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VIA E-FILING

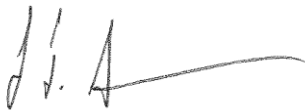
Kimberly D. Bose, Secretary
Federal Energy Regulatory Division
888 First Street, N.E.
Washington, D.C. 20426

**Subject: Rumford Falls Hydroelectric Project (FERC No. 2333-094)
Response to MDIFW Comments on the Final License Application**

Dear Secretary Bose:

On February 17, 2023, the Maine Department of Inland Fisheries and Wildlife (MDIFW) submitted comments on the Final License Application for the Rumford Falls Hydroelectric Project (Project) (FERC No. 2333), which was submitted to FERC on September 29, 2022, by Rumford Falls Hydro LLC (RFH), a subsidiary of Brookfield Renewable (Brookfield). Please find RFH's responses to MDIFW's comments in the attached. RFH appreciates MDIFW's comments and looks forward to continuing to work with MDIFW.

Sincerely,



Luke Anderson
Manager, Licensing
Brookfield Renewable

Attachments (3)

- Attachment A - Rumford Falls Hydro LLC's responses to the Maine Department of Inland Fisheries and Wildlife's comments on the Final License Application
- Attachment B - Maine Department of Inland Fisheries and Wildlife's comment letter dated February 17, 2023
- Attachment C - Correspondence

Attachment A
Rumford Falls Hydro LLC's responses to the Maine Department of
Inland Fisheries and Wildlife's comments on the Final License
Application

Rumford Falls Hydro LLC's Responses to the Maine Department of Inland Fisheries and Wildlife's Comments on the Rumford Falls Hydroelectric Project (FERC No. 2333) Final License Application

MDIFW Comment 1

On Page B-15 of the FLA, the Licensee states, “*Any PM&E measures, as they pertain to the ongoing Recreation Study and Angler Creel Survey, will be filed with the Commission as an addendum to this FLA.*”

MDIFW response: As the FLA was filed before completion of both the Recreation and Angler Creel Studies, MDIFW submits the following comments on the FLA with the intent of being able to amend or add additional comments, as necessary, pending the completion of those ongoing evaluations and filing of the addendum.

RFH response: Comment noted. In the Final License Application (FLA), which was filed by Rumford Falls Hydro LLC (RFH) on September 29, 2022, RFH stated that it was within the second study season within the Integrated Licensing Process schedule, and the study reports for the Recreation Study and the Angler Creel Survey, as well as any protection, mitigation, and enhancement (PM&E) measures as they pertain to these two studies, will be filed with the Commission as an addendum to the FLA in the first quarter of 2023.

MDIFW Comment 2

Impoundment Water Levels

Current operations regarding water levels on Page B-10 state, “*The Rumford Falls Hydroelectric Project (Project) is operated in a run-of-river mode consistent with the Project's existing Federal Energy Regulatory Commission (FERC or Commission)-issued license. Rumford Falls Hydro LLC (RFH or Licensee) maintains the Upper Dam and Middle Dam impoundments within 1 foot of full pond elevation (601.24 feet U.S. Geological Survey Datum [USGS] at the Upper Dam impoundment and elevation 502.74 feet USGS at the Middle Dam impoundment) and acts to minimize the fluctuations of the reservoir surface elevation (i.e., maintain a discharge from the Project so that, at any point in time, flows immediately downstream from the Project tailraces approximate the sum of the inflows to the Project reservoirs).*” Page D-4 reiterates the previous information as a proposed PM&E measure.

MDIFW response: Maintaining stable headpond water levels is important to minimize impacts on fish and other aquatic organisms. Consequently, MDIFW is supportive of the current and proposed operations in relation to water levels. The Licensee further indicates that they currently notify the resource agencies regarding any planned maintenance, repairs, or other scheduled activities that deviate from this operational scheme. This measure further minimizes potential impacts on aquatic resources by allowing resource agencies an opportunity to amend the activity if there are anticipated impacts (i.e., spawning activity) that could be mitigated, and it allows the resource agencies to address public inquiries/complaints. The above should be clearly stated as an operational requirement in the issuance of any new license.

RFH response: Comment noted.

MDIFW Comment 3

Bypass Flows

Current operations regarding water levels on Page B-10 state, “Pursuant to Article 402 of the Project’s existing license, RFH releases a minimum flow of 1 cubic foot per second (cfs) from the Upper Dam and 21 cfs from the Middle Dam into the bypass reaches. The minimum flow at the Upper Dam is provided via leakage from the flashboards. At the Middle Dam, the 21 cfs minimum flow is provided via a 12-inch-diameter and a 18-inch-diameter pipe, both located near the center of the dam, which is combined with leakage from the flashboards and pressure release vertical drain holes.”

Page D-5 of the FLA proposes the following PM&E measures regarding minimum flows,

- “ *Minimum flows:*
 - *Continue to release a minimum flow of 1 cfs into the Upper Dam bypass reach.*
 - *Provide a minimum flow, primarily via notched flashboards, into the Middle Dam bypass reach of 95 cfs from May 1st to October 31st and 54 cfs from November 1st to April 30th.*
- *If flashboard maintenance or other work that requires the Middle Dam impoundment to be drawn down temporarily for short periods below dam crest, the minimum flow will be maintained during this period no lower than the existing minimum flow of 21 cfs.”*

MDIFW response: MDIFW requests that the new license requires agency notification and consultation pertaining to all flashboard maintenance, drawdowns, or other work at the Project that has the potential to impact the resource. Note that MDIFW is currently notified of these activities by the Licensee, which we appreciate.

There is limited aquatic habitat potential in the Upper Dam bypass; therefore, from the perspective of aquatic habitat only, MDIFW has no objections to the current and proposed minimum flow of 1 cfs. Aesthetics, however, are a separate issue, which we expect will be addressed by other State agencies, local entities, and non-governmental organizations.

Regarding the Middle Dam bypass, the Licensee reports that flow from the 12- and 18-inch diameter pipes equates to approximately 21 cfs, and is combined with leakage from flashboards and vertical pressure release drain holes. Verbal communications regarding the recent Flow Study demonstrated this combined flow to be approximately 54 cfs, which is important as it largely forms the basis for the “new” proposed minimum flow scheme. By our interpretation, the FLA gives the impression that the Licensee is improving low flow conditions from November 31st-April 30th when operations are exactly as they had been under the previous license for this seasonal period. In addition, leakage from flashboards is likely to be inconsistent.

MDIFW is concerned that the current and proposed minimum flows for the Middle Dam bypass are extremely low and unacceptable given the drainage area, physical character, length, area, biota, and fisheries potential of the bypass reach, not to mention the aesthetic concerns raised by numerous parties. After having observed various flows in the bypass reach, it is MDIFW’s position that increased minimum flows provide improvements in fish habitat and better angling opportunities. A review of the August median flow or Aquatic Base Flow (ABF) for the site, a

metric commonly used by resource agencies to assess minimum flow requirements, illustrates the large disparity with current and proposed operations. A brief analysis of USGS Flow Data by MDIFW indicates the mean ABF over the past 25 years for the river at this site equates to 1,990 CFS. Under the current proposal, the Licensee is proposing to allocate only 2.7% or 4.8% of the August median flow down the natural river channel, while sending the remainder through the artificial canal to generate power. In contrast, recent relicensing efforts at two projects on the Little Androscoggin River provided minimum flows at or slightly below ABF. Consequently, the proposed minimum flows are grossly inconsistent with recent minimum flow improvements on other hydro projects in Maine with much smaller drainage and bypass areas that were supported by State and Federal agencies, as well as FERC.

When conducting IFIM studies, MDIFW prefers to evaluate various flows from the current license minimum flow up to ABF, and at least one flow above ABF for evaluating an appropriate flow. Our objective is to find the inflection point where increases in habitat suitability become flat-lined, or the incremental gains become limited. This process allows FERC to make a balanced decision between resource/recreational needs and hydropower production. During our site visit, MDIFW staff misunderstood the Licensee's basis for the maximum study flow of 265 cfs and only requested one additional flow (400 cfs). Unfortunately, the range of flows evaluated in the current flow study were well below ABF and make it difficult to recommend an appropriate minimum flow. Ideally, our recommendation would be for additional flows to be evaluated in 2023 before FERC commits to a minimum flow for the bypass reach. Based on the calculated ABF (1,990 cfs) and the flow values already studied (400 cfs), we recommend additional data and analyses for 800, 1600, and 3200 cfs.

Firstly, MDIFW will explore the existing submitted flow study as it forms the basis for the applicant's proposed minimum flow. Several concerns regarding the flow study include:

- The binary HSI analyses as noted in our earlier comments. However, the Licensee did include 1-D Flow Modeling with variable suitability and Area-Weighted Suitability metrics at our request. In addition, only the later analysis included the highest 400 cfs flow. Further MDIFW comments on the Flow Study will indicate a preference for this methodology.
- HSI depth curve going to zero suitability at 6 feet may have some impact on the results and is not necessarily consistent with observations of adult trout behavior in large Maine river systems.
- It should also be recognized that the substantial habitat differences from the upper to lower areas within the bypass reach likely countered the combined suitability results, and a closer examination of Table 8 in the Flow Study confirms this effect. While this isn't being noted as a study flaw, it is important in that it was hoped better minimum flows would largely improve the habitat within the over widened and typically dewatered reaches of the lower bypass area.
- Lastly, it is unclear how evaluations of higher flows approaching ABF would have impacted the suitability results. Presumably, the pool reaches may have become runs with improved velocity metrics, and an examination of Figure 3 in the Study suggests metrics for both depth and velocity would have likely improved for transects in the lower bypass area.

RFH response: In regard to the minimum flow proposed in the Middle Dam bypass reach, RFH specified in the FLA that the measured minimum flow during the Flow Study for Aquatic Habitat Evaluation, included leakage from the Middle Dam to the bypass reach and was approximately 54 cfs. The minimum flow measurement was communicated to MDIFW who was present in the field during the study. This was also conveyed in the Flow Study for Aquatic Habitat Evaluation Report in the August 5, 2022, Updated Study Report (USR) and presented at the USR meeting on August 17, 2022.

Pursuant to Article 402 of the Project's existing license, the licensee is required to provide a minimum flow of 21 cfs (as opposed to 54 cfs) from the Middle Dam in the bypass reach. RFH has provided the minimum flow via a 12-inch-diameter and 18-inch-diameter pipe located near the center of the dam. In addition, there is leakage from the flashboards and pressure release vertical drain holes throughout the year. Flashboards are designed to withstand certain flows and/or debris loading; as a result, leakage from flashboards can vary, as stated by MDIFW.

Therefore, although the minimum baseflow was 54 cfs during the study, flows in addition to the 21 cfs (through the 12 inch and 18 inch diameter pipes) could vary depending on leakage provided via flashboards throughout the year.

RFH proposes to provide a minimum flow, primarily via notched flashboards, into the Middle Dam bypass reach of a total of 95 cfs from May 1st to October 31st and 54 cfs from November 1st to April 30th. This clearly differs from the existing Project operations and license requirements of a minimum flow of 21 cfs as required of RFH in the current license.

RFH filed their Revised Study Plan (RSP) with FERC on July 7, 2020, which included the study plan for the Flow Study for Aquatic Habitat Evaluation in Appendix I. In lieu of utilizing a purely desktop-based measure of bypass flow, such as the ABF or other standard-setting process, the RSP identified the methodology to accomplish the study goal of *"informing the decision process for determining the appropriate timing and magnitude of minimum flow releases to optimize fisheries resources in terms of both aquatic habitat and safe recreational fishing opportunities,"* as a semi-quantitative demonstration flow type assessment (DFA). This site-specific study approach was designed to evaluate the flow-habitat relationship for the entire Middle Dam bypass reach and was approved by FERC, without modification, in their August 6, 2020 Study Plan Determination. Using a science-based approach for evaluating flow releases in the Middle Dam bypass reach is entirely consistent with relicensing evaluations at hydropower projects throughout the country, and is more appropriate for this particular reach than forgoing a field study and instead adopting "...minimum flows at or slightly below ABF" as MDIFW reports for two projects on the Little Androscoggin River.

Further, on July 26, 2021, on behalf of RFH, Normandeau Associates, Inc. provided a letter to staff from MDIFW and Maine Department of Environmental Protection (MDEP) which provided a summary memo detailing the mesohabitat mapping effort which was conducted in the Middle Dam bypass reach on June 8, 2021. In addition to the mesohabitat information, RFH provided the resource agencies with proposed habitat suitability criteria and target sampling flows for the flow assessment. The proposed habitat suitability criteria represented the three species-life stage fish identified by MDIFW in their initial study request (i.e., adult smallmouth bass, rainbow trout, and brown trout) as well as for

macroinvertebrates, which had been requested for inclusion by MDEP during consultation related to components of the Water Quality Study (Summary memo and transmittal email provided in Attachment C).

In addition, RFH also conducted a site visit with staff from MDIFW and MDEP on August 24, 2021, to discuss questions on information contained within the July 26 study memo and to identify potential locations throughout the Middle Dam bypass reach for placement of data collection transects. There were no concerns raised or any questions provided by resource agency staff on findings from the mesohabitat mapping effort or habitat suitability criteria. MDIFW stated that they were in support of the range of flows in the July 26 memo but did request the addition of a higher flow in the vicinity of 480 cfs and reiterated their desire for the incorporation of a one-dimensional (1-D) instream flow model approach (which RFH ultimately provided). A total of seven potential transect locations were identified during the August 24 site visit. Subsequent to the field visit, summary notes were provided via email to MDIFW on September 2, 2021. MDIFW acknowledged that the summary notes provided following the site visit looked good and again reiterated their desire for the incorporation of a 1-D instream flow model approach and noted that MDEP was supportive of that approach during the site visit (Correspondence provided in Attachment C).

Subsequent to the identification of the seven potential transect locations, RFH reviewed and identified five locations which could be safely accessed by field crews to collect habitat, depth, and velocity data over the proposed range of measured flows. In addition MDIFW was informed via telephone conversation on September 14, 2021 that RFH agreed to incorporate their requested 1-D instream flow model approach to assess the flow-habitat relationship for the Middle Dam bypass reach. MDIFW expressed interest in observing the study flows and requested RFH keep them informed of the study schedule.

Prior to the collection of field data, Normandeau conducted a one-day site visit (October 7, 2021) to conduct a walkthrough of the Middle Dam bypass reach and identify specific locations to set the head and tail pins for each of the five final transect locations. A summary of details related to the final transect placement for the Middle Dam bypass reach was provided to MDIFW on October 8, 2021 (Correspondence provided in Attachment C). MDIFW staff were informed in advance of field sampling for each of the four target flows and MDIFW was also present on site at Rumford during at least two of the flow conditions. RFH consulted with MDIFW staff throughout the field design and execution of the Flow Study for Aquatic Habitat Evaluation. In lieu of defaulting to the use of a desktop-derived ABF value, RFH conducted a field-based and site-specific, semi-quantitative DFA analysis and a 1-D modeling study to inform on bypass flows at the Project.

As acknowledged in the FLA and reiterated by MDIFW, the habitat curves continue to show an upward trend at the upper range of measured (for DFA) or modeled (for 1-D modeling) flows. This is a relatively common result of instream flows studies in larger rivers; however, MDIFW's assumption that the habitat relationship will continue to increase at higher flows remains speculative. The 1-D flow modeling was conducted at MDIFW's specific request, and the highest modeled flow (400 cfs) was also specifically requested by MDIFW. Requesting RFH to redo the entire 1-D study based on MDIFW's apparent speculation and dissatisfaction with the results is not justified. The instream flow studies were developed in collaboration with and approved by MDIFW and the study

methodologies and findings were presented in the numerous meetings and documents listed in detail above.

Even if the MDIFWs request for additional studies helped to further inform the evaluation of proposed minimum flows in the Middle Dam bypass reach (which the results of the study clearly indicate it would not), the moderate gradient and boulder-dominated channel in the reach downstream of the bedrock cascades would be dangerous for field staff to manually survey at the higher flows requested by MDIFW and alternatives, such as the use of an acoustic Doppler current profiler (ADCP) would not be feasible at most of the transects due to the abundance of large, emergent boulders that would interfere with ADCP deployment at most of the proposed high flows.

Seeking to find an inflection point in Area-Weighted Suitability (AWS) or a flow where AWS flat-lines is a common approach, and MDIFW does acknowledge that inflection points do appear to occur at flows within the range assessed by the DFA and 1-D analysis. However, basing flows at the point where AWS becomes flat or maximizes is not justified when the habitat analysis clearly shows that gains in AWS with increased flows become minor. To our knowledge there is no standard or criteria for what level of gain in habitat is considered “significant” or “insignificant”.

Our analysis clearly shows that continued gains start to “become limited” as noted by MDIFW in their February 17, 2023 comments on the FLA, as flows exceed 100 cfs, and gains per 20 cfs drop to just 5 percent at flows less than 200 cfs for the combined species AWS curve. For smallmouth bass, the naturally occurring species MDIFW describes as a “very high quality” fishery (compared to the hatchery-dependent trout fishery), habitat gains drop to 5 percent per 20 cfs at a flow of 160 cfs. Relative gains in the physical habitat, as evaluated by wetted perimeter and cross-sectional area, drop to less than 5 percent at much lower flows between 60 cfs and 80 cfs.

MDIFW goes on to justify dissatisfaction with the habitat suitability criteria (HSC), which MDIFW had ample time to comment on and discuss with RFH prior to when the DFA and 1-D studies were initiated. It is well known that HSC exert a heavy influence on the AWS results, thus the importance of reviewing HSC prior to application (Jowett et al. 2014)¹. Modifying HSC following completion of a study is also not considered best practice and would jeopardize the study integrity (i.e., changes to the HSC should not be made to achieve a specific result). This topic is covered in more detail in response to MDIFW additional comments below.

Regarding the Integrated Licensing Process (ILP), MDIFW’s request for a change to the study methods is not warranted. The ILP process and requirement of modification of an approved study. Regarding requirements of the ILP process, FERC notes the following²:

“The Integrated Licensing Process is intended to streamline the Commission's licensing process by providing a predictable, efficient, and timely licensing process that continues to ensure adequate resource

¹ Jowett, I., T. Payne, and R. Milhous. 2014. SEFA-System for Environmental Flow Analysis, Software Manual, v 1.21. 223 pp.

² <https://www.ferc.gov/industries-data/hydropower/licensing/licensing-processes/integrated-licensing-process-ilp>.

protections. The efficiencies expected to be achieved through the ILP are founded in three fundamental principles:

- Early issue identification and resolution of studies needed to fill information gaps, avoiding studies post-filing.
- Integration of other stakeholder permitting process needs.
- Established time frames to complete process steps for all stakeholders, including the Commission.”

Per FERC’s regulations (18 CFR 5.15(f)) “Any proposal to modify an ongoing study must be accompanied by a showing of good cause why the proposal should be approved as set forth in paragraph (d) of this section.” The referenced 18 CFR 5.15(d) states the following:

Criteria for modification of approved study. Any proposal to modify an ongoing study pursuant to paragraphs (c)(1)-(4) of this section must be accompanied by a showing of good cause why the proposal should be approved, and must include, as appropriate to the facts of the case, a demonstration that:

- (1) Approved studies were not conducted as provided for in the approved study plan; or
- (2) The study was conducted under anomalous environmental conditions or that environmental conditions have changed in a material way.

As described and documented herein, throughout the ILP process, RFH has collaborated closely with MDIFW to identify the issues and develop a study approach to fill the information gaps. Given this thorough consultation process, the results of an approved science based site specific analyses, the ILP established time frames to complete the process steps that have passed (RSP and FERC’s Study Plan Determination, Updated Study Report, etc.), and that the criteria for modification of an approved study have not been met, the request for additional studies should be dismissed.

MDIFW Comment 4

Secondly, MDIFW would like to address a few key statements in the FLA based on the Flow Study including:

Statement 1: Page 137 of the FLA states, “*Collectively, these results suggest that habitat conditions under current bypass flows, or under conditions of moderately increased flows conditions of moderately increased flows, provide suitable water quality conditions and an abundance of suitable physical habitat for a healthy and functioning ecosystem for both fish and macroinvertebrates.*”

Statement 2: Page 136 of the FLA states, “*Demonstration Flow Analysis (DFA) and the quantitative one-dimensional (1-D) modeling results showed that the amount of suitable habitat continues to increase up to the maximum measured or modeled flows (DFA included flows up to 265 cfs; 1-D modeling included flows from 20 cfs to 400 cfs in 20 cfs increments) for most target species.*”

Page 168 of the FLA states, “an increase in the minimum flow in the Middle Dam bypass reach would improve fish and macroinvertebrate habitat.”

Statement 3: Page 136 of the FLA states, “However, the rate of increase in habitat with increase in flow declines as flows exceed 100 cfs to 150 cfs (See Figure 5.6-5 in Section 5.6). For example, gains in habitat are only 10 percent or less per 20 cfs increment at flows of 80 cfs to 160 cfs.”

MDIFW Response: Statement 1 above sets an extremely low bar for salmonids, and “suitable” should not be the basis for evaluating the bypass habitat. Based on the HSI curves employed, a minimum suitability for rainbow and brown trout was defined as 0.25 and 0.1 cfs, respectively. In addition, both species were assigned a minimum depth suitability of 1 foot. While those minimum habitats requirements might be “suitable” or survivable, they are certainly not preferred and would not hold trout for any length of time, particularly given the lack of instream cover for the lower riffle areas. Larger trout would seek out much greater depths for holding, while they might briefly venture into shallow depths, as defined here, for foraging or travel needs.

MDIFW agrees with the statements noted in Statement 2 above: habitat suitability generally increases for all target species up to the maximum flows evaluated, and we would add that they continue on an upward trajectory. While several figures in the FLA (See Figure 5.6-4 in Section 5.6) illustrate this, we believe the best illustration is Figure 8 in the Study Report. What remains unclear is how would these suitability graphs change at flows in the vicinity of ABF.

Statement 3 above forms the basis for the proposed 95 cfs for the spring-fall period. However, MDIFW does not necessarily agree with the Licensee’s conclusion. Based on the available data, the “inflection point” appears to be around 190 cfs for fish in Figure 4 of the Study Report for DFA Optimal Habitat. However, this data is certainly impacted by the concerns we noted earlier. It is MDIFW’s position that the “inflection point” for Figure 5.6-5 in the FLA would be approximately of 200 cfs.

A close examination of the photos in the Study Report for each transect clearly illustrates how Transect 1 transforms from a relatively stagnant pool to more of a run under higher flows. Photos of Transects 3-5 clearly illustrate an abundance of dry or very shallow substrate across the overly wide channel, even at the highest flows of 275 cfs. Below are some photos taken by MDIFW staff, the wider field of view better illustrates the changes from the lowest (left column - 61 cfs) to the higher flows (right column - 265 cfs) and offers more perspective.

(See MDIFW letter in Attachment B for photos.)

Based on our site observations and experience with evaluating aquatic habitats, flows between 250-500 cfs appear to be appropriate to protect and enhance the habitat for fish and other aquatic organisms, remain reasonably wadeable, as well as improve aesthetics. It should be noted that flows in this range still only equate to a fraction (13-25%) of aquatic baseflow, and all excess flows would be available for hydropower production. Again, we believe additional flow evaluations might help to discover the best, most-balanced value.

Regarding the seasonal flow regime, the spring-fall minimum flow should be extended to December 1 due to MDIFW fall stocking programs and the river's year-round angling regulations. Winter flows could be reduced somewhat for fish as there is plenty of overwintering habitat available; however, flows should not be reduced to a point where they significantly impact aquatic invertebrate production due to habitat dessication or freezing.

RFH response: Project photographs are an important tool in planning a flow study and visualizing the results; however, photographs do not add to or allow for a basis to quantify the quantity and magnitude of water depths, water velocities, and submerged substrates that the DFA and 1-D analysis provided. Thus, while helpful, photos cannot replace the quantitative data obtained from the in-water field studies and modeling.

As detailed in response to MDIFW comment 3, the proposed habitat suitability criteria for this study were provided in written format on July 26, 2021, and were discussed at the August 24, 2021 site visit with MDIFW and MDEP staff. With the exception of the MDEP request to incorporate habitat suitability criteria for macroinvertebrates there were no comments provided on the criteria identified for adult smallmouth bass, rainbow trout, or brook trout. This was captured in the meeting notes (dated September 2, 2021) and was subsequently acknowledged by MDIFW (Attachment C).

MDIFW's criticism of utilizing HSC should have occurred during the study plan development during which RFH and MDIFW consulted with each other extensively as described above, not after the analysis when results may be contrary to MDIFW preconceived expectations (e.g., the MDIFW critique of the HSI depth curve for adult trout provided in their comments on the FLA [see MDIFW Comment 3 above]). Stating that flows should not be based on "suitable" habitat is unjustified and contrary to decades of instream flow analysis. PHABSIM, the hydraulic model used in the 1-D analysis (within the SEFA software), is the most commonly applied fish habitat model in North America (Annear et al. 2009)³. One of PHABSIMs ultimate products is the calculation of suitable habitat for target species and life-stages, based in part on the HSC which defines habitat suitability. The HSC in fact had conservative definitions on the range of suitable habitat, where curves for smallmouth bass, rainbow trout, and brown trout intentionally cut-off very shallow depths and slow velocities that many candidate HSC curves defined as suitable. MDIFW also rejected the truncation of deeper water for rainbow and brown trout based on "holding" habitat. Instream flow studies are primarily designed to assess feeding habitat, which for drift-feeding trout is typically in shallow to mid-depth, flowing water. This is in contrast to adult smallmouth bass, which are a roaming piscivorous predator that feed at a wide range of depths; hence the HSC keeps suitability at 1.0 into deep water. Deep, slow, holding habitat for trout might be applicable during winter when drift feeding is severely reduced and fish energetics results in shifts into calmer waters, but feeding habitat should be emphasized for drift-feeding salmonids.

Comments on the trends in AWS curves and inflection points were discussed in response to MDIFW Comment 3.

³ Annear, T., D. Lobb, C. Coomer, M. Woythal, C. Hendry, C. Estes, and K. Williams. 2009. International Instream Flow Program Initiative, A Status Report of State and Provincial Fish and Wildlife Agency Instream Flow Activities and Strategies for the Future, Final Report for Multi-State Conservation Grant Project WY M-7-T. Instream Flow Council, Cheyenne, WY. 181pp.

MDIFW also suggested that the spring-fall analysis period should be extended into early winter (e.g., changing the initiation of winter flows from November 1 to December 1). Water temperatures dictate to a large degree the type of microhabitats trout will utilize, and water temperatures through November are expected to be very cold in comparison to spring through fall temperatures. MDIFW acknowledged that winter habitat is abundant in the bypass reach under the proposed winter flow regime, and it is our opinion that holdover trout would be occupying winter habitat in November; therefore, extending higher flows to December is not justified.

MDIFW Comment 5

Recreational Access

Page 110 of the FLA indicates FERC identified the following potential resource issues related to fish and aquatic resources for an environmental analysis: “*Effects of Project operation on recreational use in the Project area, including the adequacy of existing recreational access and facilities in meeting recreation needs.*”

MDIFW Response: Currently, the Licensee is proposing no new or improved access opportunities for angling or boating in the FLA; however, the FLA seems to suggest that it may be considered, pending the completion of the recreational and angling studies. The only mention of expanded access opportunities states, “*In consultation with the Town of Rumford, build and maintain access and/or steps from behind the Rumford Public Library for river access.*” This statement is in relation to limited whitewater boating release events and is unlikely to satisfy angling and other recreational use of the ledges without conflicting with library activities. The stairs would be a great addition, but a suitable parking area needs to be identified for anglers, boaters, and other recreational users of the ledges. Note that MDIFW staff have observed numerous use in the area, including a lot of swimming, sun bathing, dog walking, and people simply exploring and enjoying the lower ledges and falls.

MDIFW believes the area has more potential for angling and other recreational uses, and that additional access to the upper impoundment and the lower bypass reach should be fully explored as part of this relicensing process. MDIFW staff conversations with local anglers and people from the Town indicate that a fair amount of shore angling occurs in the canals and bypass areas. MDIFW believes there should be better access provisions for these areas, even it that includes improved accessibility measures such as stairways and/or safety railings. For example, the west shore above the lowermost tailrace provides an excellent angling opportunity, but current access provisions and low flows discourage angler use. In fact, after observing the site as part of this process, MDIFW has already modified its stocking program to provide more opportunity in these areas. Lastly, the distance between the upstream launch and the boater barrier is approximately 1.9 miles. As many users float the river with nonmotorized watercraft from launch to launch, a new carry-in launch should be explored in the area just upstream of the boater barrier. There is currently an informal parking area in this general location.

MDIFW hopes the Applicant seriously considers the above improvements in its new studies and addendum to the FLA, and we will wait to fully comment when the Recreational and Angler studies are completed.

RFH Response: As stated in the FLA, due to the COVID Pandemic, RFH completed the Angler Creel Survey and Recreation Study, which were requested by MDIFW, in 2022, during the second study season within the ILP schedule. The study reports for these two studies and related PM&E measures were filed with the Commission as an addendum to the FLA on March 30, 2023.

MDIFW Comment 6

Miscellaneous Items

MDIFW previously submitted written comments on the PAD and DLA to clarify our perspective or to provide corrections of erroneous information for the record. Most of those statements have continued into the FLA on Pages 162-164; therefore, we will reiterate the more significant issues, so they remain relevant for FERC consideration.

Pages 162 and 163 continue to downplay the habitat suitability of the bypass by citing a study conducted by C. T. Main in 1989, as well as USFWS and MDIFW comments from a Licensee report dated in 1991.

MDIFW Response: The 1989 C.T. Main study largely assessed the bypass reaches for spawning and rearing habitat potential over 30 years ago. While the physical habitat remains the same, fishery management has evolved and trout stocking programs, including put-and-take and put-grow-take stockings, have produced some excellent fisheries in many similar bypass/tailrace situations that lack notable spawning and rearing habitat for trout species. The key to creating these fisheries is to have adequate flow conditions and suitable angler access. In fact, this site has produced some quality trout in recent years. In 1989, MDIFW and USFWS agreed that the habitat assessment was adequate; however, it should be noted at that time the river was still heavily polluted which resulted in almost no recreational use or value, and that the agencies had largely “written off” the river. Times have changed in the past 30 years: the Androscoggin River is cleaner, recreational use has exploded, and the river is producing good trout fishing in certain areas and a very high-quality bass fishery, all of which were nearly unimaginable back in the 1980’s.

RFH response: RFH presented the 1989 CT Main study results because it was historical data that was collected in consultation with the U.S. Fish and Wildlife Service (USFWS) and MDIFW. Contrary to MDIFW’s assertion, RFH agreed, that during this relicensing, a new flow and habitat study was warranted, and therefore in fact, it was conducted and reported by RFH

Specifically, as stated in the Comment Response Matrix in Appendix E.2-1 of the FLA, in response to a similar comment from MDIFW on the Draft License Application (DLA), RFH conducted the Flow Study for Aquatic Habitat Evaluation Study in the Middle Dam bypass reach in consultation with the MDIFW and MDEP. As described in the July 8, 2022 RSP, the study was designed to inform the decision process for determining the appropriate timing and magnitude of minimum flow releases to the Middle Dam bypass reach. Components of that study included the development of an updated mesohabitat map of the Middle Dam bypass reach as well as evaluation of the flow-habitat relationships for target fish species identified by MDIFW through the use of a qualitative demonstration flow type

assessment and a quantitative 1-D flow study. The associated study report was filed with FERC in the USR on August 5, 2022, and is summarized in Section 5.6 – Fish and Aquatic Resources of the FLA, which includes RFH’s proposed environmental measures (Please refer to Section 5.6.3 – Proposed Environmental Measures of the FLA).

MDIFW Comment 7

Page 110/162 of the FLA indicates FERC identified the following potential resource issues related to fish and aquatic resources for an environmental analysis: *“Effects of Project operation on fish impingement, entrainment, and survival in the Androscoggin River.”*

MDIFW response: MDIFW believes this item was never properly evaluated or vetted in this process. We made numerous attempts during the proposed study planning process to evaluate if Project operations were having an impact on trout survival via impingement, entrainment, or simply losses to downstream areas via the canal’s attraction flow.

RFH response: In the Comment Response Matrix in Appendix E.2 of the FLA, RFH provided a response to a similar comment from MDIFW on the DLA:

In their August 6, 2020 Study Plan Determination (SPD), FERC addressed MDIFW’s concern related to trout survival, stating:

‘Since 1994, the Rumford Falls project has operated as a run-of-river facility and limited drawdowns of the project impoundments to no more than one foot as required by its current license. These license requirements have resulted in a stable aquatic environment both upstream and downstream of the project. Flow and water levels have been relatively constant for decades and temperature measurements from the project impoundments show that the Androscoggin River in the project area maintains water temperatures that meet state requirements for aquatic habitat. For these reasons, we have no reason to suspect or conclude that project operations are adversely affecting trout movement or survival ((18 CFR 5.9(b)(5)).’

FERC did not recommend RFH conduct an assessment of entrainment probability at the Project.”

MDIFW Comment 8

Page 164 of the FLA states, *“Whereas hydropower projects can have potential effects on fish impingement, entrainment, and population survival, diadromous fish do not occur, nor, have American eel (a catadromous species) been documented to occur in, or near, the Project given the number of natural and man-made barriers located downstream of the Project...In addition, Rumford Falls is also believed to be the upstream limit for American eel (MDMR and MDEP 2008; as cited in Moore and Reblin 2010).”*

MDIFW response: MDIFW likely has the most extensive datasets in the State regarding inland fisheries distributions, and we have made the Licensee aware in the PAD, the DLA, and via e-mail (see table below) that the above statements are incorrect and should be recognized and corrected. While we are pointing out this error due to our familiarity with the resources, we consider any other eel related comments or recommendations be made from other State and Federal Agencies with jurisdiction over diadromous fish species.

WATER*	TOWN	SPP	PRESENCE CONFIRMED (YR)
SAND P	NORWAY	EEL	1966
PENNESSEEWASSEE L	NORWAY	EEL	1953
MOOSE P	OTISFIELD	EEL	Reported Unconfirmed
SATURDAY P	OTISFIELD	EEL	Reported Unconfirmed
THOMPSON L	CASCO	EEL	1997
NORTH P	WOODSTOCK	EEL	Reported Unconfirmed
BRYANT P	WOODSTOCK	EEL	1974
TWITCHELL P	GREENWOOD	EEL	2009
INDIAN P	GREENWOOD	EEL	2010
HICKS P	GREENWOOD	EEL	1993
MOOSE P	WEST PARIS	EEL	2012
NORTH P	NORWAY	EEL	Reported Unconfirmed
ANASAGUNTICOOK L	HARTFORD	EEL	2013
BUNGANOCK P	HARTFORD	EEL	1958
SOUTH P	BUCKFIELD	EEL	Reported Unconfirmed
RANGE P (UPPER)	POLAND	EEL	1970
AUBURN L	AUBURN	EEL	1987
TAYLOR P	AUBURN	EEL	Reported Unconfirmed
TRIPP P	POLAND	EEL	1986
RANGE P (LOWER)	POLAND	EEL	1991
RANGE P (MIDDLE)	POLAND	EEL	1985
HOGAN P	OXFORD	EEL	Reported Unconfirmed
WHITNEY P	OXFORD	EEL	Reported Unconfirmed
ALLEN P	GREENE	EEL	1940
SABATTUS P (LITTLE)	GREENE	EEL	1961
BERRY P	GREENE	EEL	1961
NO NAME P	LEWISTON	EEL	Reported Unconfirmed
ROUND P	GREENWOOD	EEL	Reported Unconfirmed
MARSHALL P	OXFORD	EEL	2021
BEAR P	HARTFORD	EEL	1953
CRYSTAL P	TURNER	EEL	1954
WILSON P (LITTLE)	TURNER	EEL	1969
SABATTUS P	GREENE	EEL	1998
LOON P	SABATTUS	EEL	1953
SUTHERLAND P	SABATTUS	EEL	1959
LONG P	LIVERMORE	EEL	1954
ROUND P	LIVERMORE	EEL	1954
PLEASANT P	TURNER	EEL	1940
POCASSET L	WAYNE	EEL	1940
ANDROSCOGGIN L	WAYNE	EEL	Reported Unconfirmed
BLACK P	VIENNA	EEL	1961
FLYING P	VIENNA	EEL	1960
WHITTIER P	VIENNA	EEL	1961

PARKER P	MOUNT VERNON	EEL	2003
CAESAR P	BOWDOIN	EEL	Reported Unconfirmed
HOPKINS P	MOUNT VERNON	EEL	1953
BURGESS P	FAYETTE	EEL	1958
TILTON P	FAYETTE	EEL	1940
HALES P	FAYETTE	EEL	1960
LOVEJOY P	FAYETTE	EEL	1940
TAYLOR P	MOUNT VERNON	EEL	1958
SCHOOLHOUSE P	LIVERMORE FALLS	EEL	1958
MOOSE HILL P	LIVERMORE FALLS	EEL	1957
MINNEHONK L	MOUNT VERNON	EEL	1990
ECHO L	MOUNT VERNON	EEL	1991
STURTEVANT P	MAGALLOWAY PLT	EEL	2014
C POND	C SURPLUS	EEL	1998
RICHARDSON P (UP E)	ADAMSTOWN TWP	EEL	1996
RICHARDSON P (LO E)	ADAMSTOWN TWP	EEL	1974
RANGELEY L	RANGELEY	EEL	1939
WEBB L	WELD	EEL	1940
LINCOLN P	PARKERTOWN TWP	EEL	1955
JOES P	RUMFORD	EEL	2001

***Notes: All listed waters are lakes or ponds in the Androscoggin River drainage. Waters in orange are located above Lewiston Falls; waters in red are located above Rumford Falls.**

RFH response: In their January 28, 2020 comments on the PAD, MDIFW provided anecdotal information related to the presence of American eels in the Rumford Project area. This information included a statement detailing regional records from the section of the Androscoggin River downstream of Rumford as well as dated records from the 1940s which, based on warden observations, suggested the presence of the species in several locations in Greenwood, upstream of Rumford. MDIFW noted that they have observed or received reports of eels as far upriver as Gilead, Maine, although they did not provide any specifics or supporting documentation. These comments were echoed in the MDIFW comments on the DLA, which were filed with the Commission on July 29, 2022⁴. In their comments on the DLA, MDIFW reiterated their request for RFH to amend the statement “*In addition, Rumford Falls is also believed to be the upstream limit for American eel (MDMR and MDEP 2008; as cited in Moore and Reblin 2010)*” based on the information they provided.

Following receipt and review of the MDIFW DLA comments, RFH inquired with MDIFW on September 12, 2022, noting that with the exception of the references MDIFW made to eel presence provided in response to the PAD and DLA, no data specific to eels in the Rumford Project area had been provided by MDIFW. RFH noted their interest in reviewing the historical sampling data MDIFW had referenced in their process comments. RFH had conducted a desktop search for this data; however, RFH did not find eel information other than the aforementioned historic range information originally cited in Moore and Reblin (2010). Therefore, in its September 12, 2022 request to MDIFW, RFH inquired whether MDIFW could provide their eel documentation records either electronically or in a hard

⁴ There were no requests or comments pertaining to American eel in the MDIFW letter dated June 8, 2020, which commented on RFH’s Proposed Study Plan (PSP). Similar to the comment letter provided on the PSP, the July 24, 2020 MDIFW comment letter on the Revised Study Plan (RSP) did not include any information or requests or comments pertaining to American eel.

copy. Subsequent to the September 29, 2022 filing of the FLA with the Commission, MDIFW responded to this request to determine if the information was still of use. Following affirmation, MDIFW provided information for American eel presence to RFH on October 14, 2022, as recorded in their lake inventory data and a slightly modified data set, in a similar format, was summarized in their February 17, 2023 FLA comments. To clarify, MDIFW's October 14, 2022 submittal to RFH of this detailed information including the table above, was after the FLA was submitted to FERC on September 29, 2022. Prior to the submittal of their FLA comments, MDIFW did not provide and has not provided any record-based species information for American eel.

RFH has reviewed the eel information provided by MDIFW on October 14, 2022, and in their February 17, 2023 comments on the FLA and note that the majority of the listed records provided are supportive of the believed status of Rumford Falls as the upstream limit for the species in the Androscoggin River (as cited in Moore and Reblin 2010). The MDIFW listing identifies seven waterbodies located upstream of Rumford Falls as having had confirmed records for the presence of eels and provides the year the observation was made. No other information is provided related to observation source, sampling effort, size, or abundance to help better understand the validity of these observations or their relation to the Rumford Falls Project. For example, the eel observation from Joes Pond was identified during the preparation of the PAD and through consultation with the regional office where it was determined this occurrence was associated with a pond that is not a tributary to the Androscoggin River. Although MDIFW has provided a list of waterbodies and the reported year of last observation for American eels upstream of Rumford, no supplemental information was provided to give context for those observations (e.g., sampling methodologies or details related to the detections or observations of that species or any other supporting records).

MDIFW Comment 9

Page 168 of the FLA states, *“Additionally, the existing recreational trout fishery on the upper Androscoggin River is dependent upon annual stocking of hatchery Rainbow and Brown Trout, which are not indigenous to Maine or this portion of the Androscoggin River.”*

MDIFW response: It is unclear to MDIFW how the above statement has any relevant basis in the FLA regarding the Environmental Analysis. These species are utilized to provide the best possible recreational opportunity for trout in a system that can no longer sustain native salmonids due to changes in fish composition and summertime water temperature limitations. Wild salmonids (i.e., brook trout) are common in tributaries and likely utilize the mainstem on a seasonal basis. In addition, the Department spends a considerable amount of effort to propagate, stock, manage and optimize these fisheries for recreational anglers and their value should not be discounted.

RFH response: RFH believes the referenced sentence characterizes the key aspects of the trout fisheries in the Project area, and RFH did not discount their value.

MDIFW Comment 10

Page 168 of the FLA states, “*Continued Project operations are not expected to adversely affect trout that are stocked upstream and downstream of the Project because they are managed as a put-and-take fishery, ...*”

MDIFW response:

The above statement is incorrect: brown and rainbow trout are managed with some expectation of holdover potential and should be described as a “put-grow-and-take” fishery. We have evidence of holdover trout of both species above and below the project.

RFH response: Comment noted.

MDIFW Comment 11

Lastly, we noted that the flow values in the Study Report for the transect pictures did not correspond with the flows in the text and charts.

RFH response: The transect photographs presented in Attachment 2 of the USR for the Flow Study for Aquatic Habitat Evaluation are labeled using the average calculated flows for each survey date based on depth and velocity information collected at T1 through T5 (i.e., 61, 92, 195, and 270 cfs), whereas the best flows for model calibration and subsequent habitat analysis utilized the four flow measurements at T5, which were 54, 90, 193, and 265 cfs (see Table 3 in the USR).

Once again, RFH appreciates MDIFW’s feedback and looks forward to continuing to work with MDIFW.

Attachment B
Maine Department of Inland Fisheries and Wildlife's comment letter
dated February 17, 2023



STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
284 STATE STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041



Via Electronic Filing

February 17, 2023

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Division
888 First Street, N.E.
Washington, D.C. 20426

Re: MDIFW Comments on the Final License Application for the Rumford Falls Hydroelectric Project (FERC No. 2333)

Dear Secretary Bose:

On September 29, 2022, Rumford Falls Hydro LLC (Licensee), a subsidiary of Brookfield Renewable (Brookfield), submitted their Final License Application (FLA) for the Rumford Falls Hydroelectric Project (FERC No. 2333). The Project is located on the Androscoggin River in the Town of Rumford, Oxford County, Maine. The Maine Department of Inland Fisheries and Wildlife (MDIFW) previously commented on the Pre-Application Document (PAD) and study requests, the Proposed Study Plan, the Revised Study Plan, and the Draft License Application (DLA). In addition, we have conducted numerous field visits and consultations with the Applicant associated with this Project, particularly for the Angler Creel Survey and the bypass reach studies.

Based on our statutory responsibility we have prepared the following comments on the FLA:

On Page B-15 of the FLA, the Licensee states, “Any PM&E measures, as they pertain to the ongoing Recreation Study and Angler Creel Survey, will be filed with the Commission as an addendum to this FLA.”

MDIFW response: As the FLA was filed before completion of both the Recreation and Angler Creel Studies, MDIFW submits the following comments on the FLA with the intent of being able to amend or add additional comments, as necessary, pending the completion of those ongoing evaluations and filing of the addendum.

Impoundment Water Levels

Current operations regarding water levels on Page B-10 state, “*The Rumford Falls Hydroelectric Project (Project) is operated in a run-of-river mode consistent with the Project’s existing Federal Energy Regulatory Commission (FERC or Commission)-issued license. Rumford Falls Hydro LLC (RFH or Licensee) maintains the Upper Dam and Middle Dam impoundments within 1 foot of full pond elevation (601.24 feet U.S. Geological Survey Datum [USGS] at the Upper Dam impoundment and elevation 502.74 feet USGS at the Middle Dam impoundment) and acts*

to minimize the fluctuations of the reservoir surface elevation (i.e., maintain a discharge from the Project so that, at any point in time, flows immediately downstream from the Project tailraces approximate the sum of the inflows to the Project reservoirs).” Page D-4 reiterates the previous information as a proposed PM&E measure.

MDIFW response: Maintaining stable headpond water levels is important to minimize impacts on fish and other aquatic organisms. Consequently, MDIFW is supportive of the current and proposed operations in relation to water levels. The Licensee further indicates that they currently notify the resource agencies regarding any planned maintenance, repairs, or other scheduled activities that deviate from this operational scheme. This measure further minimizes potential impacts on aquatic resources by allowing resource agencies an opportunity to amend the activity if there are anticipated impacts (i.e., spawning activity) that could be mitigated, and it allows the resource agencies to address public inquiries/complaints. The above should be clearly stated as an operational requirement in the issuance of any new license.

Bypass Flows

Current operations regarding water levels on Page B-10 state, *“Pursuant to Article 402 of the Project’s existing license, RFH releases a minimum flow of 1 cubic foot per second (cfs) from the Upper Dam and 21 cfs from the Middle Dam into the bypass reaches. The minimum flow at the Upper Dam is provided via leakage from the flashboards. At the Middle Dam, the 21 cfs minimum flow is provided via a 12-inch-diameter and a 18-inch-diameter pipe, both located near the center of the dam, which is combined with leakage from the flashboards and pressure release vertical drain holes.”*

Page D-5 of the FLA proposes the following PM&E measures regarding minimum flows,

“• *Minimum flows:*

- o Continue to release a minimum flow of 1 cfs into the Upper Dam bypass reach.*
- o Provide a minimum flow, primarily via notched flashboards, into the Middle Dam bypass reach of 95 cfs from May 1st to October 31st and 54 cfs from November 1st to April 30th.*
- *If flashboard maintenance or other work that requires the Middle Dam impoundment to be drawn down temporarily for short periods below dam crest, the minimum flow will be maintained during this period no lower than the existing minimum flow of 21 cfs.”*

MDIFW response: MDIFW requests that the new license requires agency notification and consultation pertaining to all flashboard maintenance, drawdowns, or other work at the Project that has the potential to impact the resource. Note that MDIFW is currently notified of these activities by the Licensee, which we appreciate.

There is limited aquatic habitat potential in the Upper Dam bypass; therefore, from the perspective of aquatic habitat only, MDIFW has no objections to the current and proposed minimum flow of 1 cfs. Aesthetics, however, are a separate issue, which we expect will be addressed by other State agencies, local entities, and non-governmental organizations.

Regarding the Middle Dam bypass, the Licensee reports that flow from the 12- and 18-inch diameter pipes equates to approximately 21 cfs, and is combined with leakage from flashboards and vertical pressure release drain holes. Verbal communications regarding the recent Flow Study demonstrated this combined flow to be approximately 54 cfs, which is important as it largely forms the basis for the “new” proposed minimum flow scheme. By our interpretation, the FLA gives the impression that the Licensee is improving low flow conditions from November 31st-April 30th when operations are exactly as they had been under the previous license for this seasonal period. In addition, leakage from flashboards is likely to be inconsistent.

MDIFW is concerned that the current and proposed minimum flows for the Middle Dam bypass are extremely low and unacceptable given the drainage area, physical character, length, area, biota, and fisheries potential of the bypass reach, not to mention the aesthetic concerns raised by numerous parties. After having observed various flows in the bypass reach, it is MDIFW’s position that increased minimum flows provide improvements in fish habitat and better angling opportunities. A review of the August median flow or Aquatic Base Flow (ABF) for the site, a metric commonly used by resource agencies to assess minimum flow requirements, illustrates the large disparity with current and proposed operations. A brief analysis of USGS Flow Data by MDIFW indicates the mean ABF over the past 25 years for the river at this site equates to 1,990 CFS. Under the current proposal, the Licensee is proposing to allocate only 2.7% or 4.8% of the August median flow down the natural river channel, while sending the remainder through the artificial canal to generate power. In contrast, recent relicensing efforts at two projects on the Little Androscoggin River provided minimum flows at or slightly below ABF. Consequently, the proposed minimum flows are grossly inconsistent with recent minimum flow improvements on other hydro projects in Maine with much smaller drainage and bypass areas that were supported by State and Federal agencies, as well as FERC.

When conducting IFIM studies, MDIFW prefers to evaluate various flows from the current license minimum flow up to ABF, and at least one flow above ABF for evaluating an appropriate flow. Our objective is to find the inflection point where increases in habitat suitability becomes flat-lined, or the incremental gains become limited. This process allows FERC to make a balanced decision between resource/recreational needs and hydropower production. During our site visit, MDIFW staff misunderstood the Licensee’s basis for the maximum study flow of 265 cfs and only requested one additional flow (400 cfs). Unfortunately, the range of flows evaluated in the current flow study were well below ABF and make it difficult to recommend an appropriate minimum flow. Ideally, our recommendation would be for additional flows to be evaluated in 2023 before FERC commits to a minimum flow for the bypass reach. Based on the calculated ABF (1,990 cfs) and the flow values already studied (400 cfs), we recommend additional data and analyses for 800, 1600, and 3200 cfs.

Firstly, MDIFW will explore the existing submitted flow study as it forms the basis for the applicant’s proposed minimum flow. Several concerns regarding the flow study include:

- The binary HSI analyses as noted in our earlier comments. However, the Licensee did include 1-D Flow Modeling with variable suitability and Area-Weighted Suitability metrics at our request. In addition, only the later analysis included the highest 400 cfs

flow. Further MDIFW comments on the Flow Study will indicate a preference for this methodology.

- HSI depth curve going to zero suitability at 6 feet may have some impact on the results and is not necessarily consistent with observations of adult trout behavior in large Maine river systems.
- It should also be recognized that the substantial habitat differences from the upper to lower areas within the bypass reach likely countered the combined suitability results, and a closer examination of Table 8 in the Flow Study confirms this effect. While this isn't being noted as a study flaw, it is important in that it was hoped better minimum flows would largely improve the habitat within the over widened and typically dewatered reaches of the lower bypass area.
- Lastly, it is unclear how evaluations of higher flows approaching ABF would have impacted the suitability results. Presumably, the pool reaches may have become runs with improved velocity metrics, and an examination of Figure 3 in the Study suggests metrics for both depth and velocity would have likely improved for transects in the lower bypass area.

Secondly, MDIFW would like to address a few key statements in the FLA based on the Flow Study including:

Statement 1: Page 137 of the FLA states, *“Collectively, these results suggest that habitat conditions under current bypass flows, or under conditions of moderately increased flows conditions of moderately increased flows, provide suitable water quality conditions and an abundance of suitable physical habitat for a healthy and functioning ecosystem for both fish and macroinvertebrates.”*

Statement 2: Page 136 of the FLA states, *“Demonstration Flow Analysis (DFA) and the quantitative one-dimensional (1-D) modeling results showed that the amount of suitable habitat continues to increase up to the maximum measured or modeled flows (DFA included flows up to 265 cfs; 1-D modeling included flows from 20 cfs to 400 cfs in 20 cfs increments) for most target species.”*

Page 168 of the FLA states, *“an increase in the minimum flow in the Middle Dam bypass reach would improve fish and macroinvertebrate habitat.”*

Statement 3: Page 136 of the FLA states, *“However, the rate of increase in habitat with increase in flow declines as flows exceed 100 cfs to 150 cfs (See Figure 5.6-5 in Section 5.6). For example, gains in habitat are only 10 percent or less per 20 cfs increment at flows of 80 cfs to 160 cfs.”*

MDIFW Response: Statement 1 above sets an extremely low bar for salmonids, and “suitable” should not be the basis for evaluating the bypass habitat. Based on the HSI curves employed, a minimum suitability for rainbow and brown trout was defined as 0.25 and 0.1 cfs, respectively. In addition, both species were assigned a minimum depth suitability of 1 foot. While those minimum habitats requirements might be “suitable” or survivable, they are certainly not

preferred and would not hold trout for any length of time, particularly given the lack of instream cover for the lower riffle areas. Larger trout would seek out much greater depths for holding, while they might briefly venture into shallow depths, as defined here, for foraging or travel needs.

MDIFW agrees with the statements noted in Statement 2 above: habitat suitability generally increases for all target species up to the maximum flows evaluated, and we would add that they continue on an upward trajectory. While several figures in the FLA (See Figure 5.6-4 in Section 5.6) illustrate this, we believe the best illustration is Figure 8 in the Study Report. What remains unclear is how would these suitability graphs change at flows in the vicinity of ABF.

Statement 3 above forms the basis for the proposed 95 cfs for the spring-fall period. However, MDIFW does not necessarily agree with the Licensee's conclusion. Based on the available data, the "inflection point" appears to be around 190 cfs for fish in Figure 4 of the Study Report for DFA Optimal Habitat. However, this data is certainly impacted by the concerns we noted earlier. It is MDIFW's position that the "inflection point" for Figure 5.6-5 in the FLA would be approximately of 200 cfs.

A close examination of the photos in the Study Report for each transect clearly illustrates how Transect 1 transforms from a relatively stagnant pool to more of a run under higher flows. Photos of Transects 3-5 clearly illustrate an abundance of dry or very shallow substrate across the overly wide channel, even at the highest flows of 275 cfs. Below are some photos taken by MDIFW staff, the wider field of view better illustrates the changes from the lowest (left column - 61 cfs) to the higher flows (right column - 265 cfs) and offers more perspective.







Based on our site observations and experience with evaluating aquatic habitats, flows between 250-500 cfs appear to be appropriate to protect and enhance the habitat for fish and other aquatic organisms, remain reasonably wadeable, as well as improve aesthetics. It should be noted that flows in this range still only equate to a fraction (13-25%) of aquatic baseflow, and all excess flows would be available for hydropower production. Again, we believe additional flow evaluations might help to discover the best, most-balanced value.

Regarding the seasonal flow regime, the spring-fall minimum flow should be extended to December 1 due to MDIFW fall stocking programs and the river's year-round angling regulations. Winter flows could be reduced somewhat for fish as there is plenty of overwintering habitat available; however, flows should not be reduced to a point where they significantly impact aquatic invertebrate production due to habitat dessication or freezing.

Recreational Access

Page 110 of the FLA indicates FERC identified the following potential resource issues related to fish and aquatic resources for an environmental analysis: *“Effects of Project operation on recreational use in the Project area, including the adequacy of existing recreational access and facilities in meeting recreation needs.”*

MDIFW Response: Currently, the Licensee is proposing no new or improved access opportunities for angling or boating in the FLA; however, the FLA seems to suggest that it may be considered, pending the completion of the recreational and angling studies. The only mention of expanded access opportunities states, *“In consultation with the Town of Rumford, build and maintain access and/or steps from behind the Rumford Public Library for river access.”* This statement is in relation to limited whitewater boating release events and is unlikely to satisfy angling and other recreational use of the ledges without conflicting with library activities. The stairs would be a great addition, but a suitable parking area needs to be identified for anglers, boaters, and other recreational users of the ledges. Note that MDIFW staff have observed numerous use in the area, including a lot of swimming, sun bathing, dog walking, and people simply exploring and enjoying the lower ledges and falls.

MDIFW believes the area has more potential for angling and other recreational uses, and that additional access to the upper impoundment and the lower bypass reach should be fully explored

as part of this relicensing process. MDIFW staff conversations with local anglers and people from the Town indicate that a fair amount of shore angling occurs in the canals and bypass areas. MDIFW believes there should be better access provisions for these areas, even it that includes improved accessibility measures such as stairways and/or safety railings. For example, the west shore above the lowermost tailrace provides an excellent angling opportunity, but current access provisions and low flows discourage angler use. In fact, after observing the site as part of this process, MDIFW has already modified its stocking program to provide more opportunity in these areas. Lastly, the distance between the upstream launch and the boater barrier is approximately 1.9 miles. As many users float the river with nonmotorized watercraft from launch to launch, a new carry-in launch should be explored in the area just upstream of the boater barrier. There is currently an informal parking area in this general location.

MDIFW hopes the Applicant seriously considers the above improvements in its new studies and addendum to the FLA, and we will wait to fully comment when the Recreational and Angler studies are completed.

Miscellaneous Items

MDIFW previously submitted written comments on the PAD and DLA to clarify our perspective or to provide corrections of erroneous information for the record. Most of those statements have continued into the FLA on Pages 162-164; therefore, we will reiterate the more significant issues, so they remain relevant for FERC consideration.

Pages 162 and 163 continue to downplay the habitat suitability of the bypass by citing a study conducted by C. T. Main in 1989, as well as USFWS and MDIFW comments from a Licensee report dated in 1991.

MDIFW Response: The 1989 C.T. Main study largely assessed the bypass reaches for spawning and rearing habitat potential over 30 years ago. While the physical habitat remains the same, fishery management has evolved and trout stocking programs, including put-and-take and put-grow-take stockings, have produced some excellent fisheries in many similar bypass/tailrace situations that lack notable spawning and rearing habitat for trout species. The key to creating these fisheries is to have adequate flow conditions and suitable angler access. In fact, this site has produced some quality trout in recent years. In 1989, MDIFW and USFWS agreed that the habitat assessment was adequate; however, it should be noted at that time the river was still heavily polluted which resulted in almost no recreational use or value, and that the agencies had largely “written off” the river. Times have changed in the past 30 years: the Androscoggin River is cleaner, recreational use has exploded, and the river is producing good trout fishing in certain areas and a very high-quality bass fishery, all of which were nearly unimaginable back in the 1980’s.

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Project operations were having an impact on trout survival via impingement, entrainment, or simply losses to downstream areas via the canal’s attraction flow.

Page 164 of the FLA states, “Whereas hydropower projects can have potential effects on fish impingement, entrainment, and population survival, diadromous fish do not occur, nor, have American eel (a catadromous species) been documented to occur in, or near, the Project given the number of natural and man-made barriers located downstream of the Project...In addition, Rumford Falls is also believed to be the upstream limit for American eel (MDMR and MDEP 2008; as cited in Moore and Reblin 2010).”

MDIFW response: MDIFW likely has the most extensive datasets in the State regarding inland fisheries distributions, and we have made the Licensee aware in the PAD, the DLA, and via e-mail (see table below) that the above statements are incorrect and should be recognized and corrected. While we are pointing out this error due to our familiarity with the resources, we consider any other eel related comments or recommendations be made from other State and Federal Agencies with jurisdiction over diadromous fish species.

WATER*	TOWN	SPP	PRESENCE CONFIRMED (YR)
SAND P	NORWAY	EEL	1966
PENNESSEEWASSEE L	NORWAY	EEL	1953
MOOSE P	OTISFIELD	EEL	Reported Unconfirmed
SATURDAY P	OTISFIELD	EEL	Reported Unconfirmed
THOMPSON L	CASCO	EEL	1997
NORTH P	WOODSTOCK	EEL	Reported Unconfirmed
BRYANT P	WOODSTOCK	EEL	1974
TWITCHELL P	GREENWOOD	EEL	2009
INDIAN P	GREENWOOD	EEL	2010
HICKS P	GREENWOOD	EEL	1993
MOOSE P	WEST PARIS	EEL	2012
NORTH P	NORWAY	EEL	Reported Unconfirmed
ANASAGUNTICOOK L	HARTFORD	EEL	2013
BUNGANOCK P	HARTFORD	EEL	1958
SOUTH P	BUCKFIELD	EEL	Reported Unconfirmed
RANGE P (UPPER)	POLAND	EEL	1970
AUBURN L	AUBURN	EEL	1987
TAYLOR P	AUBURN	EEL	Reported Unconfirmed
TRIPP P	POLAND	EEL	1986
RANGE P (LOWER)	POLAND	EEL	1991
RANGE P (MIDDLE)	POLAND	EEL	1985
HOGAN P	OXFORD	EEL	Reported Unconfirmed
WHITNEY P	OXFORD	EEL	Reported Unconfirmed
ALLEN P	GREENE	EEL	1940
SABATTUS P (LITTLE)	GREENE	EEL	1961
BERRY P	GREENE	EEL	1961
NO NAME P	LEWISTON	EEL	Reported Unconfirmed
ROUND P	GREENWOOD	EEL	Reported Unconfirmed
MARSHALL P	OXFORD	EEL	2021
BEAR P	HARTFORD	EEL	1953
CRYSTAL P	TURNER	EEL	1954
WILSON P (LITTLE)	TURNER	EEL	1969

SABATTUS P	GREENE	EEL	1998
LOON P	SABATTUS	EEL	1953
SUTHERLAND P	SABATTUS	EEL	1959
LONG P	LIVERMORE	EEL	1954
ROUND P	LIVERMORE	EEL	1954
PLEASANT P	TURNER	EEL	1940
POCASSET L	WAYNE	EEL	1940
ANDROSCOGGIN L	WAYNE	EEL	Reported Unconfirmed
BLACK P	VIENNA	EEL	1961
FLYING P	VIENNA	EEL	1960
WHITTIER P	VIENNA	EEL	1961
PARKER P	MOUNT VERNON	EEL	2003
CAESAR P	BOWDOIN	EEL	Reported Unconfirmed
HOPKINS P	MOUNT VERNON	EEL	1953
BURGESS P	FAYETTE	EEL	1958
TILTON P	FAYETTE	EEL	1940
HALES P	FAYETTE	EEL	1960
LOVEJOY P	FAYETTE	EEL	1940
TAYLOR P	MOUNT VERNON	EEL	1958
SCHOOLHOUSE P	LIVERMORE FALLS	EEL	1958
MOOSE HILL P	LIVERMORE FALLS	EEL	1957
MINNEHONK L	MOUNT VERNON	EEL	1990
ECHO L	MOUNT VERNON	EEL	1991
STURTEVANT P	MAGALLOWAY PLT	EEL	2014
C POND	C SURPLUS	EEL	1998
RICHARDSON P (UP E)	ADAMSTOWN TWP	EEL	1996
RICHARDSON P (LO E)	ADAMSTOWN TWP	EEL	1974
RANGELEY L	RANGELEY	EEL	1939
WEBB L	WELD	EEL	1940
LINCOLN P	PARKERTOWN TWP	EEL	1955
JOES P	RUMFORD	EEL	2001
*Notes: All listed waters are lakes or ponds in the Androscoggin River drainage. Waters in orange are located above Lewiston Falls; waters in red are located above Rumford Falls.			

Page 168 of the FLA states, “Additionally, the existing recreational trout fishery on the upper Androscoggin River is dependent upon annual stocking of hatchery Rainbow and Brown Trout, which are not indigenous to Maine or this portion of the Androscoggin River.”

MDIFW response: It is unclear to MDIFW how the above statement has any relevant basis in the FLA regarding the Environmental Analysis. These species are utilized to provide the best possible recreational opportunity for trout in a system that can no longer sustain native salmonids due to changes in fish composition and summertime water temperature limitations. Wild salmonids (i.e., brook trout) are common in tributaries and likely utilize the mainstem on a seasonal basis. In addition, the Department spends a considerable amount of effort to propagate, stock, manage and optimize these fisheries for recreational anglers and their value should not be discounted.

Letter to Ms. Bose, FERC Secretary

RE: MDIFW Comments on Final License Application for the Rumford Falls Hydroelectric Project (FERC No. 2333)

February 17, 2023

Page 168 of the FLA states, “*Continued Project operations are not expected to adversely affect trout that are stocked upstream and downstream of the Project because they are managed as a put-and-take fishery, ...*”

MDIFW response:

The above statement is incorrect: brown and rainbow trout are managed with some expectation of holdover potential and should be described as a “put-grow-and-take” fishery. We have evidence of holdover trout of both species above and below the project.

Lastly, we noted that the flow values in the Study Report for the transect pictures did not correspond with the flows in the text and charts.

Thank you for your consideration. Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,



John Perry
Environmental Review Coordinator

Cc: Francis Brautigam, Joe Overlock—MDIFW Fisheries Division, Augusta Headquarters
James Pellerin, Nicholas Kalejs—MDIFW Fisheries Division, Region A
Kyle Olcott, MDEP
Jim Vogel, Bureau of Parks and Lands
Julianne Rosset, USFWS

Attachment C Correspondence

Attachment C.1 – Correspondence from July 26, 2021

Attachment C.2 – Correspondence from September 2, 2021

Attachment C.3 – Correspondence from October 8, 2021

Attachment C.1 – Correspondence from July 26, 2021

From: Drew Trested

Sent: Monday, July 26, 2021 10:42 AM

To: Pellerin, James <James.Pellerin@maine.gov>

Cc: Kathy Howatt (Kathy.howatt@maine.gov) <Kathy.howatt@maine.gov>; Perry, John <John.Perry@maine.gov>; Anderson, Luke <Luke.Anderson@brookfieldrenewable.com>; Cousens, Dawn <Dawn.Cousens@hdrinc.com>; Browne, Peter <Peter.Browne@hdrinc.com>

Subject: Rumford Falls - Flow Study for Aquatic Habitat Evaluation

Jim –

Please see the attached letter which Normandeau has prepared on behalf of Brookfield Renewable as part of the Flow Study for Aquatic Habitat Evaluation in the Rumford Falls Middle Dam bypass reach. This letter was prepared to (1) provide preliminary findings from the mesohabitat survey conducted by Normandeau within that reach from the point downstream of Middle Dam to the upstream extent of the tailwater effects from the Lower Powerhouse during June 2021, and (2) provide additional detail related to the proposed selection of (a) target species habitat suitability criteria, and (b) Middle Dam bypass reach flows. Information provided on HSC and target study flows are considered preliminary and are being provided to you for discussion purposes.

We would like to set up a date/time where we could meet at the Project to review the information provided in the letter as well as collect input from MDIFW on specific placement of study transects within the Middle Dam bypass reach. I have included Kathy Howatt (MDEP) on this correspondence as her department has expressed an interest in understanding the potential effects of varied bypass flows on the existing macroinvertebrate community.

We are tentatively looking at the second week of August to meet at the Project. Could you (and Kathy) please let me know if any of these dates will work for that meeting:

- Tuesday, August 10
- Wednesday, August 11
- Thursday, August 12
- Friday, August 13

I anticipate meeting at the Project around 0900 to review the letter and objectives for the day. I would like to view the reach as a group from the various bridge-based vantage points to come to a consensus on placement of our transects.

Thanks,
Drew

Drew Trested, PhD
Senior Principal Scientist, Fisheries Biologist
Normandeau Associates, Inc.
30 International Drive, Portsmouth, NH 03801
603-319-5310 (direct) 603-973-3179 (cell)



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July 26, 2021

Mr. James Pellerin
Regional Fisheries Biologist
Maine Department of Inland Fisheries & Wildlife
Sebago Lake Regional Headquarters
15 Game Farm Road
Gray, Maine 04039

Re: Rumford Falls Hydroelectric Project – Flow Study for Aquatic Habitat Evaluation

Dear Mr. Pellerin:

Rumford Falls Hydro, LLC (RFH) submitted their Revised Study Plan (RSP) to the Federal Energy Regulatory Commission (FERC) on July 7, 2020. Among the seven studies described in the RSP was the Flow Study for Aquatic Habitat Evaluation (the Study). FERC provided their Study Plan Determination (SPD) on August 6, 2020 and the Study was approved as filed. As described in the RSP, the intent of this study is to:

- Evaluate the relationship between flow and available habitat within the Middle Dam bypass reach;
- Evaluate the relationship between flow and safe recreational fishing opportunities within the Middle Dam bypass reach; and
- Determine the flow needed to optimize aquatic habitat and safe recreational fishing opportunities within the Middle Dam bypass reach.

The purpose of this draft letter is to (1) provide preliminary findings from the mesohabitat survey conducted within the Middle Dam bypass reach from the point downstream of Middle Dam to the upstream extent of the tailwater effects from the Lower Powerhouse, and (2) provide additional detail related to the selection of the following to be evaluated for the study (a) target species, lifestages, and habitat suitability criteria, and (b) Middle Dam bypass reach flows. This letter is to be considered a draft summary of mesohabitat information collected to date and an initial set of HSC and flow condition criteria for further consultation.

Mesohabitat Mapping:

Mesohabitat mapping of the Middle Dam bypass reach was conducted by Normandeau staff on June 8, 2021. Discharge through the reach was 21 cfs, the required minimum flow in the Middle Dam bypass reach. A total of nine unique habitat map units (HMUs) were visually identified and are presented in Figure 1 and Table 1. The Middle Dam bypass reach was characterized by a long upper pool segment (i.e., Pool 1) starting immediately downstream of Middle Dam. From Pool 1, flow proceeded downstream through an alternating series of cascade and pool HMUs prior to discharging into a lower gradient area of pool, run, and riffle habitat immediately upstream of the confluence with the Lower Powerhouse tailrace.

The approximate length of the mapped reach from the top of the uppermost HMU (i.e., Pool 1) to the bottom of the lowermost HMU (i.e., Riffle 1) was measured at approximately 2,600 feet. Pool 1 comprised

approximately 53% of the linear reach length and the cascade-pool complex (i.e., Cascade 1 downstream through Cascade 3) comprised approximately 35% of the linear reach length.

Visual observations of relative water depths and bottom substrates were made during the mesohabitat mapping effort and are summarized in Table 2. In general substrate in Pool 1 consisted of large and small boulder, cobble and gravel with varying degrees of sediment embeddedness. Under the existing minimum flow of 21 cfs, water depths along the thalweg of Pool 1 prevented cross-channel wading at all locations. The cascade and smaller pool HMUs located immediately downstream of Pool 1 were predominantly bedrock with larger boulder substrate. This reach was high gradient and consisted of relatively shallow depths and higher velocities. Riffle 1, located downstream of the cascade complex, consisted of boulder and cobble substrates and offered more reliable wading conditions. Photograph locations 1 through 9 are identified on Figure 1 and the photographs are provided in Attachment A to this memo.

Table 1. Middle Dam bypass reach Habitat Mapping Units (HMUs) and approximate length (ft) and area (ft²) as characterized during mesohabitat mapping on June 8, 2021.

Habitat Unit	Approximate Length (ft)	Approximate area (ft ²)
Pool 1	1,373	210,960
Cascade 1	181	44,245
Pool 2	134	6,775
Cascade 2	44	1,579
Pool 3	112	7,046
Cascade 3	473	47,858
Run 1	301	13,150
Riffle 1	381	47,505
Pool 4	287	29,350

Table 2. General substrate and wadeability observations for Middle Dam bypass reach Habitat Mapping Units (HMUs) as characterized during mesohabitat mapping on June 8, 2021.

Habitat Unit	General Substrate	Wadeable Cross Section*
Pool 1	Boulder, cobble, gravel with some areas of embeddedness	Limited, water depth
Cascade 1	Bedrock	No, high gradient/velocity
Pool 2	Bedrock, boulder	No, water depth
Cascade 2	Bedrock	No, high gradient/velocity
Pool 3	Bedrock	No, water depth
Cascade 3	Bedrock	No, high gradient/velocity
Run 1	Bedrock	Limited, water depth
Riffle 1	Boulder, cobble	Yes
Pool 4	Bedrock, boulder	Limited, water depth

*As evaluated at 21 cfs inflow

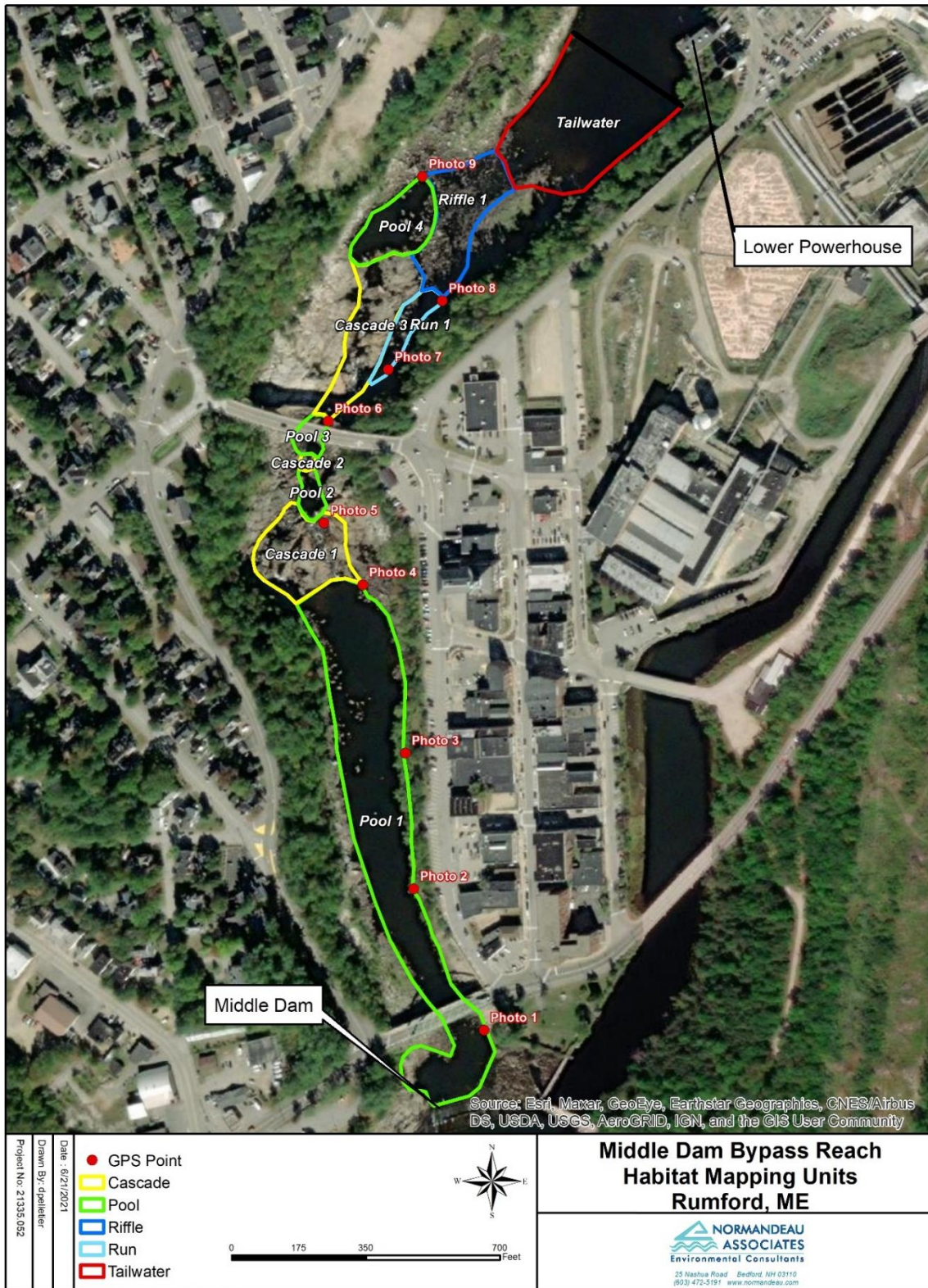


Figure 1. Middle Dam bypass reach Habitat Mapping Units (HMUs) as characterized on June 8, 2021

Fish Habitat Suitability Criteria:

Assessment of the relationship between bypass flows and aquatic habitat for target species will be conducted using a Demonstration Flow Assessment (DFA). The DFA will combine on-site measurement of habitat characteristics at selected cross-sectional transects with criteria representing the relative suitability of habitat for the target species. The relative suitability of specific habitat variables will be defined by Habitat Suitability Criteria (HSC) for each target species and life-stage. The selected target species and life-stages for this study were identified in the RSP and are adult smallmouth bass (*Micropterus dolomieu*), adult rainbow trout (*Oncorhynchus mykiss*), adult brown trout (*Salmo trutta*), and benthic macroinvertebrate species (BMI)¹. The RSP identified the habitat variables to be considered as part of this evaluation and included total water depth, mean column velocity, and instream substrate/cover.

The DFA is an empirical approach that does not involve modeling of the flow-habitat relationship; instead it involves repeated field measurements of habitat characteristics over a suite of test flows to visually compare the relative quantity of suitable or optimal habitat across flows. This process involves discrete measurements of depths, velocities, and substrate/cover across transect stations and comparing those measurements to the HSC. HSC used in DFAs are traditionally binary in nature, e.g., a given range of a habitat variable is classified as either 1.0 or 0.0. The definition of 1.0 vs. 0.0 can vary and take the form of “suitable” vs. “unsuitable” habitat, or else can be defined as “optimal” vs “usable” habitat (Thomas and Bovee 1993, Groshens and Orth 1994). The specific ranges encompassed by either “suitable” or “optimal” habitat depends upon the target species and life-stage in question, and on the methods used to estimate the appropriate ranges.

Determining the ranges to define the binary HSC typically involves collating existing HSC from previous studies, and then choosing a range of depth, velocity, and substrate/cover to represent either suitable/unsuitable or optimal/usable habitat. The choice of which existing HSC datasets are most appropriate to the study in question will affect the final form of the binary HSC, consequently the choice of candidate HSC is an important step in the development of binary HSC. Because site-specific HSC are not available from the project area, the Normandeau HSC database was filtered to select candidate HSC that were felt to be most representative of the project habitat.

The Normandeau database contained 17 HSC datasets for adult smallmouth bass, 49 datasets for adult rainbow trout, 15 datasets for adult brown trout, and 3 datasets (with 8 curves) for BMI. Each of these datasets were filtered to remove datasets that met one of more of the following conditions:

1. Datasets with small sample sizes insufficient to provide robust HSC;
2. Datasets from very small streams not representative of large rivers with greater depths;
3. Datasets from far larger rivers not representative of channels the size of the project area (e.g., Saint Lawrence River, Snake River)
4. Datasets from outside North America (e.g., some European brown trout HSC)
5. Datasets that also represented small juvenile fish as well as adult life-stages;
6. Datasets based on judgment and not containing actual habitat measurements.

This filtering process resulted in a final set of 10 HSC datasets to represent adult smallmouth bass, 13 datasets for adult rainbow trout, and 4 datasets for adult brown trout. All of the available BMI HSC were included.

¹ Inclusion of habitat suitability criteria for benthic macroinvertebrates was not identified in the RSP but was added following consultation (July 1, 2021) with the Maine Department of Environmental Protection (MDEP) to contribute to the understanding of varied bypass flows on the existing macroinvertebrate community.

Because existing HSC are typically continuous in nature and not binary, these HSC are not directly transferable to the DFA without conversion into a binary form. The HSC proposed in this document were derived using a visual, subjective approach to define suitable vs. unsuitable HSC, whereas a more quantitative and objective approach was used to define optimal vs. usable HSC.

Suitable habitat was defined as per Groshens and Orth (1994) as any range in habitat variables having a non-zero HSC value. However, given the very broad range in non-zero suitabilities for many candidate datasets, the filtered datasets were visually examined to exclude such extreme values when defining the upper or lower limits of suitable habitat.

A more objective approach was employed when defining optimal habitat. The upper and lower limits of optimal habitat were determined by recording for each candidate dataset the range in habitat attribute encompassed by suitabilities of 0.8 or higher (e.g., the range of maximum suitability). The mean value for the lower limit and the mean value for the upper limit was calculated from the candidate datasets and used to define the proposed HSC representing optimal habitat for each target species (Table 3). Given the range in optimal habitat, usable habitat is the range with non-zero HSC values between >0.0 and 0.8. This definition of optimal is slightly higher than used by Groshens and Orth (1994) who defined optimal habitat as the range in attributes with suitabilities of 0.7 or higher.

For substrate and cover, it is proposed to use the classifications and associated suitability values listed in Table 4. Where substrate/cover types overlap, such as bedrock with turbulence, the location would be set to the limiting value, e.g., a location with bedrock and turbulence would be coded as unsuitable for rainbow trout, brown trout, and BMI, or suitable and usable for smallmouth bass.

Figures 2 through 5 show the suite of candidate HSC datasets and the proposed binary criteria representing suitable or optimal habitat for depth and velocity for each of the target species. The proposed binary HSC values are listed in Table 5.

Table 3. HSC datasets used to calculate ranges of optimal habitat for depth and mean column velocity, based on suitability values ≥ 0.8 .

Species	HSC Dataset	Velocity fps		Depth ft	
		Low	High	Low	High
Smallmouth Bass (adult)	Bovee	0.50	2.20	3.40	∞
	Feather	0.10	0.75	5.60	10.30
	Susq	0.00	0.40	1.10	∞
	OK	0.00	0.20	3.40	∞
	VA	0.25	0.85	3.30	4.75
	Huron	0.30	1.70	2.70	5.40
	W VA	0.00	0.15	1.50	2.50
	SoCal	0.00	0.20	3.50	8.50
	Minn	0.25	1.50	2.70	5.75
	Baron Frk	0.25	1.05	1.40	5.40
Average:		0.17	0.90	2.86	6.09
Rainbow Trout (adult)	Bovee	0.95	1.65	1.52	∞
	Raleigh	0.00	2.40	1.20	∞
	Up Klam	0.80	1.80	3.20	∞
	NF Stan	0.35	1.10	2.00	3.80
	Stan HiQ	0.60	1.20	2.10	3.35
	LNFFR PrAb	1.20	2.35	2.10	3.30
	Pit	0.80	1.45	2.60	∞
	SFAR Lrg	0.60	1.30	1.90	3.50
	Battle	0.15	0.80	1.65	3.55
	Deer Use	0.80	1.55	1.70	3.30
	Clavey	0.00	0.70	1.70	2.80
	UNFFR comp	0.45	1.30	2.85	5.20
	UARP lrg	0.20	1.30	1.90	∞
	YubaBear lrg	0.50	1.50	1.90	3.45
Avg:		0.53	1.46	2.02	3.58
Brown Trout (adult)	Bovee	0.00	1.05	2.15	∞
	Raleigh	0.20	0.85	1.50	3.70
	MF Stan	0.20	0.90	2.00	3.90
	Kananaskis	0.00	0.60	2.55	∞
Avg:		0.10	0.85	2.05	3.80
Benthic Macro-Invertebrates	Bovee Coll/Gath	3.05	3.68	1.35	∞
	Bovee NetSpin1	0.70	1.25	0.35	1.05
	Bovee NetSpin2	1.25	2.85	1.05	1.45
	Gore	1.30	2.40	0.58	0.95
	Platte Plecop	0.12	0.30	1.35	∞
	Platte Tricop	0.10	1.50	1.35	3.15
	Platte Ephem	0.10	0.90	0.95	2.45
	Platte Simulid	0.12	1.25	1.35	∞
Avg:		0.84	1.77	1.04	1.81

∞ depth HSC remains at 1.0 into deep water (no limit)

Table 4. Proposed HSC values for substrate and cover for adult smallmouth bass (SMB), rainbow trout (RBT), brown trout (BRN), and Benthic Macroinvertebrates (BMI).

Substrate/Cover	SMB	RBT/BRN	BMI
Fines	suitable, usable	unsuitable	unsuitable
Gravel	suitable, usable	suitable, usable	suitable, usable
Cobble	suitable, optimal	suitable, optimal	suitable, optimal
Boulder	suitable, optimal	suitable, optimal	suitable, optimal
Bedrock	suitable, usable	unsuitable	unsuitable
Turbulence	suitable, optimal	suitable, optimal	suitable, optimal
Undercut Bank	suitable, optimal	suitable, optimal	suitable, usable

Table 5. Proposed HSC values representing suitable and optimal velocities (fps) and depths (ft) for adult smallmouth bass, rainbow trout, brown trout, and BMI.

Species	Suitable Habitat (HSC>0.0)				Optimal Habitat (HSC>0.8)			
	Velocity	HSC	Depth	HSC	Velocity	HSC	Depth	HSC
Smallmouth Bass (adult)	0.00	1.00	1.49	0.00	0.16	0.00	2.85	0.00
	2.50	1.00	1.50	1.00	0.17	1.00	2.86	1.00
	2.51	0.00	∞	1.00	0.90	1.00	6.09	1.00
					0.91	0.00	6.10	0.00
Rainbow Trout (adult)	0.24	0.00	0.99	0.00	0.52	0.00	2.01	0.00
	0.25	1.00	1.00	1.00	0.53	1.00	2.02	1.00
	3.00	1.00	6.00	1.00	1.46	1.00	3.58	1.00
	3.01	0.00	6.01	0.00	1.47	0.00	3.59	0.00
Brown Trout (adult)	0.09	1.00	0.99	0.00	0.09	0.00	2.04	0.00
	2.50	1.00	1.00	1.00	0.10	1.00	2.05	1.00
	2.51	0.00	6.00	1.00	0.85	1.00	3.80	1.00
			6.01	0.00	0.86	0.00	3.81	0.00
Benthic Macro- Invertebrates	0.09	0.00	0.19	0.00	0.83	0.00	1.03	0.00
	0.10	1.00	0.20	1.00	0.84	1.00	1.04	1.00
	4.29	1.00	3.29	1.00	1.77	1.00	1.81	1.00
	4.30	0.00	3.30	0.00	1.78	0.00	1.82	0.00

∞ HSC remains at 1.0 into deep water (no limit)

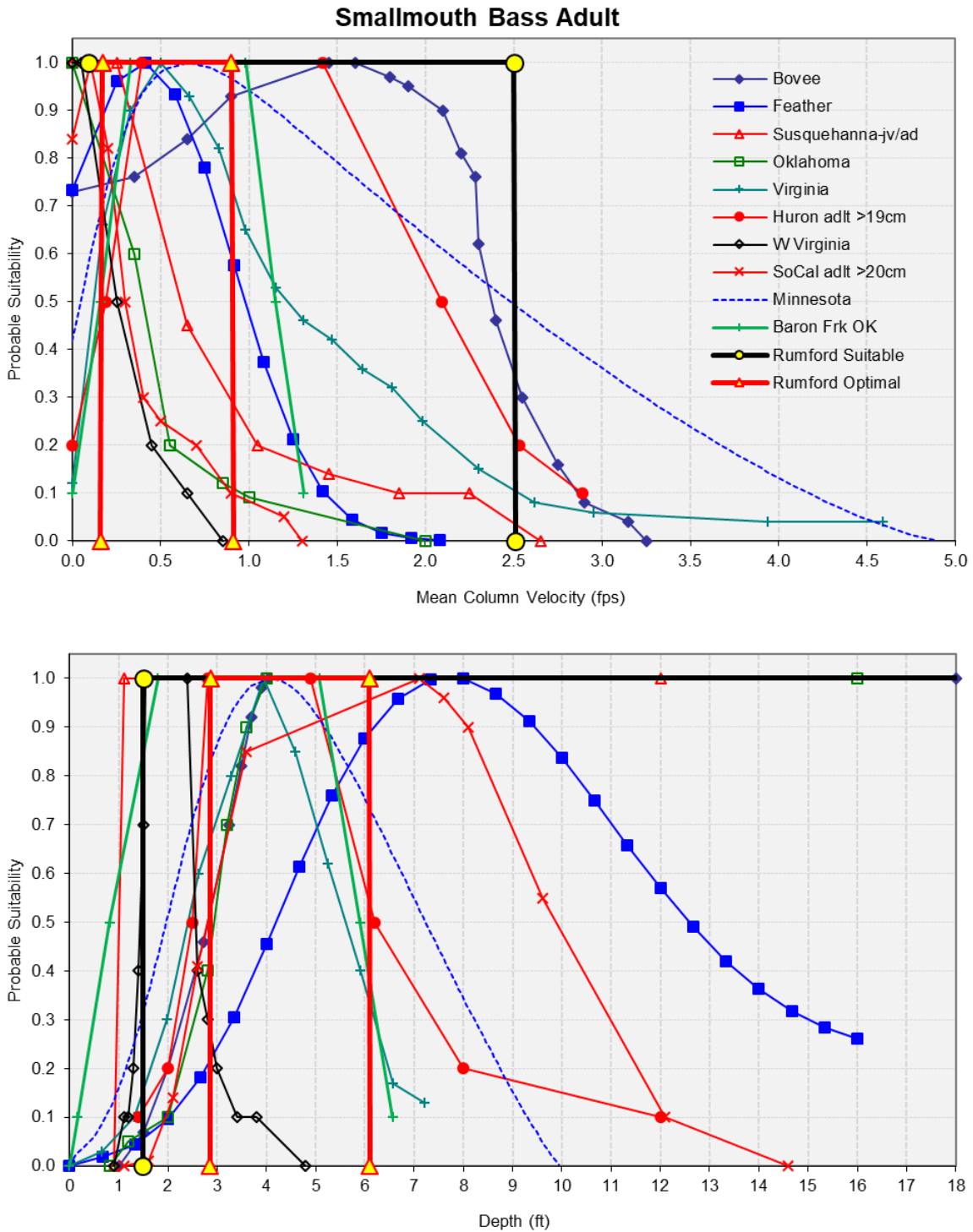


Figure 2. HSC datasets for adult smallmouth bass showing proposed binary HSC for suitable and optimal habitat.

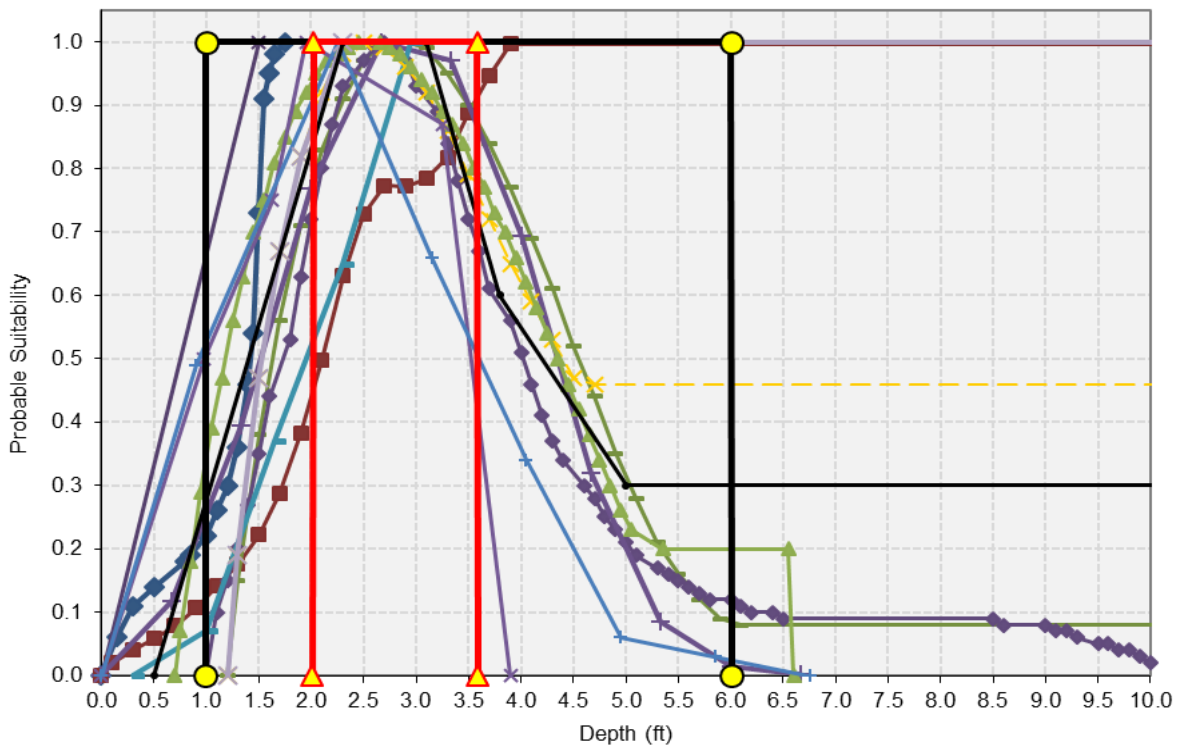
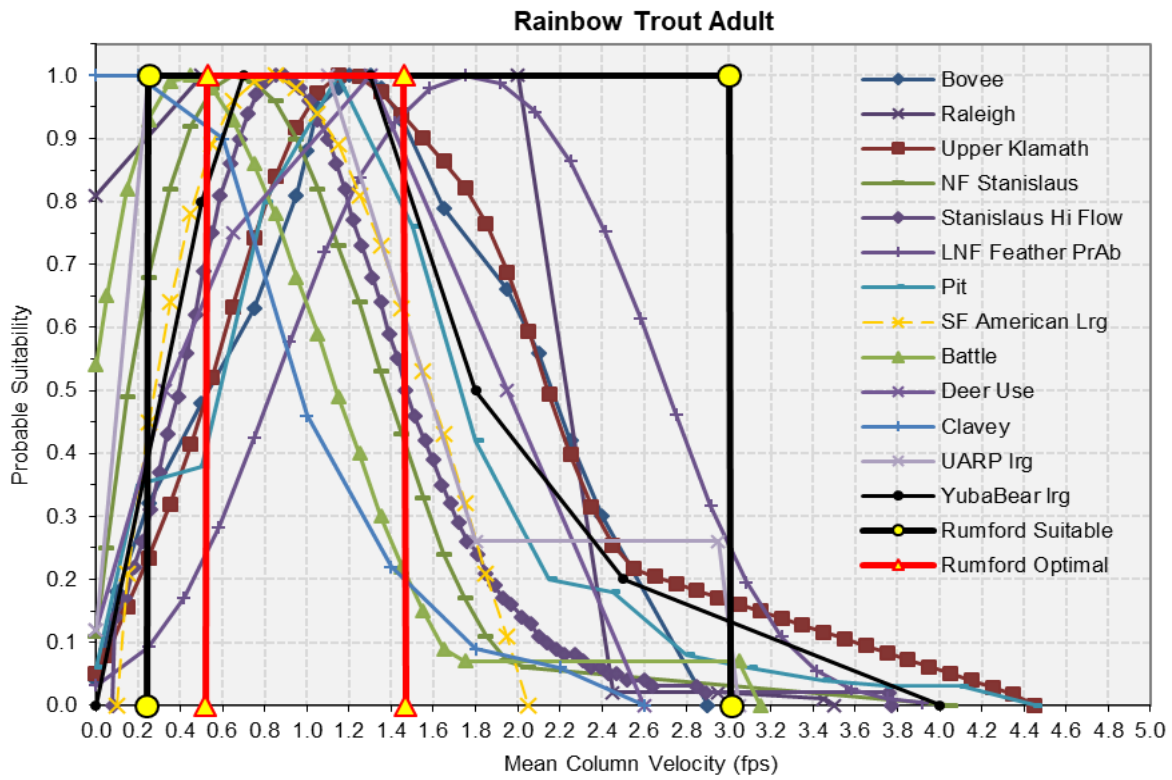


Figure 3. HSC datasets for adult rainbow trout showing proposed binary HSC for suitable and optimal habitat.

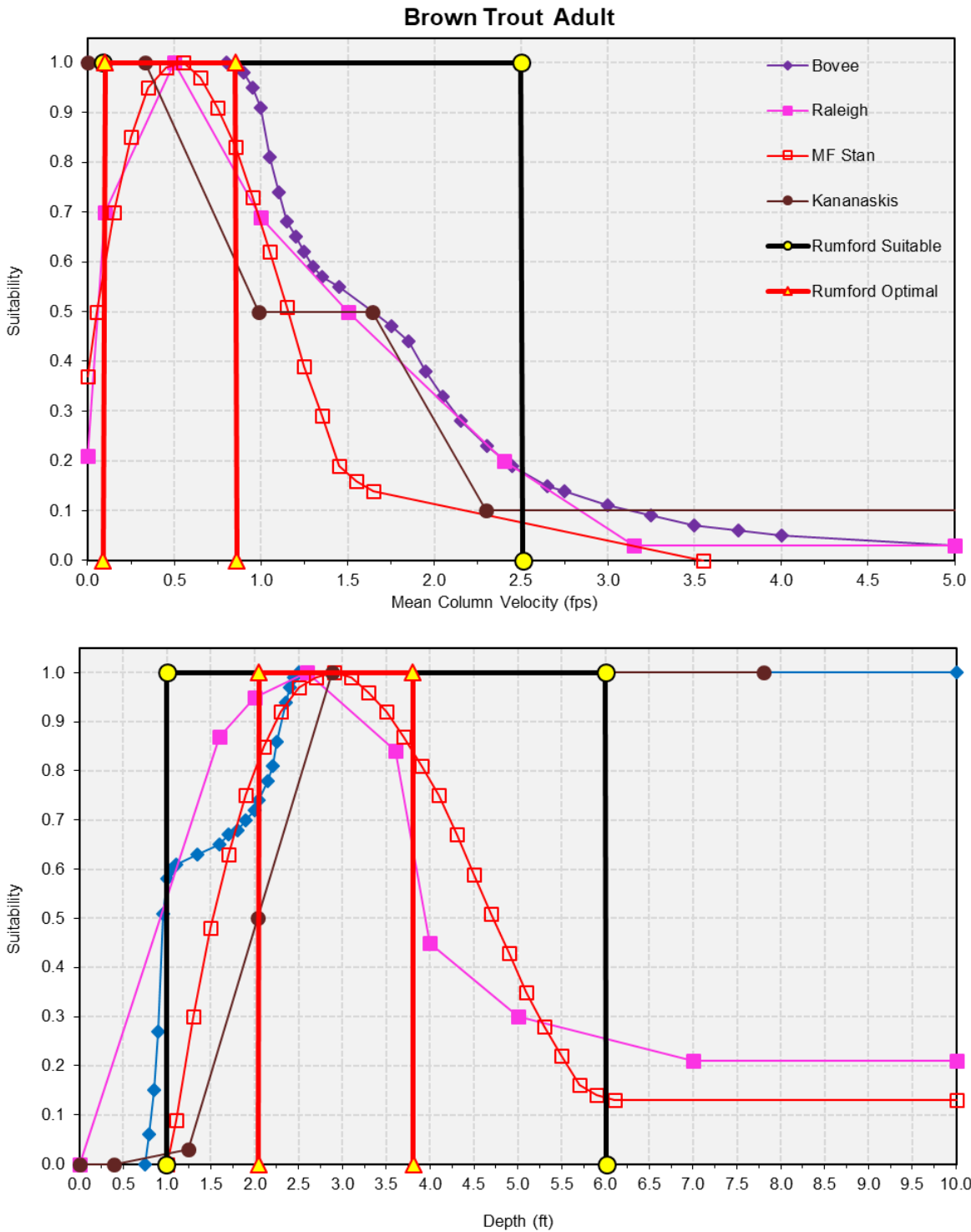


Figure 4. HSC datasets for adult brown trout showing proposed binary HSC for suitable and optimal habitat.

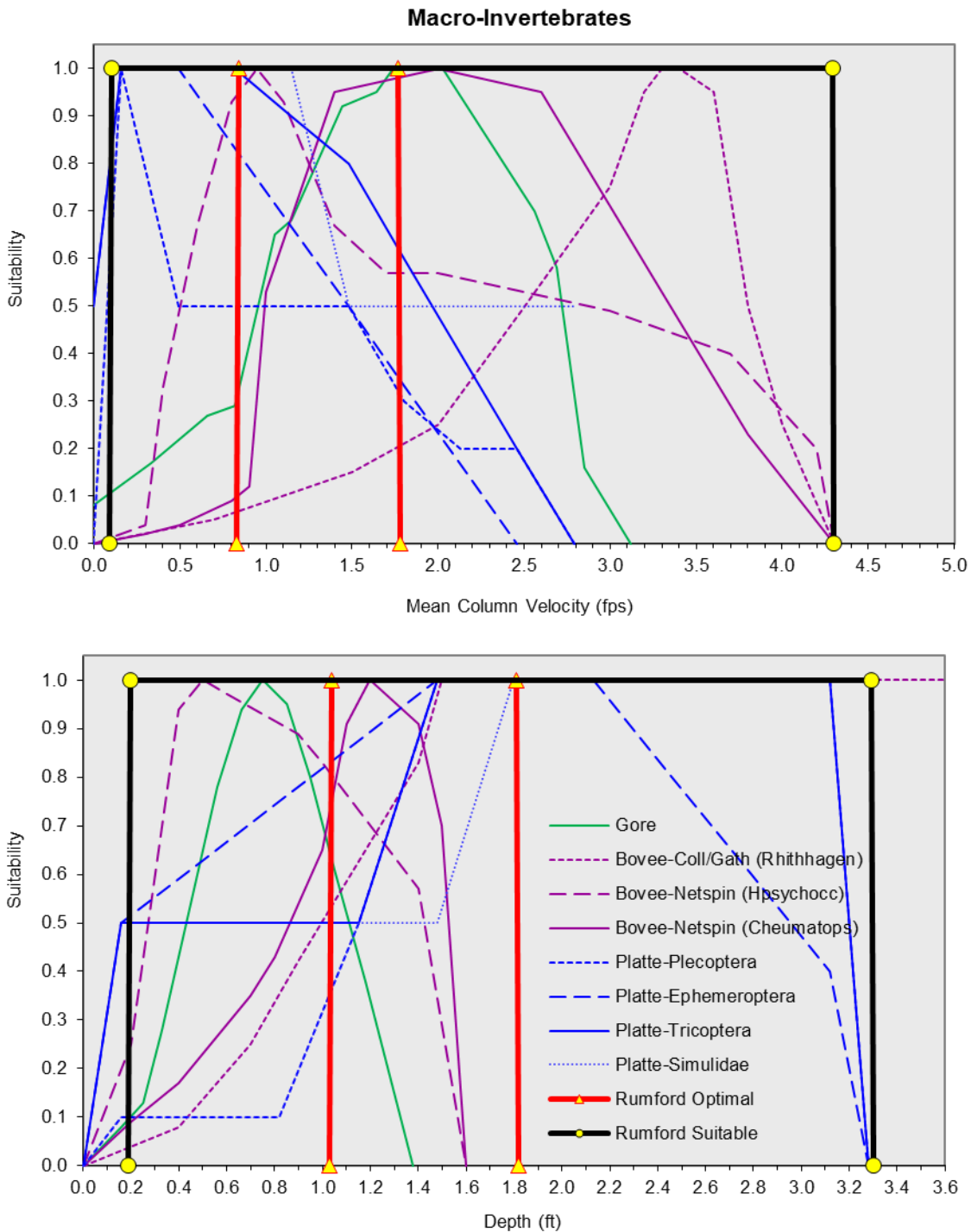


Figure 5. HSC datasets for benthic macro-invertebrates showing proposed binary HSC for suitable and optimal habitat.

Wading Suitability Criteria:

In addition to assessing the relationship between Middle Dam bypass flows and fish habitat, an assessment of the suitability of bypass flows on angling (via wading) is being conducted. This assessment will also utilize the same cross-sectional transects used for the fish assessment, but will utilize HSC specific for wading anglers. The proposed HSC listed in Table 6 is based on the combined professional judgement of five fly-fisherman, each with decades of fishing and fisheries experience in river environments. The HSC is based on the interaction between depth and velocity, where wading suitability in deeper water decreases as velocities increase.

Table 6. Proposed HSC for wading suitability assessment.

Depth <i>ft</i>	Velocity <i>fps</i>	HSC
0.0-1.0	<3.5	1.0
1.0-2.0	<2.5	1.0
2.0-3.0	<1.5	1.0
3.0-3.5	<0.5	1.0
>3.5	all	0.0
all other combinations		0.0

Middle Dam Bypass Reach Flows:

As described in the RSP, a four flow assessment approach will be utilized for the aquatic habitat evaluation study. The existing minimum flow for the Middle Dam bypass reach is 21 cfs and will serve as the starting condition for this analysis. The RSP indicates that three additional target flow values will be identified through consultation with MDIFW. Preliminary discussions with MDIFW indicated that consideration of flows up to “a few hundred” cfs may bracket a range of conditions appropriate to optimize aquatic habitat and safe recreational fishing opportunities within the Middle Dam bypass reach. To better define the upper bound of the proposed study flow range, available flow duration curves for the Middle Dam bypass reach were reviewed (see Attachment B). The median flow condition in the Middle Dam bypass reach for the annual period (i.e., January through December) is 240 cfs. When examined on a monthly basis, 240 cfs is exceeded by the monthly median condition during the months of November through June. Median conditions during the traditionally lower flow and higher recreational activity months of July through September do not achieve 240 cfs. As a result, a discharge of 240 cfs was identified as the upper bound for the Middle Dam bypass reach flow assessment. Based on this upper bound, the following Middle Dam approximate discharges are proposed for evaluation during the Study are (a) 21 cfs, (b) 95 cfs, (c) 165 cfs, and (d) 240 cfs.

As indicated in the RSP, the identified target flow levels will be subject to possible revision as on-site inspection may reveal that one or more of the target flow conditions results in unsafe working conditions within the Middle Dam bypass reach. In the event one of the identified target flows results in hazardous conditions for field data collection, RFH will consult with MDIFW to revise the target flow to a lower discharge.

Additional Consultation:

Following your review of the preliminary findings from the Rumford Falls mesohabitat survey conducted in the Middle Dam bypass reach and the HSC study flows proposed for use during the Flow Study for Aquatic Habitat Evaluation, Normandeau would like to identify a date to consult with MDIFW and RFH at the Project. The purpose of the site visit will be to review the information collected to date and discuss the proposed HSC and study flows. In addition, Normandeau seeks input from MDIFW on the specific placement of cross-river transects

at which habitat measurements (i.e., water depth, velocity, substrate, and cover) will be collected under the agreed upon study flows. It is RFH's intent to collect field measurements at the collaboratively identified transect locations during the late summer and fall of 2021. We look forward to discussing the content of this letter with you.

Sincerely,



Drew Trested
Normandeau Associates
Senior Fisheries Biologist
dtrested@normandeau.com
(603) 319-5310

CC: Mr. John Perry (Maine Department of Inland Fisheries & Wildlife)
Ms. Kathy Howatt (Maine Department of Environmental Protection)
Mr. Luke Anderson (Brookfield Renewable)
Ms. Dawn Cousens (HDR)
Mr. Peter Brown (HDR)

ATTACHMENT A:

June 8, 2021 Mesohabitat Mapping Photographs

Photo 1 – Right bank, Pool 1 – upper end (looking across, downstream)

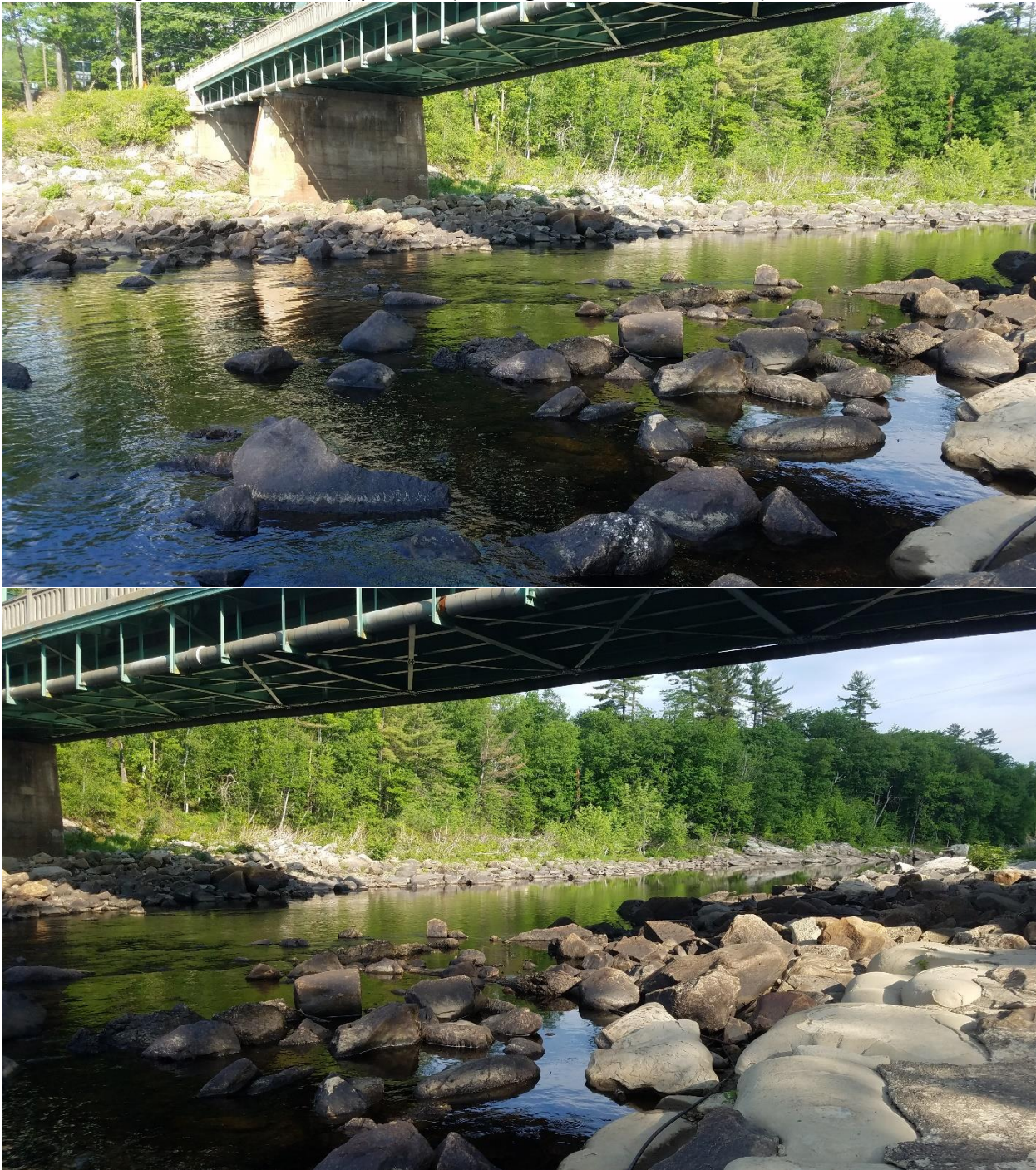


Photo 2 – Right bank, Pool 1 – upper middle (looking - upstream, across, downstream)

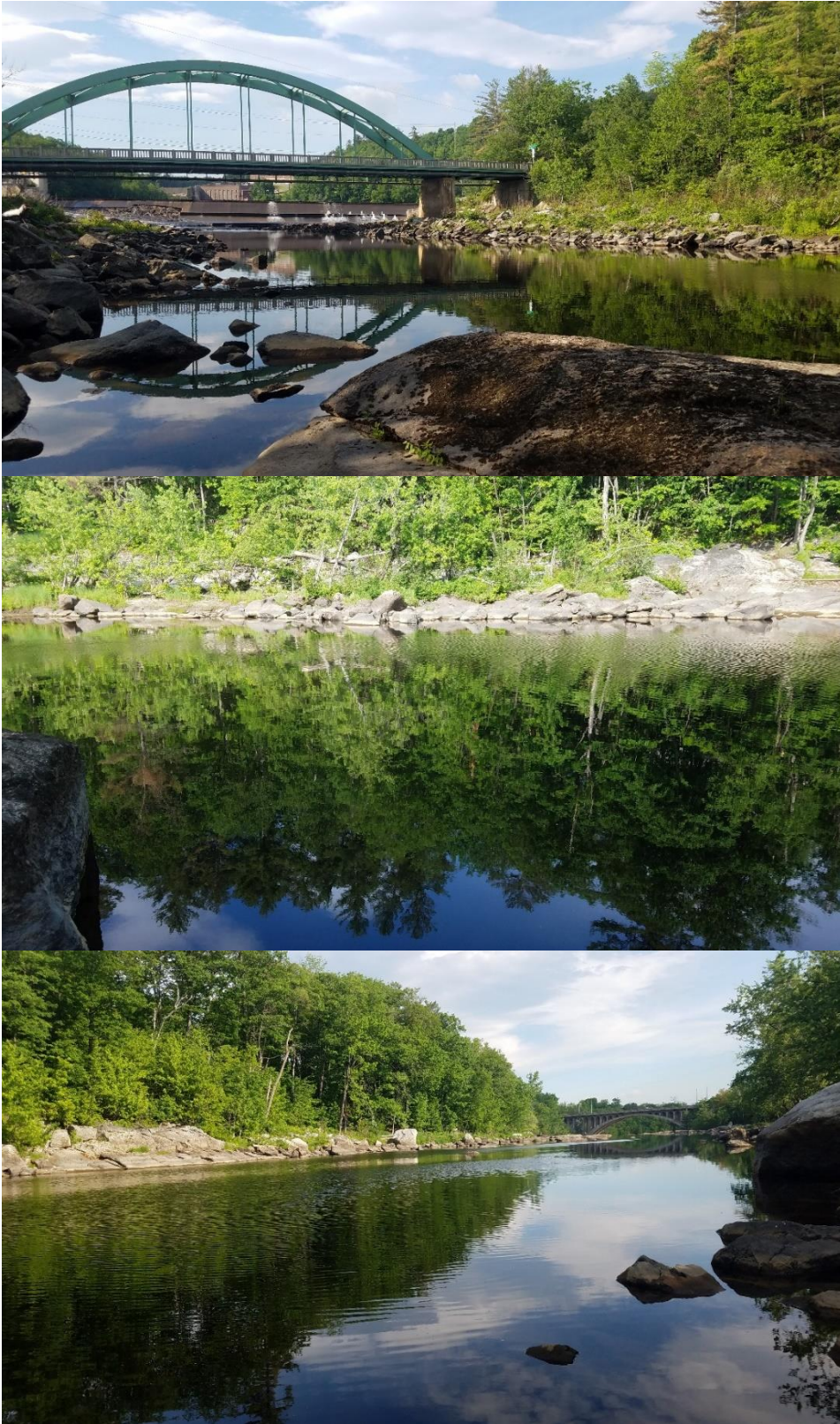


Photo 3 – Right bank, Pool 1 – lower middle (looking - upstream, across, downstream)



Photo 4 – Right bank, Pool 1 – lower end (looking - upstream, across, downstream)



Photo 5 – Right bank, Cascade 1/Pool 2 (looking - upstream, across, downstream)



Photo 6 – Right bank, Pool 3/Cascade 3 (looking - upstream, across, downstream)

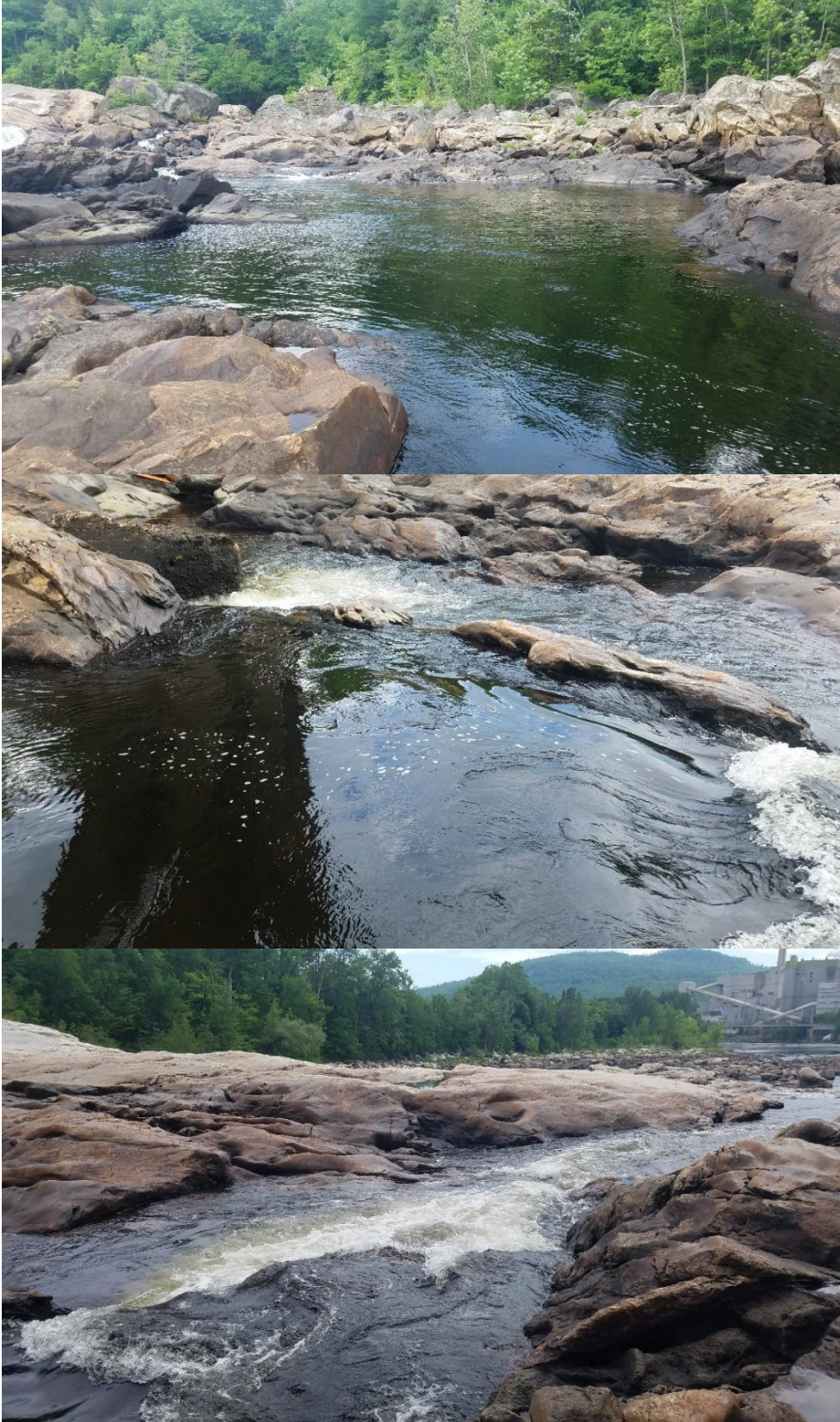


Photo 7 – Right bank, Run 1 (looking – upstream (foreground), across, downstream (foreground))



Photo 8 – Right bank, Run 1/Riffle 1 (looking - upstream, across, downstream)



Photo 9 – Left bank, Pool 4/Riffle 1 (looking - upstream, across, downstream)



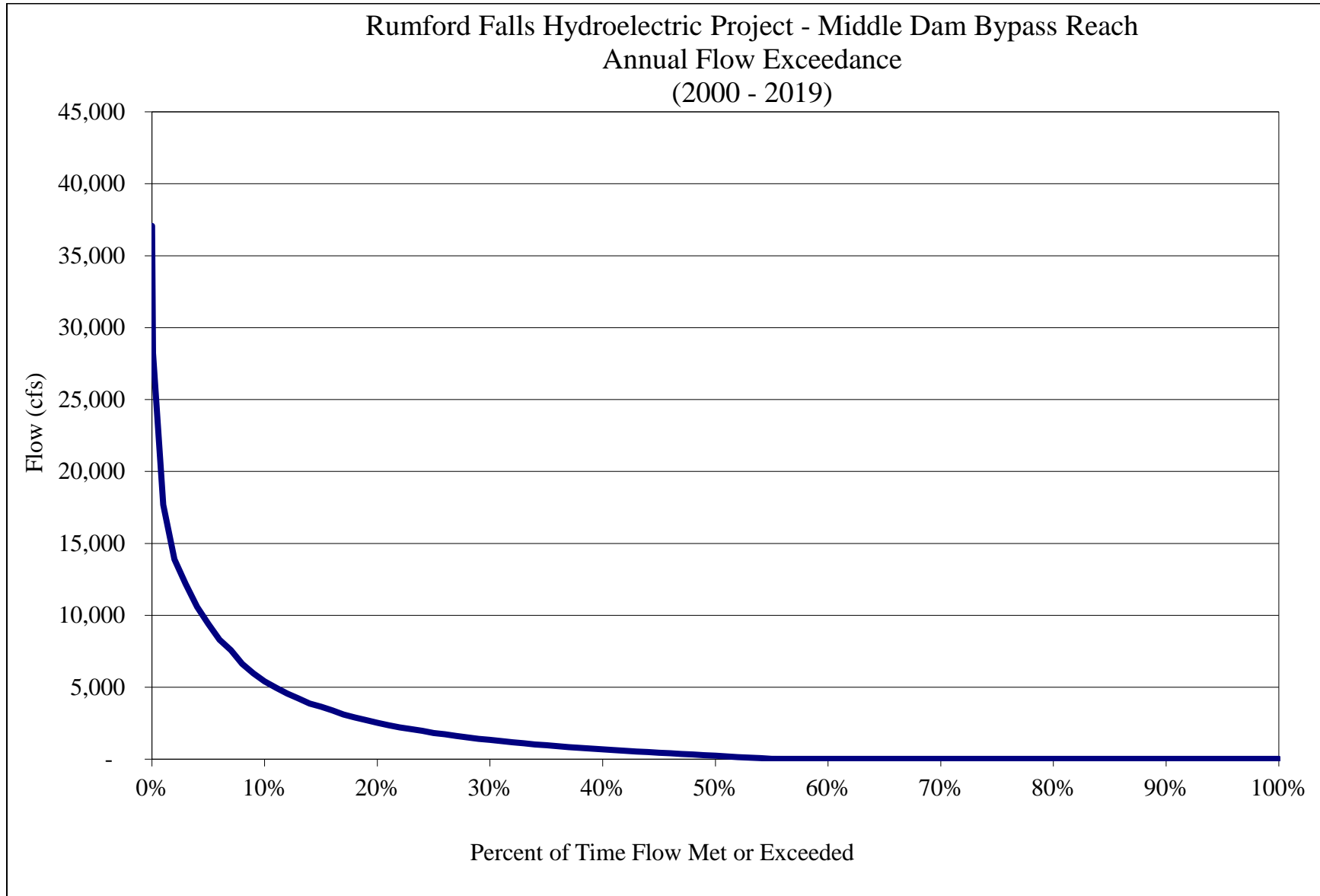
ATTACHMENT B:

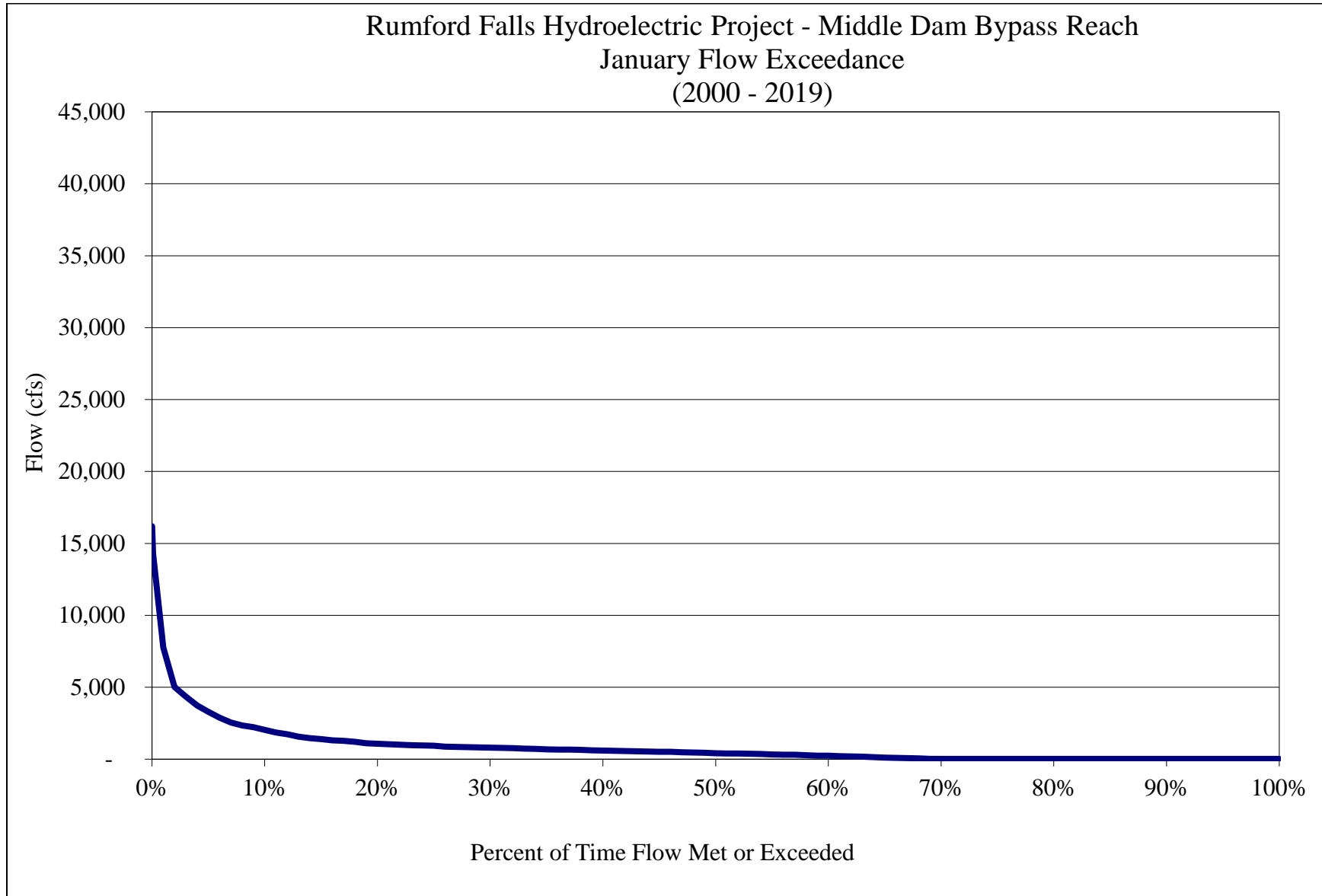
Rumford Falls Hydroelectric Project Draft Flow Duration Curves – Middle Dam Bypass Reach

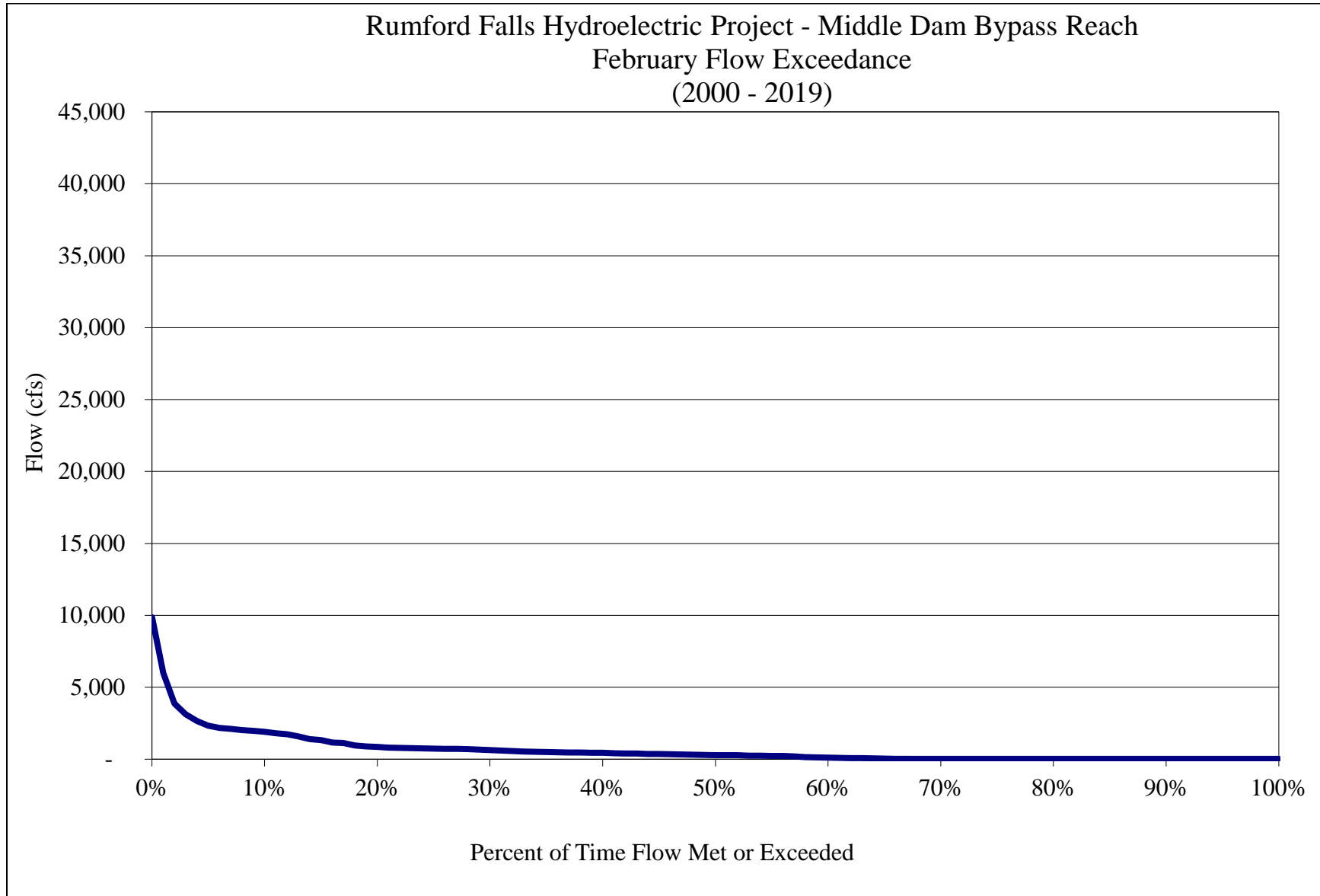
Flow duration curves were developed by HDR for the Middle Dam bypass reach using flow data from the “USGS 01054500 Androscoggin River at Rumford, Maine” gage from January 1, 2000 to December 31, 2019. The gage is located approximately 550 feet downstream of the Lower Station Development powerhouse. It was assumed that:

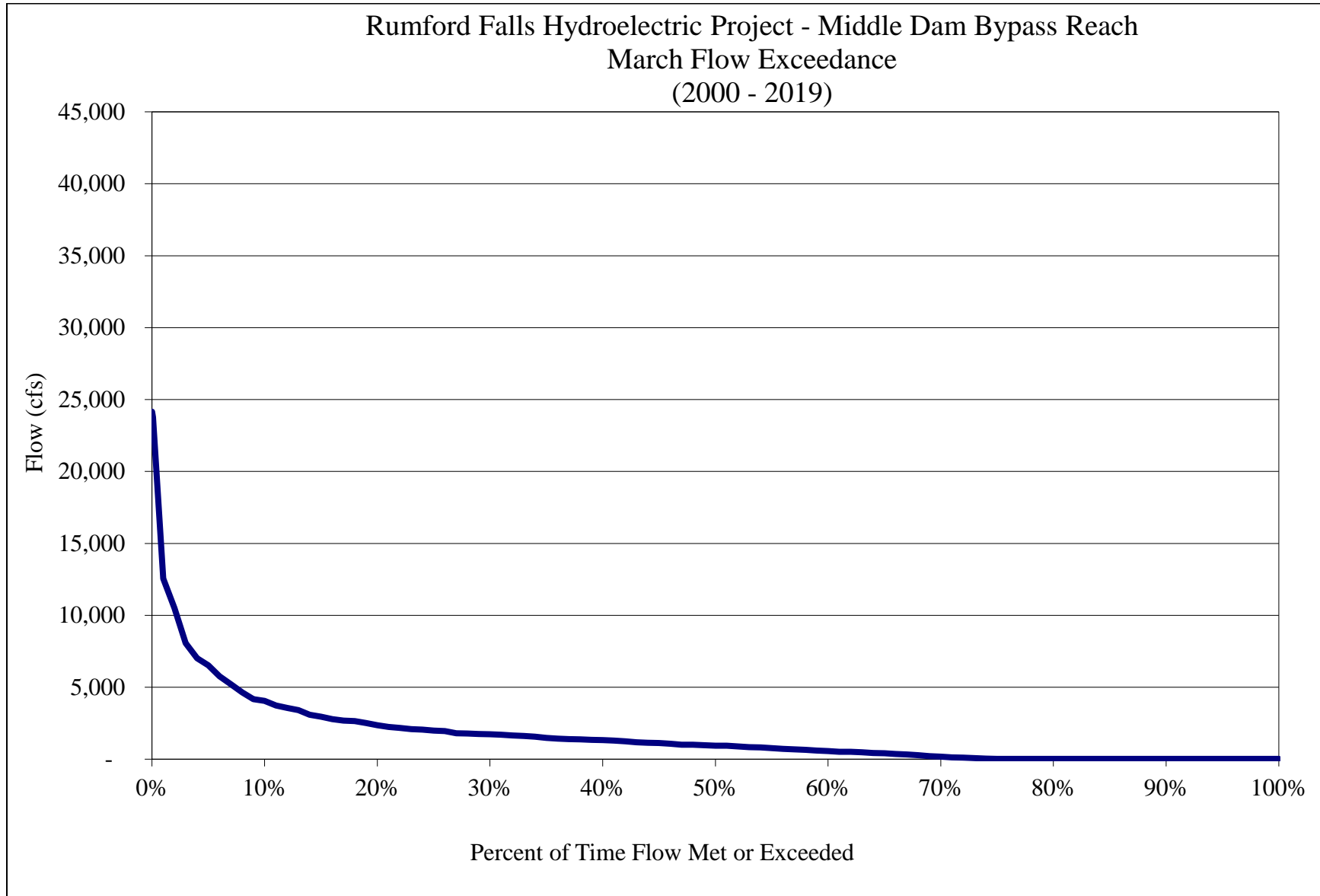
Middle Dam Bypass Reach

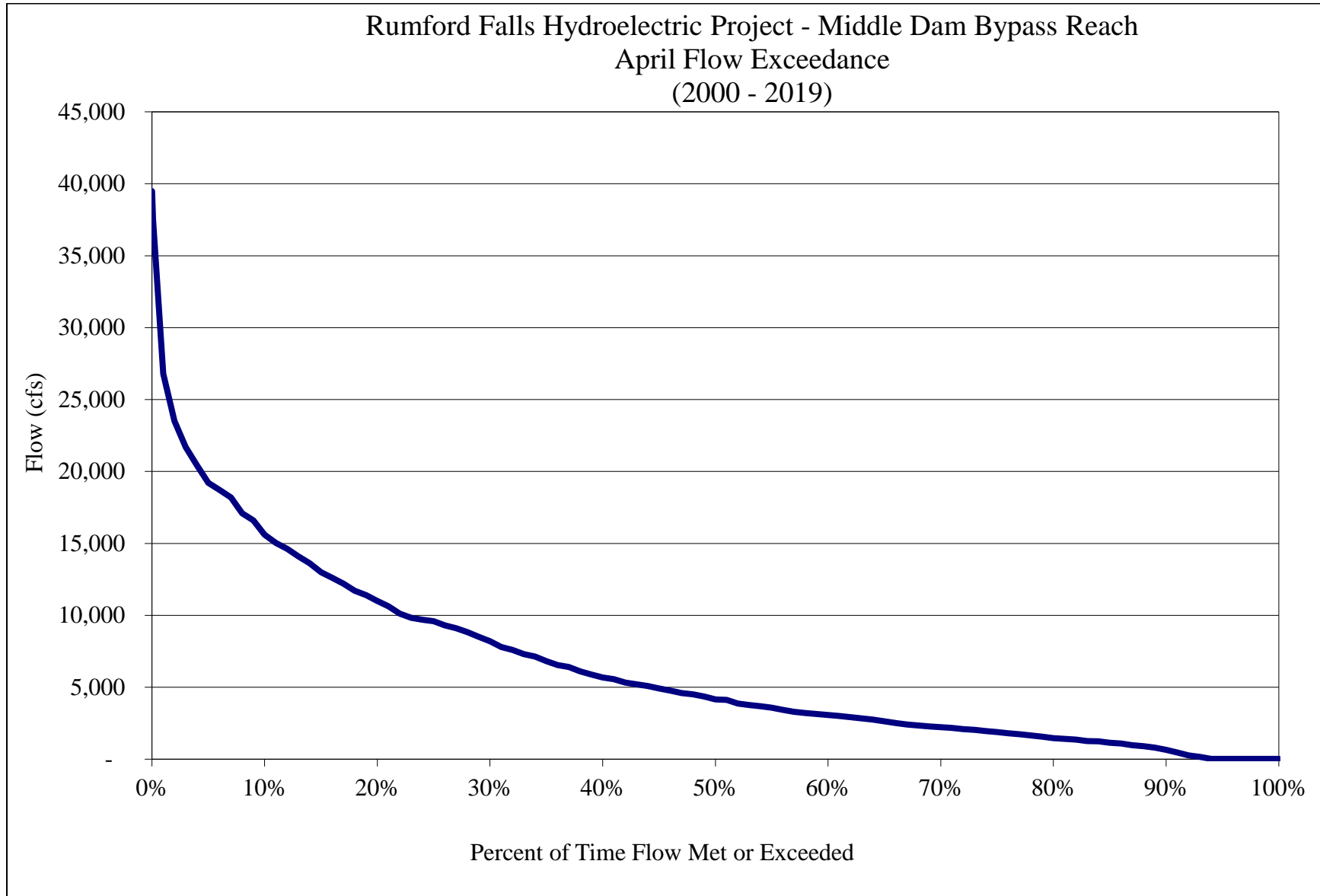
- All flows up to the Lower Station Development maximum hydraulic capacity of 3,100 cfs were directed to the powerhouse

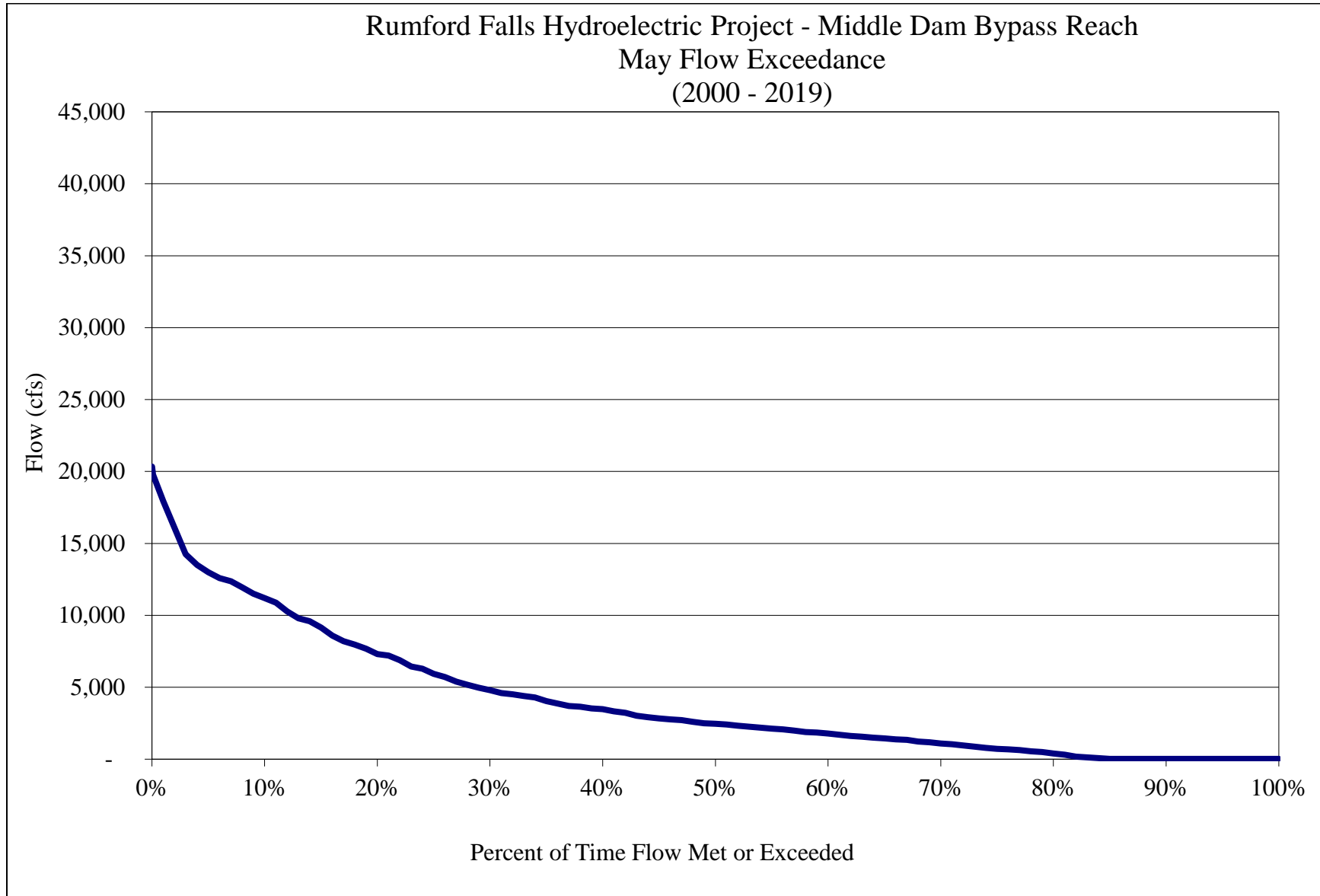


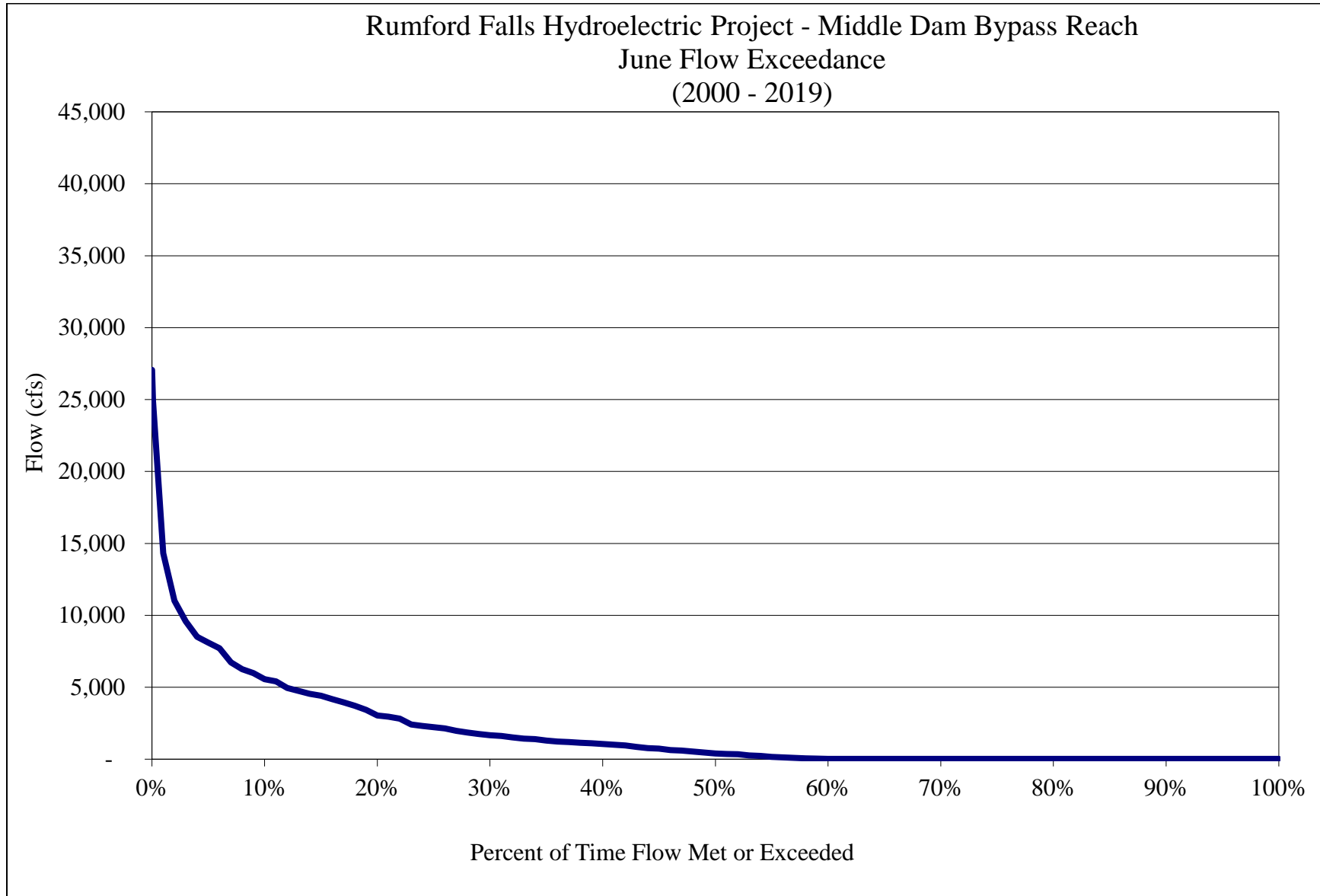


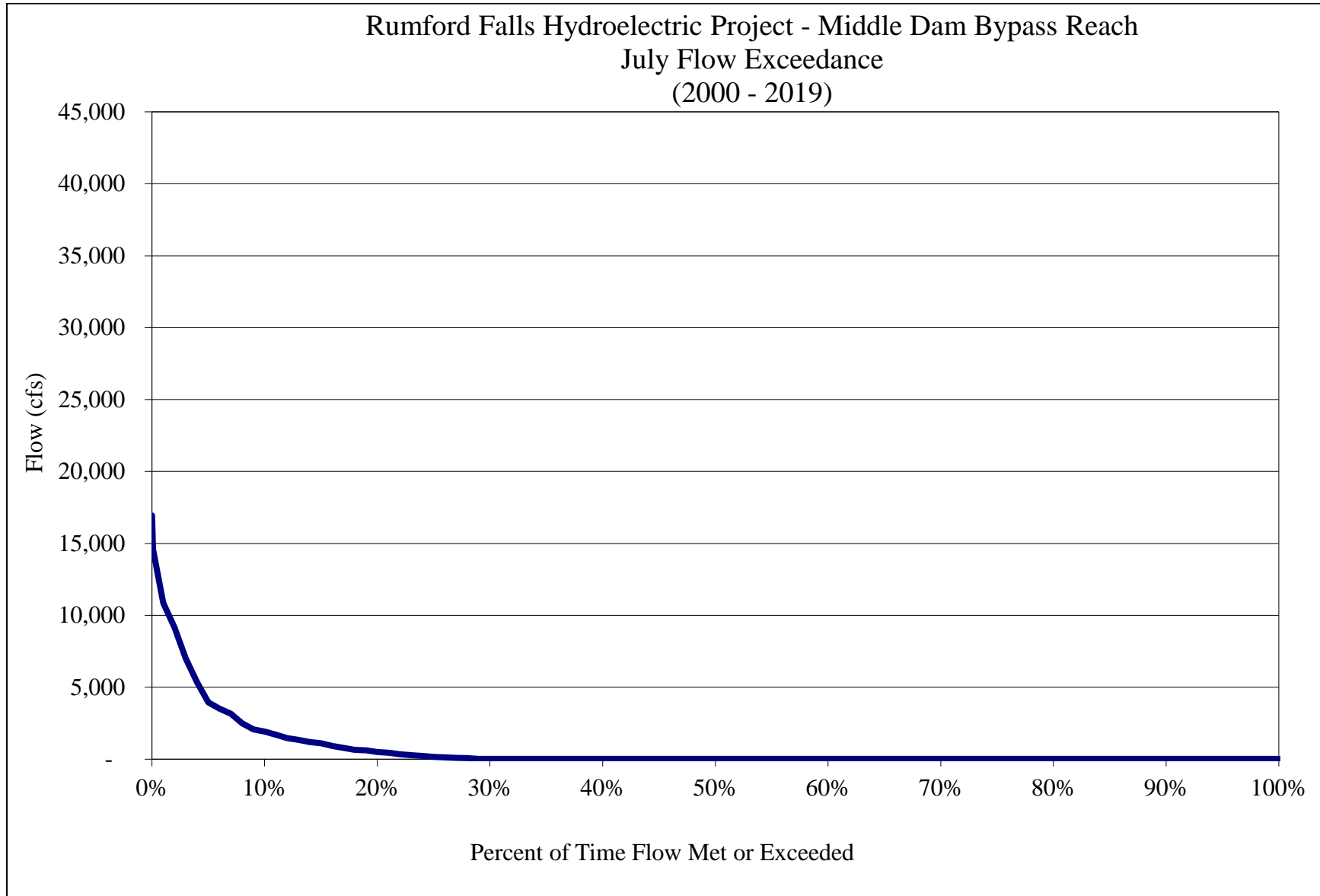


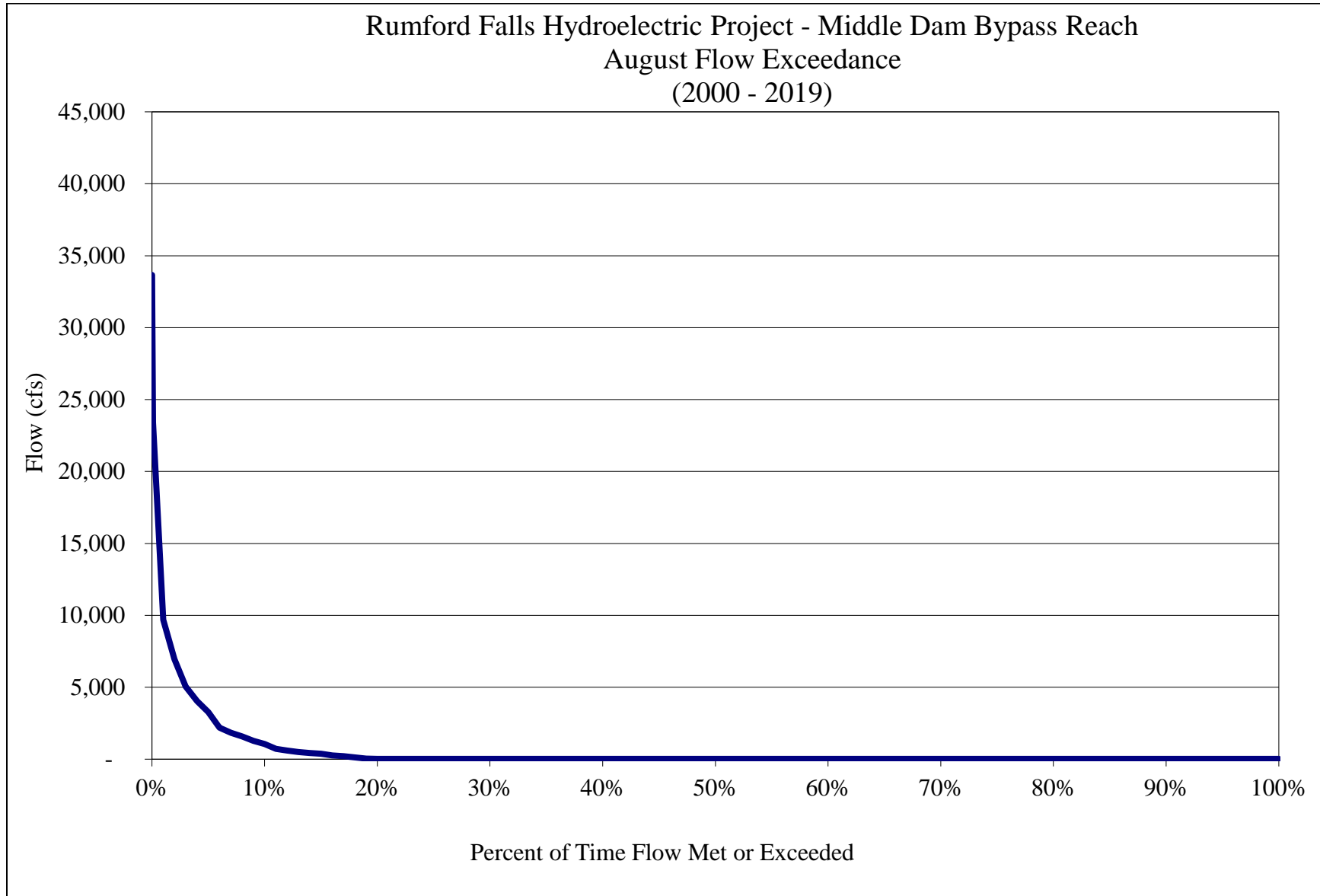


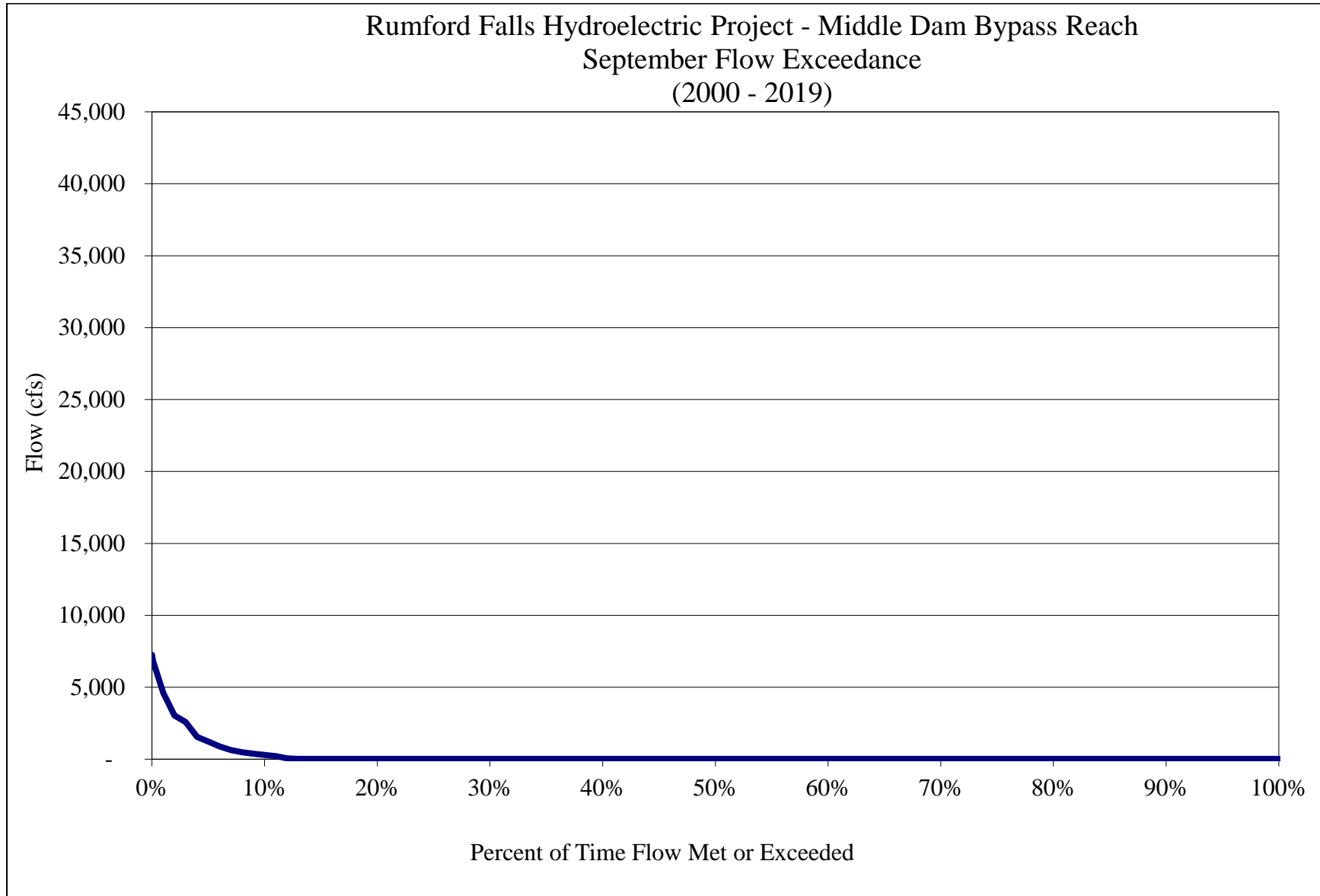


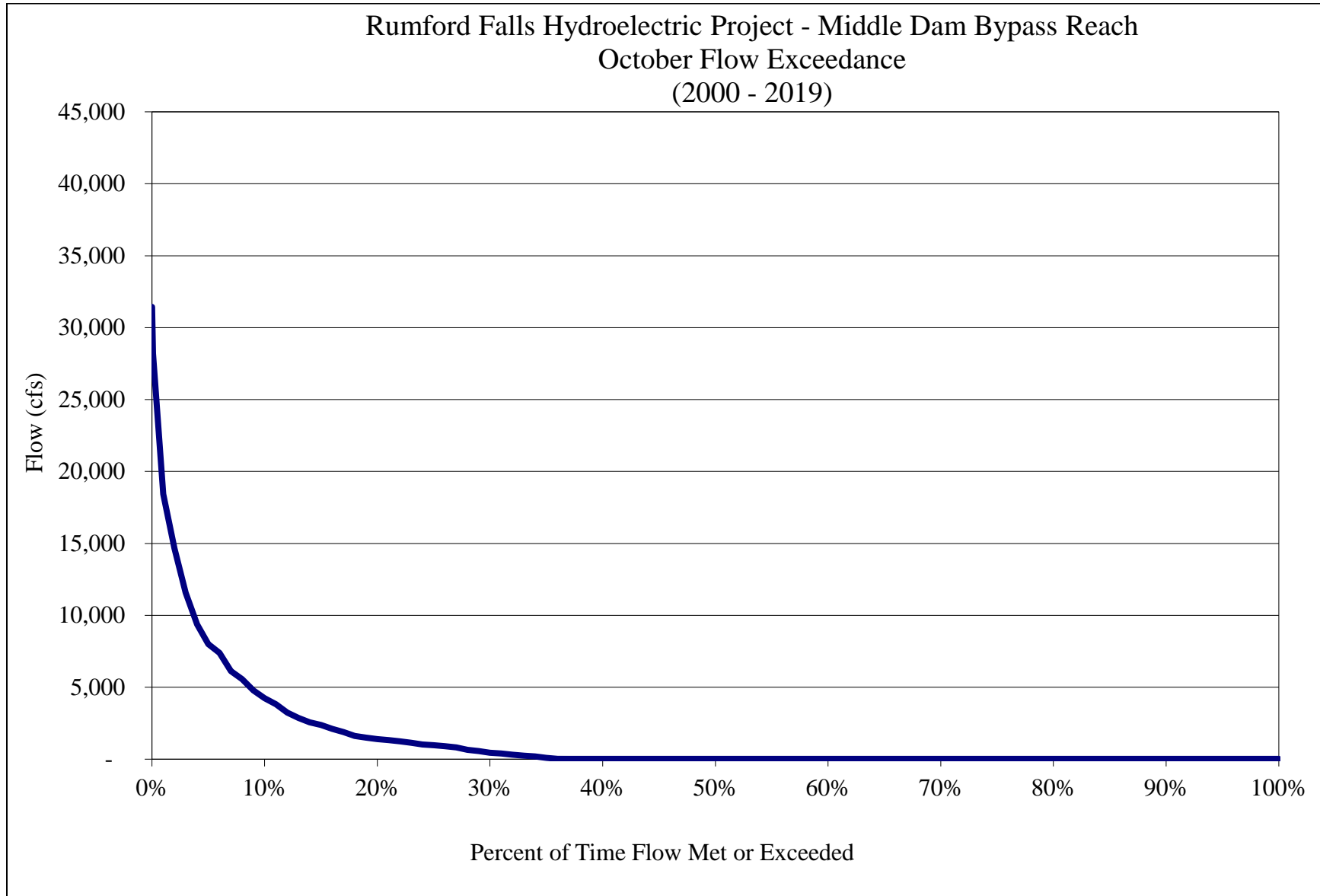


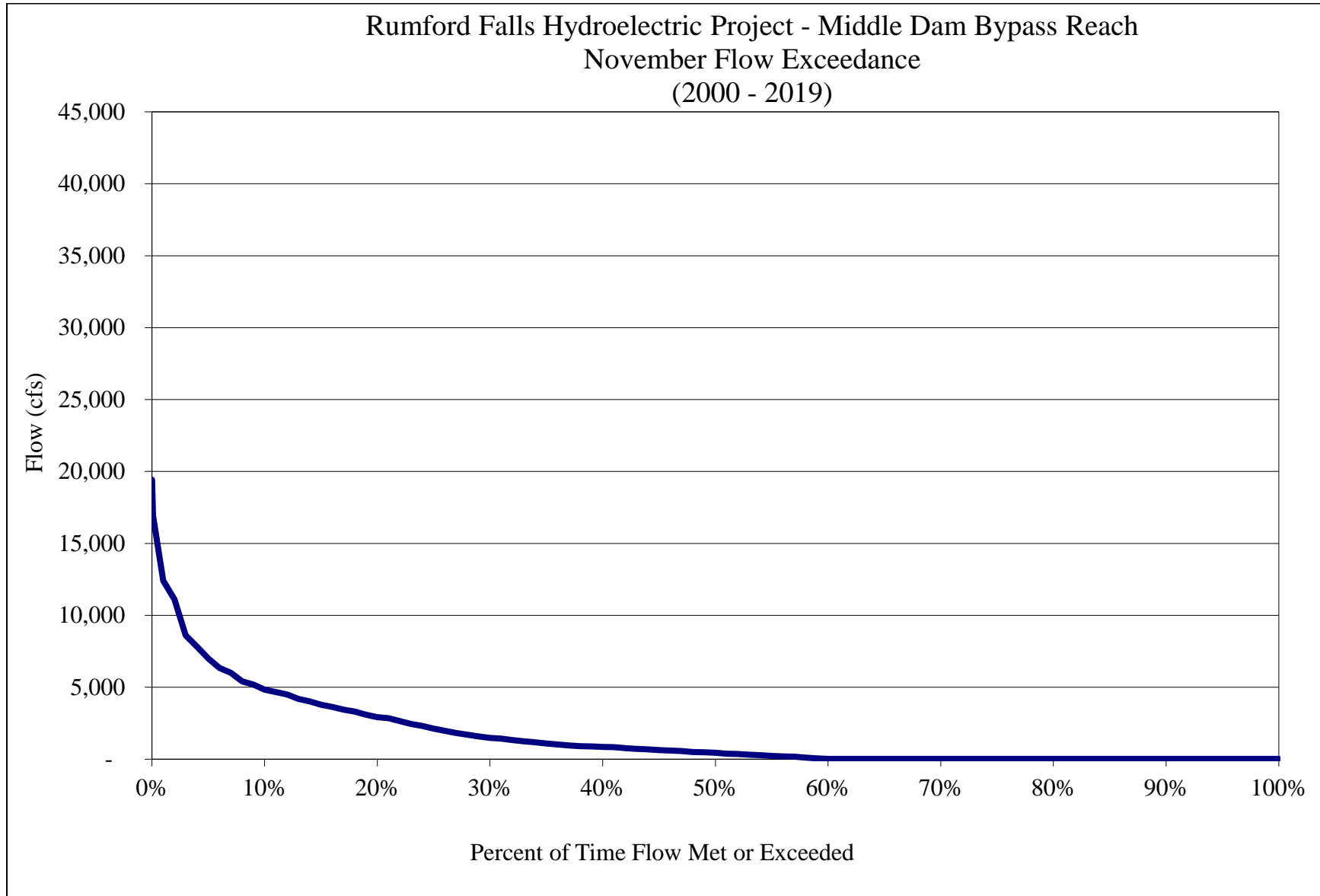


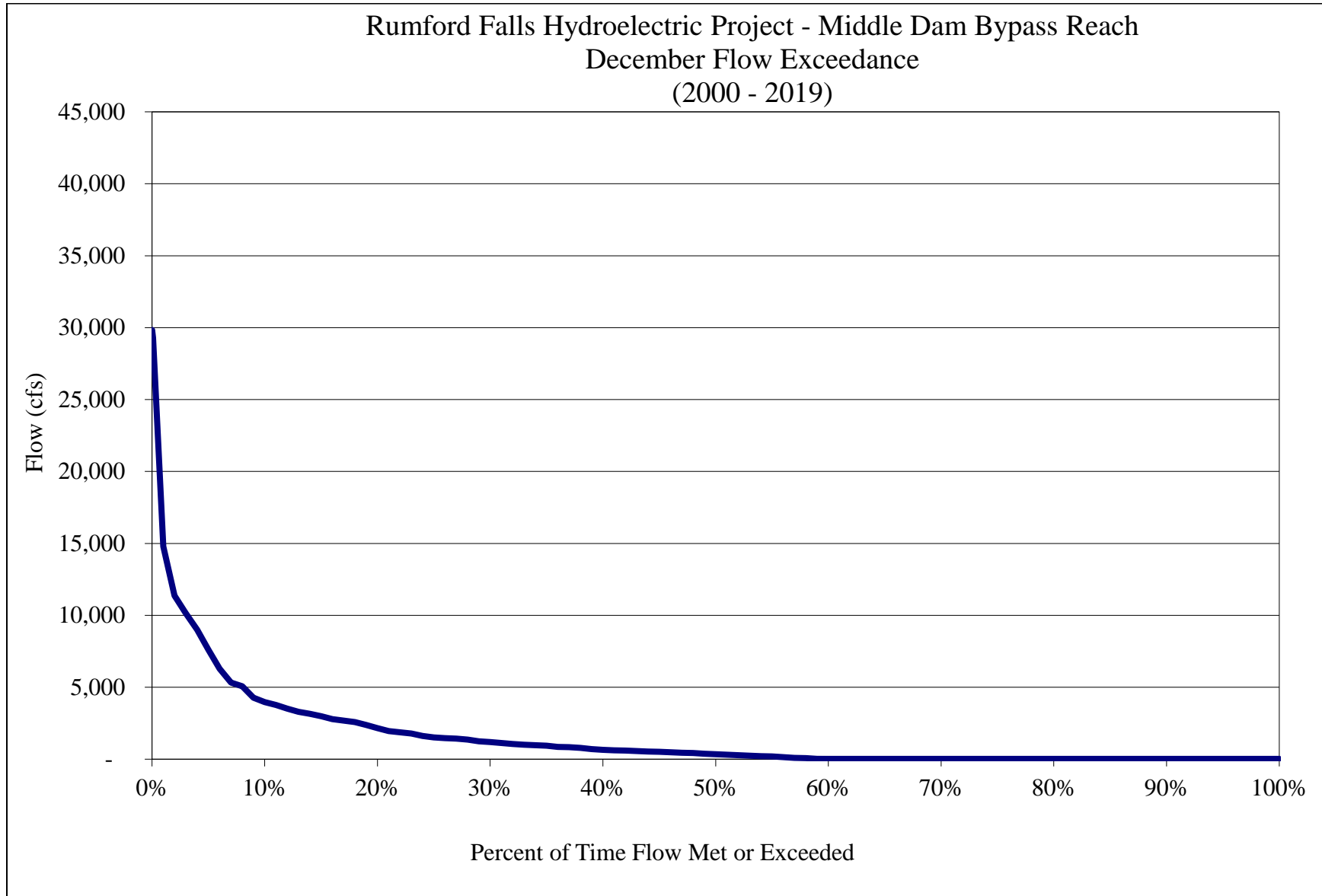












Attachment C.2 – Correspondence from September 2, 2021

From: Drew Trested
Sent: Thursday, September 2, 2021 11:16 AM
To: Pellerin, James <James.Pellerin@maine.gov>
Subject: Rumford Falls - Middle Dam bypass habitat follow up

Hi Jim –

It was good to catch up with you at Rumford last week. Attached you will find a quick summary of the items that we discussed as well as a map of the preliminary transect locations that we identified during our site walk through. Luke and I were looking to identify a date/time next week where we could set up a call with you to review what we saw and come to a consensus on final selection of transects, flows and methodology. Can you let me know if any of these work for you and I can send out a meeting invite?

- Tuesday Sept 7 – 0930-12
- Tuesday Sept 7 – after 3 pm
- Wednesday Sept 8 – 11-2
- Thursday Sept 9 – 0800-1200
- Friday Sept 10 – 0800-0945
- Friday Sept 10 – after 1230

Thanks,
Drew

Drew Trested, PhD
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Summary notes for the August 24, 2021 – Rumford Falls Project Site Visit

Attendees:

- Luke Anderson (Brookfield)
- Jim Pellerin (MDIFW)
- Chris Sferra (Maine DEP)
- Drew Trested (Normandeau)

Purpose:

- Review contents of the July 26 Flow Study for Aquatic Habitat Evaluation letter which (1) summarized mesohabitat mapping exercise conducted on June 8, 2021, (2) provided proposed binary Habitat Suitability Criteria (HSC) for adult Smallmouth Bass, Brown Trout and Rainbow Trout as well as macroinvertebrates, and (3) provided proposed survey flows of 21, 95, 165, and 240 cfs.
- Visually survey the Middle Dam bypass reach for potential placement of 3-5 transects for evaluation of aquatic habitat.

Mesohabitat Mapping:

- No major questions related to information mapped during June 8 and presented in July 26 letter.

Habitat Suitability Criteria:

- No specific questions related to proposed binary HSC curves
- MDIFW reiterated their lack of support for the use of a binary approach, preferring to see a 1-D IFIM style analysis utilizing standard HSC criteria.

Proposed Survey Flows:

- MDIFW was in support of the range of flows proposed in the July 26 letter.
- MDIFW suggested adding an additional flow of ~480 cfs.

Preliminary Transect Placement:

- Visually surveyed full length of Middle Dam bypass reach and identified a total of five potential locations to place habitat transects.
 - Habitat 1: Placed at upstream end of Mesohabitat Pool 1. Located upstream of Bridge St. bridge and just downstream of Middle Dam. Will need to review with Brookfield operations on potential safety issues with sampling this location.
 - Habitat 2: Placed in upper portion of Mesohabitat Pool 1 approximately 130' downstream of Bridge St. Bridge.
 - Habitat 3: Placed in location near to the mid-point of Mesohabitat Pool 1, approximately 615' downstream of Bridge St. Bridge.
 - Habitat 4: Placed in location through Mesohabitat Pool 4 and Riffle 1 located approximately 525' downstream of Portland St. Bridge.

- Habitat 5: Placed in location towards downstream end of Mesohabitat Riffle 1 located near to confluence with the Lower Powerhouse tailrace and approximately 840' downstream of the Portland St. Bridge.
- Visually surveyed full length of Middle Dam bypass reach and identified a total of two potential locations to evaluate wading suitability.
 - Wade 1: Placed across relatively shallow substrate area immediately under the Bridge St. Bridge towards the upstream end of the Middle Dam bypass reach.
 - Wade 2: Placed in Mesohabitat Riffle 1 located downstream of the Portland St. Bridge and between Habitat transects 4 and 5.
- Consensus reached that there was no added value to the study to place any transects within the cascade complex towards the center of the Middle Dam bypass reach.

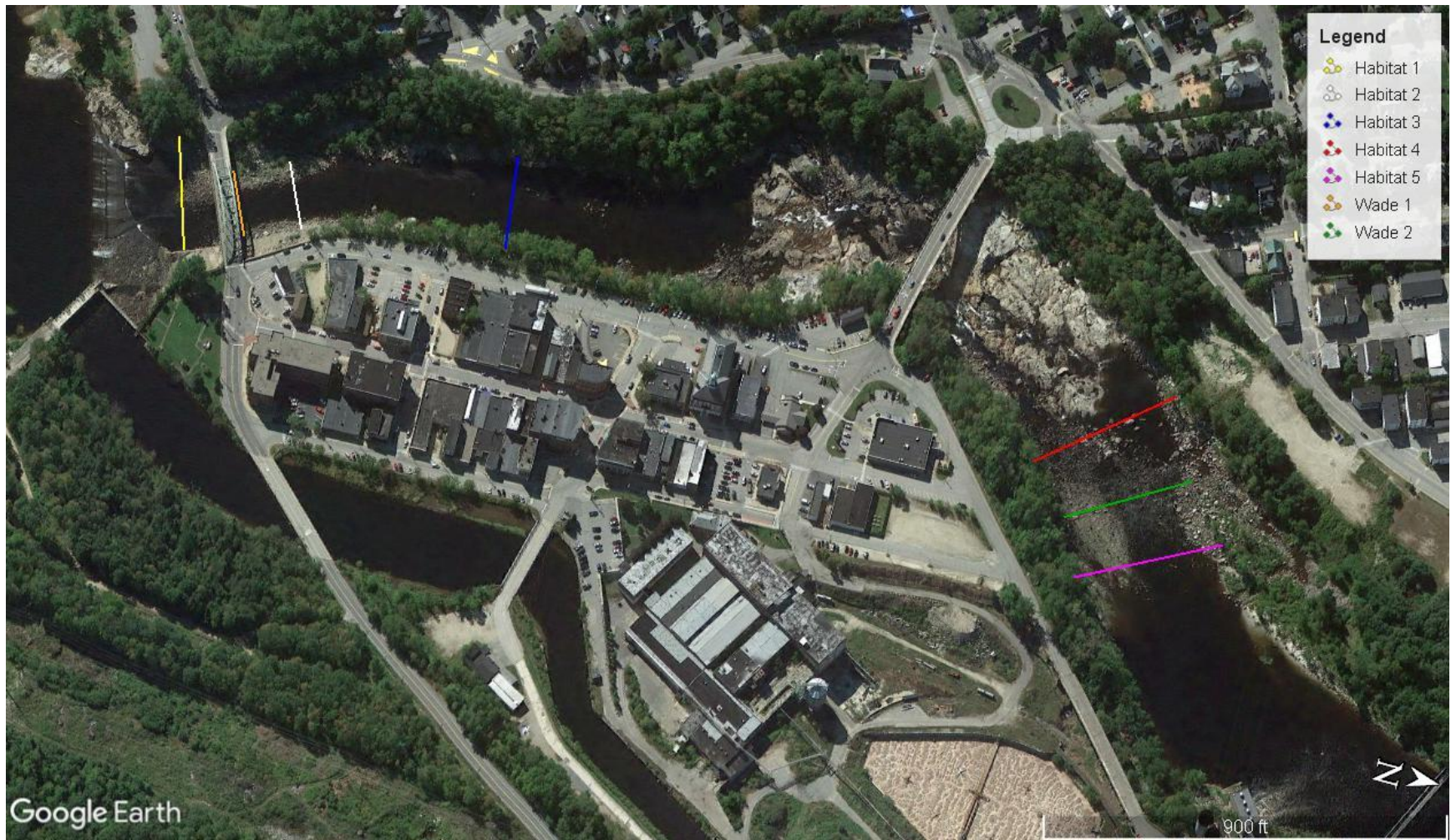


Figure 1. Preliminary transect locations for evaluation of habitat or wading within the Middle Dam bypass reach.

From: Pellerin, James <James.Pellerin@maine.gov>
Sent: Thursday, September 2, 2021 12:14 PM
To: Drew Trested <dtrested@normandeau.com>
Subject: External: RE: Rumford Falls - Middle Dam bypass habitat follow up

Notes look good, may be worthwhile to note that MDEP agreed my thoughts on the binary approach. Wednesday works best for me.

James Pellerin
Regional Fisheries Biologist
Maine Dept of Inland Fisheries & Wildlife
Sebago Lake Regional Headquarters
15 Game Farm Road
Gray, Maine 04039
(207) 287-5765
mefishwildlife.com | [facebook](#) | [twitter](#)

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Attachment C.3 – Correspondence from October 8, 2021

From: Drew Trested

Sent: Friday, October 8, 2021 9:32 AM

To: Pellerin, James <James.Pellerin@maine.gov>

Cc: Anderson, Luke <Luke.Anderson@brookfieldrenewable.com>; Cousens, Dawn <Dawn.Cousens@hdrinc.com>; Browne, Peter <Peter.Browne@hdrinc.com>

Subject: Rumford - Middle Dam bypass reach flow study

Jim –

I wanted to update you on the status of the Rumford Middle Dam bypass flow study. Normandeau was onsite yesterday (October 7) to further scout the proposed transect locations we had identified during our site visit in August. Our focus was on the one “wading” transect and two “habitat” transects we had further discussed in the pool/run section upstream of the cascade and in the riffle/run section downstream of the cascade. You can see these in the attached image for Preliminary Transects. Based on our field visit yesterday we have made a few adjustments to transect positioning. You can see this in the attached image for Updated Transects. These include:

- Eliminated transect Wade 1. This cross section is not wadable across the full channel width under the baseline flow we visited yesterday (i.e., bypass and pressure release pipes flowing and leakage). There is not a good place to cross the channel in the immediate area. Due to similarities in habitat (boulder shoreline tapering into a deep central thalweg) we opted to drop this one and will use transect Habitat 2 as representative of that area.
- Shifted transect Habitat 4 slightly downstream. We had originally placed this one to cover some of the pool area on river left. When observed yesterday the flow at this location was a convergence of inflow coming down the center of the channel and a second source cutting over from river right. This created some eddying and a general non-laminar flow pattern which is inappropriate for a 1D model. As a result we slid slightly downstream. The new location still captures the tail end of the pool on river left but has laminar flow across the reach.
- Shifted transects Habitat 5 and Habitat 6 slightly downstream. This was done to ensure we had appropriate spacing between the transects since we had to slide Habitat 4.

As of today our current plan is to conduct habitat measurements in the reach on Thursday-Friday October 14 and 15. This will obviously be dependent on appropriate river conditions for working in the reach.

Let me know if you have any questions.

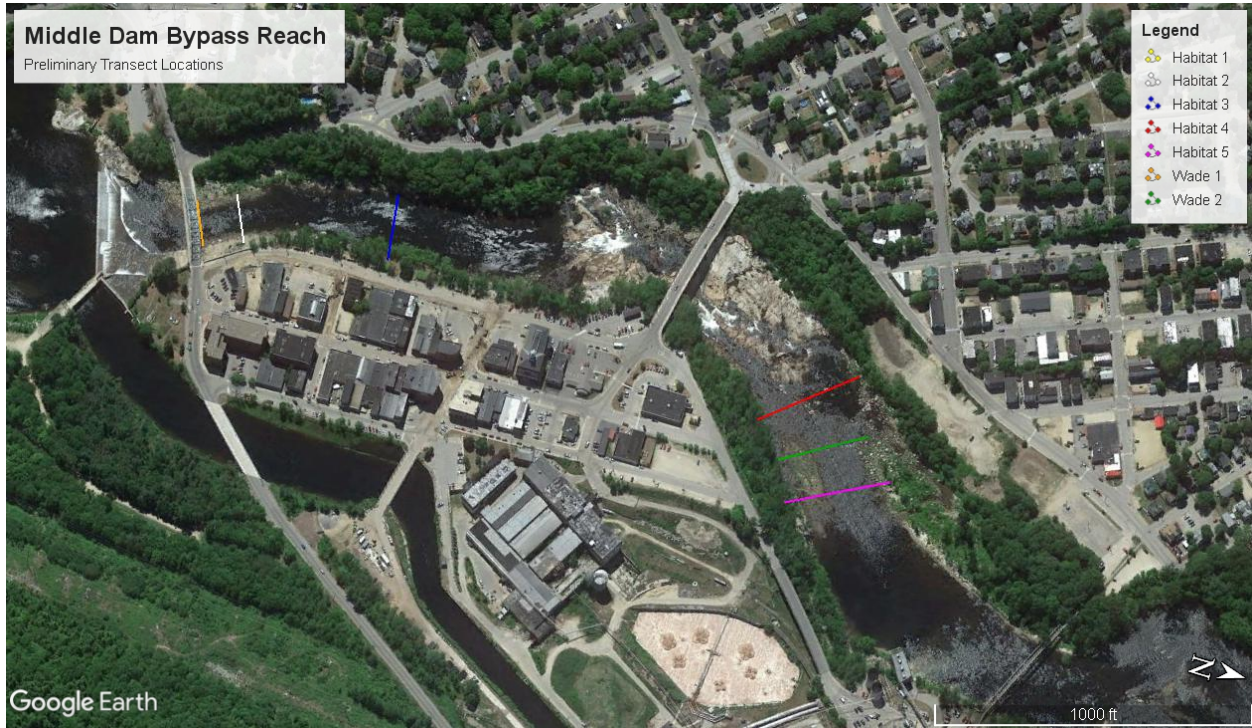
Drew

Drew Trested, PhD
Senior Principal Scientist, Fisheries Biologist
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Preliminary Transects.jpg



Updated Transects.jpg

