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United States Department of the Interior



FISH AND WILDLIFE SERVICE

New England Field Office
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Concord, NH 03301-5087
<http://www.fws.gov/newengland>

REF: Essex 19-FERC No. 2513

Ms. Katie Sellers
Kleinschmidt
75 Main Street
Pittsfield, ME 04967

Dear Ms. Sellers:

This letter regards your request, transmitted via email dated October 21, 2015, to confirm the Essex 19 Project's compliance with several license articles as part of the application process for Green Mountain Power (GMP) receiving certification from the Low Impact Hydropower Institute (LIHI). The project is located on the Winooski River in Essex Junction, Vermont.

The U.S. Fish and Wildlife Service (Service) has conducted a thorough file review (detailed below) and offers the following comments and recommendations.

BACKGROUND

Downstream Fish Passage

GMP installed a downstream bypass facility at the Essex 19 Project in 1995. In 1996, a radio telemetry study was conducted to evaluate the effectiveness of the facility for passing landlocked salmon smolts. Results of that evaluation were deemed inconclusive due to the large number of fish that did not move past the project (only 16 of 23 test fish arrived at the Essex 19 Project and of those 16, only 6 passed the project). The Service agreed that it was likely that the test fish were not in the smolt stage and thus would not be expected to exhibit normal migratory behavior. However, of those fish that did move downstream, all six used the bypass. Five of those six fish passed when flow in the bypass was 100 cfs (versus 50 cfs). The Service made a number of recommendations for modifications to the study methodology for 1997.

The Federal Energy Regulatory Commission (FERC) issued an order approving an additional year of evaluation on January 29, 1997.

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GMP undertook the second-year evaluation and provided a report of the results to the agencies in November of 1997. Of the 40 fish that were released, 37 moved into the forebay. Three fish had radio transmitter problems. Of the remaining 34 test fish, 2 used the bypass, 8 went over the spillway, 11 were entrained in the turbines, and 13 failed to move downstream.

A site visit with agency staff and GMP was conducted on October 30, 1997. A Service fishway engineer participated and assessed bypass facility conditions. The engineer identified a number of design issues that likely impact fishway effectiveness: (1) doors above the bypass entrances create an orifice condition and surface turbulence; (2) horizontal bars on the grizzly racks created turbulence, catch debris and were a behavioral deterrent to passage; (3) debris on the trashracks exacerbated turbulence; and (4) the video indicated turbulent conditions and a drop insufficient to commit fish. The engineer provided recommendations to alleviate these problems: (1) raise or remove doors above the entrance galleries; (2) install a floating boom or increase frequency of rack cleaning to minimize debris at racks; (3) remove the horizontal bars behind the grizzly racks; (4) ensure there is a drop into the entrance galleries sufficient to commit the fish; (5) run 100 cfs into the galleries but only 50 cfs out of the flume (into the plunge pool); and (6) operate bag #1 (rubber bladder closest to station) first for spilling.

By memorandum dated November 12, 1997, GMP agreed to implement five of the six recommendations if the agencies agreed that no further fishway testing would be required.

By letter dated December 3, 1997 the Service expressed appreciation at GMP's willingness to implement most of the recommendations made by our fishway engineer, but maintained that additional monitoring would be needed in order to verify that the implemented changes were effective.

On March 30, 1998, FERC issued an order accepting the study results and approving fishway modifications. In that order, FERC required GMP to implement structural and operation changes to the bypass, but did not require additional monitoring.

On April 27, 1998, the Department of the Interior (Department) filed a rehearing request with FERC on the March 30, 1998 Order. The State filed a rehearing request the following day.

In October of 1998, GMP undertook work to modify the downstream fishway.

On December 24, 1998, FERC denied the Department's and the State's rehearing requests.

Flow/Water Quality

The license for the Essex 19 Project states that it should be operated as true run-of-river during dry springs (inflows of less than 1,000 cfs between May 16 and June 15).

On May 24, 1999, the Vermont Department of Environmental Conservation (VDEC) contacted GMP with concerns that the Essex No. 19 Project was not releasing minimum flows in compliance with their license terms and requested that FERC investigate this violation. The VDEC letter included a provisional copy of the river hydrograph from the USGS gauge station

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located directly below the facility. During May 15 to May 20, 1999 river flows fluctuated by 250 cfs each day and the transitions between high and low flows were rapid. In a subsequent email to FERC on August 4, 1999, the VDEC outlined flow spikes of 1,300 cfs in August followed by a rapid recession to 110 cfs.

On September 22, 1999, FERC released a memorandum regarding these flow violations. In its response to FERC, GMP attributed the non-compliance to drought conditions experienced during this period.

On October 11, 1999, the VDEC wrote another letter to FERC explaining GMP's failure to accurately estimate project inflow and set units to match that inflow to maintain a stable headpond. The August violation, however, was a result of GMP drawing the headpond down before a shutdown of the station and then attempting to notch the rubber flashboards to spill inflow and prevent interruption of downstream flow, which resulted in a discharge almost an order of magnitude higher than inflows. GMP then reinflated the bladder to reduce the notch size and this nearly dried up the River.

On February 3, 2000, FERC issued an enforcement letter requiring GMP to file an operating plan to address future operations in order to prevent further flow issues.

By letter dated May 31, 2000, the VDEC outlined the measures GMP had agreed to implement in order to improve flow management at the Project. These measures were to be implemented and tested during the summer of 2000. On October 4, 2000, FERC issued an order amending GMP's flow release plan.

On November 22, 2000, GMP's consultants submitted a draft Flow Monitoring Refinement Plan to the VDEC for review. By letter dated December 27, 2000, the VDEC provided comments and recommendations to the plan. GMP filed a final plan with FERC on January 3, 2001. On February 20, 2001, FERC issued an Order Modifying and Approving Flow Monitoring Plan Refinements. In general, FERC agreed to the proposed refinements, but also identified that they would not eliminate the lag time in flow releases and therefore, further testing would be required to assess whether manipulating the rubber bladders would address this issue.

On July 27, 2001, GMP requested VDEC approval of temporary flow and water level management modification in order to conduct repairs to the rubber dam system. The VDEC, by letter dated September 5, 2001, approved that request, with restrictions. On December 20, 2001, the VDEC sent a letter to GMP regarding a flow violation related to the repair work, as well as a separate violation that occurred on July 19, 2001, requesting additional information.

In 2005, GMP initiated consultation on a proposed low flow turbine that GMP stated would allow the Project to better meet its flow requirements. Documents in our file indicate that the VDEC was concerned with potential water quality impacts from diverting more flow through the turbines, particularly under low inflow conditions, due to the stressed condition of the River with respect to dissolved oxygen (DO) concentration. The VDEC recommended that GMP investigate whether turbine aspiration might be possible.

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By letter dated October 12, 2005, the Service provided comments on the new turbine proposal to GMP's consultant. We expressed concern with installing a new turbine because of its potential negative impact on the downstream fish bypass: (1) the low flow turbine would be on the left side of the intake, whereas the bypass entrances are located in the center and right side of the intake; (2) the new unit would operate first on and last off; therefore, during low flow periods when the downstream bypass is operating, it would create false attraction away from the bypass entrances; and (3) the intake velocity in front of the racks at the new turbine might exceed the Service's design criterion (when only the low flow turbine is operating). Our letter provided recommendations to avoid these potential problems, including: (1) not operating the new turbine during the downstream passage season when inflow is less than 275 cfs; (2) increasing the fishway flow and passing all of it through the bypass entrance closest to the new unit, or (3) maintaining the existing fish passage flow and reducing the flow going into the new turbine.

On November 7, 2005, GMP's consultant responded to the issues raised in our October 12, 2005 letter.

By email dated November 15, 2005, VDEC staff indicated that GMP's proposal to install a vented low flow turbine was acceptable, but that continuous monitoring would be required to ensure it was achieving the anticipated increase in DO concentration (1 mg/l).

On December 14, 2005, the Service sent a letter to GMP's consultant providing comments to the November 7, 2005 submittal. In that letter, we stated that the additional information contained in the November 7, 2005 submittal addressed our concerns and therefore, we would not object to GMP proceeding with an amendment to install the low flow turbine. Our letter did stipulate that any amendment application submitted by GMP to FERC should specify that, if the new unit is found to reduce the effectiveness of the downstream bypass, GMP would work with our office and the Vermont Department of Fish and Wildlife (VDFW) to resolve the issue.

On December 15, 2005, GMP submitted an amendment application to FERC. The Department provided comments and 10(j) recommendations on the application by letter dated January 30, 2006. The Department recommended installing a vented turbine with an associated monitoring program, as well as monitoring at the intake to the new turbine when it is the only unit operating during the fall and spring fish passage seasons, to determine if attraction to the bypass facility is compromised. If monitoring revealed fish concentrating in the left corner of the intake, the Licensee would concentrate fishway attraction flow through the center bypass entrance. If this still did not address the problem, the Licensee would cooperate with the Service and VDFW to resolve the issue.

The VDEC commented on the application by letter dated February 3, 2006. In that letter, VDEC requested that FERC include a license article requiring GMP to install a vented turbine that maintains DO saturation values of 90 percent or greater at the tailrace whenever the new turbine is the only unit operating during the period June 15 through September 15, from 2200 hours to 0800 hours, and that the device would be calibrated in consultation with VDEC staff.

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In a letter dated February 10, 2006, FERC directed GMP to respond to the agencies' comments. GMP provided a response on February 10, 2006. In that letter, GMP stated it did not object to FERC including an article requiring visual monitoring and subsequent follow-up should fish passage effectiveness become an issue after the new turbine became operational.

On April 4, 2006, the VDEC submitted a letter to FERC stating that it had reached agreement with GMP regarding language for the turbine venting and monitoring requirement; GMP now proposed to undertake sampling to define the actual reaeration achieved through spillage. On April 11, 2006, the Service sent a letter to FERC stating that we had no objection to the revised language and recommended its inclusion in any amendment issued for the Project.

On June 15, 2006, FERC issued an Order Amending License. While the Order did include a new article (419) stipulating a turbine aspiration system, it did not include a license article requiring GMP to undertake monitoring at the intake to the new unit (although it is referenced in the narrative of the Order). Due to staffing constraints, the Service was not able to provide comments on the Environmental Assessment or Order.

The turbine was installed and GMP submitted a Minimum Flow Turbine Aeration Study Plan for the VDEC's review and comment. By letter dated August 28, 2008, the VDEC provided comments on the plan to GMP, as well as support for GMP's request for an extension of time to perform the calibration testing (due to unusually high flows during the summer of 2008). GMP subsequently submitted a formal extension request with FERC and on September 25, 2008, FERC issued an Order Granting Extension of Time.

From that time up until now we have no further information in our files. We also did not find any additional filings related to the low flow turbine or fish passage facilities on FERC's Online E-Library for the period 2008 through 2015. Therefore, we do not know whether the calibration testing was ever conducted or if the river-left intake area was ever monitored.

Other Relevant Information

Outside of any FERC proceeding, a downstream fish passage study was conducted in the spring of 2014 by researchers from USGS-Leetown Science Center and Karlstad University (Sweden) in collaboration with the Service. This study is part of Daniel Nyquist's Ph.D. dissertation research at Karlstad University and results are currently in a draft manuscript form to be submitted for peer review publication in a scientific journal. Major findings from this research include:

Passage performance of n=40 smolts was evaluated during peak smolt outmigration (May 10 through June 9, 2014) via radio telemetry.

- 35% (n=14 fish) failed to pass the dam
- 32.5% (n=13 fish) utilized the downstream fish passage facility
- 17.5% (n=7) passed the dam via spill over the dam
- 15% (n=6) went through the turbines

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COMMENTS

Based on the information found during our review of the administrative record for this project, the Service has identified the following issues relevant to this LIHI consultation request:

Downstream Fish Passage

1. In November of 1997, GMP agreed to put 100 cfs through the downstream bypass and 50 cfs out of the flume. However, subsequent filings reference a 50 cfs bypass flow. In addition, GMP agreed to install a recirculation system so that they could pump back 50 cfs of the 100 cfs flow, but we have no documentation that this system was ever installed.
2. In November of 1997, GMP agreed to address a number of design issues with the downstream bypass system. Again, we lack documentation that any of those modifications were ever made.
3. The Service is on record as having opposed FERC's decision to not require additional monitoring/evaluation of the bypass facility after implementation of the improvements detailed in GMP's November 1997 correspondence. The most recent passage evaluation results (2014) suggest little to no improvement in passage rates through the bypass facility relative to previous investigations (Table 1); however, it is unclear if this is due to GMP not having implemented the requested modifications, GMP not releasing the agreed-to 100 cfs through the bypass facility, a combination of those two factors, or some as-yet unidentified issue.

Table 1. Results of smolt passage investigations at the Essex 19 Project. Values are the percent of radio-tagged smolts using each identified passage route.

Passage Route	Study Year		
	1996	1997	2014
Bypass	37.5	5.9	32.5
Turbine		32.3	15.0
Spillway		23.5	17.5
Failed to pass	62.5	38.2	35.0

Walleye Mortality Contingency Plan

We are not aware of the VDFW having triggered the need for development of this plan. We defer to VDFW regarding compliance with this requirement.

Trap and Truck Program

The New England Field Office has consulted with the Lake Champlain Fisheries Resources Office (LCFRO) regarding GMP's participation in the Winooski River Trap & Truck Program. It is our understanding that LCFRO staff are satisfied with the program and believe GMP to be in compliance with this requirement.

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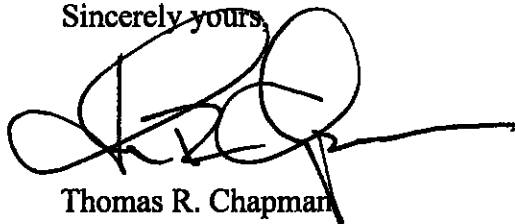
RECOMMENDATIONS

The Service recommends that any LIHI certification for the Essex 19 Project contain the following conditions:

- (1) GMP shall re-initiate consultation on the downstream bypass facility; Service engineers should assess which, if any, of the modifications agreed to in GMP's November 1997 letter have been implemented.
- (2) GMP shall verify through operations records that 100 cfs is being released into the bypass facility.
- (3) If any of the bypass modifications have not been implemented, GMP shall agree to implement them by the second spring downstream passage season after receiving LIHI certification.
- (4) If GMP has not been releasing 100 cfs into the bypass facility, it shall agree to do so every passage season during the term of its LIHI certification and shall maintain records sufficient to verify compliance with this requirement.
- (5) After implementing all of the measures above (which were previously agreed to by GMP, as documented in the administrative record), GMP shall commit to evaluating the bypass facility to verify that it is effective at passing outmigrating salmon smolts in a safe and timely manner. If study results continue to suggest low passage utilization, GMP shall commit to working with the agencies to identify impediments and to implement reasonable measures to address those impediments in an effort to increase bypass effectiveness.

We appreciate the opportunity to provide information relative to fish and wildlife issues in the Low Impact Hydropower Certification process and thank you for consulting with our office. If you have any questions, please contact Ms. Melissa Grader of this office at 413-548-8002, extension 8124.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'T. Chapman', with a long horizontal line extending to the right.

Thomas R. Chapman
Supervisor
New England Field Office

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cc: Jon Soter
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