Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

July 12, 2013

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

COMMENTS
Northfield Mountain Pumped Storage Project No. 2485
Turners Falls Project No. 1889
Updated Proposed Study Plan

Dear Secretary Bose,

The Massachusetts Division of Fisheries and Wildlife (Division) is the agency responsible for the protection and management of the fish and wildlife resources of the Commonwealth. The Division is also responsible for the regulatory protection of imperiled species and their habitats as codified under the Massachusetts Endangered Species Act (M.G.L. c.131A). The Massachusetts Endangered Species Act (MESA) was enacted in December 1990. Implementing regulations (321 CMR 10.00) were promulgated in 1992 and recently revised and implemented as of November 2010. The MESA provides a framework for review of projects or activities that occur within mapped areas of the state, called *Priority Habitat*, and published in the Natural Heritage Atlas. As such, we monitor operations at hydroelectric projects within the Commonwealth, as well as comment on proposed hydroelectric facilities. The Division has the following comments in response to the June 28 filing of FirstLight Hydro Generating Company "Updated Proposed Study Plan for the Turners Falls Hydroelectric Project (P-1889) and Northfield Mountain Pumped Storage Project (P-2485)."

General Comments:

In general FirstLight has attempted to incorporate the comments and suggestions received from stakeholders on the April 15, 2013 Proposed Study Plan (PSP). A few issues remain.

Division of Fisheries and Wildlife
100 Hartwell Street, Suite 230, West Boylston, MA 01583 (508) 389-6300 Fax (508) 389-7890
An Agency of the Department of Fish and Game

3.3.2 Hydraulic Study of Turners Falls Dam Impoundment, Bypass Reach and below Cabot Station

Page 3-53 of the Study Plan should reference collection of transects associated with state-listed macro-invertebrate and plant species. As further described below within the Division's comments on Study No. 3.5.1, transects should be established in both occupied and unoccupied patches of tiger beetle and state-listed plant habitat for use in conjunction with hydraulic modeling results. Because fine-scale variability in elevation, slope, substrate, and flow dynamics have the potential to significantly impact habitat suitability for these species, multiple transects may be needed to fully understand the extent and quality of habitats at these sites. The Division would strongly encourage the Proponent to consult with the Division prior to initiation of field work in order to seek concurrence that transect selection and data collection are sufficient to enable fine-scale analyses.

3.3.1 Conduct Instream Flow Habitat Assessments in the Bypass Reach and below Cabot Station

The site visit scheduled for July has been canceled and will be rescheduled in August.

Table 3.3.1-1 target species: Sea Lamprey spawning and incubation should be added to Reach 1 and 2. Substrate may be lacking but fish will be there when more water is added to the bypass reach.

HSI Criteria: The Division believes that good progress is being made to identify which HSI curves for which species/life history stages will be used to determine habitat availability and flow recommendations and the addition of curves which represent fish guilds rather than individual species shows some merit and should be followed up.

The Study Plan, as it relates to state-listed mussel species, does not provide any information regarding the application of IFIM methodologies (including both data collection and subsequent modeling) to Reach 5, the only reach where state-listed mussels are currently known to occur. The Division acknowledges that the broader study methodology for Reaches 4 and 5 may require further consultation between the Proponent and the Division upon completion of mussel surveys, as outlined within Study No. 3.3.16. However, given that the Proponent is proposing to use IFIM study methodologies as the primary avenue for assessing how project operations affect state-listed mussels and their habitats, Tasks 2-6 of the Study Plan should be amended so as to detail the Proponent's plan to apply appropriate data collection, modeling, and analysis methodologies for state-listed mussel species in Reach 5.

Existing Information and Need for Additional Information

In the second and third paragraphs of page 3-68, the Proponent proposes to limit the survey area to the 13-mile reach between Cabot Station and the Route 116 Bridge in Sunderland. The Study Plan also suggests that additional freshwater mussel studies associated with the FERC license of the Holyoke Dam (including portions of the Connecticut River south of Dry Brook in Sunderland) will provide information on the distribution and habitat of state-listed mussel species in Reach 5. If the Proponent intends to use data collected pursuant to methodologies not approved under the Turners Falls Hydroelectric Project (No. 1889), the Study Plan should be amended to confirm that that data will be collected pursuant to the requirements set forth under the final, FERC-approved Study No. 3.3.16.

Methodology
See General Notes 1, 2 and 3, below.

Study Reaches and Transect Selection (1-D and 2-D Modeling)
In the final paragraph of page 3-71, the Study Plan states that, for Reach 5, "the modeling approach for this reach will be further evaluated in consultation with the study team and is presently proposed to involve collecting water surface elevation data and hydraulic modeling (See Study Plan 3.2.2) in areas with suitable habitat for target species such as freshwater mussels." The Division notes that all known records for state-listed mussel species within the project area occur within Reach 5. Although the exact details of how IFIM study methodologies will be applied to Reach 5 may require further consultation between the Proponent and the Division upon completion of mussel surveys, the Division notes that water surface elevation data and hydraulic modeling will not (by themselves) be sufficient to enable assessment of how project operations impact suitable and potentially suitable habitat for freshwater mussels in Reach 5. Water elevations represent one of several factors – including, primarily, changes in flow dynamics (e.g., flow velocity and velocity dependent factors such as sheer stress) - likely to affect state-listed mussels, their habitats, and the long-term viability of mussel populations in the Connecticut River. The Study Plan should be revised to clarify how IFIM methodologies will be applied and which modeling approach (1-D or 2-D model) the Proponent believes should be employed, as further detailed above.

Habitat Suitability Index Criteria

1. On page 3-74 the Study Plan suggests that host fish for freshwater mussel species will be limited to *deep slow* and *shallow slow* guilds. The Study Plan should include a summary of references confirming that all known and potential host fish species (as detailed on page 3-75) will be captured by the proposed guilds.

2. On page 3-74 the Study Plan suggests that host fish and/or mussel HSI criteria will be used as the target lifestage/criteria for the IFIM study in Reaches 1-4. The Study Plan states that the target lifestage/criteria for Reach 5 will "be

determined based on results of mussel survey in fall of 2013 in consult with MDFW and MA Natural Heritage." As further detailed below as well as in the Division's comments on Study No. 3.3.11 and 3.3.16, the Division finds that the use of host fish as a proxy for persistent mussel habitat is not a preferred or plausible approach and would likely misrepresent mussel habitat availability and persistence.

3. On page 3-74 the Study Plan currently does not include Eastern Silvery Minnow (*Hybognathus regius*) or Burbot (*Lota lota*) - both of which are state-listed as "Special Concern" - in the list of species to be assessed using habitat suitability indices (HSI) criteria. In order for the Division to assess the impacts of project operations on both existing and potential habitat for these state-listed fish species, both should be included in Reaches 1-4.

Freshwater Mussels

1. The footnote on page 3-72 states: "FirstLight proposes to adapt empirical data collected within Reach 4 during mussel survey work… to develop HSI criteria specific to yellow lampmussel if this species is found there in sufficient abundance. These criteria can then be applied retroactively…" Yellow lampmussel is only one of three state listed species, and the Division requests that HSI curves also be developed for the eastern lampmussel (*Ligumia nasuta*) and Dwarf wedgemussel (*Alasmidonta heterodon*). As further detailed below as well as in the Division's comments on Study No. 3.3.11 and 3.3.16, if individuals are not found in sufficient abundance to calculate habitat parameters, data may be supplemented from additional data collected in adjacent sections of the Connecticut River or defendable sources in the literature. As detailed above, the Division notes that all known records for state-listed mussel species within the project area occur within Reach 5 and that data collection for HSI curve development should target these areas. Use of host fish as proxy for persistent mussel habitat is not a preferred or plausible approach. Therefore, the Study Plan should be amended to define how additional data will be acquired, or otherwise, define an abundance threshold below which an alternative approach (see comments on Study No. 3.3.11) would be used.

2. The final paragraph on page 3-72 and Table 3.3.1-2 on page 3-75 reference several mussel species – including the eastern elliptio, alewife floater, eastern floater, and triangle floater – that are not currently state-listed under the MA Endangered Species Act. The Division notes that, under the Massachusetts Endangered Species Act and its implementing regulations, the Proponent is not required to assess project impacts on species that are not currently state-listed.

3. On page 3-72, the Study Plan states that freshwater mussel habitat suitability will be assessed in all study reaches, and that host fish habitat suitability will be used as a proxy for mussel habitat persistence in the event that satisfactory

HSI curves cannot be developed for freshwater mussels. The Division would highlight several concerns with this approach:

a. Persistence of host-fish habitat should not be confused with the persistence and presence of mussel habitat. Mussel presence is governed by physical habitat characteristics beyond those preferred by host fish. Flow related variables (velocity, shear stress, depth) experienced by mussels at high flows represent factors more likely to impact mussel populations (Layzer & Madison 1995, Hardison & Layzer 2001, Morales et al 2006, Allen & Vaughn 2010, Daraio et al. 2010, and Maloney et al. 2012). Host fish presence and habitat persistence are therefore not adequate predictors of mussel habitat availability, and absence of mussels in the presence of persistent host fish habitat will only confirm the loss of suitable mussel habitat. If used alone, the Study Plan should clarify that host fish habitat persistence does not fully represent freshwater mussel habitat suitability and indicate how it intends to assess project impacts on existing and potentially suitable mussel habitat.

   Regarding state-listed mussels, this Study Plan should seek to document habitat availability, persistence and, through later analysis, how or if habitat availability/persistence is affected by current and potential project operations. The Study Plan proposes to use host-fish as a proxy for mussel habitat. As outlined above, although state-listed mussel habitat must overlap with host-fish to ensure physical contact between the two species, such overlap may be highly limited both temporally and spatially. Further, most of the potential host fishes, with Tessellated Darter and Sturgeon as notable exceptions, are resident fish species with broader habitat tolerances than have been documented for state-listed mussels. Therefore, the Division finds that the use of host fish as proxy for persistent mussel habitat is not a preferred or plausible approach, and would likely misrepresent mussel habitat availability and persistence.

   i. **Preferred Mussel Modeling Option:** HSI curves should be established for *Lampsilis cariosa*, *Ligumia nasuta* and *Alasmidonta heterodon*, which should in turn be used for defining and modeling habitat persistence. HSI should be calculated from habitat parameters of each freshwater mussel lifestage. Data used to calculate habitat suitability should be generated from proposed mussel studies (Study No. 3.3.16), and may be supplemented from data collected in adjacent sections of the Connecticut River or defendable sources in the literature. This approach is preferred because it specifically focuses on habitat suitability of freshwater mussels in reaches affected by Northfield Mountain and TFD project operations,

and has the ease of integrative analysis in PHABSIM with other species under study. Habitat suitability of known host fishes can be included in the development of HSI curves of the mussels.

The Division notes that while this is the preferred approach, we continue to be concerned that there may be insufficient data – collected under the currently proposed Study Plan or available in the literature – to support the creation of robust and representative HSI curves for each of the three state-listed species. In this circumstance, it is critical that an alternative modeling approach based on mussel habitat be employed rather than seeking to use fish as a representative proxy.

ii. **Alternative Mussel Modeling Option:** An alternative approach to modeling mussel habitat through PHABSIM would be to utilize habitat persistence modeling via methods similar to Parasiewicz et al. (2012) and Maloney et al. (2012). These authors have used modeling methods similar to PHABSIM to develop habitat persistence models for mussels. The results of these models yielded useful and robust information about how flows interact with the persistence of mussel habitat. Both Parasiewicz et al. (2012) & Maloney et al. (2012) specifically applied these models to *Alasmidonta heterodon*, a target for this Study Plan, in the Upper Delaware River to focus on the relationship between hydraulics and species habitat distribution consistent with current knowledge of *A. heterodon* habitat (Strayer & Ralley, 1993). To ensure collection of appropriate data to support the utilization of these models, we recommend that the Proponent carefully look at the modeling data needs, especially related to substrate and flow.

b. While the Division does not support the use of host fish as proxy for persistent mussel habitat, the modeling of individual host fish habitat, as part of the overall modeling effort, would yield critical information as to the presence and availability of host fish habitat. Such an analysis would allow for a more robust understanding of mussel ecology needs in the Connecticut River and whether host fish habitat availability is a limiting factor to mussel distribution.

i. **Preferred Host Fish Modeling Option:** Develop HSI curves for *confirmed* host fish in order to model host fish habitat persistence and mussel dispersal across barriers. The Division notes that although *potential* host fish species have been identified in some cases, *actual* host fish species remain poorly understood. For example, Table 3.3.11-1 of the Study Plan

acknowledges that glochidial host fish for *Ligumia nasuta* is unknown. Congeners of this species metamorphose on a number of fish species that are primarily inland freshwater species (i.e. bass, sunfish, perches, etc. [Corey et al. 2006]), suggesting that the proposed use of American shad as a host/habitat proxy may not be appropriate. Further, white sucker is listed as a potential host to be used as a proxy for modeling *Lampsilis cariosa* habitat suitability. This species is not a likely host, as only one glochidium was identified from a single fish, whereas other potential host fish species were observed with multiple encysted glochidia on multiple fish (Kneeland & Rhymer 2008).

The identification of suitable host fish relationship for *Lampsilis cariosa* and *Ligumia nasuta* are needed and can be determined through a laboratory host trial, described further under the Division's comments on Study No. 3.3.11. Such studies are not necessary for *Alasmidonta heterodon*, as Tesselated Darter has been well established as a confirmed host fish in laboratory and field studies (Michaelson & Neves 1995); this relationship should be documented in Table 3.3.1-2. For the other two species, once a suitable host fish is identified, the IFIM model for the *confirmed*, suitable host fish may be used to focus on host fish habitat, passage, and determine if these are limiting factors in the persistence of mussel species in the Connecticut River. However, as noted before and below, this does not indicate that mussel habitat or lifecycles are unaffected by the dam, only that some factor(s) other than host availability and passage is responsible for limited availability and persistence of suitable mussel habitat.

Furthermore, instream habitat alterations may affect host fish presence in reaches both above and below the dam. Any associated loss in host abundance would also manifest a decline in mussel populations, which the Proponent cites on page 3-72 as a reason to use host fish habitat persistence as a proxy for mussel habitat where mussel HSI curves cannot be developed. However, the Division reiterates that mussel habitat suitability is often not congruent to host fish distribution, but a subset nested within host fish distribution where other biotic and abiotic factors affect presence and abundance of unionids (Vaughn & Taylor 2000, Rashleigh 2008, Daraio et al. 2012, and Schwalb et al. 2012).

Therefore, the Division is concerned about the proposed omission of glochidial assessments (see Study No. 3.3.11)

because, without a more concrete understanding of which fish species are actually utilized as hosts within the Connecticut River, and which species are particularly important in enabling mussels to complete this key stage of their life cycle, fish passage and habitat persistence would have to be assessed and ensured for all potential host fish species. Further, the design of any potential fish passage devices would be dramatically more difficult without a targeted understanding of swimming speeds, necessary approach velocities, attraction flows, etc. for key fish species.

ii. **Alternative Host Fish Modeling Option:** Develop HSI curves for all potential hosts as surrogates for confirmed host fish. Should the Proponent wish to assume that all potential host fish species are equally important for purposes of the re-licensing process, model habitat persistence of all potential host species in reaches affected by flow alteration, and agree to enable passage of all potential host species as part of re-licensing discussions, the Division would willingly cede this request while highlighting our above concerns about the inefficiencies and engineering challenges this would present.

If a host fish is determined to be present, persists, has adequate migration across barriers in the absence of a viable mussel population, then the Division would conclude that host fish availability is not a limiting factor in mussel distributions in the Connecticut River, and that other factors are limiting mussel persistence.

Task 2: Field Data Collection

1. In the fifth paragraph on page 3-76, the Study Plan states that "at transects portraying mussel habitat (determined in consultation with MDFW), bottom velocity measurements will also be collected, or simulated using the IFG4 program in PHBASIM which facilitates modeling "nose" velocities (*i.e.* velocities occurring at the depth at which a species/lifestage is known to occupy)." Data collection should include a full velocity profile, with near substrate data collection being particularly important to modeling shear stress. Simulated data should be calibrated to field collected data from transects portraying mussel habitat under various flow conditions that adequately encompass the range of flows observed under current and potential flow regimes.

2. On page 3-76, data collection methodologies for Reach 5 are not, but should be, detailed. See comments above regarding the need for detailing data collection methodologies for Reach 5.

Tasks 3-6

See comments above regarding the need for detailing modeling and analysis methodologies for Reach 5.

3.3.2 Upstream and Downstream Passage of American Shad

Radio tracking- Sample size- how many fish will be tagged and where?

Mobile tracking- need more on methods- Frequency? Locations?

More than one PIT tag reader will be required per fishway in order to determine direction of travel (upstream vs. downstream)

Is it feasible to install PIT tag reader(s) at the Northfield Mountain intake/discharge or at the upper reservoir to directly evaluate entrainment?

Why is the northernmost extent of the study at Northfield Mount Hermon and not the Vernon Dam?

3.3.3 Downstream Passage of American Shad

Radio tags- Sample size- how many fish will be tagged?

Balloon tags- All turbines will be tested "at or near hydraulic capacity". Does this represent normal operation?

3.3.4 Upstream Passage of American Eel

Systematic eel surveys-why was the area around the downstream fish bypass removed from the list of sites to be studied?

The temporary eel traps are described as being 6 feet long and 1 foot wide. Is 1 foot wide enough to have the 2 different substrates used side by side as the methods describe? Please describe the substrate types to be used.

Will Cabot or Spillway fishway attraction flows be operated during the period when fishways are not operational to attract eels? How will the traps be run when the fishways are operational?

3.3.5 Downstream Passage of American Eel

Radio tag study: What is the sample size?

The hydroacoustic study should take place for more than one year because of year-to-year variability.

Another receiver site should be added upstream of the Holyoke Dam but downstream of the Route 116 bridge to confirm viability of eels passed downstream.

3.3.6 Shad Spawning

Will the Turners Falls Power Canal be added to the study as a survey site as discussed?

3.3.7 Fish Entrainment and Turbine Mortality

The Division is not convinced that no field data collection is necessary. How will realistic numbers for American shad egg and larva entrainment at NMPS be developed?

How will "developing a qualitative scale of entrainment risk" translate to an estimate of impacts on fish populations?

3.3.8 CFD of Fishway Entrances and Powerhouse Forebays

A CFD model of the Station No. 1 discharge into the bypass reach could determine potential impacts to fish migrating upstream through the bypass reach.

3.3.10 Assess Operational Impacts on Emergence of State-listed Odonates in the Connecticut River

General Description of Proposed Study

The first paragraph of page 3-171 proposes to limit the study area to the Turner's Falls Dam (TFD) Impoundment and the 13-mile reach below the TFD. The Study Plan states that "the near-complete lack of a shallow vegetated littoral zone and rocky substrate in the upper reservoir, together with its characteristic water level fluctuations, would likely preclude state-listed odonates (particularly riverine species, which are the focus of this study)." The Division is concerned about the proposed omission of surveys within the Upper Reservoir and is not aware of any surveys/assessments that confirm the Proponent's assertion that current conditions likely preclude the presence of state-listed species. As outlined in the Division's original study request, appropriate substrates for odonates vary by species but may include sand, silt, rocks, trees, coarse woody debris, undercut banks, tree / plant roots, and anthropogenic structures. Shallow vegetated littoral habitat and rocky substrates do not represent the only habitat/substrate in which emergence and eclosure of state-listed odonates will occur.

The Division's original study request was not specifically limited to riverine species, and the Study Plan should seek to assess operational impacts to *all* state-listed species with the potential to be impacted by the project. For example, the Division believes that *Enallagma carunculatum* (Tule Bluet, state-listed as "Special Concern") has the potential to utilize habitats within the Upper

Reservoir. This species is known to occur within the TFD Impoundment and riverine habitats in the Connecticut River near the confluence with Deerfield River; the Upper Reservoir is well within the flight distance of this species and appears to offer suitable habitat. Additionally, the TFD Impoundment exhibits water level fluctuations similar to the Upper Reservoir, suggesting that the Proponent's assertion (e.g., that water level fluctuations in the Upper Reservoir preclude presence) is not supported.

Additionally, the third paragraph of page 3-172 acknowledges that "the extent to which water level fluctuations disrupt emergence and eclosure is not well understood. The concern is whether emergent larvae ascend a great enough vertical distance, and quickly enough, to avoid being inundated after eclosure begins." Northfield Mountain Power Station currently operates with no restrictions on the timing, frequency, or magnitude of pumping, generation, or pool elevation within the Upper Reservoir. The Division notes that the potential impacts of water level fluctuations on state-listed species are not limited to those occurring within the mainstem of the Connecticut River. Project operations in the Upper Reservoir certainly warrant further assessment *if* state-listed odonates are present, making qualitative surveys within the Upper Reservoir a necessary first step toward assessing this issue.

Methodology

It is critical that data collection be sufficient to enable robust statistical analyses of survey results for each species across a variety of habitat conditions. Based on the Study Plan – which is currently limited to four qualitative and four quantitative sites - the Division is concerned that natural heterogeneity/variation will make detection of trends impossible within a robust statistical analysis (including multivariate methods) without sufficiently large sample sizes. The Division recommends that the Study Plan be amended to explicitly state that additional data will be collected (either within the same season or during the next study season) should initial data collection be found to be insufficient. Judgment of sufficiency should be based upon power analyses or similar statistical methods to determine if data collection is sufficient to robustly explain heterogeneity/ variation, and should be confirmed through consultation with the Division. In addition, the Division is willing to work with the Proponent to develop pre-approved, maximum data collection thresholds to guide this process and ensure sufficient data collection. A set of conclusions based solely on non-parametric statistical methods will undermine the utility and analysis power of the study.

See General Notes 1, 2 and 3, below.

<u>Task 3 (Qualitative Surveys for Larvae and Exuvia)</u>

The Division notes that the Study Plan will likely generate data sufficient to document species *presence* but not species *absence*. Documenting species absence would require more extensive survey effort and does not appear to be proposed at this time. Therefore, the Division recommends that the Study Plan be

amended to explicitly acknowledge intent to document species presence, or otherwise include methods sufficient to document species absence.

1. The third paragraph of page 3-173 suggests that three representative study reaches will be located downstream of the TFD. Based on known records of state-listed odonates along the Connecticut River, the Division believes that specific regions have seen relatively less study compared with others, including: 1) Barton's Cove, 2) Reach 3 (as defined in Study No. 3.3.1), and 3) the reach between the Railroad Bridge and Third Island in Deerfield/Montague. The Study Plan should be revised to confirm that the three reaches to be located below the TFD will be targeted in order to fill the latter two data gaps, and that two study sites be located within the reach between Railroad Bridge and Third Island. Additionally, the Division would suggest that surveys within each study reach focus on state-listed odonate species not yet documented within the target reach, but which are known to occur in similar habitats within other regions of the Connecticut River. These species include, by reach, the following target species:

    a. Barton's Cove – *Gomphus fraternus* and *Gomphus ventricosus*.
    b. Reach 3 – *Gomphus fraternus* and *Gomphus ventricosus*.
    c. Railroad Bridge to Third Island, Montague/Deerfield – *Gomphus abbreviatus, Gomphus fraternus, Gomphus vastus, Gomphus ventricosus, Neurocordulia yamaskanensis, Stylurus amnicola,* and *Enallagma carunculatum*.

2. The Study Plan does not provide information regarding the effort (amount of time to be spent per unit of area) proposed for survey of each study reach. Further, using fixed survey transect lengths will make capturing the diversity of habitats characterizing target reaches, with sufficient replication, unlikely. Without knowing the extent and location of suitable habitat within these reaches, basing survey effort on specified linear feet of river bank to be surveyed is not appropriate and may greatly under-represent critical habitats and habitat variability. Therefore, the Division believes that the Study Plan should stratify effort by habitat type and then standardize effort (amount of time to be spent per unit of area) within each habitat type. This would ensure sufficient coverage of all potential habitats throughout these regions while allowing field work to remain adaptive. Because the purpose of these surveys is to document *presence* of specific state-listed odonates, surveys within a particular reach may cease in advance of the specified effort *if* surveys successfully document the presence of all species suspected to occur within that reach.

3. The third paragraph of page 3-173 suggests that surveys will be conducted just prior to spring emergence (late May to early June) to maximize detection of all species. The Division notes that some state-listed species, such as Riverine Clubtail (*Stylurus amnicola,* state-listed as "Endangered"), are known to

emerge no earlier than late June. This suggests that the proposed survey window may be too narrow to adequately capture all species with the potential to occur. The Division believes that, at a minimum, surveys should be conducted between May 10th and June 30th, as needed, to capture the emergence periods of all target odonate species.

4. In addition to the data parameters proposed on page 3-173, elevation above the water surface, vertical and lateral distance from the water's edge, compass direction of the animal, its lateral aspect, and substrate should also be recorded for all exuvia collected during qualitative surveys. This data would supplement – and effectively improve the accuracy of - data collected under Task 4 survey activities with minimal additional cost.

Task 4 (Quantitative Surveys for Emergence/Eclosure Behavior)

1. The second paragraph on page 3-174 suggests that transect surveys (see comment on Task 3, #2 in regard to transects) will occur every two weeks from June through August. Emergence of some state-listed species can begin as early as early-May of any given year, depending on weather conditions; the Study Plan should be amended such that surveys commence in mid-May and extend through the end of August.

2. The second paragraph on page 3-174 states that "if possible, emerging larvae will be watched/tracked as they progress upslope, and the time it takes for them to stop and eclose will be recorded." The Division specifically requested the collection of data sufficient to determine how long emergence takes for state-listed species. The time it takes a teneral to complete the emergence process is a critical piece of information which, in conjunction with a better understanding of the rate and magnitude of water level fluctuations (to be provided by Study No. 3.2.2), is necessary to enable assessment of whether and to what extent water level fluctuations affect the ability of tenerals to complete the emergence process.

   Indeed, page 3-172 acknowledges that "… the concern is whether emergent larvae ascend a great enough vertical distance, and quickly enough, to avoid being inundated after eclosure begins." Further, the fourth paragraph of page 3-174 states that "field data gathered during Task 4, particularly the timing (e.g., when species emerge), distance travelled (both horizontal and vertical), and duration (i.e., speed) of travel and eclosure for species and/or species groups will be used in concert with the hydraulic model to determine which species are most vulnerable to fluctuating water levels, and under what conditions they are most susceptible." These questions represent the key goals of this study, and the Division is concerned that the lack of a robust plan to assess emergence time will undermine the utility and analysis power of the study. Therefore, the Study Plan should be revised to include a study framework geared to sufficiently assess how far tenerals travel **and** how long the emergence process takes. Assessing how long the emergence process takes

where possible is unlikely to provide data sufficient to answer these questions. See additional comments on Task 3, #2 regarding survey effort.

3. The first paragraph on page 3-174 states that **"**six transects will be established within each [of four] study reach, for a total of 24 transects…. Each transect will be perpendicular to the river, 1 m wide, and will extend upslope approximately 12 m…" The Division is concerned that the Study Plan – which would effectively yield survey of 24 linear meters of river – is unlikely to provide sufficient spatial coverage of different habitat conditions (from substrate and vegetative community type to water depth and velocity) nor a sufficient number of data observations for each species (or species group) to enable robust data analysis. One approach to overcome this concern would be to stratify the sampling within known emergence habitat type (e.g., gradually sloping mud banks, natural vegetation, rip rap, etc.) and then ensure sufficient observations are collected within each emergence habitat type. The Division remains available for consultation to help determine appropriate habitat stratification for each species, and to work with the Proponent to develop pre-approved, maximum data collection thresholds to guide this process and ensure sufficient data collection. Modifications of the Study Plan – which might include modifying transects such that they run parallel to the river and ensuring that transects are a minimum of 50m in length, at various upslope distances from the river (terminating at 12m, as proposed) – may greatly improve detection of emergence within different habitat conditions. See additional comments on Task 3, #2 regarding survey effort.

4. The second paragraph on page 3-174 states that surveys "will be timed to coincide with weather and flow conditions that are conducive to emergence." The plan should clarify the parameters under which surveys will occur, including both appropriate weather conditions and flows. Surveys should occur on weekdays and non-holidays to minimize the affect of boat traffic wake on survey results, and should occur on two consecutive days (with suitable conditions) between 4AM (or two hours prior to dawn) to 12PM. Additionally, the Division notes that, in order for surveys to yield an accurate representation of the range of travel distances and emergence time periods, surveys should occur no sooner than 24-48 hours after stabilization of water levels. The Division is concerned that, without stabilization of water levels (e.g., no peaking during a sufficient time window prior to field work), collected data will be biased toward individuals and species that travel far / fast enough to be observed and measured; individuals that do not will have been washed away by water level peaks and therefore escape observation. For similar reasons, surveys should occur no sooner than 24-48 hours after a significant rain event, the magnitude of which should also be specified.

5. In addition to the data parameters proposed on page 3-174, elevation above the water surface, vertical and lateral distance from the edge of water, the

compass direction of the animal, its lateral aspect, and substrate should also be recorded for all exuvia collected during qualitative surveys.

3.3.11 Fish Assemblage

Boat electrofishing: Not clear if this will take place in day and night.

The Division recommended sampling with eel pots but this has not been added to the methods.

Selection of study reaches: Firstlight should describe how the study reaches will be chosen. In the April 15, 2013 PSP, Firstlight cited Kiraly (2012) methods for stratified-random study design. However in the June 28, 2013 updated PSP, Firstlight has removed this citation, and failed to describe how their proposed study still represents a stratified-random design.

Potential effects on SNS: The Division believes that a fish assemblage study can be conducted throughout the entire proposed geographic scope without significant impacts to Shortnose sturgeon, and encourages FirstLight to consult with NOAA to choose acceptable methods, locations within all reaches, and time of year to complete the study. Special care needs to be used when employing gill nets as SNS are particularly vulnerable to this gear type. Net soak time should adhere to these NOAA guidelines[1]:

Gillnet soak time as a function of water temperature and DO.

Net set duration (hours)	Temperature at sampling depth	Minimum DO at sampling depth
14	Up to 15°C	4.5 mg/L
4	15° to 20°C	4.5 mg/L
2	20° to 25°C	4.5 mg/L
1	25° to 28°C	4.5 mg/L
No sampling	Over 28°C	4.5 mg/L

General Description of Proposed Study

The Study Plan states that the Proponent "is not proposing to evaluate mussel larvae on host fish because the relationships are already well understood (Table 3.3.11-1); the level of effort proposed will provide data on the distribution and relative abundance of state-listed fish species and host fish species." The Division is concerned about the proposed omission of glochidial assessments because, without a more concrete understanding of which fish species are actually utilized as hosts within the Connecticut River (see Study No. 3.3.1) – and which species

[1] Kahn, J. and Mohead, M.. 2010. A protocol for use of shortnose, Atlantic, Gulf, and green sturgeons. NOAA Technical Memorandum NMFS-OPR-45. 62 pages.

are particularly important in enabling mussels to complete this key stage of their life cycle – fish passage and habitat persistence would have to be assessed and ensured for all potential host fish species.

Watters (1996) found that 30-60% of all native mussels were negatively impacted by damming of rivers, which causes shore erosion and siltation and both suffocates mussels and impairs their reproductive cycle through the loss of or access to host species by impeding fish passage (Bogan 1993). Given the well-documented insufficiency of current fish passage structures at the TFD, the Division believes that the TFD and its associated operations effectively impair the ability of rare mussel species to colonize suitable habitats both above and below the TFD.

Furthermore, instream habitat alterations may affect host fish presence in reaches both above and below the TFD. Any associated loss in host abundance would also manifest a decline in mussel populations, which the Proponent cites on page 3-72 (Study No. 3.3.1) as a reason to use host fish habitat persistence as a proxy for mussel habitat where mussel HSI curves cannot be developed. The Division reiterates that mussel habitat suitability is often not congruent to host fish distribution, but a subset nested within host fish distribution.

The intent of this element of the Division's original study request is to target which host fish species are most critical in the Connecticut River, and therefore, guide analysis and potential re-design of current fish passage structures at the TFD to ensure passage of critical host fishes. It is, in effect, complimentary to Study Plans 3.3.1, 3.3.2, 3.3.3, 3.3.4, and 3.3.5, all of which seek to assess habitat persistence and upstream and downstream passage for migratory fish species, except that the species of concern for mussels requires identification to ensure adequate design. Further, the design of any potential fish passage devices would be dramatically more difficult without an understanding of swimming speeds, necessary approach velocities, attraction flows, etc. for key host fish, making design of any passage devices difficult, at best.

Notwithstanding the above, the Division acknowledges that an un-targeted, field based glochidial assessment for all potential host fish is not necessary or feasible. Analysis of species with small home ranges, or with minimal potential to utilize fish passage structures, would not inform analysis and potential re-design of existing passage facilities. However, the Division holds that a targeted assessment of key species or genera is necessary, appropriate, feasible and consistent with studies for other taxonomic groups, which would inform design criteria for passage structures. Said assessment should focus on larger-bodied fish species with the potential to be impacted by the current fish passage system at the TFD and inform/benefit from potential improvements to that system. Applicable methods have already been developed and could readily be applied; these include 1) genetic or morphometric identification through field collection and subsequent

laboratory analysis (Kneeland & Rhymer 2007 & 2008), or 2) laboratory host fish trials (Johnson et al. 2012 and Fritts et al. 2012).

The Division would suggest laboratory fish trials; based on recent conversations with labs that have recently conducted similar work, such a study offers an established, cost-feasible method to identify primary hosts. Because a known suitable host exists for *Alasmidonta heterodon* (tessellated darter: Michaelson & Neves 1995), laboratory trials should be prioritized to determine suitable hosts for *Lampsilis cariosa* (state-listed as "Endangered") and *Ligumia nasuta* ("Special Concern"). Using a tiered approach to assess host suitability, the study should progress to the next tier only where no suitable primary hosts are found in previous trials. A suitable primary host should be defined as any fish species with > 40% metamorphosis success using established host fish protocols (Johnson et al. 2012 and Fritts et al. 2012).

Tier 1:

- One species of black bass (*Morone salmoides* or *M. dolemieu*)
- Striped bass (*M. saxatilis*)
- One species of shad/herring (*Alosa spp.*)

Tier 2 (if no suitable hosts found above):

- One species of sunfish (*Lepomis spp.*)
- One species of chub (*Semotilus corporalis* or *S. atromaculatus*)
- One species of sucker (*Catostomus spp.*)
- Yellow perch (*Perca flavescens*)
- One catfish species (Bullhead – *Ameiurus* spp., or Channel catfish – *Ictalurus punctatus*)

Tier 3 (if no suitable host found above):

- As needed and in consultation with the Division.

Level of Effort and Cost

Laboratory methods and analyses similar in design and approach to Johnson et al. (2012) and Fritts et al. (2012) will likely range from $ < 40,000 – 80,000.

3.3.12 Effects of spill at Cabot on Sturgeon

The Division agrees with the proposed study approach. If it can be determined that these spill events can be eliminated (at least any volitional events) it may not be necessary to study further.

3.3.13 Littoral Zone Fish Habitat

The Division agrees with the proposed approach to study the zone of reservoir fluctuation (176 to 185 ft msl) and shallower areas (less than 1 foot deep at minimum pond elevation).

3.3.15 Sea Lamprey Spawning

The Division agrees with the proposed study approach. However project operation may preclude lampreys from even trying to use otherwise good spawning habitat (lampreys may wisely choose not to nest in areas dewatered or scoured by project operations). Is there a way this could be addressed in the study or will these areas become apparent through the IFIM/persistent habitat analysis?

3.3.16. Habitat Assessment, Surveys, and Modeling of Suitable Habitat for State-listed Mussel Species in the Connecticut River below Cabot Station

The Study Plan proposes to limit the survey area to the 13-mile reach between Cabot Station and the Route 116 Bridge in Sunderland, and that additional freshwater mussel studies associated with the FERC license of the Holyoke Dam (including portions of the Connecticut River south of Dry Brook in Sunderland) will provide information on the distribution and habitat of state-listed mussel species in Reach 5. If the Proponent intends to use data collected pursuant to methodologies not approved under the Turners Falls Hydroelectric Project (No. 1889), the Study Plan should be amended to confirm that that data will be collected pursuant to the requirements set forth under the final, FERC-approved Study No. 3.3.16.

Existing Information

1. In the third paragraph on page 3-227, the Study Plan notes that the species most vulnerable to changes in water elevation and flow dynamics would have an affinity for nearshore habitats or other shallow areas, which are most likely to become dewatered or vulnerable to heat stress or predators during periods of low flow. The Division agrees with this assertion, but notes that changes in flow dynamics – including increased flow velocity and sheer stress – also have the potential to significantly impact habitat suitability for rare mussel species in areas that are not susceptible to the factors outlined above. Increases in flow velocity, shear stress and scour are important factors that will have reportedly altered the persistence of habitat used by unionid mussels throughout their lifecycle (Layzer et al. 1993, Layzer & Madison 1995, Layzer & Scott 2006). Indeed, an understanding of how flow dynamics – and therefore the persistence of suitable habitat and refugia – change at relatively fine scales across a range of flow regimes is a crucial component of the Division's assessment of potential project impacts.

2. On page 3-227 the Study Plan recognizes three state-listed species of freshwater mussel (*Lampsilis cariosa, Ligumia nasuta,* and *Alasmidonta heterodon*). However, Study No. 3.3.1 only proposes creation of HSI curves for *Lampsilis cariosa* (Page 3-72 footnote). The Division requests that HSI curves be created for all three state-listed species.

Methodology

See General Notes 1, 2 and 3, below.

Task 2 (Phase 1 Mussel Survey and Habitat Assessment)

1. The Study Plan suggests that at least one site per mile will be surveyed, with additional sites delineated for survey in areas of greater habitat complexity. Further, the Study Plan suggests a minimum of 1.0 person-hours of survey effort per site, with one-hour timed searches sufficient to cover a 200-meter section. The Division requested systematic and sufficient coverage of all potentially suitable habitats in order to ensure detection of state-listed mussels. Indeed, the Division's standard mussel survey protocols require that all suitable habitats within a proposed project area – identified through a comprehensive habitat assessment, as proposed in the Division's original study request - be surveyed concurrent with or subsequent to the assessment. The Division is concerned that the Study Plan does not explicitly describe the criteria to be used in identifying potentially suitable habitat during the habitat assessment, nor ensure that all potentially suitable habitats will be surveyed. Therefore, the Division requests that the Study Plan provide additional detail regarding its plan to provide sufficient and thorough survey coverage of all suitable habitats.

2. The Study Plan suggests that a suite of morphometric and site specific data will be collected for state-listed mussels as well as the first 50 individuals of a non-listed species. The Division also requests that each state-listed mussel and the first 50 individuals of non-listed species be tagged with an individual identifier (e.g. Hallprint shellfish tags); individual identification will be useful for long-term monitoring and use in quantitative population estimates.

3. The Study Plan suggests that key instream habitat parameters (such as water depth, flow velocity, substrate, water temperature, etc.) will be collected at all survey sites. The Division notes that these instream habitat parameters should be collected pursuant to the applicable standards outlined within Study No. 3.3.1, and that the Proponent explicitly detail (either in situ or by reference to Study No. 3.3.1) the procedures that will govern data collection. The Division notes that data collection should include a full velocity profile in order to understand how velocity and other parameters change both horizontally and vertically. Complete profiles should be conducted in transects perpendicular to the flow of the river channel, including (but not limited to) a minimum of one transect within the mussel population, one transect immediately upstream of the population, and one transect immediately downstream of the population.

   Collection of flow velocities at or near the substrate surface, and at varying flows, is particularly critical to informing further analyses of how various flow regimes affect mussel behavior and persistence of potential habitat (e.g., relative sheer stress, etc.). Therefore, the Division would recommend that the Study Plan explicitly specify (either in situ or by reference to Study No. 3.3.1) that velocity measurements will be collected at near-substrate depths within all potentially suitable habitats, and that IFIM models incorporate changes in

temperature, velocity, depth, shear stress, and habitat persistence for all lifestages in the mussel lifecycle.

4. The Division notes that water temperature is a particularly important factor in determining mussel habitat suitability, and that temperature data should be collected and modeled as part of the Study Plan (see Castelli et al., 2012). Of particular concern is the relevance of temperatures during low flows and the rate of temperature change caused by peaking, as thermal thresholds are likely affected by acclimation temperature (Galbraith et al. 2012, Pandolfo et al. 2010). As a minor addition to IFIM fieldwork, we recommend point temperatures be taken at all test flows within a representative subset of transects within suitable mussel habitats.

Task 3 (Phase 2 Habitat Assessment and Mussel Survey)

1. The Study Plan suggests that additional mussel surveys will be conducted at sites where state-listed mussel species are found. Additionally, the Study Plan suggests that quantitative sampling will occur if and where state-listed mussel densities are high enough, so as to provide a more accurate assessment of density and population size. The Study Plan should provide a greater degree of specificity regarding potentially appropriate sampling methods and detail where/when each survey methods would be employed. At a minimum, the plan should include repeated site visits (to measure detection probability and population size; see Meador et al. 2010) as well as appropriate use of transects and/or quadrat excavation in a percent of occupied patches (depending on patch size). Individual identifier tags (e.g. Hallprint shellfish tags secured with Superglue) should be used on all state-listed species and the first 50 non-listed mussel individuals (see comment on Task 2 above) to better enable population size estimation and long-term monitoring of individuals.

2. The Study Plan suggests that additional habitat data – in the form of cross-channel transects – will be collected to support the Study No. 3.3.1, and that transect number will depend on population size and habitat complexity. The Division notes that Study No. 3.3.1will need to be applied within both occupied and unoccupied patches of suitable mussel habitat in order to fully understand project impacts. Given that mussel populations are currently known to occur within Reach 5, transects will need to be located so as to collect data from a sufficient number of suitable sites within this reach and other reaches, if appropriate. The Division notes that transects should be located, and appropriate data collected, pursuant to the applicable standards outlined within Study 3.3.1, and that the Proponent explicitly detail (either in situ or by reference to Study 3.3.1) the procedures that will govern these details. Proposed transect locations should be submitted to and approved by the Division to ensure that mussel occurrence data has been accommodated.

Task 4 (Effects of Flow Regime on State-listed Mussels) (3-150)

1. The Study Plan does not reference the need to delineate HSI curves for state-listed mussels, though these are needed to inform habitat modeling in Study No. 3.3.1. HSI curves represent a critical component of Study No. 3.3.1 and related modeling efforts if they are to accurately delineate suitable mussel habitats and assess project impacts. The Study Plan should explicitly outline the Proponents plan for creating data-driven HSI curves for each mussel species. The Division reiterates that HSI curves for state-listed mussels are generally not well understood, and data collection from a suite of both occupied and unoccupied sites is needed to inform curve creation. However, others have been successful at modeling persistent habitat using methods similar to PHABSIM (Parasiewicz et al. 2012, Maloney et al. 2012, Daraio et al. 2010, Morales et al. 2006, and Layzer & Madison 1995).

2. The Study Plan states that IFIM and hydraulic models will be supplemented with detailed habitat data where state-listed mussels are found. However, the objective of Phase 1 (page 3-226) states that in the absence of detection, potential habitat will be mapped based on species habitat preferences. The Division reiterates that HSI curves represent a critical component of Study No. 3.3.1 and related modeling efforts if they are to accurately delineate suitable mussel habitats and assess project impacts. The Division believes it is possible to create HSI curves, and requests that this Study Plan (and Study No. 3.3.1) identify alternative sources and methods for collecting supplemental data where necessary.

3.3.17 Tributary and Backwater Habitat

The Division agrees with the proposed study approach.

3.3.18 TF Canal Drawdown

The methodology is described as “the 2011 survey methods, with minor modifications”. What are these modifications, or are they already incorporated in the text that follows?

3.5.1. Wetlands, Riparian, and Littoral Habitat

Methodology

See General Notes 1, 2 and 3, below.

Task 1(Literature Review)

1. The Division is willing to provide information regarding the location and extent of known state-listed plant and tiger beetle populations. The Study Plan should be revised to specify that the Proponent will consult with the Division to identify known habitats for state-listed species so as to ensure that known populations are adequately surveyed and assessed.

2. The Study Plan suggests that "pre-survey, biologists will review life histories of wildlife and phenology of listed plants for known listed species at the Project to select field survey windows to optimize observations." The Division supports this approach; however, the Study Plan should be revised to confirm that the Proponent will consult with the Division during this review to ensure concurrence on appropriate survey windows and diagnostic identification characteristics.

Task 3 (Sensitive Plant Survey)

1. In the first paragraph of page 3-270, the Study Plan suggests that rare plant surveys within suitable habitats will employ a time per unit area approach, to be "determined based upon the extent of the survey area, location, and the complexity of the plant diversity and population densities." The Division supports this approach; however, the Study Plan should be revised to include appropriate time per unit area thresholds, or otherwise confirm that the Proponent will consult with the Division to establish appropriate time per unit area thresholds in advance of field work so as to ensure concurrence of survey intensity within suitable habitats.

2. In the first paragraph of page 3-270, the Study Plan states that "dates and times, the areas that were surveyed, and elevations taken with a level rod" will be collected. The Division notes that surveys should, at a minimum, also collect information regarding the spatial extent of the population, number of individuals, substrate, and plant vigor. Data related to plant vigor or health of a particular population should include spatial mapping of vigor as it varies across spatial / elevation gradients; see additional comments on Task 3, #4.

3. In the first paragraph of page 3-270, the Study Plan suggests that data will only be collected at sites where state-listed plants are located. The primary goals of the study, as stated in the third paragraph of page 3-262, "are [to] quantify the impacts of water level fluctuations and the current and proposed flow regimes on state-listed rare plant species". This, in turn, requires that the study: 1) delineate all suitable habitat for state-listed plants (particularly species inhabiting mud flats, sand bars, and high energy shore and cobble island habitat types); 2) determine habitat suitability preferences for state-listed plants by comparing flow parameters within and between occupied and unoccupied patches of suitable habitat, and 3) assess how quality, quantity, and location of habitat changes over a range of water elevations and inundation frequency/duration/timing. Therefore, the Study Plan should be revised to confirm that all suitable habitats will be identified and mapped, and that data sufficient to enable hydrological modeling of water elevations and timing, duration, and frequency of flooding – including cross-sections, as further described below – will be collected from both occupied and unoccupied patches of suitable habitat. The Division notes that the goals and

methods referenced here are nearly identical to those outlined for state-listed tiger beetles (see Task 6, below).

4. On the last paragraph of page 3-267, the Study Plan states that "this task will collect the necessary field information to evaluate the effects of these changes in water level elevations on the life cycle of state-listed species and in particular, the germination, growth, and dispersal of species inhabiting mudflats, sand bars, and cobble islands." However, the Division notes that the Study Plan does not lay out a framework through which the affects of project operations on the life cycle (including germination, growth, or dispersal) of state-listed plants will be quantified. At a minimum, the Division would suggest that cross-sections (see comments on Task 6, #1 below) be established in both occupied and unoccupied patches of suitable habitat. Fine-scale analysis is necessary to enable accurate hydrologic modeling and facilitate analysis of how germination, growth, or dispersal may be affected by the timing, duration, extent, and frequency of flooding. The Division notes that – because fine-scale variability in elevation, slope, substrate, and flow dynamics have the potential to significantly impact habitat suitability – multiple cross-sections are likely needed to fully understand the extent and quality of habitats at these sites. The Division would strongly encourage the Proponent to consult with the Division prior to initiation of field work in order to seek concurrence that data collection and survey methodology are sufficient to enable fine-scale analyses.

5. Table 3.5.1-1 should be revised to include Upland White Aster (*Oligoneuron album*), state-listed as "Endangered," and identified in the Division's original study request.

Task 6 (Project Water Level Fluctuation Assessment)

1. The Study Plan suggests that a cross-section will be established in known areas of tiger beetle habitat, for use in conjunction with model results. As outlined above, the Division believes that fine scale variability in elevation, slope, substrate, and flow dynamics has the potential to significantly impact habitat suitability and that multiple cross-sections will be needed to fully understand the extent and quality of habitats at these sites. Additionally, cross-sections should also be placed in unoccupied but potentially suitable habitats to support the analyses further described under #2, below. The Division would strongly encourage the Proponent to consult with the Division prior to initiation of field work in order to seek concurrence that surveys are sufficient to enable fine-scale analyses.

2. As outlined in the fourth paragraph of page 3-262, the Division requested integration of modeled river flows and water levels with a habitat assessment for state-listed tiger beetle species. Similarly, the Division requested that the model should, as stated in the fourth paragraph, "specifically assess the influence of existing and proposed Project operations on water levels for both

known populations and potential habitats for the Cobblestone Tiger Beetle (*Cicindela marginipennis*) and the Puritan Tiger Beetle (*Cicindela puritana*). In the first paragraph of page 3-273, the Study Plan states that a "hydraulic model will be developed as part of Study No. 3.2.2. Specifically, this information will be used to address how hydraulically connected habitats and vegetation is affected, and how operations have or may affect known populations and potential habitats for state-listed invertebrate species, including the Puritan and Cobblestone Tiger Beetles." However, the Study Plan does not appear to include a habitat assessment to identify *potential habitat* for state-listed tiger beetles; instead, the Study Plan appears to limit its analysis to known habitats.

The Connecticut River harbors the only known population of each species in Massachusetts. Although assessing impacts to known habitats is a crucial component of the Study Plan, assessing impacts to potential habitat – which might otherwise support viable populations under modified flow regimes – is similarly critical to supporting the long-term viability of each species in the Connecticut River. The Study Plan should be modified to include the Proponent's plan to conduct a habitat assessment for state-listed tiger beetle species sufficient to identify potential habitat within the TFD Impoundment and downstream of the TFD to Rainbow Beach. As requested, field assessments of both existing and potential habitats should involve collecting flood depth, timing, duration, and extent - as well as frequency and changes to substrate characteristics - sufficient to permit assessment of how the quality and extent of both existing and potentially suitable habitat changes over a range of flows. The measurements should be taken over a range of test flows, between the existing minimum flow and maximum project generation flows, and synthesized to quantify habitat suitability for each species under each test flow.

3.6.1 Recreation Use/User Contact Survey

Figure 3.6.1-1 draft survey, item #8: Group all fishing activities (shore, boat, ice) and hunting in the list

Figure 3.3.1-3 draft survey, item #8: Group all fishing activities (shore, boat, ice) and hunting in the list

3.6.3 Whitewater Boating Evaluation

The Division will not support seasonally inappropriate flow regimes for whitewater boating (i.e. high flows in mid-summer) as these flows will adversely affect the aquatic biota that the Division is seeking to reestablish and protect in the bypassed reach of the Connecticut River.

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GENERAL NOTE #1: The Division shall be notified, in the form of a Rare Animal or Plant Observation Form, of any state-listed species observed during field surveys associated with any study herein. The Proponent can take advantage of the Division's new data submittal tool, the Vernal Pool & Rare Species Information System (VPRS):

http://www.mass.gov/dfwele/dfw/nhesp/species_info/vprs_home.htm

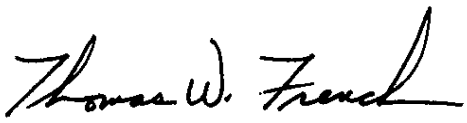
VPRS is an online mapping and data submittal application that provides users with a way to submit rare species observation reports and vernal pool certification forms to the NHESP electronically. Additionally, the system provides the ability to bulk upload data from a spreadsheet, making data submission more efficient for large-scale survey efforts. The Division would encourage the Proponent to contact our office for further details in advance of field surveys and data collection so as to ensure that data can be submitted in as efficient and cost-effective format as possible.

GENERAL NOTE #2: Field identification of many state-listed species requires considerable expertise and field experience. Therefore, all study plans requiring field surveys and identification of state-listed species should be amended to include the following requirements:

1. Field surveys should be conducted by a qualified biologist in appropriate quality habitats throughout the project area (or a portion thereof, as appropriate), using methodologies consistent with the "NHESP's Endangered Species Habitat Assessment & Survey Guidelines" guidelines.
2. The NHESP requires pre-approval of the biologist prior to conducting surveys. We can provide contact information for pre-approved biologists on a species or taxa specific basis, or we can review the qualifications of other proposed biologists (in which case a copy of the biologist's resume and qualifications should be sent to the NHESP for prior review).
3. The selected biologists shall submit written survey protocols for NHESP approval prior to initiation of field work. Survey protocols shall list the specific taxonomic characteristics for definitive identification as well as the characteristics of similar or easily confused species. Please ensure that the biologist contacts our office to discuss these species and their photo-documentation requirements.
4. Collection or handling of state-listed species requires the selected biologist submit a Scientific Collection Permit Application for NHESP review and approval prior to initiation of field work.

GENERAL NOTE #3: Many rare species are sensitive to unauthorized collection. External reports or other external materials or products developed using these data shall not reveal site locations without written consent by the NHESP. A copy of any external reports, manuscripts, or other products related to state-listed species shall be provided to the NHESP upon completion.

Thank you for this opportunity to comment.

Sincerely,  Caleb Slater, Ph.D. Anadromous Fish Project Leader	Sincerely,  Thomas W. French, Ph.D. Assistant Director for the Natural Heritage & Endangered Species Program

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