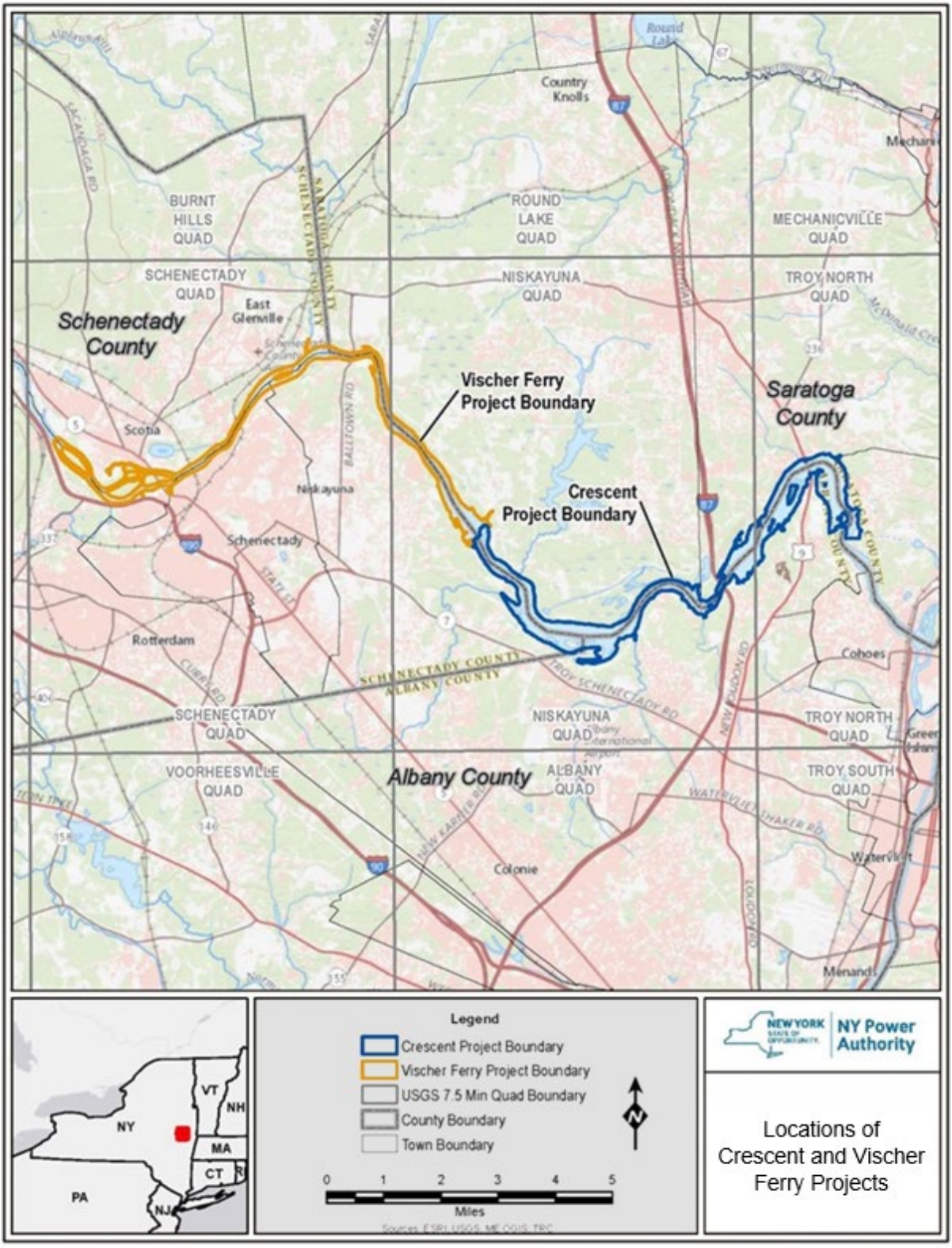


Figure 3-2 Crescent Project Location

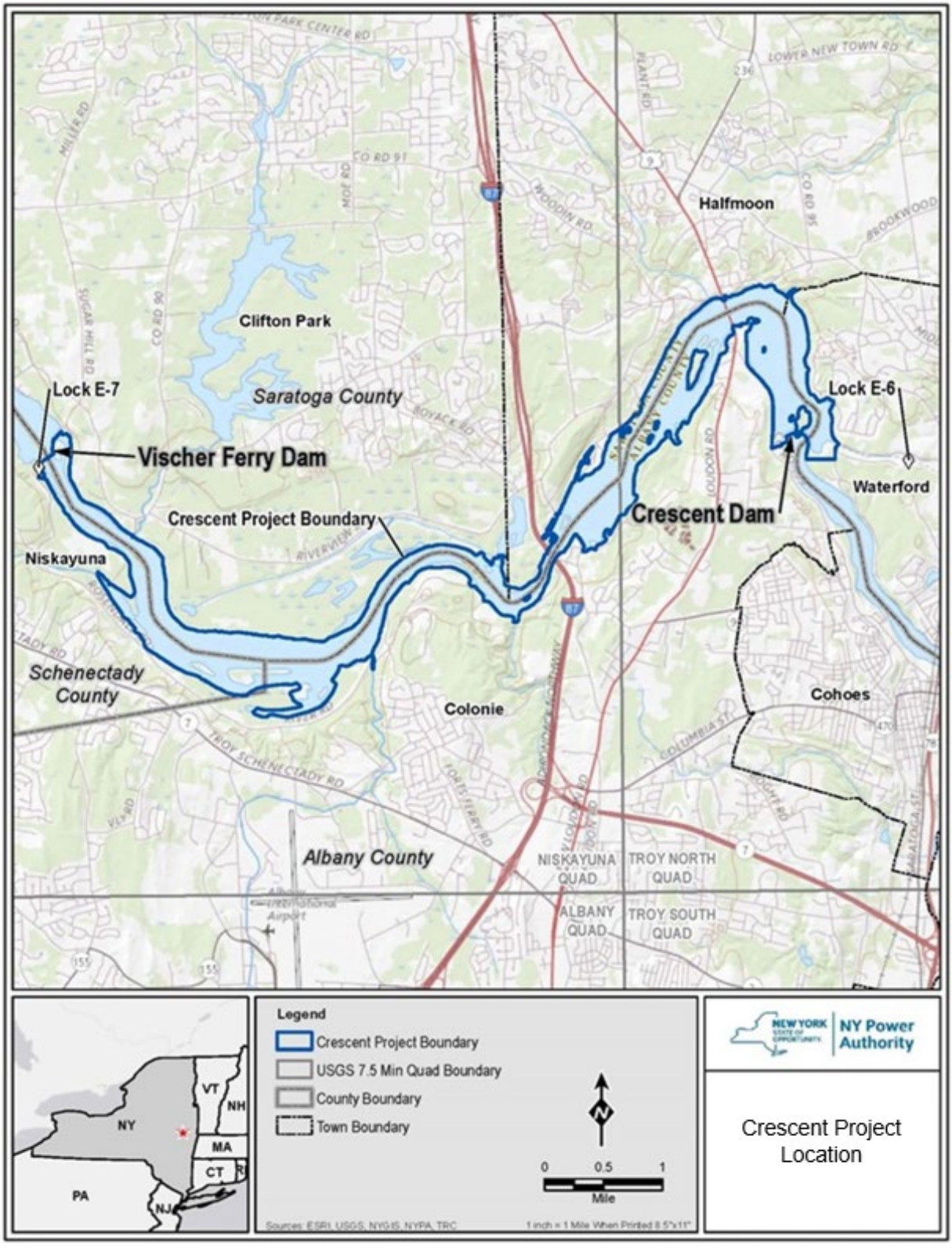
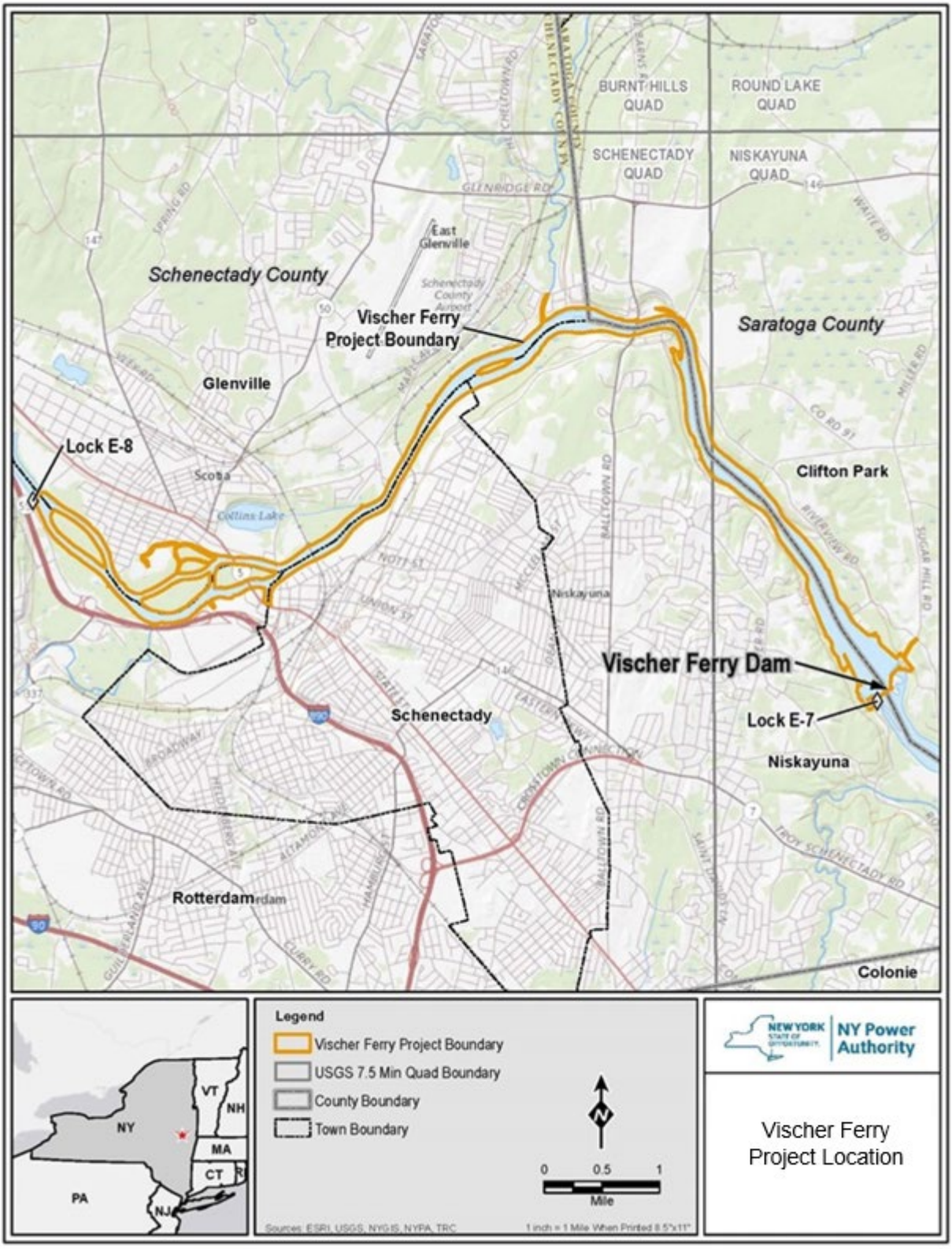


Figure 3-3 Vischer Ferry Project Location



3.1.2 Existing Project Facilities

The principal features of the Crescent Project are the dam, powerhouse, impoundment, and appurtenant facilities. The Crescent Dam consists of two independent concrete gravity overflow sections which link each river bank to a rock island in the middle of the Mohawk River. The powerhouse is located adjacent to the dam on the western bank of the river (Figure 3-4). The powerhouse contains four generating units. Exhibit A provides a detailed description of the Project facilities. No modifications to the Crescent Project facilities are currently proposed.

The principal features of the Vischer Ferry Project are the dam, powerhouse, impoundment, and appurtenant facilities. The Vischer Ferry Dam consists of three connected spillway sections having a total length of 1,919 ft. The powerhouse is located at the northern end of the dam (Figure 3-5). The powerhouse contains four generating units. Exhibit A provides a detailed description of the Project facilities. No modifications to the Vischer Ferry Project facilities are currently proposed.

Figure 3-4 Major Project Facilities of the Crescent Project

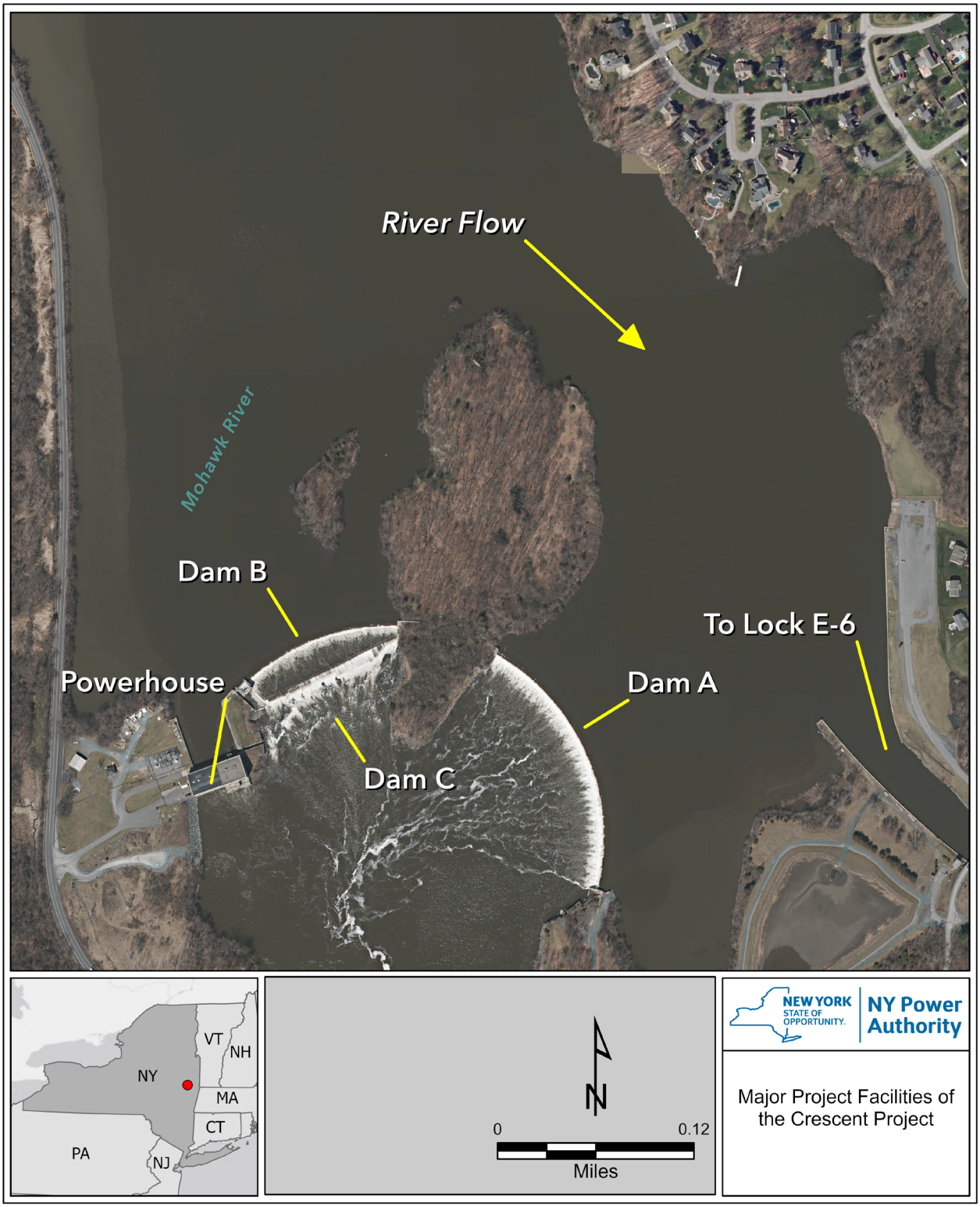
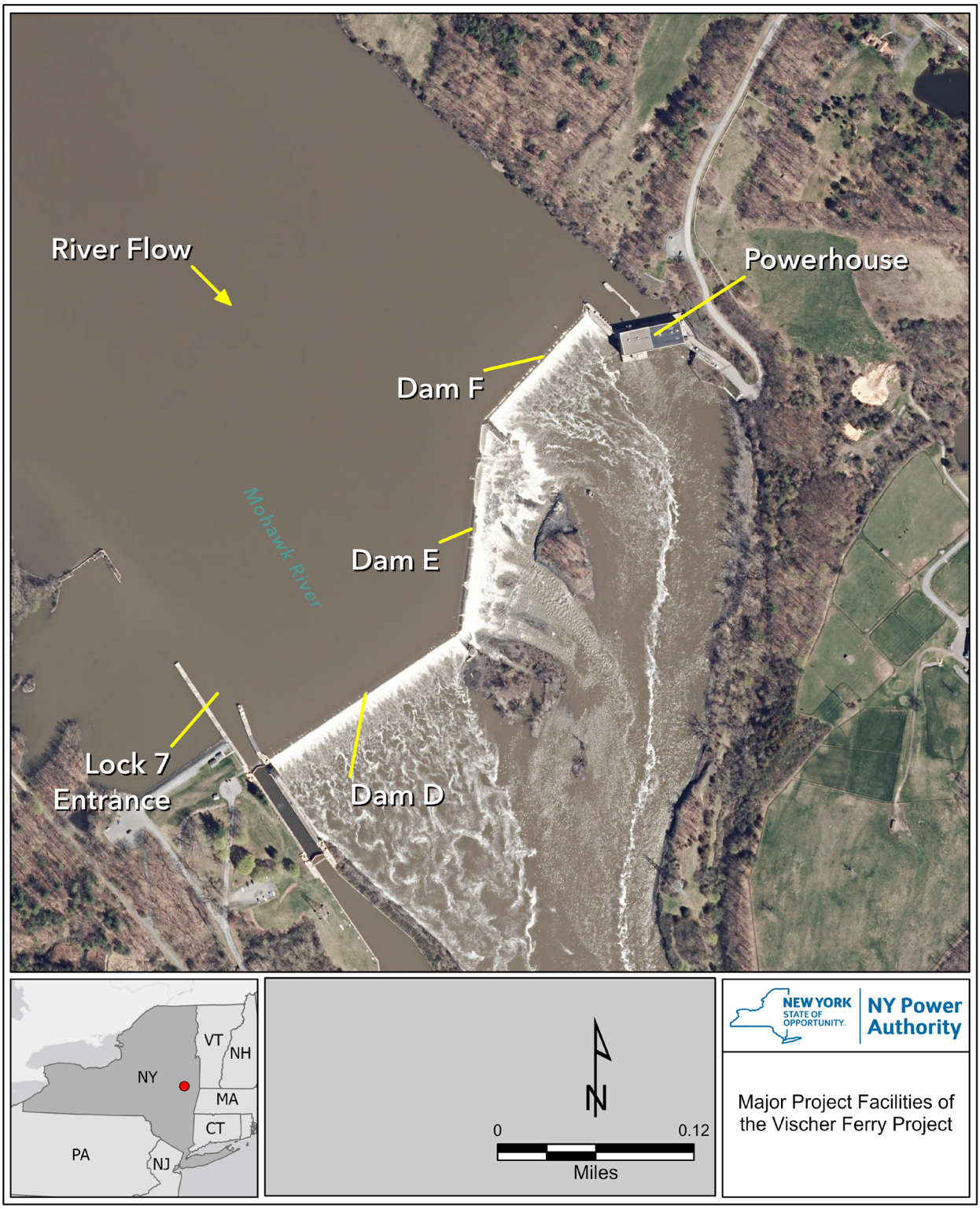


Figure 3-5 Major Project Facilities of the Vischer Ferry Project



3.1.3 Project Operations

Crescent Project

The Crescent Project is operated as run-of-river. The original purpose of the Crescent Dam was to impound water to support navigation on the Barge Canal; this remains true today. In 1983, the State of New York and the Power Authority entered into a Development Agreement whereby the State agreed to grant a perpetual hydroelectric easement to the Power Authority to develop and operate hydropower facilities at both the Crescent and Vischer Ferry project sites. The Development Agreement contains certain protocols for standard operation and maintenance of both the Project and the Barge Canal System. During unusual conditions or emergencies associated with either system, public safety is always the first priority. Otherwise, navigation and Barge Canal System operations take priority over the operation of the Project. Unless emergency conditions exist, the Project operates in run-of-river mode with minimal fluctuations allowed only at Canal Corporation's direction to aid navigation, to facilitate flashboard installation and removal, and for canal maintenance or safety. The Project therefore operates in coordination with the Barge Canal System.

The Crescent Project operations are performed in a manner to maintain the normal full pool elevation of the impoundment. Flow through the Project is through the powerhouse or over the dam. During the non-navigation season, a minimum flow of 100 cubic feet per second (cfs) (or inflow, whichever is less) is required to be passed at the Crescent Dam. In accordance with a July 31, 2007 FERC order, the minimum flow during canal navigation season is increased to 250 cfs and is passed through a notch in the Dam A flashboards. These minimum flows are for fish protection measures. Once minimum flows and any diversions required for canal operations are met, the remaining flow is available for power generation.

The Dam A and B sections of the Crescent Dam utilize 1-foot-high flashboards that are installed seasonally to help maintain the normal pool level in the Barge Canal System upstream of Lock E-6. The existing flashboards are wooden with vertical steel pin supports. The steel pins used to support the flashboards are set to fail when the headpond level overtops the flashboards by 4 feet. When the flashboards are up during navigation season (generally mid-May to mid-October), the normal full pool elevation of the impoundment is elevation (El.) 185 ft. BCD. When the flashboards are out (generally, mid-October to mid-May), the normal full pool elevation of the impoundment is El. 184 ft. BCD.

No changes to Project operations are proposed.

Vischer Ferry Project

The Vischer Ferry Project is operated as run-of-river. The original purpose of the Vischer Ferry Dam was to impound water to support navigation on the Barge Canal; this remains true today. In 1983, the State of New York and the Power Authority entered into a Development Agreement whereby the State agreed to grant a perpetual hydroelectric easement to the Power Authority to develop and operate hydropower facilities at both the Crescent and Vischer Ferry project sites. The Development Agreement contains certain protocols for standard operation and maintenance of both the Project and the Barge Canal System. During unusual conditions or emergencies associated with either system, public safety is always the first priority. Otherwise, navigation and Barge Canal System operations take priority over the operation of the Project. Unless emergency conditions exist, the Project operates in run-of-river mode with minimal fluctuations allowed only at Canal Corporation's direction to aid navigation, to facilitate flashboard installation and removal, and for canal maintenance or safety. The Project therefore operates in coordination with the Barge Canal System.

Vischer Ferry Project operations are performed in a manner to maintain the normal full pool elevation of the impoundment. Flow through the Project is through the powerhouse or over the dam. A minimum flow of 200 cfs (or inflow, whichever is less) is required to be passed at the Vischer Ferry Dam. Once Project minimum flows and any diversion required for canal operations are met, the remaining flow is available for power generation.

Flashboards are installed along the spillway crests of the Vischer Ferry Dam seasonally for the navigation season. The flashboards are 27 inches high and are installed in sockets spaced 4 feet apart. When the flashboards are installed during navigation season (generally, mid-May to mid-October) the elevation of the spillway is El. 213.25 ft. BCD. The flashboards are set to fail when the headpond level overtops the flashboards by between 1-3 feet, depending on the dam section. When the flashboards are out (generally, mid-October to mid-May), the normal full pool elevation of the impoundment is El. 211.0 ft. BCD.

No changes to Project operations are proposed.

3.1.4 Existing Environmental Measures

The Crescent and Vischer Ferry Projects are operated in accordance with their respective FERC licenses and the provisions of Water Quality Certification, including any required environmental protection, mitigation, and enhancement measures. Key environmental measures currently undertaken at the Projects are as follows:

- Run-of River Operations – The Projects are operated as run-of-river such that outflow from the projects approximates the inflow to the project. The Licensee operates the Projects to minimize the fluctuation of the impoundment surface elevation by maintaining a discharge from the Projects so that at any point in time, flows as measured downstream from each Project tailrace, approximate the sum of inflows to each impoundment. The Projects are operated to maintain the impoundment surface elevation in the range from the top of the dam (or top of the flashboards during the navigation season) to levels 6 inches below the top of dam (or top of flashboards during the navigation season). Run-of-river operations may be temporarily modified if required by emergencies and for short periods upon mutual agreement between the Licensee and NYSDEC, with notification to FERC.
- Minimum Flows – The Projects are operated with certain minimum flow requirements. At Crescent, during the non-navigation season the Licensee is required to provide a minimum flow of 100 cfs, or inflow, whichever is less at Crescent dam. During the navigation season, the minimum flow requirement is increased to 250 cfs and is passed through a notch in the Dam A flashboards for fish protection. At Vischer Ferry, a minimum flow of 200 cfs, or inflow, whichever is less, is required to be passed at the Vischer Ferry Dam during all seasons.
- Fish Deterrent and Passage System – To enhance downstream fish passage at the Projects, the Licensee operates an acoustic deterrent system at each Project during the migratory fish season (generally May-October). The acoustic deterrent systems are designed to guide blueback herring (*Alosa aestivalis*) away from the Project powerhouses and toward the downstream bypasses provided at each Project. At Crescent, the deterrent system is operated to guide fish to the north/east side of the island toward Dam A, where an approximately 80 foot notch in the flashboards provides safe downstream passage. Alternative passage is available through Lock 6 and the Waterford Flight. At Vischer Ferry, the deterrent system is operated to guide fish away from the powerhouse and forebay. Downstream fish passage is provided through two separate notches in the flashboards along Dam F, one for adult blueback herring, and another for juvenile blueback herring.

- Project Recreation Facilities – To enhance public recreation at the Projects, the Licensee operates and maintains several public recreation facilities that provide recreational access to Project lands and waters. At Crescent, the Licensee provides a tailwater fishing area and picnic area. At Vischer Ferry, the Licensee provides an overlook, tailwater fishing area, and impoundment boat launch.
- Navigation – To ensure that the Project dams continue to serve their primary purpose for navigation on the Barge Canal, the Projects are operated in close coordination with Canals. During the navigation season (generally, May through October) flashboards are installed at both Project dams to increase the impoundment level and help ensure operation of the canal lock system. At Crescent, 1-foot flashboards are installed during the navigation season to enhance operation of Canal Lock 6 and the Waterford Flight. At Vischer Ferry, 27-inch flashboards are installed during the navigation season to enhance operation of Canal Lock 7. In the event that flashboards are lost during the navigation season, the Licensee works in close coordination with Canals to replace the flashboards and resume normal project operations as soon as safe and practicable. The Licensee also closely coordinates Project operations to ensure safe installation (in the spring) and removal (in the fall) of the flashboards.

3.2 Applicant's Proposal

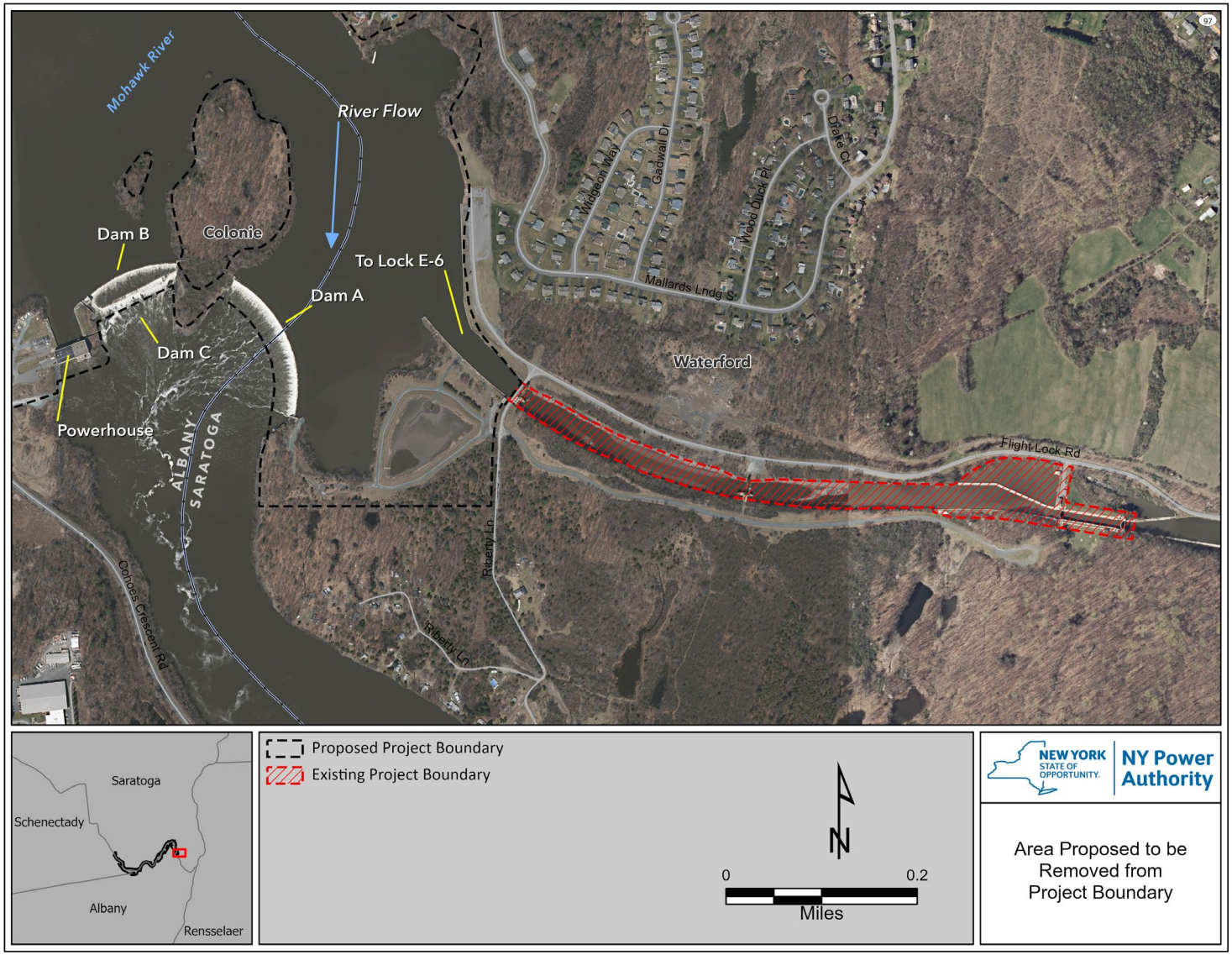
The Power Authority proposes to continue to operate and maintain the Projects and continue implementing existing environmental measures. The Power Authority proposes no new development or changes in Project operations for both Projects.

3.2.1 Proposed Project Facilities and Operations

The Power Authority proposes no new or upgraded facilities, structural changes, or operational changes to the Projects during the term of the new license.

The Power Authority is proposing minor modifications to the Crescent Project boundary to exclude a small portion of the Barge Canal System, including Lock 6, which are not operated as part of the Project, and are not necessary for Project purposes. Figure 3-6 shows the location of the proposed Lock 6 Project Boundary modification. The Power Authority's proposal will result in the removal of 14 acres of lands and canal waters from the FERC Project boundary.

Figure 3-6 Crescent Project Boundary Proposed Lock 6 Removal



3.2.2 Proposed Environmental Measures

The Power Authority proposes to continue implementing existing environmental measures.

3.3 Alternatives Considered but Eliminated from Further Analysis

3.3.1 Federal Government Takeover of the Project

FERC's statement from SD2 regarding a federal government takeover alternative is as follows:

> *"In accordance with § 16.14 of the Commission's regulations, a federal department or agency may file a recommendation that the United States exercise its right to take over a hydroelectric power project with a license that is subject to sections 14 and 15 of the FPA. We do not consider federal takeover to be a reasonable alternative. Federal takeover of the projects would require congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence showing that federal takeover should be recommended to Congress. No party has suggested that federal takeover would be appropriate, and no federal agency has expressed interest in operating the projects."*

3.3.2 Issuing a Non-Power License

FERC's Statement from SD2 regarding a non-power license alternative is as follows:

> *"A non-power license is a temporary license the Commission would terminate whenever it determines that another governmental agency is authorized and willing to assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this time, no governmental agency has suggested a willingness or ability to take over the projects. No party has sought a non-power license, and we have no basis for concluding that the Crescent and Vischer Ferry projects should no longer be used to produce power. Thus, we do not consider a non-power license a reasonable alternative to relicensing the projects."*

3.3.3 Retiring the Project

FERC's statement from SD2 regarding the Project decommissioning alternative is as follows:

> *"Decommissioning of the projects could be accomplished with or without dam removal. Either alternative would require denying the relicense application and surrender or termination of the existing licenses with appropriate conditions. There would be significant costs involved with decommissioning the projects and/or removing any project facilities. The projects provide a viable, safe, and clean renewable source of power to the region. With decommissioning, the projects would no longer be authorized to generate power.*
>
> *No party has suggested project decommissioning would be appropriate in this case, and we have no basis for recommending it. Thus, we do not consider project decommissioning a reasonable alternative to relicensing the projects with appropriate environmental measures."*

4 Environmental Analysis

4.1 Cumulative Effects

According to the Council on Environmental Quality's (CEQ) 1978 regulations implementing the National Environmental Policy Act (NEPA) (40 C.F.R. Section 1508.7) required federal agencies to consider cumulative effects in their environmental review of a Proposed Action. Under those historic regulations, a cumulative effect was defined as the impact on the environment which results from the incremental impact of a Proposed Action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydroelectric project operations and other land and water development activities.

In July 2020, CEQ revised its regulations implementing NEPA and eliminated the regulatory requirement to consider "direct, indirect, and cumulative" effects of a Proposed Action. CEQ's revised regulations required a federal agency to consider "effects" of an action, which it defined as those that are "reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives."

FERC indicated in SD2 that based upon review of the PAD and preliminary staff analysis, it identified water quality and diadromous fishes (including blueback herring and American eel (*Anguilla rostrata*), as having the potential to be cumulatively affected by the continued operation and maintenance of the Crescent and Vischer Ferry Projects in combination with other hydroelectric projects and activities in the Mohawk and Hudson River Basins.

On January 25, 2021, FERC issued SD3 to note that it would conduct its NEPA review in accordance with the July 2020 updates to the NEPA regulations. On October 7, 2021, CEQ issued a Notice of Proposed Rulemaking to revert back to the 1978 language, which would again require agencies to consider direct, indirect, and cumulative effects of a Proposed Action.

4.2 General Description of the River Basin

4.2.1 Mohawk River Watershed

The Crescent and Vischer Ferry Projects are located in the Mohawk River Watershed. The Mohawk River Watershed lies entirely in the State of New York and encompasses 3,460 square miles within 14 counties between the Adirondack Mountains to the north and the Catskills to the south (Mohawk River Watershed Coalition [MRWC], 2015). Over 600,000 people live within the watershed's 170 municipalities (MRWC, 2015). The Mohawk River is the largest tributary to the Hudson River and the Mohawk River Watershed comprises approximately 25% of the entire Hudson River Watershed (MRWC, 2015). The Mohawk River is approximately 140 miles in length. The river originates in the valley between the western Adirondacks and the Tug Hill Plateau, then flows to the east where it joins the Hudson River (MRWC, 2015). The Mohawk River Watershed is shown in Figure 4-1.

The Mohawk River Watershed can be divided into three main regional watersheds: Main River, Upper Mohawk, and Schoharie Watersheds (MRWC, 2015). The Projects are both located in the Main River (lower Mohawk) regional watershed, as shown on Figure 4-2.

The Crescent Project Dam is located approximately 4 miles upstream from the convergence of the Mohawk River with the Hudson River. The Vischer Ferry Project Dam is located approximately 14 miles upstream from the convergence of the Mohawk River with the Hudson River.

Figure 4-1 Mohawk River Watershed

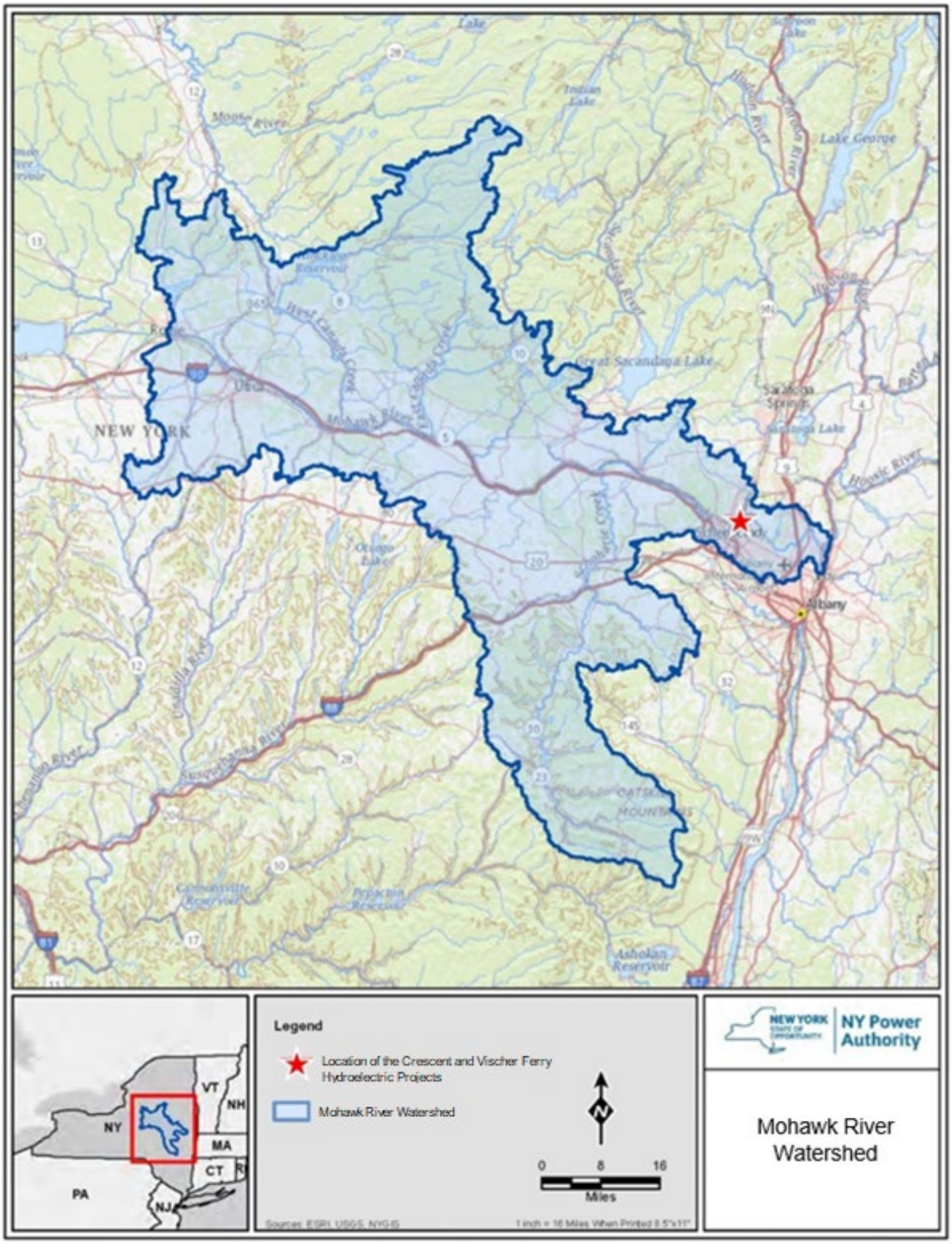
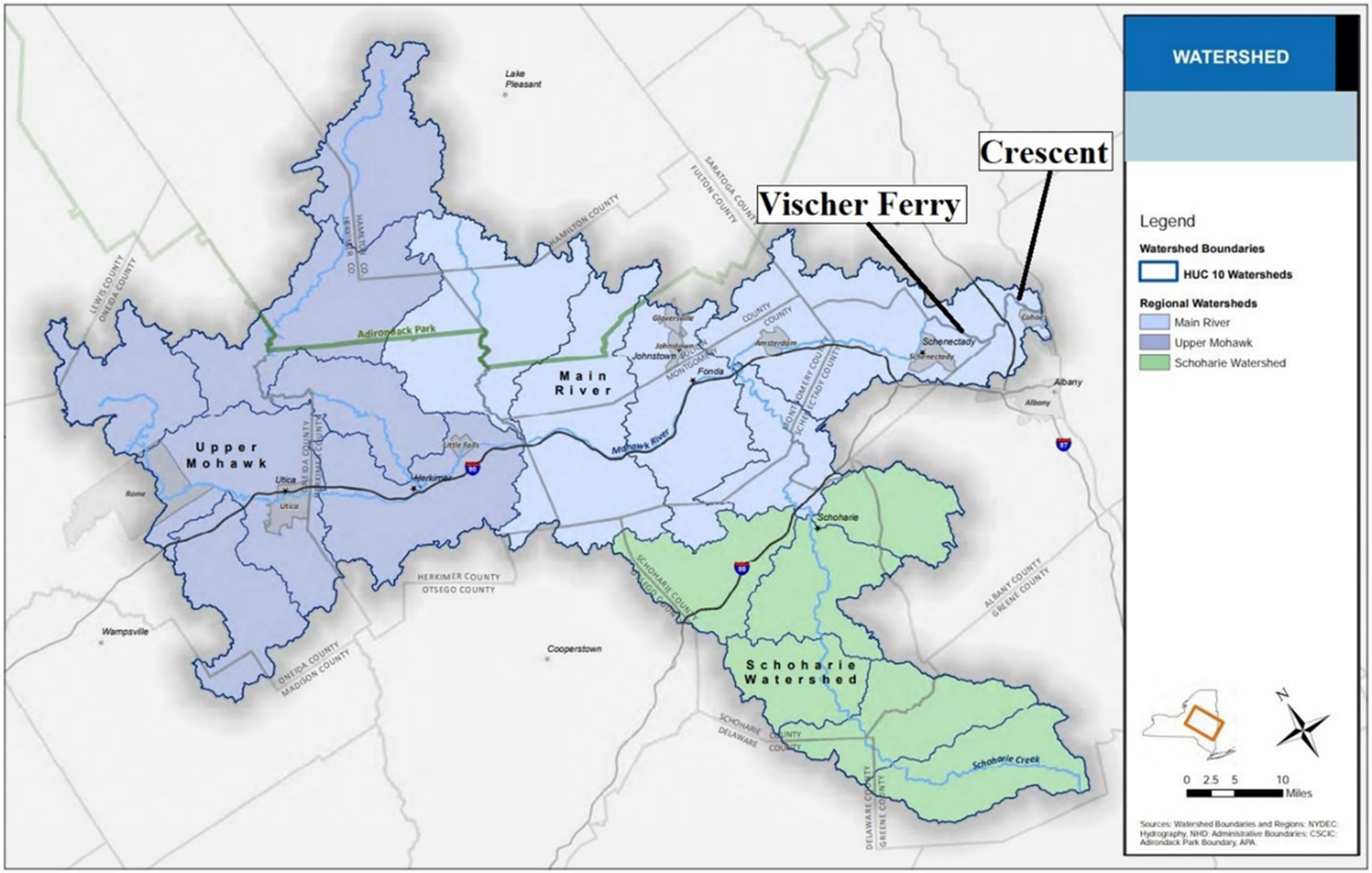


Figure 4-2 Mohawk River Regional Watersheds



Source: MRWC, 2015

4.2.2 Major Land Uses

Forests are the dominant land cover in the Mohawk River Watershed, and agriculture is the second most common land cover type. Table 4-1 summarizes the land cover types in the Mohawk River Watershed, with a comparison by region (Upper Mohawk, Main River, and Schoharie Watersheds) (MRWC, 2015). Figure 4-3 depicts major land cover types in the Mohawk River Watershed.

The principal types of land use within the Mohawk River Watershed are residential (28%), wild/forested/conservation lands (20%), agriculture (20%), and vacant land (19%). Table 4-2 summarizes the land use types in the Mohawk River Watershed, with a comparison by region (Upper Mohawk, Main River, and Schoharie Watersheds). Land cover and land use follow largely similar patterns, with the forested lands in the Adirondack highlands to the north and the Catskills to the south. Agriculture and human settlement dominate the lowlands near the Mohawk River and the mid-uplands along major tributaries to the north and south. Most of the population in the Mohawk River Watershed is located in the lowlands and mid-uplands along the main stem of the river, as are most of the roadways and railways, and the Barge Canal System. (MRWC, 2015).

Table 4-1 Major Land Use Cover of the Mohawk River Watershed

Land Cover Type	Total Mohawk River Watershed (%)	Upper Mohawk Watershed (%)	Main River Watershed (%) *	Schoharie Watershed (%)
Forest	50	48	41	71
Agriculture	25	24	21	18
Wetland	10	9	16	4
Developed	7	6	10	5
Herb/Shrub/Scrub	6	9	3	1

Source: MRWC, 2015 (data originally from the 2006 USGS National Land Cover Database)
Note: Values do not sum to 100 as only the major land use cover types are shown.

*The Projects are located in the Main River Watershed

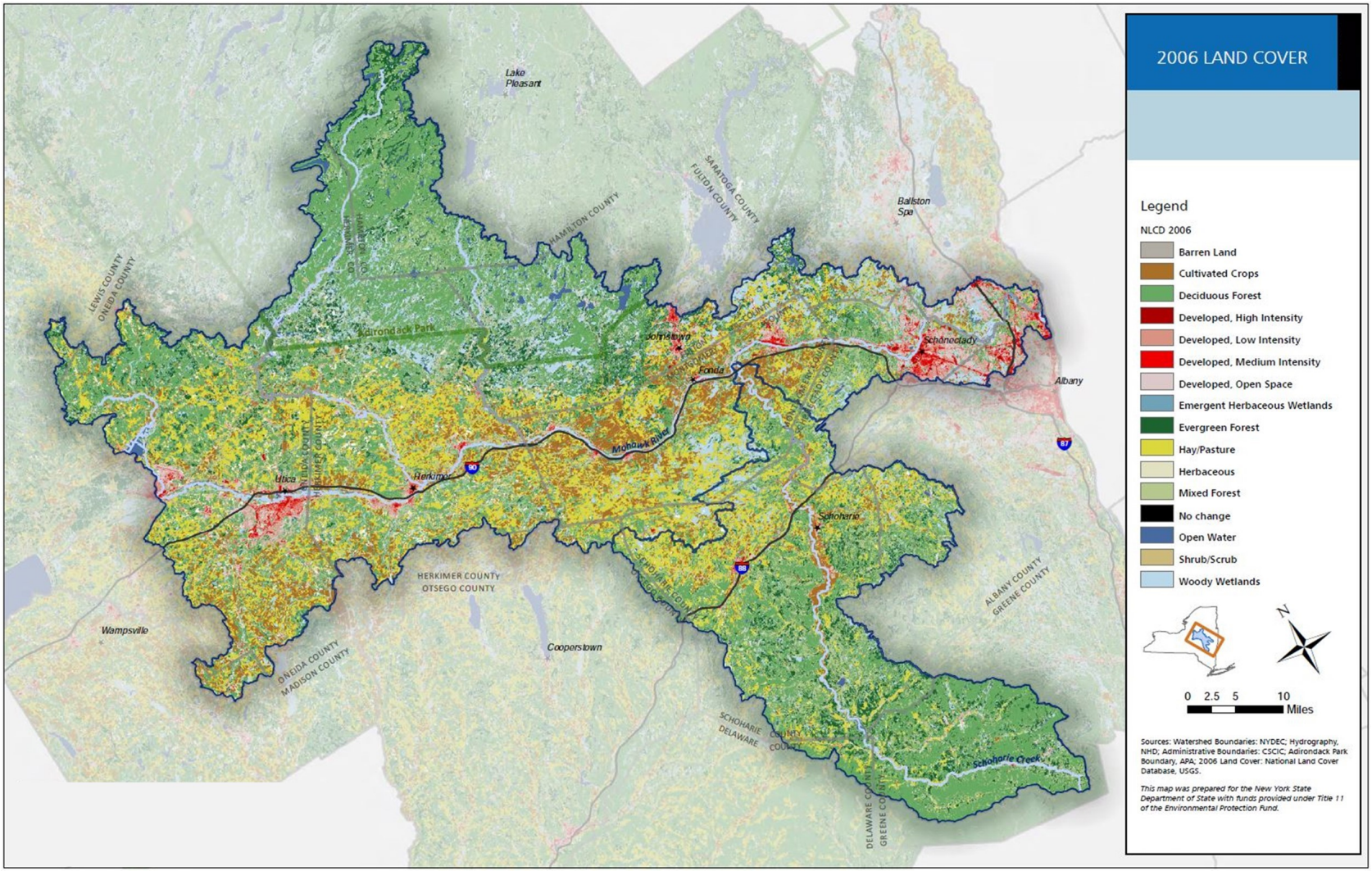
Table 4-2 Land Use of the Mohawk River Watershed

Land Use Type	Total Mohawk River Watershed (%)	Upper Mohawk Watershed (%)	Main River Watershed (%) *	Schoharie Watershed (%)
Residential	28	24	29	34
Wild, Forested, Conservation	20	24	18	17
Agriculture	20	23	22	13
Vacant	19	17	17	25
Unknown	7	6	6	7
Misc. (commercial, industrial, recreation)	6	6	5	4

Source: MRWC, 2015 (data originally from the 2006 USGS National Land Cover Database)
Note: Values do not sum to 100 as only the major land use cover types are shown.

* The Projects are located in the Main River Watershed

Figure 4-3 Land Use Types in the Mohawk River Watershed



4.2.3 Major Water Uses

The Mohawk River has many uses. In addition to providing hydroelectric generation, the Mohawk River is a source of water for agriculture, human consumption, industrial development, and recreation, including boating and angling.

Historically, the Mohawk Valley was a center of manufacturing and other industry, and a productive agricultural region. The growth of industry and agriculture in the 19th and 20th centuries had a significant negative impact on water quality in the Mohawk River and its tributaries (MRWC, 2015). With the passage of the Clean Water Act in the 1970s, water quality began to improve and continues to improve to this day (MRWC, 2015). Water quality is discussed in further detail in Section 4.4. (MRWC, 2015).

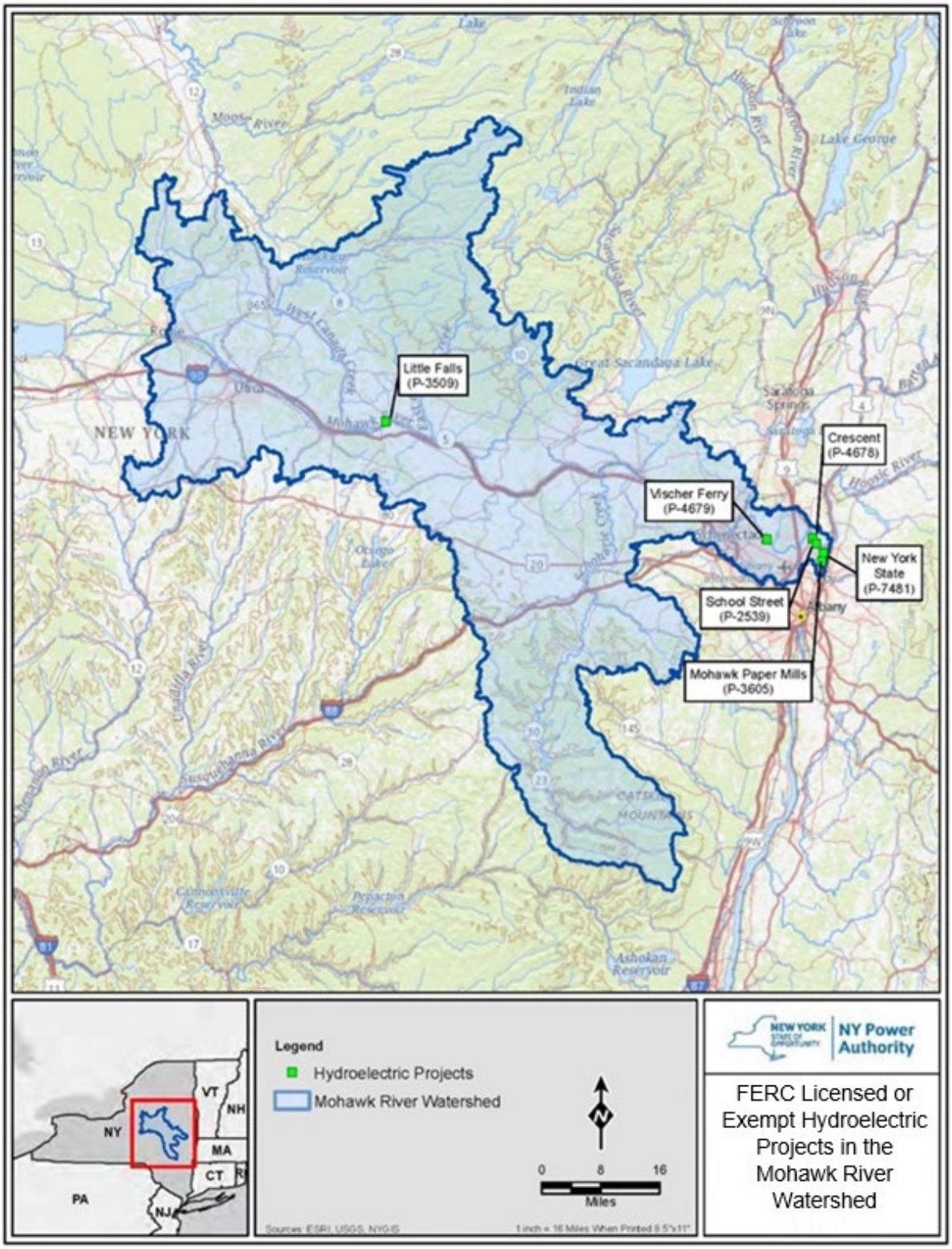
Historically, the Barge Canal System developed along the Mohawk River served as an important transportation link (MRWC, 2015). The canal along the Mohawk River connected to the east-west, cross-state Erie Canal System which served an important transportation link beginning in the early 19th century (MRWC, 2015).

4.2.4 Basin Dams

As of 2015, there are 495 dams in the Mohawk River watershed, ranging from small earthen dams for ponds to large dams for major reservoirs. Of these, there are 37 high hazard dams, designated Class C by NYSDEC. (MRWC, 2015).

There are several FERC-licensed hydroelectric projects on the Mohawk River in the general vicinity of the Crescent and Vischer Ferry Projects. The FERC-licensed Little Falls Project (FERC No. 3509) is the closest project upstream of the Vischer Ferry Project, and the School Street Project (FERC No. 2539) is the closest project downstream of the Crescent Project. Other downstream projects include the New York State Dam (FERC No. 7481), and FERC-exempt Mohawk Paper Mills Project (FERC No. 3605); see Figure 4-4).

Figure 4-4 FERC Licensed or Exempt Hydroelectric Projects in the Mohawk River Watershed



4.2.5 Tributary Streams

The Mohawk River Watershed includes approximately 4,086 miles of freshwater rivers and streams (NYSDEC, 2018a). Major tributary watersheds to the Mohawk River include Schoharie Creek (1,650 river miles), West Canada Creek (1,165 river miles), and East Canada Creek (515 river miles) (NYSDEC, 2018a). The Mohawk River Watershed also includes approximately 135 significant freshwater lakes, ponds, and reservoirs (totaling 18,315 acres), including the Hinckley Reservoir (2,684 acres), the Delta Reservoir (2,376 acres), Peck Lake (1,426 acres), and the Schoharie Reservoir (1,132 acres) (NYSDEC, 2018a), among others.

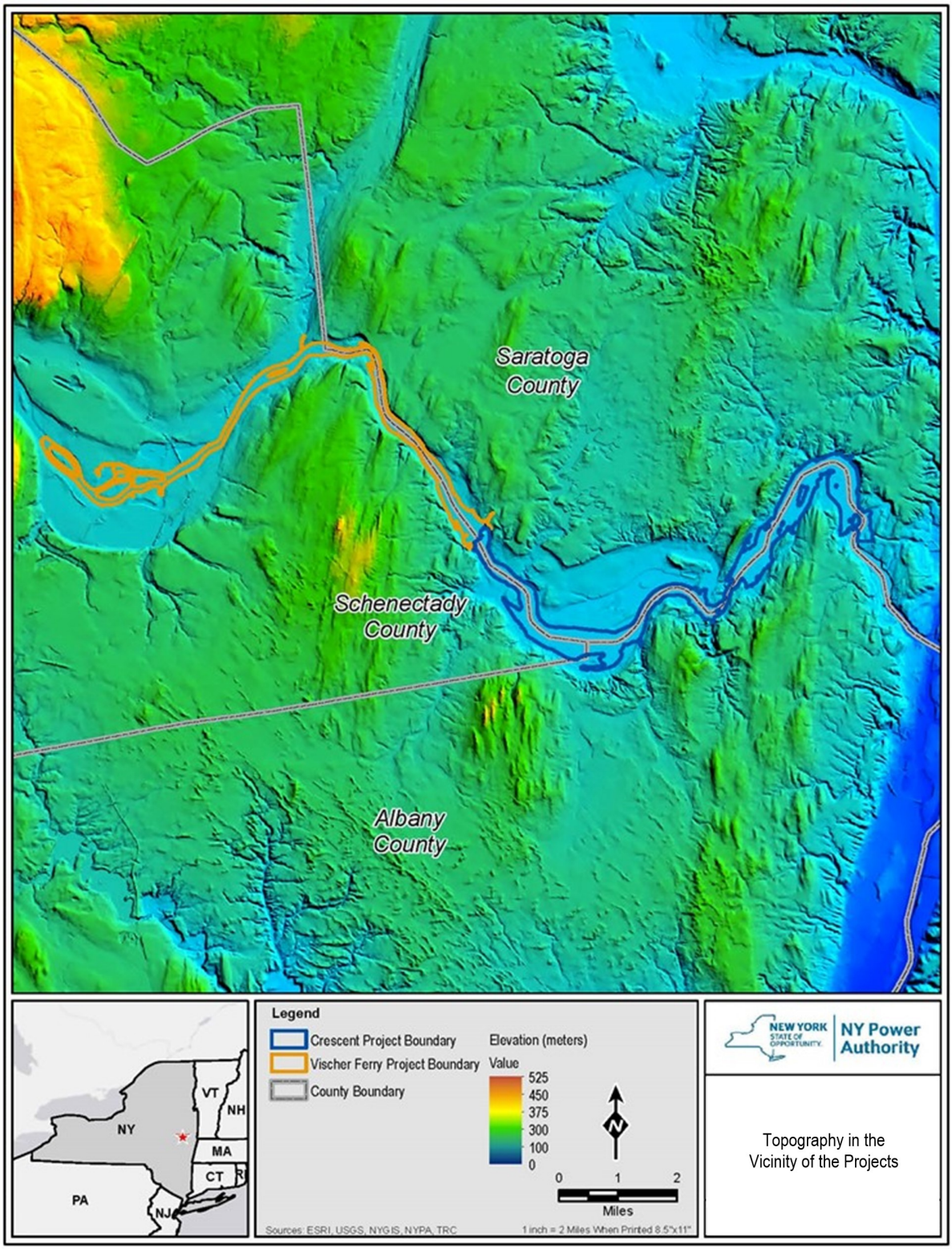
4.3 Geological and Soil Resources

4.3.1 Affected Environment

4.3.1.1 Topography

The topography of the region surrounding the Projects varies from rolling terrain with relief of 4 to 5 feet to moderately steep slopes of 20 to 30 feet (Power Authority, 1982a and 1982b). Elevations in the vicinity of the Projects range from approximately 180 feet to 350 feet. The slopes on the east bank in the immediate vicinity of the Crescent Project ranges up to 40%, and on the western embankment the slopes range up to 30% (Power Authority, 1982a). In the immediate vicinity of the Vischer Ferry Project the slopes are approximately 40% on the east bank and 50% on the west bank (Power Authority, 1982b). The topography at the Projects and the surrounding area is shown on Figure 4-5.

Figure 4-5 Topography at the Projects



4.3.1.2 Geology

The Mohawk River Watershed took final shape as a result of the last glaciation approximately 10,000 years ago. Glacial ice and melt water played a major role in forming the Mohawk Valley. Prior to the glaciation, the Mohawk River drained south from Schenectady and entered the Hudson River near Coeymans, New York. During glaciation, it flowed north through what is now the Ballston Spa area. Following glaciation, this route was blocked by ice, and as the St. Lawrence lowland was also blocked by ice, a large river called the Iromohawk drained the Great Lakes and the melt water of the eastern Laurentide ice sheet through the area between the mountains of the Adirondacks and Catskills. The Iromohawk cut a wide channel, west to east, to the Hudson, forming the route the Mohawk River follows today. The geological remnants of this river, much larger than the current river, exist within the valley. (MRWC, 2015).

The Crescent and Vischer Ferry Projects are located in the Mohawk Valley subdivision of the Hudson-Mohawk Lowlands physiographic province of New York. This region is located between the Adirondacks on the north and the Appalachian Upland on the south. In this subdivision, the bedrock is mostly soft shales which are easily eroded. The Mohawk River flows in a fairly narrow inner valley. The lowlands range from 10 to 30 miles in width and have been eroded to depths of 1,000 feet below the higher country to the north and south. (New York State Department of Transportation [NYSDOT], 2013).

Figure 4-6 shows the bedrock geology and Figure 4-7 shows the surficial geology at the Projects and the surrounding area.

Figure 4-6 Bedrock Geology at the Projects

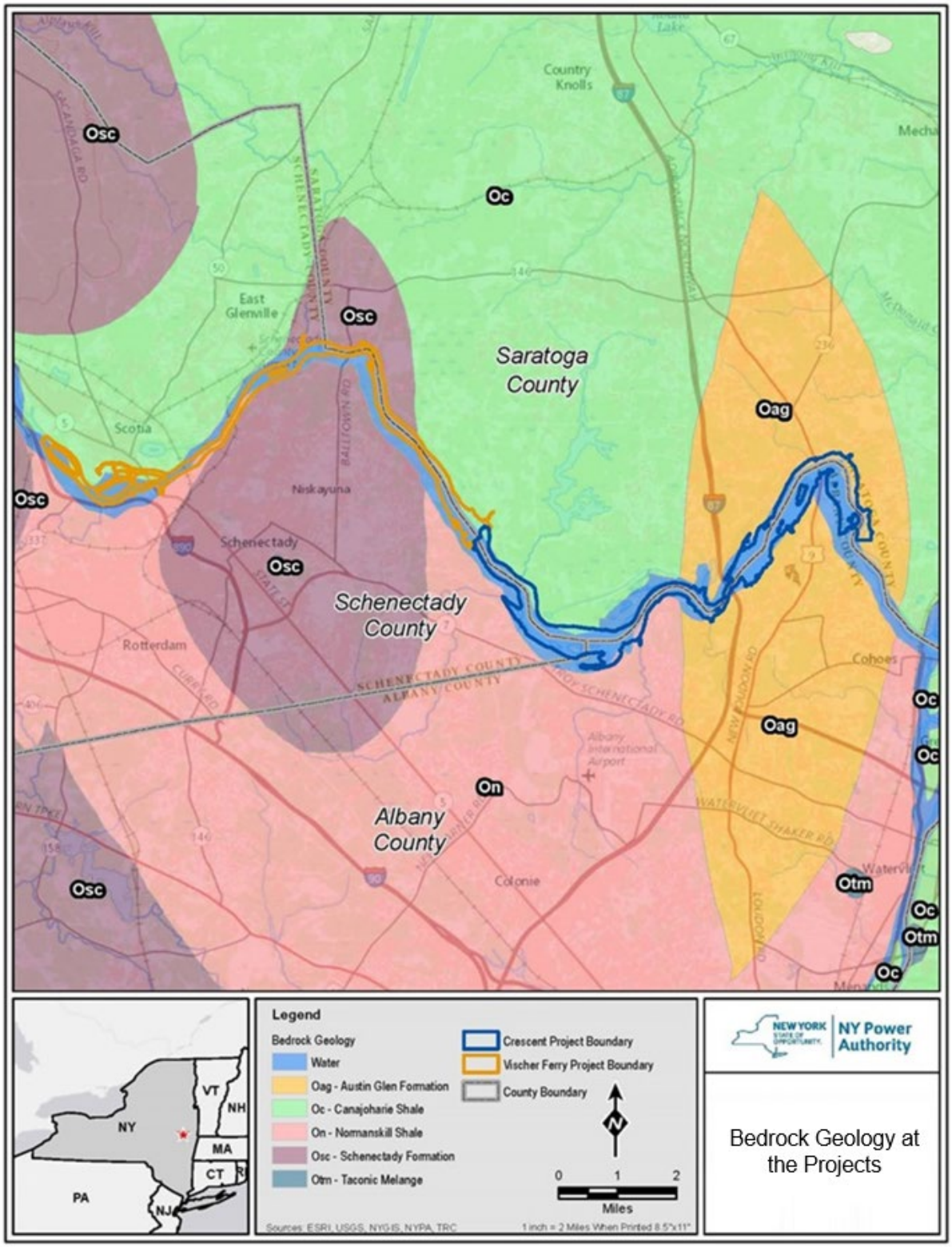
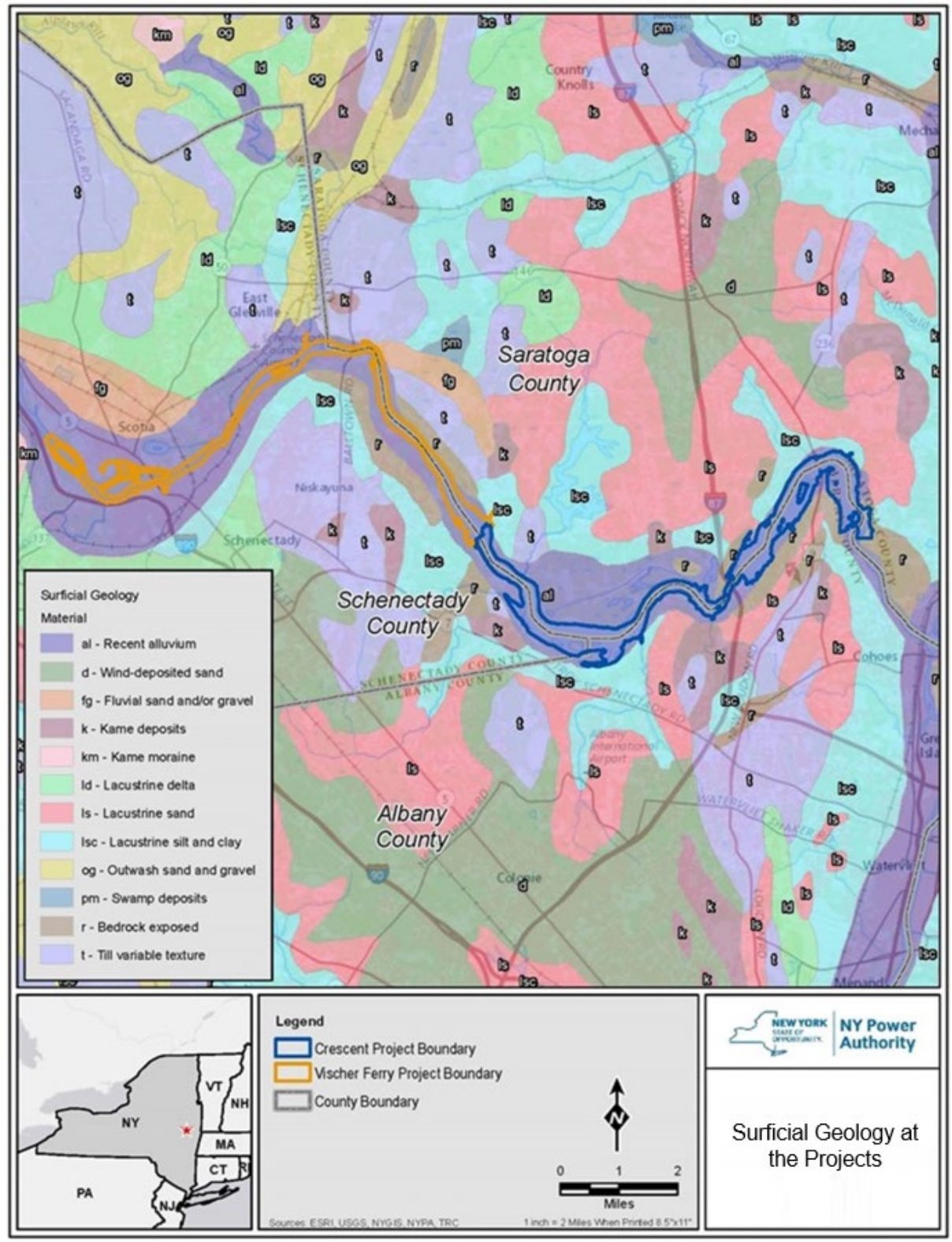


Figure 4-7 Surficial Geology at the Projects



4.3.1.3 Soils

The soil types found within the FERC Project boundaries for the Crescent and Vischer Ferry Projects, according to the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS), are provided in Table 4-3 and Table 4-4 (USDA NRCS, 2018 and 2019) and shown in Figure 4-8 and Figure 4-9.

Table 4-3 NRCS Mapped Soils in the Crescent Project Boundary

Map Unit Symbol	Map Unit Name	Acres	Percent of Area
W [1 2 3]	Water	1873.3	87.7%
Wy [3]	Wayland soils complex, 0 to 3 percent slopes, frequently flooded	45.9	2.2%
NaB [1]	Nassau channery silt loam, undulating	27.8	1.3%
Ue [2]	Udorthents, smoothed	20.9	1.0%
SA [3]	Saprists and Aquents	19.9	0.9%
Wo [1]	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	19.7	0.9%
BvB [2]	Broadalbin-Manlius-Nassau, complex, undulating	19.0	0.9%
Ha [3]	Hamlin silt loam	9.6	0.4%
OaB [2]	Oakville loamy fine sand, undulating	9.5	0.4%
Te [1]	Teel silt loam	9.2	0.4%
Ug [1]	Udorthents, loamy	8.3	0.4%
NrC [1]	Nassau very channery silt loam, rolling, very rocky	7.8	0.4%
MnC [2]	Manlius-Nassau complex, rolling, rocky	7.2	0.3%
NaD [2]	Nassau-Rock outcrop complex, hilly	5.7	0.3%
Fx [1]	Fluvaquents-Udifluvents complex, frequently flooded	4.8	0.2%
NaC [2]	Nassau-Rock outcrop complex, rolling	4.7	0.2%
NaC [1]	Nassau channery silt loam, rolling	4.5	0.2%
Ut [1]	Urban land-Udorthents complex, 0 to 8 percent slopes	4.4	0.2%
RhB [1]	Rhinebeck silty clay loam, 3 to 8 percent slopes	3.4	0.2%
Mh [1]	Medihemists and Hydraquents, ponded	2.6	0.1%
Tg [2]	Tioga fine sandy loam	2.5	0.1%
Lm [2]	Limerick-Saco complex	2.3	0.1%
BvC [2]	Broadalbin-Manlius-Nassau, complex, rolling	1.6	0.1%
HuD [2]	Hudson silt loam, hilly	2.2	0.1%
NrD [1]	Nassau very channery silt loam, hilly, very rocky	2.1	0.1%
NuB [1]	Nunda silt loam, 3 to 8 percent slopes	2.0	0.1%
Us [1]	Urban land-Udipsamments complex, 0 to 8 percent slopes	1.7	0.1%
Ra [1]	Raynham very fine sandy loam	1.6	0.1%
ChA [1]	Chenango gravelly silt loam, loamy substratum, 0 to 3 percent slopes	1.5	0.1%
HuE [1]	Hudson silt loam, 25 to 45 percent slopes	1.3	0.1%
HuE [2]	Hudson silt loam, 25 to 35 percent slopes	1.2	0.1%
BuB [1]	Burdett silt loam, 3 to 8 percent slopes	0.9	0.0%
Cu [3]	Cut and fill land	0.9	0.0%
ScA [1]	Scio silt loam, 0 to 3 percent slopes	0.8	0.0%
NuE [1]	Nunda silt loam, 25 to 35 percent slopes	0.7	0.0%
ScB [1]	Scio silt loam, 3 to 8 percent slopes	0.7	0.0%
NdA [2]	Natchaug muck, ponded, 0 to 2 percent slopes	0.7	0.0%
CoC [1]	Colonie loamy fine sand, rolling	0.6	0.0%
HuC [1]	Hudson silt loam, 8 to 15 percent slopes	0.4	0.0%
Fl [2]	Fluvaqvents frequently flooded	0.4	0.0%
HuB [2]	Hudson silt loam, 3 to 8 percent slopes	0.4	0.0%
RhA [2]	Rhinebeck silt loam, 0 to 3 percent slopes	0.4	0.0%

Map Unit Symbol	Map Unit Name	Acres	Percent of Area
CoD [1]	Colonie loamy fine sand, hilly	0.3	0.0%
Te [2]	Teel silt loam	0.3	0.0%
EnB [1]	Elnora loamy fine sand, 3 to 8 percent slopes	0.2	0.0%
HuB [1]	Hudson silt loam, 3 to 8 percent slopes	0.2	0.0%
Du [1]	Dumps	0.1	0.0%
Uk [1]	Udorthents, loamy-Urban land complex	0.1	0.0%
Te [3]	Teel silt loam	0.1	0.0%
Br [1]	Birdsall mucky silt loam	<0.1	0.0%
HuC [2]	Hudson silt loam, 8 to 15 percent slopes	<0.1	0.0%
NuB [3]	Nunda channery silt loam, 3 to 8 percent slopes	<0.1	0.0%

Note: The Crescent Project area includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. The map units are from the following soil surveys and indicated as such in the table: [1] Albany County, New York (NY001); [2] Saratoga County, New York (NY091); [3] Schenectady County, New York (NY093). Approximately 42.6% of the Project area is in NY001; 42.1% of the Project area is in NY091, and 15.2% of the Project area is in NY093.

Source: USDA NRCS, 2019

Table 4-4 NRCS Mapped Soils in the Vischer Ferry Project Boundary

Map Unit Symbol	Map Unit Name	Acres	Percent of Area
W [1] [2]	Water	1067.1	92.3%
Cu [2]	Cut and fill land	22.9	2.0%
Ha [2]	Hamlin silt loam	11.0	1.0%
Ra [2]	Raynham silt loam	8.6	0.7%
NaD [1]	Nassau-Rock outcrop complex, hilly	8.4	0.7%
NaB [2]	Nassau channery silt loam, 0 to 8 percent slopes	4.9	0.4%
BvB [1]	Broadalbin-Manlius-Nassau, complex, undulating	4.0	0.3%
UR [2]	Urban land-Colonie complex	3.9	0.3%
HrA [2]	Howard gravelly silt loam, 0 to 3 percent slopes	3.0	0.3%
BvC [1]	Broadalbin-Manlius-Nassau, complex, rolling	2.9	0.2%
FL [2]	Fluvaquents, loamy	2.7	0.2%
Ud [1]	Udipsamments, dredged	2.4	0.2%
Wy [2]	Wayland soils complex, 0 to 3 percent slopes, frequently flooded	1.9	0.2%
NVF [2]	Nunda soils, very steep	1.8	0.2%
UnB [2]	Unadilla silt loam, 0 to 8 percent slopes	1.7	0.1%
IlB [2]	Ilion silt loam, 3 to 8 percent slopes	1.6	0.1%
Ju [2]	Junius loamy fine sand	1.5	0.1%
SA [2]	Saprists and Aquents	1.4	0.1%
MPE [2]	Manlius-Rock outcrop association, steep	1.2	0.1%
Ce [2]	Cheektowaga fine sandy loam	0.8	0.1%
TvA [2]	Tuller-Brockport complex, 0 to 3 percent slopes	0.8	0.1%
Mg [2]	Made land	0.4	0.0%
MnB [1]	Manlius-Nassau complex, undulating, rocky	0.3	0.0%
ScB [2]	Scio silt loam, 3 to 8 percent slopes	0.2	0.0%
NWC [2]	Nunda extremely stony soils, sloping	0.1	0.0%
UnC [2]	Unadilla silt loam, 8 to 15 percent slopes	0.1	0.0%
NuB [1]	Nunda silt loam, 3 to 8 percent slopes	0.1	0.0%
SeB [1]	Scio silt loam, 3 to 8 percent slopes	0.1	0.0%
Gv [2]	Gravel pits	<0.1	0.0%
He [2]	Herkimer channery silt loam, calcareous subsoil variant	<0.1	0.0%
MxB [1]	Mosherville-Hornell complex, undulating	<0.1	0.0%

Note: The Vischer Ferry Project area includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. The map units are from the following soil surveys and indicated as such in the table: [1] Saratoga County, New York (NY091);[2] Schenectady County, New York (NY093). 24.7% of the Project area is in NY091, and 75.3% of the Project area is in NY093.
Source: USDA NRCS, 2018

Figure 4-8 NRCS Mapped Soils at the Crescent Project

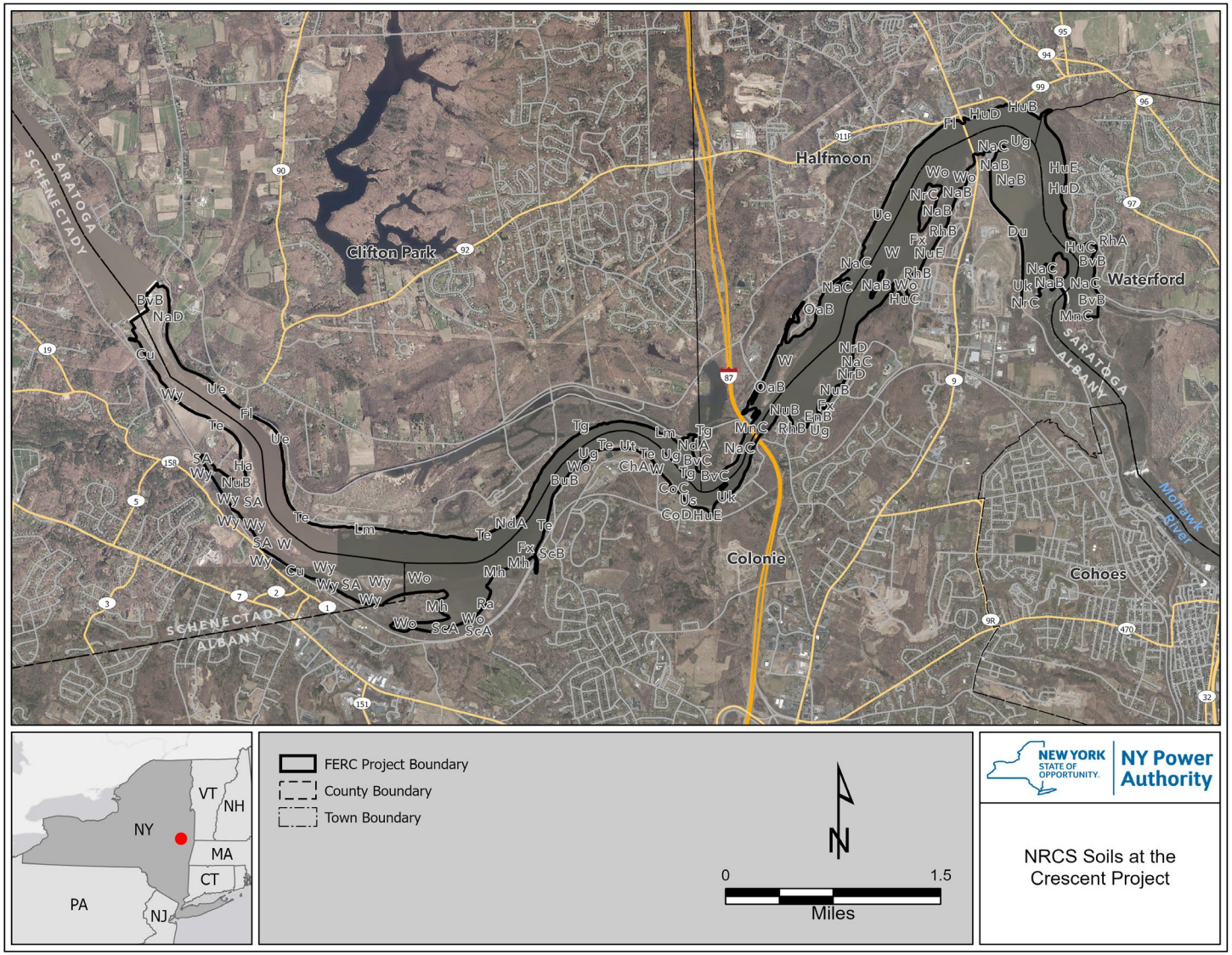
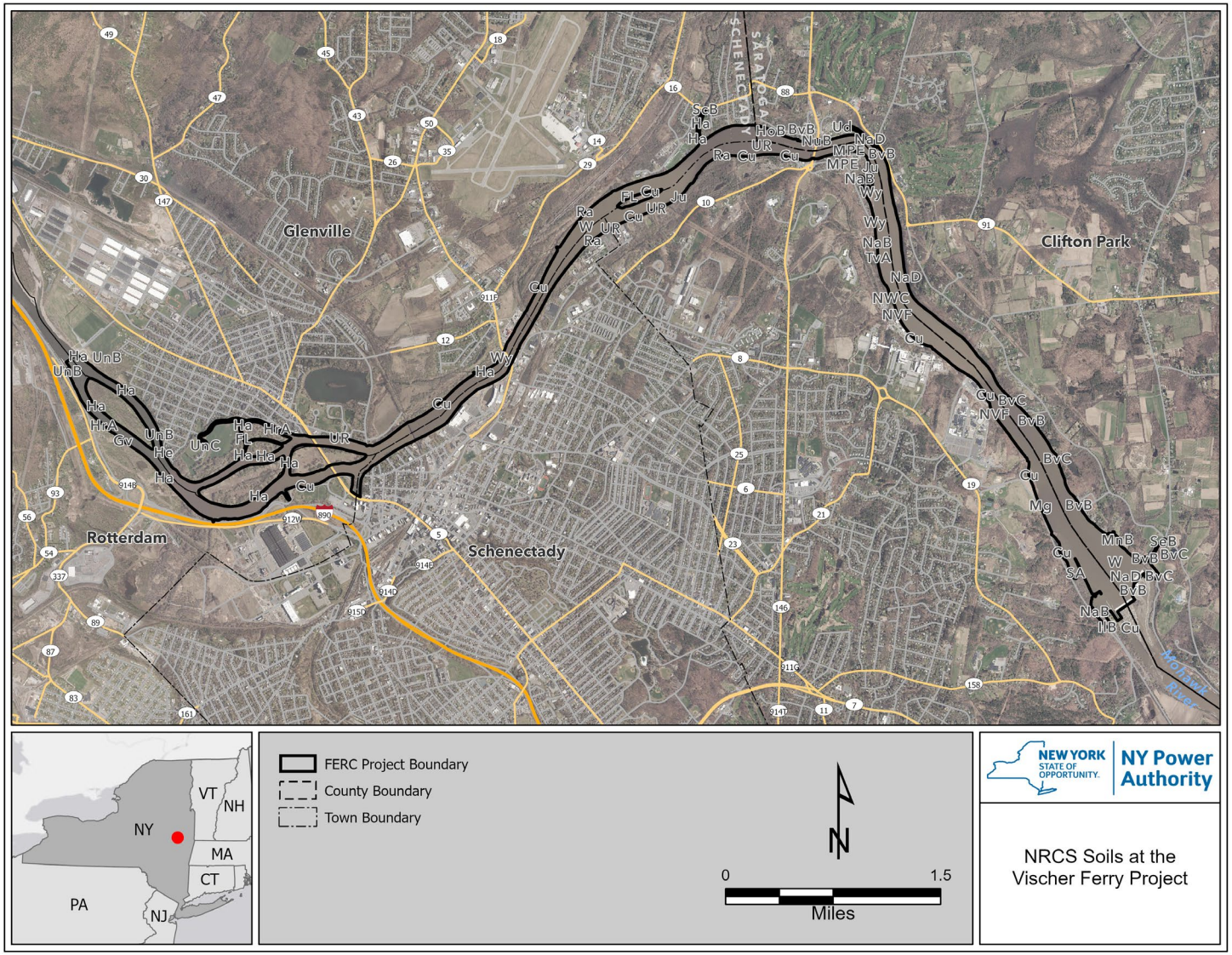


Figure 4-9 NRCS Mapped Soils at the Vischer Ferry Project



4.3.1.4 Reservoir Shoreline and Streambanks

Both Project impoundments are riverine in nature. The Crescent impoundment extends approximately 10 miles upstream from the dam and has a surface area of approximately 2,257 acres (at El. 185 BCD). The Vischer Ferry impoundment extends 10.3 miles upstream from the dam and has a surface area of approximately 1,144 acres (at El. 213.25 BCD). The characteristics of the shoreline, including topography, vegetative cover, land use, level of development, and sediment composition, tend to vary along the Project impoundments. The 2021 Aquatic Mesohabitat Study documented the state of both Projects' shorelines. The shoreline along the Crescent Project impoundment was generally characterized by a gentle gradient. The Project's shallow embankment, shallow water, as well as vegetative cover up to the river's edge contributed to a lack of bank erosion along the impoundment shoreline. The Vischer Ferry shoreline contains areas of sheer shale/bedrock cliff faces leading to steep slopes in the associated aquatic habitat; these areas were observed in the lower portions of the Vischer Ferry impoundment and the underlying geology is referred to as the Schenectady formation bedrock. Further upstream, the shoreline was generally comprised of lower banks and shallower sloped littoral areas. At the Vischer Ferry shoreline, small areas of bank erosion were observed, with both fluvial and mass wasting. This is likely due to the steep gradient between the river and riparian zones, as previously mentioned.

4.3.2 Environmental Effects

Based on the extensive information that is available for both Project areas, the Power Authority believes that it has sufficient information to adequately characterize geology and soil resources within the Project boundaries of both Projects. Erosion and sedimentation are the most common issues associated with geology and soils at hydropower projects. At the Crescent and Vischer Ferry Projects which are operated as run of river, impoundment level fluctuations are minimal, and the removal of flashboards in winter, which results in a slightly lower water level, helps to protect the impoundment shorelines from the erosional forces of winter ice.

According to the results of the 2021 Aquatic Mesohabitat Study, the Crescent and Vischer Ferry Projects were both found to have generally stable shorelines with very few areas of observed shoreline erosion. Factors contributing to the stability of the shoreline are the gentle littoral zone gradients and the robust vegetation and associated roots along the shoreline. Where steeper shoreline sections did occur (primarily on the Vischer Ferry impoundment), they were generally well armored (exposed bedrock, riprap) and therefore protected from erosion. There is no evidence that the change in impoundment elevation between navigation season (boards up) and the non-navigation winter season (boards down) affects shoreline erosion around either of the Project impoundments. The Project riparian areas are in good condition with very little shoreline erosion.

Based on the composition, characteristics, and conditions of the impoundment, shoreline erosion is not an issue, and any erosion that is occurring at the Projects is a result of natural river flows unrelated to project operations. Nor is there any evidence that the Projects result in sedimentation or sedimentation patterns that are adversely affecting Project resources, or Project operations.

4.3.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new licenses and is not proposing any changes with respect to geology and soils resources.

4.3.4 Unavoidable Adverse Impacts

Continued Project operation is not expected to adversely affect geology and soils resources at either Project.

4.4 Water Resources

4.4.1 Affected Environment

4.4.1.1 Water Quantity

4.4.1.1.1 Overview

The Mohawk River drainage area is about 3,460 square miles, as measured at the Cohoes USGS gage (No. 01357500) located about 2 miles downstream of the Crescent Dam. There are six hydroelectric facilities on the Mohawk River, including the Crescent and Vischer Ferry Projects. There are three hydroelectric developments downstream of the Crescent Project: School Street Project (P-2539); New York State Dam (P-7481), and the FERC-Exempt Mohawk Paper Mills (P-3605)(FERC, 2000). The School Street Project is located 1.5 miles downstream of the Crescent Project.

The impoundment of the Crescent Project has a surface area of approximately 2,257 acres at El. 185 ft BCD. One-foot flashboards annually installed in spring for the navigation season (generally in mid-May) and removed in the Fall at the end of the navigation season (generally in mid-October). Because the Project is operated as run-of-river, there is no useable storage. The total drainage area at the Crescent Project is approximately 3,460 square miles (USGS, 2018a).

The impoundment of the Vischer Ferry Project has a surface area of approximately 1,144 acres at El. 213.25 ft BCD. Twenty-seven inch flashboards annually installed in spring for the navigation season (generally, mid-May) and removed in the Fall at the end of the navigation season (generally, mid-October). Because the Project is operated as run-of-river, there is no useable storage. The total drainage area at the Vischer Ferry Project is approximately 3,371 square miles (USGS, 2018b).

4.4.1.1.2 Hydrology and Streamflow

The annual and monthly minimum, mean, and maximum recorded flows in cfs of the Mohawk River at the Crescent and Vischer Ferry Projects for the period January 1, 2011 through December 31, 2020 are provided in Table 4-5 and Table 4-6, respectively. Annual flow duration curves for the Crescent Project and Vischer Ferry Projects for the same period of record (January 1, 2013 through December 31, 2020) are shown in Figure 4-10 and Figure 4-11, respectively. Monthly flow duration curves for the Crescent Project are provided in the Crescent Project Exhibit B. Monthly flow duration curves for the Vischer Ferry Project are provided in Vischer Ferry Project Exhibit B. The flow statistics and flow duration curves were developed from outflow data collected by the Licensee at the Projects. Mean daily discharge data were used to develop the flow duration curves.[5]

[5] The Power Authority's Project outflow data used to develop the flow duration curves were reviewed and outliers excluded. To do this, inconsistent mean daily discharge values (values that were peaks or valleys as compared to adjacent daily discharge values) were excluded from the data used to develop the flow duration curves.

Table 4-5 Flow Statistics* (in cfs) for the Crescent Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	Period of Record: 10 years (January 1, 2011 - December 31, 2020)												
Min	1,447	989	835	718	731	225	143	146	141	313	1,322	1,614	141
Median	5,054	4,228	6,326	10,452	4,875	2,680	1,481	1,265	1,221	2,486	4,055	5,892	3,861
Mean	6,966	6,614	8,914	13,020	6,877	4,591	2,585	1,930	2,862	4,148	5,501	7,493	5,972
Max	31,692	49,453	59,306	61,261	41,489	54,487	29,720	30,186	72,841	29,656	51,259	56,335	72,841

Source: New York Power Authority

* Flow statistics are based on the average daily total station flow.

Table 4-6 Flow Statistics* (in cfs) for the Vischer Ferry Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	Period of Record: 10 years (January 1, 2011 - December 31, 2020)												
Min	1,489	1,308	1,174	791	685	376	137	133	171	328	1,094	1,638	133
Median	4,834	4,129	6,211	9,797	4,796	2,277	1,325	1,071	1,072	2,321	3,752	5,272	3,675
Mean	6,268	6,432	8,197	12,311	6,351	3,673	2,298	1,805	2,271	4,152	5,009	6,935	5,541
Max	31,512	56,768	53,049	52,929	31,152	32,885	23,331	37,508	44,736	28,694	38,380	48,875	56,768

Source: New York Power Authority

* Flow statistics are based on the average daily total station flow.

Figure 4-10 Annual Flow Duration Curves for the Crescent Project

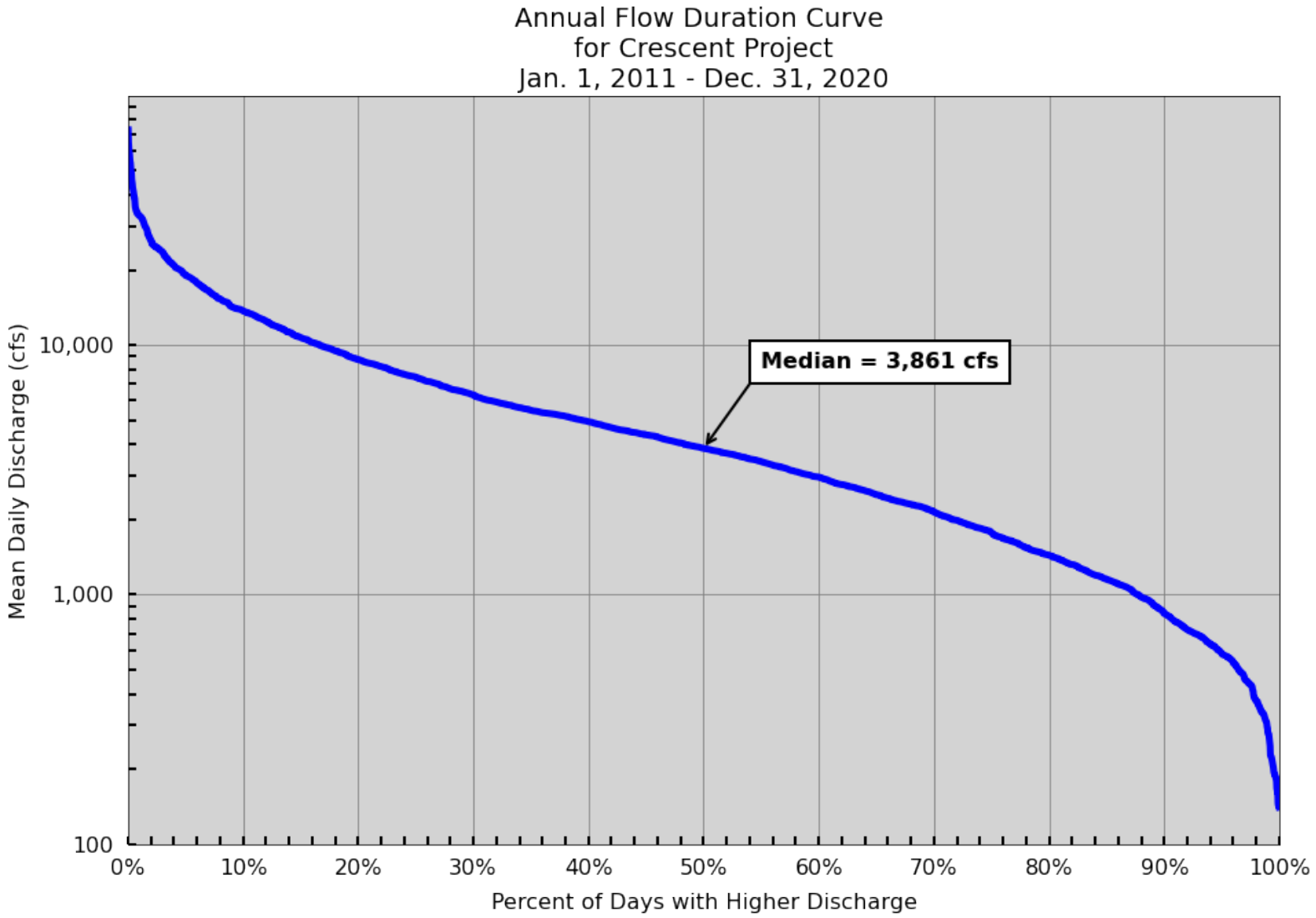
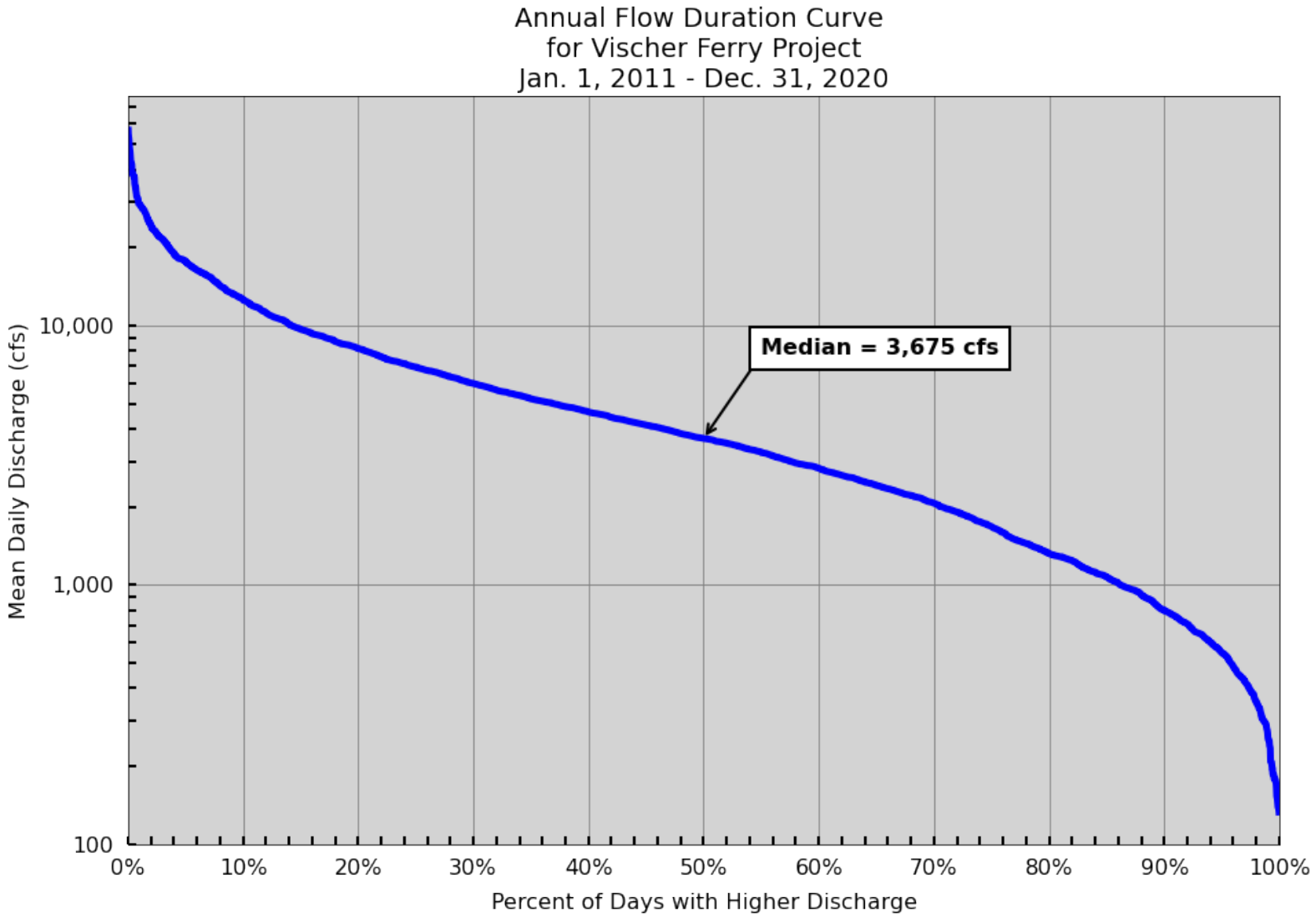
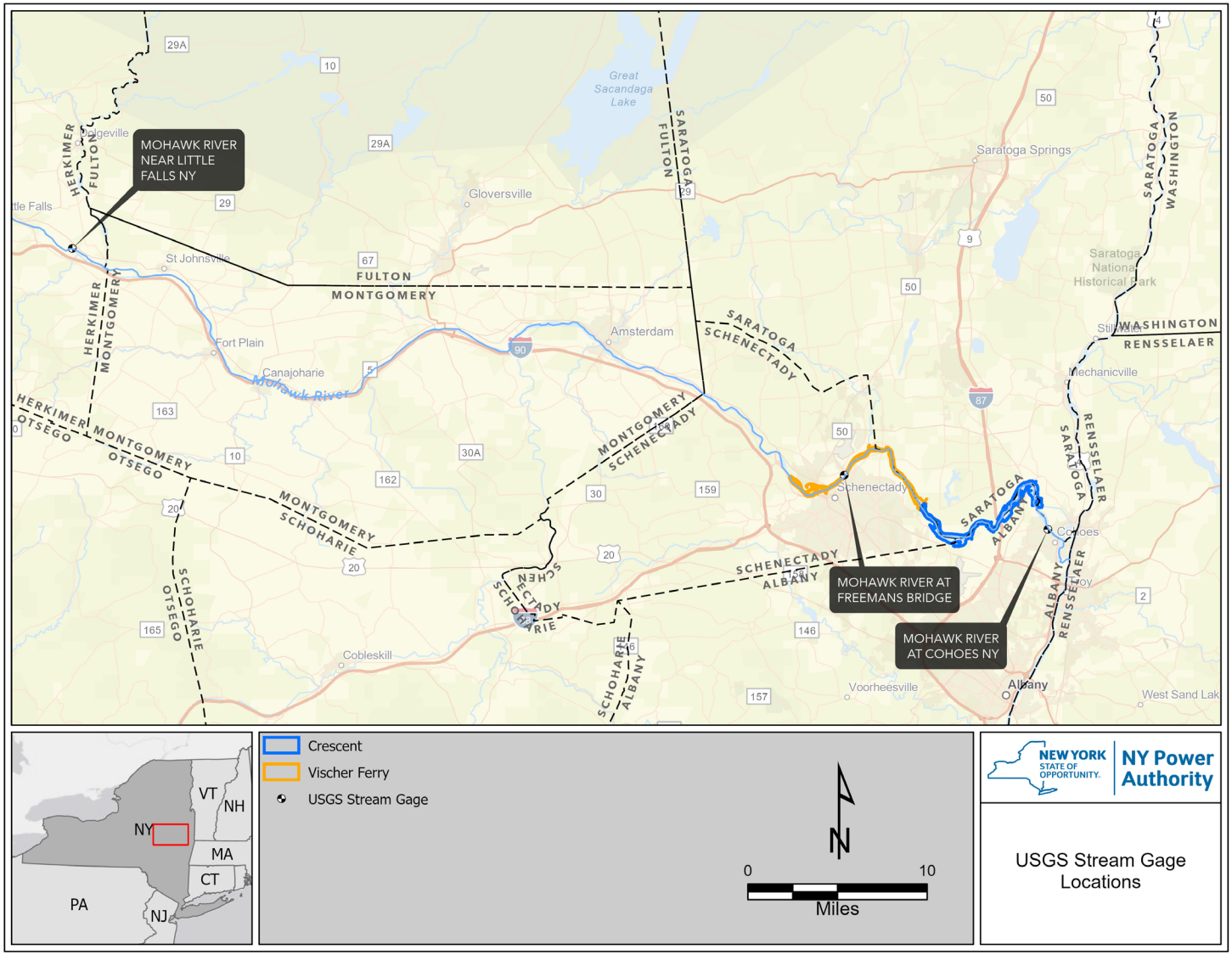


Figure 4-11 Annual Flow Duration Curves for the Vischer Ferry Project



In addition to the hourly outflow data collected by the Licensee at the Projects, the USGS also collects streamflow data for the Mohawk River. The USGS maintains a streamflow gage upstream of the Vischer Ferry Project at Little Falls (USGS Gage No. 01347000), on the Mohawk River gage at Freeman's Bridge (USGS Gage No. 01354500), and downstream of the Crescent Project at Cohoes Falls (USGS Gage No. 01357500). A figure depicting the location of these gages in relation to the Projects is shown in Figure 4-12.

Figure 4-12 USGS Gage Locations



4.4.1.1.3 Existing and Proposed Uses of Water

Navigation is the primary use of Project waters at both the Crescent and Vischer Ferry Projects. A series of locks and dams extending about 160 miles (from Waterford, NY to Three Rivers Junction, NY) regulates Mohawk River flows for navigation purposes, including Lock E-6 at the Crescent Project and Lock E-7 at the Vischer Ferry Project (FERC, 2000). Since the 1990s, the Barge Canal System has been used primarily by recreational traffic, although a small but growing amount of commercial traffic still uses it (NYSCC, 2019). Hydroelectric power production is a secondary use of Project waters.

The Mohawk River is also used for water withdrawals and discharges. There are multiple withdrawals and discharges within the boundaries of or in close proximity to the Projects. Information about the facilities is included in Table 4-7 through Table 4-9. Locations of these withdrawals and discharges are shown in Figure 4-13.

Table 4-7 State Pollutant Discharge Elimination System (SPDES) Multi-sector General Permit Permitted Facilities Within or Near the Boundaries of the Crescent and Vischer Ferry Projects

NPDES ID[1]	Facility	City	Waterbody	Latitude	Longitude
NYR00E011	Schenectady Transfer Station	Schenectady	Mohawk River	42.807	-73.95
NYR00D652	Colonie Landfill	Cohoes	Mohawk River	42.808	-73.731
NYR00E982	Environment One Corporation	Niskayuna	Mohawk River	42.845	-73.894
NYR00B941	Williams Auto Parts Inc	Schenectady	Mohawk River	42.848	-73.895
NYR00F421	Richmor Aviation	Scotia	Mohawk River	42.851	-73.937

Source: Data.NY.gov, 2019b

[1] National Pollutant Discharge Elimination System (NPDES)

Table 4-8 Industrial Wastewater Treatment Facilities Within or Near the Boundaries of the Crescent and Vischer Ferry Projects

Plant Type	SPDES Permit Number	Facility Name	Ground or Surface	Average Design Hydraulic Flow	City	Latitude	Longitude
Industrial	NY0005851	USDOE Knolls Atomic Power Laboratory	Surface	7.83	Niskayuna	42.82	-73.87
Industrial	NY0007030	GE Global Research Center	Surface	0.4	Niskayuna	42.83	-73.88
Industrial	NY0007056	General Electric Steam Turbine Generator Global	Surface	18.05	Schenectady	42.81	-73.96
Industrial	NY0023442	109th Airlift Wing	Surface	0.03	Scotia	42.85	-73.92
Industrial	NY0102148	Colonie - T Mohawk View WTP & Well Field	Surface	0.38	Latham	42.79	-73.78
Industrial	NY0131768	Riverview Landing STP	Surface	0.02	Clifton Park	42.83	-73.87
Industrial	NY0224359	Mohawk Asphalt Emulsions	Surface	0.01	Scotia	42.83	-73.93
Municipal	NY0020516	Schenectady - C STP	Surface	18.5	Schenectady	42.84	-73.92
Municipal	NY0027758	Mohawk View Water Pollution Control Plant	Surface	6	Latham	42.78	-73.77

Source: Data.NY.gov, 2019a

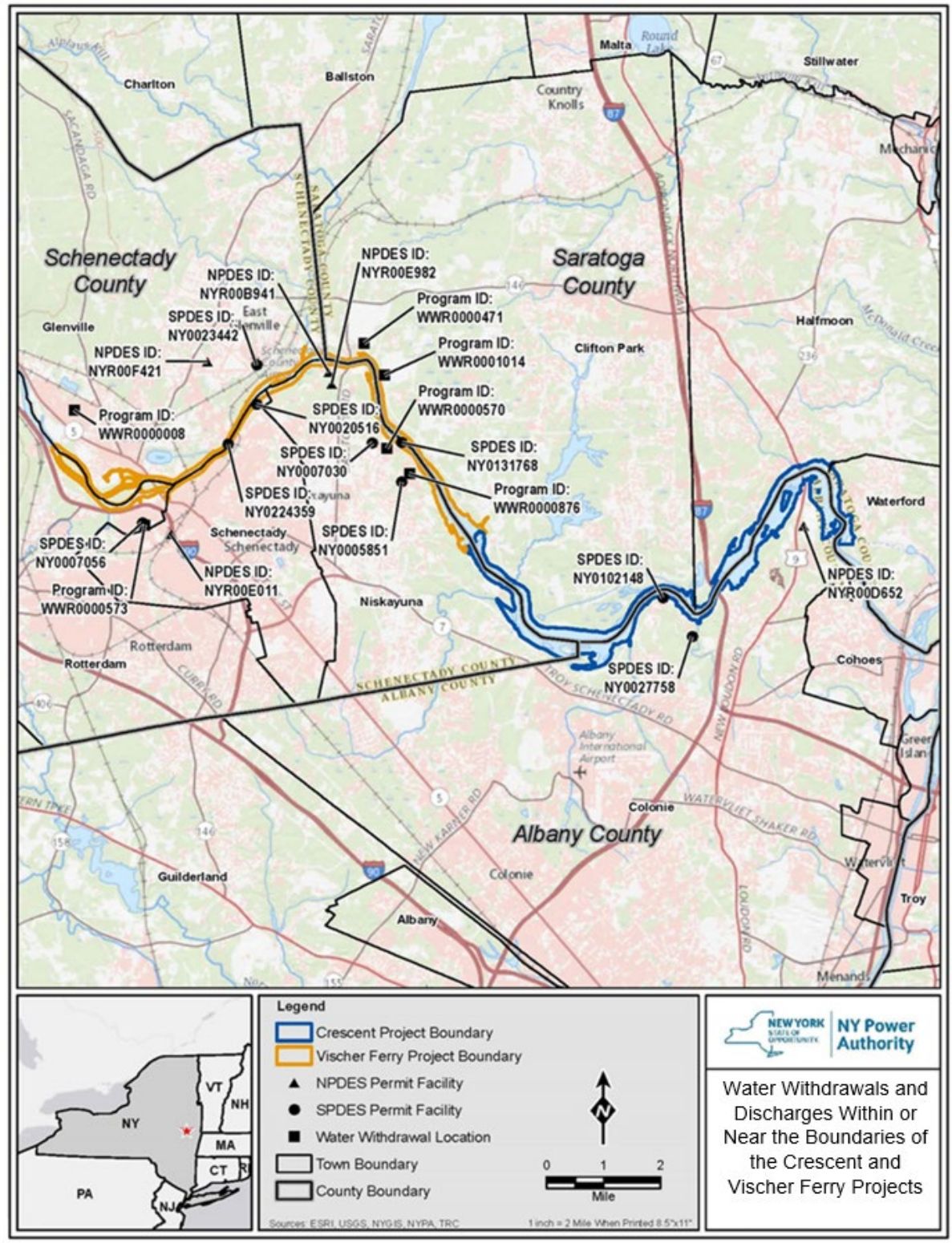
Table 4-9 Water Withdrawals Within or Near the Boundaries of the Crescent and Vischer Ferry Projects

Program ID	Facility Name	Town	County	Withdrawal Category	Withdrawal Type	Reporting Year	Average Day Withdrawal (MGD)[1]	Maximum Day Withdrawal (MGD)	Easting	Northing
WWR0000008	Adirondack Beverages	Glenville (T)	Schenectady	Bottled/Bulk Water	Groundwater; Surface Water	2019	0.41	0.6	583098	4743426
WWR0000471	Edison Club Golf Course	Clifton Park (T)	Saratoga	Recreational - Golf Course	Surface Water	2019	0.06	0.9	591290	4745361
WWR0000570	GE - Global Research Center	Niskayuna (T)	Schenectady	Commercial	Surface Water	2019	0	0	591945	4742397
WWR0000573	GE - Schenectady	Rotterdam (T)	Schenectady	Industrial	Surface Water	2019	3.97	9.06	585117	4740188
WWR0000876	Knolls Atomic Power Lab - Knolls Site	Niskayuna (T)	Schenectady	Industrial	Surface Water	2019	1.5	1.7	592588	4741674
WWR0001014	Mohawk River Country Club and Chateau	Clifton Park (T)	Saratoga	Recreational - Golf Course	Surface Water	2019	0.4	1.08	591866	4744465

Source: Data.NY.gov, 2019c

[1]Million gallons per day (MGD)

Figure 4-13 Water Withdrawals and Discharges Within or Near the Boundaries of the Crescent and Vischer Ferry Projects



4.4.1.1.4 Existing Instream Flow Uses

In addition to hydroelectric generation, instream uses of water at the Projects include navigation and the operation of the Barge Canal system, as well as recreational activities, such as boating and angling.

4.4.1.2 Water Quality

The following sections discuss water quality standards and classifications applicable to the Mohawk River in the vicinity of the Projects, as well as results from site-specific water quality investigations that pertain to the Crescent and Vischer Ferry Project waters.

4.4.1.2.1 Federal Clean Water Act

In 1972, the Federal Water Pollution Control Act Amendments established the Clean Water Act (CWA) as the foundation of modern surface water quality protection in the United States. Sections 303 and 305 of the CWA guide the national program on water quality. Subsections 303(a)-(c) of the CWA are relevant to this water quality discussion, as those subsections discuss the process by which all states adopt and periodically review water quality standards. Subsection 305(b) directs states to periodically prepare a report that assesses the quality of waters in the state.

4.4.1.2.2 State Water Quality Standards

In accordance with CWA Section 303(a)-(c), the state of New York has developed waterbody classifications and water quality standards which apply to all surface water and groundwater throughout the state. All waters in New York State are assigned a letter classification that denotes their best uses.

Table 4-10 identifies the waterbody classifications of the Mohawk River and Barge Canal in the vicinity of the Crescent and Vischer Ferry Projects. Other than one section of the Barge Canal in the vicinity of the Crescent Dam, each of these waters is classified as a Class A water (6 NYCRR § 876.4 Table I). Class A waters have best usages as “a source of water supply for drinking, culinary or food purposes; primary and secondary contact recreation; and fishing” (6 NYCRR § 701.6). Class A waters are also “suitable for fish, shellfish and wildlife propagation and survival” (6 NYCRR § 701.6).

The section of the Barge Canal that extends from Lock E-2 to the vicinity of Crescent Dam where the Barge Canal joins the Mohawk River (the Waterford Flight) is designated as a Class C water (6 NYCRR § 876.4 Table I). The best use of Class C waters is fishing and the waters are considered to be suitable for fish, shellfish, and wildlife propagation and survival. The water quality of Class C waters is considered to be suitable for primary and secondary contact recreation, though other factors may limit the use of Class C waters for these purposes (6 NYCRR § 701.8).

Table 4-10 NYSDEC Classifications for Projects' Waterbodies

Name	Description	Class	Standards
CRESCENT PROJECT			
Mohawk River	From Crescent Dam to point 1.0 mile above bridge across Mohawk River on U.S. Route 9.	A	A
Mohawk River	From point 1.0 mile above bridge across Mohawk River on U.S. Route 9 to Lock E-7.	A	A
Barge Canal (Waterford Flight Section)	From Lock E-2 to vicinity of Crescent Dam where Mohawk River and Barge Canal join. This section is the lower end of the Barge Canal.	C	C
VISCHER FERRY PROJECT			
Mohawk River	From Lock E-7 to Schenectady-Scotia Bridge across Mohawk River on N.Y. Route 5.	A	A
Mohawk River	From Schenectady-Scotia Bridge across Mohawk River on NY Route 5 to Schenectady-Montgomery County line (includes reach from Route 5 Bridge to Lock E-8.)	A	A

Source: 6 NYCRR § 876.4

NYSDEC establishes water quality standards and other criteria for many specific parameters. These standards can be either narrative or numeric. Table 4-11 outlines the water quality standards and criteria applicable to the surface waters of the Projects.

Table 4-11 NYSDEC Water Quality Standards

Parameter	Standard*
Taste -, color-, and odor-producing, toxic and other deleterious substances	None in amounts that will adversely affect the taste, color, or odor thereof, or impair the waters for their best usages.
Turbidity	No increase that will cause a substantial visible contrast to natural conditions.
Suspended, colloidal and settleable solids	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.
Oil and floating substances	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
Phosphorus and nitrogen	None in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages.
Thermal discharges	Shall follow the criteria governing thermal discharges in 6 NYCRR § 704.
Flow	No alteration that will impair the waters for their best usages.
pH	Shall not be less than 6.5 nor more than 8.5
Dissolved oxygen (DO)	For trout spawning waters (TS) the DO concentration shall not be less than 7.0 mg/L from other than natural conditions. For trout waters (T), the minimum daily average shall not be less than 6.0 mg/L, and at no time shall the concentration be less than 5.0 mg/L. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/L, and at no time shall the DO concentration be less than 4.0 mg/L.
Dissolved Solids	Shall be kept as low as practicable to maintain the best usage of waters but in no case shall it exceed 500 mg/L
Total Coliform (per 100 mL) (Applies to Class AA waterbodies)	The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 50 and 240, respectively.
Total Coliform (per 100 mL) (Applies to Class A, B, C, D, waterbodies)	The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 2,400 and 5,000, respectively.
Fecal coliforms (number per 100 mL) (Applies to A, B, C, D waterbodies)	The monthly geometric mean, from a minimum of five examinations, shall not exceed 200.

*Standards applicable to both Class A and C, unless otherwise noted.

Source: State of New York, 2018.

4.4.1.2.3 Water Quality Assessments

NYSDEC provides regular, periodic assessments of the quality of the water resources in New York State and their ability to support specific uses. This information is compiled by the NYSDEC into a database known as the Waterbody Inventory/Priority Waterbodies List (WI/PWL). WI/PWL includes waterbody Fact Sheets outlining: (1) the most recent assessment of use; (2) identification of water quality problems and sources; and (3) a summary of activities to restore and protect each individual waterbody. The Fact Sheets are grouped by the 17 major drainage basins in New York State. WI/PWL is reviewed and updated as sampling results and/or other water quality information becomes available.

Information on the NYSDEC Waterbody Inventory/Priority Waterbodies is found on the DECinfo Locator (https://gisservices.dec.ny.gov/gis/dil/). According to the site, "DECinfo Locator is an online interactive mapper that allows a user to access all available Waterbody Inventory/Priority Waterbodies List (WI/PWL) factsheets" (NYSDEC 2010a).

The most recent assessment for the stretches of the Mohawk River directly adjacent to the Crescent and Vischer Ferry Projects were completed in 2010. A description of the assessments of the waterbodies in the vicinity of the Projects from the WI/PWL appears briefly below.

The reach of the Mohawk River downstream of Crescent Dam is listed in the WI/PWL Report as suspected of being stressed for water supply and recreation uses. The Report notes that this stress is considered to have minor impacts. The suspected pollutants are nutrients (phosphorus), pathogens, and silt/sediment. Suspected sources of those pollutants are agriculture, municipal, and urban/storm runoff (NYSDEC, undated). A Source Water Assessment was completed along this reach of the Mohawk River and found very high susceptibility to contamination from pathogens and protozoa as a result of agricultural pastureland in the drainage basin, as well as the number of wastewater discharges in the watershed.

The reach of river from the Crescent Dam upstream to Schenectady, which includes the Vischer Ferry impoundment, is listed as having water supply threatened, with a documentation status of "possible." The possible, and minor, threat to water supply is linked to pathogens. The suspected impairments to water supply and recreation uses are nutrient pollutants and silt/sediment. The suspected sources of the pathogens, nutrients, and silt/sediment are from agriculture, urban/storm runoff, and combined sewer overflows. This reach encompasses both Projects' impoundments and includes the portion of the river/canal from the Crescent Dam to the Route 5 bridge in Schenectady, New York.

4.4.1.2.4 Water Quality Studies and Data

4.4.1.2.4.1 Mohawk River Water Quality Data

The USGS works collaboratively with NYSDEC to collect water quality data in the Mohawk River basin. The primary focus of this monitoring is to collect nutrient samples to support a water quality model being used to develop a phosphorus Total Maximum Daily Load (TMDL) for the Mohawk River. There are thirty (30) monitoring locations in the Mohawk River Basin, including two long-term monitoring stations in the vicinity of the Crescent and Vischer Ferry Dams: Cohoes (located approximately 1.75 miles downstream of the Crescent Dam) and Latham (located approximately 4.5 miles downstream of the Vischer Ferry Dam and 5.75 miles upstream of the Crescent Dam) water quality sampling locations (Figure 4-14). Water samples are analyzed for a number of parameters including temperature, dissolved oxygen (DO), pH, specific conductivity, and nutrients. Data are not available continuously from 2004 through 2016, however, data are available for the following years: 2004, 2005, 2006, 2009, and 2016 (Table 4-12).

Water quality is monitored continuously along a portion of the Mohawk River as part of the Hudson River Environmental Conditions Observing System (HRECOS). There are three monitoring locations along the Mohawk River: at Ilion, New York; at Lock E-8; and at the Rexford Bridge. The Ilion monitoring location is approximately 60 miles upstream of the Vischer Ferry Dam and is above the Little Falls Project on the Mohawk River. Lock E-8 is located approximately 7 miles upstream of the Vischer Ferry Dam. The Rexford Bridge station is located approximately 3.9 miles (or 4.3 river miles) upstream of the Vischer Ferry Dam.

The Rexford Bridge station is maintained by the NYSDEC. The Lock E-8 monitoring location has a USGS stage gage (No. 01354330). These stations record measurements of DO, specific conductance, turbidity, pH, and water temperature at 15-minute intervals. Water quality data for these two monitoring locations from 2013 to 2018 are presented in Table 4-12 and Table 4-13.

Figure 4-14 Water Quality Monitoring Stations in the Vicinity of the Crescent and Vischer Ferry Projects

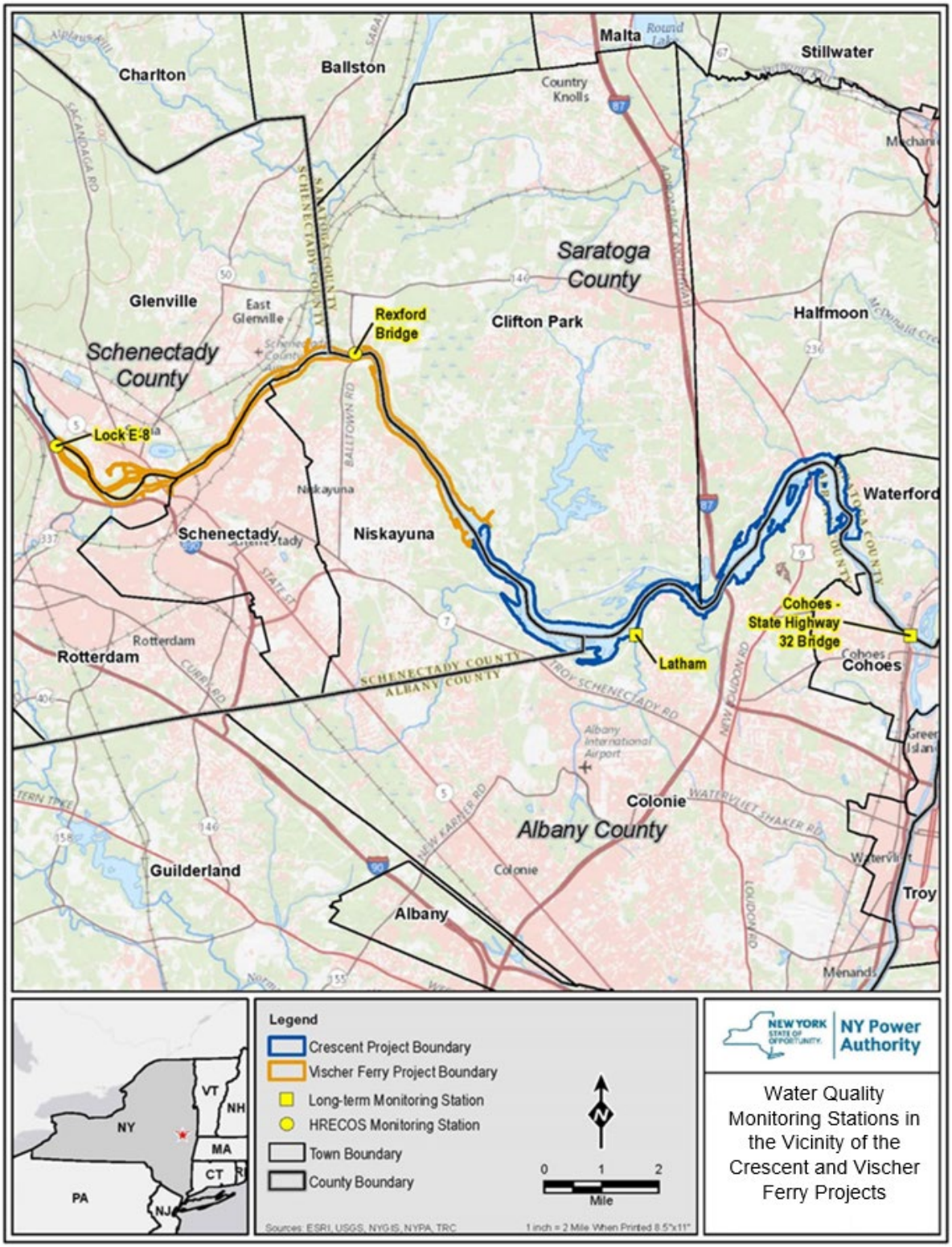


Table 4-12 Annual Minimum, Maximum, and Averages of Water Quality Data Collected at Cohoes and Latham Monitoring Locations From 2004–2016

Year	Location		Temp (°C)[1]	DO % sat	DO (mg/L) [2]	SpC[3] (µS/cm)	Turbidity (NTRU)[4]	pH
2004	Cohoes	Min	0.00	79.00	6.60	214.00	-	6.80
		Max	24.00	107.00	15.80	358.00	-	8.20
		Year Average	11.89	97.56	11.056	274.22	-	7.58
2005	Cohoes	Min	0.00	64.00	5.30	206.00	-	7.20
		Max	26.00	115.00	14.20	361.00	-	8.10
		Year Average	11.14	94.71	11.01	309.29	-	7.51
2006	Cohoes	Min	0.50	60.00	5.90	221.00	-	7.20
		Max	26.50	113.00	15.80	433.00	-	8.50
		Year Average	14.03	97.67	10.52	319.73	-	7.96
2009	Cohoes	Min	-0.10	102.00	8.20	268.00	-	7.40
		Max	26.60	133.00	19.30	275.00	-	8.20
		Year Average	13.25	117.50	13.75	271.50	-	7.80
2016	Latham	Min	5.00	73.00	6.00	292.00	4.10	7.30
		Max	25.90	134.00	13.00	363.00	14.00	8.00
		Year Average	18.23	96.17	9.40	319.33	7.38	7.67
2016	Cohoes	Min	12.10	76.00	6.20	294.00	2.10	7.50
		Max	26.00	126.00	13.70	357.00	7.20	8.30
		Year Average	19.55	94.33	8.98	325.67	4.08	7.90

Source: USGS, 2018c, d

[1] degrees Celsius (°C), [2] milligram/liter (mg/L), [3] Specific conductance (SpC), microsiemens/centimeter (µS/cm),[4] Nephelometric Turbidity Ratio Unit (NTRU)

Table 4-13 Annual Minimum, Maximum, and Averages of Water Quality Data Collected at Lock 8 and Rexford Bridge Monitoring Locations from 2013-2018

Year	Location		Temp (˚C)	DO % sat	DO (mg/L)[1]	SpC (mS/cm)	Turbidity (NTU)[2]	pH
2013	Lock E-8	Min	-0.03	67.7	5.67	0.01	-0.90	7.66
		Max	27.50	119.9	15.21	0.47	1314.00	8.78
		Year Average	11.15	99.9	11.43	0.29	31.16	8.05
2014	Lock E-8	Min	-0.05	86.90	7.26	0.01	-1.20	7.68
		Max	25.97	115.8	15.10	0.46	1,195.00	8.71
		Year Average	11.10	100.7	11.65	0.30	23.81	8.12
2014	Rexford Bridge	Min	0.28	83.80	7.11	0.00	0.51	7.75
		Max	25.65	135.00	14.78	0.55	240.4	8.60
		Year Average	13.03	97.26	10.62	0.35	8.84	8.04
2015	Lock E-8	Min	-0.05	69.7	5.64	0.20	-0.70	5.67
		Max	26.96	112.6	15.04	0.69	690.50	8.81
		Year Average	11.89	97.8	11.15	0.32	16.48	8.04
2015	Rexford Bridge	Min	-0.03	51.32	4.25	0.00	0.22	4.92
		Max	28.15	141.90	14.57	0.75	2,151.00	8.76
		Year Average	12.17	94.13	10.59	0.36	6.63	7.94
2016	Lock E-8	Min	-0.09	47.0	3.74	0.21	-33.90	7.41
		Max	27.99	149.00	15.98	0.40	1,316.00	9.11
		Year Average	12.61	98.67	11.05	0.30	17.64	7.94
2016	Rexford Bridge	Min	-0.05	46.86	3.85	0.00	0.20	7.4
		Max	28.1	210.40	17.47	0.70	1,189.00	9.33
		Year Average	12.68	93.52	10.48	0.32	8.12	8.02
2017	Rexford Bridge	Min	-0.04	76.63	6.61	0.19	0.5	7.64
		Max	25.7	141.8	14.72	0.61	699.3	8.73
		Year Average	11.68	96.67	10.94	0.31	15.63	7.99
2018	Rexford Bridge	Min	-0.03	27.84	2.22	0.15	0.23	7.62
		Max	19.16	166.5	14.96	8.34	446.3	9.04
		Year Average	11.77	94.71	10.86	2.31	8.53	8.03
2020	Lock 8	Min	-0.02	No data	4.80	0.18	0.0	7.80
		Max	29.10	No data	15.80	0.43	950.0	9.00
		Year Average	12.42	No data	11.03	0.32	15.04	8.24

Year	Location		Temp (˚C)	DO % sat	DO (mg/L)[1]	SpC (mS/cm)	Turbidity (NTU)[2]	pH
2020	Rexford Bridge	Min	0.00	No data	4.20	0.19	0.30	7.60
		Max	29.80	No data	18.80	0.49	709.0	9.20
		Year Average	12.60	No data	10.48	0.36	11.83	8.09

Source: HRECOS, 2021, 2019a and 2019b (Data prior to July 7, 2018 has been verified. Later data are provisional and subject to change.)

[1] Multiple DO readings of 0.00 were due to instrument or sensor malfunction. These readings, along with other abnormal DO readings, indicate suspicious data which was rejected during a final review by the HRECOS site manager and was not included in the table.

[2] Nephelometric Turbidity Unit

4.4.1.2.4.2 2020 Water Quality Study

In accordance with the FERC-approved Revised Study Plan (RSP), the Power Authority conducted a water quality study for the Projects in 2020. The overall goal of the study was to evaluate the effects of Project operation on water quality.

The study successfully collected baseline water quality information for the two Projects. Water quality data for the Projects was collected between June 12, 2020 and November 4, 2020 at four locations (see Figure 4-15 and Figure 4-16). Temperature and DO were collected continuously at two stations (forebay and tailwater) at both the Crescent and Vischer Ferry Projects (Table 4-14). Temperature and DO data were collected by continuous monitors at 15-minute intervals at the Projects under a range of environmental and operational conditions, including high temperature and low flow periods. In addition, surface spot check measurements of temperature, DO, pH, conductivity, and turbidity were taken at each monitoring site during weekly data downloading events, and vertical profiles of these same parameters were collected on a bi-weekly basis at each site. The 2020 monitoring period captured low flow, and high air and water temperature conditions in the area of the Projects. This is the period when low DO levels are most likely to occur in waters released through the Projects.

Monitoring at both Projects demonstrated that water temperatures at the Projects displayed very similar patterns at all sites through the study period. Throughout June, water temperatures warmed steadily at both Project sites and remained above 25 °C for most of July. A similar pattern was seen in the forebay temperature conditions. The maximum water temperatures among all sites were observed in July and August ranged from 28.4 °C to 29.5 °C. Water temperatures cooled in early August in response to heavy precipitation and increased river flows. There was no evidence of thermal stratification at any monitoring location. The temperature was well mixed from top to bottom at each site. Both the continuous and vertical profile data demonstrated that water temperatures were consistent at the forebay and tailrace sites at each Project. There were no apparent effects of Project operations on water temperature.

Additional parameters collected on a bi-weekly basis (pH, conductivity, and turbidity) also displayed similarities among the monitoring sites. These parameters measured in the forebay and tailrace sites at each Project were generally consistent from top to bottom and the tailrace values were similar to those measured concurrently in the forebay. There were no apparent effects of Project operations on these parameters. On two occasions in the Vischer Ferry Forebay, elevated pH values were measured in the top layer of the water column. These elevated pH values were likely affected by photosynthetic processes in the impoundment.

The vertical DO profiles collected during the study demonstrated that the DO values in both Project tailraces remain consistent from top to bottom. The Vischer Ferry Forebay site showed that DO levels can stratify when the turbines are not operating. DO stratification occurred on June 25 and July 9 when the turbines were off-line due to low river flows and low DO values were recorded in the deeper portions of the Forebay. At the Vischer Ferry Tailrace profile site, DO remained above 5.0 mg/L at all depths despite the lower DO at times in the Vischer Ferry Forebay. DO at the Crescent Tailrace site also remained above 5.0 mg/L during the biweekly profile measurements.

Continuous DO data collected from the Project forebays showed that DO concentrations were, at times, both irregular and erratic. At both forebay sites, DO concentrations dropped below 4.0 mg/L in the months of July and August, but also experienced high DO values at times, indicating the highly productive nature of aquatic plant growth in the Project impoundments. This trend of large DO fluctuations and high DO values was also observed in other areas of the Mohawk River upstream of the Projects in data collected by the NYSDEC (see Section 4.4.1.2.4 above.)

Both Crescent and Vischer Ferry Forebay sites experienced daily DO averages that dropped below 5.0 mg/L in July and August, with 9% of the daily average data being below 5.0 mg/L in the Vischer Ferry Forebay and 8% in the Crescent Forebay. Despite the lower DO at times in the forebays, the average daily DO values in each tailrace were always greater than 5.0 mg/L.

In the Vischer Ferry Tailrace, DO was greater than the instantaneous DO standard of 4.0 mg/L at all times. DO measurements in the Crescent tailrace were above the instantaneous DO minimum standard of 4.0 mg/l nearly all the time. Only on two short occasions did the DO measured in the Crescent Tailrace fall below 4.0 mg/L; on July 8 at 19:45 and the morning of July 11 when the Project turbines were off-line and all inflows were being passed over the dam. Both of these brief excursions below the instantaneous standard were likely the result of the respiration effects of the vast amounts of aquatic vegetation (mostly water chestnut (*Trapa natans*)) found in the Mohawk River at the Crescent Project.

DO levels in the Project areas are influenced by natural aquatic plant production and organic processes in the Project impoundments as evidenced by the large daily fluctuations observed in the Project forebays and downstream. The Crescent Project impoundment appears more affected by this natural variation than the Vischer Ferry impoundment.

The Projects maintain minimum flows over the respective dams (200 cfs at Vischer Ferry and 250 cfs at Crescent). When the flow through the forebays is low or when the turbines are off-line, the low (or lack of) inflows combined with natural plant decomposition activity (which consumes oxygen) results in lower DO values in the Project forebays.

Despite the lower DO at times in the forebays, the Project tailraces generally remain well oxygenated and Project operations have little effect on water quality. The layout of the Vischer Ferry Project is such that even when the turbines are off-line, the spillage at Vischer Ferry Dam reaches the tailrace area keeping DO levels sufficient. At the Crescent Project, when the turbines are off-line, the spillage at the Project mostly occurs on the opposite side of the river. This likely led to a very short duration period when DO levels fell below 4.0 mg/L in the Crescent Tailrace when the Project was off-line. DO measured in the tailrace monitoring locations remained above 4.0 mg/L at all times when the Project turbines were operating. Details of the study can be found in Table 4-14. The results of the 2020 study demonstrated that the operations at the Crescent and Vischer Ferry Projects have no adverse effects on Mohawk River water quality. In

response to the study results, NYSDEC suggested that the forebay monitoring sites used for the 2020 study were not representative of impoundment conditions. Accordingly, in 2021 the Power Authority conducted some additional water quality monitoring of the Project impoundments.

A summary of the preliminary results of the 2021 study are provided below. Final, detailed results of this water quality monitoring study will be included in the USR and discussed in the Final License Application for the Crescent and Vischer Ferry Projects.

Figure 4-15 2020 Crescent Water Quality Study Monitoring Station Locations

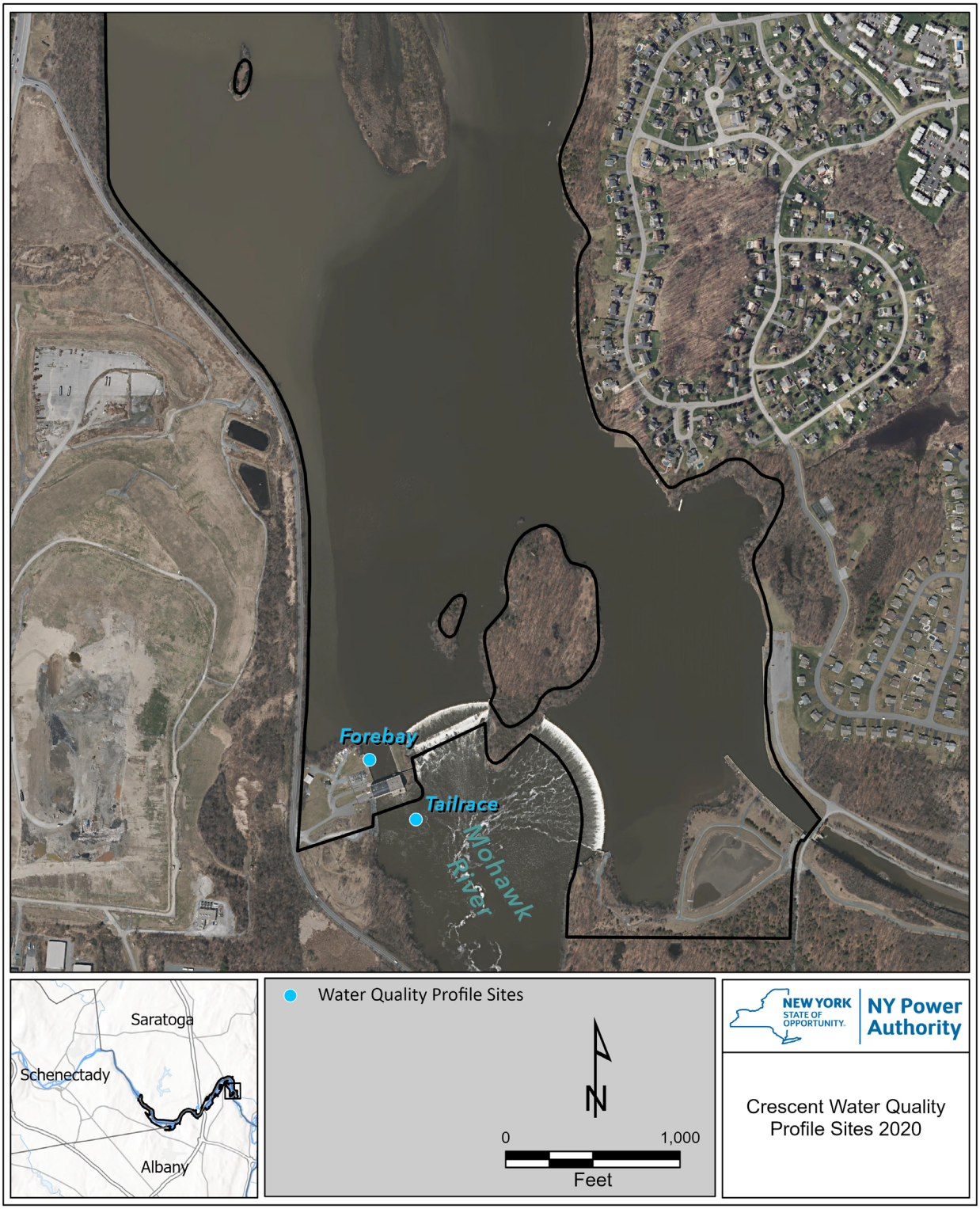


Figure 4-16 2020 Vischer Ferry Water Quality Study Monitoring Station Locations

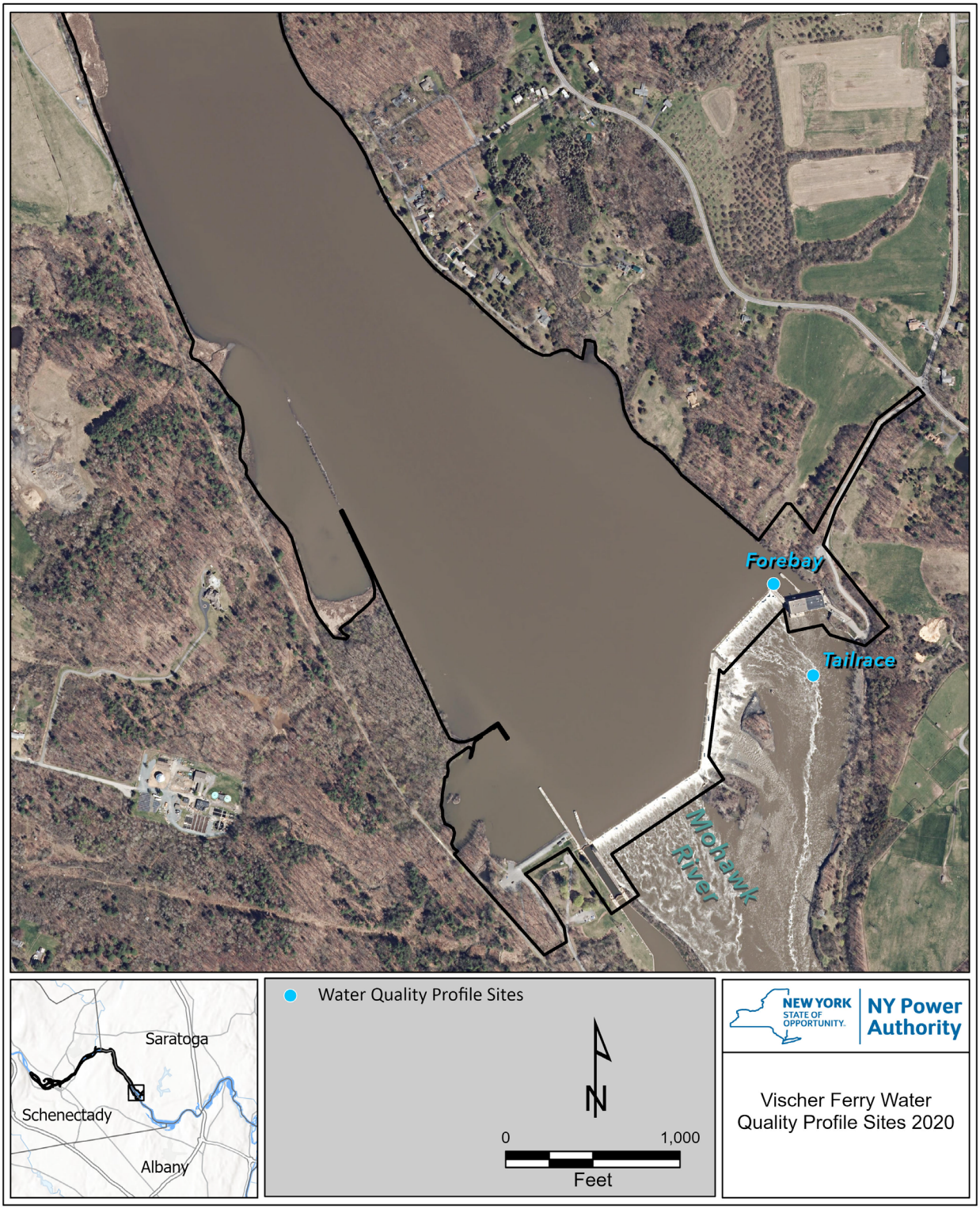


Table 4-14 June – October 2020 Monthly Continuous Water Quality Summary Results

	Crescent Project Forebay			Crescent Project Tailrace			Vischer Ferry Project Forebay			Vischer Ferry Project Tailrace		
	Temp (°C)	DO (mg/L)	DO (%)	Temp (°C)	DO (mg/L)	DO (%)	Temp (°C)	DO (mg/L)	DO (%)	Temp (°C)	DO (mg/L)	DO (%)
June												
Maximum	28.6	21.05	274.1	27.3	13.99	177.3	27.9	15.52	200.8	28.1	13.55	200.8
Minimum	21.4	4.24	51.1	21.5	6.65	75.9	20.8	5.37	65.8	21.1	6.87	65.8
Average	24.7	9.31	112.8	24.9	9.12	110.6	23.4	8.08	95.4	24.3	8.81	95.4
July												
Maximum	29.5	14.76	194.9	29.0	12.07	152.7	28.4	11.39	146.8	29.3	9.40	146.8
Minimum	24.4	0.63	8.3	24.4	3.40	43.3	23.7	1.67	21.0	24.3	5.19	21.0
Average	26.9	7.11	92.2	26.9	7.12	89.8	26.5	6.18	79.9	27.0	7.38	79.9
August												
Maximum	28.2	14.68	183.0	28.2	10.60	136.2	27.8	10.69	133.9	28.2	9.88	133.9
Minimum	22.8	1.68	21.3	22.8	4.12	51.8	24.0	2.18	26.5	22.4	4.50	26.5
Average	25.6	6.28	77.3	25.6	6.66	83.1	25.6	6.28	75.5	25.5	7.01	75.5
September												
Maximum	24.0	14.19	154.8	23.7	12.02	131.3	24.2	12.79	151.3	24.2	10.55	121.7
Minimum	17.6	4.23	49.1	17.8	5.93	68.9	17.8	3.86	44.3	17.8	6.41	74.5
Average	21.0	8.40	93.7	21.0	8.20	91.7	20.9	7.42	83.2	20.9	8.15	91.4
October												
Maximum	19.9	10.60	102.7	19.7	11.13	97.7	19.7	10.88	100.6	19.7	11.05	102.0
Minimum	9.4	6.49	68.0	9.8	6.90	73.3	9.0	6.62	69.2	9.0	7.36	78.1
Average	15.3	8.72	86.8	15.4	8.84	88.1	15.2	9.00	89.2	15.2	9.28	92.0
Study Average	22.7	7.96	92.6	22.8	7.99	92.7	22.3	7.39	84.6	22.6	8.12	93.7

4.4.1.2.4.3 2021 Water Quality Study

The ISR for the Projects was filed by the Power Authority on February 19, 2021 and contains the results of the 2020 water quality monitoring study. As discussed previously, the 2020 Water Quality Study indicated some DO stratification in the Vischer Ferry forebay location and some erratic changes in DO conditions in both Project forebays. As no other impoundment water quality data was collected as part of the study, it could not be determined if the DO concentrations observed in the Project forebays in 2020 were representative of broader impoundment conditions (perhaps influenced by the presence of extensive stands of water chestnut) or were just a very localized phenomenon in the forebays. In their comments on the ISR, NYSDEC requested collection of additional water quality data at the Projects for 2021. Although the Commission (in its study determination dated June 14, 2021) did not recommend modifying the study plan to require an additional season of water quality sampling, after meeting with NYSDEC (June 21, 2021) the Power Authority voluntarily agreed to collect some additional DO and temperature data from the Project impoundments.

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

The objectives of the 2021 study were to collect vertical profile DO and temperature data in the Project impoundments and forebays during the summer months sufficient to characterize current DO and temperature conditions at each Project impoundment and to compare the water quality data to concurrent river flow, weather conditions and Project operations.

Water quality monitoring in 2021 was conducted at three locations at each Project. Profile locations were selected in the 2021 study plan, in consultation with NYSDEC, to determine stratification patterns in deeper areas of the lower impoundments compared with the Project forebay locations. Profiles of DO and temperature were conducted at similar locations as the 2020 water quality monitoring study in the forebay of each Project and in two locations in the impoundments of each Project, described in Table 4-15. The Crescent Impoundment B site was the deepest profile location in the study at 8.5 meters deep. The Crescent forebay and Impoundment A sites were shallower (3-7-3.9 meters deep). Conversely, at the Vischer Ferry Project study area, the Forebay site was deepest sample location at 7.6 meters deep, compared to the two impoundment sites which had depths ranging from 3.8 to 5.7 meters.

Figure 4-17 and Figure 4-18 provide maps of the Project area showing the 2021 water quality monitoring locations.

Vertical water quality profiles were collected every week between June 28 and September 29, 2021. Throughout the study period, high river flows occurred at times making boat access unsafe for impoundment data collection. During these high flow periods, water quality profiles were only collected in the forebays of the Projects. The profile data were generally collected weekly from mid-morning to early afternoon. Data were collected to characterize the water quality conditions throughout the water column of forebays and the impounded Mohawk River upstream of the Projects.

Weekly profiles conducted at the Projects resulted in 14 vertical profiles in the Crescent Forebay and 10 full vertical profiles in the Crescent Impoundment A and B sites. Twelve full vertical profiles were collected in the Vischer Ferry Forebay and 10 full vertical profiles were collected in the Vischer Ferry Impoundment A

and B sites. High flows were experienced at the Projects during periods of the study, where impoundment profiles could not be collected for safety concerns and forebay profiles at Vischer Ferry could not be collected with accuracy.

The study successfully collected additional water quality data at the Projects, which included a range of environmental and operational conditions, including high flow events. Preliminary study results suggest that the Projects continued to display consistent vertical temperature patterns throughout the study period, as they did in the 2020 Water Quality study. The temperatures were consistent from top to bottom at each site, and only slight thermal stratification was observed throughout the study period on days when DO levels were also found to be stratified.

The DO levels at the Projects remained well mixed during the summer months, except for DO stratification observed on a few days with lower flow and high temperatures. DO conditions including short periods of stratification observed in the Crescent forebay were generally consistent with the two Crescent impoundment sites. However, due to the shallower sampling location in the forebay, this site did not stratify on a couple of dates when DO stratification was observed in the impoundment locations. At Vischer Ferry, although the forebay sampling location was slightly deeper compared to the impoundment locations, preliminary results suggest that the impoundment locations were more likely to stratify and that stratification in the impoundment was observed on a few low flow, high temperature days.

Overall preliminary results of the 2021 study demonstrate that the DO stratification observed in 2020 is not localized to the Project forebays and can occur in deeper areas of the Project impoundments. DO stratification is typically observed during low river flow conditions, and can occur even when the Project turbines are operating at low levels. Combined, the 2020 and preliminary 2021 water quality study results demonstrate that the Projects do not adversely affect water quality conditions.

Table 4-15 Vertical Profile Sites at Crescent and Vischer Ferry Projects

Site	Location
Crescent Forebay	Upstream end of Forebay, same location as 2020 sampling location.
Crescent Impoundment A	800 feet upstream of the Crescent Dam and intake channel.
Crescent Impoundment B	Navigation channel approximately 0.6 miles upstream of the Crescent Dam. This area is 25-30 feet in deep spots.
Vischer Ferry Forebay	Upstream end of Forebay, same location as 2020 sampling location.
Vischer Ferry Impoundment A	Navigation Channel approximately 0.4 miles upstream of the Vischer Ferry Dam and intake channel.
Vischer Ferry Impoundment B	Navigation Channel approximately 0.8 miles upstream of the Vischer Ferry Dam.

Figure 4-17 2021 Crescent Water Quality Study Monitoring Station Locations

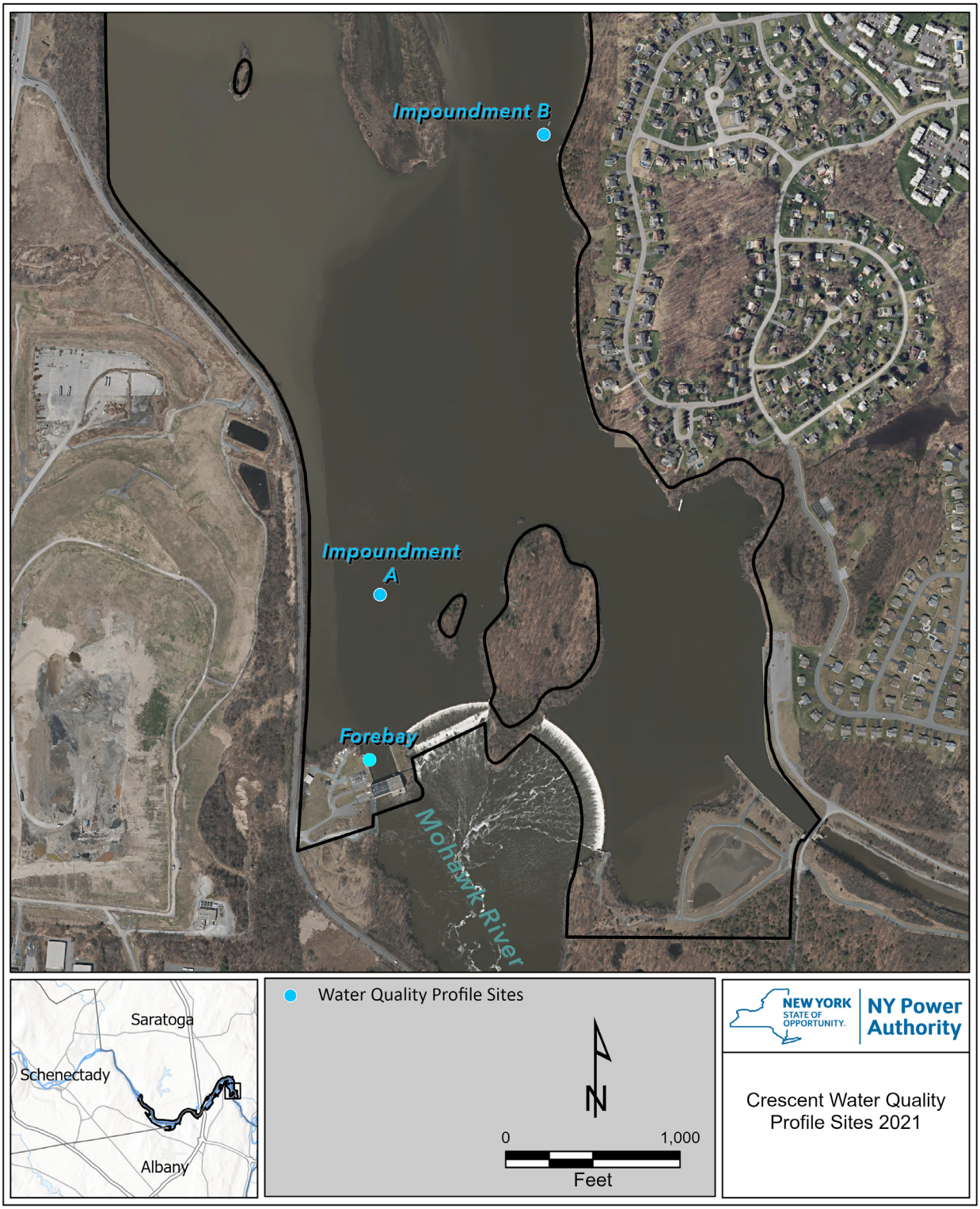
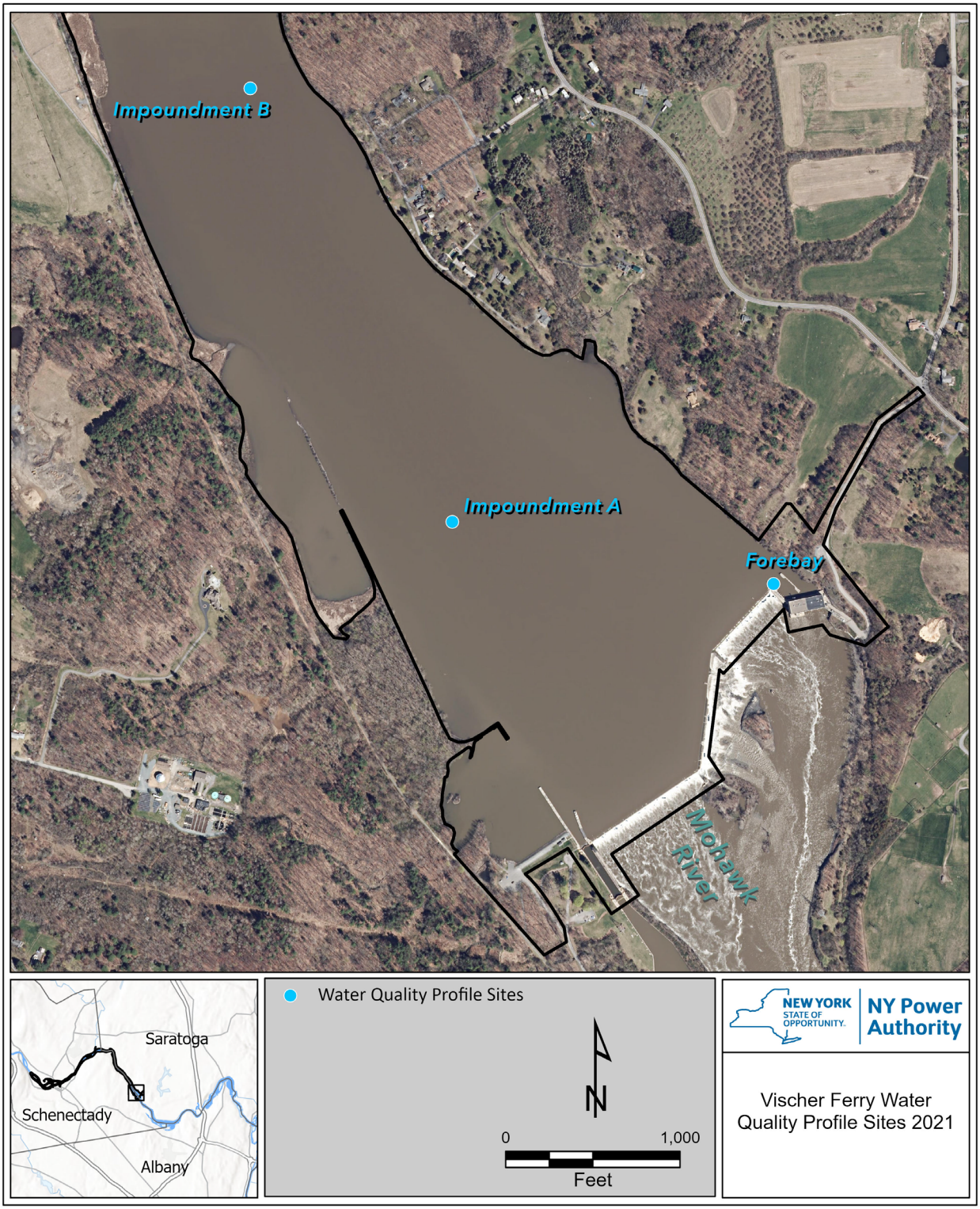


Figure 4-18 2021 Vischer Ferry Water Quality Study Monitoring Station Locations



4.4.2 Environmental Effects

Water quality data collected by the Power Authority in 2020-2021 demonstrates that Project water quality is good at both Projects. In addition, because the two Projects are operated as run of river and because the impoundments are relatively shallow and riverine in nature, the operation of the Projects causes no impoundment thermal stratification or significant warming of impoundment waters that could lead to downstream releases of high temperature or low dissolved oxygen waters. Both the continuous and vertical profile data demonstrated that water temperatures were consistent at the forebay and tailrace sites at each Project. There were no apparent effects of Project operations on water temperature.

DO levels in the Project areas are influenced by natural aquatic plant production and organic processes in the Project impoundments as evidenced by the large daily fluctuations observed in the Project forebays and downstream. The Crescent Project impoundment appears more affected by this natural variation than Vischer Ferry.

The Projects maintain minimum flows over the respective dams (200 cfs at Vischer Ferry and 250 cfs at Crescent). When the flow through the forebays is low or when the turbines are off-line, the low (or lack of) inflows combined with natural plant decomposition activity (which consumes oxygen) results in lower DO values in the Project forebays. This trend is not localized to the Project forebays and can occur in deeper areas of the Project impoundments. DO stratification is typically observed during low river flow conditions.

Despite the lower DO at times in the forebays, the Project tailraces remain well oxygenated and Project operations have little effect on water quality. The layout of the Vischer Ferry Project is such that even when the turbines are off-line, the spillage at Vischer Ferry Dam reaches the tailrace area keeping DO levels sufficient. At the Crescent Project, when the turbines are off-line, the spillage at the Project mostly occurs on the opposite side of the river. DO measured in the tailrace monitoring locations remained above 4.0 mg/L at all times when the Project turbines were operating.

Continued operation of the Projects as proposed will have no adverse effects on Mohawk River water quality.

4.4.3 Proposed Environmental Measures

Regarding water quantity, the Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to water resources. The Power Authority's water quality studies conducted in 2020 and again in 2021 demonstrate that the operation of the Projects has no adverse effect on water quality, and therefore no water quality enhancement measures are needed or proposed.

4.4.4 Unavoidable Adverse Impacts

Continued Project operation as proposed will have no unavoidable adverse impacts on water quantity.

4.5 Fish and Aquatic Resources

4.5.1 Affected Environment

4.5.1.1 Fish Community

4.5.1.1.1 Historic Fish Community Information

The Mohawk River Basin is centrally located within New York and serves as a connection between the watersheds of the Great Lakes and the Hudson River. The Mohawk River and Barge Canal System provides aquatic connectivity between the two watersheds. Since the 1800s, the lock system has allowed for some species that were not originally native to the Mohawk River or Great Lakes, such as blueback herring, to extend their ranges further than occurred prior to the development of the canal.

Since the early 1800s, when the Erie Canal was constructed, aquatic habitat in much of the lower Mohawk River has been altered by the construction of dams, locks and canals. The Crescent Project Dam impounds an area of approximately 2,257 acres, and the impoundment extends upstream of the dam approximately 10 miles to the Vischer Ferry Dam. The Vischer Ferry Dam impounds an area of 1,144 acres and extends upstream 10.3 miles to the Lock E-8 Dam. Downstream of the Crescent Dam there is a short area of free-flowing river habitat within the Project Boundary that continues approximately 1.5 miles downstream through Cohoes Falls to Erie Boulevard's School Street Project.

The lower Mohawk River supports a diverse assemblage of warm- and cool-water sport fishes, making it popular with anglers (Wells, 2018). No essential fish habitat as defined by the National Marine Fisheries Service was identified in either Project area (National Oceanic and Atmospheric Administration, 2018).

4.5.1.1.2 2020 Fish Community Study

The Power Authority conducted a Fish Community Study in 2020. The goal of the study was to utilize existing fisheries data for the lower Mohawk River to conduct a comprehensive desktop assessment of the fish community at the Crescent and Vischer Ferry Projects, including a determination of species composition and relative abundance.

Results of the study demonstrate that at least 62 fish species have been historically documented in the Mohawk River and the Barge Canal from Lock E-6 in Waterford to Lock E-20 in Rome, New York from 1934 through 1983 (McBride, 2009). Carlson (2015) reported that as many as 71 fish species may inhabit the greater river-canal system.

Overall, the Mohawk River fishery consists of warmwater, coolwater, and migratory species. Common warmwater species such as smallmouth bass (*Micropterus dolomieu*) and sunfish (*Centrarchidae* spp.) abundant and provide a diverse recreational fishery. Likewise, coolwater species such as walleye (*Sander vitreus*), and northern pike (*Esox lucius*) provide desirable target species for anglers. Proportional abundance of fish species from the survey data indicate that the most abundant gamefish species within the vicinity of the Projects are smallmouth bass followed by walleye. Overall, the resident fish community is dominated by warm- and cool-water species such as bluegill (*Lepomis macrochirus*), smallmouth bass, yellow perch (*Perca flavescens*), white sucker (*Catostomus commersonii*), fallfish (*Semotilus corporalis*), and brown bullhead (*Ameiurus nebulosus*). Both coolwater and warmwater species are present in sizes with trophy potential for anglers. Migratory species include the seasonally abundant blueback herring and

the relatively uncommon American eel. The migratory species exist in the vicinity of the Projects due to the Barge Canal which provides a passage route past Cohoes Falls and the dams present along the lower Mohawk River.

The fish community study results demonstrate that there is significant information on the species composition and relative abundance of the fish community at the Projects, as discussed in more detail below. No further study of the fish community at the Projects is needed or recommended.

4.5.1.1.3 Resident Species

At least 62 fish species were documented in the Mohawk River and the Barge Canal System from Lock E-6 in Waterford to Lock E-20 in Rome, New York from 1934 through 1983 (McBride, 2009). Smallmouth bass and walleye are the most popular gamefish among anglers (Bureau of Fisheries, 2015-2016). Most species of fish in the Mohawk River are considered resident fish species except for the anadromous blueback herring, which migrate into the river system in the spring to spawn. Blueback herring are native to the Hudson River and lowermost section of Mohawk River, but prior to the construction of the Barge Canal System did not occur above Cohoes Falls, which was the natural limit of their migration. However, with the construction of the Barge Canal System, herring were able to establish a migration run in the Mohawk River above Cohoes Falls. Juvenile blueback herring are today considered a key component of the forage base for many resident piscivorous species (George et al., 2016).

Fish communities in the Mohawk River have been sampled several times between 1934 - 2016. Studies have been conducted with a wide variety of survey methods including trap nets, gill nets, and electrofishing. Overall, 29 species have been documented within both the Crescent and Vischer Ferry Project areas during NYSDEC surveys (Table 4-16).

Based on these surveys, the NYSDEC has described the Mohawk River Basin fisheries as being in a state of transition (NYSDEC, 2012). The non-native and invasive zebra mussel (*Dreissena polymorpha*), which was first observed in 1991, spread throughout the lower river by 1993. Freshwater drum (*Aplodinotus grunniens*) became established around 1990 and northern pike have increased in abundance as well. At the same time, the runs of anadromous blueback herring have declined, and preliminary data suggest smallmouth bass are becoming less abundant (USGS, 2018e).

Table 4-16 Occurrence of Fish Species in NYSDEC State Surveys, 1998-2012

Common Name	Family	Genus and Species	Upstream of Both Project Areas	Within Both Project Areas	Downstream of Both Project Areas
Lake sturgeon	Acipenseridae	*Acipenser fulvescens*	X		
American eel	Anguillidae	*Anguilla rostrata*	X	X	X
Blueback herring	Clupeidae	*Alosa aestivalis*	X	X	X
American shad	Clupeidae	*Alosa sapidissima*		X	X
Gizzard shad	Clupeidae	*Dorosoma cepedianum*	X	X	X
Central stoneroller	Cyprinidae	*Campostoma anomalum*	X	X	X
Goldfish	Cyprinidae	*Carassius auratus*			X
Satinfin shiner	Cyprinidae	*Cyprinella analostana*	X		
Spotfin shiner	Cyprinidae	*Cyprinella spiloptera*	X	X	X
Common carp	Cyprinidae	*Cyprinus carpio*	X	X	X
Common shiner	Cyprinidae	*Luxilus cornutus*	X	X	X
Emerald shiner	Cyprinidae	*Notropis atherinoides*	X	X	X
Spottail shiner	Cyprinidae	*Notropis hudsonius*	X	X	X
Rosyface shiner	Cyprinidae	*Notropis rubellus*	X		
Rudd	Cyprinidae	*Scardinius erythrophthalmus*	X		
Creek chub	Cyprinidae	*Semotilus atromaculatus*	X	X	X
Fallfish	Cyprinidae	*Semotilus corporalis*	X	X	X
White sucker	Catostomidae	*Catostomus commersonii*	X	X	X
Northern hogsucker	Catostomidae	*Hypentelium nigricans*	X		
Shorthead redhorse	Catostomidae	*Moxostoma macrolepidotum*	X		X
Round goby	Goblidae	*Neogobius melanostomus*	X		
Yellow bullhead	Ictaluridae	*Ameiurus natalis*	X		
Brown bullhead	Ictaluridae	*Ameiurus nebulosus*	X	X	X
Channel catfish	Ictaluridae	*Ictalurus punctatus*	X		X
Stonecat	Ictaluridae	*Noturus flavus*	X		
Tadpole madtom	Ictaluridae	*Noturus gyrinus*			X
Margined madtom	Ictaluridae	*Noturus insignis*	X		
Brindled madtom	Ictaluridae	*Noturus miurus*	X		X
Brown trout	Salmonidae	*Salmo trutta*	X	X	
Brook trout	Salmonidae	*Salvelinus fontinalis*	X		
Northern pike	Esocidae	*Esox lucius*	X		
Tiger muskellunge	Esocidae	*Esox lucius* X *Esox masquinongy*	X		X
Chain pickerel	Esocidae	*Esox niger*	X		

Common Name	Family	Genus and Species	Upstream of Both Project Areas	Within Both Project Areas	Downstream of Both Project Areas
Central mudminnow	Esocidae	*Umbra limi*	X		
Trout perch	Percopsidae	*Percopsis omiscomaycus*	X		X
Brook silverside	Atherinopsidae	*Labidesthes sicculus*	X	X	X
Banded killifish	Fundulidae	*Fundulus diaphanus*	X		
Brook stickleback	Gasterosteidae	*Culaea inconstans*	X		
White perch	Moronidae	*Morone americana*	X	X	X
White bass	Moronidae	*Morone chrysops*	X		
Rock bass	Centrarchidae	*Ambloplites rupestris*	X	X	X
Pumpkinseed	Centrarchidae	*Lepomis gibbosus*	X	X	X
Bluegill	Centrarchidae	*Lepomis macrochirus*	X	X	X
Smallmouth bass	Centrarchidae	*Micropterus dolomieu*	X	X	X
Largemouth bass	Centrarchidae	*Micropterus salmoides*	X	X	X
White crappie	Centrarchidae	*Pomoxis annularis*		X	X
Black crappie	Centrarchidae	*Pomoxis nigromaculatus*	X	X	X
Greenside darter	Percidae	*Etheostoma blennioides*	X		
Rainbow darter	Percidae	*Etheostoma caeruleum*	X		
Fantail darter	Percidae	*Etheostoma flabellare*	X		
Tessellated darter	Percidae	*Etheostoma olmstedi*	X	X	X
Yellow perch	Percidae	*Perca flavescens*	X	X	X
Common logperch	Percidae	*Percina caprodes*	X	X	X
Walleye	Percidae	*Sander vitreus*	X	X	X
Freshwater drum	Sciaenidae	*Aplodinotus grunniens*	X	X	X

Source: Carlson et al., 2016

Proportional abundance of fish species from the survey data are provided in Table 4-17 and indicate that the most abundant gamefish species within the vicinity of the Projects are smallmouth bass followed by walleye. Overall, the resident fish community is dominated by warm- and cool-water species such as bluegill, smallmouth bass, yellow perch, white sucker, fallfish, and brown bullhead.

Since 1934, five major biological fisheries surveys of the Mohawk River have been conducted. The first biological fisheries survey of the entire Mohawk River occurred in 1934. The survey was conducted using seins, gill nets, and fyke nets. The purpose of the study was to establish a landmark data base for fisheries information. The second fisheries survey was carried out in 1970 and 1971 by the NYSDEC Region 4 Fisheries Unit (McBride, 1985 and 1994). Fish sampling was conducted using an electrofishing boat, and the purpose of the study was to update information on the quality of the sport fishery of the Mohawk River. The third and most comprehensive survey of the lower Mohawk River fisheries was conducted from 1979 to 1983 to assess the river's fish populations and management needs (McBride, 1985 and 1994). The surveys were conducted using trap net sets, gill nets, boat electrofishing, bag sein hauls, and otter trawl

hauls. In 2014-2015, the USGS, in conjunction with NYSDEC, undertook the fourth fish community survey at 24 Mohawk River locations (Table 4-17). The surveys were conducted using boat electrofishing of near-shore habitats. The resulting data were analyzed to assess the condition of current fish assemblages, identify the relative abundance of common species, identify spatial differences associated with seasonal or permanent impoundments, and assess temporal changes in the fish community over the past 30 years. The fifth and most recent fisheries survey occurred in 2018. NYSDEC conducted black bass (*Micropterus* spp.) surveys over a period of six nights between June 18-27, 2018, covering much of the Crescent impoundment shoreline (Table 4-17). The primary purpose of the study was to assess the status of black bass (i.e., largemouth bass (*Micropterus salmoides*) and smallmouth bass), with a secondary focus on walleye. The study was conducted using 27 individual boat shocking runs at night. The results of the five studies are summarized in Table 4-17.

Table 4-17 Historic Fish Community Data in the Mohawk River

Date	**1934**[1]	**1970 – 1971**[1, 2, 5]	**1979 – 1983**[2]	**Spring 2014 & 2015**[3]	**June 18-27, 2018**[4]
Number of Species	48	26	56	38	27
Species	**Proportion of Abundance**				
Walleye	0.064		0.005	0.165	0.123
Largemouth bass	0.001		0.011	--	0.026
Smallmouth bass	0.003		0.034	0.082	0.190
Yellow perch	0.119		0.021	0.004	0.039
Brown bullhead	0.142		0.54	--	0.047
Rock bass	0.035		0.015	--	0.091
Pumpkinseed	0.020		0.017	--	0.124
Bluegill	--		0.048	--	0.059
Blueback herring	0.045		0.512	--	--
Other Centrarchids	--		--	0.093	--
Cyprinids	--		--	0.085	--
All other species	--		--	0.002	--
All species	--		--	0.001	--

[1] McBride, 1994
[2] McBride, 1985
[3] George et al., 2016
[4] Wells, 2018
[5] Only total species number given.

4.5.1.1.4 Blueback Herring

Blueback herring is an anadromous river herring native to the eastern seaboard of North America. Its native range extends from Labrador to Florida. Along this range, the species inhabits coastal, estuarine and riverine systems, as well as some inland lakes. Blueback herring live most of their adult life at sea, returning inland to spawn. Inland migration has been enhanced in many places through man-made locks and canals, which has resulted in its expansion into many inland lakes and waterways adjacent to its native range, including the Mohawk River and Lake Ontario in New York. (NYSDEC, 2019a).

Blueback herring are native to the Hudson River and run up the Hudson in the spring to spawn in various tributaries. Cohoes Falls, located approximately 1.5 miles downstream of Crescent Dam, presents a natural barrier that blueback herring would be unable to pass if not for the Barge Canal System and locks. Blueback herring depend on the operation of locks and gates on the Barge Canal System to gain access to the Mohawk River. Blueback herring adults migrating upstream through the canal enter the Mohawk River upstream of the Crescent Dam.

Blueback herring were first recorded in the lower Mohawk River upstream of Cohoes Falls in 1934 (USGS, 2018f). Blueback herring were first reported in the upper Mohawk (above Little Falls) in 1978 (Owens et al., 1998). Spawning migrations can extend to near Rome, New York, about 120 miles above the river's mouth and more than 100 miles upstream of the Crescent and Vischer Ferry Project dams (FERC, 2000). Spawning occurs in the upper reaches of the Mohawk River and its tributaries, preferably in swift-flowing, hard-bottomed stream reaches, and begins when water temperatures reach 10-15 °C. (FERC, 2000). Spent adults migrate downstream shortly after spawning, generally during the period May through July (FERC, 2000). Juvenile blueback herring rear throughout the Mohawk River during summer and are an important prey for game fish such as bass, walleye, and yellow perch. Outmigration of juvenile blueback herring from the Mohawk River occurs during the fall (FERC, 2000).

Over the past two decades, blueback herring runs have been in decline all along the eastern seaboard, including the Mohawk River stocks. In 2012, NYSDEC and The State University of New York College of Environmental Science and Forestry (SUNY ESF) sampled the 2012 spring run. Sampling was conducted below four Canal dams and adjacent locks (E-7, E-9, E-11, and E-15). The tailwaters were boat electrofished during the day and samples of blueback herring were harvested for analyses. Approximately 1,000 blueback herring adults were shocked in 5.25 hours of 'on-time' boat electrofishing with 352 individuals collected in the survey. Males outnumbered females (2.27:1), but were statistically shorter, when measured as total length. Females had an insignificantly higher percentage of food items present in their stomachs versus males (87:79, P = 0.53). Fullness ratios varied among collection dates and sites with no difference found between May and early June sampling. By late June, the few adults that were found had much less food in their stomachs. Run timing was as expected with decreased adult density over time at lower sites and increased density at upper sites. Catch per unit effort (individuals/hour) was highest in late May (106/hour), while dropping from 88/hour to only 4/hour throughout the month of June. (Wells et al., 2013).

At the Crescent Project, downstream fish passage has been enhanced by the Licensee's installation and operation of an acoustic deterrent system in combination with the provision of a flashboard opening measuring 80 ft by 1 ft providing access from the main river channel through the dam. At Crescent, the acoustic deterrent system likely increases the number of fish migrating downstream through the Barge Canal by diverting fish to the eastern river channel where the Barge Canal entrance is located.

The Vischer Ferry Project also supports downstream passage of herring with a combination of an acoustic deterrent system and flashboard openings. Two different locations are used for the openings depending on the blueback herring lifestage present, one for adults and one for juveniles. These openings are 8 ft by 2.25 ft and were determined based on-site specific studies conducted at Vischer Ferry which determined slightly different locations were beneficial for each lifestage at this site (Ross, 1999). The downstream face of the dam associated with these openings is covered by a synthetic, rubberized material to provide a smooth substrate for fish to pass over.

In order to better understand blueback herring passage at both Projects, a study was conducted by the Power Authority in 2020. This study is summarized in Section 4.5.1.2.3.1.

4.5.1.1.5 American Eel

American eel is another diadromous species known to the Mohawk River and is native to all drainages in the state of New York. American eel are the only catadromous species in the state of New York, meaning they migrate out to sea to spawn. The catadromous life history of the American eel necessitates long migrations up and down rivers to successfully complete their life cycle. American eel spawn in the Sargasso Sea and their larvae then drift and migrate to coastal streams and enter North American estuaries, including the Hudson and Mohawk Rivers. From there, most young eel (elvers) move upstream into freshwater rivers, lakes, and ponds. However, research has shown that some eels complete their life cycle entirely in brackish water habitats (USFWS, 2015). Other research indicates that eel movement between fresh water and estuarine zones may be regular and seasonal in nature, in response to low winter temperatures in the estuary (USFWS, 2015).

Although American eel do occur in the Mohawk River, their numbers upstream of the Crescent and Vischer Ferry Projects are very small. In 2003 and 2004, a study of six Hudson River tributaries (Wynants Kill, Hannacroix Creek, Saw Kill, Black Creek, Peekskill Hollow Brook, and Minisceongo Creek) was completed evaluating population dynamics of American eels (Machut et al., 2007). The goal of this study was to quantify the distribution of American eel and the impacts of anthropogenic stressors on them. For each of the tributaries, American eel densities were highest near the mouth and below each barrier. The highest densities of American eel were found at the mouth of Hannacroix Creek (155.1 eels/100 m2) and the lowest densities (0.2 eels/100 m2) were found at Wynants Kill, which has four barriers between it and the Hudson River mainstem. The regression model completed in this study found that barriers to fish passage were the dominant factor in predicting American eel abundances. In the Hudson River drainages, barriers are thought to play a greater role in eel distribution because of the number of barriers over relatively short distances in the tributaries studied.

The American eel has been caught in the main channel of the Mohawk River as far west as Herkimer, as well as in Schoharie and West Canada Creeks (Carlson et al., 2016). During a 2015 survey conducted by the NYSDEC, no American eel were reported in five tributaries of the Mohawk River: Cayudutta Creek, Zimmerman Creek, Crum Creek, and Canajoharie Creek (the fifth tributary was not identified) (Limburg et al., 2015).

4.5.1.1.5.1 2021 American Eel Study

The objective of the 2021 American Eel Study was to assess the presence and relative abundance of American eel in the vicinity of the Crescent and Vischer Ferry Projects. The Power Authority consulted with the NYSDEC and USFWS to determine sampling methodology, schedule, and effort to meet study objectives.

Sampling occurred from April to October and consisted of using three sampling methodologies: nighttime observations, eel ramp trap sampling, and nighttime boat electrofishing.

Nighttime surveys to visually monitor for upstream migrating eels took place with a field crew of at least two researchers in the tailrace and spillway areas of each Project. Observations began 0.5 hours after sunset and continued for a minimum of 90 minutes. Researchers traversed the tailwater and spillway areas via boat and on foot as appropriate to access areas where upstream migrating eels would try to ascend project structures. Eels expected to be documented using this methodology would generally consist of elvers and small yellow eels with climbing ability. Typical areas that would attract eels are wetted surfaces with attraction flow. Researchers used headlamps, hand-held flashlights, and spotlights to observe likely areas. Five observation events were conducted April to early June. No eels were observed at either Project.

Nighttime boat electrofishing was conducted upstream of the Vischer Ferry Project. Electrofishing consisted of traversing selected habitat with a crew consisting of two netters and a boat operator. Selected habitat included both rocky and weedy areas. Only eels were targeted by the netters and general observations were made on other species observed. Two electrofishing events were conducted: one in August and one in September. Each event began at least 0.5 hours after sunset and consisted of six, twenty-minute sampling runs. Numerous fish of multiple species were observed. No eels, however, were collected or observed.

Eel ramp traps (Figure 4-19) were constructed and deployed such that attraction flow was pumped to a wetted climbing substrate (i.e., ramp), where after ascending the ramp, eels and/or any other organisms could be collected in a holding tank. General eel ramp trap design parameters were obtained from the Atlantic States Marine Fisheries Commission, Proceedings of a Workshop on American Eel Passage Technologies (2013). In consultation with the resource agencies, the ramp and climbing substrate was sized based on the expected size of the eels likely present in the system. As such, two climbing substrates were incorporated into each climbing ramp: Enkamat for small eel (elvers) and staggered PVC tubes for larger (yellow) eel. Initially the water supply pump at each trap supplied approximately 5 gallons /minute of flow which was distributed between the eel ramp and attraction flow. After agency consultation, an additional pump was installed and provided approximately 3 gallons/minute in additional attraction flow. The supplemental pump delivered water through a pressurized hose which also allows for a greater spray/water disturbance effect which was intended to provide greater attraction stimuli for upstream migrating eel.

The locations of the eel ramp traps were determined in areas adjacent to flow and/or near a physical feature that acted as a guide (shoreline, wall, or other structure). The locations of the eel ramp traps at the Vischer Ferry and Crescent Dams are shown in Figure 4-21 and Figure 4-22.

Eel ramp traps were checked twice weekly. Traps were checked for proper function, water temperature, and dissolved oxygen levels were recorded. Maintenance and cleaning of trap components occurred as needed. Eel trap installation occurred the week of May 17 and sampling occurred through September 30.

Figure 4-19 Eel ramp trap installed at downstream of the Crescent Dam tailrace area (Crescent Trap #1)

Figure 4-20 Eel ramp trap locations downstream of Vischer Ferry Dam

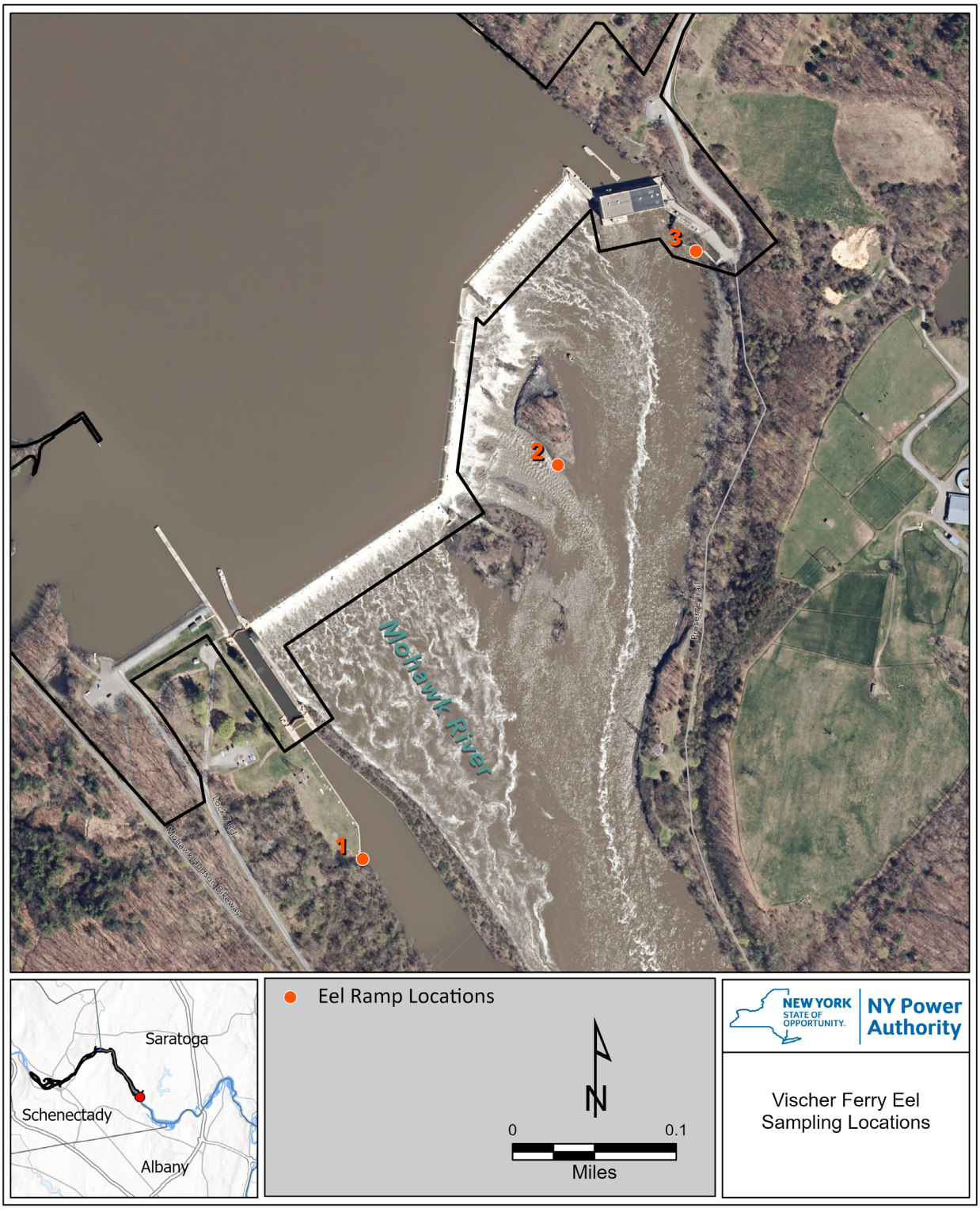
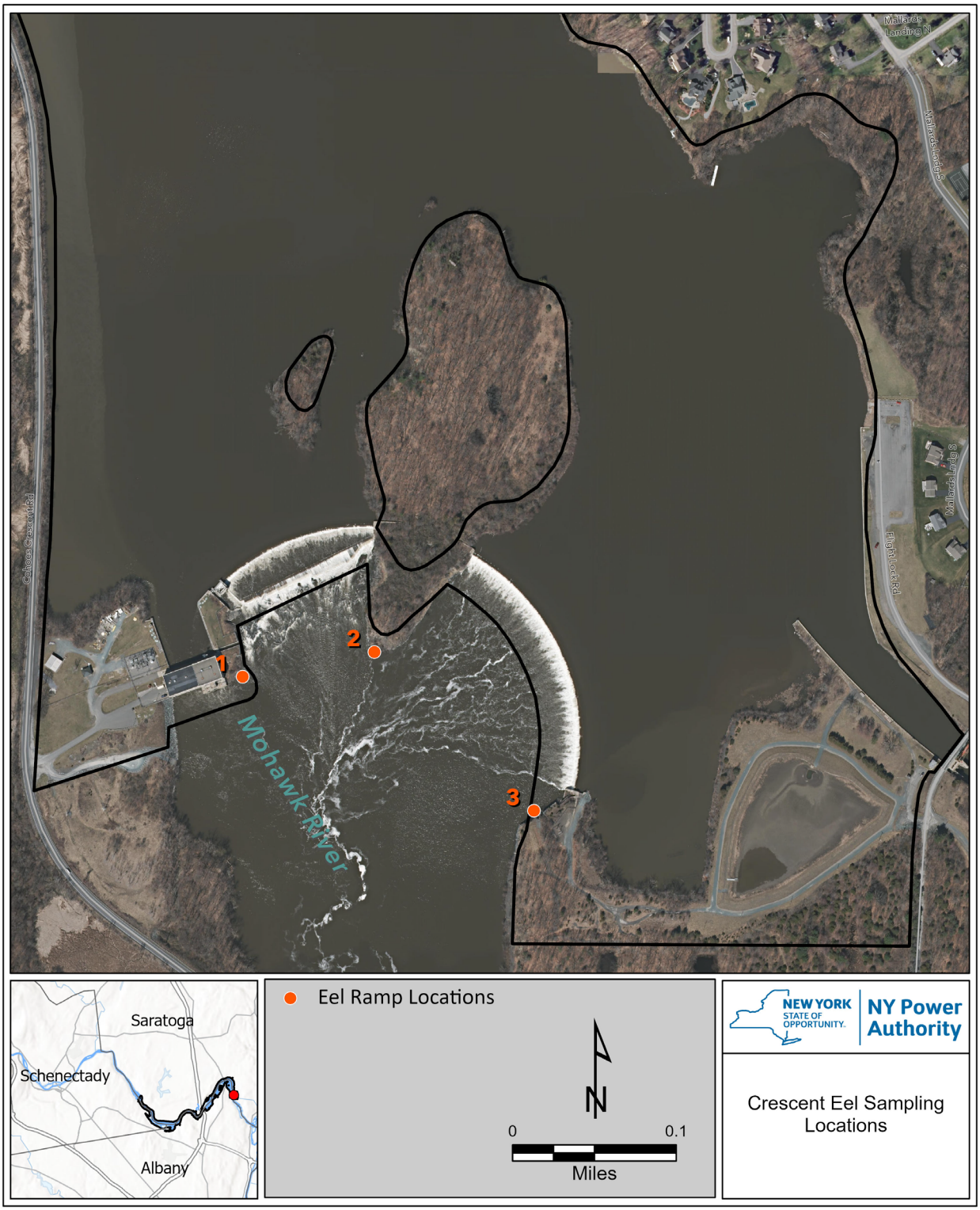
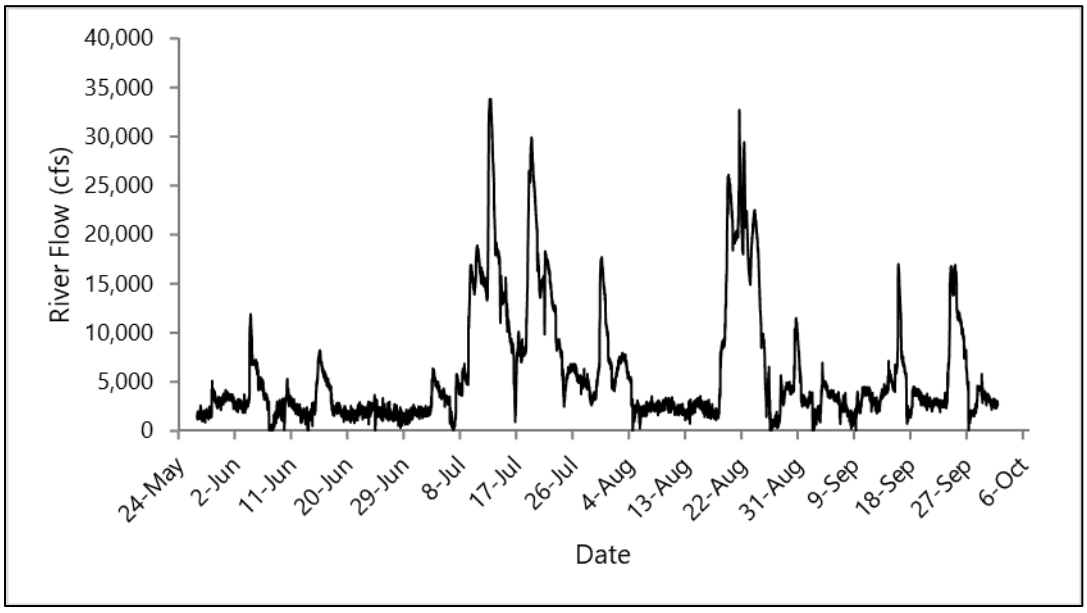


Figure 4-21 Eel ramp trap locations downstream of Crescent Dam



During the study period the Mohawk River, as recorded from the United States Geological Survey (USGS) Gage #01354500 experienced several high-water events that coincided with severe weather events (Figure 4-23). River flow during this period reached historic seasonal highs multiple times. The peak river flow was 33,800 cfs recorded on July 12, 2021. The second highest river flow reached 31,100 cfs recorded on August 21, 2021 and the third highest flow event was 28,800 cfs recorded on July 19, 2021. While the eel ramp traps were designed to accommodate typical water level fluctuations, high-water events of this magnitude could not be expected and the eel ramp traps experienced periodic outages due to water inundation, or power loss, equipment loss, or they were taken out of the river to prevent damage or equipment loss.

Figure 4-22 River flow (cfs) for the eel ramp monitoring study period (May 24 to October 1, 2021)



Though outages did occur, the six traps functioned for a total of 550 nights of sampling. During this effort, no eels were collected.

The results of the 2021 American Eel Study are consistent with previous fisheries data collected on the Mohawk River. The 2020 Fish Community Study (NYPA 2021) reviewed existing fisheries data from multiple sources obtained over the last 30+ years. While that data did document American eel in the Mohawk River, their occurrence was very uncommon. Ongoing effort by resource agencies also support the 2021 eel study results. Mohawk River electrofishing efforts by the NYSDEC in 2021 sampled large numbers of fish of numerous species but only documented one eel (Scott Wells, NYSDEC. Personnel Communication). Therefore, after substantial effort, data support that while American eel are likely present in the vicinity of the Projects, they are uncommon.

4.5.1.2 Fish Passage and Protection Facilities

4.5.1.2.1 Upstream Passage

There are no upstream fish passage facilities at the Crescent or Vischer Ferry Dams. However, as at many other lock/dam facilities on the Mohawk River, fish are passed upstream through the existing lock system (Schmidt et al., 2003). At the Crescent Project, upstream migrating fish gain access to the Crescent impoundment above the dam via the Waterford Flight and Lock E-6. At the Vischer Ferry Project, fish are passed upstream of the dam via Lock E-7. In addition, upstream migrating juvenile American eel are likely to be able to ascend both the Crescent and Vischer Ferry Dams under certain flow and weather conditions.

4.5.1.2.2 Downstream Passage

There are multiple routes for downstream fish passage at the Crescent and Vischer Ferry Projects. At both Projects, fish can pass over the dams during high-flow conditions or pass via the canal and lock system to downstream areas. Downstream passage at both Projects is also greatly enhanced through the operation of acoustic deterrent systems. At the Crescent Project, downstream fish passage for migratory blueback herring has been significantly enhanced by the Licensee's installation and operation of an acoustic deterrent system in combination with the provision of a flashboard opening measuring 24.3 meters by 0.3 meters providing access from the main channel through the dam (Figure 4-24). The Vischer Ferry Project also supports downstream passage of herring with a combination of an acoustic deterrent system and flashboard openings (Figure 4-25).

Figure 4-23 Fish Passage Routes at the Crescent Hydroelectric Project

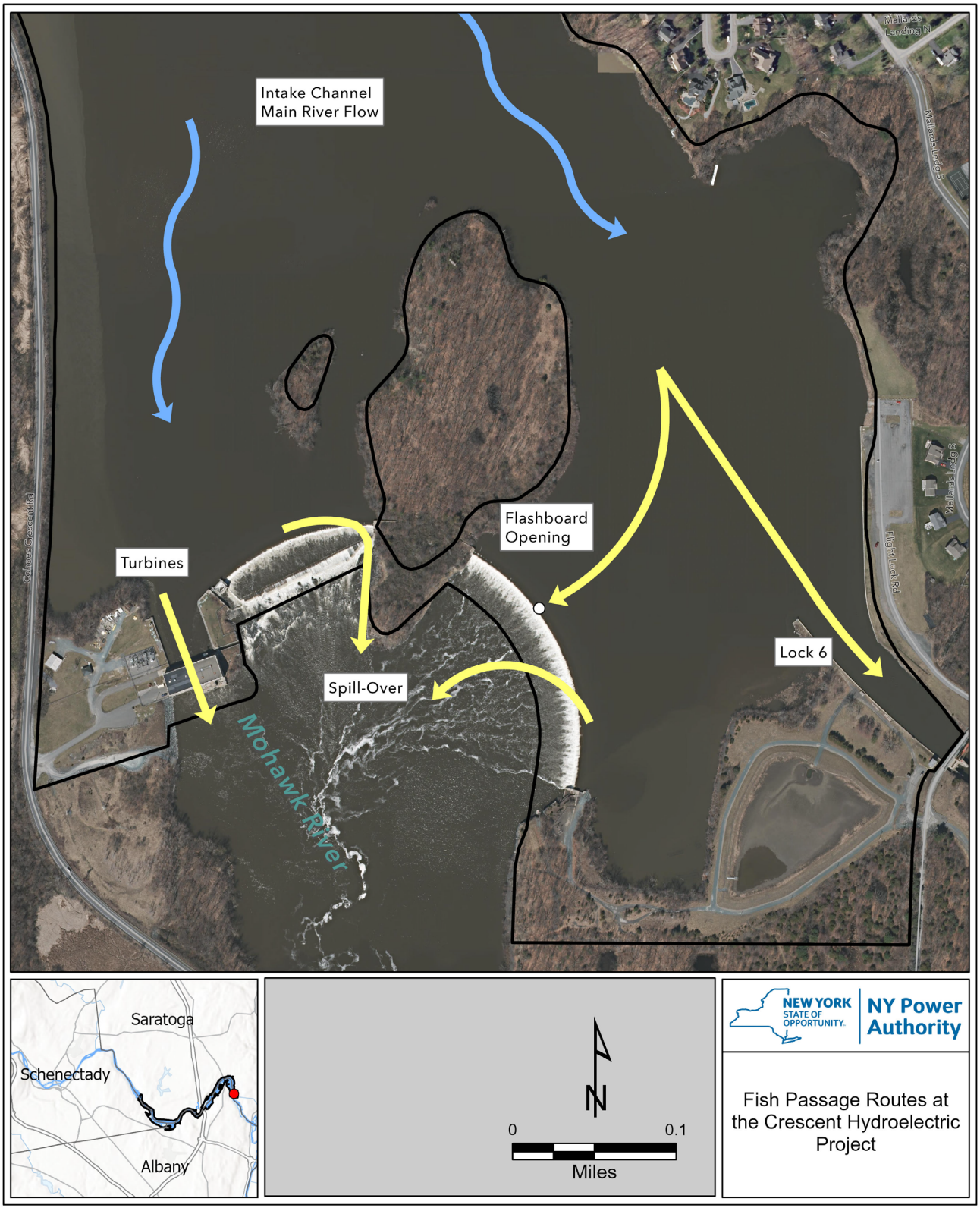
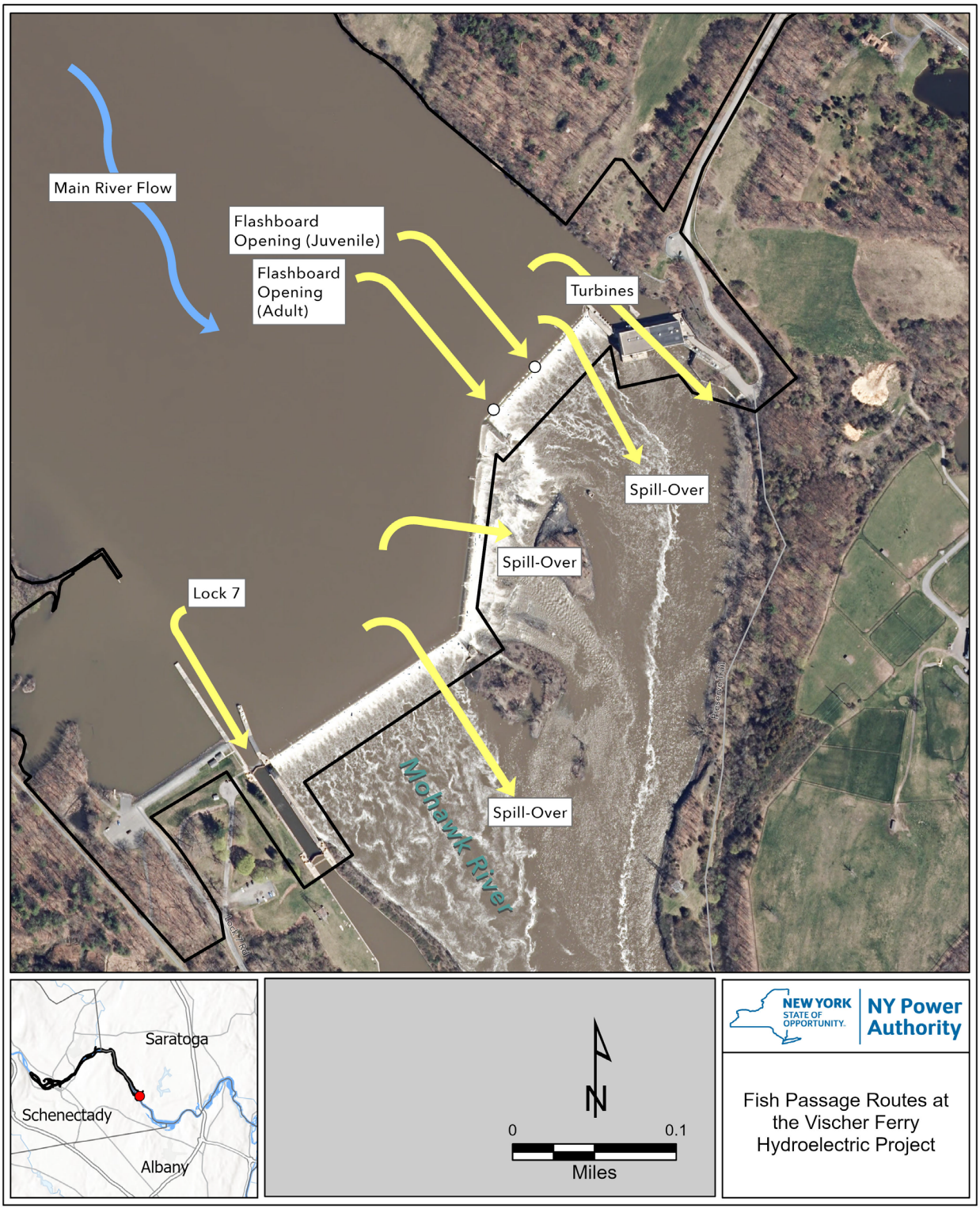


Figure 4-24 Fish Passage Routes at the Vischer Ferry Hydroelectric Project



4.5.1.2.3 Studies of Downstream Fish Passage

In the 1984 License Orders for the Projects, FERC determined that it was possible for the Crescent Project to affect the downstream passage of blueback herring, but that sufficient information was not available to make a determination. Article 40 required the Licensee to consult with resource agencies and to conduct a study to determine the impacts of the operation on fish migration and potential mitigation to offset these impacts. An initial study of blueback herring outmigration in the Lower Mohawk River was completed from September to November of 1985.

In 1992, the Power Authority provided FERC with the results of a juvenile blueback herring turbine passage mortality study conducted at the Crescent Project (RMC Environmental Services, 1992) and provided recommendations to mitigate impacts to migrating juvenile blueback herring in the vicinity of the Project. A prior study at the site had found that many juvenile blueback herring were migrating through the Crescent Project's powerhouse during their downstream migration (Chas. T. Main, Inc., 1984; Curtis and Associates, 1987). In 1992, the Power Authority proposed a preferential turbine operational plan to be protective of adult and juvenile blueback herring during the periods of mid-May through June 30 and September 1 through November 10, respectively.

The 48-hour survival of emigrating juvenile blueback herring was evaluated in a study at the Crescent Project (Mathur et al., 1996). The study looked specifically at juvenile blueback herring survival rates through the Kaplan turbine unit and over the spillways. The study was completed using a tag-recapture technique. Survival was estimated to be 96±6.7% through a Kaplan turbine and 88.3±10.7% over a spillway associated with a low-head hydro dam. Since the turbines at the Vischer Ferry Project are nearly identical to those at Crescent, turbine passage survival rates for juvenile blueback herring at Vischer Ferry are likely the same as those determined for the Crescent Project based on passage survival studies conducted at the Crescent Project (96% for the Kaplan turbines (Mathur et al., 1996)).

Feasibility studies were conducted in the Spring of 1997 (Crescent Project) and Fall of 1996 (Vischer Ferry Project) to determine whether or not the use of high frequency sound and bypasses around the headraces would be successful at preventing blueback herring from passing through the turbines (Ross, 1999). These studies were focused on the equipment placed in the forebay (headrace) at each Project. Overall effectiveness varied based on physiographic and hydrodynamic features at each site and fish size. At the Crescent Project, a similar result was obtained for young-of-the-year blueback herring but was not demonstrated for adult blueback herring. Recommendations to adjust the edge of the ultrasound field were proposed. For the Vischer Ferry Project, the use of high frequency sound resulted in over 90% of fish using the bypass for both adult and young-of-the-year blueback herring.

In 2008, hydroacoustic studies were completed to determine the effects of ultrasound on fish passage in the vicinity of the Crescent Project (Dunning and Gurshin, 2012, Normandeau Associates, 2009). This study was completed after the Crescent Project's acoustic equipment was moved from the forebay area into the side channel. From August 30 to October 5, 2008, the abundance of fish upriver of the ultrasound, downriver of the ultrasound field in the main channel, and downriver of the ultrasound in the secondary channel that leads to the Powerhouse was measured. The percentage of fish upstream of the ultrasound field that passed downstream through the main channel rather than the secondary channel was found to be three times greater than expected based on the relative water volume between the main and secondary channels. A reduction of approximately 23% of the number of fish entering the secondary channel was observed. This observation includes both blueback herring and other fishes that are not expected to respond to ultrasound.

In 2009, a study was completed to test the effectiveness of the ultrasonic field in redirecting adult blueback herring away from the powerhouse at the Crescent Project (Kleinschmidt Associates, 2009). The study was completed via radio tagging of adult blueback herring. Of the 102 tagged blueback herring, 38 were tracked via mobile tracking. Of these 38, only 24 were detected below the release location and only 14 of those were detected downriver of the ultrasonic field. Thirteen of these blueback herring were first detected in the main channel when flow ranged from 0.595 to 0.913 of the total flow through both the primary (over Dam A and through the opening in the flashboards atop Dam A) and secondary (over Dam B, through the tainter gate, debris sluice, and the Crescent turbines) channels.

In 2010, the Power Authority adjusted the western ultrasonic field to have half of the projectors point 45 degrees upriver and a study was conducted to evaluate the effectiveness of the adjusted ultrasonic fields (Gurshin et al., 2014a, Gurshin et al., 2014b). Mobile echosounder surveys were completed during the day and fish density was estimated. Stratified random trawl surveys were conducted at night to verify species composition and compare catch. The study found that after the adjustment approximately 77% of fish bypassed the turbines during the active migration period, which was significantly higher than the 31% of fish bypassing the turbines from the 2008 survey.

The current acoustic deterrent system at Crescent was installed in 2008 and is comprised of ultrasonic projectors configured to guide out-migrating blueback herring away from the side channel leading to the powerhouse. Previously, the system had been located within the forebay. The system consists of eight integrated sound projectors emitting frequencies between 122-128 kilohertz with a sound pressure level of 190 decibels re 1 micropascal at 1 meter.

The acoustic deterrent system successfully diverts the large majority of juvenile herring away from the powerhouse. The trashrack rack spacing at the Crescent Project is 3 7/8 inches which allows easy passage of juvenile herring.

The acoustic deterrent system at the Vischer Ferry Project was installed in 2000. The Licensee provides two flashboard openings on the Vischer Ferry Dam, one operated to enhance the passage of adult blueback herring and the other is designed to enhance passage of juvenile blueback herring. Based on sound deterrent testing at Vischer Ferry, adult blueback herring are more sensitive to sound and therefore one of the flashboard openings is located further away from the sound projectors. Juvenile blueback herring are less sensitive than the adults, thus the closer flashboard opening (Ross et al., 1999). The flashboard opening to accommodate migrating adults is open from May through August, while the flashboard opening to accommodate juveniles is open from September through November.

The trashrack rack spacing at the Vischer Ferry Project is 3 7/8 inches which allows easy passage of juvenile herring.

4.5.1.2.4 2020 Blueback Herring Study

The Power Authority conducted a Blueback Herring Downstream Migration Study in 2020. The goals and objectives of this study were to use existing data and information to estimate whole station, downstream passage survival of adult and juvenile blueback herring at the Crescent and Vischer Ferry Projects.

Results of the study demonstrate that total station downstream passage survival for both adult and juvenile blueback herring, for most months and under most river flow conditions, range between 85-98 percent. For both lifestages, total station survival estimates are largely driven by bypass/spillway survival rates. The

Power Authority currently implements an acoustic deterrent system to guide blueback herring toward notches in the flashboards (i.e., bypasses) as a preferred passage route compared to passing through the turbines. Data supports the conclusion that the acoustic deterrent systems at both Projects are effective at directing downstream migrating blueback herring away from the turbine intakes as intended. Additionally, the Power Authority maintains minimum flows to support downstream passage and prioritizes turbine operation such that the Kaplan Units (the more "fish-friendly" units) are the first on and last off at these run-of-river Projects.

Assessment of the acoustic deterrent system at Vischer Ferry for adult blueback herring indicated a 96% effectiveness rate. Testing of the system for juvenile blueback herring at Crescent indicated 76% effectiveness at a minimum. Therefore, the vast majority of downstream migrating blueback herring avoid turbine passage. There is, however, some level of mortality associated with use of the bypass. It is likely that bypass mortality is about 3%, which is similar to turbine passage survival for juvenile blueback herring through the Kaplan Units. These Kaplan turbine survival rates are supported by both empirical testing at Crescent and model results. Also, all flow scenarios considered provided consistent results of total project survival greater than 95% for juveniles assuming a 3% bypass mortality.

Adult blueback herring are nearly 3 times as long as juvenile blueback herring. Therefore, they are expected to experience lower turbine passage survival rates. This is particularly true for the Francis Units. The effectiveness of the acoustic deterrent systems, however, indicates that relatively few adult blueback herring are exposed to turbine passage as a downstream passage route.

The Barge Canal also, to some unknown degree, provides a downstream passage route for adult and juvenile blueback herring. Lock operation occurs during daylight hours from May through early November and frequency of operation is based on demand. Therefore, operation occurs throughout the expected downstream migration period, but downstream passage through the locks for adult and juvenile blueback herring is likely variable based on frequency of operation during migration conditions. However, there are indications of lock usage.

Overall, the results of the study indicate a high downstream passage success rate for juvenile and adult blueback herring at the Vischer Ferry and Crescent Projects. Data indicates that survival rates are especially high when coupled with the acoustic deterrent systems.

4.5.1.2.5 2020 Fish Entrainment Study

The Power Authority conducted a fish entrainment study for the Projects in 2020. The goal of the study was to provide a literature-based assessment of the potential for fish entrainment and impingement at the Projects, and to use existing databases, tools, and models to evaluate potential turbine survival rates for resident and migratory fish species and lifestages at the Projects. The representative species used for the study were the five species recommended by FERC (blueback herring, American eel, smallmouth bass, walleye, and yellow perch).

Using standard methods, the study evaluated timing and likelihood of fish becoming entrained or impinged, along with their chances of survival. The study concluded that there are no anticipated effects of impingement and limited effects of entrainment on the target species. Impingement effects on the populations are not likely because of the wide trashrack spacing that would allow fish to pass through, and because the largest fish are strong swimmers and could escape impingement.

In general, the study found the effects at the Projects would be minimal for populations of non-migratory resident species. Of the five target species evaluated, smallmouth bass, walleye, and yellow perch are resident fish living in the Crescent and Vischer Ferry impoundments and are not dependent on downstream movement to complete their lifecycle. The Project impoundments are each over ten miles long and provide considerably more habitat outside of the Project forebay areas than within. Further, habitat availability is limited in the forebay and intake areas and would not be attractive to the target species, with steep-sided walls, a historically excavated streambed, and limited cover. Though some individual fish would be expected to encounter the intakes, most adult and juvenile resident fish also have swimming capabilities that would allow them to escape entrainment at times when they would be most likely to encounter the intake area. Small resident fish that may not be able to escape, should they encounter the intake, but would likely survive turbine passage to populate areas downstream.

Obligatory migrants such as adult and juvenile blueback herring and adult American eel require passage downstream through the Project areas to complete their life history. At both Projects, both eels and herring have multiple alternate routes for downstream passage other than through the Project turbines. These migratory fish could pass through bypasses offered at each Project, via the canal and lock system to downstream areas, or over the dams during high-flow conditions. The effects of entrainment of blueback herring at both Projects are also reduced through the operation of acoustic deterrent systems that are designed to guide blueback herring to the bypass openings in the flashboards on the spillways. Blueback herring are schooling fish that migrate in large groups, particularly the juveniles. A number of environmental cues such as water temperature and flow trigger migration. High flow events during the migration period, in particular, trigger downstream movements. As such, there is an increased likelihood that spillway flows will increase the likelihood that downstream migrants will pass via the spillway. Additionally, for those that may not be diverted to the spillway bypasses, preferential operation of the Kaplan turbines, combined with the high rates of turbine survival via passage through the Kaplan turbines, would limit the effects to populations of this species. The effects on American eel populations are also minimal since based on available information, and the results of the Fish Community and American eel studies, the number of eels upstream of the Projects is low and the species is uncommon in the vicinity of the Projects and upstream areas.

4.5.1.3 Rare, Threatened, and Endangered Fish Species

There are no federally listed rare, threatened or endangered fish species located in the area of the Projects. The NYSDEC reports that lake sturgeon (*Acipenser fulvescens*), a state-listed threatened species, has been reported in the Mohawk River (USFWS, 2019a), but well upstream of the Projects. No lake sturgeon have been documented in the lower Mohawk River in the vicinity of the Projects.

4.5.1.4 Recreational Fishery

Recreational fisheries within the Crescent and Vischer Ferry Project areas fall under NYSDEC Region 4 and Region 5 jurisdictions. Recreational fishing is permitted on the Mohawk River, downstream of the Route 32 bridge, for all species, year-round (NYSDEC, 2018b). However, the fishing is catch-and-release only, and all fish must be returned to the water immediately. Certain baitfish may be possessed for use as fish bait. Tip-ups are also permitted. The use or possession of alewife or blueback herring is prohibited from Lock E-2 to Guard Gate 2 (Waterford Flight). Both the Vischer Ferry dam and Crescent dam are recommended places to fish according to several fishing guide articles and the “I Fish NY Guide to Capital District Fishing” flyer (Clifton Park, 2018, Mohawk Towpath Byway, 2009, and Streeter, 2011). There is handicapped fishing access under the Crescent (Route 9) bridge (Town of Half Moon, 2018).

Statewide angler surveys conducted during 2007 found that the Mohawk River had an estimated 219,735 (Confidence Limits ± 47,375) angler days overall (Connelly and Brown, 2009). Angler at-location expenditures were $1,778,764 ($8.10 average per day) and $1,072,811 ($4.88 average per day) for en route expenditures for the Mohawk River. Black bass (small or largemouth), trout (brook [*S. fontinalis*], brown [*S. trutta*], rainbow [*O. mykiss*]), walleye, and northern pike were the most sought-after species by anglers fishing the Mohawk (Connelly and Brown, 2009). The mean distance traveled was 24 miles and average satisfaction level was 3.3 on a scale of 1 being very dissatisfied and 5 being very satisfied. There is recreational river herring fishery in the Hudson River and its tributaries, including the Mohawk River. This recreational herring fishery is primarily driven by the need for bait in the striped bass fishery. Herring are fished from shore and boat through angling or net gears. Shore fishers mostly use scap nets or angling while boat fishers utilize all allowable gear (Hattala et. al., 2011).

One of the goals of the draft 2018-2022 Mohawk River Basin Action Agenda is to "improve fisheries and habitat to create a fishable Mohawk River." Some of the targeted actions of this plan include the following: implementing surveys to better understand fish communities, populations, and their habitats; mitigating the impacts of invasive species; monitoring and restoring declining migratory fish populations; modifying canal lockage plans to better accommodate fish passage; and making improvements to access for recreational opportunities (NYSDEC, 2018c).

Public recreation sites at both Projects provide recreational anglers with access to Project waters for fishing. At Vischer Ferry, boat access to the impoundment is available at the Lock 7 Boat Launch site, and the tailwater area is accessible to anglers via the tailwater fishing access site. At Crescent, impoundment boat launching is available at several non-Project recreation sites and tailwater access is provided at the Project tailrace bank fishing area site. The Project and non-Project recreation sites and facilities available for public use at the Projects are discussed in detail in the Recreation section (Section 4.9) of this application.

4.5.1.5 Benthic Macroinvertebrates

A relatively recent survey of macroinvertebrates in the Mohawk River was conducted in 2014-2015 (Onondaga Environmental Institute, 2015). A total of 56 stations were sampled for aquatic macroinvertebrates on the mainstem of the Mohawk River from Crescent Lake (Crescent impoundment) in the Town of Waterford, to just above Lock E-20, in the Town of Marcy. Surveys were conducted in August of 2014 and July of 2015. Artificial substrate samplers (Hester-Dendy multiplate samplers) were deployed at each of the survey locations and allowed a colonization period (5 weeks) before being retrieved for analysis. Results from the 2014 survey showed that multiple samples were dominated by Chironomidae larvae (midges), compromising two-thirds of total abundance. The second most abundant taxa were species belonging to the Ephemeroptera-Plecoptera-Trichoptera category (EPT). Of the EPT taxa, heptaginiid mayflies (Ephemeroptera) were most abundant, composing 60% of the EPT abundance. Species distribution along the Mohawk River were found to be relatively uniform.

4.5.1.6 Freshwater Mussels

Freshwater unionid mussels are sedentary organisms that are relatively immobile. They spend most of their lives living in the sediments of streams, rivers, ponds, and lakes (Allen and Vaughn, 2010). Freshwater mussels require a fish host to complete their life cycle. Once fertilized, the female adults release their larvae, known as glochidia, into the water column. Glochidia require a specific host (typically fish) to attach to and continue development and Unionid mussels have evolved a broad array of techniques for infecting their host with glochidia, which attach to soft tissues (e.g., gills and/or fins) upon contact and persist as a benign

parasite for a period of weeks or months while the glochidia transforms into a juvenile. When ready, the mussel releases from the host and falls to the substrate to complete its life cycle. This relationship between a mussel and its host is often species-specific with only one or several hosts (typically fish species) capable of successfully transforming glochidia into viable offspring. The exact host species is not yet confirmed for many mussel species, particularly rare, threatened or endangered species.

Freshwater mussels have been recorded in the Mohawk River and the Barge Canal System drainages. A list of documented mussel species and potential presence within the boundaries of the Projects is provided in Table 4-19 (NYSDEC, 2012).

The New York Natural Heritage Program database suggests that there is potential habitat for the alewife floater (*Anodonta implicata*) in the Mohawk River from approximately one mile upstream of the Crescent Dam, to the confluence with the Hudson River (NYPA, 2018).

No recent mussel surveys have been made of the Lower Mohawk River in the vicinity of the Projects. However, as discussed in Section 4.5.1.5, a survey of macroinvertebrates in the Mohawk River was conducted in 2014-2015 (Onondaga Environmental Institute, 2015), which included data on mussels. Results from the 2015 surveys showed that multiplate samples were dominated by Mollusca (gastropods and bivalves), compromising 71% of the total abundance. Within the Mollusca category, 99.3% of the individuals were the invasive zebra mussel.

4.5.1.6.1 Results from 2020 Aquatic Mesohabitat Study

The Power Authority conducted an aquatic mesohabitat study of the Projects in 2020. One of the objectives of the study was to identify areas of potential freshwater mussel presence.

During the summer surveys, no freshwater mussels were observed; however, areas of potential mussel habitat can be determined based on the substrate type and density of aquatic vegetation throughout the impoundments. Mussel species may have different habitat preferences, so the substrate data were referred to during the fall surveys to target areas of potential mussel presence. During the fall field surveys (after the flashboards were removed), areas of the exposed shoreline were searched for the presence of freshwater mussels. Maps of aquatic habitat were developed and provided in the 2020 Mesohabitat Study report, included in the ISR.

The mussels found at the Projects during the 2020 fall surveys include three species common in New York State: *Lampsilis radiata* (Eastern Lampmussel), *Pyganodon grandis* (Giant Floater), and *Leptodea fragilis* (Fragile Papershell). All three species were found at both Projects. The locations of live mussels and relic mussel shells are provided in Figure 3.6-1 in the Aquatic Mesohabitat Study report. No state or federally listed threatened, endangered, or special concern mussel species were found at either Project.

Throughout the Crescent Project, relic mussel shells were primarily found in shoreline areas dominated by gravel or cobble substrates with very few occurrences found in areas dominated by silt or ledge. However, within the Vischer Ferry Project, relic mussel shells were primarily observed along silt shorelines. Mussel shells were also observed in gravel and cobble shorelines but with a much lower occurrences as displayed within the Crescent Project. During the field survey, only two live mussels were found - both within the Crescent Project. Between the two Projects, occurrences of relic mussel shells were much higher within the Crescent Project. Table 4-19 lists the mussel species identified at both Projects.

Table 4-18 Native Freshwater Mussel Species Observed within the Crescent and Vischer Ferry Project Boundary

Common Name	Scientific Name	State Conservation Status Rank*
Eastern Lampmussel	Lampsilis radiata	S4S5
Fragile Papershell	Leptodea fragilis	S3
Giant Floater	Pyganodon grandis	S4

*New York Natural Heritage Program, October 2017. Rare Animal Status List.

4.5.2 Environmental Effects

As described in the previous sections, the resident fishery of the Mohawk River is diverse, healthy, and has been well studied. Because the Projects are operated as run of river and thereby sustain natural river flows with minimal fluctuation to impoundment levels, continued operation of the Projects will not have a significant effect on the resident and migratory fisheries, aquatic habitat, or aquatic life. Existing runs of anadromous blueback herring, have become well established in the 150 years since the canal and lock system was first constructed on the river. To enhance downstream fish passage at the Projects, the Power Authority installed and operates an acoustic deterrent system, proven effective at diverting fish away from the turbines. As such, there are no significant adverse impacts to blueback herring associated with the operation of the Projects. American eel have been documented to occur upstream of the Project dams, but are present in very low numbers. A study of the American eel conducted by the Power Authority in 2021 found no evidence of upstream migrating juvenile eels, or of more mature yellow or silver eels at the Projects. Because the numbers of eels occurring at the Projects are so small, continued operation of the Projects will have no adverse effects on American eel in the lower Mohawk River.

4.5.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to fish and aquatic resources.

4.5.4 Unavoidable Adverse Impacts

While the entrainment risk to fish species at both Projects is low, some entrainment of fish is likely to occur at the Project. However, the species most likely to be entrained at the Projects is blueback herring. Results of the blueback herring downstream passage study demonstrate that survival of juvenile blueback herring passing through the turbines is very high, with an estimated total station survival rate greater than 95% at each Project. Additional support for the high survival rate is that large schools of juvenile blueback herring pass through the Projects at a given time and there have not been any reports of large numbers of dead herring downstream of either Project. Therefore the entrainment effects on juvenile blueback herring are minimal.

Adult blueback herring are approximately 3 times as long as juvenile blueback herring and as such are expected to have lower turbine survival passage rates but total station passage survival values generally exceed 85%. Data, however, indicates that the acoustic deterrent system is very effective for adult blueback herring and therefore a relatively small percentage of these fish are subject to turbine passage and entrainment effects on adult blueback herring are expected to be minimal.

4.6 Wildlife and Botanical Resources

4.6.1 Affected Environment

4.6.1.1 Regional Setting

The U.S. Environmental Protection Agency (USEPA) has identified ecoregions, which are "areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources" throughout the U.S. Ecoregions are divided into four different levels, from coarse (Level I) to more refined (Level IV). The Projects are located within the Eastern Great Lakes Lowlands Level III ecoregion and within the Hudson Valley Level IV ecoregion (Bryce et al., 2010). This region is underlain primarily by shales and siltstones and much of the area is covered by sediments deposited into Glacial Lake Albany during the Pleistocene Epoch. The coarser-grained sands form what is now areas of dunes and sandplains dominated by pitch pine and scrub oak. Relatively low elevations and moderate climate in the region also allows Appalachian oak-hickory forest to extend further north. These and other assemblages in the region are often at the northern extent of their distribution, but climate change is expected to expand these species into areas where northern hardwoods are dominant (Bryce et al., 2010).

4.6.1.2 Botanical Resources

4.6.1.2.1 Desktop Study

Figure 3-1, Figure 3-2, and Figure 3-3 (in Section 3) show the boundaries of the Projects, which generally follow the shoreline of the Mohawk River. Both Projects are comprised predominantly of aquatic habitat. There is a limited area of upland habitat within the boundaries of the Projects. The Crescent Project includes 26 acres of Project lands and approximately 10 miles of shoreline along each bank of the Mohawk River. The Vischer Ferry Project includes 12 acres of Project lands and approximately 10.3 miles of shoreline along each bank of the Mohawk River.

Upland habitats were identified using The Nature Conservancy's (TNC) Northeast Terrestrial Habitat Map (Updated, 2015) (TNC, 2017). This map provides continuous coverage of ecological communities based on terrestrial habitats in the Northeast United States and Canada. The ecological units are based on plant community types and integrates other physical characteristics (geology, soil type, gradient etc.).

The dominant terrestrial habitats within the Crescent Project Boundary consist of two types of North-Central Appalachian Large River Floodplain: Freshwater Marsh (63.1 acres) and Acidic Swamp (55.3 acres). North-Central Appalachian Large River Floodplain habitats consist of floodplains of medium to large rivers in Atlantic drainages with a mixture of wetland and upland vegetation. Vegetation may include silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), box elder (*Acer negundo*), cottonwood (*Populus species*), as well as herbaceous areas. The majority of these habitat areas are underwater in the spring (Ferree et al., 2013). Other common habitats in the Crescent Project area are developed land (45.4 acres), North-Central Interior Wet Flatwoods (35.5 acres), Appalachian (Hemlock)-Northern Hardwood Forest (25.7 acres), agricultural lands (13.6 acres), and Laurentian-Acadian Freshwater Marsh: Smaller river floodplain/riparian (10.7 acres) (TNC, 2017).

The dominant terrestrial habitats within the Vischer Ferry Project Boundary are Appalachian (Hemlock)-Northern Hardwood Forest (29.0 acres) and developed land (14.6 acres) (TNC, 2017). The Appalachian (Hemlock)-Northern Hardwood Forest is dominated by sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia),* yellow birch (*Betula alleghaniensis*), and eastern hemlock (*Tsuga canadensis*). It is found on a variety of bedrock types and landforms (Ferree et al., 2013). Developed land consists of those

areas dominated by human development and infrastructure. Other common habitats in the Vischer Ferry Project area are North-Central Appalachian Large River Floodplain: Acidic Swamp (13.5 acres), North-Central Appalachian Large River Floodplain: Rich Swamp (13.1 acres), North-Central Interior and Appalachian Rich Swamp: Smaller river floodplain/riparian (8.6 acres), and North-Central Appalachian Large River Floodplain: Freshwater Marsh (6.5 acres) (TNC, 2017).

4.6.1.2.2 2020 Aquatic Mesohabitat Survey

In the summer and fall of 2020, the Power Authority conducted aquatic mesohabitat surveys at the Crescent and Vischer Ferry Projects which included an analysis of botanical resources.

Crescent Project

Within the Crescent Project study area, the upland deciduous forests were dominated by tree species such as red oak, American elm, silver maple, and eastern cottonwood. European black alder (*Alnus glutinosa*), an invasive tree species that can grow to 60 feet tall, were also very common. Black locust, American basswood, eastern hop hornbeam, northern catalpa, and ash and hickory species were also observed in lower densities along the impoundment. The upland mixed forests contained many of the same hardwood species, but also included eastern white pine, hemlock, and red cedar trees. Common shrub species found in forest and scrub-shrub cover types included staghorn sumac, false indigo bush, and several non-native invasive species: autumn olive, multiflora rose, and honeysuckle species. Within the low intensity developed residential areas, species that were observed reflected the dominant trees found in the upland forests but also included planted ornamental trees such as blue spruce, Norway spruce, and weeping willow. Tree of heaven (*Ailanthus altissima*), an invasive species, was also observed. Table 4-19 provides a list of all plant species observed in riparian and wetland areas.

Vischer Ferry Project

The deciduous forests observed in the Vischer Ferry impoundment were comprised of mostly different dominant species than the Crescent impoundment, such as: box elder, black willow, black locust, eastern cottonwood, and buckthorn. Silky dogwood, white birch, red oak, green ash, American sycamore, black walnut, and wild grape were some of the subdominant species observed. The dominant species observed in the mixed forests comprised of red oak, eastern white pine, red cedar, and silver maple. More scarcely observed species included staghorn sumac, white oak, hickory spp., eastern hemlock, American elm, and eastern hop hornbeam. The upland shrub/scrub areas were dominated by European alder, willow shrubs, wild grape, silky dogwood, and staghorn sumac. Some other species observed were honeysuckle, black locust, multiflora rose, oriental bittersweet, buckthorn, and goldenrod. Table 4-19 provides a list of all plant species observed in riparian and wetland areas.

Table 4-19 Summary of Plants Observed Within and Adjacent to the Crescent and Vischer Ferry Project Boundaries

Common Name	Scientific Name	Wetland Indicator Status	Invasive/ PRISM Tier
Box Elder	*Acer negundo*	FAC	
Norway Maple	*Acer platanoides*	UPL	YES/Tier 4
Red Maple	*Acer rubrum*	FAC	
Silver Maple	*Acer saccharinum*	FACW	
Sugar Maple	*Acer saccharum*	FACU	
Tree of Heaven	*Ailanthus altissima*	UPL	YES/Tier 4

Common Name	Scientific Name	Wetland Indicator Status	Invasive/ PRISM Tier
Garlic Mustard	*Alliaria petiolata*	FACU	YES/Tier 4
European Black Alder	*Alnus glutinosa*	FACW	YES/Tier 4
Service Berry	*Amelanchier spp.*	FAC	
False Indigo-bush	*Amorpha fruticosa*	FACW	
Burdock	*Arctium minus*	FACU	
Common Mugwort	*Artemisia vulgaris*	UPL	YES/Tier 4
Swamp Milkweed	*Asclepias incarnata*	OBL	
River Birch	*Betula nigra*	FACW	
White Birch	*Betula papyrifera*	FACU	
Flowering Rush	*Butomus umbellatus*	OBL	YES/Tier 4
Sedges	*Carex spp.*	OBL	
Pignut Hickory	*Carya glabra*	FACU	
Shagbark Hickory	*Carya ovata*	FACU	
Northern Catalpa	*Catalpa speciosa*	FACU	
Oriental Bittersweet	*Celastrus orbiculatus*	UPL	YES/Tier 4
Greater Celandine	*Chelidonium majus*	UPL	
Thistle	*Cirsium spp.*	FACU	
Field Bindweed	*Convolvulus arvensis*	FAC	
Silky Dogwood	*Cornus amomum*	FACW	
Hawthorn	*Crataegus spp.*	FACU	
Common Dodder	*Cuscuta gronovii*	FACW	
Nut Flat Sedge	*Cyperus esculentus*	FACW	
Queen Anne's Lace	*Daucus carota*	UPL	
Autumn Olive	*Elaeagnus umbellata*	FACU	YES/Tier 4
Monkey Flower	*Erythranthe spp.*	OBL	
Common Boneset	*Eupatorium perfoliatum*	FACW	
Joe-Pye weed	*Eutrochium purpureum*	OBL	
American Beech	*Fagus grandifolia*	FACU	
Japanese Knotweed	*Fallopia japonica*	FACU	YES/Tier 4
White Ash	*Fraxinus americana*	FACU	
Green Ash	*Fraxinus pennsylvanica*	FACW	
Witch-hazel	*Hamamelis spp.*	FACU	
Jewel Weed	*Impatiens capensis/pallida*	FACW	
Yellow Iris	*Iris pseudacorus*	OBL	YES/Tier 4
Eastern American Black Walnut	*Juglans nigra*	FACU	
Creeping Juniper	*Juniperus horizontalis*	FACU	
Eastern Red Cedar	*Juniperus virginiana*	FACU	
Honeysuckle	*Lonicera spp.*	FACU	YES/Tier 4
Purple Loosestrife	*Lythrum salicaria*	OBL	YES/Tier 4
Bergamot	*Monarda spp.*	FACU	
Eastern Hop Hornbeam	*Ostrya virginiana*	FACU	
Virginia Creeper	*Parthenocissus quinquefolia*	FACU	
Ditch Stonecrop	*Penthorum sedoides*	OBL	
Reed Canary Grass	*Phalaris arundinacea*	FACW	YES/Tier 4
Common Reed	*Phragmites australis*	FACW	YES/Tier 4
American Pokeweed	*Phytolacca americana*	FACU	
Blue Spruce	*Picea pungens*	FACU	
Red Pine	*Pinus resinosa*	FACU	
Eastern White Pine	*Pinus strobus*	FACU	
American Sycamore	*Platanus occidentalis*	FACW	
Smartweed	*Polygonum spp.*	FACW	
Eastern Cottonwood	*Populus deltoides*	FAC	
Quaking Aspen	*Populus tremuloides*	FACU	
Black Cherry	*Prunus serotina*	FACU	

Common Name	Scientific Name	Wetland Indicator Status	Invasive/ PRISM Tier
White Oak	*Quercus alba*	FACU	
Chestnut Oak	*Quercus montana*	UPL	
Pin Oak	*Quercus palustris*	FACW	
Red Oak	*Quercus rubra*	FACU	
Common Buckthorn	*Rhamnus cathartica*	FAC	YES/Tier 4
Staghorn Sumac	*Rhus typhina*	FACU	
Black Locust	*Robinia pseudoacacia*	FACU	YES/Tier 4
Multiflora Rose	*Rosa multiflora*	FACU	YES/Tier 4
Arrowhead	*Sagittaria latifolia*	OBL	
Black Willow	*Salix nigra*	OBL	
Willow shrub	*Salix spp.*	FACW	
Elderberry	*Sambucus spp.*	FACW	
Sassafras	*Sassafras albidum*	FACU	
Soft stem Bulrush	*Schoenoplectus tabernaemontani*	OBL	
Wool grass	*Scirpus cyperinus*	OBL	
Goldenrod	*Solidago spp.*	FACU	
Bur-reed	*Sparganium spp.*	OBL	
American Basswood	*Tilia americana*	FACU	
Eastern Hemlock	*Tsuga canadensis*	FACU	
Broadleaf Cattail	*Typha latifolia*	OBL	
American Elm	*Ulmus americana*	FACW	
Slippery Elm	*Ulmus rubra*	FAC	
Lowbush Blueberry	*Vaccinium angustifolium*	FACU	
Blue Vervain	*Verbena hastata*	FACW	
Wild Grape	*Vitus spp.*	FAC	
Prickly Burweed	*Xanthium spinosum*	FACU	

Table 4-20 Summary of Aquatic Vegetation Species Observed Within the Crescent and Vischer Ferry Project Boundaries

Common name	Scientific Name	Invasive /PRISM Tier	Notes
Clasping-leaved pondweed	*Potamogeton perfoliatus*	No	Common in both impoundments
Floating pondweed	*Potamogeton natans*	No	Common in both impoundments
Sago pondweed	*Stuckenia pectinata*	No	Common in both impoundments
Water stargrass	*Heteranthera dubia*	No	Very common in both impoundments
Coontail	*Ceratophyllum demersum*	No	Only observed in Crescent impoundment (common)
Tapegrass	*Vallisneria americana*	No	Very common in both impoundments
Bladder wort	*Utricularia spp.*	No	Very sparse; only observed in Crescent impoundment
Common waterweed	*Elodea canadensis*	No	Very sparse in both impoundments
European water chestnut	*Trapa natans*	Yes/Tier 4	Abundant monocultures in both impoundments
Eurasian milfoil	*Myriophyllum spicatum*	Yes/Tier 4	Common in both impoundments
Curly-leaved pondweed	*Potamogeton crispus*	Yes/Tier 4	Sparse in both impoundments
Brittle naiad	*Najas minor*	Yes/Tier 3	Common in both impoundments

Invasive species status from Capital/Mohawk PRISM 2018.

Tier 4 – Local Control: Well-established species with high and very high impacts. Eradication efforts not feasible; only localized management over time to contain, exclude, or suppress, if justified to meet local management goals.

Tier 3 – Containment: High and very high impact species that are likely too widespread for eradication, but low enough abundance to think about regional containment. Target strategic management to slow the spread since many surrounding regions could be at risk if left unattended.

4.6.1.3 Invasive Plant Species

The NYSDEC defines invasive species as "non-native species that can cause harm to the environment, the economy or to human health" (NYSDEC, 2018d). The Crescent and Vischer Ferry Projects are located within the Capital Mohawk regional invasive species management partnership area, which is part of one of the Partnerships for Regional Invasive Species Management (PRISMs). The PRISMs maintain mapping and a database tracking the distribution of invasive species in their regions (New York iMap Invasives, 2019).

Based on a review of the Capital Mohawk PRISM data, there are nine invasive plant species that may occur in the vicinity of the Crescent and Vischer Ferry Projects: black locust (*Robinia pseudoacacia*), honeysuckle (*Lonicera* spp.), multiflora rose (*Rosa multiflora*), Eurasian water-milfoil (*Myriophyllum spicatum*), climbing nightshade (*Solanum dulcamara*), wild parsnip (*Pastinaca sativa*), water chestnut (*Trapa natans*), curly pondweed (*Potamogeton crispus*), and common buckthorn (*Rhamnus cathartica*) (Table 4-21). Three of these species (Eurasian water-milfoil, water chestnut, and curly pondweed) are aquatic and are found within the Mohawk River (New York Invasive Species Information, 2018). The presence of large stands of water chestnut with the Project impoundments is discussed in more detail in the wetlands section, Section 4.7.

Table 4-21 Invasive Plant Species Documented within the Vicinity of the Crescent and Vischer Ferry Projects

Scientific Name	Common Name	Notes
Trapa natans	Water chestnut	A highly invasive aquatic plant species that forms dense mats of floating vegetation in areas of slow-moving waters. These mats can cause wide-ranging problems for fish and wildlife, as well as human use.
Lonicera spp.	Honeysuckle (species unknown)	*L. morrowii, L.tatarica, and L.maackii,* are perennial shrubs. These three invasive shrub species can form very dense populations that can outcompete and suppress growth of native plant species. The woody vine species leaves are semi-evergreen allowing the plant to grow longer into winter, giving it a competitive advantage over native vegetation. *L. japonica* is a perennial woody vine that thrives in abandoned fields, pastures, and planted forests. One way to distinguish native from invasive honeysuckles is by looking at the stems: native honeysuckles have solid stems while invasive honeysuckles have hollow stems.
Myriophyllum spicatum	Eurasian water-milfoil	A submersed aquatic plant, inhabiting stagnant, slow-moving fresh or slightly brackish waters. It roots at the lake bottom and grows rapidly forming dense beds and canopies. It can also root on muddy shores.
Pastinaca sativa	Wild parsnip	A biennial/perennial herb commonly found along roadsides, in pastures, and in abandoned fields. It grows best in rich, calcareous, alkaline, moist soils. Wild parsnip invades and modifies open habitats. Well-established fields and meadows are not likely to be invaded, but parsnip can become well-developed in any place the soil has been disturbed and native vegetation has yet to become fully established.
Potamogeton crispus	Curly pondweed	An invasive, aquatic plant species which tolerates fresh or slightly brackish water. It can grow in a range of waters from shallow to deep and from still to flowing. Due its excessive growth, this plant can become a nuisance and sometimes displaces native plants.
Rhamnus cathartica	Common buckthorn	A small deciduous tree or large shrub commonly found in lightly shaded areas such as hedgerows, along roadsides and on ravine slopes. Common buckthorn forms dense thickets with long branches that crowd and shade out native shrubs and herbaceous species, preventing growth of native plants.
Robinia pseudoacacia	Black locust	A tree commonly found in disturbed areas. Stands of black locust have been shown to reduce native plants through shading and soil chemistry alterations.
Rosa multiflora	Multiflora rose	A vigorous perennial shrub that thrives in full and partial sun in well-drained soils. Commonly found in early succession pastures and fields, open woodlands, and forest edges. Multiflora rose is extremely prolific and forms dense thickets, excluding native plant species.

Scientific Name	Common Name	Notes
Solanum dulcamara	Climbing nightshade	A shade tolerant perennial commonly found in freshwater marshes, shrub swamps, forested wetlands, cultivated habitats, forests, and roadsides. Climbing nightshade can cause physical damage by climbing on other plants and sometimes reduce abundance of native vegetation.

Source: New York Invasive Species Information, 2018 and Pennsylvania Department of Conservation and Natural Resources, 2019.

4.6.1.3.1 2020 Aquatic Mesohabitat Study

During the 2020 aquatic mesohabitat survey a substantial amount of invasive plant species occurrences were documented at both the Crescent and Vischer Ferry study areas.

Table 4-20 includes the aquatic invasive plant species and Table 4-19 lists the terrestrial and wetland invasive plant species observed during the surveys. The most common and widespread terrestrial invasive plants found in both impoundments were European alder, tree of heaven, purple loosestrife, Japanese knotweed, common reed, reed canarygrass, common mugwort, Norway maple, Oriental bittersweet, autumn olive, common buckthorn, black locust, honeysuckle, and multiflora rose. The most widespread and abundant aquatic invasive species found within both impoundments was European water chestnut. Eurasian milfoil, brittle naiad, and curly-leaved pondweed were also found at lower densities in both impoundments.

The majority of terrestrial and aquatic invasive species observed during the field surveys are classified by PRISM as Tier 4-local control (Capital/Mohawk PRISM 2018). Brittle naiad was the only Tier 3-containment species observed throughout both Projects. Tier 4 indicates that the species is well-established in the region and eradication efforts are not feasible; only localized management over time to contain, exclude, or suppress, if justified to meet local management goals. Tier 3 indicates that the species are likely too widespread for eradication, but in low enough abundance to consider regional containment.

4.6.1.4 Wildlife Resource

The FERC Project boundaries for the Crescent and Vischer Ferry Projects generally follow the shoreline of the Mohawk River and include very limited terrestrial habitat other than Goat Island within the Vischer Ferry Project Boundary and a few smaller islands within the Crescent Project boundary. As a result, wildlife habitats and use of the Projects by wildlife are mostly related to adjacent upland habitats, and riparian habitats located along the Project shorelines.

4.6.1.4.1 Project Wildlife Resources

The Crescent and Vischer Ferry Projects support a wide array of wildlife species. The Vischer Ferry Nature and Historic Preserve is located adjacent to the Crescent impoundment, downstream of Vischer Ferry Dam and upstream of Crescent Dam. This non-Project 600-acre preserve located and managed by the Town of Clifton Park, includes waterfront and wetland habitat areas. The Preserve has been named by Audubon New York as an Important Bird Area (Audubon, 2018) and by the state of New York as a Bird Conservation Area (NYSDEC, 2018e).

Species that have been documented at the Preserve and that are also likely found elsewhere in the vicinity of the Projects in similar undeveloped habitats along the Mohawk River include great blue heron (*Ardea herodias*), teals (*Anas* spp.), coots (*Fulica* spp.), loons (*Gavia* spp.), pintail (*Anas acuta*), various species of ducks, various species of hawks, osprey (*Pandion haliaetus*), warblers (family *Parulidae*), Virginia opossum (*Didelphis virginiana*), groundhog (*Marmota monax*), weasels (family *Mustelidae*), red fox (*Vulpes vulpes*), muskrat (*Ondatra zibethicus*), various turtles, spotted salamander (*Ambystoma maculatum*), red-spotted newt (*Notophthalmus viridescens*), and bullfrogs (*Lithobates catesbeianus*) (Lakes to Locks Passage, 2018). Developed areas along the Projects' dams may support other small mammals and birds used to human activity such as squirrels (*Sciurus* spp.), mice (*Mus* spp.), chipmunk (*Tamias striatus*), voles (*Microtus* spp.), and raccoon (*Procyon lotor*).

Mammal, bird, and herptile species likely to occur within the vicinity of the Projects are provided in Table 4-22, Table 4-24, and Table 4-25.

Table 4-22 Mammals Likely to Occur in the Vicinity of the Crescent and Vischer Ferry Projects

Common Name	Scientific Name
American black bear	*Ursus americanus*
American mink	*Neovison vison*
Bobcat	*Lynx rufus*
Eastern chipmunk	*Tamias striatus*
Eastern cottontail	*Sylvilagus floridanus*
Eastern coyote	*Canis latrans*
Eastern gray squirrel	*Sciurus carolinensis*
Raccoon	*Procyon lotor*
Fisher	*Martes pennanti*
Gray fox	*Urocyon cinereoargenteus*
Groundhog	*Marmota monax*
Long-tailed weasel	*Mustela frenata*
Muskrat	*Ondatra zibethicus*
North American beaver	*Castor canadensis*
North American porcupine	*Erethizon dorsatum*
Northern flying squirrel	*Glaucomys sabrinus*
Red fox	*Vulpes vulpes*
River otter	*Lontra canadensis*
Southern flying squirrel	*Glaucomys volans*
Striped skunk	*Mephitis mephitis*
Mice species	*Mus* spp.
Mole species	*Condylura* spp., *Scalopus* spp., *Parascalops* spp.
Shrew species	*Blarnia* spp., *Cryptotis* spp., *Sorex* spp.
Virginia opossum	*Didelphis virginiana*
White-tailed deer	*Odocoileus virginianus*

Source: Stegemann, 2003

4.6.1.4.2 2020 Aquatic Mesohabitat Study

The Power Authority conducted an aquatic mesohabitat study in 2020. One of the objectives of the study was to document wildlife resources and habitats found within the Project boundaries.

The study surveyed and mapped wetland habitats (aquatic bed and emergent wetland habitats) along the impoundment shorelines. These areas were found to offer particularly high-quality wildlife habitat. Avian species routinely observed using these habitats included Kingfisher, Mallard, Black Duck, Great Blue Heron, Green Heron, Spotted Sandpiper, Merganser, and Great Egret. The wading birds used the forested uplands and wooded wetlands for perching and cover and were frequently observed utilizing the aquatic beds for foraging. Songbirds such as Cedar Waxwing, Red-Wing Blackbird and Bank Swallow were

commonly observed during the surveys. Additionally, the survey team observed multiple sightings of bald eagles. The associated 2020 Bald Eagle Study is discussed in more detail in the following section.

Table 4-23 contains a complete list of wildlife species observed during the mesohabitat surveys within both the Crescent and Vischer Ferry impoundments. The SAV and PEM habitats also provide high quality nurseries for juvenile fish species and dense cover from predators; however, no fish nests were observed during the field surveys of the littoral zone.

Table 4-23 Summary of all Fauna Observed within the Crescent and Vischer Ferry Project Boundaries

Common name	Scientific name
Birds	
Spotted Sandpiper	*Actitis macularius*
Red-winged Blackbird	*Agelaius phoeniceus*
Mallard	*Anas platyrhynchos*
American Black Duck	*Anas rubripes*
Great Egret	*Ardea alba*
Great Blue Heron	*Ardea herodias*
Cedar Waxwing	*Bombycilla cedrorum*
Red-tailed Hawk	*Buteo jamaicensis*
Green Heron	*Butorides virescens*
Bald Eagle	*Haliaeetus leucocephalus*
Belted Kingfisher	*Megaceryle alcyon*
Wild Turkey	*Meleagris gallopavo*
Common Merganser	*Mergus merganser*
Osprey	*Pandion haliaetus*
Double-crested Cormorant	*Phalacrocorax auritus*
Bank Swallow	*Riparia riparia*
Mammals	
North American Beaver	*Castor canadensis*
White-tailed Deer	*Odocoileus virginianus*
Muskrat	*Ondatra zibethicus*
Herptiles	
Common Snapping Turtle	*Chelydra serpentina*
Painted Turtle	*Chrysemys picta*

Table 4-24 Birds Likely to Occur in the Vicinity of the Crescent and Vischer Ferry Projects

Common Name	Scientific Name	Within Vicinity of Crescent Project	Within Vicinity of Vischer Ferry Project
American black duck	*Anas rubripes*	X	
American crow	*Corvus brachyrhynchos*	X	X
American goldfinch	*Spinus tristis*	X	X
American kestrel	*Falco sparverius*	X	
American redstart	*Setophaga ruticilla*	X	X
American robin	*Turdus migratorius*	X	X
Baltimore oriole	*Icterus galbula*	X	X
Bank swallow	*Riparia riparia*	X	
Barn swallow	*Hirundo rustica*	X	
Belted kingfisher	*Megaceryle alcyon*	X	
Black-billed cuckoo	*Coccyzus erythropthalmus*	X	
Black-capped chickadee	*Poecile atricapillus*	X	X
Blue jay	*Cyanocitta cristata*	X	X
Blue-winged warbler	*Vermivora cyanoptera*		X
Bobolink	*Dolichonyx oryzivorus*		X
Broad-winged hawk	*Buteo platypterus*		X
Brown creeper	*Certhia americana*		X
Brown-headed cowbird	*Molothrus ater*	X	X
Canada goose	*Branta canadensis*	X	X
Cedar waxwing	*Bombycilla cedrorum*	X	X
Chestnut-sided warbler	*Setophaga pensylvanica*		X
Chimney swift	*Chaetura pelagica*	X	
Chipping sparrow	*Spizella passerina*	X	X
Common grackle	*Quiscalus quiscula*	X	X
Common yellowthroat	*Geothlypis trichas*	X	X
Downy woodpecker	*Picoides pubescens*	X	X
Eastern bluebird	*Sialia sialis*	X	X
Eastern kingbird	*Tyrannus tyrannus*	X	X
Eastern phoebe	*Sayornis phoebe*	X	
Eastern wood-pewee	*Contopus virens*	X	
European starling	*Sturnus vulgaris*	X	X
Gray catbird	*Dumetella carolinensis*	X	X
Great blue heron	*Ardea herodias*	X	X
Great crested flycatcher	*Myiarchus crinitus*	X	
Green heron	*Butorides virescens*		X
Hairy woodpecker	*Picoides villosus*	X	X
House finch	*Carpodacus mexicanus*	X	X
House sparrow	*Passer domesticus*	X	X
Killdeer	*Charadrius vociferus*	X	X
Mallard	*Anas platyrhynchos*	X	X
Mourning dove	*Zenaida macroura*	X	X
Northern cardinal	*Cardinalis cardinalis*	X	X
Northern flicker	*Colaptes auratus*	X	X
Northern mockingbird	*Mimus polyglottos*	X	X

Common Name	Scientific Name	Within Vicinity of Crescent Project	Within Vicinity of Vischer Ferry Project
Northern waterthrush	*Parkesia noveboracensis*		X
Orchard oriole	*Icterus spurius*	X	
Ovenbird	*Seiurus aurocapilla*	X	
Pileated woodpecker	*Dryocopus pileatus*		X
Red-bellied woodpecker	*Melanerpes carolinus*	X	X
Red-eyed vireo	*Vireo olivaceus*	X	X
Red-tailed hawk	*Buteo jamaicensis*	X	X
Red-winged blackbird	*Agelaius phoeniceus*	X	X
Rock pigeon	*Columba livia*	X	
Rose-breasted grosbeak	*Pheucticus ludovicianus*	X	X
Ruby-throated hummingbird	*Archilochus colubris*	X	X
Ruffed grouse	*Bonasa umbellus*	X	X
Savannah sparrow	*Passerculus sandwichensis*		X
Scarlet tanager	*Piranga olivacea*		X
Song sparrow	*Melospiza melodia*	X	X
Tree swallow	*Tachycineta bicolor*	X	X
Tufted titmouse	*Baeolophus bicolor*	X	X
Turkey vulture	*Cathartes aura*	X	
Warbling vireo	*Vireo gilvus*	X	X
White-breasted nuthatch	*Sitta carolinensis*	X	X
Wild turkey	*Meleagris gallopavo*	X	X
Willow flycatcher	*Empidonax traillii*	X	
Wood duck	*Aix sponsa*	X	X
Wood thrush	*Hylocichla mustelina*	X	X
Yellow warbler	*Dendroica petechia*	X	X

Source: NYSDEC, 2014

Table 4-25 Amphibians and Reptiles Likely to Occur in the Vicinity of the Crescent and Vischer Ferry Projects

Common Name	Scientific Name	Within Vicinity of Crescent Project	Within Vicinity of Vischer Ferry Project
Blue-spotted salamander	*Ambystoma laterale*		X
Common garter snake	*Thamnophis sirtalis*	X	X
Common map turtle	*Graptemys geographica*	X	
Common mudpuppy	*Necturus maculosus*	X	
Common snapping turtle	Chelydra serpentina		X
Eastern American toad	*Anaxyrus americanus*		X
Eastern box turtle	*Terrapene carolina carolina*	X	X
Eastern hognose snake	*Heterodon platirhinos*	X	
Eastern milk snake	*Lampropeltis triangulum*	X	X
Eastern ribbon snake	*Thamnophis sauritus*	X	
Gray treefrog	*Hyla versicolor*	X	X
Green frog	*Lithobates clamitans*	X	X
Jefferson salamander	*Ambystoma jeffersonianum*		X
Northern leopard frog	*Lithobates pipiens*	X	X
Northern redback salamander	*Plethodon cinereus*	X	X
Northern spring peeper	*Pseudacris crucifer*	X	X
Northern water snake	*Nerodia sipedon*	X	X
Painted turtle	*Chrysemys picta*	X	X
Pickerel frog	*Rana palustris*		X
Red-spotted newt	*Notophthalmus viridescens*	X	
Smooth green snake	*Opheodrys vernalis*	X	
Spotted salamander	*Ambystoma maculatum*		X
Wood frog	*Rana sylvatica*	X	X

Source: NYSDEC, 2007

4.6.1.4.3 2020 Bald Eagle Study

The Power Authority conducted a Bald Eagle Study in 2020 and 2021. The goal of the study was to survey existing and potential bald eagle nesting, foraging, and roosting locations and to monitor and record bald eagle activity at the Crescent and Vischer Ferry Projects. The study was carried out across two field seasons (2020-2021). Observations of bald eagle use of the Projects were recorded during the summer and fall (June-October) of both 2020 and 2021, and the early spring nesting survey was conducted in April-May 2021.

Throughout field survey periods, a total of 36 bald eagle sightings were recorded (these include multiple observations of the same birds, as the impoundments were traversed several times, as well as incidental observations during the course of other relicensing field studies during 2020). Of the 36 sightings, 10 were confirmed juvenile bald eagles and the sightings occurred in both Crescent and Vischer Ferry impoundments. All the bald eagles observed during the field survey were documented either in flight or roosting. One potential nest was observed during the fall survey, but no eagles were observed at the nest at the time. Figure 4-25 and Figure 4-26 shows the locations of bald eagles observed during the field surveys. Osprey nests were also observed at the Crescent Project. No other RTE animal or plant species listed in Table 4-32 were observed during the field surveys.

Table 4-26 provides a detailed listing of bald eagle observations at the Projects in 2020 and 2021. Figure 4-25 and Figure 4-26 shows the locations of observed eagle activity. Surveys conducted in 2020 and 2021 demonstrate that the Crescent and Vischer Ferry Project areas are utilized by bald eagles for foraging and roosting. In addition, one bald eagle nest was observed, though based on the month of the observation (November), it was not possible to tell if it was an active nest in 2020.

Additional bald eagle survey work was conducted in 2021; the final study report will be filed with the USR. In early spring 2021, the Projects were surveyed by boat, in vehicles and on foot for evidence of bald eagle nesting activity. The nesting survey identified 2 active nesting pairs in the immediate Project vicinities. The nest sites were monitored approximately every two weeks over the course of the spring and early summer for nesting activities and the presence of chicks. Although both nests appeared to be active, there was no observation of nesting success or chicks. Bald eagle monitoring continued through the remainder of the 2021 season. Bald eagle sightings were recorded as shown in Table 4-26.

In addition to the spring 2021 nesting survey, additional bald eagle observations were made throughout the 2021 study season by the crews conducting the 2021 water quality study. These observations were combined with observations made in 2020, and are also included in Table 4-26.

Table 4-26 Bald Eagle Observations at the Crescent and Vischer Ferry Projects, 2020-2021

Date Observed	Bird Observed	Number of Eagles	Activity Observed	Project	Latitude	Longitude	Notes
08/01/2020	Adult		Roost	Vischer Ferry	42.84094	-73.9227	
08/01/2020	Adult		Flight	Vischer Ferry	42.81766	-73.9725	
08/01/2020	Juvenile		Flight	Vischer Ferry	42.81773	-73.9747	

Date Observed	Bird Observed	Number of Eagles	Activity Observed	Project	Latitude	Longitude	Notes
08/01/2020	Juvenile		Roost	Vischer Ferry	42.83785	-73.8792	
08/01/2020	Adult		Roost	Vischer Ferry	42.83626	-73.8782	
08/01/2020	Adult		Flight	Vischer Ferry	42.83597	-73.8781	
08/04/2020	Adult	2	Roost	Vischer Ferry	42.85029	-73.902	
08/21/2020	Adult		Flight	Crescent	42.77851	-73.8116	
08/21/2020	Adult		Roost	Crescent	42.79479	-73.839	
08/21/2020	Adult		Roost	Crescent	42.79487	-73.8392	
08/21/2020	Adult		Flight	Crescent	42.77696	-73.8131	
08/21/2020	Juvenile		Flight	Crescent	42.77714	-73.8117	
08/21/2020	Juvenile		Flight	Vischer Ferry	42.8431	-73.8774	
08/21/2020	Adult		Flight	Crescent	42.81769	-73.736	
08/21/2020	Adult		Roost	Crescent	42.80903	-73.7188	
08/26/2020	Juvenile		Flight	Vischer Ferry	42.80913	-73.8484	
08/26/2020	Juvenile		Flight	Crescent	42.804517	-73.7221	
08/27/2020	Juvenile		Roost	Crescent	42.80786	-73.7147	
08/27/2020	Adult		Roost	Crescent	42.808	-73.7148	
08/27/2020	Adult		Roost	Crescent	42.81823	-73.7362	
08/27/2020	Juvenile		Flight	Crescent	42.81828	-73.7368	
08/27/2020	Adult		Flight	Crescent	42.81774	-73.7366	
08/27/2020	Adult		Roost	Crescent	42.78509	-73.766	
08/27/2020	Adult		Flight	Crescent	42.80324	-73.8437	
09/03/2020	Adult		Flight	Crescent	42.805233	-73.7224	
09/03/2020	Adult		Flight	Vischer Ferry	42.807932	-73.8433	
09/10/2020	Juvenile	2	Flight	Vischer Ferry	42.80808	-73.8446	
10/02/2020	Adult		Flight	Crescent	42.813324	-73.7231	
10/07/2020	Undetermined		Roost	Crescent	42.80827	-73.7213	
11/19/2020	Adult		Flight	Crescent	42.78114	-73.7988	
11/19/2020	Undetermined		Nest	Crescent	*	*	
11/19/2020	Adult		Flight	Crescent	42.79792	-73.8427	
11/20/2020	Adult		Flight	Vischer Ferry	42.84886	-73.8789	
11/20/2020	Adult		Roost	Vischer Ferry	42.851	-73.881	
11/20/2020	Adult		Flight	Vischer Ferry	42.82711	-73.9846	
04/22/2021	Juvenile	1	Flying	Crescent	42.807747	-73.723717	
04/28/2021	Adult	2	Nesting Pair	Crescent	*	*	One adult on nest. One

Date Observed	Bird Observed	Number of Eagles	Activity Observed	Project	Latitude	Longitude	Notes
							perched in the same tree
04/28/2021	Adult	1	Landing in tree	Crescent	*	*	
04/28/2021	Adult	1	Perched in tree	Crescent	*	*	Nest Present; eagle from above observation joined this one.
04/29/2021	Adult & Juvenile	2	Perched in tree	Vischer Ferry	42.806451	-73.857999	No nest observed
04/29/2021	Juvenile	2	Perched in tree	Vischer Ferry	42.8248002	-73.8613519	No nest observed
08/12/2021	Juvenile	1	Flight	Crescent	42.80590233	-73.72283911	
08/12/2021	Adult	1	Flight	Crescent	42.81365895	-73.7190971	
08/27/2021	Adult	1	Perched	Vischer Ferry	42.804131	-73.846103	Perched on boulder
08/27/2021	Adult	1	Flight	Vischer Ferry	42.804578	-73.847644	Flying just upstream of the dam near the lock
08/31/2021	Juvenile	2	Flight	Crescent	42.80516553	-73.72159883	
09/07/2021	Juvenile	1	Flight	Crescent	42.80750945	-73.72240248	
09/16/2021	Juvenile	1	Flight	Crescent	42.8131617	-73.71925957	
09/16/2021	Adult	2	Perched	Crescent	42.80807948	-73.72166642	Perched on tower on the island closest to the forebay
09/23/2021	Adult	1	Perched	Crescent	42.80777212	-73.72156615	Perched on tower on the island closest to the forebay
09/23/2021	Juvenile	1	Flight	Vischer Ferry	42.8123482	-73.85181745	
10/14/2021	Adult	1	Flight	Vischer Ferry	42.8118036	-73.85102287	
11/01/2021	Adult	1	Flight	Vischer Ferry	42.80684524	-73.84253922	

* Location coordinates not included to protect the nest site. Nest locations will be provided in the final study report included in the USR, and will be filed as privileged.

Figure 4-25 Location of Bald Eagle Observations at the Crescent Project, 2020-2021

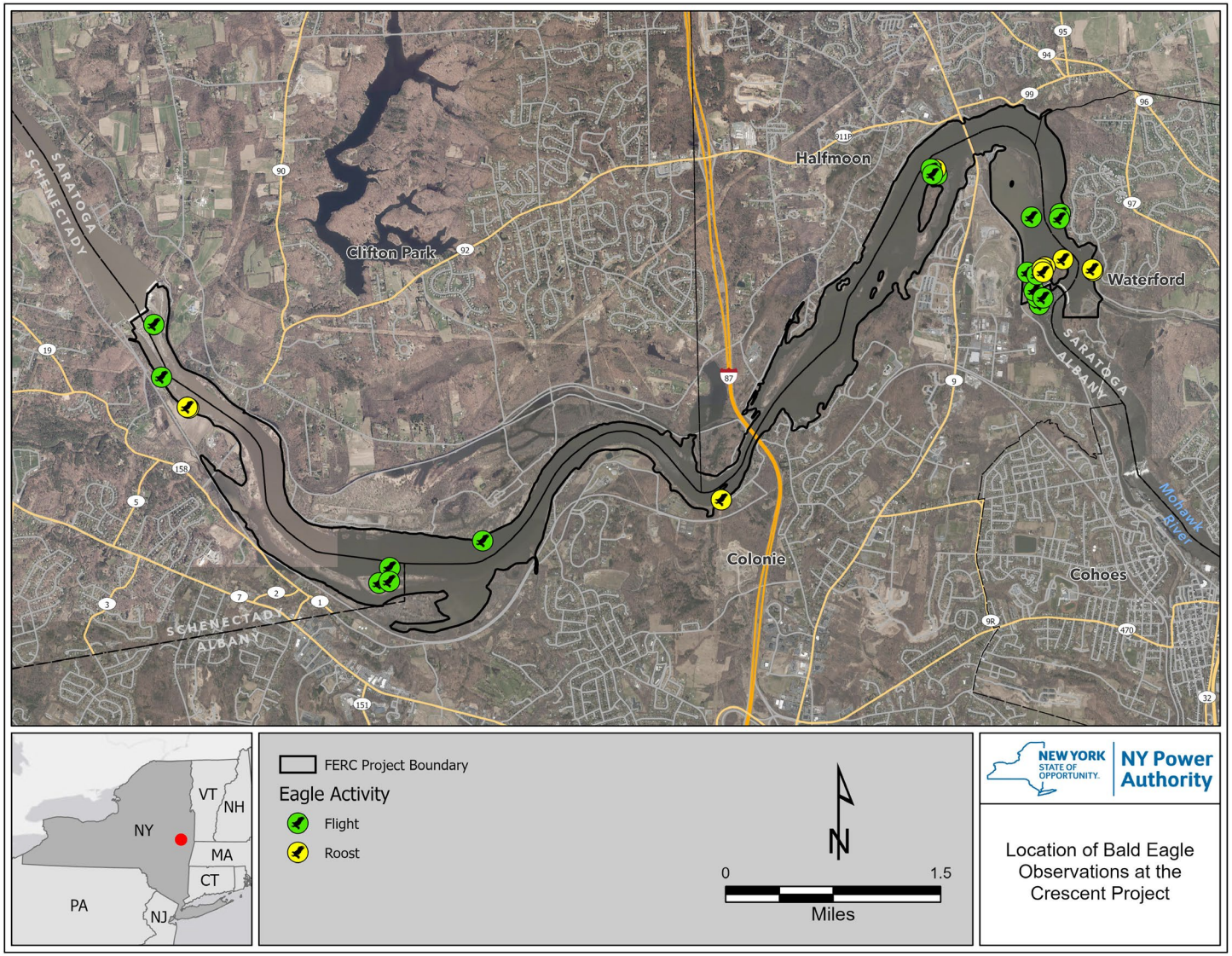
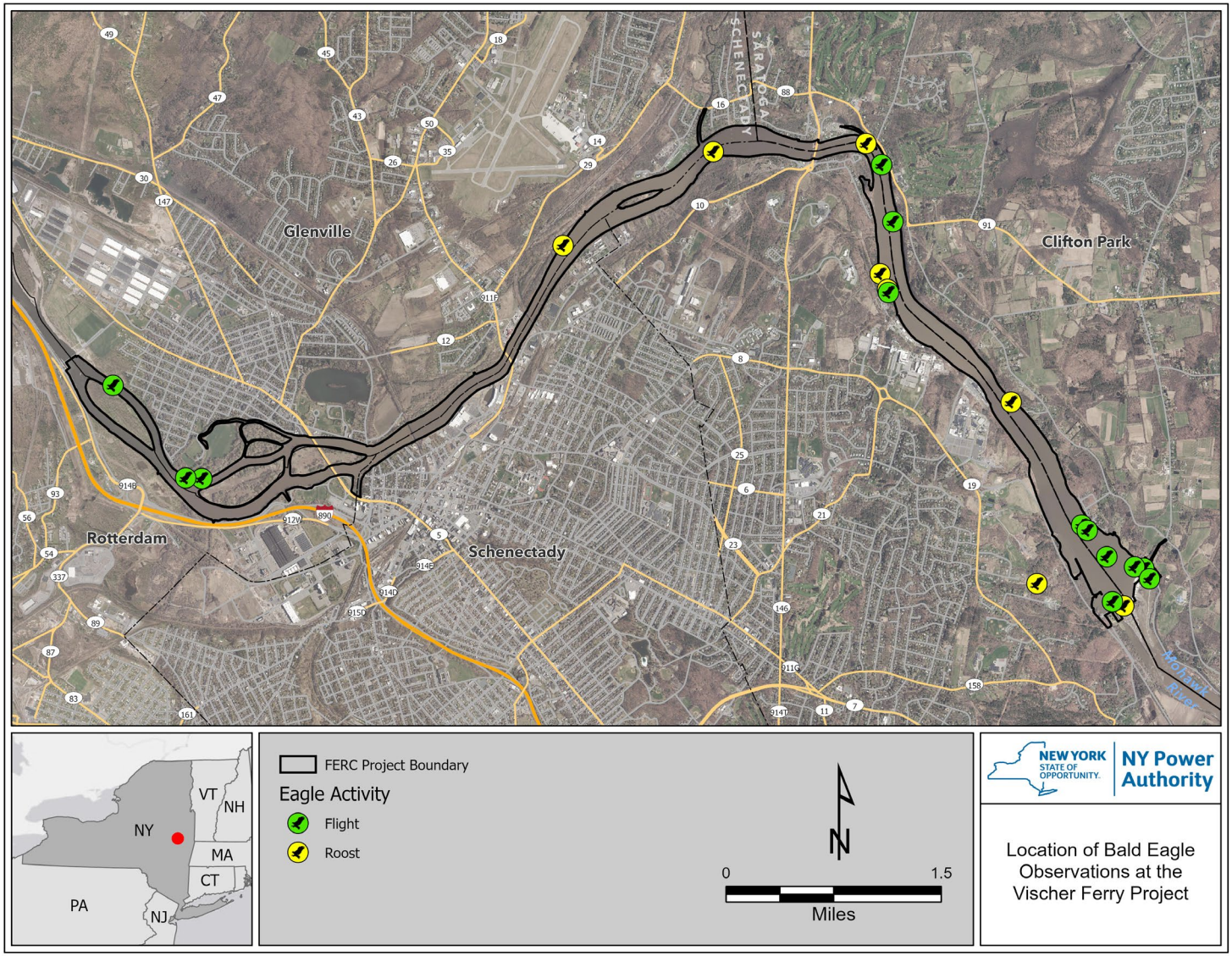


Figure 4-26 Location of Bald Eagle Observations at the Vischer Ferry Project, 2020-2021



4.6.2 Environmental Effects

There is a very limited amount of terrestrial habitat located within the Project Boundaries of the Crescent and Vischer Ferry Projects. Out of the approximately 2,283 acres within the Crescent Project Boundary, only 14 acres are upland areas that are primarily used for Project operations which includes the powerhouse, dams and switchyard. Out of the approximately 1,156 acres within the Vischer Ferry Project Boundary, only 12 acres are upland areas that are primarily used for Project operations (which includes the powerhouse, dams and switchyard). In addition, there is sufficient information about the wildlife and botanical resources that occur in the area of the Projects to characterize and describe existing wildlife and botanical resources and the effects of Project operations on those resources.

Because there are minimal upland areas within the boundaries of the Projects, and because the Projects are operated as run-of-river with minimal fluctuation of impoundment levels, the continued operation of the Projects will have little or no impact on wildlife and botanical resources.

4.6.3 Proposed Environmental Measures

Regarding wildlife resources, the Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to wildlife resources. The Project impoundments will continue to be operated as run-of-river with minimal fluctuations in impoundment water levels. Seasonal changes in the full pool elevation of the impoundments will continue to occur as a result of the installation and removal of the flashboards at the beginning and end of the navigation season. However, no changes are proposed that would result in any significant changes to the availability or use of wildlife habitats located in the riparian shoreline areas.

4.6.4 Unavoidable Adverse Impacts

Continued operation of both Projects is not expected to adversely wildlife habitats or wildlife use of the Projects.

4.7 Wetlands, Riparian, and Littoral Habitat

4.7.1 Affected Environment

This section discusses wetland, riparian, and littoral habitats in the vicinity of the Crescent and Vischer Ferry Projects. The primary source of the information used for this discussion is the United States Department of Interior (USDOI) USFWS National Wetlands Inventory (NWI). The USFWS NWI is a publicly available geospatial dataset that provides detailed information on the abundance, characteristics, and distribution of wetlands and deepwater habitats.[6]

Wetlands and deepwater habitats are essential breeding, rearing, and feeding grounds for many species of fish and wildlife. They may also perform important flood protection and pollution control functions. Wetlands are 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. Deepwater habitats are permanently flooded lands lying below the deepwater boundary of wetlands. Deepwater habitats include environments where

[6] USFWS NWI information is acquired primarily through interpreting aerial photographs, and not by conducting field surveys; therefore, it provides an estimate of acreage and location but is not conclusive.

surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live, whether or not they are attached to the substrate. Cowardin et. al. (1979) defines five major systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The first four of these systems include both wetland and deepwater habitats, but the Palustrine system includes only wetland habitats (Cowardin et. al., 1979).

Wetlands provide a multitude of ecological, economic, and social benefits. They provide habitat for fish, wildlife and plants - many of which have a commercial or recreational value - recharge groundwater, reduce flooding, provide clean drinking water, offer food and fiber, and support cultural and recreational activities (USFWS, 2018c).

The New York State Legislature passed the Freshwater Wetlands Act in 1975 with the intent to preserve, protect and conserve freshwater wetlands and their benefits, consistent with the general welfare and beneficial economic, social and agricultural development of the state. NYSDEC defines freshwater wetlands as “those areas of land and water that support a preponderance of characteristic wetlands plants that out-compete upland plants because of the presence of wetlands hydrology (such as prolonged flooding) or hydric (wet) soils. Freshwater wetlands commonly include marshes, swamps, bogs, and fens.” (NYSDEC, 2019b).

To be protected under the Freshwater Wetlands Act, a wetland must be 12.4 acres (5 hectares) in size or larger. There are approximately 97.5 acres of NYSDEC regulated wetlands in the Crescent Project Boundary and approximately 21.1 acres of NYSDEC regulated wetlands in the Vischer Ferry Project Boundary. Per statute, there is an 'adjacent area' of 100 feet around every state wetland that is also regulated to provide further protection for the wetland.

4.7.1.1 Wetland Habitats

4.7.1.1.1 National Wetlands Inventory (NWI) Maps

During the development of the PAD, the Power Authority queried the National Wetlands Inventory (NWI) map system for basic information on wetlands location and extent at the Projects. The NWI maps indicate scattered wetlands along portions of the Crescent and Vischer Ferry Project impoundments. In particular, an area of emergent and forested scrub wetland is immediately adjacent to the Crescent Project boundary in the Town of Clifton Park. This area, which has been designated as the Vischer Ferry Nature and Historic Preserve, is an important wetland complex that provides significant bird and wildlife habitat. Riparian vegetative species that occur in this area and other portions of the Projects include red maple, sugar maple, shagbark hickory (*Carya ovata*), white ash (*Fraxinus americana*), black ash (*Fraxinus nigra*), green ash (*Fraxinus pennsylvanica*), American sycamore (*Platanus occidentalis*), eastern cottonwood (*Populus deltoides*), swamp white oak (*Quercus bicolor*), black willow (*Salix nigra*), and American basswood (*Tilia americana*) (Erie Canalway National Heritage Corridor [ECNHC], 2019a). Wetland species that commonly inhabit emergent wetlands in the Projects Area include cattails, arrowhead, pickerelweed, purple loosestrife, bulrushes, sedges, and iris (ECNHC, 2019a).

More detailed wetland mapping of the Projects was conducted as part of the 2020 Aquatic Mesohabitat Study described in the next section.

4.7.1.1.2 2020 Aquatic Mesohabitat Study

In 2020, the Power Authority conducted an aquatic mesohabitat study of the Crescent and Vischer Ferry Projects. A primary purpose of the study was to identify and map aquatic habitats at the Projects including wetlands, riparian, and littoral vegetation communities, including submerged aquatic vegetation and open water habitats. Between the two Projects, 3 acres (2%) of the whole riparian zone was determined to be emergent herbaceous wetlands and 32 acres (16%) of the whole riparian zone was determined to be woody wetlands.

The Crescent Project riparian zone (50 feet from the Project boundary) surveyed during this study totaled 245 acres. The riparian zone along the Crescent impoundment is 30% forested and 44% developed. Developed areas include 109 acres, of which most are either residential (low intensity) or developed open space. Adjacent wetlands account for 57 acres, or 23% of the 50-foot riparian area. The Vischer Ferry Project riparian zone (50 feet from the Project boundary) surveyed during this study totaled 204 acres. The Vischer Ferry Project riparian zone was more forested than Crescent (44% and 30% forested, respectively) and developed lands were less common along the Vischer Ferry impoundment (34% of the total riparian area) compared to the Crescent impoundment. Vischer Ferry riparian areas included high and medium intensity development, such as condominiums and commercial areas. Forest cover types consisted of mature tree species common to the Northeast, such as oak, hickory, maple, pine and cedar species.

Naturally vegetated areas along the riparian zone and within the Project impoundments also included a variety of wetlands. Emergent wetlands covered approximately 13% (247 acres) of the Crescent impoundment, most of which were PEM1 (Palustrine Emergent Persistent) wetlands. Due to the local topography and geological conditions, there were less emergent wetlands found in the Vischer Ferry impoundment (1.8%) compared to the Crescent Project. At the Crescent impoundment the gentle gradient contributes to the prevalence of shoreline wetland areas. Due to this, the Crescent impoundment makes prime habitat for wading birds such as great blue heron, green heron, and great egret. There was also a high occurrence of bald eagle and Osprey activity along the impoundment.

Dominant species located in the PEM1 wetland types included broadleaf cattail, common reed, joe-pye weed, woolgrass, and sedge species. Further downslope within the shallow water areas, the emergent wetland type graded into PEM2 with more nonpersistent wetland species such as arrowhead, smartweed and bur-reed. In deeper areas, aquatic beds were found.

Forested and Scrub-Scrub wetlands were less common wetland types found within both project boundaries and were mostly found in adjacent riparian areas. Eastern cottonwood, silver maple, and black willow were the common species found in the PFO1 wetlands and willow shrubs and European alder were the dominant species in the PSS1 wetlands.

Shallower, near-shore areas provide diverse habitats where large stands of floating and submerged aquatic vegetation are common within the Crescent impoundment. Table 4-20 lists the aquatic vegetation species observed in both Crescent and Vischer Ferry impoundments. Referring to Table 4-27, the total area of floating vegetation observed in the Crescent impoundment was approximately 577 acres, or 27% coverage of the total area of the Crescent impoundment. Floating aquatic vegetation beds within the impoundment almost exclusively consisted of water chestnut with over 75% areal coverage in most beds. Other

subdominant aquatic vegetation species that were also observed in floating aquatic beds included Eurasian milfoil, tapegrass, brittle naiad, water stargrass, coontail, pondweeds, and bladderwort, but these species were observed on the edges of the water chestnut beds.

Submerged aquatic vegetation covered approximately 36 acres, or 2% of the Crescent impoundment. Most of the SAV beds consisted of native species such as tapegrass, water stargrass, pondweed species (*Potamogeton*), and coontail. Invasive species such as Eurasian milfoil, brittle naiad and curly leaved pondweed were also found within the submerged aquatic beds. Throughout the two Projects however, coontail was only found within the Crescent impoundment. Silt/muck of varying depths over cobble/gravel substrate was the dominant substrate where aquatic vegetation beds were found. The Crescent impoundment littoral zone has generally shallow water depths and many shallow-sloped near-shore areas where floating water chestnut monocultures thrive. Combined, floating and submerged aquatic vegetation beds cover approximately 29% (27% floating, 2% submerged) of the Crescent impoundment.

At the Vischer Ferry Project, native SAV beds are prominent throughout the impoundment. As shown by Table 4-28, the total area of SAV beds was 74 acres (7% total cover) within the project boundary. The SAV beds were found in depths up to 10-12 feet and grow in various substrates, from silt to gravel dominated shorelines. In areas where shoreline and littoral zone contain cobble/boulder substrates, native SAV beds are less dense. The most common species were native, including tapegrass, water stargrass, white water lily, and floating pondweed. Table 4-20 lists the aquatic vegetation species observed in both Crescent and Vischer Ferry impoundments. Subdominant species that were observed within these SAV beds included invasive species such as Eurasian milfoil, water chestnut, brittle naiad, as well as other native species such as sago pondweed, and clasping-leaved pondweed. The SAV beds observed within the Vischer Ferry impoundment were predominately located in the mid to upper reaches of the impoundment where the shoreline gradient is much shallower.

Table 4-27 Summary of Wetland Area and Coverage within the Crescent Project Boundary

Cover Type	Wetland Classification (NWI)	Area (Acres)	Percent Overall Cover
Emergent Wetland	Palustrine Emergent Persistent (PEM1)	247	12%
	Palustrine Emergent Nonpersistent (PEM2)	3	0.2%
	Palustrine Emergent *Phragmites* (PEM5)	24	1%
	Subtotal	274	13%
Woody Wetland	Palustrine Forested Broad-Leaved Deciduous (PFO1)	53	3%
	Palustrine Scrub-Shrub Broad-Leaved Deciduous (PSS1)	26	1%
	Subtotal	79	4%
Aquatic Bed	Floating	577	27%
	Submerged	36	2%
	Subtotal	613	29%
Total Coverage of all Wetlands		**966**	**46%**
Total Area of Crescent Impoundment (measured in GIS)		**2108**	**-**

Table 4-28 Summary of Wetland Area and Coverage within the Vischer Ferry Project Boundary

Cover Type	Wetland Classification (NWI)	Area (Acres)	Percent Overall Cover
Emergent Wetland	Palustrine Emergent Persistent (PEM1)	18.0	1.6%
	Palustrine Emergent Nonpersistent (PEM2)	2.4	0.2%
	Palustrine Emergent *Phragmites* (PEM5)	0.2	0.01%
	Subtotal	20.6	1.8%
Woody Wetland	Palustrine Forested Broad-Leaved Deciduous (PFO1)	6.0	0.5%
	Palustrine Scrub-Shrub Broad-Leaved Deciduous (PSS1)	1.0	0.1%
	Subtotal	7.0	0.6%
Aquatic Bed	Floating	187	16%
	Submerged	74	7%
	Subtotal	261	23%
Total Coverage of all Wetlands		**289**	**25%**
Total Area of Vischer Ferry Impoundment (measured in GIS)		**1137**	**-**

Table 4-29 Acreage of NWI-Mapped Wetlands Within the Crescent Project Boundary

Wetland Type	Habitat Type	Acres
L1UBHh	Lacustrine	1,055.17
PEM1Eh	Palustrine-Emergent	3.41
PFO1C	Palustrine-Forested	2.83
R2UBH	Riverine	2.69
PEM1/2Fh	Palustrine-Emergent	2.39
PEM1E	Palustrine-Emergent	2.23
R5UBH	Riverine	0.41
L2EM2Fh	Lacustrine	0.17
PFO1E	Palustrine-Forested	0.15
R4SBC	Riverine	0.04
PFO1/SS1Eh	Palustrine-Forested	0.01
PEM1C	Palustrine-Emergent	<0.01
Source: USFWS, 2019b		

Table 4-30 Acreage of NWI-Mapped Wetlands Within the Vischer Ferry Project Boundary

Wetland Type	Habitat Type	Acres
L1UBHh	Lacustrine	1,877.89
PEM1Eh	Palustrine-Emergent	42.99
L2EM2Fh	Lacustrine	16.49
PFO1Ch	Palustrine-Forested	14.80
PFO1C	Palustrine-Forested	7.35
PEM1Ch	Palustrine-Emergent	7.14
PFO1/SS1C	Palustrine-Forested	4.03
PFO1/EM1Ch	Palustrine-Forested	2.77
PSS1Fh	Palustrine-Scrub/Shrub	2.29
PSS1/FO1C	Palustrine-Scrub/Shrub	1.63
PEM1/SS1Ch	Palustrine-Emergent	1.55
PFO1Ah	Palustrine-Forested	1.46
PSS1Ch	Palustrine-Scrub/Shrub	1.34
PUBHh	Pond	1.17
PEM1F	Palustrine-Emergent	1.11
PFO1E	Palustrine-Forested	1.02
PSS1Ah	Palustrine-Scrub/Shrub	0.75
PSS1/EM1Ah	Palustrine-Scrub/Shrub	0.74
PEM1E	Palustrine-Emergent	0.71
PEM1Ah	Palustrine-Emergent	0.57
R5UBH	Riverine	0.50
R3UBH	Riverine	0.50
PUBFx	Pond	0.24
PEM1Fh	Palustrine-Emergent	0.18
R4SBC	Riverine	0.16
PFO1Eh	Palustrine-Forested	0.07
PUBHx	Pond	0.05
Source: USFWS, 2019b		

Figure 4-27 Wetlands in the Vicinity of the Projects, Map 1 of 8

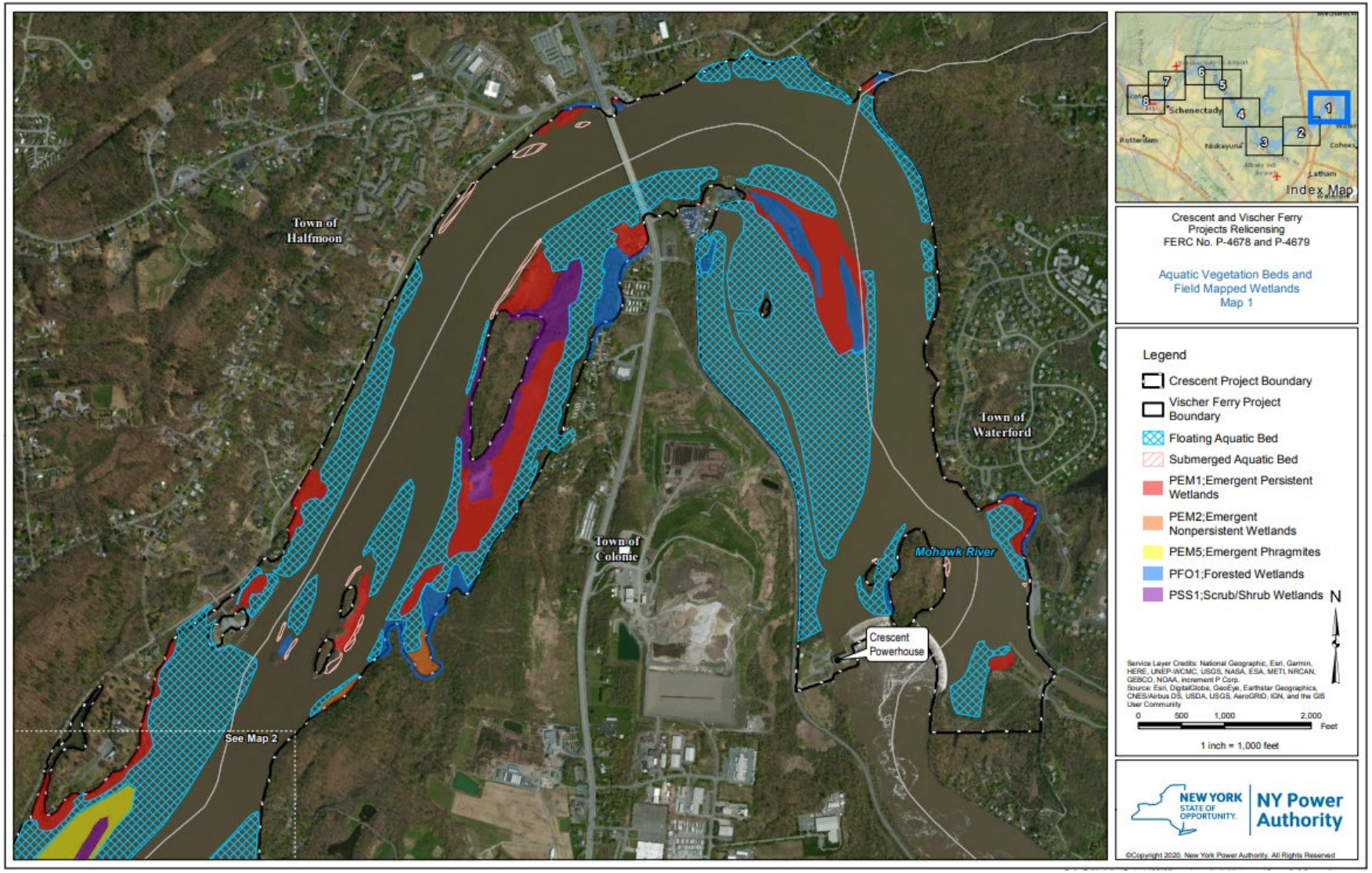


Figure 4-28 Wetlands in the Vicinity of the Projects, Map 2 of 8

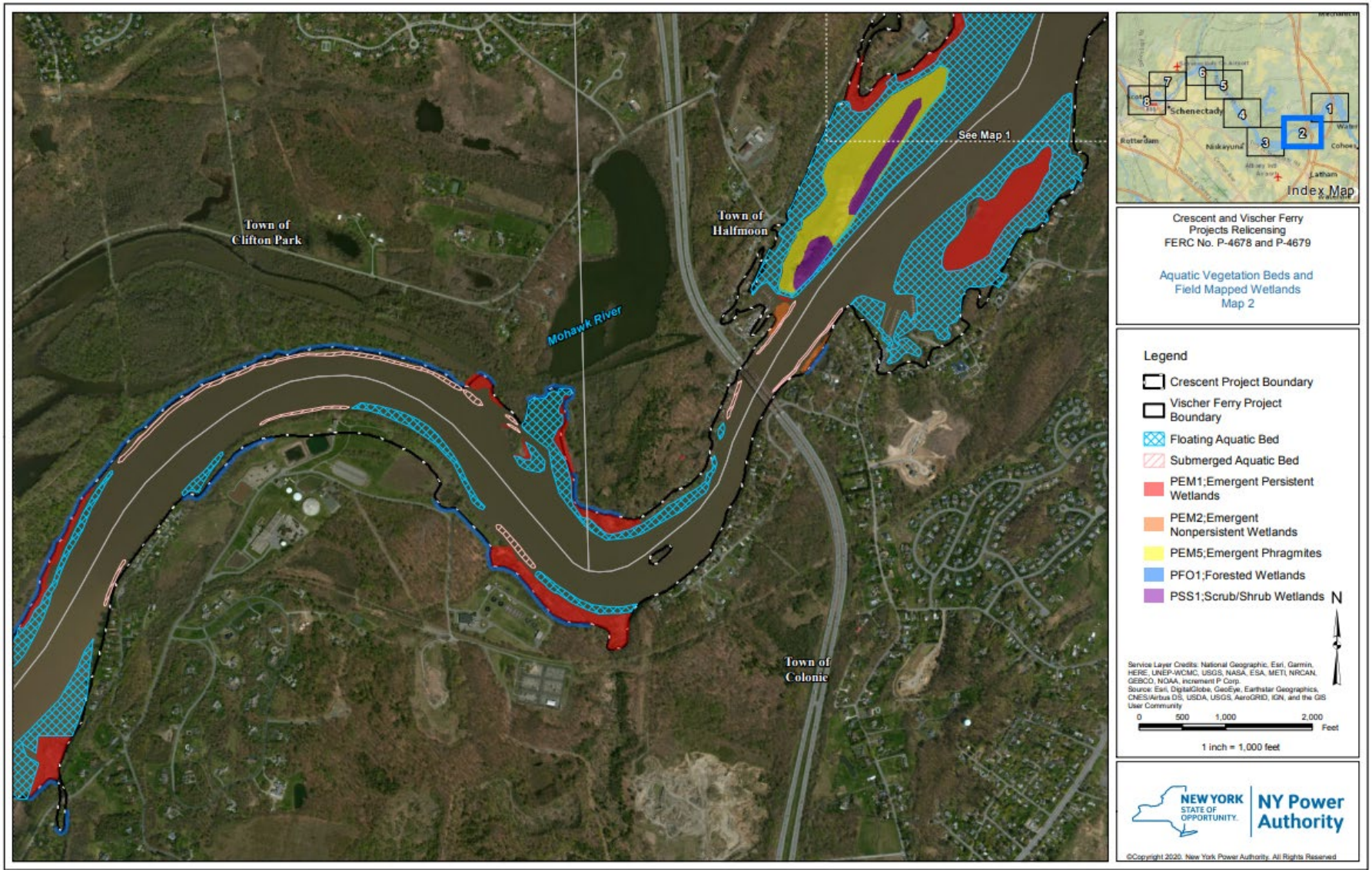


Figure 4-29 Wetlands in the Vicinity of the Projects, Map 3 of 8

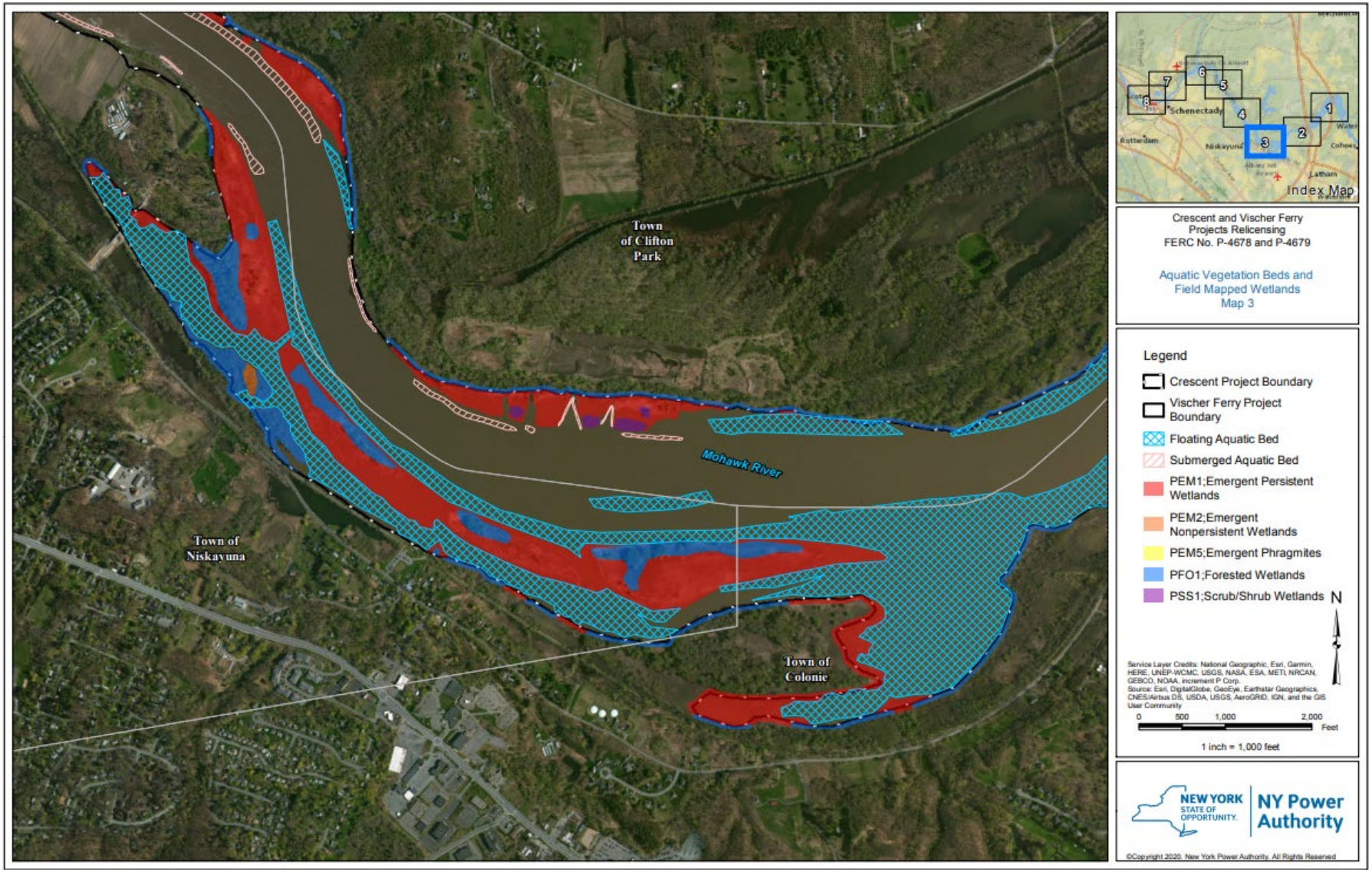


Figure 4-30 Wetlands in the Vicinity of the Projects, Map 4 of 8

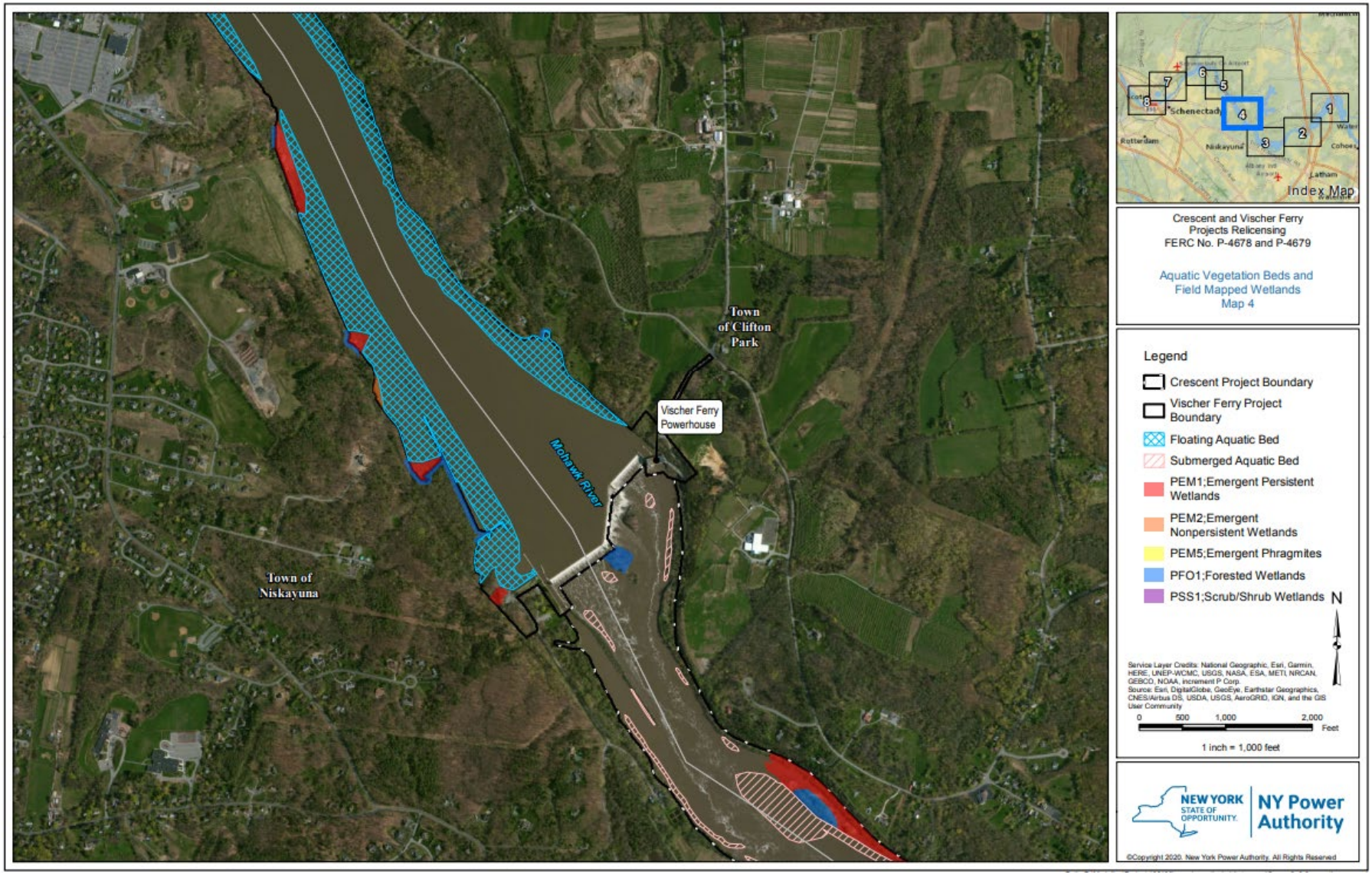


Figure 4-31 Wetlands in the Vicinity of the Projects, Map 5 of 8

Figure 4-32 Wetlands in the Vicinity of the Projects, Map 6 of 8

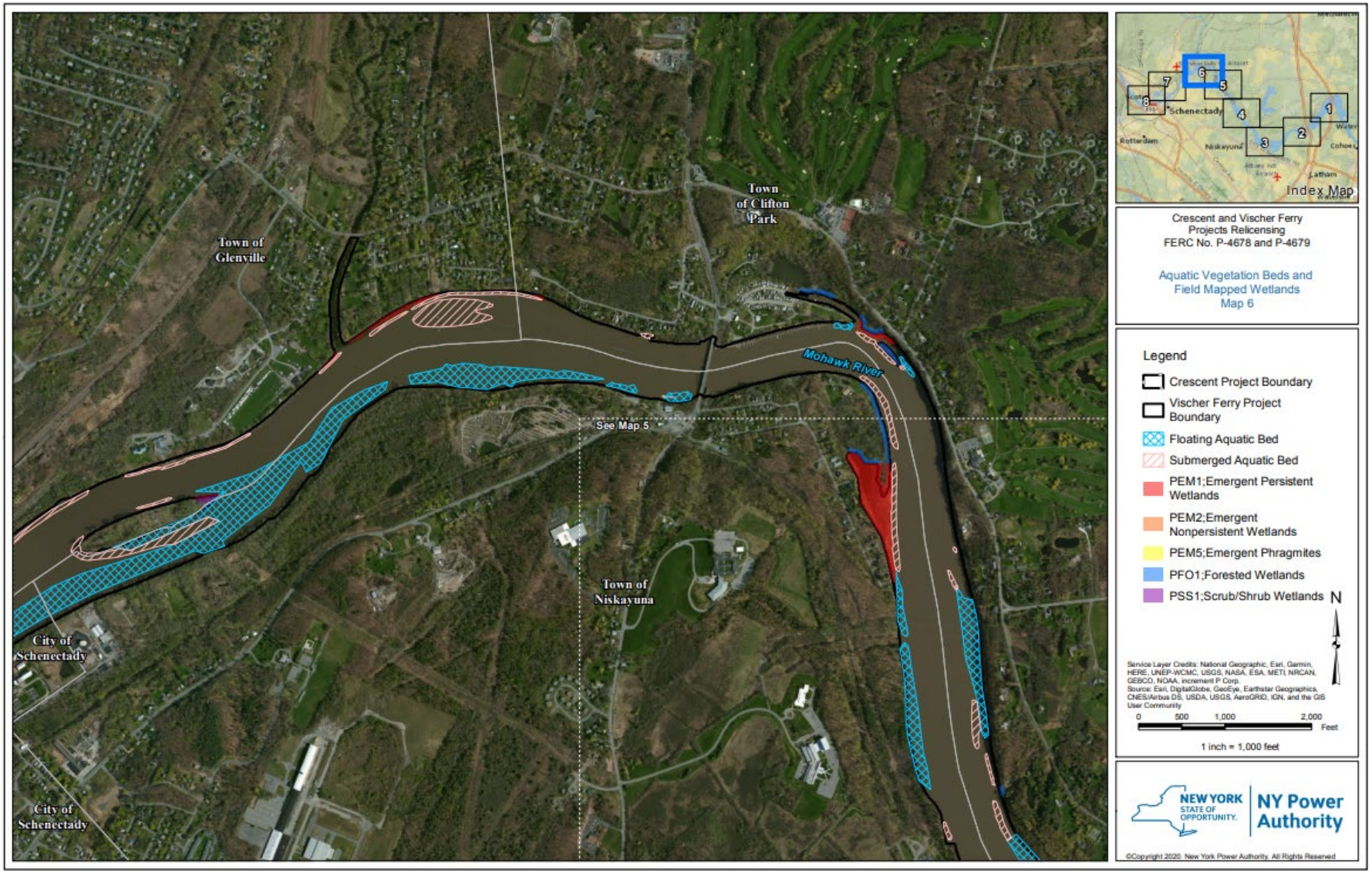


Figure 4-33 Wetlands in the Vicinity of the Projects, Map 7 of 8

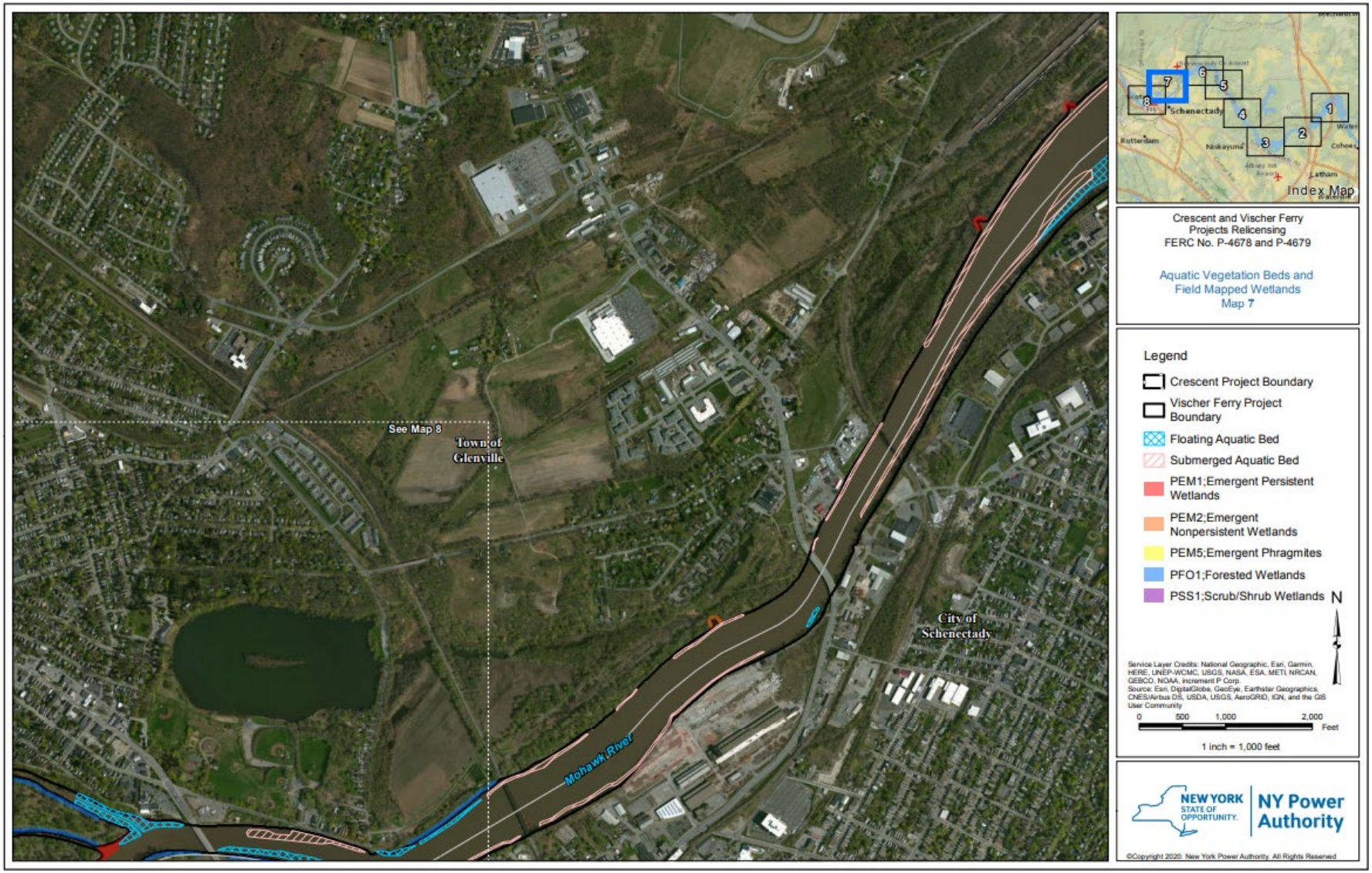
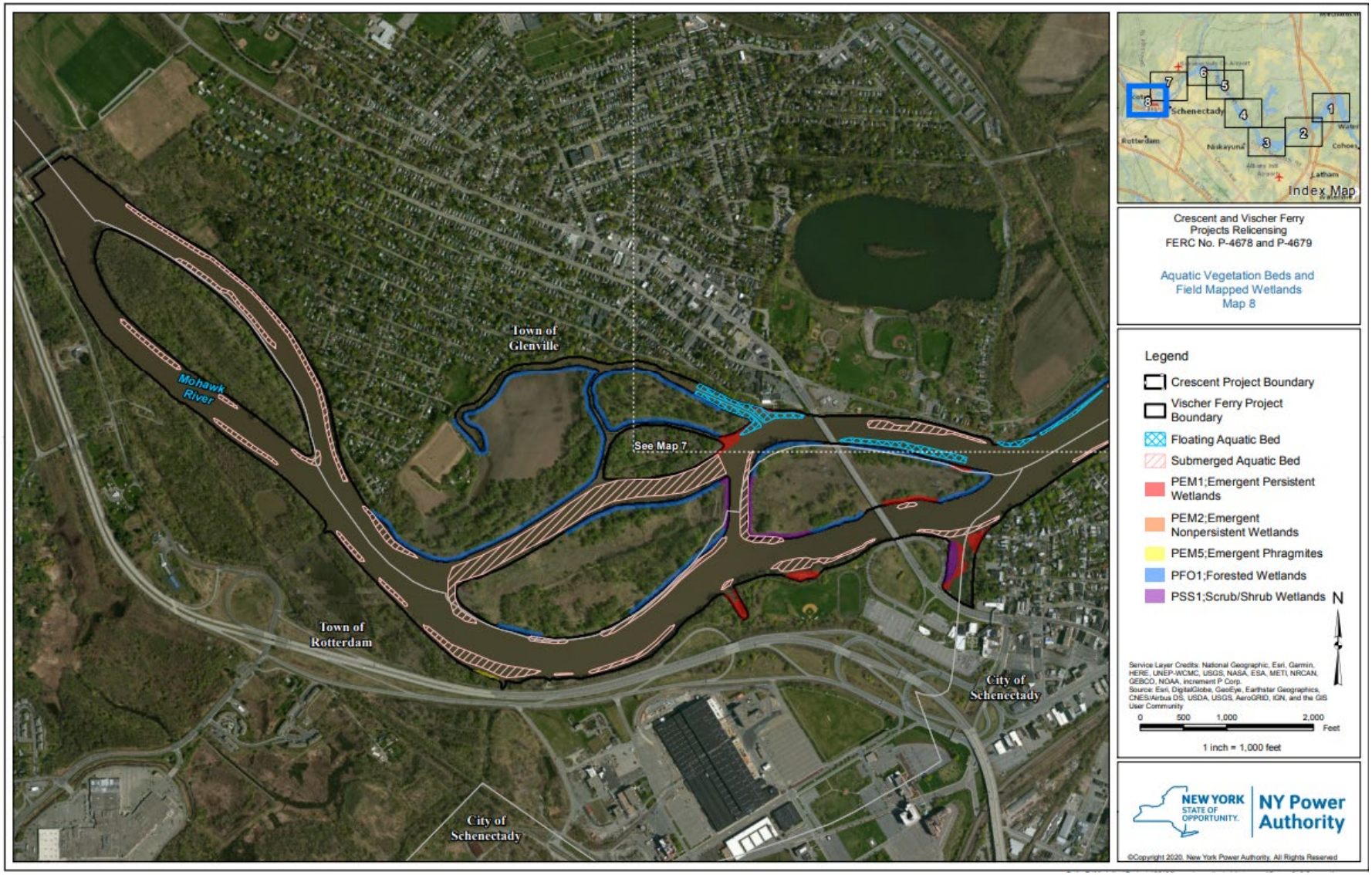


Figure 4-34 Wetlands in the Vicinity of the Projects, Map 8 of 8



4.7.2 Environmental Effects

There are a variety of wetland types located within and adjacent to the FERC Project boundary for both the Crescent and Vischer Ferry Projects. Shrub-scrub and emergent wetlands support a variety of species, while aquatic bed wetlands tend to be dominated by invasive water chestnut. The wetlands and riparian communities that currently exist within the boundaries of the Projects have become established under the current run-of-river operating regime that has been in place for nearly a hundred years. Additionally, the wetland communities appear to be well adapted to the seasonal change in impoundment water levels that result from the installation and removal of the Project flashboards at the beginning and end of the navigation seasons.

Aquatic bed wetlands at both Projects are dominated by non-native, invasive water chestnut. The Mohawk River, due to an extensive history of development and commercial boating activity, represents a major vector for both aquatic and terrestrial invasive species (Williams et al., 2018). Throughout both the Crescent and Vischer Ferry Projects, invasive terrestrial vegetation species were ubiquitous along the riparian areas. European water chestnut, Eurasian milfoil, brittle naiad, and curly-leaved pondweed were aquatic invasive plants observed at both Projects.

Because the Projects are operated as run-of-river with minimal fluctuation of impoundment levels, and because the existing wetland communities are adapted to the minor seasonal changes in impoundment water levels as a result of the installation and removal of the flashboards, the Projects do not significantly impact wetland, riparian, or littoral habitats. The reduced winter impoundment elevations are not affecting the growth and survival of the emergent wetlands or submerged aquatic beds. By the time in the fall when the boards are typically removed and the impoundment elevations are reduced, much of the aquatic vegetation has already died back and is going into winter dormancy, so are unaffected by the reduced elevation of the impoundments. Overall, the Project impoundments are well utilized by a variety of wildlife species and provide habitat for fish and aquatic species while also allowing for water-based recreation, commercial navigation of the Barge Canal System, and hydropower generation.

4.7.3 Proposed Environmental Measures

Regarding wetland resources, the Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to wetland and riparian habitat resources. The Project impoundments will continue to be operated as run-of-river with minimal short-term fluctuations in impoundment water levels. Seasonal changes in the full pool elevation of the impoundments will continue to occur as a result of the installation and removal of the flashboards at the beginning and end of the navigation season. However, no changes are proposed that would result in any significant changes to the availability or use of wetlands or riparian habitats located throughout the Projects.

4.7.4 Unavoidable Adverse Impacts

Continued operation of both Projects is not expected to adversely affect wetland, riparian, or littoral habitat resources.

4.8 Rare, Threatened, and Endangered Species

4.8.1 Affected Environment

4.8.1.1 Federal and State Listed Species

The presence of rare, threatened, and endangered (RTE) and candidate or special status species at the Projects was determined by reviewing USFWS and NYSDEC RTE species lists. Databases were utilized to generate a list of federally and/or state listed RTE species which are known to occur, or have the potential to occur, within the boundaries of the Projects. Table 4-31 lists the identified RTE species.

During development of the PAD in 2019, a search of the USFWS's Information for Planning and Consultation (IPaC) tool was performed for the Crescent and Vischer Ferry Projects to identify species listed as threatened or endangered under the Federal Endangered Species Act (ESA) that should be considered when evaluating the potential impacts of the Projects. At that time, the northern long-eared bat (*Myotis septentrionalis*) was the only species identified at both Projects.

The USFWS has not adopted a recovery plan for the northern long-eared bat. (USFWS, 2019c). However, the northern long-eared bat was listed as threatened on May 4, 2015, due to declines caused by white-nose syndrome. The USFWS finalized ESA section 4(d) rules for this species in January 2016, designating a white-nose syndrome zone, and focusing on preventing effects on bats in hibernacula associated with the spread of white-nose syndrome and effects of tree removal on roosting bats or maternity colonies. Under the rules, the USFWS concludes that incidental take from tree removal activities within the white-nose syndrome zone is not prohibited (i.e., excepted from the take prohibitions) if the tree removal: (1) occurs more than 0.25 mile from a known, occupied northern long-eared bat hibernacula; and (2) avoids cutting or destroying known, occupied maternity roost trees, or any other trees within a 150-foot radius around the maternity roost tree, during the pup season, June 1 through July 31 (USFWS, 2019c).

A subsequent IPaC report and associated species list was completed in November 2021. In this more recent species list, the monarch butterfly (*Danaus plexippus*) (a federal candidate species) was identified as a species that may utilize habitat within the Project boundaries for Crescent and Vischer Ferry Projects. This species is not currently listed as threatened or endangered and no critical habitat has been designated.

The state of New York has designated protection status for certain species. For animals and plants, the state legal protected status is under New York State Environmental Conservation Law (ECL) and state of New York regulations. The highest level of protection is given to species listed by the state as state listed endangered or state listed threatened. Regulations regarding animals are administered by NYSDEC's Division of Fish, Wildlife, and Marine Resources and regulations regarding plants are administered by NYSDEC's Division of Lands and Forests. For animals, categories of endangered, threatened, and special concern[7] species are defined in New York State ECL § 11-0535. Animals listed as endangered or threatened are protected against taking, importation, transportation, possession, or sale without a permit. Endangered, threatened, and special concern wildlife species are listed in regulation 6 NYCRR § 182.5.

[7] While special concern animals are not as rare as those listed as endangered or threatened, there is concern for their continued welfare in New York. NYSDEC may promulgate regulations as to the taking, importation, transportation, possession or sale, as it deems necessary, for the proper protection of such species (ECL § 11-0535). (NYSDEC 2018b).

For plants, categories of endangered, threatened, rare, and exploitably vulnerable are defined in ECL § 9-1503. Plants in these categories are protected against picking, removal, or damaging with herbicides without the consent of the landowner. Endangered, threatened, rare, and exploitably vulnerable plant species are listed in regulation 6 NYCRR § 193.3. (NYSDEC, 2018f).

The NYSDEC maintains databases with distribution and status information on New York's animals, plants, and significant natural communities. Site-specific data was obtained from the New York Natural Heritage Program database regarding any RTE species that may exist in or near the vicinity of the Crescent and Vischer Ferry Projects (NYPA, 2018). The New York Natural Heritage Program identified one (1) bird and one (1) plant: the bald eagle (Haliaeetus leucocephalus) and Culver's root (Veronicastrum virginicum) as potentially present in the vicinity of the Projects. The results of this data request are provided in Table 4-31.

The bald eagle is legally protected by the Bald and Golden Eagle Protection Act. Bald eagle observations at the Projects were previously discussed in Section 4.6.1. Culver's root is not federally listed, so the USFWS has not adopted a recovery plan for the species. Culver's root is state threatened.

The New York Natural Heritage Program also identified three (3) species of dragonfly at or near the Projects: cobra clubtail (*Gomphus vastus*), midland clubtail (*Gomphurus fraternus*), and russet-tipped clubtail (*Stylurus plagiatus*). These species are not federally or state listed as threatened or endangered. The cobra clubtail and russet-tipped clubtail were identified at or near the Crescent Project, and the midland clubtail was identified at or near both Projects.

Table 4-31 RTE Species with Potential to Occur at the Crescent and Vischer Ferry Projects

Common Name	Scientific Name	Legal Status	Potential to Occur Within Project Boundary*	
			Crescent	Vischer Ferry
Bald eagle	*Haliaeetus leucocephalus*	EAG[1], ST	Known Occurrence	Known Occurrence
Culver's root	*Veronicastrum virginicum*	ST	Known Occurrence in Adjacent Upland	No Known Occurrence
Northern long-eared bat	*Myotis septentrionalis*	FT, ST	Potential Habitat in Adjacent Upland	Potential Habitat in Adjacent Upland
Hooker's orchid	*Planthera hookeri*	SE	No Known Occurrence	Potential Occurrence in Adjacent Upland
Monarch butterfly	*Danaus plexippus*	C	No Known Occurrence	No Known Occurrence
Midland clubtail	*Gomphus fraternus*	Not Listed State Rank S3	Known Occurrence	Known Occurrence
Russet-tipped clubtail	*Stylurus plagiatus*	Not Listed State Rank S1	Known Occurrence	No Known Occurrence
Cobra clubtail	*Gomphus vastus*	Not Listed State Rank S1	Known Occurrence	No Known Occurrence
Alewife floater	*Anodonta implicata*	Not Listed State Rank S1S2	Potential Occurrence	No Known Occurrence

Definition of Federal Legal Status: C = Candidate, FT = Federal Threatened, FE = Federal Endangered. Definition of State Legal Status: ST = State Threatened, SE = State Endangered. State Conservation Status Rank: S1 = Critically imperiled in NYS. S2 = Imperiled in NYS. S3 = Vulnerable in NYS.

Source: NYPA 2021 Aquatic Mesohabitat Study

EAG[1] The Bald and Golden Eagle Protection Act was originally enacted in 1940 (16 U.S.C 668-668d) to protect eagles from human-induced alterations and human interactions. As defined in 50 C.F.R. Part 22, permits are required for the "taking" (meaning to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb), possession, and transportation with the United States of bald eagles and golden eagles and their parts, nests, and eggs. The bald eagle is not federally listed as threatened or endangered.

The IPaC tool also lists migratory birds that are of particular concern either because they occur on the USFWS Birds of Conservation Concern list or warrant special attention in the specified location. Seventeen (17) species of birds are listed for the Projects. These species are listed in Table 4-32 (USFWS, 2018b).

Table 4-32 USFWS IPaC Migratory Bird List with Potential to Occur at the Crescent and Vischer Ferry Projects

Common Name	Scientific Name
American golden-plover	*Pluvialis dominica*
Bald eagle	*Haliaeetus leucocephalus*
Black-billed cuckoo	*Coccyzus erythropthalmus*
Blue-winged warbler	*Vermivora pinus*
Bobolink	*Dolichonyx oryzivorus*
Canada warbler	*Cardellina canadensis*
Cerulean warbler	*Dendroica cerulea*
Dunlin	*Calidris alpina*
Eastern whip-poor-will	*Antrostomus vociferus*
Evening grosbeak	*Coccothraustes vespertinus*
Golden eagle	*Aquila chrysaetos*
Golden-winged warbler	*Vermivora chrysoptera*
Lesser yellowlegs	*Tringa flavipes*
Prairie warbler	*Dendroica discolor*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Ruddy turnstone	*Arenaria interpres*
Short-billed dowitcher	*Limnodromus griseus*
Wood thrush	*Hylocichla mustelina*

Source: USFWS 2021

4.8.1.2 Habitats

No federally designated critical habitats are located within the FERC Project boundaries of the Crescent and Vischer Ferry Projects (USFWS, 2018b).

A site-specific data request from the New York Natural Heritage Program identified no significant natural communities in the Projects Areas (NYPA, 2018).

The habitat requirements and general habitat information for each of the RTE species identified as having the potential to be located within the boundaries of both Projects are listed in Table 4-33.

Table 4-*33* Habitat Requirements of Federally and/or State Listed RTE Species

Common Name	Scientific Name	Habitat Requirements / Information
Bald eagle	*Haliaeetus leucocephalus*	Bald eagles are typically found near large bodies of water, such as bays, rivers, and lakes, that support a healthy population of fish and waterfowl, which are their primary food source. Generally, bald eagles tend to avoid areas with human activities. Bald eagles will perch in either deciduous or coniferous trees. Large, heavy nests are usually built near water in tall pine, spruce, fir, cottonwood, oak, poplar, or beech trees. Non-breeding adults and wintering birds are known to have communal roost sites. During the winter, the roost sites may be farther away from food sources. This may be due to the need for a more sheltered, warmer area. Feeding areas during the winter months usually have a high concentration of fish and waterfowl and open water (NatureServe, 2005). (NYNHP, 2018).
Culver's root	*Veronicastrum virginicum*	In New York, *Veronicastrum virginicum* is known to occur in forest edges, including along bike trails and driveways. The species has been found on north or northwest-facing slopes as well as along the bottomlands of major rivers. It has also been found on prairie remnants, fens, and meadows, river banks, deciduous woodlands (especially with oaks), and adjacent roadsides (Voss, 1996). It has also been found in moist and dry upland woods and prairies (Gleason and Cronquist, 1991). (NYNHP, 2018).
Northern long-eared bat	*Myotis septentrionalis*	The northern long-eared bat occurs throughout much of the eastern and north-central United States, but is experiencing population declines due to white-nose syndrome, a fungal disease. During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, such as caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on suitability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures such as barns and sheds. Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible. (USFWS, 2018b).

4.8.2 Environmental Effects

In SD2, FERC identified the effects of continued operations of both Projects and maintenance activities on state-listed species (e.g., bald eagle), natural communities, and the federally listed threatened northern long-eared bat as potential issues associated with rare, threatened, and endangered species.

The USFWS IPaC database indicates that the federally protected northern long-eared bat may be present in the Project areas. However, there is no critical habitat or hibernacula found within the Project boundaries. No other federally listed species are known to occur in the Project areas. Project operations do not affect state listed species know to occur in the Project areas.

4.8.3 Proposed Environmental Measures

Regarding the few RTE species that may occur within the Project boundaries, the Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to RTE resources. Continued Project operations, as proposed, will have no effect on RTE species or their habitats. No changes are proposed that would result in any significant changes to the RTE species habitats or their use.

4.8.4 Unavoidable Adverse Impacts

There are currently no known issues related to RTE species at the Projects.

4.9 Recreation, Land Use, and Aesthetic Resources

4.9.1 Affected Environment

4.9.1.1 Recreation

Public recreation opportunities are abundant along the lower Mohawk River in the vicinity of the Crescent and Vischer Ferry Projects. As part of the Barge Canal System, the lower Mohawk River, including the Crescent and Vischer Ferry impoundments, are used extensively for recreational boating and there are numerous public and commercial facilities serving this need. Though the Barge Canal System was historically operated for commercial transportation seasonally, today the Barge Canal System continues to operate seasonally, and is used primarily for recreational boating traffic. In addition to the many boat launching and mooring sites, several state and municipal parks, regional multi-use trails, and one nature preserve are located along the Projects' shorelines, providing additional boat access as well as angling, picnicking, hiking and biking opportunities. The eastern Erie Canal is part of the New York State Canalway Water Trail, which is a system of water trails for paddlers with numerous access points across New York State (NYSCC, 2019). There are currently no permits or fees required for locking through the canalway with a recreational vessel (NYSCC, 2019).

There is one nature preserve, the Vischer Ferry Nature and Historic Preserve, located along and adjacent to the Crescent Project shoreline. This natural area and historic place includes more than 600 acres of wetlands, floodplain, and bird and amphibian habitat and is owned by NYSCC and managed by the Town of Clifton Park. The Preserve includes a small picnic area along the shoreline, two Erie Canalway Trails, Historic Double Lock 19, Clute's Dry Dock, Forts Ferry, and an abundance of nature trails. The site is a Bird Conservation Area as designated by the NYSDEC and an Important Bird Area recognized by Audubon New York, with more than 200 bird species being observed at the site (Clifton Park Open Spaces, 2015).

The Erie Canalway Trail[8] stretches across over 350 miles of upstate New York, from Buffalo to Albany. Portions of the trail travel along the Mohawk River in close proximity to the Project impoundments. Trailhead parking and interpretive kiosks with historic information about the Erie Canal and Barge Canal System are located at many points along the trail. The trail closely parallels both active and historic sections of the Erie Canal and offers easy access to and from communities along the Barge Canal System (ECNHC, 2019b).

4.9.1.1.1 2021 Recreation Study

The Power Authority conducted a Recreation Study in 2021. The goal of the study was to inventory formal, informal, commercial, and non-commercial recreation sites providing public recreational access to Project waters, and to evaluate current use and future needs of the Projects' recreation sites by conducting use counts and user surveys. The specific objectives of the study were to:

- Complete a recreation facility inventory and condition assessment;
- Evaluate recreation use at the Project recreation sites; and
- Conduct user surveys to help determine the adequacy of the existing recreation sites.

Recreation Facility Inventory and Condition Assessment

The Licensee updated existing data on public recreation sites that provide access to Project lands and waters by conducting an onsite inventory and site condition assessment from August 16, 2021 to August 18, 2021. The facility inventory included each formal, informal, commercial, and non-commercial public recreation site in the study area, including the Project recreation facilities. The facility inventory found that Project, non-Project, and commercial recreation facilities provide abundant recreational opportunities in the vicinity of the Projects. Several public and commercial boat launches, boat slips, and marina facilities line both sides of the Mohawk River along the Project boundaries. Regional trails provide hiking and biking opportunities along miles of shoreline. Various parks and preserves provide angler access, picnic areas, and scenic views. The Crescent Project provides two Project recreation facilities offering shoreline access below the Project dam for anglers, as well as picnicking opportunities and scenic views of the Project. The Vischer Ferry Project provides three Project recreation facilities offering scenic views of the Project from upstream and downstream, shoreline access below the Project dam, and boating access to the Project impoundment. Ample parking capacity is provided throughout the area at the various facilities. Table 4-34 summarizes recreational amenities and parking capacity at public recreation facilities providing access to Crescent Project lands and waters, and Table 4-35 does the same for the Vischer Ferry Project. Section 4.9.1.1.1.1 presents a summary of the facility inventory results for the Crescent Project, and Section 4.9.1.1.1.2 presents the same for Vischer Ferry Project recreation facilities. The full results of the facility inventory will be included in the USR.

[8] The Erie Canal Bike Trail is also known as the Erie Canalway Trail, with the portion between Little Falls and Albany also known as the Mohawk-Hudson Bikeway (Parks and Trails New York, 2019).

Recreation Use

Prior to relicensing, the most recent estimate of recreation use at the Projects was developed as part of FERC's previously required Form 80 report. As reported in the PAD, review of the Form 80s from 2002, 2008, and 2014 indicate that estimated recreational at both Projects is increasing over time.

Updated recreation use information for the Projects was collected in 2021 as part of the 2021 Recreation Study. Field data for the Recreation Study was collected to look at existing recreation use by activity type at the Project recreation sites (the Crescent Picnic Area, Crescent Tailrace Bank Fishing Area, Vischer Ferry Scenic Overlook, Vischer Ferry Fishing Area, and Lock 7 Boat Launch) during the open water recreation season (Memorial Day through Columbus Day). This data is currently being analyzed. Updated recreation use information for the Projects will be provided in the USR and in the FLA.

User Survey

The Licensee solicited information on recreational user characteristics, use patterns, and user perceptions of Project recreational facilities via voluntary, self-administered surveys made available in collection stations strategically located at each Project. Survey stations contained paper surveys and pencils as well as a sign displaying a QR code linked to an online survey. Stations were erected prior to May 1, 2021 and remained stocked and serviced through October 31, 2021. Data from the completed surveys is currently being analyzed to evaluate the adequacy of Project recreation facilities. Results will be provided in the USR and FLA.

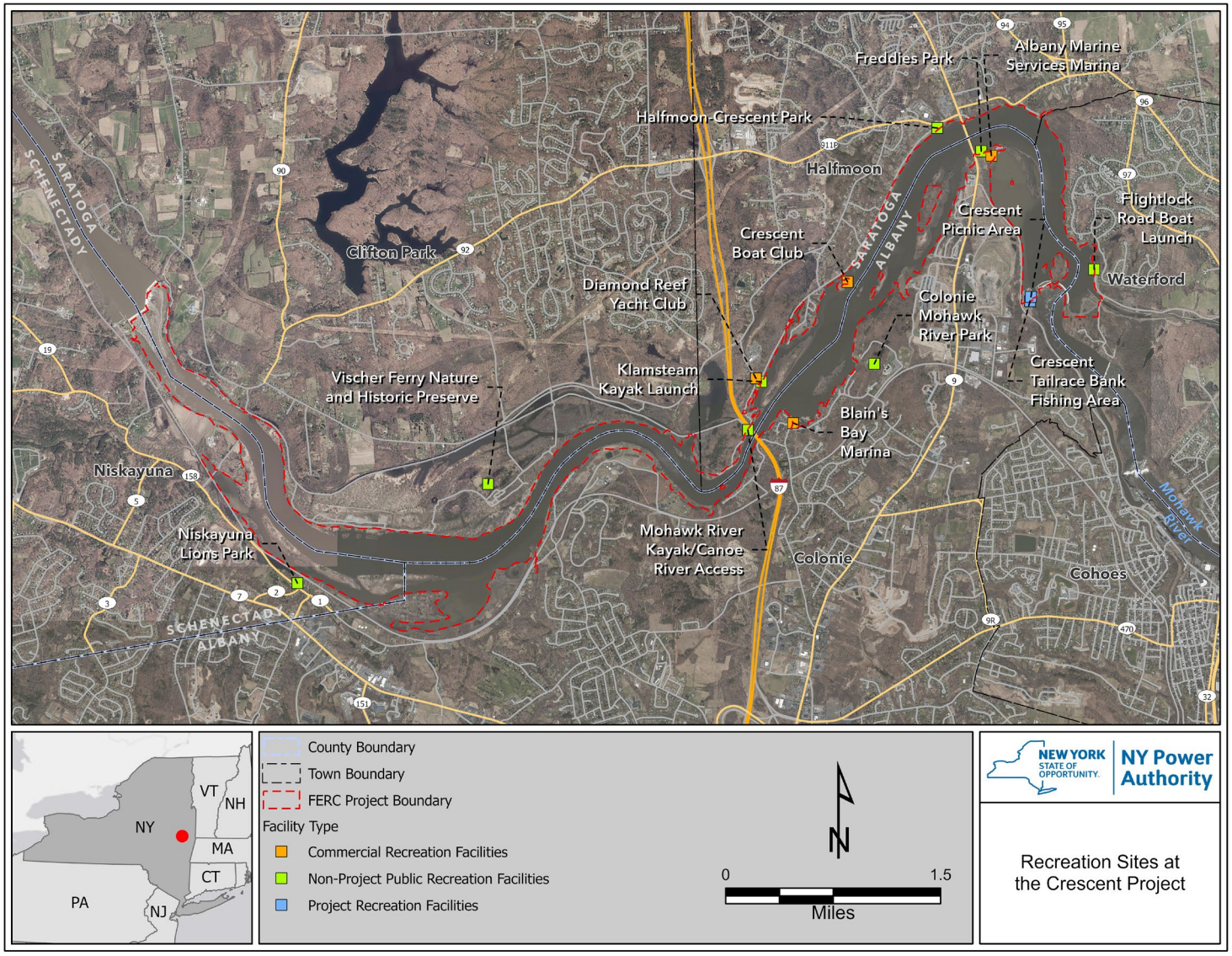
4.9.1.1.1.1 Crescent Project Recreation Sites

Recreation opportunities at the Crescent Project include fishing, boating, trails, and picnicking. Public recreation facilities at the Project include a mix of both FERC-approved Project recreation sites and facilities, as well as non-Project recreation sites. Figure 4-35 shows the location of many of the public and commercial recreation facilities in the Project area. Table 4-34 summarizes the amenities provided at each site. The following subsections describe each Project recreation facility in greater detail.

Table 4-34 Recreation Facilities in the Crescent Project Study Area

Site Name	Amenities	Estimated Parking Capacity
Project Recreation Facilities		
Crescent Tailrace Bank Fishing Area	Informal shoreline access, informal footpath	10 vehicles
Crescent Picnic Area	Picnic tables, historical and informational signage	10 vehicles
Non-Project Recreation Facilities		
Flightlock Road Boat Launch	Two concrete boat ramps, floating dock, picnic area, grills, informal shoreline access	20 vehicles with trailers
Freddie's Park	Picnic table, kiosk, trail, informal shoreline access, trash bin, historical and informational signage	10 vehicles
Halfmoon Crescent Park	Cartop boat launch, floating dock with gangway, picnic area, pier, informal shoreline access, trails, informal shoreline access, trash bin, kayak rental kiosk	30-40 vehicles
Vischer Ferry Nature and Historic Preserve	Trails, picnic area, historical and informational signage, kayak rental kiosk, informal shoreline access	24 vehicles
Colonie Mohawk River Park	Swimming pool, tennis courts, ball fields, concrete boat ramp, kiosk, picnic tables, pavilions, trash bins, grills, restrooms	14 vehicles (at boat ramp; additional parking provided at main park)
Klamsteam Kayak Launch	Trail, cartop boat launch, historical and informational signage, kayak rental kiosk	12 vehicles
Niskayuna Lions Park	Trails, restrooms, cartop boat launch, picnic tables, benches, informal shoreline access, historic structure	72 vehicles
Mohawk River Kayak/Canoe River Access	Informal cartop boat launch	4-6 vehicles
Commercial Recreation Facilities		
Crescent Boat Club	Commercial marina	Parking for marina customers only
Blain's Bay Marina	Commercial marina	Parking for marina customers only
Diamond Reef Yacht Club	Commercial marina	Parking for marina customers only
Albany Marine Services Marina	Commercial marina	Parking for marina customers only

Figure 4-35 Recreation Sites in the Crescent Project Study Area



Project Recreation Facilities

Crescent Tailrace Bank Fishing Area:

The Crescent Tailrace Bank Fishing Area is located adjacent to the Crescent Project powerhouse and Crescent Picnic Area on the south bank of the Mohawk River in the Town of Cohoes. The site is owned and operated by the Licensee and provides a gravel parking area and shoreline access. Access to the site is provided off of Cohoes-Crescent Road via a gravel road.

The bank fishing access is immediately downstream of the powerhouse on a large boulder-stabilized bank with sparse vegetation. Users can access an approximately 200 foot stretch of shoreline starting at the downstream wall of the powerhouse. Slopes along the shoreline are generally moderate, and the boulders provide stable but uneven footing. Views of the powerhouse, dam, spillways, and the Mohawk River are available along the shoreline.

An informal/unimproved footpath leads from the Tailrace Bank Fishing Area shoreline to the Crescent Picnic Area. Signage at the top of the path identifies the public fishing area. Additional signage on the powerhouse fencing indicates the site is open to the public from sunrise to sunset. The site provides parking for approximately 10 vehicles around the perimeter of a loosely defined gravel turn-around area and along the edge of the access road. Additional parking is located at the Picnic Area.

The improved areas of the site (access road and parking area) are in good condition. While shoreline access is in good condition, the shoreline itself is generally unimproved and the large boulders may be difficult to navigate for some users. No ADA-compliant access to the shoreline is available due to the irregular boulder bank stabilization and lack of a formalized path.

Crescent Picnic Area:

The Crescent Picnic Area is located adjacent to the Crescent Project powerhouse on the south bank of the Mohawk River in the Town of Cohoes. The site is owned and operated by the Licensee and provides a paved access road, paved parking area, and grassy picnic area with scenic overlook. Access to the site is provided off of Cohoes-Crescent Road via a paved road.

The picnic area consists of a flat, grassy area with three picnic tables on concrete pads. A sign containing Project recreational information pursuant to 18 CFR § 8.2 is affixed to the powerhouse fencing, while a small kiosk and a concrete pedestal provide historical information about the Project. Beyond the picnic tables, the picnic area overlooks the Mohawk River just downstream of the powerhouse and provides views of the dam, spillway, and river. A guardrail continues from the parking area and follows the perimeter of the picnic area until it meets the powerhouse fencing. The site provides access for approximately 10 vehicles in an unmarked paved parking area. Additional parking is available on either side of the paved access road.

As discussed above, directional signage and an unimproved footpath lead to the Tailrace Bank Fishing Area immediately downstream.

The site is in good condition overall; however, the picnic tables were noted to be weathered and worn with some moss growth. Scenic views are generally limited around the picnic area due to tall leafy vegetation, except in the eastern corner where vegetation has been cleared to maintain views of the dam, spillway, and Mohawk River. The site does not provide ADA-compliant parking, access, or amenities.

Non-Project Public Recreation Facilities

During the 2021 Recreation Study there were eight (8) non-Project public recreation facilities identified as providing access to Project lands or waters. Included in the non-Project recreation facilities were boat launches for both trailered and hand-carry boats, picnic areas, hiking and biking trails, historic attractions, and formal and informal shoreline access. A full description of all non-Project recreation facilities can be found in the Recreation Study to be filed with the FERC as part of the USR.

Commercial Recreation Facilities

During the 2021 Recreation Study there were four (4) commercial recreation facilities identified (Crescent Boat Club, Blain's Bay Marina, Diamond Reef Yacht Club, and Albany Marine Services Marina). A full description of all commercial recreation facilities can be found in the Recreation Study to be filed with the FERC as part of the USR.

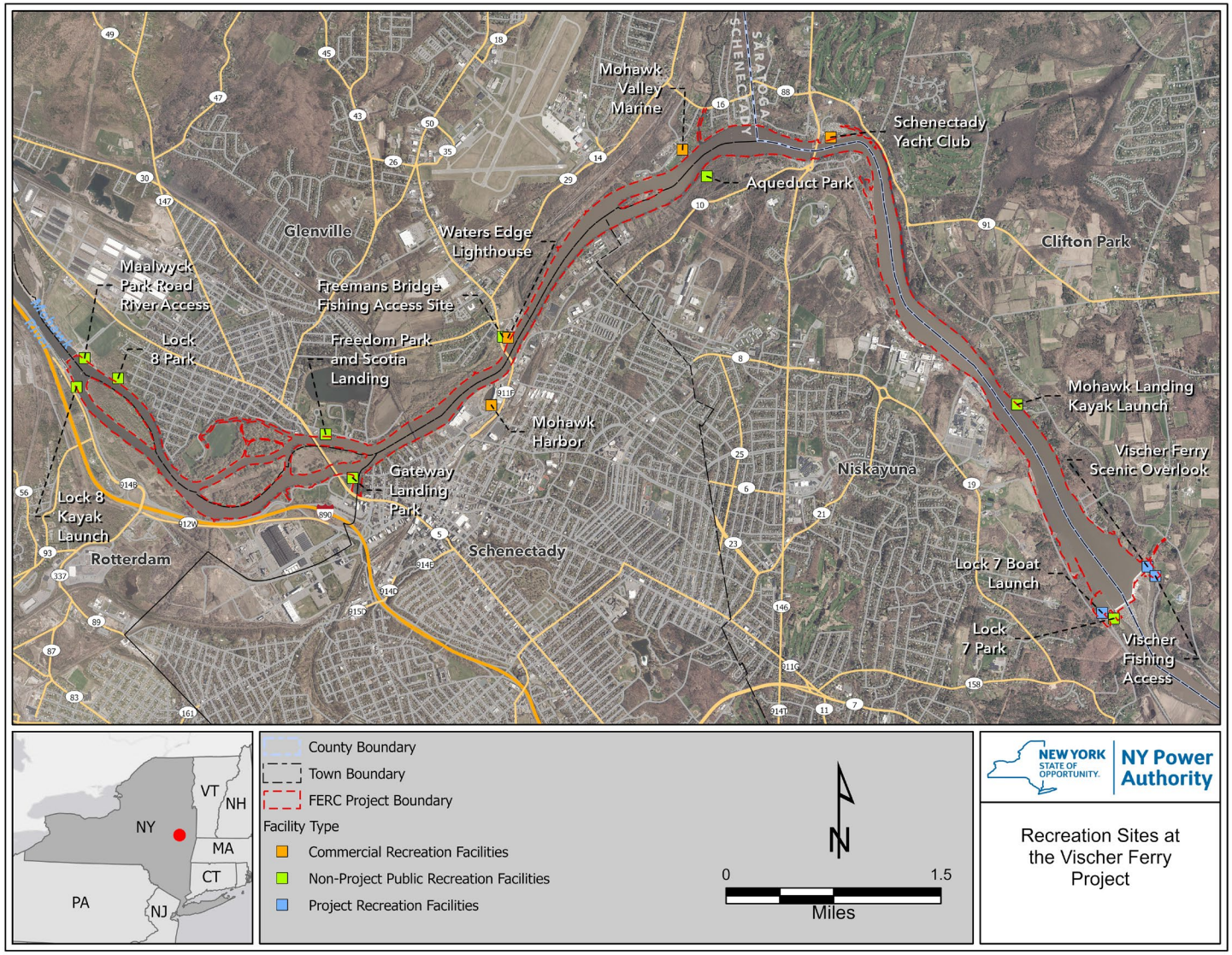
4.9.1.1.1.2 Vischer Ferry Project Recreation Sites

Recreation opportunities at the Vischer Ferry Project include fishing, boating, trails, and picnicking. Three formal Project recreation sites offer public access to the shoreline and/or Project waters: (1) Vischer Ferry Scenic Overlook; (2) Vischer Ferry Fishing Access, and (3) Lock 7 Boat Launch. In addition, there are numerous non-Project recreation sites providing access to Project waters, including other boat launches, fishing, trails, picnic areas, overlooks/vistas, and informal access points (NYPA, 2015b). Table 4-35 and Figure 4-36 depict public and commercial recreation facilities in the Project area. The following subsections describe each site in greater detail.

Table 4-35 Recreation Facilities in the Vischer Ferry Project Study Area

Site Name	Amenities Provided	Estimated Parking Capacity
Project Recreation Facilities		
Vischer Ferry Scenic Overlook	Scenic overlook, trash bin, historical and informational signage	12 vehicles
Vischer Ferry Fishing Access	Trails, informal shoreline access	Shared with Vischer Ferry Scenic Overlook
Lock 7 Boat Launch	Concrete boat ramp, floating dock, trail access	20 vehicles and 5 vehicles with trailers
Non-Project Recreation Facilities		
Lock 7 Park	Picnic tables, grill, informal shoreline access, portable toilet, trail access	5 vehicles
Mohawk Landing Kayak Launch	Trails, cartop boat launch, historical and informational signage, picnic tables, dispersed shoreline access	9 vehicles
Aqueduct Park	Scenic overlook, trails, cartop boat launch, floating docks, benches, picnic tables	9 vehicles
Freedom Park and Scotia Landing	Picnic tables, grills, trash bins, concert venue, restrooms, boat slips	140 vehicles
Freemans Bridge Fishing Access Site	Cartop boat launch, concrete boat launch, floating docks, portable toilet, information kiosk, invasive species disposal station, benches, trash bin	17+ vehicles
Gateway Landing Park	Trails, gazebo, floating docks, historical signage, shoreline access	12 vehicles
Lock 8 Kayak Launch	Pier, trails, cartop boat launch	Shared with Lock 8 Park
Lock 8 Park	Picnic tables, grills, trash bins, scenic overlook, portable toilet, trails	20 vehicles
Maalwyck Park Road River Access	Informal shoreline access	8-10 vehicles
Commercial Recreation Facilities		
Schenectady Yacht Club	Commercial marina	Parking for marina customers only
Waters Edge Lighthouse	Restaurant and marina	Parking for restaurant customers only
Mohawk Valley Marine	Commercial marina	Parking for marina customers only
Mohawk Harbor	Commercial marina	Parking for marina customers only

Figure 4-36 Recreation Sites in the Vischer Ferry Project Study Area



Project Recreation Facilities

Vischer Ferry Scenic Overlook:

The Vischer Ferry Scenic Overlook is located on the north bank of the Mohawk River in the Town of Clifton Park, just upstream from the Vischer Ferry powerhouse. The site is owned and operated by the Licensee and consists of a paved access road, gravel parking area, and scenic overlook. Access to the gravel parking area is provided along the Project access road (at the intersection of Sugar Hill Road and River View) The gravel parking area provides unmarked parking for approximately 12 vehicles. The parking is shared with the Vischer Ferry Fishing Access site and can be used to access the Erie Canal Towpath Community Connector trail.

A guardrail circles the perimeter of the parking area with an opening to provide access to a flat grassy area leading from the parking area to the overlook. The overlook is approximately 65 feet long with a chain link fence to prevent access down the slope to the forebay. Scenic views of the Vischer Ferry Project and spillway are available. A trash bin is provided at the opening in the guardrail. Signage throughout the site includes historical information, operating hours (5 a.m. to 10 p.m.), Project recreation information pursuant to 18 CFR § 8.2, and prohibits motor vehicle access below the parking area, although the access road continues to the Project powerhouse.

The site is in good condition. The gravel parking area is firm and flat, and the overlook grass is mowed. The site does not provide ADA-compliant access as it lacks accessible parking and access routes.

Vischer Ferry Tailrace Fishing Access:

The Vischer Ferry Fishing Access site is located on the north bank of the Mohawk River downstream of the Vischer Ferry powerhouse in the Town of Clifton Park. The site is owned and operated by the Licensee and consists of a paved access road, shoreline access, and access to the Erie Canal Towpath Community Connector trail. Access to the site is provided by the Project access road (Sugar Hill Road). A gravel parking area is available just off the access road adjacent to (and shared with) the Vischer Ferry Scenic Overlook.

As discussed above, the Project access road continues to the Project powerhouse, but motor vehicles are prohibited below the Scenic Overlook parking area. Recreationists follow the road down the moderate slope on foot or bicycle. Signage at the parking area directs trail users down the access road, and signage at the trail entrance identifies the site as a public fishing area and provides Project recreation information pursuant to 18 CFR § 8.2. From the entrance, a wide gravel trail with solid footing and a gentle grade continues downstream of the Powerhouse. In addition to providing access below the Project dam, this trail serves as the upstream terminus of the Erie Canal Towpath Community Connector trail. Short informal spur trails with moderate slopes and uneven footing lead from the improved trail to the shoreline access area.

The shoreline access area is open with little vegetation and gentle sand and gravel slopes toward the water. Scattered tree cover provides shade. Additional informal spur trails off the Erie Canal Towpath Community Connector trail provide dispersed shoreline access further downstream, where the shoreline becomes more heavily vegetated.

The site is in fair condition overall. During the onsite inventory, trash and debris were observed to litter the trail and shoreline. Minor erosion was observed on the spur trails leading from the gravel Erie Towpath Community Connector trail to the shoreline. The site does not provide ADA-compliant access due to the length and slope of Sugar Hill Road between the parking area and trailhead.

Lock 7 Boat Launch:

The Lock 7 Boat Launch is located on the south bank of the Mohawk River at Lock 7 in the Town of Niskayuna, directly across the river from the Vischer Ferry Project powerhouse. Access is provided by Lock 7 Road. The facility, which consists of a boat launch and parking area, was constructed by the Licensee and is maintained by the Town of Niskayuna. The site is integrated with the larger Lock 7 Park, operated by NYSCC, which includes a separate parking area, picnic area, and scenic overlook. The Erie Canalway Trail intersects with the site through the paved parking area. The paved parking area is located at the end of Lock 7 Road and provides unlined parking spaces for approximately 20 standard vehicles and five vehicles with trailers. As the parking lot is roughly square (approximately 90 feet by 110 feet), available parking may vary based on how vehicles are parked.

The boat launch is located upstream of Lock 7. The top of the ramp is asphalt, which extends from the parking area. The ramp transitions to concrete planks at the approximate water line. There are two lanes with a floating dock in the middle; however, during the onsite inventory the left lane (looking towards the river) was closed. It appeared that the subgrade under the planks had eroded, causing an irregular surface which could cause problems when launching.

The site was generally found to be in good to fair condition overall. The paved entrance and parking area are in good condition. As discussed above, at the time of the onsite inventory one lane of the boat ramp was closed. While the open lane appeared to be in good condition, water chestnut was encroaching on the ramp and had filled in the small backwater area surrounding the ramp. A narrow channel of open water through approximately two hundred feet of water chestnut led to the open channel of the Mohawk River.

The boat launch does not provide ADA-compliant parking or access. At the boat ramp, a three-inch-high lip between the asphalt approach and the floating dock prevents ADA compliance. The parking area lacks a designated ADA-compliant space.

Non-Project Public Recreation Facilities

During the 2021 Recreation Study there were nine (9) non-Project public recreation facilities identified as providing access to Project lands or waters. Included in the non-Project recreation facilities were boat launches for both trailered and hand-carry boats, picnic areas, hiking and biking trails, historic attractions, and formal and informal shoreline access. Amenities at each of the non-Project recreation facilities along with the estimated parking capacities are listed in Table 4-35. A full description of all non-Project recreation facilities can be found in the Recreation Study to be filed with the FERC as part of the USR.

Commercial Recreation Facilities

During the 2021 Recreation Study there were four (4) commercial recreation facilities identified (Schenectady Yacht Club, Waters Edge Lighthouse, Mohawk Valley Marine, and Mohawk Harbor). Amenities at each of the commercial recreation facilities along with the estimated parking capacities are listed in Table 4-35. A full description of all commercial recreation facilities can be found in the Recreation Study to be filed with the FERC as part of the USR.

4.9.1.2 Land Use

Land use classifications found throughout the Mohawk River Watershed are discussed in Section 4.2. The Crescent and Vischer Ferry Projects are located on the Mohawk River in eastern central New York within Albany County, Saratoga County, and Schenectady County, New York. The three surrounding counties are dominantly urban.

The Crescent Project is located in an area of small to medium-sized towns comprised of residences and commercial businesses interspersed with areas of small farms and small areas of undeveloped forestland. The Crescent Project is approximately four miles upstream of the confluence of the Mohawk and Hudson rivers, on the Saratoga and Albany County line. The impoundment created by Crescent Dam, extends roughly ten miles upstream of the dam to the Vischer Ferry Project located at Lock E-7.

The Vischer Ferry Project is located in a somewhat developed area located at Lock E-7. The impoundment, created by Vischer Ferry Dam, extends approximately 10 miles upstream of the dam to Lock E-8, located in the City of Schenectady. The land surrounding the Vischer Ferry Project is largely developed and dominantly characterized as high intensity development and medium intensity development.

4.9.1.2.1 Management of Project Lands

The State of New York owns the lands within the boundaries of the Projects, while lands surrounding Projects and immediately adjacent to the Project boundaries are owned by other entities, including private interests and municipalities. The Power Authority has an easement to the state-owned Project lands as part of the 1983 agreement with the State of New York. Lands within the boundaries of the Projects are managed in accordance with federal and state regulations. NYSCC has permitting authority within the boundaries of the Projects as governed by the Canal Real Property Management Policy (NYSCC, 2012). The NYSCC permit program is discussed in greater detail in Section 4.9.2.5. In general, Project operations and maintenance, along with recreation, are the primary activities that occur on Projects lands.

4.9.1.2.2 Protected Rivers

The Crescent and Vischer Ferry Projects are not located within or adjacent to any river segments that are designated as a part of, or under study for, inclusion in the National Wild and Scenic River System (National Wild and Scenic Rivers System, 2018) or included in the Nationwide Rivers Inventory (National Park Service [NPS], 2018a).

New York State's Wild, Scenic, and Recreational Rivers Act (WSRRA) protects rivers with outstanding scenic, ecological, recreational, historic, and scientific values (NYSDEC, 2018i). NYSDEC administers the WSRRA and has implemented regulations affecting the management, protection, enhancement, and control of land use and development on designated river areas. The Projects are not located within or adjacent to any river segments that are designated as part of the WSRRA.

4.9.1.2.3 National Trails System and National Wilderness Preservation System

No Projects lands are included in, or under study for inclusion in, the National Trails System (NPS, 2018b) or the National Wilderness Preservation System (The Wilderness Society, 2018).

4.9.1.2.4 Shoreline Management Policy

There are private residences adjacent to the Projects that use Project lands for informal recreational access. Applicants wishing to develop or use Project lands for dock installation or other similar activities are currently required to obtain authorization from NYPA in accordance with Article 42, the standard land-use article, which grants the Licensee the authority to grant permission for certain types of use and occupancy of Project lands and waters (i.e., non-Project use of Project lands). The types of use and occupancy of Project lands and waters for which a licensee may grant permission without prior Commission approval are set forth in Article 42 and include, for example, landscape plantings, non-commercial piers, landings, boat docks, or certain erosion control structures. Applicants must also obtain a permit for these uses from NYSCC. NYSCC may issue a 30-day revocable permit upon review by the Division Permit Engineer, the Division Canal Engineer, and the Office of Real Property Management. Permitting decisions are governed by the Guidelines and Procedures for the Disposal or Acquisition of Canal Corporation Real Property; the Canal Corporation Rules and Regulations; and the Canal Corporation's Occupancy and Work Permit Accommodation Guidelines (NYSCC, 2012).

In addition to the NYSCC permit, applicants may be required to obtain permits from the applicable towns, the NYSDEC, the U.S. Army Corps of Engineers (USACE), and the applicable jurisdictional municipalities.

4.9.1.2.5 Shoreline Buffer Zones

The Power Authority does not maintain a buffer zone around the Crescent and Vischer Ferry Project impoundments since the lands are in private and state ownership. However, a number of Town and NYSCC regulations are in place which govern use of the Project shorelines. Shoreline use and the maintenance of buffer zones varies between NYSCC and jurisdictional municipalities within the Projects areas.

4.9.1.3 Aesthetic Resources

4.9.1.3.1 Visual Character of Project Lands and Waters

The Projects are located in the Mohawk River Valley. Scenic elements of the river valley include both the river itself, as well as the portions of the river and locks which are all part of the historic Erie Canal segment of the New York State Barge Canal System. Interstate 87 and Rt. 9 both cross the Mohawk River and Crescent Project boundary. Cohoes Crescent Road runs along the southern side of the Crescent Project Boundary near the powerhouse. Both the Crescent Project powerhouse and dam are visible from Cohoes Crescent Road.

Western Gateway Bridge (Rt. 5), Rt. 29, and Rt. 146 cross the Mohawk River and Vischer Ferry Project boundary. Rt. 91 and Riverview Road runs just north of the Vischer Ferry Project boundary and portions of the river and Project are visible from the road.

Views of the Projects change with the seasons. As the deciduous trees lose their leaves, the views become less obstructed, and areas with no view in summer may offer limited or clear views of the Projects in winter. Seasonal changes in the full pool elevation of the Project impoundments with the installation and removal of flashboards does not alter the appearance of the impoundments or shorelines.

4.9.1.3.2 Scenic Attractions

Scenic views and public recreation opportunities are abundant along the lower Mohawk River in the vicinity of the Crescent and Vischer Ferry Projects and are discussed in detail in Section 4.9.1.

As discussed in Section 4.9.1, the Erie Canalway Trail is an attraction in the region. The trail stretches across over 350 miles of upstate New York. Portions of the trail travel along the Mohawk River in close proximity to the Project impoundments and offers views of the canal. The Vischer Ferry Nature and Historic Preserve is an Important Bird Area recognized by Audubon New York. It is located along the Crescent Project shoreline and offers trails and attracts birders.

The Mohawk Towpath Byway, a national scenic byway, is a network of local, county, state and federal highways that follow the historic route of the Erie Canal from Waterford and Cohoes to the historic Stockade District of Schenectady (Adirondack North Country Association, 2019). Communities along the way include Cohoes, Halfmoon, Colonie, Crescent, Vischer Ferry, and Rexford. The Mohawk Towpath Byway generally parallels the Crescent Project boundary from the Rt. 9 bridge to the I-87 bridge. The Byway follows Rt. 91 and Riverview Road just north of the Crescent and Vischer Ferry Project boundaries to Rexford, crosses the Vischer Ferry Project boundary at the Rt. 146 bridge and runs just south of the Vischer Ferry Project boundary to Schenectady.

As discussed in Section 4.9.1, there are several nature preserves and state parks in the vicinity of the Projects. Several provide notable scenic views. Peebles Island State Park, located at the confluence of the Hudson and Mohawk Rivers, offers spectacular river and rapids views and trails (New York State OPRHP, 2019). In Schenectady County, the Almy D. Coggleshall Plotter Kill Preserve in the Town of Rotterdam provides scenic views of three waterfalls.

The Town of Waterford is considered the Gateway to New York's Canals. The Hudson and Mohawk rivers merge in Waterford, while the Erie and Champlain Canals start in the Village of Waterford. Waterford is the home of the Waterford Flight of Locks, known for being the largest lift in the shortest distance of any lock system in the world. Other local attractions include the views of the river and rapids at Peebles State Park and the monument at Soldiers and Sailors Park (Guide to Albany's Capital Region, 2018).

4.9.2 Environmental Effects

4.9.2.1 Recreation Resources

In SD2, FERC identified the following issues related to recreational resources: (1) the adequacy of public access and recreational facilities to meet current and future recreation demand; and (2) the effects of continued operation and maintenance of the Projects on recreational opportunities and river access within the Project areas. Each of these issues is discussed in greater detail below.

There are numerous Project and non-Project recreation sites and facilities provided at the Projects to accommodate public recreational demand. Project recreation facilities include tailwater fishing areas, a picnic area, an overlook, and an impoundment boat launch (Vischer Ferry). Many other non-Project recreation sites and facilities provide additional recreation access to Project lands and waters, including boat launches, hiking and biking trails, picnic areas, and angler access areas. Activities supported by these sites include boating, fishing, hiking, biking, picnicking, sightseeing, and birdwatching.

Updated information on Project recreation site use, user perceptions, and projected recreation demand, based on the 2021 study results, will be provided in the USR and FLA. Based on the preliminary results of the 2021 recreation facility inventory, it is evident that there are numerous Project and non-Project public recreation sites that provide public access to Project waters. Prior Form 80 reports demonstrated that the Crescent and Vischer Ferry Project recreation sites have ample capacity to meet current and future demand. Once available, the 2021 Recreation Study results will provide an updated assessment of

recreation use at the Project recreation sites and an evaluation of whether the Project recreation sites have the capacity to meet current recreation demand.

No changes are proposed to the Power Authority's operation and maintenance of the Project recreation sites. Continued operation and maintenance of the Projects and Project recreation sites, as proposed, will ensure that these sites continue to provide public recreational access to Project waters.

4.9.2.2 Land Use Resources

In SD2, FERC identified the following issue related to land use resources: effects of continued operation and maintenance of the Projects on land use within the Project areas.

The continued operation and maintenance of the Projects, as proposed, will maintain the character of surrounding lands and will continue to provide recreational public access to Crescent and Vischer Ferry Reservoirs.

4.9.2.3 Aesthetic Resources

In SD2, FERC identified the following issue related to aesthetic resources: effects of continued operation and maintenance of the Projects on aesthetic resources within the Project areas.

No changes are proposed to the Power Authority's operation and maintenance of Project lands. Continued operation and maintenance of the Projects, as proposed, will maintain the existing aesthetics of the area.

4.9.3 Proposed Environmental Measures

4.9.3.1 Recreation Resources

The Power Authority proposes to continue existing operating conditions in the new license. More specifically, the Power Authority proposes to continue operation and maintenance of the Crescent Tailrace Bank Fishing Area, Crescent Picnic Area, Vischer Ferry Scenic Overlook, Vischer Ferry Fishing Access, and Lock 7 Boat Launch. The Power Authority is not proposing any changes with respect to recreation resources.

4.9.3.2 Land Use Resources

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to land use resources.

4.9.3.3 Aesthetic Resources

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to aesthetic resources.

4.9.4 Unavoidable Adverse Impacts

Continued operation of both Projects will not result in unavoidable adverse impacts to recreation, land use or aesthetic resources.

4.10 Cultural Resources

4.10.1 Affected Environment

The affected environment for cultural resources is defined by the Area of Potential Effects (APE). The Power Authority will submit an APE justification letter, map, and shapefiles, for both the Crescent and Vischer Ferry Projects, to the State Historic Preservation Office (SHPO) for their review. The Power Authority is proposing that the APE be the FERC Project boundary for both Projects. SHPO concurrence with the proposed APE for both Projects will be included in the FLA.

The archaeological sites located within the immediate area of the Projects are listed in the PAD. An updated search of CRIS and an updated list of previously identified archaeological sites within the APE will be included in the FLA.

4.10.1.1 Previously Identified Archaeological Sites

Previously reported archeological sites provide an overview of both types of archaeological sites (historic and precontact) that may be present in the Project area and the surrounding region. The presence of few reported sites, however, may result from a lack of previous systematic survey and does not necessarily indicate a decreased archeological sensitivity within the Projects.

An examination of CRIS identified a number of reported archeological sites within two miles of the Projects. At Crescent, twenty-five (25) historic archaeological sites, eight (8) unnamed New York State Museum (NYSM) Areas, and forty-five (45) precontact archaeological sites are located within 1 km of the Crescent Project area. At Vischer Ferry, nine (9) unnamed NYSM Areas and sixty (60) Precontact period archaeological sites occur within 1 km of the Vischer Ferry Project.

The archaeological sites located within the immediate are of the Projects are listed in the PAD. An updated search of CRIS And an updated list of previously identified archaeological sites will be prepared for the FLA.

4.10.1.2 Previously Identified Historic Properties

An examination of CRIS shows that both the Crescent and Vischer Ferry Projects are located entirely within the boundaries of the New York State Barge Canal Historic District, listed on the NRHP, and recently designated a National Historic Landmark (NHL).

At Crescent, three of the NHL's contributing historic resources are located within the Crescent Project Boundary, including the Crescent Dam, Crescent Hydroelectric Plant, and Guard Gate Road Bridge. There are six additional inventoried historic resources located adjacent to the Crescent Project Boundary on the banks of the Mohawk River. These six are outside the boundaries of the New York State Barge Canal Historic District and are not contributing resources to it.

At Vischer Ferry, three of the NHL's contributing historic resources are located within the Vischer Ferry Project Boundary, including the Vischer Ferry Dam, the Vischer Ferry Hydroelectric Plant, and Lock E-7 – Vischer Ferry. There are three additional inventoried historic resources located adjacent to the Vischer Ferry Project Boundary on the banks of the Mohawk River. These three are outside the boundaries of the New York State Barge Canal Historic District and are not contributing resources to it.

The inventoried historic architectural resources within or adjacent to the Crescent Project and Vischer Ferry

Projects are listed in the PAD.

4.10.1.3 Precontact Background

Archaeologists have divided the Precontact period culture history of New York into three general periods: Paleoindian (12000 to 9000 years ago), Archaic (9000 to 3000 years ago) and Woodland (3000 to Contact, ca.500 years ago). These periods are further subdivided into the Early (9000 to 7000 years ago), Middle (7000 to 5500 years ago) and Late (5500 to 3000 years ago) Archaic periods and the Early (3000 to 1700 years ago), Middle (1700 to 1200 years ago) and Late (1200 to 500 years ago) Woodland periods. The Late Woodland period ends with European contact which ushers in the Contact period (500 to 300 years ago) and finally the Historic period extends from 300 years ago to present.

The Paleoindian Period (ca. 12000 –9000 years ago)

The first evidence of human occupation in New York State dates to the Paleoindian period, which occurred shortly after the final retreat of the Laurentide Ice Sheet. The environment and climate of this period was in rapid flux, with dramatic warming and cooling periods. As the megafauna, such as mammoth, mastodons, and large carnivores of the Pleistocene became extinct, human hunters in New York focused on new strategies for taking caribou, elk, and deer.

Some of the best known Paleoindian period sites documented in the Northeast are located in the Hudson River Valley, south of where the Projects are located. These include West Athens Hill, the Kings Road, and Dutchess Quarry Cave (Funk,1976; Ritchie,1981).

West Athens Hill is located in Greene County on a Normanskill flint-bearing ridge and was interpreted as a Paleoindian period workshop, based on evidence for quarrying stone and the presence of blocky cores (Funk,1976). Funk additionally concludes the area was used repeatedly as a seasonal campsite with families occupying their own space.

The Kings Road site is situated north of West Athens Hill on clay flats between West Athens and West Coxsackie. A large collection of chipped stone tools, many of which were manufactured from Pennsylvania jasper were recovered from the site.

Dutchess Quarry Cave is located in Orange County. The site consists of a solution cavity in a dolomite cliff. A fluted point was found associated with caribou bone fragments, and an uncorrected radiocarbon date of 10,580 B.C +/-370 was obtained on the bone. Funk interprets this location as a hunter's temporary refuge (1976:223).

Funk (1976) and Ritchie (1981) summarize that whatever long distance movement of people and/or lithic materials may have been occurring during the Paleoindian period, the local supplies of high-grade lithic material (Normanskill and Coxackie cherts) in the Hudson Valley area meant that the first migrants into the area did not have to travel far for tool making materials. Funk goes on to conclude that such site locations may have been part of a large exchange network involving contact with other hunting and gathering bands centered in Pennsylvania (1976:223).

The Archaic Period (ca. 9000 –3000 years ago)

The climate continued to warm during the Archaic period allowing modern-day plants and animals to establish themselves in the region (Ritchie,1981). Human populations slowly increased and began exploiting a much wider range of animals, and especially plants, than they had in the preceding Paleoindian period. During the Archaic period, mobility was influenced by the extraction of food and other subsistence resources within limited areas. Seasonal campsites by small bands were common, and food procurement became a seasonal activity as well.

The Archaic period is typically divided into three subperiods: Early, Middle, and Late. Their archaeological expression varies by region. In general, the Archaic period is defined in terms of broad-spectrum foraging patterns and settlement patterns adapted to modern environments of the Holocene Epoch (Ritchie,1981). Early and Middle Archaic period sites in the Hudson River Valley tend to be small, and characterized largely by lithics only, with few organic remains preserved. As a result, archaeologists have relied on using classic sequences of projectile point typologies to flesh out the framework of the Archaic.

Archaeological sites are much more abundant in the Late Archaic throughout the region. Laurentian tradition sites are the most common Late Archaic manifestation, and sites containing Vergennes phase artifacts (Otter Creek points, gouges, ground slate points, ulus and plummets) are well known in the Hudson River Valley (Ritchie,1969, 1981). Funk (1976) observed that Vergennes phase sites increased in frequency from south to north into the upper Hudson Valley.

The sequence of Archaic point styles, from Vergennes phase to Vosburg phase and later small-stemmed point and Susquehanna, has been identified from sites in the Upper Hudson Valley with stratigraphic integrity. For example, the Lotus Point site contained one Otter Creek point in stratum five. Stratum four produced Vosburg points, as well as broad stemmed, narrow stemmed and narrow side-notched points. Other nearby sites in the with similar components are Fish Club Cave, near Ravenna, and the Hound Dog Rockshelter, in Greene County. The latter site contained two stratigraphic units. The lowest unit produced one Otter Creek point base.

Sites containing transitional or terminal Archaic period deposits are also known from the Upper Hudson Valley (Ritchie,1981). These sites often contain cultural materials clearly attributed to the Woodland period as well. Sites containing transitional lithic artifacts, i.e., Orient Fishtail projectile points, include the Tufano site, which is located at Fourmile Point in the Hudson River north of Athens, Greene County; the Bronck House Rockshelter, which is located in Coxsackie Township, Greene County; and the Zimmerman Rockshelter, which is located in close proximity to the Bronck site and is another small rockshelter within the limestone face of the Helderberg escarpment.

The Woodland Period (3,000 –Contact)

Following the Archaic, the Woodland period is marked by increased sedentism population density. Like the Archaic period, it is also divided into three subperiods, Early, Middle and Late. The manufacture and use of clay vessels for a whole range of activities is adopted and replaced earlier vessel-making techniques that relied on the use of soft stone. There is evidence of large-scale storing of food resources in pits excavated into the ground and in large ceramic vessels. Populations began settling in more resource-rich lowlands. By A.D. 1100, the Northern Iroquoian linguistic culture began moving up the Susquehanna Valley and east into the Mohawk Valley (Snow, 1994). During this phase, palisades and earthworks begin to appear in the archeological record, along with well-defined agricultural practices and Longhouse settlement. As Dean

Snow notes (1994), this period is also characterized by increased warfare and elaborate matrilocal settlement patterns. The late Woodland period, the last stage of Precontact history in the Northeast, was characterized by population expansion that resulted in the development of the nations and tribes that were later encountered by European settlers, such as the Iroquois. It is also a time when the first contact with Europeans occur, which sets the stage for enormous changes and upheavals in Native American cultural groups.

Few Early Woodland period sites are reported from the Upper Hudson River Valley. Important but well documented sites from the area are predominately Middle Woodland period in age. For example, the Tufano site is a very rich, Middle Woodland habitation site with numerous burials, pit features, hearths and post molds. A radiocarbon date returned a date of A.D. 700 +-100 years (Y-1382). The artifact assemblage is typical of the Middle Woodland period and includes diagnostic ceramics (Point Peninsula, Jack's Reef). Diagnostic projectile point forms include Levanna, Jack's Reef Pentagonal, Fox Creek, and Rossville. Faunal and floral remains from the numerous pit features identified on the site provided data on subsistence practices. White-tailed deer and sea sturgeon were the most common food species identified with much lesser numbers of black bear, turkey, woodchuck and turtle. Charred hickory nuts suggest a fall occupation. Another well documented Middle Woodland location is the Black Rock Site, which is a large open-air site near the Hudson River in Athens, Greene County. As with the Tufano Site, the Black Rock Site contained numerous burials and pit features, assignable "almost exclusively" to the late Middle Woodland (Funk,1976). The majority of ceramics are late Point Peninsula (Kipp Island phase), associated with Levanna and Jack's Reef projectile point types. A radiocarbon date of A.D. 850 +/-95 years (I-3444) supports the late Middle Woodland designation. Also like Tufano, white-tailed deer and sea sturgeon are the highest represented species in the faunal list, with a wide variety of other species present. No floral remains were recovered.

Late Woodland period sites are not unknown from the Upper Hudson River Valley, but they appear to be much less common than Middle Woodland sites. Of particular note is Bronck House Rockshelter where the uppermost cultural stratum was designated Late Woodland II (historic Iroquoian) based on the presence of trade goods and diagnostic Iroquoian pottery (Kingston Incised and Oak Hill) (Funk,1976).

4.10.1.4 Historic Background

When European settlers arrived, the Mohawk River valley was predominantly inhabited by the Mohawk Nation whose original homelands included the northeastern region of New York State extending into southern Canada and Vermont. Through the centuries Mohawk influence extended far beyond their territory and was felt by the Dutch who settled on the Hudson River and in Manhattan. The Mohawks' location as the Iroquois nation closest to Albany and Montreal, and the fur traders there, gave them considerable influence among the other nations. (Saint Regis Mohawk Tribe, 2019). As the Mohawk River valley became more populated by European settlers, the Mohawks began to withdraw from the Mohawk Valley in the mid 1700's.

Schenectady owes its existence and much of its prosperity to its location on the Mohawk River. In 1661, Arendt Van Curler, the eventual founder of Schenectady, and fourteen others were granted permission by Governor Stuyvesant to purchase a tract of land on the lower Mohawk River called the "Great Flat." Shortly after permission was granted house lots were created and streets were laid out in a grid pattern. The cities of Schenectady and Rotterdam presently occupy this land.

In 1684, the settlers in Schenectady, who numbered approximately 400, obtained a patent for 128 square miles that included the present-day City of Schenectady and the Towns of Rotterdam, Princetown, Glenville and a portion of Niskayuna. Schenectady's strategic location on the Mohawk River resulted in frequent attacks during the French and Indian War, which discouraged settlement for decades.

In 1798, the city of Schenectady was incorporated and Schenectady County was divided from Albany County in 1809 (Macpherson,2002).

After the Revolutionary War, the Inland Navigation Company constructed several short canals and locks along the Mohawk River and its tributaries. These transportation improvements led to the construction of wharves, docks and storehouses along Main Binne Kill and by 1795, the area became known for its boatbuilding capabilities.

The 1800s saw continued improvement in local transportation infrastructure. The Erie and Champlain canals were dug through the towns of Schenectady, Rotterdam and Colonie in 1825.The first two railroads in the state were centered in Schenectady, the Mohawk and Hudson in 1831 and the Schenectady and Saratoga in 1832 (Macpherson 2002).

By 1860, the area's fertile river valleys supported intensive agriculture and dairy farming. Census records show large quantities of grain, hay, apples, potatoes, butter, and cheese being produced in the area.

In the 1880s, Thomas Edison moved his Edison Machine Works to Schenectady, bringing with it jobs and a strong economic engine for the region. In 1892, Edison General Electric merged with Thomson-Houston Electric Company to form General Electric and maintained its headquarters in Schenectady for many years thereafter. Other large companies operating in the Schenectady area have included the American Locomotive Company (a.k.a. Alco), the United States Army Depot and the United States Navy Depot. More recently, the city of Schenectady has seen its population and industry decline as residents moved to the suburbs of Glenville and Rotterdam (Macpherson,2002).

The first settlers arrived in the Town of Glenville in 1665. By 1824 the town had 2,415 residents, 3 churches, 2 grist mills, 6 sawmills and 9 schoolhouses among other enterprises. Glenville's population hovered around 2,500 for most of the 19th century. The founding of the General Electric Company in 1892 led to a demand for workers and drove steady population growth in Glenville until present. By 1970, the town had 28,000 residents (Macpherson,2002).

Glenville is the only town in Schenectady County north of the Mohawk River. As a result, ferries and bridges have been important to the town's history. In the 18th century, agricultural products from the more rural Glenville were transported to the more densely populated areas of Schenectady by at least 3 ferries. The first bridge between Glenville and Schenectady opened in 1809. Canals and railroads came to Glenville as they did the surrounding area. Saw and grist mills developed during the 19th century, but the most important industry was broom manufacture. Agricultural centers were concentrated in the southern portion of town along the alluvial flats of the Mohawk River, while the mill industry was located in the uplands along streams (Macpherson,2002).

Between 1817 and 1825, the original Erie Canal was constructed. The canal traversed 363 miles from Albany to Buffalo, connecting the Hudson River to the Great Lakes. At the time of its construction, the Erie

Canal was the longest artificial waterway and the greatest public works project in North America. The canal put New York on the map, transformed New York City into the nation's principal seaport, and opened the interior of North America to settlement (ECNHC, 2019c).

The construction of the Erie Canal, and the New York canal building boom that followed, dramatically accelerated the dispossession and disruption of the traditional ways of life of the region's Native Americans. Native peoples withdrew from their ancestral lands and many were sent to reservations.

The Erie Canal quickly became an important transportation corridor. Originally four feet deep and 40 feet wide, the Erie Canal cut through fields, forests, rocky cliffs, and swamps, crossed rivers on aqueducts, and overcame hills with 83 lift locks. The Erie Canal was the engineering and construction triumph of its day. Canal packet boat passengers traveled in relative comfort from Albany to Buffalo in days rather than weeks and freight boats carried Midwestern produce from Buffalo to Albany, then on to New York City (ECNHC, 2019c).

Over the years, the Erie Canal was expanded. In 1903 the New York State legislature authorized construction of the New York State Barge Canal as an improvement to the Erie Canal. Construction of the Barge Canal began in 1905 and was completed in 1918. The current Crescent and Vischer Ferry Project dams were constructed as part of the Barge Canal Construction in 1912 and the segments of the earlier iterations of the Erie Canal in this area were abandoned. In the early 1920s the existing powerhouses were added to the dam sites, and in the 1980s the current powerhouses were expanded to add two new generating units at each Project (ECNHC, 2019c).

In 2000, the U.S. Congress recognized the Erie Canal's historic significance by establishing the Erie Canalway National Heritage Corridor. The Corridor spans 524 miles across the full expanse of upstate New York. It includes the Erie, Cayuga-Seneca, Oswego, and Champlain Canals and their historic alignments. The Corridor encompasses 4,834 square miles in 23 counties and is managed by the Erie Canalway National Heritage Corridor, in partnership with the National Park Service and numerous local, state, and federal partners. The Crescent and Vischer Ferry Projects both lie along the Canalway National Heritage Corridor (ECNHC, 2019c). National Register of Historic Places listing for the New York State Barge Canal followed in October 2014. The Barge Canal was listed as a National Historic Landmark in January 2017.

4.10.2 Environmental Effects

In SD2, FERC identified the following issues related to cultural resources: (1) effects of continued operation and maintenance of the Projects on historic properties and archaeological resources that are included in, eligible for listing in, or potentially eligible for inclusion in the National Register of Historic Places (NRHP), and (2) effects of continued operation and maintenance of the projects on any previously unidentified historic or archaeological resources or traditional cultural properties that may be eligible for inclusion in the National Register of Historic Places.

The Power Authority is not proposing any changes in the operation of the Projects that would affect any potential archaeological resources that may exist within the Project's APEs. The Power Authority is not proposing the construction of any new Project facilities or recreation facilities or ground disturbing activities that have the potential to impact NRHP-listed or eligible historic properties. An updated list of historic architectural resources within the APE will be included in the FLA.

4.10.3 Proposed Environmental Measures

The Crescent and Vischer Ferry dams and their associated impoundments are contributing properties of the New York State Barge Canal, which was designated as a National Historic Landmark in January 2016. As such, the Crescent and Vischer Ferry Project elements are covered under the Historic Properties Management Plan (HPMP) that is in development for the New York State Barge Canal National Historic Landmark. For this reason, and because, as noted above, continued operation and maintenance the Projects will be done in accordance with the provisions of the HPMP for the Barge Canal, the Power Authority believes that development of an HPMP is not warranted. However, the Power Authority will consult with the SHPO and NYSCC, as appropriate, in the event that future Project maintenance is required that could potentially have an adverse effect on cultural resources.

4.10.4 Unavoidable Adverse Impacts

Continued operation of the Projects will not result in unavoidable adverse effects to cultural resources.

4.11 Socioeconomics

4.11.1 Affected Environment

4.11.1.1 Development Patterns

The Crescent and Vischer Ferry Projects lie within five towns and three counties in the state of New York: the Town of Colonie in Albany County (Crescent Project); the Towns of Clifton Park (Crescent and Vischer Ferry Projects), Halfmoon (Crescent Project), and Waterford (Crescent Project) in Saratoga County; and the Town of Niskayuna (Crescent and Vischer Ferry Projects) in Schenectady County. The three surrounding counties are dominantly urban, ranging from 70 percent in Saratoga County to 92 percent in Schenectady County (Table 4-36). The five surrounding towns are dominantly urban ranging from 85 percent in the Town of Clifton Park to 100 percent in the Town of Niskayuna. Population densities within the surrounding towns range from 787.7 persons per square mile in the Town of Halfmoon to 1,645.1 persons per square mile in the Town of Niskayuna. In comparison, Albany County has 602.2 persons per square mile, Saratoga County has 290.8 persons per square mile, and Schenectady County has 772.8 persons per square mile. The population density for the State of New York is 428.7 persons per square mile.

Housing unit densities have a similar trend when compared to population densities, ranging from 302.1 units per square mile in the Town of Halfmoon to 636.4 units per square mile in the Town of Niskayuna. In comparison, Albany County has 263.5 units per square mile, Saratoga County has 121.8 units per square mile, and Schenectady County has 333.5 units per square mile (Table 4-36).

At 7.8 percent the vacancy rate of Schenectady County is lower than that of the State of New York at 9.11. With Albany County's vacancy rate at 9.11, its vacancy rate is approximately the same as that of New York State's. However, Saratoga County has a higher vacancy rate at 10.6 percent. The five towns abutting the Projects have a lower vacancy rate than the State of New York with a range of 4.63 percent in the Town of Niskayuna to 7.63 percent in the Town of Waterford (Table 4-37). In Saratoga County, the high vacancy rate seems to reflect the high percentage of seasonal housing with 53.1 percent of its housing stock in seasonal use.

4.11.1.2 Population Patterns and Projections

4.11.1.2.1 Current and Historical Population

Current and historical population projections for the municipalities abutting the Crescent and Vischer Ferry Projects are depicted in Table 4-38. Between 2000 and 2020, the population in the State of New York increased by 6.5 percent. The population of Albany County during the same time frame increased by 6.9 percent and the population of the Town of Colonie increased similarly by 8.0 percent. The population of Saratoga County during the same time frame increased by 17.4 percent. The population of the Town of Clifton Park increased by 15.3 percent while the population of the Town of Halfmoon increased by a staggering 38.9 percent and the population of the Town of Waterford decreased by 3.6 percent. The population of Schenectady County during the same time frame increased by 7.9 percent while the population of the Town of Niskayuna increased by 14.7 percent.

4.11.1.2.2 Projected Changes in Population

Cornell University's Program on Applied Demographics has developed county-level population projections for the State of New York in ten-year increments through the year 2040. The projections are based on rates of change from historical data collected by the U.S. Census Bureau. Population counts from the 2010 U.S. Census serve as the starting point for projections. As shown in Table 4-39 the population of Albany County is projected to increase through the year 2040, the population of Saratoga County is projected to increase through 2030 and steadily level off by 2040, and the population of Schenectady County is projected to increase from 2020 to 2030 and then level off through 2040. Of the three counties, by 2040, Saratoga County will have increased the most, at a rate of 15% growth from that its 2010 population. The population of the State of New York is projected to steadily increase from 2010 until 2030 and then steadily level off through 2040.

4.11.1.3 Economic and Employment Patterns

4.11.1.3.1 Labor Force and Unemployment

Labor force and unemployment estimates (2019) for the municipalities abutting the Projects are provided in Table 4-40. Schenectady County, with a 5.4 percent unemployment rate, is similar to the State of New York's unemployment rate of 4.4 percent. The unemployment rates for the other municipalities and counties abutting the Projects are all below the State of New York's unemployment rate, ranging from 2.8 percent in the Town of Clifton Park to 5.8 percent in Albany County.

Income and Poverty

Most of the municipalities abutting the Projects have higher median household incomes than the State of New York, except for Albany County, Schenectady County, and the Town of Waterford. They range between 4.6 and 3.3 percent lower the New York State median household income. All of the abutting municipalities have a higher median household income than the United States ranging from 8 to 79 percent higher than the U.S median income of $62,843. Of the abutting municipalities, Schenectady County has the lowest per capita income (about 13.6 percent lower than the State of New York and 4.9 percent lower than the United States) and the Town of Clifton Park has the highest per capita income (about 24.8 percent higher than the State of New York and 43.9 percent higher than the United States). Schenectady County also has the second highest poverty rate, with 11.4 percent of all residents earning below the poverty

threshold, and the Town of Niskayuna has the lowest poverty rate, with 3.4 percent of all residents earning below the poverty threshold. Albany County has the highest poverty rate with 11.9 percent of all residents earning below the poverty threshold, see Table 4-43.

4.11.1.3.2 Industry and Occupation

Table 4-44 depicts occupation categories for the abutting municipalities and the State of New York. Management, business, science and arts was the highest reported occupation category for all abutting municipalities and the State of New York. Natural resources, construction, and maintenance was the lowest reported occupation category for the majority of the abutting municipalities as well as for the State of New York.

Table 4-36 Place of Residence and Density, 2020

	Place of Residence: Urban (2010*)	Place of Residence: Rural (2010*)	Population	Persons Per Square Mile	Housing Units	Housing Units Per Square Mile	Location[1]
Albany County	90%	10%	314,848	602.2	146,131	263.5	C
Town of Colonie	99%	1%	85,590	1,530.0	37,118	618.8	C
Saratoga County	70%	30%	235,509	290.8	109,919	121.8	C, VF
Town of Clifton Park	85%	15%	38,029	789.0	15,741	305.7	C, VF
Town of Halfmoon	86%	14%	25,662	787.7	11,892	302.1	C
Town of Waterford	93%	7%	8,208	1,249.3	3,969	593.4	C
Schenectady County	92%	8%	158,061	772.8	70,794	333.5	C, VF
Town of Niskayuna	100%	0%	23,278	1,645.1	8,606	636.4	C, VF
State of New York	88%	12%	20,201249	428.7	8,488,066	172.1	C, VF

Source: Census, 2020a.
*Most recent data from 2010
[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4-37 Housing Characteristics, 2010, 2020 (% of Total Units)

	Housing Units: Total	Occupancy Status: Occupied	Occupancy Status: Vacant	Seasonal Use (2010*)	Location[1]
Albany County	146,131	90.89%	9.11%	14.30%	C
Town of Colonie	37,118	94.46%	5.54%	14.00%	C
Saratoga County	109,919	89.84%	10.16%	53.10%	C, VF
Town of Clifton Park	15,741	95.37%	4.63%	13.10%	C, VF
Town of Halfmoon	11,892	94.62%	5.38%	14.00%	C
Town of Waterford	3,969	92.37%	7.63%	13.70%	C
Schenectady County	70,794	91.76%	8.24%	7.50%	C, VF
Town of Niskayuna	8606	94.52%	5.48%	22.20%	C, VF
State of New York	8,488,066	90.896%	9.11%	36.60%	C, VF

Source: Census, 2020a.
*Most recent data available for seasonal use from 2010; all other data is 2020
[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4-38 Population, 2000 through 2020

	2000	2010	2020	Location[1]
Albany County	294,565	304,204	314,848	C
Change		3.3%	3.5%	
Cumulative from 2000		3.3%	6.9%	
Town of Colonie	79,258	81,591	85,590	C
Change		2.9%	4.9%	
Cumulative from 2000		2.9%	8.0%	
Saratoga County	200,635	219,607	235,509	C, VF
Change		9.5%	7.2%	
Cumulative from 2000		9.5%	17.4%	
Town of Clifton Park	32,995	36,705	38,029	C, VF
Change		11.2%	3.6%	
Cumulative from 2000		11.2%	15.3%	
Town of Halfmoon	18,474	21,535	25,662	C
Change		16.6%	19.1%	
Cumulative from 2000		16.6%	38.9%	
Town of Waterford	8,515	8,423	8,208	C
Change		-1.0%	-2.6%	
Cumulative from 2000		-1.0%	-3.6%	
Schenectady County	146,555	154,727	158,061	C, VF
Change		5.6%	2.2%	
Cumulative from 2000		5.6%	7.9%	
Town of Niskayuna	20,295	21,781	23,278	C, VF
Change		7.3%	6.9%	
Cumulative from 2000		7.3%	14.7%	
State of New York	18,976,457	19,378,102	20,201,249	C, VF
Change		2.1%	4.2%	
Cumulative from 2000		2.1%	6.5%	

Source: (Census 2016a, Census 2020).
[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4-39 Population Projections, 2010 through 2040

	2010 Est.	2020 Est.	2030 Proj.	2040 Proj.	Location[1]
Albany County	304,204	312,945	322,394	328,968	C
Change		2.9%	3.0%	2.0%	
Cumulative from 2010		2.9%	6.0%	8.1%	
Saratoga County	219,607	234,009	246,743	252,521	C, VF
Change		6.6%	5.4%	2.3%	
Cumulative from 2010		6.6%	12.4%	15.0%	
Schenectady County	154,727	156,103	157,575	156,356	C, VF
Change		0.89%	0.94%	-0.77%	
Cumulative from 2010		0.89%	1.8%	1.1%	
State of New York	19,378,102	20,146,131	20,604,030	20,794,907	C, VF
Change		4.0%	2.3%	0.93%	
Cumulative from 2010		4.0%	6.3%	7.3%	

Source: Vink, 2018.
[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4-40 Labor Force and Unemployment, 2019 Estimates

	Labor Force	Unemployment	Location[1]
Albany County	168,364	4.5%	C
Town of Colonie	45,382	3.1%	C
Saratoga County	124,204	3.5%	C, VF
Town of Clifton Park	19,193	2.1%	C, VF
Town of Halfmoon	14,075	3.0%	C
Town of Waterford	5,141	5.9%	C
Schenectady County	78,055	6.6%	C, VF
Town of Niskayuna	10,613	5.3%	C, VF
State of New York	10,045,829	5.5%	C, VF

Source: Census 2019a.
[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4-41 Median Household Income in Past 12 Months (in 2019 dollars), 2015-2019

	Median Household Income	Percentage of State	Percentage of U.S.[1]	Location[2]
Albany County	$66,252	96.7%	105.4%	C
Town of Colonie	$80,921	118.2%	128.8%	C
Saratoga County	$84,291	123.1%	134.1%	C, VF
Town of Clifton Park	$108,116	157.9%	172.0%	C, VF
Town of Halfmoon	$87,169	127.3%	138.7%	C
Town of Waterford	$66,184	96.6%	105.3%	C
Schenectady County	$65,499	95.6%	104.2%	C, VF
Town of Niskayuna	$110,855	161.9%	176.4%	C, VF
State of New York	$68,486	100%	109.0%	C, VF

Source: Census 2019b
[1]U.S. Median Household Income: $62,843
[2] C = Crescent Project; VF = Vischer Ferry Project

Table 4-42 Per Capita Income in Past 12 Months (in 2019 dollars), 2015-2019

	Per Capita Income	Percentage of State	Percentage of U.S.[1]	Location[2]
Albany County	$37,635	95.7%	110.4%	C
Town of Colonie	$40,310	102.5%	118.2%	C
Saratoga County	$43,065	109.51%	126.3%	C, VF
Town of Clifton Park	$49,082	124.8%	144.0%	C, VF
Town of Halfmoon	$45,654	116.1%	133.9%	C
Town of Waterford	$35,819	91.1%	105.0%	C
Schenectady County	$32,417	82.4%	95.1%	C, VF
Town of Niskayuna	$49,789	126.6%	146.0%	C, VF
State of New York	$39,326	100%	115.3%	C, VF

Source: Census 2019b
[1]U.S. Per Capita Income: $34,103
[2] C = Crescent Project; VF = Vischer Ferry Project

Table 4-43 Poverty Status, 2019

	Poverty Status: All People	Poverty Status: Under 18 Years	Poverty Status: 18-64 Years	Poverty Status: Over 65 Years	Location[1]
Albany County	11.9%	16.3%	12.1%	5.7%	C
Town of Colonie	5.8%	7.7%	5.3%	5.5%	C
Saratoga County	5.8%	6.7%	5.9%	4.7%	C, VF
Town of Clifton Park	3.7%	3.0%	4.4%	2.2%	C, VF
Town of Halfmoon	5.1%	4.7%	4.6%	7.5%	C
Town of Waterford	5.8%	6.9%	5.9%	3.2%	C
Schenectady County	11.4%	16.9%	10.6%	7.6%	C, VF
Town of Niskayuna	3.4%	2.5%	3.7%	3.8%	C, VF
State of New York	14.1%	19.6%	12.8%	11.5%	C, VF

Source: Census, 2019c.
[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4-44 Occupations for Civilian Population 16 Years and Over, 2019

	Albany County	Town of Colonie	Saratoga County	Town of Clifton Park	Town of Halfmoon	Town of Waterford	Schenectady County	Town of Niskayuna	State of New York
Management, Business, Science, and Arts	73,784	20,995	55,841	10,842	6,430	1,938	28,593	6,461	3,937,580
Service	28,679	7,100	17,513	1,876	1,746	846	13,481	684	1,900,360
Sales and Office	36,957	10,407	26,441	4,173	3,454	1,102	17,732	2,099	2,032,222
Natural Resources, Construction, and Maintenance	8,660	2,362	9,308	1,026	1,001	392	4,933	399	677,985
Production, Transportation, and Material Moving	12,681	3,108	10,793	877	1,028	559	8,199	411	950,173

Source: Census, 2019d.

4.11.2 Environmental Effects

4.11.3 Proposed Environmental Measures

FERC did not identify any issues pertaining to socioeconomic resources in SD1 or SD2.

4.11.4 Unavoidable Adverse Impacts

There are currently no known issues related to socioeconomic resources at the Crescent and Vischer Ferry Projects. As a result, no further studies for this resource are necessary or proposed.

4.12 Tribal Resources

4.12.1 Affected Environment

There are no Native American lands within the boundaries of the Projects. Currently, there are several known properties of traditional cultural significance (i.e., traditional cultural properties or TCPs) or religious properties or National Register-eligible sites associated with Native American nations within the boundaries of the Projects.

FERC contacted two Native American nations to solicit their interest in participating in the relicensing process for the Projects; the Saint Regis Mohawk Tribe and the Stockbridge Munsee Community, Wisconsin. The New York State OPRHP, Division for Historic Preservation also identified the Delaware Tribe, Mohawk Nation, and Mohican Tribe as potentially having an interest in the Project areas. The Power Authority contacted the nations potentially having an interest in the Project areas to request any existing, relevant, and reasonably available information with respect to resources of concern. St. Regis Mohawk Tribe were consulted for the relicensing of the Project.

4.12.2 Environmental Effects

FERC did not identify any issues pertaining to Tribal Resources in SD1 or SD2. Given that the Power Authority proposes to continue the existing operating conditions, there will no impact to the TCPs or religious properties within the Project boundaries.

4.12.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to tribal resources.

4.12.4 Unavoidable Adverse Impacts

Continued operation of the Projects will not result in unavoidable adverse effects to Tribal resources.

5 Developmental Analysis

This section analyzes the cost of continued operation and maintenance of the Projects under the No Action and Proposed Alternatives. Costs are associated with the operation and maintenance of the Project's facilities as well as the cost of providing proposed PME measures.

5.1 Power and Economic Benefits off the Project

An analysis will be provided in the Final License Application.

5.2 Comparison of Alternatives

An analysis will be provided in the Final License Application.

5.3 Cost of Environmental Measures

An analysis will be provided in the Final License Application.

6 Conclusions and Recommendations

6.1 Comparison of Alternatives

An analysis will be provided in the Final License Application.

6.2 Comprehensive Development and Recommended Alternative

[This section will be completed by FERC in its NEPA document.]

6.3 Unavoidable Adverse Impacts

The Power Authority is proposing no changes to the Projects or their operation. The Power Authority is proposing to continue to implement existing environmental measures including:

- Continued operation of the Projects as run-or-river with minimal impoundment fluctuations;
- Continued provision of minimum flows at both Projects, as currently required;
- Continued operation of the existing acoustic deterrent system and provision of downstream fish passage bypasses (flashboard openings) at both Projects;
- Continued operation and maintenance of the Project recreation sites; and
- Continued operation of the Projects in close coordination with the Barge Canal System to ensure that the navigational purposes of the Projects are maintained.

Continued operation of the Projects as proposed will minimize impacts to resources and as such there are minimal unavoidable adverse impacts associated with continued Project operations. The continued operation of the Projects in this manner is not expected to adversely affect geology and soils; water quantity; wildlife and botanical resources; wetlands, riparian, or littoral habitat; RTE species; recreation, land use, and aesthetic resources; socioeconomic resources; or cultural and tribal resources. Regarding fish and aquatic resources, while the entrainment risk to fish species is low, some entrainment of fish is likely to occur at the Projects.

6.4 Consistency with Comprehensive Plans

Section 10(a)(2) of the FPA requires the Power Authority to review applicable federal and state comprehensive plans, and to consider the extent to which a project is consistent with the federal or state plans for improving, developing, or conserving a waterway or waterways affected by the Project. A list of existing FERC-approved State of New York and federal plans was obtained from the Commission's website as of September 2021 (FERC 2021). FERC currently lists 50 comprehensive plans for the State of New York. Of those, the Power Authority identified the following plans as pertaining to waters in the vicinity of the Projects. No inconsistencies were found.

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