SACRAMENTO MUNICIPAL UTILITY DISTRICT
UPPER AMERICAN RIVER PROJECT
(FERC NO. 2101)

WHITEWATER BOATING FLOW STUDY FOR SLAB CREEK REACH TECHNICAL REPORT

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TABLE OF CONTENTS

Section & Description **Page**

TABLE OF CONTENTS

Section & Description **Page**

LIST OF TABLES

Table No. & Description **Page**

LIST OF FIGURES

Figures No. & Description **Page**

LIST OF FIGURES

Figures No. & Description **Page**

LIST OF APPENDICES

Appendix & Description

LIST OF APPLICABLE STUDY PLANS

Description

- Whitewater Boating Flow Study Plan For Slab Creek Reach

8.9 Whitewater Boating Flow Study for Slab Creek Reach
(Note: Above Chili Bar)

8.9.1 Pertinent Issue Questions

The Whitewater Boating Flow Study addresses the following recreational resource questions:

1a. Is it possible to have consistent and regular releases that support boating in the reach between Slab Creek Dam and Chili Bar Reservoir?
2. What are the optimal and minimum boating flows between Slab Creek Dam and Chili Bar, for all crafts, and all classes of boating?
3a. What are the effects of potential boating flows on water levels of Project reservoirs?
6. What maximum and minimum flow regimes are required for whitewater boating in stream reaches affected by the Project, including upper Rubicon River?
19. Can there be a flow management hydrology model (unimpaired hydrograph) built with a whitewater filter that estimates flows assuming UARP/Chili Bar presence and absence?
68. What is the need for, and feasibility of, whitewater boating in the reaches below Project dams?

8.9.2 Background

The objectives of the Whitewater Boating Feasibility Study included:

- Identify and describe reaches where there are existing or potential whitewater opportunities
- Quantify how the Project affects these opportunities (i.e., flows, boatable days, season of use, access)
- Characterize whitewater opportunities affected by Project operations based on physical characteristics, existing information and interviews (e.g., gradient, length, access, channel characteristics, flows, reservoir storage and diversion capacity)
- Determine current and future demand for whitewater boating on Project reaches
- Develop a range of possible flows to provide other TWG's before conducting additional studies
- Describe and assess the adequacy and availability of existing flow information
- Recommend additional studies needed for whitewater resources (e.g., Single Flow Feasibility Study or Controlled Flow Study)

Reconnaissance conducted as part of the Whitewater Boating Feasibility Study was completed in 2002 and a presentation of the methods and results was made to the Recreation TWG on January 22, 2003. Subsequent documentation of the reconnaissance was presented to the Recreation TWG on February 5, 2003. Helicopter reconnaissance of South Fork Rubicon below Robbs Forebay and Silver Creek below Junction Reservoir was conducted on June 11, 2003. Based on the presentation, documentation and field reconnaisance the Recreation TWG participants determined that additional investigation including flow studies are warranted at the Slab Creek and Ice House reaches in order to have enough information to address all of the pertinent issue questions relating to these reaches. A study plan for both of these reaches was developed and approved by the TWG February 26, 2003. The TWG subsequently asked to prepare separate study plans for each reach. The study plans were presented to the Aquatics TWG in August for review and comment. The Aquatics TWG did not have concerns with the range of flows proposed in the study plan. They also agreed that the whitewater flow study for the Slab Creek reach could be initiated as soon as November 2003.

8.9.3 Study Objectives

The objectives of this study include:

- Identify current and potential boating opportunities on the Slab Creek reach. Opportunities may vary by craft, skill level, or preferences for different types of whitewater conditions.
- Identify flow-related attributes for each of those opportunities, including a description and classification of key rapids.

- Develop relationships between flow levels and quality of whitewater experience for the Slab Creek Reach. Resulting "flow evaluation curves" will identify minimum and maximum acceptable flows and optimum flow ranges for each reach for a variety of watercraft.
- Determine the whitewater difficulty using the International Scale of Whitewater Difficulty (American Whitewater 1963) for the reach within the range of test flows.
- Determine what types of watercraft are suited for the reach within the range of test flows.
- Characterize the whitewater resource in the reach in terms of quality of the opportunity and suitability for whitewater boating.
- Determine what operational challenges may exist in providing flows in the boatable range.
- Quantify how the Project has affected the frequency and timing of boatable days available in this reach.

8.9.4 Study Area and Sampling Locations

The study area is defined as the Project reach directly downstream of Slab Creek Dam (between Slab Creek Dam and White Rock Powerhouse).

8.9.5 Information Needed From Other Studies

Hydrology data to determine the annual number of days and timing of boatable flows that occur under regulated and unimpaired conditions in this reach.

Provide timing, duration and magnitude of test flows as soon as practical to other TWG's.

8.9.6 Study Methods And Schedule

The Whitewater Boating Flow Study requires that a team of boaters paddle a given stream reach multiple times in succession while the independent variable, flow, is changed. The objective is to record how changes in flow alter the quality of the experience for individual participants and the group. The group of participants paddle each pre-selected flow then individually complete a single flow survey questionnaire querying them on a number of whitewater characteristics specific to that flow. Upon completion of all the test flows participants complete the comparative survey form enabling them to evaluate one flow over another for specific characteristics. Focus group discussions structured with specific questions are conducted at the conclusion of each single flow and upon completion of the comparative evaluations.

The methodology to complete the Whitewater Flow Study will include an organized boating trip the Project reach. Boating teams of between six to 12 boats, including both rafts and kayaks on the Slab Creek reach will be organized to make runs of the reach at the following target flows:

Slab Creek Reach: 1,000, 500 and 1,500 cfs (in that order)

The actual flows may be adjusted, within this range, while the study is in progress based on results of single flow responses and focus group discussions.

The existing information about the whitewater resource on the Slab Creek run indicates that current boating opportunities are constrained by the high flows that occur with spill events. The target flows for this run are selected to gain information about the entire range of boatable flows however the study will focus on safely gaining information about the highest flows that will provide reasonable whitewater boating opportunities in this reach.

The boating team members will have the skills necessary to boat the reach and will commit to participate in the entire test flow series. Boating participants will be selected by interested TWG participants. Each boater will sign a waiver of liability prior to participating in the study. The primary data for this study will consist of the boaters' responses to questionnaires that they will complete at the conclusion of each run. The questionnaire will include a section to gather data for a comparative flow evaluation for each reach. A draft of the questionnaire has been prepared and is attached to this study plan (***The questionnaire was distributed at the 2/26/03 Recreation TWG meeting)***. Comments and changes to the questionnaire will be incorporated prior to initiating the study. The type of

data to be collected include: 1) boatability, 2) quality of the reach, 3) suitability of the run for different crafts and boater skill levels, 3) quality of the put-in/take-out 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, 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.

The study methods will include videotaped recordings and/or photographs taken at key locations on the run with the focus on participants and issues surrounding recreation. The post-run discussion among the boaters (after the team has completed the questionnaires) will also be recorded on videotape. The questions for the focus group discussion will be developed with interested TWG participants during the process of reviewing and finalizing the questionnaires that will be used in the study.

The schedule for conducting the Whitewater Boating Flow Study will depend on the type of water year and the timing of snowmelt. The schedule will need to be flexible to respond to these climatic conditions however for planning purposes, the estimated schedule for conducting the flow study for the reach is listed below:

Slab Creek Reach: October 31, 2003 to June 30, 2004
(Tentative dates are Oct. 31-Nov. 2 and alternate dates are Nov. 7-9)

This is an approximate schedule that will be revisited and updated based on hydrologic events in the coming months. Although the Licensee has every intention of completing this study by 2004, this study plan needs to include a contingency for the occurrence of a dry water year, unforeseen power generation needs or because of biological concerns raised by the Aquatics TWG. The Licensee would like to accomplish the study plan in this reach in the fall or winter months during a period of the year when the flows necessary for the study would occur within the natural hydrograph. However, recognizing that the Aquatics TWG may have concerns with this study, the schedule for conducting this study has a broad window extending from October 2003 to June 2004.

8.9.7 Analysis

The information developed in this study will be used to describe the whitewater boating opportunities on this reach, quality of the runs, ease of the shuttle (in terms of time, distance, quality of route), access at both put-ins and take-outs, scenic quality, class of difficulty and boatability. The data collected will be summarized and analyzed for frequencies of responses and general trends that may exist in the data. The questionnaire responses will be used to estimate the minimum and maximum acceptable boating flows and optimum boating flow for the reach that is within the normal peaks of the natural hydrograph. These definitions (Whittaker et al. 1993) are:

Minimum Acceptable Flow: the lowest flow at which 50% of the survey respondents will return to paddle.

Maximum Acceptable Flow: the highest flow at which 50% of the survey respondents will return to paddle.

Optimum Flow: The flow level that provides the best combination of flow conditions for a whitewater opportunity. The optimum flow is the peak of the flow preference curve.

Flow Preference Curve: the graphic relationship between flow (horizontal axis) and survey responses (vertical axis).

Hydrology data for the period of record (1975 to 2001) will be analyzed to display how often boatable flows, as identified by the boaters, including optimum flows, have occurred under unimpaired and regulated conditions. The analysis will also identify when these flows have occurred over the period of record (number of days with boatable days per month and water year type) under unimpaired and regulated conditions.

Other hydrologic factors that may affect boating opportunities will also be analyzed. These will include how quickly typical spill flows move through the boatable range and whether there other flow fluctuations that make it difficult to boat this reach under current operations.

8.9.8 Study Output

The study output will include a USGS quad map showing basic information about the runs including the location of the put-ins and take-outs, shuttle route, and locations of photographs or videotape recordings taken during the study. The study output will also include the summarized responses to the questionnaires, flow preference curves, photographs showing portions of the runs, put-ins and take-outs, and edited videotape of the run and post-run group discussion. The edited video will capture watercraft at each pre-selected rapid for each test flow. The output will also include graphical and tabular data to compare the number and timing of boatable days that occur under unimpaired and regulated conditions in this reach.

8.9.9 Preliminary Estimated Study Cost

8.9.10 Recreation and Aesthetic TWG Endorsement

This study plan was approved on February 26, 2003 by the following entities of the TWG: ENF, American River Recreation Association/Camp Lotus, NPS, El Dorado County Parks Dept., Chris Shackleton, Gold Country Paddlers, PCWA and SMUD. Subsequent to approval, the TWG asked that separate study plans be developed for the Slab Creek and Ice House reaches**.** At the August 27, 2003 TWG the study plan was revisited and the participants re-approved this study plan (Whitewater Boating Flow Study for Slab Creek Reach) which includes revised target flows. The Plenary Group approved the plan on September 9, 2003. The participants a the meeting who said they could "live with" this study plan were USFS, SWRCB, NPS, CDFG, El Dorado County, Taxpayers Association of El Dorado County, Teichert Materials, ARRA/Camp Lotus, El Dorado Irrigation District, SMUD, PCWA, City of Sacramento, FOR, and PG&E. None of the participants at the meeting said they could not "live with" this study plan.

8.8.11 Literature Cited

American Whitewater, 1963. International Scale of Whitewater Difficulty.

Whittaker et al. 1993. Instream Flows for Recreation: A Handbook on Concepts and Research Methods. U.S. Department of the Interior.

Addendum 1 to the WWB Study Plan
(as developed by the Aquatic TWG on 09-08-03)

Concurrent with the three whitewater boating flow releases and at four locations in the Slab Creek Dam Reach (immediately below Slab Creek Dam, upstream of Mosquito Bridge, preferably downstream from the Rock Creek confluence, above White Rock Powerhouse), the Licensee shall collect the information below. The Licensee shall make a reasonable effort to gather information on the up ramp.

- Water temperature (°F) (existing *hourly* recorders at above White Rock PH, below Slab Creek dam and SFAR at above Mosquito bridge), turbidity (NTU) and Total Suspended Solids (mg/l). Licensee will strive to obtain continuous recording devices for turbidity. The Licensee shall take TSS samples once every 2-3 hours during daylight hours and more frequently on the up ramp if possible. At least one sample of each should be taken the day prior to the first boating flow release.
- Once around midday at peak flow on each day and from a standard location at each site, a photo looking upstream, across the stream and downstream.
- Stage at all four sites at least every 15 minutes during the up ramp and down ramp through the full range of the highest flow as measured by a temporary staff gage installed by the Licensee prior to the first boating flow release. Take photos described above every 15 minutes.
- Prior to the boating releases, the Licensee will assess areas of high fish stranding potential in the reach. During the down ramp and to the extent possible, the Licensee will note any stranded fish in these areas. During the fish stranding survey (after the boating flows) the flagged bullfrog site (downstream of Rock Creek) would be checked for bullfrog tadpoles. [USFS]
- During the boating flow study, the Licensee will obtain 15-minute elevation data at Slab Creek Reservoir and 15-minute flow data at the USGS gage below Slab Creek Dam for comparison to readings at the downstream temporary gage readings.
- Inundation of bed form features (e.g., bars, riffles, floodplains) associated with aquatic habitat at the three peak flows, at least.

The ENF will identify locations where bullfrogs and foothill yellow-legged frogs have been recorded in the reach, and a boater will place pins at the water line at these sites and collect other observations when he rafts during the boating flow study.

WHITEWATER BOATING FLOW STUDY FOR SLAB CREEK REACH TECHNICAL REPORT

SUMMARY

SMUD primarily investigated the feasibility of whitewater boating on the UARP Reaches for the UARP in the Whitewater Boating Feasibility Study. Based on the findings in the study, it was determined that there was not enough existing information about the Slab Creek Reach of the South Fork American River (SFAR) to assess the effects of the UARP on whitewater boating opportunities. Specifically, the class of difficulty, boating suitability and the range of boatable flows could not be determined from existing information. SMUD developed the Whitewater Boating Flow Study for Slab Creek Reach to collect this information to use in characterizing the UARP effects on boating opportunities.

This study included teams of kayakers and rafters who boated the Slab Creek Reach at three target flows: 500, 1,000 and 1,500 cfs. The actual flows, as measured during the releases, were: 616, 1,068 and 1,597 cfs. The study was conducted on October 31, November 1 and 2, 2003. Upon completion of each test flow, boaters completed evaluation forms that provided information about various reach characteristics including class of difficulty and the desirability of various flow levels.

The difficulty class for the entire reach is between class IV and V, and is most suited for boaters with advanced skills or better. At the highest test flow, more boaters tended to rate the overall difficulty of the reach as class V. The lower portions of the reach may be less difficult and may be suitable for intermediate boaters. The evaluation responses indicate that the minimum navigable flow for the reach is approximately 400 cfs. Most boaters felt that flows between 500 cfs and 2,000 cfs would provide an acceptable boating experience for them. Kayakers tended to prefer flows at the lower end of this range whereas rafters tended to prefer flows at the higher end of this range. The optimum range of flows for kayaks is approximately 700 to 1,100 cfs. The optimum range of flows for rafts is approximately 1,100 to 1,500 cfs. Based on skill level, the optimum ranges of flows are: Intermediate-1,300 to 1,450 cfs; Advanced-1,000 to 1,475 cfs;, Expert-827 to 1,337 cfs; and Elite-1,000 to 1,950 cfs.

Boaters reported that depending on the skill of individual boaters, there are up to two portages on the reach. The portage routes are easy to moderately difficult. The boaters rated the rapids at these portages as class V. The boaters reported that the reach is aesthetically pleasing with many attractive attributes for boating such as length of the run and shuttle, good portage routes, challenging whitewater, play spots, waves and holes, and plenty of locations for breaks.

In addition, SMUD characterized the boating opportunities that existed with the current UARP operations over the past 25 years, and the boating opportunities that might have existed over that same period if there were no developments upstream of Slab Creek Reach. This analysis was done using water year types recommended by the UARP Relicensing Water Year Type Subgroup. The analysis showed that, on average, there would have been fewer boatable days in all water year types, generally between March and June, with the UARP in place than might have occurred if no water developments had been in place during this 25-year period. Analyzing the synthesized unimpaired flow data, flows in the boatable range did not usually extend beyond June except in Above Normal or Wet water years.

If no developments had been in place from 1975 through 2000, flow exceedance curves for this period show flows at or above optimal levels for kayaks during the months of May and June would have occurred more than 50 percent of the time in Below Normal, Above Normal and Wet years. In Dry and Critically Dry years, these flows would have occurred less than 20 percent of the time. Rafting flows in the optimal range, above 1,100 cfs, would have had a 50 percent probability of occurring in Wet and Above Normal years. In all other water year types, flows in the optimal rafting range would have happened less than 20 percent of the time. In the month of July, rafting flows in the optimal range would have occurred in the wettest water year types and less than 20 percent of the time. The likelihood of optimal kayaking flows occurring without any developments in the watershed would be slightly better in that they would occur in Above Normal years in addition to Wet years. The months of August, September, and

October showed very low probability of optimum flows for rafts or kayaks in any of the water year types if no water developments occurred on the watershed.

The run is potentially suitable for commercial boating use however access at the put-in may make this difficult. The lack of existing legal public vehicular access to the take-out locations also affects the suitability of this run for both private and commercial boating use.

In addition to the investigation of the feasibility of whitewater boating on the UARP Reach, SMUD also collected data concerning water quality during the recreation studies. Information concerning water temperature, turbidity, total suspended solids (TSS), river flows throughout the reach, bed formation inundation, and potential fish stranding as a result of the increased flows were measured. The data were gathered at four locations spaced throughout the Slab Creek Reach of the SFAR. Data loggers were used to record the temperature and turbidity while temporary staff gages were installed to monitor the rise and fall of the water surface. TSS samples were gathered and sent to a laboratory for analysis. Bed form inundation and areas of potential fish stranding were monitored during the flow events. However the topography of the SFAR canyon limited the documentation of bed form inundation and areas of potential fish stranding. The data gathered during the flow study indicate an increase in turbidity, TSS, and temperature as the flows increased, and a decrease in turbidity and TSS as the flow stabilized at the peak daily flow. Turbidity, TSS and temperature decreased as the flows returned to normal base flows. However a rainstorm occurring the evening prior to and the first day of the study may have influenced the results of the study. Bed form inundation was only noted to occur at Slab 4, while the potential for fish stranding within the reach is almost nonexistent.

1.0 INTRODUCTION

This technical report is one in a series of reports prepared by Devine Tarbell & Associates, Inc., and The Louis Berger Group, Inc. for the Sacramento Municipal Utility District (SMUD) as an appendix to the SMUD's application to the Federal Energy Regulatory Commission (FERC) for a new license for the Upper American River Project (UARP or Project). This technical report focuses on the whitewater boating resources, which were evaluated under a controlled flow study, in the 8.0-mile-long-section of the South Fork American River between Slab Creek Dam and White Rock Powerhouse (Slab Creek Reach). This report includes the following sections:

- **BACKGROUND** – Includes when the applicable study plan was approved by the UARP Relicensing Plenary Group; a brief description of the issue questions addressed, in part, by the study plan; the objectives of the study plan; and the study area. In addition, requests by resource agencies for additions to this technical report are described in this section.
- **METHODS** – A description of the methods used in the study, including a listing of study sites.
- **RESULTS** – A description of the salient data results. Raw data were copious and detailed model results are provided in a separate compact disc (CD) for additional data analysis and review by interested parties.
- **ANALYSIS** - An analysis of the results, where appropriate.
- **FINDINGS** – A broad statement of findings.
- **LITERATURE CITED** – A listing of all literature cited in the report.

This technical report does not include a detailed description of the UARP Alternative Licensing Process (ALP) or the UARP, which can be found in the following sections of SMUD's application for a new license: The UARP Relicensing Process, Exhibit A (Project Description), Exhibit B (Project Operations), and Exhibit C (Construction).

Also, this technical report does not include a discussion regarding the effects of the UARP on whitewater boating or associated environmental resources, nor does the report include a discussion of appropriate protection, mitigation and enhancement measures. A discussion regarding resource impacts associated with the UARP is included in the applicant-prepared preliminary draft environmental assessment (PDEA) document, which is part of SMUD's application for a new license. Development of resource measures will occur in settlement discussions, which will commence in early 2004, and will be reported on in the PDEA.

2.0 BACKGROUND

The UARP Recreation and Aesthetics Technical Working Group (TWG) developed a total of eight recreation studies to collect information to answer the issue questions relating to recreation resources associated with the UARP. One of these studies, the Whitewater Feasibility Study, determined that there was insufficient information regarding the whitewater resources related to the Slab Creek Reach (See *Whitewater Feasibility Technical Report*). Consequently, the Whitewater Boating Flow Study for the Slab Creek Reach was developed to provide this additional information and this report contains the results of the study.

As a component of this study, the Aquatic Technical Work Group (TWG) requested that certain water quality parameters be monitored during the test flows. An approach to address this effort was agreed by the Aquatic TWG on September 8, 2003. This agreed approach is attached to this report as Addendum 1. Additionally the water quality component(s) of this study has been inserted to the end of the appropriate sections.

2.1 Whitewater Boating Flow Study Plan for Slab Creek Reach

On September 9, 2003 the UARP Relicensing Plenary Group approved the Whitewater Boating Flow Study Plan for Slab Creek Reach that was developed and approved by the Recreation and Aesthetics TWG on August 27, 2003. The study plan was designed to address, in part, the following issues questions developed by the UARP Relicensing Plenary Group:

Issue Question 1a	Is it possible to have consistent and regular releases that support boating in the reach between Slab Creek Dam and Chili Bar Reservoir?
Issue Question 2	What are the optimal and minimum boating flows between Slab Creek Dam and Chili Bar, for all crafts?
Issue Question 3a	What are the effects of potential boating flows on water levels of Project reservoirs?

Issue Question 6	What maximum and minimum flow regimes are required for whitewater boating in stream reaches affected by the Project, including upper Rubicon River?
Issue Question 19	Can there be a flow management hydrology model (unimpaired hydrograph) built with a whitewater filter that estimates flows assuming UARP/Chili Bar presence and absence?
Issue Question 68	What is the need for, and feasibility of, whitewater boating in the reaches below Project dams?

Specifically, the objectives of the study plan were to:

- Identify current and potential boating opportunities in the Slab Creek Reach. Opportunities may vary by craft, skill level, or preferences for different types of whitewater conditions.
- Identify flow-related attributes for each of those opportunities, including a description and classification of key rapids.
- Develop relationships between flow levels and quality of whitewater experience for the Slab Creek Reach. Resulting "flow evaluation curves" would identify minimum and maximum acceptable flows and optimum flow ranges for a variety of watercraft.
- Determine the whitewater difficulty using the International Scale of Whitewater Difficulty (American Whitewater 1963) for the reach within the range of test flows.
- Determine what types of watercraft are suited for the reach within the range of test flows.
- Characterize the whitewater resource in the reach in terms of quality of the opportunity and suitability for whitewater boating.
- Determine what operational challenges may exist in providing flows in the boatable range.
- Quantify how the Project has affected the frequency and timing of boatable days available in this reach.

As discussed above, this Whitewater Boating Flow Study for Slab Creek Reach Technical Report does not address Project impacts or protection, mitigation or enhancement measures. Therefore, this report does not address Issue Questions 1a, 3a, 19 and 68 or the study objective relating to operational challenges to providing flows in the boatable range. Note that Issue Questions 3a and 19 may be addressed using the UARP CHEOPS Water Balance Model.

The study area included the Slab Creek Reach. Figure 2.1-1 shows the Slab Creek Reach, the put-in and take-out locations, access roads and various points that are referred to in this report.

2.1.1 Whitewater Boating Flow Ecological Study Plan for Slab Creek Reach

On September 8, 2003 the Aquatic/Water Quality/Geomorphology/Hydrology Resources Technical Working Group approved the Whitewater Boating Flow Ecological Study Plan. The primary objective of the study is to determine if high flows released from Slab Creek Dam for purposes of whitewater rafting will adversely affect the water quality in the SFAR. Secondary

objectives include documenting changes of bed form features associated with aquatic habitat resulting from inundation as well as potential for fish stranding as water levels recede.

2.2 Water Year Types

The information in this subsection is provided for informational purposes, as requested by agencies. The UARP Relicensing Water Balance Model Subcommittee established five water year types to be applied to all preliminary analysis with the understanding that the UARP Relicensing Plenary Group, with cause, may modify the current water year types in the future. The five current water year types are triggered by the February 1, March 1, April 1 and May 1.

Upper American River Project

SMUD

Figure 2.1-1 Whitewater Boating Flow Study for Slab Creek Reach

Rock Creek RD.
Rock Creek Powerhouse
Mosquito Creek
Mosquito Rd. Bridge
Potential Take-out Locations
To Highway 193
South Fork American River
Redbird Creek
Chute Camp RD.
Slab Creek Dam (Put-in)
White Rock Creek
Mosquito RD.
Hassler RD.
North Canyon RD.
White Rock Powerhouse (Take-out)
Holland Drive
Meadow Lane
Union Ridge RD.
Carson RD.
To Lake Tahoe
Highway 50
To Placerville
To Placerville

Penstock

Dam

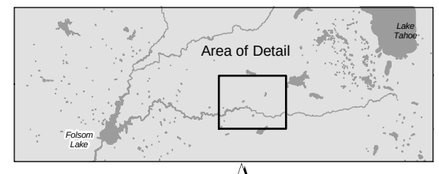
Ownership

- Sierra Pacific Industries
- SMUD
- Private
- USDA Forest Service
- B.L.M.

Gates

Water

Study Area



N

SCALE 1:27,000

0 0.2 0.4 0.6 0.8 Miles

Prepared by VESTRA Resources, Inc., Redding. CA. Feb. 09, 2004

California Department of Water Resources (CDWR) forecast for total water year unimpaired inflow into Folsom Reservoir. An additional trigger is CDWR's October 1 estimate of the actual total water year unimpaired inflow into Folsom Reservoir. The February 1 forecast determines the water year type applied for the period from February 10 through March 9: the March 1 forecast the period from March 10 through April 9; the April 1 forecast the period from April 10 through May 9; the May 1 forecast the period from May 10 through October 9; and the October 1 estimate the period from October 10 through February 9. The inflow levels area:

- Critically Dry (CD) Water Year — Less than 900,000 acre-feet
- Dry (D) Water Year — From 900,001 to 1,700,000 acre-feet
- Below Normal (BN) Water Year — From 1,700,001 to 2,600,000 acre-feet
- Above Normal (AN) Water Year — From 2,600,001 to 3,500,000 acre-feet
- Wet (W) Water Year: — More Than 3,500,000 acre-feet

The study described in this technical report covers the period of record. For this period, the water year types by month are shown in Table 2.2-1.

Table 2.2-1. Application of UARP Relicensing Plenary Group water year types for the period from Calendar Year 1975 through 2001.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1975	W	D	BN	BN	AN	AN	AN	AN	AN	AN	AN	AN
1976	AN	D	D	CD	CD	CD	CD	CD	CD	CD	CD	CD
1977	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
1978	CD	AN	AN	AN	W	W	W	W	W	AN	AN	AN
1979	AN	D	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN
1980	BN	AN	W	W	W	W	W	W	W	W	W	W
1981	W	D	D	D	D	D	D	D	D	D	D	D
1982	D	W	W	W	W	W	W	W	W	W	W	W
1983	W	W	W	W	W	W	W	W	W	W	W	W
1984	W	W	W	W	W	W	W	W	W	W	W	W
1985	W	BN	BN	BN	D	D	D	D	D	D	D	D
1986	D	BN	W	W	W	W	W	W	W	W	W	W
1987	W	D	D	D	CD	CD	CD	CD	CD	CD	CD	CD
1988	CD	BN	D	CD	CD	CD	CD	CD	CD	CD	CD	CD
1989	CD	D	D	BN	BN	BN	BN	BN	BN	BN	BN	BN
1990	BN	D	D	D	D	D	D	D	D	D	D	D
1991	D	CD	CD	D	D	D	D	D	D	D	D	D
1992	D	D	D	D	D	D	D	D	D	CD	CD	CD
1993	CD	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN
1994	AN	D	D	D	CD	CD	CD	CD	CD	CD	CD	CD
1995	CD	W	AN	W	W	W	W	W	W	W	W	W
1996	W	BN	AN	AN	AN	AN	AN	AN	AN	W	W	W
1997	W	W	W	W	W	W	W	W	W	W	W	W
1998	W	AN	W	W	W	W	W	W	W	W	W	W
1999	W	AN	W	AN	AN	AN	AN	AN	AN	AN	AN	AN
2000	AN	BN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN
2001	AN	D	D	D	D	D	D	D	D	D	D	D

2.3 Recreation TWG Determination of Adequacy

At the July 28, 2004, Recreation TWG meeting, the Recreation TWG determined that the Technical Report on Whitewater Boating Flow Study for Slab Creek Reach, dated February 2004, is adequate subject to all comments submitted by the TWG participants being incorporated into a new version of the report and reviewed by the Recreation TWG. Table 2.3-1 summarizes all comments and action items and references how each comment was addressed.

Table 2.3-1. Response to Recreation TWG comments on Whitewater Boating Flow Study for Slab Creek Reach Technical Report dated February 2004.

Comment	Reference
1. Sub-run descriptions based on different access points (July 29).	Sub-run descriptions have been added in Section 4.3 of the report.
2. Include a description of the operational challenges to provide flows in the reach (July 29).	A description of the operational challenges has been added in Section 3.3.
3. Include a discussion of commercial suitability and safety concerns of the run. This information is included in the video but it should also appear in the text of the report (July 28).	A description of commercial boating suitability has been added in Section 5.4.
4. Include photographs and more detailed descriptions of the put-in, take-out (July 28).	Photos and descriptions added to Section 4.3.2.
5. Include photographs and a more detailed discussion about difficulties associated with the Mosquito Bridge access point. Include as part of carrying capacity discussion. (July 28).	Photos and descriptions added to Section 4.3.2.
6. Provide optimum graphs by skill level for each type of craft. (July 28). The participant listing in the report appendix provides information sufficient to address the agency comment regarding the data provided by different skill levels (July 28).	Graphs have been added to Section 4.3.5.
7. Remove the ecological monitoring methods, results and analysis from the technical report (make stand alone report similar to Ice House Report) (July 28).	The ecological monitoring effort has been referenced and summarized in the report. All details of the ecological monitoring conducted during the flow study have been placed in an appendix to the report.

3.0 METHODS

The study methods conformed to those approved by the UARP Relicensing Plenary Group. This study required that a team of boaters paddle the Slab Creek Reach multiple times in succession while the independent variable, flow, was changed. The group of participants paddled each pre-selected flow. Then, each participant individually completed a questionnaire that queried the participant about a number of whitewater characteristics specific to that flow. After the participants completed their questionnaires, a post-run group discussion was conducted and videotaped. Upon completion of all of the test flows, the participants completed a comparative survey form that provided an evaluation of one flow over another flow for specific characteristics. Portions of the runs made at different test flows were recorded on videotape.

3.1 Target Flows and Schedule

The target flows used in the study were developed from the following sources:

- Interview responses collected as part of the Whitewater Feasibility Study (See *Whitewater Feasibility Technical Report*)
- The Best Whitewater in California: The Guide to 180 Runs. (Holbeck and Stanley 1998)
- Video photography of the UARp Reach taken from low-flight helicopter
- USGS quadrangle maps

The Recreation and Aesthetics TWG participants evaluated this information and agreed upon three target flows for the study. These flows were: 500, 1,000 and 1,500 cfs.

The study was conducted, as scheduled, on October 31, November 1 and November 2, 2003.

3.2 Boating Participants

Participants in rafts and kayaks boated the reach during the test flows. The participants were selected based on having the skills necessary to boat rivers of class V difficulty and their ability to commit to boating the reach at all three test flows. The goal of the study plan was to have between six to twelve participants and the actual study team consisted of 27 participants over the three days of test flows. Rafts were not expected to be able to navigate the river at the lowest target test flow of 500 cfs, so some of the participants who were in rafts only boated the test flows at the highest two flows on the second and third days.

3.3 Project Operations During the Study

The flows for the study were provided in the reach by spilling water over the Slab Creek Dam. Releases were monitored continuously during the study at Slab Creek Dam. Several operational challenges had to be overcome in order to provide stable flows in the desired range below the Slab Creek Dam. First, water from Union Valley had to be moved through the upstream powerhouses, Jaybird and Camino, and then operate White Rock Powerhouse to control the spill into the reach. Second, the Slab Creek powerhouse, which is located at the base of Slab Creek Dam, had to be shut down and measures taken to keep as much water from the spill out of the powerhouse as possible. SMUD removed all drawings and operational manuals from the powerhouse prior to the spill event to prevent water damage.

Figure 3.3-1 Slab Creek Dam Spilling during flow study.

Third, in order to avoid the possibility of stranding participants due to a turbine trip, SMUD staged operators at Jaybird, Union Valley, Camino and White Rock powerhouses. Lastly, there were also two Hydrographer Field Technicians and one Hydrographer in the field taking flow measurements during the flow events.

In the analysis of the impact of whitewater releases on reservoir elevation, only Union Valley was analyzed which is consistent with the Recreation TWG direction to analyze reservoir elevation of the primary storage reservoir upstream of the Slab Creek Reach. The forebay reservoirs, Camino and Slab Creek, did not experience fluctuations that were different from normal daily operations during the study. The volume of water used for the three days of the whitewater flow study was 353.6 acre-feet, 657.5 acre-feet , and 1306.1 acre-feet respectively. This equated to a drop in the Union Valley Reservoir elevation from 0.16, 0.33 and 0.58 feet on each of the respective flow days.

Flows in the reach were measured every 15 minutes using a gage on the dam and applying a stage-discharge relationship. The test flows were ramped at a rate of 500 cfs per hour and the flows were achieved as follows:

Date	Target Flow	Actual Flow	Duration[1]
October 31, 2003	500 cfs	616 cfs	8:30 a.m. to 1:15 p.m.
November 1, 2003	1,000 cfs	1,068 cfs	8:30 a.m. to 1:30 p.m.
November 2, 2003	1,500 cfs	1,597 cfs	9:15 a.m. to 1:15 p.m.

[1]Duration at or above the target flow level as measured at Slab Creek Dam

The flows remained fairly consistent during the study and the boaters reported that they did not notice any change in the rate of flow during their runs.

Prior to each run, the boaters met at the take-out location at White Rock Powerhouse where they were shuttled by SMUD to the put-in. After the boaters assembled for a safety briefing and orientation to the types of information that they would be asked to provide at the end of their run, they began their runs. At the beginning of each test flow, the boaters were informed of the target flow for the day. At the end of the day and prior to completing the evaluations, the Licensee obtained the actual flow information and provided this information to the boaters.

3.4 Data Collection

The data for this study were collected on: 1) single-flow evaluation form; 2) comparative-flow evaluation form; 3) video recordings and photographs of portions of the runs at different test flows; and 4) video recordings of the post-run group discussions.

The flow evaluation forms were prepared by SMUD and presented to the Recreation and Aesthetics TWG for review and comment. SMUD incorporated the suggested changes and these forms were approved by the TWG. The evaluation forms included questions about: 1) boatability; 2) quality of the reach; 3) suitability of the run for different crafts and boater skill levels; 4) quality of the put-in/take-out locations; 5) boater's opinion of the class of difficulty of the run; 6) comparison of each run at its different flows; 7) any safety concerns or hazards; 9) scenic quality; 10) number and difficulty of portages; 11) availability of play areas; and 12) boater's opinion of the flows that would represent the general paddling public preference. Copies of the single-flow and comparative-flow evaluation forms are included in Appendix A of this report.

SMUD's staff was available to clarify questions for the participants while they were filling out the questionnaires at the conclusion of each test flow however, the staff did not interpret the survey questions for the participants. The completed evaluation forms were checked by SMUD's staff for legibility, incomplete responses and for responses that were not provided consistent with the directions on the forms. The study staff directed the participants to correct any of these deficiencies on their evaluation forms before they departed for the day.

After the evaluations were completed, a group discussion took place. The post-run group discussion topics included: 1) access at the put-in/take-out location; 2) shuttle; 3) suitability of the run for commercial use; 4) the time of year when boaters would be likely to boat the reach; 5) names of rapids; 6) class of difficulty; 7) suitability for different crafts; 8) safety concerns; 9) alternate locations for take-outs; and 10) availability of lunch or break stops in the run. SMUD compiled a videotape of pertinent recordings made during the study which is made part of this report.

3.5 Ecological Studies

During the test flows, three *in situ* data parameters were gathered: water temperature (°F), turbidity (NTU), and Total Suspended Solids (TSS in mg/L). In addition, flow stage elevation, observations of potential inundation of bed form features, and observations of potential fish stranding areas were recorded. All information relating to the ecological studies conducted during this whitewater flow study is included in Appendix H.

4.0 RESULTS

4.1 Study Participants

A list of all of the study participants is included in Appendix B. Although some participants did not participate on each test flow date, overall there were 27 boaters who participated in some capacity, over the three test flow dates as shown below.

Date	Target Flow[1]	No. of Participants by Type of Craft			Total
		Kayak	Raft (14')[2]	Raft (11')[3]	
October 31, 2003	500 cfs	12	0	2	14
November 1, 2003	1,000 cfs	11	10	0	21
November 2, 2003	1,500 cfs	5	11	0	16

[1]Actual flows were 616, 1,068 and 1,597 cfs.
[2]There were two 14'rafts on 11/1 and 11/2.
[3]There was one 11'raft with 2 persons on 10/31.

Thirteen of the participants had boated the reach prior to participating in this study. Most of the participants were from the local area with a driving time of less than one hour required to reach this run. The skill level of the participants ranged from 'Intermediate' to 'Elite.' There were 3 women and 24 men, with ages ranging between 22 and 54 years and an average of around 40 years of age. Based on the responses to a series of questions about each participant's boating preferences, the team was well rounded and included members who enjoy many aspects of whitewater boating including: play spots, challenging rapids, large waves and hydraulics, steep/technical rivers, as well as boating to experience a unique and interesting place. Figure 4.1-1 shows the study participants boating the reach during the flow study event.

At 616 and 1,597 cfs, all of the boaters who began the run at Slab Creek Dam completed the run at White Rock Powerhouse. At 1,068 cfs, four of the boaters chose not to complete the run and left the reach at the Mosquito Road Bridge. One of these boaters broke his paddle during the run and he was not comfortable continuing the run with his backup paddle. The other three participants stated that they did not want to continue because of their physical state. This was not unexpected considering the physical demand that consecutive test flow days places on the participants.

Figure 4.1-1 Study Participants on the Slab Creek Reach.

Fourteen single flow evaluations were completed for the 616 cfs flow, 21 were completed for the 1,068 cfs flow, and 16 were completed for the 1,597 cfs flow. Twenty five comparative flow evaluations were completed on the day of the final test flow. Two individuals did not complete comparative flow evaluations because they only boated on one of the test flows and they did not feel they had a basis to provide opinions about other flows. A summary of all of the evaluation data is included in Appendix C.

4.2 Timetable on Test Flow Days

Table 4.2-1 provides the timetable of events that occurred on the different test flows days.

Table 4.2-1. Test flow timetable of events, Oct. 31, Nov. 1-2, 2003

Boaters:	**October 31, 2003 (500 cfs[1])**	**November 1, 2003 (1,000 cfs[1])**	**November 2, 2003 (1,500 cfs[1])**
Arrive at Put-in	8:15 a.m.	8:40 a.m.	8:50 a.m.
Begin run at Slab Cr. Dam	9:06 a.m.	9:50 a.m.	9:40 a.m.
Arrive at Mosquito Rd. Bridge	11:00 a.m.	12:15 p.m.	10:50 a.m.
Arrive at Take-out (WRPH)	1:15 p.m.	3:15 p.m.	1:30 p.m.
TOTAL TIME	4 hours 9 min.	5 hours 20 min.	3 hours 50 min.

[1]This was the target flow. The actual flows achieved were 616, 1,068 and 1,597 cfs.

Weather on the three days of the study was typical for the fall season. The air temperature ranged from the high 30's to mid-50's degrees Fahrenheit and there was light rain on the morning of second day of the study.

4.3 Reach Description

During the post-run group discussion the participants categorized segments of the reach based on the level of difficulty and potential access points. The Slab Creek Reach begins with several class IV+ rapids that are within sight of the put-in. The river continues in a very continuous nature for the next four miles. Many of the rapids are fairly long and require good class IV skills. The most significant rapid on the run occurs shortly below the Mosquito Road Bridge at river mile 3.6. The gradient eases past this point and the run becomes class II/III in nature. There is also more vegetation, primarily alders, in the river channel after this point. Rock Creek enters on river right at river mile 5.5. The Rock Creek Powerhouse could provide a potential take-out location. It could also be used as a put-in if paddlers were interested in running the last two miles of the reach down to White Rock Powerhouse which is also class II/III with one rapid that is potentially class III+.

4.4 Boater Evaluations

The boaters rated the difficulty of the Slab Creek Reach between class IV and V on the International Scale of River Difficulty (see Appendix D). This rating was fairly consistent between both kayakers and rafters at all of the test flows. However, more boaters rated the reach a class V difficulty at the highest test flow than at the 616 or 1,068 cfs flows.

The participants overwhelmingly indicated that they would likely return to boat the run at each of the test flows. At the lowest flow, some of the boaters said that the quality of their boating experience at this flow surprisingly exceeded their expectation. Regardless, at the lowest flow of 616 cfs, 12 of the 14 participants indicated that they would prefer a flow that was higher than the test flow, no boaters said they would prefer a lower flow, and two of the participants felt that this was their optimum flow. It is also important to note that most of the participants were kayaking; only one 12-foot raft with two persons participated at the lowest flow.

At 1,068 cfs, 11 of the 21 participants indicated that they would prefer a flow that was higher than the test flow, eight boaters said they would prefer a lower flow and two of the participants felt that this was their optimum flow. The responses for wanting higher or lower flows were almost evenly divided based on the type of craft with the rafters preferring a higher flow and the kayakers preferring a lower flow. Both of the boaters who indicated that 1,068 cfs was their optimum flow, were kayakers.

At the highest flow (1,597 cfs), some of the participants chose not to make the run and the study team included new study participants on this day in order to have enough boaters in the two rafts. Consequently, these new boaters did not have the benefit of experiencing the other test flows. Of the total 16 boaters that completed the run at this test flow, eleven rafters and three of the kayakers indicated that this was their optimum flow. Only one kayaker said that he preferred a higher flow and one kayaker preferred a lower flow.

4.4.1 Boatability

The boater evaluations indicated that the reach overall was very boatable. The participants strongly agreed (average 4.7 to 4.8 on a scale of 5) that the Slab Creek Reach is suitable for kayaks at all of the test flows. Participants felt that the 1,068 and 1,597 flows were suitable for rafts. The lowest test flow, 616 cfs, was less suitable for rafts, however it may be suitable for small two-person rafts. The run may also be suitable for catarafts at the test flows, however the participants did not feel the run was very suitable for open canoes or inflatable kayaks at any of the test flows.

The average number of stops to scout or portage on the reach was 2.1 at 616 cfs, and 1.8 and 1.6 at 1,068 and 1,597 cfs, respectively. The study team spent about 30 to 40 minutes scouting and portaging during their runs. Participants portaged up to two rapids on the Slab Creek Reach during the test flows. The rapid that was most often portaged was 'Mother Lode Falls' which is downstream of the Mosquito Road Bridge. Most participants rated this rapid as class V in difficulty. This rapid was portaged by at least some of the participants at each of the test flows. One raft attempted and successfully ran this rapid each day of the study. The boaters rated the portage around this rapid as 'slightly' to 'moderately difficult' at all test flows.

The other rapid portaged, less frequently, during the study was at the Mosquito Road Bridge. Most of the boaters rated this rapid between IV+ and V in difficulty. The boaters rated the portage route at this rapid as 'easy' at all test flows.

During the post-run group discussion the participants indicated that as the flows increased, there were fewer bumps and stops on rocks. Rafts, in particular found that they were not squeezed between rocks and there was more cushioning over the rocks at higher flows. In some cases the boaters said that the increased flows reduced the difficulty of some rapids by covering rocks. However, in some cases the additional flow also increased the difficulty of the rapids. Some boaters used the term 'pushy' to describe this change they experienced as the test flows increased.

Boaters also provided comments regarding safety. Swimmers (boaters who, not by their own choice, were out of their boats) were observed during the study at all of the test flows. There was also one pin by a kayaker, who was able to extract herself without assistance, and a raft wrapped on a rock at one rapid. Although these were undesirable experiences, they are not unexpected or unusual circumstances related to whitewater boating at class IV or V levels. The boaters noted that riparian vegetation that grows at the waters edge at minimum flows could be a problem for boaters as the flows are increased and the channel widens. They noted alders present in the middle of the channel, which at base flows would be along the shore of the channel. The boaters felt that this vegetation was large enough that it could cause wraps or pins, though none occurred during the study. Other than this, the boaters did not identify any safety concerns outside of the inherent concerns related to whitewater boating.

4.4.2 Access

The comparative flow evaluation included questions about river access for whitewater boating. Overall, boaters thought that the run had good access. The length of the shuttle was good at approximately 30 to 40 minutes, and the length of shuttle-to-boating ratio was good. The only areas of concern noted were at the take-out where boaters thought that a trail or steps at the White Rock Powerhouse would make their egress easier and protect the slope from erosion.

It should be noted that since the Licensee provided a shuttle service for the boaters and access through locked gates during the study, some boaters may have not recognized there are limits on the existing access to the put-in and take-out. However, some boaters did make note the existing access and commented that gates should be opened to allow vehicular access to the put-in and take-out.

The following roads are used to access the put-in at Slab Creek Dam from Highway 50: 1) Carson Road, 2) North Canyon Road, Chute Camp Road and the Slab Creek Adit Road. The following roads are used to access the take-out location at White Rock Powerhouse: 1) Mosquito Road, 2) Meadow Lane, and 3) Holland Drive. Carson Road, North Canyon Road and Mosquito Road are paved county roads that are open to the public. There are gates at six locations on roads that currently and potentially provide boating access to the SFAR. These are identified on Figure 2.1-1 and the existing condition of access relative to these gates is explained below.

4.4.2.1 Chute Camp Road (Access to Put-In Location)

There is an unlocked gate located on the Chute Camp road just below its intersection with North Canyon Road (see Figure 2.1-1). The Chute Camp Road begins at North Canyon Road and leads to Slab Creek Dam; it is approximately 1.25 miles long with a dirt surface. This is a county road at least to the point where the road crosses Iowa Creek and SMUD has performed maintenance on the road in the past for access, but does not have any formal agreement to maintain the road. The road passes through privately owned land and then onto National Forest System (NFS) land in the vicinity of Slab Creek Dam (see Figure 2.1-1). Although the gate on the Chute Camp Road is currently open and unlocked, this situation will likely change in the near future. El Dorado County plans to install locks on the gate and close the gate to restrict public access between dusk and dawn. It is likely that SMUD and landowners along the Chute Camp Road will have keys to allow them access at any time. Parking at the end of Chute Camp Road is somewhat limited. There is a flat area just outside the gate to the Adit Access Road that could accommodate ten cars. Within the last tenth mile of the Chute Camp Road, there are approximately 20 parking spaces in various locations. A quarter mile back up the road from the gate is an area that could accommodate another 25 vehicles. All of these parking areas would require boaters to hike between one-half and one-third of a mile to the put-in

4.4.2.2 Slab Creek Adit Access Road (Access to Put-In Location)

The Slab Creek Adit Access Road is gated where it meets the Chute Camp Road (see Figure 2.1-1). This is a UARP road (within the FERC Project Boundary and listed in the existing license) located on NFS land and the gate is locked by SMUD at all times to prevent vandalism and for

public safety reasons. This road is approximately one-third of a mile in length and it is a steep, partially paved, narrow, one-lane road that leads to the put-in site at the rivers edge. The topography is steep, however, there is enough room for parking 15 to 20 vehicles along this road. The end of the road would have to remain clear to provide a turn around area. The fourteen passenger van used during the flow study had some difficulty making this turn around due to the steep grade and loose gravel. The steepness of this road would be a safety concern. During a site visit SMUD consultants found this road to be steep enough that their vehicle would slide while parked with all four wheels locked. Figure 4.4-1 shows the turn around area at the end of the Slab Creek Adit Access Road.

Figure 4.4-1. Turnaround area at end of Slab Creek Adit Access Road.

4.4.2.3 Mosquito Road Bridge

The Mosquito Road Bridge crosses the SFAR at river mile 3.0. The area around the bridge has limited potential as an access site. The road leading up to the one lane bridge is quite narrow as well as the bridge itself. This road does receive significant amounts of traffic associated with residential development on the north side of the canyon; vehicles routinely have to wait for oncoming traffic to clear the bridge before they proceed. There is room for no more than four to six cars in the area around the bridge. The trails leading to the river from Mosquito Road are very steep. This site does provide access for boaters in the event of an emergency; however, it has limited potential as a routine point of access for a boating put-in or take out. Figure 4.4-2 shows the Mosquito Road Bridge crossing at the SFAR.

Figure 4.4-2. Mosquito Road Bridge crossing of the SFAR.

4.4.2.4 Holland Drive (Access to Take-Out Location at White Rock Powerhouse)

Holland Drive is 2-mile, paved road that passes through privately owned land with residences and terminates at White Rock Powerhouse, which is located on land owned by SMUD (see Figure 2.1-1). There are two gates located on this road. One gate is approximately two miles from White Rock Powerhouse. This gate is most often found open however, the landowners who hold the rights to this road can and do close the gate to restrict public access. SMUD holds an easement on this road from the private landowners and has a key to this gate, which allows SMUD to access the powerhouse.

The second gate is located approximately one mile from the White Rock Powerhouse. This is a UARP road (within the FERC Project Boundary and listed in the existing license) leading to the White Rock Powerhouse and SMUD locks the gate, at all times to prevent vandalism and for public safety reasons. There is space for forty to fifty well parked cars in the flat area adjacent to

the White Rock Powerhouse. Another 27 to 30 vehicles could be parallel parked on the road leading down to this flat area. The parking area at the White Rock Powerhouse is shown in Figure 4.4-3.

Figure 4.4-3. Parking area at White Rock Powerhouse.

4.4.2.5 Rock Creek Powerhouse Access Road (Access to Potential Take-Out Location)

Boaters also noted two alternative take-out locations on the north side of the river (see Figure 2.1-1). The first location is at the Rock Creek Powerhouse (Sithe Industries). The access road to this location has a dirt surface and it begins at the Rock Creek Road where it is gated to restrict public access to the river. This gate is closed and locked by the project owner of the Rock Creek Powerhouse at all times. The road is approximately one-quarter of a mile in length and it terminates very near the shoreline of the SFAR approximately two miles upstream of the White Rock Powerhouse. The best river access to this area is approximately 250 feet up stream of the Rock Creek Powerhouse parking area. The large flat area around the powerhouse could accommodate between 50 to 70 vehicles (see Figure 4.4-4). Shuttle time from this location to the put in at Slab Creek Dam, increases approximately 30 minutes over the shuttle time from White Rock Powerhouse. The road and the powerhouse appear to be located on public land managed by the Bureau of Land Management (BLM).

Figure 4.4-4. Parking area at Rock Creek Powerhouse.

4.4.2.6 SFAR Access from Rock Creek Road (Access to Potential Take-Out Location)

The other potential take-out location is just upstream from the White Rock Powerhouse and it is also accessed by a road connecting to the Rock Creek Road (see Figure 2.1-1). This road could also provide take out access for boaters making the two-mile run beginning at the Rock Creek Powerhouse. The 15 minute shuttle time between Rock Creek Powerhouse to this location would be far more attractive than the 35 to 40 minute shuttle time to reach the White Rock Powerhouse take out for this lower two–mile run. However, the shuttle time to the Slab Creek Dam put-in from this take-out location would increase by 25 to 30 minutes over shuttle time associated with the White Rock Powerhouse take-out. This access road has a gate at the Rock Creek Road. However, it has been observed routinely open to the public and the dirt-surfaced road has been recently graded by an unknown entity. This road appears to pass through privately owned land. The road is very steep and narrow and vehicular access requires a vehicle with high clearance or even 4WD. It is approximately one-half mile from the Rock Creek Road to the end of this road at the river's edge (see Figure 4.4-5). There are numerous dispersed campsites and evidence of recent public dispersed recreational use along the shoreline of the SFAR. The potential take-out location is also within the boundary of the Chili Bar Project (FERC No. 2155).

Figure 4.4-5. Parking area at the SFAR Access Road from the Rock Creek Road.

4.4.3 Reach Characteristics

The boaters were asked to evaluate the whitewater characteristics of the Slab Creek Reach by indicating the degree to which they agreed or disagreed with a series of statements. The responses to these statements are sorted by the type of craft and summarized for each test flow in Figures 4.4-6 through 4.4-8. In general, at each of the test flows, the reach appears to possess various attributes including the length of the run, challenging whitewater and an aesthetically pleasing environment, to conclude that if adequate flows are present, this reach provides an opportunity for whitewater boating use.

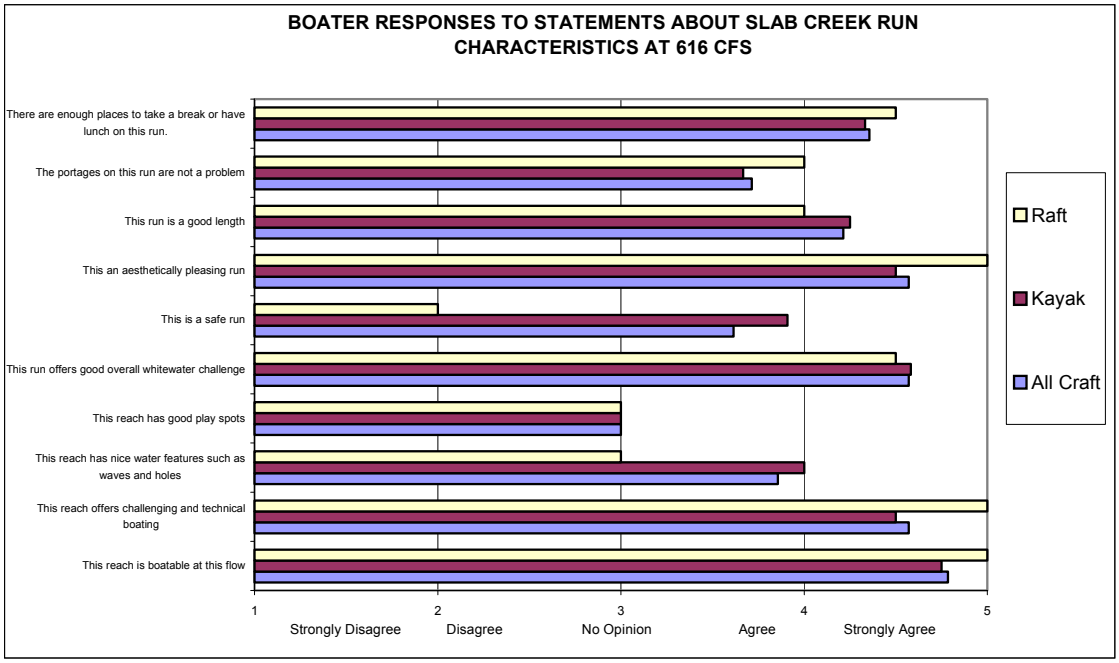


Figure 4.4-6. **Boater responses (averaged) regarding the whitewater characteristics of the Slab Creek Run at 616 cfs. Note: the responses for the raft category are from respondents who boated the reach in a 2-person raft (11'). (Source: Data from the Single Flow Evaluation Form at 616 cfs.)**

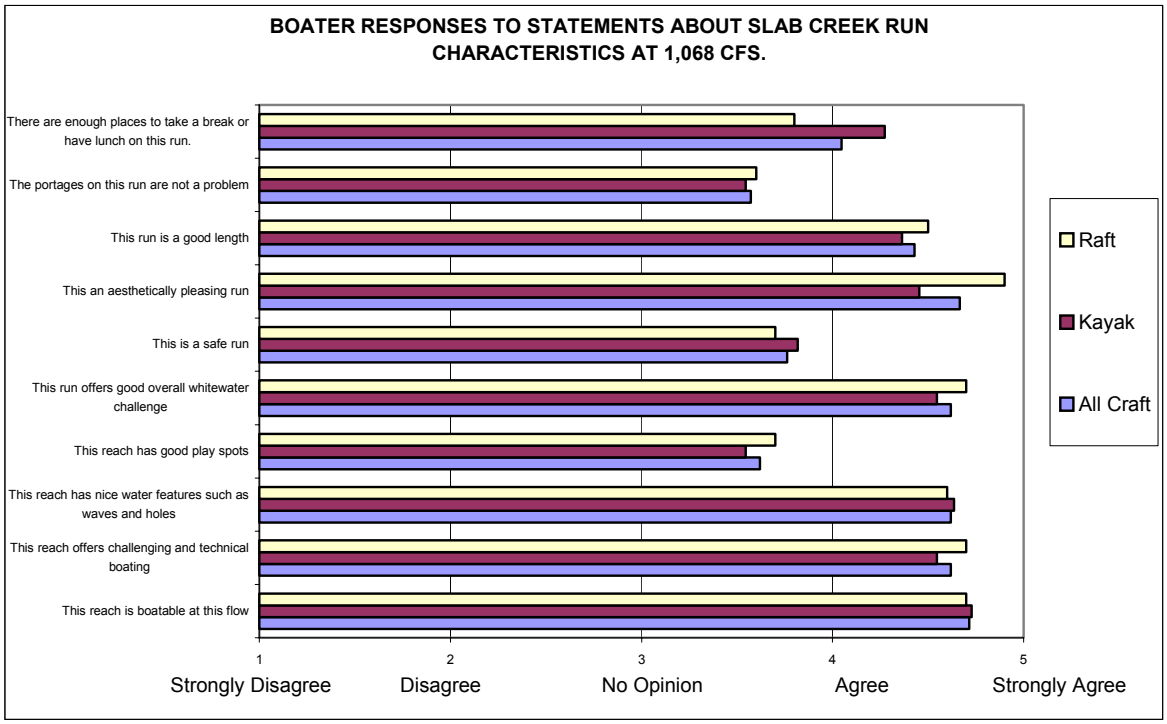


Figure 4.4-7. **Boater responses (averaged) regarding the whitewater characteristics of the Slab Creek Run at 1,068 cfs. (Source: Data from the Single Flow Evaluation Form at 1,068 cfs.)**

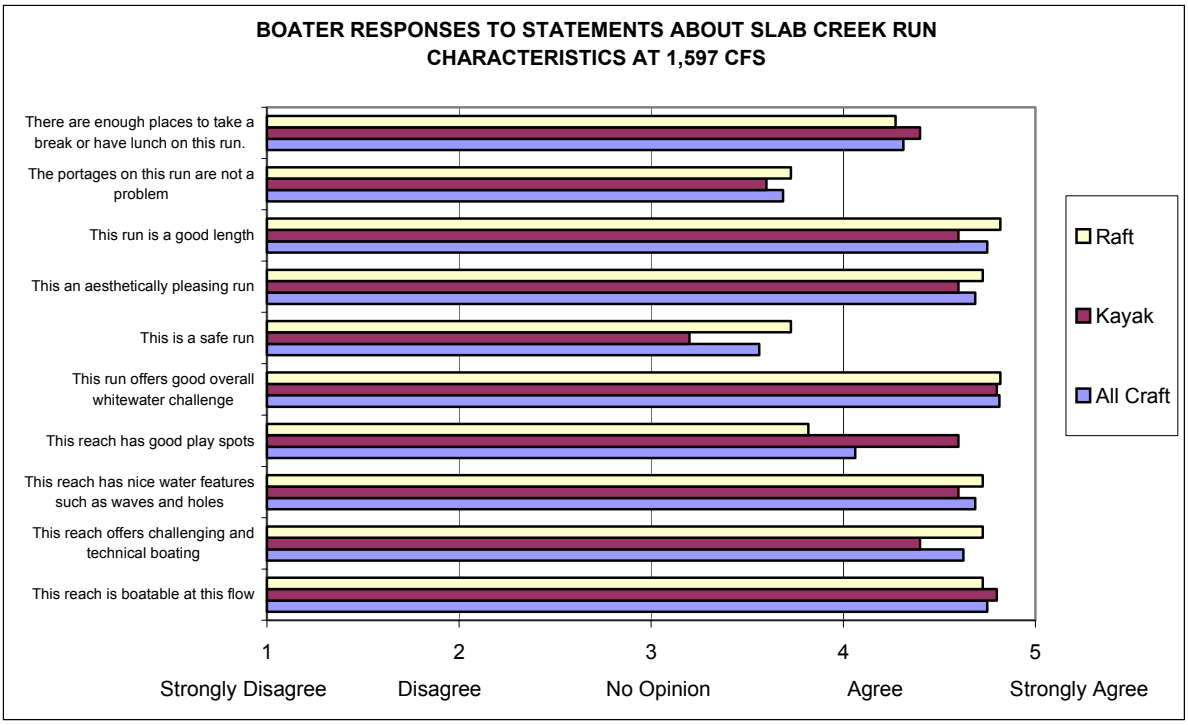


Figure 4.4-8. Boater responses (averaged) regarding the whitewater characteristics of the Slab Creek Run at 1,597 cfs. (Source: Data from the Single Flow Evaluation Form at 1,597 cfs.)

4.4.4 Acceptable Flows for Boating

To determine what flows would be acceptable to provide whitewater boating opportunities on the Slab Creek Reach, the participants were asked to provide their opinions on the acceptability of the run at various flow intervals between 300 and 3,000 cfs. Although the test flows ranged from 616 to 1,597 cfs, boaters were asked to speculate on the acceptability of flows they had not experienced. If they did not feel confident in offering an opinion on a certain flow, the boaters were directed to leave the corresponding column on the evaluation form blank. A summary of this information is provided in Figures 4.4-9 through 4.4-12 below.

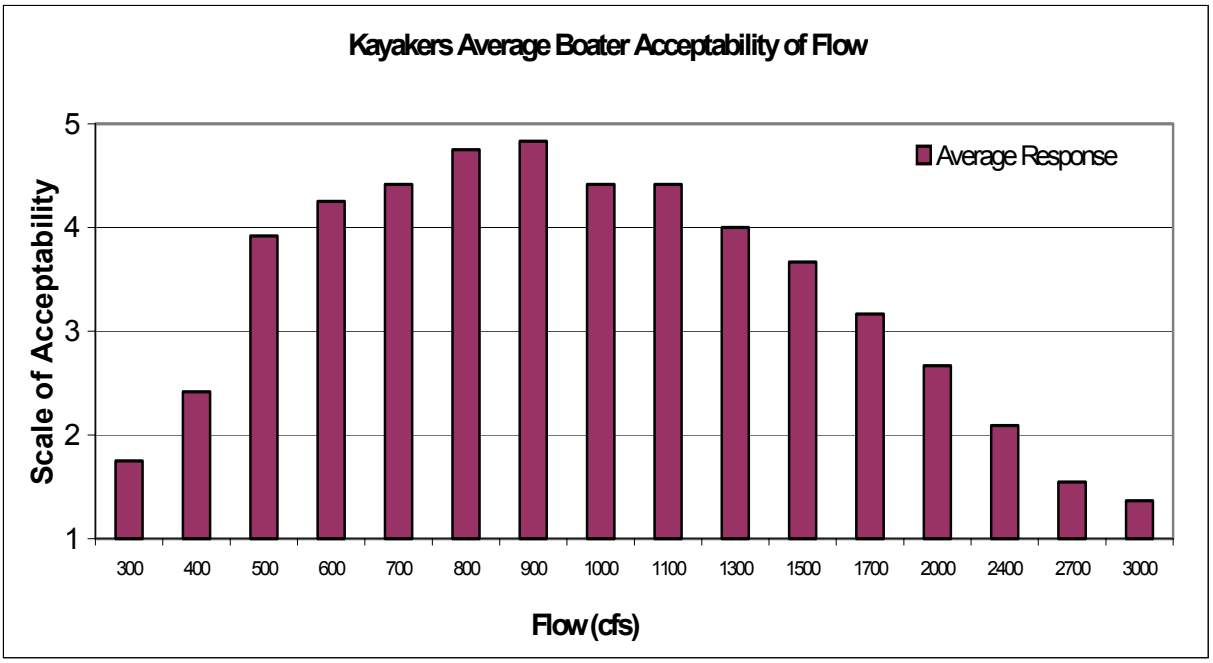


Figure 4.4-9. **Average Boater Acceptability of Flow-Kayakers.**
(Scale: 1=Totally Unacceptable, 2=Unacceptable, 3=Marginal, 4=Acceptable, 5=Totally Acceptable)
(Source: Data from the Comparative Evaluation Form)

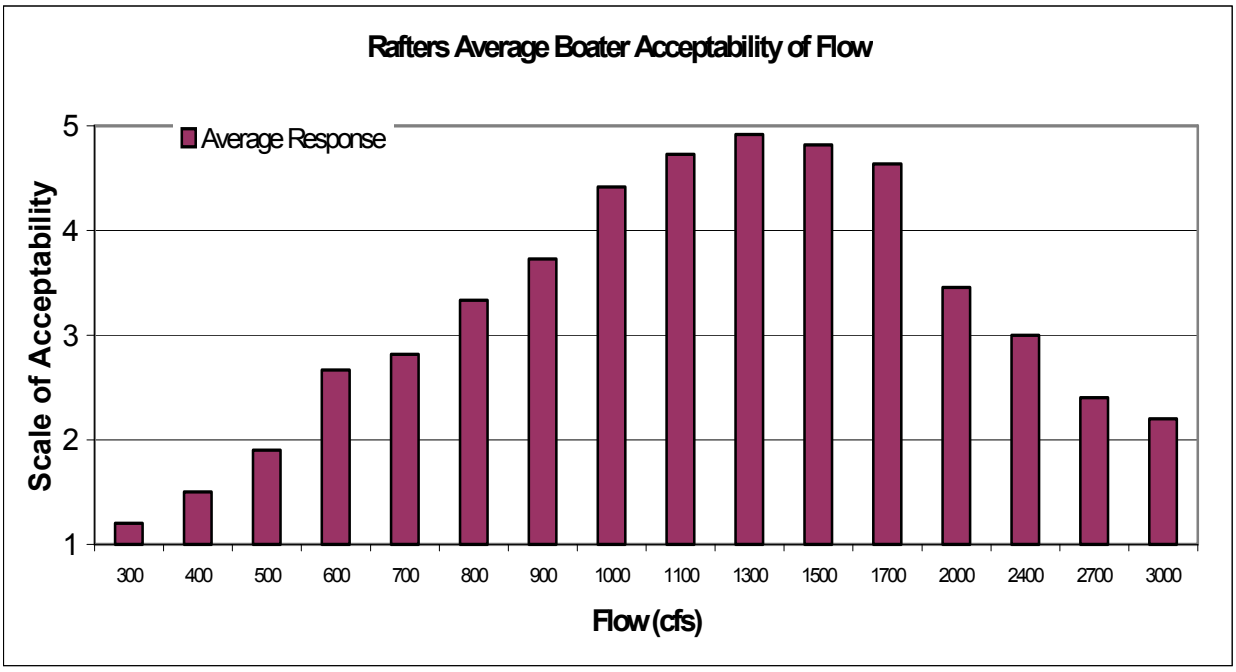


Figure 4.4-10. **Average Boater Acceptability of Flow-Rafters.**
(Scale: 1=Totally Unacceptable, 2=Unacceptable, 3=Marginal, 4=Acceptable, 5=Totally Acceptable)
(Source: Data from the Comparative Evaluation Form)

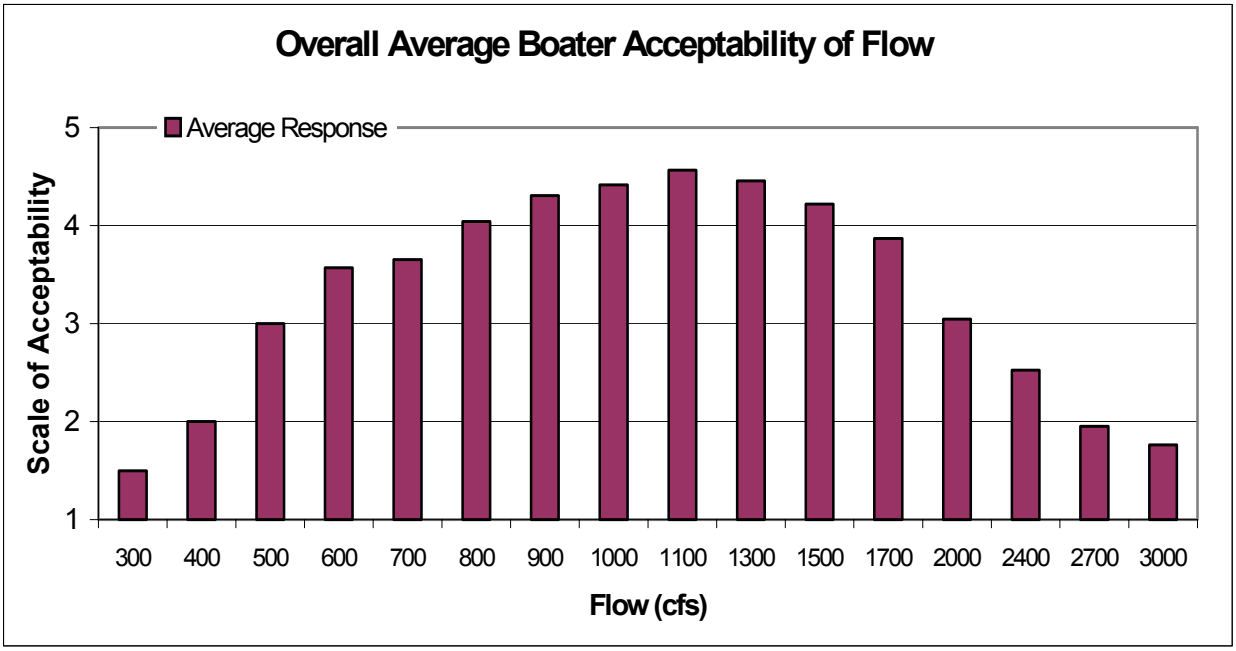


Figure 4.4-11. **Average Boater Acceptability of Flow-Overall.**
(Scale: 1=Totally Unacceptable, 2=Unacceptable, 3=Marginal, 4=Acceptable, 5=Totally Acceptable)
(Source: Data from the Comparative Evaluation Form)

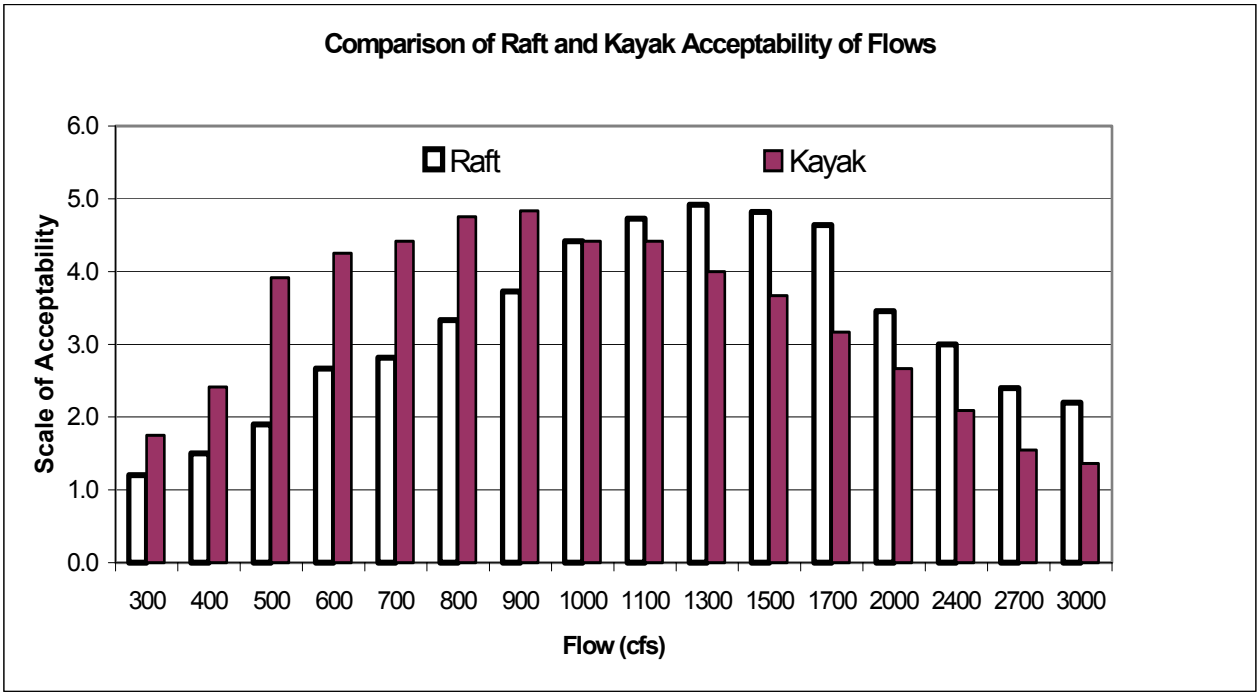


Figure 4.4-12. **Average Boater Acceptability of Flow-Comparison by Craft.**
(Scale: 1=Totally Unacceptable, 2=Unacceptable, 3=Marginal, 4=Acceptable, 5=Totally Acceptable)
(Source: Data from the Comparative Evaluation Form)

Boaters were also asked on the comparative evaluation form to provide their opinion as to the minimum flow that would allow them to simply get down the river in their craft. The average response from the kayakers was 396 cfs and the average response from rafters was 723 cfs.

4.4.5 Range of Optimum Flows

To further examine the whitewater boating opportunities at various flows, the boaters were asked to suggest the optimum range of flows that would provide the best whitewater characteristics for the run. Figures 4.4-13 provides a graphical representation of the average optimal range of flows for all craft and sorted by type of craft as determined from the evaluation data. Figure 4.4-14 through 4.4-16 shows this same information sorted by the skill level of the participants and by the skill level of participants in different types of craft. The average optimal range of flows is presented as well as the range of the individual responses provided by the boaters on the comparative flow evaluation form.

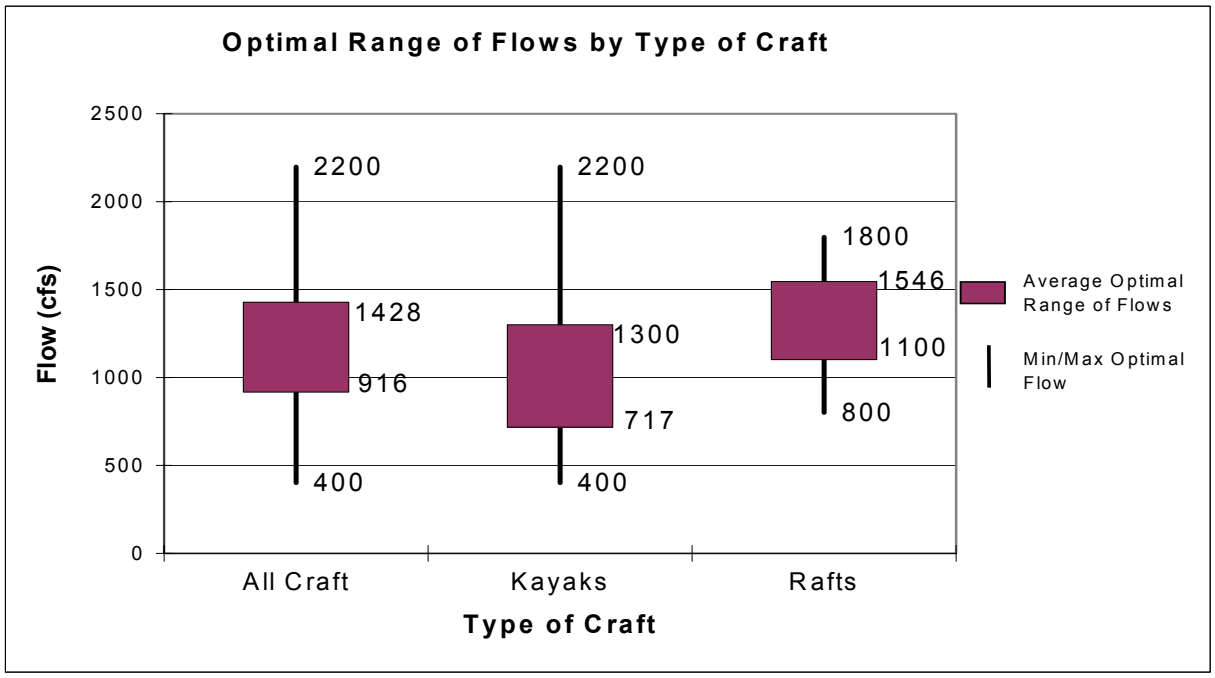


Figure 4.4-13. Average optimal range of flows presented for all craft and sorted by type of craft. (Source: Data from the Comparative Evaluation Form)

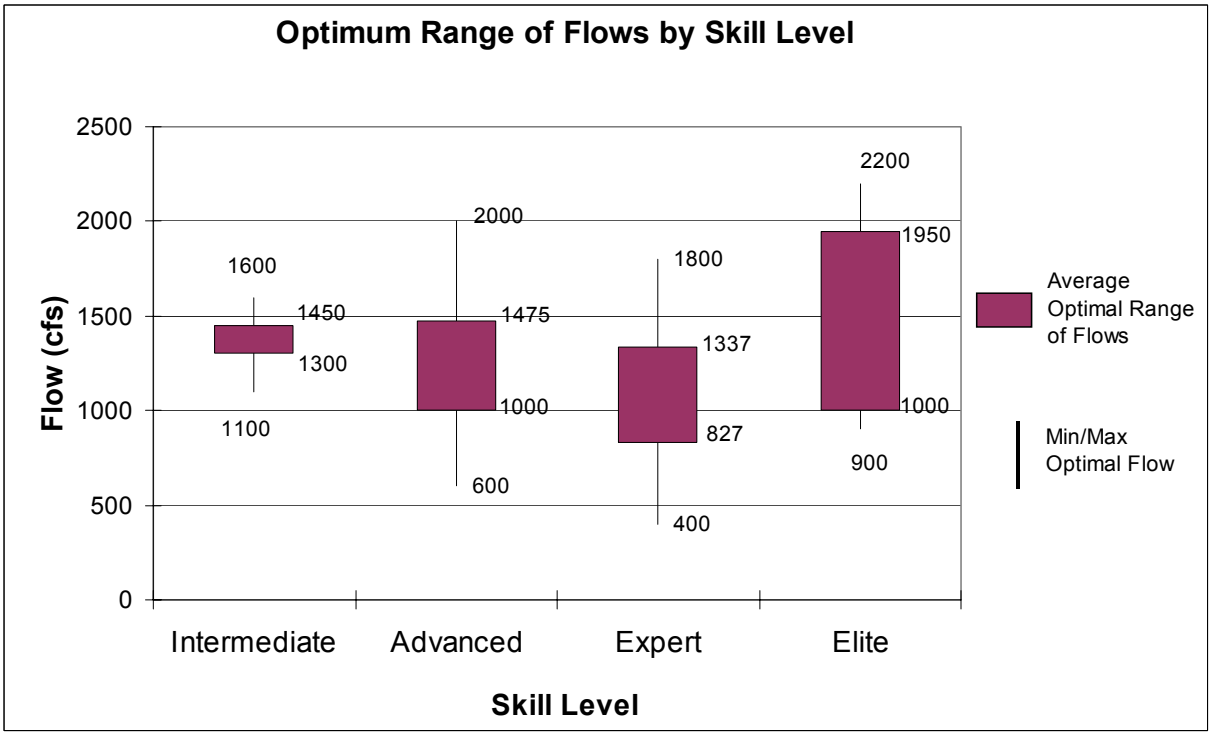


Figure 4.4-14. Average optimal range of flows presented for all craft and sorted by skill level. (Source: Data from the Comparative Evaluation Form)

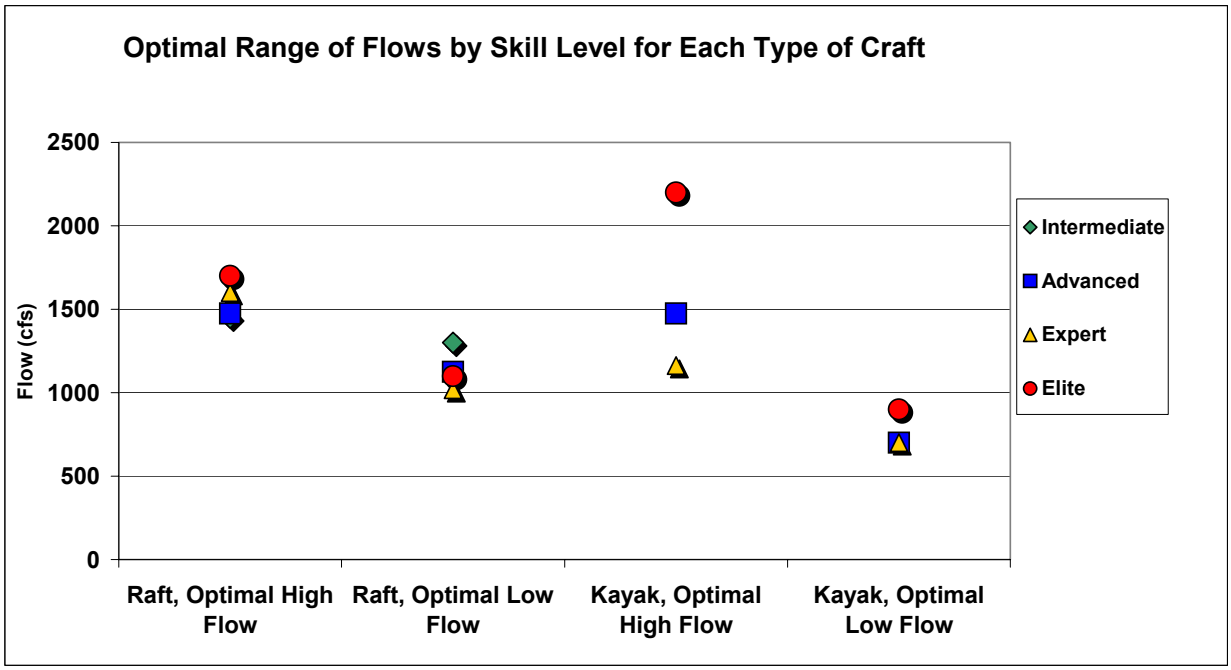


Figure 4.4-15. Average optimal high and optimal low flows presented for all craft and sorted by skill level. and craft type. (Source: Data from the Comparative Evaluation Form)

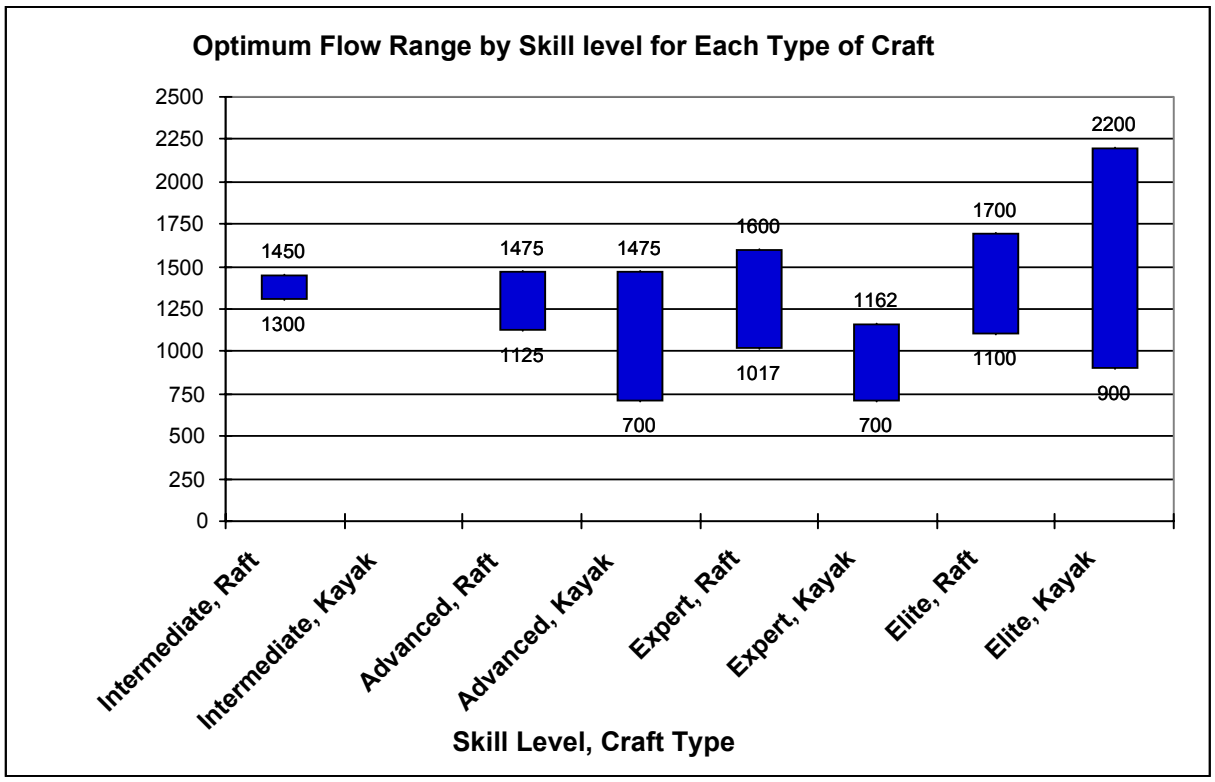


Figure 4.4-16. Average optimal range of flows presented for all craft and sorted by skill level. and craft type. (Source: Data from the Comparative Evaluation Form)

4.4.6 Comparison to Other Runs in California

The study participants most frequently compared the Slab Creek Reach to the Giant Gap Run on the North Fork American River. Many of the boaters also thought this reach was comparable to Cherry Creek on the Tuolumne River, North Fork Salmon River (CA), Golden Gate and Kyburz runs on the SFAR, the Kaweah River and the South Fork Yuba River.

4.4.7 Nearby Population Centers

The communities where boaters live who may use this run and that are within a reasonable driving distance of the Slab Creek Reach are listed below in Table 4.4-1.

Table 4.4-1. Distance and driving time to Slab Creek Reach from nearby population centers.

Loacation	Distance (miles)	Driving Time to Slab Creek Reach
Placerville, CA	8.2	15 minutes
Coloma, CA	18.2	30 minutes
Sacramento, CA	52.1	1.1 Hours
San Francisco, CA	136.3	2.4 Hours
Redding, CA	205	3.5 Hours
Reno, NV	134.2	2.5 Hours

4.4.8 Whitewater Boating Opportunities in the American River Watershed

A review of *California Whitewater: A Guide to the Rivers* (Cassady and Calhoun, 1995), *The Best Whitewater in California: The Guide to 180 Runs* (Holbek and Stanley 1998) and *California Boating and Water Sports* (Stienstra 1996) identifies 19 runs in the American River (including the Rubicon River) watershed with a total distance of over 168 miles. These runs are listed in Table 4.4-2 below.

Table 4.4-2. Whitewater boating opportunities in the American River watershed.

Name of Run	Put-In & Take Out	Length (miles)	Gradient (feet per mile)	Class	Boating Range[1] and (Optimum Flow)	Boating Season
North Fork American River						
Generation Gap	Tadpole Creek to Colfax-Foresthill Rd.	12.3	75	IV-V 0 portages	600-2,000 (1,200)	Spring
Giant Gap	Euchre Bar to Colfax-Iowa Hill Rd.	14.5	54	IV-V 0 portages	600-2,500 (1,000)	Winter, Spring
Chamberlain Falls	Colfax-Iowa Hill Rd. to Colfax-Foresthill Rd.	4.8	44	III-IV+ 0 portages	800-2,500 (1,500)	Winter, Spring
Ponderosa Way	Colfax- Foresthill Bridge to Ponderosa Way Bridge	5	21	II+ to III 0 portages	500-1,500 > 1,500 (1,200)	Spring
Middle Fork American River						
No. Middle Fk. American River	Last Chance Bridge to Middle Fk. American	12.9	129	V 7 portages	600-800 (600)	Winter, Spring
Tunnel Run	Ralston Afterbay to Spring Garden Rd.	17	23	IV 1 portage	800-1,500 (1,200)	Spring, Summer
Rubicon River						
Lower Run	Ellicott Bridge to Ralston Afterbay	20.3	108	V- to V 2 portages	500-1,000 1,000-2,000 (1,200)	Spring
South Fork American River						
Lovers Leap	Strawberry to Kyburz	9.6	171	V 3 portages	500-1,200 (1,000)	Spring
Dugald Bremner	Upper Bridge to Girard Cr.	3.5	191	V 1 portage	300-800 (500)	Winter, Spring
Lower Run	China Flat to So. Fk. American	3.3	236	V+ 2 portages	350-550 (400)	Spring, Summer
Kyburz to Riverton	Kyburz to Route 50 Bridge	9.6	90	III-IV+ IV-V 2 portages	700-1,200 1,200-1,300 (1,200)	Spring

Table 4.4-2. Whitewater boating opportunities in the American River watershed.

Name of Run	Put-In & Take Out	Length (miles)	Gradient (feet per mile)	Class	Boating Range[1] and (Optimum Flow)	Boating Season
Riverton to Peavine	Route 50 Bridge to Peavine Ridge Rd.	3.5	69	III-IV 0 portages	700-4,000 (1,500)	Spring
Golden Gate	Peavine Ridge Rd. to Forebay Rd.	9.4	117	V+ 5 portages	700-1,500 (1,000)	Spring
Silver Creek	Near FS Road 12N25 to Ice House Reservoir	1.75	481	V	50-300[2] (150-200)	Spring
Silver Creek	Camino Reservoir to SFAR	9.2	119	V 8 portages	600-800 (600)	Spring
Slab Creek	Slab Cr. Dam to White Rock PH	7	89	V 1 portage	500-2,000 (1500)	Spring
Rock Creek	Near Dutch Cyn to Rock Cr. Rd.	6.3	110	IV+ 2 portages	300-800 (600)	Winter, Spring
Chili Bar	Route 193 to Coloma	5.8	31	III+ III-IV 0 portages	700 –1,500 1,500-10,000 (2,000)	Year-round
Coloma to Lotus	Coloma Park to Lotus Campground	3	24	II II+ III 0 portages	500-1,500 1,500-3,000 >3,000 (1,500)	Spring, Summer
The Gorge	Lotus Campground to Folsom Lake	11.2	21	III+ III-IV 0 portages	800-2,000 2000-10,000 (2,000)	Year-round

[1]Boatable range and optimum flow from Holbek and Stanley (1995)
[2]Boatable range and optimum flow from boater interviews.

4.5 Hydrology

SMUD summarized the measured regulated and synthesized unimpaired flow information for the reach. These data can be used to characterize the boating opportunities that existed with the current UARP operations from Water Year 1975 through 2001, and the boating opportunities that might have existed over that same period if there were no developments upstream of Slab Creek Reach. The hydrology information was sorted into five water year types based on the CDWR April 1 Forecast for Total Unimpaired Flow into Folsom Reservoir for that water year. The five water year types used the flow criteria established by the UARP Relicensing Water Year Type Subgroup as described in Section 2.2 of this report, and can be characterized as Critically Dry, Dry, Below Normal, Above Normal and Wet. This analysis resulted in 3 Critically Dry Water Years, 7 Dry Water Years, 4 Below Normal Water Years, 5 Above Normal Water Years and 8 Wet Water Years. The hydrology information for each of the respective months within each type of water year were combined and averaged to develop monthly flow exceedance curves for each type of water year. The graphs show the probability for exceeding a range of flows between 0 and 10,000 cfs in Slab Creek Reach under Project flow conditions and conditions that might have occurred if no water developments occurred in the watershed. This information is presented in Appendix E.

The second type of hydrology information developed for this study relates to the number of boatable days that would exist in the Slab Creek Reach under regulated conditions and what might have existed if no water developments occurred in the watershed. To make this analysis, SMUD relied on a range of boatable flows as revealed by responses to the boater evaluations relating to the acceptability of different flows. This information indicated that flows between 500 and 2,000 cfs would be a reasonable range of flows to use to in this evaluation. Based on the averaged hydrologic data for each water year type, the average number of days in each month is shown on a graph for each water year type that existed under the regulated conditions and that might have existed if no water developments occurred in the watershed. As an example, under Project conditions, in the three Februarys that were characterized as Critically Dry, 12 days may have occurred that had mean daily flows in the boatable range. In this example, the 12 boatable days are attributed to the months of February in 3 different years. By averaging the 12 boatable days over the 3 years, an average of 4 boatable days occurred in Critically Dry Februarys under Project conditions. These graphs are shown in Figure 4.5-1.

4.6 Videotape

The reader is also referred to Appendix F that includes the video prepared by SMUD as part of this study. This video shows the participants boating various rapids in the Slab Creek Reach at the different test flows and excerpts from the post-run group discussions with the study participants.

4.7 Ecological Studies

All information pertaining to the ecological studies conducted during this whitewater flow study are located in Appendix H.

5.0 ANALYSIS

5.1 Minimum Acceptable Flows

The graphs in section 4.3.4 provide a basis to evaluate how acceptable various flows would be for different types of craft. The evaluation form used a five-point scale of: Totally Unacceptable, Unacceptable, Marginal, Acceptable and Totally Acceptable. Assuming that boaters would return for a flow rated ‘Marginal’, ‘Acceptable’ or ‘Totally Acceptable’, the averaged responses provided on the comparative flow evaluations indicate a minimum acceptable flow of approximately 400 cfs for kayakers and approximately 700 cfs for rafters on the Slab Creek Reach. Not surprisingly, intermediate and advanced boaters tended to have a lower minimum acceptable flow than expert and elite boaters.

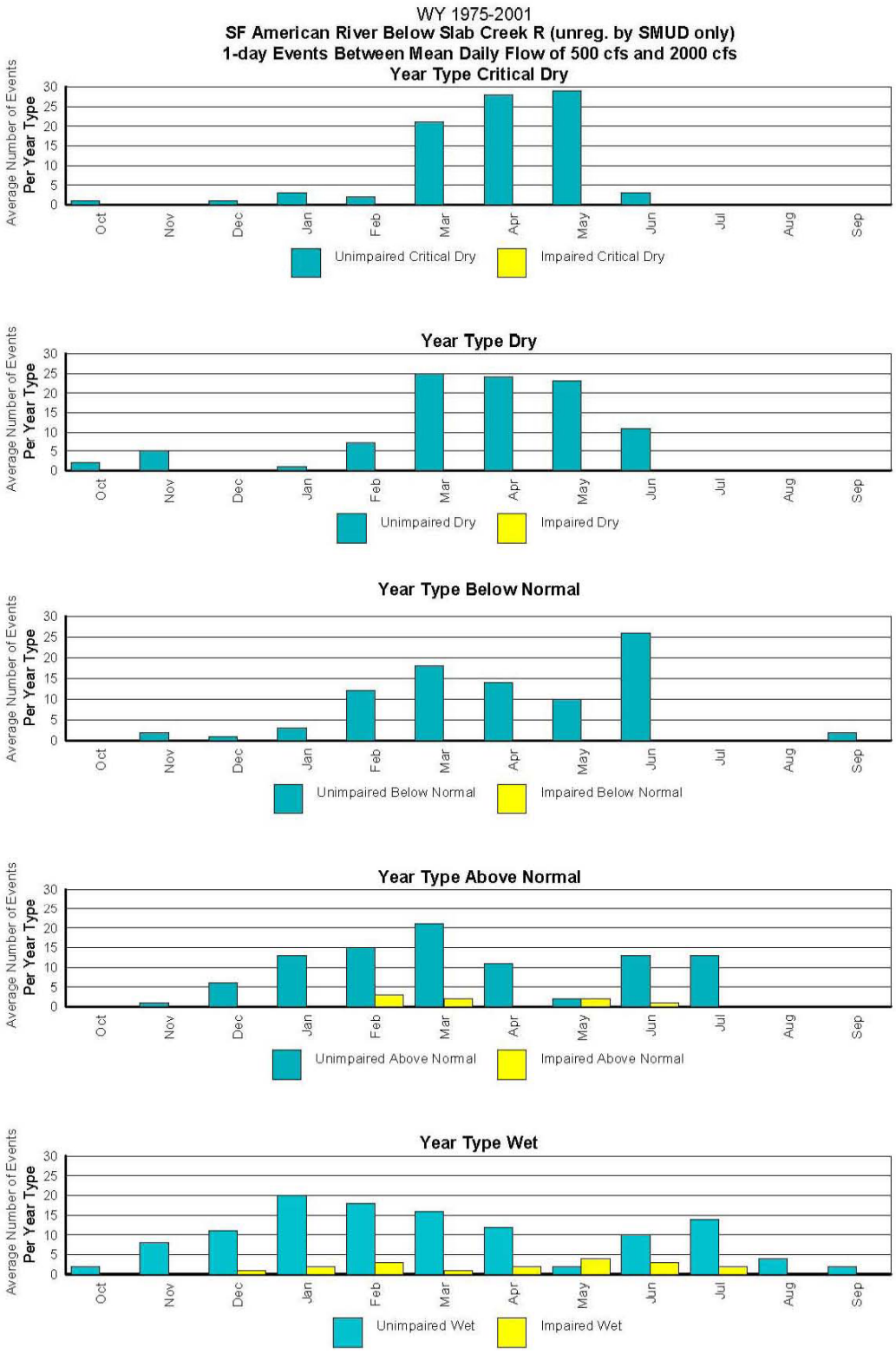


Figure 4.5-1. Average number of boatable days per month for each water year type under regulated and unimpaired conditions.

5.2 Optimal Range of Flows

The optimum flow, as defined in the study plan, is the peak of the flow preference curve and represents the flow level that provides the best combination of flow conditions for a whitewater opportunity. Analysis of the responses of the comparative flow evaluation (see Section 4.3.5) can be used to determine an optimal range of flows for different crafts on the reach. The averaged responses from the kayakers suggest an optimal range of boating flows between approximately 700 and 1,300 cfs. In looking at the individual responses, two of the kayakers provided an optimal range of flows that was inconsistent with the other 10 responses from kayakers. The high end of their optimum range was 2,000 to 2,200 cfs, which is 1.5 to 2 times the flow that the other 10 kayakers suggested in their responses. If these two outlying responses were not included in calculating the average response, the optimal boating range for kayaks would be approximately 700 to 1,100 cfs. Within the range of these ten responses, the lowest flow was 400 cfs and the highest flow was 1,500 cfs. The averaged responses from the rafters indicated an optimal range for rafts would be approximately 1,100 cfs to 1,500 cfs. Unlike the data from kayakers, the responses from the rafters appeared to be fairly consistent and there did not appear to be any outlying responses.

5.3 Hydrology Analysis

The SFAR is a watershed with a classic Sierra snowmelt drainage pattern. As such, a typical unimpaired hydrograph for the reach shows a number of storm events during the winter with elevated flows, a spring runoff period with high flows, and summer and fall seasons with fairly stable and low flows. Of course there are variations to this pattern but, in general, the storm events occur in the winter months and the highest flows are associated with the spring runoff. Figure 5.3-1 below shows the hydrograph that occurred in 1974-75 that reflects this general flow pattern.

The UARP modifies the magnitude and frequency of the flows in the UARP reach. Figure 5.3-2 shows a flow pattern that occurred in 1999 in the SFAR. This regulated hydrograph shows stable low flows and infrequent spill events. It should be noted that there is an extreme variability in the flow patterns from one year to the next in regard to either the regulated or the unimpaired flow patterns.

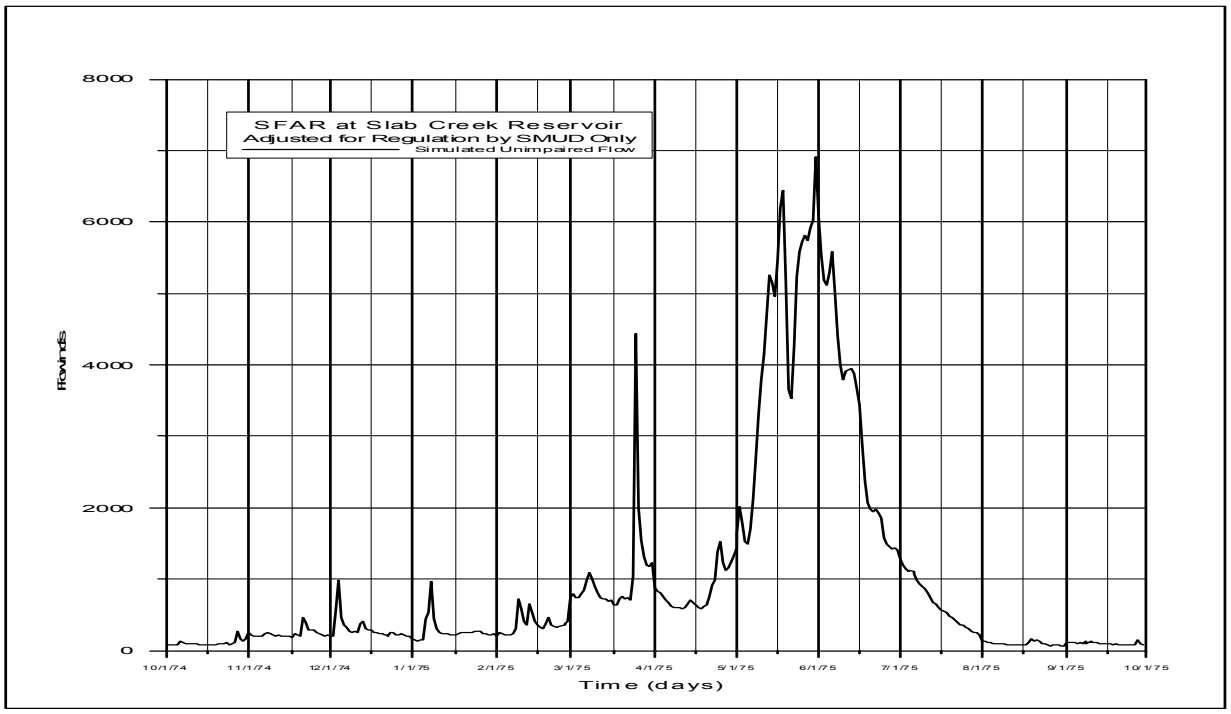


Figure 5.3-1. Synthesized unimpaired hydrograph for the SFAR October, 1974 through September 1975.

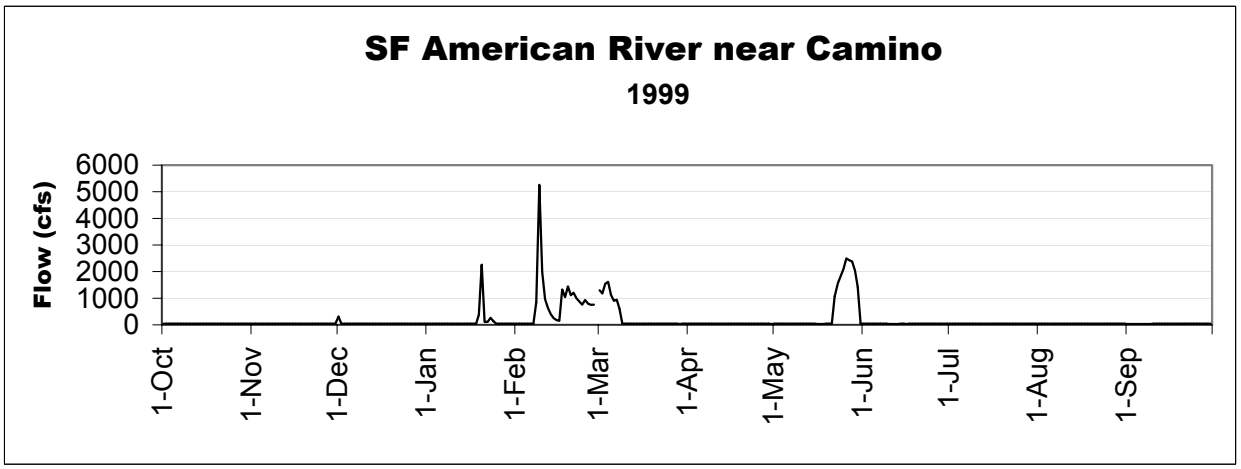


Figure 5.3-2. Regulated hydrograph for the SFAR, October 1998 through September 1999.

Analysis of the UARP hydrology information shows the number of days per month that flows in the boatable range occurred from 1974 through 2000 with the UARP in operation as compared to the number of days that might have occurred if no developments had been in place on the watershed. This analysis is shown for the various water year types in Figure 4.5-1. The flow range, developed from the boater evaluations, used in this analysis is from 500 to 2,000 cfs. This flow range would be acceptable for most craft types and ability levels. However, the lowest

flows in this range would not be acceptable for large rafts and the high end of the range would not be suitable for less skilled boaters.

A review of the synthesized unimpaired flow information indicates that flows between 500 and 2,000 cfs might have occurred in most months in Wet and Above Normal water years; most of the days would have occurred from January through July. This would be the case assuming that the UARP was not built and there were no other hydro developments constructed in the watershed. The month of May is an exception due to the fact that the flows would typically be much higher than 2,000 cfs during the peak spring runoff in Wet and Above Normal water year types. In Below Normal, Dry, and Critically Dry water year types, flows in the boatable range would occur in the winter months and through the snow run-off period ending in June. The impaired flow data shows that the UARP typically only spills in Above Normal and Wet water year types. While these spill events provided some opportunity, it is less than what would occur if no developments were on the watershed. Hourly flow data (see Figures 5.3-3 and 5.3-4) also show that while these spill events are usually relatively stable, they can fluctuate enough to affect the boating opportunity. This is due to the fact that flows may vary outside the normal boating range in less time than it takes to complete the run.

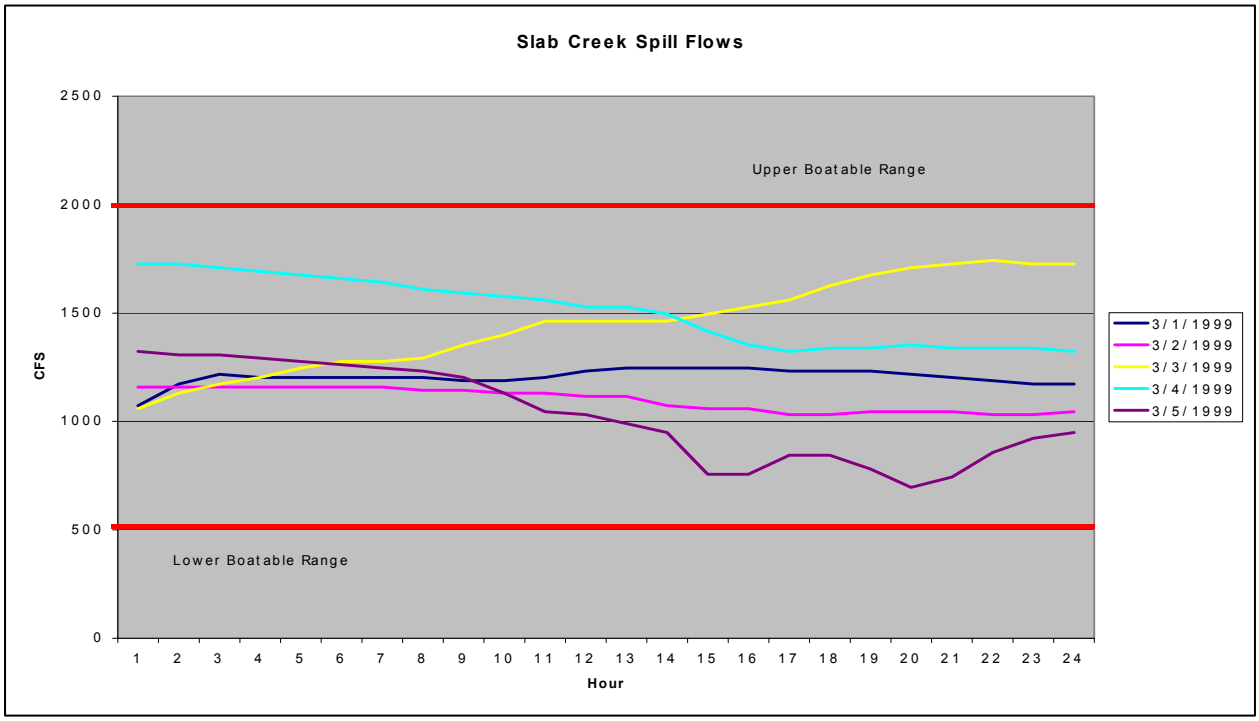


Figure 5.3-3. Hourly flows data during a spill event at Slab Creek Dam (1999).

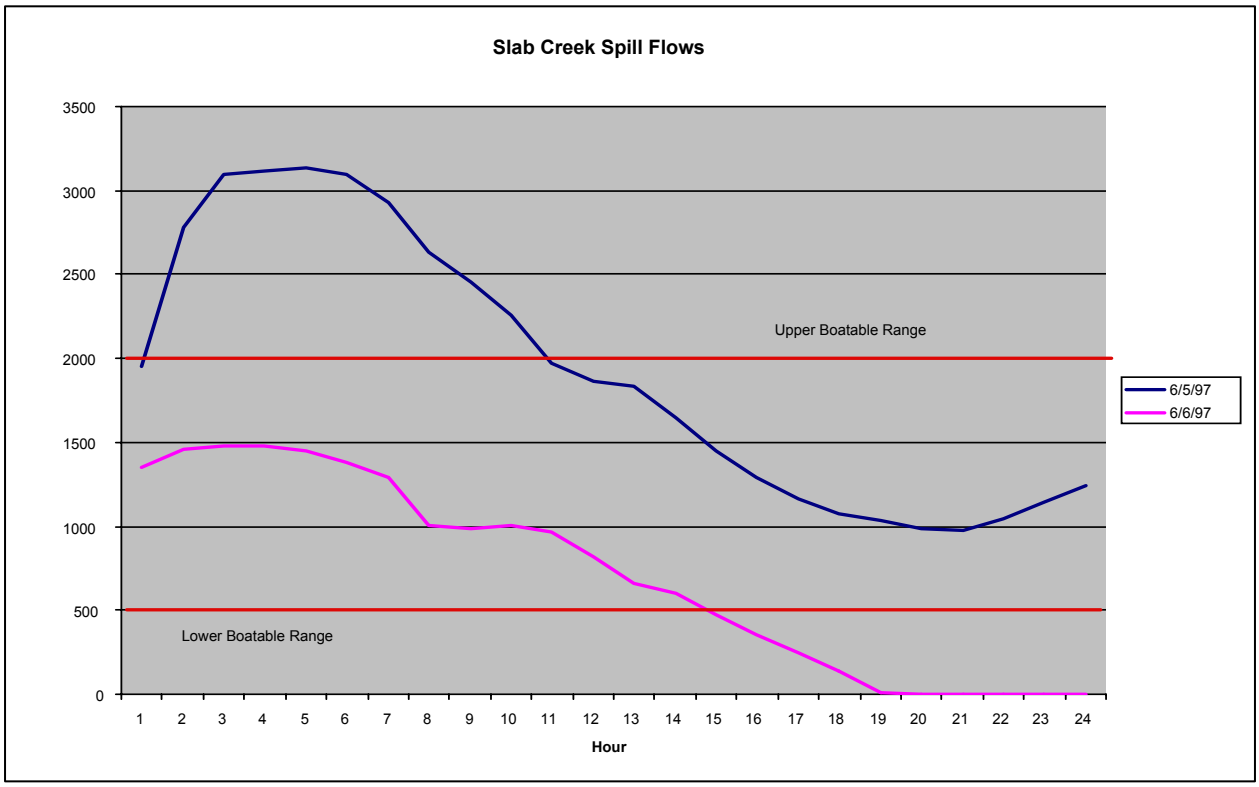


Figure 5.3-4. Hourly flows data during a spill event at Slab Creek Dam (1997).

The minimum optimal flows as determined by the controlled flow study were 700 cfs for kayaks and 1,100 cfs for rafts. The probability exceedance curves located in Appendix E show how likely these flows would be to occur in the various water year types. The months May through October were chosen to reflect boater's seasonal preference. Under conditions with no developments in the watershed, the curves show flows occurring at or above optimal levels for kayaks during the months of May and June more than 50 percent of the time in Below Normal, Above Normal and Wet years. In Dry and Critically Dry years, these flows occurred less than 20 percent of the time. Rafting flows in the optimal range, above 1,100 cfs, have a 50 percent probability of occurring in Wet and Above Normal years. In all other water year types, flows in the optimal rafting range would happen less than 20 percent of the time.

In the month of July, rafting flows in the optimal range would occur in the wettest water year types and less than 20 percent of the time if no developments were in the watershed. The likelihood of optimal kayaking flows occurring would be slightly better in that they would occur in Above Normal years in addition to Wet years. The months of August, September, and October showed very low probability of optimum flows for rafts or kayaks in any of the water year types.

5.4 Commercial Use

Several of the participants indicated that the Slab Creek Reach could have high commercial value. The participants compared the Slab Creek Reach to a wide range of high quality class IV/V boating opportunities around the state. Several commercial outfitters indicated a desire to have commercial opportunities on this reach. Outfitters that were interviewed stated that scheduled releases would provide predictability and certainty, which would be extremely attractive for outfitters. Rivers that have a natural flow regime, such as the Chamberlain Falls run on the North Fork American, can be very challenging for commercial outfitting because flows are generally available for a short time and their occurrence is hard to predict. The rafting flows that would be required to make this reach a viable commercial run are higher than the flows that would be required for optimal kayaking (these flows are outlined in section 5.2). Some outfitters that were interviewed felt that carrying rafts down the gated Adit Access Road could be problematic for commercial customers. Some improvement at the White Rock Powerhouse was also suggested to help facilitate raft access at the take-out. This is a remote run and as such, there are standard issues that face boaters on any run that is remote in nature. The primary issue is the ability for paddlers to have egress from the river canyon in case of emergency since there are few points of access in this steep river canyon.

5.5 Carrying Capacity

The Slab Creek Reach is a whitewater run in the Sierra Nevada that is class IV/V in difficulty. On runs of this difficulty it is important to allow enough room between groups so that groups do no overlap, particularly in the more difficult sections of the run. Other reaches of this difficulty have a carrying capacity target of one group launching every 20-30 minutes. A group is defined as three rafts or six kayakers. For reference, on the Chamberlain Falls reach of the North Fork American River a commercial group of four boats is allowed to launch every twenty minutes. Commercial Outfitters are allowed 24 launches per day. On the Slab Creek Reach, if a group of six kayakers launched every 20 minutes over a six hour release period, this would constitute 102 users per day. If more raft groups were present, the number of people would be greater. A typical raft group includes three rafts. On this reach if fourteen foot rafts were used, with 6 to 7 passengers on each boat, this would create a group size of 18 to 21 paddlers per group. It is likely that the number of rafters on the reach would be small. Three raft launches per day would constitute 9 rafts and approximately 60 paddlers. This would increase the total numbers of paddlers on the reach to between 110 and 150 users per day. These numbers are similar to capacity numbers agreed to on the North Fork Feather River Belden reach which in similar in length to the Slab Creek Reach. These numbers are also consistent with the physical carrying capacity numbers, specifically available parking. The likely shuttle scenario for this run would be that boaters would drive to one of the possible take-out locations and leave a car. The Mosquito Bridge Area has limited potential as an access site. There is room for no more than four to six cars in the area around the bridge. The routes to the river are very steep. The White Rock Powerhouse has room for approximately 75 cars and the Rock Creek Powerhouse has room for approximately 50 to 70 cars. Estimating two to three people per car, this would be comparable to a social carrying capacity of approximately 150 boaters. Assuming boaters would then combine four people per car to shuttle to the put-in, a total of thirty to forty vehicles would

need to be able to park at the put-in. If all parking were to occur outside the Adit Road gate, boaters would need to use all of the available parking along Chute Camp Road back to where the road crosses Iowa Creek. This would require a .6-mile walk to the put in for some of the paddlers.

6.0 FINDINGS

Participants in the Whitewater Flow Study for the Slab Creek Reach found this run to be a high quality advanced to expert run. The boaters reported that the reach is aesthetically pleasing with many attractive attributes for boating such as length of the run and shuttle, good portage routes, challenging whitewater, play spots, waves and holes, and plenty of locations for breaks. The difficulty class for the entire reach is between class IV and V, and is most suited for boaters with advanced skills or better. At the highest test flow, more boaters tended to rate the overall difficulty of the reach as class V. The last two miles of the reach are less difficult and may be suitable for intermediate boaters.

The evaluation responses indicate that the minimum navigable flow for the reach is approximately 400 cfs. Most boaters felt that flows between 500 cfs and 2,000 cfs would provide an acceptable boating experience for them. Kayakers tended to prefer flows at the lower end of this range whereas rafters tended to prefer flows at the higher end of this range. The optimum range of flows for kayaks is approximately 700 to 1,100 cfs. The optimum range of flows for rafts is approximately 1,100 to 1,500 cfs. Based on skill level, the optimum ranges of flows are: Intermediate-1,300 to 1,450 cfs; Advanced-1,000 to 1,475 cfs;, Expert-827 to 1,337 cfs; and Elite-1,000 to 1,950 cfs.

Participants found the access to the river that was used in the study to be acceptable, however this access was through several locked gates both at the put-in and the take-out at White Rock Power House. Other possible take-outs exist at the Rock Creek Power House and the SFAR Access from Rock Creek Road. Both of these access sites are also gated however the gate on the SFAR Access from Rock Creek Road is typically open. The Mosquito Road Bridge does provide access for boaters in the event of an emergency, however, it as limited potential as a routine point of access to the reach.

In addition, SMUD characterized the boating opportunities that existed with the current UARP operations over the past 25 years, and the boating opportunities that might have existed over that same period if there were no developments upstream of Slab Creek Reach. The analysis showed that, on average, there would have been fewer boatable days in all water year types, generally between March and June, with the UARP in place than might have occurred if no water developments had been in place during this 25-year period. Analyzing the synthesized unimpaired flow data, flows in the boatable range did not usually extend beyond June except in Above Normal or Wet water year types.

If no developments had been in place from 1975 through 2000, flow exceedance curves for this period show flows at or above optimal levels for kayaks during the months of May and June would have occurred more than 50 percent of the time in Below Normal, Above Normal and Wet

years. In Dry and Critically Dry years, these flows would have occurred less than 20 percent of the time. Rafting flows in the optimal range, above 1,100 cfs, would have had a 50 percent probability of occurring in Wet and Above Normal years. In all other water year types, flows in the optimal rafting range would have happened less than 20 percent of the time. In the month of July, rafting flows in the optimal range would have occurred in the wettest water year types and less than 20 percent of the time. The likelihood of optimal kayaking flows occurring without any developments in the watershed would be slightly better in that they would occur in Above Normal years in addition to Wet years. The months of August, September, and October showed very low probability of optimum flows for rafts or kayaks in any of the water year types if no water developments occurred on the watershed.

The high aesthetic values of the run and the close proximity to commercial rafting operations on the SFAR below Chili Bar made this run attractive to the outfitters that were interviewed for this study. Also the possibility of scheduled releases is advantageous for commercial outfitters because it can allow commercial guest to book trips far in advance. Concern was expressed was over the issue of having to carry boats down the Adit Access Road to the put-in.

The social carrying capacity for the reach was determined to be approximately 108 boats per day. This equates to between 110 and 150 users per day depending on the proportional use of rafts. The physical carrying capacity is limited by the available parking at the put-in, which is estimated to be between 30 and 40 cars. While there is sufficient parking capacity at the various take-out locations, White Rock Powerhouse, Rock Creek Powerhouse and the SFAR Access Road from Rock Creek Road, all of these locations are currently gated or have the potential to be gated. Access to the reach as it currently exists severely limits the physical carrying capacity of this reach.

In addition to the investigation of the feasibility of whitewater boating on the UARP Reach, SMUD also collected data concerning water quality during the recreation studies. Information concerning water temperature, turbidity, total suspended solids (TSS), river flows throughout the reach, bed formation inundation, and potential fish stranding as a result of the increased flows were measured. The data were gathered at four locations spaced throughout the Slab Creek Reach of the SFAR. Data loggers were used to record the temperature and turbidity while temporary staff gages were installed to monitor the rise and fall of the water surface. TSS samples were gathered and sent to a laboratory for analysis. Bed form inundation and areas of potential fish stranding were monitored during the flow events. However the topography of the SFAR canyon limited the documentation of bed form inundation and areas of potential fish stranding. The data gathered during the flow study indicate an increase in turbidity, TSS, and temperature as the flows increased, and a decrease in turbidity and TSS as the flow stabilized at the peak daily flow. Turbidity, TSS and temperature decreased as the flows returned to normal base flows. However a rainstorm occurring the evening prior to and the first day of the study may have influenced the results of the study. Bed form inundation was only noted to occur at one location, while the potential for fish stranding within the reach is almost nonexistent.

7.0 LITERATURE CITED

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APPENDIX A

BOATER EVALUATION FORM-SLAB CREEK RUN

Slab Creek Run
(Slab Creek Dam to White Rock Powerhouse)
WHITEWATER BOATING FLOW STUDY, 2003

BOATER EVALUATION FORM

This questionnaire is organized in three sections. ***Section 1****—Contact information and characterization of your boating skills/experience. (You will need to complete this section only once during the study.)* ***Section 2****—Questions regarding your experience on today's run.* ***Section 3****—A comparative evaluation of different flows (To be completed after completing all test flows.*

SECTION 1--BOATER BACKGROUND INFORMATION—*(COMPLETE THIS SECTION ONLY ONCE)*

1. Name _____
2. Affiliation _____
3. Home Address _____
4. Telephone _____
5. E-Mail Address _____
6. Preferred Craft _____
7. What is your age? _____ years
8. Gender (*circle one*): Male Female
9. Please indicate your current boating skill level below. *(Circle one)*

    a) Novice
    b) Intermediate
    c) Advanced
    d) Expert
    e) Elite

10. How many years have you been boating at this level? _____

11. In the past 3 years, how many days a month do you boat? _____

12. Have you ever participated in a hydro relicensing whitewater boating study before? _____

    If yes, how many, when and for which hydro projects? _____

13. How many times have you boated this run before today? ____/year

    If you have boated this run before *(Leave blank if you have not boated the run before today.)*:
    what were the flows? _____ cfs

    what type of craft(s) did you use? _____

14. How long does it take you to get to this reach from your home? _____

15. Please respond to each of the following statements about your river-running preferences.

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

SECTION 2-- BOATER POST-RUN EVALUATION FORM

Date of run: _____ / _____ / 2003

Reach: **Slab Creek**

1. What was the target flow on this run? _____ cfs as measured at _____.

2. What type of craft did you use for this run *(Circle one)*?

1. Hard shell kayak	5. Cataraft (please indicate length: _____)
2. Inflatable kayak	6. Raft (please indicate length: _____)
3. Closed deck canoe	7. No craft: I road/trail-scouted this run
4. Open canoe with floatation	8. Other: (please explain) _____

3. Please identify the put-in and take-out locations you used and estimate the time you put-in and took out on this run.

   Put-in location:_____ Time: _____

   Take-out location:_____ Time: _____

4. About how many times did you stop and get out of your boat for breaks, or for scouting and portaging?

   About _____ times for breaks.

   About _____ times for scouting or portaging.

5. Please estimate the total amount of time you spent out of your boat for breaks, or for scouting and portaging.

   About _____ minutes for breaks.

   About _____ minutes for scouting or portaging.

6. In general, how would you rate the whitewater difficulty on this reach at this flow? (Use the International Whitewater Scale that ranges from Class I to Class VI).____

7. Are you likely to return for future boating if today's flow were to be provided? (c*ircle one)*
   a) Definitely No b) Possibly c) Probably d) Definitely Yes

8. Relative to today's flow would you prefer a flow that was higher or lower or was this optimum flow?
   a) Much Lower b) Lower c) Higher d) Much Higher e) Optimum

9. Please respond to each of the following statements about the characteristics of this run at today's flow.

Statement	Strongly Disagree	Disagree	No Opinion	Agree	Strongly agree
This reach is boatable at these flows.	1	2	3	4	5
This reach offers challenging and technical boating.	1	2	3	4	5
This reach has nice water features such as waves and holes.	1	2	3	4	5
This reach has good play spots.	1	2	3	4	5
This run offers good overall whitewater challenge	1	2	3	4	5
This is a safe run.	1	2	3	4	5
This is an aesthetically pleasing run	1	2	3	4	5
This run is a good length	1	2	3	4	5

The portages on this run are not a problem	1	2	3	4	5
There are enough places to take a break or have lunch on this run.	1	2	3	4	5

10. If you feel qualified to offer an opinion of the boatability of this run at today's flow using different types of crafts, please respond to the following statements. Leave blank if you do not have experience with a particular type of craft. *(Circle one number for each type of craft)*

.

This run at this flow would work well for:	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly agree**
Kayaks	1	2	3	4	5
Rafts	1	2	3	4	5
Catarafts	1	2	3	4	5
Open Canoes	1	2	3	4	5
Inflatable Kayaks	1	2	3	4	5

11. Please estimate the number of **hits**, **stops**, **boat drags**, and **portages** you had on this run.

I **hit** rocks or other obstacles (but did not stop) about ____ times.

I was **stopped** after hitting rocks or other obstacles about _____ times (but did not have to get out of my boat to continue downstream).

I had to get out to **drag or pull my boat** off rocks or other obstacles about _____ times.

I had to **portage** around unrunnable rapids, log jams, or other sections about _____ times.

12. Please identify particularly challenging rapids or sections and rate their difficulty at this flow (using the International Whitewater Scale). Also note if you portaged any of these rapids.

Location (Name or site)	**Rating (Whitewater Scale of Difficulty)**	**Portage? (Yes or No)**

13. If you portaged any portion of the run, please identify rapids or sections you chose to portage and rate the difficulty of those portages (using your type of craft at this flow level).

Location	**Easy**	**Slightly difficult**	**Moderately difficult**	**Extremely difficult**
	1	2	3	4
	1	2	3	4
	1	2	3	4
	1	2	3	4
	1	2	3	4
	1	2	3	4

14. Did you observe or experience any significant safety issues on your run today (swims, pins, wrapped boats, man-made or natural river features etc…)? Please explain.

_____

_____

_____

_____

_____

_____

_____

15. Please use the space below to provide any comments about your boating experience today on Slab Creek.

_____

_____

_____

_____

_____

SECTION 3—Comparative Evaluation Form—(*COMPLETE AFTER THE LAST TEST FLOW EVENT)*

Name _____ Date _____ / _____ / 2003

1. Please evaluate the following flows for your craft and skill level. In making your evaluations, please consider all the flow-dependent characteristics that contribute to a high quality trip (e.g., boatability, whitewater challenge, safety, availability of surfing or other play areas, aesthetics, and rate of travel).

Slab Creek	**300 cfs**	**400 cfs**	**500 cfs**	**600 cfs**	**700 cfs**	**800 cfs**	**900 cfs**	**1000 cfs**	**1100 cfs**	**1300 cfs**	**1500 cfs**	**1700 cfs**	**2000 cfs**	**2400 cfs**	**2700 cfs**	**3000 cfs**
Totally acceptable	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Acceptable	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Marginal	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Unacceptable	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Totally Unacceptable	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

2. Based on your boating trips on this reach, please answer the following questions. *(Note: you can specify flows that you have not seen, but which you would predict based on your experience.) move*

	Flow in cfs
What is the lowest flow you need to simply get down the river in your craft?	_____
What is the lowest flow that provides a quality technical boating experience for this reach?	_____
What is the optimal range of flows that provides the best whitewater characteristics for this run?	_____ to _____
What do you feel the highest safe flow for your craft and skill level?	_____

3. In your experience, what whitewater runs in California do you believe are similar to this one at the optimum flow for this reach? Also list how often you boat these reaches.

a) _____

Trips per year on this reach (circle one) 0-3 4-8 9-15 15+

b) _____

Trips per year on this reach (circle one) 0-3 4-8 9-15 15+

c) _____

Trips per year on this reach (circle one) 0-3 4-8 9-15 15+

d) _____

Trips per year on this reach (circle one) 0-3 4-8 9-15 15+

4. Compared to the runs you listed above, how would you rate boating opportunities on the Slab Creek Reach. *(Circle one number for each; if you are unsure about a comparison, leave that item blank).*

Compared to:	Much Worse	Worse	About the Same	Better	Much Better
_____	1	2	3	4	5
_____	1	2	3	4	5
_____	1	2	3	4	5
_____	1	2	3	4	5

5. Please respond to the following statements about the non-whitewater characteristics of this run

Statement	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Length of Shuttle is not a problem.	1	2	3	4	5
The put -in for this run is good.	1	2	3	4	5
The take-out for this run is good.	1	2	3	4	5
The total shuttle to boating ratio on this run is good.	1	2	3	4	5

6. In your experience, what whitewater runs in California do you believe are similar to this one at today's flow? Also list how often you boat these reaches. [save question 15 for the comparative survey form]

a) _____

Trips per year on this reach (*circle one*) 0-3 4-8 9-15 15+

b) _____

Trips per year on this reach (*circle one*) 0-3 4-8 9-15 15+

c) _____

Trips per year on this reach (*circle one*) 0-3 4-8 9-15 15+

d) _____

Trips per year on this reach (*circle one*) 0-3 4-8 9-15 15+

7. If you have any suggestions for improving the access or shuttle for this run please describe these improvements below.

a) _____

b) _____

c) _____

d) _____

e) _____

8. Please use the space below to provide any comments about your overall boating experience on Slab Creek.

_____

_____

_____

_____

_____

APPENDIX B

LIST OF STUDY TEAM PARTICIPANTS

Name	Skill Level	Kayak OR Raft	616 cfs Eval	1068 cfs Eval	1597 cfs Eval	Comparative Eval	TOTAL SURVEYS
Bill Center	A	R14		X		X	2
Catherine Davis	A	K	X	X		X	3
Charlie Center	E	K	X	X	X	X	4
Chris Shackleton	X	K	X	X		X	3
Dan Bolster	X	R14		X	X	X	3
Dave Steindorf	X	K	X	X	X	X	4
Eric Magneson	X	K	X	X	X	X	4
Erik Powell	X	R11	X	X	X	X	4
Graydon Garlough	X	R14		X			1
Harry Williamson	I	R14		X		X	2
Joe Hess	A	R14		X	X	X	3
John J. Jerger	X	K	X	X		X	3
John VanderPol	X	R14			X	X	2
Justin States	X	K	X	X		X	3
Louis Debret	X	K	X	X	X	X	4
Mary DeRiemer	X	K	X			X	2
Matt Nunes	I	R14			X	X	2
Michael Bean	A	R14	X	X	X	X	4
Phil DeRiemer	X	K	X	X	X	X	4
Randy Calvin	A	K			X	X	2
Ron Thompson	X	K	X	X		X	3
Scott Armstrong	E	R14		X	X	X	3
Scott Valentine	X	R14		X	X	X	3
Shane Ryerson	X	R11	X				1
Steven Sylvester	X	R14		X	X	X	3
Susan Norman	X	R14		X		X	2
Tom Freer	A	R14			X	X	2
	TOTALS		**14**	**21**	**16**	**25**	

APPENDIX C

SUMMARIZED RESPONSES OF BOATER EVALUATIONS

(Provided on CD by Request)

APPENDIX D

INTERNATIONAL SCALE OF RIVER DIFFICULTY (AS REVISED BY AMERICAN WHITEWATER, 1998)

Appendix D
International scale of river difficulty
(as revised by American Whitewater, 1998)

this is the american version of a rating system used to compare river difficulty throughout the world. this system is not exact; rivers do not always fit easily into one category, and regional or individual interpretations may cause misunderstandings. it is no substitute for a guidebook or accurate first-hand descriptions of a run.

The six difficulty classes:

class i: easy. fast moving water with riffles and small waves. few obstructions, all obvious and easily missed with little training. risk to swimmers is slight; self-rescue is easy.

class ii: novice. straightforward rapids with wide, clear channels which are evident without scouting. occasional maneuvering may be required, but rocks and medium sized waves are easily missed by trained paddlers. swimmers are seldom injured and group assistance, while helpful, is seldom needed. rapids that are at the upper end of this difficulty range are designated "class ii+".

class iii: intermediate. rapids with moderate, irregular waves which may be difficult to avoid and which can swamp an open canoe. complex maneuvers in fast current and good boat control in tight passages or around ledges are often required; large waves or strainers may be present but are easily avoided. strong eddies and powerful current effects can be found, particularly on large-volume rivers. scouting is advisable for inexperienced parties. injuries while swimming are rare; self-rescue is usually easy but group assistance may be required to avoid long swims. rapids that are at the lower or upper end of this difficulty range are designated "class iii-" or "class iii+" respectively.

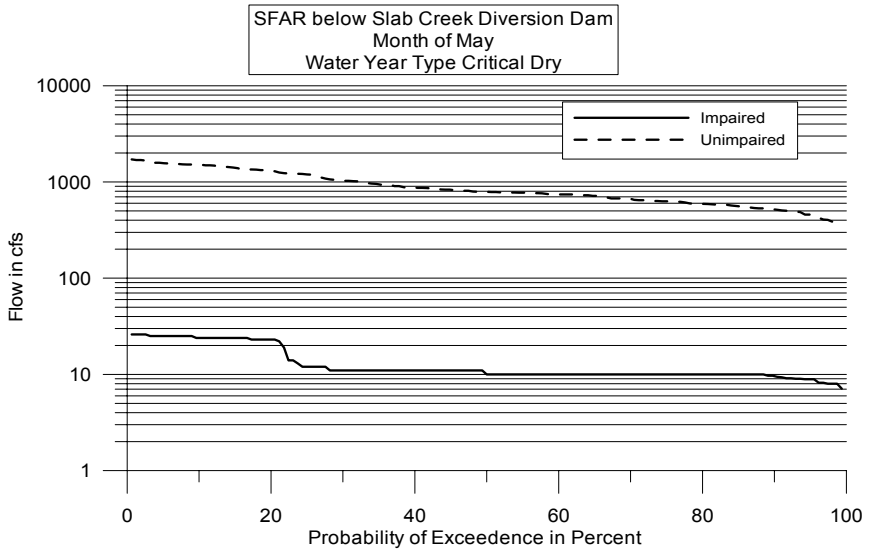
class iv: advanced. intense, powerful but predictable rapids requiring precise boat handling in turbulent water. depending on the character of the river, it may feature large, unavoidable waves and holes or constricted passages demanding fast maneuvers under pressure. a fast, reliable eddy turn may be needed to initiate maneuvers, scout rapids, or rest. rapids may require ômust" moves above dangerous hazards. scouting may be necessary the first time down. risk of injury to swimmers is moderate to high, and water conditions may make self-rescue difficult. group assistance for rescue is often essential but requires practiced skills. a strong eskimo roll is highly recommended. rapids that are at the upper end of this difficulty range are designated "class iv-" or "class iv+" respectively.

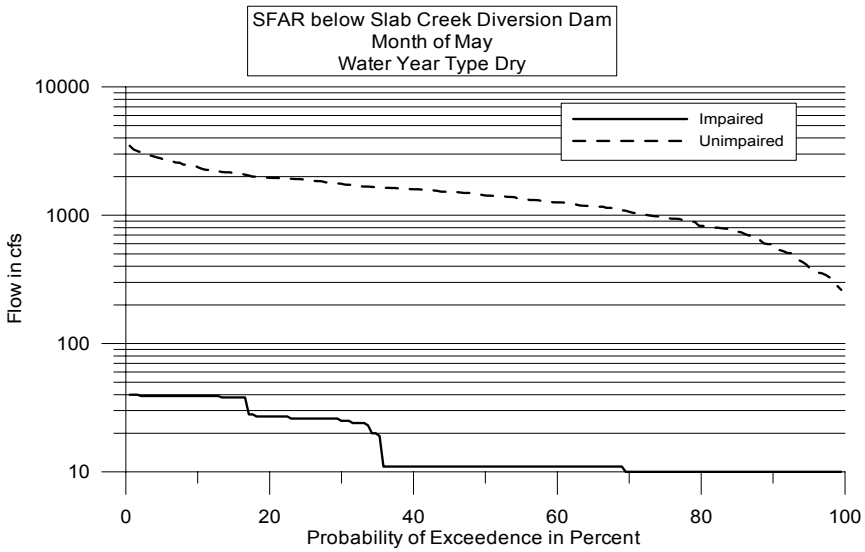
class v: expert. extremely long, obstructed, or very violent rapids which expose a paddler to added risk. drops may contain large, unavoidable waves and holes or steep, congested chutes with complex, demanding routes. rapids may continue for long distances between pools, demanding a high level of fitness. what eddies exist may be small, turbulent, or difficult to reach. at the high end of the scale, several of these factors may be combined. scouting is recommended but may be difficult. swims are dangerous, and rescue is often difficult even for experts. a very reliable eskimo roll, proper equipment, extensive experience, and practiced rescue skills are essential. because of the large range of difficulty that exists beyond class iv, class 5 is an open ended, multiple level scale designated by class 5.0, 5.1, 5.2, etc... each of these levels is an order of magnitude more difficult than the last. example: increasing difficulty from class 5.0 to class 5.1 is a similar order of magnitude as increasing from class iv to class 5.0.

class vi: extreme and exploratory. these runs have almost never been attempted and often exemplify the extremes of difficulty, unpredictability and danger. the consequences of errors are very severe and rescue may be impossible. for teams of experts only, at favorable water levels, after close personal inspection and taking all precautions. after a class vi rapids has been run many times, it's rating may be changed to an appropriate class 5.x rating.

APPENDIX E

FLOW EXCEEDANCE GRAPHS


SFAR below Slab Creek Diversion Dam
Month of May
Water Year Type Critical Dry
Impaired
Unimpaired
Flow in cfs
10000
1000
100
10
1
0
20
40
60
80
100
Probability of Exceedence in Percent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Month of May
Water Year Type Dry
Impaired
Unimpaired
Flow in cfs
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1000
100
10
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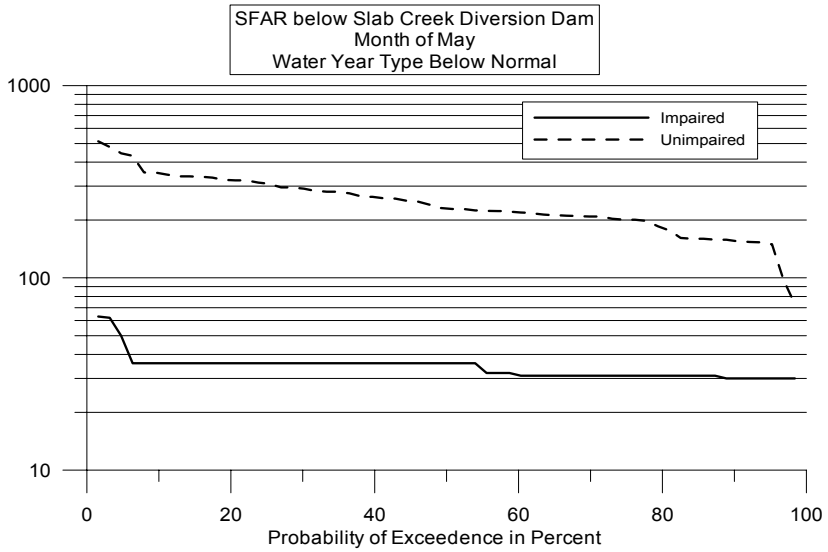
20
40
60
80
100
Probability of Exceedence in Percent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Month of May
Water Year Type Below Normal
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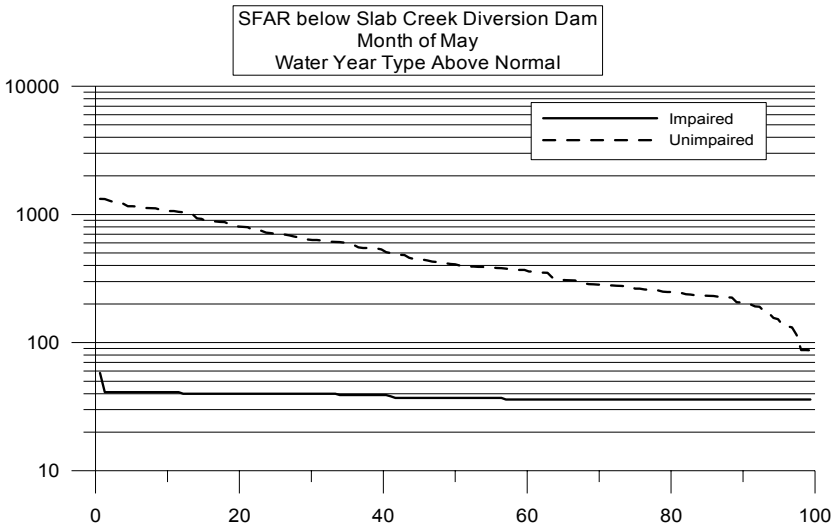
10
Impaired
Unimpaired
0
20
40
60
80
100
Probability of Exceedence in Percent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Month of May
Water Year Type Above Normal
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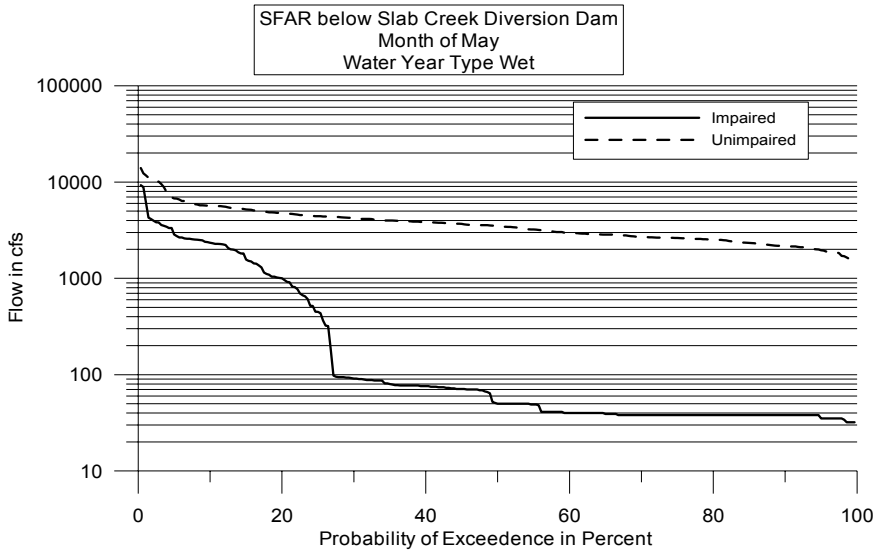
100
10
Impaired
Unimpaired
0
20
40
60
80
100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Month of May
Water Year Type Wet
Impaired
Unimpaired
Flow in cfs
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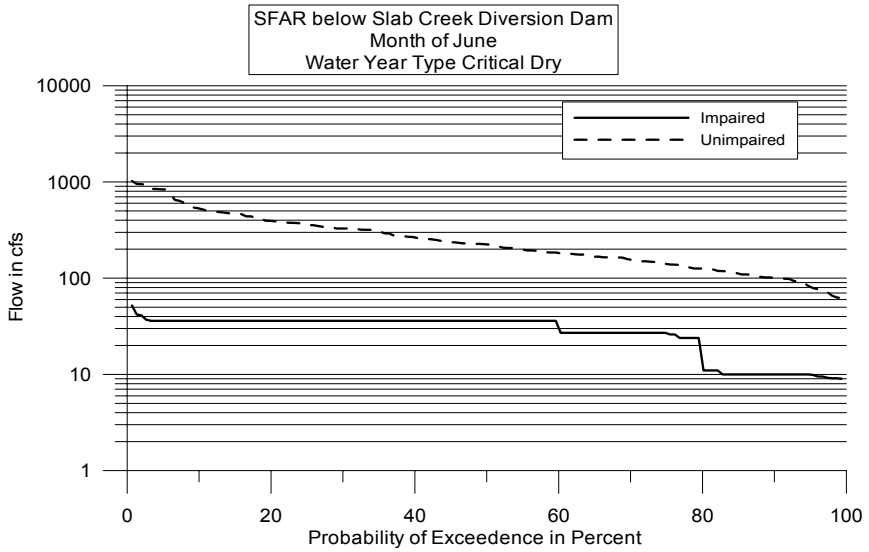
1000
100
10
0
20
40
60
80
100
Probability of Exceedence in Percent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Month of June
Water Year Type Critical Dry
Impaired
Unimpaired
Flow in cfs
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1
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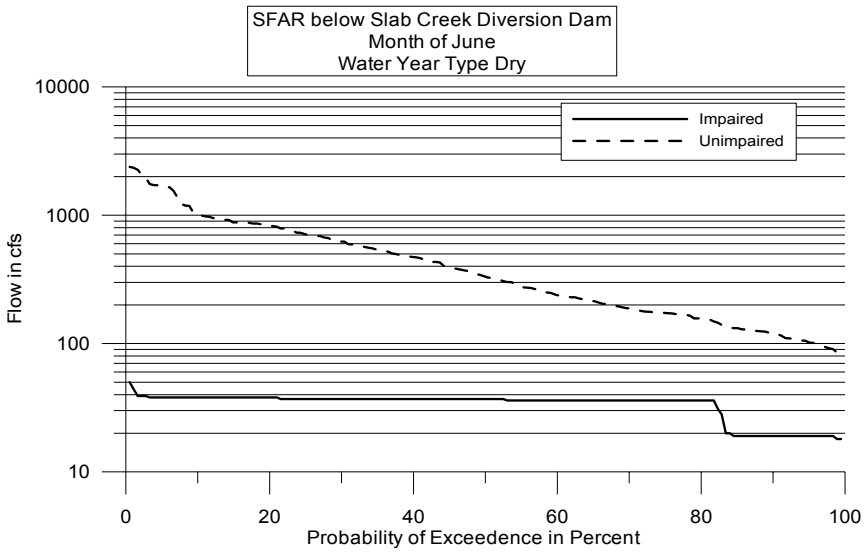
20
40
60
80
100
Probability of Exceedence in Percent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Month of June
Water Year Type Dry
Impaired
Unimpaired
Flow in cfs
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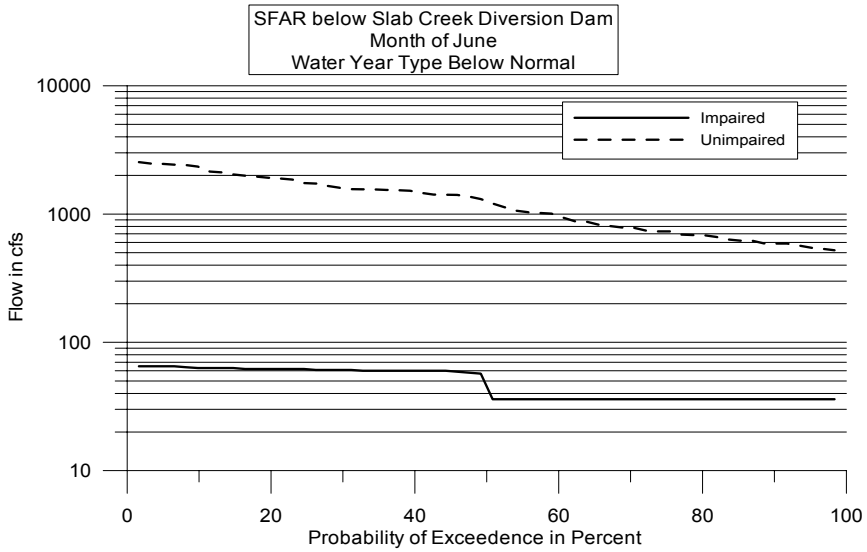
1000
100
10
0
20
40
60
80
100
Probability of Exceedence in Percent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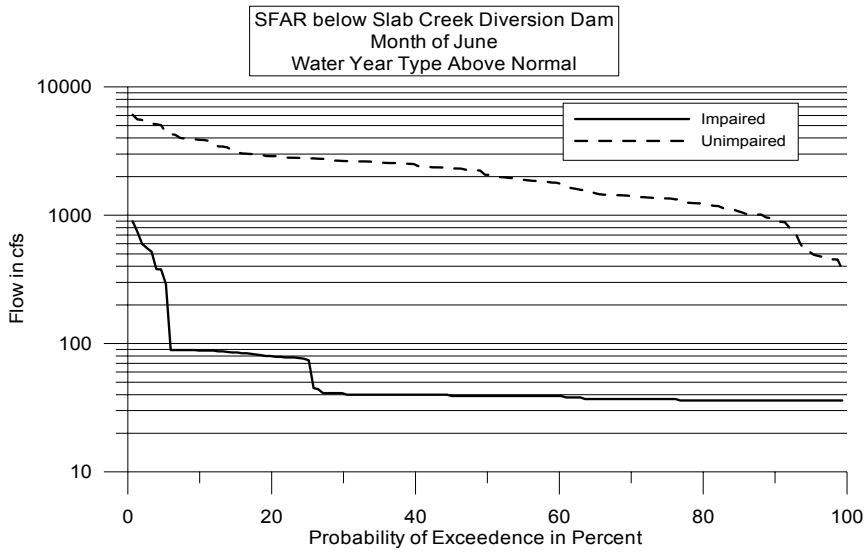
Month of June
Water Year Type Below Normal
Impaired
Unimpaired
Flow in cfs
10000
1000
100
10
0
20
40
60
80
100
Probability of Exceedence in Percent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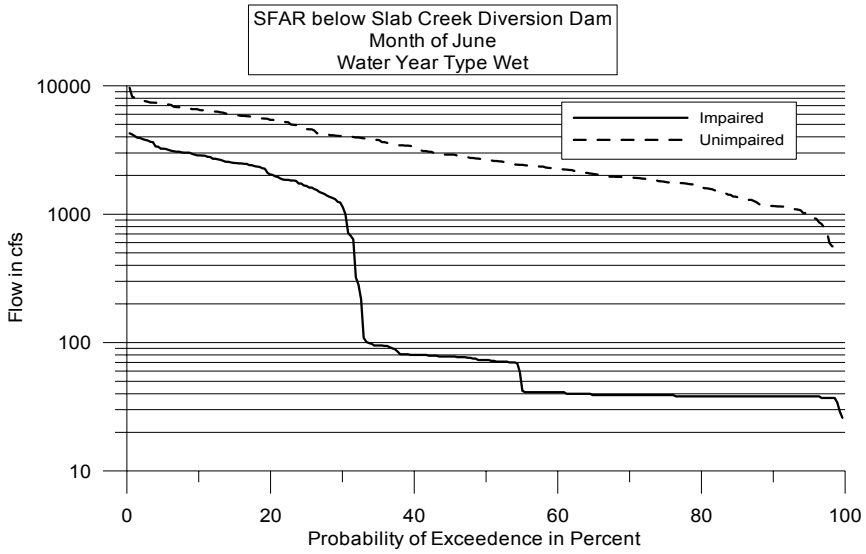
Month of June
Water Year Type Above Normal
Impaired
Unimpaired
Flow in cfs
10000
1000
100
10
0
20
40
60
80
100
Probability of Exceedence in Percent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Month of June
Water Year Type Wet
Impaired
Unimpaired
Flow in cfs
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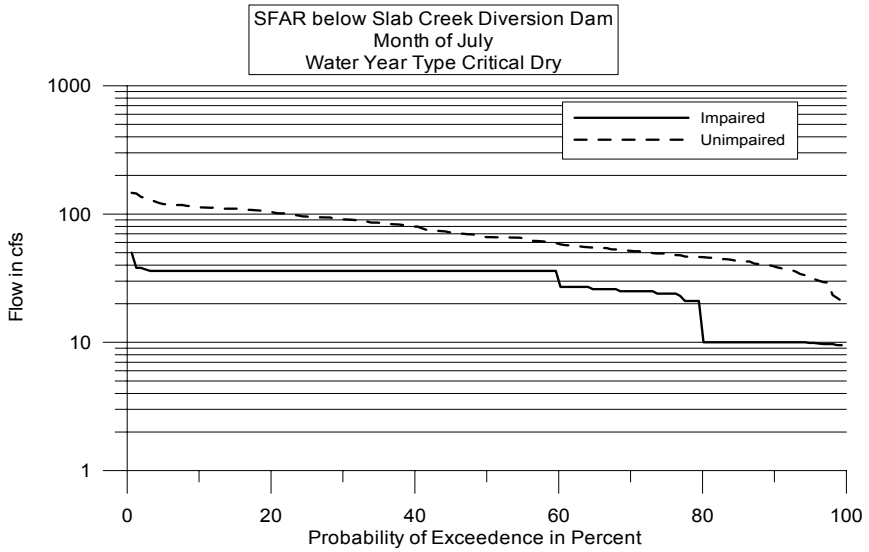
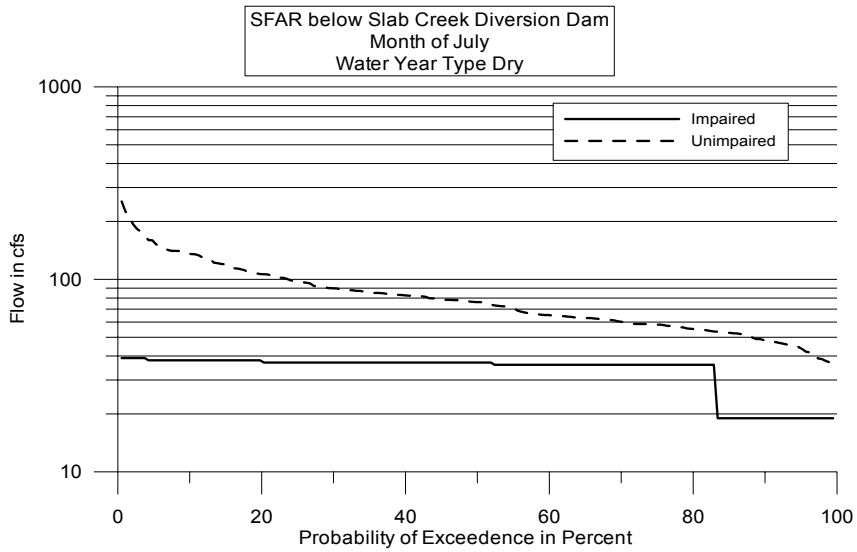
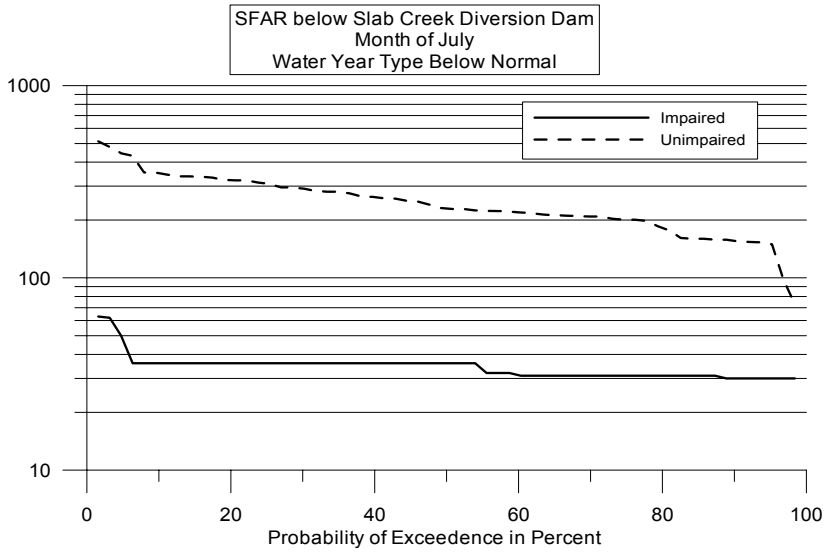
1000
100
10
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of July
Water Year Type Critical Dry
Impaired
Unimpaired
Flow in cfs
1000
100
10
1
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of July
Water Year Type Dry
Impaired
Unimpaired
Flow in cfs
1000
100
10
0
20
40
60
80
100
Probability of Exceedence in Percent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Month of July
Water Year Type Below Normal
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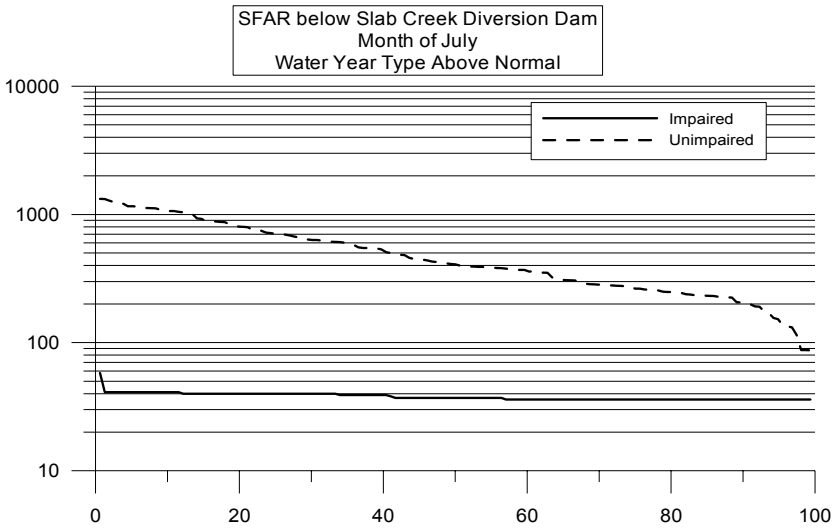
100
10
Impaired
Unimpaired
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of July
Water Year Type Above Normal
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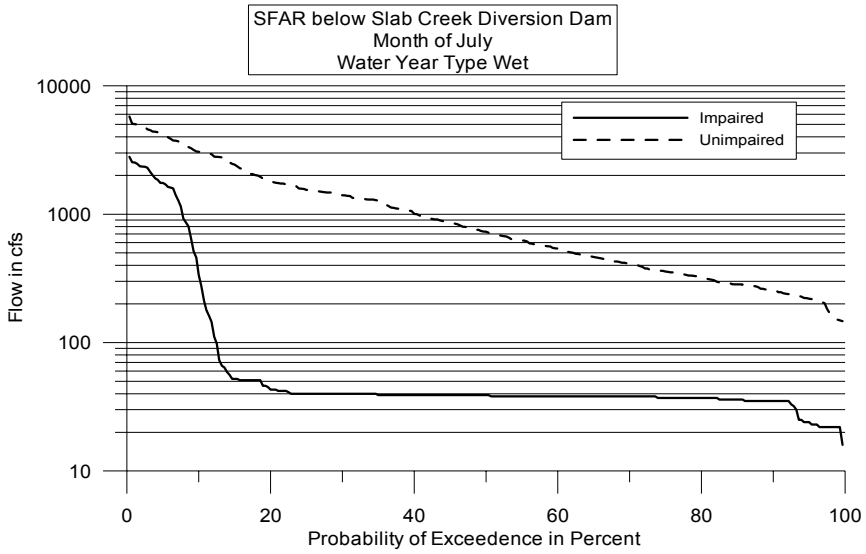
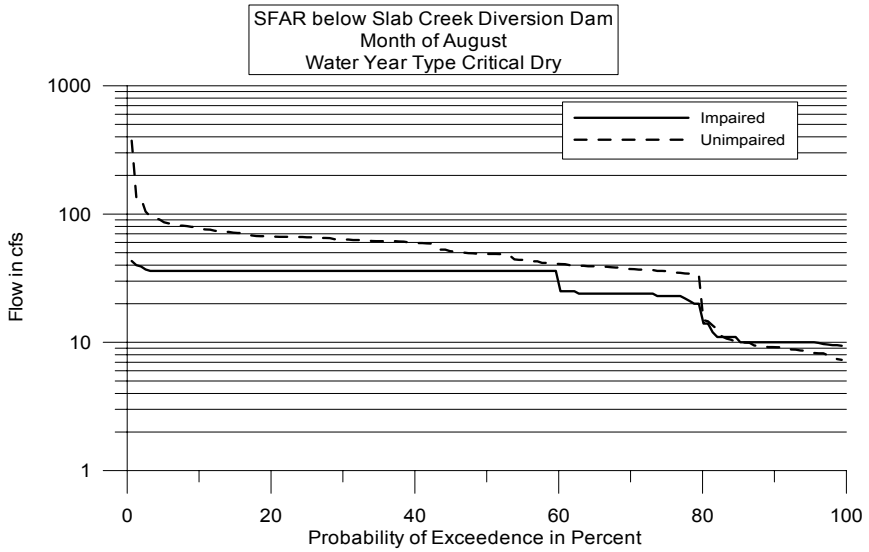
1000
100
10
Impaired
Unimpaired
0
20
40
60
80
100


SFAR below Slab Creek Diversion Dam
Month of July
Water Year Type Wet
Impaired
Unimpaired
10000
1000
100
10
Flow in cfs
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of August
Water Year Type Critical Dry
Impaired
Unimpaired
Flow in cfs
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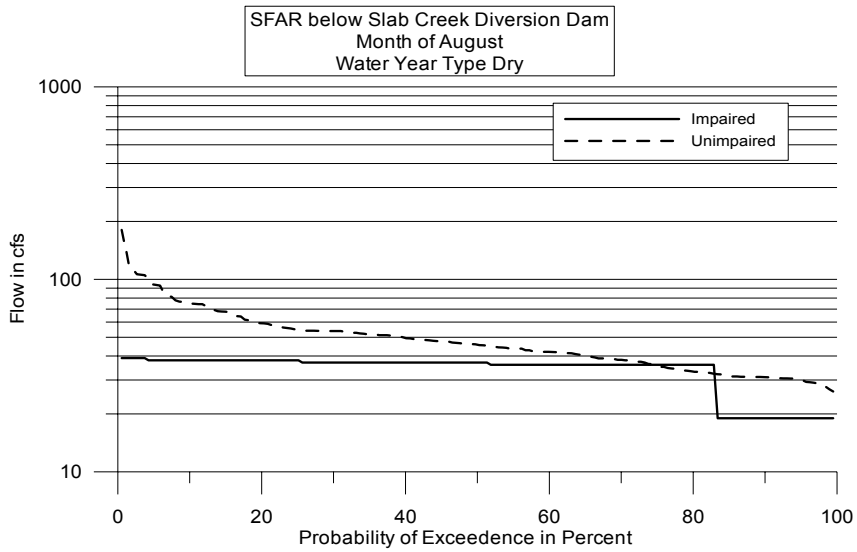
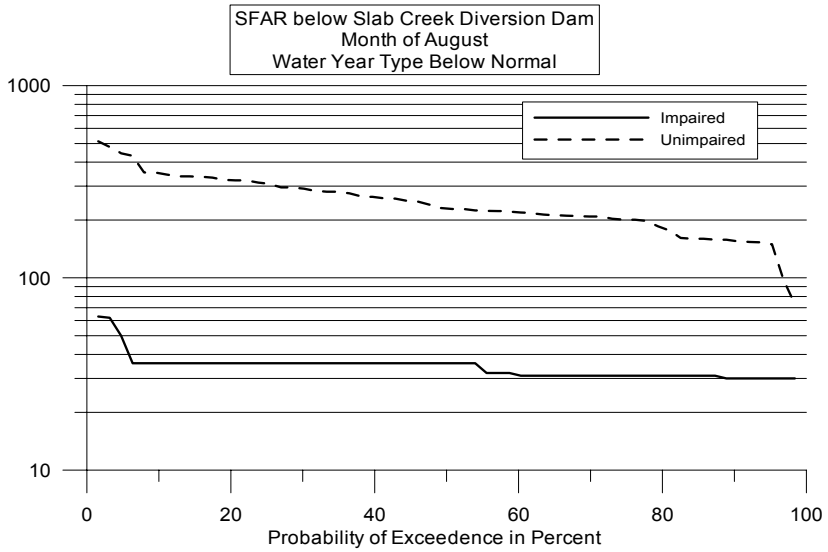
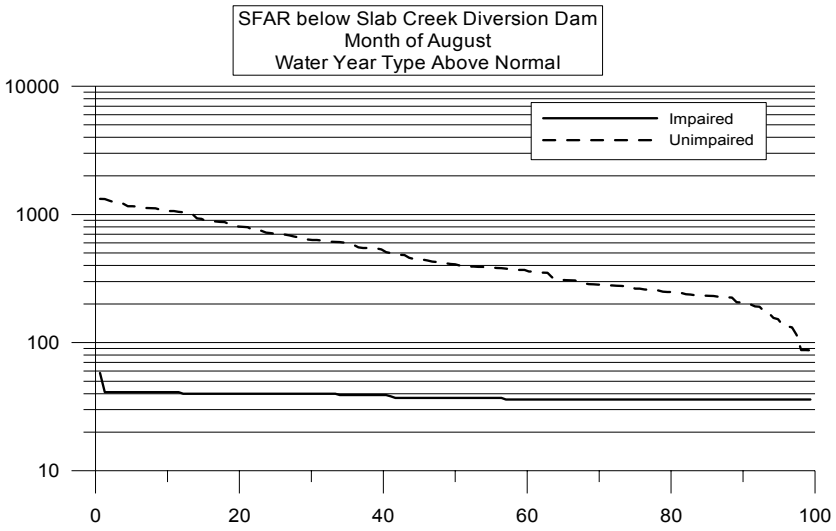
100
10
1
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of August
Water Year Type Dry
Impaired
Unimpaired
Flow in cfs
1000
100
10
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of August
Water Year Type Below Normal
1000
100
10
Impaired
Unimpaired
0
20
40
60
80
100
Probability of Exceedence in Percent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Month of August
Water Year Type Above Normal
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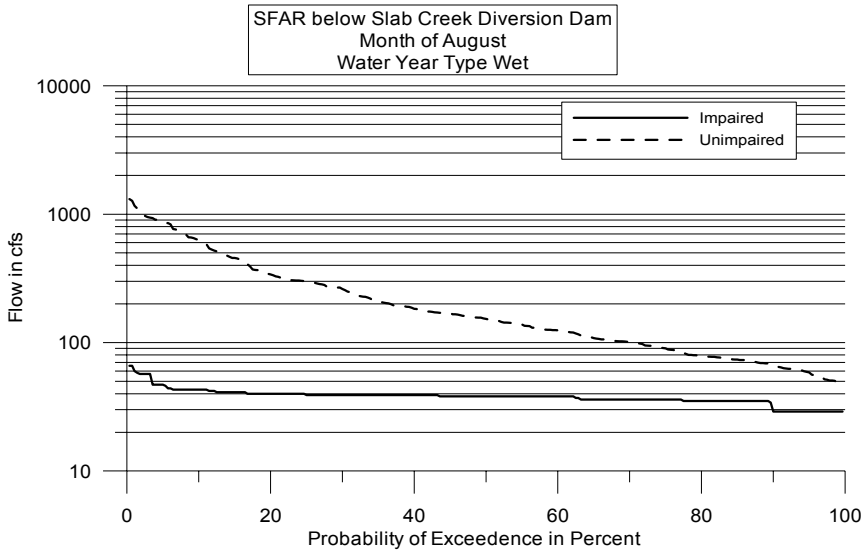
100
10
Impaired
Unimpaired
0
20
40
60
80
100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Month of August
Water Year Type Wet
Impaired
Unimpaired
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100
10
Flow in cfs
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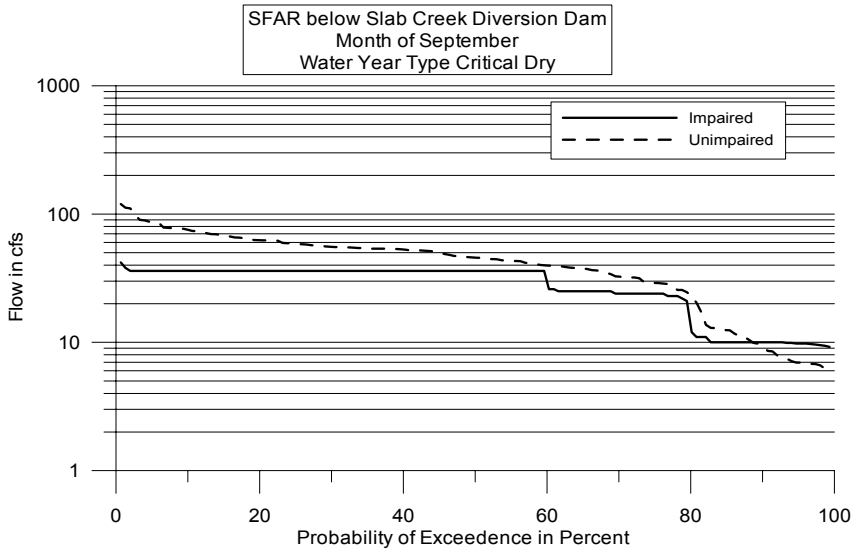
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of September
Water Year Type Critical Dry
Impaired
Unimpaired
Flow in cfs
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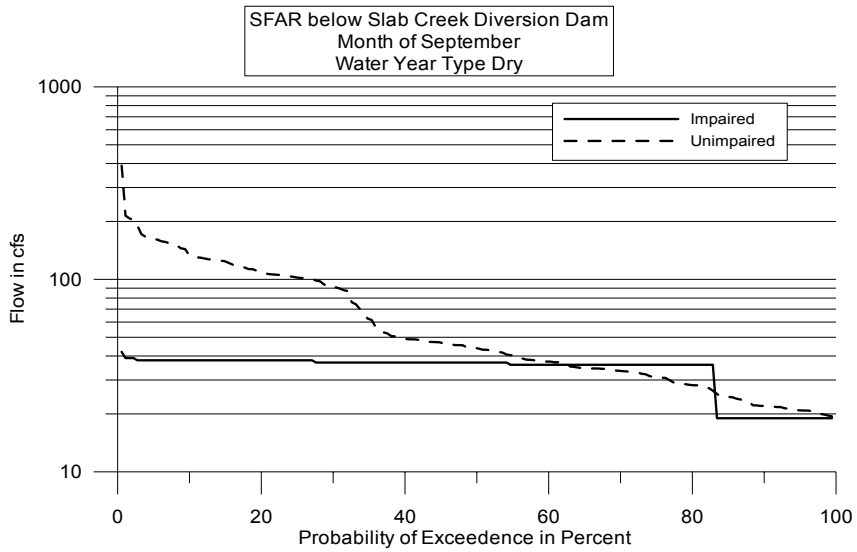
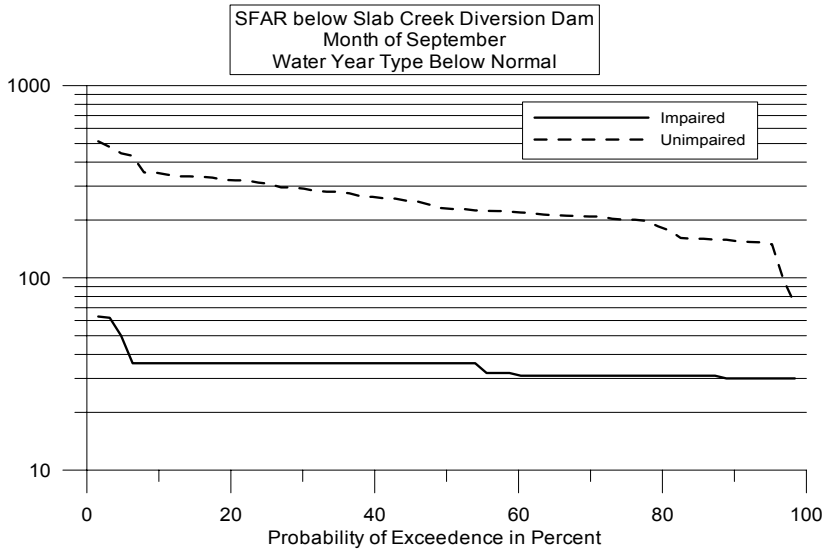
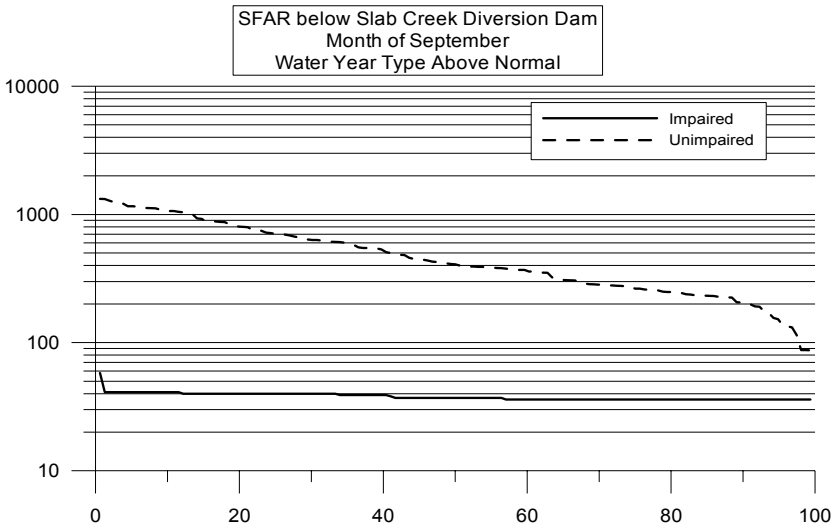
100
10
1
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of September
Water Year Type Dry
Impaired
Unimpaired
Flow in cfs
1000
100
10
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of September
Water Year Type Below Normal
1000
100
10
Impaired
Unimpaired
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of September
Water Year Type Above Normal
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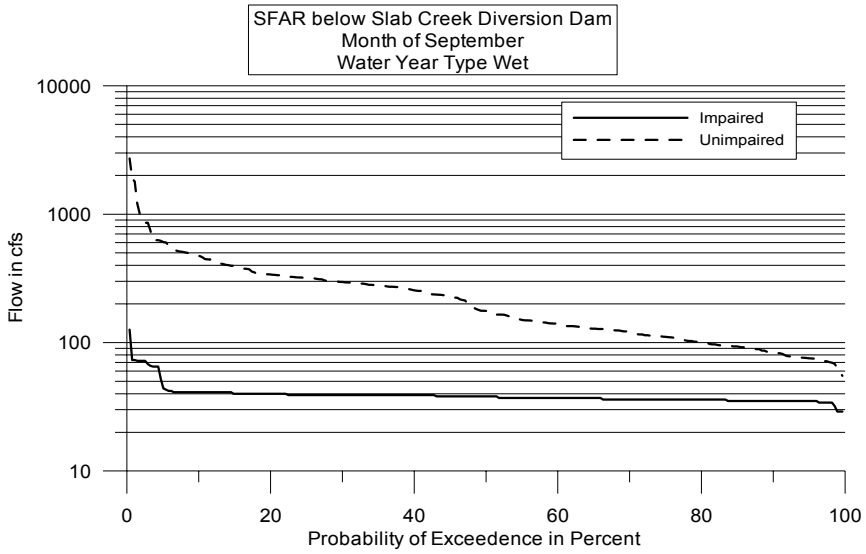
1000
100
10
Impaired
Unimpaired
0
20
40
60
80
100


SFAR below Slab Creek Diversion Dam
Month of September
Water Year Type Wet
Impaired
Unimpaired
Flow in cfs
10000
1000
100
10
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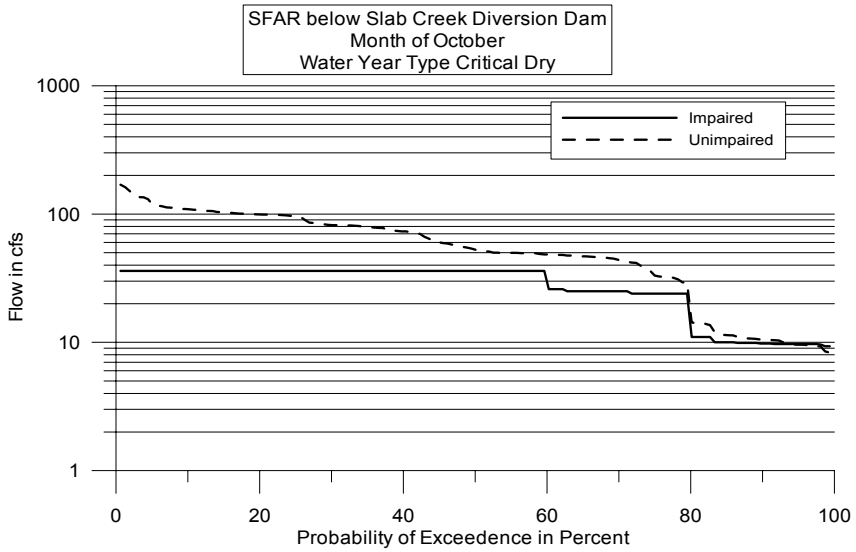
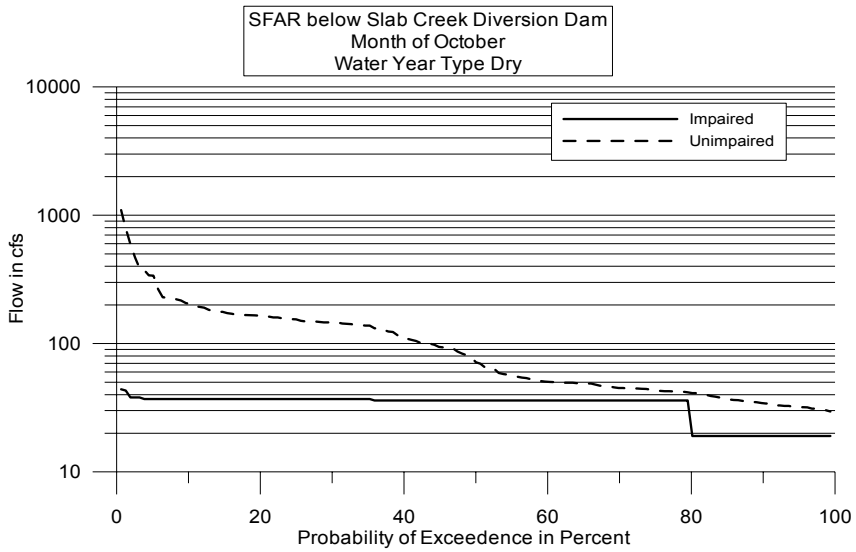
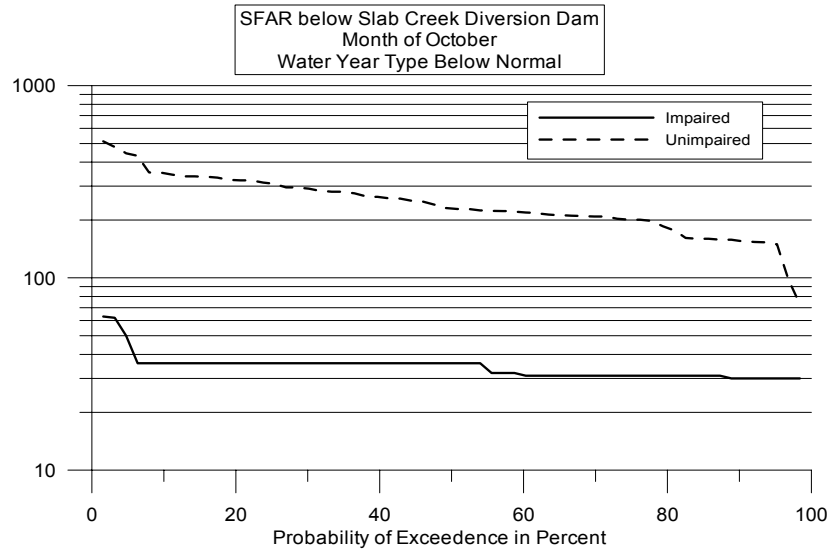
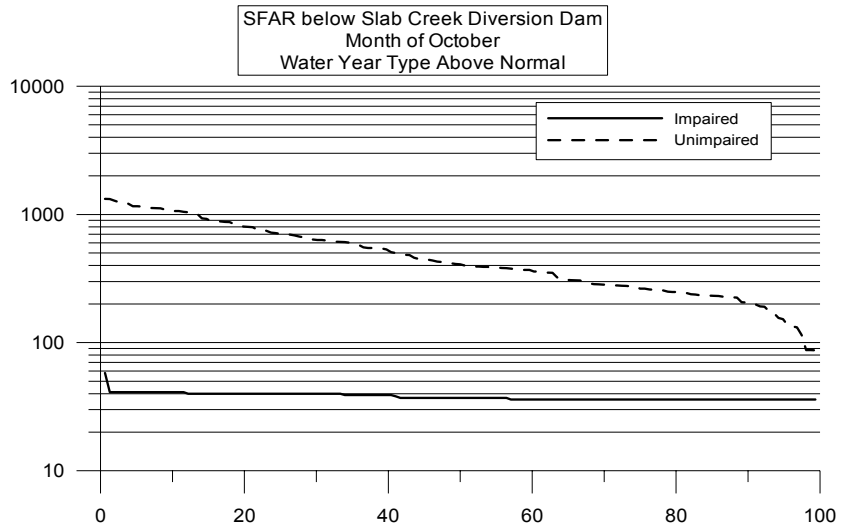
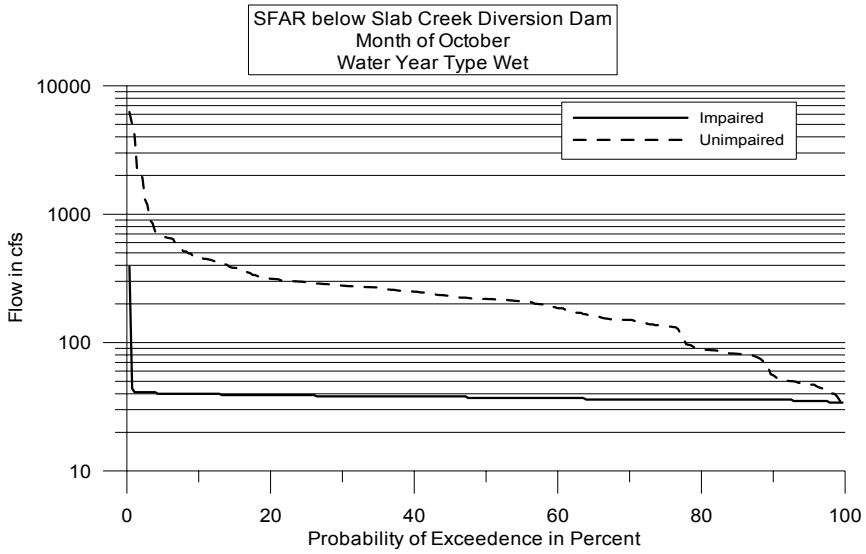
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of October
Water Year Type Critical Dry
Impaired
Unimpaired
Flow in cfs
1000
100
10
1
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of October
Water Year Type Dry
Impaired
Unimpaired
Flow in cfs
10000
1000
100
10
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of October
Water Year Type Below Normal
1000
100
10
Impaired
Unimpaired
0
20
40
60
80
100
Probability of Exceedence in Percent


SFAR below Slab Creek Diversion Dam
Month of October
Water Year Type Above Normal
10000
1000
100
10
Impaired
Unimpaired
0
20
40
60
80
100


SFAR below Slab Creek Diversion Dam
Month of October
Water Year Type Wet
Impaired
Unimpaired
10000
1000
100
10
Flow in cfs
0
20
40
60
80
100
Probability of Exceedence in Percent

APPENDIX F

VIDEO FOR SLAB CREEK STUDY VARIOUS RAPIDS AND POST-RUN GROUP DISCUSSION

(Provided on DVD by Request)

APPENDIX G

SAMPLE SITES USED DURING THE SLAB CREEK WHITEWATER BOATING FLOW STUDIES

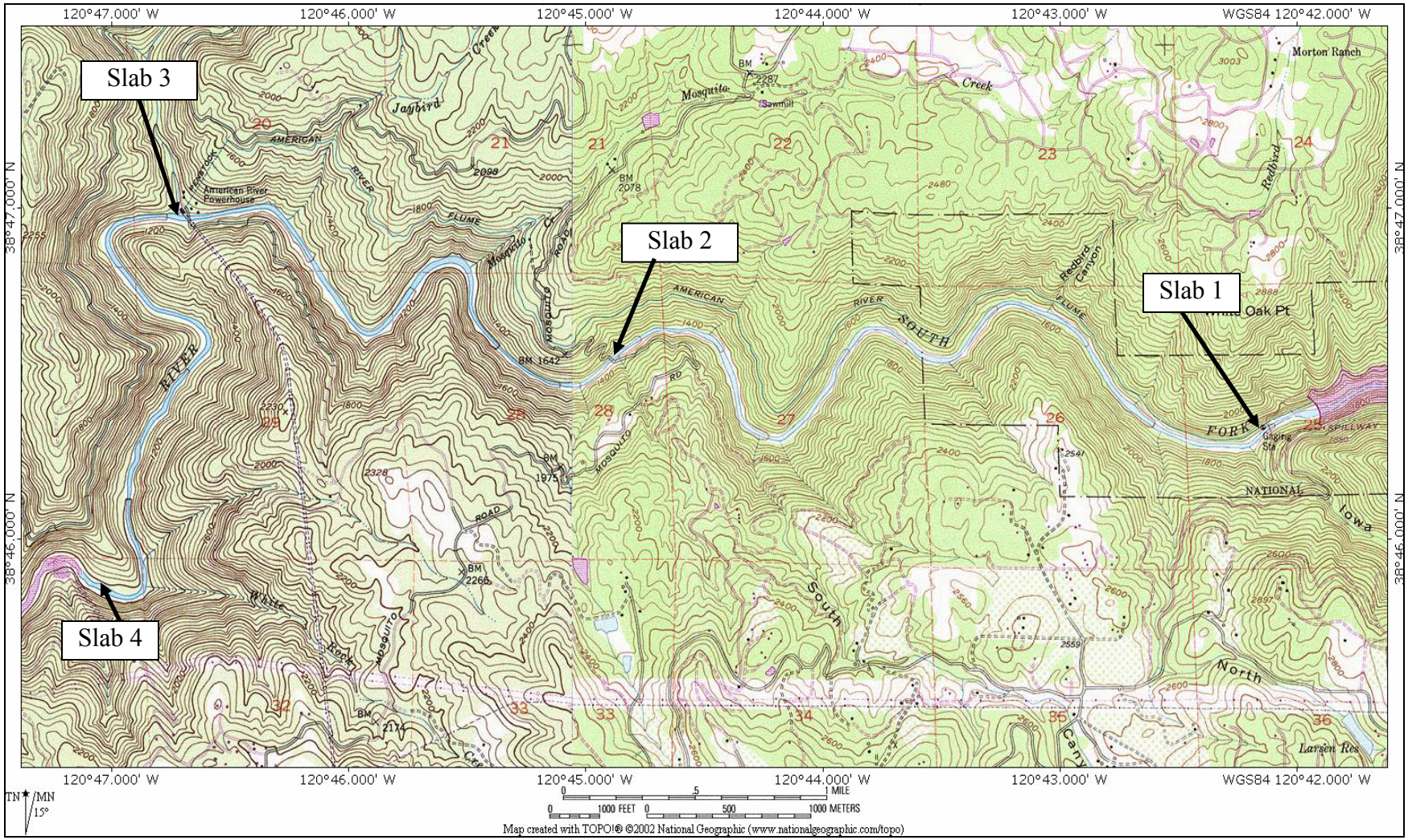


Figure 3.5-1. Sample sites used during the Slab Creek whitewater boating flow studies

APPENDIX H

ADDENDUM 1 TO THE WWB STUDY PLAN

Addendum 1 to the WWB Study Plan
(as developed by the Aquatic TWG on 09-08-03)

Concurrent with the three whitewater boating flow releases and at four locations in the Slab Creek Dam Reach (immediately below Slab Creek Dam, upstream of Mosquito Bridge, preferably downstream from the Rock Creek confluence, above White Rock Powerhouse), the Licensee shall collect the information below. The Licensee shall make a reasonable effort to gather information on the up ramp.

- Water temperature (°F) (existing *hourly* recorders at above White Rock PH, below Slab Creek dam and SFAR at above Mosquito bridge), turbidity (NTU) and Total Suspended Solids (mg/l). Licensee will strive to obtain continuous recording devices for turbidity. The Licensee shall take TSS samples once every 2-3 hours during daylight hours and more frequently on the up ramp if possible. At least one sample of each should be taken the day prior to the first boating flow release.
- Once around midday at peak flow on each day and from a standard location at each site, a photo looking upstream, across the stream and downstream.
- Stage at all four sites at least every 15 minutes during the up ramp and down ramp through the full range of the highest flow as measured by a temporary staff gage installed by the Licensee prior to the first boating flow release. Take photos described above every 15 minutes.
- Prior to the boating releases, the Licensee will assess areas of high fish stranding potential in the reach. During the down ramp and to the extent possible, the Licensee will note any stranded fish in these areas. During the fish stranding survey (after the boating flows) the flagged bullfrog site (downstream of Rock Creek) would be checked for bullfrog tadpoles. [USFS]
- During the boating flow study, the Licensee will obtain 15-minute elevation data at Slab Creek Reservoir and 15-minute flow data at the USGS gage below Slab Creek Dam for comparison to readings at the downstream temporary gage readings.
- Inundation of bed form features (e.g., bars, riffles, floodplains) associated with aquatic habitat at the three peak flows, at least.

The ENF will identify locations where bullfrogs and foothill yellow-legged frogs have been recorded in the reach, and a boater will place pins at the water line at these sites and collect other observations when he rafts during the boating flow study.

APPENDIX I

ECOLOGICAL STUDIES

APPENDIX I
ECOLOGICAL STUDIES

I1.0 ECOLOGICAL STUDIES

During the test flows, three *in situ* data parameters were gathered: water temperature (F°), turbidity (NTU), and Total Suspended Solids (TSS in mg/L). In addition, flow stage elevation, observations of potential inundation of bed form features, and observations of potential fish stranding areas were recorded.

Water temperature and turbidity data was collected at four locations (Figure 3.5-1, Appendix G) using four *in situ* samplers (Troll XP MPT 9000 model). Data was collected data every 15 minutes. The sampler for Slab 2 failed and was unavailable for the remainder of the study. As a substitute for the final two days, manual sampling was done for turbidity every 30 minutes and total suspended solids every 2 hours. Additionally, instrument failures were noted at Slab 3 and 4 during the first day of the study, but were operational for the remaining two days. In order to account for the lack of turbidity data for the first day (616cfs) two of the TSS samples were randomly chosen for laboratory analysis of turbidity. All samples were kept on ice and later sent to a local laboratory for analysis. Portable staff gages were installed at each of the four stations to measure flow stage. Flow stage on the temporary staff gages were measured every 15 minutes for comparison to the 15-minute elevation data recorded at Slab Creek Reservoir. Photos were also taken at each station to visually document various flow stages and are located in Appendix J.

The day prior to the first release, baseline *in situ* recordings were made and samples taken at each of the four stations for temperature, turbidity, TSS, and flow stage. Concurrently, areas adjacent to each station were visually evaluated for fish stranding potential. Inundation of bed form features such as bars, riffles, and floodplains associated with aquatic habitat was documented. Observations to identify potential fish stranding and inundation effects were restricted to sites adjacent to each station since access was limited by steep canyon topography and high flows.

A rainstorm occurred on the day prior to, and the first day of test flows, increasing the river stage. Hence, the staff gage readings are higher than the actual flow measured from Slab Creek Dam. The rain may have also affected temperature, turbidity and TSS of the reach during that time. All raw data pertaining to temperature, turbidity and TSS is located in Appendix L.

I1.1 Temperature

The baseline water temperature taken prior to the test flows was as follows

Slab 1: 49.55°F @0900
Slab 2: 51.01°F @1120
Slab 3: 52.46°F @1445
Slab 4: 52.96°F @1550

Table I1-1 shows the minimum and maximum temperatures recorded during the test flows. During the three-day sampling event, water temperatures increased throughout each day at each location.

Table I1-1. Minimum, maximum, and change in temperatures for the Slab Creek Reach during the test flow study.

Flow cfs	Slab 1 Temperature			Slab 2 Temperature			Slab 3 Temperature			Slab 4 Temperature		
	Min	Max	Change (+/-)	Min	Max	Change (+/-)	Min	Max	Change (+/-)	Min	Max	Change (+/-)
616	49.50	52.03	+2.53	N/A[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1068	49.28	52.53	+3.25	N/A	N/A	N/A	48.79	52.75	+3.96	48.06	52.95	+4.89
1597	49.87	52.12	+2.25	N/A	N/A	N/A	48.66	52.50	+3.84	48.25	52.88	+4.63

616 cfs Flow Event

Data is available only for the Slab 1 station (Figure I1-1). The water temperature increased 2.53°F from 49.50°F to 52.03°F. The increase in temperature occurred during the up-ramp from base flows through the midday peak flows for the site. During the descending limb of the test flow hydrograph the temperature began to fall. It must be noted that the minimum temperature recorded for the day correspond to water released from the low level outlet at Slab Creek Dam. Conversely, during the peak flow event warmer water spills from the surface of Slab Creek Reservoir, effectively increasing the overall water temperature within the system. As the flows over Slab Creek dam diminished the amount of surface water spilling into the reach decreased until the reach was charged

At the Slab 2 station, a baseline temperature reading was the only measurement taken because of persisting instrumentation problems. However, it is likely the temperature reading at the beginning of each flow day may be slightly less than those taken at Slab 1 based on the trends in the temperature data at Slab 3 and Slab 4 during the 1068 cfs and 1597 cfs flow days. Furthermore, it can be inferred that a slight temperature increase occurred as the flows reached their maximum levels at Slab 2 for the day.

At the Slab 3 and Slab 4 stations, instrument problems were encountered that prevented the recording of temperature during the first day of the study. If the temperature trends found during the 1068 cfs and 1597 cfs are reliable indicators, then we can expect the minimum temperatures at Slab 3 to be less than the minimum temperature at Slab 2, while the minimum temperature at Slab 4 should be less than the temperature at Slab 3. The opposite may be true for the maximum observed temperature at Slab 3 and 4. Instrument malfunctions were corrected for the final two days of the study to record the thermograph at the Slab 3 and 4 stations.

[1] Instrument failure was encountered with the Slab 2 recorder for all three days.

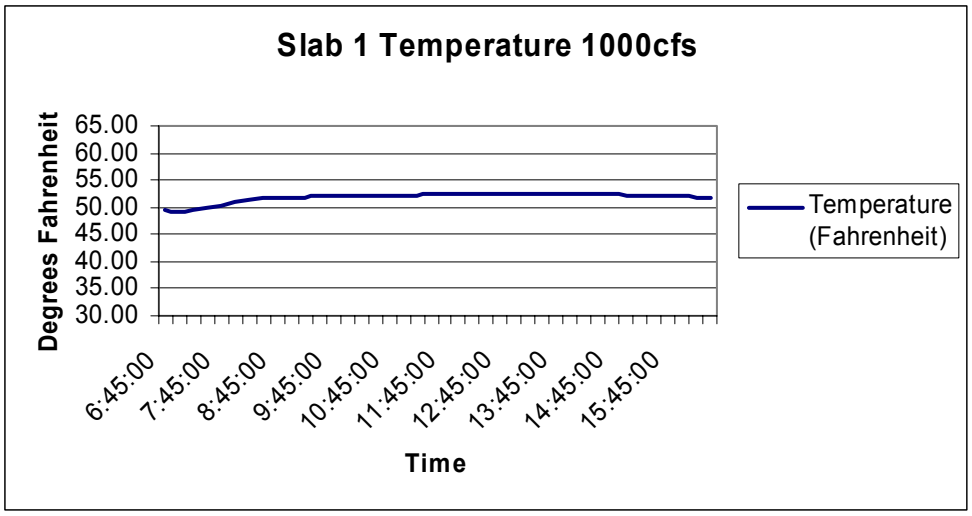


Figure I1-1 Temperatures recorded during the 616 cfs flow event

1068 cfs Flow Event

During the 1068 cfs flow day and prior to the release of water from Slab Creek Dam, the minimum temperature recorded at Slab 1, 3, and 4 was 49.28°F, 48.79°F, and 48.06°F respectively. As the stage of the river increased the temperatures increased to a maximum temperature of 52.53°F, 52.75°F and 52.95°F respectively (Figure I1-2). Of the three temperature monitoring locations, the temperature at Slab 4 had the greatest change in temperature (4.89°F), while the temperature at Slab 1 increased 3.25°F. As discussed above, the relationship between increasing temperature and increasing flows can be attributed to the spilling of Slab Creek Reservoir in order to achieve the necessary flows for this study.

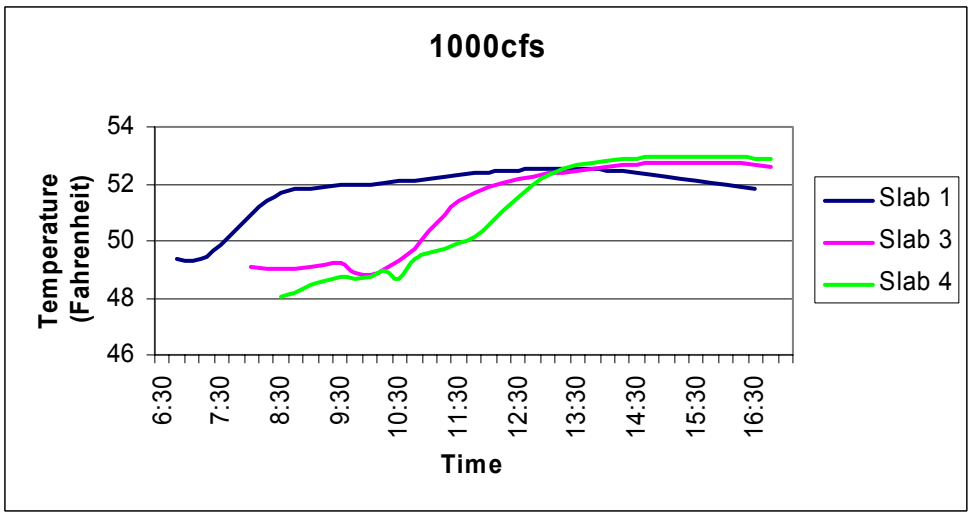


Figure I1-2 Temperatures recorded during the 1068 cfs flow event

1597cfs

During the 1597cfs flows the minimum temperature recorded at Slab 1, 3, and 4 was 49.87°F, 48.66°F, and 48.25°F respectively. As the stage of the river increased the temperatures increased to 52.12°F, 52.5°F and 52.88°F respectively (Figure I1-3). Of the three temperature monitoring locations, Slab 4 demonstrated the greatest change in temperature (4.63°F), while the temperature at Slab 1 only increased 2.25°F. As discussed above, the relationship between increasing temperature and increasing flows can be attributed to the spilling of Slab Creek Reservoir in order to achieve the necessary flows for this study.

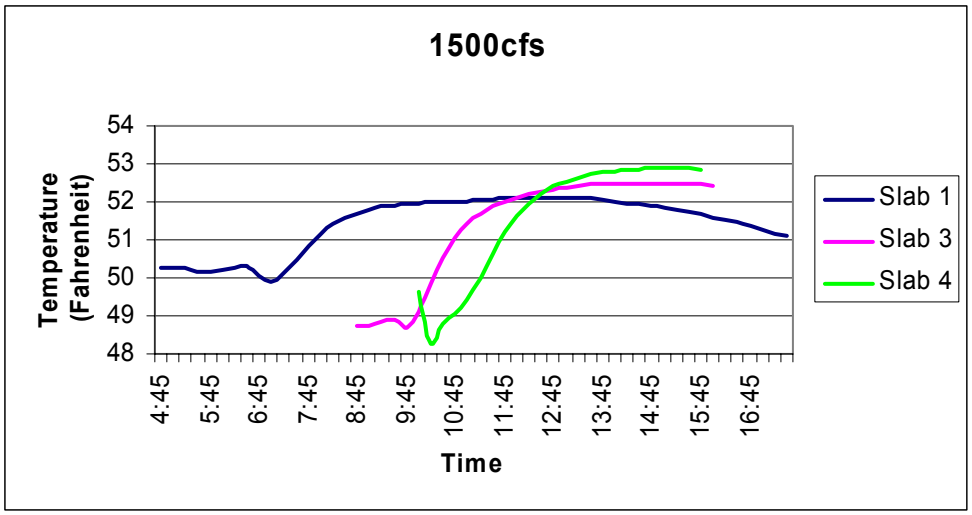


Figure I1-3 Temperatures recorded during the 1597cfs flow event

I1.2 Turbidity

Three *in situ* samplers measured the turbidity during the three flow events (Table I1-2). As discussed in the *Study Methods* section, four units were to be deployed, however three of the units malfunctioned during the 616 cfs flow event. Two of the three Troll units were repaired and deployed at the Slab 3 and 4 stations for the 1068 and 1597 cfs flow events. The fourth unit was not available for sampling; water samples were collected at Slab 2 and sent to a laboratory for analyses. Two of the samples taken at Slab 2, 3, and 4 for TSS were also analyzed for turbidity.

The baseline turbidity levels (in NTUs) taken prior to the test flows were as follows:

Slab 1: 0.1
Slab 2: 0.2
Slab 3: 0.2
Slab 4: 0.1

Table I1-2 The maximum, minimum, and mean turbidity concentrations for the Slab Creek Reach during the test flow study.

Flow	Slab 1			Slab 2*			Slab 3*			Slab 4*		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
616cfs	0.1	17.6	2.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1068cfs	0.1	2.9	1.0	0.5	18	5.2	3.1	42.6	14.8	2.1	66.5	23.2
1597cfs	0.0	1.3	0.3	0.5	19	4.7	0.4	22.1	10.5	1.5	39	20.23

*As noted above Instruments malfunctions prohibited the collection of turbidity data during the first flow event

As noted, a rainstorm may have affected turbidity concentrations throughout the reach on the first day of test flows and the previous day. As mentioned above instrument failures prevented the continuous monitoring of turbidity at Slab 2, 3 and 4 during the first flow event (616cfs). However two random TSS samples were analyzed for turbidity in order to gain some turbidity data during the first day. At Slab 2 the samples were taken at 0824 (hours) and 1130 with turbidity concentrations of 8.2 and 19.0 NTU, respectively. The first sample captured the up ramp of the hydrograph while the second sample was taken during peak flow. At Slab 2, the samples were taken at 1030 and 1530 with turbidity concentrations of 17.0 and 7.0 NTU, respectively. These two samples capture the up and down ramp at this location. At Slab 4, the samples were taken at 1145 and 1430 with turbidity concentrations of 9.8 and 30 NTU, respectively. These samples coincide with the up ramp and the end of the peak flow, respectively, at this location.

For the final two days of the flow study the turbidity levels increased during the up ramp and decreased as flows were maintained at the maximum flow. The turbidity levels decreased as the water levels receded. Turbidity levels increased linearly as water traveled downstream from Slab Creek Dam.

I1.3 Total Suspended Solids (TSS)

TSS was monitored during the test flows via sample collection and laboratory analysis. Samples with a concentration equal to or greater than 5.0 mg/L were reported while any concentrations less than 5.0 mg/L are reported as Non Detect (ND). Baseline sampling indicated that the TSS concentrations within the reach at all locations are below 5.0mg/L. All samples taken at the Slab 1 station are reported as ND. The remaining three stations showed an increase in TSS concentrations as the water levels increased throughout the reach, and a reduction in concentrations as the water levels receded (Table I1-3).

Table I1-3 TSS sample concentrations for the Slab Creek whitewater boating flow study

Sample Location	616cfs		1068cfs		1597cfs	
	Time	Concentration mg/L	Time	Concentration mg/L	Time	Concentration mg/L
Slab 1	1030	ND	0630	ND	0930	ND
	1330	ND	0930	ND	1330	ND
	1420	ND	1230	ND	1530	ND
			1530	ND		
Slab 2	0830	9	0800	ND	0800	ND

Table I1-3 TSS sample concentrations for the Slab Creek whitewater boating flow study						
Sample Location	616cfs		1068cfs		1597cfs	
	Time	Concentration mg/L	Time	Concentration mg/L	Time	Concentration mg/L
	1130	36	1030	23	1030	29
	1515	ND	1330	8	1300	ND
			1600	ND	1530	
Slab 3	1030	50	0830	ND	0930	25
	1230	60	0930	33	1030	26
	1530	8	1130	22	1215	14
			1600	6	1500	ND
Slab 4	0915	ND	0930	ND	1010	ND
	1145	21	1200	46	1200	23
	1430	42	1430	12	1400	10
			1700	6	1600	ND

Flows during the whitewater boating flow study were measured at the four stations with portable staff gages. Aside from rain and other accretion, spill from Slab Creek Reservoir was controlled by White Rock powerhouse generation. Flow was ramped at a rate of 500 cfs per hour until the desired flows were reached. The temporary staff gages provided flow duration data. Vertical rise of the river relative to the flow observed at each of the stations was also measured by the gages (Table I1-4). Photos were taken to visually document the flows relative to the river stage (Appendix J). Gage levels generally correlate to the rise and fall of the hydrograph.

Table I1-4 Maximum flow at Slab Creek Dam and maximum gage readings at each of the stations.					
Flow (cfs)	Actual cfs measured at Slab Creek Dam	Slab 1 Gage Reading (ft)	Slab 2 Gage Reading (ft)	Slab 3 Gage Reading (ft)	Slab 4 Gage Reading (ft)
616	579	2.38	2.58	1.58	1.71
1068	1045	3.21	3.42	3.25	2.63
1597	1560	4.00	4.08	4.13	3.42

During the 616 cfs boating flow release, flows varied from 446 cfs to 616 cfs. Note that as the water flows from the Dam to Slab 1 it must fill numerous pockets and pools, which would result in a more regulated flow further downstream. Travel time from the dam to Slab 1 was less than 15 minutes. At Slab 2 the water peaked at 11:00, 2.5 hours after the maximum flow was observed at Slab 1. The flow at Slab 3 peaked at 1230, which was 1.5 hours after the peak flow was measures at Slab 2. The flow at Slab 4 reached its peak at 1300, which was 0.5 hours after the peak flow at Slab 3 was measured (Figure I1-4)

The duration of the peak flow at Slab 1, 2, 3, and 4 was observed to be 4.5, 2.5, 2.25, and 1 hour respectively. The flow was measured at 579.3 cfs for the 3.0-hour duration. However, as Figure 4.6-4 depicts, the flow at Slab 4 falls from a peak of 1.71ft and stabilizes again at about 1.67 ft. This indicates that a high flow is maintained for a longer period of time than what was recorded. The readings taken at Slab 4 were cut short because of weather-related safety concerns.

During the 1068 cfs flow release, a maximum flow of 1068 cfs was measured, with flows generally varying between 1031 cfs and 1068 cfs. The gage elevations at Slab 1, 2, 3, and 4 were 3.21, 3.42, 3.25 and 2.63 feet respectively at a flow range of 1031cfs through 1068 cfs (Figure I1-5).

The maximum flow was measured from Slab Creek Dam at 08:45. At 09:00 a high water level of 3.21 feet was measured at the Slab 1 gage. At the Slab 2 station the water peaked at 0915 indicating a 15-minute travel time from the Slab 1 station. The water level reached its maximum level at 10:00 at Slab 3 indicating a 45-minute travel time between Slab 2 and 3. The travel time between Slab 3 and 4 was one hour.

Maximum flow from Slab Creek Dam was maintained for 4.5 hours. The maximum flow at Slab 1 was measured for a period of 4.0 hours; at Slab 2 the period of maximum flow was 4.25 hours; at Slab 3 the period of maximum flow was 4.75 hours; and at Slab 4 the period of maximum flow was 3.75 hours.

During the 1597 cfs flow, the maximum measured flow was 1560 cfs. The gage elevations at Slab 1, 2, 3, and 4 were 4.00, 4.08, 4.13, and 3.42 feet respectively at a flow of 1597 cfs (Figure I1-6).

The maximum flow from Slab Creek Dam at was measured 0945, peaking at 1597 cfs. At 09:30, the flow at Slab 1 stabilized, which indicates the maximum flow only took a few minutes to reach the first station. At 09:30, a high water level of 4.08 feet was first recorded at the Slab 2 staff gage. At the Slab 3 station the water peaked at 10:30 indicating a 1-hour travel time from the Slab 2 station. The water level reached its maximum level at 12:15 at Slab 4 indicating a 1.75-hour travel time between Slab 3 and 4.

SMUD maintained the maximum flow from Slab Creek Dam for 4 hours. The maximum flow at Slab 1 was measured for a period of 3.75 hours; at Slab 2 the period of maximum flow was 4.25 hours; at Slab 3 the period of maximum flow was 4.5 hours; and at Slab 4 the period of maximum flow was 3.5 hours.

A ramping rate of 500 cfs per hour was the target rate for the sampling effort. The ramping rates in terms of vertical rise of the river over time decreased as the “slug” of water moved downstream (i.e. the time from base flow to maximum flow was reduced). This was also true as the volume of water increased during each of the three study days. As mentioned, as the 500 cfs ramping rate was maintained at the dam, the slower movement of the water at the lower flows allowed for a slower filling in of pools and pockets throughout the river system, which restricted the velocity of the water through the reach. Once the flows exceeded 500 cfs, the velocity of the water traveling through the reach is increased. The increase in velocity would allow more water to move downstream at any given time and therefore account for the increased ramping rates observed at each of the stations.

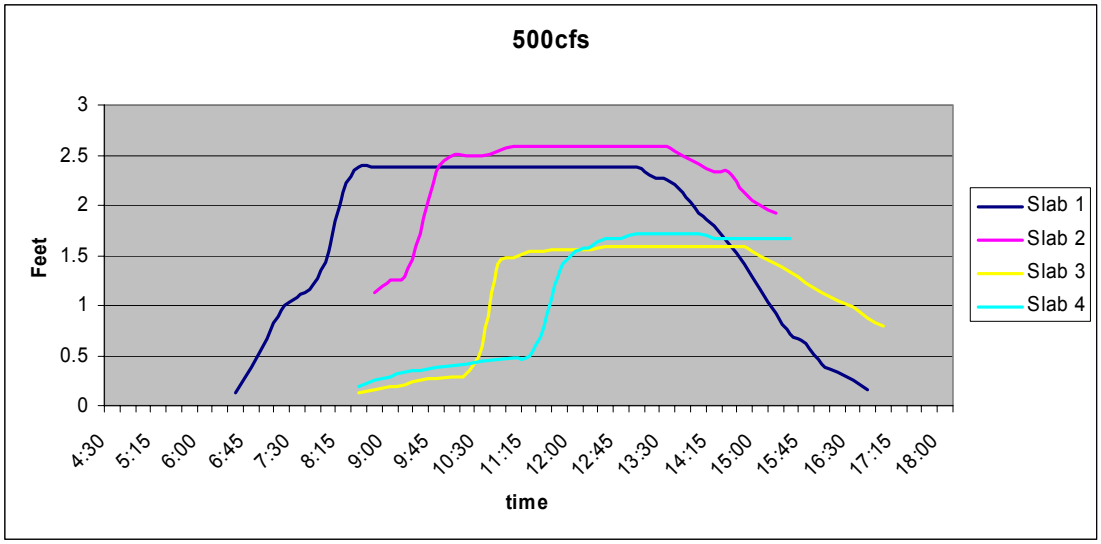


Figure I1-4 Gage readings taken during 616cfs flow at the four stations.

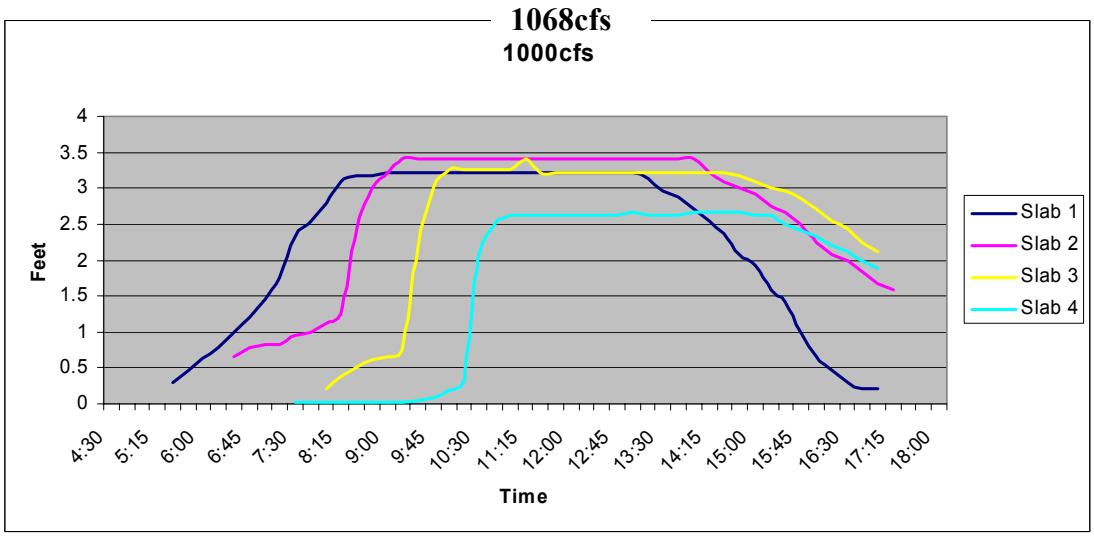


Figure I1-5 Gage readings taken during 1068cfs flow at the four stations.

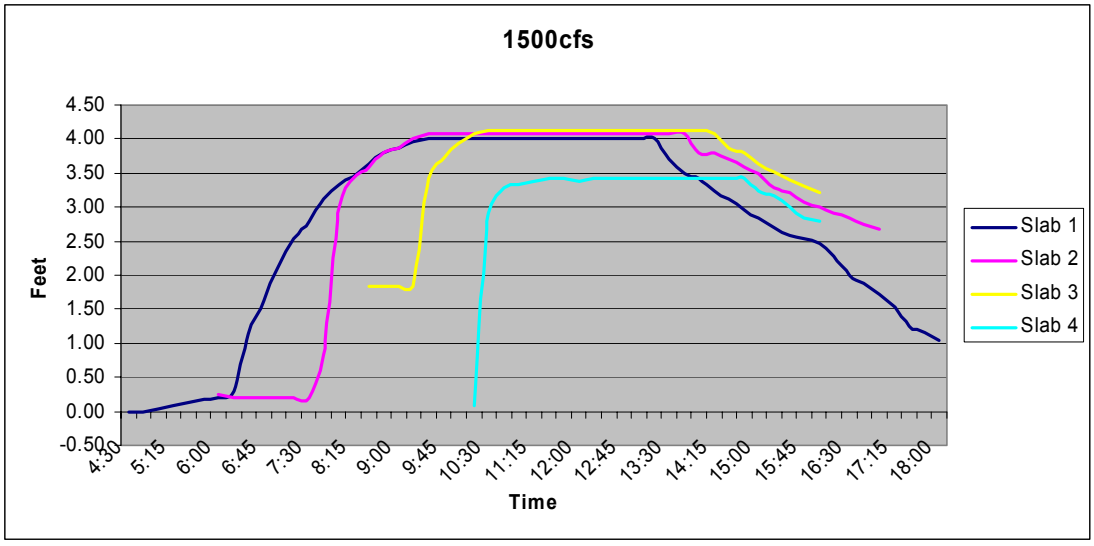


Figure I1-6 Gage readings taken during 1597cfs flow at the four stations.

I1.4 Fish Stranding

Reconnaissance prior to and assessment during the flow events was conducted to identify areas with potential to strand fish areas adjacent to the stations. The topography of the SFAR canyon in this reach does not allow many backwater areas to form as the water level increases in height. At the Slab 4 station, the river widens significantly. The widening of the riverbed in this area allows for formation of small side channels, which increase in depth as the water level increases. Upon returning to base flow these side channels do not restrict the movement of fish to and from these areas.

I1.5 Inundation of Bed Features

Prior to the boating flow releases, all four sites were identified as having features that would become significantly inundated. Slab 4 showed the greatest potential for such areas. Immediately upstream and downstream of the Slab 4 station are large gravel/cobble bars exceeding 200 feet in length and 50 feet in width. At the normal daily flow of the SFAR, these bars are exposed (Photographs K-1 through K-3, Appendix K). Inundation of the bars at Slab 4 occurred as soon as the water started to rise.

The bar located immediately downstream of the station becomes about 50% inundated at 616 cfs (Photograph K-4, Appendix K), 75% inundated at 1068 cfs (Photographs K-5, Appendix K), and 95% inundated at 1597 cfs (Photograph K-6, Appendix K). Other features at Slab 4 that became inundated as the flows increased were riparian vegetation (willow alder, cottonwood visible in photos below).

Owing to steep topography of the canyon above Slab 4 the other sites do not contain gravel bars. These areas do contain large amounts of bedrock, numerous boulders, and a thin strip of riparian

vegetation flanking the riverbanks. As the flows increase, each of these features becomes inundated. Photographs K-7 through K-9, Appendix K depict typical bed formations for Slab 1, Slab 2, and Slab 3 respectively.

I1.6 Water Quality

According to Thomas Dunne and Luna B. Leopold (1943) rivers provide for the transportation of sediment from earth to sea. As a river flows through a watershed it strips large and small particulates from the surrounding land that mix with the water therefore increasing the sediment load of a river. As flows increase as a result of rain, snow melt or water released from a dam so do the amount of sediment found within a river. The additional release of water from Slab Creek Reservoir for the whitewater boating flow study increased the amount of water flowing through the SFAR effectively gathering and moving additional particulates through the system. These additional particulates can affect the water quality of a river by increasing the turbidity and total suspended solids (TSS) within the water, as was the case during the whitewater test flows on Slab Creek. As the flows peaked and returned to base flows a decrease in turbidity and TSS was measured. This decrease in turbidity and TSS can be attributed to the river effectively removing the sediments from the system for that particular flow event. However the rainstorm that occurred the evening prior to, and during the first day of the study resulted in additional runoff that further increased the turbidity and TSS of the water in the SFAR watershed.

As briefly mentioned in the results the increase in temperature was due to the origin of the water relative to the water column of Slab Creek Reservoir as it was released into the SFAR. The cooler water temperatures measured during the minimum flows resulted from water being released through the low level outlet of Slab Creek Dam. The low level outlet releases water from a portion of the water column that is located below the thermocline of Slab Creek Reservoir, effectively resulting in a cold-water release. As the flows increased so did the temperature. The increase in temperature was a result of warmer surface water spilling into the SFAR mixing with cooler water released from the low level outlet. As the volume of water released from the surface of the Reservoir increases it effectively negates the influence of the cooler water released from the low level outlet.

APPENDIX J

ECOLOGICAL STUDY PHOTOS FOR TARGET FLOWS

(Provided on CD Only)

APPENDIX K

BED FORM INUNDATION PHOTOS FOR TARGET FLOWS

(Provided on CD Only)

APPENDIX L

ECOLOGICAL MONITORING

(Raw Data Provided on CD by Request)

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November 17 , 2003

Justin Klaurens
Devine Tarbell & Assoc. (DTA) - Sacramento
2710 S. Gateway Oaks Dr., Ste. 320 South
Sacramento, CA 95833

RE: Slab Creek
Work Order: S311021

Enclosed are the results of analyses for samples received by the laboratory on 11/03/03. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Ronald W. Bobel
Project Manager

CA ELAP Certificate Number 1624

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
slab 1	S311021-01	Water	11/02/03 15:30	11/03/03 14:20
slab 1	S311021-02	Water	11/01/03 15:30	11/03/03 14:20
slab 1	S311021-03	Water	11/01/03 12:30	11/03/03 14:20
slab 1	S311021-04	Water	11/01/03 09:30	11/03/03 14:20
slab 1	S311021-05	Water	11/01/03 06:30	11/03/03 14:20
slab 1	S311021-06	Water	10/31/03 10:30	11/03/03 14:20
slab 1	S311021-07	Water	11/02/03 13:00	11/03/03 14:20
slab 1	S311021-08	Water	10/31/03 13:30	11/03/03 14:20
slab 1	S311021-09	Water	10/31/03 07:30	11/03/03 14:20
slab 1	S311021-10	Water	10/30/03 09:24	11/03/03 14:20
slab 1	S311021-11	Water	11/02/03 06:30	11/03/03 14:20
slab 1	S311021-12	Water	11/02/03 09:30	11/03/03 14:20
slab 2	S311021-13	Water	11/02/03 08:00	11/03/03 14:20
slab 2	S311021-14	Water	11/01/03 16:00	11/03/03 14:20
slab 2	S311021-15	Water	11/02/03 15:30	11/03/03 14:20
slab 2	S311021-16	Water	11/02/03 10:30	11/03/03 14:20
slab 2	S311021-17	Water	11/02/03 13:00	11/03/03 14:20
slab 2	S311021-18	Water	11/01/03 10:30	11/03/03 14:20
slab 2	S311021-19	Water	11/01/03 13:00	11/03/03 14:20
slab 2	S311021-20	Water	11/01/03 08:00	11/03/03 14:20
slab 2	S311021-21	Water	10/31/03 08:24	11/03/03 14:20
slab 2	S311021-22	Water	10/31/03 11:30	11/03/03 14:20
slab 2	S311021-23	Water	10/31/03 15:15	11/03/03 14:20
slab 2	S311021-24	Water	10/30/03 11:28	11/03/03 14:20
slab 3	S311021-25	Water	11/02/03 10:30	11/03/03 14:20
slab 3	S311021-26	Water	11/02/03 09:25	11/03/03 14:20
slab 3	S311021-27	Water	11/02/03 12:15	11/03/03 14:20
slab 3	S311021-28	Water	11/02/03 15:00	11/03/03 14:20
slab 3	S311021-29	Water	11/01/03 09:35	11/03/03 14:20

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2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
slab 3	S311021-30	Water	10/31/03 15:30	11/03/03 14:20
slab 3	S311021-31	Water	11/01/03 08:30	11/03/03 14:20
slab 3	S311021-32	Water	10/31/03 10:30	11/03/03 14:20
slab 3	S311021-33	Water	11/01/03 11:30	11/03/03 14:20
slab 3	S311021-34	Water	10/30/03 14:53	11/03/03 14:20
slab 3	S311021-35	Water	11/01/03 16:00	11/03/03 14:20
slab 3	S311021-36	Water	10/31/03 12:30	11/03/03 14:20
slab 4	S311021-37	Water	11/02/03 12:00	11/03/03 14:20
slab 4	S311021-38	Water	11/02/03 16:00	11/03/03 14:20
slab 4	S311021-39	Water	11/02/03 14:00	11/03/03 14:20
slab 4	S311021-40	Water	11/02/03 10:10	11/03/03 14:20
slab 4	S311021-41	Water	10/31/03 14:30	11/03/03 14:20
slab 4	S311021-42	Water	11/01/03 09:30	11/03/03 14:20
slab 4	S311021-43	Water	10/31/03 09:15	11/03/03 14:20
slab 4	S311021-44	Water	11/01/03 14:30	11/03/03 14:20
slab 4	S311021-45	Water	10/31/03 11:45	11/03/03 14:20
slab 4	S311021-46	Water	10/30/03 16:00	11/03/03 14:20
slab 4	S311021-47	Water	11/01/03 12:00	11/03/03 14:20
slab 4	S311021-48	Water	10/30/03 09:00	11/03/03 14:20
slab 4	S311021-49	Water	11/01/03 17:00	11/03/03 14:20
slab 2	S311021-50	Water	11/01/03 09:00	11/03/03 14:20
slab 2	S311021-51	Water	11/01/03 14:00	11/03/03 14:20
slab 2	S311021-52	Water	11/01/03 07:00	11/03/03 14:20
slab 2	S311021-53	Water	11/02/03 12:45	11/03/03 14:20
slab 2	S311021-54	Water	11/01/03 11:30	11/03/03 14:20
slab 2	S311021-55	Water	11/02/03 11:30	11/03/03 14:20
slab 2	S311021-56	Water	11/01/03 16:00	11/03/03 14:20
slab 2	S311021-57	Water	11/01/03 08:00	11/03/03 14:20
slab 2	S311021-58	Water	11/01/03 10:00	11/03/03 14:20

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2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
slab 2	S311021-59	Water	11/01/03 10:30	11/03/03 14:20
slab 2	S311021-60	Water	11/02/03 09:00	11/03/03 14:20
slab 2	S311021-61	Water	11/02/03 08:30	11/03/03 14:20
slab 2	S311021-62	Water	11/02/03 09:30	11/03/03 14:20
slab 2	S311021-63	Water	11/02/03 10:30	11/03/03 14:20
slab 2	S311021-64	Water	11/01/03 06:35	11/03/03 14:20
slab 2	S311021-65	Water	11/01/03 11:00	11/03/03 14:20
slab 2	S311021-66	Water	11/01/03 08:30	11/03/03 14:20
slab 2	S311021-67	Water	11/02/03 11:00	11/03/03 14:20
slab 2	S311021-68	Water	11/01/03 13:15	11/03/03 14:20
slab 2	S311021-69	Water	11/01/03 12:30	11/03/03 14:20
slab 2	S311021-70	Water	11/02/03 07:30	11/03/03 14:20
slab 2	S311021-71	Water	11/02/03 15:00	11/03/03 14:20
slab 2	S311021-72	Water	11/02/03 12:00	11/03/03 14:20
slab 2	S311021-73	Water	11/02/03 10:00	11/03/03 14:20
slab 2	S311021-74	Water	11/02/03 09:30	11/03/03 14:20
slab 2	S311021-75	Water	11/02/03 13:30	11/03/03 14:20
slab 2	S311021-76	Water	11/02/03 07:00	11/03/03 14:20
slab 2	S311021-77	Water	11/02/03 16:00	11/03/03 14:20
slab 2	S311021-78	Water	11/01/03 12:00	11/03/03 14:20
slab 2	S311021-79	Water	11/02/03 14:15	11/03/03 14:20
slab 2	S311021-80	Water	11/01/03 14:45	11/03/03 14:20
slab 2	S311021-81	Water	11/01/03 07:30	11/03/03 14:20
slab 2	S311021-82	Water	11/02/03 08:00	11/03/03 14:20

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2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 1 (S311021-01) Water	**Sampled: 11/02/03 15:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
slab 1 (S311021-02) Water	**Sampled: 11/01/03 15:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
slab 1 (S311021-03) Water	**Sampled: 11/01/03 12:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
slab 1 (S311021-04) Water	**Sampled: 11/01/03 09:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 1 (S311021-05) Water	**Sampled: 11/01/03 06:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 1 (S311021-06) Water	**Sampled: 10/31/03 10:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
slab 1 (S311021-07) Water	**Sampled: 11/02/03 13:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 1 (S311021-08) Water	**Sampled: 10/31/03 13:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
slab 1 (S311021-09) Water	**Sampled: 10/31/03 07:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	

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2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 1 (S311021-10) Water	**Sampled: 10/30/03 09:24**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110043	11/04/03	11/05/03	EPA 160.2	
slab 1 (S311021-11) Water	**Sampled: 11/02/03 06:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 1 (S311021-12) Water	**Sampled: 11/02/03 09:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 2 (S311021-13) Water	**Sampled: 11/02/03 08:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 2 (S311021-14) Water	**Sampled: 11/01/03 16:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 2 (S311021-15) Water	**Sampled: 11/02/03 15:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 2 (S311021-16) Water	**Sampled: 11/02/03 10:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**29**	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 2 (S311021-17) Water	**Sampled: 11/02/03 13:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 2 (S311021-18) Water	**Sampled: 11/01/03 10:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**23**	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	

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2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 2 (S311021-19) Water	**Sampled: 11/01/03 13:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**8.0**	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 2 (S311021-20) Water	**Sampled: 11/01/03 08:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 2 (S311021-21) Water	**Sampled: 10/31/03 08:24**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**9.0**	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
Turbidity	**8.2**	0.20	NTU	"	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 2 (S311021-22) Water	**Sampled: 10/31/03 11:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**36**	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
Turbidity	**19**	0.20	NTU	"	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 2 (S311021-23) Water	**Sampled: 10/31/03 15:15**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
slab 2 (S311021-24) Water	**Sampled: 10/30/03 11:28**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110043	11/04/03	11/05/03	EPA 160.2	
slab 3 (S311021-25) Water	**Sampled: 11/02/03 10:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**26**	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 3 (S311021-26) Water	**Sampled: 11/02/03 09:25**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**25**	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	

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Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 3 (S311021-27) Water	**Sampled: 11/02/03 12:15**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**14**	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 3 (S311021-28) Water	**Sampled: 11/02/03 15:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 3 (S311021-29) Water	**Sampled: 11/01/03 09:35**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**33**	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 3 (S311021-30) Water	**Sampled: 10/31/03 15:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**8.0**	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
Turbidity	**7.0**	0.20	NTU	"	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 3 (S311021-31) Water	**Sampled: 11/01/03 08:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110097	11/08/03	11/10/03	EPA 160.2	
slab 3 (S311021-32) Water	**Sampled: 10/31/03 10:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**50**	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
Turbidity	**17**	0.20	NTU	"	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 3 (S311021-33) Water	**Sampled: 11/01/03 11:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**22**	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 3 (S311021-34) Water	**Sampled: 10/30/03 14:53**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110043	11/04/03	11/05/03	EPA 160.2	

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 3 (S311021-35) Water	**Sampled: 11/01/03 16:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**6.0**	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 3 (S311021-36) Water	**Sampled: 10/31/03 12:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**60**	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
slab 4 (S311021-37) Water	**Sampled: 11/02/03 12:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**23**	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 4 (S311021-38) Water	**Sampled: 11/02/03 16:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 4 (S311021-39) Water	**Sampled: 11/02/03 14:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**10**	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 4 (S311021-40) Water	**Sampled: 11/02/03 10:10**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 4 (S311021-41) Water	**Sampled: 10/31/03 14:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**42**	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
Turbidity	**30**	4.0	NTU	20	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 4 (S311021-42) Water	**Sampled: 11/01/03 09:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 4 (S311021-43) Water	**Sampled: 10/31/03 09:15**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 4 (S311021-44) Water	**Sampled: 11/01/03 14:30**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**12**	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 4 (S311021-45) Water	**Sampled: 10/31/03 11:45**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**21**	5.0	mg/l	1	3110080	11/05/03	11/07/03	EPA 160.2	
Turbidity	**9.8**	0.20	NTU	"	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 4 (S311021-46) Water	**Sampled: 10/30/03 16:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110043	11/04/03	11/05/03	EPA 160.2	
slab 4 (S311021-47) Water	**Sampled: 11/01/03 12:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**46**	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 4 (S311021-48) Water	**Sampled: 10/30/03 09:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	ND	5.0	mg/l	1	3110043	11/04/03	11/05/03	EPA 160.2	
slab 4 (S311021-49) Water	**Sampled: 11/01/03 17:00**	**Received: 11/03/03 14:20**							
Total Suspended Solids	**6.0**	5.0	mg/l	1	3110098	11/08/03	11/10/03	EPA 160.2	
slab 2 (S311021-50) Water	**Sampled: 11/01/03 09:00**	**Received: 11/03/03 14:20**							
Turbidity	**13**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 2 (S311021-51) Water	**Sampled: 11/01/03 14:00**	**Received: 11/03/03 14:20**							
Turbidity	**3.4**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 2 (S311021-52) Water	**Sampled: 11/01/03 07:00**	**Received: 11/03/03 14:20**							
Turbidity	**1.4**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	HT-01

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 2 (S311021-53) Water	**Sampled: 11/02/03 12:45**	**Received: 11/03/03 14:20**							
Turbidity	**2.8**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	
slab 2 (S311021-54) Water	**Sampled: 11/01/03 11:30**	**Received: 11/03/03 14:20**							
Turbidity	**3.7**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 2 (S311021-55) Water	**Sampled: 11/02/03 11:30**	**Received: 11/03/03 14:20**							
Turbidity	**4.3**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	
slab 2 (S311021-56) Water	**Sampled: 11/01/03 16:00**	**Received: 11/03/03 14:20**							
Turbidity	**2.0**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	HT-04
slab 2 (S311021-57) Water	**Sampled: 11/01/03 08:00**	**Received: 11/03/03 14:20**							
Turbidity	**2.1**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 2 (S311021-58) Water	**Sampled: 11/01/03 10:00**	**Received: 11/03/03 14:20**							
Turbidity	**18**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 2 (S311021-59) Water	**Sampled: 11/01/03 10:30**	**Received: 11/03/03 14:20**							
Turbidity	**14**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	HT-01
slab 2 (S311021-60) Water	**Sampled: 11/02/03 09:00**	**Received: 11/03/03 14:20**							
Turbidity	**8.1**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	
slab 2 (S311021-61) Water	**Sampled: 11/02/03 08:30**	**Received: 11/03/03 14:20**							
Turbidity	**4.1**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 2 (S311021-62) Water	**Sampled: 11/02/03 09:30**	**Received: 11/03/03 14:20**							
Turbidity	**19**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	
slab 2 (S311021-63) Water	**Sampled: 11/02/03 10:30**	**Received: 11/03/03 14:20**							
Turbidity	**7.8**	0.20	NTU	1	3110187	11/03/03	11/03/03	EPA 180.1	
slab 2 (S311021-64) Water	**Sampled: 11/01/03 06:35**	**Received: 11/03/03 14:20**							
Turbidity	**1.3**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	HT-01
slab 2 (S311021-65) Water	**Sampled: 11/01/03 11:00**	**Received: 11/03/03 14:20**							
Turbidity	**3.7**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	HT-01
slab 2 (S311021-66) Water	**Sampled: 11/01/03 08:30**	**Received: 11/03/03 14:20**							
Turbidity	**5.2**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	HT-01
slab 2 (S311021-67) Water	**Sampled: 11/02/03 11:00**	**Received: 11/03/03 14:20**							
Turbidity	**5.6**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	
slab 2 (S311021-68) Water	**Sampled: 11/01/03 13:15**	**Received: 11/03/03 14:20**							
Turbidity	**4.2**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	HT-01
slab 2 (S311021-69) Water	**Sampled: 11/01/03 12:30**	**Received: 11/03/03 14:20**							
Turbidity	**3.8**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	HT-01
slab 2 (S311021-70) Water	**Sampled: 11/02/03 07:30**	**Received: 11/03/03 14:20**							
Turbidity	**0.68**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 2 (S311021-71) Water	**Sampled: 11/02/03 15:00**	**Received: 11/03/03 14:20**							
Turbidity	**1.7**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	
slab 2 (S311021-72) Water	**Sampled: 11/02/03 12:00**	**Received: 11/03/03 14:20**							
Turbidity	**2.2**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	
slab 2 (S311021-73) Water	**Sampled: 11/02/03 10:00**	**Received: 11/03/03 14:20**							
Turbidity	**9.1**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	
slab 2 (S311021-74) Water	**Sampled: 11/02/03 09:30**	**Received: 11/03/03 14:20**							
Turbidity	**7.4**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	
slab 2 (S311021-75) Water	**Sampled: 11/02/03 13:30**	**Received: 11/03/03 14:20**							
Turbidity	**1.9**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	
slab 2 (S311021-76) Water	**Sampled: 11/02/03 07:00**	**Received: 11/03/03 14:20**							
Turbidity	**0.66**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	
slab 2 (S311021-77) Water	**Sampled: 11/02/03 16:00**	**Received: 11/03/03 14:20**							
Turbidity	**1.5**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	
slab 2 (S311021-78) Water	**Sampled: 11/01/03 12:00**	**Received: 11/03/03 14:20**							
Turbidity	**4.6**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	HT-01
slab 2 (S311021-79) Water	**Sampled: 11/02/03 14:15**	**Received: 11/03/03 14:20**							
Turbidity	**2.3**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
slab 2 (S311021-80) Water	**Sampled: 11/01/03 14:45**	**Received: 11/03/03 14:20**							
Turbidity	**2.1**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	HT-04
slab 2 (S311021-81) Water	**Sampled: 11/01/03 07:30**	**Received: 11/03/03 14:20**							
Turbidity	**1.0**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	HT-01
slab 2 (S311021-82) Water	**Sampled: 11/02/03 08:00**	**Received: 11/03/03 14:20**							
Turbidity	**0.50**	0.20	NTU	1	3110188	11/03/03	11/12/03	EPA 180.1	

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3110043 - General Prep										
Blank (3110043-BLK1)				Prepared: 11/04/03 Analyzed: 11/05/03						
Total Suspended Solids	ND	5.0	mg/l							
Duplicate (3110043-DUP1)	**Source: S311011-03**			Prepared: 11/04/03 Analyzed: 11/05/03						
Total Suspended Solids	ND	5.0	mg/l		260				20	
Batch 3110080 - General Preparation										
Blank (3110080-BLK1)				Prepared: 11/05/03 Analyzed: 11/07/03						
Total Suspended Solids	ND	5.0	mg/l							
Duplicate (3110080-DUP1)	**Source: S311017-01**			Prepared: 11/05/03 Analyzed: 11/07/03						
Total Suspended Solids	6.00	5.0	mg/l		6.0			0	20	
Batch 3110097 - General Prep										
Blank (3110097-BLK1)				Prepared: 11/08/03 Analyzed: 11/10/03						
Total Suspended Solids	ND	5.0	mg/l							
Duplicate (3110097-DUP1)	**Source: S311052-01**			Prepared: 11/08/03 Analyzed: 11/10/03						
Total Suspended Solids	46.0	5.0	mg/l		46			0	20	
Batch 3110098 - General Prep										
Blank (3110098-BLK1)				Prepared: 11/08/03 Analyzed: 11/10/03						
Total Suspended Solids	ND	5.0	mg/l							

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3110098 - General Prep										
Duplicate (3110098-DUP1)	**Source: S311021-33**			Prepared: 11/08/03 Analyzed: 11/10/03						
Total Suspended Solids	28.0	5.0	mg/l		22			24	20	Q-LIM
Batch 3110187 - General Prep										
Blank (3110187-BLK1)				Prepared & Analyzed: 11/03/03						
Turbidity	ND	0.20	NTU							
Laboratory Control Sample (3110187-BS1)				Prepared & Analyzed: 11/03/03						
Turbidity	2.04	0.20	NTU	2.00		102	80-120			
Matrix Spike (3110187-MS1)	**Source: S311021-51**			Prepared & Analyzed: 11/03/03						
Turbidity	5.20	0.20	NTU	2.00	3.4	90	80-120			
Matrix Spike Dup (3110187-MSD1)	**Source: S311021-51**			Prepared & Analyzed: 11/03/03						
Turbidity	5.14	0.20	NTU	2.00	3.4	87	80-120	1	20	
Batch 3110188 - General Prep										
Blank (3110188-BLK1)				Prepared: 11/03/03 Analyzed: 11/12/03						
Turbidity	ND	0.20	NTU							
Laboratory Control Sample (3110188-BS1)				Prepared: 11/03/03 Analyzed: 11/12/03						
Turbidity	2.01	0.20	NTU	2.00		100	80-120			
Matrix Spike (3110188-MS1)	**Source: S311021-82**			Prepared: 11/03/03 Analyzed: 11/12/03						
Turbidity	2.63	0.20	NTU	2.00	0.50	106	80-120			

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3110188 - General Prep										
Matrix Spike Dup (3110188-MSD1)	**Source: S311021-82**			Prepared: 11/03/03	Analyzed: 11/12/03					
Turbidity	2.43	0.20	NTU	2.00	0.50	96	80-120	8	20	

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Devine Tarbell & Assoc. (DTA) - Sacramento	Project: Slab Creek	S311021
2710 S. Gateway Oaks Dr., Ste. 320 South	Project Number: Whitewater Ecological Studies	**Reported:**
Sacramento CA, 95833	Project Manager: Justin Klaurens	11/17/03 18:08

Notes and Definitions

HT-01	This sample was received beyond the EPA recommended holding time. The results may still be useful for their intended purpose.
HT-04	This sample was analyzed beyond the EPA recommended holding time. The results may still be useful for their intended purpose.
Q-LIM	The percent recovery was outside of the control limits. The samples results may still be useful for their intended purpose.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

❑ 885 Jarvis Drive • Morgan Hill, CA 95037 • (408) 776-9600 • FAX (408) 782-6308
❑ 819 Striker Ave., Suite 8 • Sacramento, CA 95834 • (916) 921-9600 • FAX (916) 921-0100
❑ 404 N. Wiget Lane • Walnut Creek, CA 94598 • (925) 988-9600 • FAX (925) 988-9673
❑ 1455 McDowell Blvd. North, Suite D • Petaluma, CA 94954 • (707) 792-1865 • FAX (707) 792-0342
❑ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 ☎ 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ❑ Yes ❑ No
Report To: Justin Klaverens E-Mail: Justin.Klaverens@Devinetarbell.com	QC Data: ❑ Level D (Standard) ❑ Level C ❑ Level B ❑ Level A

Turnaround Time: ☑ 10 - 15 Working Days ❑ 3 Working Days ❑ 2 - 8 Hours ❑ 7 Working Days ❑ 2 Working Days ❑ 5 Working Days ❑ 1 Working Day

Mandatory: ❑ Drinking Water ❑ Waste Water ☑ Other Riverwater

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested	TSS	Turbidity	Comments
1. Slab 1	11/2/03 1530	H2O	1	250ml Plastic	S311021 -01		✓		
2. "	11/1/03 1530	"	"	"	02		✓		
3. "	11/1/03 1230	"	"	"	03		✓		
4. "	11/1/03 0930	"	"	"	04		✓		
5. "	11/1/03 0630	"	"	"	05		✓		
6. "	10/31/03 1030	"	"	"	06		✓		
7. "	11/2/03 1300	"	"	"	07		✓		
8. "	10/31/03 1330	"	"	"	08		✓		
9. "	10/31/03 0730	"	"	"	09		✓		
10. "	10/30/03 0924	"	"	"	10		✓		11.0°C

Pink - Client
Yellow - Sequoia
White - Sequoia

Relinquished By:	Date: 11/3/03 Time: 1420	Received By:	Date: 11/3 Time: 1420
Relinquished By:	Date: Time:	Received By:	Date: Time:
Relinquished By:	Date: Time:	Received By:	Date: Time:

Were Samples Received in Good Condition? ❑ Yes ❑ No Samples on Ice? ❑ Yes ❑ No Method of Shipment _____

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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❑ 1455 McDowell Blvd. North, Suite D • Petaluma, CA 94954 • (707) 792-1865 • FAX (707) 792-0342
❑ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 95833	Billing Address (if different):
City: Sacramento State: CA Zip Code: 95833	
Telephone: 916 564 4214 Fax #: 916 564 4203	P.O. #: Payment Received: ❑ Yes ❑ No
Report To: Justin Klawiens E-Mail:	QC Data: ❑ Level D (Standard) ❑ Level C ❑ Level B ❑ Level A

Turnaround Time: ☑ 10 - 15 Working Days ❑ 3 Working Days ❑ 2 - 8 Hours ❑ 7 Working Days ❑ 2 Working Days ❑ 5 Working Days ❑ 1 Working Day

Mandatory: ❑ Drinking Water ❑ Waste Water ☑ Other River Water

Sampler:

Pink - Client

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested:	TSS	Turbidity								Comments
1. Slab 1	11/2/03 0630	H_2O	1	250ml Plastic	-11		✓									
2. "	11/2/03 0930	"	"	"	12		✓									
3. Slab 2	11/2/03 0800	"	"	"	13		✓									
4. "	11/1/03 1600	"	"	"	14		✓									
5. "	11/2/03 1530	"	"	"	15		✓									
6. "	11/2/03 1030	"	"	"	16		✓									
7. "	11/2/03 1300	"	"	"	17		✓									
8. "	11/1/03 1030	"	"	"	18		✓									
9. "	11/1/03 1300	"	"	"	19		✓									
10. "	11/1/03 0800	"	"	"	20		✓									

Yellow - Sequoia

White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3	Time: 1426
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ❑ Yes ❑ No Samples on Ice? ❑ Yes ❑ No Method of Shipment _____

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

- ❑ 885 Jarvis Drive • **Morgan Hill, CA 95037** • (408) 776-9600 • FAX (408) 782-6308
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- ❑ 819 Striker Ave., Suite 8 • **Sacramento, CA 95834** • (916) 921-9600 • FAX (916) 921-0100
- ❑ 404 N. Wiget Lane • **Walnut Creek, CA 94598** • (925) 988-9600 • FAX (925) 988-9673

Company Name: Devine Tarbell & Associates		Project: Slab Creek Whitewater Ecological Studies	
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south		Billing Address (if different):	
City: Sacramento	State: CA Zip Code: 95833		
Telephone: 916 564 4214	Fax #: 916 564 4203	P.O. #:	
Report To: Justin Havrens	E-mail Address:	QC Data: ❑ Level II (standard) ❑ Level III ❑ Level IV	
Sampler:	Date / Time Results Required:	Sequoia's Work Order #	

Turnaround Time:
- ☑ 10-15 Working Days (Standard TAT)
- ❑ 7 Working Days
- ❑ 5 Working Days
- ❑ 72 Hours
- ❑ 48 Hours
- ❑ 24 Hours
- ❑ 2-8 Hours

MANDATORY:
- ❑ SDWA (Drinking Water)
- ❑ CWA (Waste Water)
- ❑ RCRA (Hazardous Waste)
- ☑ Other River Water

ANALYSES REQUESTED (Please provide method)

Client Sample I.D.	Date / Time Sampled	Matrix Desc.	# of Cont.	Container Type	Sequoia's Sample #	TSS	Turbidity								Comments/ Temp.(If required)
1. Slab 2	10/31/03 0824	H_2O	1	250mL Plastic	21	✓	✓								
2. "	10/31/03 1130	"	"	"	22	✓	✓								
3. "	10/30/03 1515	"	"	"	23	✓									
4. "	10/30/03 1128	"	"	"	24	✓									
5. Slab 3	11/2/03 1030	"	"	"	25	✓									
6. "	11/2/03 0925	"	"	"	26	✓									
7. "	11/2/03 1215	"	"	"	27	✓									
8. "	11/2/03 1500	"	"	"	28	✓									
9. "	11/1/03 0935	"	"	"	29	✓									
10. "	10/31/03 1530	"	"	"	30	✓	✓								

Relinquished by / Co.: [signature] 11/3/03 1420	Received by / Co.: [signature]	Date / Time / Temp.: 11/3 1420
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:

Were Samples Received in Good Condition? ❑ Yes ❑ No Samples on Ice? ❑ Yes ❑ No Method of Shipment: _____ Page 3 of 9

White: Sequoia Yellow: Sequoia Pink: Client

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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☐ 819 Striker Ave., Suite 8 • **Sacramento, CA 95834** • (916) 921-9600 • FAX (916) 921-0100
☐ 404 N. Wiget Lane • **Walnut Creek, CA 94598** • (925) 988-9600 • FAX (925) 988-9673

Company Name: Devine Tarbell + Associates			Project:
Mailing Address: 2710 Gateway Oaks Drive Suite 320 South			Billing Address (if different):
City: Sacramento	State: CA	Zip Code: 95833	
Telephone: 916 564 4214	Fax #: 916 564 4203		P.O. #:
Report To: Justin Klavens	E-mail Address:		QC Data: ☐ Level II (standard) ☐ Level III ☐ Level IV
Sampler:	Date / Time Results Required:		Sequoia's Work Order #

Turnaround Time:
- ☑ 10-15 Working Days (Standard TAT)
- ☐ 7 Working Days
- ☐ 5 Working Days
- ☐ 72 Hours
- ☐ 48 Hours
- ☐ 24 Hours
- ☐ 2-8 Hours

MANDATORY:
- ☐ SDWA (Drinking Water)
- ☐ CWA (Waste Water)
- ☐ RCRA (Hazardous Waste)
- ☑ Other River Water

ANALYSES REQUESTED (Please provide method)

Client Sample I.D.	Date / Time Sampled	Matrix Desc.	# of Cont.	Container Type	Sequoia's Sample #	TSS	Turbidity								Comments/ Temp.(If required)
1. Slab 3	11/1/03 0830	H_2O	1	250 mL Plastic	31	/									
2. "	10/31/03 1030	"	"	"	32	/	/								
3. "	11/1/03 1130	"	"	"	33	/									
4. "	10/30/01 1453	"	"	"	34	/									
5. "	11/1/03 1600	"	"	"	35	/									
6. "	10/31/03 1230	"	"	"	36	/									
7. Slab 4	11/2/03 1200	"	"	"	37	/									
8. "	11/2/03 1600	"	"	"	38	/									
9. "	11/2/03 1406	"	"	"	39	/									
10. "	11/2/03 1010	"	"	"	40	/									

Relinquished by / Co.: [signature] 11/3/03 1420	Received by / Co.: [signature]	Date / Time / Temp.: 11/3 1420
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment: _____ Page 4 of 9

White: Sequoia Yellow: Sequoia Pink: Client

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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☐ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell & Associates	Project: Slab Creek White water Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ☐ Yes ☐ No
Report To: Justin Klawiens E-Mail:	QC Data: ☐ Level D (Standard) ☐ Level C ☐ Level B ☐ Level A

Turnaround Time: ☒ 10 - 15 Working Days ☐ 3 Working Days ☐ 2 - 8 Hours ☐ 7 Working Days ☐ 2 Working Days ☐ 5 Working Days ☐ 1 Working Day

Mandatory: ☐ Drinking Water ☐ Waste Water ☒ Other River Water

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested:	TSS	Turbidity								Comments
1. Slab 4	10/31/03 1430 ~~1400~~	H_2O	1	250 mL Plastic	41		✓	✓								
2. "	11/1/03 0930	"	"	"	42		✓									
3. "	10/31/03 0915	"	"	"	43		✓									
4. "	11/1/03 1430	"	"	"	44		✓									
5. "	10/31/03 1145	"	"	"	45		✓	✓								
6. "	10/30/03 1600	"	"	"	46		✓									
7. "	11/1/03 1200	"	"	"	47		✓									
8. "	10/30/03 0900	"	"	"	48		✓									
9. "	11/1/03 1200	"	"	"	49		✓									
10. ~~~		"	"	"												

Relinquished By: [signature]	Date: 11/3/03	Time: 1420	Received By: [signature]	Date: 11/3	Time: 1400
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment _____

Pink - Client
Yellow - Sequoia
White - Sequoia

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

☐ 819 Striker Ave., Suite 8 • Sacramento, CA 95834 • (916) 921-9600 • FAX (916) 921-0100
☐ 404 N. Wiget Lane • Walnut Creek, CA 94598 • (925) 988-9600 • FAX (925) 988-9673
☐ 1455 McDowell Blvd. North, Suite D • Petaluma, CA 94954 • (707) 792-1865 • FAX (707) 792-0342
☐ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ☐ Yes ☐ No
Report To: Justin Klaveris E-Mail: Justin.Klaveris@DevineTarbell.com	QC Data: ☐ Level D (Standard) ☐ Level C ☐ Level B ☐ Level A

Turnaround Time:
☑ 10 - 15 Working Days ☐ 7 Working Days ☐ 5 Working Days ☐ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day ☐ 2 - 8 Hours

Mandatory:
☐ Drinking Water
☐ Waste Water
☑ Other River Water

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested: TSS	Turbidity	Comments
1. Slab 2	11/1/03 0900	H_2O	1	250mL Plastic	50			
2.	11/1/03 1400				51			
3.	11/1/03 0700				52			
4.	11/2/03 1245				53			
5.	11/1/03 1130				54			
6.	11/2/03 1130				55			
7.	11/1/03 1600				56			
8.	11/1/03 800				57			
9.	11/1/03 1000				58			
10.	11/1/03 1030				59			

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3	Time: 1420
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment _____ Page 6 of 9

Pink - Client
Yellow - Sequoia
White - Sequoia

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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☐ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ☐ Yes ☐ No
Report To: Justin Klaveris E-Mail: Justin.Klaveris@Devinetarbell.com	QC Data: ☐ Level D (Standard) ☐ Level C ☐ Level B ☐ Level A

Turnaround Time: ☑ 10 - 15 Working Days ☐ 7 Working Days ☐ 5 Working Days ☐ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day ☐ 2 - 8 Hours

Mandatory: ☐ Drinking Water ☐ Waste Water ☑ Other River Water

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested: TSS	Turbidity	Comments
1. Slab 2	11/2/03 0900	H_2O	1	250 mL Plastic	60			
2.	11/2/03 0830				61			
3.	11/2/03 0930				62			
4.	11/2/03 1030				63			
5.	11/1/03 0635				64			
6.	11/1/03 1100				65			
7.	11/1/03 0830				66			
8.	11/2/03 1100				67			
9.	11/1/03 1315				68			
10.	11/1/03 1230				69			

ORIGINAL

Pink - Client
Yellow - Sequoia
White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 14:20	Received By:	Date: 11/3	Time: 1420
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment _____ Page 1 of 9

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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☐ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ☐ Yes ☐ No
Report To: Justin Klavens E-Mail: Justin.Klavens@Devinetarbell.com	QC Data: ☐ Level D (Standard) ☐ Level C ☐ Level B ☐ Level A

Turnaround Time:
☑ 10 - 15 Working Days ☐ 3 Working Days ☐ 2 - 8 Hours
☐ 7 Working Days ☐ 2 Working Days
☐ 5 Working Days ☐ 1 Working Day

Mandatory:
☐ Drinking Water
☐ Waste Water
☑ Other Riverbank

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested: TSS	Turbidity	Comments
1. Slab 2	11/2/03 0730	H_2O	1	250mL Plastic	70			
2.	11/2/03 1500				71			
3.	11/2/03 1200				72			
4.	11/2/03 1000				73			
5.	11/1/03 930				74			
6.	11/2/03 1330				75			
7.	11/2/03 0700				76			
8.	11/2/03 1600				77			
9.	11/1/03 1200				78			
10.	11/2/03 1445				79			

Pink - Client
Yellow - Sequoia
White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3	Time: 1420
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment _____

SEQUOIA ANALYTICAL
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☐ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ☐ Yes ☐ No
Report To: Justin Klaveris E-Mail: Justin.Klaveris@Devinetarbell.com	QC Data: ☐ Level D (Standard) ☐ Level C ☐ Level B ☐ Level A

Turnaround Time:
☑ 10 - 15 Working Days ☐ 3 Working Days ☐ 2 - 8 Hours
☐ 7 Working Days ☐ 2 Working Days
☐ 5 Working Days ☐ 1 Working Day

Mandatory:
☐ Drinking Water
☐ Waste Water
☑ Other River Water

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested: TSS	Turbidity	Comments
1. Slab 2	11/1/03 1445	H_2O	1	250mL Plastic	80		1	
2.	11/1/03 0730	1	1	1	81			
3.	11/2/03 0810	1	1	1	82		1	
4.								
5.								
6.								
7.								
8.								
9.								
10.								

Pink - Client
Yellow - Sequoia
White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3/03	Time: 1420
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment _____ Page 9 of 9

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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❑ 819 Striker Ave., Suite 8 • Sacramento, CA 95834 • (916) 921-9600 • FAX (916) 921-0100
❑ 404 N. Wiget Lane • Walnut Creek, CA 94598 • (925) 988-9600 • FAX (925) 988-9673
❑ 1455 McDowell Blvd. North, Suite D • Petaluma, CA 94954 • (707) 792-1865 • FAX (707) 792-0342
❑ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ❑ Yes ❑ No
Report To: Justin Klaverens E-Mail: Justin.Klaverens@Devinetarbell.com	QC Data: ❑ Level D (Standard) ❑ Level C ❑ Level B ❑ Level A

Turnaround Time: ☑ 10 - 15 Working Days ❑ 7 Working Days ❑ 5 Working Days ❑ 3 Working Days ❑ 2 Working Days ❑ 1 Working Day ❑ 2 - 8 Hours

Mandatory: ❑ Drinking Water ❑ Waste Water ☑ Other River Water

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested: TSS	Turbidity	Comments
1. Slab 1	11/2/03 1530	H_2O	1	250ml Plastic	S311021 -01			
2. "	11/1/03 1530	"	"	"	02			
3. "	11/1/03 1230	"	"	"	03			
4. "	11/1/03 0930	"	"	"	04			
5. "	11/1/03 0630	"	"	"	05			
6. "	10/31/03 1030	"	"	"	06			
7. "	11/2/03 1300	"	"	"	07			
8. "	10/31/03 1330	"	"	"	08			
9. "	10/31/03 0730	"	"	"	09			
10. "	10/30/03 0924	"	"	"	10			11.0°C

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3	Time: 1420
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ❑ Yes ❑ No Samples on Ice? ❑ Yes ❑ No Method of Shipment _____ Page 1 of 9

Pink - Client
Yellow - Sequoia
White - Sequoia

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

❑ 885 Jarvis Drive • Morgan Hill, CA 95037 • (408) 776-9600 • FAX (408) 782-6308
❑ 819 Striker Ave., Suite 8 • Sacramento, CA 95834 • (916) 921-9600 • FAX (916) 921-0100
❑ 404 N. Wiget Lane • Walnut Creek, CA 94598 • (925) 988-9600 • FAX (925) 988-9673
❑ 1455 McDowell Blvd. North, Suite D • Petaluma, CA 94954 • (707) 792-1865 • FAX (707) 792-0342
❑ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 95833	Billing Address (if different):
City: Sacramento State: CA Zip Code: 95833	
Telephone: 916 564 4214 Fax #: 916 564 4203	P.O. #: Payment Received: ❑ Yes ❑ No
Report To: Justin Klawiter E-Mail:	QC Data: ❑ Level D (Standard) ❑ Level C ❑ Level B ❑ Level A

Turnaround Time: ☑ 10 - 15 Working Days ❑ 3 Working Days ❑ 2 - 8 Hours ❑ 7 Working Days ❑ 2 Working Days ❑ 5 Working Days ❑ 1 Working Day

Mandatory: ❑ Drinking Water ❑ Waste Water ☑ Other River Work

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested	TSS	Turbidity								Comments
1. Slab 1	11/2/03 0630	H_2O	1	250ml Plastic	-11		—									
2. "	11/2/03 0930	"	"	"	12		—									
3. Slab 2	11/2/03 0800	"	"	"	13		—									
4. "	11/1/03 1600	"	"	"	14		—									
5. "	11/2/03 1530	"	"	"	15		—									
6. "	11/2/03 1030	"	"	"	16		—									
7. "	11/2/03 1300	"	"	"	17		—									
8. "	11/1/03 1030	"	"	"	18		—									
9. "	11/1/03 1300	"	"	"	19		—									
10. "	11/1/03 0800	"	"	"	20		—									

Pink - Client
Yellow - Sequoia
White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3	Time: 1426
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ❑ Yes ❑ No Samples on Ice? ❑ Yes ❑ No Method of Shipment _____

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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☐ 819 Striker Ave., Suite 8 • **Sacramento, CA 95834** • (916) 921-9600 • FAX (916) 921-0100
☐ 404 N. Wiget Lane • **Walnut Creek, CA 94598** • (925) 988-9600 • FAX (925) 988-9673

Company Name: Devine Tarbell & Associates		Project: Slab Creek Whitewater Ecological Studies	
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south		Billing Address (if different):	
City: Sacramento	State: CA Zip Code: 95833		
Telephone: 916 564 4214	Fax #: 916 564 4203	P.O. #:	
Report To: Justin Havrens	E-mail Address:	QC Data: ☐ Level II (standard) ☐ Level III ☐ Level IV	
Sampler:	Date / Time Results Required:	Sequoia's Work Order #	

Turnaround Time:
☑ 10-15 Working Days (Standard TAT)
☐ 7 Working Days
☐ 5 Working Days
☐ 72 Hours
☐ 48 Hours
☐ 24 Hours
☐ 2-8 Hours

MANDATORY:
☐ SDWA (Drinking Water)
☐ CWA (Waste Water)
☐ RCRA (Hazardous Waste)
☑ Other River Water

ANALYSES REQUESTED (Please provide method)

Client Sample I.D.	Date / Time Sampled	Matrix Desc.	# of Cont.	Container Type	Sequoia's Sample #	TSS	Turbidity								Comments/ Temp.(If required)
1. Slab 2	10/31/03 0824	H_2O	1	250mL Plastic	21	✓	✓								
2. "	10/31/03 1130	"	"	"	22	✓	✓								
3. "	10/~~30~~31/03 1515	"	4	"	23	✓									
4. "	10/30/03 1128	"	"	"	24	✓									
5. Slab 3	11/2/03 1030	"	"	"	25	✓									
6. "	11/2/03 0925	"	"	"	26	✓									
7. "	11/2/03 1215	"	"	"	27	✓									
8. "	11/2/03 1500	"	"	"	28	✓									
9. "	11/1/03 0935	"	"	"	29	✓									
10. "	10/31/03 1530	"	"	"	30	✓	✓								

Relinquished by / Co.: [signature] 11/3/03 1420	Received by / Co.: [signature]	Date / Time / Temp.: 11/3 1420
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment:_____

White: Sequoia Yellow: Sequoia Pink: Client

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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- ❑ 404 N. Wiget Lane • **Walnut Creek, CA 94598** • (925) 988-9600 • FAX (925) 988-9673

Company Name: Devine Tarbell + Associates		Project:	
Mailing Address: 2710 Gateway Oaks Drive Suite 320 South		Billing Address (if different):	
City: Sacramento	State: CA	Zip Code: 95833	
Telephone: 916 564 4214	Fax #: 916 564 4203	P.O. #:	
Report To: Justin Klavens	E-mail Address:	QC Data: ❑ Level II (standard) ❑ Level III ❑ Level IV	
Sampler:	Date / Time Results Required:	Sequoia's Work Order #	

Turnaround Time:
- ☑ 10-15 Working Days (Standard TAT)
- ❑ 7 Working Days
- ❑ 5 Working Days
- ❑ 72 Hours
- ❑ 48 Hours
- ❑ 24 Hours
- ❑ 2-8 Hours

MANDATORY:
- ❑ SDWA (Drinking Water)
- ❑ CWA (Waste Water)
- ☑ RCRA (Hazardous Waste)
- ☑ Other River Water

ANALYSES REQUESTED (Please provide method)

Client Sample I.D.	Date / Time Sampled	Matrix Desc.	# of Cont.	Container Type	Sequoia's Sample #	TSS	Turbidity								Comments/ Temp.(If required)
1. Slab 3	11/1/03 0830	H_2O	1	250 mL Plastic	31	/									
2. "	10/31/03 1030	"	"	"	32	/	/								
3. "	11/1/03 1130	"	"	"	33	/									
4. "	10/30/01 1453	"	"	"	34	/									
5. "	11/1/03 1600	"	"	"	35	/									
6. "	10/31/03 1230	"	"	"	36	/									
7. Slab 4	11/2/03 1200	"	"	"	37	/									
8. "	11/2/03 1600	"	"	"	38	/									
9. "	11/2/03 1400	"	"	"	39	/									
10. "	11/2/03 1010	"	"	"	40	/									

Relinquished by / Co.: 11/3/03 1420	Received by / Co.:	Date / Time / Temp.: 11/3 1420
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:
Relinquished by / Co.:	Received by / Co.:	Date / Time / Temp.:

Were Samples Received in Good Condition? ❑ Yes ❑ No Samples on Ice? ❑ Yes ❑ No Method of Shipment: _____ Page 4 of 9

White: Sequoia Yellow: Sequoia Pink: Client

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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❑ 404 N. Wiget Lane • Walnut Creek, CA 94598 • (925) 988-9600 • FAX (925) 988-9673
❑ 1455 McDowell Blvd. North, Suite D • Petaluma, CA 94954 • (707) 792-1865 • FAX (707) 792-0342
❑ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell & Associates	Project: Slab Creek White water Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ❑ Yes ❑ No
Report To: Justin Klawiens E-Mail:	QC Data: ❑ Level D (Standard) ❑ Level C ❑ Level B ❑ Level A

Turnaround Time: ☑ 10 - 15 Working Days ❑ 7 Working Days ❑ 5 Working Days ❑ 3 Working Days ❑ 2 Working Days ❑ 1 Working Day ❑ 2 - 8 Hours

Mandatory: ❑ Drinking Water ❑ Waste Water ☑ Other River Water

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested	TSS	Turbidity	Comments
1. Slab 4	10/31/03 1430 ~~1400~~	H_2O	1	250 mL Plastic	41		✓	✓	
2. "	11/1/03 0930	"	"	"	42		✓		
3. "	10/31/03 0915	"	"	"	43		✓		
4. "	11/1/03 1430	"	"	"	44		✓		
5. "	10/31/03 1145	"	"	"	45		✓	✓	
6. "	10/30/03 1600	"	"	"	46		✓		
7. "	11/1/03 1200	"	"	"	47		✓		
8. "	10/30/03 0900	"	"	"	48		✓		
9. "	11/1/03 1200	"	"	"	49		✓		
10. ~~~~		"	"	"					

Pink - Client
Yellow - Sequoia
White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3	Time: 1400
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ❑ Yes ❑ No Samples on Ice? ❑ Yes ❑ No Method of Shipment _____ Page 5 of 9

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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☐ 404 N. Wiget Lane • Walnut Creek, CA 94598 • (925) 988-9600 • FAX (925) 988-9673
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☐ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ☐ Yes ☐ No
Report To: Justin Klaveris E-Mail: Justin.Klaveris@Devinetarbell.com	QC Data: ☐ Level D (Standard) ☐ Level C ☐ Level B ☐ Level A

Turnaround Time: ☑ 10 - 15 Working Days ☐ 3 Working Days ☐ 2 - 8 Hours ☐ 7 Working Days ☐ 2 Working Days ☐ 5 Working Days ☐ 1 Working Day

Mandatory: ☐ Drinking Water ☐ Waste Water ☑ Other Riverwater

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested: TSS	Turbidity	Comments
1. Slab 2	11/1/03 0900	H2O	1	250mL Plastic	50			
2.	11/1/03 1400				51			
3.	11/1/03 0700				52			
4.	11/2/03 1245				53			
5.	11/1/03 1130				54			
6.	11/2/03 1130				55			
7.	11/1/03 1600				56			
8.	11/1/03 800				57			
9.	11/1/03 1000				58			
10.	11/1/03 1030				59			

Pink - Client
Yellow - Sequoia
White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3	Time: 1420
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment _____

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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☐ 404 N. Wiget Lane • Walnut Creek, CA 94598 • (925) 988-9600 • FAX (925) 988-9673
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☐ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ☐ Yes ☐ No
Report To: Justin Klaveris E-Mail: Justin.Klaveris@Devinetarbell.com	QC Data: ☐ Level D (Standard) ☐ Level C ☐ Level B ☐ Level A

Turnaround Time: ☑ 10 - 15 Working Days ☐ 7 Working Days ☐ 5 Working Days ☐ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day ☐ 2 - 8 Hours

Mandatory: ☐ Drinking Water ☐ Waste Water ☑ Other River water

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested: TSS	Turbidity	Comments
1. Slab 2	11/2/03 0900	H_2O	1	250 mL Plastic	60			
2.	11/2/03 0830				61			
3.	11/2/03 0930				62			
4.	11/2/03 1030				63			
5.	11/1/03 0635				64			
6.	11/1/03 1100				65			
7.	11/1/03 0630				66			
8.	11/2/03 1100				67			
9.	11/1/03 1315				68			
10.	11/1/03 1230				69			

FINAL

Pink - Client
Yellow - Sequoia
White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 14:20	Received By:	Date: 11/3	Time: 1420
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment _____

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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☐ 404 N. Wiget Lane • Walnut Creek, CA 94598 • (925) 988-9600 • FAX (925) 988-9673
☐ 1455 McDowell Blvd. North, Suite D • Petaluma, CA 94954 • (707) 792-1865 • FAX (707) 792-0342
☐ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Whitewater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ☐ Yes ☐ No
Report To: Justin Klaveris E-Mail: Justin.Klaveris@Devinetarbell.com	QC Data: ☐ Level D (Standard) ☐ Level C ☐ Level B ☐ Level A

Turnaround Time: ☑ 10 - 15 Working Days ☐ 3 Working Days ☐ 2 - 8 Hours ☐ 7 Working Days ☐ 2 Working Days ☐ 5 Working Days ☐ 1 Working Day

Mandatory: ☐ Drinking Water ☐ Waste Water ☑ Other River water

Sampler:

Pink - Client

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested: TSS	Turbidity	Comments
1. Slab 2	11/2/03 0730	H_2O	1	250mL Plastic	70			
2.	11/2/03 1500				71			
3.	11/2/03 1200				72			
4.	11/2/03 1000				73			
5.	11/1/03 930				74			
6.	11/2/03 1330				75			
7.	11/2/03 0700				76			
8.	11/2/03 1600				77			
9.	11/1/03 1200				78			
10.	11/2/03 1445				79			

Yellow - Sequoia

White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3	Time: 1420
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment _____

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

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☐ 404 N. Wiget Lane • Walnut Creek, CA 94598 • (925) 988-9600 • FAX (925) 988-9673
☐ 1455 McDowell Blvd. North, Suite D • Petaluma, CA 94954 • (707) 792-1865 • FAX (707) 792-0342
☐ 1551 Industrial Road • San Carlos, CA 94070 • (650) 232-9600 • FAX (650) 232-9612

Company Name: Devine Tarbell + Associates	Project: Slab Creek Underwater Ecological studies
Mailing Address: 2710 Gateway Oaks Drive Suite 320 south	Billing Address (if different):
City: Sacramento State: CA Zip Code: ~~95814~~ 95833	
Telephone: 916 564-4214 Fax #: 916 564 4203	P.O. #: Payment Received: ☐ Yes ☐ No
Report To: Justin Klaverens E-Mail: Justin.Klaverens@Devinetarbell.com	QC Data: ☐ Level D (Standard) ☐ Level C ☐ Level B ☐ Level A

Turnaround Time: ☑ 10 - 15 Working Days ☐ 3 Working Days ☐ 2 - 8 Hours ☐ 7 Working Days ☐ 2 Working Days ☐ 5 Working Days ☐ 1 Working Day

Mandatory: ☐ Drinking Water ☐ Waste Water ☑ Other River Water

Sampler:

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	Analyses Requested: TSS	Turbidity	Comments
1. Slab 2	11/1/03 1445	H_2O	1	250mL Plastic	80		1	
2.	11/1/03 0730	1	1	1	81		1	
3.	11/2/03 0810	1	1	1	82		1	
4.								
5.								
6.								
7.								
8.								
9.								
10.								

Pink - Client
Yellow - Sequoia
White - Sequoia

Relinquished By:	Date: 11/3/03	Time: 1420	Received By:	Date: 11/3/03	Time: 1420
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Were Samples Received in Good Condition? ☐ Yes ☐ No Samples on Ice? ☐ Yes ☐ No Method of Shipment _____