LOW-IMPACT HYDROPOWER POWER INSTITUTE CERTIFICATION APPLICATION

EASTMAN FALLS HYDROELECTRIC PROJECT
(FERC NO. 2457)

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1.0 FACILITY DESCRIPTION

The Eastman Falls Hydroelectric Project (Project) is located in central New Hampshire in Merrimack and Belknap Counties, and in the city of Franklin and towns of Hill, Sanbornton, and New Hampton. The Project is located on the Pemigewasset River, at river mile 116.5, approximately 1.5 miles downstream of the U.S. Army Corps of Engineers (USACE) Franklin Falls Flood Control Dam, and about one mile upstream of its confluence with the Winnipesaukee River. The Project was originally constructed by the Pemigewasset Power Company in 1903, redeveloped by the Boston and Maine Railroad in 1910-1911, and further redeveloped by Public Service Company of New Hampshire (PSNH) in 1937 and 1983. The Project's hydroelectric facilities are owned by HSE Hydro NH, LLC and operated by Central Rivers Power NH, LLC (CRPNH).

The general Project area includes the Pemigewasset River from Sumner Island in the north to the Pemigewasset-Winnipesaukee River confluence in the south, and the lands immediately adjacent to the Pemigewasset River throughout this reach. The Project dam and powerhouses are located off North Main Street in Franklin, New Hampshire, approximately 0.6 miles west of the center of Franklin.

CRPNH recently completed the FERC relicensing process for the project, receiving a new license in 2017 (159 FERC ¶ 62,070). CRPNH has developed several compliance plans required by the licensee as discussed herein.

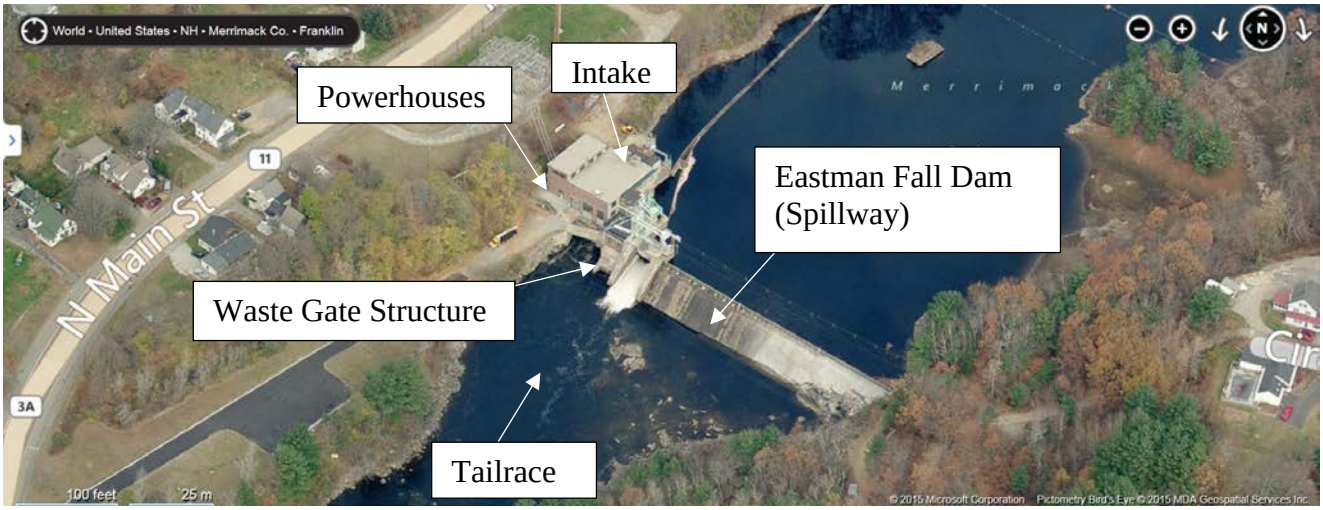


FIGURE 1 PHOTO OF PROJECT/IDENTIFICATION OF PROJECT PARTS

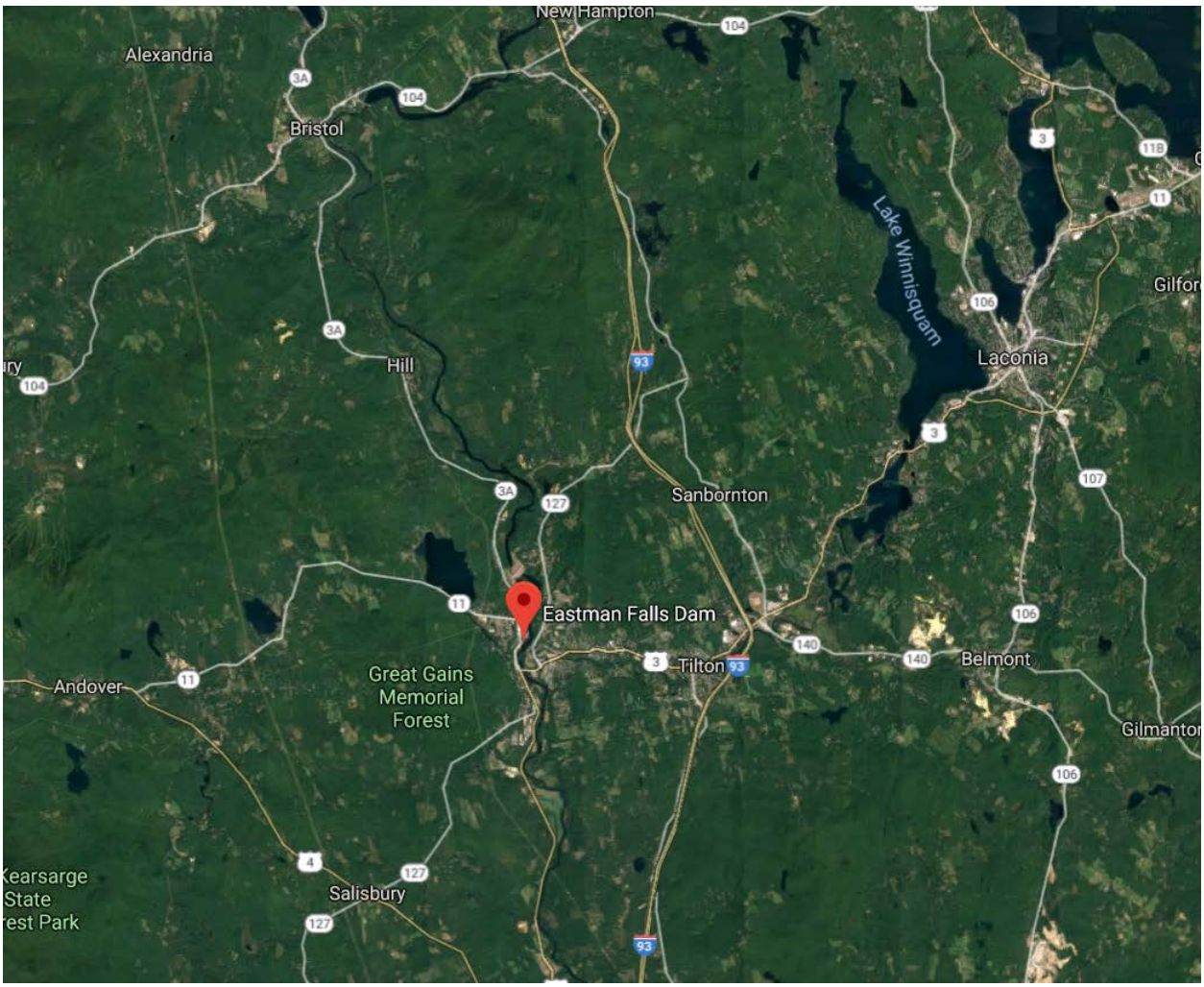


FIGURE 2 GEOGRAPHIC OVERVIEW OF PROJECT LOCATION

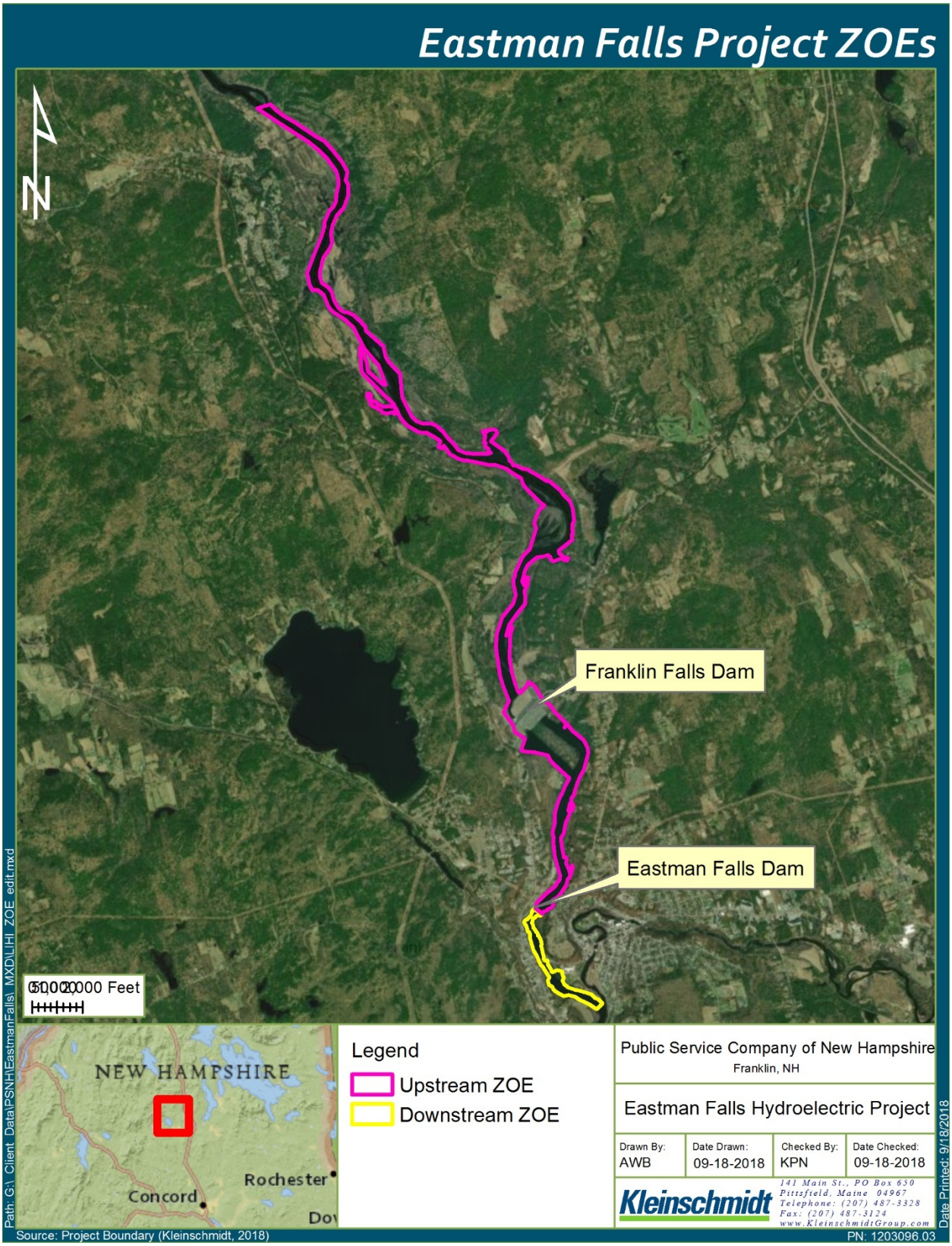


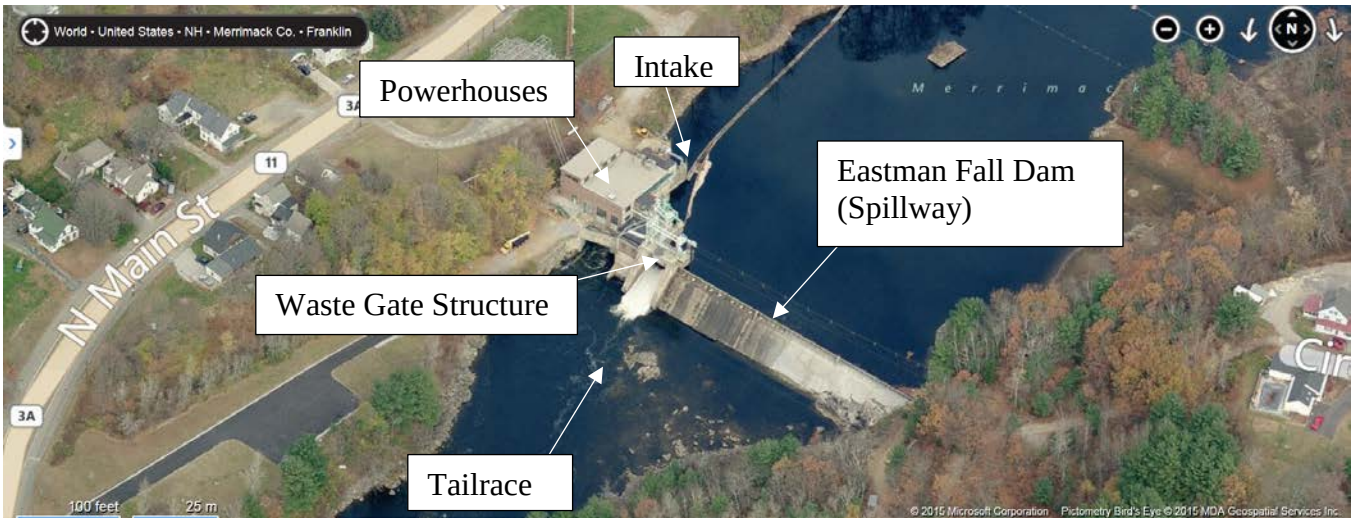
FIGURE 3 ZONES OF EFFECT

FIGURE 4 DOWNSTREAM ZONES OF EFFECT

1.1 PROJECT DESCRIPTION

The Eastman Falls Project consists of a dam, one spillway waste gate, and two single unit powerhouses, which are described in further detail below. The project operates as an un-manned, run-of-river facility, and does not have a bypass reach. Photo 1 provides a summary of the installed equipment.

PHOTO 1 EASTMAN FALLS PROJECT (MICROSOFT CORPORATION 2015)



SPILLWAY

The spillway is a concrete gravity structure approximately 341 feet long, with a maximum structural height of about 37 feet above the foundation. The fixed crest of the ogee section is at elevation 301 feet mean sea level (msl). The spillway is equipped with 6-foot-high steel flashboards for its full length. The flashboard panels are hinged at the crest and supported on the downstream side by timber struts. A cable car system spans the spillway to allow for strut removal to lower the flashboard panels to increase spillway capacity during high flow events. The same system is used by CRPNH operators after high flows subside to raise the panels and reinstall the struts. A drainage gallery is located in the higher sections of the spillway. Post-tensioned anchors were installed in the spillway in 1999.

WASTE GATE STRUCTURE

A waste gate structure abuts the right side of the spillway and includes a 16-foot-high by 30 foot wide steel slide gate. The gate sill is at elevation 292 feet msl. The reinforced concrete waste gate structure is approximately 40 feet wide with the deck (crest) at elevation 316 feet.

INTAKE STRUCTURES

The Unit No.1 intake has a headgate structure that is about 12.5 feet high by about 15 feet wide. Trashrack dimensions are 23 feet 9 1/8 inches high by 17 feet wide and consist of 1/2-inch-wide bars spaced 4 inches on center for a clear spacing of 3.5 inches. The intake structure for this section of the powerhouse admits water to the turbine through a 12.5 foot by 12.5-foot reinforced concrete penstock which is approximately 21 feet long. The bulkhead is about 40 feet high and 20 feet wide with a 1-foot wide stop log slot that can be used to dewater the intake.

The Unit No.2 intake is integral with the powerhouse and is comprised of a reinforced concrete and masonry gravity structure with an 18-foot square entrance opening. An electrically operated headgate is located within the powerhouse and is about 20 feet high by about 21 feet wide. Trashracks consist of two 12 feet 4-inch-wide by 9 feet 4-inch-high panels with 1/2-inch-wide bars spaced 4 inches on center for a clear spacing of 3.5 inches. The intake stop log panel is about 20 feet 10 inches high and 22 feet 5 ½ inches wide, that can be lowered into the stoplog frame of the bulkhead to dewater the intake via pumping.

POWERHOUSES

Two powerhouses are located on the west bank of the river. The Unit No.1 powerhouse was built in 1937 and is approximately 29 feet long, 29 feet wide, and 34 feet high. Tail gate panels (four 20 foot by 5.5 foot panels) can also be placed in tailrace with a crane, stacked on one another. With the panels in place and the headgate closed, pumps are used to dewater the penstock, unit and draft tube. Draft tube opening is approximately 23 feet wide by 14 feet 6 inches high and is approximately 60 feet in length from the turbine to the tailwater opening with varying height and width dimensions along that distance.

The Unit No. 2 powerhouse was originally constructed in about 1910 and was retrofitted with a new Kaplan horizontal-type turbine generator in 1983. The Unit No. 2 powerhouse is integral with the intake and comprised of a reinforced concrete and masonry substructure with a concrete and brick superstructure. The built-up roof is supported by steel trusses. The majority of the concrete substructure was replaced, and the upstream portion of the roof was reconstructed as part of the 1983 retrofit. The Unit No. 2 powerhouse is approximately 88 feet long, 78 feet wide and 56 feet high. The draft tube opening is approximately 23 feet wide by 14 feet 6 inches high and is an approximately 60 feet in length from the turbine to the tailwater opening with varying

height and width dimensions along that distance. The tail gate panel (draft tube stop logs) is 15 feet 5 inches high and 24 feet 5 inches wide and has a large pump installed in it. When the head gate and tail gates are closed the pump is turned on to dewater the intake and draft tube.

TAILWATER

The Pemigewasset River below the Eastman Falls Project boundary is a free-flowing, riverine body through to its confluence with the Winnipesaukee River. The normal tailwater elevation is 273.0 feet msl. Outflow from the Project joins outflow from the Winnipesaukee River about one mile downstream.

PROJECT OPERATIONS

The Eastman Falls Project operates in an un-manned, run-of-river mode such that impoundment fluctuations do not exceed ± 0.2 feet from the normal impoundment elevation of 307 feet msl with flashboards installed. The generating units are normally operated remotely from CRPNH's Control Center Customized Energy Solutions (CES) located in Philadelphia, Pennsylvania, although both units are also capable of local operation. Manual operations and maintenance of the Eastman Falls Project are performed by the Central Hydro Group, which is responsible for CRPNH's Eastman Falls Project and Ayer's Island Dam (FERC No. 2456) project located in central New Hampshire. Daily logs of pond level, flow, and outages are maintained electronically for the Project.

TABLE 1 FACILITY DESCRIPTION INFORMATION FOR THE EASTMAN FALLS HYDROELECTRIC PROJECT

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
Name of the Facility	Facility name (use FERC project name if possible)	Eastman Falls
Location	River name (USGS proper name)	Pemigewasset River
	River basin name	Merrimack River Basin
	Nearest town, county, and state	Franklin, Belknap County, New Hampshire
	River mile of dam above next major river	125.5
	Geographic latitude	43°26’51.36”N
	Geographic longitude	71°39’30.15”W
Facility Owner	Application contact names (IMPORTANT: you must also complete the Facilities Contact Form):	Curtis R. Mooney Project Manager Central Rivers Power 59 Ayers Island Road Bristol, NH 03222
	- Facility owner (individual and company names)	HSE Hydro NH AC, LLC Todd Wynn, CEO Portfolio Companies
	- Operating affiliate (if different from owner)	Central Rivers Power NH, LLC Brent Sowle, Hydro Manager
	- Representative in LIHI certification	Andy Qua Project Manager Kleinschmidt Associates 141 Main Street P.O. Box 650 Pittsfield, ME 04967
Regulatory Status	FERC Project Number (P-2457), issuance and expiration dates	FERC No. 2457, issued April 20, 2017; effective January 1, 2018; expires December 31, 2047.
	FERC License type or special classification (e.g., "qualified conduit")	Major Project – Existing Dam
	Water Quality Certificate identifier and issuance date, plus source agency name	See Appendix C: Certification issued by the New Hampshire Department of Environmental Services
	Hyperlinks to key electronic records on FERC e-library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.)	See Appendix C for copies of key records Order issuing new license (April 20, 2017) Order approving Upstream Eel Passage Plan (May 9, 2018)
Power Plant Character-istics	Date of initial operation (past or future for operational applications)	The Project was originally constructed by the Pemigewasset Power Company in 1903, redeveloped by the Boston and Maine Railroad in 1910-1911, and further redeveloped by Public Service Company of New Hampshire (PSNH) in 1937 and 1983.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	Total name-plate capacity (MW)	6.4
	Average annual generation (MWh)	27,871 MWh (10-year Average)
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	Unit No. 1 is a S. Morgan Smith Kaplan vertical-type turbine with 33 feet of head, a rated capacity of 2,650 hp (1,950 kW) with a maximum flow of 850 cfs and a minimum flow of 250 cfs. The General Electric generator is rated at 1,800 kW. Unit No. 2 is a Dominion Bridge-Sulzer Kaplan horizontal-type turbine with 33 feet of head, a rated capacity of 5,790 hp (4,260 kW) with a maximum flow of 1,930 cfs and a minimum flow of 700 cfs. The Parsons Peebles generator is rated at 4,600 kW.
	Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)	Run-of-river
	Dates and types of major equipment upgrades	In 1937 a new concrete dam was constructed in front of the original stone-filled dam and the Unit 1 powerhouse was built. In 1983, Unit 2 powerhouse, originally constructed in 1910-1911, was retrofitted with a new Kaplan horizontal-type turbine generator and the majority of the concrete superstructure was replaced, and the upstream portion of the roof was constructed. The Unit 2 powerhouse commenced operation in 1983. A 342 foot long floating louver array to facilitate downstream fish passage was installed in 1996 and replaced in 2012. Improvements to the associated plunge pool were completed in 2001 to provide safe egress for migrating smolts.
	Dates, purpose, and type of any recent operational changes	Changed operation to true run-of-river mode January 1, 2018 (effective date of new FERC license). Previously maintained continuous minimum flow of 410 CFS or inflow (whichever is less)
	Plans, authorization, and regulatory activities for any facility upgrades	None
	Date of construction	1937-Unit 1 and 1983-Unit 2

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
Characteristics of Dam, Diversion, or Conduit	Dam height	27' high (max.)
	Spillway elevation and hydraulic capacity	Spillway elevation 307.0 feet Hydrologic Capacity of the project generation units is 2,780 cfs
	Tailwater elevation	273.0 feet mean sea level (msl)
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	Unit No. 1 – 12.5 feet wide x 15 feet long Unit No. 2 – 18 feet wide x 18 feet long
	Dates and types of major, generation-related infrastructure improvements	Major maintenance and construction items accomplished during the last thirteen years include: painted flashboards (2014), replaced flashboard seals (2014), replaced fish passage louver line (2012), and resurfaced spillway (2007 and 2008).
	Designated facility purposes (e.g., power, navigation, flood control, water supply, etc.)	Hydropower
	Water source	Pemigewasset River
	Water discharge location or facility	Pemigewasset River
Characteristics of Reservoir and Watershed	Gross volume and surface area at full pool	Gross storage capacity of 4,570 acre-feet and a useable storage capacity of 1,090 acre-feet
	Maximum water surface elevation (ft. MSL)	307.0 feet mean sea level (msl)
	Maximum and minimum volume and water surface elevations for designated power pool, if available	N/A Run of River Project
	Upstream dam(s) by name, ownership, FERC number (if applicable), and river mile	Ayers Island, Central Rivers Power NH, LLC, FERC No. 2456: RM: 125.5
	Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile	Garvins Falls, Central Rivers Power NH, LLC, FERC No. 1893; RM: 86.8
	Operating agreements with upstream or downstream reservoirs that affect water availability, if any, and facility operation	None
	Area inside FERC project boundary, where appropriate	476 acres
	Average annual flow at the dam	2,130 CFS

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
Hydrologic Setting	Average monthly flows	Jan 1,200cfs; Feb 1153cfs; Mar 895cfs; Apr 1040cfs; May 1,446; Jun 1,155; Jul 1,050; Aug 774; Sep 688; Oct 651; Nov 690; Dec 1,112
	Location and name of relevant stream gauging stations above and below the facility	USGS 01081500 Merrimack River at Franklin Junction, NH USGS 01076500 Pemigewasset River at Plymouth, NH
	Watershed area at the dam	1,003 square miles
Designated Zones of Effect	Number of zones of effect	Two
	Upstream and downstream locations by river miles	Zone 1: RM 116.5 to RM 115.5 Zone 2: RM 116.5 to RM 125.5
	Type of waterbody (river, impoundment, by-passed reach, etc.)	Zone 1: Impoundment Zone 2: River
	Delimiting structures	Zone 1: Impoundment headwater down to Eastman Falls dam. This includes the Franklin Falls Dam and up above to because that is where the project backwaters. Zone 2: Eastman Falls dam down to the confluence of the Winnipesaukee River with the Pemigewasset River
	Designated uses by state water quality agency	Class B
Additional Contact Information	Names, addresses, phone numbers, and e-mail for local state and federal resource agencies	See attached LIHI Facility Contact Form
	Names, addresses, phone numbers, and e-mail for local non-governmental stakeholders	See attached LIHI Facility Contact Form
Photographs and Maps	Photographs of key features of the facility and each of the designated zones of effect	See Appendix A
	Maps, aerial photos, and/or plan view diagrams of facility area and river basin	See Appendix A

2.0 STANDARDS MATRICES

2.1 IMPOUNDMENT ZOE

CRITERION		ALTERNATIVE STANDARDS				
		1	*2*	*3*	*4*	*Plus*
A	**Ecological Flow Regimes**	***X***				
B	**Water Quality**		***X***			
C	**Upstream Fish Passage**	***X***				
D	**Downstream Fish Passage**		***X***			
E	**Watershed and Shoreline Protection**	***X***				
F	**Threatened and Endangered Species Protection**	***X***				
G	**Cultural and Historic Resources Protection**	***X***				
H	**Recreational Resources**		***X***			

2.2 DOWNSTREAM ZOE

CRITERION		ALTERNATIVE STANDARDS				
		1	*2*	*3*	*4*	*Plus*
A	**Ecological Flow Regimes**		***X***			
B	**Water Quality**		***X***			
C	**Upstream Fish Passage**		***X***			
D	**Downstream Fish Passage**	***X***				
E	**Watershed and Shoreline Protection**	***X***				
F	**Threatened and Endangered Species Protection**	***X***				
G	**Cultural and Historic Resources Protection**	***X***				
H	**Recreational Resources**		***X***			

3.0 SUPPORTING INFORMATION

3.1 ECOLOGICAL FLOWS STANDARDS: IMPOUNDMENT ZOE

CRITERION	STANDARD	INSTRUCTIONS
A	1	Not Applicable / De Minimis Effect: • Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no bypassed reaches at the facility. • If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained. • In a conduit project, identify the water source and discharge points for the conduit system within which the hydropower plant is located. • For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – ***NOTE:*** this is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.

There are no bypassed reaches at the facility which is confirmed by NHDES in Finding D-12 on page 18 of the facility's Water Quality Certification[1] states "Because there is no bypass reach…".

[1] https://www.des.nh.gov/organization/divisions/water/wmb/section401/ferc.htm

The Project operates as an un-manned, run-of-river facility. Unit 1 can operate in range from a minimum flow of 250 cfs to a maximum flow of 850 cfs, and Unit 2 operates from a minimum flow of 700 cfs to a maximum flow of 1,930 cfs. Combined the Project Units can operate between a minimum flow of 250 cfs to maximum flow of 2,780 cfs[2].

Inflow is typically maintained with a steady impoundment level of approximately 6 ft above the crest of the dam (top of flashboards) at elevation 307 feet msl. A 6-foot pond level (top of boards) is desired to maximize head for generation. The Project is normally operated on pond control (automated pond level control) with a set point at the top of boards at 6 ft. The pond level control typically maintains this level within +/- 0.2 ft.

When inflow is insufficient to operate Unit No. 1 (less than 250 cfs), the unit will be shut down and CRPNH will continue to maintain run of river operations by passing flows through the waste gate or spilled over the dam. At flows above the minimum capacity of Unit No. 1 (250 cfs or greater), inflow will be passed through unit operation. At flows greater than 700 cfs, Unit No. 2 will be brought on line and Unit No. 1 will be shut down because Unit No. 2 is a newer and more efficient unit. At flows of approximately 1,830 cfs, Unit No. 1 will be brought back on line. The waste gate will additionally be operated to pass flows in excess of the hydraulic capacity of the turbines (Unit No. 1: 850 cfs + Unit No. 2: 1,930 cfs = 2,780 cfs) and to minimize overtopping of the flashboards. During periods when sufficient inflow is anticipated such that both units can be operated, Unit 1 is brought online before Unit 2 reaches maximum capacity to allow smoother operational transition, not for downstream flow regulation.

When river flows exceed 2,780 cfs (station capacity), the waste gate is opened to manually maintain the 6-foot level. In addition, during periods when river flows exceed the hydraulic capacity of both units combined (2,780 cfs), and when the flashboards are lowered due to increased flow, the 6-foot pond level is difficult to maintain. Therefore, during these periods the pond level is maintained within +/- 0.5 foot when the wastegate is operated when river flow exceeds station capacity (2,780 cfs), and within +/ 1 foot when the flashboards are lowered and/or raised due to changing river flow.

CRPNH will continue to monitor generation, impoundment levels, and inflows at the Project. A pressure-sensitive headwater sensor is in place at the dam and provides impoundment levels.

[2] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14565890

Records of operations, run-of-river flows, and water levels will be maintained electronically. These records can be retrieved and be made available upon request; CRPNH will provide copies of monitoring data (i.e., headwater level, generation output, and flow conditions) to the FERC, NHDES, USFWS, and NHF&G to verify compliance.

In addition, an Operation Compliance Monitoring and Maintenance Plan (OCMMP)[3] was filed with FERC on June 26, 2018. In accordance with Condition E-11 of the Water Quality Certification[4] and Article 401 of the 2017 License for the Eastman Falls Hydroelectric Project FERC No. 2457 (159 FERC ¶ 62,070)[5], the Licensee filed its revised Operation Compliance Monitoring and Maintenance Plan (OCMMP) for Commission review and approval on June 26, 2018. As required by Article 401, the plan was distributed to the New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFGD), and U.S. Fish and Wildlife Service (USFWS) on April 10, 2018 for review and comment. As of the date of filing and submission of this LIHI application, no comments have been provided. A copy of the plan is included in Attachment F.

The USDI, NHFGD and NHDES concurred with the licensee maintaining an impoundment elevation of 307 feet msl (+/- 0.2 feet). The agencies believe maintaining a steady pond elevation will help protect the flora and fauna in the littoral and riparian zones of the impoundment. The NHDES states "… minimizing the frequency and magnitude of fluctuations will help protect the flora and fauna in the littoral and riparian zones of the impoundment".

Fish and wildlife habitat within the majority of the impoundment zone (Zone 1) is managed by the United States Army Corps of Engineers. See Recreation Facilities/Activities at- http://www.nae.usace.army.mil/Missions/Recreation/Franklin-Falls-Dam/

There is extensive, high quality wildlife habitat in the Project area from Franklin Falls Dam to Sumner Island and above. This area comprises the bulk of the 3,900 acres of USACE flood control project lands. This area is in turn surrounded by rural lands of the towns of Hill and Sanbornton to the west and east, respectively, and Bristol and New Hampton to the north.

[3] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14957291
[4] https://www.des.nh.gov/organization/divisions/water/wmb/section401/ferc.htm
[5] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14565890

The terrestrial wildlife habitat of the narrow border of forested land on the river's west bank between Franklin Falls and Eastman Falls Dams is limited in extent and quality due to the density and close infringement upon the river of adjacent residential and commercial/industrial developments. The wildlife habitat of the somewhat wider boarder of forested land of the river's east bank between Franklin Falls Dam and the N.H. Route 3 highway bridge is somewhat more extensive and of higher quality since it is less closely infringed upon and impacted by the adjacent residential area. The terrestrial wildlife habitat bordering the river between the Franklin Falls Dam and the N.H. Route 3 Bridge could support most of the indigenous small bird and mammal species and some of the smaller upland game and furbearer species common to northern New England and central New Hampshire, in particular. Larger game species such as the Whitetail Deer would be restricted to the habitat of the river's east bank and possibly the northern section of the river's west bank in this area.

Many of the wildlife species that occur within the vicinity of the Eastman Falls Project are likely to be present year-round. Other species may migrate seasonally, using separate and distinct breeding and wintering areas. The range of these movements varies significantly among species. Many migratory avian species that use the Project vicinity during temperate seasons are absent from the region in winter. Other species tend to display more moderate seasonal shifts of habitat usage, using distinct areas within the Project vicinity and surrounding region in summer and different distinct areas in winter.

No agency recommendations were received during the relicensing specific to fish and wildlife habitat in the impoundment.

FISHERIES MANAGEMENT

To accommodate recreational fishing interests, NHF&G has an extensive fish stocking program. Throughout the months of mid-March through early July, NHF&G stocks more than 260 lakes and ponds and nearly 1,500 miles of river and streams each year (NHF&G 2017)[6]. Every year nearly one million catchable sized trout are stocked for anglers (NHF&G 2017). Close to the Eastman Falls Project vicinity, the NHF&G engages in stocking programs in the Bristol-New Hampton area (RM 130) which includes yearling non-native rainbow trout, non-native brown trout, and native eastern brook trout (NHF&G, Donald Miller 2012 *personal communication*). In

[6] https://wildlife.state.nh.us/fishing/trout-stocking.html

2017, 1,970 brown trout, 640 eastern brook trout, and 600 rainbow trout were stocked in the Bristol-New Hampton area (NHF&G 2017)[7]. The NHF&G has a second relevant stocking area for rainbow, brown, and eastern brook trout just south of the Eastman Falls Project dam (NHF&G, Donald Miller 2012 *personal communication*). In 2017, 2,200 brown trout, 1,150 eastern rainbow trout were stocked just below the Eastman Falls Project (NHF&G 2017Due to diminished salmon returns and funding cuts, the program's federal funding ended in 2013 and New Hampshire closed the Atlantic salmon brood stock fishery program in 2015.

On August 23, 2018, FERC deemed run-of-river license violation on July 17, 2018[8].

CRPNH's filing on August 14, 2018[9], reports a run-of-river deviation that occurred on July 17, 2018. The project had been offline due to low river inflows since July 11, 2018. Dispatchers were remotely managing the wastegate to maintain run-of-river operations when on July 17, 2018, a new operator inadvertently pulsed the wastegate closed at 12:03 a.m. It was not until a dispatcher shift change at 6:30 a.m. that the error was identified. CRPNH's dispatcher immediately remotely opened the gate and restored flow at 6:33 a.m. No stranded or distressed fish downstream of the dam nor any adverse effects downstream of the tailrace were observed. CRPNH verbally notified the FWS, the New Hampshire DES, and the New Hampshire F&G on July 17, 2018. In addition, you provided a follow-up emailing to the agencies detailing the incident on July 19, 2018.

CRPNH's Electric System Control Center has reviewed this incident with their dispatchers and reaffirmed the importance of maintaining run-of-river operations at all times; especially during periods of low river flow.

[7] https://wildlife.state.nh.us/fishing/documents/stocking-full-2017.pdf
[8] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15002620
[9] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14997856

3.2 ECOLOGICAL FLOWS STANDARDS: DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
A	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Explain how the recommendation relates to agency management goals and objectives for fish and wildlife. • Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow

The U.S. Department of Interior (USDI), New Hampshire Fish and Game Department (NHFGD) and the NHDES concurred with the licensee's proposal to operate the facility as a run-of-river project whereby outflow from the project equals inflow on an instantaneous basis except during emergencies beyond the control of the licensee and for short periods upon mutual agreement with the resource agencies. The NHDES concluded "… *as such actions will help support Biological and Aquatic Community Integrity* (Env-Wq1703.19)". An Operation Compliance Monitoring and Maintenance Plan (OCMMP) was filed with FERC on June 26, 2018.

CRPNH emailed the NHDES on January 15, 2018, asking about the status of review and formal approval of the OCMMP, no response have been received at this time. A copy of this email can be found in Appendix F.

In accordance with Condition E-11 of the Water Quality Certification (Attachment C)[10] and Article 401 of the 2017 License for the Eastman Falls Hydroelectric Project FERC No. 2457 (159 FERC ¶ 62,070), the Licensee filed its revised Operation Compliance Monitoring and Maintenance Plan (OCMMP)for Commission review and approval on June 26, 2018[11]. As required by Article 401, the plan was distributed to the New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFGD), and

[10] https://www.des.nh.gov/organization/divisions/water/wmb/section401/ferc.htm
[11] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14957291

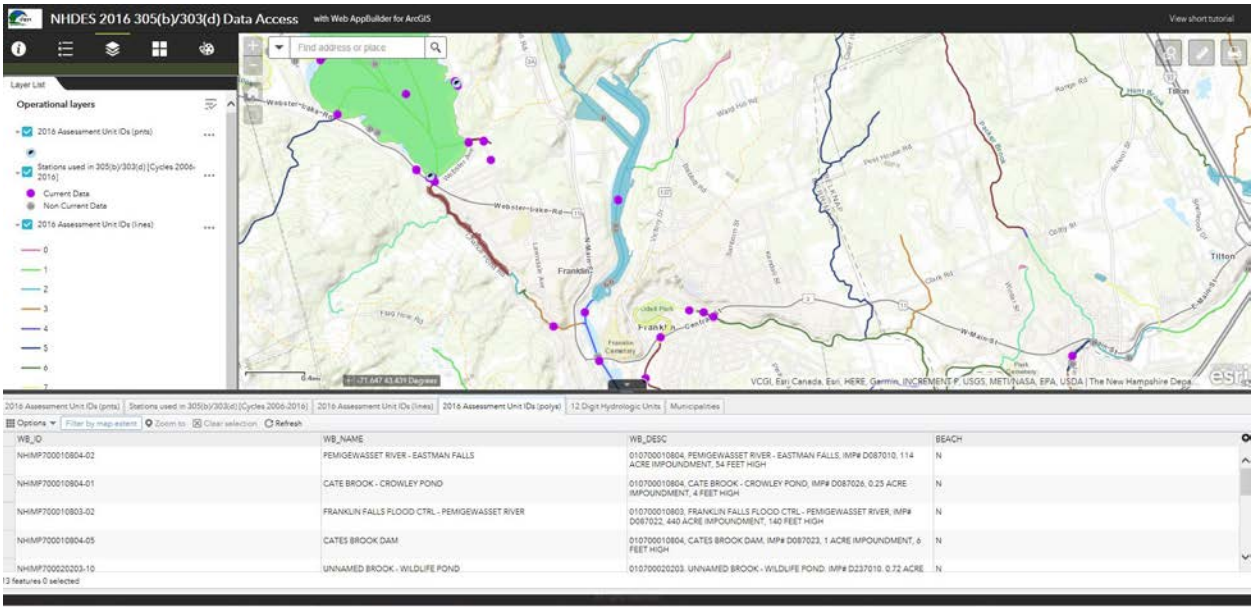
U.S. Fish and Wildlife Service (USFWS) on April 10, 2018 for review and comment. As of the date of filing and submission of this LIHI application, no comments have been provided. A copy of the plan is included in Attachment F.

The NHDES concurs with the USFWS and NHFGD that the project operate as a run-of-river facility (WQC finding D-14), "… whereby outflow from the project equals inflow on an instantaneous basis except during emergencies beyond control of the applicant and for short periods upon mutual agreement with the resource agencies, as such actions will help to support Biological and Aquatic Community Integrity".

The NHDES also concurred with the USFWS and NHFGD recommend an impoundment refill procedure whereby 90 percent of the inflow would be passed downstream and 10 percent would be used to refill the impoundment. Because "… it will help to minimize dramatic reductions or increases in downstream flow (as compared to inflow) during and immediately after impoundment refill and is therefore supportive of Biological and Aquatic Community Integrity".

3.3 WATER QUALITY STANDARDS: IMPOUNDMENT ZOE

CRITERION	STANDARD	INSTRUCTIONS
B	2	Agency Recommendation: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Provide a copy of the most recent Water Quality Certificate, including the date of issuance. • Identify any other agency recommendations related to water quality and explain their scientific or technical basis. • Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.



Based upon a review of the 2016 Section 303(d) Surface Water Quality List, the project waters are not considered impaired or listed on the State's 303d list.

The project received Water Quality Certification from the New Hampshire Department of Environmental Services on December 15, 2016 (Attachment C)[12]. Section B. of the Introduction states "*Based on the facts, findings and conditions noted below, the New Hampshire Department of Environmental Services has determined that there is reasonable assurance that construction and operation of the Activity will not violate surface water quality standards*".

[12] https://www.des.nh.gov/organization/divisions/water/wmb/section401/ferc.htm

In accordance with Condition E-13 of the Water Quality Certification and Article 401 of the 2017 License for the Eastman Falls Hydroelectric Project FERC No. 2457 (159 FERC ¶ 62,070)[13], the Licensee, filed its Water Quality Monitoring Plan (WQMP) for Commission review and approval on June 26, 2018. Pursuant to WQC Condition E-13, the plan was submitted to the New Hampshire Department of Environmental Services (NHDES) for review and approval on April 3, 2018. Comments were received from the NHDES on June 15, 2018 and were incorporated into the WQMP as appropriate. The Plan will be implemented upon approval by the Commission. A copy of the plan is included in Attachment F.

CRPNH emailed the NHDES on January 15, 2018, asking about the status of review and formal approval of the WQMP, no response have been received at this time. A copy of this email can be found in Appendix F.

The U.S. Department of Interior (DOI), New Hampshire Fish and Game Department (NHFGD) and the NHDES concurred with the licensee's proposal to operate the facility as a run-of-river project whereby outflow from the project equals inflow on an instantaneous basis except during emergencies beyond the control of the licensee and for short periods upon mutual agreement with the resource agencies. The NHDES concluded "… *as such actions will help support Biological and Aquatic Community Integrity* (Env-Wq1703.19)". An Operation Compliance Monitoring and Maintenance Plan was filed with FERC on June 26, 2018[14].

In accordance with Condition E-11 of the Water Quality Certification[15] and Article 401 of the 2017 License for the Eastman Falls Hydroelectric Project FERC No. 2457 (159 FERC ¶ 62,070), the Licensee filed its revised Operation Compliance Monitoring and Maintenance Plan (OCMMP) for Commission review and approval on June 26, 2018[16]. As required by Article 401, the plan was distributed to the New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFGD), and U.S. Fish and Wildlife Service (USFWS) on April 10, 2018 for review and comment. As of the date of filing and submission of this LIHI application, no comments have been provided. A copy of the plan is included in Attachment G.

[13] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14565890
[14] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14957291
[15] https://www.des.nh.gov/organization/divisions/water/wmb/section401/ferc.htm
[16] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14957291

CRPNH emailed the NHDES on January 15, 2018, asking about the status of review and formal approval of the OCMMP, no response have been received at this time. A copy of this email can be found in Appendix F.

The DOI, NHFGD and NHDES also recommended the USFWS standard impoundment refill procedure whereby 90 percent of the inflow would be passed downstream and 10 percent would be used to refill the impoundment. The NHDES supported the USFWS standard protocols for refilling impoundments because it will help to minimize dramatic reductions or increases in downstream flow (as compared to inflow) during and after impoundment refill and is therefore supportive of Biological and Aquatic Community Integrity. This requirement has been added to the OCMMP.

3.4 WATER QUALITY STANDARDS: DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
B	2	Agency Recommendation: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Provide a copy of the most recent Water Quality Certificate, including the date of issuance. • Identify any other agency recommendations related to water quality and explain their scientific or technical basis. • Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.

- See answer to Impoundment ZOE above.
- The project received Water Quality Certification from the New Hampshire Department of Environmental Services on December 15, 2016 (Attachment F)[17]. Section B. of the Introduction states "*Based on the facts, findings and conditions noted below, the New Hampshire Department of Environmental Services has determined that there is reasonable assurance that construction and operation of the Activity will not violate surface water quality standards*".
- In accordance with Condition E-13 of the Water Quality Certification and Article 401 of the 2017 License for the Eastman Falls Hydroelectric Project FERC No. 2457 (159 FERC ¶ 62,070)[18], the Licensee, filed its Water Quality Monitoring Plan (WQMP) for Commission review and approval on June 26, 2018. Pursuant to WQC Condition E-13, the plan was submitted to the New Hampshire Department of Environmental Services (NHDES) for review and approval on April 3, 2018. Comments were received from the NHDES on June 15, 2018 and were incorporated into the WQMP as appropriate. The Plan will be implemented upon approval by the Commission. A copy of the plan is included in Attachment F.
- CRPNH emailed the NHDES on January 15, 2018, asking about the status of review and formal approval of the WQMP, no response have been received at this time. A copy of this email can be found in Appendix F.

[17] https://www.des.nh.gov/organization/divisions/water/wmb/section401/ferc.htm
[18] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14565890

3.5 UPSTREAM FISH PASSAGE STANDARDS: IMPOUNDMENT ZOE

CRITERION	STANDARD	INSTRUCTIONS
C	1	Not Applicable / De Minimis Effect: • Explain why the facility does not impose a barrier to upstream fish passage in the designated zone. • Document available fish distribution data and the lack of migratory fish species in the vicinity. If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.

- Agencies including the USFWS, NMFS, or NHF&G have not recommended upstream fish passage facilities for the Eastman Falls Project.
- Due to diminished salmon returns and funding cuts, the program's federal funding ended in 2013 and New Hampshire closed the Atlantic salmon brood stock fishery program in 2015. Due to the September 5, 2013 USFWS decision to end its support of the Merrimack River salmon restoration program, fall passage for salmon was deemed not necessary at the Eastman Falls Project. Spring downstream passage is continued at the Project, though, to allow for any hold over Atlantic salmon smolts to migrate downriver. The NHF&G has indicated that fall downstream passage for adults and precocious parr was no longer necessary and that the last of any hold-over smolts would have left the system by the spring of 2016.
- The project will not create a barrier for upstream eel passage, because an upstream eel passage facility will be installed pursuant to USDOI's Section 18 prescription – see Downstream ZOE.
- Upon exiting eel passage facilities into the impoundment, the project impoundment creates no barrier to upstream fish movements.

TABLE 2 FISH COLLECTED IN SURVEYS CONDUCTED IN THREE TRIBUTARIES TO THE PEMIGEWASSET RIVER LOCATED IN SANBORNTON, NH 2005

COMMON NAME	SCIENTIFIC NAME	NUMBER COLLECTED		
		SALMON BROOK	WEEKS BROOK	KNOX BROOK
Brown bullhead	*Ameiurus nebulosus*	1	1	82
Blacknose dace	*Rhinichthys atratulus*	5	45	0
Burbot	*Lota*	0	1	5
Creek chub	*Semotilus atromaculatus*	0	1	11
White sucker	*Catostomus commersoni*	32	5	8
Brook trout	*Salvelinus fontinalis*	0	8	5
Fallfish	*Semotilus corporalis*	101	3	17
Golden shiner	*Notemigonus crysoleucas*	0	3	0
Largemouth bass	*Micropterus salmoides*	15	0	0
Longnose sucker	*Catostomus*	0	3	5
Longnose dace	*Rhinichthys cataractae*	48	0	0
Slimy sculpin	*Cottus cognatus*	0	34	52
Total		202	104	185

3.6 UPSTREAM FISH PASSAGE STANDARDS: DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
C	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

The U.S. Department of the Interior, Fish and Wildlife Service filed a Fishway Prescription for the Eastman Falls Project on January 23, 2017[19]. The Prescription calls for "… the Licensee shall be required to design fishway(s) at Eastman Falls Dam sufficient to pass available upstream migrating eels that arrive at the project into the maintstem of the Pemigewasset River in order to access the 14 miles of rearing habitat between Eastman Falls Dam and Ayers Island Dam. Because eels migrate downstream to the sea to complete their life cycle, the Licensee shall be required to provide downstream passage for eels. The goal for eel passage at Eastman Falls is for all eels seeking to go above or below the dam to do so safely, timely, and effectively".

In order to comply with the DOI Prescription, CRP developed a plan to install and operate an upstream fishway for American eel that will be operated annually from May 1 to October 30 (FERC approved plan attachment F)[20].

Develop a plan to annually implement downstream passage measures (interim measures will be implemented initially and eventually be replaced by permanent measures) for American eel from August 15 to November 15. Also develop and implement a fishway operation and maintenance plan and a fishway effectiveness monitoring plan. Please see attached Eel Passage Implementation Schedule that was filed with FERC on May 7, 2018[21] (Attachment F).

[19] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14476232
[20] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14913432
[21] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14911807

By letter filed January 23, 2017, Interior provided section 18 prescriptions that require CRP to provide upstream and downstream passage for American eel at the Eastman Falls dam, prepare a fishway operation and maintenance plan, and prepare a fishway effectiveness monitoring plan.

EASTMAN FALLS EEL PASSAGE IMPLEMENTATION SCHEDULE

May 3, 2018

In accordance with Section 12.6.1 of the Eastman Falls Modified Prescription, PSNH proposes the following detailed schedule for implementing timely construction, operation, maintenance, and measures for upstream and downstream eel passage, including studies and evaluations (Attachment F).

PLAN	DUE DATE	ADDITIONAL INFORMATION	OTHER
A Fishway Operations and Maintenance Plan (FOMP) to describe operation, maintenance, and emergency procedures for a yet undefined fish passage facility (submitted to resource agencies within 12 months of License effectiveness date)	January 1, 2019	FOMP to be signed by operations manager after review with operation personnel by December 31 of each year, provide an annual report detailing implementation of the FOMP, including any deviations from the FOMP	By March 15 of each year, the Licensee shall meet with the Service and MK River Tech Committee to discuss the FOMP and FEMP
A plan to provide and evaluate upstream eel passage (prepared in consultation with USFWS and filed with FERC within 6 months of License effectiveness[22] date of January 1, 2018)	Due June 30, 2018 – completed (3-21-2018)	Based on the results of the 2 years of collection data, a permanent location (or locations) will be determined by the Service and USFWS.	Permanent eel ramp(s) or ladder(s) will be operational by May 1, 2020.
A plan for interim downstream eel passage measures (implemented no later than August 15th, 2020)	Due December 31, 2019		

[22] Interior's modified prescription identifies deadlines for several items within a period of time after the *issuance* of the new FERC license (April 20, 2017). Article 401 keys these deadlines based upon the *effective* date of the license, which is January 1, 2018.

PLAN	DUE DATE	ADDITIONAL INFORMATION	OTHER
A plan to provide permanent downstream eel passage and protection at the Project (developed in consultation with resource agencies no later than January 1 of seventh year after upstream passage is operational {2025 if we assume eels are observed passing the Project this summer}),	Due January 1, 2025		
a Fishway Effectiveness Monitoring Plan (FEMP) to study effectiveness of downstream passage (due to FERC 6 months prior to establishment of permanent downstream passage measures [August 15th of the 8th calendar year documenting upstream passage])	Due February 15, 2025[23]	Licensee to submit yearly interim study reports to the Service by February 15 following each study year	Final study reports to be submitted to the Service within 6 months after study completion

FERC modified and approved the plan for evaluation of Upstream American eel passage on May 9, 2018[24].

October 30, 2018[25], FERC order 165 FERC ¶ 62,061 approved the American eel passage implementation schedule and amended Article 401 (a) due dates.

CRPNH submitted the annual upstream American eel passage survey report[26] to FERC on December 20, 2018, as well as the fishway operations and maintenance plan for American eel[27].

[23] Assuming eels are documented using upstream eel passage facilities in 2018.
[24] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14913432
[25] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15085936
[26] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15124718
[27] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15124711

3.7 DOWNSTREAM FISH PASSAGE AND PROTECTION STANDARDS: IMPOUNDMENT ZOE

CRITERION	STANDARD	INSTRUCTIONS
D	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is part of a Settlement Agreement or not. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

- See Upstream Fish Passage Standards – Impoundment ZOE.
- The most recent fish surveys (2005) were conducted through a joint venture between the USACE and NHF&G in several tributaries that discharge into the Eastman Falls Project impoundment (NHF&G 2005 *unpublished data*). Surveys of note due to their proximity to the Project were conducted in Salmon Brook (RM 119.5), Weeks Brook (RM 120.5), and Knox Brook (122.5) in the town of Sanbornton, NH. The result of these surveys is presented in Table 2. These surveys documented several species, in addition to those documented in earlier surveys conducted in the mainstem including blacknose dace, burbot, creek chub, brook trout, largemouth bass, longnose sucker, and longnose dace.
- Article 401 requires the licensee to file a plan for interim downstream eel passage within 9 months of the effective date of the license (due by October 1, 2018). Fishway prescription 13.2.1 requires that this plan be submitted on a schedule that allows for the interim passage to be operational by August 15 of the second calendar year after license issuance (by August 15, 2019). The licensee's Schedule proposes to file an interim downstream passage plan by December 31, 2019. However, this date was modified by FERC and a new date for implementation interim downstream eel passage measures is August 15, 2020[28].
- Article 401 requires the licensee to file a Permanent Downstream Passage Plan for American Eel within 9 years of the effective date of the license (due by January 1, 2027). Fishway prescription 13.2.2 requires the licensee to implement permanent downstream passage by August 15 of the eighth year after eels are first documented using upstream passage facilities. The licensee's Schedule proposes to file the plan by January 1, 2025[29].

Article 401 requires the licensee to file a Fishway Effectiveness Monitoring Plan (for downstream eel passage and protection measures) with the Commission within 6 months of the effective date of the license (due by July 1, 2018). Fishway prescription 13.3.1 requires, in part, that the licensee develop the Plan in consultation with the FWS, obtain approval of the Plan from the FWS, and file the Plan for Commission approval 6 months prior to the implementation date specified in Section 13.2.2. The licensee proposes to file the effectiveness plan with the Commission by February 15, 2025[30].

[28] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15085936
[29] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15085936
[30] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15085936

3.8 DOWNSTREAM FISH PASSAGE STANDARDS: DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
D	1	Not Applicable / De Minimis Effect: • Explain why the facility does not impose a barrier to downstream fish passage in the designated zone, considering both physical obstruction and increased mortality relative to natural downstream movement (e.g., entrainment into hydropower turbines). • For riverine fish populations that are known to move downstream, explain why the facility does not contribute adversely to the sustainability of these populations or to their access to habitat necessary for successful completion of their life cycles. • Document available fish distribution data and the lack of migratory fish species in the vicinity. • If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.

- Please see answer to Impoundment ZOE above, which describes downstream fish passage measures for the project. There are no barriers to downstream fish passage in the Downstream ZOE.

3.9 SHORELINE AND WATERSHED PROTECTION STANDARDS: IMPOUNDMENT& DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
E	1	Not Applicable / De Minimis Effect: • The facility is in compliance with all government agency recommendations in a license or certificate, such as an approved shoreline management plan or equivalent regarding protection, mitigation or enhancement of shoreline surrounding the project.

- No shoreline management requirements were recommended by agencies. The majority of the lands surrounding the Project boundary are managed by USACE, associated with the agency's operation of the Franklin Falls Flood Control Project.
- As required by Article 401 of the 2017 License Order and Condition E-12(a) of the Water Quality Certification (WQC) for the Eastman Falls Project, an Invasive Species Management and Monitoring Plan (ISMMP) was filed with FERC on May 4, 2018[31].
- Field surveys were completed within the Eastman Falls Project boundary during the peak growing season and included Project waters and lands for the approximate nine-mile segment of the Pemigewasset River, extending upstream to Sumner Island. A site visit was also conducted on July 13, 2015, with a representative of the New Hampshire Department of Environmental Services (NHDES) Exotic Species Program to verify milfoil findings. In addition to completing a reconnaissance survey of the impoundment shoreline, the field survey also investigated the developed areas near the Eastman Falls Facility and parking/recreation areas that could act as potential vectors and pathways for invasive species to enter and establish.
- Four terrestrial and one aquatic invasive species were documented in the Project impoundment. Terrestrial invasive species included: Japanese knotweed (Polygonum cuspidatum), multiflora rose (Rosa multiflora), purple loosestrife (Lythrum salicaria), and Autumn olive (Elaeagnus umbellata). Variable-leaf milfoil (milfoil) (Myriophyllum heterophyllum), was identified at five locations in shallow littoral habitats. The investigators also recorded 13 locations of Japanese knotweed patches above the waterline occurring in small discrete clusters.
- CRP will continue to maintain the existing facility foot-print which will include mowing of grasses and trimming of shrubs and herbaceous vegetation at the downstream recreational access facility and immediate areas adjacent to the existing structures. Project grounds will be maintained in a manner that includes decisions to prevent the introduction and spread of terrestrial exotic and invasive vegetation species. No terrestrial plants identified on the New Hampshire Department of Agriculture, Markets, and Food (NH Agriculture) Prohibited Invasive Plan Species List or those identified in the Invasive Plant Atlas of New England will be purposely planted within the bounds of the Eastman Falls Project.

[31] file:///J:/4494/003/Docs/LIHI%20Application/ISMP.pdf

3.10 THREATENED AND ENDANGERED SPECIES STANDARDS: IMPOUNDMENT ZOE

CRITERION	STANDARD	INSTRUCTIONS
F	1	Finding of No Negative Effects: • Identify all listed species in the facility area based on current data from the appropriate state and federal natural resource management agencies. • Provide documentation of a finding of no negative effect of the facility on any listed species in the area from an appropriate natural resource management agency.

In a letter dated June 22, 2016, Interior states that suitable habitat for the federally threatened northern long-eared bat exists within and adjacent to the project area. The Environmental Assessment found that, while there is northern long-eared bat habitat within and adjacent to the project area, northern long-eared bats are not known to inhabit the project area. In addition, there are no measures included in the FERC license that would affect northern long-eared bat habitat.

On November 8, 2018, a IPaC review was conducted to see if any updated species information was available for the project area. No new species were listed (Attachment D).

3.11 THREATENED AND ENDANGERED SPECIES STANDARDS: DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
F	1	Finding of No Negative Effects: • Identify all listed species in the facility area based on current data from the appropriate state and federal natural resource management agencies. • Provide documentation of a finding of no negative effect of the facility on any listed species in the area from an appropriate natural resource management agency.

- The brook floater (*Alasmidonta varicosa*) mussel is a freshwater riverine species known to occur downstream of the Eastman Falls Project dam. The brook floater is listed as an endangered species in the State of New Hampshire and further information on brook floater life history is detailed in Section 4.8 Rare, Threatened, and Endangered Species. Pursuant to the FERC approved RSP, PSNH performed a Brook Floater Mussel Study August 12-16, 2013.
- Brook floater specimens were found at several locations where suitable habitat was found. Brook floater was the second most abundant species collected during the survey while the numerically dominant species found was eastern elliptio (see Attachment F for Brook Floater Study Report)
- The project is operated as run-of-river, so no adverse effects are anticipated.
- No agency recommendations for protection or monitoring measures were identified in relicensing of the project.

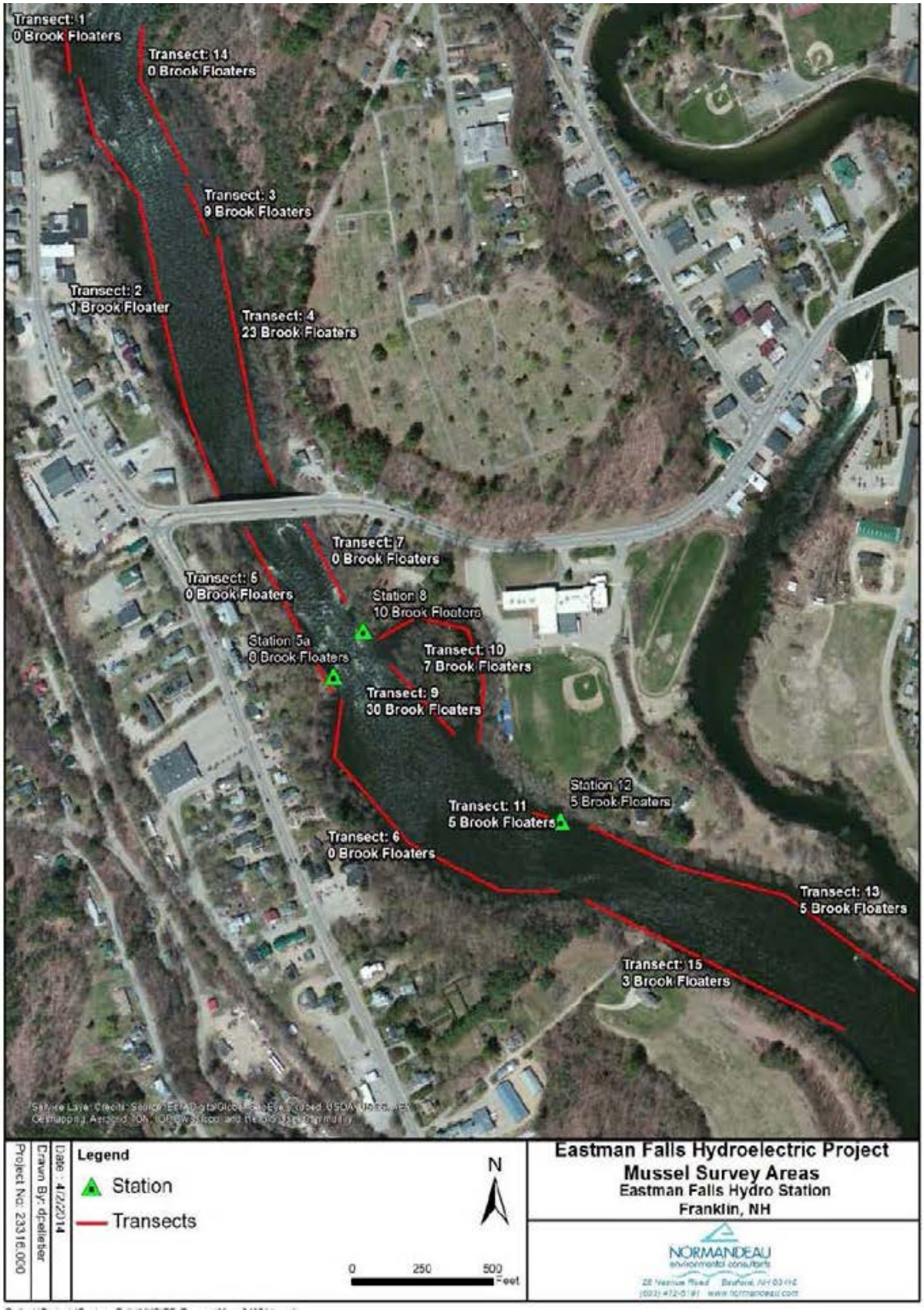


FIGURE 5 MUSCLE SURVEY AREA

3.12 CULTURAL AND HISTORIC RESOURCES STANDARDS: ALL ZOES

Criterion	*Standard*	*Instructions*
G	1	Not Applicable / De Minimis Effect: • Document that there are no cultural or historic resources located on facility lands that can be affected by construction or operations of the facility. • Document that the facility construction and operation have not in the past adversely affected any cultural or historic resources that are present on facility lands.

To protect cultural resources, Articles 405 and 406 of the FERC license requires CRP to consult with the New Hampshire State Historic Preservation Commission prior to implementing any project modifications not specifically authorized by the license, or if any unknown cultural resources are discovered during routing project operation.

The Eastman Falls dam was constructed as a power source in 1903 by the Pemigewasset Power Company. Powerhouse 1 was built in 1937, while Powerhouse 2, originally built in 1910, was retrofitted in 1983. By letter dated May 8, 2012, the New Hampshire SHPO indicated that the Eastman Falls facilities may be eligible for listing on the National Register. However, the New Hampshire SHPO concluded that issuing a license for the project would have "no potential to cause effects" on historic, architectural, or archaeological resources based on the applicant's proposal (See Attachment F). The FERC Environmental Assessment[32] concludes that because there are no known cultural resources within the project's area of potential effect and no changes to the project's features or operation are proposed, issuing a license for the project would have no adverse effect on historic properties.

While the project will have no adverse effect on known historic properties, cultural resources could be discovered during the course of operating or maintaining the project. If cultural resources are inadvertently discovered during construction or operation of the project, CRP must stop all land-disturbing activities and consult with the New Hampshire SHPO to determine the need for any cultural resource studies or measures. If no measures are needed, CRP must file documentation of its consultation.

[32] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14381615

No construction activities requiring land disturbing activities have occurred since the 2012 SHPO consultation and review.

3.13 RECREATIONAL RESOURCES STANDARDS: IMPOUNDMENT & DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
H	2	Agency Recommendation: • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

The Eastman Falls Project includes three recreation features: Eastman Falls recreation area ("park"), portage trail and the Franklin Public Boat Ramp. CRPNH operates and maintains the Eastman Falls Recreation Area and the portage trail while the City of Franklin operates and maintains the Franklin Public Boat Ramp.

To protect existing recreation opportunities at the project, the FERC license requires CRPNH to continue to operate and maintain project recreation facilities. Specifically, Article 404 of the FERC license requires the licensee to "provide public access to and ensure adequate operation and maintenance of the following recreation facilities: (1) the Eastman Falls Recreation Area, which includes a picnic area and boat launch; (2) the portage trail; and (3) the Franklin Public Boat Ramp, which includes parking and picnic areas".

In addition, the park provides parking and access for fisherman to fish along the Pemigewasset River for trout and salmon.

TABLE 3 SUMMARY OF RECREATION FACILITIES WITHIN THE PROJECT BOUNDARY

SITE NAME	FACILITIES	MANAGEMENT/OWNERSHIP
Eastman Falls Recreation Area	Picnic area, car-top put-in launch, paved parking lot	Project facility: lands owned and managed by CRP
Franklin Public Boat Ramp	Boat launch, dirt parking lot, picnic area	Project Facility: facilities owned and managed by City of Franklin
Portage	Portage trail	Project Facility: lands and facilities owned and managed by CRP
Franklin Falls Recreation Area – Shaw Cove Area	Boat launch, parking	USACE facility: located adjacent project boundary

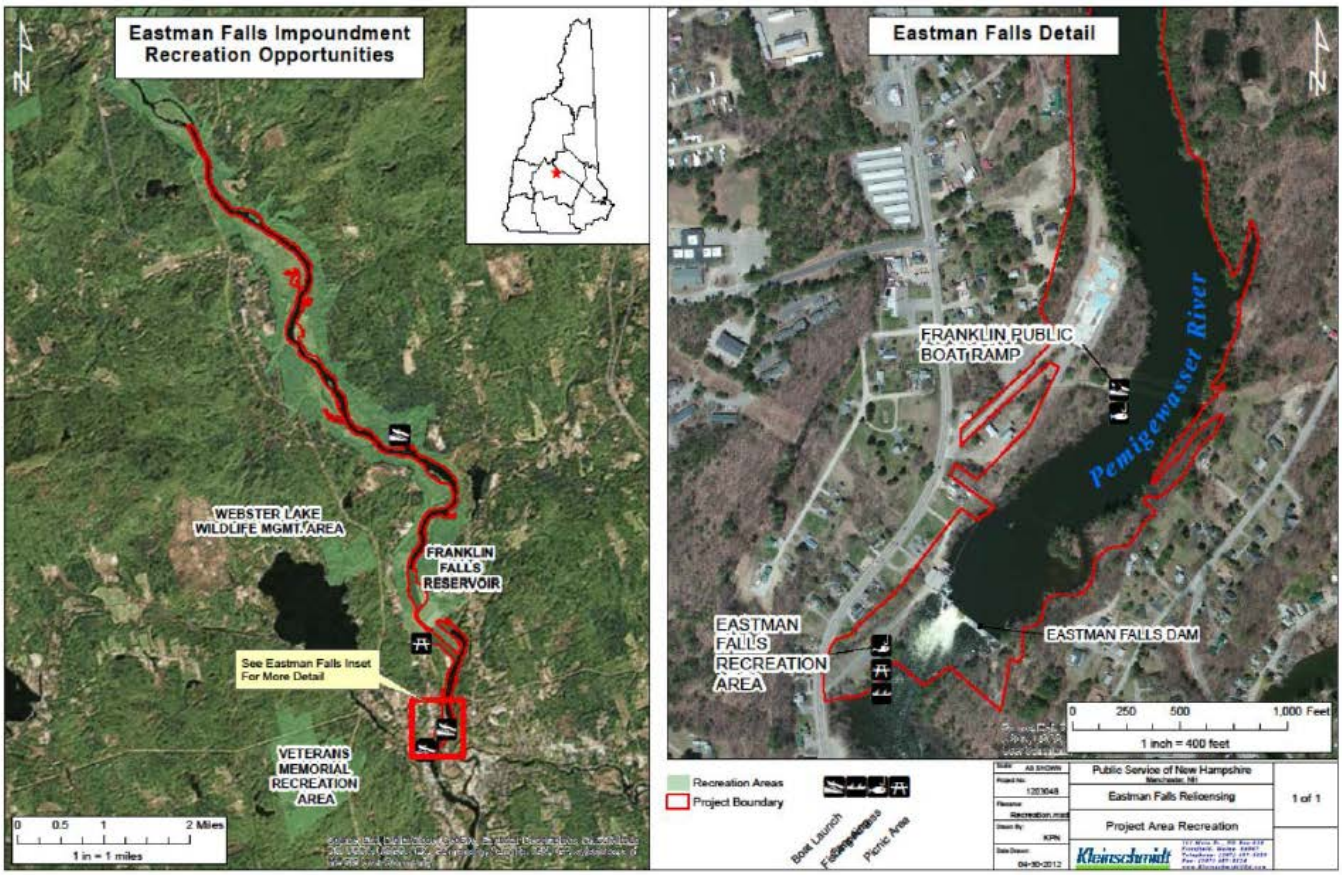


FIGURE 6 RECREATION FACILITIES WITHIN PROJECT BOUNDARY

4.0 CONTACTS FORMS

1. **All applications for LIHI Certification must include complete contact information to be reviewed.**

Project Owner:	
Name and Title	Todd, Wynn; CEO Portfolio Companies
Company	Hull Street Energy
Phone	301-664-7701
Email Address	twynn@hullstreetenergy.com
Mailing Address	4920 Elm Street, Suite 205 Bethesda, MD 20814
Consulting Firm / Agent for LIHI Program (if different from above):	
Name and Title	Andy Qua
Company	Kleinschmidt Associates
Phone	207-416-1246
Email Address	Andy.Qua@kleinschmidtgroup.com
Mailing Address	141 Main Street P.O. Box 650 Pittsfield, Maine 04967
Compliance Contact (responsible for LIHI Program requirements):	
Name and Title	Curtis R. Mooney; Manager, Regulatory Affairs
Company	Central Rivers Power
Phone	(603)744-8855 Ext. 2
Email Address	cmooney@centralriverspower.com
Mailing Address	59 Ayers Island Road Bristol, NH 03222
Party responsible for accounts payable:	
Name and Title	Ryan McQueeney; CFO, Portfolio Companies
Company	Hull Street Energy, LLC
Phone	(301)664-7702
Email Address	accounting@centralriverspower.com
Mailing Address	4920 Elm Street, Suite 205 Bethesda, MD 20814

2. Applicant must identify the most current and relevant state, federal, provincial, and tribal resource agency contacts (copy and repeat the following table as needed).

Agency Contact (Check area of responsibility: Flows_**X**_, Water Quality __, Fish/Wildlife Resources _**X**_, Watersheds _**X**_, T/E Spp. __, Cultural/Historic Resources __, Recreation _ _):	
Agency Name	United States Fish and Wildlife Service (USFWS)
Name and Title	Julianne Rosset; Fish & Wildlife Biologist
Phone	603-227-6436
Email address	julianne_rosset@fws.gov
Mailing Address	USFWS New England Field Office 70 Commercial Street, Suite 300 Concord, NH 03301
Agency Contact (Check area of responsibility: Flows_**X**_, Water Quality _**X**_, Fish/Wildlife Resources __, Watersheds _X_, T/E Spp. __, Cultural/Historic Resources __, Recreation _ _):	
Agency Name	New Hampshire Department of Environmental Services (NHDES)
Name and Title	Gregg Comstock, P.E.; Supervisor, Water Quality Planning Section
Phone	603-271-2983
Email address	gregg.comstock@des.nh.gov
Mailing Address	NH Department of Environmental Services 29 Hazen Drive, P.O. Box 95 Concord, NH 03302-0095

Agency Contact (Check area of responsibility: Flows_X_, Water Quality _X_, Fish/Wildlife Resources X__, Watersheds __, T/E Spp. _X_, Cultural/Historic Resources _ _, Recreation _X_):	
Agency Name	New Hampshire Fish and Game Department (NHFGD)
Name and Title	Carol Henderson; Environmental Review Coordinator
Phone	603-271-1138
Email address	Carol.Henderson@wildlife.nh.gov
Mailing Address	New Hampshire Fish and Game Department 11 Hazen Drive Concord, NH 03301

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _ _, Watersheds __, T/E Spp. _ _, Cultural/Historic Resources _**X**_, Recreation __):	
Agency Name	New Hampshire Division of Historical Resources
Name and Title	Nadine Miller; Deputy State Historic Preservation Officer
Phone	603-271-6628
Email address	Nadine.Miller@dcr.nh.gov
Mailing Address	NH Division of Historical Resources 19 Pillsbury Street – 2nd Floor Concord, NH 03301-3570

Agency Contact (Check area of responsibility: Flows_X_, Water Quality __, Fish/Wildlife Resources _ _, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	Federal Energy Regulatory Commission
Name and Title	John Spain; Regional Engineer
Phone	212-273-5900
Email address	John.Spain@ferc.gov
Mailing Address	19West 34th Street Suite 400 New York, NY 1001-3006

5.0 SWORN STATEMENT

Sworn Statement and Waiver Form

All applications for LIHI Certification must include the following sworn statement before they can be reviewed by LIHI:

SWORN STATEMENT

As an Authorized Representative of CRP NH Eastman, LLC, the Undersigned attests that the material presented in the application is true and complete.

The Undersigned acknowledges that the primary goal of the Low Impact Hydropower Institute's Certification Program is public benefit, and that the LIHI Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions.

The undersigned further acknowledges that if certification of the applying facility is issued, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified.

The undersigned Applicant further agrees to hold the Low Impact Hydropower Institute, the Governing Board and its agents harmless for any decision rendered on this or other applications, from any consequences of disclosing or publishing any submitted certification application materials to the public, or on any other action pursuant to the Low Impact Hydropower Institute's Certification Program.

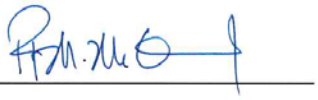
PLEASE INSERT ONLY FOR PRE-OPERATIONAL CERTIFICATIONS (See Section 4.5.3):

For applications for pre-operational certification of a "new" facility the applicant must also acknowledge that the Institute may suspend or revoke the certification should the impacts of the project, once operational, fail to comply with the certification criteria.

Company Name: CRP NH Eastman, LLC

Authorized Representative Name: Ryan McQueeney

Title: CFO

Authorized Signature: 

Date: January 15, 2019

LIHI Handbook 2nd Edition - Updated: July 20, 2016 p. 68

APPENDIX A

PROJECT ZOE, DRAWINGS, AND PHOTOS

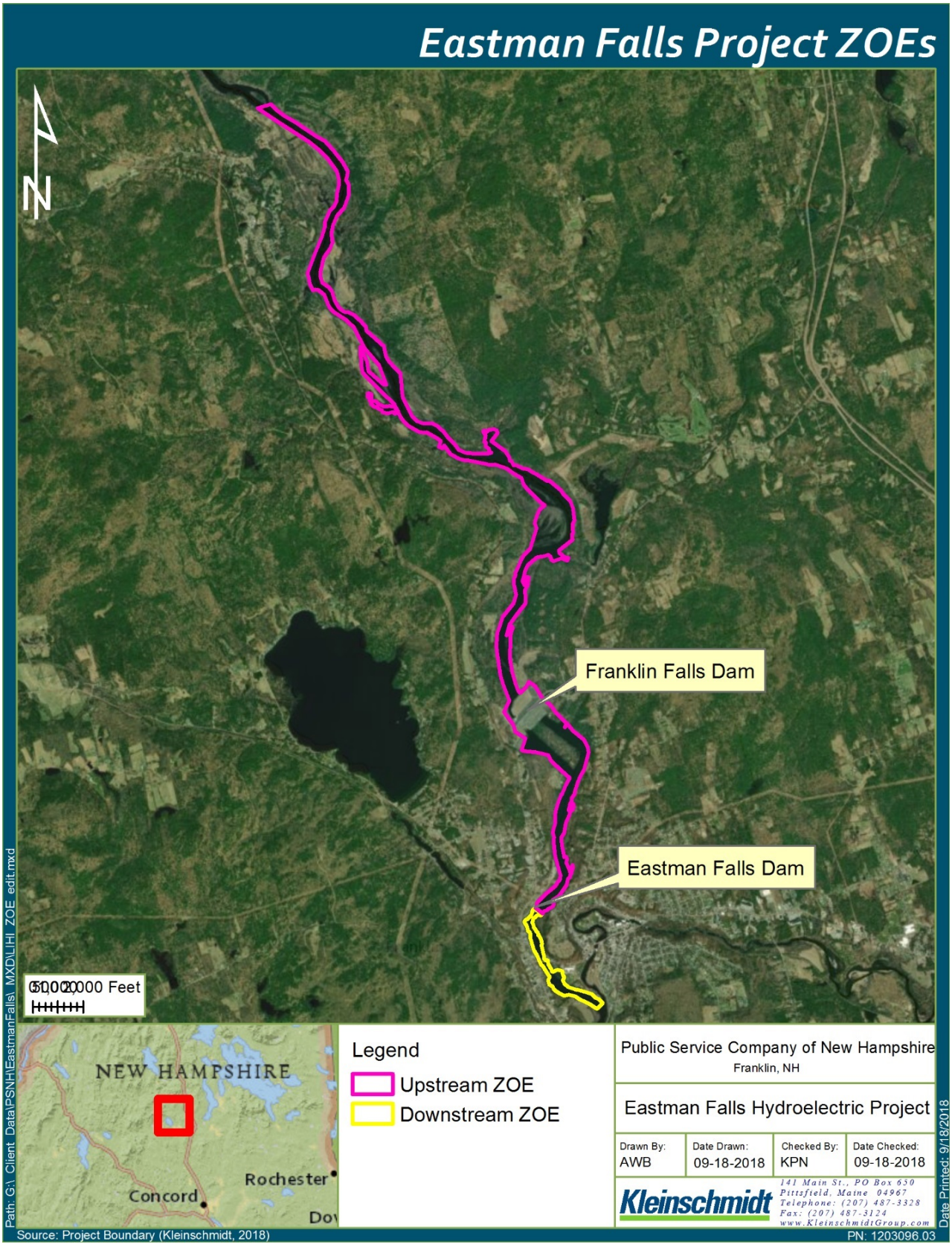


FIGURE 7 ZONES OF EFFECT

FIGURE 8 DOWNSTREAM ZONES OF EFFECT

PHOTO 2 OVERVIEW OF EASTMAN FALLS PROJECT

PHOTO 3 EASTMAN FALLS PROJECT LOOKING DOWNSTREAM

PHOTO 4 EASTMAN FALLS PROJECT LOOKING TOWARD THE DAM FROM UPSTREAM

PHOTO 5 VIEW OF THE DAM, WASTEGATE AND POWERHOUSE

PROJECT DRAWINGS (CEII)

NOT INCLUDED IN PUBLIC VERSION

(THIS MATERIAL IS CRITICAL ENERGY INFRASTRUCTURE INFORMATION (CEII)).
MEMBERS OF THE PUBLIC MAY OBTAIN NONPUBLIC OR PRIVILEGED INFORMATION BY SUBMITTING A FREEDOM OF INFORMATION ACT (FOIA) REQUEST.
SEE WWW.FERC.GOV/LEGAL/CEII-FOIA.ASP FOR MORE INFORMATION.)

APPENDIX B

FACILITY AREA AND RIVER BASIN

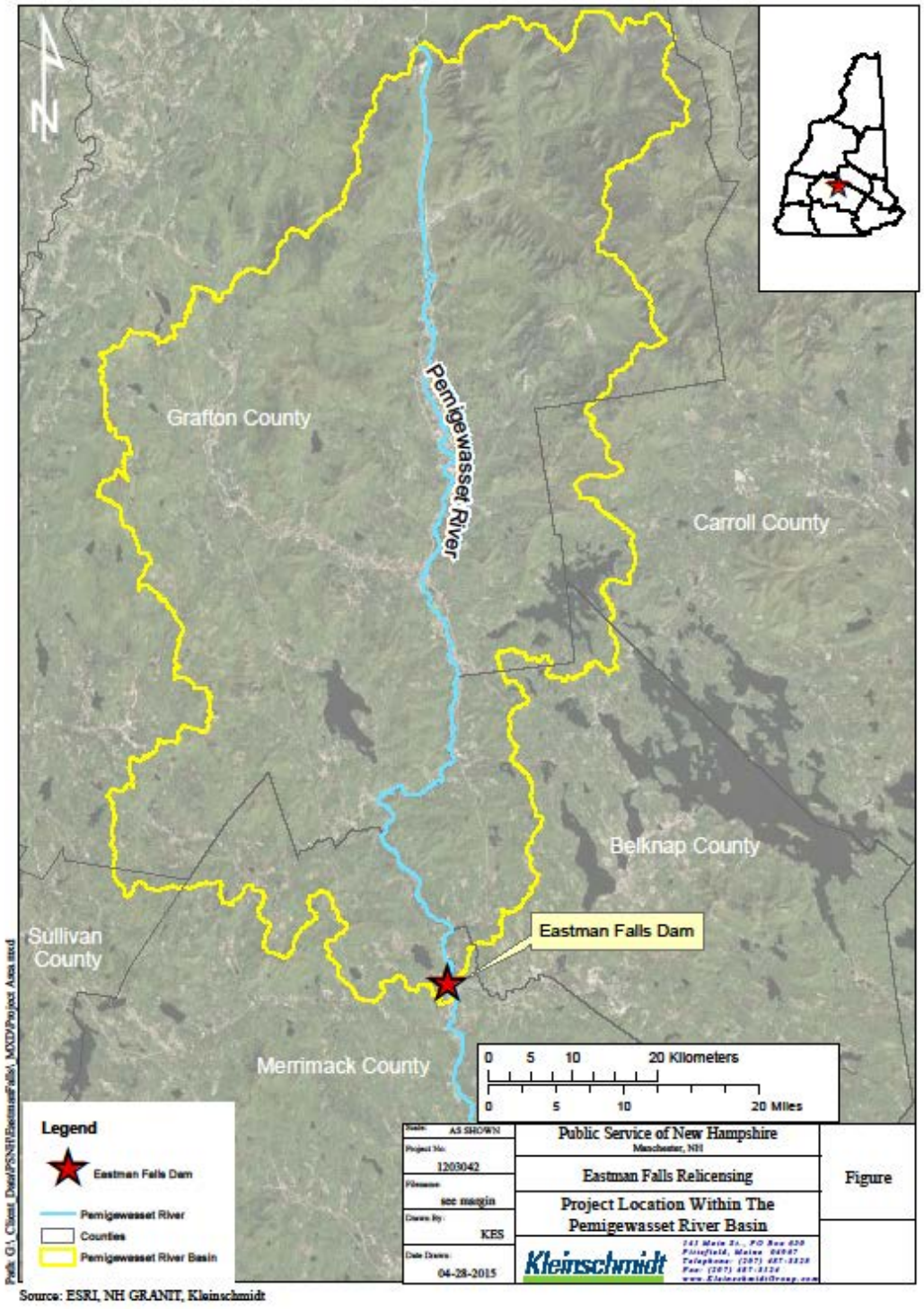


FIGURE 9 PEMIGEWASSET RIVER BASIN

APPENDIX C

WATER QUALITY CERTIFICATION

Public Service Company of New Hampshire
D/b/a Eversource
William H. Smagula
Vice President of Generation
780 North Commercial Street, P.O. Box 330
Manchester, NH 03105-0330

WATER QUALITY CERTIFICATION

In Fulfillment of

Section 401 of the United States Clean Water Act (33 U.S.C 1341) and NH RSA 485-A:12, III and NH RSA 485-A:12, IV

WQC # 2016-FERC-001

Activity Name	Eastman Falls Hydropower Project (FERC No. 2457; NH Dam No.087.10)
Activity Location	Franklin, Hill, Sanbornton, and New Hampton, NH
Affected Surface waters	Pemigewasset River, Winnipesaukee River, Merrimack River (see section D-4 for specific waterbodies)
Owner/Applicant	Public Service Company of New Hampshire D/b/a Eversource 780 North Commercial Street Manchester, NH 03105
Applicable Federal permit(s)	Federal Energy Regulatory Commission (FERC) Order Granting New License (FERC No. 2457)
Date of Approval (subject to conditions below)	December 15, 2016

A. INTRODUCTION

Public Service Company of New Hampshire D/b/a Eversource (Applicant) is proposing to continue the operation of the Eastman Falls Hydroelectric Project (Dam) located on the Pemigewasset River in Franklin, Hill, Sanbornton and New Hampton, New Hampshire as a hydroelectric project (Activity). A more complete description of the Activity is provided in Finding D-1 of this Certification.

This 401 Water Quality Certification (401 WQC or Certification) documents laws, regulations, determinations and conditions related to the Activity for the attainment and maintenance of NH surface water quality standards, including the provisions of NH RSA 485-A:8 and NH Code of Administrative Rules Env-Wq 1700, for the support of designated uses identified in the standards.

B. 401 CERTIFICATION APPROVAL

Based on the facts, findings and conditions noted below, the New Hampshire Department of Environmental Services (NHDES or DES) has determined that there is reasonable assurance that construction and operation of the Activity will not violate surface water quality standards. NHDES hereby issues this Certification, subject to the conditions in Section E of this Certification, in accordance with Section 401 of the United States Clean Water Act (33 U.S.C. 1341), RSA 485-A:12,III.

C. STATEMENT OF FACTS AND LAW

C-1. Section 401 of the United States Clean Water Act (33 U.S.C. 1341) states, in part: "Any applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate...that any such discharge will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of this title.....No license or permit shall be granted until the certification required by this section has been obtained or has been waived...No license or permit shall be granted if certification has been denied by the State..."

C-2. §401(d) of the CWA provides that: "Any certification provided under this section [401] shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with [enumerated provisions of the CWA]...and with any other appropriate requirement of State law set forth in such certification, and shall become a condition on any Federal license or permit subject to the provisions of this section."

According to EPA 401 Guidance[1], "Under § 401(d) the water quality concerns to consider and the range of potential conditions available to address those concerns, extend to any provision of state or tribal law relating to the aquatic resource. Considerations can be quite broad so long as they relate to water quality. The U.S. Supreme Court has stated that, once the threshold of a discharge is reached (necessary for § 401 certification to be applicable), the conditions and limitations in the certification may address the permitted activity as a whole."[2]

C-3. NH RSA 485-A:12, III, states: "No activity, including construction and operation of facilities, that requires certification under section 401 of the Clean Water Act and that may result in a discharge, as that term is applied under section 401 of the Clean Water Act, to surface waters of the state may commence unless the

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[1] *Clean Water Action Section 401 Water Quality Certification: A Water Quality Protection Tool for States and Tribes*. U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds. 2010.

[2] *PUD No. 1 of Jefferson County v. Washington Department of Ecology*, 511 U.S. 700, 712 (1994).

department certifies that any such discharge complies with the state surface water quality standards applicable to the classification for the receiving surface water body. The department shall provide its response to a request for certification to the federal agency or authority responsible for issuing the license, permit, or registration that requires the certification under section 401 of the Clean Water Act. Certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide assurance that the proposed discharge complies with applicable surface water quality standards. The department may enforce compliance with any such conditions, modifications, or monitoring requirements as provided in RSA 485-A:22."

C-4. NH RSA 485-A: IV states: "No activity that involves surface water withdrawal or diversion of surface water that requires registration under RSA 488:3, that does not otherwise require the certification required under paragraph III, and which was not in active operation as of the effective date of this paragraph, may commence unless the department certifies that the surface water withdrawal or diversion of surface water complies with state surface water quality standards applicable to the classification for the surface water body. The certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide reasonable assurance that the proposed activity complies with applicable surface water quality standards."

C-5. NH RSA 485-A:8 and Env-Wq 1700 (Surface Water Quality Regulations), together fulfill the requirements of Section 303 of the Clean Water Act that the State of New Hampshire adopt water quality standards consistent with the provisions of the Act.

C-6. Env-Wq 1701.02, entitled "Applicability", states that:

"(a) These rules shall apply to all surface waters.
(b) These rules shall apply to any person who causes point or nonpoint source discharge(s) of pollutants to surface waters, or who undertakes hydrologic modifications, such as dam construction or water withdrawals, or who undertakes any other activity that affects the beneficial uses or the level of water quality of surface waters."

C-7. Env-Wq 1703.01 Water Use Classifications.

(a) State surface waters shall be divided into class A and class B, pursuant to RSA 485-A:8, I, II and III. Each class shall identify the most sensitive use which it is intended to protect.

(b) All surface waters shall be restored to meet the water quality criteria for their designated classification including existing and designated uses, and to maintain the chemical, physical, and biological integrity of surface waters.

(c) All surface waters shall provide, wherever attainable, for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters.

(d) Unless the flows are caused by naturally occurring conditions, surface water quantity shall be maintained at levels adequate to protect existing and designated uses.

C-8. Env-Wq 1702.46 defines surface waters as "surface waters of the state" as defined in NH RSA 485-A:2, XIV and waters of the United States as defined in 40 CFR 122.2.

NH RSA 485-A:2, XIV defines "surface waters of the state" as "perennial and seasonal streams, lakes, ponds and tidal waters within the jurisdiction of the state, including all streams, lakes, or ponds bordering on the state, marshes, water courses and other bodies of water, natural or artificial."

40 CFR 122.2 defines "waters of the United States".

C-9. NH RSA 482-A:2, X. defines "Wetlands" as "[a]n area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

C-10. Env-Wq 1702.06 states "Best management practices" means those practices which are determined, after problem assessment and examination of all alternative practices and technological, economic and institutional considerations, to be the most effective practicable means of preventing or reducing the amount of pollution generated by point or nonpoint sources to a level compatible with water quality goals."

C-11. Env-Wq 1702.07 "Biological Integrity" means the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.

C-12. Env-Wq 1702.17 "Designated uses" means those uses specified in water quality standards for each water body or segment whether or not such uses are presently occurring. Based on a review of RSA 485-A:8 and Env-Wq 1700, and as reported in the New Hampshire Consolidated Assessment and Listing Methodology[3], designated uses include Aquatic Life, Fish and Shellfish Consumption, Primary and Secondary Contact Recreation, Drinking Water After Adequate Treatment and Wildlife.

C-13. Env-Wq 1702.18 defines a discharge as:

"a. The addition, introduction, leaking, spilling, or emitting of a pollutant to surface waters, either directly or indirectly through the groundwater, whether done intentionally, unintentionally, negligently, or otherwise; or
b. The placing of a pollutant in a location where the pollutant is likely to enter surface waters."

[3] See http://des.nh.gov/organization/divisions/water/wmb/swqa/2012/index.htm

C-14. Env-Wq 1702.23 defines "Existing uses" as "those uses, other than assimilation waste transport, which actually occurred in the water body on or after November 28, 1975, whether or not they are included in the water quality standards."

C-15. Env-Wq 1702.34 defines "Nuisance species" as "...any species of flora or fauna living in or near the water whose noxious characteristics or presence in sufficient number or mass prevent or interfere with a designated use of those surface waters."

C-16. Env-Wq 1702.39 defines a pollutant as: "pollutant" as defined in 40 CFR 122.2. This means "dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water."

C-17. The term "discharge", as applied under section 401 of the Clean Water Act means the potential for a discharge. It does not need to be a certainty, only that it may occur should the federal license or permit be granted. Further, the discharge does not need to involve the addition of pollutants (such as water released from the tailrace of a dam). As the U.S. Supreme Court has stated "[w]hen it applies to water, 'discharge' commonly means a 'flowing or issuing out'" and an addition of a pollutant is not "fundamental to any discharge" [4].

C-18. Env-Wq 1703.03 entitled "General Water Quality" includes the following:

(c) (1) All surface waters shall be free from substances in kind or quantity which:

a. Settle to form harmful deposits;
b. Float as foam, debris, scum or other visible substances;
c. Produce odor, color, taste or turbidity which is not naturally occurring and would render it unsuitable for its designated uses;
d. Result in the dominance of nuisance species; or
e. Interfere with recreational activities.

C-19. Env-Wq 1703.07 entitled "Dissolved Oxygen" states the following:

"(a) Class A waters shall have a dissolved oxygen content of at least 75% saturation, based on a daily average, and an instantaneous minimum of at least 6 mg/l at any place or time except as naturally occurs.

(b) Except as naturally occurs, or in waters identified in RSA 485-A:8, III, or subject to (c), below,class B waters shall have a dissolved oxygen content of at

[4] Information in this paragraph is from page 4 of the following guidance document: *Clean Water Action Section 401 Water Quality Certification: A Water Quality Protection Tool for States and Tribes*. U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds. 2010. The Supreme Court case that is referred to is *S.D. Warren Co. v. Maine Board of Environmental Protection et al*, 547 U.S. 370, 126 S. Ct. 1853 (2006).

least 75% of saturation, based on a daily average, and an instantaneous minimum dissolved oxygen concentration of at least 5 mg/l.

(c) For the period from October 1st to May 14th, in areas identified by the fish and game department as cold water fish spawning areas of species whose early life stages are not directly exposed to the water, the 7 day mean dissolved oxygen concentration shall be at least 9.5 mg/l and the instantaneous minimum dissolved oxygen concentration shall be at least 8 mg/l. This period shall be extended to June 30 for a particular waterbody if the fish and game department determines it is necessary to protect spring spawners or late hatches of fall spawners, or both.

(d) Unless naturally occurring or subject to (a), above, surface waters within the top 25 percent of depth of thermally unstratified lakes, ponds, impoundments and reservoirs or within the epilimnion shall contain a dissolved oxygen content of at least 75 percent saturation, based on a daily average and an instantaneous minimum dissolved oxygen content of at least 5 mg/l. Unless naturally occurring, the dissolved oxygen content below those depths shall be consistent with that necessary to maintain and protect existing and designated uses."

C-20. Env-Wq 1703.08 through 1703.11 contain standards relative to bacteria, benthic deposits, oil and grease, and turbidity.

C-21. Env-Wq 1703.13 entitled "Temperature", states the following:

"(a) There shall be no change in temperature in class A waters, unless naturally occurring.
(b) Temperature in class B waters shall be in accordance with RSA 485-A:8, II, and VIII.

NH RSA-A:8,II states the following for Class B waters "[A]ny stream temperature increase associated with the discharge of treated sewage, waste or cooling water, water diversions, or releases shall not be such as to appreciably interfere with the uses assigned to this class."

NH RSA-A:8,VIII states the following: "In prescribing minimum treatment provisions for thermal wastes discharged to interstate waters, the department shall adhere to the water quality requirements and recommendations of the New Hampshire fish and game department, the New England Interstate Water Pollution Control Commission, or the United States Environmental Protection Agency, whichever requirements and recommendations provide the most effective level of thermal pollution control."

C-22. Env-Wq 1703.14, entitled "Nutrients", states that

"a. Class A waters shall contain no phosphorous or nitrogen unless naturally occurring.
b. Class B waters shall contain no phosphorous or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring.

c. Existing discharges containing either phosphorous or nitrogen which encourage cultural eutrophication shall be treated to remove phosphorus or nitrogen to ensure attainment and maintenance of water quality standards.
d. There shall be no new or increased discharge of phosphorous into lakes or ponds.
e. There shall be no new or increased discharge(s) containing phosphorous or nitrogen to tributaries of lakes or ponds that would contribute to cultural eutrophication or growth of weeds or algae in such lakes and ponds."

C-23. Env-Wq 1703.18, entitled "pH", states that

"(a) The pH of Class A waters shall be as naturally occurs.
(b) The pH of Class B waters shall be 6.5 to 8.0, unless due to natural causes.
(c) The pH of waters identified in RSA 485-A:8, III shall be 6.0 to 9.0, unless due to natural causes."

C-24. Env-Wq 1703.19, entitled "Biological and Aquatic Community Integrity", states that

"a. The surface waters shall support and maintain a balanced, integrated and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region; and
b. Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function."

C-25. Env-Wq 1703.21 (a)(1) states that "Unless naturally occurring or allowed under part Env-Wq 1707, all surface waters shall be free from toxic substances or chemical constituents in concentrations or combinations that injure or are inimical to plants, animals, humans or aquatic life."

C-26. Antidegradation provisions are included in Env-Wq 1702 and Env-Wq 1708.

a. Env-Wq 1702.02 states that "Antidegradation" means a provision of the water quality standards that maintains and protects existing water quality and uses.
b. Env-Wq 1708.02 states that "Antidegradation shall apply to: (a) Any proposed new or increased activity, including point source and nonpoint source discharges of pollutants, that would lower water quality or affect the existing or designated uses;(b) Any proposed increase in loadings to a waterbody when the proposal is associated with existing activities; (c) Any increase in flow alteration over an existing alteration; and (d) Any hydrologic modifications, such as dam construction and water withdrawals."
c. Antidegradation applies to all parameters as evidenced by Env-Wq 1708.08 (a) (Assessing Waterbodies) which states " The applicant shall characterize the existing water quality and determine if there is remaining assimilative capacity for each parameter in question."
d. According to Env-Wq 1708.04 (b), "A proposed discharge or activity shall not eliminate any existing uses or the water quality needed to maintain and protect those uses".

e. Env-Wq 1702.03 states that "Assimilative capacity" means the amount of a pollutant or pollutants that can safely be released to a waterbody without causing violations of applicable water quality criteria or negatively impacting uses.
f. Env-Wq 1708.08 describes the process for assessing waterbodies to determine if there is remaining assimilative capacity for each parameter in question.
g. Env-Wq 1708.09 Significant or Insignificant Determination states :(a) Any discharge or activity that is projected to use 20% or more of the remaining assimilative capacity for a water quality parameter, in terms of either concentration or mass of pollutants, or volume or flow rate for water quantity, shall be considered a significant lowering of water quality. The department shall not approve such a discharge or activity unless the applicant demonstrates that the proposed lowering of water quality is necessary to achieve important economic or social development, in accordance with Env-Wq 1708.10, in the area where the waterbody is located.
h. Env-Wq 1708.01 (b) states: "For significant changes in water quality, where the quality of the surface waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality shall be maintained and protected unless the department finds, after full satisfaction of the intergovernmental coordination and public participation provisions that, in accordance with Env-Wq 1708.10, allowing lower water quality is necessary to accommodate important economic or social development in the area in which the surface waters are located. In allowing such degradation or lower water quality, the department shall assure water quality adequate to fully protect existing uses. Further, the department shall assure that the highest statutory and regulatory requirements shall be achieved for all new and existing point sources and that all cost effective and reasonable best management practices for nonpoint source control shall be implemented".
i. Env-Wq 1708.01 (c) states: "For insignificant changes in water quality, where the quality of the surface waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality shall be maintained and protected. In allowing such degradation or lower water quality, the department shall assure water quality adequate to protect existing uses fully. Further, the department shall assure that the highest statutory and regulatory requirements shall be achieved for all new and existing point sources and that all cost effective and reasonable best management practices for nonpoint source control shall be implemented".

C-27. Env-Wq 1708.05 entitled "Protection of Water Quality in ORW" states that

> "(a) Surface waters of national forests and surface waters designated as natural under NH RSA 483:7-a, I, shall be considered outstanding resource waters (ORW).
> (b) Water quality shall be maintained and protected in surface waters that constitute ORW, except that some limited point and nonpoint source discharges may be allowed providing that they are of limited activity which results in no more than temporary and short-term changes in

water quality. "Temporary and short term" means that degradation is limited to the shortest possible time. Such activities shall not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses in the ORW. Such temporary and short term degradation shall only be allowed after all practical means of minimizing such degradation are implemented."

C-28. Env-Wq 1708.07 entitled "Protection of Water Quality in High Quality Waters" states that

"(a) Subject to (b) below, high quality waters shall be maintained and protected, except that insignificant changes in water quality, as determined by the department in accordance with Env-Wq 1708.09, shall be allowed.
(b) Degradation of significant increments of water quality, as determined in accordance with Env-Wq 1708.09, in high quality waters shall be allowed only if it can be demonstrated to the department, in accordance with Env-Wq 1708.10, that allowing the water quality degradation is necessary to accommodate important economic or social development in the area in which the receiving waters are located.
(c) Economic/social benefits demonstration and alternatives analysis shall not be required for authorization of an insignificant lowering of water quality. However, in allowing a lowering of water quality, significant or insignificant, all reasonable measures to minimize degradation shall be used.
(d) If the water body is Class A Water, the requirements of Env-Wq 1708.06 shall also apply."

C-29. RSA 483 regarding Designated Rivers, states the following:

RSA 483:4, XVIII. "River corridor" means the river and the land area located within a distance of 1,320 feet of the normal high water mark or to the landward extent of the 100 year floodplain as designated by the Federal Emergency Management Agency, whichever distance is larger.

RSA 483:8-a, III. The duties of such committees shall be:
(a) To advise the commissioner, the advisory committee, the municipalities through which the designated river or segment flows, and municipalities within tributary drainage areas on matters pertaining to the management of the river or segment and tributary drainage areas. Municipal officials, boards, and agencies shall inform such committees of actions which they are considering in managing and regulating activities within designated river corridors.
(b) To consider and comment on any federal, state, or local governmental plans to approve, license, fund or construct facilities that would alter the resource values and characteristics for which the river or segment is designated.

RSA 483:10-b. Withholding of Section 401 Certification. – The general court finds that the development of any dam or channel alteration activities within a natural river or segment or the development of any new dam within a rural or

community river or segment, except as provided in RSA 483:9-a, II and RSA 483:9-b, II, will alter the physical and chemical characteristics of that river and will constitute violation of the water quality standards established under RSA 485-A:8. The commissioner shall deny certification of any federally licensed or permitted activity on such designated rivers or segments under section 401 of the Federal Water Pollution Control Act, P.L. 92-500, as amended.

RSA 483:12-a State Action; Notification of Rivers Coordinator; Petition for Review

I. Any state agency considering any action affecting any river or segment designated under this chapter shall notify the rivers coordinator prior to taking any such action. Such agency shall forward to the rivers coordinator for review and comment copies of all notices of public hearings, or, where a public hearing is not required, a copy of the application for issuance of a permit, certificate, or license within the designated river or corridor under RSA 485-C, RSA 485-A, RSA 483-B, RSA 12-E, RSA 270:12, RSA 482, RSA 482-A, RSA 149-M, RSA 430, or RSA 147-A. If an agency is notified by the rivers coordinator that a proposed activity would violate a protection measure under RSA 483:9, 483:9-a, 483:9-aa, or 483:9-b, such agency shall deny the application.

C-30. NH RSA 488:3 regarding registration of withdrawals and discharges states the following:

I. No person shall withdraw or discharge a cumulative amount of more than 20,000 gallons of water per day, averaged over any 7-day period, or more than 600,000 gallons of water over any 30-day period, at a single real property or place of business without registering the withdrawal or discharge with the department. Transfers of such volume of water shall also be registered. Registration shall be in addition to any required permits.

II. No registration shall be transferred to another person without written notification to the commissioner.

C-31. NH RSA 485:61 regarding Rules for Water Conservation, states the following:

"I. The department shall adopt rules, pursuant to RSA 541-A, for water conservation practices for water users. These rules shall strike a reasonable balance between environmental, energy, and economic impacts and be consistent with current industry standards and practices for different types of water users.

II. The water conservation rules in paragraph I of this section shall apply to all new permit applicants and applications for water withdrawals subject to the provisions of RSA 485:3, RSA 485:48, RSA 485-C:21 and section 401 of the Clean Water Act.

III. Water conservation rules shall be consistent with applicable state or federal rules and regulations. Water Conservation Rules were adopted May 14, 2005 codified as Env-Wq 2101."

C-32. Env-Wq 2101.24 entitled "Water Conservation Plan Required", states that

> "(a) The applicants for approval of a source that would be a conservation source shall submit a water conservation plan that demonstrates compliance with the applicable provisions of Env-Wq 2101.05 through Env-Wq 2101.22 in accordance with the following:"
>
> > "(5) For a new withdrawal from a surface water associated with a project requiring a 401 Water Quality Certification, the water conservation plan shall be submitted prior to or in conjunction with the application for a 401 Water Quality Certification pursuant to Section 401 of the federal Clean Water Act;
> > (6) For a new withdrawal from a surface water that requires water quality certification pursuant to RSA 485-A:12, IV, the water conservation plan shall be submitted prior to or in conjunction with the certification request".

Env-Wq 2101.23, entitled Waivers, allows DES to grant waivers of certain provisions in Env-Wq 2101 provided the person requesting the waiver submits a written request to DES that includes the information specified in Env-Wq 2101.23(d).

C-33. In 2010, DES published guidance (hereinafter called the 2010 instream flow guidance or 2010 ISF guidance) for estimating instream flow requirements for the protection of aquatic life for situations. The guidance is available at: http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-3.pdf.

C-34. Section 303(d) of the Clean Water Act (33 U.S.C. 1313(d)) and the regulations promulgated thereunder (40 C.F.R. 130.0 – 40 C.F.R. 130.11) require states to identify and list surface waters that are violating state water quality standards (i.e., Section 303(d) List) that do not have an approved TMDL. For these water quality-impaired waters, states must establish Total Maximum Daily Loads (TMDLs) for the pollutants causing the impairments and submit the list of impaired surface waters and TMDLs to EPA for approval. TMDLs include source identification, determination of the allowable load and pollutant reductions (by source) necessary to meet the allowable load. Once a TMDL is conducted, the pollutant/surface water is transferred to the list of impaired waters with approved TMDLs (known as Category 4A waters). The Section 303(d) List is, therefore, a subset of all impaired waters. The most recent Section 303(d) list of impaired waters is the 2014 Section 303(d) List. A list of all impaired waters is available at http://www2.des.state.nh.us/WaterShed_SWQA/WaterShed_SWQA.aspx

C-35. On December 20, 2007, EPA approved the Northeast Regional Mercury TMDL[5] which addressed mercury impairments in all New Hampshire fresh surface waters.

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[5] Northeast Regional Mercury Total Maximum Daily Load. Connecticut Department of Environmental Protection, Maine Department of Environmental Protection, Massachusetts Department of Environmental Protection, New Hampshire Department of Environmental Services, New York Stated Department of Environmental Conservation, Rhode Island Department of Environmental Management, Vermont Department of Environmental

C-36. When a surface water does not meet water quality standards (i.e., when it is impaired), the addition of pollutants causing or contributing to impairment is prohibited in accordance with the following:

Env-Wq 1703.03 (a) states that "The presence of pollutants in the surface waters shall not justify further introduction of pollutants from point or nonpoint sources, alone or in any combination".

NH RSA 485-A:12 (I) (Enforcement of Classification) states that "After adoption of a given classification for a stream, lake, pond, tidal water, or section of such water, the department shall enforce such classification by appropriate action in the courts of the state, and it shall be unlawful for any person or persons to dispose of any sewage, industrial, or other wastes, either alone or in conjunction with any other person or persons, in such a manner as will lower the quality of the waters of the stream, lake, pond, tidal water, or section of such water below the minimum requirements of the adopted classification".

C-37. Pursuant to Section 23(b)(1) of the Federal Power Act (FPA), §817(1), a non-federal hydroelectric project must (unless it has a still-valid pre-1920 federal permit) be licensed if it: (1) is located on a navigable water of the United States; (2) occupies lands of the United States; (3) utilizes surplus water or water power from a government dam; or (4) is located on a stream over which Congress has Commerce Clause jurisdiction, is constructed or modified on or after August 26, 1935, and affects the interests of interstate or foreign commerce.

C-38. On December 21, 2015 the NHDES received an Application for Water Quality Certification for the Activity dated December 18, 2015. The application included a copy of the final license application[6,7] filed by the Applicant with FERC.

C-39. On June 22, 2016, the U.S. Department of Interior (USDI) issued preliminary comments, recommendations, and prescriptions for the Activity to FERC to prevent loss of, or damage to, fish and wildlife resources, and to otherwise carry out the purposes of the Fish and Wildlife Coordination Act [7]. On June 28, 2016, the New Hampshire Fish and Game Department (NHFGD) filed a letter with FERC supporting the USDI letter of June 22, 2016 [7].

C-40. On October 24, 2016, FERC issued their Environmental Assessment (EA)[7] for public comment.

C-41. NHDES issued a draft section 401 Water Quality Certification for public comment from October 31, 2016 to December 2, 2016. Comments were received from the Applicant and the Upper Merrimack River Local Advisory Committee (UMRLAC). A response to comments was prepared and posted on the NHDES

Conservation, New England Interstate Water Pollution Control Commission. October 24, 2007.

[6] License Application, Eastman Falls Hydroelectric Project (FERC No. 2457). Prepared by Kleinschmidt. December 2015.

[7] A copy of this document is available on the FERC website at http://www.ferc.gov using the "eLibrary" link. Enter the docket number P-2457 to access the document.

Water Quality Certification website (http://des.nh.gov/organization/divisions/water/wmb/section401/ferc.htm).

D. FINDINGS

D-1. *Activity Description:* (The following is from the Applicant's final license application[6]):

Background: The Eastman Falls Hydroelectric Project (Activity) is located in central New Hampshire in Merrimack and Belknap Counties, and in the city of Franklin and towns of Hill, Sanbornton, and New Hampton. The Activity is located on the Pemigewasset River. The Eastman Falls Dam (Dam) is located at river mile 116.5,approximately 1.5 miles downstream of the U.S. Army Corps of Engineers (USACE) Franklin Falls Flood Control Dam, and about one mile upstream of its confluence with the Winnipesaukee River. The impoundment (i.e., reservoir) created by the dam extends approximately 9 miles upstream, running through the USACE Franklin Falls Flood Control Dam. The Activity was originally constructed by the Pemigewasset Power Company in 1903, and has been redeveloped in 1910-1911,1937 and 1983. The drainage area upstream of the dam is 1,003 square miles.

The general area of the Activity includes the Pemigewasset River from Sumner Island in the north to the Pemigewasset-Winnipesaukee River confluence in the south, and the lands immediately adjacent to the Pemigewasset River throughout this reach. The dam and powerhouses are located off North Main Street in Franklin, New Hampshire, approximately 0.6 miles west of the center of Franklin.

The Activity is currently licensed to PSNH (D/b/a Eversource) under a FERC Order (i.e., license) dated August 25, 1987. The current FERC license expires on December 31, 2017. A section 401 Water Quality Certification was issued by NHDES on January 30, 1985.

Existing Structures: The Activity consists of a dam, one spillway waste gate and two single unit powerhouses which are described below.

The existing spillway is a concrete gravity structure that is 341 foot long with a maximum height of 37 feet high (NH Dam No.087.10). The fixed crest elevation of the ogee section of the dam is 301 feet mean sea level (msl). With 6 foot high flashboards installed, the normal pool elevation is 307 feet msl. The 6 foot high steel flashboards are hinged at the crest and supported on the downstream side by timber struts that are designed to fail at 2 feet of overtopping. There are three bays of flashboards that when lowered can each pass approximately 5302 cfs with the pond at the normal pool elevation. At the normal pool elevation of 307 feet msl, the impounded surface area created by the dam is approximately 582 acres, the gross storage capacity of the impoundment is approximately 4570 acre-feet and the useable storage capacity is 1090 acre-feet. The storage capacity is not used since the project is operated as run-of-river.

A waste gate structure abuts the right side of the spillway. It includes a 16 foot high by 30 foot wide steel slide gate with a gate sill elevation of 292 feet msl. The reported capacity of the waste gate at the normal pool elevation of 307 msl) is 6,109 cubic feet per second (cfs).

The Unit No.1 intake has a headgate structure that is about 12.5 feet high by about 15 feet wide. Trashrack dimensions are 23 feet, 9-1/8 inches high by 17 feet wide and consist of 1/2 inch wide bars spaced 4 inches on center for a clear spacing of 3.5 inches. The intake structure for this section of the powerhouse admits water to the turbine through a 12.5 feet by 12.5 feet reinforced concrete penstock which is approximately 21 feet long. The bulkhead is about 40 feet high and 20 feet wide with a 1 foot wide stop log slot that can be used to dewater the intake.

The Unit No.2 intake is integral with the powerhouse and is comprised of a reinforced concrete and masonry gravity structure with an 18 foot square entrance opening. An electrically operated headgate is located within the powerhouse and is about 20 feet high by about 21 feet wide. Trashracks consist of two 12 foot 4 inch wide by 9 foot 4 inch high panels with 1/2 inch wide bars spaced 4 inches on center for a clear spacing of 3.5 inches. The intake stop log panel is about 20 foot 10 inches high and 22 foot 5-1/2 inches wide that can be lowered into the stoplog frame of the bulkhead to dewater the intake via pumping.

The two power houses are built within the dam structure on the west side; consequently, there is no bypassed reach at the dam. The powerhouses located on river left of the project contain two single generating turbines. Unit 1 is a 1.95-MW vertical Kaplan turbine that operates from 250 cfs up to 850 cfs. The Unit 1 generator is rated at 1.8 MW. Unit 2 is a 4.26-MW horizontal Kaplan type turbine that operates from 700 cfs up to 1,930 cfs. The Unit 2 generator is rated at 4.6 MW. The project has a total installed capacity of 6.4 MW. When combined the turbines can operate between a minimum flow of 250 cfs and a maximum flow of 2,780 cfs.

Downstream of the Dam, the Pemigewasset River is a free flowing, riverine body through its confluence with the Winnipesaukee River approximately one mile downstream. The normal tailwater elevation is 273.0 msl.

Downstream fish passage is provided by a 342 foot long floating louver array which guides migrating fish away from the generating facility intakes to a lowered flashboard on the spillway. The array consists of nineteen wood and steel frames holding plastic angled louver slats that extend to a depth of eight feet.

Existing Operation: Under the existing 1987 FERC license the Activity is currently operated as an un-manned, run-of-river facility with a continuous minimum flow of 410 cubic feet per second (cfs) as measured immediately downstream of the Dam, or inflow to the reservoir (whichever is less). The flow may be temporarily modified if required by operating emergencies beyond the

control of the Applicant, and for short periods upon mutual agreement between the Applicant, and the New Hampshire Fish and Game Department (NHFGD).

The minimum flow of 410 cfs was negotiated with the U.S Fish and Wildlife Service (USFWS) and the NHFGD in connection with 1983 project modifications and the 1984 relicensing. This flow corresponds to the flow equaled or exceeded 80% of the time on the flow duration curve for the Pemigewasset River. The mean annual flow of the Pemigewasset River at the Dam is approximately 2,130 cfs with peak flows of 51,576 cfs and minimum flows of 120 cfs.

River flow is calculated by subtracting the flow at the U.S. Geological Survey (USGS) 01081000 gage on the Winnipesaukee River from USGS 01081500 gage on the Merrimack River and prorating it to compensate for the drainage area between the Dam and the USGS gage.

The upstream USACE Franklin Falls Dam can affect operation of the Activity during high flows. However, during low and normal river flow conditions, the Franklin Falls Dam typically passes inflow and therefore has no effect on operation of the Activity.

The Activity is typically operated on an automated pond level control system (APLCS) to maintain a steady pond at the top of the flashboards (elevation 307 feet msl). The generating units are normally operated remotely from the Applicant's Electrical System Control Center (ESCC) in Manchester, New, Hampshire, although both units are capable of local operation. A level transducer is utilized to measure the headwater in the reservoir and this data is fed to the APLCS through a SCADA based system. With the set point at the top of the flashboards, the APLCS typically maintains this level within +/- 0.2 feet. A hydro operator visually verifies the headwater from the ESCC computer readings a minimum of 2 times per week. Any discrepancies are noted and if necessary, adjustments are made to ensure accuracy.

When inflow is less than 250 cfs (the minimum hydraulic capacity of the turbines) all inflow is passed either through the waste gate or over the spillway. When inflow exceeds the turbine capacity of 2,780 cfs, the waste gate is opened to manually maintain the reservoir at or near the top of the flashboards. If necessary the flashboards are also lowered by removing the wooden struts on the downstream side of the hinged steel flashboards. When just the waste gate is opened, the pond level can be maintained within +/- 0.5 feet. When flashboards are lowered (i.e., to accommodate high flow events) or raised due to changing river flow the pond level can be maintained within +/- 1 foot. A cable car system spans the spillway to facilitate strut removal and replacement.

With regards to current impoundment refill procedures following drawdowns for maintenance of emergencies, it is unclear how much flow is discharged downstream of the dam and how much is used for refilling the impoundment.

Applicant's Proposed Operation: The Applicant is proposing to continue operating the Activity as run-of-river as it has for the past decade. The Applicant is not proposing to add capacity or make any physical modifications to the Activity.

The Applicant does, however, propose to eliminate the current downstream minimum flow of 410 cfs. According to the final license application[6], the "minimum flow requirement is an artifact of when the project was allowed to operate in a limited peaking mode many years ago." Since the Activity now proposes to operate in a run-of-river mode, as it has for many years, the Applicant does not believe that a minimum flow requirement is necessary.

The Applicant also proposes the following measures:

- Develop and implement an operation compliance monitoring and maintenance plan (OCMMP) to monitor impoundment level, flow releases and impoundment refill procedures (a draft was included in the final license application[6]);
- Maintain downstream flows of 502 cfs [equal to the aquatic base flow (ABF)] or 90 percent of inflow to the impoundment (whichever is less) to protect downstream aquatic habitat when refilling the impoundment after drawdowns for maintenance or emergencies;
- Develop and implement an invasive species management and monitoring plan (ISMMP) to monitor the spread of invasive species within the project boundary and implement control measures, if necessary (a draft plan was included in the final license application[6]).

D-2. The Applicant is responsible for the operation of the Activity.

D-3. Surface waters are navigable waters for the purposes of certification under Section 401 of the Clean Water Act. Surface waters are jurisdictional wetlands for the purposes of wetlands permitting under RSA 482-A.

D-4. The named and unnamed fresh water rivers and streams, lakes and ponds, and wetlands in New Hampshire affected by the Activity, are surface waters under Env-Wq 1702.46. NHDES has assigned Assessment Unit (AU) identification numbers to many, but not all surface waters. Surface waters that do not have an AU number are still considered surface waters of the State in accordance with Env-Wq 1702.46 (see C-8). Surface waters that could be potentially affected by the Activity and their associated AU numbers (where available) include, but are not limited to the following:

Assessment Unit ID	Description
NHIMP700010804-02	Impoundment of Pemigewasset River Upstream of Dam
NHRIV700010804-14	Pemigewasset River Downstream of Dam
NHRIV700010804-13	Confluence of Chance Pond Branch Brook and the Pemigewasset River
NHRIV700020203-18	Confluence of the Winnipesaukee River With the Merrimack River Downstream of Dam
NHRIV700060101-12	Merrimack River Downstream of Dam

D-5. The potentially affected surface waters are Class B waterbodies; therefore Class B New Hampshire surface water quality standards apply to the Activity. Class B waterways are considered suitable for aquatic life, primary and secondary

contact recreation, fish consumption, wildlife, and, after adequate treatment, as a water supply (see C-12).

D-6. The Pemigewasset River and portions of the Merrimack River downstream of the Activity are designated rivers under RSA 483 (see C-29).

D-7. The surface waters in the vicinity of the Activity are not Outstanding Resource Waters (see C-27).

D-8. According to the 2014 303(d) list of impaired waters (see C-34), the following surface waters in the vicinity of the proposed Activity are listed as impaired. All impairments, with the exception of those highlighted in bold (which have approved TMDLs), are on the Section 303(d) List:

Assessment Unit (AU)	Waterbody Name	Cause of Impairment (Designated Use Impaired)
NHIMP700010804-02	Pemigewasset River Impoundment	**Mercury(FC)**
NHRIV700010804-14	Pemigewasset River	**Mercury(FC)**
NHRIV700010804-13	Chance Pond Branch Brook	**Mercury(FC)**
NHRIV700020203-18	Winnipesaukee River	**Mercury(FC)**
NHRIV700060101-12	Merrimack River	**Mercury(FC)**

Notes: AL = Aquatic Life, PCR = Primary Recreation, SCR = Secondary Recreation, FC = Fish Consumption, SFC = Shellfish Consumption

Impairments highlighted in bold have approved TMDLs. All other impairments are on the Section 303(d) List. All fresh surface waters are impaired mercury due to elevated levels of mercury in fish tissue which has resulted in statewide fish consumption advisory.

As stated in C-36 of this Certification, when a surface water does not meet water quality standards (i.e., when it is impaired), the addition of pollutants causing or contributing to impairment is prohibited. As noted above, all fresh surface water in New Hampshire are impaired for mercury due to concentrations found in fish tissue which have resulted in a statewide fish consumption advisory. On December 20, 2007, EPA approved the Northeast Regional Mercury TMDL which addressed mercury impairments in all New Hampshire fresh surface waters (see C-35). The primary source of mercury is atmospheric deposition from in-state and out-of-state emissions. The proposed Activity is not expected to have a significant impact on mercury levels in fish tissue.

D-9. The Activity will include the release of water from the tailrace of the Dam, which is considered a discharge as applied under § 401 of the Clean Water Act (see C-17).

D-10. NH RSA 485-A:III applies to any activity that requires certification under § 401 of the Clean Water Act (see C-3). According to § 401 of the CWA , one of the "triggers" that determines if a § 401 certification is required, is the need for a federal license or permit (see C-1). The FERC license that the Applicant must renew to continue operation of the Activity, satisfies this requirement.

D-11. Because the Activity involves a discharge (see D-9) and requires a federal license from FERC, a § 401 Water Quality Certification is required in accordance with RSA 485-A:12, III.

D-12. According to staff in the NHDES Water Use Registration and Reporting program (WURRP), the Activity is currently registered with the WURRP and must continue to report under this program. Because there is no bypass reach and the Applicant is not proposing a change in operation, a water conservation plan is not required (see C-32).

D-13. On June 22, 2016, the U.S. Department of Interior (USDI), which includes the U.S. Fish and Wildlife Service (USFWS), filed a letter with FERC in response to FERC's Notice of Application Ready for Environmental Analysis, dated April 26, 2016. The letter included preliminary recommendations and prescriptions for inclusion in the FERC license (i.e., the USDI PRP letter). On June 28, 2016, the New Hampshire Fish and Game Department (NHFGD) filed a letter with FERC supporting the USDI PRP letter. On October 24, 2016, FERC issued the Environmental Assessment (i.e., the FERC Draft EA) for the public comment, which addressed each of the preliminary recommendations and prescriptions in the USDI PRP letter. The FERC Draft EA also included draft license requirements (i.e., Articles) recommended by FERC staff. All of the above documents may be found on the FERC website[7].

D-14. *Run-of-River:* The Applicant, the USDI PRP letter (which is supported by NHFGD) and the FERC draft EA all propose that the Activity operate as a run-of-river facility. NHDES concurs with operating the Activity as a run-of-river facility, whereby outflow from the Activity equals inflow on an instantaneous basis except during emergencies beyond the control of the Applicant and for short periods upon mutual agreement with of the resource agencies, as such actions will help to support Biological and Aquatic Community Integrity (Env-Wq 1703.19 – see C-24).

D-15. *Impoundment Fluctuations:* The USDI PRP letter (which is supported by NHFGD) supports the Applicant's current operation wherein the impoundment is maintained at an elevation of 307 feet msl (+/- 0.2 feet). According to the USFWS, maintaining a steady pond elevation will help protect the flora and fauna in the littoral and riparian zones of the impoundment.

NHDES concurs with minimizing the frequency and magnitude of fluctuations in the impoundment as it will help to support Biological and Aquatic Community Integrity (Env-Wq 1703.19 – see C-23) in the impoundment.

D-16. *Impoundment Refill Procedures:* During authorized drawdowns, a refill procedure is required to ensure adequate flow is maintained downstream of the Dam and adequate flow is available to refill the impoundment at an appropriate rate to protect aquatic habitat and to support Biological and Aquatic Community Integrity (Env-Wq 1703.19 – see C-24). The USDI PRP letter (which is supported by NHFGD), recommended the USFWS standard impoundment refill procedure whereby 90 percent of the inflow would be passed downstream and 10 percent would be used to refill the impoundment. On August 2, 2016, the

Applicant responded to the USDI PRP letter and proposed a release of 502 cfs (equal to the aquatic base flow[8]) unless inflow is less, in which case it would release 90 percent of inflow. The FERC Draft EA recommends the Applicant's proposal.

Compared to the Applicant's proposal, the USFWS standard refill procedure allows more of the inflow to pass downstream under all inflow conditions. The Applicant's proposal requires the same downstream flow as the USFWS protocol when inflow is less than or equal to 502 cfs. However, when inflow exceeds 502 cfs, the Applicant's proposal results in less flow downstream than the USFWS standard procedure (502 cfs vs 90 percent of inflow) in exchange for allowing the impoundment to refill more quickly. If not properly controlled, this could result is large, rapid reductions in flow downstream of the Dam which could be harmful to aquatic life and potentially large, rapid increases in flow after the impoundment is filled. The USDI PRP letter states that in instances where there are significant resources in the impoundment that would benefit from a quicker refill, the USFWS has deviated from its standard protocol. However, in this case, the USFWS is recommending their standard refill protocol because there are State-listed endangered species of mussels (i.e. the brook floater) downstream of the dam which could be at risk if downstream flows are dramatically reduced during refill (or if downstream flows are dramatically increased after the pond is refilled. These concerns are supported by the following excerpts from the final license application:

- "...the brook floater is considered one of the most endangered mussels in the Northeast" , and "... is listed as critically impaired in New Hampshire...";
- "Over 100 brook floaters were observed downstream of Eastman Falls, accounting for the second most abundant species of freshwater mussels documented in PSNH's 2013 study";
- brook floaters "...are not found in high energy scour-prone areas".

NHDES concurs with the USFWS standard protocols for refilling impoundments because it will help to minimize dramatic reductions or increases in downstream flow (as compared to inflow) during and immediately after impoundment refill and is therefore supportive of Biological and Aquatic Community Integrity (Env-Wq 1703.19 – see C-24). However, NHDES will consider other refill procedures if it can be demonstrated to the satisfaction of NHDES, NHFGD and the USFWS that it will be protective of aquatic life, and, in particular, the brook floater mussels.

D-17. *Drawdown Rate:* The NHFGD typically recommends a maximum drawdown rate of approximately six (6) inches per day to allow adequate time for aquatic organisms (including, but not limited to mussels), to move and stay sufficiently submerged as the water level gradually recedes.

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[8] The aquatic base flow (ABF) of 502 cfs is equal to 0.5 cfs/square mile multiplied by the drainage area at the dam (1003 square miles).

NHDES concurs that, to the extent practicable, drawdowns should be limited to a maximum rate of six (6) inches per day as it will help to support Biological and Aquatic Community Integrity (Env-Wq 1703.19 – see C-24).

D-18. *Operation Compliance and Monitoring Plan:* The Applicant (see D-1), the USDI PRP letter (which is supported by NHFGD) and the FERC draft EA all propose that the Applicant develop and implement an approved operation compliance and monitoring plan (OCMP) that includes details of equipment and procedures necessary to maintain, monitor and report compliance of the Activity. A draft OCMP was provided in the final license application.

NHDES concurs that an OCMP approved by NHDES, NHFGD, USFWS, should be developed and implemented because it will help to ensure compliance with this Certification and therefore compliance with New Hampshire surface water quality regulations (Env-Wq 1700).

D-19. *Invasive Species:* The Applicant (see D-1), the USDI PRP letter (which is supported by NHFGD) and the FERC draft EA all propose that Applicant develop and implement an approved invasive species management and monitoring plan (ISMMP) to monitor the spread of invasive species within the project boundary and implement control measures, if necessary. A draft ISMMP was provided in the final license application.

NHDES concurs that an ISMMP approved by NHDES, NHFGD and the USFWS, should be developed and implemented because it would it will help to support Biological and Aquatic Community Integrity (Env-Wq 1703.19 – see C-24) and help to ensure compliance with Env-Wq 1703.03 (c)(1)d which requires all surface waters to be free from substances in kind or quantity that result in the dominance of nuisance species (see C-18) as defined in Env-Wq 1702.34 (see C-15).

D-20. *Water Quality Monitoring:* The Applicant is not proposing to conduct any water quality monitoring. The following excerpt from the USDI PRP letter explains why:

> "PSNH originally anticipated conducting a baseline water quality study to confirm compliance with state water quality standards. However, subsequent to proposing the study, the ACOE released a report titled "Upper Merrimack and Pemigewasset River Study: Field Program 2009-2012 Monitoring Data Report" (2012) that contained relevant data. Based on the existence of this new site-specific information, PSNH withdrew its study proposal.
>
> The ACOE study included sites within the vicinity of the Eastman Falls Project. Dissolved oxygen (DO) and water temperature were measured continuously from July to September in 2009 upstream and downstream of the dam. In addition, vertical profiles of DO and temperature in the impoundment were sampled monthly from June to October in 2009. Results indicate that during the study period: (1) DO concentrations and percent saturation did not fall below State standards; (2) no stratification

> of the impoundment was evident; and (3) DO and temperature patterns followed similar trends upstream and downstream of the dam".

On October 29, 2015, NHDES filed comments with FERC regarding the Applicant's Draft License Application dated August 4, 2015 which included the following statements indicating that the data collected by the ACOE (also referred to as the USACE) in 2009 is not representative of worse case conditions with regards to dissolved oxygen, temperature and algal growth.

> "...river flows during the study were generally above average during the study which likely resulted in water quality (i.e., temperature, dissolved oxygen, nutrients and chlorophyll-a) being better than what would have been measured during a drier summer with lower flows. For example, as reported in USACE 2012 report, although there was no evidence of stratification in the impoundments during the 2009 impoundment study, flows were above average for the summer (except for a part of September) which "likely increased flushing of the impoundments and prevented stratification at locations that may stratify under normal or below average summer streamflow conditions" (Section 2.6.1, p 2-26). Similarly, Section 2.6.2, p. 2-27 of the USACE 2012 report states that the lack of evidence of significant algal growth in the lower impoundments "suggests that the higher than average flows in the impoundments in the summer of 2009 prevented excessive growth that could result in stressed dissolved oxygen conditions.""

The USDI PRP letter recommends that the new FERC license be conditioned to require that the Licensee implement post-license water quality monitoring, in consultation with the USFWS and NHDES because the ACOE water quality data were not collected under "worst-case (i.e., dry) conditions". On August 2, 2016, the Applicant filed a letter with FERC responding to the USDI PRP letter. In it, the Applicant stated that although they do not believe additional water quality studies are necessary (based on the USACE study), should a study be required, they anticipate "...that the agencies would clearly define what parameters constitute "worst case" conditions prior to conducting data collection."

NHDES concurs with the USDI that water quality monitoring should be conducted by the Applicant to confirm that the Activity is not causing or contributing to water quality violations for dissolved oxygen, temperature, pH, total phosphorus and chlorophyll a in the impoundment and downstream of the Eastman Falls dam. In addition, vertical profiles of dissolved oxygen and temperature should be taken in the impoundment to determine if it stratifies because stratification can result in low levels of dissolved oxygen in the impoundment and tailrace. In response to the Applicant's request of August 2, 2016 (see above), NHDES will clarify what is meant by "worst case" conditions (see condition E-13).

Fish Passage: Section 18 of the Federal Power Act states that FERC must require construction, operation, and maintenance by the licensee of fishways as may be prescribed by the Secretaries of Commerce or Interior. The USDI PRP

letter filed on June 22, 2016, which is supported by NHFGD (see D-13) included preliminary prescriptions for fishways, which, according to the Draft EA (see D-13), FERC proposes to include in the final license.

The USDI PRP letter states that the USDI through the USFWS " is preliminarily prescribing pursuant to section 18 of the Federal Power Act, ...that such new fishways be designed, constructed, operated and maintained as are necessary to accomplish safe, timely and effective upstream passage and interim downstream passage of American eel; and such measures shall be taken as necessary to ensure the effectiveness of those fishways during the term of the license." Details are provided in Attachment A to the USDI PRP letter. The following summary of the USDI preliminary prescription is from the FERC Draft EA:

> "Interior's preliminary section 18 prescription would require PSNH to: (1) develop a plan to install up to three upstream fishways for American eel that would be operated from May 1 to October 30 (the number and location of these fishways would be determined by two seasons of monitoring); (2) develop a plan to implement downstream passage measures for American eel from August 15 to November 15 of each year (interim measures would be implemented starting in the second year of the license and permanent measures would be implemented starting in the eighth year after eels are documented using the upstream eel passage facilities); (3) develop and implement a fishway operation and maintenance plan; and (4) develop and implement a fishway effectiveness monitoring plan.
>
> Interior also requests that any license issued for the project include a reservation of authority to prescribe fishways under section 18 of the FPA."

In the June 22, 2016 letter, the USDI stated that they "reserve the right to modify recommendations and prescriptions within a reasonable time frame following the filing of any additional information or modified proposals by PSNH".

NHDES concurs with the USDI's preliminary prescriptions for fishways, and any amendments, as it will help to ensure adequate fish passage and will support Biological and Aquatic Community Integrity (Env-Wq 1703.19 – see C-24).

E. WATER QUALITY CERTIFICATION CONDITIONS

Unless otherwise authorized by NHDES, the following conditions shall apply:

E-1. **Compliance with Certification Conditions:** The Applicant shall operate and maintain the Activity to comply with the conditions of this Certification.

E-2. **Compliance with Water Quality Standards:** The Activity shall not cause or contribute to a violation of surface water quality standards.

E-3. **Modification of Certification:** The conditions of this Certification may be amended and additional terms and conditions added as necessary to ensure

compliance with New Hampshire surface water quality standards, when authorized by law, and after notice and opportunity for hearing.

E-4. **Proposed Modifications to the Activity:** The Applicant shall consult with and receive prior written approval from NHDES regarding any proposed modifications to the Activity that could have a significant or material effect on the conditions of this Certification including any changes to project operation or approved plans required by this Certification. If necessary, NHDES may modify the Certification in accordance with condition E-3 of this Certification.

E-5. **Compliance Inspections:** In accordance with applicable laws, the Applicant shall allow NHDES to inspect the Activity and affected surface waters to monitor compliance with the conditions of this Certification.

E-6. **Posting of Certification and Operation and Compliance Monitoring Plan:** A copy of this Certification and the approved Operation and Compliance Monitoring Plan (OCMP – see E-11) shall be prominently posted within the powerhouse within seven days of receiving written approval of the OCMP from NHDES.

E-7. **Transfer of Certification:** Should this Certification be transferred to a new owner, contact information for the new owner (including name, address, phone number and email) shall be provided to NHDES within 30 days of the transfer.

E-8. **Project Operation:** Unless otherwise allowed in the NHDES approved Operation Compliance Monitoring Plan (OCMP – see condition E-11 below) the Activity shall be operated as follows:

a. Run-of-River Flow: The Applicant shall operate the Activity in a run-of-river mode such that inflows equal outflows on an instantaneous basis. Run-of-river may be temporarily modified if required by operating emergencies beyond the control of the Applicant and for short periods upon mutual agreement with the NHDES, USFWS and NHFGD.

b. Impoundment Water Level: The Applicant shall strive to minimize fluctuations in the impoundment (i.e., pond) to the maximum extent practicable and shall not draw the water level in the impoundment down for the purpose of generating power. To minimize fluctuations, water level in the impoundments shall be automatically controlled (versus manual operation) to the maximum extent practicable. Water level fluctuations in the impoundment shall not exceed +/- 0.2 feet from the top of the flashboards (elevation 307.00 msl) when power is generated and inflow is no greater than the hydraulic capacity of the turbines (2,780 cfs). When inflow exceeds 2,780 cfs and inflow is passed through the turbines and waste gate to maintain a steady pond, the pond level shall be maintained within +/- 0.5 feet of the top of flashboards (elevation 307.00 msl). When inflow exceeds approximately 6000 cfs and flashboards are lowered to accommodate high inflows, the pond level shall be maintained within +/- 1.0 feet of elevation 307.00 msl.

c. **Impoundment Refill:** When refilling the impoundment after drawdown for maintenance or emergencies, the Applicant shall release 90 percent of the inflow downstream to the Pemigewassett River and utilize the remaining 10% of inflow to refill the impoundment. This refill procedure may be modified with prior approval of NHDES, USFWS and the NHFGD (see D-16).

d. **Drawdown Rates:** When drawing the water level in the impoundment down, the Applicant shall strive to achieve, to the extent practicable, a gradual drawdown rate of six (6) inches per day or less. Exceptions to the above may be allowed if required by operating emergencies beyond the control of the Applicant or for short periods upon approval by NHDES.

E-9. **Monitoring Requirements for Impoundment and Flow Management:** Unless otherwise allowed in the NHDES approved Operation Compliance Monitoring Plan (OCMP – see condition E-11 below) the Activity shall be comply with the following monitoring requirements for impoundment and flow management:

a. Records of operations, run-of-river flows and water levels shall be maintained electronically in a spreadsheet format and made available to NHDES upon request.

b. By April 1 of each year (beginning the first April after the FERC license renewal for the Activity becomes effective), the Applicant shall submit to NHDES a summary report for the previous calendar year with appropriate summary tables, graphs, text and supporting documentation that demonstrates compliance with (and, if applicable, any excursions of the project operation requirements specified in the OCMP (see condition E-11) regarding condition E-8 of this certification. Where excursions occurred, the summary shall indicate when the excursion occurred, the duration of the excursion and a description of corrective actions taken to prevent such excursions from reoccurring.

E-10. **Notification Requirements:** Unless otherwise allowed in the NHDES approved Operation Compliance Monitoring Plan (OCMP – see condition E-11 below) the Activity shall be comply with the following notification requirements:

a. If the Activity causes a deviation from run-of-river operational requirements specified in the OCMP (see condition E-11) the Applicant shall notify NHDES, NHFGD and USFWS as soon as possible, but no later than 24 hours after each such incident. The notification shall include, to the extent known, an explanation as to why the deviations occurred, a description of corrective actions taken, and how long it will take until operations will comply with the OCMP.

b. Within 45 days after each incident and after consultation with NHDES, NHFGD and USFWS, the Applicant shall submit a report to NHDES, NHFGD and USFWS that contains, to the extent possible, the cause, severity and duration of the incident, any observed or reported adverse environmental

impacts from the incident, pertinent data and a description of corrective measures.

E-11. **Operation Compliance Monitoring Plan (OCMP):**

a. Within six months of the effective date of the FERC license renewal for the Activity, the Applicant shall consult with NHDES, NHFGD and USFWS, and submit to NHDES, for approval, an operation compliance monitoring plan (OCMP) for the Activity. The Applicant shall then implement the approved plan.
b. The OCMP shall include, but is not limited to, the following:
    1) a detailed description of how the Activity will be operated under all conditions (i.e., under normal operating conditions as well as during low flow, high flow, maintenance and emergency conditions) to maintain compliance with the operation, monitoring and notification requirements in condition E-8, E-9 and E-10 of this Certification;
    2) a description of the mechanisms and structures (i.e., type, location and accuracy of all flow and impoundment elevation monitoring equipment and gages) to be used for maintaining compliance with operational requirements;
    3) procedures for maintaining and calibrating monitoring equipment;
    4) a description of the level of manual and automatic operation, and, where appropriate, an explanation why manual operations are not automated (e.g., the waste gate);
    5) rating curves and calculations for all methods of releasing flow downstream;
    6) a description of the accuracy of the elevations used to determine compliance with operation requirements and if they are based on as-built elevations;
    7) a description of the methods and frequency for reporting data to NHDES, NHFGD and USFWS;
    8) a description of the procedures for reporting deviations from the OCMP to NHDES; and
    9) an implementation schedule.

The Applicant shall consult with NHDES, NHFGD and USFWS, and receive NHDES approval of any proposed modifications to the OCMP. Any NHDES approved modifications to the OCMP shall be considered a part of this Certification. Proposed modifications shall not be implemented until approved by NHDES.

E-12. **Invasive Species Management and Monitoring Plan (ISMMP):**

a. Within six months of the effective date of the FERC license renewal for the Activity, the Applicant shall consult with NHDES, NHFGD and USFWS, and submit to NHDES, for approval, an invasive species monitoring and management plan (ISMMP) for the Activity. The Applicant shall then implement the approved plan.
b. The ISMMP shall include, but is not limited to, the following:

1) a description of invasive species monitoring methods and the frequency of monitoring;
2) a description of best management practices that will be used to reduce the spread of nuisance species found at the Activity;
3) a description of any criteria that will be used to determine when control measures are needed and a description of any control measures that the Applicant will implement to control nuisance species found at the project (i.e., manual pulling, chemical application, biological controls); and
4) a schedule for filing any monitoring reports with NHDES, USFWS and NHFGD for review.

c. The Applicant shall consult with NHDES, NHFGD and USFWS, and receive NHDES approval of any proposed modifications to the ISMMP. Any NHDES approved modifications to the ISMMP shall be considered a part of this Certification. Proposed modifications shall not be implemented until approved by NHDES.

E-13. **Water Quality Monitoring Plan (WQMP):**

a. Within six months of the effective date of the FERC license renewal for the Activity, the Applicant shall submit to NHDES, for approval, a water quality monitoring plan (WQMP) to determine if the Activity is causing or contributing to violations of state surface water quality regulations (Env-Wq 1700).
b. The WQMP shall include, but is not limited to, the following:
    1) collection of continuous (i.e., every 15 minutes) dissolved oxygen (concentration and percent saturation), water temperature and pH measurements using multi-parameter dataloggers from a site in the impoundment and a site downstream of the dam;
    2) deployment of dataloggers for at least 30 consecutive days in a summer that includes extended dry periods when river flow is approximately at the 7Q10 flow and water temperatures are approximately 25 degrees Celsius or greater (i.e., near worse case conditions);
    3) collection of two vertical profiles in the impoundment for dissolved oxygen and water temperature (in one foot increments from the surface to the bottom) on two days when continuous dataloggers are deployed and conditions are near worse case;
    4) collection of 4 grab samples (once a week for 4 weeks when the dataloggers are deployed) in the impoundment for total phosphorus and chlorophyll-a;
    5) quality assurance/ quality control provisions;
    6) the longitudinal and latitudinal coordinates of each monitoring location as well as photographs and a map showing each location;
    7) submittal of all data electronically to NHDES and in a form that can be automatically uploaded into the NHDES Environmental Monitoring Database (EMD)[9]; and

[9] Information on how to upload data into the EMD can be found at

8) submittal of a report to NHDES summarizing the results, with appropriate text, tables and graphs, by January 31st of the year after monitoring was conducted.

c. Monitoring shall commence in accordance with the NHDES approved WQMP the first summer that meets the conditions of b.2) above;
d. If results indicate the potential for water quality violations with relatively little change in water quality (i.e., water quality standards have been marginally met), DES may require additional sampling no sooner than five years after the previous sampling was conducted.
e. If results indicate that the Activity is causing or contributing to violations of surface water quality standards, NHDES may require implementation of mitigation measures and additional monitoring to confirm that mitigation measures have resulted in attainment of surface water quality standards.
f. The Applicant shall consult with NHDES and receive NHDES approval of any proposed modifications to the WQMP. Any NHDES approved modifications to the WQMP shall be considered a part of this Certification. Proposed modifications shall not be implemented until approved by NHDES.

E-14. **Fish Passage.** The Applicant shall comply with the "Preliminary Prescription for Fishway" in the U.S. Department of Interior's June 22, 2016 letter to FERC (see 0), and any amendments. Any amendments shall be considered a part of this Certification.

E-15. **NHDES Water Use Registration and Reporting:** The Applicant shall register, measure, and report all withdrawals and discharges with the NHDES Water Use Registration and Reporting program in accordance with RSA 488:3 and its supporting regulations, Env-Wq 2102.

F. APPEAL

Any person aggrieved by this decision may appeal to the N.H. Water Council ("Council") by filing an appeal that meets the requirements specified in RSA 21-O:14 and the rules adopted by the Council, Env-WC 100-200. The appeal must be filed directly with the Council within 30 days of the date of this decision and must set forth fully every ground upon which it is claimed that the decision complained of is unlawful or unreasonable. Only those grounds set forth in the notice of appeal can be considered by the Council.

Information about the Council, including a link to the Council's rules, is available at http://nhec.nh.gov/ (or more directly at http://nhec.nh.gov/water/index.htm). Copies of the rules also are available from the NHDES Public Information Center at (603) 271-2975.

If you have questions regarding this Certification, please contact Owen David at (603) 271-0699 or Owen.David@des.nh.gov

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http://des.nh.gov/organization/divisions/water/wmb/emd/ .

Eugene J. Forbes, P.E.
Director, NHDES Water Division

cc: Melissa Grader, USFWS
John Warner, USFWS
Carol Henderson, NHFGD
Ken Merrifield, Mayor City of Franklin, NH
Katie Ambrose, Town Administrator, Sanbornton, NH
Board of Selectman or Shelly Henry, Town Clerk , Hill, NH
Barbara Lucas, Town Administrator New Hampton, NH
FERC, e-file (final WQC only)

APPENDIX D

THREATENED AND ENDANGERED SPECIES

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To: November 08, 2018
Consultation Code: 05E1NE00-2019-SLI-0279
Event Code: 05E1NE00-2019-E-00619
Project Name: Eastman Falls FERC No. 2457 LIHI

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2019-SLI-0279

Event Code: 05E1NE00-2019-E-00619

Project Name: Eastman Falls FERC No. 2457 LIHI

Project Type: DAM

Project Description: The Eastman Falls Hydroelectric Project (Project) is located in central New Hampshire in Merrimack and Belknap Counties, and in the city of Franklin and towns of Hill, Sanbornton, and New Hampton. The Project is located on the Pemigewasset River, at river mile 116.5, approximately 1.5 miles downstream of the U.S. Army Corps of Engineers (USACE) Franklin Falls Flood Control Dam, and about one mile upstream of its confluence with the Winnipesaukee River. The Project was originally constructed by the Pemigewasset Power Company in 1903, redeveloped by the Boston and Maine Railroad in 1910-1911, and further redeveloped by Public Service Company of New Hampshire (PSNH) in 1937 and 1983. The Project's hydroelectric facilities are owned and operated by Central Rivers Power NH, LLC.

This project review is part of the LIHI application for the Project

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/43.49881545146312N71.67254924742501W

Counties: Belknap, NH | Merrimack, NH

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

CONFIDENTIAL – NH Dept. of Environmental Services review

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

To: Kayla Easler, Kleinschmidt Associates
141 Main Street
P.O. Box 650
Pittsfield, ME 04967

From: Amy Lamb, NH Natural Heritage Bureau
Date: 11/13/2018 (valid for one year from this date)
Re: Review by NH Natural Heritage Bureau
NHB File ID: NHB18-3478 Town: Franklin Location: Project is located off North Main Street
Description: The Eastman Falls Hydroelectric Project (Project) is located in central New Hampshire in Merrimack and Belknap Counties, and in the city of Franklin and towns of Hill, Sanbornton, and New Hampton. The Project is located on the Pemigewasset River, at river mile 116.5, approximately 1.5 miles downstream of the U.S. Army Corps of Engineers (USACE) Franklin Falls Flood Control Dam, and about one mile upstream of its confluence with the Winnipesaukee River. The Project was originally constructed by the Pemigewasset Power Company in 1903, redeveloped by the Boston and Maine Railroad in 1910-1911, and further redeveloped by Public Service Company of New Hampshire (PSNH) in 1937 and 1983. The Project's hydroelectric facilities are owned and operated by Central Rivers Power NH, LLC.

cc: Kim Tuttle

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

Comments: This site is within an area flagged for possible impacts on the state-listed *Alasmidonta varicosa* (brook floater) in the Merrimack River; contact the NH Fish & Game Department to address wildlife concerns. NHB recommends that this project include an analysis of the dam's potential effects on the natural communities listed and mapped below. Please see accompanying sheets for detailed information about each natural community occurrence.

Invertebrate Species	State[1]	Federal	Notes
Brook Floater (*Alasmidonta varicosa*)	E	--	Contact the NH Fish & Game Dept (see below).

Natural Community	State[1]	Federal	Notes
Aquatic bed*	--	--	Threats to floodplain communities include introduction of invasive species, changes in local hydrology, and influxes of nutrients or pollutants from stormwater runoff.
Dry river bluff*	--	--	Threats include changes to water levels or river dynamics and introduction of invasive species.
Herbaceous riverbank/floodplain*	--	--	Threats to this community include changes to the river's channel or flood regime, the introduction of invasives species, the introduction of nutrients and sediments via

			septic systems and stormwater runoff, and construction and vegetation clearing within and along the river's bank.
Major river silver maple floodplain system*	--	--	Threats are primarily changes to the hydrology of the river, land conversion and fragmentation, introduction of invasive species, and increased input of nutrients and pollutants.
Silver maple - false nettle - sensitive fern floodplain forest*	--	--	Threats are primarily changes to the hydrology of the river, land conversion and fragmentation, introduction of invasive species, and increased input of nutrients and pollutants.

Vertebrate species	**State[1]**	**Federal**	**Notes**
American Eel (*Anguilla rostrata*)	SC	--	Contact the NH Fish & Game Dept (see below).
Bald Eagle (*Haliaeetus leucocephalus*)	SC	--	Contact the NH Fish & Game Dept (see below).
Common Loon (*Gavia immer*)	T	--	Contact the NH Fish & Game Dept (see below).
Wood Turtle (*Glyptemys insculpta*)	SC	--	Contact the NH Fish & Game Dept (see below).

[1]Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (*) indicates that the most recent report for that occurrence was more than 20 years ago.

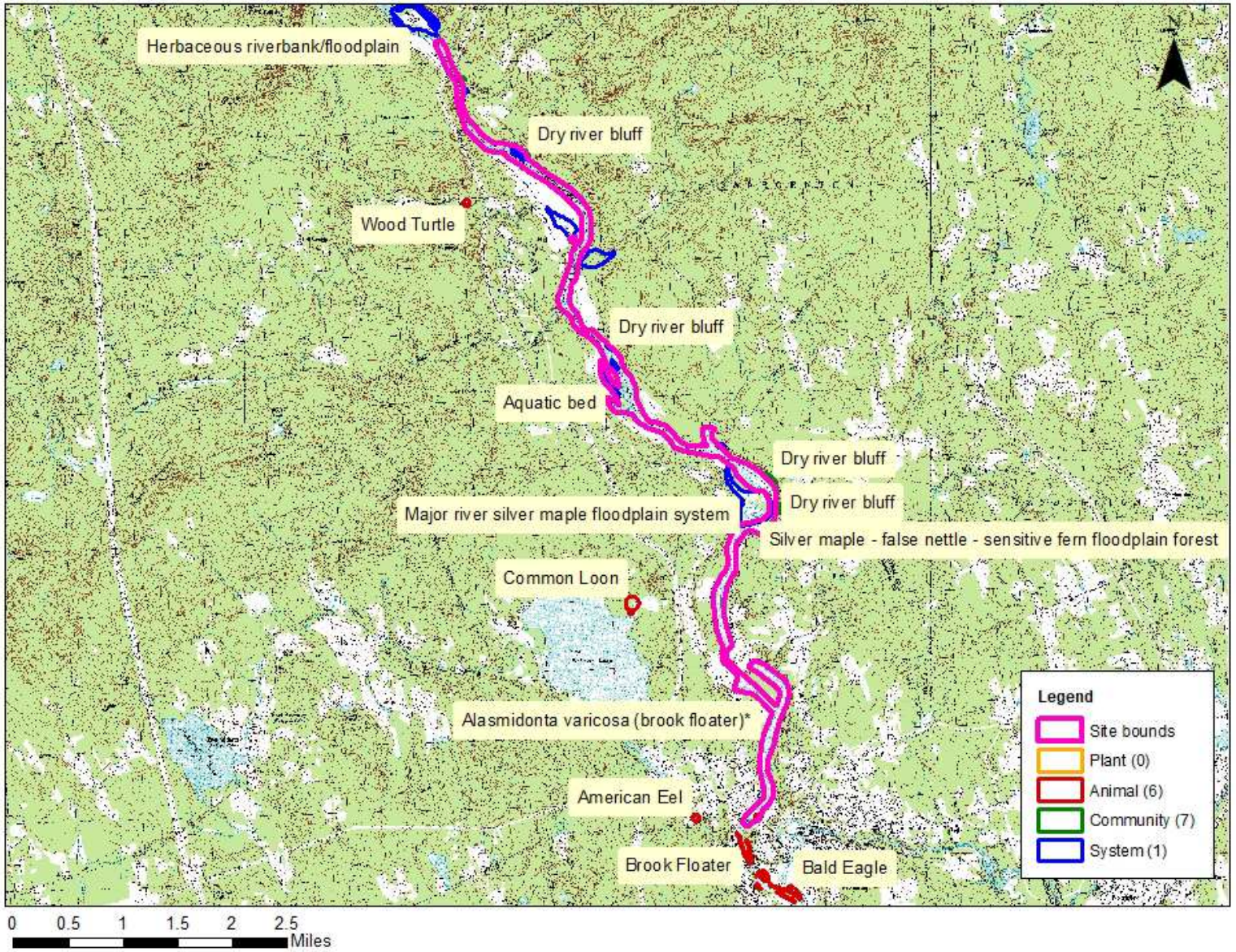
Contact for all animal reviews: Kim Tuttle, NH F&G, (603) 271-6544.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

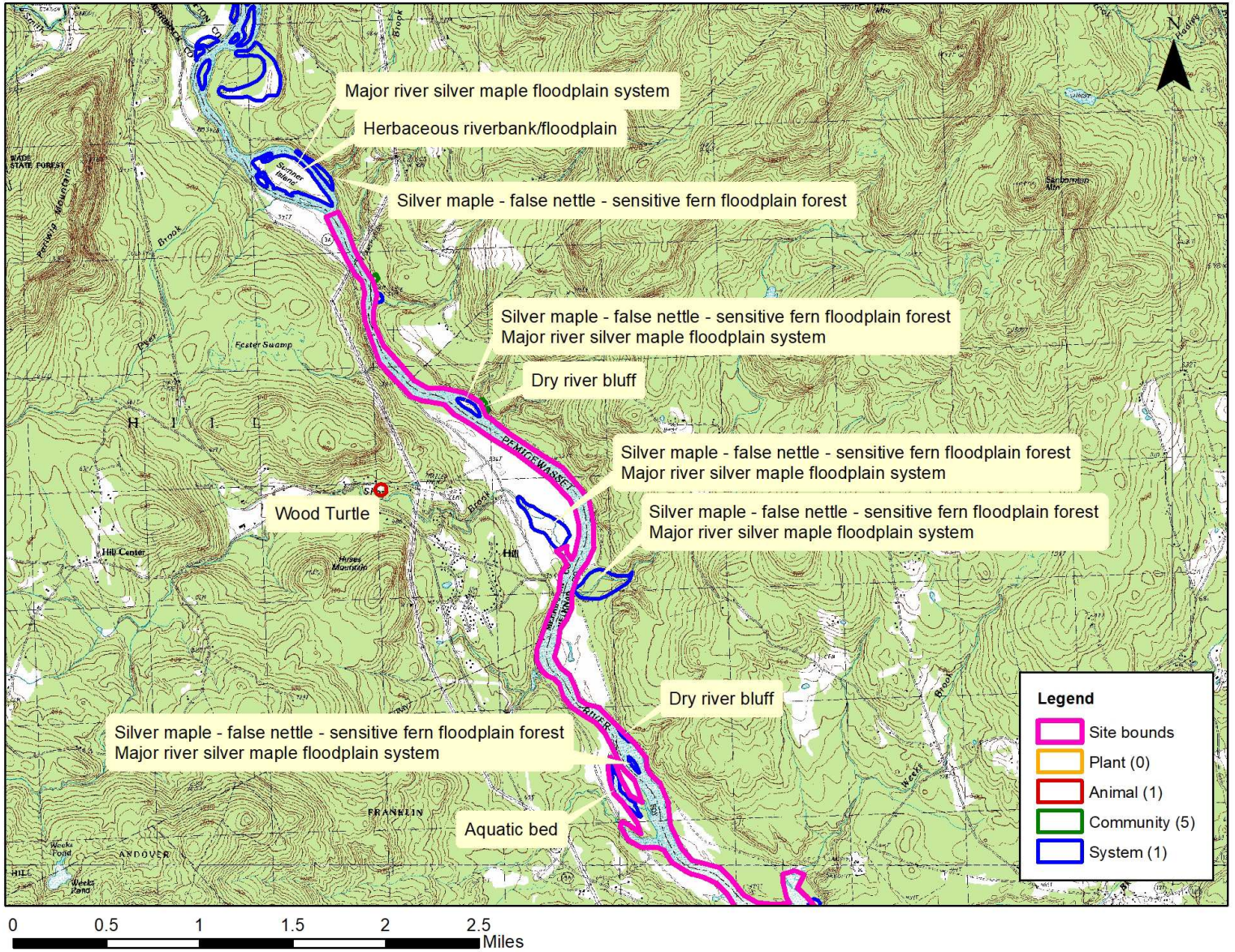
Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

NHB18-3478


Herbaceous riverbank/floodplain
Dry river bluff
Wood Turtle
Dry river bluff
Aquatic bed
Dry river bluff
Dry river bluff
Major river silver maple floodplain system
Silver maple - false nettle - sensitive fern floodplain forest
Common Loon
Alasmidonta varicosa (brook floater)*
American Eel
Brook Floater
Bald Eagle
Legend
Site bounds
Plant (0)
Animal (6)
Community (7)
System (1)
0 0.5 1 1.5 2 2.5
Miles

NHB18-3478


Major river silver maple floodplain system
Herbaceous riverbank/floodplain
Silver maple - false nettle - sensitive fern floodplain forest
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Major river silver maple floodplain system
Dry river bluff
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Major river silver maple floodplain system
Dry river bluff
Silver maple - false nettle - sensitive fern floodplain forest
Major river silver maple floodplain system
Aquatic bed
Legend
Site bounds
Plant (0)
Animal (1)
Community (5)
System (1)
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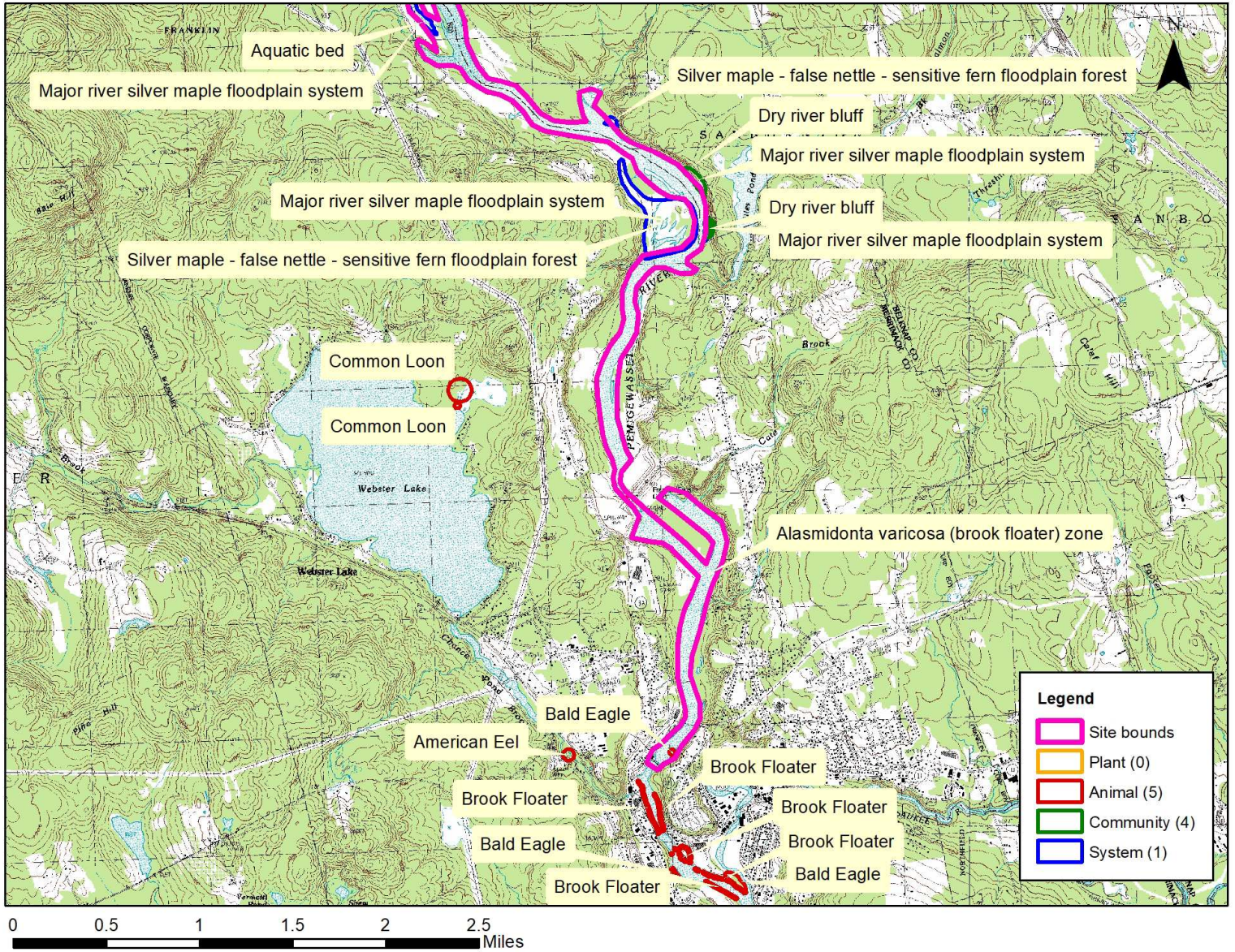
1
1.5
2
2.5
Miles

NHB18-3478


Aquatic bed
Major river silver maple floodplain system
Major river silver maple floodplain system
Silver maple - false nettle - sensitive fern floodplain forest
Common Loon
Common Loon
Silver maple - false nettle - sensitive fern floodplain forest
Dry river bluff
Major river silver maple floodplain system
Dry river bluff
Major river silver maple floodplain system
Alasmidonta varicosa (brook floater) zone
Bald Eagle
American Eel
Brook Floater
Brook Floater
Bald Eagle
Brook Floater
Brook Floater
Brook Floater
Brook Floater
Bald Eagle
Webster Lake
Webster Lake
Legend
Site bounds
Plant (0)
Animal (5)
Community (4)
System (1)
0
0.5
1
1.5
2
2.5
Miles

New Hampshire Natural Heritage Bureau - Animal Record

Brook Floater (*Alasmidonta varicosa*)

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Rare or uncommon
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2014: Good habitat: 97 individuals observed. Fair habitat: 9 individuals observed.
General Area: 2014: Good habitat: Substrates were a mix of boulder, cobble, gravel, and sand. Fair habitat: Substrates had less boulder and cobble than good habitats, and a significant amount of silt, which was absent in good habitat.
General Comments:
Management Comments:

Location

Survey Site Name: Eastman Falls
Managed By:

County: Merrimack
Town(s): Franklin
Size: 9.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2014: Pemigewasset River, Franklin, downstream of Eastman Falls dam.

Dates documented

First reported: 2014-08-12 Last reported: 2014-08-16

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Community Record

Aquatic bed

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Demonstrably widespread, abundant, and secure

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1996: A combination of open water free of plants and floating leaved and submersed aquatic vegetation.
General Area: 1996: Permanent water in the oxbow ponds. Some connect to the river at one or both ends during flood-stage.
General Comments: Several areas were also dammed by beavers. This is likely to cause high water to persist for longer periods and modify plant species composition.
Management Comments:

Location

Survey Site Name: Franklin Falls Dam
Managed By: Franklin Falls Reservoir

County: Merrimack
Town(s): Franklin
Size: 6.5 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Route 3 north from Franklin to Rte 3a north, past cemetery on right about 1.25 miles to dead end road on right. Army Corps of Engineers gate crosses road about 100 yards in. Continue on this road to T-intersection with old 3A. Go north past river cove over unnamed brook to old fields on right.

Dates documented

First reported: 1996-07-20 Last reported: 1996-07-20

New Hampshire Natural Heritage Bureau - Community Record

Dry river bluff

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1996: A natural grassland with *Schizachyrium scoparium* (little bluestem) as the dominant grass, along with some modest patches of *Andropogon gerardii* (big bluestem). Other native sandplain plants include *Lechea intermedia* (intermediate pinweed) and *Polygonella articulata* (jointweed).

General Area: 1996: The toe-slope of a river bluff opening, at least occasionally inundated on its lower portion.

General Comments: 1996: Evidence of turtle hatchings were observed, although the species could not be confirmed.

Management Comments:

Location

Survey Site Name: Franklin Falls Dam
Managed By: Franklin Falls Reservoir

County: Belknap
Town(s): Sanbornton
Size: 1.9 acres
Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Franklin. North on Route 127. Left opposite New Boston Road. Left at fork. Road ends at river.

Dates documented

First reported: 1996-06-04 Last reported: 1996-06-04

New Hampshire Natural Heritage Bureau - Community Record

Dry river bluff

Legal Status	Conservation Status
Federal: Not listed	Global: Not ranked (need more information)
State: Not listed	State: Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1996: Open conditions with early-successional areas along the Pemigewasset River. More stable areas have an open woodland character with low shrubs such as *Comptonia peregrina* (sweet fern) and saplings dominant. There are also numerous native sedge and grass species including *Carex rugosperma* var. *tonsa* (rough-seeded sedge), *C. rugosperma* var. *rugosperma*, *Panicum lanuginosum* var. *implicatum*, *Panicum rigidulum* ssp. *pubescens* (long-leaved panic grass), *Carex lucorum* (distant sedge), *Deschampsia flexuosa* (common hairgrass), *Andropogon gerardii* (big bluestem), and *Schizachyrium scoparium* (little bluestem). A variety of pine and oak species including *Pinus strobus* (white pine), *P. resinosa* (red pine), *Quercus rubra* (red oak), *Q. velutina* (black oak), *Q. alba* (white oak), and *Q. coccinea* (scarlet oak) as well as *Tsuga canadensis* (hemlock) and *Fagus grandifolia* (beech).

General Area: 1996: River bluff openings created when the river cuts through and de-stabilizes an extensive overburden of sand and gravel soils on the order of 100-200 vertical feet.

General Comments: 1996: Same description (EODATA and GENDESC) used for occurrences .006 and .007.

Management Comments: 1996: Recommend land or easement purchase from abutting landowners to avoid a demand for major bank stabilization efforts.

Location

Survey Site Name: Franklin Falls Dam
Managed By: Franklin Falls Reservoir

County: Belknap
Town(s): Sanbornton
Size: 2.0 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Take Rte. 132 to New Hampton. Old Bristol road to Wallace Road to Blakehill Road. Road ends at river.

Dates documented

First reported: 1996-06-04 Last reported: 1996-06-04

New Hampshire Natural Heritage Bureau - Community Record

Dry river bluff

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1996: Open conditions with early-successional areas along the Pemigewasset River. More stable areas have an open woodland character with low shrubs such as *Comptonia peregrina* (sweetfern) and saplings dominant. There are also numerous native sedge and grass species including *Carex rugosperma* var. *tonsa* (rough-seeded sedge), *C. rugosperma* var. *rugosperma*, *Panicum lanuginosum* var. *implicatum*, *Panicum longifolium*, *Carex lucorum* (woodland sedge), *Deschampsia flexuosa* (hair grass), *Andropogon gerardii* (big blue- stem), and *Schizachyrium scoparium* (little bluestem). A variety of pine and oak species including *Pinus strobus* (white pine), *P. resinosa* (red pine), *Quercus rubra* (red oak), *Q. velutina* (black oak), *Q. alba* (white oak), and *Q. coccinea* (scarlet oak) as well as *Tsuga canadensis* (hemlock) and *Fagus grandifolia* (beech).

General Area: 1996: River bluff openings created when the river cuts through and destabilizes an extensive overburden of sand and gravel soils on the order of 100-200 vertical feet.

General Comments: 1996: Same description (EODATA and GENDESC) used for occurrences .005 and .007.

Management Comments: 1996: Recommend land or easement purchase from abutting landowners to avoid a demand for major bank stabilization efforts.

Location

Survey Site Name: Franklin Falls Dam
Managed By: Franklin Falls Reservoir

County: Belknap
Town(s): Sanbornton
Size: 1.0 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Route 132 to New Hampton. Old Bristol Road to Wallace Road to Blakehill Road. Road ends at river.

Dates documented

First reported: 1996-09-11 Last reported: 1996-09-11

New Hampshire Natural Heritage Bureau - Community Record

Dry river bluff

Legal Status	Conservation Status
Federal: Not listed	Global: Not ranked (need more information)
State: Not listed	State: Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1996: Open conditions with early-successional areas along the Pemigewasset river. More stable areas have an open woodland character with low shrubs such as *Comptonia peregrina* (sweetfern) and saplings dominant. There are also numerous native sedge and grass species including Carex rugosperma var. tonsa (rough-seeded sedge), C. rugosperma var. rugosperma, *Panicum lanuginosum* var. *implicatum*, *Panicum longifolium*, *Carex lucorum* (woodland sedge), *Deschampsia flexuosa* (hair grass), *Andropogon gerardii* (big blue-stem), and *Schizachyrium scoparium* (little bluestem). A variety of pine and oak species including *Pinus strobus* (white pine), P. resinosa (red pine), *Quercus rubra* (red oak), Q. velutina (black oak), Q. alba (white oak), and Q. coccinea (scarlet oak) as well as *Tsuga canadensis* (hemlock) and *Fagus grandifolia* (beech). At the lower end of the woodland opening at the south end of the terrace slope system there is a natural riverside grassland. This area is basically the toe-slope of the riverbluff opening area and is at least occasionally inundated on its lower portion. *Schizachyrium scoparium* var. *scoparium* (little bluestem) is the dominant grass here with some modest patches of *Andropogon gerardii* (big bluestem) as well. Other native sandplain plants occur here including as *Lechea intermedia* (pinweed) and *Polygonella articulata* (sand jointweed). Evidence of turtle hatchings were observed.

General Area: 1996: The Prescott Brook drainage had similar, although considerably smaller, river bluff openings. There was evidence of recent small scale slides and the areas were largely un-colonized. Immediately upriver of the Franklin Falls Dam there is an area of open river bluff which is also largely un-colonized. The forest above these openings has some sandplain species associations, including some sparse *Pinus rigida* (pitch pine) and *Quercus ilicifolia* (scrub oak), however past harvesting has resulted in a prominence of white pine and few remaining pitch pine.

General Comments: 1996: The diversity of pine and oak species is significant and several species of oak are at or near their northern range limit in NH, including Pinus resinosa (red pine), Quercus rubra (red oak), Quercus velutina (black oak), Quercus alba (white oak), and Quercus coccinea (scarlet oak). River bluff openings are created when the river cuts through and destabilizes an extensive overburden of sand and gravel soils on the order of 100-200 vertical feet.

Management Comments: 1996: Recommend land or easement purchase from abutting landowners to avoid a demand for major bank stabilization efforts.

Location

Survey Site Name: Pemigewasset River
Managed By: Franklin Falls Reservoir

County: Belknap
Town(s): Sanbornton
Size: 5.6 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Rte. 132 to New Hampton. Old Bristol Road to Wallace Road to Black Hill Road. Road ends at River. Sites are between Giles Pond and the Pemigewasset River. Alternatively, from the turnoff for Franklin Falls Dam along Rte. 127 proceed 0.7 mile north to Gile Pond Road. Park at dam at base of Gile Pond. Access trail lands north along the top of the terrace at this site. River bluff openings are

ca. 600 feet north of a small drainage which cuts through the terrace perhaps 800 feet north of Gile Pond dam. Other river bluff openings evident along bluff to north and northwest.

Dates documented

First reported:	1996-07-21	Last reported:	1996-07-21

New Hampshire Natural Heritage Bureau - Community Record

Herbaceous riverbank/floodplain

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Apparently secure but with cause for concern

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1996: Naturally maintained grasslands consisting of variable mixes of medium-height shrubs, medium and tall grasses and sedges, and herbaceous species characteristic of mesic and somewhat poorly drained sites. Dominant and common native species included Spiraea latifolia (meadowsweet), *Rubus setosus* (bog blackberry), Solidago graminifolia (grass-leaved goldenrod), S. rugosa (rough goldenrod), Agropyron repens (witch-grass), *Calamagrostis canadensis* (blue-joint), *Agrostis hyemalis* (ticklegrass), *Carex tribuloides*, *Carex scoparia*, Bromus altissimus (tall brome grass), and *Muhlenbergia mexicana* (mexican muhly). Low swale areas supported dense stands of the robust sedge, expansive bulrush (*Scirpus expansus*). Non-native species included Agropyron repens (witch-grass) and *Poa palustris* (bluegrass). Mesic, fine to very fine sandy loams, somewhat to moderately well-drained (mixed alluvial land).

General Area: 1996: Borders a southern/transitional floodplain thicket.
General Comments:
Management Comments: 1996: Maintain present flood control schedules.

Location

Survey Site Name: Sumner Island
Managed By: Franklin Falls Reservoir

County: Belknap
Town(s): New Hampton
Size: 34.7 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Rte. 132 to New Hampton. Old Briston Road to Floodplain Road. Best approach is by boat or to wade across river from east bank at moderate to low water.

Dates documented

First reported: 1996-09-11 Last reported: 1996-09-11

New Hampshire Natural Heritage Bureau - System Record

Major river silver maple floodplain system

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1996: Component exemplary communities include: ***aquatic bed***, ***silver maple - false nettle - sensitive fern floodplain forest***, ***herbaceous riverbank/floodplain***, and ***dry river bluff.****Each exemplary natural communitiy is described in separate EORs.*

General Area:
General Comments:
Management Comments:

Location

Survey Site Name: Pemigewasset River
Managed By: Franklin Falls Reservoir

County: Belknap
Town(s): New Hampton
Size: 212.0 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Franklin Falls Reservoir upsteam of Franklin Falls Dam, along the Pemigewasset River between Bristol and Franklin.

Dates documented

First reported: 1996-09-11 Last reported: 1996-09-11

New Hampshire Natural Heritage Bureau - Community Record

Silver maple - false nettle - sensitive fern floodplain forest

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: Many individually small but collectively significant communities. Each forest was characterized by the predominance of *Acer saccharinum* (silver maple). *Tilia americana* (basswood) and *Ulmus americana* (american elm) were occasional associates. *Juglans cinerea* (butternut) and *Acer negundo* (box elder) were regular but infrequent components. Trees ranged from young saplings 30-40 feet tall and 3-4 inch dbh to mature trees of greater than 20 inches dbh. A core taken of a 21-inch dbh silver maple at the base of Prescott Brook indicated an age of approximately 60-70 years. Many of the forests had very little woody understory vegetation. *Toxicodendron radicans* (poison ivy) was prolific. Other common or frequent floodplain species included Matteucia struthiopteris (ostrich fern), *Onoclea sensibilis* (sensitive fern), Salix species (willow), Cornus species (dogwood), and *Acer rubrum* (red maple). In many areas, flood have been intense enough to reduce tree canopy cover significantly. The resulting fl oodplain thickets consist of sparse and/or young tree cover accompanied by a prolific shrub, vine and herbaceous layer including *Clematis virginiana* (virgin's bower), *Vitis riparia* (river grape), *Solidago rugosa* (rough goldenrod), and *Panicum clandestinum* (hidden panic grass).

General Area: 1996: Forests and thickets occur at the mouths of tributary brooks, on islands, point bars, stabilized alluvial terraces, and sand and gravel bar systems. Heavy flood, ice-scour, and woody-debris deposition damage was evident in many areas. Soils included Rumney fine sandy loam, Podunk fine sandy loam, Saco silt loam, and mixed alluvial land (wet).

General Comments:

Management Comments: 1996: Maintain present flood control schedules and minimize or cease forest management activities in natural flood plain areas.

Location

Survey Site Name: Franklin Falls Dam
Managed By: Franklin Falls Reservoir

County: Belknap
Town(s): New Hampton
Size: 158.3 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Route 132 to New Hampton. Old Bristol Road to floodplain road. Park approximately 0.25 miles after Fiske Road intersection.

Dates documented

First reported: 1996-06-29 Last reported: 1996-09-11

New Hampshire Natural Heritage Bureau - Animal Record

American Eel (*Anguilla rostrata*)

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Apparently secure but with cause for concern
State:	Special Concern	State:	Rare or uncommon

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2009: Area 13331: 1 observed.
General Area: 2009: Area 13331: Lots of trash and junk in stream. Oily sheen on bank. Grassy plants in stream. Multiple species of algae in stream. Deer and raccoon highly abundant.
General Comments:
Management Comments:

Location

Survey Site Name: Sucker Brook-Webster Lake
Managed By:

County: Merrimack
Town(s): Franklin
Size: 1.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2009: Chance Pond Brook

Dates documented

First reported:	2009-06-11	Last reported:	2009-06-11

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Bald Eagle (*Haliaeetus leucocephalus*)

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Special Concern	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2002-2012: Wintering eagles regularly observed at locations along the Merrimack River, day perching and night roosts:2013: 1 eagle observed on 1/4. 1 eagle observed on 1/12. 3 eagles observed at a single location 1/29. 2 eagles observed at a single location on 2/1. 2 eagles observed at a single location on 2/15. 1 eagle observed on 2/23. 1 eagle observed on 3/4.2012: Solitary eagles observed at 3 separate locations on 1/7. 1 eagle observed on 1/12. 1 eagle observed on 1/17. 1 eagle observed on 1/19. Solitary eagles observed at 3 separate locations on 1/23. 1 eagle observed on 1/25. 1 eagle observed on 2/2. 1 eagle observed on 2/9. 1 eagle observed on 2/14. 2 eagles observed at a single location, and solitary eagles observed at 5 separate locations on 2/25. 2 eagles observed at a single location on 2/28. Solitary eagles observed at 2 separate locations on 3/6. 1 eagle observed on 12/11. 2011: 1 eagle observed on 1/5. 1 eagle observed on 1/6. 1 eagle observed on 1/8. Solitary eagles observed at 2 separate locations on 1/9. 1 eagle observed on 1/11. Solitary eagles observed at 2 separate locations on 1/13. 1 eagle observed on 1/20. 2 eagles observed at a single location on 1/31. Solitary eagles observed at 2 separate locations on 2/3. Solitary eagles observed at 2 separate locations on 2/7. 1 eagle observed on 2/9. 2 eagles observed at a single location and solitary eagles observed at 2 separate locations on 2/15. Solitary eagles observed at 2 separate locations on 2/17. 1 eagle observed on 2/22. 2 eagles observed at 2 separate locations and a solitary eagle at a separate location on 2/26. 1 eagle observed on 2/28. 1 eagle observed on 3/2. Solitary eagles observed at 2 separate locations on 3/8. 2 eagles observed at a single location, and a solitary eagle observed at a separate location on 3/15. 1 eagle observed on 12/27. 1 eagle observed on 12/29.2010: 3 eagles observed at a single location, 2 observed at a single location, and a solitary eagle observed at a separate location on 1/9. 1 eagle observed on 12/3. 1 eagle observed on 12/17. 1 eagle observed on 12/22. 2 eagles observed at a single location on 12/28. 2 eagles observed at a single location on 12/30.2009: 2 eagles observed at a single location, and a solitary eagle observed at a separate location on 1/10. 3 eagles observed at a single location on 2/28.2008: 2 eagles observed at a single location, and solitary eagles observed at 3 separate locations on 1/12. 2 eagles observed at a single location and a solitary eagle observed at a separate location on 2/23.2007: Solitary eagles observed at 2 separate locations on 1/13. 1 eagle observed on 2/24.2006: 1 eagle observed on 2/25.2005: 2 eagles observed at a single location on 1/8. 2 eagles observed at a single location and a solitary eagle observed at a separate location on 2/24. 2 eagles observed at a single location on 2/26.2004: Solitary eagles observed at 5 separate locations on 1/10. 1 eagle observed on 1/27.2003: 1 eagle observed on 1/7. 1 eagle observed on 1/9. 1 eagle observed on 2/2. Solitary eagles observed at 2 separate locations on 2/5. 1 eagle observed on 3/4.2002: 1 eagle observed on 1/12. 1 eagle observed on 12/18.1993: Sightings near Hannah Dusting parking area, but no defined roost or perch site. Perching on east side of Sewall's Falls Dam area. Perching near Horseshoe Pond. Perching on both sides from Bridge Street to Manchester Street. Perching on east side of the river near Blue Seal Feeds. No perching in last few years near Garvins Falls Dam. Bow Power Plant: On River Road on west side of river, possible roosting just north of liquor store. Perching in Hooksett on both sides of river just north of Route 3 bridge.1991: The most active locations are Sewalls Falls, wetlands near I-393, Bow Power Plant and Hooksett boat ramp. Location of eagles depends on availability of open water and other factors.

General Area:
General Comments:

Management
Comments:

Location

Survey Site Name: Merrimack River at Concord
Managed By: Merrimack River State Forest

County: Merrimack
Town(s): Concord
Size: 418.7 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Various locations along both banks of the Merrimack River, from Franklin south to Hooksett.

Dates documented

First reported: 198? Last reported: 2013-03-04

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Common Loon (*Gavia immer*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Threatened	State:	Not ranked (need more information)

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2017: Nest 2: 1 chick hatched, 1 chick survived.2016: 1 pair, no nest.2015: Nest 2: Nest and eggs present, no chicks hatched.2014: Nest 2: 2 chicks hatched, 0 chicks survived.2013: Nest 2: 2 chicks hatched, 1 chick survived.2012: Nest 2: Nest and eggs present, no chicks hatched.2011: Nest location unknown: 2 chicks hatched, 2 chicks survived.2010: Nest 1: 2 chicks hatched, 2 chicks survived.
General Area:
General Comments: LPC territory NHT0215
Management Comments:

Location

Survey Site Name: Webster Lake
Managed By: Webster Lake WMA

County: Merrimack
Town(s): Franklin
Size: 8.2 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions:

Dates documented

First reported: 2010 Last reported: 2017

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Wood Turtle (*Glyptemys insculpta*)

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Rare or uncommon
State:	Special Concern	State:	Rare or uncommon

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2013: Area 13473: 1 adult observed, sex unknown.
General Area: 2013: Area 13473: Roadside, coniferous forest.
General Comments:
Management Comments:

Location

Survey Site Name: Needle Shop Brook
Managed By:

County: Merrimack
Town(s): Hill
Size: 1.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2013: Area 13473: 114 Old Town Road, Hill.

Dates documented

First reported: 2013-07-03 Last reported: 2013-07-03

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

APPENDIX E

SHPO CORRESPONDENCE

Please mail the completed form and required material to:

New Hampshire Division of Historical Resources
State Historic Preservation Office
Attention: Review & Compliance
19 Pillsbury Street, Concord, NH 03301-3570

RECEIVED
MAY 07 2012

DHR Use Only	
R&C #	3814
Log In Date	5/7/12
Response Date	5/8/12
Sent Date	5/10/12

Request for Project Review by the New Hampshire Division of Historical Resources

☐ This Project is funded by the **American Recovery and Reinvestment Act of 2009**

X This is a new submittal ☐ This is additional information relating to DHR Review #:

GENERAL PROJECT INFORMATION

Project Title Eastman Falls Hydroelectric Project

Project Location 215 North Main Street, Franklin, NH 03235

Tax Map & Lot # Map 097, Lot 071-00

NH State Plane - Feet Geographic Coordinates: Easting 986,419.88 Northing 345,375.01 WGS84 datum
(see RPR Manual and R&C FAQ's for help accessing this data)

Lead Federal Agency FERC
(Agency providing funds, licenses, or permits)
Permit or Job Reference # FERC No. 2457

State Agency and Contact (if applicable)
Permit or Job Reference #

APPLICANT INFORMATION

Applicant Name Public Service Company of New Hampshire

Street Address 59 Ayers Island Road Phone Number 603-345-8531

City Bristol State NH Zip 03222 Email curtis.mooney@nu.com

CONTACT PERSON TO RECEIVE RESPONSE

Name/Company Andy Qua

Mailing Address PO Box 650, 141 Main Street Phone Number 207-487-3328

City Pittsfield State ME Zip 04967 Email Andy.Qua@KleinschmidtUSA.com

Thank You

Please refer to the Request for Project Review manual for direction on completing this form. Submit one copy of this project review form for each project for which review is requested. ✓Include a self-addressed stamped envelope to expedite review response. Project submissions will not be accepted via facsimile or e-mail. This form is required. Review request form must be complete for review to begin. Incomplete forms will be sent back to the applicant without comment. Please be aware that this form may only initiate consultation. For some projects, the Division of Historical Resources (DHR) may require additional information to complete our review. All items and supporting documentation submitted with a review request, including photographs and publications, must be retained by the DHR as part of its review records. Items to be kept confidential should be clearly identified. For questions regarding the DHR review process, please visit our website at: www.nh.gov/nhdhr/review or contact the R&C Specialist at 603.271.3558.

PROJECT BOUNDARIES AND DESCRIPTION

PROJECTS CANNOT BE PROCESSED WITHOUT THIS INFORMATION

REQUIRED

☐ Attach the relevant portion of a 7.5' USGS Map (photocopied or computer-generated) ***indicating the defined project boundary.***

☐ Attach a detailed written description of the proposed project. Include: (1) a narrative description of the proposed project; (2) site plan; (3) photos and description of the proposed work if the project involves rehabilitation, demolition, additions, or alterations to existing buildings or structures; and (4) a photocopy of the relevant portion of a soils map (if accessible) for ground-disturbing projects.

Architecture

Are there any buildings or structures within the project area? X Yes ☐ No

If yes, submit all of the following information:

Approximate age(s): Dam/Spillway completed in 1937 (age = 75 yrs); Unit 1 Powerhouse completed in 1937 (roof replaced in 1981); and Unit 2 Powerhouse originally constructed 1910 with significant modifications in 1983 to accommodate new turbine.

☐ Photographs of ***each*** building located within the project area along with a photo key. Include streetscape images if applicable. (Digital photographs are accepted. All photographs must be clear, crisp and focused)

☐ DHR file review conducted on N/A Provide file review results in project narrative.

Please note that as part of the review process, the DHR may request an architectural survey or other additional information.

Archaeology

Does the proposed undertaking involve ground-disturbing activity? ☐ Yes X No

If yes, submit all of the following information:

☐ Project specific map and/or preliminary site plan that fully describes the project boundaries and areas of proposed excavation.

☐ Description of current and previous land use and disturbances.

☐ Any available information concerning known or suspected archaeological resources within the project area.

Please note that as part of the review process, the DHR may request an archaeological survey or other additional information.

DHR COMMENT *This Space for Division of Historical Resources Use Only*

☑ No Potential to cause Effects ☐ Additional information is needed in order to complete our review

☐ No Adverse Effect ☐ No Historic Properties Affected ☐ Adverse Effect

Comments: Facility may be eligible for National Register, if plans are ever developed that will impact facility, then consultation will be requested. Archaeological sites may be located along river, no potential to impact.

If plans change or resources are discovered in the course of this project, you must contact the Division of Historical Resources as required by federal law and regulation.

Authorized Signature: Richard Boisvert DSHPO Date: 5-8-12

APPENDIX F

OPERATIONS COMPLIANCE MONITORING & MAINTENANCE PLAN APPROVAL

From: Curtis Mooney <cmooney@centralriverspower.com>
Sent: Tuesday, January 15, 2019 1:38 PM
To: Comstock, Gregg
Subject: Eastman Operations Compliance Monitoring & Maintenance Plan approval

Good afternoon Gregg:

Happy New Year!

Jeremy Jessup from FERC is asking again if the NHDES has approved the Eastman Falls (FERC No 2457) Operations Compliance Monitoring & Maintenance Plan (OCMMP). Please see the attached email.

Also, we are applying for Low Impact Hydropower Institute (LIHI) certification for Eastman Falls and as part of the application process, the LIHI reviewer is asking if the OCMMP Plan has been approved and if the Water Quality Monitoring Plan has been approved.

We incorporated NHDES comments on the Water Quality Monitoring Plan and filed the revised plan with FERC and cc'd you. We have not received formal approval from the NHDES or FERC regarding the Water Quality Monitoring Plan.

Your approval of these two plans would be helpful and much appreciated.

Please let me know if you have any questions.

Thanks,
Curt

Curtis R. Mooney, MS
Central Rivers Power
Manager, Regulatory Affairs

59 Ayers Island Road
Bristol, NH 03222

Office: (603) 744-8855 Ext. 2

-----Original Message-----
From: Jeremy Jessup <Jeremy.Jessup@ferc.gov>
Sent: Tuesday, January 08, 2019 7:56 AM
To: Curtis Mooney <cmooney@centralriverspower.com>
Subject: RE: General Correspondence issued in FERC P-2457-045

Good morning and happy new year, Curt!

I hope you had a nice holiday season! Any status update on approval from the NHDES? It would be nice to get this moving now that we are in the new year.

Thanks!
Jeremy

-----Original Message-----
From: Curtis Mooney [mailto:cmooney@centralriverspower.com]
Sent: Monday, November 26, 2018 10:27 AM
To: Jeremy Jessup <Jeremy.Jessup@ferc.gov>
Subject: RE: General Correspondence issued in FERC P-2457-045

Good morning Jeremy,

Hope all is well with you.

We have not heard anything from the NHDES.

Regards,
Curt

Curtis R. Mooney, MS
Central Rivers Power
Manager, Regulatory Affairs

59 Ayers Island Road
Bristol, NH 03222

Office: (603) 744-8855 Ext. 2

-----Original Message-----
From: Jeremy Jessup <Jeremy.Jessup@ferc.gov>
Sent: Tuesday, November 13, 2018 9:59 AM
To: Curtis Mooney <cmooney@centralriverspower.com>
Subject: RE: General Correspondence issued in FERC P-2457-045

I hope all is well!

Just checking to see if you have heard anything from the NHDES?

Thank you.

-----Original Message-----
From: Jeremy Jessup
Sent: Friday, October 12, 2018 8:00 AM
To: 'Curtis Mooney' <cmooney@centralriverspower.com>
Subject: RE: General Correspondence issued in FERC P-2457-045

Thanks! FYI - hope this letter helps.

https://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=15065761

-----Original Message-----
From: Curtis Mooney [mailto:cmooney@centralriverspower.com]
Sent: Friday, October 12, 2018 7:56 AM
To: Jeremy Jessup <Jeremy.Jessup@ferc.gov>
Subject: FW: General Correspondence issued in FERC P-2457-045

Good morning Jeremy:

FYI...

Curtis R. Mooney, MS
Central Rivers Power
Manager, Regulatory Affairs

59 Ayers Island Road
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-----Original Message-----
From: Comstock, Gregg <Gregg.Comstock@des.nh.gov>
Sent: Thursday, October 11, 2018 9:47 AM
To: Curtis Mooney <cmooney@centralriverspower.com>
Subject: RE: General Correspondence issued in FERC P-2457-045

Hi Curt.
I'll have comments to you on the OCMMP by the end of this month.
Thanks again for your patience.
Regards,
Gregg

Gregg Comstock, P.E.
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-----Original Message-----

From: 'FERC eSubscription' [mailto:eSubscription@ferc.gov]
Sent: Thursday, October 11, 2018 9:26 AM
Subject: General Correspondence issued in FERC P-2457-045

On 10/11/2018, the Federal Energy Regulatory Commission (FERC), Washington D.C., issued this document:

Docket(s): P-2457-045
Lead Applicant: Public Service Company of New Hampshire
Filing Type: General Correspondence
Description: Letter to Central Rivers Power Conpany re the Operation Compliance Monitoring and Maintenance Plan - Article 401 for the Eastman Fall Hydroelectric Project under P-2457.

To view the document for this Issuance, click here https://urldefense.proofpoint.com/v2/url?u=http-3A__elibrary.FERC.gov_idmws_file-5Flist.asp-3Faccession-5Fnum-3D20181011-2D3011&d=DwICAw&c=vYl7KJMDeuM7F-Nqf_hfailBifPmyspo7hrJGlNN7nU&r=jQV3q3wAp7UZLP0ejNeQHSu8x72xfeHp1GETrJIN43I&m=hAdUGismj6M4Mrcz_iB1-WJWSwC_vaHSHrrg71TvSU8&s=2FP9z-ueSqb1pWUApAn0hE6uDeRnJi41_dP9ZtLWBbw&e=

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or for phone support, call 866-208-3676.
Comments and Suggestions can be sent to this email address: mailto:FERCOnlineSupport@Ferc.gov

APPENDIX G

REFERENCES

159 FERC ¶ 62,070
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Public Service Company of New Hampshire Project No. 2457-041

ORDER ISSUING NEW LICENSE

(Issued April 20, 2017)

INTRODUCTION

1. On December 18, 2015, Public Service Company of New Hampshire (PSNH or licensee) filed, pursuant to sections 4(e) and 15 of the Federal Power Act (FPA),[1] an application for a new license to continue operation and maintenance of the Eastman Falls Hydroelectric Project No. 2457 (Eastman Falls Project).[2] The 6.06 megawatt (MW) project is located on the Pemigewasset River in the town of Franklin in Merrimack and Belknap Counties, New Hampshire. The project occupies 476 acres of federal land owned and maintained by the U.S. Army Corps of Engineers' (Corps).[3]

2. As discussed below, this order issues a new license for the project.

BACKGROUND

3. The Commission issued a new license for the project on August 25, 1987, with an effective date of January 1, 1988, that expires December 31, 2017.[4]

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[1] 16 U.S.C. §§ 797(e) and 808 (2012).

[2] PSNH revised its application by filings of January 13 and March 30, 2016.

[3] The project occupies federal land, and is located on the Pemigewasset River, which is a navigable waterway of the United States. *Public Service Company of New Hampshire*, 37 F.P.C. 578 (1967) (stating that the Pemigewasset River is a navigable waterway). For either of these reasons, section 23(b)(1) of the FPA, 16 U.S.C. § 817(1)(2012), requires the project to be licensed.

[4] 40 FERC ¶ 62,220 (1987). The original license for the project was issued on December 31, 1969. 42 F.P.C. 1310 (1969).

4. On April 26, 2016, the Commission issued a public notice that was published in the *Federal Register* accepting the application for filing, indicating the application was ready for environmental analysis, and setting June 27, 2016[5] as the deadline for filing motions to intervene, protests, comments, recommendations, preliminary terms and conditions, and preliminary fishway prescriptions.[6] The U.S. Department of the Interior (Interior) filed a notice of intervention,[7] as well as comments, recommendations, and preliminary fishway prescriptions. The Upper Merrimack River Local Advisory Committee (Merrimack Advisory Committee) filed a timely motion to intervene.[8] The New Hampshire Fish and Game Department filed comments in support of Interior's comments, recommendations, and prescriptions. PSNH filed reply comments on August 3, 2016.

5. Commission staff prepared, and on October 24, 2016, issued, an Environmental Assessment (EA) analyzing the impacts of the proposed project and alternatives to it. Interior, PSNH, and the Merrimack Advisory Committee filed comments on the EA.

6. The interventions, comments, recommendations, and conditions have been fully considered in determining whether, and under what conditions, to issue this license.

PROJECT DESCRIPTION

A. Project Area

7. The Eastman Falls Project is located on the Pemigewasset River in the town of Franklin, Merrimack and Belknap Counties, New Hampshire. From the project area, the Pemigewasset River flows about 1 mile before joining the Winnipesaukee River to form

[5] The Commission's Rules of Practice and Procedure provide that if a filing deadline falls on a Saturday, Sunday, holiday, or other day when the Commission is closed for business, the filing deadline does not end until the close of business on the next business day. 18 C.F.R. § 385.2007(a)(2) (2016). Because the 60-day filing deadline fell on a Saturday (i.e., June 25, 2016), the filing deadline was extended until the close of business on Monday, June 27, 2016.

[6] 81 *Fed. Reg.* 26,541 (May 2, 2016).

[7] Under Rule 214(a) of the Commission's Rules of Practice and Procedure, Interior became a party to the proceeding upon timely filing of its notice of intervention.

[8] Timely and unopposed motions to intervene are granted by operation of Rule 214(c)(1) of the Commission's Rules of Practice and Procedure. 18 C.F.R. § 385.214(c) (2016).

the Merrimack River in New Hampshire. From the confluence of the Winnipesaukee and the Pemigewasset rivers, the Merrimack River flows southeasterly for 116 miles to the Atlantic Ocean. Land use in the project area is primarily residential and the remaining land is commercial, transportation, industrial, and other urban uses.

B. Project Facilities

8. The Eastman Falls Project consists of a 341-foot-long, 37-foot-high concrete gravity dam and spillway with 6-foot-high steel flashboards and a crest elevation of 307 feet above mean sea level (msl) with the flashboards installed. The dam and spillway include a concrete waste gate with a 16-foot-high, 30-foot-wide steel slide gate and a 342-foot-long, 8-foot-deep floating louver array. The louver array extends upstream from the generating facilities to the reservoir shoreline to guide fish away from the generating facility intakes and towards a lowered flashboard on the spillway.

9. Eastman Falls dam impounds the 582-acre Eastman Falls reservoir with a normal maximum water surface elevation of 307 feet msl. The reservoir extends nine miles upstream of the dam and passes through an opening in the Corps) Franklin Falls dam.

10. The project includes two powerhouses. Water enters the intake for powerhouse 1 through a 12.5-foot-high, 15-foot-wide headgate structure and a trashrack with 3.5-inch clear-bar spacing. From the headgate and trashrack, water passes into a 12.5-foot-high, 12.5-foot-wide, 21-foot-long concrete penstock that leads to powerhouse 1 which contains a single 1.8-MW turbine-generator unit. Water is discharged from powerhouse 1 via a 60-foot-long draft tube.

11. Water enters the intake for powerhouse 2 through a 20-foot-high, 21-foot-wide headgate and two trashracks with 3.5-inch clear-bar spacing and then passes into powerhouse 2 which contains a single 4.26-MW turbine-generator unit. Water is discharged from powerhouse 2 via a 60-foot-long draft tube.

12. Generator leads connect the turbine-generator units in powerhouses 1 and 2 to a 100-foot-long, 2.4-kV transmission line that connects to the regional grid. A detailed project description is contained in ordering paragraph (B)(2).

13. The project includes three recreation facilities located near the dam: (1) Eastman Falls Recreation Area, which includes a picnic area and boat launch; (2) a portage trail; and (3) the Franklin Public Boat Ramp, which includes a parking area and picnic area.

C. Project Boundary

14. The existing project boundary encloses 582 acres from the Eastman Falls dam to the upstream end of the impoundment, including the 476 acres of federal land. The

project boundary encloses the three recreation facilities and the project facilities listed above.

D. Current Project Operation

15. PSNH operates the project in a run-of-river mode, whereby outflow from the project equals inflow at all times and water levels in the impoundment are not manipulated for power generation. The normal elevation of the impoundment is 307 feet msl. PSNH releases a year-round minimum flow of 410 cubic feet per second (cfs) or inflow (whichever is less) through generating facility No. 1.

16. The project uses flows between 250 cfs (the minimum hydraulic capacity of powerhouse 1) and 2,780 cfs (the combined maximum hydraulic capacity of powerhouses 1 and 2) to generate electricity. At flows less than 250 cfs, the project does not operate and all flow is either released through the waste gate or spilled over the dam. At inflows between 250 and 700 cfs, powerhouse 1 operates and powerhouse 2 is idle. At inflows between 700 and 1,830 cfs, powerhouse 2 operates and powerhouse 1 is idle. At inflows between 1,830 cfs and 2,780 cfs, both powerhouses operate at varying capacities within their operating ranges. When inflow exceeds 2,780 cfs, both powerhouses operate at maximum capacity and excess flow is spilled over the flashboards or passed through the waste gate.

17. To provide flood protection, the Corps closes the opening in Franklin Falls dam to maintain the spillway crest elevation of 389 feet msl during periods of high inflows. During this time, flows used for generation at the Eastman Falls Project are limited to releases from the Franklin Falls spillway.

18. The project's average annual generation is approximately 27,871 megawatt-hours (MWh).

E. Proposed Operation and Environmental Measures

19. PSNH proposes to: (1) continue to operate the project in a run-of-river mode such that impoundment fluctuations do not exceed ± 0.2 foot from the normal impoundment elevation of 307 feet msl with flashboards installed;[9] (2) implement an operation compliance monitoring and maintenance plan to monitor impoundment levels, flow

[9] PSNH also proposes to discontinue maintaining the 410-cfs minimum flow downstream of the project because it would serve no purpose at a run-of-river project with no bypassed reach. The 410-cfs minimum flow is a requirement of the current license that allows PSNH to operate the project in storage-and-release mode.

releases, and impoundment refill procedures; (3) maintain downstream flows of 502 cfs (equal to the aquatic base flow), or 90 percent of inflow to the impoundment (whichever is less) to protect downstream aquatic habitat when refilling the impoundment after drawdowns for maintenance or emergencies; (4) implement an invasive species management and monitoring plan to monitor the spread of invasive species within the project boundary and implement control measures, if necessary; and (5) continue to operate and maintain the Eastman Falls Recreation Area and the portage trail.

SUMMARY OF LICENSE REQUIREMENTS

20. As summarized below, this license, which authorizes 6.06 MW of renewable energy generation capacity, requires PSNH to implement most of the proposed measures noted above, with some modifications and additional staff-recommended measures described below. The license also includes the conditions required by the New Hampshire Department of Environmental Services (New Hampshire DES) water quality certification (certification) (Appendix A). Combined, these measures will protect water quality, fisheries resources, recreation, and cultural resources at the project.

21. To protect water quality and aquatic resources, the license requires PSNH to: (1) continue to operate the project in a run-of-river mode and ensure that impoundment water level fluctuations do not exceed ± 0.2 foot from the normal impoundment elevation of 307 feet msl with flashboards installed; (2) implement an impoundment refill procedure whereby 90 percent of project inflow is passed downstream and 10 percent is used to refill the impoundment; (3) implement an operation compliance monitoring and maintenance plan to monitor impoundment levels, flow releases, and impoundment refill procedures; (4) develop a plan to conduct water temperature and dissolved oxygen (DO) monitoring continuously upstream and downstream of Eastman Falls dam for up to 3 years during the period of June 1 to September 30; (5) develop a plan to install up to three upstream fishways for American eel that will be operated annually from May 1 to October 30; (6) develop a plan to annually implement downstream passage measures (interim measures will be implemented initially and eventually be replaced by permanent measures) for American eel from August 15 to November 15; (7) develop and implement a fishway operation and maintenance plan, including procedures for managing debris collected at or near fish passage facilities; and (8) develop and implement a fishway effectiveness monitoring plan.

22. To monitor and control the spread of invasive species within the project boundary, the license requires PSNH to develop and implement an invasive species management and monitoring plan.

23. To protect existing recreation opportunities at the project, the license requires PSNH to continue to operate and maintain project recreation facilities.

24. To protect cultural resources, the license requires PSNH to consult with the New Hampshire State Historic Preservation Commission prior to implementing any project modifications not specifically authorized by this license, or if any unknown cultural resources are discovered during routine project operation.

WATER QUALITY CERTIFICATION

25. Under section 401(a)(1) of the Clean Water Act (CWA),[10] the Commission may not issue a license authorizing the construction or operation of a hydroelectric project unless the state water quality certifying agency either has issued water quality certification for the project or has waived certification by failing to act on a request for certification within a reasonable period of time, not to exceed one year. Section 401(d) of the CWA provides that the certification shall become a condition of any federal license that authorizes construction or operation of the project.[11]

26. On December 18, 2015, PSNH applied to the New Hampshire DES for water quality certification for the Eastman Falls Project. On December 15, 2016, the New Hampshire DES issued a certification for the project that includes 15 conditions (conditions E-1 through E-15), which are set forth in Appendix A of this order and incorporated into the license by ordering paragraph (D). Eight of the conditions (conditions E-1 through E-7 and E-15) are general or administrative and are not discussed further.

27. The remaining seven conditions require PSNH to: (1) operate the Eastman Falls Project in run-of-river mode at a water surface elevation of 307 feet msl ($\pm$ 0.2 foot msl) (Condition E-8a), maintain a maximum impoundment drawdown rate of six inches or less per day, to the extent possible (Condition E-8b), and implement an impoundment refill procedure after drawdowns for maintenance or emergencies where 90 percent of project inflow is passed downstream and 10 percent is used to refill the impoundment (Condition E-8b); (2) maintain electronic records of project operation and provide an annual report to New Hampshire DES demonstrating compliance with project operation requirements (Condition E-9); (3) notify the New Hampshire DES of deviations from run-of-river operation within 24 hours and file a report about the incident within 45 days (Condition E-10); (4) develop an operation compliance monitoring plan that describes how the

[10] 33 U.S.C. § 1341(a)(1) (2012).

[11] 33 U.S.C. § 1341(d) (2012).

project will be operated under various scenarios (i.e., normal flows, low flows, high flows, maintenance periods, and emergencies; the plan must also describe procedures for measuring, monitoring, and reporting project operation) (Condition E-11); (5) develop a plan to monitor and manage invasive species in the project area (Condition E-12); (6) develop a plan to monitor water quality in the impoundment and downstream of the dam (Condition E-13, which specifies that the monitoring results will be used to determine if mitigation measures or additional monitoring is necessary); and (7) comply with Interior's section 18 prescriptions, including any future modifications to those prescriptions (Condition E-14).

28. Periodically, the project impoundment is drawn down when flashboards are lowered during high flows, for maintenance, or for emergencies and run-of-river operation may be temporarily suspended. Condition E-8b requires PSNH to implement an impoundment refill procedure after drawdowns for maintenance or emergencies where 90 percent of project inflow is passed downstream and 10 percent is used to refill the impoundment. In the EA,[12] staff recommended a different impoundment refill procedure that would allow PSNH to release the aquatic base flow (502 cfs) or 90 percent of inflow (whichever is less) when refilling the impoundment after drawdowns for maintenance and emergencies. Staff recommended this alternative because it would provide adequate protection of downstream aquatic habitat while allowing the project to generate more power than would occur during the procedure required by condition E-8. However, because the impoundment refill procedure specified by condition E-8 is mandatory, it is required by ordering paragraph (D) and attached to this order in Appendix A.

29. Condition E-13 requires PSNH to monitor water quality in the impoundment and downstream of the project dam. In its license application, PSNH presents the results of water quality monitoring that indicates that DO in the project area meets New Hampshire DES's standards during warm, low-flow periods. Based on this information and proposed run-of-river operation, staff concluded in the EA[13] that the project would not likely contribute to or exacerbate DO problems in the Pemigewasset River and staff did not recommend requiring additional water quality monitoring. However, because the water quality monitoring specified in condition E-13 of the certification is mandatory, it is required by ordering paragraph (D) and attached to this order in Appendix A.

30. The 15 conditions of the certification are set forth in Appendix A of this order and incorporated into the license by ordering paragraph (D). Article 401 requires the licensee to file, for Commission approval, plans and reports required by the certification

[12] EA at 49.

[13] EA at 22 and 49.

conditions, notify the Commission of emergencies and other activities, and file amendment applications, as appropriate.

COASTAL ZONE MANAGEMENT ACT

31. Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA),[14] the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within six months of its receipt of the applicant's certification. By letter dated November 5, 2016, New Hampshire DES states that the project is not located within the state-designated coastal zone and the project will not affect New Hampshire's coastal resources. Therefore, a CZMA consistency certification is not required.

SECTION 18 FISHWAY PRESCRIPTION

32. Section 18 of the FPA[15] provides that the Commission shall require the construction, maintenance, and operation by a licensee of such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, as appropriate.

33. By letter filed January 23, 2017, Interior provided section 18 prescriptions that require PSNH to provide upstream and downstream passage for American eel at the Eastman Falls dam, prepare a fishway operation and maintenance plan, and prepare a fishway effectiveness monitoring plan. Interior's prescriptions are required by ordering paragraph (E) and attached to this order in Appendix B.

34. Interior also requested that the Commission reserve authority to prescribe fishways. Consistent with Commission policy, Article 402 of the license reserves the Commission's authority to require fishways that may be prescribed by Interior for the Eastman Falls Project.

THREATENED AND ENDANGERED SPECIES

35. Section 7(a)(2) of the Endangered Species Act of 1973 (ESA)[16] requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of

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[14] 16 U.S.C. § 1456(c)(3)(A) (2012).

[15] 16 U.S.C. § 811 (2012).

[16] 16 U.S.C. § 1536(a) (2012).

federally listed threatened and endangered species, or result in the destruction or adverse modification of their designated critical habitat.

36. In a letter dated June 22, 2016, Interior states that suitable habitat for the federally threatened northern long-eared bat exists within and adjacent to the project area. The EA found that, while there is northern long-eared bat habitat within and adjacent to the project area, northern long-eared bats are not known to inhabit the project area. In addition, there are no measures included in this license that would affect northern long-eared bat habitat. Based on this information, licensing the project will have no effect on the threatened northern long-eared bat. Therefore, no further action under the ESA is required.

NATIONAL HISTORIC PRESERVATION ACT

37. Under section 106 of the National Historic Preservation Act (NHPA)[17] and its implementing regulations,[18] federal agencies must take into account the effect of any proposed undertaking on properties listed or eligible for listing in the National Register of Historic Places (National Register), defined as historic properties, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking. This generally requires the Commission to consult with the State Historic Preservation Officer (SHPO) to determine whether and how a proposed action may affect historic properties, and to seek ways to avoid or minimize any adverse effects.

38. The Eastman Falls dam was constructed as a power source in 1903 by the Pemigewasset Power Company. Powerhouse 1 was built in 1937, while powerhouse 2, originally built in 1910, was retrofitted in 1983. By letter dated May 8, 2012, the New Hampshire SHPO indicated that the Eastman Falls facilities may be eligible for listing on the National Register. However, the New Hampshire SHPO concluded that issuing a license for the project would have "no potential to cause effects" on historic, architectural, or archaeological resources based on the applicant's proposal.[19] The EA concludes that because there are no known cultural resources within the project's area of

[17] Section 106 of the National Historic Preservation Act of 1966, as amended, 54 U.S.C. § 306108, Pub. L. No. 113-287, 128 Stat. 3188 (2014). (The National Historic Preservation Act was recodified in Title 54 in December 2014.)

[18] 36 C.F.R. Part 800 (2016).

[19] PSNH December 18, 2015 application, at Appendix A.

potential effect and no changes to the project's features or operation are proposed, issuing a license for the project would have no adverse effect on historic properties.[20]

39. While the project will have no adverse effect on known historic properties, cultural resources could be discovered during the course of operating or maintaining the project. If cultural resources are inadvertently discovered during construction or operation of the project, PSNH must stop all land-disturbing activities and consult with the New Hampshire SHPO to determine the need for any cultural resource studies or measures. If no measures are needed, PSNH must file documentation of its consultation. If a discovered cultural resource is determined to be eligible for the National Register, the licensee must file for Commission approval a historic properties management plan. As required by Article 405, PSNH must not resume land-clearing or land-disturbing activities until informed by the Commission that the requirements of the article are met.

40. Additionally, project maintenance activities that may be needed during the term of this license, but do not require Commission approval, could adversely affect cultural resources.[21] Therefore, Article 406 requires the licensee to consult with the New Hampshire SHPO prior to conducting any project modifications to determine the effects of the activities and the need for protection measures.

RECOMMENDATIONS OF FEDERAL AND STATE FISH AND WILDLIFE AGENCIES PURSUANT TO SECTION 10(j) OF THE FPA

41. Section 10(j)(1) of the FPA[22] requires the Commission, when issuing a license, to include conditions based on recommendations submitted by federal and state fish and wildlife agencies pursuant to the Fish and Wildlife Coordination Act[23] to "adequately and equitably protect, mitigate damages to, and enhance fish and wildlife (including related spawning grounds and habitat)" affected by the project.

42. In response to the April 26, 2016 public notice that the project was ready for environmental analysis, Interior filed seven recommendations under section 10(j).[24] Two

[20] EA at 37.

[21] Activities could include modifications to the powerhouses, such as painting, roof repairs, or general landscaping. *Id.*

[22] 16 U.S.C. § 803(j)(1) (2012).

[23] 16 U.S.C. §§ 661 *et seq.* (2012).

[24] Interior filed the recommendations on June 22, 2016.

of the recommendations are outside the scope of section 10(j) and are discussed in the next section. Three of the recommendations that are within the scope of section 10(j) and are included in this license require PSNH to: (1) operate the project in an instantaneous run-of-river mode (required by certification condition E-8a), (2) develop and implement an operation and flow monitoring plan (required by certification condition E-11), and (3) maintain the impoundment elevation at 307 feet msl $\pm$ 0.2 foot (required by certification condition E-8b). The remaining two recommendations that are within the scope of section 10(j) are also included in this license, and are discussed below.

43. In the EA, Commission staff made an initial determination that Interior's recommendation to develop and implement a post-license water quality monitoring plan may be inconsistent with the comprehensive planning standard of section 10(a)(1) of the FPA. Staff did not recommend water quality monitoring because existing water quality meets New Hampshire state standards and the project would continue to operate in run-of-river mode.[25] However, because the water quality monitoring plan is included in the certification (see condition E-13), which is mandatory,[26] the water quality plan is required by the license.

44. In the EA, Commission staff made an initial determination that Interior's recommendation to implement an impoundment refill protocol that passes 90 percent of inflow downstream and uses 10 percent of inflow to refill the impoundment may be inconsistent with the comprehensive planning standard of section 10(a)(1) of the FPA. Staff did not recommend Interior's refill protocol because PSNH's proposed refill protocol (i.e., releasing the aquatic base flow (502 cfs) or 90 percent of inflow (whichever is less) when refilling the impoundment) would protect aquatic habitat while allowing PSNH to generate more power than Interior's refill protocol.[27] However, because the refill protocol is included in the certification (condition E-8c), which is mandatory, the impoundment refill protocol to pass 90 percent of inflow downstream and use 10 percent of inflow to refill the impoundment is required by the license.

SECTION 10(a)(1) OF THE FPA

45. Section 10(a)(1) of the FPA[28] requires that any project for which the Commission issues a license be best adapted to a comprehensive plan for improving or developing a

[25] EA at 49.

[26] *See American Rivers v. FERC*, 129 F.3d 99 (2nd Cir. 1997).

[27] EA at 49-50.

[28] 16 U.S.C. § 803(a)(1) (2012).

waterway or waterways for the use or benefit of interstate or foreign commerce; for the improvement and utilization of waterpower development; for the adequate protection, mitigation, and enhancement of fish and wildlife; and for other beneficial public uses, including irrigation, flood control, water supply, recreation, and other purposes.

A. Interior's Recommendation

46. Interior made one recommendation under section 10(a)(1). In addition, as noted above, Interior made two recommendations under section 10(j) that are not specific measures to protect, mitigate damages to, or enhance fish and wildlife. These recommendations are considered below under the broad public-interest standard of section 10(a)(1).

47. Interior recommends that the licensee be required to notify Interior if an amendment or appeal of any fish and wildlife-related license conditions, or extension of time is filed with the Commission (10(a) recommendation 1).

48. For significant amendments related to fish and wildlife resources, the Commission's regulations require licensees to consult with Interior while preparing an amendment application.[29] For other amendments, appeals, and requests for extensions of time, Interior can receive notification of any filings and issuances through the Commission's eSubscription service.[30] Therefore, there is no need to include Interior's recommendation as a requirement of this license.

49. Interior recommends that the licensee develop and implement an invasive species management and monitoring plan (10(j) recommendation 5). This plan is required in the license by certification condition E-12.

50. Interior recommends that the Commission consult under section 7 of the Endangered Species Act if northern long-eared bat habitat will be affected by project activities (10(j) recommendation 6).

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[29] If a licensee files a request to amend its license or to amend any fish and wildlife-related license condition, the licensee may need to consult with Interior pursuant to sections 4.38(a)(6) and 4.201(c) of the Commission's regulations. 18 CF.R. §§ 4.38(a)(6) and 4.201(c) (2016).

[30] The Commission's eSubscription service can be accessed at http://www.ferc.gov/docs-filing/esubscription.asp.

51. As discussed above and in the EA,[31] operation of the project, as licensed herein, will have no effect on the threatened northern long-eared bat or its habitat. Therefore, there is no need for consultation or to include any measures addressing northern long-eared bats in this license.

B. Comments on the EA

52. Interior, PSNH, and the Merrimack Advisory Committee filed comments during the EA comment period. Interior's letter reiterates its recommendations for water quality monitoring, impoundment refill, and consultation on northern long-eared bat, but did not provide any specific comments on the EA. The Merrimack Advisory Committee's letter indicates its support for Interior's and New Hampshire DES's recommendations, conditions, and prescriptions and also did not provide any specific comments on the EA.

53. In its comments on the EA, PSNH states that the use of traps to collect juvenile American eel and the target number of eels collected in the traps could be determined as part of an upstream eel passage plan. In response to staff's statement in the EA[32] that the only existing routes for downstream movement of American eel at the dam are over the spillway or through the turbines, PSNH states that the project also has a bottom-opening waste gate that could be used for passing out-migrating American eel. PSNH also states that biological triggers, based on upstream eel passage rates and eel life cycle, should be considered as part of any downstream eel passage measures, whether interim or permanent. While the EA did not address the potential development of an upstream passage plan, the use of the bottom-opening waste gate for downstream passage, or the use of biological triggers, we expect that each of these activities can be addressed during the consultation on upstream and downstream eel passage measures with Interior (and the New Hampshire Fish and Game Department) that is required by prescriptions 13.1 and 13.2.

C. Other Issues

Debris Management

54. Interior's prescription 12.4 requires PSNH to develop a fishway operation and maintenance plan that includes debris removal from any guidance channels and fishway entrances and exits. Removing debris from fish passage facilities will ensure the effectiveness of any passage facilities; however, prescription 12.4 does not address the

[31] EA at 34.

[32] EA at 25.

handling and disposal of removed debris. To ensure that inorganic trash is properly disposed of (i.e., recycled or sent to a landfill) and organic debris, that may provide valuable habitat for fish and macroinvertebrates, is reintroduced to the river, staff recommended in the EA that the plan be modified to include procedures for sorting, passing, or disposing of debris, as appropriate.[33] Therefore, Article 403 requires PSNH to describe procedures for handling and disposal of debris as part of the fishway operation and maintenance plan.

Recreation Facilities

55. As discussed above, the Eastman Falls Project includes three recreation facilities owned by PSNH: Eastman Falls Recreation area, portage trail, and the Franklin Public Boat Ramp. PSNH operates and maintains the Eastman Falls Recreation area and the portage trail, and the City of Franklin operates and maintains the Franklin Public Boat Ramp. While PSNH may enter into an agreement with the City to operate and maintain the Franklin Public Boat Ramp, PSNH, as the licensee is ultimately responsible for ensuring adequate operation and maintenance of the project's recreational facilities. Article 404 requires PSNH to continue to provide public access to and ensure adequate operation and maintenance of the three project recreation facilities.

ADMINISTRATIVE PROVISIONS

A. Annual Charges

56. The Commission collects annual charges from licensees for administration of the FPA. Article 201 provides for the collection of funds for administration of the FPA.

57. Section 10(e) of the FPA directs the Commission to assess licensees an annual charge to recompense the United States "for the use, occupancy, and enjoyment" of its lands.[34] As noted, the Eastman Falls Project boundary includes approximately 476 acres of federal land managed by the Corps, as part of the Franklin Falls Flood Control Dam.

58. PSNH filed documentation indicating that it has maintained prescriptive rights and deeded flowage rights entitling it to flow water over land managed by the Corps since before the federal government acquired the land for construction of the Franklin Falls Flood Control Dam.[35]

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[33] EA at 47-48.

[34] 16 U.S.C. § 803(e) (2012).

[35] PSNH April 3, 2013, Response to Request for Additional Information, *(continued ...)*

59. The information provided by PSNH demonstrates that it has acquired and retained sufficient rights to carry out project purposes over land managed by the Corps as a part of the Franklin Falls Control Dam. Accordingly, the Commission will not assess an annual charge for the project's occupancy of government lands.[36]

B. Exhibit F and G Drawings

60. The Exhibit F drawings filed on December 18, 2015, and the Exhibit G drawings filed on March 30, 2016, are approved and made part of the license (ordering paragraph (C)). The Commission requires licensees to file sets of approved project drawings in electronic file format. Article 202 requires the filing of these drawings.

C. Amortization Reserve

61. The Commission requires that for new major licenses, non-municipal licensees set up and maintain an amortization reserve account upon license issuance. Article 203 requires the establishment of the account.

D. Headwater Benefits

62. Some projects directly benefit from headwater improvements that were constructed by other licensees, the United States, or permittees. Article 204 requires the licensee to reimburse such entities for these benefits if they were not previously assessed and reimbursed.

E. Use and Occupancy of Project Lands and Waters

63. Requiring a licensee to obtain prior Commission approval for every use or occupancy of project land would be unduly burdensome. Therefore, Article 407 allows the licensee to grant permission, without prior Commission approval, for the use and occupancy of project lands for such minor activities as landscape planting. Such uses must be consistent with the purposes of protecting and enhancing the scenic, recreational, and environmental values of the project.

F. As-Built Exhibits

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supplemented on May 1, 2013.

[36] *See Consumers Power Company*, 73 FERC ¶ 61,093, at 61,300 (1995) (citing *Pacific Gas and Electric Company*, 56 F.P.C. 964 (1976); *Pacific Gas and Electric Company*, 2 FERC ¶ 61,105 (1978)).

64. Where new construction or modifications to the project are involved (i.e., new fish passage facilities), the Commission requires licensees to file revised exhibits of project features as-built. Article 205 provides for the filing of these exhibits.

G. Review of Final Plans and Specifications

65. Article 301 requires the licensee to provide the Commission's Division of Dam Safety and Inspection New York Regional Office (D2SI-NYRO) with final contract drawings and specifications— together with a supporting design document consistent with the Commission's engineering guidelines. The submittal must include a quality control and inspection program, a temporary construction emergency action plan, and a soil erosion and sediment control plan.

66. Article 302 requires the licensee to provide the Commission's D2SI-NYRO with cofferdam construction drawings if cofferdams will be used for the construction activities authorized or required by this license.

67. Article 303 requires the licensee to provide the Commission's D2SI-NYRO with proposed project modifications resulting from environmental requirements.

H. Commission Approval of Resource Plans, Notification, and Filing of Reports and Amendments

68. In Appendices A and B, there are certain certification conditions and fishway prescriptions that either do not require the licensee to file plans with the Commission or do not provide for consultation with the appropriate agencies during plan development. Therefore, Article 401 requires the licensee to consult with the other agencies during plan development and to file the plans with the Commission for approval, notify the Commission of planned and unplanned deviations from license requirements, and file amendment applications, as appropriate.

STATE AND FEDERAL COMPREHENSIVE PLANS

69. Section 10(a)(2)(A) of the FPA,[37] requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project.[38] Under section 10(a)(2)(A), federal and state agencies filed 32 comprehensive plans that address

[37] 16 U.S.C. § 803(a)(2)(A) (2012).

[38] Comprehensive plans for this purpose are defined at 18 C.F.R. § 2.19 (2016).

various resources in New Hampshire. Of these, the staff identified and reviewed six comprehensive plans relevant to this project.[39] No conflicts were found.

APPLICANT'S PLANS AND CAPABILITIES

70. In accordance with sections 10(a)(2)(C) and 15(a) of the FPA,[40] Commission staff evaluated PSNH's record as a licensee for these areas: (A) conservation efforts; (B) compliance history and ability to comply with the new license; (C) safe management, operation, and maintenance of the project; (D) ability to provide efficient and reliable electric service; (E) need for power; (F) transmission services; (G) cost effectiveness of plans; and (H) actions affecting the public. This order adopts staff's findings in each of the following areas.

A. Conservation Efforts

71. Section 10(a)(2)(C) of the FPA requires the Commission to consider an applicant's electricity consumption improvement programs in the case of license applicants primarily engaged in the generation or sale of electric power, like PSNH. PSNH implements programs to improve efficiency and promotes energy conservation, including an energy savings plan and smart energy use solutions. These programs show that PSNH is making an effort to conserve electricity and made a satisfactory good faith effort to comply with section 10(a)(2)(C) of the FPA.

B. Compliance History and Ability to Comply with the New License

72. Based on a review of PSNH's compliance with the terms and conditions of the existing license, PSNH's overall record of making timely filings and complying with its license is satisfactory. Therefore, PSNH can satisfy the conditions of a new license.

C. Safe Management, Operation, and Maintenance of the Project

73. PSNH's record of management, operation, and maintenance of the Eastman Falls Project pursuant to the requirements of 18 C.F.R. Part 12 and the Commission's Engineering Guidelines and periodic Independent Consultant's Safety Inspection Reports demonstrate that the project works are safe, and that there is no reason to believe that PSNH cannot continue to safely manage, operate, and maintain these facilities under a new license.

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[39] The list of applicable plans can be found in section 5.4 of the EA and has not changed since issuance of the EA.

[40] 16 U.S.C. §§ 803(a)(2)(C) and 808(a) (2012).

D. Ability to Provide Efficient and Reliable Electric Service

74. Staff has reviewed PSNH's plans and its ability to operate and maintain the project in a manner most likely to provide efficient and reliable electric service. Staff's review indicates that PSNH regularly inspects the project turbine-generator units to ensure they continue to perform in an optimal manner, schedules maintenance to minimize effects on energy production, and since the project has been in operation, has undertaken several initiatives to ensure the project is able to operate reliably into the future. Therefore, PSNH is capable of operating the project to provide efficient and reliable electric service in the future.

E. Need for Power

75. The project is located in the Northeast Power Coordinating Council (NPCC) New England region of the North American Electric Reliability Corporation (NERC) and generates an average of 27,871 MWh annually. To assess the need for power, staff looked at PSNH's present and anticipated future use of project power, together with the need for power in the operating region in which the project is located.

76. NERC annually forecasts electrical supply and demand in the nation and the region for a 10-year period. NERC's most recent report indicates summer peak demand in the NPCC New England region is projected to grow at an annual rate of 0.48 percent from 2016 through 2025. Therefore, the project's power will help meet the regional need for power.

F. Transmission Services

77. The project includes a 100-foot-long transmission line that connects the generator bus in generating facility No. 2 to the regional grid. PSNH is proposing no changes that would affect its own or other transmission services in the region. The project and its transmission line provide power and voltage control in New Hampshire and the region.

G. Cost Effectiveness of Plans

78. PSNH does not propose to change project operation or add new project facilities, but it does propose to develop and implement a number of plans to enhance environmental resources affected by the project. Based on PSNH's record as an existing licensee, these plans are likely to be carried out in a cost-effective manner.

H. Actions Affecting the Public

79. PSNH provided opportunities for public involvement in the development of its application for a new license for the Eastman Falls Project. In addition, during the previous license period, PSNH operated the project in a manner that supported recreation

activities, including boating, fishing, and picnicking in the Pemigewasset River upstream and downstream of the project.

PROJECT ECONOMICS

80. In determining whether to issue a new license for an existing hydroelectric project, the Commission considers a number of public interest factors, including the economic benefits of project power. Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,[41] the Commission uses current costs to compare the costs of the project and likely alternative power with no forecasts concerning potential future inflation, escalation, or deflation beyond the license issuance date. The basic purpose of the Commission's economic analysis is to provide a general estimate of the potential power benefits and the costs of a project, and of reasonable alternatives to project power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

81. In applying this analysis to the Eastman Falls Project, staff considered three options: no-action alternative, PSNH's proposal, and the project as licensed herein. Under the no-action alternative, the project would continue to operate as it does now. The project has an installed capacity of 6.06 MW, and generates an average of 27,871 MWh of electricity annually. The average annual project cost is about $ $867,346, or $31.12/MWh. When an estimate of average generation is multiplied by the alternative power cost of $40.71/MWh,[42] the total value of the project's power is $1,134,628 in 2016 dollars. To determine whether the proposed project is currently economically beneficial, the project's cost is subtracted from the value of the project's power. Therefore, the project costs $ $267,282, or $9.59/MWh, less to produce power than the likely alternative cost of power.

82. As proposed by PSNH, the levelized annual cost of operating the Eastman Falls Project is $869,575, or $31.20/MWh. The proposed project would generate an average of 27,871 MWh of energy annually. The estimate of average generation is multiplied by the alternative power cost of $40.71/MWh, a total value of the project's power is $1,134,628, in 2016 dollars. Therefore, in the first year of operation, the project would cost $265,053, or $9.51/MWh, less than the likely alternative cost of power.

[41] 72 FERC ¶ 61,027 (1995).

[42] The alternative power cost of $40.71 per MWh is based on the New England Independent Operating System real time cost for New Hampshire.

83. As licensed herein with mandatory conditions and staff measures, the levelized annual cost of operating the Eastman Falls Project is $879,051, or $31.54/MWh. The proposed project would generate an average of 27,871 MWh of energy annually. The estimate of average generation is multiplied by the alternative power cost of $40.71/MWh, a total value of the project's power is $1,134,628, in 2016 dollars. Therefore, in the first year of operation, the project would cost $255,577, or $9.17/MWh, less than the likely alternative cost of power.

84. In considering public interest factors, the Commission takes into account that hydroelectric projects offer unique operational benefits to the electric utility system (ancillary service benefits). These benefits include the ability to help maintain the stability of a power system, such as by quickly adjusting power output to respond to rapid changes in system load; and to respond rapidly to a major utility system or regional blackout by providing a source of power to help restart fossil-fuel based generating stations and put them back on line.

COMPREHENSIVE DEVELOPMENT

85. Sections 4(e) and 10(a)(1) of the FPA[43] require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. The decision to license this project, and the terms and conditions included herein, reflect such consideration.

86. The EA for the project contains background information, analysis of effects, and support for related license articles. Based on the record of this proceeding, including the EA and the comments thereon, licensing the Eastman Falls Project as described in this order would not constitute a major federal action significantly affecting the quality of the human environment. The project will be safe if operated and maintained in accordance with the requirements of this license.

87. Based on an independent review and evaluation of the Eastman Falls Project, recommendations from the resource agencies and other stakeholders, and the no-action alternative, as documented in the EA, the proposed Eastman Falls Project, with the staff-recommended measures, is best adapted to a comprehensive plan for improving or developing the Pemigewasset River.

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[43] 16 U.S.C. §§ 797(e) and 803(a)(1) (2012).

88. This alternative was selected because: (1) issuance of a new license will serve to maintain a beneficial, dependable, and inexpensive source of electric energy; (2) the required environmental measures will protect and enhance fish and wildlife resources, water quality, recreation, and cultural resources; and (3) the 6.06 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution.

LICENSE TERM

89. Section 15(e) of the FPA[44] provides that any new license issued shall be for a term that the Commission determines to be in the public interest, but not less than 30 years or more than 50 years. The Commission's general policy is to establish 30-year terms for projects with little or no redevelopment, new construction, new capacity, or environmental mitigation and enhancement measures; 40-year terms for projects with a moderate amount of such activities; and 50-year terms for projects with extensive measures.[45] This license authorizes no new capacity, and requires a minor amount of new environmental mitigation measures. Consequently, a 30-year license term for the Eastman Falls Project is appropriate.

The Director Orders:

(A) This license is issued to Public Service Company of New Hampshire (licensee), for a period of 30 years, effective January 1, 2018, to operate and maintain the Eastman Falls Hydroelectric Project. This license is subject to the terms and conditions of the Federal Power Act (FPA), which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the FPA.

(B) The project consists of:

(1) All lands, to the extent of the licensee's interests in those lands, enclosed by the project boundary shown by Exhibits G-1, G-2, and G-3 filed on March 30, 2016:

Exhibit G Drawing	FERC P-2457-	Description
G-1	1001	Project Boundary Map
G-2	1002	Project Boundary Map

[44] 16 U.S.C. § 808(e) (2012).

[45] *See Consumers Power Co.*, 68 FERC ¶ 61,077, at 61,383-84 (1994).

Exhibit G Drawing	FERC P-2457-	Description
G-3	1003	Project Boundary Map

(2) Project works consisting of: (a) a 341-foot-long, 37-foot-high concrete gravity dam with a crest elevation of 301 feet above mean sea level (msl) and 6-foot-high steel flashboards; (b) a concrete waste gate with a 16-foot-high, 30-foot-wide steel slide gate; (c) a 582-acre impoundment with a normal maximum water surface elevation of 307 feet msl; (d) a 342-foot-long, 8-foot-deep floating louver array extending from the spillway to the reservoir shoreline; (e) a 29-foot-long, 29-foot-wide, 34-foot-high concrete and masonry powerhouse (powerhouse 1); and (f) an 88-foot-long, 78-foot-wide, 56-foot-high concrete and masonry powerhouse (powerhouse 2).

Powerhouse 1 and its associated facilities include: (a) a 12.5-foot-high, 15-foot-wide headgate structure with a 23.75-foot-high, 17-foot-wide trashrack with 3.5-inch clear-bar spacing; (b) a 12.5-foot-high, 12.5-foot-wide, 21-foot-long concrete penstock; (c) a 40-foot-high, 20-foot-wide stop log slot; (d) a single 1.8-megawatt (MW) turbine-generator unit; and (e) a 23-foot-wide, 14.5-foot-high, 60-foot-long draft tube.

Powerhouse 2 and its associated facilities include: (a) a 20-foot-high, 21-foot-wide headgate with two 12.3-foot-wide, 9.3-foot-high trashracks with 3.5-inch clear-bar spacing; (b) a 20.8-foot-high, 22.4-foot-wide stop log slot; (c) a single 4.26-MW turbine-generator unit; and (d) a 23-foot-wide, 14.5-foot-high, 60-foot-long draft tube.

Other project facilities include: (a) two 245-foot-long, 2.4-kilovolt (kV) generator leads that connect the turbine-generator in powerhouse 1 to a generator bus in powerhouse 2; (b) four 110-foot-long, 2.4-kV generator leads that connect the turbine-generator in powerhouse 2 to a generator bus in powerhouse 2; (c) a 100-foot-long, 2.4-kV transmission line that connects the generator bus in powerhouse 2 to the regional grid; and (d) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of Exhibits A, F, and G shown below:

Exhibit A: Pages 1 through 8 (entitled "Project Description") of the Exhibit A filed on December 18, 2015, and pages 2 and 3 of Public Service of New Hampshire's March 30, 2016, filing.

Exhibit F: The following Exhibit F drawing numbers 1004 through 1014 filed on December 18, 2015:

Exhibit F Drawing	FERC P-2457-	Description

Exhibit F Drawing	FERC P-2457-	Description
F-1	1004	Plan and Elevation
F-2	1005	Dam Sections
F-3	1006	Floor Plan – Unit No. 2 Powerhouse
F-4	1007	Longitudinal Section – Unit No. 2 Powerhouse
F-5	1008	Sections – Unit No. 2 Powerhouse
F-6	1009	Floor Plan – Unit No. 1 Powerhouse
F-7	1010	Longitudinal Section – Unit No. 1 Powerhouse
F-8	1011	Sections – Unit No. 1 Powerhouse
F-9	1012	Louver Structure Plan
F-10	1013	Louver Frame Plan and Sections
F-11	1014	Louver Panel Plan and Sections

(3) All of the structures, fixtures, equipment or facilities used to operate or maintain the project, all portable property that may be employed in connection with the project, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) The Exhibits A, F and G described above are approved and made part of the license.

(D) This license is subject to the conditions submitted by the New Hampshire Department of Environmental Services under section 401(a)(1) of the Clean Water Act, 33 U.S.C. § 1341(a)(1) (2012), as those conditions are set forth in Appendix A to this order.

(E) This license is subject to the conditions submitted by the Secretary of the U.S. Department of the Interior under section 18 of the Federal Power Act, as those conditions are set forth in Appendix B to this order.

(F) This license is also subject to the articles set forth in Form L-5, (October 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters and Lands of the United States" (*see* 54 F.P.C. 1792 *et seq*.), as reproduced at the end of this order, and the following additional articles:

Article 201. *Administrative Annual Charges*. The licensee must pay the United States annual charges, effective the first day of the month in which this license is issued, and as determined in accordance with provisions of the Commission's regulations in effect from time to time, for the purpose(s) of reimbursing the United States for the cost of administration of Part I of the Federal Power Act. The authorized installed capacity for that purpose is 6.06 megawatts.

Article 202. *Exhibit Drawings.* Within 45 days of the effective date of the license, as directed below, the licensee must file two sets of the approved exhibit drawings, form FERC-587, and Geographic Information System (GIS) data in electronic file format on compact disks with the Secretary of the Commission, ATTN: OEP/DHAC.

(1) Digital images of the approved exhibit drawings must be prepared in electronic format. Prior to preparing each digital image, the FERC Project-Drawing Number (i.e., P-2457-1001 through P-2457-1014) must be shown in the margin below the title block of the approved drawing. Exhibit F drawings must be segregated from other project exhibits, and identified as Critical Energy Infrastructure Information (CEII) material under 18 C.F.R. § 388.113(c). Each drawing must be a separate electronic file, and the file name must include: FERC Project-Drawing Number, FERC Exhibit, Drawing Title, date of this license, and a file extension in the following format [P-2457-1001, F-1, Plan and Elevation, MM-DD-YYYY.TIF].

Each Exhibit G drawing that includes the project boundary must contain a minimum of three known reference points (i.e., latitude and longitude coordinates, or state plane coordinates). The points must be arranged in a triangular format for GIS georeferencing the project boundary drawing to the polygon data, and must be based on a standard map coordinate system. The spatial reference for the drawing (i.e., map projection, map datum, and units of measurement) must be identified on the drawing and each reference point must be labeled. In addition, each project boundary drawing must be stamped by a registered land surveyor. All digital images of the exhibit drawings must meet the following format specification:

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

A third set (Exhibit G only) and a copy of Form FERC-587 must be filed with the Bureau of Land Management office at the following address:

Bureau of Land Management

Branch of Lands (ES-930)
20 M Street S.E.
Washington, D.C. 20003

Form FERC-587 is available through the Commission's website at the following URL: http://www.ferc.gov/docs-filing/forms/form-587/form-587.pdf. Although instruction no. 3 requires microfilm copies of the project boundary maps in aperture card format, electronic copies that meet the digital specifications in this ordering paragraph should be substituted. If the FERC-587 cannot be downloaded from the Internet, a hard copy may be obtained by mailing a request to the Secretary of the Commission.

(2) Project boundary GIS data must be in a georeferenced electronic file format (such as ArcView shape files, GeoMedia files, MapInfo files, or a similar GIS format). The filing must include both polygon data and all reference points shown on the individual project boundary drawings. An electronic boundary polygon data file(s) is required for each project development. Depending on the electronic file format, the polygon and point data can be included in single files with multiple layers. The georeferenced electronic boundary data file must be positionally accurate to ±40 feet in order to comply with National Map Accuracy Standards for maps at a 1:24,000 scale. The file name(s) must include: FERC Project Number, data description, date of this license, and file extension in the following format [P-2457, boundary polygon/or point data, MM-DD-YYYY.SHP]. The filing must be accompanied by a separate text file describing the spatial reference for the georeferenced data: map projection used (i.e., UTM, State Plane, Decimal Degrees, etc.), the map datum (i.e., North American 27, North American 83, etc.), and the units of measurement (i.e., feet, meters, miles, etc.). The text file name must include: FERC Project Number, data description, date of this license, and file extension in the following format [P-2457, project boundary metadata, MM-DD-YYYY.TXT].

In addition, for those projects that occupy federal lands, a separate georeferenced polygon file(s) is required that identifies transmission line acreage and non-transmission line acreage affecting federal lands for the purpose of meeting the requirements of 18 C.F.R. §11.2. The file(s) must also identify each federal owner (e.g., Bureau of Land Management, Forest Service, U.S. Army Corps of Engineers, etc.), land identification (e.g., forest name, Section 24 lands, national park name, etc.), and federal acreage affected by the project boundary. Depending on the georeferenced electronic file format, the polygon, point, and federal lands data can be included in a single file with multiple layers.

Article 203. *Amortization Reserve*. Pursuant to section 10(d) of the Federal Power Act, a specified reasonable rate of return upon the net investment in the project must be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee must set aside in a project

amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee must deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee must set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee must maintain the amounts established in the project amortization reserve account until further order of the Commission.

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

Article 204. *Headwater Benefits.* If the licensee's project was directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the prior license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the licensee must reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license. The benefits will be assessed in accordance with Part 11, Subpart B, of the Commission's regulations.

Article 205. *As-built Exhibits*. Within 90 days of completion of construction of the facilities authorized by this license, including any new upstream and downstream eel passage facilities, the licensee must file for Commission approval, revised Exhibits A, F, and G, as applicable, to describe and show those project facilities as built.

Article 301. *Contract Plans and Specifications*. At least 60 days prior to the start of any construction, the licensee must submit one copy of its plans and specifications and supporting design document to the Commission's Division of Dam Safety and Inspections (D2SI) – New York Regional Engineer, and two copies to the Commission (one of these must be a courtesy copy to the Director, D2SI). The submittal to the D2SI – New York Regional Engineer must also include as part of preconstruction requirements: a Quality Control and Inspection Program, Temporary Construction Emergency Action Plan, and Soil Erosion and Sediment Control Plan. The licensee may not begin

construction until the D2SI – New York Regional Engineer has reviewed and commented on the plans and specifications, determined that all preconstruction requirements have been satisfied, and authorized start of construction.

Article 302. *Cofferdam and Deep Excavation Construction Drawings*. Should construction require cofferdams or deep excavation, the licensee must review and approve the design of contractor-designed cofferdams and deep excavations and must: (1) have a Professional Engineer who is independent from the construction contractor review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction; and (2) ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days before starting construction of any cofferdams or deep excavations, the licensee must submit one copy to the Commission's Division of Dam Safety and Inspections (D2SI) – New York Regional Engineer and two copies to the Commission (one of these copies must be a courtesy copy to the Commission's Director, D2SI), of the approved cofferdam and deep excavation construction drawings and specifications, and the letters of approval.

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

Article 401. *Commission Approval, Reporting, Notification, and Filing of Amendments*.

(a) Requirement to File Plans for Commission Approval.

Certain conditions found in the New Hampshire Department of Environmental Service's (New Hampshire DES) water quality certification (certification) conditions (Appendix A) and the U.S. Department of the Interior's (Interior) fishway prescriptions issued pursuant to section 18 of the Federal Power Act (FPA; Appendix B) require the licensee to prepare plans in consultation with other entities and for approval by the New Hampshire DES and Interior, respectively, and implement specific measures without prior Commission approval. Each such plan is listed below and must be filed with the Commission.

New Hampshire DES Certification Condition No.	Interior Section 18 Prescription No.	Plan Name	Date Due

New Hampshire DES Certification Condition No.	Interior Section 18 Prescription No.	Plan Name	Date Due
E-11(a)		Operation Compliance Monitoring Plan	Within 6 months of the effective date of the license
E-12(a)		Invasive Species Management and Monitoring Plan	Within 6 months of the effective date of the license
E-13(a)		Water Quality Monitoring Plan	Within 6 months of the effective date of the license
	12.4	Fishway Operation and Maintenance Plan	Within 12 months of the effective date of the license
	12.6.1	Implementation Schedule	Within 3 months of the effective date of the license
	13.1	Upstream Passage Plan for American Eel	Within 6 months of the effective date of the license
	13.2.1	Interim Downstream Passage Plan for American Eel	Within 9 months of the effective date of the license
	13.2.2	Permanent Downstream Passage Plan for American Eel	Within 9 years of the effective date of the license
	13.3.1	Fishway Effectiveness Monitoring Plan	Within 6 months of the effective date of the license

The licensee must file each plan with the Commission for approval. Each filing must include documentation that the licensee developed the plan in consultation with and has received approval from the New Hampshire DES and Interior, as appropriate. The Commission reserves the right to make changes to any plan filed. The licensee must not implement the plan prior to Commission approval. Upon Commission approval, the plan becomes a requirement of the license, and the licensee must implement the plan or changes in project operations or facilities, including any changes required by the Commission.

(b) Requirement to File Reports.

Certain conditions of the New Hampshire DES's certification conditions and Interior's prescriptions require the licensee to file reports with other entities. These reports document compliance with requirements of this license and may have a bearing on future actions. Each such report is listed below and must be filed with the Commission.

New Hampshire DES Certification Condition No.	Interior Section 18 Prescription No.	Description	Date Due
E-9(b)		Annual Operation Report	By April 1 of each year after the effective date of the license
E-13(b)		Water Quality Monitoring Report	By January 31 of the second year of the license
	12.4	Annual Fishway Operation and Maintenance Report	By December 31 of each year after the effective date of the license
	13.1	Annual Upstream American Eel Passage Survey Report	By December 31 of the first and second year of the license
	13.3.1	Final Fishway Effectiveness Monitoring Report	Within 12 years of the effective date of the license

The licensee must file with the Commission documentation of any consultation with New Hampshire DES and Interior regarding the reports, and copies of any comments and recommendations made by the agencies. The Commission reserves the right to require changes to project operations or facilities based on the information contained in the reports and any other available information.

(c) Requirement to Notify the Commission of Planned and Unplanned Deviations from License Requirements

New Hampshire DES's certification conditions E-8(a) and E-10(a) would allow the licensee to temporarily modify run-of-river operation under certain conditions. The Commission must be notified prior to implementing such modifications, if possible, or in the event of an emergency, as soon as possible, but no later than 10 days after each such incident. In addition, the licensee must file the incident report required by certification

condition E-10(b) within 45 days of the event.

(d) Requirement to File Amendment Applications.

Some of the conditions in Appendix A and Appendix B contemplate the New Hampshire DES and Interior requiring unspecified, long-term changes to project operation or facilities based on new information or results of monitoring or studies required by the certification, but do not appear to require Commission approval for such changes (e.g., modification of project operation to address water quality; or modification of fishways to improve effectiveness). Such changes may not be implemented without prior Commission authorization granted after the filing of an application to amend the license.

Article 402. *Reservation of Authority to Prescribe Fishways*. Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of such fishways as may be prescribed by the Secretary of the Interior pursuant to section 18 of the Federal Power Act.

Article 403. *Debris Management*. The Fishway Operation and Management Plan required by Interior's section 18 prescription 12.4 (see Appendix B) must include procedures for sorting and properly disposing (i.e., recycling, downstream reintroduction, or landfill or other disposal) of debris that is removed from the project's fish passage facilities.

Article 404. *Recreational Facilities.* For the term of the license, the licensee must provide public access to and ensure adequate operation and maintenance of the following recreation facilities: (1) the Eastman Falls Recreation Area, which includes a picnic area and boat launch; (2) the portage trail; and (3) the Franklin Public Boat Ramp, which includes parking and picnic areas.

Article 405. *Protection of Undiscovered Cultural Resources.* If the licensee discovers previously unidentified cultural resources during the course of constructing, maintaining, or developing project works or other facilities at the project, the licensee must stop all land-clearing and land-disturbing activities in the vicinity of the resource and consult with the New Hampshire State Historic Preservation Office (New Hampshire SHPO) to determine the need for any cultural resource studies or measures. If no studies or measures are needed, the licensee must file with the Commission documentation of its consultation with the New Hampshire SHPO immediately.

If a discovered cultural resource is determined to be eligible for the National Register of Historic Places (National Register), the licensee must file for Commission approval a historic properties management plan (HPMP) prepared by a qualified cultural

resource specialist after consultation with the New Hampshire SHPO. In developing the HPMP, the licensee must use the Advisory Council on Historic Preservation and the Federal Energy Regulatory Commission's Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects, dated May 20, 2002. The HPMP must include the following items: (1) a description of each discovered property, indicating whether it is listed in or eligible to be listed in the National Register; (2) a description of the potential effect on each discovered property; (3) proposed measures for avoiding or mitigating adverse effects; (4) documentation of consultation; and (5) a schedule for implementing mitigation and conducting additional studies. The Commission reserves the right to require changes to the HPMP.

The licensee must not resume land-clearing or land-disturbing activities in the vicinity of a cultural resource discovered during construction, until informed by the Commission that the requirements of this article have been fulfilled.

Article 406. *Protection of Cultural Resources*. Prior to implementing any project modifications not specifically authorized by this license, including but not limited to maintenance activities, land-clearing or land-disturbing activities, or changes to project operation or facilities, the licensee must consult with the New Hampshire State Historic Preservation Officer (New Hampshire SHPO) to determine the effects of the activities and the need for any cultural resource studies or measures. If no studies or measures are needed, the licensee must file with the Commission documentation of its consultation with the entities above.

If a project modification is determined to affect an historic property, the licensee must file for Commission approval a Historic Properties Management Plan (HPMP). The HPMP must be prepared by a qualified cultural resource specialist after consultation with the New Hampshire SHPO. In developing the HPMP, the licensee must use the Advisory Council on Historic Preservation and the Federal Energy Regulatory Commission *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects*, dated May 20, 2002. The HPMP must include the following items: (1) a description of each historic property; (2) a description of the potential effect on each historic property; (3) proposed measures for avoiding or mitigating adverse effects; (4) documentation of the nature and extent of consultation; and (5) a schedule for implementing mitigation and conducting additional studies.

The Commission reserves the right to require changes to the HPMP. The licensee must not implement any project modifications, other than those specifically authorized in this license, until informed by the Commission that the requirements of this article have been fulfilled.

Article 407. *Use and Occupancy.* (a) In accordance with the provisions of this article, the licensee must have the authority to grant permission for certain types of use

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

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

(c) The licensee may convey easements or rights-of-way across, or leases of project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or

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

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 water craft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must file a letter with the Commission, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Commission's authorized representative, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

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

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

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

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

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

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

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

(G) The licensee must serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to that filing. Proof of service on these entities must accompany the filing with the Commission.

(H) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section

313(a) of the Federal Power Act, 16 U.S.C. § 825*l* (2012), and section 385.713 of the Commission's regulations, 18 C.F.R. § 385.713 (2016). The filing of a request for rehearing does not operate as a stay of the effective date of this license or of any other date specified in this order. The licensee's failure to file a request for rehearing must constitute acceptance of this order.

Terry L. Turpin
Director
Office of Energy Projects

Form L-5
(October, 1975)

**FEDERAL ENERGY REGULATORY COMMISSION
TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED
MAJOR PROJECT AFFECTING NAVIGABLE WATERS
AND LANDS OF THE UNITED STATES**

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Energy Regulatory Commission, in the

region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him such information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall submit to said representative a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of any such alterations to the project. Construction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights or occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a nonpower licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall

make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the

interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission my prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail

to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable

modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of

passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities.

Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army.

Article 24. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States.

Article 25. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating.

Article 26. Timber on lands of the United States cut, used, or destroyed in the construction and maintenance of the project works, or in the clearing of said lands, shall be paid for, and the resulting slash and debris disposed of, in accordance with the requirements of the agency of the United States having jurisdiction over said lands. Payment for merchantable timber shall be at current stumpage rates, and payment for young growth timber below merchantable size shall be at current damage appraisal values. However, the agency of the United States having jurisdiction may sell or dispose of the merchantable timber to others than the Licensee: Provided, That timber so sold or disposed of shall be cut and removed from the area prior to, or without undue interference with, clearing operations of the Licensee and in coordination with the Licensee's project construction schedules. Such sale or disposal to others shall not relieve the Licensee of responsibility for the clearing and disposal of all slash and debris from project lands.

Article 27. The Licensee shall do everything reasonably within its power, and shall require its employees, contractors, and employees of contractors to do everything reasonably within their power, both independently and upon the request of officers of the agency concerned, to prevent, to make advance preparations for suppression of, and to suppress fires on the lands to be occupied or used under the license. The Licensee shall be liable for and shall pay the costs incurred by the United States in suppressing fires caused from the construction, operation, or maintenance of the project works or of the works appurtenant or accessory thereto under the license.

Article 28. The Licensee shall interpose no objection to, and shall in no way prevent, the use by the agency of the United States having jurisdiction over the lands

of the United States affected, or by persons or corporations occupying lands of the United States under permit, of water for fire suppression from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license, or the use by said parties of water for sanitary and domestic purposes from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license.

Article 29. The Licensee shall be liable for injury to, or destruction of, any buildings, bridges, roads, trails, lands, or other property of the United States, occasioned by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto under the license. Arrangements to meet such liability, either by compensation for such injury or destruction, or by reconstruction or repair of damaged property, or otherwise, shall be made with the appropriate department or agency of the United States.

Article 30. The Licensee shall allow any agency of the United States, without charge, to construct or permit to be constructed on, through, and across those project lands which are lands of the United States such conduits, chutes, ditches, railroads, roads, trails, telephone and power lines, and other routes or means of transportation and communication as are not inconsistent with the enjoyment of said lands by the Licensee for the purposes of the license. This license shall not be construed as conferring upon the Licensee any right of use, occupancy, or enjoyment of the lands of the United States other than for the construction, operation, and maintenance of the project as stated in the license.

Article 31. In the construction and maintenance of the project, the location and standards of roads and trails on lands of the United States and other uses of lands of the United States, including the location and condition of quarries, borrow pits, and spoil disposal areas, shall be subject to the approval of the department or agency of the United States having supervision over the lands involved.

Article 32. The Licensee shall make provision, or shall bear the reasonable cost, as determined by the agency of the United States affected, of making provision for avoiding inductive interference between any project transmission line or other project facility constructed, operated, or maintained under the license, and any radio installation, telephone line, or other communication facility installed or constructed before or after construction of such project transmission line or other project facility and owned, operated, or used by such agency of the United States in administering the lands under its jurisdiction.

Article 33. The Licensee shall make use of the Commission's guidelines and other recognized guidelines for treatment of transmission line rights-of-way, and shall clear

such portions of transmission line rights-of-way across lands of the United States as are designated by the officer of the United States in charge of the lands; shall keep the areas so designated clear of new growth, all refuse, and inflammable material to the satisfaction of such officer; shall trim all branches of trees in contact with or liable to contact the transmission lines; shall cut and remove all dead or leaning trees which might fall in contact with the transmission lines; and shall take such other precautions against fire as may be required by such officer. No fires for the burning of waste material shall be set except with the prior written consent of the officer of the United States in charge of the lands as to time and place.

Article 34. The Licensee shall cooperate with the United States in the disposal by the United States, under the Act of July 31, 1947, 61 Stat. 681, as amended (30 U.S.C. sec. 601, et seq.), of mineral and vegetative materials from lands of the United States occupied by the project or any part thereof: Provided, That such disposal has been authorized by the Commission and that it does not unreasonably interfere with the occupancy of such lands by the Licensee for the purposes of the license: Provided further, That in the event of disagreement, any question of unreasonable interference shall be determined by the Commission after notice and opportunity for hearing.

Article 35. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 36. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 37. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

APPENDIX A

New Hampshire Department of Environmental Services
Water Quality Certification Conditions
Filed December 20, 2016

E-1. **Compliance with Certification Conditions:** The Applicant shall operate and maintain the Activity to comply with the conditions of this Certification.

E-2. **Compliance with Water Quality Standards:** The Activity shall not cause or contribute to a violation of surface water quality standards.

E-3. **Modification of Certification:** The conditions of this Certification may be amended and additional terms and conditions added as necessary to ensure compliance with New Hampshire surface water quality standards, when authorized by law, and after notice and opportunity for hearing.

E-4. **Proposed Modifications to the Activity:** The Applicant shall consult with and receive prior written approval from NHDES regarding any proposed modifications to the Activity that could have a significant or material effect on the conditions of this Certification including any changes to project operation or approved plans required by this Certification. If necessary, NHDES may modify the Certification in accordance with condition E-3 of this Certification.

E-5. **Compliance Inspections:** In accordance with applicable laws, the Applicant shall allow NHDES to inspect the Activity and affected surface waters to monitor compliance with the conditions of this Certification.

E-6. **Posting of Certification and Operation and Compliance Monitoring Plan:** A copy of this Certification and the approved Operation and Compliance Monitoring Plan (OCMP – see E-11) shall be prominently posted within the powerhouse within seven days of receiving written approval of the OCMP from NHDES.

E-7. **Transfer of Certification:** Should this Certification be transferred to a new owner, contact information for the new owner (including name, address, phone number and email) shall be provided to NHDES within 30 days of the transfer.

E-8. **Project Operation:** Unless otherwise allowed in the NHDES approved Operation Compliance Monitoring Plan (OCMP – see condition E-11 below) the Activity shall be operated as follows:

a. Run-of-River Flow: The Applicant shall operate the Activity in a run-of-river mode such that inflows equal outflows on an instantaneous basis. Run-of-river may be temporarily modified if required by operating

emergencies beyond the control of the Applicant and for short periods upon mutual agreement with the NHDES, USFWS and NHFGD.

b. Impoundment Water Level: The Applicant shall strive to minimize fluctuations in the impoundment (i.e., pond) to the maximum extent practicable and shall not draw the water level in the impoundment down for the purpose of generating power. To minimize fluctuations, water level in the impoundments shall be automatically controlled (versus manual operation) to the maximum extent practicable. Water level fluctuations in the impoundment shall not exceed +/- 0.2 feet from the top of the flashboards (elevation 307.00 msl) when power is generated and inflow is no greater than the hydraulic capacity of the turbines (2,780 cfs). When inflow exceeds 2,780 cfs and inflow is passed through the turbines and waste gate to maintain a steady pond, the pond level shall be maintained within +/- 0.5 feet of the top of flashboards (elevation 307.00 msl). When inflow exceeds approximately 6000 cfs and flashboards are lowered to accommodate high inflows, the pond level shall be maintained within +/- 1.0 feet of elevation 307.00 msl.

c. **Impoundment Refill:** When refilling the impoundment after drawdown for maintenance or emergencies, the Applicant shall release 90 percent of the inflow downstream to the Pemigewassett River and utilize the remaining 10% of inflow to refill the impoundment. This refill procedure may be modified with prior approval of NHDES, USFWS and the NHFGD.

d. **Drawdown Rates:** When drawing the water level in the impoundment down, the Applicant shall strive to achieve, to the extent practicable, a gradual drawdown rate of six (6) inches per day or less. Exceptions to the above may be allowed if required by operating emergencies beyond the control of the Applicant or for short periods upon approval by NHDES.

E-9. **Monitoring Requirements for Impoundment and Flow Management:** Unless otherwise allowed in the NHDES approved Operation Compliance Monitoring Plan (OCMP – see condition E-11 below) the Activity shall be comply with the following monitoring requirements for impoundment and flow management:

a. Records of operations, run-of-river flows and water levels shall be maintained electronically in a spreadsheet format and made available to NHDES upon request.

b. By April 1 of each year (beginning the first April after the FERC license renewal for the Activity becomes effective), the Applicant shall submit to NHDES a summary report for the previous calendar year with appropriate summary tables, graphs, text and supporting documentation that

demonstrates compliance with (and, if applicable, any excursions of the project operation requirements specified in the OCMP (see condition E-11) regarding condition E-8 of this certification. Where excursions occurred, the summary shall indicate when the excursion occurred, the duration of the excursion and a description of corrective actions taken to prevent such excursions from reoccurring.

E-10. **Notification Requirements:** Unless otherwise allowed in the NHDES approved Operation Compliance Monitoring Plan (OCMP – see condition E-11 below) the Activity shall be comply with the following notification requirements:

a. If the Activity causes a deviation from run-of-river operational requirements specified in the OCMP (see condition E-11) the Applicant shall notify NHDES, NHFGD and USFWS as soon as possible, but no later than 24 hours after each such incident. The notification shall include, to the extent known, an explanation as to why the deviations occurred, a description of corrective actions taken, and how long it will take until operations will comply with the OCMP.

b. Within 45 days after each incident and after consultation with NHDES, NHFGD and USFWS, the Applicant shall submit a report to NHDES, NHFGD and USFWS that contains, to the extent possible, the cause, severity and duration of the incident, any observed or reported adverse environmental impacts from the incident, pertinent data and a description of corrective measures.

E-11. **Operation Compliance Monitoring Plan (OCMP):**

a. Within six months of the effective date of the FERC license renewal for the Activity, the Applicant shall consult with NHDES, NHFGD and USFWS, and submit to NHDES, for approval, an operation compliance monitoring plan (OCMP) for the Activity. The Applicant shall then implement the approved plan.
b. The OCMP shall include, but is not limited to, the following:
    1) a detailed description of how the Activity will be operated under all conditions (i.e., under normal operating conditions as well as during low flow, high flow, maintenance and emergency conditions) to maintain compliance with the operation, monitoring and notification requirements in condition E-8, E-9 and E-10 of this Certification;
    2) a description of the mechanisms and structures (i.e., type, location and accuracy of all flow and impoundment elevation monitoring equipment and gages) to be used for maintaining compliance with operational requirements;

3) procedures for maintaining and calibrating monitoring equipment;
4) a description of the level of manual and automatic operation, and, where appropriate, an explanation why manual operations are not automated (e.g., the waste gate);
5) rating curves and calculations for all methods of releasing flow downstream;
6) a description of the accuracy of the elevations used to determine compliance with operation requirements and if they are based on as-built elevations;
7) a description of the methods and frequency for reporting data to NHDES, NHFGD and USFWS;
8) a description of the procedures for reporting deviations from the OCMP to NHDES; and
9) an implementation schedule.

The Applicant shall consult with NHDES, NHFGD and USFWS, and receive NHDES approval of any proposed modifications to the OCMP. Any NHDES approved modifications to the OCMP shall be considered a part of this Certification. Proposed modifications shall not be implemented until approved by NHDES.

E-12. **Invasive Species Management and Monitoring Plan (ISMMP):**

a. Within six months of the effective date of the FERC license renewal for the Activity, the Applicant shall consult with NHDES, NHFGD and USFWS, and submit to NHDES, for approval, an invasive species monitoring and management plan (ISMMP) for the Activity. The Applicant shall then implement the approved plan.
b. The ISMMP shall include, but is not limited to, the following:
    1) a description of invasive species monitoring methods and the frequency of monitoring;
    2) a description of best management practices that will be used to reduce the spread of nuisance species found at the Activity;
    3) a description of any criteria that will be used to determine when control measures are needed and a description of any control measures that the Applicant will implement to control nuisance species found at the project (i.e., manual pulling, chemical application, biological controls); and
    4) a schedule for filing any monitoring reports with NHDES, USFWS and NHFGD for review.

c. The Applicant shall consult with NHDES, NHFGD and USFWS, and receive NHDES approval of any proposed modifications to the ISMMP. Any NHDES

approved modifications to the ISMMP shall be considered a part of this Certification. Proposed modifications shall not be implemented until approved by NHDES.

E-13. **Water Quality Monitoring Plan (WQMP):**

a. Within six months of the effective date of the FERC license renewal for the Activity, the Applicant shall submit to NHDES, for approval, a water quality monitoring plan (WQMP) to determine if the Activity is causing or contributing to violations of state surface water quality regulations (Env-Wq 1700).
b. The WQMP shall include, but is not limited to, the following:
    1) collection of continuous (i.e., every 15 minutes) dissolved oxygen (concentration and percent saturation), water temperature and pH measurements using multi-parameter dataloggers from a site in the impoundment and a site downstream of the dam;
    2) deployment of dataloggers for at least 30 consecutive days in a summer that includes extended dry periods when river flow is approximately at the 7Q10 flow and water temperatures are approximately 25 degrees Celsius or greater (i.e., near worse case conditions);
    3) collection of two vertical profiles in the impoundment for dissolved oxygen and water temperature (in one foot increments from the surface to the bottom) on two days when continuous dataloggers are deployed and conditions are near worse case;
    4) collection of 4 grab samples (once a week for 4 weeks when the dataloggers are deployed) in the impoundment for total phosphorus and chlorophyll-a;
    5) quality assurance/ quality control provisions;
    6) the longitudinal and latitudinal coordinates of each monitoring location as well as photographs and a map showing each location;
    7) submittal of all data electronically to NHDES and in a form that can be automatically uploaded into the NHDES Environmental Monitoring Database (EMD)[46]; and

[46] Information on how to upload data into the EMD can be found at http://des.nh.gov/organization/divisions/water/wmb/emd/ .

8) submittal of a report to NHDES summarizing the results, with appropriate text, tables and graphs, by January 31st of the year after monitoring was conducted.

c. Monitoring shall commence in accordance with the NHDES approved WQMP the first summer that meets the conditions of b.2) above;
d. If results indicate the potential for water quality violations with relatively little change in water quality (i.e., water quality standards have been marginally met), DES may require additional sampling no sooner than five years after the previous sampling was conducted.
e. If results indicate that the Activity is causing or contributing to violations of surface water quality standards, NHDES may require implementation of mitigation measures and additional monitoring to confirm that mitigation measures have resulted in attainment of surface water quality standards.
f. The Applicant shall consult with NHDES and receive NHDES approval of any proposed modifications to the WQMP. Any NHDES approved modifications to the WQMP shall be considered a part of this Certification. Proposed modifications shall not be implemented until approved by NHDES.

E-14. **Fish Passage.** The Applicant shall comply with the "Preliminary Prescription for Fishway" in the U.S. Department of Interior's June 22, 2016 letter to FERC, and any amendments. Any amendments shall be considered a part of this Certification.

E-15. **NHDES Water Use Registration and Reporting:** The Applicant shall register, measure, and report all withdrawals and discharges with the NHDES Water Use Registration and Reporting program in accordance with RSA 488:3 and its supporting regulations, Env-Wq 2102.

APPENDIX B

U.S. Department of the Interior, Fish and Wildlife Service
Fishway Prescription for the Eastman Falls Project No. 2457
Filed January 23, 2017.

12. Modified Prescription for Fishways

Fish passage facilities and/or measures shall be constructed, operated, and maintained to provide safe, timely and effective passage for American eels at the Licensee's expense.

To ensure the immediate and timely contribution of the fish passage facilities and measures to fish restoration and enhancement in the Pemigewasset River, the following are included and shall be incorporated by the Licensee to ensure the effectiveness of the fishways pursuant to section 1701(b) of the 1992 National Energy Policy Act (P.L. 102-486, Title XVII, 106 Stat. 3008).

12.1 Design Criteria

12.1.1 Design Populations for American Eels

All downstream dams on the mainstem river have some level of upstream eel passage (Table 4.3-2). Since 2003 (when monitoring first began), numbers of juvenile eels passing downstream dams have varied from hundreds to tens of thousands (Table 4.4.2.2-1). While the Service does not have a precise estimate of the numbers of eels that would be expected to pass above the Eastman Falls Dam, measures to achieve safe, timely and effective passage at the Eastman Falls Project would enhance the eel stocks and help achieve overall management goals of Federal and State resource agencies, and the ASMFC.

Therefore, the Licensee shall be required to design fishway(s) at Eastman Falls Dam sufficient to pass available upstream migrating eels that arrive at the project into the mainstem of the Pemigewasset River in order to access the 14 miles of rearing habitat between the Eastman Falls Dam and Ayers Island Dam. Because eels migrate downstream to the sea to complete their life cycle, the Licensee shall be required to provide downstream passage for eels. The goal for eel passage at Eastman Falls is for all eels seeking to go above or below the dam to do so safely, timely, and effectively.

12.2 Fish Passage Operating Periods

Regarding the timing of seasonal fish passage operations, fish passage facilities and

measures shall be maintained and operated, at the Licensee's expense, to maximize fish passage effectiveness throughout the upstream and downstream migration periods for American eel. Fishways shall be operated according to the following schedule.[47]

Upstream Migration Period:	May 1 to October 30
Downstream Migration Period:	August 15 to November 15

12.3 Consultation

The Licensee shall develop all fish passage plans, schedules, and any supporting information to the fish passage measures described herein in consultation with, and submit them for approval by the
Service prior to requesting any Commission approval that may be necessary.

12.4 Fish Passage Operation and Maintenance Procedures

The timely and proper implementation of the fish passage measures is necessary to ensure the effectiveness of such measures. Accordingly, the Service includes here the express requirement that the Licensee develop a Fishway Operation and Maintenance Plan (FOMP) for implementation at the project.

Within 12 months of license issuance, the Licensee shall develop and submit a FOMP to the Service, the NHFGD, and the New Hampshire Department of Environmental Services (NHDES) for review and approval by the Service. Thereafter, the Licensee will keep the FOMP updated on an annual basis, to reflect any changes in fishway operation and maintenance planned for the year. If the Service requests a modification of the FOMP, the Licensee shall respond to the requested modification within 30 days of the request by filing a written response with the Service and serving a copy of the response to FERC, the NHFGD, and the NHDES. Any modifications to the FOMP by the Licensee shall require approval by the Service prior to implementation.

The Service must give preliminary approval of the FOMP prior to the Licensee filing the FOMP with the Commission for final approval. Any material change to the FOMP, including in use or schedule, in fact or practice, that affects fish passage must be approved by the Service prior to it being filed with the Commission or implemented.

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[47] These migration periods may be changed during the term of the license by the Service based on timing information cited above (for example, see Eyler 2014, 2016, Richkus and Whalen 2000, McGrath et al. 2003b, Verdon et al. 2003 cited on page 8), or new information, in consultation with the other fishery agencies and the Licensee.

The FOMP will describe baseline operations and maintenance activities and emergency procedures related to fish passage, including:

1. schedules for routine maintenance, pre-season testing, and the procedures for routine fishway operations, including seasonal and daily periods of operation, and associated dam and powerhouse operational measures needed for proper fishway operation;
2. detail of how the Project will be operated during the migration seasons to provide for adequate fish passage conditions, including:
    a. pre-season preparation and testing;
    b. debris management at the fishway entrance(s), guidance channels, and exit(s);
3. standard operating procedures for monitoring and enumerating fish passage;
4. standard operating procedures for monitoring and reporting operations that affect fish passage;
5. standard operating procedures in case of emergencies and project outages to first avoid, and second minimize, potential negative impacts on fishway operations and the effectiveness of upstream and downstream eel passage; and
6. plans for post-season maintenance, protection, and winterizing the fishways.

The Licensee shall provide written documentation to the Service, the NHFGD and the NHDES (hereafter referred to as the Resource Agencies) that all fishway operational personnel have reviewed and understand the FOMP, and it shall be signed by the operations manager of the Project. Copies of the approved FOMP and any modifications will be provided to the Resource Agencies on an annual basis.

By December 31 of each year, the Licensee shall provide an annual report to the Resource Agencies detailing the implementation of the FOMP, including any deviations from the FOMP and a process to prevent those problems in the future. The report will also include any proposed modifications to the FOMP, or in the case of emergencies or project outages, the steps taken by the Licensee to minimize adverse effects on fishway operation or fish passage measures, as well as any proposed modifications to those steps to further enhance their effectiveness in the future.

By March 15 of each year, the Licensee shall meet with the Service and the Technical Committee for Anadromous Fishery Management of the Merrimack River Basin (Technical Committee) to discuss the FOMP (and FEMP – see Section 13.3). This meeting may occur later than March 15 each year if the Licensee and the Service agree on a different date. At this annual meeting, the Licensee will discuss with the Service and Technical Committee the fish passage results from the previous year, review regulatory requirements for eel passage operations, and discuss any upcoming modification or testing the Licensee will conduct during the upcoming season.

12.5 Fishway Inspections

The Licensee shall provide Service personnel and other Service-designated representatives timely access to the fish passage facilities at the Project and to pertinent project operational records for the purpose of inspecting the fish passage measures to determine compliance with the Fishway Prescription.

12.6 Scheduling

Timely construction, operation, maintenance, and measures for upstream and downstream fish passage, including studies and evaluations, are necessary to ensure their effectiveness and to achieve restoration goals. Therefore, the Licensee shall notify and obtain approval from the Service for any extension to comply with prescribed conditions.

12.6.1 Implementation Schedule

The Service's target for completion of implementation of the upstream eel passage conditions in this Modified Prescription is no later than May 1 of the third calendar year after license issuance. For the first two upstream passage seasons after license issuance, the Licensee shall install, operate and maintain temporary eel ramps/traps and/or conduct night-time surveys to determine the best location(s) to site permanent eel passage facilities. Based on the results of the 2 years of collection data, a permanent location (or locations) will be determined by the Service and the NHFGD. Permanent eel ramps or ladder(s) will be operational by May 1 of the third calendar year after license issuance.

This Modified Prescription stipulates a phased approach to providing safe, timely and effective downstream eel passage. The target date for completing implementation of Phase 1 (interim) downstream eel passage is no later August 15 of the second calendar year after license issuance. The target date for completing implementation of Phase 2 (i.e., permanent) downstream eel passage is by August 15 of the eighth calendar year after eels are first documented using upstream eel passage facilities at the project.

The Licensee shall prepare a detailed schedule for implementing the conditions in this Modified Prescription to meet the target dates. The Licensee will prepare the schedule in consultation with the Resource Agencies and the Technical Committee. The Licensee will provide 30 days for review and comment and will offer to hold a meeting to present the schedule prior to agency review.

The Licensee will submit a final draft schedule to the Service for its prior approval before submitting the schedule to the Commission for its approval. The Licensee shall not submit a schedule to the Commission that the Service has not approved and will include all of the agency comments and the Licensee's response to those comments with the final schedule submitted to the Commission. This will ensure that the American eel population will benefit from any passage improvements as soon as practicable.

13. Prescription for Eastman Falls

13.1 Prescription Item #1

Construct, operate, and maintain up to three upstream fishways for American eels at the Eastman Falls Dam. The location(s) for siting permanent eel passage facilities will be based on the results of surveys that will be conducted the first two upstream passage seasons after license issuance. Surveys will consist of deploying temporary ramps/traps and/or conducting night-time observational surveys. Ramps/traps will be constructed according to specifications used for eel ramps at PSNH's Amoskeag and Garvins Falls projects or improved designs as may be approved by the Service. The ramps will be deployed at locations to be determined in consultation with the Service and the NHFGD. The Licensee will tend the ramps once or twice per week throughout the upstream migration season or more frequently if necessary, based on eel capture numbers. Night-time observational surveys shall be conducted on dark, rainy nights throughout the upstream migration season. Any eels collected in the ramps will be counted, transported to the headpond, and released. The time, location, number of eels observed/collected, by size class and environmental and operational conditions for each survey date will be recorded and used to generate reports that will be provided to the Service for review by December 31 each year.

Based on the results of the two years of collection data, a permanent location (or locations) for upstream eel passage facilities will be determined by the Service in consultation with the Licensee and the NHFGD. Permanent eel ramp trap(s) or ladder(s) will be operational by May 1 of the third calendar year after license issuance. The design of permanent eel passage facilities will be developed in consultation with, and require approval by, the Service. The upstream eel passage facilities shall be operated 24 hours per day and maintained at the Licensee's expense to maximize fish passage effectiveness

throughout the seasonal period identified in Section 12.2 Fish Passage Operating Periods.

Pursuant to the conditions provided herein, the Licensee shall, within 6 months of license issuance, file a plan for providing upstream passage for eels with the Commission for approval. The plan will be prepared in consultation with the Service and the NHFGD. The Licensee must have the Service's prior approval before filing the final plan with the Commission.

13.2 Prescription Item #2

Provide safe, timely, and effective downstream passage for silver American eels at the Eastman Falls Dam. Downstream passage shall be implemented using a phased approach.

13.2.1 Phase 1 Interim Downstream Eel Passage

The Licensee shall develop a plan in consultation with, and requiring approval by, the Service. The plan will describe interim measures the Licensee will undertake to protect adult eels from injury and/or mortality as they move downstream past the project. Measures may include one or more of the following:

1. implementing shut-downs from dusk to dawn during the downstream passage season specified in Section 12.2 Fish Passage Operating Periods according to the following protocol: if 0.5 inch of rain or greater falls within a 24-hour period or discharge upstream of the Eastman Falls Dam increases by 50 percent over the previous 24-hour period, shut down turbine(s) that evening plus the following 2 nights;
2. operating the existing downstream anadromous fish bypass from August 15 to November 15; and/or
3. installing and operating alternative passage technologies - such as a siphon(s) in the vicinity of the intake(s).

The Licensee may also propose alternatives to these measures, and enact them upon approval by the Service and the Commission. The plan shall be developed and approved by the Service on a schedule that will allow interim passage measures to be implemented no later than August 15 of the second calendar year after license issuance. Interim downstream passage shall be provided until such time as the trigger for permanent downstream passage identified in 13.2.2 below has been met.

13.2.2 Phase 2 Permanent Downstream Eel Passage

The Licensee shall implement permanent downstream eel passage and protection measures by August 15 of the eighth calendar year after eels are first documented using upstream eel passage facilities at the project. Measures may consist of structural facilities and/or operational protocols. Design parameters for structural facilities are provided in Table 13.2.2 below.

The design of permanent eel passage facilities and/or operational measures shall be developed in consultation with, and require approval by, the Service. Fish passage shall be operated and maintained at the Licensee's expense to maximize fish passage effectiveness throughout the period specified in Section 12.2 Fish Passage Operating Periods.

Pursuant to the conditions provided herein, the Licensee shall, no later than January 1 of the seventh year after eels are first documented using upstream eel passage facilities at the Eastman Falls Project, initiate consultation with the Service on a plan to provide permanent downstream eel passage and protection. The plan shall be prepared in consultation with the Service and the NHFGD. The Licensee must have the Service's prior approval before filing the final plan with the Commission.

Table 13.2.2. Design parameters for catadromous fish passage and protection.[48]

Parameter	**Catadromous**
Approach velocity	≤1.64 fps (Travade et al. 2005)
Rack spacing	≤3/4 inch. (Travade et al. 2005)
Attraction Flow (each bypass)	2-3% of turbine capacity (Travade et al. 2005)
Weir dimensions	
Weir/orifice spacing	every 25 linear feet
Bypass location	number and location of bypass(es) to be determined based on trashrack width and depth

[48] Because permanent downstream eel passage likely will not be required for a number of years, design criteria may evolve based on additional research or results of empirical studies. Therefore, the Service specifically reserves authority to modify this condition based on new information.

Plunge Pool	greater of 4 ft. deep or 1/4 differential from headwater to tailwater; volume sufficient to dissipate energy
Operation	Aug. 15 - Nov. 15

13.3 Fish Passage Effectiveness Monitoring

Efficiency testing of both upstream and downstream fish passage is critical to evaluating the success of fish passage structures and operations, diagnosing problems, and determining both when modifications are needed and what modifications are likely to be effective. It is essential to ensuring the effectiveness of fishways over the term of the license.

13.3.1 Fishway Effectiveness Monitoring Plan

The Licensee shall develop a Fishway Effectiveness Monitoring Plan (FEMP) in consultation with, and requiring approval by, the Service. The FEMP will contain the plans for studying the effectiveness of downstream eel passage and protection measures required pursuant to Section 13.2.2. The FEMP shall be submitted to the Commission for approval 6 months prior to the implementation date specified in Section 13.2.2. If the Service requests a modification of the FEMP, the Licensee shall amend the FEMP within 30 days of the request and send a copy of the revised FEMP to the Resource Agencies. Any modifications to the FEMP by the Licensee will require approval by the Service prior to implementation.

The Licensee shall submit yearly interim study reports to the Service following the conclusion of each study year. The interim reports for downstream passage studies will be submitted to the Service by February 15 following each study year. The final study reports will be submitted to the Service within 6 months after the completion of each study. The final study report will include methods, data analysis, results, an assessment of any factors or potential problems hindering passage effectiveness, and provide proposed modifications to achieve safe, timely and effective passage. In conjunction with submitting the final study report, the Licensee shall also provide electronic copies of all data collected from studies to the Service.

The Licensee shall meet with the Service and the Technical Committee to discuss the FEMP and FOMP. This meeting will occur no later than March 15 each year, unless the Licensee and the Service agree on a different date. At this annual meeting, the Licensee will discuss with the Service and Technical Committee the fish passage results from the previous year, review regulatory requirements for eel

passage operations, and discuss any upcoming modification or testing the Licensee proposes for the upcoming fish passage season.

Search for Brook Floater (*Alasmidonta varicosa*) and Suitable Habitat in the Pemigewasset River below Eastman Falls Dam, Franklin, NH

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1.0 Introduction

The brook floater, *Alasmidonta varicosa*, is a freshwater mussel (Unionidae) and is included on the New Hampshire state list of endangered species. It is found in streams and rivers of the Atlantic coastal region from South Carolina to Nova Scotia and New Brunswick (Nedeau et al. 2000). The brook floater inhabits small to large rivers in a range of flow conditions but is not found in high gradient streams with a fast current or in quiet water with a slow current (Nedeau et al. 2000). It is strictly a lotic water species often found in gravel riffles in nutrient poor streams (Strayer and Jirka 1997).

Normandeau Associates conducted a survey in the Pemigewasset River in Franklin, New Hampshire downstream of Public Service of New Hampshire's Eastman Falls Dam. This survey was conducted to characterize the relative abundance and distribution of freshwater mussels and habitat suitability for brook floater downstream of the Eastman Falls Project (Project).

2.0 Methodology

Mussel and habitat data were collected in wadeable areas along riverine habitat using masks and snorkels. The survey team was composed of aquatic biologists with experience conducting freshwater mussel surveys. The substrate was scanned to search for all species of mussels during the 12 to 16 August 2013 survey. Searches were conducted along 13 transects and at three stations in riverine habitats downstream of Eastman Falls Dam (450 ft downstream of the dam to the confluence of the Pemigewasset and Winnipesaukee Rivers). Transects were longitudinal areas that extended parallel to the river flow for a distance of 50 ft or more. Stations were isolated areas where accumulations of brook floaters or preferred brook floater habitat were observed and were typically small areas behind boulders with accumulations of sand.

The primary objective of the survey was to search for brook floater specimens and document suitable brook floater habitat downstream of Eastman Falls Dam. To the extent possible, the entire shoreline of the river was searched to look for suitable habitat. Areas where water depth and a strong current velocity created dangerous conditions or made it impractical for the surveyors to hold position while searching were avoided. Surveys were primarily restricted to shoreline areas, although in areas upstream of the Central Street (Route 3/127) bridge, depth and velocity were suitable to allow a search from the east bank to mid channel. Searches were conducted along transects and at stations in areas with a depth of three feet or less. Pertinent survey data including substrate composition, search times, number of surveyors, and number of each species encountered were recorded in a waterproof field notebook.

Virtually the entire eastern and western banks of the river were searched for brook floaters and suitable habitat. All habitats along the banks were searched for mussels; however more time was spent in areas with suitable brook floater habitat than in areas with poor or marginal habitat. Brook floaters found during the survey were removed from the substrate

for identification and the total lengths of 25 randomly selected specimens were measured; specimens were returned to the substrate after identification.

3.0 Results

A total of 13 transects and three stations were searched below Eastman Falls Dam (Figure 1). Transects and stations were limited to reaches with water depths less than three feet and were located along both banks. Habitat immediately downstream of the dam was not surveyed because of unsafe conditions caused by deep water and fast current. Brook floater habitat was classified good at seven transects and three stations, fair at four transects, and poor at four transects, based on professional judgment.

A total of 2,610 mussels representing five species were identified and counted during the survey (Table 2). The numerically dominant species was eastern elliptio (*Elliptio complanata*), which composed 92.3 percent of the mussels found, followed by; brook floater (*Alasmidonta varicosa*), 4.1 percent of the mussels found; triangle floater (*Alasmidonta undulata*), 3.4 percent of the mussels found; eastern lampmussel (*Lampsilis radiata*), 0.2 percent of the mussels found; and eastern floater (*Pyganodon cataracta*), 0.1 percent of the mussels found.

On the eastern side of the river upstream of the Central Street bridge, habitat was identified as poor habitat along Transect 14 because of the fast current and coarse substrate composed of boulder and cobble, and good habitat was observed at Transects 3 and 4 (Figure 1) from approximately 1,000 ft downstream of the dam to the bridge. At Transect 3 habitat was good, but only 36 total mussels were found, including nine brook floaters. Along Transect 4, approximately 1,300 ft downstream of the dam, water depth and velocity were low enough to allow access to the middle of the river down to the bridge. A total of 414 mussels were found along Transect 4 from the eastern bank to the middle of the river, including 23 brook floaters; this was the only reach where all five mussel species were found (Table 2). Transect 4 was considered one of the best brook floater habitat areas throughout the study area, primarily due to the boulder, cobble, gravel, and sand substrate (Table 1) and moderate flow. Brook floater specimens were typically found in interstitial sand and gravel between and downstream of boulders and cobble.

Along the western side of the river upstream of the Central St bridge (Transects 1 and 2), habitat was generally considered fair to poor for brook floater. The western side of the river had areas of low current velocity, and a substrate predominantly composed of sand and silt. The greatest number of mussels found within a survey area was along Transect 2 (1009 specimens). The mussel community in Transects 1 and 2 was dominated by eastern elliptio (Table 2).

Downstream of the Central Street bridge mussel habitat was fair to poor along the western side of the river and good to poor along the eastern side (Table 1). Immediately downstream of the bridge on both sides of the river (Transects 5 and 7) the current velocity was fast and created poor habitat conditions because of the fast current and coarse substrate (Figure 1). A total of 37 mussels (eastern elliptio and triangle floater) were found along Transect 5 and a ten foot by ten foot patch of sand behind boulders at Station 5a supported 10 brook floaters; however no mussels were seen along Transect 7.

Figure 1. Brook floater search locations below Eastman Falls Dam in Franklin, NH, 12-16 August 2013.

Table 1. Survey location search and habitat data collected from the Pemigewasset River below Eastman Falls Dam, Franklin, NH in August 2013.

Transect/ Station	Survey Date	Total Search Time	Distance (ft)	Habitat Rating	Substrate % Composition
Transect 1	12-Aug-13	180	150	Poor	sand 40, silt 60
Transect 2	12-Aug-13	900	1500	Fair	gravel 20, sand 60, silt 20
Transect 3	13-Aug-13	330	185	Good	cobble 50, gravel 30, sand 20
Transect 4	13-Aug-13	270	870	Good	boulder 20, cobble 55, gravel 15, sand 10
Transect 5	14-Aug-13	374	650	Fair	boulder 30, cobble 50, gravel 10, sand 10
Station 5a	14-Aug-13	5	10	Good	sand 100
Transect 6	14-Aug-13	540	1160	Poor	35 sand, 65 silt
Transect 7	15-Aug-13	60	300	Poor	boulder 40, cobble 60
Station 8	15-Aug-13	20	20	Good	firm sand 100
Transect 9	15-Aug-13	360	330	Good	boulder 40, cobble 40, gravel 20
Transect 10	15-Aug-13	90	730	Good	boulder 10, cobble 15, gravel 55, sand 20
Transect 11	15-Aug-13	46	50	Good	boulder 20, cobble 20, gravel 20, sand 40
Station 12	15-Aug-13	47	20	Good	boulder 10, cobble 25, gravel 20, sand 25, silt 20
Transect 13	15-Aug-13	120	1350	Fair	algae 10, boulder 10, cobble 20, gravel 5, sand 25, silt 30
Transect 14	16-Aug-13	120	545	Poor	boulder 40, cobble 60
Transect 15	16-Aug-13	180	1022	Fair	algae 20, gravel 10, sand 35, silt 35

Table 2. Mussel count and percent composition data collected from the Pemigewasset River below Eastman Falls Dam, Franklin, NH in August 2013.

Transect/ Station	Survey Date	Count						Percent Composition				
		Eastern Elliptio	Triangle Floater	Eastern Lampmussel	Brook Floater	Eastern Floater	Total	Eastern Elliptio	Triangle Floater	Eastern Lampmussel	Brook Floater	Eastern Floater
Transect 1	12-Aug-13	235	2				237	99.2	0.8			
Transect 2	12-Aug-13	1000	5	3	1		1009	99.1	0.5	0.3	0.1	
Transect 3	13-Aug-13	20	6	1	9		36	55.6	16.7	2.8	25.0	
Transect 4	13-Aug-13	343	46	1	23	1	414	82.9	11.1	0.2	5.6	0.2
Transect 5	14-Aug-13	30	7				37	81.1	18.9			
Station 5a	14-Aug-13				8		8				100.0	
Transect 6	14-Aug-13	50	4				54	92.6	7.4			
Transect 7	15-Aug-13											
Station 8	15-Aug-13				10		10				100.0	
Transect 9	15-Aug-13	30	3		30		63	47.6	4.8		47.6	
Transect 10	15-Aug-13	50	3		7		60	83.3	5.0		11.7	
Transect 11	15-Aug-13	47	5		5		57	82.5	8.8		8.8	
Station 12	15-Aug-13	21	2		5		28	75.0	7.1		17.9	
Transect 13	15-Aug-13	80	4		5		89	89.9	4.5		5.6	
Transect 14	16-Aug-13	3					3	100.0				
Transect 15	16-Aug-13	500	1		3	1	505	99.0	0.2		0.6	0.2
Total		**2409**	**88**	**5**	**106**	**2**	**2610**					
Percent Composition		**92.3**	**3.4**	**0.2**	**4.1**	**0.1**	**100.0**					

Approximately 550 ft downstream of the bridge the river channel widened and current velocity slowed, which may have helped to create better brook floater habitat along the eastern bank. Brook floater habitat was good at Stations 8 and 12 and at Transects 9, 10, 11 (Figure 1, Table 1). These areas had interstitial sand and gravel between and downstream of boulders and cobble to support brook floaters, eastern elliptio, and triangle floaters. At Station 8, a ten foot by ten foot patch of sand along the bank supported approximately ten brook floaters. Transect 9, along the river side of the island downstream of the Central Street bridge, supported eastern elliptio, triangle floater, and the highest number of brook floater specimens of any transect (Table 2). At Station 12 the habitat looked conducive to supporting several brook floaters but only five specimens were found. Farther downstream in Transect 13 current velocity slowed, which resulted in a boulder, cobble, and gravel substrate covered with fine silt and fair habitat. This transect supported eastern elliptio, triangle floater, and brook floater (Table 2).

Along the western bank at Transect 6, brook floater habitat was poor because of reduced flow and sand and silt substrate (Table 1). This transect supported eastern elliptio and triangle floater (Table 2). Transect 15, downstream of Transect 6, had a silt covered gravel and sand substrate and supported four mussel species, eastern elliptio, triangle floater, brook floater, and eastern floater; eastern elliptio composed 99 percent of the mussel community.

Length data were collected for 25 brook floater mussels and the data did not show any usually high or low values. The length range was 8 – 74 mm and mean length was 43 mm (Table 3).

Table 3. Length classes of brook floater specimens collected from the Pemigewasset River below Eastman Falls Dam Franklin, NH in August 2013.

Length Class	Number of Individuals
70-75 mm	3
60-69 mm	3
50-59 mm	3
40-49 mm	6
30-39 mm	5
20-29 mm	3
10-19 mm	1
0-9 mm	1
Mean Length	**43 mm**

4.0 Discussion

The Pemigewasset River between Eastman Falls Dam and the confluence with the Winnipesaukee River in Franklin, New Hampshire has suitable habitat to support several species of freshwater mussel (Unionidae), including brook floater. Brook floater specimens were found at several locations where suitable habitat was found. Brook floater was the

second most abundant species collected during the survey; the numerically dominant species found was eastern elliptio.

A larger number of mussels of all species combined found along the west side of the river (1,850) was substantially higher than the total number of mussels of all species combined found on the east side of the river (760). Conversely, the number of brook floaters found on the east side of the river (94) was much higher than the number of brook floaters found on the west side (12). The reason for this discrepancy is due to the habitats along each bank. The east bank of the river tended to have a more rapid current than the west side. The west side of the river had more habitat with quiet, slowly moving water and a sand silt substrate than the east side. The rapid current on the east side helped to create a coarser substrate with little fine grained material like silt. Brook floater prefers a clean swept substrate in rivers and streams with moderate current and little silt. Eastern elliptio, eastern floater, eastern lampmussel, and triangle floater can all live in streams, rivers, lakes, and ponds (Nedeau et al. 2000) and, therefore, easily inhabit areas with a slower current and fine grained substrate. Eastern elliptio is a very common species and is found in virtually every body of water in Maine that is capable of supporting mussels (Nedeau et al. 2000). This species is often extremely abundant in waterbodies that it inhabits.

Suitable brook floater habitat was found at several locations during the survey. Based on the present survey, preferred brook floater habitat includes riffles and runs with sand and gravel substrate and moderate flow. The areas where brook floaters were most abundant were along Transects 4 and 9. While surveying Transect 4, water level was low enough to access the middle of the river. This increased the size of the search area for this transect and made it much larger than any other transect. This is the only transect where access to the middle of the river was not prevented by deep water and high flow. Habitat along Transect 9 also supported many brook floater specimens. Brook floaters were typically found in interstitial gravel between and behind boulders and cobble.

This survey showed that brook floaters are common in the Pemigewasset River below Eastman Falls Dam where suitable habitat exists.

Length data indicated that multiple age classes exist in this section of the river. Maximum size for brook floater is reported to be approximately 70 mm (Nedeau et al. 2000, Strayer and Jirka 1997, Fichtel and Smith 1995), which indicates that some individuals found below Eastman Falls Dam are old. One individual was only 8 mm, which indicates that reproduction is occurring.

5.0 Literature Cited

Fichtel, C. and D.G. Smith. 1995. *The Freshwater Mussels of Vermont*. Vermont Fish and Wildlife Department Technical Report 18. Leahy Press, Montpelier, VT. 54pp.

Nedeau, E.J., M.A. McCollough, and B.I. Swartz. 2000. *The Freshwater Mussels of Maine*. Maine Department of Inland Fisheries and Wildlife, Augusta, ME. 118pp.

Strayer, D.L. and K.J. Jirka. 1997. *The Pearly Mussels of New York State*. New York State Museum Memoir 26. 113pp.

EVERSOURCE ENERGY

780 North Commercial Street
Manchester, NH 03101-1134

May 7, 2018

D34194

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
ATTN: OEP/DHAC
888 First Street, N.E.
Washington, DC 20426

RE: Eastman Falls Hydroelectric Project (FERC No. 2457-041)
Eel Passage Implementation Schedule

Dear Secretary Bose:

Pursuant to Article 401 of the Eastman Falls Hydroelectric Project (FERC No. 2457) license (159 FERC ¶ 62,070) and Section 18 Prescription No. 13.1, Public Service Company of New Hampshire (PSNH) d/b/a Eversource Energy filed a plan for Evaluation of Upstream American Eel Passage (Evaluation Plan) with the Commission on March 21, 2018. The plan was developed in consultation with the U.S. Fish and Wildlife Service (USFWS) and N.H. Fish and Game Department (NHFGD). In addition, Article 401, with reference to Section 18 Prescription No. 12.6.1, calls for an Implementation Schedule for Upstream Passage for American Eel within three months of the effectiveness date of the new license. Prescription No. 12.6.1 does not stipulate a specific date to develop the schedule but describes the schedule as:

> *The Licensee shall prepare a detailed schedule for implementing the conditions in this Modified Prescription to meet the target dates. The Licensee will prepare the schedule in consultation with the Resource Agencies and the Technical Committee. The Licensee will provide 30 days for review and comment and will offer to hold a meeting to present the schedule prior to agency review.*
>
> *The Licensee will submit a final draft schedule to the Service for its prior approval before submitting the schedule to the Commission for its approval. The Licensee shall not submit a schedule to the Commission that the Service has not approved and will include all of the agency comments and the Licensee's response to those comments with the final schedule submitted to the Commission.*

Given the associated efforts to first develop the Upstream Evaluation Plan and implementation milestones that are contingent upon number and timing of subsequent milestones, the three month deadline was not practical. PSNH has developed a final implementation schedule for Prescription 12.6.1 as part of the broader consultation effort associated with the recently filed Evaluation Plan, including a discussion with the Technical Committee on February 8, 2018, and a follow-up meeting with the USFWS on May 3, 3018. A requested revision to the schedule was subsequently provided to the USFWS on May 3, 2018 (Attachment 1) and approved by USFWS on May 4, 2018 (Attachment 2).

In developing the Implementation Schedule, in consultation with USFWS, it was determined that two due dates under Article 401 of the license and the final USFWS approved implementation schedule deadlines do not align:

- Interim downstream Passage Plan for American Eel - Commission due date is within 9 months of the effective date of the license. USFWS requires a due date of December 31, 2019, with the plan to be implemented in 2020.
- Fishway Effectiveness Monitoring Plan – Commission due date is within 6 months of the effective date of the license. USFWS requires that the monitoring plan be due to FERC 6 months prior to establishment of permanent downstream passage measures [August 15th of the 8th calendar year documenting upstream passage],

In order to address the discrepancies between the timelines noted above, PSNH respectfully requests that the Commission amend the due dates under Article 401 (a) to match those approved by the USFWS and provided in Attachment 1 of this filing.

PSNH hereby submits the Eastman Falls Eel Passage Implementation Schedule for Commission review and approval.

If you have any questions or require further information, please contact me at 603-744-8855, ext. 2 or curtis.mooney@eversource.com.

Sincerely,

Curtis R. Mooney

Curtis R. Mooney
Eversource Hydro Senior Engineering Specialist

cc:
Julianne Rosset– USFWS (via email)

Attachments

Attachment 1
USFWS Approved Implementation Schedule for Prescription No. 12.6.1

EASTMAN FALLS EEL PASSAGE IMPLEMENTATION SCHEDULE

May 3, 2018

In accordance with Section 12.6.1 of the Eastman Falls Modified Prescription, PSNH proposes the following detailed schedule for implementing timely construction, operation, maintenance, and measures for upstream and downstream eel passage, including studies and evaluations.

PLAN	DUE DATE	ADDITIONAL INFORMATION	OTHER
A Fishway Operations and Maintenance Plan (FOMP) to describe operation, maintenance, and emergency procedures for a yet undefined fish passage facility (submitted to resource agencies within 12 months of License effectiveness date)	January 1, 2019	FOMP to be signed by operations manager after review with operation personnel by December 31 of each year, provide an annual report detailing implementation of the FOMP, including any deviations from the FOMP	By March 15 of each year, the Licensee shall meet with the Service and MK River Tech Committee to discuss the FOMP and FEMP
A plan to provide and evaluate upstream eel passage (prepared in consultation with USFWS and filed with FERC within 6 months of License effectiveness[1] date of January 1, 2018)	Due June 30, 2018 – completed (3-21-2018)	Based on the results of the 2 years of collection data, a permanent location (or locations) will be determined by the Service and USFWS.	Permanent eel ramp(s) or ladder(s) will be operational by May 1, 2020.
A plan for interim downstream eel passage measures (implemented no later than August 15th, 2020)	Due December 31, 2019		

[1] Interior's modified prescription identifies deadlines for several items within a period of time after the *issuance* of the new FERC license (April 20, 2017). Article 401 keys these deadlines based upon the *effective* date of the license, which is January 1, 2018.

PLAN	DUE DATE	ADDITIONAL INFORMATION	OTHER
A plan to provide permanent downstream eel passage and protection at the Project (developed in consultation with resource agencies no later than January 1 of seventh year after upstream passage is operational {2025 if we assume eels are observed passing the Project this summer}),	Due January 1, 2025		
a Fishway Effectiveness Monitoring Plan (FEMP) to study effectiveness of downstream passage (due to FERC 6 months prior to establishment of permanent downstream passage measures [August 15th of the 8th calendar year documenting upstream passage]	Due February 15, 2025[2]	Licensee to submit yearly interim study reports to the Service by February 15 following each study year	Final study reports to be submitted to the Service within 6 months after study completion

[2] Assuming eels are documented using upstream eel passage facilities in 2018.

Attachment 2
USFWS Approval of Implementation Schedule

Mooney, Curtis R

From: Rosset, Julianne <julianne_rosset@fws.gov>
Sent: Thursday, May 03, 2018 1:41 PM
To: Mooney, Curtis R
Subject: Re: [EXTERNAL] Eastman Falls draft Fish Passage Implementation Schedule

Hi Curt,

Thanks for having us yesterday and going over the Fish Passage Implementation Schedule for Eastman Falls. The USFWS approves of the revised version of the schedule attached to your May 3, 2018 email.

Kind regards,
Julianne

Julianne Rosset
Fish & Wildlife Biologist
USFWS New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301
603-227-6436
julianne_rosset@fws.gov

On Thu, May 3, 2018 at 10:03 AM, Mooney, Curtis R <curtis.mooney@eversource.com> wrote:

Good morning Julianne,

Thanks for meeting with us yesterday to discuss the Eastman Falls draft Fish Passage Implementation Schedule.

Per your request, I have revised the schedule to include language for when permanent upstream eel passage is required.

Please let me know if the revised schedule looks OK; Once the Service approves it, I will file it with FERC.

Thanks,

Curt

Curtis R. Mooney, MS

Eversource Hydro

Senior Engineering Specialist

59 Ayers Island Road

Bristol, NH 03222

Office: (603) 744-8855 Ext. 2

Cell: (603) 345-8531

From: Rosset, Julianne [mailto:julianne_rosset@fws.gov]
Sent: Thursday, April 26, 2018 12:50 PM
To: Mooney, Curtis R <curtis.mooney@eversource.com>
Subject: Re: [EXTERNAL] Eastman Falls draft Fish Passage Implementation Schedule

Hi Curt,

Thanks for putting the timeline together. Sounds good. How about afterwards? I don't anticipate that the Amoskeag fish ladder calibration exercise will take too long...

Kind regards,

Julianne

Document Content(s)

EVERSOURCE ENERGY

780 North Commercial Street
Manchester, NH 03101-1134

May 4, 2018

D34192

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
ATTN: OEP/DHAC
888 First Street, N.E.
Washington, DC 20426

RE: Eastman Falls Hydroelectric Project (FERC No. 2457-041)
Invasive Species Management and Monitoring Plan

Dear Secretary Bose:

As required by Article 401 of the 2017 License Order and Condition E-12(a) of the Water Quality Certification (WQC) for the Eastman Falls Hydroelectric Project FERC No. 2457, the Licensee, Public Service Company of New Hampshire d/b/a Eversource Energy (PSNH or Licensee), hereby files its Invasive Species Management and Monitoring Plan (ISMMP).

A draft ISMMP was included as Appendix C of Exhibit E within the Final License Application submitted on December 18, 2015. Pursuant to WQC Condition E-12, the plan was resubmitted to New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFGD), and U.S. Fish and Wildlife Service (USFWS) for review and comment and for approval by NHDES. Consultation efforts are summarized in Section 5.0 of the ISMMP. PSNH hereby submits the ISMMP to the Commission for final review and approval.

If you have any questions or require further information, please contact me at (603)-744-8855, ext. 2 or curtis.mooney@eversource.com .

Sincerely,

Curtis R. Mooney

Curtis R. Mooney
Eversource Hydro Senior Engineering Specialist

Attachment

INVASIVE SPECIES MANAGEMENT & MONITORING PLAN

EASTMAN FALLS HYDROELECTRIC PROJECT (FERC NO. 2457)

Prepared for:

Public Service Company of New Hampshire d/b/a Eversource Energy

Manchester, NH

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

May 2018

INVASIVE SPECIES MANAGEMENT & MONITORING PLAN

EASTMAN FALLS HYDROELECTRIC PROJECT
(FERC NO. 2457)

Prepared for:

Public Service Company of New Hampshire
d/b/a Eversource Energy
Manchester, NH

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

May 2018

INVASIVE SPECIES MANAGEMENT & MONITORING PLAN

EASTMAN FALLS HYDROELECTRIC PROJECT
(FERC NO. 2457)

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
d/b/a EVERSOURCE ENERGY

MANCHESTER, NH

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EASTMAN FALLS HYDROELECTRIC PROJECT
(FERC NO. 2457)

DRAFT INVASIVE SPECIES MANAGEMENT & MONITORING PLAN

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
d/b/a EVERSOURCE ENERGY

MANCHESTER, NH

1.0 INTRODUCTION

The Eastman Falls Hydroelectric Project (Project) (FERC No. 2457) is an existing Project located on the Pemigewasset River in Merrimack and Belknap Counties, and in the city of Franklin and towns of Hill, Sanbornton, and New Hampton, New Hampshire. The Project is owned and operated by Public Service Company of New Hampshire d/b/a Eversource Energy (PSNH). A draft Invasive Species Management & Monitoring Plan (ISMMP or Plan) was included as Appendix C of Exhibit E of the Final License Application (FLA) filed with the Federal Energy Regulatory Commission (FERC or Commission) on December 20, 2016. As required by Article 401 of the 2017 License Order (159 FERC ¶ 62,070) and Condition E-12(a) of the Water Quality Certification, PSNH is redistributing the draft ISMMP to agencies and stakeholders. Comments received on this draft ISMMP will be incorporated, as appropriate, into the final plan which will be submitted to FERC and implemented upon approval by the Commission. The Licensee will consult with NHDES, NHFGD and USFWS, and obtain NHDES approval of any proposed modifications to the ISMMP.

1.1 PROJECT DESCRIPTION

The Eastman Falls Project is an existing, licensed 6.4 MW generating facility owned and operated by PSNH. The Project is located on the Pemigewasset River, at river mile 116.5, approximately 1.5 miles downstream of the United States Army Corps of Engineers (USACE) Franklin Falls Flood Control Dam, and about one mile upstream of its confluence with the Winnipesaukee River. The Project has an impoundment surface area of about 582 acres at normal pool elevation of 307 feet mean sea level (msl) and a gross storage capacity of approximately 4,570 acre-feet. The impoundment extends nine miles upstream, through the

USACE Franklin Falls Flood Control Dam at river mile 118, to Sumner Island at river mile 125.5.

1.2 PROJECT OPERATIONS

The Eastman Falls Project operates as in un-manned, run-of-river mode such that impoundment fluctuations do not exceed ± 0.2 foot from the normal impoundment elevation of 307 feet msl with flashboards installed. The generating units are normally operated remotely from PSNH's Electrical System Control Center (ESCC) located in Manchester, New Hampshire, although both units are capable of local operation. Manual operations and maintenance of the Eastman Falls Project are performed by the Central Hydro Group, which is responsible for PSNH's Eastman Falls Project and Ayer's Island Dam (FERC No. 2456) projects located in central New Hampshire. Daily logs of pond level, flow, and outages are maintained electronically for the Project. Additional operating parameters are described in the Project's Operation Compliance Monitoring and Maintenance Plan (OCMMP).

2.0 BACKGROUND CONDITIONS

2.1 PROJECT AREA INVASIVE BOTANICAL SPECIES STUDY

Pursuant to the FERC approved Revised Study Plan, PSNH performed an Invasive Botanical Species Study in July 2013 to: 1) determine the abundance and distribution of invasive botanical species within the influence of Project operation and maintenance activities; and 2) develop and map locations of invasive botanical species in areas potentially affected by Project operation and maintenance. Field surveys were completed within the Eastman Falls Project boundary during the peak growing season and included Project waters and lands for the approximate nine-mile segment of the Pemigewasset River, extending upstream to Sumner Island. A site visit was also conducted on July 13, 2015, with a representative of the New Hampshire Department of Environmental Services (NHDES) Exotic Species Program to verify milfoil findings. In addition to completing a reconnaissance survey of the impoundment shoreline, the field survey also investigated the developed areas near the Eastman Falls Facility and parking/recreation areas that could act as potential vectors and pathways for invasive species to enter and establish.

Results of the surveys show the Eastman Falls Project boundary encompasses a wide variety of habitat types. Generally the study area is undisturbed, and consists of large areas of forested

landscape. Four terrestrial and one aquatic invasive species were documented in the Project impoundment. Terrestrial invasive species included: Japanese knotweed (*Polygonum cuspidatum*), multiflora rose *(Rosa multiflora)*, purple loosestrife *(Lythrum salicaria*), and Autumn olive (*Elaeagnus umbellata*). Variable-leaf milfoil (milfoil) (*Myriophyllum heterophyllum*), was identified at five locations in shallow littoral habitats. The investigators also recorded 13 locations of Japanese knotweed patches above the waterline occurring in small discrete clusters. See Figures 2-1, 2-2, and 2-3 for locations of the variable -leaf milfoil and the Japanese knotweed identified within the Project study area.

The biologists documented Autumn olive, Japanese knotweed and multiflora at a single location in the vicinity of the powerhouse and parking facility survey area. Purple loosestrife was noted as a single occurrence in the impoundment. Other invasive species recorded during the 2013 study were recorded at a single location or as single occurrences and are not described in detail because they pose a negligible ecological risk and are not likely of being spread throughout the landscape as a result of Project operations.

Results from the 2013 field survey provide important baseline data on the extent to which invasive plants have established within the Project boundary. The results of the survey show that non-native invasive plant species are limited in the extent of the Project boundary. Infestations of invasive species within the Project bounds are generally confined to the sandy sections of shoreline and to the littoral areas that have an unconsolidated mud bottom. Further detail of the variable-leaf milfoil and Japanese knotweed infestations are provided below.

2.2 MILFOIL INFORMATION

Milfoil is a submerged aquatic plant that forms dense colonies. The stems are thick and heavy and can grow up to 15 feet. In addition, the leaves are multi-branched and somewhat reddish in color with greenish feather-like leaves. The leaves are in whorls of four to six and can grow up to 2 inches long. The upper stem has leaves that are whorled and the lower stem has either whorled or alternate. Fruiting stalks of variable milfoil are more green than red. Flowers emerge from the water in July in spikes up to 6 inches tall with distinctive oval-shaped, toothed bracts. In low water levels flowers can also form succulent amphibious forms (Smagula and Connor 2007). Typical habitat for milfoil includes lakes, slow-moving streams, reservoirs and canals.

The introduction of milfoil can alter a water body's ecology. Milfoil forms very dense mats of vegetation on the surface of the water. These mats interfere with recreational activities such as swimming, fishing, and boating. It can also interfere with power generation by clogging water intakes. Sheer mats can rob oxygen from the water by preventing the wind from mixing the oxygenated surface waters to deeper water and can also increase the sedimentation rates by trapping sediments.

Milfoil infestations typically decline the diversity of aquatic plants by out competing other plants. Milfoil is able to reproduce very successfully and rapidly through the formation of plant fragments. In the late summer and fall the plant becomes brittle and naturally breaks apart. These fragments will float to other areas, sink and start new plants. Milfoil will also grow from fragments created by boaters and other disturbances during any time of year. Once milfoil becomes well-established within a waterbody, it is difficult or impossible to remove. Milfoil is found in several shallow coves of the impoundment and along the shoreline where water depths are less than 10 feet.

On behalf of PSNH, Kleinschmidt contacted the NHDES Exotic Species Program Coordinator to obtain additional information regarding the USACE milfoil treatment at the Franklin Falls Dam impoundment (NHDES 2015 and 2018). As summarized in the annual year-end reports provided by NHDES Exotic Species Program Coordinator for 2015 through 2017, herbicide treatment of Navigate herbicide (2,4-D BEE granular) was applied to portions of the Pemigewasset River above the Franklin Falls Dam in Franklin in accordance with the conditions of Special Permit # SP-136 (2015) and # SP-234 issued by the New Hampshire Division of Pesticide Control.

Treatment was conducted during the summers of 2015 through 2017, with post-treatment survey assessments. The reports noted that post-treatment survey found that what remained of milfoil in the treatment areas appeared dead with brown foliage and/or stripped stems, and no rooted viable milfoil plants were observed within the treatment areas. In addition, no adverse impacts to non-targeted plants or other aquatic organisms were observed in or adjacent to the treated areas during the post-treatment survey in 2015. Some epinasty on the yellow waterlilies and slight injury to the floating-leaf pondweed in occurred 2017.

In the year-end report of the milfoil treatment for 2017, recommendations were to continue Milfoil management in 2018, with the areas with higher density growth being targeted for re-

treatment with Navigate herbicide. In addition, non-chemical controls such as hand-pulling or diver assisted suction harvesting were recommended to remove low-density or widely scattered milfoil regrowth.

FIGURE 2-1. INVASIVE SPECIES MAP 1

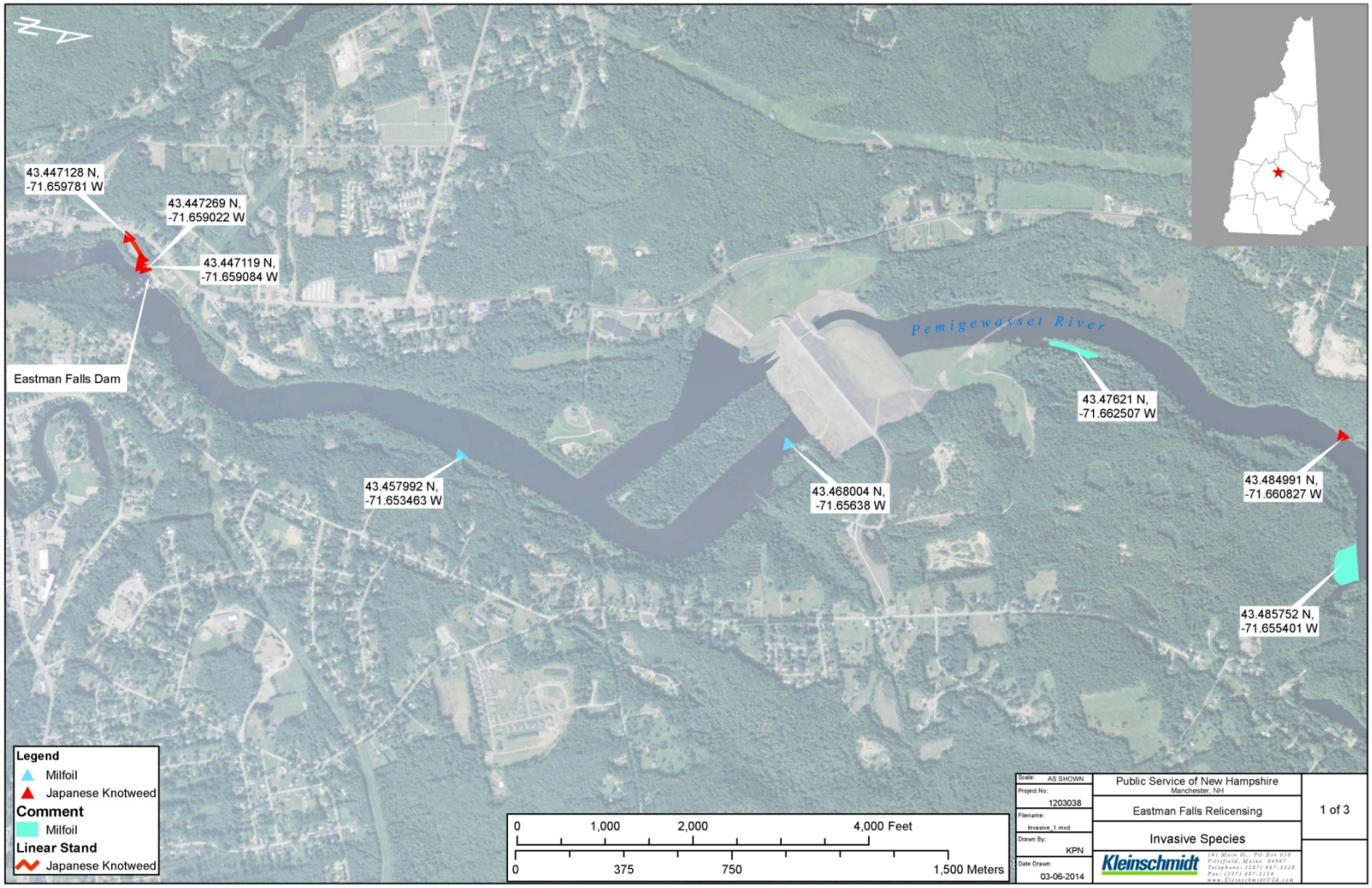


FIGURE 2-2. INVASIVE SPECIES MAP 2

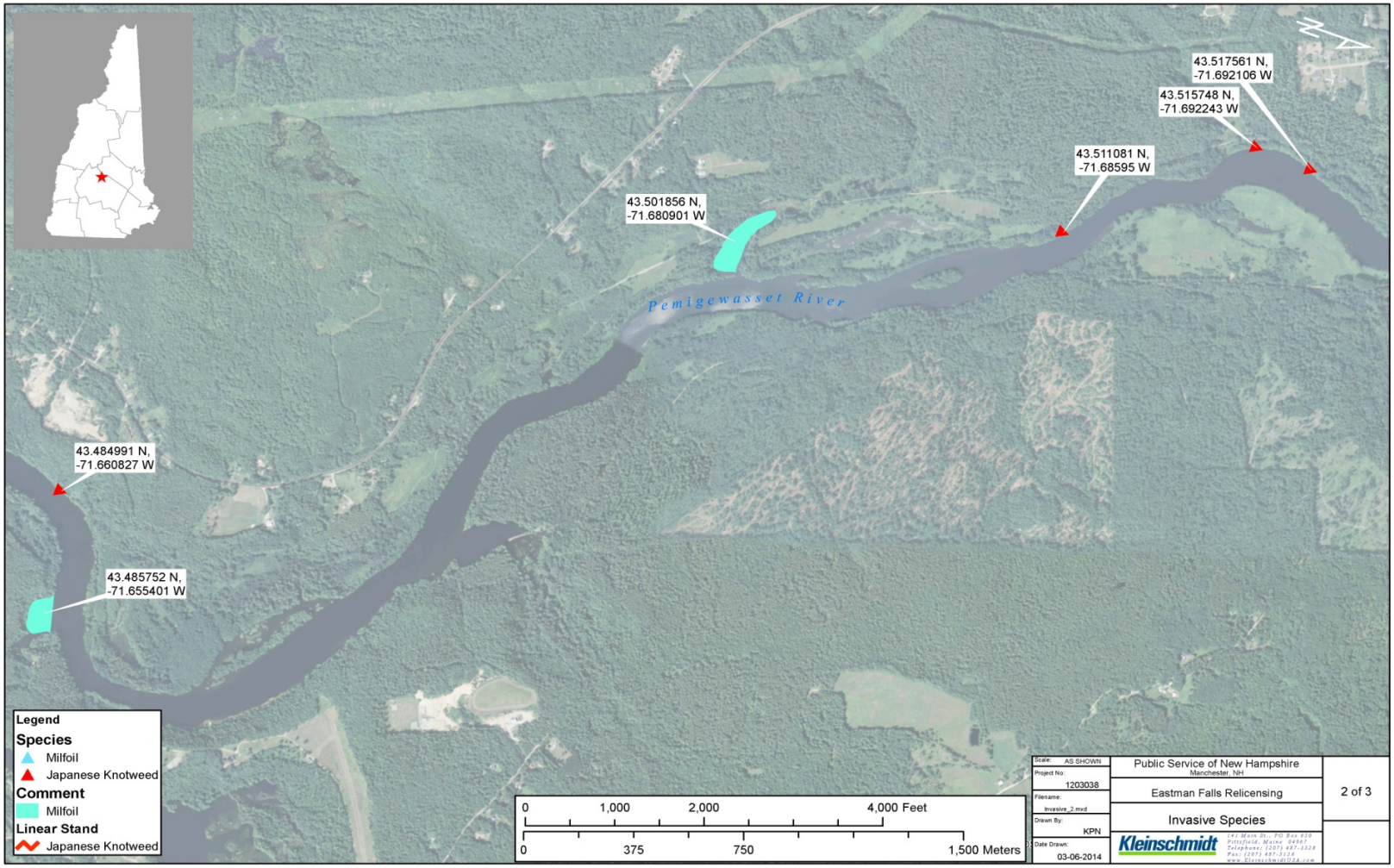
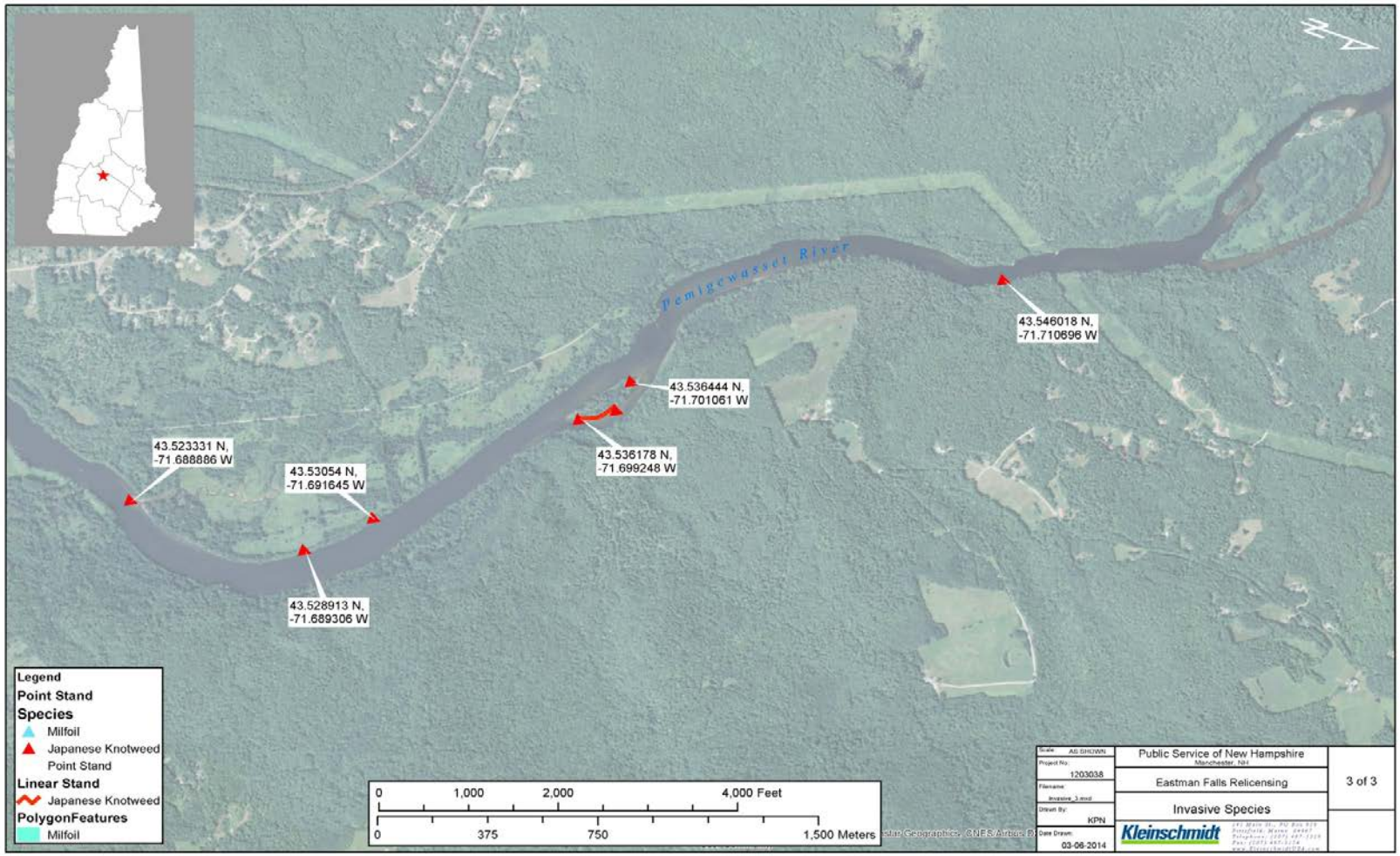


FIGURE 2-3. INVASIVE SPECIES MAP 3



2.3 JAPANESE KNOTWEED INFORMATION

In New Hampshire, Japanese knotweed is a frequent colonizer of the riparian ecosystem. It forms dense colonies that shade-out native plant species, lower native plant diversity, and reduces habitat value. The success of Japanese knotweed is partly attributed to its tolerance of a wide range of soil types, ph, and disturbances.

Japanese knotweed is a large, herbaceous perennial plant that has hollow stems with distinct raised nodes that give it the appearance of bamboo. Japanese knotweed can grow over 10 feet tall with large, triangular, smooth-edge alternative leave, four to six inches long and two to four inches wide, with pointed tips and straight bases. The mature reddish stems from a zigzag pattern. Tiny white flowers bloom late summer and fall forming long lacy spikes.

Japanese knotweed forms dense monocultures in wetlands and along streams and waterways. They generally do not support insects or provide adequate shade or cover for birds or fish; they have no natural enemies to keep their population in check. Japanese knotweed does not provide bank stabilization or erosion control and high river flows wash plant parts and rhizomes downstream where they readily root and colonize new areas.

3.0 MONITORING AND MANAGEMENT

Other than continued mowing at the project access and recreation sites, PSNH proposes no measures for managing the existing riparian vegetation. As proposed, the Project will operate under run-of-river mode conditions. Relatively stable pond levels will be maintained and are not expected to adversely affect the riparian zone, shoreline habitat or species (including threatened or endangered) that may utilize wetland and littoral zone habitat areas. This operating regime will also sustain existing riparian communities at the project and the wildlife species they support.

PSNH will continue to maintain the existing facility foot-print which will include mowing of grasses and trimming of shrubs and herbaceous vegetation at the downstream recreational access facility and immediate areas adjacent to the existing structures. These areas are maintained to provide access to the project structures for periodic surveillance, maintenance and safety

inspection activities. In the event that previously undocumented exotic, invasive species or previously unidentified federal or state listed rare, threatened, or endangered plant or animals are encountered during project maintenance procedures, PSNH will notify the NHDES Exotic Species Program Coordinator, the New Hampshire Fish and Game Department (NHFGD), and the United States Fish and Wildlife Service (USFWS), as appropriate.

3.1 INVASIVE SPECIES MONITORING

Results from the 2013 field survey provide baseline data on the extent to which invasive plants have established within the Project boundary. In order to better understand the extent and locations of invasive species within the Project boundary, PSNH proposes to implement periodic invasive species monitoring. Survey data from the 2013 relicensing study will serve as a baseline for future riparian and littoral zone surveys (for milfoil, etc.) within the project boundary, to be conducted every five years from the effective date of the new license (January 1, 2018) by a qualified botanist familiar with the identification of current New Hampshire and New England invasive plants. If any of the invasive plant species listed within the Invasive Plant Atlas of New England, a comprehensive list of species considered to be invasive or potentially invasive in New England, are discovered, the surveyor will document the type and location of the species. This monitoring effort will be coordinated with any future monitoring efforts made by the USACE at its Franklin Falls facility. PSNH will provide a letter report of the monitoring results to the NHDES Exotic Species Program Coordinator and the NHDES 401 Water Quality Certification Program Coordinator, the NHFGD, and the USFWS by the end of the calendar year in which the monitoring occurs.

3.2 INVASIVE SPECIES MANAGEMENT

Project grounds will be maintained in a manner that includes decisions to prevent the introduction and spread of terrestrial exotic and invasive vegetation species. No terrestrial plants identified on the New Hampshire Department of Agriculture, Markets, and Food (NH Agriculture) Prohibited Invasive Plan Species List or those identified in the Invasive Plant Atlas of New England will be purposely planted within the bounds of the Eastman Falls Project. In the event that any invasive species are identified, PSNH will follow recommended protocols

established by the NHDES Exotic Species Program Coordinator and the NH Agriculture[1] and consult to verify the type of species and on methods for eradication, as necessary.

PSNH shall consult with NHDES, NHFGD and USFWS, and receive NHDES approval of any proposed modifications to the ISMMP.

4.0 CONSULTATION

As required by Article 401 of the 2017 License Order (159 FERC ¶ 62,070) and Condition E-12(a) of the Water Quality Certification, PSNH redistributed the draft ISMMP to NHDES, NHFGD and USFWS for review and comment. Comments were provided by NHDES (See Appendix A) and have been incorporated into the final plan. Revisions have been submitted to NHDES to approval the final ISMMP. Additional comments provided on May 1, 2018, have also been incorporated into the final ISMMP. By email dated May 4, 2018, NHDES deemed the plan acceptable (Appendix A).

5.0 REFERENCES

NHDES (New Hampshire Department of Environmental Services) Exotic Species Program. 2015. Correspondence with Amy Smagula, NHDES Exotic Species Program Coordinator, regarding Milfoil Treatment at Franklin Falls ACOE Site in Franklin, NH - SP-136, November 17, 2015.

NHDES (New Hampshire Department of Environmental Services) Exotic Species Program. 2017. Correspondence with Amy Smagula, NHDES Exotic Species Program Coordinator, regarding Milfoil Treatment at Franklin Falls ACOE Site in Franklin, NH - SP-234, March 9, 2018.

Smagula, A. P., and Jody Connor. 2007. New Hampshire Department of Environmental Services. Aquatic Plants & Algae of New Hampshire's Lands and Ponds.

[1] The NH Agriculture (lead state agency responsible for the evaluation, publication and development of rules on invasive plant species) provides information on recommended management for control and eradication of invasive plant species.

APPENDIX A

CONSULTATION

From: Comstock, Gregg [mailto:Gregg.Comstock@des.nh.gov]
Sent: Friday, May 04, 2018 12:07 PM
To: Mooney, Curtis R <curtis.mooney@eversource.com>
Cc: Smagula, Amy <Amy.Smagula@des.nh.gov>; Henderson, Carol <Carol.Henderson@wildlife.nh.gov>; Rosset, Julianne <julianne_rosset@fws.gov>
Subject: Eastman Falls ISMMP submitted May 3 2018 - NHDES approval

Curt,

We have reviewed the revised Invasive Species Management and Monitoring Plan (ISMMP) submitted on May 3, 2018 in accordance with condition E-12 of WQC # 2016-FERC-001 issued on December 15, 2016 for the Eastman Falls Project (FERC No. 2457), and find it acceptable.

Regards,

Gregg

Gregg Comstock, P.E.
Supervisor, Water Quality Planning Section
NH Department of Environmental Services, Watershed Management Bureau
29 Hazen Drive, PO Box 95
Concord, NH 03302-0095
603-271-2983
gregg.comstock@des.nh.gov

From: Mooney, Curtis R [mailto:curtis.mooney@eversource.com]
Sent: Thursday, May 3, 2018 2:18 PM
To: Comstock, Gregg
Cc: Smagula, Amy; Henderson, Carol; Rosset, Julianne
Subject: RE: Eastman Falls Invasive Species Management and Monitoring Plan

Good afternoon Gregg:

We have incorporated all of your comments on the Eastman Falls Invasive Species Monitoring Plan. The revised plan is attached for NHDES approval.

Thanks,
Curt

Curtis R. Mooney, MS
Eversource Hydro
Senior Engineering Specialist

59 Ayers Island Road
Bristol, NH 03222

Office: (603) 744-8855 Ext. 2
Cell: (603) 345-8531

From: Comstock, Gregg [mailto:Gregg.Comstock@des.nh.gov]
Sent: Tuesday, May 01, 2018 5:05 PM
To: Mooney, Curtis R
Cc: Smagula, Amy ; Henderson, Carol ; Rosset, Julianne
Subject: Eastman Falls Invasive Species Management and Monitoring Plan

---

Hi Curt.

We have reviewed the revised Invasive Species Management and Monitoring Plan submitted on April 25, 2018 and have the following comments.

p.3, Section 2.2, 5th sentence, there is an extra period. " … are more green than red. . ".

p.3, Section 2.2, 6th sentence appears to be missing a word: "Flowers emerge from the water in July, where they in spikes up to 6 inches tall…".

p.9, Section 3.1, the 4th sentence states the following: Every five years …PSNH will send a qualified botanist familiar with the identification of New Hampshire and New England invasive plants, to perform a survey of the riparian zone on Project lands." To document how conditions have changed from the 2013 baseline, please add that the survey performed in 2013 for FERC relicensing, will be repeated every 5 years after the effective date of the new FERC license and that similar to 2013, it will include a survey of the riparian and littoral zone (for milfoil, etc.).

p. 9, Section 3.1, last sentence: Please add that a copy of the report will also be provided to the NHDES 401 Water Quality Certification Program Coordinator.

Thank you Curt.

Gregg

Gregg Comstock, P.E.
Supervisor, Water Quality Planning Section
NH Department of Environmental Services, Watershed Management Bureau
29 Hazen Drive, PO Box 95
Concord, NH 03302-0095
603-271-2983
gregg.comstock@des.nh.gov

From: Mooney, Curtis R [mailto:curtis.mooney@eversource.com]
Sent: Wednesday, April 25, 2018 9:51 AM
To: Comstock, Gregg
Subject: Eastman Falls Invasive Species Management and Monitoring Plan

Good morning Gregg –

Attached for final approval is the revised ISMMP for Eastman Falls. The Word file is in track changes so you can see how we addressed Amy's comments. She recommended a reference but a different one co-authored by her was more readily available so we used that instead. The PDF file is a clean version with correspondence appended. Upon receipt of your approval, we will add that to the Appendix prior to filing with FERC. If you have any questions or would like to discuss, please let me know. We would like to file the final plan with FERC by the end of April so DES approval at your earliest convenience would be much appreciated.

Thank you,
Curt

Curtis R. Mooney, MS
Eversource Hydro
Senior Engineering Specialist

59 Ayers Island Road
Bristol, NH 03222

Office: (603) 744-8855 Ext. 2
Cell: (603) 345-8531

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From: Smagula, Amy [mailto:Amy.Smagula@des.nh.gov]
Sent: Monday, March 19, 2018 3:46 PM
To: Curtis R. Mooney <curtis.mooney@eversource.com>; Comstock, Gregg <Gregg.Comstock@des.nh.gov>; Henderson, Carol <Carol.Henderson@wildlife.nh.gov>; Julianne Rosset (julianne_rosset@fws.gov) <julianne_rosset@fws.gov>
Subject: RE: Eastman Falls draft Invasive Species Management & Monitoring Plan

---

My only edit is on page 3 of the document, as follows:

This paragraph below appears to refer to the taxanomic features of Eurasian water milfoil (Myriophyllum spicatum) (highlighted in yellow) where you refer to the leaves divided into 12 or more pairs of leaflets. Variable milfoil, and all other milfoil species aside from EWM have less than 12 pairs of leaflets. Also, fruiting stalks of variable milfoil are more green than red. I suggest checking Crow and Hellquist (Aquatic and Wetland Plants of northeastern North America) for language appropriate to the taxanomic description of Myriophyllum heterophyllum for this report.

Your paragraph:

Milfoil is a submerged aquatic plant that forms dense colonies. The stems are multi-branched and somewhat reddish in color with greenish feather-like leaves. The leaves are in whorls of three to five around a slim stem with each leaf divided into 12 or more pairs around thin thread-like leaflets. Reddish flowers are borne on leafless spikes that rise above the surface water a few inches. Typical habitat for milfoil includes lakes, slow-moving streams, reservoirs and canals.

~~~~~~

Amy P. Smagula
Limnologist/Exotic Species Program Coordinator
NH Department of Environmental Services
29 Hazen Drive
Concord, NH 03301
Phone: 603-271-2248
Amy.Smagula@des.nh.gov

From: Curtis R. Mooney [mailto:curtis.mooney@eversource.com]
Sent: Monday, March 19, 2018 3:11 PM
To: Comstock, Gregg; Henderson, Carol; Julianne Rosset (julianne_rosset@fws.gov)
Cc: Smagula, Amy
Subject: Eastman Falls draft Invasive Species Management & Monitoring Plan

Good afternoon Gregg, Carol, and Julianne -
~~~~~~

Attached is the Eastman Falls draft Invasive Species Management & Monitoring Plan as required by Article 401 of the FERC license and Condition E-12(a) of the water quality certification.

Please provide any comments you have in writing within 30 days (by **April 18**) of this email. We will then file the plan with FERC for their approval.

If you have any questions during your review, please let me know.

Thank you for your time and assistance.
Curt

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Document Content(s)

EVERSOURCE ENERGY

780 North Commercial Street
Manchester, NH 03101-1134

June 26, 2018

D34208

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
ATTN: OEP/DHAC
888 First Street, N.E.
Washington, DC 20426

RE: Eastman Falls Hydroelectric Project (FERC No. 2457-041)
Operation Compliance Monitoring and Maintenance Plan

Dear Secretary Bose:

In accordance with Condition E-11 of the Water Quality Certification and Article 401 of the 2017 License for the Eastman Falls Hydroelectric Project FERC No. 2457 (159 FERC ¶ 62,070), the Licensee, Public Service Company of New Hampshire d/b/a Eversource Energy (PSNH or Licensee), hereby files its revised Operation Compliance Monitoring and Maintenance Plan (OCMMP) for Commission review and approval.

As required by Article 401, the plan was distributed to the New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFGD), and U.S. Fish and Wildlife Service (USFWS) on April 10, 2018 for review and comment. As of the date of filing, no comments have been provided. Consultation efforts are summarized in Section 4.0 of the OCMMP.

If you have any questions or require further information, please contact me at 603-744-8855, ext. 2 or curtis.mooney@eversource.com .

Curtis R. Mooney
Eversource Hydro Senior Engineering Specialist

Attachment

OPERATION COMPLIANCE MONITORING AND MAINTENANCE PLAN

EASTMAN FALLS HYDROELECTRIC PROJECT

(FERC NO. 2457)

Prepared for:

Public Service Company of New Hampshire
d/b/a Eversource Energy
Manchester, New Hampshire

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

June 2018

OPERATION COMPLIANCE MONITORING AND MAINTENANCE PLAN

EASTMAN FALLS HYDROELECTRIC PROJECT

(FERC NO. 2457)

Prepared for:

Public Service Company of New Hampshire
Manchester, New Hampshire
d/b/a Eversource Energy

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

June 2018

OPERATION COMPLIANCE MONITORING AND MAINTENANCE PLAN

EASTMAN FALLS HYDROELECTRIC PROJECT
(FERC NO. 2457)

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
d/b/a Eversource Energy

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OPERATION COMPLIANCE MONITORING AND MAINTENANCE PLAN

EASTMAN FALLS HYDROELECTRIC PROJECT
(FERC NO. 2457)

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
d/b/a Eversource Energy

1.0 INTRODUCTION

The Eastman Falls Hydroelectric Project (Project) (FERC No. 2457) is an existing Project located on the Pemigewasset River in Merrimack and Belknap Counties, and in the city of Franklin and towns of Hill, Sanbornton, and New Hampton, New Hampshire. The Project is owned and operated by Public Service Company of New Hampshire d/b/a Eversource Energy (PSNH). On July 2, 2012, PSNH formally initiated the relicensing process for the Eastman Falls Project with the filing of a Notice of Intent (NOI) and Pre-Application Document (PAD). In consultation with agencies, interested parties, and the Federal Energy Regulatory Authority (FERC or Commission), PSNH conducted a number of resource studies, the results of which were incorporated in the Draft License Application (DLA) filed on August 4, 2015.

A draft Operation Compliance Monitoring and Maintenance Plan (OCMMP) was included as Appendix B of Exhibit E of the DLA filing for agency and stakeholder review and comment. A revised OCMMP was included as Appendix B of Exhibit E of the Final License Application (FLA) filed with FERC on December 20, 2016, including discussion in Section 4.0 of this OCMMP of how agency and stakeholder comments on the draft OCMMP were addressed in this final OCMMP.

As required by Article 401 of the 2017 License Order (159 FERC ¶ 62,070) and Condition E-11(a) of the Water Quality Certification, this OCMMP is being submitted to FERC for final review and approval, and shall be implemented upon approval by the Commission.

1.1 PROJECT DESCRIPTION

The Eastman Falls Project is an existing, licensed 6.4 MW generating facility owned and operated by PSNH. The Project is located on the Pemigewasset River, at river mile (RM) 116.5, approximately 1.5 miles downstream of the United States Army Corps of Engineers (USACE)

Franklin Falls Flood Control Dam, and about one mile upstream of its confluence with the Winnipesaukee River. The Project has an impoundment surface area of about 582 acres at normal pool elevation of 307 ft mean sea level (msl) and a gross storage capacity of approximately 4,570 acre-ft. The impoundment extends nine miles upstream, through the USACE Franklin Falls Flood Control Dam at river mile 118, to Sumner Island at river mile 125.5.

The Eastman Falls Project consists of two generating facilities with a total nameplate capacity of 6.4 megawatts (MW), including: (1) a 341 ft long by 37 ft high concrete gravity dam equipped with 6 ft high steel flashboards for its full length; (2) a waste gate structure with a 16 ft high by 30 ft wide steel slide gate; (3) Unit 1 (a) approximately 29 ft long, 29 ft wide, and 34 ft high powerhouse 1, located on west side of the dam; (b) an approximately 12.5 ft high by 15 ft wide intake structure; (b) 12.5 ft by 12.5 ft reinforced concrete penstock approximately 21 ft long; and (c) a single 1.8 MW Kaplan vertical-type turbine generator; (4) Unit 2 (a) approximately 88 ft long, 78 ft wide, and 56 ft high powerhouse 2, located on west side of the dam; (b) an approximately 18 ft high by 18 ft wide intake structure, (c) 18 ft wide by 18 ft high by 10 ft long reinforced concrete transition section; and (d) a single 4.6 MW Kaplan horizontal-type turbine generator; (5) a 100 ft long, 2.4-kilovolt transmission line connecting both powerhouses to the regional distribution grid; and (6) appurtenant facilities.

1.2 PROJECT OPERATIONS

The Eastman Falls Project operates in an un-manned, run-of-river mode such that impoundment fluctuations do not exceed $\pm$ 0.2 feet from the normal impoundment elevation of 307 feet msl with flashboards installed. The generating units are normally operated remotely from PSNH's Electrical System Control Center (ESCC) located in Manchester, New Hampshire, although both units are capable of local operation. Manual operations and maintenance of the Eastman Falls Project are performed by the Central Hydro Group, which is responsible for PSNH's Eastman Falls Project and Ayer's Island Dam (FERC No. 2456) project located in central New Hampshire. Daily logs of pond level, flow, and outages are maintained electronically for the Project.

2.0 OPERATIONS MANAGEMENT PLAN

2.1 TYPICAL OPERATIONS

The Project operates as an un-manned, run-of-river facility. Unit 1 can operate in range from a minimum flow of 250 cfs to a maximum flow of 850 cfs, and Unit 2 operates from a minimum flow of 700 cfs to a maximum flow of 1,930 cfs. Combined the Project Units can operate between a minimum flow of 250 cfs to maximum flow of 2,780 cfs.

Inflow is typically maintained with a steady impoundment level of approximately 6 ft above the crest of the dam (top of flashboards) at elevation 307 feet msl. A 6 ft pond level (top of boards) is desired to maximize head for generation. The Project is normally operated on pond control (automated pond level control) with a set point at the top of boards at 6 ft. The pond level control typically maintains this level within +/- 0.2 ft.

When inflow is insufficient to operate Unit No. 1 (less than 250 cfs), the unit will be shut down and PSNH will continue to maintain run of river operations by passing flows through the waste gate or spilled over the dam. At flows above the minimum capacity of Unit No. 1 (250 cfs or greater), inflow will be passed through unit operation. At flows greater than 700 cfs, Unit No. 2 will be brought on line and Unit No. 1 will be shut down because Unit No. 2 is a newer and more efficient unit. At flows of approximately 1,830 cfs, Unit No. 1 will be brought back on line. The waste gate will additionally be operated to pass flows in excess of the hydraulic capacity of the turbines (Unit No. 1: 850 cfs + Unit No. 2: 1,930 cfs = 2,780 cfs) and to minimize overtopping of the flashboards. During periods when sufficient inflow is anticipated such that both units can be operated, Unit 1 is brought online before Unit 2 reaches maximum capacity to allow smoother operational transition, not for downstream flow regulation.

When river flows exceed 2,780 cfs (station capacity), the waste gate is opened to manually maintain the 6 foot level. In addition, during periods when river flows exceed the hydraulic capacity of both units combined (2,780 cfs), and when the flashboards are lowered due to increased flow, the 6 foot pond level is difficult to maintain. Therefore, during these periods the pond level is maintained within +/- 0.5 foot when the wastegate is operated when river flow exceeds station capacity (2,780 cfs), and within +/ 1 foot when the flashboards are lowered and/or raised due to changing river flow.

The hinged steel flashboards are raised and lowered to manage river flows and are not maintained in place like wooden flashboards; therefore, no additional operational procedures are necessary associated with flashboard failures. During circumstances when periodic turbine shutdowns are necessary to perform maintenance activities, PSNH will pass inflow either through the wastegate or over the spillway.

2.2 FLOOD CONTROL OPERATIONS

When river flows exceed station capacity, a combination of waste gate operation and flashboard lowering are used to pass excess flows. Flashboard struts are removed and flashboards are lowered to pass increased flows before overtopping exceeds about 1 ft. There are three bays of flashboards. One lowered bay of flashboards passes approximately 5,302 cfs at a 6 ft. pond level. As a backup, the flashboard struts are designed to fail at 2 ft. of overtopping so that the full spillway capacity is available during high flow conditions.

Operation of the upstream USACE Franklin Falls Dam has the potential to affect Eastman Falls Project operations as Franklin Falls has the ability to regulate inflow to the Eastman Falls Project. During low and normal river flow conditions, Franklin Falls Dam typically passes inflow, having no effect on Eastman Falls Project operation.

During periods of high flows, USACE Franklin Falls Flood Control Dam may hold back inflow for flood control until maximum outflow levels must be released. The USACE typically contacts PSNH to provide advance notice on how much water will be released during flood operations. The maximum discharge capacity of Franklin Falls is 18,000 cfs. When outflow from Franklin Falls is less than approximately 14,000 cfs, PSNH lowers one bay of flashboards. When discharges from Franklin Falls are between approximately 14,000 cfs and 18,000 cfs, two bays of flashboards are lowered. When flows begin to recede, PSNH raises the flashboards.

2.3 MAINTENANCE OPERATIONS

2.3.1 SCHEDULED

Turbine

Periodic turbine shutdowns will occur as necessary to perform maintenance activities. Under these circumstances PSNH will continue to maintain outflow equal to inflow either through the wastegate or over the spillway.

In addition to planned maintenance activities, there will be times when an operator has to clear accumulated debris (leaves, trees, branches, etc.) from the intakes. This may require backing off the units to flush the debris away from the intake over the spillway. PSNH will continue to maintain run of river operations by passing flows through the wastegate or over the spillway during this activity. Clearing debris from the intake normally takes less than one hour to accomplish.

Impoundment

Drawdown of the impoundment will be required from time to time to perform major maintenance on Project structures and including but not limited to accommodate requests or orders from Federal or state agencies and entities concerned with public safety, construction/maintenance of public works type projects and other similar activities.

During an impoundment drawdown, the Licensee shall strive to achieve, to the extent practicable, a gradual drawdown rate of six (6) inches per day or less. Exceptions to this may be allowed if required by operating emergencies beyond the control of the Licensee or for short periods upon approval by NHDES.

Following an impoundment drawdown for maintenance or emergencies, the Licensee shall release 90 percent of the inflow downstream to the Pemigewassett River and utilize the remaining 10% of inflow to refill the impoundment. This refill procedure may be modified with prior approval of NHDES, USFWS and the NHFGD.

Sensors

Currently, a level transducer is used to measure headwater in the impoundment adjacent to the Unit 2 headworks. The data is fed to the station PLC through SCADA based system. The data is also stored by the station PC and the GE cimplicity server.

A hydro operator will visually verify actual headwater with the Electrical System Control Center's (ESCC's) computer readings a minimum of 2 times per week. Any discrepancies will be noted and if necessary, adjustments will be made to ensure accuracy.

2.3.2 UNSCHEDULED

Turbine

Turbine units may trip unexpectedly (i.e. line fault, equipment failure, etc.). The wastegate is programmed to open 0.8' in order to provide continued downstream flow.

Impoundment

There may be occasions where PSNH will need to initiate an unplanned drawdown to respond to emergencies beyond its control such as dam safety, public safety, or impending electrical system blackout emergencies. Run-of-river operations would need to be modified during such emergencies. PSNH will notify the FERC, New Hampshire Department of Environmental Services (NHDES), U.S. Fish and Wildlife Service (USFWS), and NHF&G within 24 hours of such emergencies and include the date, time, and the reason for the emergency drawdown.

2.3.3 RECORDS OF MAINTENANCE

PSNH maintains and will continue to maintain records of maintenance operations performed at the facility and made available to NHDES upon request.

3.0 MONITORING PLAN FOR IMPOUNDMENT AND FLOW MANAGEMENT

PSNH will continue to monitor generation, impoundment levels, and inflows at the Project. A pressure-sensitive headwater sensor is in place at the dam and provides impoundment levels. Records of operations, run-of-river flows, and water levels will be maintained electronically. These records can be retrieved and be made available upon request; PSNH will provide copies of monitoring data (i.e., headwater level, generation output, and flow conditions) to the FERC, NHDES, USFWS, and NHF&G to verify compliance.

3.1 REPORTING DEVIATIONS

PSNH will notify the FERC within ten days of any deviation from run-of-river flow requirements. PSNH will notify the NHDES, NHF&G, and USFWS within 24 hours of any deviation from run-of-river flow requirements. This notification will include a discussion of the reasons for the deviation and the corrective actions taken by PSNH. PSNH will consult the NHDES regarding the incident and any identified corrective measures. A report regarding the incident will be filed with the Commission within 45 days of the incident and after consultation with the resource agencies. A copy of the report will be provided to the resource agencies. The report will contain, to the extent possible, the cause, severity and duration of the incident, and any observed or reported adverse environmental impacts resulting from the incident. The report will also provide pertinent Project data and a description of corrective measures.

3.2 ANNUAL REPORTING

PSNH will provide an annual report summarizing headwater level, generation output, and flow conditions in tabular and graphic format similar to that provided in Appendix A for January and February 2018[1].

[1] Note that slight deviations of higher or lower than +/- 0.2 feet occurred during this period, associated with rapid increases and decreases in river flow (e.g. January 14 and 16, respectively).

4.0 AGENCY CONSULTATION

The draft Project Operation Compliance Monitoring and Maintenance Plan was submitted to the FERC and resource agencies as part of the submittal of the DLA (included as Appendix B of Exhibit E) on August 4, 2015. In response to comments on the DLA, PSNH received comments from the following agencies and stakeholders:

- Letter from Bob Easton, Chief New England Branch, FERC to Curtis Mooney, PSNH, dated October 28, 2015.
- Letter from Thomas R. Chapman, Supervisor, New England Field Office, USFWS to Curtis Mooney, PSNH dated October 29, 2015.
- Letter from Glenn Normandeau, Executive Director, NHF&G to Curtis Mooney, PSNH dated October 28, 2015.
- Letter from Owen David, 401 Water Quality Certification Program Coordinator, NHDES Watershed Management Bureau to Curtis Mooney, PSNH dated October 29, 2015.

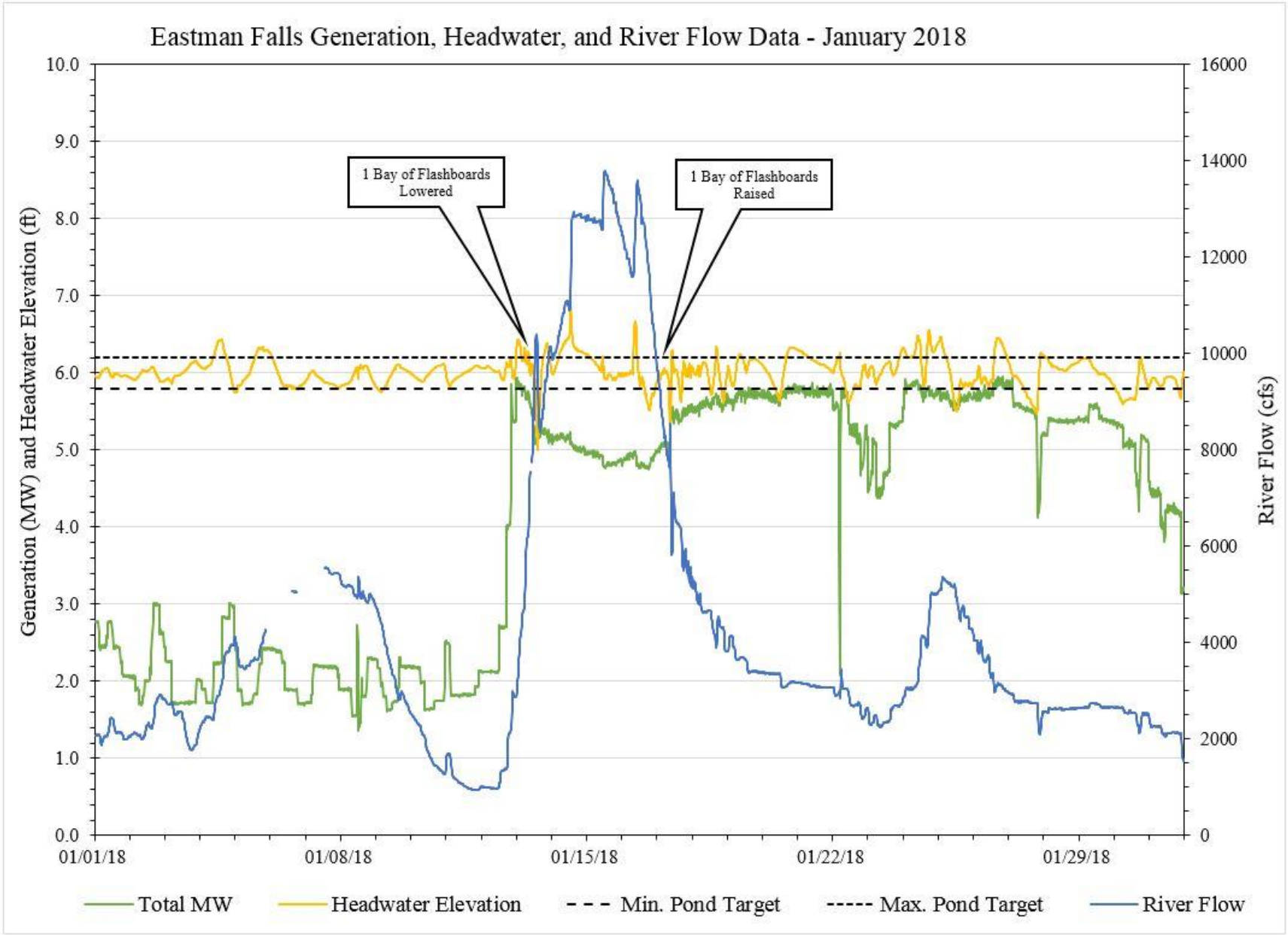
In terms of comments on the draft OCMMP, several comments were received regarding the description of existing Project operations, and one specific comment from FERC regarding the Operation Compliance Monitoring Plan. These comments are summarized below as well as how they have been addressed in this Plan.

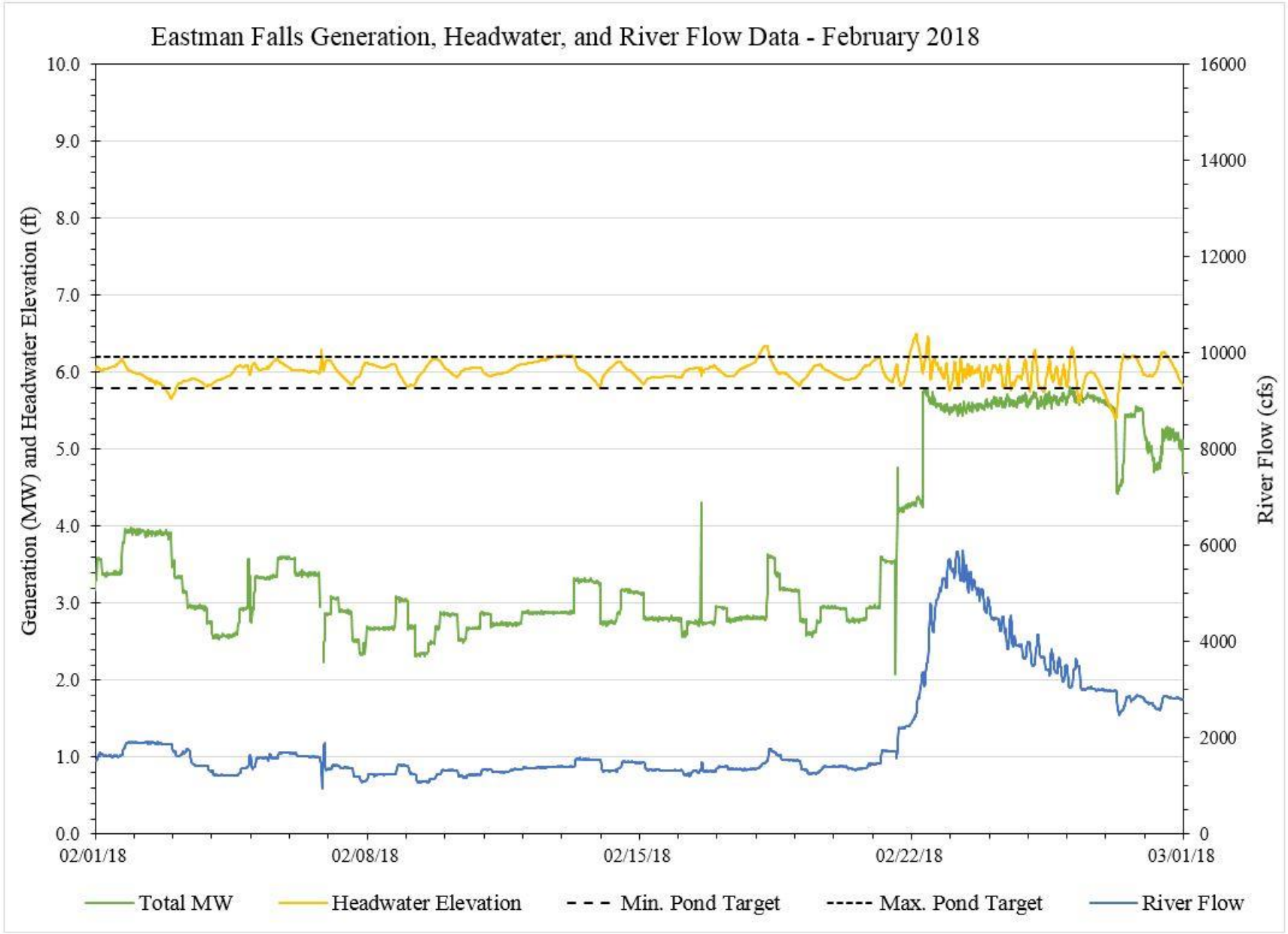
FERC commented that the FLA should include description of how the automated pond level control maintains the impoundment level; additional explanation of why the less efficient No. 1 unit is bought on line before the more efficient No. 2 unit reaches its maximum hydraulic capacity; and to clarify in the Operation Compliance Monitoring Plan whether there are any procedures described in the OCMMP apply to flashboard failures or, if not, revise the OCMMP to include operating procedures following flashboard. Accordingly, Section 2.0 has been updated to include additional information regarding automated pond level control and additional information regarding operational of units No. 1 and No. 2. Flashboards are raised and lowered to manage river flows and are not maintained in place; therefore, no additional operational procedures are necessary associated with flashboard failures.

USFWS, NHF&G, and NHDES comments relevant to this OCMMP were primarily related to PSNH providing additional description and clarification of the Project's modified run-of-river operations. Accordingly, additional description of project operations under existing conditions and as proposed by PSNH has been provided to clarify that the project is operated in run-of-river mode. As required by Article 401, the plan was reissued to agencies for review and comment on April 10, 2018. As of the date of filing the plan with FERC, no further comments have been provided.

APPENDIX A

OPERATIONS DATA – JANUARY – FEBRUARY 2018


Eastman Falls Generation, Headwater, and River Flow Data - January 2018
1 Bay of Flashboards Lowered
1 Bay of Flashboards Raised
Generation (MW) and Headwater Elevation (ft)
River Flow (cfs)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
16000
14000
12000
10000
8000
6000
4000
2000
0
01/01/18
01/08/18
01/15/18
01/22/18
01/29/18
Total MW
Headwater Elevation
Min. Pond Target
Max. Pond Target
River Flow


Eastman Falls Generation, Headwater, and River Flow Data - February 2018
Generation (MW) and Headwater Elevation (ft)
River Flow (cfs)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
16000
14000
12000
10000
8000
6000
4000
2000
0
02/01/18
02/08/18
02/15/18
02/22/18
03/01/18
Total MW
Headwater Elevation
Min. Pond Target
Max. Pond Target
River Flow

Document Content(s)

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
ACADEMY BROOK	LOUDON	EBT	1+YR	350
AIRPORT POND	WHITEFIELD	EBT	1+YR	1,000
	WHITEFIELD	EBT	2+YR	50
AKERS POND	ERROL	RT	1+YR	4,500
AMMONOOSUC RIVER	BATH	BT	1+YR	1,680
	BATH	EBT	1+YR	1,500
	BATH	RT	1+YR	1,845
	BETHLEHEM	BT	1+YR	800
	BETHLEHEM	EBT	1+YR	1,600
	BETHLEHEM	RT	1+YR	1,900
	CARROLL	EBT	1+YR	8,000
	CARROLL	RT	1+YR	7,400
	LISBON	BT	1+YR	2,500
	LISBON	EBT	1+YR	200
	LISBON	RT	1+YR	1,500
	LITTLETON	BT	1+YR	300
	LITTLETON	EBT	1+YR	400
	LITTLETON	RT	1+YR	500
AMMONOOSUC RIVER, UPPER	BERLIN	BT	1+YR	200
	BERLIN	EBT	1+YR	2,000
	BERLIN	EBT	FING	7,421
	MILAN	BT	1+YR	800
	MILAN	EBT	1+YR	500
	NORTHUMBERLAND	BT	1+YR	800
	NORTHUMBERLAND	EBT	1+YR	400
	STARK	BT	1+YR	1,200
	STARK	EBT	1+YR	2,600
AMMONOOSUC RIVER, WILD	BATH	EBT	1+YR	1,701
	BATH	EBT	2+YR	30
ANDREW BROOK	NEWBURY	EBT	1+YR	200
ANDROSCOGGIN RIVER	BERLIN	BT	1+YR	2,000
	BERLIN	EBT	1+YR	1,800
	BERLIN	EBT	2+YR	500
	BERLIN	RT	1+YR	2,500
	CAMBRIDGE	BT	1+YR	1,979
	CAMBRIDGE	EBT	1+YR	1,600
	CAMBRIDGE	EBT	2+YR	200
	CAMBRIDGE	RT	1+YR	1,500
	DUMMER	BT	1+YR	1,337
	DUMMER	EBT	1+YR	1,000
	DUMMER	EBT	2+YR	300
	DUMMER	RT	1+YR	2,000
	ERROL	BT	1+YR	1,000
	ERROL	EBT	1+YR	2,000
	ERROL	EBT	2+YR	300
	ERROL	EBT	3+YR	100
	ERROL	RT	1+YR	4,500
	MILAN	BT	1+YR	2,000
	MILAN	EBT	1+YR	1,800
	MILAN	EBT	2+YR	500

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	MILAN	RT	1+YR	2,500
ARCHERY POND	ALLENSTOWN	EBT	1+YR	890
	ALLENSTOWN	EBT	2+YR	50
	ALLENSTOWN	RT	1+YR	250
ARMINGTON LAKE	PIERMONT	BT	1+YR	500
	PIERMONT	RT	1+YR	740
ASHUELOT RIVER	GILSUM	BT	1+YR	1,340
	GILSUM	RT	1+YR	1,075
	MARLOW	BT	1+YR	1,460
	MARLOW	RT	1+YR	1,075
	SURRY	BT	1+YR	460
	SURRY	RT	1+YR	1,835
	WINCHESTER	BT	1+YR	900
	WINCHESTER	RT	1+YR	900
ASHUELOT RIVER, SOUTH BRANCH	SWANZEY	BT	1+YR	1,200
	TROY	BT	1+YR	800
	WINCHESTER	BT	1+YR	500
ATWOOD POND	SANDWICH	EBT	1+YR	200
AYERS BROOK	GILMANTON	EBT	1+YR	100
BABOOSIC BROOK	MERRIMACK	EBT	1+YR	915
	MERRIMACK	RT	1+YR	400
BACK LAKE	PITTSBURG	BT	1+YR	1,500
	PITTSBURG	EBT	1+YR	3,000
	PITTSBURG	EBT	2+YR	200
	PITTSBURG	RT	1+YR	6,000
BAILEY BROOK	NELSON	EBT	1+YR	110
BAKER RIVER	RUMNEY	BT	1+YR	2,090
	RUMNEY	EBT	1+YR	4,730
	RUMNEY	EBT	2+YR	200
	WARREN	EBT	1+YR	1,050
	WARREN	EBT	2+YR	58
	WARREN	RT	1+YR	600
	WENTWORTH	EBT	1+YR	1,000
	WENTWORTH	EBT	2+YR	100
BAKER RIVER, SOUTH BRANCH	DORCHESTER	EBT	1+YR	2,310
BARBADOES POND	MADBURY	EBT	1+YR	1,435
	MADBURY	RT	1+YR	430
BASIN POND	CHATHAM	EBT	1+YR	955
BATCHELDERS POND	HAMPTON	EBT	1+YR	250
	HAMPTON	RT	1+YR	120
BEAR BROOK	ALLENSTOWN	EBT	1+YR	670
BEAR BROOK KIDS POND	ALLENSTOWN	EBT	1+YR	70
BEAR BROOK POND, BIG	ERROL	EBT	1+YR	1,000
BEAR BROOK POND, LITTLE	WENTWORTH'S LOCATION	EBT	FING	600
BEARCAMP RIVER	SANDWICH	BT	1+YR	240
	SANDWICH	EBT	1+YR	460
	SANDWICH	RT	1+YR	200
	TAMWORTH	BT	1+YR	240
	TAMWORTH	BT	1+YR	3,227
	TAMWORTH	BT	FRY	145,172

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	TAMWORTH	EBT	1+YR	750
	TAMWORTH	RT	1+YR	500
BEARDS BROOK	HILLSBOROUGH	BT	1+YR	1,050
	HILLSBOROUGH	EBT	1+YR	1,030
	HILLSBOROUGH	RT	1+YR	1,550
BEAVER BROOK	ALTON	EBT	1+YR	1,000
	AMHERST	EBT	1+YR	220
	COLEBROOK	EBT	1+YR	410
	DERRY	BT	1+YR	60
	DERRY	EBT	1+YR	610
	LONDONDERRY	BT	1+YR	10
	LONDONDERRY	EBT	1+YR	380
	LONDONDERRY	RT	1+YR	84
BEAVER BROOK	PELHAM	BT	1+YR	100
	PELHAM	EBT	1+YR	370
	PELHAM	RT	1+YR	230
	WINDHAM	BT	1+YR	100
	WINDHAM	EBT	1+YR	620
BEAVER LAKE	DERRY	EBT	1+YR	1,970
	DERRY	RT	1+YR	700
BEAVER POND	WOODSTOCK	EBT	1+YR	500
	WOODSTOCK	EBT	2+YR	50
BEAVER PONDS	WOODSTOCK	EBT	1+YR	500
BEEBE RIVER	CAMPTON	EBT	1+YR	1,250
	CAMPTON	EBT	2+YR	50
	SANDWICH	EBT	1+YR	1,800
BEECH RIVER	OSSIPEE	EBT	1+YR	500
BELKNAP AREA RECREATION POND	GILFORD	EBT	1+YR	700
	GILFORD	EBT	2+YR	25
	GILFORD	RT	1+YR	260
BELLAMY RIVER	MADBURY	EBT	1+YR	320
	MADBURY	RT	1+YR	90
BERRY BROOK	RYE	BT	1+YR	5,111
BICKNELL BROOK	ENFIELD	EBT	1+YR	250
BIG BROOK BOG	PITTSBURG	EBT	1+YR	1,000
BIG RIVER	BARNSTEAD	EBT	1+YR	2,300
	BARNSTEAD	EBT	2+YR	100
	STRAFFORD	EBT	1+YR	2,200
BISHOP BROOK	STEWARTSTOWN	EBT	1+YR	415
BLACK BROOK	SANBORNTON	EBT	1+YR	200
BLACK MOUNTAIN POND	SANDWICH	EBT	FING	700
BLACK POND	LINCOLN	EBT	FING	500
BLACKWATER RIVER	ANDOVER	RT	1+YR	150
	SALISBURY	BT	1+YR	830
	SALISBURY	RT	1+YR	119
	WEBSTER	BT	1+YR	530
	WEBSTER	RT	1+YR	1,000
BLOOD BROOK	WILTON	EBT	1+YR	690
	WILTON	RT	1+YR	130
BLOODS BROOK	PLAINFIELD	EBT	1+YR	700

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
BLUE POND	MADISON	EBT	1+YR	500
BOG BROOK	STRATFORD	EBT	1+YR	800
	WHITEFIELD	EBT	1+YR	200
BOG POND	CAMPTON	EBT	1+YR	370
	CAMPTON	RT	1+YR	250
BOG POND, LITTLE	ODELL	EBT	1+YR	1,500
	ODELL	EBT	2+YR	250
BOGLIE BROOK	PETERBOROUGH	EBT	1+YR	200
BOSTON LOT LAKE	LEBANON	RT	1+YR	100
BOW LAKE	STRAFFORD	BT	1+YR	1,930
	STRAFFORD	BT	FING	5,629
	STRAFFORD	RT	1+YR	3,500
BRANCH RIVER	MILTON	BT	1+YR	900
	MILTON	EBT	1+YR	170
	WAKEFIELD	EBT	1+YR	500
BRICKYARD POND	EXETER	EBT	1+YR	180
	EXETER	EBT	2+YR	20
BURNHAM BROOK	CANTERBURY	EBT	1+YR	160
BUTTERFIELD POND	WILMOT	EBT	FING	3,300
BUZZELS RUN BROOK	STRAFFORD	EBT	1+YR	240
CANAAN STREET LAKE	CANAAN	RT	1+YR	250
CANOBIE LAKE	WINDHAM	EBT	1+YR	340
	WINDHAM	RT	1+YR	1,460
CARPENTERS MARSH	HANCOCK	EBT	1+YR	110
CARR POND	CLARKSVILLE	EBT	FING	1,375
CASALIS MARSH	PETERBOROUGH	EBT	1+YR	100
CASCADE BROOK	WILMOT	EBT	1+YR	250
CATAMOUNT POND	ALLENSTOWN	EBT	1+YR	1,830
	ALLENSTOWN	EBT	2+YR	100
CEDAR BROOK	STEWARTSTOWN	EBT	1+YR	260
CEDAR POND	MILAN	RT	1+YR	5,500
CENTER POND	NELSON	BT	1+YR	275
	NELSON	EBT	1+YR	310
	NELSON	RT	1+YR	800
CHANDLER POND	LANDAFF	EBT	1+YR	100
CHAPIN POND	NEWPORT	EBT	FING	1,950
CHAPMAN POND	SULLIVAN	EBT	1+YR	1,030
CHASE BROOK	LITCHFIELD	EBT	1+YR	140
CHEESEFACTORY POND	PITTSBURG	EBT	1+YR	800
CHICKWOLNEPY BROOK	MILAN	EBT	1+YR	600
CHOCORUA LAKE	TAMWORTH	RT	1+YR	1,500
CHOCORUA RIVER	TAMWORTH	EBT	1+YR	440
CHRISTINE LAKE	STARK	BT	1+YR	2,000
CHURCHILL BROOK	BROOKFIELD	EBT	1+YR	400
CLARK BROOK	ALEXANDRIA	EBT	1+YR	110
	HAVERHILL	EBT	1+YR	150
CLARK POND	CANAAN	RT	1+YR	500
CLARKSVILLE POND	CLARKSVILLE	EBT	1+YR	1,500
	CLARKSVILLE	EBT	2+YR	25
CLARKSVILLE POND	CLARKSVILLE	EBT	3+YR	10

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
CLAY BROOK	BRIDGEWATER	EBT	1+YR	250
	LYME	EBT	1+YR	200
CLEAR STREAM	ERROL	EBT	1+YR	450
	ERROL	RT	1+YR	750
	MILLSFIELD	EBT	1+YR	450
	MILLSFIELD	RT	1+YR	750
CLOUGH POND	LOUDON	BT	1+YR	50
	LOUDON	EBT	1+YR	1,930
	LOUDON	EBT	2+YR	490
	LOUDON	RT	1+YR	1,010
CLUB POND	NEW DURHAM	EBT	1+YR	1,550
	NEW DURHAM	RT	1+YR	250
COCHECO RIVER	DOVER	BT	1+YR	920
	DOVER	RT	1+YR	440
	FARMINGTON	EBT	1+YR	130
COCKERMOUTH RIVER	GROTON	EBT	1+YR	660
	HEBRON	EBT	1+YR	330
COFFIN BROOK	ALTON	EBT	1+YR	250
COHAS BROOK, LITTLE	LONDONDERRY	EBT	1+YR	180
COLD RIVER	ACWORTH	BT	1+YR	345
	ACWORTH	EBT	1+YR	2,470
	ACWORTH	RT	1+YR	1,025
	ALSTEAD	BT	1+YR	675
	ALSTEAD	RT	1+YR	825
	LANGDON	BT	1+YR	350
	SANDWICH	EBT	1+YR	580
	WALPOLE	BT	1+YR	275
	WALPOLE	RT	1+YR	1,800
COLD SPRING POND	STODDARD	EBT	1+YR	900
COLDRAIN POND	NEW DURHAM	EBT	1+YR	990
COLE POND	CANAAN	EBT	1+YR	20
	ENFIELD	EBT	FING	4,250
CONNECTICUT LAKE, FIRST	PITTSBURG	LLS	1+YR	1,400
CONNECTICUT LAKE, SECOND	PITTSBURG	LLS	1+YR	600
CONNECTICUT LAKE, THIRD	PITTSBURG	RT	1+YR	3,000
CONNECTICUT RIVER	COLEBROOK	BT	1+YR	2,000
	COLEBROOK	EBT	2+YR	30
	COLEBROOK	RT	1+YR	3,940
	COLUMBIA	BT	1+YR	2,000
	COLUMBIA	EBT	1+YR	500
	COLUMBIA	RT	1+YR	2,500
	DALTON	RT	1+YR	100
	LANCASTER	BT	1+YR	2,040
	NORTHUMBERLAND	BT	1+YR	2,000
	STEWARTSTOWN	BT	1+YR	2,000
	STEWARTSTOWN	EBT	1+YR	500
	STEWARTSTOWN	EBT	2+YR	70
	STEWARTSTOWN	RT	1+YR	3,000
	STRATFORD	BT	1+YR	2,000
	STRATFORD	EBT	2+YR	30

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	WALPOLE	BT	1+YR	900
	WALPOLE	RT	1+YR	900
CONNECTICUT RIVER, LOWER	PITTSBURG	BT	1+YR	500
	PITTSBURG	EBT	1+YR	3,198
	PITTSBURG	EBT	2+YR	200
	PITTSBURG	EBT	3+YR	24
	PITTSBURG	RT	1+YR	1,500
CONNECTICUT RIVER, MIDDLE	PITTSBURG	BT	1+YR	1,825
	PITTSBURG	EBT	2+YR	500
	PITTSBURG	EBT	3+YR	72
	PITTSBURG	RT	1+YR	3,300
CONNECTICUT RIVER, UPPER	PITTSBURG	EBT	1+YR	500
CONNOR POND	OSSIPEE	EBT	1+YR	1,760
	OSSIPEE	EBT	2+YR	200
	OSSIPEE	EBT	FING	7,000
CONSERVATION POND	WENTWORTH	EBT	1+YR	310
CONTOOCOOK RIVER	BENNINGTON	BT	1+YR	590
	BENNINGTON	RT	1+YR	600
	GREENFIELD	BT	1+YR	250
	GREENFIELD	EBT	1+YR	100
	HANCOCK	BT	1+YR	250
	HENNIKER	BT	1+YR	1,355
	HENNIKER	EBT	1+YR	1,050
	HENNIKER	RT	1+YR	2,170
	HILLSBOROUGH	BT	1+YR	590
	HILLSBOROUGH	RT	1+YR	600
	JAFFREY	BT	1+YR	250
	JAFFREY	EBT	1+YR	590
	JAFFREY	RT	1+YR	160
	PETERBOROUGH	BT	1+YR	250
	PETERBOROUGH	EBT	1+YR	520
	PETERBOROUGH	RT	1+YR	160
CONWAY LAKE	EATON	LLS	1+YR	1,503
	EATON	RT	1+YR	900
COON BROOK BOG	PITTSBURG	EBT	FING	2,700
COPPS BROOK	TUFTONBORO	EBT	1+YR	40
COPPS POND	OSSIPEE	EBT	1+YR	250
CORSER POND	ERROL	EBT	FING	750
COUNTY FARM BROOK	WILTON	EBT	1+YR	300
CRAWFORD BROOK	CARROLL	EBT	1+YR	250
CRAWFORD NOTCH KIDS POND	HART'S LOCATION	EBT	1+YR	1,000
	HART'S LOCATION	EBT	2+YR	50
CROOKED RUN	BARNSTEAD	EBT	1+YR	440
CRYSTAL LAKE	EATON	BT	1+YR	300
	ENFIELD	BT	1+YR	100
	ENFIELD	RT	1+YR	650
	GILMANTON	RT	1+YR	400
CUMMINS POND	DORCHESTER	BT	1+YR	560
CURTIS BROOK	LYNDEBOROUGH	EBT	1+YR	110
DAN HOLE POND, BIG	OSSIPEE	EBT	1+YR	1,000

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	OSSIPEE	EBT	2+YR	200
	OSSIPEE	EBT	FING	7,584
	OSSIPEE	LLS	1+YR	706
DAN HOLE POND, LITTLE	OSSIPEE	EBT	1+YR	830
	OSSIPEE	EBT	2+YR	50
DAN HOLE RIVER	OSSIPEE	EBT	1+YR	750
	OSSIPEE	EBT	2+YR	50
DANFORTH BROOK	BRISTOL	EBT	1+YR	210
DAVIS POND	MADISON	BT	1+YR	120
	MADISON	RT	1+YR	200
DEERING RESERVOIR	DEERING	RT	1+YR	900
DELLS POND	LITTLETON	BT	1+YR	100
	LITTLETON	EBT	1+YR	250
	LITTLETON	RT	1+YR	700
DIAMOND POND, BIG	STEWARTSTOWN	RT	1+YR	7,000
DIAMOND POND, LITTLE	STEWARTSTOWN	EBT	1+YR	4,000
	STEWARTSTOWN	EBT	2+YR	1,500
	STEWARTSTOWN	EBT	3+YR	100
DODGE BROOK	LEMPSTER	EBT	1+YR	440
	UNITY	EBT	1+YR	380
DUBLIN LAKE	DUBLIN	EBT	1+YR	1,310
DUDLEY BROOK	BRENTWOOD	EBT	1+YR	80
DUMMER POND, BIG	DUMMER	EBT	1+YR	2,000
	DUMMER	EBT	2+YR	500
	DUMMER	EBT	3+YR	50
DUMMER POND, LITTLE	DUMMER	BT	1+YR	250
	DUMMER	EBT	1+YR	800
DUNCAN LAKE	OSSIPEE	EBT	1+YR	3,260
	OSSIPEE	EBT	2+YR	200
	OSSIPEE	EBT	FING	7,000
	OSSIPEE	RT	1+YR	2,480
DURAND LAKE	RANDOLPH	EBT	1+YR	500
DUSTAN POND	WENTWORTH'S LOCATION	EBT	FING	750
EAST INLET	PITTSBURG	EBT	1+YR	2,000
	PITTSBURG	EBT	2+YR	100
EAST KINGSTON POND	EAST KINGSTON	EBT	1+YR	200
EASTMAN BROOK	GRANTHAM	EBT	1+YR	80
	PIERMONT	EBT	1+YR	200
	THORNTON	EBT	1+YR	210
ECHO LAKE	FRANCONIA	EBT	1+YR	3,000
	FRANCONIA	EBT	2+YR	200
	FRANCONIA	EBT	3+YR	50
ELA RIVER	NEW DURHAM	EBT	1+YR	670
ELLIS RIVER	BARTLETT	EBT	1+YR	1,330
	JACKSON	EBT	1+YR	1,970
	JACKSON	EBT	2+YR	275
	PINKHAM'S GRANT	EBT	1+YR	400
EXETER RESERVOIR	EXETER	BT	1+YR	480
	EXETER	EBT	1+YR	1,105
	EXETER	EBT	2+YR	220

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	EXETER	RT	1+YR	870
EXETER RIVER	BRENTWOOD	BT	1+YR	840
	BRENTWOOD	EBT	1+YR	380
	BRENTWOOD	RT	1+YR	1,200
	CHESTER	BT	1+YR	300
	CHESTER	RT	1+YR	250
	EXETER	EBT	1+YR	2,420
	EXETER	RT	1+YR	1,490
	FREMONT	BT	1+YR	600
	FREMONT	RT	1+YR	280
	SANDOWN	BT	1+YR	300
	SANDOWN	EBT	1+YR	410
	SANDOWN	RT	1+YR	150
FERGUSON BROOK	HANCOCK	EBT	1+YR	220
FERRY BROOK	KEENE	EBT	1+YR	200
FIREHOUSE POND	BOW	EBT	1+YR	274
	BOW	EBT	2+YR	170
FISH POND	COLUMBIA	EBT	2+YR	250
	COLUMBIA	RT	1+YR	1,000
FLAT MOUNTAIN POND	WATERVILLE VALLEY	EBT	FING	2,700
FLUME BROOK	LINCOLN	EBT	1+YR	30
FOREST BROOK	MADISON	EBT	1+YR	250
FOREST LAKE	WINCHESTER	BT	1+YR	290
	WINCHESTER	RT	1+YR	680
FOWLER RIVER	ALEXANDRIA	EBT	1+YR	1,060
FOX POND	PLYMOUTH	EBT	1+YR	300
FRANCIS LAKE	PITTSBURG	BT	1+YR	4,400
	PITTSBURG	LLS	1+YR	1,000
	PITTSBURG	RT	1+YR	2,000
FRANKLIN PIERCE LAKE	HILLSBOROUGH	BT	1+YR	300
	HILLSBOROUGH	RT	1+YR	445
FRENCH POND	HAVERHILL	BT	1+YR	860
	HAVERHILL	RT	1+YR	720
	HENNIKER	EBT	1+YR	2,500
	HENNIKER	RT	1+YR	1,100
GALE RIVER	BETHLEHEM	EBT	1+YR	1,500
	FRANCONIA	EBT	1+YR	800
	FRANCONIA	EBT	2+YR	50
GARLAND BROOK	MOULTONBOROUGH	EBT	1+YR	230
GILMORE POND	JAFFREY	BT	1+YR	600
	JAFFREY	EBT	1+YR	665
	JAFFREY	RT	1+YR	550
GLASS FACTORY BROOK	LYNDEBOROUGH	EBT	1+YR	220
GLENCLIFF HOME POND	BENTON	EBT	1+YR	300
GOOSE POND BROOK	CANAAN	EBT	1+YR	100
GOULD MILL BROOK	BROOKLINE	EBT	1+YR	440
GOULD POND	HILLSBOROUGH	BT	1+YR	600
	HILLSBOROUGH	RT	1+YR	700
GRANITE BROOK	SULLIVAN	EBT	1+YR	320
GRANITE LAKE	STODDARD	EBT	1+YR	1,000

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	STODDARD	RT	1+YR	2,700
GRANT BROOK	LYME	EBT	1+YR	600
GREAT BROOK	KENSINGTON	EBT	1+YR	270
	LEBANON	EBT	1+YR	500
GREAT EAST LAKE	WAKEFIELD	RT	1+YR	1,430
GREELEY POND, UPPER	LIVERMORE	EBT	FING	160
GRIDLEY RIVER	SHARON	EBT	1+YR	750
GROVE BROOK	SPRINGFIELD	EBT	1+YR	100
GUINEA BROOK	GILMANTON	EBT	1+YR	150
GUINEA POND	SANDWICH	EBT	FING	1,200
GUNSTOCK RIVER	GILFORD	EBT	1+YR	1,410
	GILFORD	EBT	2+YR	50
	GILFORD	RT	1+YR	400
GUSTIN POND	MARLOW	BT	1+YR	300
	MARLOW	EBT	1+YR	266
	MARLOW	RT	1+YR	500
HACKETT BROOK	CANTERBURY	EBT	1+YR	220
HALFMILE POND	ENFIELD	EBT	FING	1,260
HALL BROOK	SANDWICH	EBT	1+YR	190
HALL POND, LOWER	SANDWICH	EBT	FING	1,300
HALL POND, MIDDLE	SANDWICH	EBT	FING	600
HALL POND, UPPER	SANDWICH	EBT	1+YR	2,640
HALLS BROOK	GROTON	EBT	1+YR	190
HAM BRANCH	FRANCONIA	EBT	1+YR	1,000
HANCOCK BROOK	LINCOLN	EBT	1+YR	640
HARPER BROOK	NEW HAMPTON	EBT	1+YR	250
HARRIS POND	PITTSBURG	EBT	FING	450
HARTFORD BROOK	DEERFIELD	EBT	1+YR	540
HARTS POND	MEREDITH	EBT	FING	16,000
HATCH POND	EATON	EBT	1+YR	1,600
HAYES BROOK	FARMINGTON	EBT	1+YR	60
	NEW DURHAM	EBT	1+YR	220
HEWES BROOK	LYME	EBT	1+YR	120
HIGHER GROUND POND	WENTWORTH	EBT	1+YR	630
HIGHLAND LAKE	ANDOVER	EBT	1+YR	2,000
	ANDOVER	EBT	2+YR	200
	ANDOVER	EBT	3+YR	120
	ANDOVER	RT	1+YR	600
HILDRETH POND	WARREN	BT	1+YR	240
	WARREN	EBT	1+YR	1,299
	WARREN	EBT	2+YR	99
HOOD POND	DERRY	EBT	1+YR	210
HOPKINS POND	ANDOVER	EBT	1+YR	1,380
	ANDOVER	RT	1+YR	600
HORACE LAKE	WEARE	BT	1+YR	575
HORN POND	WAKEFIELD	BT	1+YR	210
	WAKEFIELD	EBT	1+YR	1,650
	WAKEFIELD	RT	1+YR	2,200
HOSLEY BROOK	HANCOCK	EBT	1+YR	200
HOT HOLE POND	LOUDON	EBT	1+YR	1,500

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	LOUDON	RT	1+YR	1,200
HOYT BROOK	GRAFTON	EBT	1+YR	1,120
HOYT POND	MADBURY	EBT	1+YR	160
HUNKINS POND	SANBORNTON	BT	1+YR	300
	SANBORNTON	RT	1+YR	900
HUNTS POND	HANCOCK	BT	1+YR	500
	HANCOCK	EBT	1+YR	1,100
HURD BROOK	ALTON	EBT	1+YR	300
HURD POND	LEMPSTER	EBT	1+YR	430
HUTCHINS POND	EFFINGHAM	EBT	1+YR	370
ICE POND	NEW BOSTON	EBT	1+YR	200
	NEW BOSTON	RT	1+YR	130
INDIAN RIVER	CANAAN	EBT	1+YR	850
	CANAAN	RT	1+YR	250
INDIAN STREAM	PITTSBURG	EBT	1+YR	1,500
IONA LAKE	ALBANY	RT	1+YR	200
ISINGLASS RIVER	BARRINGTON	EBT	1+YR	1,310
	BARRINGTON	RT	1+YR	1,350
	STRAFFORD	EBT	1+YR	1,480
	STRAFFORD	RT	1+YR	1,350
ISLAND POND	WASHINGTON	BT	1+YR	300
ISLAND POND, BIG	DERRY	BT	1+YR	720
	DERRY	EBT	1+YR	530
	DERRY	RT	1+YR	1,200
ISRAEL RIVER	JEFFERSON	EBT	1+YR	2,700
	JEFFERSON	RT	1+YR	2,000
	LANCASTER	EBT	1+YR	2,400
ISRAEL RIVER, SOUTH BRANCH	JEFFERSON	EBT	1+YR	1,300
JACKMAN BROOK	WOODSTOCK	EBT	1+YR	530
JACOBS BROOK	ORFORD	EBT	1+YR	266
JOE COFFIN POND	SUGAR HILL	EBT	1+YR	500
	SUGAR HILL	RT	1+YR	1,000
JOE ENGLISH BROOK	AMHERST	EBT	1+YR	195
JOE ENGLISH POND	AMHERST	EBT	1+YR	200
	NEW BOSTON	EBT	1+YR	195
	NEW BOSTON	RT	1+YR	30
JONES BROOK	MIDDLETON	EBT	1+YR	240
	MILTON	EBT	1+YR	120
JONES POND	MIDDLETON	EBT	1+YR	750
JUDD POND	CLARKSVILLE	EBT	FING	600
KELLEY BROOK	PITTSFIELD	EBT	1+YR	120
KEZAR LAKE	SUTTON	BT	1+YR	940
	SUTTON	RT	1+YR	560
KIAH POND	SANDWICH	EBT	1+YR	950
	SANDWICH	EBT	2+YR	40
KIDS POND	ERROL	EBT	1+YR	300
	ERROL	EBT	2+YR	25
	JACKSON	EBT	1+YR	200
	JEFFERSON	EBT	1+YR	400
	JEFFERSON	EBT	2+YR	25

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	SANDWICH	EBT	1+YR	100
KIMBALL POND, LOWER	CHATHAM	BT	1+YR	450
KIMPTON BROOK	SPRINGFIELD	EBT	1+YR	500
KNOX MOUNTAIN BROOK	SANBORNTON	EBT	1+YR	280
KNOX RIVER	ENFIELD	EBT	1+YR	150
KOLELEMOOK LAKE	SPRINGFIELD	BT	1+YR	480
LAFAYETTE BROOK	FRANCONIA	EBT	1+YR	300
LAMPREY RIVER	DEERFIELD	BT	1+YR	300
	DEERFIELD	EBT	1+YR	1,610
	DEERFIELD	RT	1+YR	1,400
	DURHAM	BT	1+YR	540
	DURHAM	EBT	1+YR	1,220
	DURHAM	RT	1+YR	535
	EPPING	BT	1+YR	615
	EPPING	EBT	1+YR	170
	EPPING	RT	1+YR	1,099
	LEE	BT	1+YR	755
	LEE	EBT	1+YR	1,055
	LEE	RT	1+YR	260
	NORTHWOOD	EBT	1+YR	240
	RAYMOND	BT	1+YR	615
	RAYMOND	EBT	1+YR	460
	RAYMOND	RT	1+YR	1,099
LANE RIVER	SUTTON	BT	1+YR	480
LAUREL LAKE	FITZWILLIAM	BT	1+YR	1,420
	FITZWILLIAM	RT	1+YR	1,900
LEDGE POND	MADISON	EBT	1+YR	1,060
LIME POND	COLUMBIA	EBT	1+YR	1,000
LITTLE POND	SANDWICH	EBT	1+YR	1,830
	SANDWICH	EBT	2+YR	50
LITTLE RIVER	BARNSTEAD	EBT	1+YR	270
	EXETER	EBT	1+YR	960
	LEE	EBT	1+YR	690
	NORTH HAMPTON	EBT	1+YR	180
	NOTTINGHAM	EBT	1+YR	250
LONESOME LAKE	LINCOLN	EBT	FING	1,500
LONG POND	BENTON	EBT	1+YR	2,500
	BENTON	EBT	2+YR	250
	CROYDON	EBT	1+YR	1,350
	CROYDON	RT	1+YR	700
	EATON	EBT	1+YR	1,290
	ERROL	EBT	1+YR	2,000
	LEMPSTER	EBT	1+YR	3,000
	LEMPSTER	EBT	2+YR	50
	MILLSFIELD	EBT	FING	4,050
LOON LAKE	FREEDOM	RT	1+YR	800
LOST RIVER	WOODSTOCK	EBT	1+YR	350
LOUGEE POND	BARNSTEAD	BT	1+YR	720
	BARNSTEAD	BT	FING	1,200
LOVEJOY BROOK	ENFIELD	EBT	1+YR	320

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
LOVELL LAKE	WAKEFIELD	RT	1+YR	2,000
LOVELL RIVER	OSSIPEE	EBT	1+YR	500
LUCAS POND	NORTHWOOD	BT	1+YR	1,800
	NORTHWOOD	EBT	1+YR	3,040
	NORTHWOOD	EBT	2+YR	300
	NORTHWOOD	RT	1+YR	2,350
LYMAN BROOK	COLUMBIA	EBT	1+YR	170
MAD RIVER	CAMPTON	EBT	1+YR	1,000
	FARMINGTON	EBT	1+YR	250
	THORNTON	EBT	1+YR	1,150
	THORNTON	EBT	2+YR	100
	THORNTON	RT	1+YR	555
	WATERVILLE VALLEY	EBT	1+YR	1,150
	WATERVILLE VALLEY	EBT	2+YR	100
	WATERVILLE VALLEY	RT	1+YR	555
MAGOON BROOK	NEW HAMPTON	EBT	1+YR	150
MALLEGO BROOK	BARRINGTON	EBT	1+YR	190
MANFELTREE BROOK	GRAFTON	EBT	1+YR	140
MANNING LAKE	GILMANTON	EBT	1+YR	3,364
	GILMANTON	EBT	2+YR	50
	GILMANTON	EBT	3+YR	90
MARSHALL BROOK	HANOVER	EBT	1+YR	80
MARTIN BROOK	RICHMOND	EBT	1+YR	585
MARTIN MEADOW POND	LANCASTER	RT	1+YR	2,500
MASCOMA LAKE	ENFIELD	BT	1+YR	960
	ENFIELD	RT	1+YR	1,000
MASCOMA RIVER	ENFIELD	BT	1+YR	590
	ENFIELD	EBT	1+YR	2,260
	ENFIELD	RT	1+YR	775
	LEBANON	BT	1+YR	600
	LEBANON	EBT	1+YR	200
	LEBANON	RT	1+YR	475
MASCOMA RIVER, UPPER	CANAAN	EBT	1+YR	1,624
	CANAAN	RT	1+YR	600
MASON BROOK	MASON	EBT	1+YR	95
MASSABESIC LAKE	AUBURN	BT	1+YR	1,800
	AUBURN	EBT	1+YR	2,060
	AUBURN	RT	1+YR	2,000
MEADOW POND	NORTHWOOD	RT	1+YR	320
MELVIN RIVER	TUFTONBORO	EBT	1+YR	500
	TUFTONBORO	EBT	2+YR	20
MERRILL PARK POND	CONCORD	EBT	1+YR	100
MERRILL POND	HANCOCK	EBT	1+YR	200
MERRIMACK RIVER	BOSCAWEN	BT	1+YR	720
	BOSCAWEN	RT	1+YR	500
	CONCORD	BT	1+YR	3,020
	CONCORD	EBT	1+YR	1,070
	FRANKLIN	BT	1+YR	360
	MANCHESTER	EBT	1+YR	1,460
MERRYMEETING LAKE	NEW DURHAM	LLS	1+YR	1,124

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	NEW DURHAM	RT	1+YR	1,000
MIDDLE POND	PITTSBURG	EBT	1+YR	1,000
	PITTSBURG	EBT	2+YR	120
	PITTSBURG	EBT	3+YR	25
MILL BROOK	GRAFTON	EBT	1+YR	1,160
	JEFFERSON	EBT	1+YR	1,300
	LANDAFF	EBT	1+YR	200
MILL POND	OSSIPEE	EBT	1+YR	500
	OSSIPEE	EBT	2+YR	100
MILLEN LAKE	WASHINGTON	BT	1+YR	200
	WASHINGTON	EBT	1+YR	970
	WASHINGTON	RT	1+YR	700
MILLSFIELD POND, BIG	MILLSFIELD	EBT	1+YR	1,000
	MILLSFIELD	EBT	2+YR	500
MILTON WATERSHED	MILTON	BT	1+YR	720
MINK BROOK	HANOVER	EBT	1+YR	200
MIREY BROOK	WINCHESTER	EBT	1+YR	165
MIRROR LAKE	CANAAN	EBT	1+YR	310
	WHITEFIELD	EBT	1+YR	2,000
	WHITEFIELD	EBT	2+YR	500
	WHITEFIELD	RT	1+YR	2,000
	WOODSTOCK	BT	1+YR	440
	WOODSTOCK	BT	2+YR	100
	WOODSTOCK	BT	3+YR	83
	WOODSTOCK	EBT	1+YR	710
	WOODSTOCK	RT	1+YR	750
MOHAWK RIVER	COLEBROOK	EBT	1+YR	4,400
MOHAWK RIVER, EAST BRANCH	COLEBROOK	EBT	1+YR	800
MOODY POND	OSSIPEE	BT	1+YR	200
MOORE RESERVOIR	DALTON	BT	1+YR	400
	DALTON	RT	1+YR	800
	LITTLETON	BT	1+YR	3,000
	LITTLETON	RT	1+YR	3,000
MOOSE BROOK	GORHAM	EBT	1+YR	320
	HANCOCK	EBT	1+YR	830
MOOSE FALLS FLOWAGE	PITTSBURG	EBT	1+YR	600
MOOSE POND	MILLSFIELD	EBT	FING	4,350
	PITTSBURG	EBT	1+YR	1,000
	PITTSBURG	EBT	2+YR	120
	PITTSBURG	EBT	3+YR	25
MOOSE RIVER	GORHAM	EBT	1+YR	1,500
	RANDOLPH	EBT	1+YR	500
MOUNTAIN POND	BROOKFIELD	EBT	1+YR	1,350
	CHATHAM	EBT	FING	8,969
MT WILLIAM POND	WEARE	EBT	1+YR	980
	WEARE	RT	1+YR	500
MUD POND	EASTON	EBT	FING	7,500
MUNN POND	ERROL	EBT	FING	6,900
NASH STREAM	STRATFORD	EBT	1+YR	1,500
NATHAN POND	DIXVILLE	EBT	FING	3,300

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
NEEDLE SHOP BROOK	HILL	EBT	1+YR	410
NELSON BROOK	GILMANTON	EBT	1+YR	200
NESENKEAG BROOK	LITCHFIELD	EBT	1+YR	580
NEWELL POND	ALSTEAD	BT	1+YR	1,000
	ALSTEAD	EBT	1+YR	660
NEWFOUND LAKE	BRISTOL	LLS	1+YR	1,346
	BRISTOL	RT	1+YR	1,545
NEWFOUND RIVER	BRISTOL	EBT	1+YR	2,000
	BRISTOL	EBT	2+YR	200
	BRISTOL	RT	1+YR	400
NIGHTHAWK HOLLOW BROOK	GILMANTON	EBT	1+YR	800
NINETEEN MILE BROOK	TUFTONBORO	EBT	1+YR	500
NIPPO BROOK	BARRINGTON	EBT	1+YR	250
NISSITISSIT RIVER	BROOKLINE	BT	1+YR	540
	BROOKLINE	EBT	1+YR	1,930
	BROOKLINE	RT	1+YR	150
NORTH BRANCH	ANTRIM	EBT	1+YR	800
	ANTRIM	RT	1+YR	800
NORTH RIVER	LEE	EBT	1+YR	580
	NOTTINGHAM	EBT	1+YR	1,610
	NOTTINGHAM	RT	1+YR	250
NUBANUSIT BROOK	HARRISVILLE	EBT	1+YR	600
	HARRISVILLE	RT	1+YR	100
	PETERBOROUGH	EBT	1+YR	700
NUBANUSIT LAKE	HANCOCK	RT	1+YR	3,000
NUMBER SEVEN BROOK	ORANGE	EBT	1+YR	260
OGONTZ LAKE	LYMAN	RT	1+YR	2,100
OLIVERIAN BROOK	BENTON	EBT	1+YR	666
OLIVERIAN POND	BENTON	EBT	1+YR	2,001
	BENTON	EBT	2+YR	261
	BENTON	RT	1+YR	1,170
OPECHEE LAKE	LACONIA	RT	1+YR	1,000
ORANGE POND	ORANGE	EBT	1+YR	600
	ORANGE	RT	1+YR	300
OSGOOD BROOK	MILFORD	EBT	1+YR	440
OSSIPEE LAKE	FREEDOM	LLS	1+YR	2,679
	FREEDOM	RT	1+YR	1,500
OTTER BROOK	GREENFIELD	EBT	1+YR	105
	KEENE	EBT	1+YR	1,600
	KEENE	RT	1+YR	325
	PETERBOROUGH	BT	1+YR	75
	PETERBOROUGH	EBT	1+YR	100
	SULLIVAN	EBT	1+YR	400
	SULLIVAN	RT	1+YR	75
OWL BROOK	ASHLAND	EBT	1+YR	140
OYSTER RIVER	DURHAM	EBT	1+YR	330
	LEE	EBT	1+YR	290
PARTRIDGE BROOK	WESTMORELAND	EBT	1+YR	830
PARTRIDGE LAKE	LITTLETON	RT	1+YR	1,300
PAWTUCKAWAY RIVER	NOTTINGHAM	EBT	1+YR	80

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
PEA PORRIDGE POND, BIG	MADISON	BT	1+YR	120
	MADISON	RT	1+YR	570
PEA PORRIDGE POND, MIDDLE	MADISON	BT	1+YR	60
PEABODY RIVER	GORHAM	BT	1+YR	1,000
	GORHAM	EBT	1+YR	350
	GORHAM	RT	1+YR	2,000
	GREEN'S GRANT	BT	1+YR	250
	GREEN'S GRANT	EBT	1+YR	800
	GREEN'S GRANT	RT	1+YR	500
	MARTIN'S LOCATION	BT	1+YR	250
	MARTIN'S LOCATION	EBT	1+YR	500
	MARTIN'S LOCATION	RT	1+YR	350
	PINKHAM'S GRANT	EBT	1+YR	350
PEAKED HILL POND	THORNTON	EBT	FING	3,150
PEARL LAKE	LISBON	RT	1+YR	2,500
PEMIGEWASSET RIVER	BRISTOL	BT	1+YR	1,970
	BRISTOL	EBT	1+YR	640
	BRISTOL	RT	1+YR	600
	CAMPTON	EBT	1+YR	890
	CAMPTON	EBT	2+YR	100
	CAMPTON	RT	1+YR	350
	FRANKLIN	BT	1+YR	2,200
	FRANKLIN	RT	1+YR	1,150
	LINCOLN	EBT	1+YR	2,100
	LINCOLN	EBT	2+YR	150
	LINCOLN	RT	1+YR	350
	THORNTON	EBT	1+YR	1,990
	THORNTON	EBT	2+YR	100
	THORNTON	RT	1+YR	350
	WOODSTOCK	EBT	1+YR	1,740
	WOODSTOCK	EBT	2+YR	100
	WOODSTOCK	RT	1+YR	350
PEMIGEWASSET RIVER, EAST BRANCH	LINCOLN	EBT	1+YR	1,060
	LINCOLN	EBT	2+YR	100
PERCH POND	CAMPTON	BT	1+YR	240
	CAMPTON	EBT	1+YR	1,756
	CAMPTON	EBT	2+YR	100
	CAMPTON	RT	1+YR	200
	LISBON	RT	1+YR	1,000
PERKINS POND	WEARE	EBT	1+YR	160
PERRY BROOK	SWANZEY	EBT	1+YR	250
PERRY POND, LOWER	PITTSBURG	EBT	FING	1,800
PERRY STREAM	PITTSBURG	EBT	1+YR	1,500
PETTYBORO BROOK	BATH	EBT	1+YR	400
PHILLIPS BROOK	STARK	EBT	1+YR	1,500
PICKARD BROOK	CANTERBURY	EBT	1+YR	330
PIKE BROOK	BROOKFIELD	EBT	1+YR	500
PIKE POND	STARK	EBT	1+YR	750
PINE RIVER	OSSIPEE	EBT	1+YR	1,000
PISCASSIC RIVER	FREMONT	EBT	1+YR	80

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	NEWFIELDS	EBT	1+YR	390
	NEWFIELDS	RT	1+YR	110
	NEWMARKET	EBT	1+YR	500
PISCATAQUOG RIVER	GOFFSTOWN	BT	1+YR	1,980
	GOFFSTOWN	EBT	1+YR	540
	GOFFSTOWN	EBT	2+YR	560
	GOFFSTOWN	RT	1+YR	60
	GOFFSTOWN	RT	1+YR	300
PISCATAQUOG RIVER, MIDDLE BRANCH	NEW BOSTON	BT	1+YR	300
	NEW BOSTON	EBT	1+YR	823
PISCATAQUOG RIVER, SOUTH BRANCH	NEW BOSTON	BT	1+YR	1,395
	NEW BOSTON	EBT	1+YR	700
	NEW BOSTON	RT	1+YR	1,970
PISCATAQUOG RIVER, WEST BRANCH	WEARE	BT	1+YR	330
	WEARE	EBT	1+YR	690
	WEARE	RT	1+YR	280
PLEASANT LAKE	DEERFIELD	BT	1+YR	1,000
	DEERFIELD	BT	1+YR	6,728
	DEERFIELD	BT	2+YR	233
	DEERFIELD	BT	3+YR	329
	DEERFIELD	BT	FING	3,000
	DEERFIELD	RT	1+YR	2,000
	NEW LONDON	EBT	1+YR	3,000
	NEW LONDON	LLS	1+YR	1,050
POND BROOK	MILLSFIELD	EBT	1+YR	400
	SANDWICH	EBT	1+YR	160
	WENTWORTH	EBT	1+YR	430
POND OF SAFETY	RANDOLPH	EBT	1+YR	500
	RANDOLPH	EBT	2+YR	50
POOR FARM BROOK	GILFORD	EBT	1+YR	710
POPE DAM	TUFTONBORO	EBT	1+YR	310
POST POND	LYME	BT	1+YR	100
	LYME	RT	1+YR	400
POUT POND	BELMONT	BT	1+YR	150
	BELMONT	RT	1+YR	800
PRIEST BROOK	FITZWILLIAM	EBT	1+YR	200
PROFILE LAKE	FRANCONIA	EBT	1+YR	2,000
	FRANCONIA	EBT	2+YR	350
	FRANCONIA	EBT	3+YR	50
PUNCH BROOK	FRANKLIN	EBT	1+YR	190
	SALISBURY	EBT	1+YR	130
PURGATORY BROOK	MILFORD	EBT	1+YR	1,400
PURITY LAKE	EATON	RT	1+YR	750
RAND POND	GOSHEN	EBT	1+YR	1,450
	GOSHEN	RT	1+YR	1,000
RECREATION POND	RYE	EBT	1+YR	100
ROARING BROOK	RICHMOND	EBT	1+YR	1,000
ROBIN HOOD PARK POND	KEENE	EBT	1+YR	150
ROCKY POND	WENTWORTH	EBT	FING	2,000
ROCKYBOUND POND	CROYDON	EBT	FING	1,000

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
ROUND POND	ERROL	EBT	FING	6,150
	PITTSBURG	EBT	1+YR	2,000
	PITTSBURG	EBT	2+YR	200
	PITTSBURG	EBT	3+YR	26
RUM BROOK	CANTERBURY	EBT	1+YR	190
RUSSELL POND	WOODSTOCK	EBT	1+YR	2,510
	WOODSTOCK	EBT	2+YR	200
SACO LAKE	CARROLL	EBT	1+YR	300
	CARROLL	EBT	1+YR	250
	CARROLL	EBT	2+YR	50
	CARROLL	EBT	2+YR	100
SACO RIVER	BARTLETT	BT	1+YR	1,114
	BARTLETT	BT	1+YR	2,025
	BARTLETT	EBT	1+YR	2,940
	BARTLETT	EBT	1+YR	600
	BARTLETT	EBT	2+YR	300
	BARTLETT	RT	1+YR	250
	CONWAY	BT	1+YR	2,185
	CONWAY	EBT	1+YR	600
	CONWAY	EBT	1+YR	2,500
	CONWAY	EBT	2+YR	165
	CONWAY	RT	1+YR	250
	HART'S LOCATION	EBT	1+YR	1,220
	HART'S LOCATION	EBT	2+YR	100
SACO RIVER, EAST BRANCH	BARTLETT	EBT	1+YR	770
	JACKSON	EBT	1+YR	770
SALMON BROOK	SANBORNTON	EBT	1+YR	160
	SANBORNTON	RT	1+YR	386
SALMON FALLS RIVER	WAKEFIELD	BT	1+YR	920
	WAKEFIELD	RT	1+YR	300
SALTMARSH POND	GILFORD	EBT	1+YR	1,810
	GILFORD	EBT	2+YR	100
	GILFORD	RT	1+YR	750
SANBORN BROOK	CHICHESTER	EBT	1+YR	210
SAND DAM	TROY	EBT	1+YR	150
SAND POND	MARLOW	BT	1+YR	250
	MARLOW	EBT	1+YR	3,080
SANDERSONS POND	GREENLAND	EBT	2+YR	25
	GREENLAND	RT	1+YR	100
SAWYER POND	LIVERMORE	EBT	FING	10,575
SAWYER POND, LITTLE	LIVERMORE	EBT	FING	1,200
SCOTTS BOG	PITTSBURG	EBT	FING	13,500
	PITTSBURG	EBT	FING	7,999
SESSIONS POND	DUMMER	EBT	FING	6,000
SHAKER BROOK	TROY	EBT	1+YR	260
SHANNON BROOK	MOULTONBOROUGH	EBT	1+YR	210
SHAWTOWN POND	FREEDOM	EBT	1+YR	1,400
	FREEDOM	EBT	2+YR	1,150
SHEEHAN FLOWAGE	CLARKSVILLE	EBT	FING	2,700
SIGNAL POND	ERROL	EBT	FING	750

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
SILVER LAKE	HARRISVILLE	RT	1+YR	2,600
	MADISON	RT	1+YR	1,500
SIMMONS POND	WARNER	EBT	1+YR	880
SIMMS STREAM	COLUMBIA	EBT	1+YR	1,800
SKINNER BROOK	GRANTHAM	EBT	1+YR	650
SKY POND	NEW HAMPTON	EBT	1+YR	1,380
	NEW HAMPTON	EBT	2+YR	200
SLIPPERY BROOK	CHATHAM	EBT	1+YR	390
SMITH BROOK	GRAFTON	EBT	1+YR	460
SMITH POND	WASHINGTON	EBT	1+YR	2,160
SMITH RIVER	ALEXANDRIA	EBT	1+YR	1,000
	ALEXANDRIA	RT	1+YR	40
	BRISTOL	EBT	1+YR	840
	DANBURY	EBT	1+YR	2,240
	DANBURY	RT	1+YR	800
	GRAFTON	EBT	1+YR	540
	WOLFEBORO	EBT	1+YR	200
SOLDIERS HOME POND	TILTON	EBT	1+YR	210
	TILTON	EBT	2+YR	10
SOLITUDE LAKE	NEWBURY	EBT	FING	900
SOUCOOK RIVER	LOUDON	BT	1+YR	1,320
	LOUDON	EBT	1+YR	1,310
	LOUDON	RT	1+YR	1,720
	PEMBROKE	BT	1+YR	1,320
	PEMBROKE	EBT	1+YR	840
	PEMBROKE	RT	1+YR	1,900
SOUHEGAN RIVER	AMHERST	BT	1+YR	720
	AMHERST	EBT	1+YR	790
	AMHERST	RT	1+YR	420
	GREENVILLE	BT	1+YR	735
	GREENVILLE	EBT	1+YR	790
	GREENVILLE	RT	1+YR	280
	MERRIMACK	BT	1+YR	720
	MERRIMACK	EBT	1+YR	1,010
	MERRIMACK	RT	1+YR	330
	MILFORD	BT	1+YR	960
	MILFORD	EBT	1+YR	790
	MILFORD	RT	1+YR	420
	NEW IPSWICH	EBT	1+YR	465
	NEW IPSWICH	RT	1+YR	200
	WILTON	BT	1+YR	960
	WILTON	EBT	1+YR	790
SOUHEGAN RIVER	WILTON	RT	1+YR	420
SOUTH POND	STARK	EBT	1+YR	1,000
	STARK	RT	1+YR	2,000
SOUTH RIVER	EFFINGHAM	EBT	1+YR	800
SPAULDING BROOK	BROOKLINE	EBT	1+YR	500
SPECTACLE POND	GROTON	EBT	1+YR	2,720
	GROTON	EBT	2+YR	100
	GROTON	RT	1+YR	850

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
	HEBRON	EBT	1+YR	750
	HEBRON	EBT	2+YR	100
	HEBRON	RT	1+YR	850
SPEEDWAY POND	CANTERBURY	EBT	1+YR	140
	LOUDON	EBT	1+YR	300
SPICKETT RIVER	SALEM	EBT	1+YR	240
	SALEM	EBT	1+YR	30
SPOFFORD LAKE	CHESTERFIELD	RT	1+YR	5,400
SPOONWOOD LAKE	NELSON	EBT	1+YR	1,330
SQUAM LAKE	SANDWICH	LLS	1+YR	1,565
	SANDWICH	RT	1+YR	2,500
SQUAM LAKE, LITTLE	HOLDERNESS	RT	1+YR	500
SQUAM RIVER	ASHLAND	EBT	1+YR	640
STANLEY BROOK	DUBLIN	EBT	1+YR	450
STEARNS BROOK	MILAN	EBT	1+YR	600
STEVENS BROOK	SUTTON	EBT	1+YR	250
STINSON BROOK	RUMNEY	EBT	1+YR	500
STINSON LAKE	RUMNEY	RT	1+YR	1,342
STIRRUP IRON BROOK	BOSCAWEN	EBT	1+YR	310
STIRRUP IRON POND	SALISBURY	EBT	1+YR	250
	SALISBURY	EBT	2+YR	20
STOCKER BROOK	GRANTHAM	EBT	1+YR	150
STONE POND	MARLBOROUGH	EBT	1+YR	283
STONEHOUSE POND	BARRINGTON	EBT	1+YR	1,950
	BARRINGTON	EBT	2+YR	125
STONY BROOK	LEBANON	BT	1+YR	130
	LYNDEBOROUGH	EBT	1+YR	1,285
	LYNDEBOROUGH	RT	1+YR	190
	WILTON	EBT	1+YR	1,035
	WILTON	RT	1+YR	190
STRATFORD BOG	STRATFORD	EBT	1+YR	1,500
STREETER POND	SUGAR HILL	BT	1+YR	2,130
	SUGAR HILL	RT	1+YR	2,603
STUB HILL POND	PITTSBURG	EBT	FING	450
SUCCESS POND	SUCCESS	BT	1+YR	500
	SUCCESS	EBT	1+YR	1,000
	SUCCESS	RT	1+YR	3,000
SUCKER BROOK	ANDOVER	EBT	1+YR	310
	FRANKLIN	EBT	1+YR	250
SUGAR RIVER	CROYDON	BT	1+YR	311
	CROYDON	EBT	1+YR	460
	NEWPORT	BT	1+YR	1,750
	NEWPORT	BT	1+YR	312
	NEWPORT	EBT	1+YR	1,580
	NEWPORT	RT	1+YR	514
	SUNAPEE	BT	1+YR	311
	SUNAPEE	BT	1+YR	660
	SUNAPEE	EBT	1+YR	560
	SUNAPEE	RT	1+YR	300
SUGAR RIVER, LITTLE	UNITY	EBT	1+YR	430

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
SUGAR RIVER, NORTH BRANCH	CROYDON	BT	1+YR	1,920
	CROYDON	EBT	1+YR	440
	CROYDON	RT	1+YR	700
	GRANTHAM	EBT	1+YR	780
SUGAR RIVER, SOUTH BRANCH	GOSHEN	BT	1+YR	800
	GOSHEN	BT	1+YR	312
	GOSHEN	EBT	1+YR	310
	GOSHEN	RT	1+YR	850
	LEMPSTER	EBT	1+YR	310
	NEWPORT	EBT	1+YR	310
	NEWPORT	RT	1+YR	100
SUNAPEE LAKE	SUNAPEE	LLS	1+YR	4,131
SUNAPEE LAKE, LITTLE	NEW LONDON	RT	1+YR	942
SUNCOOK LAKE	BARNSTEAD	RT	1+YR	1,050
SUNCOOK RIVER	BARNSTEAD	BT	1+YR	480
	BARNSTEAD	EBT	1+YR	440
	BARNSTEAD	RT	1+YR	380
	CHICHESTER	EBT	1+YR	70
	CHICHESTER	RT	1+YR	100
	EPSOM	BT	1+YR	420
	EPSOM	EBT	1+YR	1,000
	EPSOM	RT	1+YR	450
	GILMANTON	EBT	1+YR	530
	PEMBROKE	BT	1+YR	600
	PEMBROKE	EBT	1+YR	170
	PITTSFIELD	BT	1+YR	240
	PITTSFIELD	EBT	1+YR	560
	PITTSFIELD	RT	1+YR	660
SUNCOOK RIVER, LITTLE	EPSOM	EBT	1+YR	400
SWAIN POND	WENTWORTH	EBT	1+YR	630
SWANZEY LAKE	SWANZEY	EBT	1+YR	1,255
	SWANZEY	RT	1+YR	1,600
SWEAT POND	ERROL	EBT	FING	1,050
SWIFT RIVER	ALBANY	EBT	1+YR	1,630
	ALBANY	EBT	1+YR	2,880
	ALBANY	EBT	1+YR	2,000
	ALBANY	EBT	2+YR	300
	CONWAY	BT	1+YR	240
	CONWAY	BT	1+YR	500
	LIVERMORE	EBT	1+YR	1,000
	LIVERMORE	EBT	1+YR	550
	TAMWORTH	EBT	1+YR	950
	TAMWORTH	RT	1+YR	340
TANNERY BROOK	WILMOT	EBT	1+YR	250
TARLETON LAKE	PIERMONT	BT	1+YR	1,200
	PIERMONT	RT	1+YR	1,230
TATES POND	HUDSON	EBT	1+YR	250
TAYLOR RIVER	HAMPTON	EBT	1+YR	200
TEMPLE BROOK	TEMPLE	EBT	1+YR	375
TERRILL POND	PITTSBURG	EBT	1+YR	600

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
TEWKSBURY POND	GRAFTON	BT	1+YR	130
	GRAFTON	BT	2+YR	125
	GRAFTON	BT	3+YR	112
	GRAFTON	EBT	1+YR	1,210
	GRAFTON	RT	1+YR	125
THIRD LAKE POND	PITTSBURG	EBT	FING	450
THORNE POND	BARTLETT	EBT	1+YR	800
THREE PONDS, LOWER	ELLSWORTH	EBT	FING	260
THREE PONDS, MIDDLE	WARREN	EBT	FING	1,690
THREE PONDS, UPPER	WARREN	EBT	FING	1,300
TIOGA RIVER	BELMONT	EBT	1+YR	540
TOWER HILL POND	CANDIA	BT	1+YR	1,000
	CANDIA	EBT	1+YR	1,970
	CANDIA	RT	1+YR	300
TOWN LINE BROOK	PETERBOROUGH	EBT	1+YR	220
TOWN POOL	CARROLL	EBT	1+YR	80
TRIO POND, LOWER	ODELL	EBT	FING	10,350
TRIO POND, UPPER	ODELL	EBT	FING	2,850
TROUT BROOK	LYME	EBT	1+YR	290
TROUT POND	FREEDOM	EBT	1+YR	1,000
TROUT POND	LYME	EBT	FING	1,680
TUCKER BROOK	MILFORD	EBT	1+YR	100
TULLEY BROOK	RICHMOND	EBT	1+YR	330
TUNIS BROOK	HANOVER	EBT	1+YR	60
TUNNELL BROOK	BENTON	EBT	1+YR	850
UNKNOWN POND	PITTSBURG	EBT	FING	450
WACHIPAUKA POND	WARREN	EBT	FING	3,240
WALKER BROOK	DANBURY	EBT	1+YR	250
WALLACE BROOK	BROOKLINE	EBT	1+YR	275
WARNER RIVER	WARNER	EBT	1+YR	1,240
	WARNER	RT	1+YR	1,500
WARREN LAKE	ALSTEAD	BT	1+YR	440
	ALSTEAD	RT	1+YR	650
WATSON BROOK	ALTON	EBT	1+YR	200
WATTS BROOK	LONDONDERRY	EBT	1+YR	120
WAUKEENA LAKE	DANBURY	EBT	1+YR	2,000
WAUKEWAN LAKE	MEREDITH	RT	1+YR	1,500
WEBSTER LAKE	FRANKLIN	BT	1+YR	2,836
	FRANKLIN	BT	1+YR	2,000
	FRANKLIN	BT	2+YR	325
	FRANKLIN	BT	3+YR	325
	FRANKLIN	RT	1+YR	500
WEEKS CROSSING POND	WARREN	EBT	1+YR	800
WENTWORTH LAKE	WOLFEBORO	RT	1+YR	1,000
WEST ALTON BROOK	ALTON	EBT	1+YR	150
	ALTON	EBT	1+YR	180
WHITCHER BROOK	BELMONT	EBT	1+YR	60
	NORTHFIELD	EBT	1+YR	40
WHITCOMB POND	ODELL	EBT	FING	3,325
WHITE LAKE	TAMWORTH	EBT	1+YR	3,330

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
WHITE POND	OSSIPEE	EBT	1+YR	2,000
	OSSIPEE	RT	1+YR	1,100
	WILMOT	EBT	1+YR	1,250
	WILMOT	EBT	2+YR	50
WHITEFACE RIVER	SANDWICH	EBT	1+YR	250
WHITTEMORE BROOK	BRIDGEWATER	EBT	1+YR	210
WHITTEMORE LAKE	BENNINGTON	BT	1+YR	200
	BENNINGTON	EBT	1+YR	1,200
	BENNINGTON	RT	1+YR	1,600
WHITTEN POND	TUFTONBORO	EBT	1+YR	135
	TUFTONBORO	EBT	2+YR	10
WILD RIVER	BEAN'S PURCHASE	EBT	1+YR	600
	BEAN'S PURCHASE	RT	1+YR	1,250
	GREEN'S GRANT	EBT	1+YR	600
	GREEN'S GRANT	RT	1+YR	1,250
WILDCAT RIVER	JACKSON	EBT	1+YR	750
WILEY BROOK	WOLFEBORO	EBT	1+YR	500
WILKINSON BROOK	EFFINGHAM	EBT	1+YR	250
WILLAND POND	DOVER	RT	1+YR	500
WILLARD POND	ANTRIM	BT	1+YR	470
	ANTRIM	BT	1+YR	200
	ANTRIM	EBT	1+YR	1,600
	ANTRIM	RT	1+YR	1,200
WINKLEY BROOK	HAMPTON FALLS	EBT	1+YR	180
	HAMPTON FALLS	RT	1+YR	60
	SEABROOK	EBT	1+YR	60
WINNEPOCKET LAKE	WEBSTER	RT	1+YR	600
WINNICUT RIVER	GREENLAND	EBT	1+YR	640
	GREENLAND	EBT	2+YR	145
	GREENLAND	RT	1+YR	700
	STRATHAM	EBT	1+YR	390
	STRATHAM	RT	1+YR	50
WINNIPESAUKEE LAKE	ALTON	RT	1+YR	2,914
	GILFORD	LLS	1+YR	55,816
	GILFORD	RT	1+YR	2,900
	TUFTONBORO	RT	1+YR	2,900
	WOLFEBORO	RT	1+YR	2,470
WINNIPESAUKEE RIVER	FRANKLIN	BT	1+YR	390
	FRANKLIN	EBT	1+YR	380
	FRANKLIN	RT	1+YR	300
	NORTHFIELD	BT	1+YR	75
	NORTHFIELD	RT	1+YR	370
	TILTON	BT	1+YR	75
	TILTON	RT	1+YR	375
WINNISQUAM LAKE	LACONIA	RT	1+YR	2,450
WINONA LAKE	CENTER HARBOR	EBT	1+YR	950
	MEREDITH	RT	1+YR	500
WRIGHT POND	PITTSBURG	EBT	FING	750
YORKS BROOK	EAST KINGSTON	EBT	1+YR	950
	EAST KINGSTON	RT	1+YR	90

FRESHWATER STOCKING SUMMARY BY WATERBODY: 1/1/2017-12/31/2017				
BODY OF WATER	**TOWN**	**SPECIES**	**SIZE**	**NUMBER**
ZEALAND RIVER	BETHLEHEM	EBT	1+YR	1,000

EVERSOURCE ENERGY

780 North Commercial Street
Manchester, NH 03101-1134

March 21, 2018

D34149

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
ATTN: OEP/DHAC
888 First Street, N.E.
Washington, DC 20426

RE: Eastman Falls Hydroelectric Project (FERC No. 2457-041)
Upstream Passage Plan for American Eel

Dear Secretary Bose:

Pursuant to Article 401 of the Eastman Falls Hydroelectric Project (FERC No. 2457) license (159 FERC ¶ 62,070) and Section 18 Prescription No. 13.1, Public Service Company of New Hampshire (PSNH) d/b/a Eversource Energy's must file a plan for providing interim upstream passage of American eels within six months of the effective date of the license. The plan must be developed in consultation with the U.S. Fish and Wildlife Service (USFWS) and N.H. Fish and Game Department (NHFGD). PSNH hereby submits a Study Plan for Evaluation of Upstream American Eel Passage at the Eastman Falls Hydroelectric Project (Plan) for Commission review and approval.

A draft Upstream Passage Plan for American Eel was sent to the USFWS for review and comment, with courtesy copies to the NHFGD and New Hampshire Department of Environmental Services (NHDES), on February 9, 2018 (Attachment 1). The USFWS provided comments on the draft plan by email dated March 12, 2018 (Attachment 2). Further details of agency consultation are provided in Appendix A of the Plan (Attachment 3) and Appendix B provides an explanation of how agency comments on the draft plan have been addressed, as appropriate.

If you have any questions, please contact me at 603-744-8855, ext. 2 or curtis.mooney@eversource.com.

Sincerely,

Curtis R. Mooney
Eversource Hydro Senior Engineering Specialist

cc:
Julianne Rosset, Michael Bailey – USFWS (via email)
Matthew Carpenter, Carol Henderson – NHFGD (via email)
Gregg Comstock – NHDES (via email)

Attachments

Attachment 1

EVERSOURCE ENERGY

780 North Commercial Street
Manchester, NH 03101-1134

February 9, 2018

D34127

Ms. Julianne Rosset
Fish & Wildlife Biologist
USFWS New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301

RE: FERC Project No. 2457, Eastman Falls Project
Upstream Eel Passage Plan – License Article 401; Interior Section 18 Prescription

Dear Ms. Rosset:

In accordance with Article 401 of the FERC license and the Department of Interior (DOI)'s Section 18 Fish Passage Prescription of Public Service Company of New Hampshire's (PSNH) d/b/a Eversource Energy Eastman Falls Hydroelectric license, PSNH must develop several fish passage plans for the Project. In preparation to develop the plans PSNH has carefully reviewed the January 23, 2017 USFWS Modified Prescription for Fishways that was filed with FERC. The first step in this process was to extract the task and reporting deadlines included throughout the Prescription and defined in Article 401, to organize into chronological order.

From review of the Prescription it appears DOI is requiring four separate plan documents

(1) a plan to evaluate upstream eel passage (prepared in consultation with USFWS and filed with FERC within 6 months of License effectiveness[1] date of January 1, 2018),
(2) a Fishway Operations and Maintenance Plan (FOMP) to describe operation, maintenance, and emergency procedures for a yet undefined fish passage facility (submitted to resource agencies within 12 months of License effectiveness date),
(3) a plan to provide permanent downstream eel passage and protection at the Project (developed in consultation with resource agencies no later than January 1 of seventh year after upstream passage is operational {2025 if we assume eels are observed passing the Project this summer}), and
(4) a Fishway Effectiveness Monitoring Plan (FEMP) to study effectiveness of downstream passage (due to FERC 6 months prior to establishment of permanent downstream passage measures).

PSNH would appreciate your confirmation that this is an accurate interpretation of the prescription requirements.

[1] Interior's modified prescription identifies deadlines for several items within a period of time after the *issuance* of the new FERC license (April 20, 2017). Article 401 keys these deadlines based upon the *effective* date of the license, which is January 1, 2018.

Included with this letter is a ***draft Upstream Passage Plan for American Eel*** as required by Prescription No. 13.1. The plan includes a plan and schedule for installation of interim upstream eel passage facilities, monitoring protocols, and reporting. In order to initiate passage operations this coming migration season, PSNH is prepared to install interim upstream eel passage by May 1, 2018, or as soon as is safe and practical depending on river flow conditions, upon FERC approval of the plan as required by Article 401. Therefore, we respectfully request that you provide any written comments on the draft plan with thirty (30) days of this letter, by March 12, 2018.

If you have any questions or require further information, please contact me at 603-744-8855, ext. 2 or curtis.mooney@eversource.com .

Sincerely,

Curtis R. Mooney

Curtis R. Mooney
Eversource Hydro Senior Engineering Specialist

Attachment

cc:

FWS/NEFO – John Warner (via email)
NHFGD – Matt Carpenter (via email)
NHFGD – Carol Henderson (via email)
NHDES – Gregg Comstock (via email)

Attachment 2

Curtis R. Mooney

From: Rosset, Julianne <julianne_rosset@fws.gov>
Sent: Monday, March 12, 2018 12:51 PM
To: Curtis R. Mooney
Cc: John Warner (John_Warner@fws.gov); Matthew A Carpenter (Matthew.A.Carpenter@wildlife.nh.gov); Carol Henderson (Carol.Henderson@wildlife.nh.gov); Gregg Comstock (GREGG.COMSTOCK@DES.NH.GOV); Bailey, Michael
Subject: Re: draft Eastman Falls Upstream Eel Passage Plan

Hi Curt,

This responds to your February 9th, 2018 email soliciting comments on a draft upstream American eel passage plan for the Eastman Falls Hydroelectric Project (FERC No. 2457), located on the Pemigewasset River in Merrimack and Belknap County, New Hampshire.

PSNH proposes to design and install a single upstream eel trap in the area immediately below the project during the 2018 upstream migration period. The trap will be similar to that of an interim eel trap located at Garvins Falls dam (FERC No. 1893). PSNH also proposes to perform up to four nighttime visual monitoring surveys, focusing on areas visible from access points along both banks of the dam and the dam structure itself.

COMMENTS

Evaluation Approach

3.1 Upstream trap evaluation

The trap evaluation section states that Normandeau Associates, Inc. conducted a walk-through evaluation of the tailrace habitat downstream of the project powerhouses and spillway. Based on this effort, PSNH believes that a single upstream eel trap in the area immediately below the dam is appropriate. However, the referenced observations are not included in the study plan. The Service recommends that this information be incorporated into the plan and provided to the natural resource agencies.

The interim trap structure proposed in the plan closely resembles the western tailrace trap located at Garvins Falls dam. The Service notes that this trap has caught far less eels than the eastern spillway trap. Since 2014, the western tailrace trap has collected 99 eels while the eastern spillway trap has collected 1109 eels. As discussed at our February 8, 2018 fish passage meeting with PSNH, this may be due to the large area of the tailrace combined with the small opening of the HDPE pipe (eels likely have difficulty locating the opening of the pipe). Therefore, we recommend PSNH also use mussel spat rope woven through two- inch chain at Eastman Falls to help eels find and enter the trap.

PSNH proposes to check the eel trap up to three times per week for the duration of the upstream passage season. We agree that the trap should be checked three times initially but recommend that this number be adjusted as needed and the trap be checked more frequently over the duration of the

upstream passage season. We recommend that PSNH also check the guidance structure and make adjustments as necessary.

3.2 Nighttime visual surveys

The plan states that four visual monitoring surveys will take place at night, during the presumed peak of the upstream migration period (July 1 to August 31), at areas visible from access points along both banks of the dam and the dam structure itself. We ask that the surveys be timed to coincide with environmental conditions that are correlated with juvenile eel movement (i.e., precipitation events and cloud cover). Additionally, because the upstream eel migration period is May 1 to October 30, we suggest that PSNH perform the nighttime surveys from mid-June to mid-October. We recommend PSNH conduct up to ten nighttime surveys. If enough data is collected in the first five surveys, PSNH should consult with the agencies and determine how many additional surveys are needed. We also recommend that PSNH perform some of the nighttime surveys in the tailrace, not just from areas along the banks of the dam.

Annual Reporting

We recommend that PSNH include spill and generation information in the summary report that they propose to provide the Service annually for each interim monitoring year.

PRESCRIPTION REQUIREMENTS

PSNH requested the Service confirm that the timeline they provided regarding reporting deadlines, as per the Interior's Section 18 prescription, are correct. While we generally agree with the timeline, it does not include a plan for interim downstream eel passage measures. The plan should describe the interim measures PSNH proposes to undertake to protect adult eels from injury and mortality as they move downstream past the project. Interim passage is to be implanted no later than August 15th, 2020. Additionally, we note that the Prescription states "the licensee shall prepare a schedule for implementing the conditions in the Prescription to meet specified targets. The Licensee will prepare the schedule in consultation with the Service, State resource agencies, and the Technical Committee. The licensee will provide 30 days to review and comment and will offer to hold a meeting to present the schedule prior to agency review. The Licensee will submit a final draft schedule to the Service for its prior approval before submitting the schedule to the Commission for its approval." We suggest PSNH hold a meeting or conference call with the Service, state resource agencies, and the Technical Committee to further discuss the Prescription timeline and associated requirements.

Thank you for this opportunity to comment on the draft plans. If you have any questions, please feel free to contact me.

Kind regards,
Julianne

Julianne Rosset
Fish & Wildlife Biologist
USFWS New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301
603-227-6436
julianne_rosset@fws.gov

On Fri, Feb 9, 2018 at 2:08 PM, Curtis R. Mooney <curtis.mooney@eversource.com> wrote:

> Good afternoon:
>
> Attached is a draft upstream eel passage plan for Eastman Falls with an accompanying cover letter. I have placed the originals in the mail to Julianne.
>
> Please review the draft plan and provide any comments to me by March 12, 2018.
>
> If you have any questions or would like to schedule a conference call to discuss the plan, please let me know.
>
> Thanks,
>
> Curt
>
> Curtis R. Mooney, MS
>
> Eversource Hydro
>
> Senior Engineering Specialist
>
> 59 Ayers Island Road
>
> Bristol, NH 03222
>
> Office: (603) 744-8855 Ext. 2
>
> Cell: (603) 345-8531
>
> ---
>
>

Attachment 3

EVERSOURCE ENERGY

STUDY PLAN FOR EVALUATION OF UPSTREAM AMERICAN EEL PASSAGE AT THE EASTMAN FALLS HYDROELECTRIC PROJECT (FERC NO. 2457)

Submitted by:

Eversource Energy

780 North Commercial Street
Manchester, NH 03105

March 2018

1.0 Introduction

Eversource Energy owns and operates the Eastman Falls Hydroelectric Project No. 2457 (Project) pursuant to a license issued by the Federal Energy Regulatory Commission (FERC). On December 18, 2015, Public Service Company of New Hampshire (PSNH or licensee) filed an application for a new license to continue operation and maintenance of the Project. FERC issued the new license on April 23, 2017 with an effective date of January 1, 2018. As part of the licensing process, the United States Department of the Interiors (Interior) issued a Modified Section 18 Prescription for Fishways on January 23, 2017. As stated in the prescription, the licensee is required to file with FERC a plan for providing interim upstream passage of American eels (*Anguilla rostrata*) at the Project within 6 months of licensing. A draft study plan providing a summary of the steps that will be implemented to provide upstream passage for eels at Eastman Falls was submitted to the Service for their review on February 9, 2018. Comments on the draft plan were provided by the Service on March 12, 2018. Copies of all correspondence related to the review and comment on the draft plan are provided in Appendix A. Appendix B contains responses to each comment provided by the Service during their review and where appropriate this final study plan has been modified to incorporate those requests.

2.0 Background and Project Description

The Eastman Falls Hydroelectric Project is located in central New Hampshire in Merrimack and Belknap Counties, and in the city of Franklin and towns of Hill, Sanbornton, and New Hampton. The Project is located on the Pemigewasset River, at river mile 116.5, approximately 1.5 miles downstream of the U.S. Army Corps of Engineers (USACE) Franklin Falls Flood Control Dam, and about one mile upstream of its confluence with the Winnipesaukee River. The Project was originally constructed by the Pemigewasset Power Company in 1903, redeveloped by the Boston and Maine Railroad in 1910-1911, and further redeveloped by Public Service Company of New Hampshire (PSNH) in 1937 and 1983.

The general Project area includes the Pemigewasset River from Sumner Island in the north to the Pemigewasset-Winnipesaukee River confluence in the south, and the lands immediately adjacent to the Pemigewasset River throughout this reach. The Project dam and powerhouses are located off North Main Street in Franklin, New Hampshire, approximately 0.6 miles west of the center of Franklin.

Existing Structures

The Eastman Falls Project consists of a dam, one spillway waste gate, and two single unit powerhouses, which are described in further detail below. The project operates as an un-manned, run-of-river facility, and does not have a bypass reach.

Spillway

The spillway is a concrete gravity structure approximately 341 feet long, with a maximum structural height of about 37 feet above the foundation. The fixed crest of the ogee section is at elevation 301 feet mean sea level (msl). The spillway is equipped with 6 foot high steel flashboards for its full length. The flashboard panels are hinged at the crest and supported on the downstream side by timber struts. A cable car system spans the spillway to allow for strut removal to lower the flashboard panels to increase spillway capacity during high flow events. The same system is used by PSNH operators after high flows subside to raise the panels and reinstall the struts. A drainage gallery is located in the higher sections of the spillway. Post-tensioned anchors were installed in the spillway in 1999.

Waste Gate Structure

A waste gate structure abuts the right side of the spillway and includes a 16 foot high by 30 foot wide steel slide gate. The gate sill is at elevation 292 feet msl. The reinforced concrete waste gate structure is approximately 40 feet wide with the deck (crest) at elevation 316 feet.

Intake Structures

The Unit No.1 intake has a headgate structure that is about 12.5 feet high by about 15 feet wide. Trashrack dimensions are 23 feet 9 1/8 inches high by 17 feet wide and consist of 1/2 inch wide bars spaced 4 inches on center for a clear spacing of 3.5 inches. The intake structure for this section of the powerhouse admits water to the turbine through a 12.5 foot by 12.5 foot reinforced concrete penstock which is approximately 21 feet long. The bulkhead is about 40 feet high and 20 feet wide with a 1 foot wide stop log slot that can be used to dewater the intake.

The Unit No.2 intake is integral with the powerhouse and is comprised of a reinforced concrete and masonry gravity structure with an 18 foot square entrance opening. An electrically operated headgate is located within the powerhouse and is about 20 feet high by about 21 feet wide. Trashracks consist of two 12 foot 4 inch wide by 9 foot 4 inch high panels with 1/2 inch wide bars spaced 4 inches on center for a clear spacing of 3.5 inches. The intake stop log panel is about 20 foot 10 inches high and 22 foot 5 ½ inches wide, that can be lowered into the stoplog frame of the bulkhead to dewater the intake via pumping.

Powerhouses

Two powerhouses are located on the west bank of the river. The Unit No.1 powerhouse was built in 1937 and is approximately 29 feet long, 29 feet wide, and 34 feet high. Tail gate panels (four 20 foot by 5.5 foot panels) can also be placed in tailrace with a crane, stacked on one another. With the panels in place and the headgate closed, pumps are used to dewater the penstock, unit and draft tube. Draft tube opening is approximately 23 feet wide by 14 feet 6 inches high and is approximately 60 feet in length from the turbine to the tailwater opening with varying height and width dimensions along that distance.

The Unit No. 2 powerhouse was originally constructed in about 1910 and was retrofitted with a new Kaplan horizontal-type turbine generator in 1983. The Unit No. 2 powerhouse is integral with the intake and comprised of a reinforced concrete and masonry substructure with a concrete and brick superstructure. The built-up roof is supported by steel trusses. The majority of the concrete substructure was replaced, and the upstream portion of the roof was reconstructed as part of the 1983 retrofit. The Unit No. 2 powerhouse is approximately 88 feet long, 78 feet wide and 56 feet high. The draft tube opening is approximately 23 feet wide by 14 feet 6 inches high and is an approximately 60 feet in length from the turbine to the tailwater opening with varying height and width dimensions along that distance. The tail gate panel (draft tube stop logs) is 15 feet 5 inches high and 24 feet 5 inches wide and has a large pump installed in it. When the head gate and tail gates are closed the pump is turned on to dewater the intake and draft tube.

Tailwater

The Pemigewasset River below the Eastman Falls Project boundary is a free-flowing, riverine body through to its confluence with the Winnipesaukee River. The normal tailwater elevation is 273.0 feet msl. Outflow from the Project joins outflow from the Winnipesaukee River about one mile downstream.

3.0 Evaluation Approach

3.1 Upstream Trap Evaluation

During the summer of 2017, the licensee and fisheries staff with Normandeau Associates, Inc. (Normandeau) conducted a walk-through evaluation of the tailrace habitat downstream of the project powerhouses and spillway (Figures 1 & 2). Based upon the visual observations made during that visit, the licensee intends to install a single upstream eel trap in the area immediately below Eastman Falls during the 2018 upstream migration period (defined as May 1 to October 30). A lack of safe and effective access as well as observed velocity and channel

depths were observed during the summer 2017 site visit and did not appear to support the installation of additional interim passage structures in the tailrace channel downstream of the project powerhouses. The section of tailrace along the eastern shoreline downstream of the spillway appeared to offer the best combination of safe access as well as appropriate habitat for upstream eel movement (Figure 3). The summer 2017 site visit identified the lower, calmer flow conditions along the eastern shoreline coupled with areas of concentrated leakage as offering the greatest likelihood of velocities suitable for ascending eels.

The proposed interim trap structure is of a design similar to upstream eelways which have been installed and maintained at the Garvins Fall Dam (FERC No. 1893) located on the Merrimack River downstream of Eastman Falls in Bow, New Hampshire (Figure 4). The basic trap design will consist of a length of 4-inch corrugated HDPE drain pipe, lined with a section of 3 ¾ inch stretch knotted seine netting. The HDPE piping will originate from a rigid collection tank installed on ledge substrate immediately downstream of the hinged 6 foot flashboards and will snake down the rock substrate prior to terminating in the watered tailrace reach. Netting material run through the inside of the HDPE piping will be allowed to extend beyond the downstream end of the pipe and into the water to aid in eel location of the entrance. The collection tank will be continuously fed with ambient Pemigewasset River water pulled from the headpond either passively via siphon or actively by pump. Siphon or pump flow will also be used as attraction flow released at the downstream entrance of the trap structure. Should the HDPE pipe/trawl netting guidance device prove to be ineffective (i.e., observations during nighttime visual surveys (see Section 3.2) are demonstrating eel presence in the vicinity of the trap but trap catches are low to none) Eversource will either replace or augment the pipe guidance device with a chain/mussel spat guidance device.

Following installation of the trap on or as close to May 1 as Pemigewasset River flow conditions allow, the trap will be checked up to three times per week. In the event that trap checks conducted during the early part of the season yield high numbers of eels then the frequency of trap checks will be increased for the remainder of the upstream passage season. During each check, the attraction flow and guidance structure will be visually examined and physically adjusted (if necessary). Any eels observed in the trap will be removed, assigned a length class of ≤6″, 6-12″, or ≥ 12″, and then tallied by length class. A log sheet will be kept for each daily check and will at minimum contain the date and time of the check as well as observed counts by length class. Following enumeration, eels will be transported in a five gallon pail of ambient Pemigewasset River water and released at the public boat launch located on the western shoreline, approximately 1,200 feet upstream of Eastman Falls.

On the date of each trap check, project personnel will evaluate the trap system to ensure it is functioning properly. This will include verifying that the siphon or pump system providing

tank and attraction flow is properly operating and that intakes are free of debris. The placement of the downstream end of the entrance pipe relative to watered tailrace habitat will be checked to ensure that eels can access the entrance to the trap. The length of HDPE pipe will be visually examined to ensure no damage from river flows or outside influences (e.g. vandalism) has occurred.

3.2 Nighttime Visual Surveys

In addition to the interim eel trap which will operate continuously during the upstream migration period, the licensee will also conduct a series of nighttime visual surveys to provide insight into areas of congregation downstream of the Project.

Up to ten visual monitoring surveys will take place at night during the presumed peak of the upstream migration period (mid-June to mid-October). All surveys will be conducted immediately following sunset and an attempt will be made to coordinate surveys to occur at the same time as minor precipitation events and/or cloud cover. Upon completion of the fifth visual monitoring survey, Eversource will consult with the Service to determine if additional nighttime surveys should be conducted. If at the time of consultation, the proposed eel trap has proven to be performing well then Eversource will likely forego additional nighttime visual surveys. In an effort to limit personnel moving around in the tailrace during night hours, eel surveys will be conducted from safely accessible locations and will focus on areas visible from access points along both banks and the dam structure itself. Field personnel will be equipped with spotlights and binoculars. The extent of area surveyed will be driven by operations at the Project. High flows and the presence of spill may limit or prevent effective searching of some areas downstream of the Project.

On each survey date, the timing, location and duration of searches will be recorded. All observations of eels (i.e., presence/absence, abundance, and distribution among pre-defined size classes) will be recorded. Information related to weather and lunar cycle will be recorded for each survey. The field crew conducting the surveys will also maintain notes related to observations on project operations (i.e., generation and spill).

4.0 Annual Reporting

The licensee will provide the Service with an annual summary report by December 31 for each interim monitoring year. Numbers of eels observed/collected (by size class and sampling date) will be included in the report along with a description of all upstream eel related sampling activities and a summary of operational and environmental conditions at the site during the upstream passage season. Operations data will include spill and generation information for the duration of the sampling season.

Figure 1. View of the Eastman Falls tailrace from the powerhouse side of the channel across to the spillway.

Figure 2. View of the Eastman Falls tailrace from the spillway side of the channel across to the powerhouse discharge.

Figure 3. Area downstream of Eastman Falls spillway targeted for installation of an interim upstream eel trap. Collection tank will be installed at upper elevation with collection pipe descending around into watered habitat in vicinity of natural leakage. Natural leakage will be supplemented with additional attraction flow from headpond.

Figure 4. Proposed Eastman Falls interim eel trap design based on traps installed at Garvins Falls. Left panel shows the collection tank and descending collection pipe. Right panel shows entrance to collection pipe with flared netting material extending out into watered habitat.

APPENDIX A

Correspondence related to the distribution and review of the draft Eastman Falls upstream eel passage study plan

From: Curtis R. Mooney
Sent: Friday, February 09, 2018 2:08 PM
To: Julianne Rosset (julianne_rosset@fws.gov) <julianne_rosset@fws.gov>
Cc: John Warner (John_Warner@fws.gov) <John_Warner@fws.gov>; 'Matthew A Carpenter (Matthew.A.Carpenter@wildlife.nh.gov)' <Matthew.A.Carpenter@wildlife.nh.gov>; Carol Henderson (Carol.Henderson@wildlife.nh.gov) <Carol.Henderson@wildlife.nh.gov>; Gregg Comstock (GREGG.COMSTOCK@DES.NH.GOV) <GREGG.COMSTOCK@DES.NH.GOV>
Subject: draft Eastman Falls Upstream Eel Passage Plan

Good afternoon:

Attached is a draft upstream eel passage plan for Eastman Falls with an accompanying cover letter. I have placed the originals in the mail to Julianne.

Please review the draft plan and provide any comments to me by March 12, 2018.

If you have any questions or would like to schedule a conference call to discuss the plan, please let me know.

Thanks,
Curt

Curtis R. Mooney, MS
Eversource Hydro
Senior Engineering Specialist

59 Ayers Island Road
Bristol, NH 03222

Office: (603) 744-8855 Ext. 2
Cell: (603) 345-8531

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Sent: Monday, March 12, 2018 12:51 PM
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Cc: John Warner (John_Warner@fws.gov) <John_Warner@fws.gov>; Matthew A Carpenter (Matthew.A.Carpenter@wildlife.nh.gov) <Matthew.A.Carpenter@wildlife.nh.gov>; Carol Henderson (Carol.Henderson@wildlife.nh.gov) <Carol.Henderson@wildlife.nh.gov>; Gregg Comstock (GREGG.COMSTOCK@DES.NH.GOV) <GREGG.COMSTOCK@des.nh.gov>; Bailey, Michael <michael_bailey@fws.gov>
Subject: Re: draft Eastman Falls Upstream Eel Passage Plan

Hi Curt,

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PSNH proposes to check the eel trap up to three times per week for the duration of the upstream passage season. We agree that the trap should be checked three times initially but recommend that this number be adjusted as needed and the trap be checked more frequently over the duration of the upstream passage season. We recommend that PSNH also check the guidance structure and make adjustments as necessary.

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PRESCRIPTION REQUIREMENTS

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Thank you for this opportunity to comment on the draft plans. If you have any questions, please feel free to contact me.

Kind regards,
Julianne

Julianne Rosset
Fish & Wildlife Biologist
USFWS New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301
603-227-6436
julianne_rosset@fws.gov

APPENDIX B

Eversource responses to comments received on the draft Eastman Falls upstream eel passage study plan

Comment 1: *The trap evaluation section states that Normandeau Associates, Inc. conducted a walk-through evaluation of the tailrace habitat downstream of the project powerhouses and spillway. Based on this effort, PSNH believes that a single upstream eel trap in the area immediately below the dam is appropriate. However, the referenced observations are not included in the study plan. The Service recommends that this information be incorporated into the plan and provided to the natural resource agencies.*

Response 1: The summary of observations from the summer 2017 site visit originally presented in the first paragraph of Section 3.1 have been revised to provide additional detail. As shown in the photo series (Figures 1-3), a lack of safe and effective access as well as observed velocity and channel depths does not support the installation of additional interim passage structures in the tailrace channel downstream of the project powerhouses. The section of tailrace along the eastern shoreline downstream of the spillway offers the best combination of safe access as well as appropriate habitat for upstream eel movement. The eastern shoreline downstream of the spillway offers lower flow conditions coupled with areas of concentrated leakage. This offers the greatest likelihood of velocities suitable for ascending eels.

Comment 2: *The interim trap structure proposed in the plan closely resembles the western tailrace trap located at Garvins Falls dam. The Service notes that this trap has caught far less eels than the eastern spillway trap. Since 2014, the western tailrace trap has collected 99 eels while the eastern spillway trap has collected 1109 eels. As discussed at our February 8, 2018 fish passage meeting with PSNH, this may be due to the large area of the tailrace combined with the small opening of the HDPE pipe (eels likely have difficulty locating the opening of the pipe). Therefore, we recommend PSNH also use mussel spat rope woven through two- inch chain at Eastman Falls to help eels find and enter the trap.*

Response 2: The trap proposed for Eastman Falls is of the same physical design used at all three sampling locations at Garvins Falls dam (the eastern side of the bypass, the tailrace and the western side of the bypass in the vicinity of the gatehouse). Each trap consists of a rigid box with a descending section of HDPE pipe lined with a section of trawl net. Flow through attraction water is provided by either pump or gravity feed. The lower catches noted by the Service at the western tailrace trap versus the eastern spillway trap at Garvins are more likely a function of the physical habitat (i.e., large, deep water open tailrace with competing flows from generation at the tailrace versus relatively shallow, margin habitat with elevated flashboards to reduce competing flows at the eastern spillway) than of the pipe itself. When the overall setting and competing flows from generation are considered it is not likely that a single feed of spat rope lowered into the Garvins tailrace would produce any better results than the existing installation.

Language in Section 3.1 of the final study plan has been modified to describe an adaptive approach where if the proposed trap entrance proves to be ineffective, the pipe/trawl net guidance device will be either replaced or augmented with a chain/mussel spat guidance device. Based on the low frequency of high flow/spill conditions at the proposed sampling location due to the infrequent opening of the last bay of flashboards, a lighter gauge chain will likely be appropriate for shaping and guiding the mussel spat rope guidance device over the bedrock substrate from the trap down to the permanently wetted habitat below the area of natural leakage.

Comment 3: *PSNH proposes to check the eel trap up to three times per week for the duration of the upstream passage season. We agree that the trap should be checked three times initially but recommend that this number be adjusted as needed and the trap be checked more frequently over the duration of the upstream passage season. We recommend that PSNH also check the guidance structure and make adjustments as necessary.*

Response 3: Language in Section 3.1 of the final study plan has been modified to describe an adaptive approach to trap checks where if the three times weekly checks conducted during the early part of the season yield high numbers of eels then the frequency of trap checks will be increased for the remainder of the upstream passage season. As requested, the guidance structure will be examined during the season and if necessary adjustments will be made.

Comment 4: *The plan states that four visual monitoring surveys will take place at night, during the presumed peak of the upstream migration period (July 1 to August 31), at areas visible from access points along both banks of the dam and the dam structure itself. We ask that the surveys be timed to coincide with environmental conditions that are correlated with juvenile eel movement (i.e., precipitation events and cloud cover). Additionally, because the upstream eel migration period is May 1 to October 30, we suggest that PSNH perform the nighttime surveys from mid-June to mid-October. We recommend PSNH conduct up to ten nighttime surveys. If enough data is collected in the first five surveys, PSNH should consult with the agencies and determine how many additional surveys are needed. We also recommend that PSNH perform some of the nighttime surveys in the tailrace, not just from areas along the banks of the dam.*

Response 4:

Section 3.2 of the final study plan has been modified to include up to 10 visual monitoring surveys to take place between mid-June to mid-October and an attempt will be made to coordinate surveys to occur at the same time as minor precipitation events and/or cloud cover. Upon completion of the fifth visual monitoring survey, Eversource will consult with the Service to determine if additional nighttime surveys should be conducted. If at the time of consultation,

the proposed eel trap has proven to be performing well then Eversource will likely forego additional nighttime visual surveys.

Access into the section downstream of Eastman Falls is difficult on the spillway side and not possible on the powerhouse side. Based on the wet, overcast conditions requested for these surveys they will be limited to vantage points that can be safely accessed by project personnel.

Comment 5: *We recommend that PSNH include spill and generation information in the summary report that they propose to provide the Service annually for each interim monitoring year.*

Response 5: Spill and generation data for the extent of the monitoring period will be included in the annual summary report. Language in Section 4.0 of the final study plan has been edited to reflect this.

Document Content(s)

163 FERC ¶ 62,085

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Public Service Company of New Hampshire — Project No. 2457-043

ORDER MODIFYING AND APPROVING PLAN FOR EVALUATION OF UPSTREAM AMERICAN EEL PASSAGE, ARTICLE 401(A)

(Issued May 9, 2018)

1. On March 21, 2018, Public Service Company of New Hampshire, licensee for the Eastman Falls Hydroelectric Project No. 2457, filed its Plan for Evaluation of Upstream American Eel Passage (Plan), pursuant to Article 401(a) of the project license.[1] The Plan was also filed to comply with the U.S. Fish and Wildlife Service's (FWS) Section 18 fishway prescription, condition 13.1, included as Appendix B of the license. The project is located on the Pemigewasset River in the town of Franklin in Merrimack and Belknap counties, New Hampshire. The project occupies federal lands owned and maintained by the U.S. Army Corps of Engineers.

License Requirement

2. License Article 401(a) requires the licensee to file for Commission approval, various plans as required by the mandatory conditions stipulated by state and federal resource agencies. License Article 401(a), in part, requires the licensee to file an Upstream Passage Plan for American Eel with the Commission within six months of the effective date of the license.[2] In addition, FWS's section 18 fishway prescription condition 13.1 requires the licensee to:

"Construct, operate, and maintain up to three upstream fishways for American

[1] Order Issuing New License (159 FERC ¶ 62,070), issued April 20, 2017.

[2] The effective date of the license is January 1, 2018, therefore the due date to file the Plan with the Commission is July 1, 2018.

eels at the Eastman Falls Dam. The location(s) for siting permanent eel passage facilities will be based on the results of surveys that will be conducted the first two upstream passage seasons after license issuance. Surveys will consist of deploying temporary ramps/traps and/or conducting night-time observational surveys. Ramps/traps will be constructed according to specifications used for eel ramps at the licensee's Amoskeag and Garvins Falls projects or improved designs as may be approved by the FWS. The ramps will be deployed at locations to be determined in consultation with the FWS and the New Hampshire Fish and Game Department (New Hampshire FGD). The Licensee will tend the ramps once or twice per week throughout the upstream migration season or more frequently if necessary, based on eel capture numbers. Night-time observational surveys shall be conducted on dark, rainy nights throughout the upstream migration season. Any eels collected in the ramps will be counted, transported to the headpond, and released. The time, location, number of eels observed/collected, by size class and environmental and operational conditions for each survey date will be recorded and used to generate reports that will be provided to the FWS for review by December 31 each year.

Based on the results of the two years of collection data, a permanent location (or locations) for upstream eel passage facilities will be determined by the FWS in consultation with the Licensee and the NHFGD. Permanent eel ramp trap(s) or ladder(s) will be operational by May 1 of the third calendar year after license issuance. The design of permanent eel passage facilities will be developed in consultation with, and require approval by, the FWS. The upstream eel passage facilities shall be operated 24 hours per day and maintained at the Licensee's expense to maximize fish passage effectiveness throughout the seasonal period identified in Section 12.2 Fish Passage Operating Periods.

Pursuant to the conditions provided herein, the Licensee shall, within 6 months of license issuance, file a plan for providing upstream passage for eels with the Commission for approval. The plan will be prepared in consultation with the FWS and the NHFGD. The Licensee must have the FWS' prior approval before filing the final plan with the Commission."

Licensee's Plan

3. The licensee proposes to install an upstream eel trap in the area immediately downstream of the dam during the 2018 and 2019 upstream eel migration period (defined as May 1 to October 31). The trap would provide interim eel passage as required by condition 13.1 of the fishway prescription, and would also assist in the evaluation of

upstream passage locations and needs for consideration in developing permanent upstream eel passage at the project.

4. The eel trap would consist of a collection tank located on rock ledge substrate immediately downstream of the hinged flashboards. A 4-inch corrugated high-density polyethylene pipe, lined with a 3 ½ inch stretched seine netting, would descend from the tank, down the rock substrate to the tailrace. The pipe would terminate just prior to entering the tailrace and a section of the netting material lining the pipe would extend from the end of the pipe to the tailrace water. This configuration would assist eels in locating the pipe entrance. Continuous flow through the pipe would be provide either by siphon or pump from water upstream of the dam. If the netting attraction ramp proves to be ineffective, the license would either replace or augment the entry ramp with a chain and mussel spat rope guidance device as recommended by the FWS in their comments on the Plan. The licensee proposes to install the trap as close to May 1, 2018 as allowed by river flows. The trap would be checked, at a minimum of three times per week. If eel capture numbers are high during the beginning of the season, the licensee would increase the frequency of the trap checks for the remainder of the season. Trap checks would include enumerating captured eels and assigning a length class for each. Captured eels would then be transported and released approximately 1,200 feet upstream of the dam. The operation of the trap would be evaluated and adjusted during each check as deemed necessary to remain operational and effective.

5. The licensee also proposes to conduct night-time visual surveys during mid-June to mid-October. Up to ten night-time observations would be conducted. Surveys would be conducted just after sunset and attempted to be made following light precipitation events or under cloudy conditions when it is expected that eels would be more active. Further, the licensee proposes that at the completion of the fifth night-time observation effort, it would consult with the FWS to determine if additional surveys are necessary. If the eel trap proves to be performing well, further night-time observations would be suspended, but this would be based on the licensee's consultation with the FWS.

6. As required by the fishway prescription, the licensee proposes to provide an annual report to the FWS by December 31, summarizing each interim passage season. The reports would include the number and size classes of eels captured and observed and also include summary of operational and environmental conditions during the passage seasons.

Agency Consultation

7. The licensee states that it submitted a draft of its Plan to the FWS, New Hampshire FGD, and New Hampshire Department of Environmental Services on

February 9, 2018. FWS provided comments on the Plan by email dated March 12, 2018. FWS recommended that the licensee include in the Plan, observations of the walk-through inspection used to evaluate the area downstream of the dam for placement of the trap. FWS also made recommendations on the attraction substrate for the trap, the frequency at which the trap would be checked and the timeframe that visual observations should be conducted. The FWS also recommends that the licensee set up a meeting or conference call to determine a schedule for meeting prescription requirements. The licensee incorporated theses recommendations into the Plan.

Conclusions

8. The licensee's Plan proposes methods for evaluating upstream eel passage and also for providing interim passage at the project during the first two eel passage seasons following the license effective date. Condition 13.1 of the fishway prescription includes the full range of providing upstream eel passage, from interim passage through the evaluation process and finally including the installation of permanent passage and operation. However, the licensee's Plan does not address the permanent passage. Because the permanent passage is dependent upon the results of the two seasons of evaluation, it is difficult to predict, and include as a part of its Plan the details regarding permanent passage and operation. However, condition 13.1 states that permanent passage must be installed and operational by the third passage season, which would be by May 1, 2020. Based on the requirements of the fishway prescription, the report for the first and second interim passage seasons are due to the FWS by December 31, 2018 and December 31, 2019, respectively. Considering the requirements, a date should be set for the licensee to file a design, installation, and operation plan for the permanent upstream eelways. This date should be after the second interim passage reporting date of December 31, 2019, but should also allow time for consultation with the resource agencies regarding the interim passage data. Further, the date must allow time for the licensee to obtain approval from the Commission. Considering that the permanent upstream eel passage must be operational by May 1, 2020, the licensee should file the plan with the Commission by March 1, 2020 The plan should be developed in consultation with the FWS and New Hampshire FGD, and approved by the FWS. The licensee should include documentation of consultation and approval in its plan filed with the Commission. The Commission should reserve its right to make changes to the plan as it determines necessary.

9. The licensee's Plan fulfills the portion of fishway prescription 13.1 to evaluate upstream eel passage and to provide interim passage at the project, however, it does not include design, installation, and operation of permanent upstream eelways, and therefore as modified should be approved.

The Director orders:

(A) Public Service Company of New Hampshire's (licensee), Plan for Evaluation of Upstream American Eel Passage (Plan), filed with the Federal Energy Regulatory Commission (Commission) on March 21, 2018, pursuant to Article 401(a), and Section 18 fishway prescription, condition 13.1, as modified in paragraph (B), is approved.

(B) By March 1, 2020, the licensee must file, for Commission approval, a permanent upstream American eel, design, installation, and operation plan for the permanent upstream eelways, pursuant to Article 401(a), and Section 18 fishway prescription, condition 13.1. The plan must be developed in consultation with the U.S. Fish and Wildlife Service and New Hampshire Fish and Game Department, and be approved by the U.S. Fish and Wildlife Service. The plan must include documentation of consultation with the agencies, and the licensee's response to agency comments or recommendations based on project specific information. The Commission reserves its right to make changes to the plan as it determines necessary.

(C) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 825*l* (2012), and the Commission's regulations at 18 C.F.R. § 385.713 (2017). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

(for) Thomas J. LoVullo
Chief, Aquatic Resources Branch
Division of Hydropower Administration
and Compliance

Document Content(s)

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Public Service Company of New Hampshire Project No. 2457-041-NH

NOTICE OF AVAILABILITY OF ENVIRONMENTAL ASSESSMENT

(October 24, 2016)

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission) regulations, 18 C.F.R. Part 380 (Order No. 486, 52 FR 47897), the Office of Energy Projects has reviewed the application for a new license for the Eastman Falls Hydroelectric Project, located on the Pemigewasset River in the town of Franklin, in Merrimack and Belknap Counties, New Hampshire, and has prepared an Environmental Assessment (EA).

The EA contains the staff's analysis of the potential environmental impacts of the project and concludes that licensing the project, with appropriate environmental protective measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

A copy of the EA is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's website at http://www.ferc.gov using the "eLibrary" link. Enter the docket number excluding the last three digits in the docket number field to access documents. For assistance, contact FERC Online Support at FERCOnlineSupport@ferc.gov, (866) 208-3676 (toll free), or (202) 502-8659 (TTY).

You may also register online at http://www.ferc.gov/docs-filing/esubscription.asp to be notified via email of new filings and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

Any comments should be filed within 30 days from the date of this notice. The Commission strongly encourages electronic filing. Please file comments using the Commission's eFiling system at http://www.ferc.gov/docs-filing/efiling.asp. Commenters can submit brief comments up to 6,000 characters, without prior registration, using the eComment system at http://www.ferc.gov/docs-filing/ecomment.asp. You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support. In lieu of electronic filing, please send a paper copy to: Secretary, Federal Energy Regulatory Commission, 888 First Street, NE, Washington, D.C. 20426. The first page of any filing should include docket number P-2457-041.

For further information, contact Steve Kartalia at (202) 502-6131 or Stephen.Kartalia@ferc.gov.

Kimberly D. Bose,
Secretary.

ENVIRONMENTAL ASSESSMENT
FOR
HYDROPOWER LICENSE

Eastman Falls Hydroelectric Project

FERC Project No. 2457-041

New Hampshire

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

October 2016

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ACRONYMS AND ABBREVIATIONS

APE	area of potential effect
BMPs	Best Management Practices
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DO	dissolved oxygen
EA	environmental assessment
Eastman Falls Project	Eastman Falls Hydroelectric Project
ESA	Endangered Species Act
FPA	Federal Power Act
fps	feet per second
FWS	U.S. Fish and Wildlife Service
Interior	U.S. Department of the Interior
kW	kilowatt
mg/L	milligrams per liter
msl	mean sea level
MWh	megawatt-hour
National Register	National Register of Historic Places
NERC	North American Electric Reliability Council
New Hampshire DES	New Hampshire Department of Environmental Services
New Hampshire FGD	New Hampshire Fish and Game Department
New Hampshire SHPO	New Hampshire State Historic Preservation Officer
NHPA	National Historic Preservation Act
NHPUC	New Hampshire Public Utilities Commission
NPCC	Northeast Power Coordinating Council
PSNH	Public Service Company of New Hampshire (PSNH)
USDA	U.S. Department of Agriculture
WQC	401 Water Quality Certification

EXECUTIVE SUMMARY

Proposed Action

On December 18, 2015, Public Service Company of New Hampshire (PSNH) filed an application for a new license with the Federal Energy Regulatory Commission (Commission) to continue to operate and maintain the existing Eastman Falls Hydroelectric Project (Eastman Falls Project). The 6.06-megawatt (MW) project is located on the Pemigewasset River, within the town of Franklin, in Merrimack and Belknap Counties, New Hampshire. The project boundary includes approximately 476 acres of federal land managed by the U.S. Army Corps of Engineers as part of the Franklin Falls Flood Control Dam.

Project Description

The Eastman Falls Project consists of: (1) a 341-foot-long, 37-foot-high concrete gravity dam that includes: (i) a 341-foot-wide spillway with a crest elevation of 301 feet above mean sea level (msl); (ii) 6-foot-high steel flashboards with a crest elevation of 307 feet msl; and (iii) a concrete waste gate with a 16-foot-high, 30-foot-wide steel slide gate; (2) a 582-acre impoundment with a normal maximum pool elevation of 307 feet msl; and (3) a 342-foot-long, 8-foot-deep floating louver array extending upstream from the spillway to the reservoir shoreline to guide fish away from the generating facility intakes to a lowered flashboard on the spillway.

The project includes two generating facilities (generating facility Nos. 1 and 2). Generating facility No. 1 includes: (1) a 12.5-foot-high, 15-foot-wide headgate structure with a 23.75-foot-high, 17-foot-wide trashrack with 3.5-inch clear-bar spacing; (2) a 12.5-foot-high, 12.5-foot-wide, 21-foot-long concrete penstock; (3) a 40-foot-high, 20-foot-wide stop log slot; (4) a 29-foot-long, 29-foot-wide, 34-foot-high concrete and masonry powerhouse containing a single 1.8-MW turbine-generator unit; and (5) a 23-foot-wide, 14.5-foot-high, 60-foot-long draft tube.

Generating facility No. 2 includes: (1) an intake structure with a 20-foot-high, 21-foot-wide headgate with two 12.3-foot-wide, 9.3-foot-high trashracks with 3.5-inch clear-bar spacing; (2) a 20.8-foot-high, 22.4-foot-wide stop log slot; (3) an 88-foot-long, 78-foot-wide, 56-foot-high concrete and masonry powerhouse containing a single 4.26-MW turbine-generator unit;[1] and (4) a 23-foot-wide, 14.5-foot-high, 60-foot-long draft tube.

[1] Section 11.1(i) of the Commission's regulations states that the authorized installed capacity is the lesser of the ratings of the generator or turbine units. Generating facility No. 2 contains a 4.26 MW turbine connected to a 4.6 MW generator unit;

Transmission facilities at the project include: (1) two 245-foot-long, 2.4-kilovolt (kV) generator leads that connect the turbine-generator in generating facility No. 1 to a generator bus in generating facility No. 2; (2) four 110-foot-long, 2.4-kV generator leads that connect the turbine-generator in generating facility No. 2 to a generator bus in generating facility No. 2; and (3) a 100-foot-long, 2.4-kV transmission line that connects the generator bus in generating facility No. 2 to the regional grid.

The project operates in a run-of-river mode and generates 27,871 megawatt-hours (MWh) of electricity annually.

No new project construction or capacity is proposed.

Proposed Environmental Measures

PSNH proposes the following measures to protect or enhance environmental resources.

- Continue to operate the project in a run-of-river mode and ensure that impoundment water level fluctuations do not exceed ± 0.2 feet from the normal impoundment elevation of 307 feet msl with flashboards installed;[2]
- Implement an operation compliance monitoring and maintenance plan (OMCP) to monitor impoundment level, flow releases, and impoundment refill procedures;[3]
- Maintain downstream flows of 502 cubic feet per second (equal to the aquatic base flow; ABF), or 90 percent of inflow to the impoundment (whichever is less) to protect downstream aquatic habitat when refilling the impoundment after drawdowns for maintenance or emergencies; and
- Implement an invasive species management and monitoring plan (ISMMP) to monitor the spread of invasive species within the project boundary and implement control measures, if necessary.[4]

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therefore, the installed capacity of generating facility No. 2 is 4.26 MW.

[2] PSNH also proposes to discontinue maintaining a year-round minimum flow of 410 cubic feet per second (cfs), or inflow (whichever is less), downstream of the project because it would serve no purpose at a run-of-river project with no bypassed reach. The 410-cfs minimum flow is a requirement of the current license that allows PSNH to operate the project in storage-and-release mode.

[3] PSNH included a draft OMCP in Appendix B of its application.

Public Involvement and Areas of Concern

Before filing the license application, the applicant conducted pre-filing consultation in accordance with the Commission's Integrated Licensing Process. The intent of the Commission's pre-filing process is to initiate public involvement early in the project planning process and to encourage citizens, governmental entities, tribes, and other interested parties to identify and resolve issues prior to an application being formally filed with the Commission.

On April 26, 2016, the Commission issued a public notice accepting the application and soliciting motions to intervene and protests, stating that the application is ready for environmental analysis, and requesting comments, terms and conditions, recommendations, and prescriptions.

The primary issues associated with licensing the proposed project are the effects of project operation on aquatic resources.

Alternatives Considered

This environmental assessment (EA) considers the following alternatives: (1) the applicant's proposal, as outlined above; (2) a staff alternative that includes all of PSNH's proposed measures, the measures included in the U.S. Department of the Interior's (Interior) section 18 preliminary fishway prescriptions, and all but three of Interior's section 10(j) recommendation (a post-license issuance water quality survey, an impoundment refill procedure whereby 90 percent of inflow would be release downstream and 10 percent would be used to refill the impoundment, and consultation if the project would affect northern long-eared bat habitat); and (3) no action, meaning that the project would continue to operate, and environmental conditions at the project site would remain the same.

The staff alternative for the project includes all of the measures proposed by PSNH and six additional measures: (1) develop a plan to install up to three upstream fishways for American eel that would be operated from May 1 to October 30 (section 18); (2) develop a plan to implement downstream passage (interim measures would be implement initially and eventually be replaced by permanent measures) for American eel that would be operated from August 15 to November 15 of each year (section 18); (3) develop and implement a fishway operation and maintenance plan (FOMP), including procedures for managing debris collected at or near fish passage facilities (section 18); (4) develop and implement a fishway effectiveness monitoring plan (section 18); (5)

[4] PSNH included a draft ISMMP in Appendix C of its application.

notify the Commission and the New Hampshire State Historic Preservation Officer (SHPO) prior to implementing any maintenance activities, land-clearing or land-disturbing activities, or changes to project operation or facilities; and (6) consult with the New Hampshire SHPO if previously unidentified cultural resources are discovered during the course of constructing, maintaining, or operating the project works or other facilities.

Below we briefly discuss the anticipated environmental effects of issuing a new license for the proposed project under the staff alternative.

Staff Alternative

Aquatic Resources – Continuing to operate the project in a run-of-river mode, maintaining a normal impoundment elevation of 307 feet msl, and implementing the proposed impoundment refill procedure would protect aquatic habitat in the impoundment and in the Pemigewasset River downstream of the project. The proposed operation compliance monitoring plan would facilitate documentation of compliance with run-of-river operation, impoundment level requirements, and impoundment refill procedures. Constructing, operating, and maintaining upstream eel ladders would increase upstream passage efficiency for juvenile American eels. Implementing downstream American eel passage measures would ensure that eels upstream of the project, including those passed by the upstream eel ladders, would have a safe downstream passage route when mature and ready to return to the ocean to spawn. Developing a FOMP and a fishway effectiveness monitoring plan in consultation with Interior would ensure that the upstream and downstream passage measures are working as. Including debris management procedures in the FOMP would ensure that beneficial organic debris is passed downstream of the project dam and inorganic debris (trash) is properly disposed.

Terrestrial Resources – Operating the project in a run-of-river mode and maintaining a normal impoundment elevation of 307 feet msl would minimize impoundment fluctuations and maintain adequate flows downstream of the dam which would protect shoreline and riparian habitat in the impoundment and Pemigewasset River downstream of the project. Implementing an ISMMP would establish procedures to identify and limit the introduction and/or spread of invasive plants.

Threatened and Endangered Species – The federally threatened northern long-eared bat (*Myotis septentrionalis*) could occur in Belknap or Merrimack Counties; however, this species has not been documented in the project area, and no critical habitat has been identified in the project area.[5] Because this species is not known to inhabit the

[5] http://ecos.fws.gov/ipac

project area and operation and maintenance of the project would not substantially alter any potential bat habitat (i.e., no trees would be removed), relicensing the project as recommended by staff would have no effect on the northern long-eared bat.

Recreation and Aesthetic Resources – Operating the project in a run-of-river mode and maintaining a normal impoundment level of 307 feet msl would continue to provide boating and angling opportunities in the impoundment and along the Pemigewasset River downstream of the project.

Cultural Resources – Continued operation and maintenance of the project would not alter the historic character of the existing structures and would not disturb any known cultural resources.

Consulting with the New Hampshire SHPO prior to implementing any maintenance activities, land-clearing or land-disturbing activities, or changes to project operation or facilities that could affect cultural resources but does not require Commission approval would ensure protection of cultural resources at the project. Consulting with the New Hampshire SHPO if previously unidentified cultural resources are discovered during the course of constructing, maintaining, or operating the project works or other facilities would ensure proper treatment of those resources.

No Action Alternative

Under the no-action alternative, the project would continue to operate and environmental conditions at the project site would remain the same.

Conclusion

Based on our analysis, we recommend licensing the project with all of PSNH's proposed measures, all but three section 10(j) recommendations provided by Interior, and all of the preliminary section 18 fishway prescriptions filed by Interior. Staff does not recommend the post-license water quality survey recommended by Interior and supported by New Hampshire FGD because a study conducted by the Corps in 2009 demonstrates that project operation does not adversely affect dissolved oxygen (DO) or water temperature in the project area. Staff recommends PSNH's impoundment refill procedure instead of the refill procedure recommended by Interior because PSNH's proposal would provide the same protection of aquatic habitat at the project while allowing PSNH to refill the impoundment quicker and generate more electricity. Staff does not recommend adopting Interior's recommendation for ESA consultation on northern long-eared bat because staff determined that relicensing the project would have no effect on the northern long-eared bat and no further consultation is necessary under section 7 of the ESA.

In section 4.2 of the EA, we estimate the likely cost of alternative power for each of the four alternatives identified above. Our analysis shows that during the first year of operation under the proposed action alternative, project power would cost $264,961 or $9.51 per MWh less than the likely alternative cost of power. Under the staff alternative and staff alternative with mandatory conditions, project power would cost $255,678 or $9.17 per MWh less than the likely alternative cost of power. Under the no-action alternative, project power would cost $267,314 or $9.59 per MWh less than the likely alternative cost of power.

We chose the staff alternative as the preferred alternative because: (1) the project would provide a dependable source of electrical energy for the region (27,871 MWh annually); (2) the 6.06 MW of electric capacity would come from a renewable resource that does not contribute to atmospheric pollution, including greenhouse gases; and (3) the recommended environmental measures proposed by the applicant, as modified by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

We conclude that issuing a new license for the project, with the environmental measures we recommend, would not be a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, D.C.

EASTMAN FALLS HYDROELECTRIC PROJECT
Project No. 2457-041 – New Hampshire

1.0 INTRODUCTION

1.1 APPLICATION

On December 18, 2015, Public Service Company of New Hampshire (PSNH or applicant) filed an application with the Federal Energy Regulatory Commission (Commission) for a new license for the existing Eastman Falls Hydroelectric Project (Eastman Falls Project). The 6.06-megawatt (MW) project is located at an existing dam on the Pemigewasset River within the town of Franklin, in Merrimack and Belknap Counties, New Hampshire (figures 1 and 2). The project occupies approximately 476 acres of federal land managed by the U.S. Army Corps of Engineers (Corps) as part of the Franklin Falls Flood Control Dam.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

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

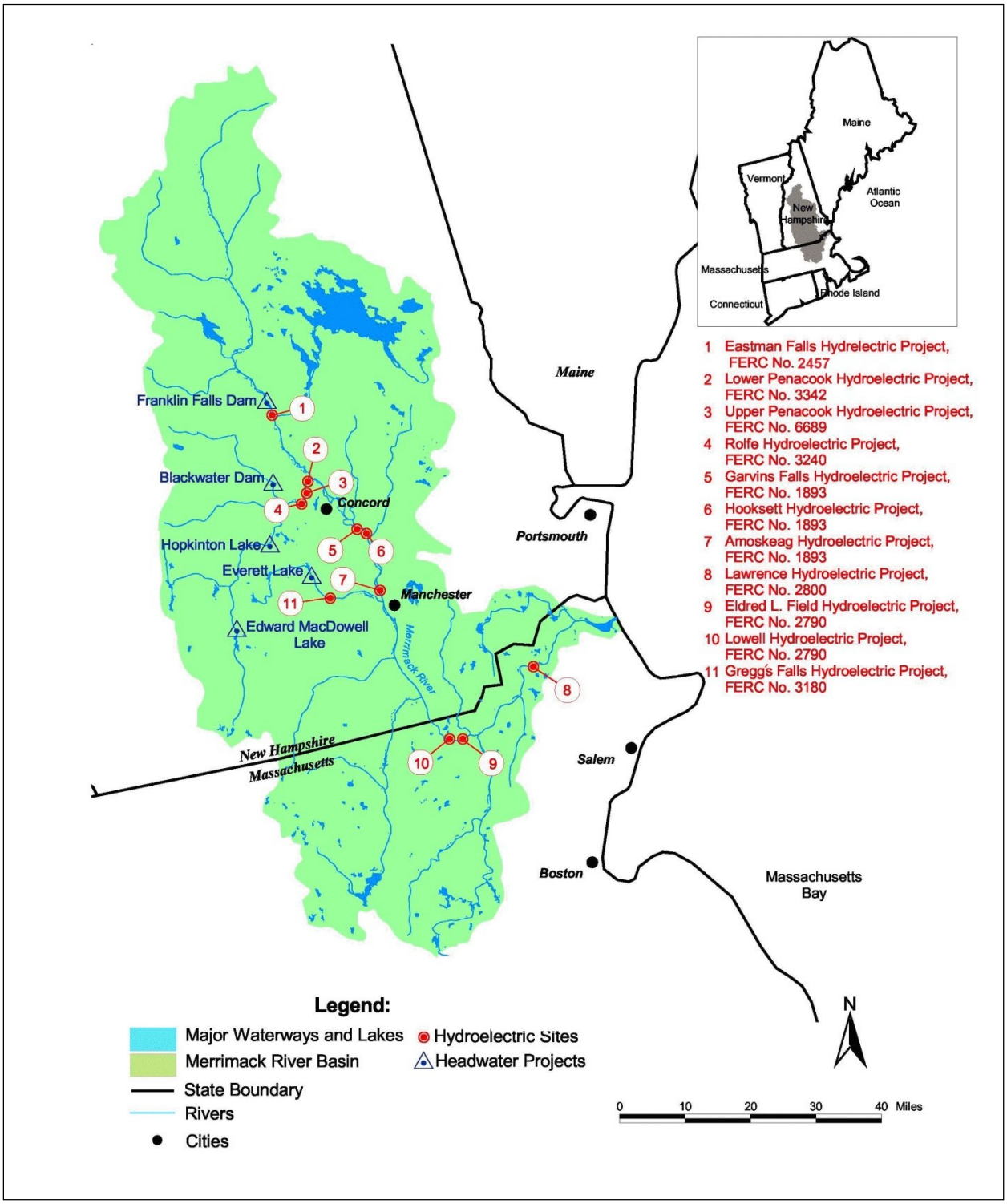

Figure 1. Map of Commission licensed projects located in the Merrimack River Basin. Source: U.S. Army Corps of Engineers, as modified by staff.

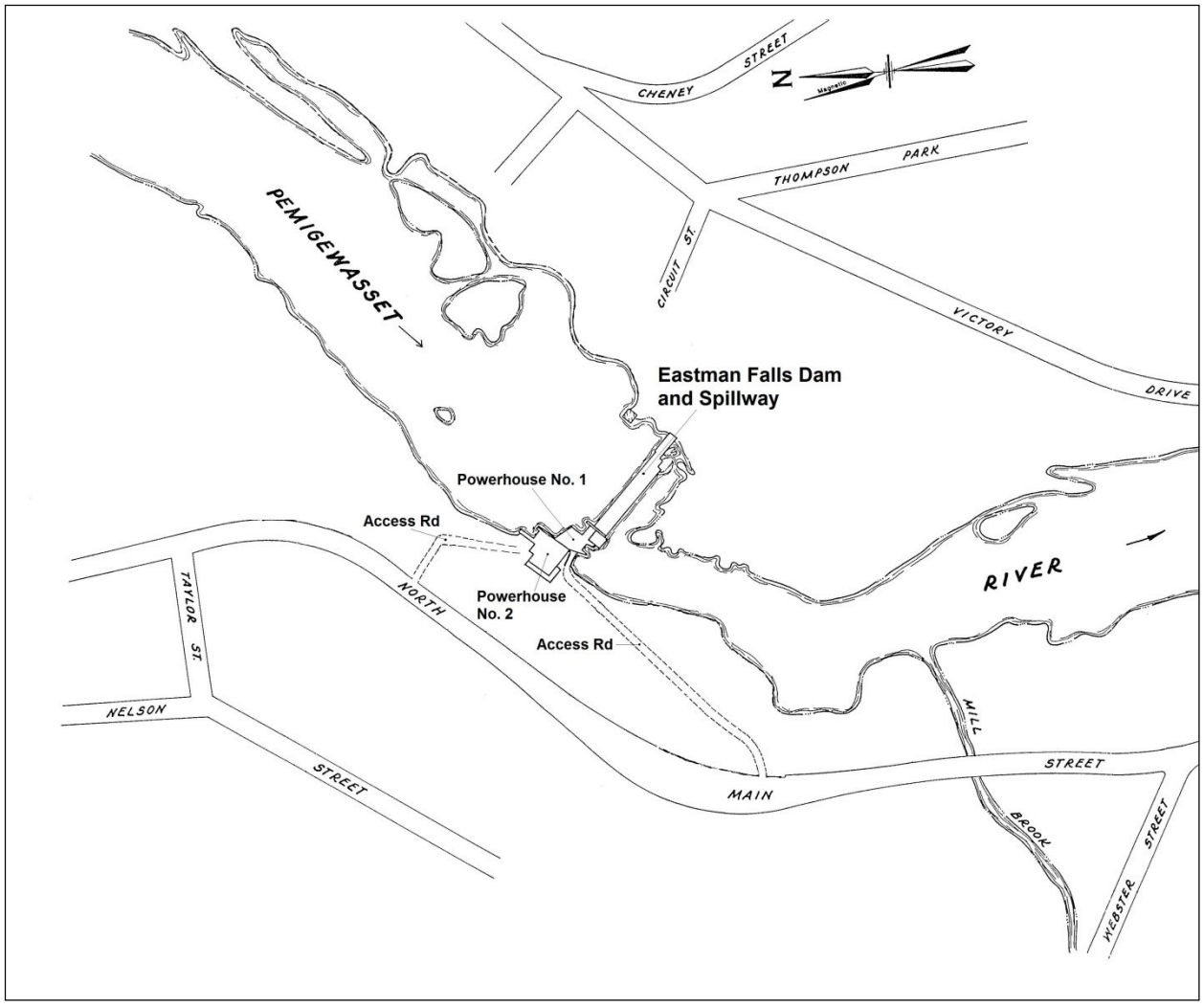

Figure 2. Existing Eastman Falls Project site plan. Source: the applicant, as modified by staff.

Issuing a license for the Eastman Falls Project would allow PSNH to generate electricity at the project for the term of the license, making electric power from a renewable resource available to the regional grid.

This environmental assessment (EA) assesses the effects associated with operation of the project, alternatives to the project, and makes recommendations to the Commission on whether to issue a license, and if so, recommends terms and conditions to become a part of any license issued.

In this EA, we assess the environmental and economic effects of operating and maintaining the project: (1) as proposed by the applicant; and (2) the applicant's proposal including the section 18 preliminary fishway prescriptions and section 10(j) recommendations. We also considered the effects of the no-action alternative. Important issues that are addressed include effects of operation of the proposed project on aquatic resources.

1.2.2 Need for Power

The Eastman Falls Project provides hydroelectric generation to meet part of PSNH's retail electric distribution customer needs. The project has an installed capacity of 6.06 MW and generates approximately 27,871 megawatt-hours (MWh) per year.

The North American Electric Reliability Corporation (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The existing Eastman Falls Project is located in the Northeast Power Coordinating Council (NPCC) New England region of the NERC. According to NERC's 2015 forecast (NERC, 2015), summer peak demand in the NPCC New England region is projected to grow at an annual rate of 0.48 percent from 2016 through 2025.

We conclude that power from the Eastman Falls Project would help meet a need for power in the NPCC New England region in both the short- and long-term. The project provides power that displaces generation from non-renewable sources. Displacing the operation of non-renewable facilities may avoid some power plant emissions, thus creating an environmental benefit.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

A license for the Eastman Falls Project would be subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described below.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of Commerce or Interior. On June 22, 2016, Interior filed timely preliminary fishway prescriptions and a request that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project. The preliminary prescriptions are described under section 2.2.4, *Mandatory Conditions*.

1.3.1.2 Section 10(j) Recommendations

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

On June 22, 2016, Interior filed timely recommendations under section 10(j), as summarized in table 5, Section 5.3, *Recommendations of Fish and Wildlife Agencies*. In Section 5.3, we also discuss how we address the agency recommendations and comply with section 10(j). Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in the specific resource sections of this document. Table 5 indicates the basis for our preliminary determinations concerning measures that we consider inconsistent with section 10(j).

In addition to the filed 10(j) recommendations, Interior, under section 10(a), recommended that the applicant serve all license amendment applications on Interior.

1.3.2 Clean Water Act

Under section 401 of the CWA, a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. On December 18, 2016, PSNH applied to New Hampshire DES for 401 water quality certification for the Eastman Falls Project. New Hampshire DES received this request on

December 21, 2015. The New Hampshire DES has not yet acted on the application for water quality certification.

1.3.3 Endangered Species Act

Section 7 of the ESA requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. One federally listed species, the northern long-eared bat (threatened) could occur in Belknap or Merrimack Counties. Although this species has not been documented within the project area, Interior states that suitable habitat exists within and adjacent to the project area in its June 22, 2016 letter. Because the project would not substantially alter the existing environment (i.e., no trees would be removed), relicensing the project as recommended by staff would have no effect on the northern long-eared bat.

1.3.4 Coastal Zone Management Act

The CZMA of 1972, as amended, requires review of the proposed project's consistency with a state's Coastal Management Program for projects within or that would affect the coastal zone. Under section 307(c)(3)(A) of the CZMA, 16 U.S.C. §1456(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state's CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA Program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

By letter dated November 5, 2015, New Hampshire DES stated that the project is not located within the state-designated coastal zone and the project would not affect New Hampshire's coastal resources. Therefore, the project is not subject to New Hampshire coastal management program review and no consistency certification is needed for the action.

1.3.5 National Historic Preservation Act

Section 106 of the NHPA requires that federal agencies "take into account" how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

In a letter dated May 8, 2012,[6] the New Hampshire SHPO made a determination of "no potential to cause effects" on historic, architectural, or archaeological resources within the projects area of potential effects (APE). Our analysis in section 3.3.5 of this EA concludes that each of the relicensing alternatives considered in this EA have no potential to cause effects on cultural resources.

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 C.F.R. § 5.1 to 5.16) require that applicants consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, ESA, NHPA, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

Relicensing of the Eastman Falls Project was formally initiated July 2, 2012, when PSNH filed with the Commission a Pre-Application Document (PAD) and a Notice of Intent (NOI) to license the Eastman Falls Project using the Integrated Licensing Process (ILP). The Commission issued a Notice of Commencement of Proceeding on August 31, 2012.

1.4.1 Scoping

During the pre-filing consultation process, scoping meetings were held to determine what issues and alternatives should be addressed in the EA. Scoping Document 1 (SD1) was issued on August 31, 2012. Scoping meetings were held in Franklin, New Hampshire on September 19, 2012, to request comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the Commission's public record for the project. An environmental site review was held September 18, 2012.

In addition to comments provided at the scoping meetings, the following entities provided written comments pertaining to SD1, the PAD, and additional study needs:

Commenting Entity	Date Filed
PSNH	October 22, 2012
New Hampshire DES	October 29, 2012
Interior	October 31, 2012

[6] Filed on December 18, 2015, as part of PSNH's license application.

1.4.2 Interventions

On April 26, 2016, the Commission issued a notice accepting the application and setting June 25, 2016, as the deadline for filing protests and motions to intervene. Interior filed a notice of intervention on June 13, 2016, and the Upper Merrimack River Local Advisory Committee filed a motion to intervene on June 21, 2016.

1.4.3 Comments on the Application

A notice requesting conditions and recommendations was issued on April 26, 2016. The following entities commented:

Commenting agencies and other entities	Date filed
Interior	June 22, 2016
New Hampshire Fish and Game Department	June 28, 2016

The applicant filed reply comments on August 2, 2016.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate and environmental conditions at the project site would remain the same.

2.1.1 Existing Project Facilities

The project consists of: (1) a 341-foot-long, 37-foot-high concrete gravity dam that includes: (i) a 341-foot-wide spillway with a crest elevation of 301 feet above mean sea level (msl); (ii) 6-foot-high steel flashboards with a crest elevation of 307 feet msl; and (iii) a concrete waste gate with a 16-foot-high, 30-foot-wide steel slide gate; (2) a 582-acre impoundment with a normal maximum pool elevation of 307 feet msl; and (3) a 342-foot-long, 8-foot-deep floating louver array extending upstream from the spillway to the reservoir shoreline to guide fish away from the generating facility intakes to a lowered flashboard on the spillway.

The project includes two generating facilities (generating facility Nos. 1 and 2). Generating facility No. 1 includes: (1) a 12.5-foot-high, 15-foot-wide headgate structure with a 23.75-foot-high, 17-foot-wide trashrack with 3.5-inch clear-bar spacing; (2) a

12.5-foot-high, 12.5-foot-wide, 21-foot-long concrete penstock; (3) a 40-foot-high, 20-foot-wide stop log slot; (4) a 29-foot-long, 29-foot-wide, 34-foot-high concrete and masonry powerhouse containing a single 1.8-MW turbine-generator unit; and (5) a 23-foot-wide, 14.5-foot-high, 60-foot-long draft tube.

Generating facility No. 2 includes: (1) an intake structure with a 20-foot-high, 21-foot-wide headgate with two 12.3-foot-wide, 9.3-foot-high trashracks with 3.5-inch clear-bar spacing; (2) a 20.8-foot-high, 22.4-foot-wide stop log slot; (3) an 88-foot-long, 78-foot-wide, 56-foot-high concrete and masonry powerhouse containing a single 4.26-MW turbine-generator unit;[7] and (4) a 23-foot-wide, 14.5-foot-high, 60-foot-long draft tube.

Transmission facilities at the project include: (1) two 245-foot-long, 2.4-kilovolt (kV) generator leads that connect the turbine-generator in generating facility No. 1 to a generator bus in generating facility No. 2; (2) four 110-foot-long, 2.4-kV generator leads that connect the turbine-generator in generating facility No. 2 to a generator bus in generating facility No. 2; and (3) a 100-foot-long, 2.4-kV transmission line that connects the generator bus in generating facility No. 2 to the regional grid.

The Eastman Falls Project has a total installed capacity of 6.06 MW and generates 27,871 megawatt-hours (MWh) of electricity annually.

2.1.2 Project Safety

As part of the licensing process, the Commission would review the adequacy of the project facilities. Special articles would be included in any license issued, as appropriate. Operational inspection would focus on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with terms of the license, and proper maintenance. In addition, any license issued would require an inspection and evaluation every 5 years by an independent consultant and submittal of the consultant's safety report for Commission review.

2.1.3 Existing Project Operation

PSNH currently operates the project in a run-of-river mode, where outflow from the project equals inflow at all times and water levels in the impoundment are not drawn

[7] Section 11.1(i) of the Commission's regulations states that the authorized installed capacity is the lesser of the ratings of the generator or turbine units. Generating facility No. 2 contains a 4.26 MW turbine connected to a 4.6 MW generator unit; therefore, the installed capacity of generating facility No. 2 is 4.26 MW.

down for power generation. The normal elevation of the impoundment is 307 feet msl. PSNH releases a year-round minimum flow of 410 cubic feet per second (cfs) or inflow (whichever is less) through generating facility No. 1.

PSNH indicates that the project is operated remotely from its electrical system control center located in Manchester, New Hampshire. PSNH states that a transducer is used to measure impoundment water levels and the data is sent to a programmable logic controller that automatically adjusts turbine gate settings maintain stable impoundment levels. The project uses flows between 250 cfs (the minimum hydraulic capacity of generating facility No. 1) and 2,780 cfs (the maximum hydraulic capacity of generating facilities No. 1 and 2) to generate electricity. At flows less than 250 cfs, the project does not operate and all flow is either released through the waste gate or spilled over the dam. At inflows between 250 and 700 cfs, generating facility No. 1 operates and generating facility No. 2 is idle. At inflows between 700 and 1,830 cfs, generating facility No. 2 operates and generating facility No. 1 is idle. At inflows between 1,830 cfs and 2,780 cfs, both generating facilities operate. When inflow exceeds 2,780 cfs, both generating facilities operate at maximum capacity and excess flow is spilled over the flashboards or passed through the waste gate.

2.2 APPLICANT'S PROPOSAL

2.2.1 Proposed Project Facilities

None.

2.2.2 Proposed Project Operation

PSNH proposes to continue to operate the project in an instantaneous run-of-river mode where outflow from the project would equal inflow at all times and water levels in the impoundment would not be drawn down for power generation. [8] PSNH would limit fluctuations within ± 0.2 feet from the normal impoundment elevation of 307 feet with flashboards. PSNH indicates that impoundment water level control would continue to be maintained by the programmable logic controller.

[8] PSNH also proposes to discontinue maintaining a year-round minimum flow of 410 cubic feet per second (cfs), or inflow (whichever is less) downstream of the project because it would serve no purpose at a run-of-river project with no bypassed reach. The 410-cfs minimum flow is a requirement of the current license that allows PSNH to operate the project in storage-and-release mode.

The project would continue to use flows between 250 cfs (the minimum hydraulic capacity of the project) and 2,780 cfs (the maximum hydraulic capacity of the project) to generate electricity. The project would continue to generate approximately 27,871 MWh annually.

2.2.3 Proposed Environmental Measures

In addition to the proposed run-of-river operation and elimination of the 410 cfs minimum flow, PSHN proposes the following measures:

- Implement an operation compliance monitoring and maintenance plan (OMCP) to monitor impoundment level, flow releases, and impoundment refill procedures;

- Maintain downstream flows of 502 cfs (equal to the aquatic base flow; ABF), or 90 percent of inflow to the impoundment (whichever is less) to protect downstream aquatic habitat when refilling the impoundment after drawdowns for maintenance or emergencies;

- Implement an invasive species management and monitoring plan (ISMMP) to monitor the spread of invasive species within the project boundary and implement control measures, if necessary.

2.2.4 Mandatory Conditions

Section 18 Prescriptions

Interior's preliminary section 18 prescription would require PSNH to: (1) develop a plan to install up to three upstream fishways for American eel that would be operated from May 1 to October 30 (the number and location of these fishways would be determined by two seasons of monitoring); (2) develop a plan to implement downstream passage measures for American eel from August 15 to November 15 of each year (interim measures would be implemented starting in the second year of the license and permanent measures would be implemented starting in the eighth year after eels are documented using the upstream eel passage facilities); (3) develop and implement a fishway operation and maintenance plan; and (4) develop and implement a fishway effectiveness monitoring plan.

Interior also requests that any license issued for the project include a reservation of authority to prescribe fishways under section 18 of the FPA.

2.3 STAFF ALTERNATIVE

2.3.1 Project Operation

Under the staff alternative, the project would continue to operate in run-of-river mode as proposed by PSNH and it would continue to generate approximately 27,871 MWh annually.

2.3.2 Modification to Measures

Under the staff alternative, the project would include all of PSNH's proposed measures, all of Interior's section 18 preliminary fishway prescriptions, all but three of Interior's section 10(j) recommendations (a post-license issuance water quality survey, an impoundment refill procedure whereby 90 percent of inflow would be release downstream and 10 percent would be used to refill the impoundment, and consultation if the project would affect northern long-eared bat habitat), and two additional staff modifications: :

- notify the Commission and the New Hampshire State Historic Preservation Officer (SHPO) prior to implementing any maintenance activities, land-clearing or land-disturbing activities, or changes to project operation or facilities; and

- consult with the New Hampshire SHPO if previously unidentified cultural resources are discovered during the course of constructing, maintaining, or operating the project works or other facilities.

2.5 ALTERNATIVE CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

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

2.5.1 Issuing a Non-power License

A non-power license is a temporary license that the Commission will terminate when it determines that another government agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this point, no agency has suggested a willingness or ability to do so. No party has sought a non-power license and we have no basis for concluding that the project should no longer be

used to produce power. Thus, we do not consider issuing a non-power license a realistic alternative to relicensing in this circumstance.

2.5.2 Federal Government Takeover

We do not consider federal takeover to be a reasonable alternative. Federal takeover and operation of the project would require Congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence to indicate federal takeover should be recommended by Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

2.5.3 Retiring the Project

Project retirement could be accomplished with or without dam removal. Either alternative would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions.

No participant has suggested that dam removal would be appropriate in this case, and we have no basis for recommending it. The power generated by the Eastman Falls Project is an important resource, and is relied upon to provide clean, renewable energy. This source of power would be lost if the project were retired, and replacement power would need to be found. There also would be significant costs associated with retiring the project's powerhouse and appurtenant facilities. In addition, the impoundment serves as an important recreational resource in the area. Thus, dam removal is not a reasonable alternative to relicensing the project with appropriate protection, mitigation and enhancement measures.

The second project retirement alternative would involve retaining the dam and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require us to identify another government agency with authority to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, and no participant has advocated this alternative. Nor have we any basis for recommending it. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we don't consider removal of electric generating equipment to be a reasonable alternative.

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the

proposed action and other recommended environmental measures. Sections are organized by resource area (aquatic, recreation, etc.). Under each resource area, historic and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.1, *Comprehensive Development and Recommended Alternative* of the EA.[9]

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The project is located on the Pemigewasset River in Merrimack and Belknap Counties, New Hampshire. The Pemigewasset River basin has a total drainage area of about 1,021 square miles (1,003 at the project dam). From the project area, the Pemigewasset River flows about 1 mile before joining the Winnipesaukee to form the Merrimack River in New Hampshire. From the confluence of the Winnipesaukee and the Pemigewasset rivers, the Merrimack River flows southeasterly for 116 miles into the Atlantic Ocean. Land use in the project area primarily consists of residential use and the remaining land consists of commercial, transportation, industrial, and other urban uses.

There are three existing licensed hydropower projects (totaling five dams) located on the mainstem of the Merrimack River between the Eastman Falls Project and the Atlantic Ocean (figure 1). From downstream to upstream they are the Lawrence Project No. 2800, the Lowell Project No. 2790 (includes two dams), and the Merrimack Project No. 1893 (includes three dams).

3.2 SCOPE OF CUMULATIVE EFFECTS ANAYLSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 C.F.R. § 1508.7), cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

[9] Unless otherwise indicated, our information is taken from the application for license filed by PSNH on January 17, 2013 and the responses to deficiencies and requests for additional information PSNH filed on March 14, 2013.

Through agency consultation and our independent analysis, we have identified American eel as a resource that would be cumulatively affected by construction and operation of the Eastman Falls Project.

3.2.1 Geographic Scope

The geographic scope of the cumulative analysis defines the physical limits or boundaries of the proposed action's effects on the resources. Because the proposed action would affect the resources differently, the geographic scope for each resource may vary.

In addition to the Eastman Falls dam on the Pemigewasset River and the five dams on the mainstem of the Merrimack River, the Ayers Island dam, which is 14 miles upstream from Eastman Falls dam, has the potential to cumulatively affect American eel. In Section 3.3.2 of this EA, *Aquatic Resources*, we discuss the site-specific as well as the cumulative effects of licensing the Eastman Falls Hydro Project on American eel.

3.2.2 Temporal Scope

The temporal scope of analysis includes a discussion of the past, present, and reasonably foreseeable future actions and their effects on American eel. Based on the term of the proposed license, we will look 30 to 50 years into the future, concentrating on the effects on American eel from reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

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

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. Based on this, we have determined that aquatic, terrestrial, threatened and endangered species, land use, recreation, and cultural resources may be affected by the proposed action and action alternatives. We have not identified any substantive issues related to geology and soils or socioeconomics; therefore, these resources are not assessed in the EA. We present our recommendations in Section 5.1, *Comprehensive Development and Recommended Alternative* section.

3.3.1 Aquatic Resources

Affected Environment

Water Quantity

The Pemigewasset River at the project dam has a drainage area of about 1,003 square miles. The project impoundment is 582 acres with an average depth of about 8 feet. The river generally exhibits highest flows during May and lowest flows during October (table 1). Based on 77 years of flow records at the U.S. Geological Survey gages no. 01081500 and 01011000, located on the Merrimack River at Franklin Junction and the Winnipesaukee River at Tilton, respectively, the mean annual flow of the Pemigewasset River near the project site is 2,130 cfs; however, as table 1 shows, the recent 10-year average is less than half of the 77-year average. The highest flow recorded is 51,576 cfs and the lowest flow recorded is 120 cfs.

Table 1. Mean monthly flows in cfs at the Eastman Falls Project from 2005 to 2014. (Source: PSNH)

Time period	Mean flow (cfs)
January	1,200
February	1,152
March	894
April	1,093
May	1,445
June	1,154
July	1,049
August	774
September	687
October	650
November	689
December	1,111
Annual	987

Water Quality

The Pemigewasset River at the project site is designated as Class B. The New Hampshire numeric standard for DO in Class B waters is a daily average of 75 percent saturation and an instantaneous minimum of 5.0 milligrams per liter (mg/L) at all times. Water temperature is not to exhibit an increase that would appreciably interfere with designated uses. A study conducted by the Corps during a period of low flows in July through September, 2009 (Corps 2012) showed that DO both upstream and downstream

of the dam was never below 7 mg/L or less than 80 percent saturation during the study period. Water temperatures were essentially the same upstream and downstream of the dam.

Fishery Resources

The resident fish community in the project vicinity of the Pemigewasset River consists of stocked rainbow, brook, and brown trout, as well as smallmouth bass, largemouth bass, chain pickerel, pumpkinseed, redbreast sunfish, walleye, white perch, and yellow perch. Other less recreationally important species that occur in the area include white sucker, fallfish, rock bass, golden shiner, common shiner, slimy sculpin, margined madtom, yellow bullhead, and brown bullhead. Three tributaries of the Eastman Falls impoundment were sampled by New Hampshire FGD in 2005 and additional species were collected, specifically: blacknose dace, longnose dace, burbot, creek chub, and longnose sucker.

There are currently no anadromous fish present in the Pemigewasset River. Historically, the restoration program for Atlantic salmon within the Merrimack River Basin resulted in annual stockings of salmon broodstock and fry in the Pemigewasset River, upstream of the Eastman Falls dam. To improve downstream salmon passage survival, the project includes a floating louver array in the forebay, which extends 8 feet below the surface of the water and was used to guide salmon adults and smolts to a safe downstream passage route through a lowered flashboard along the spillway. The Merrimack River salmon restoration program was discontinued in 2013 and both New Hampshire FGD and Interior consulted with PSNH to determine that operating the downstream fish passage facilities at the Eastman Falls Project was not necessary beyond the fall of 2014.

Efforts to restore American shad, blueback herring, and alewives in the Merrimack River Basin are ongoing. Since 1969, the technical and policy committees for the Anadromous Fishery Management of the Merrimack River (a cooperative entity that includes Interior and New Hampshire FGD) have made fish passage recommendations throughout the Merrimack River Basin. However, the ineffectiveness of the existing upstream fishway at Essex dam (in the lower river), and the lack of fishways at Hooksett and Garvins Falls dams (located in the middle reach of the Merrimack River), have prevented these species from migrating upstream to the Eastman Falls dam.

American eel, another species with restoration and management plans throughout the East Coast (ASMFC 2000), including New England, occur in very low numbers in the Pemigewasset, but are known to exist both upstream and downstream of the Eastman Falls dam (Technical Committee 2013). PSNH reports that eels have been documented in “limited numbers” in Squam Lake which is upstream of the Eastman Falls Project.

Both New Hampshire FGD and Interior have collected adult yellow American eels during electrofishing surveys downstream of the project dam. The total number of American eels collected downstream of the project dam was 5 individuals. On the Merrimack River, all of the dams have upstream eel passage and upstream passage of eels has been documented at each dam. Garvins Falls (the first dam downstream of Eastman Falls dam), passed 514 juvenile eels upstream in 2014 and 439 juveniles in 2015.

PSNH conducted a mussel survey in August 2013, and documented the presence of five mussel species in the Pemigewasset River downstream of Eastman Falls dam: eastern elliptio, brook floater, triangle floater, eastern lampmussel, and eastern floater. A total of 2,610 mussels were counted during the survey. Eastern elliptio was the dominant species, accounting for 92 percent of the mussels counted.

Environmental Effects

Mode of Operation

PSNH proposes to continue to operate the project in an instantaneous run-of-river mode, with inflow equaling outflow on an instantaneous basis, resulting in a stable impoundment water level. The impoundment elevation would be maintained at 307 feet msl. PSNH also proposes to discontinue releasing a minimum of 410 cfs, or inflow if less, at all times, which is required in the current license. PSNH says this is no longer relevant because the project, although authorized to store and release water, has been voluntarily operating in run-of-river mode for 10 years.

Interior recommends (10(j) recommendation 1) that PSNH operate the proposed project in an instantaneous run-of-river mode. Interior's recommendation states that this operating regime may be modified due to operating emergencies beyond the control of the licensee, and for short periods upon the mutual agreement between the licensee, Interior, and New Hampshire DES. Interior's 10(j) recommendation 2 would require that PSNH maintain the impoundment at an elevation of 307 feet msl ($\pm$0.2 feet). New Hampshire FGD supports Interior's recommendations 1 and 2.

Staff Analysis

Operating the project in an instantaneous run-of-river mode would maintain the impoundment at its current elevation of 307 feet msl and there would not be any impoundment fluctuations due to project operation. Further, there would be no change in the amount, schedule, and duration of flow released to the Pemigewasset River downstream of the tailrace. If the project is operated in a run-of-river mode, then the existing minimum flow of 410 cfs would serve no purpose because outflow would equal inflow at all times (i.e., when inflow exceeds 410 cfs during run-of-river operation,

outflow would exceed 410 cfs and when inflow is less than 410 cfs, outflow would equal inflow).[10]

Operating the project in a run-of-river mode would also minimize the time water is retained behind the dam and would help avoid increasing the water temperatures of the upper levels of the impoundment from solar heating. Also, because there would be no fluctuations, there would not be any effects on the reproduction of fish species that spawn in near-shore areas (Sammons and Bettoli 2000). By operating the project in a run-of-river mode, habitat in the project impoundment and habitat in the Pemigewasset River downstream of the tailrace would be unchanged compared to current conditions. Aquatic organisms, including fish and benthic macroinvertebrates, such as the brook floater mussel, would be unaffected by the proposed mode of operation.

Impoundment Refill Procedures

Periodically, the project impoundment is drawn down when flashboards are lowered during high flows, for maintenance, or for emergencies. During these times, run-of-river operation would be temporarily interrupted.

To maintain downstream flows, Interior recommends (10(j) recommendation 4) that the applicant implement an impoundment refill procedure whereby 90 percent of project inflow would be passed downstream and 10 percent would be used to refill the impoundment. New Hampshire FGD supports Interior's recommendation.

PSNH did not propose any impoundment refill procedure in its application, but in comments filed on August 2, 2016, in response to Interior's 10(j) recommendations, it stated that at some of its other projects, the amount of flow released during impoundment refill periods is equal to the aquatic base flow (ABF), which is calculated as 0.5 cfs per square mile of drainage area. In this case, that would be a flow of 502 cfs because the drainage area is 1,003 square miles. PSNH proposes to release 502 cfs during impoundment refill, unless inflow is less, in which case it would release 90 percent of inflow.

Staff Analysis

The procedures for refilling an impoundment result in a trade-off between effects on the aquatic habitat in the impoundment and aquatic habitat downstream of the dam. During most of the year, drawdowns would probably have minimal effects on aquatic

[10] There is no bypassed reach at the project; therefore, a minimum flow is not needed to protect bypassed reach habitat.

habitat and organisms in the impoundment. However, drawdowns can dewater some shallow water fish nests if they occur during the late spring or early summer spawning season for species such as smallmouth bass or sunfish. Reducing downstream flows to refill the impoundment would have the greatest adverse effect during hot summer conditions, when high water temperatures can exacerbate the effects of reduced wetted area, which could lead to additional stress or mortality for aquatic macroinvertebrates and fish.

Interior's recommended procedure for releasing 90 percent of the project inflow during impoundment refilling would ensure that flows downstream of the tailrace are near natural flow levels and that aquatic habitat downstream would quickly be returned to normal conditions. During refill of the impoundment, flow downstream of the dam would be reduced by 10 percent and the Pemigewasset River when compared to inflow to the impoundment. Short-term 10 percent reductions in downstream flows would be comparable to or even less significant than natural fluctuations in streamflow that occur throughout the year as a result of changing hydrologic conditions. Aquatic organisms such as fish and benthic invertebrates are adapted to changing streamflow conditions and would be unaffected by a temporary, 10-percent reduction in river flow. In the impoundment, the shoreline dewatered during the drawdown would gradually be submerged again by retaining 10 percent of the inflow to the impoundment. If inflow is 650 cfs (the lowest mean monthly flow, October), for example, then 65 cfs would be used to refill the impoundment. A drawdown of 1 foot at Eastman Falls is 582 acre feet, or 25,351,920 cubic feet. Therefore, under these conditions, it would take 108 hours for the impoundment elevation to increase by 1 foot using Interior's refill procedure. If inflow is 1,445 cfs (the highest mean monthly flow, May), then 145 cfs would be used to refill the impoundment and the refill would take 48 hours.

The effects of implementing PSNH's proposed impoundment refill procedure, which is based on a minimum downstream flow release of 502 cfs, or inflow, whichever is less, would be similar to Interior's 90/10 refill procedure. However, generally there would be less flow released downstream during periods when inflow exceeds 502 cfs in exchange for allowing the impoundment to refill more quickly. In the impoundment, if inflow is 650 cfs, then 148 cfs (650 minus 502) would be used to refill the impoundment and the refill would take 47 hours. If inflow is 1,445 cfs, then 943 cfs (1,445 minus 502) would be used to refill the impoundment and the refill would take 7 hours.

Operation Compliance and Monitoring Plan

PSNH proposes develop and implement an operation compliance monitoring and maintenance plan.

Interior recommends (10(j) recommendation 1) that PSNH develop a plan, within

6 months of license issuance, for monitoring run of river operation and flow releases from the project. The plan would include a description of the mechanisms, structures, level of manual and automatic operation, and methods for recording data on run-of-river operation and impoundment levels, an implementation schedule, and procedures for maintaining monitoring data for inspection by Interior, the Commission, and New Hampshire DES. New Hampshire FGD supports Interior's recommendation.

Staff Analysis

A detailed description of the equipment and procedures necessary to maintain, monitor, and report compliance would prevent possible misunderstandings of project operation and may reduce the likelihood of complaints regarding project operation being filed with the Commission. In addition, an operation compliance monitoring plan would help the agencies and Commission verify that the project is operating in a run-of-river mode. In addition to the measures specified by Interior, the plan could provide a detailed description of the protocols that PSNH would implement during scheduled and unscheduled shutdowns, including any required impoundment refill procedures which would ensure that adverse effects to aquatic habitat in the impoundment and downstream of the dam are minimized .

Water Quality Monitoring

PSNH does not propose to do any water quality monitoring because it concludes that the study of temperature and DO at the project during 2009 (Corps 2012) demonstrates that the project does not affect water quality and that State DO and temperature standards are met at the project.

Interior recommends (10(j) recommendation 3) that PSNH conduct a post-license water quality monitoring survey. Temperature and DO would be monitored continuously in the headpond and tailrace during the period June 1 to September 30, beginning in the first summer after license issuance and for up to three years. If results indicate that the project is not attaining water quality standards, then mitigation measures may be required. New Hampshire FGD supports Interior's recommendation.

Staff Analysis

New Hampshire DES (2015) concluded that project waters meet state water quality standards for DO and temperature both upstream and downstream of the Eastman Falls dam. The Corps' 2009 study (Corps 2012) supports New Hampshire DES' conclusion. As described above, there were no violations of State standards between July 1 and September 30, 2009. DO was in excess of the minimum State standard in the project vicinity during the study and the project showed little, if any, effect on water

temperature. Interior states that a post-license water quality survey is warranted because conditions during the 2009 low-flow period of the Corps' study may not have been under "worst case" conditions. There were two rain events during the study period which caused streamflow to rise and water temperature to drop. These occurred in late July and again in the third week of August. However, each of these events was followed by periods in which flows decreased to typical low-flow summer conditions and should have documented any problems that may be present with attaining State water quality standards. Conducting additional monitoring during the post-licensing period would not document any new effects on water quality because there are no proposed changes to project operation; however, additional monitoring could affirm the results of the monitoring that was conducted in 2009.

Upstream Passage for American eel

PSNH does not propose any upstream eel passage measures.

Interior's preliminary section 18 prescription, which is supported by New Hampshire FGD, would require PSNH to develop a plan to operate and maintain temporary eel ramps or traps for two years. After two years, Interior's prescription would require PSNH to install up to three permanent eel ramps or traps, in locations where the temporary eel ramps or traps successfully collect juvenile eels. Although PNSH does not propose to implement any upstream eel passage measures, it did respond to Interior's preliminary section 18 prescription by stating that it would "be more scientifically prudent" to determine the need for upstream eel passage based on a trigger, such as a continuous increase in the number of eels collected over a specific period of time. PSNH does not specify whether this collection of eels would occur at the Eastman Falls Project or at a dam further downstream in the river basin.

Staff Analysis

Juvenile American eels migrate upstream into New England rivers over an extended period from March through October and peak movements are believed to correspond to hydrologic conditions, river size, and distance from the ocean (Richkus and Whalen, 1999). Currently the only way for juvenile eels to pass upstream of the Eastman Falls dam is to climb over or around the dam, which is a well-documented behavior for juvenile eels at other dam sites.[11]

Eel ladder and trap design usually relies on a relatively small amount of water that

[11] http://www.wildlife.state.nh.us/marine/marine_PDFs/American_Eels_GulfOfMa ine.pdf.

is released onto an angled ramp covered with a textured surface over which juvenile eels can efficiently move. This basic design is successfully used for passing juvenile eels at numerous dams throughout New England (Atlantic States Marine Fisheries Commission [ASMFC], 2013). In New England, this type of eel ladder is typically operated from May until July, but seasons are extended earlier or later depending on local migration timing. Eel ladders of this type are usually removed and stored during the portion of the year when they are not being operated (ASMFC, 2013).

As indicated above, American eels have been documented in low numbers upstream of Eastman Falls dam. In addition, American eel abundance is thought to be low immediately downstream of the Eastman Falls dam and the eels that were collected were yellow eels and not juvenile eels. However, there have not been intensive surveys to confirm abundance and age or size structure of eels downstream of the project dam. Garvins Falls passed at least 514 juvenile eels during 2014 and 439 in 2015. There may be additional undocumented passage of eels over or around Garvins Falls project structures. There are over 30 miles of habitat between Garvins Falls and Eastman Falls, so it is possible that the reason few eels have been collected immediately downstream of Eastman Falls is that there is sufficient habitat downstream of Eastman Falls dam for the existing numbers of eels entering this reach.

Installation of temporary eel ramps/traps for two years could help to identify where and how many eels are trying to pass over the Eastman Falls dam. If eels are trapped in significant numbers, and the temporary ramps/traps identify locations for one or more permanent eel ramps, then it may be possible to implement upstream passage measures that improve upstream passage efficiency of juvenile American eels and allow increased numbers of eels to access habitat upstream of the dam. Ultimately this could increase the numbers of eels produced in the Pemigewasset River and aid in the recovery of the eel population. Two years of temporary trapping should provide adequate information to determine if passage is currently needed or provide information that could be used to establish triggers for providing upstream passage as PSNH suggests.

Developing an upstream eel passage plan, in consultation with the agencies, would ensure that there is an agreed upon methodology for determining the locations of temporary eel ramps or traps, evaluating their effectiveness, and selecting the number and locations of permanent eel ramps.

Downstream Passage for American eel

PSNH does not propose to implement any downstream eel passage measures.

Interior's preliminary section 18 prescription, which is supported by New Hampshire FGD, would require PSNH to develop a plan to provide downstream eel

passage in a phased approach, beginning with interim measures by August 15 of the second year after license issuance (Phase 1) and eventually implementing permanent measures (Phase 2) by August 15 of the eighth year after eels are first documented using upstream eel passage facilities at the project.

Interior's prescription specifies that Phase 1 downstream passage could include one or more of the following measures: (1) not operating the project from dawn until dusk during the downstream passage season (August 15 to November 15) under certain hydrologic conditions (when 0.5 inches of rain or more fall within a 24-hour period, or when inflow increases by 50 percent over a 24-hour period, then the project would shut down for that evening plus the following two nights); (2) operating the existing downstream fish bypass from dawn until dusk during the August 15 to November 15 period; or (3) installing and operating a fish passage siphon in the vicinity of the intake(s).

Phase 2 of the downstream eel passage prescription would require PSNH to install a permanent downstream passage facility or facilities[12] with: (1) surface and bottom entrances, (2) new trashracks or overlay screens[13] with a maximum clear bar spacing of 0.75 inches and a maximum approach velocity of 1.64 feet per second, (3) an attraction flow to the bypass (or bypasses) of 2-3 percent of turbine capacity per bypass, (4) a weir or orifice spacing of every 25 linear feet[14], and (5) a plunge pool depth of 4 feet or at least ¼ the project head.

Staff Analysis

In New England, adult eel out-migration generally occurs from September to December, with peak movements usually at night during periods when river flow is increasing.[15] Under existing conditions, the only route for downstream passage is over the spillway of the dam or through the turbines. As discussed above, the abundance of adult eels requiring downstream passage is thought to be low, although intensive surveys

[12] Interior's prescription does not specify whether there would be one or multiple facilities.

[13] Overlay screens are screen panels that are placed either seasonally or permanently over existing trashracks for the purpose of reducing the clear bar spacing and reducing fish entrainment.

[14] Interior does not explain the purpose of the weir or orifice spacing requirement; therefore, we cannot address or evaluate the effects of this specification.

[15] http://www.wildlife.state.nh.us/marine/marine_PDFs/American_Eels_GulfOfMa ine.pdf.

to document upstream eel abundance and distribution have not be conducted. If PSNH begins passing juvenile eels upstream, then the adults would become sexually mature and need to migrate downstream to spawn approximately 8 to 30 years later, based on the reported range in eel maturation (Oliveira and McCleave 2000).

Interior's prescription includes an interim option for shutting down the project to provide downstream eel passage. If project shutdown were used, the project would not operate from dawn until dusk from August 15 to November 15 under the hydrologic conditions described above. During these periods of non-operation, all water would be released downstream, most likely either over the spillway or through the spillway waste gate, and this would be the only route available to eels that are moving downstream. Survival of eels passing over the spillway or through the waste gate would likely be high because the spillway is smooth concrete and free from structures that eels could strike during passage. Water depth at the base of the spillway appears to provide adequate plunge depth to protect eels from injury as they pass from the spillway back into the river downstream of the dam. During project shutdown, there would be no potential for eels to become entrained in the turbines or impinged on the trashracks; therefore, any mortalities or injuries associated with these project features would be eliminated. Studies suggest that turbine mortality of eels varies widely based on many factors, including turbine type, size, and speed. Mortality rates range from 5 to 75 percent (Shepard 2015), with smaller and faster Kaplan turbines generally causing higher mortality than slower and larger Francis turbines. Recent studies of similar size but slower Kaplan turbines on the Connecticut River reported estimated mortality rates of 19 to 38 percent (TransCanada 2016). Because there would be no impingement or entrainment and passage over the spillway or through the waste gate would likely result in high survival, project shutdown would likely provide safer downstream passage for eels than existing conditions.

Interior's prescription includes an interim option for operating the existing downstream fish bypass (louver array and lowered flashboard) from dawn to dusk from August 15 to November 15. Unlike the shutdown option, under this option the project would continue to operate and some eels are likely go through the project turbines and experience the same rates of mortality as described above. The existing trashrack clear spacing of 3.5 inches would not exclude even large adult eels from the project intakes. The existing fish louver array in the forebay extends only 8 feet below the impoundment surface and guides fish to a lowered flashboard section along the spillway. Because of this design, which is appropriate for surface-oriented salmon or clupeids, it may not be very effective for outmigrating eels. Those eels that are successfully guided and passed via the louvers and lowered flashboard would experience the same survival rates as under the shutdown option. Overall this option is likely to provide better eel survival than existing conditions but not as good as the shutdown option.

Interior's prescription includes an interim option for installing and operating a fish

passage siphon in the vicinity of the intake(s) from dawn to dusk from August 15 to November 15. As with the louver array and lowered flashboard option, the project would continue to operate and some eels would probably go through the project turbines and experience mortality rates as described above. However, guidance efficiency with the siphon system may be better than with the surface-oriented louver array. Unlike the existing louver array and lowered flashboard section, the siphon would attract adult eels from a depth where they are more likely to be naturally migrating. Those eels that are attracted into the siphon are likely to experience similar rates of survival to the project shutdown. Therefore, this option is likely to provide better eel survival than existing conditions and the louver array and lowered flashboard options, but not as good as the shutdown option.

Interior's prescription for permanent downstream eel passage includes several specifications designed to reduce eel entrainment and impingement, as well as successfully attract and guide adult eels safely past the dam. Unlike the project shutdown interim passage option, the permanent downstream eel passage facility would be designed to operate while the project is generating. New trashracks or overlays with 0.75-inch clear spacing would prevent all adult eels from passing through the intakes and turbines. Adult eels would also be able to avoid impingement on the new trashracks or overlays if they are designed with a maximum approach velocity of 1.64 feet per second, which is less than the burst swimming speed of adult eels (Bell 1991). Entrances near both the bottom and surface of the impoundment are likely to attract adult eels from throughout the water column, so the effectiveness of the permanent facility could be better than either the existing louver array and lowered flashboard or the siphon interim passage options. We are not aware of studies comparing the effectiveness of different attraction flows; however, if Interior's prescription for 2-3 percent of turbine capacity is effective, then adult eels would locate and enter the downstream passage facility and are likely to pass safely through the conveyance structure which would most likely be a pipe. The fishway effectiveness monitoring plan, discussed below, would be a mechanism for modifying the amount of attraction flow if testing and monitoring indicate that modifications are necessary. Finally, a plunge pool located or excavated to ensure 4-feet of depth or at least one fourth of project head would protect eels as they drop from the pipe outfall of the eel bypass facility into the river downstream of the dam. Overall, by preventing turbine passage through the prescribed trashrack clear spacing and maximum approach velocity, the permanent downstream eel passage facility would eliminate eel entrainment mortality, just like the interim passage shutdown option described above. If adult eels are attracted and successfully passed through the permanent facility, then the survival of those eels would be similar to that under the interim shutdown option as well.

Developing a downstream eel passage plan, in consultation with the agencies, would provide a format for selecting interim downstream passage measures and evaluating their effectiveness. In addition, a downstream passage plan could include

procedures for selecting permanent downstream passage measures and determining when such measures would be needed.

Operation and Maintenance of Fish Passage Facilities

Interior's preliminary section 18 prescription, which is supported by New Hampshire FGD, would require PSNH to develop a fishway operation and maintenance plan (FOMP).

Staff Analysis

Some fish passage facilities require precise operation and maintenance to be effective. Interior's prescribed FOMP would be developed and implemented in consultation with the agencies and would include details about how any fish or eel passage facilities constructed at the project would be operated, including the times of the day and year, quantity of conveyance flow, and procedures for routine cleaning and maintenance. Implementing such a plan would ensure that the fish passage facilities are operated as intended and are properly maintained.

In addition, the FOMP could address proper debris disposal. Debris that accumulates on the trashrack or overlays would reduce their effectiveness at protecting fish from entrainment or impingement. If the trashrack is covered with debris, fish may become entangled in the debris rather than sliding off the trashrack as intended, or the approach velocity at the trashrack could increase which could result in a greater amount of fish entrainment or impingement. Debris that collects on the fish passage facilities can create a blockage and reduce the effectiveness of the facilities.

Additionally, proper management of debris is important because organic debris sustains lower order trophic organisms, such as benthic macroinvertebrates, which in turn influences the productivity of higher order organisms, such as fish. Organic debris also provides habitat for macroinvertebrates and fish. Leaves and large woody debris would provide habitat downstream of the dam and enhance the carrying capacity of the Pemigewasset River for macroinvertebrates and fish by providing cover and velocity shelters. Inorganic debris such as trash provides no benefit to aquatic resources and developing and implementing a FOMP with debris management procedures would provide a way for it to be removed and disposed of properly.

Fishway Effectiveness Monitoring Plan

Interior's preliminary section 18 prescription, which is supported by New Hampshire FGD, would require PSNH to develop a fishway effectiveness monitoring plan.

Staff Analysis

Interior's prescribed fishway effectiveness monitoring plan would be developed and implemented in consultation with the agencies and could include testing or monitoring of the existing louver array and lowered flashboard system or any of the new interim or permanent upstream or downstream eel passage measures that may be installed and operated at the project. Testing and monitoring the fish passage facilities could provide information that would be useful for determining whether adjustments to the fishways may be needed. Examples of possible modifications include, but are not limited to, the amount of attraction flow and depth of water through the fishways, adjustments to the entrance and exit of the fishways, or changes in the dates of operation of the fishways. Implementing the fishway effectiveness plan would ensure that the fish passage facilities are as effective as possible.

Cumulative Effects

The Eastman Falls Project, in combination with the other existing hydroelectric projects located in the Merrimack River Basin, has the potential to cumulatively affect American eels. The cumulative adverse effects can occur from multiple hydroelectric developments within a river basin and include injuries and mortality from turbine passage and interference with eel movements. Providing upstream passage for juvenile eels could expand access to potential habitat upstream of the project dam. If juvenile eels successfully pass upstream of the project dam, they would be vulnerable to turbine-related injury and mortality when they migrate downstream to spawn as mature eels; therefore, providing downstream passage measures would minimize entrainment and turbine-related mortality for these downstream migrants. Overall, improving eel passage conditions at Eastman Falls dam could cumulatively benefit American eel populations in the Merrimack River basin.

3.3.2 Terrestrial Resources

Affected Environment

The project is located in the Northeastern Highland eco-region (Griffith et. al., 2009) and is part of the Merrimack River basin. In central New Hampshire, this river basin is characterized by narrow floodplains and stream terraces surrounded by rolling hills. Trees in the basin are primarily coniferous, including white pine (*Pinus strobus*), red pine (*Pinus resinosa*), hemlock (*Tsuga canadensis*), and red spruce (*Picea rubens*).

Much of the land in the project area is undeveloped deciduous, coniferous, or mixed forest. The flood zone upstream of the Franklin Falls dam is primarily forest and

old field/early successional cover. Between Franklin Falls dam and Eastman Falls dam, lands are primarily developed with a buffer of forested land along the banks. Downstream of Eastman Falls dam, land is also primarily developed and its shorelines are characterized by steep river embankments. Vegetative cover in the project area is primarily second growth, mixed hardwood forest, with areas of individual trees and stands of white and red pine. Common tree species include red oak (*Quercus rubra*), red maple (*Acer rubrum*), aspen (*Populus* sp.), ash (*Fraxinus* sp.), and hickory (*Carya* sp.).

Three exemplary natural communities and systems are present in the project area: Major River Silver Maple Floodplain System, Herbaceous River Bank Floodplain Community, and Aquatic Bed Community. Although these communities and systems are not rare, they have been identified as high-quality habitats. Major River Silver Maple Floodplain System habitat was identified at 10 locations upstream of Franklin Falls dam. This habitat is limited in the project area by steeply sloping topography. An Herbaceous River Bank Floodplain community was identified at one location within the Franklin Falls recreation area. Aquatic Bed communities were identified at nine locations within the littoral habitat of the impoundment.

Wetlands

Wetlands in the project area are forested (2.2 acres), palustrine emergent (2.0 acres), and scrub-shrub (12.0 acres), and are mostly present upstream of the Franklin Falls dam. Wetlands in the project area are limited by topography to narrow fringe areas, coves, and near the confluence of small tributaries along the shoreline.

Forested wetlands within the project boundary are present in depressions within the floodplain. Common trees in these forests include silver maple (*Acer saccharinum*), sycamore (*Platanus* sp.), and cottonwood (*Populus* sp.). An herbaceous layer of annual and perennial plants is also present.

Palustrine emergent wetlands are present in narrow bands along the project shoreline. Vegetation in these wetlands includes sedges, rushes, and grasses.

Scrub shrub wetlands are the most common wetland type within the project boundary. These wetlands occur along the upper limits of the emergent wetlands and are dominated by woody vegetation less than 20 feet tall. Willows, alders, and dogwood are common in the drier areas, and buttonbush is more common in the semi-permanently flooded areas.

Invasive Species

Five state invasive botanical species were identified in the project area during

2013 survey efforts: Japanese knotweed (*Polygonum cuspidatum*), multiflora rose (*Rosea multiflora*), purple loosestrife (*Lythrum salicaria*), autumn olive (*Elaeagnus umbellata*), and variable leaf milfoil (*Myriophyllum heterophyllum*). Japanese knotweed was documented at 13 locations, and is present in riparian areas near the powerhouse. Milfoil was documented at five sites in shallow waters along the shoreline and in coves. The other three species were identified at one location each.

Wildlife

The project area provides various wildlife habitat including open/agricultural grassland, wooded riparian areas, and wetland and riverine areas. Mammals in the project area include beaver, deer, rabbit, fox, raccoon, and grey squirrel. Numerous birds use the riverine and riparian habitats along the Pemigewasset River for feeding and nesting habitat, including bald eagle, common goldeneye, common merganser, cormorants, herons, ducks, geese, bank swallows, trees swallows, ruffed grouse, and American woodcock.

Avian Species of Special Interest

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is a state threatened species. Bald eagles will hunt and scavenge for a variety of foods, but they prefer fish and are attracted to undisturbed lakes, reservoirs, and large rivers (FWS, 2007). Suitable habitat for bald eagles is present around the impoundment and along the Pemigewasset River. Bald eagles have been observed in flight and perched adjacent to the impoundment, but there are no known nests within the project boundary.

Common Loon

The common loon (*Gavia immer*) is a state threatened species. Loons have great difficulty walking on land, and must nest right at the water's edge where their reproductive success is susceptible to water level changes. Loons also prefer protection from prevailing winds and waves, overhead vegetation or lateral cover, and a wide viewing angle of their territory (Evers, 2004). No common loons or nests were observed during 2013 field surveys.

Common Nighthawk

The common nighthawk (*Chordelis minor*) is a state threatened species. This bird uses pine barrens, openings in Appalachian oak-pine forests, rocky ridges, and urban habitats. There have been historic sightings of the common nighthawks near the city of

Franklin. However, preferred habitat is largely absent from the project area and no common nighthawks were observed during 2013 field surveys.

Osprey

The osprey (*Pandion haliaetus*) is a state species of special concern. Osprey feed on fish and require nearby water bodies with substantial fish populations to sustain their family unit. Osprey are known to occur near the project area. However, no osprey or nests were observed during 2013 field surveys.

Environmental Effects

Wetlands

PSNH proposes to operate the project in an instantaneous run-of-river mode and maintain a normal impoundment elevation of 307 feet msl.

Under section 10(j), Interior recommends (recommendations 1 and 2) that PSNH operate the project in instantaneous run-of-river mode and maintain a normal impoundment level of 307 feet msl. New Hampshire FGD commented that it supports Interior's recommendation.

Staff Analysis

Wetlands provide high quality habitat for various wildlife. Wetlands in the project area are mostly limited to adjacent shoreline areas. Operating the project in an instantaneous run-of-river mode and maintaining the impoundment level at 307 feet msl would minimize impoundment fluctuations and maintain adequate flows downstream of the dam, protecting the existing riparian communities and the exemplary natural communities both in the impoundment and downstream.

Invasive Plants

PSNH proposes to develop and implement an invasive species management and monitoring plan, in consultation with federal and state resource agencies. As detailed in its draft plan (Appendix C of the license application), PSNH proposes to monitor the project area for invasive species and conduct meandering surveys in riparian areas every five years. PSNH also proposes to use best management practices to minimize the potential spread of invasive species. If invasive species are identified, PSNH would follow recommended protocols established by the New Hampshire DES Exotic Species Program.

Under section 10(j), Interior recommends (recommendation 5) that PSNH develop and implement a plan to monitor and control invasive species at the project in consultation with Interior and New Hampshire FGD. New Hampshire FGD commented that it supports Interior's recommendation.

Staff Analysis

Invasive plants can out-compete native ones, which could lead to a loss of diversity affecting forage and habitat for animal species. Invasive species are limited within the project boundary, occurring in sandy sections of shoreline and littoral areas having an unconsolidated mud bottom. Invasive plant species found in the project area include variable leaf milfoil, Japanese knotweed, multiflora rose, purple loosestrife, and autumn olive.

The Corps actively manages milfoil patches within the Franklin Falls flood control area, using both herbicides and non-chemical controls. PSNH proposes to survey riparian zones within the project boundary every 5 years to identify and monitor invasive species. Further, PSNH will avoid purposefully planting invasive species within the project area and would follow state protocol to manage the spread of invasive species.

PSNH is not proposing any significant changes to project operation or any new construction that would affect the introduction or spread of invasive plants. However, because routine maintenance activities (i.e., mowing, weed wacking) within the project area has the potential to spread invasive plants, monitoring invasive species would provide information about the spread of invasive plants, and could result in the implementation of measures to stop or reverse the spread of invasive plant species.

3.3.3 Threatened and Endangered Species

Affected Environment

The northern long-eared bat (*Myotis septentrionalis*) was listed as federally threatened on April 2, 2015. In a letter dated May 1, 2015, the U.S. Fish and Wildlife Service (FWS) confirmed that there has been no documented presence of any listed species within the project area. However, in a letter dated June 22, 2016, Interior stated that although the bat has not been documented in the project area, because suitable habitat exists (i.e., wooded riparian and upland areas), project activities should be evaluated to determine if habitat would be affected.

Traditional ranges for the northern long-eared bat include most of the central and eastern U.S., as well as the southern and central provinces of Canada, coinciding with the greatest abundance of forested area. Habitat includes large tracts of mature, upland

forests and typically feeds on moths, flies, and other insects. These bats are flexible in selecting roost sites, choosing roost trees that provide cavities and crevices. Winter hibernation typically occurs in caves and the areas around them can be used for fall-swarming and spring-staging. No critical habitat has been designated for this species.

In January 2016, FWS finalized the 4(d) rule for this species which focus on preventing effects on bats in hibernacula associated with the spread of white-nose syndrome[16] and effects of tree removal on roosting bats or maternity colonies (FWS, 2016). As part of the 4(d) rule, FWS proposes that take incidental to certain activities conducted in accordance with the following habitat conservation measures, as applicable, would not be prohibited: (1) occurs more than 0.25 mile from a known, occupied hibernacula; (2) avoids cutting or destroying known, occupied maternity roost trees during the pup season (June 1 – July 31);[17] and (3) avoids clearcuts within 0.25 mile of known, occupied maternity roost trees during the pup season (June 1 – July 31).

Environmental Effects

Neither PSNH or any stakeholders are recommending any changes in project operation that could affect the northern long-eared bat. In addition, no one is proposing any measures that would result in removal of suitable roosting and foraging habitat or the disturbance of bat hibernacula.

Staff Analysis

The project is located within the White Nose Syndrome Buffer Zone, but there are no known northern long-eared bat hibernacula or maternity roost trees near the project. Although not previously documented in the project area, bats could use habitat within the project area during summer months for foraging or roosting. However, even if bats were present, project operation would not have any expected effect on their habitat or food availability because no tree removal or disturbance to potential northern long-eared bat habitat would occur. Therefore, relicensing the project with any of the measures considered in this EA would have no effect on this species.

[16] Hibernacula is where a bat hibernates over the winter, such as in a cave. White-nose syndrome is a fungal infection that agitates hibernating bats, causing them to rouse prematurely and burn fat supplies. Mortality results from starvation or, in some cases, exposure.

[17] Pup season refers to period when bats birth their young.

3.3.4 Land Use and Recreation Resources

Affected Environment

Land Use

The Eastman Falls Project is located in the Pemigewasset River Basin watershed is about 1,021 square miles with over 1,100 miles of rivers and 17,000 acres of lake, pond, and reservoir areas. The watershed is primarily forested, while other lands in the Eastman Falls watershed would be characterized as urban/developed areas and agricultural lands. Land use in the immediate project vicinity is primarily rural residential, with several residences located along Eastman Falls Road near the project area. The Eastman Falls Project boundary also includes 476 acres of inundated federal lands associated with the Corps' Franklin Falls Flood Control Dam, although the dam and facilities are not part of the Eastman Falls Project.

Recreation

The Pemigewasset River flows south through the White Mountains National Forest, Franconia Notch State Park, and several regional and local recreation areas, including trail systems, wildlife management areas, private campgrounds, and boating facilities.

Recreational activities occurring in the project boundary include fishing, swimming, kayaking, canoeing, rafting, hiking, and picnicking. The Eastman Falls Project impoundment provides free public access to boat launches, picnic areas, put-in launches, parking lots, fishing access and canoe portage around the project.

New Hampshire FGD oversees the annual stocking of the Pemigewasset River, which supports recreational fishing in the project vicinity.

The Corps owns and operates Franklin Falls Dam, which lies in the middle of the Eastman Falls Project boundary, and approximately 1.5 miles upstream of the Eastman Falls dam. Franklin Falls dam is a year-round recreation area with a permanent pool of 440 acres and a maximum depth of approximately 7 feet. The Franklin Falls dam has a variety of recreation facilities that are not considered as part of the recreational facilities associated with Eastman Falls Project.

Environmental Effects

The applicant proposes to maintain existing public access within the project boundary and does not propose any new recreational facilities.

Staff Analysis

Public access to the Pemigewasset River for recreational use, including fishing, boating, picnicking, and swimming, would be unaffected by continued operation of the Eastman Falls Project. In addition, none of the proposed or recommended measures would affect recreation in the project area.

3.3.5 Cultural Resources

Affected Environment

Area of Potential Effect

The Advisory Council on Historic Preservation defines an area of potential effect (APE) as the geographic area or areas in which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE for the Eastman Falls Hydro Project includes: (a) lands enclosed by the project boundary; and (b) lands or properties outside the project boundary in which project operations or project-related actions may cause changes in the character or use of historic properties, if any exist.

Historical Background

The Eastman Falls dam project was originally constructed by the Pemigewasset Power Company in 1903, redeveloped by the Boston and Maine Railroad in 1910-1911, and further redeveloped by the Public Service Company of New Hampshire (PSNH) in 1937 and 1983. The two powerhouses sit along the west bank of the Pemigewasset River. The generating facility No. 1 powerhouse was built in 1937. The generating facility No. 2 powerhouse was originally constructed in 1910 and retrofitted in 1983, when a majority of the concrete substructure was replaced and a portion of an access road was reconstructed. The original dam provided water to mills on both sides of the river. However, one side of the river no longer contains intact facilities and has been subdivided from the proposed hydroelectric dam site. The original mill building was destroyed by fire in 1903.

Historical Properties

The Eastman Falls dam and its associated powerhouses are not included on the National Register of Historic Places (National Register).

Environmental Effects

The applicant does not propose any changes to the existing powerhouses or any new structures.

Staff Analysis

In a letter dated May 8, 2012, filed as part of the applicant's original license application, the New Hampshire SHPO stated that the Eastman Falls facilities may be eligible for listing on the National Register; however, relicensing the project would have no potential to cause effects on historic, architectural, or archaeological resources. We have reviewed the applicant's relicensing proposal and the SHPO's determination and based on this information, Commission staff find that no historic properties would be affected by the proposed continued operation of the project.

During the term of any license, the applicant would occasionally need to conduct maintenance activities in the project area or on project facilities. These activities could include replacement of broken windows on the powerhouse, powerhouse roof or masonry repairs, or general landscaping and yard maintenance within the project boundary. These activities would not require prior Commission approval; however, they could affect historic resources in the project area. Consulting with the New Hampshire SHPO prior to conducting these activities would ensure that historic resources are not adversely affected.

During the license term, it is possible that unknown archaeological or historic resources may be discovered during project operation or other project related activities that require land-disturbing activities. To ensure the proper treatment of any potential archaeological or cultural resources, a condition could be included in any license issued for the project requiring that the applicant notify the Commission and the New Hampshire SHPO if previously unidentified archaeological or cultural artifacts are encountered. In the event of any such discovery, the applicant would discontinue all exploratory or construction-related activities until the proper treatment of any potential archaeological or cultural resources is established.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate and environmental conditions at the project site would remain the same.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Eastman Falls Project's use of the Pemigewasset River for hydropower purposes to see what effect various environmental measures would have on the projects' costs and power generation. Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,[18] the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead Corp*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

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

4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT

Table 2 summarizes the assumptions and economic information we use in our analysis. This information was either provided by PSNH in the license application, response to additional information request, or estimated by staff. We find that the values provided by PSNH are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; licensing costs;

[18] See *Mead Corporation, Publishing Paper Division*, 72 FERC ¶ 61,027 (July 13, 1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

and normal operation and maintenance costs. Throughout this section all dollars are 2016 unless otherwise specified.

Table 2. Parameters for economic analysis of the Eastman Falls Project (Source: staff and PSNH).

Parameter	Value	Source
Period of analysis	30 years	Staff
Term of financing	20 years	Staff
Inflation and escalation	0.0 percent	Staff
Interest/discount rate	7.35 percent	PSNH
Cost of capital	7.35 percent	PSNH
Federal tax rate	34 percent	Staff
Local tax rate	2.6 percent	Staff
Net investment [a]	$5,295,705	PSNH
Annual operation and maintenance [b]	$175,000	PSNH
Energy rate [c]	$40.71/MWh	Staff

[a] Net investment includes the cost of existing facilities depreciated to 2016, and the $400,000 cost to prepare the license application (see PSNH's filing on January 13, 2016, and Exhibit D page 5 of the license application).
[b] Annual operation and maintenance (see Exhibit D page 4 of the license application).
[c] The energy rate is based on the 2015 average real time locational marginal price for New Hampshire according to the Independent System Operator New England.

4.2 COMPARISON OF ALTERNATIVES

Table 3 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EA.

Table 3. Summary of the annual cost of alternative power and annual project cost for the alternatives for the Eastman Falls Project (Source: staff).

	No Action	PSNH's Proposal	Staff Alternative
Installed capacity (MW)	6.06	6.06	6.06
Annual generation (MWh)	27,871	27,871	27,871
Annual cost of alternative power ($/MWh)	$1,134,628 40.71	$1,134,628 40.71	$1,134,628 40.71
Annual project cost ($/MWh)	$867,314 31.12	$869,667 31.12	$878,950 31.54
Difference between the cost of alternative power and project cost ($/MWh)[a]	$267,314 9.59	$264,961 9.51	$255,678 9.17

[a] Numbers in parenthesis denote negative values, thus these costs are greater than the cost of alternative power.

4.2.1 No-Action Alternative

Under the no-action alternative, the Eastman Falls Project would generate an average of 27,871 MWh of electricity annually, have an annual alternative power value of $1,134,628, or $40.71/MWh, and a total annual cost of $867,314, or $31.12/MWh. Overall, the project would produce power at a cost which is about $267,314, or $9.59/MWh, less than the cost of alternative power.

4.2.2 PSNH's Proposal

As proposed by PSNH, the Eastman Falls Project would have the same average annual generation and the same annual power value as the no action alternative. Based on the parameters listed in Table 2 and the cost of measures identified in Table 4, we estimate that the total annual cost of alternative power would be $869,667, or $31.20/MWh. Overall, the project would produce power at a cost which is about $264,961, or 9.51/MWh, less than the cost of alternative power.

4.2.3 Staff Alternative

Under the staff alternative, the Eastman Falls Project would have the same average annual generation and the same annual power value as the no action alternative. Based on the parameters listed in Table 2 and the cost of measures identified in Table 4, we

estimate that the total annual cost of alternative power would be $878,950, or $31.54/MWh. Overall, the project would produce power at a cost which is about $255,678, or $9.17/MWh, less than the cost of alternative generation.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 4 gives the cost of each of the environmental enhancement measure considered in our analysis. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

Table 4. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects to operate and maintain the Eastman Falls Project (Source: PSNH and staff).

Enhancement/Mitigation Measure	Entity	Capital Cost	Annual Cost	Levelized Annual Cost
Administrative				
Notify Interior if an amendment or appeal of any fish and wildlife-related license conditions or extension of time are filed	Interior, New Hampshire FGD	$0	$0	$0
Project Operation				
Operate the project in an instantaneous run-of-river mode	PSNH, Interior, New Hampshire FGD, Staff	$0	$0	$0
Maintain impoundment elevation of 307 feet msl (± 0.2 feet)	PSNH, Interior, New Hampshire FGD, Staff	$0	$0	$0
Implement an impoundment refill protocol for drawdown such that 90 percent of inflow passes downstream and 10 percent of inflow refills impoundment [a]	Interior, New Hampshire FGD	$0	$0	$0

Enhancement/Mitigation Measure	Entity	Capital Cost	Annual Cost	Levelized Annual Cost
Release 502 cfs downstream during impoundment refill unless inflow is less than 502 cfs, then implement 90-10 percent flow ratio [a]	PSNH, Staff	$0	$0	$0
Aquatic Resources				
Develop and implement a fishway operation and maintenance plan [b]	Interior, New Hampshire FGD, Staff	$3,000	$1,000	$1,365
Develop and implement an upstream eel passage plan including temporary ramps/traps, data collection, and up to three permanent upstream eel passage facilities [c]	Interior, New Hampshire FGD, Staff	$20,000	$500 plus $3,000/yr. for 2 years of data collection	$3,350
Develop and implement an interim downstream eel passage plan including interim downstream passage measures and a permanent downstream eel passage facility [d]	Interior, New Hampshire FGD, Staff	$25,000	$500	$3,540
Develop and implement a fishway effectiveness monitoring plan [e]	Interior, New Hampshire FGD, Staff	$5,000	$3,000/yr. for 2 years of monitoring	$1,028
Develop and implement an operation and flow monitoring plan	PSNH, Interior, New Hampshire FGD, Staff	$4,000	$500	$987
Develop and implement a post-license water quality monitoring plan [f]	Interior, New Hampshire FGD	$3,000	$5,000/yr. for 1 year of monitoring	$727

Enhancement/Mitigation Measure	Entity	Capital Cost	Annual Cost	Levelized Annual Cost
Terrestrial Resources				
Develop and implement an invasive species management and monitoring plan	PSNH, Interior, New Hampshire FGD, Staff,	$5,000	$5,000 every 5 yrs to conduct surveys.	$1,366
Cultural Resources				
Notify Commission and SHPO if previously unidentified archaeological or cultural artifacts are encountered during project construction	Staff	$0	$0	$0
Consult with SHPO prior to making changes to project operation or facilities	Staff	$0	$0	$0

[a] While staff cannot assign costs to this measure because the depth and duration of the impoundment drawdown and refill are unknown, it is likely that implementing the licensee's proposed refill procedure would result in more rapid refill of the impoundment and some small incremental increase in annual generation.

[b] The cost of this measure includes passing organic debris downstream of the project dam to improve aquatic habitat.

[c] This is the cost to develop and implement an upstream eel passage plan, collect data for two years, two upstream eel passage facilities, and keeping the facilities operational during the upstream eel migration season.

[d] Implementing interim downstream eel passage measures would consist of ceasing project generation from dusk until dawn from August 15 through November 15, annually, or to construct and operate a siphon system to protect eels during outmigration. Ceasing project operation would reduce annual generation by about 2,501 MWh and have an annual cost of $101,816; however, constructing a siphon system would have an annual cost of $3,540. Therefore, staff includes the estimated cost to construct a siphon system.

[e] This is the cost to develop and implement a downstream eel passage effectiveness plan that includes monitoring for 2 years.

[f] This is the cost to develop and implement a post-license water quality monitoring plan that includes monitoring for 1 year.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

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

Based on our independent review of agency comments filed on these projects and our review the environmental and economic effects of the proposed project and economic effects of the project and its alternatives, we selected the staff alternative as the preferred alternative. We recommend the staff alternative because: (1) issuance of a new hydropower license by the Commission would allow PSNH to continue to operate the project as a dependable source of electrical energy; (2) the 6.06 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of the staff alternative would exceed those of the no-action alternative; and (4) the proposed measures would protect and enhance aquatic, terrestrial, and cultural resources.

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

5.1.1 Measures Proposed by PSNH

Based on our environmental analysis of PSNH's proposal in section 3, and the costs presented in section 4, we conclude that the following environmental measures proposed by PSNH would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project:

- Continue to operate the project in a run-of-river mode and ensure that impoundment water level fluctuations do not exceed ± 0.2 feet from the normal impoundment elevation of 307 feet msl with flashboards installed[19];

- Implement an operation compliance monitoring and maintenance plan (OMCP) to monitor impoundment level, flow releases, and impoundment refill procedures;

- Maintain downstream flows of 502 cfs (equal to the aquatic base flow; ABF), or 90 percent of inflow to the impoundment (whichever is less) to protect downstream aquatic habitat when refilling the impoundment after drawdowns for maintenance or emergencies; and

- Implement an invasive species management and monitoring plan (ISMMP) to monitor the spread of invasive species within the project boundary and implement control measures, if necessary.

5.1.2 Additional Measures Recommended by Staff

We recommend all of the measures described above and six additional measures: (1) develop a plan to install up to three upstream fishways for American eel that would be operated from May 1 to October 30 (section 18); (2) develop a plan to implement downstream passage (interim measures would be implement initially and eventually be replaced by permanent measures) for American eel that would be operated from August 15 to November 15 of each year (section 18); (3) develop and implement a fishway operation and maintenance plan (FOMP)(section 18), including procedures for managing debris collected at or near fish passage facilities (section 18); (4) develop and implement a fishway effectiveness monitoring plan (section 18); (5) notify the Commission and the New Hampshire State Historic Preservation Officer (SHPO) prior to implementing any maintenance activities, land-clearing or land-disturbing activities, or changes to project operation or facilities; and (6) consult with the New Hampshire SHPO if previously unidentified cultural resources are discovered during the course of constructing, maintaining, or operating the project works or other facilities.

[19] PSNH also proposes to discontinue maintaining a year-round minimum flow of 410 cubic feet per second (cfs), or inflow (whichever is less) downstream of the project because it would serve no purpose at a run-of-river project with no bypassed reach. The 410-cfs minimum flow is a requirement of the current license that allows PSNH to operate the project in storage-and-release mode.

Below, we discuss our additional staff-recommended measures.

Upstream American Eel Passage

PSNH does not propose any measures for upstream passage of American eel. Interior's preliminary section 18 prescription would require PSNH to develop and implement a plan to install temporary eel ramps or traps for the first two upstream passage seasons following license issuance. Then, based on the results of the two years of data collection, and in consultation with Interior, PSNH would be required to install up to three permanent eel ramps or traps. New Hampshire FGD supports Interior's preliminary prescription.

The only eels collected downstream from Eastman Falls dam in the project vicinity are 5 adult yellow eels that were sampled by Interior and New Hampshire FGD during electrofishing surveys. About 40 miles downstream of the project, at the Garvins Falls dam, juvenile eels have been collected and passed (514 in 2014 and 439 in 2015), but it is unknown whether any of those eels have continued upstream far enough to attempt passage at Eastman Falls dam. The prescribed temporary eel ramps or traps would help to further understand the need for and potential effectiveness of installing upstream juvenile eel passage facilities at the Eastman Falls dam. If juvenile eels are collected in the temporary ramps or traps, then that would help determine the best locations for installing permanent ramps or traps. Therefore we recommend adopting this measure because it would provide information on upstream eel passage and would be worth the estimated average annual cost of $3,350 (estimate is for 2 permanent ramps/traps).

Downstream American Eel Passage

PSNH does not propose any measures for downstream passage of American eel. Interior's preliminary section 18 prescription would require PSNH to develop and implement a plan to provide downstream eel passage in a phased approach, beginning with interim measures by August 15 of the second year after license issuance (Phase 1) and eventually implementing permanent measures (Phase 2) by August 15 of the eighth year after eels are first documented using upstream eel passage facilities at the project.

Interior's prescription specifies that Phase 1 downstream passage could include one or more of the following measures: (1) not operating the project from dawn until dusk during the downstream passage season (August 15 to November 15) under certain hydrologic conditions (when 0.5 inches of rain or more fall within a 24-hour period, or when inflow increases by 50 percent over a 24-hour period, then the project would shut down for that evening plus the following two nights); (2) operating the existing downstream fish bypass from dawn until dusk during the August 15 to November 15

period; or (3) installing and operating a fish passage siphon in the vicinity of the intake(s).

Phase 2 of the downstream eel passage prescription would require PSNH to install a permanent downstream passage facility or facilities with: (1) surface and bottom entrances, (2) new trashracks or overlay screens with a maximum clear bar spacing of 0.75 inches and a maximum approach velocity of 1.64 feet per second, (3) an attraction flow to the bypass (or bypasses) of 2-3 percent of turbine capacity per bypass, (4) a weir or orifice spacing of every 25 linear feet, and (5) a plunge pool depth of 4 feet or at least ¼ the project head. New Hampshire FGD supports Interior's preliminary prescription.

Eel abundance upstream of the Eastman Falls Project is unknown, although PSNH reports that some eels have been collected from Squam Lake, which is in the Pemigewasset River basin approximately 13 miles upstream of the project. Additionally, because we are recommending measures that would provide upstream passage for juvenile eels, it is likely that the numbers of adult eels upstream of the project will increase during the term of any new license. Based on this information, we expect that protection measures for downstream migrating adult American eels will be needed during the term of any new license.

Interior's phased approach to providing downstream passage would defer the cost of constructing any permanent facilities until 8 years after the Eastman Falls Project is actively passing juvenile eels upstream of the dam. Prior to implementation of any permanent measures, implementation of one of the three interim measures would likely provide some protection for the limited number of adult eels that are likely migrating downstream during existing conditions. Based on available information, we conclude that Interior's preliminary section 18 measures for downstream eel passage would improve downstream passage protection for eels that migrate downstream past the Eastman Falls Project and would be worth the estimated average annual cost is $3,540; therefore, we recommend that it be included in any new license issued for the project.

Fishway Operation and Maintenance Plan

Interior's preliminary section 18 prescription would require a Fishway Operation and Maintenance Plan. New Hampshire FGD supports Interior's preliminary prescription.

Interior's prescribed FOMP would be developed and implemented in consultation with the agencies and would include details about how any fish or eel passage facilities constructed at the project would be operated, including the times of the day and year, quantity of conveyance flow, and procedures for routine cleaning and maintenance, including debris removal. Implementing such a plan would ensure that the fish passage facilities are operated as intended and are properly maintained.

In addition to fishway operation and maintenance procedures, the FOMP should address proper debris disposal. Debris that is removed from fish passage facilities during maintenance will likely be a mixture of organic and inorganic material. As appropriate, this debris should be sorted and organic debris should be passed downstream to prevent disruption of any ecosystem function and to provide habitat for macroinvertebrates and fish. Inorganic debris (i.e., trash) should be disposed of properly.

Developing and implementing a FOMP (with procedures for debris management) would ensure that any fish passage facilities are operating properly and would be worth the $1,365 annual cost; therefore, we recommend that any new license issued for the Eastman Falls Project require PSNH to develop and implement a FOMP.

Fishway Effectiveness Monitoring Plan

Interior's preliminary section 18 prescription would require a Fishway Effectiveness Monitoring Plan. New Hampshire FGD supports Interior's preliminary prescription.

In order to provide effective passage, any fishways installed at the Eastman Falls Project would need to be monitored to ensure that they are designed and working properly. If monitoring indicates that the fishways are operating poorly, then design or operational modifications could be made to improve fishway performance. For example, adjustment to conveyance and attraction flows, design or location of the fishway entrance and exit, dates of operation, or plunge pool depth or location, may be necessary. Developing and implementing a fishway effectiveness monitoring plan would ensure that the fishways are operating effectively and would be worth the $1,028 annual cost; therefore, we recommend that any new license issued for the Eastman Falls Project require PSNH to develop and implement a fishway effectiveness monitoring plan.

Cultural Resources

There are no known historical or archaeological properties within the project boundary listed or eligible for listing in the National Register. However, archaeological or historic sites could be discovered during any land-disturbing activities that may occur during the term of any license that is issued. Therefore, we recommend that the applicant notify the Commission and the New Hampshire SHPO if previously unidentified archaeological or historic properties are discovered during the course of operating and maintaining project works or other facilities at the project. In the event of any such discovery, the applicant would discontinue any activities related to the discovery until the proper treatment of any potential archaeological or cultural resources is established.

During the term or any license issued for the project, the applicant would occasionally need to conduct maintenance activities in the project area or on project

facilities. These activities could include replacement of broken windows on the powerhouse, powerhouse roof or masonry repairs, or general landscaping and yard maintenance within the project boundary. These activities would not require prior Commission approval; however, they could affect historic resources in the project area. Therefore, to ensure that historic resources are not adversely affected from maintenance activities, we recommend that the applicant consult with the New Hampshire SHPO prior to conducting any maintenance activities that do not require Commission approval but could affect cultural resources.

5.1.3 Measures Not Recommended

Water Quality Survey

Interior recommends (10(j) recommendation 3) that PSNH conduct water temperature and DO monitoring continuously in the headpond and tailrace for up to 3 years during the period of June 1 to September 30. New Hampshire FGD supports Interior's recommendation. PSNH does not propose to do any post-license water quality monitoring.

In 2015, New Hampshire DES concluded that project waters meet state water quality standards for DO and temperature both upstream and downstream of the Eastman Falls dam. The Corps' 2009 study supports New Hampshire DES' conclusion. DO was in excess of the minimum State standard in the project vicinity during the study and the project showed little if any effect on water temperature. Interior states that a post-license water quality survey is warranted because conditions during the 2009 low-flow period of the Corps' study may not have been under "worst case" conditions. There were two rain events during the study period which caused streamflow to rise and water temperature to drop. These occurred in late July and again in the third week of August. However, each of these events was followed by periods in which flows decreased to typical low-flow summer conditions and should have documented any problems that may be present with attaining State water quality standards. Conducting additional monitoring during the post-licensing period would not document any new effects on water quality because there are no proposed changes to project operation; however, additional monitoring could affirm the results of the monitoring that was conducted in 2009. Based on this information, we conclude that additional water quality monitoring would not be worth the $727 annual cost; therefore, we do not recommend requiring PSNH to conduct additional water quality monitoring as part of any new license that is issued for the Eastman Falls Project.

Impoundment Refill Procedure

Periodically, the project impoundment is drawn down for maintenance, after flashboards are lowered during high flows, or for unscheduled emergencies. To maintain

downstream flows, Interior recommends (10(j) recommendation 4) that the licensee implement an impoundment refill procedure whereby 90 percent of project inflow would be passed downstream and 10 percent would be used to refill the impoundment. PSNH instead proposes to implement an impoundment refill procedure based on releasing the ABF flow of 502 cfs during impoundment refilling. If inflow is less than 502 cfs, then PSNH's proposal would be the same as Interior's and it would release 90 percent of inflow.

Both impoundment refill procedures would protect aquatic habitat in a similar way, but the different procedures for refilling an impoundment result in a trade-off between effects on the aquatic habitat in the impoundment and aquatic habitat downstream of the dam. Interior's procedure is more protective of downstream habitat than PSNH's during periods when inflow exceeds 502 cfs because more flow would be released downstream resulting is more wetted area of the stream channel. Under the same inflow conditions, PSNH's procedure is generally more protective of aquatic habitat in the impoundment because it would allow the impoundment to refill more quickly, which would re-submerge any dewatered habitat near the shoreline.

While staff cannot assign costs to this measure because the depth and duration of the impoundment drawdown and refill are unknown, the licensee's proposed refill procedure would result in more rapid refill of the impoundment and likely result in an incremental increase in annual generation. Because the environmental effects of the two procedures are similar and because PSNH's procedure is likely to cost less, we recommend that PSNH's procedure be included in any license issued for the project.

Northern Long-eared Bat Consultation

Interior recommends (Interior 10(j) recommendation 6) that if the project would involve tree clearing, or would otherwise affect northern long-eared bat habitat, FERC should initiate consultation under section 7 of the ESA.

As discussed in section 3.3.3, *Threatened and Endangered Species*, staff found that relicensing the project with any of the measures considered in this EA would have no effect on this species. Therefore, no further consultation is needed at this time.

Interior Notification of License Amendments

Interior recommends that the licensee be required to notify Interior if an amendment or appeal of any fish and wildlife-related license conditions or extension of time is filed with the Commission (10(a) recommendation 1).

For significant amendments related to fish and wildlife resources, the Commission's regulations require the licensee to consult with Interior while preparing the amendment application.[20] For other amendments, appeals, and requests for extensions of time, Interior can receive notification of any filings and issuances through the Commission's eSubscription service.[21] Because existing Commission regulations and services allow Interior to be informed of amendments, appeals, and requests for extensions of time, we do not recommend including Interior's recommendation as a requirement of any new license that may be issued for this project.

5.2 UNAVOIDABLE ADVERSE EFFECTS

Although there is no documented fish entrainment or mortality at the project, it is likely that some fish pass and would continue to pass through the project turbines and some of those fish are probably injured or killed. Implementation of downstream eel passage measures would likely decrease entrainment mortality but some level of fish (including eel) mortality is likely to continue to occur.

5.3 FISH AND WILDLIFE AGENCY RECOMMENDATIONS

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

Section 10(j) of the FPA states that whenever the Commission finds that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of the agency. In response to our Ready for Environmental Analysis notice, Interior (letter filed on June 22, 2016) recommended six fish and wildlife measures. Of the six recommendations, two recommendations (5 and 6) are considered to be outside the scope of section 10(j) and have been considered under section 10(a) of the FPA and are addressed in section 3, *Environmental Analysis*, and section 5.1, *Comprehensive Development and Recommended Alternative*. Of the 4

[20] If a licensee files a request to amend its license or to amend any fish and wildlife-related license condition, the licensee may need to consult with Interior pursuant to sections 4.38(a)(6) and 4.201(c) of the Commission's regulations. 18 C.F.R. §§ 4.38(a)(6) and 4.201(c) (2015).

[21] The Commission's eSubscription service can be accessed at http://www.ferc.gov/docs-filing/esubscription.asp.

recommendations that we consider to be within the scope of section 10(j), we recommend adopting two. Table 5 lists the 10(j) recommendations and whether the recommendations are adopted under the staff alternative. Section 5.1.3, *Measures Not Recommended*, discusses the reasons we do not recommend adopting three of these measures.

Table 5. Analysis of fish and wildlife agency recommendations for the Eastman Falls Project.

Recommendation	**Agency**	**Within the Scope of Section 10(j)**	**Annualized Cost**	**Adopted?**
1. Operate the project in an instantaneous run-of-river mode	Interior	Yes	$0	Yes
1. Develop and implement an operation and flow monitoring plan	Interior	Yes	$987	Yes
2. Maintain impoundment elevation of 307 feet msl (± 0.2 feet)	Interior	Yes	$0	Yes
3. Develop and implement a post-license water quality monitoring plan	Interior	Yes	$727	No
4. Implement an impoundment refill protocol for drawdown such that 90 percent of inflow passes downstream and 10 percent of inflow refills impoundment	Interior	Yes	$0	No
5. Develop and implement an invasive species management and monitoring plan	Interior	No	$1,366	Yes
6. Consult about northern long-eared bat if habitat would be affected by project activities before clearing any trees	Interior	No	$0	No

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA, 16 U.S.C § 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, or conserving waterways affected by the project. We reviewed 6 comprehensive plans that are applicable to the Eastman Falls Project located in New Hampshire.[22] No inconsistencies were found.

6.0 FINDING OF NO SIGNIFICANT IMPACT

If the Eastman Falls Project is licensed with the additional staff recommended measures and mandatory conditions, the project would operate while providing protective measures to fish, wildlife, recreational access, aesthetics, and protecting any unidentified cultural or historic resources in the project area.

Based on our independent analysis, issuance of a license for the Eastman Falls Project, as proposed with the additional staff-recommended measures and mandatory conditions, would not constitute a major federal action significantly affecting the quality of the human environment.

7.0 LITERATURE CITED

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8.0 LIST OF PREPARERS

Amy Chang - Terrestrial Resources and Threatened and Endangered Species, (Environmental Science and Policy, M.S.; Biology, B.S.)

Tom Dean – Engineering and Economics (Civil Engineering, B.S.)

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APPENDIX A

LICENSE CONDITIONS RECOMMENDED BY STAFF

In this section, we present license articles for staff-recommended measures that would not be addressed by mandatory conditions. On June 22, 2016, the U.S. Department of the Interior (Interior) filed several preliminary section 18 fishway prescriptions. These prescriptions would be included in any license that is issued for the project and they are presented in section 2.2.4 of this EA.

Draft Article 201. *Administrative Annual Charges*. The licensee must pay the United States annual charges, effective the first day of the month in which this license is issued, and as determined in accordance with provisions of the Commission's regulations in effect from time to time, for the purposes of:

(a) reimbursing the United States for the cost of administration of Part I of the Federal Power Act. The authorized installed capacity for that purpose is 6.06 megawatts; and

(b) recompensing the United States for the use, occupancy and enjoyment of 476 acres of its lands (other than for transmission line right-of-way).

Draft Article 202. *Exhibit Drawings.* Within 45 days of the date of issuance of this license, as directed below, the licensee must file two sets of the approved exhibit drawings, form FERC-587, and GIS data in electronic file format on compact disks (CD) with the Secretary of the Commission, ATTN: OEP/DHAC.

(1) Digital images of the approved exhibit drawings must be prepared in electronic format. Prior to preparing each digital image, the FERC Project-Drawing Number (i.e., P-2457-1001 through P-2457-1014) must be shown in the margin below the title block of the approved drawing. Exhibit F drawings must be segregated from other project exhibits, and identified as Critical Energy Infrastructure Information (CEII) material under 18 C.F.R. § 388.113(c). Each drawing must be a separate electronic file, and the file name must include: FERC Project-Drawing Number, FERC Exhibit, Drawing Title, date of this license, and a file extension in the following format [P-247-1001, F-1, Description, MM-DD-YYYY.TIF].

Each Exhibit G drawing that includes the project boundary must contain a minimum of three known reference points (i.e., latitude and longitude coordinates, or state plane coordinates). The points must be arranged in a triangular format for geographic information system (GIS) georeferencing the project boundary drawing to the polygon data, and must be based on a standard map coordinate system. The spatial

reference for the drawing (i.e., map projection, map datum, and units of measurement) must be identified on the drawing and each reference point must be labeled. In addition, each project boundary drawing must be stamped by a registered land surveyor. All digital images of the exhibit drawings must meet the following format specification:

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

A third set (Exhibit G only) and a copy of Form FERC-587 must be filed with the Bureau of Land Management office at the following address:

Bureau of Land Management
Branch of Lands (ES-930)
20 M Street S.E.
Washington, D.C. 20003

Form FERC-587 is available through the Commission's website at the following URL: http://www.ferc.gov/docs-filing/forms/form-587/form-587.pdf. Although instruction no. 3 requires microfilm copies of the project boundary maps in aperture card format, electronic copies that meet the digital specifications in this ordering paragraph should be substituted. If the FERC-587 cannot be downloaded from the Internet, a hard copy may be obtained by mailing a request to the Secretary of the Commission.

(2) Project boundary GIS data must be in a georeferenced electronic file format (such as ArcView shape files, GeoMedia files, MapInfo files, or a similar GIS format). The filing must include both polygon data and all reference points shown on the individual project boundary drawings. An electronic boundary polygon data file(s) is required for each project development. Depending on the electronic file format, the polygon and point data can be included in single files with multiple layers. The georeferenced electronic boundary data file must be positionally accurate to ±40 feet in order to comply with National Map Accuracy Standards for maps at a 1:24,000 scale. The file name(s) must include: FERC Project Number, data description, date of this license, and file extension in the following format [P-2457, boundary polygon/or point data, MM-DD-YYYY.SHP]. The filing must be accompanied by a separate text file describing the spatial reference for the georeferenced data: map projection used (i.e., UTM, State Plane, Decimal Degrees, etc.), the map datum (i.e., North American 27, North American 83, etc.), and the units of measurement (i.e., feet, meters, miles, etc.). The text file name must include: FERC Project Number, data description, date of this

license, and file extension in the following format [P-2457, project boundary metadata, MM-DD-YYYY.TXT].

In addition, for those projects that occupy federal lands, a separate georeferenced polygon file(s) is required that identifies transmission line acreage and non-transmission line acreage affecting federal lands for the purpose of meeting the requirements of 18 C.F.R. §11.2. The file(s) must also identify each federal owner (e.g., Bureau of Land Management, Forest Service, U.S. Army Corps of Engineers, etc.), land identification (e.g., forest name, Section 24 lands, national park name, etc.), and federal acreage affected by the project boundary. Depending on the georeferenced electronic file format, the polygon, point, and federal lands data can be included in a single file with multiple layers.

Draft Article 203. *Amortization Reserve*. Pursuant to section 10(d) of the Federal Power Act, a specified reasonable rate of return upon the net investment in the project must be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee must set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee must deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee must set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee must maintain the amounts established in the project amortization reserve account until further order of the Commission.

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

Draft Article 204. *Headwater Benefits.* If the licensee's project was directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the prior license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater

improvement, the licensee must reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license. The benefits will be assessed in accordance with Part 11, Subpart B, of the Commission's regulations.

Draft Article 205. *As-built Exhibits*. Within 90 days of completion of construction of the facilities authorized by this license, including the new upstream and potential downstream eel passage facilities, the licensee must file for Commission approval, revised Exhibits A, F, and G, as applicable, to describe and show those project facilities as built.

Draft Article 301. *Contract Plans and Specifications*. At least 60 days prior to the start of any construction, the licensee must submit one copy of its plans and specifications and supporting design document to the Commission's Division of Dam Safety and Inspections (D2SI) – New York Regional Engineer, and two copies to the Commission (one of these must be a courtesy copy to the Director, D2SI). The submittal to the D2SI –New York Regional Engineer must also include as part of preconstruction requirements: a Quality Control and Inspection Program, Temporary Construction Emergency Action Plan, and Soil Erosion and Sediment Control Plan. The licensee may not begin construction until the D2SI – New York Regional Engineer has reviewed and commented on the plans and specifications, determined that all preconstruction requirements have been satisfied, and authorized start of construction.

Draft Article 302. *Cofferdam and Deep Excavation Construction Drawings*. Should construction require cofferdams or deep excavation, the licensee must review and approve the design of contractor-designed cofferdams and deep excavations and must: (1) have a Professional Engineer who is independent from the construction contractor review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction; and (2) ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days before starting construction of any cofferdams or deep excavations, the licensee must submit one copy to the Commission's Division of Dam Safety and Inspections (D2SI) – New York Regional Engineer and two copies to the Commission (one of these copies must be a courtesy copy to the Commission's Director, D2SI), of the approved cofferdam and deep excavation construction drawings and specifications, and the letters of approval.

Draft Article 303. *Project Modification Resulting From Environmental Requirements*. If environmental requirements under this license require modification that may affect the project works or operations, the licensee must be consult with the Commission's Division Dam Safety and Inspections – New York Regional Engineer. Consultation must allow sufficient review time for the Commission to ensure that the

proposed work does not adversely affect the project works, dam safety, or project operation.

Draft Article 401. *Requirement to File Plans, Reports, and Amendments*.

(a) Schedule for Filing Plans for Commission Approval

Any plan required by the U.S. Department of the Interior's (Interior) section 18 fishway prescription must be filed with and approved by the Commission prior to implementation to ensure that it does not conflict with project purposes and will not adversely affect dam safety. Therefore, within 60 days of license issuance, the licensee must file a schedule for filing each plan required by Interior's prescription with the Commission. For each plan, the schedule must specify: (1) the name of the plan, (2) the section or sections in Interior's prescription that requires the plan, (3) each entity that will be consulted during preparation of the plan, and (4) the date the plan will be filed with the Commission. Plans that are contemplated by Interior's prescription, but not necessarily required at this time, should not be included in the schedule. In order to meet any plan implementation dates specified in Interior's prescription, the filing dates in the schedule should account for the time necessary for the Commission to review and approve the plan (i.e., 60 days for plans that include new construction and 30 days for all other plans). The Commission reserves the right to make changes to the schedule for filing plans.

(b) Schedule for Filing Reports

Any report of study or monitoring results required by Interior's section 18 fishway prescription must be filed with the Commission to confirm compliance with the requirements of this license. Therefore, within 60 days of license issuance, the licensee must file a schedule for filing each report required by Interior's prescription. For each report, the schedule must specify: (1) the name of the report, (2) the section or sections in Interior's prescription that requires the report, (3) each entity that will be consulted during preparation of the report, and (4) the date the report will be filed with the Commission. Reports that are contemplated by Interior's prescription, but not necessarily required at this time, should not be included in the schedule. The Commission reserves the right to make changes to the schedule for filing reports.

(c) Reporting of Temporary Modification of Project Operation

Any temporary modification of project operation that is allowed by Interior's section 18 fishway prescription must be reported to the Commission. Planned temporary modifications of project operation must be reported to the Commission at least 30 days prior to implementing the modification. Unplanned temporary modifications of project operation must be reported as soon as possible, but no later than 10 days after each such incident. Each report must be filed with the Commission and must include a description

of the reason for the planned or unplanned temporary modification of project operation. If unplanned, the report must also include proposed measures, if applicable, to prevent future modifications.

(d) Requirement to File Amendment Applications

Any unspecified, long-term changes to project operation or facilities (e.g., installation of the permanent downstream eel passage facility) that are contemplated by Interior's section 18 fishway prescription may not be implemented without prior Commission authorization granted after the filing of an application to amend the license.

Draft Article 402. *Run of River Operation*. The licensee must operate the project in a run-of-river mode, such that inflows approximate outflows on an instantaneous basis. Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the licensee. If operation of the project causes a deviation from run-of-river mode, the licensee must notify the Commission as soon as possible, but no later than 10 days after each such incident.

Draft Article 403. *Impoundment Refill*. When refilling the project impoundment after flashboards are lowered during high flows, for maintenance, or for emergencies, the licensee must release a minimum flow of 502 cfs downstream to the Pemigewassett River, unless inflow is less, in which case it must release 90 percent of impoundment inflow.

Draft Article 404. *Operation Compliance Monitoring Plan*. Within six months of the effective date of this license, the licensee must file with the Commission, for approval, an operation compliance monitoring plan for the project. The plan must include, but is not limited to:

(a) a description of how the project will be operated to maintain compliance with the run of river operation required in Draft Article 402;

(b) a description of the impoundment refill procedures required in Draft Article 403;

(c) a description of the mechanisms and structures (i.e., type and exact locations of all flow and reservoir elevation monitoring equipment and gages) to be used for maintaining compliance with operational requirements, procedures for maintaining and calibrating monitoring equipment, and the methods and frequency for reporting monitoring data to the Commission, the U.S. Department of the Interior (Interior), New Hampshire Department of Environmental Services (New Hampshire DES), and the New Hampshire Fish and Game Department (New Hampshire FGD); and

(d) an implementation schedule.

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

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

Draft Article 405. *Debris Management*. In addition to the requirements of the Fishway Operation and Maintenance Plan (FOMP) required by Interior's section 18 fishway prescription, the FOMP shall describe:

(a) procedures for separation of organic and inorganic debris;
(b) procedures for off-site disposal of inorganic material; and
(c) procedures for reintroducing organic debris to the Pemigewasset River downstream of Eastman Falls dam, as appropriate.

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

Draft Article 407. *Invasive Species Management and Monitoring Plan.* Within six months of the effective date of this license, the licensee must file for Commission approval a plan to manage and monitor invasive plant species in the project area. The plan must include, but not be limited to: (1) a description of invasive species monitoring methods and the frequency of monitoring; (2) a description of best management practices that will be used to reduce the spread of nuisance species found at the project; (3) a description of any criteria that will be used to determine when control measures are needed and a description of any control measures that the licensee will implement to control nuisance species found at the project (i.e., manual pulling, chemical application, biological controls); and (4) a schedule for filing any monitoring reports with New

Hampshire Department of Environmental Services (New Hampshire DES), the U.S. Department of the Interior (Interior), and the Commission for review.

The plan must be prepared after consultation with New Hampshire DES and Interior. The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project-specific information.

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

Draft Article 408. *Protection of Cultural Resources.* Prior to implementing any project modifications not specifically authorized by this license, including but not limited to maintenance activities, land-clearing or land-disturbing activities, the licensee must consult with the New Hampshire Historic Preservation Commission (New Hampshire SHPO) to determine the effects of the activities and the need for any cultural resource studies or measures. If no studies or measures are needed, the licensee must file with the Commission documentation of its consultation with the New Hampshire SHPO.

If a project modification is determined to affect a historic property, the licensee shall file for Commission approval a Historic Properties Management Plan (HPMP) prepared by a qualified cultural resource specialist after consultation with the New Hampshire SHPO. In developing the HPMP, the licensee shall use the Advisory Council on Historic Preservation and the Commission's *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects*, dated May 20, 2002. The HPMP shall include the following items: (1) a description of each historic property; (2) a description of the potential effect on each historic property; (3) proposed measures for avoiding or mitigating adverse effects; (4) documentation of the nature and extent of consultation; and (5) a schedule for implementing mitigation and conducting additional studies. The Commission reserves the right to require changes to the HPMP.

The licensee shall not implement any project modifications, other than those specifically authorized in this license, until informed by the Commission that the requirements of this article have been fulfilled.

Draft Article 409. *Protection of Undiscovered Cultural Resources.* If the licensee discovers previously unidentified cultural resources during the course of constructing, maintaining, or developing project works or other facilities at the project, the licensee

must stop all land-clearing and land-disturbing activities in the vicinity of the resource and consult with the New Hampshire SHPO to determine the need for any cultural resource studies or measures. If no studies or measures are needed, the licensee must file with the Commission documentation of its consultation with the New Hampshire SHPO immediately.

If a discovered cultural resource is determined to be eligible for the National Register of Historic Places (National Register), the licensee must file for Commission approval an HPMP prepared by a qualified cultural resource specialist after consultation with the New Hampshire SHPO. In developing the HPMP, the licensee must use the Advisory Council on Historic Preservation's and the Federal Energy Regulatory Commission's *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects*, dated May 20, 2002. The HPMP must include the following items: (1) a description of each discovered property, indicating whether it is listed in or eligible to be listed in the National Register; (2) a description of the potential effect on each discovered property; (3) proposed measures for avoiding or mitigating adverse effects; (4) documentation of consultation; and (5) a schedule for implementing mitigation and conducting additional studies. The Commission reserves the right to require changes to the HPMP.

The licensee must not resume land-clearing or land-disturbing activities in the vicinity of a cultural resource discovered during construction, until informed by the Commission that the requirements of this article have been fulfilled.

Draft Article 410. *Use and Occupancy.* (a) In accordance with the provisions of this article, the licensee must have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee must also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee must take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

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

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

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 water craft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must file a letter with the Commission, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Commission's authorized representative, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

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

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

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

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

that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee must not unduly restrict public access to project waters.

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

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

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

Document Content(s)

EVERSOURCE ENERGY

780 North Commercial Street
Manchester, NH 03101-1134

June 26, 2018

D34207

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
ATTN: OEP/DHAC
888 First Street, N.E.
Washington, DC 20426

RE: Eastman Falls Hydroelectric Project (FERC No. 2457-041)
Water Quality Monitoring Plan

Dear Secretary Bose:

In accordance with Condition E-13 of the Water Quality Certification and Article 401 of the 2017 License for the Eastman Falls Hydroelectric Project FERC No. 2457 (159 FERC ¶ 62,070), the Licensee, Public Service Company of New Hampshire d/b/a Eversource Energy (PSNH or Licensee), hereby files its Water Quality Monitoring Plan (WQMP) for Commission review and approval.

Pursuant to WQC Condition E-13, the plan was submitted to New Hampshire Department of Environmental Services (NHDES) for review and approval on April 3, 2018. Comments were received from the NHDES on June 15, 2018 and have been incorporated into the WQMP as appropriate. Consultation efforts are summarized in Section 3.0 of the WQMP. The Plan will be implemented upon approval by the Commission.

If you have any questions or require further information, please contact me at 603-744-8855, ext. 2 or curtis.mooney@eversource.com .

Curtis R. Mooney
Eversource Hydro Senior Engineering Specialist

Attachment

WATER QUALITY MONITORING PLAN

EASTMAN FALLS HYDROELECTRIC PROJECT

(FERC NO. 2457)

Prepared for:

Public Service Company of New Hampshire
d/b/a Eversource Energy

Manchester, NH

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

June 2018

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WATER QUALITY MONITORING PLAN

EASTMAN FALLS HYDROELECTRIC PROJECT
(FERC NO. 2457)

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
D/B/A EVERSOURCE ENERGY

1.0 INTRODUCTION

The Eastman Falls Hydroelectric Project (Project) (FERC No. 2457) is an existing Project located on the Pemigewasset River in Merrimack and Belknap Counties, and in the city of Franklin and towns of Hill, Sanbornton, and New Hampton, New Hampshire. The Project is owned and operated by Public Service Company of New Hampshire d/b/a Eversource Energy (PSNH). A water quality monitoring plan is required by Article 401 of the 2017 License Order (159 FERC ¶ 62,070) and Condition E-13 of the Water Quality Certification, developed in consultation with and approved by NHDES.

1.1 PROJECT DESCRIPTION

The Eastman Falls Project is an existing, licensed 6.4 MW generating facility owned and operated by PSNH. The Project is located on the Pemigewasset River, at river mile 116.5, approximately 1.5 miles downstream of the United States Army Corps of Engineers (USACE) Franklin Falls Flood Control Dam, and about one mile upstream of its confluence with the Winnipesaukee River. The Project has an impoundment surface area of about 582 acres at normal pool elevation of 307 feet mean sea level (msl) and a gross storage capacity of approximately 4,570 acre-feet. The impoundment extends nine miles upstream, through the USACE Franklin Falls Flood Control Dam at river mile 118, to Sumner Island at river mile 125.5.

1.2 PROJECT OPERATIONS

The Eastman Falls Project operates in an un-manned, run-of-river mode such that impoundment fluctuations do not exceed $\pm$ 0.2 feet from the normal impoundment elevation of 307 feet msl with flashboards installed. The generating units are normally operated remotely from PSNH's

Electrical System Control Center (ESCC) located in Manchester, New Hampshire, although both units are capable of local operation. Manual operations and maintenance of the Eastman Falls Project are performed by the Central Hydro Group, which is responsible for PSNH's Eastman Falls Project and Ayer's Island Dam (FERC No. 2456) project located in central New Hampshire. Daily logs of pond level, flow, and outages are maintained electronically for the Project. Additional operating parameters are described in the Project's Operation Compliance Monitoring and Maintenance Plan (OCMMP).

2.0 WATER QUALITY MONITORING PLAN

The New Hampshire Department of Environmental Services (NHDES) within its December 20, 2016 Water Quality Certification, Condition E-13, requested that within six months of the effective date of the FERC license renewal, a water quality monitoring plan (WQMP) to determine if the renewal of the Eastman Falls FERC License activity is causing or contributing to violations of state surface water quality regulations be developed. Per the request, the objectives of this monitoring plan are to collect dissolved oxygen (DO), water temperature, pH measurements, total phosphorus and chlorophyll-a. In comments provided by NHDES on June 15, 2018, several sampling guidance and procedure documents and sample data sheets were provided (Appendix A), which will be utilized for field sampling.

The water quality throughout the Project area and the Pemigewasset and Merrimack Rivers is identified as Class B waters by the NHDES (NHDES 2008). Class B waters are considered acceptable for fishing, swimming, and other recreational purposes, and for use as water supplies after adequate treatment has been applied (NHDES 2014).

2.1 MONITORING METHODOLOGY

The methods described herein are based on the recommendations that NHDES provided in their December 2016 WQC, requesting a monitoring plan as part of the Eastman Falls Project relicensing effort. PSNH will collect continuous (i.e., every 15 minutes) dissolved oxygen (concentration and percent saturation), water temperature and pH measurements using multi-parameter dataloggers (from a site in the impoundment and a site downstream of the dam. The methodology herein includes, to the extent possible at this time, the information identified in

Section 3 of NHDES's *Sampling Guidance #1 for Hydropower Studies* last revised June 15, 2018) (See Appendix A).

PSNH proposes two monitoring locations, a site in the impoundment (at approximately 43º 26' 55" N, 71º 39' 23" W) and a site downstream of the dam at approximately 43º 26' 46" N, 71º 39' 46" W) as stipulated in Conditions E-13 b. 1) (see Figure 1).

PSNH plans to deploy dataloggers for at least 30 consecutive days during the summer following FERC approval of the plan. This will include extended dry periods when river flow is approximately at the 7Q10 flow (approximately 222 cfs) and water temperatures are approximately 25 degrees Celsius or greater (i.e., near worse case conditions). PSNH proposes to commence sampling when river flows, though monitoring real time data for the upstream Franklin Falls dam[1] are below 300 cfs for two consecutive days.

Two vertical profiles will be collected in the impoundment for dissolved oxygen and water temperature (in one-foot increments from the surface to the bottom) on two days when continuous dataloggers are deployed and conditions are near worse case. Sampling will be conducted in the morning (before 0700 hours) and afternoon (1300-1600 hours) in order to capture any diurnal fluctuations.

PSNH plans to collect four (4) grab samples (once a week for four (4) weeks when the dataloggers are deployed) at the impoundment monitoring location for sample parameters will include Total Phosphorous (TP), Total Kjeldahl Nitrogen (TKN), Nitrate (NO3) + Nitrite (NO2), E.coli, Acid Soluble Aluminum, Hardness, Calcium (Ca), Magnesium (Mg), Potassium (K), Copper (Cu), Lead (Pb), Zinc (Zn), Alkalinity, Sulfate (SO4), and Total Organic Carbon (TOC). Water samples will be delivered to a qualified laboratory on the same day as sampling. Appropriate chain-of-custody and sample labeling techniques will be followed. PSNH will also collected chlorophyll-a samples in the impoundment using epilimnetic core method defined in NHDES SOP L4: Chlorophyll-A Sampling (Appendix A).

[1] https://reservoircontrol.usace.army.mil/NE/pls/cwmsweb/cwms_realtime.projectpage?gagecode=FFD

Dissolved Oxygen and temperature data will be collected using calibrated YSI 556 and/or YSI 55 water quality meters[2]. Hach Hydrolab MS5 minisondes (or equivalent) will be used for continuous DO monitoring, calibrated per manufacturer specifications.

PSNH will confirm longitudinal and latitudinal coordinates of each monitoring location as well as photographs and will create maps showing each location. As requested by NHDES, PSNH will submit all data electronically to NHDES and in a form that can be automatically uploaded into the NHDES Environmental Monitoring Database (EMD) and a report will be submitted to NHDES summarizing the results by January 31st of the year after monitoring was conducted.

Monitoring shall commence in accordance with the NHDES approved WQMP the first summer that meets the conditions of E-13 (b), defined above. If results indicate the potential for water quality violations with relatively little change in water quality (i.e., water quality standards have been marginally met), PSNH understands that NHDES may require additional sampling no sooner than five years after the previous sampling was conducted. If results indicate that the Project is causing or contributing to violations of surface water quality standards, NHDES may require implementation of mitigation measures and additional monitoring to confirm that mitigation measures have resulted in attainment of surface water quality standards.

[2] According to the manufacturer's specifications, the accuracy of the YSI 556 water temperature, DO concentration, DO percent saturation, and conductivity measurements are ±0.15ºC, ±2% of the reading or 0.2 mg/L, whichever is greater, ±2% of the reading or 2% air saturation, whichever is greater, and ±1% or ±0.001 µS/cm, whichever is greater, respectively. The accuracy of the YSI 55 water temperature, DO concentration, and DO percent saturation measurements are ±0.02ºC, ±0.3 mg/L, and ±2% air saturation, respectively.

FIGURE 1 APPROXIMATE LOCATION OF DO AND WATER TEMPERATURE MONITORING SITES

Source: PSNH, Kleinschmidt, ESRI

2.2 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

This Plan employs standard practices for evaluating water quality at hydroelectric projects and that are consistent with those defined by NHDES.

2.3 DELIVERABLES AND SCHEDULE

As discussed above, PSNH plans to deploy dataloggers for at least 30 consecutive days during the first summer following FERC approval of the plan, provided that there are extended dry periods when river flow is approximately at the 7Q10 flow (222 cfs) and water temperatures are approximately 25 degrees Celsius or greater (i.e., near worse case conditions). PSNH proposes to commence sampling when river flows are below 300 cfs for two consecutive days. Should these conditions not occur, PSNH will confirm via email with the NHDES that monitoring will be postponed to the following year. A report summarizing data captured will be filed with the NHDES and the FERC on or before by January 31st following the study season.

2.4 REFERENCES

NHDES (New Hampshire Department of Environmental Services). 2014. Water Quality. Available online at: http://des.nh.gov/organization/divisions/water/wmb/wqs/history.htm [Accessed March 30, 2015].

NHDES (New Hampshire Department of Environmental Services). 2008. New Hampshire 2008 Section 305 (b) and 303 (d) Surface Water Quality Report. Available online at: http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/r-wd-08-5.pdf [Accessed March 30, 2015].

3.0 CONSULTATION

As required by Condition E-13 of the Water Quality Certification, the WQMP was submitted to NHDES for review and approval on April 3, 2018. Written comments were received June 15, 2018 and have been incorporated, as appropriate into the plan. NHDES requested additional detail regarding determination of the 7Q10 flow. This information was provided directly to NHDES on June 22, 2018, but is not included in the WQMP. Consultation correspondence is provided in Appendix B.

APPENDIX A

NHDES SAMPLING GUIDELINE AND METHODOLOGY

New Hampshire Department of Environmental Services

Sampling Guidance #1 for Hydropower Studies

(Dissolved Oxygen, Temperature, pH,

Nutrients, Chlorophyll a and Secchi Disk)

(Last Revised: 6/15/18)

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1 Introduction and Purpose

Applicants filing for a hydropower license or exemption from the Federal Energy Regulatory Commission (FERC) often need to conduct various water quality studies to determine the effect of project operation on state surface water quality standards. The purpose of this document is to provide sampling guidance for dissolved oxygen, temperature, pH, nutrients, chlorophyll a and secchi disk for hydropower projects conducting studies to determine the spatial and temporal effects of project operation (in terms of flow, impoundment elevation and power generation) on water quality and to determine compliance with New Hampshire surface water quality standards.

2 Surface Water Quality Standards and Thresholds

New Hampshire surface water quality standards are included in statute (RSA 485-A:8) and regulation (Env-Wq 1700) [see Section 5, reference (ref) 4]. Surface water quality standards include designated uses, criteria to protect the designated uses and antidegradation provisions to protect and maintain existing uses and to minimize degradation of high quality surface waters. Designated uses include recreation (i.e., swimming and other recreation in and on the water), fish consumption, shellfish consumption (tidal waters only), aquatic life integrity, wildlife and potential drinking water supply (Env-Wq 1702.17). The majority of the criteria are included in Env-Wq 1700. In cases where the standards include narrative criteria but no numeric criteria, the New Hampshire Consolidated Assessment and Listing Methodology (CALM- ref 3) often includes numeric thresholds which are used as translators of the narrative criteria in the standards. Criteria or thresholds are often dependent on the waterbody classification. In New Hampshire there are two classes, A and B with most surface waters classified as B. To determine the class for a specific waterbody, Applicants should contact the New Hampshire Department of Environmental Services (NHDES) Watershed Management Bureau.

Table 1 shows the surface water quality criteria or thresholds for the parameters addressed in this guidance for class A and B waters as well as the primary designated uses the criteria and thresholds are designed to protect. As shown below the designated uses for the criteria listed below are for protection of aquatic life and recreation. With regards to aquatic life protection, these criteria and thresholds help to maintain Biological and Community Integrity which is addressed in the following regulations:

> Env-Wq 1702.08 “Biological integrity” means the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
>
> Env-Wq 1702.13 “Community” means one or more populations co-occurring in surface waters.
>
> Env-Wq 1703.19 Biological and Aquatic Community Integrity.
>
> (a) All surface waters shall support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
>
> (b) Differences from naturally-occurring conditions shall be limited to non-detrimental differences in community structure and function.

Table 1 Surface Water Quality Criteria and Thresholds for Class A and B waters

Parameter (Designated Use)	**Surface Water quality Criteria or Thresholds**
Dissolved Oxygen (for protection of aquatic life)	Env-Wq 1703.07 Dissolved Oxygen. (a) Class A waters shall have a dissolved oxygen content of at least 75% saturation, based on a daily average, and an instantaneous minimum of at least 6 mg/l at any place or time except as naturally occurs. (b) Except as naturally occurs and subject to (c) and (e), below, class B waters shall have a dissolved oxygen content of: (1) At least 75% of saturation, as specified in RSA 485-A:8, II, based on a daily average; and (2) An instantaneous minimum dissolved oxygen concentration of at least 5 mg/l. (c) In areas identified by the New Hampshire fish and game department (NHF&G) as cold water fish spawning areas of species whose early life stages are buried in the gravel on the bed of the surface water, the 7 day mean dissolved oxygen concentration shall be at least 9.5 mg/l and the instantaneous minimum dissolved oxygen concentration shall be at least 8 mg/l for the period from October 1 of one year to May 14 of the next year, provided that the time period shall be extended to June 30 for a specific discharge to a specific waterbody if modeling done in consultation with the NHF&G determines the extended period is necessary to protect spring spawners or late hatches of fall spawners, or both. (d) Unless naturally occurring or subject to (a), above, surface waters within the top 25 percent of depth of thermally unstratified lakes, ponds, impoundments, and reservoirs or within the epilimnion of stratified waterbodies shall contain a dissolved oxygen content of at least 75 percent saturation, based on a daily average and an instantaneous minimum dissolved oxygen content of at least 5 mg/l. Unless naturally occurring, the dissolved oxygen content below those depths shall be consistent with that necessary to maintain and protect existing and designated uses.

Parameter (Designated Use)	**Surface Water quality Criteria or Thresholds**
Temperature (for protection of aquatic life)	Env-Wq 1703.13 Temperature. (a) There shall be no change in temperature in class A waters, unless naturally occurring. (b) Temperature in class B waters shall be as specified in RSA 485-A:8, II and VIII. RSA 485-A:8, II (regarding Class B waters): "Any stream temperature increase associated with the discharge of treated sewage, waste or cooling water, water diversions, or releases shall not be such as to appreciably interfere with the uses assigned to this class." RSA 485-A:8, VIII: "In prescribing minimum treatment provisions for thermal wastes discharged to interstate waters, the department shall adhere to the water quality requirements and recommendations of the New Hampshire fish and game department, the New England Interstate Water Pollution Control Commission, or the United States Environmental Protection Agency, whichever requirements and recommendations provide the most effective level of thermal pollution control."
pH (for protection of aquatic life)	Env-Wq 1703.18 pH. (a) The pH of Class A waters shall be as naturally occurs. (b) As specified in RSA 485-A:8, II, the pH of class B waters shall be 6.5 to 8.0 unless due to natural causes. (c) As specified in RSA 485-A:8, III, the pH of waters temporary partial use areas shall be 6.0 to 9.0 unless due to natural causes.

Parameter (Designated Use)	**Surface Water quality Criteria or Thresholds**
Nutrients – Total Phosphorus and Nitrogen (for protection of aquatic life and recreation)	Env-Wq 1703.14 Nutrients. (a) Class A waters shall contain no phosphorus or nitrogen unless naturally occurring. (b) Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring. (c) Existing discharges containing phosphorus or nitrogen, or both, which encourage cultural eutrophication shall be treated to remove the nutrient(s) to ensure attainment and maintenance of water quality standards. (d) There shall be no new or increased discharge of phosphorus into lakes or ponds. (e) There shall be no new or increased discharge containing phosphorus or nitrogen to tributaries of lakes or ponds that would contribute to cultural eutrophication or growth of weeds or algae in such lakes and ponds. Numeric thresholds for Total Phosphorus (TP) in lakes, ponds, reservoirs and impoundments are dependent on trophic classification and are provided in the CALM (Indicator 7b) for the protection of aquatic life as follows: Best Historical Trophic Category — TP (ug/L) Oligotrophic — < 8.0 Mesotrophic — ≤ 12.0 Eutrophic — ≤ 28 where TP represents the median of at least 5 (and preferably more) samples collected between May 24 and September 15 in the upper layer (e.g., epilimnion if stratified).

Parameter (Designated Use)	**Surface Water quality Criteria or Thresholds**
Chlorophyll a (for protection of aquatic life and recreation)	Env-Wq 1703.14 (see above) which references "cultural eutrophication" which is defined as follows: Numeric thresholds for chlorophyll a for the protection of recreational uses (Indicator 3) and aquatic life in lakes, ponds, reservoirs and impoundments) (Indicator 7a) are provided in the CALM as follows: For protection of recreational uses (i.e. primary contact recreation): Chlorophyll a (ug/L) Freshwaters: ≤ 15 Tidal Waters: ≤ 20 For protection of aquatic life in lakes, ponds, reservoirs and impoundments (which behave more like lakes than riverine segments): Best Historical Trophic Category — Chlorophyll a (ug/L) Oligotrophic < 3.0 Mesotrophic ≤ 5.0 Eutrophic ≤ 11 where Chlorophyll a represents the median of at least 5 (and preferably more) samples collected between May 24 and September 15 in the upper layer (e.g., epilimnion if stratified).
Secchi Disk (for protection of aquatic life and recreation)	There is no numeric criteria in regulation or a numeric threshold in the CALM. This data helps to determine the depth and extent of the littoral zone and to corroborate chlorophyll data.

3 Sampling and Analysis Plan (SAP)

Prior to sampling, Applicants should submit a Sampling and Analysis Plan (SAP) to the NHDES, Watershed Management Bureau for review and approval to help ensure that high quality data is collected. The SAP should include, but not be limited to, the following:

a. Purpose for sampling;
b. qualifications of those conducting the work;
c. parameters that will be sampled;
d. where samples will be collected (including latitude and longitude);
e. the sampling frequency and total number of samples for each parameter;
f. how samples for laboratory analysis will be collected, preserved (if applicable) and the laboratory methods that will be used to analyze the samples;
g. the make, model, accuracy, precision and range of all field measuring equipment;
h. how field monitoring equipment will be deployed;
i. how field measuring equipment will be calibrated and the frequency of calibration (especially for long term, near continuous datasonde deployments);

j. QA/QC procedures including, but not limited to, measurement performance criteria [i.e., precision, accuracy, and sensitivity (i.e., reporting limits)] and a description of the QC sample and/or activity that will be used to assess measurement performance, field checks of datasondes using handheld meters, etc.;
k. a copy of field data sheets, chain of custody, etc.;
l. when data will be entered into the NHDES Environmental Monitoring Database (EMD)[1];
m. how flow and pond elevation will be determined; and
n. how data will be summarized and reported.

The NHDES *Lake Assessment Programs Quality Assurance Plan* (ref 1) and the NHDES *2014-2018 Ambient River Monitoring Program Quality Assurance Project Plan* (ref 2) provide good examples of many of the above items and can be provided upon request.

The tables below provide specifics for some of the SAP items mentioned above. Depending on the situation, NHDES may approve alternatives to these protocols if there is sufficient justification to do so. For example, the presence of existing , relatively recent data of known quality, may be a reason to reduce the sampling effort. There may also be instances where additional sampling is necessary. For example, if conditions do not adequately capture operation during periods of relatively low flow/high temperature, or if water quality violations are identified, additional sampling may be necessary. The size of the project and how the facility operates (i.e., run-of-river versus store and release) may also impact sampling requirements.

As shown in Table 2, sampling should include long term deployment of datasondes at four locations to determine how the project impacts water quality from the reach just upstream and beyond the influence of the project (i.e., the reference site), in the impoundment and one or two sites downstream of the dam (including the bypass channel if applicable). A period of up to 10 weeks during the summer is specified to capture water quality when the project is operating under various flows and temperatures including (weather permitting) periods of low flow and relatively high temperature when water quality standard violations associated with hydropower projects are most likely to occur [e.g., dissolved oxygen is typically the lowest and chlorophyll a is typically the highest). Long term, near continuous measurements are needed to capture the dissolved oxygen signature and to facilitate calculation of the daily average percent saturation for comparison to the daily average percent saturation criteria. Nutrient, secchi disk and pH help to corroborate dissolved oxygen and chlorophyll a results [i.e. , high chlorophyll a is typically associated with diurnal swings in dissolved oxygen, high nutrient levels, high pH (due uptake of carbon dioxide by algae) and low secchi disk (i.e., water clarity) readings]. Secchi disk readings also help to determine the depth and extent of the littoral zone in impoundments.

Dissolved oxygen and temperature profiles are needed to determine how these parameters vary with depth and if the impoundment thermally stratifies (which dictates the depth the datasondes must be set [see Env-Wq 1703.07(d) in Table 1]. Thermal stratification occurs when there is more than a 1^{o}C difference in temperature per meter of depth. Such information can also identify potential dissolved

[1] Instructions for entering data into the NHDES Environmental Monitoring Database (EMD), and contact information, are provided at http://des.nh.gov/organization/divisions/water/wmb/emd/.

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oxygen concerns if low levels of dissolved oxygen in the lower portions of the impoundment are allowed to be released downstream.

As indicated in Table 2, additional sampling may be needed for studies designed to determine minimum instream flows in bypass channels and/or further downstream of the dam.

Table 2 Location, Duration and Frequency of Sampling

Parameters	Location*	Duration and Frequency*
Long term, near continuous Dissolved Oxygen (mg/L and % sat) , temperature and pH	1. Upstream of impoundment in a riverine section (this upstream "reference" site is needed to show how the project affects water quality); 2. At deep spot in the impoundment (in accordance with Env-Wq 1703.07(d), the datasonde shall be located within the top 25% of depth of thermally unstratified impoundments or within the epilimnion of thermally stratified impoundments). 3. Downstream in the tailrace or at a location representative of downstream flow 4. In the bypass channel. (Specific sampling locations shall be approved by NHDES prior to sampling).	Deployment of all datasondes for 10 continuous weeks during the summer /early fall (typically July through mid- September) to capture operation under a range of flows and temperatures including (weather permitting) periods of relatively low flow (ideally at or near the 7Q10 low flow[2]) and high temperatures (ideally approximately 25°C or above). Readings should be taken at least every 15 minutes.
Dissolved Oxygen (mg/L and % sat) and Temperature Profile	Deep spot of the impoundment at the same location as where the datasonde is deployed. Start the profile at 0.1 meter from the surface and then take readings at 1 meter from the surface and every meter thereafter (or every 0.5 meter if the impoundment depth is less than 5 meters) down to 0.5 meters from the bottom.	Once per week for 10 weeks [i.e., during the same time that the long term datasondes are deployed (see above)].
Dissolved Oxygen (mg/L and % sat) and Temperature during flow studies.	Additional sampling for dissolved oxygen and temperature may be necessary during studies conducted to determine appropriate minimum flows in bypass channels and/or downstream of tailraces. Details to be determined on a case-by-case basis.	Details to be determined on a case-by-case basis.

[2] The 7Q10 low flow is the average 7 day flow that occurs, on average, once every ten years.

Parameters	Location*	Duration and Frequency*
Total Kjldahl Nitrogen and Nitrite + Nitrate Nitrogen	If thermally stratified, collect a grab sample from the mid-epilimnion at the deep spot in the impoundment . If not stratified, collect a grab sample at a depth equal to 25% of the total depth.	Once per week for 10 weeks [i.e., during the same time that the long term datasondes are deployed (see above)].
Total Phosphorus	If thermally stratified, collect a grab sample from the mid-epilimnion and mid-hypolimnion at the deep spot of the impoundment. If not stratified, collect a grab sample at a depth equal to 25% of the total depth.	Same as above.
Chlorophyll a	Collect composite sample from the middle of the metalimnion (thermocline) to the surface at the deep spot of the impoundment if stratified ,or from two thirds of the total depth to the surface if not stratified. Composite samples can be collected with an integrated tube or by compositing samples taken at 1 meter increments with a Kemmerer bottle.	Same as above.
Secchi Disk (with a viewscope)	At the deep spot of the impoundment .	Same as above.
*See text for examples when NHDES may waive or modify these requirements. For most parameters at least 10 samples are needed to assess the parameter. If sampling is conducted for less than 10 weeks, the 10 samples should be relatively evenly distributed throughout the sampling period (i.e. for a 5 week sampling period, 2 nutrient samples should be taken each week with each sample separated by approximately 3 days.		

Table 3 Field Meter Calibration – Frequency and Acceptance Criteria

Parameters	Frequency of Calibration	Calibration Acceptance Criteria*
Dissolved Oxygen	Instantaneous readings Prior to each measurement Datasonde Deployments Prior to deployment and checked at the end of deployment and at least every two weeks (or more frequently if meter fouling is likely to occur) for deployments lasting more than two weeks.	Instantaneous readings ±2.0% of calibration saturation absolute value one minute after altitude and/or barometric compensated calibration Datasonde Deployments After Calibration:±0.2 mg/L from Oxygen Solubility in Water Value based on concurrent water temperature and barometric conditions Post Deployment :± 0.5 mg/L from Oxygen Solubility in Water Value based on concurrent water temperature and barometric conditions
Temperature	same as above	Datasonde Deployments ≤ 0.5°C from handheld meter measurement
pH	same as above	Instantaneous readings Calibration slope: 95% - 105% ± 0.3 standard units from a known standard Datasonde Deployments After two point calibration:±0.05 std units from both calibration standards Post Deployment :±0.3 std. units from both calibration standards
*The calibration criteria provided in this table are based on the field equipment used by NHDES. If different makes or models of field equipment are proposed that can't meet these criteria, the Applicant may submit their alternative calibration criteria to NHDES for consideration.		

Table 4 Adjacent Measurement Check of Datasondes using Handheld Meters– Frequency and Acceptance Criteria

Parameters	Frequency of Adjacent Measurement Checks*	Acceptance Criteria (i.e., maximum difference between the handheld and datasonde measurement)*
Dissolved Oxygen	Adjacent measurement checks of deployed datasondes using handheld meter at datasonde deployment, retrieval and at least every 2 weeks (or more frequently if probe fouling is or is likely to occur)	± 0.7 mg/L
Temperature	same as above	± 0.5°C
pH	same as above	± 0.5 standard units
*Adjacent measurements with the handheld meter are taken at same location and depth as the datasonde.		

Table 5 Field Replicate Frequency, RPDs , MDLs and RDLs

Parameters	Frequency of Field Replicates	Precision (RPD** Based on Field Replicates)	Sensitivity (Method Detection Limit or MDL)	Sensitivity (Reporting Detection Limit or RDL)*
Total Phosphorus	Once every site visit or once every 10 samples, whichever is greater	RPD < 20%	0.001 mg/L	0.005 mg/L
Total Kjldahl Nitrogen	Same as above	Same as above	0.058 mg/L	0.25 mg/L
Nitrite + Nitrate Nitrogen	Same as above	Same as above	0.003 mg/L	0.05 mg/L
Chlorophyll a	Same as above	Same as above	0.2 ug/L	0.2 ug/L

*RDLs should be no more than those shown in this table.

** The relative percent difference (RPD) is equal to the following:

$$RPD = \frac{|x_1 - x_2|}{\frac{x_1 + x_2}{2}} \times 100\%$$

where x_1 is the original sample concentration

x_2 is the replicate sample concentration

4 Reporting

Data should be summarized and presented in manner that clearly demonstrates the spatial and temporal effect of project operation (in terms of flow, impoundment elevation and power generation)

on surface water quality and if New Hampshire surface water quality standards are met. Any deviations from the SAP (including QA/QC objectives) should be clearly identified. All data should be entered in the NHDES Environmental Monitoring Database (EMD) [1].

5 References

1. *Lake Assessment Programs Quality Assurance Plan*. New Hampshire Department of Environmental Services. December, 2014.
2. *2014-2018 Ambient River Monitoring Program Quality Assurance Project Plan.* New Hampshire Department of Environmental Services. May, 2014.
3. *2014 Consolidated Assessment and Listing Methodology.* New Hampshire Department of Enviromental Services. 2014.
   See http://des.nh.gov/organization/divisions/water/wmb/swqa/2014/index.htm
4. *New Hampshire Surface Water Quality Standards* (Env-Wq 1700).
   See http://des.nh.gov/organization/commissioner/legal/rules/index.htm

AMBIENT RIVER MONITORING PROGRAM

River and Stream Water Quality Monitoring Sampling Protocols

Station 22-AMM, Bethlehem, NH Photo Credit: Amanda Bridge

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Updated: June 2016

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DES Watershed Management Bureau

The DES Watershed Management Bureau manages a number of programs and projects from which water quality data from rivers and streams are used. Although water quality samples may be collected for varying reasons or to meet the needs of different programs, all sampling should be done in a consistent manner that meets the QA/QC guidelines in the Quality Assurance Project Plan approved by DES and EPA. These protocols are primarily intended to provide instruction to DES staff and interns but are intended to also be a tool others can use to collect water quality data that will meet DES's Watershed Bureau's QA/QC requirements. These protocols can be used to collect river and stream water quality data for any program and project in the Watershed Management Bureau or within other bureaus at DES.

Examples of some of the river and stream water quality monitoring projects within the Watershed Management Bureau are:

- Long-terms trend monitoring
- Synoptic monitoring of watersheds on a rotating basis
- Confirmation monitoring for 305(b)/303(d) reporting
- Complaint investigation
- Ambient monitoring

The Trend Monitoring program collects water quality data from fixed locations multiple times per year over a long period of time to develop a data set that allows for a statistically significant reporting of trends and conditions in New Hampshire's rivers and streams. The Synoptic Monitoring program collects water quality data on a 10 year rotating schedule of all the HUC 8 watersheds in the state. Each year sites are selected that are determined to best characterize the ability of those watersheds to support a healthy aquatic community or fulfill a specific data need in that given year. Confirmation monitoring is intended to fill data gaps that will allow DES to confirm or change the assessment status of a waterbody.

Safety in the Field

Safety is the first priority while conducting river and stream field monitoring. Please take note of the following safety precautions and if at any point, you feel uncomfortable, please terminate monitoring immediately.

- Always monitor with at least one other person. Never sample in the field without a partner.
- Look at the weather forecast before sampling, making sure no storms are approaching or flood warnings are in effect.
- Avoid wading into a river if the water is high or fast moving. In these conditions, sample from a bridge or from the shore.
- If you encounter someone who makes you uncomfortable immediately return to your vehicle and leave the site – this includes leaving equipment behind if need be.

In- Stream Safety

1. Do not enter flowing water that is above your waist and be sure someone on shore knows where you are.
2. Always wear waders or waterproof wading boots.
3. Secure your footing with each step. River bottoms accumulate slippery algae on the rocks.
4. If you find that you're in fast flowing water up to your hips, turn sideways into the flow and move to a shallower area if it is difficult to maintain your balance.
5. You can use a long stick to help balance yourself while you wade to your desired location.
6. Check yourself for ticks when you get back to the car.

Bridge Sampling Safety

1. Do not lean on any unstable railings on the bridge.
2. While lowering the bucket down, or while pulling it up, make sure your feet are not caught in the rope.
3. Never put yourself in a dangerous situation. Use your best judgment while on the bridge. If you feel in danger, consider wading in to take a sample.
4. If there is guardrail check it for hornet nests on the backside before leaning over it.

Poison Ivy

Poison ivy is a common plant along the shores of New Hampshire's rivers and streams and along the embankments of bridges. The best way to avoid contact with poison ivy is to wear your waders when moving through an area where the plant is present.

If you know you walked through poison ivy, avoid touching your clothing or waders from the knee down to the boots. If necessary, use gloves to remove your waders. If you suspect you have contacted poison ivy with your bare skin, use Technu to minimize the risk of developing a rash.

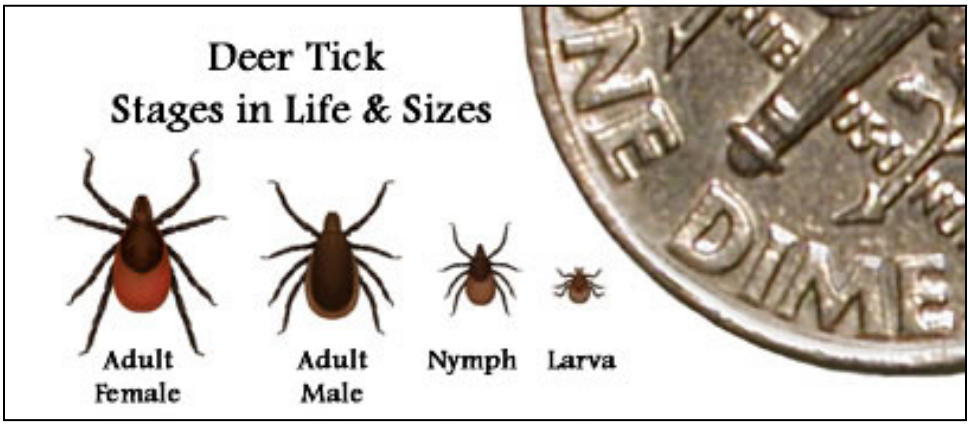
Poison ivy typically has three leaflets (but it can be found with more) with an oily sheen on their surface. It grows as a climbing or low crawling vine, or independently (one stem with three leaves).

Poison ivy growing individually (can also grow as a vine)

Deer Ticks

Ticks, which can carry the Lyme disease bacterium, prefer wooded and bushy areas with high grass and abundant leaf litter. Deer ticks can be present from May through October but are more common during the warmer summer months. During spring and early summer deer ticks can be very small.

Deer ticks can transmit Lyme disease if they are attached to your body for 24 hours or more. If you find a tick latched onto you, you should remove the tick as soon as possible by using tweezers or a tick removing tool. Grab the tick by the head as close to your skin as possible and pull it up slowly and firmly. If you have a tick latched on to you it is advisable to seek counsel from your doctor as to any additional treatments that might be needed.



To avoid ticks wear your waders when walking through dense vegetation and grassy areas. Check yourself after every trip through the tall grass.

To avoid ticks, avoid walking in tall grasses or shrubby areas. If you must, wear long pants with tall socks (preferably light colored clothing to better detect the ticks) or waders.

Quality Assurance & Quality Control

In order for water quality data to be used to assess NH's river and streams, the data must meet quality control guidelines. The Quality Assurance/Quality Control (QA/QC) measures include a four tiered approach to ensuring the accuracy of the equipment and consistency in sampling efforts.

1. Calibration:

- Calibrate the pH and dissolved oxygen meters prior to each measurement.
- Check the conductivity and turbidity meter against a known standard prior to each measurement. If necessary calibrate the conductivity and turbidity meter.

2. Replicate Analysis

- Measure and record a second measurement by each meter from the same bucket of water at one of the stations during each sampling day or as instructed by the project manager. At a minimum one replicate should be collected for every 10 samples (i.e. in the course of one round of sampling at the 40 trend stations 4 replicates are collected).
- Replicates should be measured within 15 minutes of the original measurements. If more than one team is out sampling each team should complete a replicate analysis.
- The dissolved oxygen and pH meters should be recalibrated prior to measuring the replicate. The conductivity and turbidity meters should be checked against a known standard prior to each measurement and calibrated if needed.

3. Meter Precision Checks

At the first and last station during the sampling day, perform meter precision checks. These measurements serve to ensure the accuracy of each meter. Meter checks include:

- ✓ **6.0 pH Standard:** Measure and record a reading of the 6.0 pH buffer. Do not calibrate the meter prior to this measurement as it is intended to detect drift in the meter. The acceptable range is 5.8 – 6.3 pH units.
- ✓ **DI (De-Ionized) Turbidity Blank**: Measure and record a reading of the DI turbidity blank (0 NTU). The acceptable range is 0 – 0.25 NTU.
- ✓ **100 µS Conductivity Standard:** Measure and record a reading of the 100 µS Conductivity Standard. Do not calibrate the meter prior to this measurement as it is intended to detect drift in the meter. The acceptable range is 80 µS - 120 µS.

If the same sampling schedule is used throughout the monitoring season, the replicates should be collected at different stations over the sampling season. It is acceptable to conduct the meter precision checks at the same stations over the sampling season.

Station Location and Verification

It is imperative the all water quality data be associated with a clearly defined geographic location and that sufficient information is available to confirm that location. In most cases DES staff and interns are sampling from locations that are already defined in the Environmental Monitoring Database. For these pre-defined locations the field crew needs to confirm that that location they are sampling from is the same as the location they were assigned to monitor. This is done by bringing a GPS device into the field and confirming that the latitude and longitude of the sampling location is correct. For the Trend, Synoptic, and Confirmation monitoring program field crews are provided with a site location sheet similar to the one below.

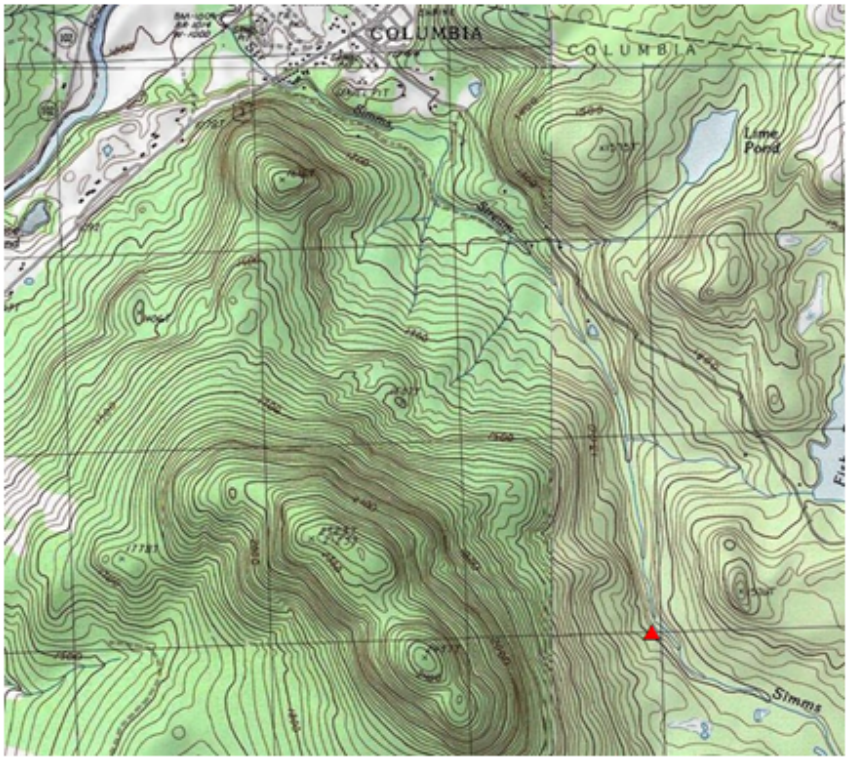
Trip 1

Simms Stream (05-SMS), Colebrook

RT. 3 to Simms Stream Rd. (on Right if headed North on Rt. 3). Sample location approx. 2.3 mi. up road on left. Use GPS coordinates to find exact location.

44.8492, -71.4931 (near dirt rd. that bears off to right)

INVERTS	WQ Logger	Temp Logger	DO	pH	SpCond	TEMP	Cl	Chl. a	E. coli	NO2	NO3	TKN	TP	TSS	Alk.	Hard	TOC	Ca	Mg	Na	K	SO4
x			2x	2x	2x	2x	2x		2x	2x	2x	2x	2x	1x	1x	1x	1x	1x	1x	1x	1x	1x
Field			Field	Field	Field	Field	JCLC		FHL	FHL	FHL	FHL	FHL	FHL	FHL	FHL	FHL	FHL	FHL	FHL	FHL	FHL



Trend Monitoring

The Trend Monitoring program collects water quality and/or biological data at fixed river and stream locations multiple times throughout each year. This long-term data is intended to allow for DES to make statistically significant assessments about how the water quality of New Hampshire's rivers and streams is changing over time. There are 40 river and stream locations in the River Trend Monitoring Program (Table 1). These locations were selected to represent the range of watershed size, human impact, and geographic variation seen throughout New Hampshire's river and streams. Water quality samples are collected at each of these 40 stations during June, July and August every year. An additional round of sampling is done each year on a rotating seasonal basis (i.e. Fall sample 2013, Winter sample 2014, ect.)

Synoptic Monitoring

Synoptic monitoring is intended to provide information from waterbodies that are not otherwise monitored, yet are important recreational or ecological resources of the state. More specifically, synoptic monitoring will include a targeted selection of waterbodies based on a systematic statewide watershed rotation and include waterbody visitations for the purposes of designated use assessment, regulatory investigation, restoration documentation, lake or pond trophic status determination, or water quality data cataloging of public waterbodies. Each year a unique list of sampling stations is selected based upon the watersheds scheduled for sampling in the 10 year rotation cycle.

Confirmation Monitoring

Every two years DES is required to report on the US Environmental Protection Agency (EPA) on the extent to which New Hampshire's surface waters provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water. In order to make a final determination of whether a river is meeting water quality standards or is impaired, it is often necessary to collect additional water quality data to confirm the assessment status of the waterbody.

In addition to water quality sampling, DES staff and interns will also conduct some or all of the following activities at trend, synoptic, and confirmation water quality stations

- Macroinvertebrate sampling
- Water Temperature dataloggers
- Multiparameter dataloggers

Trend Monitoring Stations

Station ID	River Name	Station Location	Town
01-AND	Androscoggin River	BRIDGE STREET BRIDGE	GILEAD
01-CNT	Connecticut River	RTE 10 BRIDGE	NORTHFIELD
01K-HOB	Hodgson Brook	ROUTE 1 BYPASS BRIDGE	PORTSMOUTH
01-MER	Merrimack River	RTE 113 BRIDGE, MASS	TYNGSBOROUGH
01-MSC	Mascoma River	EXIT 20 RTE 89	LEBANON
01-SAC	Saco River	RTE 113 BRIDGE	FRYEBURG
01-SGR	Sugar River	BRIDGE AT RTE 12A AND 12/103	CLAREMONT
01T-MKB	Mink Brook	NEW-Mink Brook	HANOVER
01T-SOP	South Branch Piscataquog R	HILLDALE LANE	NEW BOSTON
01-TYB	Tully Brook	TULLY BROOK	RICHMOND
01X-OTB	Otter Brook	OTTER BROOK	ROXBURY
02-ASH	Ashuelot River	RTE 63 BRIDGE	HINSDALE
02-BBO	Bear Brook	LOWER RD	ALLENSTOWN
02-CLD	Cold River	DREWSVILLE - RTE 123 BRIDGE	WALPOLE
02-CTC	Contoocook River	EAST ST BRIDGE	BOSCAWEN
02E-NSR	North Branch Sugar River	NORTH BRANCH	CROYDON
02-GNB	Grant Brook	NEW-Grant Brook	LYME
02-ISG	Isinglass River	ROCHESTER NECK RD BRIDGE	ROCHESTER
02-ISR	Israel River	RTE 2/RT 3 BRIDGE	LANCASTER
02-SHG	Souhegan River	RTE 3 BRIDGE	MERRIMACK
03-AMM	Ammonoosuc River	RR BRIDGE	BATH
01-JWT	Jewett Brook	JEWETT BROOK BESIDE BANK	LACONIA
04-SBB	Stratford Bog Brook	STRATFORD BOG BROOK	STRATFORD
05-NWL	Newell Brook	NEWELL BROOK	DUMMER
05-SMS	Simms Stream	SIMMS STREAM	COLUMBIA
06-EBS	East Branch Saco River	EAST BRANCH SACO -	JACKSON
06-SBR	South Branch Baker River	SOUTH BRANCH BAKER RIVER	WENTWORTH
07-BLM	Bellamy River	KNOX MARSH RD BRIDGE	MADBURY
07-FLT	Flints Brook	FLINT BROOK AT FRENCH MILL RD.	HOLLIS
07T-ISG	Isinglass River	ISINGLASS RIVER - NRSA STATION	BARRINGTON
08-MER	Merrimack River	RR BRIDGE D.S. OF MANCHESTER WWTF	MANCHESTER
09-OYS	Oyster River	RTE 155A BRIDGE/ USGS GAGING STATION	LEE
10-WNR	Warner River	NEW-Warner River	BRADFORD
14-ISR	Israel River	ROUTE 116 BRIDGE	JEFFERSON
15-EXT	Exeter River	HAIGH RD	BRENTWOOD
18-CCH	Cocheco River	MAPLE ST BRIDGE/GONIC MILL	ROCHESTER
22-AMM	Ammonoosuc River	RTE 302 - PIERCE BRIDGE	BETHLEHEM
23-PMI	Pemigewasset River	RTE 175 BRIDGE AT RTE 3	WOODSTOCK
27-MER	Merrimack River	SEWALLS FALLS RD BRIDGE	CONCORD
58-CNT	Connecticut River	RTE 2 BRIDGE	LANCASTER

Overview of Parameters

The following is a list of parameters that are to be collected as part of the trend and synoptic monitoring programs. The list of samples varies depending on the month but there is a core list of parameters that are always collected. The expanded parameter list is during the July round.

PARAMETER	MONTH	LAB
Dissolved Oxygen (DO)	ALL	FIELD
Specific Conductance	ALL	FIELD
pH	ALL	FIELD
Water Temperature	ALL	FIELD
Turbidity	ALL	FIELD
E. coli	ALL	NHHHS LAB
Total Kjeldahl Nitrogen (TKN)	ALL	NHHHS LAB
Total Phosphorus (TP)	ALL	NHHHS LAB
Nitrate (NO_3) - Nitrite (NO_2)	ALL	NHHHS LAB
Chloride (Cl)	ALL	JCLC LAB
Chlorophyll-a [A]	ALL	JCLC LAB
Acid Soluble Aluminum	ALL	NHHHS LAB
Hardness	ALL	NHHHS LAB
Total Aluminum (Al)	ALL	NHHHS LAB
Copper (Cu)	ALL	NHHHS LAB
Lead (Pb)	ALL	NHHHS LAB
Zinc (Zn)	ALL	NHHHS LAB
Calcium (Ca)	JULY	NHHHS LAB
Magnesium (Mg)	JULY	NHHHS LAB
Potassium (K)	JULY	NHHHS LAB
Alkalinity	JULY	NHHHS LAB
Sulfate (SO_4)	JULY	NHHHS LAB
Total Organic Carbon (TOC)	JULY	NHHHS LAB

[A] Chlorophyll-a samples are collected at a specific list of stations on larger rivers

The individual site map/direction sheets have tables on them like the table below. This table indicates which parameters will be tested, and when.

WQ Logger	Temp Logger	DO	pH	SpCond	TEMP	Cl	Chl a	*E. coli*	NO2	NO3	TKN	TP	TSS	Alk	Hard	TOC	Ca	Mg	Na	K	SO_4	Al
X		3x	3x	3x	3x	3x	3x	3x	3x	3x	3x	3x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x
Field		Field	Field	Field	Field	JCLC	JCLC	PHL	PHL	PHL	PHL	PHL	PHL	PHL	PHL	PHL	PHL	PHL	PHL	PHL	PHL	PHL

The 3x stands for June, July and August. The 1x indicates that those parameters will only be tested for in JULY.

An 'X' under the WQ (water quality) logger or the temperature logger indicates that it is a site that requires deployment of the logger. This table also indicates whether chlorophyll-a is parameter that will be collected.

Field Equipment Checklist

TREND Field Data Sheet
Site Data Sheet (Trend and Synoptic Stations)
DHHS Laboratory Login Forms
Station maps/directions
GPS
Pencil(s)
Pen(s)
Permanent marker(s)

Sampling Equipment

Waders
Laboratory bottles
Sampling bucket
Rope and reel
Walt-o-Matic for E.coli sampling
1 or 2 coolers of ice

YSI Pro 2030 Meter
Oakton pH 150 Meter
Lamotte 2020we Turbidity meter
pH stds (4.0, 7.0, 6.0)
Conductivity stds (2,000 µS/cm, 100µS/cm)
Plastic graduated cylinder
pH electrode storage solution
2 boxes Kimwipes
2 bottles DI water and an extra jug
Batteries (C, D, 9 Volt, AA, AAA)
Zip ties
Screw Driver
Duct Tape/Masking Tape
Paper Towels
Sample bottles and an extra

Always bring meter SOP's as well as manuals for each meter in case the need for trouble shooting arises.

Laboratory Bottle Preparation

June & August

Parameter	Bottle	Preservation Method	Holding Time
Chlorophyll-a	1000 ml brown bottle	None	24 Hours
Total Phosphorus/ Total Kjeldahl Nitrogen	250 ml brown bottle	0.7 ml Sulfuric Acid	28 Days
Nitrate/Nitrite (NO2/NO3)	40 ml small white bottle	None	48 Hours
Chloride	40 ml small white bottle	None	28 Days
E. coli	120ml Sterile clear bottle with yellow cap	None	6 Hours
Acid Soluble Aluminum	Small "milk jug" 32 fl oz.	None	6 Months
Hardness	500 ml white polyethylene square “metals bottle”	5.0 ml Nitric Acid	6 Months
Total Aluminum (Al)			
Copper (Cu)			
Lead (Pb)			
Zinc (Zn)			

(Left to right) Back Row: Chlorophyll-a, Acid Soluble Aluminum **Middle Row:** Hardness/Al/Cu/Pb/Zn, TP/TKN, *E.coli* **Front Row**: Chloride, N02/N03

Chlorophyll-a bottles can be found on the shelf as you walk into the JCLC.

TP/TKN and *E. coli* bottles can be found in the bottle preparation room.

Nitrate/Nitrite and Chloride bottles (same bottle) can be found in the Public Health Lab reception room located next to the Limnology lab.

Laboratory Bottle Preparation

July

Parameter	Bottle	Preservation Method	Holding Time
Chlorophyll-a	1000 ml brown bottle	None	24 hours
TP/TKN	250 ml brown bottle	0.7 ml Sulfuric Acid	28 Days
Nitrate/Nitrite (NO2/NO3)	60 ml small white bottle	None	48 Hours
Chloride	60 ml small white bottle	None	28 Days
E. coli	120ml Sterile clear bottle with yellow cap	None	6 Hours
Acid Soluble Aluminum	Small "milk jug" 32 fl oz.	None	6 Months
Hardness	500 ml white polyethylene square “metals bottle”	5.0 ml Nitric Acid	6 Months
Total Aluminum (Al)			
Calcium (Ca)			
Magnesium (Mg)			
Potassium (K)			
Copper (Cu)			
Lead (Pb)			
Zinc (Zn)			
Alkalinity	Skinny rectangular white bottle	None	14 Days
Sulfate (S04)	Skinny rectangular white bottle	None	14 Days
TOC	40 ml amber cylindrical glasses (3 per site)	None	7 Days

(Left to Right) Back Row: Chlorophyll-a, Acid Soluble Aluminum, Alkalinity, SO4 **Middle Row:** Hardness/Al/Ca/Mg/K/Cu/Pb/Zn, *E.Coli*, TP/TKN, Chloride, N02/N03 **Front Row:** 3x TOC

TSS, Hardness/metals, Alkalinity and SO_4 bottles can all be found in the bottle preparation lab room. (TOC) glasses can be found next to the Chloride and NO_2/NO_3 bottles in the Public Health Lab reception room located next to the Limnology lab.

Sample Collection Protocols

Pre-sample collection: Labeling Bottle

It is important that the bottles be labeled before the sample is poured into the bottle while the sample bottle is still completely dry. It is very difficult to properly write on a wet sample bottle. Be sure to use neat and legible writing on the bottles.

Information to include on labels:

- Test(s) required (e.g. TP/TKN)
- Station ID (e.g. 01-CNT, 02-ISG-REP)
- Date (mm/dd/yy) and time (hh:mm in military time) of collection (e.g 7/12/14 14:45)
- Collectors' initials

Sampling From a Bridge

The sample should be collected from the upstream side of the bridge in the center of the bridge. The exception to this is if the upstream side of the bridge has no safe place to walk but the downstream side has a sidewalk/bike path. In that case you should sample on the safer downstream side.

What you'll need:

- Bucket with rock or weight taped on one side
- Nash-o-matic for *E.coli* sample
- Rope attached to a bucket

Collecting the water sample from a bridge:

- Attach the end of the rope to the handle of the bucket. Lower bucket into the river from the upstream side of the bridge (water flowing toward you).

- Fill ¼ of the bucket with water.

- Pull the bucket up, swish the water around to thoroughly rinse the bucket and discard the rinsed water on the opposite side of the bridge – do not release the water to the area where you will be taking the final sample. Repeat this process 2 more times (total of **3** rinses).

- Return the bucket into the river from the upstream side of the bridge and slowly fill the bucket with water. Allow the water to flow into the bucket as slowly as possible.

- Slowly pull up the bucket with sample water. Do not bump the bucket against the bridge or otherwise agitate the sample water in the bucket as this may introduce additional oxygen and sediment thereby yielding inaccurate readings. If sample does become altered in some way, you need to dump the bucket and refill it.

- Disconnect the bucket from the rope and reel. Attach the Nash-o-matic to the rope and reel. Place an E.coli bottle in the receptacle and remove the cap. Carefully lower the rope to the river and fill the sample bottle. When pulling the rope up be sure no debris falls into the bottle (if it does start again with a new bottle). Once the sample is pulled up, quickly put the cap back on the bottle taking care not to touch the inside of the bottle or cap.

- Carefully carry the bucket of water and *E.coli* sample back to a safe location. Place the bucket in the shade and out of the rain if possible.

Fill Bottles for Laboratory Analysis

- Fill all labeled sample bottles completely with the water contained in the bucket. The brown nutrient bottles contain a small amount of acid to preserve the sample – do not pour this acid out. Use caution when opening the acid preserved sample bottles, as pressure may have built-up in the empty bottles during travel.
- Be careful not to overtop bottles when filling them, particularly the brown nutrient bottles, as overtopping them could flush out the acid preservative.
- Place all filled water sample bottles upright on ice in the cooler as soon as possible after collection, and ensure the top of the cooler is tightly closed.

Once the sample bottles have been filled for laboratory analysis the handheld meters should be used to measure the parameters below by following the protocols in the next section.

- Dissolved Oxygen (% Saturation and mg/L)
- pH
- Specific Conductance
- Turbidity
- Water Temperature

Sampling Via Wading

For wadeable streams, samples can be collected by wading directly into the river. Do not wade into water that is more than waist deep. Be sure that your partner on shore knows that you are entering the water and is available to assist you if need be.

What you'll need:

- A pair of waders or water shoes
- Bucket
- *E. coli* bottle (as needed)

Collect *E. coli* Sample

- Carefully wade into the river as close as possible to the center as can be done safely.
- Carefully remove the lid of the *E. coli* bottle making sure not to touch the sterile inside of the lid or the bottle. Hold the lid in one hand without touching the inside.
- Facing upstream, use a "U"-shaped motion and thrust the bottle under the water's surface and fill in one continuous upstream motion away from you, turning the bottle right side-up at the bottom of the "U". In this fashion, the water will flow into the bottle, then over your hand. Fill to the neck of the bottle.
- Put the cap on tight and place the bottle somewhere safe on the shore or in your pocket. If this is a replicate site be sure to fill a second bottle that has been labeled with "-REP" at the end of the station ID (i.e. 01-HOB-REP).

Collect Sample with a Bucket

- Wade back out to same spot where *E. coli* was taken. Try to minimize the amount of sediment stirred up from the bottom and chose a sampling location near the center of the stream that has not been disturbed by agitated sediment.
- Facing upstream, dip the bucket into the water and fill ¼ of the bucket. Rinse the water in the bucket and return the water to the stream behind you (downstream) with minimal disturbance of the surface of the river. Repeat this process 2 more times (total of **3** rinses).
- Facing upstream, dip the bucket into the water and fill it as slowly as possible until the bucket is ¾ full.

- Carefully carry the sample back to a safe location. Place the bucket in the shade and out of the rain if possible.

Fill Bottles for Laboratory Analysis

- Fill all labeled sample bottles completely with the water contained in the bucket. The brown nutrient bottles contain a small amount of acid to preserve the sample – do not pour this acid out. Use caution when opening the acid preserved sample bottles, as pressure may have built-up in the empty bottles during travel.
- Be careful not to overtop bottles when filling them, particularly the brown nutrient bottles, as overtopping them could flush out the acid preservative.
- Place all filled water sample bottles on ice in the cooler as soon as possible after collection, and ensure the top of the cooler is tightly closed.

Once the sample bottles have been filled for laboratory analysis the handheld meters should be used to measure the parameters below by following the protocols in the next section.

- Dissolved Oxygen (% Saturation and mg/L)
- pH
- Specific Conductance
- Turbidity
- Water Temperature

Laboratory Samples

It is important to submit laboratory samples on time to ensure they do not expire before analysis and that laboratory staff have sufficient time to process the samples. All laboratory samples must be logged into the DHHS Public Laboratory and/or the JCLC laboratory the same day they were collected (the exception to this is chloride samples which are logged into the JCLC in bulk after each sampling round is complete. Samples must be logged into the DHHS laboratory by 15:00 Monday through Thursday and by 13:00 on Friday. In some cases this may require and earlier departure in the morning from DES.

DHHS Public Health Laboratory Samples

The following is a guideline for completing the DHHS Public Health Laboratory Login Form which is required to be submitted along with your laboratory samples. The following parameters are logged in via the DHHS laboratory

Total Phosphorous (TP), Total Kjeldahl Nitrogen (TKN), Nitrate (NO_3) + Nitrite (NO_2), E.coli, Acid Soluble Aluminum, Hardness, Calcium (Ca), Magnesium (Mg), Potassium (K), Copper (Cu), Lead (Pb), Zinc (Zn), Alkalinity, Sulfate (SO_4), and Total Organic Carbon (TOC)

Below are the key pieces of information that you need to fill out on the login form. At the end of this section is an example of a filled out lab login and custody form.

Lab Account (Billing): You supervisor will provide you with the account number to charge the samples to. This should be confirmed for each round of sampling.

One Stop Project: This is a code to specific to each project (i.e. TREND, ARMP, etc.) This may vary from each sampling round. You should confirm with your supervisor before each sampling around what One Stop Project should be used.

Description: What project is this data being collected for?

Collected By: The name and phone number of the person who should be contacted if there are any questions about the samples.

Contact & Phone Number: Ted Walsh ext. 2083

Station ID: Please use the DES Station IDs (i.e. 02-CLD). If you have collected a replicate sample put "-REP" at the end of the station ID (i.e. 02-CLD-REP). If this is a new station without a VRAP ID use WSHEDTBD. If you have multiple new stations use the ID's WSHEDTBD1, WSHEDTBD2 for as many as needed. For these new stations it is important to write something in the

Sampler Comments field that provides a unique brief description of the location (i.e. Oak St Bridge Concord, Upstream of Big Creek, Nice Pond outlet, ect.

Date/Time Sampled: Date and time of each sample collected. Use military time (i.e. 14:30)

Number of Containers: Number of sample bottles per station.

Matrix: For all water samples write "AQ" for aqueous.

Parameters Sampled: In the columns to the right of the Matrix column, please fill in a box of each sample bottle. In most cases you would write one parameter per bottle. If you are sampling for Total Phosphorus and Total Nitrogen the lab can analyze both Total Phosphorus and TKN from the brown nutrient bottle. In this case you would write TP/TKN as the parameter.

Sampler Comments: Leave blank unless this is a new station without a station ID. In that case, use "WSHEDTBD" in the Station ID column and write a brief description in this box.

Lab Login #. Leave blank.

Relinquished By: Sign your name

Date & Time: Date and time you signed your name

Received By: Leave blank. This will be completed by Laboratory Services personnel.

Please fill in the number of pages

NHDES LABORATORY SERVICES LOGIN AND CUSTODY SHEET

(Laboratory Policy: Samples not meeting method requirements will be analyzed at the discretion of the NHDES Laboratory.)

Samples must be delivered in a cooler with ice or ice packs.

LAB ACCOUNT (Billing) 05-0022518 One Stop Project: TREND NHDES Site Number_____

Description: July Trend Round Town: _____ _____ Temp. ^{0}C._____2.7

Collected By: Trend Intern Contact & Phone # ____Ted Walsh 271- 2083____

Station ID	Date & Time Sampled	# of Containers	Matrix	Total Phosphorus (TP)	E. coli	Nitrate + Nitrite				Sampler Comments	Lab Login #
05-BLM	6/11/14 9:25	3	AQ	X	X	X					
09-OYS	6/11/14 10:15	1	AQ		X						
01K-HOB	6/11/14 12:05	3	AQ	X	X	X					
18-CCH	6/11/14 13:20	3	AQ	X	X	X					

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Date 1-8-15
Page 1 of 1

Relinquished By: Signature Date and Time: 6/11/14 14:30 Received By:_____

Relinquished By: _____Date and Time:_____ _____ **Received For Laboratory By:_____**

Matrix: A= Air S= Soil AQ= Aqueous (Ground Water, Surface Water, Drinking Water, Waste Water) π Other:

Page __1_ of __1___ Data Reviewed By:_____ _____ Date:_____

Jody Connor Limnology Center (JCLC) Samples

The following parameters will be analyzed in the JCLC:

Chloride (Cl)

Chloride samples have a hold time of 28 days and thus do not always need to be logged into the JCLC on the same day they are collected. For the Trend monitoring the chloride sampled are place in a refrigerator in the JCLC until the month's sampling round is completed. The day after field sampling is completed all of the chloride samples are logged into the JCLC and analyzed.

Chlorophyll-a

Chlorophyll-a samples much be logged into the JCLC, filtered and frozen within 24 hours of the sample being collected. In most cases the samples will be logged into the JCLC and processed the same day they are collected.

ARMP Field Data Sheet

The ARMP Field Data Sheet is intended to record all of your water quality measurements, QA/QC activities and other information you think would be helpful in interpreting the results and documenting the conditions you encountered.

Some items to note when filling out the field data sheet:

- Please write neatly. If you make a mistake neatly cross out the incorrect information and make edits as needed.
- Be sure to do a replicate sample for each sampling day (even if you only sample one station).
- Complete all of the needed QA/QC checks including calibration information, meter verification checks and, meter precision checks.
- On the back of the data sheet there is space to provide any information that would be helpful to us as we review that data and interpret the results.
- On the back of the form please fill in the appropriate information regarding water quality meters that were used.

Water Quality Monitoring Equipment Standard and Operating Procedures (SOPs)

This section of the ARMP protocols is intended to be a step-by-step guide to properly operate the water quality monitoring equipment and conduct all of the necessary QA/QC procedures. If during your sampling day one of the meters malfunctions and you are not able to get it working properly, you can still continue monitoring. Make a note on the Field Data Sheet that you were not able to measure a given parameter because of a malfunctioning meter and continue using the other meters.

Important Guidelines:

- Each parameter must be measured AT THE SITE. Samples should not be collected and then transported to be measured at a later time.
- Once the sample has been collected with the bucket, you should not wait more than fifteen minutes to begin taking readings with the meters as this allows time for the sample conditions to change (Temperature, DO and pH).
- Place the sample bucket in the shade, if possible, while taking the readings with the meters.
- Turn on the meter right away when you get there

Water Temperature, Dissolved Oxygen & Specific Conductance

YSI Pro 2030

Check the Dissolved Oxygen Membrane and Calibration Chamber

Before sampling begins for the day, ensure the sponge inside the grey, rubber storage chamber is moist by adding a few drops of DI water. Pour out any excess water. Return the probe to the rubber storage chamber. Wait at least 15 minutes before calibrating dissolved oxygen.

Before calibrating the dissolved oxygen, make sure the meter has been turned on for at least 15 minutes with the probe inside of the grey rubber chamber.

Calibrate the Meter for Dissolved Oxygen

Calibration must be completed at each station prior to sampling including the replicate.

1. Record the time the meter was turned on the upper left section of the ARMP Field Data Sheet.

2. Once the meter is turned on wait 15 minutes before proceeding with calibration.

3. Press and hold the Cal button for 3 seconds.

4. Scroll up or down to highlight “Dissolved Oxygen” and then press ENTER.

5. Highlight the “%” option and then press ENTER.

6. On the Field Data Sheet under the column “Dissolved Oxygen Calibration Value (%)” record the calibration value ‘Cal Value’ from the display screen. This is the small number in the lower portion of the screen. The calibration value will vary with altitude and thus may be different at each station.

7. Wait about 15 seconds for the meter to stabilize and then press ENTER.

8. ‘Calibration Successful’ will be displayed briefly and then the instrument will return to the main screen. If ‘Unsuccessful Calibration’ is displayed, wait two minutes then repeat the calibration.

9. Wait approximately one minute for the DO % saturation value to stabilize on the display screen.

10. Record the DO% saturation value on the Field Data Sheet in the column "Dissolved Oxygen % Saturation Chamber Reading".

11. If drift occurs (DO value goes up or down by more than 5%) ensure you have waited long enough for the reading to stabilize. If drift still occurs, follow steps 2-9 to re-calibrate.

Perform & Record Specific Conductance Verification

This check needs to be done at each station prior to sampling.

1. Unscrew and remove the protective metal cage around the probe.

2. Rinse the probe with DI water and gently shake the probe to remove water from the conductivity sensors then wipe dry with a Kimwipe.

3. Pour 60 ml of the 2000 µS/cm conductivity standard solution into a 100 ml plastic graduated cylinder. Place the probe in the graduated cylinder. The solution should cover the entire probe without overflowing the graduated cylinder.

4. Record the specific conductance value from the display screen on the ARMP Field Data Sheet at the bottom where it reads "2000 µS/cm std". A 20% error is acceptable: (1,600 – 2,400µS. If the reading is outside of this range put a "N" in "Needs Calibration" area, proceed to the section below and calibrate the meter for specific conductance.

5. If the reading is within the allowable error mark a "Y" in the "Needs Calibration" area, remove the probe from the standard and rinse with DI water. Screw the protective metal cage back on to the probe.

Calibrate the Meter for Specific Conductance

1. Unscrew and remove the protective metal cage around the probe.

2. Rinse the probe with DI water and gently shake the probe to remove water from the conductivity sensors then wipe dry with a Kimwipe.

3. Pour 60 ml of the 2000 µS/cm conductivity standard solution into a 100 ml plastic graduated cylinder. Place the probe in the graduated cylinder. The solution should cover the entire probe without overflowing the graduated cylinder.

4. Press and hold the Cal button for 3 seconds.

5. Scroll up or down to highlight "Conductivity" and then press ENTER.

6. Scroll up or down to highlight “Specific Conductance” and then press ENTER.

7. Scroll up or down to highlight “µS/cm” and then press ENTER.

8. Use the up and down arrows to adjust the larger number on top to display the calibration standard you will be using. In most cases the meter should already be set to 2000 µS/cm. Once displayed value is correct and matches the calibration standard being used press ENTER,

9. ‘Calibration Successful’ will be displayed briefly and then the instrument will return to the main screen. If ‘Unsuccessful Calibration’ is displayed, wait two minutes then repeat the calibration.

12. Record the specific conductance value after calibration on the Field Data Sheet in the column “After Calibration 2000 µS/cm reading”.

13. Remove the probe from the standard and rinse with DI water. Screw the protective metal cage back on to the probe.

Measuring Water Temperature, Dissolved Oxygen, and Specific Conductance

This meter should remain on until the last station has been sampled. If the meter is turned off prior to the end of the sampling day, the meter must be turned on and allowed a 15-minute warm-up period, with the probe in its chamber, prior to calibration and additional sampling. Remember, the dissolved oxygen/temperature meter must be calibrated prior to each dissolved oxygen measurement including a replicate.

1. Remove the probe from the calibration chamber and rinse the probe with DI water. Gently shake to remove excess water then wipe dry with a Kimwipe.

2. Immerse the probe into the bucket ensuring the holes at the top of the probe are underwater. Slowly move the probe back and forth in the sample until the water temperature stabilizes. Avoid having the probe touch the side or bottom of the bucket.

3. Wait approximately one minute then record the temperature (°C) once it stabilizes.

4. Once the temperature is stable, watch the DO % Saturation value and wait to record this value until it is also fairly stable.

5. When the values are stable, record DO (%), DO (mg/L), water temperature (C.) and specific conductance (uS/cm) values on the Field Data Sheet under the column for "Field Measurements – Results".

It is imperative that you are patient and wait for the Temp and DO% saturation readings to stabilize before recording any values.

Perform Meter Precision Check at First and Last Station of Sampling Day

This check needs to be performed ONLY at the first last station of the day.

1. Unscrew and remove the protective metal cage around the probe.

2. Rinse the probe with DI water and gently shake the probe to remove water from the conductivity sensors then wipe dry with a Kimwipe.

3. Pour 60 ml of the 100 µS/cm conductivity standard solution into a 100 ml plastic graduated cylinder. Place the probe in the graduated cylinder. The solution should cover the entire probe without overflowing the graduated cylinder.

4. Record the specific conductance value from the display screen on the Field Data Sheet at the bottom where it reads "Meter Precision Check First/Last Station of Sampling Day". A 20% error is acceptable: (80 µS – 120 µS. If the reading is outside of this range continue your sampling day but notify your supervisor and/or project manager upon returning to DES

5. Remove the probe from the standard and rinse with DI water. Screw the protective metal cage back on to the probe.

At the last station of the sampling day, once all sample readings and QA/QC checks are finished, you can shut the meter OFF.

pH

Oakton pH 150 Meter

The pH meter must be calibrated prior to each measurement (at each station) including the replicate.

Meter Maintenance

1. Be sure to never touch the glass bulb at the end of the probe, even with a Kimwipe.
2. Never store the pH probe in DI water. If you run out of pH electrode storage solution you may temporarily store the pH probe in pH 4.0 or 7.0 buffer solution.

pH CALIBRATION

1. Unscrew the cap of the electrode storage container and remove the bottle at the end of the pH probe. Slide the screw cap a few inches up the probe. Rinse the probe with DI water including the glass bulb at the end. Blot dry with a Kimwipe without touching the glass bulb at the end!

2. Press the POWER button to turn the meter on. The MEAS (measure mode) indicator should be displayed in the top portion of the screen.

3. Press the CAL/MEAS/BACK button to enter pH calibration mode. The CAL (calibration mode) indicator should be displayed on the screen. *The primary display will show the measured reading while the smaller secondary display will indicate the pH standard buffer solution that the electrode is submerged in. (You will not have to record these numbers)*

4. Immerse the probe into the 7.0 pH buffer (yellow solution).

5. Wait for the measured pH value to stabilize and the READY indicator to appear on the display. The READY indicator may flash on and off so wait until it is steady to achieve an accurate calibration. The value should not change for 30 seconds if it is stabilized.

6. While still immersed in the pH 7 buffer, press the ENTER/HOLD key to confirm calibration. The primary value will flash DONE.

7. Remove the electrode from the 7.0 buffer, rinse it with DI water and blot dry with a Kimwipe.

8. Place the electrode in the 4.0 pH buffer (pink solution).

9. Wait for the measured pH value to stabilize and the READY indicator to appear on the display. The READY indicator may flash on and off so wait until it is steady to achieve an accurate calibration. The value should not change for 30 seconds if it is stabilized.

10. While still immersed in the pH 7 buffer, press the ENTER/HOLD button to confirm calibration. The primary reading will flash DONE.

11. Remove the electrode from the 4.0 buffer, rinse it with DI water and wipe dry with a Kim wipe. The meter should automatically switch to the MEASURE mode. If it does not, press the CAL/MEAS/BACK button until MEAS appears on the screen.

12. Once on the measure screen the bottom right will have a percent value and that will be the pH Electrode Slope. If the number does not appear follow these steps:

    a. Press the SETUP button.
    b. Press the VIEW button three times until you view "ELE dAtA P5.0"
    c. Press the ENTER/HOLD button twice. Calibration slope in % is displayed.
       OR
    d. Press the CAL/MEAS/BACK button once to be in measure mode. The calibration slope is the third number down.

13. Record the slope on the Field Data Sheet under the column "pH Calibration Slope". The slope should be between 95 – 105%.

If the slope is out of range you should try to re-calibrate the meter first. Try waiting in each sample longer. If the slope is still out of range you should replace the pH buffer solutions 4.0 and 7.0 with unused solutions. If the slope continues to be out of range you can continue measuring pH for the sampling day but let your supervisor or project manager know so the probe can be replaced with the low pH slope value.

Measuring pH

14. Rinse the probe with DI water and blot dry with a Kimwipe.

15. Immerse the pH probe into the sample container and let it sit for a few minutes. Then, agitate the sample by **slowly** moving the electrode back and forth in the sample.

16. When a stable reading is achieved the READY indicator to be displayed. It is common for the READY indicated to blink on and off while the reading stabilizes. The measurement tends to start low and then drift upwards. Wait until the reading has stopped drifting. This

will be when the value does not change for about 30 seconds. Record the value on the Field Data Sheet.

17. Rinse the probe with DI water, blot dry with a Kimwipe and return it to the electrode solution storage container. Ensure the electrode storage container is filled at least halfway with pH storage solution.

18. Hold the POWER button to turn the meter off and return the meter and the probe to its carrying case.

Perform Meter Precision Check at First and Last Station of Sampling Day

This check needs to be performed ONLY at the first AND last station of the day.

At one of the stations during the sampling day follow steps 15-18 to measure and record a reading of the 6.0 pH buffer. DO NOT calibrate the meter before you take this reading. Record the value, station ID, and time in the data sheets "QA/QC Meter Check" box.

Turbidity

LaMotte 2020we

Initial Turbidity Check Value

1. Press and briefly hold the power button to turn the meter on.
2. In main menu select “Measure” by pressing the ENTER button.
3. Scroll down using the down arrow to the setting that reads “Turbidity-With Blank” and press ENTER.
4. Carefully wipe off any water, dust and/or fingerprints from the “DI Blank” (0.0 NTU) vial with a Kimwipe only.
5. Open the lid of the meter and align the vertical white line located on the glass vial with the arrow under the meter lid.
6. Close the lid. Select ‘Scan Blank’ by pressing ENTER. This sets the meter to zero. *There will not be a numerical value displayed on the screen at this time.*
7. Remove the DI Blank vial and return it to the meter case.
8. Carefully wipe off any water, dust and/or fingerprints from the 1.0 NTU vial with a Kimwipe.
9. Open the lid of the meter and align the vertical white line located on the 1.0 NTU vial with the arrow under the meter lid.
10. Insert the vial into the chamber. Close lid. Select ‘Scan Sample’ by pressing ENTER.
11. Record the value at the top of the VRAP Field Data Sheet where it reads: “Initial Turbidity Meter Check Value”. If the value is not “1.00” you need to calibrate (see calibration section below).

CALIBRATION

The turbidimeter needs to be calibrated once prior to the first measurement and checked once after the last measurement at the end of the day.

12. Acquire the 1.0 NTU standard and clean the outside of the vial with a Kimwipe. Insert the 1.0 NTU standard into the chamber and close the lid.
13. If the reading for the 1.0 NTU standard is not reading “1.00” press (down arrow) until “Calibrate” appears on the LCD screen, and then press ENTER to select “Calibrate”.

14. Use the up arrow or down arrow to change the highlighted digits on the display to read “1.00”.

15. Press ENTER to select “Calibrate”.

16. Press ENTER again to select “Set Calibration.

17. Remove the 1.0 NTU standard from the meter and return it to the case.

Measuring Turbidity

18. Rinse the vial labeled “Sample” or “S” with DI or sample water three times.

19. Fill the sample vial with river water by carefully and slowly pouring the water down the side of the sample vial to avoid introducing any bubbles.

19. Wipe any water, dust and/or fingerprints off the sample vial with a Kimwipe.

20. Open the lid of the turbidimeter and align the etched arrow on the cleaned Sample vial with the arrow under the meter lid.

21. Close the lid. Press ENTER to select “Scan Sample”.

22. Record the displayed turbidity reading on the VRAP Field Data Sheet in the column labeled “Turbidity (NTU)”.

23. <u>If the turbidity value is greater than 10 NTU</u> you should recalibrate the meter with the 10 NTU standard and take another reading. This will give a more accurate measurement of how high the turbidity level is. If you do recalibrate with the 10 NTU standard, be sure to indicate this under the “Comments” section on the back the VRAP Field Data Sheet. **Recalibrate with the 1.0 NTU at the next station to prevent the readings from being artificially elevated.**

24. Turn the meter **OFF** by pressing the power button

QA/QC Meter Check

At one of the stations during the sampling day measure and record a reading of the DI Turbidity Blank (0.0 NTU) standard. If the same sampling schedule is used throughout the monitoring season, the DI turbidity blank check should be conducted at different stations. Record the value, station, and time on the VRAP Field Data Sheet under the section that reads “QA/QC Meter Check” at the bottom of the page.

End of the Day Meter Check

At the last site of the day, follow steps 8-11 to read the 1.0 NTU standard and record the turbidity value under the “End of Day Meter Check” on the VRAP Field Data Sheet.

2018 River Water Quality Field Data Sheet

TRIP #_____

STATION ID: _____ **DATE:** _____/_____/2018 **SAMPLE TIME:** _____ **CREW:** _____

Time DO Meter turned ON: _____ **Time of DO calibration:** _____ **Genomic Sampling: Total mL per filter:** _____ **(< 480 mL)**

FIELD MEASUREMENTS

Parameter	Result
Temperature °C	
Dissolved Oxygen (mg/L)	
Dissolved Oxygen (%)	
Specific Conductance (µS/cm)	
pH	
Turbidity (NTU)	

Limno Log In ID: **2018-**_____

Field/Lab Data Validated: _____ By: _____

Data Entered in EMD: _____ By: _____

EMD Data Check: _____ By: _____

EDAS Data Check: By:

LAB PARAMETERS

Mark "X" if collected

Cl		Acid Sol Al	
E.coli		Total Al	
TP		Cu	
TKN		Pb	
$NO_2 + NO_3$		Zn	
Chlor-a		Hardness	
TOC		Ca	
Alkalinity		Mg	
SO_4		K	

Meter Precision Check First Station of Sampling Day

Station ID: _____	Result
Turbidity DI Blank (+/- 0.25 NTU)	
pH 6.0 std (+/- 0.3 units)	
Spec. Cond. 100 µS/cm (+/- 20 µS/cm)	

Meter precision check results should be filled in for all field data sheets for each team's day of sampling.

Meter Precision Check Last Station of Sampling Day

Station ID: _____	Result
Turbidity DI Blank (+/- 0.25 NTU)	
pH 6.0 std (+/- 0.3 units)	
Spec. Cond. 100 µS/cm (+/- 20 µS/cm)	

ON SITE HANDHELD METER CALIBRATION RECORDS – COMPLETE AT EVERY STATION

Dissolved Oxygen (calibration)		Specific Conductance (verification)			pH (calibration)	Turbidity (verification/calibration)		
DO Calibration Value (%)	DO % Saturation Chamber Reading	2,000 µS/cm std. (+/- 20%)	Needs Calibration **Y N**	**If Yes:** After Calibration 2,000 µS/cm reading	Calibration Slope (95%-105%)	Initial 1.0 NTU Reading (+/- 0.25 NTU)	Needs Calibration **Y N**	**If Yes:** After Calibration 1.0 NTU Reading

Weather: □ Clear □ Cloudy w/o rain □ Cloudy w/intermittent rain □ Cloudy w/rain

Wind: □ Calm □ Breezy □ Windy

Air Temperature: (60s, 70s, etc.) : _____

Rain Past 3 Days: □Yes □ No □Unknown

Water Level: □ Very Low □ Below Average □ Average □ Above Average □ High

Water Color: □ Clear □ Foggy □ Tea □ Brown □ Green

Photo: □No □ Yes- Description: _____

Comments/Observations: (people swimming, people kayaking/boating, algal, trash, fish, geese, etc.)

FIELD METER DOCUMENTATION		
MAKE/MODEL	**PARAMETER(S) MEASURED**	**SERIAL NUMBER**
Oakton pH 150	pH	
LaMotte 2020we	Turbidity	
YSI Pro 2030	Water Temperature, Dissolved Oxygen, Sp. Conductance	

NH DES LABORATORY SERVICES LOGIN AND CUSTODY SHEET

(Laboratory Policy: Samples not meeting method requirements will be analyzed at the discretion of the NH DES Laboratory.)

Program / Client ID: , ❒ In-House, ❒ OSA, ❒ Pool, ❒ Special, ❒ Swim, X VLAP, ❒ Other:_____ **EPA # / Project #:**_____

System Name:_____ **Site / Town:**_____ **Contact:**_____

Comments:_____ **Collected By & Phone#** _____

Limnology Temperature Check:_____**°C Checked by:**_____**Samples Preserved by:** ❒Ice ❒Blue Pack ❒Other_____

Sample Location /ID	Date/Time Sampled	# of Containers	Matrix	*E. coli* (counts)	TP												Other / Notes	Lab ID # (For Lab Use Only)
			AQ														200X-	
			AQ														200X-	
			AQ														200X-	
			AQ														200X-	
			AQ														200X-	
			AQ														200X-	
			AQ														200X-	

Relinquished By_____Date and Time_____Received By_____

Relinquished By_____Date and Time_____Received By_____

Relinquished By_____Date and Time_____ **Received For Laboratory By**_____

Matrix: A= Air S= Soil AQ= Aqueous (Ground Water, Surface Water, Drinking Water, Waste Water) ❒ Other: _____

Page _____ **of** _____ Data Reviewed By_____ Date_____

Section No.: 22.0
Revision No.: 1
Date: 2-28-02
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DS-1: Field Data Sheet

TRIP #_____

STATION ID: _____ DATE: _____/_____/ 2017 SAMPLE TIME: _____ CREW:_____

Time DO Meter turned ON: _____ Time of DO calibration:_____ Genomic Sampling: Total mL per filter: _____ (< 480 mL)

FIELD MEASUREMENTS	
Parameter	Result
Temperature ºC	
Dissolved Oxygen (mg/L)	
Dissolved Oxygen (%)	
Specific Conductance (µS/cm)	
pH	
Turbidity (NTU)	

Limno Log In ID: **2017-_____**

Field/Lab Data Validated: _____ By: _____

Data Entered in EMD: _____ By: _____

EMD Data Check: _____ By: _____

EDAS Data Check: By:

LAB PARAMETERS			
Mark "X" if collected			
Cl		Acid Sol Al	
E.coli		Total Al	
TP		Cu	
TKN		Pb	
$NO_2 + NO_3$		Zn	
Chlor-a		Hardness	
TOC		Ca	
Alkalinity		Mg	
SO_4		K	

Meter Precision Check First Station of Sampling Day	
Station ID:_____	Result
Turbidity DI Blank (+/- 0.25 NTU)	
pH 6.0 std (+/- 0.3 units)	
Spec. Cond. 100 µS/cm (+/- 20 µS/cm)	

Meter precision check results should be filled in for all field data sheets for each team's day of sampling.

Meter Precision Check Last Station of Sampling Day	
Station ID:_____	Result
Turbidity DI Blank (+/- 0.25 NTU)	
pH 6.0 std (+/- 0.3 units)	
Spec. Cond. 100 µS/cm (+/- 20 µS/cm)	

ON SITE HANDHELD METER CALIBRATION RECORDS – COMPLETE AT EVERY STATION

Dissolved Oxygen (calibration)		Specific Conductance (verification)			pH (calibration)	Turbidity (verification/calibration)		
DO Calibration Value (%)	DO % Saturation Chamber Reading	2,000 µS/cm std. (+/- 20%)	Needs Calibration **Y N**	**If Yes:** After Calibration 2,000 µS/cm reading	Calibration Slope (95%-105%)	Initial 1.0 NTU Reading (+/- 0.25 NTU)	Needs Calibration **Y N**	**If Yes:** After Calibration 1.0 NTU Reading

Weather: □ Clear □ Cloudy w/o rain □ Cloudy w/intermittent rain □ Cloudy w/rain

Wind: □ Calm □ Breezy □ Windy

Air Temperature: (60s, 70s, etc) **:** _____

Rain Past 3 Days: □Yes □ No □Unknown

Water Level: □ Very Low □ Below Average □ Average □ Above Average □ High

Water Color: □ Clear □ Foggy □ Tea □ Brown □ Green

Photo: □No □ Yes- Description: _____

Comments/Observations: (people swimming, people kayaking/boating, algal, trash, fish, geese, etc.)

FIELD METER DOCUMENTATION		
MAKE/MODEL	**PARAMETER(S) MEASURED**	**SERIAL NUMBER**
Oakton pH 150	pH	
LaMotte 2020we	Turbidity	
YSI Pro 2030	Water Temperature, Dissolved Oxygen, Sp. Conductance	

DS-2: 2018 EXO Data Logger Calibration Sheet

Station ID: _____Date: _____ Time: _____ Personnel: _____ Serial Number:_____

EXO Pre Deployment Calibration

Dissolved Oxygen (% Sat) DO (mg/L) ± 0.2 mg/L from Table		**pH** Range ± 0.05 from standard after calibration			**Specific Conductance ()** Range ± 10%	
Temperature ºC			7.00	4.00	Calibration Standard	2000
Pre-Value		Temperature ºC			Temperature ºC	
Post-Value		Pre-Value			Pre-Value	
ODO Gain		Post-Value			Post-Value	
BP (mm Hg)		pH MV			Cell Constant	
DO (mg/L) Post Cal						
DO (mg/L) Table						

Handheld Meter Calibration		**Handheld Meter Precision Checks**		**Field Measurements**		**Datalogger Measurement**
DO Meter On Time		pH 6.0 std (± 0.05)		Time		
DO Calibration Time		100 µS/cm Standard		Temperature ºC		
DO Calibration Value		Fresh Batteries _____		Dissolved Oxygen (mg/L)		
DO Chamber Reading				Dissolved Oxygen (%)		
pH Calibration Slope		Logger/Handheld Time Synched _____		Specific Conductance (uS/cm)		
2000 µS/cm Standard				pH		
SpCond Post Cal Value		Time First Interval _____				

Deployment Notes				
Lock and Key #	Water Depth	Depth of Sensors	Flow Characteristics	Substrate Characteristics
Comments:				

2016 EXO Data Logger Calibration Sheet

Station ID: _____Date: _____ Time: _____ Personnel: _____ Serial Number:_____

EXO Post Deployment QA/QC

Dissolved Oxygen (% Sat) DO (mg/L) ± 0.5 mg/L from Table		**pH** Range ± 0.3 from standard		**Specific Conductance ()** Range ± 20%	
Temperature ºC		7.00 Std.		2000 uS/cm Std.	
BP (mm Hg)		4.00 Std.		100 uS/cm Std.	
DO (% Sat.)					
DO (mg/L)					
DO (mg/L) Table					

Handheld Meter Calibration		**Handheld Meter Precision Checks**		**Field Measurements**		**Datalogger Measurement**
DO Meter On Time		pH 6.0 std (± 0.05)		Time		
DO Calibration Time		100 µS/cm Standard		Temperature ºC		
DO Calibration Value				Dissolved Oxygen (mg/L)		
DO Chamber Reading				Dissolved Oxygen (%)		
pH Calibration Slope				Specific Conductance (uS/cm)		
2000 µS/cm Standard				pH		
SpCond Post Cal Value						

Retrieval Comments:

DS-L1: Temperature/DO Profile and Secchi Disk Field Data Sheet

WATER BODY:_____ **TOWN:**_____ **BY:**_____

DATE:_____ **WEATHER:**_____

PROGRAM:____Lake Survey_____ **LAT:**_____ **LON:**_____

STATION	DEPTH (M)	TEMP. (ºC)	DISSOLVED OXYGEN (mg/L)	OXYGEN % SATURATION
Stratification:				
Mid Epi Depth:				
_____				
Mid Meta Depth:				
_____				
Mid Hypo Depth:				
_____				
Intern_____				
Staff_____				

SECCHI DISK (M) _____ **SD SCOPE (M)** _____ **BOTTOM DEPTH (M)**_____

COMMENTS:

SOP L1: DISSOLVED OXYGEN AND TEMPERATURE PROFILES

1. Locate the deep spot using triangulation, a depth finder, or GPS fathometer. Reference the sampling station map or bathymetric map for a general idea of where the deep spot is located.
2. Anchor at the deep spot and record the bottom depth on the field data sheets.
3. Turn on the dissolved oxygen/temperature meter (DO/temp). Calibrate the DO/temp meter according to Standard Operating Procedures (SOPs) included with the meter.
4. Determine the starting depth of the DO/temp profile. This is approximately 0.5 meters above the bottom depth. For example, if the bottom depth is 8.0 meters, start the profile at 7.5 meters. Then move to the nearest whole number and collect data every meter to the surface. For example, if the starting depth is 7.5 meters, the next reading would be collected at 7.0 meters, 6.0, 5.0, and so on to the 1.0 meter. The last reading will be at the surface, approximately 0.1 meters.
5. Lower the probe to the starting depth and once the readings have stabilized, record the values on the field data sheet. Repeat to the surface.
6. Determine lake stratification, or thermal layers, based on the temperature profile. The top and bottom layers will have relatively uniform temperature, less than 1°C difference between meters. The middle layer, or thermocline, will exhibit greater than 1°C difference between meters. The boundaries are determined when the temperature changes more than 1°C as you move from the bottom layer to the thermocline, and then when the temperature changes less than 1°C as you move from the thermocline to the upper layer. Note: not all lakes stratify into three distinct thermal layers. Some may only have two and shallow lakes typically less than four meters will only have one layer.

SOP L3: Deep Spot Sampling Methods For TP, TKN and Nitrite+Nitrate

- Consult the temperature profile to identify the lake's thermal layers. If the lake is thermally stratified you will want to collect a sample in the mid-epilimnion and 1-2 meters from the bottom, in the hypolimnion. If the lake is not thermally stratified, collect a sample at mid-depth. Record the sample depths on the field data sheet. Please change these depths as necessary based upon your current temperature profile.

- Properly set up the Kemmerer bottle (Figure 1). Open the bottle by pulling apart both ends until you hear a click and the bottle does not close. Place the sender in the indented space on the top of the bottle and lower the bottle to the desired depth. The depth marker should be on the surface of the water.

- Drop the messenger down the chain to close the bottle and collect the desired sample. Pull up the bottle and check to make sure there is no sediment in the sample. If you observe any sediment, discard the water and start the process in a slightly different location such as the other side of the boat, or you may need to adjust the sample depth by 0.5 meter or more (as long as you remain in the thermal layer) until you get a sample free of sediment.

- From the mid-epilimnion sample (if thermally stratified), or the mid-depth sample (if not thermally stratified), fill 1 small white bottle (without acid) for nitrite+nitrate analysis, and fill 1 small brown bottle (which contains acid) for total phosphorus (TP) and total kjeldhal nitrogen (TKN) analyses. ***DO NOT Rinse or overflow the small brown bottle as it contains a sulfuric acid preservative! If you overfill the bottle, immediately rinse with water.***

From the mid-epilimnion sample (if thermally stratified), or the mid-depth sample (if not thermally stratified), fill one small white bottle (without acid) for nitrite+nitrate analysis, and fill one small brown bottle (which contains acid) for total phosphorus and total kjeldhal nitrogen (TKN) analyses. From the mid-hypolimnion sample (if thermally stratified), fill another small brown bottle (which contains acid) for total phosphorus analysis. ***DO NOT Rinse or overflow the small brown bottle as it contains a sulfuric acid preservative! If you overfill the bottle, immediately rinse with water.***

- Place the bottles in a cooler with ice. Return to DES. The hold time for nitrogen samples is 24 hours, so the samples must be returned to DES by the end of the day or early the next morning. Coordinate with DES staff to ensure transfer of samples in a timely manner.

Figure 1.

SOP L4: CHLOROPHYLL-A SAMPLING

Method 1: Composite

Equipment

- Bucket
- Kemmerer bottle (Figure 1)
- Calibrated chain with clip

1. Rinse the bucket with lake water and discard. A dirty bucket could contain old plant material that may contaminate the sample, so make sure to rinse it clean.
2. Lower the open Kemmerer bottle to the middle of the metalimnion (thermocline) as determined from the DO/temp profile. If the lake is not stratified, lower the open Kemmerer bottle to two-thirds of the total depth.
3. Close the bottle, pull it up, and deposit into the bucket.
4. Repeat every meter to the surface. For example, if you were conducting a 4 meter composite, collect an equal amount of water from 4, 3, 2, and 1 meters.
5. Rinse the large brown bottle with a small amount of water from the bucket and discard.
6. Fill the bottle with the well-mixed composited water from the bucket.

Method 2: Integrated tube

Equipment

- Bucket
- Integrated tube (Figure 2)
- Calibrated chain with clip

1. Rinse the bucket with lake water and discard. A dirty bucket could contain old plant material that may contaminate the sample, so make sure to rinse it clean.
2. Connect the calibrated chain to the eyehook on the weighted end of the integrated tube. Lower the weighted end and chain to the middle of the metalimnion (thermocline) as determined from the DO/temp profile. If the lake is not stratified, lower to two-thirds of the total depth.
3. Crimp the top end of the tube tightly.
4. Haul the weighted end of the tube up by the chain only. Do not pull on the tube itself.
5. Place the weighted end into the bucket and uncramp the top end of the tube.
6. Lift the uncrimped end above your head so the open end is always higher than the water level in the tube. This allows the water to drain out of the tube into the bucket.
7. Rinse the large brown bottle with a small amount of water from the bucket and discard.
8. Fill the bottle with the well-mixed water from the bucket.

Figure 1. Kemmerer bottle

Figure 2. Integrated Tube Sampler

APPENDIX B

AGENCY CONSULTATION

From: Mooney, Curtis R
To: Comstock, Gregg
Cc: Andy Qua
Subject: RE: Eastman Falls Water Quality Monitoring Plan WQC # 2016-FERC-001
Date: Friday, June 22, 2018 2:02:42 PM
Attachments: Copy of Eastman_Falls_7Q10 2018 06 22.xlsx

Good afternoon Gregg,

Attached is the spreadsheet Kleinschmidt (KA) used to determine the 7Q10 flow at Eastman Falls (FERC No. 2457 NH).

- KA used the daily flow values to determine the 7 day average flow for the entire period of record
- KA sorted the 7 day average flows to determine the 7Q10 value of 222 cfs
- From there KA determined that the calculated 7Q10 of 222 cfs is not exceeded (7 day average flow is less than 222 cfs) 0.192% of the time based on the 7 day averages over the period of record

Below is the data page for Franklin Falls. KA plans to reference it in the plan as to what will be monitored prior to initiating sampling.

https://reservoircontrol.usace.army.mil/NE/pls/cwmsweb/cwms_realtime.projectpage?gagecode=FFD

Regards,
Curt

Curtis R. Mooney, MS
Eversource Hydro
Senior Engineering Specialist

59 Ayers Island Road
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From: Comstock, Gregg [mailto:Gregg.Comstock@des.nh.gov]
Sent: Friday, June 15, 2018 10:19 AM
To: Mooney, Curtis R <curtis.mooney@eversource.com>
Cc: Diers, Ted <Ted.Diers@des.nh.gov>; Walsh, Ted <Ted.Walsh@des.nh.gov>
Subject: Eastman Falls Water Quality Monitoring Plan

Hi Curt,

I have reviewed the following draft document submitted in accordance with condition E-13 of the Section 401 Water Quality Certification (WQC # 2016-FERC-001) issued on December 15, 2016 for the Eastman Falls Hydroelectric Project (FERC No. 2457).

Draft Water Quality Monitoring Plan
Eastman Falls Hydroelectric Project
(FERC No. 2457)
Prepared by Kleinschmidt
April 2018.

My comments are below:

1. It is stated that the 7Q10 flow is approximately 222 cfs. Please explain how this flow was determined and how you will know when flows are suitable to commence sampling.
2. The plan reiterates the requirements in condition E-13 of the WQC but lacks certain specifics on how the study will be conducted and data evaluated to help assure that high quality data will be collected. I have attached guidance (NHDES Sampling Guidance #1 for Hydropower Studies) which we now include with our study requests for most FERC hydro projects that are up for relicensing. Please be sure the plan includes the items discussed in sections 3 and 4 of the attached guidance with the understanding that if there are differences between the guidance and the 401 WQC requirements, the 401 WQC requirements would apply. I have also attached example protocols, data sheets, etc., that we typically use for your convenience.

Let me know if you have any questions.
Thanks Curt.

Gregg

From: Mooney, Curtis R [mailto:curtis.mooney@eversource.com]
Sent: Friday, May 4, 2018 1:19 PM
To: Comstock, Gregg
Subject: RE: Eastman Falls Water Quality Monitoring Plan

Good afternoon Gregg:

Attached for approval is the Water Quality Monitoring Plan for Eastman Falls. The plan was developed based upon procedures outlined in Condition E-13 of the water quality certification issued on December 15, 2106 and sent to you on April 3, 2018 for review and comment.

We would like to file the approved plan with FERC by May 15 so DES approval at your earliest convenience would be much appreciated.

Please let me know if you have any questions.

Thanks,
Curt

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From: Mooney, Curtis R
Sent: Tuesday, April 03, 2018 2:12 PM
To: Gregg Comstock (GREGG.COMSTOCK@DES.NH.GOV) ; Owen David (Owen.David@des.nh.gov)
Subject: draft Eastman Falls Water Quality Monitoring Plan

Good afternoon Gregg and Owen –

Attached for NHDES review is the draft Water Quality Monitoring Plan (WQMP) for the Eastman Falls Hydroelectric Project.

The plan was developed based upon procedures outlined in Condition E-13 of the water quality certification issued on December 15, 2106.

Please provide any comments within 30 days (May 3, 2018).

If you have questions or comments you would like to discuss, please let me know.

Thanks,
Curt

Curtis R. Mooney, MS
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