

NEW BULLARDS BAR DAM WHITEWATER BOATING STUDY

December 19, 2008

1.0 Introduction

The Yuba County Water Agency (YCWA) intends to apply to the Federal Energy Regulatory Commission (FERC) for a new license for the Yuba River Development Project (Project), FERC Project No. 2246, by April 30, 2014. At the current time, YCWA intends to relicense the Project using FERC's Integrated Licensing Process (ILP), which requires YCWA file with FERC a Pre-Application Document (PAD), which would include existing, relevant and reasonably available information regarding resources that could potentially be affected by continued operation of the Project, sometime between five and five and one-half years before the existing license expires on April 30, 2016.

YCWA determined that it had an opportunity in fall 2008 during scheduled higher flow releases from New Bullards Bar Dam to gather additional information regarding the potential whitewater boating characteristics of North Yuba River and Yuba Rivers from New Bullards Bar Dam to Rices Crossing. To facilitate this data gathering, YCWA consulted with American Whitewater (AW) and performed the study described below. YCWA and AW agreed that performance of this study did not presuppose the outcome of the Relicensing with regards to whitewater boating.

YCWA Unequivocally States Whitewater Boating Is An Inherently Dangerous Activity That Could Result In Serious Injury Or Death For Participants. YCWA Does Not Promote Whitewater Boating In Any Way And Specifically Not In The North Yuba River and Yuba Rivers From New Bullards Bar Dam To Rices Crossing.

2.0 Study Goals and Objectives

The goal of the study is, based on the responses of boaters who participate in the study, to estimate the minimum and optimum whitewater boating flows and other whitewater boating characteristics of the North Yuba River and Yuba River from New Bullards Bar Dam to Rices Crossing.

3.0 Existing Information

Table 3.0-1 provides some existing (pre-study) information regarding key aspects of the potential whitewater boating opportunity on the North Yuba River and Yuba River from New Bullards Bar Dam to Rices Crossing. The information is based on existing (pre-study) information in whitewater boating guidebooks and other boater sources of information (*e.g.*, Internet and personal accounts/knowledge of whitewater boaters who were contacted by YCWA). YCWA will gather additional information as it may become available.

Table 3.0-1. Existing Information on New Bullards Bar Dam to Rices Crossing Run.

<p>Put In: Base of New Bullards Bar Dam. Access to the put-in occurs from the Town of Nevada City via Highway 49, Moonshine Road and Marysville Road, which are all paved. Access continues by crossing the dam road and taking the first left and driving to the gated dam access road. The 0.75-mile-long, paved, private, gated road (posted “No Trespassing”) accesses the base of New Bullards Bar Dam.</p>
<p>Take-out(s): Two options – Rices Crossing and Colgate Powerhouse.</p> <p><u>Option 1: Rices Crossing (near Bridgeport State Park)</u> - Access to the takeout at Rices Crossing occurs from the Bridgeport State Park via a dirt road leading roughly 2 miles north. The turnoff is approximately .3miles east of the bridge over the South Fork Yuba River. Rices Crossing is the more straightforward takeout access of the two options from the Grass Valley/Nevada City area. It may also be easier to find due to the proximity to the popular South Yuba River takeout at Bridgeport.</p> <p><u>Option 2 - Colgate Powerhouse</u> - Access to Colgate Powerhouse from the Town of Dobbins occurs via Lake Francis Road. This access is entirely paved.</p>
<p>Shuttle: The shuttle is roughly 21 miles (45 minutes) from the takeout at Rices Crossing to the put-in at New Bullards Bar Dam. The route starts by traveling south from Rices Crossing (1.5 mi.); taking a left on Pleasant Valley Rd. (6.5 mi.); left onto Hwy 49 (5.2 mi.); left on Moonshine Rd. (4.9 mi.); left on Marysville Rd. across New Bullards Bar Dam (2.0 mi.); after dam head south on Marysville Rd. (0.75 mi.) to gated access road on left. One gate (locked) occurs along the shuttle route at the put-in road that leads to the base of New Bullards Bar Dam.</p>
<p>Difficulty: Class V</p>
<p>Portages: There are four rapids that are considered mandatory portages, and three others for which portages are flow dependent.</p>
<p>Estimated Boatable Flow Range: 600 – 1,500 cubic feet per second (cfs)</p>
<p>Estimated Optimum Flow: 1,000 cfs</p>
<p>Length of Reach: 9.8 river miles (total) if the Put-in is at New Bullards Bar Dam and the Takeout is at Rices Crossing. In general, the reach may be split into three distinct segments from upstream to downstream as follows: 1) New Bullards Bar Dam to Middle Yuba River confluence (2.3 miles); 2) Yuba River from the Middle Yuba River confluence to Colgate Powerhouse (5.8 miles); and 3) Yuba River from Colgate Powerhouse to Rices Crossing (1.7 miles).</p>
<p>Elevation Range: 925 vertical feet. The reach ranges in elevation from 1,450 feet at New Bullards Bar Dam on the North Yuba River to elevation 525 feet at Rices Crossing on the Yuba River.</p>
<p>Gradient: 97 feet per mile (1.8%). Smaller scale changes in gradient occur throughout the 3 sub-reaches detailed above. The estimated gradient by sub-reach is as follows: 1) New Bullards Bar Dam to Middle Yuba River confluence sub-reach is about 135 feet per mile; 2) Middle Yuba River confluence to Colgate Powerhouse sub-reach is 101 feet per mile; and 3) Colgate Powerhouse to Rices Crossing sub-reach is 12 feet per mile.</p>
<p>Watercraft: Best suited for kayaks.</p>
<p>Streamflow Gages: USGS gage (Station ID NYR) at 1,350 ft. elevation. Latitude: 39.3910°N, Longitude: 121.1430°W. Note: real-time data no longer available on CDEC.</p>
<p>Maps: USGS 1:24,000 topographic quadrangles: Challenge and French Corral</p>
<p>Run Time (est.): Kayaks: 4 to 6 hours, depending on put-in, takeout and portages.</p>
<p>Land Ownership: Most of the run occurs on land in private ownership. Land downstream of New Bullards Bar Dam and near Colgate Powerhouse is owned by YCWA (posted “No Trespassing” due to safety constraints). Small portions of the run on Yuba River are on public land administered by the United States Department of Interior, Bureau of Land Management (BLM). Rices Crossing is at the upstream end of the United States Army Corps of Engineer’s (COE) Englebright Reservoir and may be on public land administered by COE.</p>
<p>Other Information: This is an advanced stretch of river with many technical Class V rapids. There are 4-7 rapids that must be portaged by advanced kayakers; rafts may consider several portages. Hazards common to Class V whitewater are present, including vertical drops, sieves, holes and potential pin spots. There are no current data regarding impassible obstacles. Access is limited at the put-in and has historically involved a 1-mile walk to the river. Better access exists for taking off the river at Rices Crossing, because it is a common launch for flat-water kayakers at the head of Englebright Reservoir.</p>

4.0 Study Methods and Analysis

4.1 Study Area

For the purpose of this study, the study area included the portion of the North Yuba River from New Bullards Bar Dam to the confluence with the Middle Yuba River; and the portion of the Yuba River from the confluence to Rices Crossing at the upstream end of Englebright Reservoir.

4.2 Study Methods

The study will be completed in five steps, each of which is described below. In general, two target flows will be tested in the following order: 500 cfs and 1,000 cfs. YCWA will make a good faith effort to provide the target flows. YCWA will advise BLM of the study prior to implementation.

Step 1 - Select Whitewater Boating Teams. AW, in consultation with YCWA, will select a Study Boating Team comprised of a kayak and raft team to participate in the study. The Kayak Team will include five to six kayakers; and the Raft Team will include two rafts (and two safety kayakers). Each of the members of the selected Kayak Team must commit to participating in both days of the study; whereas the Raft Team will only boat at the second days' flow (1,000 cfs). However, the Raft Team will conduct land-based reconnaissance during the first day's flow to confirm that 500 cfs is much too low for rafting the reach. Due to the difficulty of the run, only boaters with advanced to expert kayaking and rafting capabilities will be selected to participate in the study. Each boater must review this study proposal and sign the attached waiver of liability (Attachment 1) before participating in the study.

YCWA understands that other members of the public may boat the North Yuba River and Yuba River prior to, during and after the boating study test flows. Due to Project safety considerations, those boaters must gain ingress and egress to the river, including across private property, using their own devices: YCWA intends that only the Study Boating Teams will be permitted access to YCWA-owned land beyond the closed, gated portion of the road to New Bullards Bar Dam.

Step 2 – Day One Controlled Flow. On Saturday, November 8, 2008, the Kayak Team members will stage from Rices Crossing. At 7:30 a.m., YCWA will coordinate a review of the study and reach, including viewing of topographic maps and aerial photographs, if available. General logistics, expectations and safety will be reviewed. At 8:00 a.m., the Kayak Team will transport their kayaks and gear to the put-in at the closed, gated access road leading to New Bullards Bar Dam. Once at the closed, gated road, YCWA will escort all Study Boating Team members beyond the closed, gated portion of the road to New Bullards Bar Dam. YCWA will provide at least one radio tuned to YCWA's frequency; however, contact may be limited due to steep canyon walls. The Kayak Team will begin the run no later than 9:30 a.m. since the run is expected to take about 5-6 hours. Take-out is expected by about 2:00 p.m. to 3:00 p.m for the Kayak Team. The target flow in the river will be 500 cfs when the Kayak Team begins the run. Individual Kayak Team members are responsible to provide their own equipment, food,

beverages and safety equipment during the run. YCWA will provide snacks and refreshments at the takeout before the boating team shuttles to the put-in and after taking out of the river. The Study Boating Team members is also responsible to provide one individual in charge of safety who will not boat the run. That individual will coordinate any off-the-river activities as needed.

In addition, at 8:30 a.m., the Raft Team (or at least the Raft Team leaders) will meet YCWA at the closed, gated access road at Marysville Road. The Raft Team will conduct land-based reconnaissance near the put-in while YCWA staff are present. Once the reconnaissance is completed (likely by 9:30 a.m.), YCWA staff will escort the Raft Team beyond the locked gate and the Raft Team will then conduct reconnaissance of the remaining reach (as feasible).

YCWA will meet the Kayak Team at the takeout at Rices Crossing (expected to be between 2:00 p.m and 3:00 p.m.). Individual Kayak Team members will complete the Boating Questionnaire (Attachment 2) at the takeout upon completion of the run, and hold a short de-briefing focus group meeting, which will be moderated by YCWA and videotaped. The purpose of the de-briefing focus group meeting is to obtain the Kayak Team member's individual and group perceptions of the day's run.

The Boating Questionnaire addresses the boater's perception of items regarding: 1) boatability; 2) quality of the run; 3) suitability of the run for different crafts and boater skill levels; 3) quality of the put-in/takeout locations; 4) boater's opinion of the class of difficulty of the run; 5) comparison of each run at its different flows; 6) quality and length of the shuttle based on general knowledge since the boaters will not have made the shuttle; 7) any safety concerns or hazards; 8) scenic quality; 9) number and difficulty of portages; 10) availability of play areas; and 11) boater's opinion of the flows that would represent the general paddling public preference.

Step 3 – Day Two Controlled Flow. The first day of study (Step 2) will be repeated in entirety on the second day of the study for the Kayak Team, with the exception that the target flow in the river during the run will be 1,000 cfs.

The Raft Team will also boat the reach. At 7:00 a.m., the Raft Team will meet YCWA staff at the put-in at the closed, gated access road to New Bullards Bar Dam. YCWA will coordinate a review of the study and reach, including viewing of topographic maps and aerial photographs, if available. General logistics, expectations and safety will also be reviewed. The Raft Team will begin the run no later than 8:00 a.m. The second day of the study will be Sunday, November 9, 2008.

The Raft and Kayak Teams will follow the same process after the run as described for the first day of the study at the takeout; however, the Kayak Team's discussion will also include a comparison of the two runs (*i.e.*, 500 cfs and 1,000 cfs).

Step 4 – Day Three Controlled Flow (if needed). If YCWA and the Study Boating Team members agree a third day of study is needed, the logistics of that study day will be discussed, including target flow. If needed, the Day Three flow will be on November 15, 2008.

Step 5 - Prepare Report. YCWA will compile the information from the study and other information, such as hydrology and information from other boaters that provide information to YCWA, into a brief report. The report will include: 1) Study Goals and Objectives; 2) Methods; 3) Results; and 4) Conclusions. The report will include copies of the completed Boater Questionnaires, as well as summaries, and a draft will be discussed with AW. YCWA will include the report in its PAD when issued to document existing, relevant and reasonably available information.

4.4 Schedule

The schedule for the study is as follows:

Step 1-Assemble Whitewater Boating Team.....	October 19–October 31, 2008
Step 2-Day One Controlled Flow	November 8, 2008
Step 3-Day Two Controlled Flow.....	November 9, 2008
Step 4-Day Three Controlled Flow (if necessary)	November 15, 2008
Step 5- Summary Report.....	February 15, 2009

4.5 Variances from the Study Plan

As detailed in the study plan, YCWA would make minor modifications to the study in the field to accommodate actual field conditions and unforeseen problems. As such, YCWA had several variances from the study plan, which are described below. In all cases, YCWA consulted with AW immediately to discuss the changes. One variance occurred prior to field-based study work and three variances occurred while in the field conducting the test flows. These variances from the study plan are detailed below.

4.5.1 Variances Prior to Field-Based Study Work

- YCWA reduced the second day’s flow level to 800 cfs from 1,000 cfs due to operational constraints on the low level output valve. In this instance, YCWA informed AW and the boating teams on Thursday, November 6, 2008.

4.5.2 Variances During the Field-Based Study Work

- The Raft Team lead decided to eliminate the rafting team from the 800 cfs flow based on the information she received from the study kayakers following their run at the 500 cfs flow. As a result, the Raft Team did not participate in the study.
- The Kayak Team changed the takeout location for the second day of flows to Colgate Powerhouse. The group arrived at this decision due to nature of the river below the powerhouse (flatwater with little interest for Class IV/V whitewater boaters). This decision also enabled the boaters to evaluate the secondary (and likely preferred) takeout location and associated shuttle route/logistics.

- The final variance was minor. The Kayak Team agreed to stage at the put-in access road to the dam for the second day of flows rather than at the original takeout location on the first day of flows at Rices Crossing. This change was made to allow additional time on the river with day light if needed since the first day was rather close to the end of daylight hours.

5.0 Study Results

5.1 Summary of Flow Study Events

5.1.1 Day One, 500 CFS (Saturday, November 8, 2008)

Seven boaters met YCWA at the takeout at Rices Crossing at 7:00 a.m., where all seven completed the liability waivers, ran through the purpose, logistics and safety details for the day. YCWA and the boating team shuttled to the put-in, where we YCWA provided the boating team vehicle access to the river at 8:30 a.m. The boaters put on the river at 9:30 a.m. In the first rapid, one of the boaters injured himself (aggravated an old injury) and decided it was not in his nor the boating team's best interest for him to continue. YCWA assisted his exit from the river and returned him to his vehicle in Nevada City, California. The remaining six boaters were on their way by 10:00 a.m. and all the vehicles exited the put-in access road and were shuttled to the takeout immediately by YCWA. The kayakers arrived at Rices Crossing at 3:15 p.m. where all six completed the surveys and took part in a post-run focus group debriefing. Following the debriefing, the kayak team, in consultation with YCWA and AW, decided to make the following changes to the schedule and logistics for the second day of flows: a) start the run earlier on at 7:00 a.m.; b) meet/stage at the put-in (rather than the takeout); and c) takeout at Colgate Powerhouse rather than Rices Crossing as most of the run below Colgate Powerhouse is flat-water and of little interest to Class IV/V kayakers.

5.1.2 Day Two, 800 CFS (Sunday, November 9, 2008)

Four boaters met at the put-in at the parking area on Marysville Road at the closed, gated access road to the dam at 7:00 a.m., where YCWA provided access to the river below the dam. The fifth kayaker from the previous day determined he could not physically complete the second day. Again, YCWA and the boating team ran through the purpose, logistics and safety details for the day. All four boaters put on the river at 8:00 a.m. after which all the vehicles exited the put-in access road and were shuttled down to the takeout immediately by YCWA. The kayakers arrived at Colgate Powerhouse at 11:15 a.m., where they completed the surveys and took part in a post-run focus group debriefing. As noted earlier, one of the boaters from Saturday was unable to participate on Sunday at the 800 cfs flow; however, he had recently run the same study reach the previous week, so he completed the survey based on that experience.

Of note, on Saturday night, the raft team leader spoke with several of the study kayakers who ran the reach at 500 cfs that day. After those discussions, the raft team leader determined that the

North Yuba River section of the run was not advisable for rafting. Thus, the raft team did not participate in the flow study on Sunday at the 800 cfs flow level.

5.2 Boating Team Background and Experience

As discussed above, seven whitewater kayakers (boaters) arrived on Saturday, November 8, 2008 to participate in the New Bullards Bar Dam Reach Whitewater Boating Flow Study; though, only four of the seven boaters completed both days of the study flows (Saturday and Sunday). However, the study results utilized a core sample size of five kayakers after YCWA, in consultation with AW, decided to include a fifth boater who completed the first day of flows at 500 cfs, and recently boated the exact same reach the previous week at 800 cfs (the scheduled flow for the second day of the flow study). Thus, the final study sample size is five kayakers that completed all components of the study survey.

The remaining two boaters were not considered part of the final boating team because they did not complete the two days of flows (as required by the study plan). One boater injured himself in the first rapid and decided to withdraw from the study at that point; and the other boater completed the first day of flows and determined he could not physically complete the second day. As a result, the following study results are based on the five boater sample that completed the surveys for both flows.

The five boaters ranged in age from 19 to 53 years, and classified themselves as either expert or elite level whitewater boaters, and all identified the hard-shelled kayak as their preferred craft. The boating team had a combined 70 years of boating experience at these current whitewater skill levels; and boat an average of 11 days per month throughout the year. Travel time to this reach from boater's residences averaged 67 minutes ranging from only 30 minutes to 150 minutes. Three of the five boaters are local residents in the Nevada City/Grass Valley, California area (30 to 35 minutes away), while the remaining two boaters were currently residing in Truckee, California (90 minutes) and Reno, Nevada (150 minutes). Prior to this flow study, three of the participants kayaked the New Bullards Bar Dam Reach (once each). One boater ran the reach at only 650 cfs and two boaters ran the reach at 800 cfs. Two of the boaters had participated in whitewater boating studies on other hydropower relicensings.

Each of the five boaters was asked to respond to a list of statements about their river-running preferences. Overall, the boaters were consistently in agreement or disagreement regarding their river-running preferences. The two exceptions were: 1) "running challenging whitewater is the most important part of my boating trips" where 20 percent of the boaters "disagreed" compared to 60 percent who either "agreed" or "strongly agreed"; and 2) "I often boat short river segments (under 4 miles) to take advantage of whitewater play areas", where 20 percent "agreed" or "strongly agreed" compared to 40 percent who "disagreed". The results are displayed in Table 5.2-1.

Table 5.2-1. Boater responses to the following river-running statements (n=5).

Statement	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I prefer running rivers with difficult rapids (Class IV and V).	1	0	0	0	4
Running challenging whitewater is the most important part of my boating trips.	1	0	1	0	3
I often boat short river segments (under 4 miles) to take advantage of whitewater play areas.	0	2	0	0	3
I often boat short river segments to experience a unique and interesting place.	0	1	0	2	2
I often boat short river segments to run challenging rapids.	0	0	0	0	5
Good whitewater play areas are more important than challenging rapids.	3	1	1	0	0
I am willing to tolerate difficult put-ins and portages in order to run interesting reaches of whitewater.	0	0	0	1	4
I prefer boating rivers that feature large waves and powerful hydraulics.	0	1	0	2	2
I prefer boating steep, technical rivers.	0	0	0	1	4
I enjoy boating both technical and big water rivers.	0	0	0	1	4

In addition, boaters were asked what other runs in California that they boat in a typical year. The following list of whitewater reaches were listed by the boaters (with incidence in parantheses):

- South Yuba River (5) – includes Summit Run (1), Purdons to Highway 49 (1) and Highway 49 to Bridgeport (3)
- Upper Cherry Creek (3)
- North Fork of the American River (2)
- South Fork of the American River (2)
- Middle Fork of the Feather River (2)
- Dinkey Creek (2)
- South Fork of the Feather River (1)
- West Branch of the Feather River, Kimshew Run (1)
- Upper Tuolumne River (1)
- Cal Salmon River (1)
- Kaweah River (1)
- North Yuba River (1)

5.3 Daily Flow Evaluations

5.3.1 Reach Length and Whitewater Difficulty

Both the 500 and 800 cfs flow level results are based on a put-in location at New Bullards Bar Dam. However, to be clear, the study results are based on a takeout at Rices Crossing (9.8 miles) at the 500 cfs flow level; and a takeout location at Colgate Powerhouse (8.1 miles) at the 800 cfs flow level. Despite this difference in length on the two flow days, the affect on the results is

likely non-existent since the remaining 1.7 miles of the reach below Colgate Powerhouse is virtually all flat-water paddling (Class II whitewater). Two notable exceptions to this rule exist. First, the shuttle route from Rices Crossing and Colgate Powerhouse is significantly different (and is discussed below in the non-whitewater characteristics section of this report). Second, the overall paddle time was higher at the 500 cfs flow level due to the additional 1.7 miles of float time (Table 5.3-1). However, based on the radio communications between the boaters and YCWA, it is estimated that the travel time from Colgate Powerhouse to Rices Crossing was no more than 30 minutes. When taking this correction into consideration, the average paddling time was roughly 30 minutes shorter at the 800 cfs flow level. The boaters indicated little difference in the overall whitewater difficulty of the reach from 500 cfs to 800 cfs with a range from Class V to V/V+ for both flow levels (Table 5.3-1).

Table 5.3-1. Length of run by flow and type of run (n=5).

Reach			Flow Level (cfs)	Average Time	Whitewater Class	
Put-In	Takeout	Length			Minimum	Maximum
New Bullards Bar Dam	Rices Crossing	9.8 miles	500	5 hrs	V	V/V+
New Bullards Bar Dam	Colgate Powerhouse	8.1 miles	800	3 hrs, 24mins	V	V/V+

5.3.2 Number of Breaks, Scouts, Portages, Etc.

As would be expected, the number of breaks, scouts and portages (and the associated time for each) all decreased with the increased flow (more water) on the second day (Table 5.3-3). While technically the average number of breaks decreased at the higher flow, in general the difference was minimal. In contrast, the number and time of scouts and portages decreased significantly (roughly 30 percent) at the higher flow from 44 minutes to 32 minutes on average. Notably, the maximum time spent scouting/portaging for both flow levels was 120 minutes (at 500 cfs). It is important to also note that at the 800 cfs flow level the reach was 1.7 miles shorter; however, virtually all of that length is flat-water paddling (Class II), so the number of breaks and scouts/portages is not affected by the omission of this final 1.7 miles at the 800 cfs flow level.

Table 5.3-2. Number and length of breaks and scouts/portages at 500 and 800 cfs flow levels (n=5).

Flow Level (cfs)	Stat	No. of breaks	Total time for breaks (minutes)	No. of scouts/portages	Total time for scouts/portages (minutes)
500	Avg.	1.4	5.4	16.0	44.0
	Min	1	5	10	10
	Max	2	6	20	120
800	Avg.	1.2	4.6	11.0	32.0
	Min	1	2	10	20
	Max	2	12	15	45

As would be expected, the number of hits, stops, and drags (and the associated time for each) all decreased with the increased flow (more water) on the second day (Table 5.3-3). The number of

portages remained consistent at both flow levels. Again, at the 800 cfs flow level, the reach was 1.7 miles shorter; however, virtually all of that length is flat-water paddling (Class II), so the number of hits, stops, drags and portages is not affected by the omission of this final 1.7 miles at the 800 cfs flow level.

Table 5.3-3. Number of hits, stops, drags and portages at 500 and 800 cfs flow levels (n=5).

Flow Level (cfs)	Statistic	No. of hits	No. of stops	No. of drags	No. of portages
500	Avg	64.0	3.4	.0	1.8
	Min	20	0	0	0
	Max	100	10	0	3
800	Avg	46.0	3.0	.4	1.8
	Min	30	0	0	0
	Max	50	10	1	3

Boaters were asked about their likelihood to return for future boating at each day's flow level (Table 5.3-6). All the boaters would return at both flows; although at the 500 cfs flow level with four boaters responded "definitely yes" and one boater responded "probably". All five boaters responded "definitely yes" at the 800 cfs flow level. With regards to the boaters' preferences for higher or lower flows after each days run (Table 5.3-7), there was consensus at the 500 cfs flow level with all boaters preferring a "higher" flow level. At the 800 cfs flow level, four boaters stated the flow was "optimal", while the remaining boater preferred a "lower" flow level.

Table 5.3-6. Number of responses about returning to boat the reach at each flow level (n=5).

Flow Level (cfs)	Definitely No	Possibly	Probably	Definitely Yes
500	0	0	1	4
800	0	0	0	5

Table 5.3-7. Number of responses regarding higher or lower flow preferences (n=5).

Flow Level (cfs)	Lower	Optimum	Higher	Much Higher
500	0	0	5	0
800	1	4	0	0

5.3.3 Overall Reach Characteristics

When asked about the reach's characteristics after each flow level, there was a consensus among the boaters (who offered an opinion) on six of the ten reach characteristics (Table 5.3-8). On the six characteristics with consensus, the boaters agreed that the five characteristics were present on this reach at each flow:

- This reach is boatable at these flows
- This reach offers challenging and technical boating

- This run offers good overall whitewater challenge
- This is an aesthetically pleasing run
- This run is a good length

The one consensus characteristic that the boaters (who offered an opinion) agreed did not exist on this run was that “this reach has good play spots”.

Table 5.3-8. Boater responses to characteristics of the run at 500 cfs and 800 cfs flow levels (n=5).

Statement	Flow (cfs)	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
This reach is boatable at these flows.	500	0	0	1	4	0
	800	0	0	0	5	0
This reach offers challenging and technical boating.	500	0	0	1	4	0
	800	0	0	0	5	0
This reach has nice water features such as waves and holes.	500	0	2	0	2	1
	800	0	0	1	3	1
This reach has good play spots.	500	0	2	0	0	3
	800	0	1	0	0	4
This run offers good overall whitewater challenge	500	0	0	3	2	0
	800	0	0	0	5	0
This is a safe run.	500	0	2	1	0	2
	800	0	3	0	0	2
This is an aesthetically pleasing run	500	0	0	0	5	0
	800	0	0	0	5	0
This run is a good length	500	0	0	3	2	0
	800	0	0	1	4	0
The portages on this run are not a problem	500	1	0	1	2	1
	800	0	0	2	3	0
There are enough places to take a break or have lunch on this run.	500	1	0	1	3	0
	800	1	0	0	4	0

Three characteristics with some divergence in responses were related to the: 1) presence of nice water features (i.e. waves and holes); 2) the safety of the run; 3) the portages are not a problem; and 4) that there enough places to take a break or have lunch on this reach (Table 5.3-8).

5.3.4 Boatability for Different Types of Craft

Overall, for those boaters who offered an opinion, a consensus view emerged that this reach at these flow levels would work well at for hard-shell kayaks. In contrast, the boaters had a consensus opinion that this run at these flows would not work well for rafts or catarafts. The boaters were split in their responses for open canoes and inflatable kayaks on this reach, although more boaters responded that they would not work well (Table 5.3-9).

Table 5.3-9. Boaters’ opinion of the boatability of the run at each flow for different types of craft (complete run).

This run at this flow would work well for:	Flow (cfs)	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Hard shell kayaks	500	0	0	1	4	0
	800	0	0	1	4	0
Rafts	500	0	3	0	0	2
	800	1	1	0	0	3
Cataracts	500	0	3	0	0	2
	800	1	1	0	0	3
Open Canoes	500	2	1	1	0	1
	800	1	3	1	0	1
Inflatable Kayaks	500	1	2	1	0	1
	800	0	3	1	0	1

5.3.5 Challenging Rapids and Portages

Each of the boaters was asked to identify challenging rapids they encountered at each of the flow levels and whether they portaged the rapid. Without widespread information available for this run, the boaters were certainly challenged to accurately identify each rapid, however, after running the reach on two consecutive days, the boaters identified five of the most challenging rapids (Table 5.3-10).

Table 5.3-10. Whitewater classification (range) and number of boaters who portaged the major rapids (n=5).

Rapid Name	Flow Level (cfs)	Portaged	Classification Range
“S-Turn” Rapid	500	2	Class V to V+
	800	2	Class V to V+
“Sieve” Rapid	500	1	Class V to V+
	800	0	Class V to V+
“Baby Dream Gap” Rapid	500	2	Class V to V+
	800	2	Class V+ to VI-
“Confluence” Rapid	500	0	Class V to V+
	800	0	Class V to V+
“Big Portage” Rapid	500	0	Class IV+
	800	1	Class V to V+

In general for all five of these rapids, the whitewater difficulty remained generally the same at both flows and was rated by the boaters in the Class V to V+ at both flows with two exceptions. The first exception was the “Baby Dream Gap” rapid, which was rated a Class V to V+ at 500 cfs, but increased to a Class V+ to VI- rapid at the 800 cfs flow level. The second exception was the “Big Portage” rapid, which was rated a Class IV+ rapid at the 500 cfs flow level and increased to Class V to V+ at 800 cfs. During the post-run focus group debriefing following the 800 cfs flow level, the boaters noted that aside from these major challenging rapids, the reach was full of solid Class IV rapids throughout during the 500 cfs flow, and that some of these Class IV rapids jumped to solid Class V rapids at 800 cfs. Furthermore, the majority of the Class IV

rapids at 500 cfs may have remained Class IV but increased in intensity at the 800 cfs flow making for regular challenging rapids throughout the reach (particularly on the North Yuba River section of the reach).

The boaters also identified three portages on the reach (Table 5.3-11). Not all of the boaters portaged all three of them, but all portaged at least one. In the post-run focus group debriefing, the boaters noted that more often than not, all but the elite Class V boaters would have to portage most if not all of the three portages, especially on a boaters’ first descent of the reach. The “S-Turn” portage was rated the most difficult of the three, and was the only portage that boaters responded was either “moderately difficult” or “extremely difficult” due to the large boulders that needed to be traversed with fall potential on one or both sides of the boulders during the portage. The “Big Portage” portage was rated “easy” to “slightly difficult”, whereas the “Baby Dream Gap” portage was unanimously rated “easy” by the boaters that portaged the rapid.

Table 5.3-11. Difficulty of the portages as identified by boaters in number of responses .

Portage	Flow (cfs)	Easy	Slightly difficult	Moderately difficult	Extremely difficult
“S-Turn”	500	0	0	1	1
	800	0	0	3	0
“Big Portage”	500	0	1	0	0
	800	3	0	0	0
“Baby Dream Gap”	500	1	0	0	0
	800	5	0	0	0

5.4 Comparative Evaluations

5.4.1 Flow Range Evaluations

The boaters (n=5) were asked to evaluate a range of flow levels for their craft (hard-shell kayaks) and skill level (expert/elite) from 150 cfs to 1,000 cfs according to a five-point scale of acceptability – totally unacceptable (1), unacceptable (2), marginal (3), acceptable (4), and totally acceptable (5). The range of acceptable flows (average rating of 3.5 or higher) for hard-shell kayaks was 500 to 1,000 cfs (Table 5.4-1). At the lower end of the flow range from 150 cfs to 350 cfs, the boaters (who were comfortable estimating at that flow) all rated the flows as “totally unacceptable”; the 400 cfs flow level was still rated as “unacceptable”; and the 450 cfs flow was rated “marginal”. The boater responses display a clear trend that shows this reach is not boatable for hard-shell kayaks at or below 400 cfs.

Table 5.4-1. Boaters’ evaluation of flow levels for hard-shell kayaks at the expert/elite skill level.

Statistic	Flow Level (cfs)									
	150	200	250	300	350	400	450	500	750	1,000
Average	1.0	1.0	1.0	1.0	1.0	1.8	2.8	4.6	5.0	3.5
Minimum	1	1	1	1	1	1	2	4	5	3
Maximum	1	1	1	1	1	3	3	5	5	4
Boaters who Responded “Cannot Estimate At This Flow”	2	2	1	1	1	1	0	0	0	3

5.4.2 Specific Boatable Flow Levels

Furthermore, the boaters were asked to identify specific flow levels for different kinds of boating scenarios as identified in Table 5.4-2. On average, the lowest flow needed to simply get down the river was 460 cfs; the lowest flow that would provide a quality technical boating experience was 500 cfs; the optimal ranged that provided the best whitewater characteristics was 520 to 790 cfs; and the highest safe flow was 1,060 cfs, on average. The boater responses on the lower end and optimal range for flows are all in a tight cluster, but at the upper end (highest safe flow to get down the river) the variation is much greater, as is typical at this skill level, where an extreme boater can often push the limits of what is runnable even for the average expert/elite Class V boater. And, in fact, only one boater identified any flow higher than 1,000 cfs (1,600 cfs) for the highest safe flow for hard-shell kayaks for an expert/elite Class V boater - the other four boaters indicated the highest safe flow was between 800 and 1,000 cfs.

Table 5.4-2. Average Flow Level Responses by Skill Level to Various Flow Scenarios (n=5).

Flow Scenarios	Average	Minimum	Maximum
What is the lowest flow you need to simply get down the river in your kayak?	460	450	500
What is the lowest flow that provides a quality technical boating experience for this reach?	500	500	500
What is the optimal range of flows that provides the best whitewater characteristics for this run?	520 - 790	500	800
What do you feel the highest safe flow for your craft and skill level?	1,060	800	1600

When asked if they would return if the flows were in their respective optimal range, three of the five boaters responded “multiple times every year”, whereas the remaining two responded “as often as I could”. None of the boaters responded that they would “never” return.

The boaters identified a set of similar whitewater reaches to the New Bullards Bar Dam Reach in California. Reaches along the lower South Yuba River had the highest response (7 responses), particularly the Highway 49 to Bridgeport and Purdons to Highway 49 reaches. The other similar reaches identified were the South Fork of the Merced River (4), Clavey River (2), Cherry Creek (1), Middle Fork of the Feather River (1) and the Loves Falls run on the North Yuba River (1). Only one boater indicated that he would not favor the New Bullards Bar Dam run over the others that he makes now (South Yuba River reaches below Purdons, South Fork of the Merced and the Clavey River). The remaining four boaters indicated they would favor the New Bullards Bar Dam Reach over at least one of the other similar runs they listed. In addition, the boaters identified how these established California runs similar to the New Bullards Bar Dam run compared to New Bullards Bar Dam Reach (Table 5.4-3). In most cases, the boaters indicated that the similar runs were “about the same” as the New Bullards Bar Dam Reach; in two instances the New Bullards Bar Dam Reach was rated “better” than

Table 5.4-3. How New Bullards Bar Dam Run compares to similar established whitewater runs in California.

Whitewater Reach	Total Responses	No. of Responses		
		New Bullards Bar Dam Reach is...		
		Worse	...About the same	...Better
South Yuba River, Purdons to Highway 49	3	0	3	0
South Yuba River, Highway 49 to Bridgeport	4	1	2	1
South Fork of the Merced River	4	0	4	0
Clavey River	2	0	2	0
North Yuba River, Loves Falls	1	0	1	0
Cherry Creek	1	0	0	1
Middle Fork of the Feather River	1	0	1	0

5.4.3 Non-whitewater Characteristics of the New Bullards Bar Dam Reach

The boaters (who offered an opinion) unanimously agreed that the put-in and overall shuttle to boating ratio were good for the New Bullards Bar Dam Reach; and the majority of the boaters agreed that the length of the shuttle was not a problem and the takeout for the run is good (Table 5.4-4).

Table 5.4-4. Percent responses to non-whitewater characteristic statements at the optimum boating range flows on New Bullards Bar Dam Reach (n=10).

Statement	Number of Boaters Who Offered an Opinion				No. of Boaters who Offered "No Opinion"
	Strongly Disagree	Disagree	Agree	Strongly Agree	
Length of shuttle is not a problem	0	1	1	3	0
Put-in for this run is good	0	0	1	4	0
Take-out for this run is good	0	1	2	2	0
Total shuttle to boating ratio on this run is good	0	0	1	3	1

Furthermore, the boaters had several suggestions for improving the access or shuttle for the New Bullards Bar Dam Reach. The categorized suggestions (with the incidence for each in parentheses) was: allowing/providing boaters to access the dam to put-in (3); installing bathrooms at put-in and/or takeout (2); improving/continuing to allow access and parking at Colgate Powerhouse (2); and clearing vegetation at put-in for better access to the river (1).

5.5 Post-Run Focus Group Summaries

Following each of the boaters' runs, the boating team took part in a brief post-run focus group to discuss the primary characteristics and impressions of the day's run in a group environment. The next two sections summarize the highlights from each of the post-run focus group discussions.

5.5.1 500 CFS Focus Group Summaries

- Solid Class V reach that offers high quality, technical boating with abundant Class IV and IV+ rapids; and as many as twelve, solid Class V rapids. Primarily a run for solid Class V boater, but could be run by solid Class IV boater who runs some Class V rapids.
- The run is a continuous, pool-drop nature with many linked rapids followed by pools before the next rapid or set of rapids; ample eddies were available between rapids or sets of rapids to allow time for scouting of upcoming rapids/river.
- Similar character on North Yuba and Middle Yuba except for the following distinctions: a) the North Yuba River sub-reach is tighter/narrower and requires more technical boating skills to navigate the rapids (often multiple moves required in a rapid); and b) the Middle Yuba section was wider and providing more lines/options in each rapid with bigger pools following the rapids.
- Only one portage on the North Yuba River section, and up to two portages on the Middle Yuba River section with the most difficult portage several miles downstream of the Middle Yuba River confluence.
- Any flows below 500 cfs would make a lot of rapids difficult to get through and likely increase to as many as six portages.
- The preferred put-in location is at the base of New Bullards Bar Dam and most boaters would be fine walking their boats down the gated access road to the put-in. One kayaker had scrambled down the canyon wall below the gated access road and stated he would never access the river by that means again due to the steep terrain, thick vegetation and amount of time it takes to get down to the river.
- The preferred takeout location is Colgate Powerhouse. If taking out at Rices Crossing, the reach is a long run (5+ hours and nearly 10 miles) from New Bullards Bar Dam. The river characteristics below Colgate Powerhouse to Rices Crossing (1.7 miles) are of little interest to Class IV/V whitewater kayakers; as a result, the boaters concluded that most, if not all would prefer to takeout at Colgate Powerhouse to shorten the run and shuttle, and focus their paddling on solid Class IV and V rapids located above Colgate Powerhouse and along the North Yuba River section of the reach.
- Currently, flow information on the reach is primarily based on guessing or driving out the dam to see what the flows are and extrapolating what the Middle Yuba River gage reads. The result is that the reach primarily boatable for a very local population.
- The reach would have a higher demand in the summer and fall, but it provides enough quality Class IV and V whitewater that it would have some demand in the spring. This reach would be in the mix with other local runs such as the South Yuba River (Highway 49 to Bridgeport and Purdons to Highway 49). This reach feels more remote than similar South Yuba River runs in the area.
- Regarding rafting on this reach, the kayakers believed rafting would be marginal on this reach due to the tight rapids that at many times were wide enough for a kayak to get through

but not wide enough for rafts. The amount of time out of the water would be significantly higher for rafts compared to kayaks for portaging.

5.5.2 800 CFS Focus Group Summaries

- The reach becomes a solid, Class V to V+ run at 800 cfs; the river becomes “pushy” and loses the technical boating aspects found at the 500 cfs flow level; very little woody debris, but the reach does have plenty of sieves. Not a run recommended for Class IV/V boater at 800 cfs flow. The rapids tend to require very technical moves or even multiple moves in the rapid, which is not recommended for Class IV/V kayakers.
- The 800 cfs flow level places a premium on fast decision-making with fewer locations to eddy out, scout the rapids and pick safe, clean lines through the rapids.
- Another consequence of the higher flow level is the difficulty of the rapids was increased substantially. The abundant Class IV rapids found at 500cfs became solid Class V rapids in most cases; as a result, the intensity of the reach is raised and the blend of Class IV and Class V rapids is almost entirely diminished.
- The Class V rapids at 500cfs remained substantially Class V rapids with a few exceptions where the difficulty was increased to Class V+;
- With more water in the river, on the North Yuba River the lines and options in the Class V and V+ rapids stayed the same but improved with more water on the North Yuba River section. On the Middle Yuba River, the increased water had more options and lines in most of the rapids, but the holes got bigger and “punchier”.
- Again, one portage on the North Yuba River section, and up to two portages on the Middle Yuba River section with the most difficult portage several miles downstream of the Middle Yuba River confluence. Boaters noted that the two Middle Yuba River rapids that are usually portaged, were slightly more runnable at the 800 cfs flow level.
- At 800 cfs, the reach is a much quicker run with the increased water in the reach, especially when combined with a shorter distance to cover by taking out at Colgate Powerhouse (3+ hours).
- The kayakers unanimously believed that this run at 800cfs would not be a good flow for a boaters’ first time on this reach – the river is too “pushy” and borders on big water river conditions requiring very quick decision-making as you enter Class V rapids throughout; the “pushy” nature of the river does not allow for adequate scouting for a first descent.
- One kayaker noted that they might enjoy the challenge of running the reach above 1,000 cfs (maybe even 1,600 cfs), but such a flow level would not be recommended for all but elite Class V kayakers; he believed that at that flow level (1,000+ cfs), the reach would become a big water river with constant, serious consequences.
- Another kayaker said he was likely at the limit of his Class V abilities at the 800 cfs flow level and would not be boat the reach at flow levels higher than 800 cfs.

- The reach would have a higher demand in the summer and fall, but it provides enough quality Class IV and V whitewater that it would have some demand in the spring. The difficulty is on par with other area reaches, but it has a more remote, wilderness feel.
- Another advantage to the takeout at Colgate Powerhouse (a shorter run) makes it more feasible and appealing in the fall/winter months when colder temperatures are a limiting factor in how long you want to be on the river. If you had to go all the way to Rices Crossing, then it would not be very appealing in the fall/winter months. In contrast, if boating this reach in the summer, you would have the option to take your time and spend the whole day exploring the river due to warmer temperatures and longer days. The reach has a lot of flexibility to run it as a fast-paced run or a relaxed, slower run.
- Overall, the boaters believed the acceptable boatable range is 500 to 800 cfs for most solid, Class V kayakers; and that it is likely boatable at or above 1,000 cfs, but only for a very small, elite level Class V/V+ kayaker.
- The optimal boatable range would be in the 650 to 750 cfs flow range, which would keep some of the technical boating characteristics of the 500 cfs flow, but provide a bit more “padding” (more water) in the rapids; and provide more options for lines (especially cleaner lines) through most rapids, and still keep a blend of Class IV and Class V rapids throughout.
- Regarding rafting, the kayakers believed it would be very questionable. It is raftable, but it would need to be an elite team of rafters and not for commercial rafting. It is very likely that it would take two full days to get down the reach. A lot of time would be spend out of the water pulling the rafts through rapids that rafts wouldn’t fit through. The kayakers said it was comparable to rafting for Cherry Creek, but more difficult.

5.6 Summary of Key Reach Study Results

Based on the study results, the whitewater and non-whitewater characteristics for the New Bullards Bar Dam Reach are summarized in Table 5.6-1. The major findings for this study reach were:

- 1) The reach is best suited for hard-shell kayaks; rafting may be possible but likely only for a team of elite rafters; not recommended for commercial rafting due to the severe consequences and technical portaging and maneuvering around boulders, rapids, etc.
- 2) The whitewater difficulty is Class V to V+;
- 3) The overall boatable range is 500 cfs to 1,000 cfs;
- 4) The optimal boatable range is 520 to 790 cfs;
- 5) The reach consists of endless Class IV/V rapids and roughly a dozen Class V to V+ rapids with three major portages with one very difficult portage below the confluence with the Middle Yuba River (at the “S-Turn” rapid)
- 6) The preferred put-in location is below New Bullards Bar Dam with the preferred takeout location at Colgate Powerhouse resulting in an 8.1-mile reach;
- 7) Vehicle access to the river at the put-in would be the ideal, but hiking down the access road was manageable and greatly preferred over hiking/scrambling down the canyon walls to the river; and

- 8) The study reach is similar to some other Northern California whitewater runs such as the South Yuba River from Highway 49 to Bridgeport and Purdons to Highway 49; Cherry Creek, South Fork Merced and the Clavey River.

Table 5.6-1. Summary of Existing and Study Information on the New Bullards Bar Dam Reach.

<p>Put In: Base of New Bullards Bar Dam. Access to the put-in occurs from the Town of Nevada City via Highway 49, Moonshine Road and Marysville Road, which are all paved. Access continues by crossing the dam road and taking the first left and driving to the gated dam access road. The 0.75-mile-long, paved, private, gated road (posted "No Trespassing") accesses the base of New Bullards Bar Dam.</p>
<p>Take-out(s): Two options – Rices Crossing and Colgate Powerhouse.</p> <p><u>Preferred Option - Colgate Powerhouse</u> - Access to Colgate Powerhouse from the Town of Dobbins occurs via Lake Francis Road. This access is entirely paved.</p> <p><u>Alternate: Rices Crossing (near Bridgeport State Park)</u> - Access to the takeout at Rices Crossing occurs from the Bridgeport State Park via a dirt road leading roughly 2 miles north. The turnoff is approximately .3miles east of the bridge over the South Fork Yuba River. Rices Crossing is the more straightforward takeout access of the two options from the Grass Valley/Nevada City area. It may also be easier to find due to the proximity to the popular South Yuba River takeout at Bridgeport.</p>
<p>Shuttle: Two options based upon the takeout location (Rices Crossing or Colgate Powerhouse)</p> <p><u>Preferred Shuttle (from Colgate Powerhouse):</u> Approximately 10 miles (20 minutes) from to New Bullards Bar Dam. The route starts by traveling north on Lake Francis Road (4.1 mi.) into Dobbins, CA; taking a right onto Old Dobbins Road (0.2 mi.); turn right onto Marysville Road (5.7 mi.) to the gravel parking area near the gated access road to New Bullards Bar Dam.</p> <p><u>Alternate Shuttle (from Rices Crossing):</u> The shuttle is roughly 21 miles (45 minutes) to New Bullards Bar Dam. The route starts by traveling south from Rices Crossing (1.5 mi.); taking a left on Pleasant Valley Rd. (6.5 mi.); left onto Hwy 49 (5.2 mi.); left on Moonshine Rd. (4.9 mi.); left on Marysville Rd. across New Bullards Bar Dam (2.0 mi.); after dam head south on Marysville Rd. (0.75 mi.) to gated access road on left. One gate (locked) occurs along the shuttle route at the put-in road that leads to the base of New Bullards Bar Dam.</p>
<p>Difficulty: Class V to V+ (solid Class V at 500 cfs; Class V+ at 800 cfs)</p>
<p>Watercraft: Best suited for hard-shell kayaks; rafting may be possible but likely only for a team of elite rafters; not recommended for commercial rafting due to the severe consequences and technical portaging and maneuvering around boulders and rapids required of most if not all rafters involved.</p>
<p>Portages: Three – one on the North Yuba River and two on the Middle Yuba River (including the most difficult)</p>
<p>Estimated Boatable Flow Range: 500 – 1,000 cubic feet per second (cfs)</p>
<p>Estimated Optimum Flow: 520 - 790 cfs</p>
<p>Length of Reach:</p> <p><u>Preferred Run (takeout at Colgate Powerhouse):</u> 8.1 miles. Put-in is at New Bullards Bar Dam and the Takeout is at Rices Crossing. In general, the reach may be split into three distinct segments from upstream to downstream as follows: 1) New Bullards Bar Dam to Middle Yuba River confluence (2.3 miles); 2) Yuba River from the Middle Yuba River confluence to Colgate Powerhouse (5.8 miles)</p> <p><u>Alternate Run (takeout at Rices Crossing):</u> 9.8 miles – by adding 1.7 miles below Colgate Powerhouse.</p>
<p>Run Time (est.): For hard-shell kayaks: a) 3 hours to Colgate Powerhouse; b) 5+ hours to Rices Crossing.</p>
<p>Elevation Range: 925 vertical feet. The reach ranges in elevation from 1,450 feet at New Bullards Bar Dam on the North Yuba River to elevation 525 feet at Rices Crossing on the Yuba River.</p>
<p>Gradient: 94 feet per mile. Smaller scale changes in gradient occur throughout the 3 sub-reaches detailed above. The estimated gradient by sub-reach is as follows: 1) New Bullards Bar Dam to Middle Yuba River confluence sub-reach is about 135 feet per mile; 2) Middle Yuba River confluence to Colgate Powerhouse sub-reach is 101 feet per mile; and 3) Colgate Powerhouse to Rices Crossing sub-reach is 12 feet per mile.</p>
<p>Streamflow Gages: Currently, a streamflow gage with realtime flow information does not exist on the North Yuba River below New Bullards Bar Dam. Boaters drive to the dam to see if it is a boatable flow.</p>
<p>Maps: USGS 1:24,000 topographic quadrangles: Challenge and French Corral</p>