UNITED STATES OF AMERICA

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

FINAL APPLICATION FOR NEW LICENSE FOR MAJOR PROJECT - EXISTING DAM

EXHIBIT E – ENVIRONMENTAL REPORT

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CRESCENT AND VISCHER FERRY HYDROELECTRIC PROJECTS RELICENSING

FERC NO. 4678 AND 4679

NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

Table of Contents

1 Introduction 1
1.1 Application 1
1.2 Purpose of Action and Need for Power 1
1.3 Public Review and Comment 2
1.3.1 Scoping 2
1.3.2 Studies 2
2 Statutory and Regulatory Requirements 4
2.1 Federal Power Act 4
2.1.1 Section 18 Fishway Prescriptions 4
2.1.2 Section 10(j) Recommendations 4
2.2 Clean Water Act 4
2.3 Endangered Species Act 5
2.4 Coastal Zone Management Act 5
2.5 National Historic Preservation Act 5
2.6 Magnuson-Stevens Fishery Conservation and Management Act 6
3 Proposed Actions and Alternatives 7
3.1 No-Action Alternative 7
3.1.1 Existing Projects Locations and Lands 7
3.1.2 Existing Project Facilities 11
3.1.3 Project Operations 14
3.1.4 Existing Environmental Measures 15
3.2 Applicant's Proposal 16
3.2.1 Proposed Project Facilities and Operations 16
3.2.2 Proposed Environmental Measures 16
3.3 Alternatives Considered but Eliminated from Further Analysis 17
3.3.1 Federal Government Takeover of the Project 17
3.3.2 Issuing a Non-Power License 17
3.3.3 Retiring the Project 18
4 Environmental Analysis 19
4.1 Cumulative Effects 19
4.2 General Description of the River Basin 19
4.2.1 Mohawk River Watershed 19
4.2.2 Major Land Uses 23

4.2.3 Major Water Uses 26
4.2.4 Basin Dams 26
4.2.5 Tributary Streams 29
4.3 Geological and Soil Resources 29
4.3.1 Affected Environment 29
4.3.2 Environmental Effects 39
4.3.3 Proposed Environmental Measures 39
4.3.4 Unavoidable Adverse Impacts 40
4.4 Water Resources 40
4.4.1 Affected Environment 40
4.4.2 Environmental Effects 71
4.4.3 Proposed Environmental Measures 72
4.4.4 Unavoidable Adverse Impacts 72
4.5 Fish and Aquatic Resources 73
4.5.1 Affected Environment 73
4.5.2 Environmental Effects 96
4.5.3 Proposed Environmental Measures 97
4.5.4 Unavoidable Adverse Impacts 97
4.6 Wildlife and Botanical Resources 98
4.6.1 Affected Environment 98
4.6.2 Environmental Effects 117
4.6.3 Proposed Environmental Measures 117
4.6.4 Unavoidable Adverse Impacts 117
4.7 Wetlands, Riparian, and Littoral Habitat 118
4.7.1 Affected Environment 118
4.7.2 Environmental Effects 133
4.7.3 Proposed Environmental Measures 133
4.7.4 Unavoidable Adverse Impacts 133
4.8 Rare, Threatened, and Endangered Species 134
4.8.1 Affected Environment 134
4.8.2 Environmental Effects 139
4.8.3 Proposed Environmental Measures 140
4.8.4 Unavoidable Adverse Impacts 140
4.9 Recreation, Land Use, and Aesthetic Resources 140

4.9.1 Affected Environment 140
4.9.2 Environmental Effects 158
4.9.3 Proposed Environmental Measures 159
4.9.4 Unavoidable Adverse Impacts 159
4.10 Cultural Resources 159
4.10.1 Affected Environment 159
4.10.2 Environmental Effects 173
4.10.3 Proposed Environmental Measures 173
4.10.4 Unavoidable Adverse Impacts 173
4.11 Socioeconomics 173
4.11.1 Affected Environment 173
4.11.2 Environmental Effects 183
4.11.3 Proposed Environmental Measures 183
4.11.4 Unavoidable Adverse Impacts 183
4.12 Tribal Resources 183
4.12.1 Affected Environment 183
4.12.2 Environmental Effects 184
4.12.3 Proposed Environmental Measures 184
4.12.4 Unavoidable Adverse Impacts 184
5 Developmental Analysis 185
5.1 Power and Economic Benefits of the Projects 185
5.2 Comparison of Alternatives 185
5.2.1 No Action Alternative 185
5.2.2 Proposed Action 186
5.3 Cost of Environmental Measures 186
6 Conclusions and Recommendations 188
6.1 Comparison of Alternatives 188
6.2 Comprehensive Development and Recommended Alternative 188
6.3 Unavoidable Adverse Impacts 188
6.4 Consistency with Comprehensive Plans 189
7 Literature Cited 191

List of Tables

Table 4-1 Major Land Use Cover of the Mohawk River Watershed 23
Table 4-2 Land Use of the Mohawk River Watershed 24
Table 4-3 NRCS Mapped Soils in the Crescent Project Boundary 34
Table 4-4 NRCS Mapped Soils in the Vischer Ferry Project Boundary 36
Table 4-5 Flow Statistics* (in cfs) for the Mohawk River at the Crescent Project 41
Table 4-6 Flow Statistics* (in cfs) for the Mohawk River at the Vischer Ferry Project 41
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 46
Table 4-8 Industrial Wastewater Treatment Facilities Within or Near the Boundaries of the Crescent and Vischer Ferry Projects 47
Table 4-9 Water Withdrawals Within or Near the Boundaries of the Crescent and Vischer Ferry Projects 48
Table 4-10 Total Lockages by Month for Waterford Flight (Locks E-2 through E-6) 51
Table 4-11 Total Lockages by Month for Lock E-7 52
Table 4-12 NYSDEC Classifications for Projects' Waterbodies 53
Table 4-13 NYSDEC Water Quality Standards 54
Table 4-14 Annual Minimum, Maximum, and Averages of Water Quality Data Collected at Cohoes and Latham Monitoring Locations From 2004–2016 58
Table 4-15 Annual Minimum, Maximum, and Averages of Water Quality Data Collected at Lock 8 and Rexford Bridge Monitoring Locations from 2013-2020 59
Table 4-16 June – October 2020 Monthly Continuous Water Quality Summary Results 65
Table 4-17 2021 Water Quality Study Vertical Profile Sites at the Crescent and Vischer Ferry Projects 68
Table 4-18 Occurrence of Fish Species in NYSDEC State Surveys, 1998-2012 75
Table 4-19 Historic Fish Community Data in the Mohawk River 77
Table 4-20 Native Freshwater Mussel Species Observed within the Crescent and Vischer Ferry Project Boundary 96
Table 4-21 Summary of Plants Observed Within and Adjacent to the Crescent and Vischer Ferry Project Boundaries 100
Table 4-22 Summary of Aquatic Vegetation Species Observed Within the Crescent and Vischer Ferry Project Boundaries 102
Table 4-23 Invasive Plant Species Documented within the Vicinity of the Crescent and Vischer Ferry Projects 103
Table 4-24 Mammals Likely to Occur in the Vicinity of the Crescent and Vischer Ferry Projects 106
Table 4-25 Summary of all Fauna Observed within the Crescent and Vischer Ferry Project Boundaries 107
Table 4-26 Birds Likely to Occur in the Vicinity of the Crescent and Vischer Ferry Projects 108

Table 4-27 Amphibians and Reptiles Likely to Occur in the Vicinity of the Crescent and Vischer Ferry Projects 110
Table 4-28 Bald Eagle Observations at the Crescent and Vischer Ferry Projects, 2020-2021 112
Table 4-29 Summary of Wetland Area and Coverage within the Crescent Project Boundary 121
Table 4-30 Summary of Wetland Area and Coverage within the Vischer Ferry Project Boundary 122
Table 4-31 Acreage of NWI-Mapped Wetlands Within the Crescent Project Boundary 123
Table 4-32 Acreage of NWI-Mapped Wetlands Within the Vischer Ferry Project Boundary 124
Table 4-33 RTE Species with Potential to Occur at the Crescent and Vischer Ferry Projects 136
Table 4-34 USFWS IPaC Migratory Bird List with Potential to Occur at the Crescent and Vischer Ferry Projects 137
Table 4-35 Habitat Requirements of Federally and/or State Listed RTE Species 138
Table 4-36 Recreation Sites in the Crescent Project Study Area 143
Table 4-37 Recreation Sites in the Vischer Ferry Project Study Area 148
Table 4-38 Historic Architectural Resources in the Crescent Project APE 164
Table 4-39 Historic Architectural Resources in the Vischer Ferry Project APE 165
Table 4-40 Archaeological Sites in the Crescent Project APE 167
Table 4-41 Archaeological Sites in the Vischer Ferry Project APE 167
Table 4-42 Place of Residence and Density, 2020 176
Table 4-43 Housing Characteristics, 2010, 2020 (% of Total Units) 177
Table 4-44 Population, 2000 through 2020 178
Table 4-45 Population Projections, 2010 through 2040 179
Table 4-46 Labor Force and Unemployment, 2019 Estimates 179
Table 4-47 Median Household Income in Past 12 Months (in 2019 dollars), 2015-2019 180
Table 4-48 Per Capita Income in Past 12 Months (in 2019 dollars), 2015-2019 180
Table 4-49 Poverty Status, 2019 181
Table 4-50 Occupations for Civilian Population 16 Years and Over, 2019 182
Table 5-1 Estimated Cost of Existing and Proposed Environmental Measures 187

List of Figures

Figure 3-1 Locations of Crescent and Vischer Ferry Projects 8
Figure 3-2 Crescent Project Location 9
Figure 3-3 Vischer Ferry Project Location 10
Figure 3-4 Major Project Facilities of the Crescent Project 12
Figure 3-5 Major Project Facilities of the Vischer Ferry Project 13
Figure 4-1 Mohawk River Watershed 21

Figure 4-2 Mohawk River Regional Watersheds 22
Figure 4-3 Land Use Types in the Mohawk River Watershed 25
Figure 4-4 FERC Licensed or Exempt Hydroelectric Projects in the Mohawk River Watershed 27
Figure 4-5 Dams Located on the Mohawk River Downstream of the Crescent Project 28
Figure 4-6 Topography at the Projects 30
Figure 4-7 Bedrock Geology at the Projects 32
Figure 4-8 Surficial Geology at the Projects 33
Figure 4-9 NRCS Mapped Soils at the Crescent Project 37
Figure 4-10 NRCS Mapped Soils at the Vischer Ferry Project 38
Figure 4-11 Annual Flow Duration Curve for the Crescent Project 1992-2021 42
Figure 4-12 Annual Flow Duration Curve for the Vischer Ferry Project 43
Figure 4-13 USGS Gage Locations 45
Figure 4-14 Water Withdrawals and Discharges Within or Near the Boundaries of the Crescent and Vischer Ferry Projects 49
Figure 4-15 Water Quality Monitoring Stations in the Vicinity of the Crescent and Vischer Ferry Projects 57
Figure 4-16 2020 Crescent Water Quality Study Monitoring Station Locations 63
Figure 4-17 2020 Vischer Ferry Water Quality Study Monitoring Station Locations 64
Figure 4-18 2021 Crescent Water Quality Study Monitoring Station Locations 69
Figure 4-19 2021 Vischer Ferry Water Quality Study Monitoring Station Locations 70
Figure 4-20 Electrofishing Sites Upstream of Vischer Ferry Dam 82
Figure 4-21 Eel ramp trap installed at downstream of the Crescent Dam tailrace area (Crescent Trap #1) 83
Figure 4-22 Eel ramp trap locations downstream of Vischer Ferry Dam 84
Figure 4-23 Eel ramp trap locations downstream of Crescent Dam 85
Figure 4-24 Fish Passage Routes at the Crescent Hydroelectric Project 88
Figure 4-25 Fish Passage Routes at the Vischer Ferry Hydroelectric Project 89
Figure 4-26 Location of Bald Eagle Observations at the Crescent Project, 2020-2021 115
Figure 4-27 Location of Bald Eagle Observations at the Vischer Ferry Project, 2020-2021 116
Figure 4-28 Wetlands in the Vicinity of the Projects, Map 1 of 8 125
Figure 4-29 Wetlands in the Vicinity of the Projects, Map 2 of 8 126
Figure 4-30 Wetlands in the Vicinity of the Projects, Map 3 of 8 127
Figure 4-31 Wetlands in the Vicinity of the Projects, Map 4 of 8 128
Figure 4-32 Wetlands in the Vicinity of the Projects, Map 5 of 8 129
Figure 4-33 Wetlands in the Vicinity of the Projects, Map 6 of 8 130
Figure 4-34 Wetlands in the Vicinity of the Projects, Map 7 of 8 131

Figure 4-35 Wetlands in the Vicinity of the Projects, Map 8 of 8 132
Figure 4-36 Recreation Sites in the Crescent Project Study Area 145
Figure 4-37 Recreation Sites in the Vischer Ferry Project Study Area 150
Figure 4-38 Crescent Project Area of Potential Effect (APE) 160
Figure 4-39 Vischer Ferry Project Area of Potential Effect (APE) 161

List of Appendices

Appendix A – Consultation Record

Appendix B – Comment/Response Matrix

Appendix C – Coastal Zone Management Act – New York State Department of State Concurrence

List of Abbreviations

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
Barge Canal System	New York State Barge Canal System
BCD	Barge Canal Datum
°C	Degrees Celsius
CEQ	Council on Environmental Quality
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
GPD	Gallons per day
GPM	Gallons per minute
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
MWh	megawatt hour
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRHP or National Register	National Register of Historic Places
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Unit
NWI	National Wetland Inventory
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	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
PA	Programmatic Agreement
PAD	Pre-Application Document
PEM	palustrine emergent
PME	protection, mitigation, and enhancement
PRISM	Partnerships for Regional Invasive Species Management
PSP	Proposed Study Plan
REA Notice	Ready for Environmental Analysis

RMP	Recreation Management Plan
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 Office
SPD	Study Plan Determination
SPDES	State Pollutant Discharge Elimination System
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
USR	Updated Study Report
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) (collectively referred to herein 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 has prepared its new license applications 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 each Project's respective Final License Application (FLA) 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 subject project 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

[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).

equal consideration to the purposes of energy conservation; the protection, mitigation, and enhancement of fish and wildlife resources; 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' FLAs. 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 provide 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 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 Monitoring 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 Monitoring Study required additional efforts in 2021. Additionally, a second year of the Water Quality Study was voluntarily conducted in 2021 in response to comments filed by Riverkeeper Inc. and the New York State Department of Environmental Conservation (NYSDEC). The Updated Study Report (USR) included the final study reports for the Bald Eagle Study, Recreation Study, American Eel Monitoring Study, and the 2021 Water Quality Study. The USR was filed with the Commission on February 17, 2022. The USR meeting was held on March 3, 2022 on an online meeting platform, due to the COVID-19 pandemic.

[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 certain diadromous fish species and 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 Monitoring 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 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 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 new licenses 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 the Draft License Application, a subsequent IPaC report and associated species list was completed in November 2021.

In the 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, however additional discussion has been added to Section 4.8 regarding the potential for monarch butterfly habitat at the Projects.

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). The concurring email from NYSDOS is provided in Appendix C.

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 (SHPO) 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 the 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

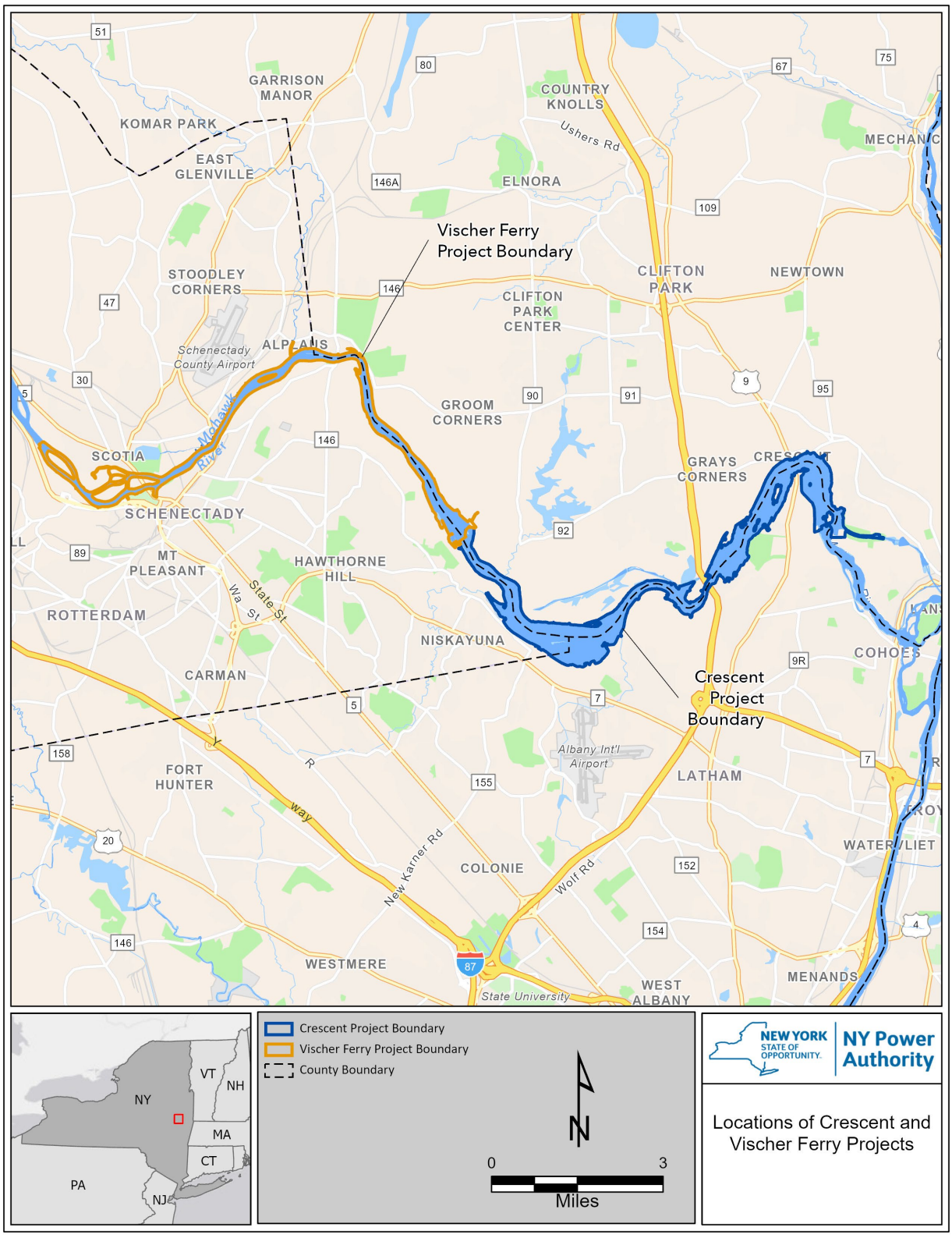


Figure 3-2 Crescent Project Location

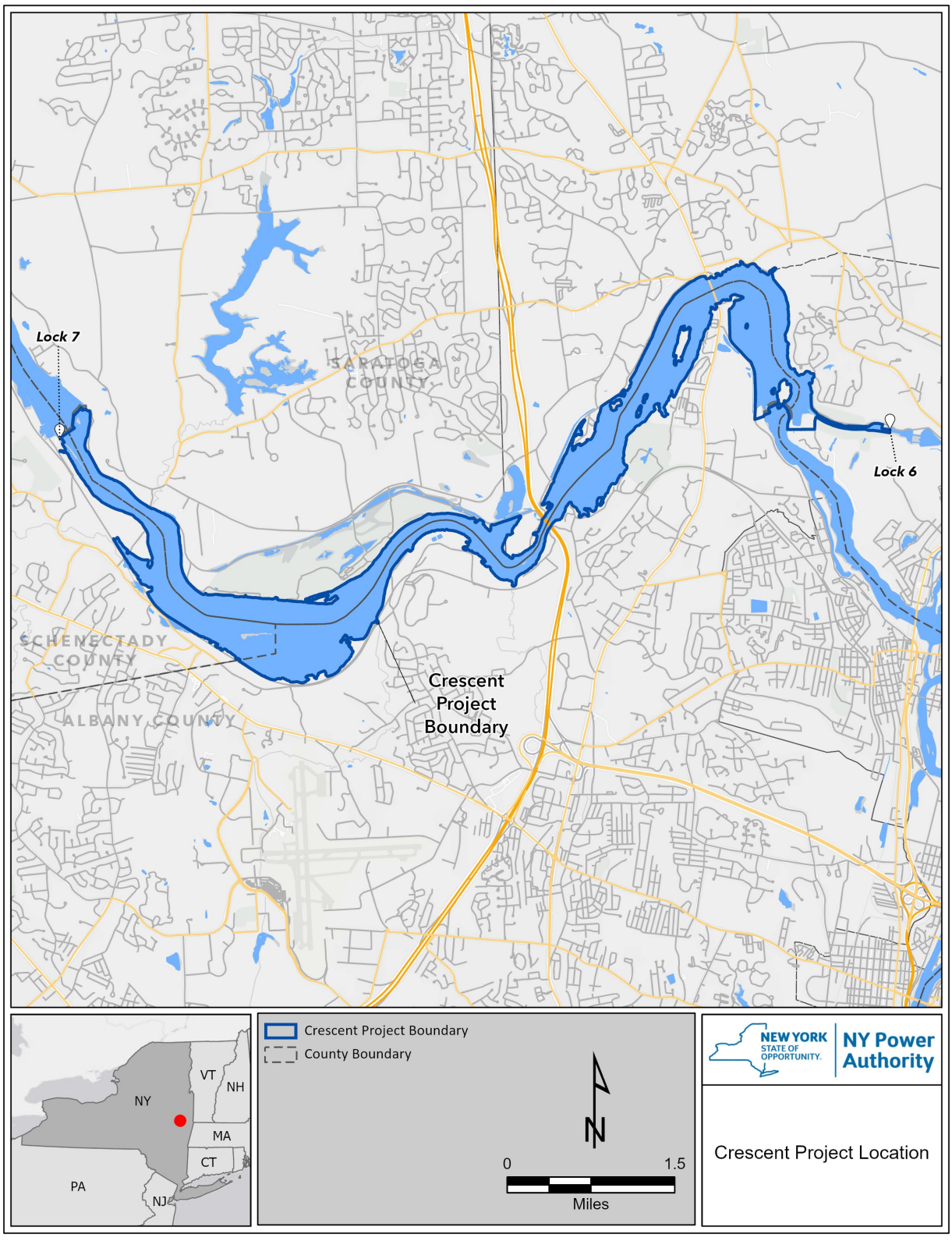
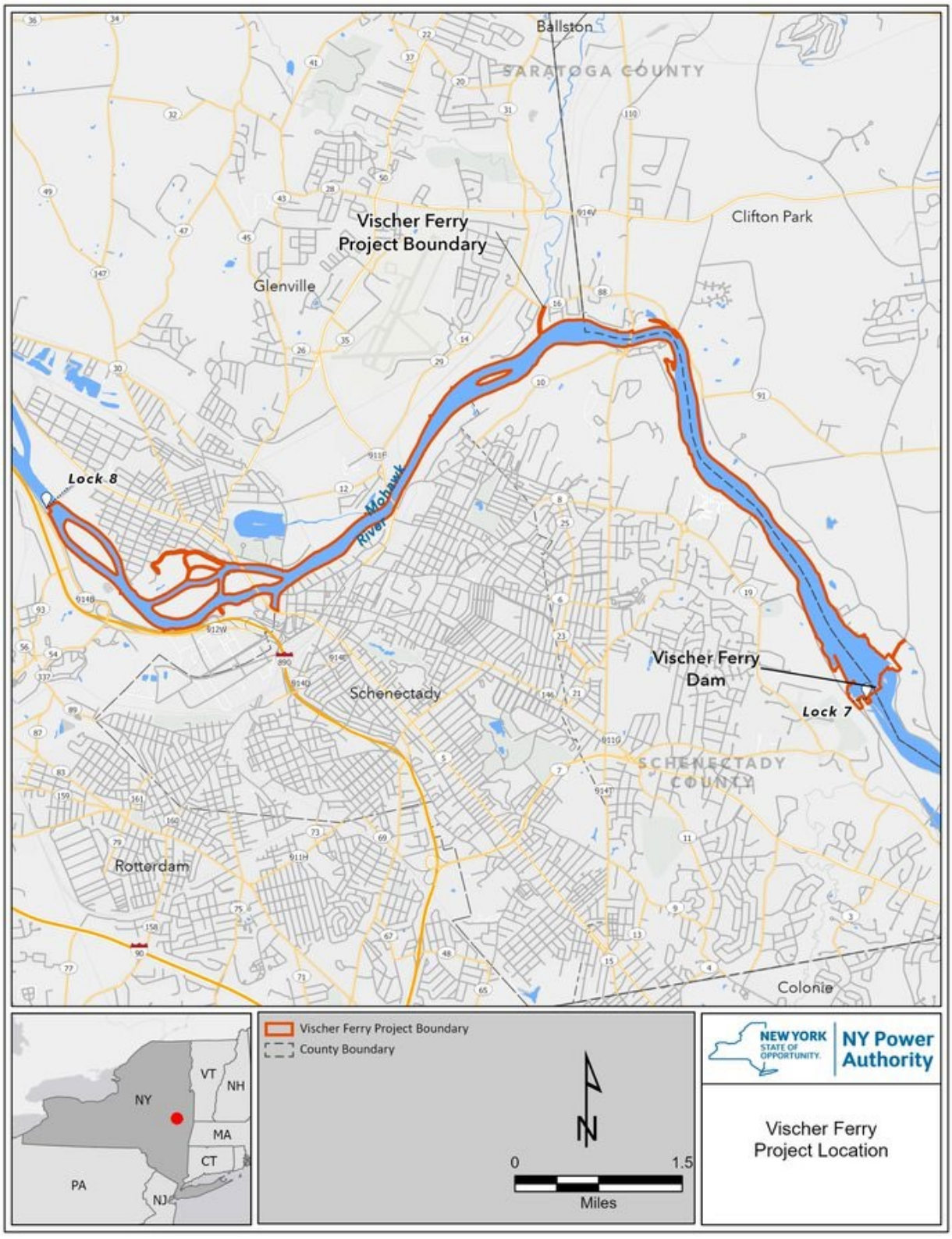


Figure 3-3 Vischer Ferry Project Location



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.

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.

Figure 3-4 Major Project Facilities of the Crescent Project

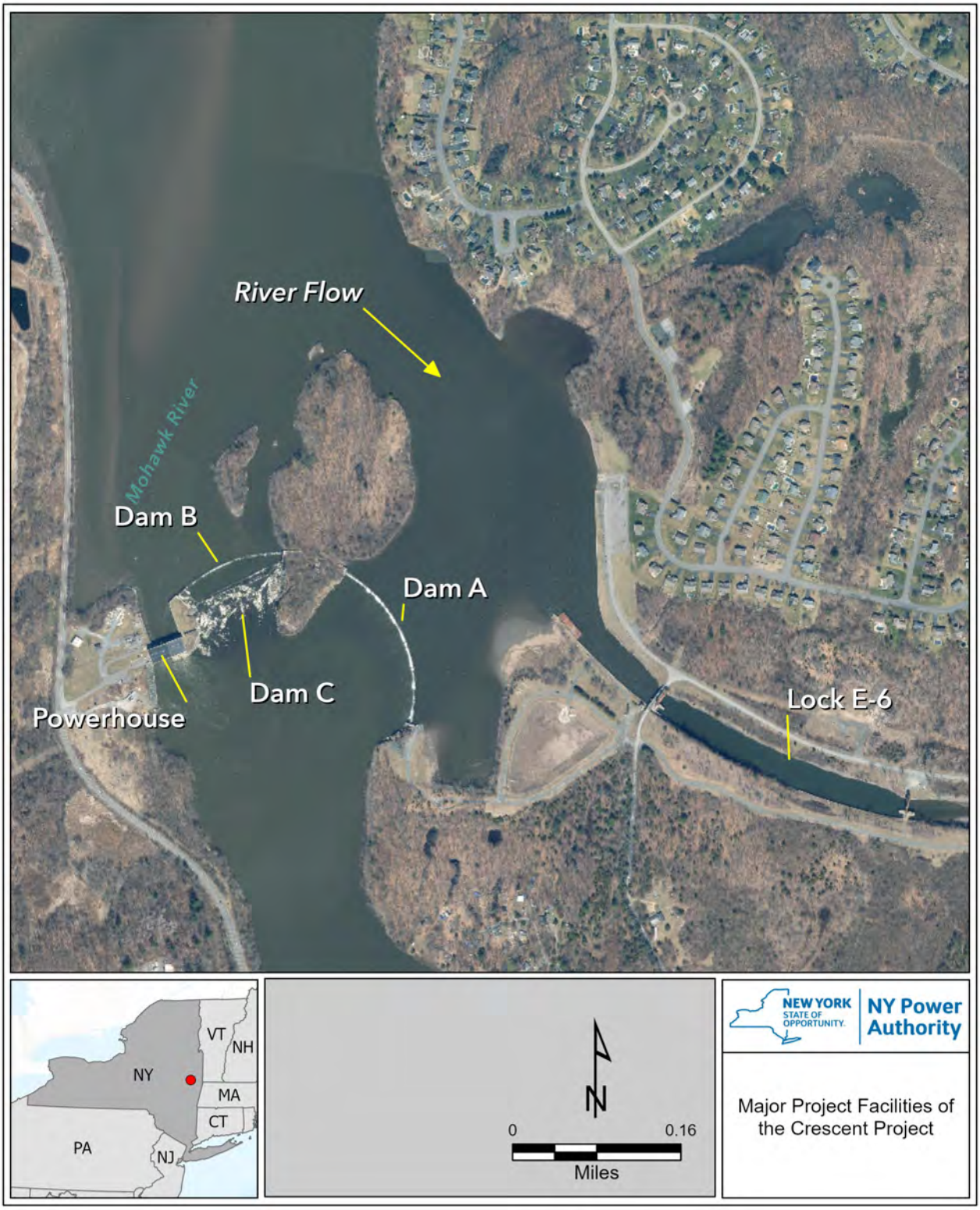
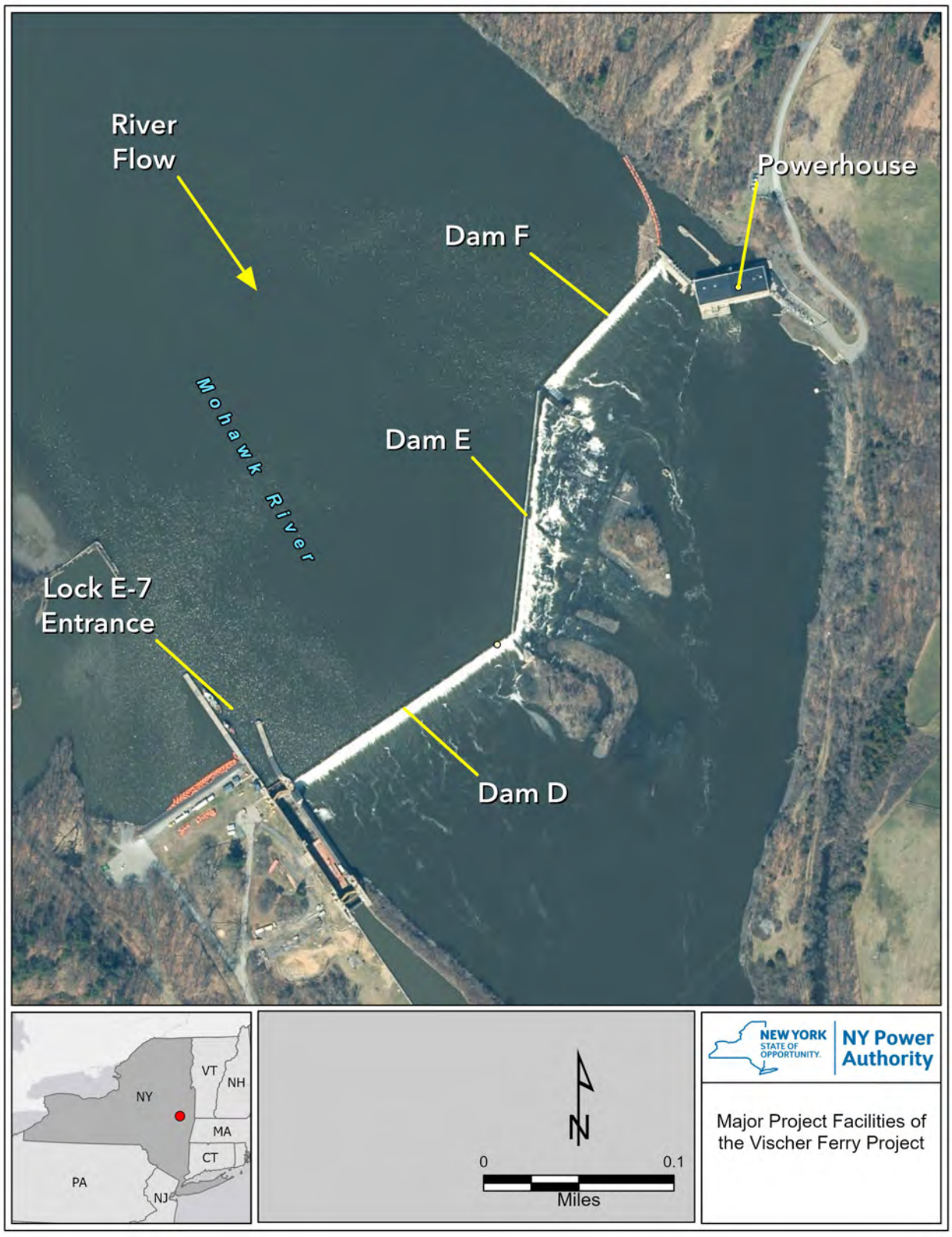


Figure 3-5 Major Project Facilities of the Vischer Ferry Project



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 impoundment fluctuations allowed only at the New York State Canal Corporation's (NYSCC) 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. Once minimum flows and any diversions required for canal and lock 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. Barge Canal Datum (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.

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 impoundment fluctuations allowed only at NYSCC'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.

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 E-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 NYSCC. 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 E-7. In the event that flashboards are lost during the navigation season, the Licensee works in close coordination with NYSCC 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. The locks that lie within the Project boundaries for the Crescent and Vischer Ferry Projects (Locks E-6 and E-7, respectively) are operated and maintained by NYSCC. Information on the frequency of lockages is provided in Section 4.4.

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 licenses. The Power Authority is proposing no changes to the Project boundary of either Project.

3.2.2 Proposed Environmental Measures

The Power Authority proposes to continue implementing existing environmental measures.

- Run-of River Operations – The Projects will continue to be operated as run-of-river such that outflow from the Projects approximates inflow. During normal operations, the Projects will continue to be 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 will continue to be operated with the existing minimum flow requirements. At Crescent, during the non-navigation season the Licensee will continue to provide a minimum flow of 100 cfs, or inflow, whichever is less at Crescent dam. During the navigation season, the minimum flow requirement will be 250 cfs, passed through a notch in the Dam A flashboards. At Vischer Ferry, a minimum flow of 200 cfs, or inflow, whichever is less, will be passed at the Vischer Ferry Dam during all seasons.
- Fish Deterrent and Passage System – The Power Authority will continue to provide downstream fish passage at the Projects for blueback herring. Currently, the Licensee operates an acoustic deterrent system at each Project 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 guides 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. At Vischer Ferry, the deterrent system guides fish away from the powerhouse and forebay toward notches in Dam F. 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. As discussed in Section 4.5, the Licensee is currently exploring potential options to the existing acoustic deterrent system in consultation with the fisheries resource agencies.

- Project Recreation Facilities – To enhance public recreation at the Projects, the Power Authority will continue to operate and maintain the existing Project recreation sites. At Crescent, the Power Authority will continue to maintain the tailwater fishing area and picnic area. At Vischer Ferry, the Licensee will continue to maintain the overlook, tailwater fishing area, and impoundment boat launch. As discussed in Section 4.9, the Licensee is proposing to prepare a Recreation Management Plan for the existing Projects recreation sites that will include some enhancements to the sites, as suggested by the results of the Recreation Study.
- Navigation – The Power Authority will continue to operate the Projects to ensure that the Project dams continue to serve their primary purpose for navigation on the Barge Canal. The Projects will continue to be operated in close coordination with NYSCC. During the navigation season (generally, May through October) flashboards will be installed at both Project dams to increase the impoundment level and help ensure operation of the canal lock system. At Crescent, 1-foot flashboards will be used and at Vischer Ferry, 27-inch flashboards will be used, as they are currently. In the event that flashboards are lost during the navigation season, the Licensee will work in close coordination with NYSCC to replace the flashboards and resume normal project operations as soon as safe and practicable.

3.3 Alternatives Considered but Eliminated from Further Analysis

3.3.1 Federal Government Takeover of the Project

FERC's statement from SD3 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 SD3 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 SD3 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

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."

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. These revisions to CEQ's NEPA regulations were finalized on April 20, 2022. CEQ finalized that proposal on April 20, 2022, formally reverting to the 1978 language requiring agencies to consider cumulative effects (87 FR 23,453) (40 C.F.R. Section 1508.1(g)).

FERC indicated in SD3 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. Accordingly, it is anticipated that the cumulative effects to these resources will be addressed in FERC's NEPA document.

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

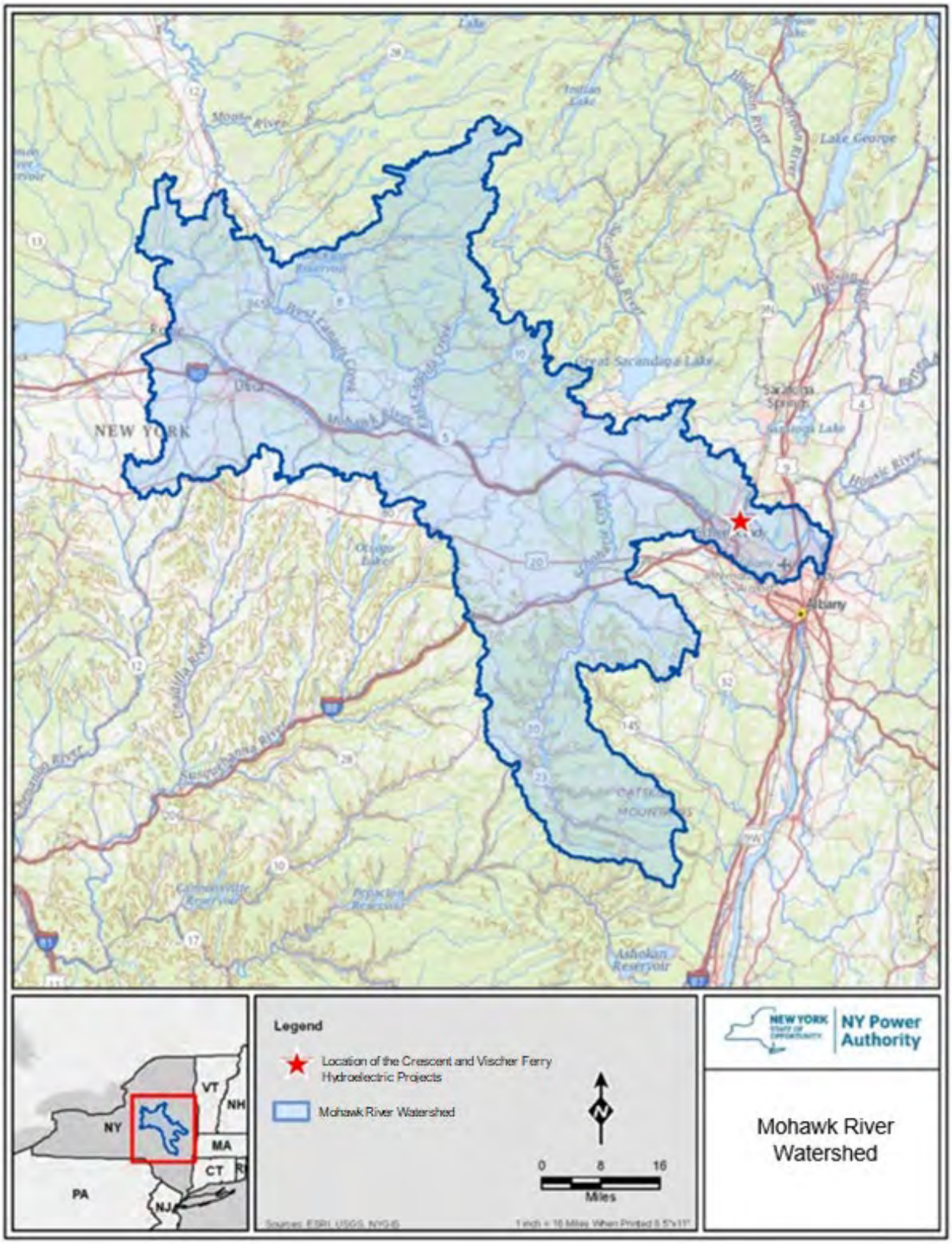
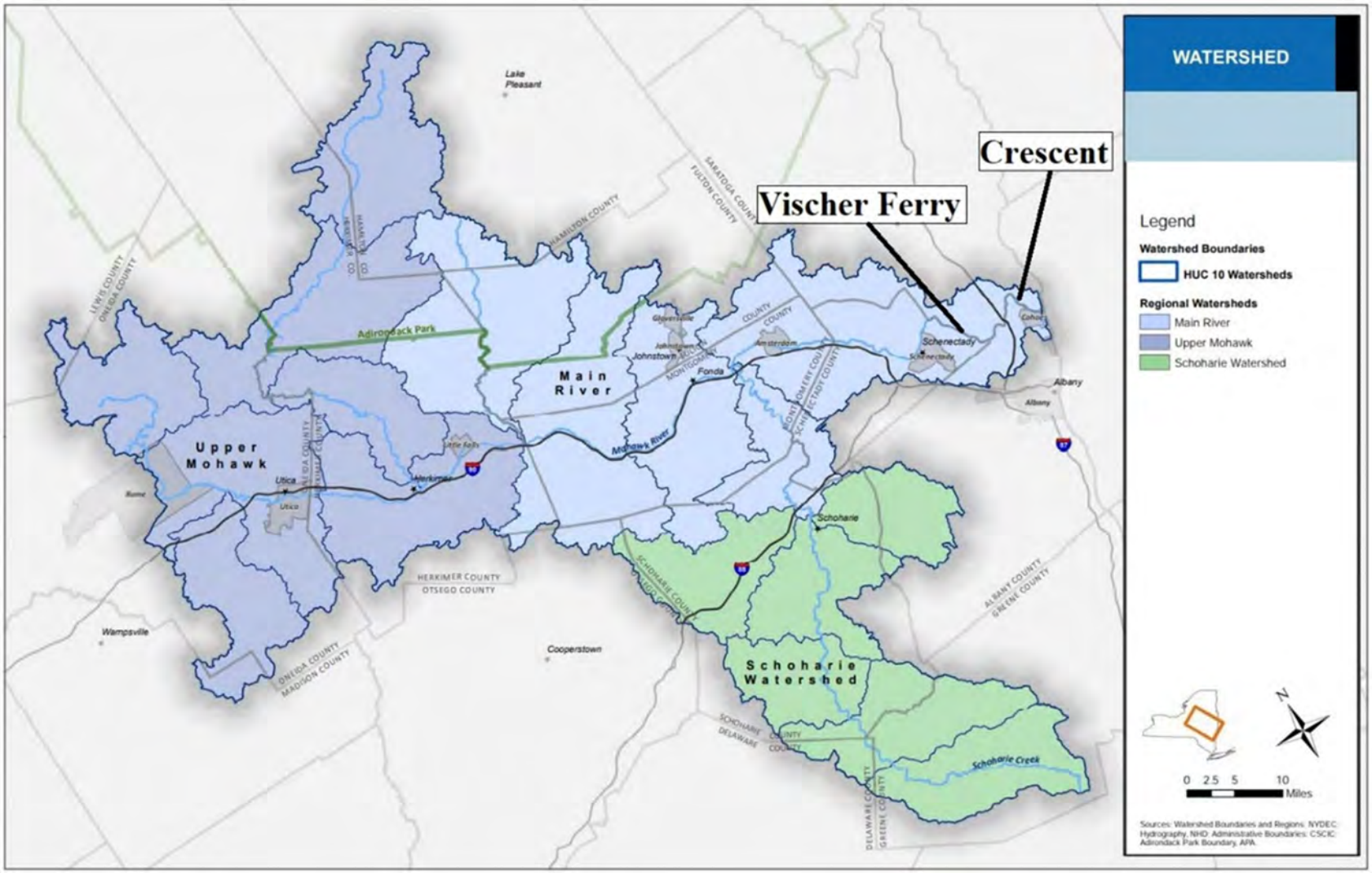


Figure 4-2 Mohawk River Regional Watersheds



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, 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

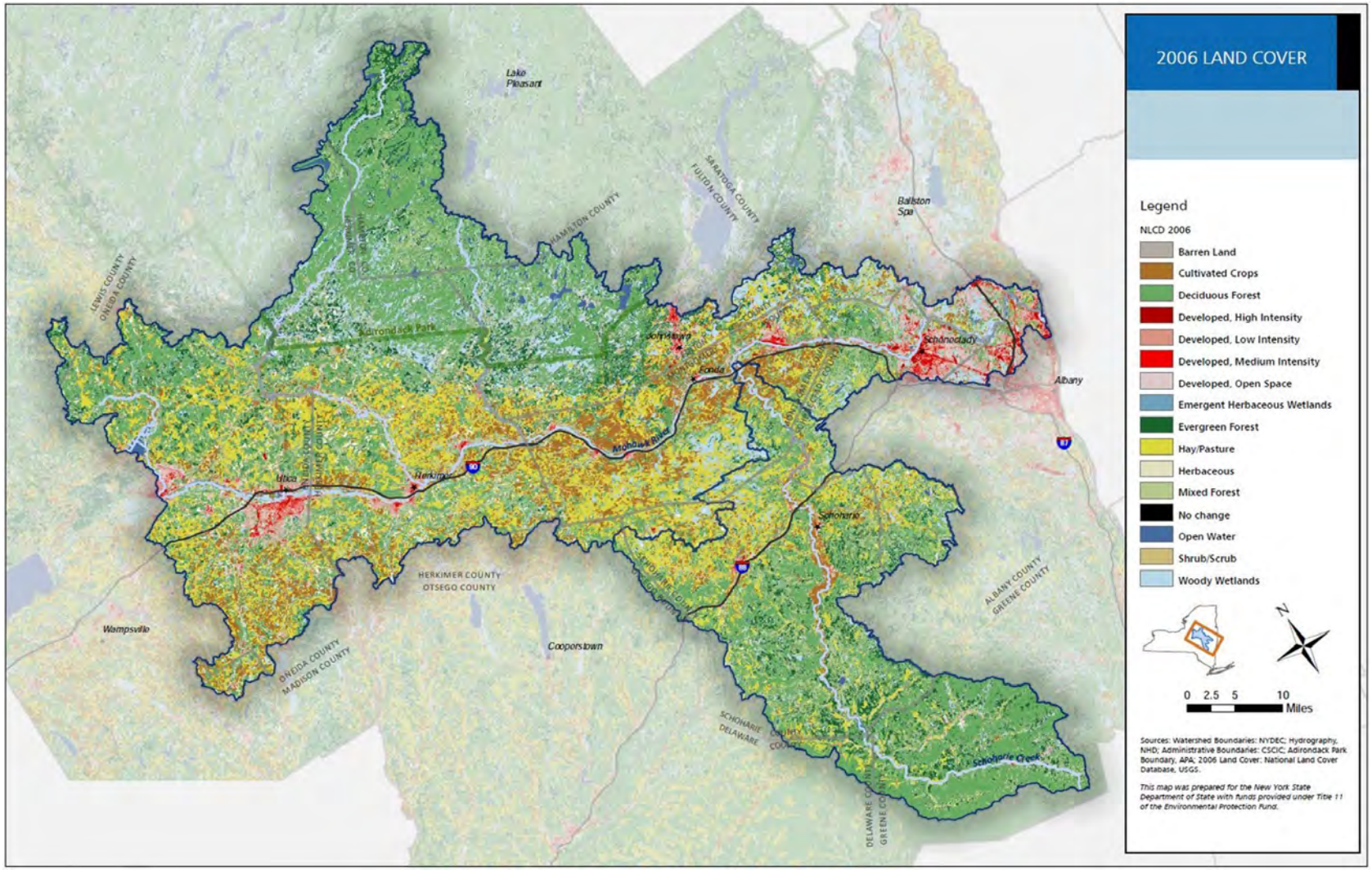
Table 4-2 Land Use of the Mohawk River Watershed

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 fishing.

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 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 and Figure 4-5).

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

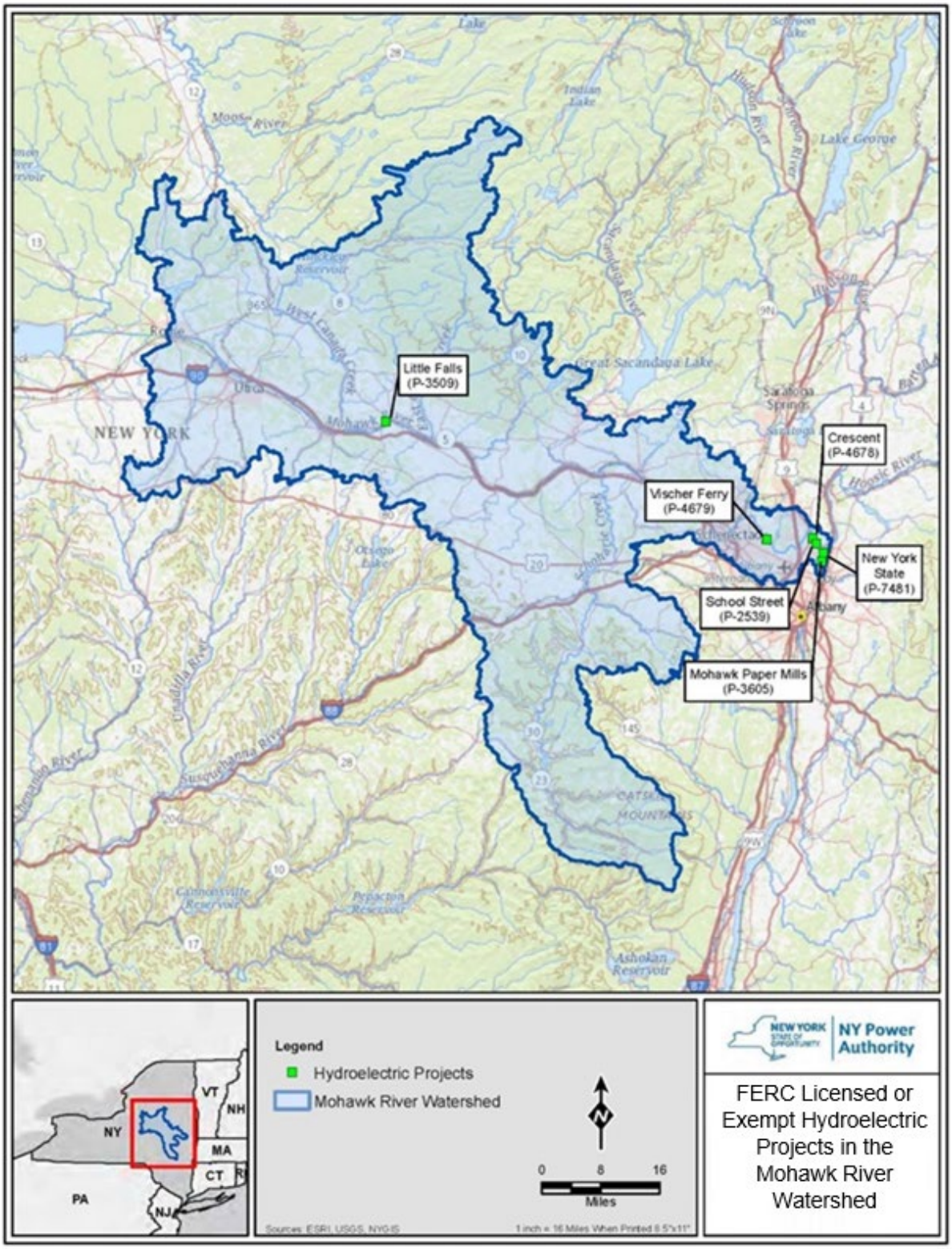
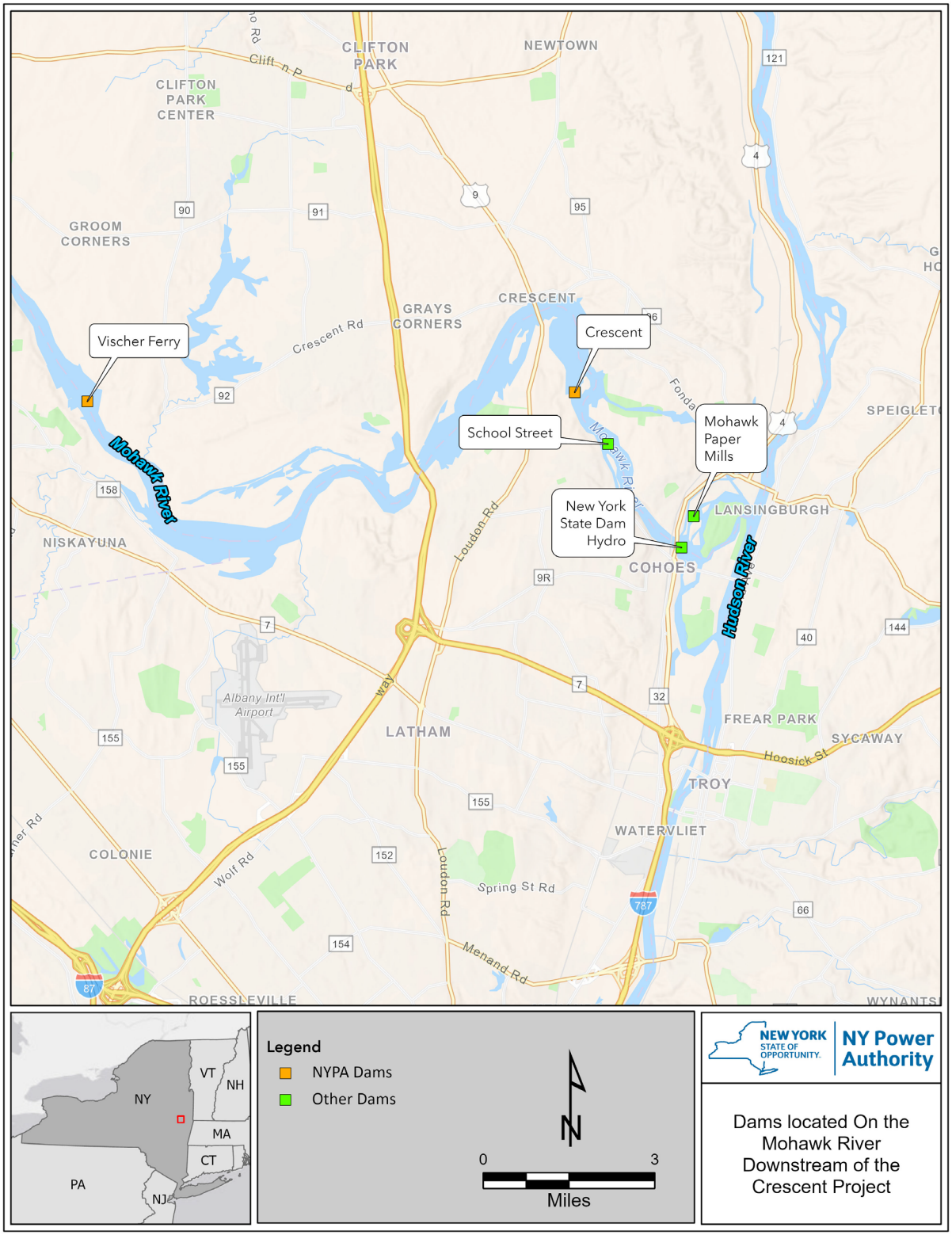


Figure 4-5 Dams Located on the Mohawk River Downstream of the Crescent Project



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.

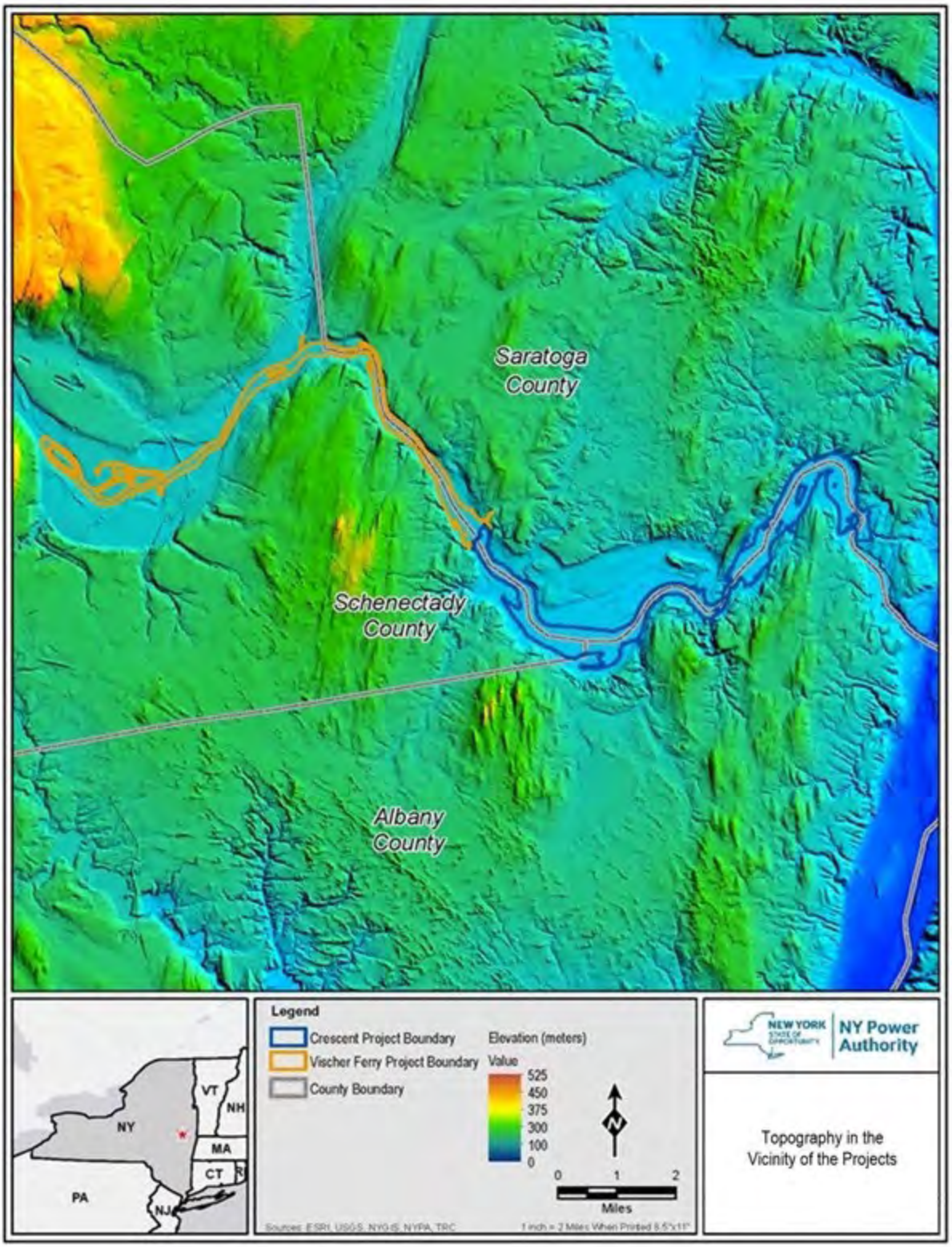
4.3 Geological and Soil Resources

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 4-6.

Figure 4-6 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 4-7 shows the bedrock geology and Figure 4-8 shows the surficial geology at the Projects and the surrounding area.

Figure 4-7 Bedrock Geology at the Projects

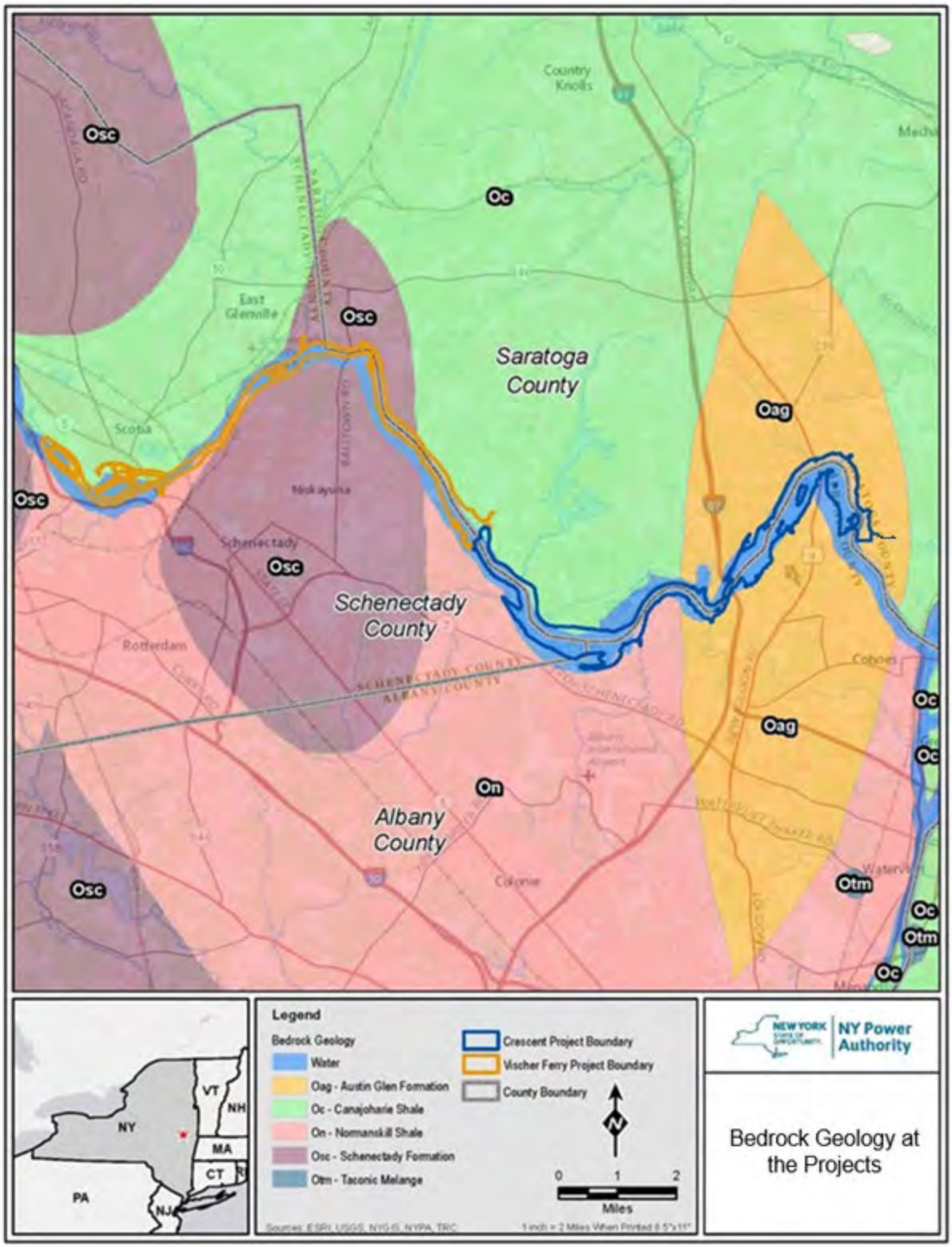
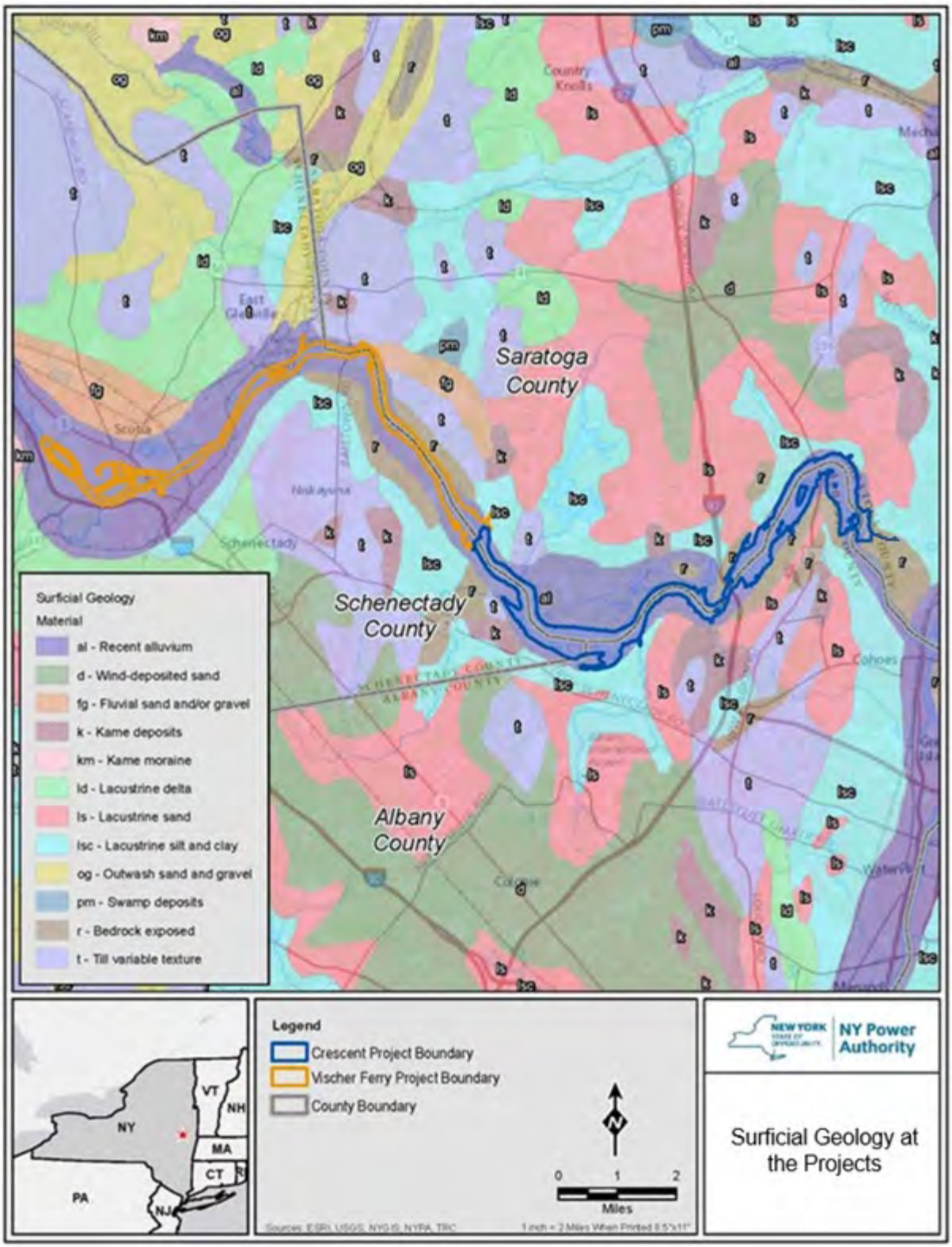


Figure 4-8 Surficial Geology at the Projects



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 4-9 and Figure 4-10.

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 4-9 NRCS Mapped Soils at the Crescent Project

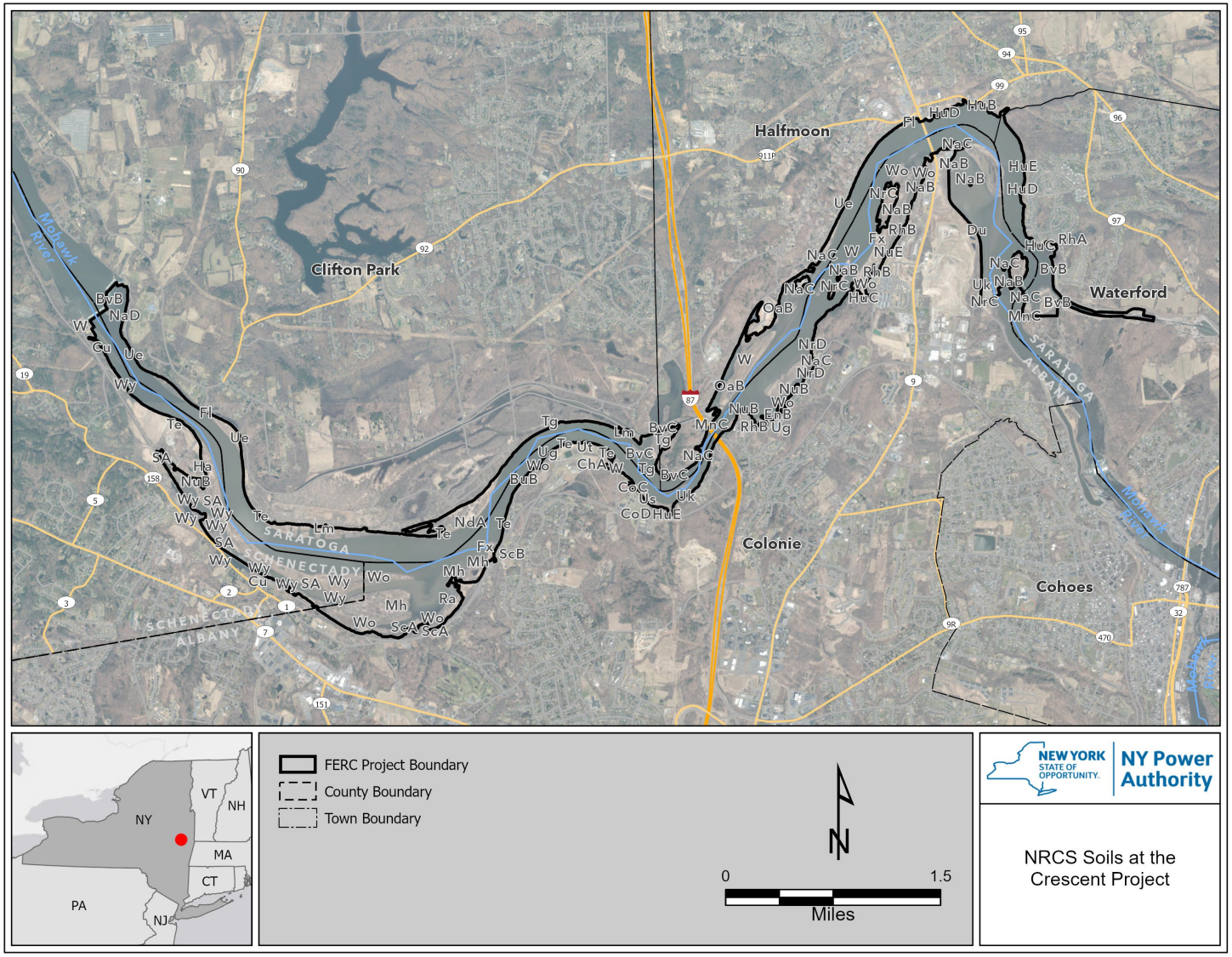
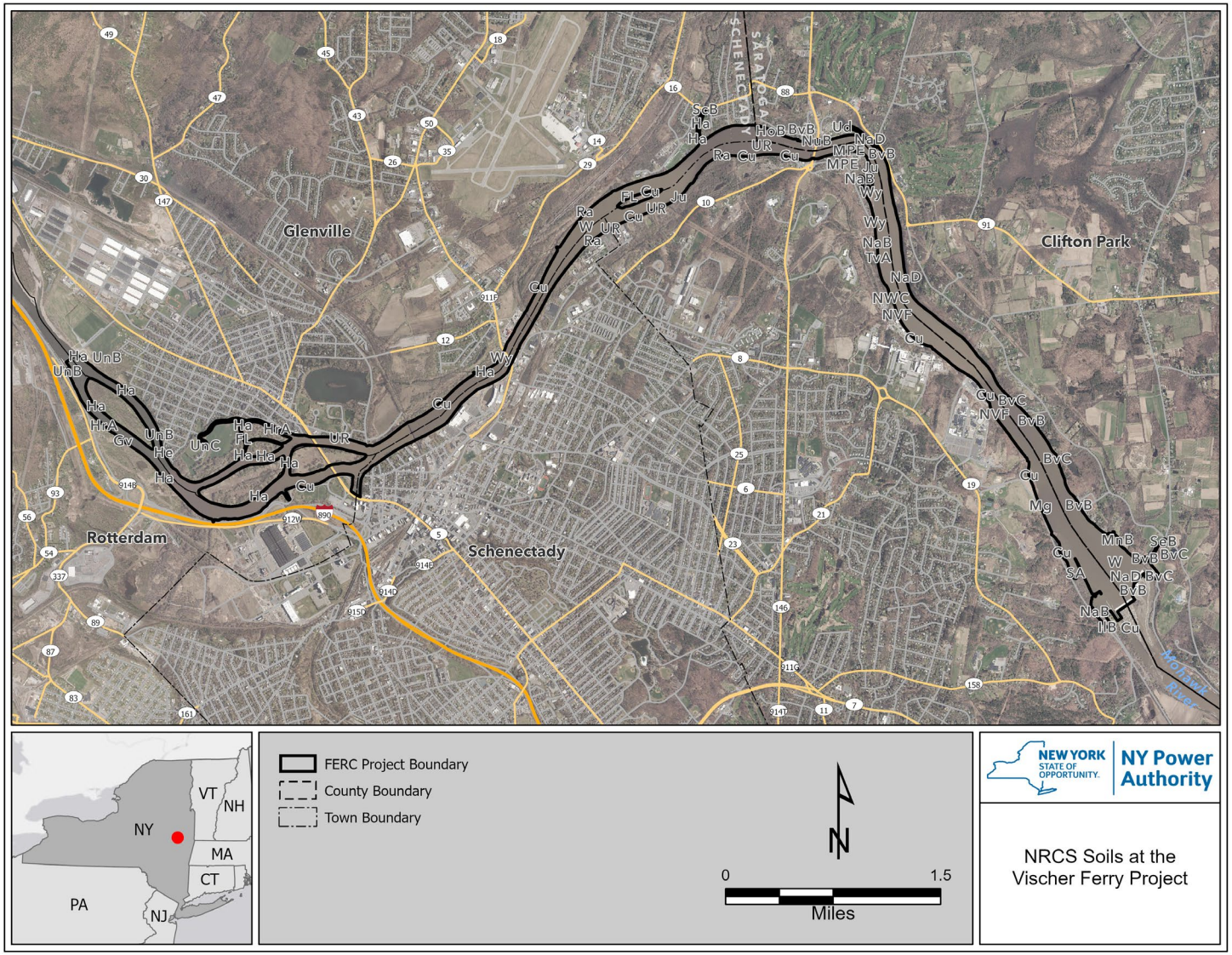


Figure 4-10 NRCS Mapped Soils at the Vischer Ferry Project



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 2,250 acres (at El. 185 ft. 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 ft. 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, there is 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 minimal, 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 operation of the Projects is not expected to adversely affect geology and soil 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 3,450 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 2,250 acres at El. 185 ft. BCD. One-foot flashboards are 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 are 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 flows in cfs for the of the Mohawk River at the Crescent and Vischer Ferry Projects, based on drainage area proration of the Cohoes USGS gage (No. 01357500) for the 30 year period January 1, 1992 through December 31, 2021, 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, 1992 through December 31, 2021) are shown in Figure 4-11 and Figure 4-12, 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.

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Period of Record: 30 years (January 1, 1992 - December 31, 2021)													
Min	1,420	1,560	1,400	196	129	244	180	244	175	544	587	1,300	129
Median	5,075	4,555	8,100	11,500	4,730	2,895	2,000	1,760	1,655	2,990	5,760	6,355	4,240
Mean	7,359	6,206	11,233	14,126	6,624	5,010	3,507	2,816	2,697	5,130	7,008	7,946	6,635
Max	92,600	52,800	64,600	79,000	42,800	89,700	34,500	96,900	82,200	51,500	63,600	55,500	96,900

Source: USGS Gage at Cohoes (No. 01357500) prorated to the Crescent Project dam (proration factor 0.9971)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Period of Record: 30 years (January 1, 1992 - December 31, 2021)													
Min	1,380	1,516	1,360	190	125	237	175	237	170	528	570	1,263	125
Median	4,930	4,425	7,869	11,172	4,595	2,812	1,943	1,710	1,608	2,905	5,596	6,174	4,119
Mean	7,149	6,029	10,913	13,724	6,435	4,867	3,407	2,736	2,621	4,984	6,808	7,715	6,446
Max	89,961	51,295	62,759	76,749	41,580	87,144	33,517	94,138	79,857	50,032	61,787	53,918	94,138

Source: USGS Gage at Cohoes (No. 01357500) prorated to the Vischer Ferry Project dam (proration factor 0.9715)

Figure 4-11 Annual Flow Duration Curve for the Crescent Project 1992-2021

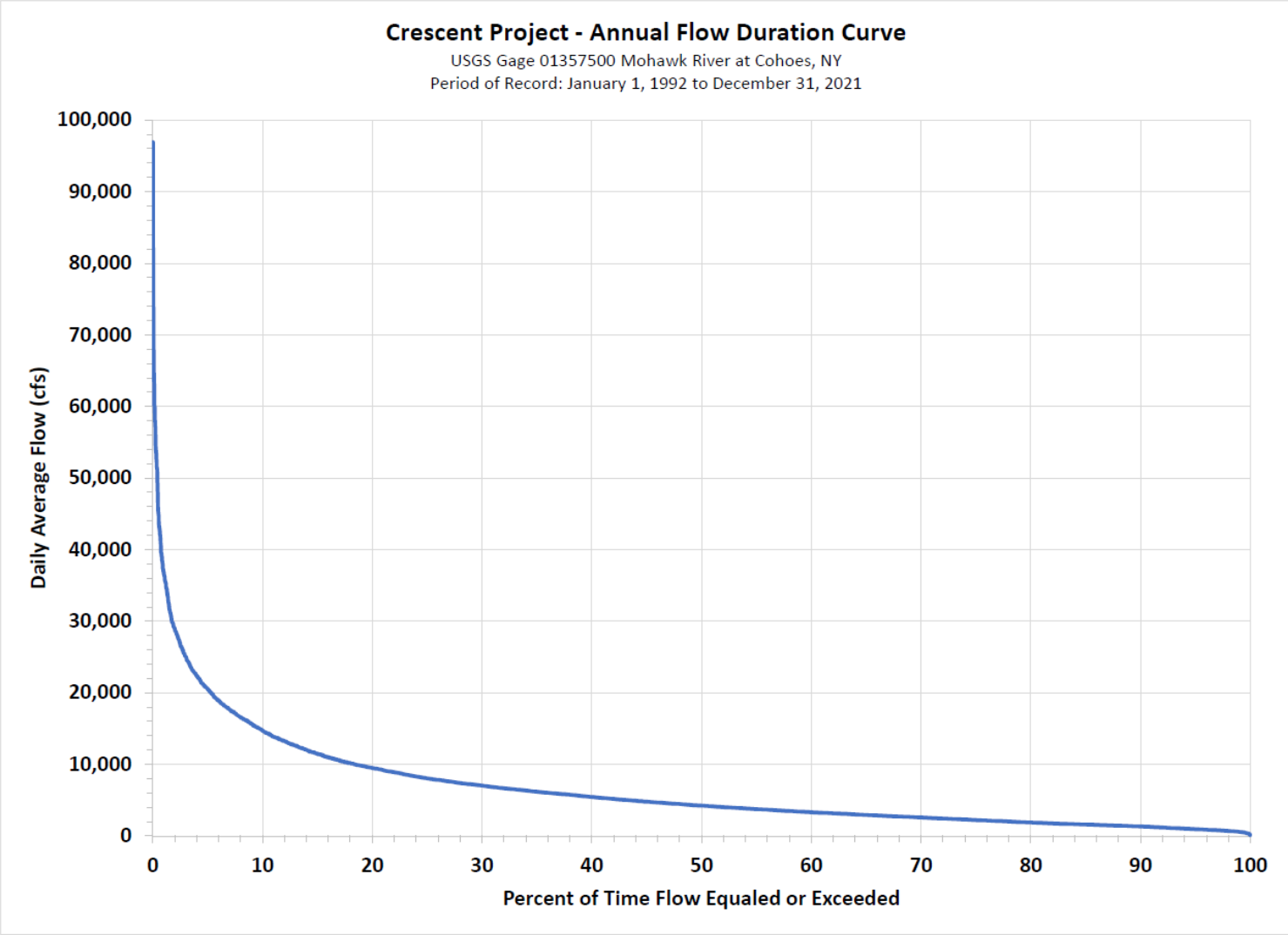
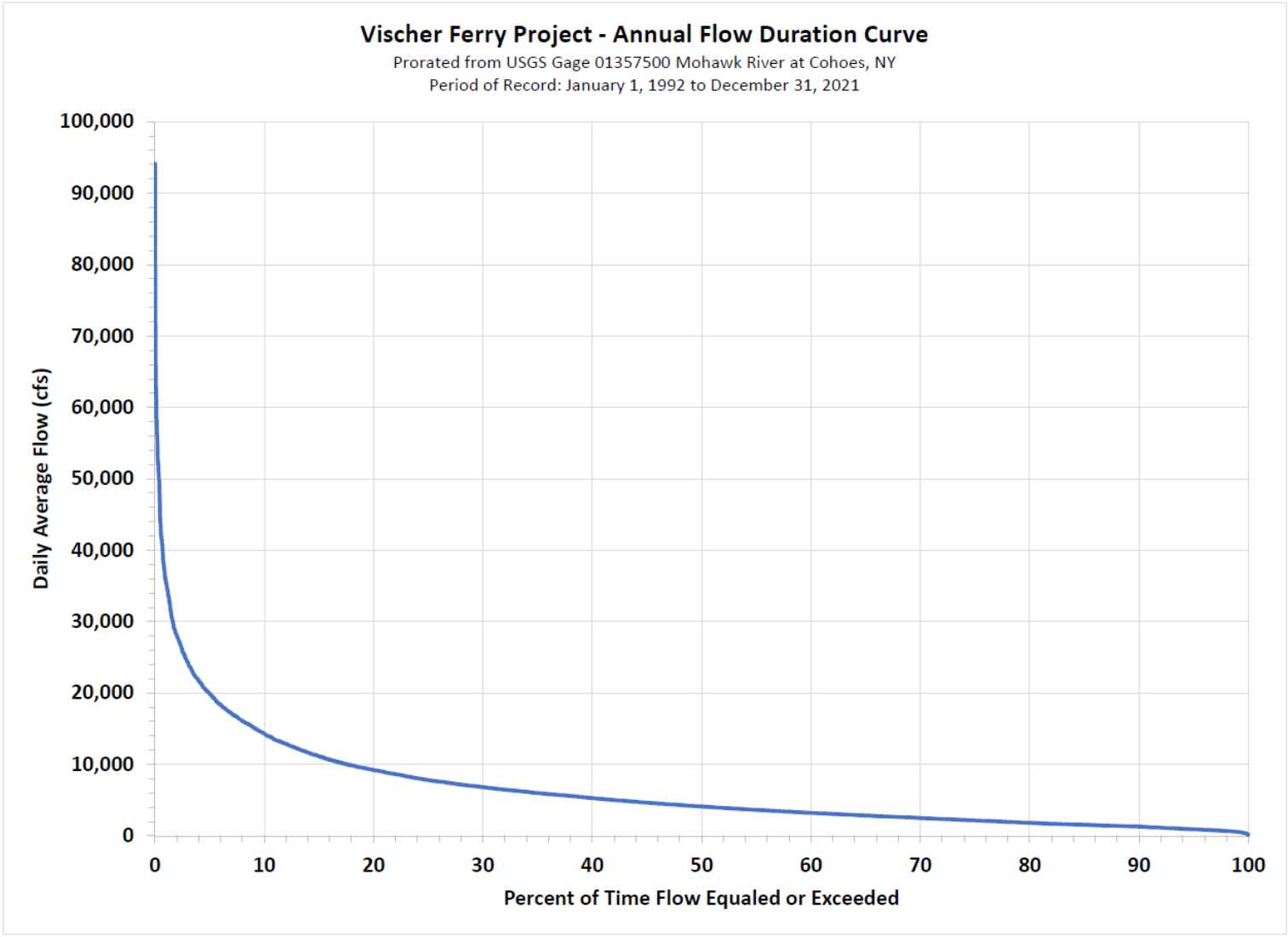


Figure 4-12 Annual Flow Duration Curve for the Vischer Ferry Project



In addition to the flow data recorded by the USGS at Cohoes, there are other USGS gage stations in lower Mohawk River with shorter periods for record. The USGS maintains a streamflow gage upstream of the Vischer Ferry Project at Little Falls (USGS Gage No. 01347000), and on the Mohawk River gage at Freeman's Bridge (USGS Gage No. 01354500). A figure depicting the location of these gages in relation to the Projects is shown in Figure 4-13. Also, since 2011, the Power Authority has maintained electronic records of discharge at the Projects. Flow duration curves and flow statistics based on the Power Authority's recorded discharge data for the period 2011-2018 were provided in the Pre-Application Document.

4.4.1.1.3 Flooding and Flood Control

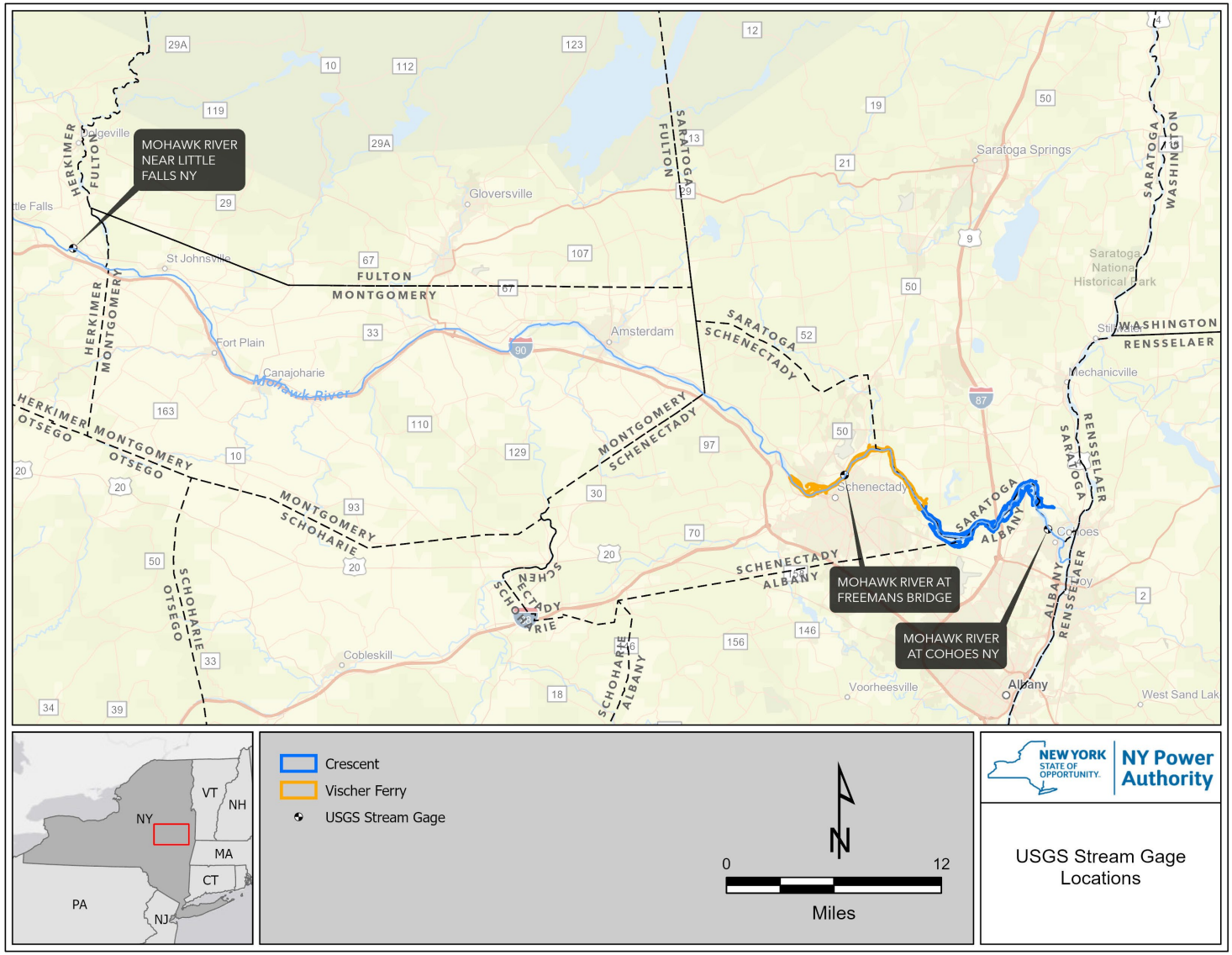
Both the Crescent and Vischer Ferry Projects have limited storage capacity and are operated as run-of-river. As such, neither Project has any flood control capability, and neither Project is operated to control downstream flooding.

Historically, there have been issues with flooding upstream of the Vischer Ferry dam, particularly in low-lying areas around Schenectady. In response to the PSP, several stakeholders commented on the need for additional study of ice-jams and ice-jam flooding in the lower Mohawk River upstream of the Vischer Ferry dam. In its comments on the PSP, FERC staff acknowledged the concerns about ice-jam flooding and requested that the Power Authority conduct a study of ice-jam flooding upstream of Vischer Ferry. In the RSP filed with FERC, the Power Authority did not propose to conduct the requested ice-jam study because such a study was already being conducted as part of New York's "Reimagine the Canals" initiative—an initiative designed to identify ideas/solutions that promote economic development, recreation, and resiliency along the New York State Canal System.

The ice-jam study was led by a Task Force and was conducted outside the FERC relicensing process. The Task Force convened an Ice Jam Mitigation Panel tasked with evaluating ice-jam flooding, including developing a river ice model. The modeling work has and will continue to facilitate the characterization and understanding of ice-jam processes in the Mohawk River upstream of the Vischer Ferry dam. Structural and nonstructural options at Vischer Ferry dam for the mitigation of ice-jam impacts continue to be assessed. The Power Authority filed several updates on the status of the ice-jam study, including the final study report which was filed with FERC in August, 2021 and again more recently on March 31, 2022

In response to initial study findings, starting in the winter of 2020-2021, NYSCC has operated an ice-breaker boat on portions of the Mohawk River between Vischer Ferry dam and Schenectady, including portions of the Vischer Ferry impoundment. Although this pilot program has only been in place a couple of winters, thus far the ice-breaker seems to be effective in helping to prevent ice-jams and related upstream flooding.

Figure 4-13 USGS Gage Locations



4.4.1.1.4 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 4-14.

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

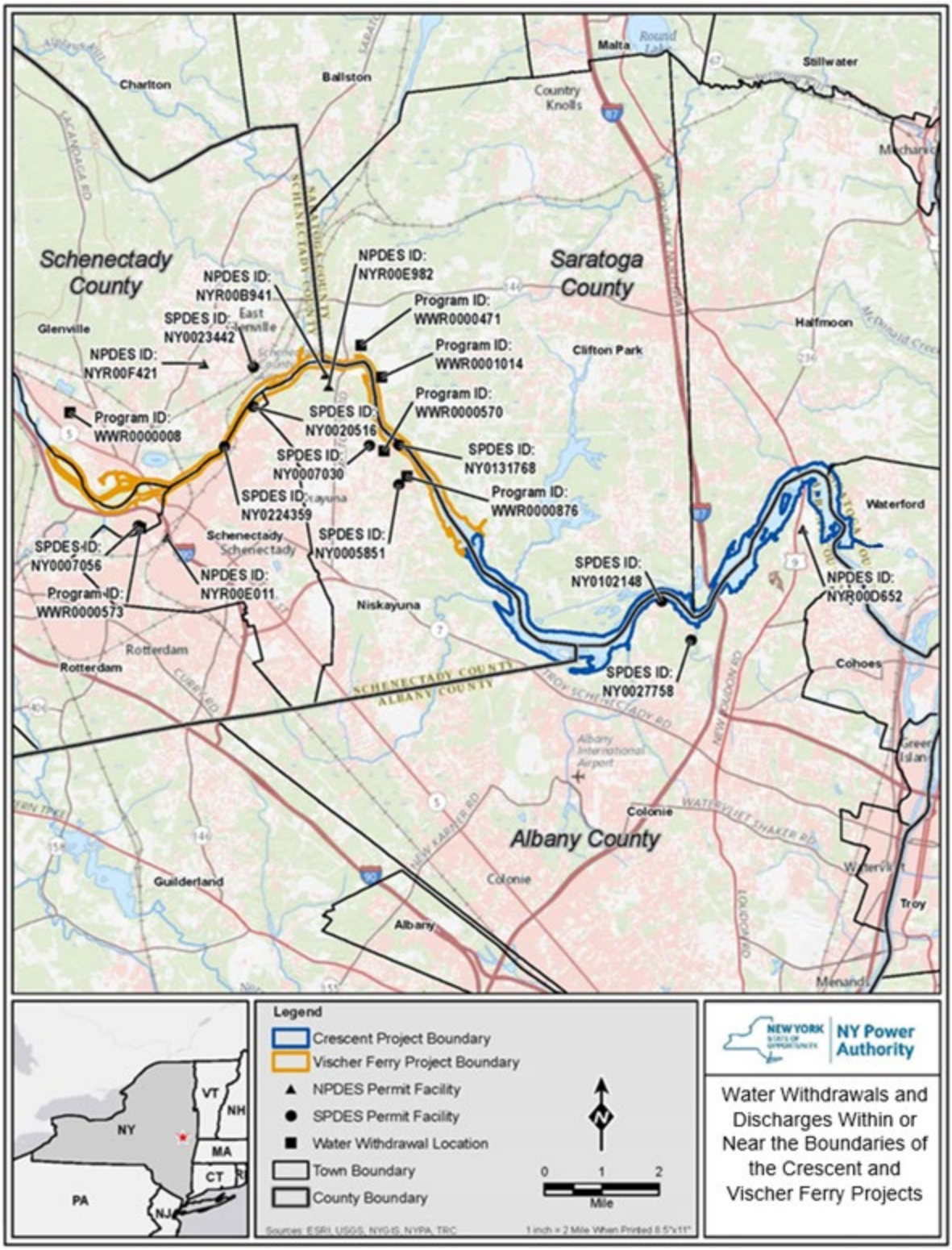
Table 4-9 Water Withdrawals Within or Near the Boundaries of the Crescent and Vischer Ferry Projects

Program ID	Facility Name	Town / County	Withdrawal Category	Withdrawal Type	Reporting Year	Average Day Withdrawal (MGD)[1]	Maximum Day Withdrawal (MGD)	Easting / Northing	NYSDEC Permitted Withdrawal Amount or Maximum System Capacity	Water Returned
WWR0000008	Adirondack Beverages	Glenville (T) / Schenectady	Bottled/Bulk Water	Groundwater; Surface Water	2021	0.55	.80	583098 / 4743426	1,300,000 (GPD)[2]	Yes
WWR0000471	Edison Club Golf Course	Clifton Park (T) / Saratoga	Recreational - Golf Course	Surface Water	2021	0.05	0.9	591290 / 4745361	1,200 (GPM)[3]	No
WWR0000570	GE - Global Research Center	Niskayuna (T) / Schenectady	Commercial	Surface Water	2021	0	0	591945 / 4742397	750 (GPM)	N/A
WWR0000573	GE - Schenectady	Rotterdam (T) / Schenectady	Industrial	Surface Water	2021	4.27	8.82	585117 / 4740188	50 (MGD)	Yes[4]
WWR0000876	Knolls Atomic Power Lab - Knolls Site	Niskayuna (T) / Schenectady	Industrial	Surface Water	2021	1.9	2.2	592588 / 4741674	5 (MGD)	Yes[4]
WWR0001014	Mohawk River Country Club and Chateau	Clifton Park (T) / Saratoga	Recreational - Golf Course	Surface Water	2019 / 2020	0.27	0.36	591866 / 4744465	750 (GPM)	Yes

Sources: Data.NY.gov, 2022; NYSDEC 2021a, b, c, d, e; NYSDEC 2019c

[1]Million gallons per day (MGD), [2]Gallons per day (GPD), [3]Gallons per minute (GPM), [4]Withdrawal and return rate are equal

Figure 4-14 Water Withdrawals and Discharges Within or Near the Boundaries of the Crescent and Vischer Ferry Projects



4.4.1.1.5 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 fishing.

During the navigation season (generally mid-May through mid-October) the locks at each of the Project dams (Lock E-6 at Crescent and Lock E-7 at Vischer Ferry) are operated to allow boats to move upstream and downstream through the Canal System. Lock E-6 is the most upstream lock on the portion of the canal known as the Waterford Flight. Additional locks on the Waterford flight, from upstream to downstream, include Locks E-5 through E-2. Lockage rates are variable depending on Barge Canal traffic. Table 4-10 and Table 4-11 provide a summary of the number of lockages made at the Waterford Flight locks (Locks E-2 through E-6) and at Lock E-7, respectively, by year and month.

Table 4-10 Total Lockages by Month for Waterford Flight (Locks E-2 through E-6)

Lock	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
E-2	2016				7	198	329	288	193	263	116	44	
	2017					117	344	271	228	230	90	8	3
	2018					184	362	234	243	200	118	10	
	2019					167	324	308	221	221	120	9	
	2020						4	72	225	166	89		
	2021					145	367	245	284	276	116	2	
E-3	2016				6	203	285	292	189	248	128	56	1
	2017		1			167	347	255	227	221	104	12	1
	2018					191	374	268	228	281	120	23	4
	2019				9	123	351	316	232	267	122	10	
	2020						9	85	230	159	94		
	2021				3	111	338	235	273	242	102	6	
E-4	2016				14	211	286	295	185	193	69	29	4
	2017				3	134	312	193	210	192	69	1	
	2018				13	142	360	256	180	262	118	17	2
	2019				5	76	300	297	230	253	129	12	
	2020						4	49					
	2021				9	153	359	230	216	147	127	9	
E-5	2016				12	220	290	276	195	145	119	42	2
	2017					143	323	203	184	149	89	6	3
	2018				11	144	332	202	139	223	85	18	
	2019				3	117	148	309	197	126	86	19	
	2020						1		2			2	
	2021				10	124	322	223	257	238	130	9	
E-6	2016				7	214	290	287	187	217	119	41	
	2017				3	154	341	227	229	204	93	9	
	2018				4	118	249	215	145	161	69	9	
	2019					84	353	296	220	239	118		
	2020						2	44	65	49	30		
	2021				6	94	245	78	83	137	74		

Table 4-11 Total Lockages by Month for Lock E-7

Lock	Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
E-7	2016	8	183	306	404	284	270	126	43	2
	2017	1	135	297	307	317	276	108	25	3
	2018	0	166	390	406	339	286	120	12	2
	2019	4	128	357	464	394	330	148	14	0
	2020				141	395	321	129	6	
	2021	12	169	611	370	378	321	128	5	1

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 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 4-12 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 4-12 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 4-13 outlines the water quality standards and criteria applicable to the surface waters of the Projects.

Table 4-13 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 4-15). 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 4-14).

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 monitoring locations from 2013 to 2018 are presented in Table 4-15.

Figure 4-15 Water Quality Monitoring Stations in the Vicinity of the Crescent and Vischer Ferry Projects

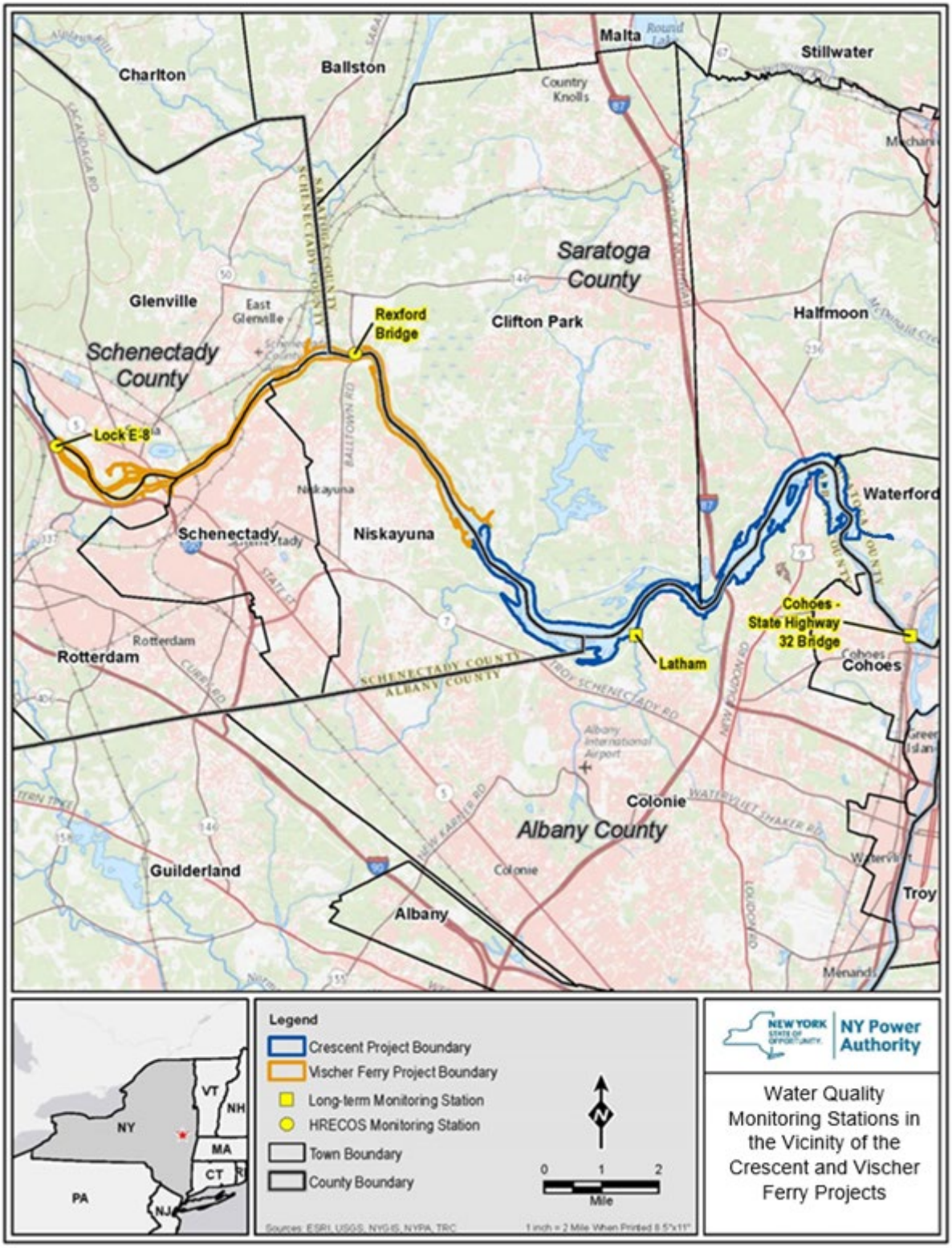


Table 4-14 Annual Minimum, Maximum, and Averages of Water Quality Data Collected at Cohoes and Latham Monitoring Locations From 2004–2016

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 4-15 Annual Minimum, Maximum, and Averages of Water Quality Data Collected at Lock 8 and Rexford Bridge Monitoring Locations from 2013-2020

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 4-16 and Figure 4-17). Temperature and DO were collected continuously at two stations (forebay and tailwater) at both the Crescent and Vischer Ferry Projects (Table 4-16). 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 found in the Mohawk River at the Crescent Project. Most of the aquatic vegetation found in the Project impoundment is water chestnut (*Trapa natans*), an invasive species (see Section 4.7.1.1.2 of this application for a description of the aquatic plants species documented in the Projects' impoundments).

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 no adverse 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 4-17. 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.

Figure 4-16 2020 Crescent Water Quality Study Monitoring Station Locations

Figure 4-17 2020 Vischer Ferry Water Quality Study Monitoring Station Locations

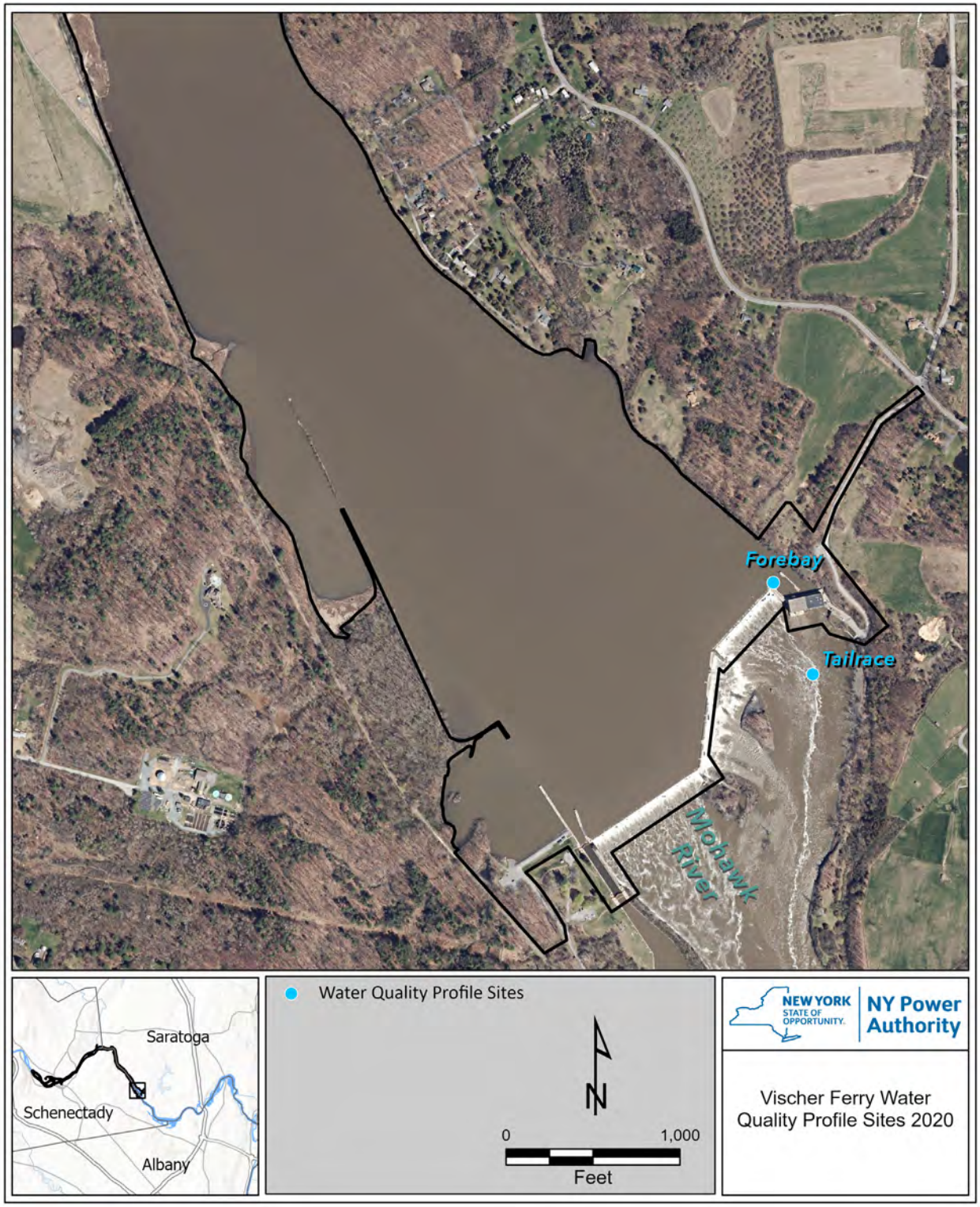


Table 4-16 June – October 2020 Monthly Continuous Water Quality Summary Results

	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 and Riverkeeper 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 DO patterns observed in the Project forebays in 2020 occur in the impounded Mohawk River upstream of the Project forebays or if the conditions are localized to the Project forebays, and b) evaluate whether the Project 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 in the same locations as the 2020 water quality monitoring study in the forebay of each Project and in two additional locations in the impoundments of each Project, described in Table 4-17. 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 4-18 and Figure 4-19 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. 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. 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.

High river flows occurred at times during the study period making boat access unsafe for impoundment data collection. Impoundment profiles could not be collected for safety concerns on four occasions, and

full-depth forebay profiles at Vischer Ferry could not be collected with accuracy on two occasions. Although the Projects experienced high flows during the study period, the objectives of this study were accomplished.

The study successfully collected additional water quality data at the Projects, which included a range of environmental and operational conditions, including high flow events. Key findings are summarized below, and the final 2021 Water Quality Study report is available in the USR filed with the Commission on February 17, 2022.

The Projects continued to display consistent vertical temperature patterns throughout the study period, as they did during 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 days with lower flow and high temperatures (e.g., June 28, July 7, and August 12). The largest vertical DO gradient observed during the study period was on July 7, when dissolved oxygen levels decreased to 3.01 mg/L at a depth of 9 meters in the Crescent impoundment, at the upstream site, Impoundment B. DO stratification was also observed in the Crescent Forebay below 2 meters, consistent with the two other Crescent sites, on July 7. During this time, river flows were relatively low, and the Project turbines were operating at a low level due to low river flows.

DO stratification was also observed at the two Crescent impoundment locations on June 28 and on August 12, during periods of low river flows. However, due to the shallower sampling location in the Forebay, this site did not stratify on June 28 and August 12 when DO stratification was observed in the impoundment locations. On these occasions, the Crescent turbine(s) were operating.

The Vischer Ferry forebay sampling location was deeper compared to the impoundment locations, but the impoundment locations were observed to be more likely to stratify. DO data collected on two of three low flow days (July 7 and August 12) showed the impoundment sites have a DO gradient decreasing with depth, whereas the Forebay site was mixed top to bottom on these days.

Data collected for this study in 2021 demonstrates that DO stratification can occur during low flow periods in the Project impoundments and forebay locations. At higher river flows, the water column stays mixed from top to bottom in all locations and neither DO or thermal stratification was observed. These results demonstrate that the DO stratification patterns observed in the forebays in 2020 are not localized to the Project forebays and are representative of overall impoundment conditions. Stratification patterns are not related to the Projects' turbine operations per se, but stratification can occur during low river flow conditions. As reported in the 2020 Water Quality Study, the Project tailrace locations remain well oxygenated despite varying DO conditions in the forebays. Overall, considering data collected in 2020 and 2021 in the Water Quality Study, the operation of the Projects does not adversely affect water quality conditions.

Table 4-17 2021 Water Quality Study Vertical Profile Sites at the 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 4-18 2021 Crescent Water Quality Study Monitoring Station Locations

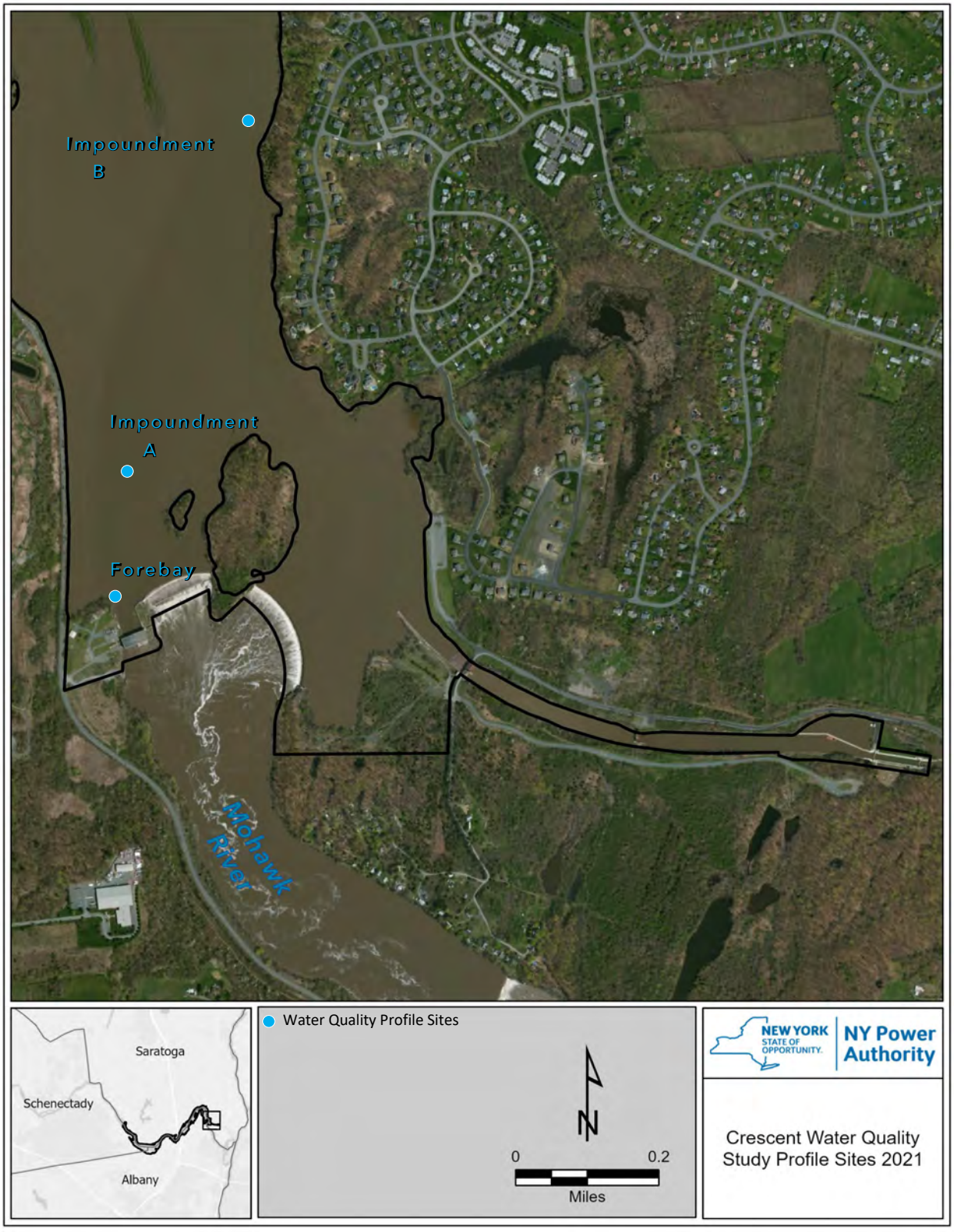
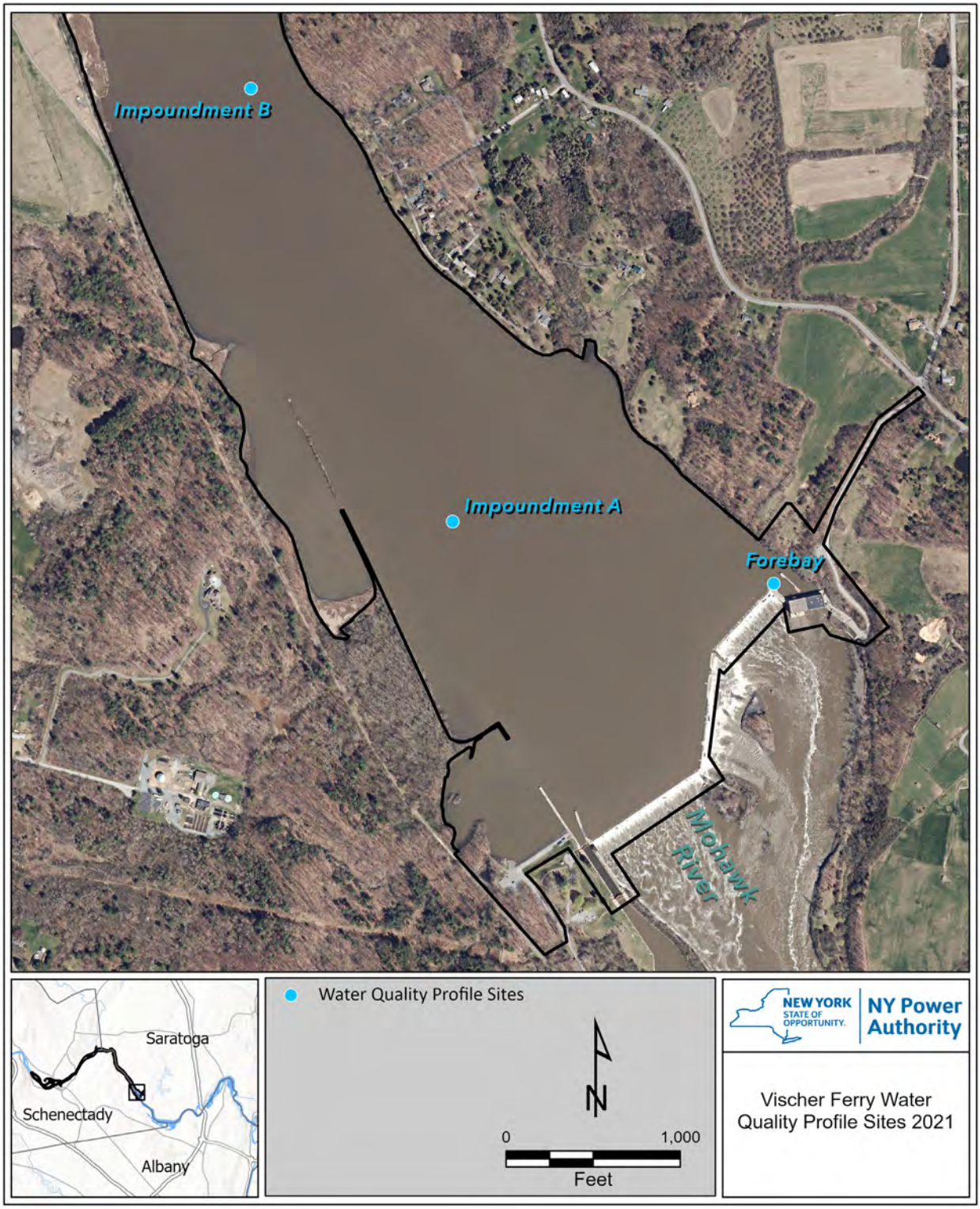


Figure 4-19 2021 Vischer Ferry Water Quality Study Monitoring Station Locations



4.4.2 Environmental Effects

Regarding water resources, the continued operation of the Projects has no effect on downstream water resources. The Projects are operated as run-of-river, and as such have limited storage and are not operated for flood control. Existing minimum flows established at both Projects will continue and will help ensure that flow is provided downstream of the dams at all times. With respect to upstream flooding, the contribution of ice-jams associated with the Vischer Ferry impoundment to upstream flooding has been and continues to be examined outside of the FERC relicensing process as part of New York's Reimagine the Canals program.

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.

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. However, the 2021 Water Quality study results demonstrate that 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 no adverse 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 above standards. 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.

As noted previously, water quality data collected in 2021 demonstrates that DO stratification can occur during low flow periods in the Project impoundments and forebay locations. At higher river flows, the water column stays mixed from top to bottom in all locations and neither DO or thermal stratification was observed. These results demonstrate that the DO stratification patterns observed in the forebays in 2020 are not localized to the Project forebays and are representative of overall impoundment conditions. Stratification patterns are not related to the Projects' turbine operations per se, but stratification can occur during low river flow conditions. As reported in the 2020 Water Quality Study, the Project tailrace locations remain well oxygenated despite varying DO conditions in the forebays. Overall, considering data collected in 2020 and 2021 in the Water Quality Study, the operation of the Projects does not adversely affect water quality conditions.

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 licenses and is not proposing any changes with respect to water resources. With respect to ice-jams and upstream flooding, the contribution of ice-jams associated with the Vischer Ferry impoundment to upstream flooding has been and continues to be examined outside of the FERC relicensing process, as part of New York's Reimagine the Canals program. Ultimately, any final recommendations for changes to Vischer Ferry Project operations or facilities that may stem from the Reimagine the Canals program can be considered as part of a future license amendment, as appropriate. The Power Authority is proposing no changes in its FLA.

Regarding water quality, the Power Authority's water quality studies conducted in 2020 and again in 2021 demonstrate that the Projects and their operation have no adverse effects on water quality. Under existing and proposed operation, the Projects currently meet and will continue to meet all applicable water quality standards. Therefore, no water quality enhancement measures are needed or proposed.

4.4.4 Unavoidable Adverse Impacts

Continued operation of the Projects as proposed will have no unavoidable adverse impacts on water quantity or quality.

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 2,250 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.) are 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 available 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.

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 4-18).

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 4-18 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 4-19 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 4-19). 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 4-19. 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 4-19.

Table 4-19 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 electro-fished 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 upstream 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 Monitoring Study

The objective of the 2021 American Eel Monitoring 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 2021 and consisted of using three sampling methodologies: nighttime observations, nighttime boat electrofishing, and eel ramp trap sampling. The results of this 2021 American Eel Monitoring Study are summarized below. The complete 2021 American Eel Monitoring Study Report is available in the USR filed with the Commission on February 17, 2022.

Nighttime Surveys

Nighttime observation surveys have been successful at documenting the presence of upstream migrating eels as they ascend wetted surfaces. Areas typically attractive to upstream migrants are wetted, have suitable climbing substrate, have reasonable slope, and have attraction flow. These conditions are common throughout the Vischer Ferry and Crescent spillway and tailwater areas.

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.

Nighttime surveys were performed in the tailrace and spillway locations downstream of the Crescent and Vischer Ferry dams, respectively, on five dates: April 22, April 28, May 13, May 18, and June 9, 2021. No eels were observed at either Project during any of the observation events.

Nighttime Boat Electrofishing

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. Nighttime boat electrofishing occurred on the nights of August 12, and September 14, 2021. Each event began at least 0.5 hours after sunset and consisted of six, 20 minute sampling runs. The sampling transects were in the vicinity of the Isle of the Mohawks as had been recommended during the resource agency site visit in November 2020. This area is in the Vischer Ferry Impoundment in the vicinity of the Route 5 Western Gateway Bridge. The sampling transects are shown in Figure 4-20.

No American eel were observed or collected during any of the electrofishing surveys. Numerous fish species, including gamefish and non-gamefish were observed. The dominant gamefish species observed were walleye and smallmouth bass. Other species observed included largemouth bass, northern pike, and yellow perch. An invasive round goby was also observed.

Eel Ramp Trap Sampling

Eel ramp traps (Figure 4-21) 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.

Six eel traps (three at each Project) were deployed downstream of each Project from mid-May through September. The eel traps were installed the week of May 18, 2021. All of the traps were deployed and operational on May 24, 2021. The eel ramp traps were deployed in locations determined in consultation with the NYSDEC and the USFWS. They were positioned 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 Crescent and Vischer Ferry Projects are shown in Figure 4-22 and Figure 4-23, respectively.

The eel ramp traps were checked twice weekly unless prevented by unsafe conditions such as pending high water events or severe weather. Traps were checked for proper function, water temperature, and dissolved oxygen levels were recorded. Maintenance and cleaning of trap components occurred as needed. Eels collected were photographed, measured (total length and girth), weighed, and scanned for existing tags. Information from existing tags was recorded. If the eels were not tagged, they were tagged using Passive Integrated Transponder (PIT) tags to identify them should they be recaptured. Tag numbers were confirmed and recorded. Eels were to then be observed for recovery and released in the vicinity of capture. If small eels were collected, they were to then be enumerated and processed as appropriate, but may not be suitable for tagging due to their size.

In total, the six traps functioned for 550 nights of sampling. No American eels were captured at any of the traps at either Project throughout the entirety of the study (May 24 through October 1, 2021). The only aquatic organisms routinely collected in the traps were crayfish.

Study Results Summary

Sampling using multiple methodologies throughout the warm water season at the Projects did not document any American eel at either Project. Use of three separate sampling methodologies provided opportunity to collect or observe all lifestages of American eel potentially present in the vicinity of the Projects. Nighttime observations target glass eels and elvers; eel ramp traps target elvers and yellow eel lifestages; and electrofishing targets yellow to adult silver eel lifestages. It is likely that if any lifestage of American eel were present in reasonable numbers they would have been observed or collected in the upstream or downstream areas of either Project dam.

Figure 4-20 Electrofishing Sites Upstream of Vischer Ferry Dam

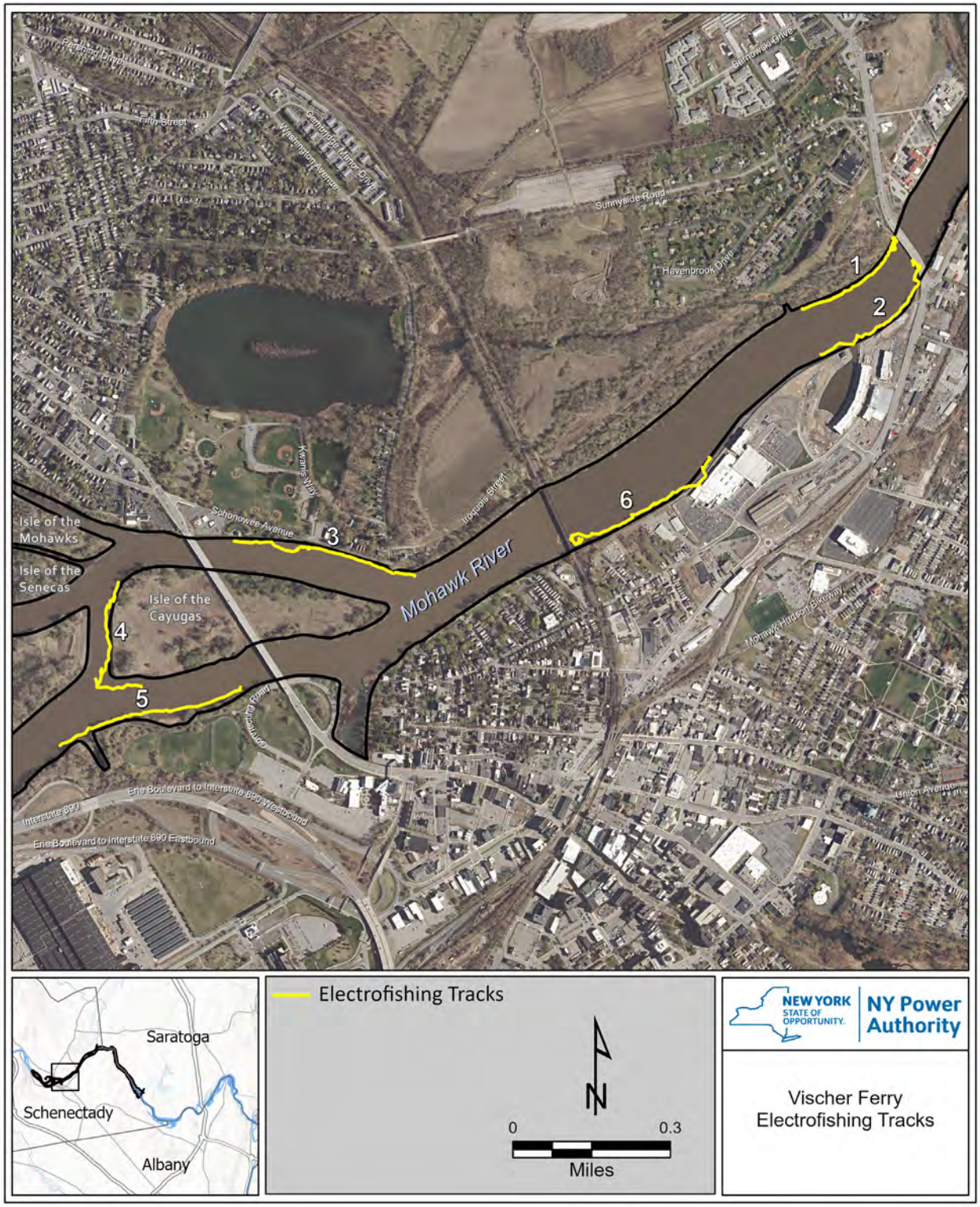


Figure 4-21 Eel ramp trap installed at downstream of the Crescent Dam tailrace area (Crescent Trap #1)

Figure 4-22 Eel ramp trap locations downstream of Vischer Ferry Dam

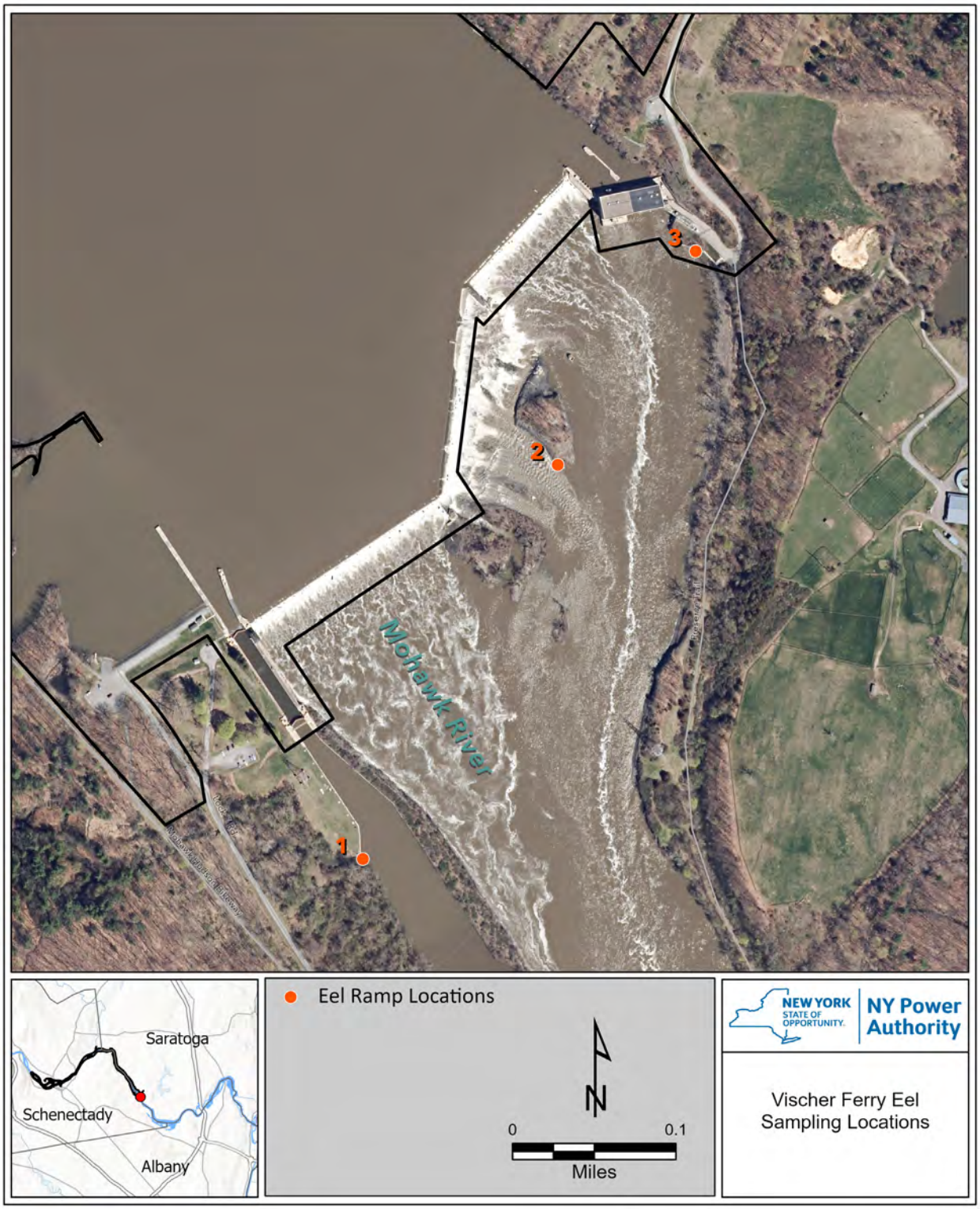


Figure 4-23 Eel ramp trap locations downstream of Crescent Dam

4.5.1.1.5.2 2021 American Eel eDNA Study

Recent research conducted by the USGS supports the results of the Fish Community and American Eel relicensing studies that concluded that while American eel are present at the Projects, they are uncommon. As part of the study effort, during the spring and summer of 2021 USGS conducted eDNA sampling in segments of the Hudson River, Mohawk River, and New York State Barge Canal to identify the presence of American Eel in these areas. The study included 36 sites in the Mohawk River, its tributaries, and the Waterford Flight (George et al, 2022).

The eDNA methodology essentially detects the presence/absence of a given species. However, comparing the results between locations can be an indicator of relative abundance. The study found that detection of eel eDNA was strongest in the Hudson River below the first barrier at the Green Island Project (FERC No. 13) dam. Above Green Island dam, detections dropped by an order of magnitude in the Hudson River.

In the Mohawk River, most of the positive detections occurred in the very lowest part of the Mohawk River near the confluence with the Hudson River, and within the Waterford Flight downstream of Lock 4. Positive detections for American eel eDNA in these areas included:

- 13 of 32 samples (41%) downstream of Cohoes Falls
- 14 of 48 samples (29%) in the Barge Canal between Locks 3 and 4
- 32 of 48 samples (67%) in the Barge Canal downstream of Lock 2
- 31 of 32 samples (97%) in the Mohawk River at Mill Rd.(i.e. near the mouth of the Mohawk River)

In comparison, positive detections within the Project areas were substantially less. They were:

- 1 of 32 samples (3%) downstream of Crescent Dam
- 1 of 48 samples (2%) upstream of Lock 6, and
- 1 of 48 samples (2%) downstream of Lock 7

These results are consistent with other studies and indicate that while American eel are present in the Mohawk River, they are most common in the very lowest portion of the river, and that their presence at the Projects is 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 (Locks E-2 through 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 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 4-24 Fish Passage Routes at the Crescent Hydroelectric Project

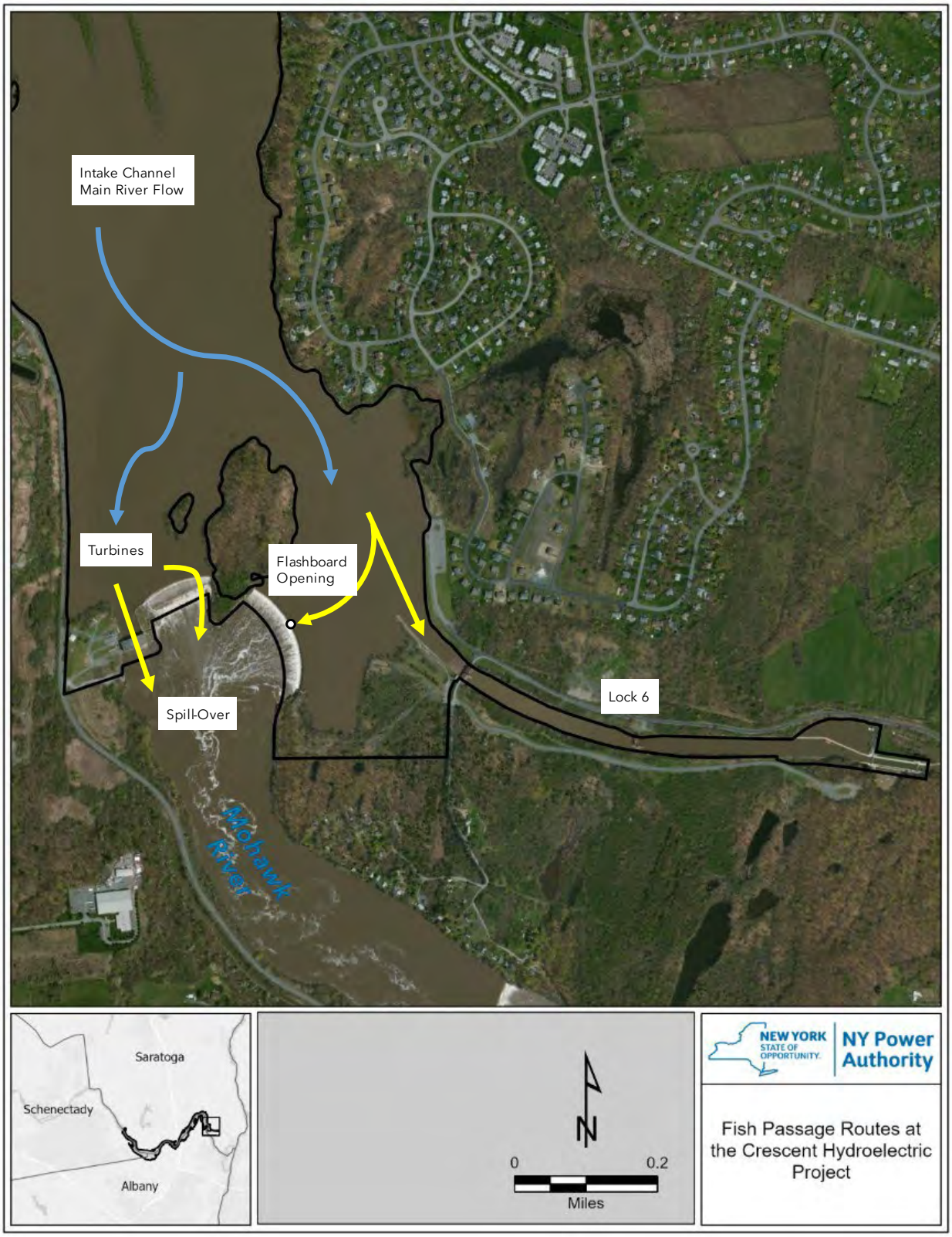
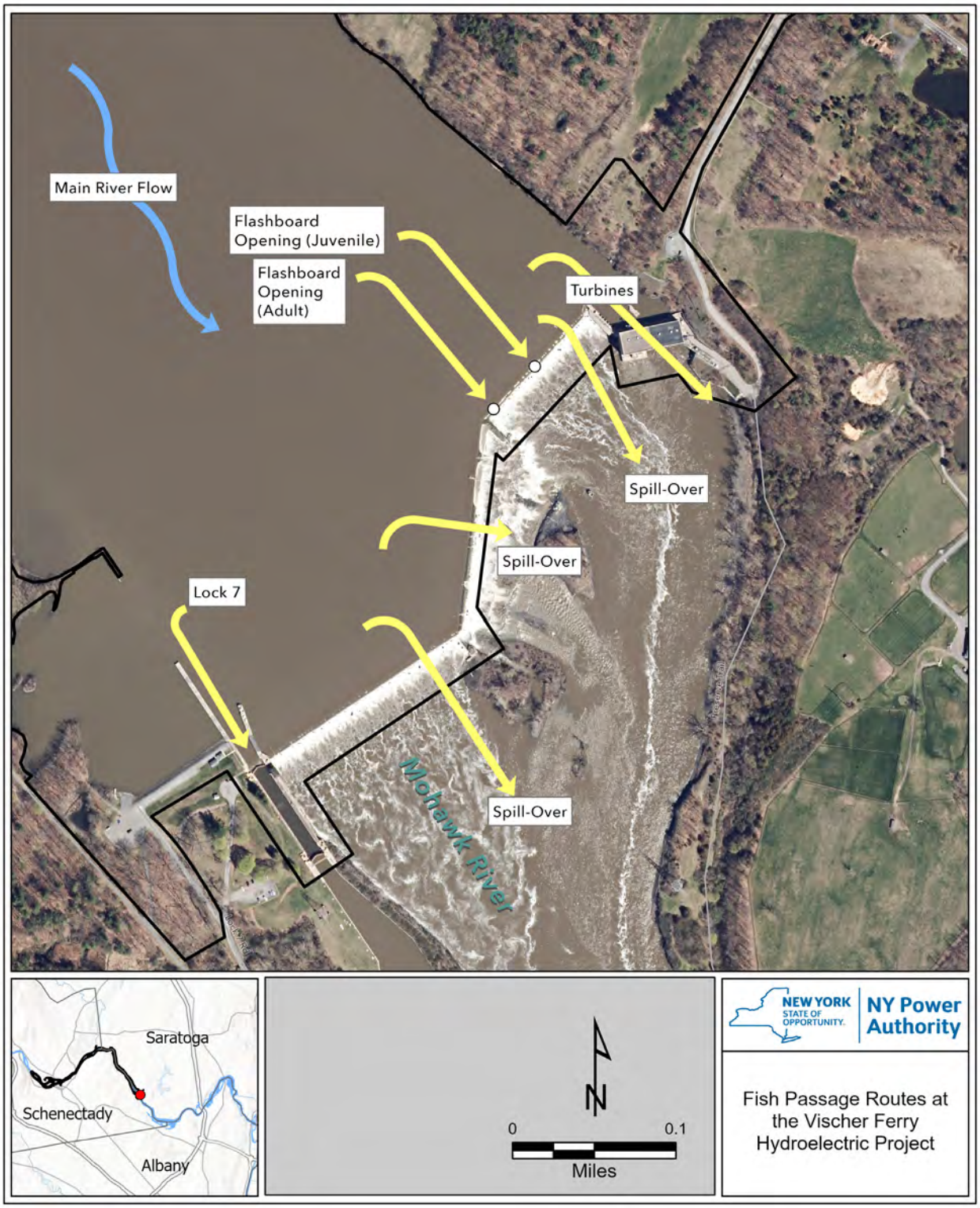


Figure 4-25 Fish Passage Routes at the Vischer Ferry Hydroelectric Project



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 (RMC Environmental Services, 1992). 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 (RMC Environmental Services, 1992)).

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 included 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. 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 currently in place 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 whole 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, whole 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. Lockage information for the canal locks that may provide fish passage at the Crescent (Locks E-2 through E-6) and Vischer Ferry (Lock E-7) was previously discussed in Section 4.4.1.1.3.

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 the 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 quality is marginal in the forebay and intake areas and would be less attractive to the target species relative to impoundment habitats. The bottom of the Crescent headrace channel is cut rock, and the sides are formed by two mass concrete retaining walls. The Vischer Ferry headrace has steep-sided walls, the southern side consists of gate structures while the northern side is cut rock. The bottom maintains a consistent elevation. Each has limited cover. The substrate of both headway channels are a combination of bedrock and concrete. 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 the jurisdiction of NYSDEC Region 4 and Region 5. 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 considerable 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 drainage and the Barge Canal System. A list of documented mussel species, as well as those that are potentially present, within the boundaries of the Projects is provided in Table 4-20 (NYSDEC, 2012).

The New York Natural Heritage Program (NYNHP) 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 at a much lower occurrence rate than observed at the Crescent Project. During the field survey, only two live mussels were found - both at the Crescent Project. Overall, occurrences of relic mussel shells were observed to be higher at the Crescent Project than at the Vischer Ferry Project. Table 4-20 lists the mussel species identified at both Projects.

Table 4-20 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 of impoundment levels, continued operation of the Projects will not have a significant effect on resident fisheries, aquatic habitat, or aquatic life.

Regarding migratory fish, existing runs of anadromous blueback herring, have become well established in the Mohawk River in the 150 years since the canal and lock system was first constructed. To enhance downstream fish passage at the Projects, the Power Authority installed and operates an acoustic deterrent system that has proven effective at diverting fish away from the powerhouse intakes to the flashboard notches provided at each of the Projects. When working properly, the acoustic deterrent systems in combination with the flashboard notches result in a high level of survival expected for out-migrating juvenile and adult blueback herring, as demonstrated by the Power Authority's blueback herring study. Under these conditions, there are no significant adverse impacts to blueback herring associated with the operation of the Projects. However, the acoustic deterrent systems are approaching end of service life, and the Power Authority has found the systems to be increasingly difficult to maintain and to keep in good operating condition. As a result, the Power Authority is currently exploring with the resource agencies potential alternatives for providing safe downstream passage for blueback herring at the Project dams.

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. Results of an eDNA study conducted by the USGS as well as fisheries sampling conducted by the NYSDEC also indicate American eel are not common in the Project Areas. There are currently no upstream eel passage facilities at any of the Mohawk River dams downstream of Crescent. And, although there are currently no upstream or downstream eel passage facilities designed specifically for American eel at the Projects, upstream passage is available to eels through the canal and locks. Downstream passage is available through the notches in the flashboards and also through the canal locks. The numbers of eels currently occurring at the Projects are small and because upstream and downstream passage are currently available to eels at both

Projects, continued operation of the Projects as proposed will have no adverse effects on American eel in the lower Mohawk River.

The results of the Power Authority's Mesohabitat Study demonstrated that several species of freshwater mussels occur in both Project impoundments. The surveys were able to locate both live and relic specimens of three different mussel species in certain areas of the impoundments. More live mussels and relics (shells) were found during the fall surveys after the flashboards had been removed and the impoundments were at their lower, winter (non-navigation season) elevations. The study also found that the littoral zone areas exposed during the non-navigation season were confined to a narrow band around the shoreline of each of the impoundments, and therefore any impacts to mussels associated with the transition from navigation to non-navigation season impoundment elevations is minimal.

4.5.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new licenses. Operation of the Projects as run-of-river with minimal fluctuations in impoundment levels will have no adverse impact on resident fisheries or aquatic habitat.

Regarding anadromous fish and fish passage, the Power Authority currently operates an acoustic deterrent system at each Project during the blueback herring migration 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. However, as discussed in Section 4.5.2, the acoustic deterrent systems are approaching end of service life, and the Power Authority has found the systems to be increasingly difficult to maintain and to keep in good operating condition. As a result, the Power Authority is currently exploring with the resource agencies potential alternatives for providing safe downstream passage for blueback herring at the Project dams.

Regarding catadromous American eel, studies conducted by the Power Authority and others establish that American eel are uncommon at the Projects. Accordingly, the Power Authority is not proposing any passage measures specific to American eel, at this time. American eel will continue to be provided upstream passage at the Projects through the existing canal and lock system. Downstream passage will continue to be provided via the seasonal flashboard notches and also through the locks.

The Power Authority is making no additional proposals regarding the protection, enhancement and mitigation of other aquatic species or habitats. Continued operation of the Projects as run-of-river with minimal fluctuations in impoundment elevations will ensure that existing habitats are protected and will be maintained.

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 three 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, indicate 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

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 within and immediately adjacent to the Projects 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 and adjacent to 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 under water 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 and immediately adjacent to 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).

4.6.1.2.1 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 a more detailed assessment of botanical resources within the Project study area.

Crescent Project

Within the Crescent Project study area, the upland deciduous forests were observed to be 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 4-21 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 4-21 provides a list of all plant species observed in riparian and wetland areas.

Table 4-21 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
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

Common Name	Scientific Name	Wetland Indicator Status	Invasive/ PRISM Tier
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	
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 4-22 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

Notes:

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 4-23). 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 4-23 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.

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 4-22 includes the aquatic invasive plant species and Table 4-21 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 Vegetation Management

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. Most of the Project lands are developed areas including lands in and around the Project powerhouses and other facilities, as well as lands associated with the developed Project recreation sites.

The Power Authority has established practices for managing vegetation on its Project lands. The Power Authority undertakes routine vegetation management at the Crescent and Vischer Ferry Projects on an as-needed basis following standard practices for Power Authority hydroelectric projects. Grassy areas around the powerhouses, switchyards and at the Project recreation sites are mowed routinely. Hand mowing, line-trimming, or spot applications of herbicides may also be used, as needed, to control weeds in driveways, parking areas, equipment, along guard rails, around signage, and around Project buildings and structures that are well away from the water. No herbicide applications are made in Project waters, drainage ways, or near the Project shorelines. All herbicide applications are made following manufacturer's specifications, and trained and certified Power Authority staff and/or contractors follow standard environmental and safety protocols for handling, applying and disposing of herbicides. There are very few areas that support trees or woody vegetation within the Projects' boundaries. Where trees are present, if any tree or limb poses a

safety hazard to any equipment, structures, Power Authority staff or the public, the Power Authority will remove them. To the extent feasible, tree-cutting and/or limb removal is limited to winter months (November to March), unless the tree and/or limb poses an imminent safety concern, in which case it will be removed as soon as is safe and practicable.

4.6.1.5 Wildlife Resources

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.

4.6.1.5.1 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 4-24, Table 4-26, and Table 4-27.

Table 4-24 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*
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

4.6.1.5.2 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 Bald Eagle Study is discussed in more detail in the following section.

Table 4-25 contains a complete list of wildlife species observed during the mesohabitat surveys within both the Crescent and Vischer Ferry impoundments. The submerged aquatic vegetation (SAV) and palustrine emergent 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 4-25 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*
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 4-26 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*	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*	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 4-27 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

4.6.1.5.3 2020-2021 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). During the Aquatic Mesohabitat Study conducted in summer and fall of 2020, observations of bald eagles were recorded, including GPS coordinates for the observed location of the bird, and a notation of its observed activity (flying, roosting, etc.). In 2021 the bald eagle study continued with an early spring nesting survey and additional bald eagle observations recorded during the summer of 2021. The results of the 2020-2021 Bald Eagle Study are summarized below. The complete Bald Eagle Study Report is available in the USR filed with the Commission on February 17, 2022.

The results of the Bald Eagle Study demonstrate that the Crescent and Vischer Ferry Project areas are utilized by bald eagles for a variety of activities. Table 4-28 provides a detailed listing of the bald eagle sightings during the 2020 and 2021 surveys. Figure 4-26 and Figure 4-27 show the locations of bald eagles observed at the Crescent and Vischer Ferry Projects, respectively.[5] Throughout field survey periods, a total of 53 occurrences of bald eagle sightings were recorded. It should be noted that some bald eagle observations were likely repeat sightings of the same individual eagle. Of the 53 sightings, 46 were sightings of a single bald eagle and seven (7) were sightings of two bald eagles. The sightings included both juvenile and adult bald eagles. Of the 53 sightings, 34 were sightings of adults, 16 were sightings of juveniles, one (1) was a sighting of both an adult and juvenile. The sightings occurred at both the Crescent and Vischer Ferry Projects; 32 at the Crescent Project and 21 at the Vischer Ferry Project. The bald eagles observed during the field survey were documented either in flight, nesting, or roosting.

One potential nest was observed during the fall 2020 survey at the Crescent Project, but no eagles were observed at the nest at the time of the sighting. During the spring 2021 nesting survey two active bald eagle nests were located and observed along the Crescent Project impoundment. While both nests were observed to be active, it was not possible to determine the number of eaglets, if any, that were in the nests. These nests were confirmed by the NYSDEC during aerial surveys conducted in 2021. These surveys are conducted every three years and these nests were not present during the 2018 survey. One nest, however, is considered a “replacement” nest for one that had fallen and, as such, it is believed to have been occupied by the same nesting pair. At the time of the 2021 nesting survey, there were no other active nests currently known to be in the Project areas.

The wide range of eagle activities observed at both Projects during the two seasons of study suggests that Project waters and the general Project area are frequently used by bald eagles for a range of activities, including nesting, throughout the year. This is supported by the relatively large number of bald eagle observations made by the Power Authority in 2020 and 2021, as well as observations recorded for winter months on the eBird website. Further, online research of bald eagle viewing opportunities in New York provides numerous articles that reference the Lower Mohawk River in the general vicinity of the Projects, particularly Cohoes Falls, as providing good opportunities to see bald eagles, especially during the winter.

[5] The exact location of nest sightings are not included to protect the nest site. Nest locations were filed as privileged information in the Bald Eagle Study report included in the USR filed on February 17, 2022

The number of references to Cohoes Falls for winter observations, which is adjacent to the Crescent Project's downstream project boundary, is likely related to the fact that open water foraging habitat exists throughout the winter. It is also likely that such habitat occurs in the tailwaters of the Crescent and Vischer Ferry Projects, which operate such that there is always flowing water (i.e., run of river operation). Open water foraging opportunities likely explain the number of winter observations of bald eagles recorded on eBird.

Given the number of eagle sightings, as well as the nesting activity observed, the results of this study suggest that there is an established eagle population that regularly utilizes habitat associated with both Projects throughout the year. Continued operation of the Projects in the future should have no impact on bald eagle use of the Projects.

Table 4-28 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	1	Roost	Vischer Ferry	42.84094	-73.9227	-
08/01/2020	Adult	1	Flight	Vischer Ferry	42.81766	-73.9725	-
08/01/2020	Juvenile	1	Flight	Vischer Ferry	42.81773	-73.9747	-
08/01/2020	Juvenile	1	Roost	Vischer Ferry	42.83785	-73.8792	-
08/01/2020	Adult	1	Roost	Vischer Ferry	42.83626	-73.8782	-
08/01/2020	Adult	1	Flight	Vischer Ferry	42.83597	-73.8781	-
08/04/2020	Adult	2	Roost	Vischer Ferry	42.85029	-73.902	-
08/21/2020	Adult	1	Flight	Crescent	42.77851	-73.8116	-
08/21/2020	Adult	1	Roost	Crescent	42.79479	-73.839	-
08/21/2020	Adult	1	Roost	Crescent	42.79487	-73.8392	-
08/21/2020	Adult	1	Flight	Crescent	42.77696	-73.8131	-
08/21/2020	Juvenile	1	Flight	Crescent	42.77714	-73.8117	-
08/21/2020	Juvenile	1	Flight	Vischer Ferry	42.8431	-73.8774	-
08/21/2020	Adult	1	Flight	Crescent	42.81769	-73.736	-
08/21/2020	Adult	1	Roost	Crescent	42.80903	-73.7188	-
08/26/2020	Juvenile	1	Flight	Vischer Ferry	42.80913	-73.8484	-
08/26/2020	Juvenile	1	Flight	Crescent	42.804517	-73.7221	-
08/27/2020	Juvenile	1	Roost	Crescent	42.80786	-73.7147	-
08/27/2020	Adult	1	Roost	Crescent	42.808	-73.7148	-
08/27/2020	Adult	1	Roost	Crescent	42.81823	-73.7362	-
08/27/2020	Juvenile	1	Flight	Crescent	42.81828	-73.7368	-
08/27/2020	Adult	1	Flight	Crescent	42.81774	-73.7366	-
08/27/2020	Adult	1	Roost	Crescent	42.78509	-73.766	-

Date Observed	Bird Observed	Number of Eagles	Activity Observed	Project	Latitude	Longitude	Notes
08/27/2020	Adult	1	Flight	Crescent	42.80324	-73.8437	-
09/03/2020	Adult	1	Flight	Crescent	42.805233	-73.7224	-
09/03/2020	Adult	1	Flight	Vischer Ferry	42.807932	-73.8433	-
09/10/2020	Juvenile	2	Flight	Vischer Ferry	42.80808	-73.8446	-
10/02/2020	Adult	1	Flight	Crescent	42.813324	-73.7231	-
10/07/2020	Undetermined	1	Roost	Crescent	42.80827	-73.7213	-
11/19/2020	Adult	1	Flight	Crescent	42.78114	-73.7988	-
11/19/2020	Undetermined	1	Nest	Crescent	*	*	-
11/19/2020	Adult	1	Flight	Crescent	42.79792	-73.8427	-
11/20/2020	Adult	1	Flight	Vischer Ferry	42.84886	-73.8789	-
11/20/2020	Adult	1	Roost	Vischer Ferry	42.851	-73.881	-
11/20/2020	Adult	1	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 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

Date Observed	Bird Observed	Number of Eagles	Activity Observed	Project	Latitude	Longitude	Notes
							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 were filed as privileged information in the Bald Eagle Study report included in the USR filed on February 17, 2022.

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

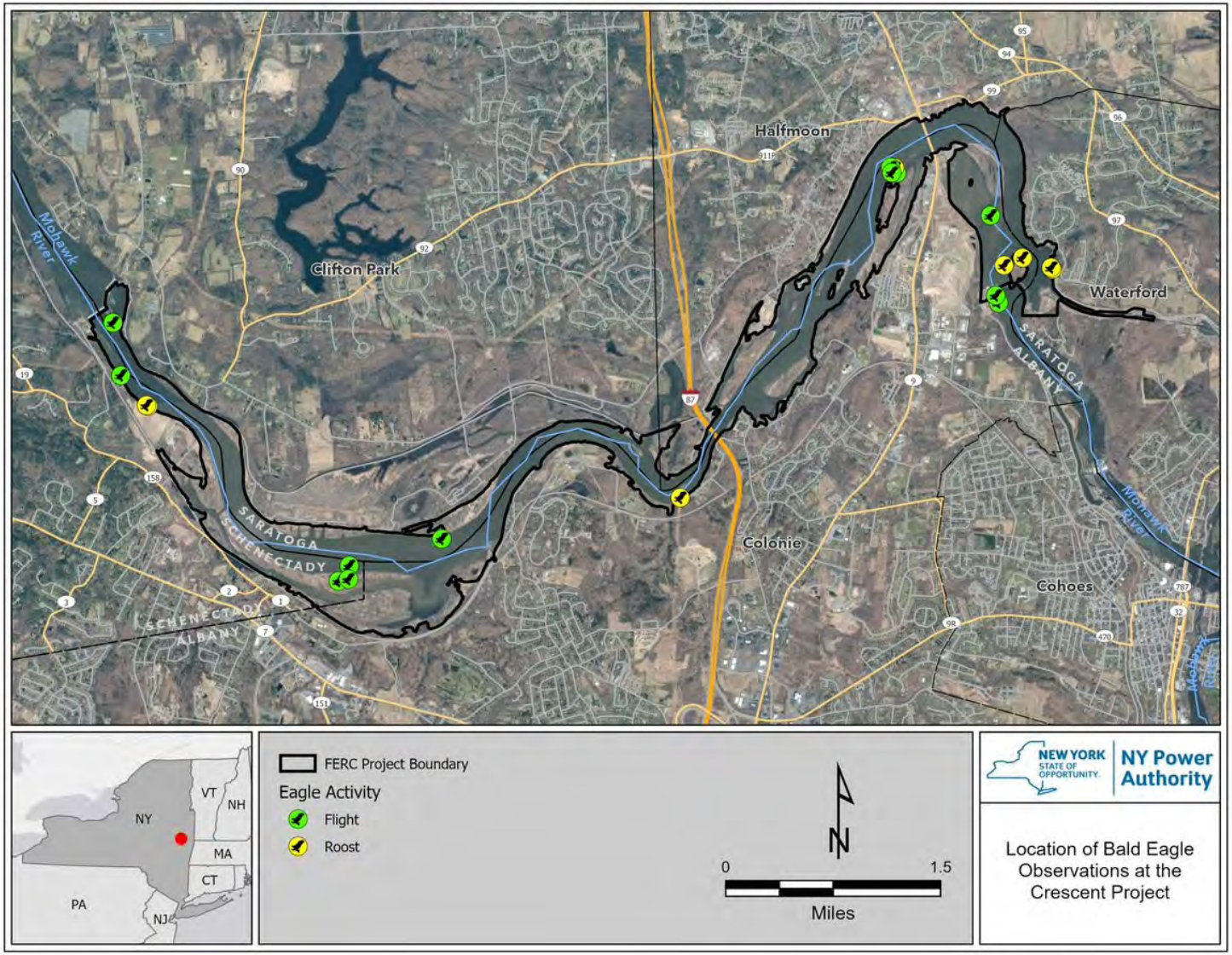
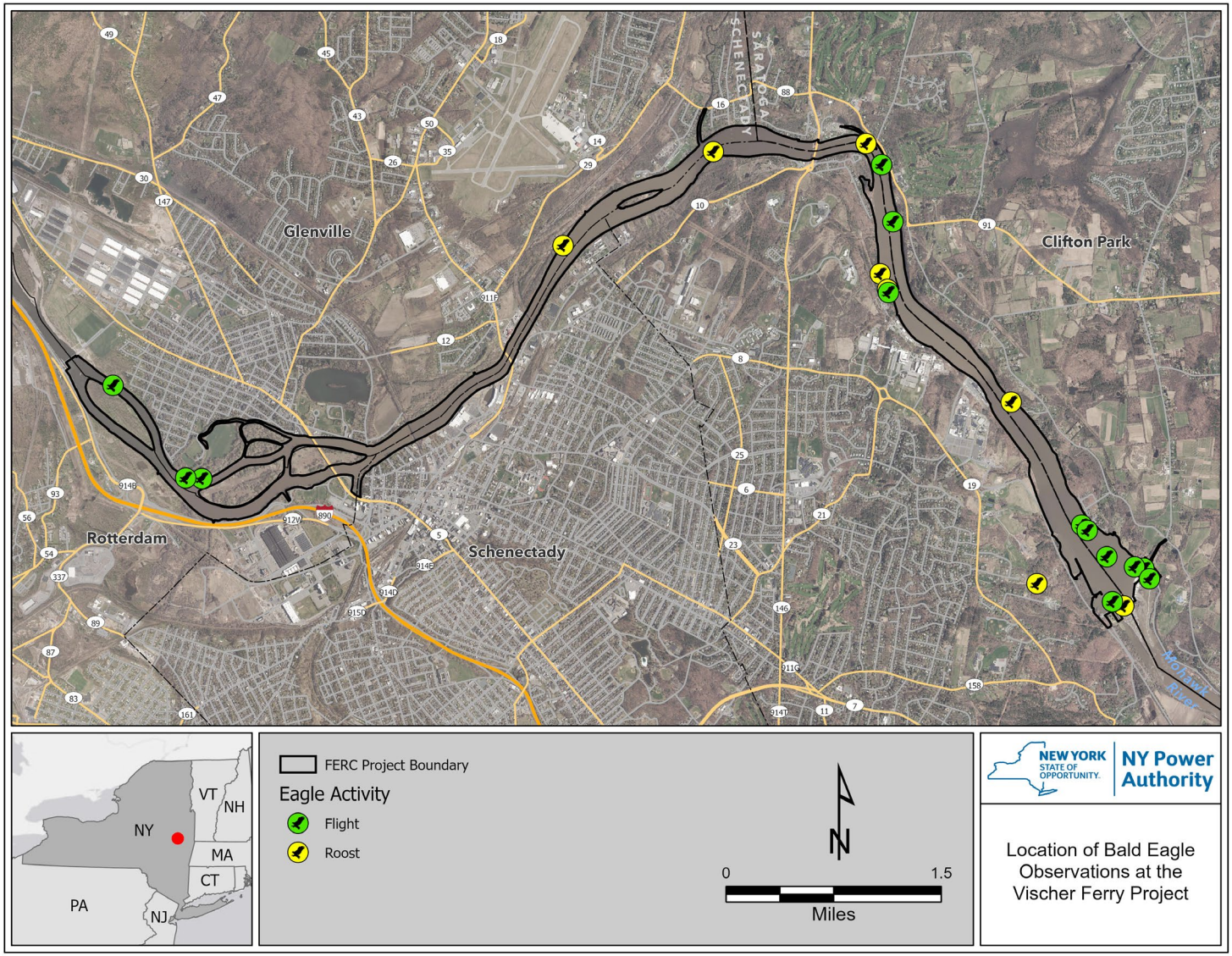


Figure 4-27 Location of Bald Eagle Observations at the Vischer Ferry Project, 2020-2021



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.

The Power Authority will continue to manage project lands as it does currently. The Power Authority has no plans for land clearing, development, or other activities on Project lands that would result in cutting or removing trees, and therefore will have no impacts on wildlife that utilize forest and tree habitats. Vegetation management on the developed areas of Project lands will continue following the Power Authority's current vegetation management practices, as outlined above, and will have no impacts on botanical or wildlife resources at the Projects.

Numerous bird species were observed to use the riparian and other habitats provided at or immediately adjacent to the Projects. Bald eagles frequent the Projects and use available habitat for foraging, roosting and nesting. Continued operation of the Projects will have no impact on bird use generally, or bald eagle use specifically. There are no overhead Project transmission lines or other facilities that could potentially impact eagles and other raptors. Primary transmission from both power plants is through underground feeds to nearby switchyards.

4.6.3 Proposed Environmental Measures

Regarding wildlife resources, the Power Authority proposes to continue existing operating conditions in the new licenses 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 botanical resources or the availability or use of wildlife habitats located in the riparian shoreline areas.

On the developed portion of Project lands, which includes areas around the powerhouses and other Project facilities, including the Project recreation sites, the License proposes to continue to manage the vegetation in accordance with its current vegetation management practices. No changes to the practices are proposed that would result in any impacts to botanical or wildlife resources at the Projects.

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. Wetland information used for this discussion includes the United States Department of Interior (USDOI) USFWS National Wetlands Inventory (NWI) [6] and Project specific wetland information collected by the Power Authority as part of the 2020 Mesohabitat Study.

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 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 NWI map system for basic information on wetlands location and extent at the Projects. The NWI maps indicate scattered wetlands along portions

[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.

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).

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-shrub 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 4-22 lists the aquatic vegetation species observed in both Crescent and Vischer Ferry impoundments. Referring to Table 4-29, 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 invasive 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 4-30, 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 4-22 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 4-29 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 4-30 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 4-31 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 4-32 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 4-28 Wetlands in the Vicinity of the Projects, Map 1 of 8

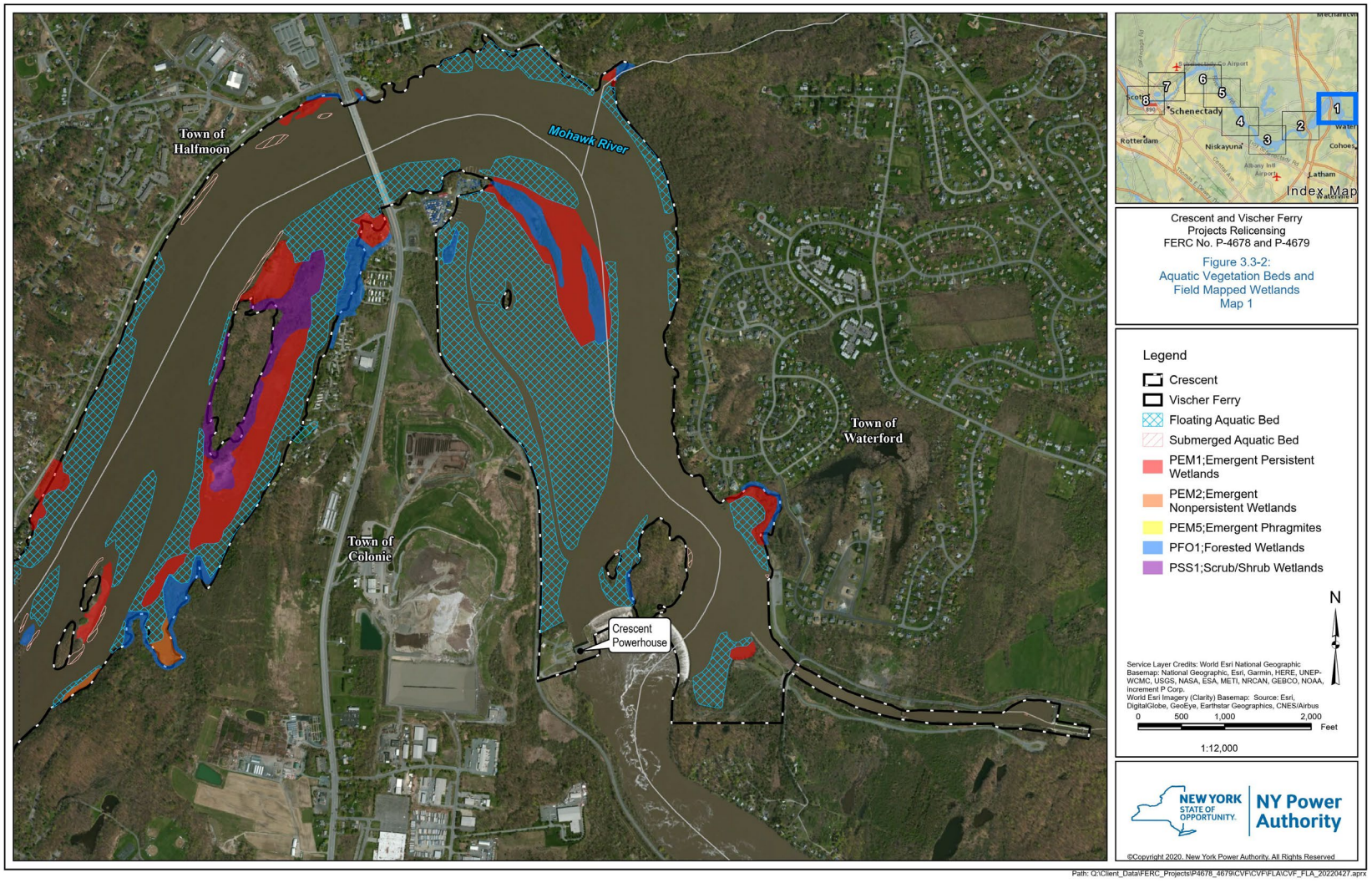


Figure 4-29 Wetlands in the Vicinity of the Projects, Map 2 of 8

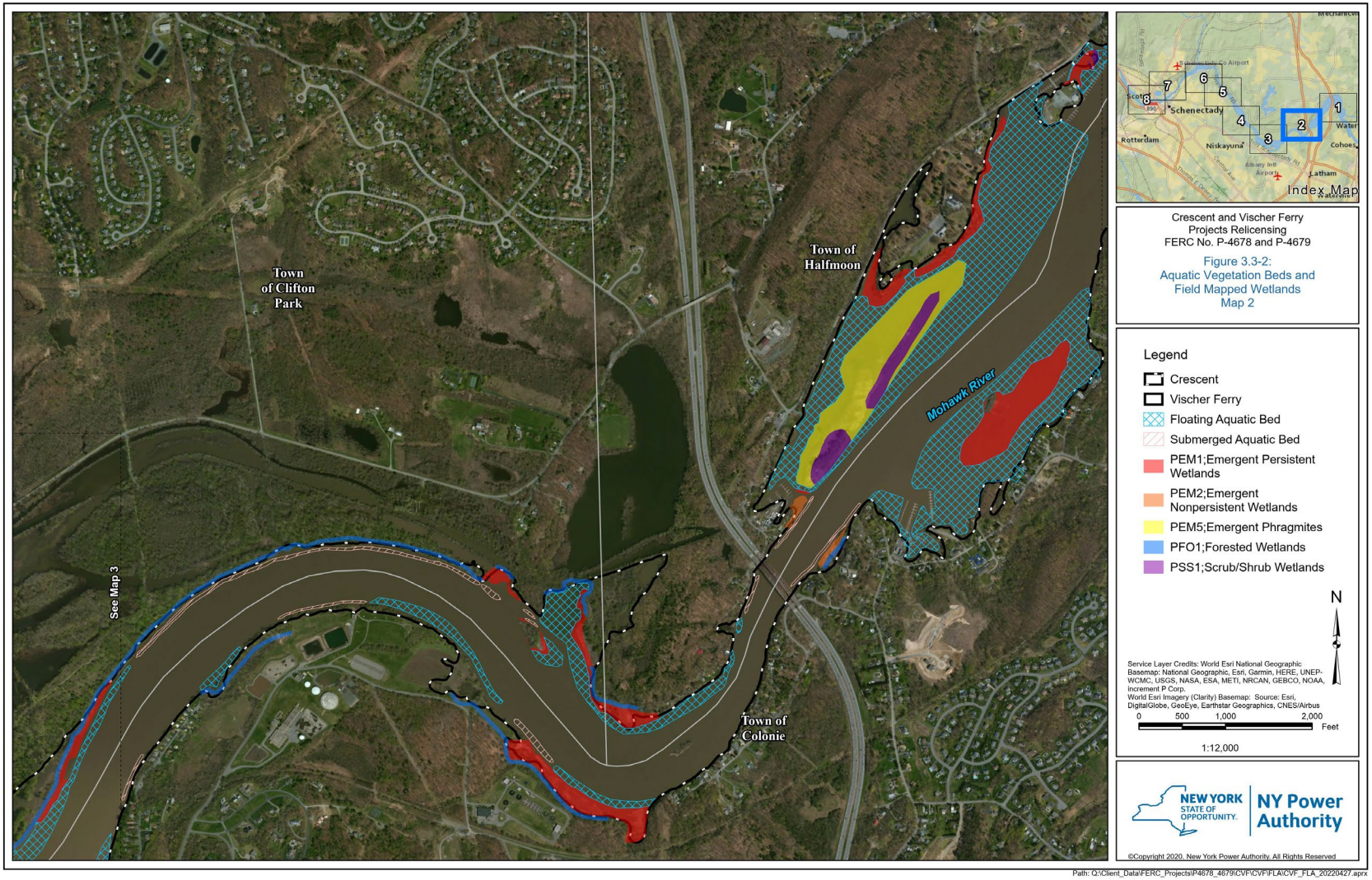


Figure 4-30 Wetlands in the Vicinity of the Projects, Map 3 of 8

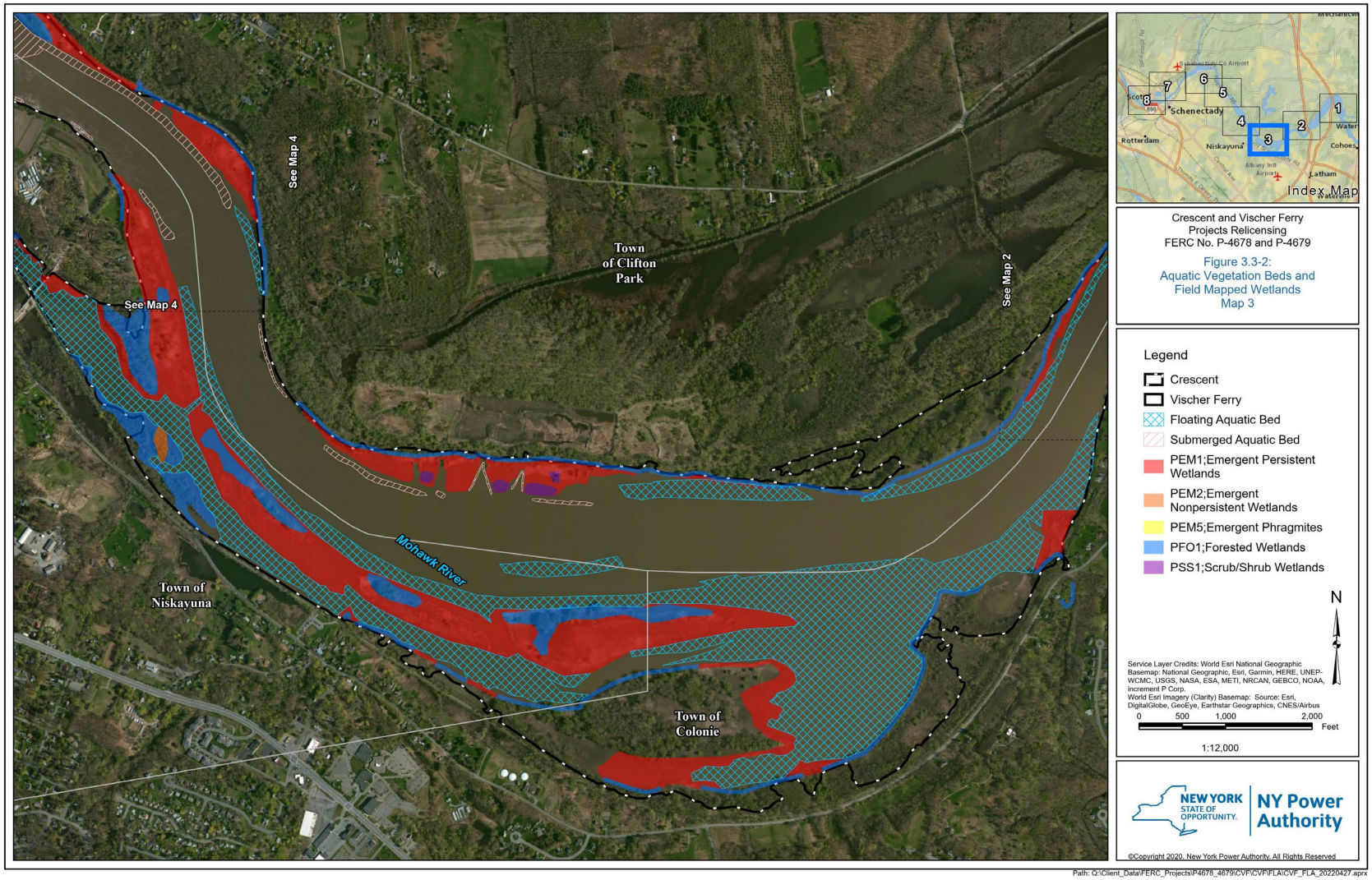


Figure 4-31 Wetlands in the Vicinity of the Projects, Map 4 of 8

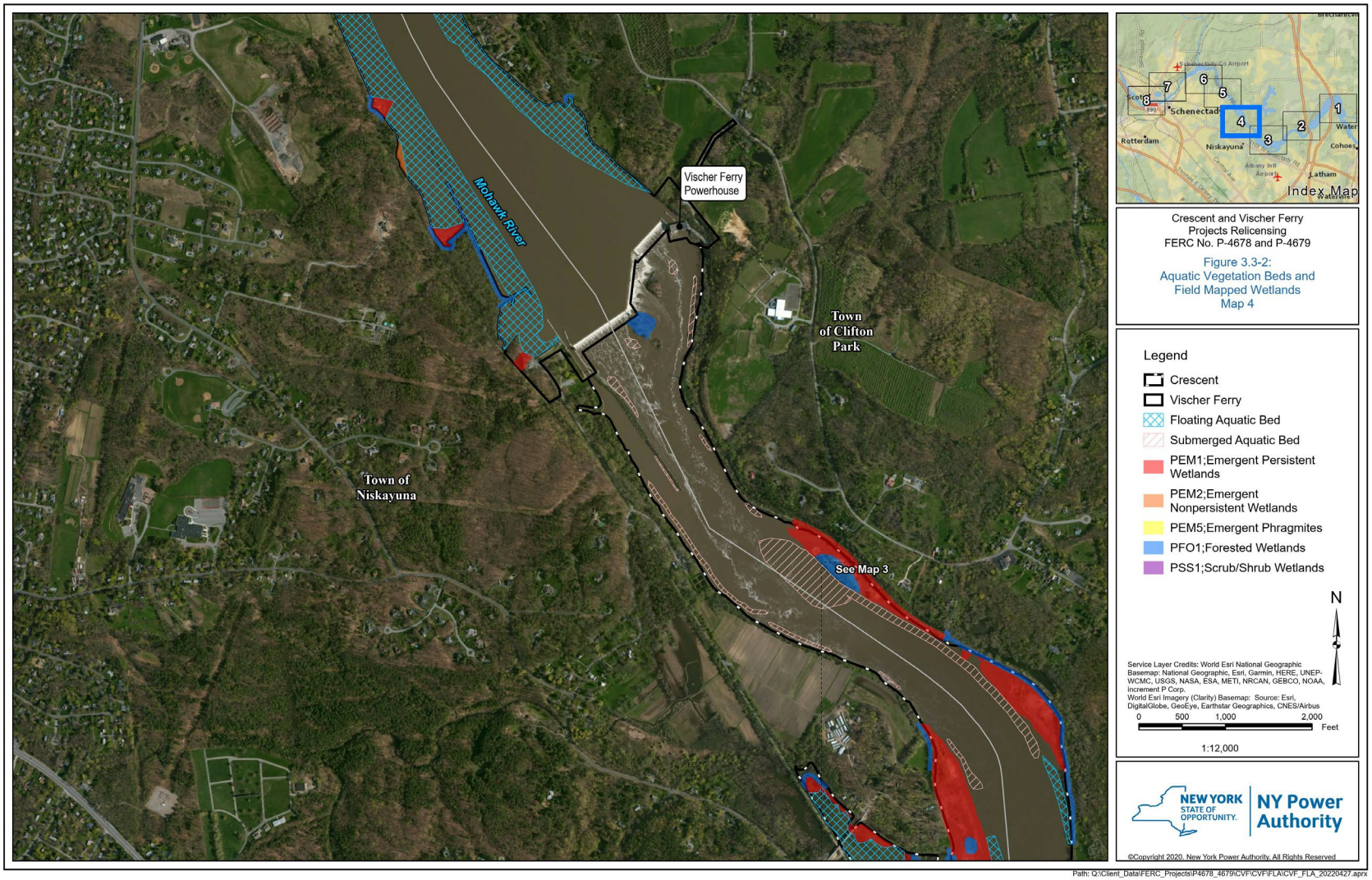


Figure 4-32 Wetlands in the Vicinity of the Projects, Map 5 of 8

Figure 4-33 Wetlands in the Vicinity of the Projects, Map 6 of 8

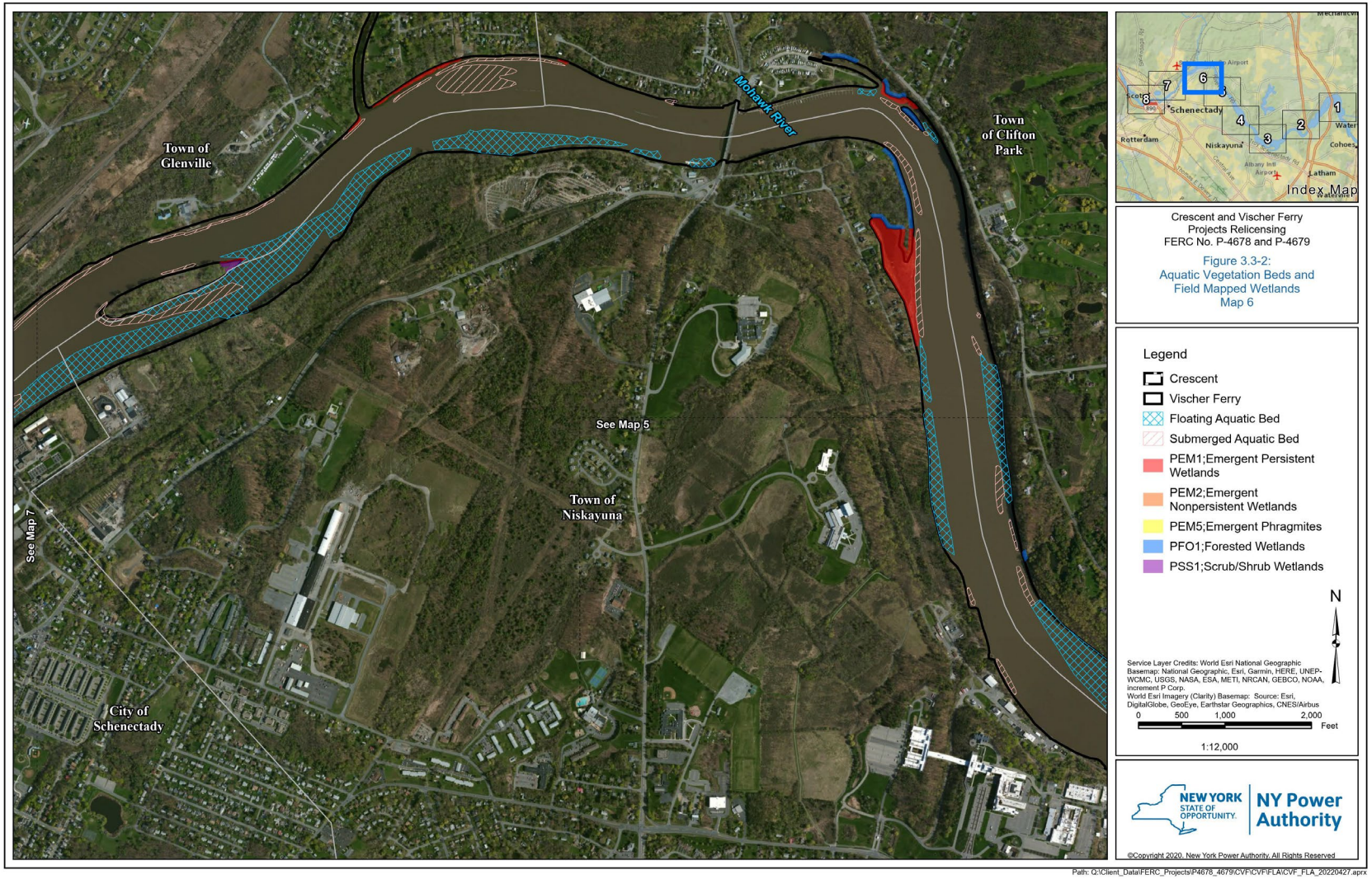
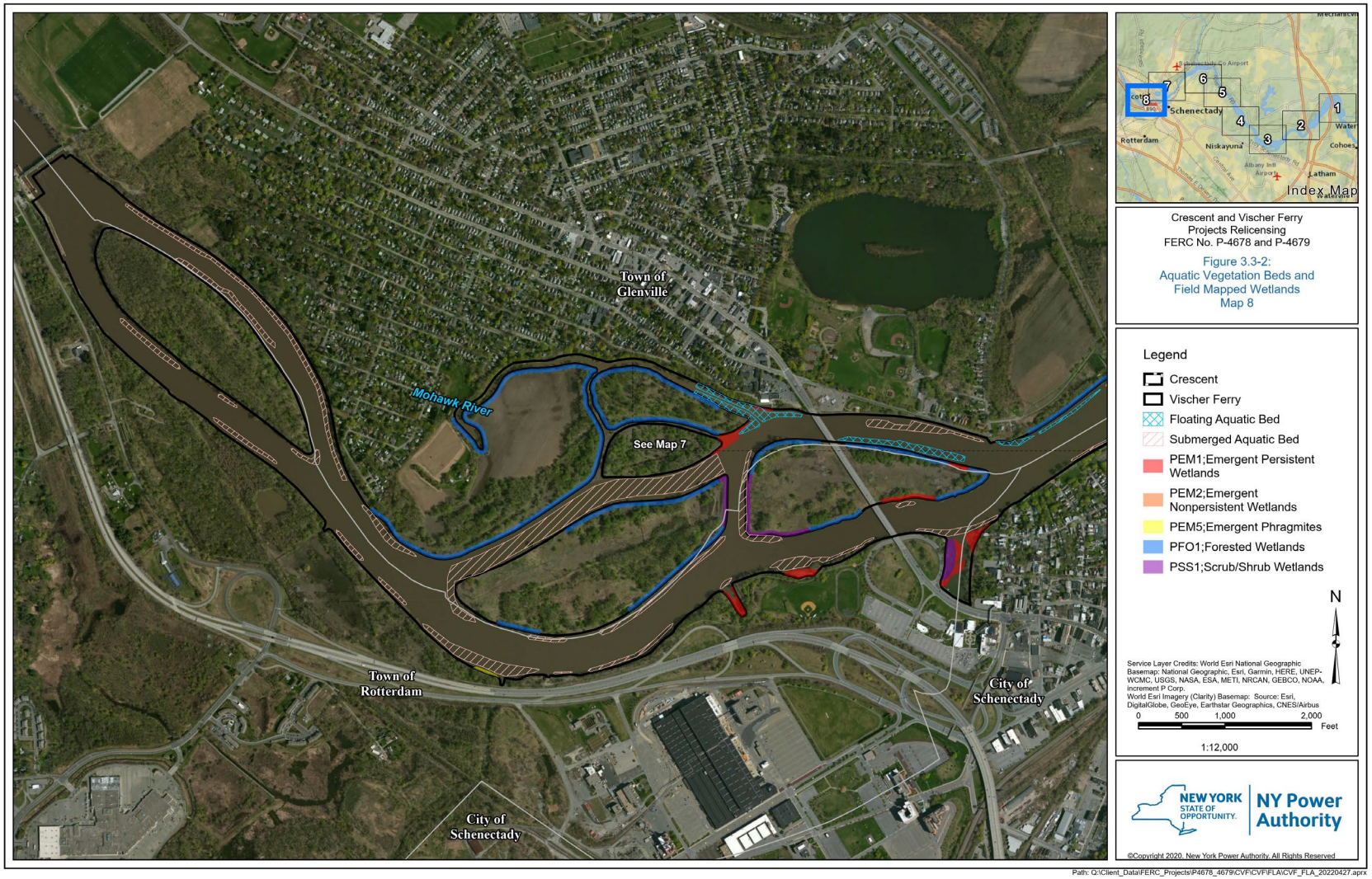


Figure 4-34 Wetlands in the Vicinity of the Projects, Map 7 of 8

Figure 4-35 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 licenses 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 4-33 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 NYNHP 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 4-33.

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. 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 NYNHP 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 4-33 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	Potential Habitat in Adjacent Upland	Potential Habitat in Adjacent Upland
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 4-34 (USFWS, 2018b).

Table 4-34 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 NYNHP 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 4-35.

Table 4-*35* 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).

Common Name	Scientific Name	Habitat Requirements / Information
Monarch Butterfly	*Danaus plexippus*	North American monarch butterflies complete an extraordinary multigenerational migration each year. The first generation of offspring from the overwintering (in Mexico) population continues the journey from the southern U.S. to recolonize the eastern breeding grounds. Second, third, and fourth generations reproduce in the northern breeding grounds throughout the summer, inhabiting most of the eastern U.S. up to southern Canada by June or July. Adult monarch butterflies are always on the move and use a variety of habitats including fields, roadside areas, open areas, wetlands and wet areas, and urban gardens. Along their migration routes and in their summer breeding areas, monarch butterflies require two types of plants: host plants for monarch caterpillars, which are almost exclusively milkweeds (Asclepias spp.), and flowering plants that provide nectar for adult butterflies.

4.8.2 Environmental Effects

In SD3, 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. Lands within the Project boundaries are mostly areas of development, including the Project powerhouses, recreation sites, and other facilities. The Power Authority is proposing no changes to the Projects or Project operations that would require tree clearing, tree cutting or in any way affect northern long-eared bat habitat.

Culver's root is known to occur in upland areas adjacent to the Project boundaries. However, as upland areas within the Project boundary are minimal and mostly areas of development, it is unlikely that Culvers root occurs within the Project boundaries. The Power Authority is proposing no changes to the Projects or Project operations that would affect Culver's root.

Monarch butterflies may utilize upland and wetland habitats within and adjacent to the Project boundaries. Migrating adults are likely to use habitats that support flowering plants for feeding on nectar. Adults may also find areas adjacent to the Project boundaries where milkweed is available for use by breeding monarch butterflies.

Because there are very few upland areas within the Project boundaries and because the Power Authority is proposing no changes to the Projects or Project operations, monarch butterflies would not be affected by continued operation of the Projects. As part of its normal Project operations, the Power Authority will continue to maintain Project lands as they do currently, consistent with their current vegetation management practices. Lawn and open areas around the powerhouses, parking lots, Project recreation sites, and other Project facilities will be mowed periodically. There are no plans or proposals involving ground or vegetation disturbance that would impact available monarch butterfly habitat. Nor would these activities be expected to impact potential occurrences or habitat for Culver's root.

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 Projects boundaries, the Power Authority proposes to continue existing operating conditions in the new licenses and is not proposing any changes with respect to RTE resources. Continued operations of the Projects, 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 sites 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).

[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).

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.

The results of the Recreation Study are summarized below. The final Recreation Study Report is available in the USR which filed with FERC February 17, 2022.

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 onsite recreation site inventory included each formal, informal, commercial[9], and non-commercial public recreation site in the study area, including the Project recreation sites. The facility inventory found that Project, non-Project, and commercial recreation sites 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 impoundments. 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 sites 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 sites 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 recreation sites. Table 4-36 summarizes recreational amenities and parking capacity at public recreation sites providing access to Crescent Project lands and waters, and Table 4-37 does the same for the Vischer Ferry Project. Section 4.9.1.1.1.1 presents a summary of the site inventory and condition assessment results for the Crescent Project recreation sites, and Section 4.9.1.1.1.2 presents the same for Vischer Ferry Project recreation sites.

[9] For commercial recreation sites within the study area, the Power Authority contacted facility owners or operators seeking permission to conduct an onsite inventory. Where permission was granted, the Power Authority included the facility in the onsite inventory. Where permission was not granted, either by lack of response or by denial of permission, the Power Authority did not include the facility in the onsite inventory but used information readily available online to inform the facility inventory.

Crescent Recreation Sites

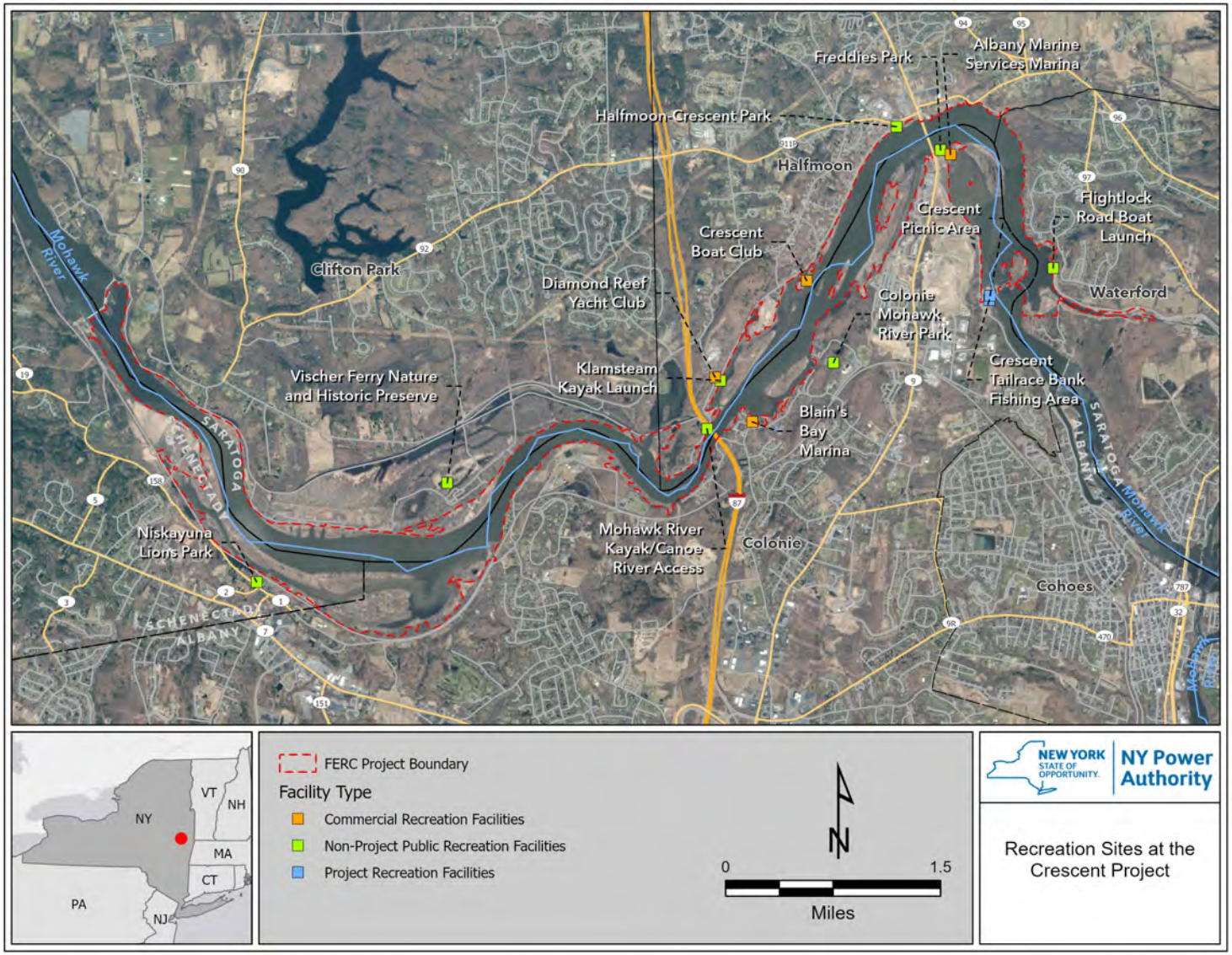
Recreation opportunities at the Crescent Project include fishing, boating, trails, and picnicking. Public recreation sites at the Project include a mix of both FERC-approved Project recreation sites and non-Project recreation sites. Figure 4-36 shows the location of many of the public and commercial recreation sites in the Project area. Table 4-36 summarizes the amenities provided at each site. The following subsections describe each Project recreation site in greater detail.

Table 4-36 Recreation Sites in the Crescent Project Study Area

Site Name	Facilities/Amenities	Estimated Parking Capacity	Location Relative to Project Boundary
Project Recreation Sites			
Crescent Tailrace Bank Fishing Area	Parking area, informal shoreline access	10 vehicles	Partially within
Crescent Picnic Area	Parking area, picnic tables, historical and informational signage	10 vehicles	Entirely within
Non-Project Recreation Sites			
Flightlock Road Boat Launch	Parking area, two concrete boat ramps, floating dock, picnic area, grills, informal shoreline access	20 vehicles with trailers	Partially within
Freddie's Park	Parking area, picnic table, kiosk, trail, informal shoreline access, trash bin, historical and informational signage	10 vehicles	Partially within
Halfmoon Crescent Park	Parking area, 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	Partially within
Vischer Ferry Nature and Historic Preserve	Parking area, trails, picnic area, historical and informational signage, kayak rental kiosk, informal shoreline access	24 vehicles	Partially within
Colonie Mohawk River Park	Parking area, 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)	Partially within
Klamsteam Kayak Launch	Parking area, trail, cartop boat launch, historical and informational signage, kayak rental kiosk	12 vehicles	Partially within
Niskayuna Lions Park	Parking area, trails, restrooms, cartop boat launch, picnic tables, benches, informal shoreline access, historic structure	72 vehicles	Partially within
Mohawk River Kayak/Canoe River Access	Parking area, informal cartop boat launch	4-6 vehicles	Partially within
Commercial Recreation Sites			

Site Name	Facilities/Amenities	Estimated Parking Capacity	Location Relative to Project Boundary
Crescent Boat Club	Commercial marina	Parking for marina customers only	Partially within
Blain's Bay Marina	Commercial marina	Parking for marina customers only	Partially within
Diamond Reef Yacht Club	Commercial marina	Parking for marina customers only	Partially within
Albany Marine Services Marina	Commercial marina	Parking for marina customers only	Partially within

Figure 4-36 Recreation Sites in the Crescent Project Study Area



Crescent Project Recreation Sites

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 site is open to the public from sunrise to sunset.

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 downstream from the Crescent impoundment are available along the shoreline.

The Crescent Tailrace Bank Fishing Area 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 Crescent Picnic Area.

The improved areas of the site (access road and parking area) were noted in the 2021 Recreation Study to be 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 providing views of the Crescent Project and of the Mohawk River below the Project impoundment. 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.

The site was noted in the 2021 Recreation Study to be 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.

Crescent Non-Project Public Recreation Sites

During the 2021 Recreation Study there were eight (8) non-Project public recreation sites identified (Flightlock Road Boat Launch, Freddie's Park, Halfmoon Crescent Park, Vischer Ferry Nature and Historic Preserve, Colonie Mohawk River Park, Klamsteam Kayak Launch, Niskayuna Lions Park, and Mohawk River Kayak/Canoe Access) as providing access to Crescent Project lands or waters. Included in the non-Project recreation sites 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 sites can be found in the 2021 Recreation Study filed with the FERC as part of the USR.

Crescent Non-Project Commercial Recreation Sites

During the 2021 Recreation Study there were four (4) non-Project commercial recreation sites identified (Crescent Boat Club, Blain's Bay Marina, Diamond Reef Yacht Club, and Albany Marine Services Marina) as providing access to Crescent Project lands or waters. A full description of the non-Project commercial recreation sites can be found in the 2021 Recreation Study Report filed with the FERC as part of the USR.

Vischer Ferry Recreation Sites

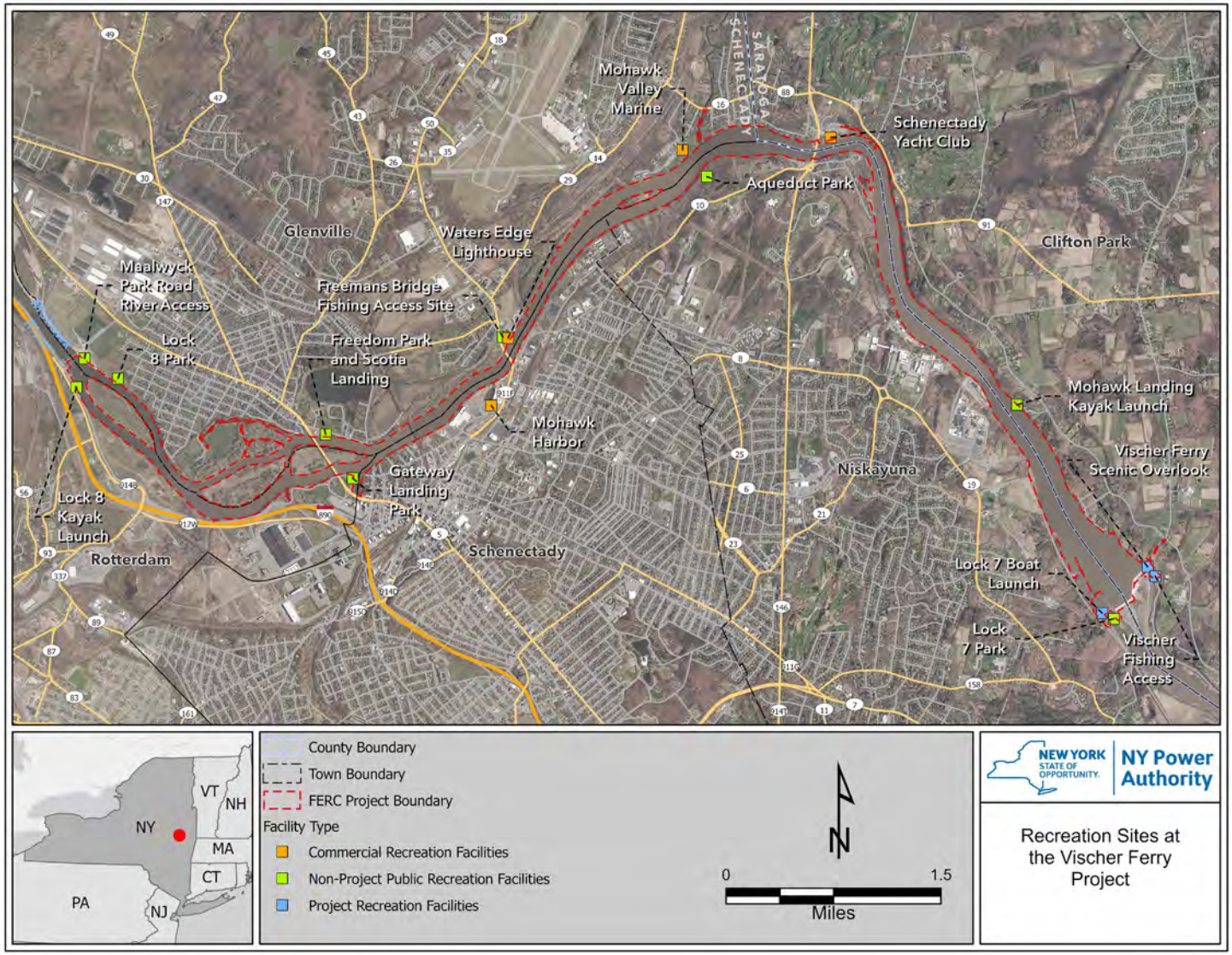
Recreation opportunities at the Vischer Ferry Project include fishing, boating, trails, and picnicking. Three formal Project recreation sites offer public access to the shoreline and/or Project waters: (1) Vischer Ferry Scenic Overlook; (2) Vischer Ferry Fishing Access, and (3) Lock 7 Boat Launch. In 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. Table 4-37 and Figure 4-37 depict public and commercial recreation sites in the Project area. The following subsections describe each site in greater detail.

Table 4-37 Recreation Sites in the Vischer Ferry Project Study Area

Site Name	Facilities/Amenities	Estimated Parking Capacity	Location Relative to Project Boundary
Project Recreation Sites			
Vischer Ferry Scenic Overlook	Parking area, scenic overlook, trash bin, historical and informational signage	12 vehicles	Entirely within
Vischer Ferry Fishing Access	Trails, informal shoreline access	Shared with Vischer Ferry Scenic Overlook	Partially within
Lock 7 Boat Launch	Parking area, concrete boat ramp, floating dock, trail access	20 vehicles and 5 vehicles with trailers	Entirely within
Non-Project Recreation Sites			
Lock 7 Park	Parking area, picnic tables, grill, informal shoreline access, portable toilet, trail access	5 vehicles	Partially within
Mohawk Landing Kayak Launch	Parking area, trails, cartop boat launch, historical and informational signage, picnic tables, dispersed shoreline access	9 vehicles	Partially within
Aqueduct Park and Rexford Aqueduct State Historic Site	Parking area, scenic overlook, trails, cartop boat launch, floating docks, benches, picnic tables, historic information signage	9 vehicles	Partially within
Freedom Park and Scotia Landing	Parking area, picnic tables, grills, trash bins, concert venue, restrooms, boat slips	140 vehicles	Partially within
Freemans Bridge Fishing Access Site	Parking area, cartop boat launch, concrete boat launch, floating docks, portable toilet, information kiosk, invasive species disposal station, benches, trash bin	17+ vehicles	Partially within
Gateway Landing Park	Parking area, trails, gazebo, floating docks, historical signage, shoreline access	12 vehicles	Adjacent
Lock 8 Kayak Launch	Pier, trails, cartop boat launch	Shared with Lock 8 Park	Partially within
Lock 8 Park	Parking area, picnic tables, grills, trash bins, scenic overlook, portable toilet, trails	20 vehicles	Partially within
Maalwyck Park Road River Access	Parking area, informal shoreline access	8-10 vehicles	Partially within
Commercial Recreation Sites			

Schenectady Yacht Club	Commercial marina	Parking for marina customers only	Partially within
Waters Edge Lighthouse	Restaurant and marina	Parking for restaurant customers only	Partially within
Mohawk Valley Marine	Commercial marina	Parking for marina customers only	Partially within
Mohawk Harbor	Commercial marina	Parking for marina customers only	Adjacent

Figure 4-37 Recreation Sites in the Vischer Ferry Project Study Area



Vischer Ferry Project Recreation Sites

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 area serves both the Scenic Overlook site and 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.), and Project recreation information pursuant to 18 CFR § 8.2. Signage and a gate along the Project access road prohibit motor vehicle access below the parking area, although the Project access road continues to the Project powerhouse.

The site was noted in the 2021 Recreation Study to be 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, described above. The Vischer Ferry Scenic Overlook parking area provides parking for the site (see above).

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 to the tailwater area 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, which is a non-Project recreation site. 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 was noted in the 2021 Recreation Study to be 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 site, 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, providing access to the adjacent Mohawk River State Park and John Brown Trail System. 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 forming two launch lanes with a floating dock in the middle.

During the 2021 Recreation Study to be the site was generally found to be in good to fair condition overall. The paved entrance and parking area was found to be in good condition. At the time of the onsite inventory the left 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 does not have a designated ADA-compliant space.

Vischer Ferry Non-Project Public Recreation Sites

During the 2021 Recreation Study there were nine (9) non-Project public recreation sites identified (Lock 7 Park, Mohawk Landing Kayak Launch, Aqueduct Park and Rexford Aqueduct State Historic Site, Freedom Park and Scotia Landing, Freemans Bridge Fishing Access Site, Gateway Landing Park, Lock 8 Kayak Launch, Lock 8 Park, Maalwyck Park Road River Access) as providing access to Vischer Ferry Project lands or waters. Included in the non-Project recreation sites 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 sites along with the estimated parking capacities are listed in Table 4-37. A full description of all non-Project recreation sites can be found in the Recreation Study to be filed with the FERC as part of the USR.

Vischer Ferry Non-Project Commercial Recreation Sites

During the 2021 Recreation Study there were four (4) non-Project commercial recreation sites identified (Schenectady Yacht Club, Waters Edge Lighthouse, Mohawk Valley Marine, and Mohawk Harbor) as providing access to Vischer Ferry Project lands or waters. Amenities at each of the non-Project commercial recreation sites along with the estimated parking capacities are listed in Table 4-37. A full description of the non-Project commercial recreation sites can be found in the 2021 Recreation Study Report filed with the FERC as part of the USR.

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. Review of the Form 80s from 2002, 2008, and 2014 indicated increasing recreational use at both Projects over that time period.

Updated recreation use information for the Projects was collected in 2021 as part of the 2021 Recreation Study. Field data was collected to look at existing recreation use by activity type at the Project recreation sites (Crescent Picnic Area, Crescent Tailrace Bank Fishing Area, Vischer Ferry Scenic Overlook, Vischer Ferry Fishing Area, and Lock 7 Boat Launch) during the study season (May 1st through October 31st).

Recreational use at Crescent Project recreation sites was estimated at 1,457 recreation days. Approximately 65 percent of this use is attributed to the Crescent Tailrace Bank Fishing Area, and the other 35 percent is attributed to the Crescent Picnic Area. Approximately 57 percent of estimated use at the Crescent Tailrace Bank Fishing Area was for fishing, 37 percent was for sightseeing, and 7 percent for "other" uses. At the Crescent Picnic Area, approximately 93 percent of use was for sightseeing, 3 percent was for picnicking, and 4 percent was categorized as "other." Parking areas for both sites are estimated to be used at 10 percent of capacity on average, non-peak weekends, with peak use estimated at 40 percent of capacity for the Crescent Tailrace Bank Fishing Area and at 20 percent of capacity for the Crescent Picnic Area.

Recreational use at Vischer Ferry Project recreation sites during the study season was estimated at 10,337 recreation days. Approximately 70 percent of this use is attributed to the Vischer Ferry Fishing Access and 30 percent is attributed to the Lock 7 Boat Launch. At the Vischer Ferry Fishing Access, approximately 41 percent of estimated use was for walking, 39 percent was for fishing, and 11 percent was for biking. The remaining uses, including jogging, sightseeing, boating, and "other" uses (including unidentified activities), each represented less than 5 percent of total use. At the Lock 7 Boat Launch, approximately 37 percent of use was for boating, 35 percent was for sightseeing, and 28 percent was for fishing.

The parking area for the Vischer Ferry Scenic Overlook was used at 25 percent of capacity on average, non-peak weekends during the study period. Peak use observed at the site was 67 percent of the site's capacity. The parking area at the Lock 7 Boat Launch was used at 8 percent of capacity on average, non-peak weekends. Peak use observed was 36 percent of the site's capacity.

Projected Recreation Demand

The 2021 Recreation Study evaluated future recreational use of and demand of Project recreation sites. To assess this, population growth, recreation participation rates, as well as projected use were factors analyzed. The study found that all Project recreation sites at both the Crescent Project and the Vischer Ferry Project are projected to have ample capacity to accommodate recreational demand on average, non-peak weekends in 2060.

Use of Crescent Project recreation sites is expected to increase from 2021 to 2060 by 12.5 percent, with a projected total of 1,639 recreation days in 2060. Individually, use of the Crescent Tailrace Bank Fishing Area is expected to increase 11.1 percent to 1,054 recreation days, and use of the Crescent Picnic Area is expected to increase 15.1 percent to 585 recreation days. Based on the projected increase in use, parking area utilization in 2060 is projected to increase to 20 percent of capacity at both the Crescent Tailrace Bank Fishing Area and the Crescent Picnic Area.

Use of Vischer Ferry Project recreation sites is expected to increase from 2021 to 2060 by 14.6 percent, with a projected total of 11,850 recreation days in 2060. Individually, use of the Vischer Ferry Fishing Access is expected to increase 15.0 percent to 8,296 recreation days, and use of the Lock 7 Boat Launch is expected to increase 13.9 percent to 3,553 recreation days. Based on the projected increase in use, parking area utilization in 2060 is projected to increase to 33 percent of capacity at the Vischer Ferry Scenic Overlook and 12 percent of capacity at the Lock 7 Boat Launch.

User Survey

The Licensee solicited information on recreational user characteristics, use patterns, and user perceptions of Project recreational sites 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. The results of the user survey are summarized below.

According to survey results, the majority of respondents reported visiting the Vischer Ferry Scenic Overlook (36 percent) during the day of the survey, followed by the Vischer Ferry Fishing Access (23 percent) and the Lock 7 Boat Launch (21 percent). The Crescent Tailrace Bank Fishing Area and Crescent Picnic Area were the least visited sites according to survey responses, with 11 and 9 percent of respondents, respectively, reporting visiting each site on the day of the survey. The average group size was just under two people, with most people (72 percent) traveling to the site by automobile, 19 percent by foot, and 9 percent by bicycle. The most popular activities reportedly engaged in across all seasons at the Project recreation sites were trail-based and sightseeing activities, including walking, nature observation, scenic viewing, hiking, canal trail usage, birding, photography, biking, and sightseeing. Less popular activities included fishing, driving for pleasure, canoeing/kayaking, running, picnicking, and fishing from a boat.

The majority of respondents visiting the Crescent Project recreation sites reported that the site is not crowded and indicated that they are satisfied with the available recreation facilities. For those respondents who were less than satisfied, litter was the most common reason given. When asked to rate the sites' parking, river access, signage, trash receptacles, and overall sight condition, the majority of respondents rated all attributes of the Crescent Picnic Area as fair to excellent, although 43 percent of respondents rated the trash receptacles at the site as below fair. The majority of respondents visiting the Crescent Tailrace Bank Fishing Area similarly rated all attributes as fair or above, with the exception of site condition; half of

respondents rated site condition as fair or above and half as below fair. Again, respondents who gave low ratings tended to reference litter as an issue at both sites. Respondents visiting each Crescent Project recreation site rated the overall site value as above average and the vast majority indicated that they would return to the site in the future.

The majority of respondents visiting the Vischer Ferry Project recreation sites reported that the site is not crowded and indicated that they are satisfied with the available recreation facilities. Explanations for any low satisfaction ratings varied by site. At the Vischer Ferry Scenic Overlook, responses included lack of restrooms, litter, and maintenance needs. At the Vischer Ferry Fishing Access, all explanations pertained to litter. Responses pertaining to the Lock 7 Boat Launch cited dock and launch maintenance issues, construction closures, and water chestnut removal. When asked to rate the site's parking, river access, signage, trash receptacles, and overall sight condition, the majority of respondents rated all attributes of the Vischer Ferry Project recreation sites as fair to excellent, with the exception of trash receptacles, which were rated as below fair at all three sites. Explanations for low ratings were similar to explanations for low satisfaction ratings. Respondents visiting each Vischer Ferry Project recreation site rated the overall site value as above average and the vast majority indicated that they would return to the site in the future.

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 sites 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.

Based on the 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. The two Project recreation sites at the Crescent Project are the Crescent Tailrace Bank Fishing Area and the Crescent Picnic Area. The three Project recreation sites at the Vischer Ferry Project are the Vischer Ferry Scenic Overlook, the Vischer Ferry Fishing Access, and the Lock 7 Boat Launch. Many other non-Project recreation sites 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.

The 2021 Recreation Study demonstrated that the Crescent and Vischer Ferry Project recreation sites have ample capacity to meet current and future demand. Results of the user survey conducted as part of the 2021 Recreation Study suggest that some changes to recreation site sites would enhance the recreation experience provided at these sites. In particular, issues regarding litter and trash were repeatedly noted by users at several of the Project the recreation sites. Unless appropriately managed, use of the Project recreation sites by the public and the resulting impacts associated with trash would be expected to continue.

No major changes are proposed to the Power Authority's operation and maintenance of the existing Project recreation sites. All of the Project recreation sites are in good condition and are meeting their intended purpose(s). Site use for all sites was found to be under capacity, based on both current and projected future use estimates. The recreation user surveys did highlight some potential changes that could be made to some of the facilities and amenities provided at the sites that would enhance site use. The Power Authority is proposing to prepare a Recreation Management Plan (RMP) for the Project recreation sites. The RMP will be developed in consultation with the agencies and will identify any enhancements to be made at the recreation sites to address some of the issues raised by the user survey respondents. The RMP will also include the Power Authority's plans for monitoring Project recreation site use over the term of the new Project licenses. Continued operation and maintenance of the Projects and Project recreation sites, as proposed, in accordance with the RMP, 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 licenses. More specifically, the Power Authority proposes to continue operation and maintenance of the existing Project recreation sites; (Crescent Tailrace Bank Fishing Area, Crescent Picnic Area, Vischer Ferry Scenic Overlook, Vischer Ferry Fishing Access, and Lock 7 Boat Launch). Because the 2021 Recreation Study demonstrated that existing Project and non-Project public recreation sites provide ample public recreation access to Project waters, the Power Authority is not proposing any additional Project recreation sites or facilities.

However, consistent with the Commission's current practice, the Power Authority is proposing to prepare a Recreation Management Plan (RMP) for the Projects. The RMP will be developed in consultation with the agencies and will identify any enhancements to be made at the recreation sites to address some of the issues raised by the user survey respondents. The RMP will also include the Power Authority's plans for monitoring Project recreation site use over the term of the new Project licenses.

4.9.3.2 Land Use Resources

The Power Authority proposes to continue existing operating conditions in the new licenses 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 licenses 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

On March 10, 2022, the Power Authority submitted an Area of Potential Effects (APE) justification letter, map, and shapefiles, for each Project, to the State Historic Preservation Office (SHPO) for their review. By letters dated March 28, 2022, the SHPO noted that they concur with the proposed APEs. Copies of this correspondence are included in Appendix A. The SHPO approved APE for each of the Projects is the FERC Project boundary as shown in Figure 4-38 and Figure 4-39.

Figure 4-38 Crescent Project Area of Potential Effect (APE)

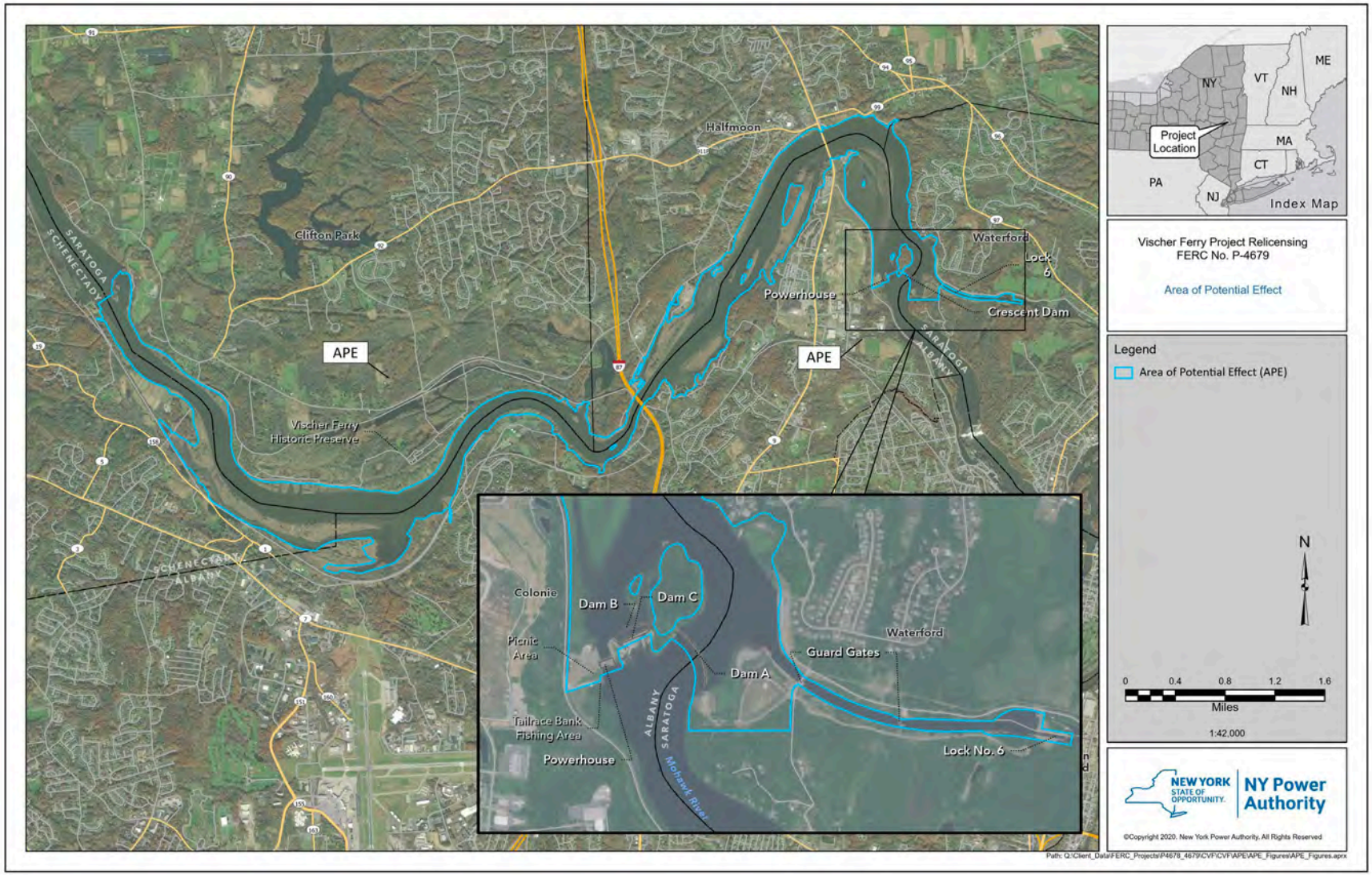
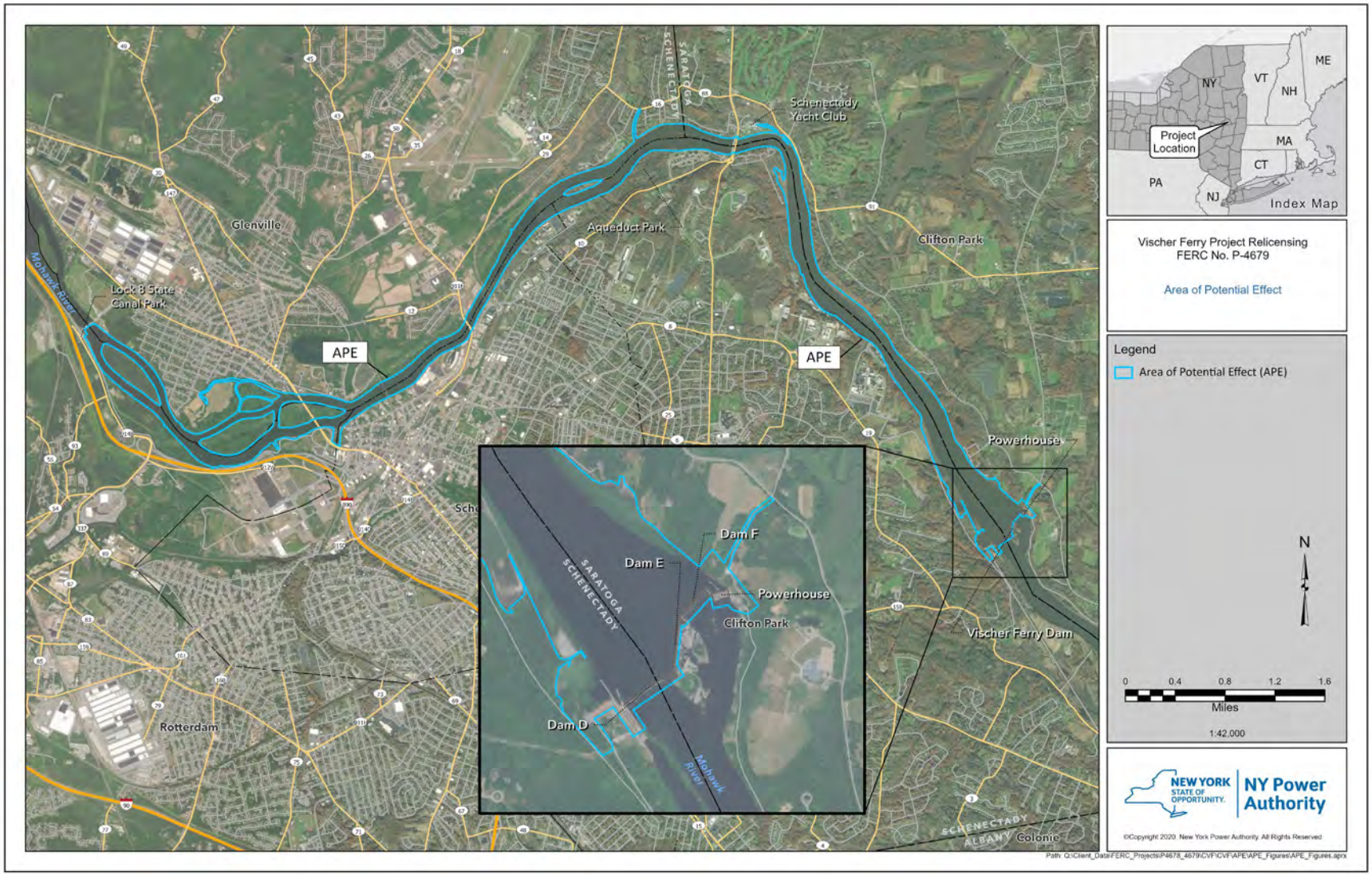


Figure 4-39 Vischer Ferry Project Area of Potential Effect (APE)



Consistent with the PSP and RSP, the Power Authority did not conduct cultural resource studies, nor does it propose to develop a Historic Properties Management Plan (HPMP). Portions of both the Crescent and Vischer Ferry Projects are contributing properties of the New York State Barge Canal, which was designated as a National Historic Landmark (NHL) in 2016. The majority of each of the Projects, as defined by the FERC Project boundary and the Projects' APEs, are located within the New York State Barge Canal NHL boundary. Further, because the Projects are operated and maintained in close coordination with NYSCC, the New York State Barge Canal NHL properties will not be affected by the continued operation of the Projects. Research characterizing the cultural history of the Project area was conducted as part of licensing.

Research was conducted using the New York State Cultural Resource Information System (CRIS), which is maintained by the SHPO and the Division for Historic Preservation (DHP) within NYS Office of Parks, Recreation, and Historic Preservation (OPRHP). CRIS contains a comprehensive inventory of archeological sites, State or National Register listed and eligible sites, and previous cultural resource surveys.

4.10.1.1 Historic Districts

A search of CRIS identified three (3) listed historic districts within or partially within the Crescent Project APE (NYS CRIS, 2022). These include the New York State Barge Canal Historic District (USN 104.000641), Vischer Ferry Historic District (USN 9103.000295), and Church Hill Historic District (USN 9110.000344) (NYS CRIS, 2022). A search of CRIS identified two (2) listed and one (1) eligible historic districts within or partially within the Vischer Ferry Project APE. These include: the New York State Barge Canal Historic District (USN 104.000641), Knolls Atomic Power Laboratory (KAPL) (USN 9303.000025), and Stockade Historic District (USN 9340.001403 and 9340.001405) (NYS CRIS, 2022).

One of these historic districts, the New York State Barge Canal Historic District (USN 104.000641), encompasses most of Crescent and Vischer Ferry Project APEs (NYS CRIS, 2022). At the Crescent Project, there are two Project-related facilities within the APE that are considered contributing historic resources to the New York State Barge Canal Historic District: Crescent Dam and Crescent Hydroelectric Plant. At the Vischer Ferry Project there are three Project-related facilities that are contributing historic resources to the same historic district: Vischer Ferry Dam, Vischer Ferry Hydroelectric Plant, and Lock E-7. The New York State Barge Canal Historic District is managed by the NYSCC under a Draft Historic Properties Management Plan (HPMP) (NYSCC, 2020).

Other historic districts that have boundaries that adjoin or slightly overlap the boundary of the Crescent and Vischer Ferry Projects' APEs include the following:

The Vischer Ferry Historic District (USN 9103.000295), which was listed on the NRHP in June of 1997 (NYS CRIS, 2022). The Vischer Ferry Historic District is located on the northern side of the Mohawk River, southeast of the Vischer Ferry dam. There are no Project facilities associated with this historic district.

The Church Hill Historic District (USN 9110.000344), which was listed on the NRHP in May of 2021 (NYS CRIS, 2022). The Church Hill Historic District is located on the northern side of the Crescent Project APE. It centers on Church Hill Road east of U.S. Route 9, and additionally includes a small area corresponding with Terminal Road (NYS CRIS, 2016). As described in the eligibility evaluation for the district, the Church Hill Historic District is an architecturally and historically significant resource located in the Town of Halfmoon, Saratoga County (NYS CRIS, 2016). A total of 17 principal buildings and their associated land,

outbuildings and other features are contained within the district boundary (NYS CRIS, 2016). There are no Project facilities associated with this historic district.

The Stockade Historic District (USN 9340.001403 and 9340.001405) was listed on the NRHP in April of 1973 and the boundary was updated in September 1984. The Stockade Historic District is located on the southern side of the Mohawk River in Schenectady, NY (NYS CRIS, 2022). There are no Project facilities associated with this historic district.

The Knolls Atomic Power Laboratory (KAPL) (USN 9303.000025). The KAPL was determined to be eligible for listing as an historic district on the NRHP in April 2015 under Criterion A in the areas of engineering and military (NYS CRIS, 2022). The KAPL historic district is located near the Project in the Town of Niskayuna. This district is managed under a Programmatic Agreement (PA) between the U.S. Department of Energy and the New York State Historic Preservation Office and Cultural Resource Management Plan (CRMP) dated December 22, 2017. There are no Project facilities associated with this historic district.

4.10.1.2 Historic Properties

An examination of CRIS identified a number of reported historic architectural sites within the Projects' APEs. The historic architectural resources identified by CRIS as being in the Crescent Project and Vischer Ferry Project APEs are listed in Table 4-38 and Table 4-39, respectively. There are 24 listed sites and three (3) eligible sites in the Crescent Project APE (NYS CRIS, 2022). There are 20 listed sites and six (6) eligible sites in the Vischer Ferry Project APE (NYS CRIS, 2022). Nearly all of the listed and eligible sites reported by CRIS are affiliated with one of the historic districts described previously.

Table 4-38 Historic Architectural Resources in the Crescent Project APE

USN	Name	Status	Historic District Affiliation
00104.000676	Crescent Dam B - Cohoes-Crescent Road	Listed	NYS Barge Canal NHL
00104.000677	Crescent Hydroelectric Plant - Cohoes-Crescent Road	Listed	NYS Barge Canal NHL
00104.000860	Bridge E-7a, BINS 4033181 and 4033182 - Interstate 87	Listed	Non-contributing to NYS BC NHL; one listing for each span
09103.000277	Farmer's Bridge Abutments (Enlarged Erie Canal)	Listed	VF HD (boundary increase)
09110.000003	FORMER FARMERS BANK OF SARATOGA COUNTY/NOXON HOUSE - 9 TERMINAL RD	Listed	Church Hill HD
09110.000015	JONES RES - 72 CHURCH RD	Listed	Church Hill HD
09110.000016	74 Church Hill Road - 74 Church Hill Road	Listed	Church Hill HD
09110.000017	RICHARDS RES. - 57 CHURCH RD	Listed	Church Hill HD
09110.000018	HARRIS RES. - 66 CHURCH RD	Listed	Church Hill HD
09110.000341	Frame 2-story Building - 7 Terminal Road	Listed	Church Hill HD
09110.000399	Crescent Terminal - Terminal Rd	Listed	NYS Barge Canal NHL
09110.000400	Bridge E-6, BIN 4005580 - US 9	Listed	NYS Barge Canal NHL
09118.000209	72 CHURCH HILL RD	Listed	Church Hill HD
09118.000244	Bridge E-5, BIN 4415130 - Guard Gate Road	Listed	NYS Barge Canal NHL
09118.000274	Crescent Dam A - Cohoes Crescent Rd 12047	Listed	NYS Barge Canal NHL
09118.000208	Lock E6 -77 Flightlock Road, Waterford, NY	Listed	NYS Barge Canal NHL
09118.000281	Lock E6 Earthen Embankment Dam -77 Flightlock Road, Waterford, NY	Listed	NYS Barge Canal NHL
09118.000288	Lock E6 Viewing Platform - 77 Flightlock Road, Waterford, NY	Listed	NYS Barge Canal NHL
09118.000289	Lock E6 Storge Shed -77 Flightlock Road, Waterford, NY	Listed	NYS Barge Canal NHL
09118.000290	Lock E6 Lockhouse -77 Flightlock Road, Waterford, NY	Listed	NYS Barge Canal NHL
09118.000291	Guard Gate 1 - Flightlock Road	Listed	NYS Barge Canal NHL
09118.000292	Guard Gate 2 - Flight Lock Rd	Listed	NYS Barge Canal NHL
09118.000293	Guard Gate Operator's House - Flight Lock Rd	Listed	NYS Barge Canal NHL
09303.000050	NISKAYUNA RR STATION, Troy & Schenectady RR - 3464 ROSENDALE RD	Listed	-
00104.000798	Twin Bridges, BINS 4033181 and 4033182 - Interstate 87	Eligible	Non-contributing to NYS BC NHL; one listing for each span
09303.000159	BIN 4-41601-0 - VISCHER FERRY RD	Eligible	-

09303.000243	Ferry Road Bridge, Troy-Schenectady RR - Niskayuna Riverfront Bike Trail	Eligible	-
00104.000314	ROADS END/Vandenburgh House - 243 DUNSBACH FERRY RD	Undetermined	-

Source: NYS CRIS, 2022

Table 4-39 Historic Architectural Resources in the Vischer Ferry Project APE

USN	Name	Status	Historic District Affiliation
09103.000082	REXFORD AQUEDUCT PIER	Listed	-
09103.000334	Vischer Ferry Hydroelectric Plant - 496 River Road 12148	Listed	NYS Barge Canal NHL
09103.000335	Dam E-3, Vischer Ferry - Mohawk River	Listed	NYS Barge Canal NHL
09302.000006	SEELEY FARMHOUSE; LITTLE RICHARD'S TAVERN - 2 FREEMANS BRIDGE RD	Listed	-
09302.000092	Moveable Dam E-4 - Rice Rd	Listed	NYS Barge Canal NHL
09302.000216	Bridge E-10, BIN 4416020 - Delaware & Hudson RR	Listed	NYS Barge Canal NHL
09302.000217	Bridge E-11, BIN 4050330 - Freemans Bridge Rd	Listed	NYS Barge Canal NHL
09302.000218	Bridge E-12, BIN 4416030 - AMTRAK/Conrail	Listed	NYS Barge Canal NHL
09303.000048	LOCK E7, Niskayuna/Vischer Ferry - Lock Seven Road	Listed	NYS Barge Canal NHL
09303.000169	Bridge E-8, BIN 4038360 - NY 146	Listed	NYS Barge Canal NHL
09303.000302	Lock E7 Lockhouse - Lock Seven Rd	Listed	NYS Barge Canal NHL
09303.000303	Lock E7 Storehouse - 1280 Lock Seven Road 12309	Listed	NYS Barge Canal NHL
09305.000360	Bridge E-13, BIN 4002590 - NY 5	Listed	NYS Barge Canal NHL
09340.000029	DAVID HEARSEY HOUSE - 4 Washington Avenue 12305	Listed	Stockade HD (Boundary Increase)
09340.000077	ABUTMENT OF THEODORE BURR'S WOODEN SUSPENSION BRIDGE - WASHINGTON AVE	Listed	Stockade HD (Boundary Increase)
09340.000974	21 GOVERNORS LN	Listed	Stockade HD (Boundary Increase)
09340.001028	32 INGERSOLL AVE	Listed	Stockade HD (Boundary Increase)
09340.001115	6 WASHINGTON AVE	Listed	Stockade HD (Boundary Increase)
09340.001128	1 WASHINGTON AVE	Listed	Stockade HD (Boundary Increase)
09340.001640	North Ferry Street Pump Station - 129 North Ferry Street 12305	Listed	Stockade HD (Boundary Increase)
09303.000140	UPPER MOHAWK REXFORD AQUEDUCT - NY 146	Eligible	Knolls Atomic Power Laboratory (KAPL)
09303.000140	UPPER MOHAWK REXFORD AQUEDUCT - NY 146	Eligible	-

09303.000274	J2-Knolls AL-1946	Eligible	Knolls Atomic Power Laboratory (KAPL)
09303.000275	J7-Knolls AL-1955	Eligible	Knolls Atomic Power Laboratory (KAPL)
09303.000279	L4 Knolls Pump House AL-1955 - 2401 River Road 12309	Eligible	Knolls Atomic Power Laboratory (KAPL)
09303.000281	L7 Knolls AL-1955	Eligible	Knolls Atomic Power Laboratory (KAPL)
09303.000282	L8 Knolls AL-1959	Eligible	Knolls Atomic Power Laboratory (KAPL)
09341.000083	131 Riverside Avenue, Scotia - 131 Riverside Avenue	Undetermined	-

Source: NYS CRIS, 2022

4.10.1.3 Archaeological Sites

An examination of CRIS reported archeological sites within the Projects' APE, which are listed in Table 4-40 and Table 4-41 respectively. Of the sites reported by CRIS as being within or partially within the APEs, there is one (1) eligible site in the Crescent APE and one (1) eligible site in the Vischer Ferry APE. The reminder of the sites reported by CRIS are of undetermined status.

Table 4-40 Archaeological Sites in the Crescent Project APE

USN	Name	Status
09110.000266	Halfmoon Village Precontact Site	Eligible
00104.000048	Mohawk View Site	Undetermined
00104.000049	DUNSBACK SITE	Undetermined
00104.000348	SHAKER ISLAND SITE (NYSM 974)	Undetermined
00104.000349	POTTERY BEACH SITE (NYSM 959)	Undetermined
00104.000511	PREHISTORIC SITE P1-CA7	Undetermined
09103.000011	Cornelius Clasen Site	Undetermined
09103.000095	FIRST BAYOU SITE (NYSM 958)	Undetermined
09103.000096	Second Bayou Site (NYSM 957)	Undetermined
09103.000097	Third Bayou Site (NYSM 973)	Undetermined
09103.000104	Unnamed site (NYSM 6247)	Undetermined
09103.000163	Rachel Fort Homestead	Undetermined
09110.000004	Crescent Aqueduct Historic Site	Undetermined
09110.000043	Rocky Point Site (NYSM 963)	Undetermined
09110.000267	H. Dunsbach Historic Site	Undetermined
09303.000129	Ferry Landing Site	Undetermined
09303.000134	UNNAMED SITE (NYSM 6239)	Undetermined
09303.000135	UNNAMED SITE (NYSM 6240)	Undetermined
00104.000039	BURMASTER FARM	Undetermined

Source: NYS CRIS, 2022

Table 4-41 Archaeological Sites in the Vischer Ferry Project APE

USN	Name	Status
09103.000218	Erie Canal and Rexford Aqueduct Site (NYSM # 10878)	Eligible
09302.000022	ALB 103	Undetermined
09302.000023	ALB 104	Undetermined
09302.000072	Unnamed Site (NYSM 6255)	Undetermined
09302.000105	Durham Project 73	Undetermined
09302.000106	Durham Project 211	Undetermined

09340.000079	RIVERSIDE PARK	Undetermined
09340.000098	OLD FREEMAN'S BRIDGE ABUTMENTS	Undetermined
09340.000104	ALCO BUILDINGS SITE	Undetermined
09340.001198	DURHAM PROJECT 44	Undetermined
09341.000006	WASHINGTON AVE BRIDGE ABUTMENTS	Undetermined
09341.000014	GLENOTIA PARK	Undetermined
09341.000020	DURHAM PROJECT 101	Undetermined
09341.000023	OLD BURR BRIDGE	Undetermined

Source: NYS CRIS, 2022

4.10.1.4 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 was 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 was also a time when the first contact with Europeans occurred, which set 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).

4.10.1.5 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 an NHL in January 2016.

4.10.1.6 Historic Properties Management Plan

The Barge Canal was listed as an NHL in January 2016. The NHL consists of 524 miles of navigable waterway and over 500 historic resources (NYSCC, 2020). Since this listing, the NYSCC has drafted a HPMP for the Barge Canal. The NYSCC is currently in discussions with SHPO and its Federal partners for the implementation of the plan.

Hydroelectric power plants along the canal are generally excluded from the NHL boundary, with the exceptions of Crescent Dam Hydroelectric Plant and Vischer Ferry Dam Hydroelectric Plant, which are considered contributing to the Barge Canal NHL (NYSCC, 2020). Because the Crescent and Vischer Ferry Projects are considered contributing elements to the NHL, both Projects will be managed under the New York State Barge Canal NHL HPMP.

4.10.2 Environmental Effects

In SD3, 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 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 NRHP.

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 Projects' 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.

4.10.3 Proposed Environmental Measures

The Crescent and Vischer Ferry Projects are contributing elements of the New York State Barge Canal, which was designated as an NHL in January 2016. As such, the Crescent and Vischer Ferry Project elements will be covered under the HPMP that is being developed for the New York State Barge Canal NHL. 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. The Power Authority is proposing no changes to the Projects or the operation of the Projects that would affect identified cultural resources. The Power Authority is not proposing the construction of any new facilities at the Projects or ground disturbing activities that would have the potential to impact cultural resources. No PME measures related to cultural resources were proposed by the relicensing participants. 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 4-42). 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 4-42).

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 4-43). 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

Current and historical population projections for the municipalities abutting the Crescent and Vischer Ferry Projects are depicted in Table 4-44. 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.

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 4-45 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

Labor force and unemployment estimates (2019) for the municipalities abutting the Projects are provided in Table 4-46. 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.

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 than 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 4-49.

4.11.1.3.1 Industry and Occupation

Table 4-50 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 4-42 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 4-43 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 4-44 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 4-45 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 4-46 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 4-47 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 4-48 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 4-49 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 4-50 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

The areas surrounding the Projects support various employment industries. Information on socioeconomic resources in the region is readily available. The Power Authority is proposing to continue to operate and maintain the Projects under the existing operating regimes. Continued operation of the Projects is not anticipated to have any direct or indirect adverse effects on population, employment, income, or other socioeconomic resources.

4.11.3 Proposed Environmental Measures

The proposed continued operation of the Projects is not anticipated to affect socioeconomic resources therefore, no measures directly aimed at enhancing socioeconomic resources are proposed.

4.11.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts to socioeconomic resources are expected to occur as a result of the continued operation of the Projects.

4.12 Tribal Resources

4.12.1 Affected Environment

There are no known Native American lands, traditional cultural properties (TCPs), or religious properties within the Projects boundaries, nor are there known National Register-eligible or -listed sites associated with Native American nations at the Projects. At the outset of the relicensing process, the Power Authority developed a Distribution List of stakeholders, including Native American nations, that has been used to distribute all relicensing documents beginning with the NOI and PAD. The Distribution List is updated routinely when the Power Authority becomes aware of changes in tribal contacts. At the time of this FLA submittal, there are five Native American nations that the Power Authority has identified as having potential interest in the Projects: St. Regis Mohawk Tribe, Stockbridge-Munsee Community Band of Mohican Indians, Delaware Tribe of Indians, Mohawk Nation Council of Chiefs, and Delaware Nation. These Native American nations are included on the Distribution List.

Prior to the initiation of the relicensing process and submittal of the PAD, in November 2018 and again in January 2019, FERC contacted two Native American nations to solicit their interest in participating in the relicensing process for the Crescent and Vischer Ferry Projects: the Saint Regis Mohawk Tribe and the Stockbridge-Munsee Community, Wisconsin. These two nations responded to FERC's request. The Saint Regis Mohawk Tribe indicated that it wished to be a consulting party on the Vischer Ferry Project (Saint Regis Mohawk Tribe, 2018). The Stockbridge Munsee Community, Wisconsin opted not to participate in consultation but asked to be notified in the event of inadvertent discoveries of cultural resources during any construction (FERC, 2019a and FERC, 2019b). In addition, the New York State OPRHP identified the Delaware Tribe and Mohawk Nations as potentially having an interest in the Projects' areas (New York State OPRHP, 2018).

There have been no other responses from the Native American nations regarding the Projects' relicensing process. None of the Native American nations commented on the DLA. No Native American nations identified any cultural properties associated with the Projects or requested any studies regarding potential Project effects on Tribal resources.

4.12.2 Environmental Effects

There are no known Native American lands, traditional cultural properties (TCPs), or religious properties within the Projects boundaries, nor are there known National Register-eligible or -listed sites associated with Native American nations at the Projects. Given that the Power Authority proposes to continue the existing operating conditions, it is not expected that there will be Project effects on Tribal resources.

4.12.3 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 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 Projects' facilities as well as the cost of providing proposed protection, mitigation, and enhancement (PME) measures.

5.1 Power and Economic Benefits of the Projects

Each of the Projects has four turbine/generator units with an installed capacity of 9-MW and a total estimated hydraulic capacity of between 1,500-1,820 cfs. The Projects are operated as run-of-river and generate electricity with the water that is available in the lower Mohawk River. The Projects generate low-cost base-load electricity which is valued by the NYISO based on installed capacity. Exhibit D provides information regarding operating revenues for the Projects.

Operating revenues include revenues from wholesale customers and market-based power sales. The average annual operating revenue for the Crescent Project from 2012 to 2021 was $2.14 million, however ranged between $1.23 million in 2016 to $3.26 million in 2014. Therefore, under the No-Action Alternative, the Project is expected to generate approximately $2.14 annually ($37.41/MWh) (2021 dollars).

The average annual operating revenue for the Vischer Ferry Project from 2012 to 2021 was $1.9 million, however ranged between $0.87 million in 2016 to $3.24 million in 2014. Therefore, under the No-Action Alternative, the Project is expected to generate approximately $1.91annually ($39.01/MWh) (2021 dollars).

The revenue and operating costs per MWh were calculated based on average annual generation for the period 2012 to 2021 of 57,195 MWh for the Crescent Project and 48,956 MWh for the Vischer Ferry Project.

5.2 Comparison of Alternatives

5.2.1 No Action Alternative

The No-Action Alternative would allow the Power Authority to continue Projects operations under the terms and conditions of the current licenses, including maintaining the current Projects boundaries, facilities, existing PME measures listed below, and operation and maintenance procedures.

The Power Authority currently implements several measures that contribute to the protection and enhancement of environmental resources:

Crescent Project

- Operation of the Project as run-of-river and in close coordination with Canal's operation of the Barge Canal;
- Continuous minimum flow release of 100cfs during the non-navigation season, and 250 cfs during the navigation season.
- Seasonal provision of downstream fish passage through a flashboard notch in Dam A and operation of the acoustic deterrent system;
- Provision and maintenance of two Project recreation sites: Picnic Area and Tailwater Fishing Area

Vischer Ferry Project

- Operation of the Project as run-of-river and in close coordination with Canal's operation of the Barge Canal;
- Continuous minimum flow release of 200 cfs;
- Provision of downstream fish passage through flashboard notches in Dam F and operation of acoustic deterrent system;
- Provisions and maintenance of three Project recreation sites: Lock 7 Boat Launch; Scenic Overlook and Tailwater Fishing Access

Based on the data discussed in Section 5.1 the average annual revenue for the Crescent Project power for the period 2012 through 2021 is approximately $2.14 million (2021 dollars) and the average operational cost for the same period was $4.75 million (2021 dollars). The average annual revenue for the Vischer Ferry Project power for the period 2012 through 2021 is approximately $1.91 million (2021 dollars) and the average operational cost for the same period was $4.2 million (2021 dollars).

5.2.2 Proposed Action

The Proposed Action is to continue to operate and maintain the Projects with existing and additional environmental PME measures. The Power Authority is not proposing any new development or changes in operation at either Project. Under this alternative, the Power Authority would continue to implement the existing PME measures for each Project identified in section 5.2.1. The alternative also includes the implementation of new PME measures for each Project that would contribute to the protection and enhancement of recreation and environmental resources.

Crescent Project

For the Crescent Project the new PME measures are the following:

- Prepare, in consultation with the agencies, a Recreation Management Plan for the Project, to include provisions for certain enhancement to existing recreation site facilities and amenities and for periodic monitoring of Project recreation site use.

Vischer Ferry Project

For the Vischer Ferry Project the new PME measures are the following:

- Prepare, in consultation with the agencies, a Recreation Management Plan for the Project, to include provisions for certain enhancement to existing recreation site facilities and amenities and for periodic monitoring of Project recreation site use.

5.3 Cost of Environmental Measures

Costs of existing and proposed PME measures are shown in Table 5-1.

Table 5-1 Estimated Cost of Existing and Proposed Environmental Measures

Proposed PME Measure	Existing or Proposed	Capital Cost (2022 dollars)	Annual Operations and Maintenance Cost (2022 dollars)
Crescent Project			
Seasonal minimum flow release of 100 cfs or 250 cfs	Existing	N/A	N/A
Provision of downstream fish passage notch in Dam A flashboards and operation of the acoustic deterrent system	Existing	N/A	$60,000
Provision and maintenance of two Project recreation sites; Picnic Area, Tailwater Fishing Access	Existing	N/A	$5,000
Prepare Recreation Management Plan	Proposed	$10,000 (plan only)	TBD
Vischer Ferry Project			
Minimum flow release of 200 cfs	Existing	N/A	N/A
Provision of downstream fish passage notches in Dam F flashboards and operation of the acoustic deterrent system	Existing	N/A	$60,000
Provision and maintenance of three Project recreation sites; Lock 7 Boat Launch, Scenic Overlook, Tailwater Fishing Access	Existing	N/A	$5,000
Prepare Recreation Management Plan	Proposed	$10,000 (plan only)	TBD

6 Conclusions and Recommendations

6.1 Comparison of Alternatives

Under the No-Action Alternative, the Power Authority would continue existing operations of the Crescent and Vischer Ferry Projects without any new development, changes in operation or environmental enhancements. Under this alternative, only the existing PME measures in the current license would be implemented. No new PME measures would be implemented.

Under the Proposed Alternative, the Power Authority also proposes to continue existing operations of the Projects without any new development or changes in operation. Under this alternative, however, the Power Authority would implement new PME measures in addition to the existing measures that would contribute to the protection and enhancement of recreation resources.

For the Crescent Project the new PME measures are the following:

- Prepare, in consultation with the agencies, a Recreation Management Plan for the Project, to include provisions for certain enhancement to existing recreation site facilities and amenities and for periodic monitoring of Project recreation site use.

For the Vischer Ferry Project the new PME measures are the following:

- Prepare, in consultation with the agencies, a Recreation Management Plan for the Project, to include provisions for certain enhancement to existing recreation site facilities and amenities and for periodic monitoring of Project recreation site use.

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 provision of downstream passage for blueback herring 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; water quality; wildlife and botanical resources; wetlands, riparian or littoral habitat; RTE species; recreation,

land use, aesthetic resources; socioeconomic resources; cultural resources; or tribal resources.

Regarding fish and aquatic resources, provision of downstream passage for blueback herring helps to ensure safe passage for 95% of juveniles, some mortality associated with passage through the flashboard notches and/or through the Project turbines is likely to occur. However, the expected level of mortality for downstream migrating juvenile blueback herring is very low and is not expected to have any adverse impacts to the migratory population as a whole. Upstream passage for blueback herring will continue to be provided through the canal and locks as it has been for many decades.

Similarly, upstream migrating American eel are also provided passage at the Projects via the canals and locks. Additionally, upstream migrating juvenile eels are adept climbers and although juvenile eels are uncommon below Crescent dam, eels that do encounter the Project dams may find alternative upstream passage routes. Downstream migrating eels are also provided passage through the locks as well as through the flashboard notches. Overall, while the Project dams may continue to be a barrier to upstream and downstream migrating eels, because the species is present in very low numbers both upstream and downstream of the Projects, the overall impact to eels in lower Mohawk River is low.

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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Appendix A – Consultation Record

Crescent Hydroelectric Project (P-4678) and Vischer Ferry Hydroelectric Project (P-4679)
Final License Application
Correspondence Record

List of Correspondence Record Files

2019_05_23 NYS Coastal Management Program CZMA
2019_07_29 Wege Scoping Comments
2019_08_07 Cook Scoping Comments
2019_08_08 Assemblymember Steck Scoping Comments
2019_08_08 Garver Scoping Comments
2019_08_08 Garver Scoping Comments 2
2019_08_09 Duggan Scoping Comments
2019_08_09 FERC AIR and Study Requests
2019_08_09 NYSDEC Scoping Comments Study Requests
2019_08_09 Riverkeeper Scoping Comments Study Requests
2019_08_09 USFWS Comments and Study Requests
2019_08_09 Woidt Scoping Comments
2019_08_12 NPS PAD Comments
2019_10_22 Assemblyman Steck PSP Comments
2019_10_29 Wege PSP Comments
2019_11_06 Wege Letter to Callahan re PSP
2019_12_13 NYSDEC email river surveys
2019_12_15 Cococcia PSP Comments
2019_12_17 FERC PSP Comments
2019_12_18 Delamarter PSP Comments
2019_12_20 NPS PSP Comments
2019_12_20 NYSDEC PSP Comments
2019_12_20 Phil Steck PSP Comments
2019_12_20 Riverkeeper PSP Comments
2019_12_20 Schenectady County Comments
2019_12_23 Kishton PSP Comments
2019_12_23 USFWS PSP Comments
2019_12_23 Woidt PSP comments
2020_01_06 USGS eel info
2020_01_07 Cherubino Comments
2020_01_14 Duggan Comments
2020_01_25 Wege RSP Comments
2020_02_04 Roberts RSP Comments
2020_02_04 Unger RSP Comments
2020_02_05 DEC RSP Comments
2020_02_05 Riverkeeper RSP Comments
2020_02_05 Stockade Association RSP Comments
2020_02_05 USFWS RSP Comments
2020_02_05 Woidt RSP Comments
2020_02_13 Duggan Comments
2020_04_08 Agency Meeting Summary CVF Year 1 Studies and COVID
2021_04_13 FERC ISR Comments and Meeting Summary
2021_04_16 NYSDEC ISR Comments
2021_04_19 Riverkeeper ISR Comments
2021_12_29 NYSOPRHP DLA Comments
2022_03_10 NYPA SHPO Crescent APE Request
2022_03_10 NYPA SHPO Vischer Ferry APE Request

2022_03_17 FERC DLA Comments
2022_03_28 SHPO Crescent APE concurrence
2022_03_28 SHPO VF APE concurrence
2022_04_01 NYSDEC DLA Comments
2022_05_04 USFWS USR and DLA Comments

From: McLean, Laura (DOS) [mailto:Laura.McLean@dos.ny.gov]
Sent: Thursday, May 23, 2019 3:33 PM
To: Slade, Mark <Mark.Slade@nypa.gov>
Subject: RE: Crescent (P-4678) and Vischer Ferry (P-4679) Hydroelectric Projects NOI and PAD FERC Filings

Mr. Slade,

From the information received, it does not appear that the proposed projects are located within New York State's coastal area. Regardless of a particular project's physical location, it is the applicant's responsibility as part of any federal permit or relicensing process to determine if the proposed action with have reasonably foreseeable adverse effects of the State's coastal resources and uses. Based on the information received to-date, the Department of State does not expect this to be the case. You may remove the Department of State from further correspondence regarding these proceedings.

Sincerely,
Laura McLean
Coastal Energy Review Specialist
NYS Coastal Management Program
Consistency Review Unit, Office of Planning, Development & Community Infrastructure

New York Department of State
O: (315) 235-0351 | Laura.McLean@dos.ny.gov
www.dos.ny.gov

From: Blair, Michelle A. <mblair@trccompanies.com>
Sent: Friday, May 03, 2019 10:54 AM
To: Andrew Raddant <andrew.raddant@ios.doi.gov>; Andrew Tittler <andrew.tittler@sol.doi.gov>; Seggos, Basil B (DEC) <Basil.Seggos@dec.ny.gov>; Bonney Hartley <bonney.hartley@mohican-nsn.gov>; countyclerk@albanycounty.com; VanMaaren, Chris C (DEC) <chris.vanmaaren@dec.ny.gov>; ckoetzle@townofglenville.org; cthorne@schenectadyny.gov; Craig McLean <manager@edisonclub.com>; Crescent Boat Club, Inc. <secretary@crescentboatclub.com>; Mackay, Daniel (PARKS) <Daniel.Mackay@parks.ny.gov>; Daniel McCoy <County_Executive@albanycountyny.gov>; Darren Bonaparte <darren.bonaparte@srmt-nsn.gov>; david_stilwell@fws.gov; Diamond Reef Marina <secretary@diamondreefyachtclub.com>; Dr. John Garver <garverj@union.edu>; Duncan Hay <duncan_hay@nps.gov>; ekinowski@stillwaterny.org; Kulleseid, Erik (PARKS) <Erik.Kulleseid@parks.ny.gov>; George Labarge <albanymarineservice@verizon.net>; Gerald Campbell <gcampbell@albanyny.gov>; James Duggan <jeduggan18@yahoo.com>; Jim Tedisco <tedisco@nysenate.gov>; lawlerj@town.waterford.ny.us; John Wiley <john_wiley@fws.gov>; mayor@albanyny.gov; Keith Goertz <R4@dec.ny.gov>; Kristen

Gillibrand <kirsten_gillibrand@gillibrand.senate.gov>; cityclerk@ci.cohoes.ny.us; Mara Drogan <cityclerk@troyny.gov>; Mary Beth Walsh <walshm@nyassembly.gov>; Mary Shannon Carrigan <carriganm@town.waterford.ny.us>; Maraglio, Matthew (DOS) <Matthew.Maraglio@dos.ny.gov>; Michael Conners, Jr <abero@srmt-nsn.gov>; Michael Penpony <michael.penpony@noaa.gov>; Mohawk Valley Marina <boats@mohawkvalleymarine.com>; Baker, Nancy M (DEC) <nancy.baker@dec.ny.gov>; Neil Breslin <breslin@nysenate.gov>; Patrick Madden <mayor@troyny.gov>; Lopez.Peter@epa.gov; Phil Steck <steckp@nyassembly.gov>; Schenectady Yacht Club <rich.mayo256@gmail.com>; Shannon Holsey <shannon.holsey@mohican-nsn.gov>; mayor@ci.cohoes.ny.us; Crounse, Sita X (DEC) <Sita.Crounse@dec.ny.gov>; Stephen Patch <stephen_patch@fws.gov>; Susan Bachor <sbachor@delawaretribe.org>
Cc: Mark.Slade@nypa.gov; Cindy.Brady@nypa.gov; Groom, Tara <Tara.Groom@nypa.gov>; Bley, Wendy <WBley@trccompanies.com>; Leclerc, Lauren G. <lleclerc@trccompanies.com>; Murphy, Michael E. <MEMurphy@trccompanies.com>
Subject: Crescent (P-4678) and Vischer Ferry (P-4679) Hydroelectric Projects NOI and PAD FERC Filings

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Good morning-

On Friday, May 3rd, the New York Power Authority filed with FERC the Notice of Intent to File and Pre-Application Document for the Crescent Hydroelectric Project (FERC No. 4678) and the Notice of Intent to File and Pre-Application Document for the Vischer Ferry Hydroelectric Project (FERC No. 4679). These documents were filed electronically with the FERC and can downloaded using the links provided below:

CRESCENT (P-4678) – https://protect2.fireeye.com/url?k=bf624719-e3474b7a-bf60be2c-0cc47aa88e08-2ded92c9d0a8cd3f&u=https://nam01.safelinks.protection.outlook.com/?url=http%3A%2F%2Felibrary.ferc.gov%2Fidmws%2Ffile_list.asp%3Faccession_num%3D20190503-5034&data=02%7C01%7Cmblair%40trccompanies.com%7C98c8f4c535a24aa0830408d6cfd5883e%7C543eaf7b7e0d4076a34d1fc8cc20e5bb%7C0%7C0%7C636924913353196141&sdata=b%2F3ym1i6F8FvNnXfSR8HvXS%2BhkNORI9tD7ifFF6KOI8%3D&reserved=0

VISCHER FERRY (P-4679) - https://protect2.fireeye.com/url?k=0a0ce13b-5629ed58-0a0e180e-0cc47aa88e08-69b06d7703e6cb32&u=https://nam01.safelinks.protection.outlook.com/?url=http%3A%2F%2Felibrary.ferc.gov%2Fidmws%2Ffile_list.asp%3Faccession_num%3D20190503-5035&data=02%7C01%7Cmblair%40trccompanies.com%7C5ce03833673647f8af8d08d6cfd58a3a%7C543eaf7b7e0d4076a34d1fc8cc20e5bb%7C0%7C0%7C636924913387859985&sdata=ozis3svhYKk0HYtNXT%2B2i%2F9pJIpK2az7oQq%2BkeOB4jk%3D&reserved=0

If there are any questions or comments regarding this filing please contact Mark Slade,

Licensing Director by phone at (914) 681-6659 or by email at Mark.Slade@nypa.gov.

Michelle Blair
Project Coordinator

14 Gabriel Drive, Augusta, ME 04330
T 207.620.3845 | **F** 207.621.8226 | mblair@trccompanies.com
LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

20190729-0009 FERC PDF (Unofficial) 07/29/2019

ORIGINAL

31 Van Voast Lane

Glenville, New York 12302

July 20, 2019

FILED
SECRETARY OF THE
COMMISSION

2019 JUL 29 P 4:18

FEDERAL
REGULATORY COMMISSION

Kimberly D. Bose

Secretary, FERC

888 First Street, NE

Washington, DC 20426

Vischer Ferry Dam Project # 4679 – 049

Dear Secretary Bose:

I wish to suggest an environmental/cultural study that should be addressed prior to re-licensing the NY Vischer Ferry Hydroelectric Project.

I was a licensed engineer, in the Flood Protection Bureau of the New York State Department of Environmental Conservation (NYSDEC) for almost 30 years. I was involved in the planning, design, construction, operation and maintenance of flood control projects constructed by the five Corps OF Engineer (COE) districts serving New York.

The Vischer Ferry Dam, producing the eleven mile Niskayuna Pool, has caused flooding problems to the unique cultural historic Stockade District of Schenectady, since constructed in 1914. State investigations of flooding problems from this dam date back to the 1920's. In an effort to address the flooding problems, the New York District of the COE identified a feasible local protection project, involving a proposed levee project for the Stockade District in the late 1960's. This project was rejected by the City, as the levee would compromise the extensively used park of the Stockade District.

Prior to re-licensing the hydroelectric plant, I ask that (1) gate modification installation and (2) operation of the gated dam be investigated to protect Stockade District and nearby cultural resources.

The New York Power Authority (NYPA) has recently begun investigating the feasibility of installing gates in a modified dam. Constructing a 400 to 600 foot gated weir would allow the pool to be partly evacuated PRIOR to the arrival of a flood wave.(Reference: A recently constructed recreational dam on the Salt River in the City of Tempe, AZ, has ten hydraulic operated gates , each gate being approximately 100 feet wide and 16 feet high.) This would substantially reduce flood damages to the historic and cultural Stockade District and the Village of Scotia area. Such a study is necessary prior to re-licensing the hydroelectric plant at Vischer Ferry Dam.

A gated weir in Vischer Ferry Dam would allow a winter draw down of the Niskayuna Pool. Ice jam modeling is too complex for reliability projections. The thickness of the ice sheet, depth of the snowpack, air temperature, duration and rate of rise, the intensity and amount of rain, all contribute in

20190729-0009 FERC PDF (Unofficial) 07/29/2019

a river system ice run. However, if the Niskayuna Pool could be drawn down several feet the probability of ice jam flooding is greatly reduced. The fact that the Niskayuna Pool can't be drawn down is a major design deficiency that must be addressed prior to re-licensing the hydroelectric plant.

Sincerely,

Russell Wege

Russell Wege, PE

Retired Engineer

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Christopher Cook, Saratoga Springs, NY.
Hello,

Hydroelectric dams provide clean energy but not without negative environmental impacts. As part of this relicensing process, please conduct a full environmental impact analysis to understand the impacts these dams have on migratory fish and water quality.

Thank you,

Chris Cook

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Assemblymember Phil Steck, Albany, NY.
August 8, 2019

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE
Washington, DC 20426

RE: Docket # P-4678 and P-4679

Dear Secretary Bose:

On behalf of my constituents in the 110th Assembly District, I am writing regarding the relicensing of Crescent and Vischer Ferry Dams on the Mohawk River. The Crescent and Vischer Ferry dams affect water flow and quality along more than 20 miles of the Mohawk River. Before any existing licenses are to be renewed, a full analysis of the following environmental impacts must be considered:

- Drinking water: Recent work by the USGS and NYSDEC has shown elevated phosphorous, chlorophyll-a, and fecal coliform bacteria in the lower Mohawk that exceed guidance values and these concerning levels may be driven in part by impoundments (Smith and Nystrom, 2017). Water quality in these impoundments affects algal growth, which in turn can affect drinking water quality and/or treatment costs by increasing the risk of formation of disinfection byproducts or harmful algal blooms (HABs). More than 100,000 people in Colonie and Cohoes rely on the Mohawk River as a drinking water source, and more than 120,000 people in Niskayuna, Schenectady, Scotia, Glenville, Rotterdam and Ballston rely at least in part on aquifers under the influence of Mohawk River water. We need to fully evaluate the roll that the dams play in affecting water quality in the lower Mohawk and implement strategies for source water protection.
- Fish: Studies are needed to better understand native, non-native, and migratory fish in the lower Mohawk. Migratory fish, including blueback herring and American eel, are present in the Mohawk River, and are known to suffer injury and mortality when passing both upstream and downstream through dams.
- Studies are needed to better understand the roll that the Vischer Ferry dam plays in causing ice jams and subsequent flooding. The Schenectady Stockade is a historical area in the 110th Assembly District. This area has been subject to significant flooding that has become increasingly worse over time. The source of the flooding is the Mohawk River. It is likely that the current dam structures on the river contribute to or cause flooding in the historic Stockade. It is critical that before any relicensing of these man made structures is allowed, there must be a comprehensive study or modeling on the formation of ice, flow of ice jams, and points were ice gets obstructed.

Thank you for your kind consideration of this request.

Sincerely,

20190808-5140 FERC PDF (Unofficial) 8/8/2019 4:42:02 PM

Phil Steck
110th Assembly District

encl: Enhanced Water Quality Monitoring in Support of Modeling Efforts in the Mohawk River Watershed

Cockburn, J.M.H. and Garver, J.I., Proceedings of the 2017 Mohawk Watershed Symposium,
Union College, Schenectady, NY, March 17, 2017
61

Enhanced Water Quality Monitoring in Support of Modeling Efforts in the Mohawk River Watershed

Alexander J. Smith1 and Elizabeth Nystrom2
1NYS-DEC, Division of Water, Mohawk River Basin Program, Albany, NY
2US Geological Survey, New York Water Science Center, Troy, NY

The quality of surface water has important effects on human and ecological health. In the Mohawk River watershed, surface water is an important drinking water source and is used for swimming, fishing, and recreation. The New York State Department of Environmental Conservation (NYSDEC) is tasked by the U.S. Environmental Protection Agency (USEPA) to monitor ambient water quality of the State. The NYSDEC is also tasked to develop Total Maximum Daily Loads (TMDLs) for state waters that fail to meet their intended uses. Water-quality impacts on designated uses in the Mohawk River watershed are well documented by the NYSDEC. These impacts include eutrophication from phosphorus, which degrades the quality of water supplies, and the presence of bacteriological pathogens, which limits contact recreational opportunities. In 2015 the NYSDEC conducted a “TMDL - Lite” analysis to better understand the sources and loads of pollutants in the Mohawk River watershed. The results of this analysis indicated approximately 60% of the phosphorus in the Mohawk River watershed is the result of point source discharges, such as sewage treatment facilities. A lesser, but still significant portion (21%) of phosphorus in the watershed is from non-point source agricultural practices. The remaining (19%) phosphorus load in the Mohawk River watershed was estimated to be from developed land, septic fields, and natural sources collectively. As a result of this analysis demonstrating the high proportion of phosphorus load originating from point source discharges and the current assessments of water quality conditions, the NYSDEC began to set in motion the process for developing a phosphorus TMDL for the Mohawk River. This process includes the development of enhanced water quality monitoring data from throughout the watershed and the development of a detailed water-quality model.

During 2016 the NYSDEC and United States Geological Survey's NY Water Science Center (USGS) partnered in the collection of a comprehensive water-quality dataset suitable for calibrating future waterquality models in support of a TMDL for the Mohawk River. Beginning in April 2016, surface-water quality samples were collected from 30 different sites throughout the Mohawk River watershed from upstream of Rome to Cohoes, including both main-stem (n=10) and tributary (n=20) locations. Samples were collected six times (Spring-Fall) from each location with an additional six collections for bacterial analysis. Sampling parameters included river and stream discharge, nutrients, suspended sediment, minerals, trace elements, organic carbon, chlorophyll-a, oxygen demand, and pathogens (coliforms). Preliminary results indicate water quality in several areas in the Mohawk River watershed exceed NYSDEC's water quality guidance values for phosphorus, chlorophyll-a, and New York State's (NYS) water-quality standards for bacteria. Although NYS does not have official water-quality standards for phosphorus and chlorophyll-a, guidance values that are protective of both drinking water supplies (25 µg/L TP, 6 µg /L Chl-a) and aquatic life (30µg/L TP, 6µg/L Chl-a) have been established and are available in the literature (Callinan 2010, Smith et al. 2015, Smith et al. 2013, Smith and Tran 2010). Using these guidance values in review of water-quality data at the 30 sites sampled in 2016, 12 tributary and 7 main-stem sites exceeded the phosphorus guidance. For chlorophyll-a, 7 tributary and 6 main-stem sites exceeded guidance values. NYS does have water quality standards for both total (2,400 colonies/100mL) and fecal (200 colonies/100mL) coliforms for surface waters for the protection of human health. These standards are based on average conditions calculated from a minimum of 5 water-quality samples in a 30-day period. Results of our investigation, which followed these sample collection criteria, indicate 5 tributaries and 1 main-stem site exceeded the standard for total coliform and 7 tributaries and 2 main-stem sites exceeded the standard for fecal coliform. However, one-time exceedances from the 30-day period of sampling were more than double the number of average exceedances and were widespread. Phosphorus concentrations and the levels of coliform standard exceedances in several tributaries including Nail, Reall, and Ballou Creeks near Utica suggest these smaller watersheds may be significant sources of pollutants. However, chlorophyll-a exceedance of guidance values does not appear to become an issue until further downstream on the main-stem Mohawk River in the area of Amsterdam – Cohoes. These results may suggest a complex interaction between nutrient concentrations, altered flow regime

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due to the canal system, and the build-up of suspended algae in downstream impoundments. Instantaneous load calculations provide a slightly different perspective on targeting specific tributaries for nutrient controls when compared with concentration only. For example, some larger tributaries, although lower in phosphorus concentration, contribute greater overall loads of phosphorus to the Mohawk River simply due to their size and average discharge.

Next steps in the process of developing a TMDL for the Mohawk River include developing a sophisticated water-quality model that builds off of the New York State Canal Corporation's (Canal Corp.) newly completed hydraulic and hydrologic models for the Mohawk River watershed. The Canal Corp. built these advanced models for the watershed to support their flood warning system for the Mohawk River. Prior to the development of Canal Corp.'s flood warning system, developing a water-quality model would have required significantly more effort. Building off of their advances in this area will dramatically improve efficiencies in NYSDEC's water quality model. A modeling team from the NYSDEC, USGS, and Canal Corp. are presently working to begin development of the Mohawk River water-quality model. The water-quality data collected during 2016 from the Mohawk River watershed will be used to calibrate this model. Once completed, the model will allow water-quality managers to estimate improvements in water quality through various scenarios of pollutant limitations within the watershed, further protecting drinking water supplies, recreational opportunities, and aquatic life.

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Invited Oral Presentation

John Garver, Schenectady, NY.
Kimberly D. Bose, Secretary, FERC
888 First St. NE
Washington, DC 20426

Dear Secretary Bose,

This is a comment on the environmental review scoping document (Docket Number P-4679), and this letter requests relicensing studies related to flooding and ice jams.

The permanent Vischer Ferry Dam (VFD, but herein "the Dam") may exacerbate flooding in the immediate upstream Schenectady pool (Lock E7 to Lock E8 – herein "the Pool"). The Dam may affect flooding by: 1) trapping sediment that has impaired (filled) the effective channel over the last century; 2) facilitating the formation of thick sheet ice in the winter; 3) reducing surface velocity that favors ice jam formation. It is likely that there is a synergism between all three of these primary drivers (accumulated sediment, sheet ice development, low river velocity), which has resulted in chronic and damaging ice jams that are nearly annual in the area of the Rexford Knolls just up river from the Dam.

Ice jams are chronic in the Schenectady pool on the lower Mohawk River (Lederer and Garver, 2001; Garver and Cockburn, 2009; Marsellos and others, 2010; Garver, 2014; Garver and others, 2018, Garver, 2018; Garver 2019). Ice jams with back up flooding have been severe especially for the communities in Rexford, Alplaus, Glenville, Scotia, and the Stockade District of Schenectady. The latter is perhaps most problematic as it is the first historic district in NYS, and river-proximal structures there have had repeatedly been damaged. Ice jam flooding has been such an issue that the USGS has installed a one-of-a-kind ice jam monitoring system to aid emergency management. This system is unique, effective, but expensive. It was installed as a series of real-time pressure transducers (and cameras) between E7 (VFD) and E8 because this is one of the most jam-prone sections of river in NY State (Wall et al., 2013).

The lower part of the Mohawk River has a low gradient, and the permanent dam at Vischer's Ferry (also Lock E7) impounds water for nearly 16 km (~10 miles) to Lock E8, and thus this is one site where thick sheet ice builds in the winter. The low gradient in this section (especially from Rexford to the Dam), compared to most sections of the Mohawk River up river from this area, contributes to jamming because river velocity slows.

The single most chronic jam point is in the Rexford Knolls, just up river from the Dam. We have shown that the Knolls are a chronic jam point, and a number of recent jams have occurred in this location. A major concern is that since dam construction, sediment has built up and accumulated, and these slugs of sediment may have reduced the channel width, and thus when ice floes move downstream the sediment forces lateral shortening and jamming.

Sediment has accumulated behind the dam since construction nearly a century ago, and that sediment has undoubtedly reduced the effective channel (full channel cross section bank to bank). An important issue is how sediment adjacent to the channel may block ice due to constriction (see Garver, 2019). We know that Irene and Lee were significant in transporting large volumes of bedload into the Pool, but we are unaware of any systematic published data that quantifies sediment accumulation in the Pool. It has been postulated that sediment is one of the major causes of channel constriction in low-flow mid winter ice jam events in the past few years (Garver, 2019). Thus we know that large volumes of sediment have accumulated in the Schenectady pool, and in almost any scenario this would favor more frequent floods (freewater and ice jam related). There are no data available on sediment thickness in the Pool.

Summary: The Dam may facilitate the growth of thick sheet ice, force velocity decrease of the River, and it has almost certainly resulted in sediment accumulation that has locally impaired channel width and depth. Studies are required to fully evaluate the roll that the Dam plays in driving ice-jam flooding and then numerical modeling is required to explore the possible ways that a new dam configuration or dam operation

could alleviate ice jams. The role of sediment and channel impairment should also be conducted in parallel. Solutions that should be explored in model runs include: 1) dam removal; 2) significant pre-emptive lowering immediately prior to break up events to fracture and break ice cover; and 3) mechanical break up of ice up river from the Dam. Finally, sediment in the channel (in the entire Pool) needs to be measured and quantified so that the role that this sediment plays in channel shallowing and width reduction can to be evaluated in hydraulic models (where sediment can removed in model runs).

If nothing else, consideration should be given to implementing a funding solution for an expanded Ice Jam monitoring system, which incurs annual expenses related to maintenance and operation. Additional consideration should be given to development of an integrated ice jam warning system to alert the public of ongoing ice jam hazards.

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John I. Garver, Schenectady, NY.
Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE
Washington, DC 20426

Docket Number P-4678 and P-4679.– Vischer Ferry and Crescent Hydroelectric Projects

Dear Secretary Bose,

This is a comment on the environmental review scoping document (Docket Number P-4679 and P-4678), and this letter requests relicensing studies related to fish populations and fish passage.

The Visher Ferry Dam (VFD) and the Crescent Dam on the lower Mohawk River are permanent impoundments, and published data clearly show that they affect the overall fishery in the watershed. Piscivorous birds (Comorants and Mergansers) have high population densities below the VFD, which may reflect limited fish passage and thus an ecological bottleneck related to poor opportunities for passage.

The Mohawk River has strongly asymmetric fish populations that vary in species and abundance between permanently impounded sections (i.e. Vischer and Crescent dams, herein “the Dams”), and those sections of the River that are seasonally impounded. A primary finding from recent surveys shows that the seasonally impounded sections of the river (i.e. those up river from the Project) support a higher diversity and larger percentage of native species.

We need more data to fully understand the nature of the fishery in the Lower Mohawk River. Specifically surveys are needed to quantify: 1) the distribution asymmetry of native versus non-native fish in the impounded sections of the river; 2) the affect that permanent impoundments has on overall fish recruitment and migration; 3) population dynamics of herring and eel; 4) the overall effect of the dams (and turbines) on both up-river and down-river fish passage; 5) the current and potential threat from invasive fish.

Limited survey data show that the lower impounded section has a diverse fishery that appears to be dominated by non-native species (McBride, 2009; George et al., 2016). While recent surveys are based on standard electrofishing, the method and timing of surveys apparently are not sufficient to fully capture the population dynamics of Herring (i.e. Alosa aestivalis) and Eel (i.e. Anguilla rostrata), thus we have almost no data on the health of these cornerstone fish.

Birds eat fish. Cormorants and Mergansers are diving birds that prey on fish and other freshwater macrofauna. There have been 162 reports of Double-Crested Cormorant (Phalacrocorax auritus) at the Vischer Ferry Dam reported on eBird since 2009 (2009 to May 2019), and combined, these reports account for 1642 birds. Likewise, there have been 229 reports

of Common Merganser (Mergus merganser) at the same site since 2009 with a total of 2442 birds being reported. Note that eBird is volunteered reported data, and obviously this represents a minimum possible number of birds at this site: this region has moderate participation in this form of data collection.

There is no other site on the Mohawk River in Schenectady County that has this reported density of these piscivores (Phalacrocorax auritus and Mergus merganser). There are no locations on the River in this area that are even close to the bird density. The eBird database is an online record of bird observations launched in 2002 by the Cornell Lab of Ornithology at Cornell University and the National Audubon Society. Thus for the Mohawk River in Schenectady County, these data show the highest occurrence of these piscivores occurs at the Vischer Ferry Dam.

Both Phalacrocorax auritus and Mergus merganser are a voracious predators of fish (Dorr et al., 2014; Pearce et al., 2015), and there have been a number of management issues in the United States associated with these birds, especially Cormorants (Dorr and Fielder, 2017a,b). Research has shown that cormorants tend to feed on smaller fish, including young fish, and they may be responsible for a mortality bottleneck (see Dorr and Fielder, 2017a). The appearance of Phalacrocorax sp. into river environments, due to a displacement from marine foraging area, has been shown to have resulted in a massive decline of fish (Jepsen et al., 2018). Cormorants feed on fishes that are readily available and the birds are common and abundant where fish are easily caught (see Dorr et al. 2014). Thus the common occurrence of these birds at the dam would suggest that there maybe some question about the efficiency of fish passage at the Dam.

Summary. We need studies and detailed data on fish populations and fish passage in the context of the Vischer and Crescent dams. The abundance of Piscivorous diving birds at the VFD may indicate that the dam is a major bottleneck caused by limited fish passage opportunities. Current data sets are insufficient for making informed management decisions.

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VISCHER FERRY HYDROELECTRIC PROJECT (P-4679-049)

STUDY PROPOSED TO NYPA for FERC RE-LICENSING

NYPA proposes to study how to modify (mainly) Dam D of the fixed concrete Vischer Ferry Dam (VFD) complex as a means to curtail the Schenectady area's long-developed, valuable properties' post-VFD vulnerability to flooding. Affected are the Historic Stockade District, the Schenectady County Community College and broader-community commerce, resources and activity, also in Scotia and Glenville. The **Goal**: confirm the feasibility of preemptive controlled drawdown to **achieve a non-flooding "balance"** between runoff-volume arriving at Lock 8 and discharge past VFD, while avoiding/minimizing overflow (and its height backwatered upstream). The **Objective**: begin steps toward providing VFD with substantial below-crest hydraulic capability (and operation protocols) to allow partial drawdown of the permanent Pool's water-surface elevation.

During construction of the VFD, the Schenectady-area community **began** to suffer a new range of flooding, capped with record flood-heights in March 1913 and 1914, the latter valid today. Nature uncontrollably causes the water (hydrology); NYS built the unmanageably obstructing VFD, its (hydraulic) inadequacies proven too-frequently by free-flow floods (plus innumerable near-flood threats) in the Schenectady area. Individual and public damages to-date have **involved INESTIMABLE HUGE COSTS.** Smart thinking readily can foresee huge further penalties, if modifying VFD to 21st century flood-mitigating capabilities fails to occur.

Attention to-date has focused on the runoff's water-surface profile, relatively flat and draining ineffectively. The bottom at VFD (Goat Island) is**~30 feet lower** than the site of Lock 8. At both of these locales, bottom-slope was key to the combined pre-VFD natural drainage: lowered runoff-surface levels approaching Schenectady from upstream and then explicit drainage downstream to and past Goat Island. The occupying Pool-volume obscures bottom-influence for drainage. Its flat surface curtails gravity-pull, denying the velocity needed to drain the runoff.

The Pool's context is important. Pre-VFD, runoff directly followed **the riverbed's distinct overall slope** from Montgomery County to Albany County. FEMA studied the entire Schenectady County reach of the canalized Mohawk River for its Flood Insurance Study (FIS) in 2009. Its Table 6 reveals large variations in the data re the floodway's cross-sections and mean velocities for the free-flow "100-Year" runoff-volume. Mean flow-velocity per respective cross-section is particularly significant. Minus the few distinctly higher velocities (expected) at certain locations such as the movable dams, the velocity averaged along some reaches indicates the basic adequacy of runoff-drainage there. Compared to the runoff-volume draining from upstream to Lock 8, **drainage from the Scotia-Schenectady reach is inadequate.**

A listing of mean velocities follows; two are extremely slow. (For reference, ***WALKING* a mile in 20 minutes** = **4.4 fps**.) Along ~7.3 miles between the "Montgomery County Line" and near Lock 8, the average mean velocity is **~8.3 fps.** Along the next ~2.5 miles, the Scotia-Schenectady reach approaching Freemans Bridge, the average mean velocity is **~4.78 fps.** Markedly slower, this "runoff-plateau" contains the two **very slow** mean velocities: **2.9 fps** upstream from the overall SCCC campus, and **2.5 fps** closely flanking SCCC facilities. They

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signify the **ineffectual drainage there** that **endangers and/or damages** the campus of this valuable institution, as well as disrupting its programs. Mean velocity passing the Historic Stockade neighborhood is **5.9 fps, not adequate**. Along the WatersEdge Lighthouse complex between Freemans Bridge and Canadian-Pacific Railroad Bridge, mean velocity is **8.3 fps, fastest** in the ~5.6-miles Lock 8 - Rexford Bridge reach. Minus the unusually fast velocities at tightly clustered four cross-sections near the Rexford Bridge, the Pool's downstream reach along the next ~4.9 miles is **~6.4 fps, not adequate**. Nearest to VFD is the Pool's **third-least** mean velocity, **4.1 fps**, fostering the ~8.4' overflow-height **crossing VFD's ~1,990-feet crest**, its accompanying backwater - - all here **severely hindering drainage along the entire Pool.**

(For reference, a **"10-Year" runoff-volume** (~34% less than "100-Year") involves a **5'-plus high overflow.** Its backwater and the arriving runoff **enter the SCCC campus and pass the Historic Stockade at bank-height, NWS "Floodstage".)**

THIS MATTER DESERVES SERIOUS ADVOCACY FOR INSERTING A LARGE GATE-SYSTEM IN "DAM D" (CHANNEL-ALIGNED) TO ACTIVELY LOWER THE POOL'S SURFACE, THUS INCREASE RUNOFF-SLOPE AND VELOCITY AS FAR AS LOCK 8.

A **~500'-wide gate-system of substantial (10-12') depth would allow preemptive surface-managing action in response to now-available alerts.** This new capability would prevent or substantially reduce flood-disruption, damages and costs. A winter-long drawdown of several feet would act to **reduce the likelihood of flooding problems with ice-jamming.**

The needed searchingly open-minded, detailed investigation requires **more than "routine" computer outputs from river-based programs** to assess how to better-drain the runoff that now must sprawl **atop this reservoir-Pool**. The **less-than-riverine nature** of this condition clearly requires close attentiveness and probably some out-of-the-box adaptation.

At this time, proposing any specific study methodology etc and indicating cost, as well as the needed level of effort, exceed the specific background and applied skill of this proposer.

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528 Orlinda Avenue
Scotia, NY 12302

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426
August 9, 2019

OFFICE OF ENERGY PROJECTS

Project No. 4678-052–New York
Crescent Hydroelectric Project

Project No. 4679-049–New York
Vischer Ferry Hydroelectric Project

New York Power Authority

VIA Electronic Mail

Mr. Robert Daly
Licensing Manager
New York Power Authority
Robert.Daly@NYPA.gov

Reference: Requests for Additional Information and Study Requests

Dear Mr. Daly:

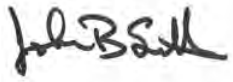
After reviewing the Pre-Application Document (PAD) for the Crescent Hydroelectric Project and the Vischer Ferry Hydroelectric Project, and participating in the July 10 and 11, 2019 scoping meetings, and the July 10, 2019 environmental site review, we have determined that additional information is needed to adequately assess potential effects of the projects on environmental resources. We provide comments on the PAD and our additional information requests in Schedule A, and three study requests in Schedule B. Unless otherwise specified, please file your responses to Schedule A with your proposed study plan, which must be filed by September 23, 2019.

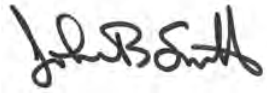
Staff may determine a need for additional studies or information upon receipt and review of scoping comments, study requests, and your proposed study plan. As necessary, we will request additional information or studies or provide additional input on proposed or requested studies after you file the proposed study plan.

Please include a master schedule in your proposed study plan that includes the steps for conducting each proposed study (i.e., data collection, data analysis, consultation,

and report preparation), the d
initial study report. If, based
measures to address the effec
your draft license application

If you have any questi
jody.callihan@ferc.gov.





Enclosures: Schedule A
Schedule B

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

ADDITIONAL INFORMATION

Lock E-6

1. Currently, the Crescent Hydroelectric Project (Crescent Project) does not include Lock E-6 as part of the project. However, it appears that Lock E-6 and the canal between the dam and the lock should be part of the project because Lock E-6 is needed for impounding the reservoir of the Crescent Project. Please explain why the lock and canal are not included in the project boundary. If it is determined that the lock and canal are needed for project purposes, both features should be enclosed within the project boundary when the draft license application or preliminary licensing proposal is filed.

Dates of Flashboard Installation/Removal and Navigation Season

2. Staff needs additional information regarding the seasonal timing of the fish passage practices that are currently implemented at both projects (notches in the flashboards and navigation lockages) to support our analysis of the effectiveness of these practices for passing migratory blueback herring and American eel. Therefore, please provide the following information for the previous 20 years, to the extent such data are available: (1) the dates the flashboards were installed and removed each year at each project; and (2) the starting and ending dates for the navigation season in the Erie Canal each year. Please note any anomalies in the record, such as late installations of the flashboards or early closing of the navigation season, and if available, the reason for the anomaly.

Flow through Fish Passage Notches

3. At the environmental site review, New York Power Authority (NYPA) was uncertain as to the amount of flow provided through the two fish notches (the adult notch and juvenile notch) at the Vischer Ferry Hydroelectric Project (Vischer Ferry Project) and the dimensions of these notches. Therefore, please provide this information, as well as the depths and substrates of the plunge pools at both the Crescent Project and the Vischer Ferry Project.

Minimum Hydraulic Capacity

4. At the environmental site review, NYPA stated the minimum hydraulic capacity was the same for all turbines—200 cubic feet per second (cfs) for the Kaplan and Francis units at each project. However, Table 3.3-1 of the Pre-Application Document (PAD)

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

indicates the minimum hydraulic capacities of the Kaplan and Francis units are 350 cfs and 400 cfs, respectively. Please clarify this discrepancy.

Water Withdrawals from the Vischer Ferry Impoundment

5. As indicated in the PAD (Table 4.3-5) and confirmed at the site visit, water withdrawals in excess of 1 million gallons per day (MGD) are made from the Vischer Ferry impoundment at General Electric in Schenectady, New York (4.0 to 11.4 MGD) and the Knolls Atomic Power Laboratory (1.7 to 3.7 MGD). To support staff's analysis of water quantity resources at both projects, please provide additional information regarding these water withdrawals. Specifically, describe how the water that is withdrawn is used and whether it is released back into the impoundment and if so, how it is modified (e.g., increased temperature of the effluent).

Period of Record for Hydrology Data

6. Hydrology statistics presented in the PAD are based on an 8-year period of record (from 2011 through 2018, encompassing Hurricane Irene), which likely biases (upwards) flow estimates at the projects, especially given the short period of record (only 8 years). Therefore, in your draft license application or preliminary licensing proposal, please provide a description of the hydrology at both projects and updated flow statistics (tables 4.3-1 and 4.3-2 of the PAD) and flow duration curves (figures 4.3-1 and 4.3-2; Appendix D) that are based on a longer period of record—at least 30 years of pro-rated flow data from the nearby United States Geological Survey (USGS) gages at Little Falls (USGS Gage No. 01347000, data available from 1927 to present) or Cohoes Falls (USGS Gage No. 01357500, data available from 1917 to present).

Fisheries Reports

7. In section 4.4 of the PAD, you cite several fisheries reports that staff was not able to locate. Therefore, please file the following reports/references as supplemental information as part of the public record for the projects: Chas T. Main, Inc. (1984); Curtis and Associates (1987), McBride (1985), and McBride (1994).

Project Facilities

8. In section 3.3 of the PAD, project facilities are identified as a dam, powerhouse, impoundment, and appurtenant facilities. In the existing license, switchyards, generator

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

leads, and transformer banks are also mentioned as existing project facilities. Please describe in greater detail the switchyards, generator leads, transformer banks, and other appurtenant facilities not previously mentioned as part of the project facilities. Please include the approximate dimensions of the switchyard, length and voltage of the generator leads, and location of each facility, including the point of inter-connection with the grid.

Vegetation Management

9. In section 3.3 of the PAD, project facilities are identified, and section 3.4 references the scope of operations for those identified facilities. Also, in section 4.8.1.1, formal project recreation sites are identified for the Crescent and Vischer Ferry Projects; and section 4.8.2.1 states that, generally, project operations and maintenance, and recreation are the primary activities that occur on project lands. Please describe the details (e.g., frequency and method) of any vegetation management that occurs at either project, their formal recreation sites, and any appurtenant facilities to support operations and maintenance. Examples of vegetation management may include activities such as mowing, trimming, and turf management; hazard or risk tree removal; clearing to maintain overlooks; herbicide treatments; and others.

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

STUDY REQUESTS

After reviewing the information in the PAD, we have identified a gap between the information in the PAD and the information needed to assess project effects. As required in section 5.9 of the Commission's regulations, we have addressed the seven study request criteria for each of the study requests that follow.

Entrainment and Impingement Study

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to evaluate the potential for trash rack impingement, turbine entrainment, and related survival for migratory (blueback herring and American eel) and resident game fishes (smallmouth bass, walleye, and yellow perch) at the Crescent Project and Vischer Ferry Project in the Mohawk River. The objectives of this study, at a minimum, are to: (1) estimate the minimum sizes of each target species[1] that would be excluded from the trash racks at each project based on body size alone; (2) provide the burst speeds (with source information cited) for juveniles and adults of each target species;[2] (3) provide the expected intake approach velocities at the maximum hydraulic capacity of each project; and (4) use a blade strike model (e.g., Franke et al. 1997)[3] to estimate the turbine mortality of each target species. The blade strike models should be based on the specifications of the Kaplan and Francis turbines (rotational speed, blade spacing and number, etc.) installed at each project; separate mortality estimates (model runs) should be conducted for the Francis and Kaplan units, with

[1] NYPA should consult with the United States Fish and Wildlife Service and New York State Department of Environmental Conservation to determine if there are species of interest other than the target species listed here; if so, include those additional species in its entrainment analysis.

[2] Surrogate fish species with a similar swimming mode and body shape may be used if lifestage- and/or species-specific information on burst speeds is not available for the target species.

[3] Franke, G.F., D.R. Webb, R.K. Fisher, Jr., D. Mathur, P.N. Hopping, P.A. March, M.R. Haedrick, I.T. Laczo, Y. Ventikos, and F. Sotiropoulos. 1997. Development of environmentally enhanced hydropower turbine system design concepts. Prepared for U.S. Department of Energy, Idaho Operations Office, Contract DE-AC07-94ID13223.

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

mortality estimates reported for each 1-inch size bin across the entire size range of fish used in the models.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

Not applicable.

Criterion (3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

Fish populations in the Mohawk River support a sustainable riverine ecosystem that is critical in providing public opportunities, including recreational fishing. Ensuring that the effect of the projects' operations pertaining to this resource are considered in a reasoned way is relevant to the Commission's public interest determination.

Criterion (4) – Describe existing information concerning the subject of the study proposal and the need for additional information.

Although a turbine mortality study (utilizing balloon tagging)[4] was previously conducted at the projects for juvenile blueback herring,[5] no entrainment or turbine mortality data are available for other species present in the vicinity of the projects, including American eel and resident gamefish such as smallmouth bass, walleye, and

[4] In the balloon tagging study, juvenile blueback herring equipped with inflatable (balloon) tags were released into the penstock, passed through the Kaplan turbines at the Crescent Project, and were recovered downstream in the tailrace, thereby providing a field-based estimate of turbine mortality.

[5] RMC Environmental Services, Inc. 1992. Juvenile blueback herring (*Alosa aestivalis*) survival in powerhouse/turbine passage and spillage over the dam at the Crescent Hydroelectric Project, New York. Filed on July 28, 1992; Accession No. 19920729-0355.

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

yellow perch. Staff needs this information to assess project effects on important fishery resources occurring in the vicinity of the project.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

Fish utilizing this portion of the Mohawk River are susceptible to impingement on the projects' trash racks and entrainment through the projects' turbines when the projects are operating. Results from the study would provide insight into the magnitude of such project effects and inform the need for license measures to protect fishery resources.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

Desktop studies of impingement and entrainment, such as the study requested here, are commonly conducted to support the Commission's hydropower licensing proceedings. Sufficient literature should be available to describe the life history characteristics, swimming speeds, and avoidance behaviors of the target species. In addition, an extensive entrainment and survival database (EPRI, 1997)[6] is available to aid desktop entrainment studies.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

We expect the desktop study (literature review, analysis, and report writing) would take 1 to 2 months to complete and cost about $20,000, unless a day or two of fieldwork is necessary in order to obtain approach velocity measurements; in that case the cost would likely be higher. The specific methodology and scope of the study can be refined during the study planning phase and upcoming proposed study plan meeting.

Bald Eagle Study

[6] Electric Power Research Institute (EPRI). 1997. Turbine survival and entrainment database – Field tests. EPRI Report No. TR-108630. Prepared by Alden Research Laboratory, Inc. Holden, MA.

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of the study is to verify existing and identify new bald eagle nest, foraging, and roost locations; and to monitor bald eagle activity levels at the identified locations at both projects. The study objective is to collect data and information to inform Commission staff's analysis of the effects of continued operation and maintenance of the projects on bald eagles and their habitat.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

Not applicable.

Criterion (3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

The bald eagle is federally protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. It is also classified as Threatened by the State of New York under the New York State Environmental Conservation Law and State of New York regulations. Additionally, detailed State of New York resource management goals can be found in the *Conservation Plan for Bald Eagles in New York State*.[7]

Criterion (4) – Describe existing information concerning the subject of the study proposal and the need for additional information.

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[7] New York Department of Environmental Conservation (New York DEC). 2016. Conservation Plan for Bald Eagles in New York State. Available: https://www.dec.ny.gov/docs/wildlife_pdf/nybaldeagleplan.pdf. Accessed: August 1, 2019.

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

The PAD identified the bald eagle as having the potential to occur at both projects, and Scoping Document 1 preliminarily identified the bald eagle as a resource issue in need of analysis under the National Environmental Policy Act. Staff found that an active nest was documented within the Crescent Project boundary and other bald eagle activity was documented at and adjacent to both projects.[8]

Applicable guidelines and planning documents[9, 10] recommend activity restrictions, or other measures, based on knowing the locations of bald eagle nests, foraging, and roost locations. The information would assist staff in analyzing possible resource affects by project activities and determine the need for resource protection measures, if any.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

Project operation and maintenance have the potential to directly affect bald eagle nesting, foraging, and roosting. Study results would inform the need for and location(s) of resource protection measures, if needed.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with

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[8] Morgan, C. 2019. eBird Checklist: http://ebird.org/ebird/view/checklist?subID=S57453805. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. Available: http://www.ebird.org. Accessed: August 1, 2019.

[9] U.S. Fish and Wildlife Service (FWS). 2007. National Bald Eagle Management Guidelines. Available: https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf. Accessed: August 1, 2019.

[10] New York DEC, 2016.

generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The proposed study methodology should include an existing literature and data review, field surveys, and a study report. The study should be conducted at both projects and be completed in 1 year.

Bald eagle use studies are commonly conducted to support the Commission's hydropower licensing proceedings. Sufficient information to inform study design is available in the *National Bald Eagle Management Guidelines*[11] and the *Conservation Plan for Bald Eagles in New York State*.[12] Additional information is also available on applicable U.S. Fish and Wildlife Service[13] and New York Department of Environmental Conservation[14] websites.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The proposed study should take about 1 year to complete with an estimated cost of about $20,000. No alternative studies have been proposed at this time.

Recreation Study

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to gather information on recreation use, recreation access, and potential project effects to determine existing and future recreation use and capacity at the projects.

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[11] FWS, 2007.

[12] New York DEC, 2016.

[13] FWS. 2016. Bald Eagle Management Guidelines and Conservation Measures. Available: https://www.fws.gov/northeast/ecologicalservices/eagle.html. Accessed: August 1, 2019.

[14] New York DEC. 2019. Bald Eagle Management. Available: https://www.dec.ny.gov/animals/7068.html. Accessed: August 1, 2019.

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

The objectives of the study are to, at a minimum: (1) identify and describe each formal and informal recreation site and facility at the project in relation to the projects' boundaries; (2) identify the condition of all formal and informal recreation sites and facilities within and adjacent to the projects' boundaries, including any erosion that may exist due to recreational use; and (3) conduct visitor surveys during the recreation season to determine the adequacy of project recreation facilities and if changes or upgrades to the sites would be needed to meet current or future recreation needs.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

There are a number of public recreational opportunities within and adjacent to the Crescent and Vischer Ferry Projects. Understanding the condition of the existing project recreation sites and facilities, the amount of current and projected future use, and how these sites and facilities are managed is essential in determining the adequacy of project recreation facilities to meet current and future recreation needs; and therefore, is relevant to the Commission's public interest determination.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

Section 4.8 of the PAD (pages 4-80 – 4-88) provides a general discussion of recreation demand in the region and a summary of recreation at each project. It also includes a brief discussion of recreation use estimates compiled every 6 years as part of the Licensed Hydropower Recreation Report Form 80 (Form 80) required by the projects' current FERC licenses. However, while NYPA proposes to conduct a project recreation

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

site facility inventory at both projects,[15] it does not propose to gather any recreation use data. Although NYPA provides a brief summary of recreation use based on its last three Form 80 filings, most data compiled for Form 80 filings are derived from informal surveys and estimates of use. The PAD also provides no project-specific information regarding visitor perceptions of recreation at the projects. A study that gathers information on visitor perceptions of the adequacy of public access and facilities, current use, and whether existing access facilities in the area are meeting recreation demand, in addition to the already proposed facility inventory, would inform future license conditions related to public access and recreation facilities.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

Each project includes a reservoir that provides boating and fishing opportunities and a tailrace that provides informal fishing access. Continued operation of the projects could affect recreational resources through disruption or displacement of activities, changes to the recreational experience, increased use, changes in the types of recreation activities in the area, or by other means. The results of the study would inventory existing recreation facilities and activities, detect current use patterns, and help to determine recreational demand and the potential need for new recreation facilities.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The specific methodology and scope of the recreation study can be refined during the study planning phase and upcoming proposed study plan meeting, but the study should include, at a minimum, the following provisions:

1. Inventory all formal and informal public and private recreational sites/facilities within and adjacent to each project's boundary.

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[15] In the PAD, NYPA identifies two project recreation sites at the Crescent Project (a picnic area near the powerhouse and an informal tailrace bank fishing area) and three project recreation sites at the Vischer Ferry Project (a scenic overlook at the project forebay, a tailrace parking area, and a boat ramp at Lock E-7 also known as the Town of Niskayuna Boat Ramp).

2. Administer a recreation use survey that addresses all recreation activity types known to occur or potentially occur at each project. Specific methods should include visitor observations and on-site visitor intercept surveys at formal and informal public recreation areas at each projects' reservoir and tailrace, as well as spot counts.

    - Visitor observations should capture information such as location, date, time, weather, number of vehicles, watercraft (if any), number of recreation users or party size, and recreation activity.
    - The visitor survey sampling should be based on a stratified random sample that includes all seasons, various locations, and various times of week and day to enable representative responses from the visitors, while ensuring interview coverage during key times (e.g., holiday and weekend days, shoulder seasons, fishing and hunting seasons).
    - The survey instrument should include items to assess visitor perceptions of crowding, recreational conflict, conflicts between the public and adjacent property owner(s), adequacy and placement of signage, adequacy of recreation facilities and access to the projects, and effects of project operation and management on recreation and recreation opportunities at the projects (e.g., fluctuating reservoir levels).
    - Spot counts should be conducted on survey days. The spot counts represent short-term counts (approximately 5 minutes per site) and should record the number of vehicles parked at a site/facility and the number of users observed. This information should be statistically analyzed to develop the recreational use figures for each project. Final recreation use for the recreation facilities and sites at each project should be summarized by season and activity type for each site.

3. Prepare a report that includes information on the number of recreation days spent at project recreation sites, average number of persons per party, and a determination of the percent of the each facility's capacity that is currently being utilized. The above information should be entered into spreadsheets for statistical analysis. The collected information should be used to project changes to project recreation demand over the term of any new license that may be issued. The report also should include: (1) identification of all project and non-project recreation sites at each project, including informal recreation sites, and who owns each site; (2) the location of the recreation sites in relation to the project boundary, including facilities/amenities that may straddle the project boundary; (3) the types

Document Accession #: 20190809-3036 Filed Date: 08/09/2019

and number of amenities provided at each site; (4) the condition of the facility/amenities; (5) identification of any erosion at each recreation site; (6) entities responsible for the operation and maintenance of the sites; (7) hours/seasons of operation, if applicable; (8) photographs of each site; (9) use figures for each recreation site, overall recreational use figures, and projected use figures; and (10) a compilation of responses to the recreation use survey.

Two or three technicians would be needed to review existing data sources, survey sites in the field from the end of May through the beginning of October (or through the Erie Canal navigation season, whichever is longer), develop the inventory, evaluate past and current use, evaluate potential effects of the project on area recreation resources, and draft and finalize maps and reports.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The estimated cost of the Recreation Study at both projects is $100,000, including study plan development, field data collection, reservoir surface area modeling and mapping, and study report preparation. One field season should be sufficient to collect the required data and prepare the study report.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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August 9, 2019

New York Power Authority
Attn: Mark E. Slade, Licensing Director
123 Main Street
White Plains, NY 10601

RE: Pre-Application Document and
Study Requests Comments
Crescent Hydroelectric Project (FERC No. 4678)
Vischer Ferry Hydroelectric Project (FERC No. 4679)
Albany, Saratoga and Schenectady Counties

Dear Mr. Slade:

The New York State Department of Environmental Conservation ("NYSDEC" or "Department") is providing the following comments on the May 2019 Pre-Application Document (PAD) submitted by the Power Authority of the State of New York ("Power Authority", "NYPA" or "Applicant") for relicensing the existing Crescent Hydroelectric Project (FERC No. 4678) and Vischer Ferry Hydroelectric Project (FERC No. 4679). Study requests comments are also provided.

Overview of Projects
The two projects, collectively referred to as the "NYPA Projects", are located on the Mohawk River adjacent to one another at river miles 4 and 14, respectively. The Crescent Project is an 11.8 MW conventional hydroelectric facility located in Albany, Saratoga and Schenectady Counties, New York in the Towns of Colonie, Clifton Park, Halfmoon, Waterford and Niskayuna. The Vischer Ferry Project is an 11.8 MW conventional hydroelectric facility located in Saratoga and Schenectady Counties, New York, in the Towns of Clifton Park, Niskayuna and the City of Schenectady.

Comments on the Pre-Application Document
The PAD is generally well-organized and addresses many of the necessary key issues for the NYPA Projects. NYSDEC staff have no specific comments on the PAD.

Comments on Scoping Document 1
Scoping Document 1 (SD1) is generally well-organized and addresses most of necessary the key issues for the NYPA Projects. NYSDEC staff have no specific comments on SD1.

Study Requests
The New York State Department of Environmental Conservation requests that the Applicant conduct the following studies:

I. Water Quality Monitoring Study

The Water Quality Monitoring Study should include: continuous water temperature and dissolved oxygen (DO) data collection for 1 year and discrete measurements (i.e. temperature, DO, pH, and conductivity) monthly from April 1 through November 30. Baseline water quality studies are needed to ensure compliance with NYS water quality standards, (the Clean Water Act § 401 Water Quality Certification) and identify potential NYPA Projects impacts to the fish community, particularly impacts to blueback herring (*Alosa aestivalis*) during upstream and downstream migrations (e.g., juvenile outmigration, adult immigration). An additional year of monitoring may be needed based on a review of the first year's study results to ensure impacts on aquatic resources and that the goals and objectives of the Study are addressed. Data should be collected from the impoundments, the by-passed reaches and tailrace. Water quality information collected should be summarized in a manner that will allow appropriate analysis of the current flow regime. Methods for mitigating water quality problems (i.e. modifications to infrastructure, or changes to existing operations) should be fully explored and modeled as to their potential effectiveness.

1. *Goals and Objectives*

   The goals and objectives of this study are to provide baseline water quality information.

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   The NYSDEC conducts statewide monitoring programs for determining the overall quality of waters, trends in water quality, and the identification of water quality issues achieved through the Rotating Integrated Basin Studies (RIBS) program, which occur on 5-year cycles. The Mohawk River’s next anticipated sampling will occur in 2020. Data from the RIBS program cannot be used to quantify the direct impacts of either hydro facility, but rather can be used to expand the assessment.

5. *Nexus to Projects Operations and Effects*

   The existing NYPA Projects impound water from the Mohawk River. These impoundments and releases have the potential to impact such water quality factors as temperature and dissolved oxygen (DO), which are critical to the quality of the aquatic habitat, especially during low flow summer periods.

6. *Methodology Consistent with Accepted Practice*

   The recommended study uses standard water quality sampling techniques commonly used in most hydropower licensing activities.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The level of effort would be low and would involve monitoring with continuous measurement devices and collecting monthly samples while undertaking other work such as fisheries or macroinvertebrate surveys. In addition, temperature and DO instruments would need to be installed, with data being periodically downloaded. The actual cost is unknown but would be relatively low.

I. Freshwater Mussel Survey

The freshwater mussel survey should be completed by an individual who is properly licensed and is familiar with the species in the watershed of the NYPA Projects. Reporting should include species-specific results. An additional year of study may be needed based on a review of the first year's study results to ensure impacts on aquatic resources and that the goals and objectives of the Study are addressed. Throughout the state and in the local geographic area freshwater mussels have been poorly documented and assessed in the past and many are in peril of extirpation and extinction due to habitat loss and alteration, overharvest, and competition with invasive species. It is unknown what species may be present in the NYPA Projects areas barring the invasive Zebra Mussel (*Dreissena polymorpha*).

1. *Goals and Objectives*

   The goals and objectives of this study are to provide information on the existing freshwater mussel populations upstream and downstream of the facilities that are impacted by NYPA Projects operations.

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   Historical references make mention of native freshwater mussels within the Mohawk River Watershed as well as within tributaries flowing into the river. The Mohawk River and associated Erie Barge Canal is an S1/S2[1] river for freshwater mussels as designated by the New York Natural Heritage Program.

[1] S1 is indicative of critically imperiled, 5 or fewer occurrences, few remaining individuals or habitat, or otherwise highly vulnerable species and S2 is indicative of statewide imperiled, 6-20 occurrences, few remaining individuals or habitat, otherwise greatly vulnerable species.

5. *Nexus to Projects Operations and Effects*

   The NYPA Projects alter the natural flows upstream and downstream. These areas are important for mussel propagation and survival. Freshwater mussels depend on fish host species and the NYPA Projects' dams block fish movement both upstream and downstream. Additionally, the turbine intakes may impinge or entrain fish, resulting in mortality. The NYPA Projects may also affect the amount of habitat available for mussels within the NYPA Projects boundaries in the impoundment.

6. *Methodology Consistent with Accepted Practice*

   The NYSDEC requests that the Applicant survey populations of freshwater mussels carried out in impoundments, stream habitats and bypass reaches of the NYPA Projects boundaries. The full areal extent of the survey should include:

   - All areas of direct disturbance by hydropower project maintenance and improvement;
   - Anywhere there will be alteration of stream banks or the stream bed related to the NYPA Projects;
   - Areas with permanent or temporary changes to flow, sedimentation, intake of waters or discharge of effluent, chemical discharge, or potential chemical spill discharge;
   - Equipment in-stream or other disturbance; and
   - All areas hydrologically influenced by the hydropower project.

   All bivalve species encountered, including invasive species, should be identified and noted in survey reports. The discovery of species listed as NYS Endangered or Threatened may require additional, more detailed surveys (Smith et al 2001). Initial surveys, and possible additional and more detailed surveys, should be timed area surveys consistent with one or both protocols listed as follows:

   - Smith, D.R., R.F. Villella, and D.P. Lemarie. 2001. Survey protocol for assessment of endangered freshwater mussels in the Allegheny River. J. N. Am. Benthol. Soc. 20(1):118-132.
   - West Virginia Mussel Survey Protocols (March 2018 version) by West Virginia DNR. http://www.wvdnr.gov/Mussels/Main.shtm

   Contractors and/or surveyors conducting surveys should have a relevant degree and experience sampling and identifying freshwater mussels in New York State. A curriculum vitae (CV) and resume should be provided to describe past experience and support selection.

   Completed reports should be sent in full to the NYSDEC for review unaltered, as well as included in the Study Report.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

   The level of effort would involve one field crew sampling on a seasonal basis. The study would take approximately one year but depending on the area covered and the river conditions could case the study to take more than one year. The actual cost is unknown and would depend upon the gear types used, number of sampling locations, local labor

costs, the ability to combine multiple studies (e.g., fisheries, macroinvertebrates, and water quality) into one task, etc. The existing literature provided in the PAD (Section 4.4.7) is inadequate to fully address Projects impacts, and there are no alternatives to conducting a mussel survey. However, the Applicant has flexibility to design the most cost-effective way to acquire the necessary data.

II. Fish Protection and Downstream Passage Studies

The NYPA Projects dams serve as a barrier to upstream and downstream fish migration. Fish moving downstream are subjected to potential mortality from impingement and entrainment. Recently issued licenses issued for projects on similar rivers throughout New York State, have incorporated 1"-clear spaced trash racks to physically exclude most adult fish from the turbines, alternate downstream passage routes, and other features (e.g. reduced approach velocities, adequate plunge pools, etc.) to encourage safe downstream fish passage.

The Applicant should explore alternatives to keep all fish species out of the turbines, and any other species found in abundance during fishery surveys. Alternatives also need to be developed to effectively allow the passage of fish downstream around the dam. These alternatives may include modifying any existing trash sluices located close to the intakes and provide notches in the flashboards.

This study should include a literature search of available passage designs for the species of concern, as well as information on the relative effectiveness of each design. Existing facilities at other dams should be investigated. Careful attention should be paid to attraction flows, guidance mechanisms and velocities. Fish moving downriver must be diverted away from the turbines and guided to the downstream passage facility. Adequate attraction and conveyance flows must be provided. The passage facility should not create a bottleneck that would delay downstream movement or expose the fish to excessive predation. All passage facilities should be designed to prevent blockage from ice and debris, should be as maintenance-free as is feasible and be able to operate under all flow conditions experienced in the Mohawk River Basin.

In addition to literature review and on-site investigations of existing facilities, the Applicant should collect site-specific data from the Projects to aid in the design of protection and passage facilities. This information should include flows, velocities, water depths, and substrates.

The Applicant should also collect information on the passage requirements of the fish species found in the Mohawk River Basin. This information should include: swimming speeds (including burst speeds); where in the water column these fish are likely to be moving and different forms of attractants or repellents (e.g. sound, light, etc.) that may help guide each species.

For fish that have been drawn into the turbines, the probability of survival for fish passage through the NYPA Projects turbines should also be assessed for both the Francis and Kaplan turbines. The Applicant should consider both adult and juvenile life stages of fish species found in the Mohawk River Basin.

1. *Goals and Objectives*

   The goals and objectives of this study are to collect site-specific information and conduct a literature review of fish passage alternatives to evaluate options for improving fish protection and downstream fish passage at the NYPA Projects facilities. The information

obtained will allow NYSDEC aquatic biologists and USFWS's fishway engineers to evaluate the potential effectiveness of various options.

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   Some survival studies have already been conducted for the Kaplan turbines, but are limited to juvenile blueback herring. Both NYPA Projects have 3-7/8" clear-spaced trash racks at intake. Downstream fish passage is provided as a space in the flashboards, however these are targeted to protecting blueback herring.

5. *Nexus to Projects Operations and Effects*

   Dams block fish movements both upstream and downstream. The turbine intakes may impinge or entrain fish, resulting in mortality. The existing minimum flow/downstream fish passage structures may not be adequate for the downstream passage of fish.

6. *Methodology Consistent with Accepted Practice*

   The recommended study uses standard literature reviews and site-specific data collection techniques common to most hydropower licensing activities and satisfactory to meeting the informational needs of the USFWS.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

   The level of effort would involve moderate literature review, discussions with fisheries biologists and fishway engineers, and site-specific data collection. The study could be completed in 1 year but may require more time. The actual cost is unknown and would depend upon the number of alternatives examined.

III. Fish Community Study

The Applicant should conduct comprehensive fisheries surveys within the vicinity of the Projects to inform how the Projects impact fish populations and species composition and inform the Fish Protection and Downstream Passage Study. The Applicant should use a variety of gear types during different seasons because the ability of any particular gear type to capture fish is affected by fish species, size and behavior, the in-water physical and hydrological conditions of the sampling site and other seasonal variables. No single gear type is effective for sampling all potential species that may be found in lake or riverine systems; however, multiple gear types

used in combination used throughout the season can effectively sample the majority of fish species present.

Comprehensive sampling for fisheries data collection should include some combination of the use of electrofishing, gill netting, trap netting, minnow traps, seining, and angling. The survey work should be done for at least 1 full year; with an option for a second year of study should the data collected be deemed inadequate upon review. The survey should cover at least three seasons (spring, summer, and fall), and all four seasons, if possible. The information collected should include species identification, size, age, sex, and condition, as well as movement patterns and habitat utilization. Standard water quality data (e.g. water temperature, dissolved oxygen, pH, and conductivity) should also be collected in conjunction with these surveys. These studies should focus on the general fishery resources, not only sportfish.

1. *Goals and Objectives*

   The goals and objectives of this study are to provide information on the existing fishery and resources in the vicinity of the NYPA Projects, including areas upstream and downstream of the dam, to aid in the determination of what the impacts of the Projects may be. The information to be collected should include both temporal and spatial aspects of species distribution; age, size, sex and condition data; habitat utilization; and fish movement patterns.

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   Fish surveys have been conducted in the vicinity of the NYPA Projects as documented in the PAD, but the majority have focused on the collection of a select few species, namely sportfish, blueback herring and American eel, and have used limited gear types (boat electrofishing, shore seining) and have a bias for and against specific fish species and therefore do not give a full view of the fish community.

5. *Nexus to Projects Operations and Effects*
   Freshwater fish and their habitat are among the aquatic resources affected by NYPA Projects operations. Knowledge of the fish community currently present, fish size, and age structure throughout the NYPA Projects is essential to adequately evaluate how the operations impact habitat and in turn impacts the fish community; how the fish populations are impacted by entrainment, impingement and passage through turbines; and is essential to inform the Applicant of what actions can minimize negative impacts or enhance benefits to fish and other aquatic resources, should they exist.

6. *Methodology Consistent with Accepted Practice*

   The recommended study uses standard scientific collecting techniques used in most hydropower licensing activities. The Applicant should use a variety of gear types during different seasons because the ability of any particular gear type to capture fish is affected by fish species, size and behavior, the in-water physical and hydrological conditions of the sampling site, and other seasonal variables. No single gear type is effective for sampling all potential species that may be found in lake or riverine systems; however, multiple gear types used in combination used throughout the season can effectively sample the majority of fish species present. Standard water quality data (e.g. water temperature, dissolved oxygen, pH, and conductivity) should also be collected in conjunction with these surveys.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

   The level of effort would involve one field crew sampling on a seasonal basis. The study would last for 1-2 years. The actual cost is unknown and would depend upon the gear types used, number of sampling locations, local labor costs, the ability to combine multiple studies (e.g., fisheries, macroinvertebrates and water quality) into one task, etc. The existing literature provided in the PAD (Section 4.4.2.1) is inadequate to fully address project impacts as they have focused primarily on the collection of sportfish with the last extensive studies completed 30 years ago. In addition, there are no alternatives to conducting standard fishery surveys, however, the Applicant does have flexibility to design the most cost-effective way to acquire the necessary data.

IV. American Eel Study

American eel (*Anguilla rostrata*) has a wide range across the Eastern United States and New York State where it is native in 17 of the 18 watersheds in the state. Eel runs, in which young-of-year juvenile eels (elvers) migrate into freshwater habitat, have long occurred with elvers scaling waterfalls and the faces of dams to access more habitat further inland. Despite their robust nature, the American eel population has been steadily in decline and the construction of dams and the operation of hydropower projects are some of the contributing factors. American eels are not known to travel well through the canal lock system and may even show a preference for dam sites during their upstream migration in the spring. As the American eel has been documented in surveys to inhabit the Mohawk River Watershed, a study is needed to ascertain the presence and abundance of eels and the need to provide them a better mode of upstream and downstream passage.

1. *Goals and Objectives*

   The goals and objectives of this study are to investigate the presence, distribution, and relative abundance of American eel in the NYPA Projects area and assess the need for eel ladders to improve successful and safe upstream passage.

2. *Resource Management Goals*

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

focusing on protecting and enhancing fish and wildlife habitat and improving public access.

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   Although caught in low numbers in the past decade, fishery surveys have collected American eels while sampling. There are also historical records of American eel caught in the Mohawk River and adjacent tributaries.

5. *Nexus to Projects Operations and Effects*

   Both NYPA Projects have constructed dam structures which pose a migratory hurdle for the American eel in their upstream migration as elvers. While elvers may be able to ascend the dam face, they are also put at a higher risk of predation and will have to expend additional energy to do so. The ability of the American eel to move upstream, and downstream, is of special interest. Additionally, there is concern over the potential of American eel to be entrained by the NYPA Projects resulting in mortalities of out-migrating adults.

6. *Methodology Consistent with Accepted Practice*

   The detection of American eel DNA is a less intensive method for detecting simple presence/absence of eel in the NYPA Projects areas. The methods provided by Cornell University's "Tracking Fish with eDNA" (https://fishtracker.vet.cornell.edu/) program should be followed as detailed in Cornell's protocols.

   The collection of eels through the deployment of eel pots and eel traps should be employed at the NYPA Projects dams to determine staging of upstream migration and relative abundance of elvers. These sampling efforts are more intensive but would facilitate assessment of both presence and numbers of eels and would be suitable for both the first and second phase of the study. In addition to traps and mops, sampling efforts should include surveying benthic habitat preferred by American eel with nets and/or electrofishing. This would allow for determining relative abundance of all eels, although mainly adults. The recommended study uses standard sampling techniques commonly used in most hydropower licensing activities for an American eel study.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

   The level of effort would involve one field crew. The study would last for 1-2 years. The actual cost is unknown and would depend upon the methods used, number of sampling locations, local labor costs, the ability to combine multiple studies (e.g., fisheries, macroinvertebrates, and water quality) into one task, etc. The existing literature provided in the PAD (Section 4.4.2.3) is inadequate to fully address Projects impacts, however, the Applicant has flexibility to design the most cost-effective way to acquire the necessary data and may combine efforts with other study efforts.

V. Aquatic Mesohabitat Study

The Applicant should conduct a mesohabitat study of all fluvial parts of the NYPA Projects area including mapping of these areas. The study should identify both mapped and unmapped wetlands, as well as aquatic vegetation and substrate within the Project area. This study may help with other studies, such as the freshwater mussel survey. Understanding the available aquatic habitat is beneficial to developing management plans for sportfish species which may utilize different habitats for different purposes, such as wetlands, flooded shoreline, and shallow vegetated areas as nurseries and rocky outcrops for protection from flows. Similar information may also be useful in identifying where certain species may be localized based on their habitat preferences.

1. *Goals and Objectives*

   The goals and objectives of this study are to map the distribution and abundance of aquatic mesohabitat within the NYPA Projects area, evaluate the types of aquatic habitats that occur there, and identify potential effects of the NYPA Projects operations on this habitat and its quality.

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   State regulated freshwater wetlands and regulated adjacent areas are located within the NYPA Projects area. General classification of the habitat has been assigned, such as impoundment or pool, but are lacking in descriptors (e.g. bottom type, substrate size, vegetation, etc.).

5. *Nexus to Projects Operations and Effects*

   Freshwater fish and their habitat are among the aquatic resources affected by NYPA Projects operations. Knowledge of the aquatic habitats throughout the NYPA Projects is essential to adequately evaluate how the operations impact habitat and, in turn, impacts the fish community. It is important to know what actions can minimize negative impacts or enhance benefits to fish and other aquatic resources, should they exist.

6. *Methodology Consistent with Accepted Practice*

   The recommended study uses standard sampling techniques commonly used in most hydropower licensing activities. This may involve a combination of desktop studies and on-site field work.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

   The level of effort would be low and would likely involve a small crew for field work and be able to be completed in 1-year's effort. The actual cost is unknown but is anticipated to be relatively low, particularly if combined with other study efforts.

VI. Project Operations Study

The Applicant should conduct a study on the operations of the NYPA Projects. Data of interest would include impoundment elevation, power generation, flows (through the turbines, downstream fish passage, and minimum flows), and leakage measurements. A demonstration of the ramping rates both up and down would also be of interest. This will provide supporting evidence that the NYPA Projects are operating in run-of-river mode[2] and demonstrate what actions are being taken to avoid impoundment drawdowns, varied downstream flows, and are meeting the necessary conservation and downstream fish passage flows.

1. *Goals and Objectives*

   The goals and objectives of this study are to provide insight to how the NYPA Projects operate and follow a run-of-river operations scheme. In addition, the leakages through the flashboards are merely an estimation and are meant to contribute towards the minimum flows, having a more accurate measurement of the leakages would be meaningful both for the Department and the Applicant.

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   The nearest USGS gages are 01356000, located 180' upstream of the Vischer Ferry Project (FERC No. 4679) and monitors gage height, and 01357500, located at the School Street Project hydroelectric plant and monitors both discharge and gage height.

5. *Nexus to Projects Operations and Effects*

   The mode of operation for a hydropower project can have a variety of effects on the riverine system that it inhabits. The least impactful mode is run-of-river, which not only is

[2] Run-of-river operational mode is when a hydropower project operates using the natural flow of the river, not stored pondage, and does not create modified or varied flows (peaks and pulses) in the downstream reaches of the waterway it operates on.

of greater benefit to the riverine ecosystem, but also limits impacts to other hydropower projects, and their operations, which may be located downstream. The NYPA Projects have several other hydropower projects located downstream, including the School Street Project (FERC No. 2539), whose operations could be affected by the operations of the NYPA Projects.

6. *Methodology Consistent with Accepted Practice*

   The recommended study uses standard techniques commonly used in most hydropower licensing activities, typically in the form of desktop analysis.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

   The level of effort is estimated to be low and would likely involve a majority of desktop analysis, keeping costs low as well. A single year's worth of effort would be needed to complete this study, providing no anomalous conditions arise.

We appreciate the opportunity to comment. If you have any questions or would like to discuss further, please feel free to contact me at 518-402-9179 or michael.higgins@dec.ny.gov.

Sincerely,

Michael T. Higgins
Project Manager
Major Projects Management

CC: Nicole Cain, NYSDEC, Bureau of Ecosystem Health
Chris VanMaaren, NYSDEC, Region 4
Mary Anne Bonilla, Office of General Counsel

2019.08.08 NYPA Crescent-Visher Ferry PAD Study Requests Comment Letter.docx

RIVERKEEPER
NY's clean water advocate

August 9, 2019

Via Electronic Filing

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE
Washington, DC 20426

Re: Comments of Riverkeeper, Inc. on the Scope of Environmental Review and Study Requests for the Crescent Hydroelectric Project (P-4678-052) and/or Vischer Ferry Hydroelectric Project (P-4679-049)

Dear Secretary Bose,

Riverkeeper appreciates this opportunity to comment on the environmental review scoping document and to request relicensing studies as part of the relicensing applications for the Crescent and Vischer Ferry Dams (FERC Nos. 4678 & 4679, respectively), located on the Mohawk River in Saratoga, Albany, and Schenectady Counties, New York.

Riverkeeper is requesting the following changes to the scope of the environmental review, based on the evidence presented below:

1. the scope of the cumulative impacts analysis must be expanded;
2. the scope of the analysis must include a "hard look" at the decommissioning alternative;
3. the environmental analysis must properly define the primary uses and address use impairments of the Mohawk River in the project areas;
4. the environmental analysis must accurately account for wastewater discharges in the project areas;
5. the environmental analysis must accurately account for drinking water intakes and drinking source water impacts in the project areas; and,
6. the environmental analysis must consider environmental justice communities.

In addition, Riverkeeper requests specific studies related to fish and water quality. Towards the goal of protecting and restoring diadromous, native, and sport fishes, Riverkeeper calls for thorough studies of:

1. fish fauna community composition including multiple dimensions of biodiversity indices;
2. American eel out-migration;
3. adult blueback herring provenance and iteroparity; and
4. fish mortality in and around the hydropower facilities.

Currently, water quality in the project areas threatens primary uses, including drinking water and recreation. Water quality studies that address the connections between these dams and documented water quality threats, including nutrient over-enrichment and harmful algal blooms, are needed to ensure that license requirements protect and restore water quality.

A. Relevant public interest considerations

Our mission at Riverkeeper, Inc. ("Riverkeeper"), a non-profit 501(c)(3) organization, is to protect and restore the Hudson River and its tributaries. The Mohawk River is the largest tributary to the Hudson River, accounting for approximately 25% of the Hudson River Watershed area.[1]

Riverkeeper has patrolled from Waterford to Rome on the Mohawk River in our vessel, the *R. Ian Fletcher*, since 2014. Riverkeeper has partnered with scientists at SUNY Cobleskill and SUNY Polytechnic Institute to monitor recreational water quality in the Mohawk River since 2015, utilizing Environmental Protection Agency (EPA)'s recommended fecal indicator bacteria and Recreational Water Quality Criteria. Riverkeeper has also been a supporter and/or participant of the Mohawk Watershed Symposium since 2014, and a member of the steering committee for the New York State Department of Environmental Conservation's Mohawk Basin Program since 2018.

New York State has made specific and measurable commitments to improving water quality in the Mohawk River to assure that water is safe for drinking and recreation, that fish populations are healthy, and that communities are resilient to flooding and other impacts from climate change. These goals are expressed in a draft five-year Mohawk River Basin Action Agenda,[2] produced by the Mohawk River Basin Program, which was established in 2010.

The Mohawk River Watershed Management Plan, published in 2015 by the Mohawk River Watershed Coalition, which is made up of Soil and Water Conservation Districts in the

[1] Mohawk River Watershed Coalition, Mohawk River Watershed Management Plan § 1.2 (2015),http://mohawkriver.org/management-plan/ (hereinafter Mohawk Management Plan).
[2] NYSDEC, Mohawk River Basin Action Agenda: 2018-2022 (2018), https://www.dec.ny.gov/docs/water_pdf/mohawkactionag.pdf.

watershed, identified these two top priorities: 1) protect and restore the quality and ecological functions of water resources; and 2) protect and enhance natural hydrologic processes.[3]

B. Changes to Scope of Environmental Review

1. The Scope of the Cumulative Impacts Analysis Must be Expanded

As required by the National Environmental Policy Act (NEPA), the Commission must analyze the cumulative impacts of the proposed action. See 40 C.F.R. § 1508.7 ("Cumulative impact is . . . the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions."). As such, the Commission must take into account all damage created as a consequence of building and operating the dams from the 1900s through the present moment. Failure to adequately examine all past effects will leave the NEPA requirements unsatisfied, "fatally infect[ing]" the Commission's analysis.[4]

In the scoping document, the Commission does acknowledge the need to study past impacts, but qualifies that, "The historical discussion will, by necessity, be limited to the amount of available information for each resource. The quality and quantity of information, however, diminishes as we analyze resources further away in time from the present."[5] It is this qualification that concerns Riverkeeper, as it falls short of the "hard look" at the environmental consequences required by NEPA.[6] While historic data is not always robust, the Commission has the ability to use modern modelling techniques to bolster their understanding of past conditions. Simply relying on limited historic data does not satisfy NEPA's purpose of informed decision-making, in light of the available techniques. Therefore, the Commission must remove that qualification and expand the scope of its cumulative impacts analysis to include a thorough comparison of conditions before and after dam construction.

This is especially critical because the cumulative impacts analysis is the only portion of the NEPA analysis where the environmental costs of the dams can be truly be captured. As required by NEPA, the Commission must analyze a minimum of three alternatives: 1) the no-action alternative, 2) the applicant's proposed action, and 3) all feasible alternatives to the proposed action.[7] The no-action alternative forms the baseline against which all other alternatives are assessed.[8]

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[3] Mohawk Management Plan, at v.
[4] *Am. Rivers & Ala. Rivers Alliance v. FERC*, 895 F.3d 32, 39 (D.C. Cir. 2018).
[5] FERC, Scoping Document: Crescent and Vischer Ferry Hydroelectric Projects § 4.1.3, No. 4678-052 & 4679-049 (*hereinafter* Scoping Document).
[6] *New York v. Kleppe*, 429 U.S. 1307, 1311 (1976) ("the essential requirement of the NEPA is that before an agency takes major action, it must have taken "a 'hard look' at environmental consequences") (internal citations omitted).
[7] 40 CFR § 1502.14.
[8] *See generally Conservation Law Foundation v. FERC*, 216 F.3d 41, 45 (D.C. Cir. 2000).

In the Crescent and Vischer Ferry scoping document, the Commission identifies five possible alternatives. It summarily dismisses three of these alternatives, federal government takeover, non-power license, and project decommissioning. This leaves only the no-action alternative of continued operation under the current license, and the Commission's proposed alternative of continued operation under the existing license requirements. The scoping proposal makes it clear that the proposed alternative entails "[n]o new or upgraded facilities, structural changes, or operational changes to the projects."[9] As such, the proposed alternative and the no-action "baseline" are actually the same, which essentially guarantees that no significant environmental impact will be found, and largely subverts the primary purpose of the NEPA analysis.

Thus, the Commission must conduct the most thorough cumulative impacts analysis possible, examining all past and present impacts to the maximum extent, to fulfill the purpose of NEPA.

2. The Scope of the Analysis Must Include a "Hard Look" at the Decommissioning Alternative

In addition, Riverkeeper maintains that the Commission must perform a study of the decommissioning alternative, to determine the environmental conditions if the dams were to be removed. The purpose of NEPA is to provide for informed decision-making where "the Commission has fully examined options calling for greater or lesser environmental protection."[10] To fulfill NEPA's requirements, the courts have consistently required some consideration of the decommissioning alternative.[11]

In the scoping document, the Commission claims that it has no basis for recommending decommissioning, such that it is not a reasonable alternative and does not warrant further study because: 1) decommissioning has significant costs, 2) the projects provide safe, renewable energy, 3) no party has suggested project decommissioning would be appropriate.[12]

While in some other cases, the Commission was able to satisfy its NEPA obligation with such conclusory explanations, the Mohawk Dams situation is materially different because Riverkeeper might support the decommissioning alternative if the NEPA study shows a positive environmental impacts.[13] Decommissioning could restore free-flowing river conditions to over 20 miles of the river, providing benefits to water quality, wildlife and habitat. It is inappropriate

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[9] Scoping Document § 3.2.1.
[10] *Conservation Law Foundation v. FERC*, 216 F.3d 41, 46 (D.C. Cir. 2000); 42 U.S.C. § 4332.
[11] *Am. Rivers v. FERC*, 201 F.3d 1186, 1201 (9th Cir. 1999); *Conservation Law Foundation*, 216 F.3d, at 46.
[12] Scoping Document § 3.5.3.
[13] *See Am. Rivers v. FERC*, 201 F.3d 1186, 1201 (9th Cir. 1999) (court accepting the Commission's explanation that decommissioning is not considered a reasonable alternative by anyone); *cf. Conservation Law Foundation v. FERC*, 216 F.3d 41, 46 (D.C. Cir. 2000) (stating that the Commission does not need to imagine the time before the dam existed, "at least when no one advocates [for] decommissioning.").

to pre-judge whether decommissioning is appropriate before it has been studied. Therefore, the reasoning provided in the scoping document does not satisfy the Commission's NEPA obligations. In addition, such study would have significant overlap with the required cumulative impacts analysis, such that it would not be overly burdensome for the Commission to complete.

Therefore, the Commission must amend the scoping document to include a full study of the decommissioning alternative in order to assess whether any of the above impacts are present to satisfy NEPA's call for informed decision-making. Riverkeeper may recommend the decommissioning alternative if the results of that study show an overall benefit to the water quality or nearby wildlife populations.

3. The Environmental Analysis Must Properly Define the Primary Uses and Address Use Impairments of the Mohawk River in the Project Areas

To fulfill NEPA's requirements, the environmental analysis must consider "[w]hether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment."[14] Therefore, the scope of the environmental analysis must encompass an examination of the project's compatibility with the Mohawk River's use designation and other state and local requirements. The Commission's current proposed EA outline places the discussion on "Consistency with Comprehensive Plans" under the "Conclusions and Recommendations" section.[15] Riverkeeper asks that this section be expanded to include all other related federal, state, and local requirements--as discussed below--pertaining to the Mohawk River and that it be placed within the environmental analysis section such that it is considered prior to choosing an alternative.

NYPA's pre-application document for the two projects lists many uses for the Mohawk River, including hydroelectric generation, agricultural water supply, drinking water, industrial development, recreation, and navigation.[16] This list excludes one of the river's most important functions, which is to support aquatic life.

The scoping document discusses aquatic resources and specifically lists aquatic resources as a focus, but does not mention drinking water uses or impacts. The aquatic resources section of the environmental assessment should be expanded to include drinking water as an aquatic resource. The analysis of the Mohawk's use as a drinking water supply must be included in the scope, as

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[14] 40 C.F.R. § 1508.27(10).
[15] Scoping Document, at § 8.0.
[16] NYPA, Crescent and Vischer Ferry Hydroelectric Projects Pre-Application Document FERC No. P-4678 & P-4679 §§ 4.1.1, 4.1.2 (2019) (*hereinafter* Crescent and Vischer Ferry Projects PAD).

NEPA also requires consideration of "[t]he degree to which the proposed action affects public health or safety," which clearly applies to safe drinking water.[17]

Under the Clean Water Act, the NYS Department of Environmental Conservation (NYSDEC) is responsible for designating the best uses of the state's waters, and setting water quality standards that correspond to these uses. According to NYSDEC's Waterbody Inventory/Priority Waterbody List (WI/PWL), the Mohawk River from the Crescent Dam to Schenectady (upstream of the Vischer Ferry Dam) is designated as Class A.[18] The best uses of Class A waters include drinking, swimming and fishing, and the water quality must also support "fish, shellfish and wildlife propagation and survival."[19]

The environmental review must acknowledge that aquatic life, human consumption and swimming are among the primary uses of these waters. The environmental impacts of the dams must be evaluated in light of these uses, and not only in light of navigational uses, which are less dependent on water quality and flow conditions.

NYSDEC's WI/PWL notes threats or impacts to water supply, aquatic life and recreational uses in the Mohawk River in the project areas.[20] Nutrients, silt/sediment and pathogens are listed as pollutants of concern. Stormwater runoff, agriculture, and combined sewer overflows are listed as sources. Both hydromodification and flow diversions are recognized as impacting uses.[21]

NYSDEC has made specific commitments to improve water quality to support these uses as part of Mohawk Basin Program Action Agendas. The aquatic resources section of the environmental assessment should be expanded to include water quality parameters relevant to documented threats, including nutrients, silt/sediment, and algae.

The uses of the river, the relevant goals of watershed management plans, and the dams' contributions to suspected use impairments, should be the subject of comprehensive environmental impact analysis.

4. The Environmental Analysis Must Accurately Account for Wastewater Discharges in the Project Areas

The Pre-Application Document (PAD) does not account for municipal and private wastewater treatment facilities that discharge to the Mohawk River or its tributaries in the vicinity of the

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[17] 40 C.F.R. § 1508.27(2).
[18] *Mohawk River WI/PWL*, DEC, https://www.dec.ny.gov/chemical/36739.html (last visited Aug. 8, 2019).
[19] 6 CRR-NY 701.6
[20] NYSDEC, WI/PWL Fact Sheets - Mohawk/Alplaus Kill Watershed (0202000411), https://www.dec.ny.gov/docs/water_pdf/wimohawkalplauskill.pdf.
[21] Id.

dams.[22] This is extremely concerning since the PAD informs the Commission in defining the scope of analysis, and this critical information does not appear to have been accounted for in the scoping document. In response to the Commission's request for information on water treatment facilities, Riverkeeper is providing the following information, and we call on the Commission to specifically include analysis of the below wastewater discharges within the scope of the project's environmental assessment.

Discharges from these facilities contain nutrients that promote the growth of algae and bacteria, particularly in slow-moving waters. These plants also have the potential to release pathogens, either by design with adherence to SPDES permit requirements, or due to malfunction or infrastructure failure. Wastewater treatment plants also release an array of unregulated micropollutants, such as pharmaceuticals, personal care products, industrial chemicals, and pesticides. Wastewater treatment plants in the project area include industrial facilities, and several municipal facilities receiving industrial wastewater, which may contain unregulated pollutants.[23] The Mohawk River is a significant contributor of micropollutants to the Hudson River Watershed, and the contaminant profile of samples collected from the Mohawk River carries the signature of wastewater treatment facilities.[24]

Movement of nutrients, pathogens, and other contaminants through the environment is fundamentally connected to hydrologic conditions.Therefore, any flow alterations associated with these dams and their operations have the potential to impact ecological processes involving these pollutants. The environmental assessment must properly account for the composition and timing of wastewater effluent releases in order to evaluate the potential impacts of dam operations.

In addition, the PAD omits facilities that are cumulatively permitted to discharge over 4.5 MGD of wastewater effluent into the waters in the project vicinity:

- Town of Rotterdam Sewer District #2 (SPDES ID NY0020141);
- Town of Niskayuna Sewer District #6 WWTP (SPDES ID NY0023973);
- Von Roll USA (SPDES ID NY0074489);
- Viaport Rotterdam Mall (SPDES ID NY0109614);
- Mohawk River Country Club & Chateau (SPDES ID NY0130826); and
- Riverview Landing STP (SPDES ID NY0131768).

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[22] *DEC InfoLocator*, NYSDEC, https://www.dec.ny.gov/pubs/109457.html (last visited Aug. 8, 2019).
[23] SPDES permits for Rotterdam (T) Sewer District #2 WWTP (ID NY0020141), Schenectady Sewage Treatment Plant (NY0020516), Mohawk View Water Pollution Control Plant (NY0027758)
[24] C. Carpenter, D. Helbling,*Widespread Micropollutant Monitoring in the Hudson River Estuary Reveals Spatiotemporal Micropollutant Clusters and Their Sources*, 52 Envtl.l Sci. & Tech. 11, 6187-6196 (2018) doi.org/10.1021/acs.est.8b00945.

The NYSDEC Mohawk River Basin Program is implementing a Source Water Protection Program for the Mohawk Watershed that is focused on these and other SPDES-permitted facilities. Riverkeeper recommends that the Commission take this program into account during the assessment of the Crescent and Vischer Ferry Dams.

5. The Environmental Analysis Must Accurately Account for Drinking Water Intakes and Drinking Source Water Impacts in the Project Areas

NEPA requires that the environmental assessment examine the potential impacts on public health and safety.[25] It is undisputed that drinking water is critical to public health. As such, the scope of environmental analysis must account for the following drinking water intakes and source water impacts, which are not included within the PAD.

Table 4.3-4 of the PAD incorrectly characterizes the Mohawk View Water Treatment Plant (SPDES ID NY0102148) as an "industrial wastewater treatment facility."[26] While this facility does have a discharge permit, more importantly it is drinking water treatment facility that serves 82,000 residents of the Town of Colonie (Public Water Supply (PWS) ID NY0100198).[27] This facility draws raw surface water from the Mohawk River and raw groundwater from wells located near the Crescent Dam impoundment.

Table 4.3-5, "Water Withdrawals Within or Near the Boundaries of the Crescent and Vischer Ferry Projects," and Figure 4.3-4, "Water Withdrawals and Discharges Within or Near the Boundaries of the Crescent and Vischer Ferry Projects" do not include the raw surface water intakes for the Mohawk View Water Treatment Plant (SPDES ID NY0102148, PWS ID NY0100198).[28] These intakes must be properly mapped, and the use of surface water as a drinking water supply must be addressed in the environmental assessment.

In addition, the PAD fails to identify five additional public drinking water supplies located in the project vicinity:

- Town of Rotterdam (WWR0001334 / PWS NY4600067 and PWS NY4600069);
- City of Schenectady (WWR0001387 / PWS NY4600070);
- Village of Scotia (WWR0001403 / PWS NY4600071);
- Town of Glenville (WWR0000601 / PWS NY4600091), which also serves Town of Ballston (PWS NY4505658); and

[25] 40 C.F.R.§ 1508.27(2)
[26] Crescent and Vischer Ferry Projects PAD, at § 4.3.1.3 tbl. 4.3-4.
[27] *Public Works - Division of Latham Water*, Town of Colonie, https://www.colonie.org/departments/lathamwater/ (last visited Aug. 8, 2019).
[28] Crescent and Vischer Ferry Projects PAD, at § 4.3.1.3 tbls. 4.3-5, fig. 4.3-4.

- Town of Niskayuna (WWR0001104 / PWS NY4600073).

Cumulatively, these systems supply drinking water to nearly 150,000 residents. These five intakes are located in the Great Flats Aquifer (also known as the Schenectady Aquifer), which underlies and exchanges water with the Mohawk River.[29] Due to the geology and soils of the aquifer and surroundings, the NYS Department of Health's Source Water Assessments for these wells indicate that they are highly susceptible to contamination from surface pollution sources.[30] The aquifer recharge area overlaps with the project area.[31] In the Schenectady and Rotterdam well fields, aquifer water levels and drawdown are dependent on river level, and vary between navigational and non-navigational seasons.[32]

The groundwater-surface water connection between the Great Flats Aquifer and the Mohawk River means that surface water quality in the Vischer Ferry project area may have the potential to impact drinking water sources. The nature of groundwater-surface water connections, and the potential impacts of surface water quality on groundwater, must be evaluated in the environmental assessment.

Finally, the City of Cohoes operates a surface drinking water intake less than 2 miles downstream of the Crescent Dam (PWS NY0100192).[33] This system is a source of drinking water to more than 20,000 residents of Cohoes and Green Island. Because of its proximity to the project areas, water quality at this intake is directly impacted by dam operations and impoundments. This intake needs to be included in the environmental assessment.

Collectively, these surface and groundwater sources are the largest regional supply of drinking water, serving nearly 225,000 people in three counties. The influence of these dams on water quality for the region must be thoroughly studied as part of the environmental review.

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[29] *Great Flats Aquifer*, Schenectady County, https://www.schenectadycounty.com/node/224 (last visited Aug. 8, 2019).

[30] Town of Glenville, Annual Drinking Water Quality Report for 2018, https://www.townofglenville.org/sites/glenvilleny/files/uploads/2018_annual_water_quality_report_003.pdf; Town of Niskayuna, Annual Drinking Water Quality Report for 2018, https://www.niskayuna.org/sites/niskayunany/files/uploads/niskayuna_awqr_2018_final.pdf; Town of Rotterdam, Annual Drinking Water Quality Report for 2018,https://rotterdamny.org/departments.aspx?DepartmentID=2; Village of Scotia, Annual Drinking Water Quality Report for 2018, https://r9b3h3p8.stackpathcdn.com/wp-content/uploads/2019/05/Water-Quality-Report-for-2018.pdf.

[31] Town of Glenville, Glenville Well-Field Protection Committee,Advisory Report on Protection of the Glenville Well-Field (2013).

[32] Thomas M. Johnson, *Responsible Planning For Future Ground Water Use From The Great Flats Aquifer: Two Case Studies: The Gep Energy Project And The Si Green Fuels Boiler Project* in Proceedings from the 2009 Mohawk Watershed Symposium, Union College, Schenectady NY (J.M.H. Cockburn & J.I. Garver eds., 2009) (*hereinafter* 2009 Mohawk Watershed Symposium).

[33] City of Cohoes, Annual Drinking Water Quality Report for 2018, https://www.ci.cohoes.ny.us/ArchiveCenter/ViewFile/Item/148.

6. The Environmental Analysis Must Consider Environmental Justice Communities

In accordance with the Commission's guidance[34] and Executive Order 12898,[35] the scope of NEPA must include a study of environmental justice communities.

NYSDEC has identified Potential Environmental Justice Areas (PEJAs) within the project areas, based on U.S. Census data.[36] Two PEJAs are located directly adjacent to the Mohawk River shoreline in Schenectady in the project areas. According to EPA environmental exposure indicators, exposure to major wastewater discharges is high in these areas, ranging from the 73rd to the 78th percentile compared to other communities in NYS and nationwide.[37] The environmental assessment should address the historical circumstances and impacts of these dams and their operations on communities in these PEJAs; the potential ongoing impacts of these dams and their operations; and the potential for increased vulnerabilities in these areas due to multiple environmental impacts, including the dams and their operations.

7. The Environmental Analysis Must Consider a Broader Range of Issues Related to Native, Migratory and Recreational Fish, and Other Aquatic Life

The scoping document identifies aquatic resources issues to be addressed, including the need for minimum flows to protect aquatic resources downstream of each project; and the effects of continued operation and maintenance of the projects on aquatic resources, including entrainment and impingement mortality of resident fishes, and entrainment mortality and downstream passage of blueback herring and American eel.

The scope should include a broader range of issues related to these fish, including upstream passage of juvenile American eels; movements of native and sport fishes; dam-associated mortality for blueback herring and American eel; effects of lighting on eel migration; and comparisons of impact to historic baseline populations, not only status quo operation and

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[34] *See* FERC, Guidance Manual for Environmental Report Preparation 4-82 (2017) (in reference to NEPA requirements within the Natural Gas Act context). See also CEQ, A Citizen's Guide to the NEPA 5 (2007) (discussing the applicability of Executive Order 12898 to the NEPA analysis).

[35] 59 Fed. Reg. 7629 (Feb. 16, 1994). *See also Summary of Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, EPA.gov, https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice (last updated Sept. 17, 2018).

[36] Maps & Geospatial Information System (GIS) Tools for Environmental Justice, NYSDEC, http://www.dec.ny.gov/public/911.html (select "Schenectady") (last visited Aug. 8, 2019).

[37] *EJSCREEN: Environmental Justice Screening and Mapping Tool*, EPA.gov, https://www.epa.gov/ejscreen (select census block areas "360930202001" and "360930203001") (last visited Aug. 8, 2019).

maintenance. In addition, impacts on freshwater mussels as well as the eggs and larvae of native and high-value recreational fishes should be considered.

Safe passage to and from rivers, and protection of freshwater habitats are critical for the conservation of native and diadromous fishes. Hydroelectric dams have been constructed in many rivers that historically had high densities of eels and other species, and these fish have been severely impacted by these in-water structures. The dams in general disconnect habitat and fragment rivers and represent one of the largest problems facing freshwater species.

Hydropower dams are a particular concern to diadromous fishes, blocking access to significant portions of critical habitat. In addition, the machinery associated with electricity generation (turbines), and the water intake systems can cause significant mortality. Injury or mortality to fish are often the result of passage at hydroelectric facilities from the following: (1) turbines and mechanical components; (2) entrainment; (3) impingement of fish, larvae, or eggs against screens/trash racks; (4) falling from spillways; (5) turbulence and shear forces; (6) hyper-oxygenated water; (7) extreme pressure changes; (8) disorientation leading delayed migrations patterns. For diadromous fishes there is a critical temporal period to reach the spawning ground before eggs will be resorbed.

Fish in general are vulnerable to injury from a variety of causes in and around hydroelectric dams. When no water spills over the dam owing to low water levels, migrant fish can be attracted to the turbine intake tunnels, which is often the only source of downstream flow present in the forebay area of the dam. Fish attempting to pass downstream of a hydroelectric dam readily incur physical injury or mortality. A survey of fish sampled in tailraces showed tears in the fins (63% of all fish) and scale loss (60%) were the most frequently observed injury types, followed by hemorrhages (44%), dermal lesions (43%), partial amputations of fins (31%), pigment anomalies (24%) and bruises (11%).[29] Emboli in the eyes (7%) and amputations of body parts (2%) occurred less frequently.[38] Other studies have shown that eels mortality is 100% when eels are entrained in turbines.[39] Injury and mortality can also occur to fish, larvae, and eggs through impingement against screens or trash racks that are intended to prevent debris, or in some cases, from being drawn into water intakes. The cumulative effect of the series of hydroelectric dams on the Mohawk River represents a particularly serious obstacle to diadromous fishes. In addition to diadromous fishes, these dams also inhibit the free mobility and potentially cause genetic isolation to the native and recreational species, all of which potentially impacts freshwater mussels.

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[38] M. Mueller, J. Pander & J. Geist,*Evaluation of External Fish Injury Caused by Hydropower Plants Based on a Novel Field-based Protocol,* 24 Fisheries Mgmt. and Ecology , 240 (2017), https://doi.org/10.1111/fme.12229.

[39] JW Carr & FG Whoriskey *Migration of Silver American Eels Past a Hydroelectric Dam and Through a Coastal Zone*. 15 Fisheries Mgmt. and Ecology, 393 (2008), https://doi.org/10.1111/j.1365-2400.2008.00627.x.

Research is needed to determine the best ways to mitigate these obstacles and provide safe passage around turbines for eels and other migrating fish. Brown et al. (2013) clearly stated that "half-way technologies" have done little to restore diadromous fishes to sustainable levels.[40] The impact of these dams on downstream passage of migratory, native and sport fishes in the Mohawk River must therefore be within the scope of this environmental review.

a. American Eels

American eels (*Anguilla rostrata*), as a catadromous species, spawn in the Sargasso Sea, and return to coastal estuaries and their tributaries as glass eels in the spring. They move upstream to freshwater habitat and will continue to migrate as immature yellow eels. The sex of the species is determined by density dependent relationships and environmental cues. Females tend to live in low density regions, growing large and deferring reproduction for often twenty years or more, whereas males tend to live in high density conditions and mature much sooner. At maturity, eels return to the Sargasso Sea to spawn once, and die. These life history patterns have allowed the species to flourish for millions of years and are adaptive across both southern and northern hemispheres of the western Atlantic.

American eels have a historic presence in the Mohawk River, despite the presence of the Falls at Cohoes. Ample research has shown that American eels have the wherewithal and an uncanny ability to surmount natural obstacles during their upstream migrations, even ones as imposing as Cohoes. Immature eels driven by evolutionary imperatives will migrate upstream and can scale 100-foot vertical walls if the conditions are right favorable..

At one time eels accounted for the highest biomass in Hudson River tributaries and it is likely that Mohawk River tributaries were no different. Alplaus, a Schenectady County hamlet almost five miles upstream of the Vischer Ferry dam, derives its name from the Dutch Aal Plaats, or "place of eels,"[41] suggesting that American eels were once highly abundant. Hence, the precipitous decline of eels in the Mohawk River is likely to have had a cascading impact to the ecosystem because of their primary roles as both predator and prey and as a host species to freshwater mussels, which are also in decline across North America for the same suite of problems that diadromous fish are facing.

Dams impede the upstream migration of immature eels while downstream passage at hydroelectric dams is known to be a significant source of mortality to out-migrating silver eels owing to the machinery associated with the generation of electricity from water intake systems and turbines. Eels are semelparous creatures (they spawn only once in their lifetimes) and therefore all anthropogenically induced mortality occurs prior to spawning. For large females

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[40] JJ Brown et al., *Fish and Hydropower on the U.S. Atlantic Coast: Failed Fisheries Policies from Half-way Technologies,* 6 Conserservation Letters 280(2013), https://doi.org/10.1111/conl.12000.
[41] Always Alplaus, https://www.alplaus.org/ (last visited Aug. 8, 2019).

that have deferred spawning, the cumulative impact from hydropower production is considered to be significant to the metapopulation.

Population densities of American eels in the Mohawk River watershed and elsewhere throughout their range are much reduced from historical levels largely due to migration barriers, habitat alterations, and a variety of other anthropogenic influences.[42] In a telemetry study attempting to determine the impact of hydropower dams to eels, Carr and Whoriskey (2008) revealed that eels of all life-stages will attempt to move downstream through the turbines in preference to the spillway and every eel that passed through the turbines was killed.[43] For eels, the dam itself and/or exterior lighting on the dam structure can become disorienting and delay the timing of their downstream migration. Eels that initially approached the dam and have difficulty finding an exit and would often withdraw to return on multiple occasions before they eventually found a way out of the reservoir or into the turbines.[44]

To understand the dams' impacts on American eels, the scope of the review should be expanded to include upstream migration, impact of exterior lighting, and injury and mortality. As described in the first two sections of this letter, the impact of the dams on American eel must be considered as compared to a baseline "no action" alternative of decommissioning and dam removal.

b. Blueback Herring

Blueback herring (*Alosa aestivalis*), are a species of diadromous fish that are present in the Mohawk River and represent an important fishery, both in the Hudson River Estuary and on the east coast of the United States. The species plays a pivotal role in the food-web as a foundational forage species in freshwater, estuarine, and marine ecosystems. With such a prominent position in the ecosystem, forage species such as blueback herring need to exist in high abundances. However, blueback herring, like American eels and most other diadromous fishes, are now in severe decline.[45] Restoration efforts throughout their range have been underway for decades to ensure continued stability and vitality of the population. Towards this aim, taxpayers have spent millions of dollars restoring river herring - of which bluebacks are a composite species - and other species of diadromous fishes because of their vital roles in the ecosystem and the human economy.

Blueback herring were historically isolated from the Mohawk river by the Cohoes Falls. However, with the development of the Erie Canal and the attendant lock system, blueback

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[42] Dittman, D.E., Machut, L.S., and Johnson, J.H. (2010) American Eel History, Status, and Management Options: Overview. Final Report for C005548, Comprehensive Study of the American Eel. State Wildlife Grant NYSDEC, Bureau of Wildlife, Albany, NY. 37 pp.
[43] JW Carr & FG Whoriskey, *supra* note 39.
[44] *Id.*
[45] Atlantic States Marine Fisheries Commission, 2017 River Herring Stock Assessment Update, Volume 1: Coastwide Summary (2017) (*hereinafter* ASMFC 2017).

herring gained access into the Mohawk basin. While blueback herring in the Mohawk could be viewed as an invasive species, they are an important native forage fish in the Hudson River Estuary and ocean ecosystem. It is quite possible that the expansion of the bluebacks into the Mohawk River represents an important habitat expansion population if downstream passage past the hydroelectric dams can be assured. Immature blueback herring may also form a significant forage base for resident sportfish like smallmouth bass and walleye in the Mohawk River as well.

To understand the dams' impacts on blueback herring, the scope of the review should be expanded to include mortality. As described in the first two sections of this letter, the impact of the dams on blueback herring must be considered as compared to a baseline "no action" alternative of decommissioning and dam removal.

c. Native and Gamefish

A robust recreational fishery exists in the Mohawk River for smallmouth bass (*Micropterus dolomieu*) and walleye (*Sander vitreus*) and other gamefish species that are highly attractive to sportsmen. While these fish don't migrate out of the Mohawk River, they move within it to find forage and spawning habitats. Therefore dams typically have a similar, if less profound, impact on native and resident species of fish, as compared to anadromous and catadromous fishes.

To understand the dams' impacts on native and gamefish, the scope of the review should be expanded to include analysis of upstream and downstream migration of native and gamefish. As described in the first two sections of this letter, the impact of the dams on resident gamefish must be considered as compared to a baseline "no action" alternative of decommissioning and dam removal.

d. Freshwater mussels

The free mobility of fish within the Mohawk River and its watershed also impacts freshwater mussels since fish are important vectors for freshwater mussels. Freshwater mussels are among the most endangered faunal groups on the planet for the same reasons as most other imperiled aquatic species, dams and habitat alteration.[46]

The scope of the review should be expanded to include impacts to freshwater mussels in relation to environmental flows, compared to baseline "no action" alternative of decommissioning and dam removal.

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[46] D. Strayer et al., *Changing Perspectives on Pearly Mussels, North America's Most Imperiled Animals*, 54 BioScience 429 (2004).

C. Study Requests

Based on the information available, Riuhverkeeper requests the following studies, according to the study request criteria outlined in the scoping document. In addition, we request that the project owner consult with regulatory agencies, Riverkeeper, and other stakeholders to develop detailed study plans, and we request that the results be used to develop permit conditions that will mitigate this dam's impact on the ecology and water quality of the Mohawk River.

1. Acoustic Telemetry Study of Out-migrating Silver Eels

a. Describe the Goals and Objectives of Each Study Proposal and the Information to be Obtained

The goal of this study is to determine the out-migration patterns of American eels in the Mohawk River and to determine if the Vischer Ferry and Crescent Dam are preventing or delaying eels from returning to the Sargasso Sea to spawn. Riverkeeper requests that acoustic telemetry be used to accurately track the movements of silver eels in and around the dams, especially in the fall when they begin their return migrations. In order to conduct this study, silver eels should be captured in late summer and their movements and behavior patterns should be monitored for at least one migration season. As in all science, more sampling and data collection is better.

b. Explain the Relevant Resource Management Goals of the Agencies or Indian Tribes with Jurisdiction over the Resource to be Studied

This criterion is not applicable.

c. Explain Any Relevant Public Interest Considerations in Regard to the Proposed Study

Relevant public interest considerations are outlined in the first section of this letter.

d. Describe Existing Information Concerning the Subject of the Study Proposal, and the Need for Additional Information

Very little is known about the various life-stages of American eels and their habitat requirements.[47] Carr and Whoriskey (2008) showed that despite a newly constructed bypass at a hydropower dam, mature silver eels were delayed in their downstream migration at the face of the dam.[48] Seventy six percent of the tagged eels entered the turbines and received fatal injuries

[47] Atlantic States Marine Fisheries Commission, American Eel Benchmark Stock Assessment: Stock Assessment, Report No. 12-01 (2012) (see comments).
[48] JW Carr & FG Whoriskey, *supra* note 39.

despite the bypass system in place. An acoustic survey would help determine the mortality rate of silver eels and other eel life-stages due to the Vischer Ferry and Crescent dams and is necessary in licensing the aforementioned dams and other hydropower dams.

The knowledge gained from these studies would not only be useful in determining how the Vischer Ferry and Crescent hydropower dams impact American eels, but would also help provide measures to improve fish survival at these and other facilities in the Mohawk River, and at other hydropower project where eels are present. Lastly, if there is a low-level outlet a study such as this would be able to determine if out-migrating eels could move downstream without high levels or injury or mortality or if they are able to use the spillway.

There is a lack of knowledge specifically related to the silver eel life-stage, and this study would have applications beyond the Mohawk River. American eels are considered depleted in United States waters[49], and information gained in these types of studies could help fishery managers better protect the species.

e. Explain Any Nexus Between Project Operations and Effects (Direct, Indirect, and/or Cumulative) on the Resource to be Studied, and How the Study Results Would Inform the Development of License Requirements

This study could help determine if the lights on the structures confuse or disorient out-migrating eels or if eels are deterred from entering water intakes by bubble curtains. It would also be determined if eels are attracted to the water in-takes and subsequently entrained into the turbines. This information would inform the development of license requirements that pertain to lighting, intake design, and fish protection measures.

The information gained could be used to determine the time of day and weather patterns that eel choose to migrate. Based on the information gained from this study, license requirements could be developed to optimize project operations during the autumn when silver eels are most likely to migrate, without causing harm to eels.

American eels are native inhabitants to the Mohawk River and their populations have been seriously impacted by the dams throughout their range. Attempts should be undertaken to restore American eels to a level which would occur if the Vischer Ferry and Crescent Dams were nonexistent. Towards this goal actions should be taken to facilitate upstream passage. The Vischer Ferry and Crescent Dams do not have upstream fish passage. Riverkeeper recommends that eel passage be provided at both dams.

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[49] Atlantic States Marine Fisheries Commission, American Eel Benchmark Stock Assessment: Stock Assessment, Report No. 12-01 (2012) (see comments).

f. Explain How Any Proposed Study Methodology (Including Any Preferred Data Collection and Analysis Techniques, or Objectively Quantified Information, and a Schedule Including Appropriate Filed Season(s) and the Duration) is Consistent with Generally Accepted Practice in the Scientific Community or, as Appropriate, Considers Relevant Tribal Values and Knowledge

Silver eels would be captured during an electroshock survey and coded transmitters (e.g., Vemco V9) would be surgically implanted into their peritoneal cavities. Coded tags of this nature were specifically developed to provide researchers with the means to track and determine the behavior patterns of fish. These types of telemetry tags can function as a simple pinger giving location only, or can be equipped with depth and/or temperature sensors. For applications such as site residency studies and automated monitoring of migrations, coded transmissions are desirable because of significantly increased battery life and the large number of unique IDs available on a single frequency.

g. Describe Considerations of Level of Effort and Cost, as Applicable, and Why Proposed Alternative Studies Would Not be Sufficient to Meet the Stated Information Needs

NYPA has not proposed any fish studies despite the information needs that we have outlined in section 7 of this letter.

2. Otolith Microchemistry Study of Blueback Herring

a. Describe the Goals and Objectives of Each Study Proposal and the Information to be Obtained

Otoliths are considered one of the most valuable tools in fisheries science because they can be used to accurately determine the age and specific habitat usage of fish.

The goal of this study is to utilize otolith microchemistry on blueback herring captured in the impoundments behind the Vischer Ferry and Crescent hydroelectric dams to determine age, life history traits, and migration patterns.

The objectives of this study are to: determine the provenance of fish captured in the impoundment; determine if the blueback herring are repeat spawners within the Mohawk River; and determine if the Mohawk River is a source or a sink population for these fishes.

b. Explain the Relevant Resource Management Goals of the Agencies or Indian Tribes with Jurisdiction over the Resource to be Studied

This criterion is not applicable.

c. Explain Any Relevant Public Interest Considerations in Regard to the Proposed Study

Relevant public interest considerations are outlined in the first section of this letter.

d. Describe Existing Information Concerning the Subject of the Study Proposal, and the Need for Additional Information

Because the otoliths growth occur on a regular basis in response to endogenous and exogenous signals, the otoliths are considered one of the most accurate chronometric structures animal world. Hence, temporal and spatial incorporation of environmentally derived elements form the ambient environment occurs in a systematic fashion that allows interpretation of a fish's life-history patterns.

For instance, by comparing Strontium (Sr)/Barium (Ba) ratios in the otoliths of blueback herring, researchers would be able to determine the provenance of fish captured in the impoundment. Since Ba is found in higher levels in freshwater environments and Sr is found in higher levels in marine environments, otoliths could be used to determine if the blueback herring are repeat spawners within the Mohawk River, which would mean they were able to complete normal migrational movements to and from the ocean. In addition, the adult blueback herring could be analyzed to show if they exhibit natal fidelity to the Mohawk River or if they are vagrants that have gotten lost. Another question that could be answered by using a robust otolith microchemistry study with blueback herring is to determine if the Mohawk River is a source or a sink population for these fishes. Otoliths as natural tags will answer many unresolved questions.

e. Explain Any Nexus Between Project Operations and Effects (Direct, Indirect, and/or Cumulative) on the Resource to be Studied, and How the Study Results Would Inform the Development of License Requirements

There is major concern when anadromous fish must pass through multiple dams, creating the potential for significant cumulative impacts. Passage of adult repeat spawners is also a major concern for most Atlantic Coast species.

The results of this study will improve understanding of the cumulative impacts of these dams on blueback herring, and inform the development of license requirements for fish passage and protection.

f. Explain How Any Proposed Study Methodology (Including Any Preferred Data Collection and Analysis Techniques, or Objectively Quantified Information, and a Schedule Including Appropriate Filed Season(s) and the Duration) is Consistent with Generally Accepted Practice in the Scientific Community or, as Appropriate, Considers Relevant Tribal Values and Knowledge

Otolith microchemistry is a standard methodology utilized in fisheries science that has received widespread acceptance. Otoliths are calcium carbonate ear bones that are possessed by all teleost fishes. Because all teleosts possess otoliths, they can be used as natural tags that record their movements from environmental signals. Otolith accrete layers of calcium carbonate on a daily basis and divalent chemicals are randomly substituted for Ca^{2+} or are inserted in the interstitial spaces of the calcium carbonate lattice during formation of the aragonitic crystal. The benefit of otolith microchemistry is that environmental history of fishes can be reconstructed by determining the chemical ratios of divalent elements incorporated in the otoliths using laser ablation inductively coupled mass spectroscopy (LA ICPMS).

Fish should be sampled for at least one to two spawning seasons and the resultant data could provide powerful data about the life histories of blueback herring in the Mohawk River and how the Vischer Ferry and Crescent dam impact their populations.

g. Describe Considerations of Level of Effort and Cost, as Applicable, and Why Proposed Alternative Studies Would Not be Sufficient to Meet the Stated Information Needs

NYPA has not proposed any fish studies despite the information needs that we have outlined in section 7 of this letter.

3. Fish Fauna Composition Study

a. Describe the Goals and Objectives of Each Study Proposal and the Information to be Obtained

The first goal of study is to utilize eDNA, boat electrofishing, and sampling with nets to assess fish fauna composition in the vicinity of the Vischer Ferry and Crescent dam areas. The objective is to determine the different dimensions of species diversity (species abundance, species richness, and species evenness) upstream and downstream of the hydropower facilities. The species sampled during these surveys would likely represent the species that are most impacted by the dams.

In addition, the routine sampling would help determine how abundant American eels and blueback herring are in the vicinity of the Vischer Ferry and Crescent Dams. These surveys would help determine the density of eels in the impoundments. Determining the density of eels and blueback herring as well as other species in the impoundments in the vicinity of the Vischer Ferry and Crescent dams would help show how many species are impacted by the dams and their hydropower operations.

b. Explain the Relevant Resource Management Goals of the Agencies or Indian Tribes with Jurisdiction over the Resource to be Studied

This criterion is not applicable.

c. Explain Any Relevant Public Interest Considerations in Regard to the Proposed Study

Relevant public interest considerations are outlined in the first section of this letter.

d. Describe Existing Information Concerning the Subject of the Study Proposal, and the Need for Additional Information

There has been a noticeable decline in the runs of blueback herring in the Mohawk River and the status of the smallmouth bass appears to be in decline as well. Maturing blueback herring provide an optimal forage for smallmouth bass. Thus, the decline in the blueback herring could be tied to other changes in the fish assemblage within the Mohawk River. The largest question is whether the hydroelectric dams are associated with the loss to the blueback herring that enter the system.

e. Explain Any Nexus Between Project Operations and Effects (Direct, Indirect, and/or Cumulative) on the Resource to be Studied, and How the Study Results Would Inform the Development of License Requirements

The cumulative effect of the series of hydroelectric dams on the Mohawk River represents a serious obstacle to diadromous fishes, if not all species of fishes. These dams also inhibit the free mobility and potentially cause genetic isolation to the native and recreational species.

Information on fish community composition by hydropower plants is an important aspect for development of license requirements. The gathering of information from these types of sampling methods would help determine the true impact to all the fishes that inhabit the Mohawk River and are affected by the generation of electricity by the Vischer Ferry and Crescent dams.

f. Explain How Any Proposed Study Methodology (Including Any Preferred Data Collection and Analysis Techniques, or Objectively Quantified Information, and a Schedule Including Appropriate Filed Season(s) and the Duration) is Consistent with Generally Accepted Practice in the Scientific Community or, as Appropriate, Considers Relevant Tribal Values and Knowledge

The combined benefits of both methods in these studies would yield a cost-effective, efficient, non-destructive sampling regime.

The use of eDNA is sensitive enough to detect newly introduced species, rare species or species that escape traditional sampling methods. Ample evidence has shown that eDNA yields a more detailed results for species richness, electrofishing yields better results for species evenness and sampling fishing is outperformed by eDNA and electrofishing alike. Both electrofishing and sampling fishing may be used to collect data for diversity analysis, however electrofishing outperforms sampling fishing with regards to amount of species caught, making electrofishing a more suitable data collection method. Two years of electroshocking and eDNA should be conducted.

Sampling with nets and should complement the above described methods. Sampling for fish with nets should be conducted in accordance with a standardized procedure (e.g. with regards to depth, temperature, time of year etc) in order to collect data on what species are caught. This methodology has 3 steps: (1) planning of how many nets should be used and where they should be placed; (2) placing nets, and (3) collecting nets, identifying, measuring sampled fish; (4) determining injuries to fish from entrainment, impingement, or from other factors caused by hydropower dams and the generation of electricity.

In order to judge how to place nets some background research needs to be conducted. When placing out the nets and collecting them again, the water temperature, the transparency of the water, wind direction, wind speed, air temperature and cloudiness should be recorded. When sorting through the nets during collections. It would be beneficial to record, length weight, and take scale samples. One to two seasons of net sampling should be conducted in and around the Vischer Ferry and Crescent dams to obtain a true representation of the species that are present.

g. Describe Considerations of Level of Effort and Cost, as Applicable, and Why Proposed Alternative Studies Would Not be Sufficient to Meet the Stated Information Needs

NYPA has not proposed any fish studies despite the information needs that we have outlined in section 7 of this letter.

4. Tailrace Net Fishing Study

a. Describe the Goals and Objectives of Each Study Proposal and the Information to be Obtained

The goal of the study is to place nets at tailraces of the hydropower facilities to determine the injury and mortality to the variety of fishes in the impoundments. The objectives are to assess the impacts of these dams and turbines on native fishes and high value sport fishes in order to evaluate the effectiveness of current fish deterrents.

4.2 Explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied

This criterion is not applicable.

c. Explain Any Relevant Public Interest Considerations in Regard to the Proposed Study

Relevant public interest considerations are outlined in the first section of this letter.

d. Describe Existing Information Concerning the Subject of the Study Proposal, and the Need for Additional Information

Riverine fish are entrained to some extent at virtually every site tested. Entrainment rates are variable among hydropower production sites. Entrainment rates for different species and sizes of fish change daily and seasonally. Most importantly, entrainment rates of different turbines at a site can be significant. The tailraces should be studied to determine if eels and other fishes are suffering injury and mortality.

The Vischer Ferry and Crescent Dams do not have downstream protections on the turbines. In addition, there are no screens on either dam, only three-inch trash screens. Consequently, fish would be readily entrained into the turbines and severely injured if not killed. At these dams, it is not known whether the existing bubble curtains actually deter blueback herring from entrainment; whether other species of fishes are being entrained into the turbines; and whether eggs and larvae of fish are susceptible to entrainment and impingement. Consideration should be given to the downstream passage of blueback herring and American eels.

e. Explain Any Nexus Between Project Operations and Effects (Direct, Indirect, and/or Cumulative) on the Resource to be Studied, and How the Study Results Would Inform the Development of License Requirements

Riverkeeper recommends that protective measures be employed and additional studies be performed to ensure the health and population stability, if not restoration, of resident native fishes, migratory fishes, and high value recreational fishes and fisheries in the Mohawk River.

The information from this study would inform whether screens would protect eels and other species from entering the turbines; how screens could be employed to protect all stages of aquatic life from eggs and larvae to adult stages; and what the optimal area is for screens that would sufficiently reduce the water velocity to prevent impingement of aquatic life.

f. Explain How Any Proposed Study Methodology (Including Any Preferred Data Collection and Analysis Techniques, or Objectively Quantified Information, and a Schedule Including Appropriate Filed Season(s) and the Duration) is Consistent with Generally Accepted Practice in the Scientific Community or, as Appropriate, Considers Relevant Tribal Values and Knowledge

Two seasons of tailrace net sampling should be conducted to ensure that harm to aquatic organisms is accurately assessed.

g. Describe Considerations of Level of Effort and Cost, as Applicable, and Why Proposed Alternative Studies Would Not be Sufficient to Meet the Stated Information Needs

NYPA has not proposed any fish studies despite the information needs that we have outlined in section 7 of this letter.

Since downstream migrants are not often observed, far less consideration has been given to the study of downstream fish passage at hydroelectric facilities. It is time to consider the downstream passage of fish in systems where hydroelectric power is being generated.

5. Water Quality Study

a. Describe the Goals and Objectives of Each Study Proposal and the Information to be Obtained

The goal of this study is to characterize impacts of the Vischer Ferry and Crescent Dams on water quality in the Mohawk River by measuring water quality upstream, within and downstream of the Crescent and Vischer Ferry impoundments. The study objectives are to characterize any effects of the dams and/or their operations on fecal-indicator bacteria, nutrients, silt/sediment, and algal/cyanobacterial abundance in the Mohawk River, with a focus on drinking water and

recreational (swimming) uses of the water. This will be done by obtaining the following information:

- Temperature, dissolved oxygen and chlorophyll *a* depth profiles upstream of the Vischer Ferry impoundment (baseline conditions) and at multiple locations within the impoundments;
- Nutrient (nitrogen and phosphorus) and turbidity measurements upstream of the Vischer Ferry impoundment (baseline conditions) and at multiple locations within the impoundments;
- Streamgage or instantaneous flow measurements sufficient to relate water quality, flow and dam operations;
- Data near drinking water intakes; and
- Frequent measurements throughout the year, to capture the broadest possible range of conditions.

b. Explain the Relevant Resource Management Goals of the Agencies or Indian Tribes with Jurisdiction over the Resource to be Studied

This criterion is not applicable.

c. Explain Any Relevant Public Interest Considerations in Regard to the Proposed Study

Relevant public interest considerations are outlined in the first section of this letter.

d. Describe Existing Information Concerning the Subject of the Study Proposal, and the Need for Additional Information

NYSDEC's Waterbody Inventory/Priority Waterbodies List notes threats or impacts to water supply, aquatic life and recreational uses in the Mohawk River in the project areas.[50] Nutrients, silt/sediment and pathogens are listed as pollutants, and stormwater runoff, agriculture, and combined sewer overflows are listed as sources. Hydromodification and flow diversions are also noted for impacting uses. The assessments were last revised in 2010, based on undated monitoring. More recent monitoring studies by NYSDEC are not reflected in the WI/PWL.

Riverkeeper partners with scientists at SUNY Cobleskill to monitor the Mohawk River for *Enterococcus*, an EPA-recommended bacterial indicator of fecal contamination. Within the

[50] NYSDEC, WI/PWL Fact Sheets - Mohawk/Alplaus Kill Watershed (0202000411), https://www.dec.ny.gov/docs/water_pdf/wimohawkalplauskill.pdf.

project areas, we have sampled seven locations approximately once per month, from May to October, since 2015.

Based on geometric means of all samples collected at each site, four of our seven sampling locations met EPA-recommended Recreational Water Quality Criteria (RWQC).[51] At three sites, the geometric means slightly exceeded the EPA-recommended threshold of 30 cells/100 mL. These are Mohawk Harbor (41 cells/100 mL), Schenectady STP (34 cells/100 mL), and I-87 Crossing near Vischer Ferry (31 cells/100 mL).[52]

Water quality at these three sites was poorer in wet weather, a pattern that we commonly observe in throughout the Hudson River Watershed.[53] (For the purposes of our monitoring studies, we define wet weather as 0.25" or greater precipitation in the three days leading up to sampling.) Comparing geometric means of samples collected in wet versus dry weather shows that, at these three sites, wet weather drove the RWQC exceedances observed. *Enterococcus* counts were also notably elevated at the Aqueduct Rowing Docks, downstream of the Schenectady STP, during wet weather.

Periods of intense rainfall and snowmelt are associated with wastewater overflows and spills throughout the Hudson River Watershed, due to insufficient wastewater treatment plant capacity and aging infrastructure. Three of the WWTPs in the project vicinity (Town of Rotterdam, Town of Niskayuna, and Town of Colonie) have reported discharges of untreated or partially treated sewage between May 2016 and June 2019.[54] In this area, permitted sanitary sewer bypasses are also a factor: the SPDES permit for the Schenectady STP allows discharges of untreated sewage when necessary, which may include periods of wet weather. The City of Schenectady STP reported five sewage discharges between May 2016 and June 2019.[55]

Fecal-indicator bacteria such as *Enterococcus* are the most commonly used indicator of wastewater pollution, and they are closely related to pathogen presence. However, wastewater effluent also contains high concentrations of nutrients, which are a noted pollutant in this area of the Mohawk River, and unregulated contaminants such as industrial chemicals and pharmaceuticals.

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[51] Recreational Water Quality Criteria and Methods, EPA.gov, https://www.epa.gov/wqc/recreational-water-quality-criteria-and-methods (select "2012 Recreational Water Quality Criteria") (last visited Aug. 8, 2019).
[52] Riverkeeper, Mohawk River Water Quality Monitoring Results 2015-2018 (2019), https://www.riverkeeper.org/wp-content/uploads/2019/03/2018-Entero-Report-MOHAWK-Final.pdf.
[53] Riverkeeper, How's the Water? 2015: Fecal Contamination in the Hudson River and its Tributaries (2015), https://www.riverkeeper.org/wp-content/uploads/2015/06/Riverkeeper_WQReport_2015_Final.pdf.
[54] Sewage Discharge Notifications, NYSDEC, https://www.dec.ny.gov/chemical/101187.html (last visited July 10, 2019) (select "Sewage Discharge Reports").
[55] *Id.*

Excessive nutrients and slow-moving water promote algal growth, which may intensify into Harmful Algal Blooms (HABs) in extreme cases. HABs are becoming increasingly common in New York State.[56] The NYSDEC's Mohawk River Basin Action Agenda reports that fourteen HABs have been documented in the Mohawk Watershed between 2012-2017, three of which had documented high algal toxins present.[57]

Recent NYSDEC monitoring, which is not reflected in current WI/PWL assessments, shows that chlorophyll *a* begins to exceed guidance values in the Amsterdam-Cohoes reach of the river, but not further upstream, and suggests that flow alterations and nutrient concentrations allow build-up of suspended algae in impoundments.[58]

HAB-forming algae may produce toxins that are harmful to humans and other animals. Toxins are potentially fatal when ingested, but negative impacts can occur through any contact with affected water. Drinking water affected by HABs requires special monitoring, and if toxins are present, additional treatment is required before consumption. Excessive algal growth can also detrimentally affect aquatic ecosystems by reducing light penetration, altering the nutritional value of phytoplankton for consumers, and depleting dissolved oxygen in the benthic through decomposition.

In addition to the direct negative impacts of HABs on recreational and drinking water quality, treatment of raw water containing large amounts of organic matter may result in disinfection byproducts that are harmful to human health.[59]

The impacts noted in NYSDEC's waterbody assessment are based on a relatively small amount of monitoring data collected nearly a decade ago. Data gathered more recently by NYSDEC has not been used to update the PWL. It is important to collect up-to-date water quality information that is comprehensive enough to assess the dynamics of this system, to protect the health and wellbeing of drinking water consumers, recreational users of the river, and aquatic life.

e. Explain Any Nexus Between Project Operations and Effects (Direct, Indirect, and/or Cumulative) on the Resource to be Studied, and How the Study Results Would Inform the Development of License Requirements

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[56] Harmful Blue-green Algae Bloom Beach Trends, NYS DOH, https://www.health.ny.gov/environmental/water/drinking/bluegreenalgae/beachsurveillance.htm (last visited Aug. 8, 2019).

[57] NYSDEC, Mohawk River Basin Action Agenda: 2018-2022 (2018), https://www.dec.ny.gov/docs/water_pdf/mohawkactionag.pdf.

[58] Alexander J. Smith & Elizabeth Nystrom, *Enhanced Water Quality Monitoring in Support of Modeling Efforts in the Mohawk River Watershed*, in 2009 Mohawk Watershed Symposium, *supra* note 28.

[59] EPA, EPA 816-R-01-014, Stage 1 Disinfectants and Disinfection Byproducts Rule: What Does it Mean to You? (2001),https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=200025FL.txt.

Flow is a fundamental feature of riverine ecosystems, affecting many physical conditions such as temperature, dissolved oxygen, and stratification; sediment regimes; and a wide range of ecological processes including nutrient uptake and primary production.

Dams restrict water movement to certain flowpaths and create reaches of slow-moving or still water. Periods of intense rainfall or snowmelt are associated with higher instream flows and sewage overflows. Depending on water levels prior to rainfall and the intensity and duration of rainfall (or snowmelt), dams may either hold water back, pass it through the project turbines, or pass it over the crest of the dam, and this may differ depending on whether flashboards are installed.

Disinfection byproducts are highly variable, requiring water treatment plant operators to monitor closely and adjust plant processes carefully. Hydropower operations at these dams alter water levels and flow, and therefore may affect raw drinking water quality.

The Crescent and Vischer Ferry project areas include multiple significant point and nonpoint pollution sources, and several drinking water intakes, all of which have been assessed as being highly susceptible to contamination. The conjunction of these inputs and uses makes it extremely important to understand the roles these two dams play, individually and cumulatively, in the ecosystem.

The Crescent and Vischer Ferry dams are part of a complex system that includes other permanent dams (permanent and temporary), locks and bypasses. Each of these components has the potential to alter water level and flow. Results of this water quality study would help to inform the development of license requirements including but not limited to: monitoring status of upstream components in the system to anticipate changes to water levels or flow; operational responses to changes in water levels or flow caused by upstream components of the system; operating restrictions related to seasonal conditions such as water temperature and snowmelt; water quality monitoring and notification requirements to drinking water plant operators; monitoring of sewage overflow reports; and minimum bypass flows and bypass flow routes.

f. Explain How Any Proposed Study Methodology (Including Any Preferred Data Collection and Analysis Techniques, or Objectively Quantified Information, and a Schedule Including Appropriate Filed Season(s) and the Duration) is Consistent with Generally Accepted Practice in the Scientific Community or, as Appropriate, Considers Relevant Tribal Values and Knowledge

Riverkeeper proposes that studies be conducted according to NYSDEC monitoring protocols, including ELAP certification requirements, so that data are consistent with regulatory practices in NYS.

g. Describe Considerations of Level of Effort and Cost, as Applicable, and Why Proposed Alternative Studies Would Not be Sufficient to Meet the Stated Information Needs

The requested studies involve standard water quality measurements, and therefore do not require unreasonable levels of effort or cost. The requested studies may utilize autosamplers and/or sondes, reducing the level of effort involved.

The water quality studies proposed in the scoping document are limited to dissolved oxygen and water temperature. While these are relevant parameters, NYSDEC assessment data show that additional parameters are important and may be directly related to dams, particularly parameters related to HABs. The water quality studies already proposed do not mention information that would be used to relate water quality to flow and dam operations, and do not recognize drinking water uses in the project areas, and therefore would not be sufficient to completely evaluate the impacts of these dams on resources in the project area.

D. Conclusion

Riverkeeper appreciates the opportunity to comment. If you have any questions about these comments, please contact Jennifer Epstein at jepstein@riverkeeper.org or (914) 478-4501 x248.

Sincerely,

Dan Shapley

Water Quality Program Director

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, New York 13045

(ER 19/0251)
FERC Nos. 4678-052 and 4679-049

August 8, 2019

Ms. Tara Groom
New York Power Authority
30 South Pearl St.
Albany, NY 12207

RE: Crescent and Vischer Ferry Hydroelectric Projects (FERC Nos. 4678 and 4679)
Comments on Pre-Application Document, Scoping Document 1, and Study Requests

Dear Ms. Groom:

The U.S. Fish and Wildlife Service (Service) has reviewed the May 3, 2019, Pre-Application Document (PAD) filed by the Power Authority of the State of New York (Applicant) for the Crescent and Vischer Ferry Hydroelectric Projects (Project or Projects) (FERC Nos. 4678 and 4679), located on the Mohawk River in Schenectady, Albany, and Saratoga Counties, New York. We have also reviewed the June 10, 2019, Scoping Document 1 issued by the Federal Energy Regulatory Commission (FERC). The Service is submitting our study requests herein.

Existing Project Description

The Crescent Project is located at the upstream end of the Waterford Flight on the New York State Barge Canal at Lock E-6 and consists of two main concrete gravity dams (Dams A and B) that are curved, have a total length of 1,435 feet, and link each bank to a rock island in the middle of the Mohawk River. The Project impoundment extends upstream 10 miles to the Vischer Ferry Project, has a surface area of 2,000 acres, and holds 50,000 acre-feet of water at the normal pool elevation of 184 feet. The 1 foot high wooden flashboards are installed seasonally during the canal navigation season (generally May through October). A third, smaller dam (Dam C), provides added structural stability for Dam B by impounding water to approximately 4.5 feet deep against the downstream toe of Dam B. Two regulating structures, a 30-foot-wide Tainter gate and an 8 foot wide ice/trash sluice gate, are located on the western side of Dam B. The powerhouse is 180 feet long and 73 feet wide, integral with Dam B, and has four turbine-generator units: two vertical Kaplan turbines (with a rated capacity of 3.0 megawatts

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

[MW] each) and two vertical Francis turbines (with a rated capacity of 2.8 MW each). The Project also contains a switchyard, generator leads, transformer banks, and appurtenant facilities.

The Vischer Ferry Project is located at the New York State Barge Canal Lock E-7 and consists of three connected concrete gravity dams (Dams D, E, and F) having a total length of 1,919 feet. Dams D and F are 30 feet high, while Dam E varies in height from 1 to 3 feet above Goat Island, located in the middle of the river. The Project impoundment extends 10.3 miles upstream to Lock E-8 in Schenectady, New York, and has a surface area of 1,050 acres and holds 25,000 acre-feet of water at the normal pool elevation of 211 feet. The 27 inch high wooden flashboards are seasonally installed during the canal navigation season (generally May through October). Regulating structures are present along the Project's headrace and include seven sluice gates. Six of these gates have openings that are 14 feet high by 8 feet wide with sill elevations of 202.1 feet; the seventh opening is used as a trash sluice and is 12 feet high and 8 feet wide with a sill elevation of 190 feet. The powerhouse is 186 feet long and 73 feet wide, integral with Dam F, and similar to the Crescent Project, has four turbine-generator units: two vertical Kaplan turbines (with a rated capacity of 3.0 MW each) and two vertical Francis turbines (with a rated capacity of 2.8 MW each). The Project also contains a switchyard, generator leads, transformer banks, and appurtenant facilities.

Both Projects are operated as run-of-river (ROR) hydroelectric facilities. The Crescent Project has a required minimum flow downstream of 100 cubic feet per second (cfs), which is increased to 250 cfs during the navigation season. The Vischer Ferry Project has a required minimum flow downstream of 200 cfs, year-round. Both Projects utilize an acoustic deterrent system to guide blueback herring (*Alosa aestivalis*) away from the Projects' intakes and toward flashboard openings for downstream passage. At the Crescent Project, the flashboard opening is located on Dam A and is designed to release 250 cfs. At the Vischer Ferry Project, two flashboard openings are utilized at different distances from the intakes. An opening at the river right end of the Dam F is provided from May through July for adult blueback herring and an opening near the center of Dam F is provided from September through November for juvenile blueback herring. Both openings are designed to release approximately 90 cfs. Each Project has four turbine-generating units and a total authorized installed capacity of 11.8 MW. The average annual generation of the Crescent Project and the Vischer Ferry Project from 2009 through 2018 was 58,456 megawatt-hours (MWh) and 50,601 MWh, respectively.

Study Requests

The Service requests that the Applicant conduct the following studies to address information gaps in the PAD and provide the information necessary to assess the effects of the Projects and determine appropriate Protection, Mitigation, and Enhancement (PME) measures.

I. Blueback Herring Migration and Routing Study

The Applicant currently utilizes a hydroacoustic deterrent system to direct downstream migrating blueback herring away from each Project's intake to limit entrainment. The Service will be evaluating the efficacy of this method during relicensing to inform our Section 18 Fishway Prescription conditions for the Projects. Of note, the difficulty in installing this system in the

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

spring prior to the start of the navigation season was problematic this year and has been an issue in the past. The cumulative impacts of entrainment through the six hydroelectric projects in the lower Mohawk and Hudson Rivers require particularly low entrainment rates[1] at each project in order to maintain a high escapement rate. This issue has become increasingly important in light of the decline in blueback herring in the system, and the Atlantic Coast more broadly.

The Service recommends that the Applicant conduct a detailed, 2 year, fisheries study utilizing a variety of hydroacoustic, tagging, netting, and general fisheries methods to determine the abundance, timing, and routing of the upstream adult and downstream adult and juvenile migration of blueback herring in relation to the dam, powerhouse, fish bypass, and lock facilities at the Project.

1. *Goals and Objectives*

The goals and objectives of this study are to determine the abundance, timing, and routing of the upstream adult and downstream adult and juvenile migration of blueback herring in relation to the dam, powerhouse, fish bypass, and lock facilities at the Project.

2. *Resource Management Goals*

The Mohawk River, in the vicinity of the Projects, is managed by the New York State Department of Environmental Conservation (NYSDEC) as a mixed coolwater/warmwater fishery. The NYSDEC's fishery management goals include sustaining and enhancing all existing viable fisheries resources of the Mohawk River, especially for blueback herring, smallmouth bass, (*Micropterus dolomieu*), northern pike (*Esox lucius*), chain pickerel (*E. niger*), walleye (*Sander vitreus*), yellow perch (*Perca flavescens*), and sunfish (Family: *Centrarchidae*). The Atlantic States Marine Fisheries Commission (ASMFC) regulates river herring stocks in New York and has the stated goal to protect, enhance, and restore East Coast migratory spawning stocks of blueback herring in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass.[2]

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

The Projects currently provide downstream passage for adult and juvenile blueback herring during the navigation season. Recent changes in the navigation season have shortened this period from ending in November to ending in October. The Applicant currently utilizes a hydroacoustic deterrent system to direct downstream migrating blueback herring away from the Projects' intakes to limit entrainment. At the Crescent Project, a flashboard opening is provided

[1] Even a 90% survival rate through each Project would result in the loss of approximately one-half of the total run.
[2] ASMFC. 2010. Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring (American Shad Management). 158pp.

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

during the navigation season in Dam A with a 250 cfs attraction flow.[3] At the Vischer Ferry Project, a flashboard opening releasing approximately 90 cfs is provided from May through July for adult blueback herring and from September through November at a location closer to the intakes for juvenile blueback herring. Both Projects have 3-7/8 inch clear-spaced trashracks.

Section 4.4.3.3 of the PAD describes the fish passage studies that have been conducted at the Projects. Entrainment mortality for juvenile blueback herring was evaluated in a 1996 study that estimated a 96 ± 7% survival through the Kaplan turbines. While the data were not provided in the PAD, it is our understanding that the estimated survival through the Francis turbines was approximately 70%. Survival of adult blueback herring was not studied. The PAD states that the fish bypass rates for the Vischer Ferry and Crescent Projects are approximately 90% and 77%, respectively. No information is provided regarding the proportion of fish passing through the adjacent locks or over the spillway, or the delay associated with the current methods of downstream passage, especially as it pertains to movement through both Projects sequentially.

Canal operations have changed considerably in the previous several decades. Other studies[4] in the Mohawk River have found that a lower number of lockages run each day can notably increase the proportion of fish passing through a project's intake. Conservatively, there has been a 70% decline in the number of lockages due to decreased usage of the canal system.[5] Additionally, climate changes have resulted in significant increases in early season water temperatures in the Hudson River Basin since the early 1990s and increases in late season discharges that are key drivers of blueback herring migration periods.

Particularly notable for juvenile out-migration is the change in the operating season of the canal locks since 2017. The navigation season during all of the previous studies at the Projects extended until roughly mid-November each year, while it now ends on or around October 10. Out-migration can occur in late October to early November, which is now outside of the navigation period. Additionally, with the general decrease in available lockages, there are currently many fewer opportunities for all blueback herring to pass through the locks, even during the navigation season.

While a variety of studies related to blueback herring migration and passage have been conducted at the Projects, there are no studies that provide data on the routing and timing of the migration of the species through both Projects under the current license conditions (i.e., ROR operations), fish passage design, lockage frequency, and restricted navigation period. The fish passage requirements at the Vischer Ferry Project are also inconsistent with current requirements at downstream projects on the Mohawk River that initiate juvenile downstream protection measures as early as August 1, in contrast to the September date at the Project, and hydroacoustic

[3] We note that at the July 10, 2019, site visit, the Applicant indicated that they generally hold the reservoir elevation between 0.1 and 0.2 feet below the crest of the flashboards, which only provides an attraction flow of approximately 185 to 220 cfs.

[4] Barnes-Williams Environmental Consultants. 1989. Report on the 1988 Juvenile Blueback Herring Emigration at the Little Falls Hydroelectric Station. 23 pp.

[5] The canal system has evolved from a commercial waterway to one primarily utilized for recreational purposes. The New York State Canal Corporation (NYSCC) noted that 1989 was the peak year for recreational lockages with 159,141 (NYSCC 2008 Annual Report). The total number of recreational lockages in 2015 was noted as 47,083 (NYSCC 2015 Annual Report).

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

data at the New York State Dam (FERC No. 7481) suggests that out-migration may start sooner than August 1.

The Service is concerned with the lack of current information regarding blueback herring movement at the Projects. Repeated entrainment through hydroelectric projects in the Mohawk and Hudson Rivers can dramatically reduce the number of out-migrating young-of-year and repeat-spawners from the Mohawk River, which are a component of the East Coast population of blueback herring as managed by the ASMFC. The Projects may contribute to a net loss of individuals in the coastal population by reducing the success of out-migrating individuals compared to the population without access to the additional habitat in the Mohawk River.

5. *Nexus to Project Operations and Effects*

The Projects' dams serve as barriers to upstream and downstream fish migration. Fish moving downstream are subjected to potential mortality from impingement and entrainment. The Projects divert the majority of the flows from the river channel into the turbines, except during high flow spillage events.

6. *Methodology Consistent with Accepted Practice*

The Service recommends a thorough fisheries study targeted at the timing and routing of blueback herring at the Projects. This study should be developed in consultation with, and approved by, the Service and the NYSDEC. The Applicant should use a variety of hydroacoustic, tagging, and netting techniques to assess the timing and population size of the migration of blueback herring at the Projects. Additionally, this study should determine the routing of blueback herring during both upstream and downstream migration. The study should assess the degree to which the species moves upstream through the locks or stages below the Projects' tailraces. This study should cover the entire migration period, both upstream and downstream for adults and downstream for juveniles, as determined by the Service and the NYSDEC. The study should focus on movement into the Projects' area, targeting the canal locks, the intakes, the fish bypasses, the turbines, and upstream from the canal and Projects' dams. Due to highly variable migration numbers and periods from year-to-year, this study should be conducted for 2 years. The study should be supplemented with general fisheries information as needed to determine the proportion of any acoustically monitored targets that are blueback herring. We recommend that a variety of sampling gear, including gill nets, trap nets, seines, and electroshocking, be used as appropriate for site conditions. This study should use standard scientific collecting techniques used in many hydroelectric licensing studies related to river herring movement. Information normally collected includes species, size, age, sex, and condition, as well as any specific habitat information (i.e. substrate, water depth, velocity conditions). Standard water quality data (i.e., water temperature, dissolved oxygen [DO], pH, and conductivity) are usually collected in conjunction with these surveys.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The level of effort would involve a field crew sampling the migration period for 2 years. The actual cost is unknown and would depend upon the gear types used, number of sampling

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

locations, local labor costs, the ability to combine multiple studies (e.g., fisheries and water quality) into one task, etc. No alternative studies have been proposed, and there are no known alternatives to conducting these surveys. However, the Applicant has flexibility to design the most effective way to acquire the necessary data as approved by the Service and the NYSDEC.

II. American Eel Study

The Service is requesting a study of American eel (*Anguilla rostrata*) occurrence in the vicinity of the Projects. American eel are known to occur in the lower Mohawk River; however, the actual abundance and distribution in the vicinity of the Projects is unknown as downstream dams and canal lockages (i.e., eel generally move at night and lockages are during the day) may limit the abundance of eel above Cohoes Falls and above and below the Projects. This information will inform our Section 18 Fishway Prescription conditions.

1. *Goals and Objectives*

The goals and objectives of this study are to determine the distribution and relative abundance of American eel in the Project boundary. The Service may recommend additional upstream and downstream study efforts pertaining to passage for this species depending on the outcome of this study.

2. *Resource Management Goals*

The Mohawk River, in the vicinity of the Project, is managed by the NYSDEC as a mixed coolwater/warmwater fishery. The NYSDEC's fishery management goals include sustaining and enhancing all existing viable fisheries resources of the Mohawk River, especially for blueback herring, smallmouth bass, northern pike, chain pickerel, walleye, yellow perch, and sunfish. The ASMFC regulates coastal American eel stocks and has the stated goal to conserve and protect the American eel resource to ensure its continued role in its ecosystems while providing the opportunity for commercial, recreational, scientific, and educational uses.[6]

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

Section 4.4.2.3 of the PAD provides information regarding American eel in the Mohawk River watershed; however, no detailed survey or distribution information is provided.

5. *Nexus to Projects Operations and Effects*

The Projects' dams impound the Mohawk River and restrict the movement of aquatic species, including American eel. The Project intakes can entrain fish and cause mortality of adult out-migrating silver eel, limiting their reproduction potential.

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[6] ASMFC. 2000. Interstate Fishery Management Plan for American Eel (*Anguilla rostrata*). 79 pp.

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6. *Methodology Consistent with Accepted Practice*

The Applicant should utilize standard fishery practices including nighttime electrofishing and eel traps/eel pots. The level of effort would involve one field crew sampling on a seasonal basis with a focus on upstream and downstream migration and location of adult eels. The study would last for 1-2 years. It could be conducted along with other fisheries sampling activities as requested by the NYSDEC. The actual cost is unknown and would depend upon the gear type used, number of sampling locations, local labor costs, the ability to combine multiple studies (e.g., fisheries and water quality) into one task, etc. The provided literature is currently inadequate to fully address Project impacts, and there are no alternatives to conducting eel surveys. However, the Applicant has flexibility to design the most cost-effective way to acquire the necessary data.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The level of effort would involve one field crew. The study would last for 1-2 years. The actual cost is unknown and would depend upon the method used, number of sampling locations, local labor costs, the ability to combine multiple studies (e.g., fisheries, mussels, and water quality) into one task, etc. The existing literature is inadequate to fully address the Projects impacts; however, the Applicant has flexibility to design the most cost-effective way to acquire the necessary data.

III. Fish Protection and Downstream Passage Studies

The Service recommends that the Applicant prepare an assessment of entrainment and mortality at the Projects and explore potential alternative methods to exclude fish from the Projects' turbines and safely pass fish downstream. This study should collect site-specific data and reference available literature regarding target fish species and impacts at similar hydroelectric sites.

1. *Goals and Objectives*

The goals and objectives of this study are to provide information on impacts due to fish entrainment and mortality and potential fish passage and protection structures that could be utilized at the Projects. The information obtained will allow the Service's fishway engineers to evaluate the potential effectiveness of various options.

2. *Resource Management Goals*

The Mohawk River, in the vicinity of the Projects, is managed by the NYSDEC as a mixed coolwater/warmwater fishery. The NYSDEC's fishery management goals include sustaining and enhancing all existing viable fisheries resources of the Mohawk River, especially for blueback herring, smallmouth bass, northern pike, chain pickerel, walleye, yellow perch, and sunfish. The ASMFC regulates river herring stocks in New York and has the stated goal to protect, enhance, and restore East Coast migratory spawning stocks of blueback herring in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass. The ASMFC regulates

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

coastal American eel stocks and has the stated goal to conserve and protect the American eel resource to ensure its continued role in its ecosystems while providing the opportunity for commercial, recreational, scientific, and educational uses.

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

Section 4.4.3.3 in the PAD indicates that the Projects have 3-7/8-inch-clear-spaced trashracks and describes the downstream fish passage and protection measures at the Projects, as identified above. This section also describes entrainment studies focused on juvenile blueback herring; however, there is no information in the PAD regarding fish entrainment or mortality at the Projects for adult blueback herring or other species.

5. *Nexus to Project Operations and Effects*

The Projects' dams serve as barriers to fish migration. Fish moving downstream are subjected to potential mortality from impingement and entrainment. New licenses issued for projects throughout New York and the northeast have incorporated 1 inch clear spaced trashracks (3/4" clear-spaced trashracks for American eel) to physically exclude most adult fish from the turbines, alternate downstream passage routes, and other features (e.g., reduced approach velocities, adequate plunge pools, etc.) to encourage safe downstream fish passage.

6. *Methodology Consistent with Accepted Practice*

The recommended study uses standard literature reviews and site-specific data collection techniques common to most hydroelectric licensing activities. The Service recommends that the Applicant explore alternatives to keep all fish species out of the turbines. We also recommend that alternatives to effectively pass fish downstream around the dams be developed. These alternatives may include any existing trash sluices located close to the intakes.

A good starting point would be a literature search of available passage designs for the species of concern, as well as information on the relative effectiveness of each design. Existing facilities on the Mohawk River and at other similar dams can be investigated. Attraction flows, guidance mechanisms, and velocities are important components of an effective fish protection and downstream passage system. An effective system also diverts fish away from the turbines and guides them to the downstream passage facility. Adequate attraction and conveyance flows are critical to the proper functioning of the fishway. A passage facility that creates a bottleneck could delay downstream movement or expose the fish to excessive predation. The Service recommends that all passage facilities be designed to prevent blockage from ice and debris and be as maintenance-free as is feasible. Effective systems must be able to operate under all flow conditions experienced in the Mohawk River.

Currently, each project on the Mohawk River uses a unique protection/passage design. The pros and cons of each system and their applicability to Crescent and Vischer Ferry should be

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

explored. Little Falls (FERC #3509) uses a punch-plate overlay and passage sluice system. School Street (FERC #2539) uses a 1'-clear-spaced angled trashrack (with solid bottom plate to guide American eel) and bypass pipe. New York State Dam (FERC #7481) utilizes a hydroacoustic warning system with incremental passage flows and unit shutdowns to guide fish through a bypass. Green Island (FERC #13), located on the Hudson River just downstream from the mouth of the Mohawk River, is installing a promising, but still experimental, proprietary passive exclusion screen and fish bypass system.

The Service recommends, in addition to literature review and on-site investigations of existing facilities, that the Applicant collect site-specific data from the Projects to aid in the design of protection and passage facilities. This information would include flows, velocities, water depths, and substrates.

We also recommend that the Applicant collect information on the passage requirements of the fish species found in the Mohawk River. This information includes swimming speeds (including burst speeds), where in the water column these fish are likely to be moving, different forms of attractants or repellents (e.g., sound, light, etc.) that may help guide each species, etc.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The level of effort would involve moderate literature review, discussions with fishway engineers, and site-specific data collection. The study could be completed in less than 1 year, but may require more time to design effective facilities. The actual cost is unknown and would depend upon the number of alternatives examined. No alternative studies have been proposed.

IV. Freshwater Mussel Surveys

The Service recommends that the Applicant conduct a thorough freshwater mussel survey at the Projects. The study should use a variety of shallow and deep-water techniques approved by the NYSDEC.

1. *Goals and Objectives*

The goals and objectives of this study are to provide information on the existing freshwater mussel communities that may be impacted by Project operations. This information will be used to document the current mussel communities to determine potential impacts from the operation of the Projects.

2. *Resource Management Goals*

The Mohawk River, in the vicinity of the Projects, is managed by the NYSDEC as a mixed coolwater/warmwater fishery. The NYSDEC's fishery management goals include sustaining and enhancing all existing viable fisheries resources of the Mohawk River, especially for blueback herring, smallmouth bass, northern pike, chain pickerel, walleye, yellow perch, and sunfish. The

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

Mohawk River, along with the Erie Barge Canal, is listed as an S1/S2[7] river for freshwater mussels by the New York Natural Heritage Program.

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

In Section 4.4.7, the PAD provides a table of possible freshwater mussel species that may occur in the vicinity of the Projects. Additional information is needed to determine their actual abundance and distribution.

5. *Nexus to Project Operations and Effects*

Freshwater mussels and other aquatic macroinvertebrates are important components of the ecosystem in the Mohawk River. The Projects affect water levels in the impoundments and flows downstream from the dams. Mussel communities can be impacted by these water level and flow fluctuations. The dams block fish movements both upstream and downstream. Mussels rely on fish for the movement of their progeny and reproductive success.

6. *Methodology Consistent with Accepted Practice*

The recommended study uses standard scientific collecting techniques common to most hydroelectric licensing activities. Standard sampling techniques targeting mussel populations should be utilized. The Applicant should follow specific study guidelines as recommended by the NYSDEC for freshwater mussels.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The level of effort would involve one field crew sampling on a seasonal basis. The study would last for 1-2 years. The actual cost is unknown and would depend upon the gear types used, number of sampling locations, local labor costs, the ability to combine multiple studies (e.g., fisheries and water quality) into one task, etc.

V. Aquatic Mesohabitat Study

The Service recommends that the Applicant verify all key aquatic habitats at the Projects, including wetlands and submerged aquatic vegetation. This study will involve verification of existing data and mapping of occurrence to update the information on these habitats for the Projects.

[7] S1: Critically imperiled, typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology making it especially vulnerable in New York State. S2: Imperiled statewide because of rarity, typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

1. *Goals and Objectives*

The goals and objectives of this study are to identify key aquatic habitat areas that may be affected by Project operations. The study will provide information on the extent and quality of aquatic habitats and the wildlife they support.

2. *Resource Management Goals*

The Mohawk River, in the vicinity of the Projects, is managed by the NYSDEC as a mixed coolwater/warmwater fishery. The NYSDEC's fishery management goals include sustaining and enhancing all existing viable fisheries resources of the Mohawk River, especially for blueback herring, smallmouth bass, northern pike, chain pickerel, walleye, yellow perch, and sunfish. The Mohawk River, along with the Erie Barge Canal, is listed as an S1/S2 river for freshwater mussels by the New York Natural Heritage Program.

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

In Section 4.6, the PAD summarizes the Service's National Wetlands Inventory (NWI) and the NYSDEC delineations of wetlands that may be affected by Project operations; however, these surveys are not precise enough to capture all regulated wetlands, thus there is a need for confirmation of wetland vegetation in the vicinity of the Projects. Little specific information is included in the PAD regarding aquatic vegetation or shoreline habitats.

5. *Nexus to Project Operations and Effects*

The Projects are currently authorized to use 1-foot (Crescent) and 3-foot (Vischer Ferry) flashboards that seasonally raise and lower the Projects' impoundments, which can impact shoreline and aquatic habitats that are important habitats for fish and wildlife. The information will be used to determine what, if any, impacts the Projects are having on these resources and what the appropriate PME measures might be.

6. *Methodology Consistent with Accepted Practice*

The Service recommends that the Applicant document all wetlands and other aquatic vegetation that may be affected by Project operations. The NWI maps are frequently used as the starting point in identifying wetlands. The Applicant should confirm the boundaries of any wetlands identified in the PAD and conduct an additional search for any wetland areas at the Projects. Submerged aquatic vegetation in the impoundments should be mapped and identified. Shoreline areas of erosion, fish nesting, and mussel beds or middens should also be mapped. The Service is not requesting detailed delineation of wetlands at the Projects.

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The level of effort and cost are relatively low. We recommend this study to ensure that there are no gaps in the aquatic mesohabitat information and to provide spatial data for important aquatic mesohabitats at the Projects. No alternative studies have been proposed.

VI. Water Quality

The Service recommends that the Applicant conduct a thorough water quality assessment at the Projects. The study should provide relevant water quality information to determine if the Projects meet minimum water quality standards for the preservation of beneficial uses at the Projects including fish and wildlife habitat and recreation.

1. *Goals and Objectives*

The goals and objectives of this study are to provide baseline water quality information to allow a proper determination of the potential impacts at the Projects. These data are necessary to evaluate how water quality may influence the current condition of the fishery.

2. *Resource Management Goals*

The Mohawk River, in the vicinity of the Projects, is managed by the NYSDEC as a mixed coolwater/warmwater fishery. The NYSDEC's fishery management goals include sustaining and enhancing all existing viable fisheries resources of the Mohawk River, especially for blueback herring, smallmouth bass, northern pike, chain pickerel, walleye, yellow perch, and sunfish. The Mohawk River, along with the Erie Barge Canal, is listed as an S1/S2 river for freshwater mussels by the New York Natural Heritage Program.

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

In Section 4.3.2.4, the PAD indicates that while there is extensive water quality data for the Mohawk River, there is no known water quality data collected in the vicinity of the Projects.

5. *Nexus to Project Operations and Effects*

The Projects release water downstream from their impoundments, which could impact such water quality factors as temperature and DO, which are critical to the quality of the aquatic habitat.

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

6. *Methodology Consistent with Accepted Practice*

The recommended study uses standard scientific water quality sampling techniques used in most hydroelectric licensing activities. These studies should include water temperature and DO monitoring on a continuous basis for at least 1 year, along with monthly sampling of other parameters such as chlorophyll content, pH, turbidity, and conductivity. An additional year of monitoring may be requested based on a review of the first year's results. This information will be used to document baseline water quality conditions and to determine potential impacts from Project operations. We recommend that water quality data be collected from vertical profiles in the impoundments and below the powerhouses at the Projects. As the Projects' dams are wide, distal portions of the downstream reach below the dam may not be adequately watered by current spillage. The Applicant should record continuous water quality data below the dams near the canal locks. The data should be presented in conjunction with generation at the Projects, noting which units were operating and any unit trips, as well as flows in the bypassed reaches. Data from the downstream U.S. Geological Survey (USGS) Cohoes gauge should also be provided, along with daily rainfall and temperature data.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The level of effort would be moderate and could involve a crew monitoring continuous measurement devices and collecting monthly samples while undertaking other work such as fisheries or macroinvertebrate surveys. In addition, temperature and DO loggers could be installed, with data being periodically downloaded. The actual cost is unknown but would be relatively low. In Section 5.2 of the PAD, the Applicant has proposed to conduct a water quality study in consultation with the Service and the NYSDEC.

VII. Run-of-River Compliance Study

The Service recommends that the Applicant conduct a ROR compliance study to evaluate Project operations and the influence they may have on downstream flows. Project operations, including unit trips, unit start-ups, and flashboard condition can have notable impacts on downstream flows and the aquatic communities in the Mohawk River.

1. Goals and Objectives

The goal of this study is to evaluate ROR compliance at the Projects and to determine what impacts the Projects may have on downstream flows. The objectives of this study are to: 1) record generation, operations, impoundment levels, and flows at the Projects; and 2) produce figures of these Projects and flow data for evaluation of ROR compliance.

2. Resource Management Goals

The Mohawk River, in the vicinity of the Projects, is managed by the NYSDEC as a mixed coolwater/warmwater fishery. The NYSDEC's fishery management goals include sustaining and enhancing all existing viable fisheries resources of the Mohawk River, especially for blueback herring, smallmouth bass, northern pike, chain pickerel, walleye, yellow perch, and sunfish. The

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ASMFC regulates river herring stocks in New York and has the stated goal to protect, enhance, and restore East Coast migratory spawning stocks of blueback herring in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass. The Mohawk River, along with the Erie Barge Canal, is listed as an S1/S2 river for freshwater mussels by the New York Natural Heritage Program.

3. Public Interest

The requestor is a resource agency.

4. Existing Information

The PAD provides no information regarding fluctuations at the USGS Cohoes gauge or whether the fluctuations may be a result of the operations of the Projects. The Projects' operations are described as ROR; however, the methods utilized to achieve ROR are not defined in the PAD. The Francis turbines at the Projects, in particular, are generally operated at full gate and the ramping up and down of these units may dramatically affect downstream flows.

5. Nexus to Project Operations and Effects

The Projects are licensed to operate in a ROR mode. However, downstream fluctuations are occurring on the Mohawk River that do not appear to be solely the cause of the operation of upstream projects. Project operations need to be evaluated to determine the source of these fluctuations. In rivers with multiple hydroelectric projects attempting to operate in a ROR fashion, there is often a difficulty in maintaining river flows depending on how each project is operated. Fluctuations downstream decrease the value of the habitat for fish and other aquatic organisms.

6. Methodology Consistent with Accepted Practice

The Service recommends that the Applicant provide a narrative in the Proposed Study Plan (PSP) of how the Applicant operates the Project to maintain ROR flows. This narrative would be most effective if it is described as follows: 1) how the units come on and off line in relation to headpond elevations and river flows and ramping rates for the units; 2) how often the units are operated in a manual mode and how ROR operations are maintained when these situations occur; and, 3) how the system is adjusted to accommodate circumstances when the flashboards are partially tripped, as was observed during the site visit.

In order to evaluate ROR compliance, the Service recommends that the Applicant install real-time monitors to record generation for each turbine and water-level sensors that should record: 1) headpond elevations; 2) incoming flows from upstream of the impoundments; and 3) downstream flows below the Projects. One additional monitor should be placed in the vicinity of the Cohoes USGS gauge to verify the accuracy of the methods employed against a known source of reliable flow data. A sensor should also be placed at the Projects to record barometric pressure, such that the depths recorded by the water-level sensors can be adjusted for pressure changes. The sensors should record data at 15-minute intervals, and be in place from May 1

20190809-5020 FERC PDF (Unofficial) 8/9/2019 8:51:49 AM

through October 31. The Applicant should utilize flow-metering devices to measure flows at the monitored stream locations over a range of low to high flows to develop rating curves for discharge at these sites.

Flows, water levels, and generation data should be presented in bi-weekly intervals on a scale that allows for interpretation of low-flow periods. Times when the Projects are operated in a manual mode, when there are unit trips, start-ups or shut-downs, and when the flashboards are repaired, fail, or are partially breached, should be indicated. The programmable logic control settings for the Project should be provided and clearly noted whenever they are changed throughout the study period. Any deviations from these protocols provided in the PSP should be explained in the Study Report.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The recommended study uses standard monitoring and flow observation techniques that have been used in many hydro licensing activities. The level of effort would be relatively low and involve installation of monitoring equipment, regular downloading of data, and the measurement of discharge-rating curve flows. Quality assessment and control and data presentation will require a moderate level of effort to ensure accurate and interpretable results from the study.

* * * * *

The Service recommends that the PSP developed by the Applicant incorporate all of the above-listed studies. We also recommend that the study proposals incorporated into the PSP be as detailed as possible so that all parties know exactly what is being agreed to when the study plan is approved.

Thank you for the opportunity to provide study requests for the Projects. If you have any questions or desire additional information, please contact John Wiley at 607-753-9334.

Sincerely,

David A. Stilwell
Field Supervisor

cc: NYSDEC, Stamford, NY (C. VanMaaren, S. Wells)
NYSDEC, Albany, NY (N. Cain)
FERC e-file
OEPC, Washington, DC (S. Alam)
FWS, BER (ERT), Falls Church, VA (S. Nash)
FWS, Hadley, MA (S. Simon)

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James L Woidt, Scarborough, ME.
As part of the existing conditions analysis in support of the Mitigation Measures to Reduce Flooding the Historic Stockade Project led by the City of Schenectady with support from the New York State Department and Homeland Security and Emergency Services (DHSES) and Federal Emergency Management Agency (FEMA), Shumaker Consulting Engineering and Land Surveying, DPC (Shumaker) completed a hydrologic, hydraulic, and ice jam analysis of the Mohawk River at the Schenectady Stockade Historic District (Stockade; Shumaker, 2019). In this report, Shumaker reviewed existing literature and stream gage records to identify a total of 20 flood events that caused flood damage in the Stockade since the construction of Vischer Ferry Dam in 1913. Of these 20 events, 11 were identified to be caused by ice jams. Shumaker's calculation of the flood risk in the Stockade due to ice jamming yielded that ice-jam induced flood risk was greater than that of unobstructed free-flow conditions and including the joint probability of ice-jam induced flood risk with the unobstructed free-flow flood risk increased the Base Flood Elevation approximately 1.2 feet from what is currently shown on the FEMA Flood Insurance Rate Maps and 1.8 feet from free-flow conditions alone based on Shumaker's (2019) revised hydraulic analyses. Therefore, ignoring ice jams would underestimate the Schenectady reach of of the Mohawk River.

Extensive published research by Dr. Garver of Union College and the USGS have identified the Rexford Knolls, between the Rexford Bridge and Vischer Ferry Dam, as a frequent location of ice jams affecting the Stockade. The operation of Vischer Ferry Dam affects the hydraulics of the Mohawk River in this location which may also affect the formation of ice jams; whether this impact is beneficial or detrimental is unknown. Although technical analyses of the impact of Vischer Ferry Dam on ice jamming do not yet exist, numerous Stockade residents have penned letters to the editor and spoken publicly claiming that Vischer Ferry Dam is responsible for flooding of the Stockade and that is must be modified. These claims are to date unfounded in science and a brief hydraulic analysis performed by Shumaker found that Vischer Ferry had less than a six-inch impact on the base flood elevation in the Stockade. However, no known studies have been completed to quantify the impacts (positive or negative) of the operation of Vischer Ferry dam on upstream or downstream ice jamming. Therefore, I recommend that flood damage be included as a potential impact of Vischer Ferry Dam and that as part of the re-licensing process, a study be conducted that quantifies the frequency and magnitude of ice jamming on the Mohawk River upstream and downstream of Vischer Ferry Dam and quantifies the impact of Vischer Ferry Dam on the frequency and magnitude of flooding upstream and downstream of the dam.

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United States Department of the Interior

NATIONAL PARK SERVICE
NORTHEAST REGION
15 State Street
Boston, Massachusetts 02109-3572

IN REPLY REFER TO:

COMMENTS ON PRE-APPLICATION STUDY REQUESTS
New York Power Authority
Crescent and Vischer Ferry Hydroelectric Projects, FERC P-4678, P-4679, Mohawk River, NY

Kimberly D. Bose, Secretary August 9, 2019
Federal Energy Regulatory Commission
888 First Street, N.R., Room 1A
Washington, DC 20426

Dear Secretary Bose:

The National Park Service (NPS) responds to the Pre-Application Document (PAD) for the Crescent and Vischer Ferry Hydroelectric projects, located on the Mohawk River with powerhouses in the towns of Colonie and Clifton Park, New York. The PAD was prepared as part of an application for a new federal license. We offer the following comments based on the PAD, submitted by New York Power Authority (NYPA), the current licensee, on May 3, 2019, and on information we obtained at the site visit on July 10, 2019 and the joint agency meeting the following day.

4.1.3 – Basin Dams – In addition to the hydroelectric developments listed in the second paragraph the unlicensed Beardslee plant on East Canada Creek and Herkimer project on West Canada Creek (P-9709) are upstream of the Crescent and Vischer Ferry projects and the Fourth Branch project on the Mohawk River and Green Island project on the Hudson (P-13) are immediately below.

4.4.1 – 1st paragraph, 3rd line: 1st clause should read: "Since the early 1900s. . . and the 2d paragraph, 1st sentence should read: "Since the early 1900s, when the Barge Canal version of the Erie Canal was constructed, . . . "
Explanation: The original Erie Canal was constructed 1817-25 and was enlarged several times during the 19th century. These "towpath era" versions of the canal ran parallel to but were separate from the Mohawk River. The latest version of the Erie Canal, often called the Barge Canal, was constructed 1905-18. The section near the Crescent and Vischer Ferry projects opened to navigation in May 1915. Unlike its towpath era predecessors, the Barge Canal was designed for motorized vessels and constructed on a far larger scale utilizing rivers that were dredged and canalized using locks and dams. While blueback herring have migrated past Cohoes Falls by way of the Barge Canal's Waterford Flight, it is unlikely that migratory species made it through the sixteen locks of the original Erie Canal as it ran through Cohoes during the 19th century.

Table 4.8.2 Non-Public Recreation Sites at the Crescent Project – In addition to those listed there is an established fishing access and car-top launch under development at the Crescent Terminal, opposite Freddie's Park, and an oft used informal launch at the end of Ferry Lane in the hamlet of Vischer Ferry at the upstream end of the Vischer Ferry Historic and Nature Preserve.

Table 4.8.4: Non-Project Recreation Sites at the Vischer Ferry Project – In addition to those listed in the table there is a hand-launch at Maalwyck Park in the Town of Glenville at the upper end of the impoundment.

Information about these and other access sites in the project area can be found in the recently published: *New York State Canalway Water Trail Guidebook* (Waterford, NY: Erie Canalway National Heritage Corridor, 2019) pp 186-205.

4.8.1.2 – Other Recreational Facilities and Opportunities in the Vicinity of the Project Area - In addition to the facilities listed there is Falls View Park and a new network of trails at the edge of Cohoes Falls, developed by a hydropower licensee at the School Street project (P-2539).

4.8.2.1 – Management of Project Lands. An 1894 Amendment to the New York State Constitution stated that the Erie, Champlain, Oswego, Cayuga-Seneca, and Black River canals "shall remain the property of the state and under its management forever".[1] Management transferred from the Department of Public Works to Department of Transportation in 1967 and from DOT to the NYS Thruway Authority in 1992. The New York State Canal Corporation was established at that time as a public benefit corporation to manage canal operations under the Thruway Authority. The NYS legislature authorized transfer of the Canal Corporation from Thruway Authority to NYPA in April 2016 and the change became effective January 1, 2017. The Canal Corporation is now listed as a subsidiary of the New York Power Authority so any action by Canal Corp is effectively an action by the licensee.

4.9.2 – Scenic Attractions – also include Cohoes Falls, largest waterfall in the eastern US after Niagara.

4.10.1.2 – Historical Overview of the Crescent and Vischer Ferry Project Region – 4th paragraph. The Binnekill in Schenectady marked the jumping-off point for upstream navigation on the Mohawk River. It was upstream of the falls and rapids of the lower Mohawk. During the 1790s the Western Inland Lock Navigation Company constructed a series of short canals with locks to carry boats past rapids on the Mohawk and over the drainage divide between the Hudson and St. Lawrence watersheds at Rome.

1 6th NYS Constitutional Convention (1894) Article VII § 8.

5.1.7 – Recreation and Land Use – The licensee proposes to conduct a recreation site facility inventory for the Crescent and Vischer Ferry Projects as the basis for a Recreation Management Plan. While the inventory is an important first step there are things affecting recreation at these projects beyond the presence, absence, or proximity of recreational facilities. The inventory should document informal as well as formal sites. The plan should address seasonal use and constraints.

Floating mats of invasive water chestnut in the impoundments above the Crescent and Vischer Ferry Projects render some access points unusable by mid-summer each year. The Recreation Management Plan should address the impacts of invasive species on recreational use and access and propose measures to manage water chestnut on project waters..

Since NYPA took control of the Canal Corporation in 2017 the annual navigation season has been shortened by several weeks at either end. Further changes to navigation on the Mohawk are currently being discussed under a NYPA initiative called "Re-Imagine the Canals." While they were once separate entities within state government, operational changes by the Canal Corporation now have a direct effect on recreational use and access at FERC licensed projects operated its parent. The Recreation Management Plan should address the effects.

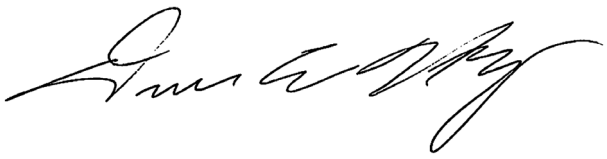
5.4 Relevant Qualifying Management Plans – should also include:

- National Park Service, *Erie Canalway National Heritage Corridor Preservation and Management Plan*, 2006
- New York State Canal Corporation, *New York State Canal Recreationway Plan*, 1995

The NPS appreciates the opportunity to comment on the PAD and looks forward to providing assistance to the applicant.

Any comments or questions should be directed to the undersigned at Duncan_Hay@nps.gov or by phone at 617-223-5056.

Sincerely



Duncan E. Hay
Hydropower Licensing Specialist
NPS Northeast Region

20191022-5139 FERC PDF (Unofficial) 10/22/2019 2:56:43 PM

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

PHIL STECK
Member of Assembly, 110th District

CHAIR
Task Force on
People with Disabilities
COMMITTEES
Health
Insurance
Judiciary
Labor
Transportation

Statement of Assemblyman Phil Steck

I want to thank NYPA for meeting with me and giving me advance notice of how NYPA would be proceeding in the process for re-licensing the Vischer Ferry dam (VFD). This gave our office the opportunity to study the issue. We have initial familiarity with the issue through our office's attendance annually at the Mohawk River Symposium sponsored by Union College.

Unfortunately, based on our review, we cannot agree with the current proposal as to the studies that are required and urge NYPA to change course in one respect. We believe the effect of VFD in exacerbating the problem of ice jam flooding has not been studied by government.

To review, VFD is owned by New York Power Authority (NYPA) and the dam is used for Hydropower at the Vischer Ferry dam, and it is used for Navigation at Lock E7.

The initial license application was filed by NYPA to FERC on 31 May 2019, and the current license will expire on 5/31/2024. The initial application for the Vischer Ferry dam (#4679) is combined with the Crescent dam (#4678) because they are on the same river and the same license schedule.

NYPA released an initial scoping document in May (2019) that outlines the nature of the application, the fact that the two projects would be treated together, and the general aspects of the Mohawk River and the dams.

Comments and specific Study plans by outside organizations and individuals had to be submitted by 9 August 2019 to FEMA, and following this submission deadline NYPA pulled together not only its own intended studies, but also the study plans submitted.

Comments and study requests included issues and requests primarily related to:

a) Recreation
b) Fish passage
c) Water quality
d) Flooding and ice jams (see below).

There were five study requests for flooding (Steck, Garver, Woidt, Duggan, Wege). All five requests noted that a particularly important issue is ice jamming and the effect that the VDF may have on creating thick sheet ice, and preventing passage of ice floes. At issue is the role

ALBANY OFFICE: Room 702, Legislative Office Building, Albany, New York 12248 · 518-455-5931, FAX: 518-455-5840
DISTRICT OFFICE: 1609 Union Street, Schenectady, New York 12309 · 518-377-0902, FAX: 518-377-0458
EMAIL: steckp@nyassembly.gov

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that the VFD has on ice jamming and the resulting flooding caused by ice jams, particularly in the Stockade area of Schenectady.

NYPA submitted its Study Plan on 23 September. This initial document will guide discussions and planning through the initial re-licensing process.

The NYPA Plan rejects all studies of flooding. This is incorrect. NYPA has failed to distinguished between ***freewater floods*** and ***ice jam floods***. NYPA is justified in its conclusion that freewater floods have been studied. On the other hand, ice jams floods are much more complicated and poorly studied. In explaining why floods and ice were NOT going to be part of the study plan, NYPA wrote (section 3.1.3)

"Several stakeholders provided comments related to flooding upstream of the Vischer Ferry dam and the effects, if any, of the Vischer Ferry Project operations on localized flooding. More specifically, some stakeholders requested that the Power Authority conduct a study to evaluate the role of Vischer Ferry dam in upstream flooding and to consider alternative dam configuration or operation to help reduce flooding potential.

The Stockade District (an historic waterfront area) of Schenectady, New York has a long history of flooding. The Stockade District lies within the 100 year floodplain of the Mohawk River and has been flooded repeatedly both before and after the Crescent and Vischer Ferry dams were built during construction of the original canal system (Shumaker and Rock, 2018). *Over the years, numerous studies have been conducted by various entities, including the State of New York, NYSDEC, the USGS, and the Power Authority to examine the frequency and causes of the Stockade District flooding, including the role of ice jams and the potential effects of existing dams in such flooding***. In a recent filing to FERC on August 9, 2019, the Power Authority provided FERC with two of the more recent reports on this subject. The letter report dated April 17, 2018 prepared by Gomez and Sullivan found that operation of the Vischer Ferry dam has little effect on upstream flooding, and that reducing the dam crest and installing crest gates would have almost no effect on upstream water surface elevations in the Stockade District during 10-year and 100-year flood events (Gomez and Sullivan, 2017).**

More comprehensive studies of the lower Mohawk River flooding have determined that ice jams are more frequently the cause of flooding in the Stockade District than high river flows or the operation of the river's dams. *For this reason, the USGS, in partnership with other agencies and researchers, has conducted several studies to understand the nature and frequency of flood causing ice jams and to develop modeling tools to predict the potential for ice jams and associated flooding on the lower Mohawk River. (USGS, 2019).*

NYSDEC has made the issue of flooding and flood control strategies a significant component of its Mohawk River Basin Action Agenda and prepares regular reports and updates on cooperative initiatives being undertaken to better understand, predict and mitigate flooding on the lower Mohawk River (NYSDEC, 2018). In addition, in 2018, the U.S. Congress authorized $1.3 M in funds to assist the City of Schenectady with a study to evaluate options and develop flood mitigation plans for the Stockade District, and the Federal Emergency Management Agency (FEMA) has recently earmarked $7.5 M for implementation of Stockade District flood mitigation strategies

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EMAIL: steckp@nyassembly.gov

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(The Daily Gazette, 2019).

In short, *the issue of flooding upstream of Vischer Ferry dam has been extensively studied and both ongoing and previous studies have repeatedly demonstrated that the existence and operation of the Vischer Ferry Project has little or no effect on upstream flooding of the Stockade District.* **Because the existing information is clearly sufficient to evaluate the flooding issue (see Criteria 4, 18 C.F.R. 5.9(b)), the Power Authority is not proposing a Vischer Ferry flooding study."**

Against this background, we have the following specific comments:

1) I am personally familiar with the efforts to mitigate the effects of flooding in the Stockade. The ongoing work in that area has nothing to do with ice jam flooding.

2) The issue is ice jamming and ice jam flooding. The issue is not freewater flooding. There have not been any specific studies that address the role of the VFD on ice formation and entrapment. NONE. The Gomez and Sullivan report only addresses free-water flooding.

3) The USGS has NOT studied ice jam flooding. The erroneous reference above is simply the USGS web page for the ice jam monitoring system. This is simply a web page that serves data on the warning system that measures changes in water levels at and above the VFD in the case of ice jams. The system is unique, and one-of-a-kind because the ice jam hazard is so serious in front of the VFD. The USGS ice jam monitoring systems assumes the existence of ice jam flooding. It does not address what is necessary to solve this problem.

4) There have been a number of studies that in fact do show that the sheet ice in front of the VDF, the build up of sediment, and the pinch point in the Knolls drives ice jams, that then flood the Stockade. This link is indisputable. See submitted letter to FERC by Garver (August 2019).

The historical issue of whether the Stockade floods or not is irrelevant. **The primary issue is: has the dam made flooding worse.** There is no substantial quantitative data on this issue. But the recent study by Shumaker Engineering showed that nearly all damaging historic floods in the Stockade are driven by ice jams. So understanding ice jams, and the relationship between ice jams and the VFD, is the key to understanding flooding in the Stockade.

Freewater models of flood levels (with or without dam) have been used to infer that the dam has no effect on the Stockade. They are using the wrong tool: we need to understand Ice Jam driven flooding.

Thank you.

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EMAIL: steckp@nyassembly.gov

20191104-0010 FERC PDF (Unofficial) 11/04/2019

ORIGINAL

31 Van Voast Lane

Glenville, NY, 12302

October 29, 2019

Kimberly D. Bose

Secretary, FERC

888 First Street, NE

Washington, DC 20426

Vischer Ferry Dam Project #4679-049

Dear Secretary Bose:

I ask that the re-licensing studies of the Vischer Ferry Dam (VFD) hydroelectric plant include flooding issues exasperated by this dam.

I am a retired licensed engineer formerly employed by the New York State Department of Environmental Conservation Flood Control Bureau (NYSDEC) for almost thirty years. I was involved in the planning, design, construction, operation and maintenance of many flood control projects constructed by the five Army Corps of Engineers (COE) districts serving New York State.

The VFD was substantially completed in1913 as a part of a ten year 500 mile canal construction project. As part of the state canal system, the Mohawk River was canalized from Utica to its confluence with the Hudson at Waterford. The river was dredged and movable dams constructed to produce the designed twelve foot depth. The exception was the construction of concrete gravity dams at Vischer Ferry and downstream at Crescent.

The VFD, with nearly a 2000 foot spillway constructed approximately thirty feet above bedrock, caused ice jam flooding that same year and the year after (1914 flood of record).

Since the VFD was constructed, the eleven mile reservoir pool flooded the Schenectady /Scotia area 23 times. Fourteen flooding events were ice jam events.

The flood prone Schenectady Stockade area is culturally unique dating back to the eighteenth century.

Over the course of twenty years I developed an understanding on what stops an ice run and creates ice blockage and backwater flooding. Briefly, a reduction in river slope, an ice covered pool, bridge piers, sharp bends in the stream channel and the confluences of high gradient tributaries trigger ice jamming. The Niskayuna Pool, formed by the VFD, triggers ice jamming by (1)thick sheet ice on the pool, (2)the sharp right bend in the river channel and (3)bridge piers.

20191104-0010 FERC PDF (Unofficial) 11/04/2019

There are small gates in the north section of the VFD. However, the Niskayuna Pool is not drained during the winter months. IF there was a winter draw down of only five feet the historical ice jam flooding events would be reduced to three. Tremendous economic loss and great inconvenience and stress would have been eliminated. I urge that this issue be addressed in the study to re-license this hydro electric plant.

I urge one additional study concerning the VFD and the re-licensing of the hydroelectric plant. I am aware that several hydraulic studies have been made on the backwater effect from the VFD in the Schenectady/Scotia reach of the Niskayuna Pool that have determined only inches of flood water reduction would result even if the VFD was removed. I question the data impute into such studies as the friction factor is so different when the reservoir pool transforms from a placid reservoir into a flood wave. The narrow rock cut channel section downstream from the Rexford Bridge will have a much higher friction factor (having high velocities) than the wide silt lined channel in vicinity of the Western Gateway Bridge (having small velocities).

My main point is the re-licensing process offers an opportunity to define and adress a long standing problem using modern technology. Not available when the VFD was designed, the National Weather Service can now reliably forecast huge runoff events days before they occur. Local gauging stations can monitor the building flood wave and refine the arrival time of the flood wave. I believe IF there was a designed gated opening in the VFD that would pass a base flood flow (130,000 cfs), without overflowing the existing dam crest, and the Niskayuna Pool was drawn down prior to the arrival of the flood wave, significant flood level reductions in the Schenectady/Scotia area could be realized.

Madam Secretary, the area I am speaking about has billions in constructed development in the 500 year floodplain, including new hotels and a large manufacturing plant (General Electric). The Irene event of August, 2011, caused over a hundred million in damages.

I urge the study to re-license the VFD hydroelectric plant, include a comprehensive flood control review. The City of Schenectady, Stockade Association, Community College and Scotia/Glenville will appreciate flood relief benefits in future years.

Sincerely,

Russell Wege

Retired engineer

Copies to:

Senator Jim Tedisco

Senator George Amadore

Assemblyman Angelo Santabarber

Assemblyman Phillip Steck

Assemblywoman Mary Beth Walsh

Supervisor Christopher Koetzle

City of Schenectady, Kristin Divtto

Professor John Garver

20191129-0006 FERC PDF (Unofficial) 11/29/2019

NON-DECISIONAL

20191129-0006 FERC PDF (Unofficial) 11/29/2019

31 Van Voast Lane

Glenville, NY 12302

November 6, 2019

Jody L. Callihan, PhD

Federal Energy Regulatory Commission

888 First Street, Suite 6H-03

Washington, DC 20426,

Reference: Vischer Ferry Dam, Hydroelectric Plant

Project #4679-049

Dear Jody,

It was good to meet you and have a brief chat at the recent scoping meeting concerning this project.

Some further thoughts may have importance in FERC's consideration of the flooding issue concerning the study plan for re-licensing this project.

The NYPA has referenced two studies, one a 1979 DEC study and a recent study by Gomez & Sullivan Consultants that conclude the Vischer Ferry Dam produces only negligible backwater flooding in the Schenectady/Scotia reach of the Niskayuna Pool.

Some background information may be helpful in understanding these two studies. First, I wrote the 1979 DEC report. I do not consider myself a technical hydrologic engineer. (My education and technical experiences was in petroleum engineering) A technician, Mike Milburt did the technical analysis of that 1979 study. Being responsible for that report, I recall Mike had a difficult time with friction factors in using the HEC-2 program that would recreate the recent flooding event.

I recall Mike used a very smooth friction factor, a figure that would NOT be used outside of lab conditions. Neither of us were happy using a number that would normally not be used to calculate river backwater conditions. However, that unrealistic number was used in that study as it duplicated the recent flooding event.

Years later, and hopefully a little wiser, I concluded that the Vischer Ferry Dam rendered that study in error. The error was, and remains, the spillway elevation of the dam (approximately 210 feet), sets the channel parameter, NOT the bottom of the river/pool bed. The Niskayuna reservoir/pool bottom is 10 to more than 20 feet below the spillway elevation. This results in moving water flowing over a static water

20191129-0006 FERC PDF (Unofficial) 11/29/2019

column for the major length of every cross section through the permanent eleven mile pool. I must conclude that no channel bottom friction occurs. I believe this is where error occurs in using standard hydraulic backwater computations.

Jim Duggan and I have discussed this understanding with the NYPA consultants Gomez and Sullivan. They do not agree with my stated understanding, saying that turbulence in the pool column has been observed below spillway elevation. Their studies and others were based using the full cross section of this channel.

The effect of this turbulence on modeling flood flows is debatable. It certainly reduces the friction factors throughout the Niskayuna Pool during flooding events and allows one to question the validity of modeling rivers that are affected by a major dam obstruction.

Gomez and Sullivan Consultants produced five or six alternatives for managing water levels at the dam. Each alternative illustrates the negligible effect on water elevations in the Schenectady/Scotia area. One alternative involved a shallow cut in the dam.

I do not believe that study was sufficient in analyzing the impact of this dam on the high- value upstream properties in the Schenectady/Scotia area. I suggest a few additional runs that assums a gated weir cut in the spillway that would pass a base flood flow.

May I further suggest a new study employ a management tool. Assume a major storm event of 6 to 10 inches in the watershed with a predicted flood wave 24 hours in advance: and assume the new flood gates are opened, allowing the Niskayuna Pool to partly drain prior to the arrival of the flood wave. Such an ability to manage the pool elevation would produce higher velocities that would shorten the flooding time and may significantly reduce flood elevations.

Finally, the ability to draw down the Niskayuna reservoir pool during the winter months would yield significant flood elevation reductions from ice jams in this high-value area.

Therefore, I am convinced that flooding is a valid concern and should be included in the proposed studies for re-licensing the Vischer Ferry Dam hydroelectric plant.

Sincerely,

Russell Wege, retired engineer

copies to:

Jim Duggan

John Garver

From: Wells, Scott M (DEC)
To: Daly, Rob; Weinstock, Andrew
Subject: [EXTERNAL]LMR surveys 1992-2008 on excel
Date: Friday, December 13, 2019 2:49:27 PM
Attachments: MR_surveys.1988-2019.pdf
LMR.Surveys.1992-2008.xlsx

CAUTION — External Email
Suspicious? Click Report Phishing on Outlook toolbar. For **Mobile** forward to (abuse@nypa,gov)

OK gents – this week I have relearned how to extract fish survey data out of our SWDBD and compiled the 7 oldest surveys on the updated roster for the lower MR. All 7 of these surveys are now on one excel file, each getting their own spreadsheet. Luckily none of these day surveys had more and 1-2 sites so all fit into one page each. Note, I copied/pasted the CV text into a link to the far upper right for each survey = easily read by placing the mouse over the cell.

The newer surveys on the list are not that simple, thankfully I already have spreadsheets on the larger efforts. Hopefully these summaries will fit the needs of ALL stakeholders needing lower river survey data from us for years to come.

More raw data and reports coming next week.

Tgif,

><> smw

Scott Wells, CP-F *est.*
Aquatic Biologist 1
DEC R4 Stamford - Fisheries
607-652-7366
scott.wells@dec.ny.gov

Lower MOHAWK RIVER (H-240) - R4 FISH SURVEYS near NYPA hydro-plants (1992 to 2019)

SN	section	code	authority	dates	description	locations	format*	report	notes
419003	Lower	8	Wells	5/6 to 10/21	BBH Collections, outreach	Abv/blw W. Flight, braided channels	forms	no	
418011	Lower	2	Wells	6/18 to 27	6-night centrachid survey	All of Crescent Lake, Lock E6 pool	excel	**Tech**	agency report
418012	Lower	18	Wells	6/29 to 10/15	TSMP collections	Cohoes to Amsterdam, above Lock E7	forms	no	
417022	Lower	8	Wells	6/15 to 10/11	BBH collections, Quebec/ESF	Cohoes to Amsterdam	forms	no	not in excel yet
416011	Lower	99	Wells	5-24 to 10/19	BBH collections, SUNY ESF	Cohoes to Rotterdam (below VF Dam)	forms	no	not in excel yet
415034	Lower	8	Wells	8/26,27	Year 2 Seining effort w/OEI	Clifton Park to Root (upper Crescent Lake)	forms	no	Inverts report by OEI
415026	Lower	18	Wells	5/27 to 10/19	TSMP and outreach	Cohoes to Glenville (below VF Dam)	forms	no	not in excel yet
415010	Lower	8	Wells	5/26 to 6/2	Year 2 USGS/DEC study	Niskayuna to Minden, below VF Dam	**excel**	**yes**	*published article*
414005	Lower	8	Wells	5/27 to 6/2	Year 1 USGS/DEC study	Waterford to Minden, abv Crescent Dam	**excel**	**yes**	agency, AFS reports
414033	Lower	8	Wells	9-30 to 10/2	Year 1 Seining effort w/OEI	Waterford to Minden, abv Crescent Dam	forms	no	
413005	Lower	8	Wells	4/30 to 6/19	Year 2 of BBH study w/ ESF	Waterford to Minden, abv Crescent, blw VF	**excel**	no	
412007	Lower	99	Wells	5/23 to 6/26	Year 1 of BBH study w/ ESF	Clifton Park to Canajoharie, blw VF dam	**excel**	**abtract**	slides from 2013 AFS conf
408007	Lower	6	McBride	6/3	Fish Kill recon, dead n. pike	below Vischer Ferry Dam	**excel**	**abstract**	same text as CV
408002	Lower	28	Zielinski	5/20	Fish Health collection	below lock E7 and VF Dam	**excel**	**abstract**	very short summary
407005	Lower	28	Linhart	5/30, 6/6	Fish Health collection (VHS)	below Vischer Ferry Dam, county border	**excel**	no	
406004	Lower	18	McBride	6/1	TSMP Collection, bbh for USGS	below Vischer Ferry Dam	**excel**	**abstract**	very short summary
405001	Lower	18	McBride	5/12 to 13	TSMP Collection	below E7 and E9 lock and dams	**excel**	**abstract**	very short summary
498004	Lower	18	McBride	5/17	TSMP collection	Niskayuna, below VF dam	**excel**	no	
492004	Lower	18	McBride	5/15	TSMP Collection	Clifton Park; below VF dam	**excel**	no	

SWFDB - statewide fisheries database, not including CV or cover details, abstracts, or TB (technical briefs)
SN - survey #, 1 digit DEC region, 2 digit year, 3 digit SN
Survey codes - see back of CV or cover page form
Fish species codes - see back of IF or BF forms, also NYS spp. list on excel
BBH - blueback herring; SMB - smallmouth bass; T - tributary; VF - Vischer Ferry
TSMP - toxic substance monitoring program; annual collections for analysis at Hale Creek Lab
Lock E - Erie Canal, NYS Barge Canal, or NYS Canal System locks
Border between upper/lower Mohawk = DEC Regions 4/6 border at county line near St. Johnsville, NY
Yellow text highlighted - sites near NYPA hydro-power facilities (Vischer Ferry, Crescent Lake Dams)
Text in red font above = data not included in the SWFDB (yet)!

Some 111 MR surveys listed below
55 MR surveys in the lower basin
19 of those surveys with data near a NYPA hydro
9 of those surveys with a summary doc

*survey data now provided on MS excel

ver. 12-13-19, smw

20191216-5001 FERC PDF (Unofficial) 12/15/2019 4:50:43 PM

John Cococcia, Niskayuna, NY.
Hello

I was just reading an article about possible ice jam study as related to the relicensing of the Vischer Ferry Dam (P-4679).

I live between the Visher Ferry Dam (Lock 7) and the Cresent Dam (Lock 6) on the Mohawk River. I believe it is IMPERATIVE that any review of ice jams related to Lock 7 (P-4679) also include a review of ice jams related to Lock 6 (P-4678). Often times, the ice and debris that flows over Lock 7 contributes to jams at Lock 6 which impacts all of the property and home owners along that stretch of the river. Making any recommendations related to Lock 7 must consider the impact to Lock 6 and the stretch of river between the two.

Thank you for taking my comment.

Regards,
John

20191217-3096 FERC PDF (Unofficial) 12/17/2019

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426
December 17, 2019

OFFICE OF ENERGY PROJECTS

Project No. 4678-052–New York
Crescent Hydroelectric Project

Project No. 4679-049–New York
Vischer Ferry Hydroelectric Project

New York Power Authority

VIA Electronic Mail

Mr. Robert Daly
Licensing Manager
New York Power Authority
Robert.Daly@NYPA.gov

Subject: Staff Comments on the Proposed Study Plan for the Crescent Hydroelectric Project and Vischer Ferry Hydroelectric Project

Dear Mr. Daly:

We have reviewed your proposed study plan for the Crescent Hydroelectric Project (Crescent Project) and Vischer Ferry Hydroelectric Project (Vischer Ferry Project), filed with the Federal Energy Regulatory Commission (Commission) on September 24, 2019. In addition to our verbal comments provided during the October 23, 2019, proposed study plan meeting, we are providing written comments pursuant to section 5.12 of the Commission's regulations. We anticipate that New York Power Authority (NYPA) will take our comments into consideration during development of the revised study plan, which must be filed with the Commission by January 21, 2020.

In the attached Schedule A, we provide comments on proposed studies and four additional information requests. In Schedule B, we request a new study on the potential effects of the Vischer Ferry Project on ice-jam flooding in the lower Mohawk River, in response to the concerns expressed over this issue at the study plan meeting by various stakeholders and in a letter filed by Assemblyman Phil Steck on October 22, 2019.

20191217-3096 FERC PDF (Unofficial) 12/17/2019

We appreciate the opportunity to comment on your proposed study plan for the Crescent and Vischer Ferry Projects. If you have any questions, please contact Jody Callihan at (202) 502-8278, or via email at jody.callihan@ferc.gov.

Sincerely,

John B. Smith, Chief
Mid-Atlantic Branch
Division of Hydropower Licensing

Attachments: Schedule A and Schedule B

20191217-3096 FERC PDF (Unofficial) 12/17/2019

SCHEDULE A

Comments on Proposed Study Plan (PSP)

Water Quality Study

1. In the PSP, you state the location of the water quality sampling sites within each project's impoundment and tailwaters will be based on consultation with New York State Department of Environmental Conservation (New York DEC) water quality staff. In the Revised Study Plan (RSP), please provide the results of this consultation, and include a map that shows the approximate locations of your proposed water quality sampling sites. Also, please indicate, in the RSP, the impoundment depth(s) at which you plan to deploy the data sondes that would be used to continuously monitor water temperature and dissolved oxygen (DO).

2. Water quality studies at hydropower projects commonly use 15-minute measurement intervals for continuously recording data sondes (i.e., water temperature and DO data are recorded every 15 minutes). Therefore, in the RSP, please explain why you propose to use a 30-minute rather than a 15-minute measurement interval for continuous measurements of water temperature and DO.

3. At the study plan meeting, there was a discussion of whether to collect water quality grab samples (surface waters) and impoundment depth profiles at weekly rather than monthly intervals (as proposed in the PSP). Therefore, in the RSP, please confirm your proposed sampling frequency (i.e., weekly or monthly) for water quality grab samples and impoundment depth profiles.

Fish Entrainment Study

4. You state that an Acoustic Doppler Current Profiler (ADCP) will be used to measure approach velocities in front of the projects' intakes during 'varying operational conditions.' In the RSP, please specify under what operation conditions (e.g., maximum hydraulic capacity of each project) these ADCP measurements would occur.

20191217-3096 FERC PDF (Unofficial) 12/17/2019

5. You propose to estimate turbine survival via a blade strike model.[1] In the RSP, please indicate if you plan on providing separate estimates of turbine survival for each turbine type (Kaplan and Francis) present at the projects.[2]

Blueback Herring Migration Study

6. You propose to conduct a single-season hydroacoustic study by placing split-beam transducers[3] at navigation locks E-6 (at the Crescent Project) and E-7 (at the Vischer Ferry Project) to assess the timing, duration, and magnitude of the upstream migration of adult blueback herring through these navigation locks. However, it is unclear how the results from this study would inform potential license conditions or relate to the management goals for blueback herring in the Mohawk River. For instance, is the study meant to provide information on run timing for the purpose of informing decisions as to when the navigation locks should be operated to optimize upstream fish passage? It is also unclear how estimates of run sizes would provide new information for the project record because it is well known that a sizeable spawning run of blueback herring occurs in the Mohawk River as previous fishery surveys upstream of the projects have caught hundreds to thousands of adults in the spring and early summer spawning season (generally May and June).[4,5] Therefore, in the RSP, please specify how the results of your proposed study would inform potential license conditions, provide new information for the project record, and relate to the management goals for blueback herring in the Mohawk River.

---

[1] Franke, G.F. and 9 others. Development of environmentally advanced hydropower turbine system design concepts. Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho. August 1997.

[2] Each project contains four turbines, two Kaplan units and two Francis units, each of which have the same specifications.

[3] Split-beam transducers send out acoustic signals into the water column and 'listen' for the for return signals. The characteristics of the return signals (amplitude, target strength, etc.) are used to estimate the number of fish in the vicinity of the transducers.

[4] http://www.asmfc.org/uploads/file/59c2ac1fRiverHerringStockAssessmentUpdateVolu meII_State-Specific_Aug2017.pdf

[5] Wells, S.M., Limburg, K.E., and C.D. Legard. 2013. Tracking blueback herring in the lower Mohawk River. AFS New York Chapter Meeting. February 2013.

20191217-3096 FERC PDF (Unofficial) 12/17/2019

7. You propose to study only the upstream component of the blueback herring migration in the Mohawk River (as described above) given that a number of previous studies have already evaluated the effectiveness of the downstream passage (acoustic deterrent) systems present at the projects. Although several studies have evaluated the effectiveness of the existing acoustic deterrent systems—which use ultrasonic (high-frequency) sound to divert juvenile and post-spawning adult blueback herring away from the powerhouses and towards surface openings in the projects' flashboards, certain information gaps remain, particularly at the Crescent Project due its more complex channel arrangement (a split channel upstream of the dams) compared to Vischer Ferry (single channel). First, the effectiveness of the acoustic deterrent system for adults at the Crescent Project, which was initially evaluated during a 2009 telemetry study,[6] has not been re-evaluated since the direction of the sound field was changed in 2010.[7] Thus, the effectiveness of the current deployment configuration is largely unknown for adult blueback herring at the Crescent Project. Secondly, despite the re-alignment of the sound field at the Crescent Project, the acoustic deterrent system still appears to be only partially effective at diverting juveniles as the diversion rate[8] in a 2012 study (3 to 27 percent after re-alignment)[9] was similar to that (20 percent) from a 2008 study conducted

[6] Effect of an ultrasonic system on adult blueback herring at the Crescent Hydroelectric Project: data report. Filed on March 15, 2010. Accession No. 20100315-5011.

[7] The direction of the sound field was changed in 2010 to penetrate farther up the east (non-powerhouse) channel in an attempt to divert more juveniles away from the powerhouse at the Crescent Project.

[8] The 'diversion rate' is the additional proportion of fish estimated to migrate down the east (non-powerhouse) channel due to the presence of the acoustic deterrence system (i.e., the proportion in excess of that expected based on the natural flow allocation between the two, east and west, channels alone in the absence of the sound field). For example, if 85 percent of the flow was down the powerhouse (west) channel, and the remaining 15 percent was down the non-powerhouse (east) channel, and 35 percent of juvenile blueback herring were estimated to move down the east (non-powerhouse) channel when the sound field was on, then the 'diversion rate' would be 20 percent.

[9] Unlike the first (2008) juvenile study, the second (2012) juvenile study calculated diversion rates for *both* the peak migration period (based on fish movement patterns) and entire study period; the 2008 study only included the latter (entire study period). This is why a range is presented for the diversion rates from the 2012 study.

20191217-3096 FERC PDF (Unofficial) 12/17/2019

prior to the re-alignment of the sound field.[10,11] Therefore, if you do not propose studies in the RSP to address these information gaps, please explain why you believe the existing information is sufficient to conclude that the current downstream passage system at the Crescent Project is effective for deterring both juvenile and adult blueback herring away from the project's turbines and passing safely downstream.

Aquatic Mesohabitat Study

8. As part of the Aquatic Mesohabitat Study, you propose to conduct field reconnaissance surveys along the projects' shorelines (littoral zones), in which you would note the occurrence of any freshwater mussels (and shell remains) or fish nests. However, you state that these field reconnaissance surveys would only be performed in areas that lack adequate (existing) aerial imagery data and would be used for the purpose of 'filling in' data gaps to create a comprehensive map of the various mesohabitats (wetlands, riparian, and littoral zones) present at the projects. Given these field surveys may cover a rather limited portion of the shoreline (depending on the quality and extent of existing aerial imagery data), it is unclear how the field component of this study would inform an analysis of potential project effects on freshwater mussels and fish spawning in the projects' impoundments. For instance, water levels in the project impoundments are drawn down 18 to 33 inches in the spring and fall for the purpose of installing and removing flashboards, which could cause desiccation of mussels and disrupt fish spawning activity. Therefore, in the RSP, please clarify how the study would inform potential project effects on mussels and fish spawning in the projects' impoundments.

Recreation Study

9. As part of the Recreation Study, you propose to use either trail cameras or spot counts to conduct use counts (page 41 of the PSP); and either a voluntary, self-administered box survey, or an intercept survey (page 42 of the PSP) to administer the recreation use survey. However, you do not describe the factors you will consider in deciding which method you will use, nor do you include a timeframe for making the decision. As discussed during the study plan meeting, please include in the RSP a description of the process you will use and any factors you will consider when making the determination on whether to use trail or spot counts, and self-administered or

[10] Dunning, D.J. and C.W.D. Gurshin. 2012. Downriver passage of juvenile blueback herring near an ultrasonic field in the Mohawk River. North American Journal of Fisheries Management 32:365-380.

[11] Gurshin, C.W.D., Balge, M.P., M.M. Taylor, and B.E. Lenz. Importance of ultrasonic field direction for guiding juvenile blueback herring past hydroelectric turbines. North American Journal of Fisheries Management 34:1242-1258.

20191217-3096 FERC PDF (Unofficial) 12/17/2019

intercept surveys. In your description, please also include a schedule for when these determinations will be made.

10. As part of the Recreation Study, you propose to conduct an inventory and condition assessment "at all non-commercial, public recreation sites that provide recreational access to project lands and waters." You also state that "the inventory will not include privately-owned recreation sites within and abutting the projects." As discussed during the study plan meeting, while a condition assessment of these commercial facilities is not necessary, it would be helpful to have an inventory of all the commercial facilities that also provide access to the projects. Therefore, in the RSP, we recommend that you revise the Recreation Facility Inventory description under Task 2 of the Recreation Study (page 40 of the PSP) to include an identification and description of all commercial recreation sites within the study area that also provide access to the projects.

Additional Information Requests (AIRs)

1. Some existing information on the presence and relative abundance of American eel in the vicinity of the projects was compiled and presented in the PAD. However, this information was from non-targeted surveys that were focused on characterizing the general fish community composition in the Mohawk River. During the study plan process, it has become apparent there are additional existing data from targeted eel surveys that have been recently completed in the Mohawk River and would help inform staff's Study Plan Determination regarding the need for field surveys to determine the relative abundance of American eel in the vicinity of the projects, such as the studies requested by the U.S. Fish and Wildlife Service and New York DEC. Therefore, please provide, in the RSP, the following data reports that were contained in a memorandum distributed by NYPA at the PSP meeting that listed the various documents and reports it has requested from New York DEC:

- USGS. 2015-2016. American eel in tributaries to the Mohawk River. The USGS, SUNY ESF, and DEC screening survey of tributaries for American eel.

- USGS. 2015. American eel *in* USGS Newsletter describing a study being conducted "in cooperation with NYDEC" to determine if American eel are present in the Mohawk River.

Also, at the PSP meeting, Michael Hreben of Kleinschmidt Associates indicated that eel catch data may exist from adult eel collection efforts (years 2009-2010) at the downstream School Street Project (FERC No. 2539) that were conducted to support post-licensing studies of fish passage effectiveness at that project. However, the final reports

20191217-3096 FERC PDF (Unofficial) 12/17/2019

associated with those efforts have not been filed with the Commission.[12] Therefore, if eel catch data (size, relative abundance, etc.) are available from the School Street Project, please provide that data in the RSP, as well as any other existing information regarding the presence, abundance, or distribution of American eel in the vicinity of the Crescent and Vischer Ferry Projects.

2. To inform staff's analysis of existing fish passage opportunities (for eels and blueback herring) afforded by the navigation locks associated with each project (E-6 at the Crescent Project and E-7 at the Vischery Ferry Project), please provide, for the past 10 years, to the extent such data are available, the monthly number of lockages at each project in each year. Also, please specify the hours of the day during which these locks operate.

3. As described above, hydroacoustic studies of juvenile blueback herring were conducted at the Crescent Project in 2008 and 2012. The manuscript reporting the results of the 2008 study included a table (Table 2) of the daily proportion of flow along with the expected and observed proportion of juveniles migrating down the east (non-powerhouse) channel. However, the report for the 2012 study does not contain such data on the daily proportion of flow and expected and observed number of juveniles moving down the east (non-powerhouse) channel. These data are needed by staff to fully interpret the results of the 2012 study—especially the results from the mobile hydroacoustic surveys that were conducted on certain dates for which there is no daily information on the relative flow distribution between the two channels.[13] Therefore, in the RSP, please provide, for the entire duration of the 2012 study (September 8, 2012 through October 26, 2012), the same daily information that was presented in Table 2 for the 2008 study.

4. At the Vischer Ferry Project, there are two separate 'notches' or flashboard openings (sections lacking flashboards) that provide downstream passage of blueback herring, one for juveniles and one for adults. Please clarify whether: (1) both notches are open for the entire duration of the navigation season or (2) if the juvenile notch is initially closed (i.e., its flashboard is in place) until the end of the adult migration season, at which time the adult notch is closed (its flashboard is installed) and the juvenile notch is opened (by removing its flashboard)? If the latter, how much time generally elapses between the

[12] See letter issued by the Commission on November 14, 2019. Accession No. 20191114-3026.

[13] To evaluate the effectiveness of the sound field in deterring blueback herring, these studies assume that, in the absence of a sound field, blueback herring migrate down each channel in direct proportion to the relative amount of flow down each channel (i.e., follow the bulk flow).

20191217-3096 FERC PDF (Unofficial) 12/17/2019

opening of the juvenile notch and closing of the adult notch (e.g., is this work done on the same day?) and on what dates does this switch generally occur?

20191217-3096 FERC PDF (Unofficial) 12/17/2019

SCHEDULE B

Additional Study Request

At the PSP meeting held on October 23, 2019, several stakeholders, including New York Assemblyman Phil Steck, commented that the Vischer Ferry Project exacerbates ice-jam flooding upstream of the project dam, including flooding in the Stockade Historic District. Comments concerning this issue were also filed with the Commission by several stakeholders. After reviewing the pre-application document (PAD), your comments on Scoping Document 1 that also provided supplemental information on flooding, and your proposed study plan, we have identified a gap between the information you provided and the information needed to assess project effects. As required in section 5.9 of the Commission's regulations, we have addressed the seven study request criteria for the study request that follows:

Ice-Jam Flooding Study

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to evaluate any project effects on flooding due to the formation of ice jams in the river reaches upstream of the Vischer Ferry Dam. The specific objectives of the study are as follows:

1. Characterize and understand ice-jam processes in the Mohawk River upstream of the project dam, including ice-jam formation, location of ice jams, and ice-jam-induced flooding.

2. Develop an ice-jam hydraulic model to evaluate the effects, if any, of the Vischer Ferry Project and its operation on ice-jam formation and flooding.

3. Identify structural and nonstructural options for the mitigation of ice-jam impacts if the project is shown to increase flood risk in any part of the study reach.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

20191217-3096 FERC PDF (Unofficial) 12/17/2019

Criterion (3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

Comments provided by the stakeholders indicate that there may be some potential for the project to influence ice-jam flooding upstream of the dam. On August 9, 2019, NYPA filed copies of a flooding study by the New York State Department of Environmental Conservation in 1979, and a flooding study by Gomez and Sullivan for NYPA in 2018. The 1979 flooding study, that included modeling, evaluated the effect the Vischer Ferry Dam has, if any, on flooding conditions under various river flows and under existing and modified conditions at the dam. The study concluded that Vischer Ferry Dam has no significant effect on flooding in Schenectady, New York. Although the report briefly discusses ice-jam flooding, it did not include any analysis or modeling related to ice-jam related flooding. The 2018 flooding study included a modeling analysis to evaluate several Vischer Ferry Dam crest modification options (i.e., lowering crest) on flooding in Schenectady, New York. The modeling included evaluation of these options under a range of flow conditions, and concluded that installing a variable crest control apparatus at the dam and using the most extreme option (i.e., dam crest reduced by 6 feet) would result in minor changes in water surface elevation in the Stockade Historic District under the 10-year flood flow and no significant changes to the water surface elevation or the depth of flooding under the 100-year and 150 percent of 100-year floods.

Both prior modeling studies evaluated dam operation and/or modification options for open-water flooding conditions and did not include hydraulic modeling analysis of ice-jam-induced flooding. Therefore, an analysis of the extent, if any, that the project contributes to ice-jam flooding is needed to identify and balance potential mitigation measures with their costs. As such, the study is relevant to the Commission's public interest determination.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

The Vischer Ferry Project impoundment extends 10.3 miles from the dam upstream to Lock E-8 in Schenectady, New York. Ice-jam flooding occurs in the low-lying areas along the Mohawk River, particularly in the vicinity of the Stockade Historic District in Schenectady (New York Department of Environmental Conservation, 2018). Ice-jam occurrences in the Stockade area, situated approximately 3 to 4 miles

20191217-3096 FERC PDF (Unofficial) 12/17/2019

downstream of Lock E-8, have been discussed in the published literature (Garver, 2018; Garver, 2014; Garver and Cockburn, 2009). The United States Geological Survey also collects information on water levels and other ice-jam related information as part of the Mohawk River Ice Jam Monitoring Program in this reach of the Mohawk River (https://www.usgs.gov/centers/ny-water/science/mohawk-river-lock-8-near-schenectady-01354330?qt-science_center_objects=0#qt-science_center_objects).

However, there is no information in the PAD, or in any other documents, that evaluates the potential effects, if any, of the Vischer Ferry Project on ice-jam flooding in this portion of the river. Therefore, a study is needed to formally analyze and evaluate project effects, if any, on ice-jam-induced flooding.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

As the project impoundment extends upstream of the areas where ice-jam flooding occurs, water levels in the river along those areas could be affected by project operation. The results of the study would help identify and evaluate the potential effect, if any, of the Vischer Ferry Project on ice-jam-induced flooding and help identify potential measures for alleviating such flooding conditions.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

This study should characterize ice jams in the study area, including the frequency and extent/severity of historic ice events, ice-jam formation, location of ice jams, and ice-jam-induced flooding. The study must develop a hydraulic model that can simulate ice jams in the affected areas. The model can be developed using readily available and accepted programs, such as the U.S. Army Corps of Engineers' Hydrologic Engineering Center's River Analysis System (i.e., HEC-RAS). The study area should extend from the project dam to upstream areas where project operation could no longer influence water level in the river. The model should be calibrated for both open-water and ice-jam conditions, which would involve field data collection during actual events. Model simulations should include the analysis for a full range of hydrologic and ice-jam conditions. The study should include an evaluation of various potential structural and nonstructural options for mitigating ice-jam-induced flooding conditions in the upstream areas of the project dam, including changes in project operation leading up to an ice-jam event.

20191217-3096 FERC PDF (Unofficial) 12/17/2019

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The cost of the Ice-Jam Flooding Study is estimated to range from $125,000 - $150,000, including study plan development, field data collection, model development and simulation, mapping, and study report preparation.

References

New York Department of Environmental Conservation. March 2018. Progress Report, Mohawk River Basin Action Agenda, Environmental Sustainability and Flood Hazard Risk Reduction.

Garver, J. I. March 2018. Ice Jam Flooding on the Lower Mohawk River and the 2018 Mid-winter Ice Jam, Proceedings from the Mohawk Watershed Symposium, Union College, Schenectady, New York.

Garver, J. I. March 2014. Insight from Ice Jams on the Lower Mohawk River, New York, Proceedings of the 2014 Mohawk Watershed Symposium, Union College, Schenectady, New York.

Garver, J. I. and J.M.H. Cockburn. March 2009. A Historical Perspective of Ice Jams on the Lower Mohawk River, Proceedings of the 2009 Mohawk Watershed Symposium, Union College, Schenectady, New York.

Document Content(s)

Delegated Letter_P-4678_and_P-4679_signed.PDF.....1-13

20191219-5022 FERC PDF (Unofficial) 12/18/2019 8:48:43 PM

Carol Delamarter, Schenectady, NY.
Stockade Association of Schenectady
32 Washington Ave
Schenectady, NY 12305

December 19, 2019
Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Vischer Ferry Dam Project #4679-049

Dear Secretary Bose,

Dear Secretary Bose:

The Stockade Association of Schenectady requests that NYPA revise their Study Plan submitted to FERC on September 23, 2019. A revised study plan must specifically address flooding issues related to the effects of the operation of Vischer Ferry hydroelectric project on flooding issues in the impoundment area of the Vischer Ferry dam.

The Stockade Association, established in 1958 and incorporated in 1973, is a 501 (c) (3) charitable organization and was formed to preserve, protect and improve the Stockade Historic District in Schenectady. The Historic Stockade, on the south shore of the Mohawk River, was designated a National Register historic neighborhood in 1973 and New York State's first historic district in 1962.

In reading the FERC Scoping Documents it is our understanding that in order for FERC to complete the relicensing process for Vischer Ferry Hydroelectric plant, FERC must have the information needed to complete an environmental assessment. This environmental assessment requires that all issues including flooding (Section 4.2.2 of SD 2) are analyzed. To do this NYPA must provide data that allows for a thorough and balanced assessment of all impacts of the project on resources. The NYPA Study Plan, as submitted, asserts there is sufficient existing information to allow FERC to evaluate flooding issues in order to complete an Environment Assessment. (Section 3.1.3 related to Criteria 4, 18 CFR 5.9 (b). The Stockade Association asserts this statement is incorrect and more study is required.

In its Study plan submission letter to FERC, NYPA asserts further study is not needed as the several studies they cite in Section 3.1.3 are adequate.

The work done by Shumaker and Rock (2019) for Phase 1 of the City of Schenectady flood project was cited by NYPA. Shumaker consultants have stated their investigation was limited and did not include any review of VFD operations on flooding in the Stockade. Because of funding for their City of Schenectady work, consultants were not allowed to make recommendations except in Stockade neighborhood. In PAD comments, Shumaker consultant, James Woidt recommended that a study be conducted that quantifies the frequency and magnitude of ice jamming on the Mohawk

River upstream from VFD and quantifies the impact of VFD operations on upstream flooding.

Another study referred to was work by USGS. Again it appears USGS modeling tools referred to by NYPA are monitoring ice jams and their backwatering between Lock 7 and 8 but have not addressed how adequately modifying the design and operations of Vischer Ferry gateless dam could mitigate the formation of backwatering and ice jams.

The NYSDEC Mohawk River Basin agenda referred to by NYPA, includes initiatives to better understand flooding throughout the entire Mohawk River Basin. To date, the area of the lower Mohawk River in question has not been analyzed nor is it clear that any DEC consultant workplan includes any study of the impacts of the 100 year old gateless dam on this section of Mohawk River Basin. NYPA is relying on an as yet unpublished DEC Mohawk River Basin report as sufficient for FERC to complete their Environmental Assessment.

The Gomez and Sullivan findings are being challenged in the comments submitted by several stakeholders. The models and scenarios used in the Gomez and Sullivan study did not assess modifications to dam crest and gates that could significantly change backwatering and localized flooding. Such modifications in dam operations combined with updated technology to forecast high water events throughout the basin could prevent local flooding to properties in Schenectady especially Historic Stockade, Scotia and SUNY Schenectady County Community College.

Relevant public interest considerations in regard to the proposed study- As stated here and by others the area known as the Stockade was listed on the National Register of Historic Places in 1973. It became New York State’s first historic district in 1962 and includes 390 properties covering approximately 90 acres. Because of the location of the Stockade neighborhood on the Mohawk River, it has had historic and cultural significance for the City of Schenectady since it was first settled in 1661 as a water gateway to the west. FEMA has recently designated that 60-75 residential structures are located in a special flood hazard area. Proposals to mitigate periodic flooding of these properties require elevating or moving structures that have been an important part of the historic and cultural fabric of the Stockade community. This disruption of National Registered buildings and cohesive neighborhood setting located in the VFD impoundment area (approximately 8 miles upstream) has not included any assessment of impacts from VFD operations. Section 106 of National Historic Preservation Act of 1966 (NHPA) requires that FERC, as a federal agency taking a licensing action and completing environmental assessment, must have sufficient information to determine that the operation of VFD will have no significant impact on this NR setting. In their Study Plan, NYPA has not provided assurances that the information needed by FERC to issue a finding of no significant impact from Vischer Ferry Hydroelectric operations is currently available without further study. Property owners in the Historic Stockade neighborhood are being asked to make decisions and costly investments for the future of their historic homes. The 100 year old Hydroelectric dam operations downstream of Stockade should also be required to study and

20191219-5022 FERC PDF (Unofficial) 12/18/2019 8:48:43 PM

make modifications to operations at VFD if it is found to reduce the impact on future flooding in the Mohawk River Basin.

20191220-5291 FERC PDF (Unofficial) 12/20/2019 3:20:36 PM

United States Department of the Interior

NATIONAL PARK SERVICE
NORTHEAST REGION
15 State Street
Boston, Massachusetts 02109-3572

IN REPLY REFER TO:

Comments on Proposed Study Plan and Responses to Aditional Information Requests
New York Power Authority

Crescent and Vischer Ferry Hydroelectric Projects, FERC P-4678, P-4679, Mohawk River, NY

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.R., Room 1A
Washington, DC 20426

December 20, 2019

Dear Secretary Bose:

The National Park Service (NPS) responds to the Proposed Study Plan (PSP) and Responses to Additional Information Requests (AIRs) for the Crescent and Vischer Ferry hydroelectric projects, located on the Mohawk River with powerhouses in the towns of Colonie and Clifton Park, New York. The PSP was prepared as part of an application for a new federal license. We offer the following comments based on the PSP, submitted by New York Power Authority (NYPA), the current licensee, on September 23, 2019, on information we obtained at the site visit on July 10, 2019, the joint agency meeting on July 11, at a study plan meeting organized by NYPA and attended by FERC staff on October 23, 2019, and FERC Staff Comments on the PSP of December 17, 2019.

2.7 Recreation Study

FERC's August 9, 2019 Requests for Additional Information and Study Requests specifies that that the Recreation Study should, at a minimum:

1. Inventory all formal and informal public and private recreational sites/facilities within and adjacent to each project's boundary [page 13, Criterion (6) item 1]
2. Administer a recreation use survey that addresses all recreation activity types known to occur or potentially occur at each project.
    - The survey instrument should include items to assess visitor perceptions of crowding, recreational conflict, conflicts between the public and adjacent property owner(s), adequacy and placement of signage, adequacy of recreation facilities and access to the projects, and effects of project operation and management on recreation and recreation opportunities at the projects (e.g., fluctuating reservoir levels).[page 14, Criterian 6, item 2, 3rd bullet]

By contrast, NYPA's proposed Recreation Study is limited to "non-commercial public recreation sites, facilities, and amenities" (PSP 2.7.1, .3, .7). While the emphasis on publically available facilities and activities is appropriate, it is overly restrictive given the nature of on-water and shore-side recreational activities within the boundaries of these two projects. Recreation is very different at Crescent and Vischer Ferry than at most hydro projects in northeast, which are located in comparatively remote areas. The New York State Department of Public Works constructed these facilities during the 1920s as adjuncts to Barge Canal development. Their waters are used for commercial tug and barge traffic, small cruise ships, tour boats and private watercraft ranging from stand-up paddleboards to large motor yachts.

20191220-5291 FERC PDF (Unofficial) 12/20/2019 3:20:36 PM

In addition to about a dozen formal and informal public access facilities within the project boundaries, there are at least five commercial marinas or boat clubs on the Crescent impoundment and four on the Vischer Ferry impoundment along with at least three boathouses and docks for university, school, and/or club rowing teams. While these commercial and club facilities are not public, they serve a large number of recreational users.

We do not propose the same level of Site Use and User Survey for marinas and clubs that NYPA proposes for project recreation sites, but they should be included in the Recreation Facility Inventory. The level of additional effort will be small. All docks and facilities on this section of the Mohawk River are required to have a Use and Occupancy Permit from the Canal Corporation. Additional information about marinas and boat clubs appears in the Canal Corporation's *Cruising Guide,*(2006), Richardson's *Hudson River & Adjacent Waterways Chartbook & Cruising Guide*, 3rd Ed.(2013), and the *New York State Canalway Water Trail Guidebook* (Waterford, NY: Erie Canalway National Heritage Corridor, 2019) pp 186-205.

Floating mats of invasive water chestnut in the Crescent and Vischer Ferry impoundments render some access points unusable by mid-summer each year. The Inventory and Study Report should recognize late season limitations to access at particular sites and address the impacts of non-native species on recreational use. The Recreation Management Plan should propose measures to manage water chestnut on project waters.

The NYS legislature authorized transfer of the Canal Corporation from Thruway Authority to NYPA in April 2016 and the change became effective January 1, 2017. The Canal Corporation is now listed as a subsidiary of the New York Power Authority so any action by Canal Corp is effectively an action by the licensee. Since NYPA took control of Canals the annual navigation season has been shortened by several weeks at either end. Further changes to navigation on the Mohawk are currently being discussed under a NYPA initiative called "Re-Imagine the Canals." Some plans submitted by BuroHaphold, NYPA's principal consultant on the Re-Imagine initiative, recommend full or partial closure of segments of the canal system. Those changes would eliminate through traffic for both commercial and pleasure vessels and would certainly have an impact on recreational use within the project boundaries.

While they were once separate entities within state government, operational changes by the Canal Corporation now have a direct effect on recreational use and access at FERC licensed projects operated by its parent. The Recreation User Survey and Study Report and the resulting management plan should address the effects.

The NPS appreciates the opportunity to comment on the PSP and looks forward to providing assistance to the applicant. Any comments or questions should be directed to the undersigned at Duncan_Hay@nps.gov or by phone at 617-223-5056.

Sincerely

Duncan E. Hay
Hydropower Licensing Specialist
National Park Service, DOI Region 1

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits
625 Broadway, 4th Floor, Albany, New York 12233-1750
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www.dec.ny.gov

December 20, 2019

New York Power Authority (NYPA)
Attn: Mark E. Slade, Licensing Director
123 Main Street
White Plains, NY 10601

RE: Proposed Study Plan Comments and Study Requests
NYPA Projects
Crescent Hydroelectric Project (FERC No. 4678)
Vischer Ferry Hydroelectric Project (FERC No. 4679)
Town of Colonie, Albany County
Towns of Clifton Park and Halfmoon, Saratoga County
Town of Niskayuna, Schenectady County

Dear Mr. Slade:

The New York State Department of Environmental Conservation ("NYSDEC" or "Department") is submitting comments on the September 23, 2019 Proposed Study Plan and Response to Additional Information Request submitted by the New York Power Authority ("NYPA" or "Applicant") for relicensing the existing Crescent Hydroelectric Project (FERC No. 4678) and Vischer Ferry Hydroelectric Project (FERC No. 4679). The two projects, collectively referred to as the "NYPA Projects", are located on the Mohawk River with the Crescent Project located in Albany, Schenectady, and Saratoga Counties, New York and the Vischer Ferry Project located in Albany and Schenectady Counties, New York.

A Proposed Study Plan public meeting was held to discuss the NYPA projects on October 23, 2019 at the Hilton Garden Inn, Albany Airport, Albany, NY. In attendance at this meeting were representatives from the Federal Energy Regulatory Commission ("FERC"), NYPA, their consultant Kleinschmidt, USFWS, NYSDEC, Riverkeeper, other non-governmental agencies as well as interested members of the public. The purpose of the meeting was to present the proposed study plan, address questions, and accept comments and requests from those in attendance in preparation for official submissions of responses to the proposed study plan.

Comments on the Proposed Study Plan

The Proposed Study Plan is generally well-organized and addresses many of the several key issues for the NYPA Projects. NYSDEC offers the following comments and recommendations on the proposed studies:

I. Water Quality Study

NYPA proposes to conduct continual monitoring of Dissolved Oxygen (DO) and water temperature at 30-minute intervals. NYSDEC requests that these parameters be continually monitored at 15-minute intervals.

NYPA also proposes to conduct monthly water quality profile sampling, NYSDEC requests that NYPA conducts weekly water quality profile sampling. This could be accomplished at the same time the weekly spot checks and calibrations of the meters are conducted.

Following participation in an additional teleconference on December 17, 2019 with staff from NYSDEC, USFWS, NYPA and Kleinchmidt, NYSDEC would also like to request the addition of bypass monitoring sites. There should be two bypass monitoring sites at each of the NYPA Projects. Staff is requesting two because of the large size of the Mohawk River. At the Crescent project, one should be sited below Dam A and the other should be sited below Dam C. At the Vischer Ferry project, one should be sited below Dam D and the other should be sited below Dam F. NYSDEC would also like to request that the location of the tailwater monitoring site at both of the NYPA Projects be located not immediately at the outflow, but further downstream so that it may capture the outflows of all turbines under all possible operating scenarios.

II. Fish Entrainment Study

NYSDEC agrees with the proposed study but wishes to express the strong desire that the study includes both the Kaplan and the Francis turbines and both the Crescent and Vischer Ferry locations for analysis. While both locations are similar, there are different environmental variables that may impact which fish could be entrained. Likewise, Francis and Kaplan turbines do not operate within the same ranges and should be equally investigated.

III. Blueback Herring Migration Study

Based on a follow-up phone call held on November 7, 2019 including NYPA, Kleinschmidt, NYSDEC, USFWS and FERC, NYSDEC agrees that there is a large data pool already available for juvenile Blueback Herring and their interaction with the NYPA projects. NYSDEC currently has a greater interest and concern, at this time, in adult Blueback Herring and their interaction with the NYPA projects. As such, the currently proposed study and its goals to assess the timing, duration, and magnitude of the immigrating adults is acceptable; however, NYSDEC is also interested in assessing the timing, duration, magnitude of the emigrating adults as well as downstream mortality. The relationship between the NYPA projects and the adult Blueback Herring population, particularly during their outmigration, is incredibly important to assessing the impacts on the fishery.

NYSDEC requests that the monitoring commence just prior to the opening of the Canal System in April, when the canal will be in operation for use of the deployment of navigational buoys and other equipment for the canal season which fish may be take advantage of for migratory purposes. It is also requested that the monitoring continue into October, to assess the downstream migration. NYSDEC would also like to request that some adult Blueback Herring be collected and equipped with acoustic tags. These fish could be collected from just prior to or within the canal flight so that they can be captured moving past the first hydroacoustic array and again when they are emigrating from the Mohawk River. Tagging in the locks may prevent loss of tagged fish due to “fallback”, the moving of fish back downstream due to a stress event, but it may also present bonus data on how lockages affect migrating Blueback Herring and mortality from exposure to multiple lockages.

Understanding that the proposed study is already quite large and will be demanding of resources, NYSDEC suggests the creation of a fund that can be awarded in the form of a competitive grant to educational facilities to conduct an acceptable study(ies) in lieu of additional requests. This could relieve NYPA with some of the burden NYPA while also delivering

additional data to the resource agencies, which will further inform management of the Blueback Herring stock and how it may relate to the NYPA projects.

IV. Fish Community Study

NYSDEC agrees with the proposed study and has no further comments.

V. Aquatic Mesohabitat Study

NYSDEC agrees with the proposed study but would like to request that the study being conducted take into account the differences in water level when the flashboards are both in place and removed. This could be accomplished by making field observations during the summer field season and again in the fall after the flashboards have been removed and the impoundments have responded to the change in elevation.

VI. Bald Eagle Study

NYSDEC agrees with the proposed study and has no further comments.

VII. Recreation Study

NYSDEC agrees with the proposed study and had no further comments.

Study Requests

The New York State Department of Environmental Conservation requests that the Applicant conduct the following studies:

I. American Eel Study

American eel (*Anguilla rostrata*) has a wide range across the Eastern United States and New York State where it is native in 17 of the 18 watersheds in the state. Eel runs, in which young-of-year juvenile eels known as elvers migrate into freshwater habitat, have long occurred with elvers scaling waterfalls and the faces of dams to access more habitat further inland. Despite their robust nature, the American eel population has been steadily in decline and the construction of dams and the operation of hydropower projects are some of the contributing factors. American eels are not known to travel well through the canal lock system and may even show a preference for dam sites during their upstream migration in the spring. As the American eel has been documented in surveys to inhabit the Mohawk River Watershed, a study is needed to ascertain the presence and abundance of eels and the need to provide them a better mode of passage.

NYPA has proposed to conduct an American eel study following the results of the Fish Community Study, however NYSDEC strongly disagrees with hinging the conducting of the American Eel Study on a desktop analysis of previously conducted sampling and studies. The vast majority of the available material for review involves sampling methodologies that were developed for targeting specific species of fish, namely black bass and other sportfish. This presents the problem of a sampling bias and perhaps also gear bias. While American eel have been caught during some of these sampling efforts, it has been as limited bycatch. The behavior of the American eel is not comparable to the behavior of a Smallmouth Bass (*Micropterus salmoides*), for example, and their reaction to receiving an electric shock is more often to dig and burrow down into available substrate than to rise to the surface where scapers can net the fish for data collection. Moreover, the Mohawk River is a large and turbid river with great width

and depths, which makes the use of boat electrofishing for the purpose of sampling eel all the more difficult.

1. *Goals and Objectives*

   The goals and objectives of this study are to assess the presence and relative abundance of American eel elvers in the NYPA Projects area and assess the need for eel ladders to improve successful and safe upstream passage.

2. *Resource Management Goals*

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

   There is a pre-proposal currently available for public review and comment which will elevate the American eel from a species of conservation need to a species of special concern in New York State (https://www.dec.ny.gov/regulations/34113.html).

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   Although caught in low numbers in the past couple of decades, fishery surveys have continued to collect mature American eels while sampling. There are also historical records of American eel caught in the Mohawk River and adjacent tributaries as referenced by Greeley (1935) in the Atlas of Inland Fishes of New York (Carlson et al. 2016)[1]: "…in waters above barriers eels are much less numerous, but sufficient numbers ascend the Mohawk…" and by Dittman et al. (2009c) that there had been commercial harvests of eel above Cohoes Falls in the Mohawk River during the colonial period.

   More recent records of American eel presence in the Mohawk River come in the form of bycatch from other fish sampling efforts, usually black bass and other sportfish, but also Blueback Herring. There have been limited to no concentrated efforts to sample American eel in the Mohawk River. They have been caught as far upstream as downstream of the Blenheim-Gilboa Dam on the Schoharie Creek (NYSDEC Survey #490009) and downstream of Newport Dam on the West Canada Creek (NYSDEC Survey #688202). They have also been caught in high numbers (100 individuals) above the NYS Dam (FERC No. 7481) in its impoundment and included all mature adults (NYSDEC Survey #490012). While often caught in small, limited amounts, American eel have been caught in the project area of the NYPA projects such as the tailwater of Vischer Ferry (NYSDEC Survey #413005).

[1] Carlson, D.M., R.A. Daniels, and J.J Wright. 2016. Atlas of Inland Fishes of New York. NYS Education Department and NYSDEC. Pg. 28-30.

According to the 2017 American Eel Stock Assessment Update by the Atlantic States Marine Fisheries Commission[2], there is evidence of a trend of neutral or declining abundance of eels and that the stock is depleted. This is a cause for concern as the eel is important for both its ecological and commercial value. The New York State freshwater stock of eels, from the elver through the yellow and to the silver eel life stage, are of great concern and as a result NYSDEC is considering the proposal of raising the species to the status of a species of concern in the state and begin to afford it some additional protection. Additionally, the American eel is on the IUCN red list of threatened species as endangered.[3]

There is an ongoing USGS study to evaluate the status of American eel populations in the Mohawk River basin, however it is not expected to be completed until March 2021 and no data is currently available.[4] This study will use American eel DNA to determine presence and abundance based on a model created using known eel populations in other Hudson River tributaries.

5. *Nexus to Projects Operations and Effects*

Both NYPA Projects have constructed dam structures which pose a migratory hurdle for the American eel in their upstream migration as elvers. While elvers may be able to ascend the dam face, they are also put at a higher risk of predation and will have to expend additional energy to do so. They may stage at the foot of the dam and then ascend by crawling up the face of the dam with slow and steady progress in order to surmount the dam and have access to upstream habitat.

6. *Methodology Consistent with Accepted Practice*

The sampling of eels should be conducted through the deployment of eel traps and eel mops to determine staging of upstream migration and relative abundance of elvers. The recommended study uses standard sampling techniques such as those used by Kleinschmidt in the relicensing of the Parr Hydroelectric Project (FERC Project 1894) [5], utilizing an eel ramp pass trap design as developed by Haro (2006). Consultation with NYSDEC and USFWS will help to refine the number, size, and placement of the eel traps and eel mops.

Traps and mops should be in place by the end of April to ensure that they will function well and be available to collect any early arriving immigrating elvers. Traps should be checked at regular intervals; once a week at numbers less than 50 and daily at more than 50 individuals. Collected eels should be enumerated and have their length and life stage recorded. All elvers should be released upstream and any mature eels released downstream of the associated NYPA project dam. Traps should be removed in October.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The level of effort would involve one field crew. The study would last for one field season, two if abnormally high flows damage the sampling gear and disrupt the study. The actual cost is unknown and would depend upon the cost of sampling gear, number

[2] http://www.asmfc.org/species/american-eel
[3] https://www.iucnredlist.org/species/191108/121739077
[4] https://www.sciencebase.gov/catalog/item/5d70f37ee4b0c4f70cfcb202
[5] Kleinschmidt. 2016. American Eel Abundance Study Report: Parr Hydroelectric Project (FERC Project 1894). Kleinschmidt. Lexington, S.C.

of sampling locations, local labor costs, the ability to combine multiple studies (e.g., fisheries, mussels, and water quality) into one task, etc. The existing literature provided in the PAD (Section 4.4.2.3) is inadequate to fully address the NYPA projects impacts and the proposed Fish Community Study would not be truly representative of the American eel population in the Mohawk River. The Applicant has the flexibility to design the most cost-effective way to acquire the necessary data and may combine efforts with other study efforts but is encouraged to continue to consult with the resource agencies and FERC.

We appreciate the opportunity to comment. If you have any questions or would like to discuss further, please feel free to contact me at 518-402-9179 or michael.higgins@dec.ny.gov.

Sincerely,

Michael Higgins
Project Manager
Bureau of Energy Project Management

CC: Nicole Cain, NYSDEC, Bureau of Ecosystem Health
Chris VanMaaren, NYSDEC, Region 4
Mary Anne Bonilla, Office of General Counsel
Scott Wells, NYSDEC, Region 4
William Eakin, NYSDEC, Region 3
John Wiley, USFWS

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Phil Steck, Albany, NY.
PHIL STECK
Member of Assembly, 110th District

December 20, 2019

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE
Washington, DC 20426

RE: Docket # P-4678 and P-4679

Dear Secretary Bose:

On behalf of my constituents in the 110th Assembly District, I would like to thank FERC for its recent comments to NYPA regarding proposed studies on the potential effects of the Vischer Ferry Project on ice-jam flooding in the lower Mohawk River.

Additionally, as mentioned in our original submission, we would like to re-emphasize our request for a full analysis of the Crescent and Vischer Ferry dams effects on water quality along more than 20 miles of the Mohawk River. Specifically, I would like to request the addition of chlorophyll and nutrients to the list of parameters to be include in its water quality study. Water quality in these impoundments affects algal growth, which in turn can affect drinking water quality and/or treatment costs by increasing the risk of formation of disinfection byproducts or harmful algal blooms (HABs). More than 100,000 people in Colonie and Cohoes rely on the Mohawk River as a drinking water source, and more than 120,000 people in Niskayuna, Schenectady, Scotia, Glenville, Rotterdam and Ballston rely at least in part on aquifers under the influence of Mohawk River water.

Thank you for your kind consideration of this request.

Sincerely,

Phil Steck
110th Assembly District

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December 20, 2019

Via Electronic Filing

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE
Washington, DC 20426

Re: Comments of Riverkeeper, Inc. on NYPA's Proposed Studies for the Crescent Hydroelectric Project (P-4678-052) and Vischer Ferry Hydroelectric Project (P-4679-049)

Dear Secretary Bose,

Riverkeeper appreciates this opportunity to comment on the proposed environmental studies as part of the relicensing applications for the Crescent and Vischer Ferry Dams (FERC Nos. 4678 & 4679, respectively), located on the Mohawk River in Saratoga, Albany, and Schenectady Counties, New York.

A. Background on Crescent and Vischer Ferry Dams' Impacts

The Crescent and Vischer Ferry dams affect water flow and quality along approximately 20 miles of the Mohawk River from Schenectady to Cohoes, and are part of a canal system that has drastically altered hundreds of miles of the Mohawk River. These dams impede migration of herring and American eel, and can maim or kill fish passing through the turbines. The dams create lake-like pools of slow-moving or still water, which can concentrate pollutants, and threaten drinking water quality for as many as 250,000 people who rely on the river or its associated aquifer as a water source.

The Crescent and Vischer Ferry areas include multiple pollution sources, including wastewater treatment plant outfalls, urban areas that shed street water runoff directly into the river, and agricultural land that can contribute pollutants like sediment and fertilizers. The conjunction of these pollution sources and water uses makes it extremely important to understand the roles these two dams play, individually and cumulatively, in the ecosystem. By controlling the flow of

water, the operations of these dams have the potential to affect many physical and biological properties and processes in the Project Area.

In addition, changes in flow, temperature and precipitation due to climate change will have a significant impact on water quality and flooding risks. Climate change was not included in Scoping Document 1, Scoping Document 2, or the Proposed Study Plans. However, the issue was raised in public comment at the Study Plan meeting on October 23, 2019, and its relevance underscored by the "Halloween Storm" of October 30-31, 2019, which caused severe flooding and extensive damage throughout the Mohawk Valley, and prompted the National Weather Service to warn of a "potential dam failure condition" at the Trenton Falls Dam on West Canada Creek in its Flood Watch.[1]

Riverkeeper's comments and study requests seek to ensure that the relicensing process includes a thorough and comprehensive examination of impacts, to facilitate the Federal Energy Regulatory Commission's (FERC) development of license requirements that will lessen the harmful impacts of these dams on the Mohawk River and its life.

B. Comments on Proposed Water Quality Study

FERC's Scoping Document 2 (SD2), released on September 20, 2019, recognizes the importance of cumulative impacts from hydropower facilities and wastewater treatment facilities on drinking water supplies.[2] Riverkeeper appreciates that FERC has acknowledged additional information provided in our comments and comments from other parties. The importance of considering diverse and cumulative impacts is also reflected in the geographic scope of FERC's proposed environmental assessment. The geographic scope for cumulative impacts includes "the Mohawk River from the Vischer Ferry impoundment to its confluence with the Hudson River because this relatively short (15-mile) reach of the river contains five hydropower projects ***and numerous wastewater treatment facilities***, the operation of which may cumulatively affect water quality

[1] National Weather Service, *October 31-November 1, 2019 Record Flooding and High Winds*, https://www.weather.gov/aly/Halloween2019Storm; Glenn Coin, *Dam Failure Possible in Oneida County: Weather Service*, syracuse.com (November 1, 2019), https://www.syracuse.com/weather/2019/11/dam-failure-possible-in-oneida-county-weather-service.html.

[2] FERC, Scoping Document 2 for the Crescent Hydroelectric Project § 4.1.2, P-4678 and Vischer Ferry Hydroelectric Project, P-4679 (2019) (*hereinafter* Scoping Document 2).

and ***drinking water supplies in the identified area***."[3] NYPA must update its water quality study proposal to reflect the geographic and substantive scope of concerns identified by FERC in SD2.

The New York Power Authority's (NYPA) water quality study proposal is based on the false premise that "water quality immediately upstream and downstream of the dams and powerhouses has not been evaluated for many years."[4] Beginning in 2016, the New York State Department of Environmental Conservation (NYSDEC) and the United States Geological Survey (USGS) collected extensive water quality data and discharge measurements at 30 sites in the Mohawk River.[5] This sampling was a first step in the development of a TMDL for the river, and NYSDEC and USGS are currently engaged in the process of developing, testing and applying hydraulic and water-quality simulation models that cover the Project Area.[6] Not only is there a study of the water quality, but in fact these models have been built upon NYPA's own flood warning models.[7]

The most recent water quality assessments must be used as the basis of the Water Quality Study Plan. As stated in Riverkeeper's comments submitted August 9, 2019, NYSDEC's Waterbody Inventory/Priority Waterbodies List for the Mohawk River in the Project Area was last updated in 2010, and does not reflect more recent data. Nor does the proposed study plan reflect the most recent information. Data presented by NYSDEC and USGS at the 2017 Mohawk Symposium showed that "chlorophyll-a exceedance of guidance values does not appear to become an issue until … the area of Amsterdam – Cohoes."[8] The authors concluded that the "results may suggest a complex interaction between nutrient concentrations, altered flow regime due to the canal

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[3] Scoping Document 2, § 4.1.2. (Bold and italic type reflect revisions from Scoping Document 1, as noted by FERC in SD2).

[4] NYPA, Crescent Hydroelectric Project, FERC Project No. 4678, Vischer Ferry Hydroelectric Project, FERC Project No. 4679, Proposed Study Plan and Responses to Additional Information Requests § 2.1.5 (2019) (*hereinafter* Study Proposal).

[5] USGS, *Surface-water Quality in the Mohawk River Basin (Pilot RIBS/TMDL)*, https://www.usgs.gov/centers/ny-water/science/surface-water-quality-mohawk-river-basin-pilot-ribstmdl?qt-science_center_objects=0#qt-science_center_objects.

[6] USGS, *Mohawk River Basin Water Quality*, https://www.usgs.gov/centers/ny-water/science/mohawk-river-basin-water-quality?qt-science_center_objects=0#qt-science_center_objects

[7] Alexander J. Smith & Elizabeth Nystrom, *Enhanced Water Quality Monitoring in Support of Modeling Efforts in the Mohawk River Watershed* in Proceedings from the 2017 Mohawk Watershed Symposium, Union College, Schenectady NY (J.M.H. Cockburn & J.I. Garver eds., 2017).

[8] *Id.*

system, and the build-up of suspended algae in downstream impoundments."[9] The impoundments referenced include those behind the Vischer Ferry and Crescent dams. We respectfully request that NYPA increase its coordination with NYSDEC, particularly the Mohawk River Basin Program and the Stream Monitoring and Assessment Section, when revising the Water Quality Study Plan, to ensure that the most recent water quality assessments are used as the basis of the plan.

In the Study Proposal, NYPA acknowledges that "certain water quality parameters, particularly [dissolved oxygen (DO)] and temperature, can be affected by the operation of hydropower projects," and that information about these parameters is "needed to confirm that the Project operations are not having adverse effects on river water quality, and that Project discharges meet applicable water quality standards for these parameters."[10] In comments submitted August 9, 2019, Riverkeeper requested a water quality study that would also include collection of chlorophyll and nutrient data, including sites located near drinking water intakes, and throughout the year to reflect a broad range of conditions and the year-round withdrawal of drinking water.[11]

In response to Riverkeeper's request, NYPA stated that chlorophyll and nutrients are "not related to Project operations."[12] This is incorrect because project operation impacts on chlorophyll--a measure of algal/cyanobacterial biomass--and nutrient concentrations within the project area are analogous to the impacts on DO and temperature.

The impoundment is defined as part of the project facility.[13] Temperature is related to hydropower operations because solar radiation heats the surface layer of the water, and this effect is more pronounced in slower-moving waters, such as impoundments formed by dams. Dissolved oxygen is closely related to photosynthesis and respiration. Near the water's surface, DO is produced through photosynthesis, largely by planktonic algae and cyanobacteria, whereas DO is consumed through respiration, largely by bacteria, at depth. The presence of nutrients, primarily nitrogen (N) and phosphorus (P), promote photosynthesis. When algae and

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[9] *Id.*
[10] NYPA, Study proposal, § 2.1.5.
[11] Riverkeeper, Comments of Riverkeeper, Inc. on the Scope of Environmental Review and Study Requests for the Crescent Hydroelectric Project (P-4678-052) and/or Vischer Ferry Hydroelectric Project (P-4679-049), § 5 (2019).
[12] NYPA, Study Proposal, Appendix B.
[13] NYPA, Crescent and Vischer Ferry Hydroelectric Projects Pre-Application Document FERC No. P-4678 & P-4679 § 3.3 (2019).

cyanobacteria die, they sink toward the river bottom, where DO is consumed during decomposition. The more biomass that is available at the bottom of the river, the more respiration may occur, and the more DO can be depleted. Due to these relationships, vertical (depth) profiles of DO and temperature provide some information about biological activity. Nutrients and chlorophyll a are interrelated components of the aquatic ecosystem. It is unreasonable to acknowledge the need to study the effects of hydropower operations on DO and temperature, and simultaneously claim that nutrients and chlorophyll "are not related to project operations."[14] The importance of studying chlorophyll and nutrients is validated by the existing water quality information and analysis by NYSDEC and USGS, and the ongoing use of surface water and hydraulically connected groundwater in the Project Area by approximately 250,000 people. Chlorophyll and nutrients are of greater concern for drinking water quality, whereas dissolved oxygen and temperature are more of concern to aquatic life. Both of these impacts are important.

The Mohawk River is known to be impaired under the Clean Water Act due to excess phosphorus. NYSDEC is developing a TMDL in order to reduce the risk of harmful algal blooms, disinfection byproduct formation and other water quality concerns that result from excessive nutrients. NYSDEC has also initiated a drinking water source protection program in the Mohawk River watershed and launched a study of disinfection byproduct formation potential.[15] NYPA should heed these concerns by including chlorophyll and nutrients as part of its water quality study to assess how hydropower operations influence water quality in this portion of the Mohawk River.

When revising the study plan, NYPA must gather all the relevant information, and should work closely with NYSDEC to design a water quality study that will comprehensively address known water quality issues in the project area.

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[14] NYPA, Study Proposal, Appendix B.

[15] Brian Nearing, State wants sewer system fixes to protect Mohawk, Albany Times Union, January 18, 2019, https://www.timesunion.com/business/article/State-wants-fixes-at-sewer-systems-Albany-13541579.php; Andrea Conine, Michaela Schnore, Zachary Smith, Gavin Lemly, Charles Stoll, and Alexander Smith, *Characterization of disinfection by-product formation potential in Mohawk River source waters to support TMDL implementation* in Proceedings from the 2019 Mohawk Watershed Symposium, Union College, Schenectady NY (J.M.H. Cockburn & J.I. Garver eds., 2019).

C. Comments on Proposed Fish Studies

The American eel is a native migratory species that has inhabited the Mohawk River and its watershed since the last glacial minimum. The presence of the Fall at Cohoes is not a sufficient barrier to prevent eels from entering the Mohawk River. Historical references denote the importance of the species to people who inhabited the Mohawk River Valley as represented by the Mohawk tribes, who maintained totemic eel clans as a fundamental kinship unit,[16] and by the hamlet of Alplaus, which receives its name from the Dutch word Al Plaats, or "Place of the Eels."[17] Furthermore, archaeological evidence cites the presence of eel weirs in the river from which Native Americans captured eels.[18] Therefore, it is reasonable to conclude that American eels have inhabited the Mohawk River for thousands of years and that eels were a commonly encountered migratory fish before the dams and other hydropower facilities contributed to their decline.

More recently, the presence of eels in the Mohawk River has been confirmed by NYSDEC, incidental to fish surveys designed to target other species over the past 30 years, and most recently in 2018, whereby the presence of a large, female silver eel was documented in the impoundment of the Project Area[19]. However, any out-migrating silver eels in the Project Area would have to negotiate the dams and the turbines of the Crescent and Vischer Ferry hydroelectric facilities before exiting the Mohawk River system. Eels in the Project Area are likely to be seriously impacted by the dams and may be delayed, entrained, or killed by the presence of the Vischer Ferry and Crescent Dams and other hydropower facilities, as has led to the decline of their species across its range.[20]

At the present, we do not have adequate information to understand eel density and distribution patterns in the Project Area. NYSDEC has acknowledged a lack of information pertaining to the density, distribution, and the factors driving the distribution of American eel in the Mohawk

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[16] C.M. Barbeau, Iroquoian Clans and Phratries, American Anthropologist New Series 19(3), 392-402 (1917).
[17] https://www.alplaus.org
[18] American Ancestry: Embracing lineages from the whole of the United States. 1888[-1898. Ed. by Frank Munsell
[19] USGS, *Status of American Eel Populations in the Mohawk River Basin*, https://www.usgs.gov/centers/ny-water/science/status-american-eel-populations-mohawk-river-basin?qt-science_center_objects=0#qt-science_center_objects. (*hereinafter* USGS American Eel Population Status)
[20] Atlantic States Marine Fisheries Commission, *2017 American Eel Stock Assessment Update* (2017) (*hereinafter* ASMFC 2017 Eel Assessment).

River.[21] What is known is that hydroelectric dams have been constructed in many rivers where eel populations were historically present, and it is recognized that these structures have contributed to habitat inaccessibility and the general decline of the species.[22] Accordingly, we find the proposed study plan for American eel insufficient in scope and scale, sampling design, and most importantly shows insufficient concern for the historical and current presence of this species, which has likely been seriously harmed by the production of electricity on the Mohawk River. The proposed study plan suggests that American eel rarely occur in the Mohawk River and in the vicinity of the Project Area. This statement is inaccurate. USGS states that "[t]he presence of eel in this basin has been confirmed only by a handful of [NYSDEC] fish surveys (aimed at sampling other species) over the past 30 years and that the density and distribution of American eels are largely unknown in this watershed."[23]

Accordingly, the NYSDEC's Mohawk River Basin Draft 2018-2022 Action Agenda clearly states that it is necessary to:

- "Investigate and gather baseline information to better understand the spatial distribution and condition of existing populations.
- Conduct watershed-wide surveys to determine the status of American eel in the Mohawk River and tributaries. Identify prime eel habitat and identify limiting factors for juvenile migration into the watershed.
- Implement a project similar to the "Hudson River Eel Project: Citizen Science Juvenile American Eel Survey" to document the movement of glass, yellow, and silver life stages of American eel within the Mohawk River and tributaries. Augment the proposed citizen science program with additional academic research of these life stages.
- Develop and implement comprehensive management actions that help grow, recover, or restore migratory fish populations that are struggling or on the edge of local extirpation."[24]

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[21] USGS American Eel Population Status.
[22] ASMFC 2017 Eel Assessment.
[23] USGS American Eel Population Status, https://www.usgs.gov/centers/ny-water/science/status-american-eel-populations-mohawk-river-basin?qt-science_center_objects=0#qt-science_center_objects
[24] NYSDEC, Mohawk River Basin Action Agenda: 2018-2022 (2018), https://www.dec.ny.gov/docs/water_pdf/mohawkactionag.pdf. (*hereinafter* Mohawk Basin Action Agenda)

In truth, there have been no specific studies aimed at determining the true density and abundance of American eels in the Mohawk River. To state that American eels rarely occur in the Mohawk River based on the results of surveys aimed at other species is an incorrect interpretation of the data and history. Absence can never be proven. All that can be established is a high probability that the target species are not present. But since we already know that American eels are in fact present in the Mohawk River, a true determination of density and distribution of the population is required to accurately assess how hydroelectric production actually impacts the fish and their populations. Towards this goal, calibrated methods, based upon detailed knowledge of gear efficiency and catchability are necessary to estimate abundance from catch per unit of sampling effort.

In order to determine the true density and abundance of American eel in the Mohawk River and especially in the Project Area, NYPA must conduct a rigorous scientific study utilizing proper sampling techniques, using effective gear from which quantification of effort can be measured. Moreover, for any study of fish populations, whether in the Mohawk River as a whole or in the Project Area, NYPA must include a robust sampling regime to determine both abundance and density. NYPA must also incorporate catchability into study designs, since it is critical when indexing abundance.[25] In addition, NYPA must account for any variability in catchability to avoid biased survey results, and ultimately arriving at an incorrect estimation. Finally, it must be clearly noted that NYPA's study must thoroughly evaluate sampling effort and gear selectivity to avoid inadequate designs leading to inaccurate results.[26]

American eels are a semelparous, catadromous species, which abstractly means that all mortality within their freshwater range occurs prior to spawning. American eels spawn once and subsequently die after an arduous return migration to the Sargasso Sea. Female eels may defer spawning for up to 20-30 years. According to the Atlantic States Marine Fisheries Commission's (ASMFC) 2017 American Eel Stock Assessment, the status of the American eel remains depleted, at historical lows in US waters.[27] The stock assessment continues to say that eels have precipitously declined or have been extirpated over portions of their historical freshwater habitats

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[25] Assessing Reservoir Largemouth Bass Standardized Boat Electrofishing: Effect of Catchability on Density and Size Structure Indices. Stephen M. Tyszko, Matt A. Hangsleben, Richard D. Zweifel, Jeremy J. Pritt & Joseph D. Conroy North American Journal of Fisheries Management, Volume 37, 2017 - Issue 3

[26] A Review of Sampling Designs Commonly Used in Canadian Freshwater Habitats https://www3.epa.gov/region1/npdes/merrimackstation/pdfs/ar/AR-1240.pdf

[27] ASMFC 2017 Eel Assessment.

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during the last 100 years mostly due to dams and turbine mortality, often in combination with over-harvest.[28] Therefore, in order to rebuild the stock, ASMFC's Interstate Fishery Management Plan has laid out goals and objectives that are designed to reduce mortality and increase conservation measures for the American eel across all life stages.[29]

Hydropower facilities will continue to negatively impact American eels if no protective measures are undertaken. Accordingly, we strongly recommend that FERC take strict action to promote safe upstream and downstream passage of American eel in the Mohawk River system. Currently, there are no protective screens on the Vischer Ferry and Crescent hydropower facilities to prevent entrainment. This is unfortunate because eels will often seek deep water escape through turbine intakes only to be injured or killed.[30] Hence, providing screens over the turbines and safe passage past the dams for eels and other migrating diadromous fish is absolutely necessary. To improve the mortality of American eels in particular, placement of screens over the turbine intakes, along with an appropriate adjusted flow velocity through the turbines to prevent impingement. FERC must also mandate state-of-the-art bypass facilities to benefit diadromous fish to avoid incurring more damage to these fishes. In addition, FERC must determine the appropriate species specific fishways and eel passages, as there are no universally applicable fish passage mechanisms. In their present condition, Vischer Ferry and Crescent Dams are currently out of alignment with the recommendations set forth by NYSDEC's Mohawk River Basin Action Agenda and the ASMFC's FMPs by impeding upstream passage by harming, killing, or delaying out-migrating eels. These dams do not enhance conservation of the American eel. Most importantly, since the presence of American eels has been confirmed in the Project Area, the installation of properly sized screens that protect yellow phase and silver phase life stages of American eels from being impinged or entrained and mangled by the turbines is the most effective way to comply with the Action Agenda and recommendations of the Atlantic States Marine Fisheries Commission to help restore and re-establish a species in decline.

The largest problem confronting migrating American eels in the Mohawk River is the presence of a series of dams, but most especially the hydroelectric facilities, including the Vischer Ferry

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[28] *Id.*

[29] Atlantic States Marine Fisheries Commission, *2017 Review of the ASMFC Fishery Management Plans for American Eel (Anguilla rostrata) 2016 Fishing Year,* http://www.asmfc.org/uploads/file/5ac2aafbAmericanEelFMPReview2017.pdf (2017).

[30] JW Carr & FG Whoriskey *Migration of Silver American Eels Past a Hydroelectric Dam and Through a Coastal Zone*. 15 Fisheries Mgmt. and Ecology, 393 (2008), https://doi.org/10.1111/j.1365-2400.2008.00627.x.

and the Crescent Dams. However, since American eels are confirmed to be present and a large, female silver eel has recently been captured in the Project Area impoundment, NYPA and FERC must follow the guidelines outlined in the NYSDEC's Mohawk River Basin Action Agenda, as well as the ASMFC protocol, which encourage the conservation of the species and the reduction of mortality.[31]

The best way to adhere to these guidelines is to conduct a robust sampling survey of American eels in the Project Area, facilitate the eels' safe movement in and out of the system, and protect eels that are present from being impinged and entrained into the turbines. In a study of hydroelectric dams by Carr and Whoriskey, demonstrated that 100 percent of entrained eels suffered mortality.[32] Accordingly, we strongly urge FERC to require NYPA to conduct all studies needed to implement appropriate fish passage devices that will re-establish American eels in their ancestral habitat and allow them to out-migrate safely.

D. Comments on Potential Ice Jam Studies

The issue of flooding due to ice jams was raised in multiple comments and at the October 23, 2019, study proposal meeting. Impacts on fish and water quality must be accounted for if operational changes to reduce ice jam flooding are considered in the future.

The Mohawk River has been extensively altered by navigational structures and hydropower generation facilities. Surface water in the Project Area and the hydraulically connected Great Flats Aquifer provide drinking water for approximately 250,000 people. A 2009 planning report for the Great Flats Aquifer states, "the water level in portions of the aquifer adjacent to the river is dependent on the river level, which varies between navigational and non-navigational seasons."[33]

If an ice jam study is conducted and operational changes are deemed necessary to mitigate ice jam flooding, protection of aquatic life and water quality must be prioritized. License requirements that may affect water level and flow must consider whether wastewater effluent

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[31] ASMFC 2017 Eel Assessment.

[32] JW Carr & FG Whoriskey *Migration of Silver American Eels Past a Hydroelectric Dam and Through a Coastal Zone*. 15 Fisheries Mgmt. and Ecology, 393 (2008), https://doi.org/10.1111/j.1365-2400.2008.00627.x.

[33] Thomas M. Johnson, *Responsible Planning For Future Ground Water Use From The Great Flats Aquifer: Two Case Studies: The Gep Energy Project And The Si Green Fuels Boiler Project* in Proceedings from the 2009 Mohawk Watershed Symposium, Union College, Schenectady NY (J.M.H. Cockburn & J.I. Garver eds., 2009).

20191220-5341 FERC PDF (Unofficial) 12/20/2019 4:19:57 PM

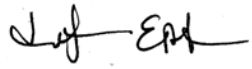
discharge and water withdrawal volumes change seasonally, while keeping in mind that groundwater-surface water connections do change seasonally.[34]

E. Conclusion

Where the mere existence of hydropower facilities will necessarily cause significant environmental impacts, it is critically important to incorporate all feasible methods to mitigate these impacts to the maximum extent possible. There are still many major gaps in the information needed to determine effective mitigation techniques. Therefore, FERC must obtain a thorough understanding of how the Crescent and Vischer Ferry Dams affect water quality, fish and other aquatic wildlife, and ice-jam flooding through our recommended comprehensive studies in order to develop the most protective license requirements.

Riverkeeper appreciates the opportunity to comment. If you have any questions about these comments, please contact Jennifer Epstein at jepstein@riverkeeper.org or (914) 478-4501 x248.

Sincerely,



Jennifer Epstein

Water Quality Program Scientist

[34] *Id.*

ORIGINAL

County of Schenectady

NEW YORK

ANTHONY JASENSKI
CHAIR OF THE LEGISLATURE

Legislator, District 4
Rotterdam, Duanesburg,
Princetown

SCHENECTADY COUNTY LEGISLATURE
County Office Building
620 State Street – 6th Floor
Schenectady, New York 12305
Tel: (518) 388-4280 Fax: (518) 388-4591
Website: www.schenectadycounty.com

December 20, 2019

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

P-4679

2019 DEC 31 P 2:19

Dear Secretary Bose:

I am writing on behalf of the Schenectady County Legislature to express my support for The Stockade Association of Schenectady's request that NYPA revise their Study Plan submitted to FERC on September 23, 2019.

It is crucial that a revised study plan address flooding issues related to the effects of the operation of the Vischer Ferry Hydroelectric Project on flooding issues in the impoundment area of the Vischer Ferry Dam. The submitted NYPA Study Plan does not adequately provide for a thorough and balanced assessment pertaining to flooding issues that comply with a proper environmental assessment.

The Stockade District became New York State's first historic district in 1962, and includes 390 properties covering approximately 90 areas. The geographical location of the Stockade neighborhood on the Mohawk River has had a historical and cultural significance for the City of Schenectady. As such, The Stockade Association was formed to preserve, protect and improve the Stockade Historic District. Their request for a revised NYPA Study Plan pertaining to flooding issues is of utmost importance in their fight to ensure that the Historic Stockade District maintains its cultural relevance for the City of Schenectady, and the State of New York.

A new Study Plan that addresses issues of flooding, related to the effects of the operation of the Vischer Ferry Hydroelectric Project, would provide property owners in the Historic Stockade District with proper information that can be used to make accurate decisions regarding their homes, as well as protect an area that has been deemed a National Register Historic Neighborhood.

I appreciate your consideration of this request.

Sincerely,

Anthony Jasenski, Sr.
Chairman
Schenectady County Legislature

RESOLUTION 193 - 19

Sponsored by Legislator King:

A RESOLUTION IN SUPPORT OF A REVISED NYPA STUDY PLAN ON THE VISCHER FERRY HYDROELECTRIC DAM

WHEREAS, the hydroelectric plant in Vischer Ferry was completed in 1913, with state engineers promising that stationary dams along the Mohawk River would not bring flood havoc – which has now been proven false; and

WHEREAS, the consequential flooding has negatively impacted and interrupted surrounding locations and communities, and places certain properties and buildings that are protected by the NHPA, such as the Stockade Historic District and NYS Barge Canal Historic District, at risk; and

WHEREAS, the Vischer Ferry hydroelectric plant has been set to be relicensed by the NYPA in 2024, with no flood studies on the current and future flood impact currently included within the NYPA Study Plan; and

WHEREAS, technological advancements could give the ability to predict and respond to storm and high-water events, reduce flooding, and mitigate the risk to roadways, properties, and structures within the community; and

WHEREAS, relicensing could potentially include crucial modifications that could reduce flood damage risk; and

WHEREAS, Schenectady County is committed to ensuring the preservation of all properties and the safety of all residents within the community; now therefore be it

RESOLVED, the Schenectady County Legislature supports the Stockade Association's interest in submitting a request for a revised NYPA Study Plan on the hydroelectric dam in Vischer Ferry, which would include such vital information.

12/10/2019: Reported from the Committee on Rules (R75)
12/10/2019: Adopted by the County Legislature

Ayes:	13.0153	(Constantine, Gatta, Hughes, Jasenski, King, McDonald, Ostrelich, Pascarella, Patierne,Pratt, Ruzzo, Socha, Vellano)
Nays:	0.0000	
Absent:	0.0000	
Abstain:	0.0000	
Excused:	1.9847	(Fields, McGarry)

Resolution 193-19

STATE OF NEW YORK }
County Legislature }
County of Schenectady }

I have compared the preceding copy with the original resolution adopted by the Schenectady County Legislature at a meeting held December 10, 2019 on file in this office, and I do HEREBY CERTIFY the same to be a correct transcript there from in the whole of the original.

WITNESS my hand and the seal of the Schenectady County Legislature at the City of Schenectady this 11th day of December, Two Thousand Nineteen.

Geoffrey T. Hall, Clerk,
Schenectady County Legislature

20191223-5000 FERC PDF (Unofficial) 12/20/2019 6:04:35 PM

gloria kishton, Schenectady, NY.
December 20, 2019
Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Vischer Ferry Dam Project #4679-049

Dear Secretary Bose,

Schenectady Heritage Foundation is a 501c3 non-profit organization founded in 1979 whose mission is to foster historic preservation in Schenectady County. To that end, we wish to comment on the Vischer Ferry Dam Project (#4679-049).

The Foundation is advocating that New York Power Authority be required to revise their Study Plan submitted to FERC on September 23, 2019. These revisions must specifically address how the operation of the Vischer Ferry hydroelectric project affects flooding issues in the impoundment area of the Vischer Ferry dam, especially in the Stockade Historic District, which is bordered by the Mohawk River.

Past studies cited by NYPA are inadequate and do not take into account new scientific information and technology that can help to analyze both ice jams and flooding in the area between Locks 7 and 8. This area includes the Stockade, a highly sensitive National Historic District, which was listed on the National Register of Historic Places in 1973, and became New York State’s first registered historic district in 1962. Architecture in this area spans several centuries and includes some of the Nation’s oldest examples of early Dutch housing. Every avenue of investigation and study should be thoroughly pursued in order to preserve this district, an important cultural resource.

Property owners, the City of Schenectady, and other government agencies are currently considering various flood mitigation measures to address the affects of flooding in the Stockade. These include “managed retreat” and elevating houses. At a time when such extreme measures and millions of dollars are potentially being spent, it is imperative that the best science and studies inform both the property owners and agencies that may be making decisions about such disruptive initiatives. We must be certain that everything possible has been done, vis-a-vis the Vischer Ferry Dam operations, to mitigate flooding, BEFORE other land-based measures are considered.

As part of a final Environmental Assessment, Section 106 of National Historic Preservation Act of 1966 (NHPA) requires that FERC, as a federal agency taking a licensing action, must have sufficient information to determine that the operation of VFD will have no significant impact on the Stockade, a National Historic District. In their Study Plan, NYPA has not provided assurances the information needed by FERC to issue a finding of no significant impact from Vischer Ferry Hydroelectric operations, is currently available without further study.

20191223-5000 FERC PDF (Unofficial) 12/20/2019 6:04:35 PM

Property owners in the Historic Stockade neighborhood are being asked to make decisions and costly investments for the future of their historic homes and to preserve the Stockade, a National cultural resource. The 100 year old Fischer Ferry Hydroelectric plant operations, downstream from the Stockade, should be required to study and make modifications to its operations if such modifications are found to reduce the impact on future flooding in the Mohawk River Basin.

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, New York 13045

December 23, 2019

Ms. Tara Groom
New York Power Authority
30 South Pearl St.
Albany, NY 12207

RE: Crescent and Vischer Ferry Hydroelectric Projects (FERC Nos. 4678 and 4679)
Comments on Proposed Study Plan

Dear Ms. Groom:

The U.S. Fish and Wildlife Service (Service) has reviewed the September 23, 2019, Proposed Study Plan (PSP) filed by the Power Authority of the State of New York (NYPA) for the Crescent and Vischer Ferry Hydroelectric Projects (Projects) (FERC Nos. 4678 and 4679), located on the Mohawk River in Schenectady, Albany, and Saratoga Counties, New York. We have also reviewed the December 17, 2019, letter from the Federal Energy Regulatory Commission (Commission) staff providing their comments and additional information requests on the PSP (Staff Comments). The Service provided our Study Requests in our August 9, 2019, letter to the NYPA (Study Requests).

Fisheries Studies

In our Study Requests, the Service requested studies of the downstream migration and routing of blueback herring (*Alosa aestivalis*) (BBH) and American eel (*Anguilla rostrata*). For BBH, the Service requested a variety of radio telemetry, acoustic, and mortality studies to evaluate the movement and mortality of BBH as they move downstream past the Projects. For American eel, we requested field studies to evaluate the occurrence of American eels in the vicinity of the Projects' tailraces and in the impoundments. In the PSP, the NYPA proposed to study the upstream migration of BBH and conduct a literature review of American eel presence in the lower Mohawk River. The Service participated in the October 23, 2019, PSP meeting and a follow-up teleconference on November 7, 2019, regarding fisheries studies, with the NYPA, the New York State Department of Conservation (NYSDEC), and Commission staff. During these meetings, the Service, NYSDEC, and Commission staff provided preliminary comments regarding the studies proposed in the PSP for fisheries resources. These concerns were adequately captured in the Staff Comments provided to the NYPA, and we understand that the NYPA is revaluating their proposed studies for these resources for the Revised Study Plan (RSP)

20191223-5163 FERC PDF (Unofficial) 12/23/2019 2:37:27 PM

due to be filed with the Commission on January 21, 2020. We appreciate the NYPA's efforts to enhance their proposed studies for BBH and American eel at the Projects.

While we understand that there is existing information available for BBH in the lower Mohawk River and at the Projects, there are notable gaps in the available information for the river between the Projects, for the current configurations for fish protection measures, and between adults and juveniles for routing and survival between the Kaplan and Francis turbines present in the powerhouses. These gaps have been identified in our Study Requests and additionally in Commission Staff Comments. The Service encourages the use of the best available information; however, we strongly encourage the NYPA to propose an updated, holistic assessment for the downstream routing of BBH through the Projects. With a comprehensive study, the NYPA will be able to readily evaluate the proportion of BBH passing through the current flashboard notches, over the dams, through the locks, and through turbines at both Projects. Coupled with existing or any needed assessments of turbine mortality for both life stages, this would provide the information needed for our analysis of BBH passage at the Projects.

It is our understanding that the NYPA will be further evaluating additional information regarding American eel presence in the vicinity of the Projects. The Service is evaluating the need for upstream passage and downstream passage and protection for this species at the Projects. If the available information suggests that American eel are present below the Projects, the NYPA should consider proposing a study for upstream passage and protection as well as entrainment mortality studies for this species in the RSP.

Water Quality

In our Study Requests, the Service recommended standard water quality studies at the Projects that are conducted during most hydroelectric project relicensing. The NYPA has proposed to conduct these studies. We participated in an additional teleconference on December 17, 2019, with the NYPA and the NYSDEC to provide technical assistance regarding the proposed water quality studies. We recommended that the NYPA install at least two floating downstream water quality monitors below the Projects in order to ensure that outflows from each of the turbines are adequately measured under all operational scenarios during the study period. Additionally, we continue to recommend that chlorophyll-a be recorded during periodic monitoring as we have noted this parameter to be highly correlated to water quality in nutrient- rich systems such as the lower Mohawk River.

Run-of-River

The Service recommended a Run-of-River Compliance Study in our Study Request. The NYPA has not proposed this study in the PSP. The Service is concerned that there will be inadequate information available to assess the impact of the Projects on notable downstream fluctuations at the United States Geological Survey Cohoes Gauge. Operational activities related to ramping rates and the Projects' abilities to accommodate upstream flow variability can notably influence downstream Projects and flows. Primarily, this study would utilize existing generation, headpond, lock operation, and gauge data; however, one additional flow monitoring station

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would need to be installed and calibrated downstream of the Crescent Project. The Service continues to recommend this study and requests its inclusion in the RSP.

* * * * *

Thank you for the opportunity to provide study requests for the Projects. If you have any questions or desire additional information, please contact John Wiley at john_wiley@fws.gov or 607-753-9334.

Sincerely,

Acting for David A. Stilwell
Field Supervisor

cc: NYSDEC, Stamford, NY (C. VanMaaren, S. Wells)
NYSDEC, Albany, NY (N. Cain)
NYSDEC, New Paltz, NY (W. Eakin)
FERC e-file

20191223-5004 FERC PDF (Unofficial) 12/22/2019 6:40:43 PM

James Woidt, PE, Scarborough, ME.
I am the lead engineer responsible for producing the draft Hydrologic, Hydraulic, and Ice Jam Analysis Report (2019) for the City of Schenectady's (City) Mitigation Measures to Reduce Flood in the Historic Stockade (Stockade Mitigation Project). This report was prepared by Shumaker Consulting Engineering and Land Surveying, DPC (Shumaker) and the US Army Corps of Engineers' Cold Regions Research and Engineering Laboratory (CRREL). Please note that the following comments are mine as an individual and were not prepared at the request of my employer nor any of my employer's clients which at this time include the City of Schenectady, Schenectady County, New York State Department of Environmental Conservation (DEC), and New York Power Authority (NYPA), all of whom have an interest in the FERC relicensing studies.

I have reviewed portions of the licensing documents relative to ice jamming and have identified several inaccuracies in the Proposed Study Plan for Vischer Ferry Hydroelectric Project (FERC Project No. 4679) as follows:

1. On Page 47 of the Proposed Study Plan, Shumaker and CRREL's draft Hydrologic, Hydraulic, and Ice Jam Assessment (2019) was referenced. This document was shared in a draft format with three individuals for technical comment. Explicit directions were provided that this draft was not to be shared with any other individuals as the funding agency for the Stockade Mitigation Project has not yet completed their review of this deliverable and approved it for public dissemination. Therefore, sharing of this report beyond those three individuals and its reference in the Proposed Study Plan is a violation of the conditions under which the report was provided. In lieu of this report, NYPA may find beneficial information in the public reports and presentations provided on the Stockade Mitigation Project website: http://www.stockaderesilience.com/project-updates.

2. On Page 47, the Proposed Study Plan states "numerous studies have been conducted…to examine the frequency and causes of the Stockade District flooding, including the role of ice jams." This is an inaccurate statement. The Gomez and Sullivan (2018) letter report on Page 5 states "The hydraulic analysis assumes free-flowing conditions and does not assess impacts due to ice or debris". Therefore, Gomez and Sullivan (2018) did not evaluate ice jamming. The New York State Department of Environmental Conservation (1979) report's conclusion on ice jamming was based on a 40-year old discussion with a former member of CRREL; to characterize this as a "study" is misleading. Also, Mr. Joseph Rocks, CRREL's current subject matter expert on ice jamming, presented that such a determination is not possible without technical study.

3. In response to Addendum #26 authored by the Schenectady County Chamber of Commerce Flood Assessment Task Force that "Vischer Ferry is probably an asset to the region in terms of reducing ice jamming and flooding": Vischer Ferry may simultaneously be an asset to the region but a detriment to the local community. Both are relevant to Vischer Ferry.

Addicks and Barker Dams in Houston, Texas are well-publicized example of this (for fluvial “free-flow” flooding).

4. On Page 47, the Proposed Study Plan states that the USGS is studying the nature and frequency of flood-causing ice jams. It should be clarified that the USGS is studying the nature and frequency of flood-causing ice jams empirically. That is, they are collecting measurements of ice jams and deducing relationships from those observations. Therefore, the study applies only to the current configuration of the Mohawk River and Vischer Ferry. The USGS study does not attribute the cause of ice jam flooding to natural conditions, Vischer Ferry, or other potential features that may promote or discourage ice jamming.
5. On Page 47, it is stated that DEC is investigating the issue of flooding and flood control strategies on the Mohawk River. It should also be stated that NYPA is a partner in this effort and is providing direct technical support in the form of hydraulic modeling of alternatives. This is an apparent (to the public; but perhaps not real) conflict of interest that should be disclosed.

6. On Page 47 and 48, NYPA concludes that “the issue of flooding has been extensively studied and… studies have repeatedly demonstrated that the existence and operation of Vischer Ferry has little or no effect on upstream flooding in the Stockade District.” Per the above comments, this is an incorrect conclusion. No study has been performed to attribute the nature and frequency of ice jam-induced floods to Vischer Ferry, natural conditions, and/or other impediments.

Otherwise, I concur with NYPA’s conclusion that Vischer Ferry has a small impact on upstream fluvial (free-flow) flooding and that the upstream fluvial flood risk posed by Vischer Ferry has been adequately studied. However, I still recommend that an ice jam study be performed. I have previously provided technical comments as part of the scoping study to justify an ice jam study; I will not repeat those comments but recommend that they, as well as comments by Dr. John Garver, be re-reviewed by NYPA.

[Comment reduced due to character limitation]

I again recommend that an ice jam study be performed to quantify the impact of Vischer Ferry on upstream and downstream ice jamming. Specifically, I recommend that a physically based study be performed that integrates the physical processes that cause the formation and break-up of ice jams as well as the impoundment of water behind them. Such a study may include physical modeling or numerical modeling via HEC-RAS, MIKE11, and/or CRISSP 2D. Finally, the ice jam study should also evaluate whether a change in the operation of water levels impounded by Vischer Ferry Dam, such as lowering the impoundment level in advance of a warm-up or rainfall event that commonly causes ice jams, would reduce the risk of flood-causing ice jams.

From:	George, Scott D
To:	Daly, Rob
Cc:	VanMaaren, Chris C (DEC); Baldigo, Barry P; Wells, Scott M (DEC)
Subject:	RE: LMR fish data for NYPA
Date:	Monday, January 06, 2020 1:22:15 PM
Attachments:	Eelsites_2015-2016.xlsx

Hi Rob,

I've attached an excel file showing the stream name, date sampled, and coordinates for the downstream end of the sampled reach for all 35 sites where eel screening surveys were conducted.

In case it is of interest, I also wanted to mentioned that in 2019 our office did more intensive quantitative (three pass depletion) fish community surveys of 20 Mohawk River tributaries. The purpose (assess resident communities prior to round goby invasion) was not related to American Eel but I can tell you that no eel were observed or captured. All of that data will be put out as a USGS data release this spring.

Scott

From: Daly, Rob <Robert.Daly@nypa.gov>
Sent: Thursday, January 2, 2020 4:00 PM
To: George, Scott D <sgeorge@usgs.gov>
Cc: VanMaaren, Chris C (DEC) <chris.vanmaaren@dec.ny.gov>; Baldigo, Barry P <bbaldigo@usgs.gov>; Wells, Scott M (DEC) <scott.wells@dec.ny.gov>
Subject: [EXTERNAL] Re: LMR fish data for NYPA

Scott,

Thanks for the info, if you have the exact locations and dates that would be great, more info the better.

Appreciate your efforts.

Happy new year!!!

Robert A. Daly
Licensing Manager

New York Power Authority
123 Main Street
White Plains, NY 10601
(914) 681-6564 ofc l (716) 628-5894 cell lRob.daly@nypa.gov
www.nypa.gov

On Jan 2, 2020, at 2:52 PM, George, Scott D <sgeorge@usgs.gov> wrote:

Hi Rob,

Scott Wells asked me to provide information on the two bullets below. These two bullets reference the same project. In short, we surveyed 20 tributary sites on the north side of the Mohawk in 2015, and 15 tributary sites on the south side of the Mohawk in 2016. Surveys were conducted using backpack electrofishing, and sampling time generally ranged from 600-1200 seconds depending on the quantity of accessible habitat. Unfortunately, no eel were captured or observed during any of these 35 surveys. Let me know if you need a summary of the exact locations sampled. We are currently piloting the use of environmental DNA (eDNA) to detect American Eel in the Mohawk and its tributaries. I suspect this method and the results it produces will be more useful for determining the location and relative abundance of eels in the watershed. Preliminary data from this project should be available around Fall of 2021 in case that is of interest.

Scott

From: Daly, Rob <Robert.Daly@nypa.gov>
Sent: Friday, December 20, 2019 7:34 AM
To: Wells, Scott M (DEC) <scott.wells@dec.ny.gov>
Cc: Weinstock, Andrew <Andrew.Weinstock@nypa.gov>; Groom, Tara <Tara.Groom@nypa.gov>; Wendy Bley (Wendy.Bley@KleinschmidtGroup.com) <Wendy.Bley@KleinschmidtGroup.com>; Mike.Hreben@KleinschmidtGroup.com
Subject: CVF Fish Data

Scott,

I want to thank you for all the info you have gotten to us, its greatly appreciated and will be helpful going forward.

I'd like to know if you could look specifically for the two reports, and the supporting raw data, noted below:

- USGS, 2015-2016, American eel in tributaries to the Mohawk River. The USGS, SUNY ESF and DEC screening survey of tributaries for the American Eel.
- USGS, 2015, American eel in USGS Newsletter describing a study being conducted "in cooperation with NYDEC" to determine if American eel are present in the Mohawk River.

And in addition, see if any of the data for reports on the document list provided earlier

(attached so on a Friday you don't have to look for it) are available.

Hope you have a very good holiday!

Rob

Robert A. Daly
Licensing Manager

New York Power Authority
123 Main Street
White Plains, NY 10601
(914) 681-6564 ofc l (716) 628-5894 cell l Rob.daly@nypa.gov
www.nypa.gov

Melissa A Cherubino, Glenville, NY.
We are concerned that the NYPAs study include consideration of the presence of chlorophyll and nutrients out of concern for impact to drinking water.

Document Accession #: 20200114-0009 Filed Date: 01/14/2020

James E. Duggan
Consultant

528 Orlinda Avenue
Scotia, NY 12302
(518) 377-0556
jeduggan18@yahoo.com

ORIGINAL

2020 JAN 14 P 4:02

20 December 2019

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

Vischer Ferry Dam Project # 4679-048

Dear Secretary Bose,

After much examination, I request that FERC require NYPA to revise its Study Plan, submitted 23 September 2019, specifically to address comprehensively the hydraulic character and hydroelectric operation of the Vischer Ferry Dam regarding their pronounced effects toward flooding issues along its impounded reservoir-pool.

The NYPA Study Plan, as submitted, asserts that sufficient information exists to allow FERC to evaluate flooding issues in order to complete an Environment Assessment. My review of the referenced Gomez and Sullivan documentation (G and S) pertinent to the flooding issue requires that I assert strong dissent.

To this end, my attachment illustrates strategic weaknesses in the documentation NYPA has submitted.

In particular, the model studied was based on considering the top of flashboards as the "crest" elevation, and thus was token in its scale compared to reality of even the "10-Year" runoff-volume. Furthermore, reporting two of the seven options to the gate-system not penetrating the structural concrete crest and reporting two more to penetrate a maximum of only 1.75 feet (21 inches) distracts from reality, a useless portrayal. Then, in providing only related-scale surface-elevations, the failure to inform re mean velocities misses their huge importance as an inadequate-drainage cause of the runoff-flooding experienced so repeatedly.

Overall, the study-effort seemed also to (a) discount the non-riverine impounded nature of the permanent large underlying water-volume, and (b) be conditioned around concern for the two subject dams' "stability" ... if their height is reduced". This latter matter is basically one of engineering awareness, appropriate preparedness and careful execution.

By contrast to the G and S study, the long-available FEMA FIS, in profiling the un-modified dam and runoff-volumes overrunning its impounded water-volume, had

provided much revealing information useful to developing pertinent, reasonable understandings. Coupled with real-time and earlier data from USGS gages spaced along the impoundment, the more-clearly defined dynamics within the pool are becoming much-better understood. Together, the FEMA and USGS information form a very valuable tool.

In conjunction with the excellent alert system in operation, a suitably modelled, designed/selected and installed gate-system can provide controlled preemptive drawdown affecting the entire impoundment to "balance" arriving runoff-volume with effective discharge past this dam with no (or very-limited) backwatering overflow. Modification should result in overflow occurring only with truly extreme runoff-volume.

For improved well-being of the affected community along the impoundment, FERC should condition re-licensing on three matters: comprehensive hydraulic study of this lengthy dam leading to unquestionable assessment of modification and related benefit regarding the flooding issue; assuming the distinct benefit of modification, a survey-report regarding pertinent candidate gate-systems, and the earliest possible committed basic budgeting and scheduling for actual modification and operational readiness.

The FERC review process and opportunity to participate at this early stage is gratifying. I hope my involvement can help lead to future betterment of community-life, minus the century-plus plague of the canalized-river flooding so readily.

Sincerely

James E. Duggan

James E. Duggan

Encl:

MINIMIZING LOCK 7 DAM'S ROLE IN FLOODING AT SCHENECTADY
"Gomez and Sullivan" Report to New York State Power Authority - Review

Document Accession #: 20200114-0009 Filed Date: 01/14/2020

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MINIMIZING LOCK 7 DAM'S ROLE IN FLOODING AT SCHENECTADY

"Gomez and Sullivan" Report to New York Power Authority - Review

20 December 2019

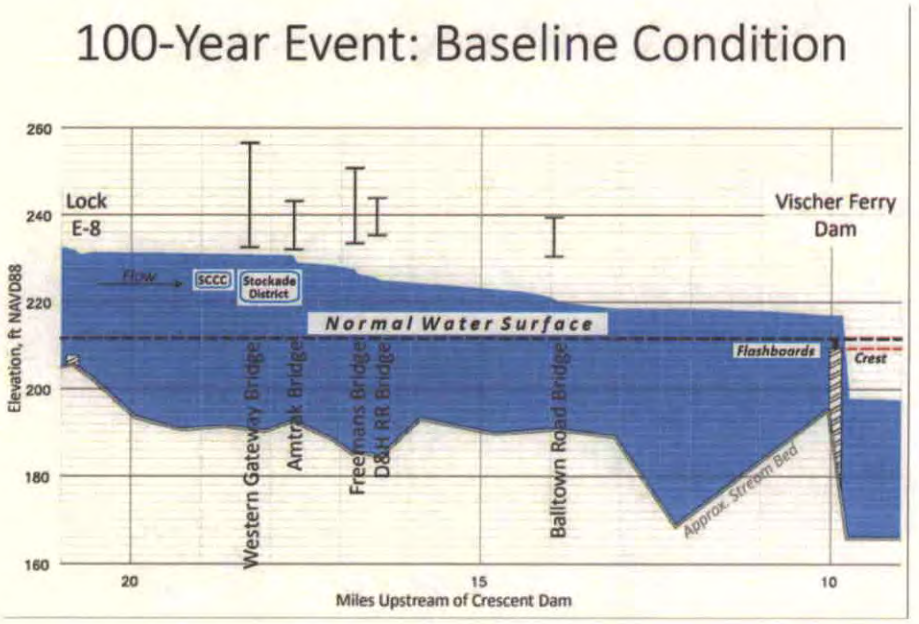
Abstract: The report of simulated crest-height reductions by modification with controlled gate-systems on two of the three dams for 100-Year runoff yielded no cost-justifying change to runoff-flooding in the targeted upstream-Schenectady reach of developed properties. Assessment of the options tested and key elements of the physical floodway provides reasoning for the result, plus basic recommendations to succeed.

The Gomez and Sullivan (G and S) report refers several times to "Balltown Road Bridge" (locally, aka the "Rexford Bridge") as a focal point regarding runoff-drainage.

> "These minimal reductions in water level *upstream of the Balltown Road Bridge* are due to the bridge acting as a significant flow control at high flow rates." (p. 8)
>
> "Option 7... ranged from approximately 2.41 feet at Vischer Ferry to *0.73 feet at Balltown Road*." (p. 9)
>
> *"Upstream of the Balltown Road Bridge,* including in the Stockade District, water levels are reduced by only a tenth of a foot or less for all options." (p. 10)

Balltown Road Bridge is a recognizable landmark, but what generates such mention?

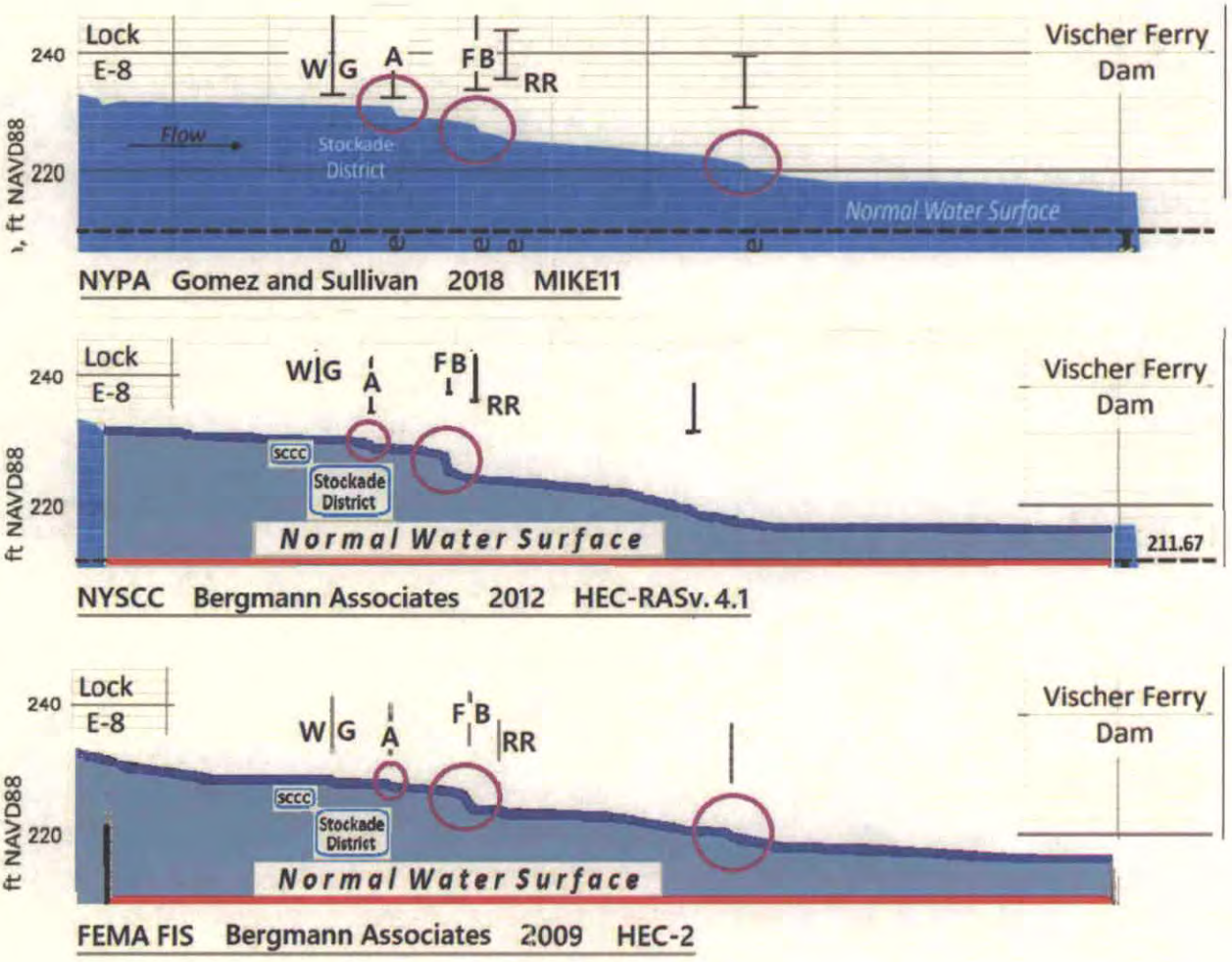
The G and S report excludes any water-surface profile. The firm presented slides of its study during a meeting with Lock 7 Dam-modification advocates, Russel Wege and James Duggan, at NYPA offices in Albany on 27 September 2018. Weeks later, Wege and Duggan received a hard-copy of the presentation. It included the following slide of a water-surface profile.



This profile lacks any distinct evidence that the "Balltown Road Bridge" reach seriously impedes runoff and might cause adverse results miles upstream, thus "...significant flow control...." (Following within this commentary are (a data and graphic examination of the subject riverbed reach excerpted from the FEMA FIS and (b) overflow-height backwatering from Lock 7 Dam and its effects far upstream in important reaches.

Other recent studies also define "...Bedrock control" at "Rexford".

The excerpted G and S "Baseline Condition" graphic (elongated slightly) indicates that the runoff-volume meets *flow control* near the *Amtrak Bridge* and the Freeman's Bridge. Control very near the latter impacts the immediate SCCC/Scotia/Schenectady reach by helping to form ***an*** *inadequately draining "runoff-plateau"*, a very real condition.



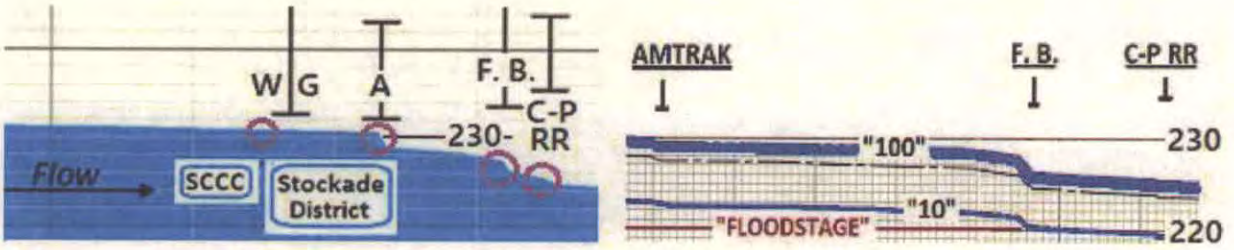
The "100-Year" runoff-volume's *overflow towers high* above the overall ~1,900-feet long Lock 7 Dam. This height then backwaters along the entire pool's normal volume.

The NYSCC *and FEMA FIS* profiles show *little restriction of runoff (a free-flow reality) at the Amtrak Bridge* , while also profiling the reach immediately upstream from Freeman's Bridge as *a key local control - - significant narrowing and a channel-side abrupt bend* (photo follows) that causes noticeable turbulence, even during an event of 70,000 cfs.

Lock 7 Dam's overflow-height backwater and is instrumental in sustaining the runoff-plateau by occupying the narrow reach between the two embracing bridges,

The narrowness is a positive characteristic in forming a more-coherent flow that could provide very effective drainage, reducing surface-height in the runoff-plateau. The *overflow-height backwater occupies cross-sectional space otherwise valuable to drain a substantial additional portion of the runoff-volume in the plateau.* The penalty is ongoing danger and repeated harms inflicted on the canalside Scotia/Schenectady area.

Excerpts (below) from the G and S "Baseline Condition" (left) and the FEMA FIS runoff-profile (right, less-compressed horizontally) illustrate the "runoff-plateau", *virtually non-draining* due to floodway breadth and consequent *extremely slow velocity* (both FEMA FIS-listed) atop the impounded underlying flat-surfaced pool-volume.



This Lock 7 Dam-exacerbated overall circumstance prevails far before a distinct draining gradient begins.

G and S Table 8: *Maximum Water Levels ... Scenario of the 100-Year Flood* (excerpted here) lists surface-levels for peak runoff that generally embrace this localized gradient that also involves a significant draining velocity.

Station	Location	Baseline Max WL (ft, NAVD 88)
16.5	D&H Railway Bridge - Upstream	225.34
16.8	Freeman's Bridge Road - Upstream	227.31
17.7	Amtrak Bridge	230.48

Within the 1.2-mile reach between the two railroad bridges, the G and S data states this indicated gradient totals 5.14 feet. The excerpted FEMA profile approximates this total.

The FEMA profile also re-distributes the gradient into only *small resistance at the Amtrak Bridge and pronounced resistance near Freeman's Bridge,* a recognized chokepoint.

After "release", runoff quickly achieves a very fast velocity, but along only a short reach to pass the C-P Railroad Bridge, Then, the average velocity is slower, but draining.

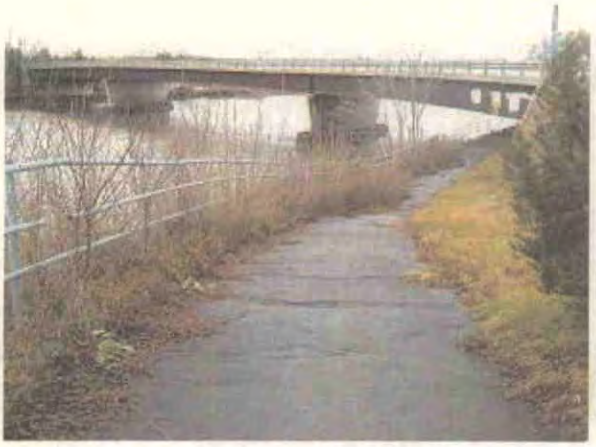
In this Google Earth photo, the angled Freemans Bridge Road is central, Waters Edge Lighthouse is upper- central and the Canadian-Pacific railroad bridge is upper-right.

It confirms two points that fit the FEMA and NYSCC depiction of slight backup: (a) the turn at the Schenectady-side ***is*** relatively abrupt, (b) the turn is complete slightly upstream from the bridge and (c) the riverbed/ floodway narrows immediately before the bridge, is pinched further near the banquet hall, and then widens slowly, downstream from the Canadian-Pacific Railroad bridge.

The bridge conceals pointed-prow aprons for two piers (below) at the quarter- points of the bridge.

the

This present two-piered Freemans Bridge replaced an overhead trussed bridge that had clear-spanned the river perpendicularly at the projecting abutment (right, above, approxi- mately the water's width downstream).



t

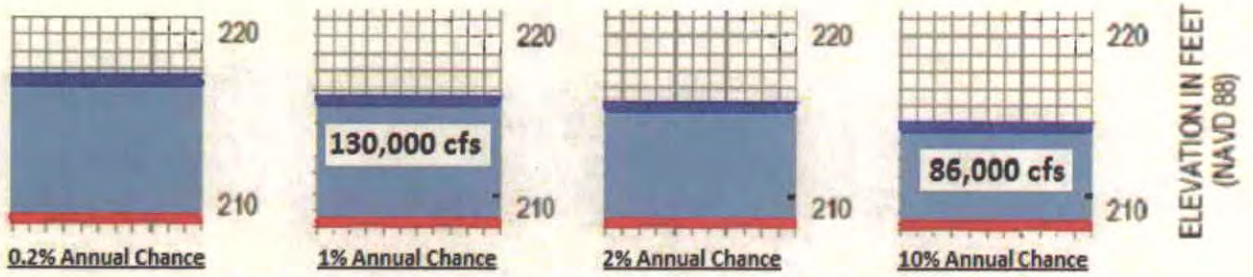
Characteristic of the reach extending *2.2 miles* upstream from Amtrak Bridge, and including Glenville, Stockade, Scotia and SCCC, the G and S water-level data identifies the presence of the *runoff-plateau, several miles long.*

Station	Location	Baseline Max WL (ft, NAVD 88)
17.7	Amtrak Bridge	230.48
18.1	Stockade Historic District	230.61
18.6	Western Gateway Bridge - Upstream	230.77
19.9	Isle of the Oneidas	231.07

This indicated total *slope of only 0.59 feet (~7.1 inches) is clearly inadequate for the drainage needed to avoid flooding.*

Further complicating this "local" inadequate-draining characteristic is the large-scale inadequate discharge at the three-story high Lock 7 Dam, miles downstream.

This overall 1,900-feet dam forces runoff to overflow, and far too slowly. The "100-Year" volume towers high, but note the (foundational) "10-Year" height - - *a concerning hydraulic "canary".* Any runoff exceeding 70,000 cfs has resulted in NWS "Floodstage".



PEAK RUNOFF-OVERFLOW HEIGHTS ACROSS CREST OF LOCK 7 DAM

Overflow-heights BACKWATER along the entire pool's flat-surfaced underlying volume exacerbates many situations tar upstream along the Niskayuna Pool.

Is not the Lock 7 Dam's HUGE "100-Year" overflow-height volume that backwaters pool-length a distinct, literally underlying problem (a) extending under Freeman's Bridge and past canalside Schenectady/Scotia/ SCCC - - and (b) supporting the runoff-plateau to flood very harmfully?

Now back to examining the reach under the Balltown Road (or Rexford) Bridge.

The elongated permanent *reservoir-pool's bottom-hugging volume prevents any significant bottom-influence toward a runoff-volume's surface profile.* As distinct volumes, the periodic arriving runoff-increase tops the in-place, flat-surfaced Niskayuna Pool, plus developing overflow-height backwater.

The FEMS FIS profiles the Balltown Road (Rexford) Bridge condition. For the tight cluster of four cross-sections J, K, L and M there, its Table 6 (pertinently excerpted below) lists revealing data. Topographically enforced narrowness bounds this very short (~255-feet) reach and promotes the ***distinctly fastest velocities*** of the "100- Year" runoff along the entire reservoir-pool, as listed below.

Fast velocities are *incongruous with any harmful retarding* of such a large volume-flow

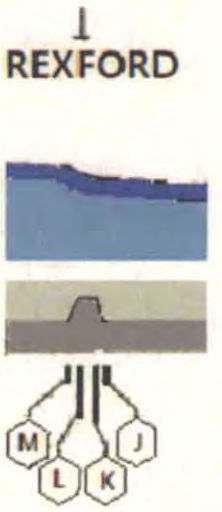
The FIS profiles of the riverbed and water-surface are excerpted (right, below) and the large volumetric throughput at this reach (cross-section x velocity = cubic feet per second) is boxed (left, below).

Such free-flow throughput is unmistakably very real.

	FLOODING SOURCE		FLOODWAY			1% or "100-Year" WATER SURFACE ELEVATION	
	CROSS-SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	INCREASE (FEET)
	MOHAWK RIVER						
158,741	Lock 7 Dam E	13,900	1,120	28,862	5.5	200.7	0.5
160,724	F	15,710	2,190	9,291	4.1	217.5	0.0
159,907	J	346,360	853	16,657	9.6	220.9	0.0
159,600	K	346,610	725	16,825	9.6	221.0	0.0
159,440	Rexford Bridge L	346,534	725	15,944	10.0	221.3	0.0
160,845	M	346,613	820	16,931	9.5	221.8	0.0

[1] Feet above Albany-Schenectady County boundary

* Floodway width determined from FIRM



Does the *slight bump* detectable on the riverbed at "Balltown Road Bridge/Rexford" pose, as the G and S report postulates, a backwatering threat so many miles far-upstream (FEMA shows "probably no")? These FEMA details, coupled with physical observations, conclude that *this small condition impacts very little and only locally.*

Its height,scaled from the FEMA profile as less than 2 feet, clearly does *not govern water-surface elevations many miles upstream.*

G and S confirms that NYPA considers the top of flashboards as the **"crest" elevation.**

Modeling gates (that match the flashboard-height) to *replace a maximum depth of only 3.75 feet in the concrete crest - - at the scale of ~130,000 cfs* "100-Year"runoff-volume, is a *decidedly timid, hardly pertinent step.*

The following data, excerpted (and adapted) from the G and S Table 8, compares modeled surface-level results at key locations upstream with open 6-feet high gate-systems (inserted at *Dam D only* (Option 4), or at *Dams D and F* (Option 7).

Per the two Delta columns immediately adjacent to the Baseline water-surface elevations, each of *these two specific low-height options* would provide small reductions from the baseline runoff-surface elevations .

Dam F would contribute the reductions (feet) listed in the right column (Option 4 subtracted from Option 7).

Table 8 *(adapted excerpts): Maximum Water Levels ... Scenario of the 100-Year Flood*

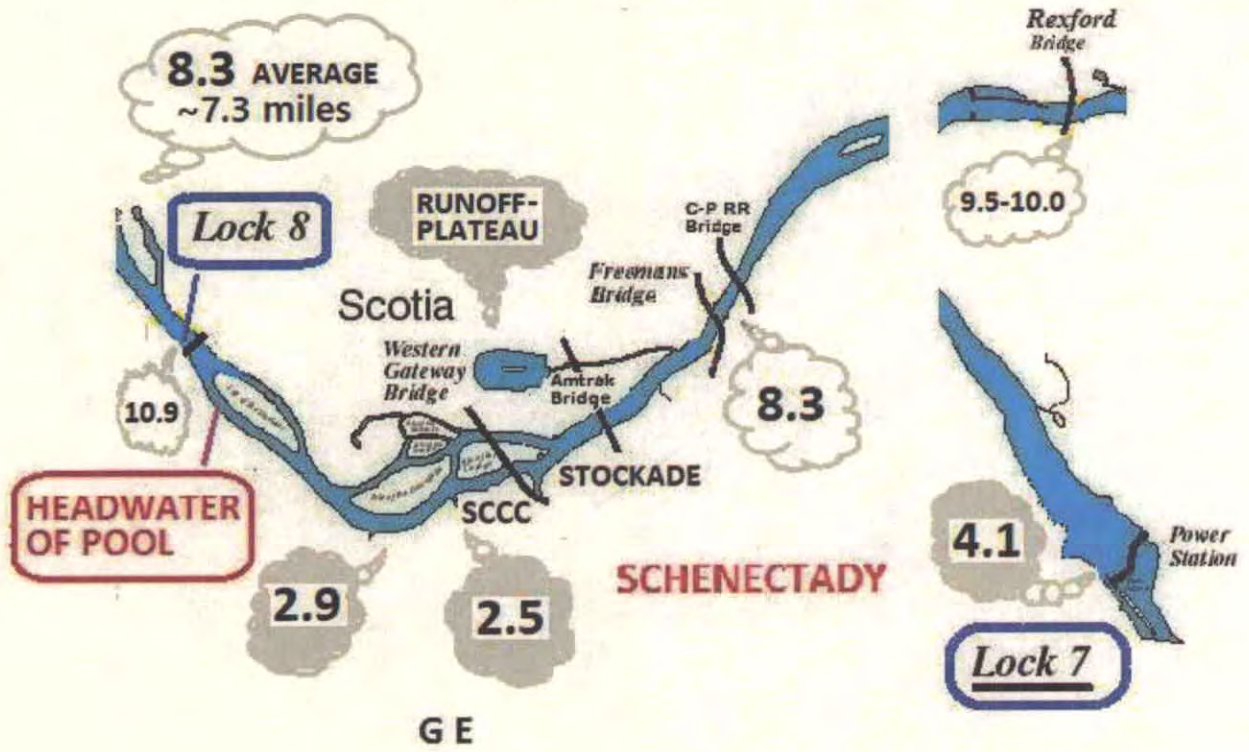
Station	Location	Baseline Max WL (ft, NAVD 88)	Option 4 - 6 ft Dam D Delta (ft)	Option 7 - 6 ft Dam D + F Delta (ft)	Option 7 - 6 ft Dam F Delta (ft)
9.7	Vischer Ferry Dam - Downstream	197.58	0.00	-0.01	-0.01
10.0	Vischer Ferry Dam - Upstream	216.77	-1.44	-2.08	-0.64
12.2	GE Global Research Center	218.33	-1.00	-1.43	-0.43
14.0	Balltown Road (Rt. 146) Bridge - Upstream	220.88	-0.60	-0.89	-0.29
16.5	D&H Railway Bridge - Upstream	225.34	-0.12	-0.16	-0.04
16.8	Freeman's Bridge Road - Upstream	227.31	-0.10	-0.14	-0.04
17.7	Amtrak Bridge	230.48	-0.09	-0.12	-0.03
18.1	Stockade Historic District	230.61	-0.09	-0.12	-0.03
18.6	Western Gateway Bridge - Upstream	230.77	-0.09	-0.12	-0.03
19.9	Isle of the Oneidas	231.07	-0.08	-0.11	-0.03

The respective Deltas (from the baseline) show that gates 6-feet high, inserted 3.75 feet into the concrete crest to match flashboard-height, would provide *negligible, cost-unjustifiable results - - less than 0.5 inch* upstream at SCCC/Scotia and Schenectady, where *reductions of many feet are needed.*

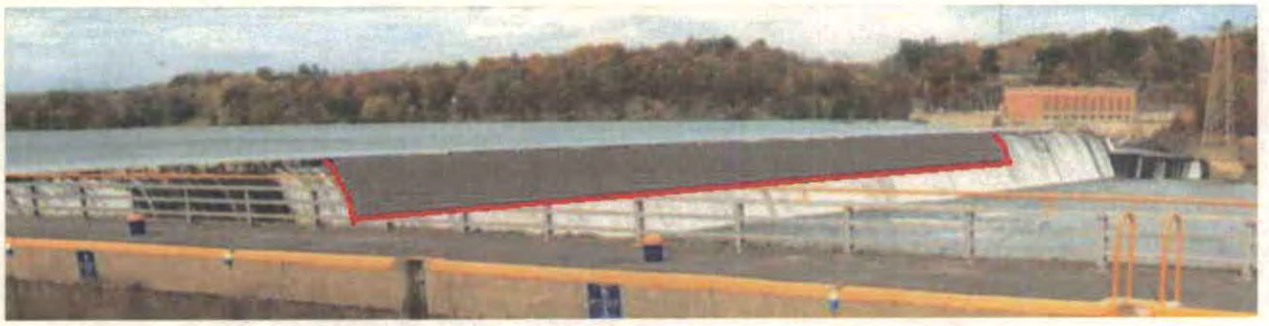
To be effective against the disruptive, damaging and more-frequent lesser volumes, and certainly a "100-Year' volume, ***the gate-system should replace no less than a 10-feet depth in the concrete crest across a large portion at Dam D alone.***

USGS gages have verified repeatedly the *cohesive behavior of water-surface levels along this entire impounded pool, in spite of concurrent major differences in velocity reach-by-reach.*

Following is an excerpted footprint of the Niskayuna Pool, intended to locate significant FEMA-listed mean velocities in feet per second (fps). The two extremely slow velocities between Lock 8 and the Stockade, then also far downstream at Lock 7, symbolize the inadequate drainage and overall discharge, thus the consequent flooding.



The objective of a gate-system modification is to develop maximum practical runoff-surface ***slope.*** Risk-management criteria focus on attaining adequate controlled preemptive capability for ***truly draining runoff-velocities*** *throughout the entire Niskayuna Pool.* This would resemble the effect of lifted dams upstream that allow the overall natural downstream-sloping riverbed there to govern runoff-drainage.



INSERT GATE-SYSTEM

Capability for preemptive release comparable to Lock 8 etc. upstream

20200204-0006 FERC PDF (Unofficial) 02/04/2020

ORIGINAL

31 Van Voast Lane

Glenville, NY 12302

January 25, 2020

Kimberly D. Bose

Secretary, FERC

888 First Street, NE

Washington, DC 20426

Vischer Ferry Dam Project #4679-049

Dear Secretary Bose:

I am a retired licensed engineer formerly employed by the New York State Department of Environmental Conservation (NYSDEC) in the Flood Protection unit.

The pool behind the Vischer Ferry Dam too frequently floods billion dollar development in the Schenectady/Scotia area. More than twenty years I have urged the Canal Corporation, now administered through the New York Power Authority (NYPA), and its predecessor agencies, to seriously study the upstream flood impact from that structure.

I am aware that NYPA does not wish to do an additional study. This flooding issue has existed for over one hundred years. I urge that FERC require such a study for both ice jam and fluvial flooding events as a relicensing requirement.

Sincerely,

Russ Wege

Russ Wege

retired engineer

20200204-5074 FERC PDF (Unofficial) 2/4/2020 2:11:56 PM

Jasmine Roberts, Schenectady, NY.
PLEASE CONTINUE TO STUDY THE DAM. I LIVE IN THE FLOOD ZONE THAT MOST FLOODS COULD BE PREVENTED FROM THE UPSTREAM DAM. THIS IS PERTINENT TO KEEPING THE STOCKADE A HISTORIC AND BEAUTIFUL PART OF SCHENECTADY. IT ALSO WOULD PREVENT PEOPLES HOMES FROM CONTINUING TO BE DAMAGES DUE TO THE DAM.
THANK YOU FOR YOUR CONTINUING WORK TO PREVENT MORE FLOODING IN THE FUTURE!!
JASMINE ROBERTS AND NICK ANTOLINO
HOME OWNERS IN THE STOCKADE DISTRICT.

20200204-5066 FERC PDF (Unofficial) 2/4/2020 1:25:14 PM

Suzanne Unger, SCHENECTADY, NY.
I am writing regarding the licensing of the Vischer Ferry Dam on the Mohawk River near Niskayuna, New York. As part of the relicensing process, I am asking you and NYPA (New York Power Authority) to consider flooding up river from the dam. While many have suspected for many years, that this fixed dam exacerbates periodic flooding in Schenectady, NY, NO in-depth, definitive study has ever been done. All studies up to now have been cursory and do not provide the data needed to determine the connection between the dam and the flooding The relicensing process is a perfect opportunity to determine once and for all, the role the dam plays in flooding.

The affected area in Schenectady, is the Stockade Historic District which is on the National Register of Historic Places and dates back to 1661. Flood mitigation is a complicated and delicate issue when it comes to the significant historic resources located along the Mohawk. The federal government has an obligation to collect the best possible data before determining how to protect this important resource.

20200206-5013 FERC PDF (Unofficial) 2/5/2020 5:30:34 PM

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits
625 Broadway, 4th Floor, Albany, New York 12233-1750
P: (518) 402-9167 | F: (518) 402-9168 | deppermitting@dec.ny.gov
www.dec.ny.gov

February 5, 2020

New York Power Authority
Attn: Robert Daly, Licensing Manager
123 Main Street
White Plains, NY 10601

RE: Revised Study Plan (RSP) Comments
Crescent Hydroelectric Project (FERC No. 4678)
Vischer Ferry Hydroelectric Project (FERC No. 4679)
Town of Colonie, Albany County
Towns of Clifton Park and Halfmoon, Saratoga County
Town of Niskayuna, Schenectady County

Dear Mr. Daly:

The New York State Department of Environmental Conservation ("NYSDEC" or "Department") is submitting comments on the January 21, 2020 Revised Study Plan (RSP) by the New York Power Authority ("NYPA" or "Applicant") for relicensing the existing Crescent Hydroelectric Project (FERC No. 4678) and Vischer Ferry Hydroelectric Project (FERC No. 4679). The two projects, collectively referred to as the "NYPA Projects", are located on the Mohawk River with the Crescent Project located in Albany, Schenectady, and Saratoga Counties, New York and the Vischer Ferry Project located in Albany and Schenectady Counties, New York.

General Comments

The NYPA has included in the RSP, a copy of the Reimagine the Canals Task Force Report which was released on January 6, 2020. The report, as it relates the NYPA Projects, focuses on flooding resiliency improvements and other initiatives such as ice jam monitoring, early warning systems and possible retrofits to the Vischer Ferry Dam to mitigate ice jams and seasonal flooding on the Mohawk River. NYPA has further indicated that as a result of the potential work identified in the report, operations and infrastructure at the projects may materially change in the future, and current environmental conditions may not be representative of conditions that will exist if the initiatives are implemented. At the current time however, this should have no bearing on the state or quality of studies as related to the relicensing of the NYPA Projects, as no material changes are being proposed by NYPA to either of the NYPA Projects at this time.

Section 2.3.1 Blueback Herring Study

This section of the RSP indicates that the fish deterrent system at the Crescent power Plant has experienced operational abnormalities and troubleshooting concluded that the power cable experienced water intrusion compromising the power needs of the sound projectors. As a result, "*The Power Authority is currently in the process of ordering a new submarine power cable and has notified the resource agencies*."[1] NYSDEC has no record of being notified of these events or the potential impact upon deterring Blueback Herring from the NYPA Projects. It is important the Department be promptly notified of all such events.

[1] Kleinschmidt. 2020. Revised Study Plan for the Crescent and Vischer Ferry Hydroelectric Projects (FERC No. 4678 and No. 4679). NYPA. Pg 17.

20200206-5013 FERC PDF (Unofficial) 2/5/2020 5:30:34 PM

Comments on the Revised Study Plan

The Revised Study Plan is generally well-organized and addresses many of the key issues for the NYPA Projects. NYSDEC offers the following comments and recommendations on the proposed studies:

I. Water Quality Study

Department staff continue to request the addition of bypass monitoring sites to the Water Quality Study and that such monitoring data to be collected over 15-minute intervals.

There should be two bypass monitoring sites at each of the NYPA Projects because of the large size of the Mohawk River and the conditions that present a split channel at both projects. At the Crescent site, one monitoring location should be sited below dam A and the other should be sited below dam C. At the Vischer Ferry site, one monitoring location should be sited below dam D and the other should be sited below dam F. These sites should collect the same data asis collected at the intake and tailrace monitoring sites. Although the bypass reach is short, it still provides suitable habitat for aquatic plants and animals. The generally rocky and shallow conditions of the bypass at the NYPA Projects will present different conditions than that of the impoundment and downstream reaches of the project which may be reflected in the water quality as well.

Monitoring data over 15-minute intervals is a standard that has been practiced in the relicensing studies at multiple Projects across New York State. It also the standard for data collected by USGS at their gaging locations, including the Cohoes location on the Mohawk River (USGS 01357500), which is collected over 15-minute intervals. Concerns regarding battery life does not present an impediment for water quality monitoring when the relicensing of other Projects demonstrates otherwise.

Having adequate and comprehensive water quality data is of particular interest to the Department and will help to guide staff's conditioning of the §401 Water Quality Certificate (WQC).

II. Fish Entrainment Study

NYSDEC agrees with the proposed study and has no further comments.

III. Blueback Herring Migration Study

NYSDEC agrees that there is a large data pool already available for juvenile Blueback Herring (*Alosa aestivalis*) and their interaction with the NYPA projects. NYSDEC has not expressed a lack of interest in the upstream migratory nature and magnitude of the blueback herring, as can be reviewed in the Department's December 20, 2019 letter in response to the PSP. As stated in staff's response to the September 23, 2019 Proposed Study Plan: "*NYSDEC currently has a greater interest and concern, at this time, in adult Blueback Herring and their interaction with the NYPA Projects. As such, the currently proposed study and its goals to assess the timing, duration, and magnitude of the immigrating adults is acceptable; however, NYSDEC is also interested in assessing the timing, duration, magnitude of the emigrating adults as well as downstream mortality. The relationship between the NYPA projects and the adult Blueback Herring population, particularly during their outmigration, is incredibly important to assessing the impacts on the fishery.*"

Much like NYPA and Kleinschmidt, the Department is seeking a more holistic approach to the Blueback Herring Migration Study, such that the full migration path of the adults of the species and their interaction with the NYPA Projects is studied and evaluated, which includes both their immigration and their emigration patterns. Survival and passage of adult blueback herring has not been as well studied as survival and passage of juvenile blueback herring have been in the NYPA

Projects area. Furthermore, there are questions and concerns about the efficacy of the acoustic deterrent system, particularly at the Crescent Project where there have been recent failings in its use and practice.

Studies that have been cited relating to blueback herring movement and passage:

- Chas. T. Main, Inc. 1984. Studies of the Migration of Juvenile Blueback Herring in the Lower Mohawk River. Prepared for the NY Power Authority.
- Curtis and Associates. 1987. Vischer Ferry Hydroacoustic study of Blueback Herring Outmigration in the lower Mohawk River. Prepared for the New York Power Authority, New York, NY.
- Dunning, D.J. and C.D. Gurshin. 2012. Downriver Passage of Juvenile Blueback Herring Near an Ultrasonic Field in the Mohawk River. North American Journal of Fisheries Management. 32:365-380.
- Federal Energy Regulatory Commission (FERC). 2000. Final Environmental Assessment for the Application to Modify Article 41 of the Crescent Project (4678) and Vischer Ferry Project (4679). November 17, 2000.
- Gurshin, C.W.D., M.P. Balge, M.M. Taylor, and B.E. Lenz. 2014a. Importance of Ultrasonic Field Direction for Guiding Juvenile Blueback Herring Past Hydroelectric Turbines. 144th American Fisheries Society Annual Meeting, Quebec, Canada. 21 August.
- Gurshin, C.W.D., M.P. Balge, M.M. Taylor, and B.E. Lenz. 2014b. Importance of Ultrasonic Field Direction for Guiding Juvenile Blueback Herring Past Hydroelectric Turbines. North American Journal of Fisheries Management, 34:6, 1242-1258.
- Kleinschmidt Associates. 2009. Effect of an Ultrasonic System on Adult Blueback Herring at the Crescent Hydroelectric Project: Data Report. Prepared for New York Power Authority. December.
- Mathur, D., P.G. Heisey, K.J. McGrath, and T.R. Tatham. 1996. Juvenile Blueback Herring (Alosa aestivalis) Survival via Turbine and Spillway. Water Resources Bulletin of the American Water Resources Association. Vol. 21, No. 1. February.
- Normandeau Associates. 2009. Hydroacoustic Studies of the Downstream Passage of Juvenile Blueback Herring in the Presence of Ultrasound at the Crescent Hydroelectric Project, Mohawk River, New York.
- Normandeau Associates. 2012. Hydroacoustic Studies of the Downstream Passage of Juvenile Blueback Herring after Reconfiguration of the Ultrasound at the Crescent Hydroelectric Project, Mohawk River, New York.
- RMC Environmental Services, Inc. 1992. Juvenile Blueback Herring (Alosa aestivalis) Survival in Powerhouse Turbine Passage and Spillage Over the Dam at the Crescent Hydroelectric Project, New York. Prepared for the New York Power Authority.
- Ross, Q. E. 1999. Studies to determine the feasibility of using high frequency sound in conjunction with bypasses located outside of the sound field to provide protection for young-of-the-year and adult blueback herring at the Crescent and Vischer Ferry Hydroelectric Projects. Prepared for New York Power Authority. In Fish Protection at Cooling Water Intake Structures: A Technologies Reference, EPRI, Palo Alto, CA, 2004.

A study that investigates and evaluates the movement of adult blueback herring through the NYPA Projects area will provide data on their immigration and emigration patterns, a measure of their survivability, and how project operations impacts that. Such information will help to guide and inform management of the blueback herring stock in the Mohawk River in addition to project operations and fish passage and protection practices at the NYPA Projects.

A white paper study will only be acceptable if it also has the goal to inform and frame a field study that will follow it in the second sampling season.

IV. Fish Community Study

NYSDEC agrees with the proposed study and has no further comments.

V. Aquatic Mesohabitat Study

NYSDEC agrees with the proposed study and has no further comments.

VI. Bald Eagle Study

NYSDEC agrees with the proposed study and has no further comments.

VII. Recreation Study

NYSDEC agrees with the proposed study and had no further comments.

Study Requests

As previously requested in our December 20, 2019 letter the Department continues to request that NYPA conduct the following study:

American Eel Study

American eel (*Anguilla rostrata*) has a wide range across the Eastern United States and New York State where it is native in 17 of the 18 watersheds in the state. Eel runs, in which young-of-year juvenile eels known as elvers migrate into freshwater habitat, have long occurred with elvers scaling waterfalls and the faces of dams to access more habitat further inland. Despite their robust nature, the American eel population has been steadily in decline and the construction of dams and the operation of hydropower projects are some of the contributing factors with mortality rates in passing through turbines woefully high without protections in place. American eels are not known to travel well through the canal lock system and may even show a preference for dam sites during their upstream migration in the spring. As the American eel has been documented in surveys to inhabit the Mohawk River Watershed, as well as the mainstem itself, a study is needed to ascertain the abundance of eels in the NYPA Projects' areas and the need to provide them a better and safer mode of passage.

NYPA has proposed to conduct an American eel study following the results of the Fish Community Study, however NYSDEC strongly disagrees with conducting of the American Eel Study as the result of a desktop analysis of previously conducted sampling and studies. The vast majority of the available material for review involves sampling methodologies that were developed for targeting specific species of fish, namely black bass and other sportfish. This presents the problem of a sampling bias and perhaps also a gear bias. While American eel have been caught during some of these sampling efforts, it has been as limited bycatch. It is an inappropriate use of the data to substantiate that bycatch of American eel during sampling for other fish species can be used as an indicator of actual species abundance; to properly determine abundance of any species, a study designed to target that species should be employed. The behavior of the American eel is not comparable to the behavior of a Smallmouth Bass (*Micropterus salmoides*), for example, and their reaction to receiving an electric shock is more often to dig and burrow down into available substrate than to rise to the surface where netters can capture the fish for data collection. Moreover, the Mohawk River is a large and turbid river with great width and depths, which makes the use of boat electrofishing for the purpose of sampling eel all the more difficult.

Furthermore, American eel are a diadromous fish species with an obligatory migratory nature. Regardless of whether or not eel are residents to the NYPA Projects, they will still encounter, interact with, and need to migrate past them in order to complete their life cycle. Information on the abundance of American eel in the NYPA Projects area is necessary to understand the full impacts that the NYPA Projects have on this species.

1. *Goals and Objectives*

   The goals and objectives of this study are to assess the presence and relative abundance of American eel elvers in the NYPA Projects area and assess the need for eel ladders to improve successful and safe upstream passage.

2. *Resource Management Goals*

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

   There is a pre-proposal currently available for public review and comment which will elevate the American eel from a species of conservation need to a species of special concern in New York State (https://www.dec.ny.gov/regulations/34113.html).

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   Although caught in low numbers in the past couple of decades, fishery surveys have continued to collect mature American eels while sampling. There are also historical records of American eel caught in the Mohawk River and adjacent tributaries as referenced by Greeley (1935) in the Atlas of Inland Fishes of New York (Carlson et al. 2016)[2]: "…in waters above barriers eels are much less numerous, but sufficient numbers ascend the Mohawk…" and by Dittman et al. (2009c) that there had been commercial harvests of eel above Cohoes Falls in the Mohawk River during the colonial period.

   More recent records of American eel presence in the Mohawk River come in the form of bycatch from other fish sampling efforts, usually black bass and other sportfish, but also Blueback Herring. There have been limited to no concentrated efforts to sample American eel in the Mohawk River. They have been caught as far upstream as downstream of the Blenheim-Gilboa Dam on the Schoharie Creek (NYSDEC Survey #490009) and downstream of Newport Dam on the West Canada Creek (NYSDEC Survey #688202). They have also been caught in high numbers (100 individuals) above the NYS Dam (FERC No. 7481) in its impoundment and included all mature adults, likely in their migration downstream to reach the Sargasso Sea (NYSDEC Survey #490012). American eel have also been documented from the School Street Project (FERC No. 2539) fish community baseline study, including collections of eel downstream of the tailwater and beneath Dam C of the Crescent Project

[2] Carlson, D.M., R.A. Daniels, and J.J Wright. 2016. Atlas of Inland Fishes of New York. NYS Education Department and NYSDEC. Pg. 28-30.

within the project area.[3] While often caught in small, limited amounts, American eel have been caught in the project area of the NYPA projects such as the tailwater of Vischer Ferry (NYSDEC Survey #413005).

There is an ongoing USGS study to evaluate the status of American eel populations in the Mohawk River basin, however it is not expected to be completed until Fall of 2021 and no data is currently available to the public for inclusion to the records.[4] This study will use American eel DNA to determine presence and abundance based on a model created using known eel populations in other Hudson River tributaries. It does include sample sites on tributaries to the Mohawk, but the locations are not within the NYPA Projects area.

According to the 2017 American Eel Stock Assessment Update by the Atlantic States Marine Fisheries Commission[5], there is evidence of a trend of neutral or declining abundance of eels and that the stock is depleted. This is a cause for concern as the eel is important for both its ecological and commercial value. The New York State freshwater stock of eels, from the elver through the yellow and to the silver eel life stage, are of great concern and as a result NYSDEC is considering the proposal of raising the species to the status of a species of concern in the state and begin to afford it some additional protection. Additionally, the American eel is on the IUCN red list of threatened species as endangered.[6]

5. *Nexus to Projects Operations and Effects*

Both NYPA Projects have constructed dam structures which pose a migratory hurdle for the American eel in their upstream migration as elvers. While elvers may be able to ascend the dam face, they are also put at a higher risk of predation and will have to expend additional energy to do so. They may stage at the foot of the dam and then ascend by crawling up the face of the dam with slow and steady progress in order to surmount the dam and have access to upstream habitat. As mature adults, American eel will again have to pass the NYPA Projects in order to complete their reproductive cycle as they migrate downstream, seaward.

6. *Methodology Consistent with Accepted Practice*

The sampling of eels should be conducted through the deployment of eel traps and eel mops to determine staging of upstream migration and relative abundance of elvers. The recommended study uses standard sampling techniques such as those used by Kleinschmidt in the relicensing of the Parr Hydroelectric Project (FERC Project 1894) [7], utilizing an eel ramp pass trap design as developed by Haro (2006). Consultation with NYSDEC and USFWS will help to refine the number, size, and placement of the eel traps and eel mops.

Traps and mops should be in place by the end of April to ensure that they will function well and be available to collect any early arriving immigrating elvers. Traps should be checked at regular intervals; once a week at numbers less than 50 and daily at more than 50 individuals. Eel mops should be checked daily and removed during high water to prevent loss of gear. Collected eels should be enumerated and have their length and life stage recorded. All elvers should be released upstream and any yellow or silver eels released downstream of the

[3] Falcinelli, D.P. 1994. Response to Schedule B AIR No. 4 Fish Resources Baseline Study. School Street Project (FERC No. 2539-003). Niagara Mohawk.
[4] https://www.sciencebase.gov/catalog/item/5d70f37ee4b0c4f70cfcb202
[5] http://www.asmfc.org/species/american-eel
[6] https://www.iucnredlist.org/species/191108/121739077
[7] Kleinschmidt. 2016. American Eel Abundance Study Report: Parr Hydroelectric Project (FERC Project 1894). Kleinschmidt. Lexington, S.C.

associated NYPA project dam. Traps should be removed in September to conclude the sampling season.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

The level of effort would involve one field crew. The study would last for one field season, two if abnormally high flows damage the sampling gear and disrupt the study. The actual cost is unknown and would depend upon the cost of sampling gear, number of sampling locations, local labor costs, the ability to combine multiple studies (e.g., water quality) into one task, etc. The existing literature provided in the PAD (Section 4.4.2.3), PSP (3.2.1), and RSP (Section 3.2.1) is inadequate to fully address the NYPA projects impacts and the proposed Fish Community Study would not be truly representative of the American eel population in the Mohawk River or within the NYPA Projects area.

Data from a literature review of other studies conducted in the Mohawk River Watershed may contribute to an understanding of the relationship between American eel and the NYPA Projects. However, to use that same data to 'suggest[8]' American eel are present in small numbers is inappropriate when an active study conducted within the NYPA Projects area aimed specifically to collect eels would provide the best and most useful data to inform NYSDEC on the state of the population and how it interacts with the NYPA Projects. Such data is necessary to make well-informed recommendations to NYPA regarding fish passage and protection measures.

The Department appreciates the opportunity to comment. If you have any questions or would like to discuss further, please feel free to contact me at (518) 402-9179 or michael.higgins@dec.ny.gov.

Sincerely,

Michael Higgins
Project Manager
Bureau of Energy Project Management

[8] Kleinschmidt. 2020. Revised Study Plan for the Crescent and Vischer Ferry Hydroelectric Projects (FERC No. 4678 and No. 4679). NYPA.

20200205-5135 FERC PDF (Unofficial) 2/5/2020 3:57:55 PM

February 5, 2020

Via Electronic Filing

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE
Washington, DC 20426

Re: Comments of Riverkeeper, Inc. on the Revised Study Plans for the Crescent Hydroelectric Project (P-4678-052) and/or Vischer Ferry Hydroelectric Project (P-4679-049)

Dear Secretary Bose,

Riverkeeper appreciates this opportunity to comment on the proposed environmental studies as part of the relicensing applications for the Crescent and Vischer Ferry Dams (FERC Nos. 4678 & 4679, respectively), located on the Mohawk River in Saratoga, Albany, and Schenectady Counties, New York.

A. Consistency with NYDEC's Policies and Goals

Riverkeeper urges that FERC take our recommendations into account in light of their consistency with the New York State Department of Environmental Conservation (NYSDEC)'s own policies and goals. For example, NYSDEC has consistently made it clear that nutrient levels are a concern in State waters, and play a role in concerns related to drinking water.[1] NYSDEC's 2011 NY Nutrient Standards Plan states that this concern should be interpreted broadly: "New York State believes nutrient criteria development should go beyond a focus on just the causal stressors of phosphorus and nitrogen, and also incorporate appropriate response variables, such as *chlorophyll a*, water clarity, and *measures of biological impact*."[2] These concerns are highlighted in the Mohawk River specifically as shown in 2018-2022 Mohawk River Basin Action Agenda. The Mohawk Agenda identified both reducing nutrient levels and improving

[1] NYSDEC, New York State Nutrient Standards Plan 6 (July 7, 2011), available at https://www.dec.ny.gov/docs/water_pdf/nutrientstds2011.pdf. (*hereinafter* "NY Nutrient Standards Plan").
[2] *Id.* (emphasis added).

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fisheries as goals, and the use of surveys and studies a key tool to reach these goals.[3] In particular for fisheries, the Mohawk Agenda identifies "targeted actions to improve habitat and habitat connectivity," including "[m]onitor[ing] to measure impacts of the modified canal lockage plan on fish species in the Mohawk River" and providing grants to replace, remove, or retrofit dams.[4] The action here, to study impacts of the Crescent and Vischer Ferry dams, is directly applicable to these goals as discussed in more detail below.

In a related context, a core tenet of administrative law is that an agency's specialized expertise provides grounds for courts' deference towards an agency's own interpretation of its own regulations and rulings.[5] Furthermore, even interpretations of documents without the force of law such as opinion letters, policy statements, and manuals are "entitled to respect . . . to the extent that those interpretations have the power to persuade."[6] Here, there is even greater flexibility to take NYSDEC's expertise and guidance into consideration in this discretionary context. The importance of studying both nutrients and fish has been clearly and consistently articulated by NYSDEC both broadly and within the context of the Mohawk River. FERC and NYSDEC itself should respect NYSDEC's policies and goals, and require that NYPA incorporate Riverkeeper's recommendations within the study plans to remain consistent with the existing guidance.

B. Water Quality Study

FERC has defined the geographic scope of water quality assessment for these licenses "to include the Mohawk River from the Vischer Ferry impoundment to its confluence with the Hudson River."[7] The Mohawk River in the vicinity of the Vischer Ferry and Crescent dams, and the area immediately downstream, are classified by NYSDEC as Class A waters.[8] According to NYSDEC regulations, the best usage of these waters includes "a source of water supply for drinking, culinary or food processing purposes."[9]

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[3] NYSDEC, Mohawk River Basin Action Agenda 2018-2022 at 3-7 (2018) (*hereinafter* "Mohawk Agenda").
[4] *Id.* at 9.
[5] *Matter of Riverkeeper, Inc. v. Seggos*, 75 N.Y.S.3d 854, 867 (Sup. Ct. 2018); *Matter of N.Y. State Superfund Coal., Inc. v. NYSDEC*, 892 N.Y.S.2d 594, 595 (App. Div. 3rd Dept. 2009).
[6] *Matter of Riverkeeper, Inc.*, 75 N.Y.S.3d at 867 (citing see *Skidmore v. Swift & Co.*, 323 US 134, 140 (1944)).
[7] S.D. 2
[8] 6 CRR-NY 876.4
[9] 6 CRR-NY 701.6

As a reason for excluding nutrients and chlorophyll from its study, NYPA asserts in the Revised Study Plan that these parameters are not affected by project operations.[10] This is impossible to know without study. Chlorophyll and nutrients are related to the exact same biological processes that influence dissolved oxygen and temperature, which NYPA accepts as related to operations. Furthermore, based on recent water quality data collected in the vicinity of these projects, NYSDEC and USGS have concluded that the projects may be having an impact on chlorophyll levels.[11]

One of the main objectives of NYSDEC's Mohawk Basin Action Agenda is to "protect and assess source waters."[12] The agenda identifies harmful algal blooms as a direct threat to water supplies and lays out numerical thresholds for phosphorus and chlorophyll a to protect drinking water sources.[13] Based on the currently proposed water quality study parameters, Riverkeeper asks how NYPA will be able to assess the potential effects of the project on drinking water in the project area, and requests additional study to better evaluate the potential impacts of the Crescent and Vischer Ferry projects on water quality in the Mohawk River.

NYPA has proposed to study water quality parameters and the intake and tailrace of each project for a single study season. The geographic footprint of the projects and the scope of potential impacts justify additional effort. The water quality study should be conducted over two years, to provide information about interannual variability and to maximize the opportunity of capturing significantly different weather conditions. In addition to continuous data collected at the intakes and tailraces, data should be collected from sites within the project impoundments, with the purpose of understanding how water quality varies over space and time, and in relation to locations of wastewater treatment plant outfalls and other pollution sources in the project areas.

C. Fish Studies

Eels were historically found in high abundance in the Mohawk River and its watershed. However, hydroelectric dams have contributed to the decline of eels across their ancestral

[10] NYPA, Revised Study Plan, § 2.1.5.
[11] Alexander J. Smith & Elizabeth Nystrom, *Enhanced Water Quality Monitoring in Support of Modeling Efforts in the Mohawk River Watershed* in Proceedings from the 2017 Mohawk Watershed Symposium, Union College, Schenectady NY (J.M.H. Cockburn & J.I. Garver eds., 2017).
[12] Mohawk Agenda, *Supra* note 3, at 15.
[13] *Id.* at 17.

habitat.[14] In recognition of the importance of American eels in the Mohawk Watershed, the NYSDEC Mohawk River Basin Program set forth the following principles with regard to American eels in its Draft 2018-2022 Action Agenda:

- "Investigate and gather baseline information to better understand the spatial distribution and condition of existing populations.
- Conduct watershed-wide surveys to determine the status of American eel in the Mohawk River and tributaries. Identify prime eel habitat and identify limiting factors for juvenile migration into the watershed.
- Implement the successful "Hudson River Eel Project: Citizen Science Juvenile American Eel Survey" to document the movement of glass, yellow, and silver life stages of American eel within the Mohawk River and tributaries.
- Augment this program with additional academic research of these life stages."[15]

In general, the agenda calls for "comprehensive management actions that help grow, recover, or restore migratory fish populations that are struggling or on the edge of extirpation (local extinction)."[16] The breadth of these principles underscores the significance and value of this species in the watershed.

NYSDEC has recently proposed to increase protection for eels in NYS, making them a species of concern.[17] In light of the fact that American eels are present in the Mohawk River, management agencies must apply the precautionary principle to protect the existing populations of American eel and especially juveniles entering the system to ensure their maximum contribution to the panmictic recruitment effort. Ample scientific research has clearly shown that American eels are greatly impacted by hydropower production and their tendency to use turbine intakes when moving downstream.[18]

The USGS asserts that a "knowledge gap" exists regarding the presence of American eel in the Mohawk River, and "is due in part to the fact that surveying American Eel populations is

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[14] NYSDEC, Species Assessment for American Eel 13 (2014), https://www.dec.ny.gov/docs/wildlife_pdf/sgcnameel.pdf.
[15] Mohawk Agenda, *Supra* note 3, at 27.
[16] *Id.* at 27.
[17] NYSDEC, Draft Species List Under the Part 182.5 Pre-proposal (2019), https://www.dec.ny.gov/docs/wildlife_pdf/preproposal182.pdf
[18] Species Assessment for American Eel, *supra* note 14, at 13.

challenging and time consuming with traditional fish sampling techniques (electrofishing, netting, etc.) because the species is largely nocturnal and buries itself in coarse substrates."[19] A scientifically robust survey technique is needed to accurately determine the actual abundance of American eel populations in the project area (see our comments from December 2019). The current plan proposed by NYPA is insufficient in scope, scale, and sampling design with regard to American eel. NYPA must conduct a rigorous and robust scientific study to fully understand the population and abundance of the American eel that currently exist in the project areas of the Vischer Ferry and Crescent Dams.

NYPA must conduct a study using effective gear from which quantification of effort can be measured. NYPA must also incorporate catchability into study designs, since it is critical when indexing abundance. In addition, NYPA must account for any variability in catchability to avoid biased survey results, and ultimately arriving at an incorrect estimation. Finally, it must be clearly noted that NYPA's study must thoroughly evaluate sampling effort and gear selectivity to avoid inadequate designs leading to inaccurate results.

Additionally, we strongly encourage the use of environmental DNA (eDNA) studies to determine to supplement other studies seeking to determine presence and abundance of American eel in and around the project dams. Environmental DNA in water samples has been used effectively to determine the occurrence of some aquatic species but has not been extensively applied to American eel. A recent study found that detection of eDNA in water samples from streams was greater than 90% effective at determining the occurrence of Eastern Brook Trout, *Salvelinus fontinalis*, and the quantity of DNA in water samples was a significant predictor of population density and biomass.[20] However, eDNA studies should only supplement a full assessment survey of American eel in the Mohawk River basin.

If eel populations in the Mohawk River are scant, it is at least in part because dams have significantly reduced their ability to enter the system, flourish while in the system, and have contributed to their demise when they become mangled in the turbines. It is without question that

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[19] USGS, Status of American Eel populations in the Mohawk River Basin. https://www.usgs.gov/centers/ny-water/science/status-american-eel-populations-mohawk-river-basin?qt-science_center_objects=0#qt-science_center_object

[20] Baldigo et al. (2017) Efficacy of Environmental DNA to Detect and Quantify Brook Trout populations in Headwater Streams of the Adirondack Mountains, New York. Transactions of the American Fisheries Society 146:99-111.

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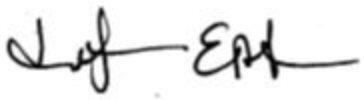
American eels in the project area are likely to be seriously impacted by the dams and may be delayed, entrained, or killed by the presence of the Vischer Ferry and Crescent Dams, as has led to the decline of their species across its range.[21]

NYPA must not rely on flawed or inadequate studies to make conclusions or declare that eels are an oddity in the Mohawk River and thus dismiss the importance of protecting eel populations. The studies conducted as part of this relicensing process must be used to fill the knowledge gaps regarding American eels in the Mohawk River, and ensure that proper protections are put in place. Hydroelectric production should not come at the expense and health of a native migratory species that has been grievously harmed by hydropower production and other anthropogenic forms of river regulation, yet hydropower facilities will continue to negatively impact American eels if no protective measures are undertaken. Providing screens over the turbine intakes, along with an appropriate adjusted flow velocity through the turbines to prevent impingement, is absolutely necessary to provide safe passage past the dams for eels and other migrating diadromous fish. We respectfully request that FERC take strict action to ensure safe upstream and downstream passage of American eel in the Mohawk River system.

Riverkeeper appreciates this opportunity to comment. If you have any questions about these comments, please contact Jennifer Epstein at jepstein@riverkeeper.org or (914) 478-4501 x248.

Sincerely,



Jennifer Epstein

Water Quality Program Scientist

[21] Atlantic States Marine Fisheries Commission, 2017 American Eel Stock Assessment Update (2017).

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Carol Delamarter, Schenectady, NY.
Stockade Association of Schenectady
32 Washington Ave
Schenectady, NY 12305

February 4, 2020
Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Vischer Ferry Dam Project #4679-

0Study Plan49
Dear Secretary Bose,

Dear Secretary Bose:
The Stockade Association of Schenectady has reviewed NYPA's January 21, 2020 revised Study Plan. Flooding concerns in the Stockade neighborhood and limits of NYPA proposed in initial were addressed in Stockade Association letter dated December 18, 2019.
It is our understanding that in order for FERC to complete the relicensing process for Vischer Ferry Hydroelectric plant, FERC must have the information needed to complete an environmental assessment. This environmental assessment requires that all issues including flooding (Section 4.2.2 of SD 2) are analyzed. To do this NYPA must provide data that allows for a thorough and balanced assessment of all impacts of the project on resources. The NYPA Revised Study Plan dated January 21, 2020, as submitted, asserts there is sufficient existing information to allow FERC to evaluate flooding issues in order to complete an Environment Assessment. (Section 3.1.3 related to Criteria 4, 18 CFR 5.9 (b). NYPA addresses flood study requirements in response to FERC in Appendix B, response 40. The Stockade Association asserts that NYPA cannot dismiss study needs through other efforts that may be underway in the future. These efforts do not fully address seasonal flooding or provide all information needed to complete an Environmental Assessment.

The Stockade Association acknowledges and supports all efforts by NYS Reimagine the Canal Task Force to make improvements to the NYS Canal System. New studies by Bergmann and BuroHappold are informing future improvement activities on the NYS Canal. In its revised study plan submission, NYPA does not provide any evidence how relying on these 0r other studies and possible future actions by NYS will inform all FERC relicensing requirements for the Vischer Ferry Dam Project. We are requesting that FERC Directors Study Plan Determination include some clarification for NYPA of how information in all external flood studies cited by NYPA will be integrated with FERC relicensing requirements and completion of Environmental Assessment.

Carol DeLaMarter, Chair
Stockade Association Preservation Committee
Cdelam6533@aol.com

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, New York 13045

February 5, 2020

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St., NE
Washington, DC 20426

RE: Crescent and Vischer Ferry Hydroelectric Projects (FERC Nos. 4678 and 4679) Comments on Revised Study Plan

Dear Ms. Bose:

The U.S. Fish and Wildlife Service (Service) has reviewed the January 24, 2020, Revised Study Plan (RSP) filed by the Power Authority of the State of New York (NYPA) for the Crescent and Vischer Ferry Hydroelectric Projects (Project or Projects) (FERC Nos. 4678 and 4679, respectively), located on the Mohawk River in Schenectady, Albany, and Saratoga Counties, New York. The Service provided our comments on the Proposed Study Plan in our December 23, 2019, letter to the NYPA (PSP Comments).

General Comments

The NYPA has indicated that the January 2020 announcement of the recommendations and findings of the Reimagine the Canals Task Force[1] may have substantive changes related to the Projects, especially in relation to ice jam flooding and modifications to crest gates and flashboards that may lead to changed conditions at the Vischer Ferry Project in the future. We note that currently no plans or modifications to the Vischer Ferry Project have been formalized beyond the announcement. We are unaware of any proposed changes at the Crescent Project. At this time, the Reimagine the Canals initiative is still in the early stages of development, and it is appropriate to continue studies and relicensing until the NYPA requests amendments to the Project works through the Federal Energy Regulatory Commission (Commission).

Blueback Herring

In the RSP, the NYPA has indicated that the acoustic deterrent system at the Crescent Project is in need of repair and the installation of the system will not occur until the Summer of 2020. The

[1] https://www.governor.ny.gov/news/governor-cuomo-annnounces-approval-300-million-funding-reimagine-canals-initiative

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NYPA contacted the Service on December 19, 2019, to notify us of this issue, and we advised the NYPA that they should coordinate closely with our office and the New York State Department of Environmental Conservation regarding the efficacy of the system in its damaged condition and any needed mitigation measures until the system is repaired. However, we are concerned that the timing of this particular issue is occurring during the study period for relicensing and has been suggested by the NYPA as a reason for lessening the rigor of studies that are needed to assess the impacts of the Projects on the movement of blueback herring (*Alosa aestivalis*) (BBH) in the Mohawk River.

In our PSP Comments, the Service discussed that while existing information is available for both of the Projects regarding the migration of BBH, there are notable gaps in the available information for the river between the Projects, for the current configurations for fish protection measures, and between adults and juveniles for routing and survival between the Kaplan and Francis turbines present in the powerhouses. The Service recommended that the NYPA conduct an updated, holistic assessment for the downstream routing of BBH through the Projects. With a comprehensive study, the NYPA will be able to readily evaluate the proportion of BBH passing through the current flashboard notches, over the dams, through the locks, and through turbines at both Projects. Coupled with existing or any needed assessments of turbine mortality for both life stages, this would provide the information needed for our analysis of BBH passage at the Projects.

The NYPA has proposed to conduct a holistic desktop analysis of BBH migration at the Projects based on the existing information at the Projects and at other projects. While this proposed study would partially meet the goal of the Service's request, we believe that site-specific data are necessary for proper evaluation of the Projects' impacts. For instance, the proportion of BBH that may approach the Project intakes, fish notches, and canal locks is likely unique to each Project. The Service recommended that the NYPA conduct a downstream radio telemetry and balloon tagging mortality study to evaluate migration and mortality at the Projects, and we continue to recommend this approach.

American eel

The NYPA has proposed to conduct a desktop-only analysis of fisheries data in the lower Mohawk River to evaluate the presence of American eel (*Anguilla rostrata*). Based on information included in the PSP, the NYPA has concluded that the available information shows that American eel are present in the Project area in low numbers. The NYPA cites information from the United States Geological Survey (USGS) that indicates that of 35 surveyed tributaries in the Mohawk River, none found American eel. Additionally, the NYPA states that the USGS is proposing to conduct environmental DNA studies in the Mohawk River to be completed in the Fall of 2021 to further evaluate American eel presence. After reviewing the information provided in Figure 3-1 of the RSP, it is clear that only 3 of the 35 surveys occurred in tributaries below the Vischer Ferry Dam, and none occurred below the Crescent Dam. As the NYPA has concluded that American eel are present in low numbers below the Projects, the Service recommends that the Commission require an Upstream Passage Study for American eel. American eel should be included in the NYPA's proposed Entrainment and Mortality Study.

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Run-of-River Study

The NYPA has declined to include the Run-of-River Study requested by the Service. As indicated in our PSP Comments, this study will allow the Service to evaluate how the Projects influence downstream flows through ramping rates and allowable fluctuation ranges. The NYPA questions whether the study is for the purpose of evaluating fluctuations at the downstream Cohoes USGS gauge, which are also influenced by a downstream project. This is not the case. The Service requested this study, and specifically the deployment of a water level monitor downstream of the Crescent Project, to evaluate the effects of the Projects on downstream river flows due to our observation of fluctuations at the Cohoes gauge. The NYPA has also indicated that these data are already collected, except for the water level monitor downstream of the Crescent Project, and will be provided in the Final License Application (FLA). However, this study is intended to provide a continuous record of the Projects' operations and influence on downstream flows to the stakeholders, which is not generally provided to the Commission in the FLA, as suggested by the NYPA. The Service has requested this study in several relicensings in New York State where gauge data suggests that run-of-river operations could be improved. The Service continues to recommend that the Commission require our requested Run-of-River Study.

Water Quality

In our PSP Comments, the Service recommended that the NYPA utilize two floating downstream monitors collecting data at 15-minute intervals for the duration of the study and to measure chlorophyll-a during discrete monitoring events. The NYPA's proposal of one downstream monitor does not appear to adequately cover the extent of the tailrace flows from both the Francis and Kaplan turbines. A 15-minute interval for data collection is a standard interval used in many hydroelectric relicensings for water quality studies, especially where units may ramp up and down quickly, such as at the Projects. The NYPA has suggested that battery limitations may prevent this; however, the record across many other Projects has shown that this is not the case. The NYPA has declined to monitor chlorophyll-a, stating that the Projects do not influence chlorophyll-a. The slow moving, warmer impoundments associated with the Projects can increase algal productivity above levels in naturally flowing rivers, and can notably influence dissolved oxygen in the system. We continue to recommend two downstream monitors at both Projects, a 15-minute data collection interval, and the collection of chlorophyll-a in the Water Quality Study.

* * * * *

Thank you for the opportunity to provide study requests for the Projects. If you have any questions or desire additional information, please contact John Wiley at john_wiley@fws.gov or 607-753-9334.

Sincerely,

David A. Stilwell

David A. Stilwell
Field Supervisor

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cc: NYSDEC, Stamford, NY (C. VanMaaren, S. Wells)
NYSDEC, Albany, NY (N. Cain)
NYSDEC, New Paltz, NY (W. Eakin)
FERC e-file

20200205-5004 FERC PDF (Unofficial) 2/5/2020 8:00:46 AM

James L Woidt, Scarborough, ME.
To Whom It May Concern:

I have previously submitted to FERC technical comments requesting a study of the contribution, if any, Vischer Ferry Dam has on the formation, magnitude, and frequency of ice jam-induced flooding. As NYPA's response to my December 22, 2019 comments provided in Appendix B or the Revised Study Plan states that the reason for not studying ice jamming is because NYPA is studying ice jams as part of other efforts, I presume NYPA understands the technical merit of studying this issue and I will not re-iterate those previously-submitted comments. Instead, I opine that the impact of Vischer Ferry Dam should be studied as part of the FERC re-licensing process for the following reasons:

1. In NYPA's response to my December 22, 2019 comments, NYPA justified their decision to not study ice jams as part of the FERC re-licensing process because NYPA is already evaluating and mitigating ice jams as part of the Reimagine the Canals effort. While I commend NYPA for the Reimagine the Canals effort, the Reimagine the Canals effort is an elective effort, not regulatory. NYPA is just beginning the visioning and preliminary planning for the Reimagine the Canals effort. There are no regulatory or legal requirements that require accomplishment of an explicit objective relative to ice jam mitigation for the Reimagine the Canals effort. The effort is also subject to political support at the state level. For these reasons, it is possible that the Reimagine the Canals effort does not yield any ice jam mitigation actions – possibly as the result of, but not limited to, de-funding of the effort at the state level or NYPA's election to not pursue ice jam mitigation strategies. Therefore, I opine that the FERC re-licensing process is the only process that will require adverse impacts to be mitigated.

2. In January 2020, the Ice Jams in the Mohawk River Valley Report to the Reimagine the Canals Task Force prepared by BuroHappold (2019) on behalf of NYPA was made publicly available. In this report, BuroHappold/NYPA state:

"Under ice jam conditions, this [Vischer Ferry] dam can block the flow of water, elevating water levels, and ice jams easily accumulate at locks and related facilities. Ice can interfere with the movement of the locks and place additional load on their structural and mechanical components by, for example, preventing full gate opening…Removing Vischer Ferry Dam would reduce the risk of ice jam creation by removing the existing obstructions to water flow."

In this statement, NYPA acknowledges that Vischer Ferry Dam adversely impacts ice jam-flooding. Further, NYPA also acknowledges that icing of the gates can prevent their function which could reduce NYPA's capacity to manage water levels above Vischer Ferry Dam and inadvertently exacerbate flooding. From the statement in the BuroHappold (2019) report, it is understood that Vischer Ferry adversely impacts ice jam flooding. It can also be logically extrapolated that the operation of Vischer Ferry Dam, specifically the increasing or decreasing of water levels, can

20200205-5004 FERC PDF (Unofficial) 2/5/2020 8:00:46 AM

exacerbate or decrease this adverse effect of the dam (which I acknowledge would remain even in the extreme scenario that NYPA's license is not renewed). As NYPA is responsible for operation of Vischer Ferry Dam levels, I opine that NYPA's operation of Project P-4679 can decrease or increase the impacts of ice jamming. As such, re-licensing of the Project should require that NYPA operate Vischer Ferry Dam in a way to mitigate the adverse impact of ice jams specifically caused by NYPA's operation of the Vischer Ferry Dam.

My hope is that with the above comments, FERC and NYPA will recognize that Vischer Ferry Dam is likely to adversely impact the important local issue of ice jam flooding on the Mohawk River. I further hope that NYPA, as part of the FERC re-licensing process, will undertake a study that quantifies the frequency and magnitude of ice jamming on the Mohawk River upstream and downstream of Vischer Ferry Dam, quantifies the impact of Vischer Ferry Dam operations on the frequency and magnitude of flooding upstream and downstream of the dam, and requires mitigation of any adverse impacts identified from the above. As previously stated, the FERC re-licensing process is the only on-going regulatory process that will require NYPA to undertake specific actions to mitigate the yet unquantified, but reasonably suspected, adverse impacts of Vischer Ferry Dam operations on ice jamming. Thank you for your consideration of this important issue.

Sincerely,
James Woidt

Document Accession #: 20200213-0012 Filed Date: 02/13/2020

ORIGINAL

James E. Duggan
Consultant

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Scotia, NY 12302
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2020 Feb 13

4 February 2020

Vischer Ferry Dam Project # 4679-048

Dear Secretary Bose,

Again, I respond thankfully to the opportunity FERC has provided for comment regarding the NYPA "Revised Study Plan", dated 21 January 2020. Along the upper-third reach of Lock 7 (Vischer Ferry) Dam's impounded reservoir-pool, endangerment of canalside Scotia and Schenectady by runoff-flooding continues and will grow. Time is crucial to (a) expedite accurately focused planning and (b) assure commitment to modify this dam to allow well-scaled controllable release, increasing the public good.

Following my previous comments re the Gomez and Sullivan letter report (April 17, 2018) that NYPA presented as assessing inadequate performance by a shallow gate-system, NYPA now continues referring to that report, as well as the "Mohawk Flood Assessment Report", dated 8 October 2019, by Bergmann Associates for the "Reimagine the Canals Task Force". Furthermore, NYPA also defers to land-based... activities by the City of Schenectady that divert public attention from pursuing the obvious runoff-drainage problem. My return more fully to these matters will follow.

Within the above-mentioned "... Assessment Report" (p. 17) is the following statement that indicates adverse strategic consequence to the prospect of applying capital and opera- tional change at the Lock 7 (Vischer Ferry) Dam to mitigate the flooding issue:

> "Pursuant to NYPA's hydroelectric Federal Energy Regulatory Commission ***license***, minimum water levels are required to be maintained at the top of the concrete spillway during the non-navigation season and at the top of 27-inch high flashboards that are installed during the navigation season. Water levels are ***not allowed to be preemptively lowered*** in anticipation of a major flood Event at the Vischer Ferry Dam." (My bolds and italics)
>
> If this statement is accurate and will remain unchanged, the flood-affected community and Its demonstrable values will remain imperiled, unless and/or

until FERC will incorporate temporary lowering as a flood-mitigation provision.

Now a retired architect, I resided in Schenectady's Historic Stockade for 49 years, coping with repeated free-flow and ice-jam flood threats and intrusions into my home. For most of that period (and now well beyond while residing nearby), I have been an active analytic observer of the water-surface elevation dynamics, the Lock 7 Dam's nature within its overall site and the slow discharge from the broad tailwater of its lengthy impoundment.

My strong dissent to NYPA's positions to-date continues with concern about the discernibly inadequate scale of the proposed gate-system toward runoff-flooding along the overall impounded reservoir-pool, directly affecting the community. The headwater reach lost significant bottom-influence not far upstream from Schenectady and Scotia. We should recognize this loss and compensate with the fullest practical new discharge.

To deal with substantial hydrologic circumstances against this lengthy dam's present hydraulic characteristics, the Bergmann "Mohawk Flood Assessment Report" for the "Reimagine ... Task Force" has postulated two potential interventions, each of tnem appearing to be at the extremities of a possible range.

The more-drastic intervention to replace the entire dam with "Full-Height Tainter Gate Bays" was illustrated and its cost estimated, then withdrawn. That scope of intervention has not been the affected community's objective.

The Task Force's other listed proposal, Obermeyer gates, for modifying the Lock 7 Dam is not effectively different from the preceding inadequate Gomez and Sullivan study. Both proposals are *virtually token in proposed depth of replacing concrete* to address (a) the needed better overall throughput of the runoff-volume, based on (b) greater actual discharge of runoff from the reservoir-pool's tailwater at a significantly lower weir-elevation to promote higher-velocity, while *involving least or no backwatering overflow.*

A runoff-profile and pertinent drainage-velocities, as informative basic findings, are unavailable for review as means to help corroborate or possibly adjust the proposal.

While the relatively small scale of intervention modelled by the Task Force's consultant defined the result as inadequate to prevent flooding, the (Table 7) summary listed both *benefits and costs* (capital and operations) as *"High"*. Benefits construed as "high" should stimulate increasing the scale of intervention toward practical adequacy.

4 Feb 2020, 1600

A "mid-scale" capability to exercise effective preemptive action and sustained followup can achieve a *well-managed relative "balance" between the arriving runoff and pool-discharge many miles downstream - - without or minimal overflow-backwatering*. The result would increase draining surface-slope/velocity characteristics throughout.

The software used, MIKE 11, stresses *river*-modelling. With this high, fixed-crest dam anchored to the riverbed, the impounded reservoir-pool volume's occupying mass (a) hardly acts as riverine, while its flat surface (b) usurps the riverbed's prior role as the natural influence on draining velocity and surface-slope, particularly in the headwater and tailwater reaches. This latter influence for drainage was instrumental to the earliest and recurring two-century-plus community experience in developing its structures with least dangers from free-flow runoff-flooding - - until the 20th Century approached, when the employment-surge at then-new GE pressured gross expansion of housing with apparently little recognition of periodic hazard in the also-new floodplain, after late-1912 (refer to change in drainage imposed by crest-height as reflected in photos below).

~EARLY 1912 DAM UNDER CONSTRUCTION DIRECTLY ON RIVERBED (~180')

MARCH 1913 RECORD FLOOD-HEIGHT -- DESPITE TWO SEGMENTS MISSING

Flooding during the 1% runoff-volume is the conventional focus. More frequent is the 10% runoff or slightly larger, often un-noticed, but acting clearly as a "canary" of concern.

For "only" the 10% runoff-volume along a 1,990 feet crest, the FEMA FIS identified 5+ feet (backwatering) overflow-height makes the hydraulics of this high fixed dam very suspect - - and consequences very severe.

A free-flow runoff-volume slightly larger than 10% invades to begin a broad range of disruptions in community life, as well as repeated lower-elevation damages to numerous structures (Schenectady County Community College campus and activities become affected, a newer victim beyond the "usual").

Lock 7 (Vischer Ferry) Dam's hydraulic characteristics likely have generated a higher and broader 1% free-flow floodplain than had existed before its substantial (not literal) completion by late 1912, *its site ~30 feet lower overall than the Lock 8 site upstream.*

NYPA also has cited: "During 2018, the U.S. Congress authorized $1.3 million in funds to assist the City of Schenectady with a study to evaluate options and develop flood mitigation plans for the Stockade District, and the Federal Emergency Management Agency (FEMA) has recently earmarked $7.5 M for implementation of Stockade District flood mitigation strategies (The Daily Gazette, 2019)."

This land- and property-directed funding and resulting activity in conceiving possible actions diverts attention from the obvious hydraulically impeded runoff atop a fixed dam-impounded reservoir-pool volume. The now-proposed "Stockade Resiliency" measures will *destroy the genuine historic sense embodied in both the character of streetscapes and individual buildings,* many of the latter to be grossly distorted. *Many neighborhood residents are very frightened by the very disruptive personal uncertainties in relocating* from their homes to await whichever physical change is selected from among the varied massive projects the City's consultants have offered.

In the re-licensing process for NYPA. enhancing the composite canalside Schenectady community's well-being, *minus such common flood-threat and reality related to the Lock 7 Dam*, must become prominent among NYPA's other studies. Following that, and as a high-priority, early-preparation matter, should be a parallel commitment to funded follow-through as a precondition to re-licensing this NYPA project.

FERC has provided great new encouragement to the many long-affected local persons and organizations in recognizing the shortcoming in NYPA previously omitting the subject of flooding - - an inconceivable act after a century-plus of flooding events, and the corrective engineering advances now available in the 21st-Century.

In urging FERC to continue support toward resolving the affected community's plight with this fixed dam, its impounded reservoir-pool and free-flow runoff-flooding, I do not ignore the many strong and closely related implications toward ice-jam flooding.

Again, I convey my professional and personal gratitude to FERC for recognizing flooding as a distinct hazard related to the Lock 7 Dam that NYPA should address as a pre-condition to re-licensing. Your on-going process will be valued as strategic to the future well-being of our canalside community resources.

Sincerely,

James E. Duggan

4 Feb 2020, 1600

MEETING SUMMARY

Agency Discussion – CVF Year 1 Studies and COVID-19
Webex – meeting access code: 735-088-234 – (Join Meeting Link sent via email)
April 8, 2020, 9:00

NYPA: Cindy Brady, Rob Daly, Tara Groom, Jeff Gerlach, Vin Pezzullo, Andrew Weinstock
Kleinschmidt Associates: Wendy Bley, Mike Hreben
NYDEC: Chris VanMaaren, Nicole Cain, Mike Higgins
USFWS: John Wiley (Not available)

Agenda:

1. Good morning, I hope all is well with everyone and their families.
2. Purpose of call: Due to COVID-19 pandemic some Year1 studies may be impacted
    a. *The COVID-19 pandemic is a fluid situation. NYPA has conducted the procurement phase of onboarding consultants to perform the studies. The purpose of this call is to inform the agencies of NYPA's intent to complete the studies as conditions allow as of April 8, 2020 and to seek input and guidance from the agencies. Following is a recap of the FERC licensing timeline for the Crescent & Vischer Ferry (CVF) projects.*
3. ILP Schedule:
    a. Licenses Expire May 31, 2024 – Relicensing began 2019
    b. Notice of Intent-Pre-Application Document Filed 5/31/2019
    c. Scoping Meetings/Site Visit 7/10-11 2019
    d. Proposed Study Plan Meeting 10/23/2019
    e. NYPA filed Revised Study Plan 01/21/2020
    f. FERC issued Study Plan Determination (SPD) 2/20/2020
    g. Initial Study Report of Year 1 Studies Filed 2/19/2021
    h. Initial Study Report Meeting 3/6/2021
    i. File Draft License Application 01/01/2022
    j. Updated Study Report Filed 2/19/2022
    k. File Final License Application 5/31/2022
    l. New License Issued 5/31/2024
4. CVF – FERC Study Plan Determination:
    a. Water Quality Study
        i. *The original timeline for deploying monitoring equipment and collecting data was to start in May. Currently it is anticipated data collecting will be able to begin in late June or early July. NYPA believes the data collected will provide the data needed to determine an assessment of water quality and what – if any- mitigation measures might be needed since the critical period for DO and water temperature happen during later summer and early fall. The CVF system is a relatively shallow system operated as run of river.*
        ii. Discussion: *We will evaluate the data and consult with the agencies to determine if the data gathered is adequate without going back into the field next season (2021). Further if equipment is not able to be deployed by early July 2020 we will reconvene to determine if this study gets postponed until 2021.*

b. Fish Entrainment & Survivability
    i. *This is a desktop study that can go forward without delay. There is a field component – gathering water velocities near the intakes that can take place in summer or fall assuming we have normal facility operating conditions.*
c. Blueback Herring Downstream Migration Desktop Study
    i. *This is a desktop study that can go forward without delay.*
d. Fish Community Study
    i. *This is a desktop study that can go forward without delay. There are existing fisheries data sets. NYPA will be reaching out to the agencies to obtain any data sets we don't yet have.*
e. Aquatic Mesohabitat Study
    i. *NYPA is planning that this study will go forward as planned. The field components are scheduled for late summer and fall.*
f. Bald Eagle Study
    i. *This study has two field components: early spring nesting survey would occur in April and a foraging and roosting survey that will occur later in the season (summer and fall). The early spring nesting season will be postponed until 2021. The foraging and roosting survey portion can be completed in 2020.*
    ii. *Discussion: Chris VanMaaren will provide NYPA with DEC contacts in the region and local birders or National Heritage Program staff that may track information on Bald Eagle nest locations.*
g. Recreation Study
    i. *This study will be postponed until 2021. Recreation usage will not be typical this year due to COVID19.*
    ii. *Discussion: DEC has some signs warning people to social distance at public parks and recreation sites. DEC offered signs if NYPA needs any. Follow-up: NYPA has already created their own signs for use by NYPA and Canals at the projects and recreation sites.*
h. American Eel Study
    i. *Postpone until 2021. It won't be possible to conduct surveys in the early spring when young juvenile upstream migrating eel (elvers) are most likely to be moving in the system. NYPA will consult with agencies in the field to determine where the optimum sampling locations will be to deploy the fyke nets and eel mops. That consultation could occur later this season in anticipation of a spring deployment in 2021.*

5. Discussion

Recap:

Studies that are anticipated to go forward this year without delay:

1. Fish Entrainment Study
2. Blueback Herring Downstream Migration Study
3. Fish Community Study
4. Aquatic Mesohabitat Study

Studies that will be partially delay or impacted

1. Water Quality Study
2. Bald Eagle Survey

Studies postponed until 2021

1. Recreation Study
2. American Eel Study

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426
April 13, 2021

OFFICE OF ENERGY PROJECTS

Project No. 4678-052–New York
Crescent Hydroelectric Project

Project No. 4679-049–New York
Vischer Ferry Hydroelectric Project

New York Power Authority

VIA Electronic Mail

Ms. Cindy Brady
Manager, Licensing
New York Power Authority
Cynthia.Brady@nypa.gov

Reference: Comments on the Initial Study Report and Meeting Summary

Dear Ms. Brady:

On February 19, 2(Report (ISR) for the Cres(Project describing NYPA On March 3, 2021, NYP/ NYPA filed its ISR Meeti and the Meeting Summar C.F.R. § 5.15(c)(4). Unle draft license application.

If you have any qu email at jody.callihan@fe

APPENDIX A
Comments on the Initial Study Report and Meeting Summary

1. At the ISR Meeting, Commission staff requested that NYPA report the amount of flow that was being passed through the turbines during each of the vertical profiles (of temperature and dissolved oxygen) that were collected in the project impoundments on a bi-weekly basis during the summer of 2020. Although most of this information was provided in the Revised Water Quality Study Report filed with the Meeting Summary, turbine flow data were not provided for the following sampling dates at the Vischer Ferry impoundment: June 12, June 25, July 2, and July 9. Please provide the turbine flows during these vertical profiles as this information will aid staff's analysis of the potential effects of project operation on water quality and impoundment stratification patterns.

2. Table 3.2 of the Fish Community Study Report filed with the ISR provides catch-per-unit-effort (CPUE) data that is pooled across both the Crescent and Vischer Ferry impoundments and includes general groupings such as 'other centrarchids,' 'cyprinids,' and 'all other species.' As requested by Commission staff at the ISR Meeting, please calculate and report the impoundment-specific CPUE values of each fish species based on this dataset (e.g., the CPUE of smallmouth bass in the Vischer Ferry impoundment as well as the Crescent impoundment). This information will provide staff with a better understanding of the community composition and relative abundance of fish species present in each impoundment and support staff's impingement and entrainment analysis.

3. An objective of the State of New York's *Reimagine the Canals* initiative is to assess how the Erie Canal can help mitigate impacts from flooding and ice jams to improve resiliency and restore ecosystems in canal communities, including those along the Vischer Ferry Project impoundment.[1] To support this objective, a modeling study is being conducted by Dr. Hung Tao Shen, of Clarkson University, to better understand the effects, if any, of the operation of the Vischer Ferry Project on ice-jam flooding in the Mohawk River portion of the Erie Canal, as well as the potential effectiveness of various options to mitigate ice-jam-induced flooding (e.g., the use of ice-breaker vessels). The Commission's Study Plan Determination issued on February 20, 2020, requested NYPA to file the results of these ice-jam modeling studies with the ISR because this information is needed to support staff's environmental analysis of the potential effects of project operation on ice-jam-induced flooding in the vicinity of the Vischer Ferry Project.

[1] For more information see https://www.ny.gov/programs/reimagine-canals-initiative.

At the ISR meeting, NYPA provided a general update on the ice-jam mitigation options being explored as part of the *Reimagine the Canals* initiative, but no modeling results were discussed or included in the ISR. In the ISR Meeting Summary, NYPA stated it would file the results of the ice-jam modeling study once they become publicly available.

As indicated in the Study Plan Determination, Commission staff needs the results of the ice-jam modeling study to support its environmental analysis of the potential effects of the operation of the Vischer Ferry Project on ice-jam formation and ice-jam-induced flooding in the project area. Therefore, please file, within 30 days of the issuance date of this letter, a schedule for providing the results of the ice-jam modeling study to the Commission. Based on the filed schedule, it may be necessary for the Commission to amend the Integrated Licensing Process procedural schedule to provide stakeholders and Commission staff opportunities to review the results of the ice-jam modeling efforts, comment on those results, and to request additional studies based on their review of those results.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits
625 Broadway, 4th Floor, Albany, New York 12233-1750
P: (518) 402-9167 | F: (518) 402-9168 | deppermitting@dec.ny.gov
www.dec.ny.gov

April 16, 2021

New York Power Authority
Attn: Robert Daly, Licensing Director
123 Main Street
White Plains, NY 10601

RE: Initial Study Report
Crescent Hydroelectric Project (FERC No. 4678)
Vischer Ferry Hydroelectric Project (FERC No. 4679)
Town of Colonie, Albany County
Towns of Clifton Park/Halfmoon, Saratoga County
Town of Niskayuna, Schenectady County

Dear Mr. Slade:

The New York State Department of Environmental Conservation ("NYSDEC" or "Department") is submitting comments on the February 19, 2021 Initial Study Report (ISR) submitted by the New York Power Authority ("NYPA" or "Applicant") for relicensing the existing Crescent Hydroelectric Project (FERC No. 4678) and Vischer Ferry Hydroelectric Project (FERC No. 4679). The two projects, collectively referred to as the "NYPA Projects" or "Projects", are located on the Mohawk River with the Crescent Project located in Albany, Schenectady, and Saratoga Counties, New York and the Vischer Ferry Project located in Albany and Schenectady Counties, New York.

NYSDEC staff attended the March 3, 2021 ISR virtual meeting for these NYPA Projects.

Comments on the Initial Study Report
The ISR was found to be a well-written and comprehensive document for the field efforts of the 2020 field season.

Water Quality Study
NYSDEC would like to request that along with the total flow through the units at the Projects, that NYPA also graph the total prorated flow that passes the Projects with generation flow included. This will provide a more complete understanding of flows at the Projects, how they are being utilized, and confirm that the minimum flows are also being provided.

With the consideration that the "2020 water year" could be considered a low-flow, dry year, and is likely a good representative of the poor conditions that could be present at the Projects, there appeared to be localized dissolved oxygen (DO) stratification in the forebays. There was however, also some evidence of erratic DO changes, therefore it is unclear if this is a characteristic of the Mohawk River or a function of Project operations. This warrants a further investigation to ensure that the Projects do not have a negative impact on the local water quality of the Mohawk River.

Blueback Herring Downstream Migration Study

NYSDEC also notes that there was no mention or account for delays or outages of the acoustic guidance system and how such events may impact safe and effective downstream passage. Although this may be a rare occurrence, in recent years, there has been some problematic occurrences in the operation of the acoustic guidance system including complications with vendor contracts, timing of deployment, and damage to the submerged cable compromising strength of the acoustics. NYSDEC does appreciate NYPA's efforts to remedy these items, however, they should also be accounted for in the evaluation of Blueback Herring downstream migration of the Projects.

Study Requests and Modifications

The NYSDEC requests that the Applicant also conduct the following studies:

Water Quality Monitoring Study

The Water Quality Monitoring Study should include continuous water temperature and dissolved oxygen (DO) data collection and discrete measurements (i.e. temperature, DO, pH, and conductivity) monthly from June 1 to October 31. Baseline water quality studies are needed to ensure compliance with NYS water quality standards, (the Clean Water Act § 401 Water Quality Certification) and identify the potential Projects impacts to the fish community, particularly impacts to blueback herring (*Alosa aestivalis*) during upstream and downstream migrations (e.g., juvenile outmigration, adult immigration). An additional year of monitoring is needed based on a review of the first year's study result, as noted above, that there was some evidence of local DO stratification and erratic values. Data should be collected from a location in the impoundments, the forebay, and the tailrace. Water quality information collected should be summarized in a manner that will allow appropriate analysis of the current flow regime. Methods for mitigating water quality problems (i.e. modifications to infrastructure, or changes to existing operations) should be fully explored and modeled as to their potential effectiveness.

1. *Goals and Objectives*

   The goals and objectives of this study are to provide baseline water quality information.

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

   The NYSDEC conducts statewide monitoring programs for determining the overall quality of waters, trends in water quality, and the identification of water quality issues achieved through the Rotating Integrated Basin Studies (RIBS) program, which occur on

5-year cycles. Data from the RIBS program cannot be used to quantify the direct impacts of either hydro facility, but rather can be used to expand the assessment.

Results from the 2020 field season have shown that there may be localized impacts to the DO based on data collected in the Projects forebays. It is not clear if this is representative only of the forebay area, and impact from Project operation, or may be representative of the impoundments. There is value in collecting data from a location in the impoundments to clarify the relationship of the Projects to the water quality of the Mohawk River.

5. *Nexus to Projects Operations and Effects*

   The existing NYPA Projects impound water from the Mohawk River. These impoundments and releases have the potential to impact such water quality factors as temperature and dissolved oxygen (DO), which are critical to the quality of the aquatic habitat, especially during low flow summer periods.

6. *Methodology Consistent with Accepted Practice*

   The recommended study uses standard water quality sampling techniques commonly used in most hydropower licensing activities.

7. *Level of Effort, Cost, and Why Alternative Studies Will Not Suffice*

   The level of effort would be low and would involve monitoring with continuous measurement devices and collecting monthly samples while undertaking other work such as the American Eel and Bald Eagle studies. In addition, temperature and DO instruments would need to be installed, with data being periodically downloaded. The actual cost is expected to be relatively low.

We appreciate the opportunity to comment. If you have any questions or would like to discuss further, please feel free to contact me at 518-402-9179 or michael.higgins@dec.ny.gov.

Sincerely,

Michael T. Higgins
Project Manager
Major Projects Management

CC: Nicole Cain, NYSDEC, Bureau of Ecosystem Health
Chris VanMaaren, NYSDEC, Region 4
Mary Anne Bonilla, Office of General Counsel

April 19, 2021

Via Electronic Filing

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE
Washington, DC 20426

Re: Comments of Riverkeeper, Inc. on the Initial Study Reports for the Crescent Hydroelectric Project (P-4678-052) and/or Vischer Ferry Hydroelectric Project (P-4679-049)

Dear Secretary Bose,

Riverkeeper appreciates this opportunity to comment on the Initial Study Reports as part of the relicensing applications for the Crescent and Vischer Ferry Dams (FERC Nos. 4678 & 4679, respectively), located on the Mohawk River in Saratoga, Albany, and Schenectady Counties, New York.

Water Quality Study

In the Initial Study Report ("ISR"), NYPA states that no further water quality study is needed. However, the dissolved oxygen ("DO") data collected at both projects, and the positioning of the upstream sampling stations, leave open questions about the representativeness of the sampling locations upstream of the projects.

DO fell below the NYS daily average standard of 5.0 mg/L 9% of the time in the Vischer Ferry forebay and 8% of the time in the Crescent forebay.[1] The ISR noted that DO was "irregular and erratic at all four samples sites, in particular at the forebay sites."[2] The number of days on which DO fell below the NYS standard, along with the uncertainty around causes of DO fluctuations, show that more information is needed about water quality.

[1] New York Power Authority. 2021. Water Quality Study: Crescent and Vischer Ferry Projects Relicensing.
[2] *Ibid.*

During the second year of study, a sampling location should be installed further upstream at each project, to obtain information that is more representative of conditions in the impoundments. In 2020, the water quality sensors were positioned very close to the shoreline bulkheads, within the project forebays. Locations that are further upstream and further from shore can provide information that is more broadly representative of the impoundments. This can be compared with the forebay station data to improve understanding of DO depletion and fluctuations.

This additional information is important to develop license conditions that prevent DO depletion from occurring.

If you have any questions about these comments, please contact Jennifer Epstein at jepstein@riverkeeper.org or (914) 478-4501 x248.

Sincerely,

Jennifer Epstein

Water Quality Program Scientist

New York State
Parks, Recreation and
Historic Preservation

KATHY HOCHUL
Governor

ERIK KULLESEID
Commissioner

December 29, 2021

To: Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE
Washington, DC 20426

Re: Vischer Ferry Hydroelectric Project (FERC No. P-4679-049) Draft License Application

Dear Secretary Bose:

Thank you for the opportunity to comment on the above referenced project. OPRHP submits the following comments for your consideration.

New York State facilities that are directly or indirectly adjacent to the project area include Mohawk River State Park and Rexford Aqueduct State Historic Site. Neither is cited in the Draft License Application.

The Application does discuss the NYS Canalway's Lock 7 Boat Launch, located within the NYPA project area. It notes that the launch and associated parking lot are not ADA-compliant (p. 142), and that one launch lane is closed due to erosion and settlement of its concrete planks. However, there are no proposed improvements to the launch as part of this relicensing. In addition to boating activities, the Lock 7 Boat Launch parking area is used for parking and trailhead access to the OPRHP Mohawk River State Park and the Mohawk-Hudson Bike Trail. Please consider including appropriate upgrades to this facility as part of the project.

Please don't hesitate to contact me at diana.carter@parks.ny.gov or (518) 474-8288 if you have any questions or need clarification.

Sincerely,

Diana Carter

Diana Carter
Assistant Division Director for Planning and Analysis
Alternate State Liaison Officer

Cc via email: Alane BallChinian, OPRHP, Saratoga-Captial District
Tana Bigelow, OPRHP, DESP Planning and Analysis Bureau
Shari Carlnero, OPRHP, Counsel's Office
Kurt Kress, OPRHP, Hudson Valley Capital District
Rob Daly, NYPA, Licensing

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JUSTIN E. DRISCOLL
Interim President and Chief Executive Officer

March 10, 2022

VIA Cultural Resource Information System (CRIS)

Daniel Mackay, Deputy Commissioner
New York State Office of Parks, Recreation and Historic Preservation
Peebles Island Resource Center
Delaware Avenue
Cohoes, NY 12047

Re: Crescent Hydroelectric Project Relicensing–FERC Project No. 4678 (19PR03259)
Proposed Area of Potential Effect
Town of Colonie, Albany County;
Towns of Clifton Park, Halfmoon, Saratoga and Waterford, Saratoga County; and
Town of Niskayuna, Schenectady County

Dear Mr. Mackay:

The New York Power Authority (NYPA or the Power Authority) is seeking a new license for the Crescent Hydroelectric Project (Crescent Project or the Project; FERC No.4678). On May 3, 2019, the Power Authority commenced the relicensing process by filing its Notification of Intent (NOI) to File an Application for New License and Request for Designation as Non-Federal Representative along with the accompanying Pre-Application Document (PAD) with the Federal Energy Regulatory Commission (Commission or FERC). On June 10, 2019, FERC designated the Power Authority as its non-federal representative for carrying out informal consultation pursuant to Section 106 of the National Historic Preservation Act (NHPA).[1] Since the Crescent Project's new license will be issued by FERC, the relicensing is subject to review pursuant to Section 106 of the NHPA, 54 U.S.C. § 306108, and its implementing regulations (36 CFR Part 800). As part of the Section 106 process, and as discussed herein, the Power Authority proposes that the Area of Potential Effect (APE) for the Crescent Project coincide with the FERC Project Boundary, which is the crest elevation of the Mohawk River at the Crescent Dam spillways with the flashboards installed or El. 184.0 Barge Canal Datum (BCD) (Attachment). The Power Authority respectfully requests the New York State Office of Parks, Recreation, and Historic Preservation's Division for Historic Preservation's (SHPO) concurrence with its proposed APE for the Crescent Project.

Project Description

The Crescent Hydroelectric Project (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 (Attachment). It is located 2 miles upstream of the School Street Hydroelectric Project (FERC

[1] FERC Accession Number 20190610-3013

No. 2539) owned by Erie Boulevard Hydropower, L.P. The Crescent impoundment is part of the New York State Barge Canal System (Barge Canal System) and is approximately 10 miles long with the upstream terminus of the impoundment at the Vischer Ferry Project Dam. The Project is operated in run of river mode. The priority during the navigation season is to provide adequate water levels for operation of the Barge Canal System, with power generation being second. The Crescent dam, powerhouse, and impoundment are contributing elements of the New York State Barge Canal National Historical Landmark.

Historical Project Development

The Crescent Dam was designed for the Department of Public Works by the Office of the State Engineer and Surveyor in 1907. Construction was completed in 1912. With its completion, the Old Erie Canal was abandoned, and the newly impounded waters of the Mohawk River were used for navigation. A headgate structure was built to permit the release of water. A small hydroelectric powerhouse was added to the Crescent Dam at the eastern abutment around 1916. The 225 KW of DC power generated by the facility was used to operate the nearby locks of the Barge Canal System. The powerhouse was abandoned by 1925 when the current powerhouse was placed into service.

In 1922, the State of New York authorized the superintendent of Public Works to develop the hydropower potential at Crescent Dam. A hydroelectric generating station was constructed at the western end of the dam and used the headgate structure as part of the headrace. The Crescent station was completed in the summer of 1925 and was constructed with two 2.8 MW Francis turbine units. Commercial operation commenced in 1925. The output of the Crescent station effectively utilized only about half of the site's capacity. Also added in 1925 were the Tainter gate and sluiceway structure in Dam B, and the foundation for two future generating units.

As required by the 1984 FERC license, NYPA expanded the powerhouse, which roughly doubled its size, by installing two new Kaplan turbines each rated at 3MW, rehabilitating the two older Francis units, widening the headrace and tailrace, and expanding the switchyard. In addition, the existing dam was stabilized by the installation of post-tensioned rock anchors and concrete surface deterioration exceeding 6 inches by 6 inches was repaired (the spalled and deteriorated concrete on the old powerhouse and Dams "A" and "B" were chipped away and replaced with new concrete). The original forebay and stoplog structures were demolished and a new east forebay wall was constructed. This work began in 1988 and was finished by December 1990, except for rehabilitation of the original powerhouse Francis turbine-generators, which were finished in April 1993. In 2017, the two Kaplan turbines were refurbished, and turbine generator control equipment was upgraded for all units as part of a Life Extension and Modernization project.

Current Project Facilities

The existing FERC license for the Crescent Project was issued to The Power Authority for the expansion, rehabilitation, operation, and maintenance of the Crescent Hydroelectric Project on June 26, 1984, for a period of 40 years, and expires on May 31, 2024. Numerous amendments were issued by FERC, including:

- a 1991 Order increasing the Project's authorized generating capacity to 11.8 MW;

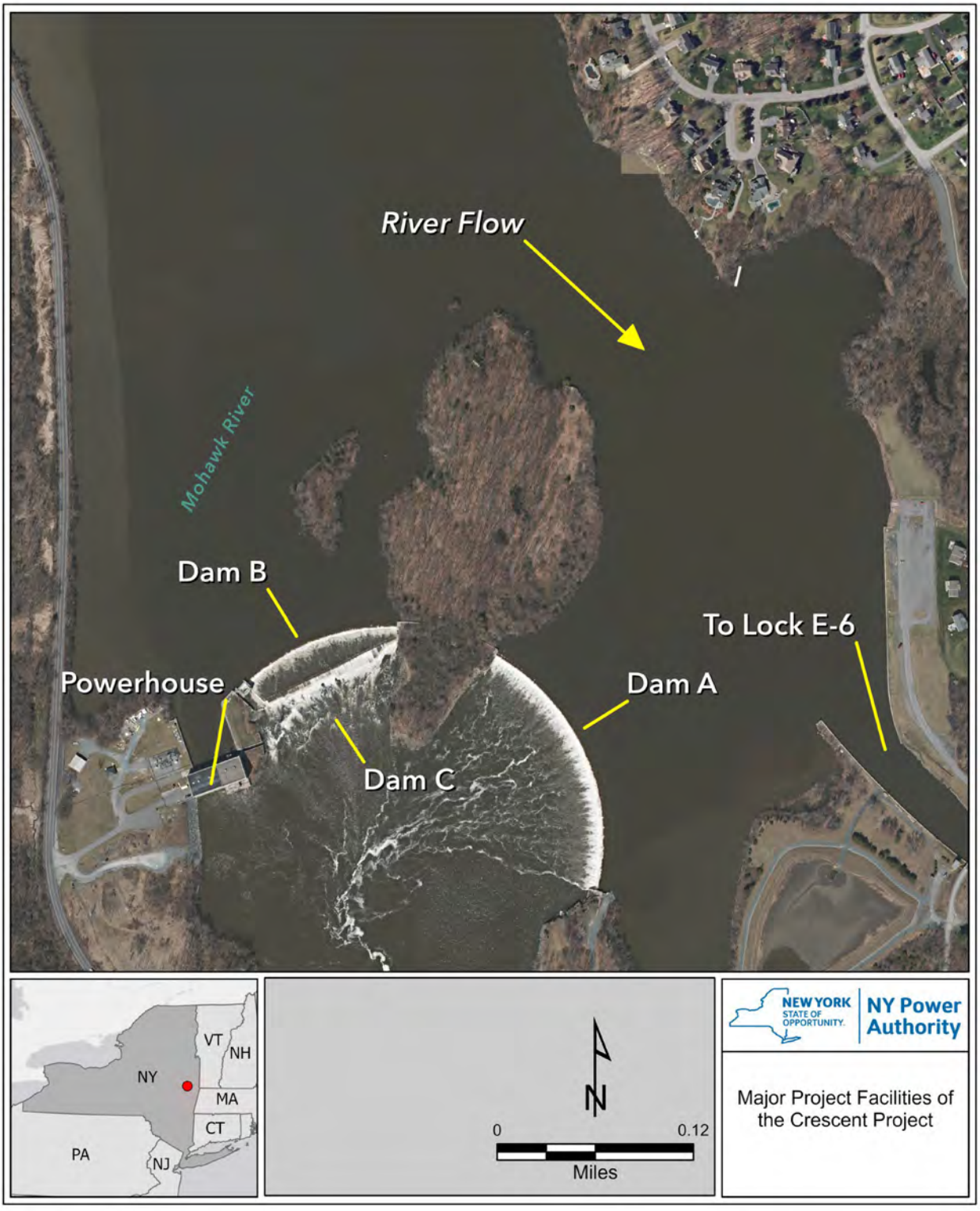
- a November 2000 Order amending Article 41 of the Project license, addressing run of river operations; and
- a July 31, 2007, amendment ordering minimum flows.

The New York State Department of Environmental Conservation (NYSDEC) issued a Water Quality Certification pursuant to section 401 of the Clean Water Act on September 26, 1983.

The Crescent Project generally consists of a dam, powerhouse, impoundment, and appurtenant facilities. The Crescent Dam consists of two independent concrete gravity overflow sections which link each riverbank to a rock island (Alligator Island) in the middle of the Mohawk River. Both sections are curved in plan and have a crest at elevation (El.) 184 BCD.[2] The total length of the dams is 1,435 feet (ft.). The eastern overflow section (Dam A) is 901 ft. long and 52 ft. in height. The western section (Dam B) is 534 ft. long and 32 ft. in height; providing 1,435 feet of spillway crest at El. 184 ft. BCD. A smaller overflow section, Dam C is 530 ft. long, is located immediately downstream of Dam B. The maximum structural height of this dam is approximately 16 ft., and it has a crest elevation of El. 171 ft. BCD (see Figure 1). To aid canal navigation, one-foot-high (12 inch) wooden flashboards are installed along the crests of both Dams A and B seasonally in spring (generally in April based on seasonal conditions) and removed in the fall (generally in November based on seasonal conditions).

[2] All elevations refer to Barge Canal Datum (BCD) unless stated otherwise. BCD= NAVD88 -1.67 feet or USGS Datum +0.99 feet.

Figure 1 Major Project Facilities of the Crescent Hydroelectric Project



The regulating section is located at the western end of Dam B. It is constructed of reinforced concrete and consists of an 8-foot-wide sluiceway and a 30-foot-wide Tainter gate bay. The sill of the sluiceway is at El. 182 ft. BCD. The sluiceway is equipped with stoplog slots. The sill of the Tainter gate is at El. 176 ft. BCD; in the closed position, the top of the gate is at El. 188.5 ft. BCD. The gate is operated electrically from a local control panel.

Water is directed to the powerhouse through a 175-foot-long headrace channel. The bottom of the headrace channel is cut rock, and the sides are formed by two mass concrete retaining walls. The channel is rectangular in plan and is approximately 123 ft. wide at the powerhouse. The elevation of the channel bottom varies from El. 171 ft. BCD at the upstream end of the headrace to El. 161 ft. BCD at the powerhouse.

The existing powerhouse located on the western bank is constructed of brick and concrete and is approximately 180 ft. long and 73 ft. wide. The powerhouse includes an intake structure with trashracks, rake, stoplogs, and gates. The trashrack bar spacing width is 3 7/8 inches. The powerhouse houses four turbine/generator units: two 2.8 MW rated Francis turbines and two 3.0 MW vertical Kaplan turbines. The original portion of the powerhouse contains the two original Francis units (Units 1 and 2). In the 1980s, the powerhouse was expanded to include the two Kaplan units (Units 3 and 4), which are located riverward of the original powerhouse.

The tailrace is an open, unlined rock cut approximately 145 ft. wide and 65 ft. long. Elbow-type draft tubes discharge water directly into the excavated tailrace channel. The tailwater is approximately El. 157 ft. BCD, and is controlled by Erie Boulevard's School Street Station, located about 2 miles downstream of the Crescent Project.

The Crescent impoundment extends upstream approximately 10 miles to the Vischer Ferry Project Dam. At El. 185 ft. BCD (with 12-inch boards up), the surface area of the impoundment is approximately 2,257 acres. At El. 184 ft. BCD (with boards down) the surface area of the impoundment is approximately 2,108 acres and impounds approximately 50,000 acre-feet of water.

Project Operation

The Crescent Project is operated on a run-of-river basis. The original purpose of the Crescent Dam was to impound water to support navigation on the Barge Canal System; 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 the Project. The Development Agreement contains certain protocols for standard operation and maintenance of both the Project and the Barge Canal System. With the exception of public safety, which is always the Power Authority's priority, navigation and Barge Canal System operations take precedence over the hydroelectric generating potential of the Crescent Project. Unless emergency conditions exist, the Project operates in run-of-river mode with minimal fluctuations only allowed at the 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.

As indicated above, Project operations are performed to maintain the normal full pool elevation of the impoundment. Flow through the Project is via the powerhouse or over the dam. During the non-navigation season, the FERC license requires a minimum flow of 100 cubic feet per second (cfs) (or inflow, whichever is less) 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. Once Project minimum flows and any diversion required for canal operations are met, the remaining flow is available for power generation.

As discussed above, the Power Authority operates the Project in coordination with the NYSCC; however, Barge Canal System operations take priority over power generation, and the Project simply utilizes flows through the Project's power generating equipment that, in absence of the generating facilities, would pass over the Crescent Dam. If the Project generating facilities were not to exist, water not used for Barge Canal System operations would pass over the dam rather than through the powerhouse.

Area of Potential Effect

NYPA has carefully considered the APE proposed for the Crescent Project relicensing. In crafting the APE, NYPA referred to both NHPA regulations, 36 C.F.R. § 800.16(d), as well as FERC's guidelines. 36 C.F.R. § 800.16(d) defines the APE as:

> the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

Taking both the NHPA definition of the APE and the manner in which the Crescent Project is operated into account, NYPA has drawn the APE to coincide with the Crescent Project Boundary, which is the crest elevation at the Crescent Dam spillways with the flashboards installed or El. 185.0 BCD (Attachment). The APE measures approximately 2,283 acres and extends upstream to the Vischer Ferry Dam, Barge Canal System Lock E-7 and the Vischer Ferry Hydroelectric Project. Based on the Crescent Project operations, as discussed above, the Project will not—either directly or indirectly—cause changes in the character or use of historic properties beyond the proposed APE.[3]

For the reasons discussed above, the Power Authority respectfully requests that the Office of Parks, Recreation, and Historic Preservation's Division for Historic Preservation (SHPO) concur with the Power Authority's proposed APE for the Crescent Project. As always, the Power Authority welcomes the opportunity to discuss this matter with any of the consulted parties. Should there be any questions, please contact the Power Authority's Cultural Resources Specialist, Robert F. Panepinto, at (914) 681-6404.

[3] 36 C.F.R. § 800.16(d).

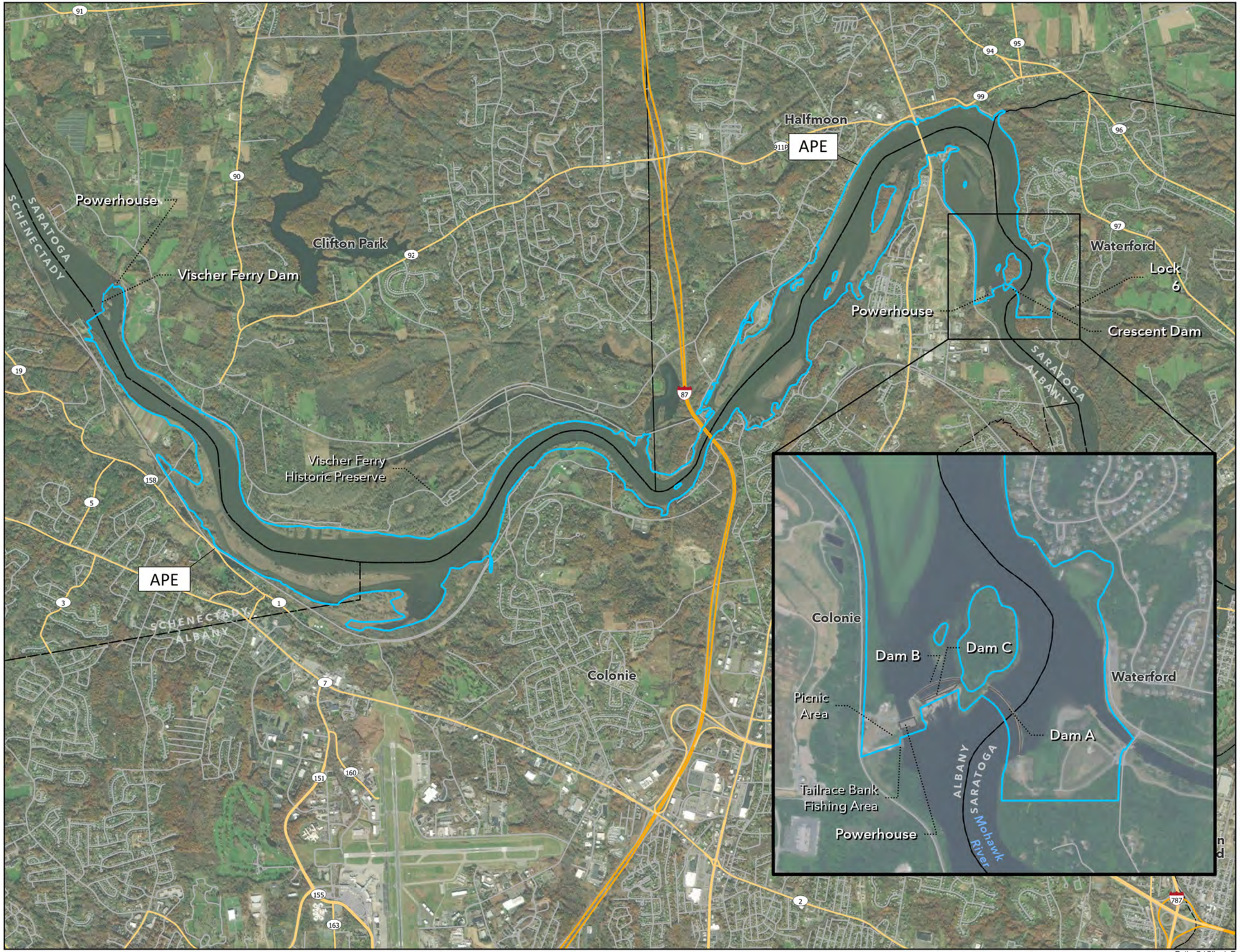
Sincerely,

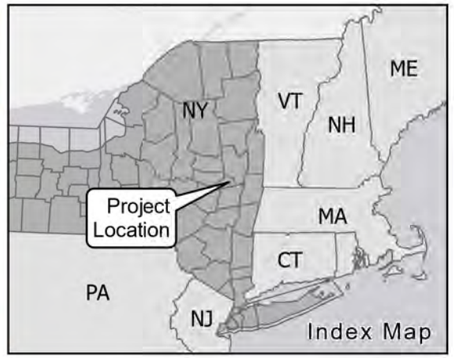
Tara Groom
Licensing Manager

New York Power Authority
30 S. Pearl Street
Albany, New York 12207
Telephone: (518) 433-6748
Email: Tara.Groom@nypa.gov

cc: R. Panepinto, NYPA; R. Daly, NYPA

Enclosure: Crescent Project APE Attachment





Crescent Project Relicensing
FERC No. P-4678

Area of Potential Effect

Legend

Area of Potential Effect (APE)

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Miles

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Interim President and Chief Executive Officer

March 10, 2022

VIA Cultural Resource Information System (CRIS)

Daniel Mackay, Deputy Commissioner
New York State Office of Parks, Recreation and Historic Preservation
Peebles Island Resource Center
Delaware Avenue
Cohoes, NY 12047

Re: Vischer Ferry Hydroelectric Project Relicensing—FERC Project No. 4679 (19PR03314)
Proposed Area of Potential Effect
Town of Clifton Park, Saratoga County and
Town of Niskayuna and City of Schenectady, Schenectady County

Dear Mr. Mackay:

The New York Power Authority (NYPA or the Power Authority) is seeking a new license for the Vischer Ferry Hydroelectric Project (Vischer Ferry Project or the Project; FERC No.4679). On May 3, 2019, the Power Authority commenced the relicensing process by filing its Notification of Intent (NOI) to File an Application for New License and Request for Designation as Non-Federal Representative along with the accompanying Pre-Application Document (PAD) with the Federal Energy Regulatory Commission (Commission or FERC). On June 10, 2019, FERC designated the Power Authority as its non-federal representative for carrying out informal consultation pursuant to section 106 of the National Historic Preservation Act (NHPA).[1] Since the Vischer Ferry Project's new license will be issued by FERC, the relicensing is subject to review pursuant to Section 106 review of the NHPA, U.S.C. § 306108, and its implementing regulations (36 CFR Part 800). As part of the Section 106 process, and as discussed herein, the Power Authority proposes that the Area of Potential Effect (APE) for the Vischer Ferry Project coincide with the FERC Project Boundary, which is the crest elevation at the Vischer Ferry Dam spillways with the flashboards installed or El. 213.25 Barge Canal Datum (BCD) (Attachment). The Power Authority respectfully requests the New York State Office of Parks, Recreation, and Historic Preservation's Division for Historic Preservation's (SHPO) concurrence with its proposed APE for the Vischer Ferry Project.

Project Description

The Vischer Ferry Hydroelectric Project (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 (Attachment). The Project's impoundment is part of the New York State Barge Canal System (Barge Canal System) and is 10.3 miles long with the

[1] FERC Accession Number 20190610-3013

upstream terminus of the impoundment located at the Barge Canal System's Lock E-8 in Schenectady. The Project is operated in a run-of-river mode. The priority during the navigation season is to provide adequate water levels for operation of the Barge Canal System, with power generation being second. The Vischer Ferry dam, powerhouse, and impoundment are contributing elements of the New York State Barge Canal National Historical Landmark.

Historical Project Development

The NYS Department of Public Works constructed the Vischer Ferry Dam for the purpose of navigation on the Erie Canal segment of the New York State Barge Canal System. Construction of the Barge Canal System Lock E-7 and the Vischer Ferry dam was completed in 1913. In the early 1920's, plans were made for the construction of hydroelectric stations at both Vischer Ferry and Crescent Dams to utilize the lost potential energy (ex., water spilled over the dam). The Vischer Ferry powerhouse was completed in 1925 with two 2.8 MW Francis generating units and provisions for future expansion. Operations commenced the same year. In 1980, seven new electrically operated sluice gates were installed on the original head gate structure at the northern end of the Dam F spillway to allow for regulation of the Vischer Ferry pool levels for navigation.

As required by the 1984 FERC license, NYPA expanded the powerhouse, which roughly doubled its size, by installing two new Kaplan hydroelectric turbines each rated at 3MW, rehabilitating the two older units, widening the headrace and tailrace, and expanding the switchyard. Expansion of the existing two-unit powerhouse was completed in the early 1990's. In addition to the work described above, the expansion included the demolition of the original head gates and concrete rehabilitation at the dam. In 2017, the two Kaplan turbines were refurbished as part of a Life Extension and Modernizations project. In addition, turbine generator control equipment was upgraded for all units.

Current Project Facilities

The existing FERC license for the Vischer Ferry Project was issued to the Power Authority for the expansion, rehabilitation, operation and maintenance of the Vischer Ferry Hydroelectric Project on June 26, 1984, for a period of 40 years, and expires on May 31, 2024. Numerous amendments were issued by FERC, including:

- a 1991 Order increasing the Project's authorized generating capacity to 11.8 MW;
- a November 2000 Order amending Article 41 of the Project license, addressing run of river operations; and
- a July 31, 2007, amendment ordering minimum flows.

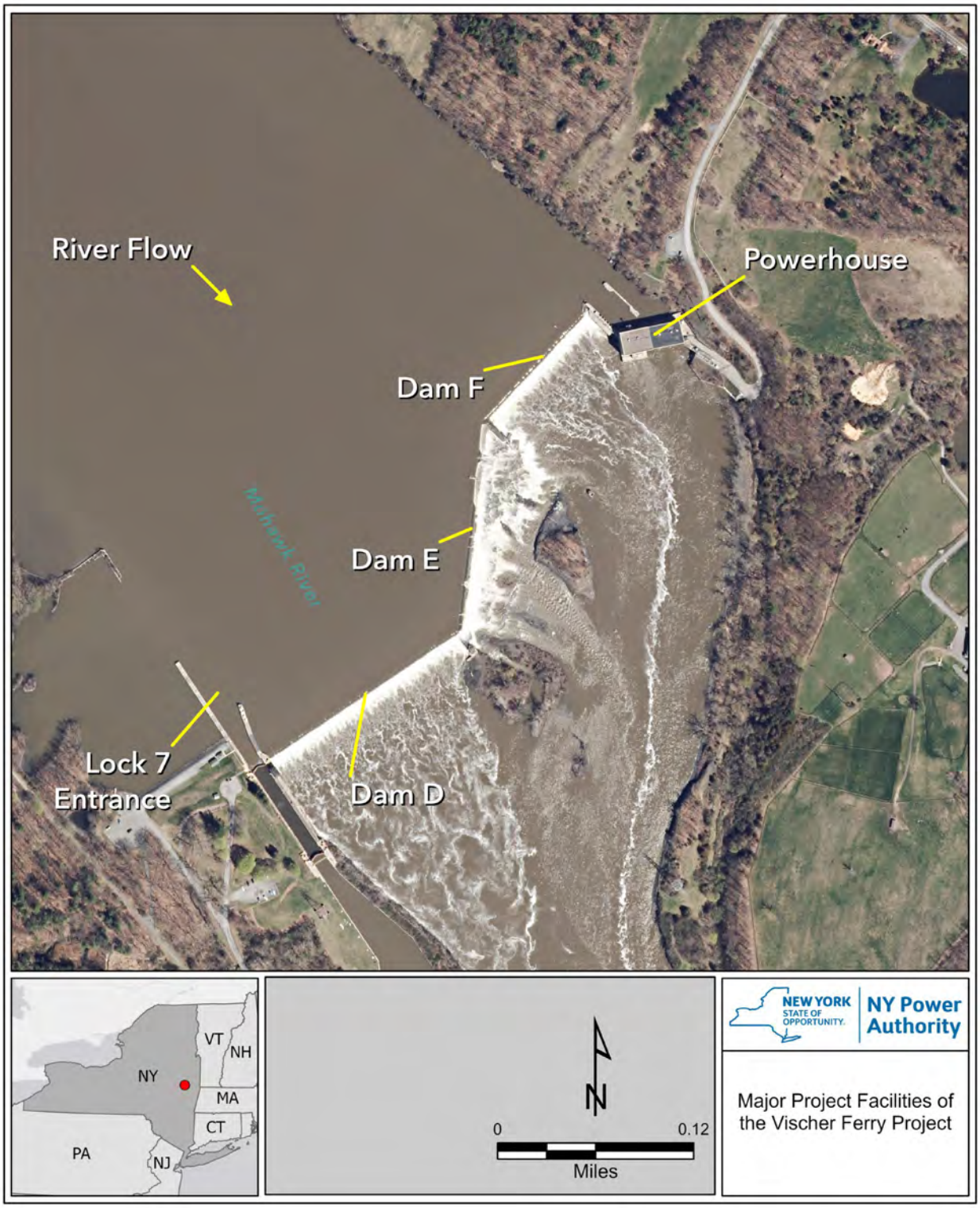
The New York State Department of Environmental Conservation (NYSDEC) issued a Section 401 Water Quality Certification on September 26, 1983.

The Project generally consists of a dam, powerhouse, impoundment, and appurtenant facilities. The dam consists of three connected spillway sections having a total length of 1,919 feet (ft.). The two outer sections are regular, ungated, ogee-shaped weirs with an average structural height of approximately 30 ft. above rock. A 2-foot-thick concrete apron extends 40 ft. beyond the toe of the dam and is keyed into bedrock on its downstream edge. Dam D (western dam section) is 735 ft. long, and Dam F (the eastern dam section) is 502 ft. long. Dam E (the middle section) is a

broad-crested weir, is 682 ft. long, and was constructed over a small bedrock island near the center of the river. The height of Dam E varies from 1 to 3 ft. above the rock of the island. These three sections of dam are collectively known as “Dam 3 at Vischer Ferry” (see Figure 1). To aid canal navigation, flashboards are installed along the crests of all spillways seasonally from spring (generally in April based on seasonal conditions) to the end of navigation season (generally in November based on seasonal conditions). The flashboards are 27 inches high and are installed in sockets spaced 4 ft. apart. With the flashboards installed the spillway is El. 213.25 ft. BCD.[2] The spillway crest elevation is 211.0 ft. when flashboards are removed.

[2] All elevations refer to Barge Canal Datum (BCD) unless stated otherwise. BCD= NAVD88 -1.67 feet or USGS Datum +0.99 feet.

Figure 1 Major Project Facilities of the Vischer Ferry Hydroelectric Project



As part of the late 1980s expansion, a new gated section was built at the northern end of the Dam F spillway. It is constructed of reinforced concrete and consists of seven rectangular gate openings with electrically operated sluice gates. Six of the gate openings are 14 ft. high by 8 ft. wide with sills at El. 202.1 ft. BCD. The seventh opening, a trash sluice, is 12 ft. high by 8 ft. wide with a sill at El. 190 ft. BCD. The gate openings are separated by 3-foot-wide concrete piers with semi-circular noses and square tails separating each opening. The gates are locally controlled and are generally closed. A concrete apron approximately 130 ft. long and 16 ft. wide directs flow from the gates to the downstream pond.

Water is directed to the powerhouse through an irregularly shaped headrace channel. The headrace channel width is approximately 145 ft. at the upstream end but increases to about 180 ft. wide at the entrance to the powerhouse. The bottom of the headrace channel maintains a fairly constant elevation of El. 189 ft. BCD. The Vischer Ferry headrace was once the site of the Vischer Ferry lock for the Erie Canal. The current headrace has no controlling upstream gates. The southern side of the headrace is formed by the gate structure described in the previous paragraph; the northern side is cut from rock along the river's edge.

The Vischer Ferry Project powerhouse is located at the northern end of the dam. The current powerhouse was built in 1925 and expanded in 1990. The powerhouse is constructed of yellow-orange brick, concrete block, and concrete, and is approximately 186 ft. long by 73 ft. wide. The powerhouse includes an intake structure with trashracks, rake, stoplogs, and gates. The trashrack bar spacing width is 3 7/8 inches. The powerhouse contains four turbine/generator units: two 2.8 MW rated Francis turbines (older units) and two 3.0 MW vertical shaft Kaplan turbines (installed during the NYPA expansion that started in the late 1980s).

The tailrace is an open, unlined rock cut approximately 150 ft. wide and 65 ft. long. Elbow-type draft tubes discharge water directly into the excavated tailrace channel. The tailwater is approximately El. 157 ft. BCD.

The Vischer Ferry impoundment extends upstream 10.3 miles to Lock E-8 in Schenectady, New York. At El. 211.0 (with flashboards down), the surface area of the impoundment is approximately 1,137 acres and impounds approximately 25,000 acre-feet of water. With 27-inch flashboards installed, the normal full pool elevation increases 2.25 feet to El. 213.25 ft. BCD and the surface area of the impoundment is approximately 1,144 acres and the impoundment retains an additional 2,400 acre-feet of water.

Project Operation

The Vischer Ferry Project is operated on a run-of-river basis. The original purpose of the Vischer Ferry Dam was to impound water to support navigation on the Barge Canal System; this remains true today. In 1983, the State of New York and NYPA entered into a Development Agreement whereby the State agreed to grant a perpetual hydroelectric easement to NYPA to develop and operate hydropower facilities at the Project. The Development Agreement contains protocols for standard operation and maintenance of both the Project and the Barge Canal System. With the exception of public safety, which is always the Power Authority's priority, navigation and Barge Canal System operations take priority over the hydroelectric generating potential of the Project. Unless emergency conditions exist, the Project operates in run-of-river mode with minimal adjustments only, allowed at the 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.

As indicated above, Project operations are performed to maintain the normal full pool elevation of the impoundment. Flow through the Project is via the powerhouse or over the dam. The FERC license requires a minimum flow of 200 cubic feet per second (cfs) (or inflow, whichever is less) 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.

As discussed above, the Power Authority operates the Project in coordination with the NYSCC; however, Barge Canal System operations take priority over power generation, and the Project simply utilizes flows through the Project's power generating equipment that, in absence of the generating facilities, would pass over the Vischer Ferry Dam. If the Project generating facilities were not to exist, water not used for Barge Canal System operations would pass over the dam rather than through the powerhouse.

Area of Potential Effect

NYPA has carefully considered the APE proposed for the Vischer Ferry Hydroelectric Project relicensing. In crafting the APE, NYPA referred to both NHPA regulations, 36 C.F.R. § 800.16(d), as well as FERC's guidelines. 36 C.F.R. § 800.16(d) defines the APE as:

> the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

Taking both the NHPA definition of the APE and the manner in which the Vischer Ferry Project is operated into account, NYPA has drawn the APE to coincide with the Vischer Ferry Project Boundary, which is the crest elevation at the Vischer Ferry Dam spillways with the flashboards installed or El. 213.25 BCD (Attachment). The APE measures approximately 1,156 acres and extends upstream to the Barge Canal System Lock E-8 in the City of Schenectady. Based on the Vischer Ferry Project operations, as discussed above, the Project will not—either directly or indirectly—cause changes in the character or use of historic properties beyond the proposed APE.[3]

For the reasons discussed above, the Power Authority respectfully requests that the Office of Parks, Recreation, and Historic Preservation's Division for Historic Preservation (SHPO) concur with the Power Authority's proposed APE for the Vischer Ferry Project. As always, the Power Authority welcomes the opportunity to discuss this matter with any of the consulted parties. Should there be any questions, please contact the Power Authority's Cultural Resources Specialist, Robert F. Panepinto, at (914) 681-6404.

[3] 36 C.F.R. § 800.16(d).

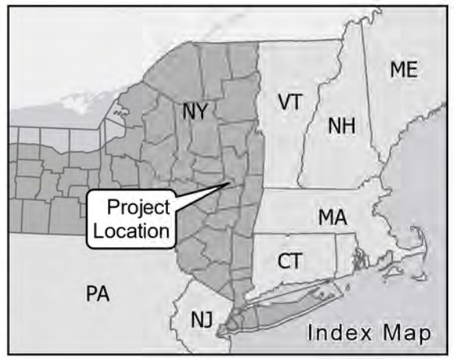
Sincerely,

Tara Groom
Licensing Manager

New York Power Authority
30 S. Pearl Street
Albany, New York 12207
Telephone: (518) 433-6748
Email: Tara.Groom@nypa.gov

cc: R. Panepinto, NYPA; R. Daly, NYPA

Enclosure: Vischer Ferry Project APE Attachment



Vischer Ferry Project Relicensing
FERC No. P-4679

Area of Potential Effect

Legend

Area of Potential Effect (APE)

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Miles

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NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

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Document Accession #: 20220317-3026 Filed Date: 03/17/2022

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426
March 17, 2022

OFFICE OF ENERGY PROJECTS

Project No. 4678-052 – New York
Crescent Hydroelectric Project

Project No. 4679-049 – New York
Vischer Ferry Hydroelectric Project

New York Power Authority

VIA Electronic Mail

Mr. Robert Daly
Director of Licensing
New York Power Authority
Robert.Daly@nypa.gov

Reference: Comments on Draft License Application

Dear Mr. Daly:

Pursuant to 18 CFR § 5.16(c), this letter contains Commission staff's comments on New York Power Authority's (NYPA) December 22, 2021 draft license applications (DLA) for the Crescent Hydroelectric Project and Vischer Ferry Hydroelectric Project. Our specific comments on the DLAs are outlined in Appendix A. Please incorporate your responses to comments on the DLAs in the final license applications (FLA). We may request additional information at a later date regarding these projects.

Project Nos. 4678-052 and

If you have any que
e-mail at jody.callihan@fe

Attachment: Appendix A

APPENDIX A
Comments on the Draft License Applications

General

1. Sections 5.17(e) and 4.38(b)(2)(vi) of the Commission's regulations require that every application for a license for a project with a capacity of 80 megawatts or less must include in its application copies of statements of whether it is seeking benefits under section 210 of the Public Utilities Regulatory Policies Act of 1978 (PURPA). Neither draft license application (DLA) indicates whether NYPA is seeking PURPA benefits for the projects. Therefore, in the final license applications (FLA), please indicate if benefits are being sought under section 210 of PURPA; if so, provide the necessary documentation for doing so in accordance with section 4.38(b)(2)(vi) of the Commission's regulations.

Exhibit A

2. Although the project boundary in Exhibit G for the Vischer Ferry Project includes Lock E-7 of the Erie Canal, Exhibit A of the Vischer Ferry DLA does not describe Lock E-7.[1] Therefore, please provide a description (e.g., dimensions) of the lock in Exhibit A of the Vischer Ferry FLA.

In Section 3.2.1 of Exhibit E of the Crescent DLA, NYPA proposes to remove, from the current project boundary of the Crescent Project, certain portions of the Erie Canal, including Lock E-6 and the two guard gates (Guard Gate 1 and Guard Gate 2) located at the upstream end of Waterford Flight (upstream of Lock E-6). It appears that Lock E-6 and the guard gates are needed for project purposes at the Crescent Project. Lock E-6 is likely needed to maintain the impoundment and the guard gates are needed to protect the lock during flooding. Therefore, in the Crescent FLA, please include a description of Lock E-6 and the guard gates in Exhibit A and revise the project boundary in Exhibit G to include Lock E-6, Guard Gate 1, and Guard Gate 2.

3. Section 4.51(b)(1) of the Commission's regulations requires a description of the physical composition, dimensions, and general configuration of any dams, spillways, powerhouses, or other structures. In the FLAs, please provide a description of the projects' intakes and trash racks (e.g., dimensions).

4. Section 4.51(b)(4) of the Commission's regulations requires a description of the number, length, voltage, and interconnection of any primary transmission lines to be

[1] A unique Exhibit A, B, C, D, and F was filed in each DLA, but the same Exhibit E and Exhibit H were included in each DLA.

included as part of the project. In the FLAs, please provide a description (i.e., length, voltage, whether aboveground or underground) of the generator leads (i.e., transmission lines from the project generators to the switchyard) at each project.

5. Single-line diagrams are considered Critical Electric/Energy Infrastructure Information (CEII) and should be filed as such. Please file the single-line diagrams of the projects as CEII with the FLAs.

Exhibit B

6. The DLAs for the Crescent and Vischer Ferry Projects describe project operation during normal flow conditions. However, there is little description of how the projects are operated during high-flow conditions, beyond a statement that the projects are operated in close coordination with the New York State Canal Corporation. As such, it is not clear how the projects operate during high-flow conditions. Therefore, please describe how the projects are operated during high-flow or flood conditions and if the projects are shut down and if so, under what conditions.

7. Annual and monthly flow statistics and flow duration curves are provided for a relatively short period of record (POR), from January 1, 2011 through December 31, 2020, and are based on "daily average total station flows" at each project. In the FLAs, please describe how total daily station outflows were measured (or calculated) at each project and whether these flows included any water releases to support navigation on the Erie Canal (e.g., releasing water from the Crescent impoundment into the nearby Waterford Flight during the navigation season).[2] Also, please indicate if project-specific flow data exist prior to 2011 such that the flow statistics and flow duration curves provided in the FLAs can be based on a longer POR. If such flow data exist, or can be calculated, please update all flow statistics and flow duration curves in the FLAs based on a longer POR (ideally at least 30 years, to the extent such data are available). If such data are not available, please explain why the POR for project-specific flow data cannot be extended.

[2] The Waterford Flight consists of a series of five navigation locks (with a total lift of 169 feet over 2.5 miles) that allows vessels to bypass the 80-foot-high Cohoes Falls, which is located downstream of the Crescent Project. Water is occasionally released from the Crescent impoundment to support navigation through Waterford Flight.

Exhibit E

Aquatic Resources

8. Section 2.1.1 of Exhibit E states there are no anadromous fish species present at the projects. However, the anadromous blueback herring is seasonally present at both projects and throughout the Mohawk River. Therefore, please correct this statement in the FLAs.

9. Section 2.4 of Exhibit E states that in an email dated May 23, 2019, NYPA received concurrence from the New York State Department of State (New York DOS) indicating the Commission's licensing of the projects would not affect resources within New York's designated coastal zone because the projects are located outside of the coastal zone. Neither DLA contains a copy of this email correspondence. Therefore, in the FLAs, please provide a copy of this email correspondence from New York DOS.

10. Figure 4-4 shows the locations of Commission licensed or exempted hydroelectric projects on the Mohawk River. The projects in the lower portion of the Mohawk River—from Vischer Ferry to the confluence of the Mohawk and Hudson Rivers—are clustered together and difficult to distinguish from one another due to their close geographic proximity. Therefore, in the FLAs, please include a revised figure 4-4 that contains an expanded view of this area of interest, and include on the map, any non-hydropower dams that could affect fish passage in the vicinity of the projects.

11. Page 39 of Exhibit E states that the POR used to develop the annual and monthly flow duration curves for each project was January 1, 2013 through December 31, 2022. However, the flow duration curves presented in Exhibit B of each FLA indicate the POR used to generate the curves was January 1, 2011 through December 31, 2022. Please clarify this discrepancy in the FLAs and specify the POR for the flow data upon which the flow duration curves for each project are based.

12. Table 4-9 of Exhibit E indicates there are some large water withdrawals from the Vischer Ferry impoundment (exceeding 1.5 million gallons per day) by the Knolls Atomic Laboratory and the General Electric Plant in Schenectady, New York. In the FLAs, please describe the purpose of these withdrawals and indicate whether they represent consumptive withdrawals, whereby withdrawn water is not returned to the river, or non-consumptive withdrawals, whereby water is returned to the river at a similar rate to which it is withdrawn (e.g., for withdrawals used as cooling waters at industrial facilities).

13. Section 4.5.1.2.4 of Exhibit E states that downstream fish passage through the navigation locks (of the Erie Canal) for adult and juvenile blueback herring is likely variable based on the frequency of operation (of the locks) during the migration season.

Additional information on the frequency of lockages at Lock E-7 (at the Vischer Ferry Project) and Locks E-2, E-3, E-4, E-5, and E-6 (at the Crescent Project) would aid Commission staff's assessment of the extent to which these navigation locks provide passage opportunities for migratory fish species occurring at the projects, namely blueback herring and American eel. Therefore, in the FLAs, please provide, to the extent such information is available, data from the past 5 years on the frequency of lockages (e.g., typical number of lockages per day) at each of the navigation locks referenced above. Lockage data should be reported by year to account for potential changes in operation of the locks due to the global Covid-19 pandemic. Also, please provide, for each of the past 5 years, the starting and ending dates of the navigation season in this portion of the Erie Canal.

Terrestrial Resources and Threatened and Endangered Species

14. Section 4.8.1.1 of Exhibit E identifies the monarch butterfly (*Danaus plexippus*), which is a federal candidate species, as a species that may use habitat in the vicinity of the Crescent and Vischer Ferry Projects. However, table 4.31 indicates there are no known occurrences of this species at the projects. In the FLAs, please describe whether suitable monarch butterfly habitat is present at the projects and summarize any expected impacts of project operation and maintenance on this species.

15. The DLAs do not include any information on vegetation management at the project. In the FLAs, please describe your proposed vegetation management activities to support project operation and maintenance (e.g., tree removal or trimming), including a description of the locations where such activities are conducted and the specific methods used (e.g., mechanical or herbicide use).

16. As described in section 4.6.1.4.3 of Exhibit E, bald eagles are known to nest and forage in the vicinity of the projects, as well as other resident and migratory birds (as indicated in tables 2.24 and 4.32 of Exhibit E). Therefore, in the FLAs, please describe any mitigation measures currently being taken or planned, such as following the Avian Powerline Interaction Committee's or U.S Fish and Wildlife Service's guidelines to minimize impacts to bald eagles and other birds.[3]

Recreation Resources

17. Section 4.9.1.1.1.1 of Exhibit E describes both the FERC-approved project recreation sites and facilities, as well as non-project recreation sites available at the

[3] The APLIC and FWS guidance documents are available at: https://www.aplic.org/mission and https://ecos.fws.gov/ServCat/DownloadFile/104185?Reference=60102.

Crescent Project, and section 4.9.1.1.1.2 describes the same for the Vischer Ferry Project. In the FLAs, please clarify each site's relationship to the project boundary (i.e., fully contained within the project boundary, a portion of the site is within the project boundary, or it is adjacent to the project boundary).

Cultural Resources

18. Section 4.10.1.2 of Exhibit E states that the inventoried historic architectural resources within or adjacent to the Crescent and Vischer Ferry Projects are listed in the May 3, 2019 Pre-Application Document. Please also include them in the FLAs, as well as any new properties identified through NYPA's updated search of the New York State Office of Parks, Recreation and Historic Preservation's Cultural Resources Information System (CRIS).[4]

19. Section 4.10.3 of Exhibit E states that because the Crescent and Vischer Ferry dams and their associated impoundments are contributing properties of the New York State Barge Canal National Register Historic District, which was designated as a National Historic Landmark in January 2016, project elements are covered under an Historic Properties Management Plan (HPMP) that is in development for the New York State Barge Canal National Historic Landmark. In the FLAs, please describe the status of this HPMP and whether it has been completed and approved or if it is still being developed. If it is complete, please provide a copy of the document with the FLAs. If it is not complete, please provide a timeframe for expected completion.

Tribal Resources

20. Section 4.12.1 of Exhibit E states 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 Crescent and Vischer Ferry Projects. In the FLAs, please clarify that these sites are discussed in section 4.10 *Cultural Resources*, and if not, please provide a description of them either in section 4.12 *Tribal Resources*, or section 4.10 *Cultural Resources*. If the information surrounding these sites is sensitive, please provide at least a basic description of the sites and their general location.

21. Section 4.12.1 of Exhibit E states that NYPA consulted with the St. Regis Mohawk Tribe for the relicensing of the Crescent and Vischer Ferry Projects, but also contacted the Stockbridge Munsee Community, the Delaware Tribe, the Mohawk Nation,

[4] CRIS (https://cris.parks.ny.gov) is a Geographic Information System program that provides access to New York State's historic and cultural resource databases and digitized paper records.

and the Mohican Tribe. The DLA does not, however, indicate whether NYPA received any responses from these Tribes. In the FLAs, please clarify if responses were received from the Stockbridge Munsee Community, the Delaware Tribe, the Mohawk Nation, and/or the Mohican Tribe and, if so, summarize those responses.

Exhibit G

22. Section 4.41(h) requires that Exhibit G includes: (1) project boundary data in a geo-referenced electronic format (i.e., ArcView shape files or similar format); (2) electronic boundary data that is positionally accurate to ±40 feet; and (3) a text file describing the map projection used for the Exhibit G data. The Exhibit Gs filed with the DLAs do not include this information; therefore, please file, with the FLAs, Exhibit G maps that provide this information.

23. Section 4.41(h) of the Commission's regulations require Exhibit G maps to identify by legal subdivision, lands that are owned or planned to be acquired in fee by the applicant, and lands over which the applicant has acquired or plans to acquire rights to occupancy and use (*e.g.*, easement, lease). In the FLAs, please include Exhibit G maps that distinguish lands owned or planned to be acquired in fee by the applicant from those lands over which the applicant has acquired or plans to acquire rights to occupancy and use.

24. Section 4.39 of the Commission's regulations require Exhibit G maps to be stamped by a registered land surveyor and contain true and magnetic norths. Please include the required stamp and both true and magnetic norths on the Exhibit Gs filed with the FLAs.

Exhibit H

25. The Exhibit H filed for the projects does not include information on NYPA's need over the short- and long-term for the electricity generated by the projects [section 5.18(c)(1)(i)(B) of the Commission's regulations], the reasonable cost and availability of alternative sources of power [5.18(c)(1)(i)(C)], and a comparison of the impact on the operations and planning of the NYPA's transmission system of receiving or not receiving licenses for the projects [section 5.18(c)(1)(i)(F)]. In addition, Exhibit H lacks a statement of the measures taken or planned by NYPA to ensure the safe management, operation, and maintenance of the projects, as required by section 5.18(c)(1)(ii)(B) of the Commission's regulations. Therefore, in the FLAs, please file an Exhibit H that provides all of the information required by sections 5.18(c)(1)(i)(B), 5.18(c)(1)(i)(C), 5.18(c)(1)(i)(F), and 5.18(c)(1)(ii)(B) of the Commission's regulations.

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation, and Historic Preservation

KATHY HOCHUL
Governor

ERIK KULLESEID
Commissioner

March 28, 2022

Mr. Robert Panepinto
Cultural Resources Specialist
New York Power Authority
123 Main Street-5E
White Plains, NY 10601

Re: FERC
Crescent Hydroelectric Project Relicensing (FERC Project No. 4678)
19PR03259

Dear Mr. Panepinto:

Thank you for continuing to consult with the New York State Historic Preservation Office (SHPO). We have reviewed the provided documentation in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources.

We note that the Crescent Hydroelectric Plant is listed in the State and National Registers of Historic Places as a contributing resource to the New York State Barge Canal Historic District. This submission includes a justification for the proposed project Area of Potential Effect (APE).

Based on this review, our office concurs with the New York Power Authority's proposed APE for this project.

If you have any questions, I can be reached via email or at (518) 268-2164.

Sincerely,

Weston Davey
Historic Site Restoration Coordinator
Weston.davey@parks.ny.gov

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation, and Historic Preservation

KATHY HOCHUL
Governor

ERIK KULLESEID
Commissioner

March 28, 2022

Mr. Robert Panepinto
Cultural Resources Specialist
New York Power Authority
123 Main Street-5E
White Plains, NY 10601

Re: FERC
Vischer Ferry Hydroelectric Project Relicensing (FERC Project No. 4679)
Town of Clifton Park, Saratoga County, NY
19PR03314

Dear Mr. Panepinto:

Thank you for continuing to consult with the New York State Historic Preservation Office (SHPO). We have reviewed the provided documentation in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources.

We note that the Vischer Ferry Hydroelectric Plant is listed in the State and National Registers of Historic Places as a contributing resource to the New York State Barge Canal Historic District. This submission includes a justification for the proposed project Area of Potential Effect (APE).

Based on this review, our office concurs with the New York Power Authority's proposed APE for this project.

If you have any questions, I can be reached via email or at (518) 268-2164.

Sincerely,

Weston Davey
Historic Site Restoration Coordinator
Weston.davey@parks.ny.gov

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits
625 Broadway, 4th Floor, Albany, New York 12233-1750
P: (518) 402-9167 | F: (518) 402-9168 | deppermitting@dec.ny.gov
www.dec.ny.gov

April 1, 2022

VIA ELECTRONIC FILING

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1a
Washington, DC 20426

RE: Comments on Draft License Application
Crescent Vischers Ferry Hydroelectric Projects (FERC No. 4678 and 4679)
Mohawk River
Schenectady, Saratoga and Albany Counties

Dear Secretary Bose:

The New York State Department of Environmental Conservation ("NYSDEC" or "Department") is providing the following comments on the December 2021 Draft License Application (DLA) submitted by the New York Power Authority ("Applicant") for relicensing the existing Crescent and Vischers Ferry Hydroelectric Projects, FERC No. 4678 and 4679 (the "Project") located on the Mohawk River.

The NYSDEC provides the following comments:

Exhibit A, Vischers Ferry.

Section 2.1.1 Project Dam: Please describe the substrate of the bottom of the headrace channel.

Table 2-2: Please include the Turbine Design Head with and without flashboards

Exhibit B, Crescent

Section 3.3 Project Hydrology; it is unclear why only 10 years of flow data (January 2011 to December 2020) is being used. Please provide reasoning.

Exhibit E Crescent and Vischers Ferry

Section 3.1.3 Project Operations, Crescent Project, page 14 states, after describing the minimum flow regime for the project, that "these flows are for fish protection measures." This seems contradictory to the statement above which indicates that the minimum flows provide are for navigation, please clarify.

Section 4.1 Cumulation effects state " 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". It's unclear from this statement if FERC will conduct its NEPA analysis.

Please clarify if FERC is proposing to conduct its NEPA analysis considering water quality and diadromous fishes cumulative impacts including direct, indirect and cumulative?

Section 4.4.1.1.2 It's unclear why the Applicant is using only 10 years worth of data for determining annual monthly minimum, mean, and maximum flows. Please clarify if more data is available. If so that should be included in the FLA so there is a longer period of record.

On Page 68, the applicant states that *"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".* In the previous sentence the applicant states that *"both of the 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*". Please revise this statement to make a distinction between native aquatic plants and invasive aquatic plants. Water chestnut, an invasive out competes submergent and emergent native plants. NYSDEC suggests that a discussion of invasive species management and an aquatic invasive species control plan be included in the FLA to address the effects of water chestnut on DO levels in the project area.

On Page 77 The eel study only targeted juvenile eels migrating up the Mohawk River but it did not target mature eels moving down the Mohawk River. Other methods could have been implemented to target mature eels.

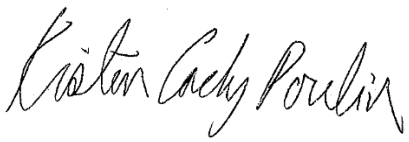
Page 85 states " The study looked specifically at juvenile blueback herring survival rates through the Kaplan turbine unit and over the spillways. The study was completed using a tag-recapture technique. Survival was estimated to be 96±6.7% through a Kaplan turbine and 88.3±10.7% over a spillway associated with a low-head hydro dam." Please confirm that the 96 % survival is for the turbine and 88% is over the spillway.

On page 90 the applicant states that they found freshwater mussels during their 2020 mesohabitat study. A drawdown management plan / freshwater mussel protection plan should be included in the FLA to ensure that the mussel communities are not affected by drawdowns and fluctuations caused by the projects.

On Page 91 *"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".* Dams certainly effect the migration of eels upstream and downstream and are a major reason why eels are not seen in their historic ranges. The statement made by the applicant claiming that "the projects have no adverse effects on American Eels" is false. There is evidence of eels upstream of the projects, and the applicant indicates that "data support that while American eel are likely in the vicinity of the Projects, they are uncommon" (page 81 Exhibit E). In general, dams are detrimental to eel migration. Crescent and Vischer Ferry dams aren't the first impassable barriers on the Mohawk River so there aren't large groups of eels trying to climb these facilities, like there are at the Federal Dam in Troy, but an eel ramp is being installed at the Federal dam in Troy in order to get more eels above the dam. This means there will be more eels trying to migrate within the Mohawk river system in the future. Please modify the statement regarding no adverse effects.

NYSDEC appreciates the opportunity to review and comment on the Draft License Application. If you have any questions or would like to discuss further, please feel free to contact me at Kristen.Cady-Poulin@dec.ny.gov.

Sincerely,



Kristen Cady-Poulin
Environmental Analyst
Energy Bureau Management
Division of Environmental Permits

ecc: M. Porter, NYSDEC
C. VanMareen, NYSDEC
J. Wiley, USFWS
A. Ramirez, USFWS

Document Accession #: 20220504-5155 Filed Date: 05/04/2022

United States Department of the Interior
FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, New York 13045

May 4, 2022

Robert Daly, Licensing Director
New York Power Authority
123 Main Street
White Plains, NY 10601
rob.daly@nypa.gov

Via FERC e-File

RE: Crescent Hydroelectric Project (Project No. 4678-052)
Vischer-Ferry Hydroelectric Project (Project No. 4679-049)
Updated Study Report and Draft License Application

Dear Robert Daly:

The U.S. Fish and Wildlife Service (Service) has reviewed the February 17, 2022, Updated Study Report (USR) and March 23, 2022, Draft License Application (DLA) from the New York Power Authority (Applicant) for the Crescent and Vischer Ferry Hydroelectric Projects (Project or Projects, collectively) (Project Nos. 4678 and 4679, respectively), located on the Mohawk River in Saratoga, Albany, and Schenectady counties, New York. The Service is providing additional information pertaining to American Eel (*Anguilla rostrata*), below.

2021 Applicant Eel Study

The Applicant did not observe American Eel during a 2021 eel study at the Projects. The Applicant utilized stationary eel traps, nighttime observations, and nighttime electrofishing techniques. The Applicant states in the DLA that because no eels were observed at the Projects, the number of eels occurring at the Projects is likely small; therefore, the operation of the Projects has no adverse effects on the American Eel.

2021 USGS eDNA Study

In addition to the effort conducted by the Applicant in 2021, the U.S. Geological Survey conducted an environmental DNA (eDNA) study in segments of the Hudson River, Mohawk River, and New York State Barge Canal to identify the presence of American Eel in the study area.[1] The study found that American Eel eDNA was detected below both the Crescent and the

[1] George, S.D., Baldigo, B.P., Rees, C.B., Bartron, M.L., and Winterhalter, D.R. 2022. Environmental DNA and

Vischer Ferry Project dams (Enclosure A). The detection of eel eDNA was strongest below the first barrier at the Green Island Project (Project No. 13) dam, as would be expected. Above Green Island, detections dropped by an order of magnitude in the Hudson River and confluence with the Mohawk River. Detections subsequently declined within the Waterford Flight of the New York State Barge Canal and in the Mohawk River upstream of the confluence. At the time of the study, none of the barriers in the study area provided upstream eel passage facilities; therefore, it is not unexpected to see strong declines in American Eel detection above subsequent barriers in a river system.

American Eel in the Mohawk River

The positive American Eel eDNA detections at the Projects confirm our understanding that a small population of eels exists in the vicinity of the Projects. The Projects obstruct the upstream migration of American Eel, once historically abundant upstream of the Projects, and can cause mortality and injury during downstream migration. The Service expects an increased occurrence of American Eel in the vicinity of the Projects during the new license terms. The Green Island Project is required to provide upstream passage and downstream protection for American Eel and has begun an interim upstream passage effort for 2021 until the final facilities are constructed.[2] The New York State Dam Project (Project No. 10457), the first barrier on the Mohawk River where regular detections of eel eDNA occurred in 2021, will be relicensing during the first quarter of the new license terms. The Service will evaluate potential upstream and downstream fish passage measures, including measures for American Eel, at the Projects during the development of our fishway prescription during this relicensing.

*****

Thank you for the opportunity to comment on the USR and the DLA. In order to address substantive concerns in the DLA proposals, we encourage the Applicant to engage in settlement negotiations with all stakeholders to address the outstanding resource issues at the Projects, including fish passage and protection, water quality, and recreation. If you have any questions or desire additional information, please contact John Wiley at john_wiley@fws.gov, or at 607-753-9334.

Sincerely,

DAVID STILWELL

Digitally signed by DAVID STILWELL
Date: 2022.05.04 15:27:50 -04'00'

David A. Stilwell
Field Supervisor

Enclosure

cc: J. Epstein, jepstein@riverkeeper.org

electrofishing data for American Eel in the Mohawk and Hudson River Watersheds: U.S. Geological Survey data release. https://doi.org/10.5066/P9UGE0CF.

[2] FERC Accession No. 20220411-3007.

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Enclosure A

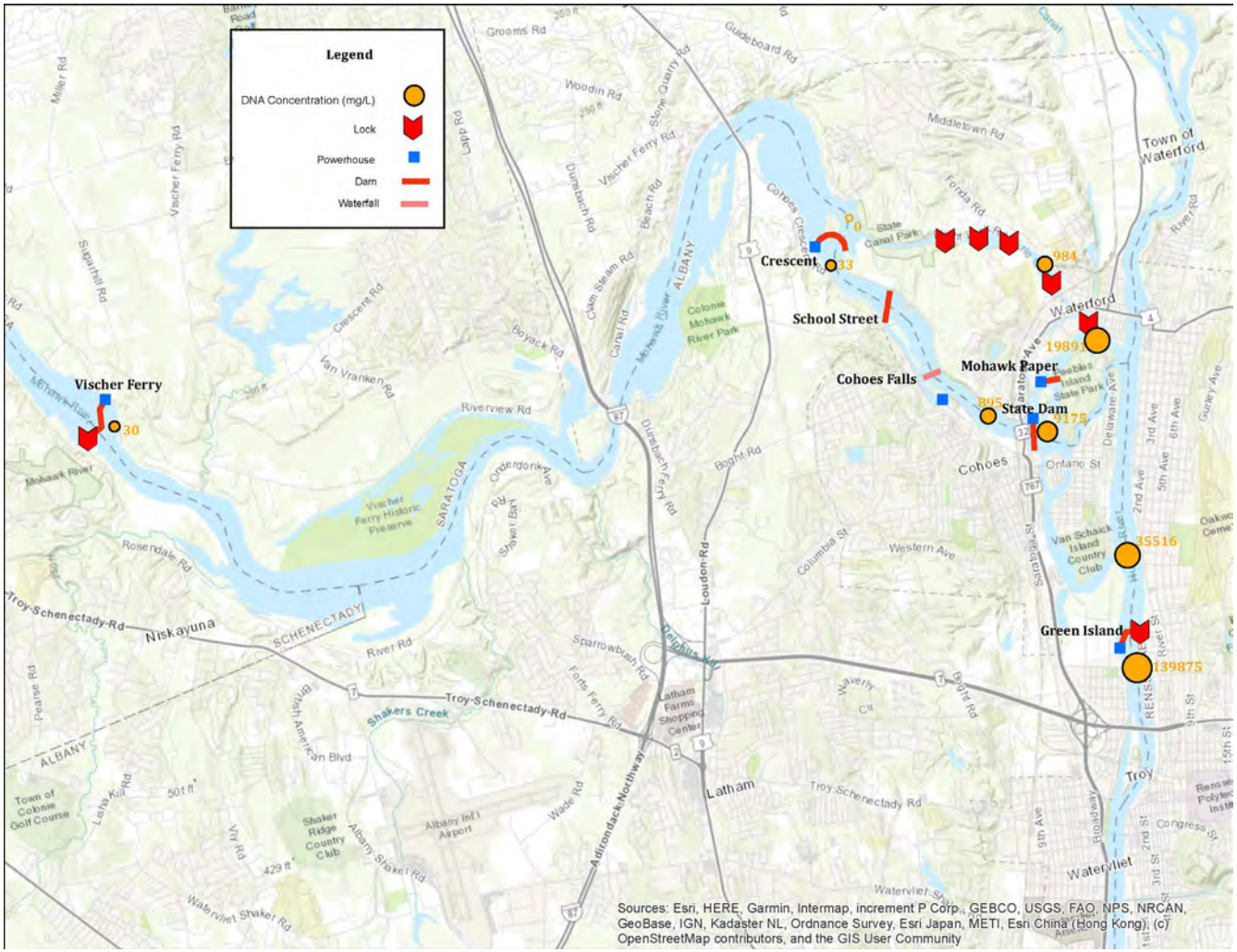

Figure 1. Map of Hudson River and Mohawk River confluence including 2021 environmental DNA data from a United States Geological Survey study of American Eel (*Anguilla rostrata*). Data from George, S.D., Baldigo, B.P., Rees, C.B., Bartron, M.L., and Winterhalter, D.R. 2022. Data retrieved from Environmental DNA and

electrofishing data for American Eel in the Mohawk and Hudson River Watersheds: U.S. Geological Survey data release. https://doi.org/10.5066/P9UGE0CF.

Appendix B – Comment/Response Matrix

Summary Response to Comments on the Crescent (P-4678) and Vischer Ferry (P-4679) Draft License Applications

No.	Commenter	Comment	Response
Federal Energy Regulatory Commission (FERC)			
1	FERC 3/17/2022 Letter	Sections 5.17(e) and 4.38(b)(2)(vi) of the Commission's regulations require that every application for a license for a project with a capacity of 80 megawatts or less must include in its application copies of statements of whether it is seeking benefits under section 210 of the Public Utilities Regulatory Policies Act of 1978 (PURPA). Neither draft license application (DLA) indicates whether NYPA is seeking PURPA benefits for the projects. Therefore, in the final license applications (FLA), please indicate if benefits are being sought under section 210 of PURPA; if so, provide the necessary documentation for doing so in accordance with section 4.38(b)(2)(vi) of the Commission's regulations.	The Power Authority is not seeking benefits under the Public Utilities Regulatory Policies Act (PURPA) of 1978**.** Exhibit H (Section 3) has been revised to include information that responds to the requirements of section 4.38 (b)(2)(vi) of the Commission's regulations.
2	FERC 3/17/2022 Letter	Although the project boundary in Exhibit G for the Vischer Ferry Project includes Lock E-7 of the Erie Canal, Exhibit A of the Vischer Ferry DLA does not describe Lock E-7.[1] Therefore, please provide a description (e.g., dimensions) of the lock in Exhibit A of the Vischer Ferry FLA. In Section 3.2.1 of Exhibit E of the Crescent DLA, NYPA proposes to remove, from the current project boundary of the Crescent Project, certain portions of the Erie Canal, including Lock E-6 and the two guard gates (Guard Gate 1 and Guard Gate 2) located at the upstream end of Waterford Flight (upstream of Lock E-6). It appears that Lock E-6 and the guard gates are needed for project purposes at the Crescent Project. Lock E-6 is likely needed to maintain the impoundment and the guard gates are needed to protect the lock during flooding. Therefore, in the Crescent FLA, please include a description of Lock E-6 and the guard gates in Exhibit A and revise	Exhibit A (Section 2.1.6) of the Crescent License Application has been revised to include a description of Lock E-6. Exhibit A (Section 2.1.6) of the Vischer Ferry License Application has been revised to include a description of Lock E-7.

No.	Commenter	Comment	Response
		the project boundary in Exhibit G to include Lock E-6, Guard Gate 1, and Guard Gate 2. [1]A unique Exhibit A, B, C, D, and F was filed in each DLA, but the same Exhibit E and Exhibit H were included in each DLA.	
3	FERC 3/17/2022 Letter	Section 4.51(b)(1) of the Commission's regulations requires a description of the physical composition, dimensions, and general configuration of any dams, spillways, powerhouses, or other structures. In the FLAs, please provide a description of the projects' intakes and trash racks (e.g., dimensions).	Exhibit A, Section 2, of both Crescent and Vischer Ferry License Applications, has been revised to include additional details about each of the Project's intakes and trash racks.
4	FERC 3/17/2022 Letter	Section 4.51(b)(4) of the Commission's regulations requires a description of the number, length, voltage, and interconnection of any primary transmission lines to be included as part of the project. In the FLAs, please provide a description (i.e., length, voltage, whether aboveground or underground) of the generator leads (i.e., transmission lines from the project generators to the switchyard) at each project.	Exhibit A, Section 2, of both Crescent and Vischer Ferry License Applications, has been revised to include additional details regarding Project interconnect and transmission facilities.
5	FERC 3/17/2022 Letter	Single-line diagrams are considered Critical Electric/Energy Infrastructure Information (CEII) and should be filed as such. Please file the single-line diagrams of the projects as CEII with the FLAs.	The single-line diagrams for each of the Projects are referenced in Exhibit A (Section 2.1.5) and have been filed as CEII.
6	FERC 3/17/2022 Letter	The DLAs for the Crescent and Vischer Ferry Projects describe project operation during normal flow conditions. However, there is little description of how the projects are operated during high-flow conditions, beyond a statement that the projects are operated in close coordination with the New York State Canal Corporation. As such, it is not clear how the projects operate during high-flow conditions. Therefore, please describe how the projects are operated during high-flow or flood conditions and if the projects are shut down and if so, under what conditions.	Exhibit B (Section 2.3.3) of both Crescent and Vischer Ferry License Applications, has been revised to include additional description on how the Projects are operated during high flow conditions. In addition, the Project has a FERC-approved Emergency Action Plan (EAP) and is operated in accordance with EAP requirements.
7	FERC 3/17/2022 Letter	Annual and monthly flow statistics and flow duration curves are provided for a relatively short period of record (POR), from January 1, 2011 through December 31, 2020, and are based on	The flow duration curves and flow statistics included in Exhibit B (Section 3.3) for each Project have been revised based on a period of

No.	Commenter	Comment	Response
		"daily average total station flows" at each project. In the FLAs, please describe how total daily station outflows were measured (or calculated) at each project and whether these flows included any water releases to support navigation on the Erie Canal (e.g., releasing water from the Crescent impoundment into the nearby Waterford Flight during the navigation season).[2] Also, please indicate if project-specific flow data exist prior to 2011 such that the flow statistics and flow duration curves provided in the FLAs can be based on a longer POR. If such flow data exist, or can be calculated, please update all flow statistics and flow duration curves in the FLAs based on a longer POR (ideally at least 30 years, to the extent such data are available). If such data are not available, please explain why the POR for project-specific flow data cannot be extended. [2] The Waterford Flight consists of a series of five navigation locks (with a total lift of 169 feet over 2.5 miles) that allows vessels to bypass the 80-foot-high Cohoes Falls, which is located downstream of the Crescent Project. Water is occasionally released from the Crescent impoundment to support navigation through Waterford Flight.	record of 30 years of USGS gage data (prorated based on drainage area). These same 30-year USGS gage-based flow duration curves are included and discussed in Exhibit E (Section 4.4).
8	FERC 3/17/2022 Letter	Section 2.1.1 of Exhibit E states there are no anadromous fish species present at the projects. However, the anadromous blueback herring is seasonally present at both projects and throughout the Mohawk River. Therefore, please correct this statement in the FLAs.	Exhibit E (Section 4.5) has been revised to clarify that one anadromous fish species, blueback herring, is present at the projects.
9	FERC 3/17/2022 Letter	Section 2.4 of Exhibit E states that in an email dated May 23, 2019, NYPA received concurrence from the New York State Department of State (New York DOS) indicating the Commission's licensing of the projects would not affect resources within New York's designated coastal zone because the projects are located outside of the coastal zone. Neither DLA contains a copy of this email correspondence. Therefore, in the FLAs, please provide a copy of this email correspondence from New York DOS.	A copy of the May 23, 2019 email correspondence with New York State Department of State (NYSDOS) regarding Project effects on the Coastal Zone is provided in Appendix A.

No.	Commenter	Comment	Response
10	FERC 3/17/2022 Letter	Figure 4-4 shows the locations of Commission licensed or exempted hydroelectric projects on the Mohawk River. The projects in the lower portion of the Mohawk River— from Vischer Ferry to the confluence of the Mohawk and Hudson Rivers—are clustered together and difficult to distinguish from one another due to their close geographic proximity. Therefore, in the FLAs, please include a revised figure 4-4 that contains an expanded view of this area of interest, and include on the map, any non-hydropower dams that could affect fish passage in the vicinity of the projects.	Exhibit E Figure 4-5 has been added to show the lower Mohawk River downstream of the Projects in more detail.
11	FERC 3/17/2022 Letter	Page 39 of Exhibit E states that the POR used to develop the annual and monthly flow duration curves for each project was January 1, 2013 through December 31, 2022. However, the flow duration curves presented in Exhibit B of each FLA indicate the POR used to generate the curves was January 1, 2011 through December 31, 2022. Please clarify this discrepancy in the FLAs and specify the POR for the flow data upon which the flow duration curves for each project are based.	The flow duration curves and flow statistics included in Exhibit B (Section 3.3) for each Project have been revised based on a period of record of 30 years of USGS gage data (prorated based on drainage area).
12	FERC 3/17/2022 Letter	Table 4-9 of Exhibit E indicates there are some large water withdrawals from the Vischer Ferry impoundment (exceeding 1.5 million gallons per day) by the Knolls Atomic Laboratory and the General Electric Plant in Schenectady, New York. In the FLAs, please describe the purpose of these withdrawals and indicate whether they represent consumptive withdrawals, whereby withdrawn water is not returned to the river, or non-consumptive withdrawals, whereby water is returned to the river at a similar rate to which it is withdrawn (e.g., for withdrawals used as cooling waters at industrial facilities).	Exhibit E (Section 4.4) has been revised to include additional information from New York State Department of Environmental Conservation (NYSDEC) about these withdrawals.
13	FERC 3/17/2022 Letter	Section 4.5.1.2.4 of Exhibit E states that downstream fish passage through the navigation locks (of the Erie Canal) for adult and juvenile blueback herring is likely variable based on the frequency of operation (of the locks) during the migration season. Additional	Exhibit E (Section 4.4) has been revised to provide additional details regarding the frequency of lockages. Tables 4-10 and 4-11 in Exhibit E provide a summary of the number of

No.	Commenter	Comment	Response
		information on the frequency of lockages at Lock E-7 (at the Vischer Ferry Project) and Locks E-2, E-3, E-4, E-5, and E-6 (at the Crescent Project) would aid Commission staff's assessment of the extent to which these navigation locks provide passage opportunities for migratory fish species occurring at the projects, namely blueback herring and American eel. Therefore, in the FLAs, please provide, to the extent such information is available, data from the past 5 years on the frequency of lockages (e.g., typical number of lockages per day) at each of the navigation locks referenced above. Lockage data should be reported by year to account for potential changes in operation of the locks due to the global Covid-19 pandemic. Also, please provide, for each of the past 5 years, the starting and ending dates of the navigation season in this portion of the Erie Canal.	lockages made at the Waterford Flight locks (Locks E-2 through E-6) and at Lock E-7, respectively, by year and month.
14	FERC 3/17/2022 Letter	Section 4.8.1.1 of Exhibit E identifies the monarch butterfly (Danaus plexippus), which is a federal candidate species, as a species that may use habitat in the vicinity of the Crescent and Vischer Ferry Projects. However, table 4.31 indicates there are no known occurrences of this species at the projects. In the FLAs, please describe whether suitable monarch butterfly habitat is present at the projects and summarize any expected impacts of project operation and maintenance on this species.	Exhibit E (Section 4.8) has been updated to provide additional discussion about the potential for monarch butterfly habitat at the Project.
15	FERC 3/17/2022 Letter	The DLAs do not include any information on vegetation management at the project. In the FLAs, please describe your proposed vegetation management activities to support project operation and maintenance (e.g., tree removal or trimming), including a description of the locations where such activities are conducted and the specific methods used (e.g., mechanical or herbicide use).	Exhibit E (Section 4.6) has been revised to include a description of proposed vegetation management activities at the Projects.
16	FERC 3/17/2022 Letter	As described in section 4.6.1.4.3 of Exhibit E, bald eagles are known to nest and forage in the vicinity of the projects, as well as other resident and migratory birds (as indicated in tables 2.24 and 4.32 of	Exhibit E (Section 4.6) has been revised to further discuss bald eagle use of the Projects and the conclusion that there are no adverse impacts to bald eagles or habitat that result from Project

No.	Commenter	Comment	Response
		Exhibit E). Therefore, in the FLAs, please describe any mitigation measures currently being taken or planned, such as following the Avian Powerline Interaction Committee's or U.S Fish and Wildlife Service's guidelines to minimize impacts to bald eagles and other birds.[3] [3] The APLIC and FWS guidance documents are available at: https://www.aplic.org/mission and https://ecos.fws.gov/ServCat/DownloadFile/104185?Reference=60102.	operations, and therefore no mitigation measures are needed or proposed.
17	FERC 3/17/2022 Letter	Section 4.9.1.1.1.1 of Exhibit E describes both the FERC-approved project recreation sites and facilities, as well as non-project recreation sites available at the Crescent Project, and section 4.9.1.1.1.2 describes the same for the Vischer Ferry Project. In the FLAs, please clarify each site's relationship to the project boundary (i.e., fully contained within the project boundary, a portion of the site is within the project boundary, or it is adjacent to the project boundary).	Exhibit E (Section 4.9) has been revised to include further information about each of the Project and non-Project recreation sites relative to the FERC Project boundary.
18	FERC 3/17/2022 Letter	Section 4.10.1.2 of Exhibit E states that the inventoried historic architectural resources within or adjacent to the Crescent and Vischer Ferry Projects are listed in the May 3, 2019 Pre-Application Document. Please also include them in the FLAs, as well as any new properties identified through NYPA's updated search of the New York State Office of Parks, Recreation and Historic Preservation's Cultural Resources Information System (CRIS).[4] [4]CRIS (https://cris.parks.ny.gov) is a Geographic Information System program that provides access to New York State's historic and cultural resource databases and digitized paper records.	Exhibit E (Section 4.10) has been revised to include an updated list of known historic properties within the Projects' area of potential effects (APE), based on an updated search of CRIS.
19	FERC 3/17/2022 Letter	Section 4.10.3 of Exhibit E states that because the Crescent and Vischer Ferry dams and their associated impoundments are contributing properties of the New York State Barge Canal National Register Historic District, which was designated as a National Historic Landmark in January 2016, project elements are covered	Exhibit E (Section 4.10) has been revised to include updated information regarding the status of the New York State Barge Canal National Register Historic District HPMP, including a

No.	Commenter	Comment	Response
		under an Historic Properties Management Plan (HPMP) that is in development for the New York State Barge Canal National Historic Landmark. In the FLAs, please describe the status of this HPMP and whether it has been completed and approved or if it is still being developed. If it is complete, please provide a copy of the document with the FLAs. If it is not complete, please provide a timeframe for expected completion.	description of Project facilities that are considered contributing elements.
20	FERC 3/17/2022 Letter	Section 4.12.1 of Exhibit E states 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 Crescent and Vischer Ferry Projects. In the FLAs, please clarify that these sites are discussed in section 4.10 Cultural Resources, and if not, please provide a description of them either in section 4.12 Tribal Resources, or section 4.10 Cultural Resources. If the information surrounding these sites is sensitive, please provide at least a basic description of the sites and their general location.	There are no known traditional cultural properties (TCPs), religious properties or National Register-eligible sites associated with Native American nations within the Project APE. Exhibit E (Section 4.12) has been revised to correct the error in the DLA.
21	FERC 3/17/2022 Letter	Section 4.12.1 of Exhibit E states that NYPA consulted with the St. Regis Mohawk Tribe for the relicensing of the Crescent and Vischer Ferry Projects, but also contacted the Stockbridge Munsee Community, the Delaware Tribe, the Mohawk Nation, and the Mohican Tribe. The DLA does not, however, indicate whether NYPA received any responses from these Tribes. In the FLAs, please clarify if responses were received from the Stockbridge Munsee Community, the Delaware Tribe, the Mohawk Nation, and/or the Mohican Tribe and, if so, summarize those responses.	There have been no responses received from the Stockbridge Munsee Community, the Delaware Tribe, the Mohawk Nation, or the Mohican Tribe. Exhibit E (Section 4.12) has been revised.
22	FERC 3/17/2022 Letter	Section 4.41(h) requires that Exhibit G includes: (1) project boundary data in a geo-referenced electronic format (i.e., ArcView shape files or similar format); (2) electronic boundary data that is positionally accurate to ±40 feet; and (3) a text file describing the map projection used for the Exhibit G data. The Exhibit Gs filed with the	The Final License Application for both Projects includes revised Exhibit G maps, in appropriate geo-referenced electronic format.

No.	Commenter	Comment	Response
		DLAs do not include this information; therefore, please file, with the FLAs, Exhibit G maps that provide this information.	
23	FERC 3/17/2022 Letter	Section 4.41(h) of the Commission's regulations require Exhibit G maps to identify by legal subdivision, lands that are owned or planned to be acquired in fee by the applicant, and lands over which the applicant has acquired or plans to acquire rights to occupancy and use (e.g., easement, lease). In the FLAs, please include Exhibit G maps that distinguish lands owned or planned to be acquired in fee by the applicant from those lands over which the applicant has acquired or plans to acquire rights to occupancy and use.	Information required by Section 4.41(h) of the Commissions regulations has been included in Exhibit G for both Projects.
24	FERC 3/17/2022 Letter	Section 4.39 of the Commission's regulations require Exhibit G maps to be stamped by a registered land surveyor and contain true and magnetic norths. Please include the required stamp and both true and magnetic norths on the Exhibit Gs filed with the FLAs.	Exhibit G maps for both Projects have been stamped by a registered land surveyor as required under Section 4.39 of the Commission's regulations.
25	FERC 3/17/2022 Letter	The Exhibit H filed for the projects does not include information on NYPA's need over the short- and long-term for the electricity generated by the projects [section 5.18(c)(1)(i)(B) of the Commission's regulations], the reasonable cost and availability of alternative sources of power [5.18(c)(1)(i)(C)], and a comparison of the impact on the operations and planning of the NYPA's transmission system of receiving or not receiving licenses for the projects [section 5.18(c)(1)(i)(F)]. In addition, Exhibit H lacks a statement of the measures taken or planned by NYPA to ensure the safe management, operation, and maintenance of the projects, as required by section 5.18(c)(1)(ii)(B) of the Commission's regulations. Therefore, in the FLAs, please file an Exhibit H that provides all of the information required by sections 5.18(c)(1)(i)(B), 5.18(c)(1)(i)(C), 5.18(c)(1)(i)(F), and 5.18(c)(1)(ii)(B) of the Commission's regulations.	Exhibit H includes sections that provide information as required under Sections 5.18(c)(1)(i)(B), 5.18(c)(1)(i)(C), 5.18(c)(1)(i)(F), and 5.18(c)(1)(ii)(B) of the Commission's regulations.

No.	Commenter	Comment	Response
New York State Office of Parks, Recreation, and Historic Preservation			
26	NYSOPRHP 12/29/2021 Letter	New York State facilities are directly or indirectly adjacent to the project area include Mohawk River State Park and Rexford Aqueduct State Historic Site. Neither is cited in the Draft License Application.	Exhibit E (Section 4.9) has been revised to clarify that the Mohawk River State Park and Rexford Aqueduct State Historic Site are other public recreation sites that provide direct or indirect access to the Projects.
27	NYSOPRHP 12/29/2021 Letter	The Application does discuss the NYS Canalway's Lock 7 Boat Launch, located within the NYPA project area. It notes that the launch and associated parking lot are not ADA-compliant (p. 142), and that one launch lane is closed due to erosion and settlement of its concrete planks. However, there are no proposed improvements to the launch as part of this relicensing. In addition to boating activities, the Lock 7 Boat Launch parking area is used for parking and trailhead access to the OPRHP Mohawk River State Park and the Mohawk-Hudson Bike Trail. Please consider including appropriate upgrades to this facility as part of the project.	Exhibit E (Section 4.9) has been revised to include a proposal by the Power Authority to prepare a Recreation Management Plan (RMP) for the Projects. Development of this plan would be undertaken in consultation with the agencies and would include any detailed proposals for Project recreation site enhancements or modifications, as suggested by NYSOPRHP.
New York State Department of Environmental Conservation (NYSDEC)			
28	NYSDEC 4/1/2022 Letter	Section 2.1.1 Project Dam: Please describe the substrate of the bottom of the headrace channel.	Exhibit A (Section 2.1.1) for both Projects has been revised to include additional description of the substrate in each of the Project's headrace channels.
29	NYSDEC 4/1/2022 Letter	Table 2-2: Please include the Turbine Design Head with and without flashboards	Exhibit A (Table 2-2) for both Projects have been updated to include information on turbine design head. The turbines at both Projects have a design head of 28 ft. without flashboards; add 2.25 ft. for Vischer Ferry and 1 ft. for Crescent with flashboards.
30	NYSDEC 4/1/2022 Letter	Section 3.3 Project Hydrology; it is unclear why only 10 years of flow data (January 2011 to December 2020) is being used. Please provide reasoning.	The flow duration curves and flow statistics included in Exhibit B (Section 3.3) for each Project have been revised based on a period of record of 30 years of USGS gage data (prorated based on drainage area). These same 30-year

No.	Commenter	Comment	Response
			USGS gage-based flow duration curves are included and discussed in Exhibit E (Section 4.4).
31	NYSDEC 4/1/2022 Letter	Section 3.1.3 Project Operations, Crescent Project, page 14 states, after describing the minimum flow regime for the project, that "these flows are for fish protection measures." This seems contradictory to the statement above which indicates that the minimum flows provide are for navigation, please clarify.	Exhibit E (Section 3.1.3) has been revised to clarify the purposes of the minimum flows provided at each of the Projects. During the fish passage season, the required minimum flows are provided primarily though openings in the flashboards which are provided for purposes of facilitating safe passage of downstream migrating blueback herring. Other fish species may also utilize the flashboard openings.
32	NYSDEC 4/1/2022 Letter	Section 4.1 Cumulation effects state "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". It's unclear from this statement if FERC will conduct its NEPA analysis. Please clarify if FERC is proposing to conduct its NEPA analysis considering water quality and diadromous fishes cumulative impacts including direct, indirect and cumulative?	As noted by NYSDEC, FERC's Scoping Document 2 indicates that water quality and diadromous fishes are resources that have the potential to be cumulatively affected by the continued operation of the Projects. Accordingly, it is anticipated that Commission staff will appropriately analyze the cumulative effects on these resources in the National Environmental Policy Act (NEPA) document that will be prepared for the Crescent and Vischer Ferry Projects.
33	NYSDEC 4/1/2022 Letter	Section 4.4.1.1.2 It's unclear why the Applicant is using only 10 years' worth of data for determining annual monthly minimum, mean, and maximum flows. Please clarify if more data is available. If so that should be included in the FLA so there is a longer period of record.	See response to Comment 29.
34	NYSDEC 4/1/2022 Letter	On Page 68, the applicant states that "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". In the previous sentence the applicant states that "both of the brief excursions below	Exhibit E (Section 4.4) has been revised to clarify that much of the aquatic vegetation in the Project impoundments is non-native water chestnut. Based on dissolved oxygen (DO) sampling conducted by the Power Authority in

No.	Commenter	Comment	Response
		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." Please revise this statement to make a distinction between native aquatic plants and invasive aquatic plants. Water chestnut, an invasive out competes submergent and emergent native plants. NYSDEC suggests that a discussion of invasive species management and an aquatic invasive species control plan be included in the FLA to address the effects of water chestnut on DO levels in the project area.	the impoundments in 2021 it appears that water chestnut may have an influence on both impoundment and headrace DO concentrations. However, the 2021 study was limited in scope and was not designed to provide information on the full effects of water chestnut on impoundment water quality. To the extent allowed, the effects of water chestnut on impoundment DO levels are discussed briefly in the Revised Study Plan (RSP) and in Exhibit E.
35	NYSDEC 4/1/2022 Letter	On Page 77 The eel study only targeted juvenile eels migrating up the Mohawk River but it did not target mature eels moving down the Mohawk River. Other methods could have been implemented to target mature eels.	The RSP for the eel study and associated methodologies were developed in consultation and concurrence with the NYSDEC and United States Fish and Wildlife Service (USFWS). Exhibit E (Section 4.5) has been revised to include the results of the 2021 eel study and includes some discussion of the sampling methods used. More detailed discussion of study methods is provided in the Updated Study Report (USR) filed with the Commission on February 17, 2022.
36	NYSDEC 4/1/2022 Letter	Page 85 states " 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." Please confirm that the 96 % survival is for the turbine and 88% is over the spillway.	The statement in the DLA Exhibit E is correct. The Power Authority's 2020 blueback herring study found that previous study estimated juvenile blueback herring survival to be 96±6.7% through a Kaplan turbine and 88.3±10.7% over a spillway associated with a low-head hydro dam.
37	NYSDEC 4/1/2022 Letter	On page 90 the applicant states that they found freshwater mussels during their 2020 mesohabitat study. A drawdown management plan / freshwater mussel protection plan should be included in the FLA to ensure that the mussel communities are not affected by drawdowns and fluctuations caused by the projects.	The Crescent and Vischer Ferry Projects are operated as run-of-river, and therefore not subject to any routine drawdown of the impoundments. The elevation of impoundment waters changes twice yearly with the installation

No.	Commenter	Comment	Response
			and removal of the Project flashboards (27 inches at Vischer Ferry and 1 foot at Crescent) which aid canal navigation. During installation and removal of the flashboards, the impoundments are drawn down briefly to facilitate safe work at the dams. Otherwise, there are no routine drawdowns of the impoundments and fluctuations are limited.
38	NYSDEC 4/1/2022 Letter	On Page 91 "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." Dams certainly effect the migration of eels upstream and downstream and are a major reason why eels are not seen in their historic ranges. The statement made by the applicant claiming that our study shows that "the projects have no adverse effects on American Eels" is false. There is evidence of eels upstream of the projects, and the applicant indicates that "data support that while American eel are likely in the vicinity of the Projects, they are uncommon" (page 81 Exhibit E). In general, dams are detrimental to eel migration. Crescent and Vischer Ferry dams aren't the first impassable barriers on the Mohawk River so there aren't large groups of eels trying to climb these facilities, like there are at the Federal Dam in Troy, but an eel ramp is being installed at the Federal dam in Troy in order to get more eels above the dam. This means there will be more eels trying to migrate within the Mohawk river system in the future. Please modify the statement regarding no adverse effects.	Comment noted. The License Application specifically pertains to the Crescent and Vischer Ferry Projects. It does not pertain to the effects of dams on American eel in general or the effects of the three Mohawk River Dams downstream of Crescent. All data, including the site-specific eel study conducted by the Power Authority and the data from other fisheries sampling conducted by others, including the NYSDEC, indicate that eels are present in very low numbers. More recent USGS eDNA study results also suggest eels are present at the Crescent and Vischer Ferry Projects in very low numbers. Because eels are currently uncommon at the Projects, the Projects have no adverse effects on American eel population.
39	USFWS 5/4/2022 Letter	USFWS provided information on the status of 2021 American Eel eDNA survey work completed by USGS in the Mohawk and Hudson Rivers.	Exhibit E (Section 4.5) has been revised to include a summary of the eDNA data.

Appendix C – Coastal Zone Management Act – New York State Department of State Concurrence

From: McLean, Laura (DOS) [mailto:Laura.McLean@dos.ny.gov]
Sent: Thursday, May 23, 2019 3:33 PM
To: Slade, Mark <Mark.Slade@nypa.gov>
Subject: RE: Crescent (P-4678) and Vischer Ferry (P-4679) Hydroelectric Projects NOI and PAD FERC Filings

Mr. Slade,

From the information received, it does not appear that the proposed projects are located within New York State's coastal area. Regardless of a particular project's physical location, it is the applicant's responsibility as part of any federal permit or relicensing process to determine if the proposed action with have reasonably foreseeable adverse effects of the State's coastal resources and uses. Based on the information received to-date, the Department of State does not expect this to be the case. You may remove the Department of State from further correspondence regarding these proceedings.

Sincerely,
Laura McLean
Coastal Energy Review Specialist
NYS Coastal Management Program
Consistency Review Unit, Office of Planning, Development & Community Infrastructure

New York Department of State
O: (315) 235-0351 | Laura.McLean@dos.ny.gov
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Sent: Friday, May 03, 2019 10:54 AM
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Subject: Crescent (P-4678) and Vischer Ferry (P-4679) Hydroelectric Projects NOI and PAD FERC Filings

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Good morning-

On Friday, May 3rd, the New York Power Authority filed with FERC the Notice of Intent to File and Pre-Application Document for the Crescent Hydroelectric Project (FERC No. 4678) and the Notice of Intent to File and Pre-Application Document for the Vischer Ferry Hydroelectric Project (FERC No. 4679). These documents were filed electronically with the FERC and can downloaded using the links provided below:

CRESCENT (P-4678) – https://protect2.fireeye.com/url?k=bf624719-e3474b7a-bf60be2c-0cc47aa88e08-2ded92c9d0a8cd3f&u=https://nam01.safelinks.protection.outlook.com/?url=http%3A%2F%2Felibrary.ferc.gov%2Fidmws%2Ffile_list.asp%3Faccession_num%3D20190503-5034&data=02%7C01%7Cmblair%40trccompanies.com%7C98c8f4c535a24aa0830408d6cfd5883e%7C543eaf7b7e0d4076a34d1fc8cc20e5bb%7C0%7C0%7C636924913353196141&sdata=b%2F3ym1i6F8FvNnXfSR8HvXS%2BhkNORI9tD7ifFF6KOI8%3D&reserved=0

VISCHER FERRY (P-4679) - https://protect2.fireeye.com/url?k=0a0ce13b-5629ed58-0a0e180e-0cc47aa88e08-69b06d7703e6cb32&u=https://nam01.safelinks.protection.outlook.com/?url=http%3A%2F%2Felibrary.ferc.gov%2Fidmws%2Ffile_list.asp%3Faccession_num%3D20190503-5035&data=02%7C01%7Cmblair%40trccompanies.com%7C5ce03833673647f8af8d08d6cfd58a3a%7C543eaf7b7e0d4076a34d1fc8cc20e5bb%7C0%7C0%7C636924913387859985&sdata=ozis3svhYKk0HYtNXT%2B2i%2F9pJIpK2az7oQq%2BkeOB4jk%3D&reserved=0

If there are any questions or comments regarding this filing please contact Mark Slade,

Licensing Director by phone at (914) 681-6659 or by email at Mark.Slade@nypa.gov.

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