RA-02 GORGE BYPASS REACH SAFETY AND WHITEWATER BOATING STUDY REPORT

SKAGIT RIVER HYDROELECTRIC PROJECT
FERC NO. 553

Seattle City Light

Prepared by:
River Science Institute, Inc.

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Updated Study Report

TABLE OF CONTENTS

List of Figures

List of Tables

List of Attachments

List of Acronyms and Abbreviations

AQI .....air quality index
cfs.....cubic feet per second
City Light.....Seattle City Light
Ecology .....Washington State Department of Ecology
FERC.....Federal Energy Regulatory Commission
ISR .....Initial Study Report
KOP.....Key Observation Point
LP.....licensing participant
NPS .....National Park Service
PAD.....Pre-Application Document
PRM .....Project River Mile
Project .....Skagit River Hydroelectric Project
PSP.....Proposed Study Plan
RSP .....Revised Study Plan
SPD .....Study Plan Determination
SR.....State Route
TCP .....traditional cultural property
USFS .....U.S. Forest Service
USR.....Updated Study Report
WDFW.....Washington Department of Fish and Wildlife

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1.0 INTRODUCTION

The RA-02 Gorge Bypass Reach Safety and Whitewater Boating Study (Bypass Safety and Whitewater Boating Study) is being conducted in support of the relicensing of the Skagit River Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC) No. 553, as identified in the Revised Study Plan (RSP) submitted by Seattle City Light (City Light) on April 7, 2021 (City Light 2021a). On June 9, 2021, City Light filed a "Notice of Certain Agreements on Study Plans for the Skagit Relicensing" (June 9, 2021 Notice)[1] that detailed additional modifications to the RSP agreed to between City Light and supporting licensing participants (LP) (which include the Swinomish Indian Tribal Community, Upper Skagit Indian Tribe, National Marine Fisheries Service, National Park Service [NPS], U.S. Fish and Wildlife Service, Washington State Department of Ecology [Ecology], and Washington Department of Fish and Wildlife [WDFW]). The June 9, 2021 Notice proposed no changes to the Bypass Safety and Whitewater Boating Study as described in the RSP.

In its July 16, 2021 Study Plan Determination (SPD), FERC approved the Bypass Safety and Whitewater Boating Study without modification. On March 8, 2022, City Light filed its Initial Study Report (ISR), which noted that progression to Level 3 study (a multiple controlled flow evaluation using a team of boaters paddling two to four flows based on flow volumes identified from the Level 2 field reconnaissance) was warranted based on results of the Level 1 and Level 2 phases of study but was contingent, in part, on further communication with Indian Tribes. After the filing of the ISR, American Whitewater filed a request for study modification to proceed with the Level 3 multiple flow evaluation. FERC's August 8, 2022 Determination on Requests for Study Modifications recommended City Light to proceed with implementing the Level 3 multiple flow evaluation as outlined in the ISR, including evaluating the four planned spills recommended therein.

Following FERC's August 8, 2022 Determination on Requests for Study Modifications, City Light scheduled the Level 3 implementation for two dates in October 2022. Hazardous air quality from wildfires and severe weather required City Light to postpone both dates for Level 3 data collection. City Light anticipates conducting the Level 3 field work in the third quarter of 2023.

A report of the study efforts is being filed with FERC as part of City Light's Updated Study Report (USR). A technical memorandum of the Level 3 multiple flow evaluation will be provided to LPs and filed with FERC following completion of the field data collection in the third quarter of 2023.

[1] Referred to by FERC in its July 16, 2021 Study Plan Determination as the "updated RSP."

2.0 STUDY GOALS AND OBJECTIVES

The goal of this study is to evaluate the suitability of the Skagit River in the Gorge bypass reach for whitewater boating under current conditions, inform future operational scenarios that include the range of instream flow measures that may be included in a future license, and assess potential constraints such as Project operations and safety concerns. This study included identifying any river access needs and potential effects of access on other Project resources. The Bypass Safety and Whitewater Boating Study analysis considered information obtained from other studies examining resources in the Gorge bypass reach, such as FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study (Bypass Instream Flow Model Development Study; City Light 2023d). Due to the physical characteristics of the Gorge bypass reach, e.g., channel shape, substrate and gradient, the study investigated whitewater suitability for expert paddlers only. The study was not intended to investigate commercial whitewater boating opportunities in the Gorge bypass reach.

The study had the following objectives:

- Describe the whitewater boating opportunity in the Gorge bypass reach, including the whitewater difficulty, character of rapids, number of portages, suitability for expert paddlers, and uniqueness of opportunity;
- Determine the range of flows that would provide whitewater boating opportunities in the Gorge bypass reach;
- Quantify the frequency, timing, duration, magnitude, and rate of change of spill events from Gorge Dam annually within the whitewater boating flow range;
- Assess the feasibility of expert whitewater boating, including public safety, effects on generation, and cost of providing whitewater boating in the Gorge bypass reach;
- If boating is determined feasible, compare the results of this assessment with an estimate of potential whitewater boating use; and
- If boating is determined feasible, identify existing and potential river access needs and routes, and challenges with utilizing those routes, including potential effects to natural, cultural, and other Project resources from increased public access.

3.0 STUDY AREA

The study area is the 2.5-mile Gorge bypass reach from Gorge Dam to Gorge Powerhouse. The reach is a relatively steep, confined canyon characterized by bedrock and large boulder substrate. The suitability of this reach for expert whitewater boating has not been previously investigated. Public access to the Gorge bypass reach is restricted for safety. There are no established locations to access the river. Access to the river requires crossing over large boulders on steep slopes.

A map of the study area is provided in Figure 3.0-1.

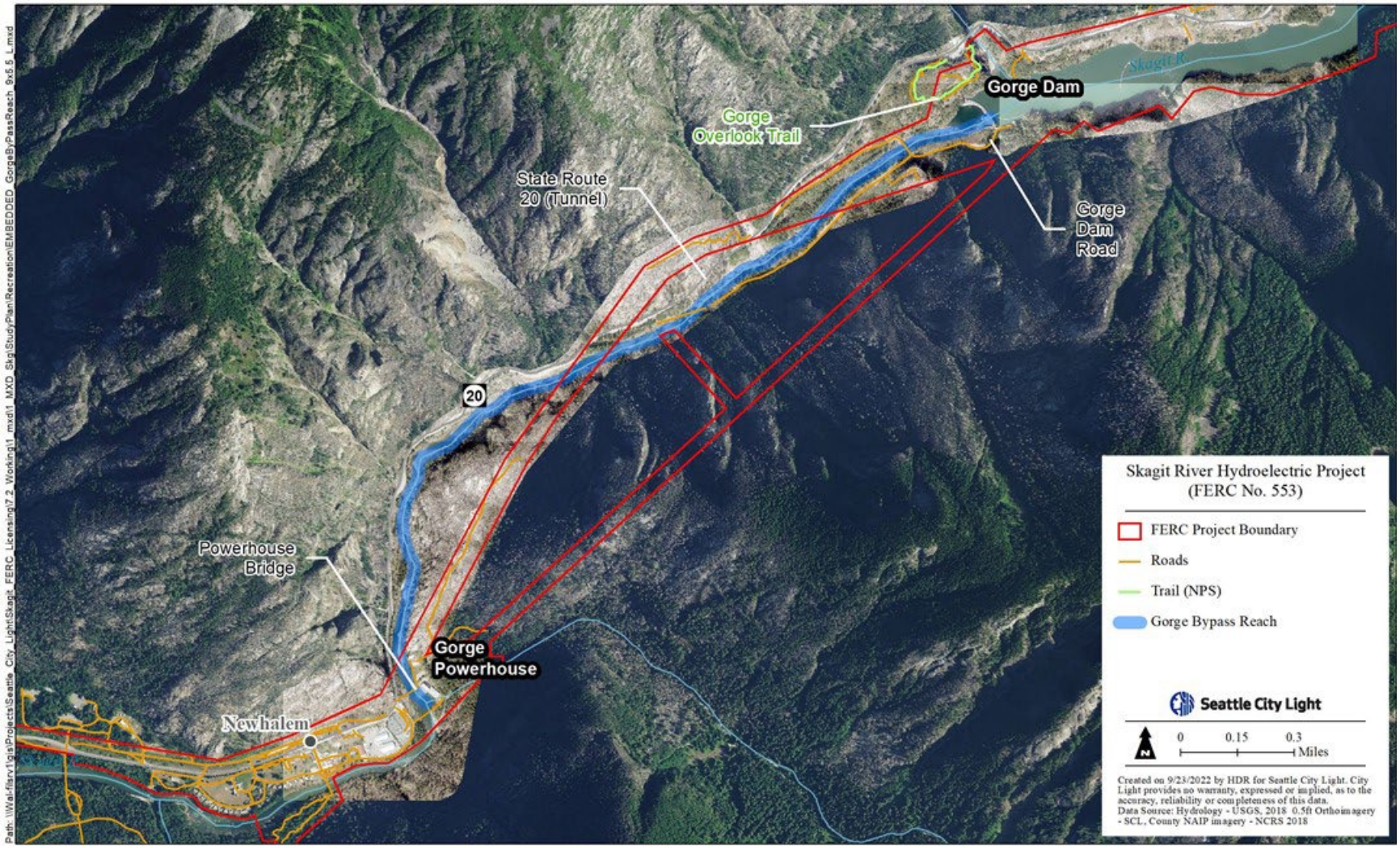

Figure 3.0-1. Gorge bypass reach study area.

4.0 METHODS

The Bypass Safety and Whitewater Boating Study consists of a three-phased sequential investigation referred to as Levels 1, 2, and 3 (Whittaker et al. 2005). The phased sequential approach was designed to increase study resolution as investigations progress from one level to the next, as well as share interim results earlier in the relicensing process across resource disciplines. Advancement to more intensive study levels was dependent on results and recommendations in the prior study level.

Each investigation level contained distinct study objectives, methods, and products captured in interim reports. The respective interim reports included the following information where known: a description of the current understanding of the suitability of whitewater boating opportunity in the Gorge bypass reach, public safety issues, Project operational constraints, competing resources, and explicit decision criteria whether to proceed to the next level of study or suspend further investigation.

The three levels of investigation were described in the study plan, including objectives, potential data sources, methods, anticipated products in this interim report for each level, and potential criteria for advancement to the next level of investigation.

4.1 Level 1: Desktop Analysis

Level 1 desktop analysis included literature reviews, structured interviews, summary of hydrology in the Gorge bypass reach, Gorge Dam spill gate operation, physical description of the river channel in the Gorge bypass reach, description of existing river access, and summary of regulatory agency resource management goals, and Indian Tribe interests in the Gorge bypass reach.

Literature review included whitewater guidebooks, magazine publications with a focus on whitewater recreation, electronic whitewater guidebooks available online, and internet searches for trip reports. A table summarizing whitewater opportunities in the Skagit River basin to the confluence with the Sauk River was compiled and included the name of the whitewater run, river name, put-in and take-out location, length, gradient (feet per mile), and whitewater difficulty. Detailed information on the Gorge bypass reach was included in the table where information was available, including length, gradient, estimated whitewater difficulty, and potential access points. Cells where information is unknown remain blank.

The study team interviewed individuals in the whitewater boating community with knowledge of the Gorge bypass reach. The interviews focused on individuals' knowledge of the Gorge bypass reach, any dates with direct observations of the Gorge bypass reach, opinion on whitewater difficulty, estimated range of preferred flows for whitewater boating, and other individuals with knowledge on whitewater boating in the Gorge bypass reach.

The recent hydrology of the Gorge bypass reach was analyzed. Analysis included the annual frequency and timing of spill events, duration, magnitude, and rate of change. The hydrology section of the Level 1 desktop analysis included a description of Gorge Dam spill gate operations, including the predictability, timing, and reason for planned spill events.

The Level 1 desktop analysis summarized regulatory agency resource goals and Tribal interests for the Gorge bypass reach. The Level 1 desktop analysis lists other relicensing studies being conducted in the Gorge bypass reach for respective resource areas.

The Level 1 desktop analysis included explicit decision criteria used to determine whether to proceed to Level 2 field reconnaissance. Progression to a Level 2 field reconnaissance was evaluated based on results from the Level 1 desktop analysis. Evaluation criteria include the criteria listed below:

(1) Level 1 desktop analysis determines Gorge bypass reach contains rapids suitable / not suitable for whitewater boating;

(2) Access to the river is / is not feasible;

(3) Potential effects on natural and cultural resources can / cannot be resolved for next level of proposed study;

(4) Agency regulations and/or Tribal concerns do / do not prohibit further investigation;

(5) Project operations are / are not able to provide opportunistic spills in range suitable for whitewater boating; and

(6) Opportunities for coordination with other studies.

4.2 Level 2: Field Reconnaissance

The Level 2 field reconnaissance involved shore-based observation of planned spill in the Gorge bypass reach on November 6 and 7, 2021. The objective was to observe potential whitewater boating flow volumes in the Gorge bypass reach to evaluate navigability and whitewater difficulty and estimate a suitable range of flows for Level 3 multiple flow evaluation, if warranted. Evaluation of river access and safety concerns also occurred during the field reconnaissance. The Level 2 field reconnaissance in the RSP originally anticipated observing opportunistic flows in the Gorge bypass reach and to the extent practicable, controlled spills associated with other studies, such as the FA-05 Bypass Instream Flow Model Development Study (City Light 2023d). The study team later determined that scheduling planned spill events for Level 2 field reconnaissance was advantageous to coordinate logistics with study volunteers and execute study phases.

Participants in the Level 2 field reconnaissance received a brief overview of the relicensing process, the study plan process within the broader relicensing, objectives of the field reconnaissance, and specific criteria to evaluate (Whittaker et al. 2005). City Light coordinated transportation during the field reconnaissance to areas of interest identified by LPs familiar with the area. The Level 2 field reconnaissance concluded with a structured focus group in Newhalem. Focus group questions prompted discussion on navigability, whitewater difficulty, suitable range of flows for whitewater boating, river access needs, safety, other areas of concern, and uniqueness of the Gorge bypass reach compared to other opportunities in the region.

The whitewater boating community identified and nominated participants in the Level 2 field reconnaissance in advance. Selection was based in part on knowledge of whitewater boating opportunities in the Skagit River basin, high level of whitewater boating skills, and experience to evaluate potential safety and whitewater difficulty for the Gorge bypass reach, as well as

familiarity with the Project relicensing process. The Level 2 field reconnaissance was limited to six participants from the whitewater community for tour logistics and to facilitate focus group discussion.

The interim report summarizes findings from the Level 2 field reconnaissance. The report includes an evaluation of existing access to the Gorge bypass reach for whitewater boaters, potential resource issues identified, study participant opinions expressed in focus groups, and a summary of findings reported in the Level 1 desktop analysis. Decision criteria identified in the Level 1 desktop analysis were evaluated similarly in the Level 2 field reconnaissance assessment to determine if the study should progress to Level 3 multiple flow evaluation. Progression to a Level 3 multiple flow evaluation is based on the results from the Level 2 field reconnaissance interim report.

4.3 Level 3: Multiple Flow Evaluation

Following evaluation of the Level 1 desktop analysis and Level 2 field reconnaissance analyses, a Level 3 multiple flow evaluation was deemed appropriate and recommended by FERC, and the following methods will be applied when the Level 3 multiple flow evaluation is conducted. City Light anticipates implementing the Level 3 field data collection in the third quarter of 2023. Study team participants have confirmed their availability to participate in the Level 3 multiple flow evaluation in the third quarter of 2023.

The Level 3 multiple flow evaluation will consist of a team of six or fewer boaters paddling two to four flows. The range of flows will be based on volumes previously identified in the Level 2 field reconnaissance—750 cfs, 1,250 cfs, 1,750 cfs, and 2,250 cfs (with the caveat that study participants requested flexibility to adjust flow volumes in the Level 3 multiple flow evaluation as they progress through the flows). Participants will complete a single flow evaluation form after each flow event and participate in a structured focus group. Boaters will complete a comparative flow evaluation form and final structured focus group upon completion of all flow events. The single flow and comparative flow evaluation forms were developed upon determination that a Level 3 multiple flow evaluation was warranted. The multiple flow reconnaissance will utilize four planned spill events.

Similar to the Level 2 field reconnaissance, boaters will be identified in advance collaboratively with representatives of the whitewater community. Participants will commit to each flow evaluation for comparison purposes. Participants may elect not to boat if they perceive conditions in the channel are unsafe. Representatives of the whitewater boating community will be responsible for determining if individuals possess the necessary skills to participate in the Level 3 multiple flow evaluation. All study participants will be required to sign a liability waiver. The study team will aim to have a consistent team of boaters between the Level 2 field reconnaissance and Level 3 multiple flow evaluation study phases for continuity, but unforeseen events or conflicts beyond the study team's control may influence the final Level 3 multiple flow evaluation team representatives.

The Level 3 multiple flow evaluation will analyze the boaters' single flow and comparative flow evaluation forms, as well as opinions expressed in focus group discussions. The analysis will identify the range of flows identified for whitewater boating, including the minimum acceptable flow and the optimum flow, if applicable. The Level 3 multiple flow evaluation will also identify the overall whitewater difficulty and list of significant rapids. For safety reasons, non-boater access

into the Gorge bypass reach will be limited during the Level 3 multiple flow evaluation events. Flow conditions and boating opportunities will be documented with photographs and video at Key Observation Points (KOP) in the Gorge bypass reach for LP review in the reporting phase.

4.4 Reporting

The Bypass Safety and Whitewater Boating Study report synthesizes information and analysis for the respective levels of study implemented in this investigation. For the Level 1 desktop analysis and Level 2 field reconnaissance, the report includes the following: (1) description of the whitewater boating opportunity observed in the Gorge bypass reach; (2) description of the existing access to the Gorge bypass reach; (3) public safety concerns; and (4) summary of natural and cultural resources and operations that could be affected by providing whitewater opportunities. Level 3 multiple flow evaluation reporting in a forthcoming technical memorandum will include an analysis of multiple flow comparisons as described by Whittaker et al. (2005). The technical memorandum of the Level 3 multiple flow evaluation will be provided to LPs and filed with FERC following completion of the field data collection in the third quarter of 2023.

5.0 RESULTS

The Bypass Safety and Whitewater Boating Study report is limited to the results for Level 1 desktop analysis and Level 2 field reconnaissance phases of the study completed through November 7, 2021. Based on the results of the Level 1 desktop analysis and Level 2 field reconnaissance, the Level 3 multiple flow evaluation was warranted but implementation was initially delayed in 2022 out of respect for Tribal concerns. The Level 3 multiple flow evaluation was ultimately scheduled to occur in the fall of 2022, but was delayed again because of wildfire smoke creating unhealthy air quality conditions on the first scheduled weekend event, and severe weather conditions on the second planned weekend event. The Level 3 multiple flow evaluation is currently scheduled to occur in the third quarter of 2023.

5.1 Level 1: Desktop Analysis

The Level 1 desktop analysis included a review of information on whitewater runs in the Skagit River basin, structured interviews with whitewater boaters familiar with potential whitewater opportunities in the Gorge bypass reach, summary of hydrology in the Gorge bypass reach, Gorge Dam spill gate operation, physical description of the river channel in the Gorge bypass reach, description of existing river access, and summary of regulatory agency resource management goals and Tribal interests in the Gorge bypass reach.

5.1.1 Literature Review

A total of 21 distinct whitewater runs ranging in difficulty from Class I to V were identified in whole or part for the upper Skagit River basin. This area includes the mainstem river and tributaries from the confluence with the Sauk River upstream to the international border. The list of whitewater runs was developed using a combination of whitewater guidebooks, maps, and online river information pages (Table 5.1-1).

Most of the whitewater runs listed in Table 5.1-1 are located outside of the Project Boundary, as is the Gorge bypass reach. Five of the whitewater runs intersect the Project Boundary. These whitewater runs include Lightning Creek and Little Beaver Creek (tributaries flowing into Ross Lake), Thunder River (a tributary flowing into Diablo Lake), Stetattle Creek (a tributary flowing into Gorge Lake), and Bacon Creek (a tributary flowing into the Skagit River downstream of the Project). The transmission line right-of-way crosses Bacon Creek. Each of these five whitewater runs are free-flowing streams located largely outside the Project Boundary for the majority of their lengths. Lighting Creek and Little Beaver Creek are accessed by a combination of paddling or motoring across Ross Lake followed by hiking up the tributary stream to the designated put-in located outside the Project Boundary. Thunder Creek is a free-flowing tributary flowing into Thunder Arm on Diablo Lake. American Whitewater describes this as a backcountry paddling destination requiring paddlers to hike up the Thunder Creek trail for 4.1 miles to an undesignated put-in location (American Whitewater 2021a). Paddlers take-out on Diablo Lake at Colonial Creek Campground. Most of the paddling opportunity on Thunder Creek is outside the Project Boundary.

Wolf Bauer, founder of the Washington Kayak Club, documented whitewater runs on the Cascade, Sauk, Skagit, and Suiattle rivers in his 1965 map of Washington State whitewater opportunities (American Whitewater 2021b). Guidebook author Douglass North described four whitewater runs in the Skagit River basin in his whitewater guidebook titled Washington Whitewater, the 34 Best

Whitewater Rivers (North 1992). Jeff and Tonya Bennett's guidebook of 320 whitewater runs in Washington (Bennett and Bennett, undated) provides detailed descriptions for whitewater runs on the mainstem Skagit as well as multiple tributaries. American Whitewater provides a national online river index of whitewater runs, maps, flow information, and trip reports (American Whitewater 2021c). Administrators for the American Whitewater river information pages add new whitewater runs when information is provided from the boating community.

Table 5.1-1. Whitewater boating runs listed for the upper Skagit River basin.[1]

Whitewater Segment	Put-in	Take-out	Length (miles)	Gradient (ft/mile)	Difficulty[2]
Upper Granite Creek	State Route (SR) 20 Bridge over Granite Creek (SR 20 Milepost 148.2)	Highway pull-out (SR 20 Milepost 143.1)	4.6	254	IV-V (V+)
Granite Creek to Ruby River	Highway pull-out (SR 20 Milepost 143.1)	East Bank trailhead (SR 20 Milepost 138.3)	5.0	148	IV
Canyon Creek	Cedar Crossing on Canyon Creek Trail	Granite Creek Campground (SR 20 Milepost 141.2)	6.7	112	IV-V
Lightning Creek	Boundary Trail	Ross Lake	3.4	80	III-IV (V)
Little Beaver	Little Beaver Trail	Ross Lake	2.7	109	IV-V
Thunder Creek	4.1 miles up Thunder Creek trail	Colonial Creek Campground	4.1	85	IV-V
Stetattle Creek	Stetattle Creek Trail to Jay Creek	Gorge Lake Campground	3.2	51	IV(V)
Skagit River: Goodell Creek to Copper Creek	Goodell Creek Boat Launch	Copper Creek Boat Access Site	8.7	12	II-III
Skagit River: Copper Creek to Marblemount	Copper Creek Boat Access Site	Marblemount Boat Launch	5.9	10	I-II
Skagit River: Marblemount to Rockport	Marblemount Boat Launch	Howard Miller Steelhead Park	10.6	8	I-II
Bacon Creek	U.S. Forest Service (USFS) Road 1064	SR 20 Bridge over Bacon Creek	5.3	38	II+(IV)
Upper Cascade River	Below Mineral Park Campground	Marble Creek Campground	3.5	25	II
Cascade River	Marble Creek Campground	Rockport Cascade Road bridge over Cascade River	7.6	81	V
Suiattle	Sulphur Creek	Rat Trap Bridge (USFS Road 25)	13.6	66	III+
Suiattle	Rat Trap Bridge (USFS Road 25)	Sauk River	12.7	30	II-III
Sloan Creek	USFS Road 49 at old bridge site	Sloan Creek Campground	0.8	265	IV-V

Whitewater Segment	Put-in	Take-out	Length (miles)	Gradient (ft/mile)	Difficulty[2]
North Fork Sauk River	North Fork Sauk Road (USFS Road 49)	North Fork Falls Trail	1.7	187	IV+
Whitechuck River	USFS Road 23 at Crystal Creek	Whitechuck Campground	6.5	103	IV
Sauk River	Bedal Campground	Whitechuck Campground	8.4	37	III-
Sauk River	Whitechuck Campground	Sauk Prairie Bridge	10.5	42	III+(IV)
Sauk River	Darrington	Sauk River Park	13.5	13	II

1 Sources: Bennett and Bennett (undated); North (1992); American Whitewater (2021c).
2 American Whitewater (2021d). International Scale of Whitewater Difficulty.

From October 2007 to March 2008, American Whitewater conducted an internet-based survey to assess the quality and popularity of 150 whitewater runs in the North Cascades (American Whitewater 2021e). The whitewater runs listed in Table 5.1-1 for the upper Skagit River basin were included in American Whitewater's online survey of 150 whitewater runs. Three whitewater runs in the upper Skagit River basin ranked in the top 25 most popular runs out of 150 river segments in American Whitewater's survey: the Sauk River from Whitechuck Campground to Clear Creek was ranked the 5th most popular whitewater run in the North Cascades; the Skagit River segment from Goodell Creek Boat Launch to Copper Creek Boat Access Site was ranked the 12th most popular run; and the Skagit River segment from Copper Creek Boat Access Site to Howard Miller Steelhead Park (combining two of the river segments delineated in the RA-05 Lower Skagit River Recreation Flow Study [City Light 2023h]) was ranked 16th most popular. The Gorge bypass reach was not included in American Whitewater's online survey of 150 whitewater runs in the North Cascades.

None of the published guidebooks identify the Gorge bypass reach as a whitewater run. American Whitewater delineates the Gorge bypass reach on its river information page and notes in the river description that the organization is exploring the "feasibility of providing opportunities for whitewater recreation in this reach…" (American Whitewater 2021f). No trip reports have been published of individuals boating the Gorge bypass reach.

5.1.2 Pre-Reconnaissance Site Visit

As part of the Level 1 desktop analysis, the study team added a pre-reconnaissance site visit with a small group of study participants consisting of American Whitewater staff and volunteers. The pre-reconnaissance site visit was needed to identify logistical and safety needs for a potential Level 2 field reconnaissance. The pre-reconnaissance site visit allowed the study team to evaluate KOPs, field evaluation forms, travel safety plans, and recommend potential spill flows for the Level 2 field reconnaissance. In addition, the pre-reconnaissance took advantage of planned spill flows released in the Gorge bypass reach for field work associated with the FA-05 Bypass Instream Flow Model Development Study (City Light 2023d). The planned spill flows for the FA-05 Bypass Instream Flow Model Development Study, which were observed during the pre-reconnaissance site visit, were proposed for 1,200 cfs and 500 cfs, and occurred on July 26 and 27, 2021. Information collected from the pre-reconnaissance site visit is presented below.

5.1.2.1 KOP Evaluation

KOPs A through G were visited during the Level 1 desktop analysis pre-reconnaissance (Figure 5.1-1). KOPs B, D, and F correspond to locations with rapids of interest to the study participants. KOPs D and F are located at road pull-outs near the Gorge bypass reach with good viewpoints of the river channel. The study team and study participants determined that KOPs C and E did not provide adequate views of the river channel for evaluating whitewater rapids and would not be carried forward to the Level 2 field reconnaissance. For all the KOPs, study participants requested closer access to the river channel beyond the SR 20 guardrail and below the service road in the Level 2 field reconnaissance to better assess whitewater difficulty, boating lines through rapids, portage routes, and safety.

KOP B is located on the service road on the left side of the Gorge bypass reach as viewed downstream. This KOP is across the river channel from the area known historically as the Devil's Elbow below the first tunnel on SR 20. This segment of the river contains approximately a half-mile of potentially Class IV to V rapids. From the service road, views of the river channel and associated rapids were limited due to the high elevation above the channel, coupled with obstructions from dense vegetation. Study participants requested improved access during the Level 2 field reconnaissance at KOP B to better assess the rapids at this location. Study participants also suggested scheduling the Level 2 field reconnaissance in the late fall when deciduous leaves were off the trees to reduce visual obstructions.

KOPs A and G correspond to potential put-in and take-out locations, respectively. During the pre-reconnaissance, study participants identified an additional put-in location (KOP A1) upstream of the Gorge Dam bridge on river left (looking downstream) for inclusion in the Level 2 field reconnaissance. Study participants also identified an alternative take-out location on river left (looking downstream) where the Trail of the Cedars pedestrian bridge crosses the Skagit River. This alternative take-out location was designated KOP H for the Level 2 field reconnaissance.

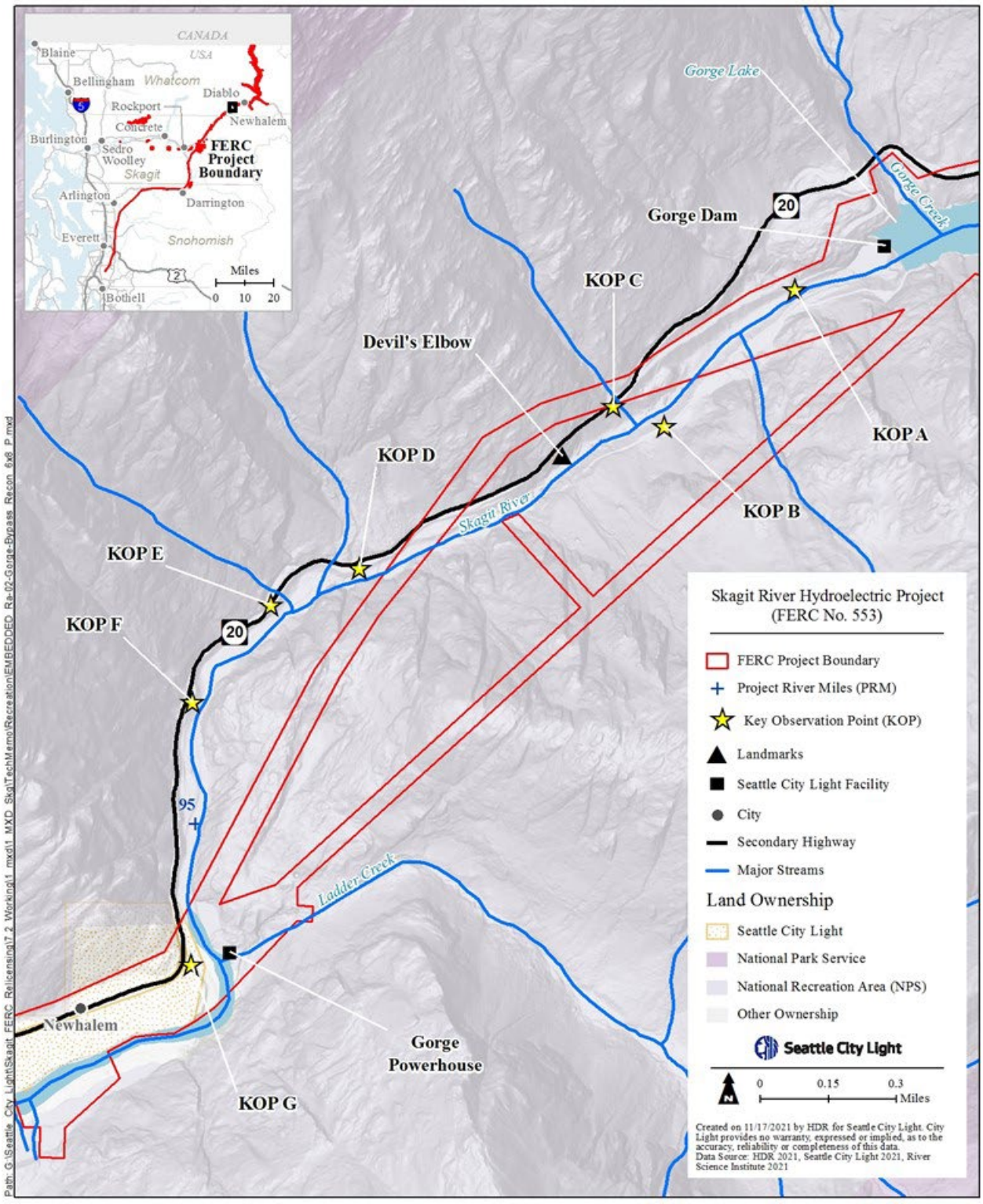

Figure 5.1-1. Key Observation Points evaluated in the Level 1 desktop analysis pre-reconnaissance site visit.

5.1.2.2 Field Evaluation Form

Study participants provided feedback on a draft field evaluation form that study participants would use at each KOP during the Level 2 field reconnaissance. The following additions based on study participant recommendations were made to the field form.

- Does this KOP provide a sufficient view to scout the rapids?
- Add an additional category for rating portage route difficulty.

5.1.2.3 Safety Plan for the Level 2 Field Reconnaissance

Safety evaluations in the Level 1 desktop analysis pre-reconnaissance were limited to consideration of study participant access to KOPs for the next level of study, the Level 2 field reconnaissance. The pre-reconnaissance determined that each of the KOPs could be accessed safely from SR 20 or the service road for the Level 2 field reconnaissance. The safety plan for the pre-reconnaissance required all participants to remain on or adjacent to the guardrails at highway pullouts, the bridge downstream of Gorge Dam, or the Gorge bypass reach service road when conducting observations. The Level 1 desktop analysis pre-reconnaissance study participants requested adjustments to the safety plan to allow for closer access to the river channel to better assess whitewater difficulty, portage routes, safety, and routes through rapids. Safety measures were developed to manage risks for the Level 2 field reconnaissance allowing closer observations of the river. Improving the viewpoints in these areas provided the boating team a better assessment of future scouting locations, portage routes, safety, and routes through rapids for the Level 3 multiple flow evaluation.

Public safety relative to whitewater boating flows in the Gorge bypass reach should be evaluated following implementation of the Level 3 multiple flow evaluation study phase when the range of whitewater boating flows is determined.

5.1.2.4 Flow Recommendations for Level 2 Field Reconnaissance

The spill flows observed during the pre-reconnaissance on July 26 and 27, 2021 (Table 5.1-2) were preliminarily field verified by the FA-05 Bypass Instream Flow Model Development Study team (City Light 2023d). The proposed 1,200 cubic feet per second (cfs) spill on July 26, 2021, was approximately 100 cfs less than planned. Increments of 100 cfs or greater can make a difference in whitewater navigability and difficulty for the gradient and channel structure present in the Gorge bypass reach. Study participants were informed of the 100 cfs difference which occurred on July 26, 2021, prior to confirming desired flows for the Level 2 field reconnaissance.

Study participants recommended two flows be provided for the Level 2 field reconnaissance: Flow 1 (800 to 900 cfs), and Flow 2 (1,200 to 1,500 cfs). Study participants determined that 500 cfs was too low to navigate some of the rapids safely. The 500 cfs flow was less safe because it reduces route options in the rapids and presents potential for boats to get pinned. Study participants wished to observe 800 to 900 cfs in Level 2 field reconnaissance to determine if that volume improved navigability and safety. Study participants also wanted to observe 1,200 to 1,500 cfs with the larger group in the Level 2 field reconnaissance for comparison with the earlier release of 800 to 900 cfs and help make further recommendations for Level 3 multiple flow evaluation.

Table 5.1-2. Level 1 desktop analysis pre-reconnaissance planned spill volumes.

Date	Proposed Spill Volume (cfs)	Preliminary Field Verification of Discharge (cfs)
July 26, 2021	1,200	1,092
July 27, 2021	500	486

5.1.3 Gorge Bypass Reach Channel Characteristics

The Gorge bypass reach is a relatively steep, confined bedrock canyon with large boulder and cobble substrate (NPS 2020). The Gorge bypass reach is 2.5 miles in length with an overall gradient of 97 feet per mile from the plunge pool at the base of Gorge Dam to Gorge Powerhouse. This gradient is similar to other whitewater runs with Class IV to V difficulty. The gradient varies within the Gorge bypass reach with steeper gradients corresponding to the rapids observed at KOPs B, D, and E. The river sections between these three KOPs are relatively low gradient with calm, non-turbulent water ponded up by the downstream nick points in the river channel. The rapids located at the KOPs are formed by a combination of the steeper gradient combined with channel constrictions from the canyon walls and boulder substrate.

The rapids within view of KOP B consist of a series of step pools from Project River Mile (PRM) 96.75 to PRM 96.25. The river drops approximately 80 feet within this 0.5-mile section. Large boulders and channel constrictions between the pools create hydraulic features.

KOP D (PRM 95.75) consists of a long, single rapid. The river drops 75 feet in 0.1 mile at KOP D. The rapid can be further divided into an upper, middle, and lower section. The upper section contains a channel constriction between the bedrock canyon wall on the left and debris flows on the right. The middle and lower sections of the rapid are interspersed with large boulders and cascades.

The river drops approximately 40 feet in 0.1 mile at KOP F (PRM 95.25). Large boulders constrict the channel at this location creating a step pool cascade feature.

5.1.4 Structured Interviews

The Gorge bypass reach is visible while driving SR 20, and multiple gravel pull-outs provide opportunities for more in-depth observations of the river channel from the highway. Members of the boating community have stopped at these viewpoints and some expressed interest in exploring this whitewater opportunity (O'Keefe 2021). Regulations restricting public access to the Gorge bypass reach (NPS 2021) limit the ability of boaters to observe the full length of the Gorge bypass reach as a potential whitewater boating opportunity. Infrequent spill in the Gorge bypass reach, coupled with a lack of real-time information on spill volume to the public, further discourage boaters from systematically analyzing the potential for a whitewater boating opportunity in the Gorge bypass reach. As a result, few individuals have explored the Gorge bypass reach for the purpose of evaluating the potential for a whitewater boating opportunity.

The Bypass Safety and Whitewater Boating Study enabled several boaters volunteering to participate in the Level 1 desktop analysis pre-reconnaissance site visit to observe and evaluate planned spill flows at several locations in the Gorge bypass reach. Two of these boaters provided

written responses to structured interview questions (Attachment A). In addition, a retired City Light employee with a strong boating background and past opportunities to observe specific flow volumes in the Gorge bypass reach provided written responses to structured interview questions. The interview questions focused on the individuals' knowledge of the Gorge bypass reach, dates in which the individuals made direct observations of the Gorge bypass reach, their opinion on whitewater difficulty, safety concerns unique to the Gorge bypass reach, estimated range of flows suitable for whitewater boating, and contact information for other individuals with knowledge of whitewater boating in the Gorge bypass reach.

Structured interview responses estimate the whitewater difficulty for the Gorge bypass reach ranges from Class IV to Class V, depending on spill flow. At lower flows (500 to 800 cfs), one respondent indicated there may be a number of Class III rapids in the Gorge bypass reach with one large Class V rapid. None of the respondents thought the Gorge bypass reach presented any unique whitewater safety concerns different from other whitewater boating runs of similar difficulty. The collective estimated range of flows based on shoreline observations was between 500 and 1,500 cfs. Rumors have circulated in the whitewater community of a potential whitewater descent of the Gorge bypass reach in the past, but no individual or group came forward with first-hand information, despite phone calls to key boaters in the Pacific Northwest knowledgeable of first descents and explorations in the area (Williams 2021).

5.1.5 Gorge Dam Spill Gate Operation and Spill Hydrology

Gorge Dam spill gate design, capacity, and operation information was obtained from information in the Pre-Application Document (PAD), as well as an interview with Project operators on August 21, 2021 (City Light 2021c).

Spill data from Gorge Dam was analyzed for the period from 1997 to 2020. Analysis included the annual frequency and timing of spill events, duration, magnitude, and rate of change for all spill events. The same analysis was performed on a subset of the spill data that ranged in volume from 500 cfs to 1,500 cfs during daylight hours determined to be useable for whitewater boating activity (0800 hours to 1800 hours). The 500 to 1,500 cfs range was selected to represent a preliminary boatable flow range based on information collected in the Level 1 desktop analysis pre-reconnaissance site visit with members of the boating community.

5.1.5.1 Gorge Dam Spill Gate Operation

Gorge Dam has one spillway with two fixed wheel spillway gates with a maximum spillway capacity of 120,000 cfs (City Light 2020). The usable storage is 6,600 acre-feet. Spill volume is a product of Gorge Lake elevation and gate opening. The spillway gates are calibrated to an accuracy within 50 cfs. The intake structure consists of a single bifurcated intake with two openings. The intake tunnel connects to four penstocks delivering water to four turbines in the Gorge Powerhouse. The maximum hydraulic capacity of the Gorge Powerhouse is 7,440 cfs.

Under normal operations, flows in the Gorge bypass reach are limited to accretion flow, spill-gate seepage, tributary input, and precipitation runoff (City Light 2020). Unplanned spill can occur at Gorge Dam to manage run-off from stochastic storm events and snowmelt. Spill flow forecasts are not predictable for stochastic storm events. Planned spill may also occur to support maintenance activities at Gorge Dam or Powerhouse, but such spills are infrequent (City Light 2021c).

Spill may also occur at Gorge Dam when the Ross Powerhouse ramps up short-term to maximum hydraulic capacity of 16,000 cfs, exceeding the maximum hydraulic capacity at Diablo and Gorge powerhouses of 7,130 cfs and 7,440 cfs, respectively, less than half the capacity at the Ross Powerhouse. Project operators utilize active storage in Diablo and Gorge lakes to store additional volume. Project operators spill at Gorge Dam when additional discharge from Ross Lake cannot be stored at Diablo and Gorge lakes.

Spill may occur at Gorge Dam when there is a temporary outage at the Gorge Powerhouse from a load rejection. During unplanned outages, plant operators can pass up to 1,800 cfs through relief valves at the powerhouse to maintain discharge in the Skagit River downstream of the Gorge Powerhouse. Inflows to Gorge Lake in excess of 1,800 cfs that cannot be stored in the lake are spilled into the Gorge bypass reach.

5.1.5.2 Gorge Dam Spill Analysis

The annual volume of spills from Gorge Dam was analyzed for the period from 1997 to 2020 (Figure 5.1-2). The minimum volume spilled from Gorge Dam for the 24-year period 1997 through 2020 was less than 50 cfs in 14 of the years. The maximum volume spilled for the period 1997 through 2020 was 23,363 cfs in 2003 (Table 5.1-3). Annual mean spill volume ranged from 26 cfs in 2001 to 8,075 cfs in 2003. The annual median spill volume ranged from less than 50 cfs in 2001 to 5,394 cfs in 2003. The median annual spill volume in five of the 23 years analyzed was less than 1,500 cfs.

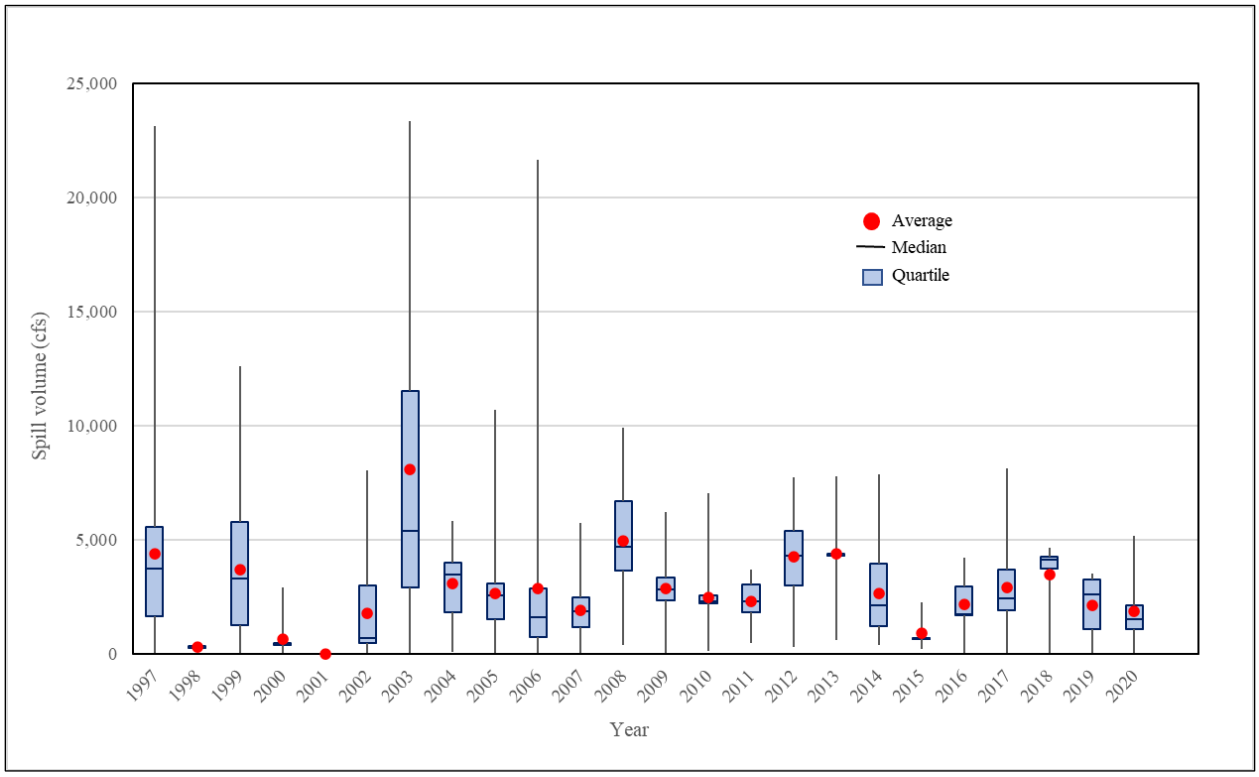

Figure 5.1-2. Box-whisker plot of annual Gorge Dam spill volume, 1997-2020.

Table 5.1-3. Gorge Dam spill volume annual mean, median and range, 1997-2020.

Year	Gorge bypass reach discharge, 1997-2020 (cfs)					
	Mean	Median	Minimum[1]	1st Quartile	3rd Quartile	Maximum[2]
1997	4,394	3,760	<50	1,667	5,561	23,160
1998	301	317	207	262	348	380
1999	3,721	3,326	<50	1,250	5,778	12,634
2000	638	440	<50	380	450	2,932
2001[3]	<50	<50	<50	<50	<50	<50
2002	1,803	682	<50	500	3,021	8,071
2003	8,075	5,394	<50	2,936	11,514	23,363
2004	3,078	3,470	89	1,841	3,993	5,829
2005	2,647	2,584	<50	1,541	3,086	10,715
2006	2,890	1,611	<50	741	2,861	21,651
2007	1,917	1,888	<50	1,192	2,474	5,749
2008	4,960	4,680	387	3,654	6,703	9,936
2009	2,875	2,811	<50	2,333	3,359	6,218
2010	2,478	2,290	120	2,218	2,551	7,041
2011	2,329	2,290	471	1,837	3,048	3,700
2012	4,249	4,304	289	3,008	5,376	7,724
2013	4,389	4,346	630	4,305	4,386	7,768
2014	2,663	2,148	404	1,229	3,979	7,855
2015	908	675	204	652	703	2,255
2016	2,166	1,743	<50	1,694	2,966	4,204
2017	2,901	2,421	<50	1,925	3,710	8,148
2018	3,499	4,147	<50	3,750	4,245	4,657
2019	2,119	2,614	<50	1,072	3,259	3,526
2020	1,869	1,518	<50	1,089	2,154	5,174

1 Spill flows less than 50 cfs from Gorge Dam are not measurable.
2 Removed maximum value data errors of 218,806.7 cfs on 3/26/1997; 162,014.3 cfs on 7/4/1997; and 89,218.8 cfs on 7/1/1997.
3 Single spill event from Gorge Dam in 2001.

The monthly volume of spills from Gorge Dam was analyzed for the period from 1997 to 2020 (Figure 5.1-3). The months of June, July, October, and November had the widest range of spill flows. The monthly mean spill volume ranged from 1,407 cfs in September to 5,321 cfs in October (Table 5.1-4). The monthly median spill volumes from April through September indicates that half of the spill events in those months may fall within the Level 1 desktop analysis preliminary boating flow range (i.e., 500 to 1,500 cfs).

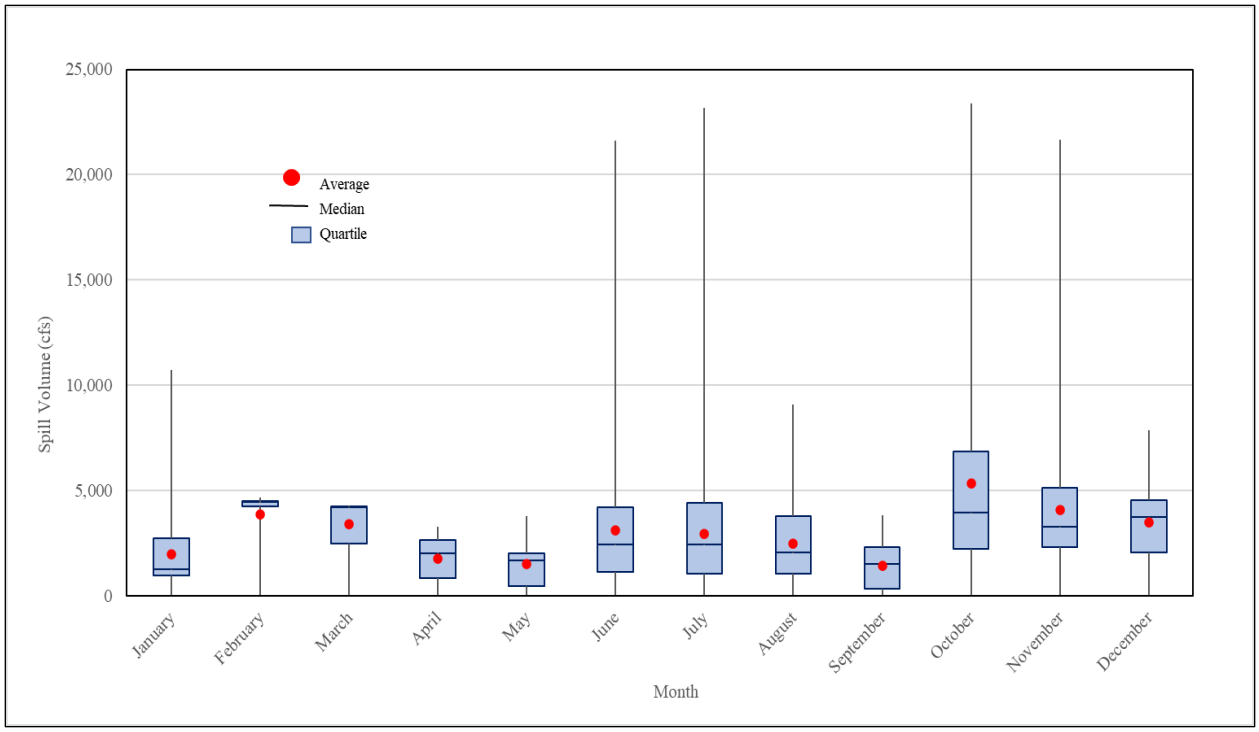

Figure 5.1-3. Box-whisker plot of monthly Gorge Dam spill volume, 1997-2020.

Table 5.1-4. Gorge Dam spill volume monthly mean, median and range, 1997-2020.

Month	Gorge bypass reach discharge, 1997 – 2020 (cfs)					
	Mean	Median	Minimum[1]	1st Quartile	3rd Quartile	Maximum[2]
January	1,960	1,246	<50	966	2,747	10,715
February	3,875	4,436	<50	4,232	4,460	4,657
March	3,400	4,180	<50	2,465	4,230	4,279
April	1,772	2,032	<50	840	2,663	3,293
May	1,524	1,681	<50	450	2,017	3,774
June	3,120	2,427	<50	1,129	4,200	21,623
July	2,948	2,440	<50	1,037	4,427	23,160
August	2,477	2,049	<50	1,044	3,793	9,091
September	1,407	1,499	<50	336	2,303	3,804
October	5,321	3,966	<50	2,227	6,860	23,363
November	4,071	3,261	<50	2,289	5,137	21,651
December	3,468	3,728	<50	2,051	4,521	7,855

1 Spill flows less than 50 cfs from Gorge Dam are not measurable.
2 Removed maximum value data errors of 218,806.7 cfs on 3/26/1997; 162,014.3 cfs on 7/4/1997; and 89,218.8 cfs on 7/1/1997.

Spill frequency and timing from Gorge Dam was analyzed for the period from 1997 to 2020 for daylight hours (0800 hours to 1800 hours). The highest frequency of spill occurred in 1997 with 701 spill events (Figure 5.1-4). The lowest number of spill events occurred in 2001 with one event. The highest number of spills in the preliminary boatable flow range between 500 and 1,500 cfs was 217 spills in 2014. There were three years with no spills in the preliminary boatable flow range: 1998, 2001, and 2013.

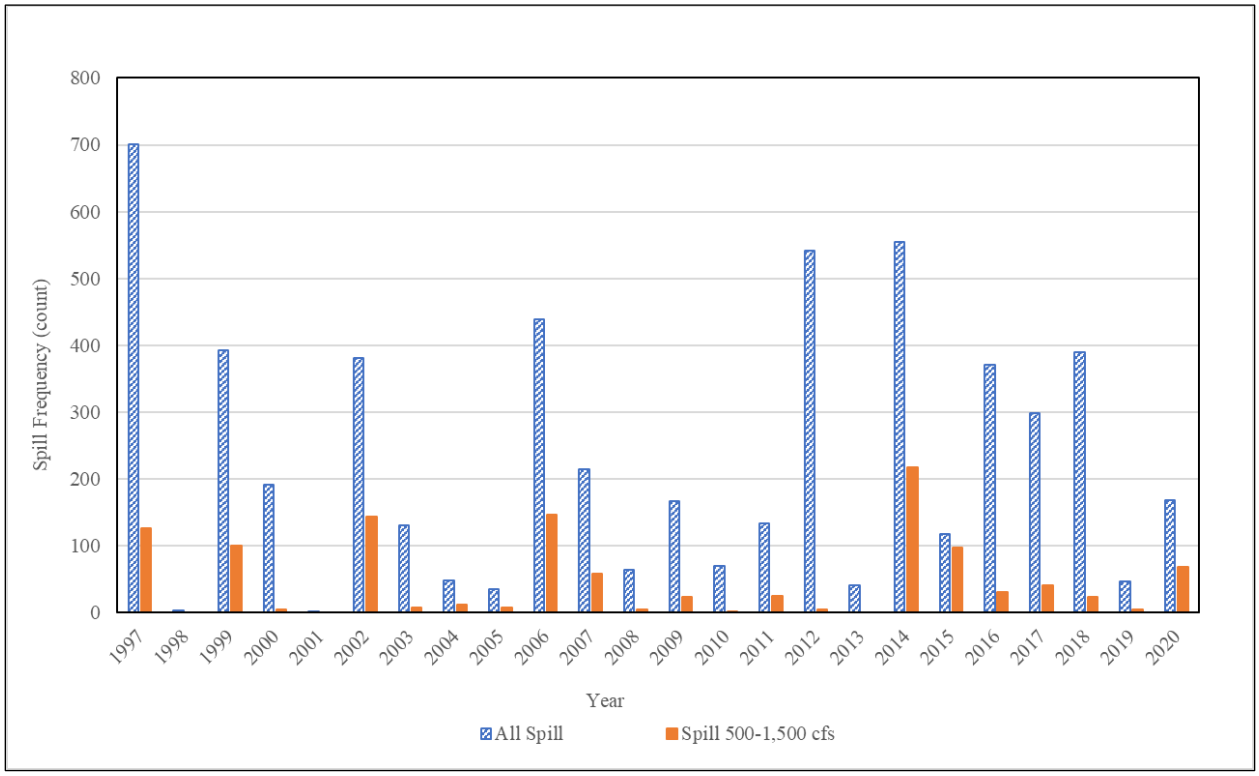

Figure 5.1-4. Gorge Dam spill frequency 1997-2020 during daylight hours (0800 to 1800 hours).

Spill occurred in all months of the year. The greatest number of spills occurred in July with 1,494 spills, and the lowest occurred in January, with 34 spills (Figure 5.1-5). The greatest number of spills in the preliminary boatable flow range between 500 and 1,500 cfs was also July with a total of 396 spill events. The lowest number of spills in the preliminary boatable flow range occurred in the months of February, March, and September with six spills. The greatest number of spill events typically occur from May through August and November for spills in the preliminary boating flow range.

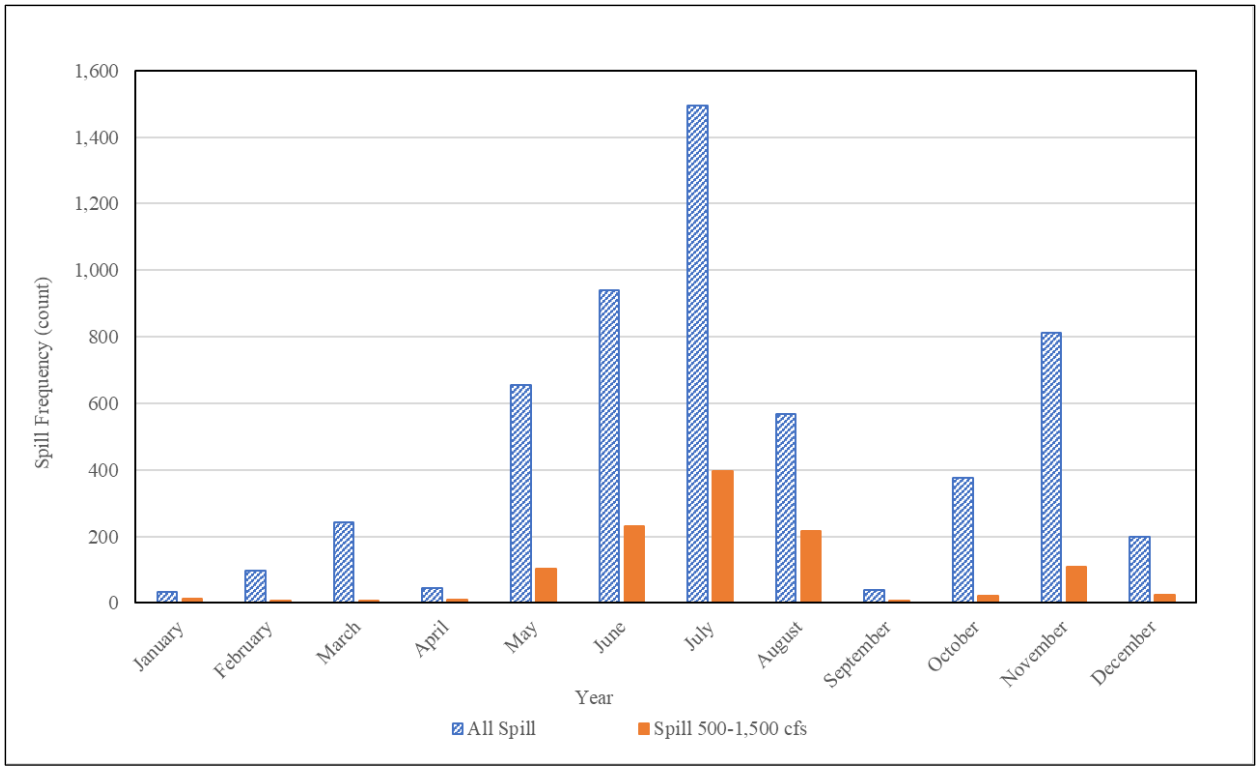

Figure 5.1-5. Gorge Dam spill frequency per month during daylight hours (0800 to 1800 hours), 1997-2020.

The duration of individual spill events was analyzed for the preliminary boating flow range (i.e., 500 cfs to 1,500 cfs) during daylight hours for the 1997 and 2020 spill record (Figure 5.1-6). Seventy-two percent of the spill events were greater than one hour in length. Fifty-nine percent of the spill events were greater than two hours and 45 percent were greater than three hours. Thirty-two percent of the spill events were greater than six hours and 27 percent were greater than eight hours. The average time to boat the full length of the Gorge bypass reach was estimated to be two to three hours based on the pre-reconnaissance site visit.

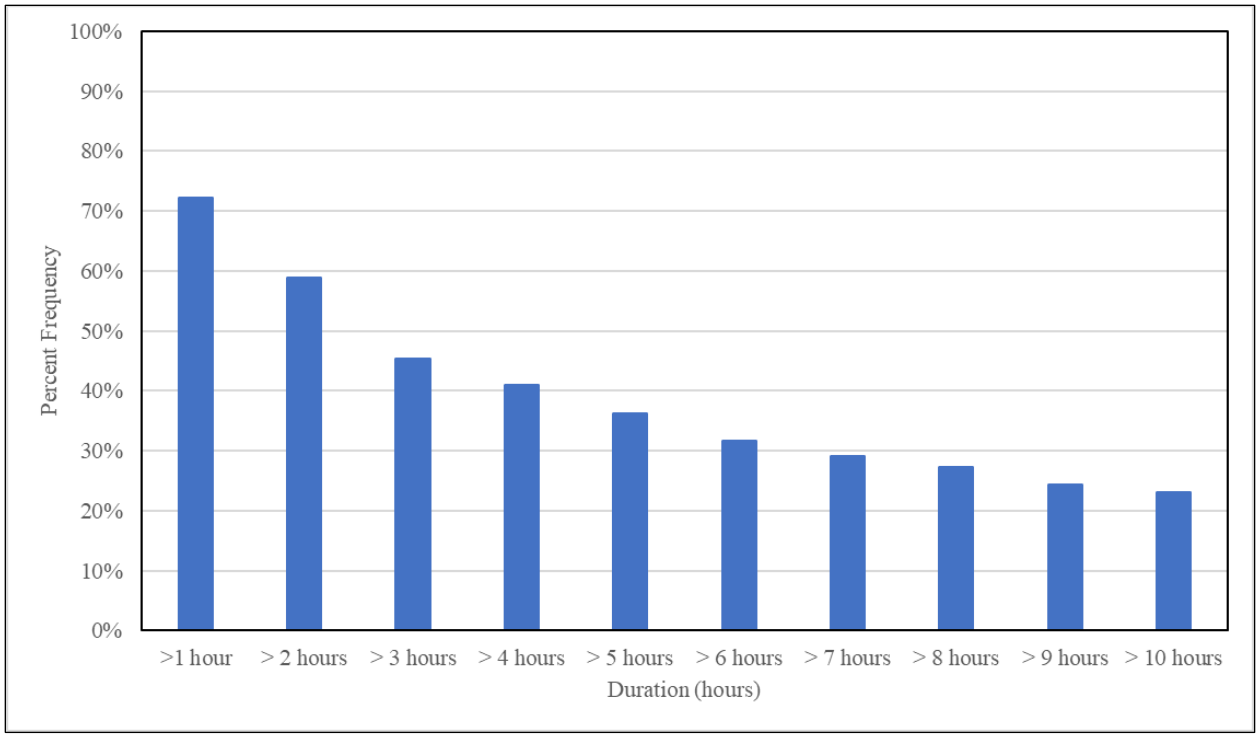

Figure 5.1-6. Gorge Dam spill duration for flows from 500 cfs to 1,500 cfs during daylight hours (0800 to 1800 hours), 1997-2020.

The time for spill from Gorge Dam to achieve stable conditions at the bottom end of the Gorge bypass reach varies with spill volume. The time for flows to achieve stable conditions within the preliminary boating flow estimate ranged from 2 hours 45 minutes for 500 cfs to 1 hour 30 minutes for 1,200 cfs (Table 5.1-5).

Table 5.1-5. Time for spill flows from Gorge Dam to stabilize in Gorge bypass reach.[1]

Flow (cfs)	Average Velocity (feet per second)	Time to Stability
50	0.2467	13 hours – 33 minutes
250	0.7519	4 hours – 27 minutes
500	1.2149	2 hours – 45 minutes
1,200	2.2274	1 hour – 30 minutes

1 Source: GHD Bypass Reach Timing Test July 21, 2021 (City Light 2021b).

The rate of change in discharge was analyzed for spill events in the preliminary boating flow range (i.e., 500 cfs to 1,500 cfs) during daylight hours for the 1997 to 2020 spill record to evaluate how long boating opportunities typically exist in the Gorge bypass reach. The rate of change was calculated for each hour of spill as a percentage of the previous hour's discharge volume using the equation below:

Rate of change = (discharge [hour 2] – discharge [hour 1]) / discharge (hour 1) x 100%

During spill flow upramping, the vast majority of spill events increased by 5 percent or less per hour (Figure 5.1-7). Only 17 spill events out of 601 analyzed increased discharge by 100 percent or greater per hour. Similarly, for spill flow downramping, the vast majority of spill events decreased by 5 percent or less per hour (Figure 5.1-8). For spill events in the preliminary boating range (i.e., 500 to 1,500 cfs range), the majority of the upramp and downramp events do not appear to cause dramatic short-term changes (less than 1 hour) in flow characteristics for whitewater boaters in the Gorge bypass reach. Flows in the preliminary boating range do not change quickly in the upramp or downramp.

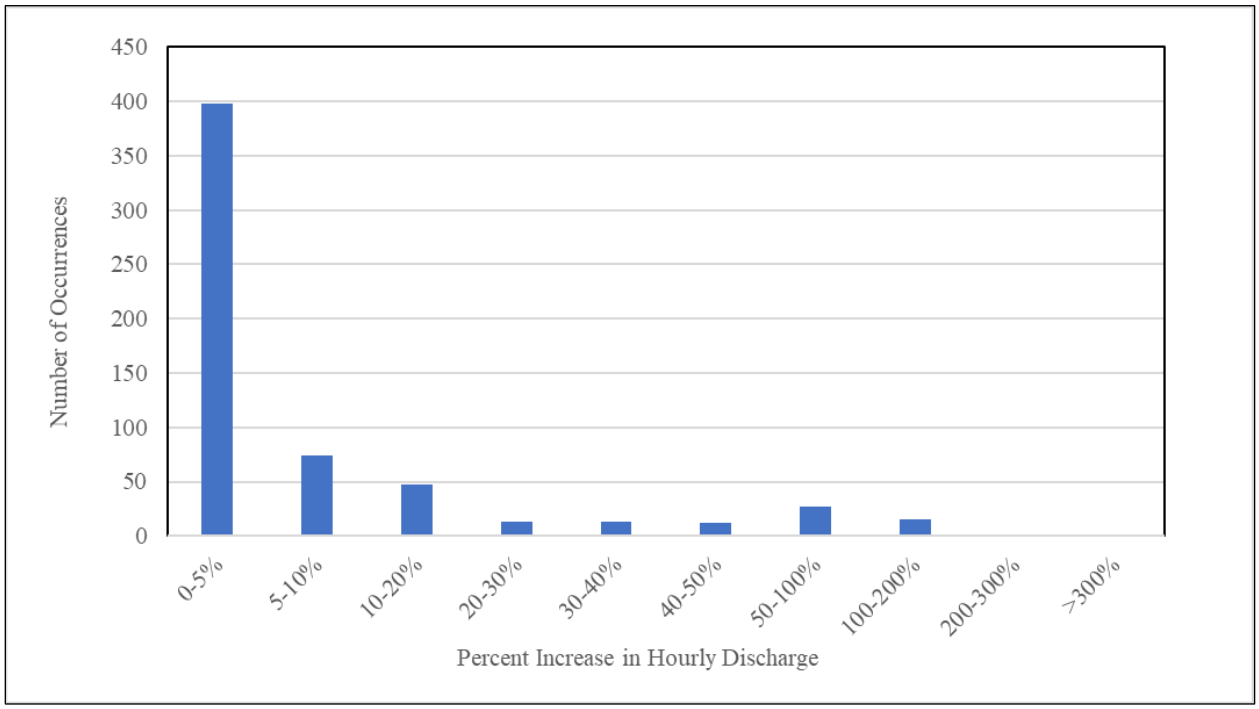

Figure 5.1-7. Rate of change in upramping discharge for spills from 500 cfs to 1,500 cfs during daylight hours (0800 to 1800 hours), 1997 - 2020.

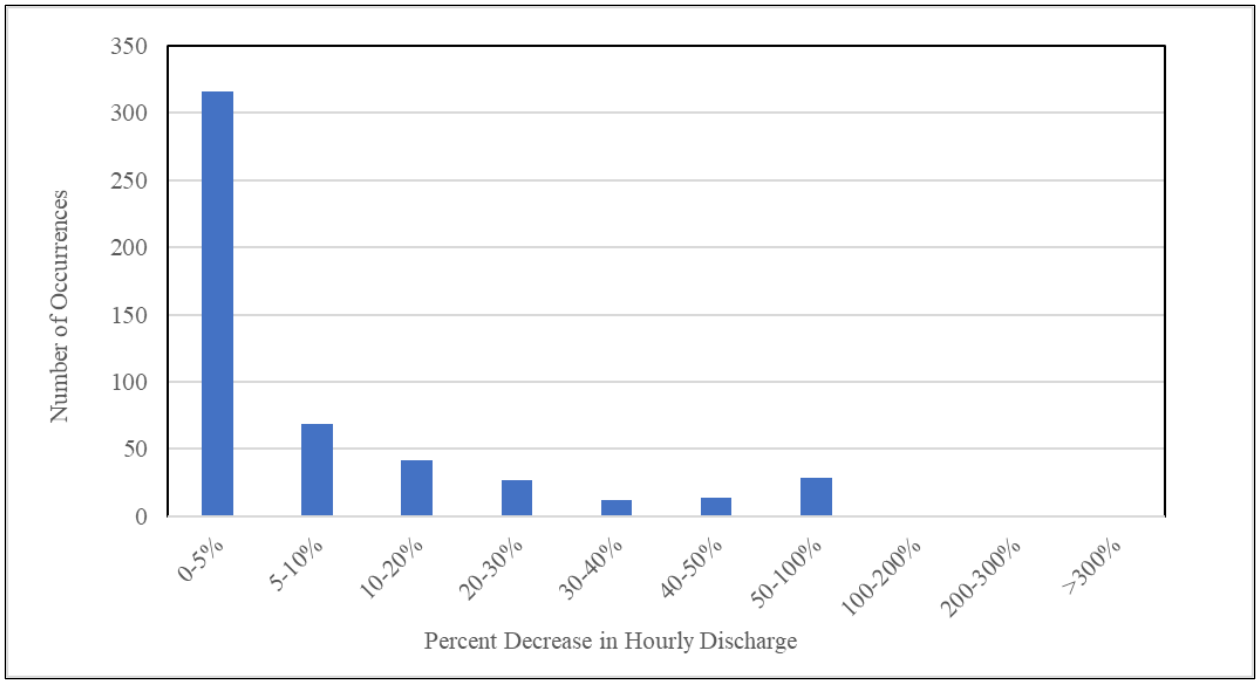

Figure 5.1-8. Rate of change in downramping discharge for spills from 500 cfs to 1,500 cfs during daylight hours (0800 to 1800 hours), 1997-2020.

5.1.6 Interdisciplinary Studies and LP Participation

A total of 10 studies undertaken as part of the Project relicensing process overlap with the Bypass Safety and Whitewater Boating Study in one or more of the following ways: (1) geographically with the Gorge bypass reach; (2) may provide information on resource conflicts; and/or (3) may potentially provide information for future operations at Gorge Dam (Table 5.1-6). Study results were provided in the interim and updated study reports for respective studies. The decision to progress to the Level 3 multiple flow evaluation for the Bypass Safety and Whitewater Boating Study was based, in part, on an interdisciplinary assessment of potential effects identified in the study reports associated with concurrent natural and cultural resource relicensing studies. Evaluation of potential future flow regimes in the Gorge bypass reach will be part of the comprehensive resource effects analysis developed and integrated during preparation of the license application. This interdisciplinary analysis will consider the potential effects of modified flow regimes and recreation access on respective resources.

LPs, including resource agencies and Indian Tribes, were given an opportunity to participate in the development of the Bypass Safety and Whitewater Boating Study. American Whitewater, NPS, WDFW, and the Upper Skagit Indian Tribe provided comments during the Study Plan development process prior to submission of the Proposed Study Plan (PSP). Study plan comments were also received on the PSP and RSP from American Whitewater, NPS, Ecology, and WDFW (City Light 2021a). LPs had the opportunity to comment on the study results for the ISR; American Whitewater and NPS provided comments on the Level 1 desktop analysis and Level 2 field reconnaissance results included in the Bypass Safety and Whitewater Boating Study Interim Report (City Light 2022b). LPs will have opportunities to comment on the results presented in this study report.

The Gorge bypass reach is located on lands managed by NPS. For safety reasons, NPS prohibits public access to the Gorge bypass reach (NPS 2021). The Gorge bypass reach is outside the Project Boundary. City Light is not authorized to restrict or enforce the closure. City Light staff do conduct a visual inspection of the Gorge bypass reach when spill is scheduled from Gorge Dam to inform persons violating the NPS closure.

Table 5.1-6. Relicensing studies overlapping within Gorge bypass reach.

Study ID	Study Name (Study Report Reference)	Study Scope Relative to Gorge Bypass Reach	Resource Study Overlap Consideration
CR-03	Gorge Bypass Reach Cultural Resources Survey (City Light 2022a)	Cultural resources survey from Gorge Dam to Gorge Powerhouse.	Potential resource conflicts
FA-01a	Water Quality Monitoring Study (City Light 2023a)	Water quality monitoring in Gorge bypass reach.	Potential resource conflicts
FA-03	Reservoir Fish Stranding and Trapping Risk Assessment (City Light 2023b)	Fish stranding in Gorge Reservoir associated with pool elevations.	Potential resource conflicts and Project operations
FA-04	Fish Passage Technical Studies Program (City Light 2023c)	Investigation of fish passage in Gorge bypass reach.	Potential resource conflicts
FA-05	Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study (City Light 2023d)	Fish habitat mapping, hydraulic modeling and habitat suitability curves in Gorge bypass reach.	Potential resource conflicts
GE-01	Reservoir Shoreline Erosion Study (City Light 2023e)	Survey of erosion areas on Gorge Reservoir shoreline.	Potential resource conflicts and Project operations
GE-04	Skagit River Geomorphology Between Gorge Dam and the Sauk River Study (City Light 2023f)	Inventory of geomorphic conditions in Gorge bypass reach including channel width, cover, substrate, side channels, and large woody debris.	Potential resource conflicts
RA-01	Recreation Use and Facility Assessment (City Light 2023g)	Inventory of recreation facilities in Newhalem that may potentially serve needs of recreation boaters.	Geographic
TR-06	Golden Eagle Habitat Analysis (City Light 2022c)	Transmission line corridor and lands within a 2-mile buffer on either side of the Project centerline.	Geographic and potential resource conflicts
TR-07	Northern Goshawk Habitat Analysis (City Light 2022d)	Lands within a 0.5-mile buffer of Project dam, transmission line corridor and townsites.	Geographic and potential resource conflicts

5.1.7 Level 1 Desktop Analysis Decision Criteria and Evaluation Findings

The study plan listed six evaluation criteria for the field work to progress from the Level 1 desktop analysis to the Level 2 field reconnaissance. The evaluation criteria and associated findings are listed below:

Criterion 1: Level 1 desktop analysis determines Gorge bypass reach contains rapids suitable / not suitable for whitewater boating.

Evaluation finding: Observations of flows in the Gorge bypass reach during the pre-reconnaissance site visit on July 26 and 27, 2021, found suitable rapids for whitewater boating. KOPs B, D, and F were located adjacent to whitewater rapids. Study participants estimated the rapids observed at KOPs B, D, and F ranged from Class IV to Class V difficulty. American Whitewater describes Class IV rapids as "intense, powerful but predictable rapids requiring precise boat handling in turbulent water" (American Whitewater 2021d). Class V rapids are described as "extremely long, obstructed, or very violent rapids which expose a paddler to added risk." Class IV rapids are considered suitable for advanced paddlers while Class V is better suited to experts.

Study participants believed all the rapids could be navigated at the flows observed during the Level 1 desktop analysis pre-reconnaissance. Study participants also noted that portage routes were available where individuals might choose not to run a rapid.

Criterion 2: Access to the river is / is not feasible.

Evaluation finding: Access to the river is feasible. KOPs A and G were located at potential put-in and take-out locations respectively. Study participants noted the river was accessible at both KOPs for whitewater boaters in the existing condition. Study participants identified alternate locations for evaluation in the Level 2 field reconnaissance. These included a potential put-in location upstream of the Gorge Dam bridge on river left (looking downstream) and a potential take-out location at the Trail of the Cedars pedestrian bridge on river left (looking downstream).

Criterion 3: Potential effects on natural and cultural resources can / cannot be resolved for next level of proposed study.

Evaluation finding: Resource agencies and Indian Tribes provided comments on the study plan. None of these organizations opposed implementation of the Bypass Safety and Whitewater Boating Study. Cultural, fishery, geomorphology and terrestrial resource study leads were contacted during the Level 1 desktop analysis to determine if they had concerns with progression to the Level 2 field reconnaissance and specifically the potential effects associated with study participants accessing the KOP locations or the discrete planned spill flows for purposes of implementing the Level 2 field reconnaissance portion of the study. Resource study leads did not voice concerns with potential effects associated with KOP locations or the one-time study evaluation for the Level 2 field reconnaissance.

Criterion 4: Agency regulations and/or Tribal concerns do / do not prohibit further investigation.

Evaluation finding: The Gorge bypass reach is a culturally sensitive area for the Indian Tribes. KOP locations for study participant observations were approved by the cultural resource study leads prior to field implementation.

Criterion 5: Project operations are / are not able to provide opportunistic spills in a range suitable for whitewater boating.

Evaluation finding: Project operations are not able to provide opportunistic spills in the preliminary range suitable for whitewater boating in a predictable fashion. Opportunistic spills do occur in the preliminary range determined suitable for whitewater boating but are unpredictable in timing, duration, and rate of change thereby raising potential safety concerns for whitewater boaters. Furthermore, there is no advance notice for unplanned spill events.

The planned spill events in July 2021 were in the range considered potentially suitable for whitewater boating. Preliminary discussions with Project powerhouse operators indicate operators are capable of releasing flows from Gorge Dam for limited durations in order to meet the objectives of this study plan.

Criterion 6: Opportunities for coordination with other studies.

Evaluation finding: There are opportunities for coordination with other studies. The planned spill events occurring the week of July 26-30, 2021, were scheduled for the FA-05 Bypass Instream Flow Model Development Study (City Light 2023d). Several studies including the Bypass Safety and Whitewater Boating Study scheduled field work in the Gorge bypass reach simultaneously to take advantage of the planned spill.

5.2 Level 2: Field Reconnaissance

The Level 2 field reconnaissance for the Bypass Safety and Whitewater Boating Study took place November 5-7, 2021. The Level 2 field reconnaissance was a shore-based observation of spill flows in the Gorge bypass reach to evaluate the whitewater recreation opportunity, difficulty, safety, access, and estimate a suitable range of flows for Level 3 multiple flow evaluation.

The Level 2 field reconnaissance was scheduled in advance with planned spill volumes rather than relying on opportunistic spill flows. The planned spill event provided greater certainty for logistics and safety planning, as well as coordinating participation with volunteers from the boating community. The planned spill event allowed other resource leads to coordinate data collection needs for their respective studies.

5.2.1 Level 2 Participants

Six individuals participated in the Level 2 field reconnaissance (Table 5.2-1). American Whitewater nominated the study participants. Study participants were nominated in part on knowledge of whitewater boating opportunities in the Skagit River basin, whitewater boating skills, and experience to evaluate potential safety and whitewater difficulty for the Gorge bypass reach. Participants self-identified as expert kayakers. All participants were Washington State residents.

Study participants in the field reconnaissance received an orientation presentation providing an overview of the relicensing process, development of the Bypass Safety and Whitewater Boating Study, study goals and objectives, schedule, data collection tools for the Level 2 field reconnaissance, and a safety briefing.

Table 5.2-1. Level 2 field reconnaissance study participants.

Age	Years Whitewater Paddling	Whitewater Skill Level	Preferred Watercraft	Home River	State
35	22	Expert	Kayak	Skykomish	WA
39	25	Expert	Kayak	South Stillaguamish	WA
50	15	Expert	Kayak	Skykomish	WA
50	30	Expert	Kayak	Middle Fork Snoqualmie	WA
53	25	Expert	Kayak	North Fork Snoqualmie (Ernie's Gorge)	WA
38	20	Expert	Kayak	Green	WA

5.2.2 Level 2 Planned Spill Volumes

The Level 2 field reconnaissance was scheduled in advance with a planned spill in the morning increasing to a higher planned spill in the afternoon (Table 5.2-2). The Level 2 field reconnaissance planned spill volumes were based on recommendations from study participants in the Level 1 desktop analysis pre-reconnaissance site visit. Precipitation from storms the week prior to the Level 2 field reconnaissance coupled with river stage requirements in the Skagit River downstream from the Project caused the operators to cancel the planned spill event for Level 2 field reconnaissance on short notice. A single planned spill of 1,200 cfs was rescheduled for Sunday, November 7, 2021.

Table 5.2-2. Level 2 field reconnaissance proposed spill volumes.

Date	Time (hours)	Proposed Spill Volume (cfs)	Actual Spill Volume (cfs)
November 6, 2021	0800 - 1130	850	0
November 6, 2021	1300 - 1600	1,200	0
November 7, 2021	0800 - 1130	1,200	1,200

Study participants visited each of the KOPs on Saturday, November 6, 2021, when no spill occurred. Flow in the Gorge bypass reach was limited to accretion and tributary inputs only. Study participants returned on Sunday, November 7, 2021, to observe the 1,200 cfs controlled spill at each of the KOPs.

5.2.3 Level 2 Key Observation Points

Nine KOPs were used for the Level 2 field reconnaissance to evaluate navigability, whitewater difficulty, and estimate a suitable range of flows for a Level 3 multiple flow evaluation (Figure 5.2-1). The KOPs were identified during the Level 1 desktop analysis pre-reconnaissance site visit with American Whitewater study participants in July 2021. Four of the KOPs were selected to

assess potential river access locations. The remaining five KOPs were located where participants could observe rapids. Study participants in the Level 2 field reconnaissance were provided closer access to the river channel at each of the designated KOPs to better assess whitewater difficulty, boating lines through rapids, portage routes, safety, and river access.

KOP B, located on the service road on the river left (looking downstream) of the Gorge bypass reach in the area referred to as Devil's Elbow, was further divided into three KOPs: B1, B2 and B3. The additional KOPs were necessary at this location to allow study participants to observe the full length of the rapids which span up to a half-mile. KOPs B1, B2, and B3 allowed the study participants to assess the full length of this segment in the Gorge bypass reach.

KOPs D and F, located at road pull-outs on SR 20 on river right (looking downstream), were carried over from the Level 1 desktop analysis pre-reconnaissance site visit. These KOPs provide viewpoints of two rapids in the Gorge bypass reach. The study team was able to evaluate the full length of these rapids during the Level 2 field reconnaissance.

KOPs A, A1, G, and H were located at potential river access locations. KOPs A1 and H were added to the list of potential river access sites during the Level 1 desktop analysis pre-reconnaissance site visit. KOP A1 is located on river left (looking downstream) just downstream from the plunge pool at the base of Gorge Dam. KOP H is located on river left (looking downstream) where the Trail of the Cedars pedestrian bridge crosses the Skagit River in Newhalem.

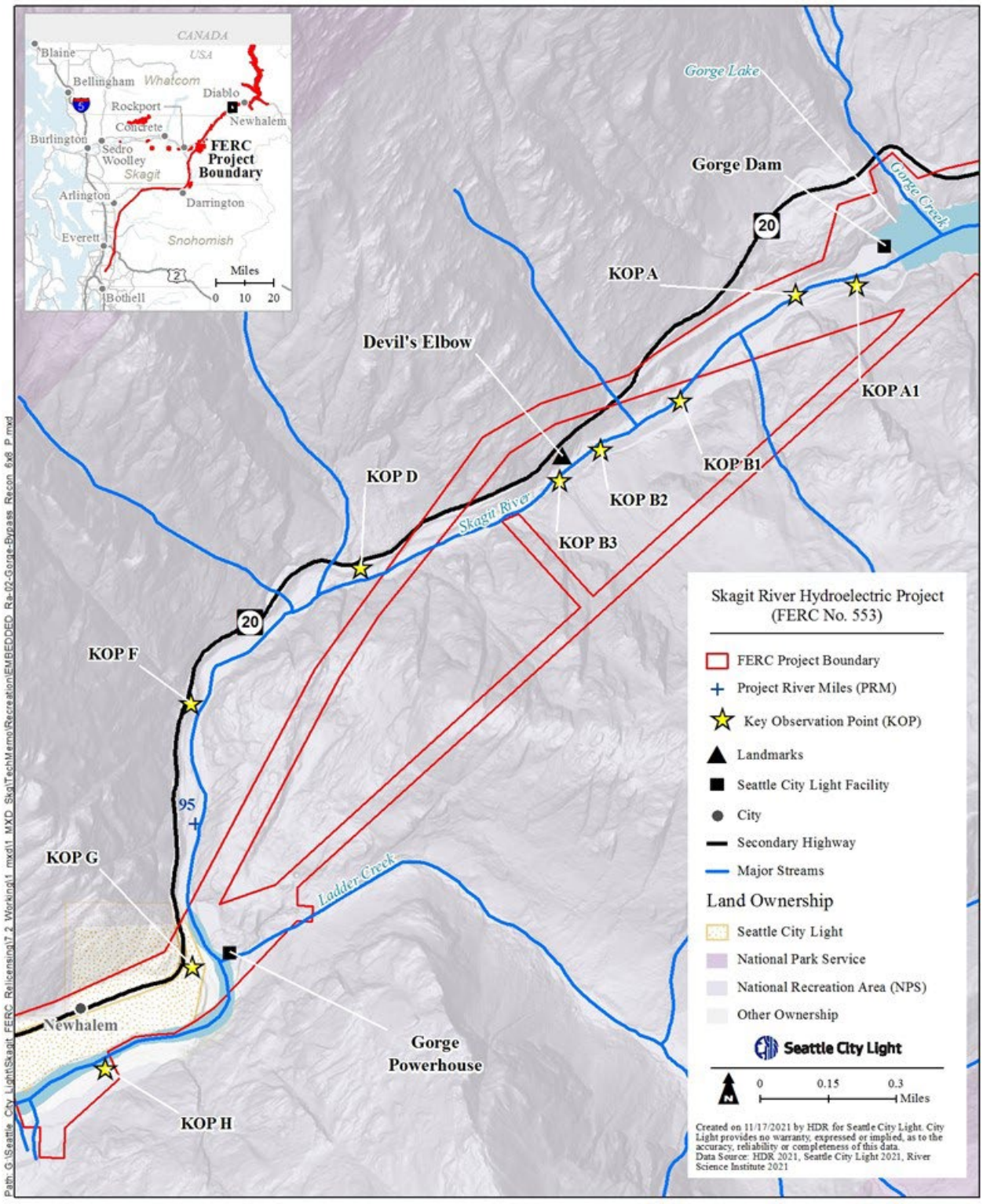

Figure 5.2-1. Level 2 field reconnaissance Key Observation Points.

5.2.4 Level 2 Field Reconnaissance Focus Groups

Structured focus groups were held with study participants on Saturday, November 6, 2021, and Sunday November 7, 2021, following field observations of the Gorge bypass reach at the respective KOPs (Attachment B). Focus group questions were designed to prompt discussion on navigability, whitewater difficulty, suitable range of flows for whitewater boating, river access needs, safety, other areas of concern, and uniqueness of the Gorge bypass reach compared to other opportunities in the region.

On Saturday, November 6, 2021, study participants were shown a series of photographs at respective KOPs projected on a large screen format prior to responding to focus group questions for that location. The photographs represented conditions at each KOP with spill flows of 500 cfs, 1,200 cfs, and approximately 4,500 cfs (KOPs B1, B2 and B3 only). Photographs were used for this focus group since planned spills for Saturday were postponed.

On Sunday, November 7, 2021, study participants provided additional responses to focus group questions based on direct observations of the 1,200 cfs spill flow that same day. The additional responses following observation of the 1,200 cfs flow are differentiated from responses on November 6, 2021, in Attachment B.

5.2.4.1 River Access

Study participants were asked to assess potential river access locations as part of the Level 2 field reconnaissance. Currently, there are no established locations to access the river.

In the focus group session, study participants indicated a preference for KOP A1 over KOP A as a river put-in location. KOP A1 offers a large staging area both on land and water for boaters to organize and communicate prior to paddling the Gorge bypass reach. KOP A1 was more aesthetic as a launch area than KOP A. An abandoned service road provides access to KOP A1 allowing boaters to get close to water level without dragging their kayaks down a steep bank hardened with grout. The participants were concerned the grout surface at KOP A would be detrimental to their boats.

Participants indicated parking was sufficient on the service road. Realigning the gate to the opposite side of the bridge would improve a turn-around area and create more parking on the downstream end of the dead-end service road on river left (looking downstream). Moving the gate would also allow boaters to drop-off equipment closer to the trail leading to KOP A1.

KOP H was evaluated as a potential take-out location in the Level 2 field reconnaissance. KOP H is located on river left (looking downstream) where the Trail of the Cedars pedestrian bridge crosses the Skagit River in Newhalem. In the focus group, study participants preferred KOP H, commenting that this location offers an aesthetic staging area to complete a trip, load gear, and socialize with other boaters and non-boaters. The study team indicated KOP G should also be a take-out option for boaters wanting to do multiple runs in the Gorge bypass reach in the same day. Parking is available on Main Street and SR 20 parking lots in Newhalem and was considered adequate, but there was a concern summer crowds in Newhalem may limit parking opportunities.

5.2.4.2 Whitewater Difficulty

Study participants evaluated the whitewater difficulty and safety associated with the rapids in the Gorge bypass reach. Study participants rated the overall whitewater difficulty of the full Gorge bypass reach as Class V(V+) at flows of 1,200 cfs. The designation in parenthesis refers to a single rapid at KOP D that is more difficult (Class V+) than the rest of the Gorge bypass reach. This rapid at KOP D can be portaged on river right, thereby resulting in the overall Class V designation. At lower flows of approximately 750 cfs, whitewater difficulty may decrease to Class IV+ for much of the Gorge bypass reach, but the rapid at KOP D would likely remain Class V to V+.

Study participants did not identify any unique whitewater boating safety issues in the Gorge bypass reach compared to other runs with similar difficulty. Study participants remarked that unlike many other runs of similar difficulty, egress from the Gorge bypass reach is relatively easy using the service road at KOP B and SR 20 at KOPs D and F.

American Whitewater describes Class V rapids as "extremely long, obstructed, or very violent rapids which expose a paddler to added risk" (American Whitewater 2021d). Class V rapids contain inherent risk and are best suited for experts. City Light does not have the expertise to evaluate the difficulty and safety associated with individual Class V rapids. As a result, the evaluations of whitewater difficulty and associated safety for whitewater boaters in this study report are based on study participant opinions on the whitewater safety in the Gorge bypass reach associated with Class V rapids.

5.2.4.3 Flow Comparisons

Study participants evaluated three spill flows in the Gorge bypass reach using a combination of photographs from previous spill events of 500 cfs, 1,200 cfs, and 4,500 cfs (KOPs B1, B2, and B3 only) and direct observations of 1,200 cfs on November 7, 2021.

Study participants believe 500 cfs is too low for whitewater boating and would not be "fun." Routes through rapids might disappear at 500 cfs making it less safe. More rocks would obstruct navigation. Rapids would likely become more vertical, which could result in safety concerns with boats pinning vertically.

The 1,200-cfs flow covers up hazardous rocks making the channel more navigable with more route options. Study participants labeled this as the "goldilocks flow" meaning it was not too low, not too high, but just right. Study participants commented that a higher flow between 1,800 cfs to 2,000 cfs may also be suitable for whitewater boating.

5.2.4.4 Comparison with other Whitewater Boating Opportunities in the Area

Study participants described the Gorge bypass reach as a "five-star" and "stand-out" run at 1,200 cfs and went on to say there is not another run of this caliber in the Skagit River drainage. The Gorge bypass reach would be a top tier run in Washington. The rapids have a distinct character and an overall aesthetically pleasing river setting that boaters will want to experience. The short shuttle combined with the easy access at the put-in and take-out greatly enhance the attraction to this whitewater opportunity. Scheduled releases in July, August, or September will attract boaters from a wide area. The Gorge bypass reach could become an annual gathering for the boating community. Study participants noted that the attraction to this run is greater than the whitewater

boating alone. The location in a national park with other recreation opportunities in close proximity makes this more than just a boating destination that may allow the public to combine whitewater boating with a family trip to the area.

5.2.4.5 Is Level 3 Multiple Flow Evaluation Warranted?

In the focus group sessions, study participants believed the Gorge bypass reach was suitable for whitewater boating and a Level 3 multiple flow evaluation was warranted. Study participants recommended evaluating four planned spills in succession over a two-day period (Table 5.2-3). Study participants emphasized an adaptive approach during the Level 3 multiple flow evaluation allowing real-time adjustments to controlled spill volumes based on boater feedback from prior releases in the study.

Table 5.2-3. Recommended spill volumes for Level 3 multiple flow evaluation.

Day	Release Number	Time (hours)	Proposed Spill Volume (cfs)
Day 1	1	0800 - 1130	750
	2	1300 - 1630	1,250
Day 2	3	0800 - 1130	1,750
	4	1300 - 1630	2,250

5.2.5 Level 2 Field Reconnaissance Decision Criteria and Evaluation Findings

The six evaluation criteria used for the Level 1 desktop analysis were also used to assess progression from the Level 2 field reconnaissance to the Level 3 multiple flow evaluation. Progression from Level 2 field reconnaissance to Level 3 multiple flow evaluation was determined to be warranted and was recommended by FERC. The evaluation criteria and associated findings for the Level 2 field reconnaissance below have been updated to reflect comments from LPs following filing of the ISR:

Criterion 1: Level 2 field reconnaissance determines Gorge bypass reach contains rapids suitable / not suitable for whitewater boating.

Evaluation finding: Study participant observations of flows in the Gorge bypass reach during the Level 2 field reconnaissance on November 6 and 7, 2021, found the rapids suitable and highly desirable for whitewater boating. Study participants estimated the rapids observed at the respective KOPs ranged from Class IV to Class V difficulty. Study participants stated the rapids could be navigated at the flows observed during the Level 2 field reconnaissance. Study participants also noted that portage routes were available where individuals might choose not to run a rapid.

Criterion 2: Access to the river is / is not feasible.

Evaluation finding: Access to the river is feasible. KOPs A, A1, G and H were located at potential put-in and take-out locations. Study participants noted that access to the river was feasible at all locations under existing conditions. KOP A1 was the preferred location for the put-in. KOPs G and H were both acceptable for river take-out locations. Study participants did not think any improvements were needed for kayakers to access the river.

Criterion 3: Potential effects on natural and cultural resources can / cannot be resolved for next level of proposed study.

Evaluation finding: Potential effects of the Level 3 multiple flow evaluation on natural and cultural resources were evaluated. The cultural, fishery, geomorphology, and terrestrial resource study leads were contacted to determine if there were concerns with potential effects associated with the range of planned spill volumes and timing for the Level 3 multiple flow evaluation. None of the resource study leads voiced concerns with the proposed range of flows in the Level 3 multiple flow evaluation or the anticipated timing of the study implementation.

The CR-03 Gorge Bypass Reach Cultural Resources Survey identified landform modifications made for construction of the Gorge High Dam between 1954 and 1961 (City Light 2022a). The area in the Gorge bypass reach also contains historic debris and concrete foundations recommended eligible for the National Register of Historic Places. It was determined that activities associated with the Level 3 multiple flow evaluation would not affect these historic properties.

Criterion 4: Agency regulations and/or Tribal concerns do / do not prohibit further investigation.

Evaluation finding: The Gorge bypass reach is located on lands managed by NPS. For safety reasons, NPS prohibits public access to the Gorge bypass reach (NPS 2021). Study implementation and associated data collection for the Bypass Safety and Whitewater Boating Study is authorized under a permit issued by NPS.

The Gorge bypass reach is a culturally sensitive area for the Indian Tribes. KOP locations for study participant observations were approved by the cultural resource study leads prior to field implementation.

On March 4, 2022, the Upper Skagit Indian Tribe informed City Light it was opposed to implementation of the Level 3 multiple flow evaluation. In comments on the ISR, NPS recommended suspending the Level 3 multiple flow evaluation due to cultural concerns.

In response to these concerns raised by LPs, City Light postponed implementation of the Level 3 multiple flow evaluation. In the August 8, 2022 Determination on Requests for Study Modifications, FERC recommended implementing the Level 3 multiple flow evaluation.

Criterion 5: Project operations are / are not able to provide opportunistic spills in range suitable for whitewater boating.

Evaluation finding: Project operations are not able to provide opportunistic spills in the preliminary range suitable for whitewater boating in a predictable fashion. Opportunistic spills do occur in the preliminary range determined suitable for whitewater boating but are unpredictable in timing, duration and rate of change thereby raising potential safety concerns for whitewater boaters. Furthermore, there is no advance notice for unplanned spill events.

The planned spill events for the Level 1 desktop analysis pre-reconnaissance and Level 2 field reconnaissance demonstrated the ability of the Project to release spill in the range considered potentially suitable for whitewater boating. Preliminary discussions with Project operators indicate

the Project is capable of releasing flows from Gorge Dam for limited durations in order to meet the objectives of this study.

Criterion 6: Opportunities for coordination with other studies.

Evaluation finding: Resource study leads were informed of planned spill volumes associated with the Level 2 field reconnaissance. The study team for the FA-01a Water Quality Monitoring Study used the planned spill event to collect additional field data during the Level 2 field reconnaissance (City Light 2023a).

5.3 Level 3: Multiple Flow Evaluation

Analysis of information collected in the Level 1 desktop analysis and Level 2 field reconnaissance phases of this study indicated that progression to the Level 3 multiple flow evaluation was warranted but depended, in part, on an interdisciplinary assessment of potential effects and communication with Indian Tribes. Study participants in the Level 2 field reconnaissance recommended evaluating four planned spills in succession over a two-day period.

The controlled spill volumes proposed by the study participants were presented to the cultural, fishery, geomorphology, and terrestrial resource study leads to determine if there were concerns with potential effects associated with the range of planned spill volumes and timing for the Level 3 multiple flow evaluation. None of the resource study leads voiced concerns with the proposed range of flows in the Level 3 multiple flow evaluation or the timing of the study implementation.

As noted in the Level 2 decision criteria in Section 5.2.5, FERC recommended implementing the Level 3 multiple flow evaluation in the August 8, 2022 Determination on Requests for Study Modifications. In coordination with the study participant boating team, City Light scheduled the Level 3 multiple flow evaluation for October 7-9, 2022. The week prior to the planned Level 3 multiple flow evaluation, wildfires in the Skagit River basin caused air quality index (AQI) values exceeding 300. AQI values greater than 200 are categorized as very unhealthy to hazardous (Figure 5.3-1). On the weekend the Level 3 multiple flow evaluation was planned, similar unhealthy to hazardous AQI conditions were forecasted. To avoid health impacts on study participants, staff, and contractors, City Light elected to reschedule the Level 3 multiple flow evaluation for later in October. The AQI for the October 8-9, 2022 weekend remained above 300 (Figure 5.3-2). The Level 3 multiple flow evaluation was rescheduled for the weekend of October 28-30, 2022.

AQI Basics for Ozone and Particle Pollution

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

Figure 5.3-1. Air quality index health concern categories (AirNow 2022).

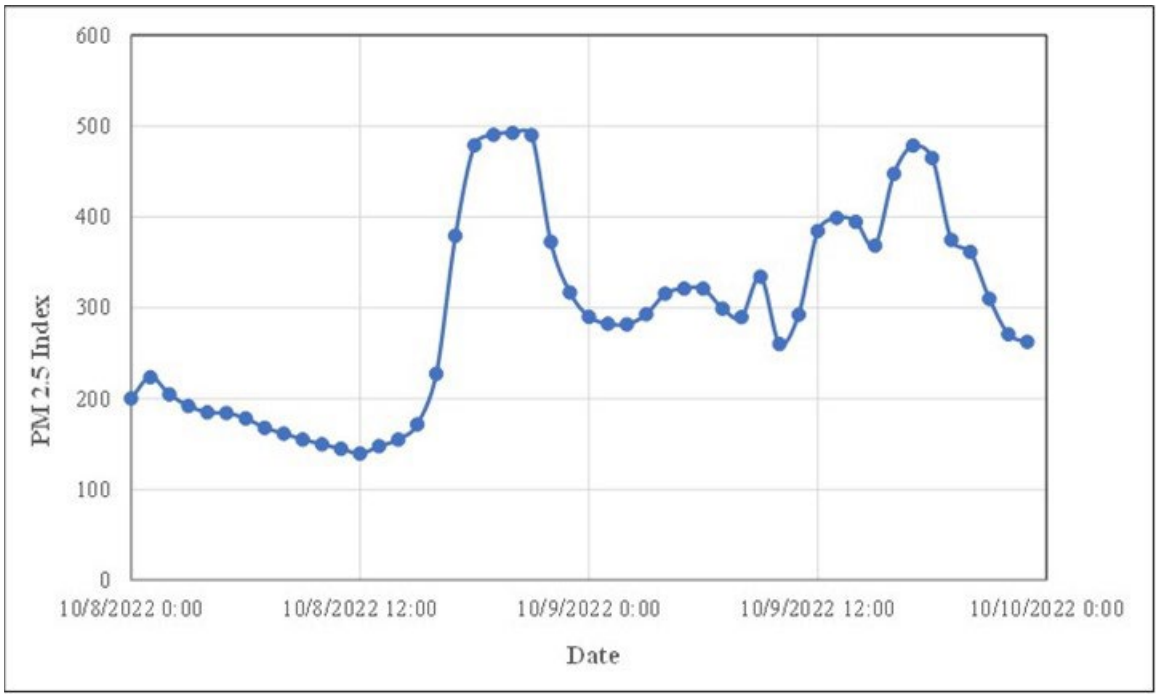

Figure 5.3-2. Air Quality Index in Newhalem, October 8-9, 2022 (Purple Air 2022).

In the week prior to the weekend of October 28-30, 2022, the weather forecast called for cold temperatures and heavy precipitation (Figure 5.3-3). Prolonged exposure to cold temperatures and heavy precipitation combined with the whitewater difficulty and long days collecting field data led City Light to cancel the Level 3 multiple flow evaluation for the 2022 study season. City Light plans to reschedule the Level 3 multiple flow evaluation in the third quarter of 2023 under more favorable weather conditions. A technical memorandum of the Level 3 multiple flow evaluation will be provided to LPs and filed with FERC following completion of the field data collection in the third quarter of 2023.

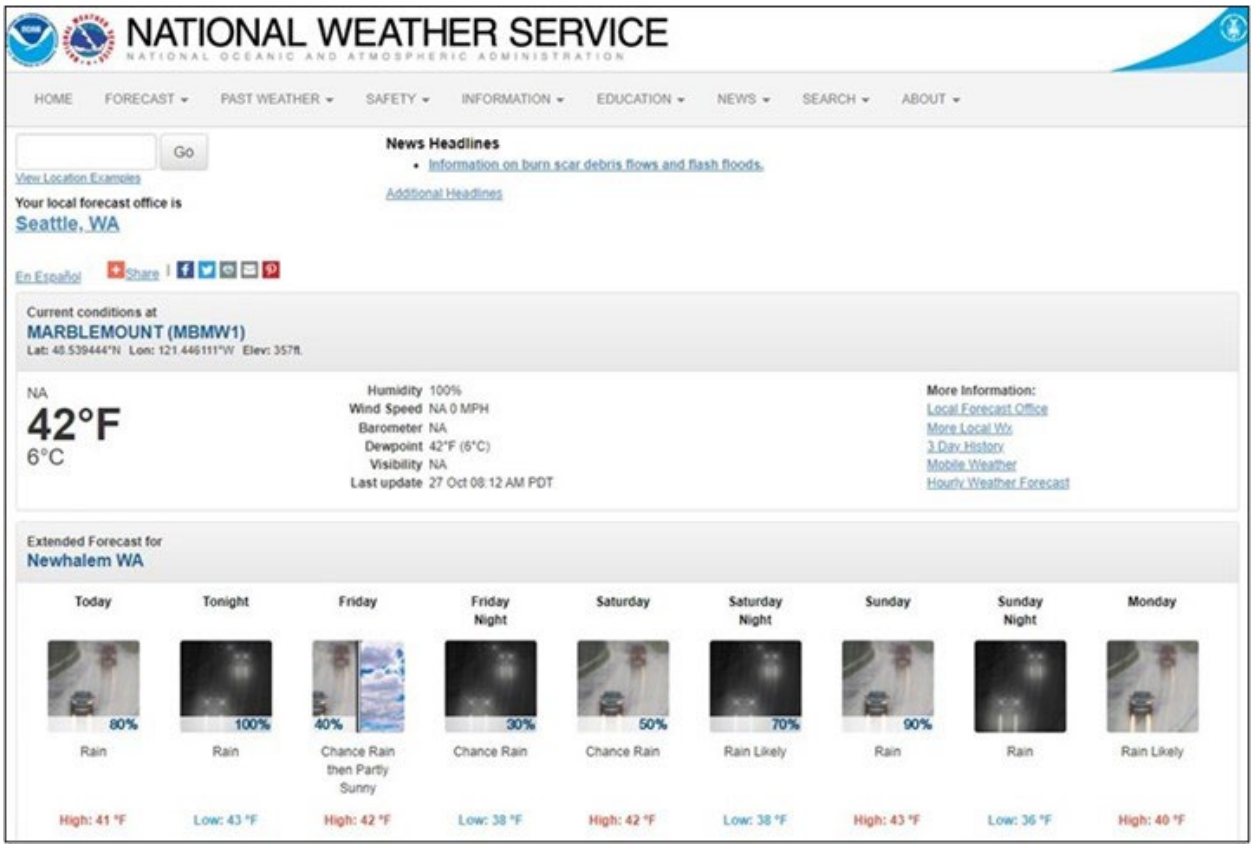

Figure 5.3-3. Weather forecast for Newhalem, October 27-31, 2022 (National Weather Service 2022).

6.0 DISCUSSION AND FINDINGS

The Bypass Safety and Whitewater Boating study report includes the results for the Level 1 desktop analysis and the Level 2 field reconnaissance. Implementation of the Level 3 multiple flow evaluation was delayed initially because of concerns with potential effects on cultural resources. Two attempts to reschedule the Level 3 multiple flow evaluation in October 2022 were canceled due to hazardous air quality and weather conditions. City Light will schedule the Level 3 multiple flow evaluation in the third quarter of 2023. The discussion and findings through October 2022 are organized by the three levels of data collection described in the study methods.

6.1 Level 1 Desktop Analysis Summary

The Level 1 desktop analysis determined that the Gorge bypass reach contained rapids potentially suitable for whitewater boating. Study participants observed flows of 1,092 cfs and 486 cfs during the pre-reconnaissance site visit on July 26 and 27, 2021, respectively. The pre-reconnaissance site visit was coordinated with pre-planned spills for the FA-05 Bypass Instream Flow Model Development Study (City Light 2023d). Project operators indicated gate openings at Gorge Dam are capable of providing spill increments in the preliminary range of whitewater boating flows.

Study participants rated the whitewater difficulty Class IV to V based on the pre-reconnaissance flow observations. Study participants also noted that portage routes were available where individuals might choose not to run a rapid. The Gorge bypass reach was accessible for launching kayaks directly downstream from the plunge pool below Gorge Dam, and two locations were identified in Newhalem for exiting the river.

Spill data from Gorge Dam was analyzed for the period from 1997 to 2020. Opportunistic spills do occur in the preliminary range determined suitable for whitewater boating but are unpredictable in timing, duration, and rate of change, thereby raising potential safety concerns for whitewater boaters. Furthermore, it is difficult to forecast unplanned spill events in advance, and spill is not published in real-time to the public.

No potential effects on natural and cultural resources were identified with study participants accessing the KOP locations or the discrete planned spill flows for the Level 1 desktop analysis pre-reconnaissance. The study team determined the Level 2 field reconnaissance was warranted based on information collected in the Level 1 desktop analysis.

6.2 Level 2 Field Reconnaissance Summary

For logistical and safety planning purposes, planned spill from Gorge Dam was scheduled in advance for the Level 2 field reconnaissance. Two flows were scheduled for observation on November 6, 2021—850 cfs in the morning and 1,200 cfs in the afternoon. Precipitation from storms the week prior to the Level 2 field reconnaissance coupled with river stage requirements in the Skagit River downstream from the Project caused the operators to cancel the planned spill event for Level 2 field reconnaissance on short notice. The 1,200 cfs planned spill was re-scheduled for Sunday, November 7, 2021, for study participants to observe.

The study team contacted resource study leads for the cultural, fishery, geomorphology, and terrestrial resource study areas in advance of the Level 2 field reconnaissance to review the planned

spill volumes. The study leads did not voice concerns with potential effects associated with the discrete planned spills for the Level 2 field reconnaissance or with study participants accessing the KOP locations. The study team for the FA-01a Water Quality Monitoring Study used the Level 2 field reconnaissance planned spill event to collect additional field data (City Light 2023a).

Structured focus groups were held with study participants on Saturday, November 6, 2021 and Sunday, November 7, 2021, following observations of the Gorge bypass reach. Study participants rated the overall whitewater difficulty of the Gorge bypass reach as Class V(V+) at flows of 1,200 cfs. Study participants believed the Gorge bypass reach was suitable for whitewater boating and described the Gorge bypass reach as a "five-star" and "stand-out" run at 1,200 cfs and went on to say there is not another run of this caliber in the Skagit drainage.

Study participants did not identify any unique safety issues associated with whitewater boating in the Gorge bypass reach compared to other runs with similar difficulty. Study participants remarked that unlike many other Class V runs, egress from the Gorge bypass reach is relatively easy using the service road at KOP B and SR 20 at KOPs D and F.

American Whitewater describes Class V rapids as "extremely long, obstructed, or very violent rapids which expose a paddler to added risk" (American Whitewater 2021d). Class V rapids contain inherent risk and are best suited for experts. City Light does not have the expertise to evaluate the difficulty and safety associated with individual Class V rapids. As a result, the evaluations of whitewater difficulty and associated safety for whitewater boaters in this study report are based on study participant opinions on the whitewater safety in the Gorge bypass reach associated with Class V rapids.

In the Level 2 field reconnaissance, study participants recommended progression to the Level 3 multiple flow evaluation based on observations of the whitewater opportunities in the Gorge bypass reach. Study participants recommended releasing four planned spills in succession over a two-day period for evaluation in the Level 3 multiple flow evaluation (see Table 5.2-3). Study participants emphasized the need for an adaptive approach during the Level 3 multiple flow evaluation allowing actual spill volumes for release numbers 2, 3, and 4 to be adjusted based on boater feedback from prior releases in the Level 3 multiple flow evaluation.

6.3 Level 3 Multiple Flow Evaluation

Implementation of the Level 3 multiple flow evaluation was delayed because of concerns with potential effects on cultural resources. Attempts to reschedule the Level 3 multiple flow evaluation were canceled due to hazardous air quality and weather conditions. The study plan included six explicit decision criteria used to evaluate successive progression between levels of study (City Light 2021). Upon completion of Level 2 field reconnaissance, the City Light cultural resources lead completed outreach to Indian Tribes (Criterion 4) to determine if there were concerns with progression to a Level 3 multiple flow evaluation. The Upper Skagit Indian Tribe expressed its opposition to implementing the Level 3 multiple flow evaluation due to cultural sensitivities. In addition, NPS recommended suspending the Level 3 multiple flow evaluation due to cultural concerns. In light of these concerns from the Upper Skagit Indian Tribe and NPS, City Light suspended implementation of the Level 3 multiple flow evaluation in the summer of 2022. In the August 8, 2022 Determination on Requests for Study Modifications, FERC recommended implementing the Level 3 multiple flow evaluation.

City Light attempted to implement the Level 3 multiple flow evaluation on two weekends in October 2022. City Light canceled each scheduled weekend for the Level 3 multiple flow evaluation for health and safety reasons. City Light anticipates rescheduling the Level 3 multiple flow evaluation in the third quarter of 2023 under more favorable environmental conditions. Analysis of the Level 3 multiple flow evaluation and associated technical memorandum will be provided following completion of the field data collection.

The Level 3 multiple flow evaluation would help define a range of flows suitable for whitewater boating. The range of suitable flows, also known as a flow preference curve, would include the minimum acceptable flow and the optimum flow. The defined range of boating flows would allow the study team to complete analysis of the study goals and objectives associated with effects on generation, cost of providing whitewater boating in the Gorge bypass reach, and potential effects to natural, cultural, and other Project resources from planned spills in the boatable range and potential for increased public access. Public safety for boaters and non-boaters associated with planned spills for whitewater boating in the Gorge bypass reach would be analyzed in the Level 3 multiple flow evaluation.

7.0 VARIANCES FROM FERC-APPROVED STUDY PLAN AND PROPOSED MODIFICATIONS

The following variances were described in the Gorge Bypass Reach Safety and Whitewater Boating Study Interim Report (City Light 2022b):

- The study team elected to proceed to the Level 2 field reconnaissance to complete the field work prior to the onset of winter conditions in the study area. As a result, the Level 1 desktop analysis and Level 2 field reconnaissance interim reports were combined into a single report for the ISR filed in March 2022. The decision to progress from the Level 1 desktop analysis to the Level 2 field reconnaissance study phase is documented in the Gorge Bypass Reach Safety and Whitewater Boating Study Interim Report using the evaluation criteria specified in the study methods (City Light 2022b).
- Field investigations associated with Level 2 field reconnaissance and Level 3 multiple flow evaluation in the study plan were originally limited to opportunistic flows in the Gorge bypass reach and, to the extent practicable, planned spills associated with other studies, such as the FA-05 Bypass Instream Flow Model Development Study (City Light 2023d). The study team determined that scheduling planned spill events for the Level 2 field reconnaissance and forthcoming Level 3 multiple flow evaluation was advantageous to coordinate logistics with study volunteers and execute study phases.
- City Light added the pre-reconnaissance site visit on July 26 and 27, 2021, to the Level 1 desktop analysis in order to observe planned spill flows in the Gorge bypass reach. The planned spill was scheduled initially for the FA-05 Bypass Instream Flow Model Development Study (City Light 2023d). The Level 1 desktop analysis pre-reconnaissance site visit enabled the study team and study participants to improve Level 2 field reconnaissance planning by observing actual flows in the Gorge bypass reach, evaluating field safety needs, assessing KOPs, and recommending flows for evaluation in the Level 2 field reconnaissance.

The study plan's schedule was designed to be progressive and dynamic. Though implementation of the Level 3 multiple flow evaluation was anticipated to occur, if warranted, in summer or fall 2022, implementation was delayed—initially because of concerns with potential effects on cultural resources and later because of unhealthy air quality conditions from fires on the first scheduled weekend and cold, wet weather conditions on the second scheduled weekend. City Light anticipates completing the Level 3 multiple flow evaluation in the third quarter of 2023 under more favorable environmental conditions for safety reasons. A technical memorandum of the Level 3 multiple flow evaluation will be provided to LPs and filed with FERC following completion of the field data collection.

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GORGE BYPASS REACH SAFETY AND WHITEWATER BOATING STUDY REPORT

ATTACHMENT A

STRUCTURED INTERVIEW QUESTIONS AND RESPONSES

Level 1 Structured Interviews Questions—Blank

Seattle City Light is investigating whitewater boating opportunities as part of the relicensing process for the Skagit River Hydroelectric Project (Project). The Project is located in northern Washington State and consists of three power generating developments on the Skagit River – Ross, Diablo, and Gorge – and associated lands and facilities. Gorge Dam diverts water around a 2.5-mile segment of the Skagit River known as the Gorge bypass reach. Seattle City Light developed the Gorge Bypass Reach Safety and Whitewater Boating Assessment (RA-02) to evaluate whitewater boating opportunities in the Gorge bypass reach. The results of the study will be included in the application for a new license for the Project.

You have been identified as a person that may be able to assist with initial information gathering on whitewater boating opportunities in this reach. Please respond to the questions below to the best of your knowledge.

Name (for record keeping purposes only): _____

1. Please describe your history/interest in the Gorge bypass reach.

   Response:

2. Have you visited/observed the Gorge bypass reach? Yes____ No____

   a. Please provide date(s) if you remember. Date(s):_____

3. Was there spill flow in the Gorge bypass reach channel at the time of your visit?

   a. Please provide an estimate to the best of your ability of the flow in cfs (per date if multiple visits) at the time of your visit(s). Flow (cfs):_____

4. Do you have an estimate of the whitewater difficulty (Class I – VI) in the Gorge bypass reach?

   WW Difficulty:_____

5. Do you think there are safety concerns for whitewater recreation unique to the Gorge bypass reach that are different from whitewater segments of similar difficulty? Yes____ No____

   If yes, please describe:

6. What range of flows (cfs) would you estimate are needed to paddle the Gorge bypass reach?

   Flow range (cfs): _____ to _____

7. Are you aware of anyone paddling or attempting to paddle the Gorge bypass reach in the past (individuals will remain anonymous)? Yes____ No_____

   a. Please provide dates and flow (cfs) if available. Date:_____

8. Can you recommend other individuals we should contact for an interview with knowledge of or interest in whitewater boating in the Gorge bypass reach.

a. Contact name: _____

b. Contact address: _____

c. Contact email: _____

d. Contact phone: _____

9. Please provide any additional information or comments you believe will help inform this study of the Gorge bypass reach.

Information and Comments:

For additional information on this study plan and the overall relicensing for the Project please contact Mike Aronowitz. Michael.Aronowitz@seattle.gov

Thank you for your assistance with this study.

Structured Interview: Respondent 1

1. Please describe your history/interest in the Gorge bypass reach.

I worked for Seattle City Light as an Environmental Analyst from 1995-2012. Sometime around 1998-2000 or so, I was the liaison between the Environmental Compliance Division downtown and the Skagit facilities and made numerous visits to the Skagit Facilities to work on water quality related issues. I was in touch with one of the members of the Skagit re-licensing team also, who was also a kayaker, and she let me know about an upcoming series of releases in the by-pass region, so I spent a fair amount of time scouting when I was up there that one year. I was seriously intent on running it since I was sure at that time that I could get away with being down there as I worked there. And this was before 9/11. My memory was that I had figured about 600-800 cfs would be good and once I tried really hard to get an even stronger paddler to run it with me during a last-minute short window (during the week) when I knew it would be flowing, but unfortunately was unsuccessful in finding anyone. It has remained one of those "Lost Opportunities" that I've always regretted. At that time, I couldn't seem to interest anyone who was interested and experienced enough to tackle a first descent that was willing to drive that far during the week for just 2.5 miles. Something I don't think would happen nowadays.

I have been paddling whitewater since 1980 – done over 500 different river runs in the world. Between 1993-1999 did a fair amount of class V.

2. Have you visited/observed the Gorge bypass reach? Yes_X__ No___

a. Please provide date(s) if you remember.

Date(s):with water in it, between 1998 and 2000

Dry – many times between 1995 and 2010

3. Was there spill flow in the Gorge bypass reach channel at the time of your visit? YES

a. Please provide an estimate to the best of your ability of the flow in cfs (per date if multiple visits) at the time of your visit(s).

Flow (cfs): 600-1,000. I know I saw it at various levels but don't remember how many different flows or exactly what they were. I'm kind of guessing 600-1,000 at maybe 3 different flows. It was also just kind of luck when I was actually working up at the Skagit. My job didn't require weekly visits or anything like that.

4. Do you have an estimate of the whitewater difficulty (Class I – VI) in the Gorge bypass reach?

WW Difficulty: looked to be class III-IV with one big class V, which, my memory at the time was that I would probably run it, meaning I saw a line! but the kind of line where I wanted someone else to go first. It was big, powerful waves and holes. From the road reminded me of Robe Canyon of the Stillaguamish at 5.5-6.0 feet, maybe bigger? That one

rapid was huge. That's what I remember. I remember the rest being either fun or straight forward and I also remember at least half of this short run as easy of what I could see.

5. Do you think there are safety concerns for whitewater recreation unique to the Gorge bypass reach that are different from whitewater segments of similar difficulty? Yes___ No___X_

If yes, please describe:

I don't think it's a safety issue, but access to the put-in might be an issue? My plan was to drive down and look from that road at the downstream end of the reservoir. But I'm not sure I had a clear put-in location in mind. I never did go down there.

7. What range of flows (cfs) would you estimate are needed to paddle the Gorge bypass reach?

Flow range (cfs): 600 to 800 but I'd also say that nowadays, I and others run things lower now than we would before, so could be better lower. My guess is that a whole lot higher makes the easy part uninteresting and fast and the hard drop likely something to portage.

8. Are you aware of anyone paddling or attempting to paddle the Gorge bypass reach in the past (individuals will remain anonymous)? Yes___ No__X___

a. Please provide dates and flow (cfs) if available. Date:_____

9. Can you recommend other individuals we should contact for an interview with knowledge of or interest in whitewater boating in the Gorge bypass reach.

a. Contact name:_____
b. Contact address:_____
c. Contact email:_____
d. Contact phone:_____

10. Please provide any additional information or comments you believe will help inform this study of the Gorge bypass reach.

Information and Comments:

My memory is that one could continue below the powerhouse and the wastewater treatment plant to Newhalem creek to add a couple miles of class II. Note that I only looked at the part of the river that one can see from the road. Not sure if there's more than that. I never hiked in even when I probably could have gotten away with driving down the City Light road to check it out because at the time, my feet weren't capable of any scrambling.

Structured Interview: Respondent 2

1. Please describe your history/interest in the Gorge bypass reach.

I saw the Gorge bypass reach with water in it 20 years ago, and it looked like an amazing stretch of whitewater. When the opportunity to participate in the feasibility study was presented, I was excited to participate.

2. Have you visited/observed the Gorge bypass reach? Yes_X__ No____

a. Please provide date(s) if you remember.

Date(s): July 26-27, 2021

3. Was there spill flow in the Gorge bypass reach channel at the time of your visit?

a. Please provide an estimate to the best of your ability of the flow in cfs (per date if multiple visits) at the time of your visit(s).

Flow (cfs): 7/26/21 flow was 1,100; 7/27/21 flow was 500

4. Do you have an estimate of the whitewater difficulty (Class I – VI) in the Gorge bypass reach?

WW Difficulty: Class IV – V

5. Do you think there are safety concerns for whitewater recreation unique to the Gorge bypass reach that are different from whitewater segments of similar difficulty? Yes___ No__X__

If yes, please describe:

6. What range of flows (cfs) would you estimate are needed to paddle the Gorge bypass reach?

Flow range (cfs): 700 to 1400

7. Are you aware of anyone paddling or attempting to paddle the Gorge bypass reach in the past (individuals will remain anonymous)? Yes__X__ No_____

a. Please provide dates and flow (cfs) if available. Date:_____

8. Can you recommend other individuals we should contact for an interview with knowledge of or interest in whitewater boating in the Gorge bypass reach.

a. Contact name: Rick Williams
b. Contact address:_____
c. Contact email:_____
d. Contact phone:_____

9. Please provide any additional information or comments you believe will help inform this study of the Gorge bypass reach.

Information and Comments: The Gorge bypass reach is a beautiful and unique stretch for recreation. It has a desirable combination of significant drops, that are separated by pools, amongst huge boulders and beautiful water. If the stretch was natural river, it would be one that whitewater recreationalists would use regularly.

Structured Interview: Respondent 3

1. Please describe your history/interest in the Gorge bypass reach.

I am a local whitewater kayaker interested in seeing more options in the area. Particularly in times when other rivers are low.

2. Have you visited/observed the Gorge bypass reach? Yes_X__ No____

a. Please provide date(s) if you remember.

Dates: 07/25/2021 and 07/26/2021

3. Was there spill flow in the Gorge bypass reach channel at the time of your visit?

a. Please provide an estimate to the best of your ability of the flow in cfs (per date if multiple visits) at the time of your visit(s).

Flow(cfs): 1,200 cfs on 07/26/2021; 500 cfs on 07/27/2021

4. Do you have an estimate of the whitewater difficulty (Class I – VI) in the Gorge bypass reach?

WW Difficulty:_Class 4 to 5___

5. Do you think there are safety concerns for whitewater recreation unique to the Gorge bypass reach that are different from whitewater segments of similar difficulty? Yes___ No X__

If yes, please describe:

6. What range of flows (cfs) would you estimate are needed to paddle the Gorge bypass reach?

Flow range (cfs): 500 to 1,500

7. Are you aware of anyone paddling or attempting to paddle the Gorge bypass reach in the past (individuals will remain anonymous)? Yes____ No_X_

a. Please provide dates and flow (cfs) if available. Date:_____

8. Can you recommend other individuals we should contact for an interview with knowledge of or interest in whitewater boating in the Gorge bypass reach.

a. Contact name:_____
b. Contact address:_____
c. Contact email:_____
d. Contact phone:_____

9. Please provide any additional information or comments you believe will help inform this study of the Gorge bypass reach.

Information and Comments:

GORGE BYPASS REACH SAFETY AND WHITEWATER BOATING STUDY REPORT

ATTACHMENT B

FOCUS GROUP QUESTIONS AND RESPONSES NOVEMBER 6–7, 2021

1. **River Access**
    a. **Put-in: KOP A and A1**
        i. Which site (A vs A1) is preferrable as an access location?
        A1 is preferred
        ii. Why?
        Safer location than A
        Easier on boat
        Less subject to erosion
        Faster to launch
        Can handle more boaters assembling on and off the water for communication and planning safety prior to paddling reach
        More fun
        Better aesthetics

        iii. Is access to the river adequate for your watercraft?
        Yes, for kayaks
        iv. Is parking adequate?
        More desirable to pass through gate and park and/or drop-off boats and people on other side of bridge
        Can fit lots of cars on the service road
        More parking than needed for a scheduled whitewater release
        v. Thoughts/Comments on staging areas
        Staging areas are good
        vi. Other access needs/amenities
        Covered changing spot would be nice but not necessary

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

Take-out: KOP G and H

vii. Which site (KOP G or KOP H) is preferrable as an access location?
Prefer to have option to use both G or H as a take-out

viii. Why?
G makes for shorter paddle and walk to vehicle allowing boaters interested in multiple laps to travel back to the put-in more quickly.
H is more aesthetic take-out at below bridge and lawn area for staging/ loading boats

ix. Is access from the river adequate for your watercraft?
Yes, for kayaks

x. Is parking adequate?
Parking is adequate for both but more limited at G

xi. Thoughts/Comments on staging areas
Concerns that Newhalem might be too crowded to accommodate parking for boaters for summer releases

xii. Other access needs/amenities
Area from Gorge Powerhouse to Goodell Creek is designated a no boating zone by NOCA.
What is the rational for this closure?
Under what authority is the no boating zone established?
How is it implemented?
Do we need to request change in the no boating zone to carry out Level 3 Multiple Flow phase of the study?

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

KOP Evaluation

b. **KOP B1**

i. Did this KOP provide sufficient view of the river to scout rapids?
View was sufficient to scout the rapids

ii. Were you able to evaluate WW difficulty from this KOP?
Yes, using photos from summer and fall spill events of 500, 1,200 and 3,000 cfs (verified as ~4500 cfs by Skagit Ops post focus group) and direct observations of bypass at base flow conditions on Saturday, 11/6/2021.

iii. What is your estimate of the WW difficulty at this KOP?
1. 500 cfs—*4^{+}*
2. 1,200 cfs—*5^{-} (updated after direct observation on Sunday, 11/7/21)*
3. 3,000 cfs—*5 (Facilitator note—photos of flows in focus group were labeled as 3,000 cfs but later determined to be ~4,500 cfs)*

iv. Was there a portage route at this KOP to get around rapids if needed?
Yes, and boaters noted the service road offers is accessible from throughout the KOPs in B section offering good egress

v. What side of the river was the portage route located on?
River Left and Right

vi. What was the difficulty of the portage route?
River Left: ~~moderate~~ updated to easy after Sunday, 11/7/21 observations in bypass
River Right: ~~moderate~~ updated to difficult after Sunday, 11/7/21 observations in bypass

vii. Did you identify/name any rapids of significance at this location? If yes, please provide names and estimate of WW difficulty
4 doors
Grafton Boulder/vision

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

KOP B2

viii. Did this KOP provide sufficient view of the river to scout rapids?
View was sufficient to scout the rapids

ix. Were you able to evaluate WW difficulty from this KOP?
Yes, using photos from summer and fall spill events of 500, 1,200 and 3,000 cfs (verified as ~4500 cfs by Skagit Ops post focus group) and direct observations of bypass at base flow conditions on Saturday, 11/6/2021.

x. What is your estimate of the WW difficulty at this KOP?
1. 500 cfs—*no photos available for KOP B2*
2. 1,200 cfs—*5 (based on direct observation on Sunday, 11/7/21)*
3. 3,000 cfs—*5 (Facilitator note—photos of flows in focus group were labeled as 3,000 cfs but later determined to be ~4,500 cfs)*

xi. Was there a portage route at this KOP to get around rapids if needed?
Yes, and boaters noted the service road is accessible from throughout the KOPs in B section offering good egress

xii. What side of the river was the portage route located on?
River Left and Right

xiii. What was the difficulty of the portage route?
River Left: moderate
River Right: moderate
Sunday Focus Group comment: If you are portaging most drops you probably should not have put on in first place and should have driven shuttle

xiv. Did you identify/name any rapids of significance at this location? If yes, please provide names and estimate of WW difficulty
None

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

KOP B3

xv. Did this KOP provide sufficient view of the river to scout rapids?
Yes

xvi. Were you able to evaluate WW difficulty from this KOP?
Yes

xvii. What is your estimate of the WW difficulty at this KOP?
1. 500 cfs—*no photos available for KOP B3*
2. 1,200 cfs—*5^- (based on direct observation on Sunday, 11/7/21)*
3. 3,000 cfs—*5^+ (Facilitator note—photos of flows in focus group were labeled as 3,000 cfs but later determined to be ~4,500 cfs)*

xviii. Was there a portage route at this KOP to get around rapids if needed?
Yes

xix. What side of the river was the portage route located on?
River Left: moderate
River Right: No portage

xx. What was the difficulty of the portage route?
River Left: moderate
River Right: No portage

xxi. Did you identify/name any rapids of significance at this location? If yes, please provide names and estimate of WW difficulty
Steam Train
Diesel Locomotive

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

KOP D

xxii. Did this KOP provide sufficient view of the river to scout rapids?
Yes

xxiii. Were you able to evaluate WW difficulty from this KOP?
Yes

xxiv. What is your estimate of the WW difficulty at this KOP?
1. 500 cfs—*Class 5 based on photos and direct observations of two members from the Team during July pre-recon*
2. 1,200 cfs—*5+ (based on direct observation on Sunday, 11/7/21)*
3. 3,000 cfs—*no photo to assess WW difficulty*

xxv. Was there a portage route at this KOP to get around rapids if needed?
Yes

xxvi. What side of the river was the portage route located on?
River Right

xxvii. What was the difficulty of the portage route?
Moderate to and from the river to the road. Road easy to portage

xxviii. Did you identify/name any rapids of significance at this location? If yes, please provide names and estimate of WW difficulty
To be determined. MacDaddy?

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

KOP F

xxix. Did this KOP provide sufficient view of the river to scout rapids?
Yes

xxx. Were you able to evaluate WW difficulty from this KOP?
Yes

xxxi. What is your estimate of the WW difficulty at this KOP?
1. 500 cfs—*Class 5 based on photos and direct observations of two members from the Team during July pre-recon*
2. 1,200 cfs—*only Class 5 but serious (based on direct observation on Sunday, 11/7/21)*
3. 3,000 cfs—*no photo to assess WW difficulty*

xxxii. Was there a portage route at this KOP to get around rapids if needed?
Yes

xxxiii. What side of the river was the portage route located on?
River Right

xxxiv. What was the difficulty of the portage route?
Moderate

xxxv. Did you identify/name any rapids of significance at this location? If yes, please provide names and estimate of WW difficulty
To be determined

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

Flow Comparisons

c. **500 cfs flow**

i. What are the advantages of this flow?

None
Might make rapid at KOP D easier

ii. What are the disadvantages of this flow?

Too low
Difficult to maneuver
Safety issues/pins
No fun

iii. What is the whitewater class of this flow?

Class 5

iv. Any safety concerns at this flow?

Pins

v. What are the special attributes at this flow?

None
Might make good swimming holes in summer

vi. Your thoughts on a lower flow than 500 cfs

No way

vii. What type of watercraft are suitable for this river segment at this flow?

Kayak

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

1,200 cfs flow *(based on direct observation on Sunday, 11/7/21)*

viii. What are the advantages of this flow?

Flow covers up hazardous rocks
More navigable
Cleaner lines

ix. What are the disadvantages of this flow?

Adds difficulty at KOP D rapid
Links together upper and middle sections of this rapid without a lot of recovery time

x. What is the whitewater class of this flow?

Class 5 (5^+)

xi. Any safety concerns at this flow?

Standard Class 5 safety concerns

xii. What are the special attributes at this flow?

Goldilocks flow:
Not too big
Not too hard
Just right

xiii. Your thoughts on a higher flow than 1,200 cfs
1,800 cfs?
2,000 cfs?

xiv. What type of watercraft are suitable for this river segment at this flow?

Kayak

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

Level 3 Study

d. Based on observations in the Level 2 Reconnaissance, do you think additional study is warranted, e.g., on water assessment of multiple flows?

Yes, Level 3 is warranted based on observations in Pre-recon and Level 2 Field Reconnaissance of flows spilled

e. Multiple flow assessments are typically designed in a fashion that allows data analysis to develop a flow preference curve. Boating participants paddle a series of flows (typically 3 to 4 releases over a 1-to-2-day period) and evaluate each flow using a single flow survey tool. The results help identify minimum acceptable and optimum flows.

i. Knowing a range of flows should be tested in the Level 3 investigation, what is the **lowest flow** that should be released to better understand a potential minimum acceptable flow

Facilitator Note: Group discussion on need to investigate a low flow. General concern this would lead to establishing a low flow in license that was not enjoyable. Explanation of flow preference curve and need to collect data on acceptable and unacceptable flows.

750 cfs selected as lowest flow for Level 3 study

ii. What study flow do you think might help the group identify the standard trip or optimum flow?

Facilitator Note: Optimum flow identified during focus group

iii. What flow might help the group identify the high challenge flow?

Facilitator Note: High challenge flow identified during focus group

iv. What kind of **flow increments between releases** (Flow 1, Flow 2, Flow 3, etc.) are necessary for boaters to discern changes in whitewater difficulty, safety, navigation, boatability, etc.

Day 1:

Flow 1: 750 cfs

Flow 2: 1,250 cfs

Day 2:

Flow 3: 1,750 cfs

Flow 4: 2,250 cfs

**Group emphasized adaptive approach with the ability to request flow adjustments to the range based on direct experience with Flow 1, 2 and 3*

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

Comparison with other whitewater boating opportunities in the area

f. How does the Gorge bypass reach compare with other boating opportunities?

i. In the Skagit drainage

November 6, 2021 comments based on photos of Gorge bypass reach

- *High appeal*
- *Aesthetic*
- *Whitewater Challenge*
- *Quality of whitewater resource*
- *Easy Access*

November 7, 2021 comments after direct observation of 1,200 cfs in Gorge bypass reach

- *Five star run at 1,200 cfs*
- *Aesthetic*
- *Quality of whitewater resource*
- *Easy Access*
- *There is not another run of this caliber in the Skagit drainage*
- *Stand out run*
- *Rapids have unique/distinct lines boaters want to experience*
- *Gorge bypass reach could become an annual gathering place for the whitewater community*
- *Attraction to this run is greater than the whitewater alone. The reach is in a national park with other recreation opportunities such as camping and hiking that allows you to make a family trip to the area to boat a release and do other activities or boat other runs in area*

ii. In western WA west of the Cascades

November 6, 2021 comments based on photos of Gorge bypass reach

- *Equivalent to other top tier runs in Western WA*
- *Gorge bypass reach would be on the tick list for Class 5 boaters in Western WA*

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes

iii. In PNW

November 6, 2021 comments based on photos of Gorge bypass reach

- *This area is the heart of the PNW so same comments for Skagit drainage and Western WA apply.*

November 7, 2021 comments after direct observation of 1,200 cfs in Gorge bypass reach

- *If releases were scheduled for July, August and September then releases will be on every boaters annual calendar*

iv. Will releases in the optimum range attract boaters to the Gorge bypass reach?

November 6, 2021 comments based on photos of Gorge bypass reach

- *Depending on season*
- *July or August will be best option*

g. Are releases in the minimum acceptable range sufficient to attract boaters Gorge bypass reach?

Facilitator Note: Not answered directly because minimum acceptable flow has yet to be defined. Study participants implied in discussion on recommended flows for Level 3 investigation their concern that a low flow would not be fun.

Black font=Focus Group Question
Blue italic=boater response on November 6, 2021 using photos
Gold italic=boater response on November 7, 2021 after direct observation of 1,200 cfs
Red italic= facilitator notes