	Place cursor in first fill-in field and use F11 to tab through fields. **Vermont Agency of Natural Resources** **Water Quality Certification Application** **for Hydroelectric Facilities**
Send to:	Peter LaFlamme, Director Watershed Management Division 1 National Life Drive, Davis 3 Montpelier, VT 05620-3522

Please type or print in black ink. ALSO be sure to complete the signature block on page two.

Application for ☑ New ☐ Amended Certification (Date of original certification:)

1. Applicant: Great River Hydro, LLC
Contact: John L. Ragonese, FERC License Manager
Mailing address: 69 Milk Street, Suite 306; Westborough, MA 01851
Work phone: 603-498-2851 E-mail address: jragonese@greatriverhydro.com

If an agent is acting for the applicant during the permit process, complete #2.

2. Authorized agent:
Contact: Secondary Contact: Jennifer Griffin
Mailing address: 2 Killeen Street, North Walpole NH 03609
Work phone: 603-966-0477 E-mail address: jgriffin@greatriverhydro.com

3. Project name: Bellows Falls Hydroelectric Project FERC Project No. (if any): FERC No. 1855 Town(s): New Hampshire: Cheshire, Walpole; Vermont: Windham, Rockingham	Geographic location (latitude/longitude): 43.13339834575315, -72.44188566520162 Waterbody (stream, lake or pond) affected: Connecticut River, Connecticut River Drainage Basin Dam name and Vermont Dam Inventory number (if any): Bellows Falls Dam

4. Project description. Concisely describe the project infrastructure, how the project will be operated, the components of any proposed mitigation or enhancements and how the complete proposal will meet Vermont Water Quality Standards:

See separate and attached Project Description / Proposed Operation page

5. Attached materials:

List attachments. Include one printed copy and one digital copy (in Adobe Acrobat (pdf) format) of *Information Supporting a Vermont Water Quality Certification Application for a Hydroelectric Project* or a FERC application, and any other supporting documents. **List of Information Supporting Bellows Falls VT Water Quality Certification Application is attached.**

6. Fee: Pursuant to 3 V.S.A. § 2822(j)(30) the application fee shall be equal to 1% of project cost with a maximum fee of $20,000. Project cost shall be calculated as the total of capital costs and operation and maintenance expenses over a default license term. For amended certifications, project costs shall be calculated as the total capital cost associated with the amendment.

Project Cost $ > $2 M Total Enclosed $ $20,000

Application is hereby made for a water quality certification pursuant to 33 U.S.C. §1341. Upon request, I will make available any information necessary for the Vermont Agency of Natural Resources to make a water quality certification decision. I hereby certify that the information provided with this application is true and accurate to the best of my knowledge. I recognize that by signing this application I am giving consent to employees of the State to enter the subject property for the purpose of processing this application.

John Ragonese — *Signature of applicant*

04-18-2024 — *Date*

Signature of authorized agent

Date

I hereby designate to act as my agent in matters related to this certification application.

Signature of applicant

Date

This application **must** be signed by the applicant and the agent, if an authorized agent is designated.

4. Project Description and Proposed Operation, Mitigation and Enhancements

The Project Description and Proposed Operation, Mitigation and Enhancements are described in the revised, amended Bellows Falls Final License Application (Bellows Falls FLA) Initial Statement and Exhibits A, B, C and D submitted to the Federal Energy Regulatory Commission (FERC or the Commission) on June 7, 2023[1], along with the revised composite Exhibit E for Wilder, Bellows Falls and Vernon Projects (Exhibit E)[2]. Bellows Falls FLA Exhibits F, G and H were previously filed on December 7, 2020[3]. The Great River Hydro (GRH) proposal, as outlined in the Bellows Falls FLA Exhibit B (Exhibit B) reflects the proposed operation in accordance with a Memorandum of Understanding (MOU) executed on December 1, 2020[4] between GRH, the Project certifying authorities (including VTDEC), and other participating stakeholders. The MOU includes an Exhibit A "Great River Hydro's Proposed Alternative Operation for the Projects" that is the basis of the proposed Project operation in the Bellows Falls FLA. The Bellows Falls FLA also includes a proposed set of fish passage environmental measures that have since been incorporated into a Settlement Agreement on Fish Passage (SAFP) executed by Vermont Department of Fish and Wildlife among other state and federal agencies and filed with the Commission on August 2, 2022[5] . This Water Quality Certificate application presents information collected and presented in Exhibit E and assumes future operations consistent with the Bellows Falls FLA, MOU and SAFP. Exhibit E provides a full description of the proposed Project activity and is summarized below. Additional supporting information is provided in ILP Water Quality Study 6 Updated Study Report dated 12-15-2016[6] and ILP Fish Assemblage Study 10 Report dated 08-01-2016[7].

The Bellows Falls Project dam and powerhouse are located on the Connecticut River at river mile (RM) 173.7, approximately 1 mile upstream of the Saxtons River confluence and 3 miles downstream of the Williams River at the upper end of a sharp bend of the Connecticut River at Bellows Falls, Vermont, in

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[1] Accession No. 20230608-5102 Great River Hydro, LLC submits Revised Final License Application and Exhibits for the Bellows Falls Hydroelectric Project et. al. under P-1855 et. al. Includes Exhibit A, B, C and D for Bellows Falls Project revised 06-07-2023.

[2] Accession No. 20230608-5103 Great River Hydro, LLC submits Revised Final License Application and Exhibits for the Bellows Falls Hydroelectric Project et. al. under P-1855 et. al. Includes composite Exhibit E for Wilder, Bellows Falls and Vernon Projects revised 06-07-2023.

[3] Accession Nos. 20201207-5219 (Public), - 5220 (Privileged);-5221 (CEII); Amended Final License Applications of Great River Hydro, LLC for Bellows Falls Project, et. al. under P-1855 et. al. Includes Exhibit F, G, and H for Bellows Falls Project

[4] Memorandum of Understanding between Great River Hydro and the United States Fish and Wildlife Service, the New Hampshire Department of Environmental Services, the New Hampshire Fish and Game Department, the Vermont Department of Environmental Conservation, the Vermont Department of Fish and Wildlife, The Nature Conservancy, and the Connecticut River Conservancy; filed with Bellows Falls Project FLA Exhibit B of Amended Final License Applications of Great River Hydro, LLC for Bellows Falls Project, et. al. under P-1855 et. al. Accession Nos. 20201207-5219 (Public),

[5] Accession No. 20220803-5124 Great River Hydro, LLC submits Offer of Settlement between Great River Hydro, LLC and the U.S. Department of Interior et. al, and Revisions to Exhibit D Documents for the Bellows Falls Hydroelectric Project et, al. under P-1855, et. al.

[6] Accession No. 20161215-5280 ILP Study Reports 6, 25 and 30, final reports and supplements, TransCanada Hydro Northeast Inc. under P-1892, et al filed December 15, 2016

[7] Accession No. 20160801-5232 TransCanada Hydro Northeast Inc. August 1, 2016 Updated Study Report under P-1855, et. al.

the town of Rockingham, Vermont, and in the town of Walpole, New Hampshire. The Project consists of a concrete gravity dam, spillway, and bypassed reach; an approximately 26-mile impoundment; a power canal and powerhouse; a substation, line garage, and storage buildings located near the powerhouse; fish passage facilities; and appurtenant facilities. The location of the project is shown in Figure 1 below.

The dam is a concrete gravity structure extending across the Connecticut River from Rockingham, Vermont, to Walpole, New Hampshire. Virtually all of the dam structure is located in New Hampshire. It is 643 ft long with a maximum height of about 30 ft and is divided by concrete piers into 5 bays. Two bays contain steel roller-type flood gates, and three contain stanchion flashboards. A steel bridge runs the length of the dam for access and for operation of flashboards. A 25-ton gantry crane sits atop the bridge.

GRH proposes to install a new intake structure to house a 680 kW minimum flow unit at the downstream face of stanchion flashboard bay 1, adjacent to the abutment at the Vermont end of the dam. The new concrete intake structure will also include three new spill conveyance structures, increasing the spill capacity of the existing dam by 465 cfs in addition to generation flow through the minimum flow unit itself. Renewable energy produced from the minimum flow unit is intended to be sold to Vermont utilities through a Vermont Standard Offer Purchase Power Agreement.

The GRH proposal, as outlined in Exhibit B, reflects the proposed operation in accordance with the MOU. The proposed operation will predominantly maintain a specified water surface elevation (Target WSE) at the dam and, as a result, maintain flow below the Project equal to the approximate inflow as measured or calculated at the dam (inflow equals outflow or IEO). Specifically, a Target WSE of 291.1 ft m.s.l. (NVGD 29) will be maintained at the Bellows Falls dam by passing inflow within a Target WSE Bandwidth between 291.6 ft and 290.6 ft to account for potential differences between anticipated inflow and actual instantaneous inflow. In addition to IEO Operation, the Project will have restricted discretionary Flexible Operation capability to respond to elevated energy prices as well as unrestricted capability to respond to emergencies and ISO-NE transmission and power system requirements.

In general, the proposed operational changes are anticipated to provide environmental benefits for aquatic life by creating more stable reservoir water surface elevations, reducing the magnitude of changes and the frequency of sub-daily changes in discharge from the project, increasing the amount of time that the project is operated as inflow equals outflow and at full reservoir. Apart from the proposed changes to the operational conditions and the new minimum flow unit, the only other proposed new construction will be associated with the fish passage related improvements outlined in Exhibit E reflecting terms and conditions in the SAFP.

Multiple water quality studies have been completed within the Bellows Falls Project area in support of the FERC license application. Overall, these studies found current project operations are meeting Vermont water quality standards and it is expected this will not change under the proposed operational changes (Exhibit E sections 3.5.1.2, 3.5.2.2, 3.5.3.2, and 3.5.4.2 and ILP Study 6). Additionally, discretionary Flexible Operation generation is proposed for a limited number of hours each month (1.4 to 9% of the total hours in a month), with fewer hours in the April-October period and more in the late fall to early spring months. This schedule would protect critical aquatic resource sensitive months

between April and September while allowing for more operational flexibility during less sensitive winter months when many aquatic resources are dormant (Exhibit E Section 3.3 and Section 3.6).

In the Bellows Falls impoundment, specifically, pre-winter habitat operations will be implemented to reduce the likelihood of dewatering or freezing of DWM during their winter hibernation. This will be accomplished by maintaining WSEs near the lower limit of the proposed operational range for a period of time when water temperatures are dropping from 15^0 C to 10^0 C, a period when DWM are expected to be seeking overwintering habitat. Once water temperatures are consistently below 10^0 C, the Project will return to normal operations and will not drop WSEs below the pre-winter elevation during the remainder of the winter period (unless required to by flood profile operation) to ensure hibernating DWM remain submerged (Exhibit E Section 2.2.1).

Minimum flow in the bypassed reach below the dam was the subject of numerous discussions held between the stakeholders and GRH in June 2020. Flow to the bypassed reach below the dam will be at least 300 cfs year-round. This flow rate, supported by state and federal fishery agencies, was determined based on IFIM modeling of various flow across a series of transects perpendicular to bypass channel habitat. Agencies chose to prioritize 1.) target fish species associated with flow sensitive riffle and run habitats, as opposed to species associated with less flow-sensitive pool habitat, and 2.) include non-spawning life stages because extreme flows scour the exposed bedrock that dominates the bypassed reach and remove finer spawning substrate on an annual or more frequent timeframe. The proposed continuous minimum flow of 300 cfs is supported by state and federal fishery agencies and both VT and NH water quality agencies. This will provide additional habitat to target fish species such as dace, suckers, darters, and Fallfish. See Summary of Bellows Falls Bypass Instream Flow MOU Discussion and Flow Selection at the end of Section 5 of this application.

Under the GRH proposal, current access to the river within the Project Boundary will be maintained or enhanced through the capital improvements to the boat launches, a new portage livery service and general recreation area access and parking. The proposed operation will result in higher base flow conditions in the river that will more closely resemble natural flows, enhancing river paddling conditions while at the same time providing for stable impoundment water surface elevations that support power boating, flat water canoeing and rowing.

While the whitewater boating community requested GRH study and consider providing scheduled whitewater recreation releases under a new license, the proposed operation does not support or include such. Periodic releases that would support whitewater boating would significantly affect and disrupt the aquatic habitat intended to be enhanced below the dam and was not supported by fishery agencies that supported the proposed minimum flow in the bypassed reach. Furthermore, the reach currently does not support public recreation use due to inherent dangers associated with naturally occurring, highly variable, and often extremely turbulent flow that can spill over the dam once station flow capacity is exceeded. Such flows can rise rapidly and far exceed boating capabilities of average recreational boaters. The lack of safe and available access to the reach for ingress or egress (i.e., for put-in, take-out, or emergency rescue purposes) further discourages recreational use of the bypass. During high water conditions, the reach is posted to discourage in-stream use of any kind due to rapidly changing conditions and extreme velocity and strength of the current passing through the bypass.

Current in-stream wading angling will be the most affected change in current recreation use due to the proposed operation eliminating the 1083 cfs minimum flow, in lieu of a higher, more naturalized flow below the station and dam. There are several locations where anglers are known to wade into the river to fish, or to reach exposed sandbars from which to fish. Safe opportunity for in-stream wading will likely be restricted to the riverbank unless assisted by flotation or boat. Combined with the anticipated improved aquatic resources, fishing conditions and opportunities should continue or improve under the proposed operation.

For all recreation in-stream users, anticipated and actual flow and discharge information below the Bellows Falls Project will continue to be made available to the general public.

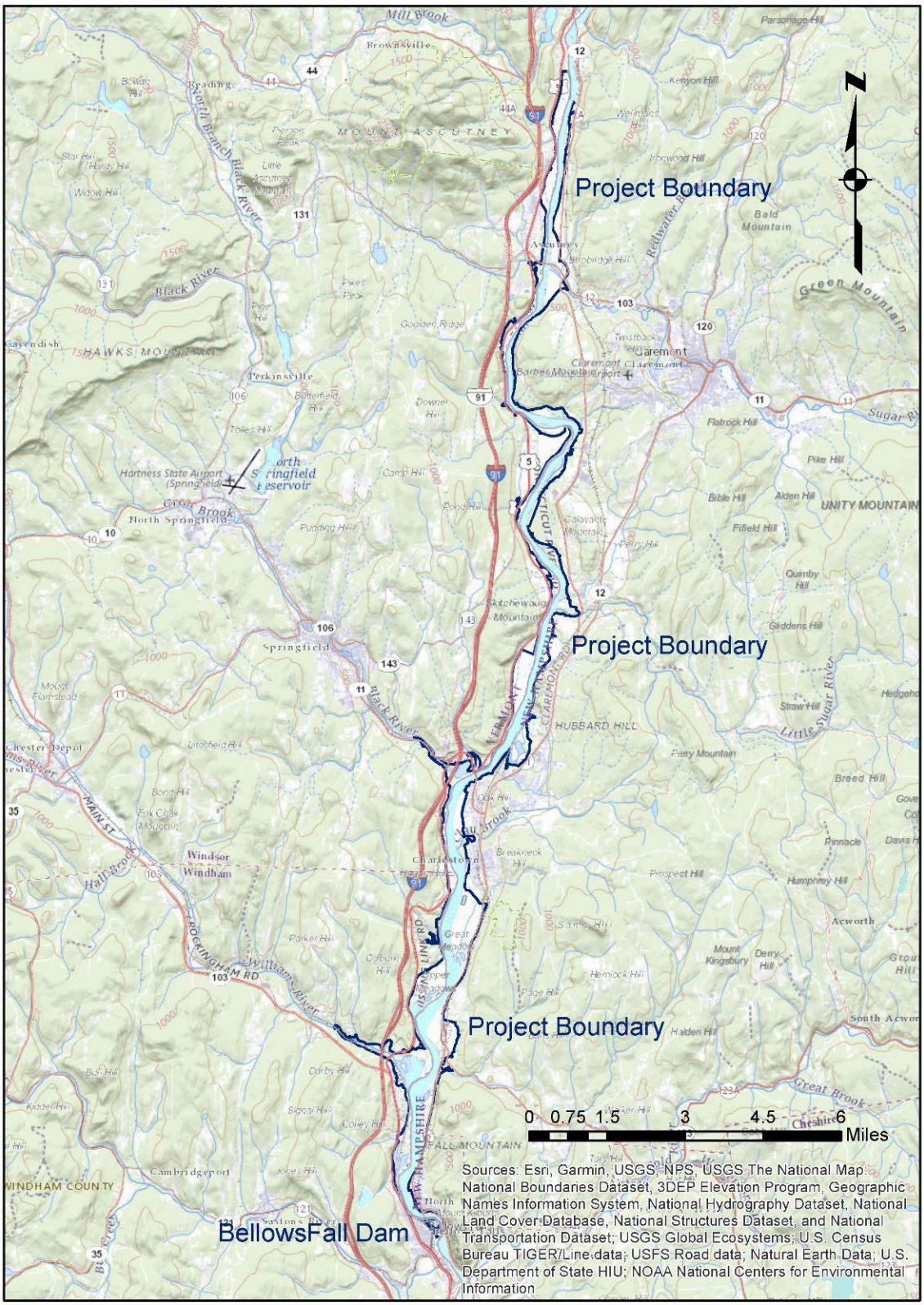

Figure 1. Location of Bellows Falls Dam and Project Boundary

5. List of Information Supporting Vernon Project VT WQC Application

The list below identifies the main sources of information supporting this WQC Application:

Revised Amended Bellows Falls FLA 06-07-23 (Includes Initial Statement and Exhibits A, B, C, and D):

Accession Nos. 20230608-5102; Revised Amended Final License Applications of Great River Hydro, LLC for Project, et. al. under P-1855 et. al.

GRH Website:
https://relicensing.greatriverhydro.com/overview/documents/?eeFront=1&ee=1&eeFolder=Documents%2F85-Revised-Final-License-Application-BF-Min-Flow-Unit&eeListID=1

Revised Amended Exhibit E for Wilder, Bellows Falls and Vernon Projects; Revised 06-07-2023:

Accession No. 20230608-5103 Great River Hydro, LLC submits Revised Final License Application and Exhibits for the Bellows Falls Hydroelectric Project et. al. under P-1855 et. al

GRH Website: http://relicensing.greatriverhydro.com/wp-content/uploads/simple-file-list/Documents/85-Revised-Final-License-Application-BF-Min-Flow-Unit/2023-06-07-WLDR-BF-VERN-RFLA-Exhibit-E.pdf

Amended Vernon FLA 12-7-2020 (Includes Exhibits F, G, and H):

Accession Nos. 20201207-5219 (Public), - 5220 (Privileged);-5221 (CEII); Amended Final License Applications of Great River Hydro, LLC for Project, et. al. under P-1855 et. al.

GRH Website:
https://relicensing.greatriverhydro.com/overview/documents/?eeFront=1&ee=1&eeFolder=Documents%2F80-Amended-Final-License-Applications-AFLA%2F30-Bellows-Falls&eeListID=1

Memorandum of Understanding executed December 1, 2020:

Included in 12-7-2020 FLA Exbibit B, Accession Nos. 20201207-5219 (Public) (see above). MOU between Great River Hydro and the United States Fish and Wildlife Service, the New Hampshire Department of Environmental Services, the New Hampshire Fish and Game Department, the Vermont Department of Environmental Conservation, the Vermont Department of Fish and Wildlife, The Nature Conservancy, and the Connecticut River Conservancy.

GRH Website: http://relicensing.greatriverhydro.com/wp-content/uploads/simple-file-list/Documents/80-Amended-Final-License-Applications-AFLA/10-Wilder/2020-12-07_WLDR_Amend_FLA_ExABCDFGH.pdf

Settlement Agreement on Fish Passage (SAFP) 08-02-2022:

Accession No. 20220803-5124. Settlement Agreement on Fish Passage (SAFP) executed by New Hampshire Fish and Game Department among other state and federal agencies and filed with the Commission on August 2, 2022.

GRH Website: http://relicensing.greatriverhydro.com/wp-content/uploads/simple-file-list/Documents/80-Amended-Final-License-Applications-AFLA/70-AFLA-Settlement-Agreement-Fish-Passage/2022-08-02-GRH-AFLA-Fish-Passage-Settlement-Agreement.pdf

ILP Study 6 Water Quality Updated Study Report:

Accession No. 20161215-5280 ILP Study Reports 6, 25 and 30, final reports and supplements, TransCanada Hydro Northeast Inc. under P-1892, et al filed December 15, 2016

GRH Website:
https://relicensing.greatriverhydro.com/overview/documents/?eeFront=1&ee=1&eeFolder=Documents%2F50-Study-Reports%2F130-Study-Reports-1-33%2FStudy-06-Water-Quality-Monitoring&eeListID=1

ILP Study 10 Fish Assemblage Study Report:

Accession No. 20160801-5232 TransCanada Hydro Northeast Inc. August 1, 2016 Updated Study Report under P-1855, et. al.

GRH Website:
https://relicensing.greatriverhydro.com/overview/documents/?eeFront=1&ee=1&eeFolder=Documents%2F50-Study-Reports%2F130-Study-Reports-1-33%2FStudy-10-Fish-Assemblage&eeListID=1

All Final Study Reports for ILP Studies 1 through 33 can be found in the GRH Relicensing Public Information Library on the GRH Relicensing Website:

https://relicensing.greatriverhydro.com/overview/documents/?eeFront=1&ee=1&eeListID=1&eeFolder=Documents/50-Study-Reports/130-Study-Reports-1-33

Various Submittal Filings were made in order to submit all the final Study Reports to the FERC. They can be accessed here:
https://relicensing.greatriverhydro.com/overview/documents/?eeFront=1&ee=1&eeFolder=Documents%2F50-Study-Reports&eeListID=1

Summary of Bellows Falls Bypass Instream Flow MOU Discussion and Flow Selection

The mitigation concerns related to the relicensing efforts for the Bellows Falls Hydroelectric Project (Project), FERC No. 1855, included selection of instream flow releases through the bypass reach (Bypass). The issues related to Bypass flow releases were treated in multiple confidential discussions between the stakeholders and Great River Hydro (GRH) in June 2020. Confidential meeting minutes, presentations and documents were produced during the process of identifying proposals for operating the projects under new licenses. This memo is intended to place into the public record the essence of those discussions including pertinent presentation material.

The summary below relates to five primary issues regarding Bypass flows:

1. Selection of appropriate species for instream flow modeling;
2. Selection of appropriate life stages for instream flow modeling;
3. Treatment of the existing fish dam in the middle of the Bypass;
4. Selection of appropriate transects used for modeling instream flows; and
5. The magnitude and periodicity of downstream flow releases in the Bypass.

Target Species

Approximately 73% of the Bypass is composed of pool habitat (Figure 1), primarily large, deep bedrock-controlled pools that are relatively insensitive to Bypass discharge (e.g., depth and velocity changes little except at very high flows). Due in part to the insensitivity of such habitats, fish species that are typically associated with deep, slow pool characteristics, such as juvenile and adult walleye and smallmouth bass, were judged to be inappropriate species for assessing flow needs in the Bypass. Consequently, those pool-dwelling species life stages were dropped from the analysis and species more closely associated with flow-sensitive riffle and run habitats, such as dace, suckers, darters, and fallfish, were retained for instream flow modeling.

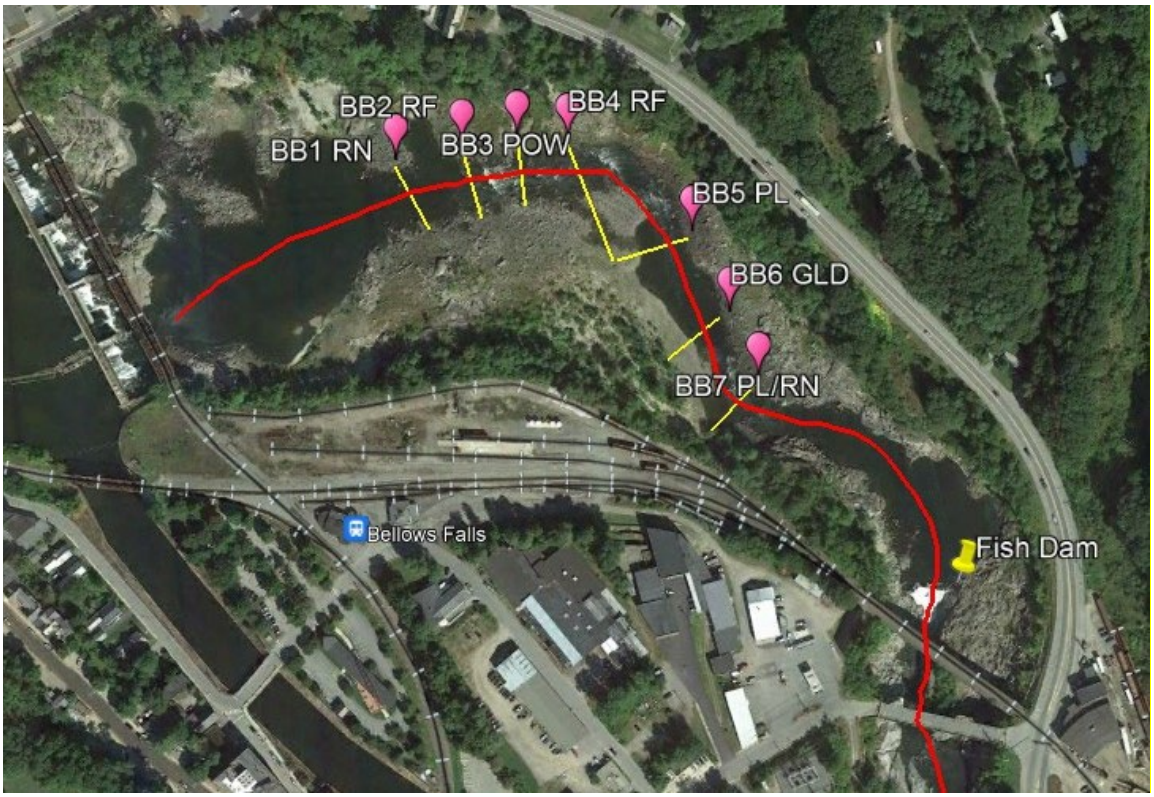

Figure 1. Bellows Falls Bypass reach showing channel (red line), fish dam, and instream flow transects (yellow lines). PL=pool, RN=run, POW=pocketwater, GLD=glide, RF=riffle.

Spawning Life Stages

Most of the target species rely on smaller substrate materials, such as sand, gravel, or small cobbles for successful spawning. However, the bedrock nature of the Bypass combined with the extreme flows that regularly occur during times of spill have removed finer substrate types from the Bypass. Any remaining gravel substrate components are likely restricted to the bottom of the deep pool habitats that are not suitable for spawning. Among the shallower habitats, gravel substrate was only observed in any notable quantity on the lowest transect (#7), which occurred in a pocket just downstream of a glide habitat (Figure 2). Due to the paucity of suitable spawning habitat in the Bypass, the spawning life stages of target species were dropped from the instream flow modeling. suitable spawning habitat in the Bypass, the

spawning life stages of target species Bypass, the spawning life stages of target species were dropped from the instream flow modeling.

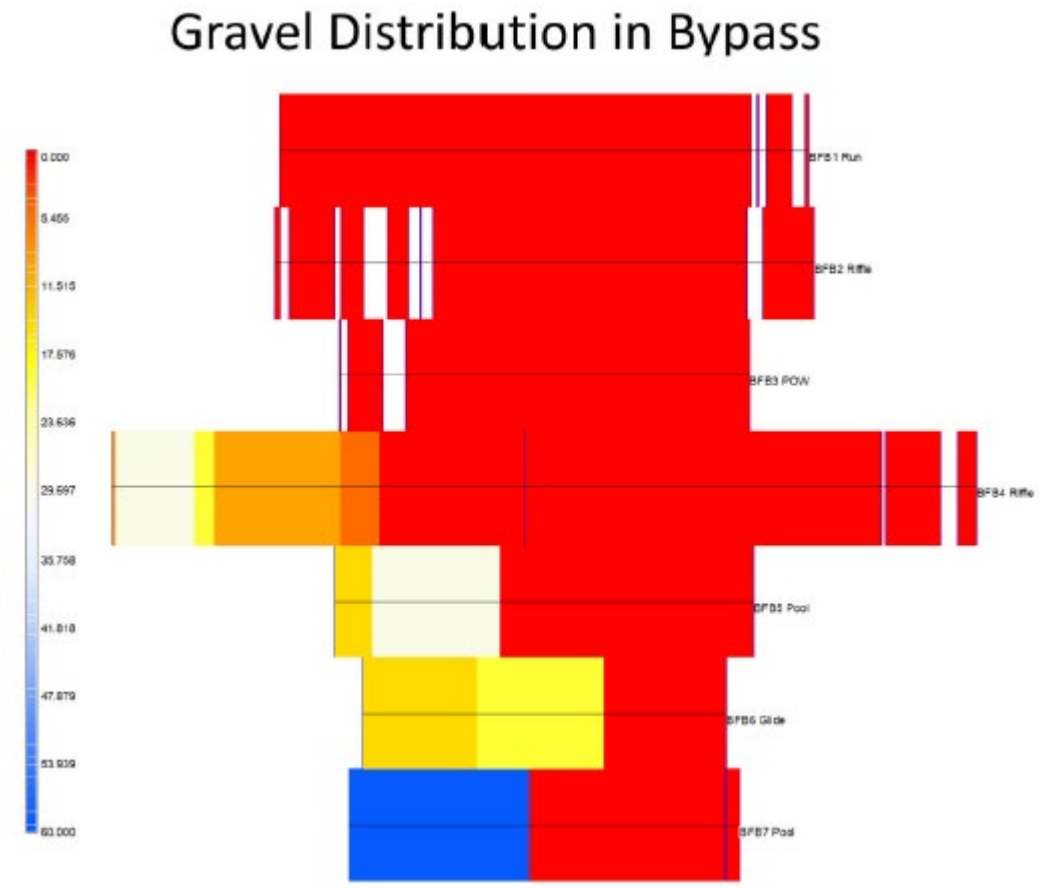

Figure 2. Distribution and percent of gravel substrate along transects in the Bypass reach.

Existing Fish Dam

An 11-foot tall concrete fish barrier dam sits atop an exposed natural ledge drop that exists near the lower extent of the Bypass reach, in the region of deep bedrock pools downstream of the instream flow transects (Figure 1). This dam was installed to prevent upstream migrant Atlantic salmon from being attracted into the Bypass under high spill conditions, and essentially encouraged fish to utilize the fish ladder installed at the base of the powerhouse. The barrier dam and the fish ladder were designed and constructed in consultation with state and federal agencies, specifically to address Atlantic salmon reintroduction program requirements. Due to the abandonment of that program, the dam is no longer a desired feature for these agencies, which will now look to other initiatives (besides GRH and relicensing recommendations) to potentially remove this man-made structure. However, given the lack of spawning habitat for target species in the Bypass and the presence of a natural bedrock drop underlying the existing

dam, removal of the dam would not result in improved immigration of or utilization of available habitat by target species in the Bypass.

Selection of Transects for Instream Flow Modeling

Seven transects were placed in the Bypass reach to develop the hydraulic habitat model (Figure 1). Transects were distributed among the shallow water habitats to represent riffle (2), run (1), pocketwater (1), glide (1), and shallow (non-bedrock) pool (2) habitats. Transect #4 was placed where the Bypass channel took a 90-degree bend, however the transect was not wholly perpendicular to flow, but instead the lower (right bank) half of the transect was oriented parallel to flow. Due to this placement, the lower half of the transect ran along the margin of the channel rather than up the bank, and consequently this transect erroneously suggested the channel had a wide band of shallow margin habitat. Initial modeling further suggested that this shallow margin habitat provided an increasing abundance of suitable habitat for target species as flows increased (Figures 3 and 4). However, this result was contrary to all other transects that appropriately extended perpendicular up onto each bank rather than parallel downstream along the channel margin. Because of the misleading results associated with transect #4, the initial assessment of instream flow needs, based on application of the Vermont 401 WQS policy, was biased towards flows of almost 1,000 cfs. To address this source of bias, transect #4 was removed from the hydraulic model and the flow-habitat relationship was reassessed.

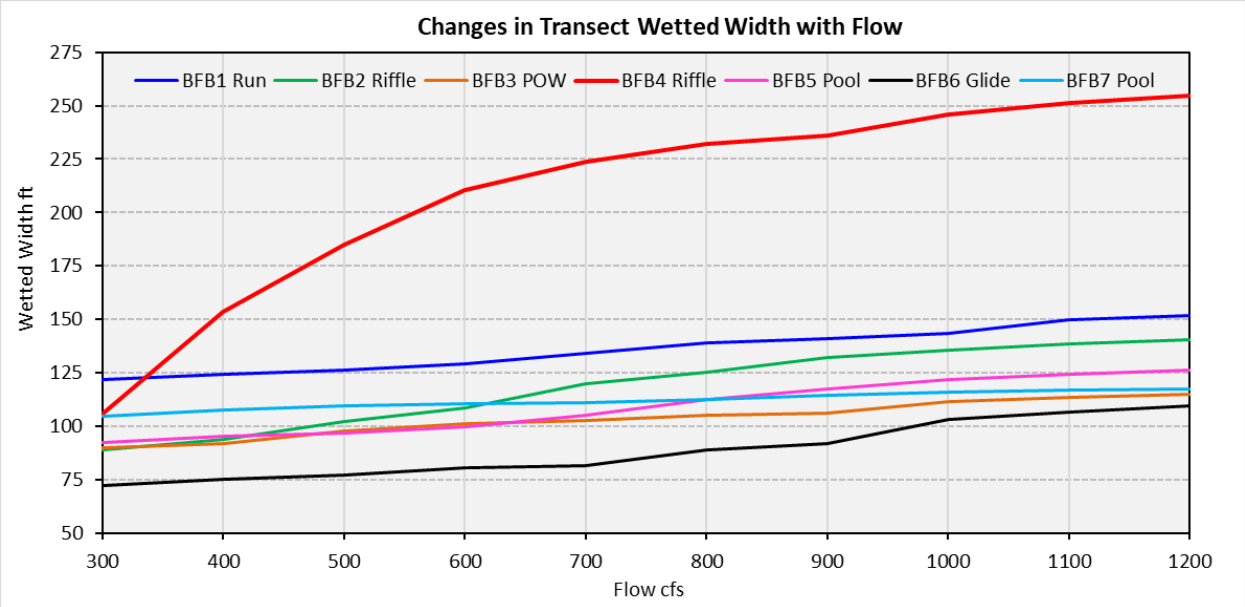

Figure 3. Changes in wetted width with increasing flow, showing rapid change for transect 4 but little change for remaining transects.

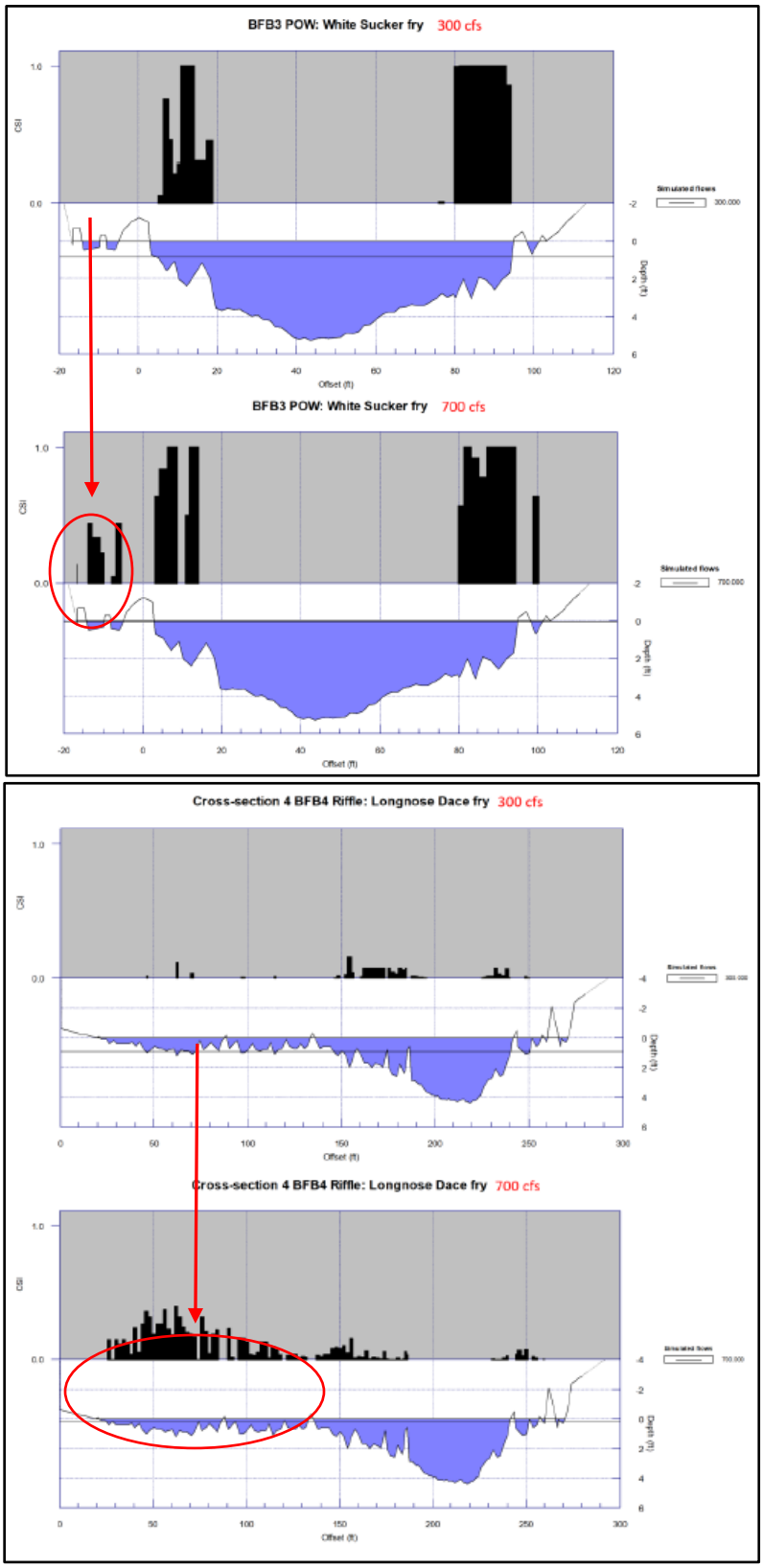

Figure 4. Differences in magnitude and suitability of margin habitat (red circles) at higher flows between transect 3 (upper graphs) and transect 4 (lower graphs).

Magnitude and Periodicity of Bypass Flows

Figures 5, 6, and 7 show the results of the reassessment without transect #4, pool-dwelling species/life stages, or spawning life stages, which resulted in WQS flows ranging from 150 cfs to 330 cfs, depending upon season. Further discussions concluded that providing different seasonal flows was not feasible given the structure of the dam facilities at the head of the Bypass. Consequently, a single year-round flow of 300 cfs was determined to be appropriate for release into the Bypass reach.

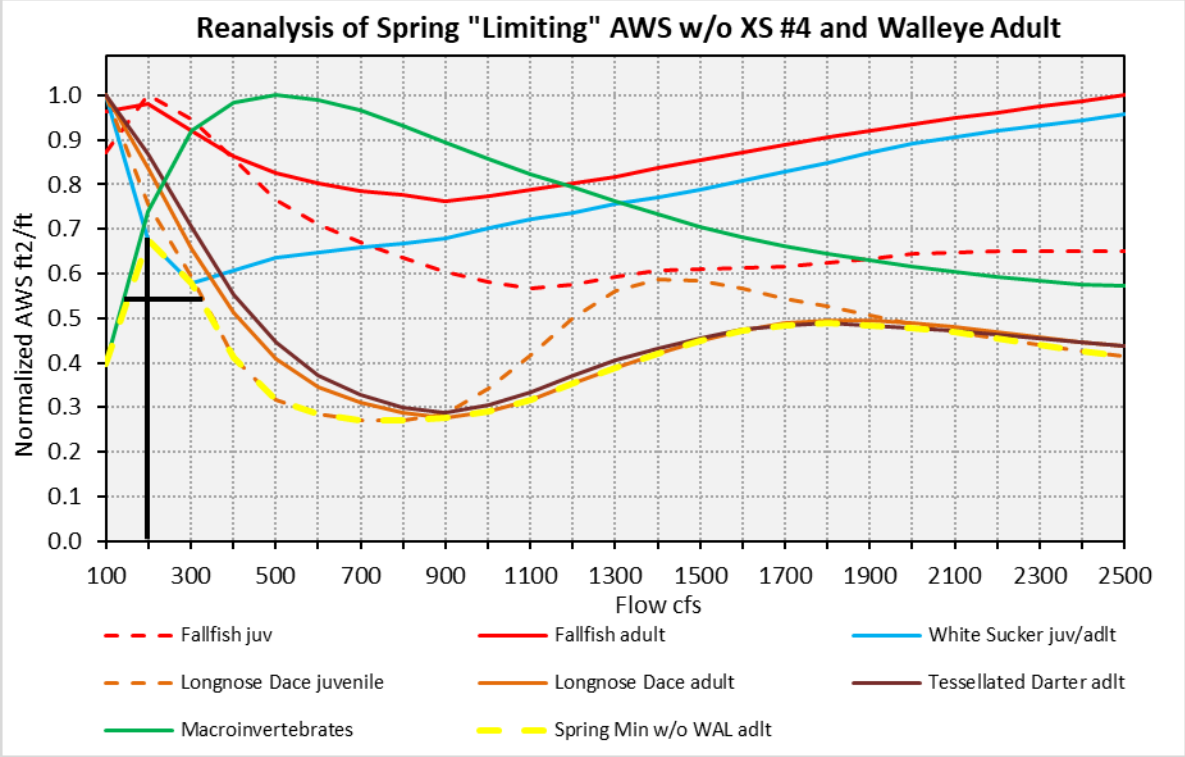

Figure 5. AWS for spring species and life stages, showing limiting AWS (yellow line), maximum value of limiting AWS (thick black vertical line), and range in flows meeting 80% of maximum (thick black horizontal line).

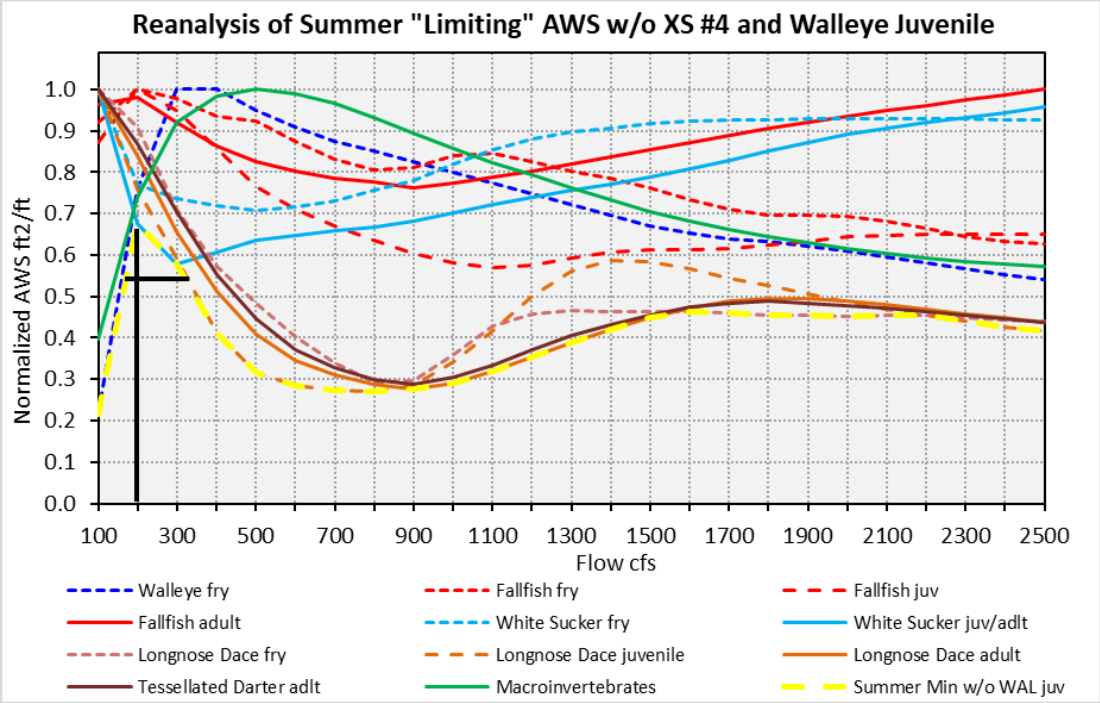

Figure 6. AWS for summer species and life stages, showing limiting AWS (yellow line), maximum value of limiting AWS (thick black vertical line), and range in flows meeting 80% of maximum (thick black horizontal line).

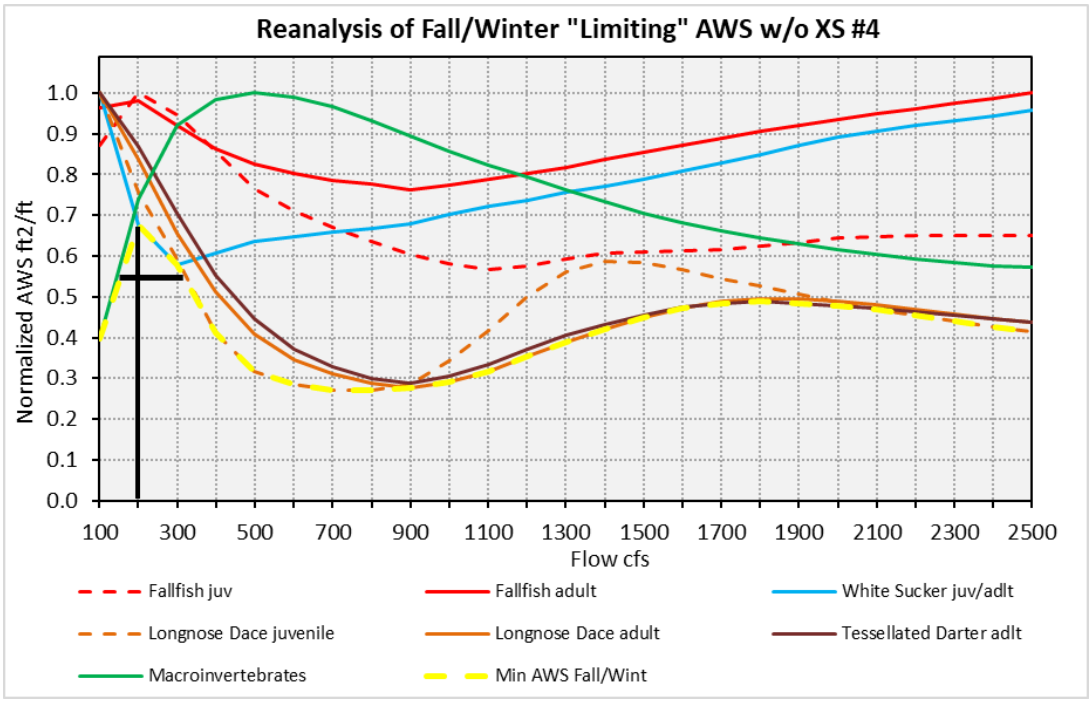

Figure 7. AWS for fall/winter species and life stages, showing limiting AWS (yellow line), maximum value of limiting AWS (thick black vertical line), and range in flows meeting 80% of maximum (thick black horizontal line).