

Whitewater Recreation Management Plan for South Fork Silver Creek downstream of Ice House Dam Sacramento Municipal Utility District

Hydro License Implementation • September
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Upper American River Project
FERC Project No. 2101

Final

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Acronyms and Abbreviations

Acronym	Definition
BLM	Bureau of Land Management
cfs	cubic feet per second
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Department of Agriculture, Forest Service
Plan	Whitewater Recreation Management Plan for South Fork Silver Creek Downstream of Ice House Dam
SMUD	Sacramento Municipal Utility District
SWRCB	State Water Resources Control Board
UARP	Upper American River Project
USGS	U.S. Geologic Survey
YCWA	Yuba County Water Agency

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1.0 INTRODUCTION AND BACKGROUND

The Upper American River Project (UARP) is owned and operated by Sacramento Municipal Utility District (SMUD) and is located within El Dorado and Sacramento counties, primarily within lands of the Eldorado National Forest. The UARP consists of three major storage reservoirs (Loon Lake, Union Valley Reservoir, and Ice House Reservoir), eight smaller regulating or diversion reservoirs, and eight powerhouses. The UARP also includes recreation facilities containing over 700 campsites, five boat ramps, hiking paths, and bicycle trails at the reservoirs.

This Whitewater Recreation Management Plan for South Fork Silver Creek Downstream of Ice House Dam¹ (Plan) fulfills requirements of the UARP (FERC Project 2101) License set forth in the State Water Resources Control Board (SWRCB) section 401 Water Quality Certification, Condition 4B of Appendix A of the new License order² (FERC 2014a), and in the U.S. Department of Agriculture, Forest Service (Forest Service) section 4(e) Condition No. 50.2 of Appendix B of the new License order (FERC 2014a) and the October 2014 License amendment (FERC 2014b)³. Appendices A and B of this Plan contain the language from these documents as applicable to this Plan.

This Plan was prepared in coordination with the Consultation Group which includes the Forest Service, SWRCB, U.S. Bureau of Land Management (BLM), and American Whitewater, among others.

1.1 MANAGEMENT PLAN GOAL AND OBJECTIVES

Consistent with the terms of the License, the goal of this Plan is to identify thresholds⁴ that establish when SMUD will modify the number of days when recreation streamflows are provided. The Plan objectives to achieve this goal include the following: (1) establish quantitative, simple to measure, and effective thresholds related to whitewater boating use based on baseline monitoring results; (2) describe adaptive management procedures for adjusting streamflows based on threshold exceedances; and (3) describe the monitoring methodology necessary to evaluate threshold exceedances.

¹ SMUD uses the name of the Plan that conforms to License Article 401(a).

² SWRCB section 401 Water Quality Certification Condition 4B and Forest Service section 4(e) Condition No. 50.2 refer to this Plan as “recreation plan”.

³ The October 16, 2014 License amendment issued by FERC requires that SMUD submit the Whitewater Recreation Management Plan for South Fork Silver Creek within four years of the License.

⁴ Thresholds (referred to as “triggers” in the Project License) are metrics used to determine adjustments to the number of recreation streamflow release days.

1.2 PLANNING AREA

This Plan addresses whitewater boating use in the section of South Fork Silver Creek, referred to as the Ice House Run, which includes approximately 11 miles of river between Ice House Dam and Bryant Springs Bridge (Figure 1). The Ice House Run is located approximately 34 miles from Placerville, the nearest population center. The river flows through a mixture of public land within Eldorado National Forest and private land (Figure 1).

Access to the river may occur at various locations along the Ice House Run; however, boaters generally launch at Ice House Dam (the designated put-in) or Ice House Bridge (Figure 2) and take out at Bryant Springs Bridge (the designated take-out, Figure 3). Boaters who launch at Ice House Dam usually park in the designated parking area near the dam and hike approximately 0.25 mile to the river along a small paved road that leads down to the Ice House Dam release valve; unauthorized vehicles are precluded from driving on this road by a locked gate (Figure 2). Boaters who launch at Ice House Bridge or take-out at Bryant Springs Bridge usually park in currently undesignated parking areas adjacent to the bridge and road (Figures 2 and 3, respectively).

Secondary river access points include the U.S. Geologic Survey (USGS) gage (11441500) located approximately 0.4 mile downstream from Ice House Dam or Ice House Resort both of which require access through private property, Silver Creek Group Campground which requires reservation through the Forest Service (Figures 1 and 2), and Junction Reservoir Boat Ramp (Figures 1 and 3).

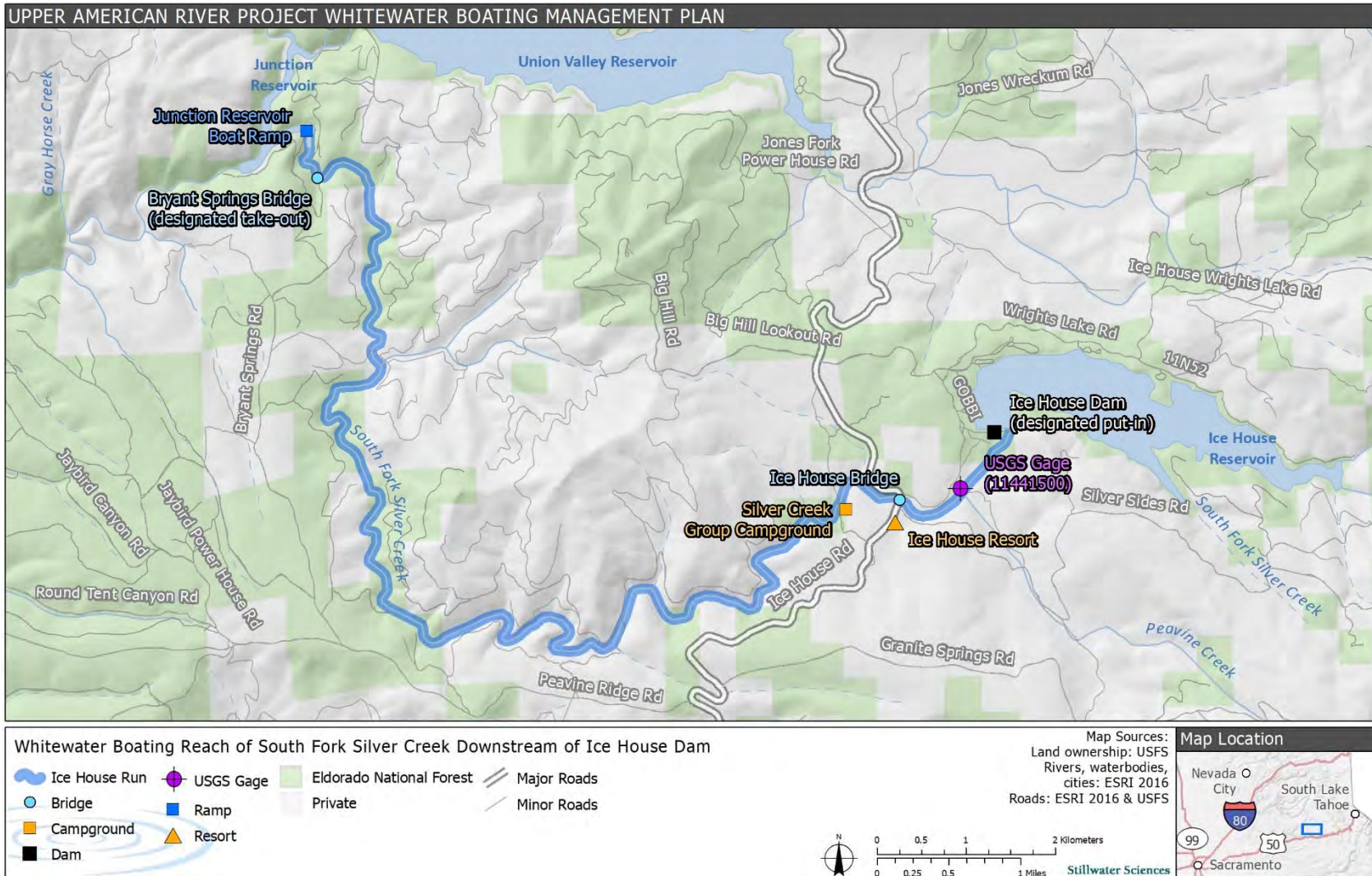


Figure 1. Map of the Ice House Run (South Fork Silver Creek downstream of Ice House Dam).



Figure 2. Ice House Run put-in access locations.



Figure 3. Ice House Run take-out parking locations within 0.25 miles (note that Junction boat ramp is not included in the 25 spaces quantified in Section 3.1).

2.0 FLOW MODIFICATION THRESHOLDS

This section describes the threshold monitoring metric for determining whether the flow schedule will be adjusted. The thresholds are based on several factors including: the License requirements; supply and demand, as reflected by availability and use of comparable runs; and three years (2015 – 2017) of baseline monitoring results.

2.1 RATIONALE

2.1.1 License Requirements

Boating use thresholds are used in an iterative approach to adjust the recreation flow schedule up to the maximum number of potential boating days required in the License. The License requires that within 5 years of License issuance and every 5 years thereafter, the Licensee will, in cooperation with the Consultation Group, determine whether use has exceeded thresholds defined in this Plan such that recreation streamflow days should be adjusted. Table 1 shows the flow schedule required for the first five years of the License (i.e., from 2015 through 2019) and the maximum number of days that could be required if the boating use threshold is exceeded. The 2015 through 2019 flow schedule is assumed to be the minimum number of release days that could be required if the boating use threshold is not exceeded. Whitewater flow releases are required from May through June between the hours of 10:00 a.m. and 3:00 p.m.

Table 1. Flow schedule for 2015 through 2019 and upper limit of potential flow adjustments.

Water Year Type	Minimum or Maximum Schedule	May	June
Critically dry	Minimum ¹	300 cfs/1 weekend day	None
	Maximum	300 cfs/2 weekend days	None
Dry	Minimum ¹	300 cfs/3 weekend days	None
	Maximum	300 cfs/6 weekend days	None
Below normal	Minimum ¹	400 cfs/2 weekend days or holidays and 500 cfs/2 weekend days or holidays	
	Maximum	400 cfs/5 weekend days or holidays and 500 cfs/2 weekend days or holidays	
Above normal	Minimum ¹	400 cfs/2 weekend days or holidays and 500 cfs/4 weekend days or holidays	
	Maximum	400 cfs/5 weekend days or holidays and 500 cfs/6 weekend days or holidays	
Wet	Minimum ¹	400 cfs/4 weekend days or holidays and 500 cfs/5 weekend days, holidays, or Fridays	
	Maximum	400 cfs/7 weekend days, holidays, or Fridays and 500 cfs/9 weekend days, holidays or Fridays	

cfs = cubic feet per second; Source: FERC 2014a

¹ The minimum release schedule was implemented during the first five years of the License (i.e., 2015 through 2019).

2.1.2 Comparable Runs

Information about comparable whitewater boating runs is relevant for assessing potential future demand and use. Table 2 shows how four other runs in northern California compare to the Ice House Run in terms of various attributes. These runs are located in mountainous regions at comparable elevations and mainly flow through undeveloped, forested land. Figure 4 shows proximity of comparable runs to the Ice House Run.

Table 2. Attributes of the Ice House Run and comparable whitewater boating runs.

Attribute	Ice House Run (South Fork Silver Creek)	Tiger Creek Dam Run (Mokelumne River)	Pit 5 Run (Pit River)	Chamberlain Falls Run (North Fork American River)	Our House Run (Middle Yuba River)
Difficulty ¹	Class III-IV	Class IV (<2,500 cfs)	Class III-IV	Class III-IV+	Class III-V
Run Length (mile)	11	3	9	4.8	7.85
Gradient (feet per mile)	110	72	81.5	41	68
Shuttle distance (mile)	9 (paved)	3 (gravel)	7 (gravel)	12 (paved and dirt)	10 (paved and dirt)
Proximity to a large city	--	About the same distance	Farther	About the same distance	About the same distance
Raft use possible (6+ person)	No	Yes	No	Yes	Yes
Existing commercial use	No	No	No	Yes	No
Existing level of boating use	Baseline average of 10 boaters per release day ²	Average of 83 boaters per release day ³	Average of 42 boaters per release day ⁴	Existing use likely higher because of commercial use ⁵	Existing use likely less because scheduled releases are not yet provided ⁵
Boating season	May-June	May-June	August-September	Winter, spring	April-May

cfs = cubic feet per second

¹ Based on Section IV. *International Scale of River Difficulty* of the Safety Code of American Whitewater (Walbridge and Singleton 2005).

² Baseline monitoring data collected from 2015 through 2017.

³ Monitoring data provided by PG&E for the 2014 and 2015 survey years. Although monitoring data reports the number of boats, SMUD assumes the units of measure are comparable enough for characterizing level of boating use in terms of the average number of boaters per release day because most of the use is by kayaks. Daily boating use ranged from 51 to 144 boats (or boaters) per release day. Note that boaters may make multiple runs in a single release day; however, multiple runs were not identified in the results (Hartman, pers. comm., 2018.)

⁴ Monitoring data for 2013 through 2016 survey years indicates daily boater use ranged from 14 to 90 boaters per day (referred to as "boater days" in the report). Multiple runs performed in a single release day were not included in this estimate (PG&E 2017).

⁵ Publicly available data could not be located.

The demand for future whitewater boating on the Ice House Run can be informed by analyzing the level of boating use for these comparable runs. Whitewater boating on the Chamberlain Falls Run requires a permit from the Auburn State Recreation Area and at least six outfitter guiding companies offer commercial trips—these circumstances are indicators of high demand for this type of whitewater boating experience. Yuba County Water Agency (YCWA) assessed whitewater boating on the Our House Run in 2012 (YCWA 2012). YCWA’s assessment concluded low whitewater boating use on the Our House Run in the past is attributed to hydropower project diversions and the lack of real-time flow information. However, because the run is popular with the local boating community and has considerable whitewater boating demand, YCWA’s FERC License application includes a measure to provide scheduled whitewater boating releases for the Our House Run. Evaluating whitewater boating use on the Tiger Creek and Pit 5 runs provides an indication of how boating use changes in the first few years after whitewater boating releases are instituted. Monitoring results for the Pit 5 Run from 2013 through 2015 show the lowest level of annual whitewater boating use (105 boaters per day) occurred in 2013, the first year PG&E provided releases suitable for whitewater boating. By 2016 the annual use more than doubled to 237 boaters per day. Similarly, the level of whitewater boating use on the Tiger Creek Run almost tripled from the first to the third year of releases—from 257 to 696 boats per year. Information about these four comparable runs suggests high whitewater boating demand can be expected for the Ice House Run.

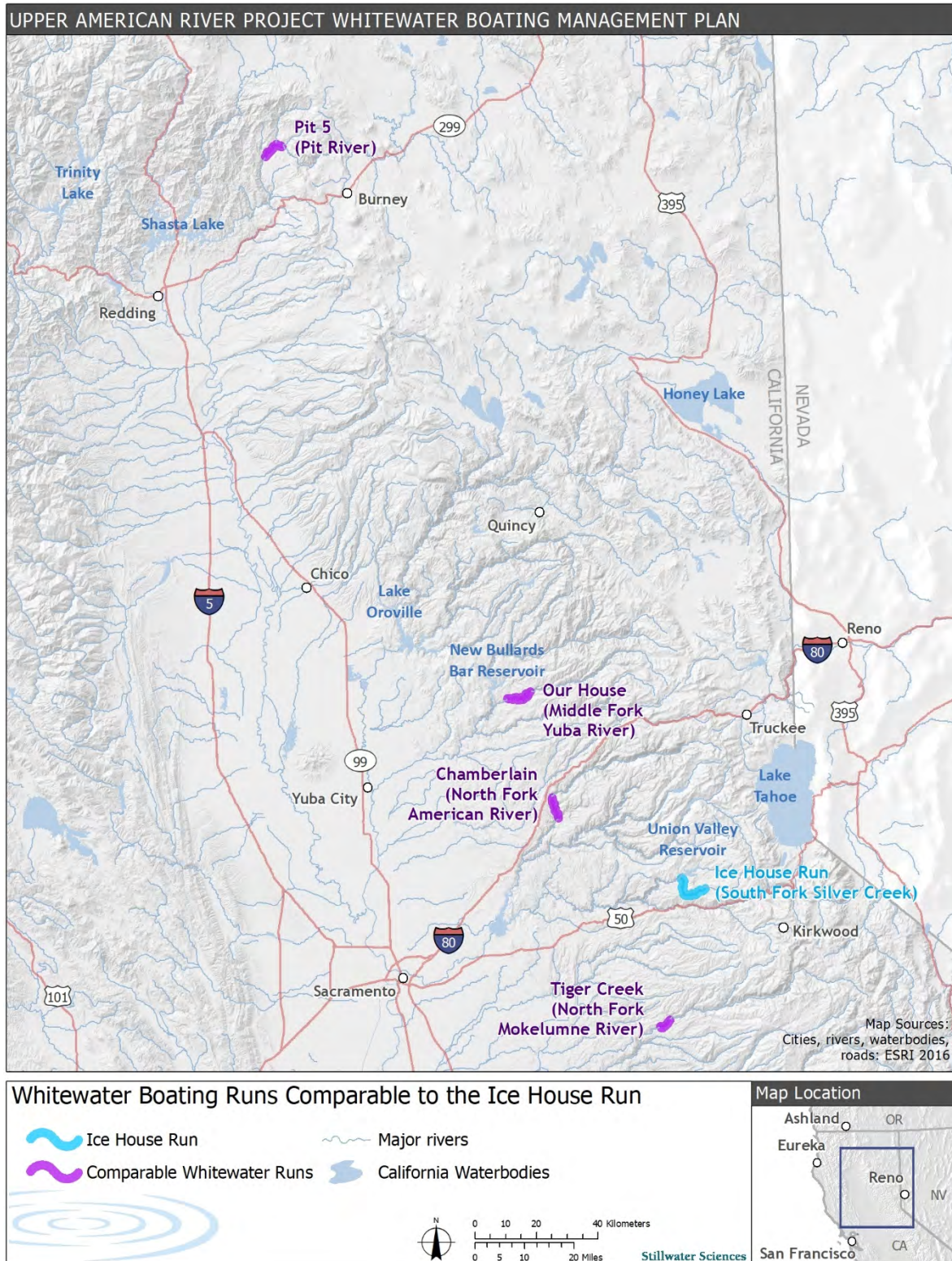


Figure 4. Whitewater boating runs comparable to the Ice House Run.

2.1.3 Baseline Monitoring Results (2015 through 2017)

SMUD monitored whitewater boating use during the first three years of the Project License, 2015 through 2017, by tabulating observations of whitewater boating-related activities and summarizing responses to post-trip interviews. Table 3 summarizes some of the key monitoring results that show the low level of existing use in the first three years of the License. Commercial whitewater boating trips did not occur from 2015 through 2017.

Because the required annual number of days to provide whitewater boating flow depends on the water year type⁵, whitewater boating flows were provided on one, six and nine days during 2015, 2016, and 2017, respectively. During the first three years of the License the annual average daily number of boaters was 25, 13, and 6 boaters per release day, respectively, and the annual average daily number of boaters over the 3-year monitoring period was about 10 boaters per release day.

Table 3. Baseline monitoring results of number of observed whitewater boaters and numbers and types of boats, 2015 through 2017.

Year/No. of days with whitewater boating releases	No. of Boaters and Groups ¹		No. of Boats				Total
	Boaters	Groups	Kayaks		Rafts		
			Hardshell	Inflatable	Paddle	Oar	
2015/1 day ²	25	8	25	3	0	0	28
2016/6 days	79	22	62	3	8	0	72
2017/9 days	53	15	34	8	5	0	47

¹ All non-commercial boating use.

² Not included in the totals values is 1 group of 4 hardshell kayakers who performed multiple runs.

Source: SMUD Whitewater Boating Database 2018

Information obtained during post-trip interviews provides insight about boater logistics for the Ice House Run and indicate that whitewater boaters find the level of use acceptable in terms of the quantity of flow and quality of their experience. The post-trip interview responses indicate:

- Most whitewater boaters launched near Ice House Dam (the designated put-in) and a few boaters launched near Ice House Resort.
- Whitewater boaters ended their trips at Bryant Springs Bridge unless an unexpected event (e.g., boat damage) occurred.
- Whitewater boaters were not constrained by parking availability near Ice House Dam (maximum number observed was 32 vehicles), Bryant Springs Bridge

⁵ Water year types are specified SWRCB Condition No. 1 and Forest Service Condition No. 27 (Appendices A and B of the License, respectively).

(maximum number observed was 10 vehicles), Ice House Bridge or along Forest Road 11N98B (between Ice House Bridge and Ice House Dam).

- Whitewater boaters rarely encountered other boaters during their trips; none were negatively affected by their encounters (Table 4).
- Whitewater boating use and associated parking did not create conflicts with non-whitewater recreation use in the run.
- Hardshell kayaks accounted for most of the whitewater boating use.
- Commercial use did not occur.
- Congestion and crowding did not occur at put-in and take-out locations or along the run.
- Whitewater boaters commonly made only one run in a day. In 2015, 25 boaters made a total of 29 launches but multiple runs were not made in 2016 and 2017.
- Flows of 400 and 500 cubic feet per second (cfs) are suitable for small rafts (about 11 feet or less in length).
- All boaters said they would return to boat the flow provided on the day of their trip however, boaters generally prefer flows in the 400 to 500 cfs range (Table 5).

Table 4. On-river encounters reported during baseline monitoring post-trip interviews.

Year	Number of Interviews	Number of Encounters	Encounter Effect			
			Negative	Positive	None	No Response
2015	9	6	0	0	5	1
2016	23	18	0	0	11	7
2017	13	3	0	0	3	0
Total	45	27	0	0	19	8

Table 5. Number of post-trip survey responses assessing flows released during baseline monitoring (2015 – 2017).

Release Flows (cfs)	Number of Responses by Category		
	Too high	Just right	Too Low
336	0	3	6
409–415	0	9	6
508–516	2	11	2
617	2	3	1

cfs = cubic feet per second

As evidenced by the lack of perceived crowding on the water and excess parking capacity at the designated put-in and take-out, the initial number of flow release days required by the License provided sufficient capacity to accommodate the level of annual use that occurred from 2015 through 2017. Further, the most limiting parking capacity exists at Bryant Springs Bridge and it appears the level of use would have to significantly increase before parking capacity at this location would be a constraint.

2.2 THRESHOLD MONITORING METRIC FOR ADJUSTING FLOWS ON SOUTH FORK SILVER CREEK

2.2.1 Monitoring Metrics Considered for Detecting Threshold Exceedance

Thresholds for changing the number of days with flow releases could be based on one or more monitoring metrics that relate to whitewater boating demand and quality of the run. Table 6 lists possible monitoring metrics associated with demand and run quality indicators, as well as some of the strengths and weaknesses of each metric.

Table 6. Monitoring metrics considered for setting thresholds.

Threshold Monitoring Metric	Strength	Weakness
Demand Indicator Metrics		
Daily average number of boaters using the run	<ul style="list-style-type: none"> Easily compared to baseline data 	<ul style="list-style-type: none"> Requires intensive observation for data collection
Daily average number of boaters launching	<ul style="list-style-type: none"> Simple data collection and analysis Easily compared to baseline data 	<ul style="list-style-type: none"> Potentially underestimates use if boaters launch at unmonitored location
Daily average number of boaters taking out	<ul style="list-style-type: none"> Simple data collection and analysis Easily compared to baseline data 	<ul style="list-style-type: none"> Potentially underestimates use if boaters take out at unmonitored location
Daily Average number of boating trips	<ul style="list-style-type: none"> Refines whitewater boating demand in terms of numbers of trips on the run in a day 	<ul style="list-style-type: none"> Requires an intensive monitoring effort to detect boaters making short, multiple runs in a single day and minimize error Requires reanalysis of baseline data for comparability
Average peak parking occupancy	<ul style="list-style-type: none"> Easily compared to baseline data Measures the most likely potential use constraint 	<ul style="list-style-type: none"> High potential for data collection error because assumes vehicles associated with boating and non-boating use can be distinguished Rigorous monitoring effort in terms of staffing for data collection
Run Quality Indicator Metrics		
Waiting at put-in, take-out, or rapids that require scouting	<ul style="list-style-type: none"> Simple (binary) data collection and analysis Strong correlation to run quality 	<ul style="list-style-type: none"> Tolerance for waiting and crowding is not consistent among all boaters Wide range of possible thresholds Requires many post-trip interviews Requires reanalysis of baseline data for comparability
Perceived crowding		

2.2.2 Monitoring Metric Identified for Detecting Threshold Exceedance

SMUD evaluated the monitoring metrics shown in Table 6 with regard to:

- Correlation to baseline use levels and patterns;
- Accuracy for determining whitewater boating use and indicating trends over a 5-year monitoring period;
- Comparability to baseline monitoring data; and
- Cost efficiency for monitoring data collection and analysis.

The monitoring metric that best meets these objectives is the *5-year daily average number of boaters* arriving at the Bryant Springs Bridge take-out because baseline monitoring results show:

- Boaters rarely made multiple runs in a day so the selected monitoring metric does not need to accommodate this use pattern (Table 3).
- The selected monitoring metric should be independent of other uses or influences. The parking area near Ice House Dam is used by non-boaters visiting the adjacent day use area on the Ice House shoreline. Non-boating parking also occurs at the Bryant Springs Bridge, Ice House Bridge, and along the shoulder of Forest Road 11N98B near the upstream end of the run.
- On-water crowding would not be a useful monitoring metric because low and entirely non-commercial use of the run results in low potential for on-water crowding to occur. Further, this metric has a high degree of subjectivity because boaters have different tolerances for waiting and encountering other boaters.
- Despite their put-in location and unless prevented by an unexpected event (e.g., boat damage), whitewater boaters almost exclusively ended their trips at Bryant Springs Bridge. Monitoring use at this location would account for nearly all boaters who do not end their trips at the bridge due to boat damage or other rare events.

Further, the monitoring metric of a 5-year average daily number of boaters is preferred because it:

- Reflects demand in terms of the actual number of boaters using the run and can be used to identify use trends;
- Allows direct comparison to baseline and ongoing monitoring data;
- Provides for accurate, cost-efficient data collection and analysis;
- Allows for consistent and simple interpretation of monitoring results to determine whether a threshold for adjusting the flow schedule has been achieved; and

- Reduces annual variability in whitewater boating use that may be affected by external factors such as weather and flows occurring in other nearby runs.

3.0 ADAPTIVE STREAMFLOW MANAGEMENT

Adaptive management procedures for adjusting flow schedules based on threshold exceedances are described below.

3.1 FLOW SCHEDULE ADJUSTMENTS DUE TO THRESHOLD EXCEEDANCES

The decision to modify the flow regime will be based on the approximate capacity of the run as reflected by a constraining factor, such as a site constraint. While information on boater experience will be collected, flow modifications will be based on triggers established from actual boater use as specified by the SWRCB section 401 Water Quality Certification, Condition 4B (see Appendix A). Although the demand for the Ice House Run appears high relative to comparable runs, and would likely increase as boaters become more familiar with the run, baseline monitoring data analyzed for the first three years of the License indicates low whitewater boating use and no concerns about crowding or congestion. Based on post-trip interview data that indicates boaters did not feel crowded during the first three years of streamflow releases⁶ (see Section 2.3.1), and that the run is used primarily by small crafts, it is reasonable to assume the run could accommodate significantly higher boating use without affecting run quality in terms of crowding or congestion. Therefore, the boaters' experience from the first three years of monitoring provided no indication of a constraint.

Parking capacity at Bryant Springs Bridge is the most likely constraint for whitewater boating use on the Ice House Run; however, parking is not a suitable metric for adjusting flow schedules (see Section 2.2.2). Regression analysis of the baseline data was used to predict the total number of boaters per release day based on the number of vehicles parked at Bryant Springs Bridge. A significant relationship was found ($F_{1,12} = 101.98$, $p < .001$), with an R^2 of 0.856 (Figure 5). This relationship suggests that a threshold for increasing the number of release days based on the number of boaters can be predicted from the maximum parking occupancy at Bryant Springs Bridge.

⁶ Twenty-seven of 45 boaters said they encountered other boaters during their trips, 19 of which said their encounters did not affect their experience (8 responses were not obtained). These responses were collected on streamflow release days when total daily use was as high as 27 boaters.

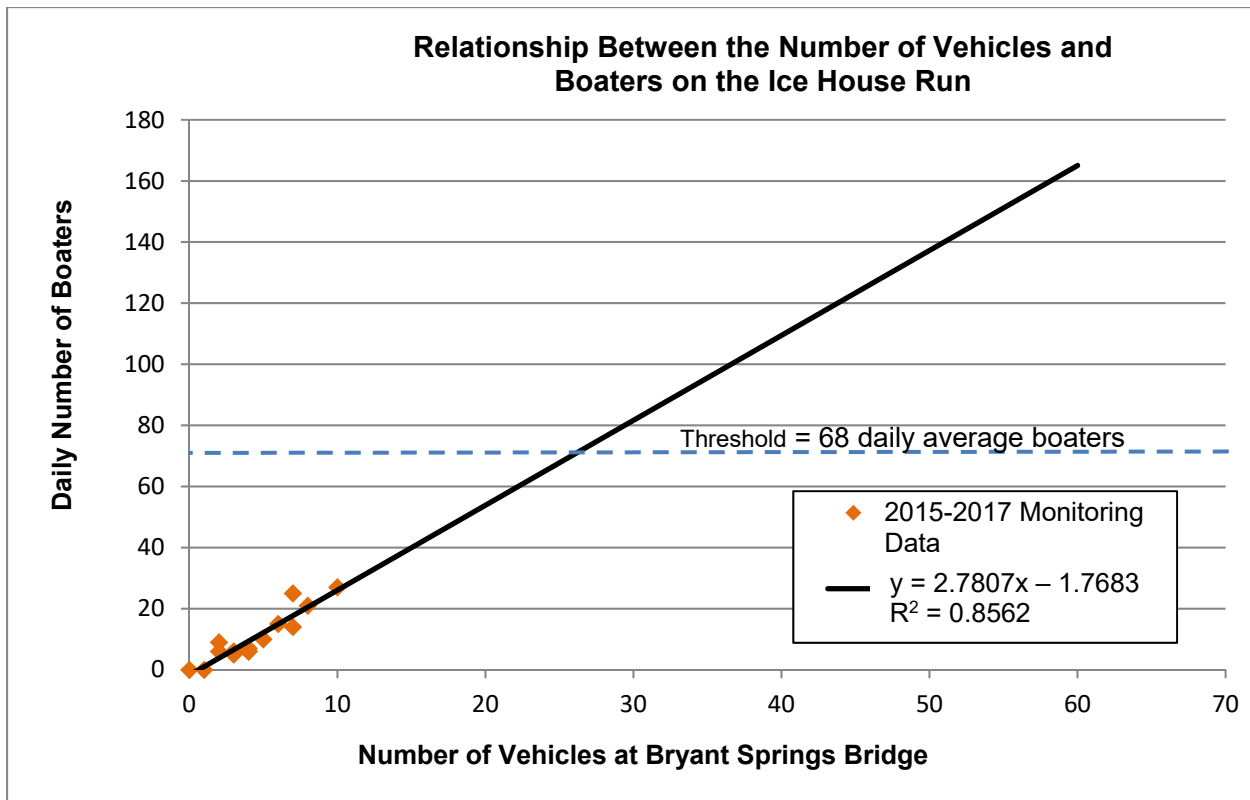


Figure 5. Linear regression of the daily number of boaters on the Ice House Run and the number of vehicles parked at Bryant Springs Bridge for 2015 through 2017.

The estimated single-vehicle parking capacity within 0.25 mile of Bryant Springs Bridge is approximately 25 spaces⁷ which, based on the predictive model, correlates to approximately 68 boaters per release day (Figure 5). For the purposes of establishing a boating use threshold for the Ice House Run, a 5-year daily average of 68 boaters per release day is a reasonable estimate of the level of use that would require adding days to the flow schedule. This threshold would be about 18 percent less than the average level of use observed in 2016 and 2017 on Tiger Creek Run of 83 boaters per release day. Assuming the level of use on the Tiger Creek Run represents a level of use that does not exceed resource capacity, boating use of up to 68 boaters per release day on the Ice House Run is not expected to exceed resource capacity in terms of crowding and congestion. Boater density on the Ice House Run with 68 boaters per day would be lower than boater density on the Tiger Creek Run with 83 boaters per day considering the Ice House Run is about four times longer than the Tiger Creek Run and it has a one hour longer release period. Additionally, a use level of 68 boaters per day on the Ice House Run is not expected to create congestion at the put-in. Baseline monitoring indicated 90 percent of the boaters launched within a 3-hour period from about 10 a.m. to 1 p.m. At a use level of 68 boaters per day, about 23 boaters per hour could be

⁷ Based on field observations of currently available parking areas assuming vehicles are parked in an orderly and safe manner that does not obstruct traffic on Bryant Springs Road. Parking capacity may be reevaluated following planned parking improvements in 2024.

expected to launch during the peak launch window. Given this capacity can be accommodated at both the put-in and take-out, a level of use up to 68 boaters per day should not negatively affect boaters' in terms of crowding and congestion.

An adjustment to the number of release days will be determined using the following equation:

$$R(B, P, c) = \begin{cases} \text{license min}, & \frac{B}{c} \cdot P \leq \text{license min} \\ \left[\frac{B}{c} \cdot P \right], & \text{license min} < \frac{B}{c} \cdot P < \text{license max} \\ \text{license max}, & \frac{B}{c} \cdot P \geq \text{license max} \end{cases} \quad (\text{eq.1})$$

where R is the number of days to release for the given water year (Table 1); B is the average daily number of boaters calculated from the 5-year monitoring period; P is the number of release days during the 5-year monitoring period for a given water year type; and c is the capacity threshold. R should be rounded to the nearest integer. If R is less than the minimum number of days in the License (Table 1), then the minimum number of days in the License will be implemented. If R is greater than the maximum number of days in the License (Table 1), then the maximum number of days in the License will be implemented. Table 6 provides an example of how the number of release days for each water year type will change based on Equation 1.

This approach assumes an association between the number of boaters and the number of release days, and approximates the number of days to release (R) based on the previous 5-year monitoring period flow schedule (P). For example, if the average daily number of boaters calculated for the 5-year monitoring period is less than or equal to 68 boaters per release day (Years 1-5, Years 6-10, and Years 11-15 in Table 7), then the number of days to release during the succeeding 5-year period (Years 16-20 in Table 7) will be the minimum flow schedule described in Table 1. If the average daily number of boaters calculated for the 5-year monitoring period increases to a level of use that is greater than the capacity threshold of 68 boaters per release day (Years 16-20 in Table 7), then the number of days to release during the succeeding 5-year period (Years 21-25 in Table 7) will increase depending on water year type. If, after exceeding the threshold, the average daily number of boaters calculated for the 5-year monitoring period decreases to a level of use less than or equal to 68 boaters per release day (Years 21-25 in Table 7), then the number of days to release during the succeeding 5-year period (Years 26-30 in Table 7) will proportionally decrease for a given water year type. Example calculations are provided for Years 31-35.

The priority for adding release days is to add days at the lowest specified flow, with the following priority for the type of day (1) weekend days, (2) holidays, then (3) Fridays. Where the schedule specifies release days of more than one flow quantity, the priority for adding release days to the schedule begins with the lowest flows (e.g., 400 cfs) until the maximum number of release days specified for that flow is achieved and then

adding days at the next highest flow, applying the same priority for the type of day (e.g., weekend) where only one flow quantity is specified.



Table 7. Example of the number of release days for each 5-year interval following issuance of the License calculated from the threshold equation $R = B/c * p$.

Water year type	<i>R</i> Years 1-5	<i>R</i> Years 6-10	<i>R</i> Years 11-15	<i>R</i> Years 16-20	<i>R</i> Years 21-25	<i>R</i> Years 26-30	<i>R</i> Years 31-35
<i>B</i> (avg. daily no. boaters observed)	10	50	80	130	95	140	--
Critically dry	1	1	1	1	2	2	$(140/68) * 2 = 4.1$ License min < <i>R</i> < License max, <i>R</i> =2
Dry	3	3	3	4	6	6	$(140/68) * 6 = 12.3$ License min < <i>R</i> < License max, <i>R</i> =6
Below normal	4	4	4	5	7	7	$(140/68) * 7 = 14.4$ License min < <i>R</i> < License max, <i>R</i> =7
Above normal	6	6	6	7	11	11	$(140/68) * 11 = 22.6$ License min < <i>R</i> < License max, <i>R</i> =11
Wet	9	9	9	11	16	16	$(140/68) * 16 = 32.9$ License min < <i>R</i> < License max, <i>R</i> =16

R is the number of days to be released for a given water year (Table 1),
B is the average daily number of boaters calculated for the 5-year monitoring period
P is the number of release days for the previous 5-year monitoring period flow schedule
c is the capacity threshold of 68 boaters per release day.
¹ Example of how *R* values are calculated for each 5 year period.

3.2 OTHER FLOW SCHEDULE ADJUSTMENTS

Other adjustments to the flow schedule may be necessary to address emergency conditions or, if approved by the Forest Service and SWRCB, improve cost efficiency while continuing to provide quality whitewater boating in the run by adjusting the frequency and magnitude of flows in the flow schedule within the total volume of water necessary to provide the releases specified in Table 1 or as modified in the future. This section explains the actions associated with adjusting the flow schedule that are unrelated to achieving thresholds.

3.2.1 Modifications, Cancellations, and Safety Concerns

SMUD will make a good faith effort to maintain project operability and schedule outages so whitewater boating flows can be provided as specified in Table 1 or as modified in the future. Further, SMUD will make a good faith effort to provide flow releases consistent with the schedule it develops at the beginning of each season identifying specific release dates. However, it may be necessary to change the frequency, duration, magnitude, day of the release or cancel flow releases and the flow schedule may be temporarily modified under the following circumstances:

- State or federal electrical emergencies where specific orders are issued or specific actions are mandated by an appropriate authority, requiring the Licensee to produce electricity outside normal planned operations;
- System events that cause the operating reserves to drop below the Western Energy Coordinating Council Minimum Operating Reliability Criteria.
- Equipment malfunction, public safety emergency, or law enforcement activity.⁸
- Short term non-emergency conditions, if approved by the Forest Service and SWRCB.

3.2.2 Release Flow Magnitude and Duration

The License includes a provision to adjust, if approved by FERC, Forest Service, and SWRCB, release flows within the total volume of water necessary to deliver the releases specified in Table 1 or as modified in the future. Such flow adjustments provide flexibility in the future to address needs such as whitewater boater preferences (e.g., higher or lower flows, longer or shorter duration) or better water management.

4.0 MONITORING

Although the License order does not specify monitoring requirements for the Ice House Run, SMUD submitted to FERC, on January 23, 2015, a Whitewater Boating Monitoring

⁸ This includes road closures that may prevent access to the Ice House run.

Plan (FERC 2015) and included monitoring methodology for South Fork Silver Creek downstream of Ice House Dam⁹. SMUD developed the monitoring plan in consultation with the Forest Service, BLM, SWRCB, and American Whitewater. The three years of baseline monitoring was conducted consistent with procedures identified in the monitoring plan.

4.1 METHODS

The following monitoring methods reflect lessons learned from monitoring the first three years of whitewater release flows in the Ice House Run and are intended to replace and supersede all applicable sections of the Whitewater Boating Monitoring Plan (FERC 2015). Data collection methods described here will directly inform the monitoring metric used to determine threshold exceedances described in Section 2 of this Plan.

4.1.1 Boating Use

Monitoring will occur annually during each scheduled streamflow release day. This Plan identifies a 5-year daily average number of boaters arriving at the take-out (Bryant Springs Bridge) as the most informative monitoring metric for evaluating use and demand on the Ice House Run. On each streamflow release day, one observer will collect data at Bryant Springs Bridge from 12:00 to 19:00. Data collection at Bryant Springs Bridge will include number of boats, boat types, number of boaters, number of boater groups, commercial status, number of runs, number of vehicles and trailers by parking location (1-hr sampling interval), non-boating recreation use by activity type, and photo documentation.

Post-trip interviews will be conducted within five days of each streamflow release date to collect crowding and user experience information. A minimum of 15 interviews (if available) will be attempted following each streamflow release date. For consistency, the same researcher will conduct all interviews in a monitoring year whenever possible. Post-trip data collection will include skill level, shuttle approach, facility satisfaction (scale of 1-10), multiple runs (yes/no), safety issues (yes/no), large woody debris location, encounter effects (yes/no), flow satisfaction (scale of 1-10), and run quality (scale of 1-10). Appendix C contains the detailed set of the questions and topics the researcher uses to conduct the post-trip interviews.

Photos will be obtained on the first and last day of streamflow releases in each season to identify potential environmental impacts of whitewater boating use. Photos will be taken at areas where boaters put-in and take-out at Ice House Dam, Ice House Bridge, and Bryant Springs Bridge. The intent of the photos is to document any impacts such as

⁹ The License requires that SMUD monitor all boating use on the South Fork American River downstream of Slab Creek Dam when recreational boating flows are provided, from within three months of License issuance to at least Year 5. The 2015 Whitewater Monitoring Plan includes monitoring protocols for the Slab Creek and Ice House runs.

bare soil, erosion, and vegetation removal or damage. Photos will be taken at similar locations each year to facilitate comparison.

All data will be entered into the SMUD Whitewater Boating Database immediately following each streamflow release weekend. Photos will be catalogued by location, survey date, and captioned with noteworthy observations (e.g., bank erosion), if present.

4.1.2 Large Woody Debris

Large woody debris monitoring will rely on information collected during post-trip interviews. Individuals will be asked whether large woody debris located on National Forest System land impeded or obstructed whitewater boating use. If problematic large woody debris is identified, the researcher will attempt to obtain the location and general characteristics (preferably with photographs and/or videos) of the hazard.

4.2 REPORTING

The reporting frequency and details for boating use and large woody debris findings are described below.

4.2.1 Boating Use

Within five years of License issuance and every five years thereafter, SMUD will, in cooperation with the Consultation Group, prepare a report that: (1) describes whitewater recreation use and impacts observed during the previous five years of monitoring; (2) notes whether use has exceeded the thresholds described in Section 2 of this Plan; and (3) recommends whether the number of streamflow days should be increased or decreased based on the adaptive management approach described in Section 3 of this Plan. After the report is approved by the Forest Service and SWRCB, SMUD will file the report with FERC for approval.

4.2.2 Large Woody Debris

SMUD will annually review post-trip interview responses and coordinate with the Forest Service, California Department of Fish and Wildlife, and the Consultation Group regarding large woody debris that is hazardous to recreation streamflow users. Reporting for large woody debris is not specifically required by the License.

5.0 CONSULTATION AND NOTIFICATION PROCEDURES

SMUD will consult with agencies and members of the whitewater boating community regarding monitoring results, flow schedule adjustments, and large woody debris hazard treatment. SMUD will also notify agencies and the whitewater boating community about any implemented changes to the flow schedule.

5.1 FIVE YEAR MONITORING REPORT

Beginning in 2020 and every five years thereafter, SMUD, in consultation with the Consultation Group, will prepare a report that includes a determination of whether whitewater boating use has achieved a threshold for modifying the flow schedule. Following consultation, SMUD will file the report with FERC. If monitoring results result in changes to the flow schedule, SMUD will implement the modified schedule beginning in the subsequent flow season.

5.2 FLOW SCHEDULE ADJUSTMENTS

SMUD will notify FERC and the Consultation Group if scheduled releases are modified or canceled because of any of the unexpected events listed in the first three bulleted items in Section 3.2.1. SMUD will provide notification as soon as possible but no later than 10 days after such an event occurs.

SMUD will request approval from the Forest Service and SWRCB for any temporary modification of the flow schedule for a non-emergency reason. If approved and the schedule is so modified, including release cancelations, SMUD will notify FERC and the Consultation Group as soon as possible. Notifications will also be provided on SMUD's website that provides streamflow and reservoir level information.¹⁰

5.3 LARGE WOODY DEBRIS

By August 15 of each year SMUD will annually compile information on large woody debris hazards obtained during post-trip interviews with boaters and information provided by key members of the whitewater boating community. If large woody debris hazards on National Forest System land are identified that need to be addressed, SMUD will convene a meeting no later than August 30 and invite agencies, including the Forest Service and SWRCB, and members of the whitewater boating community. Meeting participants will review the information compiled by SMUD and discuss options for addressing concerns associated with the large woody debris hazards. SMUD will solicit a proposal for treating the identified large woody debris from the Forest Service, including the agency's approval for SMUD to implement the treatment. SMUD will evaluate the Forest Service proposal with regard to personnel safety and if determined to be safe, SMUD will implement the treatment within 30 days of receiving Forest Service approval. SMUD will make a good faith effort to complete approved treatments by mid-October.

¹⁰ Required by the Forest Service Condition No. 51, Public Information Services and SWRCB Condition No. 7, Streamflow and Reservoir Level Information

6.0 LITERATURE CITED

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Appendix A
State Water Resources Control Board section 401
Water Quality Certification, Condition 4B

4.B. South Fork Silver Creek below Ice House Reservoir Dam

Initial Period

Within three months after License issuance and continuing through the first five years after License issuance, the Licensee shall provide the recreation streamflows displayed in Table 18:

Table 18. Recreation Flows: South Fork Silver Creek below Ice House Reservoir Dam (First Five Years After License Issuance)				
Water Year Type	Month	Flow (cfs)	Time	Duration
CD	May	300	10 am-3 pm	1 weekend day
D	May	300	10 am- 3 pm	3 weekend days
BN	May/June	400 Plus* 500	10 am- 3 pm	2 weekend days/holidays Plus* 2 weekend days/holidays
AN	May/June	400 Plus* 500	10 am- 3 pm	2 weekend days/holidays Plus* 4 weekend days/holidays
W	May/June	400 Plus* 500	10 am- 3 pm	4 weekend days/holidays or Fridays Plus* 5 weekend days/holidays or Fridays

* Two different flow levels are required for the specified number of days.

Consultation and Monitoring

Prior to the end of the first five-year period, the Licensee shall prepare a Recreation Plan for approval by the Deputy Director to determine triggers, based on actual boating use, for establishing when the Licensee shall increase the number of days of recreation streamflows to be provided. Boating days shall not exceed the total amount displayed in Table 19. Table 19 contains the required recreation flows for Silver Creek below Ice House Reservoir Dam for years subsequent to the initial five-year period following License issuance if the triggers in the Recreation Plan are met. The frequency and magnitude of the boating flows may be adjusted within the total volume of water displayed in the tables upon approval of the Deputy Director. The Licensee shall file the Deputy Director's approval, together with any required modifications, with the Commission.

Within five years of License issuance and every five years thereafter, the Licensee shall, in cooperation with USFS, prepare a report that: (1) describes whitewater recreation use and impacts; (2) notes whether use has exceeded the triggers defined in the Recreation Plan; and (3) makes a recommendation whether the streamflow days should be increased based on the triggers in the Recreation Plan. Boating days shall

not exceed the total amount displayed in Table 19. This report shall be provided to the Deputy Director, who shall determine whether the streamflow days should be increased and/or the frequency and magnitude of the boating flows should be adjusted within the total volume of water displayed in the tables based on the triggers in the Recreation Plan. The Deputy Director may require modifications as part of the approval. The Licensee shall implement any changes to the streamflow days upon receiving Deputy Director and all other necessary approvals. The Licensee shall file the Deputy Director's approval, together with any required modifications, with the Commission.

Table 19. Recreation Flows: South Fork Silver Creek below Ice House Reservoir Dam (Year 6 through the License Term and Any Extensions)				
Water Year Type	Month	Flow (cfs)	Time	Duration
CD	May	300	10 am-3 pm	2 weekend days
D	May	300	10 am- 3 pm	6 weekend days
BN	May/June	400 Plus* 500	10 am- 3 pm	5 weekend days/holidays Plus* 2 weekend days/holidays
AN	May/June	400 Plus* 500	10 am- 3 pm	5 weekend days/holidays Plus* 6 weekend days/holidays
W	May/June	400 Plus* 500	10 am- 3 pm	7 weekend days/holidays or Fridays Plus* 9 weekend days/holidays or Fridays

* Two different flow levels are required for the specified number of days.

Modification of Recreational Streamflows

All provisions for recreational streamflows are subject to the safe operation of the UARP facilities and equipment necessary to provide such streamflows. The Licensee shall maintain all UARP facilities and equipment in good working order. The Licensee shall not schedule discretionary UARP facility or equipment outages in conflict with providing the recreation streamflows described in Tables 18 and 19. The Licensee shall provide scheduled recreation streamflows on the days when such releases are forecast to occur, except as described below. The recreation streamflows described above may be temporarily modified for:

- State or federal electrical emergencies where specific orders are issued, or specific actions are mandated by an appropriate authority, requiring the Licensee to produce electricity outside normal planned operations;
- System events that cause the Operating Reserves to drop below the Western Energy Coordinating Council Minimum Operating Reliability Criteria; or
- Equipment malfunction, public safety emergency, or law enforcement activity.

If the described recreation streamflows are so modified, the Licensee shall provide notice to the Commission, SWRCB, Forest Service, and members of the boating community as soon as possible but no later than 10 days after such incident. The described recreation streamflows may also be temporarily modified for short periods in non-emergency situations upon approval of the Deputy Director. If the described recreation streamflows are so modified, the Licensee shall provide notice to the Commission, SWRCB, Forest Service, and members of the boating community as soon as possible.

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Appendix B
U.S. Department of Agriculture, Forest Service
section 4(e) Condition No. 50.2

50.2. South Fork Silver Creek Below Ice House Reservoir Dam

Within 3 months after License issuance, the Licensee shall provide the recreation streamflows displayed in the following tables for the first 5 years after License issuance:

Recreational Streamflows for South Fork Silver Creek Below Ice House Reservoir Dam

Water Year Type	January – April	May	June	July - December
CD		300 cfs for 1 weekend days ¹		
D		300 cfs for 3 weekend days		
BN		400 cfs for 2 weekend days/holidays PLUS 500 cfs for 2 weekend days/holidays		
AN		400 cfs for 2 weekend days/holidays PLUS 500 cfs for 4 weekend days/holidays		
W		400 cfs for 4 weekend days/holidays or Fridays PLUS 500 cfs for 5 weekend days/holidays or Fridays		

Flows shall be provided between the hours of 10:00 am and 3:00 pm.

Prior to the end of the 5-year period, the Licensee shall, *in cooperation with the Consultation Group*, prepare a recreation plan that is approved by FS, to determine triggers for establishing when the Licensee shall increase the number of days of recreation streamflows to be provided. Within 5 years of License issuance and every 5 years thereafter, the Licensee shall, in cooperation with FS *and the Consultation Group*, prepare a report describing whitewater recreation use and impacts, whether use has exceeded predetermined triggers such that recreation streamflow days should be adjusted. Boating days shall not exceed the total amount displayed in the table below;

however, the frequency and magnitude of the boating flows may be adjusted within the total volume of water displayed in the tables upon approval of the FS. This report shall be filed with FERC, following FS approval.

Water Year Type	January – April	May	June	July - December
CD		300 cfs for 2 weekend days ¹		
D		300 cfs for 6 weekend days		
BN		400 cfs for 5 weekend days/holidays PLUS 500 cfs for 2 weekend days/holidays		
AN		400 cfs for 5 weekend days/holidays PLUS 500 cfs for 6 weekend days/holidays		
W		400 cfs for 7 weekend days/holidays or Fridays PLUS 500 cfs for 9 weekend days/holidays or Fridays		

1. Flows shall be provided between the hours of 10:00 am and 3:00 pm.

The Licensee shall annually, in cooperation with the FS, *CDFG*, and the *Consultation Group*, identify large woody debris that is hazardous to recreation streamflow users. The Licensee shall relocate within the channel the large woody debris upon approval of the FS.

All provisions for recreation streamflows are subject to the safe operability of the Project facilities and equipment necessary to provide such streamflows. The Licensee shall make a good faith effort to maintain the operability of such Project facilities and equipment and shall not schedule discretionary outages of such Project facilities and equipment in conflict with providing the recreation streamflows described above. The Licensee shall make a good faith effort to provide scheduled recreation streamflows on the days when such releases are forecast to occur.

The recreation streamflows described above may be temporarily modified for: (1) state or Federal electrical emergencies declared by an appropriate authority where specific orders are issued or specific actions are mandated by said authority that require the Licensee to produce electricity outside normal planned operations; (2) system events that cause the Operating Reserves to drop below the Western Energy Coordinating Council Minimum Operating Reliability Criteria; or (3) equipment malfunction, public safety emergency, or law enforcement activity. If the described recreation streamflows are so modified, the Licensee shall provide Notice to *FERC and FS* as soon as possible but no later than 10 days after such incident. The described recreation streamflows may also be temporarily modified for short periods in non-emergency situations upon approval of FS for areas within their jurisdiction. If the described recreation streamflows are so modified, the Licensee shall provide Notice to *FERC and FS*.



Appendix C
Questions and Discussion Topics Used to Conduct Post-trip Interviews with Boaters

Information from Data Sheet:

Run:

Run date:

Flow (cfs):

No. in Group:

Name:

Phone:

Questionnaire:

1. Boater Information
 - a. What is your residence city?
 - b. Craft?
2. Shuttle Approach
 - a. What did you do for shuttle (e.g., vehicle drop/bike/shuttle driver)?
 - b. How many vehicles did you leave at each location (put-in & take-out):
3. Put-in/Take Out Logistics
 - a. Where did you put-in?
 - i. Did you have to wait to launch? Why?
 - ii. On a scale of 1 to 10, were you satisfied with the Put-in? If less than 6 – Why?
 - b. Where did you take-out?
 - i. Did you have to wait to take-out? Why?
 - ii. On a scale of 1 to 10, were you satisfied with the Take Out? If less than 6 – Why?
4. Multiple Runs
 - a. How many runs did you make?
 - b. Other runs on other reaches or rivers that weekend?
 - c. Other runs on other reaches or rivers considered?
5. Safety Issues
 - a. Did you have any safety issues? (What/Where)
 - b. Did you have any portages? How many and why?
 - c. Did you have any scouts? How many and why?
6. Encounter Information
 - a. Did you see anyone else when you were on the river?
 - b. Did it positively or negatively affect your experience, or have no effect?
7. Individual Skill Level
 - a. Class III: Intermediate; Class IV: Advanced; Class V: Expert
8. Flow Satisfaction
 - a. Based on your personal skill level, was the flow too high, too low, or just right? Why?
 - b. Would you return at the flows you experienced?
 - c. On a scale of 1 to 10, how was the over-all quality of the run? If less than 6 – Why?
 - d. Did the run meet your expectations?
9. Other Information
 - a. Any other information you'd like to provide?