



Connecticut River Program Office  
136 West Street, Suite 202  
Northampton, MA 01060

12 July 2019

Shannon Ames, Executive Director  
Low Impact Hydropower Institute  
329 Massachusetts Avenue, Suite 6  
Lexington, MA 02420

RE: Vernon Hydroelectric Project (FERC No. 1904; LIHI Certification #40)  
Comments on LIHI Recertification Application

Dear Ms. Ames,

This letter is regarding the pending application by Great River Hydro, LLC (GRH) for the Low Impact Hydropower Institute's (LIHI) recertification of the Vernon Hydropower Project, located on the Connecticut River in Vermont and New Hampshire.

For over two decades, the Nature Conservancy (Conservancy) has been committed to understanding and mitigating the effects of hydropower dams on river ecosystems and the species and people that depend on them. The Conservancy has been an active participant in the current relicensing of three GRH hydropower projects on the mainstem Connecticut River (Wilder Dam, Bellows Falls Dam, and Vernon Dam), and for more than a decade has been expending considerable resources toward understanding the impacts of these projects, as well as many other dams and hydropower projects in the Connecticut River watershed.

In partnership with the University of Massachusetts Amherst and the US Army Corps of Engineers, we developed a series of watershed hydrology models to understand the impacts of 70 dams in the Connecticut River watershed, and to develop and examine potential operational alternatives to

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restore riverine ecological function<sup>1</sup>. One of our models was developed specifically to examine impacts and management alternatives for the three aforementioned GRH projects and two additional downstream projects owned and operated by FirstLight Power. Upon considering the results of this model and available empirical data, including data gathered during the relicensing process, we have determined that Great River Hydropower’s Vernon project should not be certified as a low-impact project, based on LIHI’s criteria, goals, and standards.

The specific rationale behind our conclusion follows. We focused on criterion for which we have the most knowledge, expertise, and experience. For each of these criteria, we’ve restated the goal statement, which according to the LIHI guidance “define the purpose or objective that must be achieved,”<sup>2</sup> and provide evidence to support or refute the achievement of that criterion.

### **Criterion A – Ecological Flow Regimes**

**Goal:** The flow regimes in riverine reaches that are affected by the facility support habitat and other conditions suitable for healthy fish and wildlife resources.

**Standard A-1. Not Applicable/De Minimis Effect:** Because Vernon is a peaking hydropower facility, it does not operate “in a true run-of-river operational mode,” and therefore *does not meet this standard*.

**Standard Claimed by Applicant: Standard A-2. Agency Recommendation:** The current minimum flow standard that the applicant is leaning on to support their achievement of this criterion was set in 1979, prior to LeRoy Poff’s 1998 seminal paper on the “natural flow regime.” As acknowledged by LIHI’s new ecological flow criteria, since that time, our scientific understanding of riverine systems has increased significantly, only adding to the evidence that flat minimum flow standards **do not** “support habitat and other conditions suitable for healthy fish and wildlife resources.”

For example, over the past two decades the scientific community has accumulated considerable data demonstrating the extreme impacts of hydropeaking on riverine resources, including stranding; displacement; spawning nest desiccation; disruption of spawning behavior; loss of migratory cues; scouring of substrate and vegetation required for habitat and food resources; depressed growth, reproductive, and survival rates; and significant alteration of ecological communities, where river habitat specialists are lost and habitat generalists dominate. In light of

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<sup>1</sup>Kennedy et al. 2018. The Connecticut River Flow Restoration Study, The Nature Conservancy, U.S. Army Corps of Engineers, and University of Massachusetts Amherst. Northampton, MA. Available: <https://tnc.app.box.com/s/jdnxvgsquxcqhbcp92qhxb6wbc4td/file/294321142454>.

<sup>2</sup> Low Impact Hydropower Certification Handbook, 2<sup>nd</sup> Edition, <https://lowimpacthydro.org/wp-content/uploads/2019/01/2nd-Edition-Handbook-Rev-2.03-2018-12-20-1.pdf>

this weight of evidence, the applicant has not demonstrated how a project with only a minimum flow standard and daily and annual operations dominated by a hydropeaking regime can “support habitat and other conditions suitable for healthy fish and wildlife resources.”

Furthermore, according to LIHI’s definition of “science-based,” a “science-based agency recommendation can be based on relevant peer-reviewed and published studies; principles, methods, or techniques generally accepted within the scientific community; other technically sound best management practices; or facility-specific studies. In all cases, the recommendation must be based on rigorous, systematic, and objective methodologies to obtain reliable and valid knowledge that demonstrates that the design and operations of a facility would be expected to achieve the criterion goals.” The current minimum flow standard does not reflect any of these characteristics of a “science-based” agency recommendation. Indeed, consistent with current science, agency staff do not consider the current operational regime “science-based” or supportive of their trust resources, as stated in their letters to LIHI.

*The standard of a “science-based” agency recommendation is therefore not met by the Vernon project.*

**Standard A-3. Limited Storage:** Although the current flow standard was once regionally-accepted, it is no longer so, and is widely criticized for being antiquated and harmful to ecological systems. Therefore, *the Vernon project does not meet this standard.*

**Standard A-4. Site-Specific Studies:** As part of the current relicensing, GRH conducted an Instream Flow Incremental Methodology Study at Vernon, the results of which will be used by the agencies to support the development of flow recommendations and 401 Water Quality Certification conditions for the new license<sup>3</sup>. Although a science-based recommendation supported by the IFIM study is a hopeful outcome of the relicensing process, it does not yet exist; *the Vernon project therefore does not meet this standard.*

In reference to the following two criteria, note that in the Northeast barrier prioritization for anadromous fish<sup>4</sup>, the Vernon project ranks in the top tier as a severe barrier for migratory fish populations (see Figure A). Unless a barrier in this category has clearly demonstrated safe and effective up and downstream passage, it cannot be supportive of migratory species that are able to

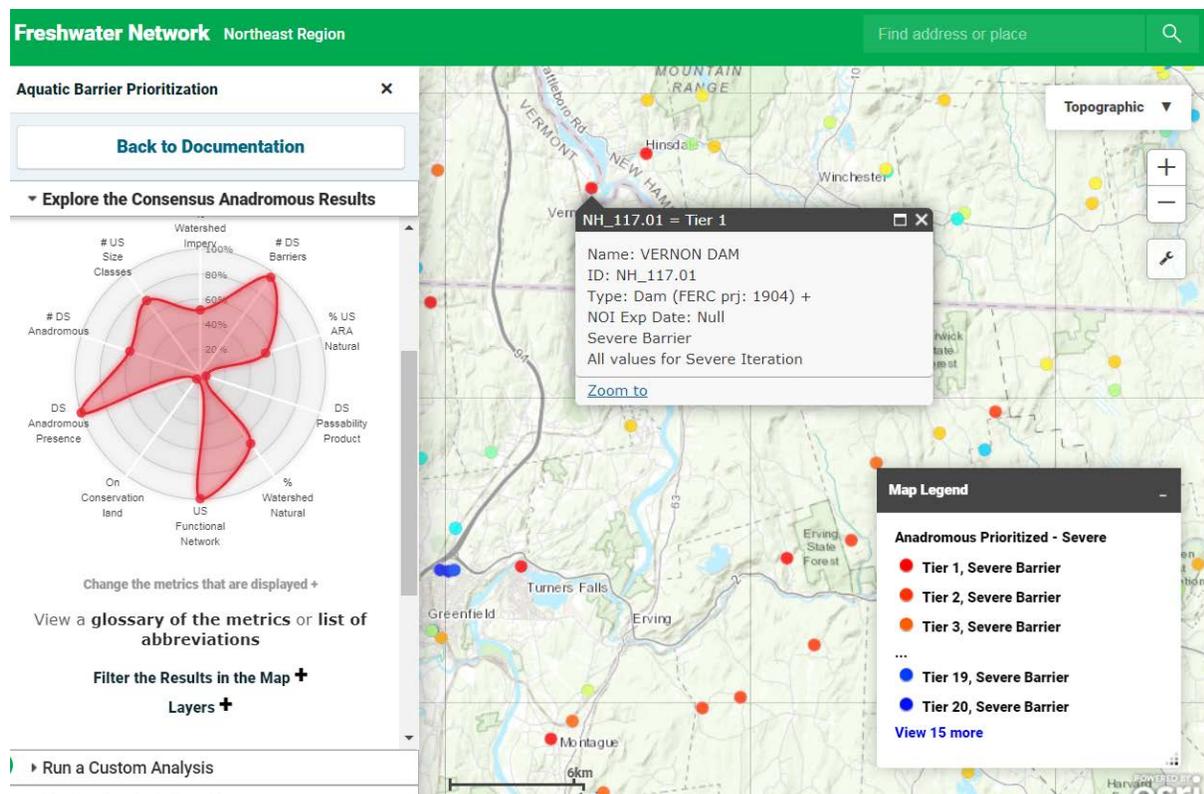
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<sup>3</sup> Note that since Vernon is a hydropeaking dam, science-based recommendations will have to take into account how operations support the availability of persistent habitat (habitat available over time), as opposed to the commonly used metric of weighted usable area.

<sup>4</sup> <https://maps.freshwaternet.org/northeast/>

“successfully complete their life cycles” nor can it “maintain healthy, sustainable fish and wildlife resources.”

**Figure A. Northeast Barrier Prioritization for Anadromous Fish**



**Criterion C – Upstream Fish Passage**

**Goal:** The facility allows for safe, timely, and effective upstream passage of migratory fish. This criterion is intended to ensure that migratory species can successfully complete their life cycles and maintain healthy, sustainable fish and wildlife resources in areas affected in the facility.

**Standard C-1. Not Applicable/De Minimis Effect:** The Vernon dam creates a barrier to migrating fish species; it therefore does not meet this standard.

**Standard Claimed by Applicant: Standard C-2. Agency Recommendation:** The Vernon project’s existing upstream anadromous fish ladder has generally been considered effective. However, it was designed to pass Atlantic salmon, and relicensing studies have demonstrated some issues with

Vernon’s ability to pass fish in a “safe, timely, and effective” manner, including the lack of passage for American eel, a critical species in the Connecticut River’s fish community. Eels have been documented to use the fish ladder, but substantial fallback has been observed, and the ladder is not operated during the time period that corresponds with the upstream eel migration, meaning that as a result, passage of eel at Vernon is not “timely” or “effective”. Although GRH is aware of some of these issues and are working with the agencies to make improvements, the agencies will be providing a more complete assessment of necessary passage improvements for American eel, as well as other migratory species such as sea lamprey and American shad, and will be submitting a set of recommendations as part of the relicensing process.

**Standard C-3. Best Practice/Best Available Technology:** Because the anadromous fish ladder was designed for Atlantic salmon, it is therefore not a “well-designed, well-operated” ladder “appropriate for all migratory fish species that occur in the area affected by the facility,” and impacts upstream passage for at minimum American eel, sea lamprey, and American shad<sup>5</sup>. Therefore, *the Vernon project does not meet this standard.*

**Standard C-4. Acceptable Mitigation:** The Vernon project does not employ “approved, alternative fish passage mitigation measures that support the migratory fish species affected by the facility.” *The Vernon project therefore does not meet this standard.*

## Criterion D – Downstream Fish Passage

**Goal:** The facility allows for the safe, timely, and effective downstream passage of migratory fish. For riverine (resident) fish, the facility minimizes loss of fish from reservoirs and upstream river reaches affected by facility operations. All migratory species can successfully complete their life cycles and to maintain healthy, sustainable fish and wildlife resources in the areas affected by the facility.

**Standard D-1. Not Applicable/De Minimis Effect:** Several migratory fish species exist in the vicinity of the Vernon dam, and its associated hydropower turbines create a barrier to downstream migrating fish species. *The Vernon project therefore does not meet this standard.*

**Standard Claimed by Applicant: Standard D-2. Agency Recommendation:** The results of the relicensing studies requested by the resource agencies indicate that existing downstream passage facilities are not protective of juvenile American shad, post-spawned adult shad, or adult silver-phase American eels<sup>6</sup>. The agencies will use these results to develop fishway prescriptions and/or

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<sup>5</sup> Transcanada Hydro Northeast Inc. ILP Studies 17, 18, and 21

<sup>6</sup> Transcanada Hydro Northeast Inc. ILP Studies 19 and 22

401 Water Quality Certification conditions in the relicensing process. Therefore, until these prescriptions and conditions are made, *the Vernon project does not meet this standard.*

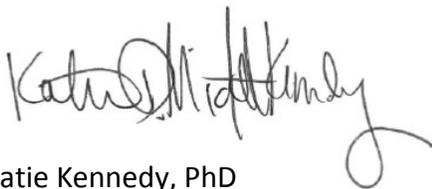
**Standard D-3. Best Practice/Best Available Technology:** Vernon dam does not have “well-designed, well-operated downstream fish passage” that is “appropriate for all migratory fish species that occur in the area affected by the facility,” and impacts downstream passage for at minimum American eel and American shad<sup>7</sup>. Therefore, *the Vernon project does not meet this standard.*

**Standard D-4. Acceptable Mitigation:** The Vernon project does not employ “approved alternative fish passage mitigation measures that support the migratory and native non-migratory fish species affected by the facility.” *The Vernon project therefore does not meet this standard.*

As stated previously, based on the evidence outlined above, we conclude that as currently operated, the Vernon project should not be certified as low-impact hydropower by the Low Impact Hydropower Institute. We sincerely thank you for the opportunity to comment on the pending re-certification of Great River Hydropower’s Vernon project. The Nature Conservancy values the Low Impact Hydropower certification and is committed to ensuring that this designation remains true to its name, a program “dedicated to reducing the impacts of hydropower by recognizing projects which actively protect river ecosystems.”<sup>8</sup> We are confident that you and the board are committed to this goal as well.

If you have any questions or concerns, please feel free to contact me by email ([kkennedy@tnc.org](mailto:kkennedy@tnc.org)) or by phone (413-586-2349).

Sincerely,



Katie Kennedy, PhD  
Applied River Scientist

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<sup>7</sup> Ibid

<sup>8</sup> LIHI Fact Sheet, <https://lowimpacthydro.org/wp-content/uploads/2018/05/2018LIHIFactSheet.pdf>.