Relicensing Study 3.6.3

WHITEWATER BOATING EVALUATION

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

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EXECUTIVE SUMMARY

FirstLight Hydro Generating Company (FirstLight), a subsidiary of GDF SUEZ North America, Inc., is the current licensee of the Northfield Mountain Pumped Storage Project (Northfield Mountain Project, FERC No. 2485) and the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889). FirstLight has initiated with the Federal Energy Regulatory Commission (FERC, the Commission) the process of relicensing the two Projects using FERC's Integrated Licensing Process (ILP).

FERC issued its first study plan determination letter (SPDL) for the Turners Falls and Northfield Projects on September 13, 2013, approving the revised study plan (RSP) with certain modifications. FERC's SPDL required FirstLight to conduct a Whitewater Boating Evaluation in the 2.7-mile long Turners Falls Dam bypass reach (from Turners Falls Dam to Cabot Station), which is the subject of this report. The study objectives were to:

- assess the effects of a range of bypass reach flows on whitewater recreation opportunities;
- determine what watercraft-types would be appropriate to utilize potential bypass reach whitewater flows;
- determine the range of flows (minimum through optimal) needed to support various whitewater boating opportunities by watercraft;
- determine whether current or future demand exists for whitewater boating in the bypass reach;
- determine the number of days per month (and during what months) the acceptable and optimum flows for whitewater boating would be available under the current and any proposed mode of operation for the Turners Falls Project;
- determine any competing recreational uses or other resource needs that may be adversely affected by whitewater boating;
- identify the need for and define adequate access points, if needed, that provide trails and car-top parking at Great Falls Discovery Center, Station No. 1 and Cabot Station, and egress at the end of the 2.7 mile bypass reach run at the confluence of the Deerfield River; and
- conduct an assessment of existing regional whitewater boating opportunities.

Currently, whitewater boating in the bypass reach is available during periods of spill at the Turners Falls Dam, typically during high river flows when the hydraulic capacity of the power canal is exceeded. However, prior to this study, little information was available regarding boating conditions at various bypass reach flows. To aid in the design of this study, local boaters paddled the bypass reach during canal maintenance[1] in the fall of 2013 when all flow was discharged at Turners Falls Dam and during spring 2014 when the hydraulic capacity of the Cabot and Station No. 1 hydroelectric developments were exceeded. Information regarding bypass reach flows during these periods was used in consultation with the boating organizations to help determine the range of flows to be evaluated, and to finalize logistics for the boating evaluation, which was scheduled for the summer of 2014.

[1] During the canal maintenance outage, the canal is dewatered resulting in all flow being diverted at the Turners Falls Dam into the head of the bypass reach.

The whitewater boating evaluation was conducted on July 19, 20, and 21, 2014. A team of boaters representing kayakers, open canoeists, closed canoeists, rafters, catarafters/shredders, and a stand up paddle boarder ran up to six evaluation flows (2,500, 3,500, 5,000, 8,000, 10,000 and 13,000 cfs) over a three-day period. The reach was found to provide an acceptable boating experience for most watercraft type at all six of the study flows, with overall optimal boating conditions for most watercraft type occurring in the 5,000-8,000 cfs range. Additionally, both lower and higher flows rated well with the participants, although the ratings were dependent on type of watercraft and skill level.

Boaters participating in the study were asked to evaluate the boating characteristics and quality of the bypass reach at each of the six flow levels. Using the International Scale of River Difficulty**,** the Turners Falls Dam bypass reach was rated as a Class I to a Class IV whitewater run. However, for most evaluation flows, the Class IV rating was attributed to a single feature, the Rock Dam, a natural bedrock vertical drop in the river gradient located close to the downstream end of the bypass reach.

Regarding potential future use and demand, information collected from the boaters that participated in the July 2014 Turners Falls Dam bypass reach boating evaluation indicates a level of interest for boating flows in the bypass reach, although the interest level is dependent on the magnitude of flow. A hydrologic assessment of the frequency of boatable flows (>2,500 cfs) found that boatable flows can be expected to occur in the spring approximately 74% of the time in April and 38 % of the time in May. Boatable flows can also be expected to occasionally occur during the summer and fall.

Boaters participating in the study were asked to compare the bypass reach with the other regional boating opportunities. Overall, boaters rated most of the other regional rivers as more desirable than the Turners Falls Dam bypass reach, although most participating boaters indicated that they would “possibly” return to the bypass reach. When examined by watercraft, all participants who boated the 2,500 cfs flow in closed canoes, a cataraft/shredder, and SUP indicated they would “probably” or “definitely” return to boat this flow. At the overall optimal flows of 5,000-8,000 cfs boaters were fairly evenly divided among those who would “possibly”, “probably,” and “definitely” return.

Numerous other regional whitewater boating opportunities were identified as part of the study including several reaches of the Deerfield River, the Ashuelot River, the West River and the Millers River. Like the Turners Falls bypass reach, some of the boating opportunities in the region are dependent on natural flows. Thus, these boating opportunities are seasonal in nature, and generally more available in the spring and fall than in the summer. On the other hand, the study identified several regional boating opportunities that are available throughout the recreation season through scheduled flow releases, including two notable boating reaches on the Deerfield River, as well as the West River and the Millers River. Scheduled releases at these rivers provide regional boaters with significant whitewater boating opportunities throughout the recreation season, including in the summer and on weekends.

The study also considered whether whitewater boating in the bypass reach, as a flow dependent activity, could affect other activities and resources. FirstLight is conducting a number of flow-related impact studies as part of the Project relicensing effort to better understand the impacts of bypass reach flows on a variety of resources. Although the results of most of these other studies are not yet available to allow a detailed assessment of the potential for whitewater boating flows to impact other resources, it is expected that there could be concerns about potential impacts to aquatic resources in the bypass reach and to motorized boating on the Turners Falls Impoundment associated with providing high flow releases, exceeding inflow to Turners Falls Dam, into the bypass during periods of the year when high flows would not normally occur in the river. One concern already identified by federal and state fishery agencies is the potential impact of additional or extraordinary flows in the bypass reach on shortnose sturgeon spawning/incubation/rearing periods in late spring and early summer. These potential impacts will be considered further after the other resource studies are completed.

Bypass reach access points were also identified as part of this study. The study identified three areas (fishway put-in, Turners Falls Station No. 1 Fishing Access, Cabot Woods Fishing Access) that currently provide access to the bypass reach, and one site (Poplar Street Access) downstream of the bypass reach that currently serves as both the canoe portage put-in and as a take-out for those boating the bypass reach. Both the fishway put-in area and Turners Falls Station No. 1 Fishing Access could provide adequate access to the bypass reach for skilled and experienced whitewater boaters. The Cabot Woods Fishing Access is not suitable for bypass access due to steep slopes.

Overall, the results of the whitewater boating evaluation of the Turners Falls bypass reach demonstrate that the bypass reach provides whitewater boating opportunities for a variety of water craft and skill levels, over a wide range of flow conditions. Based on an assessment of river hydrology, under existing Project operations, acceptable boating flows typically occur an estimated 40-45 days between April and November. Such spill events can occur anytime throughout the boating season, but are most likely to occur in the spring and fall. Demand for boating in the bypass reach appears to be tempered by the numerous other boating opportunities that occur within close proximity of the Turners Falls Project, many of which are available in the summer and on weekends through scheduled flow releases. Other factors that may influence a boater's decision to utilize the bypass reach during spill events include the short length of the reach, the urban setting, and lack of knowledge regarding bypass spills/flow levels.

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LIST OF ABBREVIATIONS

AMC	Appalachian Mountain Club
AW	American Whitewater
cfs	cubic feet per second
C1	Solo closed canoe
C2	Tandem closed canoe
CRWC	Connecticut River Watershed Council
FCRPT	Friends of the Connecticut River Paddlers' Trail
FERC	Federal Energy Regulatory Commission
FirstLight	FirstLight Hydro Generating Company
ILP	Integrated Licensing Process
MA	Massachusetts
MADCR	Massachusetts Department of Conservation and Recreation
MADFW	Massachusetts Division of Fisheries and Wildlife
mi^2	square miles
NMFS	National Marine Fisheries Service
NEFLOW	New England FLOW
NH	New Hampshire
NOI	Notice of Intent
NPS	National Park Service
OC1	Solo open canoe
PAD	Pre-Application Document
PSP	Proposed Study Plan
RSP	Revised Study Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SPDL	Study Plan Determination Letter
SUP	Stand up paddle board
the Commission	Federal Energy Regulatory Commission
USFWS	U.S. Fish and Wildlife Service
VRC	Vermont River Conservancy
VT	Vermont

1 INTRODUCTION

FirstLight Hydro Generating Company (FirstLight), a subsidiary of GDF SUEZ North America, Inc., is the current licensee of the Northfield Mountain Pumped Storage Project (Northfield Mountain Project, FERC No. 2485) and the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889).

FirstLight has initiated with the Federal Energy Regulatory Commission (FERC, the Commission) the process of relicensing the Northfield Mountain Project and Turners Falls Project using FERC's Integrated Licensing Process (ILP). The current licenses for the Northfield Mountain Project and Turners Falls Project were issued on May 14, 1968 and May 5, 1980, respectively, with both set to expire on April 30, 2018.

As part of the ILP, FERC conducted a public scoping process during which various resource issues were identified. On October 31, 2012, FirstLight filed its Pre-Application Document (PAD) and Notice of Intent (NOI) with FERC. The PAD included FirstLight's preliminary list of proposed studies. On December 21, 2012, FERC issued Scoping Document 1 (SD1) and preliminarily identified resource issues and concerns. On January 30 and 31, 2013, FERC held scoping meetings for the two Projects. FERC issued Scoping Document 2 (SD2) on April 15, 2013.

FirstLight filed its Proposed Study Plan (PSP) on April 15, 2013 and, per the Commission regulations, held a PSP meeting at the Northfield Visitor Center on May 14, 2013. Thereafter, FirstLight held ten resource-specific study plan meetings to allow for more detailed discussions on each PSP and on studies not being proposed.[2] On June 28, 2013, FirstLight filed with the Commission an Updated PSP to reflect further changes to the PSP based on comments received at the meetings. On or before July 15, 2013, stakeholders filed written comments on the Updated PSP. FirstLight filed a Revised Study Plan (RSP) on August 14, 2013 with FERC addressing stakeholder comments. Included in the RSP was Study No. 3.6.3 *Whitewater Boating Evaluation* which was designed to evaluate whitewater boating potential in the Turners Falls Dam bypass reach.

As stated in the Study Plan, the study objectives were to:

- Assess the effects of a range of Turners Falls bypass reach flows on whitewater recreation opportunities;
- Determine what watercraft-types would be appropriate to utilize any potential whitewater flows in the bypass reach;
- Determine the range of flows (minimum through optimal) needed to support various whitewater boating opportunities by watercraft;
- Determine whether current or future demand exists for whitewater boating in the bypass reach;
- Determine the number of days per month (and during what months) the acceptable and optimum flows for whitewater boating would be available under the Turners Falls Project's current and any proposed mode of operation;

[2] The ten meetings were held on May 14, 15, 21, and 22, and June 4, 5, 11, 12, and 14 and August 8.

- Determine any competing recreational uses or other resource needs, such as needs for fisheries and aquatic resources, that may be adversely affected by whitewater boating;

- Identify the need for and define adequate access points, if needed, that provide trails and car-top parking at Great Falls Discovery Center, Station No. 1 and Cabot Station, and egress at the end of the 2.7 mile bypass reach at the confluence of the Deerfield River;

- Conduct an assessment of existing regional whitewater boating opportunities.

FERC approved the study plan for Study No. 3.6.3, in its Study Plan Determination Letter (SPDL) dated September 13, 2013, with modifications. The FERC modifications included a requirement to file a Modified RSP with FERC, including detailed study protocols, logistics, schedules, and methods to access the bypass reach developed in consultation with interested stakeholders before the study is conducted; assessment of at least four controlled releases; and revisions to the evaluation forms.

Consultation on modifications to the RSP was conducted via conference calls with interested stakeholders in October and November 2013. A Modified RSP, which addressed stakeholder comments, was filed with FERC on January 13, 2014. On April 25, 2014, FERC approved the Modified RSP for Study No. 3.6.3 with staff recommended modifications. Those modifications included:

- Halting operation at Cabot Station during the study if boating participants indicate it is negatively impacting study evaluations or it is necessary to have adequate flows for the study evaluations;

- Consultation with boating participants after the first day of flow evaluations to determine not only the volume of the two additional test flows, but also the gate (including bascule gates 1-4 and tainter gates 1-3) which the test flows would be released;

- Any releases from the tainter gates should include any necessary measures to ensure boater safety including, at a minimum, a pre-run flush to clear debris that has accumulated directly behind the gates, and use of a spotter(s) immediately below the dam to identify and warn boaters of passing debris while releases are occurring;

- A reasonable removal of known manmade risks, such as rebar;

- Modification of Question 15 of the Single Flow Evaluation Form to read "*Did you experience any difficulties (e.g., pinned, wrapped boat, swam) or identify any specific risk (e.g., downed trees, woody growth in the river) during your run at this flow? Provide a brief description and location of these experiences or identified risks."*

Whitewater boater stakeholder organizations including New England Flow (NEFLOW), American Whitewater (AW) and the Appalachian Mountain Club (AMC) were consulted on March 10 and April 22, 2014 and were requested to assist with identifying boaters to participate in the flow study. NEFLOW provided FirstLight representatives with updates on boater participants between May 4 and July 16, 2014. A consultation meeting and site visit was held on July 1, 2014 with AW, AMC and NEFLOW to review the Modified RSP and FERC recommendations, and to finalize study plan logistics and details. The whitewater boating evaluation of the bypass reach was conducted on July 19, 20, and 21, 2014.

2 STUDY AREA

The focus of this study was the 2.7 mile Turners Falls Project bypass reach. The study area for the study extends approximately 3.3 miles from the Turners Falls Dam, downstream through the bypass reach, to the Poplar Street Access site in Montague, MA.

The Turners Falls Dam is located on the Connecticut River at river mile 122. It consists of two individual concrete gravity dams, referred to as the Gill Dam and Montague Dam, which are connected by a natural rock island known as Great Island. Below the dam, originating at the gatehouse, is the Turners Falls power canal. The power canal is approximately 2.1 miles long and has a design capacity of approximately 18,000 cubic feet per second (cfs). Associated with this power canal are two Project hydroelectric generating facilities: Station No. 1 and Cabot Station. Station No. 1 is located approximately 0.9 miles downstream of the gatehouse and has a hydraulic capacity of 2,210 cfs. Cabot Station is located at the downstream terminus of the power canal, where it rejoins the main stem of the Connecticut River. The station has a total hydraulic capacity of approximately 13,728 cfs (FirstLight PAD 2012). Paralleling the power canal is a 2.7 mile long bypass reach of the Connecticut River. Flows in the bypass reach result from the spilling of water at the Turners Falls Dam. Being located part-way down the bypass reach, flow releases from Station No. 1 also have a direct effect on flow in the lower 1.2 miles of the bypass reach. In addition, the Turners Falls bypass reach receives flow from one major tributary, the Fall River, which discharges into the upstream end of the bypass reach approximately 0.16 miles below the dam. The drainage area of Fall River is approximately 34.2 mi^2 (FirstLight PAD 2012).

The Turners Falls Project is operated in conjunction with the Northfield Mountain Project. The operation of the Turners Falls Project is governed by the magnitude of river flows, which are largely determined by discharges from the upstream hydropower projects on the river, and the need for power. Under the current FERC license for the Turners Falls Project, FirstLight is required to release a continuous minimum flow of 1,433 cfs or inflow, whichever is less below the Project. FirstLight typically maintains the minimum flow requirement through discharges at Cabot Station and/or Station No. 1. The FERC license also requires a continuous minimum flow of 200 cfs in the bypass reach starting on May 1, and increasing to 400 cfs when fish passage starts by releasing flow through a bascule gate on the Turners Falls Dam. The 400 cfs continuous minimum flow is provided through July 15, unless the upstream fish passage season has concluded early, in which case the 400 cfs flow is reduced to 120 cfs to protect shortnose sturgeon. The 120 cfs continuous minimum flow is maintained in the bypass reach from the date the fishways are closed (or by July 16) until the river temperature drops below 7°C, which typically occurs around November 15th (FirstLight PAD 2012).

3 METHODOLOGY

As outlined in the Modified RSP, the Whitewater Boating Evaluation study was comprised of five specific tasks: boating evaluation protocol, logistics and schedule development, on-water boating evaluation, identification and evaluation of access to the bypass reach, data review and analysis, and report preparation. The methods associated with each task are described in the following sections.

3.1 Boating Evaluation Protocol, Logistics and Schedule Development

AMC, AW and NEFLOW were consulted on March 10 and April 22, 2014 and were requested to assist with identifying boaters to participate in the flow study. The boating organizations recruited local and regional boaters for participation in the 2014 evaluation and provided FirstLight with updates on boater participants between May 4 and July 16, 2014. A consultation meeting and site visit was held on July 1, 2014 with AMC, AW, and NEFLOW to review the study plan, finalize study plan logistics, study dates, study photo/video locations and the daily ranges of flows to be evaluated over the course of the study. Anecdotal information obtained from whitewater boaters who ran the bypass reach during a Turner Falls Canal maintenance[3] event in the fall of 2013 was also useful in determining flows to be evaluated during the formal whitewater boating evaluation.

Based on this consultation, details of the study logistics were agreed upon in advance with participating stakeholders. The Turners Falls Fishway parking was used as a meeting and staging area for the study, and boater and boat shuttle vehicles ran from the staging area to the put-in area below Turners Falls Dam (the "fishway put-in") and from the take-out (Poplar Street Access) to the staging area during the evaluation. Four photo/video locations, including the Gill-Montague Bridge, were selected and utilized throughout the evaluation.

Dates and a proposed range of flows for each day were tentatively established as follows:

- July 19 – a range between 2,500 and 4,000 cfs
- July 20 – a range between 4,500 and 8,500 cfs
- July 21 – a range between 9,000 and 13,000 cfs

The Modified RSP did provide flexibility to adjust flows during the evaluation based on boater participant recommendations.

Prior to the whitewater evaluation, FirstLight coordinated closely with TransCanada, the licensee of the upstream Vernon Hydroelectric Project (FERC No. 1904), to ensure the proper volume of was conveyed from the upstream dam so as to make the desired releases for the evaluation because flows of this magnitude are typically not available in July. TransCanada was releasing extra water downstream in conjunction with a test at an upstream plant on the dates the whitewater evaluation was conducted, and combined with an inch of rain received the week prior to the whitewater evaluation, upstream flows during the evaluation were higher than normal. Without the coordination with TransCanada and the

[3] During the canal maintenance, the canal is dewatered resulting in all flow being conveyed at the Turners Falls Dam into the head of the bypass reach.

additional water releases from its upstream dam, FirstLight would not have been able to provide the whitewater flows used during the 3-day evaluation.

Prior to conducting the 3-day evaluation, measures were taken to help insure boater safety during the evaluation. The bypass reach was inspected for the presence of rebar, and where rebar was found, it was removed if it could be done so in a safe and reasonable manner.

At the Poplar Street access site downstream of Cabot Station that was used as the take-out site for the study, a secure hand line from the top of the bank to the shoreline was installed. In addition, to help facilitate the movement of large numbers of watercraft participating in the study, an electric winch and staff were provided at the take-out to assist with boat retrieval. Vehicle shuttles transported participants and watercraft from the take-out to the staging area.

Local emergency agencies were notified of the study schedule and study area. The local boating community and camp owners on the Turners Falls Impoundment were also notified of the study and potential impoundment fluctuations that might occur due to the evaluation.

3.2 On-Water Boating Evaluation

The whitewater boating evaluation was conducted on July 19, 20 and 21, 2014. At the beginning of each day, safety discussions were conducted by FirstLight staff and by a member of the boating team. Boaters and their watercraft were shuttled to the fishway put-in area (some walked and carried their boats to the put-in from the staging area). The four (4) photo and video locations (Gill-Montague Bridge, river right[4] near the confluence of the Fall River, river left approximately 500 feet downstream of the put-in site, and river left at Rock Dam) were manned and still and video footage recorded at each site for each of the six (6) evaluation flows. The photo and video locations, as well as the staging area, put-in and take-out sites are shown in Figure 3.2-1.

Flows for the study were released from bascule gate 1, closest to the gatehouse, and bascule gate 4. Of the four bascule gates, bascule gate 1 is “pond following” meaning that the operator will adjust the gate to pass the desired flow and if the Turners Falls Impoundment level changes during the whitewater evaluation, the bascule gate will adjust automatically to maintain the desired flow. Flows from the gate were calculated based on the gate setting and the bascule gate rating curves, as provided by the manufacturer.

The 2,500 cfs and 3,500 cfs flows were released from bascule gate 1, the 5,000 cfs, 8,000 cfs, and 10,000 cfs flows were released from bascule gate 4, and 10,000 cfs and 3,000 cfs were released from bascule gates 4 and 1, respectively, during the 13,000 cfs flow. This gate operation arrangement simulated normal gate operating conditions for naturally occurring flows of these magnitudes.

On July 19th, twenty-six (26) boaters ran and evaluated the bypass reach at 2,500 and 3,500 cfs. Participant boater experience/skill levels ranged from “novice” to “expert.” Watercraft used for these flows included hard shell kayaks, solo open canoes (OC1), solo closed canoes (C1), rafts, cataraft/shredders. There also was one stand up paddle board (SUP).

On July 20th, twenty-two (22) and twenty-one (21) boaters ran and evaluated the bypass reach at 5,000 and 8,000 cfs, respectively. Boaters’ experience levels were the same as on the 19th. Watercraft used for these flows included hard shell kayaks, OC1s, C1s, and rafts, cataraft, a C2, and a SUP.

[4]River right assumes one is looking in a downstream direction.

On July 21st, thirty (30) and twenty-six (26) boaters ran and evaluated the bypass reach at 10,000 and 13,000 cfs, respectively. Boaters' experience levels were the same as on the 19th. Watercraft used for these flows included hard shell kayaks, OC1s, solo closed canoes (C1), and rafts.

After boating each test flow, the participants completed a "Single Flow Evaluation Form" (Appendix A). Boaters were asked to rate various whitewater characteristics of the bypass reach; whitewater classification of the flow; whether they would choose to paddle that specific flow again in the future; whether they would prefer a higher or lower flow level than the evaluated release; rate the access to and from the bypass reach (i.e., put-in and take-out sites); specific challenges; and whether they portaged any features at that specific flow.

After the final run (13,000 cfs on July 21, 2014), boaters also completed a "Comparative Flow Evaluation Form" (Appendix B) that allowed the boaters to compare all of the flows they boated over the course of the three-day evaluation. Specifically, the boaters were asked to determine the minimum acceptable and optimal flows; factors important to boater satisfaction; suitability of the evaluated flows for watercraft and skill level, and a comparison of the boating flows in the bypass reach to other local and regional rivers that provide whitewater boating opportunities.

After the forms were completed, a post-evaluation discussion was conducted to collect additional information and input from the boaters regarding the whitewater opportunities found in the bypass reach. Margin notes from the boaters' evaluation forms and the post-evaluation discussion are summarized in Appendix C.

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.6.3
Whitewater Boating Evaluation

Figure 3.2-1: Whitewater Evaluation, Photo and Video Locations

N

0 1,500 3,000 6,000 Feet

Path: W:\gis\studies\3_6_3\maps\Figure 3.2-1.mxd

3.3 Identification and Evaluation of Access to the Turners Falls Bypass Reach

Several formal and informal recreation and access sites associated with this study were identified during the consultation meeting and field site visit with the boating organizations (AW, AMC, NEFLOW) on July 1, 2014. This included the staging area, the fishway put-in, Cabot Woods Fishing Access and Poplar Street Access. In accordance with FERC's letter of January 22, 2015 regarding Study No. 3.6.2 - *Recreation Facilities Inventory and Assessment*, additional assessments will be conducted in 2015 for the fishway put-in, Cabot Woods Fishing Access and Poplar Street Access sites.

3.4 Data Review and Analysis

Whitewater boating evaluation forms completed by the boating study participants were the primary data analyzed for this study. Evaluation forms were used to determine the boaters' preferences for various bypass reach flows, particularly as those flows related to the whitewater boating experience, and whitewater features that they encountered. Evaluation forms were also analyzed to gain additional insight regarding the whitewater boating experience provided in the bypass reach at various flows, particularly as it relates to other regional whitewater boating opportunities. Post-evaluation discussion comments from the boating study participants were also evaluated.

In addition to the evaluation of the whitewater boating forms, some other data sources were utilized for this study, including boating guides, reports and studies on boating/whitewater boating trends, and Turners Falls historical flow information. All referenced materials are cited in the References section of this report.

4 WHITEWATER RECREATION FLOW STUDY RESULTS AND DISCUSSION

4.1 Description of Boating Features in the Turners Falls Bypass Reach

The focus of the study was the 2.7 mile bypass reach from the Turners Falls Dam to Cabot Station. Boating characteristics of the reach are highly variable and the bypass reach exhibits a combination of whitewater features interspersed with longer stretches of flat water or riffles. Boaters who participated in the study identified and evaluated several specific whitewater boating features. Starting at the dam, the first approximately 2,500 feet of the bypass reach are characterized by a series of rock ledges and out-croppings, which create a whitewater play area under a range of flows. Boaters found this area to be boatable at all of the flows tested, and depending on the flow, rated this stretch as Class II-IV. Downstream of the play area, the bypass reach is characterized by a series of riffles and some flat water, with another Class II-III feature just before the Station No. 1 powerhouse, located about 4,000 feet downstream of the Turners Falls Dam. Below Station No. 1 is an area of riffles and small rapids, interspersed with flat water. Approximately 4,000 feet downstream of Station No. 1, paddlers encounter Rawson Island, with boatable channels on both sides of the island. Boaters utilizing the larger left channel encounter the Rock Dam feature, approximately 5,000 feet downstream of Station No. 1. This natural rock ledge feature was rated Class III-IV by most boaters at most flows, and some boaters chose to portage this ledge. Boaters utilizing the right channel reported a series of small Class II-III riffles and rapids. From Rock Dam to Cabot Station is a reach of about 4,000 feet which is mixture of flat water and riffle areas before reaching Cabot Station.

4.2 Assessment of Whitewater Boating Opportunities in the Bypass Reach

Forty-two (42) different boaters participated in some portion of the whitewater boating study. Table 4.2-1 provides a summary of the whitewater boating study participants, by day and flow.

Table 4.2-1: Bypass Reach Whitewater Boating Study Participation in Test Flows by Watercraft

	Kayak	C1/C2	OC1	Cataraft/ Shredder	Rafts	SUP
July 19 – 2,500 cfs	10	2	8	1	4	1
July 19 – 3,500 cfs	8	2	6	5	4	1
July 20 – 5,000 cfs	10	2	5	2	2	1
July 20 – 8,000 cfs	9	2	5	2	2	1
July 21 – 10,000 cfs	11	2	5	0	12	0
July 21 – 13,000 cfs	11	1	4	0	10	0

The majority of the boater participants (27 or 64%) had not previously boated the bypass reach. But, 15 participants had boated the bypass reach ranging from one-to-five times (11 or 26%), six-to-ten times (3 or 7%), and more than twenty times (1 or 2%).

Boaters were asked to evaluate each flow based on their watercraft and skill level for various characteristics, rating each characteristic on a scale of five from -2 (totally unacceptable) to 2 (totally acceptable). Boaters also provided an “overall” rating for each of the six flows. Responses for each of the rated characteristics were averaged by flow and watercraft type, although solo closed canoe (C1) and tandem closed canoe (C2) were combined as a single watercraft type because only the 5,000 cfs flow was boated in a C2 (by the C1 boater participants). Similarly, cataraft and shredder (inflatable cataraft) were combined as a single watercraft type because only the 3,500 cfs flow was boated with a shredder. A

"weighted average rating" was calculated based on all of the rated characteristics by flow and watercraft type, excluding the boater participants' "overall rating", for each watercraft type by flow.

Flow Suitability and Difficulty

Boaters were asked to rate the flow suitability on a scale of five from "totally unacceptable" (-2) to totally acceptable (2), and if rated as unacceptable indicate if the flow was "too low" or "too high" and the perceived difficulty of the bypass reach at each flow for a "typical user". Table 4.2-2 summarizes flow suitability by watercraft based on boater participant responses.

With regard to suitability, all six of the test flows were deemed suitable for whitewater boating in one or more of the watercraft types. A flow of 2,500 cfs was deemed acceptable or better by those using kayaks, open canoes (OC1), closed canoes (C1/C2) and SUPs. Only those in rafts deemed 2,500 cfs to be an unacceptable flow. Flows of 3,500 and 5,000 cfs were also deemed to be acceptable or totally acceptable for all watercraft type but rafts. A flow of 8,000 cfs release was judged to be acceptable or totally acceptable to all watercraft types. While no other flows were rated unacceptable by any watercraft type, one kayaker indicated the 10,000 cfs flow was too high and one indicated that it was too low; two OC1 boaters indicated the 10,000 cfs flow was too high; two rafters indicated that 3,500 cfs flow was too low; and one rafter indicated the 10,000 and 13,000 flows were too high.

Table 4.2-2: Bypass Reach Flow Suitability by Watercraft

Watercraft	Flow 1 2,500 cfs	Flow 2 3,500 cfs	Flow 3 5,000 cfs	Flow 4 8,000 cfs	Flow 5 10,000 cfs	Flow 6 13,000 cfs
Kayaks	Acceptable (0.60)	Acceptable (0.63)	Acceptable (1.27)	Totally Acceptable (1.67)	Acceptable (1.09)	Acceptable (1.18)
OC1	Acceptable (0.75)	Acceptable (1.00)	Acceptable (1.20)	Acceptable (1.25)	Acceptable (0.66)	Neutral (0.50)
Rafts	Unacceptable (-0.75)	Neutral (0.00)	No response	Acceptable (1.00)	Acceptable (1.10)	Acceptable (1.00)
C1/C2	Acceptable (1.50)	Acceptable (1.50)	Acceptable (1.00)	Totally Acceptable (2.00)	Acceptable (1.00)	Acceptable (1.00)
Cataraft/Shredder	No response	Acceptable (1.20)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
SUP	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run

Boating participants were also asked about the perceived difficulty of the boating runs for the six flows. The perceived difficulty rating was based on the International Scale of River Difficulty (i.e., whitewater classification; Class I to Class IV) for a boater with little-to-no prior experience with boating the bypass reach at various flows. As summarized in Table 4.2-3, the perceived difficulty of each flow varied by watercraft. Only the OC1 boaters rated the flows from 8,000 cfs and above as Class IV whitewater. Overall, the results indicate that at the flows tested, the bypass reach provides a range (from Class I to Class IV) of whitewater opportunities.

The majority of the boater participants had years of boating experience on various rivers as well as teaching and commercial guide experience and were asked to rate the difficulty of the bypass using the International Scale of River Difficulty based on their knowledge, experience and background. Their responses are summarized in Table 4.2-3.

Based on the overall boater participants' having years of experience, the bypass reach ranges from a Class I-II run (OC1's at 2,500 cfs) to a Class III-IV run (OC1's at 13,000 cfs), again reflecting a range of different boating opportunities depending on watercraft used and flows.

Table 4.2-3: Bypass Reach Difficulty based on the International Scale of River Difficulty by Watercraft by Flow

Watercraft	Flow 1 2,500 cfs	Flow 2 3,500 cfs	Flow 3 5,000 cfs	Flow 4 8,000 cfs	Flow 5 10,000 cfs	Flow 6 13,000 cfs
Hard shell kayak	I to III	II to III	II to IV	II+ to IV	II to IV	I[5] to IV
Solo Open Canoe (OC1)	I to II	II to III+	II to IV	II to IV	III	III to IV
Raft	II to III	I to III	I to IV	II to III	I to III+	II to III
Closed canoe (C1 and C2)	II	II to II+	II to II+	II to III	II+ to III	III
Cataraft/Shredder	II	II to III+	II to III	II to III	Did not run	Did not run
Stand Up Paddle Board (SUP)	II to III	II to III	III	III	Did not run	Did not run
OVERALL RATING	I to III	II to III	II-IV	II to IV	II-IV	II-IV

Kayaker Ratings

Kayaker responses to the bypass reach flow characteristics are summarized in Table 4.2-4. The kayakers rated the navigability of all six flows as either "acceptable" (3,500 cfs) or "totally acceptable" (2,500, 5,000, 8,000, 10,000 and 13,000 cfs) with the 8,000 cfs receiving the highest overall rating (2.00). The kayakers' overall rating of 2,500 and 3,500 cfs was "neutral" (-0.44 and 0.37, respectively). Characteristics related to whitewater features (availability of challenging technical boating, powerful hydraulics, whitewater play areas, and overall whitewater challenge) received "neutral" to "unacceptable" ratings at 2,500 and 3,500 cfs. The remaining four flows (5,000, 8,000, 10,000 and 13,000 cfs) had overall ratings of "acceptable" with the 8,000 cfs flow receiving the highest overall rating (1.44) from the boaters. The 8,000 cfs flow also was rated the preferred flow based on the weighted average calculation (1.42) of the flow characteristics.

[5] One expert kayaker rated the 13,000 cfs release as a Class I on the low end of the range.

Table 4.2-4: Bypass Reach Whitewater Flow Characteristics by Flow – Kayaks

Hard Shell Kayaks						
Characteristic	**Flow 1 2,500 cfs (N = 10)**	**Flow 2 3,500 cfs (N = 8)**	**Flow 3 5,000 cfs (N = 10)**	**Flow 4 8,000 cfs (N = 9)**	**Flow 5 10,000 cfs (N = 11)**	**Flow 6 13,000 cfs (N = 11)**
Navigability	Totally Acceptable (1.78)	Acceptable (1.37)	Totally Acceptable (1.90)	Totally Acceptable (2.00)	Totally Acceptable (1.81)	Totally Acceptable (1.80)
Availability of challenging technical boating	Unacceptable (-0.60)	Unacceptable (-0.71)	Acceptable (1.00)	Acceptable (1.33)	Acceptable (1.18)	Acceptable (1.18)
Availability of powerful hydraulics	Unacceptable (-0.80)	Neutral (-0.12)	Acceptable (0.70)	Acceptable (1.44)	Acceptable (1.00)	Acceptable (1.27)
Availability of whitewater play areas	Unacceptable (-0.77)	Neutral (-0.12)	Acceptable (0.85)	Acceptable (1.44)	Acceptable (1.18)	Acceptable (1.45)
Overall whitewater challenge	Unacceptable (-0.70)	Neutral (-0.12)	Acceptable (0.80)	Acceptable (1.11)	Acceptable (0.77)	Acceptable (1.27)
Safety	Acceptable (1.33)	Acceptable (1.37)	Totally Acceptable (1.90)	Totally Acceptable (1.89)	Totally Acceptable (1.63)	Totally Acceptable (1.54)
Aesthetics	Acceptable (1.40)	Acceptable (1.25)	Acceptable (1.40)	Totally Acceptable (1.55)	Acceptable (1.00)	Acceptable (1.09)
Length of run	Acceptable (0.90)	Acceptable (1.00)	Acceptable (1.30)	Acceptable (1.11)	Acceptable (0.81)	Acceptable (0.81)
Number of portages	Acceptable (1.33)	Acceptable (1.25)	Acceptable (1.40)	Acceptable (1.11)	Acceptable (0.91)	Acceptable (1.09)
Boating instruction	Acceptable (0.80)	Acceptable (1.00)	Acceptable (1.10)	Acceptable (1.22)	Acceptable (0.63)	Acceptable (0.63)
Overall rating	Neutral (-0.44)	Neutral (0.37)	Acceptable (1.10)	Acceptable (1.44)	Acceptable (1.27)	Acceptable (1.13)
Weighted Average Rating	Neutral (0.42)	Acceptable (0.63)	Acceptable (1.24)	Acceptable (1.42)	Acceptable (1.09)	Acceptable (1.21)

Open Canoe Ratings

The OC1 boaters rated the navigability of all six flows as “totally acceptable” with the 5,000, 8,000 and 10,000 cfs flows receiving the highest rating (2.00). OC1 boaters also rated the 2,500 cfs flow neutral (-0.38) overall with the four whitewater related characteristics being rated as “neutral” to “unacceptable”.

All other flows received overall ratings of "acceptable" with the 10,000 cfs flow having the highest overall boater rating of 1.40. However, based on the weighted average of the flow characteristics, the 8,000 cfs flow is rated as the preferred flow (1.45) for solo open canoeists as shown in Table 4.2-5.

Table 4.2-5: Bypass Reach Whitewater Flow Characteristics by Flow – Solo Open Canoes

Solo Open Canoe (OC1)						
Characteristic	**Flow 1 2,500 cfs (N = 8)**	**Flow 2 3,500 cfs (N = 6)**	**Flow 3 5,000 cfs (N = 5)**	**Flow 4 8,000 cfs (N = 5)**	**Flow 5 10,000 cfs (N = 5)**	**Flow 6 13,000 cfs (N = 4)**
Navigability	Totally Acceptable (1.71)	Totally Acceptable (1.83)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (1.75)
Availability of challenging technical boating	Unacceptable (-0.62)	Acceptable (0.83)	Acceptable (1.00)	Acceptable (1.40)	Totally Acceptable (1.60)	Totally Acceptable (1.75)
Availability of powerful hydraulics	Unacceptable (-1.13)	Neutral (-0.16)	Neutral (0.40)	Acceptable (1.20)	Acceptable (1.00)	Acceptable (1.50)
Availability of whitewater play areas	Neutral (-0.38)	Neutral (0.17)	Acceptable (0.80)	Acceptable (1.40)	Totally Acceptable (1.80)	Acceptable (1.50)
Overall whitewater challenge	Unacceptable (-0.88)	Neutral (0.17)	Acceptable (0.60)	Acceptable (1.20)	Acceptable (1.40)	Totally Acceptable (1.75)
Safety	Totally Acceptable (1.88)	Totally Acceptable (1.83)	Acceptable (1.20)	Totally Acceptable (1.80)	Acceptable (1.20)	Acceptable (1.25)
Aesthetics	Acceptable (0.88)	Acceptable (0.83)	Neutral (0.40)	Acceptable (1.00)	Acceptable (0.60)	Acceptable (0.75)
Length of run	Acceptable (1.13)	Acceptable (1.17)	Acceptable (0.60)	Acceptable (1.40)	Acceptable (1.00)	Acceptable (1.25)
Number of portages	Acceptable (1.25)	Acceptable (1.17)	Acceptable (1.20)	Totally Acceptable (2.00)	Totally Acceptable (1.60)	Acceptable (1.33)
Boating instruction	Acceptable (1.00)	Acceptable (1.17)	Acceptable (0.80)	Acceptable (1.20)	Neutral (0.20)	Neutral (0.25)
Overall rating	Neutral (-0.38)	Acceptable (1.00)	Acceptable (1.20)	Acceptable (1.20)	Acceptable (1.40)	Acceptable (1.25)
Weighted Average Rating	Neutral (0.47)	Acceptable (0.90)	Acceptable (0.90)	Acceptable (1.45)	Acceptable (1.30)	Acceptable (1.31)

Whitewater Raft Ratings

Table 4.2-6 summarizes whitewater rafter responses and ratings regarding the test flow characteristics. The rafters rated the navigability of all six flows as "acceptable" (2,500 cfs, 3,500 cfs, 5,000 cfs, 8,000 cfs, 13,000 cfs) or "totally acceptable" (10,000 cfs). Flows of 2,500 and 3,500 cfs received overall ratings of "neutral" (-0.50 and 0.13, respectively) from rafting participants. Characteristics related to whitewater features (availability of challenging technical boating, powerful hydraulics, whitewater play areas, and overall whitewater challenge) received "neutral" to "unacceptable" ratings at both 2,500 and 3,500 cfs. The remaining four flows had overall ratings of "acceptable" with the 8,000 cfs flow receiving the highest overall boater rating (1.50) as well as the highest weighted average rating (1.05).

Table 4.2-6: Bypass Reach Whitewater Flow Characteristics by Flow - Rafts

Raft						
Characteristic	**Flow 1 2,500 cfs (N = 4)**	**Flow 2 3,500 cfs (N = 4)**	**Flow 3 5,000 cfs (N = 2)**	**Flow 4 8,000 cfs (N = 2)**	**Flow 5 10,000 cfs (N = 12)**	**Flow 6 13,000 cfs (N = 10)**
Navigability	Acceptable (0.75)	Acceptable (1.50)	Acceptable (1.50)	Acceptable (1.50)	Totally Acceptable (1.54)	Acceptable (1.30)
Availability of challenging technical boating	Neutral (-0.50)	Neutral (-0.25)	Neutral (0.50)	Acceptable (1.50)	Acceptable (0.75)	Neutral (0.30)
Availability of powerful hydraulics	Unacceptable (-1.00)	Unacceptable (-0.75)	Neutral (-0.50)	Acceptable (1.25)	Acceptable (0.92)	Acceptable (0.60)
Availability of whitewater play areas	Neutral (-0.50)	Neutral (-0.50)	Neutral (0.00)	Acceptable (1.25)	Acceptable (1.00)	Acceptable (1.20)
Overall whitewater challenge	Unacceptable (-1.00)	Neutral (-0.25)	Neutral (0.50)	Acceptable (1.50)	Neutral (0.50)	Neutral (0.40)
Safety	Acceptable (1.50)	Acceptable (1.00)	Acceptable (1.50)	Acceptable (1.50)	Acceptable (1.50)	Acceptable (1.40)
Aesthetics	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)
Length of run	Neutral (0.00)	Neutral (-0.50)	Neutral (0.50)	Acceptable (1.00)	Acceptable (0.75)	Acceptable (0.90)
Number of portages	Neutral (0.50)	Acceptable (1.25)	Neutral (0.00)	Neutral (0.00)	Acceptable (1.00)	Acceptable (0.56)
Boating instruction	Acceptable (0.75)	Acceptable (1.00)	Neutral (0.00)	Neutral (0.00)	Acceptable (0.67)	Acceptable (0.70)
Overall rating	Neutral (-0.50)	Neutral (0.13)	Acceptable (1.00)	Acceptable (1.50)	Acceptable (1.33)	Acceptable (1.10)

Raft						
Characteristic	**Flow 1 2,500 cfs (N = 4)**	**Flow 2 3,500 cfs (N = 4)**	**Flow 3 5,000 cfs (N = 2)**	**Flow 4 8,000 cfs (N = 2)**	**Flow 5 10,000 cfs (N = 12)**	**Flow 6 13,000 cfs (N = 10)**
Weighted Average Rating	Neutral (0.13)	Neutral (0.33)	Neutral (0.50)	Acceptable (1.05)	Acceptable (0.96)	Acceptable (0.83)

Closed Canoe Ratings

The closed canoeists rated navigability of five of the six flows as “acceptable” (2,500 cfs, 5,000 cfs, and 10,000 cfs) or “totally acceptable” (3,500 cfs and 8,000 cfs), with one flow, 13,000 cfs being rated as “neutral”. As illustrated in Table 4.2-7, C1 and C2 boaters rated all six flows as “acceptable” with all flows receiving an overall boater rating of 1.00. Weighted average ratings of the test flows indicate the 8,000 cfs flows is the preferred flow with a rating of 1.35.

Table 4.2-7: Bypass Reach Whitewater Flow Characteristics by Flow – Closed Canoes

Solo (C1) and Tandem (C2) Closed Canoe						
Characteristic	**Flow 1 2,500 cfs (N = 2)**	**Flow 2 3,500 cfs (N = 2)**	**Flow 3* 5,000 cfs (N = 2)**	**Flow 4 8,000 cfs (N = 2)**	**Flow 5 10,000 cfs (N = 2)**	**Flow 6 13,000 cfs (N = 1)**
Navigability	Acceptable (1.5)	Totally Acceptable (2.00)	Acceptable (1.5)	Totally Acceptable (2.00)	Acceptable (1.50)	Neutral (0.00)
Availability of challenging technical boating	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.50)	Acceptable (1.50)	Acceptable (1.00)
Availability of powerful hydraulics	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.5)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)
Availability of whitewater play areas	Acceptable (1.00)	Acceptable (1.25)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)
Overall whitewater challenge	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.50)	Acceptable (1.00)	Acceptable (1.00)
Safety	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)
Aesthetics	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Acceptable (1.5)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Acceptable (2.00)
Length of run	Acceptable (1.00)	Acceptable (1.50)	Acceptable (1.00)	Acceptable (1.50)	Acceptable (1.50)	Acceptable (1.00)
Number of portages	Acceptable (1.00)	Acceptable (1.50)	Acceptable (0.50)	Acceptable (1.00)	Acceptable (1.00)	Neutral (0.00)
Boating instruction	Totally Acceptable (2.00)	Acceptable (1.00)	Acceptable (1.5)	Neutral (0.00)	Neutral (0.00)	Neutral (0.00)
Overall rating	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)
Weighted Average Rating	Acceptable (1.21)	Acceptable (1.33)	Acceptable (1.15)	Acceptable (1.35)	Acceptable (1.25)	Acceptable (0.90)

*Flows evaluated by C2 boaters

Cataraft and Shredder Ratings

Catarafts were run on the 2,500, 3,500, 5,000 and 8,000 cfs flows and a shredder (inflatable cataraft) was run on the 3,500 cfs flow. These boaters rated the navigability of the four flows run as "totally acceptable" with all four flows being rated equally. Overall, the 2,500 cfs flow was rated as "neutral", the 3,500 cfs flow was rated as "acceptable", and the remaining flows were rated as "totally acceptable" by the boaters with scores of 2.00. Based on flow characteristics, weighted average ratings indicate the 5,000 and 8,000 cfs are the preferred flows with ratings of 1.95 and 2.00, respectively, as shown in Table 4.2-8.

Table 4.2-8: Bypass Reach Whitewater Flow Characteristics by Flow – Cataraft and Shredder

Cataraft and Shredder						
Characteristic	**Flow 1 2,500 cfs (N = 1)**	**Flow 2* 3,500 cfs (N = 5)**	**Flow 3 5,000 cfs (N = 2)**	**Flow 4 8,000 cfs (N = 2)**	**Flow 5 10,000 cfs (N = 0)**	**Flow 6 13,000 cfs (N = 0)**
Navigability	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Availability of challenging technical boating	Acceptable (1.00)	Acceptable (0.6)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Availability of powerful hydraulics	Neutral (0.00)	Acceptable (0.80)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Availability of whitewater play areas	Acceptable (0.00)	Acceptable (0.60)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Overall whitewater challenge	Neutral (0.00)	Acceptable (0.60)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Safety	Neutral (0.00)	Acceptable (1.40)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Aesthetics	Acceptable (1.00)	Totally Acceptable (1.80)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Length of run	Neutral (0.00)	Acceptable (1.60)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Number of portages	Neutral (0.00)	Acceptable (1.60)	Acceptable (1.5)	Totally Acceptable (2.00)	Did not run	Did not run
Boating instruction	No response	Acceptable (1.20)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run

Cataraft and Shredder						
Characteristic	**Flow 1 2,500 cfs (N = 1)**	**Flow 2* 3,500 cfs (N = 5)**	**Flow 3 5,000 cfs (N = 2)**	**Flow 4 8,000 cfs (N = 2)**	**Flow 5 10,000 cfs (N = 0)**	**Flow 6 13,000 cfs (N = 0)**
Overall rating	Totally Acceptable (2.00)	Acceptable (1.40)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Weighted Average Rating	Neutral (0.44)	Acceptable (1.22)	Totally Acceptable (1.95)	Totally Acceptable (2.00)	Did not run	Did not run

*Flows evaluated by shredder

Stand up paddle board rating

One stand up paddle boarder (SUP) ran the four lower flows and rated the navigability as well as the overall rating of all four as 'totally acceptable' with ratings of 2.00. Based on weighted averages of the flow characteristics for each of the four flows, the 8,000 cfs flow rated the highest at 1.50. The flow ratings for stand up paddle boarding are shown in Table 4.2-9.

Table 4.2-9: Bypass Reach Whitewater Flow Characteristics by Flow – Stand Up Paddle Board

Stand Up Paddle Board (SUP)						
Characteristic	**Flow 1 2,500 cfs (N = 1)**	**Flow 2 3,500 cfs (N = 1)**	**Flow 3 5,000 cfs (N = 1)**	**Flow 4 8,000 cfs (N = 1)**	**Flow 5 10,000 cfs (N = 0)**	**Flow 6 13,000 cfs (N = 0)**
Navigability	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Availability of challenging technical boating	Acceptable (1.00)	Totally Acceptable (2.00)	Totally Acceptable (1.00)	Totally Acceptable (2.00)	Did not run	Did not run
Availability of powerful hydraulics	Neutral (0.00)	Acceptable (1.00)	Neutral (0.00)	Acceptable (1.00)	Did not run	Did not run
Availability of whitewater play areas	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Totally Acceptable (2.00)	Did not run	Did not run
Overall whitewater challenge	Acceptable (1.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Safety	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run

Stand Up Paddle Board (SUP)						
Characteristic	**Flow 1 2,500 cfs (N = 1)**	**Flow 2 3,500 cfs (N = 1)**	**Flow 3 5,000 cfs (N = 1)**	**Flow 4 8,000 cfs (N = 1)**	**Flow 5 10,000 cfs (N = 0)**	**Flow 6 13,000 cfs (N = 0)**
Aesthetics	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Length of run	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Did not run	Did not run
Number of portages	Totally Acceptable (2.00)	Neutral (0.00)	Neutral (0.00)	Neutral (0.00)	Did not run	Did not run
Boating instruction	Totally Acceptable (2.00)	Acceptable (1.00)	Acceptable (1.00)	Acceptable (1.00)	Did not run	Did not run
Overall rating	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Totally Acceptable (2.00)	Did not run	Did not run
Weighted Average Rating	Acceptable (1.40)	Acceptable (1.40)	Acceptable (1.20)	Acceptable (1.50)	Did not run	Did not run

Minimum and Optimal Flow Preferences

The boaters were asked to indicate if they would have preferred a flow that was higher, lower, or did they consider a specific flow the minimum acceptable flow (enough flow for an enjoyable recreation experience) or the optimal flow. Minimum acceptable flow preferences were found to vary by watercraft type. The canoeists (OC1 and C1/C2) and the SUP rated a flow of approximately 2,500 cfs as the minimum acceptable flow; catarafts/shredder selected a flow in the range of 3,500 to 5,000 cfs; kayakers selected the 5,000 cfs flow; and rafters selected a flow in the range of 5,000 to 8,000 cfs. Table 4.2-10 summarizes the boaters' responses to their perceptions of minimum acceptable flows.

Table 4.2-10: Bypass Reach Minimum Acceptable Flow Preferences by Watercraft Type

Hard Shell Kayakers					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs			1	7	2
3,500 cfs			2	4	
5,000 cfs		3	7	1	
8,000 cfs		7	1	1	
10,000 cfs*	1	9	2		
13.000 cfs	2	9			

Solo Open Canoe (OC1)					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs			6	2	
3.500 cfs		2	3	1	
5,000 cfs		4		1	
8,000 cfs		3	2		
10,000 cfs	1	4			
13.000 cfs	2	2			

Raft					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs				3	1
3.500 cfs				4	
5,000 cfs		1		1	
8,000 cfs		2			
10,000 cfs	2	9		1	
13.000 cfs	6	2	1	1	

Solo Closed (C1) and Tandem Closed (C2) Canoes					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs			2		
3.500 cfs		2			
5,000 cfs		1	1		
8,000 cfs	1	1			
10,000 cfs	2				
13.000 cfs	1				

Cataraft/Shredder					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs				1	
3.500 cfs			4	1	
5,000 cfs			2		
8,000 cfs*			2	1	

Stand Up Paddle Board (SUP)					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs			1		
3.500 cfs		1			
5,000 cfs		1			
8,000 cfs		1			

*Boaters selected multiple categories

The boaters were asked to indicate their perceptions of the optimal flow. Optimal flow preferences also varied by watercraft based on boater participant responses: a flow in the range of 3,500 to 5,000 cfs for C1/C2 boaters; 5,000+ cfs for OC1 boaters; a flow in the range of 5,000 to 8,000 cfs for catarafts/shredders; 8,000 cfs for SUP; 8,000+ cfs for rafters; and, a flow in the range of 10,000 to 13,000 cfs for kayakers. Table 4.2-11 summarizes the boater responses to their perceptions of optimal flows by watercraft.

Table 4.2.11: Optimal Flow Preferences

Hard Shell Kayakers					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs				6	4
3.500 cfs			1	3	2
5,000 cfs			4	6	1
8,000 cfs			3	6	1
10,000 cfs		3	1	7	
13.000 cfs		6	4	2	

Solo Open Canoe (OC1)					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs			2	5	1
3.500 cfs			4	2	
5,000 cfs			4	1	
8,000 cfs		2	2	1	
10,000 cfs		2	3		
13.000 cfs		3	1		

Raft					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs				2	1
3.500 cfs				4	
5,000 cfs				2	
8,000 cfs				2	
10,000 cfs		10	1	1	
13.000 cfs	4	3	2	1	

Solo Closed (C1) and Tandem Closed (C2) Canoes					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs				2	
3.500 cfs			2		
5,000 cfs			2		
8,000 cfs		2			
10,000 cfs		1	1		
13.000 cfs		1			

Cataraft/Shredder					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs				1	
3.500 cfs			3	2	
5,000 cfs			1	1	
8,000 cfs*			2	1	

Stand Up Paddle Board (SUP)					
Flow Preference	**Much Lower**	**Lower**	**No Change**	**Higher**	**Much Higher**
2,500 cfs				1	
3.500 cfs				1	
5,000 cfs				1	
8,000 cfs			1		

*Boaters selected multiple categories

Table 4.2-12 is a compilation of boater responses to minimum acceptable (Min) and optimum (Opt) flow preferences by watercraft from Tables 4.2-10 and 4.2-11. For watercraft groups that indicated a flow between a range of flows (i.e., optimal flow preference for kayakers is 10,000 to 13,000 cfs), both flows are reflected in the table below as the optimal flow for group. Table 4.2-12 indicates that the 5,000 cfs flow may provide a flow for variable boating experiences for all watercraft groups. The 5,000 cfs flow provides a minimum acceptable flow for kayakers, rafts, and catarafts/shredders (high end minimum acceptable flow) and an optimal flow for OC1, C1/C2, and catarafts/shredders (low end optimal flow). The 5,000 cfs flow falls within a range of minimum acceptable (2,500 cfs) and optimal (8,000 cfs) flow for SUP's. Kayakers were the only group that rated the flows of 10,000 cfs and higher as optimal flows.

Table 4.2-12: Minimum Acceptable and Optimal Flow Compilation/Comparison

	2,500 cfs		3,500 cfs		5,000 cfs		8,000 cfs		10,000 cfs		13,000 cfs	
Watercraft	**Min**	**Opt**	**Min**	**Opt**	**Min**	**Opt**	**Min**	**Opt**	**Min**	**Opt**	**Min**	**Opt**
Kayak					✓					✓		✓
OC1	✓					✓						
Raft					✓		✓	✓				
C1/C2	✓			✓		✓						
Cataraft/Shredder			✓		✓	✓		✓				
SUP	✓							✓				

Boaters were requested to identify challenging features, rapids or sections of the bypass reach and rate their difficulty using the International Scale of River Difficulty for each release. Table 4.2.13 is a compilation of noted features and their scale of difficulty by flow.

Table 4.2-13: Identified Challenging Features in the Bypass Reach Rated Using the International Scale of River Difficult for Each Release

Flow	Below spillway	Put-in rapid/ upper ledges	Wave river right at top	Sta. 1	Right channel Rawson Island	Waves above Rock Dam	Rock Dam	Overall Rating for Bypass Reach
2,500 cfs		II	III		II		III-IV	II-III
3,500 cfs		I-III				II	III-IV	I-IV
5,000 cfs		II-III		II	III		II-IV	II-IV
8,000 cfs		II-IV		II		II	III-IV	II-IV
10,000 cfs	II+-III	II+-IV	III	II	III		II-IV	II-IV
13,000 cfs	II-III+	III-III+	IV	III	III	III	II-IV	II-IV

In addition to the difficulties identified in the evaluation forms, other difficulties noted by the boaters over the three-day study were strainers at all flows, water backing up into the trees along the shorelines, and being able to see large holes in the river downstream of the put-in at the higher flows (10,000 and 13.000 cfs).

Boaters were asked to identify any rapids or sections they portaged and to rate the difficulty of the portage on a scale of 1 ("easy") to 4 ("extremely difficult"). Rock Dam is a natural ledge that extends across the channel from Rawson Island to the left riverbank and is a major feature in the bypass reach. Rock Dam was portaged by some boaters to avoid running the feature (downstream portage), or in order to run the feature multiple times (upstream portage). Most of the participants, however, did not portage Rock Dam.

Some boaters, however, portaged Rock Dam at all the flows except the 13,000 cfs flow. Of those that did, the majority rated the Rock Dam portage as either "easy" or "slightly difficult". Over the three-day evaluation, Rock Dam was portaged and rated a total of twenty-four times by some participants. Nine boaters rated the portage as "easy" and five boaters rated it as "slightly difficult." Ten boaters rated the portage as "moderately difficult", and no boaters rated the portage as extremely difficult. The majority of the boaters who rated the portage as moderately difficult used larger watercraft, which generally are more difficult to portage.

Rock Dam can be avoided by boaters by running the bypass reach channel to the right of Rawson Island. For those boaters portaging Rock Dam, ratings by watercraft type are shown in Table 4.2-14.

Table 4.2-14: Rock Dam Portage Difficulty Ratings by Watercraft Type

Watercraft	Easy	Slightly Difficult	Moderately Difficult
Kayak	4	1	1
Open canoe	3	1	
Raft		2	2
Closed canoe			1
Cataraft	2	1	2
SUP			4

Applying the scale scoring (1-"easy" to 4- "extremely difficult") to the boater responses, the average portage difficulty rating at Rock Dam is 2.04, or slightly difficult.

Boater participants were asked to complete a Comparative Flow Evaluation Form upon completion of their participation in the whitewater evaluation. Tables 4.2-15 through 4.2-17 summarize the boater responses to the various questions related to whitewater opportunities on the comparative forms.

Boaters were asked to rate various factors that can affect their satisfaction with a whitewater boating run. Table 4.2-15 summarizes boaters' responses to various factors based on a scale of one (1), "not at all important, to five (5), "extremely important." Based on overall boater responses, four factors were rated as "very important": availability of features (4.21), safe trip (3.98), size/difficulty of features (3.75) and thrilling experience (3.53). Four factors were rated as "moderately important" including water quality, attractive scenery, accessibility, and driving distance to river. Three factors were considered "slightly important": crowding, shuttle availability, and weather. No factors were rated as "not at all important" or "extremely important".

Table 4.2-15: Whitewater Boater Trip Satisfaction Factors

	Kayakers	OC1	Raft	C1/C2	Cataraft/ Shredder	SUP	Weighted Average
Availability of features	Very Important (4.44)	Very Important (4.38)	Very Important (4.00)	Very Important (4.50)	Very Important (3.80)	Very Important (4.00)	Very Important (4.21)
Size/ difficulty of features	Very Important (3.88)	Moderately Important (3.38)	Very Important (4.00)	Moderately Important (3.00)	Moderately Important (3.40)	Very Important (4.00)	Very Important (3.75)
Driving distance to river	Moderately Important (3.00)	Moderately Important (2.75)	Slightly Important (2.33)	Moderately Important (3.50)	Moderated Important (2.60)	Moderately Important (3.00)	Moderately Important (2.72)
Accessibility	Moderately Important (2.94)	Moderately Important (3.13)	Moderately Important (3.07)	Moderately Important (3.00)	Moderately Important (2.80)	Moderately Important (3.00)	Moderately Important (3.00)
Shuttle availability	Slightly Important (2.19)	Not at all Important (1.38)	Slightly Important (2.10)	Not at all Important (1.50)	Slightly Important (1.80)	Slightly Important (2.00)	Slightly Important (1.96)
Crowding	Slightly Important (2.38)	Slightly Important (2.38)	Slightly Important (2.40)	Moderately Important (3.00)	Slightly Important (2.00)	Very Important (4.00)	Slightly Important (2.41)
Weather	Slightly Important (1.63)	Slightly Important (2.29)	Slightly Important (1.80)	Slightly Important (2.50)	Slightly Important (1.80)	Moderately Important (3.00)	Slightly Important (1.87)
Water temperature	Slightly Important (1.69)	Slightly Important (2.25)	Slightly Important (1.73)	Slightly Important (2.00)	Slightly Important (1.60)	Moderately Important (3.00)	Slightly Important (1.83)
Attractive scenery	Slightly Important (2.50)	Moderately Important (2.63)	Slightly Important (2.40)	Moderately Important (3.00)	Moderately Important (3.00)	Very Important (4.00)	Moderately Important (2.60)
Water quality	Moderately Important (3.38)	Moderately Important (3.13)	Moderately Important (2.87)	Moderately Important (3.00)	Moderately Important (3.40)	Moderately Important (3.00)	Moderately Important (3.15)
Thrilling experience	Very Important (3.75)	Moderately Important (2.75)	Very Important (4.13)	Slightly Important (2.50)	Moderately Important (2.60)	Very Important (4.00)	Very Important (3.53)

	Kayakers	**OC1**	**Raft**	**C1/C2**	**Cataraft/ Shredder**	**SUP**	**Weighted Average**
Safe trip	Very Important (4.25)	Very Important (3.63)	Very Important (4.13)	Moderately Important (3.50)	Moderately Important (3.40)	Very Important (4.00)	Very Important (3.98)

Boaters evaluated the six flows for their watercraft and skill level that would contribute to a high quality trip in the Turners Falls bypass reach on a scale of five from "totally unacceptable" (-2) to "totally acceptable" (2). Weighted averages were also calculated for each flow based on all boater ratings. Responses are summarized in Table 4.2-16 by watercraft type by flow. All flows were rated as acceptable to at least one type of boater/watercraft, ranging from 2,500 cfs for closed canoes to 13,000 cfs for all class of watercraft that boated the high flow. Based on a weighted average rating for each flow, the 8,000 cfs flow (1.59) rated higher than the other flows for suitability, and also received the highest rating from all the watercraft groups.

Table 4.2-16: Bypass Reach Flow Suitability based on Flow Characteristics

	2,500 cfs	3,500 cfs	5,000 cfs	8,000 cfs	10,000 cfs	13,000 cfs
Kayak	Unacceptable (-0.75)	Neutral (-0.25)	Acceptable (1.11)	Acceptable (1.50)	Acceptable (1.45)	Acceptable (1.36)
Open canoe	Neutral (0.14)	Acceptable (1.00)	Acceptable (1.25)	Acceptable (1.25)	Acceptable (1.25)	Acceptable (1.00)
Raft	Unacceptable (-1.00)	Neutral (-0.36)	Acceptable (1.00)	Acceptable (1.50)	Acceptable (1.40)	Acceptable (1.05)
Closed canoe	Acceptable (1.00)	Totally acceptable (2.00)	Totally acceptable (2.00)	Totally acceptable (2.00)	Acceptable (1.50)	Acceptable (1.00)
Cataraft/Shredder	Neutral (0.00)	Acceptable (1.00)	Totally acceptable (2.00)	Totally acceptable (2.00)	Did not run	Did not run
Stand up paddle board	Totally acceptable (2.00)	Totally acceptable (2.00)	Totally acceptable (2.00)	Totally acceptable (2.00)	Did not run	Did not run
Weighted Average Rating	Neutral (-0.22)	Neutral (0.48)	Acceptable (1.35)	Totally acceptable (1.59)	Acceptable (1.41)	Acceptable (1.18)

Boaters were asked to determine the minimum acceptable flow and the optimal flow for the bypass reach, regardless of whether the flow was evaluated as part of the study. Individual boater responses addressing minimum and optimal flows for some watercraft groups varied significantly (i.e., minimum acceptable flow/range for rafts varied from 2,500 to 10,000 cfs) as shown in Table 4.2-17. Some boater participants provided non-specific responses (i.e., 8,000+ cfs) for flow values. In calculating average minimum and optimal flows, all individual responses by watercraft group were summed (non-specific responses were rounded up to the nearest 1,000 cfs) and divided by the number of responses by watercraft group.

Based on boater responses, minimum acceptable flows for the bypass reach ranged from 2,500 cfs for all watercraft except catarafts/shredders (3,500 cfs) to 10,000 cfs for rafts. The average minimum acceptable flow by watercraft ranged from 2,500 cfs (C1/C2's and SUP) to 5,400 cfs for rafters. Minimum acceptable flows typically vary by watercraft types dependent on factors such as size (length/width), draft (size and weight/load), and watercraft maneuverability. Boater responses to optimum flows ranged from 3,500 cfs (OC1's) to one response of 50,000 cfs (rafter). Average optimum flows ranged from 5,000 cfs (C1/C2) to 10,200 cfs for rafters.

Data from the Comparative Flow Evaluation Forms for minimum acceptable and optimal flows by watercraft groups coincide closely with boater perceptions on minimum and optimal flows from the single flow evaluation forms (see Tables 4.2-10 and 4.2-11).

Table 4.2-17: Minimum Acceptable and Optimal Flows by Watercraft

Watercraft	Minimum Acceptable Flow/Range*	Average Minimum Acceptable Flow	Optimum Flow/Range*	Average Optimum Flow
Kayak	2,500-8,000 cfs	5,100 cfs	5,000-13,000 cfs	9,100
Open canoe (OC1)	2,500-8,000 cfs	3,714 cfs	3,500-10,000 cfs	6,428 cfs
Raft	2,500-10,000 cfs	5,400 cfs	5,000-50,000 cfs	10,200 cfs
Closed canoe (C1/C2)	2,500 cfs	2,500 cfs	5,000 cfs	5,000 cfs
Cataraft/Shredder	3,500 cfs	3,500 cfs	8,000 cfs	8,000 cfs
Stand up paddle board (SUP)	2,500 cfs	2,500 cfs	8,000 cfs	8,000 cfs

*Based on individual boater participants responses from Comparative Flow Evaluation forms

Based on the boater perceptions and their responses from the evaluation forms, the evaluation results demonstrate that the Turners Falls bypass reach can provide variable whitewater boating opportunities (whitewater classification, numbers and locations of play areas/features, a range of boater skill level needed to boat the bypass reach, whitewater experiences, suitability for various watercraft types) depending on flows. The importance and value of variable opportunities was supported by the boater participants' responses to rating the importance of having a variety of flows to provide different types of boating experiences and opportunities for boaters with different skill levels and/or different watercraft types. The participating boaters were near unanimous in rating the importance of having the variable opportunities and experiences that would be derived from variable flows in the bypass reach as "very important." Only rafters and cataraft/shredder boaters rated different boating experiences as "moderately important."

These values were rated on a scale of one ("not at all important) to five ("extremely important") and are summarized in Table 4.2-18.

Table 4.2-18: Variable Boating Opportunity Value Ratings

Watercraft	Provide different types of boating experiences	Provide opportunities for people with different skill levels and watercraft
Kayak	Very important (3.63)	Very important (3.94)
Open canoe	Very important (3.63)	Very important (4.00)
Raft	Moderately important (3.47)	Very important (3.60)
Closed canoe	Very important (4.00)	Very important (4.50)
Cataraft/Shredder	Moderately important (3.20)	Very important (3.80)
Stand up paddle board	Very important (4.00)	Very important (4.00)
Weighted Average	Very important (3.56)	Very important (3.85)

Boaters were also asked to evaluate the skill level needed to safely paddle the bypass reach. Based on boater responses shown in Table 4.2-19, the bypass reach can be safely paddled for a range of boater skill levels of beginner/novice up to the 5,000 cfs flow, and intermediate level skills at the 3,500 cfs flow and above.

Table 4.2-19: Skill Level needed to Safely Paddle Bypass Reach

Level	2,500 cfs	3,500 cfs	5,000 cfs	8,000 cfs	10,000 cfs	13,000 cfs
Beginner	6 (22%)	3 (11%)	1 (4%)	1 (4%)	2 (6%)	2 (7%)
Novice	15 (56%)	14 (54%)	14 (56%)	7 (29%)	5 (16%)	6 (20%)
Intermediate	6 (22%)	9 (35%)	10 (40%)	14 (58%)	21 (68%)	18 (60%)
Advanced	0	0	0	2 (8%)	3 (10%)	4 (13%)
Expert	0	0	0	0	0	0

Overall, based on the results of the evaluation, the bypass reach rates as a Class I-IV whitewater run, although at most of the flows tested the overall rating for the bypass reach is Class II-IV. For many of the evaluation flows, however, the Class IV rating was solely attributable to the Rock Dam feature. With respect to flows, the bypass reach was found to be boatable by nearly all watercraft type at all of the flows evaluated, and produced a variety of whitewater experiences over the range of flows tested, depending on watercraft type. The minimum acceptable whitewater flow was found to vary by watercraft: 2,500 cfs for all canoes and SUP; 3,500 cfs for catarafts/shredders; and 5,000 cfs for kayaks and rafts. The optimal whitewater flow also varied by watercraft: 3,500 cfs for closed canoes (C1 and C2); 5,000 cfs for OC1 and cataraft/shredder; 8,000 cfs for rafts and SUP; and 10,000 cfs for kayaks. Overall, flows in the range of 5,000- to 8,000 cfs were the preferred flow range for most watercraft types.

Finally, related to boaters' evaluation of factors that determine satisfaction with a trip, as part of the bypass reach study, boaters were encouraged during the post-study discussion and during their various surveys of the boating flows to make notes of other observations, factors and concerns that could affect their use of the bypass reach for whitewater boating. Along these lines, several boaters made comments regarding the aesthetics of the bypass reach, suggesting that the urban/industrial setting may not be attractive to some boaters.

4.3 Demand for Whitewater Boating in the Bypass Reach

Current use of the bypass is limited, even though the bypass reach is available for boating during periods of spillage from the Turners Falls Dam. Limited use may be indicative of low demand, or may be because of stakeholders' lack of knowledge of periods of spill into the bypass reach. Existing USGS gages located on the Connecticut River below Cabot Station (Montague gage) and on the Deerfield River in Montague provide real-time flow information that can be used to estimate Connecticut River flows at Turners Falls Dam by subtracting the Deerfield River flow from the Montague gage flows. When estimated Connecticut River flows exceed 18,000 cfs (the capacity of the Turners Falls canal) the excess flow is likely to be spilled into the bypass reach, under normal Project operations. In this way, flow information at the two USGS gages can be used by boaters to determine when there are likely to be periods of spill into the bypass reach. Section 4.5 of this report includes an equation to estimate the spill at the Turners Falls Dam based on the two USGS gages.

Anecdotal information collected in preparation for the study indicated that whitewater boaters have run the Turners Falls bypass reach when there is water available, but no information specifically correlating bypass flows with recreational boating opportunities in the bypass reach was found. In fact, research found that existing published boating guides (AMC) and other resources (AW national river database) contained very limited information on the Turners Falls bypass reach. This research suggests that although existing USGS gage data is available and can be used to estimate flows in the bypass reach, boaters may not be aware that it exists or do not know how to access it. While some boating does occur during periods of high river flow, which results from spill into the bypass reach, better access to information on anticipated spills in the bypass reach based on USGS's forecasts may result in more whitewater boating in the bypass reach during periods of spill.

During a power canal outage for maintenance in October 2013, water was diverted from the power canal to the bypass reach and AMC, AW and NEFLOW coordinated local and regional boaters to boat the bypass reach. The boating organizations also coordinated boaters to run the bypass reach in May and June 2014 during spring and high flow events that resulted in spill into the bypass reach. FirstLight provided AMC with flow data at the Turners Falls Dam for those days boaters ran the bypass in October 2013 and May/June 2014. This information was used to help determine the approximate flows that were ultimately evaluated during the formal study evaluation in July 2014.

During the July 2014 evaluation, boaters were asked to indicate how likely they would be to return for future boating at flows equivalent to the six test flows. Table 4.3-1 reflects the boaters' (as a group) likelihood to return to boat the six (6) flows tested. Boaters' responses to this question were notably diverse. As a group, most boaters indicated that they would "possibly" return to the bypass reach, depending on the flow. At a flow of 2,500 cfs, boaters were about equally split between those that would definitely not return and those that would "possibly" or "probably" return. At a flow of 3,500 cfs most boaters indicated they would "possibly" return, but the remaining boaters were about equally split between "definitely no" (not returning) and "probably" or "definitely yes" (returning). Even at the overall optimal flows of 5,000-8,000 cfs, boaters were fairly evenly divided among those who would "possibly", "probably" and "definitely" return, with only one boater indicating they would not return at these flows. When examined by watercraft, all participants who boated the 2,500 cfs flow in closed canoes, a cataraft/shredder, and SUP indicated they would "probably" or "definitely" return to boat this flow. The closed canoeists also indicated they would "probably" or "definitely" return to boat 3,500 cfs flows as well.

Table 4.3-1: Likelihood of Boaters to Return to Boat the Test Flows

All Boaters				
Likely to Return	**Definitely No**	**Possibly**	**Probably**	**Definitely Yes**
2,500, cfs	11 (42%)	7 (27%)	3 (12%)	5 (19%)
3.500 cfs	6 (23%)	10 (38%)	5 (19%)	5 (19%)
5,000 cfs	0	7 (33%)	7 (33%)	7 (33%)
8,000 cfs	1 (5%)	5 (24%)	8 (38%)	7 (33%)
10,000 cfs	1 (3%)	9 (31%)	7 (24%)	12 (41%)
13,000 cfs	2 (9%)	7 (30%)	4 (17%)	10 (43%)

Boaters were asked to compare boating opportunities in the Turners Falls bypass reach to other rivers of similar difficulty on a local, state, regional and national basis on a scale of four ranging from "worse than average" (-1) to "among the very best" (3). As a group, the boaters rated the Turners Falls bypass reach slightly better than average, in comparison to other rivers within a one-hour drive and to other rivers in Massachusetts and average compared to other rivers in the northeast. The bypass reach was rated slightly below average compared to other rivers in the country. Overall, based on watercraft group ratings, the Turners Falls bypass reach provides an average to slightly better than average whitewater opportunity in comparison to other local and regional whitewater boating opportunities of similar difficulty. As a group, the boaters did not rate the bypass reach as among the very best in comparison to other local and regional whitewater boating opportunities of similar difficulty. Responses are summarized in Table 4.3-2.

Table 4.3-2: Bypass Comparison to Rivers/Boating Opportunities of Similar Difficulty

	Other rivers w/in a 1 hour drive	Other rivers in Massachusetts	Other rivers in the northeast	Other rivers in the country
Kayak	Better than average (0.64)	Average (0.46)	Average (0.00)	Average (-0.21)
Open canoe	Average (0.00)	Average (0.00)	Average (-0.13)	Average (-0.25)
Raft	Better than average (0.67)	Average (0.47)	Average (0.00)	Worse than average (-0.54)
Closed canoe	Average (0.00)	Average (0.00)	Average (0.00)	Average (0.00)
Cataraft/Shredder	Average (0.40)	Better than average (1.00)	Average (0.00)	Average (-0.25)
SUP	Average (0.00)	Average (0.00)	Average (0.00)	Average (0.00)

Boaters were also asked to compare the Turners Falls bypass reach to specific regional rivers for whitewater boating opportunities based on various factors. Boaters were asked to assume optimal flow conditions for comparison purposes. The eleven (11) regional rivers used for comparison were those rivers approved by the stakeholder boating organizations during development of the Whitewater Boating Evaluation study plan. The list of comparison rivers utilized in the study contains regional rivers within a 40-mile radius of the Turners Falls bypass reach. These regional rivers provide a range of boating opportunities including both rivers with dams, some with scheduled boating releases, and rivers without dams where whitewater boating opportunities are typically dependent on high flow events (typically spring run-off).

The regional rivers were rated on a scale of: 1 - more desirable than the Turners Falls bypass reach; 2 – similar to the Turners Falls bypass reach; and 3 – less desirable than the Turners Falls bypass reach. Overall, boater ratings indicate that all of the comparison rivers, except the Green River, are more desirable/slightly more desirable than the Turners Falls bypass reach for whitewater boating. The Green River is rated similar to the Turners Falls bypass reach. Weighted averages for all factors, excluding the overall boater ratings, indicate that all of the rivers are slightly more desirable than the Turners Falls bypass reach except for the Green River and the Deerfield East Branch, which are rated as slightly less desirable. The Turners Falls bypass reach was rated as more favorable compared to some of the comparison rivers in the following specific categories: suitable for intermediate boaters, rafting, tubing, driving distance to river, and ease of shuttles based on boater responses.

Boater participant responses for all watercraft types are summarized in Table 4.3-3.

Table 4.3-3: Comparison Ratings for the Turners Falls bypass reach and Other Regional Whitewater Boating Rivers

Factors	Westfield, N. Branch	Quabog, Warren to Brimfield	Ashuelot, Gilsum to Shaw's Corner	Deerfield, E. Branch, Somerset to Searsburg	Deerfield, Fife Brook	Chickley, Hawley to Charlemont	Farmington, Otis to New Boston	Green, VT. to MA.	Millers, S. Royalston to Athol	Otter Brook, Roxbury to Keene	Souhegan, Greenville to Wilton
Suitable for novice boater	2.18	2.73	1.79	2.14	1.45	2.60	2.42	1.75	2.21	2.29	1.82
Suitable for intermediate boater	1.56	1.73	1.91	2.38	1.92	1.33	1.58	2.00	1.71	1.54	1.55
Suitable for advanced boater	2.00	1.64	2.36	2.00	2.37	1.33	1.58	2.50	1.88	2.23	2.00
Size & difficulty of features	2.27	1.91	1.75	2.13	2.19	1.83	1.71	2.63	1.92	1.85	1.73
Play boating	2.09	1.82	2.17	2.71	2.00	2.33	1.82	2.75	1.96	1.77	1.82
Rafting	2.50	2.56	1.90	2.57	1.67	2.00	2.93	2.60	1.60	2.50	2.38
Tubing	1.86	2.63	2.14	3.00	1.59	2.50	2.75	2.25	2.27	2.50	2.50
Canoeing	1.60	1.50	1.70	2.00	1.64	1.00	1.47	1.86	1.60	1.45	1.20
Kayaking	1.70	1.82	1.90	2.14	1.83	1.17	1.58	2.14	1.62	1.64	1.50
Eddy hopping	1.64	1.36	1.58	2.00	1.55	1.50	1.43	2.00	1.57	1.38	1.09
Technical maneuvering	1.64	1.09	1.58	1.86	1.63	1.00	1.39	2.25	1.50	1.38	1.27
River gradient	1.30	1.40	1.36	1.71	1.85	1.20	1.36	2.00	1.57	1.25	1.20
Driving distance to river	1.91	2.27	2.25	2.43	2.06	2.00	2.35	2.50	2.21	2.08	2.00
Shuttles	2.00	2.20	2.25	2.13	1.97	1.83	1.95	2.43	2.08	1.92	2.00
Access to river	1.45	1.45	1.67	2.14	1.56	1.33	1.67	2.00	1.67	1.69	1.64
Parking	2.09	1.91	2.00	2.71	1.67	2.17	2.00	2.75	2.00	2.15	2.18
Scenery	1.45	1.82	1.50	1.86	1.50	1.17	1.71	1.38	1.63	1.62	1.73
Water quality	1.64	1.91	1.50	1.71	1.28	1.00	1.38	1.25	1.96	1.31	1.36
Overall boater rating	1.64	1.45	1.67	1.67	1.74	1.17	1.43	2.25	1.65	1.46	1.55
Weighted average rating	1.82	1.86	1.84	2.29	1.76	1.61	1.78	2.16	1.84	1.79	1.60

A review of the whitewater opportunities on the regional comparison rivers used in the study as well as some other regional rivers that are utilized for whitewater boating was also undertaken as part of the study. Table 4.2-4 summarizes information on the many regional whitewater opportunities currently available to boaters within a 50-mile radius of the Turners Falls Project based on information gathered from the AW website (American Whitewater, 2015), the Northeast Paddlers Message Board website (Northeast Paddlers Board, 2015), AMC River Guides (Fiske, 2007; AMC, 2006 (MA/CT/RI)) other boating websites (*e.g.*, River Facts, n.d.), as well as from the analysis of the boater evaluations used for the evaluation of the Turners Falls bypass reach. There are numerous additional whitewater boating opportunities in the region within easy driving distance of the Turners Falls Project. These include the 0.25 mile Class I-III whitewater opportunity at Sumner Falls, VT (~ 75 miles from the Project) in which boaters take advantage of generating releases from TransCanada's Wilder Project.

Table 4.3-4: Regional River Boating Attributes

River	Class	Length	Typical Season	Distance from Turners Falls Bypass
Massachusetts				
Chickley River, Route 8A to Deerfield River	Class II-III	6.0 miles	Snow/ice melt and after heavy rains	18 miles
Cold River, Route 2 hairpin turn to Deerfield River	Class II-IV	4.25 miles	Snow/ice melt and after heavy rains	19 miles
Connecticut River, Holyoke	Class I-III	2.0 miles	Dam controlled (generating flows)	27 miles
Deerfield River, Bear Swamp to Route 2	Class II-III	9.5 miles	April-October Scheduled dam releases (~106 days)	18 miles
Deerfield River, No. 5 Dryway, Monroe Bridge to Bear Swamp	Class III-IV	3 miles	May-October Scheduled dam releases (~32 days)	21 miles
Deerfield River, Wilcox Hollow to Stillwater Bridge	Class I-II	7 miles	Dam controlled (spill events)	7 miles
Dunbar Brook, South Road to Deerfield River	Class V	2.7 miles	Snow/ice melt and after heavy rains	21 miles
Fall River, Otis Reservoir to Farmington River	Class V	0.9 miles	March-April and Otis Reservoir drawdown (4 releases Sept. - Oct.)	40 miles
Farmington River-West Branch, Lower New Boston (Reservoir Road to Iron Bridge)	Class II-IIII	2.25 miles	March-April and Otis Reservoir drawdown (4 releases Sept. - Oct.)	45 miles

River	Class	Length	Typical Season	Distance from Turners Falls Bypass
Farmington River-West Branch, Upper New Boston (Iron Bridge to American Legion Field)	Class III-IV	3 miles	March-April and Otis Reservoir drawdown (4 releases Sept. - Oct.)	42 miles
Farmington River-West Branch, Upper New Boston (New Boston to near Thorp Brook)	Class II	5 miles	March-April and Otis Reservoir drawdown (4 releases Sept. - Oct.)	39 miles
Green River, US Route 7 to Hoosic River	Class II-III	8.15 miles	April	33 miles
Green River, West Leyden to covered bridge	Class II-III	5.6 miles	April	9 miles
Hoosic River, First Adams Dam to MA-5	Class II	1 mile	Dam controlled (spill events)	30 miles
Hoosic River, North Adams to North Pownal, VT	Class I-II	11.3 miles	Snow/ice melt and after heavy rains	31 miles
Hubbard River, W. Hartland Road to Route 20	Class V	2.65 miles	Snow/ice melt and after heavy rains	42 miles
Konkapot Brook, Mill River to Ashley Falls	Class I-III	11 miles	Snow/ice melt and after heavy rains	42 miles
Little River, Dam below Cobble Mountain Reservoir to Northwest Road	Class III-IV	3.2 miles	High water in March-April, Cobble Hill Reservoir drawdown (spill events)	36 miles
Millers River, South Royalston to Athol	Class II-III	7.0 miles	High water in March-April, dam controlled (2 releases in April)	17 miles
Millers River-Lower, Erving to Millers Falls	Class II-III	6.5 miles	High water in March-April, dam controlled (2 releases in April)	4 miles
North River, Halifax Vermont Gorge to Colrain	Class II	7 miles	Snow/ice melt and after heavy rains	8 miles

River	Class	Length	Typical Season	Distance from Turners Falls Bypass
Pelham Brook, Rowe Center to Deerfield River	Class V	3.25 miles	High runoff period usually in early April	19 miles
Quaboag River, Warren to Route 67	Class II-IV	5.5 miles	March-May and after rain falls	32 miles
Swift River, Along Route 9 to North Branch Westfield River	Class IV-V	1 mile	Snow/ice melt and after heavy rains	19 miles
Turners Falls Bypass	Class I-IV	2.7 miles	Dam Controlled (spill events)	0 miles
Walker Brook, 3.5 miles West of Chester on Route 20 to Chester	Class IV	3.5 miles	Snow/ice melt and after heavy rains	32 miles
Westfield River, Huntington to Russell	Class I-II	4 miles	Dam controlled	31 miles
Westfield River-Middle Branch, River Road to Littleville Dam	Class II-III	7 miles	Snow/ice melt and after heavy rains	27 miles
Westfield River-North Branch, West Cummington to Cummington	Class I-III	6.2 miles	March-April except for lower 5 miles which is dam controlled (5 releases in March/April)	20 miles
Westfield River-North Branch, Cummington to Chesterfield Gorge	Class I-III	7.2 miles	March-April except for lower 5 miles which is dam controlled (5 releases in March/April)	20 miles
Westfield River-North Branch, Chesterfield Gorge to Knightsville Dam	Class I-III	9.2 miles	March-April except for lower 5 miles which is dam controlled (5 releases in March/April)	23 miles
Westfield River-North Branch, Knightsville Dam to Huntington	Class I-III	5.2 miles	March-April except for lower 5 miles which is dam controlled (5 releases in March/April)	27 miles
Westfield River-West Branch	Class III-IV	9.5 miles	Snow/ice melt and after heavy rains	30 miles
Westfield River-West Branch	Class II-III	7.5 miles	Snow/ice melt and after heavy rains	31 miles

River	Class	Length	Typical Season	Distance from Turners Falls Bypass
New Hampshire				
Ashuelot River, Marlow to Gilsum Gorge	Class III-IV	5.3 miles	Natural flow river with spring high water	33 miles
Ashuelot River, Gilsum Gorge to Shaws Corner	Class II	4 miles	Natural flow river with spring high water	33 miles
Ashuelot River, Ashuelot to Hinsdale	Class II-IV	3.5 miles	Dam controlled (spill events)	13 miles
Ashuelot River-South Branch, Troy to Webb	Class III-IV	2.3 miles	Snow/ice melt and after heavy rains	24 miles
Cold River, South Acworth to Vilas Pool	Class II	5.5 miles	Dam controlled (spill events)	39 miles
Cold River, Vilas Pool to Alstead	Class III-IV	0.7 mile	Dam controlled (spill events)	38 miles
Cold River, Alstead to Drewsville	Class II	2 miles	Dam controlled (spill events)	37 miles
Contoocook River, Jaffery to Peterborough	Class II	5 miles	Dam controlled (spill events)	31 miles
Contoocook River-North Branch, Route 9 and 123 to Hillsboro Fire Station	Class V	6 miles	Snow/ice melt and after heavy rains	39 miles
Minnewawa River, Marlborough recycling center to Otter Brook	Class II-IV	4.5 miles	High runoff period usually in early spring and fall drawdown of lakes	26 miles
Otter Brook, East Sullivan to Otterbrook Park	Class III-IV	3.2 miles	Natural flow river with spring high water	29 miles
Otter Brook, Roxbury to Keene	Class II	3.1 miles	April (upper section), dam controlled (lower section, 4 releases in April-May)	26 miles
Souhegan River, Greenville to New Hampshire Route 101	Class II-III	5.75	Snow/ice melt and after heavy rains	41 miles

River	Class	Length	Typical Season	Distance from Turners Falls Bypass
Souhegan River, NH Route 101 Bridge to Wilton	Class III	1.25	Snow/ice melt and after heavy rains	44 miles
Stony Brook, Route 31 to Wilton	Class III-IV	1.25	Snow/ice melt and after heavy rains	40 miles
Vermont				
Ball Mountain Brook, Metcalf Road to Jamaica State Park	Class III-IV	3.5 miles	Snow/ice melt and after heavy rains	35 miles
Battenkill River, Manchester to NY border	Class	11 miles	Snow/ice melt and after heavy rains	44 miles
Deerfield River, Searsburg Dam to Harriman Reservoir	Class III	4.5 miles	Dam controlled (spill events)	25 miles
Deerfield River-East Branch, Somerset Reservoir to Searsburg Reservoir	Class I-II	6 miles	Dam controlled (spill events)	29 miles
Deerfield River-West Branch, Heartwellville to Readsboro Village	Class V	3.5 miles	Snow/ice melt and after heavy rains	22 miles
Green River, Green River to West Leyden (MA)	Class II-III	6.8 miles	Dam controlled (spill events)	8 miles
Roaring Branch, Kelly Stand Road to East Kansas	Class V	3.5 miles	Snow/ice melt and after heavy rains	40 miles
Rock River, South Newfane to West River	Class III-IV	3.3 miles	Snow/ice melt and after heavy rains	24 miles
Saxton's River, Grafton to Connecticut River	Class II-III	11 miles	Snow/ice melt and after heavy rains	36 miles
Walloomsac River, Appalachian Trail Crossing to Park Street in Bennington	Class I-III	4 miles	Snow/ice melt and after heavy rains	35 miles

River	Class	Length	Typical Season	Distance from Turners Falls Bypass
Wardsboro Brook, North Wardsboro to West River	Class III-IV	4.5 miles	Snow/ice melt and after heavy rains	33 miles
West River, Ball Mountain Dam to Jamaica State Park	Class III	2.75 miles	Scheduled releases 1-2 weekends per year; typically spring and fall	26 miles
West River, Londonderry rapids	Class II-III	5 miles	Natural flow river with spring high water	42 miles
West River, Salmon Hole to Route 100	Class II	3.2 miles	Scheduled releases 1-2 weekends per year; typically spring and fall	35 miles
Williams River, Northchester to Brockway Mills	Class II	7.5 miles	Snow/ice melt and after heavy rains	40 miles
Winhall River, Grahamville School Road to Winhall Campgrounds	Class III+	4.5 miles	Snow/ice melt and after heavy rains	40 miles

This table demonstrates that there are a number of regional rivers that provide the same range of whitewater classifications (Class I to Class IV) as the range of the six test flows released for the Turners Falls bypass reach boating evaluation. Many of the other regional rivers identified in the table provide longer whitewater stretches and runs (4 to 30 miles) than the bypass reach (2.7 miles), although many of the regional river stretches can be split into shorter runs, some comparable in length to the Turners Falls bypass reach.

Many of the boating rivers in the region are unregulated and whitewater boating opportunities are dependent upon natural flows. However, several of the other whitewater boating rivers are regulated river segments, where there are scheduled whitewater boating releases. Among these is the Fife Brook section of the Deerfield River where scheduled releases occur at the Fife Brook Dam. Typically, 106 water release days are provided annually on the Fife Brook section of the Deerfield River between April and October to support commercial rafting and other whitewater boating opportunities. The Fife Brook section is approximately 22 miles from the Turners Falls bypass. Also along the Deerfield, there are scheduled releases from the Deerfield No. 5 development which provides a class II-IV boating opportunity. Other regional rivers, such as the West River, Westfield N. Branch, Farmington and Otter Brook also provide scheduled releases, (approximately 2-5 per year on each river), typically either in the spring or fall. All of these regional rivers with scheduled releases are located within easy driving distance (~40 miles) of the Turners Falls Project.

On the whole, the evaluation of whitewater boating demand for the Turners Falls bypass reach suggests that there are numerous whitewater boating opportunities in the region that are available as a result of scheduled releases, or seasonally during periods of high flows, that provide as good or better whitewater opportunities for boaters of all skill levels. These opportunities appear to be sufficient to meet current demand, based on the boaters' ratings of the comparability of these other rivers to the Turners Falls bypass reach. In addition, while the evaluation of the test flows in the Turners Falls bypass reach

demonstrates that at certain flows, the Turners Falls bypass reach can provide a quality whitewater boating opportunity for a range of watercraft types and skill levels, when asked, boaters indicated, overall, that the Turners Falls bypass reach generally does not provide a preferable whitewater boating opportunity in comparison to other regional whitewater boating opportunities.

Information from the boaters that participated in the July 2014 Turners Falls bypass reach whitewater evaluation indicate a level of interest for boating flows in the bypass reach, although the interest is dependent on the magnitude of releases and the type of watercraft. (See Tables 4.2-10 – 4.2-12) In the post-evaluation discussion, some rafters indicated there was limited commercial trip value to the bypass because of the uncertainty of flows. Many boaters stated an advantage to the bypass reach based on test flows evaluated during the study is for teaching and developing whitewater boating skills for beginner to intermediate level boaters. Other boaters stated the bypass reach could provide a resource when flows on other regional rivers do not have sufficient flows for boating, when boating flows are not scheduled for other rivers, or in tandem with scheduled releases at other rivers in order to provide variety of boating opportunities on a trip to the area.

While Table 4.3-1 indicates the likelihood of boaters that participated in the July 2014 evaluation to return and boat specific flows, other boaters indicated in margin notes on their forms a lack of interest in boating the bypass due to factors such as short run, lack of features, and availability of better opportunities at other regional rivers, including the nearby Deerfield River, which receives approximately 106 scheduled boating flows, annually.

4.4 Bypass Reach Access

There are three access points into the bypass reach between the Turners Falls Dam and the Poplar Street Access. These sites are the fishway put-in (RM 20.2), an informal trail off Power Street upstream of Station No. 1 (RM 20.9), and Cabot Woods Fishing Access (RM 22.0). These three sites are used primarily for shoreline fishing and picnicking and are shown on Figure 4.4-1 and a brief description of each follows.

The fishway put-in is located on river left approximately 400 feet downstream of Turner Falls Dam. Nearby public parking is available at the Turners Falls Fishway parking lot off 1st Street, along 2nd Street, and in a lot associated with the Great Falls Discovery Center. The site is accessible by foot off the Canalside Trail Bike Path from the south side of the FirstLight utility bridge over the power canal; a locked gate restricts vehicle access across the bridge to the bypass area to authorized vehicles only. Access to the put-in area from the north side of the power canal utility bridge is via a gravel road and firm footpath to the shoreline. The approximate distance from the parking areas to the put-in ranges from 1,350 feet to 1,550 feet.

An informal trail (Station No. 1 Fishing Access) off Power Street accesses the bypass on river left approximately 600 feet upstream of Station No. 1. Roadside parking is provided along Power Street. The trail is approximately 200 feet long with a firm surface and gradual gradient to the shoreline.

The bypass area can also be accessed through the Cabot Woods Fishing Access site from Migratory Way, which extends from G Street to the S. O. Conte Anadromous Fish Research Center. Roadside parking is available along Migratory Way near the trailhead to the shoreline, and at a lot outside the gate at the northerly terminus of Migratory Way where it joins G Street. This gate closes to vehicular traffic at 5:00 pm daily. The shoreline can be accessed via an approximately 650 foot trail from the Migratory Way roadside parking area. Access at this site is intended primarily for angler use. The terrain along the path varies from a short moderate slope off Migratory Way to a fairly level terrace with a steep slope over a

series of informal paths to the shoreline. The distance from the parking lot outside the gate to the shoreline is approximately 0.75 miles.

Although located downstream of the bypass reach, the Poplar Street Access is the put-in area for the FirstLight vehicle-supported canoe portage and was used as the take-out area during the July 2014 bypass reach whitewater evaluation. The site provides vehicle parking and a footpath from the parking area to the shoreline of the Connecticut River.

Other areas investigated in the field for potential additional access include the confluence of the Fall River with the Turners Falls bypass reach, and the confluence of the Deerfield River with the Connecticut River.

The Fall River flows into the bypass reach approximately 0.16 mile downstream of Turners Falls Dam from river right. The Route 2 bridge over the Fall River, approximately 570 feet upstream of the confluence is being replaced and the site has been under construction since 2013. Therefore, it is not possible to determine how accessible the bypass reach will be from the new bridge at this time. There is a pull off area on the south side of Route 2 and east side of the Fall River (currently being used for construction laydown), that is capable of providing parking for 15 to 20 vehicles. Several informal trails lead to the bypass reach from this parking area, however, the terrain and trails are extremely steep and would not be suited to boating access. The pull off area is within the Route 2 right-of-way.

The Deerfield River flows into the Connecticut River approximately 3.2 miles downstream of Turners Falls Dam from river right, and approximately 0.65 miles downstream of Cabot Station (where the bypass reach ends). Land ownership is a mixture of private, state and industrial owners. The Commonwealth of Massachusetts owns property upstream of the General Pierce Bridge on river right and on the east bank of the Deerfield River where it joins the Connecticut River. River banks in this general area are steep. FirstLight's Poplar Street Access is approximately 1,100 feet diagonally across from where the Deerfield River joins the Connecticut River.

As part of the July 2014 whitewater boating evaluation, participants rated the put-in (fishway put-in) and take-out (Poplar Street Access) areas that were used during the study on a one ("easy") to three ("difficult") scale on the Single Flow Evaluation Form after each run. Table 4.4.1 illustrates boater ratings of the put-in and take-out by watercraft type over the course of the study (all six flows).

Table 4.4-1: Turners Falls Bypass Reach Put-in and Take-out Ratings

Fishway Put-in Rating							
	Kayakers	OC1	Raft	C1/C2	Cataraft/Shredder	SUP	Totals
Easy	56	26	27	6	7	4	126 (85%)
Moderate	1	5	7	5			18 (12%)
Difficult	2				2		4 (3%)
Poplar Street Access (Take-out) Rating							
	Kayakers	OC1	Raft	C1/C2	Cataraft/Shredder	SUP	Totals
Easy	4	3	5		2		14 (9%)
Moderate	37	11	15	1	1	3	68 (44%)
Difficult	17	20	15	11	7	1	71 (46%)

Eighty-five percent (85%) of boaters rated the fishway put-in area below the Turner Falls Dam (river left) as "easy" access to the bypass, while three (3%) percent rated it as difficult. The Poplar Street take-out was rated as moderate/difficult access by 91% percent of the participants, and as easy access by 9%.[6] The fishway put-in could accommodate carry-in launching from the existing public parking areas. Due to space constraints on the north side of the power canal utility bridge (i.e., between the power canal and the bypass reach), allowing vehicle access to the put-in area, particularly trailer rigs, for boat drop-off and launching may be an issue. Access ratings appear to be dependent in part to the type of watercraft being launched or retrieved (i.e., watercraft size and weight).

While not used during the whitewater boating evaluation of the bypass reach as a put-in or take-out, the Turners Falls Station No. 1 Fishing Access can also provide an adequate put-in or take-out area to the bypass reach for whitewater boating. The Cabot Woods Fishing Access is not suitable for whitewater boating access to the bypass reach. The site is intended primarily for anglers, and FirstLight discourages other in-water uses at that site, particularly swimming, due to the strong and unpredictable water currents that can occur at this site. In addition a portion of the existing trail is along steep terrain, making it generally not suitable as a boater put-location.

Flows in the bypass reach can vary depending on time of year, operational needs and constraints, tributary inflows, and weather events. Flows range from leakage to extremely high flows when flows exceed the hydraulic capacity of the power canal. Strong and unpredictable currents often occur. Any access to the bypass reach would need to be limited to boaters skilled and experienced with whitewater boating.

[6] The Poplar Street Access site was rated as if boat retrieval (winch) was not in use.

Northfield Mountain Pumped Storage Project (No. 2485)
and Turners Falls Hydroelectric Project (No. 1889)

Study 3.6.3
Whitewater Boating Evaluation

Figure 4.4-1: Location of Evaluated Access Points

N

0 1,500 3,000 6,000 Feet

Path: W:\gis\studies\3_6_3\maps\Figure 4.4-1.mxd

4.5 Whitewater Boating Flow Analysis

One of the objectives of the Whitewater Boating Evaluation was to determine the number of days per month (and during what months) when acceptable and optimal boating flows are available in the bypass reach under current and proposed Turners Falls Project operation.[7] As described earlier in Section 4.2, the level of acceptable and optimal flows described by study participants is somewhat variable depending on watercraft type. All of the flows tested were determined to be boatable by most of the watercraft types. Boaters' perceptions of acceptable flows varied from 2,500 cfs (OC1, C1/C2, and SUP) to a range of 5,000 to 8,000 cfs (rafts), and optimal flows varied from a range of 3,500 to 5,000 cfs (C1/C2), to a range of 10,000 to 13, 000 cfs (kayaks).

Under the current operation of the Turners Falls Project, the availability of flow in the Turners Falls bypass reach is dependent on river flows, which are largely determined by discharge from the upstream hydropower projects on the river, and the need for power. The hydraulic capacity of the Turners Falls Project generating stations (Cabot Station and Station No. 1) is 15,938 cfs. The hydraulic capacity of the power canal is approximately 18,000 cfs.

An analysis was conducted to estimate the flows on the Connecticut River at the Turners Falls Dam using the United States Geological Survey (USGS) gages on the Connecticut River in Montague, MA and on the Deerfield River in West Deerfield for overlapping periods of record. Table 4.5-1 provides background on the two gages.

Table 4.5-1: USGS Gages in the Project Area

Gage No.	Gage Name	Period of Record	Drainage Area	Comments
01170500	Connecticut River at Montague City, MA	1940-2013	7,860 mi^2	Flows on the CT River are regulated by several seasonally operated storage reservoirs (First and Second CT Lakes, Lake Francis, Moore and Comerford Reservoirs)
01170000	Deerfield River near West Deerfield, MA	1940-2013	557 mi^2	Flows on the Deerfield River are regulated by two seasonally operated storage reservoirs (Somerset and Harriman Reservoirs)

The Montague gage is located just downstream of Cabot Station and includes the discharge from the Deerfield River. The drainage area at the Turners Falls Dam is 7,163 mi^2. The difference in drainage area of the Connecticut River at the Montague Gage (7,860 mi^2) and at the Turners Falls Dam (7,163 mi^2) is

[7] While the study plan envisioned that FirstLight would determine the availability of acceptable and optimal flows for whitewater boating under both existing and the proposed modes of operation of Turners Falls, until the other studies related to flow-related resources, project operations and flows are completed, it is premature for FirstLight to make any specific proposal regarding alternative project operations and/or to evaluate resource impacts associated with any proposed alternative mode(s) of operation. In addition, Relicensing Study 3.8.1"Evaluate the Impact of Current and Potential Future Modes of Operation on Flow, Water Elevation and Hydropower Generation" will be conducted to more comprehensively examine the potential impacts to all resources associated with proposed project operational changes. Data from this study will be used to help determine whether, and how, different operating scenarios may affect flows in the bypass reach. The report for this study is anticipated to be filed with FERC the first quarter of 2017.

697 mi^2, of which the bulk of the increase is attributable to the Deerfield River (557 mi^2 at the USGS gage and 665 mi^2 as measured at its confluence with the Connecticut River). The Deerfield River USGS gage was prorated by a factor of 1.25 (697/557) to represent the additional flow from the 697 mi^2 drainage area. The prorated flow was then subtracted from the corresponding flow measured at the Montague gage to estimate flows at the Turners Falls Dam. The following equation was applied, where Q is flow in cfs.

$$Q_{TF\ Dam} = Q_{Montague\ gage} - 1.25(Q_{Deerfield\ gage})$$

For the common period of record of 1940 to 2013, the daily flow was estimated at the Turners Falls Dam. To further estimate the duration of time flow is released at the dam, the computed daily flow data was subtracted from the approximate canal capacity of 18,000 cfs as shown in the equation below. Thus, if the computed flow at the Turners Falls Dam from the above equation was 20,000 cfs on a given day, it was assumed that 2,000 (20,000-18,000 cfs) would be spilled at the Turners Falls Dam because the hydraulic capacity of the canal will have been exceeded.

$$Q_{Estimated\ TF\ Dam\ Spill=} = Q_{Montague\ gage} - 1.25(Q_{Deerfield\ gage}) - 18{,}000\ cfs$$

Where flows at the two USGS gages can be found instantaneously at

$Q_{Montague\ gage}$ http://waterdata.usgs.gov/usa/nwis/uv?01170500

$Q_{Deerfield\ gage}$ http://waterdata.usgs.gov/usa/nwis/uv?site_no=01170000

Using this approach, monthly Turners Falls Dam spill duration curves were computed as shown in Figures 4.5-1 to 4.5-5 (3 months per plot, and annual). These curves provide an approximation of the magnitude and duration of spill events to the bypass reach over the 1940-2013 period of record. On average, based on the annual spill duration curve, spill occurs approximately 20% of the time, with the bulk of spill occurring during the expected runoff months of March, April and May. During July, August, and September, spill occurs less than 4% of the time.

It should be noted that during spill events, Station No. 1 with a hydraulic capacity of 2,210 cfs is likely operating and thus adding flow to the lower 1.7 miles of the bypass reach, including the Rock Dam feature. In addition, Fall River is also discharging into the bypass reach and may be contributing significant additional flow.

Using the monthly spill duration curves, the percentage of time the flows in the bypass reach would be expected to exceed each of the study flows are listed in Table 4.5-2. Estimates of the equivalent number of boating days associated with these percentages were made by applying the percentages to the number of days in each month.

Table 4.5-2: Percentage by Month and Estimated Number of Days Spill Flows Equal or Exceed Boating Evaluation Flows

Month	Flows Evaluated during the July 2014 Bypass Reach Whitewater Boating Study					
	2,500 cfs		5,000 cfs		10,000 cfs	
	Percent of Time	Estimated Days	Percent Exceeded	Estimated Days	Percent Exceeded	Estimated Days
January	7%	2	5%	2	4%	1
February	6%	2	4%	1	2%	<1
March	29%	9	24%	7	18%	6
April	74%	22	66%	20	54%	16
May	38%	12	31%	10	21%	7
June	8%	2	6%	2	3%	1
July	3%	1	2%	1	1%	<1
August	2%	1	2%	1	1%	<1
September	2%	1	2%	1	1%	<1
October	8%	2	6%	2	4%	1
November	12%	4	9%	3	4%	1
December	17%	5	14%	4	10%	3

As shown, Connecticut River flows at the Turners Falls Project frequently exceed the 18,000 cfs capacity of the Turners Falls Canal, resulting in spillage into the bypass reach and often produce both acceptable and optimal boating boatable conditions. As with most natural whitewater river systems, boatable conditions are most likely to occur in the spring and fall, with fewer incidents of unregulated spillage into the bypass reach producing boatable conditions in the summer and early fall. Acceptable boating flows in the range of 2,500 cfs or more would be expected to occur 74% of the time in April (~22 days), and more than 38% of the time in May (~12 days). During the summer months acceptable flows would be expected to occur between 8% and 2% of the time in June (~2 days), July (~1 day), and August (~1 day). In the fall acceptable bypass flows (>2,500 cfs) would be expected to occur 2% of the time in September (~1 day), 8% of the time in October (~2 days) and 12% of the time in November (~4 days). In total, based on the long term hydrology of the river, acceptable boating flows would be expected to occur on approximately 45 days during the recreational boating season (April-November).

Overall optimal boating conditions of > 5,000 cfs would be expected to occur on approximately 40 days during the recreation season, with the majority of those spill events occurring in April (66% or ~20 days), and May (31% or 10 days). In short, while boating conditions in the bypass are dependent upon higher river flows that produce spillage in the bypass, such conditions are not infrequent, and boaters have numerous seasonal opportunities to boat the bypass reach at both acceptable and overall optimal boating conditions, under existing Project operations.

During the summer months when flows in the Connecticut River are generally much lower, periods of spillage into the bypass reach are likely limited due to infrequent storm/precipitation events. In fact, as noted earlier, to provide the artificial test flows as part of this study during July 2014 FirstLight coordinated closely with TransCanada to ensure the proper volume of water was conveyed from TransCanada's Vernon Hydroelectric Project. TransCanada was conducting a test at an upstream plant requiring higher than normal discharge to maintain pond elevation coupled with over an inch of rain in

the watershed the week prior. Without this coordination, and the additional water releases from the upstream dam, FirstLight would not have been able to provide the whitewater flows used during the study.

It must also be noted that the Vernon Hydroelectric Project currently has a year-round minimum flow requirement of 1,250 cfs, which is equivalent to 0.2 times the drainage area at the Vernon Dam (6,266 mi^2). As a result, during July, August and September there may be periods when TransCanada is only passing its minimum flow requirement. The Turners Falls Impoundment has some storage capacity; however, whitewater releases would deplete the storage, which could then adversely impact motorized boating on the Turner Falls Impoundment, among other impacts.

Figure 4.5-1: Turners Falls Dam Spill into Bypass Reach- Annual Spill Duration Curve (1940-2013)

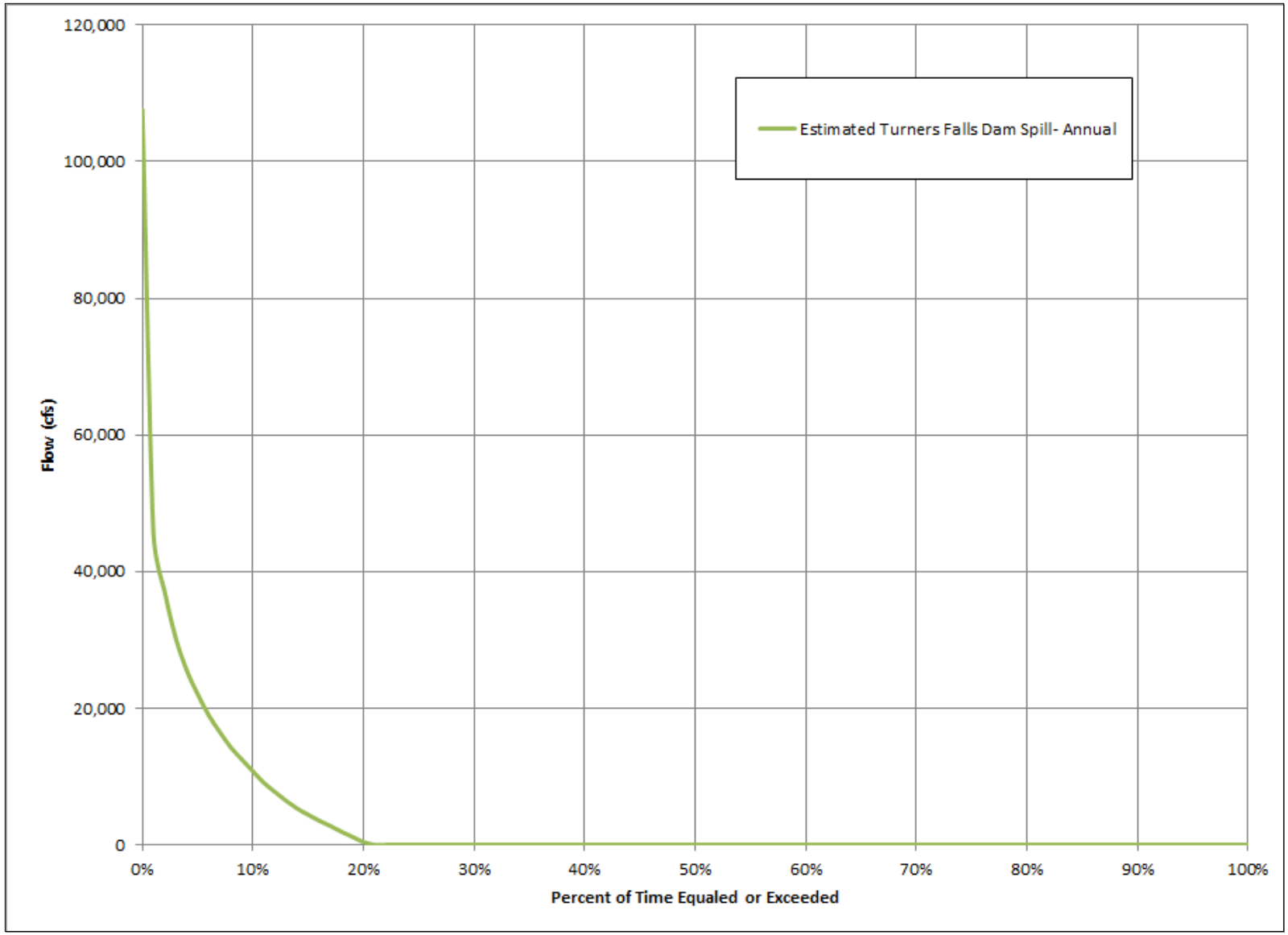


Figure 4.5-2: Turners Falls Dam Spill into Bypass Reach- Jan, Feb and Mar Spill Duration Curves (1940-2013)

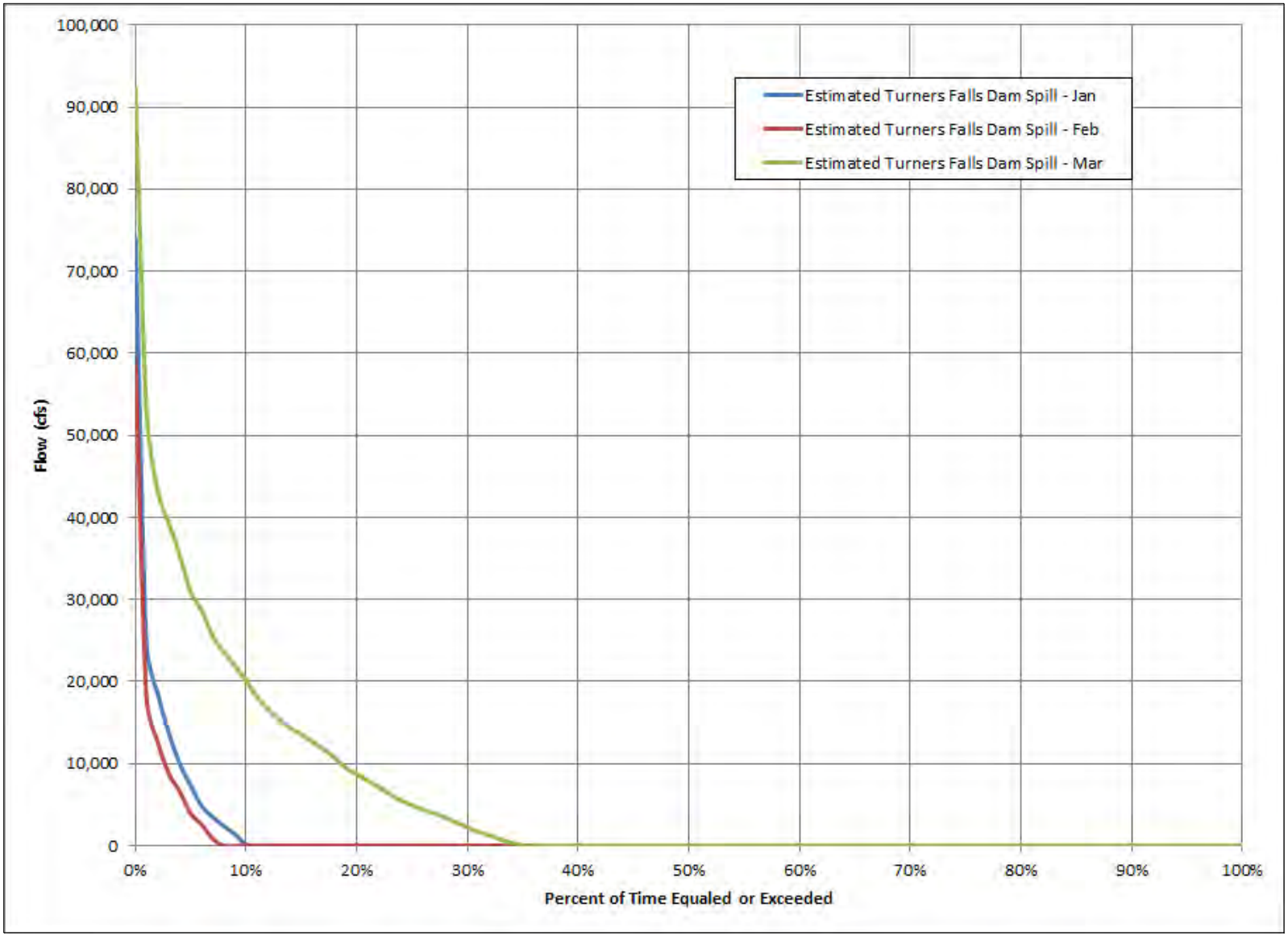


Figure 4.5-3: Turners Falls Dam Spill into Bypass Reach- Apr, May and Jun Spill Duration Curves (1940-2013)

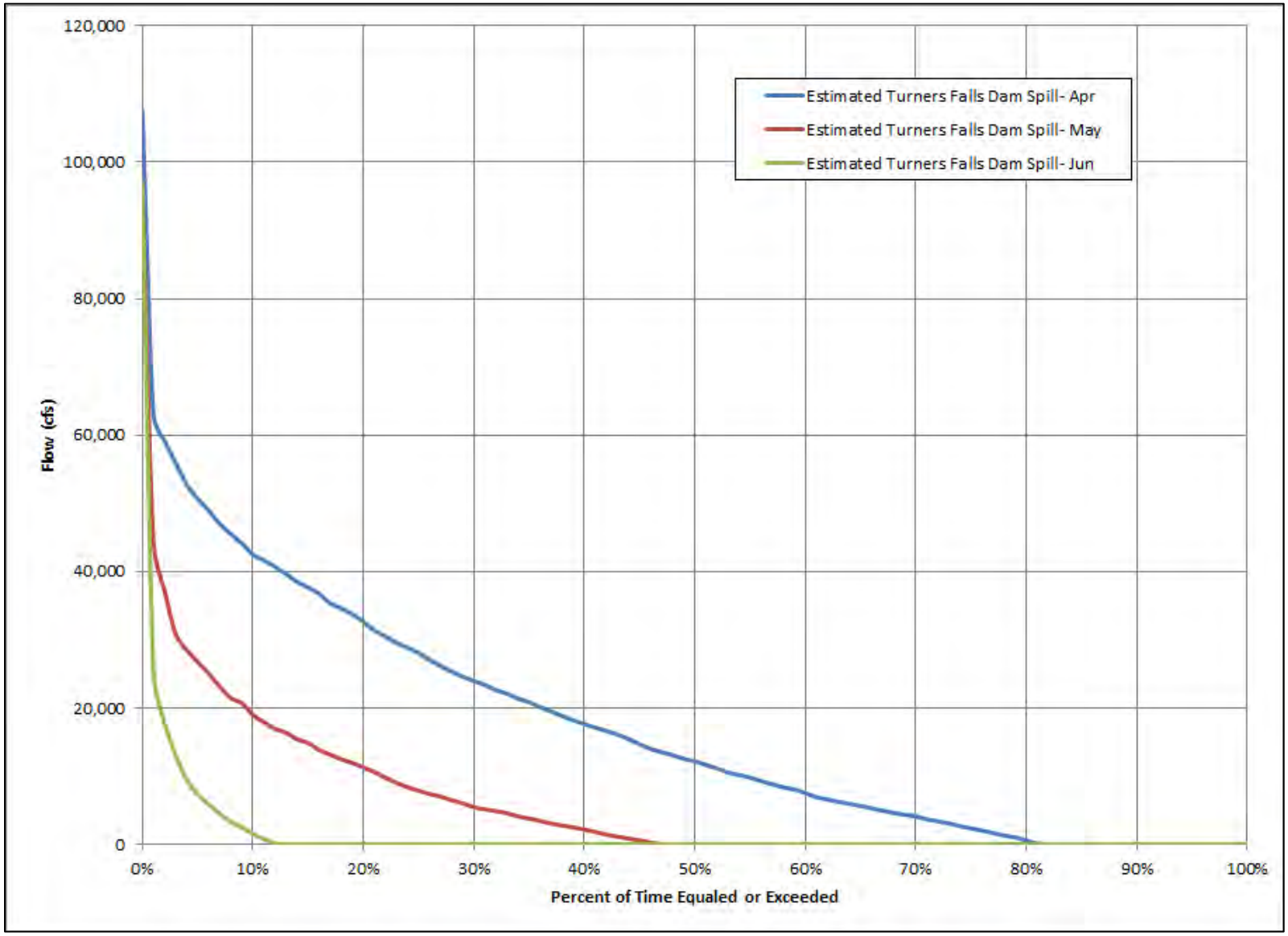


Figure 4.5-4: Turners Falls Dam Spill into Bypass Reach- Jul, Aug, and Sep Spill Duration Curves (1940-2013)

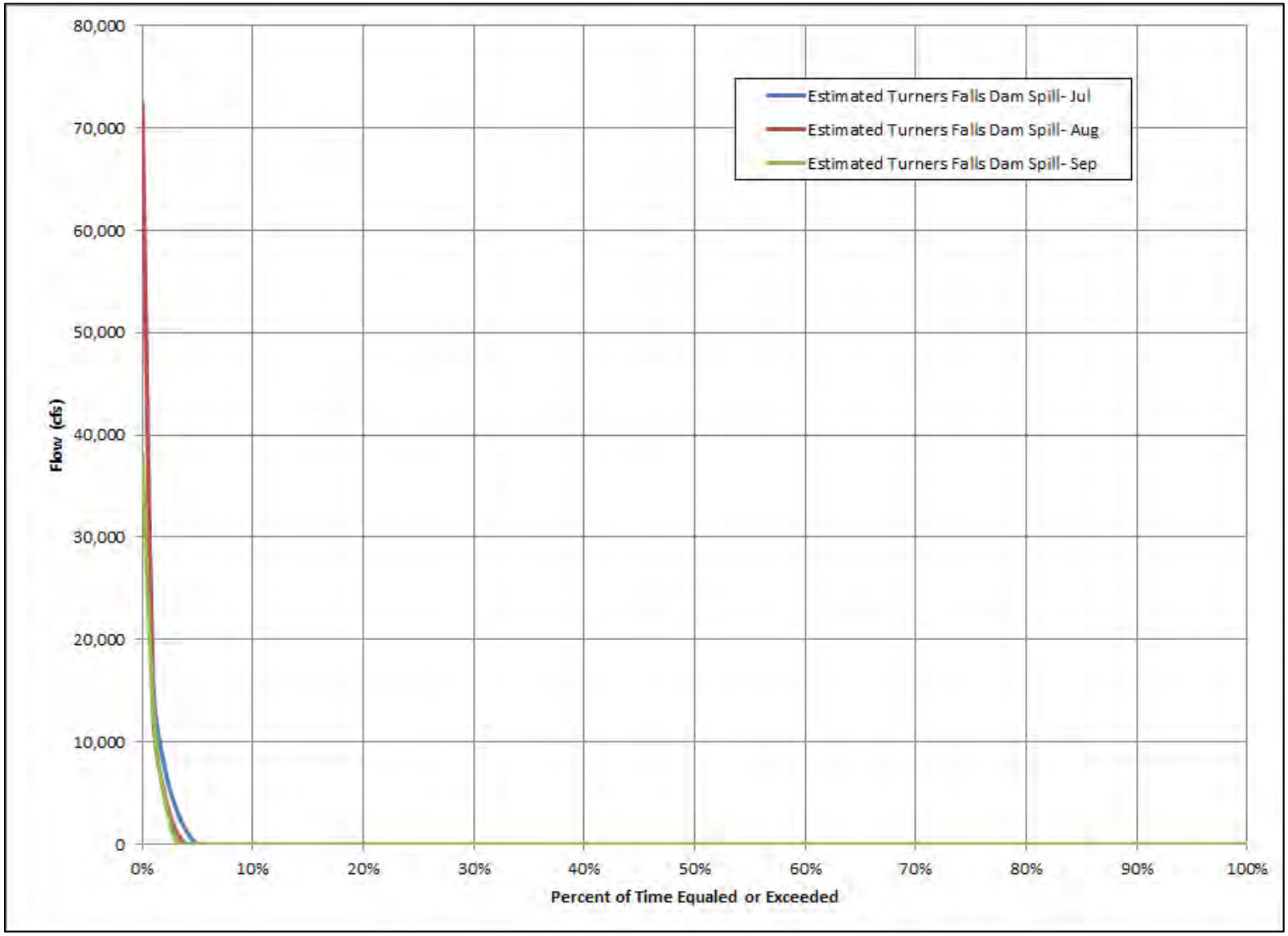
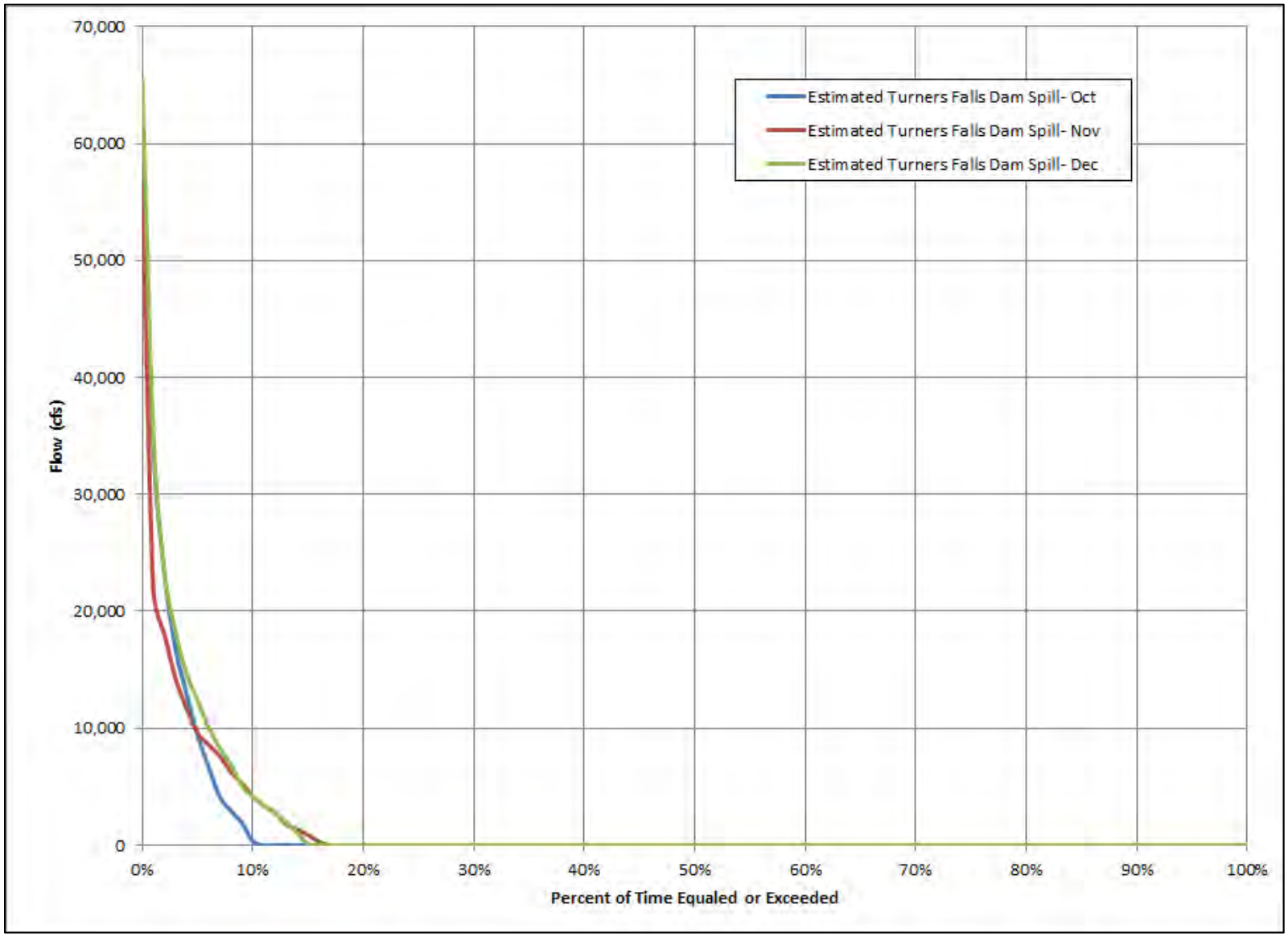


Figure 4.5-5: Turners Falls Dam Spill into Bypass Reach- Oct, Nov and Dec Spill Duration Curves (1940-2013)



4.6 Potential Impacts to Other Resources

The final objective of the whitewater boating study is to consider the potential effect of whitewater boating in the Turners Falls bypass reach on other resources. Whitewater boating is a flow dependent activity that has the potential to impact other activities or resources at the Project. FirstLight is conducting several other flow-related impact studies as part the relicensing effort for the Projects to better understand the impacts of Project operations and flows on various resources. The studies include, among others,: Study No. 3.3.1-*Instream Flow Habitat Assessments in the Bypass Reach and below Cabot Station*; Study No. 3.3.6-*Impact of Project Operations on Shad Spawning, Spawning Habitat and Egg Deposition in the Area of the Northfield Mountain and Turners Falls Projects*; Study No. 3.3.10-*Assess Operational Impacts on Emergence of State-Listed Odonates in the Connecticut River*; Study No. 3.3.12-*Evaluate Frequency and Impact of Emergency Water Control Gate Discharge Events and Bypass Flume Events on Shortnose Sturgeon Spawning and Rearing Habitat in the Tailrace and Downstream from Cabot Station*; and Study No. 3.8.1-*Evaluate the Impact of Current and Potential Future Modes of Operation on Flow, Water Elevation and Hydropower Generation.*

Although the results of these other studies are not yet available to provide a detailed assessment of the potential for impacts associated with whitewater boating use of the bypass reach, it is expected that there could be concerns about potential impacts to aquatic resources in the bypass reach and to motorized boating on the Turners Falls Impoundment associated with providing high flow releases into the bypass during periods of the year when high flows would not normally occur in the river.

One concern already identified by resource agencies is the potential impact of additional or extraordinary flows in the bypass reach on shortnose sturgeon spawning/incubation/rearing periods in April, May and June. During development of the study plan and finalizing the logistics and planning for the whitewater boating field evaluation, National Marine Fisheries Service (NMFS), Massachusetts Division of Fish and Wildlife (MADFW) and U.S. Fish and Wildlife Service (USFWS) were included in the consultation process due to concerns with potential impacts to shortnose sturgeon spawning.

The shortnose sturgeon is a federally listed endangered species under the Endangered Species Act. There is a population of shortnose sturgeon residing in the river reach between Turners Falls and Holyoke Dams. Spawning habitat for these fish occurs between Rock Dam and a point approximately 650 feet downstream of the Cabot Station tailrace. Sturgeon spawning in this area typically occurs from April to mid-May and the egg incubation period is about two weeks when water temperatures are between 8 and 12 degrees Celsius (°C). Additional environmental conditions associated with spawning activity include decreasing river discharge following the spring freshet and bottom water velocities of 0.4 to 0.7 m/sec (Dadswell *et al.*, 1984; NMFS, 1998).

All three fishery agencies expressed concerns about the impact of conducting an evaluation of whitewater boating in the bypass reach during the shortnose sturgeon spawning season. In its letter of December 12, 2013, NMFS stated “We appreciate FirstLight’s proposal to avoid impacts to shortnose sturgeon during shortnose spawning, rearing, and outmigration. This sensitive period occurs from approximately April 15th to June 22nd. If variable flows must be considered for whitewater evaluation during the April-June period, we would recommend test flows be evaluated during the first two weeks of April or the last week of June”. In their letter of July 12, 2013, MADFW stated “The Division will not support seasonally inappropriate flow regimes for whitewater boating (i.e. high flows in mid-summer) as these flows will adversely affect the aquatic biota that the Division is seeking to reestablish and protect in the bypassed reach of the Connecticut River.”

5 CONCLUSIONS

A study was conducted to evaluate whitewater boating potential in the 2.7 mile Turners Falls Dam bypass reach. The study objectives were to assess the effects of a range of flows on whitewater recreation opportunities, the demand for such flows, other regional whitewater boating opportunities, bypass reach access for whitewater boating, competing uses and resource needs, and the availability of acceptable and optimal whitewater boating flows under current and proposed modes of Project operation.

Overall, the study found the six evaluation flows provided whitewater conditions and opportunities ranging from Class I to Class IV for various types of watercraft and boater skill and experience levels. The study found that the bypass reach was boatable by nearly all watercraft type at all six of the flows evaluated, and produces a variety of whitewater experiences over the range of flows tested, depending on watercraft type. The minimum acceptable whitewater flow was found to vary by watercraft: 2,500 cfs for all canoes and SUP; 3,500 cfs for catarafts/shredders; and 5,000 cfs for kayaks and rafts. The optimal whitewater flow also varies by watercraft: 3,500 cfs for closed canoes (C1 and C2); 5,000 cfs for OC1 and cataraft/shredder; 8,000 cfs for rafts and SUP; and 10,000 cfs for kayaks. Flows in the range of 5,000 to 8,000 cfs flow were found to be the overall optimal boating flows for the Turners Falls bypass reach.

Access to the bypass reach was also evaluated as part of the study. The study identified three areas (fishway put-in, Turners Falls Station No. 1 Fishing Access, Cabot Woods Fishing Access) that currently provide access to the bypass reach and could be used as "put-in" sites, and one site (Poplar Street Access) downstream of the bypass reach that was used as a "take-out" site for the evaluation. Both the fishway put-in area and Turners Falls Station No. 1 Fishing Access are suitable for whitewater boating use and could provide adequate access to the bypass reach. The Cabot Woods Fishing Access is not suitable for access to the bypass reach for whitewater boaters due to steep slopes and in-water safety concerns.

To help assess boater demand, the study considered the bypass reach in the context of other regional whitewater boating opportunities. In a comparison to regional whitewater rivers by the boater participants, most of the other regional rivers rated slightly more desirable than the bypass reach for whitewater boating. In response to a related question, most boaters indicated that they would "possibly" return to the bypass reach. When examined by watercraft, all participants who boated the 2,500 cfs flow in closed canoes, a cataraft/shredder, and SUP indicated they would "probably" or "definitely" return to boat this flow. At the overall optimal flows of 5,000-8,000 cfs boaters were fairly evenly divided among those who would "possibly", "probably," and "definitely" return. Factors suggested by the boaters based on their survey responses that may affect the overall appeal of the bypass reach for boating included the relatively short length of the boating run (2.7 miles), the urban setting, and the lack of information about when spills are occurring or expected to occur. Based on these results, it is not clear that there is significant demand for increased whitewater boating opportunities in the bypass reach.

In addition, other regional whitewater boating opportunities were assessed to determine the availability of whitewater boating opportunities within ~ 50 miles of the Turners Falls bypass reach. Like the Turners Falls bypass reach, some of the boating opportunities in the region are dependent on natural flows. Thus, these boating opportunities are seasonal in nature, and generally more available in the spring and fall than in the summer. On the other hand, the study identified several regional boating opportunities that are available throughout the recreation season through scheduled flow releases. Scheduled releases at these rivers provide regional boaters with significant whitewater boating opportunities throughout the recreation season, including in the summer and on weekends.

The availability of whitewater boating flows in the bypass reach was assessed by preparing and reviewing annual and monthly Turners Falls Dam spill duration curves developed using USGS gage flows based on a long-term period of record (1940-2013). The spill duration curves demonstrate that boatable

flows >2,500 cfs can and do occur in the bypass reach year round, with the highest incidence of boating opportunities occurring in the spring (March through May) and to a lesser degree in the fall (October and November). While flow duration curves do not identify individual incidences of spill events in excess of 2,500 cfs, the frequency of such occurrences, based on a relatively long term record (1940-2013) is useful in predicting the likelihood of the frequency of boatable flows in the bypass reach in the future as a percentage of time, or as an estimated number of boatable days. Results of this assessment show that acceptable boating flows of at least 2,500-3,500 cfs would be expected to occur approximately 45 days during the boating season (April-November). Spills that would produce overall optimal boating conditions of at least 5,000-8,000 cfs would be expected to occur 40 days during the boating season. Overall, these results suggest that while boating opportunities in the bypass reach follow the seasonal pattern typical of other unregulated whitewater boating reaches in the region, it is also clear that there are numerous opportunities to boat the bypass reach, primarily in the spring and some in the fall. Because boating flows in the bypass reach typically occur as a result of spill of river flows that exceed the hydraulic capacity of the Turners Falls power canal (18,000 cfs), and because FirstLight is not considering any significant changes to the capacity of the power canal, such spill events and the resulting boating opportunities would be expected to occur under future operation of the Project.

Overall, the results of the whitewater boating evaluation of the Turners Falls bypass demonstrate that the bypass reach provides whitewater boating opportunities for a variety of water craft and skill levels, over a wide range of flow conditions. Based on an assessment of river hydrology, under existing Project operation, boating flows typically occur an estimated 40-45 days between April and November. Such spill events can occur anytime throughout the boating season, but are most likely to occur in the spring and fall. The study also showed that there are numerous other boating opportunities that occur within close proximity to the Turners Falls Project, a significant number of which are available in the summer and on weekends through scheduled flow releases. Other factors that may influence a boater’s decision to utilize the bypass reach during spill events include the short length of the reach, the urban setting, and lack of knowledge regarding bypass spills/flow levels.

6 REFERENCES

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APPENDIX A – SINGLE FLOW EVALUATION FORM

Figure 3.6.3-1b: Single Flow Evaluation Form

SINGLE FLOW EVALUATION FORM
Turners Falls Hydroelectric Project FERC No. 1889
Whitewater Controlled Flow Study

Date of run: _____

Name: _____

Indicate which flow release this survey corresponds to (check appropriate box):

Flow 1	cfs	Date/time	
Flow 2	cfs	Date/time	
Flow 3	cfs	Date/time	
Flow 4	cfs	Date/time	
Flow 5, if applicable	cfs	Date/time	
Flow 6, if applicable	cfs	Date/time	

1. Watercraft used (Circle appropriate one):

Hard shell kayak	Stand up paddle board
Inflatable kayak	C2
OC1	Raft
OC2	Cataraft
C1	Other (describe):_____

2. Your whitewater boating skill level for the watercraft used for this flow (Circle appropriate one):

Beginner	Advanced
Novice	Expert
Intermediate	

3. Please evaluate the boating access for this segment of river (Circle appropriate one):

   Put-in Access: easy moderate difficult

   Take-out Access: easy moderate difficult

4. At "Rock Dam" did you (Circle appropriate response):

   Run Rock Dam Portage Rock Dam Paddle alternate canal (avoid Rock Dam,)

5. Please evaluate this flow for your craft and skill level for each of the following characteristics (Circle one number for each characteristic).

	Totally unacceptable	Unacceptable	Neutral	Acceptable	Totally acceptable	If unacceptable, was flow: Too Low	Too high
Navigability	-2	-1	0	1	2		
Availability of challenging technical boating	-2	-1	0	1	2		
Availability of powerful hydraulics	-2	-1	0	1	2		
Availability of whitewater play areas	-2	-1	0	1	2		
Overall whitewater challenge	-2	-1	0	1	2		
Safety	-2	-1	0	1	2		
Aesthetics	-2	-1	0	1	2		
Length of run	-2	-1	0	1	2		
Number of portages	-2	-1	0	1	2		
Boating instruction	-2	-1	0	1	2		
Overall Rating	-2	-1	0	1	2		

6. Evaluate the recently completed flow for your craft based on your perceived difficulty of the run for a "typical user". For example, if you perceived that a flow of 2,500 cfs was Class II, please rank this flow for a typical Class II boater.

If unacceptable, was flow:

Release Date/Time	Flow (cfs)	Your Perceived Difficulty of the run (Class I-V+)	Totally Unacceptable	Unacceptable	Neutral	Acceptable	Totally Acceptable	Too Low	Too high
			-2	-1	0	1	2		

7. Are you likely to return for future boating in the Turners Falls bypass at this flow? (Circle one)

Definitely no Possibly Probably Definitely yes

8. Based on the International Whitewater Scale (defined below), how would you rate the whitewater difficulty of the river at this flow? (if appropriate, provide a range of whitewater classifications for this flow)

This flow rates at Class: _____

- Class I – Fast moving water with riffles and small waves. Few obstructions, all obvious and easily missed with little training. Risk to swimmers is slight; self-rescue is easy.
- Class II – Straightforward rapids with wide, clear channels which are evident without scouting. Occasional maneuvering may be required, but rocks and medium-sized waves are easily missed by trained paddlers. Swimmers are seldom injured and group assistance, while helpful is seldom needed.
- Class III – Rapids with moderate, irregular waves which may be difficult to avoid and which can swamp an open canoe. Complex maneuvers in fast current and good boat control in tight passages or around ledges are often required; large waves or strainers may be present but are easily avoided. Strong eddies and powerful current effects can be found, particularly on large-volume rivers. Scouting is advisable for inexperienced parties. Injuries while swimming are rare; self-rescue is usually easy but group assistance may be required to avoid long swims.
- Class IV – Intense, powerful but predictable rapids requiring precise boat handling in turbulent water. Depending on the character of the river, it may feature large, unavoidable waves and holes or constricted passages demanding fast maneuvers under pressure. A fast, reliable eddy turn may be needed to initiate maneuvers, scout rapids, or rest. Rapids may require "must" moves above dangerous hazards. Scouting may be necessary the first time down. Risk of injury to swimmers is moderate to high, and water conditions may make self-rescue difficult. Group assistance for rescue is often essential but requires practiced skills. A strong eskimo roll is highly recommended.
- Class V – Extremely long, obstructed, or very violent rapids which expose a paddler to added risk. Drops may contain large, unavoidable waves and holes or steep, congested chutes with complex demanding routes. Rapids may continue for long distances between pools, demanding a high level of fitness. What eddies exist may be small, turbulent, or difficult to reach. At the high

end of the scale, several of these factors may be combined. Scouting is recommended but may be difficult. Swims are dangerous, and rescue is often difficult even for experts. A very reliable eskimo roll, proper equipment, extensive experience, and practiced rescue skills are essential.

9. What skill level does a paddler need to safely paddle the bypass at this flow? (Circle one)

Beginner	Advanced
Novice	Expert
Intermediate	

10. Relative to this flow, would you consider the minimum acceptable flow (enough flow for an enjoyable recreation experience) to be higher, lower, or about the same as this flow? Circle one

Much lower	Higher
Lower	Much higher
No change	

11. Relative to this flow, would you consider the optimum flow for this type of trip to be higher, lower, or about the same as this flow? Circle one

Much lower	Higher
Lower	Much higher
No change	

13. Using site numbers or locations, please identify challenging features, rapids or sections and rate their difficulty (using the International Whitewater Scale at this flow).

Site numbers/Locations[1]	Rating
_____	_____
_____	_____

14. Estimate the number of hits, stops, boat drags, and portages you had at this flow (i.e., did you hit anything and did you have to stop or get out of the boat to continue?).

Number of hits (but did not stop)	_____
Number of hits with stops (did not have to get out of boat)	_____
Number of hits with stops (had to get out of boat to continue)	_____
Number of portages	_____

[1] Site numbers/locations will be defined in consultation with the whitewater boating stakeholders during the field investigations for the IFIM study (Study No. 3.3.1)

15. Using site numbers/locations on the map provided, identify rapids or sections you portaged and rate the difficulty of the portages (for your type of watercraft at this flow)

Place site numbers/location and reason for portage	Easy	Slightly Difficult	Moderately Difficult	Extremely Difficult
_____	1	2	3	4
_____	1	2	3	4
_____	1	2	3	4

16. Did you experience any difficulties (e.g., pinned, wrapped boat, swam) or identify any specific risk (e.g., downed trees, woody growth in the river bed) during your run at this flow? Provide a brief description and location of these experiences or identified risks..

Difficulty	Location
_____	_____
_____	_____
_____	_____

17. Provide any additional comments about this flow below. If necessary, please use site numbers/locations to identify specific locations.

APPENDIX B – COMPARATIVE FLOW EVALUATION FORM

Figure 3.6.3-1c: Comparative Flow Evaluation Form

COMPARATIVE FLOW EVALUATION FORM

Turners Falls Hydroelectric Project FERC No. 1889

Whitewater Controlled Flow Study

Date: _____, 2014

Name: _____

1. Watercraft used (Circle appropriate one):

Hard shell kayak	Stand up paddle board
Inflatable kayak	C2
OC1	Raft
OC2	Cataraft
C1	Other (describe):_____

2. Your whitewater boating skill level (Circle one):

Beginner	Advanced
Novice	Expert
Intermediate	

Please answer each of the following questions based on your experience or reaction to the river at each of the flows boated. If you have no opinion about a particular item, leave it blank. Please do not discuss these questions or your responses with other participants.

3. How many times have you boated the Turners Falls bypass of the Connecticut River before this study? (Circle one)

0 times 1-5 times 6-10 times 11-20 times >20 times

4. A number of factors can affect one's satisfaction with a whitewater trip. How important are each of these factors to you? (Circle one number for each factor)

	Not at all Important	Slightly Important	Moderately Important	Very Important	Extremely Important
Availability of features	1	2	3	4	5
Size/difficulty of features	1	2	3	4	5
Driving distance to river	1	2	3	4	5
Accessibility	1	2	3	4	5
Shuttle Availability	1	2	3	4	5
Crowding	1	2	3	4	5
Weather	1	2	3	4	5
Water temperature	1	2	3	4	5
Attractive scenery	1	2	3	4	5
Water quality	1	2	3	4	5
Thrilling experience	1	2	3	4	5
Safe trip	1	2	3	4	5

5. Evaluate the following flows for your craft and skill level. In making your evaluations, consider all the flow-dependent characteristics that contribute to a high quality trip (e.g., navigability, whitewater challenge, safety, availability of features, aesthetics, and length of run). If you did not boat a particular flow(s) during the evaluation, do not rate that flow.

Release Date/Time	Flow (CFS)	Totally Unacceptable	Unacceptable	Neutral	Acceptable	Totally Acceptable
		-2	-1	0	1	2
		-2	-1	0	1	2
		-2	-1	0	1	2
		-2	-1	0	1	2

6. Based on your boating runs on this section of the Connecticut River as part of this study, specify the flows that provide the following types of experiences. (Note: you can specify flows that you did not run/observe, but which you think would provide the type of experience in question).

Flow (cfs)

- From a recreational perspective what is the **minimum acceptable flow** for this run? Note that minimum acceptable differs from minimum flow necessary to navigate. _____
- From your perspective, what is the **optimum flow** for this run? _____

7. Rate the flows evaluated in terms of your craft and skill level

FLOW	CFS	Totally Unacceptable	Unacceptable	Neutral	Acceptable	Totally Acceptable
1						
2						
3						
4						
5						
6						

8. How important is it to have a variety of flows in the Turners Falls bypass section of the Connecticut River? Rate the importance of having variable flows for the reasons below, or check the box below the table.

A variety of flows is necessary to:	Not at all important	Slightly important	Moderately important	Very important	Extremely important
provide different types of boating experiences;	1	2	3	4	5
provide opportunities for people with different skill levels and watercraft;	1	2	3	4	5

or, □ it isn't important to provide a variety of flow levels for boating.

9. Compared to other rivers of similar difficulty, how would you rate the boating opportunities on the Turners Falls bypass section of the Connecticut River? (Circle appropriate response for each region. If you are unsure about a comparison, leave that item blank.)

Compared to:	Worse than average	Average	Better than average	Excellent	Among the very best
Other rivers within a 1 hour drive					
Other rivers in Massachusetts					
Other rivers in the northeast					
Other rivers in the country					

10. Based on your experience at other regional rivers, use the following scoring system to compare the boating opportunities at these regional rivers to those of the Turners Falls bypass section of the Connecticut River.[1] Assume optimal flow conditions for boating.

[1] Other rivers (and specific river sections) will be identified in consultation with whitewater boating stakeholders prior to the evaluation. Whitewater classifications of rivers and sections will be added to this table once sections are identified

Score using the following system:

1 = More desirable than Turners Falls bypass section of the Connecticut

2 = Similar to the Turners Falls bypass section of the Connecticut

3 = Less desirable than the Turners Falls bypass section of the Connecticut

4 = No experience boating the river

	Westfield, N. Branch – all sections	Quabog, Warren to Brimfield	Ashuelot, Gilsum to Shaw's Corner	Deerfield. E. Branch, Somerset to Searsburg	Deerfield, Fife Brook	Chickley, Hawley to Charlemont	Farmington, Otis to New Boston	Green, VT. To MA.	Millers, S. Royalston to Athol	Otter Brook, Roxbury to Keene	Souhegan, Greenville to Wilton	Westfield, N. Branch, all sections
Suitable for novice boater												
Suitable for intermediate boater												
Suitable for advanced boater												
Size & difficulty of features												
Play boating												
Rafting												
Tubing												
Canoeing												
Kayaking												
Eddy hopping												
Technical maneuvering												
River gradient												
Driving distance to river												
Shuttles												
Access to river												
Parking												
Scenery												
Water quality												
Overall												

11. Any other comments?

APPENDIX C – BOATER EVALUATION FORM MARGIN NOTES AND POST-EVALUATION DISCUSSION NOTES

Turners Falls Whitewater Boating Evaluation – July 19 to 21, 2014

Margin Notes from Boater Evaluation Comments from Evaluation Forms

2,500 cfs Flow (7-19-2014)

Way too low.

This would be great for a novice – to make this more palatable for a more experienced boater, the level would have to be higher.

Better flow than what I experienced last year.

Beautiful river. Need a lot more water for good whitewater.

Fine for novice.

Beautiful scenic valley, we saw an eagle and heron. Flow appropriate for whitewater instruction, due to low flow, some long flatwater sections.

A lot of flat water. Saw a bald eagle.

Nice level for Class II boaters.

Very easy, can avoid anything dangerous. Take-out would be tough. I'd come only if nothing else was running. Rock Dam was fun. Put-in surfing was decent, nothing hard but nothing of note.

At this level, there is only one significant feature. I doubt I'd make the drive if I had a reasonable alternative.

Definitely too low for a satisfying rafting run. Rock Dam was fun. Several areas appear to have good potential at higher flows.

Too low.

Flow less than optimum. More water would make for a better recreational flow.

Strongly suggest that "right of way" be obtained at take-out that goes from Poplar Street down to sandbar at river's edge on river right – just upstream of the take-out that we used today. Note – people were camping and fishing there Saturday. Saw three bald eagles. If portaging Rock Dam, it would be moderately difficult.

3,500 cfs Flow (7-19-2014)

Nice wildlife – beaver, eagles, yellow birds (orioles?). Water quality seemed very low – eyes stinging a bit.

Nice flow.

A local mentioned there may be old steel ties in one of the lines at Rock Dam. I ran the line at the lower flow and didn't have a problem. This could cause injury or death under some conditions and should be

cut out of the rock when there is no flow. All assuming the local's correct. I did not and will not run that line again, but it was the most technical and interesting line.

Too low.

Good, but could be higher.

Much more fun at 3,500 vs. 2,500. Better at 2,500 cfs.

This flow was a lot of fun. The ledges on river left had great play features as well as some of the waves downstream. Rock Dam was fun at this level.

I prefer very technical runs, like slalom racing, so not so interesting for me. For novice instruction, place has good potential. I can see advanced boaters coming and running Rock Dam over and over, as some in our group did today.

Put-in left channels great surf and play spots, intermediate level. I would drive to paddle this level. Nice wave trains below put-in. Surf waves by the second power station above Rock Dam near "the Patch" were good on river left. Good spin spot for open boats. Rock Dam was a good drop, straight forward but squirrely below in the outflow. I swam there, but not a bad swim.

Put stairs or steps at take-out.

Getting better.

Slightly better than 2,500 for rafting, but still too low. Ledges have potential for surfing at higher flows.

Nice level.

Thank you to FirstLight for providing shuttle and winch at take-out. However, I strongly suggest/request that access should be negotiated with landowner immediately upstream of take-out for right of way from Poplar Street down to the river left shore. This would enable recreational users to take rafts and/or heavy boats without necessity for winch. Without such access, the take-out is EXTREMELY arduous and potentially dangerous. In the past, this was allowed so there is precedent.

I thought this level was safer for Class II paddlers and thus better for novice instruction. For my paddling, too much flat if I want a whitewater day. Not much technical, just one short drop. I prefer continuous technical. Scenery nice.

Liked 3,500 much more than 2,500 for a Class II boater.

At the put-in there were boils that made the ferry to river right.

Swam at Rock Dam a few times at this level, much more turbulent landing after drop. No issues with strainers but there are multiple ones along the run.

5,000 cfs Flow (7-20-2014)

Take-out very difficult when raining. At this flow, I would bring people who were ready for a small step-up from Fife. I believe the main line of the Rock Dam is safer at this level than 2,500 or 3,500.

This seems like a nice flow for beginners stepping up from the Fife Brook of Deerfield. I can also see teaching a safety and rescue class at this level in ledges after dam. Very easy to portage Rock Dam on river left.

Fun play in first rapid.

Best flow yet, more waves, more features.

The waves are there, but lack access (eddies). Everything is "catch on the fly". The river stretch has a lot of potential. It's conveniently located and access is easy. I'm not sure how many boaters will want to run this with only 2 rapids. They were fun at 5,000, but still might not be enough to draw people here. The rapid below the dam has some great waves. Most of these though must be caught on the fly and have no eddy service. This limits how much they can be played. The first rapid would be the perfect place for a whitewater play park. Enhancing/building a few eddies would significantly increase the desire for this run and amount of boater traffic.

Take-out at Poplar Street. Request/suggest that "right of way" be obtained on (CT) river left immediately upstream of the take-out we are using for the study. The "right of way" is a path that used to be drivable from Poplar Street to river's edge. People are camping and fishing on that sandbar this weekend. Taking a raft out would be extremely arduous and potentially unsafe at current take-out. The "right of way" would greatly improve the situation.

At this level Rock Dam offers multiple technical lines which would make me willing to take novices down this river. Rock Dam is now better than Zoar Gap because it can be run many times very easily. It is a good place to teach novices how to scout drops and line up, horizon lines. I heard the steel I was told about yesterday was out of play and ran the line left of the tongue with no trouble. It was very good.

Great flow. I would drive the 90 minutes to paddle it.

Good play at ledges below dam. More than one route through Rock Dam at this level.

Great level. Went left of island at put-in, right of island seemed to take more of the water with the #4 gate open. Same mid-river surfing above Rock Dam, not as easy to catch for a single blade canoer. Far right side of Rock Dam (left channel) was a good drop – easy. Middle channel at Rock Dam was a good 2 foot drop. Good surf/play on right side.

Good level. Opened up many possibilities for route – easier to harder. Many routes through Rock Dam opened up at higher level of 5,000 cfs.

Rock Dam was the easiest level yet.

5,000 cfs provides a more fluid run through upper rapids (river right). Less flow than 3,500 was flowing through the river left rapids. Gate #4 favors river right. If gate #1 was used flow may be more ?? or favor river left.

Best run yet.

Like the fact that it is very easy to portage around dam for multiple runs.

8,000 cfs Flow (7-20-2014)

Best flow of study so far. Less dead spots, more waves, better eddys.

Rock Dam was more dynamic at 5,000. The rest of the river was much better at this flow 8,000. More suitable waves.

Take-out. Please enhance by obtaining landowner permission or a "right of way" in order to allow access from Poplar Street to the river right beach just upstream of the take-out we used in this study. The current take-out is extremely arduous and potentially dangerous for rafts and/or heavy watercraft. It is my understanding that this right of way access to the riverbank was formerly available to the public (and is still used by emergency personnel) but was closed due to littering and vandalism. At one point in the past the Connecticut River Watershed Council published a brochure describing access points for "Source to the Sea" river travelers. This site was in use at that time.

First rapid would be attractive as a play rapid at this level but you would want to take-out as soon after the first rapid as possible. The rest of the run would be just nuisance paddling.

Someone mentioned there is rebar in Rock Dam. May want to check on this and remove it during fish flow. Nice play wave opened up right channel of first island. Good level for beginners moving into novice, lot to practice in first rapid river right and left channels. I wouldn't personally come to paddle but would certainly add it to existing Deerfield trip (Sunday) – take the newbies down. If you take the time a few lines open up at Rock Dam, e.g. far right boof.

Perfect level.

Left line at Rock Dam has remained the same at all levels. Seems to get easier with more water.

Very good flow with lots of surfing available at the upper ledges. If there was a portage trail to carry back up one could spend an entire afternoon playing the waves and surfing.

The higher flow (8,000 cfs) made the flat stretchers easier to paddle but also washed out most features. It did create several play waves.

This was the best level so far.

Better take-out access – take-out at Rock Dam? Great play waves below Rock Dam river right, one at Cabot, one right of Smead Island.

The 8,000 cfs flow opened up new feature at the beginning left channel at the Rock Dam. The remainder of the river as washed out for most play.

An alternate take-out just upstream of the take-out we used would greatly add to the ease of doing this run. At this level, the river moved too quick and was too pushy for novices to feel comfortable. They might be able to hang on and paddle it, but their level of comfort probably would not be there.

Great level.

Overall I thought this was a very good level and liked it very much. I personally liked Rock Dam at 2,500, but only Rock Dam. Overall 8,000 cfs made the whole river good.

10,000 cfs Flow (7-21-2014)

Large waves and powerful rapids. Moving back and forth was challenging. Needed to look far ahead to plan your ferries. Instruction only for upper level boaters. Safety needs to occur in groups.

Take-out access – Need to negotiate "right of way" with landowner from Poplar Street down to shore on (CT) River left. Currently posted as No Trespassing. The current take-out is extremely difficult and potentially dangerous for rafts and heavy watercraft. The option to drive the vehicle to the shore was available in the past. Please negotiate to obtain this access again. Put-in access – rafts rigged with rowing frames, such as those used by fly fishermen, are heavy (150-200 lbs.). Please allow the bridge to be used – i.e., open gate access – so that vehicles can drive to the put-in just like we have done at the study. Kayakers can carry boats from parking lot. That is nearly impossible with heavy rafts. Thank you.

Fun.

Good intermediate flow. One good play feature with eddy service. One other with "catch on the fly" service. Rock Dam easy at this level – not a big hydraulic. Easy river running most of the river.

Fun, flats could be filled with games if with commercial guest.

Honestly, I found it boring….too much flat water for not enough fun running or playing.

Not a ton of challenge for me, but fun nevertheless. This would be a good level for Class III boot camp people moving from novice to intermediate. Fun level, play if you look for it. It felt a little between too high and a little too low for playability in the rapids just below the put-in.

A few nice surf waves at beginning of right channel that bypasses Rock Dam.

I avoided the big water associated with the 10K release. I paddled the left hand side below the dam; took the middle route at the island above Rock Dam; and paddled over the right hand side of the Rock Dam. But I did the same at 5K and 8K releases.

Features are more powerful, playing/surfing can be limited as you flush downstream. Play below Rock Dam at Cabot and Smead Island was excellent, easy recovery areas.

Optimal level of OC1 I think is 8,000.

My guess is that optimal rafting level is a touch lower. 6,000-8,000.

This river seems ideal for rafting and paddling either commercially or just for fun. While it may be more feasible to only release 5,000 cfs, I felt that 10,000 cfs provided a wonderful combination of fun, challenge, and time to rest/swim.

5-8,000 cfs is optimum. A lot of features were run out.

Rock Dam feature offered Class II+ options, but enjoy more at lower flows. Ledges below dam form some play features, but are hard to catch with a raft.

A lower flow would make this stretch more accessible for novice paddlers.

If there were an easier way to get back up from below Rock Dam, that would be awesome.

Occasional strainers on the side.

Rock Dam will be better at a lesser flow.

Thank you for all the work and inviting us to paddle the CT.

13,000 cfs Flow (7-21-2014)

Maybe want to remove tree top river right on right channel of island before Rock Dam – good play feature, need to paddle around it. 13K seemed to wash out some nice play river right at put-in rapid. 13K washed out standard line at Rock Dam.

Fun!!!

13,000 was somewhat easier than 10K. Left upper ledges provided much play. Rock Dam was runnable in multiple locations.

This was the best flow we saw. Great surfing at Rock Dam in a raft. Great waves for kayaks in the beginning. A few good kayak play spots as well.

There were many standing trees in currented waters at this level. They pose a risk if needing to get to shore. The streambed is not used to this much water so it makes the shoreline feel like flood stage. The river itself did not though. The trees would be my only concern.

Preferred 10,000 cfs. Request "right of way" to shore at take-out.

Way too much flatwater to be worth it. A couple good waves, and fun drops at Rock Dam, but that's about it.

Fun, should be lower.

Of the big flows (10K vs 13K), I preferred the 10K. 13K was above my skill level.

Big water feel – not slow between features. Still good play spots above and below Rock Dam especially for bigger open boats.

Rock Dam was easier and the drop was smaller, but surfing was better.

A lower flow would accent the Rock Dam a bit better. The Rock Dam was washed out.

Very fun flow.

Optimal level my guess would be 5,000-8,000 cfs.

Thank you very much.

Fun compression waves in several areas. Some play spots. Drop at Rock Dam small.

Rock Dam became pretty straight forward, lost a lot of surfing spots.

This level washes out Rock Dam. Only one real place to run middle of river, left of large rock.

I liked the 10,000 cfs level for a high water flow instead of the 13,000 cfs. It would be nice if FirstLight could post on the internet an estimate of how much water is being spilled over the dam. An alternate easier take-out would be appreciated.

Misc. Comments from Comparative Evaluation Form (7-21-2014)

My main reason for coming back here would be for teaching. I probably wouldn't return to paddle it with people above an intermediate level.

Both levels are similar in fun, though some waves are better at 13,000.

This section of river is very fun and would be valuable to New England whitewater. The more water the better for this section. Having a "big" water option in this region would be very valuable.

I think 5-8,000 offers nice technical challenge at Rock Dam. 10,000 introduced play. 13,000 had some play but a bit washed. It's a great second river (or 1st of two); great teaching river. At 8-10K you can easily spend a few hours at first rapid teaching, play, ferry, river reading skills, surfing. If you add some rocks to make eddies on 1st rapid river left, you could have a nice play park.

The take-out is horrible for rafts and heavy boats. Please obtain "right of way" to river left shore for take-out access. This was possible in the past and hopefully could be arranged. Without a winch raft take-out would be extremely difficult and potentially dangerous.

You did a great job. Thanks for the opportunity. A model for a study.

Conn River is big water – it's not like their other rivers.

8,000 cfs surf city.

The river reminds me of the Sacandaga in NY (section that flows into the Hudson). I enjoyed the Turners Falls bypass and would paddle it once or twice a year, especially if it was the only river with water. I prefer smaller rivers like the Otter, Pork Barrel West, New Boston, Housatonic. These rivers tend to need lower flows to paddle and have many features and are close to my home.

There is too little whitewater on this run for it to be worth the drive for me if I had a reasonable alternative.

I liked 3,500 better. Better to bring novice for instruction because safer. Too much flat and too few and small features for whitewater. Rock Dam is better at 3,500 and could be a great play place but access there is hard.

Value in warm water/summer boating. Rock Dam feature of interest and advanced boaters, novice instruction possible. I like very technical rivers, so not so much interest for me.

Optimal flow would be great, the boater can choose easy, or difficult while on that optimal flow.

I had a blast.

Section is short. A competent boater should do it.

At higher flow, Rock Dam is a smaller drop, but surfing is better.

Thank you.

With regular predictable releases I would come here to boat occasionally with family and friends. The take-out access will need major improvement. The put-in will need similar boat drop off access as on this study.

The 1st rapids after the put-in and Rock Dam are the features that make this run worthwhile. The Rock Dam is not suitable for novices. The 1st rapid is only suitable for beginners and novices at the lower flows. An alternative take-out needs to be found to make this river frequently used.

FirstLight Turners Falls Bypass Whitewater Boating Evaluation Whitewater Boaters

Notes from post-evaluation discussion – July 21, 2014

Tom Christopher opened the discussion by asking for reactions to the flows between 2,500 and 13,000 cfs.

Evan Eichorn: Thought that 5,000 cfs was good with a small boat. There was also some good play at 3,500 cfs on the left channel of the island (below dam). Bigger flows were good with a bigger boat. There was some play below Cabot Station. Would like regular access at Rock Dam as it would be a good attraction, "park and play" at Rock Dam. Also play area at the put-in. Prefer the lower levels for smaller boats.

Tom C: If there is no provided shuttle available, how do you characterize the put-in?

Evan: If no shuttle, use smaller canoe at 3,500 -5,000. Could lug a larger boat to the put-in. Carrying small boats from Unity Park are not a problem, but would want the 3,500 to 5,000 cfs flow.

Jim Dowd: Works as fishing guide using heavier boats. Access to the river and take-outs are difficult with heavy boats such as fishing boats. Poplar Street is physically arduous/dangerous with a heavy boat especially if it is raining. Historically there was an access upstream of the Poplar Street Put-in at the gravel bar, which is listed in the CRWC Source to Sea. Would like to see access opened back up. This was a terrific experience, and easier access would make it better. Votes for the 8,000 cfs flow.

Jim Michaud: 10,000 cfs was perfect for a big water feel like the Kennebec River. There are a lot of other technical rivers in the area.

Tom C: 10,000 cfs provided large dynamic waves, what is the rafters' opinions?

Frank Mooney: In a raft with a strong crew (guides), both the 10,000 and 13,000 cfs flows were fun, and the first ledge section was tremendous, however it is would not be easily accessible with a commercial operation. Might be good for a park and play. This was big water and warm water. All flows offered play at Rock Dam. Had no idea at what flows Rock Dam washed out at - had thought at about 8,000 cfs. Thinks that a "park and play" would work.

Tom C: Play boaters/Play Spots? Are there enough spots to make this viable even at the lower flows?

Carrin Tinney: At a flow of 10,000 cfs the play features developed that you could get to and play and park for a while. Could make a play park in the left entrance channel. Would need between 8,000 cfs and 10,000 cfs for a play park there with 6-7 waves in a small area. It could bring business to the town.

Tom C: Regardless of whether flows were at 2,500 cfs to 13.000 cfs there was something fun for almost everyone to do.

Jordan Yaruss: 5,000 cfs is where the fun started and was still easy for every level of paddler. Going lower than 5,000 did not make it easier, just slower with more work in between features. Greatest value of the stretch is for teaching. Doesn't get much more than Class II+ even at the highest flows with the exception of Rock Dam, which is Class III at all levels paddled, but easily avoidable. Flows of 5,000 to 8,000 cfs are optimal as those are best for teaching opportunities.

Tom C: What about opportunities for teaching boating skill?

Robert (Zoar Rafting): Nothing for teaching except training with guides. Other than the rooster tail at the dam, there isn't anything that isn't already offered on the Deerfield River. Dumping with customers in the rooster tail would not be good. This is not suitable for commercial purposes.

Zoar Rafting Guide: For teaching novices in inflatable kayaks, the bypass is not a good fit as it's a long swim if something happens. It's a better fit for training more advanced boaters.

Jordan: Teaches kayaking for AMC and others. There are three low consequence swims at lower flows with easy pick-ups and you would not swim into anything hazardous. Would not take a beginner over Rock Dam between 2,500 cfs and 3,500 cfs but would over 3,500 cfs if they wanted to try it. There is also good eddy hopping practice.

Tom C: Felt that Rock Dam was safe at all levels. Comments?

Zoar Rafting guide: Rock Dam is a lot of fun, unique feature, good surfing far right, rocks are jagged but easy to avoid and the area is easy to scout.

Robert (Zoar Rafting): 2,500 cfs offered nothing for rafters at Rock Dam. 5,000 cfs is more active for rafters to be able to do things with. 5,000 cfs to 10,000 cfs was raftable, but only a few features were present, basically the rooster tail and Rock Dam. Not much that would be fun for a raft trip.

Tom C: Scenic value, at low flows and possibly further downstream than Poplar Street?

Evan: Somewhat interesting, observed some wildlife, foliage season would be attractive.

Zoar Rafting guide: Potential during foliage season.

Jordan: Not at the top of list for aesthetics if I was going to suggest a river for scenery.

Jim Dowd: River aesthetics improve downstream of the urban area.

Tom C: Comments of the future of releases and economic benefit of whitewater releases if releases are secured?

Evan: Would need to get the word out about the flows. It is a somewhat depressed area and it would help bring people to the area. People may come to watch and boat.

Jim Dowd: Can draw a loose connection to what may happen here with what happened on the Deerfield. A huge recreation resource developed on the Deerfield due to the releases. Could expect it would be a positive economic impact on this community.

James Kelly-Rand: With scheduled releases and convenient access at put-in and take-out I would come with friends and family. This is a closer drive for me.

Ryan Galway: Add a path for friends and family to watch. Area offers different things for family to do if they don't all want to paddle.

Tom C: Portage - would a trail along the upper ledges for observation or ability to carry boat back up stream be beneficial?

Yes all around.

Carrin: At 10,000 and 13,000 easy take-out above Rock Dam disappeared. River left difficult to scout at 13,000 cfs at Rock Dam. Portage on river right was difficult above 10,000 cfs. The West River releases once per year, and we are always looking for a second river. If FirstLight could coordinate their release with the West and other rivers, this would be a good bonus river. Always looking for something to run when nothing else is running. Don't think that it would be a destination river for someone traveling 3 ½ hours since it is short with few features, but if coordinated with other rivers this could be a bonus for a nice long day of paddling.

Frank: The number of scheduled flows is the key to economic impact and I don't expect to see 106 bypass flows releases , however releases here could complement other rivers and a significant number of releases would bring people here.

Robert (Zoar Rafting): Would need a schedule to be able to plan ahead, and different flows would need to be provided. This would benefit scheduling for commercial trips. Need easy access at Rock Dam and Poplar Street take-out.

Tom C: Safety? During the study, everyone was spot on with few swims. Is this a safe river for different types of boating? Is it tuber friendly?

Ryan: This is not friendly for tubes especially Rock Dam due to recirculation on river right.

Glenn Stewart: There have been multiple fatalities at Rock Dam in the past.

Jim Dowd: Too dangerous for tubers. There are potholes, trees, foot entrapments. Tubers aren't required to wear safety equipment.

Matt Guertin: Too many dangerous areas/strainers

Jordan: Least safe part of river is the take-out. Need development at take-out if there are to be releases in the bypass. Should be able to drive to put-in to launch and then park at fishway parking area.

Robert (Zoar Rafting): Make access like Sunderland Bridge boat launch to solve problems. Would need to change the grade.

Jack Gill: If novices are unsupported, the first set of ledges and Rock Dam are not very safe as compared to other areas. It is a wide area for a long swim. Casual paddlers that flip will be difficult to recover – it's a big river.

Matt: Most of the time people are paddling the water is cold, not like today.

Carrin: If rebar exists at Rock Dam in left channel it needs to be removed.

Matt: Is going to try and mark rebar locations for FirstLight to remove. Flow below Cabot Station affects the Rock Dam pool with back flow. If a flow phone is instituted, it would be good to know could include whether there is generation at Cabot Station as well.

Jim Dowd: Should have a telephone and internet flow information available with accurate information.

Ryan: Is there real time information available?

Matt: Currently one has to back out Deerfield flows from the Montague gauge to estimate bypass flows.

Evan: Would like gauge information to be available for this section of river.