US Northeast Hydro Region
Portsmouth Hydro Office
One Harbour Place, Suite 330
Portsmouth NH 03801

tel 603. 559.5513
web www.transcanada.com

August 15, 2016

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

Re: TransCanada Hydro Northeast Inc.'s May 16, 2016 Updated Study Report – Response to Comments
Project Nos. 1892-026, 1855-045, and 1904-073

Dear Secretary Bose:

TransCanada Hydro Northeast Inc. ("TransCanada") is the owner and licensee of the Wilder Hydroelectric Project (FERC No. 1892), the Bellows Falls Hydroelectric Project (FERC No. 1855), and the Vernon Hydroelectric Project (FERC No. 1904). The current licenses for these projects each expire on April 30, 2019. On October 31, 2012, TransCanada initiated the Integrated Licensing Process by filing with the Federal Energy Regulatory Commission ("FERC" or "Commission") its Notice of Intent to seek new licenses for each project, along with a separate Pre-Application Document for each project.

TransCanada submitted an Updated Study Report ("USR") for the three projects, as required by 18 C.F.R. §5.15(f) on May 16, 2016 and in accordance with the Revised Process Plan and Schedule for the ILP issued May 5, 2016 by the Commission. The USR meeting was held on June 1, 2016 in accordance with 18 C.F.R. §5.15(c)(3) and a meeting summary was filed June 14, 2016. With this filing, TransCanada submits responses to various comments and specifically to Disagreements and Requests to Amend Study Plans regarding the Study Reports filed in the May 16, 2016 USR for the three projects, as required by 18 C.F.R. §5.15(c)(5). Comments, Disagreements and Requests to Amend Study Plans on the USR were filed by the following parties:

Name of Individual or Organization	Acronym Used in Comment/ Response Table
Connecticut River Watershed Council	CRWC
Mr. John Mudge, river abutter	Mr. John Mudge
New Hampshire Fish & Game Department	NHFGD
The Nature Conservancy	TNC
US Fish & Wildlife Service	FWS
Vermont Agency of Natural Resources	VANR

Our responses are indicated in the attached table entitled, Response to May 16, 2016 USR Comments. Study reports that will be revised in response to comments received during the comment period for the May 16, 2016 USR. We propose to file revised reports following the Commission's study determination letter expected on September 12, 2016 (according to the current Process Plan and Schedule), and perhaps as early as October 1, 2016, on the following studies.

1. Study 17 – Upstream Passage of Resident Fish Species Assessment, pending receipt of video data from VANR from spring time 2016 (per comment # .
2. Study 23 – Fish Impingement, Entrainment, and Survival Study

In addition, supplemental data as requested in applicable comments will be provided for the following studies, by August 31, 2016 or sooner:

1. Study 8 – Channel Morphology and Benthic Habitat Study (HEC-RAS model cross sections at study site transects, and cross section selection rationale)
2. Study 19 – American Eel Downstream Passage Assessment (project discharge by discharge point at the time of passage for each radio-tagged fish)
3. Study 22 – Downstream Migration of Juvenile American Shad at Vernon (project operations data for the period encompassing first release to last passage of radio-tagged fish)

If there are any questions regarding the information provided in this filing or the process, please contact John Ragonese at 603-498-2851 or by emailing john_ragonese@transcanada.com.

Sincerely,

John L. Ragonese
FERC License Manager

Attachment: Response to May 16, 2016 USR Comments
cc: Interested Parties List (distribution through email notification of availability and download from TransCanada's relicensing web site www.transcanada-relicensing.com).

TransCanada Response to May 16, 2016 USR Comments

Study 8 – Channel Morphology and Benthic Habitat Study

Comment #	Study #	Source	Comment	Response
1	8	VANR	While the report [Section 4.5] 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 5.3 of the report summarizes information regarding potential coarse- and fine-grained sediment sources and states: "*Based on information developed as part of Studies 1 – 3, riverbank erosion is an ongoing source of fine-grained material, which can contribute to increased embeddedness of coarse-grained substrates in the study area*." The riverbank erosion studies (Studies 1, 2, and 3) identified that riverbanks are primarily composed of fine-grained material. The Study 8 report identifies that erosion of fine-grained material may contribute to increased embeddedness of coarse-grained sediment.
2	8	VANR	The report further states [Section 4.5.2], "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.	The Study 4 HEC-RAS model cross sections were placed at intervals of approximately 500 ft along the approximately 120-mile study area of the Connecticut River. HEC-RAS model cross sections were placed primarily where elements or features would potentially affect the model reliability and accuracy accounting for such considerations such as but not necessarily limited to river bathymetry, corridor topography, and channel constriction. A number of cross-sections were located at specific locations relative to the study sites of other studies (e.g., erosion), but not Study 8. As described in Section 4.5.2 of the report "*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*

Comment #	Study #	Source	Comment	Response
				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." As described in the study report, a single representative cross section was selected for evaluations at each study site based on qualitative evaluation of variables and information at each site, including the shape of the flow-shear stress curve and the proximity of each cross section to the site transects. Assignment or selection of a single HEC-RAS cross section that intersects a study transect at a single location is not necessarily considered more reliable or applicable than selection of an adjacent cross section from the HEC-RAS model, when relevant variables are considered. Examples of potentially unsuitable data from evaluated HEC-RAS model cross-sections included lower shear stresses at a given flow relative to adjacent cross sections (see response to comment #4 regarding descriptions of the process used as part of Study 8 to select cross section data from Study 4 for analyses).
3	8	VANR	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.	Our opinion is that revising the hydraulic model by adding additional Study 8 specific cross-sections would not add material information to the study conclusions. The requested supplementary spatial information on the location of the Study 8 transects and the Study 4 HEC-RAS model cross sections will be provided.

Comment #	Study #	Source	Comment	Response
4	8	VANR	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?	Shear stress data was obtained from the one-dimensional numerical hydraulic model that was developed as part of Study 4 using the US Army Corps of Engineers HEC-RAS software system, which is consistent with the approach described in RSP-08. The one-dimensional discretization does not explicitly calculate variability of shear stress across a given transect, and the HEC-RAS model data was not altered to account for variability across the HEC-RAS model cross sections.
5	8	VANR	The selection of a representative cross section is a central aspect of the shear stress analysis [Section 4.5.2]. 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.	The requested supplemental information will be provided.
6	8	VANR	Section 4.5.2 describes several sources of variability inherent in both the methods and process…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 4.5.2 of the report identifies potential sources of variability in HEC-RAS hydraulic model output data, including bathymetric data used to develop the HEC-RAS model cross sections. Other potential sources of variability inherent to the methods and process identified in the study plan are numerous and include sampling bias associated with the pebble counts and embeddedness surveys, classification of sampled particle sizes (Table 4.1 in

Comment #	Study #	Source	Comment	Response
				Section 4.2.3), and site conditions, including the presence of algal mats overlying some sample transects (Section 4.2.3).
7	8	VANR	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.	Evaluation of potential drivers for distribution of sediment in the study area is not a component of the approved study plan for Study 8.
8	8	VANR	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.	The stability of the median particle size was evaluated to provide a consistent characterization of particle stability that acknowledges variability inherent in the field and desktop components of the approved study plan and associated methodologies (see response to comment #5). Given the study finding that the median-size and larger particles are stable up to the project MGFs at most of the study sites (Sections 5.5 and 6.0), there is no basis for calculating the particle size for which the critical shear stress is exceeded at the MGF. In addition, the MGFs at each facility are approximately half the minimum annual peak flows that are presented in Table 4.5 in Section 4.4.1 and as described in Section 6 of the report. Note that the secondary (top) horizontal axis on the plots presented in Appendix E corresponds to the critical shear stress for incipient motion (mobilization) for each of the particle size classes (not just the median particle size) at each transect, and that information presented in the particle size distribution data presented in Appendix D can be used to obtain the requested information.

Comment #	Study #	Source	Comment	Response
9	8	VANR	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, [which] may not be an appropriate fit for model-based analysis.	Observations during the study site visits indicated that site 08-M15 is located in a back eddy as evidenced by flow moving in the "upstream" direction relative to the dominant downstream flow. The basis for including the field observations at site 08-M15 is that the observed condition is not consistent with the explicit assumptions of one-direction flow at model cross sections. No similar variations were observed at the other study sites.
10	8	CRWC	CRWC endorses the Vermont Agency of Natural Resources comments on this study. CRWC cannot fathom how one can do a study about erosion and not talk about embeddedness. Embeddedness is the tool to evaluate the suitability of the substrate as habitat for aquatic organisms. This is especially true given the overwhelming presence of silt bottom areas.	The first sentence of the study plan states: "*In their study requests, NHDES, NHFG, VANR, and CRWC describe concerns regarding the potential for Wilder, Bellows Falls, and Vernon Project facilities and operations to affect fluvial processes related to movement of coarse sediment (e.g., gravel and cobble) in the project- affected areas, and associate this concern with potential effects on benthic habitat*." The study methodology followed from this concern and the associated effects on coarse-grained benthic habitat. The study plan specifically identified that criteria for selection of study sites included the presence of coarse-grained sediment. Embeddedness is addressed in the study report to the extent that it is addressed in the study plan; i.e., embeddedness at the study sites is documented and - as stated in the comment - "*used as a tool to evaluate the suitability of the substrate as habitat for aquatic organisms*".

Study 17 – Upstream Passage of Riverine Fish Species Assessment

Comment #	Study #	Source	Comment	Response
11	17	FWS	Executive Summary: … the first paragraph…states that video recording at Wilder extended from April 15, 2015 to January 7, 2016." However, in the fourth paragraph "Fish passage was recorded throughout the monitoring period from May 12, 2015 through shutdown on January 7, 2016." Does one represent the set of dates over which video monitoring spanned and the other indicate the time period fish were actually observed? [The report] should clarify this apparent discrepancy.	The commenter is correct, the Wilder fish ladder opened and video recording began on April 17 (not April 15), and the first fish passage was documented on May 12. The Executive Summary text will be clarified in the revised report.
12	17	FWS	In the last paragraphs of the Executive Summary, [the report] concludes that there is little benefit to operating the ladders for resident species due to low net upstream passage counts. The Service does not believe that net upstream passage is the only relevant metric to analyze. Assessing the total upstream and downstream counts puts the net counts into a more appropriate context. In addition, the ladders were designed for Atlantic salmon. Therefore, the ladders are not optimally designed for riverine species which could be one reason for the high number of counts in the downstream direction (i.e., these could represent fallback).	We note that the study report includes total up and downstream passage values in Tables 4.1-1, 4.2-1, and 4.3-1. The entire Salmonsoft click history is included in Appendix C, and daily up and downstream counts and graphs are provided in Appendix D. Appendix E includes hourly data for both up and downstream detections (appendices were filed separately in zipfile of Excel files). Further discussion of the data will be provided in the revised report. We concur that the ladders were designed to pass Atlantic Salmon (and American Shad at Vernon). It was beyond the scope of this study to evaluate ladder effectiveness or attempt to optimize operations for one or more resident species.
13	17	FWS	Fish passage monitoring began as early as April 15, 2015	Conditions (e.g., flows, temperature) and the

Comment #	Study #	Source	Comment	Response
			for all three sites, however white sucker and walleye move during early April through May. Therefore, at least a portion of the white sucker and walleye runs may have been missed in this study…The Service recommends that TC contact VTFWD to request its Salmonsoft files for the period April 15 through June 30, 2016. TC should review the files and document how many white sucker and walleye used the ladder during this period. This will provide an indication of what percentage of those runs may have been missed in 2015 as a result of the delayed start of monitoring at Vernon.	number of fish observed in fish ladders will vary from year to year making comparisons between the numbers of fish observed during specific timeframes in different years problematic. Study 17 was a one-year study conducted in 2015 and it is beyond the scope of the study to supplement it with data from subsequent years. The value of such additional information is small if it serves only to confirm what is apparently already well known (that these species may move earlier than was recorded in 2015), particularly given the level of effort and cost to review the 2016 videos for the 2.5 month period requested. However, we will review the data that VANR compiles for the 2016 spring season and if white sucker and walleye were not distinguished in VANR's review, we will review the video for these species through May 31, 2016 (rather than through June 30) which represents the period that extends beyond anticipated spawning driven movement for these species.
14	17	FWS	Section 4.1.1 Species Assemblage: [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." However, since fish were not individually marked as part of this study, it is not known if the recordings were in fact the same fish. Therefore, we recommend removing this statement from the study report. While there may be some back and forth movement or milling about (particularly for certain species such as trout),	We agree that some fish may be using the ladders to pass downstream and that some proportion of the counts was likely contributed by downstream movements. However, it is our conclusion, based on video review, that for most species the milling effect (including feeding within the ladders) occurs. We therefore respectfully disagree with removing this statement as it was intended as a hypothesis not a conclusion. The alternative, that different fish may have used the ladder to pass downstream, will be included in the revised report.

Comment #	Study #	Source	Comment	Response
			quantifying this type of passage behavior on an individual basis would require an entirely different study design than what was used. Another plausible explanation could be that different individual fish are using the ladder to pass downstream than those that used it to move upstream. In addition to plotting cumulative passage by individual species, please plot cumulative passage for: (1) all species; (2) diadromous species; and (3) resident species in three separate plots.	Cumulative passage for: (1) all species; (2) diadromous species; and (3) resident species in three separate plots will be provided in the revised report. However, we recommend caution in interpreting combined species plots for other than overall seasonality of passage activity. Specific migratory seasonality, periodicity, behavior, and relative abundance affect daily net passage counts and therefore cumulative percent of total.
15	17	FWS	4.1.3 Diel Periodicity: Daily periodicities of fish use of the Wilder, Bellows Falls, and Vernon fish ladders were plotted as the number of upstream and downstream movements and net upstream passage by hour of day for each species observed. Net upstream passage should not be displayed as a stacked bar chart on top of upstream movement counts, as the resultant graph could be misinterpreted (i.e., for Figure 4.1-10, the data could be interpreted that there was net upstream movement of two Atlantic salmon when in fact it was only a single salmon). Instead, TC should graph net upstream passage as a linear function on the existing graphs, maintaining upstream and downstream counts as well as hour of day.	The stacked bar charts were intended to illustrate the relationship between upstream and downstream movement at different times of day. They are not cumulative values, but we concur that the figures could be misinterpreted and will replace the net upstream bars with a line plot on these graphs. We note that daily up and downstream counts and graphs (below the numerical data for each species) are provided in Appendix D of the study report.
16	17	FWS	4.1.4 Fish Passage and River Flows: [The report] states that, when calculating the ratio of passage flow to station flow at Wilder, Unit 3 discharge was applied to passage and not generation because it serves as the fish passage system attraction flow. While we understand that Unit 3 flow should not be counted twice in the calculation, assigning it to fish passage flow results in a	We believe the dual role that Wilder Unit 3 plays is more accurately represented by including it with attraction and passage flows than with other generation flows. The unit operates continually to provide station minimum flow, as well as attraction water during fish ladder operations, with much of that flow going to attraction flow (see Study 19

Comment #	Study #	Source	Comment	Response
			high ratio (average of 45 percent) which does not fully represent the dual role Unit 3 plays.	Section 4.4.1). If Unit 3 is not available (due to temporary unit outage), a Unit 3 bypass supplies the attraction water. The volume of attraction flow cannot be easily parsed out from Unit 3 total flows since it is dependent on head pond and tailrace water elevations and thus varies continually based on the range of generation levels from minimum flow to full generation.
17	17	FWS	4.2.1 Species Assemblage: On page 23 [the report] "Similarly, in Study 16 (Sea Lamprey Spawning Assessment) although attempts were made to collect fish for tagging from the Bellows Falls fish ladder, abundances were insufficient to feasibly collect there, so all tagged specimens were collected from the Vernon fish ladder and released in the Bellows Falls impoundment having not used the Bellows Falls fish ladder." From this statement it is unclear if the lamprey collected from the Vernon fish ladder and subsequently placed in the Bellows Falls impoundment were included in the Vernon passage counts or not. TC should clarify this issue.	The entrance to the Vernon fish trap is just upstream of the viewing window. Therefore, Sea Lamprey entering the trap were counted as passed upstream by the Vernon ladder for Study 17 purposes.
18	17	FWS	4.5 Post-Season Fish Ladder Inspection Results: A mid-year assessment of the Wilder fish ladder was conducted by TC on September 23, 2015. This assessment was undertaken based on problems identified during a site visit by Service hydraulic engineer Brett Towler on September 4, 2015. On page 65 [the report] states, "An observed inconsistency in water height over a number of weirs suggested some weir orifices might be blocked, causing water to pool higher than designed. The fish ladder was subsequently shut down, an inspection conducted, debris removed	We agree that the ladder debris may have led to potential under-utilization of the ladder and under-counting during that period. Appendix D documented passage at Wilder for eel, bass, walleye, trout, and sunfish during the same period (e.g., the 30 days from 08/25 – 09/23) indicating that passage was not entirely restricted by debris and alterations in water levels in some weirs. In addition, while various species used the ladder during this period, only trout used the ladder in any notable numbers (212 upstream, 214 downstream),

Comment #	Study #	Source	Comment	Response
			(maintenance personnel enter the fish ladder to remove debris), and the fish ladder put back into operation. The inspection found three areas where debris load likely altered normal operation. These were the same suspect areas identified during the FWS site visit. These problem areas were not identified during the previous week's routine inspection. Discussion with the working foreman revealed that a heavy debris load in the forebay was passed through the trash/ice sluice (next to the fish ladder exit) just a few days before the FWS site visit." While the problems identified during the mid-year assessment may have been due to the debris passed through the trash/ice sluice, we don't know for certain how long the passage issues occurred prior to being discovered by Mr. Towler; it may have been several days or it could have been much longer. At a minimum, the ladder was not functioning properly for several weeks during a time when data from the other ladders indicate at least some species were passing (e.g., eels, bass and sunfish); therefore, passage rates recorded in this study are potentially not a reflection of the true passage rate potential at Wilder.	and most other species numbers were very small (net upstream values 2 or less by species).
19	17	VANR	The assessment was not intended to determine the effectiveness of each fish ladder in passing resident riverine or diadromous fish species… [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.	We concur that the approved study plan did not include an assessment of fish ladder efficiency for one or more resident species. However, the study conclusion that there is little benefit to operating the ladders is more fully stated in the report to specify that operating the ladders for resident species beyond the current operating season for migratory species would provide little added benefit. This conclusion was based on the periodicity of passage that was documented, as well

Comment #	Study #	Source	Comment	Response
			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.	as on the overall numbers of fish that were observed passing in 2015.
20	17	FWS and VANR	The Agency requests…[that] in addition to individual species graphs, three additional plots 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.	Please see response to comment #14.
21	17	VANR	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 suggests that eels are attracted to the ladders when operating and will utilize them to pass, though effectiveness of this passage route is unknown. The Agency requests that TransCanada collect additional information on the effectiveness of the Wilder and Bellows Falls fish ladders facilities for passing American eel.	The request is for a new study to assess fish ladder effectiveness for American eel, but does not satisfy the FERC study request criteria (18 CFR § 5.9(b)). Additionally, based on the sum results of American eel studies conducted, we believe there are too few fish in the system to justify such a study at this time.
22	17	VANR	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	Please see response to comment # 14 above. The purpose of the study was to count passage and the study concluded that the raw count, particularly of residents, is inflated due to milling. In addition, the approved study plan did not include an assessment of fish ladder efficiency for one or more resident species, so the comment that observed movement both up and downstream

Comment #	Study #	Source	Comment	Response
			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.	could indicate ladder operational issues is speculative.
23	17	VANR	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.	Please see response to comment # 13 above.
24	17	VANR	Section 4.5: As indicated the Wilder fish ladder was visually inspected by a U.S. Fish and Wildlife Service, Fish Passage Engineer on September 4, 2015…Before the ladder was inspected on September 4, 2015, when was the last time the Wilder fish ladder was inspected	Please see response to comment #18 above. TransCanada's operating procedures for the fish ladders are per FWS design and direction, the operating procedures are followed, and the components of the structures are maintained as

Comment #	Study #	Source	Comment	Response
			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. Request: The Agency requests an additional year of study at Wilder, 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.	designed; the ladders are therefore operated as designed. The Wilder and Bellows Falls fish ladders were designed to pass adult salmon. The most efficient mode of operation for adult salmon is likely not the most efficient mode of operation for the range of resident species that used the Wilder ladder in 2015. TransCanada welcomes additional inspection of the fish ladder(s) by FWS. We respectfully disagree that an additional year of study at Wilder is warranted. As noted in response to comment #18, fish passed during the period in question. We do not believe that sufficient additional information would be gathered through another year of study to warrant the expense of doing so.
25	17	VANR	Appendix B: The general operation procedure for the Wilder fishway is relatively [1987] dated compared to the Bellows Falls [2012] and Vernon [2013] fish ladder procedures. The Agency requests 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.	Both Vernon and Bellows Falls fishway operations and physical elements were modified as a result of downstream passage implementation and unit upgrades (Vernon). Whereas downstream passage at Wilder utilizes an existing structure that did not require changes in the Wilder fish ladder design or operation. The more recent dates on the Bellows Falls and Vernon operating procedures were due to formatting revisions intended to align all operating procedures with TC's current format of such documents. The Wilder operating procedure has not yet been reformatted.
26	17	CRWC	CRWC endorses the Vermont Agency of Natural Resources position that without evaluation of the effectiveness of the fish ladders there can be no real	Please see response to comment # 19 above.

Comment #	Study #	Source	Comment	Response
			understanding of the value of the fish ladder to riverine resident species of fish.	

Study 19 – American Eel Downstream Passage Assessment

Comment #	Study #	Source	Comment	Response
27	19	NHFGD	Study 19 presents adequate data for evaluating passage at each of the three dams in the project area, but a better understanding of the cumulative effects of the three dams on downstream eel passage requires a closer look at the eels which were documented as passing multiple dams… Additional data should be provided for the following categories of eels: • Category 1: The 24 eels that were released above the Wilder Dam and passed all three projects. • Category 2: The 21 eels that passed the Wilder Dam and not detected at Vernon. • Category 3: The 44 eels that passed both Bellows Falls and the Vernon Dam. • Category 4: The 21 eels released above Bellows Falls, which passed Bellows Falls and did not pass Vernon. In a separate table, route of passage/total number of eels should be listed for each dam for the 24 eels that were released above the Wilder Dam and passed all three projects (Category 1). This should be compared with route of passage/total number of eels for the 21 eels that passed the Wilder Dam but did not pass Vernon (Category 2). The same comparison should be	The route selection study objectives were to evaluate routes of passage, travel time, and residency time at each project. The study was not designed or intended to evaluate survival or cumulative passage through multiple projects (including probability of detection at the next dam), nor to evaluate the fate of radio-tagged eels that did not pass. Survival was evaluated in the turbine survival portion of the study using HI-Z tag/ recapture methods. Had the route selection study been designed to evaluate cumulative passage through more than one project, other methods (e.g., inter-project manual tracking) would likely be employed. However, that evaluation was beyond the scope of the approved study. With regard to probability of detection at the next downstream dam, we note that 93 (not 98 as the comment indicates) eels passed Bellows Falls (Table 5.1.2-1). Any estimates developed for probability of detection would not be project survival estimates but rather, survival estimates over the entire reach between projects which account for all losses from all causes (e.g., predation, tag loss), and again was

Comment #	Study #	Source	Comment	Response
			done between eels in Category 3 and Category 4. Residency and travel times at each dam should be compared between eels in Category 1 and Category 2. The same should be done for eels in Category 3 and Category 4. The probability of detection at the next dam downstream should be calculated by passage route for the 45 eels that passed the Wilder Dam and the 98 eels that passed the Bellows Falls Dam. The individual routes taken by eels depicted in Appendix E (2D Maps of Eel Movement and Passage) should be color coded by the four categories of eels listed above).	beyond the scope of this study. We believe that color coding maps found in Appendix E of the report would not provide sufficient additional information given the added effort it would require and would essentially be identical maps. However, we could provide a table that lists each fish by the commenter's categories that can be compared to the applicable maps.
28	19	FWS	Turbine Survival Section 4.3.6 Assessment of Injuries: In the guidelines for classifying injuries in Table 4.3.6-1, it states that fish with no visible maladies that die within one hour of recapture are classified as a "non-passage related minor injury." The basis for making that decision seems highly subjective. It is unclear what a "non- passage related minor injury" could be, since after passing through the turbine, the eels are quickly retrieved. We can think of no non-turbine-induced causes of injuries to large eels during this short period of time spent in a deep tailrace before recapture. It is also unclear how reasonable it is to classify an eel's condition as "minor injury" if it died while being held for less than an hour. There is also a criterion [in the report] that states that an eel with multiple injuries is classified by the worst of	The commenter may have misread the second classification in the table, which states: A fish with no visible external or internal maladies is classified as a passage related major injury if the fish dies within 1 hour. If it dies beyond 1 hour it is classified as a non-passage related minor injury. This is the standard procedure for all HI-Z tag studies. This standard classification has proven to be reliable for the many studies conducted. During the present study only one eel of 33 that was assigned a minor injury status had multiple minor injuries. This one eel had a small bruise on its lower mandible and small piece of its caudal fin missing. These injuries combined would not seriously impact this fish.

Comment #	Study #	Source	Comment	Response
			its injuries. This is acceptable if an eel suffers minor and major injuries, but if an eel suffers a number of "minor" injuries such as scraping, eye bulging and partially hemorrhaged eye, it seems reasonable to classify these multiple maladies as significant enough for a "major injury" designation.	
29	19	FWS	Turbine Survival Section 4.4.1 Wilder: Without the evaluation of Unit 3, which has unique properties such as a small diameter and high speed runner, we will need to make inferences about turbine mortality through this unit based on the results of other turbine mortality studies done at other projects. Additionally, we have concerns about passage of eels through Unit 3 irrespective of turbine survival, as the use of Unit 3 discharge for fishway attraction flows puts any downstream migrants that pass through Unit 3 at additional risk. Screening of this intake to prevent any eel entrainment into Unit 3 and the associated fishway attraction water system will need to be considered.	Section 6.6-1 in the Study 23 report states, based on Franke et al. (1997): "Estimates for small fish (4-8 inches) under all scenarios for the Francis (Unit 3) turbine ranged from ~73-93%, and for larger fish ranged from ~50-75% for 15-inch fish and ~0-50% for-30 inch fish" (see also Table 6.6-1 in that report). Although Unit 3 could not be reliably tested because of the flow diversion through the fishway, the direct survival of the eels passed through Francis Unit 4 at Vernon can provide an indication of what survival could be through Francis Unit 3 at Wilder. The 48h survival of the eels passed through Vernon Unit 4 was 93.5% (SE 3.6%). The Vernon and Wilder units are similar in size at 5.2 and 6 ft., respectively. The Wilder unit does rotate faster than the Vernon Unit, 212 rpm versus 133 rpm. The Wilder unit has only one bucket more than the Vernon Unit, 14 versus 13. Based on the similar characteristics of the two units, adult eel turbine passage (turbine only) survival at Wilder Unit 3 should be similar to that obtained at the Vernon Francis unit. The Vernon Unit 4 blade strike probability (Franke et al. 1997) estimates were only slightly higher than Wilder Unit 3: 79.8-95% for small fish (4-8 in), 62.2-81.1 for 15-in fish, and 24.4 – 62.2% for 30-in fish (see study 23 report).

Comment #	Study #	Source	Comment	Response
				Additionally, once data from the FirstLight study becomes available, survival information for the single Francis Unit 1 tested at Station 1 can be compared to Wilder Unit 3 since they are similar units (unit 1 at Station 1 has 13 buckets, 4.5 ft diameter and rotation rate of 200 rpm). Screening of the Unit 3 intake to prevent entrainment of eels could be considered as part of potential mitigation but was beyond the scope of Study 19 to assess.
30	19	FWS	Route Selection Section 5.1.3 Wilder: Table 5.1.1-3 summarizes the number of eels that passed via each route and the proportion of river flow passed through that route. Based on data summarized in Figure 5.1.1-3, eel passage at Wilder was predominantly during hours of darkness with all passages between 5:00 p.m. and 5:00 a.m. As such, only flow data during the hours eels passed should be considered in the calculation of flow proportions to various routes depicted in Table 5.1.1-3. In addition, these pooled data do not provide a good sense of what options eels may have had as they approached the station. Since individual eel track information is available, providing data broken out by eel distribution among passage routes based on actual flows through available routes at the time of passage would provide better insight into the factors leading to route selection…These same comments also apply to the assessment of passage route data versus flow data at Bellows Falls and Vernon.	The study report addresses the first comment, as we understand it. Text just above Table 5.5.1-3 states "The proportion of flow through each passage route was calculated by dividing the passage route flow at the time of passage by the total discharge from the project at that time." The same calculations were performed for Bellows Falls and Vernon. The requested data on flows at the time of passage for each eel will be provided for all three projects.

Comment #	Study #	Source	Comment	Response
31	19	FWS	Route Selection Section 5.1.2 Bellows Falls: Results of migration and routing studies at Bellows Falls indicated that only 28 of the 45 eels, or only 62 percent of those that passed Wilder were detected approaching Bellows Falls. There is no information provided regarding the ultimate fate of the 17 eels that did not arrive at Bellows Falls. However, lacking that information, we note that the arrival data corroborate the turbine survival studies showing a 62.2 percent survival rate through Wilder.	As noted above in response to comment # 27 the route selection portion of the study was not designed to evaluate survival, nor was it designed to assess migration from one project to another. The ultimate fate of the 17 Wilder-passed eels that did not arrive at Bellows Falls is unknown, and conclusions regarding such are speculative. Based on the aborted Wilder unit 3 turbine survival test it is likely that most if not all of the eels that passed via unit 3 and did not arrive at Bellows Falls suffered injury or mortality.
32	19	FWS	Route Selection Section 5.1.3 Vernon: Results of migration and routing studies at [Vernon] indicated that 44 of the 65 eels, or 68 percent of those released at and passed Bellows Falls were detected approaching Vernon. As stated above, we have no information on the fate of eels that passed Bellows Falls. Based on turbine survival rates alone, a higher percentage of Bellows-released eels would have been expected to reach Vernon. The report should include an evaluation of what may be the cause of unexpectedly low numbers of eels released at Bellows Falls that arrived at Vernon.	Similar to our response to comment # 31 above, the fate of the 21 Bellows Falls-passed eels that did not arrive at Vernon is unknown as the study was not designed to evaluate the ultimate fate of the released fish.

Study 22 – Downstream Migration of Juvenile American Shad at Vernon

Comment #	Study #	Source	Comment	Response
33	22	FWS	Section 3.3 Turbine Survival: In this section, [the report] notes that "sample size requirements can be adjusted upwards or downwards to achieve desired statistical precision level if the initial assumption	Precision and sample size is based on 1h survival not on 48h survival, so adjustment of sample size can only be done based on 1h results. We did not expect to see such high delayed (48h) mortality.

Comment #	Study #	Source	Comment	Response
			deviates significantly during the course of the study." The consultant chose a threshold of greater than 95 percent survival for controls to aid in determining study sample size needs. The study results showed lower control survival during the delayed assessment and concluded, "only the 1hr survival estimate was deemed reliable." The report then states "similar high juvenile American shad mortality rates have occurred during the delayed assessment period in other Hi-Z tag studies conducted on the Susquehanna and Connecticut rivers." If it was known that control mortalities would be "high" based on past studies, why was a value of 95 percent survival selected? Safe and effective fish passage should include an understanding of survival beyond a one hour period. Monitoring of fish longer than one hour following a turbine passage event is intended to measure mortality due to effects that may not be evident in the period of one hour. The lack of this information prevents a full evaluation of turbine-induced impacts.	For the Vernon study, *1h survival* estimates had precision (Ɛ) levels that were within ≤ ±6%, 95% of the time; and the recapture rate for controls was 97.3%. Since the pre-specified precision level was achieved on *1h survival*, an *implicit assumption* in our sample size calculations, and we were not able to pin point exact causes of high control mortality (>20%) at 48h, it was not possible to adjust the sample size to improve control survival after the study had been completed. Most other studies of juvenile shad had delayed (48h) mortality in the 5 to 10% range although some studies had higher delayed mortality and higher 48h control mortality. All recaptured fish in this study were monitored for 48h. Since the delayed mortality remained high for both treatment and control fish computing a reliable 48h survival estimate is not possible. A primary effect of high delayed control mortalities to is to either produce estimates with wide confidence intervals or give nonsensical estimates (e.g., 48 h survival being higher than 1 h survival). However, examination of the injury rates, types, and severity gives an indication of the long term effects of turbine passage. Only 4.4% of the recaptured turbine-passed juvenile shad at Vernon were injured. If one assumes that these injuries would result in eventual death then the 48h survival for juvenile shad passing Vernon Units 4 and 8 could be as high as 95.6%.
34	22	FWS	Section 4.1 Route Selection: A total of 284 tagged juveniles released upstream arrived at the Vernon	Similar to Study 19 (see response to comment # 27), the route selection portion of Study 22 was not

Comment #	Study #	Source	Comment	Response
			Station/Dam. However, a total of 43 (or 15.1 percent) of the fish that arrived were never confirmed as passing. The report notes that the fate of these fish is unknown and those data are discussed no further. The data for these fish should not be dismissed and it should be considered that they may indicate indirect project-related effects, including predation. Information such as where the last known detection in the immediate project area was, whether they were concentrated in certain areas, or whether they were last detected among a variety of areas will provide valuable insight and should be described in the report.	intended to evaluate survival, nor to evaluate other causes of non-passage such as predation. The study objectives were to evaluate route selection, travel time, and residency only. While some predation is likely it cannot be quantified within this study's scope. In addition, even if tags were detected in a single area it cannot be known whether the shad were dead (from predation or other causes) and drifted into that location with river flow, or the shad were alive and potentially passed but lost their tags which stayed in that location.
35	22	FWS	Section 4.1 Route Selection: Radio tagged fish released upstream provide an opportunity to examine the number of those fish detected at the most downstream detection station (upstream of Stebbins Island) relative to the documented passage route through the station. We recommend that TC report the numbers of shad that passed through turbine versus non-routes relative to how many of those fish were subsequently detected the below-project antenna. These calculated proportions could then be compared to and contrasted with both the balloon-tag derived turbine mortality and through- project survival estimates.	As noted above, the route selection portion of the study was not intended to evaluate turbine survival. Additionally, working with juvenile alosids can be difficult, as they tend to be very delicate. Many tags can become detached during or after passage. The number of tags detected downstream would not be an accurate representation of the number of juvenile shad that continued downstream after passing via a turbine route.
36	22	FWS	Section 4.1 Route Selection: A continuous time series of river discharge is needed to place the reporting of radio tagged fish passage by river flow in a meaningful management context. Figure 4.1.3-5 shows radio-tagged passage by total project discharge which does not take into account that river conditions were variable over time.	The run timing (hydroacoustic) portion of the study provides information on flow conditions during the period of residency. In addition, the median residency time was 1 hour and 88% of all shad passed within 24 hours. Therefore, we believe that little meaningful information would be gleaned from additional analysis of radio tagged shad since most passed quickly. Table 4.1.3-3 presents the range of

Comment #	Study #	Source	Comment	Response
				flows at each passage route at the time of passage which varied widely, and Figure 4.1.3-5 illustrates that shad passed at a range of total flows indicating there is unlikely to be a management context to be discovered since it is evident that shad move at all discharges without apparent preference and quickly. We note that Appendix I of the study report includes residency time and proportional discharge from each discharge point at the time of passage for each fish, and we will provide project operations data for the period of the study (September 25 – October 30, 2015).
37	22	FWS	Section 4.2 Run Timing: The design, methods, data, results, and conclusory statements appear reasonable and supported. They also serve to further support the findings on radio tagged fish route use/timing (i.e., delay), with the acknowledgment that the ability to determine "delay" is not reliably possible with the limited single beam sonar.	We acknowledge and appreciate the comment. We also note that Section 5.2 of the study report states: "There was no evidence that juvenile shad accumulated in the forebay over the outmigration season, which would have been indicative of a migratory barrier or migratory delay." This statement supports the findings on radio tagged fish route use and median residence time of about 1 hour, with the acknowledgment that abundance trends do not indicate substantially longer residency times than what was observed by radio-telemetry. The limitation of the split-beam sonar to track individuals outside of the acoustic beam prevents residency time to be quantified on the observed temporal scale of residency time for juvenile shad.
38	22	FWS	Section 4.3 Turbine Survival: On page 60, [the report] states that all the Unit 4 fish were recaptured alive, yet the next sentence states, "the number of fish assigned dead for Unit 4 was 15." The first sentence should be revised to clarify that, of those released fish	We acknowledge the comment, and in lieu of revising the study report for this single clarification, we offer this revised/re-arranged text in the first paragraph of Section 4.3.1: *The number of fish assigned dead for Unit 4, Unit 8,*

Comment #	Study #	Source	Comment	Response
			that were subsequently recovered downstream, all were recovered alive.	*and controls were 15, 8, and 2, respectively. Of the recaptured fish, all from Unit 4 fish were alive; all but two from Unit 8 were alive, and all but one of the control fish were alive.*
39	22	FWS	Table 6.3-3 [in]…Study 23 identifies survival of 1 to 3 inch juvenile American shad from "EPRI source" data (1997) as ranging from 93.9 to 95.4 percent, with "calculated survival potential" ranging from 89.1 to 98.2 percent. However, in Figure 4.2.3-2 of this [Study 22] report it shows that during the reported peak period of outmigration, juveniles ranged in size from 85 mm to 110 mm (or 3.0 to 4.3 inches); with a reported mean length of 97 mm (3.8 inches). It would be more representative of actual fish passing Vernon station to report in Study 23 the anticipated survival of juvenile shad up to 4 inches. With this modification, the Study 23 report and Table 6.3-3 would better reflect site-specific conditions at Vernon and the expected decreased survival rates for larger juveniles.	Predicted survival rates for juvenile shad presented in Table 6.3-3 in the Study 23 report are representative of individuals encompassing the observed size range at Vernon. The range of values presented for the "EPRI Source Data" were taken from Winchell et al. and are representative of fish with a TL <100 mm (3.9 inches). The range of values presented for the "Calculated Survival Potential" are estimates obtained by the Franke formula for individuals with a body length of 4 inches. So the table entry for juvenile shad length would be more accurate if changed to 1 to 4 inches, and will be revised in the Study 23 report.

Study 23 – Fish Impingement, Entrainment, and Survival Study

Comment #	Study #	Source	Comment	Response
40	23	FWS	Section 3.1 Wilder: In Table 3.1-1 the calculated approach velocity for [Wilder] units 1 and 2 is given as 2.5 feet per second (fps), while later in the document the specified velocity is 4.3 fps. Based on an intake area of 1,314.4 square feet and a turbine capacity of 5,650 cfs, the approach velocity should be 4.3 fps. Therefore the error in the table should be corrected.	The study report presents an approach velocity of 4.3 fps for Wilder Units 1-2 in Section 4.4 and Table 4.4-1, and a value of 2.5 fps in Table 3.1-1. As noted in Table 3.1-1, both units 1 and 2 at Wilder each consist of two bays, each with a screen area of 1,314.4 ft^2 (total area 2,628.8 ft^2 per unit). Based on a turbine capacity of 5,650 cfs, the correct approach velocity should be 2.2 fps. The final report will be

Comment #	Study #	Source	Comment	Response
				corrected.
41	23	FWS	Section 3.3 Vernon: In Table 3.3-1 the calculated approach velocity for [Vernon] units 1 through 4 is given as 1.4 fps; however, that number appears to be based on an intake area of 764.4 square feet and a turbine capacity of 1,100 cfs. First, we note that the maximum hydraulic capacity listed for units 1 through 4 in the Pre-Application Document (PAD) was 1,465 cfs, not 1,100 cfs. [The report] should verify which capacity figure is correct. Second, the calculation uses the full rack area. In order to determine the maximum approach velocity, the minimum wetted rack area should be used (in this case that would be the rack area at elevation 212.0 Mean Sea Level; MSL). Using the capacity listed in the PAD and the minimum licensed pond level of 212 feet MSL results in an approach velocity of 2.08 fps. Using that same elevation but the lower maximum capacity of 1,100 cfs results in an approach velocity of 1.56 fps.	The "maximum hydraulic capacity" for each turbine unit presented in the PADs was based on theoretical design conditions rather than actual output. Units 1-4 have been modified from triple runner to single runner units since original installation which may affect actual discharge. The 1,100 cfs maximum capacity was obtained from the unit-specific flow efficiency curves which were used in the Ops Model, and is at the high end of operational discharges presently (typically 850-950 cfs). These values were used to provide consistency among these two studies. Although a rack elevation of 212.0 MSL does indeed form the lower boundary of the licensed operating range, under normal operations Vernon operates with a headpond value within the normal operating range of 218.6-219.8 MSL. That range is well above the upper intake elevation of 214.9 ft MSL
42	23	FWS	Section 4.4 Project Approach Velocities: As noted earlier, the maximum turbine discharges listed in the report differ from those specified in the PADs for the three projects…the discharges listed in Table 4.4-1 [should be verified as being] the correct ones.	As noted in the response to comment # 41, the maximum capacity for each turbine unit presented in the study report was obtained from the unit-specific flow efficiency curves which were used in the Ops Model. These values were used to provide consistency among these two studies and are more accurate, and different from the theoretical or design-based "maximum hydraulic capacity" values listed in the PADS.

Comment #	Study #	Source	Comment	Response
43	23	FWS	Section 5.2 Entrainment: [The report] states that one of the primary factors reducing entrainment potential at Wilder is the relatively deep intakes; however, deep intakes likely increase the entrainment potential for American eels. While there may be low numbers of obligatory migrants (e.g., eels) currently, this will not be the case once upstream eel passage is implemented at the projects. For Bellows Falls, one of the factors listed as reducing entrainment potential is the lack of a natural shoreline due to the elongated power canal. However, the power canal itself may increase entrainment potential for species utilizing the habitat it provides.	The first comment is noted. Primary factors listed in the report with a likelihood of either increasing or decreasing entrainment were intended to be representative of the fish community as a whole. There will obviously be individual species which may or may not conform to these generalizations due to their specific life history characteristics. American Eel is a good example of this. With regard to the second comment, the study report describes the Bellows Falls power canal which is constructed of paving stones and concrete and does not provide high quality littoral fish habitat.
44	23	FWS	5.2.2 Qualitative Assessment of Entrainment Potential: [The report states that] qualitative assessments of entrainment potential of target fish species and life stages were derived using a multi-step ranking based on habitat and life history, swim speeds, and empirical data from comparable hydroelectric locations. Although [the report] identifies species requiring downriver movement as being the most susceptible to entrainment, adult eels are only given a rating of medium at all three projects and adult shad are ranked as high/medium for the Vernon Project (Tables 5.2-4 through 5.2-6) for the Habitat and Life History factor. Likewise, for the factor of swim speed relative to approach velocity, in all cases adult American eel and adult shad are rated as having a low entrainment potential, presumably because their swimming abilities generally exceed the approach velocities. While the	The final report tables will be modified to reflect the nature of this comment relative to American Eel and American Shad.

Comment #	Study #	Source	Comment	Response
			scientific literature may support that these species/life stages have the physical ability to avoid becoming entrained at the project intakes, the "Low" rating does not account for the behavior of obligatory migrants to follow the dominant flow…[J]ust because they can avoid entrainment does not mean they will, if the prevailing flow field is through the intakes. In fact, results from the radio telemetry studies clearly show that adult eels exhibit high entrainment and adult shad exhibit medium entrainment levels (Wilder eels: 93 percent; Bellows Falls eels: 82 percent; Vernon eels: 77 percent; Vernon adult shad: 43 percent). Therefore, unless the rack spacing at the intakes physically precludes entrainment, we recommend the tables be adjusted to reflect more realistic rankings for these two factors.	
45	23	FWS	Section 6.1 Blade Strike Probabilities: Table 6.1-1 provides predicted survival of entrained fishes based on Franke et al. (1997) for the Wilder Project. According to the table, the input used for turbine efficiency was 73.3 percent for both the Kaplan and Francis turbines. While this efficiency matches the maximum discharge efficiency of the vertical Francis turbine provided in Table 3.1-2, it differs from the maximum discharge efficiency of the Kaplan turbines (79.1 percent per Table 3.2-1). We request that…the basis for using the chosen turbine efficiency [be explained]. Additionally, we request that…an explanation [be provided] as to why survival was only predicted for maximum discharge efficiency versus peak efficiency. It would be informative to compare predicted survivals between the two efficiencies.	The study report incorrectly retained the maximum discharge efficiency for the Francis unit into the calculations for the Kaplan units. That calculation will be corrected and the revised table of predicted survival rates will be included in the final report (see Table 6.1-1). There was no intention to limit presentation of predicted survival to only the maximum turbine efficiency. In general, predicted survival decreases slightly from maximum to peak efficiency for Kaplan units and increases or remains constant for Francis Units. As requested, summary tables for predicted survival at peak efficiency for each project unit will be provided in the final study report.

Comment #	Study #	Source	Comment	Response
			Further, survival should be predicted for the turbine(s) that provides the existing minimum flow release at each project (using the efficiency of the turbine at that flow). Finally, a more detailed explanation should be provided for the Correlation Factor applied to the equation (either 0.1 or 0.2). Based on our review of Franke et al. (1997), it appears that a lambda of 0.1 may be appropriate for Kaplan turbines but model results for Francis turbines, which were assigned a lambda equal to 0.2 based on Kaplan turbine results because no other reliable estimation method was available, showed that poor correlation between measured and calculated survival.	The range of correlation factors presented by Franke et al. (1997) for these predictive equations is 0.1 to 0.2. To account for the variation in correlation among this range of values and turbine types, both ends of the recommended range of values were included in the report tables. The report will be revised to include the requested information relative to survival at minimum flow turbines. We note that Wilder unit 3 is the minimum flow unit, at Bellows Falls all three units are identical, and at Vernon unit 10 or units 5-8 provide minimum flow.
46	23	FWS	Section 6.2 EPRI Source Data: In assessing turbine passage survival, [the report] relied on data provided in Winchell et al. (2000), which is a subset of the EPRI (1997) survival data. It would be helpful if the report included the Winchell et al. data as an appendix. Table 6.2-1 summarizes survival rates reported in Winchell et al. (2000) by size class for axial (e.g., Kaplan) and radial (i.e., Francis) flow turbines with runner speeds less than 300 rpm. While in some cases fish size may be more important than species for assessing fish survival potential, clearly this is not the case for all species. For example, it has been documented in a number of studies (…Study Report 19) that actual survival of American eels through Francis turbines is much higher than would be predicted by the Franke et al. (1997) equation. Further, no sites in the EPRI database assessed survival of adult American shad or any similar-sized fish (i.e., fish within	A copy of Winchell et al., (2000) will be provided as an appendix in the final study report. To our knowledge, the EPRI data set represents the largest and most recent source of full tailrace netting studies that exists. These types of field studies are extremely difficult and expensive to conduct and the desktop approach to evaluating impingement and entrainment probabilities following this approach and using this set of data has been accepted by FERC at numerous hydro relicensings. Overall, there has been little additional empirical study of larger fish including adult shad since the EPRI database was developed. With regard to adult shad, Franke's formula does not differentiate in survival between species, and only provides estimates of immediate (not delayed)

Comment #	Study #	Source	Comment	Response
			the size interval 15.1 inches to 20 inches). Therefore, calculating a mean survival for fish greater than 12 inches may do little to inform what the actual expected survival would be for a particular species. We also note that nearly 20 years has passed since the EPRI report was released. There likely have been a number of empirical turbine survival evaluations in the intervening years that could be used to update and recalculate mean survival rates. Further, the paucity of data for particular species of interest (e.g., adult American shad and adult American eel) speaks to the need for additional empirical studies and underscores the importance of TransCanada having undertaken such studies at its facilities.	survival. Recent studies at Conowingo can provide some supplementary information; however, the Francis units and to a lesser extent, Kaplan units at Conowingo have larger runner diameters and slower rotations than at Vernon so data may not correlate well. It has also been shown that the Franke blade-strike model under-predicted survival of adult shad in passage through the Francis turbine at Conowingo (Normandeau, unpublished data). We concur that mean survival values provide limited information but in the absence of better data on adult shad survival relevant to the Vernon units, we relied on the available estimates in Table 6.2-1 for fish > 12 inches (86.8-100%, mean = 93.4% through Kaplan units, and 36.1-100%, mean = 73.2% through Francis units).
47	23	FWS	Section 6.3 Potential Survival through Turbines: The Service believes this assessment is flawed for the reasons discussed under sections 6.1 and 6.2 above (at least with respect to adult eels and shad). In addition, it is unclear whether the values presented under the heading "Percent Survival by Fish Size" based on EPRI source data are the ranges for all species within that size range or in fact are the ranges for that particular species (we assume it is the former but clarification would be appreciated). It also is unclear whether the data represent the entire EPRI database or only those sites where control survival was less than 10 percent (the criteria used in Winchell et al. 2000). We recommend the data in Tables 6.3-1 through 6.3-3 be broken out by turbine type.	The qualitative assessment in the report (Section 6.3) is based upon available information provided in the EPRI dataset (as summarized in Winchell et al., 2000) as well as the range of predicted survival rates based on the Franke blade strike equation (as calculated for the study report). The qualitative rating system was taken directly from Winchell et al. (2000) and applied to the range of estimates. Data presented from EPRI in the study report is based upon all species within a particular size range and does not focus on an individual species. These estimates were taken directly from Winchell et al. (2000) which focused solely on size (not species) as previous literature has suggested size to be of greater importance relative to survival than species. The purpose of including Tables 6.3-1 through 6.3-3

Comment #	Study #	Source	Comment	Response
				was to summarize total project entrainment survival and the estimate ranges therein account for the different turbine types. Tables 6.1-1 through 6.1-3 include survival estimates by turbine type.
48	23	FWS	Section 7.0 Total Project Survival: [comment summarizes results]…Through project survival of adult shad at Vernon was not estimated. Although Table 7.1-4 lists survival rates, these were based on detection downstream of the various passage routes of [adult] shad fitted with radio telemetry tags as part of Study 21…and survival was to be assessed through the motion sensing capabilities of the radio telemetry tags; however, it is our understanding (based on information provided by FirstLight at a stakeholder meeting to discuss the radio telemetry data analyses) that there were problems with the motion sensing aspect of the tags and therefore, their use in determining survival was questionable. Further, at the recent Fish Passage 2016 conference, a paper was presented that showed dead eels released downstream of a dam traveled from 20 to 30 kilometers downstream 1 ; this finding suggests that mere detection of tagged fish downstream of a dam does not in and of itself document survival. Given the potential problems with using the motion sensing capabilities of the radio telemetry tags to determine survival, as well as the recent research regarding the mobility of tagged dead eels, the Service believes Tables 7.1-1 through 7.2-2 should be revised to exclude any survival estimates based on telemetry detection alone. In particular, we are concerned with	We cannot respond to information about FirstLight's adult shad study; however, the tags used in Study 21 (report filed August 1, after the time of this comment) were different tags than used by FirstLight (based on information in the FirstLight study plan). We encountered no problems with motion detectors on the tags used in Study 21; however data gleaned from them is not considered to be very reliable since they can be activated with any movement including from a dead/floating fish or a lost tag that moves with river flow. So while they may accurately pinpoint location, they may not accurately reflect the status or even presence of a fish. The comment about eels refers to radio telemetry conducted as part of Study 19 and motion detecting tags were not part of the study plan and were not used for adult eels. For purposes of Study 23 we reported the available data for each TC project including data on total project survival (e.g., turbine and non-turbine routes for migratory species) per the original study request by FERC and the approved study plan. With regard to turbine survival (the focus of Study 23) and in the absence of Vernon-specific turbine survival data for adult shad, we used Study 21 telemetry data which did indicate 100% survival based on tag detection and manual tracking

Comment #	Study #	Source	Comment	Response
			using these estimates for adult shad. As can be seen in Table 7-1 [developed by FWS and included in comments], while the balloon tag survival estimates for juvenile shad fall within the range of survival estimates via Franke et al. (1997), the 100 percent survival rates listed for adult shad based on telemetry detection are much higher than those calculated using the Franke et al. equations.	conducted as part of the spawning portion of the study. We respectfully note that the commenter's Table 7-1 (included in the comment letter) mistakenly labels data from Study 23 on proportional use of each route in relation to all other routes at each project as "Actual Entrainment per TC Studies".
49	23	VANR	Section 3.0 Study Area: Tables 3.1-1, 3.2-1, and 3.3-1 …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.	The comment is noted. An overlay of tighter spaced trash racks on the existing unit intakes would increase velocities in direct proportion to the increases in percent of open cross section area blocked by the extra bars required to reduce clear spacing. An increase in velocities will likely reduce entrainment of larger bodied fish but may increase entrainment of smaller bodied fish as their burst speeds would be too slow to avoid entrainment. Larger bodied fish unable to escape the existing velocities could be impinged on the screens rather than entrained. As trash rack spacing is increased, debris loading becomes a greater issue as well.
50	23	VANR	Section 4.4 Project Approach Velocities…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 [VANR] 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 [VANR] standard, and 9 and 10 are slightly above the standard at 2.1 fps.	The comment is noted. The study report (Section 4.4) calculated intake or approach velocities based on information on engineering drawings of the Wilder, Bellows Falls, and Vernon forebay/intake structures. As noted in our response to comment #40, the correct approach velocity for Wilder units 1 and 2 should be 2.2 fps. The final report will be corrected.
51	23	CRWC	CRWC agrees with the Vermont Agency of Natural	Study 23 was not designed to address questions

Comment #	Study #	Source	Comment	Response
			Resources that the spacing on the trash racks is too large and was not the focus of the study so TransCanada needs to undertake additional work to answer the question the study was designed to address. CRWC endorses the findings provided by the US Fish and Wildlife Service.	about the adequacy of trash rack spacing, but simply to estimate impingement/entrainment and survival potential under existing conditions including the trash rakes. See also response to comment # 49 above.

Study 24 – Dwarf Wedgemussel and Co-occurring Mussel Study

Comment #	Study #	Source	Comment	Response
52	24	FWS	Section 3.3 Selection of Delphi Participants: We had asked for the criteria used to select expert panelists. [The] report does not describe the criteria used; rather, it only lists the qualifications of the potential panelists. While the Service does not dispute that the five potential panelists listed are highly qualified, our concern is that the initial list was restricted to those five individuals. Based on peer-reviewed published literature alone, this list could have been greatly expanded [provides list of 10 examples]...It also bears noting that Crance (1987) states, "A panel consisting of about 10 experts is probably ideal, but more than 10 may be used if desired."	We note that FERC, in its January 22, 2015 study determination, stated "There are multiple accepted practices for developing HSCs based on quantitative field data, existing data, expert opinion, or some combination of these approaches. Any of these approaches may be adequate to meet the goals and objectives of this study." [emphasis added] The Report (Section 1) states: "[HSC] would be developed by reviewing and synthesizing existing data, and by soliciting input from regional experts using a Delphi approach." The report inadvertently omitted the criteria used (which was included in TC's May 31, 2016 response to comments on the March 1, 2016 USR). Criteria were: 1) research (field) experience; and 2) the collective works (peer-reviewed publications, books, and reports) of prospective candidates, particularly with dwarf wedgemussels. TC felt it necessary to identify and produce a panel of experts with DWM field experience and that field is limited.

Comment #	Study #	Source	Comment	Response
				The list of potential panelists was not purposely restricted but recognized the limited number of regional experts on DWM and habitat suitability. The report also notes in Section 3.2: "The Delphi process for developing HSC can vary according to several factors, including the number of participants, the number of available datasets from which to evaluate, the project schedule, etc". We respectfully disagree with the contention that the list of panelists could have been greatly expanded. A review of the ten individuals cited by FWS in its comment letter indicates that most would be considered ill-suited or unqualified for this study's goal of HSC development for DWM: two are geneticists, one is a statistician without significant DWM experience, one is a museum curator with an interest in phylogeny and evolution, but no direct experience in DWM or its habitat, and two have conducted surveys of mussels but have no published body of work related to DWM (one is primarily an ornithologist with experience in botany and herpetology). The remaining four individuals listed by FWS have published work potentially relevant to this study, and three of them are cited in the report (e.g., information from their work was used to develop the HSC for panel review). Three of them are associated with USGS (however one is primarily a fisheries biologist with limited published mussel research). Further, we contacted USGS in hopes of having a USGE panelist, but none suggested to us

Comment #	Study #	Source	Comment	Response
				were able to participate.
53	24	FWS	Section 3.4 Selection of Candidate Variables and HSC Curves: The Service supports evaluation of the seven variables listed. In addition, recent literature suggests an association between water temperature and presence of DWMs (positive relationship between DWM and groundwater influence; Rosenberry et al. 2016).	We acknowledge the comment supporting evaluation of the seven variables included in the report. The referenced study provides potentially interesting information; however, to our knowledge there is no data available that quantifies groundwater influence (location, flow, or temperature) within the study area to which this information might be correlated for purposes of developing and/or modeling HSC.
54	24	FWS	Section 3.6 Panelist Responses and HSC Revisions: According to [the report], Delphi "rounds" were repeated until each panelist indicated that all HSC curve revisions were "acceptable" to them, with "acceptable" not necessarily indicating complete agreement. According to Crance (1987), "The exercise is terminated when a consensus or an acceptable level of agreement has been reached on the curves." What constitutes an acceptable level of agreement is not defined in either the report or Crance (1987).	Although not specifically defined, it should be apparent that the definition of “acceptable level of agreement” used in this analysis was “that the panelist felt the HSC curve was adequate for use in modeling DWM habitat in the study area” (Section 3.3, page 7).
55	24	FWS	Section 4.0 Results: [The report] states that the Delphi process concluded after three rounds, with unanimous agreement on four variables and majority agreement on the three remaining variables. However, only two panelists commented and agreed to the third round curves for bed shear stress, relative shear stress and shear velocity. The fact that there was not consensus (or even agreement) on three of the seven Habitat Suitability Criteria (HSC) variables is very concerning. As we noted in our May 2, 2016 comments, if agreement cannot be reached among the panelists then we recommend adding	There was no dissent on the shear variables, rather one panelist chose not to comment on the shear variables. In our view, this represents consensus (agreement) among the panelists participating on those variables. As stated in response to comment #52, the pool of qualified panelists is quite small.

Comment #	Study #	Source	Comment	Response
			panelists and continuing with subsequent rounds until agreement on the curves is reached. This is particularly important given the very small number of panelists involved. Additionally, because the anonymity of the experts is maintained in the report, it is not clear whether either of the panelists who did agree on the curves has particular expertise in the hydraulic parameters being assessed. Again, enlarging the Delphi panel will help ensure there is sufficient expertise among the group to adequately inform curve development and increase the likelihood of achieving consensus.	
56	24	FWS	Section 4.8 Other Topics: [The report] explains how [TC] anticipates using the curves in the hydraulic habitat model to assess project effects: "...it is expected that a process similar to "effective habitat analysis" will be employed when modeling habitat over a range of peaking flows...This method fixes a specific location's combined suitability,...to the minimum value over the range of modeled flows....if a specific location yields a combined suitability of zero....that location will remain at zero suitability, even if conditions are suitable at other flows." While this description may be accurate, it also could be somewhat misleading. A more thorough explanation can be found in the Instream Flow Study Report for the Catawba-Wateree Project (FERC No. 2232; DTA 2005) [excerpted in the comment letter]…[That] description clarifies that a location will be given a suitability of zero if one of the flows in <u>that particular dual flow combination</u> is zero, regardless of whether the other flow assessed results in suitable habitat. This is an important distinction, as the point of "effective" or "dual flow" analysis is to evaluate what combination of flows results in the	The comment is noted. Once the analysis is complete the method employed to determine suitability will be explained in the final report.

Comment #	Study #	Source	Comment	Response
			greatest quantity of persistent habitat.	
57	24	FWS	Section 4.9 Next Steps: [The report] states that the draft HSC curves reflect the expert opinion of three panelists. Actually, only four of the seven curves reflect the opinion of three panelists, with the remaining three curves reflecting the opinion of two panelists. [The report states] the curves developed through the Delphi process will be evaluated, tested, and possibly modified based, in part, on preliminary modeling and analyses. As explained above, the Service does not support moving forward with curve evaluation and testing at this point in time. Following are our recommendations as to how the study should proceed from this point forward: 1.…[A]ttempt to add experts to the existing panel (preferably at least three more) in an effort to achieve consensus on the seven identified parameters. This likely will mean at least one or two more rounds of review. 2. Once consensus has been achieved on the HSC parameters, TC should convene a meeting of the Aquatics Workgroup to discuss the curves and obtain feedback on the curves as well as on the proposed analyses the curves would be used for within the hydraulic model (e.g., habitat time series, dual flow, habitat persistence, etc.). 3. Based on that feedback,…the curves[should be finalized] and conduct initial model testing. Results of these tests should be presented to the Aquatics Workgroup to obtain feedback prior to moving forward with full model runs.	Please see response to comment # 54 and # 55. We had hoped to receive feedback on the HSCs presented in the report as part of this round of stakeholder comments so that we could gain consensus and move forward with the modeling of the HSC curves and additional consultation. Based on comments received, there does not seem to be any issue with the accuracy of the curves themselves (with the exception of the depth curve discussed in our response to comment #58 below.
58	24	FWS	Appendices A through C: Delphi Round Summaries:	We note that optimal depth was changed to begin at

Comment #	Study #	Source	Comment	Response
			The initial depth HSC sent out to panelists has a suitability of 1.0 for depths from approximately 5 feet out to 20 feet. However, based on the supporting citations, it appears that optimal depths should be much shallower; of the five references, only one identifies DWM as being found at depths in excess of 3 feet. Therefore, it appears that the data collected during earlier phases of Study 24 may be disproportionately influencing curve development… it does not seem that sufficient justification exists for concluding that water depth up to 40 feet is optimal for DWMs… Basing HSC curves on mere presence of DWMs essentially lowers the bar on what truly may be optimal habitat, as those individuals may have been moved there by host fish, flows, etc. and may not be able to persist in that particular location long-term.	2 ft in the second round (rather than 5 ft). The panelists likely based their depth HSC decisions on the biology of the species rather than on existing data, i.e., is there a biological reason why depths >20 ft would not be suitable for DWM, given suitability of the other variables? One panelist said "I don't think depth is as important as other factors in determining DWM habitat suitability". Another panelist said "water depth is important for dwarf wedgemussels, but there does not seem to be an upper depth limit. In any waterbodies where they have been found, they have been found in the deepest areas that were surveyed (up to 25 ft in the Connecticut River)." Evidently the expert panelists did not think that depths >2 ft were a limiting factor for this species.
59	24	FWS	Water Temperature: On page 3 of the Round 2 summary, Panelist B stated that HSC should be selected that are relevant to project operations and, therefore, the panelist does not see the relevance of including groundwater influence or temperature sensitivity unless there are documented links to project operations… we are not arguing for the inclusion of a temperature metric as a stand-alone HSC curve, primarily due to the fact that TC was not asked to map groundwater seeps as part of this study or the instream flow study; therefore, data are lacking. We only want to clarify that a given parameter need not be directly related to project operations to justify its inclusion in the model.	The comment is noted, no response required; see also response to comment #53 relative to groundwater.
60	24	FWS	Round 3 Summary: On Page 2 of the Round 3 summary, a panelist suggests comparing site-specific data to the Delphi curves as a quality-control check. As	The Connecticut River data should be useful to help define the maximum/minimum ranges of suitable habitat, though they are likely to be insufficient to

Comment #	Study #	Source	Comment	Response
			noted above, there are very few site-specific data to compare; only a handful of DWMs were found in the 2014 surveys (transect-based and quantitative quadrat) and only qualitative information on the depth, velocity and substrate where DWMs were found in the 2011 and 2013 surveys has been made available through TC reports.	define optima.
61	24	TNC	[A]fter reviewing the May 16 USR, we did not find explicit criteria [for selecting experts], only a list of qualifications of each expert. Explicit criteria could have potentially justified the limited set of experts, but we can identify several other experts that have "research (field) experience" or "collective works (peer-reviewed publications, books, and reports" (May 31 letter, page 70) [lists examples from the USR Literature Cited section, and from Google Scholar]. We…remain concerned that the limited number of experts on the panel [was] not based on defined criteria and was therefore not justified, and has consequently potentially introduced significant bias to the Delphi panel process. Furthermore, because it deviates from the suggested guidance in Crance (1987), it should have been identified as a deviation from the study plan, and should therefore have been brought to the Aquatics Working Group for discussion and problem-solving.	Please see response to comment # 52 above. A review of the literature cited in the comment letter indicates that several were also cited in the study report (e.g., information from their work was included as part of HSC development for panel review). With the exception of research conducted by individuals associated with USGS, other research cited in the comment letter is quite limited and supports our position that the field of qualified panelists is very small. We respectfully disagree that the study plan (more accurately the Delphi-based proposal) deviated in any meaningful way from the guidance in Crance (1987) which states (p. 2) "The panel should represent a diversity of knowledge about habitat use…" and "…priority should be given to panelists who are knowledgeable about habitat suitability for the species." Again, that pool of panelists is limited and the panel was further restricted by USGS inability to participate.
62	24	TNC	In response to the concerns regarding the overlap in roles by the contractor, TransCanada indicated that it was not an issue that the contractor served both as an expert	Please see response to comment # 52, #54, #55, and # 61.

Comment #	Study #	Source	Comment	Response
			panelist, and developed the list of potential panelists. However, based on the limited justification for the expert panel selection, we remain concerned that there could have been bias incurred in this process. For example, there were only 2 experts who made the final decisions on the HSC for three of the habitat variables, and one of these experts was a TransCanada contractor. Furthermore, TransCanada made the decision on when there was an "acceptable" level of agreement, meaning that not all of the panelists needed to agree. Given the small number of panelists, the lack of agreement is concerning, and together with the weight of influence of TransCanada and its associated contractors, the potential for bias is extremely high.	We respectfully disagree that the process was biased or potentially biased. As stated above, the pool of qualified panelists is small and the number of available panelists even smaller at the time the panel was convened. We purposely removed the TC contractor from the role of moderator and brought in a well-qualified moderator unassociated with the DWM study precisely because we recognize the contractor first and foremost as a DWM expert. As noted above in the response to comment # 54 and #57 there was no "lack of agreement".
63	24	TNC	[B]ased on the above concerns, we find that the Delphi process was conducted in an inadequate manner, and suggest that FERC require TransCanada to conduct the Delphi process with at least 8-10 panelists. This may be done simply by conducting additional rounds with additional experts.	Please see response to comment # 52 where we note that FERC, in its January 22, 2015 study determination, stated "There are multiple accepted practices for developing HSCs based on quantitative field data, existing data, expert opinion, or some combination of these approaches. Any of these approaches may be adequate to meet the goals and objectives of this study." For the reasons stated in our responses above, we respectfully disagree that more panelists and more rounds would provide new or significantly different information useful to developing HSC for DWM. In addition, we note that the existing Delphi process (with 3 panelists) required almost 7 months from development of the transmittal letter to report preparation - 4 months just for the 3 panelists to

Comment #	Study #	Source	Comment	Response
				respond to 3 times – significant additional time would be required for a larger panel and would needlessly delay finalization of HSC and associated modeling of them.

Study 33– Cultural and Historic Resources Study

Comment #	Study #	Source	Comment	Response
64	33	CRWC	The Cultural Heritage study seemingly relies on documents that are not available to stakeholders. CRWC is interested on behalf of the Brattleboro Historical Society about Fort Dummer, an historic site that is now buried under the reservoir behind the Vernon Dam. It is our second hand understanding that the site has been incorporated into one of the historic documents but we have no idea which study or field assessment it appears in and no idea of what TC plans to do about the Brattleboro concern. We heartily endorse John Mudge's critique of this situation.	We refer the commenter to TC's June 2, 2016 Addendum to Responses that includes responses to comments received by the Brattleboro Historical Society. The public dissemination of reports that contain locational information for significant archaeological sites is restricted by federal and state laws that are designed to protect the sites from potential damage or destruction. Specifically, Section 304 of the National Historic Preservation Act of 1966 (36 CFR Part 800.11(c)(1) restricts disclosure of certain types of sensitive information regarding cultural resources, which may result in information developed under these acts being withheld from public disclosure under the FOIA exemption. The sensitive information most often pertains to archaeological site locations and contents. State law in NH (RSA 227 C:11) and VT (VSA Chapter 5, Section 317(20) also exempt archaeological site locations from the "right-to-know" law, which includes the confidentiality of archaeological site reports and their restriction from public distribution.

Comment #	Study #	Source	Comment	Response
				The NHDHR/SHPO has indicated that release of the reports be coordinated through the FERC in its role as the lead Federal agency for complying with Section 106 of the NHPA.
65	33	Mr. John Mudge	Section 13.0 of Study 33, page 32, is the list of literature cited in preparing the report. The study does not cite Where the Great River Rises, edited by Rebecca Brown and published in 2009 by the Dartmouth College Press and the Connecticut River Joint Commissions. Page 137 of that book is a much more complete and accurate list of selected Abenaki names in the Connecticut River watershed… That omission has resulted in the incorrect translation of Native American names. Study 33 omits any mention of Dartmouth College. Dartmouth College would undoubtedly be a natural source of information about the traditional cultural and history of the region [includes examples and detail]… The failure to utilize the resources of Dartmouth College is a significant omission on the part of TransCanada and the authors of the study. Study 33 fails to mention whether the authors made any contact with the New Hampshire state archeologist. Again, a failure to have requested the assistance of or get suggestions from the state archeologist is a significant omission on the part of TransCanada and the authors of the study.	The comment about *Where the Great River Rises* is noted and was mentioned at the meeting as well. This information will be reviewed and incorporated as applicable into the revised TCP report (pending additional consultation with Abenaki Tribe representatives). We note that the TCP report is a Section 106 compliance document, and is intended, per 36 CFR Part 800.4 "Identification of Historic Properties" (a)(2), to, "Review existing information on historic properties within the area of potential effects, including any data concerning possible historic properties not yet identified"; and 36CFR800.4(a)(4) "to assist in identifying properties, including those located off tribal lands, which may be of religious and cultural significance to them and eligible for the National Register.." With regard to Dartmouth College, it was not necessary to utilize such resources since relevant information was already provided for the report (by PAL the regional experts who had already done extensive research) including maps, archaeological reports related to the study area, and historical documents, including entire scanned books, book chapters, and articles relating to the Connecticut River and its Tribes.

Comment #	Study #	Source	Comment	Response
				The NH state archaeologist has reviewed and has had the opportunity to comment on all Study Plan 33 activities in New Hampshire throughout the course of the relicensing effort. PAL, which assembled the background information used to prepare New Hampshire sections of the TCP study, has reviewed all available site information on file at the NH SHPO and has been in regular contact with the NH SHPO staff throughout the course of the effort.
66	33	Mr. John Mudge	[I]t should be noted here that erosion on the banks of the Connecticut River has been a significant problem for Native American sites. Perhaps the reports from the Public Archeology Laboratory, PAL, will describe the erosion at some of the sites they have researched. Perhaps because the authors of Study 33 failed to consult with the New Hampshire State Archeologist, they did not learn about an area in Haverhill, New Hampshire, known as the Ingalls Site. In recent years that site was extensively researched before erosion destroyed it. The Ingalls site is one of the most famous Native American / archeological sites in the area.	PAL's Phase IA reports discuss observed erosion and erosion control history for all the recorded archaeological sites in the study area. The extent to which erosion has impacted the integrity of those sites subjected to Phase II investigation is discussed in those reports. The Ingalls Site (27-GR-112) in Haverhill, NH, was discussed extensively in PAL's Phase IA archaeological reconnaissance survey report for the Wilder Project (May 2013), was included in the list of areas recommended for Phase IB survey, and included in the list of pre-contact Native American archaeological sites presented in the Wilder PAD (Table 3.12-1). In 2015 TransCanada sought the landowner's permission to conduct Phase IB surveys on the site, but received no response. Until such time as investigations are permitted, the Ingalls Site will be treated as a significant archaeological site and will be included among the sites that will be subject to monitoring under the forthcoming Historic Property Management Plan to be prepared for the

Comment #	Study #	Source	Comment	Response
				Wilder Project.
67	33	Mr. John Mudge	In different reports and discussions I am referred to as the only landowner in New Hampshire who allowed PAL to dig on his property…this is the riverbank right beside where PAL conducted its digs in 2015 on the Mudge farmland in Lyme, New Hampshire. (photo included in comment letter)... According to the May 31, 2016, letter from TransCanada, "Response to Comments," this type of situation is classified as "eroding – vegetated." However, there is no vegetation here.	The comment refers to Study 1 – Historical Riverbank Position and Erosion Study which was filed as part of the March 1, 2016 USR. The commenter may have seen a draft map of the area intended to illustrate the type of mapping done for studies 2 and 3 which had not been filed with FERC at the time of the comment. However, we reviewed the photo and mapping of the property conducted as part of the current erosion studies. The area depicted in the photo was mapped as "eroding" while some other portions of the property including the area investigated for archaeological resources were mapped as either "eroding" or "eroding - vegetated". It is important to note (and the Study 3 report describes) that areas categorized as "eroding – vegetated" are considered just as unstable as those categorized as "eroding".
68	33	Mr. John Mudge	Lastly, on multiple occasions I have been told that I would be forwarded a copy of the PAL report describing the findings on the Mudge property. I have never received that report.	Our June 2, 2016 amendment to response to comments for reports filed March 1, 2016 discussed this issue. Mr. Mudge, as the property owner of the Lampshire Meadow Site (27-GR-232) is entitled to receive a copy of Phase II report prepared for that site. That report was filed electronically with FERC on August 1, 2016 and a hard copy was sent via Fed Ex to Mr. Mudge on August 3, 2016.