United States Department of the Interior

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

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

August 8, 2019

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

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

Dear Ms. Groom:

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

Existing Project Description

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

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

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

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

Study Requests

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

I. Blueback Herring Migration and Routing Study

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

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

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

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

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

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

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

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

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

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

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

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

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

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

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

5. *Nexus to Project Operations and Effects*

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

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

II. American Eel Study

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

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

5. *Nexus to Projects Operations and Effects*

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

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

III. Fish Protection and Downstream Passage Studies

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

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

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

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

5. *Nexus to Project Operations and Effects*

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

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

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

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

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

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

IV. Freshwater Mussel Surveys

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

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

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

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

5. *Nexus to Project Operations and Effects*

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

6. *Methodology Consistent with Accepted Practice*

The recommended study uses standard scientific collecting techniques common to most hydroelectric licensing activities. Standard sampling techniques targeting mussel populations should be utilized. The Applicant should follow specific study guidelines as recommended by the NYSDEC for freshwater mussels.

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

The level of effort would involve one field crew sampling on a seasonal basis. The study would last for 1-2 years. The actual cost is unknown and would depend upon the gear types used, number of sampling locations, local labor costs, the ability to combine multiple studies (e.g., fisheries and water quality) into one task, etc.

V. Aquatic Mesohabitat Study

The Service recommends that the Applicant verify all key aquatic habitats at the Projects, including wetlands and submerged aquatic vegetation. This study will involve verification of existing data and mapping of occurrence to update the information on these habitats for the Projects.

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[7] S1: Critically imperiled, typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology making it especially vulnerable in New York State. S2: Imperiled statewide because of rarity, typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.

1. *Goals and Objectives*

The goals and objectives of this study are to identify key aquatic habitat areas that may be affected by Project operations. The study will provide information on the extent and quality of aquatic habitats and the wildlife they support.

2. *Resource Management Goals*

The Mohawk River, in the vicinity of the Projects, is managed by the NYSDEC as a mixed coolwater/warmwater fishery. The NYSDEC's fishery management goals include sustaining and enhancing all existing viable fisheries resources of the Mohawk River, especially for blueback herring, smallmouth bass, northern pike, chain pickerel, walleye, yellow perch, and sunfish. The Mohawk River, along with the Erie Barge Canal, is listed as an S1/S2 river for freshwater mussels by the New York Natural Heritage Program.

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

In Section 4.6, the PAD summarizes the Service's National Wetlands Inventory (NWI) and the NYSDEC delineations of wetlands that may be affected by Project operations; however, these surveys are not precise enough to capture all regulated wetlands, thus there is a need for confirmation of wetland vegetation in the vicinity of the Projects. Little specific information is included in the PAD regarding aquatic vegetation or shoreline habitats.

5. *Nexus to Project Operations and Effects*

The Projects are currently authorized to use 1-foot (Crescent) and 3-foot (Vischer Ferry) flashboards that seasonally raise and lower the Projects' impoundments, which can impact shoreline and aquatic habitats that are important habitats for fish and wildlife. The information will be used to determine what, if any, impacts the Projects are having on these resources and what the appropriate PME measures might be.

6. *Methodology Consistent with Accepted Practice*

The Service recommends that the Applicant document all wetlands and other aquatic vegetation that may be affected by Project operations. The NWI maps are frequently used as the starting point in identifying wetlands. The Applicant should confirm the boundaries of any wetlands identified in the PAD and conduct an additional search for any wetland areas at the Projects. Submerged aquatic vegetation in the impoundments should be mapped and identified. Shoreline areas of erosion, fish nesting, and mussel beds or middens should also be mapped. The Service is not requesting detailed delineation of wetlands at the Projects.

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

The level of effort and cost are relatively low. We recommend this study to ensure that there are no gaps in the aquatic mesohabitat information and to provide spatial data for important aquatic mesohabitats at the Projects. No alternative studies have been proposed.

VI. Water Quality

The Service recommends that the Applicant conduct a thorough water quality assessment at the Projects. The study should provide relevant water quality information to determine if the Projects meet minimum water quality standards for the preservation of beneficial uses at the Projects including fish and wildlife habitat and recreation.

1. *Goals and Objectives*

The goals and objectives of this study are to provide baseline water quality information to allow a proper determination of the potential impacts at the Projects. These data are necessary to evaluate how water quality may influence the current condition of the fishery.

2. *Resource Management Goals*

The Mohawk River, in the vicinity of the Projects, is managed by the NYSDEC as a mixed coolwater/warmwater fishery. The NYSDEC's fishery management goals include sustaining and enhancing all existing viable fisheries resources of the Mohawk River, especially for blueback herring, smallmouth bass, northern pike, chain pickerel, walleye, yellow perch, and sunfish. The Mohawk River, along with the Erie Barge Canal, is listed as an S1/S2 river for freshwater mussels by the New York Natural Heritage Program.

3. *Public Interest*

The requestor is a resource agency.

4. *Existing Information*

In Section 4.3.2.4, the PAD indicates that while there is extensive water quality data for the Mohawk River, there is no known water quality data collected in the vicinity of the Projects.

5. *Nexus to Project Operations and Effects*

The Projects release water downstream from their impoundments, which could impact such water quality factors as temperature and DO, which are critical to the quality of the aquatic habitat.

6. *Methodology Consistent with Accepted Practice*

The recommended study uses standard scientific water quality sampling techniques used in most hydroelectric licensing activities. These studies should include water temperature and DO monitoring on a continuous basis for at least 1 year, along with monthly sampling of other parameters such as chlorophyll content, pH, turbidity, and conductivity. An additional year of monitoring may be requested based on a review of the first year's results. This information will be used to document baseline water quality conditions and to determine potential impacts from Project operations. We recommend that water quality data be collected from vertical profiles in the impoundments and below the powerhouses at the Projects. As the Projects' dams are wide, distal portions of the downstream reach below the dam may not be adequately watered by current spillage. The Applicant should record continuous water quality data below the dams near the canal locks. The data should be presented in conjunction with generation at the Projects, noting which units were operating and any unit trips, as well as flows in the bypassed reaches. Data from the downstream U.S. Geological Survey (USGS) Cohoes gauge should also be provided, along with daily rainfall and temperature data.

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

The level of effort would be moderate and could involve a crew monitoring continuous measurement devices and collecting monthly samples while undertaking other work such as fisheries or macroinvertebrate surveys. In addition, temperature and DO loggers could be installed, with data being periodically downloaded. The actual cost is unknown but would be relatively low. In Section 5.2 of the PAD, the Applicant has proposed to conduct a water quality study in consultation with the Service and the NYSDEC.

VII. Run-of-River Compliance Study

The Service recommends that the Applicant conduct a ROR compliance study to evaluate Project operations and the influence they may have on downstream flows. Project operations, including unit trips, unit start-ups, and flashboard condition can have notable impacts on downstream flows and the aquatic communities in the Mohawk River.

1. Goals and Objectives

The goal of this study is to evaluate ROR compliance at the Projects and to determine what impacts the Projects may have on downstream flows. The objectives of this study are to: 1) record generation, operations, impoundment levels, and flows at the Projects; and 2) produce figures of these Projects and flow data for evaluation of ROR compliance.

2. Resource Management Goals

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

ASMFC regulates river herring stocks in New York and has the stated goal to protect, enhance, and restore East Coast migratory spawning stocks of blueback herring in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass. The Mohawk River, along with the Erie Barge Canal, is listed as an S1/S2 river for freshwater mussels by the New York Natural Heritage Program.

3. Public Interest

The requestor is a resource agency.

4. Existing Information

The PAD provides no information regarding fluctuations at the USGS Cohoes gauge or whether the fluctuations may be a result of the operations of the Projects. The Projects' operations are described as ROR; however, the methods utilized to achieve ROR are not defined in the PAD. The Francis turbines at the Projects, in particular, are generally operated at full gate and the ramping up and down of these units may dramatically affect downstream flows.

5. Nexus to Project Operations and Effects

The Projects are licensed to operate in a ROR mode. However, downstream fluctuations are occurring on the Mohawk River that do not appear to be solely the cause of the operation of upstream projects. Project operations need to be evaluated to determine the source of these fluctuations. In rivers with multiple hydroelectric projects attempting to operate in a ROR fashion, there is often a difficulty in maintaining river flows depending on how each project is operated. Fluctuations downstream decrease the value of the habitat for fish and other aquatic organisms.

6. Methodology Consistent with Accepted Practice

The Service recommends that the Applicant provide a narrative in the Proposed Study Plan (PSP) of how the Applicant operates the Project to maintain ROR flows. This narrative would be most effective if it is described as follows: 1) how the units come on and off line in relation to headpond elevations and river flows and ramping rates for the units; 2) how often the units are operated in a manual mode and how ROR operations are maintained when these situations occur; and, 3) how the system is adjusted to accommodate circumstances when the flashboards are partially tripped, as was observed during the site visit.

In order to evaluate ROR compliance, the Service recommends that the Applicant install real-time monitors to record generation for each turbine and water-level sensors that should record: 1) headpond elevations; 2) incoming flows from upstream of the impoundments; and 3) downstream flows below the Projects. One additional monitor should be placed in the vicinity of the Cohoes USGS gauge to verify the accuracy of the methods employed against a known source of reliable flow data. A sensor should also be placed at the Projects to record barometric pressure, such that the depths recorded by the water-level sensors can be adjusted for pressure changes. The sensors should record data at 15-minute intervals, and be in place from May 1

through October 31. The Applicant should utilize flow-metering devices to measure flows at the monitored stream locations over a range of low to high flows to develop rating curves for discharge at these sites.

Flows, water levels, and generation data should be presented in bi-weekly intervals on a scale that allows for interpretation of low-flow periods. Times when the Projects are operated in a manual mode, when there are unit trips, start-ups or shut-downs, and when the flashboards are repaired, fail, or are partially breached, should be indicated. The programmable logic control settings for the Project should be provided and clearly noted whenever they are changed throughout the study period. Any deviations from these protocols provided in the PSP should be explained in the Study Report.

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

The recommended study uses standard monitoring and flow observation techniques that have been used in many hydro licensing activities. The level of effort would be relatively low and involve installation of monitoring equipment, regular downloading of data, and the measurement of discharge-rating curve flows. Quality assessment and control and data presentation will require a moderate level of effort to ensure accurate and interpretable results from the study.

* * * * *

The Service recommends that the PSP developed by the Applicant incorporate all of the above-listed studies. We also recommend that the study proposals incorporated into the PSP be as detailed as possible so that all parties know exactly what is being agreed to when the study plan is approved.

Thank you for the opportunity to provide study requests for the Projects. If you have any questions or desire additional information, please contact John Wiley at 607-753-9334.

Sincerely,

David A. Stilwell
Field Supervisor

cc: NYSDEC, Stamford, NY (C. VanMaaren, S. Wells)
NYSDEC, Albany, NY (N. Cain)
FERC e-file
OEPC, Washington, DC (S. Alam)
FWS, BER (ERT), Falls Church, VA (S. Nash)
FWS, Hadley, MA (S. Simon)

Document Content(s)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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August 9, 2019

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

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

Dear Mr. Slade:

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

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

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

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

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

I. Water Quality Monitoring Study

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

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

5. *Nexus to Projects Operations and Effects*

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

I. Freshwater Mussel Survey

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

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

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

5. *Nexus to Projects Operations and Effects*

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

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

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

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

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

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

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

II. Fish Protection and Downstream Passage Studies

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

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

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

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

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

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

1. *Goals and Objectives*

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

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

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

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

5. *Nexus to Projects Operations and Effects*

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

III. Fish Community Study

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

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

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

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

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

IV. American Eel Study

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

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

5. *Nexus to Projects Operations and Effects*

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

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

V. Aquatic Mesohabitat Study

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

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

5. *Nexus to Projects Operations and Effects*

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

VI. Project Operations Study

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

1. *Goals and Objectives*

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

2. *Resource Management Goals*

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

3. *Public Interest*

   The requestor is a state resource agency.

4. *Existing Information*

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

5. *Nexus to Projects Operations and Effects*

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

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

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

6. *Methodology Consistent with Accepted Practice*

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

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

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

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

Sincerely,

Michael T. Higgins
Project Manager
Major Projects Management

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

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

United States Department of the Interior

NATIONAL PARK SERVICE
NORTHEAST REGION
15 State Street
Boston, Massachusetts 02109-3572

IN REPLY REFER TO:

COMMENTS ON PRE-APPLICATION STUDY REQUESTS
New York Power Authority
Crescent and Vischer Ferry Hydroelectric Projects, FERC P-4678, P-4679, Mohawk River, NY

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.R., Room 1A
Washington, DC 20426

August 9, 2019

Dear Secretary Bose:

The National Park Service (NPS) responds to the Pre-Application Document (PAD) for the Crescent and Vischer Ferry Hydroelectric projects, located on the Mohawk River with powerhouses in the towns of Colonie and Clifton Park, New York. The PAD was prepared as part of an application for a new federal license. We offer the following comments based on the PAD, submitted by New York Power Authority (NYPA), the current licensee, on May 3, 2019, and on information we obtained at the site visit on July 10, 2019 and the joint agency meeting the following day.

4.1.3 – Basin Dams – In addition to the hydroelectric developments listed in the second paragraph the unlicensed Beardslee plant on East Canada Creek and Herkimer project on West Canada Creek (P-9709) are upstream of the Crescent and Vischer Ferry projects and the Fourth Branch project on the Mohawk River and Green Island project on the Hudson (P-13) are immediately below.

4.4.1 – 1st paragraph, 3rd line: 1st clause should read: "Since the early 1900s. . . and the 2d paragraph, 1st sentence should read: "Since the early 1900s, when the Barge Canal version of the Erie Canal was constructed, . . . "
Explanation: The original Erie Canal was constructed 1817-25 and was enlarged several times during the 19th century. These "towpath era" versions of the canal ran parallel to but were separate from the Mohawk River. The latest version of the Erie Canal, often called the Barge Canal, was constructed 1905-18. The section near the Crescent and Vischer Ferry projects opened to navigation in May 1915. Unlike its towpath era predecessors, the Barge Canal was designed for motorized vessels and constructed on a far larger scale utilizing rivers that were dredged and canalized using locks and dams. While blueback herring have migrated past Cohoes Falls by way of the Barge Canal's Waterford Flight, it is unlikely that migratory species made it through the sixteen locks of the original Erie Canal as it ran through Cohoes during the 19th century.

Table 4.8.2 Non-Public Recreation Sites at the Crescent Project – In addition to those listed there is an established fishing access and car-top launch under development at the Crescent Terminal, opposite Freddie's Park, and an oft used informal launch at the end of Ferry Lane in the hamlet of Vischer Ferry at the upstream end of the Vischer Ferry Historic and Nature Preserve.

Table 4.8.4: Non-Project Recreation Sites at the Vischer Ferry Project – In addition to those listed in the table there is a hand-launch at Maalwyck Park in the Town of Glenville at the upper end of the impoundment.

Information about these and other access sites in the project area can be found in the recently published: *New York State Canalway Water Trail Guidebook* (Waterford, NY: Erie Canalway National Heritage Corridor, 2019) pp 186-205.

4.8.1.2 – Other Recreational Facilities and Opportunities in the Vicinity of the Project Area - In addition to the facilities listed there is Falls View Park and a new network of trails at the edge of Cohoes Falls, developed by a hydropower licensee at the School Street project (P-2539).

4.8.2.1 – Management of Project Lands. An 1894 Amendment to the New York State Constitution stated that the Erie, Champlain, Oswego, Cayuga-Seneca, and Black River canals "shall remain the property of the state and under its management forever".[1] Management transferred from the Department of Public Works to Department of Transportation in 1967 and from DOT to the NYS Thruway Authority in 1992. The New York State Canal Corporation was established at that time as a public benefit corporation to manage canal operations under the Thruway Authority. The NYS legislature authorized transfer of the Canal Corporation from Thruway Authority to NYPA in April 2016 and the change became effective January 1, 2017. The Canal Corporation is now listed as a subsidiary of the New York Power Authority so any action by Canal Corp is effectively an action by the licensee.

4.9.2 – Scenic Attractions – also include Cohoes Falls, largest waterfall in the eastern US after Niagara.

4.10.1.2 – Historical Overview of the Crescent and Vischer Ferry Project Region – 4th paragraph. The Binnekill in Schenectady marked the jumping-off point for upstream navigation on the Mohawk River. It was upstream of the falls and rapids of the lower Mohawk. During the 1790s the Western Inland Lock Navigation Company constructed a series of short canals with locks to carry boats past rapids on the Mohawk and over the drainage divide between the Hudson and St. Lawrence watersheds at Rome.

1 6th NYS Constitutional Convention (1894) Article VII § 8.

5.1.7 – Recreation and Land Use – The licensee proposes to conduct a recreation site facility inventory for the Crescent and Vischer Ferry Projects as the basis for a Recreation Management Plan. While the inventory is an important first step there are things affecting recreation at these projects beyond the presence, absence, or proximity of recreational facilities. The inventory should document informal as well as formal sites. The plan should address seasonal use and constraints.

Floating mats of invasive water chestnut in the impoundments above the Crescent and Vischer Ferry Projects render some access points unusable by mid-summer each year. The Recreation Management Plan should address the impacts of invasive species on recreational use and access and propose measures to manage water chestnut on project waters..

Since NYPA took control of the Canal Corporation in 2017 the annual navigation season has been shortened by several weeks at either end. Further changes to navigation on the Mohawk are currently being discussed under a NYPA initiative called "Re-Imagine the Canals." While they were once separate entities within state government, operational changes by the Canal Corporation now have a direct effect on recreational use and access at FERC licensed projects operated its parent. The Recreation Management Plan should address the effects.

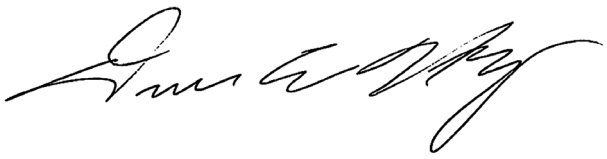
5.4 Relevant Qualifying Management Plans – should also include:

- National Park Service, *Erie Canalway National Heritage Corridor Preservation and Management Plan*, 2006
- New York State Canal Corporation, *New York State Canal Recreationway Plan*, 1995

The NPS appreciates the opportunity to comment on the PAD and looks forward to providing assistance to the applicant.

Any comments or questions should be directed to the undersigned at Duncan_Hay@nps.gov or by phone at 617-223-5056.

Sincerely



Duncan E. Hay
Hydropower Licensing Specialist
NPS Northeast Region

Document Content(s)

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

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

RE: Docket # P-4678 and P-4679

Dear Secretary Bose:

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

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

Thank you for your kind consideration of this request.

Sincerely,

Phil Steck
110th Assembly District

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

Cockburn, J.M.H. and Garver, J.I., Proceedings of the 2017 Mohawk Watershed Symposium,
Union College, Schenectady, NY, March 17, 2017
61
Enhanced Water Quality Monitoring in Support of Modeling Efforts in the Mohawk River Watershed
Alexander J. Smith1 and Elizabeth Nystrom2
1NYS-DEC, Division of Water, Mohawk River Basin Program, Albany, NY
2US Geological Survey, New York Water Science Center, Troy, NY
The quality of surface water has important effects on human and ecological health. In the Mohawk River watershed, surface water is an important drinking water source and is used for swimming, fishing, and recreation. The New York State Department of Environmental Conservation (NYSDEC) is tasked by the U.S. Environmental Protection Agency (USEPA) to monitor ambient water quality of the State. The NYSDEC is also tasked to develop Total Maximum Daily Loads (TMDLs) for state waters that fail to meet their intended uses. Water-quality impacts on designated uses in the Mohawk River watershed are well documented by the NYSDEC. These impacts include eutrophication from phosphorus, which degrades the quality of water supplies, and the presence of bacteriological pathogens, which limits contact recreational opportunities. In 2015 the NYSDEC conducted a “TMDL - Lite” analysis to better understand the sources and loads of pollutants in the Mohawk River watershed. The results of this analysis indicated approximately 60% of the phosphorus in the Mohawk River watershed is the result of point source discharges, such as sewage treatment facilities. A lesser, but still significant portion (21%) of phosphorus in the watershed is from non-point source agricultural practices. The remaining (19%) phosphorus load in the Mohawk River watershed was estimated to be from developed land, septic fields, and natural sources collectively. As a result of this analysis demonstrating the high proportion of phosphorus load originating from point source discharges and the current assessments of water quality conditions, the NYSDEC began to set in motion the process for developing a phosphorus TMDL for the Mohawk River. This process includes the development of enhanced water quality monitoring data from throughout the watershed and the development of a detailed water-quality model.

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

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

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

Literature Cited

Callinan, C.W. (2010) River Disinfection By-Product/Algal Toxin Study. New York State Department of Environmental Conservation, Division of Water. Albany, NY. pp. 75

Smith, A.J., Duffy, B.T. and Novak, M.A. (2015) Observer rating of recreational use in wadeable streams of New York State, USA: Implications for nutrient criteria development. Water Research 69, 195-209.

Smith, A.J., Thomas, R.L., Nolan, J.K., Velinsky, D.J., Klein, S. and Duffy, B.T. (2013) Regional nutrient thresholds in wadeable streams of New York State protective of aquatic life. Ecological Indicators 29, 455-467.

Smith, A.J. and Tran, C.P. (2010) A weight-of-evidence approach to define nutrient criteria protective of aquatic life in large rivers. Journal of the North American Benthological Society 29(3), 875-891.

Invited Oral Presentation

Document Content(s)

August 9, 2019

Via Electronic Filing

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

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

Dear Secretary Bose,

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

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

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

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

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

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

A. Relevant public interest considerations

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

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

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

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

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

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

B. Changes to Scope of Environmental Review

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Town of Niskayuna (WWR0001104 / PWS NY4600073).

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

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

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

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

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

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

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

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

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

6. The Environmental Analysis Must Consider Environmental Justice Communities

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

a. American Eels

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

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

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

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

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

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

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

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

b. Blueback Herring

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

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

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

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

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

c. Native and Gamefish

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

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

d. Freshwater mussels

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

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

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

C. Study Requests

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

1. Acoustic Telemetry Study of Out-migrating Silver Eels

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

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

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

This criterion is not applicable.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. Otolith Microchemistry Study of Blueback Herring

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

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

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

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

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

This criterion is not applicable.

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

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

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

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

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

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

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

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

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

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

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

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

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

3. Fish Fauna Composition Study

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

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

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

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

This criterion is not applicable.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4. Tailrace Net Fishing Study

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

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

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

This criterion is not applicable.

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

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

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

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

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

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

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

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

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

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

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

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

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

5. Water Quality Study

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

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

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

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

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

This criterion is not applicable.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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[56] Harmful Blue-green Algae Bloom Beach Trends, NYS DOH, https://www.health.ny.gov/environmental/water/drinking/bluegreenalgae/beachsurveillance.htm (last visited Aug. 8, 2019).
[57] NYSDEC, Mohawk River Basin Action Agenda: 2018-2022 (2018), https://www.dec.ny.gov/docs/water_pdf/mohawkactionag.pdf.
[58] Alexander J. Smith & Elizabeth Nystrom, *Enhanced Water Quality Monitoring in Support of Modeling Efforts in the Mohawk River Watershed*, in 2009 Mohawk Watershed Symposium, *supra* note 28.
[59] EPA, EPA 816-R-01-014, Stage 1 Disinfectants and Disinfection Byproducts Rule: What Does it Mean to You? (2001),https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=200025FL.txt.

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

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

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

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

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

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

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

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

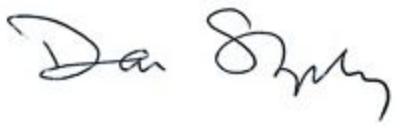
The requested studies involve standard water quality measurements, and therefore do not require unreasonable levels of effort or cost. The requested studies may utilize autosamplers and/or sondes, reducing the level of effort involved.

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

D. Conclusion

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

Sincerely,



Dan Shapley

Water Quality Program Director

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

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

Dear Secretary Bose,

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

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

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

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

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

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

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

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

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

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

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Document Content(s)

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

Dear Secretary Bose,

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

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

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

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

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

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

Summary: The Dam may facilitate the growth of thick sheet ice, force velocity decrease of the River, and it has almost certainly resulted in sediment accumulation that has locally impaired channel width and depth. Studies are required to fully evaluate the roll that the Dam plays in driving ice-jam flooding and then numerical modeling is required to explore the possible ways that a new dam configuration or dam operation could alleviate ice jams. The role of sediment and channel impairment should also be conducted in parallel. Solutions that should be explored in model runs include: 1) dam removal; 2) significant pre-emptive lowering immediately prior to break up events to fracture and break ice cover; and 3) mechanical break up of ice up river from the Dam. Finally, sediment in the channel (in the entire Pool) needs to be measured and quantified so that the role that this sediment plays in channel shallowing and width reduction can to be evaluated in hydraulic models (where sediment can removed in model runs).

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

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Document Content(s)

VISCHER FERRY HYDROELECTRIC PROJECT (P-4679-049)

STUDY PROPOSED TO NYPA for FERC RE-LICENSING

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

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

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

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

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

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

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

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

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

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

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

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Document Content(s)

ORIGINAL

31 Van Voast Lane

Glenville, New York 12302

July 20, 2019

Kimberly D. Bose

Secretary, FERC

888 First Street, NE

Washington, DC 20426

Vischer Ferry Dam Project # 4679 – 049

Dear Secretary Bose:

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

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

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

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

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

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

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

Sincerely,

Russell Wege

Russell Wege, PE

Retired Engineer

Document Content(s)

James L Woidt, Scarborough, ME.
As part of the existing conditions analysis in support of the Mitigation Measures to Reduce Flooding the Historic Stockade Project led by the City of Schenectady with support from the New York State Department and Homeland Security and Emergency Services (DHSES) and Federal Emergency Management Agency (FEMA), Shumaker Consulting Engineering and Land Surveying, DPC (Shumaker) completed a hydrologic, hydraulic, and ice jam analysis of the Mohawk River at the Schenectady Stockade Historic District (Stockade; Shumaker, 2019). In this report, Shumaker reviewed existing literature and stream gage records to identify a total of 20 flood events that caused flood damage in the Stockade since the construction of Vischer Ferry Dam in 1913. Of these 20 events, 11 were identified to be caused by ice jams. Shumaker's calculation of the flood risk in the Stockade due to ice jamming yielded that ice-jam induced flood risk was greater than that of unobstructed free-flow conditions and including the joint probability of ice-jam induced flood risk with the unobstructed free-flow flood risk increased the Base Flood Elevation approximately 1.2 feet from what is currently shown on the FEMA Flood Insurance Rate Maps and 1.8 feet from free-flow conditions alone based on Shumaker's (2019) revised hydraulic analyses. Therefore, ignoring ice jams would underestimate the Schenectady reach of of the Mohawk River.

Extensive published research by Dr. Garver of Union College and the USGS have identified the Rexford Knolls, between the Rexford Bridge and Vischer Ferry Dam, as a frequent location of ice jams affecting the Stockade. The operation of Vischer Ferry Dam affects the hydraulics of the Mohawk River in this location which may also affect the formation of ice jams; whether this impact is beneficial or detrimental is unknown. Although technical analyses of the impact of Vischer Ferry Dam on ice jamming do not yet exist, numerous Stockade residents have penned letters to the editor and spoken publicly claiming that Vischer Ferry Dam is responsible for flooding of the Stockade and that is must be modified. These claims are to date unfounded in science and a brief hydraulic analysis performed by Shumaker found that Vischer Ferry had less than a six-inch impact on the base flood elevation in the Stockade. However, no known studies have been completed to quantify the impacts (positive or negative) of the operation of Vischer Ferry dam on upstream or downstream ice jamming. Therefore, I recommend that flood damage be included as a potential impact of Vischer Ferry Dam and that as part of the re-licensing process, a study be conducted that quantifies the frequency and magnitude of ice jamming on the Mohawk River upstream and downstream of Vischer Ferry Dam and quantifies the impact of Vischer Ferry Dam on the frequency and magnitude of flooding upstream and downstream of the dam.

Document Content(s)

Christopher Cook, Saratoga Springs, NY.
Hello,

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

Thank you,

Chris Cook

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