United States Department of the Interior

FISH AND WILDLIFE SERVICE

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In Reply Refer To: FERC Nos. 1892, 1855 and 1904 May 2, 2016
TransCanada Hydro Northeast Inc.
Connecticut River
COMMENTS ON STUDY REPORTS

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Dear Secretary Bose:

This responds to study reports filed by Normandeau Associates, Inc. (NAI) on behalf of TransCanada Hydro Northeast Inc. (TC) on March 1, 2016 as part of the relicensing of the Wilder, Bellows Falls and Vernon projects, located on the Connecticut River in New Hampshire and Vermont. On March 17 and 18, 2016, TC held meetings to discuss the study reports and TC submitted its study report meeting minutes to the Federal Energy Regulatory Commission (FERC) on March 31, 2016. TC provided 10 completed study reports and three interim study reports for review and comment. The U.S. Fish and Wildlife Service (Service) has reviewed the study reports and meeting minutes and offers the following comments. In addition, we are providing comments on two "in progress" studies (Study Nos. 21 and 24).

STUDY REPORT COMMENTS

Study 10 Fish Assemblage Survey

Objectives of this study include:

1. documenting fish species occurrence, distribution, and relative abundance within the project impoundments, tailwaters, and downstream riverine sections;
2. comparing historical records of fish species occurrence in the project-affected areas to study results; and
3. describing the distribution of resident/riverine and diadromous fish species in the project-affected areas in relation to data gathered by related studies, fisheries agencies' surveys, and other relevant information.

Appendices do not provide location information for each sample station.

Study 11 American Eel Survey

The objective of this study was to characterize the distribution and relative abundance of American eel (*Anguilla rostrata*) in the impoundments, riverine sections, and project-influenced portions of tributaries of the Wilder, Bellows Falls, and Vernon projects.

Methods

According to the approved study plan, American eel surveys within the mainstem Connecticut River would be conducted using a boat-mounted electrofishing system and surveys within selected project-influenced tributaries would be conducted by electrofishing. Sampling was to occur during the evening and night hours when eels are most active. In addition, eel trap stations were to be established at each mainstem and tributary location selected for electrofishing. Traps would be set with a 24-hour soak time.

In the study report, TC states that 102 mainstem river reaches were sampled by boat or portable (pram or backpack) electrofishing equipment as well as by overnight sets of bated eel traps. Twenty-four tributary reaches were similarly sampled. Boat shocking occurred at night but portable electrofishing was conducted during daytime hours due to safety concerns. Twenty-one of the 102 mainstem reaches and 15 of the 24 tributary reaches were sampled with portable equipment (i.e., during daytime). This shift in methodology represents a significant variance to the approved study plan.

Results and Discussion

A total of three eels were collected from two (out of 126) sample sites. Both of these sites were within the Bellows Falls impoundment (BFI). All eels were collected via boat electrofishing during evening/night hours.

Conclusions

TC acknowledges that the catch rates were very low but were characterized as "comparable" to previous sampling efforts; only two eels were collected over a 203.6-mile survey area in Yoder et al.'s (2009) fish assemblage and habitat assessment of the upper Connecticut River, and only 27 eels were recorded in 25 years of sampling within the vicinity of the Vermont Yankee Nuclear Power Plant. However, it should be noted that, unlike Study 11, the studies referred to utilized daytime sampling, as they were not designed to target American eels.

The Revised Study Plan stipulated that sampling "will occur during the evening and night hours (6:00 pm to midnight) when American eel are most active," but 29 percent of the sampling events occurred during daytime. All of the Wilder and Bellow Falls riverine reaches were sampled during the day, while nearly all (89 to 93 percent) of the impoundment reaches were sampled at night. The fact that all of the eels collected during the study were from night-time sampling indicates that catch rates would have been higher had all sampling taken place at night.

Regarding related studies being undertaken as part of the relicensing process, TC provides summary results and concludes that eel data collected during Studies 10, 11, 17 and 18 indicate a trend of decreasing numbers of eels with increasing latitude, and that eels are distributed in low abundance throughout the project-affected areas.

Service is concerned that the variance to the approved study plan affected eel catch rates (i.e., conducting many sampling events during the day rather than at night, as stipulated). We do not, however, dispute the general conclusion that it is likely that upriver reaches have lower eel abundance and density, given the lack of eel-specific passage measures at TC's projects and at the downstream Turners Falls Project, as well as the relatively large amount of available habitat between the dams. However, it is somewhat surprising that the few eels that were collected came from the Bellows Falls impoundment; if eel abundance decreases with increasing latitude, we would expect higher catch rates in the Vernon impoundment/Bellows Falls riverine reach relative to upstream reaches.

Study 12 Tessellated Darter Survey

The objective of this study was to characterize the distribution and relative abundance of tessellated darters (*Etheostoma olmstedi*) within project-affected areas by conducting a habitat-based field survey. Study sites were chosen in proportion to the available habitat types within a given river reach. At each of the randomly selected sites, three cross-river transects were randomly placed. Along each transect, 3-meter radius count circles were dropped at five locations roughly equally spaced from bank to bank. Within each count circle a diver quantified the number of tessellated darters observed and estimated the proportion of juveniles to adults. Freshwater mussel observations also were made and physical habitat and water quality data were collected at each sampling location.

A total of 263 tessellated darters were observed during sampling, with 80 percent determined to be juveniles. Spatially, most darters were collected from the Wilder Impoundment and this river reach also had the highest catch per unit area (CPUA), the highest mean CPUA per count circle and the highest maximum CPUA per count circle (35.4). At all river reaches sampled, the majority of darters were detected within the near-bank count circles. Most darters were observed in water depths less than 8 feet and where mean water column velocity was 0.6 feet per second or slower. Of the three substrate types where darters were observed, the vast majority were in sand/silt/clay habitat. Most darter observations occurred in count circles, with less than 50 percent submerged aquatic vegetation (SAV) coverage and less than 25 percent woody debris coverage. No federally listed endangered dwarf wedgemussels (*Alasmidonta heterodon*) (DWM) were observed within any of the count circles, but four (possibly five) other species of freshwater mussels were documented.

According to TC, observations of tessellated darters during the study were consistent with biological accounts documenting that darter habitat includes sand- and mud-bottomed areas, slow runs and backwater of small to large rivers. TC further states that individuals were regularly observed in areas of appropriate habitat (shallow, relatively slow moving, sand-mud substrates),

apparently referring to results from Study 10 (Fish Assemblage) as well as Study 12. However, results of Study 10 show that darters were collected from a variety of habitats. In Table 1 below, we consolidated study results, which show that 47 percent of the darters collected in Study 10 were from gravel/cobble substrate, with only 31 percent being taken from sand/silt/clay habitat. While soft sediment may be suitable darter habitat, it clearly is one of several types where darters were documented within the study area.

Table 1. Numbers of tessellated darters collected from different habitats during Study 10.

	Season			
Habitat	**Spring**	**Summer**	**Fall**	**Total**
Boulder	43	39	45	127
Gobble/Gravel	136	143	148	427
Silt/Sand/Clay	98	83	108	289
Tributary	34	23	18	75
Total	311	288	319	918*

* Note that this total differs from the total referenced in the Tessellated Darter Study Report. These data were taken directly from Study Report 10 Appendix A.

Further, in Table 2, we present the contrasts the numbers of darters collected within different river reaches between the two studies. Although nearly 80 percent of darters sampled from all river reaches were collected within the Wilder Impoundment during Study 12, less than 20 percent of the darters were found in this reach during Study 10, with nearly 70 percent being collected from the Wilder and Bellows Falls riverine reaches (32 and 35 percent, respectively). There could be a number of reasons for the observed differences between the two studies. For example, it may be easier for divers to see tessellated darters against a sand/silt/clay substrate versus a cobble/gravel substrate, given their cryptic coloration. Regardless, we recommend that the study report acknowledge and attempt to explain these differences rather than ignore them.

Table 2. Numbers of tessellated darters collected within different river reaches during the course of conducting Studies 10 and 12.

	Study 10		**Study 12**	
Study Reach	**Count**	**%**	**Count**	**%**
Vernon Riverine	2	0.2	1	0.4
Vernon Impoundment	77	8.4	2	0.8
Bellows Falls Riverine	297	32.4	6	2.3
Bellows Falls Impoundment	50	5.4	37	14.1
Wilder Riverine	321	35.0	9	3.4
Wilder Impoundment	171	18.6	208	79.1
Total	918		263	

Study 16 Sea Lamprey Spawning Assessment

TC issued an interim study report for the Sea Lamprey Spawning Assessment study. Objectives of this study were to: (1) identify suitable spawning habitat within project-affected areas; (2) use radio telemetry to document where sea lampreys (*Petromyzon marinus*) spawn within project-affected areas; (3) conduct surveys at spawning sites to document suitability; (4) collect physical habitat data where lamprey nests occur; and (5) assess potential effects of project operations on spawning habitat.

Results from Study 7 – Aquatic Habitat Mapping were used to identify potential spawning habitat, and a subset of these sites was chosen for monitoring lamprey spawning activity. In addition, 40 lampreys were radio-tagged and followed within the project area. Spawning habitat was assessed at 23 sites, although lampreys were not visually observed or tracked to all of those sites.

Based on study results, lamprey nests were documented at 16 of the 23 habitat assessment sites. Four of the 23 sites were determined to not have suitable habitat. TC-tagged lampreys were tracked to 15 of the 23 sites, and lampreys tagged downstream for studies at the Turners Falls and Northfield Mountain projects (FERC Nos.1889 and 2485) were found at two additional sites. Dewatering was observed at nine of the 23 sites. Caps were placed on nests at three sites, but due to high flows, no larvae were caught. Twelve TC-tagged lampreys were not tracked to any of the habitat assessment stations.

SERVICE COMMENTS

- The way the results are reported is confusing. For example, the narrative summary of Assessment Station BT31 indicates that one potential lamprey nest was documented during the supplementary low-water survey, while Table 5.2-1 has a "Y" under the Nests column and Table 5.2-2 shows no nests at this site. Table 3 below is our attempt to try to consolidate all related data.

- The report should provide an explanation as to why four sites identified as having suitable habitat based on habitat mapping were subsequently determined to have unsuitable habitat based on field observations.

- According to the Site Selection Report for Study 16, redds would be monitored at 20 sites. Those 20 sites were to be determined based on radio-tracking tagged fish, supplemented as needed by some or all of 20 selected habitat survey sites; however, it appears that the way the study was carried out, the habitat survey sites were the primary means of selecting where to monitor for spawning activity. The result was that only 16 of the 23 sites surveyed included redds (four short of the stipulated 20). It is unclear from the report if redds were documented at non-assessment site locations to which tagged lampreys were tracked. If tagged lampreys were tracked to locations within project-affected areas and redds were found, TC should explain why those locations were not included in the study.

- In the Assessment Station summaries, TC states that for a number of sites where lamprey nests were dewatered, suitable substrate was available in deeper water. However, substrate alone does not determine suitability, as depths and velocities also need to be within a certain range. The fact that nests were found in sites that became dewatered could reasonably be assumed to indicate that site had more suitable habitat than the deeper site.

- For the project effects analysis, a determination of "no project effects" was assigned to sites where no nests were identified; however, just because nests were not built in 2015 does not mean they will not be built there in future years. The Service recommends that the project operations effects analysis include all areas with suitable habitat regardless of whether nests were documented in 2015 or not.

- Of the sites with suitable habitat and lamprey nests, project effects analysis showed that nests were exposed up to 38.4 percent of the time, with the number of exposure events ranging from 4 to 53 at a given site. The duration of exposure ranged from 1 hour to 276 hours. When looking at the number of nests dewatered (15) relative to the total number of documented nests (42), it appears that 36 percent of the nests were dewatered. Again, this analysis was based on 2015 operations and water level logger data. Water level loggers were deployed from May 15 to July 15 in 2015. June exhibited higher than average flows at Bellows Falls (about 137 percent more than average) and Wilder (double the 10-year average); therefore, the results represent a "best case" scenario with respect to level of peaking operation impact. Under more typical June flows, the project would be expected to operate in a peaking mode more frequently and with greater flow fluctuations, which would likely increase the number, duration and extent of exposures. Therefore, the Service recommends that the analysis of operations impacts be expanded using the hydraulic model to represent the range and frequency of operations based on long term hydrography, and not based solely on a single-study year.

- There appear to be discrepancies between on-site observations and operations analysis results. For example, Figure C-8 of Appendix C indicates that water surface elevation fluctuations at Site BT3 would not dewater the nest observed there; however, during the supplementary low-water survey, the nest was noted to be dewatered. TC provides no explanation for this discrepancy, which calls into question the accuracy of the water level logger data and/or the method of analysis. It should be noted that the logger for Site BT3 actually was located in the vicinity of the lamprey habitat, whereas seven other loggers were anywhere from 0.2 mile to nearly 2.5 miles away from the associated lamprey habitat assessment site. Given the importance of determining water levels at the actual spawning site, TC should have installed water level loggers at habitat assessment stations that did not already have them.

- According to TC, due to access and safety issues, only three redds were capped. No ammocoetes were collected from the nest capping effort. However, even if ammocoetes were collected, TC would not be able to determine if project operations affected

spawning success, because all the capped redds were from sites shown not to be affected by project operations, based on the water level logger data.

Table 3. Summary of data provided in Study Report 16.

Habitat Assessment Station	Tagged Lamprey[A]	No. Nests	Substrate	Embeddedness	Suitable?[B]	WLL at Site?	WLL ID	WLL location	Dewatered - Observed	Dewatered-WLL analysis	Nest Cap?
WL1	200	3	gavel-cobble	moderate	Yes	No	15-WR-002		yes; 2/3	same	
WL2		5	gravel-cobble	moderate	Yes	No	15-WR-002	0.62 mi u/s	yes; 4/5	same	
WL3	163	0	sand-cobble	low	No/Yes	No			NA		
WL4	179, 195	0	gravel-cobble	moderate	Yes	No?	15-WI-03	0.19 mi u/s	NA		
WL5		3	gravel	negligible-low	Yes	Yes	15-WI-05		yes; 1/3	same	
WL6	186	3	gravel	low-moderate	Yes	Yes	15-WI-06		no	same	
WL7	171, 181	4	gravel	negligible-low	Yes	No	15-WI-06	0.68 mi u/s	yes; 1/4	same	
BT3	162, 167	1	gravel	high	Yes	Yes	14-BT-02		yes, 1	none	
BT4	171, 180, 181, 197	1	gravel	moderate	Yes	No	14-BT-02	2.48 mi d/s	not specified		
BT6	177, 178, 184, 186, 188, 196	0	gravel	low-moderate	Yes	Yes	14-BT-01		NA		
BT13	180, 183	2	gravel-cobble	low-moderate	Yes	Yes	14-BT-13		yes; 1/2	same	
BT18	187	10	sand-cobble	negligible-high	Yes	Yes	Study Specific		not specified	same	Yes
BT31		0	gravel	low-moderate	No/Yes	Yes	14-BT-31		NA		
BL1		6	gravel-cobble	negligible-moderate	Yes	No	15-BL-02	1.24 mi d/s	yes; 1/6	same	
BL2	192	3	gravel-cobble	negligible-low	Yes	Yes	15-BL-02		no	same	
BL3	165, 169, 170	4	gravel-cobble	low-high	Yes	No	15-BL-02	1.12 mi u/s	no	same	
VT14	170, 189	0	gravel	moderate	Yes	Yes	14-VT-14		NA		
VT16	173, 175, 176, 191	4	cobble	negligible-low	Yes	Yes	Study Specific		no	same	Yes
VT18	161,	4	gravel-cobble	negligible-low	No/Yes	Yes	Study Specific		not specified		Yes
VT40		0	gravel	high	No/Yes	Yes	14-VT-40		NA		
VT46		0	gravel	high	No/Yes	Yes	14-VT-46		NA		
VL1	KA fish: 51, 56, 62, 102, 110,	6	gravel	negligible-high	Yes	No	15-VI-02	0.62 mi d/s	yes; 1/7		
VL2	112, 115, 116, 117	11	gravel	negligible-high	Yes	No	15-VI-02		yes; 3/11		

[A] Blue represent early-run tagged fish; orange are mid-run tagged fish; and red are late-run tagged fish

[B] No/Yes indicates there was no suitable habitat at the assessment site but TC did find suitable habitat upstream

Study 18 American Eel Upstream Passage Assessment

The objective of this study was to provide baseline data on the presence and areas of concentration of American eels (*Anguilla rostrata*) attempting to move upstream of the Vernon, Bellows Falls and Wilder dams. Visual surveys were conducted weekly in areas of likely concentration below each of the dams. In addition, 10 baited eel pots per project were set overnight once per week. If/when locations of eel aggregations were identified through either visual surveys or eel pot collections, eel trap passes were to have been deployed. Due to low catch rates and lack of identification of aggregation areas, no eel trap passes were deployed.

Results

No eels were observed at any of the fourteen survey sites or collected in the eel pots at Wilder. One eel was observed near the fish ladder entrance and two were collected in eel pots (one at the fish ladder entrance and one at the base of the dam in the bypass reach) at Bellows Falls. Eighty eels were observed at Vernon, with the majority being observed at sites 8 and 15 (below one of the powerhouse-side tainter gates and within the fish ladder, respectively). Seventy percent of the

eels observed/collected were greater than 12 inches long and 30 percent were less than 12 inches long.

While not a direct objective of Study 18, environmental data such as precipitation, dam discharge, water temperature, and "lunar illumination" were recorded. TC notes that, while more than half of all observed eels were seen during nights devoid of moon light, eels were also observed on nights with lunar illumination in excess of 75 percent (23 of 80 total eels) and therefore the relationship between lunar illumination and timing of eel upstream migration is unclear.

Based on our review, the data appear to indicate an inverse relationship between numbers of eels observed and lunar illumination; most eels were observed on low light evenings. Additionally, we researched moon phases for the period May 2015 through Oct 2015 and determined that the new moon coincides with larger pulses of observed eels at Vernon. In fact, the largest pulse on July 15 is the exact day of the new moon. However, we concede that the data set is limited and that other factors likely come into play.

Discussion

Based on study results, TC states that no concentrations of eels staging below or trying to ascend the dams were identified. However, TC notes that, based on the numbers of eels observed using the Vernon ladder during the course of Study 17, eels were more attracted to the fish ladder (which was only operated for the riverine fish passage study) than other wetted areas across the dam, and raises the question as to whether higher numbers of eels would have been detected at other locations had the ladder shut down as it normally does after the anadromous fish passage season.

TC does not draw the same inferences at Wilder and Bellows Falls with respect to attraction to the ladders as it did for Vernon, apparently based on the relatively lower ladder passage numbers (52 at Wilder, 60 at Bellows Falls versus 1,545 at Vernon). While eel passage rates in the ladders were lower at the upstream two projects, they still suggest (particularly in the context of the very low numbers of eels observed or caught as part of Study 18 at those facilities) that the ladders likely attract eels. The fact that two of the three eels observed at Bellows Falls were at the fish ladder underscores this supposition. Given that the overall abundance of eels available to attempt to pass the Bellows Falls and Wilder projects is lower than at Vernon, it is not surprising that passage rates were lower at those facilities.

In discussing the issue with lack of catch in the eel pots, TC hypothesizes that the low numbers of eels present below each dam may have made eel pots an ineffective sampling method. We do not know why the eel pots did not catch eels but doubt it is related to overall eel abundance in the vicinity of the dams. Dozens of eels were observed along the base of Vernon Dam and nearly 40 were observed in the ladder (with an additional 1,545 documented passing via the ladder in Study 17); clearly, eels were present in densities that should have resulted in successful eel pot captures. A more likely hypothesis is that eels were attracted to the fish ladders, which operated

throughout summer. Eels using the ladders (i.e., actively migrating) may not have been interested in feeding and thus, did not enter eel pots located in the vicinity of (or within) the ladders.

As noted above, TC questions whether more eels would have been observed at other wetted locations had the fish ladders not been operating. The Service shares this question, which supports our request that TC conduct a supplementary study (only at Vernon) in 2016 to determine if there are discernible areas of eel concentration during periods when the fish ladder is not operating at its normal capacity flows as it was in 2015. Collecting this data and installation of an eel trap in the lower Vernon ladder will also help identify if alternate ladder operations could result in higher passage rates for eels. Therefore, the Service recommends that TC repeat Study 18 in 2016, using visual observations at wetted locations along the dam and near and along the fishway entrance area, and placement of an eel trap within a lower portion of the Vernon fish ladder.

In accordance with the approved 2015 study plan, TC should again plan to install temporary eel trap passes at any locations where adequate concentrations of eels are found through visual surveys. TC should determine the location, design, and operation and attraction flows of the eel trap pass within the fish ladder and at any other sites found to have eel concentrations, in consultation with the agencies and Dr. Alex Haro of the USGS Conte Anadromous Fish Research Center. We note that a similar study using an eel trap located in the lower part of a fish ladder was successfully conducted in 2015 at the Turners Falls Project as part of a FERC-approved study plan for that project.

By requesting this study, TC should not infer that the Service will not seek expanded ladder operation as part of any new license issued for the Vernon Project, as that cannot be determined until after review of the riverine fish passage study report yet to be filed. Rather, this study request is intended to obtain additional information to better understand the relative benefits and drawbacks of different fish passage scenarios to assist us in developing recommendations and prescriptions as part of the relicensing process.

Study 21 American Shad Telemetry Study

Although TC has yet to release the report for this study, it did provide an update during the March 17-18, 2016 Study Report meetings, including preliminary results and proposed methods of analyzing the data.

Study objectives include characterizing effects of project operations on adult American shad behavior, approach routes, passage success, survival, and residency time as they move through the Vernon Project during both upstream and downstream migrations. Related study objectives are to: (1) assess near-field attraction to, and entrance efficiency of, the Vernon fish ladder; and (2) characterize project operation effects on post-spawn downstream migration route selection, passage efficiency, downstream passage timing residency, and survival related to the Vernon Project.

According to information provided by TC at the March 17-18, 2016 meeting, it intends to analyze the upstream passage telemetry data to determine fishway attraction effectiveness, upstream fish passage efficiency, and upstream fish passage effectiveness. All of these analyses involve calculations using direct proportions of the number of tagged shad at a certain location relative to all tagged fish available.

The Service believes that, while the analyses proposed by TC will provide useful information, they are insufficient to achieve the stated study goals of assessing project operations effects on shad behavior, approach routes, and passage success. Data analysis requires consideration and accounting for time-varying covariates (e.g., turbine discharge, river discharge) that must be examined at an appropriate time scale and rate to examine and understand any potential effects and how those effects may vary under different conditions.

The Service needs to understand not only proportions of shad passed but the rates of passage, which require use of more recently developed and established analytical approaches of telemetry data at fishways, such as the time-to-event analysis described in Castro-Santos and Perry (2012). In their paper, the researchers state "Because passage at obstacles is a time-based process, almost any study of fish passage is likely to encounter time varying covariates, and analytical methods that do not explicitly include these processes will always contain systematic errors" (Castro-Santos and Perry 2012). TC's consultant, NAI, has experience with time-to-event analysis with shad telemetry data from its work on the Lockwood Dam, Kennebec River, Maine and will be using this same approach this year in an evaluation of shad passage/behavior/movement at the Holyoke Project (FERC No. 2004) in Holyoke, Massachusetts. In addition, FirstLight Power is proposing to use a time-to-event approach in analyzing data associated with a shad telemetry study for its Turners Falls Project (FERC No. 1889).[1]

As explained in Castro-Santos and Perry (2012), this time-to-event analysis uses a proportional hazards regression (Cox Regression) to account for when tagged fish are detected in monitored areas (i.e., near-field fishway entrance) and either proceed to the next event (i.e., entry of fishway), remain in the tailrace, or leave the area, and how those actions/events relate to project operations (e.g., generation, spill, etc.). Comparable parametric methods have recently been described by Zabel et al. (2014), who showed similar benefits. In the later discussion section of Zabel et al.'s (2014) chapter, matters of direct application to downstream passage of adult shad at Vernon are discussed, such as the plots explaining differences in the percent of fish arriving at an entry zone to "spillway" or "turbines" under both high and low spill.

The Service recommends that TC include a time-to-event analysis; this analytical approach will help achieve the stated study goal, is consistent with using the best available scientific approaches, and is consistent with FL's proposed method of analyzing similar project operations effects.

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[1] Minutes from FirstLight Hydro Generating Company's March 8, 2016 meeting to discuss its proposed analysis of telemetry and PIT data for Study Report 3.3.2: Evaluate Upstream and Downstream Passage of Adult American Shad. http://www.northfieldrelicensing.com/Lists/Document/Attachments/362/Memo_Up_Downstream_American_Shad_Proposed_Analysis.pdf (accessed April 2016).

Study 24 Dwarf Wedgemussel and Co-Occurring Mussel Study

The objectives of this study were to assess the distribution, population demographics and habitat use of DWM in project areas and assess the influence of flow regime (including project-induced flow fluctuations) on DWM and its habitat.

During the March 17-18, 2016 Study Report meetings, TC provided an update on Study 24. All of the field work has been completed. The remaining tasks include developing habitat suitability index (HSI) curves for DWM that will be used in the instream flow study analysis to determine project effects. In the Updated Study Report submitted by TC on September 14, 2015, TC stated that five panelists had agreed to participate in the Delphi process. However, at the March 17-18, 2016 study report meeting, TC's consultant informed the stakeholders that only three panelists were actively participating in developing the HSI curves. One of the panelists was the person who had developed the background information and questionnaire that was sent out to prospective panelists and who initially had been identified as the Delphi facilitator (but who has since been replaced by another person).

Delphi group guidance (Habibi et al. 2014) recommends:

- that there are three "separate" groups: (1) the decision makers, (2) a person or group designing the initial questionnaire, and (3) the respondent group or panel. Given what has transpired, there has been no clear separation between the latter two groups;

- number of panelists: literature suggests a minimum of 5, with between 6 and 10 being ideal (Habibi et al. 2014). There are only three active panelists in the DWM Delphi process; and

- avoiding "overrepresentation" by stakeholders or individuals from a single agency, interest group or geographical area. Presently, both the moderator and one of the panelists (i.e., one third of the expert panel) are associated with TC.

The new Delphi moderator (a representative from NAI) informed stakeholders during the March 17-18, 2016 study report meeting that, after two rounds of input, the panel was having difficulty reaching consensus on three of the five parameters. The moderator suggested that if consensus could not be reached after a third round, the remaining curves would be developed based on feedback from the panelists who could reach agreement.

The purpose of the Delphi technique is to gain consensus from panelists who have expertise in a particular area. The number of review rounds should not be the basis for reaching agreement; rather, reaching a consensus is a basis for ending the review rounds (Habibi et al. 2014).

If a composite value is in favor of the two agreeing panelists and the final panelist is in dissent, then adding additional panelists (ideally two or more) for subsequent rounds may help reduce the uncertainty in the suitability scores. Further, the number of panelists on a team could affect

composite scores, depending on the method used to calculate them, therefore this is a concern with only three panelists now on the DWM team.

Given the concerns detailed above, the Service recommends that TC provide all of the materials related to the Delphi process, including:

- the criteria that were used for expert selection;
- the list of experts who were solicited and why;
- names of the five panelists mentioned at the September 14, 2015 meeting;
- names of the current panelists;
- a copy of the questionnaire that was developed and sent to panelists;
- round 1 and 2 data values;
- HSI curves developed so far; and
- reviewer feedback.

This information is needed now so that the Service can assess the status of the Delphi panel deliberations and potentially recommend additional panelists to help achieve consensus on the remaining issues. Given that HSI curve development has substantial implications on the assessment of project impacts on a federally listed species, we believe that the panel moderator should not allow the panel to proceed with developing HSI curves for parameters where consensus has not been achieved (i.e., should not be allowed to ignore the dissenter's viewpoint).

COMMENTS FROM OTHER AGENCIES

In addition to the above comments, we endorse the comments and recommendations provided by the New Hampshire Fish and Game Department and Vermont Agency of Natural Resources (VANR) on Study 10 – Fish Assemblage, Study 13 – Tributary and Backwater Fish Access, and Studies 14 and 15 Resident Fish Spawning, and VANR s comments on Study 8 – Channel Morphology and Benthic Habitat.

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

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

Literature Cited

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