

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D. C. 20426
February 9, 2018

OFFICE OF ENERGY PROJECTS

Project No. 9690-112—New York
Rio Hydroelectric Project
Eagle Creek Hydro, LLC

Project No. 10481-067—New York
Mongaup Falls Hydroelectric Project
Eagle Creek Hydro, LLC

Project No. 10482-117—New York
Swinging Bridge Hydroelectric Project
Eagle Creek Hydro, LLC

Mr. Robert Gates
Eagle Creek Renewable Energy, LLC
116 North State Street
PO Box 167
Neshkoro, WI 54960-0167

Reference: Study Plan Determination for the Rio, Mongaup Falls, and Swinging Bridge Hydroelectric Projects

Dear Mr. Gates:

Pursuant to 18 C.F.R. § 5.13(c) of the Commission's regulations, this letter contains the study plan determination for the Rio Hydroelectric Project No. 9690, Mongaup Falls Hydroelectric Project No. 10481, and Swinging Bridge Hydroelectric Project No. 10482 (collectively referred to as the Mongaup River Projects). This determination is based on the study criteria set forth in section 5.9(b) of the Commission's regulations, applicable law, Commission policy and practice, and the record of information.

Background

On September 12, 2017, the co-licensees for the projects; Eagle Creek Hydro Power, LLC, Eagle Creek Water Resources, LLC, and Eagle Creek Land Resources, LLC (collectively referred to as Eagle Creek Hydro) filed a proposed study plan (PSP) for 11

studies covering aquatic, fisheries, terrestrial, recreational, and cultural resources in support of their intent to relicense the Mongaup River Projects.

Eagle Creek Hydro held an initial study plan meeting on October 4, 2017, and a second meeting on November 9, 2017, to discuss the PSP. On January 10, 2018, Eagle Creek Hydro filed a revised study plan (RSP) that includes revisions to the proposed studies, and a newly proposed Black Brook Dam Decommissioning Study.

Comments on the RSP were filed by the National Park Service (Park Service) on January 19, 2018. American Whitewater (AW), Appalachian Mountain Club (AMC), and Kayak and Canoe Club of New York (KCCNY) jointly filed comments on the RSP on January 22, 2018. The U.S. Fish and Wildlife Service (FWS), New York State Department of Environmental Conservation (NYSDEC), and Homeowners on Toronto, Inc. (HOOT) filed comments on the RSP on January 25, 2018.

Study Plan Determination

Eagle Creek Hydro's RSP is approved, with the staff-recommended modifications discussed in Appendix B. Of the 14 studies contained in Eagle Creek Hydro's RSP, all 14 are approved with staff-recommended modifications (Appendix A). In addition, Eagle Creek Hydro is required to conduct 2 new studies on: Delaware River flows; and alewife. The specific modifications to Eagle Creek Hydro's study plans and need for new studies are discussed in Appendix B. Studies for which no issues were raised are not discussed in this determination. Unless otherwise indicated, all components of the approved studies not specifically modified by this determination must be completed as described in the RSP.

Commission staff reviewed all study plan criteria in section 5.9 of the Commission's regulations; however, only the specific study criteria that are particularly relevant to this determination are referenced in Appendix B.

Pursuant to section 5.15(c)(1) of the Commission's regulations, the initial study report for all studies in the approved study plan must be filed by February 9, 2019.

Nothing in this study plan determination is intended, in any way, to limit any agency's proper exercise of its independent statutory authority to require additional studies. In addition, Eagle Creek Hydro may choose to conduct any study not specifically required herein that it feels would add pertinent information to the record.

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If you have any questions, please contact Quinn Emmering at
quinn.emmering@ferc.gov or (202) 502-6382.

Sincerely,



For:
Terry L. Turpin
Director
Office of Energy Projects

Enclosures: Appendix A – Summary of determinations on proposed and recommended studies
Appendix B – Staff's recommendations on proposed studies and recommended study modifications

APPENDIX A

SUMMARY OF DETERMINATIONS ON PROPOSED AND RECOMMENDED STUDIES

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
1. Reservoir Water Level Fluctuation/Operation Model Study	Eagle Creek Hydro, FERC		X	
2. Aquatic Habitat Assessment Study Plan	Eagle Creek Hydro, FERC		X	
3. Fisheries Survey Study Plan	Eagle Creek Hydro, FERC		X	
4. Fish Entrainment/Impingement Study	Eagle Creek Hydro, FWS		X	
5. Water Quality Study	Eagle Creek Hydro, FERC		X	
6. Macroinvertebrate and Mussel Survey	Eagle Creek Hydro,		X	
7. Recreation Facility Inventory, Recreation Use and Needs Assessment, and Reservoir Surface Area Assessment Study	Eagle Creek Hydro, FERC, Park Service, HOOT		X	
8. Whitewater Boating Assessment Study	Eagle Creek Hydro, AW, AMC, KCCNY (boating groups); FERC		X	
9. Shoreline Management Assessment Study	FERC, HOOT		X	

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
10. Cultural Resources Study	Eagle Creek Hydro, FERC		X	
11. Black Brook Dam Decommissioning Study	Eagle Creek Hydro, FWS, FERC		X	
12. Special-Status Species Survey Study	Eagle Creek Hydro, FWS, NYSDEC, FERC		X	
13. Bald Eagle Management Study	Eagle Creek Hydro, FWS, NYSDEC, FERC		X	
14. Bypass/Base Flow Transect Evaluation Study	Eagle Creek Hydro, FERC		X	
15. Delaware River Flow and Aquatic Habitat Study	FERC, Park Service		X	
16. Alewife Hydro-Acoustic Study	FERC, FWS, NYSDEC		X	

APPENDIX B
STAFF RECOMMENDATIONS ON PROPOSED STUDIES AND
RECOMMENDED STUDY MODIFICATIONS

The following discusses staff's recommendations on studies proposed by Eagle Creek Hydro and participants' requests for study modifications and additional studies.

SECTION 1: GENERAL ISSUES

General

Background

FWS notes that the table in Section 19, Schedule for Conducting Proposed Studies does not include the spring fisheries survey proposed in the RSP.

Discussion and Staff Recommendation

Staff recommend that Eagle Creek Hydro provide an updated schedule that includes the spring fisheries survey and any additional schedule modifications that result from this study plan determination.

Construction and Repairs during Relicensing Studies

Background

On January 26, 2018, the Eagle Creek Hydro filed with the Commission an application, separate from the current relicensing process, for a non-capacity license amendment for the Swinging Bridge Project. In the application, Eagle Creek Hydro proposes a new 30-foot by 30-foot powerhouse and minimum-flow turbine generator (Unit 3) with a rated capacity of 1.1 megawatts (MW) to replace the existing inoperable turbine generator (Unit 1) with a rated capacity of 5 MW. The new powerhouse would be located immediately adjacent to, and north of, the existing powerhouse for Unit 2 with a rated capacity of 6.75 MW. The proposal would lower the authorized installed capacity in the current license from 11.75 MW to 7.85 MW. Eagle Creek states that Unit 3 would need to be operational by July 2019 in order to maintain its existing contract with the New York State Energy Research and Development Authority.

Eagle Creek Hydro has stated it plans to perform repairs to the Toronto Reservoir intake gate tower in the near future, though they have not specified exactly when repairs would be initiated.

Comments

FWS and NYSDEC notes that construction of the new powerhouse would occur during relicensing studies and are concerned that construction related to the amendment, if approved, could potentially impact relicensing study results. FWS further states that Eagle Creek Hydro did not address potential effects of such construction on generation, minimum flows, or other project operations that could affect the accuracy of the studies, other than limiting construction activities to periods outside of the winter roosting and foraging season for bald eagles.

FWS recommends that all studies potentially affected by construction of the proposed powerhouse be conducted in 2019 after the completion of construction or that construction be delayed until after the completion of studies. NYSDEC states that it would likely require Eagle Creek Hydro to conduct a second season of studies in order to compare conditions at the Swinging Bridge Hydroelectric Project pre- and post-construction.

HOOT stated that the licensee should be directed to clarify its plans for repairs to the Toronto Reservoir intake gate tower and the extent to which those repairs would require changes to reservoir levels that may affect its ability to execute its study plan with respect to Toronto Reservoir.

Eagle Creek Hydro's Response and Proposal

On January 29, 2018, the Eagle Creek Hydro filed a letter in response to the agencies' concerns regarding potential effects of the proposed construction on the results of relicensing studies. In their letter, they provide clarification on the proposed construction and additional information on measures that would be implemented to prevent impacts to relicensing studies. Eagle Creek Hydro's additional information and proposed measures include:

- The majority of the construction for the Unit 3 powerhouse and appurtenances would occur in a very limited footprint, in pre-disturbed upland area consisting primarily of an existing dirt access road.
- For the limited construction that would occur within the shoreline of the Mongaup River, which is currently covered with large rip-rap, they would implement measures to isolate the construction area from the river (i.e., installation of a temporary cofferdam around the tailrace of the new Unit 3) prior to June 1, 2018. This schedule would avoid potential impacts to studies to be performed in the

Mongaup River downstream of the Swinging Bridge Dam, which would commence after June 1, 2018, including the Fisheries Survey Study, Water Quality Study, Macroinvertebrate and Mussel Survey Study, and the Bypass/Base Flow Transect Evaluation Study.

- The proposed Unit 3 would utilize the same intake and penstock for the existing Unit 2 powerhouse. The existing penstock bifurcation for the existing minimum flow discharge valve would be extended to connect to the proposed Unit 3 powerhouse; therefore, no construction activities would occur within the Swinging Bridge Reservoir or along the embankment from the dam crest to the proposed powerhouse.
- The construction of the proposed Unit 3 would utilize existing access roads and upland lay-down areas and would not require tree or vegetation clearing.
- No interruption to the required minimum flow during construction of Unit 3.
- No interruption to the ability to operate the Unit 2 powerhouse within the requirements of the existing license during construction of Unit 3.
- The construction schedule for Unit 3 has been planned to avoid heavy construction activities with the potential to generate noise at levels considered adverse to wintering eagles during the bald eagle wintering period from December 1 through March 31.

Discussion and Staff Recommendation

We agree with FWS and NYSDEC that construction of the proposed minimum flow powerhouse has the potential to affect relicensing studies; however, we expect that Eagle Creek Hydro's proposed measures noted above should prevent impacts to the relicensing studies. We also agree with HOOT that repairs to the Toronto Reservoir intake gate tower could involve changes to reservoir levels that may affect its ability to execute its study plan with respect to Toronto Reservoir. Therefore, we recommend that Eagle Creek Hydro identify in its Initial Study Report, any reservoir changes associated with the repairs to the Toronto Reservoir intake gate tower and discuss if and to what extent those changes and any other construction effects associated with the repairs affected its first year studies.

SECTION 2: MODIFICATIONS TO PROPOSED STUDIES

Study 1 – Reservoir Water Level Fluctuation/Operation Model Study

Eagle Creek Hydro's Proposal

Eagle Creek Hydro proposes to develop, calibrate, and validate a Computer Hydro Electric Operations and Planning Software (CHEOPS™) operations model that integrates each of the three Mongaup River Projects. The operations model would support the future evaluation of proposed and potential recommendations for project operations at an hourly time-step and under various reservoir inflow and outflow conditions. Upon completion, the operations model would be capable of predicting reservoir elevations, surface areas, available storage, and generation that would result from various operational scenarios. In particular, in order to address the stakeholders' requests, the model would be utilized to support future evaluations of impoundment elevations and downstream flows based on proposed operating, flow, and recreation alternatives for the three projects.

Comments on the Study

HOOT comments that the RSP is sufficient, so long as the operations model produced by this Study is calibrated to allow testing of the full range of alternatives. NYSDEC and FWS generally support the RSP; however, they both request that the RSP be modified to fully incorporate their previous comments on the PSP regarding upstream flows in the Delaware, temperature data (as available), and presentation of the results. Additionally, NYSDEC requests that the RSP be modified to require the model to be done in consultation with the NYSDEC, FWS, and Park Service. NYSDEC and FWS also request that Eagle Creek Hydro consult with them during the development of the Reservoir Water Level Fluctuation/Operation Model regarding model decisions and assumptions. Park Service state that their previous comments on the PSP were not addressed regarding the need for the operation model to determine the calibration influence of the Mongaup River flows and temperatures on the upstream and downstream Delaware River conditions at seven USGS gages on the Delaware River system upstream of the Mongaup River and five USGS gages on the Delaware River downstream of the Mongaup River confluence.

Discussion and Staff Recommendation

The proposed operation model, as presented in the RSP, is described very generally with little information on the processes, methodology, and the data to be used

[section 5.9(b)(4) and (6)]. As mentioned above, Park Service, NYSDEC, FWS, and HOOT requested to be involved during the development and calibration of the model. Allowing the agencies to review and recommend input regarding the data sets to be used in the analyses and the model's output data would ensure that the model, once developed, is capable of analyzing both the proposed project and any agency alternative. Therefore, Eagle Creek Hydro should conduct one or more workshops with relicensing participants during the development of the Operations Model. Eagle Creek Hydro should also conduct a workshop when the model is ready for use to show how the model works and its ability to analyze operation alternatives [section 5.9(b)(6)]. If Eagle Creek Hydro does not adopt a recommendation from Park Service, NYSDEC, FWS, and Hoot, Eagle Hydro should explain its rationale for not doing so in the Initial Study Report. The rationale should be based on the study criteria stipulated in section 5.9(b) of the Commission's regulations.

We note that the Park Service requests a study of the projects' effects on the Delaware River, including both flow and temperature data, which both NYSDEC and FWS support. In Section 3 – *Studies Requested but Not Adopted by Eagle Creek Hydro*—we conclude that there is no nexus between project operations and flows on the Delaware upstream of the Mongaup River confluence and recommend not adopting Park Service's proposed study of this upstream reach [section 5.9(b)(5)].

Study 2 – Aquatic Habitat Assessment Study

Eagle Creek Hydro's Proposal

Eagle Creek Hydro proposes to conduct desktop and field surveys to document and map within the reservoirs' fluctuation zones: aquatic habitats and aquatic invasive species, erosion areas, as well as recording encountered biological features such as fish spawning beds, mussel beds, or shell materials.

As part of this study, Eagle Creek Hydro also proposes to verify National Wetland Inventory (NWI) and NYSDEC-mapped wetlands within the projects' boundaries. In addition, the type and GPS location of any wetlands found to be unmapped or where major discrepancies from the existing maps are found would also be documented. Further, any major discrepancies would be noted on aerial maps and provided in the study report. In order to obtain the data, and as conditions allow, Eagle Creek will use side-scan sonar (SSS) from a boat to identify aquatic habitat types. In addition, Eagle Creek will use multi-beam sonar (MBS) from a boat to obtain bathymetric data.

Comments on the Study

The FWS and NYSDEC note that Eagle Creek Hydro's proposed methodology to assess wetlands do not conform to standard method and practice and does not meet the goals and objectives of their original study requests.

NYSDEC also notes that the proposed methodology may fail to identify wetland areas not located in the vicinity of the NWI- and NYSDEC-mapped wetlands to be verified.

As a result, the agencies ask that Eagle Creek Hydro develop a standalone wetland delineation study, separate from the *Aquatics Habitat Assessment Study* to help clarify the study's components, and modify the study to describe and map the approximate boundary of all wetlands in the vicinity of the projects. In addition, FWS specifically recommends the study scope also include the impoundments, Black Lake Creek, Black Brook, and the Mongaup River to the confluence with the Delaware River.

Discussion and Staff Recommendation

Wetland Delineation Study

We agree with FWS and NYSDEC that Eagle Creek Hydro should modify *Study 2 - Aquatic Habitat Assessment* by separating the wetland objective into a standalone study to provide needed clarity for staff and stakeholders. As currently organized, it's unclear as to why disparate study requests (e.g. wetlands, aquatic habitat, etc.) have been incorporated into the single Aquatic Habitat Assessment Study. Therefore, we recommend that Eagle Creek Hydro extract the wetland objective (discussed below) into a standalone study. Dividing the studies, as such, would provide needed clarity for staff and stakeholders to more effectively evaluate, reference, and locate each study's respective objectives and methods [section 5.9(b)(6)].

Eagle Creek Hydro argues that standard wetland delineation methods, as recommended by FWS and NYSDEC, are unwarranted given no earth-disturbing activities and no development is proposed as part of the relicensing. As a result, they propose to limit the study to field-verification of existing NWI- and NYSDEC-wetland maps within the projects' boundaries during the field surveys. We concur with Eagle Creek Hydro that the level of detail provided by standard wetland delineation methodology exceeds the needs for our environmental analysis [section 5.9(b)(5)], particularly given the level of effort and cost [section 5.9(b)(7)], and we therefore do not recommend it.

Eagle Creek Hydro's PAD includes NWI and NYSDEC wetland maps found in the vicinity of the projects, but field verification of these wetlands has not been performed [section 5.9(b)(4)]. Eagle Creek Hydro's proposed methodology is unclear and suggests that wetland field-verification may only occur within the aquatic habitat survey area (i.e. reservoirs' fluctuation zones). Operation of the projects and recreation activities (e.g. alter hydrology, trampling of vegetation) has the potential to affect all wetlands in the vicinity of the projects, not only those in and near the reservoirs' fluctuation zones [section 5.9(b)(5)]. Therefore, we agree with FWS and NYSDEC and recommend that surveys conducted for the purpose of field verification include all wetlands within the project boundary including the impoundments, Black Lake Creek, Black Brook, the Projects' bypassed reaches, and the Mongaup River to the confluence with the Delaware River.

Eagle Creek Hydro proposes to document the type and GPS locations of wetland boundaries with major discrepancies and large wetland complexes not included in the existing NWI or NYSDEC-wetland maps. However, smaller wetlands are valuable as they also support a variety of wetland-dependent species including federally endangered bog turtles. NWI and NYSDEC wetland maps are produced using digital maps (e.g. aerial imagery, soils maps, etc.) and therefore not precise enough to capture all wetlands potentially occurring in the project area, as noted by NYSDEC. Therefore, we also recommend that the type and GPS location of all missing wetlands, not just large wetland complexes be documented and mapped by Eagle Creek Hydro, as requested by FWS and NYSDEC [section 5.9(b)(4)]. Such wetland corrections and additions would inform our environmental analysis of project effects and recommendations for measures to be included in any license issued for the project [section 5.9(b)(5)].

Study 3 – Fisheries Survey Study

Eagle Creek Hydro's Proposal

The Mongaup River Projects may affect fishery resources by fluctuating reservoir elevations, flows in downstream reaches and through impingement and entrainment at the projects' intakes. Eagle Creek Hydro's study objective is to supplement existing fishery data collected at the projects by conducting fisheries surveys during the late summer/early fall at areas representative of the projects' impoundments, tailraces, bypassed reaches, and downstream reaches, including downstream of the Rio powerhouse to the Mongaup River's confluence with the Delaware River. Specifically, Eagle Creek Hydro proposes to conduct 3 days of electrofishing sampling on the Mongaup River

between the Rio Dam and the river's confluence with the Delaware River and a single day of sampling at each of the following locations:

- Black Lake Creek from Toronto Dam to Cliff Lake and from Cliff Lake Dam to the confluence with the Mongaup River;
- Mongaup River from Swinging Bridge tailrace to Mongaup Falls Reservoir;
- Mongaup River from Mongaup Falls Dam to the Rio Reservoir.

To survey for American eel and American shad at the project, Eagle Creek Hydro proposes to conduct a targeted electrofishing effort on three consecutive days in late-spring on the Mongaup River from Rio Dam downstream to the confluence with the Delaware River.

Reservoir sampling would be conducted at locations selected according to habitat type and provide representative samples in each of the five impoundments and include one day of daytime boat electrofishing, and possibly one overnight gillnet set and/or placement of eel pots in each reservoir.

Eagle Creek Hydro proposes to prepare a report that summarizes the study results, including species richness, relative abundance, size class structure, and habitat use.

Comments on the Study

Study Timing

The boating groups comment that sampling in the late summer/fall alone would not provide sufficient information on various fish species and life stages under varying flow conditions. FWS and NYSDEC also request that a late fall/winter or early spring survey in the impoundments to evaluate seasonal habitat use of fish and susceptibility to entrainment at the projects.

Level of Effort, Methodology, & Existing Information

FWS and NYSDEC note that Eagle Creek Hydro has limited its fish sampling efforts to 11 days at the projects and does not propose to sample Black Brook given the availability of existing fishery information for the projects. The agencies disagree with Eagle Creek Hydro's assessment of the available data and note that data demonstrates a need for a comprehensive fisheries survey at the projects. More specifically, NYSDEC argues that the majority of the surveys cited were species-specific, and did not evaluate the fish communities within the project effected water bodies. As a result, the agencies

recommend that the study plan be modified to utilize multiple types of fisheries sampling gear, at several locations in each reservoir and study reach over multiple seasons to provide a comparison of new data with existing data at the projects and with existing data from other water bodies within New York State. Finally, NYSDEC notes that sampling fish by boat electrofishing is most effective during night and requests that nighttime boat electrofishing be incorporated into the study plan.

Black Brook Fishery Survey

In their comments on the *Black Brook Decommissioning Study*, the agencies' request that Eagle Creek Hydro study the fishery resources within Black Brook to aid in the evaluation of decommissioning.

Spring Spawning Survey

The FWS and NYSDEC are concerned with Eagle Creek Hydro's proposed protection mitigation and enhancement (PM&E) measure to maintain the reservoirs at existing elevations during the spring spawning season in lieu of conducting spring spawning surveys would not provide an opportunity to evaluate the effectiveness of PM&E measures required during the last licensing. As a result the agencies request that spring spawning surveys be conducted.

American Eel and American Shad Sampling

Because the timing of American shad and American eel upstream migrations may differ, the FWS and NYSDEC request the study be modified to include specific sampling periods for American eel and American shad.

Alewife Hydro-Acoustic Study

NYSDEC notes that the projects' reservoirs have alewife populations that support predatory fish and provide forage for bald eagles. NYSDEC and the FWS recommend that Eagle Creek Hydro modify its proposed study plan to include targeted hydro-acoustic surveys to provide information on the abundance and seasonal distribution of alewife in the Projects' reservoirs.

Discussion and Staff Recommendation

Study Timing

Regarding the boating groups' comment that sampling in the late summer/fall alone will not provide sufficient information on various fish species and life stages under varying flow conditions, we understand this comment to be specific to the riverine and bypassed reaches affected by the projects. Typically, the analysis sought by the boating groups is conducted by evaluating potential stream flows and fishery management goals and objectives, and includes considerations for habitat and water quality.

As discussed below under *Study 14 – Bypass/Base Flow Transect Evaluation Study*, Eagle Creek Hydro proposes to evaluate the relevance of the 1988 *Mongaup Basin Instream Flow Study* (Stetson-Harza and Ichthyological Assoc. 1988) to determine whether it still accurately represents the existing baseline conditions and can be used to analyze current flow study needs at the projects. The 1988 *Mongaup Basin Instream Flow Study* (or an alternate flow study, if deemed necessary) will provide the information needed to assess the effects of varying flow conditions on fish species and life stages consistent with fishery management goal for the stream reaches [section 5.9(b)(4) and (6)]. The specific species and life stages to be assessed in each reach should be determined through consultation with the NYSDEC [section 5.9(b)(6)]. Therefore, the additional seasonal fishery sampling recommended by the boating groups is not needed at this time.

Regarding the FWS and NYSDEC request that a late fall/winter or early spring survey in project reservoirs to inform a season-specific assessment of entrainment at the projects, as discussed below under *Study 4 – Fish Entrainment/Impingement Study*, the 1992-1993 *Entrainment Studies Mongaup Hydroelectric Projects* (Lawler, Matusky & Skelly Engineers [LMS] 1994) study was designed to provide detailed data on winter entrainment (November to March) at each of the Projects' powerhouses. Our review found that the entrainment data collected by LMS between November 1992 and March 1993 is reliable and sound and would inform an analysis of late-fall, winter, and early spring entrainment at the projects sufficient to inform potential license conditions [sections 5.9(b)(4)]. However, we also found that the LMS study does not characterize the occurrence, relative abundance, and size distribution of fish in proximity to the project intakes during spring, summer, and fall; and subsequently, we recommend that Eagle Creek Hydro conduct two seasonal experimental gill net sample events during spring, summer, and fall (a total of six sampling events) to collect fish residing in proximity to each of the projects' powerhouse intakes. This recommended study plan modification and existing LMS wintertime data will inform a season-specific assessment

of entrainment at the projects [section 5.9(b)(6)]. We discuss our analysis of the LMS study and detailed recommendation below in *Study 4 – Fish Entrainment/Impingement Study*.

Level of Effort, Methodology, & Existing Information

Eagle Creek Hydro’s proposed *Study 3 – Fisheries Survey Study* is intended to augment the data of 62 existing fishery surveys that have been conducted for approximately the last 30 years (1998 to 2017, with the exception of 2002 and 2006). NYSDEC argues that none of the existing studies are a comprehensive fisheries survey at the projects and the majority of the surveys were species specific and did not evaluate the fish community as a whole. As a result, the FWS and NYSDEC find that Eagle Creek Hydro’s proposed effort and methodology is insufficient to describe the fish communities affected by the project. To correct this apparent deficiency, NYSDEC, in its comments on the proposed study plan, provided protocols that it and the FWS recommend be implemented for sampling the fishery resources at the projects. These documents articulate the level of effort (including gear types) the State of New York recommends for assessing fish communities and species specific sampling efforts.

Study criterion 4 [section 5.9(b)(4)] gives preference to the uses of existing information to satisfy data needs and is intended to identify gaps in the existing data to support a decision of what additional information is needed to assess project effects. Given the number of fisheries studies conducted over the last 30 years it is conceivable that the existing information’s is extensive. However, neither Eagle Creek Hydro nor the agencies discuss the existing data in any level of detail that could identify existing data gaps. Proposed studies should clearly explain how the existing information is adequate to satisfy the study goal and objective and articulate the data gaps the proposed study is intended to fill [section 5.9(b)(4)].

In addition, proposed studies should provide detailed methods sufficient for Commission staff and stakeholders to have a clear understanding of the proposal and a reasonable expectation of the information the study will produce. Eagle Creek Hydro’s *Fishery Survey Study* does not provide this level of detail [section 5.9(b)(6)]. For example, while Eagle Creek Hydro states that it expects to use backpack and boat electrofishing, gill nets and/or eel pots, there is no commitment to use any of these gear types. Similarly, the RSP does not identify specific habitats that will be sampled or a process for selecting habitats and sample locations or number of sample locations. Instead Eagle Creek Hydro states “(s)ampling will be performed at various locations throughout the reservoirs and stream reaches as can be accomplished within the proposed sample duration noted above.” According to the proposed study plan, this would be one

day per reservoir/stream reach, or 11 days in total. While sample days can be used to assess the level of effort associated with passive sample gear (e.g., gill nets and eel pots), this is not an appropriate unit of measure when referencing active sampling techniques (e.g., electrofishing). The acceptable unit of measures for electrofishing is either distance/area, unit run-time, or sample size, depending on the sampling design [section 5.9(b)(6)].

Regarding data collection, Eagle Creek Hydro notes that sampled fish will be identified and counted and “(g)ame species (e.g., trout species, smallmouth bass, walleye, and yellow perch) of up to 30 individuals of game species, as well as species of interest (e.g., American eel), will be weighed and measured.” This adds more ambiguity to the study plan and generates the following questions: (1) is it intended that 30 individual game fish in total will be measured and weighed or 30 individuals per species of game fish; (2) is it 30 individuals from each sampling effort, sample site, gear type, sample day, or water body; (3) how would the 30 individual fish be selected to prevent the introduction of bias; and (4) how was it determined that data from 30 individual fish would be sufficient to support a length-frequency distribution/size class structure analysis of the fish communities in project waters.

We do, however, note that Eagle Creek Hydro states it will obtain “representative samples in the five impoundments, tailrace/discharges, downstream reaches, and bypassed reaches,” which is our expectation. Eagle Creek Hydro implies that its study as designed will provide the information needed to augment the existing data set. However, given the level of uncertainty embraced in study plan and lack of discussion of the existing information and how it will support the development of a license application, we are unable to determine whether the study as proposed would provide the information needed for our effects analyses of the projects.

Therefore, Eagle Creek Hydro should implement its proposed study, as modified herein. The study report should incorporate and assimilate all of the relevant and existing fisheries data for each of the projects’ reservoirs and affected stream reaches. Using new and existing data, the study report should characterize: (1) the current fish species composition, relative abundance (e.g., catch per unit effort [CPUE]), and habitat use; and (2) the current fish size class and structure and condition factor of fish in project affected waters. The report should also articulate the study methods implemented to a level of detail that would support exact replication. Finally, the study report should identify any remaining data gaps.

Black Brook Fishery Survey

FWS and NYSDEC note that Eagle Creek Hydro is not proposing to conduct any fishery surveys in Black Brook and assert that fishery surveys in Black Brook are needed to inform a decommissioning analysis of the Black Brook development. Eagle Creek Hydro asserts that its proposed fishery survey data from the Mongaup River system, in conjunction existing data from a 2016 Black Brook fishery survey conducted by the NYSDEC, is sufficient to describe the fishery.

Using the Mongaup River fishery data to determine the fish community in Black Brook as Eagle Creek proposes is not appropriate. While this data may provide some insight into the species that may be found in Black Brook, it will not be definitive and will not provide information on species composition and relative abundance [section 5.9(b)(6)]. Similarly, the NYSDEC's 2016 Black Brook fishery survey effort was conducted to determine presence/absence of trout. While brook trout, brown trout, and pumpkinseed were documented, this study cannot be relied upon to provide definitive information on the fish community in Black Brook as Eagle Creek Hydro asserts [section 5.9(b)(6)].

Water diversions from Black Brook were discontinued in 1984 when the pipeline that carried water from Black Brook Dam to the Mongaup Falls surge tank failed. Black Brook Dam may be a barrier to upstream fish migration and creates a small impoundment that may influence water quality and effect downstream fishery resources [section 5.9(b)(5)].

In its proposed *Study 11 – Black Brook Dam Decommissioning Study*, Eagle Creek Hydro would evaluate the size of Black Brook Dam, relative to the natural falls at that location [section 5.9(b)(4)]. This information may be used to assess the extent to which removal of Black Brook Dam would benefit upstream fish passage. Our recommended study plan modifications for macroinvertebrate sampling and continuous real-time water temperature monitoring in Black Brook (discussed in studies 11 and 6, respectively) and the proposed in-situ water quality sampling would provide information on the Black Brook development's effects on water quality [section 5.9(b)(4)]. Because flows in Black Brook are no longer altered by the Mongaup Falls Project and the revised study plan (as modified herein), would provide information to evaluate the effects of the Black Brook development on NYSDEC's management goals for Black Brook, detailed information on the existing fish community within Black Brook is not needed to evaluate the decommissioning alternatives for the Black Brook development [sections (b)(4) and (6)].

Spring Spawning Survey

Eagle Creek Hydro proposes to maintain reservoir elevations to keep bass spawning habitats inundated during the spawning season. As a result, Eagle Creek Hydro argues that spring spawning season surveys are not needed as this resource would be protected by the proposed measure. The agencies' argument is valid. If the effectiveness of a current PM&E measure has never been evaluated, implementing the same measure without scrutiny would not be appropriate [sections 5.9(b)(4), (5), and (6)]. However, the goal of Eagle Creek Hydro's *Study 2 – Aquatic Habitat Assessment Study Plan* is to identify, map, and assess potential project effects on aquatic habitats within each of the five project reservoirs. Eagle Creek Hydro's *Study 1 – Reservoir Water Lever Fluctuation Study Plan* will provide information on project operational effects on the aquatic habitats within the reservoirs. Fishery survey data collected from this study (as modified herein), will provide information on the relative abundance and size/age structure of the fish community within the reservoirs [section 5.9(b)(4)]. These data should provide the information needed to support an evaluation of current conditions in the reservoirs and the adequacy of the proposed measure to maintain reservoir elevations and protect bass spawning habitat during the spring [section 5.9(b)(6)] and without the added cost of spring spawning surveys [section 5.9(b)(7)].

American Eel and American Shad Sampling

American Eel

If timed correctly, Eagle Creek Hydro's proposed sampling effort to conduct three concurrent days of electrofishing efforts in the Mongaup River downstream of Rio dam may provide information on the presence/absence of American eel in the Mongaup River downstream of Rio Dam. However, this information would be of little added benefit given: (1) the known presence of eel in this reach; and (2) the documented occurrence in the upstream Mongaup Falls Reservoir [section 5.9(b)(4)]. Nor would it provide any new information regarding the project effects on the species [section 5.9(b)(4)]. Currently, no information exists about where upstream migrating American eels might be concentrating below the Rio Project or if they are seeking upstream passage [section 5.9(b)(4)]. However, given the known presence of this species, its migratory life history, its historic range in the Mongaup River upstream of Mongaup Falls, it is likely that the Rio Project impedes or blocks upstream migration of American eel [sections 5.9(b)(4) and (5)]. As a result, Eagle Creek Hydro should, after consultation with the FWS and NYSDEC, conduct systematic surveys for upstream migrating eel at a minimum, at the Rio Project's tailrace, the minimum flow turbine tailrace, and at the base of Rio Dam. The study should be designed to identify areas of eels staging in pools or attempting to ascend

wetted structures and, if appropriate, inform an American eel upstream passage feasibility assessment (discussed in *Section 3 - Upstream and Downstream Fish Passage Study*).

The study should include visual surveys at night, at least once per week, on foot (wading) or from a boat from spring through fall and target areas where eels are likely to congregate below the Rio Dam, powerhouse tailraces, and within the bypassed reach, and at locations of significant leakage. Data collected should include location, observation of eels (presence, absence, numbers, and estimated sizes), time and date of observation, field notes on weather conditions, and moon phase. Other data that should be recorded include notes on project operations and flow data during sampling.

In addition, baited eel pots should be deployed in the project's tailraces, bypassed reach, and at the base of the Rio Dam and fished once per week (overnight sets) for the duration of the study. The number and specific location of the eel pots should be developed in consultation with the agencies and include other locations that upstream migrating eels may congregate. At a minimum, the data collected should include location, number captured, relative sizes, and time and date. Eels collected from baited eel pots should be marked in an effort to identify individuals who may have already been captured to avoid overestimating eel abundance. Any recaptures should be recorded.

We anticipate the implementation of this study would require two individuals to conduct sampling on two days per week for the 26 week duration of the study period and cost about \$60,000 [section 5.9(b)(7)].

American Shad

If timed correctly, Eagle Creek Hydro's proposed sampling effort to conduct three concurrent days of electrofishing efforts in the Mongaup River downstream of Rio dam may provide information on the presence/absence of American shad in the Mongaup River downstream of Rio Dam. Currently no data on the presence of American shad has been provided [section 5.9(b)(4)]. While Eagle Creek Hydro proposes to conduct the sampling on three consecutive days between June 1 and July 15 the short duration of the survey period could be problematic because the shad spawning migration timing may vary for a multitude of reasons including water temperature and flow conditions.[section 5.9(b)(6)]. However, we note that Eagle Creek Hydro proposes to also consult with the NYSDEC on the timing of the shad spawning run and likely presence below Rio Dam. This consultation should help pin-point survey efforts, so we agree with this approach. Until such time that American shad are documented in the Mongaup River, a targeted American shad study, as requested by the agencies, is not warranted [section 5.9(b)(5)]. However, we note that our recommended America eel survey, discussed above, would

also provide an opportunity for incidental observations of American shad at the Rio Project and any observations should be reported [section 5.9(b)(6)]. Therefore, when developing the American eel study, Eagle Creek Hydro should include a provision to document any incidental observations of American shad. Inclusion of this provision in the American eel study should not affect the cost of that study [section 5.9(b)(7)].

Alewife Hydro-Acoustic Study

NYSDEC's and FWS's request for hydro-acoustic surveys of alewife populations and distribution in the project' reservoirs is essentially a study request. Because Eagle Creek Hydro is not proposing to conduct this study we discuss it below in Section 3 – *Studies Requested but Not Adopted by Eagle Creek Hydro.*

Study 4 – Fish Entrainment/Impingement Study

Eagle Creek Hydro's Proposal

With the exception of American eel, Eagle Creek Hydro asserts that the existing LMS study provides the information necessary to evaluate project entrainment effects on fishery resources at the Mongaup River Projects. Eagle Creek Hydro proposes to augment the LMS study results with a qualitative desktop analysis of impingement and entrainment risk and estimates of mortality for American eel at the Rio Project. Eagle Creek Hydro proposes to use standard methodology including a review of the EPRI database on entrainment studies conducted at other hydroelectric projects. Eagle Creek Hydro proposes to estimate American eel mortality using standard mortality assessment practices.

Comments on the Study

Adequacy of Existing Entrainment Study

The FWS and NYSDEC note that the stated goal of the 1992 and 1993 entrainment study was a qualitative, presence-based analysis of entrainment at the Mongaup Projects and entrainment of alewife in winter months at the Rio and Swinging Bridge Projects. As such, the agencies state that the results of the study do not provide useful or reliable information on potential fish entrainment and mortality at the projects. As a result, the agencies reiterate their request for a *Fish Entrainment and Mortality Study*, which would include the use of literature reviews and site-specific data to conduct a desktop analysis of project effects.

Fish Protection, and Upstream and Downstream Passage Studies

FWS and NYSDEC note that Eagle Creek Hydro, in its revised study plan, removed efforts to evaluate upstream eel passage at the projects that were included in its proposed study plan. As a result, the agencies reiterate their previous request for *Fish Protection, and Upstream and Downstream Passage Studies*, which would include the use of literature reviews, discussions with fishway engineers, and site-specific data to conduct a desktop analysis of project effects and potential fish passage/protection solutions.

Discussion and Staff Recommendation

Adequacy of Existing Entrainment Study

The FWS and NYSDEC raise several concerns with the usefulness and reliability of the existing LMS study for the following reasons: (1) study was conducted in a drought year; (2) the study was seasonally biased for winter; (3) collection efficiencies at the projects were poor; (4) conclusions drawn by the study are flawed; (5) the survival estimate was based on the limited number of entrainment mortality studies available at that time and no in-situ mortality data was included from the field study.

Eagle Creek Hydro argues that site-specific data collected during the LMS study is sufficient to support its relicensing of the projects and is more valuable than using data from other locations, as requested by the agencies. The licensee notes that several of the issues associated with the LMS study and identified by the agencies are common in field entrainment studies, including studies that would be used in the agencies requested desktop study.

The LMS study was conducted between November 1992 and October 1993. The study was conducted to describe the species composition, relative abundance, and size of entrained fish and to estimate the total annual entrainment specific to the Mongaup Falls Project. The purpose of the winter entrainment sampling at the Swinging Bridge and Rio Projects was to characterize the occurrence, relative abundance, and size distribution of alewife entrained. Reservoir profile data [dissolved oxygen (DO) and water temperature] were collected from each reservoir in the vicinity of the intakes and used to predict the potential for entrainment of fish based on DO and depth (based on species' temperature preference). As indicated in Figure 8-1 of the revised study plan, sampling occurred at each of the projects and each of the units between November 1992 and March 1993. Consistent with the study's purpose, only the Mongaup Falls Project was sampled

between April 1993 and October 1993. However, given the unusually dry summer conditions that year, generation at the Mongaup Falls Project was limited and no entrainment sampling was conducted in late-June and July, and only one sample event was conducted in August [section 5.9(b)(4)].

The LMS study was designed to provide detailed data on winter entrainment (November to March) at each of the projects. Predictions of entrainment potential during the summer months at the Swinging Bridge and Rio Projects were relied upon given the assumption that the reservoirs stratify and temperature and DO would deter fish presence near the projects' intakes. While DO may be used to determine the absence of species if anoxic conditions below a species lethal tolerance level exists, DO and water temperature cannot be used to predict entrainment rates. The LMS study indicates that while DO levels in the vicinity of the intakes were depressed after mid-June, and would likely deter the presence of fish in the area, none were at a level lethal to fish that would decisively exclude them from the intake zone [section 5.9(b)(4)]. In addition, as indicated by the agencies and confirmed in the LMS study, dry summer conditions significantly curtailed project operations. Low flows and limited project operations would reduce the turnover/exchange rate within the reservoirs and likely influence the water temperature and DO concentration the study relied upon to predict entrainment potential during the summer months [section 5.9(b)(4)]. As a result, the LMS study results, if applied to the projects, would likely underestimate entrainment potential from June through mid-October [section 5.9(b)(6)]. As a result much of the LMS study (June – October) was conducted under anomalous environmental conditions and those conditions likely had a direct effect on the study's results [sections 5.9(b)(4) and 5.15(d)(2)].

The LMS study also notes a limitation in the available literature for estimating turbine mortality at the projects. For example, the rotational speed of the Mongaup River Project's turbines are higher than the surrogate projects used. To compensate, the LMS study conservatively relied upon survival values from the lower end of the range of those reported by the Electric Power Research Institute (EPRI) [section 5.9(b)(4)]. While this is a reasoned approach when data is limited, the current volume of literature for estimating turbine mortality at hydroelectric projects is greater than in 1994 [sections 5.9(b)(4) and (6)]. As a result, the study's turbine survival estimates would benefit from an updated review of existing literature developed during the last two decades [section 5.9(b)(6)].

While we find that the LMS study entrainment data collected between November 1992 and March 1993 to be reliable and sound, assumptions used to develop summer-time study results were likely influenced by drought conditions during the study's implementation. As a result, and for the reasons discussed above, Eagle Creek Hydro

should conduct a desktop entrainment study for each of the projects as requested by the agencies and include an updated mortality/turbine survival analysis for each project. Because the LMS study does not characterize the occurrence, relative abundance, and size distribution of fish in proximity to the Rio and Swinging Bridge projects between April and October and data collected at the Mongaup Falls Project was collected under anomalous conditions [section 5.9(b)(4)], Eagle Creek Hydro should modify *Study 3 – Fisheries Survey Study* to include two seasonal experimental gill net sample events during spring, summer, and fall (a total of six sampling events) to collect fish residing in proximity to the projects' powerhouse intakes [sections 5.9(b)(4) and (6)]. We estimate the cost of our recommended desktop entrainment study and the gillnet sampling effort to be \$70,000 [section 5.9(b)(7)].

Upstream and Downstream Fish Passage Feasibility Study

Regarding the FWS' and NYSDEC's request for their *Upstream and Downstream Passage Study*, we discuss this study separately in section 3 *Studies Requested But Not Adopted by Eagle Creek Hydro*.

Study 5 – Water Quality Study

Eagle Creek Hydro's Proposal

Eagle Creek Hydro proposes to supplement the existing water quality dataset by collecting continuous water temperature and DO between June 1 and September 30, at 15-minute intervals within each of the project reservoirs (at a location in the vicinity of project outlet works), and at the following eight stream locations:

- Black Lake Creek at the discharge from Toronto Reservoir;
- Black Lake Creek immediately upstream of its mouth at Cliff Lake Reservoir;
- Black Lake Creek at the discharge of Cliff Lake Reservoir;
- Black Lake Creek immediately upstream of the confluence with the Mongaup River;
- Mongaup River at the Swinging Bridge powerhouse;
- Mongaup River at the Mongaup Falls powerhouse;
- Mongaup River at the upstream extent of the Rio Project's bypassed reach; and
- Mongaup River immediately downstream of the Rio Project's tailrace.

Eagle Creek Hydro also proposes to collect in-situ surface water quality data (DO, pH, specific conductance) at each of these locations to a depth of 2-4 feet; and weekly

reservoir profile data (temperature and DO) at one-meter intervals from the water surface to a depth two meters below the elevation indicating anoxic conditions or the bottom of the reservoir, whichever is encountered first.

Eagle Creek Hydro proposes to compare and evaluate current and historic water quality data to determine change-over-time and include a graph of stream flows at the USGS streamflow gages 01432900 and 01433500 during the study period.

Comments on the Study

Stream Water Quality Monitoring Locations

Regarding stream reaches, FWS and NYSDES recommend that Eagle Creek Hydro collect the proposed water quality data at the upper and lower ends of the Mongaup Falls and Rio Projects' bypassed reaches. The boating groups appear to support this recommendation as they raise concerns that water quality is likely to change as it moves downstream through the bypassed reaches. The agencies also recommend the addition of a monitoring station just upstream of the Mongaup Falls Reservoir. The agencies argue that monitoring locations that bracket the study reaches, as requested here, are needed to assess changes to water quality within the reaches.

Reservoir Water Quality Monitoring

FWS and NYSDEC recommend that water quality profile data be collected from the entire water column (surface to bottom) within the reservoirs to be consistent with the 1994 LMS entrainment study.

Stream Flow and Generation Data

FWS and the NYSDEC request that generation data at all powerhouses and stream flow release data from Toronto Reservoir be provided to support an evaluation of the effects of flow on water quality.

Duration of Water Quality Monitoring

FWS and NYSDEC request that Eagle Creek Hydro collect water quality data throughout the year to support an assessment of how water quality may affect fishery resources throughout the year.

Discussion and Staff Recommendation

Stream Water Quality Monitoring Locations

Rio and Mongaup Falls Bypassed Reach

Although Eagle Creek Hydro proposes to monitor water quality in the upper extent of the Rio bypassed reach, it does not propose to monitor water quality within the Mongaup Falls bypassed reach or in the lower extent of the Rio bypass reach. Instead, Eagle Creek Hydro explains that its proposed sample location in proximity to the project intake within the Mongaup Falls Reservoir (P9) would provide water quality data that is representative of water discharged from the reservoir and into the Mongaup Falls Bypassed Reach [sections 5.9(b)(4) and (6)]. In addition, Eagle Creek Hydro states that its proposed sample locations P10 and P13 on the Mongaup River just below the Mongaup Falls and Rio tailrace discharges, respectively, would provide data that is representative of the water quality at the lower extent of their respective bypassed reaches (when the projects are not generating).

Collectively, Eagle Creek Hydro's proposed approach to use the reservoir water quality data as a surrogate to for data from the upper extent of the bypassed reach and data from its proposed site just below the Mongaup Falls powerhouse would support an analysis of longitudinal changes to water quality within the bypass reach when the project is not generating [section 5.9(b)(6)]. Similarly, using data collected at station P13 and comparing it to water quality data collected from the upper Rio bypassed reach would support an analysis of longitudinal changes to water quality there [section 5.9(b)(6)]. However, the agencies argue, water quality data collected at the proposed P10 and P13 locations downstream of the tailraces would no longer be representative of water within the lower extent of the bypassed reaches and subsequently result in data gaps when the projects are generating [section 5.9(b)(4)].

We agree with the agencies on this issue. The proposed approach would result in data gaps that would hinder an analysis of longitudinal changes to water quality within the Mongaup Falls and Rio bypassed reaches. However, if the projects' generation schedules are sufficiently variable and provide a broad range of dates, times, and durations of non-generation periods that result in a sufficient sample size when data from P10 and P13 represents the water quality within the lower extent of the bypassed reaches, the proposed approach could provide the necessary information at a reduced level of effort and study cost [sections 5.9(b)(6) and (7)]. As a result, we do not recommend the agencies' request for a water quality monitoring station within the upper and lower extent

of the Mongaup Falls bypassed reach or in the lower extent of the Rio bypassed reach, at this time.

Mongaup River Upstream of Mongaup Falls Reservoir

Although Eagle Creek Hydro proposes to monitor water quality in the Mongaup River at the Swinging Bridge Project's tailrace (P8), it does not propose to monitor water quality in the Mongaup River immediately upstream of the Mongaup Falls Reservoir at the end of this affected reach. The agencies assert that adding a water quality monitoring station to the lower extent of this reach is needed to support an assessment of project effects on water quality within the reach. Eagle Creek Hydro argues that water quality data collected from the proposed monitoring location P8 at the Swinging Bridge powerhouse discharge and at its proposed location P6 on Black Lake Creek immediately upstream of the confluence with the Mongaup River (and upstream of Mongaup Falls Reservoir) would be representative of the requested location.

Stream flows within the reach of the Mongaup River between Swinging Bridge Reservoir and Mongaup Falls Reservoir are highly regulated and fluctuate from the minimum flow requirement of 100-cubic-feet-per-second (cfs) to peak generation flows of 1,015-cfs [section 5.9(b)(4)]. The volume of water and travel time within stream reaches may cause the water temperature and DO within the downstream reaches to change. As a result, project operations have the potential to affect water quality within the Mongaup River between Swinging Bridge Reservoir and Mongaup Falls Reservoir [section 5.9(b)(5)] and we are not aware of any water quality data for the requested location that supports Eagle Creek Hydro's claim that data collected upstream at stations P6 and P8 would be representative of the water quality at the requested downstream location [section 5.9(b)(4)]. Therefore, in order to evaluate potential project effects on water quality within the reach of the Mongaup River between Swinging Bridge Dam and the Mongaup Falls Reservoir, Eagle Creek Hydro should include a water quality monitoring station within the Mongaup River immediately upstream of the river's mouth with the Mongaup Falls Reservoir. We estimate this recommendation will increase the cost of this study by \$5,000.

Black Brook

We note that the Eagle Creek Hydro is proposing to collect in-situ water quality data (DO and temperature) during the field reconnaissance activities. However, it's unclear where this water quality data will be collected, as Eagle Creek Hydro merely specifies "from shore in four locations." In-situ water data should be collected from a location immediately upstream of the impoundments influence and immediately

downstream of Black Brook Dam, with the remaining two sampling locations to be along the impoundment [section 5.9(b)(6)]. Because we are not recommending any additional effort associated with the in-situ water quality data collection there would be no additional cost per this recommendation [section 5.9(b)(7)]. We note, however, that Black Brook hosts a cold water trout fishery [section 5.9(b)(4)]. The presence of the shallow impoundment behind Black Brook Dam may contribute to warm water temperatures that affect this fishery [section 5.9(b)(5)]. Understanding the influence of Black Brook Dam and its effects on aquatic habitats downstream would be needed for a decommissioning analysis that includes dam removal [section 5.9(b)(4)].

Eagle Creek Hydro's proposed in-situ water quality data will be collected during the "2018 field season" and only provide data from a single snapshot in time. We recognize that Black Brook water quality was collected in conjunction with the *1988 Mongaup Basin Instream Flow Study* and the project has not altered flows in Black Brook since 1984 when the development's penstock failed [section 5.9(b)(4)]. However, sedimentation and filling of the shallow impoundment behind Black Brook Dam during the last 30-years may have altered the development's influence on water quality in Black Brook, rendering the 1988 water quality data unreliable [Section 5.9(b)(4)]. As a result, the proposed water quality data collection and the 1988 data alone would not provide sufficient information to evaluate the summer seasonal effects of the Black Brook impoundment on water temperature in the downstream reach. Therefore, *Study 5 – Water Quality Study Plan* should be modified to include real-time water temperature monitoring at the two locations specified above (above and below the impoundment). This data would provide information on the summer seasonal effects (if any) of the Black Brook impoundment on the water temperatures in Black Brook downstream and subsequently on aquatic habitat and coldwater fishery located there [section 5.9(b)(6)]. This information is needed to inform the decommissioning with dam removal alternative analysis and the added cost of about \$5,000 is justified [sections 5.9(b)(4) and (7)].

Reservoir Water Quality Monitoring

Eagle Creek Hydro proposes to collect reservoir profile data from the surface to a depth of two meters below where anoxic conditions are documented or the reservoir bottom, whichever is encountered first. It is unclear why the agencies find it necessary to collect reservoir profile data to the bottom when anoxic conditions are present. . Knowing the location of the anoxic conditions within the reservoir would inform other study results [e.g., *Study 3 – Fishery Survey Study* and our recommended desktop entrainment study (discussed in *Study 4 – Fish Entrainment/Impingement*)] and subsequent potential license conditions (e.g, fish screening, project operations, reservoir aeration, etc.) [sections 5.9(b)(4) and (5)]. Habitat conditions below this level will no

support fishery resource and as such the additional data requested is not needed [sections 5.9(b)(6) and (7)]. As a result, we recommend Eagle Creek Hydro collect reservoir profile data as it proposes until it records a minimum of two consecutive DO readings less than 1.0 mg/l.

Stream Flow Data

Eagle Creek Hydro proposes to incorporate stream flow data from two USGS streamflow gages (gage numbers: 01432900 and 01433500). The first gage is located on the Mongaup River in Mongaup Valley, New York, upstream of the projects' influence and the second on the Mongaup River downstream of the projects and immediately below the Rio Project's tailrace.

The project affected stream reaches are highly regulated and subject to peaking generation flows and/or minimum flow releases. While collecting DO and temperature data within these affected stream reaches would describe the existing environment, without concurrent reach-specific stream flow data it would not be possible to evaluate how flow changes due to project operations affect temperature and DO within the affected reaches [section 5.9(b)(4)]. Correlating reach specific project flows data and concurrent water quality data will support an analysis of project effects on aquatic resources and inform potential license conditions [sections 5.9(b)(5) and (6). Because each of the subject stream reaches are regulated by Eagle Creek Hydro, it should be in possession of the data to calculate real-time stream flows within the subject reaches. As a result, Eagle Creek Hydro should report real-time stream flow data on a 15-minute interval, consistent with its water quality data collection efforts. The study report should include an analysis that evaluates project operational effects (flow) on water quality at each of the water quality monitoring stations within the subject stream reaches. Because the stream flows data and/or generation data to calculate real-time stream flow data for the subject reaches should be readily available to the Eagle Creek Hydro, the cost of providing this information and the recommended analysis would be minimal [section 5.9(b)(7)].

Duration of Water Quality Monitoring

Eagle Creek Hydro asserts that augmenting existing water quality data with 2018 data collected from June through September will be sufficient to evaluate water quality relative to the projects' operations and applicable state water quality standards. The water quality monitoring requested by FWS and NYSDEC would include a minimum of one year continuous real-time water temperature and DO monitoring and monthly

sampling of pH, turbidity, and conductivity. The agencies assert that this information is needed to assess how water quality may affect fishery resources at the projects.

The existing water quality data provided will be useful to identify trends in water quality when evaluated in context with the new data collected by the proposed study. However, of the existing water quality data provided, only the 1994 LMS study sampled water quality in the winter and only on a single day in January and February [section 5.9(b)(4)]. That said, it is unclear how additional wintertime water quality sampling, when water in the reservoirs should be nearly isothermal, would inform an analysis of project effects on fishery resources as suggested by the agencies. We note that, the LMS study showed that temperature stratification within the reservoirs started to develop in early May [section 5.9(b)(4)]. Due to this, Eagle Creek Hydro's proposed sample period from June to September may not record water quality from the reservoirs when they are in an isothermal state before a thermocline is established [section 5.9(b)(6)]. Water quality data collected before the reservoirs' establish a thermocline should closely represent winter conditions. However, water quality data during the transition period from an isothermal state to a stratified state and back would provide information that support our recommended desktop entrainment study and associated gillnet sampling near the project intakes. As a result, Eagle Creek Hydro should conduct its proposed water quality monitoring (as modified herein) from ice-off in the spring until the dissolution of the thermocline in the fall. We anticipate this would extend the study period from about mid-April through October. While this modification would not result in any significant cost increase associated with the proposed continuous water temperature and DO monitoring, it could result in up to 11 additional reservoir profile sampling events, increasing the study cost by approximately \$30,000 [section 5.9(b)(7)]. However this information is directly correlated to the projects' effects on water quality within the reservoirs and on subsequent downstream reaches [section 5.9(b)(5)]. We do not, however, recommend the year-round continuous or additional monthly water quality monitoring requested by the agencies as data collected pursuant to our recommended modification should be sufficient to evaluate project related effects on water quality and subsequently on their fishery resources (the agencies' stated objective for their request).

Study 6 – Macroinvertebrate and Mussel Survey

Eagle Creek Hydro's Proposal

The projects' operations alter reservoir elevations and flows within downstream aquatic habitats. These alterations likely influence and effect aquatic macroinvertebrate and mussel communities residing in these habitats. As a result, Eagle Creek Hydro

proposes to survey and evaluate the macroinvertebrate community in project affected waters and mussel communities in the projects' bypassed reaches and downstream riverine reaches. Eagle Creek Hydro proposes to select sample sites within the reservoirs based on locations of the dominant habitat of each reservoir. For the riverine and bypass reach sample site locations, Eagle Creek Hydro proposes to establish three sample sites in each of nine reaches, representing riffle mesohabitat and two non-riffle mesohabitats (i.e., run and pool). Eagle Creek Hydro does not propose to sample macroinvertebrates within Black Brook in support of a decommissioning analysis for the Black Brook Dam development.

Eagle Creek Hydro proposes to conduct mussel surveys along four 100-foot linear transects within the project stream reaches and along two similar transects in the Mongaup River from Rio powerhouse tailrace downstream to the Delaware River.

Comments on the Study

FWS and NYSDEC request two modifications to the proposed *Macroinvertebrate and Mussel Survey* study. First, they request that all mussel beds on the Mongaup River downstream of the Rio Powerhouse to the confluence with the Delaware River be surveyed. The agencies note that the aquatic habitat in this reach of the Mongaup River is connected with the Delaware River and as a result, the state-listed mussel species and the federally listed dwarf wedge mussel (*Alasmidonta heterodon*) may reside there. Second, the agencies request that the northern macroinvertebrate survey location within Cliff Lake be moved to a unique habitat area upstream of the tunnel diversion to Swinging Bridge.

In addition, in their comments on the *Black Brook Decommissioning Study*, the agencies' request that Eagle Creek Hydro study macroinvertebrates within Black Brook to aid in the evaluation of decommissioning.

Discussion and Staff Recommendation

Mongaup River Mussel Surveys

The Mongaup River downstream of the Rio Project's tailrace is subject to project operational effects that may include varying water velocities, depths, temperatures, and other parameters [section 5.9(b)(5)]. Eagle Creek Hydro's proposal to survey two 100-foot linear transects within the 4.6-mile reach from the Rio tailrace to the mouth of the Mongaup River would not specifically target mussel beds as requested by the agencies and would represent a sample length of about 1 percent of the total length of this reach

[section 5.9(b)(6)]. Given the status of the federally listed dwarf wedge mussel and its confirmed presence in the Delaware River, conducting a sufficiently robust survey of mussel habitat is appropriate and, as a result, the Eagle Creek Hydro's proposed approach is inadequate [section 5.9(b)(6)]. In contrast, not knowing how many there are or the extent of all the mussel beds within the reach, the agencies' request census may be excessive, and could require a very high level of effort beyond what is needed to conform to the generally accepted practice within the scientific community of sampling subsets [sections 5.9(b)(6) and (7)]. As a result, rather than have Eagle Creek Hydro conduct a survey of all mussel beds in the entire reach, or its proposed linear surveys, we recommend that Eagle Creek Hydro: (1) locate and map all mussel beds located within the Mongaup River between the Rio tailrace and its confluence with the Delaware River; and (2) select a statistically sound representative sample of the mapped mussel beds for detailed mussel surveys. The mussel beds to be surveyed should be selected in consultation with the FWS and NYSDEC. While we don't anticipate this recommendation would increase the cost of survey efforts, we estimate the cost associated with our recommended mussel bed mapping effort would increase study costs by \$10,000.

Macroinvertebrate Sample Locations

Cliff Lake

Eagle Creek Hydro's proposal to select macroinvertebrate reservoir habitats based on the dominant habitat type would exclude a survey for macroinvertebrates within the unique habitat within Cliff Lake located upstream of the tunnel outfall from Toronto Reservoir as requested by the agencies [section 5.9(b)(4)]. The agencies' macroinvertebrate study request did not identify specific locations for macroinvertebrate surveys within the projects' reservoirs. They did note that macroinvertebrate communities are linked to water quality and provide a food base for fish. However, no justification for sampling the unique habitat vs the dominant habitat in Cliff Lake was provided [section 5.6(b)(6)]. Sampling the dominant habit would provide a more comprehensive evaluation of the available food base for fish and water quality in Cliff Lake compared to a small localize unique habitat type [section 5.9(b)(6)]. While we acknowledge that there would be no difference in cost by substituting one sample location for another, we question the value of the data that would be obtained from the unique habitat in Cliff Lake [section 5.9(b)(6) and (7)]. As a result, we do not recommend the agencies' requests to locate the Cliff Lake macroinvertebrate sample site to the unique habitat area upstream of the tunnel diversion to Swinging Bridge Reservoir.

Black Brook

In their comments on *Study 11 – Black Brook Dam Decommissioning Study Plan* (discussed below) and their initial study requests, the FWS and the NYSDEC ask that Eagle Creek Hydro survey for macroinvertebrates upstream of, within, and downstream of the Black Brook Dam and impoundment. Eagle Creek Hydro is not proposing to sample macroinvertebrates within Black Brook or the Black Brook impoundment.

Aquatic macroinvertebrates are indicators of water quality and provide a food source to fishery resources. Black Brook hosts a cold water trout fishery [section 5.9(b)(4)]. The presence of the shallow impoundment behind Black Brook Dam may affect water quality and influence macroinvertebrate communities and subsequently the fishery resources downstream of Black Brook Dam [section 5.9(b)(5)]. Understanding the influence of the Black Brook Dam development and its effects on aquatic habitats downstream is needed for our decommissioning analysis that will include a dam removal alternative and inform potential license conditions [sections 5.9(b)(4) and (5)]. Macroinvertebrate sampling within Black Brook was conducted as part of the 1988 *Mongaup Basin Instream Flow Study* [section 5.9(b)(4)]. While the project has not altered flows in Black Brook since 1984 when the development's penstock failed, changes in the watershed (e.g., development, logging, land/use) during the last 30 years have likely altered the water quality and the macroinvertebrate community, rendering the 1988 macroinvertebrate data unreliable [Section 5.9(b)(4)]. As a result, the existing 1988 macroinvertebrate data is not sufficient to assess the effects of the Black Brook impoundment on macroinvertebrates and subsequently water quality in Black Brook. Subsequently, Eagle Creek Hydro should modify this study to include three additional macroinvertebrate sample locations (immediately upstream of the impoundment, within the impoundment, and immediately downstream of the impoundment). Sample locations upstream and downstream of the impoundment should be located in similar mesohabitats to support a direct comparison of the macroinvertebrate communities present [section 5.9(b)(6)]. We estimate the level of effort and cost associated with this modification would increase the cost of the study by \$15,000.

Study 7 – Recreation Facility Inventory, Recreation Use and Needs Assessment, and Reservoir Surface Area Assessment Study

Eagle Creek Hydro's Proposal

Eagle Creek Hydro proposes to conduct a recreation facility inventory and a recreation use and needs assessment at all three projects. The recreation facility

inventory will use a standardized site inventory form that Eagle Creek Hydro will use to record information on the general condition of the facilities and the available amenities. The recreation use and needs assessment will consist of recreation user spot counts, an on-site survey of recreation users, and existing recreation use data (i.e. data from other sources, such as whitewater sign-in logs and existing NYSDEC recreation use information, where applicable). Eagle Creek Hydro proposes to collect recreation user data from April 2018 through October 2018, omitting the winter season.

Comments on the Study

Winter Sampling Days

HOOT, FWS, Park Service, and NYSDEC request that Eagle Creek Hydro include winter sampling days in the recreation use and needs assessment.

Region-wide Survey

HOOT and Park Service request that Eagle Creek Hydro deploy a large-scale survey that samples the entire region to obtain information related to recreation at the projects. HOOT justifies this request, in part, based on their assertion that the projects have a high level of recreation use, and that the projects provide regionally significant recreation opportunities.

Modification to Survey Instrument

HOOT requests that Eagle Creek Hydro revise question 14 in the recreation survey proposed in the RSP to include a comparative, rather than numeric, metric.

Visual Simulations

HOOT requests that Eagle Creek Hydro supplement the proposed recreation survey to address the effects of reservoir level fluctuations on recreation demand by including visual simulations of different reservoir levels and asking survey respondents to rate the acceptability of these different elevations.

Sample Size

HOOT comments that Eagle Creek Hydro should ensure their data collection efforts produce an adequate number of responses, and that Eagle Creek Hydro should be prepared to conduct an additional year of sampling if they fail to achieve an adequate

sample size. HOOT does not, however, indicate what sample size they believe will be sufficient.

Discussion and Staff Recommendation

Winter Sampling

Winter recreation use is known to occur at the project, but the amount of detailed existing information on recreation use at the projects is limited. In the scoping meeting and study plan development meetings, NYSDEC confirmed that Bald Eagle viewing at the projects is known to occur, primarily during the winter months, and the project has at least one trail that provides winter recreation opportunities [section 5.9(b)(4)]. Therefore, Eagle Creek Hydro should include winter sampling days for both the spot counts and recreation user surveys. It is expected that these additional sampling days will not result in a substantial increase in the level of effort or cost for the study. Eagle Creek Hydro should revise the RSP to include winter sampling days [section 5.9(b)(7)].

Region-wide Survey

According to the PAD, 2015 FERC form 80 data indicates the projects received 11,653 total annual user days, which the Commission defines as any visit to any recreation site at a project within a 24 hour period. Therefore, contrary to HOOT's assertion, the projects do not currently appear to receive a large amount of recreation use. Even if every user day recorded in the form 80 data represented a distinct individual (which it clearly would not, as some users, especially local residents, could visit the project multiple times per year), this level of use represents only a maximum of 2.57 percent of the population of Sullivan and Orange Counties [section 5.9(b)(4)]. Therefore, it seems unlikely that the data gained from a broader survey of non-users would provide any information to inform staff's environmental analysis [section 5.9(b)(5)]. Furthermore, although neither HOOT nor the NPS provide estimates of the cost to conduct such a study, the cost to conduct this study would not be justifiable in light of the low levels of use at the projects and their likely limited regional significance [section 5.9(b)(7)].

Modification to Survey Instrument

Regarding HOOT's suggestion to modify the recreation use and needs survey question 14 to include a comparative, rather than numeric, measure, because survey respondents are not likely to be aware of the exact reservoir level at any given time. Changing question 14 to a Likert scale format ranging from "very low" to "very high" will result in less confusion and better data than a numeric response, and these responses

could be correlated with the actual reservoir levels when the data is analyzed [section 5.9(b)(6)]. Therefore, Eagle Creek Hydro should modify question 14 to a Likert scale format ranging from “very low” to “very high.”

Visual Simulations

The results of the modified recreation user survey, in conjunction with the reservoir surface area assessment, should provide information to evaluate the projects’ effects on recreation, and the *Study 1 – Reservoir Water Level Fluctuation/Operation Model Study*, as discussed above, will allow different operational scenarios to be evaluated in terms of reservoir levels. The results of this study (*Study 7 – Recreation Facility Inventory, Recreation Use and Needs Assessment, and Reservoir Surface Area Assessment Study*) will generate data on recreation users’ assessments of reservoir levels, and the available reservoir surface area for the range of possible reservoir levels. This information will then be used, along with studies of the other resources (i.e. fisheries, whitewater flow releases, power generation, etc.), to inform the development of different possible operating scenarios, which will be incorporated into iterations of the operations model. Therefore, visual simulations of different operational scenarios in the recreation use and needs survey are not necessary [section 5.9(b)(4)].

Sample Size

Regarding the sample size of the recreation use and needs survey, typically, for studies related to outdoor recreation, a target sample size of approximately 400 responses is sufficient (Vaske, 2008). Eagle Creek Hydro should, therefore, ensure that they design their sampling schedule to achieve this generally accepted target sample size of approximately 400 responses. If Eagle Creek Hydro does not achieve a sufficient number of responses, then the study should be continued in a second season to ensure a sufficient sample size [section 5.9(b)(6)].

Study 8 – Whitewater Boating Assessment Study

Eagle Creek Hydro’s Proposal

Eagle Creek Hydro proposes to conduct a whitewater boating study on the bypassed reach below the Rio dam and the lower reach of the Mongaup River below the Rio powerhouse (lower Mongaup reach) using the methods outlined by Whittaker, Shelby, and Gangemi (2005). The study would use a phased approach consisting of three levels that progress from a desktop analysis to a controlled flow assessment. Eagle Creek

Hydro proposes to conduct a Level 1 analysis that consists of a desktop study, summary of hydrology information, and structured interviews of boaters and submit a report with the results that includes recommendations regarding the necessity of a Level 2 and/or Level 3 study.

Comments on the Study

AW, AMC, and KCCNY (boating groups) state that Eagle Creek Hydro's study plan is inadequate because it does not guarantee that Eagle Creek Hydro will go beyond a Level 1 study and conduct a controlled flow whitewater boating assessment. The boating groups assert that the information that a Level 1 study would generate is "already known" and, therefore, a controlled flow whitewater boating assessment is necessary to evaluate the whitewater boating opportunities in both the bypassed reach and the lower Mongaup reach.

Additionally, the boating groups are concerned that the proposed in-person structured interviews will not capture users that have firsthand knowledge of the bypassed reach because the bypassed reach is only boatable during rare, extreme precipitation events.

The boating groups also request that Eagle Creek Hydro deploy the proposed survey instrument online and that the survey instrument include questions related to the minimum acceptable or optimal boating flows, the adequacy of the current release schedules, and the adequacy of current flow information.

Discussion and Staff Recommendation

The current license for the Rio Project requires a 100-cfs minimum flow in the bypassed reach and one biweekly whitewater boating release from the powerhouse into the lower Mongaup reach from April 15 and October 15, with releases alternating between Saturdays and Sundays. The biweekly releases also alternate between 435 cfs (1 unit) or 870 cfs (2 unit) flows. In appendix D of the RSP, Eagle Creek Hydro provides the results of a whitewater boating study that was conducted in 1990 downstream of the Rio powerhouse as part of the previous licensing effort at the project. There are no known studies of the bypassed reach, and, therefore, there is limited available information on the potential for whitewater boating opportunities in the bypassed reach [section 5.9(b)(4)].

Eagle Creek Hydro's proposed study generally conforms to the commonly accepted practices outlined in Whittaker, Shelby, and Gangemi (2005). Since there is

little to no information on whitewater boating opportunities in the bypassed reach, this approach is acceptable. Further, if the structured interviews do not provide a reasonably large sample of boaters who have knowledge of the bypassed reach, then Eagle Creek Hydro should recruit knowledgeable interviewees some other way in order to obtain the necessary information (e.g. working with stakeholder groups, convening a focus group, etc.).

Prior to submitting the ISR to the Commission, Eagle Creek Hydro should provide the results of their Level 1 analysis to the boating groups, agencies, and other stakeholders for comments, and allow at least 30 days for their responses. Eagle Creek Hydro should include these comments, and their responses to them, in the ISR. Upon receipt of the ISR, if there is a disagreement among the relicensing participants, the question of whether Eagle Creek Hydro should conduct a Level 2 and/or Level 3 study for either or both reaches would be resolved through the study plan modification process.

Additionally, Eagle Creek Hydro should revise the survey instrument to include questions to elicit information on minimum acceptable or optimal boating flows, the adequacy of the current release schedules, and the adequacy of current flow information. As for the method of distribution of any survey instrument(s); an online survey distributed to a convenience sample would not provide a representative sample of project users [section 5.9(b)(6)]. Therefore, we do not recommend that Eagle Creek Hydro be required to distribute the survey online.

Study 9 – Shoreline Management Assessment Study

Eagle Creek Hydro's Proposal

Commission staff has fielded numerous complaints (both before and during the scoping meeting) regarding aspects of shoreline management, such as regulations concerning docks and water levels; and conflicts between property owners. Currently, Eagle Creek Hydro uses “shoreline management guidelines” that are generally less detailed than a full shoreline management plan. In order to inform the potential development of a shoreline management plan, Eagle Creek Hydro proposes to conduct a survey of abutting shoreline property owners, and of other private property owners who have reservoir rights (i.e. rights to access the project reservoirs through their ownership of adjacent property), to solicit information on their use of the reservoirs, perceptions of potential crowding and/or conflict, current shoreline management practices, and the impacts of reservoir water levels. The survey will target the population of shoreline and adjacent property owners on Toronto Reservoir and Swinging Bridge Reservoir, which

are both part of the Swinging Bridge Project. Eagle Creek Hydro will consult with representatives of the various property owners to determine the best method to deliver the survey, which they state will likely be via direct mail.

Comments on the Study

HOOT comments that it generally supports the proposed study, but offers a few specific suggestions to improve the survey instrument. First, HOOT suggests that the relevant questions clearly describe the specific elements of Eagle Creek Hydro's shoreline management practices and responsibilities, because some respondents might not be aware of the full scope of Eagle Creek Hydro's current shoreline management activities. Second, HOOT suggests additional questions related to property owners' perceptions of the effects of reservoir levels on project aesthetics, dock length and location, their decision to acquire a boat, and their decision to remove a boat.

Discussion and Staff Recommendation

Eagle Creek Hydro should modify the survey instrument to include clear descriptions of the specific elements of Eagle Creek Hydro's shoreline management practices and responsibilities; and include the additional questions related to property owners' perceptions of the effects of reservoir levels on project aesthetics, dock length and location, their decision to acquire a boat, and their decisions to remove a boat. Besides the Commission's records of complaints and various statements given in the scoping meeting related to shoreline management, there is little to no other information on this issue shoreline management at the Swinging Bridge Project [section 5.9(b)(4)]. The information from this study is necessary for Commission staff's analysis of any proposed measures related to shoreline management, including the shoreline management plan that Eagle Creek Hydro intends to develop [section 5.9(b)(5)]. Additionally, the requested modifications would not be expected to add significant cost to the study [section 5.9(b)(7)].

Study 10 – Cultural Resources Study

Eagle Creek Hydro's Proposal

Eagle Creek Hydro proposes to conduct a comprehensive cultural resources survey and inventory within the projects' area of potential effects (APE), which include all lands within the FERC project boundaries, and any additional lands outside the FERC project boundaries where project-related effects could affect historic properties. This would

consist of a systematic pedestrian survey within all accessible areas of the APE using a crew of qualified professional archaeologists. All archaeological sites would be recorded, mapped, and photographed in compliance with standards established by the New York State Historic Preservation Office (SHPO). Such methods would reflect a Phase IA archaeological survey, and if needed, a Phase IB archaeological survey. Eagle Creek Hydro also proposes to conduct a survey of architectural and engineering resources 50 years or older within the projects' APE, including project-related facilities and non-project-related facilities. This work would be conducted according to New York SHPO standards for historic resources surveys, including appropriate site maps, completion of survey files, photography, and data entry into the online cultural resource information system (CRIS). Following background research and field work, each surveyed architectural resource would be evaluated for its eligibility for inclusion to the National Register of Historic Places (National Register).

Eagle Creek Hydro proposes to include a determination of project-related effects on any resources recommended eligible for inclusion to the National Register. Eagle Creek Hydro also proposes to contact the Delaware Nation and Delaware Tribe to obtain information of any place of religious or cultural significance (i.e., traditional cultural properties, past villages or sites, gathering areas) and provide them a draft cultural resources study report for review. If such cultural resources exist within the APEs, Eagle Creek Hydro would assess their National Register eligibility and potential or existing project-related effects. This element of the study would be conducted by a knowledgeable professional with anthropological training in talking with, and gaining information from, Indian tribes. If historic properties (i.e., any cultural resources determined eligible for the National Register) are located within the projects' APEs, or other historic properties are affected by the projects outside the APEs, Eagle Creek Hydro would prepare a historic properties management plans (HPMP), which would govern the management of historic properties during the term of any new licenses issued for the projects.

Comments on the Study

No comments filed.

Discussion and Staff Recommendation

Eagle Creek Hydro is proposing to decommission the Black Brook development. The Black Brook Dam and appurtenant facilities are more than 50 years old; and therefore, Eagle Creek Hydro should also determine whether the dam and appurtenant facilities are eligible for the National Register and seek concurrence from the New York

SHPO. If it is determined that the Black Brook Dam is eligible, and the New York SHPO concurs, Eagle Creek Hydro, in consultation with the New York SHPO, should conduct a complete written and photo documentation of the affected facilities and use such documentation for the resolution of any potential adverse effects to Black Brook Dam and appurtenant facilities. This work should be included in the cultural resources study report, and draft and final HPMPs, including the determination of National Register eligibility of any archaeological resources discovered in these affected areas during the term of any license issued, and subsequent steps to resolve any potential adverse effects to such archeological resources determined to be eligible. An APE also needs to be established for this site, and Eagle Creek Hydro should seek concurrence on the APE from the New York SHPO.

Study 11 – Black Brook Dam Decommissioning Study

Eagle Creek Hydro's Proposal

To support a decommissioning analysis of Black Brook Dam, Eagle Creek Hydro proposes to: (1) verify the depth and dimensions of the dam; (2) characterize the sediments (volume and chemical composition) within the impoundment; and (3) provide a description of the existing environment in the immediate vicinity of the dam.

Comments on the Study

The FWS and NYSDEC request that Eagle Creek Hydro study the fish and macroinvertebrates within Black Brook to aid in the evaluation of decommissioning the Black Brook Dam. The agencies also request that Eagle Creek Hydro provide an opportunity for agency staff to visit the Black Brook dam and impoundment and conduct a site-visit.

Discussion and Staff Recommendation

Macroinvertebrate Surveys

We discuss the agencies request for fishery and macroinvertebrate surveys in Black Brook above under *Study 3 – Fisheries Survey Study* and *Study 6 – Macroinvertebrate and Mussel Survey*, respectively.

Site-visit

Regarding the agencies' request for a site-visit, we do not expect agency access to the projects to be an issue considering Standard Article 4 of the project licenses affords officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across project lands and project works in the performance of their official duties.

Dam Borings

To verify the depth and size of the Black Brook Dam, Eagle Creek Hydro proposes to conduct two borings into the dam. We recommend Eagle Creek Hydro consult with and obtain approval from the Commission's Division of Dam Safety, New York Regional Office, prior to implementing any tests that may affect the structure's integrity.

Study 12 – Special-Status Species Survey Study

Eagle Creek Hydro's Proposal

In order to document the presence or absence of special-status plant and wildlife species and their habitat potentially occurring at the projects, Eagle Creek Hydro proposes a phased approach. Eagle Creek Hydro initially would conduct a desktop study starting with consultation with FWS and NYSDEC to confirm which special-status species potentially occur in the projects' area. Eagle Creek Hydro proposes to map existing records and compile habitat requirements and life histories for all special-status species potentially occurring within the projects' boundaries. Based on those species previously documented or potentially existing within the projects' boundaries, Eagle Creek Hydro would perform field surveys within the projects' boundaries.

Concurrent with the field effort for this study, Eagle Creek Hydro would perform a site reconnaissance to evaluate and document aquatic and terrestrial environments 100 yards upstream and downstream of the Black Brook Dam for *Study 11 - Black Brook Dam Decommissioning*.

Comments on the Study

FWS and NYSDEC recommend that the study be modified to include recording any additional raptor species noted as roosting, foraging, or nesting at the projects.

Discussion and Staff Recommendation

NYSDEC has indicated that peregrine falcons, state-listed as endangered, have been documented nesting in the vicinity of the projects. During the nesting season, peregrine falcons and other raptor species are particularly prone to disturbance which could affect their reproductive success. Project operations and maintenance (O&M) and recreation activities have the potential to disturb nesting raptors [section 5.9(b)(5)]. Documenting the location and status of any raptor nest encountered during surveys for special-status species and bald eagle nest surveys (Study 13), as recommended by FWS and NYSDEC, would inform staff's environmental analysis [section 5.9(b)(4) and (5)]. Such incidental observations, would be of minimal additional effort and cost [section 5.9(b)(7)]. However, it's unclear how staff would use observations of raptors roosting and foraging in the vicinity of the projects, as recommended by FWS and NYSDEC, to further inform our environmental analysis of project effects or develop recommendations for measures to be included in any license issued for the project [section 5.9(b)(5)]; therefore we do not recommend its adoption.

Study 13 – Bald Eagle Management Study

Eagle Creek Hydro's Proposal

Bald eagles are known to nest in the Mongaup River Valley. In addition, the previous relicensing process established that fish entrained at the projects are a food source for scavenging wildlife, including a large number of bald eagles that winter at the projects¹. Bald eagles also habitually return to regular night roosts that are commonly occupied by multiple individuals.

Eagle Creek Hydro proposes a desktop study to compile existing information regarding bald eagle nesting and winter foraging activities in the project areas. Specifically, Eagle Creek Hydro proposes to: (1) consult with the FWS, Park Service, NYSDEC, and the Delaware Highlands Conservancy (DHC) to obtain existing information on eagles in the Mongaup River System; (2) request breeding summary reports and GIS nest location data from NYSDEC; (3) conduct interviews with individuals who have historically performed surveys and management activities for bald

¹ See staff's Environmental Assessment issued for the three projects on September 19, 1991, and Eagle Creek Hydro's PAD filed on March 30, 2017.

eagles within the project areas (e.g. former NYSDEC staff); and (4) provide Eagle Creek Hydro O&M staff with log sheets to record observations of bald eagle activity including foraging, roosting, and nesting behavior during the study period.

Eagle Creek Hydro would develop a report summarizing recovery efforts and study results in the Mongaup River System including annual winter population counts, foraging activities (i.e., preferred prey and foraging sites), breeding and nesting activities in the project area, roosting locations, and summarize collected results from interviews and existing data. Based on the results of this study, Eagle Creek Hydro proposes to develop a bald eagle management plan that would be filed with the Commission concurrent with the FLA.

In support of the nesting component of its proposal, Eagle Creek Hydro requests that NYSDEC and DHC provide existing information regarding eagle observations, management activities, and nest locations. Eagle Creek Hydro contends that the existing NYSDEC data should provide sufficient information on nesting bald eagles in the vicinity of the projects.

Comments on the Study

In general, FWS and NYSDEC assert that the licensee has not proposed a study that will meet the goals and objectives of their recommended *Bald Eagle Population and Winter Foraging Study*. NYSDEC state that the existing data the licensee proposes to use is outdated, limited in scope, or tangential regarding bald eagle resource use in the project area.

Nest-site Surveys

FWS state that the existing bald eagle nesting data has not been updated since 2010. In addition, NYSDEC states that existing nest data only consist of general coordinates of reported nest locations based on their last date of observation.

Objective 1 of the *Bald Eagle Population and Winter Foraging Study*, as requested by FWS and NYSDEC, would include: (1) collecting all available data from the NYSDEC and DHC regarding active and inactive bald eagle nest locations in the vicinity of the projects, (2) conducting visual surveys during the nesting season (December 1 through June 30) to identify the location and status (present/absent, active/inactive) of all eagle nests in the vicinity of the projects and recording any observations of eagles and their young, (4) following protocols found in FWS's Bald

Eagle Management Guidelines and Conservation Measures, and (5) preparing a map and summary of nest locations in the vicinity of the projects symbolized by status.

Winter Roost Surveys

NYSDEC also states that there is no existing information on winter overnight roost sites and requests that Eagle Creek Hydro identify these sites as part of its study plan.

Bald Eagle Spatial Activity, Diet Composition, and Fish Entrainment

FWS and NYSDEC state anecdotal evidence suggests that open water in the winter months and the entrained alewife forage base are the primary reasons for the notable winter bald eagle population at the projects. The agencies note that no standardized studies have been conducted to support this hypothesized relationship or examined the degree to which wintering eagles feed on entrained fish and alewife, in particular. As discussed above in *Study 4 - Fish Entrainment/Impingement*, the agencies raised several concerns regarding the entrainment studies during the last relicensing (LMS 1994) that were conducted in part to evaluate the availability of entrained alewife for winter feeding of bald eagles. Despite design issues, the agencies acknowledge that this study (LMS 1994) showed that alewife was the most abundant species entrained in the winter months and that they were typically less than 10 centimeters (cm) in length.

FWS notes they will be evaluating potential impacts to the bald eagle population at the projects to inform the need for fish protection and passage measures that may be prescribed under their Section 18 authority of the Federal Power Act. FWS states the needed information in their requested *Fish Protection and Downstream Passage Study*, in combination with the agencies' recommended eagle study, would allow them to determine what effects potential future fish passage and protection measures at the projects would have on fish entrainment and the wintering bald eagle population.

Regarding wintering eagles the *Bald Eagle Population and Winter Foraging Study* recommended by FWS and NYSDEC would include the following: (objective 2) spot map locations and document behavior (especially foraging) of all bald eagles found in the project impoundments, tailraces, and downstream areas to generate an interpolated map of bald eagle foraging activity; (objective 3) focused surveys to identify forage species (e.g., fish, mammal, bird) and size, and if it's found that eagles generally forage downstream of the powerhouses, conduct additional focused foraging observations in areas noted having the highest concentration of eagle activity with relevant project generation being noted for each location; (objective 4) analysis of the relationship of the

observed winter forage activity of eagles at the projects and fish entrainment due to project operations; and (objective 5) if determined necessary by the agencies, conduct a study to document the type, number, and size of fish entrained during the winter.

Discussion and Staff Recommendation

Nest-site Surveys and Winter Roost Surveys

Disturbance resulting from human presence, noise, and equipment associated with ongoing maintenance (e.g. vegetation management, repairs) and recreation activities could adversely affect nesting bald eagles and wintering bald eagles using regular overnight roost sites (section 5.9(b)(5)). Therefore, knowing where eagle nest sites and roost sites are located will assist our analysis of ongoing project effects, if any, on the eagles and allow us to determine what measures could be implemented to enhance eagle roosting habitat (section 5.9(b)(5)). The existing NYSDEC data would not provide sufficient current, or project-specific information, on the location of active and inactive (i.e. alternative) bald eagle nest sites [section 5.9(b)(4), (6), and (7)]. There is also no current information on overnight roost sites regularly occupied by bald eagle wintering at the projects [section 5.9(b)(4)]. Such information will inform our environmental analysis and aid in developing recommendations for measures to be included in any license issued for the project [section 5.9(b)(5)].

Objective 1 of the *Bald Eagle Population and Winter Foraging Study*, as recommended by FWS and NYSDEC, would provide the level of information required by staff regarding bald eagle nesting; therefore, we recommend as part of the approved study plan. We also recommend surveys to document and map overnight roost sites regularly occupied by bald eagles wintering at the projects as part of Eagle Creek Hydro's study plan.

Bald Eagle Spatial Activity, Diet Composition, and Fish Entrainment

We recognize that no standardized studies have been conducted to support the hypothesized relationship between the diet of wintering bald eagles and entrained fish or the spatial activity of foraging eagles at the projects. However, we also note that existing data has generally established that the open water in the winter months and fish entrained at the projects are used by the wintering bald eagle population.

Although entrained fish constitute some unknown portion of the wintering bald eagle diet, the eagles are likely not strictly dependent on this food resource alone. Additionally, no information has been provided to suggest that alternative food sources

are unavailable or limited due to project-related effects. Therefore, given the artificial means by which entrained fish are made available, incidental to project operations, staff consider this food resource supplemental to the natural diet of the wintering bald eagle population. As such, it's reasonable to expect that eagles would be able to make adjustments to their foraging behavior to locate alternative food sources if the quantity of entrained fish should change as a result of project operations. Due to this, any effects to bald eagles resulting from a decrease in fish entrainment at the projects would not be expected to be long term and would be offset by the benefits to the fish populations.

Staff note that studies to assess the relative importance of a supplemental food source (entrained fish) for bald eagles wintering in the project area to inform agency recommendations or management strategies (maintain or enhance entrainment of fish) is not the licensee's responsibility.

Otherwise, we find that objectives 2 through 4 are unlikely to provide conclusive data regarding the diet composition of wintering bald eagles. Further, it's unclear how the additional information and level of detail that would be provided by objectives 2 through 5 would be used to further inform our environmental analysis of project effects or develop recommendations for measures to be included in any license issued for the project [section 5.9(b)(5)], particularly given the level of effort and cost that would be required [section 5.9(b)(7)].

Lastly, as discussed above in *Study 4 - Fish Entrainment/Impingement Study*, staff find that the LMS study entrainment data collected between November 1992 and March 1993 to be reliable and sound [section 5.9(b)(4) and (6)].

Based on the reasons discussed above, we do not recommend objectives 2 through 5 of the *Bald Eagle Population and Winter Foraging Study* recommended by FWS and NYSDEC.

Study 14 – Bypass/Base Flow Transect Evaluation Study

Licensees' Proposal

In its *Bypass/Base Flow Transect Evaluation Study* Eagle Creek Hydro proposes to evaluate the relevance of the 1988 *Mongaup Basin Instream Flow Study* (Stetson-Harza and Ichthyological Assoc. 1988) to determine whether it still accurately represents the existing baseline conditions and can be used to analyze current flow study needs at the projects. To accomplish this, of the 74 original transects evaluated, the Eagle Creek Hydro proposes to resurvey one transect in the following five stream reaches:

- Black Lake Creek downstream of Toronto Dam – Transect 4
- Mongaup River downstream of Swinging Bridge – Transect 66
- Mongaup Falls bypassed reach – Transect 8
- Rio bypassed reach – Transect 8 of Reach 1
- Mongaup River downstream of Rio powerhouse – Transect 6 of Reach 3

For these five transects, Eagle Creek Hydro proposes to collect water velocity, depth, and substrate composition at 1-foot intervals.

In addition, because the 1988 study did not include Black Lake Creek downstream of Cliff Lake, Eagle Creek Hydro proposes to augment the 1988 study with up to three transects, one for each mesohabitat present (i.e., pool, riffle, run).

Comments on the Study

Adequacy of 1988 Mongaup Basin Instream Flow Study

The boating groups assert that a new Instream Flow Incremental Methodology (IFIM) study is needed to assess habitats in the bypassed reaches and downstream of project tailraces given the significant flood events over the last 30 years (e.g., Hurricane Irene in 2011). The FWS and NYSDEC request that Eagle Creek Hydro conduct a new Delphi or IFIM study.

Representative Sample and Sample Size

If the applicant's proposed study is approved in lieu of their preferred new Delphi or IFIM study, the FWS and NYSDEC recommend that the applicant's proposed transect resampling result in an overall error of less than five percent (95 percent confidence) compared to the existing 1988 *Mongaup Basin Instream Flow Study*. The agencies

further recommend that transects selected to be resampled represent the extent and variability within the selected study reaches.

Study Review

The FWS and NYSDEC recommend that Eagle Creek Hydro include a “placeholder” in the *Bypass/Base Flow Transect Evaluation Study* to allow the agencies to review the 1988 study in context with current licensing studies and following the first year of study.

Flow Observations

The FWS and the NYSDEC request that Eagle Creek Hydro provide them an opportunity to observe the existing minimum flow across all of the affected reaches, and an opportunity to observe any final proposed flow modifications.

Discussion and Staff Recommendation

Adequacy of 1988 Mongaup Basin Instream Flow Study

The 1988 *Mongaup Basin Instream Flow Study* provides the information needed to evaluate potential project effects on flow and aquatic resources in project effected stream reaches [section 5.9(b)(4)]. However, changes to minimum flow regimes from the projects’ previous license to their current license and significant stream flow events (e.g., Hurricane Irene) may have changed project affected stream channels evaluated in the 1988 study [section 5.9(b)(4)]. Evaluating the relevance of the 1988 study transect data to determine whether they accurately represent the existing baseline conditions is a cost effective reasoned approach [sections 5.9(b)(6) and (7)] to addressing flow study needs at the projects.

Representative Sample and Sample Size

It is critical that the selected transects provide an adequate sample size and represent the available habitats within each sampled reach in order to determine whether the existing transect data can be relied upon and used to evaluate existing, proposed, and recommended streamflows. However, Eagle Creek Hydro’s proposed sample of five transects represents less than 7 percent of the transects used in the 1988 study. In addition, its methods for selecting the five transects and how they represent the habitat within their sampled reach is unclear [sections 5.9(b)(6) and (4)].

As a result, we recommend that Eagle Creek Hydro randomly select one 1988 study transect from each mesohabitat (i.e., pool, riffle, run) present within each of the five stream reaches proposed for resurveying. Resurveying each mesohabitat type present within each of these five reaches would ensure an adequate sample size (up to 15 transects, 20 percent of transects surveyed in 1988 study) and that the transects are representative of the available habitat [section 5.9(b)(6)]. We also recommend that Eagle Creek Hydro's initial study report include a description of each reach and the available mesohabitats found within them, the process used to randomly select mesohabitat-specific transects, and a statistical analysis of the resurveyed transect data comparing it to the original 1988 study's transect data.

We anticipate this recommended modification will increase the cost of this study by about \$50,000; however, this level of effort is needed to evaluate the reliability and usefulness of the existing transect data from the 1988 *Mongaup Basin Instream Flow Study*.

Study Review

The Integrated Licensing Process includes provisions for an initial study report [section 5.15(c)(1)], a public meeting to discuss study results [section 5.15(c)(2)], and an opportunity to file comments on the initial study report and request study plan modifications and/or new studies [section 5.15(b)(4)]. As a result, the agencies request that the study plan include a "placeholder" to allow the agencies an opportunity to review the 1988 study in context with current licensing studies would be duplicative of our regulations and, therefore, unnecessary.

Flow Observation

In regards to the agencies' request to observe existing minimum flows in affected reaches, as we note above, we do not expect agency access to the projects to be an issue considering Standard Article 4 of the project licenses affords officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across project lands and project works in the performance of their official duties.

If a resource agency chooses to be present during the implementation of licensing studies it is our expectation that the licensee will accommodate such a request.

Regarding the agencies' request for an opportunity to observe any final proposed flow modifications, we note that Eagle Creek Hydro is not currently proposing any change to the existing minimum flow requirements. Any proposed alteration to

minimum flows would be presented in Eagle Creek Hydro's Preliminary Licensing Proposal (PLP), which would be filed pursuant to section 5.16 of the Commission's regulations, following the implementation and completion of the approved study plan. As a result, it is premature to require Eagle Creek Hydro to provide an opportunity to observe the final proposed streamflows as a provision in the approved study plan. Therefore, we do not recommend that the study plan be modified to include such a provision.

SECTION 3: STUDIES REQUESTED BUT NOT ADOPTED BY EAGLE CREEK HYDRO

Delaware River Flow and Aquatic Habitat Study

Issue

Water releases from the Rio Project into the Mongaup River flow directly into the Delaware River. According to the Park Service, these releases count towards the USGS Montague Gage flow target (Montague target) of 1,750 cfs, located 16 miles downstream of the mouth of the Mongaup River.² The USGS River Master (River Master) considers Eagle Creek Hydro's forecasted flow releases from the Rio Project, along with base flow and other inputs, when determining water releases from New York City (NYC) reservoirs on the East and West Branches of the Delaware needed to meet, but not exceed, the Montague target. As a result, the Park Service argues that water releases from the Rio Project directly influence the River Master's releases from the NYC reservoirs, and subsequently, influence the stream flow in the East and West Branches of the Delaware River below the reservoirs and in the mainstem of the Delaware River for 69 miles downstream to the confluence with the Mongaup River.

Park Service also argues that the Delaware River downstream of the Mongaup River confluence is potentially impacted by lower than normal water conditions when planned releases from the Rio Project, which are factored into the River Master's flow release calculations from the NYC reservoirs, are later cancelled or reduced. The Park Service states that when planned releases from the Rio Project are cancelled or reduced, the River Master is unable to augment the flow to meet the Montague target due to the 3-day travel time for flow releases from the NYC reservoirs to reach the mouth of the Mongaup River. Park Service notes that this results in a flow deficit at the Montague gage and lower flows in the Delaware River for 77.44 miles downstream of the Mongaup River to the Easton, PA, the upstream-most point where directed releases from the Lehigh River can be used to make up for deficient Delaware River flows. Subsequently, the Park Service argues that the Rio Project has the potential to affect the Upper, Middle, and Lower Delaware Scenic and Recreational River, from the NYC reservoirs to Easton, PA.

²Rio water releases to the Mongaup River flow directly into the Delaware River, and occur within a system with strict rules governing flow management established by the Amended 1954 Supreme Court Decree, which states that a minimum basic rate of flow of 1750 cfs shall be maintained at USGS Montague Gage (<https://water.usgs.gov/osw/odrm/decree.html>).

Study Request

The Park Service, FWS, and NYSDEC request that Eagle Creek Hydro evaluates the Rio Project's operational effects on Delaware River flows, upstream and downstream of the confluence with the Mongaup River. Specifically, to document the potential influence of the cancellation of planned flow releases from the Rio Project that were factored into the River Master's calculation for compensating releases from the NYC reservoirs, the Park Service requests that Eagle Creek Hydro provide data on flows (cfs) and river height (stage) during the timeframe of influence of Mongaup system releases at USGS gages located along the east and west branches of the Delaware River, as well as the mainstem to Easton, PA, which is located downstream of its confluence with the Mongaup River.

In addition, the Park Service requests that the licensee provide a record of all the times when planned releases from the Rio Project that were provided to the River Master were canceled, or significantly reduced, and for what reason. Park Service requests that this also include an analysis of the degree to which the flows in the bypassed reach below the Rio Project have been in compliance with the minimum flow requirements in the current license (100 cfs or 60 cfs minimum release). Park Service specifies that this analysis would involve a desktop analysis of the past 5-10 years of instantaneous gage data from the USGS gages below the Rio Project.

As a component of its requested *Flow Study*, the Park Service also requested that Eagle Creek Hydro evaluate the effects of the Mongaup River Projects' operations on water temperature and aquatic habitat within the Delaware River upstream and downstream of its confluence with the Mongaup River. We note that the FWS and NYSDEC in their comment on the RSP, also requested the study of temperature conditions in Delaware River upstream and downstream of the Mongaup River confluence. Park Service requests that Eagle Creek Hydro map the mesohabitat (e.g., pool, riffle, run) of the Delaware River between New York and Easton, Pennsylvania. The requested aquatic habitat mapping would document stream depth, water velocities, and substrates. Park Service requests that the habitat mapping extend into the Mongaup River and its tributaries where Eagle Creek Hydro's proposed fishery surveys would be conducted.

Additionally, the Park Service requests that this study address the Rio Project's effects on recreation on the Delaware River upstream and downstream of the confluence with the Mongaup River. The Park Service asserts that cancellation of scheduled project releases could impact flow-dependent recreation opportunities, citing a brief hypothetical

situation where canoeists must “drag” their boats in times of resulting miscalculations of flow releases by the River Master from the NYC reservoirs. The Park Service requests that the study include data on project effects on recreation use and user experiences on the Delaware during the Rio Project’s recreational flow releases, but it does not describe what type(s) of data, beyond readily available gage information, that should be included. The Park Service does note that this study would be a desktop exercise, which seems to indicate that the Park Services does not believe any field data collection efforts would be required.

Discussion and Staff Recommendation

Delaware River Flows

While the River Master may use information provided by Eagle Creek Hydro in its flow management of the Delaware River and established by the Amended 1954 Supreme Court Decree (Decree), the Decree does not specify any legal obligation on Eagle Creek Hydro to provide flows to satisfy the target flows articulated in the Decree. As a result, there is no nexus between project operations and flows on the Delaware upstream of the Mongaup River confluence [section 5.9(b)(5)]. Project operations do, however, have the potential to affect reservoir elevations for each of the projects’ five reservoirs, flows in the Mongaup River below each of the projects, and the Delaware River downstream of its confluence with the Mongaup River [section 5.9(b)(5)]. Therefore, we recommend that Eagle Creek Hydro evaluate the effect of flow releases from the Rio Project on the Delaware River downstream of its confluence with the Mongaup River. According to the section 5.7 of the RSP, Eagle Creek Hydro proposes to develop, calibrate, and validate an operations model that: (1) integrates each of the three Mongaup River Projects; (2) supports the future evaluation of proposed and potential recommendations for project operations at an hourly time-step and under various reservoir inflow and outflow conditions; and (3) upon completion, is capable of predicting reservoir elevations, surface areas, available storage, and generation that would result from various operational scenarios. The model will be utilized to support future evaluations of impoundment elevations and downstream flows based on proposed operating, flow, and recreation alternatives for the three projects [section 5.9(b)(6)].

Eagle Creek Hydro has proposed to graph the flows over the past 4 years associated with the USGS gage located immediately downstream of the Rio powerhouse, as well as the USGS gage located immediately downstream of the confluence of the Mongaup River and the Delaware River. However, since there is no other major tributary to the Delaware River downstream of the Mongaup River, we recommend that Eagle Creek Hydro extend the flow study downstream of the Rio project to the USGS gage on

Delaware River at Easton, PA. We also recommend that Eagle Creek Hydro extend the time period as necessary so that it includes a minimum of one dry year, one wet year, and a normal year [sections 5.9(b)(5) and 5.9(b)(6)].

Eagle Creek proposes to also provide information regarding forecasted and actual recreation and generation flows and present this information in a report with the data from two USGS gages located immediately downstream of the Rio powerhouse (USGS gage No. 01433500 - Mongaup River near Mongaup, NY) and immediately downstream of the confluence of the Mongaup River and Delaware River at Port Jervis, NY (USGS gage No. 01434000 – Delaware River at Port Jervis, NY). This data will allow the stakeholders to correlate the forecasted and actual flows from the projects relative to the flows downstream of the confluence of the Mongaup and Delaware Rivers. Existing historical flow data for USGS gages is readily available online, and an analysis that compares the influence of Mongaup River Project releases on resulting Delaware River flows downstream of the Mongaup River is a desktop exercise for the licensee that can be performed with little difficulty and at relatively minimal cost [Sections 5.9(b)(4) and 5.9(b)(7)].

Delaware River Water Temperature

As discussed in section 9.5 of the RSP, the Rio Reservoir thermally stratifies during the summer and the Rio Project's intakes are located within the thermocline [Section 5.9(b)(4)]. Drawing water from the reservoir's thermocline likely results in substantially cooler water temperatures in the Mongaup River downstream of the Rio powerhouse. As discussed above, the Rio Project's peaking operations would likely influence Delaware River flows. Similarly, cold-water input from the Mongaup River would affect water temperature in the Delaware River downstream of the Mongaup River confluence, rising and falling with the cyclical operation of the Rio powerhouse [section 5.9(b)(5)].

In section 5.10 of the RSP, Eagle Creek Hydro notes that it is not aware of any continuous water temperature data available for the Delaware River downstream of the Mongaup River confluence [section 5.9(b)(4)] and that this data would be needed to evaluate potential project impacts to the water temperature of the Delaware River [section 5.9(b)(6)]. However, given the 200-square-mile watershed of the Mongaup River versus the 3,070-square-mile watershed of the Delaware River, Eagle Creek Hydro finds that performing the requested monitoring “would equate to searching for a problem.” However, a review of mean daily flows in the Mongaup River and the Delaware River between May 1 and September 30 for 2016 and 2017 (USGS gage Nos. 01433500 and 01434000) indicates that, on average, Mongaup River flows are equivalent to 7 percent of

the Delaware River flow as measured upstream of the confluence. On July 7, 2016 and July 20, 2017, Mongaup River flows were 19 and 16 percent of the mean daily flow in the Delaware River upstream of the confluence, respectively. Although these percentages may not seem significant, the Rio Project operates in a peaking mode. Therefore, real-time instantaneous flows from the Rio Project's peaking flow releases/cessations would have a greater influence on the Delaware River than demonstrated in a mean daily flow analysis. As a result, we find that operation of the Rio Project operation and subsequent flow releases and cessations likely affect water temperature on a sub-daily basis in the Delaware River [section 5.9(b)(5)].

Water temperatures affect the composition of communities within aquatic habitats. Water temperatures also influence biological activity and growth in fish and other aquatic biota. Fish, macroinvertebrates, and other aquatic species generally have a preferred temperature range.³ As a result, we recommend that Eagle Creek Hydro modify its *Water Quality Study* to monitor water temperature in the Delaware River at one location upstream of Mongaup River confluence and at up to three locations downstream of the confluence. Eagle Creek Hydro should use the resulting data to articulate temperature effects of the Rio Project operations on Delaware River water temperatures and to delineate the zone of thermal mixing within the Delaware River. Specific locations should be determined in consultation with the Park Service, FWS, and New York DEC.

Aquatic Habitat Mapping

As discussed above, we recommend that Eagle Creek Hydro evaluate the effect of flow releases from the Rio Project on the Delaware River downstream of its confluence with the Mongaup River. Understanding, the project's effects on the stage change in this section of the Delaware River is the first step in establishing a clear nexus of potential project effects on aquatic habitats there [section 5.9(b)(5)]. Therefore, it would be premature to require Eagle Creek Hydro to conduct the requested aquatic habitat mapping on the Delaware River downstream of the confluence with the Mongaup River. For reasons discussed above, under *Delaware River Flows*, we do not find it appropriate to require Eagle Creek Hydro conduct aquatic habitat mapping on the Delaware River upstream of its confluence with the Mongaup River.

Finally, regarding the Park Service's request for aquatic habitat mapping of the Mongaup River and tributaries, we note that the *Mongaup Basin Instream Flow Study*

³ Source: <https://water.usgs.gov/edu/temperature.html>; retrieved January 26, 2018.

(1988), characterized substrate and water velocities at 74 transects within eight project effected stream reaches documenting the available aquatic habitat, with the exception of Black Lake Creek downstream of Cliff Lake [section 5.9(b)(4)]. As discussed above in Section 2 - *Proposed Studies*, Eagle Creek Hydro proposes a *Bypass/Base Flow Transect Evaluation Study*, to evaluate the continued relevance of the *Mongaup Basin Instream Flow Study* and to augment its data with habitat data (water velocity, depth, and substrate composition) from mesohabitats within Black Lake Creek [section 5.9(b)(6)]. As a result, requiring the Park Service's requested aquatic habitat mapping in the Mongaup River and affected tributaries would be premature, pending the completion of the *Bypass/Base Flow Transect Evaluation Study*, as modified by staff and discussed in Section 2 above.

Project Effects on Delaware River Recreation

As discussed above, we recommend that Eagle Creek Hydro evaluate the effect of flow releases from the Rio Project on the Delaware River downstream of its confluence with the Mongaup River. Understanding the project's effects on stage change in this section of the Delaware River will help in understanding the relationship between project operation and flow-dependent recreation there (i.e. effects on recreation use and user experience) [section 5.9(b)(5)]. Therefore, it would be premature to require Eagle Creek Hydro to conduct the requested analysis of potential effects on flow-dependent recreation on the Delaware River downstream of the confluence with the Mongaup River. Regarding upstream of the confluence, as discussed under *Delaware River Flows*, there is no nexus between the projects and Delaware River flows upstream of the confluence with the Mongaup River; therefore, we do not recommend that Eagle Creek Hydro conduct any analysis of potential effects on flow-dependent recreation there.

Upstream and Downstream Fish Passage Study

Issue

The Projects have the potential to block or impede the upstream and downstream passage of migratory fish species, particularly American shad and American eel. Spawning American shad are known to be present in the Delaware River upstream of the confluence of the Mongaup River, so presence in the Mongaup River may be possible as well. American eel have been documented in the both the Delaware Rivers and as far upstream in the Mongaup River Basin as the Mongaup Falls Reservoir.

Study Request

The FWS and NYSDEC request that Eagle Creek Hydro conduct an upstream and downstream fish passage feasibility study. Specifically, the agencies' request that Eagle Creek Hydro collect site-specific information from the projects and conduct a preliminary analysis that will aid in the design of protection and passage facilities at the projects, including the storage reservoirs (Toronto and Cliff Lake) and the Black Brook development. The agencies request that the analysis include an assessment of alternatives that would effectively pass fish upstream and downstream around the projects' works and emphasize that special attention be given the passage of American eel.

Discussion and Staff Recommendation

Eagle Creek Hydro does not propose to conduct a fish passage feasibility analysis at this time. Eagle Creek Hydro considers the analysis premature given the proposed *Study 3 – Fisheries Survey Study*, which is intended to provide information on the Mongaup River fishery affected by the projects. When a project's effect on the resource of interest is confirmed, conducting a feasibility analysis such as the requested study may be appropriate as it would inform potential license conditions intended to address specific project effects [sections 5.9(b)(5) and (6)]. However, where such effects are debated, it may be premature to identify and evaluate PM&E measures until the results of the studies of project effects are known. Eagle Creek Hydro's proposed *Study 3 – Fisheries Survey Study* (as modified herein) and our recommended desktop entrainment study, American eel study, and American shad surveys (discussed in section 2, above) would provide information that would determine the need for project and species specific fish passage and/or protection measures [sections 5.9(b)(4), (5) and (6)]. As a result, conducting the requested Upstream and Downstream Fish Passage Study before a specific need has been demonstrated would be premature and is not a cost effective approach [section 5.9(b)(7)].

Alewife Hydro-Acoustic Study

Issue

The Projects' reservoirs have populations of alewife that support predatory fish and provide forage for bald eagles.

Study Request

NYSDEC and the FWS, request that Eagle Creek Hydro assess the abundance and distribution of alewife in the Projects' reservoirs with the use of hydro-acoustic surveys. The NYSDEC states that knowing the abundance of alewife, distribution in the reservoir and proximity to the projects' intakes is needed to understand how the Projects' affect the alewife population. It is NYSDEC's position that hydro-acoustic surveys may be the only viable method to evaluate the current status of alewife in project reservoirs.

Discussion and Staff Recommendation

In its response to this study request Eagle Creek Hydro states that there is sufficient information on alewife populations in the Mongaup River system, such that, a targeted hydro-acoustic study is not necessary. The FWS asserts that the current status of the alewife populations must be understood for NYSDEC to manage the reservoirs' fisheries.

In Appendix C of the RSP, Eagle Creek Hydro provided a summary table of NYSDEC Fish Surveys performed in Mongaup River system between 1988 and 2016. The table includes a list of 62 studies, eight of which targeted alewife, and notes that alewife have been found in each of the Projects' reservoirs. Other than in a single paragraph on the LMS entrainment study (where it was determined that high alewife entrainment occurs during the winter), alewife is not mentioned in the PAD [sections 5.9(b)(4) and (5)].

While the agencies debate the need for new current information on alewife distribution and abundance they give no consideration for the apparent existing information [section 5.9(b)(4)]. Similarly, although Eagle Creek Hydro argues the relevance and adequacy of the existing information, it did not provide the information or explain how the existing information will support the development of a license application and an analysis of potential project effects [section 5.9(b)(4)]. Subsequently, we are unable, at this time, to determine whether the requested study and subsequent additional information is needed [section 5.9(b)(4)].

As a result, we recommend that Eagle Creek Hydro conduct a desktop analysis of the existing fisheries studies, including those listed in Appendix C of the RSP, and develop an alewife specific study report that summarizes the data for each reservoir describes the relative abundance, habitat use, seasonal proximity to project intakes, and population trends. The study report should evaluate the adequacy of the existing data to inform an analysis of project effects, and if inadequacies are identified, propose a field

study to fill the data gaps. We estimate the cost of conducting this analysis and developing the report to be \$20,000 [section 5.9(b)(7)].

Socioeconomic Study

Study Request

HOOT requests a socioeconomic study of the projects' impact on the regional economy. HOOT suggests Eagle Creek Hydro use the IMPLAN method, which the Forest Service developed in the mid-1970s as a planning tool for weighing the community impact of various projects and actions involving natural resources. HOOT points out that these studies have been conducted during at least two other relicensing efforts.

HOOT bases this request, in part, on their assertion that the projects receive a significant amount of recreation use, and, therefore, can be assumed to have a significant impact on the regional economy. HOOT states that the results of this study would inform an analysis of potential project operations that would stabilize the reservoir levels for aesthetic and recreation benefits.

Eagle Creek Hydro rejected HOOT's request, in part, on the grounds of cost, citing a cost estimate range of \$250,000-\$500,000. HOOT disputes the licensee's cost estimate as being, "an order of magnitude" higher than necessary, but does not provide their own estimate of the cost to conduct this study.

HOOT disputes the licensees' assertion that the Commission does not typically "quantify" non-power benefits, but their dispute seems to be based on a distinction between the literal and intended meaning of the word. We understand the licensee to mean "economically quantify" in terms of dollars, rather than simply anything that can be counted (e.g. recreation user days, fish and wildlife stock estimates, etc.).

Discussion and Staff Recommendation

HOOT's assertion that the projects receive a significant amount of recreation use is not based on any available data. In fact, the PAD notes that FERC form 80 data shows the projects received only 11,653 recreation user days in 2015. The Toronto Reservoir, specifically, received 2,792 recreation user days, with an average of 140 user days on peak weekends. Typically, a recreation user day is defined as any visit to any site within a 24-hour period, which means that these figures likely represent much fewer individuals

who visit the project multiple times throughout the year. Although the projects are clearly important to stakeholders, local residents, and shoreline residents, the assertion that they support a significant amount of recreation use does not appear to be accurate [section 5.9(b)(4)].

HOOT states that the results of this study would likely lead to a consideration of dramatically altering project operations to stabilize reservoir levels in order to provide aesthetic and recreational benefits to project residents and recreation users. While it is premature to discuss potential license conditions at this time, the results of *Study 1 – Reservoir Water Level Fluctuation/Operation Model Study; Study 7 – Recreation Facility Inventory, Recreation Use and Needs Assessment, and Reservoir Surface Area Assessment*; and *Study 9 – Shoreline Management Assessment* will be sufficient to inform any potential license conditions related to project operations' effects on reservoir levels, recreation, and aesthetics. The requested socioeconomic study, therefore, would not be necessary to inform any potential license conditions. Eagle Creek Hydro correctly notes that the Commission does not typically quantify non-power benefits such as recreation and aesthetics in economic terms, despite HOOT's assertion to the contrary, which appears to be based on a misunderstanding of the intended meaning of the word "quantify" [section 5.9(b)(5)].

Therefore, given that the other studies noted above will provide the data necessary for our environmental analysis, conducting the requested socioeconomic study is not justified [section 5.9(b)(7)]. For this reason, and the reasons noted above, we do not recommend that Eagle Creek Hydro conduct HOOT's requested socioeconomic study.

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