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

RE: Comments on Updated Study Reports filed May 16, 2016
Wilder, Bellows Falls, and Vernon Hydroelectric Projects (FERC No. P-1892, P-1855, P-1904)

Dear Secretary Bose:

The Vermont Agency of Natural Resources (Agency) herein provides comments on the updated study reports filed by TransCanada Hydro Northeast, Inc. (TransCanada) for the Wilder (FERC No. 1892), Bellows Falls (FERC No. 1855), and Vernon (FERC No. 1904) hydroelectric projects.

TransCanada filed updated study reports with the Federal Energy Regulatory Commission (FERC) for its projects on the lower Connecticut River on May 16, 2016. This filing was followed by a meeting June 1, 2016. A summary of the meeting was filed with FERC on June 14, 2016. After review of the filings and participation in the meeting, the Agency offers the following comments on the updated study report.

Comments on Study Reports

Study 8 – Channel Morphology and Benthic Habitat Study

Section Specific Comments:

- Section 4.5 states, "available information from these studies was used to assess potential sources of fine-grained and coarse-grained sediment. The objectives of this assessment were to evaluate whether riverbank erosion is a potential source of 1) course-grained substrate that provides benthic habitat, and/or 2) fine-grained sediment that could result in increased embeddedness of coarse-grained sediment in the study area."

    - While the report uses available information from the riverbank erosion studies to evaluate whether erosion of the riverbanks is a potential source of course-grained substrate, the report does not evaluate whether riverbank erosion is a potential source of fine-grained sediment that could result in increased embeddedness of coarse-grained sediment in the study area. As more information becomes available from the riverbank erosion studies, study 8 should be revised to evaluate this objective.

- Section 4.5.2 states, "Information from Study 4 was obtained for between two and seven hydraulic model cross sections for the mainstem sites, with the requested number of cross sections dependent on the spatial extent of each site relative to the location of adjacent hydraulic

model cross sections. Similarly, information from Study 4 was obtained for between one and six hydraulic model cross sections for the four tributary sites for which information from Study 4 is used". The report further states, "modeled shear stress varies between adjacent HEC-RAS model cross sections. This variability likely results from the spatial locations of each cross section as well as other factors, including available bathymetric data and boundary conditions used for the Study 4 hydraulic model."

- Please describe any efforts to place cross sections in the hydraulic model at locations that could be of use in other studies. The selection of numerous adjacent cross sections, and subsequent sub-selection of a representative cross section for each site has the potential to introduce a substantial amount of uncertainty into the analysis. Please evaluate the feasibility of re-running the hydraulic model with cross sections included at the Study 8 transects to reduce uncertainty introduced by using adjacent transects. Please also provide the hydraulic model cross sections obtained for each mainstem site and describe the spatial extent of each site relative to the location of adjacent hydraulic model cross sections.

- Section 4.5.2 states, "Figure 4.1 depicts the flow (discharge)-shear stress curves for seven of the Study 4 hydraulic model transects adjacent to Site 08-M20, with flow as the independent variable on the vertical axis and shear stress as the dependent variable on the horizontal axis."

  - Please describe the flow-shear stress outputs from the hydraulic model in greater detail. Do the output curves provide average shear stress values for a given cross section? If so, would one expect the average shear stress value for a cross section to be consistent across a transect? Were any efforts made to account for variability across a transect?

- Section 4.5.2 also states, "The selection of a single cross section at each site was based on qualitative evaluation of information at each site, including the shape of the flow-shear stress curve and the proximity of each cross section to the site transects. In particular, some of the Study 4 information indicated nonmonotonic flow-shear stress curves and maximum shear stresses at very low flow (e.g., 2,000 cfs). Cross sections with strongly non-monotonic flow-shear stress curves were not used unless all of the cross-section data at that site had similar, non-monotonic curves."

  - The selection of a representative cross section is a central aspect of the shear stress analysis. Please include the cross sections that were evaluated for selection at each site as an appendix. In addition to including the flow-shear stress curve for each cross section, please also include the proximity of each cross section to the site, as well as a rationale for selecting the representative cross section.

- Section 4.5.2 describes several sources of variability inherent in both the methods and process including, "variability likely results from the spatial locations of each cross section as well as other factors, including available bathymetric data and boundary conditions used for the Study 4 hydraulic model" and "the variability of conditions that result in incipient motion of sediment."

  - The Agency agrees that there is a substantial amount of variability inherent in modelling sheer stress and sediment movement. In addition, to the sources of variability described above, there is also variability within transects to consider. In the discussion, please discuss on the variability and uncertainty inherent in the study.

- Section 5.1 describes the dominant substrate trending from cobble to gravel, moving downstream below each of the project dams.

    - Please discuss what process or processes may be driving the distribution of sediment in such a manner.

- Section 5.5 describes the model-based analysis, in which the stability of substrates are evaluated by comparing the critical shear stress for the median particle size at each transect with shear stress information from the selected Study 4 hydraulic model cross section.

    - This analysis is illustrative and useful, however, it is also limited. It does not indicate whether substrates below the median size are stable or mobile at MGF. Using the particle distributions included in Appendix D, please apply the critical shear stress to the full distribution of particle sizes at a given transect. The resulting analysis would indicate the proportion of substrate that is stable and immobile at each transect at MGF.

- Section 5.5.1 states, "Shear stress data indicates that substrate at site 08-M15 is stable at the MGF of 11,400 cfs at this location; however, observations during the site visits suggest that the median substrate at this site (sand) is apparently mobile at flows less than the MGF.

    - At the site described above, the model-based analysis does not seem to align with conditions observed in the field. Please evaluate the characteristics of the other sites and identify any sites that have similar characteristics to site 08-M15, may not be an appropriate fit for model-based analysis.

Study 17 – Upstream Passage of Riverine Fish Species Assessment

General Comment: The objectives of this study were to identify the use and temporal distribution of upstream passage through the Wilder, Bellows Falls, and Vernon fish ladders by riverine and diadromous fish species and; identify potential appropriate operating windows during the open-water period for the fish ladders for riverine and diadromous fish species at each project. The assessment was not intended to determine the effectiveness of each fish ladder in passing resident riverine or diadromous fish species.

The pre-application documents (PAD) for the three projects, filed with FERC on October 30, 2012, indicate the upstream fish ladders at all three projects were designed to provide passage for migrating Atlantic salmon and American shad. However, no formal effectiveness studies have been conducted for salmon or other species at the Wilder or Bellows Falls project. Therefore, the conclusion that there is little benefit to operate ladders for resident species upstream passage at Bellows Falls and Wilder based on low net upstream passage counts of resident species cannot be reached without further evaluation of the ladders effectiveness. The effectiveness of the ladders for passing target resident species was not evaluated as part of this study, it is unknown if the low number are the result of issues with attraction flow, operations with the ladder, project operations, or cumulative effect of all the above. The results do however establish that resident fish species have propensity to move past the dams when given an opportunity.

General Comment: The study report includes graphs that show the daily net upstream passage counts and cumulative passage (as percent of annual total) with water temperature for each species at the three projects. The Agency request for the final report include, in addition to individual species graphs, three additional plot for each project that plot daily net upstream passage counts and cumulative passage (as

percent of annual total) with water temperature for all fish species, diadromous species, and resident fish species at each project.

General Comment: American eels were passed at all three facilities in greater numbers than were detected as part of Upstream American Eel Passage Study (Study 18). This suggest that eels are attracted to the ladders when operating and will utilize them to pass, though effectiveness of this passage route is unknown. The American eel is listed as a Species of Greatest Conservation Need in both New Hampshire and Vermont with a conservation status of "vulnerable" in New Hampshire and as a high priority in Vermont. As identified in Vermont's Wildlife Action Plan providing effective upstream passage for juvenile eels pass dams to access critical rearing habitat upstream is a state priority.[1]

Need for Additional Information: The Agency request that TransCanada collect additional information on the effectiveness of the Wilder and Bellows Falls fish ladders facilities for passing American eel.

Section Specific Comments:

- 4.1.1 Species Assemblage – Wilder: The report states, "The high number of both upstream and downstream movements relative to the net upstream passage count suggests milling in the counting window pool that resulted in multiple recordings of the same fish."

    - Individual fish were not marked as part of this study, it is unknown whether the recordings are the same individual or a different fish using the ladder to pass downstream. While there may be some upstream and downstream movement or milling in front of the fish ladder viewing window, quantification of this on an individual basis is not possible. Furthermore, since the efficiency of the ladder in passing resident target species in not known, the upstream and downstream movement could indicate issues with the ladder operations in providing safe, timely and effective for target fish passage.

- 4.4 Discussion – Vernon: The report states, "Since the Vernon fish ladder was opened on May 5 and three species, bass, Walleye, and White Sucker, were observed on that day, it is apparent that the beginning of the run was missed in monitoring." As state earlier in the report the delay in opening the fish ladder was the result of a high flow event.

    - The Agency concurs with this statement that the migration of the resident spring spawning species such as white suckers and walleye was missed. However, the Vermont Fish and Wildlife Department, using the same methodology for assessing fish species use of the Vernon fish ladder began its assessment on April 15, 2016. This data should be reviewed by TransCanada for the purpose of supplementing the 2015 data, to identify the beginning and peak of the migration of resident spring spawning species.

- Section 4.5 Post-Season Fish Ladder Inspection Results – Wilder: As indicated the Wilder fish ladder was visually inspected by a U.S. Fish and Wildlife Service, Fish Passage Engineer on September 4, 2015. The Engineer observed inconsistencies in water height over a number of weirs suggesting weir orifices may be blocked, causing the ladder not to operate as designed. The ladder was subsequently shutdown, the debris was cleaned out of three sections, and operations resumed on September 23, 2015. TransCanada noted in the report that the previous week's

[1] Kart, J., R. Regan, S.R. Darling, C. Alexander, K. Cox, M. Ferguson, S. Parren, K. Royer, B. Popp, editors. 2005. Vermont's Wildlife Action Plan. Vermont Fish and Wildlife Department. Waterbury, Vermont.

routine inspection did not identify problems, and that the ladder operated normally outside this time frame.

- Before the ladder was inspected by the US Fish and Wildlife Service (Service), Fish Passage Engineer on September 4, 2015, when was the last time the Wilder fish ladder was inspected by the Service Fish Passage Engineer? After the ladder was shutdown, clean, and restarted, was it ever inspected by the Service, Fish Passage Engineer? The Agency's concern is that without review of the normal operations of the ladder by a professional fish passage engineer, it is not known whether the ladder is being operated as designed or in the most efficient mode.

- Appendix B TransCanada Fish Ladder Operating and Inspection Procedures: The general operation procedure for the Wilder fishway was last revised June 15, 1987. The inspection, maintenance, and operations protocol for Bellows Falls fish ladder was adopted December 6, 2012 and the Vernon fish ladder was adopted April 25, 2013.

    - The general operation procedure for the Wilder fishway is relatively dated compared to the Bellows Falls and Vernon fish ladder procedures. The Agency request that TransCanada provide information and background on what precipitated the revision of the inspection, maintenance, and operating procedures for Bellows Falls and the Vernon fish ladder facilities and not the Wilder facility.

Request: The Agency request an additional year of study at Wilder facility, if TransCanada cannot provide assurance that the ladder was operating normally before the Service Fish Passage Engineer identified the issue, and after the issue was addressed.

Study 23 – Fish Impingement, Entrainment, and Survival Study

- Section 3.0 Study Area: Tables 3.1-1, 3.2-1, and 3.3-1 present the characteristics of the forebay structure of Wilder, Bellows Falls, and Vernon facilities, including information on the trash rack spacing at each of the facilities. The table indicate that the trash rack clear spacing at Wilder for units 1 and 2 is 5-inches, at Bellows Falls facility for units 1 – 3 the clear spacing is 4-inches, and for the Vernon facility the clear spacing on the trash rack is 3.625-inches.

    - The clear spacing of the trash racks for the Wilder, Bellows Falls and Vernon facilities, listed above, are greater than hydroelectric facilities that have received a Section 401 water quality certification. The Agency's concern is that the greater the trash rack spacing may increase the rate of entrainment of fish at the facilities.

- Section 4.4 Project Approach Velocities: The calculated intake velocity (in feet per second or fps) at maximum turbine discharge for each unit at the Wilder, Bellows Falls and Vernon facilities are presented in table 4.4-1.

    - The Agency uses a standard for intake velocities at units of less than or equal to 2.0 fps. Wilder units 1 and 2 are calculated to be 4.3 fps well over the standard. At Bellows Falls all the units are slightly above at 2.2 fps. Additionally, at the Vernon facility units 5 through 8 at 2.5 fps are above the standard, and 9 and 10 are slightly above the standard at 2.1 fps.

Comments from other Resource Agencies

In addition to the above comments, we endorse the comments and recommendations provided by the U.S. Fish and Wildlife Service on Study 19 – American Eel Downstream Passage Assessment, Study 22 – Downstream Migration of Juvenile American Shad at Vernon, and Study 23 – Fish Impingement, Entrainment, and Survival Study.

Sincerely,

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