ENVIRONMENTAL ASSESSMENT
FOR
HYDROPOWER LICENSE

West Buxton Hydroelectric Project
FERC Project No. 2531-075
Maine

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

July 2017

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ACRONYMS AND ABBREVIATIONS

APE	area of potential effect
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commerce	U.S. Department of Commerce
Commission (or FERC)	Federal Energy Regulatory Commission
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
D2SI	FERC Division of Dam Safety and Inspections
DO	dissolved oxygen
EA	environmental assessment
ESA	Endangered Species Act
°F	Fahrenheit
FPA	Federal Power Act
fps	feet per second
fph	feet per hour
FWS	U.S. Fish and Wildlife Service
GIS	geographic information system
HPMP	historic properties management plan
ILP	Integrated Licensing Process
Interior	U.S. Department of the Interior
ISO	Independent System Operator
Maine DACF	Maine Department of Agriculture, Conservation, and Forestry
Maine DEP	Maine Department of Environmental Protection
Maine DIFW	Maine Department of Inland Fisheries and Wildlife
Maine DMR	Maine Department of Marine Resources
Maine DOT	Maine Department of Transportation
Maine NHP	Maine National Heritage Program
Maine SHPO	Maine Historic Preservation Commission Officer
mg/L	milligrams per liter
MW	megawatt
MWh	megawatt-hours
National Register	National Register of Historic Places
NERC	North American Electric Reliability Council
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPCC	Northeast Power Coordinating Council, Inc.
PAD	Pre-Application Document
Recreation Plan	recreation facilities management plan
SD1	Scoping Document 1
USGS	U.S. Geological Survey
White Pine Hydro	Brookfield White Pine Hydro LLC

EXECUTIVE SUMMARY

Proposed Action

On December 15, 2015, Brookfield White Pine Hydro LLC (White Pine Hydro) filed an application for a new license with the Federal Energy Regulatory Commission (Commission or FERC) to continue to operate the West Buxton Hydroelectric Project (West Buxton Project). The 7.812-megawatt (MW) project is located on the Saco River, in the Towns of Buxton and Hollis, in York and Cumberland Counties, Maine, about 19.6 river miles upstream of head-of-tide in Saco, Maine. The project does not occupy federal land.

Project Description and Operation

The West Buxton Project's features include: (1) a 585-foot-long by 30-foot-high concrete gravity dam with a crest elevation of 173.8 feet (United States Geological Survey or USGS datum), consisting of (i) a gate and stanchion section controlling flow to a flood channel, (ii) two overflow sections topped with an inflatable rubber dam, (iii) a log sluice section and an angled concrete curtain wall upstream of the intake structure, which together provide downstream fish passage for migratory fish; and (iv) intake structures for two separate powerhouses; (2) an upstream American eel ladder in the flood channel; (3) a 118-acre impoundment at a normal pool elevation of 177.8 feet; (4) an 105-foot-long by 39-foot-wide upper powerhouse that contains five turbine generating units with a total capacity of 3,812 kW; (5) a 241.5-foot-long concrete conduit leading from the intake structure to a surge chamber and the lower powerhouse; (6) a 51.2-foot long by 45.5-foot-wide lower powerhouse that contains one 4,000 kW turbine generating unit; and (7) two 38-kV transmission lines, connecting the upper and lower powerhouses to the non-project West Buxton switching station.

White Pine Hydro owns, operates, and maintains two recreation facilities at the project. These include a canoe portage take-out, as well as a canoe portage put-in with parking and tailwater access. White Pine Hydro maintains a short portage trail section along a public roadway to link the put-in and take-out.

White Pine Hydro operates the project in a run-of-river mode, in accordance with the current license and the 1997 Saco River Instream Flow Agreement, under which White Pine Hydro provides outflow that approximates inflow from the upstream Bonny Eagle Project (FERC Project No. 2529) and minimizes impoundment level fluctuations. The project's current water quality certificate requires that the project be operated with a minimum outflow of 768 cubic feet per second (cfs), or inflow, whichever is less. The project generates 34,007 megawatt-hours (MWh) of electricity annually.

Proposed Measures

White Pine Hydro proposes the following measures to protect or enhance environmental resources at the project:

- Continue run-of-river operation, with daily impoundment fluctuations of 1 foot or less from the normal pool elevation of 177.8 feet during normal operation;

- Continue to release a total project outflow of 768 cfs, or inflow, whichever is less, downstream in the project tailwater (at the confluence of the Saco River and the project flood channel), as measured through generation flow records, flood gate settings, and fish passage facilities;

- Release a continuous flow of 30 cfs from a flood or stanchion gate to the flood channel from May 1 through Columbus Day weekend to enhance adult brown trout habitat and angling opportunities;[1]

- Finalize a plan for monitoring compliance with project operation, including any minimum and flood channel flows, as well as impoundment levels.

- Continue to implement the provisions of the 2007 Saco River Fisheries Assessment Agreement (2007 Fisheries Agreement), which includes (a) schedules and processes for constructing fish passage facilities for Atlantic salmon, American shad, alewife, and American eel,[2] and (b) post-construction effectiveness monitoring of all fish passage facilities;

- Implement the proposed recreation facilities management plan (Recreation Plan), which provides for: (1) recreation improvements and the management of the project recreation facilities, including (a) improving an existing non-project angler access trail on the western shore of the Saco River downstream from West Buxton Dam with a staircase and safety measures, (b) constructing a new public boat launch, upstream of West Buxton Dam, on the western shore

[1] White Pine Hydro indicates that it is amenable to modifying the seasonality component of its proposal to extend the flow release to November 30 (or earlier if ice conditions warrant closing the gate). *See* White Pine Hydro's February 2, 2017 Filing.

[2] Upstream passage for American eel has been constructed and is currently operational at West Buxton Dam (*see* White Pine Hydro July 28, 2016 Filing at Attachment 1-5; accession No. 20160728-5143). Downstream passage for American eel is to be operational by September 1, 2028, and permanent upstream passage for the anadromous species is to be operational by May 1, 2019.

of the project impoundment, (c) improving the existing tailwater access on the eastern shore of the Saco River downstream from West Buxton Dam by adding a staircase, stabilizing existing bank erosion, and improving the existing parking area, and (d) improving the existing canoe take-out on the eastern shore of the impoundment by relocating the take-out 10 feet upstream and adding stone steps; and (2) the evaluation of the need for additional access or for improvements to existing recreation facilities during the license term; and

- Implement the proposed historic properties management plan (HPMP) for the protection of cultural resources.

In addition to the measures listed above, White Pine Hydro proposes to remove 7.7 acres of land from the existing project boundary that do not serve a project purpose. About 4.2 acres of this land is located at the uppermost extent of the impoundment; 2.3 acres are located just northwest of West Buxton Dam, behind White Pine Hydro's non-project maintenance and office buildings; and 1.2 acres are located along the Saco river just southwest of West Buxton Dam and the Maine Department of Transportation (Maine DOT) Bridge (West Buxton Road).

Public Involvement and Areas of Concern

Before filing its license application with the Commission, White Pine Hydro conducted pre-filing consultation in accordance with the Commission's Integrated Licensing Process. The intent of the Commission's pre-filing process is to involve the public 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. As part of the pre-filing process, staff conducted scoping to identify issues and alternatives. Staff distributed a scoping document to stakeholders and other interested entities on October 1, 2012. Scoping meetings were held in Buxton and Hallowell, Maine on November 1 and 2, 2012, respectively. No comments warranting the issuance of a revised scoping document were filed.

White Pine Hydro filed its license application on December 18, 2015. On October 20, 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 relicensing the project are: (1) minimum flows and flood channel flows; (2) upstream and downstream passage for Atlantic salmon, American shad, alewife, and American eel; and (3) recreational access.

Alternatives Considered

This environmental assessment (EA) analyzes the effects of continued project operation and recommends conditions for any license that may be issued for the project. In addition to White Pine Hydro's proposal, we consider two alternatives: (1) White Pine Hydro's proposal with staff modifications (staff alternative); and (2) no action, or continued operation with no changes.

Under the staff alternative, the project would be operated and maintained as proposed by White Pine Hydro, except for the flood channel flows. Instead, staff recommends that White Pine Hydro release 60 cfs to the flood channel from May 1 through November 30 (or sooner if ice conditions warrant closing the flood gate earlier).

White Pine Hydro's proposed Project Operation Monitoring Plan includes most of the elements that would be needed to adequately monitor compliance with project operation. However, the plan should describe the licensed operational requirements, as well as include the curves and calculations for turbine and gate settings needed to monitor flows at the project. The staff alternative includes these modifications to the plan.

The proposed Recreation Plan includes best management practices (BMPs), such as conducting pre-construction topographic surveys, installing silt fences, stabilizing existing erosion sites, as well as re-grading and seeding slopes that would minimize potential erosion and sedimentation during and after construction. The Recreation Plan also provides for ongoing maintenance of the recreation sites, including removal of litter and fallen trees. However, the Recreation Plan does not contain measures to minimize the potential effects of construction, operation, and maintenance of the recreation sites on terrestrial resources. To minimize effects of recreation on terrestrial resources, including federally listed species, the staff alternative includes the following modifications to the project's Recreation Plan:

- include measures, to the extent feasible, to minimize the introduction or spread of non-native invasive aquatic and terrestrial vegetation during construction, operation, and maintenance of project recreation sites; and

- limit tree removal and trimming associated with construction of the project boat launch, the improvements to the angler access trail, and non-emergency vegetation maintenance to August 1 through May 31 to avoid potential effects to the northern long-eared bat during the pup season.

No Action Alternative

Under the no-action alternative, the project would continue to operate as it has in the past. None of the proposed or recommended measures would be implemented and there would be no enhancement of environmental resources.

Staff Alternative

Below, we briefly discuss the anticipated environmental effects of issuing a new license for the project under the staff alternative.

Aquatic Resources – Continuing to operate the project in a run-of-river mode (within 1 foot below the normal pool elevation of 177.8 feet), with the proposed total project outflow of 768 cfs, would maintain existing habitat for aquatic resources in the West Buxton impoundment and downstream sections of the Saco River. Releasing a flow of 60 cfs to the project flood channel from May 1 through November 30 (or earlier if ice conditions warrant closing the gate) would enhance (a) brown trout habitat by at least an additional 9 percent over White Pine Hydro's proposed 30-cfs flow release, (b) benthic macroinvertebrate production (forage for trout), and (c) angling opportunities for trout in the channel. Implementing the proposed Operation Monitoring Plan, with staff's modifications, would provide a means for verifying that the project is operated in accordance with the operational requirements of the license.

Continuing to operate and maintain the upstream eel ladder would allow juvenile eels to safely and efficiently pass West Buxton Dam, and access potential habitat upstream of the dam. Installing an upstream fish passage facility for anadromous fish would provide a safe and efficient means of passing Atlantic salmon and river herring upstream of the project. Providing downstream eel passage, in accordance with the 2007 Fisheries Agreement, would reduce the entrainment and impingement mortality of downstream migrating adult eels. Continuing to operate and maintain the existing downstream fish passage facilities for anadromous fish would afford downstream migrating salmon smolts and out-migrating river herring a safe and efficient route for moving downstream past the project. This would continue to minimize turbine-related injury and mortality of fish. Evaluating the effectiveness of the proposed upstream and downstream fish passage measures would help to ensure that all passage facilities/ measures are working effectively. Finally, implementing fish passage operation and maintenance plans for each facility would define how the upstream and downstream passage measures at the project will be operated and maintained.

Terrestrial Resources – Continuing to operate the project in run-of-river mode would maintain existing shoreline habitat along the impoundment and Saco River downstream of the project. Construction, maintenance, and use of the proposed boat launch and improved angler access trail, canoe take-out, and tailwater access would have

temporary and some minor permanent adverse effects on terrestrial resources, including the loss of 0.9 acres as well as the temporary disturbance of adjacent upland and wetland areas.

Modifying the proposed Recreation Plan, to include, to the extent feasible, staff's recommended measures for controlling invasive species would help to minimize the potential spread of non-native invasive plants, promote the growth of native plants, and provide higher quality habitat for wildlife within the project boundary, as compared to White Pine Hydro's proposed action.

Threatened and Endangered Species – Interior's Environmental Conservation Online System (ECOS)[3] and Information for Planning and Conservation (IPaC) system,[4] indicates that two federally listed threatened species, the small whorled pogonia and northern long-eared bat could occur in York and Cumberland Counties, Maine, including within the project boundary.[5]

The small whorled pogonia is known to persist in early succession forests and at forest edges, potentially benefiting from increased light availability at forest edges or near gaps in forest canopy. The proposed recreation facility construction could eliminate some potentially suitable habitat, but could also improve the suitability of adjacent forested habitat by increasing light availability near the edges of the new access road and parking area for the boat launch.

Northern long-eared bats may use forested areas within the project boundary during the summer for roosting and foraging. Limiting tree removal and trimming at the recreation sites during construction/maintenance activities, to between August 1 and May 31 would restrict disturbance to potential maternity roost trees during the time when pups are incapable of flight (*i.e.*, June and July), and, thus, would avoid adverse effects on the bat.

Recreation – White Pine Hydro's proposed Recreation Plan includes measures for maintaining and modifying existing recreation facilities, and constructing new facilities, as well as evaluating the need for additional access or for improvements to existing recreation facilities. Maintaining access signs, as part of the Recreation Plan would

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[3] *See* https://ecos.fws.gov/ecp/.

[4] *See* http://ecos.fws.gov/ipac.

[5] On October 27, 2016, staff used IPaC to request an official FWS species list for the project, and filed it under Docket No. P-2531-000. Subsequently, staff requested an updated species list, and filed it on March 14, 2017.

inform the public of recreation opportunities at the project. Finally, monitoring recreational access as part of the Recreation Plan would ensure that existing and proposed facilities are properly maintained and adequate for users.

Cultural Resources – Within the APE, there are three resources determined eligible for listing in the National Register of Historic Places. Continued operation and maintenance of the project, and the potential construction of fish passage facilities could alter the historic character of the existing structures, and could disturb known and unknown cultural resources. With the measures proposed in the HPMP, 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.

Draft License Articles

Staff recommendations for conditions of any new license for the project are based on the analysis presented in this EA. Draft license articles are attached in Appendix B.

Conclusion

Based on our analysis, we recommend licensing the project as proposed by White Pine Hydro, with some staff modifications and additional measures.

In Section 4.2, *Comparison of Alternatives*, we estimate the likely cost of alternative power for each of the three alternatives identified above. Our analysis shows that during the first year of operation under the no-action alternative, project power would cost $702,309, or $20.65/MWh less than the cost of alternative generation. Under the proposed action alternative, project power would cost $249,447, or $7.37/MWh less than the likely alternative cost of power. Under the staff alternative, project power would cost $225,557, or $6.72/MWh less than the cost of alternative generation.

We chose the staff alternative as the preferred alternative because: (1) the project would continue to provide a dependable source of electrical energy for the region (33,544 MWh annually); (2) the 7.812 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution, including greenhouse gases; and (3) the recommended environmental measures proposed by White Pine Hydro, and additional measures recommended 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 in the staff alternative, would not be a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

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WEST BUXTON HYDROELECTRIC PROJECT
Project No. 2531-075 - Maine

1.0 INTRODUCTION

1.1 APPLICATION

On December 18, 2015, Brookfield White Pine Hydro LLC (White Pine Hydro or applicant) filed an application with the Federal Energy Regulatory Commission (Commission or FERC) for a new license to continue to operate and maintain the existing West Buxton Hydroelectric Project (West Buxton Project). The 7.812-megawatt (MW) project is located on the Saco River, in the Towns of Buxton and Hollis, in York and Cumberland Counties, Maine, about 19.6 river miles upstream of head-of-tide in Saco, Maine (Figure 1). The West Buxton Project does not occupy federal land.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the West Buxton Project is to provide a source of hydroelectric power. Under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a license to the applicant for the West Buxton 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.

Issuing a license for the West Buxton Project would allow White Pine Hydro to generate electricity at the project for the term of the license, making electric power from a renewable resource available to the regional grid.

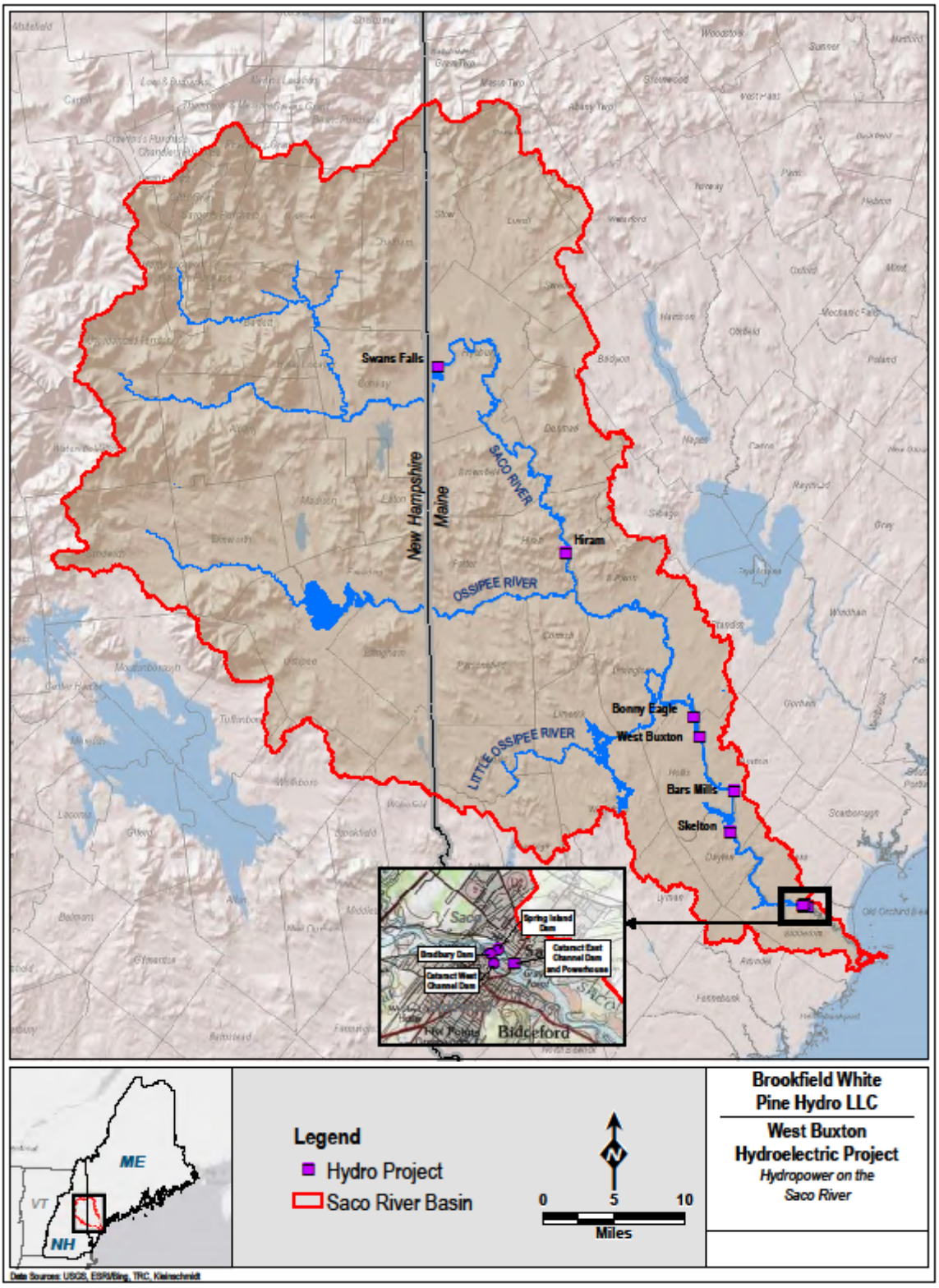

Figure 1. Location of the West Buxton Project and other dams in the Saco River Basin. (Source: White Pine Hydro, 2015).

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) as proposed by the applicant, with our recommended measures (staff alternative). We also considered the effects of the no-action alternative. The primary issues associated with relicensing the project are: (1) minimum flows and flood channel flows; (2) upstream and downstream passage for Atlantic salmon, American shad, alewife, and American eel; and (3) recreational access for small hand carry/motorized watercraft in the project impoundment and angler access in the tailwater and flood channel areas.

1.2.2 Need for Power

To assess the need for power, we looked at the needs in the operating region in which the project is located. The average annual generation of the West Buxton Project is 34,007 megawatt-hours (MWh). The power generated is sold to the Independent System Operator of New England.

The North American Electric Reliability Council (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The West Buxton Project is located in the Northeast Power Coordinating Council, Inc. (NPCC) region of the NERC. According to NERC's 2016 forecast (NERC, 2016), from 2017 through 2026, summer demand in the New England area of the NPCC region is projected to grow at an annual rate of 0.21 percent.[6]

We conclude that the power from the West Buxton Project would help meet a need for power in the NPCC region in both the short- and long-term. The power generated by

[6] On December 19 and December 21, 2016, the U.S. Department of the Interior (Interior) and the U.S. Bureau of Indian Affairs, commented on the Maine Indian tribes' desire to consider sources of electrical power that do not block the free flow of the state's rivers. Interior and BIA state that the applicant has not established a need for electrical power generated by the project, and provide a copy of the 2012 viability study of wind power in Maine (*see* http://www.maine.gov/energy/pdf/Binder1.pdf). The analysis provided by NERC's 2016 Long-term Reliability Assessment accounts for 319 MW of new capacity from photovoltaic and wind resources in the generation fuel mix for the New England region, and yet establishes that the region has an increasing need for power. As noted, the baseline summer peak demand for the region is projected to grow 0.21 percent of the next ten years.

the project may displace generation from non-renewable sources, which may avoid some power plant emissions and create an environmental benefit.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

Any new license for the 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

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 the U.S. Department of Commerce (Commerce) or the U.S. Department of the Interior (Interior). On December 16, 2016, the National Marine Fisheries Service (NMFS), on behalf of Commerce, timely filed a preliminary fishway prescription for the project, and on December 19, 2016, Interior, on behalf of the U.S. Fish and Wildlife Service (FWS), timely filed a fishway prescription for the project. The agencies' fishway prescriptions generally require White Pine Hydro to:

(1) Install, operate, and maintain a permanent upstream American eel passage facility at West Buxton Dam,[7] in accordance with section 5.2.a of the 2007 Saco River Fisheries Assessment Agreement (2007 Fisheries Agreement), and monitor its effectiveness, in accordance with section 5.1.c of the 2007 Fisheries Agreement;

(2) Install, operate, and maintain a permanent downstream American eel passage facility, or implement operational measures that achieve a 90 percent passage efficiency at the project by September 1, 2028, in accordance with sections 5.2.b.1 and 5.2.b.2 of the 2007 Fisheries Agreement, and test the effectiveness of the measures, in accordance with section 5.1.c of the 2007 Fisheries Agreement;

(3) Beginning in 2026, monitor for American eel mortality downstream from West Buxton Dam weekly from September 15 through November 15, and, if

[7] Upstream passage for American eel has been constructed and is currently operational at West Buxton Dam (*see* White Pine Hydro's July 28, 2016 Filing at Attachment 1-5).

confirmed observation of more than 50 eel mortalities per night occurs at the project, implement measures identified in section 5.2.b.3 of the 2007 Fisheries Agreement;[8]

(4) Install, operate, and maintain a permanent upstream fish passage facility for Atlantic salmon, American shad, and alewife, which is to be operational by May 1, 2019, at West Buxton Dam;

(5) Operate and maintain the existing permanent downstream fish passage facilities for Atlantic salmon, American shad, and alewife at West Buxton Dam as part of any new license issued for the project;[9]

(6) Submit upstream fish passage facility conceptual design drawings to NMFS, FWS, and the Maine Department of Marine Resources (Maine DMR) by January 31, 2017, consistent with section 5.1.a of the 2007 Fisheries Agreement;

(7) Operate each new fish passage facility, once constructed, for a 1-year "shakedown" period to ensure that it generally operates as designed and to make minor adjustments to the facilities and operation;

(8) Conduct effectiveness studies of all newly constructed or significantly modified permanent upstream and downstream fish passage facilities or measures, consistent with section 5.1.c and the relevant parts of section 5.4 of the 2007 Fisheries Agreement;

(9) Maintain the fish passage facilities in proper working order and keep fishway areas clear of trash, logs, and material that would hinder passage, consistent with section 5.1.d of the 2007 Fisheries Agreement; and

(10) Maintain and operate the permanent fish passage facilities and measures during the upstream and downstream migration periods identified below.

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[8] The measures would include either (a) opening an existing fish sluice or other gate at the project, or (b) reducing generation to reduce approach velocities to the intakes.

[9] The existing downstream fish passage facilities at the West Buxton Project, which has been in operation since 1996, include a 6-foot-deep hanging concrete curtain, which is anchored to the eastern shore of the impoundment upstream of the powerhouse and extends to the sluice gate. The 10-foot-wide by 2-foot-deep sluice is used to discharge fish into the tailrace. Together, these structures constitute the project's downstream fish passage facility.

Species	Upstream Migration Period	Downstream Migration Period
Atlantic Salmon	May 1 – October 31	April 1 – June 30 (smolts and kelts) October 15 – December 31 (kelts)
American shad	May 15 – July 31	July 15 – November 15 (juv.) June 1 – July 31 (adult)
Alewife/ blueback herring	May 1 – July 1	July 15 – November 15 (juv.) June 1 – July 31 (adult)
American eel	June 1 – September 15	September 15 – November 15 (night)

In addition to the specific fish passage measures listed above, NMFS and Interior reserve authority to prescribe fishways at the project during the term of any new license under section 18 of the FPA.

The agencies' preliminary fishway prescriptions are generally consistent with the 2007 Fisheries Agreement,[10] which is attached, for reference, to this EA as Appendix A. The details of the fishway prescriptions, therefore, can be found in Appendix A

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 is determined 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.

[10] NMFS and/or Interior include the following additional measures in their prescriptions that were not included in the 2007 Fisheries Agreement: (1) design the upstream fish passage for anadromous fish to operate between the 5 and 95 percent exceedance flows; (2) submit the 30, 60, 90 percent concept designs and final design for the upstream passage facility for review and approval; (3) evaluate migratory delay or downstream passage mortality associated with flood channel flow releases as part of the facilities' effectiveness studies; (4) keep fishways in proper working order; (5) timing of seasonal operation for fish passage facilities; and (6) project access and consultation regarding filings. These measures are consistent with practice at other projects, and White Pine Hydro does not object to their inclusion in the prescriptions.

On December 12, 2016, Maine DMR filed timely recommendations under section 10(j). In addition, on December 16, 2016, NMFS filed timely recommendations under section 10(j); and on December 19, 2016,[11] Interior filed timely recommendations under section 10(j). These recommendations are summarized in Table 14, and discussed in section 5.3, *Summary of Section 10(j) Recommendations*.[12]

1.3.2 Clean Water Act

Under section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. If the state agency fails or refuses to act on a request for certification, within a reasonable period of time (which shall not exceed one year) after receipt of such request, the certification requirements are deemed waived.

On December 12, 2016, White Pine Hydro applied to the Maine Department of Environmental Protection (Maine DEP) for a section 401 water quality certification for the project. On the same day, Maine DEP received this request. Maine DEP has not yet acted on the application for water quality certification.

[11] In addition to its section 10(j) recommendations, Interior, on the behalf of BIA, requested that Commission staff consider the 2012 viability study of wind power in Maine, which we address in this EA. *See* n. 7, *supra*.

[12] The Maine Department of Inland Fisheries and Wildlife (Maine DIFW) filed four recommendations on December 20, 2016, one day late. Maine DIFW recommends that White Pine Hydro: (1) operate the project in a run-of-river mode, with a head pond fluctuation of no greater than 1 foot: (2) release 90 cubic feet per second (cfs) year-round to the flood channel; (3) consult with Maine DIFW prior to lowering the head pond for maintenance, repairs, or other planned/scheduled activities; and (4) not remove the 7.7 acres from the project boundary.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of endangered species or result in the destruction or adverse modification of the critical habitat of such species. Based on Interior's Environmental Conservation Online System (ECOS)[13] and Information for Planning and Conservation (IPaC) system,[14] the federally threatened small whorled pogonia (*Isotria medeoloides*) and northern long-eared bat (*Myotis septentrionalis)* could occur in the project area.[15] No critical habitat has been designated for these species (FWS, 2017a; 2017b).

Small patches of potentially suitable habitat for small whorled pogonia would be replaced by the proposed boat launch facilities, with the remaining forested habitat becoming potentially more favorable habitat for this species. However, this species was not found in the study area during White Pine Hydro's 2013 reconnaissance surveys. There are no known northern long-eared bat hibernacula or maternity roost trees occurring in the project vicinity, but suitable habitat for summer roosting and foraging activities could be present. Because White Pine Hydro proposes to remove about 40 trees to construct a new boat launch and improve an existing angler access trail, limiting tree removal to the period between August 1 and May 31 would avoid adverse effects associated with these activities on the northern long-eared bat and any potentially-suitable summer habitat.

Our analysis of project impacts on the small whorled pogonia and northern long-eared bat is presented in section 3.3.3, *Threatened and Endangered Species*, and our recommendations in section 5.1 *Comprehensive Development and Recommended Alternative*. Based on available information, we conclude that relicensing the project, with staff's recommended measures, would have no effect on the small whorled pogonia and is not likely to adversely affect the northern long-eared bat, and would not result in prohibited incidental take of the northern long-eared bat.

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[13] *See* https://ecos.fws.gov/ecp/.

[14] *See* http://ecos.fws.gov/ipac.

[15] On October 27, 2016, staff used IPaC to request an official FWS species list for the project, and filed it under Docket No. P-2531-000. Subsequently, staff requested an updated species list, and filed it on March 14, 2017.

1.3.4 Coastal Zone Management Act

The Coastal Zone Management Act of 1972 (CZMA), as amended, requires review of the 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.

On July 13, 2015, White Pine Hydro requested concurrence from the Maine Department of Agriculture, Conservation, and Forestry (Maine DACF) that a consistency review of the license application is unnecessary because the project is not located in Maine's designated coastal area. In a letter dated July 15, 2015,[16] Maine DACF stated that the West Buxton Project is not located within Maine's coastal boundary and would not affect Maine's coastal resources. Therefore, the project does not require certification of consistency with Maine's coastal zone program.

1.3.5 National Historic Preservation Act

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

On October 1, 2012, the Commission designated White Pine Hydro as its non-federal representative for the purposes of conducting Section 106 consultation with the Maine State Historic Preservation Officer (Maine SHPO), pursuant to section 106 of the NHPA. White Pine Hydro consulted with the Maine SHPO to identify historic properties and assess potential adverse effects on historic properties within the project's area of potential effects (APE). There is one archaeological site (Daniel G. Bradbury Homestead) and two historic sites (West Buxton Bridge and West Buxton Hydroelectric Facility) within the APE that are eligible for listing in the National Register. In a letter dated June 12, 2014, the Maine SHPO stated that the relicensing of the project, with the implementation of a HPMP, would not affect these historic properties.[17]

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[16] *See* Final License Application, Appendix E-2.

[17] *See* White Pine Hydro's Final Historic Properties Management Plan (HPMP), Appendix A, filed July 28, 2016.

To meet the requirements of section 106, we intend to execute a Programmatic Agreement (PA) with the Maine SHPO for the protection of historic properties from the effects of construction, operation, and maintenance of the West Buxton Project. The terms of the PA would ensure that the applicant addresses and treats all historic properties identified within the project's APE in accordance with the provisions of the HPMP.

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 C.F.R. §§ 5.1 to 5.16) require applicants to 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, the ESA, the NHPA, and other federal statutes. Pre-filing consultation must be completed and documented according to the Commission's regulations.

Relicensing of the project was formally initiated August 10, 2012, when White Pine Hydro filed with the Commission a Pre-Application Document (PAD) and a Notice of Intent to license the project using the Integrated Licensing Process (ILP). The Commission issued a Notice of Commencement of Proceeding on October 1, 2012.

1.4.1 Scoping

Before preparing this EA, we conducted scoping to determine what issues and alternatives should be addressed. 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 October 1, 2012. Scoping meetings were held in Buxton and Hallowell, Maine on November 1 and 2, 2012, respectively, 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 on November 1, 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
Maine DMR	December 5, 2012
NMFS	December 7, 2012
White Pine Hydro	December 7, 2012
Maine DEP	December 7, 2012
FWS	December 10, 2012
Maine DIFW	December 10, 2012

No comments warranting the issuance of a revised scoping document were filed. Comments needing discussion are addressed in this EA.

1.4.2 Interventions

On October 20, 2016, the Commission issued a notice accepting the application and setting December 19, 2016, as the deadline for filing protests and motions to intervene. Maine DIFW filed a notice of intervention on December 14, 2016.

1.4.3 Comments on the Application

A notice requesting comments, recommendation, and preliminary terms and conditions was issued on October 20, 2016. The following entities commented:

Commenting Entity	Date Filed
Maine DEP	December 17, 2016
Maine DMR	December 12, 2016
NMFS	December 16, 2016
Interior	December 19, 2016
Maine DIFW	December 20, 2016
U.S. Bureau of Indian Affairs	December 21, 2016

White Pine Hydro filed a response to the comments on February 2, 2017.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative as the baseline environmental condition for comparison with other alternatives.

2.1.1 Existing Project Facilities

West Buxton Dam is located at river mile (RM) 19.6 on the Saco River.[18] The project is situated between the upstream Bonny Eagle Project (FERC Project No. 2529; at

[18] River miles on the Saco River are measured from head-of-tide (RM 0) in Saco, Maine, which is the location of the Cataract Project (FERC Project No. 2528). As used herein, head-of-tide (or tidal limit) is the farthest point upstream where a river is affected by tidal fluctuations, or where the fluctuations are less than a certain amount (typically less than 0.2 foot).

river mile (RM) 26) and the downstream Bar Mills Project (FERC Project No. 2194; at RM 19). The project facilities are shown in Figure 2.

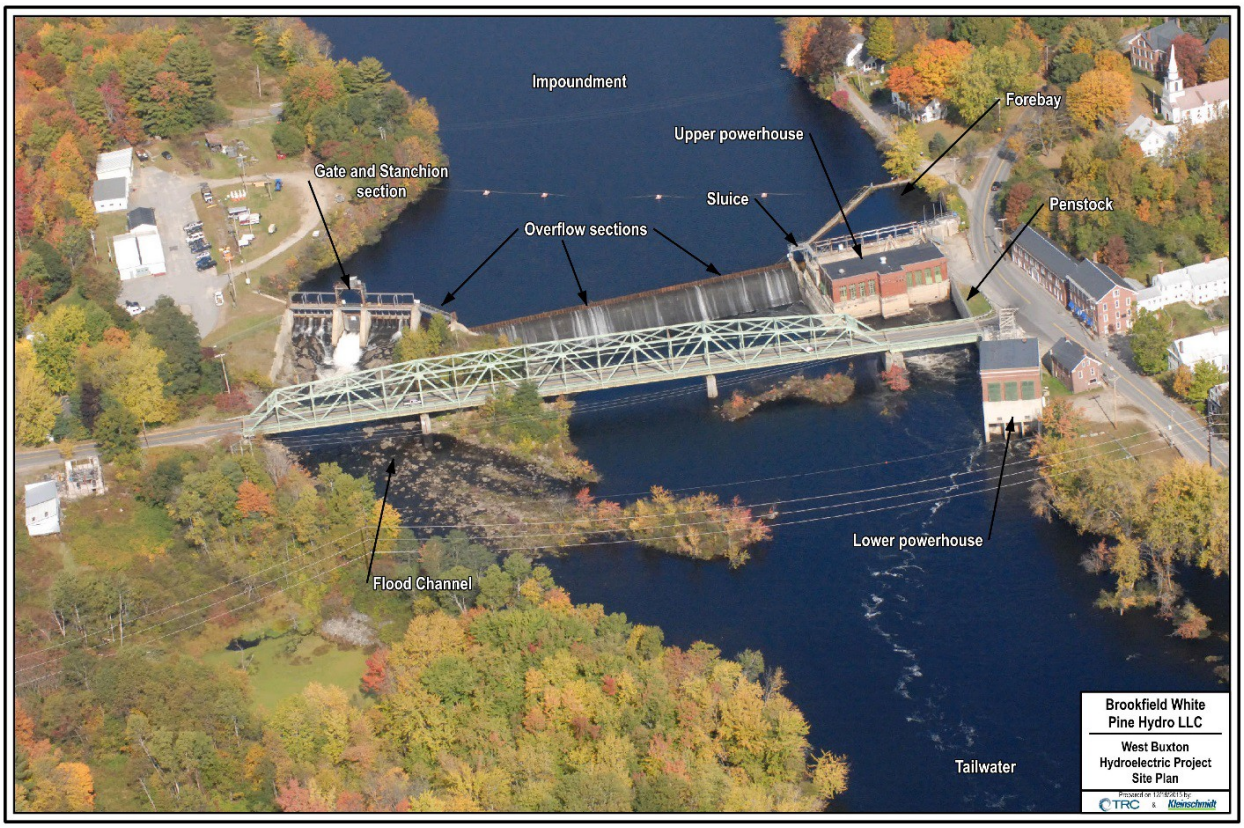

Figure 2. West Buxton Project site plan (Source: White Pine Hydro, 2015; as modified by staff).

West Buxton Impoundment

The West Buxton Impoundment is approximately 1.3 miles long, with a surface area of 118 acres at the normal full pond elevation of 177.8 feet.[19] There is no useable storage capacity in the impoundment.

West Buxton Dam

The project dam is composed of a gate section, a concrete gravity overflow section(s) and an integral powerhouse section, totaling approximately 585 feet in length and having a gross head of 30 feet. Upstream on the westerly side of the dam, there is a concrete cut-off wall with an elevation of 187.8 feet and an earthen dike with a crest

[19] Unless otherwise stated, all elevations in this EA are referenced to U.S. Geological Survey (USGS) datum.

elevation of 189.8 feet. A second concrete cut-off wall, also at elevation 187.8 feet, extends upstream on the easterly side of the dam. The project dam extends from the west cut-off wall with: (1) a 40-foot-long by 11-foot-high stanchion section which has a sill elevation of 167.8 feet; (2) a spillway gate with a sill at elevation 163.8 feet, which contains a 20-foot-wide by 15-foot-high vertical lift gate; and (3) a second 40-foot-wide by 11-foot-high stanchion section, having a sill elevation of 167.8 feet.

There are three overflow spillway sections, with a crest elevation of 173.8 feet, which adjoin the second stanchion section. The western overflow section is 30 feet, 9.5 inches long and the other two main overflow sections are each 135.1 feet long. The main spillway sections are topped with sections of inflatable rubber dam, having a crest elevation of 178.1 feet.

Finally, there is a sluiceway section that is used to pass natural debris at the dam, which extends easterly from the dam's spillway section. The sluiceway opening is 10.8 feet wide, and has a sill elevation of 171.8 feet. Flow through the sluiceway is controlled by a 10.8-foot-wide by 7.5-foot-high vertical lift gate.

Intake

The powerhouse intake section is located to the east of the sluiceway section, and is about 136.5 feet in length. The intake structure for the upper powerhouse, which contains Units 1 through 5, has 17-foot-high intake openings (four 16 feet wide and one 17 feet wide) with vertical lift gates, separated by 3-foot-wide piers and protected by trashracks having 1.875-inch clear bar spacing. The intake structure to the lower powerhouse, which houses Unit 6, has two 15.6 feet-wide by 21.5 feet-high openings with vertical lift gates, separated by a 2.5 feet-wide pier and protected by trashracks having 4-inch clear bar spacing. The intakes to both powerhouses are protected from floating debris by a 190-foot-long, reinforced, angled concrete curtain wall, extending to a depth of approximately 6 feet.

Fish Passage Facilities

White Pine Hydro provides downstream passage for migratory fish at the project, using the angled curtain wall to guide fish to the sluiceway that discharges into a plunge pool. In addition, White Pine Hydro recently installed an upstream American eel ladder, within the project's flood channel, on the gate and stanchion section of the project dam.

Powerhouse(s)

The upper powerhouse is integral with the project dam, and measures 105 feet long by 39 feet wide. The upper powerhouse houses five horizontal axis Francis turbine generating units (Units 1-5), which have a total installed capacity of 3,812 kilowatts

(kW). The lower powerhouse measures 51.2 feet long by 45.5 feet wide, and houses a single 4,000-kW vertical axis Kaplan turbine generating unit. Flow passes from the project intake to the lower powerhouse via a 241.5-foot-long concrete conduit that leads to a 74-foot-long by 30 to 45-foot-wide surge chamber before entering the lower powerhouse. The West Buxton Project generates 34,007 megawatt-hours (MWh) of electricity annually.

Tailwater

The normal tailwater elevation for the upper and lower powerhouses is at about elevation 150.3 feet. The Saco River is backwatered downstream from the project by an irregular riffle and small island complex.[20] The riffle is located about 200 to 500 feet downstream from the project dam and forms a distinct hydraulic control at the upstream end of the Bar Mills Project impoundment.

Along the western shoreline, there is an excavated, man-made flood channel immediately downstream from the dam's gated section. This flood channel is separated from the backwatered zone by a non-project stone masonry wall that extends downstream from the highway bridge pier. From upstream, the flood channel extends from a 20-foot-wide pool downstream approximately 500 feet to its confluence with the tailwater.

Transmission Facilities

The power generated by Units 1-5 is fed through a single-phase, step-up transformer located within the upper powerhouse into the grid via a 175-foot-long, 38-kilovolt (kV) transmission line. The power generated by Unit 6 is fed through a single 3-phase, step-up transformer located with the lower powerhouse into the grid via a 35-foot-long, 38-kV transmission line. The interconnection with the grid is located at a non-project switching station (owned by Central Maine Power Company) on top of the lower powerhouse surge chamber.

Recreational Facilities

White Pine Hydro operates and maintains two formal recreational facilities located within the project boundary, including a canoe portage take out and a canoe portage put-in that also includes a multi-use parking area and tailwater access.

[20] Immediately downstream from the project dam is a pool with a depth of about 6 feet, which gradually transitions into the riffle as the water flows downstream.

Project Boundary

The existing boundary for the West Buxton Project extends upstream from the project dam approximately 7,000 feet to the terminus of the Bonny Eagle Project boundary, and approximately 500 feet downstream to the terminus of the Bar Mills Project boundary. The existing project boundary includes a total of about 52.6 acres of land and 122 acres of open water at a full pond elevation of 177.8 feet, as well as lands associated with project structures, such as the dam, generator leads, powerhouse, recreational facilities, and appurtenant facilities. White Pine Hydro owns non-project maintenance and office buildings that are currently located within the project boundary (Figure 3).

2.1.2 Project Safety

The West Buxton Project has been operating for about 29 years under an existing license. During this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance.

As part of the relicensing process, the Commission staff would evaluate the continued adequacy of the project's facilities under a new license. Special articles would be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the term of the new license to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

2.1.3 Existing Project Operation

The West Buxton Project operates in coordination with the upstream Bonny Eagle Project, which is located about 1.5 miles upstream of Weston Buxton Dam.[21] As there are no major tributaries contributing flow to the project area, the majority of inflow to the West Buxton impoundment comes from flow that is regulated by the Bonny Eagle Project. Water from the West Buxton impoundment is released to the Saco River

[21] The Bonny Eagle Project is licensed with an impoundment fluctuation of 4.5 feet from July 1 through March 31. The cycling pattern during this operational period generally occurs on a daily or twice daily basis, depending on available inflow. From April 1 through June 30, the Bonny Eagle Project is operated in a run-of-river mode. The Bonny Eagle Project is also licensed with seasonally variable minimum flows, ranging from 250 to 600 cfs, or inflow, whichever is less.

downstream from the dam through the project powerhouse(s), over the main spillway, through the stanchion gates (flood channel), or through the sluiceway.

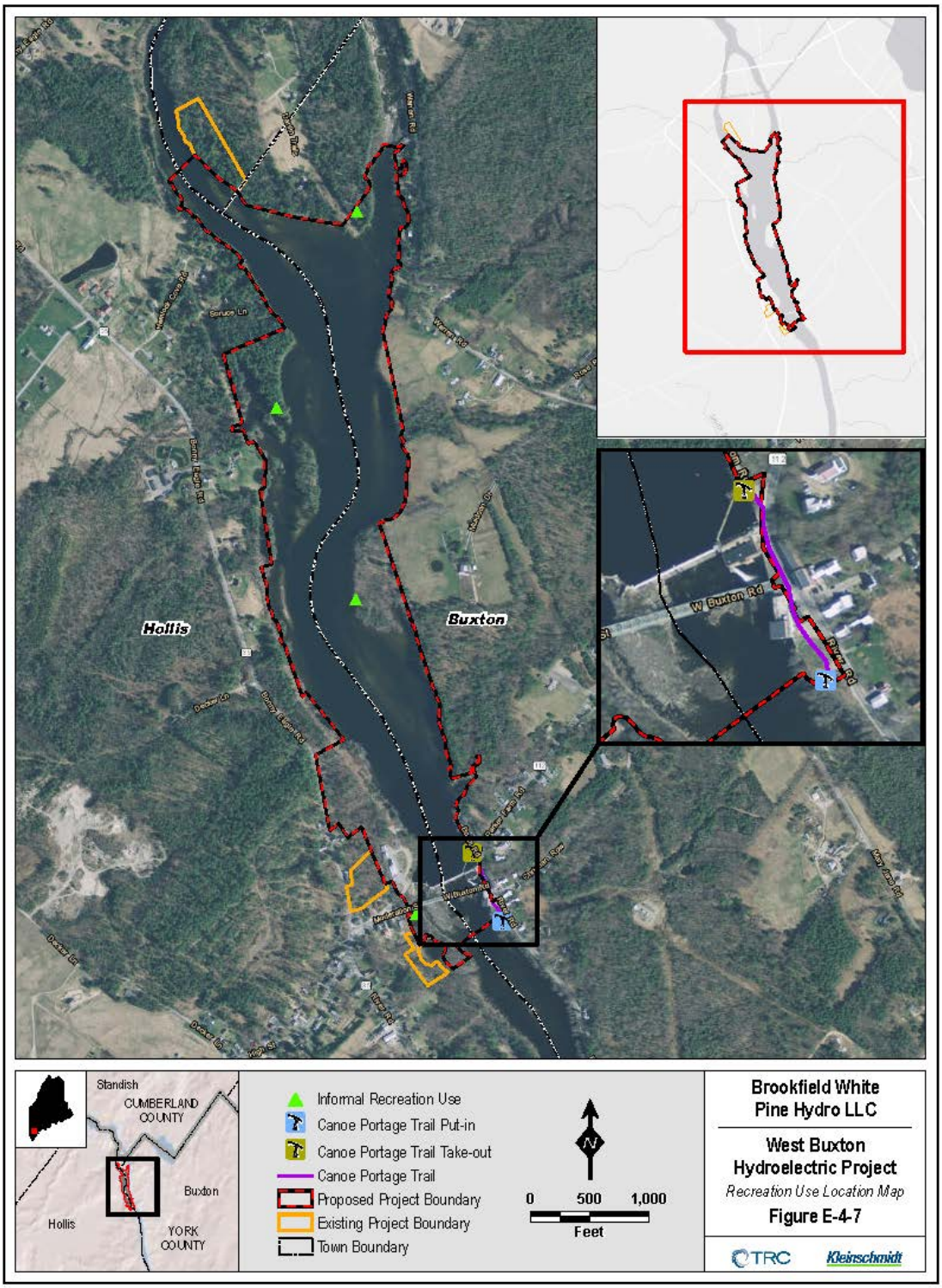

Figure 3. West Buxton Project boundary and existing and proposed recreation facilities (Source: White Pine Hydro, 2015).

The West Buxton Project operates in a run-of-river mode, approximately matching Bonny Eagle outflows. In operating in this manner, the existing license requires that White Pine Hydro act to minimize fluctuations of the impoundment surface elevation, which White Pine Hydro does by limiting the fluctuation during normal operation to less than 1 foot below the normal full pond level of 177.8 feet. In addition, White Pine Hydro maintains, in accordance with the project's existing water quality certification, a total project outflow of 768 cfs, or inflow, whichever is less, in the project tailwater, as measured through generation flow records and fish passage facilities (FERC, 1988).[22]

The West Buxton Project uses flows between 190 cfs (minimum hydraulic capacity of Unit 2 in the upper powerhouse) and 5,162 cfs (maximum hydraulic capacity of the two powerhouses) to generate electricity, while maintaining the 768-cfs minimum flow.[23] Flows less than the minimum hydraulic capacity, which occurs less than 1 percent of the time,[24] are passed over the spillway. Under high-flow river conditions, water in excess of 5,162 cfs is spilled at the dam, which occurs about 15 percent of the time.[25] Once the capacity of the generating units is exceeded, the impoundment level is managed, in order of use, by (a) using the vertical flood gate (3,660 cfs) to pass flow to the flood channel, (b) deflating the rubber dam sections of the spillway, and (c) passing flow through the stanchion gates to the flood channel.[26]

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[22] The project "tailwater" is shown in figure 2. It is located immediately downstream of the confluence of the project's flood channel with the Saco River. The project tailwater consists of the combined flow from the project's flood channel, the upper and lower powerhouses, the dam's overflow section, and the dam's sluice.

[23] Because the Bonny Eagle outflows represent the inflow to West Buxton (where minimum flows vary depending on time of year; *see* n. 21), minimum outflow from West Buxton is typically less than 768 cfs.

[24] *See* Figure B-1 in Final License Application, Exhibit B.

[25] *Id*. High flows occur primarily in the spring (March through May) and in November and December.

[26] *See* Supporting Design Report at 7, in Final License Application, Exhibit F.

2.2 APPLICANT'S PROPOSAL

2.2.1 Proposed Operation and Environmental Measures

White Pine Hydro proposes to:

- Continue run-of-river operation, with daily impoundment fluctuations of 1 foot or less from the normal pool elevation of 177.8 feet during normal operation;

- Continue to release a total project outflow[27] of 768 cfs, or inflow, whichever is less, downstream in the project tailwater (at the confluence of the Saco River and the project flood channel), as measured through generation flow records, flood gate settings, and fish passage facilities;

- Release a continuous flow of 30 cfs from a flood or stanchion gate to the flood channel from May 1 through Columbus Day weekend to enhance adult brown trout habitat and angling opportunities;[28]

- Finalize the proposed plan for monitoring compliance with project operation, including any minimum and flood channel flows, and pond levels.

- Continue to implement the provisions of the 2007 Fisheries Agreement,[29] which includes (a) schedules and processes for constructing fish passage facilities for Atlantic salmon, American shad, alewife, and American eel,[30] and (b) post-construction effectiveness monitoring of all fish passage facilities;

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[27] "Outflow" in this EA is defined as total project releases from Powerhouse No. 1, Powerhouse No. 2, flood gate(s), and fish passage facilities.

[28] White Pine Hydro states that it is amenable to modifying the seasonality component of its proposal to extend the flow release to November 30 (or earlier if ice conditions warrant closing the gate). *See* White Pine Hydro's February 2, 2017 Filing.

[29] White Pine Hydro's proposed measures for fish passage at the West Buxton Project are consistent with the 2007 Fisheries Agreement (*see* Appendix A of this EA) and the agencies' fishway prescriptions described in section 1.3.1, *Federal Power Act – Section 18 Fishway Prescriptions*.

[30] *See* section 1.3.1, *Federal Power Act – Section 18 Fishway Prescriptions*, including n. 7, *supra*, for the proposed schedules.

- Implement the proposed recreation facilities management plan (Recreation Plan), which provides for: (1) recreation improvements and the management of the project recreation facilities, including (a) improving an existing non-project angler access trail on the western shore of the Saco River downstream from West Buxton Dam with a staircase and safety measures, (b) constructing a new public boat launch, upstream of West Buxton Dam, on the western shore of the project impoundment, (c) improving the existing tailwater access on the eastern shore of the Saco River downstream from West Buxton Dam by adding a staircase, stabilizing existing bank erosion, and improving the existing parking area, and (d) improving the existing canoe take-out on the eastern shore of the impoundment by relocating the take-out 10 feet upstream and adding stone steps; and (2) the evaluation of the need for additional access or for improvements to existing recreation facilities during the license term; and

- Implement the proposed historic properties management plan (HPMP) for the protection of cultural resources.

In addition to the measures listed above, White Pine Hydro proposes to remove 7.7 acres of land from the existing project boundary, which it has concluded are unnecessary for project purposes. These lands include: (1) a 4.2-acre parcel located at the uppermost extent of the impoundment; (2) a 2.3-acre parcel located just northwest (upstream) of West Buxton Dam, behind White Pine Hydro's non-project maintenance and office buildings; and (3) a 1.2-acre parcel located along the Saco river just southwest (downstream) of West Buxton Dam and the Maine Department of Transportation (Maine DOT) Bridge (West Buxton Road).

2.3 STAFF ALTERNATIVE

The staff alternative includes all but one of the measures proposed by White Pine Hydro (described below), all but four of the measures recommended by the agencies under sections 10(j) and 10(a) of the FPA (described below), and the following staff-recommended changes to White Pine Hydro's proposal:

- Release a continuous flow of 60 cfs to the flood channel from May 1 through November 30 (or earlier if ice conditions warrant closing the gate);

- Finalize the proposed Project Operation Monitoring Plan to include: (1) a description of the licensed operational requirements; and (2) the curves and calculations for turbine and gate settings needed to monitor flows at the project.

- Include measures, to the extent feasible, to minimize the introduction or spread of non-native invasive aquatic and terrestrial vegetation during construction, operation,[31] and maintenance of the project recreation sites; and

- Limit tree removal and trimming associated with construction of the project boat launch, the improvements to the angler access trail, and non-emergency vegetation maintenance to August 1 through May 31 to avoid potential effects to the northern long-eared bat during the pup season; and

We do not recommend White Pine Hydro's proposed measure, and Maine DMR's 10(j) recommendation, to release a continuous flow of 30 cfs from a flood or stanchion gate to the flood channel from May 1 through the Columbus Day weekend. Nor do we recommend Interior's 10(j) recommendation to maintain 50 cfs in the flood channel year-round and Maine DIFW's section 10(a) recommendation to release 90 cfs from a flood or stanchion gate to the flood channel year-round. Finally, we do not recommend Maine DMR 10(j) recommendation for interim trap and transport of anadromous fish at either the downstream Skelton or Cataract Projects, FERC Project Nos. 2527 and 2528, respectively.

Proposed and recommended measures are discussed under the appropriate resource sections and summarized in section 5, *Conclusions and Recommendations*.

2.4 ALTERNATIVES 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.

2.4.1 Issuing Non-power License

A non-power license is a temporary license that the Commission will terminate when it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this point, no agency has suggested a willingness or ability to do so. No party has sought a non-power license for the project and we have no basis for concluding that the project should no longer be used to produce power. Thus, we do not consider issuing non-power licenses a realistic alternative to relicensing in this circumstance.

[31] In the context of this EA, the term "operation" includes use of the sites by recreationists.

2.4.2 Federal Government Takeover of the Project

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 that federal takeover should be recommended to Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

2.4.3 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 West Buxton 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. 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

This section includes: (1) a general description of the project vicinity, (2) an explanation of the scope of cumulative effects analysis, and (3) our analysis of the proposed action and recommended environmental measures. Sections are organized by resource area (aquatic, recreation, etc.). Historic and current conditions are described under each resource area. The existing conditions are the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of the proposed mitigation, protection and enhancement

measures, and any cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.1, *Comprehensive Development and Recommended Alternative*.[32]

3.1 GENERAL DESCRIPTION OF THE SACO RIVER BASIN

The Saco River originates at Saco Lake in New Hampshire and flows approximately 40 miles southeast through the Mount Washington Valley before entering Maine near Fryeburg, Maine. It then flows approximately 90 miles through the foothills and flat wooded plains of southern Maine, and the urban areas of Biddeford and Saco, Maine before discharging to the Gulf of Maine and the Atlantic Ocean near Saco, Maine. The gradient of the river immediately downstream from West Buxton Dam is 9.7 feet per mile (Yoder *et al.*, 2008).

The Saco River has a drainage area of 1,700 square miles at the mouth, and 1,572 square miles at West Buxton Dam. Approximately 85 percent of the Saco River Basin is forested and 10 percent is under agricultural use (FERC, 1996). The project is located in a rural community with local residential and commercial development. Most of the abutting land is privately owned. The lands within the project boundary are largely undeveloped, with the exception of project facilities near the dam and two non-project buildings (a maintenance building and an office building).

There are seven existing FERC-licensed hydroelectric projects on the Saco River (*see* Figure 1). The Swans Falls Project (FERC Project No. 11365), which is not owned by White Pine Hydro, is the uppermost facility. The remaining six projects, which are owned by White Pine Hydro, include, in descending order, Hiram (FERC Project No. 2530), Bonny Eagle, West Buxton, Bar Mills, Skelton, and Cataract. The West Buxton Project is the fourth of the hydropower projects on the Saco River upstream of the river mouth, and is located about 24 miles upstream from where the mouth the river meets the Atlantic Ocean at Camp Ellis, Maine and about 19.6 miles above head-of-tide at the Cataract Project.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 C.F.R. § 1508.7), an action may cause cumulative effects on the environment if its impacts overlap in time and/or space with the impacts of other past, present, and reasonably foreseeable future actions,

[32] Unless otherwise indicated, information in this EA is taken from the application for license filed by White Pine Hydro on December 18, 2015, and responses to requests for additional information filed on July 28 and August 18, 2016.

regardless of what agency or person undertakes such actions. Cumulative effects 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.

Based on our review of the information provided in license application, and agency comments, we have identified migratory fish (*i.e.*, American shad, alewife, blueback herring, American eel, and Atlantic salmon) and aquatic habitat as resources that could be cumulatively affected by continued operation of the project.[33] Activities within the basin that may cumulatively affect these migratory fish species include the construction and operation of dams within the river basin, which have resulted in migratory barriers, as well as loss of spawning habitat and changes in the timing and availability of aquatic habitat in the Saco River.

3.2.1 Geographic Scope

The geographic scope of the cumulative effects analysis defines the physical limits or boundaries of the proposed action's effects on the resource. We have identified the geographic scope for migratory fish to include the Saco River Basin from the upstream Swans Falls Project to the mouth of the Saco River at the Atlantic Ocean. We have identified the geographic scope for aquatic habitat to include the Saco River Basin from the upstream Bonny Eagle Project to the mouth of the Saco River at the Atlantic Ocean.

3.2.2 Temporal Scope

The temporal scope of our cumulative effects analysis includes a discussion of past, present, and reasonably foreseeable future actions and their effects on each resource that could be cumulatively affected. Based on the potential term of a license, the temporal scope will look 30 to 50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the project-specific effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment,

[33] American shad, alewife, blueback herring, Atlantic salmon, and American eel are known to occur in the lower Saco River. However, only the American eel is known to occur in the project area, though juvenile salmon are stocked upstream of the project. Because the 2007 Fisheries Agreement provides for fish passage at the Bar Mills and West Buxton Projects in the near future, it is reasonably foreseeable that migrating fish will occupy project waters during any new license term. Therefore, our environmental document will include a cumulative effects analysis of these species.

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, recreational access and facilities, and cultural resources may be affected by the proposed action and alternatives. We have not identified any substantive issues related to geology and soils, aesthetics, or socioeconomics associated with the proposed action; and therefore, these resources are not addressed in the EA. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

3.3.1 Aquatic Resources

3.3.1.1 Affected Environment

Water Quantity and Use

The average annual flow at the West Buxton Project is approximately 3,372 cfs.[34] The Saco River generally exhibits highest flows during April and May and lowest flows during August and September (*see* Exhibit B, Appendix B-1 of License Application). Flows exceed 5,162 cfs (*i.e.*, the maximum hydraulic capacity of the project) about 18 percent of the time and exceed 768 cfs (*i.e.*, the minimum flow required by the current license) about 98 percent of the time (Figure 4).

[34] White Pine Hydro calculated annual average flow using data collected from 1980 through 2014 at USGS gage no. 01066000, located upstream on the Saco River in Cornish, Maine, and prorated by a factor of 1.17 to compensate for the drainage area between West Buxton Dam (1,572 square miles) and the USGS gage (1,293 square miles).

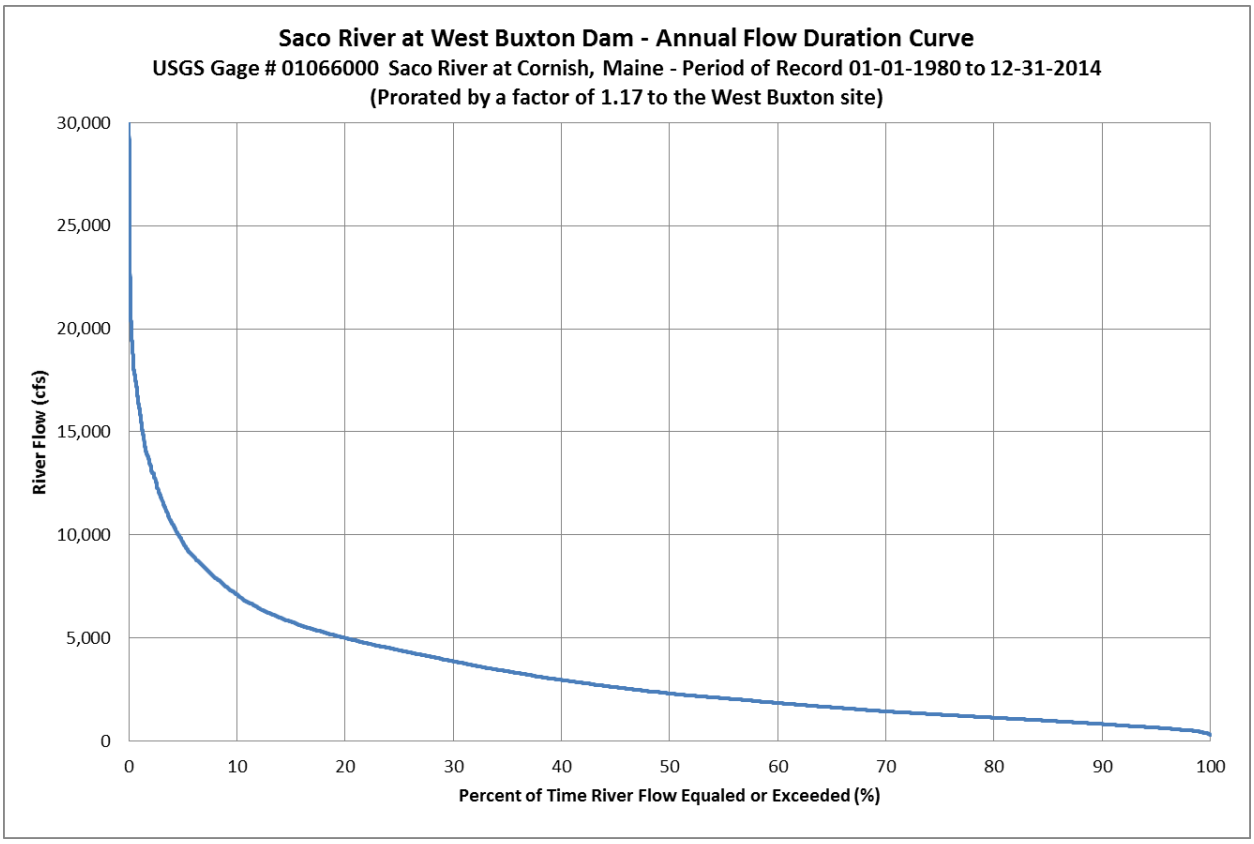

Figure 4. Saco River at West Buxton - Annual Flow Duration Curve. (Source: White Pine Hydro, 2015).

As stated in section 2.1.3, *Existing Project Operation*, White Pine Hydro operates the West Buxton Project in coordination with the upstream Bonny Eagle Project. The project impoundment is approximately 1.3 miles long, has an estimated surface area of 118 acres, and has no appreciable storage capacity. When flow is within the range of the project's hydraulic capacity (*i.e.*, 190 to 5,162 cfs; which occurs about 20 percent of the time), White Pine Hydro operates the project in a run-of-river mode, approximately matching Bonny Eagle outlfows, with impoundment fluctuations limited to 1 foot or less. When inflows to the project exceed 5,162 cfs, water in excess of the hydraulic capacity of the generating units is spilled at the dam or into the flood channel.

Project waters are used for hydroelectric generation and limited recreation. There are no known withdrawals or consumptive uses of water from the project impoundment. Nor is there any known direct discharges to the impoundment or to project waters downstream from West Buxton Dam or no permitted point source discharges to the Saco River upstream of the project in Maine.

Water Quality

Maine's water quality laws (38 M.R.S.A. §§ 464 *et. Seq.*) establish the State's classification system for surface waters. The Saco River from its confluence with the Little Ossippe River downstream to the Bar Mills impoundment, which includes the entire project area, is classified as Class A (38 M.R.S.A. § 467), which is described as:

> *Class A waters must be of such quality that they are suitable for the designated uses of drinking water after disinfection; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as habitat for fish and other aquatic life. The habitat must be characterized as natural.*

The Maine statutes include a provision recognizing that some changes in aquatic life and habitat may have occurred because of existing hydropower impoundments. The provision states that within the influence of an existing hydropower impoundment, habitat characteristics and aquatic life criteria for Class A waters are considered to be met:

> *...provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.*

The State of Maine has established Class A water quality standards for dissolved oxygen (DO) and pH, and statewide criteria for dissolved iron and manganese (Table 1). Currently, Maine has no standards for nutrient concentrations in freshwater, although draft criteria for nutrient concentrations and environmental response indicators (*i.e.*, Chlorophyll a and Secchi disk depth) are available (Maine DEP, 2012a) (Table 1).

Table 1. Established and draft Maine water quality standards for applicable parameters. (Source: White Pine Hydro, 2015).

Parameter	Criteria	Water Classification
Statutory Criteria		
DO[1]	7.0 milligrams per liter (mg/l) or 75 percent saturation	Class A
pH[1]	6.0 to 8.5	Class A
Dissolved Iron[2]	1 mg/l	Statewide
Dissolved Manganese[2]	0.1 mg/l (human health)	Statewide
Draft Criteria		

Parameter	Criteria	Water Classification
Total Phosphorus[3]	≤0.018 mg/l	Class A
Chlorophyll a[3]	0.0035 parts per million	Class A
Secchi Disk Depth[3]	≥2.0 meters	Class A

[1] Maine Statute 38 M.R.S.A. (§ 465 & § 465A).
[2] Maine DEP (2012a).
[3] Maine DEP (2012b).

Unlike many of the major river basins in Maine and elsewhere in New England, the majority of the Saco River basin north of the cities of Saco and Biddeford remains relatively unaffected by industrial development and the associated effects on water quality. In addition, there is no known significant areas of non-point source discharge[35] into project waters. Thus, water quality in the Saco River, including throughout the Project area, is generally considered very good (FPL Energy, 2003).

Pursuant to the Commission-approved Study Plan,[36] White Pine Hydro conducted water quality studies in 2013 to assess the potential effects of operating the project on water quality. The studies included: (1) collecting baseline lake trophic data in the West Buxton impoundment; (2) collecting baseline DO and water temperature data in the West Buxton tailwater; and (3) sampling benthic macroinvertebrates in the Saco River in the project tailwater.[37] The objective of the impoundment and tailwater monitoring efforts was to update baseline information and document concentrations of DO and temperature and water quality conditions upstream and downstream of the Project facilities. The objective of the macroinvertebrate sampling effort was to generate data on the aquatic macroinvertebrate community in the Saco River in the tailwater section downstream of the Project, and to assess this community in terms of Maine's Aquatic Life Standards to confirm the Class A water quality classification.

[35] Potential sources of non-point source discharge(s) to the Saco River from the surrounding watershed include agricultural run-off, road salt, and sediment inputs due to silvicultural activities (FERC, 1996).

[36] *See* Study Plan Determination letter issued June 20, 2013.

[37] White Pine Hydro conducted all water quality sampling in accordance with standard operating procedures provided by the MDEP for water quality sampling at hydropower facilities (Maine DEP, 2014; 2003a; 2003b; 2003c).

West Buxton Impoundment

During the summer and early fall of 2013, White Pine Hydro collected water quality samples from the deepest part of project impoundment (*i.e.*, mid-channel, just upstream of the West Buxton Dam's boat barrier). Lake trophic sampling was performed twice per month for five consecutive months during the period June through October 2013. Sample parameters included DO, water temperature, Secchi disk transparency,[38] Cholorophyll *a*,[39] total phosphorus, and pH. Vertical profile data was collected at 3-foot intervals.

DO and water temperature profiles showed relatively little variation between the surface and bottom of the water column, which indicates that the impoundment did not stratify during the sampling period. During the survey period, water temperature in the project's impoundment ranged from 54.9 degrees Fahrenheit (°F) to 78.6 °F, and DO ranged from 7.7 milligrams per liter (mg/L) to 12.3 mg/L. Values for Secchi depth, chlorophyll *a*, and total phosphorus indicate that the impoundment could be characterized as mesotrophic based on Maine's lake trophic status guidelines (Maine DEP, 2012c; Table 2).

Table 2. The range and average for water quality parameters in the West Buxton Project impoundment and Maine DEP trophic state guidelines.

Water Quality Parameter	Range	Average	Mesotrophic
Water temperature (°F)	54.9-78.6	67.8	NA
Dissolved oxygen (mg/L)	7.7-12.3	9.1	NA
pH	6.9-7.2	7.1	NA
Total phosphorus (mg/L)	0.009-0.018	0.013	0.0045-0.02
Chlorophyll *a* (ppm)	0.001-0.006 [a]	0.002	0.0015-0.007

[38] Secchi depth is a measure of water transparency. To measure Secchi depth, an 8-inch disk with a black and white pattern is lowered into the water column until it is no longer visible from the surface and then the disk is raised until it is visible again. The depths at which the disk disappears and reappears are averaged and reported as the Secchi depth.

[39] Chlorophyll *a* is a measure of the amount of phytoplankton in the water and reflects the biological productivity of the water body.

Water Quality Parameter	Range	Average	Mesotrophic
Secchi depth (m)	2.1-4.8	3.6	4-8

[a] The September 9, 2013 Chlorophyll *a* sample (0.006 ppm) was turbid in the lab; and turbidity is known to interfere with a proper Cholorphyll *a* reading.

West Buxton Tailwater

White Pine Hydro conducted tailwater sampling at a single station located mid-channel, about 500 feet downstream from West Buxton Dam, and downstream from the lower powerhouse. Sampling occurred twice a day, one day per week, for 10 weeks between July and September, 2013.[40] Water temperatures and DO concentrations in the tailwater were generally consistent with those observed in the impoundment, though temperatures were slightly higher in the tailwater (White Pine Hydro, 2014a). Water temperature collected during the morning hours averaged 71.4 °F (range of 62.6 °F to 78.4 °F), and temperature during the evening hours averaged 72.1 °F (range of 63.3 °F to 79.9 °F). DO concentrations averaged 8.9 mg/L (range of 8.3 to 10.2 mg/L) in the morning, and 8.8 mg/L (range of 8.2 to 10.2 mg/L) in the evening.

West Buxton Tailwater Macroinvertebrates

White Pine Hydro conducted macroinvertebrate sampling in the project tailwater following Maine DEP's "Methods for Biological Sampling and Analysis of Maine's Inland Waters" (Davies and Tsomides, 2002). Sampling was conducted at a single location using three standard rock basket samplers. Habitat measurements, which included substrate type, depth, and temperature, were collected at the time of sampler retrieval. Samples were collected, preserved, and transported to the laboratory where macroinvertebrates were sorted, identified, and enumerated.

The macroinvertebrate community downstream from the project was found to be abundant and rich in taxa. The community was populated relatively evenly across 38 different taxa with no organism representing more than 12 percent of total abundance.

[40] Maine DEP's Riverine Sampling Protocol requires sampling to be conducted under certain low flow, high water temperature conditions. However, 2013 was a high flow year for the Saco River. Therefore, the combined flow and temperature conditions did not quite meet the Maine DEP's low flow/high temperature threshold on any of the 10 sampling days, though they were close on a number of days. Nonetheless, Maine DEP determined that the 2013 river flow/temperature conditions were satisfactory for water quality determination (White Pine Hydro, 2014b).

The diversity value for the community was relatively high. Structural indices for the sampled community are summarized in Table 3.

Table 3. Indices of community structure for the aquatic macroinvertebrate community in the tailwater section of the West Buxton Project, July and August 2013. (White Pine Hydro, 2014a).

Index	Value	Index	Value
Total Abundance	193	Ephemeroptera, Plecoptera, and Trichoptera (EPT) Richness	22
Taxa Richness	38	Ephemeroptera, Plecoptera (EP) Richness	14
S-W Diversity	3.14	EP Abundance	41 percent
Hilsenhoff's Biotic Index (HBN)	3.50	Midge Richness	10
HBN Water Quality	Excellent	Midge abundance	17 percent

Water quality sensitive organisms were found to account for a large portion of the tailwater community. The EPT richness index showed that sensitive mayfly, stonefly, and caddisfly taxa represented 58 percent of the taxa identified, and the orders of these species (EP richness) represented 37 percent of the taxa richness. In terms of total abundance, mayflies and stoneflies made up 41 percent of the community. The HBN value of 3.50 was also indicative of excellent water quality (Hilsenhoff, 1987).

Stream Aquatic Habitat Analysis

To address whether the Saco River downstream from the project supports its designated use of "habitat for fish and other aquatic habitat," Maine DEP requested that White Pine Hydro describe the flows and aquatic habitat provided by the existing minimum flow of 768 cfs at the project.[41] The information used for this assessment came from a 1991 minimum flow study (Stetson-Harza, 1991) for a river reach that begins 100 feet downstream from the lower powerhouse and extends about 945 feet downstream, depending on the pond level and backwater from the Bar Mills Project impoundment. For purposes of this discussion, the habitat provided at the current minimum flow was

[41] The reach of interest consists of the West Buxton tailwater and reach immediately downstream. The upstream end of the reach is bounded by deep, riverine pool habitat, and receives inflows from the powerhouse discharge, discharge through the flood channel gates, and spillage.

compared to the relative amount of habitat provided at bankfull conditions.[42] The amount of aquatic habitat available, as defined by the wetted perimeter,[43] was determined by calculating the relative water surface elevations corresponding to both bankfull flow and 768 cfs, then calculating the wetted perimeter provided by each flow.

Table 4 shows the results of the aquatic habitat analysis, for flows ranging from 370 to 6,050 cfs. Wetted perimeter ranged from 366 feet at 370 cfs to 423 feet at the bankfull flow of 6,050 cfs. The wetted perimeter for the existing 768-cfs minimum flow is 371 feet. The existing minimum flow, therefore, wets approximately 88 percent of the channel perimeter wetted by the bankfull discharge of 6,050 cfs.

Table 4. Stage-discharge and wetted perimeter relationship of transect 1 (from Stetson-Harza, 1991) located 900 feet downstream from the West Buxton Project. (Source: White Pine Hydro, 2015).

Flow (cfs)	WSEL (feet) [1]	Wetted Perimeter (feet)	
370	94.9	366	
400	94.9	366	
500	95.0	368	
750	95.2	371	
768	95.3	371	88 percent
917	95.4	374	
1000	95.5	375	
1500	96.0	382	
2000	96.5	389	
2500	97.0	392	
3000	97.5	397	
3500	98.0	400	
4000	98.5	404	
4500	99.0	407	

[42] Hydraulically, bankfull flow corresponds to the discharge at which river hydraulics create channel geometry by forming or moving sediment bars, embankments, transporting bed load, and defining the break point between channel and floodplain areas (Dunne and Leopold, 1978; Floss *et al.*, 2007; Dudley, 2004). This elevation can be visually discerned by indicators such as well-defined bank crests, as well as a shift in vegetation and/or substrate (Dudley, 2004).

[43] The wetted perimeter of a stream is defined as the circumference of the streambed in contact with water, and is used as an indicator of aquatic habitat availability over a range of discharges (Instream Flow Council, 2002).

Flow (cfs)	WSEL (feet) [1]	Wetted Perimeter (feet)	
4960	99.5	410	
5000	99.6	411	
6050	100.6	423	Bank Full Value

[1] Water surface elevations are in local survey datum.

Fisheries

Saco River Fisheries Management

The lower Saco River from the Cataract Project upstream to East Limington, which includes all of the West Buxton Project, is managed by Maine DIFW as a self-sustaining warm-water fishery and a put-grow-and-take trout fishery (Maine DIFW, 2012). The lower Saco River fish assemblage is composed of both inland freshwater fish species, as well as various life stages of migratory species such as Atlantic salmon, alewife, blueback herring, American shad, and American eels.

Since the 1980s, the recreational freshwater fishery resources of the lower Saco River have been rated as "high value" by Maine DIFW (Maine DIFW, 1982).[44] In addition, the Joint Agency Fisheries Management Plan for the Saco River (FWS, 1987) shows the West Buxton Project to be within Saco River fisheries management Reach III, which extends from the downstream Skelton Dam to the Little Ossipee River confluence located upstream of the West Buxton Project. The reach is characterized by mostly impounded water, and the plan lists the management objectives for the reach as:

- Manage as a migratory pathway for Atlantic sea-run salmon, American shad and American eels;
- Sustained production of trout, Atlantic salmon, American shad, and American eels consistent with habitat capabilities;
- Establish recreational fisheries for trout and Atlantic salmon consistent with habitat capabilities;
- Increase recreational utilization of all warmwater fish populations and commercial utilization of American eels.

[44] In assigning a value (low, moderate, high) to a fishery, Maine DIFW considers the quality and availability of fish habitat, water quality, size of the watershed, and fish communities (including recruitment, forage base, and natural reproduction) present in the river reach.

Recruitment of warmwater fish in project waters is maintained by natural reproduction. However, Maine DIFW annually stocks brook and brown trout in the Saco River at two locations upstream of the West Buxton Project to maintain the river's trout fishery (Maine DIFW, 2010).[45]

Resident fish

The resident fish community in the project area includes coldwater and warmwater game and non-game species (FPL Energy, 2003). Yoder *et al*. (2008) conducted boat electrofishing surveys in the tailwaters of West Buxton Dam and the upstream Bonny Eagle Dam. The resulting relative abundance and thermal guild data are summarized in Table 5, which shows that the fish assemblage is generally dominated by warm and cool water (transitional) species.

Table 5. Fish collected at two sites on the Saco River, Hollis, Maine. (Source: Yoder *et a*l., 2008, as cited in White Pine Hydro, 2015).

Species	Relative Abundance (% of catch)		Thermal guild*
	West Buxton Tailwater (n=209)	Bonny Eagle Tailwater (n=373)	
White sucker	26.3	28.4	Transitional
Fallfish	22.5	6.4	Warm
American eel	15.8	0.3	Warm
Smallmouth bass	12.9	5.9	Warm
Pumpkinseed sunfish	7.7	2.1	Warm
Common shiner	5.7	37	Warm
Yellow perch	4.8	17.4	Transitional/Warm**
Golden shiner	2.4	0	Warm
Burbot	1.0	0.3	Transitional
Chain Pickerel	0.5	0.3	Warm
Largemouth Bass	0.5	1.9	Warm

***** Thermal guild designation by Lyon *et al*. (2009).

****** Hartel *et al*. (2002) classified the yellow perch as a warm water species.

[45] To address the increasing public interest in fishing rivers through the fall and winter (when conditions allow), Maine DIFW adopted year-round fishing regulations and expanded stocking programs on four rivers in southern Maine, including the Saco River. *See* Maine DIFW's December 20, 2016 letter at 3. Because much of the lower Saco River is impoundment by hydropower dams, the project's flood channel and tailwater offer unique habitat for trout management in this part of Maine. Thus, Maine DIFW's fishery management objectives for the project are to provide a seasonal fishery for brook trout and a year-round fishery for brown trout that includes multiple age classes.

White Pine Hydro conducted an electrofishing survey of the West Buxton impoundment (Normandeau Associates [Normandeau], 2007), using methodologies recommended by Maine DIFW to assess the structure of smallmouth and largemouth bass populations. A total of 29 smallmouth and seven largemouth bass were collected.[46] Black crappie, bluegill, brown bullhead, brown trout, chain pickerel, fallfish, golden shiner, pumpkinseed sunfish, rainbow trout, white sucker, and yellow perch were also collected. Yellow perch and white sucker were the most frequently collected species, and were considered "abundant." Brown trout and rainbow trout were characterized as "rare," with all other species classified as "common." Overall, the 2007 study of the West Buxton impoundment bass fishery found a good mix of smallmouth and largemouth bass, and that bass were in normal condition (Normandeau, 2007). However, in reviewing fisheries data collected in the West Buxton impoundment, Maine DIFW noted year class failures, particularly in relation to largemouth bass, but also in the larger size classes of smallmouth bass (Maine DIFW, 2012).

Aquatic Habitat

IMPOUNDMENT – Fish habitat at the project is varied and includes habitats associated with the impoundment and tailwater downstream from the dam and powerhouses, as well as a migratory pathway for various life stages of diadromous fish. The West Buxton impoundment is small (118 acres), shallow (average depth ranges from 10 to 15 feet), and riverine in nature. Overall, fisheries cover in the impoundment is very good and is characteristic of habitat suitable for spawning, rearing, and foraging for indigenous warmwater fish species. Aquatic habitat is dominated by boulder pool conditions, with scattered pockets of bedrock and shoal areas approximately 2 to 4 feet deep, under normal pond level conditions. Several small alluvial islands are surrounded by pocket shoals of finer sediments and aquatic macrophyte beds. Shoreline habitat is composed of largely undisturbed embankments, with stable, well defined vertical banks. Overhanging vegetation from forested cover and isolated pockets of wetlands[47] provide littoral habitat for fish and other aquatic organisms (Yoder *et al*., 2008; White Pine Hydro, 2016).

Substrate in the upper impoundment is generally coarse, and dominated by boulder and cobble substrates. The mid and lower impoundment exhibits deposition of finer sediments, which has resulted in the formation of sediment bars, and is seasonally

[46] Smallmouth bass ranged from 1 to 15 years in age, with 3- and 4-year-old fish being the most common. Largemouth bass ranged in age from 3 to 10 years in age.

[47] There are 1.4 acres of aquatic bed wetlands, 0.7 acres of emergent wetlands, 6.3 acres of forested wetlands, and 0.4 acres of shrub-scrub wetlands within the project boundary (White Pine Hydro, 2016).

vegetated with aquatic growth. Instream cover is generally high with overhanging vegetation, undercut banks, pools, slow-moving shallow area, boulders, aquatic macrophytes, and root wads. The diverse substrate, varying flow fields and abundant cover provide good habitat for a variety of riverine fish species (Yoder *et al*., 2008).

PROJECT TAILWATER – The Saco River is backwatered downstream from the West Buxton Project by an irregular riffle and small island complex, located approximately 200 to 500 feet downstream from the project dam. This riffle is located at the upstream end of the Bar Mills Project, and forms a distinct hydraulic control.[48] Habitat in this backwatered area is comprised of a deep (*i.e.*, depths greater than 6 feet) pool located immediately downstream from both the upper powerhouse and spillway area. The pool is dominated by bedrock and boulder substrates. Pool habitat gradually transitions toward boulder dominated run-glide habitat, moving downstream toward the controlling riffle. At typical summer low-flow, habitat suitability (depth, velocity, and wetted area) in this section is defined by both the hydraulic control created by the riffle and Project discharge (Yoder *et al*., 2008).

FLOOD CHANNEL – The project flood channel is located along the western shoreline, immediately downstream from the gated section of the project dam. This channel is a relatively short (about 500 feet long), man-made channel created in 1936-37 designed to convey flood flow releases from project gates and the stanchion section. The gates and stanchions are operated to discharge water during high flow events, typically during spring runoff (White Pine Hydro, 2014a).

Substrate in the flood channel is composed of bedrock, boulder, and cobble, forming a riffle complex. The upstream section is a 20-foot-wide backwater pool and the downstream portion is a run that merges with the project tailwater. Substrate and cover conditions in the flood channel are suitable for adult brown trout, which Maine DIFW stocks and manages in the project area to support a put-grow-and-take fishery.[49] Habitat is dominated by riffles and short runs (White Pine Hydro, 2014a).

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[48] A hydraulic control is the top of an obstruction in a stream or a point in a stream where streamflow is constricted by any large, relatively immobile object (*e.g.*, boulder, bedrock, etc.) that stabilizes the stream geometry and maintains long-term channel character.

[49] Maine DIFW annually stocks 200 fall yearling brown trout downstream from West Buxton Dam, but none are currently stocked in the flood channel which potentially could support 88,000 ft^2 of fishable trout habitat. *See* Maine DIFW's December 4, 2012 letter.

During the pre-filing licensing process, Maine DIFW requested that White Pine Hydro conduct a flow demonstration study in the flood channel. The goal of this study was to conduct a semi-quantitative incremental flow evaluation of a series of flow releases downstream from the gate structure, with respect to (a) improving habitat for brown trout and (b) improving accessibility to the reach for recreational anglers to effectively catch those trout.[50] The flow study, which was conducted in August of 2013, documented fisheries habitat suitability in the flood channel under existing flow conditions (20-cfs leakage[51]) and four alternative minimum flows, including 20-cfs leakage plus a gate release of 30, 60, 90, and 120 cfs (White Pine Hydro, 2014a). The study evaluated flow effects on habitat preferences for brown trout, including depth, velocity, and substrate/cover. Suitability was narratively (or qualitatively) classified along two transects, representing the two dominant habitat types (*i.e.*, run and riffle habitat).[52]

The flow study shows that the existing leakage flow of 20 cfs provides approximately 68 percent of the available suitable habitat for brown trout that would be achieved with the 90- and 120-cfs flow release (Table 6). To address the goal of making the reach more "cast-friendly," Commission staff estimated percent exposed substrate (rubble and boulder) for Transect 2 (riffle habitat) to be between 50 and 60 percent with the existing 20-cfs leakage flow.

In addition to flow, water temperatures also play a role in determining habitat suitability for fish, particularly trout. Water temperatures in the Saco River in the project vicinity follow a typical seasonal pattern. Water quality sampling results from the West Buxton tailwater area between mid-July and mid-September showed that temperatures ranged between 62.6 ºF on September 18, 2013 to 79.9 ºF on July 17, 2013. Brown trout have a temperature tolerance range of 32 - 80.6 ºF, while optimal temperatures are 53.6 - 66.2 ºF (FWS, 1986).

[50] *See* White Pine Hydro's Initial Study Report, filed April 22, 2014, at 2-63 and 2-66. During the on-site, post-demonstration study team discussion, Maine DFIW stated that one of its goals is to make the area more "cast-friendly."

[51] A total of about 20 cfs leaks from the vertical flood gate and stanchion gates.

[52] Substrate was dominated by unembedded boulder and cobble at all flows, and was determined to be consistently "excellent" at all flows. Therefore, depth and velocity became the habitat suitability parameters evaluated (White Pine Hydro, 2014a).

Table 6. Change in habitat suitability for adult brown trout in the project flood channel at various gate releases. (Source: White Pine Hydro, 2015; as modified by Staff).

Gate Release (cfs)	Leakage Flow (cfs)	Total Flood Channel Flow (cfs)	Suitability Transect-1 (Run Habitat) [1]	Suitability Transect-2 (Riffle Habitat) [1]	Cumulative Suitability	Relative Percent	Percent Exposed Substrate (Rubble and Boulder) [2]	
							Transect 1	Transect 2
0	20	20	20.16	19.44	39.6	68	No Data	50 - 60
30	20	50	24.45	24.30	48.8	84	50 - 60	No Data
60	20	80	28.91	26.40	55.3	95	20 - 30	20 - 30
90	20	110	32.65	25.55	58.2	100	20 - 30	20 - 30
120	20	140	31.40	26.93	58.3	100	20 - 30	10 - 20

[1] Suitability was narratively classified at each vertical along each transect for depth and velocity into quartiles of "excellent" (SI rating 0.76-1.0), "good" (SI rating 0.51-0.75), "fair" (SI rating 0.26-0.50), or "poor" (SI rating 0.0-0.25). The suitability values recorded at each vertical were summed at each flow across each transect to generate a cumulative suitability score.

[2] Commission staff estimated the percentages of the transects that contained exposed boulders of 1 to greater than 4 feet in diameter from photographs of the transects taken during the demonstration flow study. The photographs are found on pages 2-81 through 2-84 of White Pine Hydro's July 2014 Initial Study Report. The report was filed on April 22, 2014, and can be found on the Commission's eLibrary for the project at Accession No. 20140422-5147. No data for a gate release of 0 cfs at Transect 1 is shown because the report did not include a photograph for the Transect at the 0-cfs gate release. No data for a gate release of 30 cfs is shown for Transect 2 because the photograph provided for that transect at a gate release of 30 cfs has too narrow a field of view to determine a percentage.

Diadromous Fish[53]

ANADROMOUS[54] FISH SPECIES AND HABITAT – The West Buxton Project is located within the historical range of a number of species of diadromous fish, including several species of anadromous species (*i.e.*, Atlantic salmon and river herring [blueback herring and alewife]). American shad are present in the lower Saco River, but it is thought that this species may have been stopped by the natural falls at the head of tide in Saco/Biddeford, which is the site of the Cataract Project, limiting it to the tidal reach of the river (McLaughlin *et al.*, 1987). NMFS and Interior, however, assume that American shad historically used habitat in the Saco River up to Hiram Dam, including habitat in the Ossipee River.[55] The Saco River still supports remnant populations of all these species, and some of these fish occur in the West Buxton Project area (FPL Energy, 2012).

Biologists have mapped over 14,100 units[56] (291 acres) of Atlantic salmon habitat throughout the Saco River watershed,[57] including 13,300 units (275 acres) upstream of West Buxton Dam, much of it on the Ossipee River, which flows into the Saco River about 55 miles upstream of West Buxton and Bonny Eagle Dams. The river also has over 296,858 units (681 acres) of alewife habitat, an estimated 103,000 units (about 400 acres) of blueback herring habitat,[58] and 103,537 units (433 acres) of American shad habitat

[53] Diadromous is a term used to describe a life history strategy that includes movement between fresh- and saltwater, where organisms exhibit two migrations to spend various life stages in different ecosystems.

[54] The term "anadromous" is used to describe a life history strategy where reproduction and egg deposition occurs in freshwater, while rearing to the adult stage occurs in saltwater.

[55] *See* NMFS's December 16, 2016 Comments at 11; and FWS's December 19, 2016 Comments at 6-7.

[56] One unit of surface area equals 100 square yards.

[57] FWS indicates that there are 14,665 habitat units in the Maine portion of the Saco River; 95 percent of the habitat is located upstream of West Buxton Dam (FWS, 1987).

[58] The 1987 Saco River Strategic Plan for Fisheries Management (FWS, 1987) does not estimate the amount of habitat in the Saco River for blueback herring. However, NMFS and Interior state that the freshwater spawning habitat requirements for blueback herring (Mullen *et al*., 1986) are similar to those of American shad (Stier and Crance, 1985), both preferring fast currents over hard substrate in large to small rivers.

throughout the watershed, all within the state of Maine downstream from the Hiram Project.[59] Between 40 and 50 percent of this habitat is inaccessible because of the lack of permanent fish passage at mainstem projects.[60]

SACO RIVER FISH PASSAGE – The Cataract Project, the first project on the Saco River and located near head of tide, includes four dams situated along two separate channels of the river, at the site of what was once a formidable set of falls.[61] Upstream and downstream fish passage facilities are provided for salmon, shad, and river herring at all four of the Cataract Project dams (FPL Energy, 2012). The next barrier encountered on the river is Skelton Dam, which is also equipped with upstream and downstream passage facilities for salmon, shad, and river herring. The third barrier on the river is Bar Mills Dam. While downstream passage is provided for anadromous species at Bar Mills, there is currently no upstream passage facilities for anadromous species at the dam.[62]

West Buxton Dam represents the fourth barrier on the Saco River. The existing project license requires downstream anadromous fish passage measures at the project.[63] The Bonny Eagle Project, the next upstream project, also has a downstream passage facility for anadromous species. However, neither West Buxton nor Bonny Eagle Dams currently provide upstream passage for anadromous fish.

Therefore, they estimate that the total blueback herring habitat to be equivalent to that of American shad in the Saco River.

[59] *See* NMFS's December 16, 2016 Comments at 10-12; and FWS's December 19, 2016 Comments at 6-7.

[60] *See* NMFS's December 16, 2016 Comments at 13; and Maine DMR (2014).

[61] Atlantic salmon, river herring (alewife and blueback herring), American shad, and American eel historically migrated upstream past the falls at Cataract and the site of the West Buxton Project to use habitat in the upper Saco River watershed. See NMFS's December 16, 2016 letter at 9, and FWS's December 19, 2016 letter at Attachment B.

[62] The Bar Mills license requires White Pine Hydro to construct upstream anadromous fish passage at Bar Mills by May 1, 2016. On June 26, 2015, the Commission approved White Pine Hydro's request to extend the operational date for the facility from May 1, 2016 to May 1, 2018. Subsequently, on January 4, 2017, the Commission approved White Pine Hydro's request to further extend the operational date of the facility to May 1, 2019.

[63] *See* n. 9, *supra*.

Upstream fish passage for anadromous species in the lower Saco River is provided at the Cataract and Skelton Dams, through a combination of fish lifts, fish locks, and a Denil fish ladder. Trap and transport operations at both the Cataract East Channel and Skelton fish lifts are used to trap and transport fish to selected upstream locations in the Saco River. Since operation of the Cataract East Channel fish lift and West Channel Denil fish ladder began in 1993, White Pine Hydro and its predecessors (*i.e.*, Central Maine Power Company and Florida Power and Light) have passed 509,846 river herring, 66,767 American shad, and 801 Atlantic salmon at these two dams (Table 7). Since operation of the Skelton fish lift began in 2002, White Pine Hydro has passed 209,197 river herring, 439 American shad, and 168 Atlantic salmon at Skelton Dam (Table 8).

Atlantic salmon, shad, and river herring are captured and trucked to upstream locations, and/or periodically used for ongoing fish passage studies. Most adult salmon passing Cataract and Skelton are trucked to suitable spawning habitat in the Ossipee River. Most, though not all, American shad are trucked from the Cataract East Channel fish lift to the Cataract impoundment, giving shad access to significant spawning habitat between the Skelton and Cataract Projects. Most river herring have been permitted to pass through the existing fishways at Cataract and Skelton Dams to reach spawning habitat in those impoundments; though, based on agency plans for 2015-2017, adult river herring are currently trucked to, and released in, the West Buxton impoundment.

Table 7. Annual and total fish passage numbers at the Cataract East channel fish lift and the Cataract West channel Denil fish ladder since commencement of operations through 2016. (Source: Brookfield White Pine Hydro LLC, 2015; Brookfield Renewable Energy Group [BREG], 2017).

	Cataract East Channel Fish Lift			**Cataract West Channel Denil Fish Ladder**		
Year	**Atlantic Salmon**	**American Shad**	**River Herring**	**Atlantic Salmon**	**American Shad**	**River Herring**
2016	2	13,889	19,874	0	2,573	2,770
2015	1	5,940	53,872	4	231	19
2014	0	2,565	10,543	0	15	1,033
2013	3	5,036	42,389	1	135	1,025
2012	9	6,221	24,548	3	198	3,510
2011	48	3,257	39,108	46	84	489
2010	14	3,315	18,745	7	348	513
2009	3	164	1,939	11	114	73
2008	21	1,357	21,934	41	236	629
2007	9	1,244	16,017	15	184	67
2006	2	938	7,984	28	15	10
2005	5	738	383	20	6	5
2004	8	1,639	32,295	11	29	528
2003	12	1,099	22,536	27	128	4,226

	Cataract East Channel Fish Lift			Cataract West Channel Denil Fish Ladder		
Year	Atlantic Salmon	American Shad	River Herring	Atlantic Salmon	American Shad	River Herring
2002	11	807	19,349	36	207	849
2001	32	1,976	41,916	37	594	24,974
2000	30	1,049	23,112	20	274	2,024
1999	24	4,534	19,157	42	460	11,913
1998	11	1,370	14,809	17	4	1,269
1997	16	1,069	1,848	12	35	282
1996	33	807	9,019	21	27	148
1995	18	571	6,904	16	9	2,916
1994	5	395	1,960	16	4	280
1993*	15	877	830	38	6	53
TOTAL	**332**	**60,851**	**450,241**	**469**	**5,916**	**59,605**

***** West Channel Fishway became operational June 25, 1993.

Table 8. Annual and total fish passage numbers at the Skelton fish lift since commencement of operations through 2016. (Source: Brookfield White Pine Hydro LLC, 2015; BREG, 2017).

Year	Atlantic Salmon	American Shad	River Herring
2016	0	202	15,478
2015	1	32	25,456
2014	3	33	3,728
2013	0	29	34,845
2012	1	47	22,675
2011	49	37	15,752
2010	6	14	15,013
2009	14	0	1,753
2008	40	6	21,209
2007	11	1	13,747
2006	14	0	3,865
2005	11	0	388
2004	17	72	25,047
2003	24	3	14,411
2002*	26	0	11,582
TOTAL	**168**	**439**	**209,197**

***** The Skelton Fish Lift became operational in the fall of 2001, with 2002 being the first full season of operation.

Since the 1980s, the Saco River Salmon Club, in cooperation with the State of Maine and FWS, has been stocking Atlantic salmon fry into the Saco River watershed.

Also, FWS periodically stocks hatchery-raised salmon smolts[64] in the Saco River. To date, most stocking of fry and smolts has occurred in the Maine portion of the watershed upstream of the Bonny Eagle Project, although some fish have been stocked between Skelton and Bar Mills, and between Cataract and Skelton. As a result of the past and on-going efforts, Atlantic salmon occur periodically in the West Buxton Project area.

Atlantic salmon smolt migration occurs in the spring on high river flows, typically in April and May.[65] Also, as a result of trucking operations that place adult salmon above the West Buxton Project, post-spawned adults, as well as possible drop-down[66] adults, pass through the project. Downstream migration of the post-spawned adults may occur in the fall, but more typically during the following spring, during high flow events. The number of out-migrating salmon smolts and kelts[67] that pass through the project is not known, but since the number of adult salmon transported to the Ossipee River is small, the numbers of kelts potentially migrating downstream is small.

FISH PASSAGE STUDIES AND MONITORING – White Pine Hydro and its predecessors have been participating in diadromous fish restoration and management efforts on the Saco River for more than 20 years. As part of those coordinated efforts, White Pine Hydro and its predecessors conducted, or participated in, a number of studies or monitoring efforts aimed at understanding migratory fish movements and fish passage needs in the lower Saco River basin. The focus of most of the study and monitoring efforts, to date, has been on the Cataract and Skelton Project fish passage facilities. However, some studies and monitoring have been conducted upstream of these areas, including at the West Buxton Project.

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[64] The term "smolt" refers to a young salmon, about 2 years in age that is at the stage of development when it assumes the silvery color of the adult and is ready to migrate to the sea.

[65] Atlantic salmon spawn in October and November, and the eggs hatch during March and April (Faye *et al*., 2006). The newly hatched alevins (yolk-sac larvae) remain in the gravel for about 6 weeks. Alevins emerge from the gravel in mid-May. Juvenile salmon (parr) remain in rivers 1 to 3 years (until about 5 inches or greater in length) after which they develop into smolts and migrate to the ocean in the spring (Fay *et al*., 2006).

[66] The term "drop-down," in this context, describes those fish released in upstream habitats, which do not exhibit downstream migratory behavior, but otherwise fall back to areas downstream from the project dam.

[67] The term "kelt" refers to a post-spawn salmon.

The downstream fish passage system at West Buxton, which has been in operation since 1996, was tested for its effectiveness to pass Atlantic salmon smolts in 1997 and 1999 (Normandeau, 2000).[68] The results showed that turbine passage survival of smolts was 97 percent for Unit No. 6 (fixed blade propeller type) and 85 percent for Unit No. 4 (Francis type). The 1999 study also showed that salmon smolt passage via the bypass facility, when combined with the turbine passage survival, achieved an estimated project passage survival rate of 96 percent.

In 2010 White Pine Hydro initiated the first phase of a two-phase study to evaluate downstream kelt passage in the Saco River in 2010. Phase I was a desktop evaluation of the Cataract, Skelton, Bar Mills, West Buxton, and Bonny Eagle Project characteristics to determine which of the projects had the most potential to delay or adversely affect kelt passage. The results of the study found that the Skelton, Cataract East Channel, and Bar Mills sites pose the greatest barriers to kelt passage, while the Bonny Eagle and West Buxton Projects were determined to be less problematic (Kleinschmidt, 2011). Because of the scarcity of fish, Phase II (Normandeau, 2011) has not yet been completed.

CATADROMOUS[69] FISH SPECIES – American eel is the only catadromous species to inhabit the Saco River. They are present at the project as both juveniles and adults. Elvers (young juvenile eels) migrate upstream in spring and may reside in freshwater for years as older "yellow" (resident) eels. In late summer or early fall, mature "silver" eels migrate downstream on their way to the Sargasso Sea to spawn (FWS, 2007).

White Pine Hydro installed, and put in operation, upstream passage facilities for American eel at the four Cataract dams in 2012, Skelton Dam in 2013, and Bar Mills Dam in 2015. In addition, White Pine Hydro recently installed, and put in operation, an upstream American eel ladder at West Buxton Dam (White Pine Hydro, 2016).

In-migrating eels are adept at passing dams through a variety of means. Therefore, the installed upstream eel ladders would likely not account for all eels successfully passing each dam. However, the eel ladder counts do provide some assessment of the overall numbers of eels returning to the Saco River. For the period 2012 through 2015, approximately 8,800 American eels were passed at the Cataract Project (2,200 eels per year), and, for the period 2014 and 2015, 20,230 eels were passed at Skelton Dam (10,115

[68] The 2007 Fisheries Agreement includes provisions for evaluating the existing bypass facility for American shad and river herring.

[69] The term "catadromous" is used to describe a life history strategy where fish reproduce and spend early life stages in saltwater, move into freshwater to rear as sub-adults, then move back into saltwater to spawn as adults.

eels per year).[70] No passage numbers are available for the Bar Mills and West Buxton eel ladders, though eels are known to pass upstream of West Buxton Dam[71] and have been collected at the upstream Bonny Eagle Project (Yoder *et al.*, 2008).

DIADROMOUS FISH MANAGEMENT – Runs of diadromous fish in the Saco River are small, and represent remnant populations of the historic runs of these species. Thus, fish restoration efforts on the river have focused on optimizing available habitat and using fish passage facilities and stocking to get fish to the most viable spawning and juvenile rearing habitat available. Thus, diadromous fish present in the West Buxton Project area is variable, depending on the species and the time of year. Currently, the West Buxton Project area is used by Atlantic salmon (smolts and kelts) and American eel (juveniles and adults), and river herring have recently been stocked upstream of West Buxton Dam. Currently, there are no American shad in the project area.

Fish restoration efforts in the Saco River Basin have been a collaborative effort among state and federal fishery agencies, local and national fish and fishing interests, and dam owners. In 1994, the licensee for six of the Saco River hydropower projects, including West Buxton, entered into an agreement to settle issues related to anadromous fish passage on the mainstem Saco River (Central Maine Power, 1994). The 1994 agreement established: (1) dates or timeframes for the development of upstream anadromous fish passage facilities for the Cataract and Skelton Projects; (2) a schedule to construct downstream passage at the licensee's six projects on the Saco River; and (3) a process for assessing the need, design, and schedule for providing upstream passage facilities for the Bar Mills, West Buxton, Bonny Eagle, and Hiram Projects.

In 2007, the licensee, along with the parties to the 1994 agreement, entered into to the 2007 Fisheries Agreement, which identified the fish passage and fishery assessment/management measures to be implemented at the projects on the Saco River. Key components of the agreement include: (1) establishing the "need, design, and schedule" for future upstream anadromous fish passage facilities, in accordance with the 1994 agreement; (2) installing upstream and downstream American eel passage measures at each of the six licensee-owned projects; and (3) conducting studies related to migratory fish, including studies of fish migration and passage effectiveness. In July 2007, the

[70] The upstream eel ladder at Skelton Dam was placed in operation on June 29, 2013, which was also its first year of operation. In 2013, the eel ladder passed 1,580 eels, which is not reflected in the total of 20,230 eels cited in the text of this EA.

[71] Visual observations at the West Buxton Project show that American eel migrate upstream primarily through the flood channel.

Commission included the measures of the 2007 Fisheries Agreement in each of the project's respective licenses.[72]

White Pine Hydro has undertaken all of its commitments with respect to fish passage at the West Buxton Project. The recently completed commitments include: (1) the design, installation, and operation of upstream American eel passage (placed in operation June 7, 2016); and (2) a 2-year downstream passage effectiveness study for juvenile clupeids (shad and river herring), once 790 fish have reached the West Buxton impoundment. The upcoming commitments include: (1) the design, installation, and operation of upstream anadromous fish passage (operational by May 1, 2019); and (4) downstream passage for eels (September 1, 2028).

During the development of the revised relicensing study plan for the West Buxton Project, White Pine Hydro, NMFS, FWS, Maine DMR, and Maine DIFW entered into a *Letter of Understanding*, dated April 16, 2013. The *Letter of Understanding* clarified the fish passage requirements of the 2007 Fisheries Agreement, and stipulated that White Pine Hydro conduct certain fish passage siting and design studies pursuant to the 2007 Fisheries Agreement as part of the existing license. The studies included: (1) a radio-telemetry study of adult alewife downstream from the project;[73] (2) a computational fluid dynamics modeling study;[74] (3) an upstream American eel passage siting study; and (4) a downstream passage effectiveness study of juvenile clupeids.[75] White Pine Hydro filed the final reports for the radio telemetry (Normandeau, 2016) and the flow modeling studies (Alden, 2016) on July 28, 2016; and the interim and final reports for the downstream clupeid effectiveness study on March 30, 2016, and March 31, 2017, respectively. White Pine Hydro and the resource agencies used, and continue to use, the

[72] *See* Appendix A of this EA for the specific provisions, including those for the West Buxton Project.

[73] The objective of the telemetry study is to evaluate adult alewife behavior in the Saco River immediately downstream from West Buxton Dam to quantify preferential use of distinct tailwater areas to aid in the future placement of upstream fish passage and siting of the entrance.

[74] The objective of the flow modeling study is to provide the hydraulic information needed to properly site and design an upstream passage facility at West Buxton Dam. The purpose of the model is to better understand both far and near attraction flow conditions for fish passage.

[75] The objective of the downstream passage effectiveness study is to gather information regarding the effectiveness of the Bonny Eagle, West Buxton, and Bar Mills downstream fish passage facilities in guiding juvenile clupeids past the projects.

results of the studies to design and site the requisite fish passage facilities at West Buxton.

Freshwater Mussels

Ten species of freshwater mussels have been documented in Maine (Swartz and Nedeau, 2007), including five that are known or expected to occur in the Saco River watershed (Table 9). None of these five species are state or federally protected.

Table 9. Freshwater mussel species known or expected to occur in the Saco River watershed. (Source: Swartz and Nedeau, 2007; as cited in the Final License Application).

Common Name	Reported Distribution
Creeper	Sparsely Distributed in Watershed
Eastern elliptio	Widespread in Watershed
Eastern floater	Widespread in Watershed
Eastern pearlshell	Widespread in Watershed
Triangle floater	Widespread, though sparse in upper watershed

3.3.1.2 Environmental Effects

Effects of Project Operation on Water Quality

Operation of a hydropower project can cause fluctuations in impoundment levels that can contribute to shoreline erosion, increase turbidity, and thereby decrease water quality. Some modes of project operation also have the potential to reduce flows downstream of a project, which can lead to increases in water temperature and decreases in DO. As described below, White Pine Hydro proposes to operate the West Buxton Project in a run-of-river mode, in accordance with 1997 Saco River Instream Flow Agreement,[76] and the agencies recommend the proposed mode of operation. White Pine

[76] The 1997 Saco River Instream Flow Agreement settled licensing issues relating to instream flows at the mainstem Saco River hydroelectric projects. Among the key objectives of this agreement were to (a) improve habitat for Atlantic salmon, American shad, and river herring, (b) provide an improved zone of passage for anadromous fish, (c) improve anadromous fish spawning habitat, and (d) maintain and improve the habitat for resident aquatic life. With respect to the West Buxton Project, the agreement established

Hydro does not propose, nor does any agency or other entity recommend, additional measures pertaining to water quality.

Our Analysis

Continuing to operate the West Buxton Project in a run-of-river mode would minimize the time water is retained behind the dam, and would minimize decreases in DO in the lower levels of the impoundment associated with stratification, as well as increases in water temperature within the upper levels of the impoundment from solar heating. Run-of-river operation would reduce the potential for increases in turbidity and sedimentation of the river bottom associated with unnatural fluctuations in flow (as discussed below). Sedimentation associated with unnatural fluctuations can negatively impact aquatic organisms, by altering habitat suitability, reducing oxygen uptake, and reducing the density and nutritional value of food (Harrison *et al*., 2007).

Run-of-river operation would also maintain the water temperature and DO conditions that exist at the project. As discussed above in section 3.3.1.1, *Aquatic Resources - Affected Environment*, DO remained above 7.5 mg/L (averaging about 9 mg/L) and water temperature remained below 80 °F (averaging about 70 °F). In addition, impoundment waters do not exhibit thermal stratification. As a result, the impoundment and the Saco River downstream from the project (*i.e.*, tailwater) currently meet Maine's Class A water quality standards for DO and water temperature.

Run-of-River Operation

Reservoir and downstream flow fluctuations during the operation of hydro projects may affect shoreline littoral habitat and riverine habitat by exposing this habitat to periodic dewatering, making it unsuitable for aquatic biota. Fluctuations during fish spawning periods are of most concern because such fluctuations may make the habitat unsuitable for spawning, or may result in exposure and mortality of fish eggs and larvae if spawning has already occurred in an area affected by dewatering.

Consistent with the 1997 Saco River Instream Flow Agreement, White Pine Hydro proposes to minimize reservoir fluctuations by operating the project in a run-of-river mode, and maintaining a maximum fluctuation in upstream reservoir level of 1 foot below the full pond elevation of 177.8 feet during normal operation. In addition, White Pine Hydro proposes to release, in accordance with the project's existing water quality certification, a total project outflow of 768 cfs, or inflow, whichever is less, in the project tailwater. FWS, NMFS, and Maine DIFW concur with run-of-river operation, and

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that the West Buxton Project flows "will be determined by the instream flows of the Bonny Eagle Project."

recommend that White Pine Hydro operate the West Buxton Project, as proposed in the license application.

Our Analysis

The project impoundment is small, but provides habitat for resident fish and aquatic species that include (a) largemouth and smallmouth bass, (b) a number of non-game fish species, and (c) aquatic macroinvertebrates. In addition, the impoundment offers potential spawning, rearing, and juvenile habitat for anadromous river herring and habitat for juvenile (yellow) American eels.

Continuing to operate the West Buxton Project in a run-of-river mode would result in: (1) little, or no, attenuation of water in the impoundment; (2) very little fluctuation in the impoundment water levels; and (3) little alteration in downstream river flows. The existing information in the record for the project demonstrates that operating the project under the terms of the existing license, as well as the comprehensive flow and fish passage agreements established for the Saco River, helps to maintain and support habitat for aquatic organisms in the Saco River, both upstream of and downstream from the project. Because, the West Buxton Project is operated in a run-of-river mode, with little fluctuation in the project impoundment, the project has little effect on overall river flow in the lower Saco River.

Operating the project in a run-of-river mode, with a downstream minimum flow, as proposed by White Pine Hydro, would continue to reduce the chances of fish stranding, as well as disruption to any near-shore spawning habitat and passage for anadromous fish through the area. Additionally, operating the project in this manner would help to maintain relatively stable reservoir levels, which would continue to benefit aquatic vegetation beds near the shoreline, as well as fish and other aquatic organisms that rely on near-shore habitat for spawning, foraging, and cover. Finally, erosion of shoreline areas and resultant turbidity, as well as sediment mobilization, would also continue to be minimized when the impoundment is held relatively stable.

Headpond Maintenance Drawdowns and Refill Procedures

Impoundment drawdowns for routine maintenance have the potential to lead to shoreline erosion along the impoundment and downstream from the project, which could adversely affect water quality, as well as aquatic and riparian habitat and the organisms that depend on, and use, such habitats. White Pine Hydro, as part of its *Project Operation Monitoring Plan*, proposes to consult with Maine DEP, Maine DIFW, Maine DMR, FWS, and NMFS regarding temporary minimum flows, impoundment level limits, and refill procedures. Maine DIFW recommends that White Pine Hydro consult with Maine DIFW prior to lowering the head pond for maintenance, repairs, or other planned/ scheduled activities to minimize effects on bass and other aquatic species.

Our Analysis

Project impoundments may need to be drawn down periodically for scheduled or unscheduled maintenance, as well as emergencies beyond the control of the operator. If a drawdown occurs rapidly, saturated streambank soils could become more susceptible to sloughing as the resistance of the soils decrease upon dewatering. Although streambank erosion does not appear to be an issue at the project, sloughing of streambank soils is known to cause areas of streambank erosion. In addition, rapid drawdowns of an impoundment or river reach can affect water quality by increasing water temperature and reducing DO. Rapid drawdowns can also lead to stranding of fish and other aquatic organisms, as well as dewatering of spawning, nursery, and foraging habitat. There is little evidence that past operation, including maintenance drawdowns, has affected water quality, or the existing fishery and other aquatic organisms. Nonetheless, White Pine Hydro's proposal to consult with the agencies regarding maintenance drawdowns would help ensure that drawdowns and refills associated with scheduled and unscheduled maintenance activities are negated, or minimized to the extent possible.

Flood Channel Minimum Flow

Under the existing license, the project's approximate 500-foot-long flood channel receives no minimum flow release, except for leakage from the vertical flood gate and stanchion gates (about 20 cfs). White Pine Hydro proposes to continue the existing mode of operation, except that it would release 30 cfs, in addition to the 20-cfs leakage flow, to the flood channel from May 1 through Columbus Day weekend to enhance adult brown trout habitat and angling opportunities in that reach. Maine DMR recommends the flood channel flow proposed by White Pine Hydro, while FWS recommends a flood channel flow of 50 cfs (30-cfs release plus 20-cfs leakage) year-round and Maine DIFW recommends a 90-cfs flow release for the flood channel year-round.

Our Analysis

The project flood channel has potential to support a managed sport fishery composed of brown trout and other cool-water game species. Under current project operation, the leakage flow of 20 cfs provides about 68 percent of the available suitable habitat for brown trout. Percent exposed substrate is between 50 and 60 percent (*see* Table 6).

VOLUME OF FLOW – During development of the study plan, Maine DIFW stated that its management objectives for the West Buxton Project are: "to provide seasonal (spring, fall, winter) fisheries for brook trout and an extended year-round brown trout

fishery, including the opportunity for development of a limited multi-age-class fishery."[77] Maine DIFW does not consider White Pine Hydro's proposed minimum flow for the flood channel as being consistent with the state agency's management objectives. Maine DIFW focuses its trout management objectives at West Buxton on the flood channel because: (1) the configuration of the channel provides suitable salmonid habitat (*i.e.*, substrate), wading characteristics, and adjacent access enhancement opportunities; (2) White Pine Hydro's public safety concerns associated with accessing other areas at the project (*e.g.*, project tailwater); and (3) the focus of the main (east) channel is in developing upstream fish passage for migratory fish.[78] Maine DIFW argues that managing the flood channel for recreational trout fishing minimizes public safety concerns and attempts to segregate freshwater and migratory fish management needs and concerns.

In its December 4, 2012, study request letter, Maine DIFW requested that White Pine Hydro: (1) describe existing habitat in the flood channel; and (2) identify opportunities to enhance flows in this reach and maximize productivity of this habitat. In August 2013, White Pine Hydro conducted a demonstration flow study in the flood channel, with the goal documenting fish habitat suitability and improving angler access to the reach at five flow levels. In general, the study involved: (1) identifying appropriate adult brown trout habitat suitability indices; (2) locating two transects in the flood channel; (3) the placement of a staff gage in the channel; (4) the collection of spot measurements of depth, velocity, and substrate along each transect; (5) joint review of the data, with a comparison to the adult brown trout habitat suitability indices; and (6) photo documentation of each flow release.[79]

With regard to documenting fish habitat suitability, the results of the demonstration flow study indicate that with White Pine Hydro's proposed flow release of 30 cfs,[80] habitat suitability for adult brown trout would increase from 68 percent (leakage

[77] *See* Maine DIFW's June 5, 2013 Comments at 2.

[78] *See* Maine DIFW's December 20, 2016 Comments.

[79] *See* April 22, 2014 Initial Study Report at 2-63 through 2-65 for detailed information on the study methodology.

[80] For each flow evaluated, the 20-cfs leakage flow is combined with the individual flow release to determine the total flow in the flood channel at the time of the demonstration flow study. Thus, when discussing the habitat benefits of an individual flow release, the actual flow in the channel is 20-cfs greater than the individual flow

only) to 84 percent (*see* table 6). Incrementally, increasing the gate setting to 60 cfs, 90 cfs, and 120 cfs, would provide 95, 100, and 100 percent, respectively, of the available suitable brown trout habitat in the flood channel. When accounting for the 20-cfs leakage flow, a minimum flow release of 60 cfs represents a 60 percent increase in channel flow (80 cfs versus 50 cfs), with an 11 percent increase in adult brown trout suitability over the amount of habitat provided by the proposed 30-cfs flow. A minimum flow release of 90 cfs represents a 120 percent increase in flow (110 cfs versus 50 cfs), with a 16 percent increase in adult brown trout suitability over the amount of habitat provided by the proposed 30-cfs flow (only a 5 percent increase over the gain in habitat with a 60-cfs flow).

Any one of the flow alternatives evaluated would improve aquatic habitat in the flood channel. However, the inflection point on the flow versus habitat curve,[81] is around 60 cfs, which means that the amount of habitat gained per increment of flow above 60 cfs decreases. In addition to the aquatic habitat benefits associated with the alternative flows, providing flow to the flood channel could provide out-migrating fish (*e.g.*, Atlantic salmon, American shad, river herring, and American eels) with a secondary downstream passage route past the project, with higher flows providing greater benefits than lower flows.

Maine DIFW supports its recommendation for releasing a year-round 90-cfs flow to the flood channel based on not only the semi-quantitative results of the flow study, but also on visual observation of the flow/habitat changes that occurred with each flow evaluated.[82] Maine DIFW stated that observed changes in habitat quality associated with each test flow were noted and recorded by its biologists, and noted that significant changes in habitat as flow releases were increased from 60 to 90 cfs. For example, the length of the flood channel with suitable brown trout habitat is extended by about 150 feet (approximately a 30 percent increase in the length of the flood channel), offering additional habitat to hold trout and other cool-water species. In addition, comparing photos for Transect 1 shows significant visual increases in suitable habitat at the lower

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release. For example, the habitat benefits associated with the 30-cfs release is based on a total flow of 50 cfs in the flood channel.

[81] The inflection point on a flow versus habitat curve is the point at which the slope flattens or reverses such that the habitat gain per incremental flow step either decreases, flatlines, or goes negative. The latter is known as the Law of Diminishing Returns.

[82] *See* Maine DIFW's December 20, 2016 Comments at 5.

end of the channel (*e.g.*, changes in water velocity, seams, and broken water),[83] over what is observed under lower flows. The photos also show significant increases in side channel inundation, increasing the wetted channel width. Therefore, flow releases of 60 and 90 cfs would not only provide incremental increases in habitat for fish, but likely enhance macroinvertebrate production in the channel (*i.e.*, forage for trout).

The aforementioned observations were not included in White Pine Hydro's flow versus habitat rating chart. Nonetheless, such visual observations are an important aspect of a demonstration flow study, and contribute useful information to the overall evaluation of the flood channel minimum flow issue, where it concerns habitat suitability for brown trout, at the West Buxton Project.

With regard to improving angling opportunities in the flood channel (*i.e.*, making the reach more "cast-friendly"), a gate release of 30 cfs does little to improve the percent exposed substrate in the reach. For example, at Transect 1, we estimate percent exposed substrate to be between 50 and 60 percent, which is similar to leakage conditions. At gate releases of 60, 90, and 120 cfs, a substantial amount of the boulders become submerged at Transects 1 and 2, where percent exposed substrate drops to 20 to 30 percent. Percent exposed substrate at Transect 2 is further reduced to 10 to 20 percent with a gate release of 120 cfs. While the angling experience would improve at the higher flows, flow releases above 90 cfs could affect the ability of anglers to wade in the reach. The angling experience aspect of the flood channel flow issue is further discussed in section 3.3.4.2, *Land Use and Recreation – Environmental Effects*.

SEASONALITY OF FLOW RELEASE – FWS's and Maine DIFW's recommendations for flows in the flood channel would require White Pine Hydro to release year-round flows of 30 and 90 cfs to the flood channel. White Pine Hydro contends that flow of 30 cfs or higher are not needed year-round in the flood channel for the protection or enhancement of fish, aquatic habitat, or recreation.

Year-round flow releases, of any amount, would provide additional habitat for fish and other aquatic organisms throughout the year. However, fish and other aquatic life biologically do not need higher flows during the winter months to survive, as aquatic organisms tend to be less active during this time of year. In addition, Maine DIFW's management goals may remain achievable in the absence of a year-round flow. Also, the potential exists for adverse effects on project features and concerns for public safety. We address each factor, in turn, below.

[83] The term "seam" is defined as the junction between pieces of water moving at two different speeds (*e.g.*, fast/slow, fast/still, or even downstream/upstream). The term "broken water" is defined as a patch of water whose surface is rippled or choppy, usually surrounded by relatively calm water.

The contiguous riverine reach downstream of the flood channel consists of the West Buxton tailwater and the reach immediately downstream of the tailwater (*i.e.*, headwater of the Bar Mills impoundment). This reach, which consists of natural habitat, begins approximately 100 feet downstream from the lower powerhouse, and extends to approximately 945 feet downstream, depending on the impoundment level and backwater from the Bar Mills Project impoundment (Stetson-Harza, 1991).[84] The riffle closest to West Buxton Dam is located at the upstream end of the Bar Mills impoundment and forms a distinct hydraulic control. Habitat in this backwatered area is composed of a deep (*i.e.*, depths greater than 6 feet) pool located immediately downstream from the upper powerhouse and spillway. The pool is dominated by bedrock and boulder substrates, and this pool habitat gradually transitions toward boulder dominated run-glide[85] habitat moving downstream toward the controlling riffle. This more extensive river reach of high quality riffle, run, and riverine pool habitat immediately contiguous to the flood channel represents a river reach that brown trout can exploit as over-wintering habitat, thus facilitating Maine DIFW's objective of a year-round fishery.

In addition to the flow's biological aspects, White Pine Hydro states that there are safety considerations to releasing flows to the flood channel, especially on a year-round basis as neither the flood gates nor stanchions are designed for continuous operation during the winter months, because of the problem of ice formation.[86] White Pine Hydro supports its concern with evidence from its downstream Cataract Project,[87] where, in January 2016, when attempting to lift a gate, the hoist cables for that gate broke as a result of ice build-up. Given the similarity in gate design between the Cataract and West Buxton Projects, there is no reason to believe that the same problem couldn't occur at West Buxton.

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[84] *See* White Pine Hydro's February 2, 2017 Filing at 7-8.

[85] A "run" is a swift-flowing stream reach with a gradient greater than 4 percent; little to no surface agitation, waves, or turbulence; no major flow obstructions; and relatively uniform flow. A "glide" is a shallow stream reach with a maximum depth that is 5 percent or less of the average stream width, a water velocity less than 8 inches per second, and without surface turbulence. *See* Armantrout (1998).

[86] *See* White Pine Hydro's February 2, 2017 Filing at 6-7.

[87] The Cataract Project is equipped with the exact same style of gate that exists at the West Buxton Project, including the same dimensions. *See* White Pine Hydro's February 2, 2017 Filing at 6.

Frozen gates pose a safety hazard and could result in damaged equipment. Operating either the flood gate or the top gate of a stanchion section to pass flows in the winter months could further exacerbate ice build-up from spray, and could make the gates even more difficult to operate when needed (*e.g.*, during high flow events that typically occur during spring run-off). In addition to the potential for damaged equipment, ice build-up associated with a flow release in the flood channel would likely create a hazard for anglers attempting to wade or bank fish in this reach during the winter.

CONFLICTS AMONG MANAGEMENT OBJECTIVES – White Pine contends that flow releases higher than 30 cfs conflict with fish restoration goals, and could lead to false attraction to the flood channel. Specifically, White Pine Hydro states that Maine DIFW's recommendation for a 90-cfs year-round flow release in the flood channel conflicts with Maine DMR's recommendation for flood channel flow releases of 30 cfs from May 1 through Columbus Day weekend. Moreover, White Pine Hydro notes that Item 4.c NMFS's Fishway Prescription requires that upstream migratory delay and downstream mortality of diadromous species will need to be incorporated into the effectiveness studies of the fish passage facilities or other measures, should flow releases be provided to the flood channel for brown trout

Maine DMR states that May 1 through Columbus Day encompasses the time period (late June through late August) when small American eels will be swimming upstream through the flood channel to reach the upstream eel passage facility.[88] Maine DMR is concerned that flow releases higher than 30 cfs may interfere with the upstream migration of this native fish species.

Any amount of flow in the flood channel, more than the existing leakage, could affect upstream movement of American eels in the channel. However, there is no evidence in this case to indicate that flow releases in the flood channel would significantly affect, or otherwise restrict, upstream eel passage at West Buxton Dam. Small eels are known to use margins and slower-water areas to migrate upstream. While such areas would continue to exist in the flood channel at any flow level, the lower flow releases of 30 and 60 cfs would be less likely than the higher releases of 90 and 120 cfs to hinder small eels from migrating upstream through the reach to access the upstream eel ladder.

With regard to false attraction, flow releases to the flood channel located on the west side of the Saco River have the potential to effect upstream migrating fish. For example, higher flow releases may negatively affect attraction to future fish passage facilities on the east side of the river, which could impair passage effectiveness.

[88] *See* Maine DMR's December 12, 2016 Comments at 6.

Assuming an upstream attraction flow of 3 to 5 percent[89] of station capacity (approximately 5,160 cfs) is part of the fish passage design criteria, the attraction flow for anadromous fish passage on the east side of the river would be in the range of 150 to 250 cfs. Thus, flow releases of 90 or 120 cfs, in addition to the estimated 20-cfs leakage flow, could create a competing attraction flow on the west side of the river that could lead to passage delays at the project (*i.e.*, upstream migrating fish would be led to the flood channel instead of to the entrance for the fish passage facility). Releases of 30 cfs (50 cfs total) and 60 cfs (80 cfs total) would have incrementally lower probabilities of creating a false attraction flow on the west side of the river.

Finally, NMFS is concerned that downstream migrating diadromous fish could be injured or killed passing through the flood gates and flood channel. We would expect, however, the likelihood of passing the project via this route, even with a gate open, to be small. The project's capacity is approximately 5,160 cfs, and the flood channel minimum flows (up to 120 cfs) represent only about 2 percent of the station's capacity. Such a small flow is not likely to attract fish from the existing downstream fish passage facility. Nonetheless, assuming a small portion of fish do pass the project via the flood gates and flood channel, we expect the potential for injury to those outmigrating fish to be negligible. The proposed enhancement flow would be provided by raising one of the top gates in the stanchion section, and the stanchion gates discharge onto a sloped concrete apron and into a large pool below the gate sections.

As discussed above, releasing a minimum flow to the flood channel has the potential to affect fish passage at the West Buxton Project. NMFS, in its Fishway Prescription, addresses such potential by requiring that White Pine Hydro include migration delay and downstream passage mortality associated with the flood channel flow release (any flow released) as part of the fish passage effectiveness studies. Including the flood channel flows as part of the fish passage effectiveness studies would provide a mechanism for White Pine Hydro and the resource agencies to identify and address any potential issue associated with providing a minimum to the flood channel, regardless of the flow level.

Project Operation Compliance Monitoring

White Pine Hydro proposes to operate the West Buxton Project in a run-of-river mode, with up to a 1-foot impoundment fluctuation under normal operations and a total project outflow of 768 cfs, or inflow, whichever is less. As discussed above, White Pine also proposes to release a seasonal flow to the flood channel. The resource agencies have also recommended minimum flows for the flood channel.

[89] *See* Final License Application at E.4-62.

To document compliance with project operation, White Pine Hydro proposes to implement the Project Operation Monitoring Plan that was filed with the license application.[90] The draft plan describes the project, and consists of additional sections describing: (1) the operational requirements of the new license; (2) project operation management under normal, flood, and low-flow conditions; (3) maintenance of routine operational data; (4) scheduled maintenance activities with consultation provisions;[91] (5) unscheduled operation, with notification provisions;[92] (6) project operation monitoring procedures;[93] and (7) reporting procedures.[94]

Our Analysis

The data reporting provisions proposed by White Pine Hydro, and included in the Project Operation Monitoring Plan, would help White Pine Hydro and the Commission ensure that the project is operated in accordance with the operational requirements of any new license issued for the project. Implementing the proposed plan would also provide a

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[90] *See* Final License Application, Appendix E-4.

[91] Scheduled maintenance activities include such things as turbine shutdowns, impoundment drawdowns, and fish passage operations. White Pine Hydro would consult with Maine DEP, Maine DIFW, Maine DMR, NMFS, and FWS regarding such activities.

[92] Unscheduled maintenance activities include such things as units that trip off-line unexpectedly and unplanned drawdowns for dam safety, public safety or electrical system emergencies. White Pine Hydro would notify Maine DEP, Maine DIFW, Maine DMR, NMFS, and FWS within 24 hours of such unscheduled activity.

[93] White Pine Hydro would monitor project generation via a SCADA system. Outflow will be calculated automatically from generation readings using a conversion factor based on kW/cfs passed through the unit(s). Impoundment levels would be recorded with an existing pressure-sensitive sensor (transducer) that provides real-time readings. Project outflow and pond level would be recorded electronically by the automated operations system every 15 minutes and subsequently archived. White Pine Hydro would (a) provide the monitoring data to the Commission, Maine DEP, Maine DIFW, Maine DMR, NMFS, and FWS upon request, and (b) include the curves and calculations used to convert kW to cfs, and gate settings to cfs, in the final Project Operation Monitoring Plan.

[94] White Pine Hydro would notify Maine DEP, Maine DIFW, Maine DMR, NMFS, and FWS within 24 hours of any temporary change in project operation, and the Commission within 10 days of any such incident.

mechanism for reporting the operational data to not only the Commission, but agencies and other stakeholders as well. To facilitate the Commission's administration of the license, however, any final plan should include the licensed operational requirements, as well as the curves and calculations used to convert kW to cfs, and gate settings to cfs.

Diadromous Fish Passage

The Saco River has been the focus of significant efforts to restore runs of diadromous fish species that historically occupied the lower river, including the catadromous American eel, and several anadromous species (*i.e.*, Atlantic salmon, American shad, and river herring (alewife and blueback herring)). To facilitate the agencies' fish restoration goals for the Saco River, White Pine Hydro (and its predecessor), along with state and federal fishery agencies and other stakeholders, developed and signed a number of agreements that collectively establish a balance between hydropower operations, river flows, fish passage facilities and operations, and fish management programs to support restoration of diadromous fish to the Saco River Basin. These agreements include the 1994 Saco River Fish Passage Agreement, the 1997 Instream Flow Agreement, and the 2007 Fisheries Agreement. The discussion that follows is based on the measures and other provisions included in the 2007 Fisheries Agreement.

UPSTREAM AMERICAN EEL PASSAGE

In the West Buxton final license application, White Pine Hydro proposed to design and install an upstream eel passage facility in accordance with section 5.2.a of the 2007 Fisheries Agreement. NMFS and FWS, in their respective section 18 prescriptions, require that White Pine Hydro provide upstream passage for American eel at West Buxton. In meeting the schedule outlined in the 2007 Fisheries Agreement, White Pine Hydro installed the upstream eel passage facility at West Buxton on June 6, 2016, and placed it in service on June 7, 2016.[95]

Our Analysis

Historically, juvenile eels reaching West Buxton Dam were required to climb over or around the project dam. Yoder *et al*. (2008) demonstrated that eel passed upstream of West Buxton Dam to access upstream habitat, though the relative abundance of eels in the West Buxton tailwater (about 16 percent of the overall fish assemblage) was much higher than the species' relative abundance in the upstream Bonny Eagle tailwater (less than 1 percent). While climbing over or around dams is a well-documented behavior for juvenile eels (GMCME, 2007), the climbing ability of eels declines as they grow

[95] *See* White Pine Hydro's July 28, 2016 Filing at Attachment 1-5.

(Legault, 1988). The differences in relative abundance between the West Buxton and Bonny Eagle tailwaters suggest that that historical mode of passage may not have been ideal or effective for all eels reaching West Buxton Dam. The upstream eel passage facility installed at the project in 2016 should increase upstream passage effectiveness and improve access to upstream habitat. Moreover, the operational period for the facility (June 1 – September 15) brackets the time when the majority of the juvenile eels are expected to migrate upstream at the project, and it is consistent with the operation period of upstream eel passage facilities at downstream dams.

DOWNSTREAM AMERICAN EEL PASSAGE

White Pine Hydro proposes to implement measures for downstream eel passage by September 1, 2028, consistent with the provisions of section 5.2.b of the 2007 Fisheries Agreement,[96] including implementing interim downstream eel passage measures.[97] NMFS and FWS, in their respective section 18 prescriptions, require that White Pine Hydro provide downstream eel passage at West Buxton in accordance with the measures included in the 2007 Fisheries Agreement. Maine DMR also recommends that White Pine Hydro install downstream eel passage facilities as outlined in the 2007 Fisheries Agreement, including implementing interim measures as necessary.

Our Analysis

In New England, adult eel out-migration typically occurs from mid-August to December (Haro *et al.*, 2003; GMCME, 2007). Adult eels often move downstream in pulses with large numbers of eels moving during short periods, followed by longer periods with relatively little movement (EPRI, 2001). Peak movements often occur at night during periods of increasing river flow (Richkus and Whalen, 1999). Other

[96] The 2007 Fisheries Agreement stipulates that downstream passage for eels at West Buxton be operational 12 years after upstream passage is operational, because the majority of American eel in Maine waters (about 95 percent of the females and 70 percent of the males) become mature at 12 years of age and out-migrate to spawn (Oliveira and McCleave, 2000; as cited in Maine DMR's Comment Letter at 3). Because upstream eel passage was installed at West Buxton Dam in June 2016, downstream passage for eel would be needed by 2028

[97] As an interim measure, White Pine Hydro would annually conduct visual observations in the project tailrace once a week from September 15 through November 15 for the presence of adult eel mortalities. If more than 50 eel mortalities per night are observed, then the interim provisions of section 5.2(b)(3) of the 2007 Fisheries Agreement would be implemented.

environmental cues, such as local rain events and moon phase, may encourage downstream movement of out-migrating eels (EPRI, 2001; Haro *et al.*, 2003).

Downstream routes for adult eels migrating through the project area include passing over the spillway when the project spills, through the debris sluice when it is used, or through the turbines during generation. Data collected at USGS gage no. 01066000 near Cornish, Maine, indicate that the project spills 18.4 percent of the time during the expected out-migration period for adult eel in the Saco River (September 15 through November 15). The license application does not describe the hydraulic capacity or frequency of operation of the debris sluice; therefore, it is unclear how often this route may be available to eels migrating downstream. Regardless, because the turbines have a hydraulic capacity of 5,160 cfs, and White Pine Hydro generally passes all river flow through the project turbines when possible, turbine passage is the most likely downstream passage route during the adult eel migration period from August to December.

Previous estimates of survival for adult eels passing through turbines are highly variable and range from 0 percent to 94 percent (EPRI, 2001). Factors that can influence downstream passage survival include eel size (Richkus and Dixon, 2003) and turbine design (EPRI, 2001). White Pine Hydro did not conduct any study of survival rates of adult eels migrating downstream past the West Buxton Project as part of the relicensing process. However, White Pine Hydro monitors the project tailwaters for adult eel mortalities as part of the 2007 Fisheries Agreement. To date, White Pine Hydro reports that there has been no significant mortality observed. This information suggests either that (a) the number of adult eels out-migrating past West Buxton is low, and/or (b) turbine passage survival for adult eels at West Buxton Dam is high.

There are several measures that could be implemented to improve downstream passage survival for eels at the West Buxton Project, including night-time turbine shutdowns;[98] increased spillflows;[99]

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[98] Nightly shutdowns would protect eels migrating downstream through the project area from turbine entrainment injury and mortality, although some injuries and mortalities could occur from the corresponding increase spillway passage. Shutdowns could take the form of a 24-hour shutdown for the entire migration season, temporally from dusk to dawn during the period of peak migration (Richkus and Whalen, 1999). Timing shutdowns based on site-specific eel monitoring data and environmental conditions could reduce project-related eel mortality, while also reducing the cost of lost generation (Haro *et al.*, 2003).

[99] The debris sluice and/or the spillway/flood channel gates could be used to increase spill during the eel downstream passage period. While survival rates over the spillway of through the flood channel gates may be higher than turbine passage, it would

installation of intake screens;[100] or installation of an eel-specific bypass facility, such as an airlift system (Haro *et al*., 2016).[101] However, downstream passage of eels at the West Buxton Project is not needed at this time, as eels that are now passing upstream via the new eel ladder will not start their downstream migration journey for about 12 years. Therefore, developing a downstream passage plan for American eels, as provided for in the 2007 Fisheries Agreement, would allow White Pine Hydro, in consultation with the resource agencies, to develop safe, effective, and timely passage for downstream migrating eels.

The 2007 Fisheries Agreement provides for interim downstream eel passage measures.[102] These measures, if determined necessary and implemented, would protect downstream migrating American eel until permanent downstream passage is provided, accounting for changes in the timing of eel maturation.

UPSTREAM ANADROMOUS FISH PASSAGE

White Pine Hydro proposes to implement measures for upstream anadromous fish passage in accordance with the provisions of section 5.3.b of the 2007 Fisheries Agreement and the April 16, 2013 Letter of Understanding regarding Fish Passage

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likely depend upon the release point for the spill because flow spilled over the spillway or through the flood channel gates would fall onto the dam's apron or onto bedrock, which could cause injury or mortality.

[100] The current trashracks at the West Buxton Project have clear bar-rack spacing that vary from 1.875 inches (upper powerhouse) to 4 inches (lower powerhouse), which is not likely to completely prevent adult eels from passing into the turbines. Installing new trashracks or overlay screens would likely reduce entrainment, but would require providing downstream passage via another route

[101] An airlift system is a new design of a deep bypass system that uses airlift technology (the Conte Airlift Bypass) to induce flow in a bypass pipe. In limited testing, Haro *et al*. (2016) found that: (1) downstream migrating eels readily located, entered, and passed through the bypass; (2) eels did not show a strong avoidance of the pipe's riser section, which contained injected air; and (3) no mortality or injury of bypassed eels occurred, and eels did not avoid repeated entrainment through the bypass. While not widely used at this time, airlift technology appears to be a viable method for increasing passage effectiveness for American eels through a deep bypass system.

[102] *See* n. 97, *supra*; and section 5.2.b.3 of the 2007 Fisheries Agreement, included as Appendix A to this EA.

Studies.[103] NMFS and FWS, in their respective section 18 prescriptions, require that White Pine Hydro provide upstream anadromous fish passage facilities at West Buxton in accordance with the measures included in the 2007 Fisheries Agreement. Maine DMR also recommends that White Pine Hydro provide upstream anadromous fish passage facilities as outlined in the 2007 Fisheries Agreement.

Our Analysis

As the fourth of seven hydropower projects on the mainstem of the Saco River, the West Buxton Project is one of the projects that has been the focus of comprehensive efforts to address fish passage and diadromous fish management needs to best support Saco River restoration efforts. Atlantic salmon and American eel currently occur in the West Buxton Project area, and adult alewife have recently been stocked in the Bar Mills and West Buxton impoundments.

While Atlantic salmon do occur in the Saco River, the numbers of returning salmon are low. Adults that do migrate upstream into the river are trapped at either the Cataract or Skelton fish passage facilities and transported by truck from those projects to spawning habitat on the Ossipee River, a tributary that flows into the Saco River upstream of the West Buxton and Bonny Eagle Projects. Salmon returning to the Saco River are typically of hatchery origin and/or strays from other river systems.[104] With regard to river herring, numbers of alewife and blueback herring returning to the Saco River are good, but highly variable from year-to-year. American shad do not currently occur in the West Buxton Project area,[105] and, to date, numbers of shad returning to the Saco River are low.

The fishway prescriptions, consistent with section 5.3.b.1 of the 2007 Fisheries Agreement, call for White Pine Hydro to construct a single permanent upstream fish passage facility of anadromous species at the West Buxton Project to be operational by May 1, 2019. The prescriptions also call for White Pine Hydro to submit conceptual

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[103] *See* Final License Application, Exhibit E-5.

[104] The Saco River Atlantic salmon, regardless of origin, are not considered part of the Gulf of Maine Distinct Population Segment, and are not a federally listed species under the ESA (NMFS, 2009).

[105] The number of American shad currently returning to the Saco River have not fully utilized existing habitat downstream from West Buxton Dam. Thus, consistent with the 2007 Fisheries Agreement, there are no plans to introduce shad to the Saco River upstream of West Buxton Dam.

designs for the passage facility by January 31, 2017.[106] The prescriptions further provide that the design goal for the facility be as effective at passing sufficient escapement numbers of the target species as a single (4-foot wide) Denil-type fish ladder.

The fishway prescriptions filed by NMFS and FWS, and the 10(j) recommendation filed by Maine DMR, are generally consistent with the fish passage provisions of the 2007 Fisheries Agreement. White Pine Hydro finds that the additional measures prescribed or recommended by the agencies, as outlined in section 1.3.1, *Statutory and Regulatory Requirements – Federal Power Act*,[107] could be implemented at the West Buxton Project. The provision for a Denil-type fish ladder would provide a safe and efficient means of passing Atlantic salmon and river herring upstream of the project. Therefore, the prescribed and recommended upstream fish passage, along with the supporting 2007 Fisheries Agreement and April 16, 2013 Letter of Understanding regarding Fish Passage Studies, provides a reasonable approach to providing timely fish passage at the West Buxton Project, and for restoration of anadromous species to the Saco River Basin upstream of West Buxton Dam.

DOWNSTREAM ANADROMOUS FISH PASSAGE

White Pine Hydro proposes to continue providing downstream anadromous fish passage at West Buxton via the existing facility, which consists of a gated sluiceway located adjacent to the powerhouse. NMFS and FWS, in their respective section 18 prescriptions, require that White Pine Hydro provide downstream anadromous fish passage facilities at West Buxton, in accordance with the measures included in the 2007 Fisheries Agreement. Maine DMR recommends that White Pine Hydro implement a 2-year clupeid effectiveness study of the existing downstream passage facility, in accordance with section 5.4.d of the 2007 Fisheries Agreement.

[106] Section III(4) of the April 16, 2013 *Letter of Understanding regarding Fish Passage Studies* (*see* Final License Application, Appendix E-5) provides that White Pine Hydro would submit a conceptual fish passage design to NMFS, FWS, and Maine DMR by January 31, 2017, and that functional design drawings would be submitted to the Commission in 2017 or early 2018. White Pine Hydro held on-site meetings with the resource agencies on May 13 and 19, 2016, to initiate consultation on possible design options for the upstream fish passage facility at the project. To date, no design drawings have been filed with the Commission.

[107] *See* n. 10, *supra*.

Our Analysis

Juvenile Atlantic salmon fry and smolts are stocked in the Saco River upstream of the West Buxton Project. Juvenile stocking efforts vary annually, but have been on-going since the 1990's (FPL Energy, 2003; FERC, 2005). As a result of juvenile stocking efforts, and the transport of spawning adults above the West Buxton Project, Atlantic salmon smolts out-migrate through the West Buxton Project area via (a) the existing gated downstream sluiceway located adjacent to the upper powerhouse (in use since about 1996), (b) spill, or (c) through the turbines.

Typically smolt migration occurs in April and May. Spill during those two months, based on the period of record (1980 – 2014), occurs about 73 percent of the time in April and 43 percent of the time in May. With regard to the downstream sluiceway at West Buxton, it is typically operated throughout the smolt migration period, and is, therefore, available for use by smolts (and post-spawn adults or kelts). Although spill and the sluiceway are available downstream passage routes, some smolts may pass through the project turbines. To quantify turbine survival, smolt migration studies have been conducted at the West Buxton Project (Normandeau, 2000). Based on the studies, estimated turbine survival rates range from 85 percent (unit 4) to 97 percent (unit 6). The same study found that passage through the downstream sluiceway, when combined with passage through the turbines, resulted in an estimated whole station survival rate of 96 percent for salmon smolts.

White Pine Hydro is proposing no changes in its operations that would be expected to significantly alter existing survival estimates for salmon smolts at the project. Therefore, continuing to operate the existing downstream gated sluiceway, as it has been operated in the past, would afford downstream migrating salmon smolts an efficient mechanism for passage at the project, minimizing turbine-related injury and mortality.

Post-spawned adult salmon may also out-migrate through the West Buxton Project via spill, the downstream sluiceway, or through the turbines. To date, no studies of kelt survival have been conducted specifically at the West Buxton Project. However, the Phase I desktop assessment[108] of kelt survival conducted by White Pine Hydro at its Saco River projects, including West Buxton, showed that Bonny Eagle and West Buxton were least likely to be an impediment to kelt passage, while Skelton, Cataract (East Channel), and Bar Mills posed to greatest hindrance to kelt passage (Kleinschmidt, 2011). As

[108] The purpose of the Phase I assessment was to evaluate project characteristics to determine which of White Pine Hydro's Saco River projects has the most potential to delay or adversely affect kelt passage. The results of Phase I were used to prepare the study plan for the Phase II assessment, which, to date, has not been conducted as a result of the scarcity of returning adult salmon.

explained below, trashrack bar spacing, turbine type, and route of passage would likely minimize downstream migration delay, as well as injury and/or mortality of post-spawn adult salmon at the West Buxton Project.

The trashracks for Units 1 – 5 having a bar spacing of 1.875 inches, which is expected to excluded most, if not all, adult salmon. The trashrack for Unit 6 has a bar spacing of 4 inches, which is wide enough to allow kelts to pass through. However, the Unit 6 turbine is a vertical Kaplan unit, which likely exhibits lower mortality than Francis turbine type (Units 1 – 5), since a Kaplan turbine has fewer blades and larger water passages (Bell, 1981). Finally, kelts are most likely to pass West Buxton Dam via spill or the downstream sluiceway, since they, like smolts, actively and rapidly move through the project area as they migrate to the ocean, and would generally avoid littoral-zone areas (areas near a river bank), which is where the intake to Unit 6 is located (east river bank).

With regard to effectiveness studies, section 5.4.d of the 2007 Fisheries Agreement stipulated that White Pine Hydro would conduct a 2-year clupeid effectiveness study of the existing downstream passage facility. This study was initiated in May 2015, when White Pine Hydro stocked 700 river herring upstream of the West Buxton Project (BREG, 2016).[109] In 2016 (Year 2 of the study), White Pine Hydro stocked approximately 520 river herring upstream of the West Buxton Project (BREG, 2017). In both years, BREG fisheries technicians monitored use of the downstream fish passage facility from mid-August through mid-October.[110] No juvenile or adult post-spawning river herring were observed using the facility either year. White Pine Hydro plans to continue stocking river herring upstream of the West Buxton Project in 2017, and monitoring out-migrating juvenile clupeid routes in 2017.

White Pine Hydro's 2 years of clupeid monitoring of the downstream fish passage facility appears to satisfy the provisions of the 2007 Fisheries Agreement for clupeid studies, as well as Maine DMR's recommendation for such studies. White Pine Hydro's plans to continue stocking river herring upstream of the West Buxton Project, and to continue monitoring use of the downstream passage facility would ensure that downstream out-migrating river herring, and potentially shad in the future, are observed and use of the existing downstream passage facility is detected. Such an effort, would provide necessary information to identify potential changes, if any, that are needed to the

[109] *See* White Pine Hydro's July 28, 2016 Filing at 131-139 (Attachment 2 – Fish Passage Reports).

[110] Observations were made twice per week at each of the three facilities regardless of weather conditions. The fisheries technician was stationed upstream of the downstream bypass for a period of 15 to 30 minutes in the evening just before sundown to observe fish activity in the bypass area, unit intake area, and headpond area.

downstream passage facility to fully protect downstream migrating river herring and shad and minimize injury/mortality associated with downstream passage through the project.

FISH PASSAGE GENERAL PROVISIONS

White Pine Hydro proposes to implement a number of "general" fish passage measures at West Buxton, in accordance with section 5.1 of the 2007 Fisheries Agreement. The measures consist of: (1) agency design review for the upstream anadromous fish passage facility (section 5.1.a); (2) a 1-year "shakedown" period to ensure the facility is operating as designed (section 5.1.b); (3) effectiveness studies of all new or redesigned fish passage facilities (section 5.1.c); and (4) fishway operating procedures (section 5.1.d).

NMFS and FWS, in their respective section 18 prescriptions, require that White Pine Hydro implement these general fish passage provisions of the 2007 Fisheries Agreement. In addition, NMFS and FWS include in their respective prescriptions requirements pertaining to: (1) seasonal timing of fishway operation; (2) access to project facilities; and (3) agency consultation on all filings. Maine DMR recommends that White Pine Hydro implement the "shakedown" period, effectiveness monitoring, and the operating procedures of sections 5.1.b through 5.1.d of the 2007 Fisheries Agreement, as well as the seasonal operation guidelines prescribed by NMFS and FWS.

Our Analysis

Fish passage effectiveness studies would help ensure that any passage measures implemented by White Pine Hydro would provide safe, timely, and efficient passage. Passage effectiveness studies typically evaluate factors such as attraction flows, attraction efficiency, passage efficiency, passage delay, and survival rates. If collected, this type of information could assist White Pine Hydro in modifying the design or operation of any fish passage measures implemented at the project, potentially improving upstream or downstream fish passage effectiveness. In addition, monitoring the effectiveness of the newly installed upstream eel ladder, including collecting juvenile eel count data, would provide information to help determine when downstream eel passage facilities or measures may be necessary.

With regard to operation and maintenance plans, White Pine Hydro filed draft operation and maintenance plans for the existing downstream anadromous fish passage facility and the upstream American eel ladder, in accordance with the stipulations of

section 5.1.d of the 2007 Fisheries Agreement.[111] White Pine Hydro also plans to develop an operation and maintenance plan for the proposed upstream anadromous fish passage facility, once that facility is constructed.[112]

Most fish passage facilities require precise operation and routine maintenance to ensure that the facilities operate effectively. Individual operation and maintenance plan(s) would ensure that each fish passage facility constructed at the project would be operated during the appropriate times of the day and year, and with an appropriate conveyance flow. Such plan(s) also would ensure that routine cleaning and maintenance, including debris removal, are performed so that the facilities operate as intended.

As to reporting, neither of the proposed plans specifically include a provision to file annual reports with the Commission. Notwithstanding this omission in the plans, White Pine Hydro files an annual Saco River Fish Passage Report with the Commission that documents fish passage operational data for the reporting year and provides an operational plan for the upcoming year. Continuing this practice of filing the annual report fish passage report would ensure that the Commission can effectively administer the requirements of any new license issued for the project.

The remaining general fish passage provisions consist of: (1) agency design review for the upstream fish passage facility; (2) a 1-year "shakedown" period; (3) access to project facilities; and (4) agency consultation on all filings. Collectively, these provisions would ensure that any new or modified fish passage facilities are constructed correctly, and are maintained and operated to pass fish in a safe, timely, and effective manner.

TRAP AND TRUCK OF ANADROMOUS FISH

Maine DMR recommends that White Pine Hydro continue to trap and trap adult Atlantic salmon, alewife, and blueback herring at either the Cataract or Skelton fish passage facilities, and transport these fish to areas in the basin upstream of the West Buxton Project, in accordance with sections 5.3.c and 5.3.d of the 2007 Fisheries Agreement. White Pine Hydro does not object to continuing the trap and truck

[111] *See* White Pine Hydro's July 28, 2016 Filing at 33-38 (Attachment 1 – Appendix B-1) and at 39-44 (Attachment 1 – Appendix B-2).

[112] Section 3.6.3 of White Pine Hydro's proposed Project Operation and Maintenance Plan, filed as part of its Final License Application (Appendix E-4), provides that an operation and maintenance plan for the upstream fish passage facility would be developed in 2019. *See* White Pine Hydro's July 28, 2016 Filing at Attachment 1-6.

operations on the Saco River, but contends that such measures are unnecessary for a West Buxton Project license.

Our Analysis

In-migrating adult anadromous fish (*e.g.*, Atlantic salmon and river herring) encounter multiple dams on the mainstream of the Saco River, the Cataract and Skelton Projects being the only ones with functional upstream fish passage facilities. Facilities at the Bar Mills, West Buxton, Bonny Eagle, and Hiram Projects have not yet been built. Therefore, in keeping with the agencies' fish restoration goals for the Saco River, trap and truck operations at the Cataract and Skelton Projects ensure that anadromous fish populations in the river will be maintained until spawning habitat in the river is fully accessible through fish passage at each project.

The existing trap and truck operation on the Saco River is a provision of the 2007 Fisheries Agreement, and applies only to the Cataract and Skelton Projects. Maine DMR's recommendation, therefore, does not require any actions to be taken at the West Buxton Project. Because these measures are already included in the Cataract and Skelton Project licenses, they would continue to be implemented whether any such measures were included in any new license issued for the West Buxton Project.

3.3.1.3 Cumulative Effects

The West Buxton Project, in combination with the other existing hydroelectric projects located in the Saco River Basin, could cumulatively affect migratory fish species (*i.e.*, Atlantic salmon, American eels, American shad, alewife, and blueback herring) and aquatic habitat. Cumulative adverse effects can occur from multiple hydroelectric developments within a river basin and include injuries and mortality from turbine passage, as well as interference with fish movements and migrations.

The operation of the West Buxton Project has been designed to support on-going efforts to manage resident fisheries and restore runs of diadromous fisheries to the Saco River Basin. The project is operated in a run-of-river mode, consistent with the 1997 Saco River Instream Flow Agreement. In accordance with the 1994 Fish Passage Agreement and the 2007 Fisheries Agreement, fish passage facilities have been, or will be, installed at the West Buxton Project, as needed, to support the on-going restoration effort. White Pine Hydro also has undertaken a number of studies relative to diadromous fish restoration efforts at the West Buxton Project, which are designed to assess direct project effects on fishery resources, as well as address the potential cumulative effects of the project on the overall restoration effort in the basin. In accordance with the 2007 Fisheries Agreement, these studies will continue into the future.

White Pine Hydro's proposal to provide upstream fish passage for migratory fish species, would: (1) provide anadromous fish access to spawning and nursery habitat that has been unavailable since construction of the dams; and (2) make upstream American eel passage at West Buxton Dam more efficient, and improve access to habitat upstream of the dam. Additionally, White Pine Hydro's proposal to continue to operate the existing downstream anadromous fish passage facility, as well as implement downstream eel passage measures (permanent and interim), would limit entrainment and turbine-related mortality of fish moving downstream through the project. Therefore, the proposed protection and enhancement measures are likely to be cumulatively beneficial for diadromous fish on the Saco River.

White Pine Hydro is not proposing to change project operation, with the exception of providing a seasonal minimum flow in the flood channel to enhance brown trout habitat and angling opportunities. Providing a minimum flow in the flood channel would enhance aquatic habitat in the project area, but, depending on the amount of flow provided, could hinder upstream passage of anadromous fish and American eel at the project.

3.3.2 Terrestrial Resources

3.3.2.1 Affected Environment

Vegetation

The West Buxton Project lies within the Northeastern Coastal Zone Level IV Ecoregion which is situated between the Northeastern Highlands ecoregion to the northwest and the Atlantic Ocean to the southeast. Within this ecoregion, the project is located within the Gulf of Maine Coastal Plain biophysical region (Griffith *et al.*, 2009). This biophysical region is characterized by irregular plains and rolling to low hills (Maine DIFW, 2005). The region's glacially deposited soils are generally rocky and nutrient poor (USGS, 2016). The majority of this biophysical region is forested with a variety of species including maple-beech-birch forests and white-red-jack pine forests (Maine Tree Foundation, 2016) and the northern extent of oak-hickory forests (Maine DIFW, 2005). Coastal and inland wetlands are also present (USGS, 2016).

The project is located in a rural area with year-round and seasonal residences, agricultural land, and undeveloped forested areas adjacent to the project boundary. In most locations, the project boundary is very close to the shoreline of the Saco River and encompasses a small amount of land outside of the wetted portions of the project impoundment and tailwater. In total, the project boundary encompasses approximately 52.6 acres of land, and approximately 122 acres of open water (118 acres impoundment, 4 acres tailwater).

White Pine Hydro conducted a Botanical Reconnaissance Survey in 2013. This study described vegetative communities, including wetlands and non-native invasive plants, and wildlife habitats within the West Buxton Project boundary relative to four areas: (1) upper impoundment; (2) middle impoundment; (3) lower impoundment; and (4) tailwater. Figure 5 provides a map of the project area, depicting cover types observed within these four areas within the project boundary (White Pine Hydro, 2014a). Non-native invasive plant occurrences are described in more detail below.

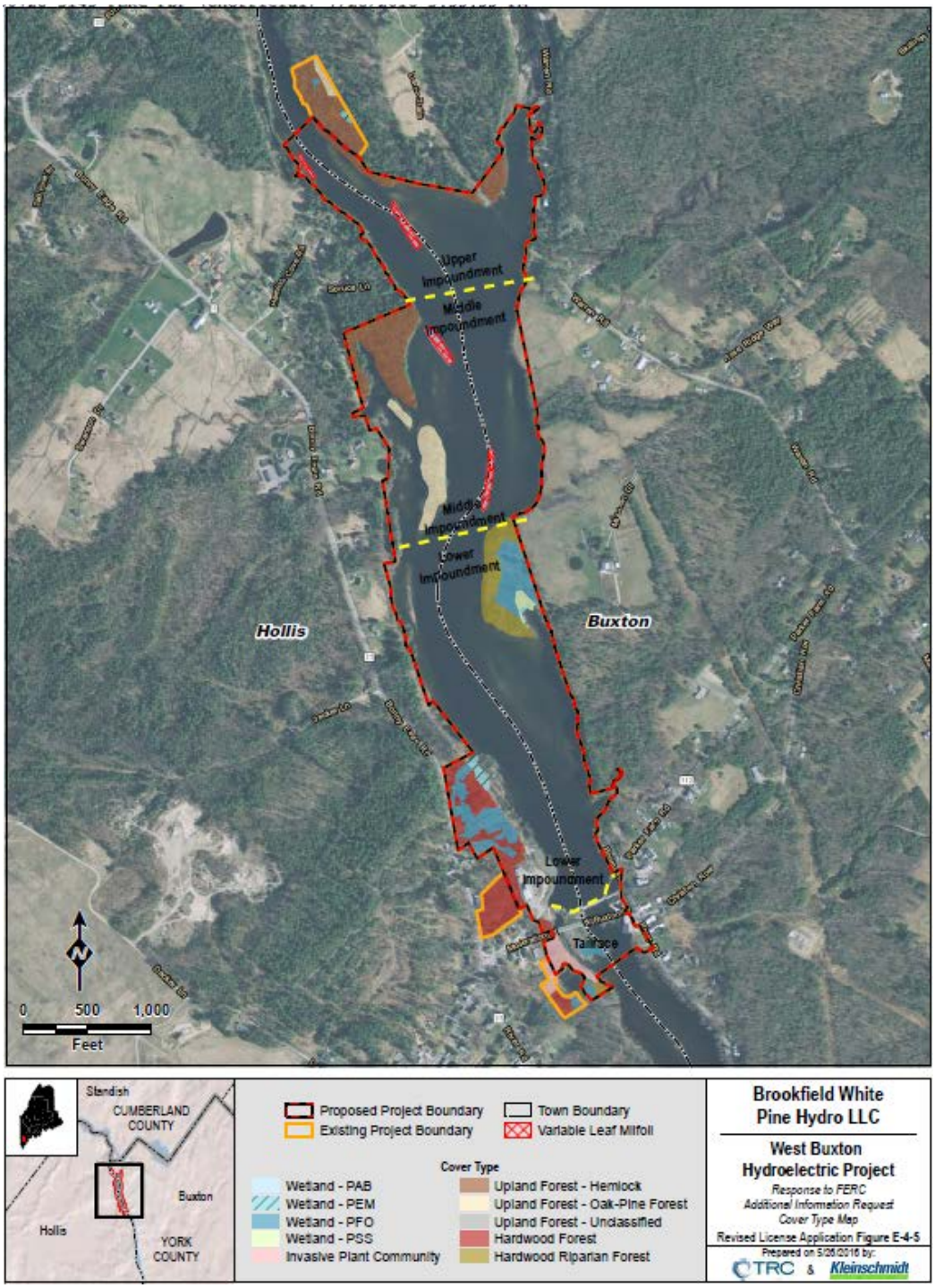

Figure 5. Vegetation cover types within the existing West Buxton Project boundary. (Source: White Pine Hydro, 2016).

Wetlands

The wetland types identified within the project boundary include palustrine emergent wetland (PEM), palustrine forested wetland (PFO), palustrine scrub-shrub

(PSS), and aquatic invasive plants (PAB). The total acreage for each wetland type within the existing project boundary is shown in Table 10 below.

Table 10. Wetland types within the existing West Buxton Project boundary. (Source: White Pine Hydro, 2015).

Wetland Type	**Acres**	**Percent of Total Acres**
palustrine emergent wetland (PEM)	0.7	7.95
palustrine forested wetland (PFO)	6.3	71.59
palustrine scrub-shrub (PSS)	0.4	4.55
aquatic invasive plants (PAB)	1.4	15.91
Total Acreage of Wetlands	**8.8**	**100.00**

Upper Impoundment

The immediate shoreline of the upper impoundment includes areas of exposed bedrock and emergent wetland fringe (both non-persistent and persistent). Near-shore emergent wetlands include three-way sedge, soft rush, and cattail. Deeper emergent aquatic areas are located within the river and are generally dominated by pickerel weed, bur-reed, and water lily. Variable-leaf milfoil, an invasive species of significance in Maine, was documented in two locations in the upper impoundment. In addition, there are two small, isolated wetlands, a PFO and a PEM, located within an upland forested area on the northeast shore of the impoundment.

Forested areas consist primarily of hemlock, white oak, red oak, and some white pine. The dense overstory in these forested areas somewhat limits the development of an herbaceous community. However, the herbs growing in this area include bunchberry, cinnamon fern, sarsaparilla, and bracken fern.

The shoreline of the upper impoundment also includes a portion of a cleared, maintained transmission line corridor. Dominant vegetation found within the maintained corridor includes juniper, bracken fern, and sweet fern.

Middle Impoundment

The middle impoundment is characterized by a series of islands along the west shore near some mainland forest within the project boundary. Vegetative communities on the islands consist primarily of upland forest, with red oak, white pine, white oak, and red maple in the overstory, and low-bush blueberry, bracken fern, and sarsaparilla in the understory. Forested areas on the shoreline is similar to the hemlock forest found along the upper impoundment.

Wetlands in the middle impoundment are primarily emergent, and form a thin margin along the shoreline. Some of the wetlands in this area are associated with the islands along the western shoreline or the shaded backwater areas underneath overhanging tree branches where there are silty and mucky substrates. Botanical species within these wetlands include pickerel weed, water lily, bur-reed, jewelweed, and sensitive fern. Variable-leaf milfoil was also documented in two locations in the middle impoundment.

Lower Impoundment

Both the terrestrial and wetland communities along the lower impoundment transition into hardwood dominated communities. Forested areas are dominated by an overstory of red maple, green ash, and American elm, with some white pine, red oak, and white oak. Wetlands include PFO, PEM and PSS wetland types. In addition, a small stream runs through a portion of the wetland on the west side of the lower impoundment (*see* figure 13). A PFO wetland on the west side of the lower impoundment is dominated by red maple and American elm in the overstory. Red maple and green ash dominate another small PFO wetland area on the east shore of the lower impoundment with silver maple making up a lesser component of the overstory. The understory is well-developed and is primarily a dense growth of fringed sedge with alder and red maple saplings.

An area of riparian forest located along the upper east shoreline of the lower impoundment has similar overstory species to the adjacent wetland (described above), including red maple and green ash, with a lesser component of silver maple. Understory vegetation includes white pine saplings, alder, honeysuckle, common buckthorn, high-bush blueberry, low-bush blueberry, and winterberry. Herbaceous vegetation includes sensitive fern, ostrich fern, cinnamon fern, royal fern, soft rush, fringed sedge, and wool grass.

There are also some areas of active and historic agricultural development, as well as residential and commercial uses. Several non-native species occur in this area, including barberry, Japanese knotweed, garlic mustard, common buckthorn, and honeysuckle.

Tailwater

Downstream from the impoundment and adjacent to the tailwaters, is an area characterized by human disturbance. The east shore is occupied by commercial development and a river access site. The west shore is not developed and is primarily hardwood forest. The overstory of the forested area is primarily composed of red maple, green ash, and silver maple. Shrub and herbaceous vegetation in this area is dominated by invasive species, including policeman's helmet (also known as Himalayan Balsam or ornamental jewelweed), Japanese knotweed, garlic mustard, multiflora rose, barberry and

honeysuckle. Japanese knotweed, honeysuckle, and ornamental jewelweed are dominant and form large monocultures. This invasive plant community encompasses about 1.6 acres. The species present are described in more detail below (Figure 5).

Invasive Species

Japanese barberry, Japanese knotweed, common buckthorn, and two types of bush honeysuckle are considered common and widespread non-native shrubs in Maine. Japanese barberry is a spiny deciduous shrub that displaces many native herbs and shrubs by forming dense stands in closed canopy forests, open woodlands, wetlands, fields, and other areas. Birds spread the seeds of this species, but it can also spread vegetatively through root creepers and branches that can root at the tips. Japanese knotweed is a shrubby herbaceous perennial that can grow 4 to 10 feet tall and spreads quickly forming dense thickets, outcompeting native species in riparian areas where it can survive flooding and rapidly colonize scoured banks and islands. Knotweed also spreads both by seed and vegetatively through long, stout rhizomes, which can be spread by water, as a contaminant in fill dirt or yard waste, or on the soles of shoes (Swearingen *et al.*, 2010). Common buckthorn is a dioecious[113] shrub or small tree that also outcompetes native shrubs and herbs for space and sunlight by forming dense thickets. While most fruits fall and seeds germinate near the parent plant, birds and mice are also known to spread common buckthorn seeds far from parent plants (Wieseler, 2009). Two perennial bush honeysuckles native to eastern Asia, morrow and tartarian, are known to be invasive in Maine. These honeysuckle species are commonly found in open, full-sun areas, but are shade-tolerant and can invade forest understories. Birds and mammals consume its fruits and then spread seeds to new areas (Maine DACF, 2013).

Two non-native invasive herbs, garlic mustard and policeman's helmet were also found in the project area as described above. Having infiltrated New England states in recent years, garlic mustard is becoming established in Maine. Garlic mustard is a biennial[114] herb that displaces native herbs and suppressing native tree seedling growth by releasing toxins in the soil that affect mychorrhizal fungi in forests, forest edges, floodplains, roadsides, and disturbed lands. Each (second year) garlic mustard plant can produce hundreds of seeds that can then be spread by wind, water, wildlife, and people (Swearingen *et al.*, 2010). Policeman's helmet is not as common or widespread in

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[113] Dioecious species, are plants that produce only male or female flowers on each individual and fruiting plants are always female.

[114] Biennial plants take 2 years to complete their life cycles. First year garlic mustard plants are low-growing rosettes and the second year plants produce one or more flowering stalks.

Maine, but has been documented in York County. Common in riparian zones and wet ditches along roadsides, policeman's helmet flowers profusely producing seed pods with 4 to 16 seeds each. Like other jewelweeds, this species spreads easily because the seeds can be ejected as far as 15 feet from parent plants when ripe pods are disturbed (Maine DACF, 2013).

In addition, one aquatic invasive species of significance in Maine, variable-leaf milfoil,[115] was identified. As described above, there are several patches of variable-leaf milfoil established in the upper and middle impoundment (*see* Figure 5). Infestations of variable leaf milfoil are known to exist in Lake Arrowhead and the Little Ossipee River, which flow into the Saco River upstream of the project. Other infestations are documented immediately upstream of the project boundary (*i.e.*, in the Saco River between Limington Rips and Bonny Eagle Dam) and downstream from the project (*i.e.*, on the Saco River in the vicinity of the Skelton Project).

RTE Plant Species

During development of the PAD, the Maine Natural Areas Program (Maine NAP) identified eight state listed rare, threatened, and endangered (RTE) plant species that potentially occur within a four mile radius of the project. These species include northern blazing star, dwarf bulrush, Heller's cudweed, narrow-leaved goldenrod, fall fimbry, fern-leaved false foxglove, hollow joe-pye weed, and small whorled pogonia (a federally listed [threatened] species). S*ee* section 3.3.3, *Threatened and Endangered Species*, for discussion of federally listed species.

Based on the habitat preferences of these rare plant species, White Pine Hydro's 2013 botanical surveys focused on areas of emergent shoreline vegetation with sandy substrates, as well as xeric[116] communities associated with shallow bedrock conditions. Other existing plant communities within the study area were surveyed to identify potential habitat that may support additional rare species. No unique natural communities occur within the project boundary and no RTE species or habitats were observed.

Wildlife

To gather information on wildlife species occurrence and use, as well as the potential effects of project operations on these species, White Pine Hydro conducted a

[115] While native to portions of the U.S., there is no historic evidence of variable-leaf milfoil being native to New England, where it has now been confirmed in all states.

[116] The term "xeric" describes sites that are very dry or contain little moisture.

Wildlife Reconnaissance Survey in 2013, and a Common Loon Survey in 2013 and 2014 (White Pine Hydro, 2014a). The survey focused on documenting occurrences of bird and mammal species, including RTE species and their associated habitats in riparian and upland areas of the project impoundment and tailwater shoreline. Birds and mammals that were observed (either directly or via sign) during the survey and other field efforts conducted in 2013 include year-round residents and migratory species that use separate and distinct breeding and wintering areas.

Mammals

Examples of species that are widespread throughout the region are white-tailed deer, gray squirrel, raccoon, and striped skunk. These species inhabit a variety of habitats consisting of forest, cropland, and pastureland and developed areas. In addition, they make use of riparian habitats along streams, such as the Saco River and its tributaries, during dispersal and foraging. Porcupine may be found in coniferous forests, or mixed or deciduous stands in the project vicinity. Habitat-selective species, such as gray fox may also occur in the vicinity of the project in areas of dense northern hardwood or mixed forest near old fields. No coyotes were observed during field investigations at the project. This widely distributed species, however, is likely to occur in the project vicinity year round. Red squirrel, gray squirrel, masked shrew, meadow jumping mouse, and eastern chipmunk are also likely to occur in the project vicinity.

Beavers and muskrat were observed during the survey. While no beaver lodges or dens of either species were observed, both species are likely year-round inhabitants within the project area. Beavers are common inhabitants of rivers, streams, ponds, lakes, and occasionally watered roadside ditches in Maine. Muskrat are found throughout still or slow-moving waterways, including marshes, beaver ponds, reservoirs, and the marshy borders of lakes and rivers.

Although not observed during field studies and seldom seen, river otters are relatively common throughout Maine. River otters may occasionally occur within the project vicinity, and their presence is possible year round. This highly aquatic species is known to inhabit riparian streams bordered by forested areas such as those that occur along the Saco River and its tributaries.

Birds

Bird species that were observed, or are considered likely to occur within the project boundary are those that are typical of southwestern Maine. Waterfowl observed on the project impoundment during field investigations in 2013 included mallard ducks and wood ducks. Canada goose, black duck, and common merganser were not observed,

but likely occur in the project area. Belted kingfisher, great blue heron, and spotted sandpiper were observed during field surveys.

A diverse array of other species, such as corvids,[117] woodpeckers, raptors, passerines, and game birds are also are expected to occur in upland, riparian, and wetland habitats of the project area. Many of these are migratory species, but some, such as black-capped chickadee, woodpecker species, and corvid species, are expected to remain in the project vicinity year-round.

Avian species that rely on open water habitats typically do not overwinter on smaller lakes and ponds such as the project impoundment, because of winter ice cover. Species such as osprey, blue heron, and several species of wading birds and waterfowl will typically leave the project vicinity by late fall or early winter. Some avian species that use open water habitats, such as bald eagle and common merganser, are highly individual in seasonal use. Some individuals of such species remain in the vicinity of the project during part or all of the winter, while others leave the region completely.

Barn swallow, chimney swift, eastern kingbird, evening grosbeak, least flycatcher, tree swallow and veery are all migratory species. These birds likely occupy various habitats in the project vicinity during temperate seasons. All of these species have potential to forage and/or breed within the project area and immediate vicinity and are expected to migrate to warmer climates to overwinter.

Common loons may be found in a wide variety of freshwater aquatic habitats, however, they generally prefer lakes larger than 59 acres with clear water, an abundance of small fish, numerous small islands, and an irregular shoreline that creates coves. This piscivorous[118] species is highly adapted for diving and submergent swimming. In order to capture the peak nesting period,[119] White Pine Hydro conducted common loon population and nesting surveys at the project on two dates in June 2013. Several incidental surveys were also conducted in 2013 and 2014. No individual loons, no territorial common loon pairs, and no evidence of loon nesting activities were observed during formal or incidental surveys over the 2-year survey period.

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[117] Corvids is a term used to describe a family of passerine birds that comprise the crow family (*i.e.*, crows, ravens, rooks, jackdaws, jays, magpies, treepies, choughs, and nutcrackers).

[118] Piscivorous species are carnivorous animals which eat primarily fish.

[119] Peak common loon nesting season in southern Maine is late May through early July, but nesting occasionally extends into mid- to late July, and rarely, may extend into August.

RTE Wildlife Species and Significant Wildlife habitats

Based on habitats identified within the project boundary and in its immediate vicinity, several mammals and avian species, some of which are state species of special concern, have the potential to occur at the project. While not observed during wildlife surveys, little brown bats are among state species of special concern that are likely to occur within the project vicinity in summer to roost and forage. Little brown bats feed primarily over wetlands and other still water where insects are abundant. They use rivers, streams, and trails as travel corridors to navigate across the landscape and they prefer summer roosts that are close to water. Female little brown bats summer in maternity colonies, gathering in very warm roosts in which to bear and nurse their young. Males roost in smaller colonies, and may use tree cavities as well as buildings. In the winter, male and female little brown bats hibernate together in clusters in moderately sheltered hibernacula, including caves, mine tunnels, and occasionally in hollow trees. Many little brown bats leave Maine in search of adequate hibernacula in winter. No winter hibernacula for little brown bats is known to occur in the project area. As discussed in section 3.3.3, *Threatened and Endangered Species*, the northern long-eared bat, a federally listed species, may occur in the project vicinity.

Of the nine state birds of special concern with the potential to occur in the project boundary, only the great blue heron was observed at the project during the wildlife survey.[120] Great blue herons occur in various saltwater and freshwater habitats, including open coasts, marshes, sloughs, riverbanks, lakes, and small ponds. This species typically stalks fish, frogs, and other prey in shallow waters, but also occasionally forages in grasslands and agricultural fields. Breeding herons gather in colonies ("rookeries") and build stick nests high off the ground, in tall trees or snags. Great blue herons are a partial migrant; many migrate south to warmer climates in winter, but some attempt to overwinter in southern Maine. No heron rookeries are known to occur in the project vicinity and none were observed during the 2013 study, but this species likely forages in project wetlands and shallow water areas during temperate seasons.

While still protected by the Federal Bald and Golden Eagle Protection Act, bald eagles, once nearly extirpated in the United States, have re-established to the extent that they were removed from the federal endangered species list in 2007 and from the Maine endangered species list in 2009. Foraging along the shorelines of lakes, reservoirs, rivers, marshes, and coasts, bald eagles eat primarily fish, but are highly opportunistic and will consume birds, reptiles, amphibians, crustaceans, small mammals, and carrion. Many bald eagles leave Maine in winter, but some remain where open water is available (e.g.,

[120] Other Maine bird species of special concern that are either known, or likely, to inhabit the project area or vicinity include bald eagle, barn swallow, chimney swift, eastern kingbird, evening grosbeak, least flycatcher, tree swallow, and veery.

large flowing rivers and coastal areas) or where carrion is available. No bald eagles were observed within the project vicinity during the 2013 wildlife survey, however, this species may occur in the project vicinity as a transient.

3.3.2.2 Environmental Effects

Effects of Project Operation and Maintenance on Terrestrial Resources

White Pine Hydro proposes to continue to operate the project in a run-of-river mode, and to mow several small areas of grass around the project facilities. In addition, White Pine Hydro proposes to remove three parcels totaling approximately 7.7 acres of land, including approximately 0.4 acre of wetlands,[121] from the project boundary. White Pine Hydro does not propose any protection or enhancement measures related to project operation and maintenance to protect wetland, botanical, and wildlife resources. Interior, on behalf of FWS, states that uplands, wetlands, and associated wildlife are not likely to be adversely affected by proposed project operation.[122]

Our Analysis

Operating the project run-of-river, with daily pond level variations limited to one foot or less during normal operation, minimizes impacts that are commonly associated with impoundment water level fluctuations, such as shoreline erosion, changes to wetland composition, structure, and function, and associated changes to wildlife habitat usage. One wildlife species of concern to resource agencies was the common loon. White Pine Hydro's common loon nesting 2013 and 2014 surveys found no territorial or nesting loons within the project boundary. Likewise, no individual (unpaired or non-breeding) loons were observed. Based on impoundment size, character, and field observations of available habitat, it is unlikely that territorial or breeding loons would occur in the project boundary.

Under proposed operation, the West Buxton Project would continue to have no significant storage capacity or effect on the overall river flow regime of the Saco River. Project outflows would continue to approximate inflows from the upstream Bonny Eagle Project, and these minimum flows would be provided year round. Therefore, the proposed impoundment elevations and downstream flows would continue to have minor to negligible effects on botanical and wildlife resources.

[121] The wetland types within the parcels include approximately 0.1 acre of PEM and 0.3 acre of PFO wetlands.

[122] *See* Interior's December 19, 2016 Comments.

There are few maintained upland areas within the project boundary.[123] White Pine Hydro maintains some small areas of lawn around a non-project office, maintenance buildings, and utility corridors. While mowing limits plant communities in these areas to grasses and herbs, the small areas provide wildlife habitat opportunities for generalist, grassland, and edge-habitat species. White Pine Hydro would continue to mow the lawns in these areas on an as-needed basis. Continuing to mow in these small areas would promote the existing vegetation and associated wildlife.

The three parcels that White Pine Hydro proposes to remove from the project boundary include land located in the following general locations, as shown on Figure 5: (1) behind the licensee's non-project maintenance and office buildings along the southwest portion of the project; (2) within the northwest portion of the project boundary; and (3) on the western shore of the project, downstream from the project dam and the Maine DOT bridge. No significant wildlife or botanical habitats are known to occur in these parcels. Existing and proposed project operation and maintenance activities do not affect these areas, and removal of these parcels from the project boundary would have no effect on vegetation.

Recreation Site Improvements, Maintenance, and Use

As discussed in section 3.3.4, *Land Use and Recreation*, White Pine Hydro proposes to create a new boat launch and improve several existing recreation sites at the project, including a canoe impoundment take-out, a canoe tailwater access, and an informal angler access trail. Construction of the proposed boat launch would permanently disturb both wetland and upland areas. Improvements to the canoe take-out, tailwater access, and angler access trail would involve some temporary and permanent soil and vegetation disturbances in upland areas. Terrestrial resources at the recreation sites would also be temporarily disturbed during recreation use and regular maintenance activities, such as vegetation management, trash removal, and maintenance of recreation signage and the gravel of the access road and parking area.

[123] Central Maine Power Company owns and maintains distribution lines, which are, in part, located within the project boundary. These lines and associated transmission corridor are not, however, part of the West Buxton Project. Central Maine Power Company uses an integrated vegetation management strategy to manage the non-project transmission corridor within the project boundary. This strategy includes hand cutting and selective herbicide applications on an as needed basis, and mowing the corridor in unusual circumstances. There are no anticipated changes to the vegetation management in this corridor.

White Pine Hydro developed its Recreation Plan in consultation with Maine DIFW. The Recreation Plan states that the boat launch was designed to minimize effects to the wetlands and maximize use of the upland areas. In addition, as outlined in the Recreation Plan, the applicant proposes to use BMPs during construction of the recreation improvements.

Interior, on behalf of FWS, states standard environmental control measures [BMPs], such as the installation of a silt fence, would prevent short term effects of construction of the boat launch site on nearby wetlands. Maine DIFW recommends that the vegetation along the existing informal access trail be maintained to provide unencumbered angler access along the full length of the flood canal.[124]

Our Analysis

EFFECTS OF BOAT LAUNCH CONSTRUCTION – White Pine Hydro's proposed boat launch site would be located within the project boundary, and would provide a new road access, parking area for vehicles and trailers, a single-lane boat launch, and a dock.[125] Development of these recreation facilities would affect small wetland and upland areas. Specifically, construction of the launch would permanently disturb a total of 0.9 acres, including an estimated 0.18 acres of PFO wetland with small pockets of PSS and PEM, 0.10 acres of PEM wetland, and 0.62 acres of upland vegetation. The 0.10 acres of PEM wetland are located within an existing, non-project utility transmission corridor along the western shoreline. An estimated 36 trees would be removed in order to construct the access road, parking area, and boat launch. In addition, the access road would cross a small stream (*see* Figure 8).

Removal of 36 trees and clearing the understory and herbaceous plants to create space for the new boat launch, parking area, and access road would create a gap in the forest canopy, creating new edge habitat and fragmenting forested land within the project boundary. Canopy gaps allow more sunlight to filter from the new edge habitat into the remaining forest, which creates a microclimate that is hotter, dryer, and windier than forest interiors, and could create more opportunities for non-native invasive plants to colonize the new forest edges. The loss of forest vegetation would affect wildlife habitat availability within the project boundary, but most mobile species would relocate to other nearby forested areas during construction. In addition, the wetland/upland forest that would be removed is a small fragment of larger forested areas to the west of the project. This forest fragment also contains edge habitat along Central Maine Power Company's

[124] *See* Maine DIFW's August 18, 2016 Comments.

[125] The dimensions of the recreation facilities at the proposed boat launch site are provided in section 3.3.4, *Land Use and Recreation*.

utility corridor that runs roughly parallel to the project impoundment, as well as edge habitat along the project impoundment itself, on the east side of the area. Therefore, it likely that this area is already inhabited by vegetation and wildlife species that are adapted to the microclimate of edge habitats.

White Pine Hydro's Recreation Plan includes several environmental protection measures that would be implemented before and during boat launch construction. Prior to construction, the applicant would conduct a topographic survey and collect data on water depths throughout the site. The erosion and sedimentation control BMPs to be used during construction include bank stabilization at the new launch, stabilization and seeding of the slope along the access road, and use of standard and water silt fencing,[126] as appropriate. Temporary staging areas, if necessary, would be placed in upland areas to avoid or minimize potential wetland impacts.

Surveying the topography of the site prior to construction would allow the applicant to identify drainage patterns, select the appropriate erosion and sediment control BMPs, and map the locations where they would be deployed. The surveys would help the applicant determine whether or not culvert(s) are necessary to allow water to flow from the small stream under the intersection with the proposed access road and/or allow water flow through other wetland areas on the west side of the lower impoundment. The surveys could also help the applicant identify developed areas or previously disturbed uplands that could be used for temporary staging. Installing silt fences and use of other BMPs would minimize erosion and contain sediment during construction. Stabilizing and seeding slopes after construction would minimize potential erosion and facilitate the restoration of vegetation in the disturbed areas. Overall, the implementation of these BMPs would minimize effects to terrestrial resources during construction.[127]

Implementing additional BMPs would minimize the introduction or spread of non-native, invasive plants and their associated harmful effects. Construction-related BMPs could include: (1) prior to construction, during the proposed topographic survey, identifying non-native invasive plants that may occur in the areas that would be disturbed during boat launch construction; (2) removing and properly disposing any non-native invasive plants prior to beginning ground-disturbing activities; and (3) washing

[126] We assume that the proposed "water silt fencing," as described in the revised Recreation Plan, refers to silt/turbidity curtains which are floating, impermeable barriers that are weighted at the bottom to trap/prevent sediment from moving under the curtain within wetlands and/or water bodies.

[127] As White Pine Hydro states in its revised Recreation Plan, construction of the new boat launch will be dependent upon receiving appropriate local, state, and federal permits.

construction equipment between each use at the project recreation sites. These additional BMPs would minimize the potential introduction or spread of non-native invasive plants within the project boundary during construction and would thereby promote the recovery and growth of native species after construction.

EFFECTS OF IMPROVEMENTS TO THE EXISTING CANOE TAKE-OUT, TAILWATER ACCESS, AND ANGLER ACCESS TRAIL – The proposed improvements to the existing canoe take-out, tailwater access, and angler access trail would affect small, upland areas of primarily herbaceous vegetation. The canoe take-out and tailwater access areas are located on the eastern shoreline of the lower impoundment and tailwater respectively. The angler access is located on the western shoreline of the tailwater area (*see* Figures 9 - 11). White Pine Hydro would relocate the existing take-out approximately 10 feet upstream of the current location, install stone stairs (three steps), and clear vegetation along the eastern wing wall to facilitate paddler egress from the river and easier portaging to the tailwater area. At the canoe tailwater access, the applicant would install a longer stairway, stabilize existing bank erosion, and raise the elevation of the existing parking area to reduce the amount of runoff from the adjacent road affecting the area.

Improvements to the existing informal angler access trail on the western shoreline of the project tailwater would include widening,[128] repairing, and stabilizing steep portions of the existing trail, as well as adding a parking area. The applicant would also install a new trail segment and railing for bank fishing upstream of the highway bridge, a (relocated) security fence to prevent access to dam infrastructure, and recreation signage. In addition, downstream from the bridge, the applicant would install a steel staircase access, railings, water diversion devices, and recreation signage. The applicant estimates that less than five trees would need to be removed as part of the improvements to the angler access trail.

These improvements involve mostly temporary disturbances to vegetation that is located in existing edge habitat. Permanent disturbance to vegetation would be limited to the area of the stairs/stairways, the parking areas, and the angler access trail. Stabilizing the soils and redirecting the drainage from the parking area at the canoe tailwater access, would stop the existing bank erosion and minimize the potential for bank erosion at this location in the future.

Implementing additional BMPs during construction of the improvements to the existing canoe take-out, tailwater access, and angler access trail would minimize the introduction or spread of the non-native invasive plants and their associated harmful

[128] The existing angler access trail is about 1 to 2 feet wide, and would be widened to approximately 6 feet.

effects. As discussed above with regard to construction of the boat launch, prior to construction activities associated with improving the canoe take-out, tailwater access, and angler access trail, the applicant could identify any non-native invasive plants that occur in the areas that would be disturbed. Removing and properly disposing of any non-native invasive plants prior to beginning ground-disturbing activities and washing construction equipment between each use at the project recreation sites would minimize the potential introduction or spread of non-native invasive plants during construction activities. These measures would also indirectly promote the recovery and growth of native species after construction.

EFFECTS OF RECREATION USE AND SITE MAINTENANCE – Operation and maintenance of the new and improved project recreation sites would have temporary effects on terrestrial resources, including the quality of the habitat for wildlife and the occurrence and extent of non-native invasive plants within the project boundary. For example, litter clean-up would protect plants that could be smothered by it and wildlife that could be harmed by it through ingestion, entrapment, laceration, or other injury. The proposed removal of fallen trees[129] from recreation sites would maintain safe access to the recreation sites but could also eliminate some nutrients and potential habitat for many species of wildlife.

Operation and maintenance of the recreation sites within areas dominated by non-native invasive plants could result in the spread of these species and associated adverse effects to native species. Seeds or fragments of non-native invasive plants such as Japanese knotweed, policeman's helmet, and garlic mustard could become lodged in footwear or equipment during recreation or maintenance activities, such as walking/hiking on the trails, re-grading gravel on the access road and parking areas, mowing, removal of fallen trees, and other vegetation management to provide recreation access. This plant material could then be transported on footwear and equipment and be spread from recreation site to site, and/or outside of the project boundary. Also, fragments of the aquatic plant variable-leaf milfoil could be inadvertently transported from the project impoundment on boats, trailers, fishing gear, or other equipment and spread from one water body to another if equipment is not properly cleaned between uses. The introduction and/or spread of non-native terrestrial and aquatic non-native invasive plants would displace native vegetation and degrade the habitat for native wildlife.

[129] Coarse woody debris such as fallen trees can provide nesting, roosting, and foraging habitat for insects, birds, mammals, amphibians, and reptiles, as well as nutrients for plants. Staff assumes that fallen trees in undeveloped areas within the project boundary would be retained.

To minimize these effects, certain BMPs could be implemented during recreation site maintenance activities. For example, several of the BMPs discussed above for construction would also be applicable for maintenance activities. Prior to conducting maintenance activities, the applicant could identify non-native invasive plants that may occur in the areas that would be mowed, cleared, or otherwise disturbed. Properly disposing of any non-native invasive vegetation that is cleared, especially at the angler access trail where these species are dominant, would help to minimize the spread of these species to the other project recreation sites in the future. In addition, washing mowers, gravel graders, and other maintenance equipment between uses at each site would minimize the potential spread of non-native invasive plant seeds and fragments.

The effects of recreation activities on terrestrial resources also could be minimized by increasing visitors' awareness of BMPs for recreation. For example, signage from the "Stop the Aquatic Hitchhikers!"[130] educational campaign could be installed at the new boat launch and the canoe take-out. The signage would provide visitors with specific: (1) procedures for cleaning boats and other aquatic recreational vehicles; and (2) guidelines to prevent the spread of aquatic invasive species from one water body to another. Also, a boot brush station could be provided at the trailhead of the angler access trail, with accompanying signage to encourage visitors to use it to clean their footwear before and after walking the trail.[131] The signage would explain the importance of thoroughly cleaning footwear and other equipment to prevent the inadvertent transport of invasive plant seeds or fragments to new areas. If litter becomes a problem at the recreation sites, signs encouraging visitors to dispose of trash properly could be installed. Implementing these BMPs and educating visitors about the recreational use BMPs would provide unencumbered access to the recreation sites, while helping to minimize the spread of non-native invasive plants and protecting native species and habitats.

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[130] FWS designed the "Stop Aquatic Hitchhikers!" educational campaign on behalf of the national Aquatic Nuisance Species Task Force and its partner organizations, which include Maine DIFW and Maine DEP. The goal of the campaign is to raise awareness about the growing threat of aquatic invasive species and promote pro-conservation behaviors to recreational users while building community capacity to address the aquatic invasive species threat. *See* http://stopaquatichitchhikers.org/.

[131] Including pictures of Japanese knotweed, policeman's helmet, and garlic mustard on the signage, as examples of non-native invasive species that can be spread through recreation activities, would help visitors identify and avoid them.

3.3.3 Threatened and Endangered Species

3.3.3.1 Affected Environment

FWS, in its March 14, 2017, official species list,[132] identified two federally listed threatened species, the small whorled pogonia and northern long-eared bat, as potentially occurring within in the project area.

Small Whorled Pogonia

Small whorled pogonia is an herb in the orchid family that grows in acidic, humus-rich soils, among mature beech, birch, maple, oak, hickory and sometimes hemlock and other softwood trees. This species prefers forests with an open understory and is often found on slopes close to small streams.

Small whorled pogonia is named for the five- to six-leaf whorl topping the stem just below its greenish yellow flower(s) which bloom between mid-May to mid-June and last a few days to a week. While individuals of this species may not flower every year, when flowering, it appears to self-pollinate. Pollinated flowers form capsules with several thousand to over 9,000 tiny dust-like seeds per plant. However, this seed production is considered to be low to moderate and known populations are composed of less than 20 plants.

Threats to the species include habitat loss and/or degradation due to urbanization and recreational activities and collection for commercial or personal use (FWS, 2016). Although this species is widely distributed among 86 sites spread across 15 states and Ontario, Canada, it is rare throughout its range and has been extirpated from 13 to 15 sites and approximately 40 other sites are considered historical occurrences (FWS, 1992). FWS has not designated critical habitat for this species (FWS, 2017a).

Northern Long-eared Bat

Northern long-eared bat is a medium-sized migratory bat species with longer ears (average 17 millimeters mm or 0.7 inches) than other *Myotis* species. While foraging,

[132] *See* FWS's March 14, 2017 Filing. Using FWS's Information for Planning and Consultation (IPaC) system, Commission staff initially requested an official list of threatened and endangered species that may occur in the proposed project area, and/or may be affected by the proposed project, on October 27, 2016.

this species uses high frequency echolocation to hawk[133] and glean[134] moths, beetles, spiders, flies, and leafhoppers primarily between the understory and canopy in forested areas, but also in more open areas such as forest clearings, over water bodies, and along roads starting at dusk. During the winter, small groups of northern long-eared bats typically hibernate in cracks and crevices in the walls or ceilings of caves or abandoned mines with high humidity, cool temperatures, and no air currents, but this species has also been observed hibernating in buildings, railroad tunnels, and other man-made structures. Every two to three days during the summer, individuals or colonies switch roosts, which can include a wide variety of live and dead tree species and sizes, as well as the nooks and crannies of man-made structures. Northern long-eared bats breed from late July to October, but females store sperm during hibernation, delaying fertilization (*i.e.*, of a single egg) until ovulation during the spring. Pups are typically born between late May and July and are raised in maternity colonies of 30 to 60 individuals,[135] and are most vulnerable to disturbances at maternal roosts before they learn to fly,[136] from 18 to 21 days after birth.[137]

While northern long-eared bats' range includes much of the eastern and north central United States and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia, its distribution is patchy and historically it has been observed more frequently in the northeastern United States and in Quebec and Ontario, Canada. This species was thought to have been more common in the northern part of the U.S. range than in the south. However, the populations in southern Canada and east of the Mississippi River in the U.S. have experienced sharp declines since the introduction and spread of white-nose syndrome (NatureServe, 2017).[138]

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[133] Hawking is a foraging technique in which predators catch and consume prey while in flight.

[134] Gleaning is a foraging technique in which predators pick prey from leaves and other surfaces.

[135] 78 Federal Register 61051, 61054-61058 (October 2, 2013).

[136] 80 Federal Register 2374 (January 16, 2015).

[137] 78 Federal Register 61057 (October 2, 2013).

[138] White-nose syndrome is a disease caused by a white fungus that infects the muzzle and other parts of hibernating bats and is associated with high mortality rates of seven bat species, including gray bat, big brown bat, eastern small-footed bat, Indiana bat, little brown bat, northern long-eared bat, and tri-colored bat (FWS, 2014a).

The primary threat to northern long-eared bats is white-nose syndrome, which is associated with high mortality rates of this species.[139] Other threats to northern long-eared bats include: (1) changes to hibernacula[140] openings that restrict movement or change the microclimate; (2) blasting, drilling, and other noises that disturb bats during hibernation; (3) clearing trees that are used for staging or swarming habitat or as maternity roosts; (4) burning that allows smoke to pass through roost trees (spring through fall) or enter hibernacula during the winter; (5) changes to water resources entering hibernacula or used for drinking or foraging habitat; and (6) exposure to pesticides and herbicides. According to FWS, however, these other threats are not causing the species to be in danger of extinction (FWS, 2014b). While no critical habitat has been designated for northern long-eared bats (FWS, 2017b), the project is located within the white-nose syndrome buffer zone for the northern long-eared bat.[141]

In January 2016, FWS finalized the 4(d) rule[142] for this species, which focuses on preventing effects on bats in hibernacula associated with the spread of white-nose syndrome and effects of tree removal[143] on roosting bats or maternity colonies. As part of the 4(d) rule, take[144] that is incidental to tree removal is permitted if it: (1) occurs more than 0.25 mile from a known, occupied hibernacula; and (2) does not involve cutting or destroying known, occupied maternity roost trees or any trees within a 150-foot (45-meter) radius around a known, occupied maternity roost tree during the pup season

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[139] White-nose syndrome agitates hibernating bats, causing them to rouse prematurely, burn fat supplies, and starve or die from exposure.

[140] Hibernacula are places where bats hibernate during winter, such as in a cave.

[141] White-nose syndrome buffer zone encompasses counties within 150 miles of a U.S. county or Canadian district in which white-nose syndrome or the fungus that causes white-nose syndrome is known to have infected bat hibernacula (FWS, 2017c).

[142] *See* 81 *Fed. Reg*. 1,900-1,922 (2016).

[143] FWS defines "tree removal" as cutting down, harvesting, destroying, trimming, or manipulating in any other way the trees, saplings, snags, or any other form of woody vegetation likely to be used by northern long-eared bats. 81 *Fed. Reg*. 1,902 (2016).

[144] "Take" is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct. "Incidental take" is defined as any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, an otherwise lawful activity. 81 *Fed. Reg.* 1,901 (2016).

(June 1 – July 31).[145] Removal of hazardous trees for the protection of human life and property is also permitted and not result in prohibited incidental take of northern long-eared bats.

3.3.3.2 Environmental Effects

While White Pine Hydro does not propose any measures for the protection of the small whorled pogonia or northern long-eared bat, the applicant does propose to consult with FWS and Maine DIFW prior to finalizing the plans for the proposed boat launch and angler access trail to avoid potential impacts to the northern long-eared bat. No agencies recommended specific measures regarding the small whorled pogonia or northern long-eared bat. However, Interior,[146] on behalf of FWS, recognized White Pine Hydro's proposal for pre-construction consultation at the recreation sites to avoid or minimize potential impacts to northern long-eared bat.

Our Analysis

SMALL WHORLED POGONIA – Small whorled pogonia is known to occur in York and Cumberland Counties, Maine (FWS, 2017a), was identified in the IPaC species list for the project area, and potentially suitable habitat may occur in the mixed hardwood-coniferous forests in the project boundary. Construction of the proposed boat launch could disturb or eliminate small patches of potentially suitable forest habitat for this species. The adjacent forested habitat would remain intact, but conditions near the new forest edges would be altered as described in section 3.3.2 *Terrestrial Resources*. It is thought that this species can adapt to, and may even respond favorably to forest edge and early succession habitats, perhaps because of the increase in light availability (NatureServe, 2017). Therefore the gap in the forest canopy that would be created by the new boat launch facilities may provide more favorable conditions for this species in the adjacent forested area. However, small whorled pogonia was not found within the study area during White Pine Hydro's 2013 reconnaissance surveys. Therefore, we conclude that relicensing the project would have no effect on the small whorled pogonia.

NORTHERN LONG-EARED BAT – There are no known northern long-eared bat hibernacula or maternity roost trees occurring in the project vicinity. However, not all maternity roost trees in the northern long-eared bats' range have been identified, and because the project vicinity is largely forested, suitable habitat for summer roosting and foraging activities could be present. In addition, the suitability of trees for roosting can

[145] Pup season refers to the period when bats birth and care for their young. 81 *Fed. Reg.* 1,900-1,922 (2016).

[146] *See* Interior's December 19, 2016 Comments.

change over time and this species is known to move frequently among suitable roost trees throughout the summer.

Potential northern long-eared bat roosting and foraging habitat in the forested uplands, wetlands, and riparian areas would be disturbed during construction of the proposed boat launch facilities and the improvements to the angler access trail. Approximately 40 trees total would be removed from the west side of the project area (*i.e.*, 36 trees from boat launch site and less than 5 trees along the angler access trail). Removal of potential maternity roost trees can reduce northern long-eared bats' reproductive success if conducted during June or July, which is the time that pups are incapable of flight. Limiting tree removal to the period between August 1 and May 31 would minimize the effects of construction on northern long-eared bats and potentially suitable summer habitat, and would be protective of any northern long-eared bat maternity roost colonies and their pups until they learn to fly.

Vegetation management activities involving tree trimming or removal, if conducted during June or July, could also disturb northern long-eared bat maternity roosts. Inspecting trees to determine the presence/absence, as well as the quality of potential roosting habitat for bats, prior to non-emergency tree removal or trimming at project facilities, including recreation sites, would provide a mechanism to minimize or avoid any potential effect of the activity on bat maternity roosts. If bats are observed or potentially suitable bat roosting habitat would be disturbed, conducting non-emergency tree removal or trimming between August 1 and May 31 would reduce or eliminate the chance of adversely affecting the northern long-eared bat during the pup season. Based on our analysis and the measures described herein, we conclude that relicensing the West Buxton Project would not result in prohibited incidental take and is not likely to adversely affect the northern long-eared bat.

3.3.4 Land Use and Recreation

3.3.4.1 Affected Environment

Land Use

Land use in the vicinity of the project consists mainly of undeveloped lands, including some areas classified as wetlands, as described in section 3.3.2.1, *Terrestrial Resources*. The project boundary includes a total of approximately 52.6 acres of land and 121.9 acres of open water at a full pond elevation of 177.8 ft. The majority of land within the project boundary is undeveloped, with "undeveloped" and "resource area" land use categories comprising over 71 percent of the land acreage within the project boundary. The project is located in the towns of Buxton and Hollis.

Approximately 14.3 acres within the project boundary are developed. The majority of this development is associated with the project powerhouses and non-project maintenance buildings owned by White Pine Hydro. Small sections of a non-project transmission line[147] occur in several discrete locations within the project boundary. Transportation corridors within the project boundary are limited and are largely comprised of the West Buxton Road, which crosses the Saco River just south of the dam.

Recreation lands within the project boundary occupy approximately one-tenth of an acre, which is less than one percent of total lands within the project boundary. The majority of the properties abutting the project boundary are residential or agricultural properties and are under private ownership.

There are no lands in the immediate vicinity of the project that are included in the national trails system, or designated as wilderness lands. No portion of the Saco River is included on the list of Wild and Scenic Rivers. Two sections of the Saco River are listed in the Nationwide Rivers Inventory (NRI) for their outstanding recreation, scenery and other values. These stretches are located in Cumberland, York and Oxford counties. The NRI, which was created in 1982 and amended in 1993, identifies river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance (NPS, 2011).

Recreation

Statewide Recreation Plan

The 2014 – 2019 Maine State Comprehensive Outdoor Recreation Plan (SCORP) guides recreation planning and development in the state (Maine DACF, 2015). While the plan offers no specific recommendations for the project area, it does identify goals for recreation within the state. These goals include: connect more residents of all ages with the health and wellness benefits of outdoor recreation; support regionally connected trail systems in Maine's less developed regions to increase access to outdoor recreation for the rural population and enhance economic development; and connect to future tourism markets through recreation interests. The SCORP also identifies issues associated with recreation supply and demand. The plan indicates there is demand to: use trails for many purposes, including mountain biking and ATV riding; increase viewing and learning opportunities, such as interpretive trails; enjoy water-based recreation, including kayaking; increase amenities, such as flush toilets; and participate in events, such as a 5k trail race.

[147] The non-project transmission line is owned, and its corridor is maintained, by Central Maine Power Company.

Regional Recreation

The Saco River runs from New Hampshire's White Mountains to the Atlantic Ocean in southern Maine. The Saco River contains brook trout, landlocked salmon, smallmouth bass, and brown trout (Maine Office of Tourism, 2017). The Maine portion of the Saco River is open to year-round fishing.

The Maine lakes and mountains region, in which the project is located, offers numerous recreation opportunities including wildlife watching, fall foliage viewing, snowmobiling, paddling, hiking, biking and skiing (Maine Office of Tourism, 2017). This region includes Sebago Lake, which is less than 5 miles from the project. Sebago Lake is Maine's deepest and second largest lake. Sebago Lake State Park offers swimming on sandy beaches, sport-fishing, camping and boating. In the winter, visitors can engage in snowshoeing and cross-country skiing (Maine Bureau of Parks and Lands [Maine BPL], 2017).

The West Buxton project is more specifically located in the Southern Maine Coast Tourism Region. Recreational opportunities in this region include swimming, hiking, surfing, sailing, kayaking, biking, golfing, and birdwatching. Multiple state parks in the region include: Ferry Beach State Park, Fort McClary State Historic Site, John Paul Jones State Historic Site, Storer Garrison State Historic Site, and Vaughan Woods State Park (Maine BPL, 2017).

Existing Project Recreation Facilities

The project vicinity provides a variety of opportunities for public recreation. White Pine Hydro owns and operates two formal public recreation sites within the project boundary (Figure 6), including: (1) the canoe tailwater access site with parking for two vehicles; and (2) the canoe impoundment take-out site. Angler access to project waters is available at these two project recreation sites. The two sites are connected via public roadways and a short trail section that is maintained by White Pine Hydro. This route is used as a portage around the east side of the West Buxton dam. The canoe portage around the dam is available seven days per week for hand-carry transport of canoes and kayaks. The canoe portage trail is approximately 700 feet long from the take-out to the put-in site. In addition to the formal recreation sites, there is an 800-foot-long informal angler access trail on the west side of the Saco River, just below the West Buxton dam, with an accompanying informal parking area for two vehicles.

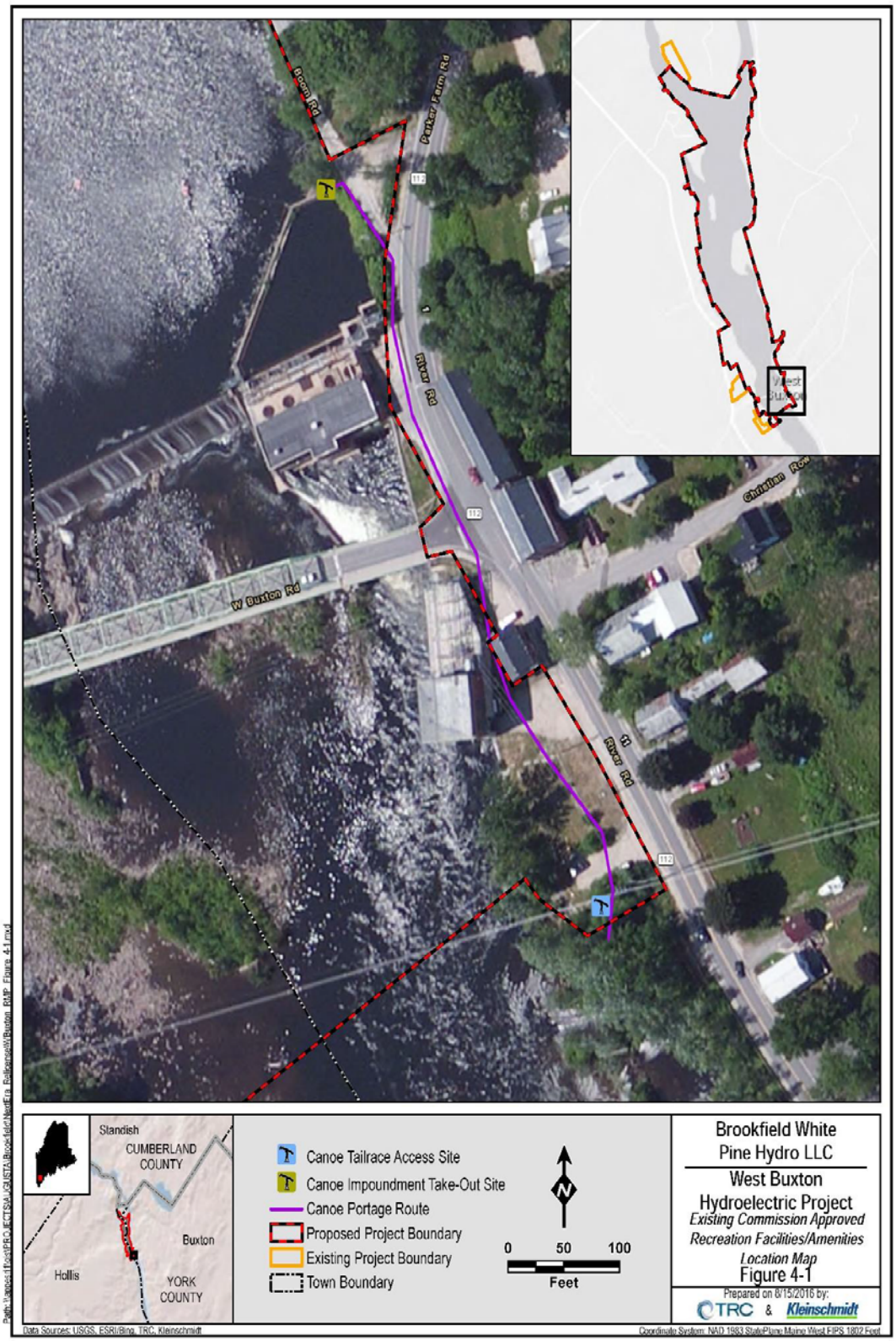

Figure 6. Existing project recreation sites at the West Buxton Project. (Source: Final Recreation Facilities Management Plan, filed August 18, 2016).

Recreational Use

White Pine Hydro filed its most recent Licensed Hydropower Development Recreation Report (FERC Form 80) in 2015. According to the report, the project had approximately 2,230 annual recreation visits. Use at the canoe tailwater access site and the canoe impoundment take-out site were each at 5 percent capacity. The Form 80 report for 2009 states that the project recreation facilities had 3,600 annual visits and were used at 25 percent capacity. Information provided by White Pine Hydro indicates that significant erosion and overgrown vegetation exist at the project recreation sites. Quantitative data related to use of the informal angler access trail are unknown.

Because the acreage of land within the project boundary is small, recreation opportunities within the project boundary are limited. The primary activities observed at the project are bank fishing and non-motorized boating.

3.3.4.2 Environmental Effects

Land Use

MODIFICATION OF PROJECT BOUNDARY

White Pine Hydro proposes to reduce its project boundary by removing approximately 7.7 acres of land that are not needed for project operation and maintenance or other purposes. Three parcels of land would be removed. The first parcel includes 2.3 acres of land located behind non-project maintenance and office buildings along the southwest portion of the project boundary. The second parcel includes 4.2 acres of land and is located within the northwest portion of the project boundary. The third parcel includes 1.2 acres of land and is located in the southwest portion of the project, below the West Buxton Dam and the Maine DOT Bridge. White Pine Hydro states that these three parcels are not needed for current or future project operation, or for natural, recreational, or cultural resource protection. The new project boundary would consist of 168 acres of land and water.

Maine DIFW recommends that the three land parcels be retained until all recreational access needs have been implemented and meet agency needs. The agency contends that these properties could support recreational alternatives not yet considered or identified, if the planned access improvement do not happen.

In response to Commission staff's request for additional information, White Pine Hydro states that the three land parcels that they propose to remove from the project boundary are not needed for current or future project purposes, and that their removal would not affect continued operation of the project, or otherwise affect any natural and/or

recreational use associated with the project.[148] In addition, White Pine Hydro commented, in detail, on the lack of recreational value for each of the three parcels of land,[149] stating that there is no evidence or new information establishing the recreational value of the three parcels, or the need to retain them in the project boundary for future recreational needs.

Our Analysis

The lands and waters proposed for removal are primarily forested lands, are not affected by project operation, and not needed for project purposes. There is no evidence from the FERC Form 80 filings suggesting that existing recreation sites are either at, or nearing capacity. Also, White Pine Hydro is proposing recreational enhancement measures, including constructing a boat launch. Therefore, their removal would not result in a change in the project's effect on environmental, recreational, or cultural resources. Removal of these lands would establish a new project boundary that would cover only those areas needed for project operation and maintenance and would remove those lands that are not needed for project purposes.

Recreation

FLOOD CHANNEL FLOW

White Pine Hydro proposes to continue to operate the project in run-of-river mode. Additionally, White Pine Hydro proposes to release a flow of 30 cfs, plus leakage, for a total of 50 cfs, into the project's approximate 500-foot-long flood channel. As discussed in detailed in section 3.3.1, *Aquatic Resources*, the proposed flow would enhance aquatic habitat for brown trout and provide enhanced flows for angling. The flow release would extend from May 1 through Columbus Day weekend, though White Pine Hydro is amenable to extending the period through the open water period[150] in southern Maine (*i.e.*, generally through November 30).[151] Maine DMR recommends White Pine Hydro's proposal, while FWS recommends a year-round channel flow of 50 cfs, and Maine DIFW recommends a year-round 90-cfs flow release in the flood channel.

[148] *See* White Pine Hydro's July 28, 2016 AIR response.

[149] *See* White Pine Hydro's February 2, 2017 response to agencies' terms and conditions.

[150] The general open water period is reflective of the time when water is mainly free from ice.

[151] *See* White Pine Hydro's February 2, 2017 Filing.

Our Analysis

Continuing operating the project in run-of-river mode would have no effect on existing recreation opportunities at the project. White Pine Hydro's proposed 30-cfs flow release would provide enhance angling opportunities for brown trout and other cool-water species in the approximate 500-foot-long flood channel, with additional increases commensurate with the flow provided, from 30 up to 90 cfs. This is evident from the findings of the flow demonstration study conducted in 2013 (*see* section 3.3.1, *Aquatic Resources)*. The transect data from the study shows that most gains in habitat suitability are achieved between gate settings of 30 to 60 cfs. However, a flow release of 90 cfs provides additional side channel habitat, holding areas, and wading opportunities. Flow releases above 90 cfs (*e.g.*, 120 cfs) become unsafe for wading, which would not meet Maine DIFW's management objective for the channel.

Based on our review, we identified an alternative to the proposed and recommended flows: a flow release of 60 cfs to the flood channel, from May 1 through November 30 (or sooner if ice conditions warrant closing the flood gate earlier). With regard to the seasonality component, extending the time period (from May 1 through November 30) would provide additional recreation days at the project. Releasing the seasonal 60-cfs flow to the flood channel would provide angling opportunities for resident trout, while also allowing the resource agencies and White Pine Hydro to pursue fish restoration goals for migratory fish species on the Saco River, in accordance with the 2007 Fisheries Agreement (*i.e.*, developing fish passage facilities on the opposite side of the river). Flow releases of less than 60 cfs would allow only pockets of water to form between boulders in the flood channel, which would hamper fishing. However, flow releases of 60 cfs or more would result in a substantial amount of the boulders being submerged, which would provide an easier fishing experience for the average angler.

RECREATION FACILITIES MANAGEMENT PLAN (RECREATION PLAN)

In developing its preliminary licensing proposal, White Pine Hydro prepared a draft Recreation Plan. Maine DIFW, in its comments on the preliminary licensing proposal, requested that White Pine Hydro consult with them and seek concurrence on the final plan for new recreation facilities.[152] Notwithstanding this request, White Pine Hydro included the draft Recreation Plan as part of the final license application. As a result, staff requested that White Pine Hydro further consult with Maine DIFW to prepare

[152] *See* Maine DIFW's October 5, 2015 Filing.

a final Recreation Plan.[153] After meeting with Maine DIFW representatives on site, White Pine Hydro filed its final Recreation Plan August 18, 2016.

White Pine Hydro proposes to implement the final Recreation Plan. This plan includes its proposed recreation enhancement measures (*see* Figure 7), and addresses maintenance and operations of project recreation sites over the term of a license to address management and operation of existing project recreation sites.

As explained more fully below, the plan includes: (1) constructing a project boat launch facility on the western shore of the project that would consist of a 100-foot-long by 35-foot-wide parking area and 160-foot-long access road; (2) making changes to the existing informal angler access trail for safety reasons by installing a staircase, signs, railings and other safety measures; (3) improving and maintaining the current canoe tailwater access as an access point on the east side of the Saco River, for fishing and non-motorized boating, including stairs, stabilization of existing bank erosion, and improvements to the existing parking area; and (4) improving the canoe impoundment take-out by adding stone stairs and clearing vegetation to improve canoe take-out.

The Recreation Plan also provides for the use of BMPs during construction, and routinely maintain the facilities, including litter clean-up and lawn mowing. Finally, under the plan, White Pine Hydro would evaluate the need for additional access or improvements to existing recreation facilities via the FERC Form 80 process, if the process finds that an existing site has reached capacity. Any proposed modification to the Recreation Plan would be submitted to appropriate agencies for review and comment prior to filing with the Commission.

Boat Launch

White Pine Hydro proposes to construct and maintain a boat launch facility (*see* Figure 8) on the western shore of the project, about 1,000 feet upstream of West Buxton Dam. The launch would serve as the take-out for through boating. A 100-foot-long by 35-foot-wide parking area accommodating four small trailered rigs would also be constructed. The approximately 160-foot-long gravel drive leading to the launch, the turnaround and the parking area would be composed of gravel, with concrete planks being used for the launch.

White Pine Hydro proposes to use several measures to lessen the effect of constructing the boat launch. Construction of the boat launch would include appropriate erosion and sedimentation control measures, including a pre-construction topographic

[153] *See* Commission staff's request for additional information issued April 26, 2016.

survey, bank stabilization at the launch, stabilization of the access roadside slope, and seeding of the roadside slope. During construction, best management practices would be used, such as proper utilization of standard and water silt fencing, as appropriate. Temporary staging areas, if necessary, would be placed in upland areas to avoid or minimize potential wetland impacts.

Maine DEP agrees that the proposed motorized boat launch on the western shore would provide sufficient project access. Interior supports and encourages efforts to create additional access to the Saco River, stating that lack of suitable access is an issue.

Angler Access Trail

White Pine Hydro proposes to make several improvements to the informal angler access trail (*see* Figure 9), including: (1) installing a staircase to access Project waters; (2) installing safety and erosion mitigation devices; (3) restricting access to the areas immediately below the project flood gate and stanchion sections; and (4) clearing a parking area. Maine DEP agrees that the proposed angler access trail will provide sufficient public access.

Canoe Impoundment Take-Out

In the Final License Application, page E-4-97, White Pine Hydro proposed to close the eastern shore impoundment take-out. However, White Pine Hydro modified its proposal for the canoe takeout located on the eastern shore of the impoundment after filing its final license application.[154] The licensee now proposes to relocate the existing canoe take-out (*see* Figure 10) approximately 10 feet upstream of its current location and add stone stairs to improve paddler egress, and also clear vegetation to support the improved take-out.

Maine DEP states that the proposed east bank recreation measures would help provide sufficient project access to allow more recreation, including fishing.[155] In addition, Maine DIFW has been actively engaged in consultation with White Pine Hydro regarding the existing and proposed sites, and provided feedback to help ensure that the proposed facilities would meet the needs of recreationists who would be using the facilities.

[154] *See* White Pine Hydro's Final Recreation Facilities Management Plan (page 2) filed August 18, 2016.

[155] *See* Maine DEP's November 17, 2016 Filing.

Canoe Tailwater Access

White Pine Hydro proposes to continue to operate and maintain the tailwater (put-in) area as an access point *(see* Figure 11) to the east bank of the Saco River downstream from the dam for fishing and non-motorized boating. Planned improvements include the installation of stairs, stabilization of existing bank erosion, and improving the existing parking area. The parking area for two vehicles would remain, but the elevation of the parking area would be raised to reduce the amount of runoff affecting it. Maine DEP agrees that the proposed east bank recreation measures would help provide sufficient project access to allow more recreation, including fishing.[156]

Our Analysis

There are currently two formal recreation access sites that are part of the West Buxton Project; the canoe tailwater access site with parking for two vehicles and the canoe impoundment take-out site. These two sites provide important public access to the project, and should continue to be operated and maintained under a new license.

The proposed improvements to the two existing recreation sites, which were developed in consultation with Maine DIFW, would ensure that the sites are safe and adequate for use by recreationists. In addition, the two new recreation sites (the boat launch on the impoundment and the angler access trail) should be included in the license as project recreation sites, as doing so would ensure that the facilities are constructed, operated, and maintained as project recreation sites over the term of any new license issued for the project. The construction of these amenities, along with the existing amenities, would provide for a varied array of recreation facilities and experiences at the West Buxton Project. Finally, implementing the proposed Recreation Plan, with the modifications discussed in sections 3.3.2, *Terrestrial Resources*, and 3.3.3, *Threatened and Endangered Species*, would ensure that existing and new facilities are properly constructed and maintained in a way that minimizes effects on existing natural resources.

BOAT LAUNCH – The only existing option for boat access to the impoundment is the canoe tailwater access site, which allows for hand-carry boats only by way of a trail. The proposed boat launch facility would provide better access to the impoundment and allow for easier launching for vehicles with trailers.

The proposed boat launch facility crosses a wetland. To reduce potential effects of constructing the boat launch on the wetland and other terrestrial habitats, White Pine Hydro proposes several measures to reduce the effect of constructing the boat launch and access drive on the wetland and other terrestrial habitats through the of the construction-

[156] *Id.*

related BMPs included in the Recreation Plan. However, as discussed in sections 3.3.2, *Terrestrial Resources*, and 3.3.3, *Threatened and Endangered Species*, additional measures could be implemented to further minimize the spread of non-native invasive plants, maximize wildlife habitat within the project boundary, and minimize potential effects on native vegetation and wildlife, including federally listed species.

ANGLER ACCESS TRAIL – Currently, there are safety concerns with the existing angler access trail, including steep slopes and natural surfaces. Improving the angler access trail would provide a safer footing and more durable surface. Installing the staircase and railings would allow less erosion to take place than with a steep trail. Further, it would eliminate the potential of shortcutting switchbacks of a trail. Installing water diversion devices on the steeper areas and using gravel where necessary on the trail base, as proposed, would also lessen the potential for erosion. Also, clearing the area adjacent to that which is currently used for parking to allow for parking of three vehicles would allow for increased access.

CANOE TAILWATER ACCESS – White Pine Hydro's proposed measures to alleviate runoff, install stairs, and stabilize erosion would allow for this access area to be more effectively used by the public. Specifically, the addition of stairs would provide for an easier canoe put-in.

CANOE IMPOUNDMENT TAKE-OUT – White Pine Hydro's proposed measures, including relocating the take-out 10 feet upstream, installing stone steps, and clearing a small amount of vegetation along the eastern wing wall would allow for this currently overgrown site to potentially attract more users.

CONSTRUCTION BMPS AND ADDITIONAL MEASURES – White Pine Hydro proposes several strategies to reduce the effect of the proposed improvements to, and construction of, the existing and proposed recreation facility improvements. Such measures include use of best management practices, such as using silt fencing during construction. However, implementing additional measures, such as those discussed in sections 3.3.2, *Terrestrial Resources*, and 3.3.3, *Threatened and Endangered Species*, would further assist White Pine Hydro in protecting wetlands and terrestrial habitats, as well as the wildlife that use these habitats.

SIGNAGE – Implementing the measures discussed in section 3.3.2, *Terrestrial Resources*, would help White Pine Hydro educate the public and recreation users on the benefits of limiting the spread of detrimental plant species in the project area.

REVIEW AND UPDATE PROCEDURES – Monitoring recreation use would provide White Pine Hydro a means of assessing future recreation needs at the project. While the Recreation Plan provides for periodic monitoring of recreational use, and determining the need for additional facilities in the future, monitoring and submission of a report every

6 years would help ensure that the facilities are able to keep up with potential demand. The report should assess each site for its ability to meet user demands and needs.

EFFECTS OF CONSTRUCTION ON EXISTING USE

White Pine Hydro proposes to stagger the schedule for recreation facility construction and improvements to minimize effects of construction on existing recreation facilities. The improvements to the canoe tailwater access site and canoe impoundment take-out would be completed within one year of a license issuance. The project boat launch would be completed during the second full year following a license issuance. Improvements to the existing informal access trail on the west side of the impoundment would be completed within two years of a license issuance.

Our Analysis

Construction and modification of, and improvements to, the proposed and existing project recreation sites would mean that some sites, and associated amenities, would be closed at times. Closures due to project construction could increase demand at other nearby sites. The number of visitors affected by the proposed measures is relatively low when compared to the capacities of these and nearby recreation sites. However, construction, modification of, and improvements to, the recreation sites should take place during off-peak times to minimize disruption.

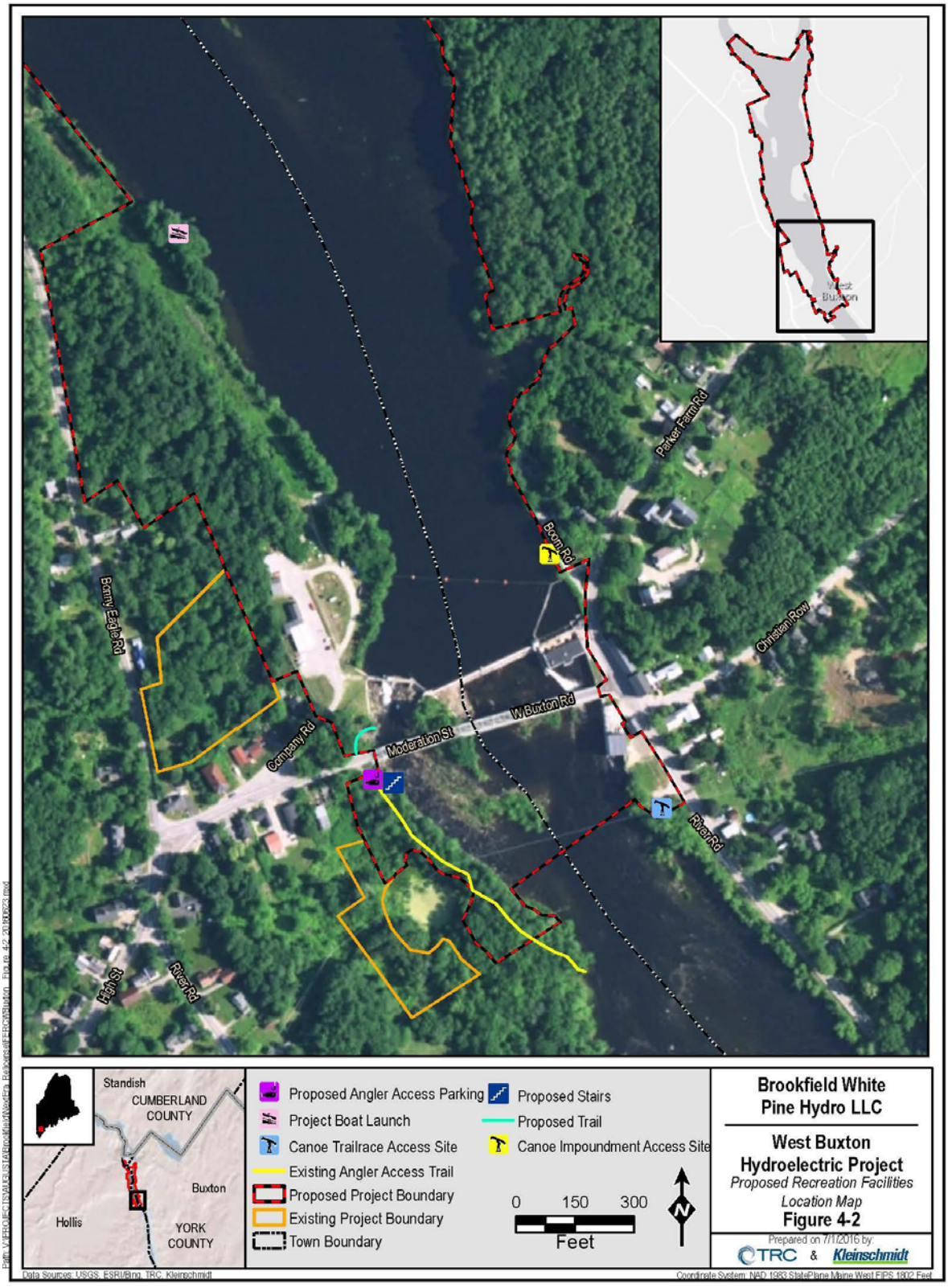

Figure 7. Proposed recreation facilities location map. (Source: White Pine Hydro, 2015).

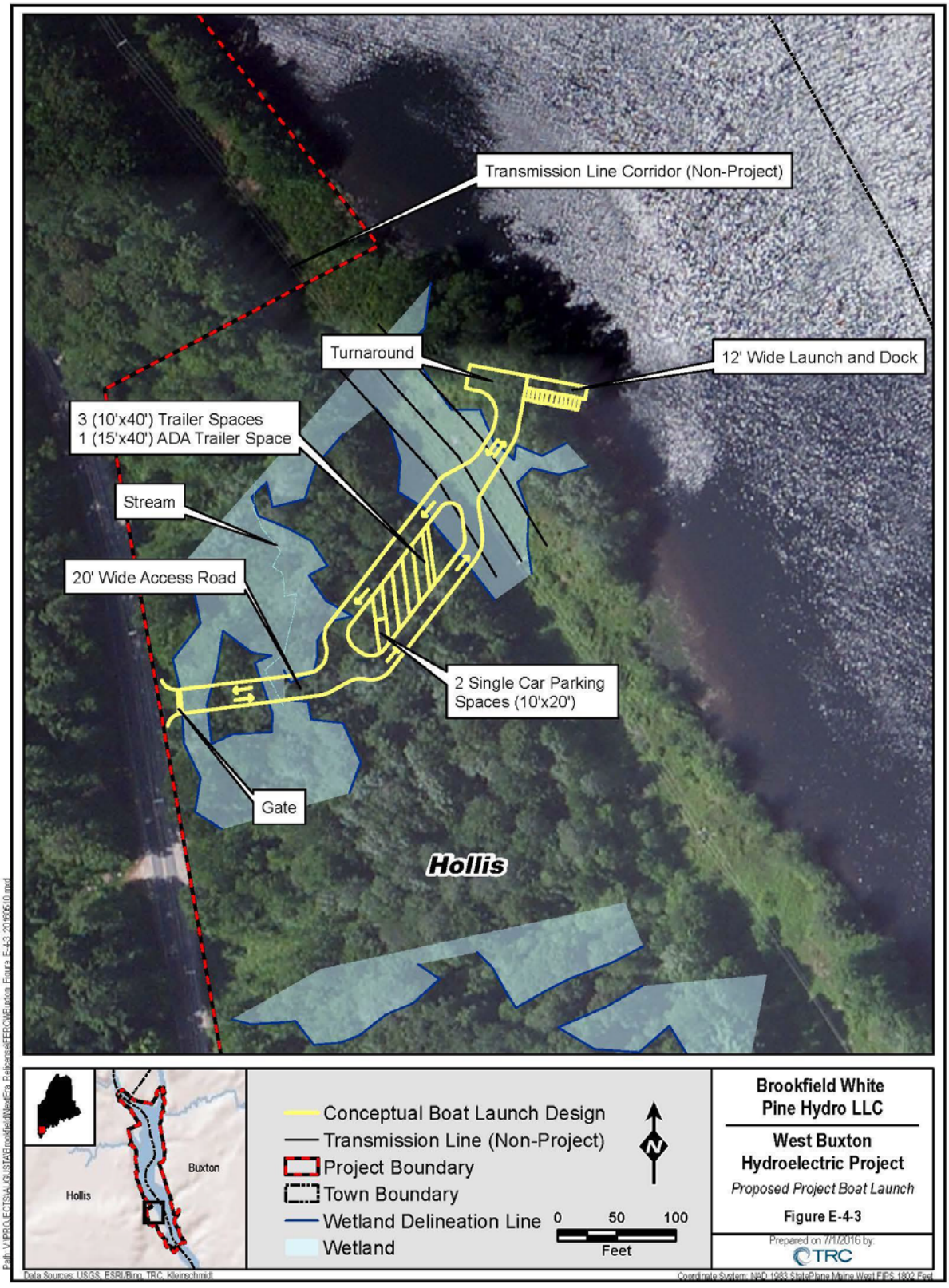

Figure 8. Proposed project boat launch. (Source: White Pine Hydro, 2015).

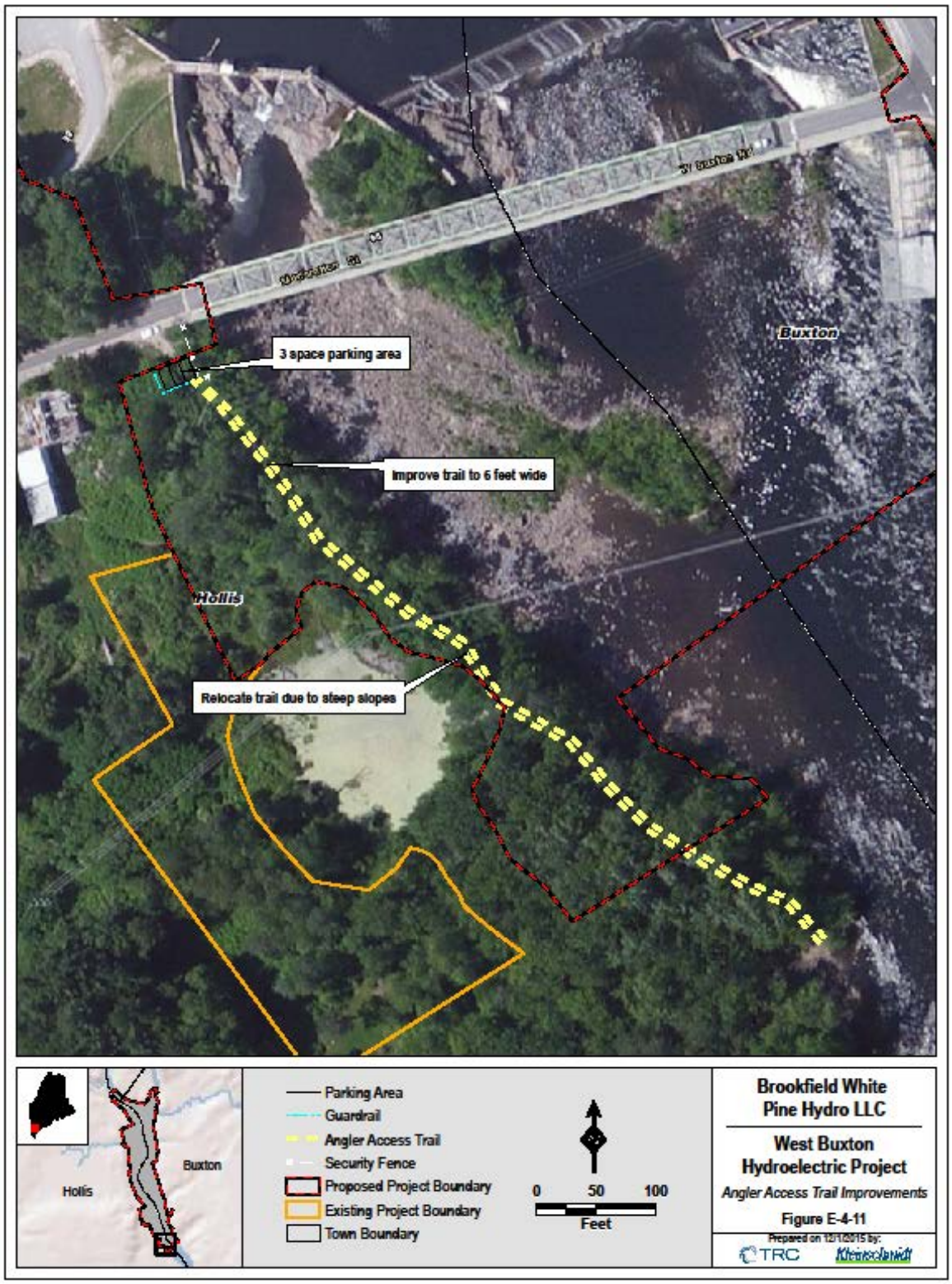

Figure 9. Proposed angler access trail improvements. (Source: White Pine Hydro, 2015).

Figure 10. Proposed canoe take-out improvements. (Source: White Pine Hydro, 2015).

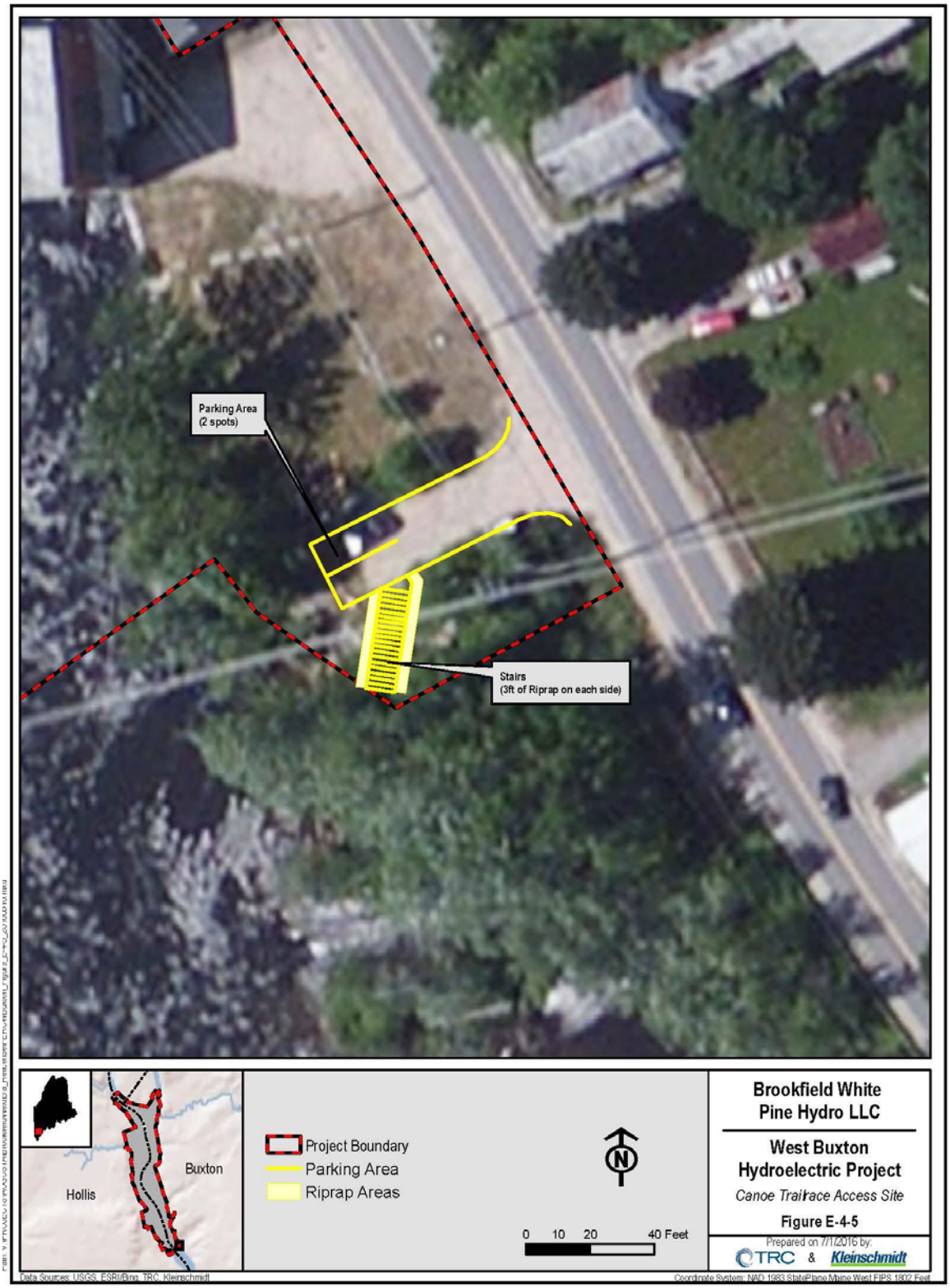

Figure 11. Proposed tailwater access site improvements. (Source: White Pine Hydro, 2015).

3.3.5 Cultural Resources

3.3.5.1 **Affected Environment**

Section 106 of the NHPA requires the Commission to evaluate potential effects on properties listed or eligible for listing in the National Register prior to an undertaking. In this case, the undertaking is the issuance of a new license for the proposed project. Project-related effects associated with this undertaking include those effects associated with the day-to-day operation and maintenance of the project after issuance of a license.[157] Section 106 also requires that the Commission seek concurrence with the Maine SHPO on any finding involving effects or no effects on historic properties and allow the Advisory Council on Historic Preservation (Advisory Council) an opportunity to comment on any finding of effects on historic properties. If Native American properties have been identified, section 106 requires that the Commission consult with interested Native American tribes that might attach religious or cultural significance to such properties.

On October 1, 2012, the Commission designated FPL Energy, White Pine Hydro's predecessor, as the non-federal representative for carrying out day-to-day consultation regarding the licensing efforts pursuant to section 106 of the NHPA. However, the Commission remains responsible for all findings and determinations regarding the effects of the proposed project on any historic property, pursuant to section 106.

Area of Potential Effects

Pursuant to section 106, the Commission must take into account whether any historic property located within the proposed project's APE could be affected by the issuance of a license for the project. The Advisory Council on Historic Preservation defines an 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.[158] The APE encompasses the likely extent of project construction and

[157] Relicensing the West Buxton Project involves construction of upstream fish passage at the project dam, in accordance with the 2007 Fisheries Agreement, which may result in future modifications to the dam. The HPMP, filed July 28, 2016, stipulates that White Pine Hydro consult with the Maine SHPO prior to any construction activities that have the potential to adversely affect historic properties, which would address any potential affects this activity may have on historic project structures.

[158] *See* 36 C.F.R. Section 800.16(d) (2014).

operations as well as project-related environmental measures that could be undertaken during the term of any license issued for the proposed project.

The APE for archaeological resources for the project includes: lands enclosed within the project boundary and/or lands located within 50 feet (15 meters) of the edge of the river bank, whichever is the greater of the two areas. The APE for architectural resources includes the lands enclosed by the project boundary and lands or properties outside of the project boundary where project construction and operation or project-related recreational development or other enhancements may cause changes in the character or use of historic properties, if any historic properties exist. By letter dated June 12, 2014,[159] the Maine SHPO concurred with the definition of the project's APE.

Cultural History Overview

Prehistoric occupation of the West Buxton Project may be divided into three major temporal periods: (1) the Paleoindian period (prior to 7,500 B.C.); (2) the Archaic period (7,500-1,000 B.C.); and (3) the Ceramic period (1,000 B.C.-1550 A.D.). The period following the Late Ceramic Period is known as the Contact Period (1550-1750).

The Paleoindian period is characterized by highly mobile bands of hunter-gatherers who rapidly colonized the continent. These were the earliest prehistoric inhabitants in the region, as well as throughout North America. The Paleoindians are known for their wide use of the fluted spear point, which was presumably used to hunt large game species. Archaeological evidence indicates that during the later Paleoindian period, fluted spear points were replaced by smaller, unfluted points, as well as other point styles. The landscape in Maine during the Paleoindian period was still vegetated in tundra and/or woodlands.

The Archaic period represents the longest cultural period in the region. It is characterized by an eventual shift from the hunter-gatherer lifestyle to one with different settlement and subsistence patterns. This shift is shown by the presence of most sites along present-day water bodies, and the presence of food remains of aquatic species. By the Middle Archaic period, the first cemetery sites occur, revealing distinct mortuary practices.

The close of the Late Archaic period is characterized by an archaeological tradition known as the Susquehanna Tradition, which is widespread in Maine and New England. The people of this tradition appear to have been more focused on a terrestrial economy rather than a marine economy. Tool forms transitioned to large, broad-bladed chipped stone spear points from the small, unfluted points.

[159] *See* White Pine Hydro's Final HPMP, Appendix A filed July 28, 2016.

The Ceramic period is marked by the introduction of pottery manufacture and use in Maine. Known as the Woodland period in other parts of the Northeast, this cultural period began 3,000 years ago. Ceramics first appear in the archaeological record of Maine 3,000 years ago. They persist until contact with Europeans began, when clay pots were replaced in favor of iron and copper kettles that were traded for beaver pelts and other animal furs. Many Ceramic period sites exist in Maine, along both the coast and in the interior of the state. The Ceramic period ends with European contact around 450 years ago. Most of the artifacts attributable to prehistoric inhabitants of Maine disappear from the archaeological record at this time.

Historic Period

European fishermen began visiting the east coast of the Maritime Provinces shortly after 1500 A.D., but Europeans probably did not have regular contact with the inhabitants of the Gulf of Maine coast until 1600. The first permanent European settlement in the Gulf of Maine occurred in 1604 on St. Croix Island by the French. The Native American inhabitants of the St. Croix River drainage were referred to by the early French colonists as the Etchemin, considered to be the ancestors of the modern Passamaquoddy, Maliseet and, possibly, Penobscot, and the Souriquois, the ancestors of the modern Mi'kmaq. To the west of the Etchemin lands lived a people referred to by the Souriquois as the Almouchiquois, who cultivated crops for subsistence.

French explorer Samuel de Champlain anchored at the mouth of the Saco River and met with Native Americans in 1605. Captain John Smith visited Maine's coast in 1614 and encouraged European settlement. Following initial contact with Europeans, plagues swept through Native villages, killing over 75 percent of inhabitants. Many wars between Europeans and Native Americans occurred during the century before the American Revolution. Disputes occurred over control of land, resources, and territories as European nations tried to expand their power in the region.

European settlements first appeared on the Saco River north of Biddeford in the 1760s, when European explorers first arrived in the central Maine region, in the form of surveyors from Massachusetts who sought to map what was then the northern reaches of their colony. The transitory visitors were replaced by more permanent settlers in the years after the War of 1812. Maine separated from Massachusetts in 1820 and became a state.

Buxton was incorporated in 1772 by Governor Thomas Hutchinson. The town functioned as an industrial mill town throughout much of the nineteenth and early twentieth centuries. Early industries in the area included sawmills and gristmills on the Saco River. In the 1800s, West Buxton was home to a lumber mill that manufactured about 7,000,000 feet of lumber annually. Construction of a hydroelectric dam was completed in West Buxton in 1907. It was one of several dams on the Saco River

constructed to generate electricity for the growing communities. The construction of West Buxton Dam led to the dismantling of several mill buildings just north of the dam. A major flood in 1936 further shaped the surrounding area and potentially demolished historic resources.

Prehistoric and Historic Archaeological Resources

White Pine Hydro conducted a Phase I archaeological survey in 2013 (Moore and Will, 2013; Moore, 2014) for the proposed project. Phase I testing included a walkover inspection and subsurface testing in 12 areas previously identified as sensitive for precontact period resources. One precontact period site (007.067) was identified: a small campsite which produced debitage[160] and fire-cracked rock. Site files maintained by the Maine SHPO shows there to be another precontact period site (007.003) is in the vicinity of the APE, but this site was not located during the Phase I survey.

Site 007.067 was recommended for a Phase II archaeological evaluation to determine its potential eligibility for listing in the National Register. Phase II testing was conducted at this site in October 2014. None of the recovered artifacts were attributable to a specific precontact period and no cultural features were discovered; therefore, the site does not meet eligibility criteria for National Register listing. The Maine SHPO concurred that site 007.067 is not eligible for listing in the National Register of Historic Places (NRHP).[161]

An architectural survey of the project's APE was conducted in June 2013, with follow-up work in 2014. The purpose of the survey was to identify historic resources within the project's APE currently listed on, or determined eligible for listing on, the NRHP. Based on a 1997-1998 survey of historic bridges conducted by the Maine Department of Transportation, the West Buxton Bridge over the Saco River has been determined to be eligible for inclusion in the NRHP by the Maine SHPO.

The 2013-2014 architectural survey recommended the West Buxton Project, including its contributing resources (upper and lower powerhouses, forebay, penstock, spillway, gate and stanchion section, and impoundment) as NRHP-eligible under

[160] Debitage is the waste material or debris made during the stone tool manufacturing process.

[161] *See* the Maine SHPO's April 21, 2015 Letter; filed with the Final HPMP (in Appendix A) on July 28, 2016.

Criterions A and C.[162] The survey also resulted in the identification of a National Register boundary for the West Buxton Project.

Traditional Cultural Properties

On September 11, 2012, staff established a consultation list in order to discuss project effects on cultural resources. The list was distributed to Aroostook Band of Micmacs, Houlton Band of Maliseet Indians, Passamaquoddy Tribe (Pleasant Point Reservation), Passamaquoddy Tribe (Indian Township), Penobscot Indian Nation, and the applicant. The tribes have not reported any known traditional cultural properties within any of the projects' APEs to date.

3.3.5.2 Environmental Effects

White Pine Hydro does not propose any changes to West Buxton Dam or to the operation of the project that would affect historic properties. Notwithstanding its relicensing proposal, White Pine Hydro filed an HPMP that would ensure that appropriate consultation occurs prior to any activity that could affect the historic properties in the APE. The HPMP describes the protection of the historic properties that have been listed or determined to be eligible for listing in the National Register, and includes provisions to address any historic properties discovered during the license term. The HPMP was prepared in consultation with the Maine SHPO.

By developing the HPMP in consultation with the Maine SHPO, White Pine Hydro has outlined its specific proposal for avoiding, minimizing or mitigating adverse effects to the sites and plans for implementing any necessary treatment measures if avoidance is not possible. Further, the HPMP reduces the need for consultation with the Maine SHPO in the future by providing a list of activities (*i.e.*, routine repair, maintenance, and replacement in-kind) that would not require consultation with the Maine SHPO because such activities would have little or no potential effect on historic properties. The HPMP also provides a description of the process for treatment of previously unidentified historic resources and properties discovered at the project during the term of a license, which involves consultation with the Maine SHPO.

[162] Criterion A is associated with those events that have made a significant contribution to the broad patterns of our history. Criterion C is associated with those qualities that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

The HPMP coordinates the management of historic properties with White Pine Hydro's management of recreational, ecological, and other resources associated with the project. In the event that the licensee proposes ground-disturbing activity that may have the potential to affect the lands that were unable to be tested, or otherwise potentially adversely affect historic properties, the licensee would consult with the Maine SHPO.

Our Analysis

Based on the studies conducted in 2013 and 2014, no precontact archaeological sites, one postcontact archaeological site, and two historic architectural resources were determined to be eligible for listing in the NRHP. In addition, there are two resources within the APE where there is insufficient data for a determination of eligibility. These five resources are addressed in the HPMP. The Maine SHPO indicates that the West Buxton Bridge and the West Buxton Hydroelectric Facility in the APE are eligible for listing in the NRHP.[163] The Maine SHPO also indicates that the relicensing the project would have no adverse effect on these eligible properties, because White Pine Hydro is not proposing any measures that would alter any historic properties in the project area. The Maine SHPO's finding, however, is conditional on White Pine Hydro developing an HPMP to protect the historic resources throughout the term of the license.

Staff concurs with the recommendations of the Maine SHPO that relicensing the project, with the proposed HPMP, would not adversely affect historic properties that are eligible for or listed on the National Register. In addition, the consultation provisions in the HPMP (with the Maine SHPO), where it concerns unanticipated discovery of historic resources and otherwise effects to historic properties at the project (*e.g.*, construction of a fish passage facility that may alter a known historic property), would ensure that such properties are adequately protected.

To meet the requirements of section 106, the Commission intends to execute a PA with the Maine SHPO for the proposed project for the protection of historic properties that would be affected by the construction and operation of the project. The terms of the PA would require White Pine Hydro to implement the HPMP filed on July 28, 2016 for the term of a license.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the project's use of the Saco River for hydropower purposes to see what effects various environmental measures would have on the project's

[163] *See* the Maine SHPO's June 12, 2015 Letter; filed with the Final HPMP (in Appendix A) on July 28, 2016.

costs and power generation. Under the Commission's approach to evaluating the economics of a hydropower project, as articulated in *Mead Corp*.,[164] 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.*, operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost for the project. If the difference between the cost of alternative power and total project cost is positive, the project helps to produce 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 helps to produce 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 11 summarizes the assumptions and economic information we use in our analysis for the project. This information was provided by White Pine Hydro in its license application or estimated by staff. We find that the values provided by White Pine Hydro are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs, net investment, estimated future capital investment required to maintain and extend the life of facilities, relicensing costs, normal operation and maintenance cost, and Commission fees.

[164] *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.

Table 11. Parameters for the economic analysis of the West Buxton Project (Source: White Pine Hydro, as modified by staff).

Parameters	Values (2017 dollars)	Sources
Period of analysis	30 years	Staff
Term of financing	20 years	Staff
Current Net Investment [a]	$5,157,200	White Pine Hydro
Current Annual Costs, Including O&M [b]	$410,060	White Pine Hydro
Relicense Application Costs [c]	$763,600	White Pine Hydro
Cost of Capital [d]	12 percent	White Pine Hydro
Discount Rate [e]	12 percent	Staff
Alternative Energy Rate [f]	$32.71/MWh	Staff

[a] Provided by White Pine Hydro in Exhibit D, section D2.2 filed December 18, 2015.
[b] Provided by White Pine Hydro in Exhibit D, section D4.4, filed December 18, 2015. The figure includes O&M expenses and local property and real estate taxes, but excludes income taxes, depreciation, and costs of financing, updated by staff to 2017 dollars.
[c] Provided by White Pine Hydro in Exhibit D, section D4.5, filed December 18, 2015.
[d] Provided by White Pine Hydro in Exhibit D, section D4.1, filed December 18, 2015.
[e] Provided by staff. Discount rate is considered equivalent to the cost of capital.
[f] Provided by staff. The alternative energy value is based on the EIA's projected price of natural gas energy for electric power production in New England for 2017.

4.2 COMPARISON OF ALTERNATIVES

Table 12 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: no-action, the applicant's proposal, and the staff alternative.

Table 12. Summary of the annual cost of alternative power and annual project cost for the three alternatives for the West Buxton Project. (Source: staff).

	No Action	White Pine Hydro's Proposal	Staff Alternative
Installed capacity (megawatts)	7.812	7.812	7.812
Annual generation (MWh)	34,007	33,827	33,544
Annual cost of alternative power ($ and $/MWh)[a]	$1,112,369 32.71	$1,106,481 32.71	$1,097,211 32.71
Annual project cost ($ and $/MWh)[b, c, d]	$410,060 12.06	$857,034 25.34	$871,654 25.99
Difference between the cost of alternative power and project cost ($ and $/MWh)	$702,309 20.65	$249,447 7.37	$225,557 6.72

[a] The annual cost of alternative power is derived from the total unit cost of producing electric energy from natural gas, obtained from the EIA natural gas energy prices for 2017, $32.71/MWh.

[b] The annual cost for the No Action alternative includes the average annual cost identified in Exhibit D, Section 4.0 of the Final License Application, updated to 2017 dollars.

[c] The annual cost for White Pine Hydro's Proposal includes the enhancement and mitigation measures proposed by White Pine Hydro.

[d] The annual cost of the Staff Alternative includes White Pine Hydro's proposed costs, plus staff's recommended additions, deletions, and modifications, as identified in Table 13.

4.2.1 No-Action Alternative

Under the no-action alternative, the project would continue to operate as it does now. The project would have an installed capacity of 7.812 MW, and generate an average of 34,007 MWh of electricity annually. The average annual cost of alternative power would be $1,112,369, or about $32.71/MWh. The average annual project cost would be $410,060, or about $12.06/MWh. Overall, the project would produce power at a cost that is $702,309 or $20.65/MWh, less than the cost of alternative power.

4.2.2 White Pine Hydro's Proposal

White Pine Hydro proposes to: (1) continue run-of-river operation and maintain the impoundment water surface within 1 foot, or less, below the normal pool elevation of 177.8 feet during normal operation; (2) continue to release a total project outflow of 768 cfs, or inflow, whichever is less, from the project to protect downstream fish and aquatic

resources; and (3) release a 30-cfs minimum flow to the flood channel from May 1 through Columbus Day weekend to enhance adult brown trout habitat and angling opportunities.

White Pine Hydro also proposes to: (1) finalize and implement the proposed operation monitoring plan to monitor compliance with project operation, including any minimum and flood channel flows and pond levels; (2) construct fish passage facilities at the project in accordance with the 2007 Fisheries Agreement that includes (a) schedules and processes for constructing facilities for Atlantic salmon, American shad, alewife, and American eel, and (b) post-construction effectiveness monitoring of all fish passage facilities; (3) implement the proposed Recreation Plan that provides for: (a) recreation improvements and the management of the project recreation facilities, including (i) improving an existing non-project angler access trail on the western shore of the Saco River downstream from West Buxton Dam with a staircase and safety measures, (ii) constructing a new public boat launch, upstream of West Buxton Dam, on the western shore of the project impoundment, (iii) improving the existing tailwater access on the eastern shore of the Saco River downstream from West Buxton Dam by adding a staircase, stabilizing existing bank erosion, and improving the existing parking area, and (iv) improving the existing canoe take-out on the eastern shore of the impoundment by relocating the take-out 10 feet upstream and adding stone steps; and (b) the evaluation of the need for additional access or for improvements to existing recreation facilities during the license term; (4) implement the proposed HPMP for the protection of cultural resources; and (5) remove 7.7 acres of land and water from the existing project boundary that do not serve a project purpose.

The project would have an installed capacity of 7.812 MW, and generate an average of 33,827 MWh of electricity annually. The average annual cost of alternative power would be $1,106,481, or about $32.71/MWh. The average annual project cost would be $857,034, or about $25.34/MWh. Overall, the project would produce power at a cost that is $249,447, or $7.37/MWh, less than the cost of alternative power.

4.2.3 Staff Alternative

Table 13 shows the staff recommended additions and modifications to White Pine Hydro's proposed environmental protection and enhancement measures and the estimated cost of each. Based on a total installed capacity of 7.812 MW and an average annual generation of 33,544 MWh, the cost of alternative power would be $1,097,211, or about $32.71/MWh. The average annual project cost would be $871,654, or about $25.99/MWh. Overall, the project would produce power at a cost that is $225,557, or about $6.72/MWh, less than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 13. Cost of environmental mitigation and enhancement measures considered in assessing the effects of operating the West Buxton Project. (Source: staff).

Enhancement/Mitigation Measures	Entity	Capital cost	Annual cost [a]	Levelized annual cost [b]
General				
Continue run-of-river operation, with daily impoundment fluctuations of 1 foot or less from the normal pool elevation of 177.8 feet during normal operation to protect downstream aquatic habitat.	White Pine Hydro, Interior, [c] NMFS, [c] Maine DIFW, Staff	$0	$0	$0
Consult with Maine DIFW prior to lowering the head pond for maintenance, repairs, or other planned/ scheduled activities to minimize effects on bass and other aquatic species.	Maine DIFW	$0	$0	$0
Aquatic Resources				
Continue to release a total project outflow of 768 cfs, or inflow, whichever is less, from the project to protect downstream fish and aquatic resources.	White Pine Hydro, Interior, NMFS, Staff	$0	$0	$0

Enhancement/Mitigation Measures	Entity	Capital cost	Annual cost [a]	Levelized annual cost [b]
Release a continuous 30-cfs flow to the flood channel from May 1 through Columbus Day weekend to enhance adult brown trout habitat and angling opportunities.[165]	White Pine Hydro, Maine DMR	$0	$9,285	$9,285
Release a continuous 60-cfs flow to the flood channel from May 1 through November 30, or earlier if ice conditions warrant, to enhance adult brown trout habitat and angling opportunities.[166]	Staff	$0	$23,905	$23,905
Maintain a year-round 50-cfs flow (continuous 30-cfs release, plus 20-cfs leakage) to the flood channel to enhance adult brown trout habitat and angling opportunities.	Interior	$0	$20,891	$20,891
Release a year-round, continuous 90-cfs flow to the flood channel to enhance adult brown trout habitat and angling opportunities.	Maine DIFW	$0	$56,948	$56,948
Implement the proposed Project Operation Monitoring Plan.	White Pine Hydro	$5,158	$5,158	$5,798

[165] *See* n. 28, *supra*.

[166] Staff estimates that extending the release of the 60-cfs flow to November 30 will cost an additional $5,180, or 100 MWh of seasonal generation.

Enhancement/Mitigation Measures	Entity	Capital cost	Annual cost [a]	Levelized annual cost [b]
Implement the proposed Project Operation Monitoring Plan with staff's recommended modifications	Staff	$5,158	$5,158	$5,798
Construct fish passage facilities at the project in accordance with the provisions of the 2007 Fisheries Agreement, which includes schedules and processes for constructing fish passage facilities, as well as post-construction effectiveness monitoring of all fish passage facilities.[167]	White Pine Hydro, Maine DMR, Interior, NMFS, Staff	$5,777,368 [d]	$46,425 [e] + $139,276 per year for 3 years [f]	$780,939
Recreation and Land Use Resources				
Remove 7.7 acres of land from the existing project boundary that do not serve a project purpose.	White Pine Hydro, Staff	$0	$0	$0 [g]
Continue to maintain and provide public access to existing recreation sites at the project.	White Pine Hydro, Staff	$0	$0	$0

[167] The downstream American eel passage operational date does not occur until September 1, 2028. Because the exact measures (operational or otherwise), and corresponding costs, for downstream eel passage are not presently known, the current levelized annual cost does not account for this future provision. Instead, staff has provided an estimated cost for turbine passage during the adult eel migration period, as the most likely measure, for the purposes of providing an idea of what downstream eel passage at the project might cost. The cost of seasonal nighttime turbine shutdowns (6 pm to 6 am) from September 1 through November 15 annually, would be approximately $115,808, or 3,540 MWh of seasonal generation.

Enhancement/Mitigation Measures	Entity	Capital cost	Annual cost [a]	Levelized annual cost [b]
Improve an existing non-project angler access trail on the western shore of the Saco River, downstream from West Buxton Dam, with a staircase and safety measures.	White Pine Hydro, Staff	$51,584	$15,475	$21,879
Construct a new public boat launch, upstream of West Buxton Dam, on the western shore of the project impoundment.	White Pine Hydro, Staff	$175,384	$0 [h]	$21,773
Improve the existing tailwater access to the eastern shore of the Saco River, downstream from West Buxton Dam, with the addition of a staircase, stabilization of existing bank erosion, and the improvement of the existing parking area.	White Pine Hydro, Staff	$36,109	$0 [h]	$4,483
Improve the existing canoe take-out on eastern shore of the project impoundment by relocating the take-out 10 feet upstream and installing stone steps.	White Pine Hydro, Staff	$5,158	$0	$0 [i]
Implement the proposed Recreation Plan.	White Pine Hydro, Staff	$15,475	$5,158	$7,079

Enhancement/Mitigation Measures	Entity	Capital cost	Annual cost [a]	Levelized annual cost [b]
Modify the Recreation Plan to include: (1) measures, to the extent feasible, to minimize the introduction or spread of non-native invasive aquatic and terrestrial vegetation during construction, operation, and maintenance of the project recreation sites;[168] and (2) limit tree removal and trimming associated with construction and non-emergency maintenance of the project recreation sites to August 1 through May 31.	Staff	$0 [j]	$0	$0
Cultural Resources				
Implement the proposed HPMP for the protection of cultural resources.	White Pine Hydro, Staff	$5,158	$5,158	$5,798

[a] Annual costs typically include operational and maintenance costs and any other costs which occur on a yearly basis.

[b] All capital and annual costs are converted to equal annual costs over a 30-year period to give a uniform basis for comparing all costs.

[c] The agencies' recommendations regarding run-of-river operation permits the impoundment elevation to be maintained within 1 foot of full pond. Therefore, we do not interpret their recommendation as requiring instantaneous run-of-river.

[d] Cost accounts for the upstream anadromous fish passage facility. The cost associated with upstream American eel passage is not included because the facility was authorized and built under the existing license.

[e] Annual O&M costs include $10,317 for the upstream American eel passage facility and $36,109 for the upstream anadromous fish passage facility.

[168] The specific measures would be developed in consultation with FWS, Maine DEP, Maine Department of Agriculture, Conservation, and Forestry (Maine DACF), and the Corps.

[f] Monitoring costs include $10,317 for the upstream American eel passage facility and $128,959 for the upstream anadromous fish passage facility.
[g] We assume the cost for this measure is included in the cost of the license application.
[h] Cost included with the $15,475 shown for the angler access trail improvements.
[i] We assume there is no cost to close the existing canoe take-out along the eastern shore of the project impoundment and the unused canoe portage trail.
[j] Staff assumes no cost for consulting with agencies in the development of the measures to minimize the introduction or spread of non-native invasive plants during construction, operation, and maintenance, or for the timing restriction for tree removal. However, there could be minor costs associated with implementing any measure identified to address the introduction or spread of invasive plant species.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for relicensing the 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 the project and our review of the environmental and economic effects of the proposed project and project alternatives, we selected the staff alternative as the preferred alternative. We recommend this alternative because: (1) issuing a major license for the project would allow White Pine Hydro to continue to operate its project as a dependable source of electrical energy; (2) the 7.812 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 and recommended measures would protect and enhance fish and wildlife resources and would improve public recreation opportunities at the project.

In the following section, we make recommendations as to which environmental measures proposed by White Pine Hydro or recommended by agencies should be included in any license issued for the project. In addition to White Pine Hydro's proposed environmental measures listed below, we recommend changes to White Pine

Hydro's flood channel flow proposal and certain modifications to the proposed Recreation Plan be included in any license issued for the project.

Measures Proposed by White Pine Hydro

Based on our environmental analysis of White Pine Hydro's proposal in section 3, and the costs presented in section 4, we conclude that the following environmental measures proposed by White Pine Hydro 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.

To protect or enhance aquatic habitat, fish, wildlife habitat, and recreation at the project, White Pine Hydro proposes to:

- Continue run-of-river operation, with daily impoundment fluctuations of 1 foot or less from the normal pool elevation of 177.8 feet during normal operation;

- Continue to release a total project outflow of 768 cfs, or inflow, whichever is less, downstream in the project tailwater (at the confluence of the Saco River and the project flood channel), as measured through generation flow records, flood gate settings, and fish passage facilities;

- Finalize the proposed operations monitoring plan for monitoring compliance with project operation, including any minimum and flood channel flows, and pond levels.

- Continue to implement the provisions of the 2007 Fisheries Agreement, which includes (a) schedules and processes for constructing fish passage facilities for Atlantic salmon, American shad, alewife, and American eel, and (b) post-construction effectiveness monitoring of all fish passage facilities;

- Implement the proposed recreation facilities management plan (Recreation Plan, which provides for: (1) recreation improvements and the management of the project recreation facilities, including (a) improving an existing non-project angler access trail on the western shore of the Saco River downstream from West Buxton Dam with a staircase and safety measures, (b) constructing a new public boat launch, upstream of West Buxton Dam, on the western shore of the project impoundment, (c) improving the existing tailwater access on the eastern shore of the Saco River downstream from West Buxton Dam by adding a staircase, stabilizing existing bank erosion, and improving the existing parking area, and (d) improving the existing canoe take-out on the eastern shore of the impoundment by relocating the take-out 10 feet upstream and

adding stone steps; and (2) the evaluation of the need for additional access or for improvements to existing recreation facilities during the license term;

- Implement the proposed HPMP for the protection of cultural resources; and

- Remove 7.7 acres of land from the existing project boundary that do not serve a project purpose.

5.1.1 Staff's Recommended Changes to White Pine Hydro's Proposal

We recommend White Pine Hydro's proposed measures above, as well as the additional staff-recommended measures listed below, be included in any new license issued for the West Buxton Project. The staff-recommended measures include modifying: (1) White Pine Hydro's flood channel flow proposal to release a continuous 60-cfs release from May 1 through November 30 (or earlier if ice conditions warrant closing the gate); (2) the proposed Project Operation Monitoring Plan to include a description of the licensed operational requirements and the curves and calculations for turbine and gate settings needed to monitor flows at the project (*i.e.*, converting kW to cfs and gate settings to cfs); and (3) the proposed Recreation Plan to include the following provisions to protect terrestrial resources during recreation site construction, operation, and maintenance:

- Include measures, to the extent feasible, to minimize the introduction or spread of non-native invasive aquatic and terrestrial vegetation during construction, operation, and maintenance of the project recreation sites; and

- Limit tree removal and trimming associated with construction of the project boat launch, the improvements to the angler access trail, and non-emergency vegetation maintenance to August 1 through May 31 to avoid potential effects to the northern long-eared bat during the maternity roosting/pup season.

We discuss our recommended changes to White Pine Hydro's proposal below.

Flood Channel Minimum Flow

The flood channel, which receives only leakage flow (about 20 cfs) under the existing license, is a man-made channel, about 500 feet in length that conveys flood flow releases from the stanchion section and flood gates (*see* figure 2). Substrate in the flood channel is composed of bedrock, boulder, and cobble, forming a riffle complex, which, along with cover conditions in the channel, is suitable habitat for adult brown trout. Because much of the lower Saco River is impounded by hydropower dams, the project's flood channel and tailwater offer unique habitat for trout management in southern Maine. To address public demand for trout fishing on the Saco River, Maine DIFW annually

stocks yearling brown trout downstream from West Buxton Dam and manages the fishery as a put-grow-and-take fishery.

Maine DIFW's fishery management objectives for the West Buxton Project are to provide a seasonal fishery for brook trout and a year-round fishery for brown trout that includes multiple age classes. Maine DIFW's trout management objectives are focused specifically on the flood channel because: (1) the configuration of the channel provides suitable salmonid habitat, wading characteristics, and adjacent access enhancement opportunities; (2) White Pine Hydro's public safety concerns associated with accessing other areas at the project; and (3) the focus of the main (east) channel is on developing upstream fish passage for migratory fish.

To address Maine DIFW's fishery management goals at the project, White Pine Hydro proposes to release, to the flood channel, a continuous 30-cfs flow from May 1 through Columbus Day weekend to enhance adult brown trout habitat and angling opportunities in the flood channel. Maine DMR (10(j) recommendation #5) recommends White Pine Hydro's proposed seasonal flow of 30 cfs, while FWS, through Interior (10(j) recommendation #4), recommends that White Pine Hydro provide a year-round continuous flow of 50 cfs (30-cfs release plus 20-cfs leakage) and Maine DIFW recommends that White Pine Hydro release a continuous 90-cfs to the flood channel year-round.

As noted above, the project's flood channel has the potential to support a managed sport fishery for primarily brown trout. To further its fishery management goals at the project, Maine DIFW, during the pre-filing licensing process, requested that White Pine Hydro conduct a flow demonstration study in the flood channel. The goal of the study was to conduct a semi-quantitative incremental flow evaluation of a series of flow releases downstream from the gate structure (leakage with no gate release, as well as gate releases of 30, 60, 90, and 120 cfs), with respect to (a) improving habitat for brown trout, and (b) improving accessibility to the reach for recreational anglers to effectively catch those trout (or making the reach more "cast-friendly").

The results of the flow study (*see* table 6) indicate that most gains in habitat suitability were achieved between gate releases of 30 to 60 cfs (total channel flow of 50 and 80 cfs, respectively). No additional gains in habitat suitability occurs above 90 cfs (total channel flow of 110 cfs) because increases in depth and wetted width are offset by increased velocities, which increasingly become unsuitable for adult brown trout. Specifically, leakage flow of 20 cfs provides about 68 percent of the available suitable habitat for brown trout, while White Pine Hydro's proposed flow release of 30 cfs provides 84 percent of the available brown trout habitat. Flow releases of 60, 90, and 120-cfs provide 95, 100, and 100 percent of the available brown trout habitat, respectively.

Any one of the flow releases evaluated would improve aquatic habitat in the flood channel. However, visual observations of the flow/habitat changes that occur with each of the flows evaluated suggest that flows above 60 cfs provide a number of biological benefits not provided by flows less than 60 cfs. For example, the length of the flood channel with suitable brown trout habitat increases by about 30 percent (from 300 to 500 feet) when flows are increased from 60 to 90 cfs, offering additional cool-water habitat. In addition to the benefits to trout habitat, flow releases of 60 and 90 cfs would enhance macroinvertebrate production in the channel (*i.e.*, forage for trout) because of additional wetted area provided by the higher flows.

With regard to Maine DIFW's goal of making the reach more "cast-friendly," White Pine Hydro did not include an appropriate metric as part of the flow study. Therefore, we used percent exposed substrate (rubble and boulder) to determine how easy it would be to fish the flood channel. Specifically, we reviewed the photographs of the study provided as part of the flow study report and estimated how much of the two transects consisted of exposed substrate at each release flow evaluated (*see* table 6).

The results of our review show that at leakage and White Pine Hydro's proposed flow release of 30 cfs, the transects are dominated with large, exposed boulders (50 to 60 percent of the transect) that would make it difficult to fish the reach. There would only be pocket-type water between the boulders, making it difficult to drift nymph or dry fly through the reach without the line getting snagged on an exposed boulder. With gate releases of 60 cfs and higher, a substantial amount of the boulders become submerged (20 to 30 percent exposed), and, thus, the obstructions are significantly reduced which makes the reach more fishable. While higher flows enhance the angling experience, flows above 90 cfs could reduce the ability of anglers to wade in the reach.

With regard to potential effects on migratory species, flow releases to the flood channel could affect upstream movement of American eels in the channel, by potentially affecting the amount of suitable wetted substrate available to upstream migrating eels that does not also have higher velocities that small eels typically avoid. However, there is no evidence in the record to suggest that the flow releases being considered in the flood channel, especially the lower flows of 30 and 60 cfs, would significantly affect, or otherwise restrict, upstream eel passage at West Buxton Dam. In addition, flow releases to the flood channel could potentially effect upstream migrating fish by creating a false attraction flow on the west side of the river to the flows needed to guide fish to the fish passage facilities on the east side of the river (150 to 250 cfs). Releases of flow in the lower range, 30 and 60 cfs, would minimize the probability of creating such a flow. Finally, additional flows in the flood channel could attract more downstream migrants to pass the project via the flood channel route. However, the potential for this occurring, as well as any injury or mortality to those fish that do use the flood channel, would be low due to the small amount of flow passing through the flood gate compared to other passage routes.

Based on our review of the demonstration flow study results and analysis of percent exposed substrate, as well as the comments and recommendations filed on the issue, we recommend that any license issued for the West Buxton Project included a requirement that White Pine Hydro release a minimum flow of 60 cfs to the flood channel. We also recommend that this flow be provided, seasonally, from May 1 through November 30 (ending earlier if ice conditions warrant closing the gate). We recommend this seasonal release, because: (1) fish and other aquatic life biologically do not need higher flows during the winter months to survive, as such organisms tend to exhibit reduced activity during this period; (2) Maine DIFW's management goals would remain achievable in the absence of a year-round flow, because the project tailwater (a river reach with high quality riffle, run, and riverine pool habitat) is contiguous to the flood channel and represents habitat that brown trout can use as over-wintering habitat; and (3) it reduces the potential for adverse effects on project features and public safety related to icing conditions.

We estimate the cost of providing White Pine Hydro's proposed, and Maine DMR's recommended, seasonal flow release of 30 cfs to be $9,285 annually. Interior's recommendation for 50 cfs (30 cfs release, plus 20 cfs leakage) year-round is estimated to cost $20,891 annually, while Maine DIFW's recommended year-round flow release of 90 cfs would cost an estimated $56,948. The benefits associated with Interior's and Maine DIFW's recommended flow releases are not commensurate with the costs to White Pine Hydro of providing the flows. Staff's recommended seasonal flow release of 60 cfs is estimated to cost $23,905, and the environmental and recreational benefits of providing this flow outweigh the additional cost of $14,620, annually, when compared to White Pine Hydro's proposed flow release.

Modifications to Project Operation Monitoring Plan

White Pine Hydro's proposed Project Operation Monitoring Plan filed with the license application generally describes the project, and consists of additional sections describing: (1) the operational requirements of the license; (2) project operation management under normal, flood, and low-flow conditions; (3) maintenance of routine operational data; (4) scheduled maintenance activities with consultation provisions; (5) unscheduled operation, along with notification provisions; (6) project operation monitoring procedures; and (7) reporting procedures. However, the proposed plan describes White Pine Hydro's proposed operational measures, as opposed to those required in a license (item 1 above), and does not include the curves and calculations for converting kW to cfs and gate settings to cfs (part item 6 above). To ensure compliance with the operational requirements of the license and facilitate the Commission's administration of the license, we recommend the proposed Project Operation Monitoring Plan be revised to include these modifications. Revising the plan, as discussed above, would have no additional cost to White Pine Hydro.

Modifications to the Recreation Management Plan

White Pine Hydro's proposed Recreation Plan contains provisions to minimize potential erosion and sedimentation and to maintain the sites throughout a new license term. Examples of the proposed measures include conducting pre-construction topographic surveys, as well as using standard BMPs during construction such as installing silt fences, stabilizing existing erosion sites, and re-grading and seeding slopes. Implementing these BMPs would minimize potential erosion and sedimentation during and after construction. The applicant also proposes to clean up litter and remove fallen trees during routine maintenance of the project recreation sites. Implementing these measures would help ensure cleanliness and safe access to the project recreation sites.

Non-Native Vegetation

The Recreation Plan does not contain measures to minimize the potential introduction and/or spread of both aquatic and terrestrial non-native invasive plants during the applicant's proposed construction and maintenance, as well as during operation of the project recreation sites. Non-native invasive plants that occur within the project boundary include an aquatic species called variable-leaf milfoil, and a number of terrestrial species, including Japanese knotweed, garlic mustard, and policeman's helmet. The seeds and/or fragments of these species can be spread on construction and maintenance equipment to uninfected areas within or outside of the project boundary. In addition, recreation activities can spread aquatic and terrestrial non-native invasive species via footwear, boats, canoes, and other recreation gear. Introduction or spread of these species would inhibit the growth of native plants and degrade the quality of the habitat for native wildlife.

To minimize these potential adverse effects to terrestrial resources, we recommend, to the extent feasible, that White Pine Hydro include additional measures to minimize the introduction or spread of non-native invasive aquatic and terrestrial vegetation during construction, operation, and maintenance of the project recreation sites. White Pine Hydro should consult with FWS, Maine DEP, Maine DACF, and the Corps to develop the specific measures, which could include provisions to: (1) identify, control, and/or monitor existing invasive plant populations; and (2) minimize the transport of invasive plant seeds and fragments during construction, operation, and maintenance of the project recreation sites as discussed in section 3.3.2, *Terrestrial Resources*. Implementing these types of measures as part of the revised Recreation Plan would minimize the introduction or spread of non-native invasive vegetation at project recreation sites during construction, operation, and maintenance of the project recreation sites.

Threatened and Endangered Species

The federally listed threatened northern long-eared bat may use forested areas within the project boundary during the summer for roosting and foraging. Limiting tree removal and trimming associated with the construction and maintenance of the project recreation sites to between August 1 and May 31 would minimize potential effects to the northern long-eared bat because it would avoid disturbance to potential maternity roost trees during the time when pups are incapable of flight (*i.e.*, June and July). With this restriction on the timing of tree removal and trimming, staff concludes that relicensing the project is not likely to adversely affect the northern long-eared bat and would not result in prohibited incidental take of this species.

The costs for: (1) consulting with resource agencies in the development of measures to minimize the introduction or spread of non-native invasive plants during construction, operation, and maintenance; and (2) restricting the time for tree removal, as part of the Recreation Plan, would be negligible. These measures are reasonable to minimize the potential effects of construction, operation, and maintenance of the West Buxton Project recreation sites on terrestrial resources, including federally listed species.

5.1.2 Measures Not Recommended

Fish Passage – Trap and Truck Operation

Maine DMR (10(j) recommendation #4) recommends that White Pine Hydro continue to trap-and-truck adult Atlantic salmon, alewife, and blueback herring at either the downstream Cataract or Skelton fish passage facilities, and transport these fish to areas in the river basin upstream of the West Buxton Project. This measure is consistent with provisions sections 5.3.c and 5.3.d of the 2007 Fisheries Agreement, and ensures that anadromous fish populations in the river will be maintained until spawning habitat in the river is fully accessible through permanent fish passage at each mainstream Saco River project. However, as presented in the 2007 Fisheries Agreement, the measure only applies to the Cataract and Skelton Projects, and Maine DMR's recommendation does not require the Commission to take any action at the West Buxton Project. The recommendation, then, lacks a nexus to any project effect, and is a measure to address a non-project effect related to White Pine Hydro's operation of its downstream Cataract and Skelton Projects. Therefore, we do not recommend the measure be included in any new license issued for the West Buxton Project.

5.1.3 Conclusion

Based on our review of the agency comments filed on the project and our independent analysis pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, we conclude that licensing the West Buxton Project, as proposed by White Pine Hydro with

the additional staff-recommended measures, would be best adapted to a plan for improving the Saco River Basin.

5.2 UNAVOIDABLE ADVERSE IMPACTS

Most adult fish could avoid involuntary entrainment, but entrainment of some small fish could still occur. Similarly, some entrainment mortality could occur for adult American eels migrating downstream until permanent downstream eel passage measures are implemented. Additionally, the project would continue to act as a barrier to upstream fish migration until upstream fish passage for Atlantic salmon, American shad, and alewife is constructed and operational in May 2019.

5.3 SUMMARY OF SECTION 10(j) 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 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 October 20, 2016, notice accepting the application to relicense the project and soliciting motions to intervene, protests, comments, recommendations, preliminary terms and conditions, and preliminary fishway prescriptions, Maine DMR, NMFS, and Interior, collectively, filed nine section 10(j) recommendations for the project.[169] We found all but two of the nine recommendations to be within the scope of 10(j). Of the seven section 10(j) recommendations, we recommend adopting five. Table 14 lists the recommendations filed pursuant to section 10(j), and indicates whether the recommendations are included under the staff alternative.

Section 5.1.1, *Additional Staff Recommended Measures*, discusses the reasons we do not recommend adopting two measures we determined are within the scope of section 10(j). Section 5.1.2, *Measures Not Adopted*, discusses our reasons for not adopting the measures we determined are not within the scope of 10(j).

[169] Maine DMR filed five 10(j) recommendations on December 12, 2016; NMFS filed two 10(j) recommendations on December 16, 2016; and Interior filed four 10(j) recommendations on December 19, 2016.

Table 14. Analysis of fish and wildlife agency recommendations for the West Buxton Project.

Recommendation	Agency	Within Scope of Section 10(j)	Levelized Annual Cost	Recommend Adopting?
Operate in a run-of-river mode, with daily impoundment fluctuations of 1 foot or less from the normal pool elevation of 177.8 feet during normal operation to protect downstream aquatic habitat.	Interior, NMFS	Yes.	$0	Yes.
Release a total minimum flow of 768 cfs, or inflow, whichever is less, from the project to protect downstream fish and aquatic resources.	Interior, NMFS, Maine DMR	Yes.	$0	Yes.
Determine instream flows from the West Buxton Project based on instream flows from the Bonny Eagle Project, as called for by paragraph 6 of the 1997 Flow Agreement (250 to 600 cfs, or inflow, whichever is less, depending on time of year); and potentially modify flow if agreement is modified or nullified.	Interior	Yes.	$0	Yes.
Release a continuous 30-cfs flow to the flood channel from May 1 through Columbus Day weekend to enhance adult brown trout habitat and angling opportunities.	Maine DMR	Yes.	$9,285	No.[a] (*see* section 5.1.1)
Maintain a year-round 50-cfs flow (continuous 30-cfs release, plus 20-cfs leakage) to the flood channel to enhance adult brown trout habitat and angling opportunities.	Interior	Yes.	$20,891	No.[a] (*see* section 5.1.1)
Install downstream American eel passage facility or implement downstream eel passage measures that are operational by September 1, 2028, and	Maine DMR	No.[b]	$115,808 [c]	Yes.

Recommendation	Agency	Within Scope of Section 10(j)	Levelized Annual Cost	Recommend Adopting?
implement interim measures in accordance with the provisions of the 2007 Fisheries Agreement.				
Install an upstream fish passage facility for anadromous fish species (Atlantic salmon, American shad, alewife, and blueback herring) that is operational by May 1, 2019, in accordance with the provisions of the 2007 Fisheries Agreement.	Maine DMR	Yes.	$717,224	Yes.
Implement the general fish passage provisions of the 2007 Fisheries Agreement, including (a) annual review and consultation requirements, (b) operational procedures, and (c) effectiveness studies.	Maine DMR	Yes.	$63,715	Yes.
Continue to trap adult Atlantic salmon, alewife, and blueback herring at the downstream Cataract or Skelton fishway, and transport those fish to release sites upstream of West Buxton, until such time as permanent fish passage is installed at the project.	Maine DMR	No.[d]	$0	No. (*see* section 5.1.2)

[a] Preliminary findings that recommendations found to be within the scope of section 10(j) are inconsistent with the comprehensive planning standard of section 10(a) of the FPA, including the equal consideration provision of section 4(e) of the FPA, are based on staff's determination that the costs of the measures outweigh the expected benefits.

[b] Fish and wildlife measure that cannot be defined until the occurrence of some future event.

[c] The downstream American eel passage operational date does not occur until September 1, 2028. Because the exact measures (operational or otherwise), and corresponding costs, for downstream eel passage are not presently known, staff estimates the cost of the most likely option at the project (*i.e.*, seasonal nighttime (6 pm to 6 am) turbine shutdowns from September 1 through November 15 annually) to be approximately $115,808, or 3,540 MWh of seasonal generation.

[d] Measure lacks a nexus to any project effect; and is a measure to address a non-project effect related to White Pine Hydro's operation of its downstream Cataract and Skelton Projects.

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 or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed 17 qualifying comprehensive plans that are applicable to the West Buxton Project, located in Maine. No inconsistencies were found.

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

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

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

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6.0 FINDING OF NO SIGNIFICANT IMPACT

If the West Buxton Project is issued a new license as proposed with the additional staff-recommended measures, the project would continue to operate while providing enhancements to aquatic and terrestrial resources, improvements to recreation facilities, and protection of cultural and historic resources in the project area.

Based on our independent analysis, we find that the issuance of a license for the West Buxton Project, with additional staff-recommended environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

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APPENDIX A

2007 FISH PASSAGE ASSESSMENT AGREEMENT

2.9 DISPUTE RESOLUTION

The Parties will endeavor to resolve in good faith any dispute that may arise in carrying out this Agreement, using a consensus process which may include meetings between the Parties with a facilitator. The intent of the Parties is to maintain the spirit of cooperation and understanding that led to this Agreement and the 1994 Agreement.

5.0 FISHERIES MANAGEMENT MEASURES

5.1 Provisions Relating to All Fish Passage Facilities Agreed to Herein

a. Design Review – Plans and designs for each permanent fish passage facility agreed to herein will be reviewed in accordance with Section 7 of the 1994 Agreement and the current FERC license requirements for each applicable Project.
b. Shakedown Period – Once each new fish passage facility is constructed under this Agreement, Licensee will operate each fish passage facility for a one-season "shakedown" period to ensure that it is generally operating as designed and to make minor adjustment to the facilities and operation. At the end of the shakedown period, Licensee shall have a licensed engineer certify that the facility is constructed and operating as designed in all material respects. Licensee will provide the USFWS, NMFS, MDMR and MASC as appropriate with a copy of the as-built fishway drawings as submitted to FERC, along with the licensed engineer's letter of certification. All design drawings or as-built drawings determined to be Critical Energy Infrastructure Information under FERC guidelines shall, if retained by the USFWS, NMFS, MDMR or MASC, be held as confidential files that are not available to the public without prior written authorization from Licensee, unless required to be released by operation of law.
c. Effectiveness Studies – Licensee agrees to conduct effectiveness studies following the shakedown period of all newly constructed or significantly modified permanent upstream and downstream fish passage facilities or measures required under this Agreement. In the event that the facilities or measures as initially implemented are not effectively passing the target species, Licensee agrees to make, in consultation with the USFWS, NMFS, MDMR and MASC, reasonable, cost-effective, adjustments to the facilities or measures in an effort to improve fish passage effectiveness. "Reasonable, cost-effective, adjustments" shall mean such adjustments to the facilities or measures, as

initially implemented, to improve the fish passage effectiveness towards desired levels, but in no event shall the aggregate cost of such adjustments exceed 5% of the initial capital cost of that fish passage facility or measure, or of the significant modification of an existing fish passage facility, as applicable. The "initial capital cost" will include capital costs expended on the fish passage facility or measure up to the date of certification. This provision shall not apply to the Springs and Bradbury fish passage facilities or measures, which are addressed separately herein.

All effectiveness studies of upstream fish passage facilities conducted pursuant to this Section shall use the following criteria:

- Study goals: Document upstream passage effectiveness of all newly constructed fishways at the Bar Mills, West Buxton, Bonny Eagle, and Hiram projects as applicable.
- Study initiation and duration: Studies will be initiated during the passage season following the facility shakedown period**,** and carried out for up to three years for each species. Initiation of studies for each species will depend in large part on the availability of suitable numbers and types of fish (i.e. that have been imprinted to move upstream of the project being studied).
- Study design: Details on the design of upstream passage effectiveness studies are to be determined through consultation between Licensee and the USFWS, NMFS, MDMR or MASC as appropriate.

d. Fishway Operating Procedures – Licensee will, in consultation with the USFWS, NMFS, MDMR and MASC, draft and maintain a standard set of written Fishway Operating Procedures for each of its Projects on the Saco River. These Fishway Operating Procedures will include general schedules for routine maintenance, procedures for routine operation, procedures for monitoring and reporting on the operation of each fish passage facility or measure, procedures for annual start-up and shut-down, and procedures for emergencies and Project outages significantly affecting fishway operations. Copies of these Fishway Operating Procedures, and any revisions made during the term of this Agreement, will be sent to the USFWS, NMFS, MDMR and MASC.

5.2 American Eel Management Measures

Licensee will provide permanent eel passage measures at its Saco River Projects according to the following schedule. The schedules set forth in this section for the development and implementation of upstream and downstream eel passage measures may be delayed following consultation with, and agreement by, the USFWS, NMFS, and MDMR that eels are not yet sufficiently abundant to require passage or to provide enough data to allow for a determination of the type or location of eel passage measures.

PROJECT	UPSTREAM EEL PASSAGE OPERATIONAL DATE[170]	DOWNSTREAM EEL PASSAGE OPERATIONAL DATE
Cataract – East and West Channel Dams	June 1, 2008	September 1, 2011
Cataract-Springs or Bradbury Dam	June 1, 2010	n/a
Skelton	June 1, 2012	September 1, 2024
Bar Mills	June 1, 2014	September 1, 2026
West Buxton	June 1, 2016	September 1, 2028
Bonny Eagle	June 1, 2018	September 1, 2030
Hiram	June 1, 2020	September 1, 2032

a. Upstream Eel Passage Measures

1. The Parties agree that an upstream eel passage facility will be required at only one location at each of the Projects, except at the Cataract Project where a facility may be required at both the West Channel Dam and East Channel Dam.
2. Licensee agrees to provide an upstream eel passage facility at either the Springs or Bradbury dam. Licensee may elect to either i) study, in consultation with the applicable Fishery Agencies, which dam is the most appropriate location for a facility, or ii) install an upstream facility at both dams.
3. In the year before initiation of an upstream eel passage facility at a Project, Licensee will conduct a study to establish where at the Project the passage should be located. Licensee will present the results of this study to USFWS, NMFS and MDMR and obtain their concurrence with the choice of location, which concurrence shall not be unreasonably withheld. If it is the consensus of USFWS, NMFS, and MDMR that insufficient numbers of eels are present to require a fishway or to determine the location of an upstream eel fishway, those agencies may elect to delay the requirement to install passage facilities until adequate numbers of eels are present or a fishway location can be determined.

[170] Annual installation and operation dates may be modified by Licensee based on river flows and the ability to safely access the site.

b. Downstream Eel Passage Measures

1. Licensee will provide engineering and /or operational plans for permanent downstream eel passage measures to MDMR, USFWS and NMFS for consultation by February 28 of the year in which downstream eel passage measures are scheduled at a given Project.
2. An efficiency goal of 90% has been targeted at each Project for permanent downstream eel passage measures, subject to confirmation through testing or other appropriate measures, that the goal is reasonably achievable and scientifically valid. This goal may be revised following consultation with and consensus by and between Licensee and the USFWS, NMFS and MDMR.
3. Interim Downstream Eel Passage Measures. If, in the interim period prior to implementing permanent downstream eel passage measures at the various projects, downstream eel passage measures are needed under certain circumstances at a specific Project to reduce significant adult eel mortality from downstream turbine passage, Licensee agrees to undertake the following measures during the passage season for that year, 1) open an existing fish sluice or other gate at the Project to provide an unimpeded passage route, and 2) reduce generation if necessary to reduce the calculated hydraulic approach velocity to the turbine intake(s), thereby reducing the potential for impingement or entrainment of eels. The implementation of these measures will be initiated as described below by the confirmed observation[171] of more than 50 adult eel mortalities per night at a given Project ("trigger number"). Subject to any license conditions, these measures will be implemented as follows:

   A. Licensee will routinely monitor the tailrace of one project from September 15 through November 15 annually for adult eel mortalities. The Skelton Project will initially serve as the indicator site for the Projects; routine monitoring will be instituted at Bar Mills and each subsequent upstream Project the 10th year after upstream eel passage has been installed at the subject Project.
   B. Routine monitoring will occur once per week at the applicable Project. The monitoring will consist of visual observations of the tailrace area conducted from the shore or from watercraft.
   C. Licensee will report any observed eel mortalities greater than the trigger number to the MDMR within 24 hours of the observation, or,

[171] If eel mortalities in excess of 50 per night at a Project are reported by others, then that observation must be confirmed by either MDMR or Licensee personnel before measures under the interim downstream passage protocol are required.

if on a weekend, by the next business day. Licensee will clear dead eels from the tailrace when practical and safe to do so.

D. If observed mortalities during the routine monitoring are greater than the trigger number, then the monitoring frequency at the affected Project tailrace will be increased to once per weekday and once per weekday monitoring will be initiated at the next upstream Project.

E. Subsequently, if additional observed eel mortalities at the Project:

   i. are less than the trigger number for 5 days, then routine weekly monitoring may resume.

   ii. continue to be greater than the trigger number, Licensee will implement controlled spillage at the subject Project by the 3rd night following the observation of the trigger number. Controlled spillage will consist of opening a gate to pass approximately 4% of actual turbine flow for up to eight hours per night (a lesser quantity or duration of spillage may be allowed based upon studies or a demonstration of effectiveness). The controlled spillage and weekday monitoring for the Project will continue for 5 nights.

F. If additional observed eel mortalities during the above 5-night spillage period:

   i. are less than the trigger number, then normal operation and weekly monitoring may be resumed on the 6th day.

   ii. continue to be greater than the trigger number, Licensee will continue the controlled spillage and will, by the 3rd night following the observation of the trigger number, implement reduced nighttime generation at the affected Project such that the calculated hydraulic approach velocity to the turbine intake(s) is approximately 2 feet per second (fps) or less during the controlled spillage hours. The controlled spillage, reduced generation and once per weekday monitoring for the Project will continue for 5 nights.

G. Subsequently, if daily monitoring continues to show eel mortalities greater than the trigger number at a Project, Licensee, USFWS, NMFS or MDMR may initiate discussions to define further cost effective interim measures for reducing adult eel mortality at that Project. These measures may include additional spillage or generation reductions. If the USFWS, NMFS or MDMR and Licensee cannot agree upon the implementation of additional interim measures, then they will follow the dispute resolution process of Section 2.9 of this Agreement.

H. In no case shall interim downstream passage measures be required at a particular Project for more than eight hours per night for more than two weeks per season.

I. The need for interim downstream monitoring and passage measures will cease at a given Project once permanent downstream eel passage is implemented at that Project.

J. The MDMR, USFWS, NMFS and Licensee may, by consensus, agree to modify the above interim protocol or measures.

4. Notwithstanding the above, the Parties agree that the only downstream eel passage measures required at Springs and Bradbury dams will be via routine gate operation or spillage.

5.3 Anadromous Fish Management Measures

In addition to the general requirements set forth in Section 5.1 above, the following are requirements specific to Atlantic salmon, American shad, alewife, and blueback herring.

a. Downstream Passage Measures at Hiram

1. Licensee shall not be required to institute any additional downstream fish passage measures at the Hiram Project until permanent downstream fish passage measures are operational at Hiram pursuant to this section.

2. Permanent downstream fish passage measures for Atlantic salmon (the only anadromous species needing downstream passage at the Hiram Project) shall be operational by the earlier of:

A. April 15 following two (2) years after Licensee receives written notification of the commencement of scheduled annual stocking of juvenile Atlantic salmon in the Saco River watershed above the Hiram Dam pursuant to a written agency-approved Atlantic salmon stocking program to be developed by USFWS, NMFS, MASC or New Hampshire Fish and Game Department, which establishes a stocking program to develop a permanent run of Atlantic salmon above Hiram, but in no case earlier than April 15, 2017; or

B. The operation of permanent upstream fish passage facilities for Atlantic salmon at the Hiram Project.

b. Permanent Upstream Passage Facilities

1. Licensee will provide a single permanent upstream anadromous fish passage facility at each of the Projects according to the following schedule. The schedules set forth in this section for the development and installation of upstream anadromous fish passage facilities may be delayed contingent upon the returning numbers of the target species, and following

consultation with, and agreement by, the USFWS, NMFS, MASC and MDMR as appropriate.

PROJECT	OPERATIONAL DATE
Bar Mills	May 1, 2016
West Buxton	May 1, 2019
Bonny Eagle	May 1, 2022
Hiram	May 1, 2025[172]

2. Licensee will, 18 months prior to the planned construction of each upstream passage facility, submit conceptual designs for approval by the USFWS, NMFS, MASC and MDMR, and will subsequently file functional design drawings with the Commission for approval. The Parties agree that the design goal for each of these facilities is that they be as effective at passing sufficient escapement numbers of the target species as a single standard Denil-type fishway. The approval by the USFWS, NMFS, MDMR and MASC of conceptual designs that meet this goal will not be unduly withheld. Any disputes over the conceptual designs will be resolved through the Section 2.9 dispute resolution process.
3. The Parties agree that Licensee will not be required to install more than one upstream fish passage facility at each of the Bar Mills, West Buxton, Bonny Eagle or Hiram Projects during the term of this Agreement.

c. Atlantic Salmon Management Measures

Licensee agrees to continue to trap adult Atlantic salmon at either the Cataract or Skelton fishway, and truck these fish to release sites in the Maine portion of the Saco River basin until such time as permanent upstream fish passage measures are operational at each of Licensee's Saco River projects (see Section 5.3.b.1. of this Agreement for operational dates). The release (location and numbers of fish) will be carried out in accordance with the annual operations plan developed through the SRCC planning process.

d. Alewife and Blueback Herring Management Measures

Licensee agrees to continue to trap adult alewife and blueback herring at either the Cataract or Skelton fishways, and truck these fish to release sites in river reaches below the Hiram Project until such time as permanent upstream passage measures are

[172] Provided that such facility is necessary based upon the status of salmon restoration at that time.

operational at the Bar Mills, West Buxton and Bonny Eagle projects (see Section 5.3.b.1. of this Agreement for operational dates). The release (location and numbers of fish) will be carried out in accordance with the annual operations plan developed through the SRCC planning process.

e. American Shad Management Measures

1. Licensee will attempt to improve American shad passage at the Springs Island Dam according to the following:

A. When adult shad returns at the Cataract fish passage facilities (East and West channels combined) reach 3,000 fish per year for two consecutive years, then Licensee will perform an engineering study design for facility and/or operational modifications to improve shad passage at Springs Island Dam.

B. When adult shad returns at the Cataract fish passage facilities (East and West channels combined) subsequently reach 5,000 fish per year for two consecutive years, then Licensee will implement the modifications within 2 years, or will implement the modifications in 2014 (to be operational in 2015), whichever is sooner, (In the latter case, the above study/design would be conducted in 2012.)

C. The modifications considered and agreed upon to attain effective passage for American shad may include facility modifications of the existing Springs/Bradbury Dam lock and lift systems and/or operational modifications.

2. If Licensee and the USFWS, NMFS and MDMR cannot agree by June 1, 2012 that the above measures provide effective[173] upstream passage for American shad, then Licensee agrees to install a single Denil-type fishway at the location of the Springs Island Dam fish lock and lift according to the schedule in 5.3.e.1., above, and in general accordance with the attached concept plan. *See* Attachment C.

3. The Parties agree that no additional anadromous fish passage facility or operational modifications beyond those agreed to above will be required at the Springs/Bradbury dams during the term of the this Agreement. If effectiveness testing of the Denil fishway demonstrates that the Springs Island dam is not passing shad effectively, then Licensee and the Parties agree that trap and truck operations will be used to supplement the above measures to pass additional shad past the Springs/Bradbury dams.

[173] For purposes of this Agreement, effective upstream passage is defined as allowing for sufficient upstream spawning escapement.

4. Licensee agrees to continue to trap adult American shad at either the Cataract or Skelton fishways, and truck these fish to release sites in river reaches below the Hiram Project until such time as permanent upstream passage measures are operational at the Bar Mills, West Buxton and Bonny Eagle projects (see Section 5.3.b.1. of this Agreement for operational dates). The release (location and numbers of fish) will be carried out in accordance with the annual operations plan developed through the SRCC planning process.

5.4 Studies

a. Licensee agrees to conduct a three-year study of Atlantic salmon kelts to determine/examine downstream passage routes at select Saco River sites.

- Phase one will be a desktop study to determine which Projects have the most potential to delay/affect kelt passage.
- Phase two will be to study the passage routes at no more than two selected Projects.
- The study will be conducted in the spring (3 months) using 20 to 30 fish per year and yield the equivalent information of a radio-telemetry study. The salmon kelts will be supplied by a federal hatchery at no cost to Licensee. If sufficient numbers of salmon kelt are not timely provided to Licensee at no cost, Licensee shall have no further obligation to undertake a kelt passage study until such time as a sufficient number of kelt are made available.

Licensee agrees to submit a draft study plan to the USFWS, NMFS, and MASC by April 2009, and to begin the study by spring 2010.

b. Licensee agrees to conduct a two-year semi-quantitative study of downstream passage effectiveness for clupeids (using, for example, standardized observations, video cameras and rotary screw traps, or similar methods) at the Cataract Dam, during the summers of 2007 and 2008. In the event of unusual environmental conditions, the USFWS, NMFS and MDMR in consultation with Licensee may agree to delay the study.[174]

[174] The purpose of the semi-quantitative studies of clupeid passage under this Agreement will be to document the general effectiveness of the fish passage measures but will not necessarily quantitatively measure the percentage or total numbers of fish passed. The studies will consider clupeids as a group of similar species.

c. Licensee agrees to conduct a two-year semi-quantitative study of downstream passage effectiveness for clupeids (using, for example, standardized observations, video cameras and rotary screw traps, or similar methods) at the Skelton Dam, during the summers of 2009 and 2010. In the event of unusual environmental conditions, the USFWS, NMFS and MDMR in consultation with Licensee may agree to delay the study.

d. Licensee agrees to conduct a two-year semi-quantitative study of downstream passage effectiveness for clupeids (using, for example, standardized observations, video cameras and rotary screw traps, or similar methods) sequentially at the Bar Mills, West Buxton, and Bonny Eagle projects beginning the year after 6 adult clupeids per acre of impoundment (approximately 1,580 fish at Bar Mills; 790 fish at West Buxton; and 2,080 fish at Bonny Eagle) are passed or stocked above the specific project. If the USFWS, NMFS and MDMR determine that the numbers of clupeids returning to the lower Saco River (Cataract and Skelton impoundments) during the planned study year are insufficient to stock those lower impoundments, then the studies anticipated in this section may be postponed upon mutual agreement between Licensee and the USFWS, NMFS and MDMR.

e. Licensee agrees to compile the existing studies of downstream anadromous fish passage effectiveness at each of the Projects into one compendium or summary report for submittal to the FAAC within two years of a Final FERC Order approving this Agreement becoming effective.

f. Licensee will conduct a three-year study of downstream eel migration timing and routes at the Cataract Project from 2008 through 2010.

g. All studies contemplated herein will be developed in consultation with NMFS, USFWS, MASC, MDIFW, or MDMR as applicable. Results will be submitted to FERC by Licensee after study completion; NMFS, USFWS, MASC, MDIFW, or MDMR as applicable will be asked for comment on the results, which comments will be submitted to FERC with the study results.

h. Licensee agrees to conduct an electro-fishing survey of smallmouth and largemouth bass populations in the West Buxton impoundment in 2007 and to provide standard bass population data to the MDIFW by March 31, 2008 before introduction of alewife into the impoundment or upstream waters occurs.[175]

[175] The sample data provided for each bass survey will include sample date and location, habitat type, sampling depth, gear type, time and duration of the sample and

i. Licensee agrees to conduct an electro-fishing survey of smallmouth and largemouth bass populations in the Bonny Eagle impoundment in 2008 and to provide standard bass population data to the MDIFW by March 31, 2009 before introduction of alewife into the impoundment or upstream waters occurs.

j. Licensee agrees to conduct an electro-fishing survey of smallmouth and largemouth bass populations in the Lake Arrowhead impoundment in 2009 and to provide standard bass population data to the MDIFW by March 31, 2010 before introduction of alewife into the impoundment occurs.

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prevailing weather conditions. The standard bass population data (population descriptive metrics) reported will include number of bass collected during the sampling, species (largemouth or smallmouth), catch per unit effort, weight and length, condition factor, and population age structure and growth rates using scale samples for all Age 1+ bass. Licensee will provide the USFWS, NMFS, MDMR, MASC and MDIFW with numeric abundance data for other species collected during the above bass population survey.

APPENDIX B

LICENSE CONDITIONS RECOMMENDED BY STAFF

In this section, we present draft license articles for staff-recommended measures:

Draft Article 001. *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 the provisions of the Commission's regulations in effect from time to time, to reimburse the United States for the cost of administration of Part 1 of the Federal Power Act. The authorized installed capacity for that purpose is 7.812 megawatts.

Draft Article 002. *Approved Exhibit F Drawings.* Within 45 days of the date of issuance of this license, as directed below, the licensee must file the approved exhibit F drawings in electronic file format on CD disks.

(a) Digital images of the approved exhibit F drawings must be prepared in electronic format. Prior to preparing each digital image, the FERC Project-Drawing Number (i.e., P-2531-1001 through P-2531-1007) must be shown in the margin below the title block of the approved drawing. The licensee must file two separate sets of Exhibit F drawings with the Secretary of the Commission, ATTN: OEP/DHAC. 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 file extension in the following format [P-2531-1001, F-1001, Description, MM-DD-YYYY.TIF]. All digital images of the exhibit drawings must meet the following format specification:

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

Draft Article 003. *Revised Exhibit G Drawings*. Within 90 days of the issuance date of this license, the licensee must file, for Commission approval, revised Exhibit G drawings enclosing within the project boundary all principal project works necessary for

operation and maintenance of the project, excluding the 7.7 acres of land proposed for removal and including all existing and new project recreation sites, as identified in Article XXX. The Exhibit G drawings must comply with sections 4.39 and 4.41 of the Commission's regulations.

Draft Article 004. *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 005. *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 006. *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 consult with the

Commission's Division of Dam Safety and Inspections – New York Regional Engineer. Consultation must allow sufficient review time for the Commission to ensure that the proposed work does not adversely affect the project works, dam safety, or project operation.

Draft Article 007. *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 008. *Cofferdam and Deep Excavation Construction Drawings*. Should construction require cofferdams or deep excavations, the licensee must: (1) have a Professional Engineer who is independent from the construction contractor, review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction; and (2) ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days before starting construction of any cofferdams or deep excavations, the licensee must 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 shall 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 009. *As-built Drawings.* Within 90 days of completion of construction of the facilities authorized by this license, including the upstream anadromous fish passage facility, the licensee must file for Commission approval, revised Exhibits A, F, and G, as applicable, to describe and show those project facilities as built. A courtesy copy must be filed with the Commission's Division of Dam Safety and Inspections (D2SI) – New York Regional Engineer, the Director, D2SI, and the Director, Division of Hydropower Administration and Compliance.

Draft Article 010. *Commission Approval, Filing Reports, Notification, and Filing of Amendments.*

(a) Resource Plan Requirements

Conditions found in Appendices X and X of this license require the licensee to prepare: (1) downstream American eel passage design plans (National Marine Fisheries Service [NMFS] and U.S. Fish and Wildlife Service [FWS] Condition 1.b); (2) upstream anadromous fish passage design(s) and plan(s) (NMFS and FWS Condition 2); (3) fish passage effectiveness studies (NMFS and FWS Condition 4.c); and (4) fish passage operation and maintenance plans (NMFS and FWS Condition 4.d) in consultation with NMFS, FWS, the Maine Department of Marine Resources (Maine DMR), and the Maine Atlantic Salmon Commission (Maine ASC). The conditions either do not provide for Commission approval or do not specify when the plan(s) would be filed with the Commission for approval. Therefore, the due date for filing each plan with the Commission is as specified below:

NMFS Fishway Prescription Condition No.	**FWS Fishway Prescription Condition No.**	**Plan Name**	**Due Date for Filing the Plan(s) with the Commission**
1.b	1.b	Downstream American eel fishway design plan	March 31, 2028
2	2	Upstream anadromous fishway final design plan(s)	January 31, 2018
4.c	4.c	Fishway effectiveness study plan(s) ➢ Upstream Anadromous Fishway ➢ Downstream American Eel Fishway	➢ January 31, 2020 ➢ March 31, 2020
4.d	4.d	Fishway operation and maintenance plan(s) ➢ Upstream Anadromous Fishway ➢ Downstream American Eel Fishway	➢ January 31, 2020 ➢ March 31, 2020

The licensee must include with each plan filed with the Commission documentation that the licensee developed the plan in consultation with NMFS, FWS, Maine DMR, and Maine ASC, and received approval from NMFS and FWS. Each such plan also must include a provision to file resulting reports with the Commission, as well as the appropriate agency or agencies. The Commission reserves the right to make

changes to any plan submitted. Upon Commission approval, the plan becomes a requirement of the license, and the licensee must implement the plan or changes in the project operation or facilities, including any changes required by the Commission.

(b) Requirement to File Reports

One National Marine Fisheries Service (NMFS) fishway prescription condition in Appendix X and one U.S. Fish and Wildlife Service (FWS) fishway prescription condition in Appendix X require the licensee to meet annually with NMFS, FWS, and Maine Department of Marine Resources and (a) review fish passage operational data from the previous year, (b) draft an annual fish passage report (*i.e.*, Saco River Diadromous Fish Passage Report), and (c) develop an operational plan for the upcoming year. Because this report relates to compliance with a requirement of this license, and may have a bearing on future actions, it must also be filed with the Commission for information purposes. The report is listed in the following table:

NMFS Fishway Prescription Condition No.	**FWS Fishway Prescription Condition No.**	**Description**	**Due Date for Filing the Report with the Commission**
4.d	4.d	Annual Saco River Diadromous Fish Passage Report	By March 31 of each year for the prior calendar year, beginning upon license issuance

The licensee must file with the Commission documentation of any consultation, and copies of any comments and recommendations made by any consulted entity in connection with the report. The Commission reserves the right to require changes to project operation or facilities based on the information contained in the report and any other available information.

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

Two National Marine Fisheries Service (NMFS) fishway prescription conditions in Appendix X and two U.S. Fish and Wildlife Service (FWS) fishway prescription conditions in Appendix X would allow the licensee to implement interim downstream American eel passage measures and modify the timing of seasonal fishway operations under certain conditions. The Commission must be notified as soon as possible in writing, but no later than 10 days after each such modification. Temporary modifications must not exceed 30 days. Any modification exceeding 30 days requires prior Commission approval.

NMFS Fishway Prescription Condition No.	FWS Fishway Prescription Condition No.	License Requirement
1.c	1.c	Interim downstream American eel passage measures
4.e	4.e	Timing of seasonal fishway operation

(d) Requirement to File Amendment Applications

Certain conditions of National Marine Fisheries Service's fish prescription in Appendix X and U.S. Fish and Wildlife Service's fishway prescription in Appendix X contemplate unspecified long-term changes to project operation or facilities for the purposes of complying with the agencies' fishway prescriptions or mitigating environmental impacts (*e.g.*, conditions 4.c of each fishway prescription requires fishway effectiveness monitoring and potential adjustments/changes to the facilities or measures). Such changes may not be implemented without prior Commission authorization granted after the filing of an application to amend the license.

Draft Article 011. *Project Operation and Impoundment Levels*. The licensee must operate the West Buxton Project in a run-of-river mode, where outflows approximate inflows to the project. The licensee must maintain the lake level within 1 foot, or less, below the normal full pool elevation of 177.8 feet United States Geological Survey datum.

Run-of-river operation and the lake level elevation may be temporarily modified by (a) if required by conditions beyond the control of the licensee, or (b) for short periods upon mutual agreement with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, the Maine Department of Environmental Protection, the Maine Department of Marine Resources, and the Maine Department of Inland Fisheries and Wildlife. If operations are so modified, the licensee must notify the Commission as soon as possible, but not later than 10 days after discovery of each such incident. Within 30 days of such notification, the licensee must file an incident report that, to the extent possible, identifies the cause, severity, and duration of the incident; any observed or reported adverse environmental impacts resulting from the incident; and includes operational data, any corrective measures implemented, and comments or correspondence, if any, received from the aforementioned agencies regarding the incident. Based on the report and the Commission's evaluation of the incident, the Commission reserves the right to require modifications to the project facilities and operations to prevent the incident from reoccurring.

Draft Article 012. *Project and Flood Channel Minimum Flows*. The licensee must release, from the project, a continuous, year-round minimum flow of 768 cubic feet per second (cfs), or inflow, whichever is less, downstream in the project tailwater (at the

confluence of the Saco River and the project flood channel), as measured through generation flow records, flood gate releases and fish passage facilities, to protect water quality and aquatic habitat in the Saco River. The total project outflow of 768 cfs must include a seasonal flow release of 60 cfs from May 1 through November 30 (or earlier if ice conditions warrant closing the flood gate) in the project's flood channel, to enhance adult brown trout habitat and angling opportunities in that reach.

The project and flood channel minimum flows may be temporarily modified by (a) approved maintenance activities, (b) if required by conditions beyond the control of the licensee, or (c) for short periods upon mutual agreement with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, the Maine Department of Environmental Protection, the Maine Department of Marine Resources, and the Maine Department of Inland Fisheries and Wildlife. If the project and flood channel minimum flows are so modified, the licensee must notify the Commission as soon as possible, but not later than 10 days after discovery of each such incident. Within 30 days of such notification, the licensee must file an incident report that, to the extent possible, identifies the cause, severity, and duration of the incident; any observed or reported adverse environmental impacts resulting from the incident; and includes operational data, any corrective measures implemented, and comments or correspondence, if any, received from the aforementioned agencies regarding the incident. Based on the report and the Commission's evaluation of the incident, the Commission reserves the right to require modifications to the project facilities and operations to ensure future compliance.

Draft Article 013. *Project Operation Monitoring Plan*. Within 90 days of license issuance, the licensee must file, with the Commission for approval, a revised Project Operation Monitoring Plan to ensure compliance with the operational requirements of the license. The plan must be based on, and include the provisions of, the proposed Project Operation Monitoring Plan, filed on December 18, 2015, as Appendix E-4 of the Final License Application, with, at a minimum, the following modifications:

1. Revise section 2.3 to reflect Article XXX (project operation and impoundment levels) and Article XXX (project and flood channel minimum flows) of this license; and

2. Include the curves and calculations used to convert kilowatt to cubic feet per second (cfs), and gate settings to cfs.

The revised Project Operation Monitoring Plan must be developed after consultation with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Maine Department of Environmental Protection, the Maine Department of Inland Fisheries and Wildlife, and the Maine Department of Marine Resources. The licensee must include with the plan an implementation schedule, documentation of consultation, copies of recommendations on the completed plan after it has been prepared

and provided to the agencies above, 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 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 014. *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 Secretaries of the Interior or Commerce pursuant to section 18 of the Federal Power Act.

Draft Article 015. *Upstream Eel Passage Operation, Maintenance, and Effectiveness Plan*. The Upstream Eel Passage Operation, Maintenance, and Effectiveness Plan, filed July 28, 2016 (*see* Attachment 1, Appendix B-2 of the filing at 39-44), is approved, and must be implemented according to the schedule included in the plan.

The approved Upstream Eel Passage Operation, Maintenance, and Effectiveness Plan must not be amended without prior Commission approval. The Commission reserves the right to make changes to the Upstream Eel Passage Operation, Maintenance, and Effectiveness Plan.

Draft Article 016. *Downstream Anadromous Fish Passage Operation and Maintenance Plan*. The Downstream Anadromous Fish Passage Operation and Maintenance Plan, filed July 28, 2016 (*see* Attachment 1, Appendix B-1 of the filing at 33-38), is approved, and must be implemented according to the schedule included in the plan.

The approved Downstream Anadromous Fish Passage Operation and Maintenance Plan must not be amended without prior Commission approval. The Commission reserves the right to make changes to the Downstream Anadromous Fish Passage Operation and Maintenance Plan.

Draft Article 017. *Recreation Management Plan*. The licensee must operate and maintain, or provide for the operation and maintenance of, the following four existing and new project recreation sites: Canoe Tailwater Access (existing); Canoe Impoundment Take-Out (existing); Project Boat Launch (proposed); and Angler Access

Trail (proposed). Within 90 days of license issuance, the licensee must file, with the Commission for approval, a revised Recreation Management Plan that is based on, and includes the provisions of, the final Recreation Management Plan, filed on August 18, 2016, with the following modifications:

The modifications to the Recreation Management Plan include provisions for altering sections 4.3, 5.1, and 5.2 of the plan by:

(1) Including, to the extent feasible, measures to minimize the introduction or spread of non-native invasive aquatic and terrestrial vegetation during construction, operation, and maintenance of the project recreation sites. Specific measures should be developed in consultation with the U.S. Fish and Wildlife Service, Maine Department of Environmental Protection, Maine Department of Agriculture, Conservation, and Forestry, and the U.S. Army Corps of Engineers; and

(2) Limiting tree removal and trimming associated with construction of the project boat launch, improvements to the angler access trail, and non-emergency vegetation maintenance to August 1 through May 3.

The revised Recreation Management Plan must be developed after consultation with the agencies identified in item (1) above, and the Maine Department of Inland Fisheries and Wildlife. The licensee must include with the plan an implementation schedule, documentation of consultation, copies of recommendations on the completed plan after it has been prepared and provided to the agencies above, 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 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.

Within 60 days of the first Form 80 filing after license issuance, and every 6 years thereafter, the licensee must file a report describing whether or not an update to the recreation plan is needed. The report must include an evaluation of the adequacy of existing recreation facilities to provide public access and whether or not changes are warranted to address existing and projected future recreation needs. If an update to the approved Recreation Plan is needed, the licensee must incorporate the updated plan into the report for Commission approval (red-line documents are preferred so that plan

modifications can be easily identified). The report must be developed after consultation with the Maine Department of Inland Fisheries and Wildlife. as well as the agencies identified in item (1) above. The licensee must include with the report documentation of consultation, copies of recommendations on the completed report after it has been prepared and provided to the entities above, and specific descriptions of how the entities' comments are accommodated in the report. The licensee must allow a minimum of 30 days for the entities to comment and to make recommendations prior to filing the report/update with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons based on project-specific reasons. The Commission reserves the right to require changes to the Recreation Plan based on the report.

Within 90 days of completion of all the recreation facilities required by the plan, the licensee must file for Commission a report documenting the completed recreation sites. The documentation may include photographs (aerial or traditional), as-built drawings, or other methods, provided that the documentation clearly demonstrates the recreation sites, to include approved recreation facilities, have been constructed in substantial conformity as approved. The report must also include confirmation that the approved recreation sites are located inside the project boundary.

Draft Article 018. *Programmatic Agreement and Historic Properties Management Plan*. The licensee must implement the "Programmatic Agreement between the Federal Energy Regulatory Commission and the Maine State Historic Preservation Officer for Managing Historic Properties that may be affected by Issuing a License to White Pine Hydro, LLC for the Operation of the West Buxton Hydroelectric Project in York and Cumberland Counties, Maine," executed on _____ by the Maine State Historic Preservation Officer, and including, but not limited to, the Historic Properties Management Plan (HPMP), filed July 28, 2016, for the project. In the event that the Programmatic Agreement is terminated, the licensee must continue to implement the provisions of its approved HPMP. The Commission reserves the right to require changes to the HPMP.

Draft Article 019. *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-kiloVolts 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.