ENVIRONMENTAL ASSESSMENT
FOR
HYDROPOWER LICENSE

Upper Mechanicville Hydroelectric Project
FERC Project No. 2934-029
New York

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
Washington, D.C. 20426

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ACRONYMS AND ABBREVIATIONS

APE	area of potential effects
ASMFC	Atlantic States Marine Fisheries Commission
Canal Corporation	New York State Canal Corporation
certification	water quality certification
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CRIS	Cultural Resource Information System
DO	dissolved oxygen
EA	environmental assessment
ESA	Endangered Species Act
ºF	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
fps	feet per second
FWS	U.S. Fish and Wildlife Service
HPMP	historic properties management plan
Interior	U.S. Department of the Interior
IPaC	Information for Planning and Conservation system
kW	kilowatt
mg/L	milligrams per liter
MW	megawatt
MWh	megawatt-hour
National Register	National Register of Historic Places
New York DEC	New York State Department of Environmental Conservation
New York SHPO	New York State Historic Preservation Office
NERC	North American Electric Reliability Corporation
NHPA	National Historic Preservation Act
NYSEG	New York State Electric and Gas Corporation
PA	Programmatic Agreement
REA	Ready for Environmental Analysis
RM	river mile
ROR	run-of-river
SD	Scoping Document
TU	New York State Council of Trout Unlimited
USGS	U.S. Geological Survey

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission
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Washington, D.C.

Upper Mechanicville Hydroelectric Project
FERC Project No. 2934-029 – New York

1.0 INTRODUCTION

1.1 APPLICATION

On April 1, 2019, New York State Electric and Gas Corporation (NYSEG) filed an application for a new license with the Federal Energy Regulatory Commission (Commission or FERC) to continue operating the 16.53-megawatt (MW) Upper Mechanicville Hydroelectric Project No. 2934 (Upper Mechanicville Project or project).[1,2] The project is located on the Hudson River, in Saratoga and Rensselaer Counties, New York (figure 1). The Upper Mechanicville Project generates an average of 88,537 megawatt-hours (MWh) of energy annually. The project does not occupy federal land. NYSEG proposes no changes to the project's capacity.

[1] An original license for the project was issued on April 23, 1981, for a term of 40 years, with an effective date of April 1, 1981, and an expiration date of March 31, 2021. *See New York State Electric & Gas Corporation*, 15 FERC ¶ 61,066 (1981).

[2] The Order Amending License and Denying Competing Applications for License issued on December 18, 1985 authorized an installed capacity of 18.5 MW. However, as indicated in Exhibit A of the final license application, the current actual installed capacity at the project is 16.53 MW, which is the lesser of the sum of the generator capacities (16.53 MW) and the turbine capacities (19.17 MW) (i.e., the project is generator-limited).

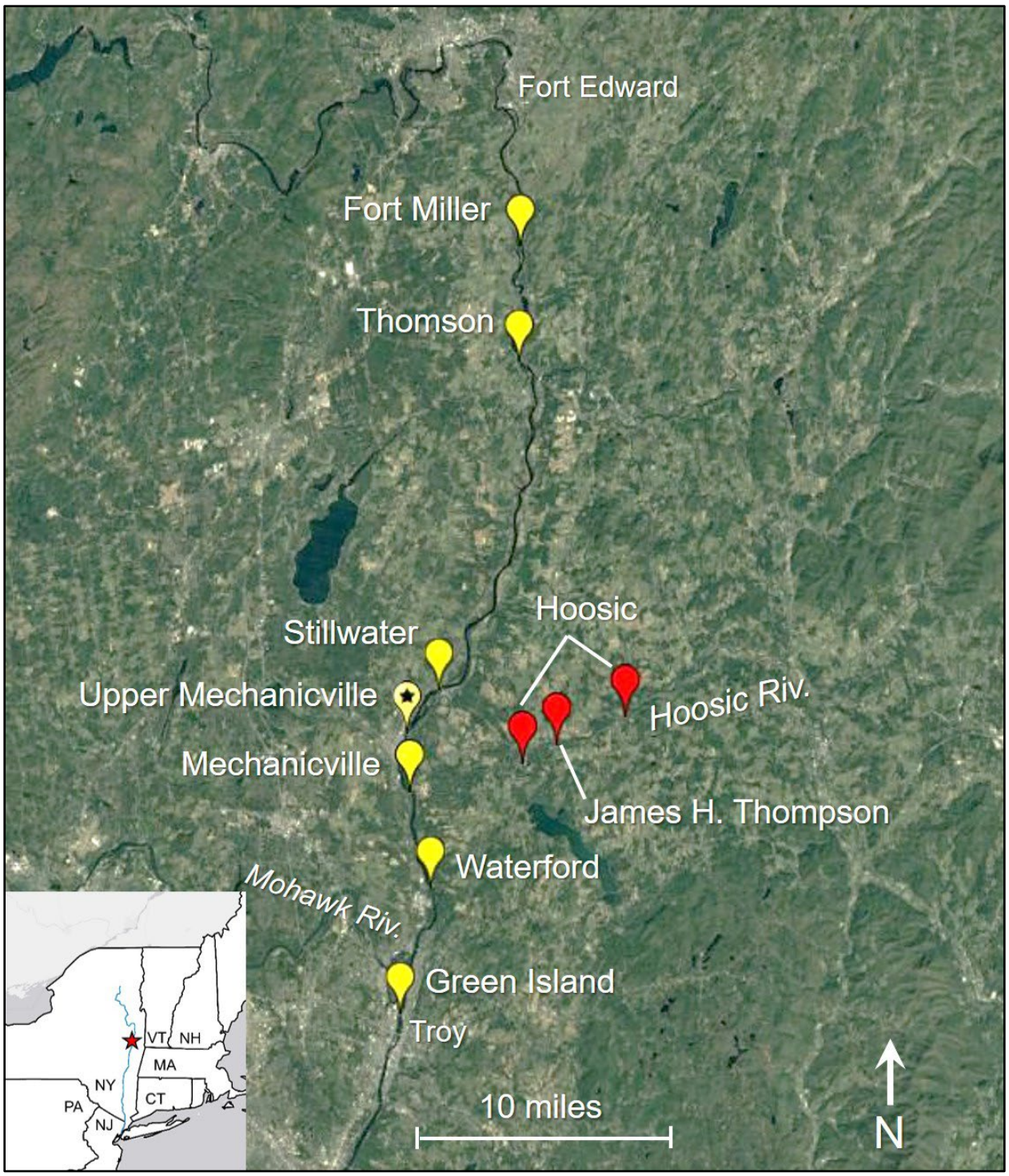

Figure 1: Dams in the vicinity of the Upper Mechanicville Project. Lock and dams are represented by yellow symbols and dams without locks as red symbols (Source: staff).

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the Upper Mechanicville Project is to provide a source of hydroelectric power. Therefore, under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a new license for the project and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, or water supply), the Commission must give equal consideration to the purposes of: (1) energy conservation; (2) the protection of, mitigation of damage to, and enhancement of fish and wildlife resources; (3) the protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

Issuing a new license for the Upper Mechanicville Project would allow NYSEG to continue to generate electricity at the project for the term of a new license, making electric power from a renewable resource available to its customers.

This environmental assessment (EA) has been prepared in compliance with the National Environmental Policy Act of 1969 to assess the environmental and economic effects associated with operation of the project, alternatives to the project, and makes recommendations to the Commission on whether to issue a new license, and if so, recommends terms and conditions to become a part of any license issued for the project.

In this EA, we assess the environmental and economic effects of: (a) continued project operation as proposed in the application and as specified in the Upper Mechanicville Hydroelectric Project Offer of Settlement[3] (Settlement Agreement) (proposed action); (b) the proposed action with additional or modified measures (staff alternative); and (c) no action. Both agencies with mandatory conditioning authority in this license proceeding, the U.S. Department of the Interior's (Interior) Fish and Wildlife Service (FWS) and the New York State Department of Environmental Conservation (New York DEC), are signatories on the Settlement Agreement. Several of the environmental measures proposed in the Settlement Agreement differ materially from the preliminary fishway prescription filed by Interior, prior to the Settlement Agreement, on January 27, 2020. Although the letter filed by FWS on April 21, 2020 indicates that its

[3] On April 8, 2020, NYSEG filed the Upper Mechanicville Hydroelectric Project Offer of Settlement (Settlement Agreement), on behalf of itself, the U.S. Fish and Wildlife Service, New York State Department of Environmental Conservation, and New York State Council of Trout Unlimited. NYSEG states the Settlement Agreement serves as an amendment to its final license application filed on April 1, 2019.

modified fishway prescription will be consistent with the Settlement Agreement (see below, section 1.3.1.1, *Section 18 Fishway Prescriptions*), the mandatory conditions that the licensee would be subject to are largely unknown at this time (i.e., until the modified mandatory prescriptions are filed after issuance of this EA). For these reasons, we do not include in this EA a staff alternative with mandatory conditions. If the final mandatory conditions (i.e., modified section 18 fishway prescriptions and water quality certification conditions) differ from the measures contained in the Settlement Agreement (analyzed herein), the effects of such differences will be discussed and analyzed in any license order issued for the project. The primary issues associated with relicensing the Upper Mechanicville Project are fish passage (for American eel and blueback herring) and the effects of navigation-related impoundment drawdowns on aquatic habitat and fish spawning.

1.2.2 Need for Power

The North American Electric Reliability Corporation (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Upper Mechanicville Project is located in the Northeast Power Coordinating Council (NPCC)-New York region of NERC. According to NERC's 2019 forecast (NERC, 2019), annual total internal peak demand is expected to range between 31,068 MW and 32,202 MW during the 10-year forecast period from 2020 through 2029. Although NERC projects anticipated reserve capacity margins (generating capacity in excess of demand) in the region to range from 22.66 percent to 27.18 percent of peak demand during this same period, the project's power will continue to meet part of existing load requirements within the system as well as maintain the stability of the power system. In addition, the 2015 New York State Energy Plan sets forth a goal for the state utilities to source 50 percent of their electric generation from renewable energy sources by 2030, so power from the Upper Mechanicville Project would also help meet the renewable energy goal of the state.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

Any license for the Upper Mechanicville Project is subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described in the following sections.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require the construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretary of the U.S. Department of Commerce or the Secretary of the Interior. On January 27, 2020, Interior timely filed preliminary fishway prescriptions for the project

and requested that the Commission include a reservation of authority to prescribe fishways under section 18 of the FPA in any license issued for the project.

The Settlement Agreement was filed on April 8, 2020, after Interior's preliminary fishway prescriptions were filed. As discussed above, FWS is a signatory to the Settlement Agreement and several of the measures relating to fish passage in the Settlement Agreement differ materially from Interior's preliminary fishway prescriptions. In its comments on the Settlement Agreement, filed April 21, 2020, FWS acknowledged these differences and stated that it will file a modified fishway prescription under section 18 of the FPA that is consistent with the Settlement Agreement at the "appropriate point" in the Commission's relicensing process, which we interpret to mean no later than 60 days after the comment deadline on this EA pursuant to section 5.24(d) of the Commission's regulations. Therefore, for the purposes of this EA, we consider the Settlement Agreement to reflect FWS's current recommended measures for the project rather than its previously filed preliminary fishway prescriptions, and only analyze herein the measures contained in the Settlement Agreement.

1.3.1.2 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

On January 27, 2020, Interior timely filed three recommendations under section 10(j). In its comments on the Settlement Agreement, filed April 21, 2020, FWS states that the measures in the Settlement Agreement supersede its original 10(j) recommendations. The current 10(j) recommendations are summarized in table 9, in section 5.3, *Fish and Wildlife Agency Recommendations.* In section 5.3, we also discuss how we address agency recommendations and comply with section 10(j).

1.3.2 Clean Water Act

Under section 401(a)(1) of the Clean Water Act, a license applicant must obtain either a water quality certification (certification) from the appropriate state pollution control agency verifying that any discharge from a project would comply with applicable provisions of the Clean Water Act, or a waiver of certification by the appropriate state agency. The failure to act on a request for certification within a reasonable period of time, not to exceed one year, after receipt of such request constitutes a waiver.

On January 24, 2020, NYSEG applied to the New York DEC for a section 401 certification for the Upper Mechanicville Project. New York DEC received the application on January 27, 2020.[4] New York DEC has not yet acted on the certification request.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of such species. On January 30, 2020, Commission staff requested an official species list for the project through FWS's Information for Planning and Conservation (IPaC) system.[5] Although no federally listed species are presently known to occur within the project boundary, the project is located within the range of the threatened northern long-eared bat, and both Interior's January 27, 2020, letter and section 2.10 of the Settlement Agreement indicate that this species could occur within the project impact area. Additionally, Interior stated that "[b]ased on the measures…included in the [Northern Long-eared Bat Management Plan], any take that may occur incidental to this project is not prohibited under the final 4(d) rule. No further ESA coordination or consultation will be required if the NLEBMP is approved by the Service." The Northern Long-eared Bat Management Plan was included in the Settlement Agreement filed on April 8, 2020.

An analysis of project effects on the northern long-eared bat is presented in section 3.3.3, *Threatened and Endangered Species*, and staff's recommendations are included in section 5.1, *Comprehensive Development and Recommended Alternative*. Based on the available information, we conclude that relicensing the project, with NYSEG's proposed Northern Long-eared Bat Management Plan filed with the Settlement Agreement, may affect the northern long-eared bat, but any incidental take that may result from these activities is not prohibited under the final 4(d) rule. Therefore, no further consultation under the ESA is required regarding the northern long-eared bat.

1.3.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 United States Code (U.S.C.) § 1456(3)(A), 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,

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[4] On January 27, 2020, the applicant filed a copy of the certification request and receipt of delivery to New York DEC.

[5] *See* official species list memorandum, filed February 3, 2020.

or the agency's concurrence is conclusively presumed by its failure to act within 6 months of its receipt of the applicant's certification.

In an e-mail dated September 14, 2015, and filed with NYSEG's license application, the New York State Department of State indicates that the Upper Mechanicville Project is not located within New York State's coastal area and that it does not anticipate the need for a consistency review because project effects on the coastal zone are unlikely.

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA), 54 U.S.C. § 306108, requires that a federal agency "take into account" how its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

Commission staff designated NYSEG as its non-federal representative for the purposes of conducting section 106 consultation under the NHPA on May 16, 2016. NYSEG consulted with the New York State Historic Preservation Office (SHPO) and potentially affected tribes to identify historic properties and to assess potential adverse effects on historic properties within the project's area of potential effects (APE). NYSEG conducted a Phase 1A Archaeological Survey as part of its Cultural Resources Study for this relicensing. Two historic properties listed on the National Register were found within the APE. The results of the investigation indicate that continued project operation is not likely to affect cultural resources in the APE but that a historic properties management plan (HPMP) would provide proper guidance if archaeological discoveries were made during future project improvement activities. In a letter dated February 16, 2018, and filed with the final license application, the New York SHPO agrees with NYSEG's recommendation to develop an HPMP. To address potential effects to historic properties identified within the APE, NYSEG proposes to develop an HPMP within 12 months of any new license issued for the project. The HPMP would direct the long-term management of historic properties and archaeological sites within the APE, including measures to avoid, minimize, or mitigate adverse effects on historic properties throughout the term of a new license.

To meet the requirements of section 106, the Commission intends to execute a Programmatic Agreement (PA) with the New York SHPO for the protection of historic properties within the project's APE from the effects of continued operation and maintenance of the Upper Mechanicville Project. The terms of the PA would ensure that NYSEG addresses and treats any adverse effects to historic properties identified within the APE through the development of an HPMP.

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations, 18 Code of Federal Regulations (C.F.R.) § 4.38, require that applicants consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, ESA, NHPA, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

1.4.1 Scoping

Before preparing this EA, we conducted scoping to determine what issues and alternatives should be addressed. We issued an initial scoping document (SD1) on May 16, 2016. It was noticed in the *Federal Register* on May 20, 2016.[6] The following entities provided written comments:

Commenting Entity	Date Filed
FWS	July 8, 2016
New York DEC	July 13, 2016
NYSEG	July 14, 2016

A revised scoping document was issued on August 9, 2016.

1.4.2 Interventions

On May 28, 2019, the Commission issued a notice accepting NYSEG's license application. The notice set July 29, 2019, as the deadline for filing motions to intervene and protests and requests for cooperating agency status.[7] The following entities filed notices of intervention or motions to intervene (none in opposition to the project).

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[6] 81 Fed. Reg. 31927.

[7] The Commission's Rules of Practice and Procedure provide that if a filing deadline falls on a Saturday, Sunday, holiday, or other day when the Commission is closed for business, the filing deadline does not end until the close of business on the next business day. *See* 18 C.F.R. § 385.2007(a)(2) (2019). Because the 60-day intervention deadline fell on a Saturday (i.e., July 27, 2019), the filing deadline was extended until the close of business on Monday, July 29, 2019.

Entity	Date Filed
Albany Engineering Corporation	June 6, 2019
New York DEC	July 5, 2019
Interior	July 5, 2019
New York State Canal Corporation (Canal Corporation)	July 25, 2019
Gravity Renewables, Inc.	July 31, 2019*
New York State Council of Trout Unlimited	December 3, 2019**

*Late intervention denied on August 29, 2019.
** Late intervention granted on February 12, 2020.

1.4.3 Comments on the License Application

On November 29, 2019, the Commission issued a Ready for Environmental Analysis (REA) notice requesting comments, recommendations, preliminary terms and conditions, and preliminary prescriptions. The following entities commented:

Entity	Date Filed
NYSEG	December 10, 2019
Interior	January 27, 2020

1.5 SETTLEMENT AGREEMENT

On April 8, 2020, NYSEG filed a Settlement Agreement on behalf of itself, FWS, New York DEC, and the New York State Council of Trout Unlimited (TU). Commission staff issued public notice of the Settlement Agreement on April 10, 2020, establishing an April 30, 2020 deadline to file comments and a May 11, 2020 deadline to file reply comments. As described above, FWS filed comments on April 21, 2020 in support of the Settlement Agreement. No other entities commented.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement (PM&E) measures would be implemented. We use this

alternative to establish baseline environmental conditions for comparison with other alternatives.

2.1.1 Existing Project Facilities

The Upper Mechanicville Project is located on the Hudson River at river mile (RM) 167 in Saratoga and Rensselaer Counties, New York. The project facilities are shown in figure 2.

The project dam is an approximately 700-foot-long concrete gravity dam with a nominal crest elevation of 80.0 feet[8] for the non-overflow structures. The dam has three spillway bays, each of which extends 222 feet across the length of the dam and are separated by 7.5-foot to 10.5-foot-wide concrete piers. Each spillway bay has a crest elevation of 66.6 feet and contains a 222-foot-wide by 6-foot-high pneumatically operated Obermeyer crest gate. The project impoundment is 1.8 miles long and has a surface area of 380 acres and a gross storage capacity of 10,735 acre-feet at a typical normal pool elevation of 72.6 feet (i.e. at the top of the fully raised gates). The impoundment has a maximum depth of around 20 feet.

The intake channel leading to the powerhouse has two reinforced guide walls and three 35-foot-diameter cellular cofferdam walls constructed of sheet piling. An intake bypass sluice gate (sluice gate, hereafter) is located on the east guide wall of the intake channel immediately upstream of the project's intake. The sluice gate is 20 feet wide and 16.5 feet deep at the gate sill, and has a 7.5-foot-high gate that is operated with a double-stem overhead hoist. The sluice gate is used to pass ice and debris downstream of the dam; discharge from the sluice gate flows parallel to the spillway (figure 2).

The powerhouse is 151.5 feet long and 122 feet wide and contains two 12,780-horsepower [or 9,585-kilowatt (kW)] vertical Kaplan turbines and two Siemens-Allis generators each having a rated capacity of 8,265 kW. The trash racks covering the intakes have a clear spacing of 5.5 inches.

[8] All elevation values reported herein are referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

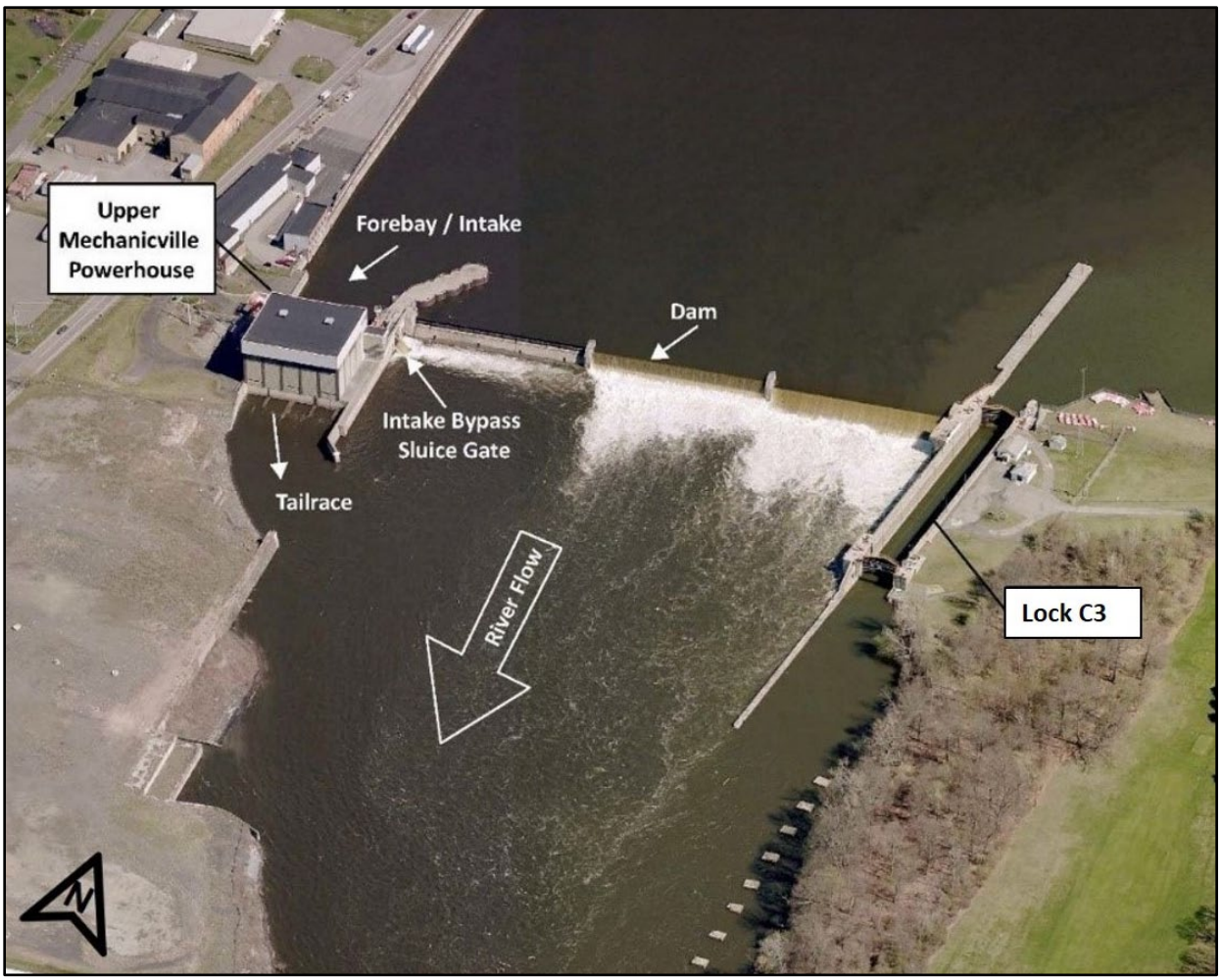

Figure 2. Project facilities at the Upper Mechanicville Project (Source: license application, as modified by staff).

The excavated tailrace channel is 1,200 feet long, 120 feet wide, and contains a bi-level bottom[9] that is designed to minimize cross-currents to reduce the effects of the project on navigation. Two guide walls are present along the uppermost 330 feet (west side) and 120 feet (east side) of the tailrace channel (figure 2).

[9] The bi-level bottom refers to the sloped bottom of the riverbed (3.5 feet higher on the east side) to guide flows exiting the powerhouse away from the navigation lock to minimize cross-currents, which can negatively affect navigation, namely vessel maneuverability in the vicinity of Lock C3. For more information on the bi-level bottom, see the Application for Amendment to License filed by NYSEG on June 7, 1982.

Project power is transmitted through a 1.10-mile-long, 34.5-kilovolt transmission line that interconnects with the grid at NYSEG's Mulberry Substation located in the town of Stillwater, New York.

Lock C3 of the Champlain Canal is located on the east side of the project dam opposite the powerhouse (figure 2).[10] The lock is owned and operated by the Canal Corporation. The lock chamber is 330 feet long and can accommodate barges up to 45 feet wide and approximately 320 feet long. The lock includes upstream and downstream approach walls, as well as upstream and downstream miter gates. Filling and emptying the lock has a negligible effect on the impoundment elevation and occurs by valve-controlled gravity flow. Although the upstream miter gates are the primary water retaining feature of the lock because they are typically in a closed position, the downstream miter gates also serve to maintain the impoundment at times. For instance, for a vessel to pass upstream through the locks, the upstream miter gates must be opened, during which time the downstream miter gates remain closed and maintain the impoundment. As such, the entire navigation lock, including both miter gates, is necessary to maintain the impoundment and is integral to the project and its operation.

2.1.2 Current Project Boundary

The current project boundary for the Upper Mechanicville Project encloses approximately 387 acres and includes the dam, impoundment (to an elevation of 72.6 feet), powerhouse, an upstream portion of Lock C3 (i.e., that portion upstream of the project dam), transmission line corridor, and appurtenant facilities. NYSEG holds title or rights to all lands within the project boundary. There are no project recreation facilities required pursuant to the current license or included within the project boundary.

2.1.3 Project Safety

The Upper Mechanicville Project has been operating for more than 37 years under the current license issued in 1981. During this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency, and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the project has been inspected and evaluated every 5 years by an independent consultant, and a consultant's safety report has been submitted for Commission review.

As part of the relicensing process, Commission staff will evaluate the continued adequacy of the proposed project facilities under a new license. Special articles will be

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[10] The Champlain Canal is part of the New York State Canal System, which also includes the Erie, Oswego, and Cayuga-Seneca Canals. The project is located on a portion of the Champlain Canal that is confluent with the mainstem Hudson River.

included in any license issued, as appropriate. Commission staff would continue to inspect the project during the new license term to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

2.1.4 Current Project Operation and Environmental Measures

Project operation differs between the 'navigation' and 'non-navigation' seasons on the Champlain Canal. The opening and closing dates of the navigation season are set by the Canal Corporation. Historically, the navigation season ran from early May through mid- to late-November. However, since 2017, the navigation season has been shorter, from mid-May through mid-October; this shortened navigation season will continue at least through 2021.[11] The non-navigation season refers to the portion of the year (mid-October through mid-May) when the Champlain Canal is closed to boat traffic and its navigation locks are not operating.

During the non-navigation season, the project is operated in a run-of-river (ROR) mode, with project outflow approximating project inflow, to maintain the impoundment at an elevation of 72.6 feet. Impoundment elevations are maintained by the project's microprocessor-based control system, which adjusts turbine flow as necessary to maintain the target impoundment elevation. The project is operated remotely from NYSEG's Energy Control Center in Vestal, New York, but NYSEG staff typically visit the project two to three times per week.

During the navigation season, NYSEG adjusts the water levels of the impoundment, as directed by the Canal Corporation, to support navigation.[12] A low-clearance railroad bridge spans the project impoundment 3,100 feet upstream of the project dam. Some vessels cannot pass underneath this bridge when the impoundment is at its full pool elevation of 72.6 feet (or 72 inches above the dam crest). Therefore, upon request from the Canal Corporation, NYSEG lowers the impoundment to allow boats to pass underneath the bridge; the impoundment is often drawn down to an elevation of 70.8 feet (50 inches above the dam crest), and less frequently to an elevation of 69.1 feet (30 inches above the dam crest). There are generally multiple lockages per day at Lock C3. For instance, from 2015 through 2018, there were, on average, 4 to 10 vessel lockages

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[11] http://www.canals.ny.gov/boating/hours.html; http://www.canals.ny.gov/news/pressrel/2018/Canal-Directors-Approve-Three-Year-Waiver-of-Recreational-Boat-Tolls.html

[12] *See* Agreement between New York State Electric & Gas Corporation and New York State Department of Transportation, filed on August 25, 1983, Accession No. 19830831-0551.

per day during the navigation season. On days when the impoundment needs to be lowered for navigation purposes, the impoundment is typically drawn down and maintained at the level needed to support navigation for several hours during the day, after which time the impoundment is raised to its prior elevation (figures 3 and 4). Therefore, during the navigation season, the project is not operated in an instantaneous ROR mode of operation, in the strict sense, because there are times when project outflow exceeds inflow (when the impoundment is being lowered) and when project inflow exceeds outflow (when the impoundment is being refilled).

Typically, there is only one drawdown-refill cycle per day during the navigation season, but on some days the impoundment may be drawn down and refilled more than once for navigation purposes (figures 3 and 4). Navigation-related impoundment drawdowns are accomplished by lowering, and spilling water over, the project's pneumatic crest gates, at a rate not exceeding 26 inches per hour. To refill the impoundment following drawdowns, flow through the turbines is reduced (below project inflows) in a manner that allows impoundment levels to raise slowly (at a rate not exceeding 6 inches per hour) while ensuring the continuity of downstream flow in the Hudson River via turbine discharge. Based on over 30 years of joint operation of the project and Lock C3, these rates of impoundment drawdown (not exceeding 26 inches per hour) and refill (not exceeding 6 inches per hour) provide the responsiveness needed by the Canal Corporation to coordinate the in-sequence lockages necessary to facilitate the passage of boat traffic through the Champlain Canal (i.e., boats moving both upstream and downstream through Locks C2, C3, and C4).

Maximum impoundment drawdowns (to the dam crest, or an elevation of 66.6 feet), are rarely needed for navigation purposes and are generally reserved for routine maintenance and repairs. Occasionally during the navigation season, the impoundment level needs to be raised (by reducing the flow through the project) to facilitate the passage of deep draft vessels.

During the navigation season, the project operates to the extent that generation does not interfere with the ability to maintain the pool levels deemed necessary for navigation by the Canal Corporation. When the project is operating, flows in excess of those needed to support navigation enter the intake channel, pass through the powerhouse, and are discharged downstream into the tailrace. During normal and low-flow conditions, the project is operated such that the pneumatic crest gates in two of the three spillway bays are in the fully raised position, with the top of the third crest gate set approximately 3 inches above the desired impoundment elevation.[13] This allows the project to start spilling shortly after a station trip to ensure the continuity of downstream

[13] The gate straps on the pneumatic crest gates allow the top of the gates to travel to an elevation of 72.8 feet (or 74 inches above the dam crest).

flow. If the available flows are below the minimum hydraulic capacity of the project [1,200 cubic feet per second (cfs)], the turbines are taken offline and the crest gates are adjusted to maintain the target impoundment elevation (i.e., 72.6 feet in the non-navigation season or as directed by the Canal Corporation during the navigation season). When inflows exceed the project's maximum hydraulic capacity (12,000 cfs), the pneumatic crest gates are used to spill flows in excess of those needed to maintain the target impoundment elevation. During the non-navigation season, spill is generally released through the spillway bay adjacent to the powerhouse. However, during the navigation season, spill is preferentially released through the spillway bay nearest the navigation lock to minimize cross currents.[14]

[14] Spilling water over the crest gate farthest away from the navigation lock (through the spillway bay adjacent to the powerhouse) can create eastward flowing cross currents that negatively affect the maneuverability of vessels using the lock.

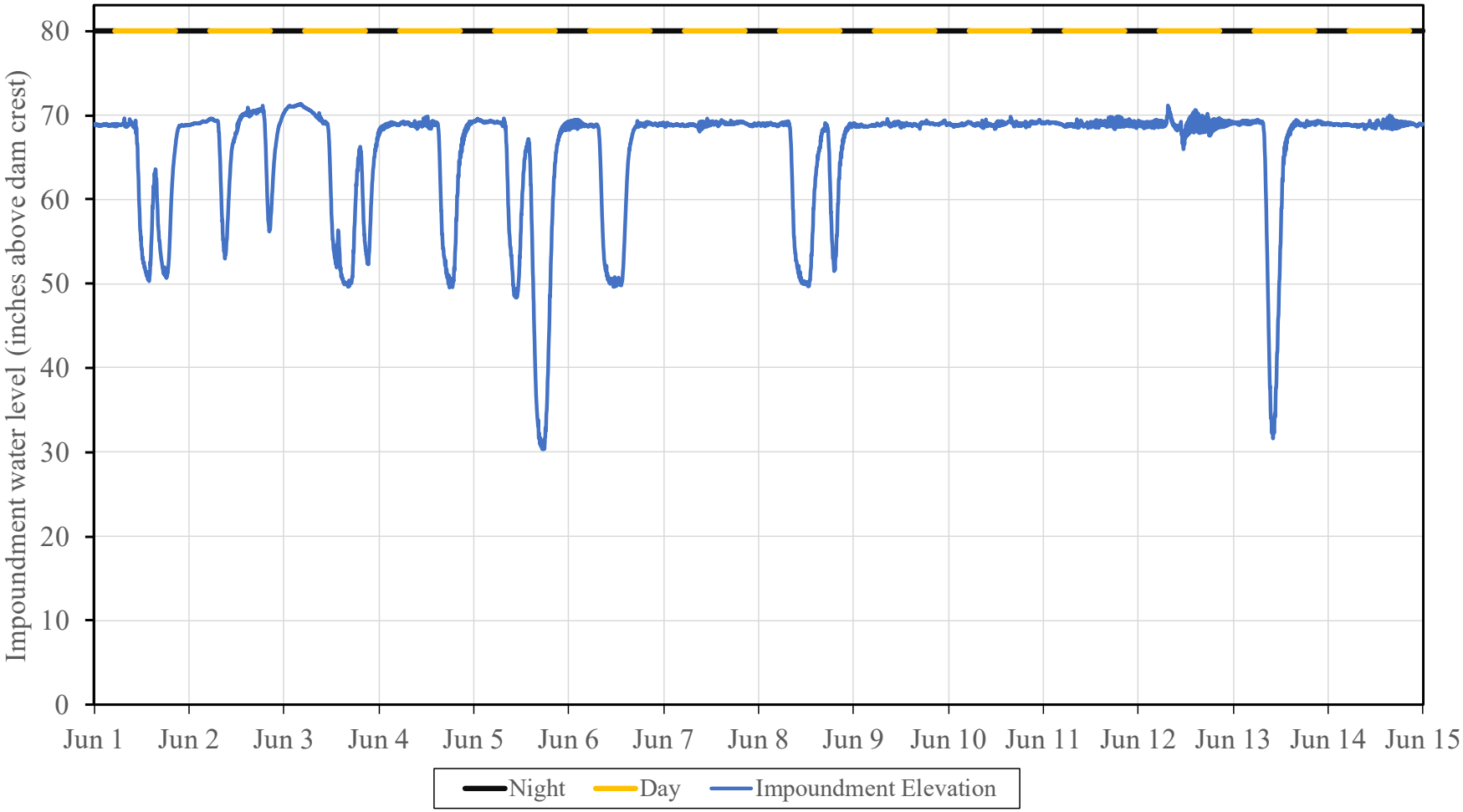

Figure 3. Continuously recorded impoundment water levels (inches above the dam crest) during a period (June 1, 2004 through June 14, 2004) representative of normal project operation during the navigation season. The blue line shows water levels, and the alternating orange and black bars across the top of the plot represent daytime and nighttime periods, respectively, based on local sunrise and sunset times (Source: staff).

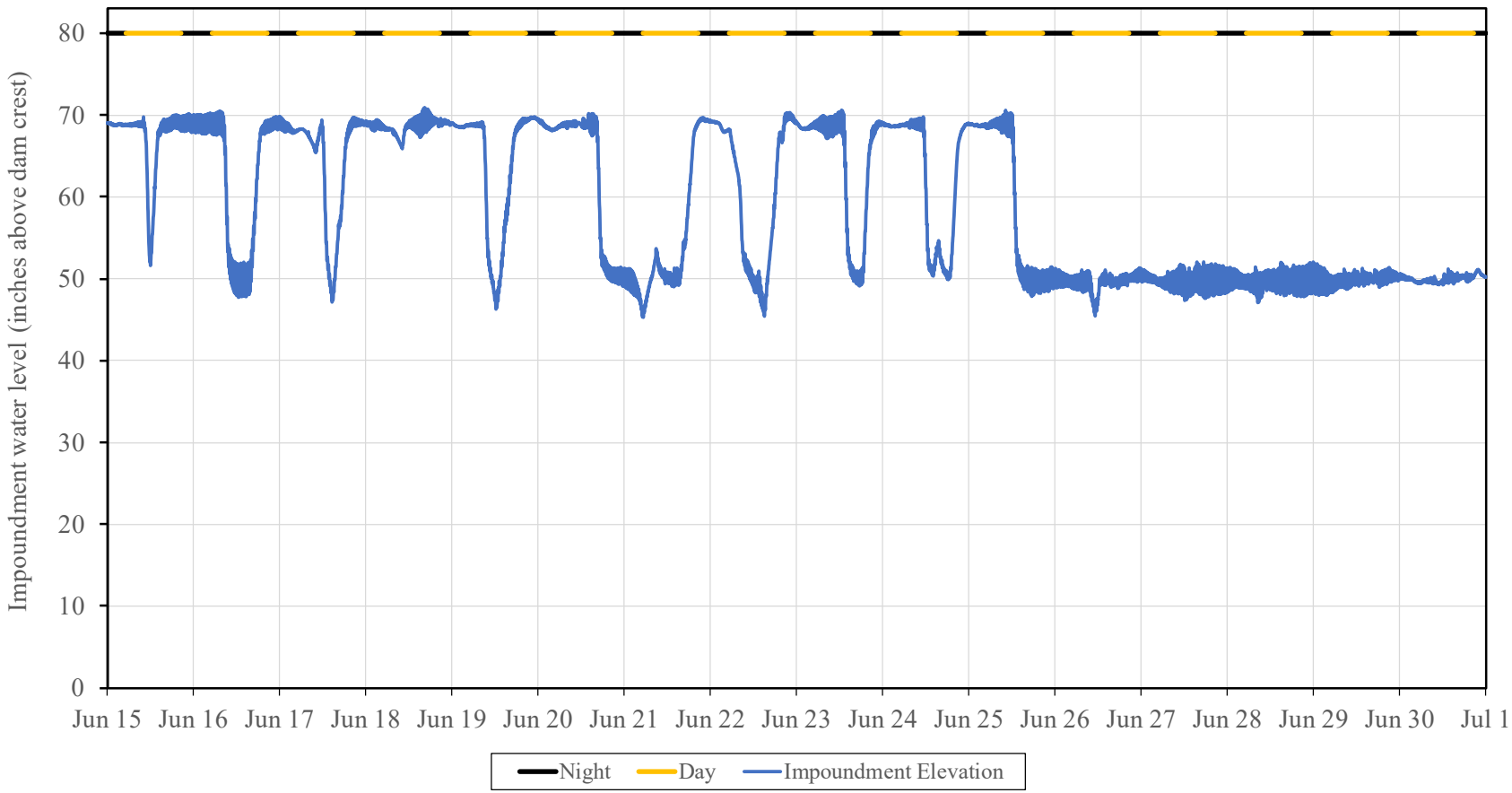

Figure 4. Continuously recorded impoundment water levels (inches above dam crest) during a period (June 15, 2004 through June 30, 2004) representative of normal project operation during the navigation season. The alternating orange and black bars across the top of the plot represent daytime (orange) and nighttime (black) hours, based on local sunrise and sunset times (Source: staff).

2.2 APPLICANT'S PROPOSAL

2.2.1 Proposed Project Facilities

As described below, NYSEG proposes to install upstream and downstream fish passage facilities at the project. NYSEG also proposes to expand the project boundary by 5.75 acres to include the excavated tailrace channel and its accompanying guide walls (containing the bi-level bottom project feature described above) as well as the earthen embankment located on the east side of the river that serves to retain water and helps maintain the project impoundment (figure 5).

2.2.2 Proposed Project Operation and Environmental Measures

As described in the license application and amended by the Settlement Agreement, NYSEG proposes the following operational and environmental measures:[15]

- Operate the project in a ROR mode during the navigation season and maintain the impoundment at an elevation of 72.6 feet, except when the Canal Corporation requests adjustments (lowering or raising) of impoundment levels to support navigation (section 3.1 of the Settlement Agreement);

- Operate the project in a ROR mode and maintain the impoundment at an elevation of 72.6 feet during the non-navigation season to minimize potential shoreline erosion associated with project operation (section 3.1 of the Settlement Agreement);

- Limit the rate of change in impoundment elevation to no more than 26 inches per hour in the downward direction and 6 inches per hour in the upward direction to support navigation on the Champlain Canal and ensure the continuity of downstream flow in the Hudson River during impoundment refill (section 3.1 of the Settlement Agreement);

- Provide a seasonal minimum flow of 45 cfs, or inflow to the project, if less, into the bypassed reach from April 1 through November 30, within 1 month of the effective date or issuance date of the license, whichever is later, to support downstream habitat by providing continuous circulation of water in the bypassed reach (section 3.2 of the Settlement Agreement);

[15] In a letter filed on May 22, 2020 (Accession No. 20200522-5210), NYSEG clarified the purpose and intent of some of its proposed measures in response to staff's Additional Information Request on the Settlement Agreement issued on May 4, 2020.

- Develop a stream flow and water level monitoring plan, in consultation with New York DEC and FWS, to describe the monitoring equipment and procedures that would be used to ensure compliance with the impoundment elevations, minimum flows, and the rate of change in impoundment elevation specified in the Settlement Agreement; file the plan with the Commission within 6 months of the issuance date or effective date of the new license, whichever is later, and implement the plan within 18 months of such date (section 3.4 of the Settlement Agreement);

- Install and operate an eel ladder in the project's tailrace on a seasonal basis, from April 1 through November 30, beginning with the 2023 migration season, to improve upstream passage opportunities for American eel (section 3.3 of the Settlement Agreement);

- Install a downstream eel passage facility by September 30, 2025, consisting of permanent trash racks with a 0.75-inch clear spacing and a non-turbine route of passage (downstream bypass) that would be operated on a seasonal basis from ice out (typically mid- to late-March) through November 30, to protect and provide safe passage for eels migrating downstream (section 3.3. of the Settlement Agreement);

- Install an upstream fishway within 1 year following the installation of upstream fish passage at the next project downstream (Mechanicville Project, FERC No. 6032), to support the upstream migration of fish species within the Hudson River (section 3.3 of the Settlement Agreement);

- Develop a fishway operation and maintenance plan that describes operation and maintenance procedures for all fishways; submit the plan to FWS and New York DEC for approval within 2 years of the effective date or issuance date of the new license, whichever is later, and provide the plan to the Commission within 2 months of approval by FWS and New York DEC (section 3.3.3 of the Settlement Agreement);

- Implement the Northern Long-eared Bat Management Plan filed with the Settlement Agreement (Attachment A of the Settlement Agreement);

- Implement the Bald Eagle Management Plan filed with the Settlement Agreement (Attachment B of the Settlement Agreement);

- Implement the Invasive Plant Species Management Plan[16] filed with the Settlement Agreement (Attachment D of the Settlement Agreement); and

- Implement an HPMP for the protection of historic properties eligible for listing on the National Register (section E.6.2 of the Final License Application).

[16] The Settlement Agreement refers to this plan as the "*Invasive Species Management Plan*" or the "*Invasive Plant Species Management Plan*." For consistency, this EA uses Invasive Plant Species Management Plan.

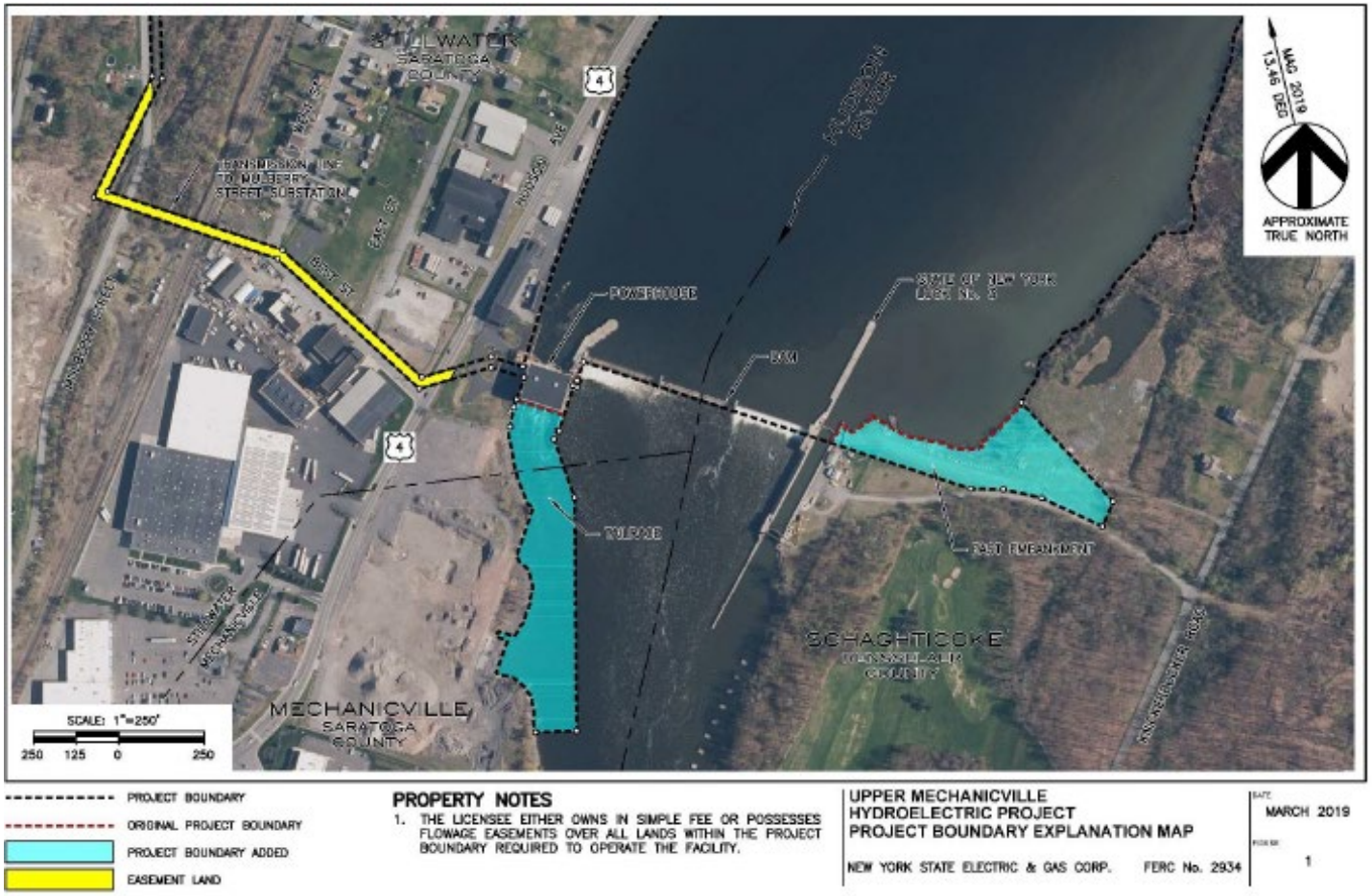

Figure 5 . Proposed expansion of the project boundary to include the tailrace channel along the western side of the river and the earthen embankment along the eastern side of the river (proposed expansion areas shown in blue) (Source: license application).

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would be operated as proposed by NYSEG, except for the proposed measures to: (1) provide a minimum flow of 45 cfs, or inflow to the project, if less, into the bypassed reach on a seasonal basis from April 1 through November 30; and (2) install an upstream fishway within 1 year following the installation of upstream fish passage at the next project downstream (Mechanicville Project). The staff alternative would also include the following staff-recommended additions or modifications:

- Modify NYSEG's proposed stream flow and water level monitoring plan by removing the provision to monitor the seasonal minimum flow of 45 cfs, and incorporating the plan's provisions for monitoring impoundment elevations, the rate of change in impoundment elevation, and for record keeping, within an operation compliance monitoring plan;

- Develop an erosion and sediment control plan, in consultation with the resource agencies (New York DEC and FWS) for Commission approval, to minimize erosion and sedimentation during the construction of the proposed downstream eel passage system; and

- Execute a programmatic agreement for the development and implementation of an HPMP.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

We considered several alternatives to NYSEG's proposal, but eliminated them from further analysis because they are not reasonable in this case. They are: (1) issuing a non-power license, (2) federal takeover of the project, and (3) retiring the project.

2.4.1 Issuing a Non-power License

A non-power license is a temporary license that the Commission would terminate when it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this time, no agency has suggested a willingness or ability to take over the project. No party has sought a non-power license, and we have no basis for concluding that the Upper Mechanicville Project should no longer be used to produce power.

2.4.2 Federal Government Takeover

Federal takeover and operation of the Upper Mechanicville Project would require congressional approval. While that fact alone would not preclude further consideration

of this alternative, there is currently no evidence to indicate 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 project.

2.4.3 Retiring the Project

As the Commission has previously held, decommissioning is not a reasonable alternative to relicensing in most cases.[17] Decommissioning can be accomplished in different ways depending on the project, its environment, and the particular resource needs.[18] For these reasons, the Commission does not speculate about possible decommissioning measures at the time of relicensing, but rather waits until an applicant actually proposes to decommission a project, or a participant in a relicensing proceeding demonstrates that there are serious resource concerns that cannot be addressed with appropriate license measures and that make decommissioning a reasonable alternative.[19] NYSEG does not propose decommissioning, nor does the record to date demonstrate there are serious resource concerns that cannot be mitigated if the project is relicensed; as such, there is no reason, at this time, to include decommissioning as a reasonable alternative to be evaluated and studied as part of staff's NEPA analysis.

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[17] *See, e.g., Eagle Crest Energy Co*., 153 FERC ¶ 61,058, at P 67 (2015); *Public Utility District No. 1 of Pend Oreille County*, 112 FERC ¶ 61,055, at P 82 (2005); *Midwest Hydro, Inc*., 111 FERC ¶ 61,327, at PP 35-38 (2005).

[18] In the unlikely event that the Commission denies relicensing a project or a licensee decides to surrender an existing project, the Commission must approve a surrender "upon such conditions with respect to the disposition of such works as may be determined by the Commission." 18 C.F.R. § 6.2 (2019). This can include simply shutting down the power operations, removing all or parts of the project (including the dam), or restoring the site to its pre-project condition.

[19] *See generally Project Decommissioning at Relicensing*; Policy Statement, FERC Stats. & Regs., Regulations Preambles (1991-1996), ¶ 31,011 (1994); *see also City of Tacoma, Washington*, 110 FERC ¶ 61,140 (2005) (finding that unless and until the Commission has a specific decommissioning proposal, any further environmental analysis of the effects of project decommissioning would be both premature and speculative).

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and other recommended environmental measures. Sections are organized by resource area, with historic and current conditions described first. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed PM&E measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.1, *Comprehensive Development and Recommended Alternative*.[20]

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Upper Mechanicville Project is located at RM 167 on the Hudson River in Saratoga and Rensselaer Counties, New York. The Hudson River originates in the Adirondack Mountains and flows south 315 river miles to New York Harbor, where the river meets the Atlantic Ocean. The Hudson River watershed encompasses approximately 13,400 square miles and lies almost entirely (93 percent) within the state of New York.

The Hudson River watershed is composed of three major sub-watersheds. These sub-watersheds include the Hudson River Estuary watershed, Mohawk River watershed, and Upper Hudson River watershed, where the project is located. The Upper Mechanicville Project has a drainage area of about 4,500 square miles. Two tributaries flow into the Hudson River in the vicinity of the project. The Hoosic River flows into the project impoundment 1.5 miles upstream of the project dam and a smaller tributary, Anthony Kill, enters the river 0.7 mile downstream of the project dam.

The project is located in the Hudson Valley Lowlands physiographic province. This region has a narrow floodplain, irregular valleys, plains broken by hills and terraces, and a flatter glacial lake plain in the north. The region has a humid continental climate, with large seasonal temperature fluctuations and precipitation that is distributed evenly throughout the year. Average monthly temperatures in the area range from 21.7 degrees Fahrenheit (°F) in January to 71.5°F in July. Average annual precipitation in the project area is approximately 45 inches.

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[20] Unless noted otherwise, the sources of our information are the license application filed April 1, 2019, the amendment to the final license application filed on December 30, 2019, additional information filed by NYSEG on August 21, 2019, and May 22, 2020, and the Settlement Agreement.

Most of the Upper Hudson River watershed (70 percent) contains forested habitat, while 18 percent and 4 percent of the watershed is used for agricultural and residential purposes, respectively. The project is situated in an area that has been used for industrial purposes for over 100 years, as the project dam, built in 1882, previously supported a large paper mill.

The Hudson River watershed is one of the most heavily developed drainage basins for hydropower production in the United States and also contains extensive infrastructure—the New York State Canal System—supporting commercial and recreational navigation on the Erie and Champlain Canals. The lowermost dam on the mainstem Hudson River is located at RM 154 at the U.S. Army Corps of Engineers' Green Island-Troy Lock and Dam and associated Green Island Project (FERC Project No. 13) (figure 1). Upstream of the Green Island Project, there are a series of six lock and dams, including the Upper Mechanicville Project, on the 37-mile-portion of the Champlain Canal that is confluent with the Hudson River (figure 1).[21] These six dams are used to support navigation on the Champlain Canal by providing water for lock operations. Four of the six lock and dams have operating hydropower projects; these include, from downstream to upstream: Mechanicville (FERC Project No. 6032), Upper Mechanicville (FERC Project No. 2934), Stillwater (FERC Project No. 4684), and Fort Miller (FERC Project No. 4226) (figure 1). There are no active hydropower projects at the Thomson (Lock C5) or Waterford (Lock C1) lock and dams, nor are there any pending applications to develop hydropower at these sites.

Fish passage facilities are only present at one of these lock and dams, at the Stillwater Project, which is located immediately upstream (1.8 RMs) of the Upper Mechanicville Project. The downstream fish passage system at Stillwater consists of an angled trash rack with 1-inch clear spacing and a bypass sluice gate (no upstream passage is provided at this project). The current licenses for the downstream Mechanicville[22] and

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[21] In this 37-mile-stretch of river, the Champlain Canal is confluent with the mainstem Hudson River. Farther upstream, at Fort Edward, New York, the Champlain Canal branches off from the Hudson River towards Lake Champlain and comprises an artificial channel that is separate from, and no longer confluent with, the Hudson River.

[22] *Niagara Mohawk Power Corporation and Fourth Branch Associates*, 63 FERC ¶ 62,257 (1993). After an extended period of not operating (1997-2006), the license for the Mechanicville Project was transferred to the current licensee, *Albany Engineering Company*, in 2006, *see* 117 FERC ¶ 62,065 (2006).

Green Island[23] projects require the installation of fish passage facilities, but these facilities are still in the design and pre-construction phases and are not yet operational. The fishways at the Green Island Project are to consist of two fish lifts (for anadromous species)[24] and one upstream passage facility (for American eel), as well as a downstream fish passage system consisting of an exclusion screen and low-level bypass outlets for eels. All fishways at the Green Island Project are required to be constructed by April 2, 2021.[25] The design plans for the downstream fish passage system at the Mechanicville Project were approved by the Commission in 2007;[26] the system would consist of an angled trash rack with 1-inch clear spacing and a downstream bypass structure (no upstream passage is required at the Mechanicville Project at this time).

Fish passage facilities are also present at hydropower projects on the Hoosic River, a tributary that flows into the Upper Mechanicville project impoundment. There are two projects on the lower Hoosic River, including the: (1) Hoosic Hydroelectric Project (FERC No. 2616), which consists of the Schaghticoke and Johnsonville Developments at RMs 7.1 and 13.3, respectively, and (2) James H. Thompson Hydroelectric Project (FERC No. 6411), which is an exemption. The dam for the James H. Thompson Project (RM 11.0) is located between the two developments (dams) of the Hoosic Project. There are no fish passage facilities at the James H. Thompson Project. However, upstream and downstream passage for eels is provided at the Hoosic Project in the form of eel ladders (one ladder at each development) and a downstream passage system (at each development) consisting of trash racks with 1-inch clear spacing and a downstream bypass (opening in the flashboards).

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 C.F.R. § 1508.7), a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions

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[23] *Green Island Power Authority*, 140 FERC ¶ 62,133 (2012) (issuing a new license for the Green Island project).

[24] Anadromous fish species spend most of their adult life at sea but return to freshwater to spawn and complete their life cycle.

[25] *Green Island Power Authority and Albany Engineering Corp.*, 165 FERC ¶ 62,013 (2018) (issuing a compliance order); *Green Island Power Authority and Albany Engineering Corp.*, 169 FERC ¶ 62,001 (2019) (issuing an order on compliance filing and approving the licensee's fish passage design drawings).

[26] *Albany Engineering Corp.*, 119 FERC ¶ 62,118 (2007).

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 time, including hydropower and other land and water development activities.

During public scoping we identified American eel as a resource that may be cumulatively affected by the proposed operation and maintenance of the Upper Mechanicville Project. Based on our review of the license application and other information sources, we have since identified water quantity, water quality, and blueback herring as resources that may be cumulatively affected by the proposed operation and maintenance of the Upper Mechanicville Project.

3.2.1 Geographic Scope

Our geographic scope of analysis for cumulatively affected resources is defined by the physical limits or boundaries of the proposed action's effect on the resources and contributing effects from other hydropower and non-hydropower activities within the Hudson River watershed.

The geographic scope for American eel and blueback herring includes the 32-mile-long reach of the mainstem Hudson River from Fort Miller to Green Island that contains a series of seven lock and dams, five of which have operating hydroelectric projects associated with them, as described above in section 3.1, *General Description of the River Basin*. Recent survey data, from 1994 to 2015, indicate that American eels are rare upstream of Fort Miller.[27] The Fort Miller area is also the current upstream extent of blueback herring in the Hudson River (Hattala et al., 2011; Carlson et al., 2016). Therefore, we chose this geographic scope because this is the portion of the Hudson River in which eels and blueback herring are most likely to occur and their migration and habitat access could be cumulatively affected by the presence and operation of several lock and dams and hydropower projects.

The geographic scope for water quantity and water quality includes the approximately 40-mile stretch of the Hudson River from Fort Edward downstream to the confluence of the Mohawk River with the Hudson River. We chose this geographic scope because the operation of lock and dams (to support navigation) and the series of hydropower projects in this portion of the river may cumulatively affect water quantity and water quality. We chose the mouth of the Mohawk River as the downstream terminus for this analysis because water entering the Hudson River from this major

[27] Fish Entrainment Study Report for the Feeder Dam Hydroelectric Project, November 1993 to November 1994, filed January 30, 1995. Accession No. 19950201-0297; FERC License Article 409 Compliance 2015 American eel survey, Curtis/Palmer Project, filed December 17, 2015. Accession No. 20151217-5233.

tributary likely alters the physical and chemical properties (water quality) and flow magnitude (water quantity) downstream of this confluence.

3.2.2 Temporal Scope

The temporal scope of our cumulative effects analysis in the EA will include a discussion of past, present, and reasonably foreseeable future actions and their effects on water quantity and quality as well as American eel and blueback herring. Based on the potential term of any license issued, the temporal scope will look 30 to 50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions. 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.

In section 3.3.2, *Aquatic Resources*, we discuss the cumulative effects of licensing the project on water quantity, water quality, American eel, and blueback herring.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effect of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the site-specific and cumulative environmental issues.

Only the resources that have the potential to be affected are addressed in this EA. Based on this, we have determined that geology and soils, aquatic resources (including water quantity, water quality, and fisheries), terrestrial resources, recreation, and cultural resources may be affected by the proposed action and action alternatives. We have not identified any substantive issues related to aesthetic resources associated with the proposed action, and therefore, this resource is not addressed in this EA. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

3.3.1 Geology and Soils

3.3.1.1 Affected Environment

The Upper Mechanicville Project is located in the Hudson Valley Lowlands physiographic province of New York State. The project dam is situated upon the Ordovician Age Canajoharie Formation, which is a brittle black fissile, and sometimes calcareous, shale. The bedrock in the project vicinity is mostly sedimentary in origin, and is complexly folded, sheared, frequently cleaved, and thinly bedded. The surficial geology of the project area consists of Pleistocene glacial till, exposed bedrock, lacustrine

sand, silt, clay, and fluvial outwash sand and gravel. The project vicinity is composed of soil series formed primarily in glacial and glaciofluvial deposits and recent alluvium.

The western shoreline of the project impoundment is heavily developed with residential and commercial properties and is armored with rip rap or shale to protect against shoreline erosion. The eastern shoreline of the impoundment has a more gradual slope than the western shoreline and is well vegetated with a forest canopy underlaid by established shrub and herbaceous layers.

Based on habitat mapping performed during NYSEG's Impoundment Drawdown Study, 44.23 acres of the impoundment shoreline are exposed when the impoundment is fully drawn down (6 feet) to the dam crest. Most of this exposed area lies along the more gradually sloping eastern shoreline—where slopes are generally less than 15 degrees—and substrates are predominantly silt-mud (78 percent of the total drawdown zone), with bedrock and silt-bedrock comprising most of the remaining substrate, 8 and 6 percent, respectively, of the total drawdown zone.

Sixty-six percent of the impoundment drawdown zone contains some form of cover (e.g., submerged or emergent vegetation, or woody debris). Dominant cover types vary by bank height. The dominant cover type in the upper impoundment drawdown zone—the portion of the impoundment shoreline that is exposed by drawing down the impoundment to an elevation of 70.8 feet, as defined in table 1—is emergent wetland vegetation, which comprises 6.19 acres (or 88 percent) of the 7.05 acres containing some form of cover in this zone. Woody debris is also present and represents 11 percent of the cover found in the upper drawdown zone. In the middle impoundment drawdown zone (defined in table 1), cover is provided in the form of floating aquatic vegetation (63 percent of cover in this zone), woody debris (17 percent), and submerged aquatic vegetation (16 percent). In the lower impoundment drawdown zone (defined in table 1), the dominant cover type is submerged aquatic vegetation (e.g., milfoil) (75 percent), and some floating aquatic vegetation is also present (24 percent).

Table 1. Elevation ranges and pond heights for the various impoundment drawdown zones referred to throughout this document. NGVD 29 refers to the National Geodetic Vertical Datum of 1929 (Source: staff).

Impoundment Drawdown Zone	**Elevation Range (NGVD 29)**	**Pond Height (above dam crest)**
Upper	70.8 – 72.6 feet	50 – 72 inches
Middle	69.1 – 70.8 feet	30 – 50 inches
Lower	66.6 – 69.1 feet	0 – 30 inches

3.3.1.2 Environmental Effects

Effects of Project Operation on Shoreline Erosion

Water level fluctuations associated with the operation of hydropower projects can cause or exacerbate shoreline erosion, the severity of which depends on the characteristics of the surrounding soils and the frequency and magnitude of such fluctuations.

NYSEG proposes to continue operating the project in a ROR mode and maintaining the impoundment at an elevation of 72.6 feet during the non-navigation season to minimize impoundment fluctuations and potential shoreline erosion in the project area. During the navigation season, NYSEG also proposes to operate the project in a ROR mode and maintain the impoundment at an elevation of 72.6 feet; however, impoundment levels would be adjusted when requested by the Canal Corporation to support navigation, as described above in section 2.1.4, *Existing Project Operation and Environmental Measures*. NYSEG proposes to notify the Commission and New York DEC of all impoundment drawdowns exceeding 6 inches that are unrelated to navigation activities (i.e., those drawdowns causing the impoundment to drop below an elevation of 72.1 feet that are not requested by the Canal Corporation to support navigation activity). Following any such reportable drawdowns, NYSEG would notify New York DEC as soon as possible by phone or email, but no longer than 5 business days after any such event and notify the Commission in a manner consistent with Commission-established procedures.

NYSEG also proposes to limit the rate of impoundment elevation change to no more than 26 inches per hour in the downward direction and 6 inches per hour in the upward direction, unless directed otherwise by the Canal Corporation. NYSEG states it would curtail or suspend project operation (and adherence to its proposed impoundment elevation and rate of change) during any operating emergency beyond the licensee's control or upon prior mutual agreement between NYSEG and New York DEC. In either case, NYSEG would notify the Commission and New York DEC following the procedures described above.

As evidenced by their execution of the Settlement Agreement, New York DEC, FWS, and TU support NYSEG's proposed mode of operation and management of water levels in the impoundment.

Staff Analysis

To better understand the expected frequency and magnitude of navigation-related impoundment drawdowns,[28] staff analyzed continuously recorded impoundment elevation data (collected at one-minute intervals) from a representative year of project operation (2004; *see* figure 6).[29] During the 2004 navigation season, NYSEG made 140 impoundment drawdowns to support navigation. Most (83 percent) of these drawdowns involved lowering the impoundment to an elevation of 70.8 feet (50 inches above the dam crest); occasionally (16 percent of the time) the impoundment was drawn down to an elevation of 69.1 feet (30 inches above the dam crest). Two drawdowns to the dam crest itself (elevation of 66.6 feet) were performed in 2004, one to support navigation and the other for spillway maintenance. Navigation-related impoundment drawdowns occurred primarily during the day and generally lasted several hours before the impoundment was returned to its prior elevation (*see* figures 3 and 4).

Although navigation-related impoundment fluctuations are fairly frequent during the navigation season (on average, two drawdowns every 3 days), most drawdowns (more than 80 percent) are rather limited in magnitude and do not exceed 2 feet. Also, as described above, much of the impoundment is either: (1) protected by rip-rap or concrete walls in critical areas, including the project works (i.e., adjacent to the powerhouse, dam, east embankment, and tailrace) or (2) well vegetated, including much of the eastern shoreline. These shoreline characteristics help limit the potential for project-induced erosion associated with the operation of the project and the impoundment drawdowns that are made to support navigation. Therefore, NYSEG's proposal to continue operating the project as it currently does should not increase erosion beyond existing conditions.

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[28] Although impoundment drawdowns are made for navigation purposes, staff still consider the water level fluctuations associated with these drawdowns to be project-related because only since the project began operating, and especially after 1990 when the impoundment was raised from an elevation of 69.1 feet to 72.6 feet through the addition of 6-foot-high crest gates (the project previously had 2.5-foot-high flashboards), have such drawdowns been necessary (i.e., the drawdowns would not be necessary without the project and are thus project-related).

[29] Although impoundment elevation data were available from more recent years (2016 and 2017), those years were not considered representative of normal project operation during the navigation season because the target impoundment elevation was 70.8 feet, not 72.6 feet, in order to support the passage of vessels transporting gravel to New York City as part of a commercial contract.

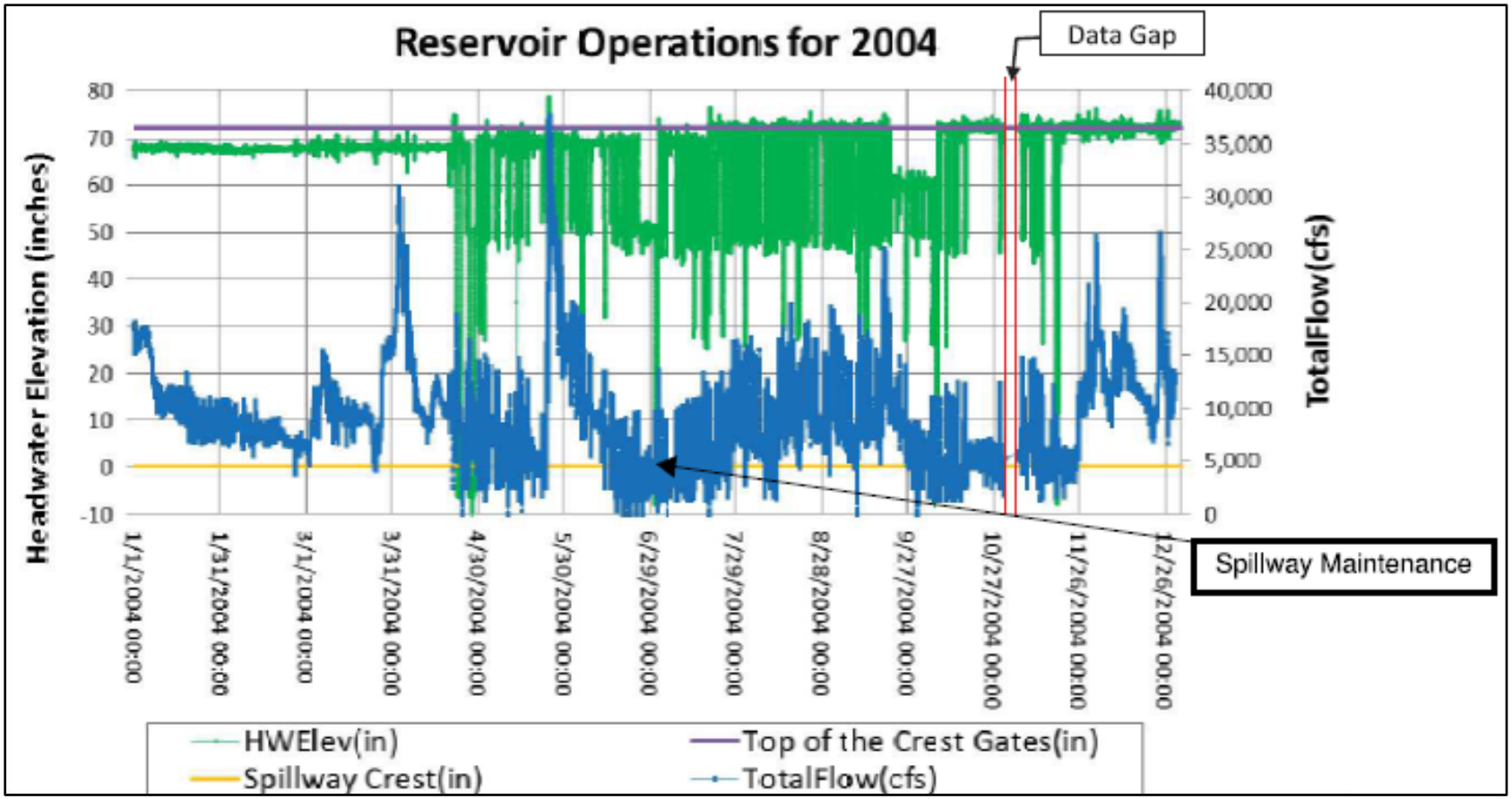

Figure 6. Impoundment levels during a representative year (2004) for the Upper Mechanicville Project. The green line shows the continuously recorded impoundment levels (inches above the dam crest); the blue line represents project inflows in cubic feet per second (cfs). Impoundment drawdowns for purposes other than navigation (e.g., maintenance or inspections) are noted, as are data gaps in continuously recorded impoundment elevations (Source: Initial Study Report, filed on January 26, 2018).

Effects of Fishway Construction on Erosion and Sedimentation

Depending on the amount of disturbance to the riverbed and required clearing of nearby vegetation, the installation of new fish passage structures at hydropower projects can cause erosion and sedimentation if proper erosion and sediment control measures are not in place prior to the start of, and during, construction.

NYSEG proposes to install several new fishways at the project including an upstream eel ladder by the start of the 2023 migration season, a downstream eel passage system consisting of new 0.75-inch trash racks and a non-turbine route of passage (downstream bypass) by September 30, 2025, and an upstream fishway (for anadromous fish) within 1 year of upstream passage being installed at the downstream Mechanicville Project. While NYSEG does not propose any specific measures to prevent erosion and sedimentation associated with the installation of these fishways, it does note that all construction activities would be performed in accordance with standard best management practices to avoid potential erosion and sedimentation.

Staff Analysis

According to the preliminary design provided in Appendix C of the Settlement Agreement, the upstream eel ladder would be a portable, non-permanent, structure that would be deployed and operated on a seasonal basis. As such, the seasonal installation and removal of this structure, which has a small footprint (24 inches in diameter) would result in little disruption or re-suspension of sediments from the riverbed. Because the design and type of upstream fishway that would be installed for anadromous fish is unknown at this time (the design would be similar to any upstream fishway(s) installed at the downstream Mechanicville Project), the potential effects of this fishway on geology and soils are largely unknown at this time. Nevertheless, potential erosion or sedimentation effects associated with the possible installation of this fishway would be addressed by the Commission's standard terms and conditions for a hydropower license, which require a licensee to take reasonable measures in the construction, maintenance, and operation of a project to prevent stream sedimentation and soil erosion on lands adjacent to streams or other water bodies.

The installation of a new downstream eel passage system has the potential to cause some erosion and sedimentation due to the scope and scale of in-river work and likely disturbance of the riverbed during the construction and installation of this fish passage structure. For instance, to install the new trash racks with a smaller (0.75-inch) clear spacing, the existing trash racks would have to be removed, which would require the installation of cofferdams to dewater the intake channel and the use of heavy equipment and machinery to move construction materials. Disturbance of the riverbed and the possible re-suspension of sediments could also occur if an existing structure such as the sluice gate cannot be used for the downstream eel bypass and a new downstream eel

bypass needs to be constructed. Although NYSEG notes it would employ best management practices during all construction activities, it does not propose specific measures to control in-river sedimentation or erosion associated with the installation and construction of the downstream eel passage system. Therefore, the development of an erosion and sediment control plan, including site-specific best management practices and based on the final design of the fishway, would help ensure that any erosion and sedimentation associated with the construction and installation of the downstream eel passage system are minor, localized, and short-term. In addition, the development of such a plan would help ensure the polychlorinated biphenyl (PCB)[30] hotspot found just upstream of the powerhouse, which has been remediated (dredged, capped, and filled), would not be disturbed during any construction activities.

3.3.2 Aquatic Resources

3.3.2.1 Affected Environment

Water Quantity

Given the large drainage area at the project (4,500 square miles), project inflows are fairly high. Across a 40-year period of record (POR) from 1977 through 2017, the mean annual flow at the project was 8,562 cfs based on pro-rated flow data from the U.S. Geological Survey (USGS) gage (No. 01335754) near Waterford, New York.[31] Flows vary seasonally and are generally highest in April and lowest in September (table 2). The instantaneous minimum and maximum flows at the project across the POR were 1,143 cfs and 60,574 cfs, respectively.

There are no consumptive uses or water withdrawals in the immediate project vicinity. The closest withdrawal location is approximately 0.6 mile downstream along the impoundment of the Mechanicville Project (FERC No. 6032). The City of Mechanicville withdraws an average of 0.9 million gallons per day from this location for public drinking water.

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[30] Polychlorinated biphenyls (PCBs) are man-made chemicals that are a human health concern. Approximately 1.3 million pounds of PCBs were discharged into the upper Hudson River as byproducts of the capacitor manufacturing process at two General Electric plants located in Hudson Falls and Fort Edward. The usage of PCBs was banned in 1979, but some legacy contamination persists due to the chemical's strong tendency to bind with sediments and withstand extreme environmental conditions.

[31] Pro-rated flow data were obtained by multiplying flows at USGS station No. 01335754 near Waterford, New York, by 0.977 to account for the difference in drainage area between the project and USGS gage.

Any municipal or industrial discharges to surface or ground waters of New York State require a State Pollution Discharge Elimination System (SPDES) permit from New York State DEC. There are no SPDES-permitted municipal or industrial discharges in the immediate project vicinity. The nearest SPDES-permitted discharge is the Stillwater Wastewater Treatment Plan, which discharges into the Hudson River upstream of the Stillwater Project (FERC Project No. 4684).

Table 2: Estimated mean, minimum, maximum, 90 percent, and 10 percent exceedance flows for the Upper Mechanicville Project from January 1, 1977 through December 31, 2017 (Source: license application, as modified by staff).

Month	Mean Flow (cfs)	Minimum Flow (cfs)	Maximum Flow (cfs)	90 Percent Exceedance Flow (cfs)	10 Percent Exceedance Flow (cfs)
January	8,898	1,329	43,867	4,201	14,850
February	8,027	1,993	38,201	4,374	12,115
March	11,055	2,208	60,574	4,826	19,149
April	15,946	2,784	54,126	6,418	28,148
May	11,056	2,413	55,982	3,908	21,494
June	7,232	1,788	41,034	3,078	13,190
July	5,035	1,143	35,563	2,550	9,409
August	4,382	1,153	58,620	2,374	7,621
September	4,319	1,172	31,264	2,412	6,874
October	6,600	1,573	34,586	2,843	13,385
November	8,574	2,022	31,264	3,967	13,678
December	9,306	2,276	43,965	4,778	14,655
Annual	8,365	1,143	60,574	3,058	15,827

Water Quality

The Hudson River has a long history of water quality issues. The discharge of untreated sewage into the river was recognized as a growing problem in the early 1900s. The biological breakdown of this sewage material caused oxygen depletion in major portions of the river, including the New York City and Albany areas (Hattala et al., 2011). In addition, industrial plants discharged pollutants into the Hudson River, most notably PCBs from the 1940s through the late 1970s. The enactment of the Clean Water Act in 1972 helped limit pollutant discharges from point sources, such as industrial plants, by establishing the National Pollution Discharge Elimination System and improving wastewater treatment facilities. The Hudson River was also designated as a Federal Superfund Site, which paved the way for the extensive PCB remediation work

that has occurred in the upper Hudson River, including the project area, where a PCB hotspot (just upstream of the powerhouse) was dredged, backfilled, and capped in 2014.[32] These environmental restoration efforts have improved water quality in the Hudson River.[33]

Project waters immediately upstream and downstream of the project dam are currently classified by New York DEC as Class B and Class C waters, respectively. New York DEC defines the best usage of Class B waters as primary and secondary contact recreation and fishing and indicates that Class B waters should be suitable for fish, shellfish, and wildlife propagation and survival. Class C waters are intended to support fishing and be suitable for fish, shellfish, and wildlife propagation and survival. Relevant state water quality standards for Class B and C waters are as follows: (1) daily average dissolved oxygen (DO) values shall be no less than 5.0 milligrams per liter (mg/L), and at no time shall DO concentrations be less than 4.0 mg/L, and (2) pH values shall be between 6.5 and 8.5.[34]

NYSEG conducted a Water Quality Study at the project during the summer of 2017. The study involved continuous monitoring (at 15-minute intervals) of water temperature and DO from July 19, 2017 through October 4, 2017 at three sites: (1) in the project forebay upstream of the dam, where data loggers were deployed in both surface and bottom waters, (2) within the project tailrace, and (3) approximately 1,600 feet downstream of the project dam. Discrete measurements of water temperature, DO, pH, and water clarity (Secchi depths) were also taken when the data loggers were serviced and downloaded every 7 to 10 days. Vertical profiles of water temperature and DO in the project impoundment were collected on a weekly basis from August 9, 2017 through September 7, 2017.

The Water Quality Study was conducted under typical summer conditions, as the mean flow during the continuous monitoring period (4,389 cfs) was similar to that over the same date range for the longer-term POR (4,414 cfs). In addition, air temperatures in New York state during the summer of 2017 were also near average.[35]

Results from the Water Quality Study demonstrated the impoundment was not stratified, as temperature and DO values were similar between surface and bottom waters

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[32] https://www3.epa.gov/hudson/cleanup.html#quest2; https://www3.epa.gov/hudson/pdf/Phase2_Overview-2015.pdf

[33] https://www.dec.ny.gov/lands/5098.html

[34] *See* 6 NYSRR § 703.3.

[35] https://www.ncdc.noaa.gov/sotc/national/201713

during the continuous monitoring period. Specifically, differences in DO levels between surface and bottom waters were generally less than 0.5 mg/L; temperature differences were generally less than 1°F, with occasional differences of 2°F due to afternoon heating of surface waters. Vertical profile data corroborated these trends.

Water temperatures were also similar upstream and downstream of the project dam and ranged from 65°F to 79°F throughout the continuous monitoring period. Dissolved oxygen levels were also similar upstream and downstream of the dam during the monitoring period and ranged from 7 mg/L to 10 mg/L, which is well above the state water quality standards described above. Moderate diel variability in DO levels was observed, as DO concentrations were generally 1.5 mg/L to 2.0 mg/L higher during the day than at night. Discrete measurements of pH ranged from 7.14 to 7.75, which is consistent with state water quality standards. Secchi depth measurements ranged from 1.5 feet (July 17) to 8.5 feet (September 13).

Aquatic Habitat

Aquatic habitat in the project impoundment is described above in section 3.3.1.1, *Geology and Soils, Affected Environment.*

Regarding downstream habitat, NYSEG developed a mesohabitat map of the area immediately downstream of the project dam as part of its Flow Demonstration Study. Mesohabitat mapping indicated the primary habitat downstream of the project dam is bedrock and bedrock shards, with some boulder and cobble present along the western shoreline, adjacent to the project's tailrace. The project contains a limited bypassed reach that is approximately 275 feet long. Currently, there is no minimum flow provided to the bypassed reach. However, according to visual observations during the Flow Demonstration Study, the area downstream of the dam, including the bypassed reach, remains watered (99 percent inundated) even when there is no spill and the project is operating. This is likely due to a backwatering effect from the nearby Mechanicville Project that is located just 2.5 miles downstream of the Upper Mechanicville Project. The proximity of the Mechanicville Dam creates a relatively flat surface water profile that is conducive to backwatering, as the tailwaters of the Upper Mechanicville Project essentially serve as the impoundment for the downstream Mechanicville Project.[36]

[36] The normal tailwater elevation at the Upper Mechanicville Project is 48.0 feet, which is the same as the normal impoundment elevation at the downstream Mechanicville Project.

Fishery Resources

Resident Fish Community

The Upper Hudson River supports both warm water and cool water fisheries. Due to historical PCB contamination in the Upper Hudson, New York DEC manages the portion of the Hudson River from Hudson Falls downstream to Troy (including the project area) as a catch-and-release fishery only. Currently, there are no fish stocking efforts in the project vicinity.

The resident fish community upstream and downstream of the project dam is similar and dominated by centrarchids[37] and cyprinids (shiners and fallfish) (tables 3 and 4). Daytime boat electrofishing surveys were conducted upstream and downstream of the project dam in 2017 during the months of April, May, June, July, and September. Based on data from these surveys, white sucker was numerically dominant in the project impoundment and accounted for 16 percent of all fish captured. The most common cyprinids in the project impoundment were common shiner, spottail shiner, and fallfish (table 3). The most common centrarchids in the project impoundment were smallmouth bass, pumpkinseed, and bluegill. Smallmouth bass appear to be the most abundant game fish in the project impoundment; less abundant game fish include yellow perch, walleye, and largemouth bass (table 3).

Downstream of the project dam, smallmouth bass were numerically dominant and accounted for nearly 28 percent of all fish captured, followed by white sucker (16 percent) (table 4). Similar to the impoundment, bluegill and pumpkinseed are common centrarchids and common shiner, fallfish, and spottail shiner are common cyprinids found downstream of the project dam. Yellow perch and walleye were captured downstream of the project dam, but not largemouth bass.

During the Impoundment Drawdown Study, centrarchid nests were enumerated along the impoundment shoreline. The main spawning season for centrarchids in New York is late spring and summer, from May through July.[38] During the spawning season, males build nests consisting of depressions in soft sediments or small gravel. Eggs are deposited into the nests by females and fertilized by males, which also guard the incubating eggs and newly hatched fry. A total of 502 centrarchid nests were observed in the project impoundment; because the survey occurred during the fall and winter, these nests were unoccupied. Most of the nests were concentrated on a silt flat along the

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[37] Centrarchids are a family of fishes that include species such as smallmouth bass, pumpkinseed, bluegill, largemouth bass, rock bass, black crappie, and redbreast sunfish, all of which prefer to spawn in shoreline areas.

[38] https://www.dec.ny.gov/animals/7022.html

eastern shoreline of the impoundment just downstream of the mouth of the Hoosic River. The vast majority (84 percent) of nests were in the lower impoundment drawdown zone—the portion of the shoreline that would be exposed by drawing down the impoundment below an elevation of 69.1 feet, as defined in table 1. The remaining nests were found in the middle drawdown zone, as none were observed in the upper drawdown zone.

In addition to the resident fish species described above, several migratory fish species occur in the project area, namely American eel and blueback herring (described below). Other migratory species appear to be rare at the project, as just two American shad and one striped bass were collected downstream of the project dam during the May and June fishery surveys, respectively. This is consistent with recent distribution data for these species, which indicate that striped bass and American shad are most prevalent downstream of the Green Island-Troy Lock and Dam (Carlson et al., 2016).

Table 3. Fish catch data and species composition in the project impoundment based on daytime boat electrofishing surveys (9.13 total hours of electrofishing) conducted across April, May, June, July, and September of 2017 (Source: staff).

Species	**Family**	**Number Caught**	**Percent Composition**
White sucker	Catostomidae	551	16.3
Blueback herring	Clupeidae	472	13.9
Common shiner	Cyprinidae	324	9.6
Smallmouth bass	Centrarchidae	321	9.5
Spottail shiner	Cyprinidae	311	9.2
Fallfish	Cyprinidae	276	8.1
Pumpkinseed	Centrarchidae	261	7.7
Yellow perch	Percidae	233	6.9
Bluegill	Centrarchidae	160	4.7
Common carp	Cyprinidae	139	4.1
Emerald shiner	Cyprinidae	60	1.8
Rock bass	Centrarchidae	37	1.1
Logperch	Percidae	31	0.9
River chub	Cyprinidae	27	0.8
Golden shiner	Cyprinidae	24	0.7
Largemouth bass	Centrarchidae	20	0.6
Redhorse spp.	Catostomidae	18	0.5
Northern hog sucker	Catostomidae	16	0.5

Brook silverside	Atherinopsidae	13	0.4
Black crappie	Centrarchidae	12	0.4
Channel catfish	Ictaluridae	12	0.4
Yellow bullhead	Ictaluridae	12	0.4
Walleye	Percidae	12	0.4
Northern pike	Esocidae	8	0.2
Freshwater drum	Sciaenidae	8	0.2
Gizzard shad	Clupeidae	7	0.2
Tessellated darter	Percidae	6	0.2
Johnny darter	Percidae	4	0.1
Silver lamprey	Petromyzontidae	4	0.1
American eel	Anguillidae	3	0.1
Redbreast sunfish	Centrarchidae	2	0.1
Blacknose dace	Cyprinidae	2	0.1
Banded killifish	Cyprinodontidae	1	0.0

Table 4: Fish catch data and species composition downstream of the project dam based on daytime boat electrofishing surveys (14.26 total hours of electrofishing) conducted across April, May, June, July, and September of 2017.

Species	**Family**	**Number Caught**	**Percent Composition**
Smallmouth bass	Centrarchidae	347	27.5
White sucker	Catostomidae	198	15.7
Blueback herring	Clupeidae	161	12.8
Bluegill	Centrarchidae	64	5.1
Common shiner	Cyprinidae	54	4.3
Fallfish	Cyprinidae	51	4.0
Spottail shiner	Cyprinidae	51	4.0
Emerald shiner	Cyprinidae	46	3.7
Common carp	Cyprinidae	36	2.9
Tessellated darter	Percidae	31	2.5
Logperch	Percidae	29	2.3
American eel	Clupeidae	26	2.1
Pumpkinseed	Centrarchidae	24	1.9
Yellow perch	Percidae	21	1.7

Rock bass	Centrarchidae	18	1.4
Channel catfish	Ictaluridae	15	1.2
Walleye	Percidae	14	1.1
Yellow bullhead	Ictaluridae	13	1.0
Gizzard shad	Clupeidae	11	0.9
Golden shiner	Cyprinidae	10	0.8
Black crappie	Centrarchidae	8	0.6
River chub	Cyprinidae	8	0.6
Freshwater drum	Sciaenidae	8	0.6
Silver lamprey	Petromyzontidae	3	0.2
Brook silverside	Atherinopsidae	2	0.2
American shad	Clupeidae	2	0.2
Northern pike	Esocidae	2	0.2
Johnny darter	Percidae	2	0.2
Northern hogsucker	Catostomidae	1	0.1
Redbreast sunfish	Centrarchidae	1	0.1
Margined madtom	Ictaluridae	1	0.1
Stonecat	Ictaluridae	1	0.1
Striped bass	Moronidae	1	0.1

American Eel

American eel is the only catadromous species[39] found in the project area. Historically, American eel were documented as far upstream as Lake Harris (RM 285) in the Hudson River (Carlson et. al, 2016). American eels were very abundant in rivers and streams along the U.S. eastern seaboard and often composed more than 25 percent of the total fish biomass in a given river (ASMFC, 2008). However, beginning in the 1970s, eel abundance began declining from historical levels due to a combination of factors, such as overfishing, habitat loss from dams, turbine mortality, changing oceanic conditions, toxins and contaminants, and disease (ASMFC, 2012; ASMFC, 2013). Eel abundance in rivers along the east coast of the United States, including the Hudson River, declined substantially during the 1980s through the early 1990s, but the stock has since stabilized, albeit at historically low levels (ASMFC, 2017a). Restoration efforts to recover the depleted stock of American eel are ongoing and include efforts to improve upstream and

[39] Catadromous fish spend most of their life in freshwater and migrate to the ocean to spawn.

downstream passage opportunities for eels to increase the number of adults that are able to migrate from fresh and estuarine waters to the ocean to spawn (i.e., increased spawning escapement), which in turn, could help curb further declines in juvenile recruitment and overall stock abundance (ASMFC, 2008).

American eel spawn in the Sargasso Sea and their leaf-like larvae (referred to as leptocephali) drift passively in ocean currents towards the North American coastline. As they near continental waters and exit from the Gulf Stream, young eels metamorphose into 'glass eels' that are transparent, have fins, and are capable of swimming. When glass eels enter estuaries they are about 1 year old and 2 inches long (Shepard, 2015). Glass eels generally enter the Hudson River estuary during late February or March.[40] As glass eels move upstream, they become pigmented and more robust, and are referred to as 'elvers.' In the tidal freshwater portion of the Hudson River, glass eels and elvers are seasonally present from March through early June, but typically exhibit peak abundance from mid-April to mid-May based on 12 years (2008-2019) of fyke net data from this portion of the Hudson River.[41] As young eels migrate upstream past the head-of-tide, their net rate of movement decreases because movements are no longer tidally assisted. For reference, the head-of-tide in the Hudson River is located at the Green Island Project at RM 154, which is the lowermost dam on the mainstem Hudson River.

As elvers begin putting more energy into growth and less energy towards migration, they enter the primary growth, or 'yellow eel' phase, which is the longest lasting life stage of American eel and can last for 20 to 30 years (at least for females which mature later and at a larger size than males). This long period of residency in fresh and brackish waters provides ample opportunities for the dispersal of yellow eels. Even though yellow eels may settle into a particular area and establish a home range, upstream movements and excursions still occur throughout this life stage, as some individuals may abandon their home range and move farther upstream due to an environmental trigger (e.g., increased eel density, competition, or an increase in flow) (Welsh and Liller, 2013; Shepard, 2015) or simply due to the fact that some individuals in the population appear to be more exploratory than others (Feunteun, 2003; Lamson et al., 2006). Yellow eels are most active at water temperatures around 68 ^{o}F and are highly nocturnal as upstream movements occur primarily at night (McGrath et al., 2003; Verdon et al., 2003). Eels captured well upstream in inland freshwater habitats, while fewer in number, tend to be mostly females, whereas those individuals captured farther downstream, including brackish waters, are more numerous and mostly males (Helfman, 1987; Goodwin and Angermeier, 2003; Shepard 2015). The mechanism that results in this pattern is largely unknown—that is, whether eels that would eventually become females migrate farther

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[40] https://www.dec.ny.gov/docs/remediation_hudson_pdf/082415eelreport.pdf

[41] *Id.*

upstream or eels that find themselves farther upstream end up developing into females due to favorable environmental conditions.

Towards the end of their residency and growth period in brackish and fresh waters, eels begin maturing and undergo a process referred to as 'silvering' that prepares eels for their migration back to the Sargasso Sea to spawn. Silvering involves an enlargement of the eyes and nostrils, gut resorption, gonadal development, a change in coloration (eels in this stage are referred to as 'silver' eels), and a switch from a more demersal lifestyle (yellow eels) to a more pelagic existence as silver eels. Males being silvering and maturing at smaller sizes and younger ages than females. Many males begin maturing and migrating to the Atlantic Ocean when they reach lengths of 14 to 16 inches and are 4 to 5 years old (ASMFC, 2012; Shepard, 2015). Meanwhile, females do not begin maturing until they reach larger sizes (generally greater than 16 inches). The size and age at maturation for females generally increases with latitude along the eastern seaboard of North America. In the New England and New York region, the mean length and age of maturing females ranges from 19 to 38 inches and 13 to 23 years old (ASMFC, 2012; Shepard, 2015). The downstream migration of silver eels towards the Atlantic Ocean occurs mainly at night and is often triggered by increases in flow associated with rainfall events during the late summer and fall (Haro, 2003). In New York, the downstream migration of silver eels typically occurs from September through November, with a peak in October (figure 7).

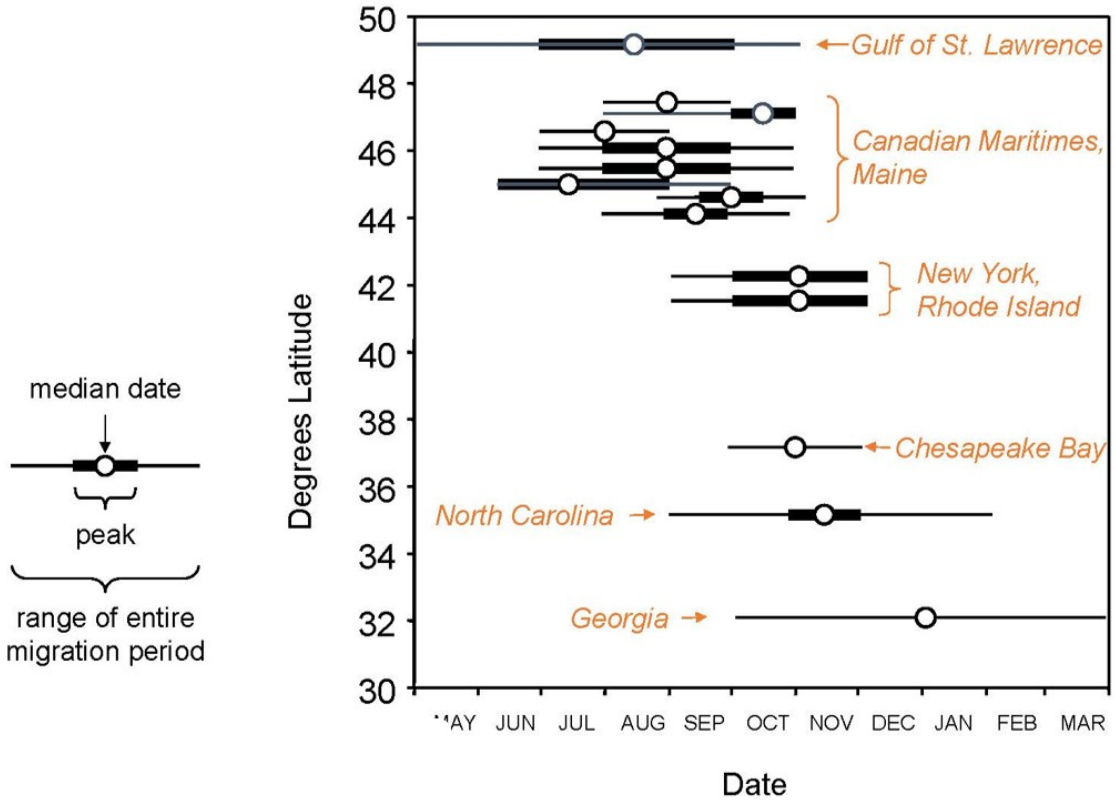

Figure 7. Emigration timing of silver eels along the eastern seaboard of North America (source: Haro, 2003).

Targeted eel surveys were conducted at the project on June 28-29, 2017, and July 5-6, 2017. During these surveys, boat electrofishing was conducted in habitats deemed most suitable for eels (e.g., lower flow areas and areas with cover along the river bank). A total of 3.02 hours and 5.22 hours of active electrofishing (pedal time) were performed upstream and downstream of the project dam, respectively. Twenty-one eels were captured during the eel surveys, 18 of which were captured downstream, and 3 of which were captured upstream of the project dam. The relative abundance of eels (expressed as the number of eels per hour of electrofishing) was higher downstream (3.4 eels per hour) than upstream (1.0 eel per hour) of the dam. In addition, there were 8 eels caught downstream of the project during the September fish community survey (0.88 hour of pedal time), but none were caught in the project impoundment (0.4 hour of pedal time) during this survey. Two size modes of eels were present; the smaller size mode consisted of eels 6 inches to 20 inches long and the larger size mode consisted of eels 24 inches to 36 inches long (figure 7).[42] While most individuals appeared to be yellow eels, some eels

[42] All fish lengths reported in this document represent total lengths.

in the larger size mode are consistent with the reported sizes of silver eels (as described above) and therefore could undergo silvering in the fall.

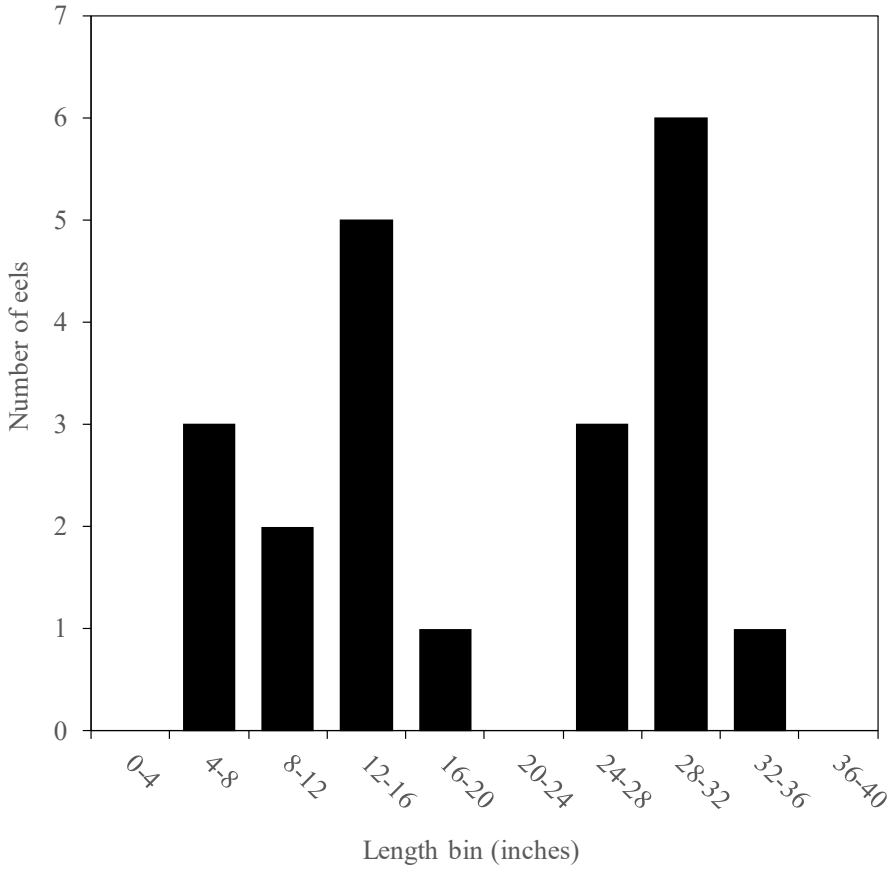

Figure 8. Size distribution (total length, inches) of American eel captured during fisheries surveys conducted at the Upper Mechanicville Project during the summer of 2007 (late June through mid-September). The lengths used to generate the plot were from 21 eels captured downstream of the project dam. Not all eels were able to be measured, including 3 eels from the impoundment and 5 eels downstream of the dam, because these individuals either sank to the bottom before they could be netted or escaped from the boat before they could be measured (Source: staff).

Two ancillary spotlight surveys were performed to determine if elvers were aggregating below or attempting to climb wetted concrete surfaces (i.e., the dams and locks) at the Upper Mechanicville Project and upstream Stillwater Project. The spotlight surveys were conducted at Upper Mechanicville and Stillwater on the evenings of June 28, 2017 and July 5, 2017, respectively. No elvers were observed during these surveys.

Blueback herring

Historically, blueback herring migrated upstream to Fish Creek at RM 178 on the Hudson River (Carlson et al., 2016). Despite numerous lock and dams being built in the

Hudson River watershed in the early 1900s, from 1905 to 1918, blueback herring have largely maintained their historical distribution due to the species' tendency to migrate through navigation locks, especially adults. This behavior has also allowed the species to expand its range into areas of the watershed that were previously inaccessible. For example, the presence of several dams at the mouth of the Mohawk River and the 65-foot-high Cohoes Falls at RM 2.5 (on the Mohawk River) historically prevented blueback herring from migrating up the Mohawk River from the Hudson River. Following the construction of navigation locks on the Mohawk River in association with the enlargement of the Erie Canal, including a series of locks (Waterford Flight) that bypassed the dams on the lower river and Cohoes Falls, blueback herring have established a spawning run in this system by moving through the navigation locks (McBride, 1994; Owens et al., 1998; Hattala et al., 2011). Currently, blueback herring are routinely found as far upstream as Little Falls (RM 80) in the Mohawk River (Carlson et al., 2016), a migration which requires fish to pass through 17 navigation locks. Blueback herring have also been reported in Lake Champlain (Carlson et al., 2016), which requires passage through 13 navigation locks on the Champlain Canal to reach this waterbody.

Similar to American eel, blueback herring are depleted and at historically low abundance levels due to a variety of factors such as the loss of spawning habitat associated with dam construction, overfishing, habitat degradation, ocean bycatch mortality, and pollution (Eakin et al., 2016). However, there are some signs that the condition of the Hudson River stock is improving, as the most recent estimates of stock abundance exhibited an increasing trend from 2006 to 2015,[43] and mean fish length has increased since 2012 in the Hudson River (Eakin et al., 2016). The current Sustainable Fisheries Management Plan for New York River Herring Stocks, approved by the Atlantic States Marine Fisheries Commission (ASMFC) in 2017,[44] does not specifically call for the installation of fish passage facilities to aid the recovery, or improve habitat access, of the Hudson River stock of blueback herring.

Blueback herring are anadromous and spend most of their adult life at sea but return to freshwater (often the same river system in which they were born) to spawn. Mature fish, 3 to 4 years old, typically arrive in the Hudson River in April and spawn through early June, quickly leaving the system after spawning and returning to the ocean (ASMFC, 2017b). Juvenile blueback herring spend their first summer in freshwater

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[43] http://www.asmfc.org/species/shad-river-herring

[44] http://www.asmfc.org/files/RiverHerringSFMPs/NY_RiverHerringSFMP_2017.pdf

rearing habitats and migrate to the ocean in the fall, generally in September or October in New York.

A total of 635 blueback herring (406 adults and 229 juveniles) were captured during the fishery surveys conducted at the Upper Mechanicville Project in 2017. All but two fish were captured by boat electrofishing.[45] No adults were captured during the April or September surveys, as most adults (91 percent) were captured in late May (May 24 through May 31), with the remainder captured in late June and early July. The relative abundance of adult blueback herring was higher upstream of the project (64 fish per hour) than downstream (34 fish per hour). Adults were collected within Lock C3 as well as the navigation lock (Lock C4) at the upstream Stillwater Project. Adults ranged in size from 7.9 to 11.9 inches and had a mean length of 10.2 inches. Juvenile blueback herring (229 individuals) were only captured upstream of the project dam during the September survey. The presence of juveniles in the project impoundment demonstrates that successful spawning occurs upstream of the Upper Mechanicville Project. In addition, the seasonal pattern of occurrence of blueback herring at the project is consistent with the life history of this species—that is, adults are present in rivers during a fairly short window coinciding with their late spring to early summer spawning run, with juvenile fish present during the summer months before they migrate to the ocean in the fall.

3.3.2.2 Environmental Effects

Effects of Project Operation on Water Quality

The operation of hydropower projects can affect water quality in numerous ways, including a reduction in downstream DO levels by releasing water through the powerhouse that is drawn from the bottom layers of stratified impoundments or reservoirs containing low DO concentrations. These potential effects are most pronounced during the summer because this is when stratification is most common due to the heating of surface waters, flows are lower, which results in less spillage and associated re-aeration of water passed downstream, and lastly, because warm water cannot hold as much oxygen as cooler waters.

During the navigation season (mid-May through mid-October), NYSEG proposes to continue operating the project in a ROR mode and maintaining the project impoundment at an elevation of 72.6 feet, except when the Canal Corporation requests adjustments (lowering or raising) of impoundment levels to support navigation. During the remainder of the year (non-navigation season), NYSEG proposes to continue operating the project in a ROR mode to maintain a stable impoundment elevation of 72.6

[45] Two blueback herring were captured by gill nets deployed downstream of the project.

feet. As evidenced by their execution of the Settlement Agreement, New York DEC, FWS, and TU support NYSEG's proposed mode of project operation.

Staff Analysis

The Water Quality Study conducted by the applicant demonstrated that current project operation has little effect on water quality as water temperature and DO levels were similar upstream and downstream of the project dam and were consistent with state water quality standards. In particular, DO levels downstream of the dam ranged from 7 mg/L to 10 mg/L during the summer, which is well above state standards. These relatively high DO levels are likely due to the lack of stratification in the shallow project impoundment and the frequent spillage and re-aeration that occurs during the navigation season when surface waters of the impoundment are spilled over the crest gates, on a nearly daily basis, to draw down the impoundment in support of navigation. As described above in section 3.1.2.2, *Affected Environment, Water Quality*, the PCB hotspot just upstream of the powerhouse was dredged, capped, and backfilled in 2014; thus, the release of any remnant PCBs from this remediated hotspot, due to project operation, is unlikely. Therefore, continuing to operate the project with no changes, as proposed by the NYSEG, would not be expected to result in any project-related changes in water quality conditions, which appear suitable at this time for aquatic biota in the project area.

Seasonal Minimum Flow

The operation of hydropower projects often results in large diversions of water through a powerhouse and away from the natural river channel. Without flow augmentation (e.g., a minimum flow) or substantial leakage, portions of the bypassed reach—the stretch of river between the point of diversion and where the powerhouse discharge re-enters the natural river channel—can become dewatered, thereby potentially reducing habitat suitability and water quality for aquatic resources.

As described in section 3.2 of the Settlement Agreement, within 1 month of license issuance, or the effective date of any license issued for the project, whichever is later, NYSEG proposes to provide a minimum flow of 45 cfs, or inflow to the project, if less, into the bypassed reach on a seasonal basis from April 1 through November 30.[46] This minimum flow would be released through the project's sluice gate, via spill, or through the downstream eel bypass (once operational). As stated in NYSEG's response to FERC's additional information request on the Settlement Agreement, the primary

[46] Due to the project's large drainage area, it is highly unlikely that project inflows would ever be as low as 45 cfs because the lowest daily average flow observed across 112 years of available data (from 1887 through 2019) was 600 cfs, based on pro-rated flow data from USGS gage No. 01335754 near Waterford, New York.

purpose of this seasonal minimum flow is to support downstream habitat by keeping water circulating in the bypassed reach.

As evidenced by their execution of the Settlement Agreement, New York DEC, FWS, and TU support NYSEG's proposed seasonal minimum flow of 45 cfs.

Staff Analysis

As discussed in section 3.3.2.1, *Affected Environment, Aquatic Habitat,* the river channel downstream of the project dam, including the bypassed reach, is mostly (99 percent) inundated when the project is operating, but not spilling any water, due to a backwatering effect from the downstream Mechanicville Project. In addition, favorable water quality conditions exist downstream of the project dam during summer based on both continuous and discrete water quality monitoring (see section 3.3.2.1, *Affected Environment, Water Quality*). For instance, DO levels in the bypassed reach ranged from 8.73 mg/L to 9.28 mg/L during the fishery surveys conducted in late May and late June. NYSEG does not describe or discuss the expected changes in habitat quantity or water quality associated with its proposed 45-cfs minimum flow, as compared to a baseline (no spill) condition. Regardless, there appears to be minimal benefits of releasing a 45-cfs minimum flow into the bypassed reach on a seasonal basis, because this flow may only result in a 1 percent increase in wetted habitat and DO levels downstream of the project dam are already well above state standards due to a lack of impoundment stratification and frequent spillage into the bypassed reach during navigation-related impoundment drawdowns.

Stream Flow and Water Level Monitoring

As described in section 3.4 of the Settlement Agreement, NYSEG proposes to develop a stream flow and water level monitoring plan to verify the impoundment elevations, rate of impoundment elevation change, and seasonal minimum flow (45 cfs) proposed in the Settlement Agreement. The plan would include provisions for monitoring and keeping records of these variables (to be measured in 15-minute to 1-hour intervals) and for the exchange of information contained in the records among the parties. The plan would be developed in consultation with, and approved by, New York DEC and FWS. NYSEG would file the plan with the Commission within 6 months of the issuance date, or effective date, of any new license issued for the project, whichever is later. Any gages or other monitoring equipment required by the plan would be installed and operational within 18 months of license issuance.

As evidenced by their execution of the Settlement Agreement, New York DEC, FWS, and TU support NYSEG's proposed development and implementation of a stream flow and water level monitoring plan.

Staff Analysis

The development and implementation of compliance monitoring plans, such as NYSEG's proposed stream flow and water level monitoring plan, help ensure that environmental measures are being met and achieving their intended purpose. Therefore, NYSEG's proposed stream flow and water level monitoring plan would aid compliance with any measures contained in the Settlement Agreement that are required by any new license issued for the project.

Effects of Impoundment Fluctuations on Centrarchid Spawning

Water level fluctuations associated with the operation of hydropower projects can result in changes in water depth and expose shoreline areas where fish such as centrarchids spawn and rear their young. Depending on their magnitude, frequency, and seasonality, such fluctuations may affect the spawning success of centrarchids in numerous ways, such as: reducing the amount of stable spawning habitat, causing males to abandon the nests they are guarding, or resulting in direct mortality of eggs and larvae via desiccation (Clark et al., 2008).

During the navigation season (mid-May through mid-October), NYSEG proposes to operate the project in a ROR mode and maintain the impoundment at an elevation of 72.6 feet, except when the Canal Corporation requests adjustments (lowering or raising) of impoundment levels to support navigation.

As evidenced by their execution of the Settlement Agreement, New York DEC, FWS, and TU support NYSEG's proposed mode of operation and management of water levels in the impoundment.

Staff Analysis

Centrarchids spawn in shoreline areas from May through July, which coincides with the first half of the navigation season, when the project impoundment is frequently drawn down to support navigation. As described above in section 3.3.2.1, *Fishery Resources,* most centrarchid nests (84 percent) were found in the lower impoundment drawdown zone, which is only exposed when the impoundment is drawn down below an elevation of 69.1 feet, which occurs infrequently at the project. Specifically, across a 13-year period from 2003 through 2015, the impoundment was drawn down below an elevation of 69.1 feet a total of 11 times during the centrarchid spawning season (May 1 through July 31), with no more than two such drawdowns in any year. In addition, the presence of juvenile centrarchids (less than 4 inches long) and abundance of adults in the project impoundment (table 3) indicate that successful spawning and recruitment to the adult population is occurring. Therefore, NYSEG's proposal to continue its current mode

of operation would be expected to largely maintain, and provide spawning opportunities for, the existing centrarchid populations in the project impoundment.

Upstream Passage of American Eel

While some dams may not represent a complete barrier to the upstream migration of American eel due to the species' climbing ability (particularly small eels), dams often limit the access of eels to portions of their historical freshwater feeding and growth habitats, which may ultimately affect growth rates, sex ratios, and the potential reproductive output (fecundity) of silver eels from a river system.

As described in section 3.3 of the Settlement Agreement, NYSEG proposes to install and operate an eel ladder in the project's tailrace on a seasonal basis, from April 1 through November 30 of each year, beginning with the 2023 migration season, to improve upstream passage opportunities for American eel. The preliminary design of the eel ladder is provided in Appendix C of the Settlement Agreement and consists of a helical eel ramp that would be placed in the project tailrace, where powerhouse discharge would serve as attraction flow. The ladder would terminate in a trap, where eels would be collected and released upstream either manually or through an automated system. The final design of the eel ladder would be based on consultation with FWS and New York DEC. NYSEG proposes to submit the final design plans for the eel ladder to the Commission for final approval. Immediately following the installation of the upstream eel ladder, NYSEG would conduct field measurements of water velocities, attraction flows, and other relevant variables to ensure compliance with the FWS fish passage engineering design criteria that are in place at the time of installation.[47] Reports containing these field measurements would be provided to FWS and New York DEC within 9 months of any structure installation and filed with the Commission within 12 months of any structures being installed.

As evidenced by their execution of the Settlement Agreement, FWS, New York DEC, and TU support NYSEG's proposal to install upstream eel passage at the project.

Staff Analysis

While some eels are currently able to pass upstream of the project dam, either through the navigation locks or by climbing over or along wetted surfaces, the project appears to impede the upstream migration of American eel given that eel abundance is higher downstream of the project than upstream. Specifically, the relative abundance of eels was more than three times higher downstream of the project dam (3.4 eels per hour) than upstream (1.0 eel per hour) during the eel surveys conducted in June and July of

[47] https://www.fws.gov/northeast/fisheries/pdf/USFWS-R5-2019-Fish-Passage-Engineering-Design-Criteria-190622.pdf

2017. In addition, eels were only captured downstream of the project dam during the September 2017 fish community survey.

Eels smaller than 5.7 inches, a size range typically considered as elvers,[48] were not captured at the project, which could be related to gear selectivity. Catch data from boat electrofishing surveys are likely biased towards larger individuals (i.e., yellow and silver eels) due to the fact smaller fish are less susceptible to electrofishing in general (Reynolds, 1996) and any elvers that float to the surface are likely difficult to identify and net from a boat due to their small size. Two nighttime spotlight surveys were conducted along wetted surfaces of the dams and locks at the Upper Mechanicville Project and upstream Stillwater Project on the evenings of June 28, 2017, and July 5, 2017, respectively. Spotlighting has been successful at evaluating the presence and distribution of upstream migrating elvers at other hydroelectric projects (e.g., as part of siting studies to inform the optimal placement of eelways).[49] However no elvers were observed during the two spotlight surveys, but this could be due, in part, to the limited sampling effort associated with these ancillary surveys (just one sampling date at each location) rather than the absence of elvers. Therefore, it is largely unknown whether eels arrive at the project at sizes smaller than those observed in the boat electrofishing surveys (i.e., less than 5.7 inches).

Regardless of whether smaller eels (elvers) are present at the project, the eel surveys confirmed that yellow eels of a size range found to utilize eelways (ramps and ladders) at other dams are indeed present downstream of the Upper Mechanicville Project. Schmidt et al. (2009) found that while most eels (80 percent) that successfully ascended an eel ladder at a non-powered dam at the mouth of Saw Kill, a tributary of the Hudson River, were less than 8 inches and had a mean size of 6 inches, some yellow eels up to 20 inches long used the ladder. At the Millville Project (FERC No. 2343) on the Shenandoah River, eels that passed the eel ladder in the summers of 2004 and 2005 ranged in length from 7.5 inches to 29.1 inches and had a mean length of 12.6 inches (Welsh and Liller, 2013). The mean lengths of eels ascending the eel ladders at the Chambly Dam on the Richelieu River and St. Lawrence-FDR Project (FERC No. 2000) on the St Lawrence River were 15.0 inches and 17.9 inches, respectively, with a size

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[48] https://www.gulfofmaine.org/council/publications/american_eel_high-res.pdf

[49] Final Study Report. Biological and Engineering Studies of American Eel RSP 3.3. Conowingo Hydroelectric Project. FERC Project Number 405. Filed on August 31, 2012. Accession No. 20120831-5011; https://www.aldenlab.com/blog/eel-shining-to-locate-upstream-passage-routes.

range (across projects) of 7.6 inches to 32.8 inches (McGrath et al., 2003; Verdon et al., 2003).

The smaller size mode of eels found downstream of the Upper Mechanicville Project (6 inches to 20 inches) is well within the reported size range of yellow eels successfully ascending eel ladders at other dams.[50] In addition, although some eels may pass upstream of the project through the navigation locks, the locks operate mostly during the day, while eels are highly nocturnal and move predominantly at night. Therefore, installing an appropriately designed eel ladder at the project, in consultation with FWS and New York DEC, as proposed by NYSEG in the Settlement Agreement, would improve eel access to an additional 1.8 miles of mainstem habitat on the Hudson River (upstream to the Stillwater Project) and an additional 11.0 miles of tributary habitat (up to the first dam without eel passage, the James H. Thompson Project) on the Hoosic River. Tributaries in the Hudson River watershed have been shown to constitute important refuge and growth habitats for yellow eels in the Hudson River watershed (Machut et al., 2007). Thus, combined with the appropriate downstream protection measures (see below), this improved access to feeding and growth habitats could lead to increased spawning escapement and reproductive output of silver eels from the Hudson River.

NYSEG proposes to operate the eel ladder from April 1 through November 30. This operation window is adequate for passage purposes as it encompasses the expected upstream migration period for American eel in the Hudson River. For example, Schmidt et al. (2009) deployed eel ladders in the Saw Kill tributary of the Hudson River from April 15 through October 29 in 2006 and from April 30 through October 29 in 2007, and found that elvers and yellow eels passed the ladder from May 15 through September 18 in 2006 and May 26 through October 13 in 2007.

Installing the eel ladder by the start of the 2023 migration season, as proposed in the Settlement Agreement, should provide sufficient time for NYSEG to finalize the design of the upstream eel ladder, based on consultation with FWS and New York DEC. An appropriately designed and placed eel ladder would ensure the structure passes American eel upstream of the project dam in a safe, timely, and effective manner.

Downstream Passage of American Eel

Although there is considerable variability in turbine mortality rates of eels depending on project-specific operating conditions and turbine specifications (e.g., turbine type, rotation speed, and blade number), eels entrained at hydropower projects generally experience higher turbine (blade strike) mortality than other fish species. The

[50] Appendix C of the Settlement Agreement, indicates the preliminary upstream eelway design is a helical eel ramp that contains multiple peg spacings to accommodate a wide size range of eels, including elvers.

higher mortality of eels is due to their unique body shape as they are relatively long for their weight, compared to other fish species. A common protection measure for eels at hydropower projects in the eastern U.S. is the installation of trash racks with a clear-spacing (0.75-inch or 1-inch) that physically excludes large silver eels during their downstream fall migration and routes them towards a non-turbine route of passage (e.g., a low-level outlet or surface bypass).

As described in section 3.3 of the Settlement Agreement, NYSEG proposes to install a downstream eel passage system at the project by September 30, 2025, to protect and provide safe passage for eels that are migrating downstream towards the ocean to spawn. The system would consist of new permanent trash racks with a 0.75-inch clear spacing and a non-turbine route of passage (downstream bypass) that would be operated seasonally from ice out (mid- to late-March) through November 30. The design of the downstream passage system would be based on FWS's passage design criteria and consultation with FWS and New York DEC. NYSEG proposes to provide the conceptual/preliminary design to the agencies in October 2021 for review and comment, and the 60 and 100 percent designs in April 2023 and October 2023, respectively. NYSEG proposes to submit the final design plan (approved by the FWS and New York DEC) to the Commission, for final approval, in December 2023. Immediately following installation of the downstream eel passage system, NYSEG would conduct field measurements of conveyance flows, plunge pool depths, and other relevant variables to ensure compliance with the FWS's fishway passage design criteria that are in place at the time of installation. Reports containing these field measurements would be provided to FWS and New York DEC within 9 months of any structures being installed and filed with the Commission with 12 months of any structure installation.

As evidenced by their execution of the Settlement Agreement, FWS, New York DEC, and TU support NYSEG's proposal to install a downstream eel passage system at the project.

Staff Analysis

The project's current configuration does not prevent the entrainment of eels. Given the wide trash rack spacing (5.5 inches clear) and the tendency for silver eels to follow the bulk flow during their downstream migration (Jansen et al., 2007), most silver eels likely pass through the project's turbines, and to a lesser extent through the navigation locks or over the dam during spill events (spill occurs about 15 percent of the time during the peak downstream migration period, October through November). Based on the blade strike models performed as part of the Fish Protection and Passage Study, the survival of silver eels passing through the project turbines is expected to range from 87.4 percent (for large mature females 42 inches long) to 95.8 percent (for 14-inch males). These model-based estimates of turbine survival agree well with field-based estimates (92 to 93 percent turbine survival) obtained by releasing balloon-tagged silver

eels through turbines with similar characteristics to those at the Upper Mechanicville Project. Specifically, the Kaplan turbines at the projects tested in the balloon-tagging studies had rotational speeds ranging from 88 revolutions per minute (rpm) to 94 rpm and four runner blades (Heisey et al., 2019); the Kaplan turbines at Upper Mechanicville also have 4 blades but rotate at a slightly lower speed (72 rpm).

Under NYSEG's proposal, the trash rack spacing at the project (clear-spacing between the bars) would be reduced from 5.5 inches to 0.75-inch. This reduction in trash rack spacing would result in the physical exclusion of eels longer than 20.3 inches from the project's turbines (table 5). The excluded eels would be passed downstream through a non-turbine route of passage (i.e., downstream bypass). Some silver eels smaller than 20 inches would still be susceptible to turbine mortality if the proposed downstream eel passage system were installed. However, due to the size differences between sexes noted above (females are larger than males as described in section 3.3.2.1, *Affected Environment, Fishery Resources*), most of the silver eels that would be physically excluded from the turbines would be egg-bearing females, which are the source of new recruits (young eels) to the population. As in most fishes, fecundity increases with size, and large female eels (29 to 34 inches long) can produce 2.7 million to 10.2 million eggs (Goodwin and Angermeier, 2003). Therefore, installing an appropriately designed downstream eel passage system, as proposed in the Settlement Agreement, could result in up to a 12 percent increase in spawning escapement of female silver eels from the Hudson River and provide an additional source of recruits to the declining American eel population.[51]

As discussed above, American eel do not begin maturing until they are at least 3 to 4 years old. Therefore, installing the downstream eel passage system by September 30, 2025, as proposed in the Settlement Agreement, would protect and provide downstream passage for any yellow eels that previously migrated through the proposed upstream eel ladder (spring 2023) and have since matured and are seeking downstream passage. The proposed installation date (September 30, 2025) would also allow sufficient time for any design modifications to be made that are deemed necessary based on consultation with the agencies and approved by the Commission.

The proposed operation season for the downstream bypass (mid- to late-March through November 30) is longer than necessary to encompass the peak downstream migration season of silver eel in New York (October and November, as shown in figure 7). Nevertheless, operating the downstream bypass during the spring and summer could

[51] The estimated 12 percent increase in spawning escapement is based on the turbine mortality of the largest eels (42-inch females) expected to migrate downstream through the project from upstream areas.

provide some additional protection (from turbine mortality) for resident fish and downstream passage opportunities for adult blueback herring, as described below.

Table 5. Minimum sizes (total length, in inches) of fish species physically excluded by the project's current trash racks (5.5-inch clear spacing) and proposed trash racks (0.75-inch clear spacing). Fish exclusion sizes were based on body scaling factors relating body width to fish length as reported in Smith (1985). (Source: license application, as modified by staff).

Species	Reported maximum length (inches)	Minimum sizes excluded from:	
		5.5-inch trash racks	0.75-inch trash racks
Migratory			
American eel	42.0	NE[a]	20.3
Blueback herring	10.0	NE	5.8
Resident			
Northern pike	40.0+	NE	9.6
Black crappie	21.0	NE	7.6
Freshwater drum	37.0	NE	6.9
Northern hog sucker	7.0	NE	6.7
Yellow perch	15.0	NE	6.6
Walleye	36.0	NE	6.0
Smallmouth bass	24.0	NE	5.9
Fallfish	17.0	NE	5.8
Bluegill	12.0	NE	5.7
Largemouth bass	26.0	NE	5.6
Spottail shiner	5.8	NE	5.4
White sucker	28.0	NE	5.1
Channel catfish	40.0+	35.3	4.8
Rock bass	15.0	NE	4.8
Common carp	40.0	34.0	4.6
Common shiner	5.0	NE	NE
Emerald shiner	5.0	NE	NE

[a] 'NE' indicates the species is not excluded by the trash rack spacing because the minimum exclusion size is greater than the species maximum reported length in Smith (1985).

Fish Entrainment and Impingement

The passage of large volumes of water through trash racks and turbines can result in fish impingement and entrainment mortality at hydropower projects. Blade strikes are thought to be the primary source of mortality for fish entrained through hydropower projects (Franke et al., 1997; Pracheil et al., 2016). Fish size plays an important role in entrainment susceptibility and turbine mortality, whereby smaller fish are more likely to be entrained, but experience lower turbine mortality, although the physical properties of turbine units also play a role in turbine mortality (Winchell et al., 2000; Čada et al., 1997; Pracheil et al., 2016).

As described in section 3.3 of the Settlement Agreement, NYSEG proposes to install a downstream eel passage system by September 30, 2025, consisting of permanent trash racks with a smaller clear spacing (0.75-inch) than the existing trash racks (5.5-inch clear spacing) and a downstream bypass that would be operated from ice out (mid- to late-March) through November 30.

As evidenced by their execution of the Settlement Agreement, FWS, New York DEC, and TU support NYSEG's proposal to install new trash racks with a 0.75-inch clear spacing at the project.

Staff Analysis

The trash racks that are currently in place at the project have a clear spacing of 5.5 inches and would only exclude a few large-bodied species from the project turbines. Specifically, common carp and channel catfish exceeding 34 inches and 35 inches in length, respectively, would be the only adults physically excluded from the project's existing trash racks (table 5). It is unlikely that adult catfish and carp of these sizes would be impinged on the project's trash racks because their burst swimming speeds of 8 feet per second (fps) and 14 fps, respectively, are much greater than the maximum approach velocity at the project of 2.98 fps.

Although the adults of other fish species present in the project impoundment could physically pass through the existing trash racks based on their body size alone, the adult stages of these species can likely avoid entrainment because their burst swimming speeds are greater than the maximum approach velocity and range from 3.5 fps (smallmouth bass) to 13.0 fps (northern pike). Meanwhile, some juveniles are susceptible to entrainment because their burst swimming speeds (1.8 fps to 4.3 fps, across species) are less than or overlap with the maximum approach velocity.[52] Nevertheless, given their small body size and the relatively low rotational speed of the project's turbines (72 rpm),

[52] Burst swimming speeds were obtained from table 3-6 of the Revised Initial Study Report, which is included in Appendix B of the final license application.

any juveniles that are entrained should experience relatively high survival through the turbines. Juveniles collected in the project impoundment during September 2017 (smallmouth bass, largemouth bass, and yellow perch) were generally 2 inches to 4 inches long. The blade strike modeling conducted as part of NYSEG's Fish Protection and Passage Study predicts that fish in this size range would experience high survival through the project's turbines, ranging from 97.3 percent to 99.3 percent.

While the primary purpose of NYSEG's proposal to install trash racks with a smaller clear spacing (0.75-inch) is to physically exclude large American eels, this measure would also affect the entrainment and impingement potential of other fish species. The 0.75-inch trash racks would physically exclude most adult fish present in the project impoundment, except for shiners, which do not attain large sizes (table 5). Nevertheless, as discussed above, most adults can avoid entrainment and impingement based on their swimming ability alone, regardless of the trash rack spacing (0.75-inch or 5.5-inches). Therefore, the deployment of 0.75-inch trash racks would not be expected to alter the entrainment or impingement potential of resident adult fish at the project compared to existing conditions.

Compared to the existing trash racks, the proposed 0.75-inch trash racks would physically exclude and reduce the entrainment of juveniles and sub-adults in the 5-inch to 8-inch length range (table 5). Based on the blade strike models, the expected turbine mortality of fish in this size range is 0.9 percent to 3.5 percent. Therefore, by excluding these individuals from the turbines, the new 0.75-inch trash racks could increase the survival of this size group by up to 3.5 percent. However, this small increase in survival could be offset by an increase in impingement mortality on the smaller-spaced 0.75-inch trash racks. Juvenile centrarchids and yellow perch in the 4-inch to 6-inch size range have burst speeds ranging from 2.4 fps to 3.6 fps. The project inflow that would result in an approach velocity exceeding the burst swimming speeds of juveniles in this size range (2.4 fps), assuming all inflow is passed through the powerhouse, is 9,677 cfs. Project inflows only exceed this value approximately 30 percent of the time on an annual basis. Therefore, any increase in impingement mortality associated with the smaller-spaced trash racks would likely be minor and only an issue when the project is operating at the upper end of its capacity and passing flows of approximately 10,000 cfs to 12,000 cfs through the powerhouse.

In contrast to the resident fish species described above that may become incidentally entrained or impinged when they are in the vicinity of the trash racks and project intakes (e.g., during feeding periods), diadromous[53] fish such as American eel and

[53] Diadromous species migrate between the ocean and freshwater for the purpose of reproduction, and includes both anadromous (e.g., blueback herring) and catadromous species (e.g., American eel).

blueback herring have a greater migratory urge than resident species because they must migrate past dams and hydropower projects to complete their life cycle. As such, migratory species are more susceptible, in general, to entrainment and impingement than resident freshwater species. The effects of the proposed 0.75-inch trash racks on American eel are discussed above in section 3.3.2.2, *Environmental Effects, Downstream Passage of American eel*.

During their downstream migration, juvenile clupeids, such as blueback herring follow the bulk flow (i.e., water entering the powerhouse) at hydropower projects (Kynard, 1993; Desrochers *et al.*, 1993). Given this behavior and the fact that juvenile blueback herring are small enough[54] to fit through both the proposed (0.75-inch) and existing (5.5-inch) trash racks (table 5), the installation of 0.75-inch trash racks would not be expected to result in a change in entrainment mortality or delay the downstream migration of juvenile blueback herring, many of which likely migrate downstream through the project powerhouse.

The mean length of adult blueback herring collected at the project was 10.2 inches, and all adults were greater than 7.8 inches long. Adults of this size range could easily pass through the existing 5.5-inch trash racks but would be physically excluded by the 0.75-inch trash racks (table 5). As such, adult blueback herring attempting to move downstream through the powerhouse could experience some delay in their downstream migration (i.e., until they are able to locate an alternate route of passage via Lock C3 or spill). Although NYSEG does not indicate what type of downstream bypass it would provide for eels (e.g., a new low-level outlet or the existing sluice gate), the bypass would be operated from ice out (mid- to late-March) through November 30, which encompasses the downstream migration period of adult blueback herring (late May through early July). Therefore, if blueback herring are able to use the downstream eel bypass, this could help minimize any such migration delays by providing an additional route of passage for adults that attempt to move downstream through the powerhouse but are prevented from doing so by the 0.75-inch trash racks. By excluding adult blueback herring from the turbines, the 0.75-inch trash racks would essentially eliminate turbine mortality for adults of this species, which is expected to range from 1.8 percent to 4.4 percent based on the blade strike model.

Upstream Fish Passage (General)

Dams can restrict access to freshwater spawning habitats that anadromous species, such as blueback herring, depend on to complete their life cycle. The installation of fish

[54] Juvenile blueback herring collected in the project impoundment during September 2017 were less than 4 inches long.

passage facilities at dams that impede upstream migration can improve access to spawning habitats for anadromous fish.

As described in section 3.3 of the Settlement Agreement, NYSEG proposes to install upstream fish passage at the project within one year of any upstream fish passage facilities being installed at the downstream Mechanicville Project. The upstream fishway would be designed in consultation with FWS and New York DEC and would be of a similar design and type to that installed at the downstream Mechanicville Project. Following the installation of the upstream fishway, NYSEG would conduct field measurements of water velocities, attraction flows, and other relevant variables to ensure compliance with FWS's fishway passage design criteria in place at the time of installation. If deemed necessary through consultation with FWS and New York DEC, passage effectiveness studies of the fishway could be conducted.

As evidenced by their execution of the Settlement Agreement, New York DEC, FWS, and TU support NYSEG's proposed future installation of an upstream fishway at the Upper Mechanicville Project.

Staff Analysis

NYSEG does not explicitly state which fish species the upstream fishway would be designed for, or benefit. However, it does note, in its letter responding to staff's additional information request on the Settlement Agreement, that "…blueback herring and American shad are the two primary [anadromous] species of interest to the agencies [FWS and New York DEC]." American shad appear to be rare in the project vicinity. Just 2 individuals were captured downstream of the project dam during 22.11 total hours of boat electrofishing conducted upstream and downstream of the dam from mid-April through early July in 2017, which equates to a relative abundance of 0.09 American shad per hour of electrofishing. Due to their rarity at the project, American shad would appear to benefit little, at this time, from the installation of an upstream fishway. Therefore, we focus our analysis herein on blueback herring.

Adult blueback herring appear to be relatively abundant in the project area during the spawning season, as 374 individuals were captured during 8.1 hours of boat electrofishing (46 fish per hour) during late May. Because there are no upstream passage facilities at any of the downstream dams on the mainstem Hudson River, these adults would have had to pass through three navigation locks (the lock at Green Island, Lock C1 at Waterford, and Lock C2 at the Mechanicville Project) to reach the Upper Mechanicville Project (*see* figure 1). Blueback herring are also able to successfully pass through Lock C3 at Upper Mechanicville as 217 adults (71.9 fish per hour) were captured upstream of the project dam. The remaining 157 adults (30.1 fish per hour) that were captured downstream of the dam or within Lock C3 itself, could represent individuals that have already spawned and are moving downstream, fish that are still attempting to

migrate upstream, individuals that may spawn downstream of the project dam (i.e., between the Mechanicville and Upper Mechanicville projects), or some combination thereof.

Although the dependency on navigation locks for fish passage could cause some delays in migration (i.e., passage can only occur when the locks are operated), lockages at the project are fairly frequent during the blueback herring upstream migration season, with five to eight lockages per day, on average, during May and June. Therefore, given these passage opportunities and demonstrated ability of blueback herring to use navigation locks to migrate through the project area, there appears to be minimal benefit to installing upstream passage for blueback herring at the project at this time, or conditionally, in the future, as proposed by NYSEG (i.e., if upstream passage is installed at the downstream Mechanicville Project).

Fishway Operation and Maintenance Plan

To maintain the effectiveness of fish passage facilities, fishways need to be properly operated and maintained. Most fishways require routine maintenance to ensure the fishways operate effectively.

As described in section 3.3.3 of the Settlement Agreement, NYSEG proposes to develop a fishway operation and maintenance plan and submit the plan to FWS and New York DEC for approval within 2 years of license issuance, or the effective date of the license, whichever is later. NYSEG would file the plan with the Commission within 2 months of approval by the FWS and New York DEC. The plan would include a description of the fishway measures associated with the project, an implementation schedule for the fishways, and operation and maintenance procedures. A fishway operation and maintenance report would be provided on an annual basis to FWS and New York DEC by February 28, and filed with the Commission by April 30, beginning with the first full calendar year following the filing of the fishway operation and maintenance plan with the Commission. The annual report would include a summary of the current status of the project's fishways (structures, flows, etc.) and any issues (deviations, delays in timing of installation, etc.), as well as the counts of eels captured in the upstream eel ladder and released upstream (either manually or via an automated system, to be determined during the design phase).

As evidenced by their execution of the Settlement Agreement, New York DEC, FWS, and TU support NYSEG's proposal to develop and implement a fishway operation and maintenance plan for the project.

Staff Analysis

An operation and maintenance plan would ensure that any fishways required to be installed or constructed at the project would operate during the appropriate times of the

day and year, and with appropriate conveyance and attraction flows.[55] In addition, the plan would ensure that routine cleaning and maintenance, including debris removal, are performed so that the fishways operate as intended. The submission of an annual report to the resource agencies and Commission would confirm the target species are utilizing the fishways and also afford a more thorough understanding of the hydrologic and environmental factors affecting fish passage, which could be used to improve the effectiveness of the fishways, if deemed necessary in the future by the resource agencies and approved by the Commission.

3.3.2.3 Cumulative Effects on Aquatic Resources

Water Quantity

NYSEG proposes to continue its current mode of operation, including frequent impoundment drawdowns (typically once per day during the navigation season) to support navigation activity on the Champlain Canal. At any point in time during the navigation season, project outflow may exceed project inflow (when the impoundment is being lowered) or project outflow may be less than project inflow (when the impoundment is being refilled). While not a strict instantaneous ROR mode of operation, over the course of a day these temporary modifications to impoundment water levels likely balance each other out such that daily outflow from the project approximates daily inflow. As described in section 2.1.4, *Existing Project Operation and Environmental Measures*, NYSEG would also implement procedures to ensure the continuity of downstream flow in the Hudson River when the impoundment is being refilled and during station trips. There is one water withdrawal facility 0.6 RM downstream of the project, but the magnitude of this withdrawal is very small (1.67 cfs) compared to the river flow and is likely offset by discharges from the wastewater treatment plant at the upstream Stillwater Project. Therefore, there is no indication that continuing to operate the Upper Mechanicville Project as proposed by NYSEG (with no operational changes) would add to the cumulative effects on water quantity that have occurred or may occur in the future due to any new activities in the Hudson River.

Water Quality

As described above in section 3.3.2.1, *Affected Environment, Water Quality*, existing water quality conditions at the project are consistent with state water quality standards. These favorable water quality conditions are likely due to the lack of

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[55] Although the final attraction and conveyance flows of the fishways would be determined in consultation with FWS and New York DEC, section 3.3.1.3 of the Settlement Agreement indicates that the flow provided through the downstream eel bypass (to attract fish towards the bypass) would be about 600 cfs when the project is operating at its maximum hydraulic capacity of 12,000 cfs.

stratification in the shallow project impoundment and the frequent spillage that occurs during the summer in association with the impoundment drawdowns that are made to support navigation. Although NYSEG proposes to release a minimum flow of 45 cfs into the bypassed reach from April 1 through November 30 to increase water circulation in this area, DO levels are already well above state standards and near saturation downstream of the project dam. Therefore, NYSEG's proposal to continue its current project operation, with the addition of a 45-cfs seasonal minimum flow, should maintain, but would not necessarily enhance, the already favorable water quality conditions that exist at the project. As such, the project's contribution to cumulative effects on water quality in the Hudson River would be minimal.

American Eel Migration

Restoration efforts to recover the depleted stock of American eel are ongoing and include efforts to improve upstream and downstream passage opportunities for eels in order to increase the number of adults that are able to migrate from freshwater and estuarine habitats to the ocean to spawn (i.e., increased spawning escapement), which in turn, could help curb further declines in juvenile recruitment and overall stock abundance (ASMFC, 2008). As described in section 3.3.2.2, *Environmental Effects, Upstream Passage of American Eel,* NYSEG's proposal to install an upstream eel ladder at the project would improve access to growth and feeding habitats of American eel. Specifically, the eel ladder would improve access to an additional 1.8 additional miles of mainstem habitat and 11.0 miles of tributary habitat (in the Hoosic River) upstream of the Upper Mechanicville Project. In combination with the eel ladder that is required to be installed at the Green Island Project, the installation of an upstream eel ladder at Upper Mechanicville could increase eel abundance upstream of the project. When these eels mature into silver eels attempting to migrate downstream to the ocean to spawn, they would be protected from entrainment mortality at the project under NYSEG's proposal to install new trash racks with a clear spacing of 0.75-inch, which would physically exclude eels and route them toward a non-turbine route of passage (i.e., downstream bypass). In combination with the operation of downstream passage facilities for eels that are either in place (Stillwater), or required but not yet installed at other nearby projects (Mechanicville and Green Island), the installation of a downstream eel passage system at the Upper Mechanicville Project should help increase spawning escapement of silver eels from the Hudson River. Therefore, we conclude NYSEG's proposals to install upstream and downstream passage for American eel at the Upper Mechanicville Project, in combination with passage opportunities at nearby hydropower projects, is consistent with ongoing restoration efforts and would result in an overall positive cumulative effect on American eel migration and habitat access in the Hudson River.

Blueback Herring Migration

As described above in section 3.3.2.1, *Affected Environment, Fishery Resources*, it is well known that adult blueback herring migrate upstream through navigation locks to reach freshwater spawning habitats in the Hudson River watershed. Fisheries survey data collected during the upstream migration period indicate the project does not significantly impede the upstream migration of blueback herring as adults were more abundant upstream of the project dam than downstream and adults were also captured within the project lock itself (Lock C3). Although NYSEG proposes to install upstream fish passage for the migration of fish species within the Hudson River, it does not indicate what species the general upstream fishway would be designed for, or benefit. Moreover, there is no certainty as to when, or if, the proposed fishway would be installed given the conditional nature of NYSEG's proposal to install the upstream fishway within 1 year of upstream passage being provided at the downstream Mechanicville Project. There are currently no requirements to install upstream fish passage facilities at the Mechanicville Project. Therefore, we conclude that NYSEG's proposal to conditionally provide upstream passage at the project would contribute minimally to cumulative effects on blueback herring migration in the Hudson River given the species' documented ability to successfully migrate through navigation locks and the unknown type, operation period, and installation timing of NYSEG's proposed upstream fishway.

As discussed in section 3.3.2.2, *Environmental Effects*, *Fish Entrainment and Impingement*, NYSEG's proposal to install trash racks with a smaller (0.75-inch) clear spacing would physically exclude adult blueback herring from the project's turbines. While possibly resulting in a small increase in overall survival of up to 3.5 percent (because fish would be no longer susceptible to turbine mortality), the physical exclusion of adults could delay their downstream migration, which generally occurs from late May through early July in the Hudson River. The proportion of adult blueback herring that attempt to migrate downstream through the project's powerhouse relative to other routes of downstream passage is unknown. While the migration of adults seeking downstream passage through the powerhouse could be delayed, other routes of downstream passage are available via the project lock and spill. In addition, NYSEG's proposal to operate a downstream eel bypass from April 1 through November 30, which encompasses the downstream migration period of adult blueback herring in the Hudson River, could provide an additional route of downstream passage, if the bypass is suitable for blueback herring. Therefore, we conclude that NYSEG's proposal to install a downstream eel passage system by September 30, 2025, consisting of trash racks with a smaller (0.75-inch) clear spacing and downstream bypass, would contribute minimally to cumulative effects on blueback herring migration in the Hudson River.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

The Upper Mechanicville Project is located within the Northeastern Coastal Zone's Hudson Valley ecoregion, characterized by a narrow floodplain, irregular valleys, and plains broken by hills and terraces (Bryce et al., 2010).

Upland habitat within the project boundary has been modified by industrial, commercial, and residential development, including facilities associated with the New York State Canal System. The project boundary encompasses about 387 acres,[56] mainly composed of the Hudson River and associated wetland habitat. In addition, residential development and project facilities occupy the remainder of the project boundary.

The primary forest community type, as defined by Edinger et al. (2014), that occurs at the project is successional northern hardwood. This community is described as a mixed forest occurring on sites that have been cleared or otherwise disturbed, and include a dominant layer of aspen, poplar, birch, black cherry, red maple and ash species, and a diverse understory and ground layer. Appalachian oak-hickory forest and pitch pine-scrub oak barren communities also occur in the Hudson Valley ecoregion but are not well represented in the project area.

Wetlands

NYSEG identified approximately 546 acres of National Wetlands Inventory (NWI) mapped wetlands near the Upper Mechanicville Project (figure 9). Wetland habitat present near the project is primarily represented by the impounded Hudson River, classified as limnetic, permanently flooded, lacustrine habitat with an unconsolidated bottom (L1UBHh; 481.5 acres). Associated wetland habitats in the project impoundment include various palustrine forested, scrub-shrub, and emergent wetlands. A 201-acre freshwater wetland parcel, classified by New York DEC as a state-regulated freshwater wetland (ME-34), is located west of the Hudson River.

[56] Estimated by staff, as noted in section 2.1.2, *Existing Project Boundary*.

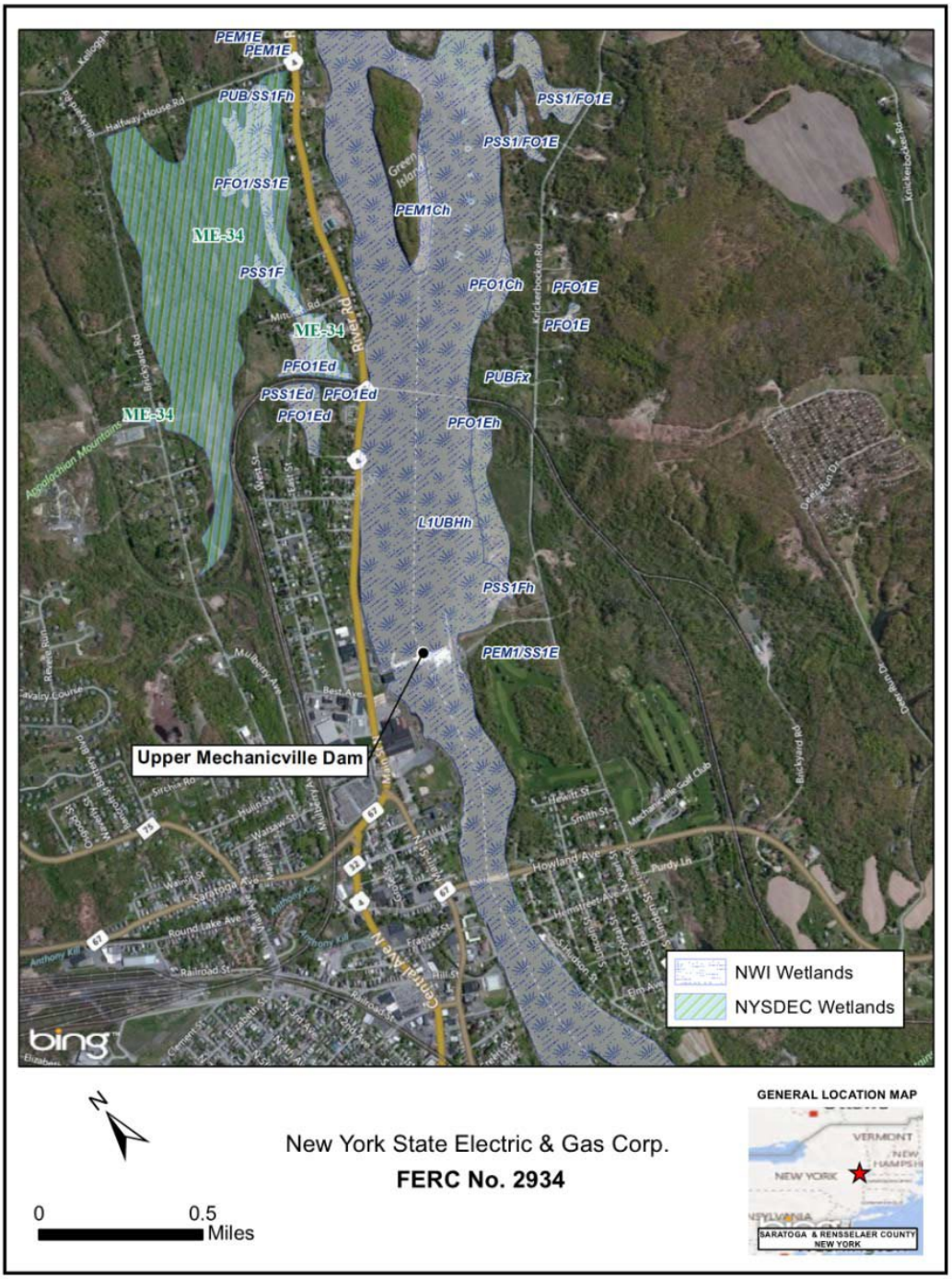

Figure 9. Wetlands in the vicinity of the Upper Mechanicville Project (Source: license application).

Invasive Species

As noted in the license application, several invasive plant species are present within the project area, including purple loosestrife and barnyard grass in wetland fringe habitat (Anchor QEA, 2009; Albany Engineering Corporation, 2008).

Terrestrial invasive species identified by the Capital Region Partnership for Regional Invasive Species Management (Capitol Region PRISM) include Japanese stiltgrass, mile-a-minute, porcelainberry, giant hogweed, garlic mustard, and Japanese knotweed, all of which have been observed within Saratoga and Rensselaer counties (Williams et al., 2019; New York Invasive Species Information Clearinghouse, 2020).

Aquatic invasive plant species that occur within the Hudson River in Saratoga and Rensselaer counties include water chestnut,[57] Eurasian watermilfoil, curly leaf pondweed, and others (Williams et al., 2019). Several efforts at water chestnut management are conducted in the vicinity of the project, including within the Hoosic River (Rensselaer Land Trust, undated).

Wildlife

Due to the level of development within the project boundary, wildlife expected to use habitat available at the project include species tolerant of human development and activity (i.e., raccoon, eastern cottontail rabbit, red fox, red and eastern gray squirrels, and numerous passerine bird species), game species such as white-tailed deer, and species using lands associated with the Hudson River and surrounding wetland habitat (i.e., various amphibian, waterfowl and marsh bird species, and mammals such as muskrat and beaver).

State-listed Species

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, which prohibit the "take" of eagle eggs, nests, and offspring, and can also include substantially disturbing normal breeding and feeding activities, except as permitted by regulation. Bald eagles are listed as a threatened species in New York State and are protected under New York State law.

[57] https://www.dec.ny.gov/animals/109536.html

Bald eagles typically forage over water and other open habitats. Bald eagles nest in mature trees and snags and on cliffs, rocks, and artificial structures, generally within 1 mile of water. Nesting activity occurs from January through August.

The Settlement Agreement indicates that a bald eagle nest is present approximately 2,400 feet downstream of the project on the east bank of the Hudson River, just below the project boundary. Additional data indicate that bald eagles have been observed within the project boundary during the breeding season on numerous occasions over the past 5 years.[58] Since bald eagle breeding activity within New York State has been expanding since the 1980s, and suitable bald eagle breeding habitat exists within the project boundary, it is conceivable for bald eagles to nest within the project area during the term of any license that may be issued for the project.

Plants

New York Natural Heritage Program's October 1, 2015, letter, filed with the license application, indicated that the state threatened Davis' sedge (*Carex davisii*) and Mock-pennyroyal (*Hedeoma hispida*) have been reported on lands near the mouth of the Hoosic River in Lock 4 State Canal Park (about 1.5 miles north of the Upper Mechanicville dam).

Davis' sedge is a densely clumped, perennial sedge that generally grows along woodland edges near the extent of freshwater high tides.[59] In New York, populations of Davis' sedge are mainly found along the Hudson River from north of Albany to Queens.

Mock-pennyroyal (also named rough pennyroyal) is a small, annual, upland plant found in a variety of open, dry sites, from natural talus slopes and grasslands to areas that have been disturbed by grazing or human activities (e.g., roadsides, mowed areas, etc.).[60]

During data collection on October 17-18, 2017 for the Impoundment Drawdown Study, a third state-listed species, the state threatened riverweed (*Podostemum*

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[58] According to the Cornell Lab of Ornithology's eBird database (http://ebird.org), several individual bald eagle adults were observed near the Upper Mechanicville dam during the January through May period of the years 2015 to 2020. On February 26, 2017, an adult bald eagle was observed about 200 meters southeast of the Upper Mechanicville powerhouse, carrying nest material towards the Hudson River (https://ebird.org/checklist/S34819903).

[59] https://guides.nynhp.org/davis-sedge/

[60] https://guides.nynhp.org/rough-pennyroyal/

ceratophyllum) was observed at locations upstream of the project dam, both within and outside of the project impoundment. Riverweed is an aquatic plant that grows submerged or seasonally exposed on rocky substrates in streams or rivers with high flow rates.[61] According to NYSEG's August 21, 2019, additional information response, the impoundment elevation during the field observations was 70.8 feet (approximately 50 inches above the spillway crest), and that the riverweed was observed growing in substantially rocky habitat (i.e., rock/bedrock coverage of 75 to 90 percent), in swiftly moving water approximately 1 to 4 feet deep, and not growing near aquatic invasive species (e.g., *Myriophyllum* [watermilfoil] species).

3.3.3.2 Environmental Effects

In SD2, Commission staff identified four terrestrial resource issues associated with relicensing the Upper Mechanicville Project, including the effects of continued project operation and maintenance on: (1) species of concern, such as the bald eagle, Davis' sedge, and mock-pennyroyal; (2) the spread and introduction of invasive plants; (3) wetland habitat and associated wildlife and botanical resources, particularly navigation-related impoundment fluctuations; and (4) wildlife and botanical resources.

The Settlement Agreement contains NYSEG's proposals for its Invasive Plant Species Management Plan and Bald Eagle Management Plan, and proposed operation measures that include impoundment fluctuations consistent with the Canal Corporation's navigation activities. Therefore, staff analyzed the effects associated with these two plans, as well as the effects of continued project operation and maintenance, including navigation-related impoundment fluctuations on wetlands and three state-listed plant species.

Invasive Plant Species Management Plan

NYSEG's proposed Invasive Plant Species Management Plan, filed with the Settlement Agreement, includes measures to prevent the introduction and spread of terrestrial and aquatic invasive plant species, for example: employing best management practices during construction or maintenance, such as cleaning and drying boats that come into contact with water, training workers to identify and remove invasive species from construction equipment before entering an invasive-free area, use of invasive-free gravel, fill, erosion control material (i.e., straw or fiber rolls), and seed stock during replanting.

[61] https://guides.nynhp.org/riverweed

As evidenced by their execution of the Settlement Agreement, FWS, New York DEC, and TU support NYSEG's proposal to implement the Invasive Plant Species Management Plan filed with the Settlement Agreement.

Staff Analysis

Although no invasive species were observed within the project boundary during relicensing studies, numerous invasive species are known to occur in Saratoga and Rensselaer counties. Continued operation and maintenance of the project could result in the introduction or spread of terrestrial and aquatic invasive species within the project boundary, and during construction of the proposed downstream eel passage system, general upstream fishway (if installed), and seasonal installation of the proposed eel ladder. However, employing measures to minimize the introduction and spread of invasive species during construction, operation, and maintenance, such as those included within the proposed Invasive Plant Species Management Plan, would minimize the introduction or spread of invasive species within the project boundary.

Bald Eagle Management Plan

NYSEG proposes to implement the Bald Eagle Management Plan, filed with the Settlement Agreement, to minimize project effects on bald eagles by implementing the following provisions: (1) prior to tree clearing, NYSEG would observe the area to be impacted by tree clearing for bald eagle nests, and notify FWS and New York DEC if bald eagle nesting activity is discovered within or immediately adjacent to the project boundary; and (2) during the nesting season (January 1 to September 30), no tree clearing would occur within 330 feet, and no construction activities would occur within 660 feet, of any known bald eagle nests, and NYSEG would consult with New York DEC and FWS regarding activities that cannot meet these conditions.

As evidenced by their execution of the Settlement Agreement, FWS, New York DEC, and TU support NYSEG's proposal to implement the Bald Eagle Management Plan filed with the Settlement Agreement.

Staff Analysis

Project maintenance would result in limited ground disturbance within the project boundary, including the potential removal of trees. However, consulting with FWS and New York DEC when bald eagles nest within or immediately adjacent to the project boundary and incorporating measures to minimize habitat disturbance surrounding active nests on project lands, such as those included in the proposed Bald Eagle Management Plan, would minimize effects to bald eagles.

Effects of Impoundment Fluctuations on Wetland Resources

Impoundment fluctuations associated with the operation of hydropower projects can result in changes in hydrology that may affect wetland habitats and associated wildlife and botanical resources. Depending on the magnitude, frequency, duration, and seasonality of such fluctuations, wetland hydrology and habitat may be influenced by such fluctuations.

During the navigation season, NYSEG proposes to operate the project in a ROR mode and maintain the impoundment at an elevation of 72.6 feet, except when the Canal Corporation requests adjustments (lowering or raising) of impoundment levels to support navigation. As noted above in section 3.3.2, *Aquatic Resources*, NYSEG's proposed mode of operation and management of water levels in the impoundment, is supported by New York DEC, FWS, and TU as evidenced by the execution of the Settlement Agreement.

Staff Analysis

NYSEG's proposal to continue its current mode of operation would be expected to largely maintain existing wetland habitat and associated wildlife and botanical resources. Therefore, navigation-related impoundment fluctuations associated with the Canal Corporation's navigation activities would not be expected to affect wetland resources.

Effects of Project Operation and Maintenance on State-Listed Plants

As discussed in section 3.3.3.1, *Affected Environment, State-listed Species,* suitable habitat for Davis' sedge and mock-pennyroyal could exist in upland habitat within the project boundary, upriver of the Upper Mechanicville dam. Also, riverweed was confirmed in a rocky, fast-flowing area within the project impoundment.

NYSEG proposes to continue routine maintenance on project lands for safe operation of the project and implement the Invasive Plant Species Management Plan to minimize the introduction and spread of invasive species during construction, operation, and maintenance of the project.

Staff Analysis

As NYSEG proposes to operate the project in a ROR mode and maintain the impoundment at an elevation of 72.6 feet, except when the Canal Corporation requests adjustments (lowering or raising) of impoundment levels to support navigation, and would continue existing routine maintenance of the project, no additional effects on Davis' sedge, mock-pennyroyal, or riverweed would be expected. Further, NYSEG's implementation of its proposed Invasive Plant Species Management Plan would minimize the introduction and spread of invasive terrestrial and aquatic plant species that could

compete with populations of Davis' sedge and mock-pennyroyal that may exist within the project boundary, or riverweed populations that are known to occur in the project impoundment.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

Although FWS's IPaC system indicates that no federally listed species are known to occur in the vicinity of the Upper Mechanicville Project,[62] the project is located within the range of the federally listed threatened northern long-eared bat (*Myotis septentrionalis*) (FWS, 2019a and 2019b). Further, both Interior's January 27, 2020, letter and section 2.10 of the Settlement Agreement indicate that this species could occur within the project impact area. No critical habitat for any federally listed threatened and endangered species occurs within project-affected lands.

Northern long-eared bat

FWS listed the northern long-eared bat as threatened on May 4, 2015 (FWS, 2015), and determined on April 27, 2016 that designating critical habitat is not prudent (FWS, 2016a).

The northern long-eared bat is a medium-sized bat species (3 to 3.7 inches in length) with longer ears than other species in the *Myotis* genus (FWS, 2015). The species' range includes 37 states, including most of the central and eastern United States, as well as the southern and central provinces of Canada, coinciding with the greatest abundance of forested areas.

The northern long-eared bat is found in a variety of forested habitats in the summer season. During this time, bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. In the fall season, northern long-eared bats leave their forested habitat to hibernate in caves, mines, and other similar habitat. The bats arrive at hibernacula between August and September, enter hibernation between October and November, and emerge from hibernacula between March and April. Hibernacula and surrounding forest habitats play important roles in the bat's life cycle

[62] *See* official species list memorandum, filed February 3, 2020.

beyond the time when bats are overwintering, including for fall-swarming[63] and spring-staging[64] activities. Reproduction is limited to one pup per year in late spring. As such, bat populations can be slow to rebound from anthropogenic and naturally occurring mortality events.

On January 14, 2016, FWS issued a final 4(d) rule that prohibits the following activities in areas of the country impacted by white-nose syndrome:[65] incidental take within a hibernation site; tree removal within 0.25 mile of a known, occupied hibernaculum; and cutting or destroying known occupied maternity roost trees, or any other trees within 150 feet of that maternity roost tree, during the pup-rearing season (June 1 through July 31) (FWS, 2016b). On January 5, 2016, FWS developed an optional streamlined consultation framework that allows federal agencies to rely on a programmatic biological opinion on FWS's final 4(d) rule to fulfill section 7(a)(2) consultation requirements for northern long-eared bat (FWS, 2016c).[66]

The Upper Mechanicville Project is located in Saratoga and Rensselaer counties, which are within the white-nose syndrome zone and the northern long-eared bat species

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[63] Fall-swarming occurs between summer and winter hibernation. The purposes of swarming behavior include: introduction of juveniles to potential hibernacula, copulation, and gathering at stop-over sites on migratory pathways between summer and winter regions.

[64] Spring-staging occurs between winter hibernation and migration to summer habitat. During this time, bats begin to gradually emerge from hibernation and exit the hibernacula to feed but re-enter the same or alternative hibernacula to resume daily bouts of torpor (i.e., a state of mental or physical inactivity).

[65] White-nose syndrome is the main threat to the northern long-eared bat and has caused a precipitous decline in bat numbers (in many cases, 90 to 100 percent) where the disease occurs.

[66] FWS developed a key to help federal agencies determine if they can rely on the streamlined section 7 consultation in the 4(d) rule or if their actions may cause prohibited incidental take that requires separate section 7 consultation (FWS, 2016d). FWS's key considers whether the federal action: (1) may affect the northern long-eared bat; (2) involves the purposeful take of northern long-eared bats; (3) is located inside the white-nose syndrome zone; (4) will occur within a hibernaculum or alter the entrance/environment of a hibernaculum; (5) involves tree removal; (6) involves the removal of hazardous trees; and (7) includes (a) the removal of an occupied maternity roost tree or any trees within 150 feet of a known occupied roost tree from June 1 through July 31, or (b) the removal of any trees within 0.25 mile of a hibernaculum at any time of year.

range (FWS, 2019a and 2019b). There are no known summer or winter occurrences of northern long-eared bats within the project boundary. However, there are confirmed summer occurrences of northern long-eared bats in Lewis County northwest of the project and Orange County south of the project (FWS, 2019c; New York DEC, 2018), and winter occurrences in northwest Saratoga County and southeast Rensselaer County (FWS, 2019d; New York DEC, 2018).

3.3.4.2 Environmental Effects

Although New York DEC and FWS records indicate there are no northern long-eared bat hibernacula or maternity roosts known to occur within the project boundary, project lands may provide suitable summer roosting and feeding habitat for the species. Routine maintenance in the project boundary may involve the removal of trees, which may remove potential summer roosting habitat used by northern long-eared bats.

The proposed Northern Long-eared Bat Management Plan filed with the Settlement Agreement includes conditions for NYSEG, prior to any tree-clearing activity within the project boundary, to observe the areas to be cleared for occupied maternity roost trees, roost trees, sloughing bark or dead limbs that provide habitat for the northern long-eared bat, and consult with New York DEC and FWS prior to any tree-clearing activities if occupied trees, bark, or limbs are observed. The plan also provides that NYSEG may remove, without notifying or consulting with New York DEC and FWS, any suitable roost tree that is 3 inches in diameter at breast height (dbh) between October 1 and March 31, and any trees less than 3 inches dbh provided their removal does not damage adjacent larger trees. The plan also provides for NYSEG to remove any trees that are a threat to human life or property (hazard trees), and report to New York DEC and FWS if bats are observed.

In a letter filed January 27, 2020, Interior states that "any take that may occur incidental to this project is not prohibited under the final 4(d) rule" and that "no further ESA coordination or consultation is required at this time."

Staff Analysis

Seasonal limits on tree-clearing activity for trees 3 inches dbh or larger, consultation with New York DEC and FWS regarding any tree-clearing activities in occupied habitat, and reporting observations of northern long-eared bats during any removal of hazard trees, is likely to minimize effects to this species. We also conclude that, while continued operation and maintenance of the project may affect the northern long-eared bat, any incidental take that may result from these activities is not prohibited by the final 4(d) rule.

3.3.5 Recreation and Land Use

3.3.5.1 Affected Environment

Regional Recreation Opportunities

Federal and state recreation lands within 60 miles of the project include Saratoga National Historic Park (3,394 acres), Adirondack State Park (6 million acres), and Saratoga Spa State Park (2,379 acres). These parks offer a variety of recreation opportunities including picnic facilities, playgrounds, swimming areas, golf courses, hiking trails, athletic courts, historic sites and battlefields, camping, boating, and fishing. Water-based recreation is available locally via the Hudson River, the Champlain Canal, and Saratoga Lake, which offer beach areas, marinas, boat ramps, and kayak launch sites. Recreation opportunities in the immediate vicinity of Mechanicville include two city parks, the Lock 4 Canal State Park, and the Mechanicville Golf Club.

Project Recreation

NYSEG does not own or operate any recreational facilities or fishing access areas within the project boundary. NYSEG reports that recreational development is not possible due to the limited amount of space available on NYSEG-owned lands within the project boundary. Under the current license, NYSEG has provided funds to the City of Mechanicville and the Canal Corporation for improvements including the installation of duck boxes, dock repairs, and picnic facilities at Lock C3. NYSEG is not responsible for the maintenance of any of the improvements nor are any of the facilities in the project boundary. NYSEG reports that the only recreational activity within the project boundary is associated with boat traffic through Lock C3 and an occasional fisherman.

Land Use

The project is located in an area that has been in industrial use for over 100 years. The area west of the project contains a mixture of residential, commercial, and industrial uses. The Hudson River forms the eastern boundary of the project. Lock C3 is situated on the east bank of the Hudson directly across from the project. The land lying east of the lock is primarily open space in the form of forest brushland, farmland, and a nine-hole golf course. Hemstreet Park, a small residential community, is located on the east bank of the Hudson River approximately 0.5 mile south of the lock.

3.3.5.2 Environmental Effects

NYSEG is not proposing any recreation or land-use related protection, mitigation, or enhancement measures for the Upper Mechanicville Project. NYSEG states that there are limited opportunities to build facilities within the project boundary on NYSEG-owned land, thus precluding the development of recreation or land use improvements.

No recommendations for access, recreational amenities, or land use improvements were received from local, state, or federal entities.

Staff Analysis

Multiple recreation opportunities exist in and around the project area. Passage through Lock C3 allows for upstream and downstream recreational boating on the Hudson River. Nearby city, state, and federal parks offer a variety of land-based recreation activities for the public to enjoy. Water-based recreation is provided through several boat ramps, marinas, kayak launches, and beach access areas.

There has not been a demonstrated need for recreation facilities at the project. In addition, the limited amount of NYSEG-owned land near the project restricts the ability for NYSEG to provide recreation or land use improvements.

3.3.6 Cultural Resources

3.3.6.1 Affected Environment

Section 106 of the NHPA requires that the Commission take into account the effects of its actions on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking.[67] Historic properties are those that are listed or eligible for listing in the National Register. The regulations implementing section 106 of the NHPA also require that the Commission seek concurrence with the SHPO on any finding involving effects or no effects on historic properties, and consult with interested Indian tribes or Native Hawaiian organizations that attach religious or cultural significance to historic properties that may be affected by an undertaking. In this document, we also use the term "cultural resources" for properties that have not been determined eligible for listing in the National Register. Cultural resources represent things, structures, places, or archaeological sites that can be either prehistoric or historic in origin. In most cases, cultural resources less than 50 years old are not considered historic.

[67] An undertaking means "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license, or approval." 36 C.F.R. § 800.16(y) (2019). Here, the undertaking is the potential issuance of a new license for the Upper Mechanicville Project.

Area of Potential Effects

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by the issuance of a proposed license within a project's APE. The APE is determined in consultation with the SHPO and is defined 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.[68] The APE for the project is defined as all lands within the project boundary and any lands outside the project boundary where cultural resources may be affected by project-related activities that are conducted in accordance with the FERC license. The New York SHPO concurred with the APE in a letter to NYSEG dated August 4, 2017.[69] The Delaware Nation concurred with the APE in an email to NYSEG dated August 8, 2017.[70]

Prehistoric and Historic Background

The archaeological record of prehistoric and historic populations in the Hudson River Valley of New York begins at the end of the last Ice Age. Glacial retreat beginning around approximately 10,500 B.C. exposed a landscape significantly modified by ice creating open tundra or spruce parkland. The Paleoindian period, which is associated with fluted projectile points, utilized flakes, and smaller bifacial tools like scrapers and burins, lasted through approximately 8000 B.C. The Archaic period (8000 B.C. to 1500 B.C.) included a warming environment, an arid climate, and increased ecological diversity. The emergence of ground and polished stone tools indicates that techniques to process nuts and edible plants were becoming more refined. Settlement patterns focused on seasonal resource availability. The latter part of the Archaic period revolved around hunting and fishing with tools including projectile points, adzes, ground slate knives, the ulu, barbed bone projectile points, and a variety of chipped stone tools.

The Woodland period (1500 B.C. to A.D. 1500) included the manufacture and use of ceramic vessels. Trade and communication became more widespread as did sociopolitical changes, territorialization, and changes in residence patterns. These changes created an identifiable Iroquoian tradition within western, central, and northern New York State by A.D. 1300. However, at the time of European contact, Mohican tribes occupied the Hudson River Valley. Mohican control extended from Lake Champlain to the northern part of Duchess County and from the Schoharie Valley into New England. The Mohican were part of a broad and closely related group of Algonquian-speaking peoples that occupied southeastern New York State, Long Island,

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[68] 36 CFR § 800.16(d).

[69] Page 996 in Appendix A of the Final License Application.

[70] Page 1002 in Appendix A of the Final License Application.

New England, and the eastern part of the Mid-Atlantic region. The Mohican frequently clashed with their western neighbors, the Iroquoian-speaking Mohawk, and the area west of the Hudson River was claimed by both the Mohawk and Mohican as hunting grounds.

Contact between Native Americans and Europeans along the Atlantic coast of North America may have begun as early as the 1490s. Dutch explorer Henry Hudson navigated the river that now bears his name north to the present-day City of Albany in 1609. European settlers encountered an indigenous population wracked by diseases brought from the Old World. Waves of epidemics killed thousands of Native Americans living in the Northeast during the early contact period. These epidemics were compounded by internecine hostilities fostered by competition for access to European trade goods. Warfare among indigenous populations would kill thousands of Native Americans and force others to flee the region during the 17th century.

In 1675, New York became an English colony and by the 18th century, farms dotted the Hudson River Valley, and cities such as Kingston and Albany had become important English strongholds in the New World. In 1718, Jonathan Gates established a tavern in what would become Mechanicville; however, a series of inter-colonial wars from 1689 to 1763 prevented significant settlement activities. By 1800, a mill, forge, woolen factory, and several gristmills were established, and residents began to refer to the town as Mechanicville due to the growing population of resident skilled tradesmen.

The first canal was completed in 1800 to bypass the falls on the Hudson River and connect Stillwater and Mechanicville. However, it was the opening of the Champlain Canal in 1823 that drove regional development and economic improvements in the mid-19th century. The dam in Mechanicville was originally constructed in 1882 by the Hudson River Water Power and Paper Company. By 1883, the dam was supplying hydropower to the Hudson River Company's pulp mill which was producing 25 tons of chemical pulp fiber used in the papermaking process. By the early 20th century, the historic Champlain Canal had fallen into disrepair. Construction of a barge canal was approved in 1903 and completed in 1918. The Upper Mechanicville Project powerhouse is located opposite Lock C3 of the Champlain Canal, which was constructed in 1912 as part of the New York State Barge Canal System. The dam was acquired by the State of New York in 1923, but its construction predates the barge canal.

The paper mill and facilities exchanged hands several times until it was permanently closed in 1977. At that time, NYSEG began the process of redeveloping the Upper Mechanicville Project and applied for a hydroelectric license from the Commission in 1980. An original license was issued on April 23, 1981 and project-related construction was completed in 1983. Portions of the paper mill were demolished during project construction, and the powerhouse was constructed at the location of the former gatehouse. The mill's intake channel was also significantly rehabilitated and

modified during construction. Adjacent portions of the abandoned mill were purchased by a developer and demolished in 2013 to make way for waterfront apartments.

Cultural Resources Investigation

As part of its studies to support relicensing, NYSEG conducted a Phase IA survey within the APE to identify archaeological sites that may be affected by the issuance of a new license for the continued operation and maintenance of the project. The Phase IA survey included a review of available cultural resource reports, secondary literature, historic maps, and site files pertinent to the APE. NYSEG's examination of the New York State Cultural Resource Information System (CRIS) identified 57 archaeological sites within 1 mile of the project. Forty of the sites were precontact, meaning they likely date from before A.D. 1609. Ten of the sites were historic (from A.D. 1609 or more recent), six sites were not dated, and one site was both precontact and historic. Of these sites, only two are adjacent to or within the APE.

Within the immediate vicinity of the project, NYSEG's examination of CRIS identified three National Register-listed properties, one National Register-eligible structure, and five properties that were previously determined to be ineligible. The three properties listed on the National Register are the New York State Barge Canal Historic District, Lock C3, and the Champlain Canal; only the New York State Barge Canal Historic District and Lock C3 are within the APE. The National Register-eligible property is the Hudson House "Ephraim Newland Home" and is outside of the APE.

Archaeological Sensitivity and Potential

The New York Archaeological Council describes archaeologically sensitive areas as sites that contain one or more variables that make them likely locations for evidence of past human activities. Sensitive areas can include places near known prehistoric sites that share the same valley or that occupy a similar landform (e.g., terrace above a river), areas where historic maps or photographs show that a building once stood but is now gone as well as the areas within the former yards around such structures, an environmental setting similar to settings that tend to contain cultural resources, and locations where Native Americans and published sources note sacred places, such as cemeteries or spots of spiritual importance. Based on the 40 previously reported, precontact archaeological sites in the project vicinity, the project impoundment has a high likelihood of containing precontact sites, and the electrical transmission line corridor has a moderate likelihood. Based on the 10 previously reported historic sites in the vicinity of the project, there is a high likelihood of historic sites in the impoundment and a moderate likelihood of historic sites in the electrical transmission line corridor.

Archaeological potential is the likelihood of locating intact archaeological remains within an area while taking into account subsequent uses of an area and the impact those uses would likely have on archaeological remains. The electrical transmission line

corridor has some extensive areas of disturbance, resulting from railroad development and from historic brickyards. Therefore, the archaeological potential of the electrical transmission line corridor is low for precontact resources and moderate for historic resources. There is some armoring and disturbance of the west bank of the Hudson River where U.S. Route 4/NY Route 32 is close to the river. And, there is extensive historic-era disturbance on the river from the New York State Barge Canal System's locks and dams, which reduce the precontact archaeological potential to low. The historic archaeological potential for the APE is moderate due to the prior existence of 19th century structures that have been either demolished or subsumed by other developments.

3.3.6.2 Environmental Effects

Project-related effects on cultural resources within the APE can result from modifications to project facilities or project operation; project-related ground-disturbing activities; construction, modification, or maintenance of project recreation facilities and use of such facilities by visitors; project-induced shoreline erosion;[71] and vandalism. Current project operation is not affecting cultural resources within the APE. NYSEG is not proposing to modify project operation or conduct any project-related land-clearing or land-disturbing activities within the APE that would impact any archaeological site, historic cemetery, or architectural resource, or area that has been identified as having moderate to high potential for containing archaeological sites. However, continued operation and maintenance of the project, including ground-disturbing activities that may be needed in the future, have the potential to affect undiscovered historic and archaeological resources during the term of any license issued. Any adverse effects must be resolved in consultation with the New York SHPO. To avoid, minimize, or mitigate for adverse effects on historic properties that may be affected by relicensing the project, NYSEG proposes to develop an HPMP in consultation with the New York SHPO, federally recognized Native American tribes, and other consulting parties, within 1 year of any new license issued for the project.

In its letter dated February 16, 2018,[72] the New York SHPO agreed with NYSEG's recommendation to develop an HPMP to determine the potential effects of any future development or alteration.

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[71] Project-induced shoreline erosion does not include shoreline erosion attributable to flood flows or natural phenomena, such as wind-driven wave action, erodible soils, and loss of vegetation due to natural causes.

[72] Page 1055 in Appendix A of the Final License Application.

Staff Analysis

In accordance with section 106, NYSEG has consulted with the New York SHPO and Native American tribes to determine the effects of project operation on cultural resources. The New York State Barge Canal Historic District and Lock C3, which are listed on the National Register, are within the APE. Current project operation does not adversely affect cultural resources and NYSEG is not proposing any changes to project operation. However, through regular project operation and maintenance, there is a potential for adverse effects on National Register-listed, National Register-eligible, and undiscovered historic properties throughout the term of any license issued. The implementation of an HPMP to mitigate any adverse effects that may arise over the term of any license issued would protect cultural resources that are eligible for the National Register. An HPMP would provide direction and guidance for NYSEG's management of historic properties and would ensure that appropriate consultation occurs prior to any activity that could affect historic properties in the APE.

To meet the requirements of section 106, the Commission intends to execute a PA with the New York SHPO for the protection of historic properties that could be affected by the continued operation and maintenance of the project. The terms of the PA would require NYSEG to develop and implement an HPMP for the term of any new license issued for the project.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate in its current manner. The project impoundment would be maintained at an elevation of 72.6 feet; during the navigation season, impoundment levels would be modified in support of the Canal Corporation's navigation activities. The environmental measures proposed by the licensee in the Settlement Agreement would not be required. As such, the project would continue to impede American eel passage upstream of the dam and result in mortality of American eel and some resident fish migrating downstream through the powerhouse.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Upper Mechanicville Project's use of the Hudson River for hydropower purposes to see what effect various operation and environmental measures would have on the project's costs and power generation. Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,[73] the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EA for the protection, mitigation, and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (i.e., for operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 POWER AND DEVELOPMENTAL BENEFITS OF THE PROJECT

Table 6 summarizes the assumptions and economic information we use in our analysis. This information, except as noted, was provided by NYSEG in its license application and subsequent submittals. We find that the values provided by the applicant are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs, estimated capital investment required to develop the project, licensing costs, normal operation and maintenance cost, and Commission fees.

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[73] *See Mead Corporation, Publishing Paper Division*, 72 FERC ¶ 61,027 (1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

Table 6. Parameters for economic analysis of the Upper Mechanicville Project (Sources: NYSEG and staff).

Parameter	Value
Period of economic analysis (years)	30
Current net investment[a]	$24,929,406
Annual operation and maintenance[b]	$465,093
Relicense application costs[c]	$1,811,723
Term of financing (years)	20
Cost of capital/discount rate (percent)[d]	8
Federal income tax rate (percent)[d]	21
Local tax rate (percent)[d]	3
Energy value ($/MWh)[e]	20.59
Capacity value ($/kilowatt-year)[e]	159.70

[a] Remaining undepreciated net investment and relicensing cost. Value provided by the applicant was updated to 2020.
[b] Includes insurance and Commission fees. Value provided by the applicant was updated to 2020.
[c] Value provided by the applicant was updated to 2020.
[d] Estimated by staff.
[e] Based on the Energy Information Administration's 2020 Annual Energy Outlook.

4.2 COMPARISON OF ALTERNATIVES

Table 7 compares the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EA: no action, NYSEG's proposal, and the staff alternative.

Table 7: Summary of the annual cost of alternative power and annual project cost for the alternatives for the Upper Mechanicville Project (Source: staff).

	No Action	NYSEG's Proposal	Staff Alternative
Installed capacity (MW)	16.53	16.53	16.53
Annual generation (MWh)	88,537	78,887	79,337
Dependable capacity (MW)	2.35	2.35	2.35
Annual cost of alternative power ($/MWh)	$2,198,374 24.83	$1,999,785 25.35	$2,008,813 25.32
Annual project cost ($/MWh)	$3,754,815 42.41	$5,909,990 74.92	$5,910,913 74.50
Difference between the cost of alternative power and project cost ($/MWh)	($1,556,441) (17.58)	($3,910,205) (49.57)	($3,902,100) (49.18)

4.2.1 No-action Alternative

Under the no-action alternative, the Upper Mechanicville Project would continue to operate as it does now. With an installed capacity of 16.53 MW, the project generates an average of 88,537 MWh of electricity annually. The average annual cost of alternative power would be $2,198,374, or about $24.83/MWh. The average annual project cost would be $3,754,815, or about $42.41/MWh. Overall, the project would produce power at a cost that is $1,556,441, or $17.58/MWh, more than the cost of alternative power.

4.2.2 Applicants' Proposals

Based on an installed capacity of 16.53 MW and an average annual generation of 78,887 MWh, the cost of alternative power would be $1,999,785, or about $25.35/MWh. The average annual project cost would be $5,909,990, or $74.92/MWh. Overall, the project would produce power at a cost that is $3,910,205, or $49.57/MWh, more than the cost of alternative power.

4.2.3 Staff Alternative

The staff alternative would include the staff-recommended additions, deletions, and modifications to the applicant's proposed environmental protection and enhancement measures and the estimated cost of each as shown in table 8.

Based on an installed capacity of 16.53 MW and an average annual generation of 79,337 MWh, the cost of alternative power would be $2,008,813, or about $25.32/MWh. The average annual project cost would be $5,910,913, or $74.50/MWh. Overall, the project would produce power at a cost that is $3,902,100, or $49.18/MWh, more than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 8 gives the cost of each of the environmental enhancement measures for the project considered in our analysis. All costs in table 8 are in 2020 dollars. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

Table 8: Cost of operation and environmental measures considered in assessing the environmental effects of continuing to operate the Upper Mechanicville Project (Sources: staff and NYSEG).

Enhancement/Mitigation Measures	Entity	Capital Cost	Annual Cost	Levelized Annual Cost
Operate the project in a ROR mode during the navigation season and maintain the impoundment at an elevation of 72.6 feet, except when the Canal Corporation requests adjustments (lowering or raising) of impoundment levels to support navigation	NYSEG, FWS, New York DEC, TU, Staff	$0	$0	$0[a]
Operate the project in a ROR mode and maintain an impoundment elevation of 72.6 feet during the non-navigation season	NYSEG, FWS, New York DEC, TU, Staff	$0	$0	$0[a]
Limit the rate of impoundment elevation change to no more than 26 inches per hour in the downward direction and 6 inches per hour in the upward direction	NYSEG, FWS, New York DEC, TU, Staff	$0	$0	$0[b]
Within 1 month of license issuance, provide a seasonal minimum flow of 45 cfs into the bypassed reach from April 1 through November 30	NYSEG, FWS, New York DEC, TU	$0	$9,266[c]	$9,266

Enhancement/Mitigation Measures	Entity	Capital Cost	Annual Cost	Levelized Annual Cost
Develop and file with the Commission, within 6 months of license issuance, a stream flow and water level monitoring plan to describe the monitoring equipment and procedures that would be used to ensure compliance with the impoundment elevations, minimum flows, and rate of impoundment elevation change proposed in the Settlement Agreement. Implement the plan within 18 months of license issuance.	NYSEG, FWS, New York DEC, TU	$50,000	$10,000	$16,151
Develop and file with the Commission for approval, within 6 months of license issuance, an operation compliance monitoring plan that contains certain elements of the applicant's proposed stream flow and water level monitoring plan describing the monitoring equipment and procedures that would be used to ensure compliance with the impoundment elevations and rate of impoundment elevation change (but excluding the 45-cfs seasonal minimum flow into the bypassed reach) proposed in the Settlement Agreement. Implement the plan within 18 months of license issuance.	Staff	$50,000	$10,000	$16,151

Enhancement/Mitigation Measures	Entity	Capital Cost	Annual Cost	Levelized Annual Cost
Install and operate an eel ladder in the project's tailrace on a seasonal basis, from April 1 through November 30, beginning with the 2023 migration season	NYSEG, FWS, New York DEC, TU, Staff	$251,628	$16,942	$47,897
Install a downstream eel passage facility by September 30, 2025, that consists of permanent trash racks with a 0.75-inch clear spacing and a non-turbine route of passage (downstream bypass) that would be operated on a seasonal basis from ice out through November 30	NYSEG, FWS, New York DEC, TU, Staff	$16,000,000	$253,962[d]	$2,222,298
Install an upstream fishway within 1 year following the installation of upstream fish passage at the next project downstream (Mechanicville Project, FERC No. 6032)	NYSEG, FWS, New York DEC, TU	$0	$0	$0[e]
Develop a fishway operation and maintenance plan within 2 years of the effective date or issuance date of the new license, whichever is later	NYSEG, FWS, New York DEC, TU, Staff	$50,000	$12,624	$18,775
Develop an erosion and sediment control plan to minimize erosion and sedimentation during the construction of the proposed downstream eel passage system	Staff	$7,500	$0	$923

Enhancement/Mitigation Measures	Entity	Capital Cost	Annual Cost	Levelized Annual Cost
Implement the Bald Eagle Management Plan filed with the Settlement Agreement	NYSEG, FWS, New York DEC, TU, Staff	$10,065	$5,033	$6,271
Implement the Invasive Plant Species Management Plan filed with the Settlement Agreement	NYSEG, FWS, New York DEC, TU, Staff	$20,130	$10,065	$12,542
Implement the Northern Long-eared Bat Management Plan filed with the Settlement Agreement	NYSEG, FWS, New York DEC, TU, Staff	$10,065	$5,033	$6,271
Develop and implement an HPMP	NYSEG, New York SHPO, Staff	$35,228	$10,065	$14,399

Note: Costs provided by the applicant are indexed to 2020 dollars.

[a] No additional costs as it is a continuing measure.

[b] No additional cost is expected as stated by the applicant in its May 22,2020 additional information request response.

[c] Cost based on a loss of 450 MWh in generation as provided in the application.

[d] Cost includes a loss of 9,200 MWh in generation, in addition to an annual operation of cost of $100,000.

[e] Because the applicant proposes to install an upstream fish passage of a type similar to that which may be installed at the downstream Mechanicville Project (FERC No. 6032) where there is currently no requirement to install an upstream fish passage and the type of passage is unknown, no cost is estimated for this measure as it is speculative.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for relicensing the Upper Mechanicville Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on this project and our evaluation of the environmental and economic effects of the proposed action and its alternatives, we selected the staff alternative as the preferred alternative for the Upper Mechanicville Project. We recommend this alternative because: (1) issuing a new license for the project would allow NYSEG to continue to operate the project and provide a beneficial and dependable source of electric energy; (2) generation from the Upper Mechanicville Project, with an installed capacity of 16.53 MW of electric capacity, comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the recommended measures would protect and enhance aquatic, terrestrial, and cultural resources at the project.

In the following section, we make recommendations as to which environmental measures proposed by NYSEG, or recommended by agencies or other entities, should be included in any new license issued for the project. In addition to NYSEG's proposed environmental measures listed below, we recommend additional staff-recommended environmental measures to be included in any new license issued for the project.

5.1.1 Measures Proposed by the Applicant

Based on our environmental analysis of NYSEG's proposal in section 3.0, and the costs presented in section 4.0, we conclude the following operation and environmental measures proposed by NYSEG would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including the following measures in any new license issued for the Upper Mechanicville Project:

Project Operation

- Operate the project in a ROR mode during the navigation season and maintain the impoundment at an elevation of 72.6 feet, except when the Canal Corporation requests adjustments (lowering or raising) of impoundment levels to support navigation (section 3.1 of the Settlement Agreement);

- Operate the project in a ROR mode and maintain the impoundment at an elevation of 72.6 feet during the non-navigation season to minimize potential shoreline erosion associated with project operation (section 3.1 of the Settlement Agreement); and

- Limit the rate of change in impoundment elevations to no more than 26 inches per hour in the downward direction and 6 inches per hour in the upward direction to support navigation on the Champlain Canal and ensure the continuity of downstream flow in the Hudson River during impoundment refill (section 3.1 of the Settlement Agreement).

Aquatic Resources

- Install and operate an eel ladder in the project's tailrace on a seasonal basis, from April 1 through November 30, beginning with the 2023 migration season, to improve upstream passage opportunities for American eel; (section 3.3 of the Settlement Agreement);

- Install a downstream eel passage facility by September 30, 2025, consisting of permanent trash racks with 0.75-inch clear spacing and a non-turbine route of passage (downstream bypass) that would be operated on a seasonal basis from ice out (typically mid- to late- March) through November 30, to protect and provide safe passage for eels migrating downstream (section 3.3. of the Settlement Agreement); and

- Develop a fishway operation and maintenance plan that describes operation and maintenance procedures for all fishways, to be submitted to FWS and New York DEC for approval within 2 years of the effective date or issuance date of the new license, whichever is later, and submitted to the Commission within 2 months of approval by FWS and New York DEC (section 3.3.3 of the Settlement Agreement).

Terrestrial Resources

- Implement the Bald Eagle Management Plan filed with the Settlement Agreement; and

- Implement the Invasive Plant Species Management Plan filed with the Settlement Agreement.

Threatened and Endangered Species

- Implement the Northern Long-eared Bat Management Plan filed with the Settlement Agreement.

Cultural Resources

- Implement an HPMP for the protection of historic properties eligible for listing on the National Register (section E.6.2 of the Final License Application).

5.1.2 Additional Staff-recommended Measures

Under the staff alternative, the project would be operated with NYSEG's proposed measures, as identified above, and the following additions or modifications:

- Modify NYSEG's proposed stream flow and water level monitoring plan by removing the provision to monitor the seasonal minimum flow of 45 cfs, and incorporating the plan's provisions for monitoring impoundment elevations, the rate of change in impoundment elevation, and record keeping, within an operation compliance monitoring plan;

- Develop an erosion and sediment control plan, in consultation with the resource agencies (New York DEC and FWS) for Commission approval, to minimize erosion and sedimentation during the construction of the proposed downstream eel passage system; and

- Execute a programmatic agreement for the development and implementation of an HPMP.

Below, we discuss the basis for our staff-recommended measures and the rationale for modifying NYSEG's proposal.

Project Operation and Water Levels

As described in section 3.1 of the Settlement Agreement, NYSEG proposes to continue operating the project as it currently does. While the target impoundment

elevation would be 72.6 feet during both the navigation and non-navigation seasons, NYSEG would continue to make frequent adjustments of impoundment water levels (i.e., drawdowns and refills) to support navigation on the Champlain Canal, as described above in section 2.1.4, *Existing Project Operation and Environmental Measures*. NYSEG also proposes to limit the rate of impoundment elevation change during drawdowns and refills to 26 inches per hour and 6 inches per hour, respectively, during the navigation season.

NYSEG's proposal to continue its current project operation would strike the appropriate balance between developmental and non-developmental resources by continuing to support navigation on the Champlain Canal (which is important to the region's economy) while also protecting environmental resources. As discussed in section 3.3.2.2, *Environmental Effects, Effects of Impoundment Fluctuations on Centrarchid Spawning*, the spawning success and associated recruitment of centrarchids would be expected to be maintained at current levels under existing project operation because most fish appear to spawn at depths that are not frequently exposed or affected by the navigation-related impoundment fluctuations. In addition, wetland habitat and its associated wildlife and botanical resources would be expected to be largely maintained under current project operation, as discussed in section 3.3.3.2, *Environmental Effects, Effects of Impoundment Fluctuations on Wetland Resources*. Therefore, we recommend that NYSEG implements the operation measures proposed in the Settlement Agreement, including the mode of operation and target impoundment elevations during the navigation and non-navigation seasons as well as the rate of change in impoundment elevation. There are no costs associated with these measures because they reflect NYSEG's current mode of project operation.

Stream Flow and Water Level Monitoring Plan (Operation Compliance Monitoring Plan)

As described in section 3.4 of the Settlement Agreement, NYSEG proposes to develop a stream flow and water level monitoring plan to verify the impoundment elevations, rate of impoundment elevation change, and seasonal minimum flow (45 cfs) proposed in the Settlement Agreement. The plan would be developed in consultation with, and approved by, New York DEC and FWS. NYSEG would file the approved plan with the Commission within 6 months of the issuance date, or effective date, of any new license issued for the project, whichever is later.

It is the Commission's responsibility to ensure compliance with the operation and environmental measures it requires in licenses it issues for hydroelectric projects. While NYSEG states it would file the stream flow and water level monitoring plan with the Commission within 6 months of license issuance, it does not explicitly state that it would seek Commission approval of the plan. Moreover, we do not recommend some of the environmental measures, namely the seasonal minimum flow of 45 cfs (see below), that would require monitoring as part of NYSEG's stream flow and water level monitoring plan. Therefore, to ensure compliance with the operation and environmental measures

we are recommending—ROR operation, impoundment elevations, and the rate of change in impoundment elevation— NYSEG should develop and file, for Commission approval, within 6 months after license issuance, an operation and compliance monitoring plan. The operation and compliance monitoring plan should include certain elements from NYSEG's proposed stream flow and water level monitoring plan, including the provisions for monitoring and keeping records of impoundment elevations and the rate of change in impoundment elevation. We estimate that the levelized annual cost to develop an operation compliance monitoring plan would be $16,151 and conclude that the benefits of the plan would outweigh the costs.

Upstream Passage of American Eel

As described in section 3.3.1.1 of the Settlement Agreement, NYSEG proposes to install and operate an eel ladder on a seasonal basis from April 1 through November 30, beginning with the 2023 migration season. As discussed in section 3.3.2.2, *Environmental Effects, Upstream Passage of American Eel*, the project appears to impede the upstream migration of American eel as the relative abundance of eels was three-times higher downstream of the project dam than upstream. To pass upstream of the project under existing conditions, eels would have to travel through the navigation locks, which operate during the day (eels are highly nocturnal) or climb wetted surfaces. As such, the seasonal installation and operation of an eel ladder designed in consultation with FWS and New York DEC and based on FWS' fish passage engineering design criteria, would improve access to additional growth and feeding habitats upstream of the project; specifically, an additional 1.8 miles of mainstem habitat on the Hudson River and 11.0 miles of tributary habitat in the Hoosic River. We estimate that the levelized annual cost to seasonally install and operate the eel ladder would be $47,897 and conclude that the benefits of the eel ladder would outweigh the costs.

Downstream Passage of American Eel

As described in section 3.3.1.3 of the Settlement Agreement, NYSEG proposes to install a downstream eel passage system by September 30, 2025 consisting of new permanent trash racks with smaller (0.75-inch) spacing than the existing trash racks (5.5 inches clear) and a downstream eel bypass that would be operated on a seasonal basis from ice out (typically mid- to late-March) through November 30 each year. As discussed in section 3.3.2.2, *Environmental Effects, Downstream Passage of American Eel*, eels of all sizes can pass through the existing trash racks and are thus subject to a turbine mortality rate of up to 12 percent. However, the installation of trash racks with a smaller (0.75-inch) spacing would physically exclude eels larger than 20.3 inches (mostly females) and essentially eliminate turbine mortality of egg-bearing females. The downstream eel bypass, to be designed in consultation with the resource agencies and based on FWS' fish passage engineering design criteria, would provide a suitable route of downstream passage for physically excluded eels. As such, the installation and operation of NYSEG's proposed downstream eel passage system should help increase spawning

escapement of eels from the Hudson River (by up to 12 percent), which is consistent with ASMFC's management goals of protecting silver eels during their downstream migration to the ocean to increase spawning escapement from river systems. We estimate the levelized annual cost to install, operate, and maintain the downstream eel passage system is $2,222,298. In consideration that this measure is part of the Settlement Agreement reached among NYSEG and certain of the stakeholders, including federal and state fish and wildlife agencies who manage eels in the project area, we conclude in this instance that the benefits of the passage system would outweigh the cost.

Erosion and Sediment Control Plan

As described above, in section 3.3.1.2, *Effects of Fishway Construction on Erosion and Sedimentation*, the construction and installation of NYSEG's proposed downstream eel passage system could contribute to erosion and sedimentation in the project vicinity due to the moderate amount of in-river disturbance expected with this activity. Although NYSEG indicates it would employ best management practices for all construction activities, they do not propose specific measures to control in-river sedimentation or erosion during the installation and construction of this fish passage system. Therefore, we recommend that prior to any construction activities associated with the downstream eel passage system, that NYSEG develop, in consultation with the resource agencies for Commission approval, an erosion and sediment control plan to minimize erosion and sedimentation that may occur during fishway construction and installation. The plan should include site-specific measures that are based on the scale and scope of the final design plans and also account for the remediated PCB hotspot located immediately upstream of the powerhouse. Once implemented, the plan would ensure that any adverse effects on environmental resources from erosion and sedimentation would be minimized during the construction and installation of the fishway. We estimate that the levelized annual cost to develop an erosion and sediment control plan would be $923 and conclude that the benefits of the plan would outweigh the costs.

Fishway Operation and Maintenance Plan

As described in section 3.3.3 of the Settlement Agreement, NYSEG proposes to develop a fishway operation and maintenance plan to ensure proper operation of the proposed fishways described above. The plan would be submitted to FWS and New York DEC, for approval, within 2 years of license issuance, or the effective date of the license, whichever is later. NYSEG would file the plan with the Commission within 2 months of approval by the FWS and New York DEC. The plan would include a description of the fishway measures associated with the project, an implementation schedule for the fishways, and operation and maintenance procedures. A fishway operation and maintenance report would be provided on an annual basis to FWS and New York DEC by February 28, and filed with the Commission by April 30, beginning with the first full calendar year following the filing of the fishway operation and maintenance plan with the Commission. The annual report would include a summary of the current status of the

project's fishways (structures, flows, etc.) and any issues (deviations, delays in timing of installation, etc.), as well as the counts of eels captured in the upstream eel ladder and released upstream (either manually or via an automated system, to be determined during the design phase).

The development and subsequent implementation of a fishway operation and maintenance plan (upon approval by the Commission) would help ensure that the fishways required by any license issued for the project are operating during the appropriate times of the day and year with the appropriate conveyance and attraction flows and that routine cleaning, maintenance, and debris removal are performed to keep the fishways in proper working order. Because we are not recommending NYSEG's general upstream fishway (see below), the fishway operation and maintenance plan would only include operation and maintenance procedures for the upstream eel ladder and downstream eel passage system. We estimate the levelized annual cost to develop a fishway and operation and maintenance plan is $18,775 and conclude the benefits of the plan would outweigh the costs.

Invasive Plant Species Management Plan

As described in section 3.6 of the Settlement Agreement, NYSEG proposes to implement the Invasive Plant Species Management Plan, filed as Attachment D of the Settlement Agreement. The plan includes measures such as employing best management practices during construction or maintenance to prevent the introduction or spread of invasive plant species, cleaning and drying boats that come into contact with water, and the use of invasive-free materials and seed stock during replanting. Several aquatic and terrestrial invasive plant species occur at the Upper Mechanicville Project. Employing measures to minimize the introduction and spread of invasive species during construction, operation, and maintenance, such as those included within the proposed Invasive Plant Species Management Plan, would minimize the introduction or spread of invasive species within the project boundary. We estimate that the levelized annual cost to implement the Invasive Plant Species Management Plan would be $12,542 and conclude that the benefits of the measure would outweigh the costs.

Bald Eagle Management Plan

As described in section 3.5 of the Settlement Agreement, NYSEG proposes to implement the Bald Eagle Management Plan, filed as Attachment B of the Settlement Agreement. The plan includes the following provisions: (1) prior to tree clearing, observe the impacted area for bald eagle nests, and notify FWS and New York DEC if bald eagle nesting activity is discovered within or immediately adjacent to the project boundary; and (2) during the nesting season (January 1 to September 30), no tree clearing would occur within 330 feet, and no construction activities would occur within 660 feet, of any known bald eagle nests, and NYSEG would consult with New York DEC and FWS regarding activities that cannot meet these conditions.

Bald eagles have been observed at and near the project during the breeding season, and a nest is located on the eastern shore of the Hudson River approximately 2,400 feet downstream of the Upper Mechanicville dam. As maintenance of the project has the potential to clear forested habitat, and thus impact nesting habitat for the state-listed threatened bald eagle, such a plan would minimize the potential for project effects on bald eagles. We estimate that the levelized annual cost to implement the Bald Eagle Management Plan would be $6,271 and conclude that the benefits of the measure would outweigh the costs.

Northern Long-eared Bat Management Plan

As described in section 3.5 of the Settlement Agreement, NYSEG proposes to implement the Northern Long-Eared Bat Management Plan, filed as Attachment A of the Settlement Agreement. The plan includes the following provisions: (1) prior to any tree clearing activity within the project boundary, observe the areas to be cleared for occupied maternity roost trees, roost trees, sloughing bark or dead limbs that provide habitat for the northern long-eared bat, and consult with New York DEC and FWS prior to any tree-clearing activities if occupied trees, bark, or limbs are observed; (2) NYSEG may remove, without notifying or consulting with New York DEC and FWS, any suitable roost tree that is 3 inches dbh between October 1 and March 31, and any trees less than 3 inches dbh provided their removal does not damage adjacent larger trees; and (3) NYSEG may remove any trees that are a threat to human life or property (hazard trees), and report to New York DEC and FWS if bats are observed.

The project boundary is located within the range of the northern long-eared bat As maintenance of the project has the potential to clear forested habitat, and thus impact summer roosting habitat for the federally listed threatened northern long-eared bat, such a plan would minimize the potential for project effects on northern long-eared bat individuals and habitat. .

We estimate that the levelized annual cost to implement the Northern Long-eared Bat Management Plan would be $6,271 and conclude that the benefits of the measure would outweigh the costs.

Historic Properties Management Plan

The New York State Barge Canal Historic District and Lock C3 are within the APE and are listed on the National Register. As operation of the Upper Mechanicville Project has the potential to adversely affect multiple historic sites that are listed on the National Register, implementation of an HPMP would ensure that any adverse effects on National Register eligible components of the project would be properly identified and resolved through consultation with the New York SHPO. To ensure that adverse effects on known and potential historic properties, and to any as yet unidentified cultural resources, are satisfactorily resolved over the term of any new license, we intend to

execute a PA with the New York SHPO for the Upper Mechanicville Project. The PA would require NYSEG to develop and implement an HPMP in consultation with the New York SHPO. We estimate that the levelized annual cost to implement the HPMP would be $14,399 and conclude that the benefits of the measure would outweigh the costs.

5.1.3 Measures Not Recommended by Staff

Seasonal Minimum Flow

As described in section 3.2 of the Settlement Agreement, within 1 month of license issuance or the effective date of any license issued for the project, whichever is later, NYSEG proposes to release a minimum flow of 45 cfs, or inflow to the project, if less, into the project's bypassed reach on a seasonal basis from April 1 through November 30 each year. This minimum flow would be released through the project's sluice gate, via spill, or through the downstream eel bypass (once operational). As stated in NYSEG's response to FERC's additional information request on the Settlement Agreement, the intended purpose of this seasonal minimum flow is to support aquatic habitat by keeping water circulating in the bypassed reach. NYSEG did not elaborate, however, on the expected changes in habitat quantity or quality, or the specific resources that would benefit from releasing a 45-cfs minimum flow into the bypassed reach. As evidenced by their execution of the Settlement Agreement, New York DEC, FWS, and TU support NYSEG's proposed seasonal minimum flow of 45 cfs.

As noted in section 3.3.2.1, the river downstream of the dam, which includes the 275-foot-long bypassed reach, supports a resident fish population that includes smallmouth bass, white sucker, bluegill, pumpkinseed, yellow perch, and walleye. Migratory species that occasionally inhabit the area include American eel and blueback herring, and to a much lesser extent, American shad and striped bass. Fish habitat at and adjacent to the bypassed reach consists primarily of bedrock and bedrock shards, with some boulder and cobble present along the western shoreline, adjacent to the project's tailrace. Although currently, no minimum flow is intentionally provided to the bypassed reach, 99 percent of the reach remains inundated even when there is no spill over the dam.

Staff's analysis in section 3.3.2.2*, Environmental Effects, Seasonal Minimum Flow* indicates there would be little change in habitat quantity (about a 1-percent increase in wetted area) in the bypassed reach as compared to the existing condition (no minimum flow) due to a backwatering effect from the downstream Mechanicville Project that keeps the reach watered even when there is no spill over the project dam. Staff's analysis also indicates that favorable water quality conditions exist in the reach in the absence of spill over the dam and that DO levels downstream of the project dam during summer are already well above those stipulated by the state standards. Therefore, there is no basis to conclude that the fishery or water quality in the bypassed reach is imperiled by current project operations.

In consideration of the limited benefits to the fishery and water quality of the bypassed reach, we find that providing NYSEG's seasonal minimum flow of 45 cfs would not be worth the levelized annual cost of $9,266.

Upstream Fish Passage (General)

As described in section 3.3 of the Settlement Agreement, NYSEG proposes a conditional fish passage measure whereby NYSEG would install an upstream fishway at the project for migratory fish species only if upstream fish passage is installed at the next project downstream (Mechanicville). The installation of the project's upstream fishway would occur within 1 year of the installation of upstream passage at the downstream project. As evidenced by their execution of the Settlement Agreement, New York DEC, FWS, and TU support NYSEG's proposed future installation of an upstream fishway at the project.

The Settlement Agreement's upstream passage measure is contingent on the occurrence of an uncertain future event (i.e., installation of upstream passage at the downstream Mechanicville Project). Therefore, predicting when the measure would, if ever, be implemented at the project along with the specific environmental conditions that would exist at that time, would entail mere speculation. Moreover, the measure lacks specificity as to the specific design of the fishway, which is information that would be necessary to weigh both the benefits and costs of the measure pursuant to sections 4(e) and 10(a) of the FPA. For these reasons, we have no basis for recommending the conditional upstream fish passage measure stipulated in the Settlement Agreement.

As to the current need to install upstream fishways at the project, the ability of blueback herring to successfully migrate through navigation locks, including those in the Hudson River, is well documented, as described above in sections 3.3.2.1, *Affected Environment, Fishery Resources*, and 3.3.2.2, *Environmental Effects, Upstream Fish Passage (General)*. During the upstream migration season, adult blueback herring were captured within the project lock itself (Lock C3) and within Lock C4, located at the upstream Stillwater Project. In addition, the relative abundance of adults was higher upstream of the project than downstream during the spawning season (in late May). As such, the project does not appear to significantly impede the upstream migration of adult blueback herring through this portion of the Hudson River, which is likely due to the species' tendency to move through navigation locks. Therefore, we conclude that there would be limited benefits to installing upstream passage for anadromous species, such as blueback herring, at this time. For this reason, we have no basis for recommending the more immediate installation of the upstream fishway at the project as a condition of any license issued for the project.

5.2 UNAVOIDABLE ADVERSE EFFECTS

Although adult fish can generally avoid involuntary entrainment or impingement due to their swimming ability, some entrainment and impingement mortality is likely unavoidable for juveniles of most fish species. However, the expected turbine survival at the project is relatively high (greater than 97 percent for 4-inch fish) due to the low rotational speed (72 rpm) of the project's turbines. While there could be a slight increase in impingement mortality of juveniles and sub-adults associated with the installation of the narrower spaced (0.75-inch) trash racks, such mortality would be limited to periods when the project is operating near its maximum hydraulic capacity. Therefore, we do not expect any long-term or population-level impacts of entrainment and impingement mortality. The impoundment fluctuations associated with navigation-related drawdowns could expose some active centrarchid nests; however, most centrarchids appear to nest below the typical zone of fluctuation (i.e., in the lower impoundment drawdown zone) and successful spawning and recruitment occur despite these fluctuations. As such, we expect that continued operation of the project, with its associated impoundment level fluctuations, would continue to support healthy centrarchid populations in the project area.

5.3 FISH AND WILDLIFE AGENCY RECOMMENDATIONS

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission should include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the project.

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency will attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of the agency.

In response to our November 29, 2019 notice soliciting comments, recommendations, preliminary terms and conditions, and preliminary fishway prescriptions, Interior timely filed three section 10(j) recommendations for the project on January 27, 2020. As noted previously, subsequent to the filing of Interior's 10(j) recommendations, a Settlement Agreement was executed on behalf of NYSEG, New York DEC, TU, and FWS. In comments on the Settlement Agreement, filed on April 21, 2020, FWS stated that the measures in the Settlement Agreement supersede its original 10(j) recommendations.

Table 9 lists FWS's 10(j) recommendations and indicates whether the recommendations are included under the staff alternative, as well as the basis for our preliminary determinations concerning measures that we consider inconsistent with

section 10(j). Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in the specific resource sections of this document.

Table 9. Analysis of fish and wildlife agency recommendations for the Upper Mechanicville Project (Source: staff).

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Recommend Adopting?
Operate the project in a ROR mode during the navigation season and maintain the impoundment at an elevation of 72.6 feet, except when the Canal Corporation requests adjustments (lowering or raising) of impoundment levels to support navigation.	FWS	Yes	$0	Yes
Operate the project in a ROR mode and maintain an impoundment elevation of 72.6 feet during the non-navigation season for the purpose of minimizing shoreline erosion associated with project operation.	FWS	Yes	$0	Yes
Limit the rate of change in impoundment elevation to no more than 26 inches per hour in the downward direction and 6 inches per hour in the upward direction to support navigation on the Champlain Canal and ensure the continuity of downstream flow in the Hudson River during impoundment refill.	FWS	No. This operation measure is not tied, or related, to any specific fish or wildlife resources, and is therefore not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	$0	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Recommend Adopting?
Within 1 month of license issuance, provide a seasonal minimum flow of 45 cfs into the bypassed reach from April 1 through November 30, to support downstream habitat by providing continuous circulation of water in the bypassed reach.	FWS	Yes	$9,266	No. See discussion below.
Develop and implement a stream flow and water level monitoring plan to describe the monitoring equipment and procedures that would be used to ensure compliance with the impoundment elevations, minimum flows, and rate of impoundment elevation change specified in the Settlement Agreement.	FWS	Yes	$16,151	No. See discussion below.
Install and operate an eel ladder in the project's tailrace on a seasonal basis, from April 1 through November 30, beginning with the 2023 migration season to improve upstream passage opportunities for American eel.	FWS	Yes	$47,897	Yes
Install a downstream eel passage facility by September 30, 2025, consisting of permanent trash racks with a 0.75-inch clear spacing and a non-turbine route of passage (bypass) that would be operated on a seasonal basis from ice out (typically mid- to late-March) through November 30 for the purpose of protecting and providing safe passage for eels migrating downstream.	FWS	Yes	$2,222,298	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Recommend Adopting?
Install an upstream fishway within 1 year of the installation of upstream fish passage at the downstream Mechanicville Project to support the upstream migration of fish species within the Hudson River.	FWS	No. Implementation of the measure is contingent on an uncertain future event (i.e., the possible installation of fish passage at the downstream Mechanicville Project).	Not estimable due to uncertainty on if and when the measure would be implemented and due to the lack of specifics regarding the type, size, and operation flows of the potential fishway.	No
Develop a fishway operation and maintenance plan within 2 years of the effective date or issuance date of the new license, whichever is later, to ensure the proper functioning of all fishways at the project.	FWS	Yes	$18,775	Yes
Implement the Bald Eagle Management Plan, filed with the Settlement Agreement, for the	FWS	Yes	$6,271	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Recommend Adopting?
purpose of minimizing the effects of tree clearing on bald eagle habitat.				
Implement the Northern Long-eared Bat Management Plan, filed with the Settlement Agreement, for the purpose of minimizing the effects of tree clearing on northern long-eared bat habitat.	FWS	Yes	$6,271	Yes
Implement the Invasive Plant Species Management Plan, filed with the Settlement Agreement, for the purpose of minimizing the introduction and spread of aquatic and terrestrial invasive plant species.	FWS	Yes	$12,542	Yes

Seasonal Minimum Flow

We are making a preliminary determination that FWS's section 10(j) recommendation for a seasonal minimum flow (see table 9 above) is inconsistent with the comprehensive development and public interest standards of sections 10(a) and 4(e) of the FPA.

As discussed in section 3.3.2.2, *Environmental Effects, Seasonal Minimum Flow*, providing a seasonal minimum flow of 45 cfs into the bypassed reach from April 1 through November 30, would result in little increase in aquatic habitat (less than a 1 percent increase in wetted area) downstream of the project dam, including the bypassed reach, where water quality conditions are already favorable, as described in section 3.3.2.1, *Affected Environment, Water Quality*.

We concluded, in section 5.1.3 above, that the benefits associated with the seasonal minimum flow proposed in the Settlement Agreement would be minimal and not be worth the levelized annual cost of the measure, which is $9,266.

Stream Flow and Water Level Monitoring Plan

We are making a preliminary determination that FWS's section 10(j) recommendation to develop and implement a stream flow and water level monitoring plan (see table 9 above) is inconsistent with the comprehensive development and public interest standards of sections 10(a) and 4(e) of the FPA.

Except for the provision to monitor the proposed seasonal 45-cfs minimum flow, which is not recommended in this EA, FWS's stream flow and water level monitoring plan is consistent with the staff-recommended operation compliance monitoring plan, which includes all monitoring and reporting provisions necessary to document compliance with the operational requirements of any license issued for the project. Therefore, FWS's stream flow and water level monitoring plan is unnecessary for compliance purposes and would provide no additional benefits compared to the staff-recommended operation compliance monitoring plan.

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C. § 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed 15 qualifying comprehensive plans that are applicable to the Upper Mechanicville Project, located in New York. No inconsistencies were found.

The following is a list of qualifying comprehensive plans relevant to the Upper Mechanicville Project:

Adirondack Park Agency. n.d. New York State wild, scenic, and recreational rivers system field investigation summaries. Albany, New York.

Atlantic States Marine Fisheries Commission. 1999. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. (Report No. 35). April 1999.

Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American eel (*Anguilla rostrata*). (Report No. 36). April 2000.

Atlantic States Marine Fisheries Commission. 2000. Technical Addendum 1 to Amendment 1 of the Interstate Fishery Management Plan for shad and river herring. February 9, 2000.

Atlantic States Marine Fisheries Commission. 2008. Amendment 2 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2008.

Atlantic States Marine Fisheries Commission. 2009. Amendment 2 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. May 2009.

Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. February 2010.

Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.

Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.

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

New York Department of Environmental Conservation. 1979. Hudson River Basin water and related land resources: Level B study report and environmental impact statement. Albany, New York. September 1979.

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6.0 FINDING OF NO SIGNIFICANT IMPACT

If the Upper Mechanicville Project is relicensed with our recommended measures, the project would operate while providing enhancements to fish and wildlife resources and protecting historic resources in the project area.

Based on our independent analysis, issuance of a new license for the Upper Mechanicville Project, with additional staff-recommended measures, would not constitute a major federal action significantly affecting the quality of the human environment.

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APPENDIX A: DRAFT LICENSE ARTICLES RECOMMENDED BY STAFF FOR THE UPPER MECHANICVILLE HYDROELECTRIC PROJECT NO. P-2934

Draft Article 201. *Administrative Annual Charges*. The licensee must pay the United States annual charges, effective the first day of the month in which the license is issued, and as determined in accordance with provisions of the Commission's regulations in effect from time to time, for the purposes of reimbursing the United States for the cost of administration of Part I of the Federal Power Act. The authorized installed capacity for that purpose is 16.53 megawatts.

Draft Article 202. *Exhibit F Drawings*. The following Exhibit F drawings filed on April 1, 2019 (Exhibits F-2 thru F-9), and August 21, 2019 (Exhibit F-1), are approved.

Exhibit No.	FERC Drawing No.	Drawing Title	Filename Drawing Title[74]
F-1	P-2934-1001	Principal Structures – General Arrangement	Principal Structures
F-2	P-2934-1002	Intake Bypass Sluice – Plan and Details	Intake Bypass Sluice
F-3	P-2934-1003	Powerhouse and Intake – Plan	Powerhouse Intake-P1
F-4	P-2934-1004	Powerhouse and Intake – Plan	Powerhouse Intake-P2
F-5	P-2934-1005	Powerhouse and Intake – Section	Powerhouse Intake-S1
F-6	P-2934-1006	Powerhouse and Intake – Section	Powerhouse Intake-S2
F-7	P-2934-1007	Powerhouse and Intake – Section	Powerhouse Intake- S3
F-8	P-2934-1008	Powerhouse – Elevations	Powerhouse-Elevations1
F-9	P-2934-1009	Powerhouse – Elevations	Powerhouse-Elevations2

[74] These exact drawing titles must be used in the filename when filing the electronic file format drawings required in license Article 203. Commission staff shortened the drawing titles due to filename character limits. There is no need to modify the titles as they appear on the drawings.

Article 203. *Exhibit F Drawings*. Within 45 days of the date of issuance of this order, as directed below, the licensee must file the approved exhibit drawings in electronic file format.

The licensee must prepare digital images of the approved exhibit drawings in electronic format. Prior to preparing each digital image, the licensee must add the FERC Project-Drawing Number (*i.e.*, P-2934-1001 through P-2934-1009) in the margin below the title block of the corresponding approved drawing. The licensee must **label and file the Exhibit F drawings as Critical Energy Infrastructure Information (CEII) material under 18 CFR § 388.113** (The submission should consist of: 1) a public portion consisting of a cover letter; and 2) a CEII portion containing only the Exhibit F drawings). Each drawing must be a separate electronic file, and the file name must include: FERC Project-Drawing Number, FERC Exhibit Number, Filename Title, date of this order, and file extension in the following format [P-2934-1001, F-1, Principal Structures, MM-DD-YYYY.TIF]. All digital images of the exhibit drawings must meet the following format specification:

IMAGERY:	black & white raster file
FILE TYPE:	Tagged Image File Format, (TIFF) CCITT Group 4 (also known as T.6 coding scheme)
RESOLUTION:	300 dots per inch (dpi) desired, (200 dpi minimum)
DRAWING SIZE:	22" x 34" (minimum), 24" x 36" (maximum)
FILE SIZE:	less than 1 megabyte desired

Draft Article 204. *Exhibit G Drawings*. Within 45 days of the date of issuance of this license, the licensee must file for Commission approval, a revised Exhibit G drawing with a project boundary that encloses the entire Lock C3. The Exhibit G drawing must comply with sections 4.39 and 4.51(h) of the Commission's regulations.

Draft Article 205. *Amortization Reserve.* Pursuant to section 10(d) of the Federal Power Act, a specified reasonable rate of return upon the net investment in the project must be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee must set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee must deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee must set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee must

maintain the amounts established in the project amortization reserve account until further order of the Commission.

The specified reasonable rate of return used in computing amortization reserves must be calculated annually based on current capital ratios developed from an average of 13 monthly balances of amounts properly included in the licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rate for such ratios must be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity must be the interest rate on 10-year government bonds (reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Draft Article 206. *Headwater Benefits.* If the licensee's project was directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the licensee must reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license. The benefits will be assessed in accordance with Part 11, Subpart B, of the Commission's regulations.

Draft Article 207. *As-built Drawings*. Within 90 days of completion of construction of the facilities authorized by this license, the licensee must file for Commission approval, revised Exhibits A, F, and G, as necessary, to describe and show those project facilities as built. If the licensee determines the previously approved exhibits reflect the as-built facilities and no revisions are necessary, the licensee must file a letter stating the approved exhibits reflect the as-built project facilities.

Draft Article 301. *Contract Plans and Specifications*. At least 60 days prior to the start of any construction, the licensee must file final design documents with the Secretary of the Commission, preferably through eFiling. The licensee must also submit two hard copies of the documents to the Commission's Division of Dam Safety and Inspections (D2SI) – New York Regional Engineer. The design documents must include: final plans and specifications, a supporting design report, a Quality Control and Inspection Program, a Temporary Construction Emergency Action Plan, and a Soil Erosion and Sediment Control Plan. The licensee may not begin construction until the D2SI – New York Regional Engineer has reviewed and commented on the documents, determined that all preconstruction requirements have been satisfied, and authorized start of construction.

Draft Article 302. *Cofferdam and Deep Excavation Construction Drawings*. Should construction require cofferdams or deep excavations, the licensee must: (1) have

a Professional Engineer who is independent from the construction contractor, review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction; and (2) ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days before starting construction of any cofferdams or deep excavations, the licensee must file the approved cofferdam and deep excavation construction drawings and specifications, and the letters of approval with the Secretary of the Commission, preferably through eFiling. The licensee must also submit two hard copies of the documents to the Commission's Division of Dam Safety and Inspections – New York Regional Engineer.

Draft Article 303. *Project Modification Resulting from Environmental Requirements.* If environmental requirements under the license require modification that may affect the project works or operations, the licensee must consult with the Commission's Division of Dam Safety and Inspections – New York Regional Engineer. Consultation must allow sufficient review time for the Commission to ensure that the proposed work does not adversely affect the project works, dam safety, or project operation.

Draft Article 401. *Project Operation.* The licensee must operate the project according to the following requirements:

(1) during the navigation season, the dates of which are determined by the New York State Canal Corporation (Canal Corporation) but generally range from mid-May through mid-October, the licensee must operate the project in a run-of-river mode and maintain the impoundment at an elevation of 72.6 feet National Geodetic Vertical Datum of 1929 (NGVD 29), except as modified in support of navigation activity as requested by the Canal Corporation, which may request adjustments to water levels of the project impoundment to accommodate navigation on the Champlain Canal;

(2) to support navigation on the Champlain Canal and ensure the continuity of downstream flow in the Hudson River during the navigation season, the licensee must limit the rate of change in impoundment elevation to no more than 26 inches per hour in the downward direction during navigation-related impoundment drawdowns and no more than 6 inches per hour in the upward direction when the impoundment is being refilled following navigation-related impoundment drawdowns;

(3) during the non-navigation season, which generally occurs from mid-October through mid-May depending on the dates of the navigation season as determined by the Canal Corporation, the licensee must operate the project in a run-of-river mode, with outflows from the project approximating inflows, and maintain the impoundment at a target elevation of 72.6 feet NGVD 29. At all times during the non-navigation season the impoundment must remain at or above an elevation of 72.1 feet.

Planned Deviations

Requirements regarding run-of-river operation, impoundment elevations, and the rate of change in impoundment elevation may be temporarily modified for short periods, of up to 3 weeks, after mutual agreement among the licensee and the U.S. Fish and Wildlife Service and New York State Department of Environmental Conservation (collectively, resource agencies). After concurrence from the resource agencies, the licensee must notify the Commission within 14 days and file a report with the Secretary of the Commission as soon as possible, but no later than 30 days after the onset of the planned deviation. Each report must include: (1) the reasons for the deviation and how project operations were modified, (2) the duration and magnitude of the deviation, (3) any observed or reported environmental effects, and (4) documentation of consultation with the resource agencies. For planned deviations exceeding 3 weeks, the licensee must file an application for a temporary amendment of the operational requirements of this license and receive Commission approval prior to implementation.

Unplanned Deviations

Requirements regarding run-of-river operation, impoundment elevations, and the rate of change in impoundment elevation may be temporarily modified if required by operating emergencies beyond the control of the licensee (*i.e.*, unplanned deviations). For any unplanned deviation from run-of-river operation or deviation in impoundment elevation that lasts longer than 3 hours ***or*** results in visible environmental effects such as a fish kill, the licensee must notify the resource agencies within 24 hours, and the Commission within 14 days, and file a report as soon as possible, but no later than 30 days after each such incident. The report must include: (1) the cause of the deviation; (2) the duration and magnitude of the deviation; (3) any pertinent operational and/or monitoring data; (4) a timeline of the incident and the licensee's response; (5) any comments or correspondence received from the resource agencies, or confirmation that no comments were received from the resource agencies; (6) documentation of any observed or reported environmental effects; and (7) a description of measures implemented to prevent similar deviations in the future.

For unplanned deviations from run-of-river operation or impoundment elevations lasting 3 hours or less that do not result in visible environmental effects, the licensee must include in the annual operation compliance monitoring report required by Article 402, a description of each incident that occurred during the prior October 1 through September 30 time period. The report must include for each 3 hours or less deviation: (1) the cause of the deviation; (2) the duration and magnitude of the deviation; (3) any pertinent operational and/or monitoring data; (4) a timeline of the incident and the licensee's response to each deviation; (5) any comments or correspondence received from the resource agencies, or confirmation that no comments were received from the resource

agencies; and (6) a description of measures implemented to prevent similar deviations in the future.

Draft Article 402. *Operation Compliance Monitoring Plan.* Within six months of the issuance date of this license, the licensee must file with the Commission for approval, an operation compliance monitoring plan that describes how the licensee will document compliance with the operational requirements of this license. The plan must include all provisions of the proposed stream flow and water level monitoring plan described in section 3.4 of the Settlement Agreement, except monitoring of the seasonal 45-cubic feet per second minimum flow, which is not required by this license. In addition, the plan must include, but not necessarily be limited to, the following:

(1) a detailed description of how the licensee will document compliance with the operational requirements of this license, including operating the project as required by Article 401;

(2) procedures for reporting to the Commission, on an annual basis, the dates of the navigation season no later than 30 days after the dates are determined by the New York State Canal Corporation;

(3) a description of all gages or measuring devices that will be used to monitor operation compliance, including the method of calibration and location of each gage and/or measuring device;

(4) standard operating procedures to be implemented outside of normal operating conditions, including during: (a) scheduled facility shutdowns and maintenance; and (b) emergency conditions such as unscheduled facility shutdowns and maintenance;

(5) a provision to maintain a log of project operation; and

(6) procedures for reporting monitoring data to the Commission on an annual basis.

The licensee must prepare the plan after consultation with the U.S. Fish and Wildlife Service and New York State Department of Environmental Conservation (collectively, agencies). The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan must not begin until the plan is approved by the Commission. Upon Commission approval, the licensee must implement the plan, including any changes required by the Commission.

Article 403. *Upstream eel passage.* The licensee, at least 90 days before the start of any in-river disturbance activities at the project site associated with the construction/installation of the upstream eel ladder, must file, for Commission approval, detailed design drawings of its proposed eel ladder to improve access to upstream habitats for American eel, together with a schedule to construct/install the upstream eel ladder before commercial operation of the fishway.

This filing shall include, but not be limited to: (1) specifications of the dimensions of the eel ladder including its length, height, slope, and any climbing material; and (2) a description of the methods and a schedule for installing the upstream eel ladder.

The licensee shall prepare the aforementioned drawings and schedule after consultation with the U.S. Fish and Wildlife Service and New York State Department of Environmental Conservation (collectively, the agencies). The licensee shall include with the drawings documentation of consultation, copies of agency comments and recommendations on the drawings and schedule after they have been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the licensee's facilities. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the drawings and schedule with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the proposed facilities and schedule. Operation of the fishway shall not begin until the licensee is notified by the Commission that the filing is approved. Upon Commission approval, the Licensee shall implement the proposal, including any changes required by the Commission.

Article 404. *Downstream eel passage.* The licensee, at least 90 days before the start of any in-river disturbance activities at the project site associated with the construction/installation of the downstream eel passage system, must file, for Commission approval, detailed design drawings of its proposed trash rack structure to reduce the entrainment of American eel, together with a schedule to construct/install the downstream eel passage system (consisting of the proposed trash rack structure and a downstream bypass) before commercial operation of the fishway.

This filing shall include, but not be limited to: (1) specifications of the size of the openings between the trash rack bars; (2) the maximum intake approach velocity; and (3)

a description of the methods and a schedule for installing the downstream eel passage system.

The licensee shall prepare the aforementioned drawings and schedule after consultation with the U.S. Fish and Wildlife Service and New York State Department of Environmental Conservation (collectively, the agencies). The licensee shall include with the drawings documentation of consultation, copies of agency comments and recommendations on the drawings and schedule after they have been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the licensee's facilities. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the drawings and schedule with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the proposed facilities and schedule. Operation of the fishway shall not begin until the licensee is notified by the Commission that the filing is approved. Upon Commission approval, the Licensee shall implement the proposal, including any changes required by the Commission.

Article 405. *Fishway Operation and Maintenance Plan.* The licensee must file a fishway operation and maintenance plan consistent with section 3.3.3 of the Settlement Agreement filed on April 8, 2020 with the Commission for approval within 26 months of license issuance. In addition to the provisions described in the fishway operation and maintenance plan in section 3.3.3 of the Settlement Agreement, including the filing of an annual fishway operation and maintenance report to the Commission by April 30 of each year, the fishway operation and maintenance plan must include, but not necessarily be limited to the following:

(1) procedures for routine operation of the facilities, including operation flows;

(2) procedures for performing routine maintenance and debris/trash removal and disposal before and during the migration season, to ensure the fishways are fully operational during the migratory period;

(3) procedures for starting-up and shutting down the fishways; and

(4) standard operating procedures to be implemented during emergencies and project outages that could affect fishway operations.

The licensee must prepare the plan after consultation with the U.S. Fish and Wildlife Service and New York State Department of Environmental Conservation (collectively, agencies). The licensee must include with the plan documentation of

consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan must not begin until the plan is approved by the Commission. Upon Commission approval, the licensee must implement the plan, including any changes required by the Commission.

Article 406. *Reservation of Authority to Prescribe Fishways.* Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of such fishways as may be prescribed by the Secretary of the Interior pursuant to section 18 of the Federal Power Act.

Article 407. *Bald Eagle Management Plan.* The Bald Eagle Management Plan, filed April 8, 2020, is approved and made part of the license and may not be amended without prior Commission approval. Upon license issuance, the licensee must implement the Bald Eagle Management Plan.

Article 408. *Invasive Plant Species Management Plan.* The Invasive Plant Species Management Plan, filed April 8, 2020, is approved and made part of the license and may not be amended without prior Commission approval. Upon license issuance, the licensee must implement the Invasive Plant Species Management Plan.

Article 409. *Northern Long-eared Bat Management Plan.* The Northern Long-eared Bat Management Plan, filed April 8, 2020, is approved and made part of the license and may not be amended without prior Commission approval. Upon license issuance, the licensee must implement the Northern Long-eared Bat Management Plan.

Article 410. *Programmatic Agreement and Historic Properties Management Plan*. The licensee must implement the "Programmatic Agreement Between the Federal Energy Regulatory Commission and the New York State Historic Preservation Office for Managing Historic Properties that May be Affected by Issuance of a License to New York State Electric and Gas Corporation for the Continued Operation of the Upper Mechanicville Hydroelectric Project in Saratoga and Rensselaer Counties, New York (FERC No. 2934-029)," executed on ____, and including but not limited to the Historic Properties Management Plan (HPMP) for the project. Pursuant to the requirements of this Programmatic Agreement, the licensee must file, for Commission approval, an HPMP within one year of issuance of this order. When filing the HPMP for Commission approval, the licensee must include any documentation of consultation with the New

York SHPO and _____ during the development of the HPMP. The Commission reserves the authority to require changes to the HPMP at any time during the term of the license. If the Programmatic Agreement is terminated prior to Commission approval of the HPMP, the licensee must obtain approval from the Commission and the New York State Historic Preservation Officer, before engaging in any ground-disturbing activities or taking any other action that may affect any historic properties within the project's area of potential effects.

Article 411. *Use and Occupancy*. (a) In accordance with the provisions of this article, the licensee must have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee must also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee must take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 water craft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee must require multiple use and occupancy of facilities for access to project lands or waters. The licensee must also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee must: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the impoundment shoreline. To implement this

paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project impoundment. No later than January 31 of each year, the licensee must file with the Commission a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed. No report filing is required if no conveyances were made under paragraph (c) during the previous calendar year.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 water craft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must file a letter with the Commission, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G map

may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Commission's authorized representative, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee must consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee must determine that the proposed use of the lands to be conveyed is not inconsistent with any approved report on recreational resources of an Exhibit E; or, if the project does not have an approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed must not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee must take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee must not unduly restrict public access to project lands or waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project must be consolidated for consideration when revised Exhibit G drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article must not apply to any part of the public lands and reservations of the United States included within the project boundary.