



United States Department of the Interior



FISH AND WILDLIFE SERVICE

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In Reply Refer To:

July 15, 2013

TransCanada Hydro Northeast Inc.
Vernon Hydroelectric Project, FERC No. 1904
Bellows Falls Hydroelectric Project, FERC No. 1855
Wilder Hydroelectric Project, FERC No. 1892

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Dear Secretary Bose:

This responds to the updated Proposed Study Plan (PSP) submitted by TransCanada Hydro Northeast (TransCanada) on July 8, 2013 as part of the relicensing of the Vernon, Bellows Falls and Wilder projects, located on the Connecticut River in Vermont and New Hampshire.

Background

TransCanada filed its initial draft PSP on April 15, 2013. Subsequent to that filing, TransCanada conducted six full day meetings between May 13 and June 12, 2013. Substantial technical comments and recommendations on most of the proposed studies were provided by the U.S. Fish and Wildlife Service (Service) and other parties at the meetings. Based on those comments and recommendations, TransCanada indicated that they would be making significant changes to the proposed study plans to expand on, clarify or modify individual study proposals.

By letter dated June 13, 2013, the Service requested a 15-day extension of time (EOT) of the July 15 2013 deadline for filing comments on the updated PSP. By letter dated June 28, 2013, the Federal Energy Regulatory Commission (Commission) denied the Service's EOT request.

The Service is providing the following remarks for your consideration. These comments were prepared following our review of both the initial and updated PSP, and include information obtained from multiple study plan meetings. We note that the late filing of the updated PSP, coupled with the Commission's denial of our request for an EOT, has regrettably affected our ability to thoroughly review and prepare within a reasonable time frame, essential comments and recommendations on the updated PSP. We believe this denial will also affect other interested

parties' ability to adequately review recently submitted materials, prepare and coordinate their comments with other involved parties, and restrict their input during this process. This will unfortunately result in less thorough and comprehensive comments and recommendations being developed and has the likelihood of adversely impacting the interest of all parties, including the Applicant who has expended an enormous amount of time and effort to assure that adequate studies are being considered, developed, and performed. We also note that, as a result of the reduced time frame, our hydraulic engineer will not be available to review some study plans by the July 15, 2013 submittal deadline. Therefore, additional comments on those plans may be provided at a later date, or in response to the Final Study Plan.

Updated Study 4 – Hydraulic Modeling Study

We have no comments on this study at this time.

Updated Study 5 – Operations Modeling

Methods

The plan proposes to define econode relationships with flows and downstream node elevations using output from the hydraulic model. To ensure accuracy, the hydraulic model cross-sections and the Vita model econodes should be at the same location. The updated PSP is not clear on the relationship between these locations.

At the study plan meetings, there were discussions pertaining to the development of a two-dimensional rating curve for “interzone” areas where there is a transition from ponded to riverine conditions, so that the relationship between upstream and downstream project operations could be assessed. In addition, there was discussion on the use of an optimization model to run various operation scenarios. Neither of these concepts are included in the updated PSP, but should be discussed and included in the final plan.

Deliverables

At the study plan meetings, we requested the model data set. The Vista model is proprietary, but TransCanada indicated that the HEC-RAS input hydrology set would be provided. This should be clarified in this section of the updated PSP.

Updated Study 6 – Water Quality Monitoring and Continuous Temperature Monitoring

We defer comment on this study to the New Hampshire Department of Environmental Services and the Vermont Department of Environmental Conservation.

Updated Study 7 – Aquatic Habitat Mapping

The updated PSP reflects changes discussed at the study plan meetings relative to mapping at high pond levels and discussion of additional water surface elevation monitoring.

Updated Study 8 – Channel Morphology and Benthic Habitat Study

We have no comments on this study plan.

Updated Study 9 – Instream Flow Study

Dual Flow Analysis

The updated PSP includes a dual flow analysis component to assess the amount of habitat that remains suitable over a given range of project discharge flows as was recommended by the Service and other parties. TransCanada proposes to assess “some immobile aquatic species or life stages.” Some species and life stages, like freshwater mussels or deposited fish eggs, are clearly immobile or otherwise unable to respond to flow fluctuations from peaking power operations. However, other species and life stages are also impacted by fluctuating flows in less obvious ways. Flow changes can affect the location of suitable habitat, and would necessitate the movement of the individual fish to a different location in the river upon each flow change. If these locations are dispersed or distant from each other, the fish could be displaced from the flow change itself, or need to actively search for the now relocated habitat areas and possibly move substantial distances to find suitable habitat. The consequences of these movements could be vulnerability to predation, energy expenditures to search for and relocate to suitable habitat. Therefore, as noted by the Vermont Department of Fish and Wildlife (VDFW) at the study plan meetings, the Dual Flow Analysis should also be conducted on smaller fish species and life stages. Determination of what species and life stages would be assessed using Dual Flow Analysis should be made in consultation with the Service, the VDFW, the New Hampshire Fish and Game Department, and parties on the Aquatics Working Group.

Deliverables

We note that the results of the Dual Flow analysis should be listed in the list of deliverables from the study. In addition, the Service and other parties also recommended including in the analysis, mapping of habitat at various flows to show how the location of suitable habitat changes at various flows. This analysis can be derived from the PHABSIM data.

Updated Study 10 – Fish Assemblage Study

Study Area and Study Sites

We note that TransCanada now proposes to sample downstream of the Vernon Dam (to Stebbins Island). We support the inclusion of this area, as it remains unclear which project’s operations exert the most influence over this reach of river.

Methods

The updated PSP contains a modified study design that addresses some of the comments and concerns raised during the June 6, 2013 study plan meeting. Rather than sample a set number of segments within each general reach of the impoundment (upper, middle, and lower), the

geographic area (from the upper limits of the Wilder headpond downstream to Stebbins Island) has been divided into seven strata that generally break down by project and impounded versus free-flowing habitat. TransCanada will sample 12-15 randomly selected 500-meter segments within each strata, with the exception of the Bellows Falls bypass reach, which, due to its relatively short length, would have five segments.

While TransCanada has incorporated randomization into the study design, the recommendation to conduct replicate sampling has not been adopted. Further, according to the updated PSP, boat electrofishing will be the primary sampling method within each 500-meter segment, unless access within a particular strata is limited and does not permit boat shocking. It seems likely that a given strata may contain some areas that are conducive to boat electroshocking and some areas that are not. Based on the above, the Service recommends that TransCanada modify the proposed sampling design to stratify by habitat type. The number of sampling stations would be proportional to the amount of that habitat relative to other habitat types. For example, if setback habitat within the defined geographic area represents 15 percent of all habitat, 15 percent of the stations should be in this habitat type (with each particular station randomly chosen). To address the concern of replication, we recommend that a minimum of three replicates of each habitat-specific type be sampled at each station. These modifications would help address stakeholder concerns and should result in a broader diversity of habitats being sampled effectively.

It is unclear to the Service why TransCanada has lowered from 50 down to 35 the number of fish of any one species from which individual length and weight data would be collected. Also not specified is how those 35 fish would be chosen. Would it be the first 35 fish, or would a certain number from each visually assessed length class be measured and weighed? The Service recommends that TransCanada follow the protocol specified in FirstLight's Fish Assemblage study plan: "...all captured fish will be identified to species, classified as adult, juvenile or Young-of-Year (YOY), enumerated, weighed, measured for total length and then released. If large numbers ($n > 25$) of small fish (YOY fish or cyprinids less than 100 mm) are captured they will be grouped by size class, enumerated, and batch-weighed with length measurements only taken from one large and one small representative specimen within each group."¹ In order to be able to adequately assess the size structure and health (i.e., condition factor) of the population, all individual fish of a given species need to be measured and weighed (or, at a minimum, a representative subsample within each length class).

The Service supports the reduction in gill net set time, as this addresses concerns raised by the VDFW regarding excessive mortality with this gear type under the initially proposed 24-hour set time. Likewise, we concur with adding in trap nets as a potential gear type.

Analysis

The analysis should be modified according to our proposed changes to the sampling design described above; any summary statistics generated should be by habitat type rather than stratum. We are unsure what TransCanada means by "Effort will be made to incorporate a size class component." At the June 6, 2013 study plan meeting, the Service recommended that the analysis

¹ FirstLight Updated Preliminary Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485). June 28, 2013. Page 3-181.

should include a size class breakdown for catch per unit effort per fish species. Given that length and weight will be collected on sampled fish, there should be no reason why that information should not be analyzed and reported; why collect those data if they will not be used? Those data are what is needed to provide an overall picture of the fish assemblage: what species are in which habitats (during which seasons), how many of each species, what size classes, and in what condition.

Deliverables

The Service requests that TransCanada provide the raw data, in digital format, to stakeholders, upon request.

Updated Study 11 – American Eel Survey

Methods

Electrofishing Surveys

TransCanada has modified the study design from sampling a defined number of transects upstream of each dam to a specified number of segments within a given strata. While the overall number of sampling events will increase, because each segment is 500 meters (versus the original proposed 1,000 meters), the net result is that less habitat will be sampled. For example, at Wilder, originally 17.4 miles of river were to have been sampled, whereas only 11.1 miles will be sampled under the updated PSP. While this decreased effort is of concern, the increased number of sampling events and randomized design may result in an increased number of habitats being surveyed; therefore, the Service does not object to this change.

Eel Traps

In response to comments raised during the May 23, 2013 study plan meeting regarding the number of eel traps initially proposed, TransCanada has changed the survey methodology similar to the electrofishing survey: the geographic area will be divided into strata of 500-meter segments and eel traps will be placed in a specified number of randomly selected segments within each strata. The net result is an increase in the number of eel traps deployed. The Service supports this change.

Updated Study 12 – Tessellated Darter Survey

Methods

The updated PSP proposes use of an electrified benthic trawl to effectively sample darters. On the June 21, 2013 conference call regarding various studies, we raised the concern about the potential impacts of the trawl on the federally listed endangered dwarf wedgemussel (DWM) (*Alasmidonta heterodon*). Potential impacts would include capture, relocation or disturbance of DWM. The trawl sampling is proposed to target areas with DWM, since the darter study itself is

predicated on the fact that tessellated darters are the host species for the DWM's glochidia life stage.

In response to those concerns, TransCanada has provided some explanation of how they believe that neither the trawl itself nor the electric current that DWM could be exposed to are likely to cause adverse impacts. It states in the updated PSP that the trawl is unlikely to gouge the bottom habitat, and that the trawl net could be affixed with additional exclusion netting at the bottom to reduce collection of mussels (as well as rocks and other bottom debris). Alternatively, TransCanada has suggested they could modify their sampling protocol and avoid areas with DWM, after data on DWM occurrence in the project areas are completed this year as part of TransCanada's DWM study plan (Study 24).

We cannot determine whether the proposed use of a modified trawl would avoid adverse effects to adult or juvenile DWM without supporting documentation or evidence that the modifications have been successfully implemented elsewhere. Avoidance of areas known to support DWM would minimize or avoid the likelihood of adversely affecting DWM; however, this sampling scheme might not provide the data needed to assess potential impacts from the proposed relicensing. Therefore, we recommend further coordination with the Service in the refinement of the study design in order to develop a study plan that will provide sufficient data on tessellated darters and also fulfill Endangered Species Act (ESA) requirements.

Because the tessellated darter survey most likely will occur within occupied DWM habitat, it is likely that there will be effects on individual mussels or glochidia. The Commission will need to initiate consultation and provide an effects determination to the Service and request our review and concurrence (under section 7 of the ESA) once a Final Study Plan has been developed.

Updated Study 13 – Tributary and Backwater Access and Habitats Study

Methods

In response to concerns raised during the May 20, 2013 study plan meeting, TransCanada has modified the updated PSP to include consultation with the Aquatic Working Group with respect to evaluating the preliminary data and selecting sites for further, intensive study. The Service supports this change. However, as the plan now reads, it is unclear to us what screening metrics will be used to identify those "shallow inlets and shoal areas with the greatest chance of impeding fish movement." Will it be the 1-foot depth criterion cited later in the section, or some other measure? If it is the former, it would seem unnecessary to meet with the working group, as there would be no need to further reduce the number of sites to monitor in 2014 (i.e., all of the sites meeting that criterion should be evaluated).

The protocol for monitoring the selected sites is confusing. Selected sites would have water level recorders installed and operated for one year. Water quality data would only be collected at those sites if access to the main river is found to be impeded. However, the reason those sites were selected is because they had water depths less than 1 foot; therefore, water quality data should be collected at all of the selected sites.

Analysis

The updated PSP is not clear on how the collected data will be presented. The Service recommends that one of the products be bathymetric maps of all selected sites, showing the location where the recorder was installed. Not only will it be important to know how depth changes seasonally and with project operations, but also how wide that minimum depth is as it relates to zone of passage.

Updated Study 14 – Resident Fish Spawning in Impoundments Study

Methods

One element raised at the May 23, 2013 study plan meeting that does not appear to have been incorporated into the updated PSP is the need for TransCanada to consult with the state fisheries agencies regarding specific locations to target for monitoring. State fisheries biologists have substantial on-the-ground experience and knowledge that should be used to assist in identifying potential spawning sites.

The Service recommends adding the eastern silvery minnow as a target species that depends on backwater coves for spawning.

Updated Study 15 – Resident Fish Spawning in Riverine Sections Study

Study Goals and Objectives

The Service supports the inclusion of the reach downstream of Vernon Dam as a location to assess impacts of the project on spawning habitat and spawning activity by resident fish in riverine habitat.

Methods

As noted under our comments on Study 14, the Service recommends that the updated PSP include consultation with the state fisheries agencies regarding specific locations to target for monitoring. State fisheries biologists have substantial on-the-ground experience and knowledge that should be used to assist in identifying potential spawning sites.

In addition to the physical and chemical data TransCanada proposes to collect at identified spawning locations, the Service recommends assessing for effects of scouring and sedimentation, as these can impact egg survival.

Updated Study 16 – Sea Lamprey Spawning Assessment

The updated PSP has been modified to provide additional clarity on nest sampling protocols and data collection on nests that was requested by the Service and other parties at the study plan meeting on June 6, 2013. We concur with those modifications.

Methods

The study proposes use of radio-telemetry to identify lamprey spawning locations in the project areas. We endorse this proposed method. However, given the limited number of radio-tagged lampreys and the large areas of mainstem and tributary rivers that lampreys could disperse to, we recommend that TransCanada also utilize the data from the Hydraulic Modeling Study (Study 4) and Aquatic Habitat Mapping (Study 7) to locate potential areas of lamprey spawning habitat based on substrate and depth criteria or lamprey spawning and incubation. During the course of this and other studies, these areas could be observed for lamprey spawning concentrations that may not be identified by the radio-tracking survey if no tagged individuals select those sites. If any such areas offer different habitat conditions from those occupied by tagged individuals, they may be appropriate for inclusion in the nest monitoring phase of the study and/or provide potential unique habitats for evaluation in the Instream Flow Study (Study 9). Addition of this component would strengthen the study plan by providing an alternative method to identify spawning areas and potentially expand the geographic location and habitat conditions that could be evaluated for project effects.

Updated Study 17 – Upstream Passage of Riverine Fish Species Assessment

Study Goals and Objectives

The updated PSP clarifies that fish passage operations to assess passage of riverine fish species will be conducted from early spring to late fall and encompass the entire “open water” period, when freezing temperatures would lead to icing of project equipment. We concur with this time period for the study.

Methods

Based on discussions at the June 21, 2013 study plan meeting, the updated plan provides detailed description of the use of video monitoring using the Slamonsoft digital video counting system. We concur with the proposed counting and monitoring methods.

At the meeting, TransCanada indicated a desire not to have fishway shutdowns and inspections due to the time and logistics of carrying out multiple shutdowns of three fishways. We indicated that although we understood that rationale, we were concerned that debris accumulation in the ladders during extended fishway operations could disrupt ladder hydraulics and affect passage.

In response, TransCanada has proposed that inspections of the facility will also include visual observation of the ladders to identify if hydraulic changes occur, and if so, a shutdown, inspection and ladder cleanout may be implemented. While we would agree that most major blockages may be visible on inspection while operating, less dramatic changes in ladder hydraulics may be less obvious. Therefore, we recommend that the three ladders be inspected at the end of the 2013 season, to assess debris accumulation after the spring operation period in 2013, and that this information would be used to evaluate if there is a need for one or more inspection and clean-out during the ladder operation for this study.

In addition, we recommend that the study plan require consultation between TransCanada and the Service regarding inspections and TransCanada decisions on whether or not to dewater and inspect the fishways during the study period. This consultation on observation data would assure that the Service and other parties all agree that fishway monitoring results are valid and were not affected by ladder operating conditions

Updated Study 18 - American Eel Upstream Passage Assessment

Study Goals and Objectives

In response to concerns raised by the Service at the May 23, 2013 study plan meeting, TransCanada has modified the study design to conduct the systematic surveys in study year one and deploy the temporary eel trap passes in study year two (rather than perform both tasks in the same study year). The Service supports this change.

Methods

Temporary/Portable Eel Trap Passes

TransCanada states that “Prior to the installation of any temporary eel trap passes during year one...” The Service believes this should read “...during year two.” Regardless, we support the general point of the sentence that TransCanada will consult with the Aquatics Working Group prior to selecting locations to deploy the eel trap passes.

The Service is concerned with TransCanada’s proposal to limit the number of eel trap passes to two per project. Given the number of possible areas of concentration at each project, it is possible that more than two eel trap passes will be needed. The Service recommends that the number of eel trap passes required at each project be determined in consultation with the Aquatics Working Group, based on the results of the systematic surveys conducted in year one.

Updated Study 19 - American Eel Downstream Passage Assessment

Methods

FirstLight states that mortality and injury of silver eels may be assessed at non-turbine routes (as recommended by the Service and others), depending on the results of the route selection study; if a “significant” proportion of fish use non-turbine routes, TransCanada will consult with the Aquatics Working Group and consider options to assess those routes. The word “significant” is somewhat ambiguous unless it is being used in the statistical sense, which we do not think is the case for the subject study; therefore, we recommend replacing it with the word “substantial.”

However, as we noted on the June 21, 2013 conference call on various studies, without assessment of spill survival, there will be no information to compare that passage route with turbine passage. If turbine passage proves to inflict high mortality, there will be no information upon which to evaluate if spilling water at the dam might provide a safer alternative route and

potentially suggest a way to mitigate for project impacts. This assessment would likely be needed later if that is the case, and it may be more economical to do this assessment concurrently with the other survival evaluations in addition to putting eel survival through the turbines in context of other routes.

Route Selection

TransCanada states that radio-tagged eels will be monitored from late August through mid-October. The Service recommends that monitoring continue until all test eels are confirmed to have left the study area (or the tag life has expired, whichever occurs first).

Survival/Injury Studies

In this section, TransCanada states that a minimum of 50 eels with HI-Z Turb'N tags will be released at each project, with the exact number to be determined in consultation with the Aquatics Working Group. However, earlier in the plan, TransCanada stated that it will proportionally allocate the number of eels tested (150) by the number of different turbine types. The Service recommends that a minimum of 50 tagged eels be released into each turbine type, per project. Given that there is one turbine type at Bellows Falls, two types at Wilder, and three types at Vernon, a total of 300 test eels would be needed. This is the number of eels FirstLight proposes to use in its balloon tag study, and the number the Service used in its study request ("A minimum number of 50 tagged eels...will be required at each location...station turbines").

According to the updated PSP, eels would be injected into the turbines while at or near full generation. The Service is concerned that restricting the test to one operational condition may be insufficient to evaluate overall turbine mortality. If peak efficiency is at a flow less than full generation, that condition also needs to be evaluated. Likewise, if the units sometimes are operated at minimum gate, that also needs to be evaluate. Testing at these other loads is necessary, as turbine survival is known to vary depending on turbine unit operations. However, if TransCanada provides data showing that the turbines only operate at one setting for the duration of the adult eel outmigration period, testing only that one condition will suffice.

Analysis

Route Selection

If analysis of the routing data indicates preference for spill routes and resultant poor survival, additional consultation with the Aquatics Working Group would take place to discuss the need for additional survival estimates and studies. Given that the proposed radio telemetry tags would not have a motion sensor or other mechanism from which to determine the fate (i.e., alive or dead) of the eel, it likely would be difficult to use the information to assess survival (which is why a separate directed mortality study was requested).

Deliverables

All data used to develop the report should be made available to stakeholders (upon request) in digital format, including all telemetry and PIT tag data.

Updated Study 20 - American Eel Downstream Migration Timing Assessment

At the May 23, 2013 study plan meeting, the VDFW suggested that data from Study 17 (Upstream Passage of Riverine Species Assessment) could be used to inform the subject study. The updated PSP addresses this suggestion. The Service supports incorporating relevant data from other studies being conducted either at TransCanada's projects or FirstLight's projects, once they become available. In particular, the hydroacoustic data that FirstLight will collect both at the Northfield Mountain Pumped Storage (NMPS) and the Turners Falls projects could provide valuable information regarding the timing of eel outmigration on the Connecticut River.

Schedule

The updated PSP indicates that the study will occur in 2014. While the literature review portion of the study could be conducted in 2014, the final report, if it is to incorporate data collected from other studies, will not be finished until late in 2014. Therefore, the study likely will not be completed until 2015. Alternatively, TransCanada could release a draft report in 2014, and a revised report in 2015 once information from other relevant studies becomes available.

Updated Study 21 – American Shad Telemetry Study

Methods

The updated Methods section includes more planning details that will occur in consultation with the Aquatic Working Groups. There is a statement that tagged shad will be manually tracked and spawning areas located, but it is not stated at what frequency mobile tracking will occur. Given the length of the reach from Bellow Falls to Vernon, we expect that the entire reach could be covered in one day, therefore we are assuming that the entire reach will be surveyed. This point should be clarified. Consistency with previous study approaches used by Conte Laboratory will be beneficial as will the additional review of study data from 2011 and 2012. Radio receiver and PIT reader coverage appears well designed to meet study objectives and is shown in figures and described in detail. The use of motion and temperature reporting tags was requested and has been incorporated.

Sample sizes of tagged shad were increased from the original proposal to include 50 double tagged (radio/PIT) shad from Holyoke for release in the upper Turners Falls Dam Pool. A matching pair of 50 single PIT-only tagged shad will also be released in this area. As noted with FirstLight Power's shad telemetry plans, fallback of shad from trapping, handling, tagging, and transport may reach 40 percent. This would potentially mean that there will be only 30 radio (double-tagged) shad remaining for study. As noted, it is expected that FirstLight study fish, with coordinated radio tag frequencies, code sets, and codes will supplement this number. Therefore, we recommend increasing the proposed sample size to allow for evaluation of study

objectives over the entire upstream shad run at Vernon and associated varied operational and environmental conditions.

The methods include no discussion of the timing of tagged fish releases. Shad should not be released in a limited time window. Spreading out releases would reduce concerns about radio tag code collisions and allow for increased sample sizes to be released in three batches. However, we also recommend shifting the release periods to the early and middle parts of the run to avoid the increased losses of fish that occur with later releases. At the May 23, 2013 meeting, TransCanada stated that restricting the number of releases was not based on the cost of additional radio tags, but rather to assure the quality of the data. We believe that additional quality data can be obtained if the study design is modified to include three batch releases of 30-40 double-tagged fish per batch (with paired single PIT-tagged fish) to accounting for fallbacks. Releases could be spaced at ten-day intervals, spanning the month of May.

The planned release of 50 double tagged shad into Vernon Dam Pool should be adequate with recent observed passage rates and the suggested increase in study fish releases below Vernon, with the additional fish from FirstLight also supplementing the available sample. As noted with the releases below Vernon, several release groups would be desirable upstream of Vernon to better represent variable and changing conditions (operational and environmental) over the period of early May to early June.

The study proposes nighttime observation periods for spawning activity that will commence once radio-tagged shad are detected and suitable water temperatures are occurring upstream of Vernon Dam. Observations are proposed to occur every night after that trigger is reached but the duration of the monitoring each night is not specified. Existing literature indicates that shad spawning does not extend very late into the night, therefore rather than setting specific hours of observation, we recommend that the updated PSP indicate that observations will continue until spawning ceases each night.

Analyses

The outlined analyses appear appropriate. All data used to develop the report should be made available to stakeholders (upon request) in digital format, including all telemetry and other data.

Updated Study 22 – Downstream Migration of Juvenile American Shad - Vernon

Study Goals and Objectives

In response to feedback provided by stakeholders at the May 23, 2013 study plan meeting, TransCanada has modified the goals and objectives of this study. The Service believes the updated goals and objectives address some of the concerns raised at the meeting.

Methods

The updated Methods section includes the addition of video monitoring to assess the timing of the juvenile shad outmigration. This new method was proposed in response to the Service

raising a concern with relying solely on radio-tagged juveniles and Turbine Tag juveniles that may or may not represent the natural timing, duration, and magnitude of wild fish outmigration(s) and the operational/environmental conditions that are occurring in those periods of natural movement. The Service recommended the use of hydroacoustics in the Vernon Dam forebay to quantitatively determine timing, duration, and magnitude of the juvenile outmigration, which would provide important context to the limited number and release timeframe of radio-tagged juvenile fish releases.

The May 23, 2013 meeting stimulated significant discussion on the topic of hydroacoustic evaluations used at Vernon in an unsuccessful juvenile shad study in 2009. The Service's Connecticut River Coordinator has contacted Hydroacoustic Technology Incorporated (HTI), the company that provided the equipment for that study, and corresponded with the Bruce Ransom, the HTI Program Manager who recalled working with TransCanada's consultant on that project. Mr. Ransom noted that the 2009 study was restricted to a set-up with transducers located only behind the trash racks (due to the objective of determining entrainment into the turbine units), and utilized wide beam transducers that resulted in significant backscatter (noise). He further noted that the transducers were mounted on fixed, non-adjustable mounts that did not allow for transducer adjustment to achieve a cleaner signal. Mr. Ransom's email response included the following statements: "there are better ways to instrument and hydroacoustically monitor shad...at Vernon Dam;" "One could resolve passing juvenile shad in-turbine with the transducer array deployed at Vernon in 2009, although only in certain bands;" "The Vernon 2009 results aren't indicative of hydroacoustic sampling capabilities at the site;" and "With a sufficient deployment and testing period, proper transducer selection and placement, and probably incorporation of rotators to refine optimal aiming angle post deployment, we feel that one could do a good job of monitoring downstream shad entrainment from behind the trash racks at Vernon Dam..." These statements indicate that despite the disappointing results of the 2009 study, properly deployed hydroacoustic transducers would provide quality data to address the study objectives. We note that as part of their relicensing studies, FirstLight is proposing installation of hydroacoustic equipment at Cabot Station and the canal Gatehouse at the Turners Falls Project and at the Northfield Mountain Pumped Storage intake to assess juvenile shad outmigration. The goals and objectives of those studies are the same as the goals and objectives of this study at Vernon.

The use of a camera(s) has been proposed by TransCanada in lieu of a hydroacoustic study. However, a camera mounted on the bypass entrance has potential drawbacks due to the inability to discern images during periods of reduced visibility from turbid conditions. Hydroacoustic imaging can function in turbid conditions. Also, the field of vision for a single camera does not compare to the area of coverage that can be provided by acoustic transducers that can effectively create a detection screen. Juvenile shad outmigration is believed to be triggered by higher flow events, which are associated with high turbidity. As we noted at the May 23, 2013 meeting, hydroacoustic technology would also be of use in assessing silver eel outmigration study objectives (timing, duration, magnitude) as that period overlaps with juvenile shad. Analyses of hydroacoustic data would substantially improve our understanding of project impacts and inform any potential mitigative measures.

The Service supports the addition of 150 study fish to evaluate a Francis turbine unit as we had requested at the May 23, 2013 meeting. Turbine mortality/survival studies with tagged juvenile shad proposed to be conducted at full or near full generation. However, turbine mortality varies with turbine unit generation and efficiency. Therefore, the Service believes that if the units will operate at less than full hydraulic capacity, that is the condition that needs to be evaluated. Likewise, if the units are always operated at peak efficiency, those conditions should be evaluated. If the units are operated over a range of efficiencies, all conditions should be evaluated (maximum gate, peak efficiency, and minimum gate).

All data used to develop the report should be made available to stakeholders (upon request) in digital format, including all telemetry and other data.

Updated Study 23 - Fish Impingement, Entrainment, and Survival Study

Existing Information and Need for Additional Information

While TransCanada cites a number of passage route entrainment studies, it should be noted that, with the exception of one study by Normandeau (1996), the focus of all of the other studies was on a single species: Atlantic salmon.

Methods

TransCanada proposes to use existing literature along with the site-specific design characteristics of the turbines at the Wilder, Bellows Falls and Vernon projects to estimate potential entrainment rates and mortality of resident and diadromous fishes of interest. During the May 23, 2013 study plan meeting, the Service voiced concern over using this methodology, for the following reasons:

- While there is a database of turbine passage survival studies, the actual number of sites with similar design characteristics (e.g., turbine size, type, runner diameter, head, etc.) where similar target species were evaluated likely is quite small. For example, below is a table showing the number of sites available for comparison in the Electric Power Research Institute database. Once the evaluated species are compared with potential species of interest at the TransCanada projects, it becomes apparent that any mortality estimates derived from the literature would be based on a very limited data set.
- A recent report by Kleinschmidt (2007) [that used a methodology at the Holtwood Project (FERC No. 1881) similar to the one that is being proposed in the current updated PSP] found that the average predicted survival values derived from the Advanced Hydro Turbine Model (Franke *et al.* 1997) were higher than actual empirical studies conducted at the Holtwood Project for juvenile Alosids. Where empirical data were taken from other projects, results showed a higher survival for some species/life stages evaluated than from the modeled results (for adult river herring and adult eels). Where empirical studies showed lower survival than modeled results, Kleinschmidt appears to attribute the discrepancies to flaws in the field studies, while results showing higher survival in the field studies are attributed to differences in turbine specifications (rather than to any inherent flaws in the Franke *et al.* model). The Service acknowledges that field studies rarely are conducted under perfect conditions,

however it is equally plausible that the Franke *et al.* model requires further refinement that additional empirical studies may help inform.

While the Service does not object to using a desktop methodology to estimate turbine mortality at the three projects for resident fishes, we had recommended at the May 23, 2013 meeting that the results of the empirical mortality studies to be conducted on juvenile shad and adult eels be compared to estimates derived using the Franke *et al.* model. This comparison should allow further insight into the appropriateness of using a model, an off-site empirical study, or a site-specific empirical study to estimate turbine mortality at a project. In the updated PSP, TransCanada has adopted this recommendation.

Table summarizing pertinent turbine specifications for projects where survival studies have been conducted on Francis turbines, along with information from Vernon and Wilder.

Station	Designed Turbine Flow (cfs)	Number of Buckets	Runner Speed (rpm)	Head (ft)	Runner Diameter (in)
Vernon, Units 1 (vertical)	3670	??	85.7	57	??
Wilder, Unit 3 (vertical)	700	??	212	58	??
Alcona, MI	615	16	90	43	100
Alcona, MI	1155 -1660	16	90		100
Bond Falls, MI	450		300	210	
Caldron Falls, WI (Unit 1)			226	80	72
Centralia, WI (Unit 1)	510				
Centralia, WI (Unit 2)	510		90	20	28
Centralia, WI	variable			15.5	
Colton, NY	497	19	360	265	59
Cushman Plant 2, WA	800	17	300	450	83
Cushman Plant 2, WA (1960)	800	17	300		83
E. J. West, NY	2,700	15	113	63	131
Finch Pruyn, NY (Unit 4)				9-16	41
Finch Pruyn, NY (Unit 5)				9-16	41
Five Channels, MI	675	16	150	36	55
Five Channels, MI	1034 -1167	16	150		55
Grand Rapids, WI (U 1,2,4 comb)	645		90		
Grand Rapids, WI (Unit 2)	645		150	28	58
Grand Rapids, WI (Unit 4)	926		180	28	72
Hardy, MI (Unit 2)	510	16	163.6	100.2	83.75
Highley, NY	675	13	257	46	48
Hoist, MI	300		360	142	
Holtwood, PA(U10/single	3,500	16	94.7	62	149.5

runner)					
Holtwood, PA (U3/double runner)	3,500	17	102.8	62	112
Holtwood, PA	3,500	16	95	55	164
Luray, VA	369	12	164	18	62.75
La central de Beauharnois	7,000	13	75	79	212
Minetto, NY	1,500	16	72	17	139
Peshtigo, WI (Unit 4)	460		100	13	80
Potato Rapids, WI (Unit 1)	500		123	17	84
Potato Rapids, WI (Unit 2)	440		135	17	80
Pricket, MI	326		257	54	53.5
Rogers, MI (units 1 & 2)	383	15	150	39	60
Ruskin, BC	4,000		120	130	149
Sandstone Rapids, WI			150	42	87
Seton Creek, BC	4,500		120	150	114
Shasta, WA	3,200	15	138.5	380	184
Shasta, WA	3,200	15	138.5		184
Stevens Creek, SC	1,000	14	75	28	135
Vernon, VT/NH	1,834	15	74	34	156
White Rapids, WI	1,540	14	100	29	134
White Rapids, WI	900				
Youghiogheny, PA	750			120	

Updated Study 24 – Dwarf Wedgemussel (*Alasmidonta heterodon*) and Co-occurring Mussel Study

The updated PSP for DWM has further clarified study methods and analyses to address the issues that were discussed at the study plan meeting on June 6, 2013. While it is understood that methodologies to answer the question of the projects' impacts on DWM are somewhat experimental, the updated PSP does a good job of laying out the sequence of data collection and consultation on next steps and study alternatives.

Updated Study 25 – Dragonfly and Damselfly Inventory and Assessment

We defer comment on this study to the Vermont Agency of Natural Resources.

Updated Study 26 – Cobblestone and Puritan Tiger Beetle Study

We have no comments on this study plan.

Updated Study 27 – Floodplain, Wetland, Riparian, and Littoral Habitats Study

Methods

Invasive Plant Species

At the June 6, 2013 study plan meeting, the Service questioned whether the entire shoreline would be mapped for invasive species. In response, TransCanada noted that during the 2010 erosion survey, invasives data were collected. Service staff stated that, based on the level of detail presented in the Pre-Application Document, it was unclear what types of invasives data were collected in 2010 (were dominant species identified? did the geo-spatial documentation allow for a quantification of infestation?). In response to these concerns, TransCanada has updated the plan to specify that well-defined beds of invasives would be revisited, mapped with GPS, and characterized. The Service supports these changes, as it will allow for a more informative assessment of invasives throughout the project-affected areas.

Analysis

For the bald eagle information, we recommend that the report provide maps of the project area showing locations of all eagle roosting and nesting trees. A complementary table should be provided listing the location of the trees, whether it is a roosting or nesting site, an assessment of its status (healthy, diseased, etc.) and its level of protection (e.g., within a right-of-way, on protected/conservation land, etc.).

Updated Study 28 – Fowler's Toad Survey

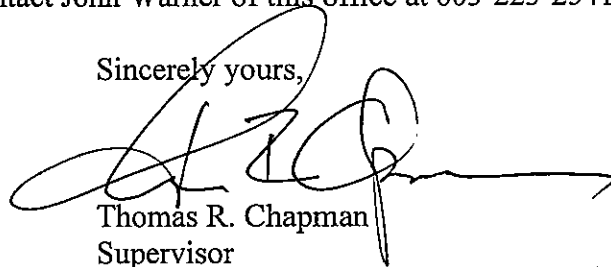
We defer comment on this study to the Vermont Agency of Natural Resources.

Updated Study 29 – Northeastern Bulrush Survey

We have no comments on this study plan.

Thank you for the opportunity to comment on the updated PSP. If you have any questions regarding these comments, please contact John Warner of this office at 603-223-2541.

Sincerely yours,



Thomas R. Chapman
Supervisor
New England Field Office

Kimberly D. Bose, Secretary
July 15, 2013

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