Black Canyon Hydroelectric Project
FERC Project No. P-14110
Proposed Recreational Boating and River Access Study Plan
September 2012

Prepared for
Black Canyon Hydro, LLC
3633 Alderwood Avenue
Bellingham, WA 98225

Table of Contents

List of Tables

1 INTRODUCTION

Black Canyon Hydro, LLC, (BCH) ultimately plans to file an application for an original license for the Black Canyon Hydroelectric Project (Project), FERC Project Number P-14110, and associated facilities on the North Fork Snoqualmie River (North Fork), approximately 4 miles northeast of North Bend in King County, Washington. The Project has a proposed generation capacity of 25 megawatts (MW) and would be located entirely on private lands.

The Project would consist of the following new facilities: 1) a 8-foot-high, 162.4-foot-long inflatable rubber diversion with associated fish passage and intake structures; (2) a variable pooling area behind the diversion with a normal water surface elevation of 971 feet above mean sea level and a maximum pooling of 2.83 acres; (3) a power conduit tunnel consisting of an approximately 450-foot-deep vertical tunnel into an approximately 8,300-foot-long, 12-foot-diameter horizontal tunnel and penstock connecting to; (4) a 60-foot-long, 100-foot-wide metal powerhouse with two Francis turbine units, one rated at 16 MW and the other rated at 9 MW; (5) a 200-foot-long, 24-foot-wide tailrace; (6) a 4.2-mile-long, 115-kilovolt overhead transmission line that transmits project power to the regional grid (transmission line would be an overbuild of an existing transmission line with only approximately 0.65 miles of new transmission); (7) a 0.75-mile-long and a 0.5-mile-long extension of two existing logging roads that lead to the project facilities; and (8) appurtenant facilities (switchyard, maintenance building, etc.).

The project would operate in run-of-river mode. The combined maximum hydraulic capacity of the two project turbines would be 900 cubic feet per second (cfs). The project would divert water from a 2.6-mile-section of the North Fork Snoqualmie River.

BCH filed a Notice of Intent (NOI) and the associated Pre-Application Document (PAD) to commence the FERC Integrated Licensing Process on March 27, 2012. In response to the subsequent study requests filed by FERC staff and other stakeholders and as detailed in 18 CFR 5.11, BCH is required to submit relevant resource study plans. This includes a study of recreational boating within the Project reach which follows the requirements of 18 CFR 5.11(b)-(e).

2 STUDY DESCRIPTION AND OBJECTIVES

In accordance with 18 CFR §5.11(d)(1), this section describes the goals and objectives of the study and the information to be obtained. The goal of this study is to evaluate existing recreational boating activities on the North Fork Snoqualmie River, including boat access, that may be affected by construction and operation of the proposed Project and to assess the potential effects of the Project on recreational boating, including effects due to changes in flow regime and river geomorphology. The specific objectives of the study are to:

- Identify recreational boating activity, including put-in and take-out sites, on the North Fork;
- Estimate current and future use of the river by boaters;
- Evaluate the effects of project construction and operation on boating opportunities on the North Fork;
- Determine acceptable and optimal recreation flow ranges for each relevant equipment type;
- Describe the effects of the proposed diversion weir and altered river flows and geomorphology on existing and potential boating activity, including boat access, within the project area;
- Describe any new boating opportunities that may be created by the project; and
- Describe liability issues related to providing controlled whitewater flows.

The 2.6-mile Project Reach includes a stretch of the North Fork known as Black Canyon (also known locally as Ernie's Gorge or Ernie's Canyon), just upstream of the unincorporated community of Ernie's Grove. The river falls steeply in this reach, and the canyon's narrow whitewater rapids (Class V+) are useable only by expert-level whitewater kayakers and river rafters, and only under certain flow conditions. The recreational boating and river access study will characterize the acceptable and optimal flow ranges for boating activities in this reach, the effects of the proposed project on the frequency and timing of these flows, the state of existing access to the river and potential improvements, and the likely current and future demand for access to the project area for recreational boating use, consistent with the overall study objectives stated above.

The Recreational Boating and River Access Study Plan is primarily based on the comments submitted by FERC staff on July 24, 2012 (FERC, 2012). American Whitewater also made a formal study request for recreational boating. While other stakeholders mentioned evaluating recreational boating, FERC staff and American

Whitewater made a formal study request which met the criteria found in Appendix A of Scoping Document 1 for study requests.

3 STUDY AREA

The recreational boating and river access study area will include:

- The North Fork from the recreational boating access located downstream from Wagner Bridge to the take-out location at King County's Three Forks Natural Area, at the confluence with the Middle Fork Snoqualmie River;
- Areas adjacent to the river used by recreational boaters to scout and portage along the route;
- Existing roads within the Black Canyon Hydroelectric project area that are currently or potentially used to access the river:
    - North Fork Road, National Forest Development Road 5700, from Ernie's Grove to Spur 10 Road;
    - Lake Hancock Road / SE 88th Street from North Fork Road to Spur 10 Road;
    - Unnamed private roads near the Project Reach, particularly the existing section that would become part of the proposed intake access road;
- Locations of proposed new or extended roads and potential new river access points:
    - Proposed intake access road;
    - Proposed powerhouse access road; and
    - Possible put-in/take-out locations near intake or powerhouse structures.

4 RESOURCE MANAGEMENT GOALS

In accordance with 18 CFR §5.11(d)(2), this section describes resource management goals of agencies or Indian tribes with jurisdiction over the resources to be studied.

BCH is not aware of any applicable resource management goals of agencies or Indian tribes with jurisdiction over recreational boating within the vicinity of the Project. Additionally, none were indicated by the FERC staff's Recreational Boating and River Access Study Request. However, BCH would appreciate any stakeholder input on this subject.

5 EXISTING INFORMATION

In accordance with 18 CFR §5.11(d)(3), this section describes existing information on recreational boating and river access in the Project area, and the need for additional information.

Due to the steep, turbulent nature of the North Fork in the project reach, recreational boating is limited to expert-level (Class V+) whitewater kayaking and rafting. Boating on the Project Reach is ad hoc, so existing information specific to the study area comes largely from unofficial third-party informational websites. A preliminary Internet search found no evidence of commercial use by whitewater guide services. The highly technical nature of the reach and the lack of evidence for commercial use make it unlikely that the North Fork at and upstream from the project location meet FERC's established criteria for navigability, which usually require evidence of actual commercial activity or a rating less than Class IV (FERC 2004, pp. 5-6).

Sources of generally applicable information and study approaches potentially applicable to Black Canyon include:

- Various published or publicly available maps and geographic information systems (GIS) data;
- Ecology's 1974 "Whitewater Stream Inventory and Streamflow Suitability for Whitewater Canoeing and Kayaking" (Bortelson 1974);
- RCO's "2006 Recreation Survey Final Report" (RCO 2007);
- The Washington Salmon Recovery Funding Board's (SRFB, a subsidiary board to RCO) "Estimates of Future Participation in Outdoor Recreation in Washington State" (SRFB 2003);
- "Flows and Recreation: A Guide to Studies for River Professionals," published by the Hydropower Reform Coalition and the National Park Service (Whittaker et al. 2005).

5.1 Hydrology

USGS gage 12142000 has collected decades of discharge and gage height data for the North Fork (USGS 2012). This data set will underlie the hydrologic analysis of recreational flow conditions and potential impacts from the project.

5.2 Suitable Flow Conditions

Table 1 shows suitable flow conditions for paddling Black Canyon as reported by several sources. Reported minimum flows all fall in the range of 300 to 450 cfs, and maximum flows fall in the range of 750 to 900 cfs.

5.3 Access

Currently, put-in access is available from Hancock Forest Management (HFM) with purchase of any of several annual and daily permit options, and may necessitate a hike down Spur 10 Road from a locked gate to the put-in at Spur 10 Bridge. HFM collects user sign-in cards from visitors at authorized access points (HFM 2012). From Spur 10 Bridge, users must boat some 2 miles of intermediate whitewater before reaching the more challenging whitewater reach in the canyon. Alternately, some users apparently access the Black Canyon reach more directly by hiking without authorization along the private Lake Hancock Road (Professor Paddle 2012). Take-out access is at King County's Three Forks Natural Area, just above the confluence of the North and Middle Forks, at the 428th Street bridge.

Table 1 Reported suitable flow conditions for boating

Source	Minimum flow (cfs)	Maximum flow (cfs)	Season	Notes
AllAboutRivers.com 2012	300	800	November through June	
American Whitewater 2012	400	900	More often than not during the rainy fall, winter, and spring	
Bortelson 1974 (p. 10)	350 to 450	800		Not specific to Black Canyon – Study evaluated the less technical reach from "campground above Deep Creek to swinging bridge below Hancock Creek" (p. 28)
Professor Paddle 2012	300	750	Spring through mid-summer	

cfs = cubic feet per second

5.4 Current Use and Significance

In 2007 to 2008, American Whitewater collected online survey data from 165 self-selected respondents, who rated Black Canyon as one of 24 whitewater runs with

"outstanding recreational and aesthetic qualities of regional and national significance" (American Whitewater 2008, p. 8), though only 12 percent of respondents (19 individuals) had ever made the run (American Whitewater 2008, p. 13). American Whitewater's survey results indicate no commercial use of the run.

Additional information needs for recreational boating and river access include the following:

- If available from HFM, data on the number and type of access permits given out annually for the Snoqualmie Forest, the number and distribution of sign-in cards collected throughout the year, and the specific purpose and duration of visits (to be coordinated with Recreational Resources Study);
- List of other relevant existing documents for literature review;
- Hydrologic data and analysis, to be developed as part of the Instream Flows Study;
- Recreational usage data from user survey, to be developed in conjunction with the Recreational Resources Study;
- Contact information for paddlers experienced with Black Canyon under varying conditions (and ideally, varying watercraft) and potentially willing to participate in surveys or site reconnaissance.

6 NEXUS TO PROJECT

In accordance with 18 CFR §5.11(d)(4), this section describes any nexus between Project operations and effects on recreational boating and river access.

Construction and operation of the Black Canyon Hydroelectric Project could affect recreational boating activity in the vicinity of the project area in several ways. Water diversions could change the number and distribution of days when stream flows are suitable for boating. Construction of in-water structures could temporarily displace boating opportunities, although the coincidence of allowed construction windows for in-water work and flows too low for boating make this unlikely. Roads extended for access to project facilities could possibly be made available for improved put-in and/or take-out access after construction. Depending on specifics of the project's operation, changes in flow levels below the diversion could either improve or reduce the frequency of flows suitable for boating. If construction and operation of the project could improve river access or frequency of suitable flows, then the project would contribute to BCH's and FERC's responsibility under the Federal Power Act (FPA) to provide recreational opportunities at hydroelectric projects.

7 METHODS

In accordance with 18 CFR §5.11(d)(1) and §5.11(d)(5), this section provides a detailed description of the proposed study methodology, including data collection and analysis techniques, or objectively quantified information, sampling strategy, and a schedule including data collection and analysis techniques, or objectively quantified information, sampling strategy, and a schedule including appropriate field season(s) and the duration (see "Schedule" heading below for schedule).

Recreational boating and river access will be studied in close conjunction with river-related elements of the Recreational Resources Study, and building on the relevant results from the Instream Flows Study. BCH proposes the following study elements along the general lines described in "Flows and Recreation: A Guide to Studies for River Professionals" (Whittaker et al. 2005):

- Literature review. Existing sources will be compiled and reviewed to identify relevant literature and data.
- Hydrology summary. A hydrology summary will be prepared distilling results of the Instream Flows Study as appropriate for recreational boating analysis. Data will be analyzed at the level of the shortest increments available in the USGS data set to evaluate short-duration effects, such as the North Fork's response to precipitation events, diurnal variation in flows due to snowmelt, and the changing period of usable daylight throughout the year.
- Structured interviews. Interviews will be conducted simultaneously for recreational boating and other recreational resources. Examples of relevant interview questions are available in Appendix A to the Jackson Hydroelectric Project Revised Flow Recreation Study Plan (Snohomish PUD 2006, 124-126). The specific questions to be included in the surveys would be refined based on conditions and recreational boating uses unique to the North Fork. Solicited interviews may include:
    - Responses solicited from list of experienced users and other knowledgeable people, developed in conjunction with project stakeholders and agencies.
    - Responses collected from site users on representative days during each month of a year.
    - As a fallback if respondent pool is small, responses may be solicited from website users who have posted trip reports or other information about the reach.

- Flow comparison survey. A survey of experienced Black Canyon paddlers will be conducted regarding boating conditions under different flow conditions in the North Fork.
- Supply and demand assessments. A supply/demand assessment of recreational opportunities for boating will be developed, with the level of detail to be determined during study plan review.
- Multiple flow reconnaissance assessment. If the flow comparison survey fails to characterize suitable flows with reasonable accuracy, volunteer boaters may be recruited to conduct a reconnaissance assessment of the North Fork under multiple flow conditions. Example questions for the volunteers to address, taken from a similar study (Snohomish PUD 2006, 127 130), will be customized to address conditions specific to the North Fork. Note that the questionnaires for the Jackson Hydroelectric Project were prepared for a proposed controlled flow assessment, which is not possible on the uncontrolled North Fork.

The following sections lay out specific methods to address each study goal identified in STUDY DESCRIPTION AND OBJECTIVES. The Progress Reporting section indicates the relationships among these studies and proposes several opportunities for stakeholder involvement.

7.1 Identify Recreational Boating Activity, Including Put-in and Take out Sites, on the North Fork

- Structured interviews with boaters, land and resource managers, guides (if any), user groups, and others will be conducted to determine with greater certainty the types and locations of boating activity occurring on the North Fork.
- In coordination with Recreational Resources Study, contact HFM to request permit and usage data for Snoqualmie Forest.
- Interview results and Snoqualmie Forest usage data (if available) will be used to concretely identify, map, and describe existing and potential sites for recreational boating access along the river corridor, including new "sub-reaches" that may be made independently accessible by new access points.

7.2 Estimate Current and Future Use of the River by Boaters

- Structured interviews will be conducted to assess boating activity occurring in the project area, including trip purpose (e.g., whitewater runs, fishing), trip length (if known), and seasonal considerations.

- Recreational boating supply and demand will be assessed to estimate future boating use under the "no action" alternative and under proposed project operational regime(s).

7.3 Evaluate the Effects of Project Construction and Operation on Boating Opportunities on the North Fork

- In conjunction with the Instream Flows Study, acceptable or optimal flows will be correlated with pre- and post-development flow conditions for a range of design and operational alternatives.
- The overlap between river closure and flows suitable for boating will be determined based on construction staging plans, the likely allowable work window for in-water work (if applicable), and hydrologic results from the Instream Flows Study.

7.4 Determine Acceptable and Optimal Recreation Flow Ranges for Each Relevant Equipment Type

- Interviews with experienced boaters and other experts will be conducted to determine a range of conditions generally acceptable to various types of watercraft and skill levels usable in the study area.
- The flow comparison survey and, if needed, the multiple flow reconnaissance assessment will be used to determine the range of flow suitability for the types of watercraft likely to be used on river reaches in the study area.

7.5 Describe the Effects of the Proposed Diversion Weir and Altered River Flows and Geomorphology on Existing and Potential Boating Activity, Including Boat Access, within the Project Area

- Effects of altered flows and geomorphology on boating opportunities will be assessed in conjunction with the Instream Flows Study and the Geomorphology, Large Wood, and Sediment Study.
- Monthly data from field usage surveys, the results of the supply and demand analysis, and the suitable flow range will be used to estimate current and future recreational boating use that might be expected for each month of the year.

7.6 Describe any New Boating Opportunities that May Be Created by the Project

- The interview questions for surveys conducted to address other goals as described above will be customized to determine anticipated increases in use if access to the

river were improved, for example, by providing access to put-in or take-out points that does not require carrying a boat significant distances or paying a substantial fee.

- The supply and demand analysis will estimate possible increases in recreational boating due to the greater range of trip length and difficulty made available by new put-in and take-out points.
- The results of all study elements, in aggregate, will be used to recommend acceptable and optimal recreation flow ranges, implications of these flows for developing the project's operational regime, and desirable access conditions for boating. Measures would be included in the project's Recreation Management Plan.

7.7 Describe Liability Issues Related to Providing Controlled Whitewater Flows

- The literature review will include study reports and documents from other FERC licensing proceedings that address liability related to whitewater recreation at hydropower projects, particularly within Washington State.
- Consultation with stakeholders, particularly whitewater recreation groups, and interviews with knowledgeable land and resource managers will include requests for information and input related to the project's potential liability issues.
- Depending on BCH's judgment, BCH may retain legal counsel regarding liability related to whitewater boating near the Project. BCH may take this action in conjunction with the Recreational Boating and River Access Study or independently.

7.8 Safety Concerns

Stakeholders requesting and participating in this study must recognized that whitewater boating is inherently dangerous and that the proposed study will take place in a remote and confined canyon where the risks of injury or death may be high and realistic chance of timely rescue in the event of accident or tragedy is limited. BCH feels that it should carry out the whitewater flow study requests received, and that FERC would require such studies. In the absence of a FERC Study Plan Determination and Order, BCH would not voluntarily organize or invite participation in whitewater activities. As a mandatory condition of participation in any whitewater boating flow reconnaissance study, BCH will require all boaters to execute a waiver and release of liability protecting BCH and property owners, including the public, from any liability for property damage and physical injury or death arising from or as a result of their participation. Participation

will be voluntary and unpaid, and entirely at the risk of the participant. Participants shall at no time be considered employees or contractors of BCH.

7.9 Logistics

Logistics for the multiple flow reconnaissance assessment, if it is needed, will be developed in collaboration with local recreational users or consultants with knowledge of the area. Decisions will be detailed in a Multiple Flow Reconnaissance Logistics Plan before that study element is implemented. The Logistics Plan will include information about target flows, participants, communication timelines and protocols when flows approach targets for assessment, meeting times and locations, shuttle and meeting logistics, safety concerns, documentation responsibilities, and schedule.

8 PROGRESS REPORTING

In accordance with 18 CFR §5.11(b)(3), this section describes provisions for periodic progress reports, including the manner and extent to which information will be shared; and the time allotted for technical review of the analysis and results.

Study reports will be submitted as required by the FERC Integrated Licensing Process (ILP). The most recent schedule, issued by FERC in Appendix B of Scoping Document 1, includes a number of opportunities for progress reports, exchange of analysis and results between stakeholders, and information sharing. After proposed study plans are filed with FERC there will be a study plan meeting and comment period before a revised study plan is filled and a comment period passes. Once studies begin, the ILP also has deadlines for an Initial Study Report to be submitted, an Initial Study Report Meeting, and an Initial Study Report Meeting Summary. However, this schedule is subject to change by FERC staff and should not necessarily be relied upon. It is BCH's understanding that any changes to the ILP plan and schedule will be noticed by FERC staff.

Additionally, FERC and stakeholders will have the opportunity to review, comment, and participate in study development at several points.

BCH will solicit from stakeholders:

- Additions to the lists of relevant documents for the literature review;
- Additions to the list of knowledgeable individuals for interview; and
- Input on the survey questions to be asked of recreational boating users.

These solicitations will be incorporated into the revised study plan, or through direct communication or a meeting after revised study plans are accepted but before interviews begin.

Interview subjects, both those identified through stakeholder collaboration and those using the site during on-site interview days, will be asked about their level of whitewater boating expertise, knowledge of the site, and willingness to participate in further analysis. Users who understand the relationship between USGS gage data and suitable flows in Black Canyon will be invited to participate in the flow comparison survey. Results of the survey will be provided to stakeholders for comment in an interim report. If the responses achieve consensus regarding acceptable and optimal flow ranges, these values will form the basis for subsequent analysis.

If the flow comparison survey does not yield a clear consensus, flow comparison survey participants and others (who may be expert paddlers but do not know Black Canyon well) will be invited to participate in a multiple-flow reconnaissance assessment. BCH and reconnaissance participants would then select two to four flow levels for evaluation. Over the course of the study period, participants would run Black Canyon opportunistically when flows were near the selected study levels, and their judgments on the suitability of the flow, along with other documentation, would be assembled and used to generate the optimal and acceptable flow ranges for subsequent analysis.

FERC and stakeholders will then have the opportunity to comment on the study results in a draft Recreational Boating and River Access Study.

9 SCHEDULE

In accordance with 18 CFR §5.11(b)(2), the schedule for conducting the study is provided in Table 2 below.

Table 2. Recreational Boating and River Access Schedule.

Component	Completion Date*
Proposed Study Plan Meeting	October 4, 2012
Proposed Study Plan Comments Due	December 6, 2012
File Revised Study Plan	January 7, 2013
Revised Study Plan Comments Due	January 22, 2013
ID Existing Conditions/Current & Future Use	2013
Evaluate Effects & Determine Flow Ranges	2013

Initial Study Report filed with FERC	February 6, 2014
Initial Study Report Meeting	February 21, 2014
Initial Study Report Meeting Summary	March 10, 2014

*Dates based on schedule created and presented by FERC in Scoping Document 1 and subject to change.

10 LEVEL OF EFFORT AND COST

In accordance with 18 CFR §5.11(d)(6), the anticipated level of effort and cost are provided in Table 3 below.

The estimated cost of this work is approximately $42,500, depending upon the extent of flow analysis, fieldwork conducted, and the level of information that might be obtained from existing sources.

One or two technicians would be expected to review existing data sources; interview knowledgeable boaters; survey river reaches and boating access areas in the field; develop an inventory of access locations or other sites of interest to boaters; evaluate current and future use and the need for additional facilities; evaluate a range of flows and potential effects of the project on boating opportunities; and draft and finalize maps and reports. Depending on the degree of success in conducting multiple-flow assessments utilizing natural flows, it is possible that additional follow-up studies will be needed to complete the evaluation of potential effects.

Table 3. Level of Effort and Cost

Task	Labor and Expenses
Prepare Proposed Study Plan	$7,000
Prepare Revised Study Plan	$2,500
ID Existing Conditions/Current & Future Use	$6,000
Evaluate Effects & Determine Flow Ranges	$5,000
Site Visits, Meetings and Reporting	$15,000
Flow Modeling	6,000
Review Potential Conflicts/Propose PM&E	$1,000
Total	$42,500

11 REFERENCES

American Whitewater. 2008. "Whitewater Paddling in the North Cascades." http://www.americanwhitewater.org/content/Document/view/documentid/554. Accessed August 2, 2012.

Bortleson, Gilbert C. 1974. "Whitewater Stream Inventory and Streamflow Suitability for Whitewater Canoeing and Kayaking." Washington State Department of Ecology. https://fortress.wa.gov/ecy/publications/SummaryPages/7411002.html. January 1974. Accessed July 31, 2012.

Federal Energy Regulatory Commission, 2012. Letter to Chris Spens with request for studies, additional information, and study requests in response to the Notice of Intent to File, Pre-Application Document (PAD) and Scoping Document. July 24, 2012. Federal Energy Regulatory Commission. Washington, D.C.

HFM (Hancock Forest Management). 2012. "Snoqualmie." http://hancockrecreationnw.com/snoqualmie/about/about-snoqualmie. Accessed August 2, 2012.

Professor Paddle. 2012. "Snoqualmie, N. Fork – 2. Spur 10 Bridge to 428th Street Bridge (Ernie's Canyon)." http://www.professorpaddle.com/rivers/riverdetails.asp?riverid=602. Accessed July 30, 2012.

RCO (Washington State Recreation and Conservation Office). 2007. "2006 Recreation Survey Final Report." August 1, 2007. http://www.rco.wa.gov/doc_pages/other_pubs.shtml. Accessed July 31, 2012.

Snohomish PUD (Public Utility District No. 1 of Snohomish County). 2006. "Revised Study Plans and Studies Not Proposed: Henry M. Jackson Hydroelectric Project, FERC No. 2157." FERC eLibrary Accession Number 200609125117.

SRFB (Salmon Recovery Funding Board). 2003. "Estimates of Future Participation in Outdoor Recreation in Washington State." March 2003. http://www.rco.wa.gov/doc_pages/other_pubs.shtml. Accessed July 31, 2012.

Whittaker, Doug, Bo Shelby, and John Gangemi. 2005. "Flows and Recreation: A guide to studies for river professionals." Hydropower Reform Coalition and National Park

Service. October 2005. http://www.nps.gov/hydro/flowrec.htm. Accessed August 2, 2012.

12 APPENDIX A: Recreational Boating Study Area