AMERICAN WHITEWATER

Upper Klamath Outfitters Association

November 5th, 2018

Mark Bransom, Executive Director
Klamath River Renewal Corporation
423 Washington St.
San Francisco, CA 94111

RE: Klamath Hydroelectric Project (P-2082) Proposed Removal of Project Works

Dear Mr. Bransom:

We thank you for the opportunity to comment on KRRC's *Definite Plan for the Lower Klamath Project*.

American Whitewater and Upper Klamath Outfitters Association have previously written to express our support for the Joint Application for License Transfer and License Amendment and the Application for Surrender of License for Major Project and Removal of Project Works filed by PacifiCorp and the Klamath River Renewal Corporation (KRRC) with the Federal Energy Regulatory Commission on September 23, 2016.[1] We support removal of JC Boyle, Copco 1, Copco 2 and Iron Gate Dams from the Klamath River, and we encourage the KRRC to use this opportunity to mitigate for lost whitewater recreational opportunities that will occur with project removal by enhancing new recreational benefits that will arise once the river is freely flowing.

To date, American Whitewater and Upper Klamath Outfitters Association have fully participated in the Klamath Project relicensing proceeding at various levels over the past two decades, including participating in studies as well as reviewing and providing written comments on all major scoping, draft, and final documents. We have actively supported dam removal as the action that provides the best opportunity to restore healthy fish runs, improve water quality, and support natural riparian processes while minimizing costs to ratepayers. Removing the Klamath Dams will restore flows to 17 miles of river that are currently inundated, and to 6 miles of reaches that are dewatered by hydroelectric diversions. In addition to the benefits described above, proposed action will provide outfitters and the general boating public with new opportunities for trips on a freely-flowing river. These long-term benefits however come with impacts to existing recreational opportunities that require mitigation.

American Whitewater, representing recreational boaters, and Upper Klamath Outfitters Assocation have a shared interest in restoring the Upper Klamath and

[1] FERC eLibrary Submittal 20171103-5106, Motion of Intervention of American Whitewater <https://elibrary.ferc.gov/idmws/search/intermediate.asp?link_file=yes&doclist=14616651>; and FERC eLibrary Submittal 20180615-5054, Late Motion of Intervention of Upper Klamath Outfitters Association <https://elibrary.ferc.gov/idmws/search/intermediate.asp?link_file=yes&doclist=14679602>

ensuring ongoing opportunities for whitewater recreation during and after dam removal.[2]

The following comments can assist KRRC in expanding and refining its plans for post-dam whitewater recreation, including the development of a Final Recreation Plan in June, 2019. Our comments focus primarily on two portions of the Definite Plan:

- Section 7.6, Recreation Facilities Removal & Draft Plan
- Appendix Q—Draft Recreation Plan

We have previously expressed most of the points covered in this letter to KRRC staff and their contractors. At a stakeholder outreach meeting on May 17, 2018, we offered initial input, principally regarding the location of river access points. More recently, on October 18-19, we collaborated with local outfitters in organizing a Site Tour, which included KRRC staff and their contractors as well as representatives of PacifiCorp and government agencies.

As part of the Site Tour, we prepared and distributed a document, *Whitewater Recreation on the Upper Klamath River: Planning and Priorities for Dam Removal*, which provides detailed descriptions of challenges, needs, and opportunities for whitewater recreation on a post-dam Klamath. We attach that document to this letter as Appendix 1.

GENERAL COMMENTS ON THE DEFINITE PLAN

The Upper Klamath River is a major regional whitewater recreation resource, providing opportunities for customers on outfitted rafting trips as well as the general boating public. Whitewater boating is a well-established beneficial use of the Klamath that contributes significantly to the local tourism and recreation economy. Beyond these tangible benefits, whitewater recreation on the Upper Klamath introduces people to wild rivers, which in turn promotes environmental stewardship and river conservation.

At present, most whitewater boating on the Upper Klamath occurs on the Hells Corner Gorge reach, which offers one of the region's only summer-long Class IV+ whitewater runs. This section's summer-long flows were recognized as a defining attribute of the "Outstandingly Remarkable Value" for recreation—a value of regional and national significance—when the Upper Klamath was designated as a National Wild and Scenic River in 1994. The Final Eligibility and Suitability Report for the Upper Klamath Wild and Scenic River Study of 1990 states as follows:

Offers a variety of year-round whitewater boating opportunities for rafters, canoeists, and kayakers; provides only year-round Class III-V run in Oregon and northern

[2] In these comments, and in the Appendix, we refer to the 44 miles of river from Keno Dam to Iron Gate Dam as the "Upper Klamath." In its Definite Plan, KRRC refers to the four-dam PacifiCorp hydroelectric project as the "Lower Klamath Project."

California, attracting visitors from outside the region who are willing to travel long distances to experience the quality whitewater run; contains more rapids (52) in this segment, ranging from Class I-V, than in most other rivers in the western United States; offers excellent fishery for wild rainbow trout with a size and catch rate among the highest in the state; nearly unlimited shoreline access; year-round fishing season; attracts anglers from outside the region.

Dam removal will bring major changes to whitewater recreation and the outstandingly remarkable value of recreation. Under Section 7(a) of the Wild and Scenic Rivers Act, the managing agency is obligated to evaluate whether the proposed action will "invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area on the date of designation of a river as a component of the National Wild and Scenic Rivers System."[3] As the Definite Plan notes, the loss of peaking releases from Boyle Powerhouse will bring an end to summer-long rafting on the Hells Corner Gorge run. The Definite Plan acknowledges that KRRC has a responsibility to offset this impact by working to expand other opportunities for post-dam whitewater recreation. Whether the recreation value is unreasonably diminished will depend on the quality of a comprehensive planning and implementation effort to address river-based recreation and whitewater boating specifically. With careful planning before dam removal, river runners will be able to enjoy new whitewater opportunities that will emerge as the reservoirs drain and as water returns to bypassed reaches; with a commitment to effective implementation, the overall recreation value will not be unreasonably diminished.

American Whitewater and local outfitters are focusing on four key requirements for whitewater recreation on a restored post-dam Klamath:

- ***River accesses.*** Strategically-placed boating accesses from Keno Dam to Iron Gate.
- ***Channel restoration***. Mitigation of unnatural vegetation overgrowth in the active channel resulting from decades of unnaturally low flow and rocky unnatural debris in two bypassed reaches resulting from past construction activity.
- ***Test flows.*** Brief test releases simulating post-dam summertime flows in two bypass reaches and in the Hells Corner Gorge reach.
- ***Flow enhancement.*** Increased instream flows, especially in the summer months.

Careful, proactive attention to these requirements can help minimize or mitigate losses to existing whitewater opportunities by adding new whitewater opportunities. In this way, KRRC can enhance whitewater recreation on the Klamath, support local outdoor recreation businesses, and ensure that future river runners can fully enjoy a restored Upper Klamath River.

River Accesses

[3] 16 USC § 1278(a)

Strategically placed river accesses are essential to whitewater recreation on any river, but they are especially important on the Upper Klamath. As described in Appendix 1, the Upper Klamath undergoes frequent and significant changes in gradient and difficulty as it cuts through the Cascade Range. On rivers with this type of variability, frequent access is vital so that river runners can choose runs that match their skills and equipment. In addition, frequent accesses allow boaters to select trips of an appropriate length to match their schedules—anything from a few hours to several days.

We are mindful of KRRC's limited budget for the development of river access points. Fortunately, most of the accesses we propose are pre-existing river or reservoir accesses. Many require little or no improvement in order for them to continue providing boater access after dam removal.

The following table lists our access requests and recommendations.

Table 1: River Access Points

Name of Access	Existing vs. Proposed	Action or Improvement Required
Keno Dam	Existing	No action by KRRC required—facilitate coordination with PacifiCorp and Bureau of Reclamation as appropriate
Highway 66 Bridge	Existing	Minor extension to riverbank
Moonshine Falls / Below Boyle Dam	Proposed	Moderate improvements, short extension to riverbank
Spring Island	Existing	None
Frain Ranch / Above Caldera	Existing	Improvements to Topsy Grade Road
Stateline	Existing	Minor spur road improvement
Access 6	Existing	None
Access 1	Existing	Short extension to river bank dependent on extent of head cut
Copco Valley / Above Copco Dam	Proposed	New spur road and launch site
Copco 2 Dam	Proposed	Temporary access. No new facilities; only traffic control
Fall Creek	Existing	Minor extension to riverbank
Jenny Creek / Camp Creek	Proposed	Optional future access
Iron Gate Hatchery	Existing	Minor improvements to boat ramp

Access During Dam Removal

For outfitters, it will be critical to have uninterrupted use of two key launch sites during dam removal. These access points will allow outfitters to continue operating

during the interval between reservoir drawdown (which will mark the end of peaking releases) and the completion of dam removal.

- ***Moonshine Falls / Below Boyle***. This access will allow outfitters to operate on the Big Bend Run (aka Boyle Bypass run) during dam removal.
- ***Copco 2 Dam***. This interim access will allow outfitters to use the Wards Canyon reach during dam removal.

Channel Restoration

KRRC must address navigability issues, both at the damsites and on the bypassed sections of river.

- ***Damsites.*** At each damsite, KRRC must restore the natural channel in a way that ensures safe boating passage, free from human-caused hazards like sharp metal, rebar, or jagged concrete.
- ***Bypass reaches***. The two "bypass reaches"—where the river is diverted into canals—have been greatly altered by hydropower development.
    - In the Boyle Bypass reach, debris from blasting during canal construction has littered the channel with sharp rock.
    - In the Copco 2 Bypass reach, artificially-reduced flows have allowed vegetation to grow unchecked in the active river channel.

  These unnatural hazards to navigation must be mitigated to allow safe whitewater recreation after dam removal.

For more details on channel restoration, see our Specific Comments below and refer to Appendix 1.

Test Flows

Outfitters will face an entirely new flow regime following dam removal. Peaking releases will end on Hells Corner Gorge, while on the two bypass reaches, flows will be restored to channels that have only rarely been boated and have never been used for outfitted raft trips. In order for outfitters to anticipate and adapt to these new challenges and opportunities, they need a chance to "test drive" these runs at typical post-dam summertime flows. These test flows must occur early enough to give outfitters sufficient lead time to purchase new equipment and prepare guides to safely operate on these runs after dam removal.[4]

Flow studies done previously on the Upper Klamath are incomplete with respect to the impacts of the proposed action and outfitters need additional information. The Recreation Flow Analysis (RFA), completed as a collaborative effort between PacifiCorp and American Whitewater, is contained within Chapter 2 of the Recreation Resources Final Technical Report (FTR) published by PacifiCorp in February 2004, and submitted to the Federal Energy Regulatory Commission (FERC) as part of the

[4] Outfitters currently have rafts and equipment designed for use on the Hell's Corner run. A lower range of flows and different channel characteristics may require different boats—e.g. smaller rafts or inflatable kayaks.

relicensing proceeding for the Klamath Hydroelectric Project (FERC P-2082).[5] These were valid studies that are part of the administrative record. However, these studies were not intended to simulate midsummer flows on a post-dam river; they were conducted under the assumption that the project would be relicensed and PacifiCorp would have the ability to provide scheduled optimal flows as a condition of project operations. Further brief flow testing is needed given the new proposed action to remove the facilities and their ability to provide scheduled flow releases.

American Whitewater formally requests brief test flows in 2019 to simulate typical summer flows on three sections of river:

- Big Bend, aka Boyle Bypass
- Hells Corner Gorge
- Ward's Canyon, Copco 2 Bypass

A study request is included as Appendix 2 following the format of study plan requests and criteria used in federal hydropower licensing proceedings.[6]

Flow Enhancement

We recognize that KRRC does not control post-dam flows on the Upper Klamath. On the other hand, KRRC's efforts to enhance whitewater recreation cannot reach their full potential if the river does not have enough water to support boating. Summer flows are critical, since this is when river runners most want to boat, yet it is also when the Upper Klamath is at its lowest levels. We urge KRRC to revise the Definite Plan to directly reference the recreational benefits of increased instream flows.

SPECIFIC COMMENTS ON THE DEFINITE PLAN

7.6 Recreation Facilities Removal & Draft Plan

7.6.1 J.C. Boyle Reservoir

Pioneer Park and Topsy Campground

KRRC states its intent to remove all features and facilities at Pioneer Park on J.C. Boyle Reservoir. For reasons explained on the Site Tour and described in detail in Appendix 1 (page 7, "Highway 66 Bridge Access"), we believe that either the east or west portion of Pioneer Park, adjacent to the Oregon Highway 66 bridge, will likely provide better—and less costly—river access than the location that KRRC proposes to develop one mile downstream within Topsy Campground.

However, although we anticipate that Pioneer Park will prove to be a better location for a river access than Topsy Campground, we recommend that KRRC

[5] <http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Klamath_River/REC_Report.pdf>
[6] 18 CFR § 5.9(b)

defer a final decision until after reservoir drawdown, when it will be possible to inspect the riverbank at each location and make a final choice.

Spring Island River Access.
We agree with KRRC's statement that "This site will be retained for public use." Spring Island serves a vital function as the launch point for the Hells Corner run downstream, and after dam removal it will additionally serve as take-out for the Big Bend run immediately upstream. Importantly, in Appendix Q, page 11, Table 1-2, KRRC states the proposed action for Spring Island is "Unknown." This entry should be revised to correspond to KRRC's statement here, in section 7.6.1, which indicates that Spring Island will be retained.

7.6.2 Iron Gate Reservoir

Fall Creek
KRRC notes that this recreation site could be removed or retained. We strongly urge that this site be retained. In addition to providing a hiking and fishing access, Fall Creek can serve as an important whitewater access. At minimal cost, the existing gravel boat launch can be extended a short distance to the right (west) bank of the Klamath. This access would provide a take-out for boaters running the advanced (Class IV to IV+) Wards Canyon reach and a put-in for boaters running the reach presently inundated by Iron Gate Reservoir, which is likely to offer intermediate whitewater (Class II+ to III+). An alternative would be a new access at the site of the Copco Powerhouse but this would likely be more costly and require maintaining and likely upgrading the bridge.

Iron Gate Hatchery Public Use Area
We agree with KRRC that this important boat launch on the right (north) bank of the Klamath should be retained. At present, this access serves as a put-in for boaters launching to run downstream toward I-5 and Hornbrook. In the future, it will additionally serve as a take-out for boaters running the reach presently inundated by Iron Gate Reservoir. We urge KRRC to improve this boat launch to accommodate increased use once Iron Gate Dam is removed.

Appendix Q—Draft Recreation Plan

We agree with KRRC's stated goal of restoring recreation opportunities consistent with pre-hydropower development conditions. This includes returning formerly bypassed sections of river channel to their natural, pre-project condition. We also agree with KRRC's stated commitment to offset whitewater recreation opportunities that will be eliminated as part of the dam removal project. As noted previously, the loss of raftable summertime flows in the Hells Corner reach will significantly reduce whitewater recreation opportunities. Substantial effort must be made to offset this loss.

1.1 Existing Recreation Sites

Table 1-1: Existing PacifiCorp Recreation Facilities

Pioneer Park: KRRC identifies Pioneer Park (East and West) as a facility to be removed. As noted previously, we believe that either the east or west portion of this facility is likely to provide a better and less costly access than KRRC's proposed river access at Topsy Campground.

Stateline Take-out; Fishing Access Sites 1-6: Table 1-1 states that the future of these sites is "unknown." We urge KRRC to change this wording to "retain."

- Stateline Access and Access 6 are vital accesses at a location where whitewater difficulty changes dramatically, from the Class IV+ Hells Corner Gorge to the Class II Stateline run.
- Access 1 serves as an important take-out for the Stateline reach, and in the future will serve as put-in for the Copco Valley Reach—the stretch presently inundated by Copco Reservoir.

Fall Creek Day Use Area: We agree with KRRC that this access should be retained. The existing boat launch should be extended a short distance to the right (west) bank of the Klamath.

Iron Gate Fish Hatchery Day Use Area: We agree that this access should be retained and improved.

Table 1-2: Other Existing Recreation Facilities

Spring Island Boater Access: Table 1-2 lists the disposition of this site as "unknown." This contradicts KRRC's statement in Section 7.6.1 that "This site will be retained for public use." Table 1-2 should be corrected to note that Spring Island Boater Access will be retained.

2.2 Recreation Opportunities Identified in the Definite Plan

Topsy Campground

KRRC proposes to provide a river access at this point. As noted previously, we believe that either the east or west portion of Pioneer Park, adjacent to the Oregon Highway 66 bridge, is likely to provide better and less costly river access than the proposed new access within Topsy Campground.

Fall Creek Day Use Area

As noted previously, we agree with KRRC's proposal that ". . . the site be retained and modified to support day use activities and hiking at Fall Creek." We also request that the existing graveled reservoir boat launch be extended a short distance to the right (west) bank of the Klamath.

Iron Gate Hatchery Day Use Area

We agree with KRRC's proposal that "…this site be retained and modified to provide additional facilities and a reconstructed boat ramp to support continued and improved recreation access in the area." This river access will see increased use in the future when river runners will use it as a take-out after running the Iron Gate reach, which is presently inundated by Iron Gate Reservoir.

2.3 Recreation Opportunities Identified through Stakeholder Outreach

2.3.1 Existing Facilities

Spring Island Boater Access
As we noted in the stakeholder outreach meeting and in the Site Tour, this vital river access should be retained. In the future it will serve as both a take-out for the challenging Class IV+ Big Bend run upstream, as well as a launch point for the Upper Hells Corner and Hells Corner Gorge runs downstream. As with other strategically placed river accesses, this access occurs where the river's gradient and whitewater difficulty change significantly.

Frain Ranch Campground
As noted in the stakeholder outreach meeting and in the Site Tour, we request an "Above Caldera Rapid" boat launch on the left (east) bank near Frain Ranch, above Caldera Rapid. This area marks a major change in gradient and whitewater difficulty, from the Class II (intermediate) whitewater of the Upper Hells Corner reach to the Class IV+ (advanced) rapids of Hells Corner Gorge just downstream.

As noted in Appendix 1 (page 9, "Above Caldera Access"), access is needed here not only because the river's difficulty changes, but also because, following dam removal and the loss of peaking releases, the Hells Corner Gorge just downstream will not be raftable in summer. In other words, rafters will need to be able to take-out at this point in summer.

As noted in the Appendix, access could be provided on either bank at this point. However, we prefer an access on the left (east) bank at Frain Ranch ***provided that Topsy Grade Road is properly maintained***.

Stateline Boater Takeout, PacifiCorp Fishing Access Sites 1 through 6
The Definite Plan should state that these are important whitewater access points that should be maintained. In Appendix Q, page 23, paragraph 2, the Definite Plan incorrectly states that "PacifiCorp will retain ownership of these sites following license surrender… and public access will no longer be available." In fact, PacifiCorp has stated no definite position. In 1972 correspondence between PacifiCorp and California Department of Fish and Game, PacifiCorp signals their intent to provide access through an off-license agreement. KRRC should encourage PacifiCorp to maintain these sites as public accesses.

2.3.2 New Facilities and Plans

Table 2-2: New River Access Locations

The introduction to this section correctly notes that our request for river accesses are based on known or expected changes in whitewater difficulty. However, Table 2-2 contains several errors. Several entries in this table are described as "Proposed Recreation Developments," when in fact almost all of the recommended river accesses already exist. Most would require only minor extensions, modifications, or improvements for them to continue providing access after dam removal.

Existing accesses incorrectly characterized as "Proposed" include Keno Dam, Highway 66 Bridge, Spring Island, Stateline, PacifiCorp Fishing Accesses 6 and 1, Fall Creek, and Iron Gate Hatchery. These accesses should be treated in a separate table and clearly labeled as existing accesses.

We have already commented on several of the accesses listed in Table 2-2. Below, we address or expand on only selected accesses in that table.

Keno Dam. This site is described as a proposed access. However, informal access is currently available in PacifiCorp's Keno Park. We propose improvements to the Keno Access, as well as a guarantee of year-round access for boat launching (at present, the access is subject to seasonal closure whenever Keno Park is closed). For details, see Appendix 1, page 7, "Keno Dam Access."

Highway 66 Bridge Crossing. Although described as a proposed access, this site is presently used as a river access, serving as take-out for the Keno run immediately upstream. We are not proposing the development of a new river access at this site. We propose only that the existing reservoir access be extended a short distance to the riverbank. This would provide a take-out for the Keno run and a put-in for the Big Bend run. For details, see Appendix 1, page 7, "Highway 66 Bridge Access."

Below J.C. Boyle Dam. This site is described as a proposed access on river left. The site is actually on river right, just below Boyle Dam. See Appendix 1, pp 7-8. We refer to this as the "Moonshine Falls Access"—a reference to an historical rapid at this location which may have been dynamited. As described in the Appendix and explained on the Site Tour, this access is essential for two reasons: 1) it would allow raft outfitters to operate on the Big Bend run during dam removal, and 2) it would allow boaters to launch closer to the point where springs enter and add flow in the Big Bend reach. As a long-term access, this site is probably preferable to a Topsy Campground access, since it is not subject to seasonal closure and is farther downstream and thus closer to the point of spring inflow.

This access is needed *in addition* to an access at the Highway 66 bridge, since the Highway 66 bridge access is too far upstream from the spring inflow.[7]

Above Caldera. As noted in our earlier comments regarding Frain Ranch Campground, it is essential to have a river access at this point because the river changes in difficulty and because the Hells Corner Gorge downstream will not be raftable at typical post-dam summer flows. We prefer an access on the left (east) bank at Frain Ranch ***provided that Topsy Grade Road is properly maintained.***

Above Copco 1 Dam. We refer to this proposed access on the right (north) bank as the "Copco Valley Access." This vital access occurs where the Upper Klamath undergoes a radical shift in gradient and whitewater difficulty. Here the gentle gradient and projected Class II rapids of Copco Valley end, while just downstream lies the high gradient and Class IV-V rapids of Wards Canyon. For details, see Appendix 1, page 10, "Copco Valley Access."

Copco 2 Dam. As explained in the Site Tour and in Appendix 1, page 13, this proposed interim access would allow raft outfitters to continue operations during dam removal by running trips down Wards Canyon. Given this site's location near Copco 2 dam, we propose only limited, traffic-controlled access during dam removal.

Copco 2 Powerhouse. During stakeholder outreach, we identified this site as a possible new river access. However, we have subsequently determined that the existing Fall Creek site just downstream can serve the same function at much lower cost.

Fall Creek. Table 2-2 lists this site as a proposed river access, but in fact there is an existing graveled reservoir boat launch. All that is required to convert this to a river access is a minor, inexpensive extension of the gravel ramp to the right (west) bank of the Klamath following dam removal.

Jenny Creek / Camp Creek Access. During stakeholder outreach, we identified one or the other of these sites as a proposed new access. However, we cannot predict the need for, or feasibility of, accesses at these locations until the dams are removed and the reach presently inundated by Iron Gate Reservoir is revealed. We recommend that these sites be listed as potential future accesses.

Boyle Bypass Reach

The Definite Plan overlooks needed channel restoration in the Boyle Bypass Reach. This section of river was heavily impacted by construction of the Boyle diversion canal on the right (west) slope of the canyon. Blasting for the canal sent

[7] In addition to transitions in level of difficulty, understanding hydrology of a river is important in determining access points for river-based recreation. Inflow of a spring or major tributary can greatly affect the ability of a river reach to provide adequate flows for boating.

large amounts of sharp rock cascading into the channel, most notably at a constricted point a mile downstream from Boyle Dam known as Sidecast Slide.

Sidecast Slide may be impassable at typical summertime flows. If so, some of this unnatural rocky debris may need to be removed or modified in order to return the channel to its natural pre-hydropower level of navigability. During the 2002 Controlled Flow Study, the rapid was found to be impassable for rafts at low and moderate flows. However, the constriction was subsequently altered to improve fish passage, and it is unknown whether these efforts improved navigability.

To determine whether Sidecast Slide is navigable for rafts at summer flows, a test run is needed at simulated summer flows. If the rapid is still unnavigable at these flows, then modification or debris removal may be necessary to return the channel to its natural pre-hydropower condition.

Copco 2 Bypass Reach

The Definite Plan correctly describes our serious concerns regarding the unnatural overgrowth of vegetation in the Copco 2 Bypass channel. This overgrowth poses a severe hazard to whitewater boaters. Removal of hazardous vegetation within the active river channel is essential prior to reservoir drawdown, since this work will be impossible once flows are restored to the channel. For details, see Appendix 1, page 13, “Copco Bypass Reach.”

Access During Deconstruction

Outfitters need uninterrupted access to existing roads dam during deconstruction so that they can continue operating during the transition to a post-dam river. In particular, we request uninterrupted road access to:

- Launch site below Boyle Dam (aka “Moonshine Falls Access”)
- Spring Island launch site
- Copco 2 Dam
- Fall Creek

2.4 Summary of Identified Recreation Opportunities

Table 2-3: Identified Recreation Opportunities

KRRC should amend the entries for several sites listed in this table to incorporate comments and corrections noted previously:

- “Fall Creek Day Use Area.” Note our request to extend the existing boat launch to the riverbank.
- “New River Access Locations.” In many cases, the numbers in the left column correspond to *existing* river accesses rather than *new* accesses. This gives the incorrect impression that most sites are proposed new accesses, when in fact many already exist and require little or no alteration.

Mischaracterized sites include: Spring Island (#2); Stateline (#7); PacifiCorp Accesses 1-6 (#8-13); Fall Creek Day Use Area (#14); Iron Gate Hatchery (#16); Keno Dam (#17); and Highway 66 Bridge (#18). Also, we are no longer requesting an access at Copco 2 Powerhouse (#22), so this should be removed from the left column.

- "Copco 2 Bypass Reach." This entry correctly identifies our request for limited removal of vegetation in the active river channel. However, this entry should note that the proposed action is not simply a benefit to recreation—it is also required under KRRC's broader obligation to return the river to its natural pre-hydropower condition.

4 Recreation Plan Finalization

4.1.1 River Access Sites—Whitewater Put-in/Take-out

In order to offset the loss of whitewater rafting opportunities based on peaking flows, KRRC states its intention to develop "new or improved existing river access sites to allow for new whitewater boat access at or near the upstream and downstream ends of J.C. Boyle Reservoir, Copco Lake, and Iron Gate Reservoir."

We strongly support this commitment to developing or maintaining river accesses. Further, we note that the general locations identified by KRRC—near the upstream and downstream ends of the three reservoirs—correspond closely to accesses that American Whitewater and the outfitters have proposed. See Table 2, below.

Table 2: River Accesses, Location Relative to Reservoirs

Reservoir Location	Corresponding Proposed Access
J.C. Boyle Reservoir, upstream end	Highway 66 Bridge access (existing)
J.C. Boyle Reservoir, downstream end	Moonshine Falls access, aka "Below Boyle Dam" (proposed)
Copco Reservoir, upstream end	Fishing Access 1 (existing)
Copco Reservoir, downstream end	Copco Valley Access, aka "Above Copco Dam" (proposed)
Iron Gate Reservoir, upstream end	Fall Creek Day Use Area Access (existing)
Iron Gate Reservoir, downstream end	Iron Gate Hatchery Access (existing) or Jenny Creek / Camp Creek Access (proposed)

Appendix P—Estimate of Project Costs

3.5.6 Recreation Plan

Table 3-1: Assumptions for New or Improved Recreation Facilities

We are concerned that the “River Access” portion of this table commits KRRC only to the development of “Up to two river boating access points at TBD locations.” It is unclear how KRRC arrived at this limit of two river access points, and whether this limitation applies only to entirely new access points (e.g. our proposed “Copco Valley Access”) or whether it includes existing accesses that require little or no improvement (e.g. Fall Creek Day Use Area). KRRC should not place an arbitrary limit on the number of river accesses, especially since only three of the 12 permanent accesses recommended by American Whitewater are actually “new” access points. (See Table 1, above.)

Conclusion

Thank you for the opportunity to provide comment on the KRRC’s *Definite Plan for the Lower Klamath Project*. We appreciate the opportunity to engage directly with staff from KRRC and your contractors. We look forward to continued engagement and opportunities to work with you in developing a successful approach to dam removal and river restoration that addresses outdoor recreation impacts and opportunities.

Sincerely,

Bill Cross, Regional Coordinator
American Whitewater

Thomas O’Keefe, PhD, Pacific Northwest Stewardship Director
American Whitewater

Pete Wallstrom
Upper Klamath Outfitters Association

WHITEWATER RECREATION
ON THE
UPPER KLAMATH RIVER

PLANNING AND PRIORITIES
FOR
DAM REMOVAL

AMERICAN WHITEWATER

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Pete Wallstrom, Member

WHITEWATER RECREATION ON THE UPPER KLAMATH RIVER

PLANNING AND PRIORITIES FOR DAM REMOVAL

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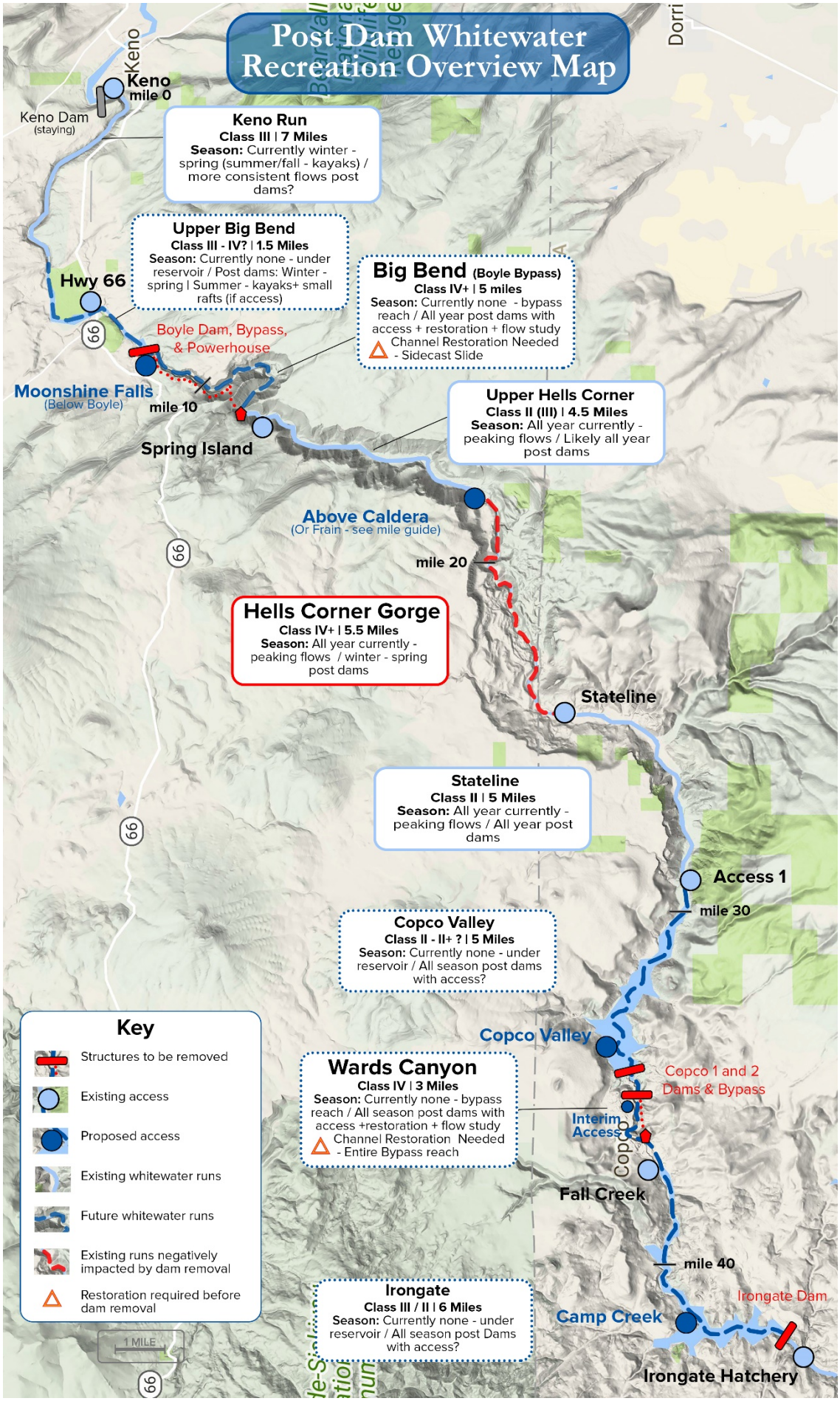
Post Dam Whitewater Recreation Overview Map
Keno
Keno mile 0
Keno Dam (staying)
Keno Run
Class III | 7 Miles
Season: Currently winter - spring (summer/fall - kayaks) / more consistent flows post dams?
Upper Big Bend
Class III - IV? | 1.5 Miles
Season: Currently none - under reservoir / Post dams: Winter - spring | Summer - kayaks+ small rafts (if access)
Hwy 66
Big Bend (Boyle Bypass)
Class IV+ | 5 miles
Season: Currently none - bypass reach / All year post dams with access + restoration + flow study
Channel Restoration Needed - Sidecast Slide
Boyle Dam, Bypass, & Powerhouse
Moonshine Falls
(Below Boyle)
mile 10
Spring Island
Upper Hells Corner
Class II (III) | 4.5 Miles
Season: All year currently - peaking flows / Likely all year post dams
Above Caldera
(Or Frain - see mile guide)
mile 20
Hells Corner Gorge
Class IV+ | 5.5 Miles
Season: All year currently - peaking flows / winter - spring post dams
Stateline
Stateline
Class II | 5 Miles
Season: All year currently - peaking flows / All year post dams
Access 1
mile 30
Copco Valley
Class II - II+ ? | 5 Miles
Season: Currently none - under reservoir / All season post dams with access?
Key
Structures to be removed
Existing access
Proposed access
Existing whitewater runs
Future whitewater runs
Existing runs negatively impacted by dam removal
Restoration required before dam removal
1 MILE
Copco Valley
Wards Canyon
Class IV | 3 Miles
Season: Currently none - bypass reach / All season post dams with access +restoration + flow study
Channel Restoration Needed - Entire Bypass reach
Copco 1 and 2 Dams & Bypass
Interim Access
Copco
Fall Creek
mile 40
Irongate
Class III / II | 6 Miles
Season: Currently none - under reservoir / All season post Dams with access?
Irongate Dam
Camp Creek
Irongate Hatchery
66

RAPID RENEWAL ON THE UPPER KLAMATH

Dam removal will bring major changes to whitewater recreation on the Upper Klamath. To ensure that those changes are positive will require careful planning now—before the dams come out. This pamphlet outlines the challenges, issues, and opportunities for post-dam whitewater recreation. Our goals are to minimize or mitigate losses to existing whitewater opportunities, to support the outdoor recreation economy and local businesses, and to provide opportunities for future river runners and the general public to enjoy the Upper Klamath and to develop personal connections to a restored river.

A STUBBORN, STEEP, STAIRSTEP RIVER

The Upper Klamath is a very determined river. Most rivers flow outward from mountain ranges, or skirt around them. Not the Upper Klamath. The "UK" cuts straight through the lofty Cascade Range. It's one of only three rivers—along with the Pit and the mighty Columbia—to pull off that trick.

The Upper Klamath's mountain-cleaving course is *steep*. In 44 miles from Keno to Irongate, the river drops 1,900 feet, for an average gradient of 43 feet per mile. For comparison, the Colorado River drops less than eight feet per mile in its passage through the Grand Canyon. Moreover, the Upper Klamath, like many rivers that cut through volcanic terrain, is not uniformly steep. It's uneven. As if knifes through the Cascades, the river swings radically between mild stretches with gradients as low as 15 feet per mile and precipitous sections with gradients near 100 feet per mile. Running a river like the Upper Klamath is like being in a plane descending through heavy turbulence: One moment you're flying straight and level, the next you plunge into a stomach-lurching air pocket. Or put another way, some whitewater rivers offer you a fast whoosh down a playground slide; the Upper Klamath gives you a butt-bumping ride down an uncarpeted staircase.

This steep, uneven descent explains the river's draw for both hydropower developers and whitewater boaters.

Hydropower Development

Over a hundred years ago, the Upper Klamath's steepest sections caught the eye of hydroelectric developers. Engineers with the California Oregon Power Company (COPCO), including John C. Boyle (for whom one of the dams is named), recognized that they could harness the river's fall to generate electricity. They targeted two stretches that combine two key characteristics: high gradient, and a sweeping curve in the canyon. In these reaches, engineers diverted the river into a bypass canal or pipeline, then into a tunnel bored *through* the ridge that the river curves around. That diversion through the ridge is shorter than the river's winding course, which translates into a big savings in construction costs.

After passing through the ridge, the diverted water drops through turbines and returns to the river. Importantly, dam operators release the water unevenly, in pulses of just a few hours per day. These "peaking flows" allow them to generate electricity during midday "peak demand" hours.

Whitewater Boating, Past and Present

For river runners, steep rivers mean rapids, and the Upper Klamath does not disappoint. In the 1970's and 80's, rafters and kayakers discovered that the middle portion of the UK, which had not been tapped for hydro development, held a classic Class IV whitewater run—the so-called "Hells Corner" reach. This steep cut through the heart of the Cascades had not been dammed because it lacked an easy damsite and a convenient river bend. The action-packed Hells Corner reach quickly became one of the region's most popular whitewater runs.

The key to Hells Corner's popularity is that it offers exciting, advanced Class IV and IV+ "big water" boating for the entire summer rafting season. Most rivers in the region get too low for boating by early to mid-summer. But because of peaking releases from the JC Boyle Powerhouse, rafters can run Hells Corner at strong, consistent flows all summer long. Without peaking releases, the river would fall too low for rafting by early June in most years. These unique, summer-long flows were recognized as one of the Upper Klamath's "Outstandingly Remarkable Values"—a value of regional and national significance—when it was designated as a National Wild and Scenic River in 1994.

Whitewater boating on Hells Corner is an established and highly valued part of the local tourism and recreation economy. The Hells Corner run draws from 3,000 to 5,000 outfitted rafting customers to the area each summer, along with a smaller number of groups representing the general public and local paddling clubs. Outfitters pump millions of dollars into the local economy through direct revenues, overhead, and secondary spending by rafting customers.

Beyond this economic boon, rafting on Hells Corner offers less tangible benefits. In particular, outfitters introduce customers to the outdoors and help them to appreciate and value wild rivers. A raft trip on the Upper Klamath is an opportunity to get people outside and help them connect with the natural world. Moreover, people who experience wild rivers are more likely to want to protect them. In this way, whitewater recreation on the Upper Klamath contributes to environmental stewardship and support for river conservation and restoration, including dam removal.

THE FUTURE OF WHITEWATER RECREATION

Dam removal will forever change whitewater boating on the Upper Klamath. On the downside, without increased flows, the loss of peaking releases from Boyle Powerhouse will bring an end to summer-long boating on the Hells Corner run. The river will simply be too low in summer. On the plus side, new whitewater runs will emerge from beneath the reservoirs, and flows will return to two stretches of river that have been bypassed for decades by diversions.

However, these new stretches of river will be of little value for river runners without careful planning for ***new river accesses***, ***channel restoration***, and ***flow enhancement***. With proper planning, the Upper Klamath can support even more whitewater recreation than it does today. But without that preparation, whitewater boating will languish, local economies will suffer, and the public will lose a remarkable recreation resource.

After dam removal, the entire Upper Klamath below Keno Dam will likely be designated as a National Wild and Scenic River. When combined with the Lower Klamath, which was designated in 1981, the entire 234 miles of the Klamath—from Keno Dam to the Pacific—will become the longest Wild and Scenic River in the lower 48 states. That celebrity is sure to spark more interest in boating on this river. If we prepare now by focusing on strategic river accesses, channel restoration, and improved flows, then everyone will be able to enjoy this remarkable river to the fullest.

The Logic of River Access Placement

Obviously, river runners need places to put their boats in the river and to take them out again. But more than that, whitewater boaters need accesses that are strategically located.

- *Above all, river runners need access points wherever rivers change in difficulty.*

While it might seem that the shift from, say, Class III to Class IV is a minor change, it's actually quite significant. All runnable rapids—from easy riffles suitable for novices to raging cataracts that only experts should run—fall within just four classifications. True, the International Scale of River Difficulty grades rivers and rapids from Class I all the way up to Class VI. But since Class I means flatwater—no rapids at all—and Class VI means unrunnable (think Niagara Falls), that leaves only four grades to classify everything else. Everything from a lazy afternoon float through mild riffles to an adrenaline-pumped, high-stakes, check-your-life-insurance descent through hair-raising rapids at the very limits of navigability. Thus each step up or down represents a major shift in difficulty.

River runners come in all skill levels, and they prefer different amounts of challenge. As already noted, the Upper Klamath has tremendous variation in gradient, which translates directly into variations in difficulty. It's vital to have accesses in the right places so that boaters can choose runs that match their whitewater skills and preferences. If there aren't enough strategically placed accesses, then boaters will be deterred by runs that include stretches that are either too mild or too wild for them. In the worst case, boaters who lack the skills to run challenging whitewater may get in over their heads unless they have a way to stop and take out above a steep stretch. In the following pages we'll provide detailed recommendations for river accesses.

Predicting the Difficulty of Submerged Runs

A novel challenge in siting river accesses on the Upper Klamath is that much of the river is hidden beneath reservoirs. Moreover, since the dams were built long before whitewater boaters were running the UK, we

have no historical accounts of what the inundated rapids were like. That's where gradient comes in. Many factors affect whitewater difficulty, but gradient is the single most important variable.

- *Gradient is our best tool for predicting the difficulty of runs that are buried beneath reservoirs.*

We can discover the gradient of inundated reaches in two ways: by examining topographic maps that were drawn before the dams were built, and by looking at depth-soundings from bathymetric surveys of the reservoirs. Though we can't predict exactly where individual rapids will fall, or precisely what they'll look like, we can make good guesses as to the overall whitewater difficulty of submerged reaches. Armed with that information, we can strategically plan for appropriate river accesses on sections of river that will be "daylighted" when the reservoirs are drained.

Trips of Various Lengths

Accesses let boaters choose runs of the right difficulty *and* of an appropriate length. On some long wilderness rivers, it is appropriate to have just two access points—one near where the river enters the wilderness, and one where it emerges again. But on a non-wilderness river such as the Upper Klamath, it is typical to provide more frequent access points, which allow for a greater variety of trips than simply running the entire river from one end to the other.

Trips on a post-dam Upper Klamath could range from a few hours to several days. Typically, boaters travel from nine to 14 river miles in one day. With 44 continuous miles of river available on the UK, river runners could boat for the better part of a week if they wanted to. Theoretically, someone could launch at Keno Dam and run all the way to the Pacific—though the time commitment and challenging logistics would deter most river runners.

Of greater significance are river runners at the opposite end of the time spectrum: those who have only a day or a half-day available. River runners appreciate the flexibility that shorter outings provide. Many outfitted guests book half-day trips, while those planning their own trips often make short runs after work on summer evenings. A post-dam Upper Klamath needs enough accesses to facilitate shorter runs.

Channel Restoration

River runners need a natural river channel, free from human-caused hazards like sharp metal or jagged concrete. At each damsite, it will be crucial to ensure safe passage for boaters once the dams are removed.[1]

Importantly, the two "bypass reaches" of the Upper Klamath—where the river is diverted into canals—have been greatly altered by dams. In one bypass reach, debris from blasting during canal construction has littered the channel with sharp rock. In both bypass reaches, artificially reduced flows have allowed riparian vegetation to grow unchecked in the river channel. These hazards to navigation must be eliminated to allow safe whitewater recreation. We'll discuss the details in the "Mile-By-Mile" guide that follows.

Flow Studies

To properly plan and prepare for whitewater boating opportunities on a post-dam river, we need to simulate future flow conditions now. In particular, we need to "test-drive" the two bypass reaches, as well as the Hells Corner reach, at typical post-dam summertime flows. In 2002, PacifiCorp organized a "Controlled Flow Study" on these reaches in collaboration with American Whitewater. These were valid studies that are part of the administrative record, but they didn't specifically focus on the typical midsummer flows of a post-dam river. **We need additional flow studies— conducted in 2019, while there is still enough lead time in the planning process—to evaluate the rapids on these stretches.**

Flow Enhancement

Strategic accesses and restored channels aren't enough: If there's not enough water in the river, we can't boat. We recognize that KRRC does not control post-dam flows on the Upper Klamath. On the other hand, KRRC's efforts to enhance whitewater recreation cannot reach their full potential if the river doesn't have enough water. Summer is the critical period: That's when river runners most want to boat, and that's when the Upper Klamath is at its lowest. ***Every effort must be made to secure increased flows to the river below Keno Dam.***

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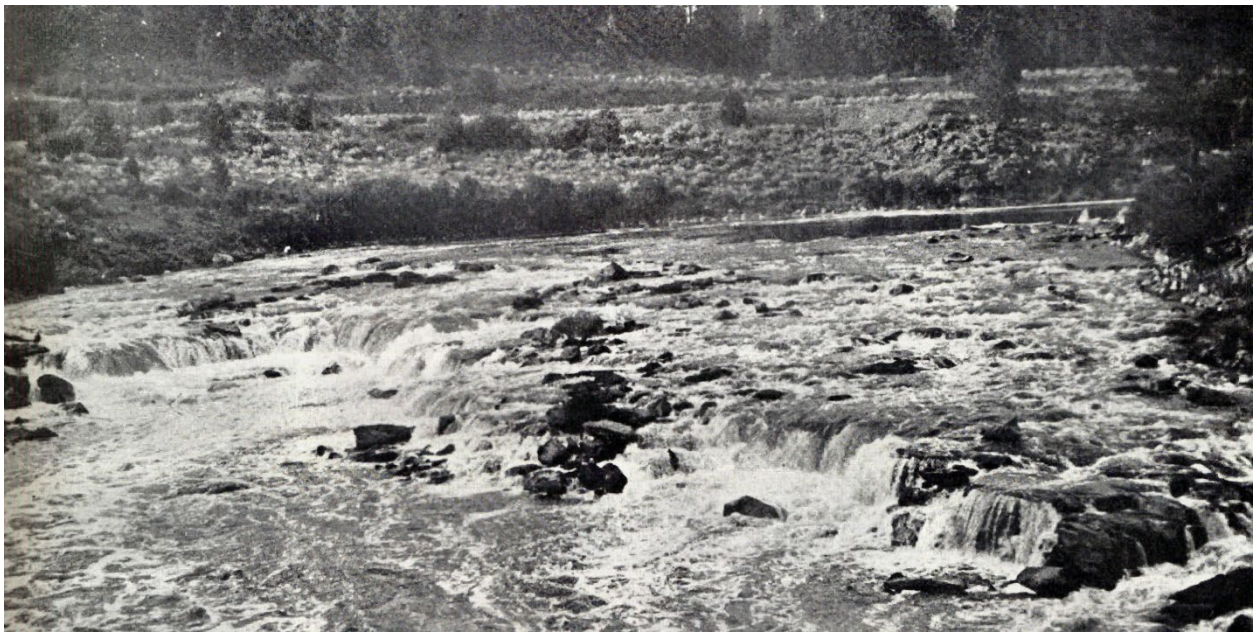
[1] This has been an ongoing issue at the Elwha Dam site. See Mapes, L.V., *After the dams: A river of junk runs through unleashed Elwha*, Seattle Times, June 2, 2016. <https://www.seattletimes.com/life/outdoors/after-the-dams-a-river-of-junk-runs-through-unleashed-elwha/>

Ensuring a Smooth Transition

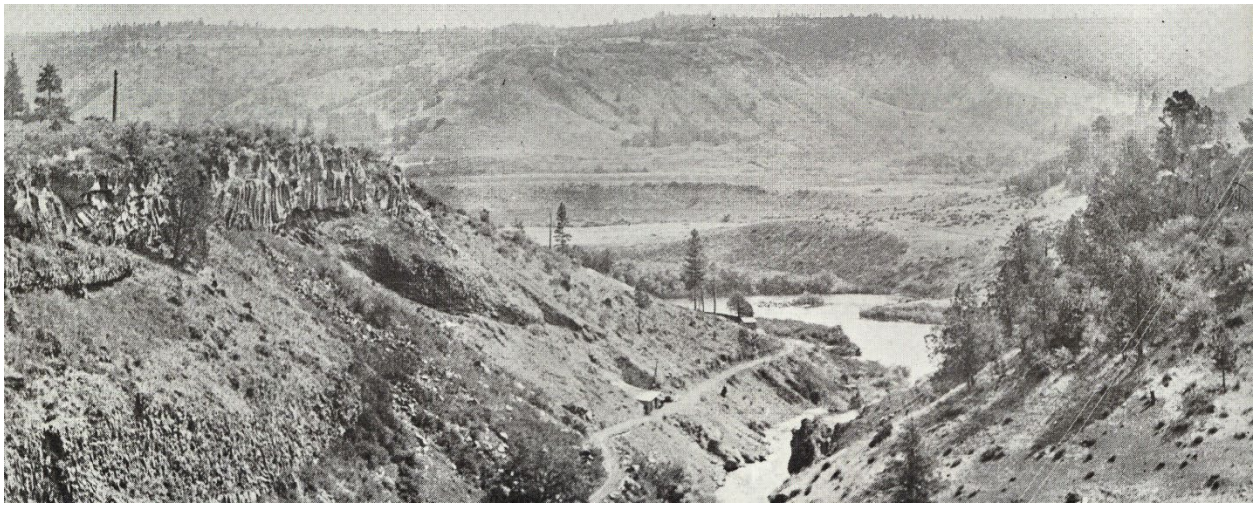
Beyond planning for whitewater recreation *after* the dams come out, we need to sustain recreation *during* removal. Outfitters face the greatest challenge. Paddlers who plan their own trips will survive if they have to wait an extra season for a new stretch of whitewater to emerge, but one lost summer can doom a small business. Outfitters need time to plan for, and adapt to, the new river. In particular, we need to ensure uninterrupted access to key runs during dam removal. We cannot allow outfitters to be shut off the river during the year—or years—that it takes to remove these dams. We understand that KRRC hopes to dismantle the dams in one year, but there could be unforeseen delays. KRRC has also stated that new accesses will be completed within a year after removal. But again, there could be delays. Outfitters need to keep operating with minimal interruption. In the following pages, we'll outline specific steps to ensure a smooth transition.

Our Goal

We look forward to working with KRRC, agencies, tribes, and NGO's as we plan for a successful transition to a post-dam Klamath. We believe there is a bright future for whitewater recreation on this remarkable river, and that the public should continue to have the opportunity to experience and appreciate this wild river and, as a result of that experience, to become advocates for environmental stewardship and river conservation.



Moonshine falls – Before Boyle Dam



Looking upstream from Wards Canyon into Copco Valley – Before Copco 1 and 2 dams

THE UPPER KLAMATH:

A MILE-BY-MILE GUIDE TO POST-DAM WHITEWATER RECREATION

The following section provides greater detail on issues, challenges, and opportunities that dam removal presents for river runners.

- Existing river accesses and whitewater runs have **LIGHT BLUE** headings.
- Proposed accesses and future whitewater runs are in **DARK BLUE**.
- Structures to be removed and river reaches that will have reduced whitewater opportunities are in **RED**.
- River reaches requiring channel restoration are in **ORANGE**.

Wards Canyon - Photo credit: 2002 Recreational Flow Study

0 *Keno Dam Access.* Existing accesses on both sides of the river need improvement.

- **Downriver Runs:** Boaters heading downriver launch on the left (east) bank at PacifiCorp's Keno Park, since it is easier and makes for a shorter shuttle. However, in its present state this access actually hinders downriver runs. Two key improvements are needed. First, all boaters—but especially rafters—must be able to drive closer to the river to unload gear. Rafts are too heavy to carry hundreds of feet from the Day Use parking area to the riverbank. Second, Keno Park is closed seasonally from autumn through spring—which is exactly when this stretch is most likely to have boatable flows.
- **Keno Wave:** When flows are over 1,100 cfs (as during spring runoff) kayakers come to surf the "Keno Wave," one of Oregon's best "park-and-play" surf waves. The wave is less than a half mile downstream from the dam, but reaching it is very difficult. If kayakers approach on the left (east) bank, they must paddle downriver from the dam to the wave, then after surfing they must lug their boats a half-mile back up the right bank, before paddling back across the river to their cars. And ironically, as noted above, this left bank access is closed in spring when the wave is most likely to be surfable. Alternatively, kayakers can approach on the right via a *terrible* mile-long unpaved road (the so-called "Wagon Road"). To improve access to the wave, either the right-side road must be improved, or a foot path should be developed to reach the wave via the left bank in Keno Park.

0-7 *Keno Run.* Class III (intermediate). Gradient: 40 ft/mi. From Keno Dam to the Highway 66 Bridge, the Klamath makes its first cut into the Cascades. This rugged canyon offers fun rapids, fine scenery, outstanding bird life, and excellent solitude. Highway 66 is far above the left bank. This run has boatable flows in spring, but gets less use in summer when flows drop. Many boaters are deterred by the two-mile flatwater paddle across the upper end of Boyle Reservoir at the end of the run. Removal of Boyle Dam will eliminate that drawback, so we expect use to increase following dam removal. Some boaters are also put off by poor water quality below Keno Dam, especially in summer and early autumn. Enhanced flows would help improve water quality.

7 *Highway 66 Bridge Access.* Existing access on the left (east) bank, serves as take-out for the Keno Run. In the future, this access will also serve as put-in for the much more challenging Big Bend Run. The final two miles of the Keno Run, presently buried by Boyle Reservoir, are likely to be gentle (pre-dam surveys show a gradient of only 10 ft/mi.). However, just below the Highway 66 bridge, the river abruptly steepens and accelerates. KRRC has proposed a river access a mile *below* this bridge, at Topsy Campground. We believe the Highway 66 bridge is likely to provide a better access, for four reasons:

- Difficulty increases beyond the bridge, as the canyon narrows and the gradient jumps to 45 ft/mi.
- The riverbank is likely to be gentler at the bridge—it was an historic ford—than at the campground.
- The campground is closed seasonally, so boaters could not launch there from autumn through spring.
- The campground access unnecessarily lengthens the shuttle for the Big Bend Run.

7-8.5 *Upper Big Bend Run.* Below the Highway 66 bridge, gradient increases significantly. In the half-dozen miles below the bridge, the Klamath drops 500 vertical feet through a scenic, forested canyon. The first 1.5 miles of this reach are buried beneath Boyle Reservoir, so we can only speculate about rapids in this stretch. Based on the 45 ft/mi gradient, we predict that the Upper Big Bend run will have Class III-IV whitewater, though there could be stronger rapids. One unknown is the location and condition of "Moonshine Falls," AKA "Fishing Falls," an historical rapid located at or near Boyle damsite. Historical photos show a significant vertical drop; however, the present difficulty and navigability of the rapid is unknown since we don't know whether it survived dam construction or was significantly altered.

8.5 *Boyle Damsite.* Boyle Dam, built in 1958, diverts up to 2,400 cfs out of the river for the next 4.5 miles.

8.6-9 *"Moonshine Falls" Access (Below Boyle Dam).* For three reasons, boaters need a launch point just below Boyle Dam.

- The flow regime changes here. Not far below Boyle Dam, roughly 225-250 cfs of groundwater enters the Klamath in a roughly mile-long stretch, mostly along the left (east) bank. This accretion boosts flows, notably in summer when the river drops to less than 750 cfs at Keno. After dam removal, the added groundwater will allow summer-long boating below Boyle damsite, even when the river above the damsite is too low. If the only access is farther upstream, at the Highway 66 Bridge or at Topsy Campground, then in summer boaters would have to drag their craft from those accesses all the way down to where the springs enter. This would deter most boaters and would completely preclude professionally outfitted trips.

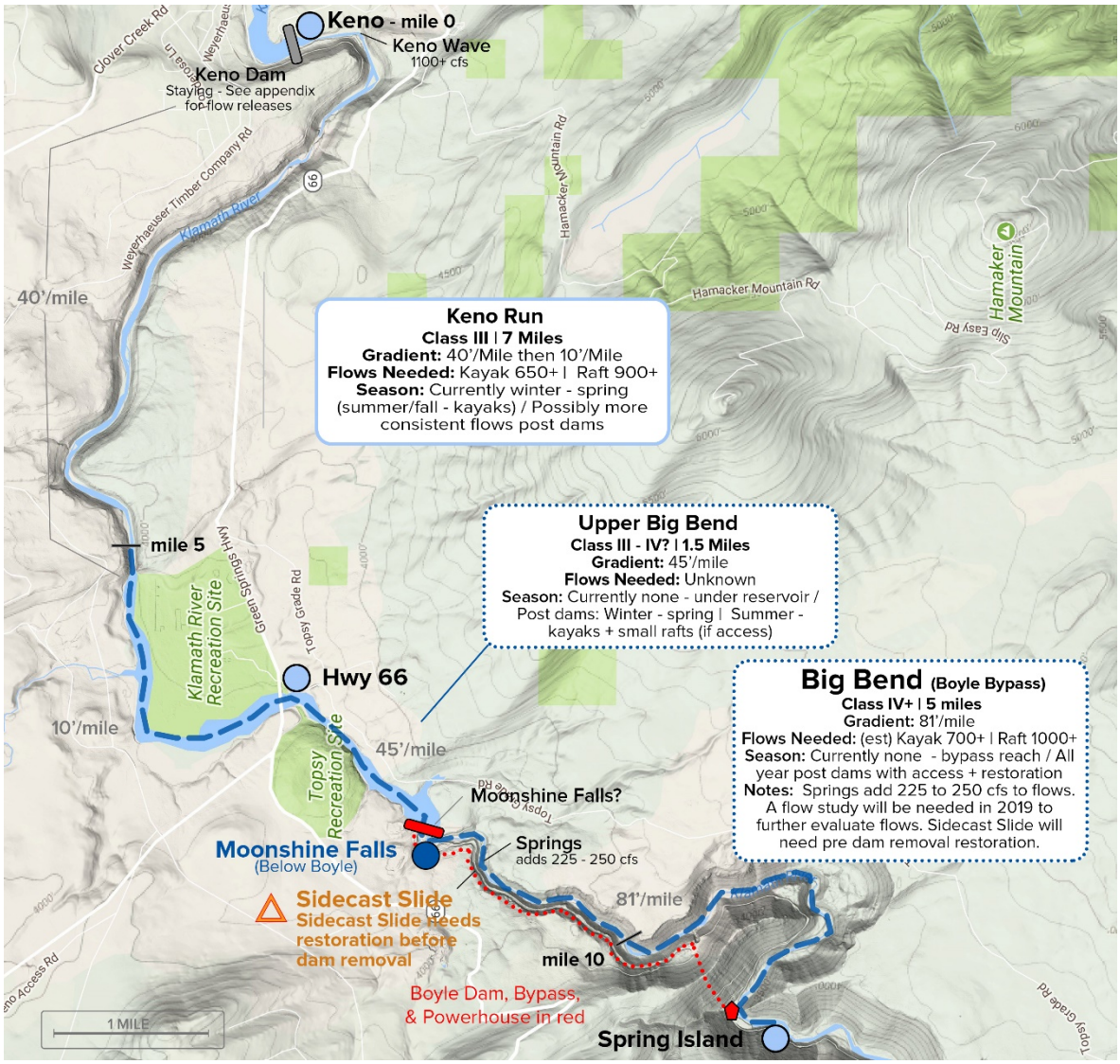
- A "Below Boyle Dam" access is essential during dam decommissioning. If the only accesses are farther upstream, at the Highway 66 bridge or Topsy Campground, then outfitters and other river runners will be unable to launch on the Boyle Bypass Reach until dam removal is complete.
- The disposition of "Moonshine Falls" is an important unknown. If dam removal reveals a rapid that is impassible for river runners, then it will be essential to have a launch point *below* that rapid.

8.5-13.5 ***Big Bend Run,*** AKA **Boyle Bypass**. Class IV+ (advanced). Class V at high water. Gradient: 81 ft/mi.

The main portion of the Big Bend Run lies below Boyle damsite, where the gradient increases as the river knifes through a narrow gorge. This reach includes a three-mile-long, thousand-foot-deep meander known as Big Bend. At present, this run has boatable flows only rarely during spring runoff, when inflows to Boyle Dam occasionally exceed its diversion capacity. After dam removal, this run will offer summer-long boating—at least for small rafts and kayaks—thanks to groundwater inflow. Under the present flow regime, it is unclear whether large rafts will be able to navigate this stretch in summer. To answer that question, a flow study is needed in 2019. (See below.)

9.8 ***Sidecast Slide.*** This is the toughest rapid on the Big Bend run—a long, shallow washboard that is made unnaturally difficult by sharp boulders that cascaded into the river during blasting for the Boyle diversion canal on the right slope. During the 2002 flow study organized by PacifiCorp and American Whitewater, rafts were unable to run this rapid at moderate flows. This rapid was subsequently modified to improve fish passage, but it is unknown whether those changes improved navigability. **A new controlled flow study is needed in 2019 to evaluate this rapid at typical summer flows.** If it is still impassable for rafts, then it will need further modification to return the channel to its natural, pre-project condition.

12.8 ***Boyle Powerhouse.*** Water diverted at Boyle Dam is returned to the river in a peaking release pattern.



13.5 *Spring Island Access.* This existing BLM access is the standard launch point for the Hells Corner Run. In the future, it will also serve as a take-out for the Big Bend Run. It should be retained as a river access.

13.5-18.3 *Upper Hells Corner Run.* Class II (III). Gradient: 25 ft/mi. These first five miles of the Hells Corner reach have moderate gradient and difficulty. This section can be run at lower flows than Hells Corner Gorge just downstream, and should offer summer-long boating even after dam removal ends peaking flows.

18.3 *Above Caldera Access.* Access is needed here once peaking flows end. When Hells Corner Gorge downstream has insufficient flows in summer, rafters will need to take out here after running Big Bend. In addition, drift boaters launching at Spring Island for the Upper Hells Corner run will need to take out here. An access can be developed on the right, connecting to an existing dirt road. Alternatively, boaters could take out on the left at Frain Ranch, provided that: 1) the bridge over the Klamath below Boyle damsite is retained, and 2) Topsy Grade Road on the east side of the river is adequately maintained.

18.5-24 *Hells Corner Gorge.* Class IV+. Gradient: 83 ft/mi.

The abrupt "horizon line" of Caldera Rapid marks the beginning of one of the West's most thrilling whitewater runs. For the next half-dozen miles to the California border, the UK thunders through dozens of big, challenging, drenching rapids that delight thousands of rafting customers every summer. Members of the general public also use this run, but the long shuttle and rough roads deter many.

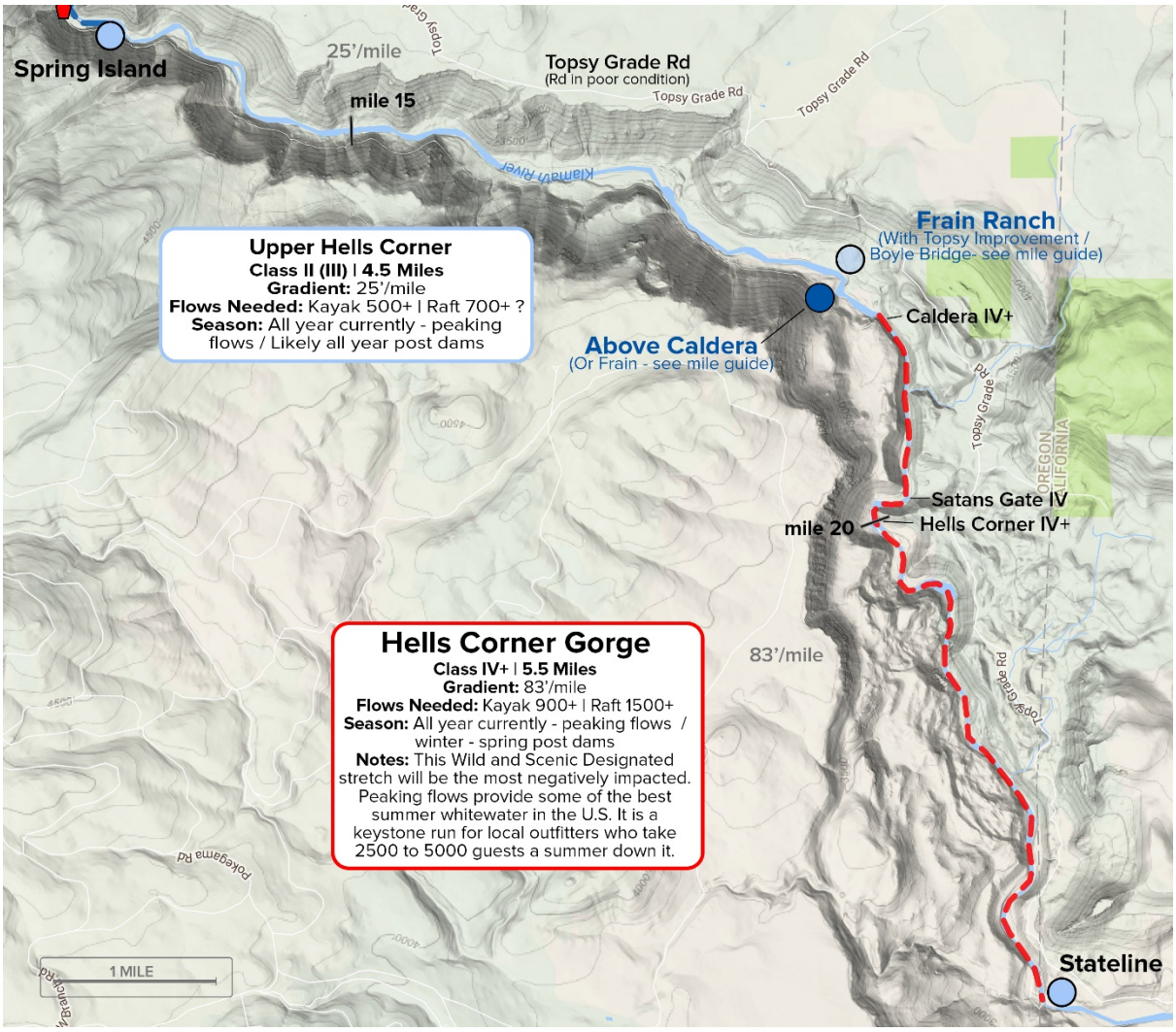
As mentioned earlier, the key to Hells Corner's popularity is peaking flows. Every night, PacifiCorp stores the Klamath's flow in Boyle Reservoir, releasing a paltry 100 cfs to the river. Then every morning, PacifiCorp releases that pent-up water through Boyle Powerhouse in an oversized pulse. Outfitters book clients all summer long knowing that every day, they can rely on a predictable surge of 1,600-1,900 cfs.

When dam removal brings these peaking flows to an end, it will mark the end of summer rafting in Hells Corner gorge. Due to the unusual geology and river morphology of this stretch, full-size rafts have difficulty negotiating it at flows below 1,500 cfs or above 3,400 cfs. Under the current flow regime, post-dam summertime flows in Hells Corner are likely to fall in the 900-1,000 cfs range. The significant impact that dam removal will have on this recreational opportunity requires analysis and appropriate mitigation measures to support other whitewater experiences within the project area. If flows can be enhanced in the future, then summertime rafting might once again be feasible on this stretch.

After dam removal, Hells Corner will still offer full-flow rafting during spring snowmelt. However, due to more demanding weather and flow conditions, springtime runs are not well suited for introducing less experienced boaters to advanced whitewater.

24 *Stateline Access.* This access on PacifiCorp Parcel A land serves as take-out for the Hells Corner Gorge or put-in for the mild Stateline Run just downstream.

Caldera Rapid at current summer flows - Photo credit: Momentum River Expeditions



Hells Corner Gorge - Photo credit: Momentum River Expeditions

24-29 *Stateline Run.* Class II (beginner). Gradient: 26 ft/mi. In the five miles from Stateline to Copco, the UK winds swiftly through a scenic, open valley dotted with ranches. Class II rapids keep things lively.

25 *Access 6.* Access on PacifiCorp Parcel A land. Alternative to Stateline Access. This access point is recognized in the 1972 agreement between California Department of Fish and Game and PacifiCorp.

29 *Access 1.* Today, this vital access on PacifiCorp Parcel A land serves as take-out for the Stateline Run. In the future, it will also serve as put-in for the Copco Valley Run just downstream. This access point is recognized in the 1972 agreement between California Department of Fish and Game and PacifiCorp.

29-34 *Copco Valley Run.* Probable Class II to II+ (predicted). Gradient: 18 ft/mi.

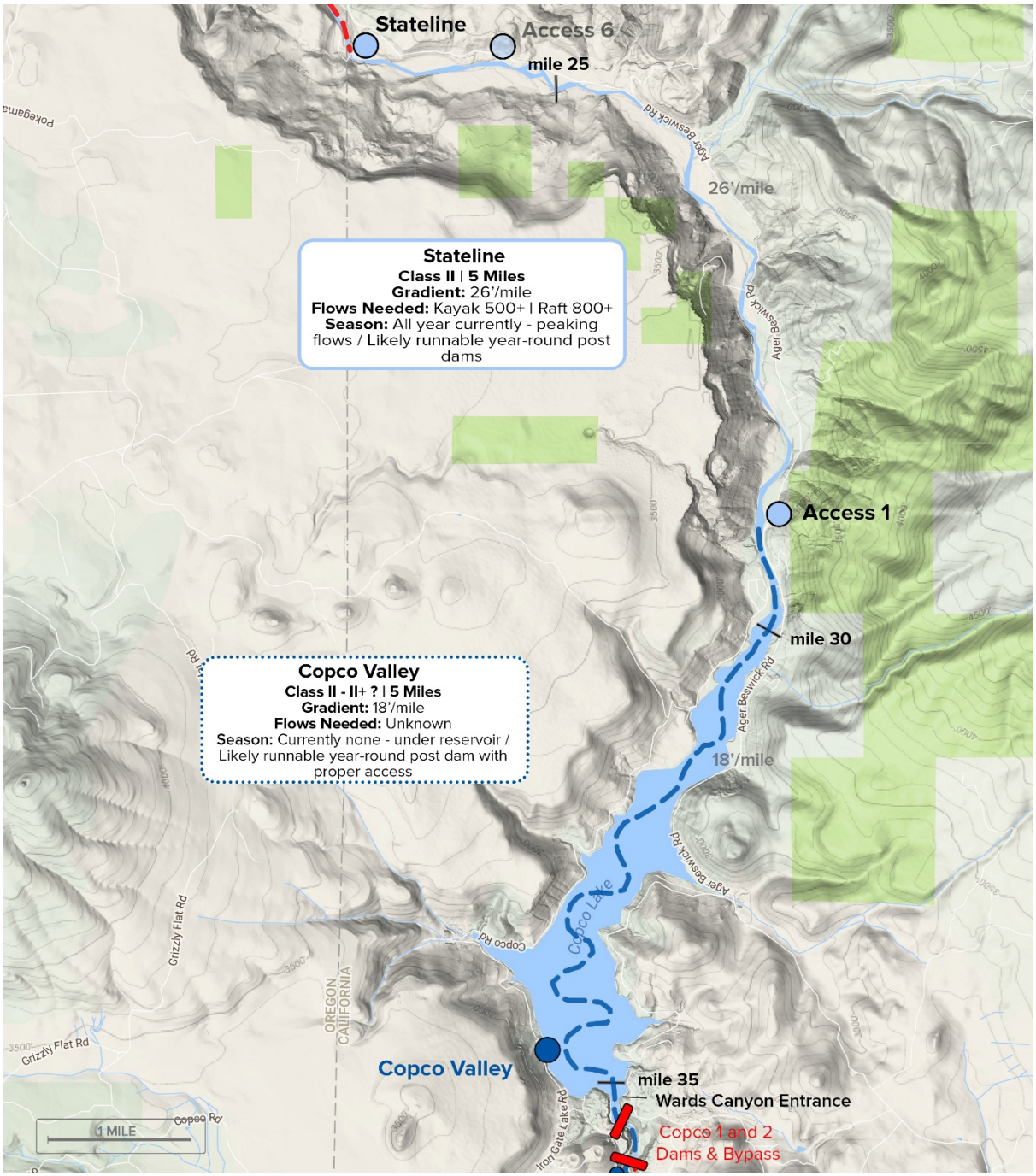
This five-mile reach through a gentle valley will likely offer easy rapids and riffles, well-suited for beginners and for drift boat fishing. Riverside lands under Copco Reservoir should be transferred to public ownership and should be protected in their natural condition.

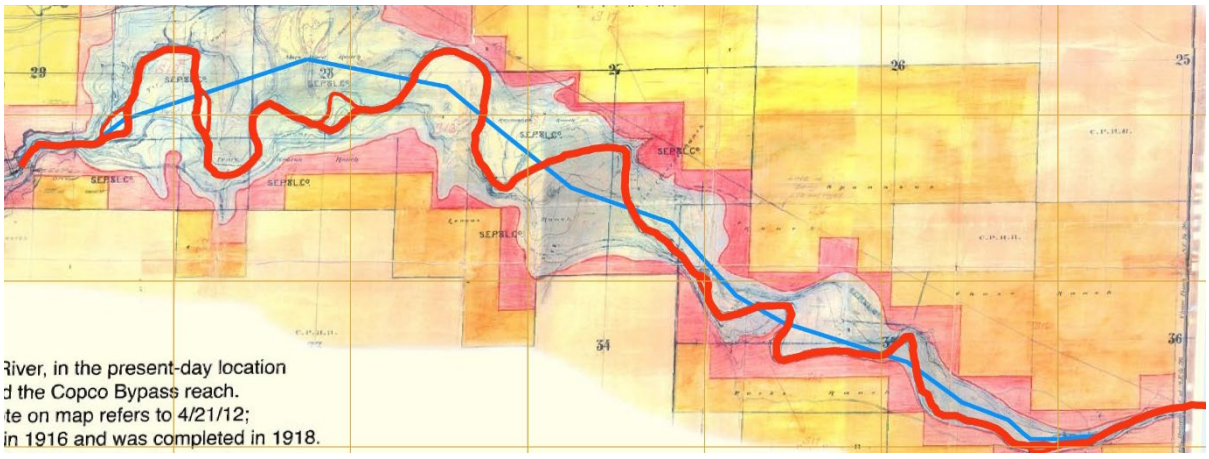
34 *Copco Valley Access.* This critical proposed access corresponds to a major change in gradient and difficulty. It will provide a take-out for beginners on the Copco Valley Run who do not want to tackle the challenging Class IV rapids of Wards Canyon just downstream. Conversely, this access will provide a put-in for experienced boaters wanting to run Wards Canyon. This access must be developed on the right (north) bank to allow short shuttles for boaters running the Copco Valley and Wards Canyon runs.

35 *Wards Canyon Entrance.* Not far below the proposed Copco Valley Access, the Klamath abruptly enters the gunsight notch of a narrow basalt canyon. On old maps this is Wards Canyon, named for a ranching family that homesteaded near the canyon entrance. When John C. Boyle came here in the early 1900's, he quickly identified Wards Canyon as the Upper Klamath's premier damsite.

35.5 *Copco 1 Dam.* Completed in 1922, this 132-foot-high dam—oldest in the Klamath project—is located about 500 yards below the Wards Canyon entrance.

Wards Canyon Entrance viewed looking downstream from Copco Valley before construction of Copco dam





Historic map of Copco Valley showing river course and reservoir

35-37.7 ***Wards Canyon.*** Class IV. Gradient: 85 ft/mi.

Wards Canyon is the most visually striking canyon on the Upper Klamath. Here, dark lava flowed directly across the Klamath's course, creating a natural dam. Over time, the river carved a 300-foot-deep gorge through the lava flow. The Klamath's passage through the canyon is tumultuous, as the river tumbles over dozens of bedrock rapids. At the canyon's deepest point, the river sweeps for nearly half a mile past sheer colonnades of columnar basalt. Peregrine falcon are a common sight along the canyon walls.

This section will likely be boatable all summer, possibly even for full-size rafts. Wards Canyon was run in the 2002 controlled flow study, but the test flows did not include the most typical flow that would be expected in July and August following dam removal. **For this reason, a further controlled flow study is needed in 2019.**

In the 2002 study, boaters found Class IV rapids through the entire exposed length of Wards Canyon. However, no boater has ever seen the first half-mile of the canyon, which was buried under Copco 1 and 2 dams long before anyone was running rapids for fun. Still, we can garner important clues from John Boyle's original 1911 engineering notes on the Copco 1 Damsite. Boyle described a 70-foot-wide channel, filled by the river from wall to wall, with a gradient of 100 ft/mi and a current velocity of almost 15 miles per hour. Based on Boyle's dramatic description, it is possible that the river near the Copco 1 damsite—that is, in the first half-mile of Wards Canyon—may hold rapids even greater than Class IV in difficulty.

Wards Canyon has outstanding potential for both outfitters and the general boating public. It offers a combination of exciting rapids, spectacular scenery, potentially summer-long boatable flows, a short shuttle, and a location just 20 miles from I-5 and only an hour from Rogue Valley population centers. Outfitters could offer half-day runs of Wards Canyon alone, or full-day trips in combination with the Irongate Run just downstream.

36 ***Copco 2 Dam and Copco 2 Access.*** Located 500 yards below Copco 1, Copco 2 dam is the smallest dam in the Klamath project at only 38 feet in height.

It will be critical to have a temporary access at Copco 2 Dam during decommissioning. This will allow outfitters—and possibly the general boating public as well—to begin running Wards Canyon immediately after the reservoirs are drained. Once peaking flows end, the Hells Corner Run upstream will no longer be a viable summer run. Outfitters will need immediate access to Wards Canyon in order to transition successfully to post-dam conditions. Later, after the Copco Valley Access has been completed, the Copco 2 Access can be converted to an angling access and/or a day use site.

36-37.5 ***Copco Bypass Reach.*** At Copco 2 Dam, almost the entire flow of the Upper Klamath is diverted into a pipeline and tunnel for 1.5 miles. Except during unusual high water, only 10 cfs—the flow of a small creek—is released from Copco 2 Dam into this bypassed river channel. This constant trickle of water, combined with the unnatural lack of occasional high flows that would naturally clear out vegetation, has allowed a thick growth of riparian vegetation—mostly willows and alders—to colonize the river channel.

This human-caused overgrowth poses a severe hazard to whitewater boaters. Brush or branches in the river are known as "strainers," because they allow water to pass through but hold back boats and boaters. Many drownings result from boaters becoming ensnared in strainers, and brush growing in the channel is particularly problematic. It is important to note that the vegetation growing in the active channel is distinct from mature forest found in riparian zones, whch provides important habitat value as large woody debris.

The unnatural overgrowth in the Copco 2 Bypass portion of Wards Canyon must be removed *before* flows are restored to this channel. This work must be performed in 2019 or 2020. ***Once flows are restored to the channel in 2021, it will be too late to remove brush and trees and to restore the channel to its natural, pre-project condition***. Similar mitigation measures have been implemented on other projects where flow has been restored to a reach that was dewatered for decades.[2]

37.5 ***Copco 2 Powerhouse*** on the left. We had previously proposed a new access at this site. However, we have concluded that boaters can instead use the existing access just downstream at Fall Creek.

37.8 ***Fall Creek Access.*** This existing access needs only minor improvement. After dam removal, the existing gravel boat launch on the reservoir's north (right) shore can easily be extended to the riverbank. This

[2] See for example License Article 407, Alocoa Power Generating, Inc., 110 FERC ¶ 61,056, at 61,093 (2005): "the plan shall also describe the methods for vegetation removal in the bypassed Cheoah River, including the linear distance that vegetation shall be removed as well as the distance from the center line of the bypassed reach."

access is located at a major shift in difficulty and gradient, where the river transitions abruptly from the advanced rapids of Wards Canyon to the intermediate rapids of the Irongate Run. This access will serve as both a take-out for Wards Canyon and a put-in for the Irongate Run.

37.8-44 ***Irongate Run.*** Predicted Class III for approximately four miles, then II. Stronger rapids possible. Gradient: 24 ft/mi average. 30 ft/mi first four miles, 15 ft/mi last two miles.

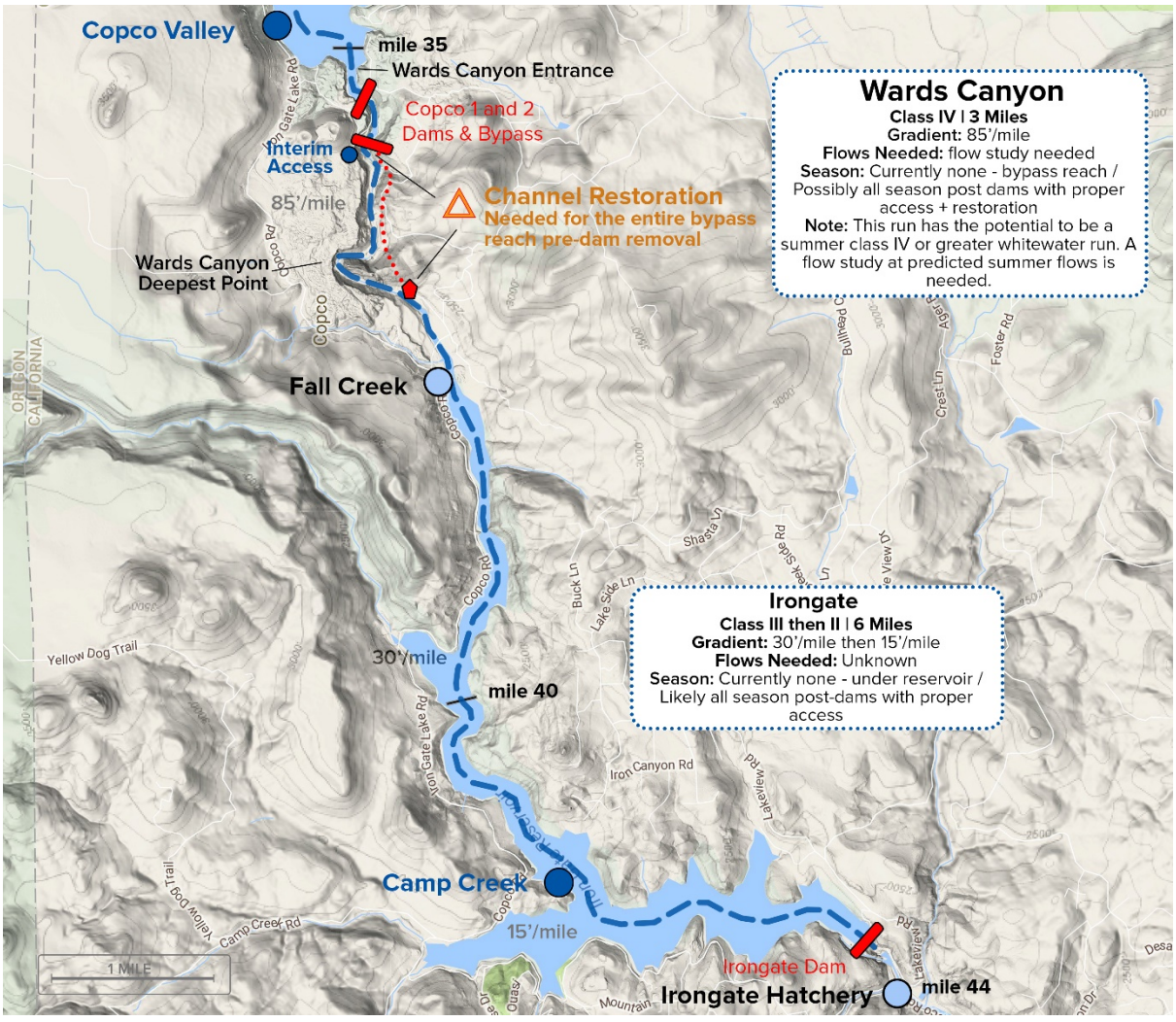
This reach has major recreation potential given its moderate gradient and proximity to I-5 and the Rogue Valley. The take-out is only nine miles from the Interstate. Here the river flows through a scenic, semi-arid canyon dotted with oak, juniper, and pine. The Irongate reach could be a stand-alone half-day run, or it could be combined with Wards Canyon upstream for a full-day run. Depending on the nature of the whitewater, it could also be popular for drift boat fishing. Lands under Irongate Reservoir should be transferred to public ownership and should be protected in their natural condition.

40 ***Jenny Creek confluence.*** Jenny Creek, an important tributary draining the Cascade-Siskiyou National Monument, enters on the right. An access could be developed here if it is not possible to create an access two miles downstream at Camp Creek.

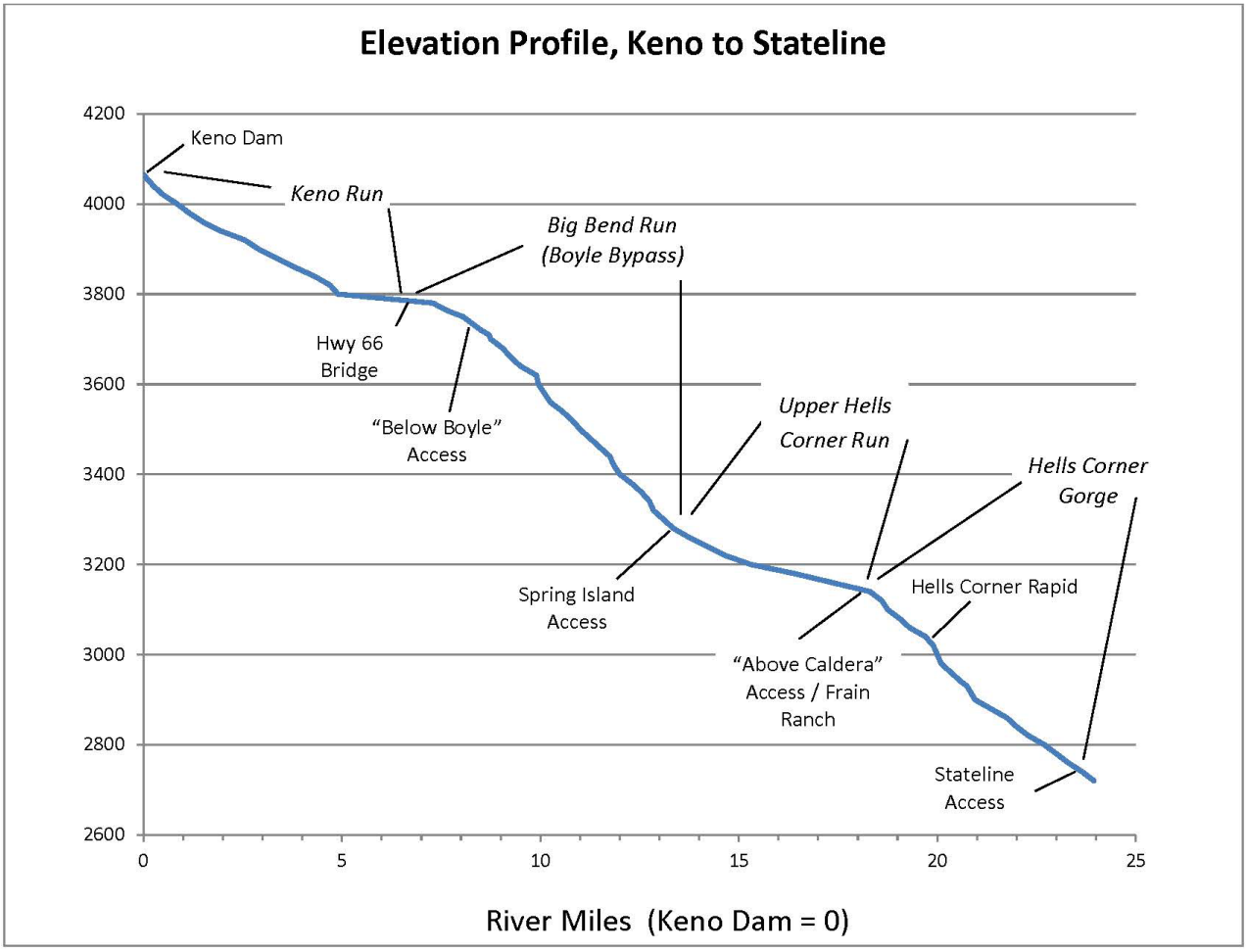
41.8 ***Camp Creek Access.*** This proposed access point, located where Camp Creek enters on the right, could be developed shortly after reservoir drawdown. This access would allow river runners to use the Irongate run even before Irongate Dam is completely removed. This would be a benefit to outfitters in the first summer after peaking flows end.

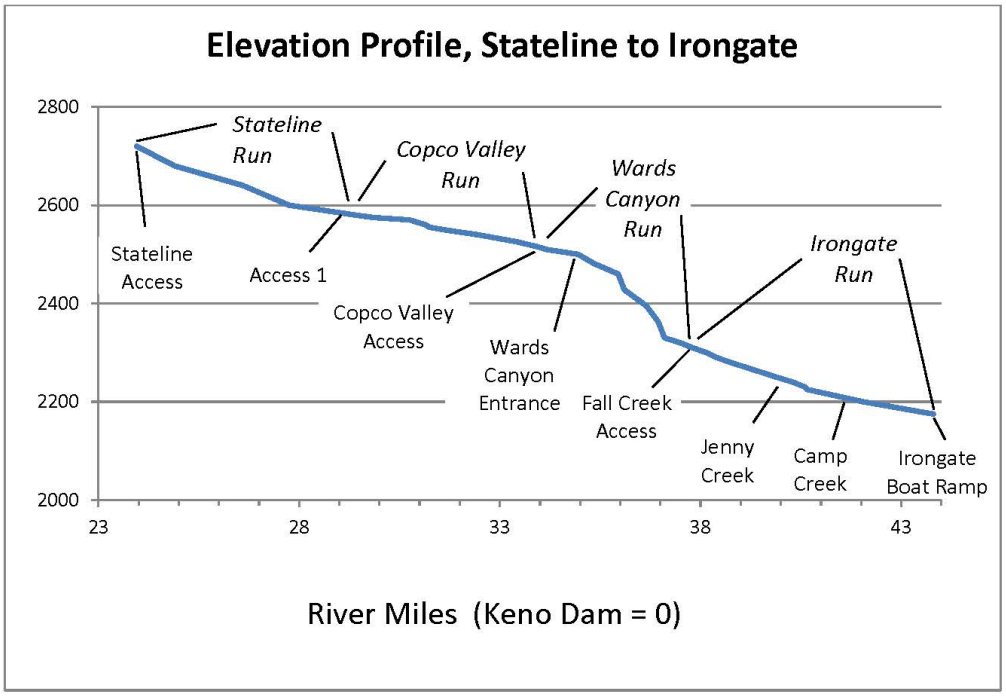
43.5 ***Irongate Dam.*** Reregulating dam built in 1962 in the scenic Irongate narrows.

44 ***Irongate Access.*** We agree with KRRC that this important existing access, across the river from the Irongate Fish Hatchery, should be retained and improved. Irongate marks the end of the Upper Klamath. From here, it's just a 190-mile paddle to the Pacific!



ELEVATION PROFILES





KENO FLOW RELEASES

Note: Add 225 to 250 cfs for runs below big bend springs (near the current J.C. Boyle Dam)

AVERAGE FROM 2003 TO MAY 2018

[USGS Link >]

USGS 11509500 KLAMATH RIVER AT KENO, OR

Available data for this site | Time-series: Daily statistics | GO

Klamath County, Oregon
Hydrologic Unit Code 18010206
Latitude 42°08'00", Longitude 121°57'40" NAD27
Drainage area 3,920 square miles
Gage datum 3,961 feet above NGVD29

Output formats
HTML table of all data
Tab-separated data
Reselect output format

00060, Discharge, cubic feet per second,

Mean of daily mean values for each day for 15 - 16 years of record in, ft3/s (Calculation Period 2002-10-01 -> 2018-09-30)

Period-of-record for statistical calculation restricted by user

Day of month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	983	836	1,170	1,960	1,690	1,200	917	622	706	686	851	814
2	1,140	925	1,170	1,900	1,610	1,200	907	628	709	716	861	813
3	1,120	1,030	1,170	1,850	1,580	1,210	893	634	712	711	872	845
4	1,130	1,120	1,130	1,830	1,650	1,190	854	622	737	707	892	794
5	1,120	1,180	1,130	1,800	1,740	1,180	799	625	742	700	853	735
6	1,190	1,170	1,160	1,910	1,730	1,150	766	624	725	716	852	737
7	1,210	1,130	1,180	2,010	1,810	1,090	745	628	729	767	850	763
8	1,180	1,090	1,200	2,140	1,890	1,110	726	627	731	818	875	852
9	1,080	1,170	1,170	2,110	1,910	1,150	721	631	742	823	929	881
10	1,000	1,290	1,250	2,030	1,810	1,200	714	641	702	809	886	863
11	998	1,290	1,320	2,000	1,710	1,220	699	654	722	820	859	811
12	990	1,130	1,330	2,090	1,640	1,190	673	657	755	823	831	719
13	991	1,040	1,380	2,170	1,570	1,160	645	650	756	810	814	671
14	986	940	1,460	2,200	1,570	1,180	636	656	729	825	807	747
15	1,040	943	1,730	2,180	1,570	1,160	633	680	695	798	810	836
16	1,050	889	1,840	2,040	1,590	1,120	633	722	660	786	802	829
17	1,040	844	1,830	1,940	1,630	1,120	630	700	666	793	779	780
18	1,050	837	1,760	1,910	1,640	1,110	628	706	670	769	811	751
19	992	888	1,790	1,890	1,560	1,080	632	729	696	796	876	729
20	978	882	1,830	1,830	1,430	1,050	624	727	729	795	878	731
21	1,000	914	1,760	1,740	1,420	1,010	621	719	726	805	842	827
22	1,010	1,060	1,760	1,690	1,410	1,000	623	712	679	764	838	967
23	998	1,320	1,830	1,700	1,380	1,000	638	689	687	760	820	972
24	1,030	1,230	1,850	1,690	1,350	1,010	637	692	696	777	846	976
25	1,010	1,120	1,840	1,640	1,320	1,030	643	709	699	787	820	959
26	969	1,120	1,850	1,660	1,320	1,030	656	716	700	806	825	958
27	950	1,130	1,930	1,680	1,360	1,020	654	719	684	816	835	922
28	933	1,130	1,980	1,690	1,410	975	652	696	668	810	857	924
29	936	869	1,940	1,720	1,350	942	656	662	670	838	875	908
30	917		1,910	1,740	1,320	923	643	682	661	852	854	835
31	897		1,980		1,230		635	695		834		872

HIGH SNOWPACK YEAR - 2011

USGS Link >

Daily Mean Discharge, cubic feet per second												
DATE	Jan 2011	Feb 2011	Mar 2011	Apr 2011	May 2011	Jun 2011	Jul 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011
1	776[A]	1,300[A]	1,300[A]	4,160[A]	3,180[A]	2,310[A]	1,020[A]	887[A]	760[A]	795[A]	1,050[A]	999[A]
2	780[A]	1,390[A]	1,410[A]	4,070[A]	3,000[A]	2,300[A]	1,150[A]	918[A]	765[A]	806[A]	1,050[A]	994[A]
3	692[A]	1,310[A]	1,970[A]	3,990[A]	2,940[A]	2,300[A]	1,150[A]	824[A]	776[A]	798[A]	1,060[A]	1,000[A]
4	771[A]	1,590[A]	2,090[A]	3,480[A]	2,760[A]	2,300[A]	1,140[A]	678[A]	830[A]	799[A]	1,060[A]	998[A]
5	794[A]	1,590[A]	2,120[A]	2,650[A]	2,730[A]	2,310[A]	1,130[A]	677[A]	844[A]	810[A]	1,060[A]	996[A]
6	700[A]	1,410[A]	2,130[A]	2,630[A]	2,730[A]	2,320[A]	1,130[A]	678[A]	885[A]	855[A]	1,060[A]	996[A]
7	720[A]	2,010[A]	2,120[A]	2,920[A]	2,720[A]	2,320[A]	1,140[A]	682[A]	886[A]	835[A]	1,060[A]	999[A]
8	721[A]	2,730[A]	2,100[A]	3,270[A]	2,720[A]	2,280[A]	1,150[A]	677[A]	885[A]	832[A]	1,330[A]	995[A]
9	735[A]	2,720[A]	1,940[A]	3,260[A]	2,730[A]	2,230[A]	1,160[A]	743[A]	885[A]	825[A]	1,480[A]	993[A]
10	744[A]	2,830[A]	1,800[A]	2,930[A]	2,710[A]	2,230[A]	1,160[A]	816[A]	864[A]	820[A]	1,120[A]	993[A]
11	752[A]	2,850[A]	1,640[A]	2,750[A]	2,590[A]	2,210[A]	1,160[A]	814[A]	831[A]	815[A]	980[A]	995[A]
12	785[A]	2,810[A]	1,100[A]	2,800[A]	2,440[A]	1,900[A]	1,000[A]	812[A]	874[A]	716[A]	982[A]	994[A]
13	798[A]	2,770[A]	1,070[A]	2,770[A]	2,420[A]	1,880[A]	814[A]	812[A]	895[A]	620[A]	982[A]	995[A]
14	868[A]	1,850[A]	1,020[A]	2,700[A]	2,420[A]	1,890[A]	735[A]	792[A]	886[A]	568[A]	987[A]	995[A]
15	1,100[A]	794[A]	1,440[A]	2,440[A]	2,270[A]	1,890[A]	626[A]	788[A]	890[A]	480[A]	949[A]	993[A]
16	1,120[A]	699[A]	1,400[A]	1,920[A]	2,280[A]	1,930[A]	634[A]	795[A]	911[A]	455[A]	536[A]	918[A]
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20	431[A]	699[A]	2,200[A]	2,560[A]	2,310[A]	1,820[A]	555[A]	895[A]	899[A]	451[A]	1,200[A]	737[A]
21	817[A]	749[A]	2,520[A]	2,690[A]	2,310[A]	1,590[A]	507[A]	863[A]	818[A]	555[A]	1,350[A]	733[A]
22	978[A]	943[A]	2,800[A]	2,760[A]	2,300[A]	1,480[A]	344[A]	818[A]	800[A]	665[A]	1,530[A]	730[A]
23	963[A]	1,010[A]	2,700[A]	3,000[A]	2,300[A]	1,380[A]	550[A]	700[A]	796[A]	665[A]	1,260[A]	724[A]
24	964[A]	1,180[A]	2,290[A]	3,300[A]	2,300[A]	1,310[A]	632[A]	700[A]	808[A]	733[A]	998[A]	718[A]
25	964[A]	1,330[A]	2,330[A]	3,330[A]	2,310[A]	1,380[A]	717[A]	694[A]	807[A]	772[A]	997[A]	714[A]
26	965[A]	1,000[A]	2,650[A]	3,430[A]	2,320[A]	1,380[A]	819[A]	696[A]	806[A]	767[A]	996[A]	718[A]
27	965[A]	981[A]	2,660[A]	3,470[A]	2,320[A]	1,270[A]	804[A]	699[A]	803[A]	761[A]	994[A]	730[A]
28	1,000[A]	1,100[A]	2,660[A]	3,480[A]	2,310[A]	986[A]	841[A]	687[A]	799[A]	760[A]	993[A]	729[A]
29	1,030[A]		3,110[A]	3,640[A]	2,310[A]	991[A]	890[A]	678[A]	796[A]	760[A]	995[A]	724[A]
30	1,030[A]		3,650[A]	3,760[A]	2,310[A]	995[A]	891[A]	696[A]	791[A]	770[A]	998[A]	721[A]
31	1,030[A]		3,970[A]		2,300[A]		890[A]	703[A]		882[A]		722[A]
COUNT	31	28	31	30	31	30	31	31	30	31	30	31
MAX	1,440	2,850	3,970	4,160	3,180	2,320	1,160	918	915	882	1,530	1,000
MIN	431	699	1,020	1,910	2,270	986	344	677	760	448	536	714

LOW SNOWPACK YEAR - 2014

USGS Link >

Daily Mean Discharge, cubic feet per second												
DATE	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Jun 2014	Jul 2014	Aug 2014	Sep 2014	Oct 2014	Nov 2014	Dec 2014
1	553[A]	599[A]	804[A]	1,010[A]	843[A]	990[A]	697[A]	734[A]	749[A]	411[A]	663[A]	609[A]
2	554[A]	598[A]	738[A]	977[A]	640[A]	1,070[A]	659[A]	734[A]	789[A]	413[A]	662[A]	609[A]
3	546[A]	600[A]	682[A]	1,000[A]	420[A]	871[A]	644[A]	730[A]	791[A]	400[A]	662[A]	609[A]
4	554[A]	603[A]	702[A]	988[A]	408[A]	712[A]	643[A]	725[A]	856[A]	392[A]	755[A]	605[A]
5	570[A]	971[A]	767[A]	994[A]	716[A]	684[A]	643[A]	726[A]	903[A]	392[A]	769[A]	602[A]
6	521[A]	1,090[A]	731[A]	995[A]	987[A]	683[A]	654[A]	711[A]	900[A]	392[A]	1,050[A]	600[A]
7	506[A]	766[A]	728[A]	990[A]	1,170[A]	684[A]	669[A]	695[A]	899[A]	765[A]	907[A]	602[A]
8	536[A]	525[A]	730[A]	988[A]	1,310[A]	686[A]	669[A]	693[A]	896[A]	1,130[A]	816[A]	600[A]
9	518[A]	518[A]	734[A]	983[A]	1,100[A]	685[A]	669[A]	688[A]	801[A]	1,160[A]	810[A]	599[A]
10	481[A]	515[A]	775[A]	981[A]	993[A]	765[A]	749[A]	687[A]	711[A]	1,160[A]	809[A]	599[A]
11	478[A]	514[A]	699[A]	979[A]	988[A]	851[A]	731[A]	685[A]	711[A]	1,110[A]	714[A]	623[A]
12	483[A]	538[A]	618[A]	976[A]	816[A]	847[A]	711[A]	685[A]	711[A]	1,050[A]	606[A]	625[A]
13	492[A]	602[A]	706[A]	981[A]	706[A]	849[A]	708[A]	684[A]	709[A]	922[A]	683[A]	624[A]
14	443[A]	552[A]	814[A]	986[A]	706[A]	852[A]	735[A]	686[A]	707[A]	1,260[A]	713[A]	622[A]
15	455[A]	597[A]	852[A]	983[A]	754[A]	854[A]	746[A]	654[A]	672[A]	1,100[A]	714[A]	608[A]
16	496[A]	657[A]	834[A]	984[A]	798[A]	853[A]	743[A]	650[A]	641[A]	818[A]	716[A]	597[A]
17	477[A]	617[A]	932[A]	934[A]	791[A]	847[A]	740[A]	648[A]	666[A]	713[A]	715[A]	597[A]
18	455[A]	503[A]	1,140[A]	894[A]	792[A]	846[A]	708[A]	646[A]	582[A]	710[A]	643[A]	598[A]
19	475[A]	500[A]	1,420[A]	890[A]	796[A]	847[A]	705[A]	641[A]	649[A]	710[A]	618[A]	596[A]
20	476[A]	552[A]	1,540[A]	889[A]	766[A]	878[A]	714[A]	638[A]	693[A]	686[A]	577[A]	598[A]
21	468[A]	550[A]	1,440[A]	894[A]	858[A]	891[A]	714[A]	637[A]	695[A]	661[A]	598[A]	636[A]
22	467[A]	528[A]	1,310[A]	896[A]	787[A]	888[A]	711[A]	636[A]	655[A]	659[A]	597[A]	1,270[A]
23	467[A]	527[A]	1,310[A]	900[A]	797[A]	884[A]	706[A]	637[A]	609[A]	663[A]	563[A]	1,080[A]
24	467[A]	527[A]	1,310[A]	835[A]	812[A]	885[A]	704[A]	640[A]	656[A]	690[A]	524[A]	779[A]
25	467[A]	527[A]	1,310[A]	788[A]	811[A]	994[A]	705[A]	643[A]	538[A]	687[A]	508[A]	580[A]
26	467[A]	586[A]	1,200[A]	779[A]	811[A]	1,070[A]	702[A]	644[A]	396[A]	662[A]	507[A]	573[A]
27	471[A]	725[A]	1,020[A]	794[A]	812[A]	955[A]	703[A]	647[A]	410[A]	662[A]	505[A]	604[A]
28	489[A]	818[A]	1,040[A]	804[A]	912[A]	888[A]	703[A]	646[A]	410[A]	662[A]	504[A]	602[A]
29	502[A]		1,050[A]	801[A]	862[A]	894[A]	705[A]	646[A]	411[A]	661[A]	583[A]	560[A]
30	502[A]		1,050[A]	818[A]	797[A]	807[A]	703[A]	650[A]	413[A]	661[A]	610[A]	736[A]
31	563[A]		1,040[A]		801[A]		727[A]	652[A]		663[A]		609[A]
COUNT	31	28	31	30	31	30	31	31	30	31	30	31
MAX	570	1,090	1,540	1,010	1,310	1,070	749	734	903	1,260	1,050	1,270
MIN	443	500	618	779	408	683	643	636	396	392	504	560

Appendix 2
Supplemental Analysis of Test Flows for the Klamath River

This study request is formatted consistent with the requirements of 18 CFR § 5.9.

Study Description and Objectives § 5.9(b)(1)
Describe the goals and objectives of each study proposal and the information to be obtained.

Whitewater boating is a flow-dependent activity that will be impacted by the proposed action of removing the Klamath River Dams and associated hydroelectric facilities.

Outfitters and the recreational boaters will face an entirely new flow regime following dam removal. Peaking releases will end on Hells Corner Gorge. On the Big Bend run and Ward's Canyon run flows will be restored to channels that have only rarely been boated and have never been used for outfitted raft trips. In order for outfitters to anticipate and adapt to these new challenges and opportunities, they need a chance to "test drive" these runs at typical post-dam summertime flows. These test flows must occur early enough to give outfitters sufficient lead time to purchase new equipment and prepare guides to safely operate on these runs after dam removal.

Resource Management Goals § 5.9(b)(2)
If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied

With the removal of hydropower facilities, the proposed action will eliminate the ability of the project to provide enhanced peaking flows that are currently utilized by whitewater outfitters and recreational boaters during the summer recreation season. As part of the environmental review for project decommissioning, the changes to the flow regime and impacts on recreation need to be evaluated.

These changes in flow will bring major changes to whitewater recreation and the outstandingly remarkable value of recreation for the Klamath Wild and Scenic River. Under Section 7(a) of the Wild and Scenic Rivers Act, the managing agency is obligated to evaluate whether the proposed action will "invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area on the date of designation of a river as a component of the National Wild and Scenic Rivers System."[1]

Whether the outstandingly remarkable recreation value of this Wild and Scenic River is unreasonably diminished will depend on the quality of a comprehensive planning and implementation effort to address river-based recreation and whitewater boating specifically. An enhanced understanding of how a new flow

[1] 16 USC § 1278(a)

regime, following dam removal, impacts whitewater recreation is critical information required for environmental analysis and a Wild and Scenic Rivers Section 7 determination.

Relevant Public Interest §5.9(b)(3)
If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

Outfitters who have been running trips on the Hells Corner section of the Upper Klamath for decades have a considerable interest in actions that will affect flow and their ability to provide a whitewater boating experience for their customers during the summer tourist season. Based on current information, the Hells Corner section will no longer be an option for mid-summer rafting. Other opportunities may emerge that would require different types of boats or equipment. Further evaluating the opportunities that will become available following dam removal and determining equipment needs is in the public interest.

Existing Information §5.9(b)(4)
Describe existing information concerning the subject of the study proposal, and the need for additional information

The Recreation Flow Analysis (RFA) is contained within Chapter 2 of the Recreation Resources Final Technical Report (FTR) published by PacifiCorp in February 2004, and submitted to the Federal Energy Regulatory Commission (FERC) as part of the relicensing proceeding for the Klamath Hydroelectric Project (FERC P-2082).[2]

These studies were completed as a collaborative effort between PacifiCorp and American Whitewater, and represent valid studies that are part of the administrative record. However, these studies were not intended to simulate midsummer flows on a post-dam river; they were conducted over 15 years ago under the assumption that the project would be relicensed and PacifiCorp would have the ability to provide scheduled optimal flows as a condition of hydropower project operations. Supplemental test flows, within the range of anticipated summer flows following dam removal (generally below the optimal range), are necessary given the new proposed action to remove the facilities and the ability to provide scheduled flow releases.

Based on USGS gage data (USGS 11509500 Klamath River at Keno, OR) from 2003 to 2018, average flow released from Keno Dam steadily drops from approximately 1200 cfs in early June to below 750 cfs by 4th of July weekend. During the summer season of July and August, most critical for local outfitters, flow fluctuates from 625-725 cfs. In a high snowpack year such as 2011, flows in early June are higher at 2300 cfs, but by the second week in July, flows are

[2]<http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Klamath_River/REC_Report.pdf>

generally lower than 750 cfs with some days experiencing higher flows. In a low snowpack year such as 2014, flows are well below 1000 cfs in June, with July and August flows generally fluctuating from 625-725 cfs. We estimate that the springs near the current J.C. Boyle Dam contribute an additional 225-250 cfs. For purposes of understanding the impacts to whitewater recreation following dam removal, an evaulation of flows in the range of 850-1000 cfs within Big Bend, Hells Corner, and Ward's Canyon is necessary.

Nexus to Project §5.9(b)(5)
Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements

A clear project nexus exists between project impacts and recreational opportunities on the river. The current hydropower project, proposed for removal, affects allocation, timing, levels and distribution of water flows within the Klamath River in the reach from Keno Dam to Iron Gate Dam. This regulation influences the spatial and temporal availability of water for a variety of uses including whitewater recreation. Study results will inform the development of requirements to address recreational impacts for a decommissioning order from the Federal Energy Regulatory Commission.

Study Methodology §5.9(b)(6)
Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge

Methodology is generally based on the integrated approach summarized by Whittaker, Shelby and Gangemi (2005).[3] These methods of applying a structural norm approach to evaluating recreational flow needs for river-based recreation are peer reviewed and widely accepted,[4] having been employed in approximately 100 hydropower licensing proceedings including several reaches with existing commercial use (e.g. Kern River Borel Project P-382, Clackamas River Project P-2195).

In the case of the Klamath River we have existing information on instream flow needs for recreation. Additional test flows within the anticipated summer range of 850-1000 cfs within Big Bend, Hells Corner, and Ward's Canyon are necessary.[5]

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[3] This publication can be requested through the National Park Service at <http://www.nps.gov/hydro/flowrec.htm>

[4] Whittaker, D. and B. Shelby. 2002. Evaluating Instream Flows for Recreation: Applying the Structural Norm Approach to Biophysical Conditions. Leisure Sciences, 24:363–374.

[5] Note that this flow range is based on release from Keno Dam with the addition of inflow from springs at the upstream end of the Big Bend Reach.

Big Bend Reach

The 2004 Recreation Flow Analysis determined that "flows of about 1,300 to 1,500 cfs would probably attract the most use (providing high-quality standard rafting and kayaking opportunities)."[6] Anticipated summer flows of 850-1000 cfs are below the minimum acceptable range for technical rafting but within the range for technical kayaking. Outfitters need an opportunity to evaluate instream flows in this range to determine if smaller rafts might provide a viable business opportunity in the summer. Additionally, the Sidecast Rapid, formed by blast rock, needs to be evaluated. This rapid was found to be impassable for rafts at low and moderate flows. However, the constriction was subsequently altered to improve fish passage, and it is unknown whether these efforts improved navigability.

Hell's Corner Reach

The 2004 Recreation Flow Analysis found that peaking operations of the J.C. Boyle powerhouse in the Hell's Corner reach vary flows each day through much of the year, generally increasing from base flows (350 cfs) to about 1,500 to 1,700 cfs (one turbine) during low- and moderate-flow periods, and increasing to about 2,800 cfs (two turbines) if there is sufficient outflow from Upper Klamath Lake.[7] The report further found that "altered flow regimes with different timing or less variation because of peaking (including no variation or run-of-the river regimes) would alter the frequency and quality of these opportunities." Since the proposed action is project removal, the impacts of future run-of-the river operations need to be further evaluated. Anticipated summer flows of 850-1000 cfs are below the minimum acceptable range for commercial rafting but within the range for technical rafting and kayaking. Outfitters need an opportunity to evaluate instream flows in this range to determine if smaller rafts might provide a viable business opportunity in the summer.

Ward's Canyon Reach

The 2004 Recreation Flow Analysis found that "recreation in this reach is substantially affected by Project operations, which generally provide 10 cfs throughout the year except during rare spill events. In general, base flows provide general recreation opportunities only; boating and fishing cannot occur at these levels… Higher base flows are not likely to provide standard boating opportunities unless they exceed 600 cfs, but quality technical kayaking would be available above 300 cfs."[8] The anticipated summer flows of 850-1000 cfs are

[6] At Page 2-116, Recreation Resources Final Technical Report (2004), <http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Klamath_River/REC_Report.pdf>
[7] At Page 2-116, Ibid.
[8] At Page 2-117, Ibid.

within the acceptable range for standard whitewater boating but below the optimal range. Given the condition of the channel and lack of history of use by outfitters or the general public, a need exists to evaluate instream flows within the anticipated summer range.

We propose a series of studies over a period of three days during spring 2019 at a time that can be coordinated with PacifiCorp. Investigation of flows in the 850-1000 cfs can be conducted without any disruption or modification of flows released from Keno Dam. The effort requires coordination with PacifiCorp so that diversion of flows at J.C. Boyle Dam and Copco 2 Dam is adjusted to provide target flows in the historic river channels affected by the projects. We propose a test flow of 800 cfs and 950 cfs for each river reach (the lower flow in the morning and the higher flow in the afternoon). This flow is based on our estimate of the range of midsummer flows which is the sum of the release from Keno Dam and the contribution of natural springs to flow. Prior to conducting the instream flow study for recreation, we request a basic hydrologic analysis to confirm these assumptions. The various reaches could be studied over a consecutive three-day period in the spring. This basic plan can be modified based on further discussion of the results of the previous study and a collaborative approach to study plan development.

Final Product

The final study product requested is a report that supplements the 2004 Recreation Flow Analysis. If KRRC takes the lead on the study and hires a contractor, American Whitewater and Upper Klamath Outfitters Association should be provided with a draft of survey instruments for review and comment. A draft report should be provided for review and comment prior to publication of any final report or memo intended to be part of the administrative record in the proceeding.

American Whitewater can take a leadership role in study development and data analysis. Under this scenario, we would assume KRCC could take responsibility for reviewing any operational constraints and working with PacifiCorp to determine timing of the study, work collaboratively to develop appropriate survey instruments and administration of surveys, and coordinate management of providing flows with PacifiCorp.

Level of Effort and Cost §5.9(b)(7)
Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The total cost will be dependent on the level of documentation KRCC believes is necessary for the administrative record in this proceeding. We estimate that hiring a consultant to conduct the study and document findings in a report would

cost $20,000-$30,000. Based on initial inquiries we have made, it may be possible to hire the same consultants, Confluence Research, who conducted the studies for PacifiCorp; given their preexisting knowledge of the system and prior work to evaluate instream flow needs for recreation, they would likely be the most cost effective.

There are a number of factors affecting cost, but one of the most effective ways to reduce cost is to consolidate the field component (i.e. controlled flow study) to one discrete time period. American Whitewater has worked with licenses/applicants to provide in-kind services and is willing to develop a collaborative proposal with agencies and the utility that is as efficient as possible and could further reduce cost.

If KRRC finds that hiring an outside consultant to conduct the study and prepare the report is cost prohibitive, we have in-house capacity to help design a study and analyze data. In situations where we have taken the lead on data analysis, we often produce a memo of findings and not a formal report. While we are open to taking on this responsibility, we find that many licensees/applicants prefer to maintain direct oversight over the study and any reports that are produced and retain the services of a consulting firm experienced in instream flow analysis for recreation.