CONNECTICUT RIVER WATERSHED COUNCIL
The River Connects Us
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July 15, 2013

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

Re: Northfield Mountain Pumped Storage Project No. 2485-063
Turners Falls Project No. 1889-081
Comments on the June 28, 2013 updated Proposed Study Plan

Dear Secretary Bose,

The Connecticut River Watershed Council, Inc. (CRWC) is a nonprofit citizen group that was established in 1952 to advocate for the protection, restoration, and sustainable use of the Connecticut River and its four-state watershed. The interests and goals represented by CRWC include, but are not limited to, improving water quality; enhancing habitat for fish and other aquatic biota; safeguarding and improving wildlife habitat; protecting threatened and endangered species; protecting wetlands; preserving undeveloped shore lands; enhancing public recreation and promoting recreational safety; protecting aesthetic values; protecting archeological, cultural, and historical resources; fostering sustainable economic development, energy production, and preserving the local tax base along the Connecticut River and its tributaries.

CRWC submitted comments on FirstLight's Pre-application Document (PAD), FERC's Scoping Document 1 (SD 1), and 26 study requests in our letter dated March 1, 2013. We reviewed the Proposed Study Plan (PSP) filed with FERC on April 15, 2013, and attended all of the meetings that have been held to discuss the draft study plans. We have now reviewed the updated PSP dated June 28, 2013, and all of our comments below refer to the updated PSP unless otherwise specified.

Many changes have been made to the updated PSP in response to comments provided at the stakeholder meetings. We appreciate the changes and improvement that have been made so far. We have a set of general comments and extensive comments on each of the proposed and three of the rejected studies, which are all below.

General comments:

PME is not defined in the list of acronyms.

Throughout the document, there are places where it says that "stakeholders" will be consulted, and other places where it says "resource agencies" will be consulted. We are not sure if the two

terms are being used interchangeably in this context. If not, then there are many places where groups like CRWC would also want to be consulted along with resource agencies.

During the May 21, 2013 meeting, we said that having a grid of the schedules of all the studies or all the fisheries studies would be extremely helpful. No such grid has been provided in the updated PSP, but having one for the revised PSP is essential so that we can tell if any of the schedules for studies that require certain flows or operational control are at odds with one another.

The "Proposed Plan to Avoid/Minimize Entrainment of Silt during Future Upper Reservoir Drawdowns" that was required by FERC after the 2010 U.S. Environmental Protection Agency and Massachusetts Department of Environmental Protection (MassDEP) enforcement order should be wrapped into the proposed study plan and timetable. It is important that we have the results of the sediment management plan in the same time frame as the other studies.

In all of the study schedules, it would be good to see when stakeholders will see an initial draft of the study results, aside from a generic reference to the ILP schedule in FERC's Scoping Document 1 (SD1).

3.1.1 2013 Full River Reconnaissance Study

Introductory comments on this study

As an active member of the Connecticut River Streambank Erosion Committee (CRSEC) we are familiar with the Full River Reconnaissance (FRR) process. CRWC and many other members of CRSEC have long felt that the FRR methodology had weak areas, and we felt that John Field's 2007 "Fluvial Geomorphology Study of the Turners Falls Pool on the Connecticut River Between Turners Falls MA and Vernon VT" offered many good suggestions on how to improve the FRR. We felt the 2008 FRR was particularly flawed, and complaints and critiques have already been laid out in excruciating detail in the FERC docket at that time.

While we understood why the 2013 FRR would be wrapped into the study plan schedule, we were surprised to see the FRR as a study described in the PSP dated April 15. After all, other compliance studies that are of interest in some of the proposed relicensing studies, such as the annual fish ladder results or the sediment management plan, were not brought in as studies in the PSP. Now that the FRR is part of the PSP, we recommend that any task that is outside of the scope of a typical FRR be put into a different study, either 3.1.2 or a third erosion-related study. For example, Task 5 is an evaluation of all riverbank stabilization projects done since 1996. This should perhaps separated out into its own study, unless FirstLight intends to do this analysis as part of every FRR in the future.

We have long asked for a QAPP to be written for the FRR methodology, and we are glad that it will be part of the 2013 FRR. We reviewed a draft of the QAPP in December 2012, and CRSEC provided comments to FirstLight in early February of 2013 (CRWC contributed to this effort). The QAPP, to my knowledge, was not updated much for the April 15 filing, and has not been updated as of the June 28 filing. The review of the QAPP now falls in a 2-week window in late August, and we feel that this is an inadequate amount of time when rolled into review of all the other studies. The QAPP review and acceptance should be allowed to fall under a separate time line.

Many changes and improvements have been made to the updated PSP since the April 15 version in response to comments at the May 15 and June 14 meetings. We still have several problems with the FRR methodology, however.

Task 1a: Identify and Define Current Riverbank Features and Characteristics

Field (2007) recommended on page 46 of his report, section 9.3b Monitoring of erosion #2, "The mapping of erosion sites as conducted during previous full river reconnaissance efforts (NEE, 2005) should be modified to include the types of erosion present (e.g., undercut banks, topples, slides, slumps, flows), other features indicative of erosion (e.g., tension cracks, exposed roots, leaning trees), and the stage of erosion present (Figure 30)." [More details are provided in this recommendation that involves preserving elements of previous studies to enable year-to-year comparisons.] We are disappointed that the field data logging worksheet, Table 3.1-1 and the riverbank characterization matrix, Table 3.1-2 continues to be extremely flawed. Erosion stage and features indicative of erosion are ignored. The coding of each segment that results from using the Table 3.1-2 matrix is extremely confusing and meaningless. In Table 3.1-1, the erosion **types** listed include two categories that were identified as being **stages** by Field in 2007. In addition, as FRCOG has aptly pointed out in their comment letter, many of the observations are of proxies for erosion, such as amount of vegetation, bank height and slope, etc.

In response to comments at the June 14 meeting, the updated PSP now includes a Table 1 that compares Field's stages of erosion with the matrix of riverbank features and characteristics. This table highlights some of the problems with the matrix: the matrix definition of Field's "notching or undercutting" and "secondary notching or undercutting" is the same, as is the matrix definition of Field's "slide or topple" and "flows (disaggregated slide)." Looking at Field's diagram's these are four distinct stages, not two that are equivalent.

Task 3: Land-use mapping.

The updated PSP says that the plans will be developed using MassGIS data layers of land use. We looked at MassGIS online, and found reference to a MacConnell land use classification scheme using 21 categories, but we also found that the land use (2005) MassGIS data layer (http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus2005.html) with the following 40 categories. We would like confirmation which list will be used for this and the land use study, and whether or not the 2005 land use data layer is the one that will be used. The concern heard at the meeting was that active grazing on riparian land was of interest. This may not be captured in even the most detailed land use codes, since "pasture" can be hayfields with no animals or grazing lands.

LAND USE CODE DEFINITIONS

Land Use Code	Land Use Description	Detailed Definition
1	Cropland	Generally tilled land used to grow row crops. Boundaries follow the shape of the fields and include associated buildings (e.g., barns). This category also includes turf farms that grow sod.
2	Pasture	Fields and associated facilities (barns and other outbuildings) used for animal grazing and for the growing of grasses for hay.
3	Forest	Areas where tree canopy covers at least 50% of the land. Both coniferous and deciduous forests belong to this class.

4	**Non-Forested Wetland**	DEP Wetlands (1:12,000) WETCODEs 4, 7, 8, 12, 23, 18, 20, and 21.
5	**Mining**	Includes sand and gravel pits, mines and quarries. The boundaries extend to the edges of the site's activities, including on-site machinery, parking lots, roads and buildings.
6	**Open Land**	Vacant land, idle agriculture, rock outcrops, and barren areas. Vacant land is not maintained for any evident purpose and it does not support large plant growth.
7	**Participation Recreation**	Facilities used by the public for active recreation. Includes ball fields, tennis courts, basketball courts, athletic tracks, ski areas, playgrounds, and bike paths plus associated parking lots. Primary and secondary school recreational facilities are in this category, but university stadiums and arenas are considered Spectator Recreation. Recreation facilities not open to the public such as those belonging to private residences are mostly labeled with the associated residential land use class not participation recreation. However, some private facilities may also be mapped.
8	**Spectator Recreation**	University and professional stadiums designed for spectators as well as zoos, amusement parks, drive-in theaters, fairgrounds, race tracks and associated facilities and parking lots.
9	**Water-Based Recreation**	Swimming pools, water parks, developed freshwater and saltwater sandy beach areas and associated parking lots. Also included are scenic areas overlooking lakes or other water bodies, which may or may not include access to the water (such as a boat launch). Water-based recreation facilities related to universities are in this class. Private pools owned by individual residences are usually included in the Residential category. Marinas are separated into code 29.
10	**Multi-Family Residential**	Duplexes (usually with two front doors, two entrance pathways, and sometimes two driveways), apartment buildings, condominium complexes, including buildings and maintained lawns. Note: This category was difficult to assess via photo interpretation, particularly in highly urban areas.
11	**High Density Residential**	Housing on smaller than 1/4 acre lots. See notes below for details on Residential interpretation.
12	**Medium Density Residential**	Housing on 1/4 - 1/2 acre lots. See notes below for details on Residential interpretation.
13	**Low Density Residential**	Housing on 1/2 - 1 acre lots. See notes below for details on Residential interpretation.
14	**Saltwater Wetland**	DEP Wetlands (1:12,000) WETCODEs 11 and 27.
15	**Commercial**	Malls, shopping centers and larger strip commercial areas, plus neighborhood stores and medical offices (not hospitals). Lawn and garden centers that do not produce or grow the product are also considered commercial.
16	**Industrial**	Light and heavy industry, including buildings, equipment and parking areas.

17	**Transitional**	Open areas in the process of being developed from one land use to another (if the future land use is at all uncertain). Formerly identified as "Urban Open".
18	**Transportation**	Airports (including landing strips, hangars, parking areas and related facilities), railroads and rail stations, and divided highways (related facilities would include rest areas, highway maintenance areas, storage areas, and on/off ramps). Also includes docks, warehouses, and related land-based storage facilities, and terminal freight and storage facilities. Roads and bridges less than 200 feet in width that are the center of two differing land use classes will have the land use classes meet at the center line of the road (i.e., these roads/bridges themselves will not be separated into this class).
19	**Waste Disposal**	Landfills, dumps, and water and sewage treatment facilities such as pump houses, and associated parking lots. Capped landfills that have been converted to other uses are coded with their present land use.
20	**Water**	DEP Wetlands (1:12,000) WETCODEs 9 and 22.
23	**Cranberry bog**	Both active and recently inactive cranberry bogs and the sandy areas adjacent to the bogs that are used in the growing process. Impervious features associated with cranberry bogs such as parking lots and machinery are included. Modified from DEP Wetlands (1:12,000) WETCODE 5.
24	**Powerline/Utility**	Powerline and other maintained public utility corridors and associated facilities, including power plants and their parking areas.
25	**Saltwater Sandy Beach**	DEP Wetlands (1:12,000) WETCODEs 1, 2, 3, 6, 10, 13, 17 and 19
26	**Golf Course**	Includes the greenways, sand traps, water bodies within the course, associated buildings and parking lots. Large forest patches within the course greater than 1 acre are classified as Forest (class 3). Does not include driving ranges or miniature golf courses.
29	**Marina**	Include parking lots and associated facilities but not docks (in class 18)
31	**Urban Public/Institutional**	Lands comprising schools, churches, colleges, hospitals, museums, prisons, town halls or court houses, police and fire stations, including parking lots, dormitories, and university housing. Also may include public open green spaces like town commons.
34	**Cemetery**	Includes the gravestones, monuments, parking lots, road networks and associated buildings.
35	**Orchard**	Fruit farms and associated facilities.
36	**Nursery**	Greenhouses and associated buildings as well as any surrounding maintained lawn. Christmas tree (small conifer) farms are also classified as Nurseries.
37	**Forested Wetland**	DEP Wetlands (1:12,000) WETCODEs 14, 15, 16, 24, 25 and 26.

38	**Very Low Density Residential**	Housing on > 1 acre lots and very remote, rural housing. See notes below for details on Residential interpretation.
39	**Junkyard**	Includes the storage of car, metal, machinery and other debris as well as associated buildings as a business.
40	**Brushland/Successional**	Predominantly (> 25%) shrub cover, and some immature trees not large or dense enough to be classified as forest. It also includes areas that are more permanently shrubby, such as heath areas, wild blueberries or mountain laurel.

Study Schedule.

The updated PSP indicates that FirstLight is seeking permission from FERC to file the FRR in September 2014, approximately six months later than it normally would. FirstLight has filed a separate letter to FERC requesting permission to do this. CRWC is not in favor of pushing back the due date for the FRR for the following reasons 1) the FRR's main purpose is license compliance, 2) the FRR is intended to generate a schedule and list of sites for riverbank restoration – the 2008 lacked such a component and so CRSEC would like to proceed with meetings and discussions about future projects as soon as possible, 3) we think seeing the FRR before the report for study 3.1.2 makes logical sense because the second study should build on the first, and 4) why lump the review of the FRR with the review of all other interim reports for other studies when the FRR has its own schedule that allows for a staggered, and more thoughtful, review?

3.1.2 Northfield Mountain/Turners Falls Operations Impact on Sediment Transport

Introductory comments on this study

Although many changes and improvements have been made to the updated version of 3.1.2 since the April 15 version in response to comments at the May 15 and June 14 meetings, we still find many parts of this study problematic and confusingly organized, potentially leading to $500,000-worth of studies that will have meaningless or erroneous results. In general, the three updated TransCanada erosion studies are laid out more clearly and more logically than this study. While we wish we had more time to provide even more detailed comments, we in general feel that the erosion studies in the updated TransCanada PSP are a better model for looking at the processes of erosion.

The 2007 Field Report recommended for future work under 9.3a Understanding the causes of erosion (#4 on page 46) "A more thorough understanding of beach formation and the processes that lead to bank stabilization is needed. A remote sensing technique should be used to map the location and width of beaches in the Turners Falls pool. LIDAR could be an effective method of doing this if the flight occurs during low pool levels." Recommendation #7 was "determine if narrow beaches correspond to the areas of highest shear stress as predicted by the hydraulic model."

In CRWC's study request 2, we requested further investigation of beach formation as part of a determination of sediment deposition in the study area. We discussed beach formation at the

May 15 meeting and we were told that the recreation study will ask about beaches, sediment filling in, and locations of areas affected. We disagree that this topic is best covered in a recreational survey, and moreover, the draft surveys provided as part of Study 3.6.1 (the recreational use survey) in the updated PSP do not ask any questions related to beach formation. TransCanada has recently completed LiDAR surveys all the way down to the Holyoke Dam and the data in their impoundments will be used in TransCanada's Study 3. FirstLight could likely obtain/purchase the LiDAR data from TransCanada to include a beach formation analysis in this study.

Task 2: Geomorphic Understanding of Connecticut River

The wording in this section is confusing – "…this task would entail… it would include background… " Are you doing the task or not? If so, it "will" entail and "will" include.

We believe the Field 2007 report already accomplishes Task 2. The end product of Task 2, as stated on page 3-27 of the updated PSP, is a summary of the principal potential causes of riverbank erosion that occur within a river corridor, including natural processes and anthropogenic causes. That is exactly what the Field 2007 report contained, and we believe that it was competently done.

There are, however, erosion monitoring recommendations from the 2007 Field report that likely lie outside the scope of a typical Full River Reconnaissance, and should be done in this study. For example, Field's 2007 recommendation #9 in Section 9.b Monitoring of Erosion was "An attempt should be made to overlay the 1961 aerial photographs with a current flight and to create a topographic map from the 1961 flight. The feasibility of this effort has been confirmed by Eastern Topographics, Inc. This effort will identify the previous extent of the low bench (Figure 7a-b) and identify areas of the most significant bank recession in the past 45 years." Recommendation #10 in the 2007 Field report was "Portions of the 1971 ground surveys by Ainsworth and Associates, Inc. of Greenfield MA should be resurveyed to identify changes in bank position since the opening of the Northfield Mountain Pumped Storage Project."

CRWC made these same recommendations in our Proposed Study 2. At the study plan meetings we continued to discuss the need for this analysis, which we believe to be useful for the purpose of anticipating future project effects during the next license, and potentially analyzing mitigation measures and natural river processes over time. FirstLight has rejected studying historic riverbank conditions because they don't want to do a pre-raising of the dam comparison. However, in another study, page 3-182, task 3 of Fish Assemblage study says, "Comparisons will be made with historical records," looking at a study from the early 1970's before and after Northfield Mountain began operations. TransCanada's Study 1 is titled "Historical Riverbank Position and Erosion Study," and the rationale for doing this study is that it "will facilitate conclusions as to the association and effect of project operations on active erosion at various locations within or areas affected by the three projects." FERC indicated at the June 14 meeting that they are interested in a trend analysis going back in time. We continue to recommend including a comparison of riverbank position over time for the purposes of moving forward with a new license.

Task 3: Install Proposed Water Level Monitors in Turners Falls Impoundment.

A map showing the water level monitor locations would be extremely helpful. In lieu of that, the table below has the location in miles upstream of the dam, as well as comments.

CRWC comments on existing and proposed water level recorders

Water Level Recorder	**Distance from TF Dam (miles)**	**Comments**
Turners Falls Dam Existing Gage	-	Existing hourly gage
TF Boat Barrier Line	0.3	Existing hourly gage
Need for a gage	2.1-5.5	Need a proposed gage between the TF boat barrier line and the tailrace, upstream of the Narrows or French King Gorge. Figure 3.2.2-2 shows a dramatic grade change at and upstream of the gorge. The tailrace site has its own set of dynamics that might not be representative of upstream of the gorge.
Northfield Tailrace	6.5	Existing hourly gage
3,500 ft upstream of Northfield Tailrace	~7.2	Proposed 15-minute interval gage. Not sure how location (3,500 ft upstream of tailrace) was chosen. CFD for tailrace study covers 1 km.
Upstream of Schell Bridge, 8.5 miles upstream of Northfield tailrace	15	Proposed 15-minute interval gage. We aren't sure why the Route 10 bridge wasn't used so that the data from 2012 could be expanded, but otherwise the location seems fine.
Just below Stebbins Island	~20.5	Proposed 15-minute interval gage. We don't see the value in having two gages here, or even one. We can't recall any discussions at the meeting that would have prompted this decision. However, we do see that TransCanada's erosion study has been modified to continue down to Stebbins Island, so perhaps FirstLight wishes to collect data related to TransCanada's study and/or potential conclusions.
Just above Stebbins Island	~20.5	Proposed 15-minute interval gage. See comment above; we recommend deleting one or both of these sites and adding one between French King Gorge and the Northfield Mountain tailrace.

Figure 4.3.1.3-7 of the PAD shows the annual elevation curves for the four existing hourly gages. Note how there is a large difference between the curve for the Turners Falls dam vs. the curve for the boat barrier line, which is only 0.3 miles upstream of the dam. Looking at the graphs for each month in 4.3.1.3-8 through 4.3.1.3-19 in the PAD, there are some months that the line for the Northfield tailrace follows closely with that of the boat barrier, and some months when the two lines are very different. CRWC therefore feels that at least one additional water level recorder between the boat barrier line and the Northfield tailrace is warranted, to understand better the dynamics in this section of the impoundment. Figure 3.2.2-2 of the updated PSP shows an elevation drop at the gorge, and this should be a point of interest that we would want to have gages at, preferably upstream and downstream, or at a minimum just upstream.

Installation of the water level recorders between August 2013 and November 2013 is not an adequate amount of time for the recorders to be out. If year-round recording is not possible (with Vermont Yankee operating, ice is not an issue except at Barton Cove), then a full season of data is needed to adequately characterize river fluctuations during different parts of the year. The recorders are being used for several studies, and a full season is imperative. Looking at the elevation curves for the four existing water level recorders for each month in 4.3.1.3-8 through 4.3.1.3-19 in the PAD, there are some months, such as April and May, when the four lines are vastly different than one another, and these will be missed under the current proposal. If data is needed in 2013 to inform other studies, data can certainly be collected as proposed in 2013, and then in 2014 collect a full year or full season of data. If differences in results necessitate and update with the hydraulic study, then that can be done.

Task 3: Evaluation of Water Elevation and Flow Data.

This task and the previous task are both numbered "Task 3."

General: On page 3-25, the updated PSP says that for the purposes of this study the four existing gages are called "long-term monitors" and the two gages monitored in 2012 are termed "short-term monitors." The proposed monitors are called proposed water level monitors.

Task 3a and 3d. Hydrographs of Turners Falls Impoundment Elevations vs. Flow

3a is for the long-term and short-term (2012) monitors. We aren't sure what the end product will be as described. We think that for each water level monitor, there will be a single graph showing each year's hydrograph super-imposed onto the same sheet of paper. This would make a total of six graphs. Is that correct?

3d is for the proposed monitors. Couldn't this be one task with two components? The way these sub-tasks are organized is very confusing. Each graph will show the hydrograph for a proposed monitor, and will also show the Vernon discharge and the Montague gage data. If there are 4 proposed monitors, we think this means 4 graphs, but it is a little confusing.

What we would like to see as another task related to 3a and 3d is a single hydrograph showing the period of time that the proposed recorders will run, with hydrograph lines for the 4 long term monitors and for the proposed monitors all on one graph. This would give us one sense of locational variability over the study period.

Tasks 3c and 3e: Evaluation of Maximum Daily Fluctuation of Turners Falls Impoundment Elevations on a Monthly (and Annual) Basis

3c is for the long-term and short-term (2012) monitors. This task proposes to make monthly and annual "delta" duration curves for 1) the period of record for each recorder (from 2000 on), 2) for 2010 alone – this is the year that Northfield Mountain was shut down between May and November, and 3) for times that the Turners Falls dam is not spilling. We think the delta duration curves will provide useful information and we recommend this stays in the study plan, but duration curves don't show seasonal, weekly, or other kinds of patterns, so we would also like to see a graph of the delta over time, as in tasks 3a and 3d, but it won't be a hydrograph it will be a delta graph. This could be done by month or season, so that variations would not be lost. This could be done for the long-term monitors only, for a subset of years and for 2010 separately.

3e is for the proposed monitors. See comments above for 3c.

Task 3f: Analysis of Flow and WSEL Data to Correlate Project Operations and WSEL Fluctuations.

First bullet. We think using mean daily flows will miss the peak flows and fluctuations. We would prefer hourly data used, although one would need to think about what the time gap is between the West Deerfield gage and the Montague City gage. The end result of using hourly data would essentially be a hydrograph for flows just upstream of the Turners Falls Dam, something we currently don't have. There is an old USGS discontinued gage somewhere in this vicinity; perhaps that data could be obtained if that is of any value.

Second bullet. The subtracted hydrograph suggested in the above bullet should be plotted on this graph.

Second bullet: Don't just concentrate on high flows here, but all flows low and high.

In general, **we want to know when water levels change, what is the ramping rate**? That would be relevant for the Odonate study and other habitat studies.

Task 5c: Evaluation of Round 1 Field Evaluation

Transects are buried in this subtask, whereas it is an entire study for TransCanada.

During the June 14 meeting, I asked for stratigraphic descriptions of the bank material, and Bob Simons said it would be done during the transect surveys, but I don't see that there is any mention of stratigraphy in the updated PSP.

Task 6: Causes of Erosion

This section lists 9 potential causes of erosion (two of which overlap: land management practices and anthropogenic influences to the riparian zone), and then describes how just 3-4 of these will be analyzed (land management is called "spatial analysis," and the studies that look at riparian land management are not referenced here). Therefore, this task seems incomplete and detracts from the study proposal's credibility.

We believe it will be impossible to parse out some of the causes of erosion. For example, is erosion at the toe of the slope due to water level fluctuations, hydraulic sheer stress, boat and wind wavies, ice or debris. Moreover, it is our opinion that boat wakes are an indirect effect of project operation/existance. In the Massachusetts section of the Connecticut River, the two areas that are heavily used for motor boating are the Holyoke impoundment and the Turners Falls impoundment. No doubt, motor boating would not be as prevalent without the existence of those two dams.

The resulting analysis in this task has the feeling of being highly subjective and therefore we feel that there will be lots of money spent on questionable results.

Task 7: Report

The updated PSP has 9 bullets giving the subject headings of the sections in the final report, with no details about the ways that the data will be analyzed or presented. TransCanada's updated Study 2 (Riverbank Transect Study) includes the following details about deliverables, and we recommend this level of detail in the FirstLight study plans:

"The work products provided as part of this study will include:
1) A GIS shapefile of monitoring sites and table of site characteristics;
2) drafted overlaid topographic cross sections showing changes at each site through time;

3) *bar graphs showing estimated volumes of soil loss through time and segregated by bank features (e.g., composition, slope, height); and*
4) *line graphs showing variations in water stage through time overlaid with bar graphs showing volume of soil loss during the time between survey events;"*

Likewise, TransCanada's deliverables for Study 3, Riverbank Erosion Study, contains the following details about deliverables that we think provides stakeholders with a better sense of how the data will be logically used and presented:

"The work products to be completed as part of this study will include:
1) *An annotated bibliography of local studies and published literature describing how a particular document relates to one or more of the study goals;*
2) *tables and figures documenting and illustrating how the character of the watershed (e.g., drainage area), valley (e.g., width), and channel (e.g., meander dimensions) vary in a downstream direction;*
3) *maps showing long-term trends in channel migration and bank erosion;*
4) *bathymetric contour maps and/or cross sections showing how the depth of the river varies across the river at selected sites;*
5) *surficial geology maps of the Connecticut River valley bottom within the study area presented on 7.5' topographic quadrangles;*
6) *GIS shapefiles and summary tables of channel conditions for more than 300 miles of shoreline;*
7) *figures and tables of the stratigraphic and soil descriptions of bank sediments;*
8) *topographic cross sections and plan maps illustrating important bank and channel conditions;*
9) *maps and cross sections illustrating how flow stage, velocity, and shear stress vary with discharge for various points along the river based on hydraulic modeling results; and*
10) *an interim and final study report synthesizing the above deliverables into a narrative that addresses the study goals and issues raised in various study requests."*

TransCanada's erosion study deliverables section indicates that an interim study report will be prepared after a first year of study for stakeholders to review and comment. A draft final report will be prepared after year two, and stakeholder comments will be included in a final study report. We like this idea. There appears to be no interim or draft reports that will be filed by FirstLight, and no stakeholder review and comment.

3.2.1 Water Quality Monitoring Study

TransCanada's study 6 proposes weekly water samples collected at the forebays of Wilder, Bellows Falls, and Wilder Dams between June 1 and September 30, and tested for nitrate/nitrite, total nitrogen, total phosphorus, total Kjeldahl nitrogen, and Chlorophyll-a. CRWC recommends the same testing at the forebay of the Turners Falls dam for the following reasons:

- Comparing across sites would be interesting, to detect any trends at the four dams under relicensing
- FERC has expressed an interest in looking at cumulative effects, and nutrient loading via sediment transport is one cumulative effect worth investigating.
- As NMFS noted in their study request document, soil erosion contributes to nutrient loading. Long Island Sound is impaired for dissolved oxygen caused by nutrient loading. The states of CT, MA, NH, and VT, along with EPA and NEIWPCC have been working

on updating the 2001 TMDL to reduce nitrogen loading. PME measures at the hydro projects to minimize soil losses from erosion will help in this effort, but having actual water quality data will also allow government agencies to ascertain current loading values, which may be impacted by project operations, among other things.

CRWC requested sediment analysis in Barton Cove to be tested for metals and PCBs in CRWC study request 6. FirstLight's rationale for not doing this is that they analyzed samples in 2010 after the sediment dumping EPA enforcement action in 2010. However, that data represents a single day (August 26, 2010) from sediment inside the tunnel, older sediment dug when they first drained the reservoir, sediment near the tailrace, and across the river on the bank. These locations are not representative of Barton Cove and represent only a single day. River level fluctuations may increase the available mercury in fish at reservoirs, and possibly impounded areas like Barton Cove. See the study proposal for Niagara Power Project (No. 2216) regarding for background information on the mercury issue:
http://niagara.nypa.gov/ALP%20working%20documents/finalreports/IS28.pdf

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

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 14, 2013 at Northfield Mountain ("the meeting").

- On page 3-49, boat wakes are listed as a source of water level fluctuations in the Turners Falls impoundment and below Cabot Station. Boat wakes are temporary waves caused by the passage of watercraft. For the purposes of a hydraulic model, boat wakes have no effect on the amount of water in the river at any time, the velocity of water going downstream, or the cross-section of the river bed that contains water. CRWC recommends deleting these two bullets.
- CRWC recommends adding "Operation of Northfield Mountain Pumped Storage Project (pumping or generating)" to the list of sources of water level fluctuations below Cabot station on page 3-49.
- This study should include a hydraulic analysis of the Turners Falls canal, since upstream and downstream passage goes through the canal.

Task 2: installation of water level recorders.

Please refer to our comments from study 3.1.2 on water level recorders. Please note that the details and information in the updated PSP for study 3.1.2 and here in 3.2.2 are not the same.

Task 7: unsteady flow model. Matrix of proposed model runs, tables 3.2.2-3 and -4.

Explain what "max gen" vs. "min gen" means for each facility shown. For example, in table 3.2.2-4, does "Turners Falls" mean Cabot and No. 1? Does "max" mean Cabot is running full strength and "min" means No. 1 is operating? If not, what?

Explain why there needs to be separate scenarios for Holyoke and Holyoke pond level.

Scenarios in Table 3.2.2-4 don't factor in everything that is coming downstream into the reach below Cabot. Based on our understanding of Section 3.3.2 of the PAD, when natural routed flows are above 15,938 cfs (the capacity of Cabot and No. 1 together), which happens 28% of the

time, the dam spills water. This amount of spill would be impacted by whether or not Northfield Mountain is pumping, generating, or off. At flows less than 1,433 cfs (3% of the time), No. 1 station operates as roughly run of river and this flow amount would also be impacted by what is happening at Northfield Mountain. Therefore, we think that the run matrix for below Cabot needs to take into account the various operational states at Northfield Mountain.

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

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on April 16 and May 8, 2013 at Northfield Mountain and June 20 conference call meeting ("the meetings").

In study reaches and transect selection and study schedule sections, modify revised dates of site visits accordingly, since the July ones were postponed due to stakeholders being busy writing comments on the updated PSP.

Existing Information and Need for Additional Information

Ensuring that flows in the bypass reach and below Cabot Station are conducive to reproduction and survival of the federally endangered shortnose sturgeon (SNS) is a key element of this study. It is therefore not clear why this section leaves out any mention of SNS, whereas CRWC's study requests 11 and 12 and NOAA's study request #2, for example contained a summary of existing information that would be relevant here. Information from Boyd Kynard and Micah Keefer's research should be summarized here, along with what we know about flows and sites. According to Boyd Kynard (personal communication, July 12, 2013), his research shows SNS may prefer the Rock Dam site for spawning, but flows experienced under current operations are do not make that site favorable.

3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain ("the meeting").

- Task 3: At the meeting, we asked that details for mobile tracking methods be fleshed out, but the updated version has no details about how often mobile tracking will take place, or where.
- Task 4: Ted Castro-Santos pointed out at the meeting that failure to pass can also lead to mortality. Perhaps a distinction needs to be made in this task that you will be assessing "direct mortality," and that "indirect mortality" is also a factor. Please specify whether or not indirect mortality will be evaluated. We do see a benefit to an analysis of some kind.
- The updated study schedule on page 3-120 seems reasonable. CRWC is interested in having the Conte Lab studies be posted so that the public can review them, as discussed at the meeting. However, it is our opinion that Task 1 should have already been completed as part of the PAD (a request for information went out over a year ago), or at least in the months following the PAD.

Shad telemetry locations are shown in Figure 3.3.2-1 through 3.3.2-4. There have been several changes from the locations shown in the PowerPoint presentation (online at northfieldrelicensing.com) for the meeting.

- It was noted during the meeting that shad are probably spawning in the canal. The canal itself does not have any receivers other than the Cabot station forebay. For upstream migration, if you get a reading for a fish at the Cabot station forebay but not at the gatehouse ladder, do you assume it has spawned or do you assume mortality? Likewise for an opposite situation for downstream migration. Is there a need for an additional receiver in the canal?
- A recommendation was made at the meeting to install multiple PIT tag readers at the Cabot fish ladder. If more than one is recommended, perhaps Table 3.3.2-1 could indicate so.
- In order to be able to evaluate downstream passage route selection, and pond fluctuations on upstream and downstream passage, more receivers are needed just upstream of the Turners Falls dam. The updated draft moves the one just upstream of the dam to a spot near a set of old bridge abutments upstream. Fluctuations of the pond at the top end of the gatehouse ladder has been mentioned as a possible problem for fish migration, and there are no receivers that would allow for that evaluation.
- At the meeting, Ted Castro-Santos recommended 6 receivers in the vicinity of the Northfield Mountain Intake. The updated draft, however, still proposes only 3 receivers.
- A PIT tag reader should be installed at the Northfield Mountain intake/discharge pipe or at the entrance to the upper reservoir to evaluate entrainment mortality.
- Why is the northernmost extent of the study at Northfield Mount Hermon and not somewhere closer to the Vernon Dam?

3.3.3 Evaluate Downstream Passage of Juvenile American Shad

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 4, 2013 at Northfield Mountain ("the meeting").

Task 1.

- Second paragraph refers to "pumpback mode" which is a term not used before. Please define.
- Last paragraph, page 3-131: Receivers are to be set up above and below the TF Dam to determine spillage survival. How is survival going to be determined using radio receivers? In task 3 it is explained that fish will be recovered from the tailrace, examined for injuries and held for 48 hours to determine latent mortality. We think a similar method should be used for spillage survival, and downstream bypass survival. Otherwise, how will we evaluate whether or not going through the turbines is better or worse, and also evaluate whether changes need to be made to downstream passage options.We also think there should be a control group for both.

Task 2.

- We aren't sure why the paragraph describing the "proof of trial concept" to tagging juvenile shad, the numbers used, and methods used, that was present in the April 15 PSP has now been removed.

Study Schedule.

- During the meeting, Kleinschmidt expressed worry that tagging would not be possible for juvenile shad. We wonder, then, if 2013 should be used as a trial period, during which radio and balloon tags could be inserted and tested to see if the study plan is viable. If not, then the licensee will have time to develop an alternative plan.

3.3.4 Evaluate Upstream Passage of American eel

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 4, 2013 at Northfield Mountain ("the meeting").

Task 1:

- Why has the Cabot station log sluice survey site been deleted?
- Specify whether eels will be released at the point of capture or not.

Task 2:

- USGS Conte Anadromous Fish lab researcher Alex Haro (written comments distributed at the meeting) recommended adding the Cabot Station Spillway near north abutment as a survey site, and that has not been added.
- The updated PSP describes the temporary traps as being 6 feet long and 1 feet wide. I believe we talked about making the traps 6 feet long and 3 feet wide. Is 1 foot wide enough to have the 2 different substrates used side by side as the new paragraph says? Please describe climbing substrate types.
- Alex Haro had pointed out that it is not specified whether Cabot or Spillway fishway attraction flows will be operated during the period when fishways are not operational. How will the traps be run when the fishways are operational?

3.3.5 Evaluate Downstream Passage of American eel

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 4, 2013 at Northfield Mountain ("the meeting").

Task 1

- We talked at the meeting about providing a table of a range of operating conditions here, but no table or details about the operating conditions have been provided.
- USGS Conte Anadromous Fish lab researcher Alex Haro (written comments distributed at the meeting) recommended 15-20 discreet ground truth events. The draft says 12-18, and so we'd recommend that the mid to upper end of this range be used.
- Alex recommended the hydroacoustic study take place for more than one year because of year-to-year variability. Only one year of study is proposed, perhaps due to the expense. Is there an equivalent method for this study that is less costly and could be used for more than one year? What is TC doing?

Task 2b:

- Alex Haro recommended adding a site above the Holyoke Dam and downstream of the Route 116 bridge to confirm viability of non-killed eels. No such site has been added.
- This draft has also not incorporated Alex Haro's recommendation that spill morality be considered and estimated, and that a metric for delay be developed. CRWC thinks these two additional issues are important.

3.3.6 Impact of Project Operation on Shad Spawning, Spawning Habitat and Egg Deposition in the Area of Northfield Mountain and Turners Falls Projects

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain ("the meeting").

- Task 2: Examination of known spawning areas downstream of Turners Falls Dam. During the meeting, we discussed adding the canal to this survey. FirstLight says that some spawning occurs in the canal, and they said they would possibly add it to this study. CRWC recommends that all spawning areas associated with the project area, including in the canal, be studied.

3.3.7 Fish Entrainment and Turbine Passage Mortality Study

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 4, 2013 at Northfield Mountain ("the meeting").

- Task 1: Not sure how qualitative scale of entrainment potential will translate to estimating impacts on fish numbers.
- Alex Haro says careful attention needs to be paid to error around estimates for metrics in desktop and field analysis.
- Task 3. We would prefer more actual mortality data of all life stages.

3.3.8 Computational Fluid Dynamics Modeling in the Vicinity of the Fishway Entrances and Powerhouse Forebays

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain ("the meeting").

- Wish to understand the dynamics at the Station No. 1 outfall for upstream migrants and the dynamics just upstream of the Turners Falls dam (at gatehouse and when spilling) for downstream migrants. This study won't look at that.
- John Warner of the USFWS asked at the meeting whether model would be able to pick up near-rack velocities. There was general agreement among the agencies that they are going to want to see the results of this study for the flows at the rack. CRWC doesn't see how this discussion was addressed in the updated PSP.

3.3.9 Two-dimensional Modeling of the Northfield Mountain Pumped Storage Project Intake/Tailrace Channel and Connecticut River Upstream and Downstream of the Intake/Tailrace.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain ("the meeting").

- CRWC suggests a revision to the fifth goal and objective: Assess flow issues related to pumping and generation, including potential local flow reversal, to impact migrating fish, bank erosion, and paddling.
- Under existing information, and relevant to Task 1, there should be a reference to the *Consent Order and Restoration Plan for Removal of Silt/Sediment* filed by FirstLight to FERC on September 13, 2010. The final attachment to the restoration plan included bathymetric information and a plan for the section of river downstream of the intake/tailrace.
- Given the sediment dumping in 2010 and then Hurricane Irene in 2011, CRWC recommends field spot checks of the 2006 HydroTerra bathymetry study before that study is relied upon for the model.
- Task 3: How will field-collected velocity profiles be obtained?
- Task 5: At the meeting, we discussed adding a description of the deliverables here, but nothing has been added. Ralph Abele, in particular, recommended adding a flow conditions table as one of the items in the report.

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

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain ("the meeting").

- Task 4 says that water level data will be used to identify the zones along each transect that have low, moderate, to high inundation frequency. The water level loggers that are not permanent and are only hourly will only be run August to November, 2013 and not the study months of June through August. This is one more reason why the loggers should be out for more than one season.
- Will the water level analysis be able to show how quickly the river levels increase and/or decrease and the typical range of changes along the banks for the months of the study?
- Task 5 or 6 should reference the boat wake assessment from study 3.1.2 to discuss possible impacts from water level fluctuations exacerbated by boat wakes.

3.3.11 Fish Assemblage Assessment.

Despite the lack of highlighting on the pages, several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain ("the meeting").

- Task 1 wording and text in the methodology paragraph above has changed, leaving out many details about how sample locations will be determined. The reference to Kiraly in the April 15 version is gone. It is not clear why these details about methodology are gone; if anything, partners wanted more details. Discussions at the meeting recommended AFS standard methods, but those are not obviously included.
- Task 2: Boat electrofishing. Not clear if this will take place in day and night. During the meeting, it was recommended that night electrofishing be included in order to capture bass and catfish.
- We are glad to see the inclusion of fishing methods for deep and shallow waters. Not included is eel pots, which were recommended by Mass Division of Fisheries and Wildlife during the meeting.
- Task 3: Melissa Grader asked for length, weight, size class to be listed in the report, but there is no mention that these details will be included in the final report. We would like to see details included and summarized in the report.
- The April 15 version of the PSP had a Figure 3.3.11-3 showing the stratum boundary for fish assemblage sampling and a Table 3.3.11-2 with the numbers and description of strata. In the updated PSP, the strata are not defined, and one can't evaluate if Melissa Grader's recommendation that the upper boundary of strata 1 be moved to the Vernon dam was incorporated into the study plan or not.

3.3.12 Evaluate Frequency and Impact of Emergency Water Control Gate Discharge Events and Bypass Flume Events on Shortnose Sturgeon Spawning and Rearing Habitat in the Tailrace and Downstream from Cabot Station.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain ("the meeting").

Task 3:

- In the second paragraph, we had discussed that the random locations be stratified random locations at the meeting, but that recommendation was not captured in the updated draft.
- Water quality samples for suspended sediment should be collected during discharge events.

3.3.13 Impacts of the Turners Falls Project and Northfield Mountain Project on Littoral Zone Fish Habitat and Spawning Habitat.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain ("the meeting").

- Task 1: Please define what an "event" is.
- At the meeting, Ken Sprankle from the USFWS had said that quantification of habitat density is desired. I don't see how this comment was incorporated into the updated PSP.

3.3.14 Aquatic Habitat Mapping of Turners Falls Impoundment.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain ("the meeting").

- It is not clear how the zone of reservoir elevation will be determined, or how the maps were created in Figure 3.3.14-1. We only have one year of data at the Route 10 bridge. The reservoir fluctuation range cited (176 to 185 ft msl) is relevant for the Turners Falls dam, not all locations along the entire pool.
- Task 1b: It is not clear what data will be collected at each transect or vertical.

3.3.15 Assessment of Adult Sea Lamprey Spawning within the Turners Falls Project and Northfield Mountain Project Area.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain ("the meeting").

- Most of the changes discussed at the meeting have been incorporated into the updated version, as far as I can tell. At the meeting, Lael Will from VT Fish and Wildlife mentioned that TransCanada was proposing to cap the lamprey nests to determine if there is viable hatching. We'd be interested to know rationale for not doing that here.

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

Minimal changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain ("the meeting"). At the meeting, people were not sure of the extent of the project effect into the lower Deerfield River or the presence of mussels in the lower Deerfield. The updated PSP doesn't reference any schedule for resolving that question or decision that may or may not have been made. CRWC has no further comment on this study.

3.3.17 Assess the Impacts of Project Operations of the Turners Falls Project and Northfield Mountain Project on Tributary and Backwater Area Access and Habitat.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain ("the meeting").

- I don't think we discussed this during the meeting, but in task 1 it defines low pond as 176 feet msl, or as close to practical. This represents the level at the Turners Falls Dam and is the bottom end of the range the license allows (176 to 185 msl at or near the dam). Low discharge in the Connecticut River is defined as a gage height of < 8 feet at Montague. This gage height translates to roughly 7,000 cfs, a level that Figure 4.3.1.2-12 in the PAD says is exceeded 60% of the time. We are not clear how this level represents a low flow level, and we wonder if it would be better defined by the FirstLight gage at Vernon, because the Montague gage incorporates peaking flows from the Deerfield River. At river flows 7,000

cfs and less, the PAD says on page 3-25 that FirstLight tries to maintain the pool height minimum of 180.5. It is good to look at the minimum level allowed in the license, but it might be worth considering the current practice and those effects. Either way, we don't know what the river levels are like closer to the tailrace when Northfield Mountain is pumping water out of the pond at this level.

- We recommend putting in at least one, but preferably several, loggers in the tributaries to assist with the visual observations. Fourmile Brook is tributary we would recommend. Fall River should also have its own logger, since this one is in the bypass channel and natural flows in the Connecticut River have little bearing on the amount of water in the bypass, unless the dam is spilling.
- I am assuming FirstLight has confirmed that there are no "setback areas" in this impoundment as there are in the Vernon impoundment and elsewhere, which we discussed during the meeting, but I don't see any mention of this determination.

3.3.18 Impacts of the Turners Falls Canal Drawdown on Fish Migration and Aquatic Organisms.

Despite the lack of highlighting on the pages, several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain ("the meeting").

- Under methodology, it says that FirstLight believes that the 2011 survey methods are adequate, with minor modifications. The minor modifications that FirstLight proposes are not specified.
- Task 1. FirstLight proposes to segment the canal into seven zones as was done in the 2011 survey. I believe at the meeting, meeting participants said that the wider zones, such as 3 and 4 should be broken in half because there are some areas that are dry and some that are wider.
- The systematic traverse is not defined, but it seems worth evaluating whether scientific survey methods that involve random transects or random plots of a certain size would yield better results. We are trying to survey large and small things, so systematic traversing might miss things.
- Task 2 is to identify and *assess* potential measures. It appears from here and in the schedule that there is no true assessment of the installed measures in 2015, although I think it is implied that success is how wetted the area remains. We recommend a second round of survey as in Task 1, including temperature, dissolved oxygen, and turbidity measurements for the areas that do remain wetted after installation of PMEs.
- Sediment dredging? How often does it occur, how would affect surveys and PME measures? Boyd mentioned an area that had lots of amocetes that no longer do since the 2010 sediment debacle. Raise any of that?
    - Water quality sampling for suspended solids should be done downstream of the Cabot discharge during canal draining and refill/resumption of operation.

3.3.19 Evaluate the Use of an Ultrasound Array to Facilitate Upstream Movement to Turners Falls Dam by Avoiding Cabot Station Tailrace.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain ("the meeting").

- Task 1: The frequency of the array should be documented.
- Task 1: "Telemetry methods like those proposed in Study No. 3.3.2 will be utilized." How many fish will be tagged, or how will you calculate how many fish you need to tag to have viable results? Ted Castro-Santos suggested using a power analysis.
- Task 1: It may be useful to install more radio receivers or PIT tag readers in the bypass channel for this study as opposed to Study 3.3.2, because in this case how the fish behave in the bypass channel will be of interest.

3.4.1 Baseline Study of Terrestrial Wildlife and Botanical Resources at the Turners Falls Impoundment, the Bypass Reach, and below Cabot Station within the Project Boundary.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain ("the meeting").

- The study area is still not well defined. Under methodology on page 3-248, it states that a field survey of the "shoreline" will be conducted. Under Task 2, it says that field surveys will be conducted "in the Project area." Is it the project area, or is it a shoreline survey? If shoreline only, what distance from the waterline will be surveyed?
- Under methodology on page 3-248, it states that the study will include a survey below Cabot station "to the downstream extent of the Project boundary." The Powerpoint slides from the June 5 meeting say that the survey will be conducted downstream "to Sunderland MA." Which is it? Again, the study area is not well defined.
- Will FirstLight properties like the Barton Cove campground area and peninsula be surveyed in full, or only the shoreline? There are some interesting plants on this peninsula. If areas like this will be surveyed, will the transect methodology change?
- During the meeting, FirstLight consultants said that potential vernal pools would be identified in this study, but there is no mention of that in the updated PSP.
- Not sure if the methods described are also ideal for bird surveys.
- Task 3: No details are provided as to the content of the final report, the data that will be reported.
- Is there any value to nocturnal surveys?

3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain ("the meeting").

- The study area is defined under methodology on page 3-255 as the lands around Project facilities and recreational areas on Northfield Mountain. We assume this means Project lands to the east of Route 63. Will surveys be done on project lands to the west of Route 63? Our question from 3.4.2 about whether surveys will be done of project lands owned by FirstLight that are not along the shoreline (Bennett Meadow, Barton Cove campground, for example) will holds.
- Task 3: What kind of data on plants will be collected? No details given.
- Task 6: No details are provided as to the content of the final report, the data that will be reported. The FERC representative/consultant at the meeting recommended that plant information include details on seed dispersal and germination in the report. The updated PSP doesn't indicate whether this information will be provided.

3.5.1 Baseline Inventory of Wetland, Riparian, and Littoral Habitat on the Turners Falls Impoundment, and Assessment of Operational Impacts on Special-status Species.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain ("the meeting").

- An attempt should be made to eliminate overlap between this study and study 3.4.1, or perhaps the two studies should be merged. Otherwise, it is very confusing.
- The second bullet under Study Area should reference the width of the shoreline surveyed – same as the impoundment (200 ft) or not?
- Tasks 3 and 4 do not provide any details on the data that will be collected during the plant surveys.
- Task 3 should contain the same text about landowner permission that was added to page 3-248 of study 3.4.1.
- Task 6: It is not clear how a water level fluctuation assessment that focuses on puritan tiger beetle habitat fits into a plant survey study with no geographic overlap. This task should be moved to another study, such as 3.4.1, or pulled out as its own study.
- Task 8: No details are provided as to the content of the final report, the data that will be reported.

3.6.1 Recreation Use/User Survey

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain ("the meeting").

Page 3-276 under third paragraph of the General Description, it describes a mail survey targeted to "adjacent residential landowners." Page 3-279, paragraph above Task 3, it describes a mail

survey mailed in the spring to "residential abutters." Because there are some river residents who don't own the land their house sits on (FirstLight owns the land under several seasonal camps), it makes sense to take the word "landowner" out of this study. Those river residents should be sent a survey.

Task 1: Study Preparation

CRWC recommends, in addition to obtaining copies of recreation plans from the Towns of Northfield, Gill, Erving, Montague, and Greenfield, that FirstLight talk to recreation departments in the towns that have them and recreation/open space committees in smaller towns. We also recommend discussions with the MA Department of Conservation and Recreation for their sense of user type, number, and issues associated with the state-run boat ramps and state-owned or –protected conservation land along the river. Additionally, we recommend contacting the MA Environmental Police and local police to talk to them about the various issues regarding recreational use that they observe in the Turners Falls impoundment, bypass, and downstream of the river. For example, I have heard anecdotal stories of the Barton Cove boat ramp being too crowded, people parking along Route 2, and cars getting ticketed.

We are glad to see that FirstLight is planning to hold an additional meeting with stakeholders to review and obtain comments on the proposed survey instruments. We recommend that such a meeting be scheduled very soon because summer schedules are filling up fast.

We understand that a FirstLight consultant plans to attend a July 17 Connecticut River Paddlers Trail meeting, and we encourage future communication between FirstLight and this group down the line for this and other recreational studies.

If any statistics have been kept by Northfield Mountain about attendance such as on the Quinnetucket, campsites used, kayaks rented, and the former shuttle service, these should be obtained and also presented in the final report for the previous 10 years.

Task 2: Field Work

The user survey is to take place year-round, which is appropriate.

Pressure tube counters are to be placed at "high use facilities" within the Project.

Calibration counts are to be done 2 hours per site during each calibration day at each of the 20 formal Project recreation facility listed in study 3.6.2. How many days do you need for statistical purposes>

Spot counts are to be conducted five days per month at all 20 formal Project recreation facilities listed in study 3.6.2. TransCanada is proposing to do surveys nine days per month but during a shorter season. FirstLight will work with state agencies and private groups to determine use at their facilities.

A user contact survey will be administrated during the calibration and spot count site visits. Additional information is needed about project sample size goals for the user survey. It is

unclear how the proposed methods assure sufficient sample size is obtained. Does the proposed method ensure that sampling over one year only will provide a representative assessment of user uses? Comments on the survey questions are below.

A Northfield Mountain trail user survey will be used during the calibration and spot count site visits at Northfield Mountain. It is unclear how the proposed methods assure sufficient sample size is obtained. Does the proposed method ensure that sampling over one year only will provide a representative assessment of user uses? Comments on the survey questions are below.

A mail survey will be mailed in the spring to residential abutters. Additional information is needed about project sample size goals for the user survey. Comments on the survey questions are below.

General comments about Task 2

FERC's study request #6 dated March 1, 2013 said in their proposed methodology #3 that methods should include on-site visitor intercept surveys at formal and informal public recreation areas at the project reservoirs, tailraces, and riverine areas, including the Turners Falls bypassed reach. Study 3.6.2 in the updated PSP only looks at formal public recreation areas. We suggest that the Turners Falls canal should also be added to this list of informal site locations. For example, if you drive along the lower canal near the Cabot Woods Fishing Access parking area, you will often see people birdwatching with spotting scopes looking at the ducks, geese, mergansers, and other birds that congregate in the lower canal. In that same location, people put fishing poles out into the canal; under the current proposal, neither of these uses of project lands would ever be surveyed.

The surveys as presently designed to not get at those people who are not using facility for whatever reason. TransCanada's surveys do ask questions about why their facilities are not being used.

The proposed user survey only surveys those already using amenities. There needs to be a robust proposal for assessing the unmet demand by those not currently using the site.

The updated PSP does not adequately meet the goal for determining demand at recreation sites, which is the first objective listed on page 3-277.

During discussions at the meeting, stakeholders consistently requested multiple survey vehicles to capture users and non-users from the greater community as part of this study. At the meeting, we discussed mail surveys, internet surveys, and the like, but those were all rejected by FirstLight. The out-of-hand rejection on page 3-276 of using electronic means to survey is not warranted. Electronic survey technologies exist that allow for statistically meaningful survey results. FirstLight should take a closer look at this and also coordinate with local and regional recreation organizations to successfully assess the potential for increased use with better access and improved recreation opportunities.

CRWC also suggested adding focus groups into the mix, because users arriving at a boat ramp, for example, may be rushed and not focused on all the issues that they might think of in a different setting. This might be one way of surveying the greater community, or river non-users.

Given the reliance on the results of this study for other studies, such as 3.6.4 Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boats and 3.6.6 Assessment of Effects of Project Operations on Recreation and Land Use, we recommend that the user survey be given out at the Sunderland boat ramp and the river abutters mail survey should be mailed out to all abutters downstream of the Project down to the Sunderland bridge (Route 116).

Task 4: Report Writing

No details are provided as to what the report will contain or how the data will be presented.

If any statistics have been kept by Northfield Mountain about attendance such as on the Quinnetucket boat tour, campsites used, kayaks rented, and the former shuttle service, these should be obtained and also presented in the final report for the previous 10 years.

Figure 3.6.1-1: Draft Recreational User Survey:

- A script that the surveyor will say to each user should be at the top of the survey.
- Weather categories and a place for air temperature should be added to the survey.
- Question 1: If someone answers yes, does the survey continue?
- Question 5: Follow up question to this could be what activities have you done on other visits.
- Question 8 should include fishway viewing, birding/wildlife viewing, rowing, swimming from a boat, swimming from shore, and multi-day float trips. The list should be organized better to group types of activities for easier viewing and choosing. There should be space for writing something in "other."
- It might be useful to collect more information about the survey responder: age, gender, etc.
- There should be more questions related to river fluctuation on this survey. Questions should ask whether river fluctuation affected launching and boating, swimming, fishing from shore, accessing shore, scenic quality of shore.
- FERC's study request #6 in methods under #4 said that "surveys of fisherman and hunters should include additional pertinent information related to game and harvest." No such questions are in the draft survey.
- Please refer to our comments for study 3.6.4 regarding the survey questions.
- Please refer to our comments for study 3.6.6. regarding the survey questions.
- Please refer to our comments for study 3.6.7. regarding the survey questions.
- Portage, other services such as rentals, shuttles, etc.

Figure 3.6.1-2: Northfield Mountain Trail User Survey:

- A script that the surveyor will say to each user should be at the top of the survey.
- Please refer to our comments for study 3.6.7. regarding the survey questions.
- The first question here should be same as question 1 in the user survey.

- No questions relate to user experiences at the Northfield Mountain Mountaintop Observation Area, which is one of the 20 formal recreation sites, and is potentially part of study 3.6.7.

Figure 3.6.1-3: Residential Abutters Survey:

- There should be an introductory paragraph to the recipient of this survey describing the purpose of the survey.
- Question 2: What is the meaning of "regular access?" Regular could be once a year on the same date every year, or every day.
- Question 2 is also confusing with regard to the purpose of the question and whether it is related to access via rights of way. Camp owners often access their camps via rights of way through private lands of abutters. Issues and potential conflicts exist regarding one party giving visitors permission to access the rights of way, or land owners not maintaining rights of way and camp owners needing access through other properties, etc. Questions may be refined to get more information about some of these issues to the extent that they are related to Project lands and Project land usage.
- Question 4 should be the same list as on the user survey.
- There should be a question asking if the person has a dock associated with their residence and how many boats are docked to it, and the kind of boats.
- Questions should ask about beach formation, river level fluctuations, use or overuse of the river, conflicts between river users, how long they have been living along the river, what the strengths and weaknesses are to the facilities and to the river.
- Question7: How does an open-ended question like #7 get used in a survey report or survey statistics. Will reviewers have access to each survey response to read these answers?
- There are no questions related to river level fluctuations, a subject about which we are sure abutters will have much to say and the most hands-on knowledge. Suggested questions are as follows:
    - As a land abutter/camp owner what impacts on recreation have you experienced in regard to the fluctuation of the river level?
    - What other impacts have you experienced that might not be associated with recreation?
    - Are there specific days/times when the fluctuation of the river has completely denied your ability to recreate?
    - Have you experienced any physical tangible loss because of fluctuation? (if so, what?…be specific)
- A question should ask whether land use is impacted by project operations to help inform study 3.6.6.

3.6.2 Recreation Facilities Inventory and Assessment

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain ("the meeting").

There are a number of shortcomings to the standardized survey form, listed below. We were told that these surveys have already been completed, but it might be necessary to go back and re-do some portions.

Figure 3.6.2-2 Standardized Survey Form

- Access: whether or not the access or dock is open to the public should be noted. For example, riverview picnic area has a dock for the Quinnetucket, but I don't think it's open to the public for river access.
- Parking lots: The number of spaces for regular car spaces should be differentiated from # of trailer spaces. For example, the state boat ramp at Barton Cove has no parking spaces for regular cars that bring canoes and kayaks on top of their vehicle; all spaces are for trailers only.
- Campground/campsite: the season that this facility is open should be noted
- There is no space for noting the condition of parking spaces, camp sites, docks, or boat launch facilities.
- There should be much greater detail on the site condition, ADA compliance, and user impact in a numeric ranking format.

3.6.3 Whitewater Boating Evaluation

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain ("the meeting").

- It is not explained how flows will be measured or estimated through the bypass reach during each test run.
- Task 5: No details are provided as to the content of the study report.
- Otherwise, all comments from the meeting seem to have been incorporated.

3.6.4 Assessment of Day Use and Overnight Facilities Associated with Non-Motorized Boats

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain ("the meeting").

Study objectives:
The first bullet has been revised, based on comments at the meeting, to include facilities in the Project area and along both sides of the shoreline down to the Sunderland Bridge. The Study Plan should instead be revised to define the study area as the following: within the Project boundary, plus downstream areas that include the shoreline of the Connecticut River downstream to the Sunderland bridge and the shoreline of the lower Deerfield River from the Route 5/10 bridge to the confluence with the Connecticut River.

The second bullet should be revised to say "Determine if an alternate walkable portage trail around the Turners Falls dam is feasible." Based on comments submitted thus far and comments spoken at the scoping meetings in late January, there is already an established need for an alternate portage.

The last bullet says that one of the study objectives is to determine if the seasons of operation are consistent with actual river use. How will this be determined? The "Standardized Survey Form" (Figure 3.6.2-2 in the updated PSP) that is part of Study 3.6.2 does not appear to gather data

about the dates that a particular day or overnight facility is open to the public. The Draft Recreation User Survey (Figure 3.6.1-1 in the updated PSP) has no questions about user satisfaction for times of year that facilities are not open. The only ask about the user's experience the day of the survey. For example, the Barton Cove campground closes after Labor Day weekend. The surveys as written now would not capture anyone's thoughts about whether there is a demand for camping into the fall.

CRWC's requested study #26 was for the feasibility of a new portage route around Turners Falls Dam and improved river access point downstream of Turners Falls canal. We would like to see a desktop and on-the-ground review of a replacement or modification to the Poplar Street access, and we feel that analyzing whether there is a need for this is not necessary, given the existing consensus among users that this site is inadequate. This element of the study should be explicitly laid out in a revised study plan.

Task 1: Literature Review
CRWC recommends adding two maps to be included on the list of useful resources. "Inland Guides" produced by KM Digital Productions (www.kmdigiprod.com) has produced a "Recreational Guide to the Connecticut River" that is a fold-out map. There is a map that covers Vernon, VT to Turners Falls, MA, and a map that covers Turners Falls, MA to Hatfield, MA. These excellent maps are on sale at the CRWC office or can be obtained through the KM Digital Productions website or any number of commercial outlets.

The updated PSP says in the third paragraph of this section that data from the Recreation Use/User Contact Survey will be reviewed to assess the need for new or improved facilities to accommodate non-motorized boating use at the Projects. "Projects" should be revised to say "study area." Relying on the user contact survey for assessing the need for new or improved facilities, however, is problematic for two reasons: 1) other than question 14: does this recreation facility serve your interests, there are no questions in the draft user survey designed to provide useful information for study 3.6.4, and 2) the user survey will be given out to people at the 20 formal recreation use facilities within the project boundary, therefore there will be no assessment of the adequacy or need for facilities downstream of the Project.

Task 2: Field Work
CRWC recommends a stakeholder working group meeting in the middle of this task, to go over Task 1 results and visit sites. We see value and efficiency to group discussion in the middle of this task.

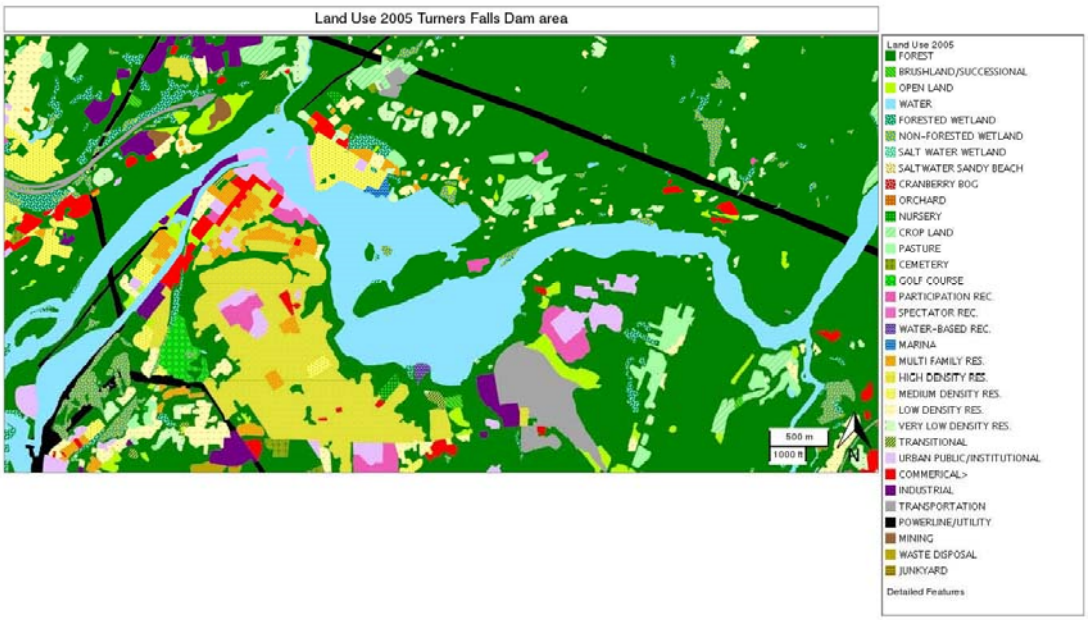
3.6.5 Land Use Inventory

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 12, 2013 at Northfield Mountain ("the meeting").

Task 1: Literature and Aerial Photography Review
It is not clear what aerial photography will be used in this task – is this going to be aerial imagery available from Google Earth or MassGIS or something that FirstLight plans to generate using new flight information?

Will this study use the MassGIS 2005 land use data layer? See the picture created below using MassGIS's OLIVER online mapping tool, and the data layer is described online at http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus2005.html.
Since so much information useful for this study is readily available from MassGIS, it seems that aerial photography would be used in conjunction with these data layers.

Land Use 2005 Turners Falls Dam area http://maps.massgis.state.ma.us/temp/OL_MORIS_print/1373642392.11...



Task 2: Development and Application of Land Use Designations
Task 3 (Land use mapping) of study 3.1.1, the Full River Reconnaissance, also looks at land use along the Connecticut River. Based on discussions during the meeting for study 3.6.5, it was my understanding that the two efforts would be essentially be done as one. Therefore, the description of Task 2 for study 3.6.5 should be made more consistent with the description of Task 3 in study 3.1.1. The updated PSP for study 3.6.5 lists seven land use types. The updated PSP for study 3.1.1 says that the plans will be developed using MassGIS data layers of land use. Please see our comments in study 3.1.1 regarding the number of land use categories that are intended to be used, but MassGIS uses more than seven land use types.

Task 3: Map and Summary Development
A list of proposed maps should be included in the revised PSP.
One of the maps should show land uses with lands owned or flowage rights owned by FirstLight clearly identified.
As noted on page 3-315 under Existing Information, the Licensee has granted permission to others for Non Project use of Project lands. Two of these uses, docks and water withdrawals that were granted through FirstLight, may not show up on a land use map, and CRWC recommends that a table and/or map be provided in this task that indicates the location, size of docks, and amount of water withdrawn daily or annually.

3.6.6 Assessment of Effects of Project Operation on Recreation and Land Use

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 12, 2013 at Northfield Mountain ("the meeting").

Task 1: Data compilation

If the Recreation Use/User Contact Survey is to help inform this study, then the survey questions for river users and river abutters need to be designed to be more informative than the single question currently in the updated PSP user survey. The river abutter survey currently has no questions geared towards river level fluctuations or whether land use on their property is affected by project operation, which is a big issue (see photos on next page). The surveys will also need to be conducted at river access points and mailed to river abutters downstream of the Turners Falls canal to the Sunderland bridge, such as the rowing program at Deerfield Academy and river users at the Sunderland boat ramp.

Photos: An example river abutter's experience with daily river fluctuations during July of 2011.

The updated PSP on the top of page 3-318 says that FirstLight will review historic and existing water level fluctuation information, and this paragraph should refer to water level recorder data and river flow and fluctuation data that will be part of Task 3 of study 3.1.2 and Task 2 of 3.2.2.

Task 3: Report development

Details should be provided as to the content of the report and the ways data will be presented.

3.6.7 Recreation Study at Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain ("the meeting").

Task 1: Review of Existing Information
Public education programs offered at the visitor's center has been added to this task, which involves using the Recreation Use and User Contact Survey to identify opinions of current recreation/education users at Northfield Mountain. This change is in response to one of our questions during the meeting, and we appreciate the inclusion in the updated PSP. However, neither the river user nor the trail user survey questionnaire in study 3.6.1 is currently geared to attendees of most of the educational programs. The proposed forms should either be modified, or a survey questionnaire should be developed specific for the educational program users at Northfield Mountain.

If Northfield Mountain keeps records of attendance numbers of their educational and school programs, the number of programs offered, and attendance numbers should be provided for the past 10 years. The types of programs and staffing it takes to run them should also be described.

Task 4: Report development
No details have been provided about the content of the report or the ways that data will be presented.

3.7.1 Phase 1A Archaeological Survey

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 12, 2013 at Northfield Mountain ("the meeting").

- Task 1: The study plan meeting was held on June 12, not on June 14, as stated in the updated PSP.
- There was considerable discussion at the meeting as to whether FirstLight should also conduct a Phase 1B study as part of this study. I thought the consensus was to do a comprehensive phase 1 survey, but the updated PSP does not seem to reflect this.
- Doug Harris from the Narragansett tribe mentioned petroglyphs below the water mark that are covered below Vernon Dam during the discussion for study 3.6.5 Land Use inventory, and we are wondering if this kind of historical resource is covered in this study or any other.

3.7.2 Reconnaissance-Level Historic Structures Survey

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 12, 2013 at Northfield Mountain ("the meeting").

- The definition of "structure" in the context of this study needs to be a bit better defined.
- We support the Nolumbeka Project's request for a traditional cultural property study.

3.8.1 Evaluate the Impact of Current and Potential Future Modes of Operation on Flow, Water Elevation, and Hydropower Generation

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 14, 2013 at Northfield Mountain ("the meeting").

- Task 5: Stakeholders and/or FERC asked for a full list of the other studies that will be informed by this study.
- Task 6: No details are provided about how the results of model runs will be presented in a report.
- During the meeting, it was noted that this study will not look at ramping rates because it relies on an hourly time step. Ramping rates at Northfield Mountain and Turners Falls have the potential to affect habitat, water quality, and recreation use. Will the flow study do that? We need to have a way to evaluate ramping rates.

4.2.2 Climate Change and Continued Project Operations

This study was rejected by FirstLight and discussed during the May 14, 2013 stakeholder meeting.

Both FirstLight and seemingly FERC have rejected the call for a study to determine the impact of climate change on project operations and the facilities themselves because they claim that such a study would not lead to license conditions. CRWC rejects that analysis. There are two main concerns about not conducting CRWC Study Request 5. They are:

A) the effects of warming temperature on the water and

B) the impacts of higher than normal flows on the facilities themselves.

Understanding each concern could lead to appropriate license conditions.

A) River water temperatures have been rising on a historic basis (Paul Jacobson, Charles Fredette and Nels Barrett, American Fisheries Society Monograph 9, 2004 and NOAA National Climate Center, Northeast 12 month average temperate for the period 1896 through 2012). There should be a clear understanding of the effects of the reservoirs at the projects on whether or not they are exacerbating the documented temperature increase. There is no way to establish any mitigation measures to protect aquatic life without the base information on the effects of climate change combined with the effects of the reservoirs on water temperature.

B) Climate change means more frequent events of more intense weather. Heavier rain when it comes will create unusual higher flows. In winter the potential for higher snow pack combined with quicker melting and the possibility of heavy rain events could create flooding conditions even beyond what is modeled at this time under FERC emergency preparedness requirements. CRWC understands that the three projects are run of the river so our concern is not about storing water. CRWC knows that the dams will pass what water they can. Our concern here is that these intense higher flows will increase wear and tear on all three facilities. Increased damages or wear and tear on the facilities caused by more high flow events will have an impact on the economic analysis FERC must perform on the applications.

Recommendation: FirstLight should be required to conduct a study based on CRWC Study Request 5. In particular, the study should rely on 30-50 year temperature increase models that incorporate thermal loading from the reservoirs. The other key element would be to anticipate how climate change predictions would affect management of high flow events at Turners Falls Dam and evaluate if changes to the dam or canal flow control structures would mitigate adverse impacts on the facility.

4.5.1 Contingent Valuation Study

This study was rejected by FirstLight and discussed during the June 11, 2013 stakeholder meeting.

One of the underlying tenets in the FERC relicensing process is that under the National Environmental Protect Act, power production is no longer the sole focus of FERC. The value of activities like recreation have their own and competing value with power production.

A contingent valuation study was called for by AMC, NE Flow and American Whitewater. FirstLight has declined so far to conduct such a study. The point of a contingent valuation study is that it seeks to put two competing social goods on an equal footing, in this case recreation and power production. These economic studies assess the value of an activity for society and what may be lost if the activity is prevented from occurring. FirstLight can put a value on the power they produce but without an economic figure of the recreation value, there is nothing to put on the other side of the balance scale. FERC cannot balance the two values in this case, as they should, because one value has not been determined.

This lack of balance is not limited to on-water activities alone. Those who do not boat but instead bird, hike, ski and wildlife watch face limited access to the river. If you do not boat, and depending where you reside, you may not be able to experience New England's greatest river at all. Most land along the river is privately owned so foot or motorized access to the river is limited to whom does one know who owns land along the river. As part of this relicensing process the question will be asked, what can FirstLight do about opening up the river for all types of river related recreation? The question cannot be answered without serious study of the economic value of those non-water river related outdoor activities.

Recommendation: FERC should require FirstLight to conduct an economic impact study on the value of a wide gamut of outdoor recreation activities including the value of whitewater opportunities.

4.7.1 Feasibility of Converting Northfield Mountain Pumped Storage Facility to a Closed-loop or Partially Closed-loop System

This study was rejected by FirstLight and discussed during the May 15, 2013 stakeholder meeting.

FirstLight's rationale for rejecting this study request was that 1) a feasibility study of this nature would be expensive and detailed enough that it would be comparable to that required for a major new project or license amendment, and 2) FERC has stated elsewhere that it doesn't have the authority to require a license applicant to construct and operate an entirely different project from the one it has proposed, and FirstLight feels that a closed loop system would be the equivalent to a different project.

FERC wrote on page 6 of their Scoping Document 2 (SD2) "Construction of a new lower reservoir would likely have significant impacts on the environment and high cost. Therefore, we will not commit to conducting a detailed analysis of such an alternative until we better understand the environmental effects of the existing project."

We agree that converting the project to a closed-loop system – if it ever happened-- might be very expensive and would likely have its own set of substantial environmental impacts. We don't agree, however, that the level of detail necessary to look into the feasibility of a closed-loop system at this stage in the process would be the equivalent to designing and applying for an entirely new project.

And while we don't know all the environmental impacts of Northfield Mountain Pumped Storage Project, we do know that the impacts on the Connecticut River over the last 40 years have been large:

- river fluctuations contributed to dramatic erosion; in some places the bank has eroded back 30 feet over the past four decades,
- an unknown number of fish and other aquatic organisms, larvae, and eggs have been and continue to be killed in the turbines,
- recreational use is impacted by large daily river fluctuations,
- and migrating fish may be getting confused by the pumping and discharging of a large enough amount of water that equals the flow of the Connecticut River in the summertime.

New pumped storage facilities being designed today are more commonly closed-loop systems in order to avoid the environmental impacts, and therefore mitigation costs, as explained on page 3-12 of Electric Power Research Institute's (EPRI's) 2013 Technical Report titled "Quantifying the Value of Hydropower in the Electric Grid – Final Report" Online at http://www1.eere.energy.gov/water/pdfs/epri_value_hydropower_electric_grid.pdf

> ***Design New Pumped Storage Plants to Minimize Environmental Impact***
> *The last potential method related to technology is to design new pumped storage plants such as low profile or closed loop, which minimize environmental impacts and therefore could save time in licensing. Currently, licensing for new pumped storage plants represents a significant amount of project time and cost. One recent trend is for pumped storage plants to be built "off-channel," adjacent to existing river systems--called "closed-loop" plants. Of the current FERC filings, more than half are closed-loop. <u>These facilities tend to have fewer environmental impacts and therefore have reduced licensing times and often more opportunity with decreased hydrological constraints. The shortened licensing time leads to more time in operations and less upfront cost, which could ultimately result in an increased lifetime value from the facility.</u> This increased operation time for closed-loop plants was not monetized as part of this study, but further research should be done to quantify the potential value compared to open-loop plants. <emphasis ours>*

Running Northfield Mountain using the Connecticut River as the lower reservoir has its own set of large monetary costs. The erosion control projects have cost the company in the order of $1 million dollars annually for the past 15 years. The May 2010 planned maintenance outage that clogged the works with sediment must have cost tens or hundreds of millions of dollars to get the project up and running again, and that doesn't take into account the loss of revenue from no power generation for seven months or the loss of one life. The proposed studies in the updated PSP that are related to Northfield Mountain's effects on the Connecticut River will cost at least over $1 million of the $3.6-4.8 million total study costs listed in the updated PSP. Mitigation costs in the next license are currently unknown, but may prove to be expensive.

In the case of the Turners Falls annual drawdown, there has never been a formal study of the ecological effects of this practice, yet proposed the April 15 version of study 3.3.18 "Impacts of the Turners Falls Canal Drawdown on Fish Migration and Aquatic Organisms," didn't propose any further study, and went right to developing mitigation options. As with that, it is time to take a look at what other options might be possible besides using the Connecticut River as a lower reservoir. A feasibility study for a closed-loop system is a good first start.

We appreciate the opportunity to provide comments on the updated PSP.
Sincerely,

Andrea Donlon
River Steward

Document Content(s)