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Jeff Crocker, Streamflow Protection Coordinator
Vermont Department of Environmental Conservation
Watershed Management Division
1 National Life Drive, Main 2
Montpelier VT 05620-3522

*RE: American Whitewater and Vermont Paddlers Club Response to Draft
Water Quality Certification for the Morrisville Project, Green River
Development (FERC No. P-2629)*

Dear Mr. Crocker:

American Whitewater (AW) and Vermont Paddling Club (VPC) submit these comments to Vermont Agency of Natural Resources (ANR) in response to the Draft Water Quality Certification for the Morrisville Project, Green River Development, FERC Project No. P-2629. As conservation-oriented paddling organizations, we have a strong interest in the future of the Green River. Federal actions that affect flow and access to the river may potentially adversely impact opportunities for our members to utilize the river resource. Inasmuch as the Water Quality Certification by DEC will impact the recreational opportunities on the Green River below the Green River Dam, we respectfully submit these comments for your consideration.

American Whitewater is a national non-profit 501(c)(3) river conservation and recreation organization founded in 1954. We have approximately 6,000 members and 100 affiliate clubs, representing tens of thousands of whitewater paddlers across the nation.

American Whitewater's mission is to protect and restore our nation's whitewater resources and to enhance opportunities to enjoy them safely. Our members are primarily conservation-oriented kayakers and canoeists, many of whom live and/or engage in recreational boating in Vermont.

The Vermont Paddlers Club was established in 1970 and currently has over 100 members. In addition, the Vermont Paddlers Club is an American Whitewater affiliate club and is an American Canoe Association Paddle America Club. The mission of the club is to facilitate the enjoyment of recreational paddlesports. To this end, the Vermont Paddlers Club organizes whitewater and flatwater canoe and kayak trips, promotes safe and enjoyable paddling through education and other activities, maintains an awareness of river resources and conservation issues, and takes action when appropriate to help protect paddling resources. Given the club's mission and the fact that the many of its members reside within reach of the Green River, the Vermont Paddlers Club has a significant interest in the outcome of this process.

SUMMARY

The Green River, from the dam in Morrisville to the confluence with the Lamoille River, offers unique whitewater boating opportunities with rapids ranging from Class I to Class V. Of particular significance is the scenic lower reach flowing through a deeply wooded area with several gorges, falls, and drops that provide an advanced whitewater boating experience. This section of the Green River has a 400-foot vertical drop in elevation over 2.75 miles and contains numerous sections of Class III, IV, and V rapids that are enjoyed by a significant number of whitewater boaters.

In its Draft Water Quality Certification, DEC proposes modifications to the

existing flow regime that purport to restore flows to a more natural condition that will benefit the aquatic habitat and recreation. The data do not support this proposition. Our analysis of historical flows on the Green River reveals that DEC's prescriptions requiring unnatural minimum flows and other operational constraints would:

- Lead to rapid reservoir lowering and refilling during Loon nesting time, resulting in flooding Loon nests.
- Fail to fill the reservoir in most years until mid-summer or fall, resulting in potential impacts to fauna and flora utilizing the varial zone of the reservoir.
- Eliminate all natural variability in the Green River flow regime at all scales for extended periods of time (months) during the spring and summer, resulting in impacts to water quality, life history cues for aquatic species, and geomorphology.
- Eliminate significant numbers of natural pulse flows in the Green River, including the entire spring snowmelt pulse in some years, resulting in degraded paddling opportunities and ecological impacts.
- Allow hydropower generation only in winter when natural pulse flows are relatively rare and the associated ecological and recreational values of pulse flows are limited.

DEC seeks to manage the Green River as if it were a lake rather than a dynamic river system with natural variances, eliminating the natural ebb and flow by flattening out the natural river hydrograph. This artificial manipulation will have an adverse impact on river ecology and recreation opportunities on the Green River by prescribing unnaturally high minimum flows that will reduce or eliminate high natural flows and cause a dramatic drop in reservoir elevation that will far exceed the impacts of the current store-

and-release operations of MWL on shoreline habitat.

Contrary to what DEC asserts, the Draft WQC would eliminate some or all whitewater boating opportunities that would naturally occur in the spring and beyond during all year types. Based on our analysis of historic flows, the elimination of spring and early summer whitewater boating opportunities could be as great as a 100% loss of what would naturally occur due to prescriptions requiring unnaturally high base flows followed by storage of all but base flows in order to refill the depleted reservoir.

In terms of Loon nesting, high minimum flows will often prevent MWL from achieving the DEC proposed target pool elevation of 1219.75 msl by the start of the nesting period on May 1st, dangerously lower reservoir levels during the initial nesting period in May, and damage nests in June and July while refilling the reservoir to the target pool elevation. In some water years, these unnaturally high minimum flows will result in reservoir level fluctuations of up to three feet in the spring.

Comparing the effect of the DEC prescriptions to either current operations or the conditions proposed in the FERC Environmental Assessment (EA), the data show that the Draft WQC would result in greater flow alteration, more damage to aquatic habitat, and fewer whitewater boating opportunities than would occur under either of the two alternatives. Instead of protecting aquatic habitat and existing recreational use as it is required to do under the Anti-Degradation Policy in its Water Quality Standards, DEC instead proposes to create its own artificial flow regime that threatens and degrades the very values it aims to enhance.

I. FERC Relicensing Process for the Morrisville Project

The 1986 Electric Consumers Protection Act (ECPA) amended the Federal Power

Act to require that FERC give “*equal consideration* to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality.” (emphasis added) The Act requires FERC to balance the Licensee's interest in generating power through the use of a public resource with the public interest in protecting natural resources, providing recreational opportunity, aesthetics, and other factors.

Relicensing of any hydroelectric project, and the Morrisville Project is no exception, is a costly and time consuming process that requires a Licensee to undertake numerous studies to determine whether the project is having an adverse impact on various resources including soils, aquatic and terrestrial life, and the ability of the public to use the river for recreational enjoyment. In the case of the Morrisville Project, Morrisville Water & Light (MWL) studied all of the potential impacts, submitting detailed reports to FERC for use in preparing an EA for the Project. These studies involved the active participation of NGO's and resource agencies including AW and VPC, as well as ANR.

AW and VPC have actively participated in this relicensing process by attending scoping meetings, submitting study requests, participating in the Whitewater Boating Study, submitting comments on the License Application and other documents filed by the Licensee, the filing of a Motion to Intervene in the FERC relicensing proceeding, submitting comments in response to proposed prescriptions and conditions filed by ANR and USFWS, meeting with ANR to discuss our interest in protecting recreation opportunities on the Green River, and providing ANR with information and references to

multiple studies demonstrating that scheduled whitewater boating releases consistent with the natural river hydrology do not result in any degradation of water quality or aquatic species habitat.

FERC issued its Final Environmental Assessment on December 16, 2014 establishing that the Green River is a high quality whitewater boating resources, as follows:

Morrisville, AW, and VPC have all identified the Green River as a quality and unique whitewater boating resource in the project area. Whitewater boating has the potential to have a positive economic impact on the local communities. The likelihood of attracting a significant amount of boaters to the Green River each year is largely dependent on the ability to schedule a reasonable number of annual releases and establish adequate notification procedures. Annually-scheduled releases allow boaters to plan trips in advance for preferred whitewater flows and generally encourage greater use of the resource thereby increasing the potential for positive local economic impact.

Based on a careful analysis of the data, FERC recommended that MWL develop “a plan to provide five scheduled annual releases and establish suitable notification procedures in consultation with AW, VPC, and any other interested parties would ensure that adequate whitewater boating opportunities are available on the Green River throughout the term of any license.”

In addition to requiring MWL to provide 5 annual scheduled whitewater releases, FERC recommended in the EA that MWL provide advance notification of scheduled releases when flows exceed 140 cfs to ensure that regional and local boaters have adequate notice to plan trips and participate in scheduled releases. Based on the Whitewater Boating Study, local boaters account for the majority of Green River boaters (about 30 to 40 individuals). Additionally, the study estimated that if Morrisville were to provide advance notice of scheduled annual releases, the Green

River could attract anywhere from 80 to 150 whitewater boaters annually.

In response to preliminary recommendations and prescriptions filed by DEC following FERC's Final Environmental Assessment, AW filed comments with FERC on January 16, 2015 analyzing historical flow data for the Green River. After analyzing 13 years of data between 1915-1932 (excluding 4 incomplete years), we found that the Green River Development is operated in a modified run-of-river mode rather than a daily hydropeaking mode, modestly increasing the number of pulse flows above a threshold of 100 cfs over what would be expected in a natural flow regime. Proposals by American Whitewater and Vermont Paddlers Club for 7-8 scheduled whitewater boating releases would not increase the frequency or magnitude of these pulse flows above what would be expected either under a natural or a managed flow regime. Instead, we propose that the Licensee be required to schedule its high generational flows in a manner that would maximize the recreational opportunities available to whitewater boaters consistent with other river values and the natural flow regime.

AW and VPC support the recommendations developed by FERC staff for the Green River Development with the exception of its conclusion that providing 7-8 annual releases would significantly reduce the number of angler days as compared to the 5 days recommended in the EA, as there are no studies documenting the existence of conflicts between anglers and paddlers on the Green River, and, if not scheduled, these same flows are likely to occur in an unscheduled manner for power generation. Overall, however, the FERC recommendations are well supported by the record and were developed through a transparent process that relied on science and a careful balance of interests.

II. Draft Water Quality Certification

The Vermont Department of Environmental Conservation (DEC) issued a draft Water Quality Certification for the Morrisville Project on January 7, 2016.¹ The draft WQC proposes that MWL operate the Green River Development in a modified run-of-river mode under which the presence of the dam, capacity tests, additional winter pulse flows using storage, artificial spring and summer base flows, elimination of spring pulse flows to refill the reservoir, and the technical limits of the Licensee's facilities to follow and release inflows will all modify natural hydrologic conditions to a significant extent.

Specifically, under the draft WQC, MWL would be permitted to operate the Green River Dam in a store-and-release mode from December 16th – March 31st; however, it would be prohibited from fluctuating the Green River Reservoir more than 1.5 feet within a target of 1218.50 to 1220.00 msl or from releasing generational flows greater than 110. cfs unless inflows were higher. In April, MWL would be required to operate in a mode that would assure stable-or-rising pool until a target elevation of 1219.75 is reached. MWL would then need to maintain the reservoir at an elevation of 1219.75 through December 15th. Under the draft WQC, MWL would be prohibited from

¹ Morrisville Water & Light initially filed its Water Quality Certification Application on April 19, 2013, and referenced the filing in its License Application. On January 15, 2014, FERC notified MWL that it was required to file with FERC a copy of its application for WQC within 60 days of FERC's issuance of its November 6, 2013 Ready for Environmental Analysis. MWL filed a second application for a WQC on January 30, 2014, which MWL filed with FERC on February 3, 2014. The record does not document the withdrawal or action on the initial application, and it is unclear whether ANR has acted timely on MWL initial application for WQC. See, *PacifiCorp, Order Denying Rehearing*, 149 FERC ¶ 61,038, (citing *Central Vermont*, 113 FERC ¶ 61,167 at PP 15-16) MWL subsequently withdrew and resubmitted its application to ANR on November 7, 2014 and again on September 9, 2015.

providing any scheduled whitewater boating releases.

Under current operations, MWL is required to maintain the pool elevation within a 1-foot range between May 1st – November 31st. Outside of this period, MWL is permitted to lower the reservoir up to 10 feet in the winter months, although it typically operates within a six-foot range, and then refills the pool to the target elevation in April. In addition, MWL voluntarily maintains the pool height within a 3 inches of crest between May 1st and July 31st to protect Loon nesting which could be harmed by pool elevation decreases greater than 1 foot or increases greater than 6 inches during a 28-day period during the Loon nesting period.

Although DEC purports to prescribe run-of-river flows that closely mimic the natural hydrologic conditions between April 1st and December 15th, the minimum flow requirement in the draft WQC is inconsistent with the natural hydrology which is often lower than 60 cfs. Typically, minimum flows are required in hydropeaking projects with bypass reaches in order to prevent the complete dewatering of the natural river channel below the dam. Conversely, true instantaneous run-of-river would pass inflows below the dam without the need for calculated minimum flows.

Under current license conditions, MWL is required to pass minimum flows of 5.5 cfs through an 8-inch diameter bypass flow pipe. The minimum flows are necessary due to the current store-and-release operating mode. Minimum flows are appropriate during the winter months from December 16th – March 31st when limited store-and-release operations are allowed under the Draft WQC. The Draft WQC, however, prohibits store-and-release operations from April 1st – December 15th. Nevertheless, DEC prescribes minimum flows that may frequently exceed inflows, particularly during the spring

months. These minimum flows are inconsistent with run-of-river operations in that they will result in a lowering of the pool height, followed by extended periods of reduced or eliminated higher natural base and pulse flows downstream of the dam in order to raise reservoir levels to the target pool elevation.

These variances necessarily alter the natural hydrology of the river, reducing the frequency and intensity of natural pulses that perform important ecological functions. Variable high flow events restore the following functions: channel maintenance, sediment transport, spawning and migration cues, scouring of lentic and upland vegetation in the channel, reduction of invasive species, and recreation.

In the Draft WQC, DEC completely disregards the FERC Environmental Assessment that was based on extensive studies, a multi-year public NEPA process, and careful consideration of the values of “energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality.” In the case of the recreational values identified in the whitewater boating study, DEC completely disregards the whitewater boating study conducted as part of the relicensing process. **Without relying on any site-specific studies showing that the proposed whitewater releases conflict with other river values, DEC proposes to eliminate all scheduled whitewater boating opportunities on the Green River.**

The Draft WQC seeks to replace a FERC proposal to balance the social and environmental benefits and impacts of the project with a DEC proposal that tries yet fails to maximize environmental benefits, while granting other interests like hydropower and

recreation opportunistic use of their artificial flow regime. In essence, the Draft WQC seeks to manage the reservoir like a lake, thereby eliminating many of the hydropower project's societal benefits and foregoing the ecological benefits of a natural flow regime, yet leaving the negative impacts of the reservoir in place. Given the costs of equipment upgrades needed to maintain a stable impoundment level to comply with the Draft WQC, limited future benefits, and ongoing impacts, we question whether dam removal might be a better option.

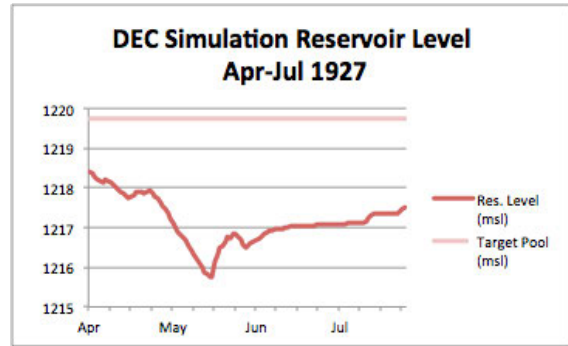
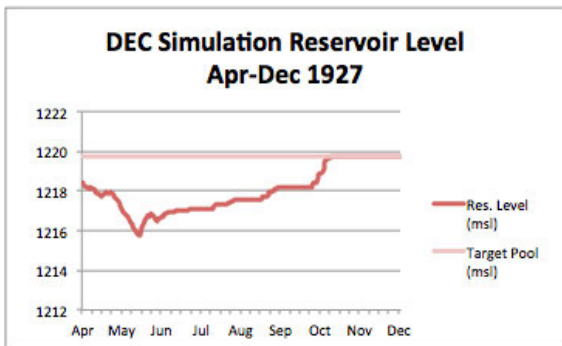
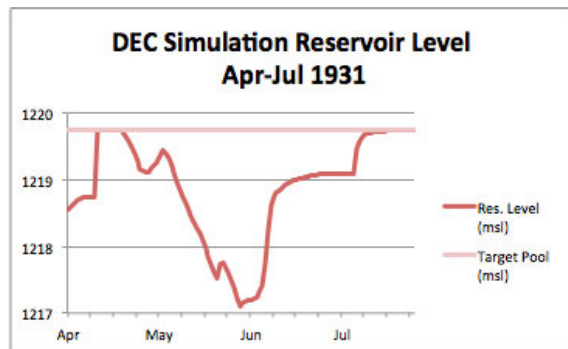
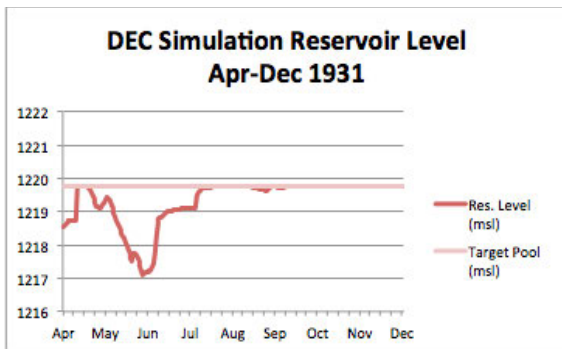
Short of dam removal or the restoration of "true" run-of-river conditions on the Green River, we believe that DEC should work to balance aquatic habitat, power generation and recreation opportunity by prescribing a modified run-of-river mode of operation that recognizes and balances all river values. Under this alternative, periodic releases of flows over 140 cfs in the spring, summer and fall would benefit aquatic habitat, provide whitewater paddling opportunities, and protect vital elements of the natural flow regime.

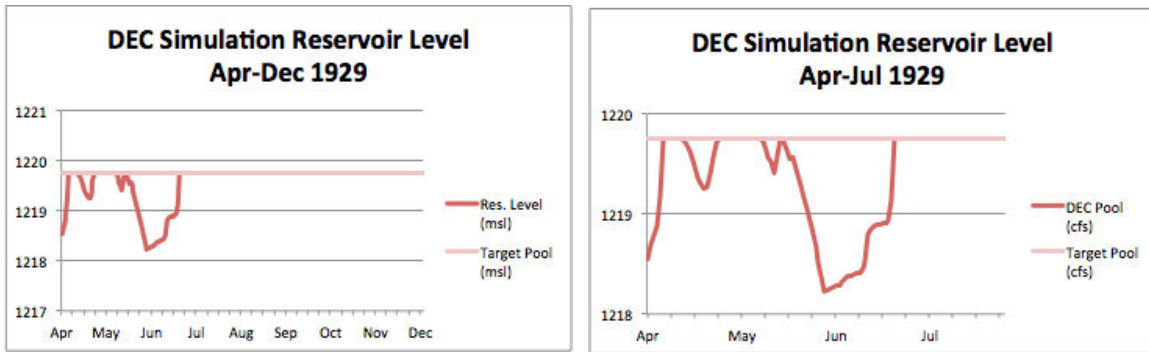
III. Anti-Degradation Policy Violations in the Draft WQC

Vermont's Anti-Degradation Policy, Section 1-03 of the Vermont Water Quality Standards, states that, "Existing uses of waters and the level of water quality necessary to protect those existing uses shall be maintained and protected regardless of the water's classification." The Policy specifically enumerates uses that the State is required to maintain, including "[t]he use of the waters for recreation or fishing." The analysis and comment below highlight specific ways in which the Draft WQC violates this policy.

1. *Modeling of reservoir levels reveals the Draft Water Quality Certification would result in dramatic fluctuations in biologically socially sensitive times*

The requirement in the Draft Water Quality Certification to provide 60 cfs base flows in April and May, and other artificial base flows in the summer, in concert with reservoir drawdowns and targets, will significantly lower reservoir levels below the target elevation of 1219.75. A basic water budget model developed using the USGS gage data from the three water years -- 1931 (low water year), 1927 (average water year), and 1929 (high water year) -- reveals that the prescribed minimum flows will result in a dramatic lowering of the Green River Reservoir. While the extent of the pool fluctuations will vary from year-to-year depending on spring rainfall and snowpack, excessive minimum flows will consistently lower the pool below target levels, as the charts below demonstrate:





In all three years examined, prescribed minimum flows of 60 cfs during April and May would cause a significant drop in reservoir elevation, each year dropping the pool to a level below the winter pool elevation of 1218.50. An analysis of the water data shows that the prescribed minimum flows will lower the reservoir between 1.5 feet and nearly 3 feet during the spring months. Furthermore, maintaining a target pool elevation of 1219.75 would not have been achieved until mid-October (1927), mid-July (1931), and late-June (1929), respectively.

- a. *The reservoir conditions created by the Draft Water Quality Certification would significantly degrade loon nesting habitat and success rates*

The lowering of the pool elevation as a result of artificial minimum flows will damage the shoreline habitat vital to Loon nesting between May 1st to August 1st . Under current operations, MWL voluntarily attempts to maintain the reservoir water level 3 inches below the dam spillway crest in cooperation with the Vermont Center for Ecostudies Loon Recovery Program. According to FERC’s EA, for reservoirs that have the ability to control water levels, Loon nests are most successful when water levels do not increase more than 6 inches or decrease more than 12 inches during any 28-day period within the peak nesting season (Fair, 1979). DEC’s prescribed minimum flows would result in a lowering of the pool elevation in a 28-day period more than double the

12-inch threshold and likely 10 times the 3-inch fluctuation under the current mode of operation. Similarly, pool level increases of three to four times the 6-inch threshold over a 28-day period would also result from the storage of flows above the prescribed minimum flows in order to refill the depleted reservoir. In each water year studied, the prescribed minimum flows would almost certainly have a significant negative impact on Loon nesting success. In short, the Draft WQC will result in the flooding, failure, and degradation of Loon nests in most years.

b. The reservoir conditions created by the Draft Water Quality Certification would significantly degrade habitat and spawning for reservoir fish

The reservoir level fluctuations caused by the artificial minimum flows are contrary to DEC's stated fisheries management goals of "[p]rotecting spawning fish, eggs, and fry from harmful water level fluctuations in spring and early summer; and maintaining the ecological integrity of littoral areas and their habitat value for fish populations." ¶93 In its Draft WQC, DEC states::

94. Water level fluctuations at any time of the year can affect fish populations, but fluctuations in the spring and early summer affect spawning fish, their eggs, and fry, and can therefore, be especially harmful. The large winter drawdown dewateres shoreline areas and negatively affects the survival of aquatic plants and invertebrates, as well as amphibians and reptiles overwintering in the littoral zone. These plants and invertebrates provide food for other aquatic life, serve as spawning substrate for fish such as perch and pickerel, and provide cover for juvenile fish, forage fish and predator fish. As a result, the overall productivity of the reservoir may be negatively affected. The large winter drawdown also limits wintertime fishing as it can create unsafe ice conditions.

The dramatic drops and rises in reservoir level during the critical spring growing and spawning season caused by the Draft WQC will cause significant dewatering and flooding of the ecologically important littoral zone, thereby degrading this habitat. The reservoir fluctuations resulting from excessive minimum flows in April and May will also

have a negative impact on successful bass spawning and fry development, as DEC acknowledges, as follows:

206. As described in findings 152 and 153, bass species begin spawning in mid-May and require a stable reservoir elevation to be maintained into July. Stable water levels during this period will maintain and protect reproductive requirements by promoting successful bass spawning and fry development (Standards, Sections 3-04 (A)(1) and (B)(4)). The Applicant's proposal to maintain a stable reservoir elevation at 1219.75 feet msl from May 1 to August 1 to support nesting loons will also support successful bass spawning. This time period coincides with the end of the spawning and incubation period for rainbow trout and longnose sucker downstream and the emergence of early fry life stages. For the period June 1 to September 30, the target elevation shall be maintained at 1219.75 feet msl. The development shall be operated in modified run-of-river mode where outflow equals inflow, but outflow shall not be less than 7 cfs. If the target water level decreases to 1219.5, outflows shall be reduced to 5.5 cfs until the target level is restored.

c. The reservoir conditions created by the Draft Water Quality Certification would significantly degrade reservoir recreation and aesthetics

The DEC analysis of the impact of its proposed flow regime on the reservoir conditions is premised on the faulty assumption that reservoir levels will remain stable after May 1st; however, the data does not support its assumption. The Draft Water Quality Certification would result in reservoir levels that do not reach full pool until June, July, or even October depending on the year. The result will leave a visible varial zone around the reservoir that degrades aesthetic and recreational values during the peak recreation season. As DEC acknowledges:

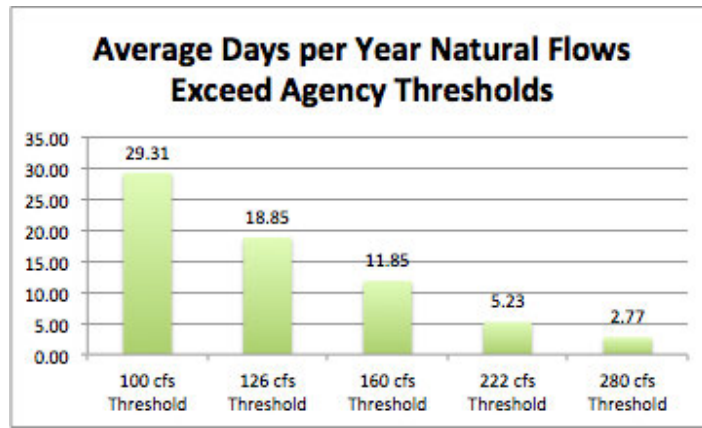
92. The Green River Reservoir fishery includes smallmouth bass, chain pickerel, northern pike, yellow perch, brown bullhead, and pumpkinseed sunfish. The remote setting of this reservoir and the prohibition against internal combustion engines draw summertime anglers in search of the wilderness fishing experience.

The reservoir level fluctuation caused by excessive minimum flows will have a negative impact on the Green River Reservoir fishery and aesthetics, values that the Draft WQC

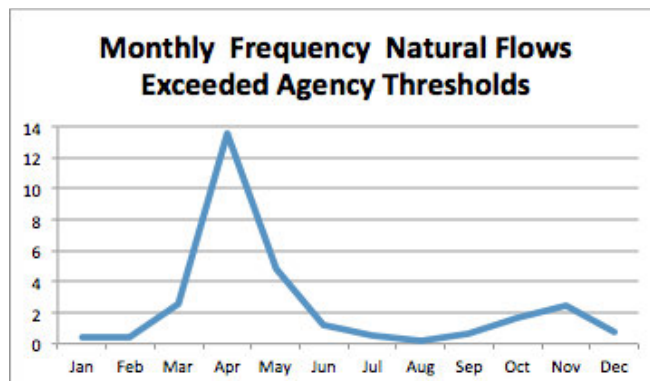
purports to protect.

2. *Modeling of flows in the Green River reveals the Draft Water Quality Certification would result in dramatic reductions in natural flow variability*

Flow data from USGS Gage No. 04291000 on the Green River for the pre-project years 1916-1920 and 1924-1931 show that the average number of days in which flows naturally exceeded a threshold of 100 cfs were as follows:

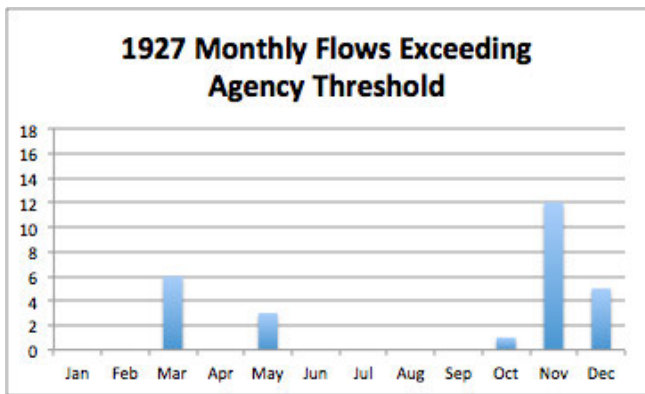
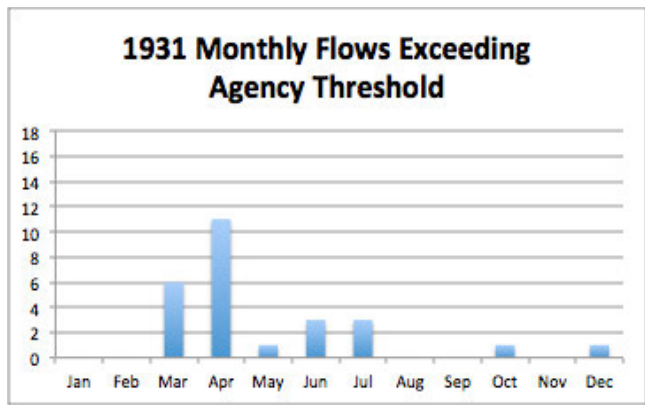


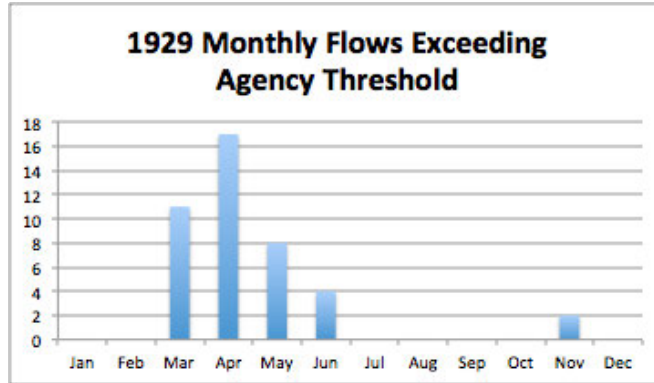
The exceedance chart above is based on median daily flows. Given the flashy nature of the Green River, it is likely that the actual frequency of these high flows exceeds the historical average shown above, as short-term high flows may not have been included in the median daily flows. Unsurprisingly, the high flows on the Green River occur most frequently during spring months, following snow melt and rains, but also occur periodically during other months.



As stated in the FERC EA, a review of historic Green River flow data from 1915 to 1932 (excluding 4 incomplete water years from this timespan) indicates that under the historic natural flow regime, an average of about 18 days occurred annually in which flows exceeded the average acceptable minimum whitewater flow (i.e., 128 cfs).

In order to better understand the natural flow regime of the Green River, we examined three representative years, 1931 (Low Flow Year), 1927 (Average Year), and 1929 (High Flow Year), to see how the timing of natural pulse flows fluctuate from year to year. The charts below show the frequency of natural flows exceeding the Agency threshold of 100 cfs.





This examination of these three water years reveals considerable variation in the timing, frequency, magnitude, and duration of the natural flow regime such that flow restoration and prescriptions should be framed within the natural range of variability.

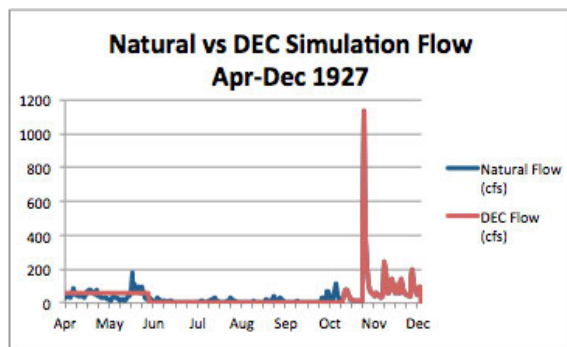
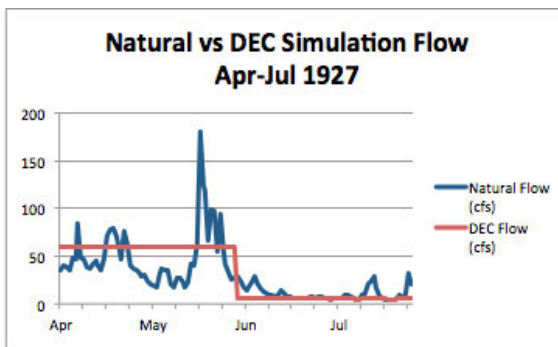
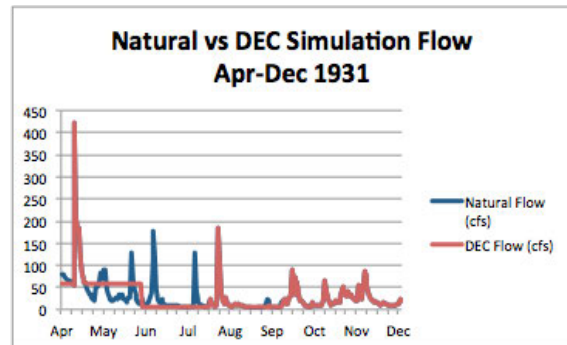
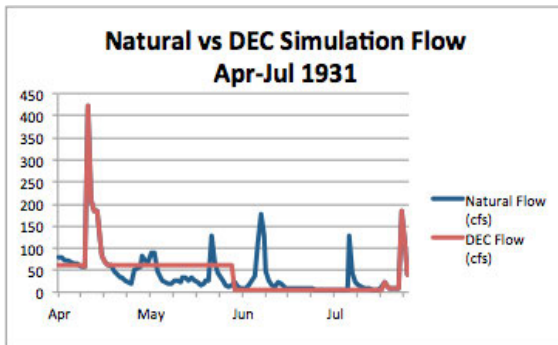
DEC relies upon PHABSIM to construct the flow prescriptions. The natural flow regime, and run-of-river conditions, do not avoid the high flows that the PHABSIM model deems imperfect for target fish species in DEC’s analysis. Converting from the current modified run-of-river operation to a true run of river operation would have little effect on the number of flow events over 100 cfs. The PHABSIM model offers no support for ending or curtailing the current regulated flow pulses, or for truncating the natural flow regime as the Draft WQC proposes to do.

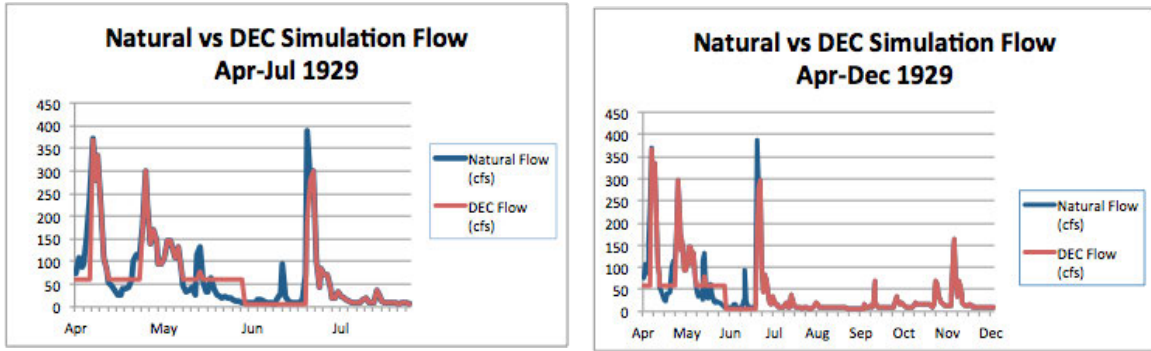
Contrary to what DEC seems to assert and does prescribe, high flows should not be avoided. They are a vital part of the natural flow regime. While they may not offer fish optimal aquatic habitat during their short duration, they create optimal physical habitat for those fish by flushing sediment and stagnant water, by improving dissolved oxygen, by inhibiting vegetative encroachment, and by other means. High flows are important parts of any flow regime, and PHABSIM is simply not designed to document that value or prescribe the needed flows.

The base flow and reservoir level requirements in the Draft WQC will

significantly reduce important natural (and/or project-related) flow variability. Under the Draft WQC, each spring operators will try to refill the reservoir while at the same time releasing artificially high base flows. Modeling reveals this results in the natural spring rain and snowmelt flow pulses being degraded in terms of frequency, magnitude, duration, and timing. Large pulses are lost in the spring and summer, and smaller scale natural variability is lost throughout the summer. In some years, as shown in the analysis of 1927, the Draft WQC would totally flatline the flow regime in spring and summer, a situation devastating to the river environment and without any natural analog.

The charts below examine the specific impacts of the DEC prescriptions on natural flow variability that would otherwise be available under natural conditions during water years 1931, 1927, and 1929. In making these charts we used a simple water budget model in which we met the instream flow requirements in the Draft WQC while attempting to meet reservoir level targets.





This analysis of three water years demonstrates that the effect of the DEC prescriptions will be to flatten out the natural hydrograph, eliminating the natural peaks and low flow periods that provide important biological cues and help restore aquatic habitat. The most dramatic impacts of the DEC prescriptions are evident in water years 1931 and 1927 when most or all naturally occurring variability and whitewater boating opportunities would have been eliminated under the Draft WQC.

It is worth noting that while there are opportunities for improving the aquatic environment notably through a modest increase in base flows, the Green River is not on the list of Vermont impaired waters, nor is it listed on the Vermont list of Waters Altered by Flow Regulation. Similarly, the Green River is not on Vermont’s Stressed Waters List. As stated in the Draft WQC, “Overall, spawning and incubation habitat for a wide variety of fish species, particularly trout species, is relatively abundant in the Green River.” ¶95 Accommodating a limited number of whitewater releases is consistent with DEC’s goals for the Green River. While evidence shows the current operations are supporting beneficial uses and even trout spawning, DEC’s proposed winter peaking, reduced spring snowmelt pulses, and unnaturally and excessive minimum flows are inconsistent with the natural flow regime. The DEC prescriptions will degrade river recreation, and will degrade aquatic species habitat and survival as well.

Historical data describing the natural flow regime confirms our proposal is within the range of natural variability, and studies conducted elsewhere of planned pulse flows that are within the natural range of variability have shown benefits and negligible impacts. Providing the Licensee with limited additional flexibility (outside of the Loon nesting period) in pool height would allow for greater flexibility in scheduling whitewater releases.

We feel that the fisheries data, weight of studies conducted elsewhere, and hydrology data at least infer that the current operating regime may not require sweeping changes like the DEC modified run-of-river proposal to meet management targets (which this proposal would not do), especially given the impacts on recreation and power generation, and the risks to aquatic habitat.

a. The flow regime created by the Draft Water Quality Certification would significantly degrade aquatic habitat in the Green River

American Whitewater supports improvements to the flow regime at hydropower dams like the Green River in order to more closely replicate the natural flow regime. Artificially limiting variable pulse flows results in reduced sediment transport, lower dissolved oxygen rates, and inadequate restoration of habitat that is beneficial aquatic species. Variable flows also provide triggers to species at various life stages, and we support the restoration of functional flows on rivers like the Green River. *See*, Yarnell, Sarah et al., Functional Flows in Modified Riverscapes: Hydrographs, Habitats and Opportunities. *BioScience*, August 5, 2015.² Natural variability of flows have a positive ecological effect.

Numerous studies in the FERC record have assessed the effects of variable flow

² <http://www.americanwhitewater.org/content/Document/view/documentid/1431>

regimes that seek to restore key functions of a natural flow regime. American Whitewater has worked on many of these relicensings, often as the leading advocate for more natural down-ramping from large seasonal spills in the West, and pulse flows to restore key ecological functions in rain dominated, snowmelt, and mixed hydrology across the country. Several recent studies have shown that scheduled pulse flows have had positive or no effect on stream ecosystems. We offer highlights of just a few below.

The West Fork of the Tuckasegee in North Carolina is a stream similar in size and gradient to the Green River. While the dam releases no base flows, accretion flow provides base flows in the upper reaches and some variability in the lower reaches. We negotiated seven annual pulse flows of 250 cfs in the West Fork to restore a portion of the natural average of 20 comparable pulse flow days. These are scheduled in May through August and mimic natural summer thunderstorms and are variable within those timeframes. Monitoring has revealed no significant temperature or fisheries impacts associated with the pulse flows, anecdotally the stream substrate and riparian corridor are becoming more similar to an un-diverted stream (fewer fines than prior to releases) and the public is greatly enjoying paddling the stream during pulse flows. Following monitoring, resource agencies recommended that the release program continue.³

The Upper Nantahala is also a bypassed river reach but has significant tributaries that help it function much like a natural river. We negotiated 8 annual releases ranging from 250 to 425 cfs: one weekend in April, one weekend in September, and four summer evenings. These flows simulate rain events and augment accretion-driven variability. Monitoring revealed variability in trout densities and age classes that were

³ <http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13810895>

indistinguishable from natural variability, and no evidence of mortality in live adult caged trout. Elevated water temperature has thus far remained within biological thresholds but ongoing monitoring is worthwhile. The releases have proven to be an unqualified recreational success, with no documented impacts. Following monitoring, resource agencies recommended that the release program continue.⁴

The Cheoah is a larger river but also quite steep, flowing through Western North Carolina. It has a restored variable base flow as well as 18-20 days of pulse flows arranged in a variable schedule that alternates on a 5 year cycle, and follows natural flow patterns with a slight seasonal shift of spring flows (~1 Month) towards summer. Like most FERC project monitoring efforts, the monitoring of the Cheoah flows tested for impacts rather than benefits. The monitoring revealed no significant impacts and since this time the number of pulse flow releases has been slightly increased by resource agencies.⁵

On the Bear River in Idaho we aimed to restore key functions of a snowmelt flow regime with very limited water through restoration of nine pulse flows during the normal high water timeframe. The Bear is a bypassed reach with a base flow as well as significant irrigation flows. The pulse releases caused a decrease in fine sediment and an enhancement of spawning gravels, and was not shown to affect species richness, biomass or catch rates of fish, or BMI Density. There was however a significant shift to a greater percentage of EPT macroinvertebrates, indicating improved riverine conditions in response to the pulse flows. Pulse flows caused mobilization of sediment and resulting turbidity spikes that reduced in intensity and duration as the program proceeded. Results

⁴ <http://www.americanwhitewater.org/content/Document/view/documentid/1430/>

⁵ <http://www.americanwhitewater.org/content/Document/view/documentid/954/>

were deemed by the resource agencies to be generally positive or neutral and they recommended that the program be continued.

These are just four examples in which we worked with agencies to design pulse flows to partially mimic the natural flow regime in order to enhance recreational opportunities. The studies and other anecdotal information on these and other rivers demonstrate that scheduled whitewater boating releases have either a negligible or even positive impact on aquatic habitat when done in a responsible manner.

We agree that operating the Green River Development so that inflows equal outflows real-time is one way to restore a flow regime to the Green River that is within the natural range of variability. We likewise feel that scheduled pulse flows can be integrated into the flow regime in a manner that is also within the natural range of variability, and that can have additive recreational benefits without causing ecological impacts.

b. The flow regime created by the Draft Water Quality Certification would significantly degrade whitewater paddling in the Green River

FERC acknowledges in their EA that the 4.35-mile stretch of the Green River from the dam to its confluence with the Lamoille River offers a range of whitewater boating opportunities unique to the region. The milder upper reach has a 150-foot vertical drop in elevation over 1.6 miles offers a scenic float with several sections of Class I and II rapids from the dam to Garfield Road, which crosses the river and meets Green River Dam Road about 1.6 miles downstream of the dam. The more popular lower reach of the Green River, from Garfield Road to its confluence with the Lamoille River, has a 400-foot vertical drop in elevation over 2.75 miles and contains numerous sections of Class

III, IV, and V rapids. The scenic lower reach flows through a deeply wooded area with several gorges, falls, and drops and provides a more advanced whitewater boating experience. Local whitewater boaters enjoy the full length of Green River from the dam to the confluence with the Lamoille River, but it is particularly known for the more challenging lower reach.

As part of the relicensing process, MWL conducted a whitewater boating study at the Green River in collaboration with AW and VPC in 2011. The objectives of the study were to assess whitewater boating opportunities on the Green River provided by various flow releases, determine an acceptable range of whitewater flows (minimum, standard, and high-challenge flows), and quantify the number of days current project operation allows for whitewater boating opportunities. As part of the 2-day study, 26 advanced paddlers evaluated the 2.75-mile lower reach at flows ranging from 105 cfs to 280 cfs. Based on the evaluations by study participants, the study identified 128 cfs as the average acceptable minimum flow, 222 cfs as the average optimal flow for a standard run, and 280 cfs as the average optimal flow for a high challenge run. The study found that in 2011, Morrisville generated power at or above the identified 128-cfs minimum whitewater flow on a total of 15 days for a sum of 216 hours during normal project operations. Eight of these days occurred during April and May, collectively, while a total of three days occurred in October. The remaining four days occurred once in January, June, November, and December

Under either the current flow regime or under natural conditions, whitewater boating is an existing use that should be protected by Vermont's Anti-Degradation Policy. MWL annually provides scheduled whitewater releases on short notice at the

request of AW and VPC, which MWL utilizes for the primary purpose of power generation. These releases are generally scheduled outside of the May 1st to July 31st Loon nesting period when pool level fluctuations are voluntarily limited by MWL. These releases most often occur in April when flows are high due to snow runoff and after rain events, and in addition, in the later fall during the winter pool drawdown. Even December scheduled releases draw as many as 50 whitewater boaters based on past experience.

Likewise, whitewater boating is also an existing use under natural flow conditions. Under true run of river conditions boatable flows in excess of 140 cfs would occur approximately 18 times annually. While these flows can occur anytime throughout the year, they most frequently occur during the months of April, May, and November, although the timing of these natural flows do vary considerably. The fact that whitewater boating is an existing use is further established by the whitewater boating study and by FERC's EA.

DEC does not dispute that whitewater boating is an existing use on the Green River, and implicitly acknowledges such existing whitewater boating use in the draft WQC, as follows:

237. As proposed, schedule whitewater releases will conflict with the operational regime being condition by this certification at the Green River development. However, by Condition B of this certification, facility operations will be closer to run-of-river operations which will help to restore the frequency of natural high flow events and allow for whitewater boating when natural flows are compatible with boating. The Applicant has proposed to install a notification system that will alert users of the outflows from the facility.

Whitewater boating is plainly included as a recreation activity protected under the Anti-Degradation Policy of Vermont's Water Quality Standards. As such, DEC is required under its Anti-Degradation Implementation Procedure to conduct a detailed analysis of

the impact of its preferred flow regime on existing and potential whitewater boating opportunities. It has not done so.

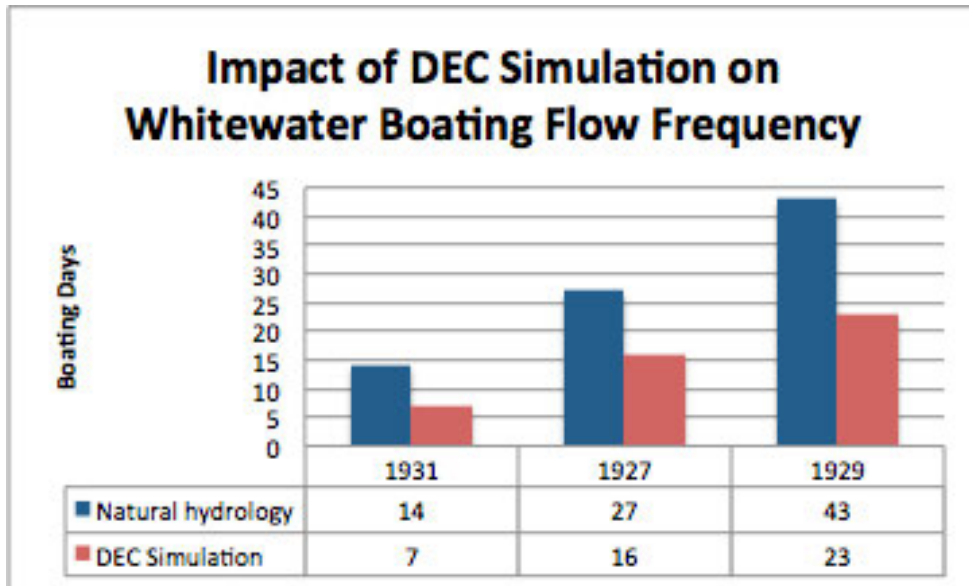
In rejecting the FERC recommended alternative and proposing modified run-of-river operations that degrade whitewater paddling opportunities and without flow provisions for paddling, DEC eliminates valuable scheduled whitewater boating opportunities from the proposed and current operations of the Green River. DEC provides no analysis or discussion of the value of whitewater boating on the Green River, and provides no rationale for its conclusory statements that the proposed whitewater releases are incompatible with its goals for the Green River. Furthermore, DEC's statement that its proposed flow regime "will help to restore the frequency of natural high flow events and allow for whitewater boating when natural flows are compatible with boating" is erroneous given the facts that both refilling the reservoir after the winter drawdown and the prescribed minimum flows will significantly reduce the number natural high flow events paddlers can experience.

The flow regime proposed in the Draft WQC would degrade existing whitewater boating opportunities available under either the current and natural flow regime. MWL would be prohibited from scheduling any whitewater boating releases based on: 1) the limitation of store-and-release operations to December 15th to March 31st when snow, ice, and temperatures are largely incompatible with paddling; 2) the limitation on generation flows to 110 cfs in winter months, a level insufficient to provide acceptable whitewater boating opportunities on the off chance weather supported paddling during this timeframe; 3) the requirement that inflows equal outflows between April 1st and December 15th except for artificial base flows; and, 4) the requirement of minimum flows

that will at times exceed inflows and thus eliminate significant natural spring and summer pulse flows. The Draft WQC would prohibit even a 3-inch or less reservoir level fluctuation that could result from a scheduled whitewater release. These unwarranted prescriptions have the effect of significantly degrading an existing use with no evidence it will benefit another existing use, which is prohibited under the Anti-Degradation Policy.

The Draft WQC would also restrict whitewater boating opportunities that would be available under natural flow conditions. The refilling of the Green River Reservoir from a depth of 1218.5 to 1219.75 following the winter pool drawdown will limit whitewater boating opportunities that would be naturally available between April 1st and April 31st.

The loss of whitewater boating opportunities in the spring, months in which natural whitewater boating opportunities should be most plentiful due to snow melt and rains, is further diminished by the prescribed unnatural and excessive minimum flows of 60 cfs between April 1st and May 31st. As shown in the chart below, the frequency of whitewater boating opportunities is dramatically decreased under the DEC prescribed flows as compared to the natural river hydrology, as follows:



In the three water years studied -- 1931 (low), 1927 (average), 1929 (high) -- whitewater boating opportunities decreased by 50%, 41%, and 47%, respectively, when DEC prescribed flows were simulated based on historic flow data. Rather than restoring the frequency of natural high flow events as DEC claims, the prescriptions would have the opposite effect.

3. *Anti-Degradation Policy Analysis does not support the elimination of existing uses on the Green River, and the proposed flow modifications will degrade water quality*

Under the Anti-Degradation Policy in the Water Quality Standards, an adverse impact on an existing recreational use can only be justified in circumstances where a Tier 2 or Tier 3 review is required under the Anti-Degradation Implementation Procedure. Otherwise, existing uses must be maintained and protected under a Tier 1 review. DEC acknowledges that “[t]his project does not affect any Outstanding Resource Waters and therefore does not trigger a Tier 3 review under Section VIII of the Procedure.” ¶242

A Tier 2 review under the Anti-Degradation Implementation Procedure is required when “[w]aters whose existing ambient water quality exceeds (i.e. is better than) the applicable minimum water quality criteria and indices for the class to which the waterbody is assigned shall be considered high quality water.” In determining whether a Tier 2 review is required for a particular waterbody, DEC states that “[t]he Secretary may have to review a single waterbody under multiple tiers of review depending on whether a waterbody is impaired or high quality for different parameters.” ¶241

In this case, DEC errs in its determination that the Green River Development is subject to a Tier 2 review under the Anti-Degradation Implementation Procedure. As DEC correctly states, none of the waters within or near the project area are listed on the U.S. Environmental Protection Agency approved list of waters considered to be impaired based on water quality monitoring efforts. ¶71 As such, a Tier 2 review is only warranted if DEC first determines that the river exceeds the water quality criteria for certain parameters. The use of the terms “the waterbody”, “single waterbody”, and “a waterbody” make it clear that DEC cannot simply declare all waters in the Lamoille River and Green River falling within the project boundaries for the Morrisville Development, Cady Falls Development, Green River Development, and Lake Elmore Dam to be subject to a Tier 2 review without specific findings that each segment exceeds the water quality criteria for certain parameters. Even then, the Tier 2 review can only be used to assess impacts on those parameters and on those segments of a “single waterbody” that warrant a Tier 2 review. In the case of the Green River Development, DEC has not identified any specific parameter in which the water quality exceeds the Class B classification for the river segment, and as such, a Tier 2 review of the project is

inappropriate.

To the extent that DEC seeks to conduct a Tier 2 review of the Green River Development, it must identify the specific parameters on which that review will be based. DEC will need to show that for these parameters, the water quality meets the Class A(2) standards for a public water supply. Inasmuch as Class A(2) waters are managed to support boating, fishing and other recreational uses, the Draft WQC must assure that its prescriptions do not degrade those existing uses including whitewater boating. It is unclear whether the Green River, even under the conditions proposed in the Draft WQC, are sufficient to qualify under the Class A(2) classification to achieve any other management objective.

DEC grossly fails in the Draft WQC by proposing to significantly alter the natural flow regime in a manner that will adversely impact water quality. The modified run-of-river regime proposed by DEC is an unwarranted and unscientific attempt to smooth out the peaks that would normally occur in a true run-of-river or natural flow regime. By requiring reservoir refilling between April 1st and April 30th, and by prescribing minimum flows of 60 cfs out of storage and refilling between April 1st and May 31st, DEC would eliminate valuable whitewater boating opportunities and ecological benefits of natural pulse flows that would be available under natural run-of-river conditions. DEC would replace these natural hydrologic conditions with unnaturally high minimum flows and delay high-flow events during reservoir refill, treating the Green River below the dam more like a lake than a naturally dynamic river. While DEC purports to be restoring the natural hydrology, they are significantly altering it in a manner that reduces natural variances that are beneficial to aquatic habitat, while at the same time, reducing

opportunities for recreation that are either currently available or would be available under true run-of-river operations.

Despite providing no basis for conducting a Tier 2 review, DEC makes the following finding:

253. The Secretary considered all of the factors listed in Finding 248 above and, based on information supplied by the Applicant and Agency staff field investigations, identified the following existing uses at the Green River development: aquatic biota, wildlife and aquatic habitat; and recreation.

254. The existing dam and impoundment have changed the natural condition of the river at project facilities. Currently, aquatic biota, wildlife and aquatic habitat, and angling are impacted in the Green River Reservoir by water level fluctuations and downstream of the Green River by insufficient conservation flows and high generation flows. Current operations do not consistently sustain existing uses as a result of the low flows or high generation flows in the Green River. In addition, current operations do not consistently support existing uses in the Green River Reservoir because the magnitude water level fluctuations are too severe to support aquatic habitat and biota. However, the modifications to the project conditioned under this Certification will result in improvements to water quality, which will protect and improve conditions for existing uses at this development. Those modifications include reduced water level fluctuations at Green River Reservoir and a moderated peaking regime in the Green River.

Although DEC asserts, albeit erroneously, that its prescriptions will restore the frequency of natural high flow events and enhance opportunities for whitewater boating⁶, it nevertheless fails to even make mention of whitewater boating much less analyze the impact of its prescriptions on this protected use.

DEC does not offer any data showing that the Green River under current operations is not currently providing for their target native and exotic fish species. In fact, DEC states that all the target species are naturally reproducing in the Green River, and/or using it as valuable habitat. As DEC finds in the draft WQC:

95. The Green River flows approximately 4.3 miles from Green River Reservoir

⁶ See, ¶237

to the Lamoille River. Overall, spawning and incubation habitat for a wide variety of fish species, particularly trout species, is relatively abundant in the Green River. Upstream of the culvert on Garfield Road, the river supports a self-sustaining population of brook trout. The portion of the river downstream of the culvert also supports a self-sustaining brook and brown trout population, and adult brown and rainbow trout from the Lamoille River also spawn successfully in the lower portion of the river. Because the Green River is cooled by the release of hypolimnetic water from the reservoir, it provides cool water to the Lamoille River, and during summer months, large trout in the Lamoille River may seek thermal refuge near the mouth of the Green River or in the Green River itself.

There are no creel or other data to indicate that the fish species in the Green River are anything but thriving under the current operating regime. What data we do have seem to indicate that there may not be a significant impact in need of corrective management.

IV. Requested Remedy

First and foremost, DEC should conduct a basic water budget analysis and ensure that whatever operating regime they prescribe is capable of achieving the targets they require without impacting beneficial uses. Our analysis has shown that the modifications to run-of-river conditions prescribed in the Draft WQC would degrade nearly all beneficial uses of the Green River both upstream and downstream of the dam, and this is equally true when compared to run-of-river conditions and the FERC staff recommended alternative. The current prescriptions must be replaced entirely.

We request that the DEC reconsider its ill advised Draft WQC, and instead, endorse the FERC staff preferred alternative, perhaps with limited modifications to achieve a more natural flow regime, or opt for true run-of-river conditions (which may result in unprofitability and dam removal). Our proposal is consistent with and biologically indistinguishable from the natural flow regime, and is consistent with the current or FERC recommended modified run-of-river modes of operation.

Subtle modifications to the FERC staff preferred alternative could include limits

on reservoir drawdown that allow for power generation, and targets for generation that help generation flows conform with the natural range of variability with regards to the frequency, magnitude, duration, and timing of pulse flows. At least some (6-10) generation flows over 140 cfs should be made in a predictable manner to support recreational use consistent with the FERC staff alternative. The FERC staff preferred alternative, with or without potential subtle changes listed above, would constitute an improvement over existing conditions, and a vast improvement over the Draft WQC. It would continue to support power generation, Loon nesting, whitewater boating, and in-stream fish populations, all of which would be degraded under the Draft WQC.

Conclusion

We respectfully request that DEC revise its Draft Water Quality Certification for the Morrisville Project as described above. Failure to do so would significantly degrade the beneficial uses and ecological integrity of the Green River and the Green River Reservoir. Thank you for considering these comments.

Respectfully submitted,

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