Monitoring Program
2015 Final Annual Report
Sacramento Municipal Utility District

Hydro License Implementation • June 2016

Upper American River Project

FERC Project No. 2101

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1.0 Introduction

This Monitoring Program Annual Report (Report) is being submitted to the Federal Energy Regulatory Commission (Commission) by the Sacramento Municipal Utility District (SMUD), in accordance with State Water Resources Control Board (SWRCB) Condition 8 of the 401 Water Quality Certification and U.S. Forest Service (USFS) 4(e) Condition 31(hereafter Conditions), located in Appendices A and B, respectively, of the Commission's Order Issuing New License (License). SWRCB 401Condition 8 states:

The Licensee shall prepare an annual report that fully describes the monitoring efforts of the previous calendar year, including the data collected and analysis of that data. The report shall be filed with the Commission by June 30 of each year for the preceding year. USFS, CDFW, USFWS, and the State Water Board shall have at least 30 days to review and comment on the draft report prior to filing with the Commission. The Licensee shall provide copies of the final annual report to USFS, CDFW, USFWS, and the Deputy Director.

And, USFS 4(e) Condition 31 states:

The licensee shall file with FERC by June 30 of each year an annual report fully describing the monitoring efforts of the previous calendar year. FS, CDFG, FWS, and SWRCB shall have at least 30 days to review and comment on the draft report prior to filing with FERC. The licensee shall provide copies of the annual report to FS, CDFG, FWS, and SWRCB.

Additionally, SWRCB Condition 10 requires SMUD to include a summary of the efforts made to pass large woody debris at several Project reservoirs in the Annual Monitoring Report.

SWRCB 401Condition 10 states:

The Licensee shall ensure that mobile instream large woody debris continues downstream beyond Robbs Peak Reservoir Dam, Junction Reservoir Dam, Camino Reservoir Dam, and Slab Creek Reservoir Dam. This requirement will not be in effect when access and working conditions are dangerous or unsafe. At a minimum, all sizes greater than both 20 centimeters wide and 12 meters in length shall be allowed to continue downstream beyond Robbs Peak Reservoir Dam, Junction Reservoir Dam, Camino Reservoir Dam, and Slab Creek Reservoir Dam. Smaller sizes are also allowed but are not required to be moved beyond these dams. To demonstrate compliance with this condition, the Licensee shall include in the annual monitoring report that is required in Condition 8 (Monitoring Program) a summary of the efforts made during the year to pass large woody debris below the dams.

Furthermore, Article 401(b) of the License requires SMUD to file the Annual Report with the Commission, along with any comments received by the Agencies during the review period, by June 30th of each year.

Finally, the preface to the Conditions states that:

For purposes of the ecological resources adaptive management program, each year is defined on a calendar year basis (i.e., January through December). This Monitoring Program covers monitoring to be conducted during all years until a new license is issued. Where years are specified, Year 1 is the first year during which all initial minimum streamflows required by the license are implemented by May 1.

All minimum streamflows required by the License were implemented in October 2014; therefore Year 1 as it pertains to the Monitoring Program was 2015. As such, only a few Plans required under the Conditions were approved and implemented in 2015. Of those, several were assigned specific reporting requirements and deadlines in lieu of this Report in the Commission's Order approving the Plan. These are noted in the summary presented in Section 2.0. For background, the 2015 water year type was classified as Critically Dry.

2.0 Monitoring Program Conditions

The following is a summary of the status of SMUD's resource Monitoring Program as described in the USFS 4(e) Condition 31 which also encompasses all those measures listed in SWRCB's 401 Condition 8.

2.1 Fish Populations

This Plan is still in development and is required to be filed with the Commission by November 23, 2016. However, the hardhead monitoring component is required to be implemented prior to this date (August – September 2016); as such a separate Plan has been developed for this resource and will be filed with the Commission following final agency approval . The first monitoring effort for the trout component of the Plan is not required until 2019.

2.2 Aquatic Macroinvertebrates

This Plan is still in development and is required to be filed with the Commission by November 23, 2016. The first monitoring effort is not required until 2019.

2.3 Amphibian and Aquatic Reptile Monitoring Plan

This Plan was approved by the Commission on May 19, 2016. Monitoring activities initiated in 2016. Results will be included in the 2016 Annual Report due to the Commission by June 30, 2017.

2.4 Mountain Yellow-legged Frog

This Plan is still in development and is required to be filed with the Commission by November 23, 2016. The first monitoring effort is not required until 2019.

2.5 Amphibians (Foothill Yellow-Legged Frog Flow Fluctuations)

This plan is incorporated in the Amphibian and Aquatic Reptile Monitoring Plan mentioned in Section 2.3.

2.6 Riparian Vegetation Monitoring

2.7 This Plan is still in development and is required to be filed with the Commission by November 23, 2016. The first monitoring effort is not required until 2019.

2.8 Algae Species Identification and Monitoring

Plan was approved by the Commission on December 18, 2015 and is scheduled for implementation in 2016. Results will be included in the 2016 Annual Report due to the Commission by June 30, 2017.

2.9 Geomorphology (Sensitive Site Investigation and Mitigation Plan Development)

This Plan was approved by the Commission on June 18, 2015 and implementation is ongoing. The Final Report is due to the Commission by October 1, 2016. Activities implemented in 2015 under the approved Plan included:

- Collected water-surface elevation hydrographs during snowmelt runoff.
- Conducted pre-test pulse flow release geomorphic and riparian vegetation monitoring at the sensitive sites, and erosion monitoring at the infrastructure evaluation sites with the objective of establishing baseline conditions.
- The development of a numerical hydraulic model to inform the maximum test pulse release volumes not expected to cause unintended impacts downstream.

2.10 Geomorphology (Continuing Evaluation of Representative Channel Areas)

This Plan is still in development and is required to be filed with the Commission by November 23, 2016. The first monitoring effort is not required until 2019.

2.11 Water Temperature

Plan was approved by the Commission on September 30, 2015 and monitoring was initiated in 2016. Results will be included in the 2016 Annual Report due to the Commission by June 30, 2017.

2.12 Water Quality

Plan was approved by the Commission on July 9, 2015. Monitoring for in-situ and bacterial elements was conducted in 2015 using the methods and protocols described in the approved Plan. A Report containing the data and analysis of that monitoring effort is attached in Appendix A.

2.13 Recreation Survey

Monitoring associated with the recreation survey is described in USFS 4(e) Condition No. 42. Survey planning and preparation is scheduled for 2019, monitoring in 2020. Results will be included in the 2020 Annual Report due to the Commission by June 30, 2021.

2.14 Robbs Peak Powerhouse Entrainment

This plan was approved on July 30, 2015 and monitoring is ongoing. The Final Report is due to the Commission by May 15, 2017. Activities implemented in 2015 under the approved Plan included:

- Fish capture and marking of trout (PIT tags) in the South Fork Rubicon River upstream of Robbs Peak Forebay.
- Installation of PIT tag antennas arrays for entrainment monitoring.
- Development of estimate of abundance from initial fish capture effort described above.

2.15 Bear Management

This Plan was filed with the Commission on May 21, 2015 and monitoring was initiated in 2016. Results will be included in the 2016 Annual Report due to the Commission by June 30, 2017.

2.16 Bald Eagle Monitoring

This Plan was approved by the Commission on July 2, 2015 and monitoring is ongoing for the 2016 breeding season. Results will be included in the 2016 Annual Report due to the Commission by June 30, 2017.

2.17 Heritage Resource Monitoring

Monitoring and reporting associated with heritage resources is described in the Historic Properties Management Plan (HPMP). Monitoring associated with the HPMP was conducted in 2015 and will be included in a report(s) to be filed with the Commission upon completion and review by appropriate Parties. Activities implemented in 2015 under the approved Plan included:

- SMUD worked with an archeological contractor to develop a workplan to implement the HPMP.
- In consultation with the ENF and tribes, the workplan was approved.

- SMUD decided to evaluate as many sites as possible to reduce future monitoring obligations.
- 81 sites were monitored or evaluated in 2015.
- 5 separate reports are being prepared to document the results based on where the sites are located and whether they were monitored or evaluated.
- Draft reports will be circulated to appropriate Parties.

2.18 Reservoir Levels Evaluation

Monitoring associated with lake levels is described in USFS 4(e) Condition No. 49, and SWRCB 401 Condition 5. Five year results will be included in the 2018 Annual Report due to the Commission by June 30, 2019.

2.19 Review of Recreation Developments

Monitoring associated with the review of recreation developments is described in USFS Condition No. 44. Survey planning and preparation is scheduled for 2019, monitoring in 2020. Results will be included in the 2020 Annual Report due to the Commission by June 30, 2021.

2.20 Large Woody Debris

No large woody debris meeting the specifications described in SWRCB Condition 10 were observed in 2015. However, in anticipation of a spill event in February 2015, the log booms were removed at Slab Creek Reservoir, allowing for the passage of any woody debris accumulated on the reservoir. The log booms were restored shortly thereafter.

3.0 Frequency

The Monitoring Program covers monitoring to be conducted during all years until a new license is issued. Table 1 describes the monitoring frequencies for the first five years of the License. As noted, some monitoring activities have specific reporting requirements and deadlines in lieu of this Report.

Table 1. Monitoring Program Frequency First Five Years.

	2015	**2016**	**2017**	**2018**	**2019**
License Monitoring Year	1	2	3	4	5
Trout Population Monitoring					X
Hardhead Population Monitoring		X	X		X

Benthic Macroinvertebrate					X
Amphibian and Aquatic Reptile Monitoring		X	X	X	X
Mountain Yellow-legged Frog Monitoring					X
Riparian Vegetation Monitoring					X
Algae Species Identification and Monitoring		X			
Geomorphology (Sensitive Site Investigation and Mitigation Plan Development)	X	X			
Geomorphology (Continuing Evaluation of Representative Channel Areas)					X
Water Temperature		X	X	X	X
In Situ Water Quality	X	X	X	X	X
Bacteria Monitoring	X	X	X	X	X
Metals bioaccumulation		X			
Water General Chemistry		X	X		
Recreation Survey					X
Robbs Peak Powerhouse Entrainment	X	X	X		
Bear Management Monitoring		X	X	X	X
Bald Eagle Monitoring		X	X	X	X
Heritage Resource Monitoring	X	X			X
Reservoir Levels Evaluation					X
Review of Recreation Developments					X

APPENDIX 1

2015 Water Quality Monitoring Report

Water Quality Monitoring Report

Sacramento Municipal Utility District

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Acronyms and Abbreviations

Acronym	Definition
CDFW	California Department of Fish and Wildlife
cm	centimeter
ºC	degrees Celsius
FERC	Federal Energy Regulatory Commission
m	meter
MDL	Method Detection Limit
mg/L	milligram per liter
MPN	Most Probable Number
MRL	Method Reporting Limit
NTU	Nephelometric Turbidity Unit
SFAR	South Fork American River
SMUD	Sacramento Municipal Utility District
s.u.	standard unit of pH
SWRCB	State Water Resources Control Board
UARP	Upper American River Project
uS	microsiemens = 10^{-6} siemens, a unit of electrical conductance
USFS	U.S. Forest Service

1.0 INTRODUCTION AND BACKGROUND

This Water Quality Monitoring Report addresses monitoring set forth in Condition 8.J of Appendix A of the Order Issuing New License issued by the Federal Energy Regulatory Commission (FERC) on July 23, 2014 (FERC 2014) for the Upper American River Project (UARP; FERC Project 2101), owned and operated by the Sacramento Municipal Utility District (SMUD). Appendix A of the License contains the State Water Resources Control Board (SWRCB) Water Quality Certification, which was informed by the Relicensing Settlement Agreement article 1-5.10.

The UARP lies within El Dorado and Sacramento counties, primarily within lands of the Eldorado National Forest. The UARP consists of three major storage reservoirs—Loon Lake, Union Valley, and Ice House (with a combined capacity of approximately 379,000 acre-feet), eight smaller regulating or diversion reservoirs, and eight powerhouses. The UARP has an authorized installed capacity of 637.3 megawatts (MW). The UARP also includes recreation facilities containing over 700 campsites, five boat ramps, hiking paths, and bicycle trails at the reservoirs.

Condition 8.J of Appendix A of the FERC license requires monitoring throughout the duration of the license term, with sampling frequency varying by water quality constituent. However, as described in Condition 8.J, the water quality monitoring plan may be modified pursuant to adaptive management program needs following review of results. Nevertheless, the sampling frequency over the first five years of the monitoring program is dictated by Condition 8.J and will, at a minimum, include annual sampling for *in situ* parameters and bacteria, and sampling for metals bioaccumulation and general chemistry in Years 2 and 3, respectively.

This report describes the results of the first year (2015) of water quality monitoring of basic *in situ* parameters and bacteria for the UARP. Results for the one-time sampling of general chemistry and metals bioaccumulation will be reported separately.

At the completion of the first five years of monitoring, SMUD will consult with the State Water Resources Control Board (SWRCB), Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), U.S. Forest Service (USFS), and U.S. Bureau of Land Management (BLM) to determine if the results warrant modifying the water quality monitoring plan.

2.0 MONITORING OBJECTIVE

The objective of the 2015 monitoring program was to perform *in situ* water quality and bacteria monitoring in various reservoirs and stream reaches of the UARP, in order to

meet the objectives and rationale of the SWRCB Water Quality Certification Condition 8.J.

The rationale for water quality monitoring, as described by the SWRCB Water Quality Certification, is as follows:

Water quality monitoring is important for determining compliance with state and federal water quality standards and examining long-term trends in water quality. The frequency of monitoring for any compound can be reduced if shown to be at background or non-detect levels for a statistically significant period of time.

3.0 STUDY AREA

The study area included project reservoirs and diverted stream reaches. All UARP reservoirs (Rubicon, Buck Island, Loon Lake, Gerle Creek, Ice House, Union Valley, Junction, Camino, Brush Creek, and Slab Creek) were included in the monitoring program except for the relatively small Robbs Peak Reservoir (30 acre-feet). [Note: Rockbound Lake, although associated with the UARP, is not included as a Project feature or within the FERC-defined UARP boundary.] The diverted stream reaches included in the monitoring program represented all streams and rivers downstream of project reservoirs (Figure 3-1).

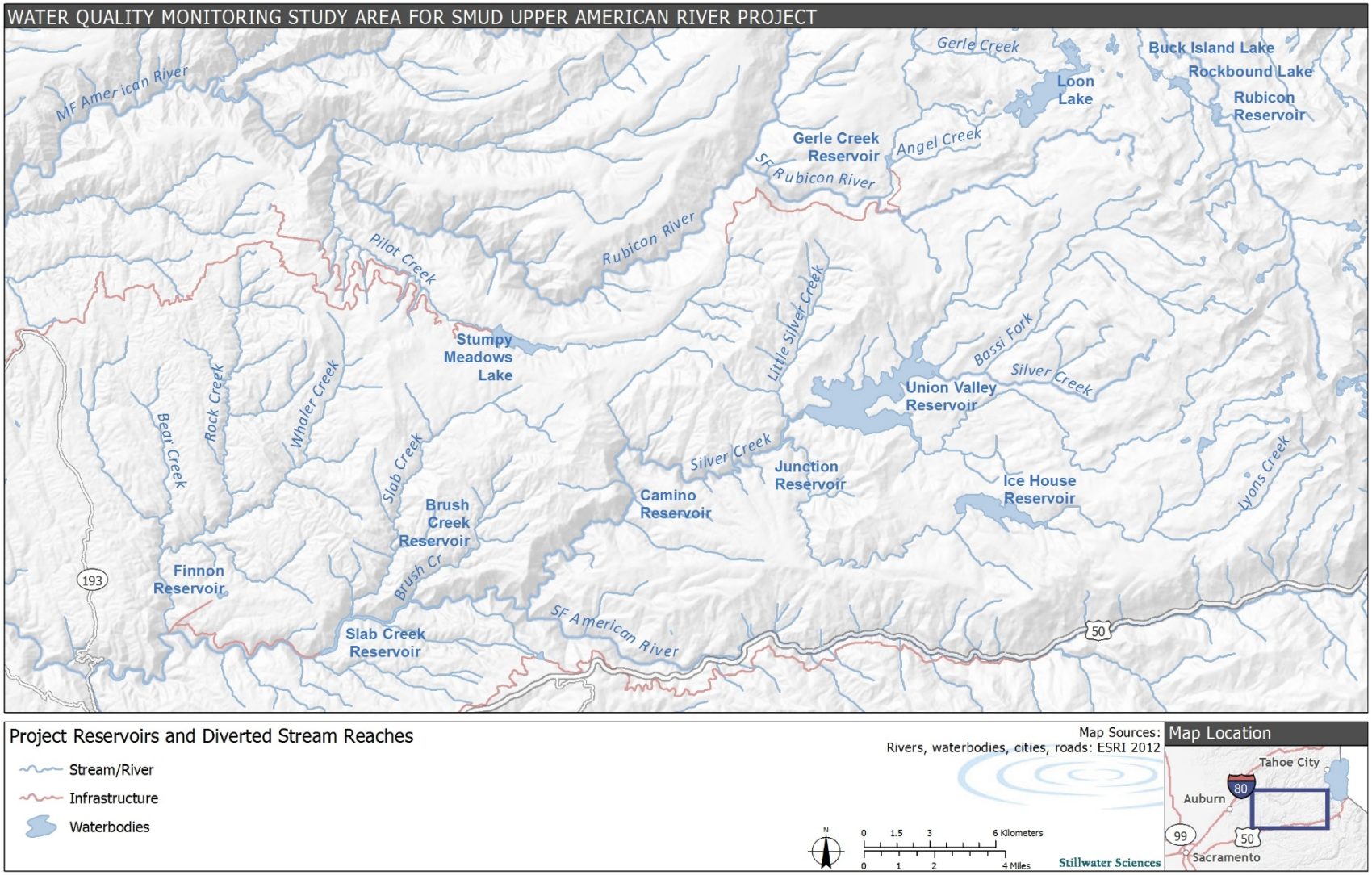

Figure 3-1. Study area for SMUD Upper American River Project in situ and bacteria monitoring.

4.0 SAMPLING FREQUENCY AND LOCATIONS

Year 1 (2015) sampling frequency for *in situ* water quality was consistent with summer and fall monitoring periods designated in the Water Quality Monitoring Plan (SMUD 2015) (Table 4-1). Since the Water Quality Monitoring Plan was not approved until mid-2015, *in situ* winter and spring monitoring at all sites and Independence Day bacteria monitoring at UARP middle elevation sites were not conducted in 2015. Consistent with the SWRCB letter of July 15, 2015 (Appendix F), the full annual complement of required bacteria monitoring was conducted by sampling all UARP bacteria sites during the 30-day period surrounding Labor Day.

Table 4-1. Sampling Frequency for *In situ* Water Quality and Bacteria.

Type	2015 (Year 1) Frequency
In situ reservoir	Once in fall – October or November
In situ riverine	Once in summer – August Once in fall – November
Bacteria	5 samples within 30 days – around Labor Day

Specific sampling locations within reservoirs and diverted stream reaches varied depending on the general constituent under study. As specified in the Water Quality Monitoring Plan (SMUD 2015), *in situ* monitoring occurred at 15 representative reservoir locations (Figures 4-1 and 4-2, Table 4-2) and 19 representative stream reaches (Figures 4-1 and 4-2, Table 4-3), and bacteria sampling occurred at 15 locations (Figures 4-1 and 4-2, Table 4-4).

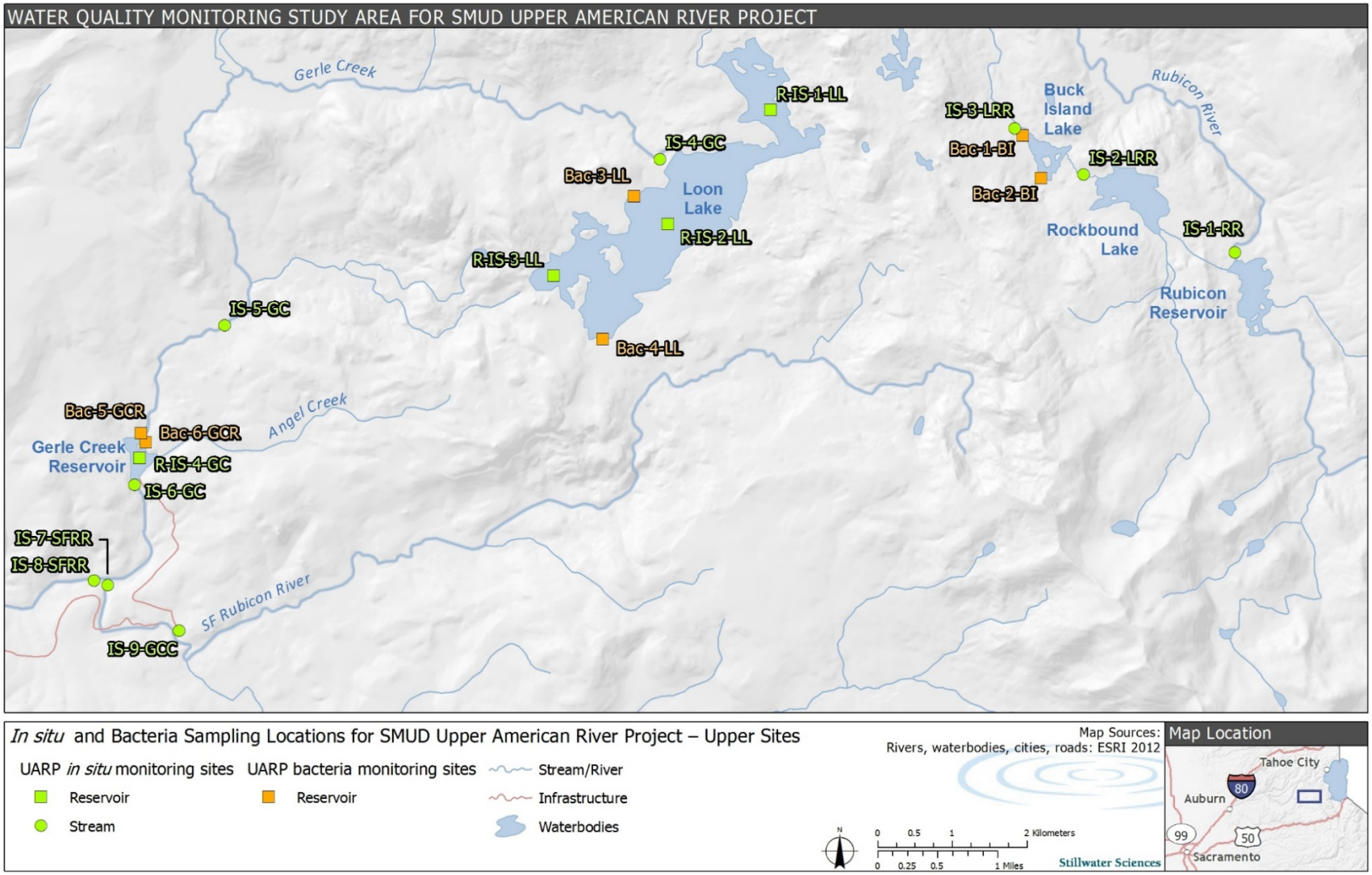

Figure 4-1. *In situ* and bacteria sampling locations for SMUD Upper American River Project – upper sites.

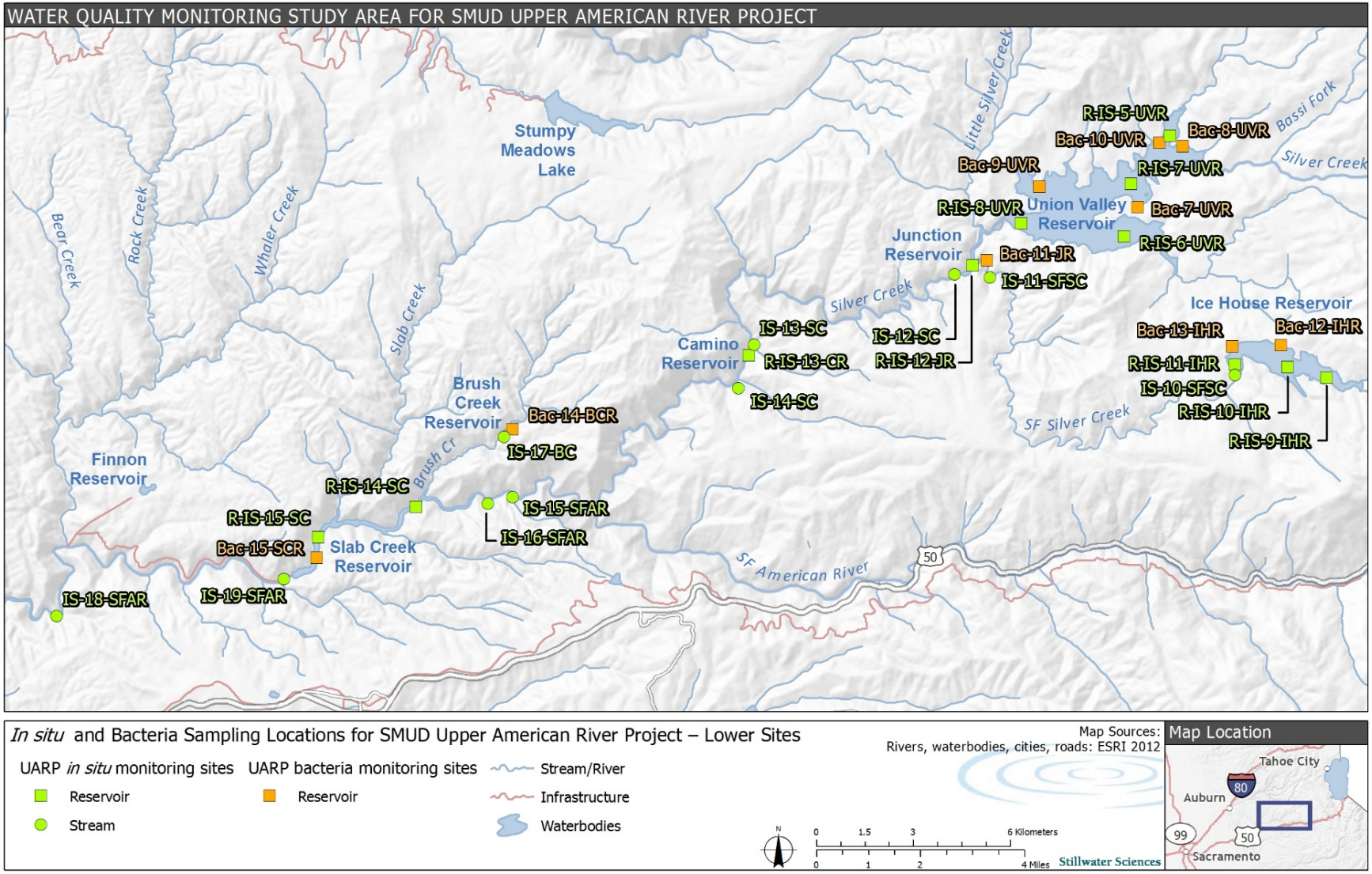

Figure 4-2. *In situ* and bacteria sampling locations for SMUD Upper American River Project – lower sites.

Table 4-2. *In situ* Sampling Locations and Dates for SMUD Upper American River Project Reservoir Sites.

SMUD Site Name	Site ID	Location	2015 Sample Date
R-4C	R-IS-1-LL	Loon Lake, upper reservoir (northeast body)	10/22
R-4B	R-IS-2-LL	Loon Lake, mid-reservoir (west body)[1]	10/22
R-4A	R-IS-3-LL	Loon Lake, near dam	10/19
R-5	R-IS-4-GC	Gerle Creek Reservoir, mid-lake	10/20
R-6C	R-IS-5-UVR	Union Valley Reservoir, Robbs PH tailrace zone	10/23
R-6D	R-IS-6-UVR	Union Valley Reservoir, Jones Fork Silver Creek arm	10/23
R-6B	R-IS-7-UVR	Union Valley Reservoir, mid-reservoir	10/23
R-6A	R-IS-8-UVR	Union Valley Reservoir, near dam	10/23
R-7C	R-IS-9-IHR	Ice House Reservoir, upper lake body	10/20
R-7B	R-IS-10-IHR	Ice House Reservoir, mid-reservoir	10/20
R-7A	R-IS-11-IHR	Ice House Reservoir, near dam	10/22
R-8	R-IS-12-JR	Junction Reservoir, mid-reservoir between arms	10/22
R-9	R-IS-13-CR	Camino Reservoir, mid-reservoir	11/9
R-11B	R-IS-14-SC	Slab Creek Reservoir, upper-reservoir	11/9
R-11A	R-IS-15-SC	Slab Creek Reservoir, mid-reservoir	11/9

[1] 2015 sample location was closer to shore than originally specified due to weather conditions (e.g., wind, waves).

Table 4-3. *In situ* Sampling Locations and Dates for SMUD Upper American River Project Riverine Sites.

SMUD Site Name	Site ID	Location	2015 Sample Dates
2	IS-1-RR	Rubicon River outflow from Rubicon Reservoir	8/24, 11/5
5	IS-2-LRR	Little Rubicon River outflow from Rockbound Lake	8/24, 11/5
6	IS-3-LRR	Little Rubicon outflow from Buck Island Lake	8/24, 11/5
7	IS-4-GC	Gerle Creek outflow from Loon Lake	8/25, 11/4
14	IS-5-GC	Gerle Creek inflow to Gerle Creek Reservoir	8/25, 11/4
15	IS-6-GC	Gerle Creek outflow from Gerle Creek Reservoir	8/25, 11/4
18	IS-7-SFRR	S.F. Rubicon upstream of Gerle Creek confluence[1]	8/25, 11/4
19	IS-8-SFRR	S.F. Rubicon downstream of Gerle Creek confluence	8/25,11/4
16	IS-9-GCC	Gerle Creek Canal inflow to Robbs Forebay	8/25, 11/4
25	IS-10-SFSC	S.F. Silver Creek outflow from Ice House	8/25, 11/2
27	IS-11-SFSC	S.F. Silver Creek inflow to Junction Reservoir	8/26, 11/2
29	IS-12-SC	Silver Creek outflow from Junction Reservoir	8/26, 11/2
32	IS-13-SC	Silver Creek inflow to Camino Reservoir	8/26, 11/2
34	IS-14-SC	Silver Creek outflow from Camino Reservoir	8/26, 11/2
38	IS-15-SFAR	SFAR upstream of Camino Powerhouse	8/26, 11/2
41	IS-16-SFAR	SFAR downstream of Camino Powerhouse	8/27, 11/3
40	IS-17-BC	Brush Creek outflow from Brush Creek Reservoir	8/27, 11/3
60	IS-18-SFAR	SFAR upstream of White Rock Powerhouse	8/27, 11/3
43	IS-19-SFAR	SFAR downstream of Slab Creek Reservoir	8/27, 11/3

[1] This site was missed during the August and November 2015 sampling events.

Table 4-4. Bacteria Sampling Locations and Dates for SMUD Upper American River Project Riverine Sites.

Reservoir	SMUD Site Name	Site ID	Location	2015 Sample Dates
Buck Island Reservoir (beach locations)	R-3B	Bac-1-BI	On Northshore, near dam and OHV camping	9/2, 9/10, 9/17, 9/22, 9/30
	77	Bac-2-BI	On south shore, near Rubicon Hiking Trail	9/2, 9/10, 9/17, 9/22, 9/30
Loon Lake Reservoir (beach locations)	64	Bac-3-LL	West of main dam, near Red Fir Campground	9/2, 9/8, 9/14, 9/21, 9/29
	65	Bac-4-LL	West of Loon Lake Campground, near boat launch	9/2, 9/8, 9/14, 9/21, 9/29
Gerle Creek Reservoir (beach locations)	66	Bac-5-GCR	Near Gerle Creek Campground	9/2, 9/8, 9/14, 9/21, 9/29
	67	Bac-6-GCR	Near Angel Creek picnic area	9/2, 9/8, 9/14, 9/21, 9/29
Union Valley Reservoir (swim areas)	R-6H	Bac-7-UVR	At Fashoda Beach	9/2, 9/8, 9/14, 9/21, 9/29
	R-6E	Bac-8-UVR	Near Wench Creek Campground	9/2, 9/8, 9/14, 9/21, 9/30
	FC-2	Bac-9-UVR	Near Camino Cove Campground	9/2, 9/8, 9/16, 9/22, 9/30
	R-6F	Bac-10-UVR	Near Yellowjacket Campground	9/2, 9/8, 9/14, 9/21, 9/29
Other UARP Locations	R-8B	Bac-11-JR	Junction Reservoir, near boat launch	9/2, 9/8, 9/16, 9/22, 9/30
Ice House Reservoir (beach locations)	68	Bac-12-IHR	Northshore near private campground access	9/2, 9/10, 9/16, 9/22, 9/30
	69	Bac-13-IHR	East of boat launch and picnic area	9/2, 9/10, 9/16, 9/22, 9/30
Other UARP locations	R-10B	Bac-14-BCR	Brush Creek Reservoir, near boat launch	9/3, 9/10, 9/16, 9/23, 9/29
	R-11C	Bac-15-SCR	Slab Creek Reservoir, near boat launch	9/2, 9/10, 9/16, 9/23, 10/1

5.0 METHODS

5.1 *IN SITU* PARAMETERS

Reservoir *in situ* monitoring was conducted by watercraft to access mid-reservoir areas (Figure 5-1). A multi-probe Sonde (Yellow Stone Instruments [YSI] 6920) was deployed from the boat for measurement of *in situ* parameters, including water temperature, conductivity, dissolved oxygen, pH, and turbidity (Table 5-1).

Figure 5-1. *In situ* sampling site at Camino Reservoir, mid-reservoir (R-IS-13-CR).

At each reservoir site, a vertical water column profile was collected for all *in situ* parameters, at one-meter depth intervals. For bottom water samples, the Sonde was drawn back 0.5 meter (m) from the sediment layer before taking a reading. Prior to taking each reading, the Sonde was allowed to stabilize (typically requiring no more than 90 seconds). Water transparency was measured at reservoir stations with a standard Secchi disk.

At riverine sites, Sonde readings were obtained where sufficient stream turbulence provided good lateral and vertical mixing of the water, and as near as possible to the stream thalweg (Figure 5-2). Prior to taking each reading, the Sonde was allowed to stabilize (typically requiring no more than 90 seconds) such that there was no variability in parameter readings at each location.

Figure 5-2. *In situ* sampling site at Silver Creek outflow from Junction Reservoir (IS-12-SC).

For both reservoir and riverine *in situ* monitoring, Sonde calibration was conducted on-site prior to the start of each sampling day using standard solutions and recorded on calibration logs (Appendix E). Other data gathered at each monitoring station included date, time, site name, sampling location, collector's name, weather conditions, and any other pertinent observations related to the monitoring station. Following each field effort, data was added to a database template provided by SMUD, for eventual transfer into SMUD's master database.

All sampling was conducted in compliance with the final, approved Water Quality Monitoring Plan (SMUD 2015).

Table 5-1. *In situ* Water Quality Methods.

Parameter	Method	Units	MDL
Water temperature (YSI 6560 Sensor)	EPA 170.1	degrees Celsius (ºC)	0.1
Conductivity (YSI 6560 Sensor)	SM 2510-B	microsiemens per centimeter (uS/cm)	1.0
DO (YSI 6562 Rapid Pulse Sensor)	SM 4500-O(G)	milligrams per liter (mg/L)	0.1
pH (YSI 6565 Sensor)	SM 4500-H	standard unit of pH (s.u.)	0.1
Turbidity (YSI 6136 Sensor)	SM 2130B	Nephelometric Turbidity Unit (NTU)	0.1
Secchi depth (Secchi disk)	USGS	Meter (m)	0.1

EPA = Environmental Protection Agency
MDL = method detection limit
SM = Standard Methods

5.2 BACTERIA

Bacteria grab samples were collected near reservoir and river shorelines in shallow water, and in particular at swim areas/beach locations as designated in Table 4-4. Samples were collected in sterilized bottles supplied by the analytical laboratory. Field sampling personnel filled each sample bottle by direct immersion in the reservoir or stream. Immediately after collection, samples were placed on ice for transport to the analytical laboratory within the required field hold time (Table 5-2).

Figure 5-3. Bacteria Sampling Site at Camino Cove Campground (Bac-9-UVR).

Table 5-2. Bacteria analytical methods and field hold times.

Analyte	Method	Units	MDL	Hold time
Escherichia coli	SM9223B (Quantitray)	MPN/100 mL	1.8	8 hr
Fecal coliforms	SM9221E(MPN 15 or 25)	MPN/100 mL	1.8	8 hr

hr = hour
MDL = method detection limit
mL = milliliter
MPN = most probable number

Field-based quality assurance and quality control (QA/QC) for bacterial samples was assured by accurate and thoroughly completed sample labels, field sheets, chain of custody and sample log forms. Sample labels included sample identification code, date, time, preservative, client name, collector's name, reservoir/river name, sampling location, and analysis/sample type. All sample labels were cross-checked by a second field technician before delivering samples to the analytical laboratory.

6.0 RESULTS

6.1 *IN SITU* PARAMETERS

6.1.1. Riverine Sites

In situ water quality data for UARP riverine sites are summarized in Table 6-1. Water temperatures ranged from 7.3 to 22.2 degrees Celsius (°C) during the August 2015 sampling event and were variable by site. Water temperatures were generally lower during the November 2015 event, ranging from 3.5 to 12.4°C and were also variable by site. pH at riverine sites ranged from 6.2 to 7.8 standard unit of pH (s.u.) during the August 2015 sampling event, with three exceedances of the Basin Plan instantaneous minimum water quality objective (6.5 s.u.) and no exceedances of the instantaneous maximum (8.5 s.u.). Measured pH below the Basin Plan instantaneous minimum occurred at sites IS-1-RR (6.2 s.u.), IS-3-LRR (6.3 s.u.), and IS-10-SFSC (6.4 s.u.) (Table 6-1), which may be due to low buffering capacity characteristic of headwater reaches in granitic watersheds. Riverine pH ranged from 6.6 to 7.8 during the November 2015 event with no exceedances of the Basin Plan water quality objectives for pH.

During the August sampling event, riverine dissolved oxygen ranged from 7.0 to 10.3 milligram per liter (mg/L) (74 to 106% saturation), with no measurements falling below Basin Plan instantaneous minimum concentrations of 7.0 mg/L for cold freshwater habitat (COLD) and spawning (SPAWN) designated beneficial uses. Dissolved oxygen was similar during the November event, ranging from 7.4 to 10.4 mg/L (66 to 93% saturation) across all riverine sites, which is well above the minimum Basin Plan objectives.

Typical of granitic watersheds, conductivity at the riverine sites was low, ranging from 0 to 61 microsiemens per centimeter (uS/cm) during the August sampling event and from 5 to 57 uS/cm during the November event. August turbidity measurements were also low, ranging from 0.4 to 6.0 Nephelometric Turbidity Unit (NTU) with no particular spatial pattern. Background turbidity typically increases with increasing runoff, and this parameter was generally higher during the November sampling (1.2 to 295 NTU), which occurred 1-2 days following a storm event. November turbidity also tended to increase with distance downstream, with relatively higher turbidity occurring at the lower elevation sites (IS-13-SC, IS-15-SFAR, IS-16-SFAR) and the highest turbidity occurring at Brush Creek outflow from Brush Creek Reservoir (IS-17-BC). Overall, measured November riverine turbidity levels would not be expected to cause nuisance or adversely affect beneficial uses.

6.1.1. Reservoir Sites

In situ water quality data for UARP reservoir sites are presented in Figures 6-1 through 6-8 and Appendix A.

Loon Lake and Gerle Creek Reservoir water columns were well-mixed, exhibiting little variation with depth for water temperature (13 to 14°C), dissolved oxygen (7.5 to 8.5 mg/L), pH (6.3 to 7.8 s.u.), and turbidity (< 1 NTU). With the exception of pH values between 6.3 and 6.5 s.u. in the bottom waters of Loon Lake (Figure 6-1), there were no exceedances of Basin Plan water quality objectives. Shallow sites in the relatively larger and deeper Union Valley and Ice House reservoirs (R-IS-5-UVR, R-IS-10-IHR) were also well-mixed, exhibiting similar water temperature (15 to17°C), dissolved oxygen (7.5 to 8.5 mg/L), pH (5.6 to 7.8 s.u.), and turbidity (< 1 NTU) as those of Loon Lake and Gerleºreek reservoirs, with the exception of slightly higher turbidity (2.2 NTU) near the bottom of Site R-IS-10-IHR. Deeper sites in Union Valley and Ice House reservoirs were stratified, with the thermocline between 13 and 20 m depth and dissolved oxygen decreasing into the hypolimnion. Dissolved oxygen in Union Valley Reservoir remained above 4 mg/L, while in Ice House Reservoir dissolved oxygen dropped to near zero near the bottom of Site R-IS-9-IHR (Figure 6-5). pH generally decreased slightly with depth in both reservoirs, with no exceedances of the Basin Plan instantaneous maximum pH objective (8.5 s.u.) and only occasional values below the instantaneous minimum (6.5 s.u.) in reservoir bottom waters.

Junction Reservoir appeared to be weakly stratified with surface water temperatures at 9 to 10°C and bottom water temperatures at approximately 8°C. Dissolved oxygen and pH decreased with depth in Junction Reservoir from 8.9 mg/L at the surface to 6.4 mg/L in bottom waters, and 7.1 s.u. at the surface to 5.9 s.u. in bottom waters. Turbidity remained low and relatively consistent (≤1.0 NTU) throughout the water column in Junction Reservoir (Figure 6-7).

Slab Creek Reservoir and Camino Reservoir water columns were well-mixed, exhibiting little variation with depth for water temperature (7.1 to 11.4°C), dissolved oxygen (8.2 to 11.5 mg/L), and pH (6.0 to 7.6 s.u.) (Figures 6-7 and 6-8). With the exception of pH values between 6.0 and 6.5 in the bottom waters of Camino Reservoir, there were no exceedances of Basin Plan water quality objectives. Turbidity in Camino and Slab Creek reservoirs was slightly higher than that of other study reservoirs and variable with depth. In Camino Reservoir, turbidity ranged 3.0 to 6.0 NTU, with decreasing levels from 0 to 4 m depth and increasing levels below 4 m (Figure 6-7). The relatively higher turbidity at the surface of Camino Reservoir corresponded to higher riverine turbidity at Site IS-13-SC (71.5 NTU), just upstream of the reservoir. In Slab Creek Reservoir, turbidity increased with depth from 2.5 NTU at the surface to 6.9 NTU at 10 m, then decreased slightly to 5-6 NTU in deeper waters (Figure 6-8). The relatively higher turbidity in Slab Creek Reservoir corresponded to higher riverine turbidity at Site IS-17-BC (295.4 NTU) and Site IS-16-SFAR (35.3 NTU), located upstream of the reservoir. Both Camino and

Slab Creek reservoirs and the aforementioned riverine sites are downstream of the King Fire area, which burned over 97,000 acres of land in El Dorado County, California, in mid-September to mid-October 2014.

Table 6-1. *In situ* water quality for UARP Riverine Sites.

Site ID	2015 Sample Date	Water Temperature (°C)	pH (s.u.)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	Turbidity (NTU)
August 2015							
IS-1-RR	8/24	19.6	6.2	7.5	82	0	1.1
IS-2-LRR	8/24	22.0	6.5	7.0	80	15	0.5
IS-3-LRR	8/24	21.3	6.3	7.3	83	11	0.4
IS-4-GC	8/25	12.8	7.1	8.6	82	10	0.9
IS-5-GC	8/25	15.2	6.8	8.9	89	13	0.7
IS-6-GC	8/25	17.6	7.0	7.8	82	15	0.7
IS-9-GCC	8/25	21.0	7.3	8.2	92	17	0.5
IS-8-SFRR	8/25	17.7	6.9	8.5	89	16	0.4
IS-10-SFSC	8/25	7.3	6.4	8.9	74	8	6.0
IS-11-SFSC	8/26	14.9	7.7	9.1	90	13	1.0
IS-12-SC	8/26	9.5	6.8	10.0	88	10	0.6
IS-13-SC	8/26	17.5	7.0	9.1	95	16	1.9
IS-14-SC	8/26	12.3	6.7	10.3	96	11	0.8
IS-15-SFAR	8/26	22.2	7.8	9.2	106	61	1.3
IS-16-SFAR	8/27	21.6	7.6	8.9	101	29	1.1
IS-17-BC	8/27	11.4	6.7	10.3	94	24	3.0
IS-18-SFAR	8/27	19.0	7.1	9.8	106	22	1.2
IS-19-SFAR	8/27	13.7	7.4	10.3	99	17	2.1
November 2015							
IS-1-RR	11/5	3.5	7.8	10.1	76	5	2.3
IS-2-LRR	11/5	6.1	7.8	10.0	81	5	1.2
IS-3-LRR	11/5	8.9	7.4	9.6	83	6	1.4
IS-4-GC	11/4	10.5	7.4	8.9	80	6	1.5
IS-5-GC	11/4	3.8	7.2	9.7	74	10	1.6
IS-6-GC	11/4	7.8	7.3	9.3	78	12	1.9
IS-9-GCC	11/4	10.1	7.8	7.4	66	30	1.5
IS-8-SFRR	11/4	5.8	7.0	10.2	81	12	1.7
IS-10-SFSC	11/4	7.4	6.6	8.9	74	10	3.4
IS-11-SFSC	11/2	7.8	7.1	9.7	82	12	2.5
IS-12-SC	11/2	7.3	7.0	9.5	79	12	1.7
IS-13-SC	11/2	9.3	6.9	10.0	87	18	71.5

Site ID	2015 Sample Date	Water Temperature (ºC)	pH (s.u.)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	Turbidity (NTU)
IS-14-SC	11/2	8.7	6.9	10.0	86	10	3.3
IS-15-SFAR	11/2	11.1	7.0	9.9	90	57	12.6
IS-16-SFAR	11/3	9.1	7.3	10.4	90	55	35.3
IS-17-BC	11/3	12.4	7.7	9.5	89	38	295.4
IS-18-SFAR	11/3	11.9	7.3	10.0	93	35	9.5
IS-19-SFAR	11/3	11.4	7.6	9.8	90	21	10.0

ºC = degrees Celsius
s.u = standard unit of pH
mg/L = milligrams per liter
uS/cm = microsiemens per centimeter
NTU = Nephelometric Turbidity Unit

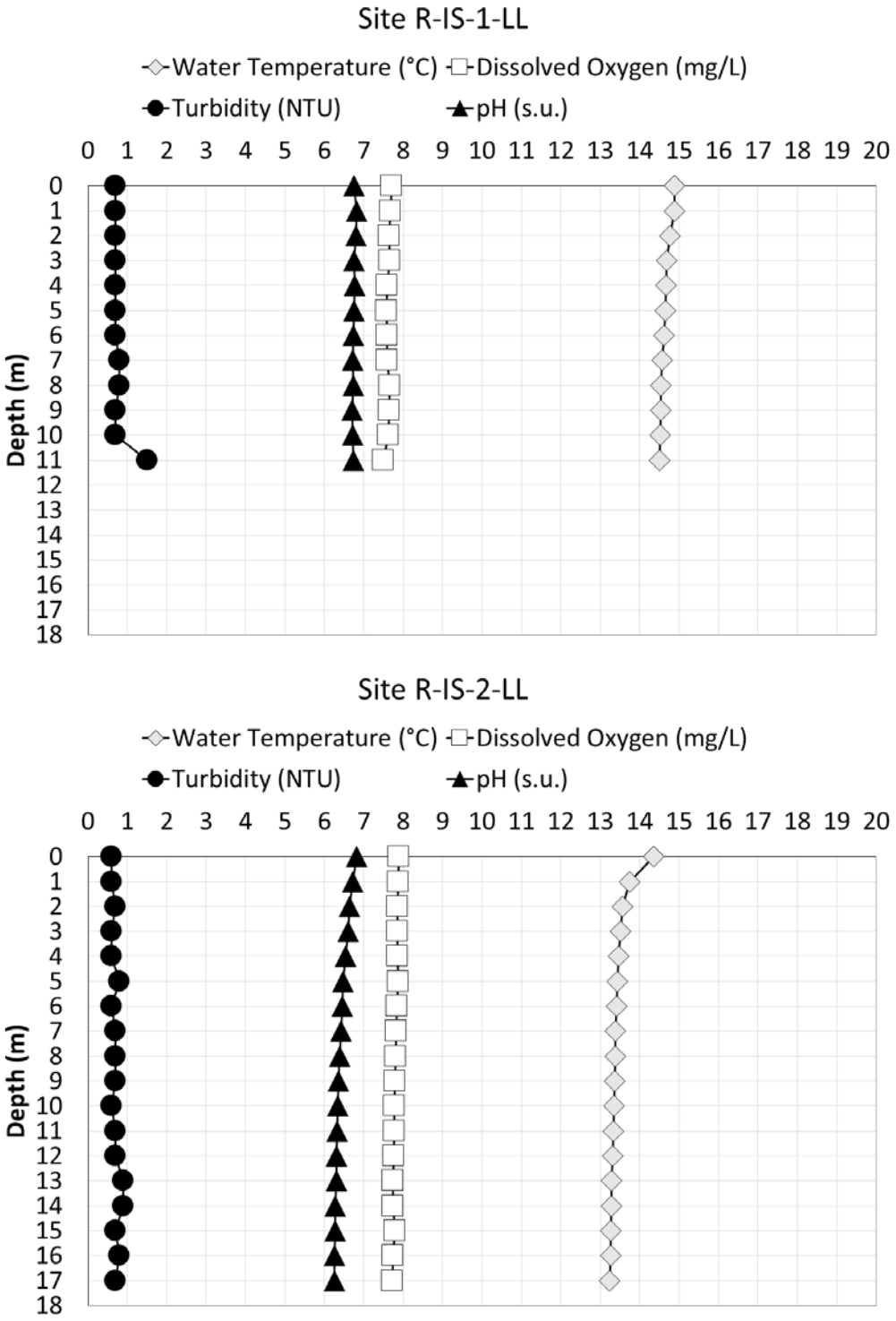

Figure 6-1. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Loon Lake sites R-IS-1-LL (top) and R-IS-2-LL (bottom) during October/November 2015.

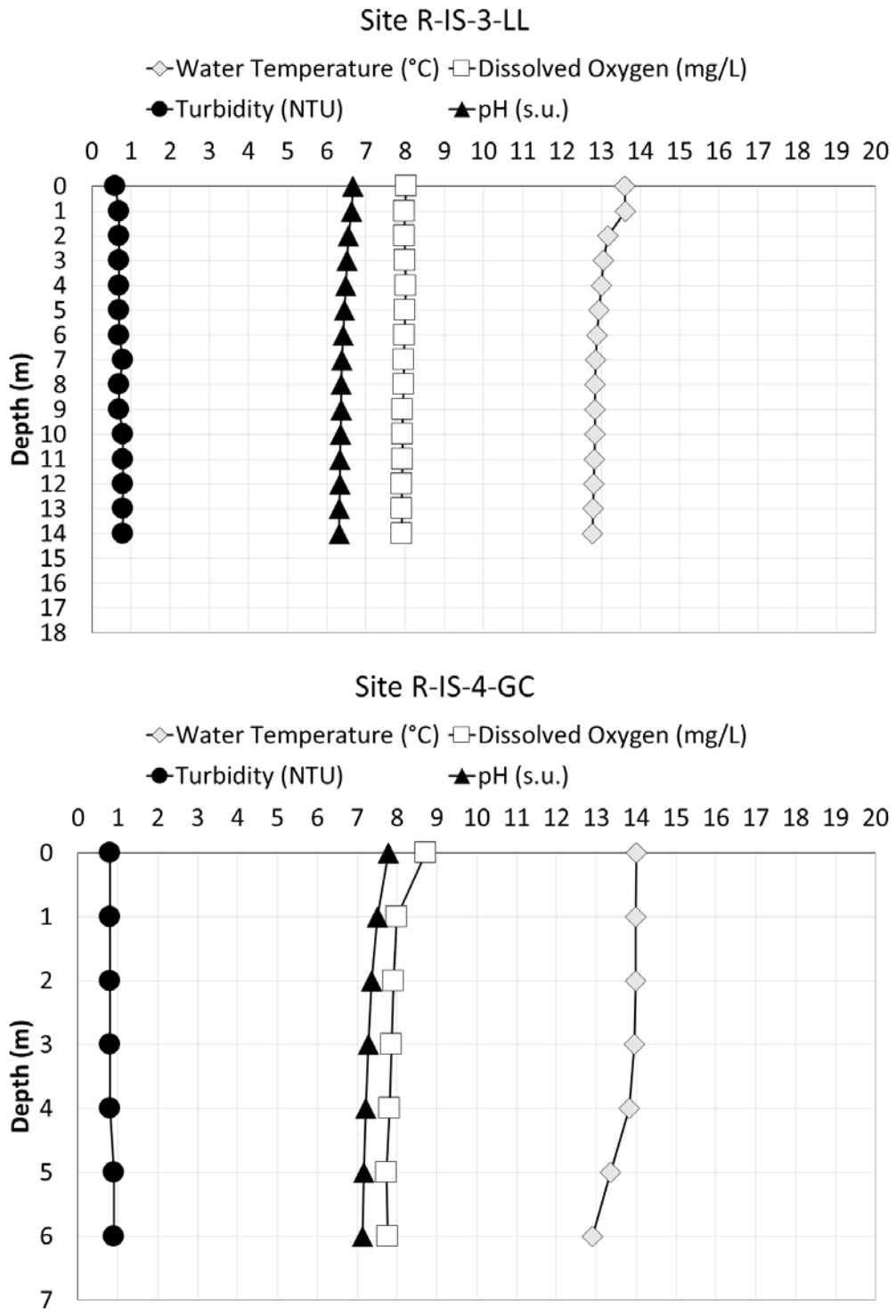

Figure 6-2. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Loon Lake and Gerle Creek Reservoir sites R-IS-3-LL (top) and R-IS-4-GC (bottom) during October/November 2015.

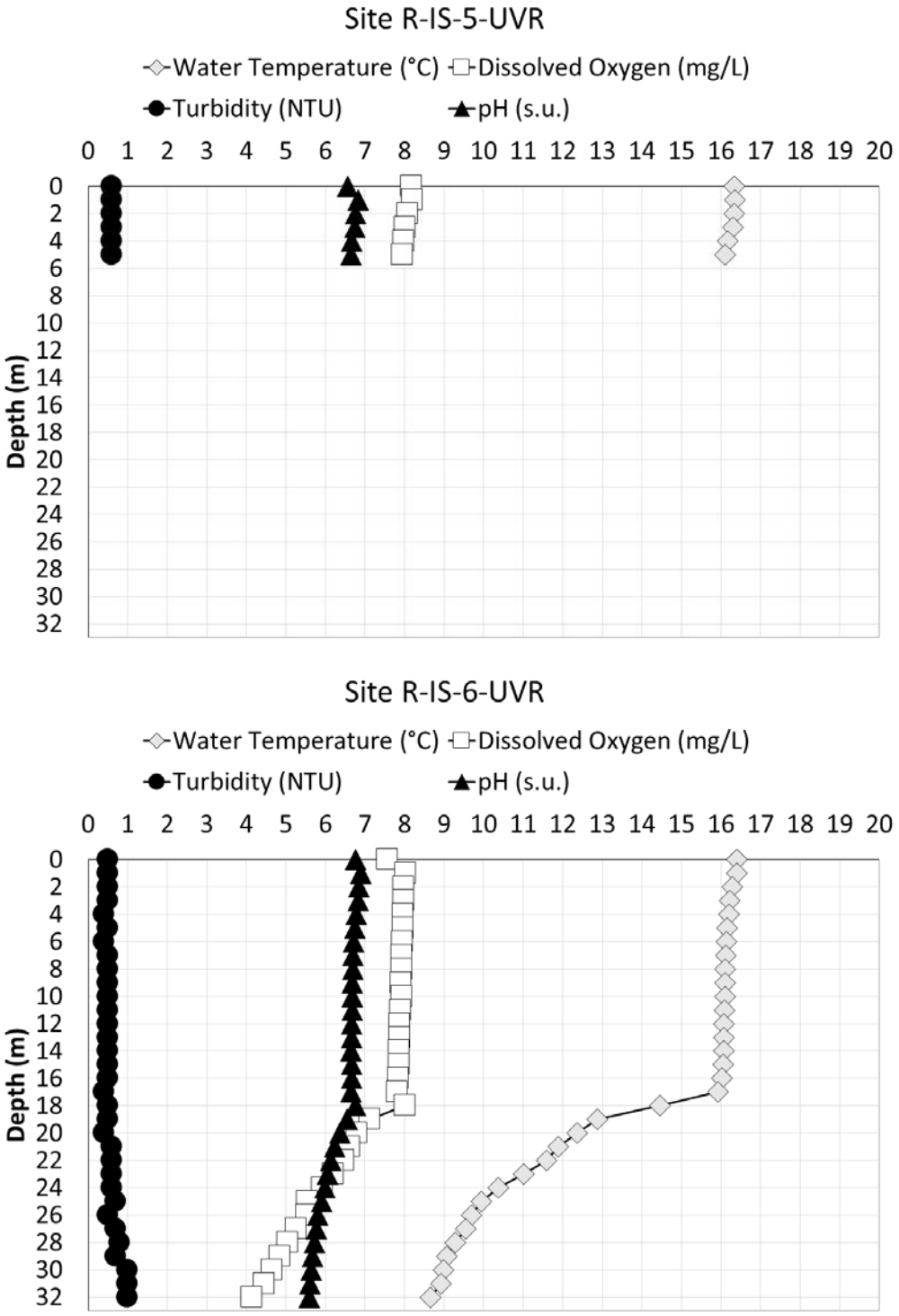

Figure 6-3. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir sites R-IS-5-UVR (top) and R-IS-6-UVR (bottom) during October/November 2015.

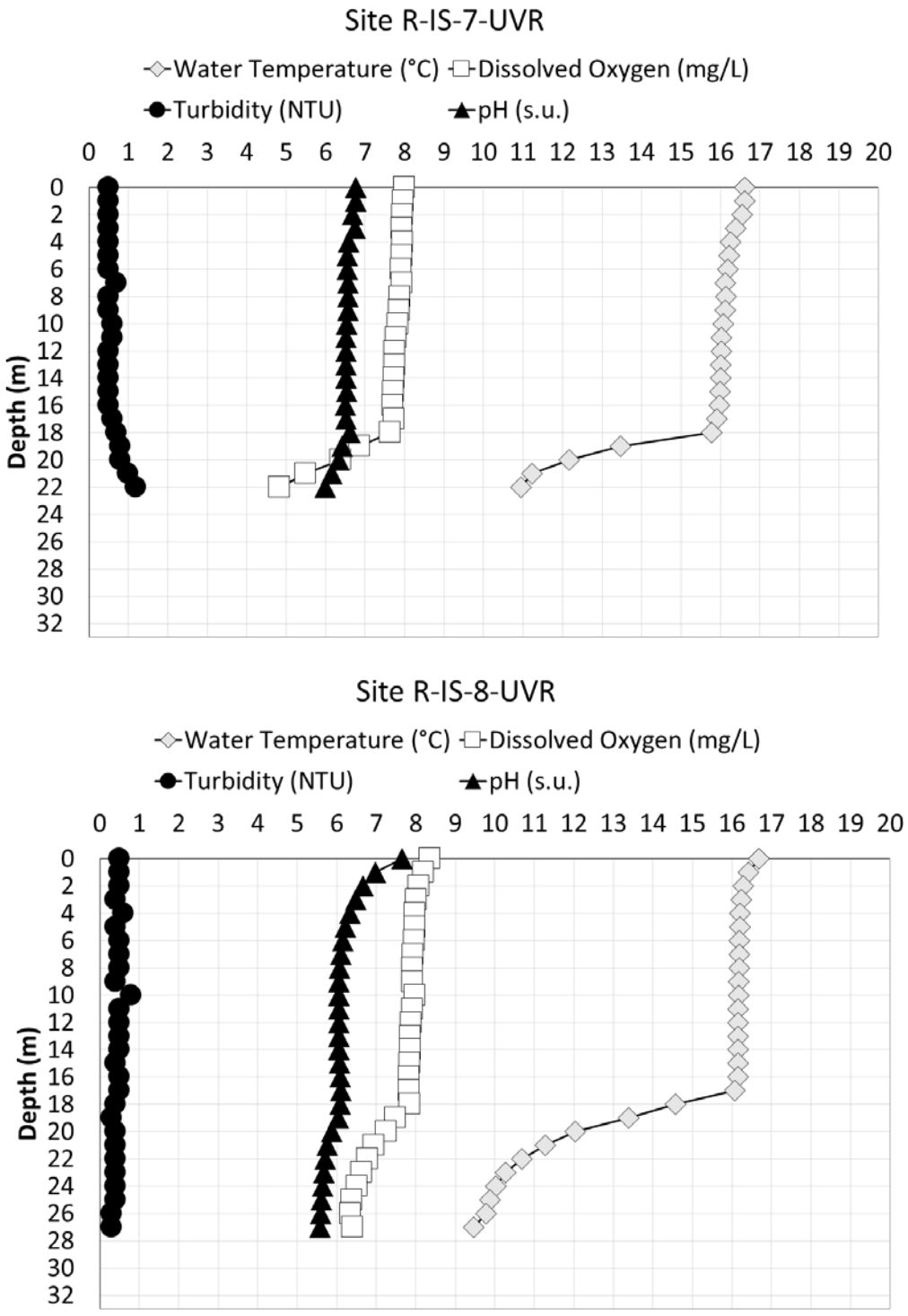

Figure 6-4. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir sites R-IS-7-UVR (top) and R-IS-8-UVR (bottom) during October/November 2015.

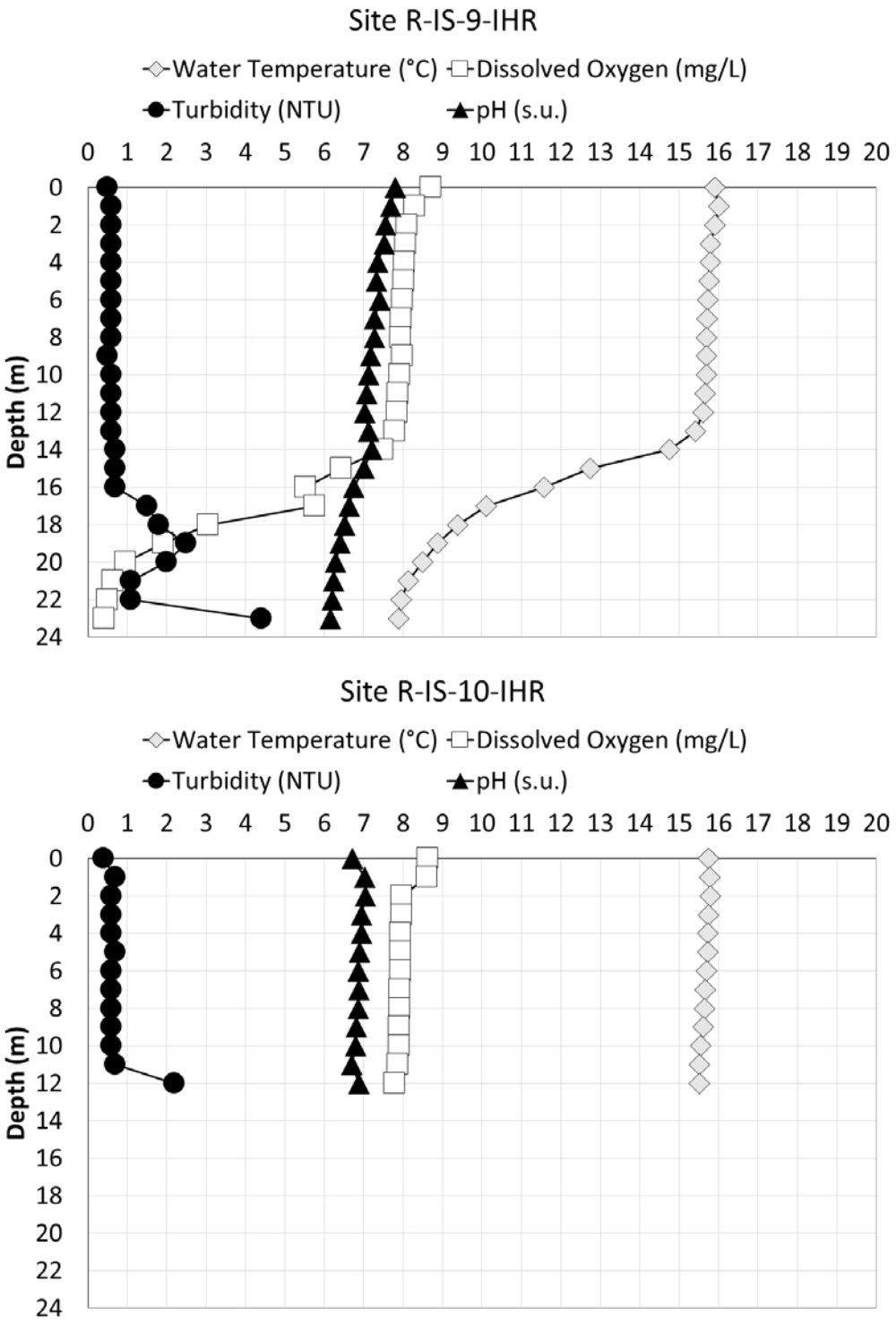

Figure 6-5. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Ice House Reservoir sites R-IS-9-IHR (top) and R-IS-10-IHR (bottom) during October/November 2015.

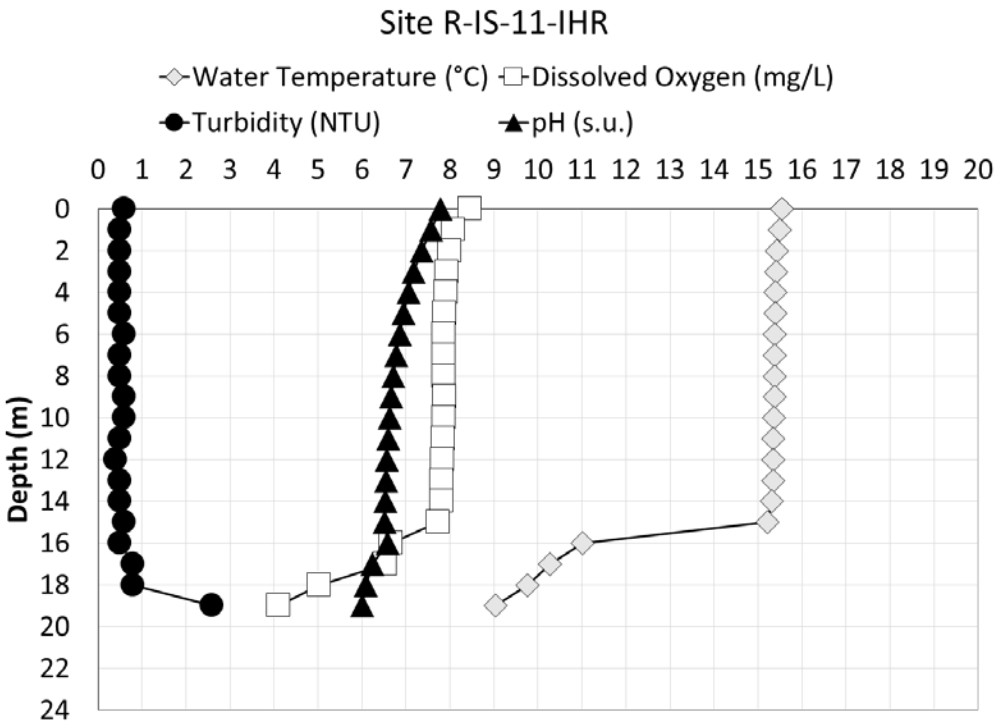

Figure 6-6. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Ice House Reservoir Site R-IS-11-IHR during October/November 2015.

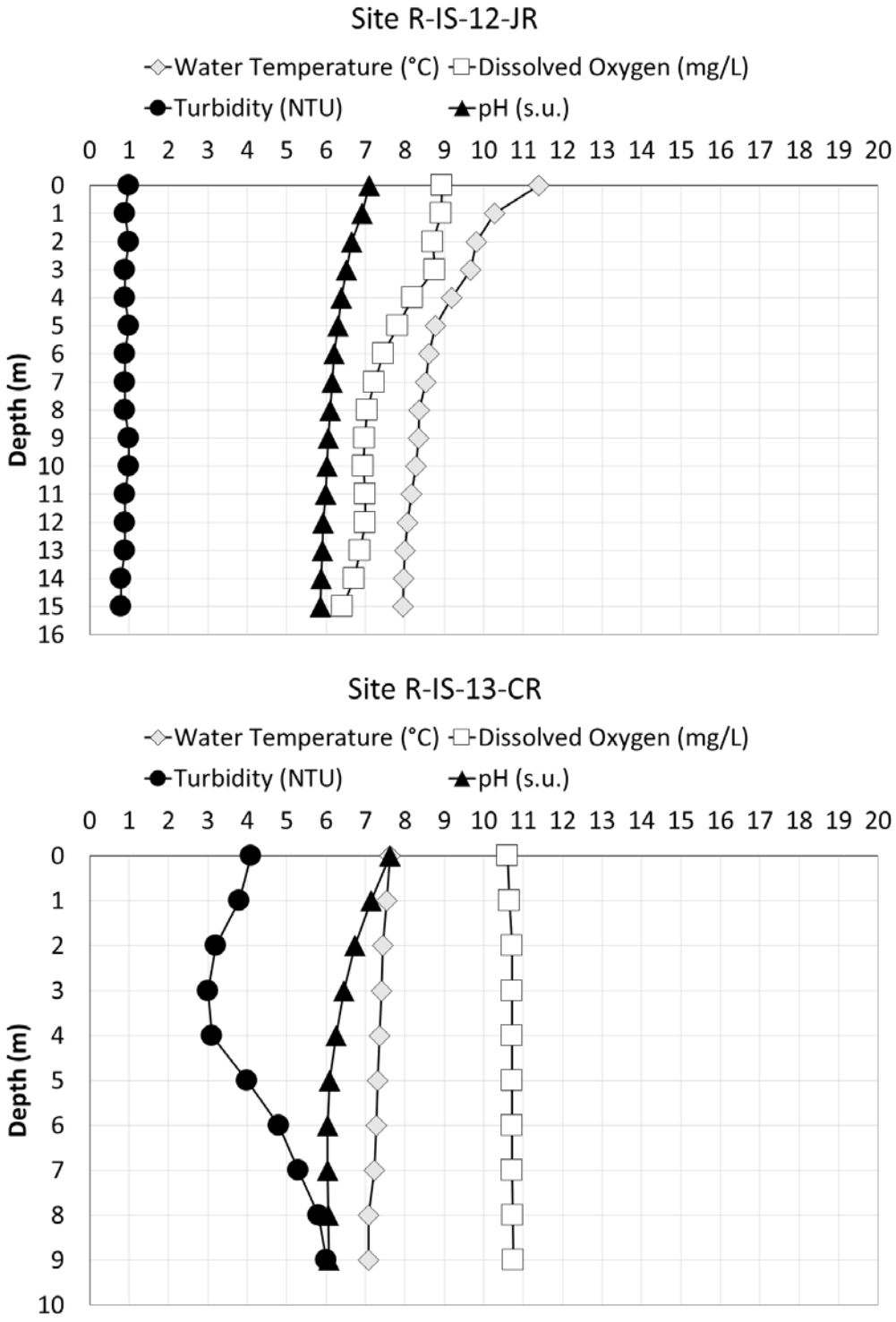

Figure 6-7. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Junction and Camino reservoir sites R-IS-12-JR (top) and R-IS-13-CR (bottom) during October/November 2015.

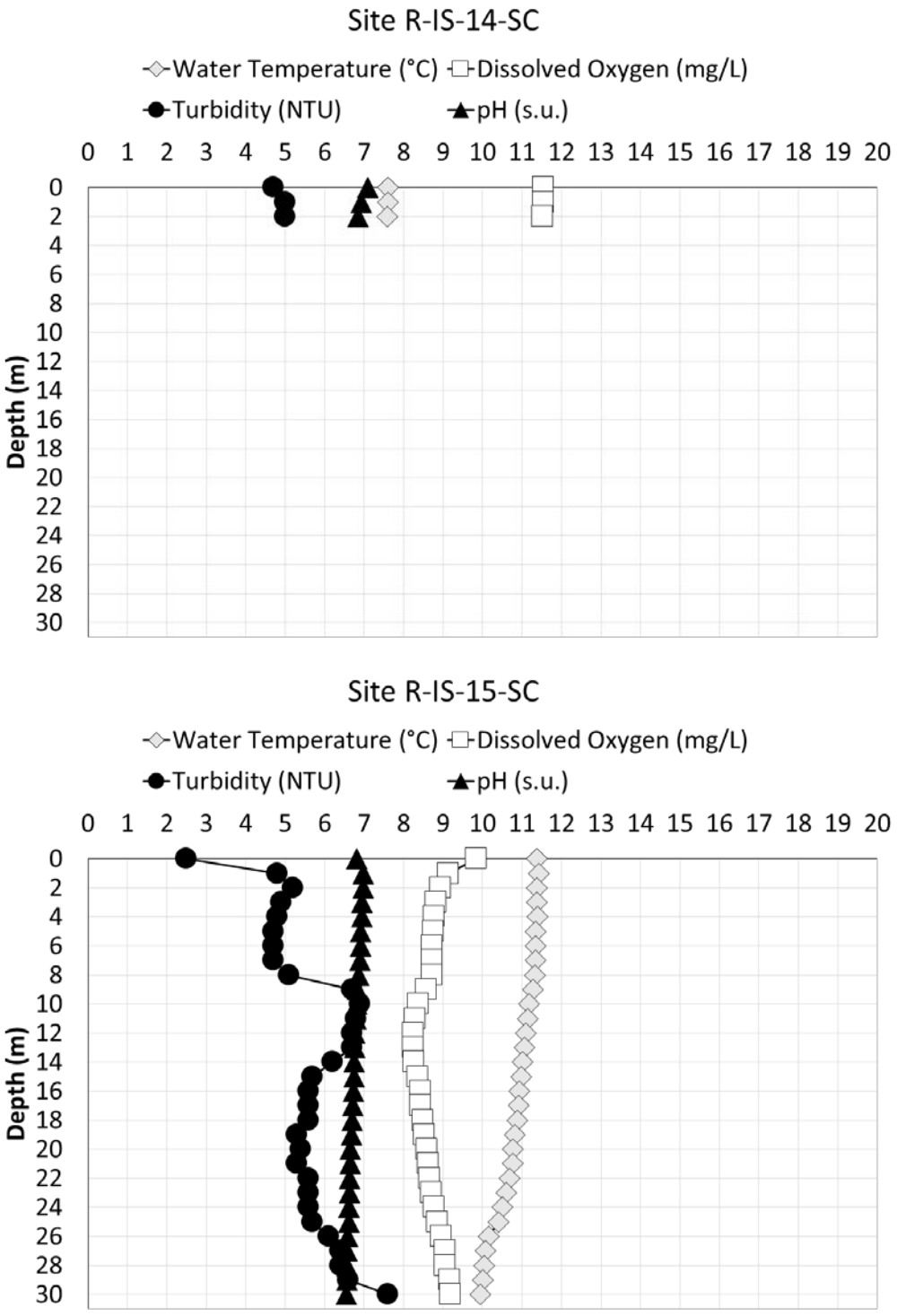

Figure 6-8. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Slab Creek Reservoir sites R-IS-14-SC (top) and R-IS-15-SC (bottom) during October/November 2015.

6.2 BACTERIA

Instantaneous fecal coliform counts ranged from less than the method detection limit (MDL) at 1.8 most probable number per 100 milliliters (MPN/100 mL) to 350 MPN/100 mL during the 2015 Labor Day sampling event (Appendix B, Table B-1). Overall, the geometric mean fecal coliform counts for the 2015 event ranged from 0.9 to 6.3 MPN/100 mL (Table 6-2), where results <MDL were treated as 0.5 x MDL for the calculation. The two lowest geometric mean fecal coliform counts (0.9 MPN/100 mL) occurred in Union Valley Reservoir (Bac-9-UVR) and Ice House Reservoir (Bac-12-IHR), while the highest geometric mean fecal coliform count (6.3 MPN/100 mL) occurred in Gerle Creek Reservoir (Bac-6-GCR). The highest count was well below the Basin Plan objective of 200 MPN/100 mL, as a geometric mean of 5 samples collected over 30 days, for the recreational water contact (REC-1) designated beneficial use. Further, none of the 2015 samples exceeded the instantaneous maximum Basin Plan objective of 400/100 mL.

Instantaneous *E. coli* counts ranged from less than the method detection limit (MDL) at 1 MPN/100 mL to 236 MPN/100 mL during the 2015 Labor Day sampling event (Appendix B, Table B-1). Overall, the geometric mean *E. coli* counts for the 2015 event ranged from 0.5 to 4.8 MPN/100 mL (Table 6-2), where results <MDL were treated as 0.5 x MDL for the calculation. The two lowest geometric mean *E. coli* counts (0.5 MPN/100 mL) occurred in Loon Lake (Bac-3-LL) and Ice House Reservoir (Bac-12-IHR), while the highest geometric mean *E. coli* count (4.8 MPN/100 mL) occurred in Slab Creek Reservoir (Bac-15-GCR). There is no Basin Plan numeric objective for *E. coli.*

Table 6-2. Bacteria counts for UARP sites.

Site ID	Fecal coliform geometric mean (MPN/100 mL)	*E. coli* geometric mean (MPN/100 mL)
Bac-1-BI	2.2	0.9 [1]
Bac-2-BI	2.5	1.9
Bac-3-LL	1.5 [1]	0.5 [1]
Bac-4-LL	1.7 [1]	0.6 [1]
Bac-5-GCR	1.7 [1]	1.0
Bac-6-GCR	6.3	2.7
Bac-7-UVR	1.5 [1]	0.9 [1]
Bac-8-UVR	2.0	0.8 [1]
Bac-9-UVR	0.9 [1]	0.8 [1]
Bac-10-UVR	1.9	1.2
Bac-11-JR	2.2	1.1
Bac-12-IHR	0.9 [1]	0.5 [1]
Bac-13-IHR	1.5 [1]	1.0
Bac-14-BCR	2.8	2.3
Bac-15-SCR	2.2	4.8

MPN/100 mL = most probable number per 100 milliliters
[1] Method detection limit (MDL_ for fecal coliform = 1.8 MPN/100 mL. MDL for *E. coli* = 1.0 MPN/100 mL. Individual results <MDL were treated as 0.5 x MDL for the geometric mean calculations.

7.0 CONCLUSIONS

Based on 2015 *in situ* and bacteria monitoring results, riverine water quality in the UARP study area consistently met Basin Plan water quality objectives for dissolved oxygen and turbidity, with a small number of instances of pH measured below the Basin Plan instantaneous minimum objective (6.5 s.u.). Reservoir water quality was also generally good, with only occasional values measured below the Basin Plan instantaneous minimum objectives for dissolved oxygen (5 mg/L) and/or pH (6.5 s.u.) in the bottom waters of stratified reservoirs (i.e., Loon Lake, Union Valley Reservoir, Ice House Reservoir) and in well-mixed reservoirs (i.e., Camino Reservoir). Despite the occasional exceedances in some reservoir bottom waters, surfaces waters of the UARP study area consistently supported designated beneficial uses, including cold freshwater habitat (COLD), spawning (SPAWN), and recreational water contact (REC-1).

8.0 LITERATURE CITED

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APPENDIX A
In situ Vertical Profile Data for UARP Reservoir Sites

Table A-1. *In situ* Vertical Profile Data for UARP Reservoir Sites.

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
Loon Lake									
R-IS-1-LL	10/19	surface	14.9	7.7	76	7	6.8	0.7	7.5
		1.0	14.9	7.7	76	7	6.8	0.7	
		2.0	14.8	7.6	75	7	6.8	0.7	
		3.0	14.7	7.7	75	7	6.8	0.7	
		4.0	14.7	7.6	75	7	6.8	0.7	
		5.0	14.7	7.6	75	7	6.8	0.7	
		6.0	14.6	7.6	75	7	6.7	0.7	
		7.0	14.6	7.6	75	9	6.7	0.8	
		8.0	14.5	7.7	75	7	6.7	0.8	
		9.0	14.5	7.6	75	7	6.7	0.7	
		10.0	14.5	7.6	75	7	6.7	0.7	
		11.0	14.5	7.5	76	7	6.7	1.5	
R-IS-2-LL	10/22	surface	14.4	7.9	77	7	6.8	0.6	7.5
		1.0	13.7	7.9	6	7	6.7	0.6	
		2.0	13.6	7.9	76	7	6.6	0.7	
		3.0	13.5	7.9	75	7	6.6	0.6	
		4.0	13.5	7.9	75	8	6.5	0.6	
		5.0	13.4	7.9	76	7	6.5	0.8	
		6.0	13.4	7.8	75	7	6.5	0.6	
		7.0	13.4	7.8	75	7	6.4	0.7	
		8.0	13.4	7.8	75	7	6.4	0.7	
		9.0	13.4	7.8	75	7	6.4	0.7	
		10.0	13.4	7.8	74	7	6.3	0.6	
		11.0	13.3	7.8	74	7	6.3	0.7	
		12.0	13.3	7.8	74	7	6.3	0.7	

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
R-IS-2-LL	10/22	13.0	13.3	7.8	74	8	6.3	0.9	7.5
		14.0	13.3	7.8	74	8	6.3	0.9	
		15.0	13.3	7.8	74	7	6.3	0.7	
		16.0	13.3	7.8	74	7	6.3	0.8	
		17.0	13.2	7.7	74	7	6.3	0.7	
R-IS-3-LL	10/22	surface	13.6	8.0	77	7	6.7	0.6	7.0
		1.0	13.6	8.0	77	7	6.6	0.7	
		2.0	13.2	8.0	76	7	6.6	0.7	
		3.0	13.1	8.0	76	7	6.5	0.7	
		4.0	13.0	8.0	76	8	6.5	0.7	
		5.0	12.9	8.0	76	7	6.5	0.7	
		6.0	12.9	8.0	76	7	6.4	0.7	
		7.0	12.9	8.0	75	7	6.4	0.8	
		8.0	12.9	8.0	75	7	6.4	0.7	
		9.0	12.9	7.9	75	7	6.4	0.7	
		10.0	12.9	7.9	75	7	6.4	0.8	
		11.0	12.8	7.9	75	7	6.3	0.8	
		12.0	12.8	7.9	75	7	6.3	0.8	
		13.0	12.8	7.9	75	8	6.3	0.8	
		14.0	12.8	7.9	75	7	6.3	0.8	
Gerle Creek Reservoir									
R-IS-4-GC	10/20	surface	14.0	8.7	80	16	7.8	0.8	6.0
		1.0	14.0	8.0	78	16	7.5	0.8	
		2.0	14.0	7.9	77	16	7.4	0.8	
		3.0	14.0	7.9	76	16	7.3	0.8	
		4.0	13.8	7.8	75	16	7.2	0.8	
		5.0	13.4	7.7	74	15	7.2	0.9	
		6.0	12.9	7.8	74	17	7.1	0.9	

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (ºC)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
Union Valley Reservoir									
R-IS-5-UVR	10/23	surface	16.3	8.2	84	10	6.6	0.6	6.5
		1.0	16.4	8.2	84	11	6.8	0.6	
		2.0	16.3	8.1	82	11	6.8	0.6	
		3.0	16.3	8.0	82	11	6.7	0.6	
		4.0	16.2	8.0	81	11	6.7	0.6	
		5.0	16.1	8.0	81	11	6.7	0.6	
R-IS-6-UVR	10/23	surface	16.4	7.6	77	11	6.8	0.5	7.5
		1.0	16.4	8.0	82	11	6.9	0.5	
		2.0	16.3	8.0	81	11	6.8	0.5	
		3.0	16.2	8.0	81	11	6.8	0.5	
		4.0	16.2	8.0	81	11	6.8	0.4	
		5.0	16.2	8.0	81	11	6.8	0.5	
		6.0	16.1	8.0	81	11	6.7	0.4	
		7.0	16.1	7.9	81	11	6.7	0.5	
		8.0	16.1	7.9	80	11	6.7	0.5	
		9.0	16.1	7.9	81	11	6.7	0.5	
		10.0	16.1	7.9	80	11	6.7	0.5	
		11.0	16.1	7.9	80	11	6.7	0.5	
		12.0	16.1	7.9	80	11	6.7	0.5	
		13.0	16.1	7.9	80	11	7.7	0.5	
		14.0	16.1	7.9	80	11	6.6	0.5	
		15.0	16.1	7.9	80	11	6.7	0.5	
		16.0	16.0	7.9	79	11	6.7	0.5	
		17.0	15.9	7.8	79	11	6.7	0.4	
		18.0	14.5	8.0	79	12	6.8	0.5	
		19.0	12.9	7.1	67	10	6.6	0.5	

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
R-IS-6-UVR	10/23	20.0	12.4	6.8	63	10	6.4	0.4	7.5
		21.0	11.9	6.6	61	10	6.2	0.6	
		22.0	11.6	6.5	59	10	6.1	0.6	
		23.0	11.0	6.2	56	10	6.1	0.6	
		24.0	10.4	5.9	53	10	6.0	0.6	
		25.0	10.0	5.6	49	10	5.9	0.7	
		26.0	9.7	5.5	49	10	5.8	0.5	
		27.0	9.5	5.3	46	10	5.8	0.7	
		28.0	9.3	5.1	44	10	5.7	0.8	
		29.0	9.1	4.9	42	10	5.7	0.7	
		30.0	9.0	4.7	40	10	5.6	1.0	
		31.0	8.9	4.5	40	10	5.6	1.0	
		32.0	8.7	4.1	36	10	5.6	1.0	
R-IS-7-UVR	10/23	surface	16.6	8.0	82	11	6.8	0.5	7.0
		1.0	16.6	8.0	82	11	6.8	0.5	
		2.0	16.6	8.0	81	11	6.7	0.5	
		3.0	16.4	7.9	81	11	6.7	0.5	
		4.0	16.3	8.0	81	11	6.6	0.5	
		5.0	16.2	7.9	81	11	6.6	0.5	
		6.0	16.2	7.9	81	12	6.6	0.5	
		7.0	16.1	7.9	81	12	6.6	0.7	
		8.0	16.1	7.9	80	11	7.6	0.5	
		9.0	16.1	7.9	80	11	6.6	0.5	
		10.0	16.1	7.8	79	11	6.5	0.6	
		11.0	16.0	7.8	79	11	6.5	0.6	
		12.0	16.0	7.8	79	11	6.5	0.5	
		13.0	16.0	7.8	79	11	6.5	0.5	
		14.0	16.0	7.7	78	11	6.5	0.5	

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (ºC)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
R-IS-7-UVR	10/23	15.0	16.0	7.7	78	11	6.5	0.5	7.0
		16.0	16.0	7.7	78	12	6.5	0.5	
		17.0	15.9	7.7	78	11	6.5	0.6	
		18.0	15.8	7.6	76	11	6.6	0.7	
		19.0	13.5	6.9	66	10	6.4	0.8	
		20.0	12.2	6.4	58	9	6.3	0.8	
		21.0	11.2	5.5	49	9	6.2	1.0	
		22.0	11.0	4.8	43	10	6.0	1.2	
R-IS-8-UVR	10/23	surface	16.7	8.4	86	12	7.7	0.5	8.0
		1.0	16.4	8.2	84	10	7.0	0.5	
		2.0	16.3	8.1	82	10	6.7	0.5	
		3.0	16.2	8.0	82	11	6.5	0.4	
		4.0	16.2	8.0	81	11	6.3	0.6	
		5.0	16.2	8.0	81	11	6.2	0.4	
		6.0	16.2	8.0	81	11	6.2	0.5	
		7.0	16.2	7.9	81	11	6.1	0.5	
		8.0	16.2	7.9	81	11	6.1	0.5	
		9.0	16.2	7.9	81	13	6.1	0.4	
		10.0	16.2	8.0	81	11	6.1	0.8	
		11.0	16.2	7.9	80	11	6.1	0.5	
		12.0	16.2	7.9	80	11	6.1	0.5	
		13.0	16.2	7.9	80	12	6.1	0.5	
		14.0	16.2	7.9	80	12	6.1	0.5	
		15.0	16.2	7.9	80	12	6.1	0.4	
		16.0	16.2	7.8	80	12	6.1	0.5	
		17.0	16.1	7.8	79	12	6.1	0.5	
		18.0	14.6	7.9	77	12	6.1	0.4	
		19.0	13.4	7.5	71	10	6.0	0.3	

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
R-IS-8-UVR	10/23	20.0	12.0	7.3	67	10	5.9	0.4	8.0
		21.0	11.3	1.0	63	10	5.8	0.4	
		22.0	10.7	6.8	61	10	5.7	0.4	
		23.0	10.3	6.6	59	9	5.7	0.4	
		24.0	10.0	6.5	58	9	5.6	0.4	
		25.0	9.9	6.4	56	10	5.6	0.4	
		26.0	9.8	6.4	56	10	5.6	0.3	
		27.0	9.5	6.4	56	11	5.6	0.3	
Ice House Reservoir									
R-IS-9-IHR	10/20	surface	15.9	8.7	88	9	7.8	0.5	8.0
		1.0	16.0	8.3	84	8	7.7	0.6	
		2.0	15.9	8.1	82	8	7.6	0.6	
		3.0	15.8	8.1	81	8	7.5	0.6	
		4.0	15.8	8.0	81	8	7.4	0.6	
		5.0	15.8	8.0	81	8	7.3	0.6	
		6.0	15.7	8.0	80	8	7.4	0.6	
		7.0	15.7	8.0	80	8	7.3	0.6	
		8.0	15.7	7.9	80	9	7.3	0.6	
		9.0	15.7	8.0	80	8	7.2	0.5	
		10.0	15.7	7.9	80	8	7.1	0.6	
		11.0	15.7	7.9	79	8	7.1	0.6	
		12.0	15.6	7.9	79	8	7.0	0.6	
		13.0	15.4	7.8	78	8	7.1	0.6	
		14.0	14.8	7.5	73	8	7.2	0.7	
		15.0	12.8	6.4	60	8	7.0	0.7	
		16.0	11.6	5.5	50	8	6.8	0.7	
		17.0	10.1	5.8	51	8	6.6	1.5	
		18.0	9.4	3.1	26	8	6.5	1.8	

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (ºC)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
R-IS-9-IHR	10/20	19.0	8.9	1.9	16	11	6.4	2.5	8.0
		20.0	8.5	1.0	8	12	6.3	2.0	
		21.0	8.1	0.6	5	15	6.2	1.1	
		22.0	8.0	0.5	4	15	6.2	1.1	
		23.0	7.9	0.4	4	16	6.2	4.4	
R-IS-10-IHR	10/20	surface	15.7	8.6	87	9	6.7	0.4	8.0
		1.0	15.8	8.6	81	8	7.0	0.7	
		2.0	15.8	8.0	80	8	7.0	0.6	
		3.0	15.8	8.0	80	8	6.9	0.6	
		4.0	15.7	7.9	80	8	7.0	0.6	
		5.0	15.7	7.9	80	8	6.9	0.7	
		6.0	15.7	7.9	80	8	6.9	0.6	
		7.0	15.7	7.9	80	8	6.9	0.6	
		8.0	15.6	7.9	80	8	6.9	0.6	
		9.0	15.6	7.9	79	9	6.8	0.6	
		10.0	15.6	7.9	79	9	6.8	0.6	
		11.0	15.5	7.9	79	8	6.7	0.7	
		12.0	15.5	7.8	78	8	6.9	2.2	
R-IS-11-IHR	10/22	surface	15.5	8.5	85	9	7.8	0.6	10.5
		1.0	15.5	8.1	81	8	7.6	0.5	
		2.0	15.4	8.0	80	8	7.4	0.5	
		3.0	15.4	7.9	79	8	7.2	0.5	
		4.0	15.4	7.9	79	8	7.1	0.5	
		5.0	15.4	7.9	79	8	7.0	0.5	
		6.0	15.4	7.9	79	8	6.9	0.6	
		7.0	15.4	7.9	79	9	6.8	0.5	
		8.0	15.4	7.9	79	9	6.7	0.5	
		9.0	15.4	7.9	79	8	6.7	0.6	

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
R-IS-11-IHR	10/22	10.0	15.4	7.9	79	8	6.6	0.6	10.5
		11.0	15.3	7.9	78	8	6.6	0.5	
		12.0	15.3	7.8	78	8	6.6	0.4	
		13.0	15.3	7.8	78	8	6.6	0.5	
		14.0	15.3	7.8	78	8	6.5	0.5	
		15.0	15.2	7.7	77	8	6.5	0.6	
		16.0	11.0	6.7	59	7	6.6	0.5	
		17.0	10.3	6.5	58	7	6.2	0.8	
		18.0	9.8	5.0	43	8	6.1	0.8	
		19.0	9.0	4.1	35	8	6.0	2.6	
Junction Reservoir									
R-IS-12-JR	10/22	surface	11.4	8.9	82	10	7.1	1.0	3.5
		1.0	10.3	8.9	79	10	6.9	0.9	
		2.0	9.8	8.7	77	11	6.6	1.0	
		3.0	9.7	8.8	77	10	6.5	0.9	
		4.0	9.2	8.2	71	10	6.4	0.9	
		5.0	8.8	7.8	67	9	6.3	1.0	
		6.0	8.6	7.5	64	9	6.2	0.9	
		7.0	8.5	7.2	62	9	6.2	0.9	
		8.0	8.4	7.0	60	9	6.1	0.9	
		9.0	8.4	7.0	59	9	6.1	1.0	
		10.0	8.3	7.0	59	9	6.0	1.0	
		11.0	8.2	7.0	59	10	6.0	0.9	
		12.0	8.1	7.0	59	9	5.9	0.9	
		13.0	8.0	6.9	58	9	5.9	0.9	
		14.0	8.0	6.7	57	9	5.9	0.8	
		15.0	8.0	6.4	54	9	5.9	0.8	

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (ºC)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
Camino Reservoir									
R-IS-13-CR	11/9	surface	7.6	10.6	89	9	7.6	4.1	3.0
		1.0	7.5	10.7	89	9	7.1	3.8	
		2.0	7.4	10.7	89	9	6.7	3.2	
		3.0	7.4	10.7	89	9	6.5	3.0	
		4.0	7.4	10.7	89	9	6.3	3.1	
		5.0	7.3	10.7	89	9	6.1	4.0	
		6.0	7.3	10.7	89	10	6.0	4.8	
		7.0	7.2	10.7	89	10	6.0	5.3	
		8.0	7.1	10.7	89	11	6.1	5.8	
		9.0	7.1	10.8	89	10	6.1	6.0	
Slab Creek Reservoir									
R-IS-14-SC	11/9	surface	7.6	11.5	97	21	7.1	4.7	2.5
		1.0	7.6	11.5	97	21	6.9	5.0	
		2.0	7.6	11.5	96	21	6.9	5.0	
R-IS-15-SC	11/9	surface	11.4	9.8	90	24	6.8	2.5	3.0
		1.0	11.4	9.1	83	23	7.0	4.8	
		2.0	11.4	8.9	82	23	7.0	5.2	
		3.0	11.4	8.8	81	24	6.9	4.9	
		4.0	11.4	8.8	80	24	6.9	4.8	
		5.0	11.4	8.8	80	24	6.9	4.7	
		6.0	11.4	8.7	80	24	6.9	4.7	
		7.0	11.4	8.7	80	25	6.9	4.7	
		8.0	11.3	8.7	80	25	6.9	5.1	
		9.0	11.3	8.6	78	28	6.8	6.7	
		10.0	11.2	8.4	76	28	6.8	6.9	
		11.0	11.1	8.3	75	27	6.8	6.8	

Site ID	2015 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	pH (s.u.)	Turbidity (NTU)	Secchi disk (m)
R-IS-15-SC	11/9	12.0	11.1	8.3	75	26	6.8	6.7	3.0
		13.0	11.1	8.2	75	26	6.8	6.7	
		14.0	11.0	8.3	75	25	6.8	6.2	
		15.0	8.0	8.4	76	24	6.8	5.7	
		16.0	10.9	8.4	76	26	6.7	8.6	
		17.0	10.9	8.4	76	24	6.7	5.6	
		18.0	10.9	8.5	77	24	6.7	5.6	
		19.0	10.8	8.5	77	24	6.7	5.3	
		20.0	10.8	8.6	78	24	6.7	5.4	
		21.0	10.8	8.6	78	24	6.6	5.3	
		22.0	10.7	8.7	78	24	6.6	5.6	
		23.0	10.6	8.7	78	24	6.6	5.6	
		24.0	10.5	8.8	79	23	6.6	5.6	
		25.0	10.4	8.9	79	23	6.6	5.7	
		26.0	10.2	9.0	80	23	6.6	6.1	
		27.0	10.1	9.1	80	24	6.6	6.4	
		28.0	10.0	9.1	80	23	6.6	6.4	
		29.0	10.0	9.2	81	23	6.6	6.6	
		30.0	10.0	9.2	81	23	6.6	7.6	

°C = degrees Celsius
m = meter
mg/L = milligrams per liter
s.u = standard unit of pH
uS/cm = microsiemens per centimeter
NTU = Nephelometric Turbidity Unit

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APPENDIX B
Bacteria Results for UARP Reservoir and Riverine Sites

Table B-1. Bacteria (MPN/100mL) for UARP Sites.

Site ID	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Fecal coliform geometric mean [1]	*E. coli* geometric mean [1]
	Fecal coliform	*E. coli*	Fecal coliform	*E. coli*	Fecal coliform	*E. coli*	Fecal coliform	*E. coli*	Fecal coliform	*E. coli*		
Bac-1-BI	4.0	<1.0	<1.8	2.0	<1.8	<1.0	7.8	1.0	2.0	1.0	2.2	0.9
Bac-2-BI	<1.8	<1.0	2.0	1.0	<1.8	1.0	70	25.3	<1.8	2.0	2.5	1.9
Bac-3-LL	2.0	<1.0	<1.8	<1.0	4.5	<1.0	<1.8	<1.0	<1.8	<1.0	1.5	0.5
Bac-4-LL	2.0	<1.0	<1.8	<1.0	4.0	<1.0	<1.8	<1.0	2.0	1.0	1.7	0.6
Bac-5-GCR	23	3.1	<1.8	1.0	<1.8	<1.0	<1.8	1.0	<1.8	<1.0	1.7	1.0
Bac-6-GCR	350	71.7	4.5	8.5	7.8	<1.0	<1.8	<1.0	<1.8	1.0	6.3	2.7
Bac-7-UVR	<1.8	<1.0	<1.8	<1.0	2.0	2.0	2.0	<1.0	2.0	2.0	1.5	0.9
Bac-8-UVR	<1.8	<1.0	<1.8	<1.0	11.0	1.0	<1.8	<1.0	4.5	2.0	2.0	0.8
Bac-9-UVR	<1.8	<1.0	<1.8	<1.0	<1.8	<1.0	<1.8	2.0	<1.8	1.0	0.9	0.8
Bac-10-UVR	<1.8	2.0	2.0	<1.0	<1.8	<1.0	<1.8	<1.0	17	11	1.9	1.2
Bac-11-JR	4.5	<1.0	<1.8	<1.0	2.0	1.0	<1.8	1.0	6.8	5.2	2.2	1.1
Bac-12-IHR	<1.8	<1.0	<1.8	<1.0	<1.8	<1.0	<1.8	<1.0	<1.8	<1.0	0.9	0.5
Bac-13-IHR	2.0	2.0	2.0	1.0	<1.8	1.0	2.0	<1.0	<1.8	1.0	1.5	1.0
Bac-14-BCR	<1.8	<1.0	<1.8	2.0	130	235.9	1.8	<1.0	<1.8	<1.0	2.8	2.3
Bac-15-SCR	<1.8	3.0	4.5	66.3	<1.8	1.0	17	6.3	<1.8	2.0	2.2	4.8
MDL	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	-	-
MRL	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	-	-

1 Individual results <MDL were treated as 0.5 x MDL for the geometric mean calculations.

APPENDIX C
In situ Field Data Sheets

Stillwater Sciences

SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(s) used: YSI 6920, turbidimeter Personnel: Christina Buck

option A

Site Location: Rubicon River outflow from Rub Res. UTM (NAD27): 0740405/4319347 (Rub1)
Date: 8/24/15 Time: 1030
Photos: ① 1489, 1490, 1491 ② 1493 (#2467) Weather: Sunny, warm
Notes: Low flow, slow moving, many pools, chose place with most visible flow

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
19.56	6.84	74.6	0.018	16	6.18	1.1	5.47	bottom	in pool ~2M deep
19.59	6.89	75.2	0.018	16	6.03	0.7	5.08		

option B

Site Location: Rubicon R. outflow from Rub. river UTM (NAD27): 0740489/4319297 (Rub2)
Date: 8/24/15 Time: 1115
Photos: 1494 + 1495 (#2468) Weather: warm, sunny
Notes: Faster flowing, should be able to access from both sides

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
19.64	7.51	82.0	0.00	0	6.16	1.1	1.79	bottom	~1M in pool DS

Site Location: Little Rubicon out flow Rockbound Lake UTM (NAD27): 10S 0738461 4320341 WP#007
Date: 8/24/15 Time: 1400
Photos: 899-904 (#2468) Weather: warm, sunny
Notes: No flow, bond spot that might be flowing

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
21.95	80.7		0.016	15	6.48	0.5	7.31	bottom	~2.5 m in bowl
	7.01	80.2							

Site Location: Little Rubicon outflow UTM (NAD27): 0737544/4320957 (WYPT #104)
Date: 8/24/15 Time: 1610
Photos: 1496 - 1500 (#2467) Weather: Warm, Sunny
Notes: Good flow, went DS of all flow for easy access during higher flows w/s of Rubicon trail crossing.

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
21.29	7.33	82.7	0.012	11	6.25	0.4	CB 1.91 1.65	bottom	~0.5m in deepest area

Stillwater Sciences

SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

Page 4 of 5

Instrument(S) used: YSI 6920 Personnel: Bruce Hitch, Christina Buck

Site Location: Gerle Creek outflow from Loon Lake
Date: 8-25-2015
Photos: CAMERA 2467 us 1510 Loon Lake ds 1511
Notes:
UTM (NAD27): 10S 0732792 4320543
Time: 1400 am WP 105
Weather: clear, sunny

* IS - 4 - GC *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
12.84	8.64	81.7	0.014	10	7.06	0.9	5.70	→	0.5 m bottom
								→	

Site Location: Gerle Creek inflow to Gerle Creek Reservoir
Date: 8-25-2015
Photos: 1512 - 1514
Notes:
UTM (NAD27): 10S 0732792 4320543
Time: 12:30 => 15 WP 107
Weather: clear sunny

* IS - 5 - GC *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
15.22	8.88	88.5	0.016	13	6.75	0.7	1.54		1.0 m bottom

Site Location: Gerle Creek outflow from Gerle Creek Reservoir
Date: 8-25-2015
Photos: 1515 - 1518
Notes: ICE
UTM (NAD27): 10S 0732357 4335270
Time: 13:30 WP 110
Weather: clear sunny

* IS - 6 - GC *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
17.64	7.84	82.1	0.017	15	6.99	0.7	1.40		0.25m bottom

Site Location: Robbs Peak Forebay
Date: 8-25-2015
Photos: 1519-1520 (camera)
Notes: KEN, wading boots 1521 + 1522 (camera)
UTM (NAD27): 10S 0726639 4314196
Time: 14:15 WP 111
Weather: clear sunny

* IS - 9 - GCC *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
21.03	8.15	91.5	0.019	17	7.29	0.5	2.35		3 m bottom

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SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(S) used: YSI 6920 + Micro TPI turbidimeter Personnel: Bruce Hitch, Christina Buck

Site Location: Gerle Creek ds of confluence → SF Rubicon UTM (NAD27): 0725252 4314903
Date: 8-25-2015 Time: 15:00 WP 112
Photos: 1523-1524 Weather: clear sunny
Notes: gauging pool

* IS-8-SFRR *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
17.61	8.42	88.2	0.019	16	7.14	0.4	3.07		1.5 m bottom

Site Location: Gerle Creek ds of confluence → SF Rubicon UTM (NAD27): 0725228 4314908
Date: 8-25-2015 Time: 15:10 WP 113
Photos: 1525 + 1526 - 1527 Weather: clear sunny
Notes: ds of gauging pool

* IS-8-SFRR *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
17.70	8.52	89.4	0.019	16	6.91	0.4	2.47		1.5 m bottom

Site Location: SF Silver Creek, outflow from Ice House reservoir UTM (NAD27): 0729138 4300389
Date: 8-25-2015 Time: 16:30 WP 115
Photos: 1531-1533 Weather: clear Sunny
Notes:

* IS-10-SFSC *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
7.26	8.91	73.9	0.012	8	6.42	6.0	13.53		0.5 m bottom

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SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(S) used: YSI 6920 + Micro TPI Turbidimeter Personnel: Bruce Hitch

Site Location: SF Silver Creek inflow to Junction UTM (NAD27): 10 S 0721537 4303162
Date: 8-26-2015 Time: 10:46
Photos: Weather: clear sunny
Notes: ds of gaging station

IS-11-SFSC

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
14.85	9.06	86.7	0.016	13	7.65	1.0	5.06		1.0 m bottom

Site Location: SF Silver Creek outflow from Junction UTM (NAD27): 10 S 0720468 4303274
Date: 8-26-2015 Time: 11:54
Photos: Weather: clear sunny
Notes: ds of dam

IS-12-SC

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
9.46	10.03	87.8	0.015	10	6.75	0.6	2.56		2.0 m bottom

Site Location: Silver Creek inflow to Camino Reservoir UTM (NAD27): 10 S 0714174 4301268
Date: 8-26-2015 Time: 12:55
Photos: Weather: clear sunny
Notes:

IS-13-SC

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
17.52	9.09	95.1	0.018	16	6.95	1.9	5.39		1.0 m bottom

Site Location: Silver Creek outflow from Camino Reservoir UTM (NAD27): 10 S 0713699 4299952
Date: 8.26.15 Time: 13:28
Photos: Weather: clear sunny
Notes:

IS-14-SC

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
12.31	10.32	96.4	0.015	11	6.72	0.8	6.42		0.75m bottom

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Instrument(S) used: _____ Personnel: Bruce Hitch

Site Location: SFAR upstream of Camino PH. UTM (NAD27): 10 S 0706704 4296557
Date: 8-26-15 Time: 15:24
Photos: Weather: clear sunny
Notes:

* IS-15-SFAR *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
22.23	9.23	106.0	0.065	61	7.75	1.3	1.44		1.0 m bottom

Site Location: Brush Creek outflow from Brush Creek reservoir UTM (NAD27): 10 S 0706484 4298360
Date: 8-27-15 Time: 10:49
Photos: Weather: clear sunny 70°
Notes:

* IS-17-BC *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
11.44	10.25	93.9	0.032	24	6.65	3.0			0.25 m bottom

Site Location: SFAR downstream of Camino UTM (NAD27): 10 S 0705942 4296357
Date: 8-27-2015 Powerhouse Time: 11:38
Photos: Weather: clear sunny
Notes:

* IS-16-SFAR *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
21.62	8.94	101.3	0.081	29	7.56	1.1			4 m bottom

Site Location: SFAR downstream of Slab UTM (NAD27): 10 S 0699539 4293744
Date: 8-27-2015 Creek Revd. Time: 12:43
Photos: Weather: clear sunny
Notes:

* IS-19-SFAR *

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
13.71	10.25	98.8	0.021	17	7.36	2.1			1.5 m bottom

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Instrument(S) used: YSI 6920 Personnel: BTH

Site Location: SFAR upstream of White Rock PH. UTM (NAD27): 10 S 0692471 4259284
Date: 8-27-2015 Time: 13:38
Photos: Weather: clear sunny
Notes:

IS - 18 - SFAR

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
18.98	9.84	106.0	0.025	22	7.13	1.2			0.25 m bottom

Site Location: UTM (NAD27):
Date: Time:
Photos: Weather:
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	

Site Location: UTM (NAD27):
Date: Time:
Photos: Weather:
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	

Site Location: UTM (NAD27):
Date: Time:
Photos: Weather:
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	

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SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(s) used: YSI 6920 Personnel: BOTH Bruce Thomas Hatch Steve Mary Gabrielson SMUD

Site Location: IS-20-SFAR UTM (NAD27): 10 S 0689634 4293119
Date: 9/3/2015 Time: 14:29
Photos: Weather: clear, sunny
Notes:

no algae

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
15.89	9.86	99.6	0.028	23	6.63	1.5			1m bottom

Site Location: IS-21-SFAR UTM (NAD27): 10 S 0684030 4296322
Date: 9/3/2015 Time: 15:51
Photos: Weather: clear, sunny
Notes:

no algae

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
17.64	9.60	100.7	0.025	21	7.09	1.3	—		0.5m bottom

Site Location: IS-22-SFAR UTM (NAD27): 10 S 0678404 4299110
Date: 9/4/2015 Time: 10:55
Photos: Weather: clear sunny
Notes:

no algae

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
17.33	9.69	100.9	0.032	28	7.22	0.6	—		0.75m bottom

Site Location: IS-23-SFAR UTM (NAD27): 10 S 0673145 4292222
Date: 9/4/2015 Time: 15:30
Photos: Weather: clear sunny
Notes:

no algae

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
20.48	8.81	97.9	0.143	132	7.55	0.9			1.0m bottom

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Reservoir - Water Quality
In situ Profiles

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Date: 10/19/15
Time: 12:30

Site Location: R-IS-1-LL
UTM (NAD27): 10 S 0734275 4321206 (2m)

Instrument used: YSI 6920
Water depth: 11 m

Personnel: BRUCE HITCH, KELLEIGH CRONE

Secchi: 7.5 m

Site Notes: Sunny, Cool, Slight Breeze

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		14.89	7.71	76.3	0.009	7.0	6.75	0.7		
3.3	1	14.88	7.67	75.9	0.009	7.0	6.82	0.7		
6.6	2	14.77	7.64	75.4	0.009	7.0	6.81	0.7		
9.8	3	14.69	7.66	75.4	0.009	7.0	6.76	0.7		
13.1	4	14.67	7.59	74.7	0.009	7.0	6.77	0.7		
16.4	5	14.65	7.57	74.5	0.009	7.0	6.75	0.7		
19.7	6	14.62	7.59	74.6	0.009	7.0	6.73	0.7		
23.0	7	14.57	7.59	74.5	0.011	9.0	6.72	0.8		
26.2	8	14.54	7.66	75.2	0.009	7.0	6.73	0.8		
29.5	9	14.53	7.64	74.9	0.009	7.0	6.71	0.7		
32.8	10	14.52	7.63	74.9	0.009	7.0	6.72	0.7		
36.1	11	14.51	7.50	75.8	0.009	7.0	6.73	1.5*		*Hit bottom
39.4	12									
42.7	13									
45.9	14									
49.2	15									
52.5	16									
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

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Reservoir - Water Quality
In situ Profiles

Date: 10/22/15
Time: 1315

Instrument used: 6920
Water depth: 60 ft

Site Location: R-IS-2-LL
UTM (NAD27): 10S 0732765 4319087 (acu) 3m

Secchi: 7.5 m

Personnel: RTH, KKC

Site Notes: Sunny, warm, calm

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		14.35	7.89	77.1	0.008	7.00	6.82	0.6		
3.3	1	13.74	7.87	75.9	0.008	7.00	6.72	0.6		
6.6	2	13.56	7.86	75.5	0.008	7.00	6.64	0.7		
9.8	3	13.51	7.86	75.4	0.009	7.00	6.60	0.6		
13.1	4	13.46	7.86	75.4	0.010	8.00	6.53	0.6		
16.4	5	13.43	7.88	75.5	0.009	7.00	6.48	0.8		
19.7	6	13.41	7.84	75.0	0.009	7.00	6.45	0.6		
23.0	7	13.39	7.82	74.8	0.009	7.00	6.42	0.7		
26.2	8	13.38	7.81	74.7	0.009	7.00	6.39	0.7		
29.5	9	13.37	7.79	74.6	0.009	7.00	6.36	0.7		
32.8	10	13.35	7.78	74.4	0.009	7.00	6.34	0.6		
36.1	11	13.34	7.77	74.3	0.009	7.00	6.32	0.7		
39.4	12	13.31	7.76	74.1	0.009	7.00	6.31	0.7		
42.7	13	13.29	7.75	74.0	0.010	8.00	6.30	0.9		
45.9	14	13.28	7.75	74.0	0.010	8.00	6.28	0.9		
49.2	15	13.26	7.79	74.3	0.009	7.00	6.27	0.7		
52.5	16	13.26	7.75	74.0	0.009	7.00	6.26	0.8		
55.8	17	13.24	7.73	73.7	0.009	7.00	6.26	0.7		
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

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Reservoir - Water Quality
In situ Profiles

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Date: 10/22/15
Time: 1330

Instrument used: 6920
Water depth: 51.6 ft

Site Location: R-IS-3-U
UTM (NAD27): 10S 0731660 4318947 (meu) 3m

Secchi: 7m

Personnel: BTH, KKC

Site Notes: Sunny, warm, calm

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		13.60	8.03	77.2	0.009	7.00	6.67	0.6		
3.3	1	13.62	7.99	76.8	0.009	7.00	[illegible]	0.7		6.63 = pH
6.6	2	13.18	7.99	76.1	0.009	7.00	6.55	0.7		
9.8	3	13.05	8.00	76.0	0.009	7.00	6.52	0.7		
13.1	4	13.00	8.01	76.0	0.010	8.00	6.49	0.7		
16.4	5	12.94	8.00	75.9	0.009	7.00	6.45	0.7		
19.7	6	12.90	7.99	75.7	0.009	7.00	6.42	0.7		
23.0	7	12.86	7.97	75.4	0.009	7.00	6.39	0.8		
26.2	8	12.85	7.96	75.3	0.009	7.00	6.37	0.7		
29.5	9	12.85	7.94	75.2	0.009	7.00	6.36	0.7		
32.8	10	12.85	7.94	75.1	0.009	7.00	6.35	0.8		
36.1	11	12.83	7.93	75.0	0.009	7.00	6.34	0.8		
39.4	12	12.81	7.92	74.8	0.009	7.00	6.34	0.8		
42.7	13	12.80	7.91	74.8	0.009	8.00	6.32	0.8		
45.9	14	12.78	7.92	74.8	0.009	7.00	6.32	0.8		
49.2	15									
52.5	16									
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

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Reservoir - Water Quality
In situ Profiles

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Date: 10/20/15
Time: 13:45

Instrument used: 6920
Water depth: 22.4 ft.

Site Location: R-IS-4-GC
UTM (NAD27): (acu)

Secchi: 6m.

Personnel: BRUCE HITCH, KELLEIGH CROWE

Site Notes: SUNNY, COOL, WINDY

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		14.00	8.72	80.1	0.021	16.0	7.79	0.8		
3.3	1	13.99	8.00	77.5	0.021	16.0	7.50	0.8		
6.6	2	13.98	7.92	76.8	0.021	16.0	7.36	0.8		
9.8	3	13.96	7.86	76.2	0.021	16.0	7.28	0.8		
13.1	4	13.82	7.81	75.0	0.021	16.0	7.21	0.8		
16.4	5	13.35	7.74	73.8	0.019	15.0	7.16	0.9		
19.7	6	12.90	7.76	73.5	0.020	17.0	7.13	0.9		
23.0	7									
26.2	8									
29.5	9									
32.8	10									
36.1	11									
39.4	12									
42.7	13									
45.9	14									
49.2	15									
52.5	16									
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

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Reservoir - Water Quality
In situ Profiles

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Date: 10/23/15
Time: 1500

Instrument used: 6920
Water depth: 20.2 ft

Site Location: R-IS-5-UVR
UTM (NAD27): 10 S 0727189 4307401 (acu) 3m

Secchi: 6.5m

Personnel: BTH + KKC

Site Notes: ~~Sunny~~, Partly cloudy, Breezy

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		16.34	8.18	83.5	0.014	10.0	6.57	0.6		
3.3	1	16.35	8.19	83.5	0.013	11.0	6.83	0.6		
6.6	2	16.34	8.08	82.4	0.013	11.0	6.76	0.6		
9.8	3	16.31	8.01	81.6	0.013	11.0	6.74	0.6		
13.1	4	16.17	7.98	81.1	0.013	11.0	6.67	0.6		
16.4	5	16.10	7.95	80.8	0.013	11.0	6.65	0.6		
19.7	6									
23.0	7									
26.2	8									
29.5	9									
32.8	10									
36.1	11									
39.4	12									
42.7	13									
45.9	14									
49.2	15									
52.5	16									
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

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Stillwater Sciences

Reservoir - Water Quality
In situ Profiles

Date: 10/23/15
Time: 1330

Instrument used: 6920
Water depth: 116 ft

Site Location: R-ES-6-UVR
UTM (NAD27): 10S 0725572 4304448 (3 sec)

Secchi: ~~3~~ 7.5 m

Personnel: BTH + KKC

Site Notes: Sunny, Warm, Slight breeze

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		16.41	7.57	[illegible]	0.014	11.0	6.77	0.5		77.3 = DO %
3.3	1	16.40	8.03	82.0	0.013	11.0	6.90	0.5		
6.6	2	16.28	7.99	81.4	0.013	11.0	6.84	0.5		
9.8	3	16.21	7.98	81.2	0.013	11.0	6.83	0.5		
13.1	4	16.20	7.97	81.0	0.013	11.0	6.78	0.4		
16.4	5	16.16	7.96	80.9	0.013	11.0	6.75	0.5		
19.7	6	16.14	7.95	80.8	0.013	11.0	6.72	0.4		
23.0	7	16.12	7.94	80.6	0.014	11.0	6.70	0.5		
26.2	8	16.11	7.93	80.4	0.014	11.0	6.70	0.5		
29.5	9	16.11	7.92	80.5	0.015	11.0	6.68	0.5		
32.8	10	16.10	7.93	80.4	0.014	11.0	6.68	0.5		
36.1	11	16.09	7.90	80.2	0.014	11.0	6.68	0.5		QC change: Field crew error, should have recorded 6.67 MBS
39.4	12	16.08	7.89	80.1	0.014	11.0	6.66	0.5		
42.7	13	16.07	7.88	79.9	0.014	11.0	7.67	0.5		
45.9	14	16.07	7.87	79.8	0.014	11.0	6.64	0.5		
49.2	15	16.06	7.86	79.7	0.014	11.0	6.66	0.5		
52.5	16	16.03	7.85	79.4	0.014	11.0	6.66	0.5		
55.8	17	15.92	7.81	78.9	0.014	11.0	6.65	0.4		
59.1	18	14.46	8.02	78.6	0.015	12.0	6.77	0.5		
62.3	19	12.87	7.13	67.1	0.013	10.0	6.55	0.5		
65.6	20	12.36	6.79	63.3	0.013	10.0	6.36	0.4		
68.9	21	11.89	6.61	61.(	0.013	10.0	6.23	0.6		
72.2	22	11.59	6.46	59.1	0.013	10.0	6.14	0.6		
75.5	23	11.02	6.21	56.0	0.013	10.0	6.06	0.6		
78.7	24	10.37	5.92	52.5	0.013	10.0	5.99	0.6		
82.0	25	9.95	5.55	48.7	0.014	10.0	5.90	0.7		
85.3	26	9.69	5.52	48.6	0.013	10.0	5.81	0.5		
88.6	27	9.54	5.27	45.9	0.014	10.0	5.77	0.7		
91.9	28	9.28	5.05	43.8	0.014	10.0	5.73	0.8		
95.1	29	9.07	4.85	41.9	0.014	10.0	5.68	0.7		
98.4	30	8.98	4.66	40.2	0.014	10.0	5.64	1.0		
101.7	31	8.92	4.46	40.3	0.014	10.0	5.61	1.0		
105.0	32	8.66	4.14	35.5	0.015	10.0	5.59	1.0		
108.3	33									
111.5	34									

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Stillwater Sciences

Reservoir - Water Quality
In situ Profiles

Date: 10/23/15
Time: 1430

Instrument used: 6920
Water depth: 83 ft.
Secchi: 7.0 m

Site Location: R-IS-7-UVR
UTM (NAD27): 10S 0726091 4306241 (meters) 3m

Personnel: BTH + KLC

Site Notes: Sunny, warm, Breezy.

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		16.61	8.00	82.0	0.013	11.0	6.76	0.5		
3.3	1	16.61	7.96	81.7	0.013	11.0	6.76	0.5		
6.6	2	16.55	7.95	81.4	0.013	11.0	6.68	0.5		
9.8	3	16.39	7.94	81.1	0.013	11.0	6.74	0.5		
13.1	4	16.27	7.95	80.9	0.013	11.0	6.58	0.5		
16.4	5	16.22	7.94	80.8	0.013	11.0	6.55	0.5		
19.7	6	16.18	7.91	80.5	0.013	12.0	6.55	0.5		
23.0	7	16.13	7.93	80.5	0.015	12.0	6.57	0.7		
26.2	8	16.14	7.88	80.1	0.013	11.0	~~7.57~~	~~0.5~~		QC change: Field crew error, should have recorded 6.57 NLS
29.5	9	16.12	7.87	79.9	0.013	11.0	6.56	0.5		
32.8	10	16.07	7.83	79.3	0.013	11.0	6.54	0.6		
36.1	11	16.03	7.78	78.9	0.013	11.0	6.52	0.6		
39.4	12	16.03	7.76	78.7	0.013	11.0	6.52	0.5		
42.7	13	16.01	7.75	78.5	0.013	11.0	6.52	0.5		
45.9	14	16.00	7.73	78.3	0.013	11.0	6.52	0.5		
49.2	15	15.99	7.72	78.2	0.013	11.0	6.53	0.5		
52.5	16	15.98	7.71	78.0	0.015	12.0	6.50	0.5		
55.8	17	15.91	7.73	78.1	0.015	11.0	6.51	0.6		
59.1	18	15.78	7.63	76.2	0.013	11.0	6.61	0.7		
62.3	19	13.47	6.86	66.2	0.013	10.0	6.42	0.8		
65.6	20	12.16	6.38	58.2	0.012	9.0	6.34	0.8		
68.9	21	11.23	5.50	49.4	0.013	9.0	6.15	1.0		
72.2	22	10.95	4.83	43.2	0.013	10.0	5.99	1.2		
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

Stillwater Sciences

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Reservoir - Water Quality
In situ Profiles

Date: 10/23/2015
Time: 1245

Site Location: R-IS-8-UVR
UTM (NAD27): 10S 0722602 4304952 (acu) 2m

Instrument used: 6920
Water depth: 97 ft
Secchi: 8m

Personnel: BTH, KKC

Site Notes: Sunny, warm, slight breeze

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		16.68	8.36	85.9	0.014	12.0	7.65	0.5		
3.3	1	16.42	8.19	83.5	0.012	10.0	6.97	0.5		
6.6	2	16.28	8.08	82.3	0.012	10.0	6.67	0.5		
9.8	3	16.24	8.02	81.7	0.013	11.0	6.48	0.4		
13.1	4	16.21	7.99	81.3	0.013	11.0	6.33	0.6		
16.4	5	16.20	7.98	81.1	0.013	11.0	6.22	0.4		
19.7	6	16.19	7.96	80.9	0.013	11.0	6.15	0.5		
23.0	7	16.18	7.93	80.6	0.013	11.0	6.10	0.5		
26.2	8	16.18	7.92	80.5	0.013	11.0	6.07	0.5		
29.5	9	16.17	7.91	80.5	0.016	13.0	6.06	0.4		
32.8	10	16.17	7.99	81.1	0.014	11.0	6.06	0.8		
36.1	11	16.16	7.91	80.4	0.014	11.0	6.06	0.5		
39.4	12	16.16	7.89	80.1	0.014	11.0	6.06	0.5		
42.7	13	16.16	7.86	79.9	0.014	12.0	6.06	0.5		
45.9	14	16.16	7.86	79.8	0.014	12.0	6.06	0.5		
49.2	15	16.16	7.85	79.8	0.014	12.0	6.07	0.4		
52.5	16	16.15	7.84	79.7	0.014	12.0	6.08	0.5		
55.8	17	16.07	7.83	79.3	0.014	12.0	6.10	~~0.5~~		0.5 = NTU
59.1	18	14.58	7.85	77.2	0.015	12.0	6.08	0.4		
62.3	19	13.39	7.49	71.1	0.013	10.0	6.03	0.3		
65.6	20	12.03	7.25	67.0	0.013	10.0	5.87	0.4		
68.9	21	11.27	6.95	63.2	0.013	10.0	5.76	0.4		
72.2	22	10.69	6.78	60.8	0.013	10.0	5.71	0.4		
75.5	23	10.27	6.63	58.9	0.013	9.0	5.67	0.4		
78.7	24	10.03	6.52	57.6	0.013	9.0	5.64	0.4		
82.0	25	9.87	6.38	56.4	0.013	10.0	5.61	0.4		
85.3	26	9.78	6.35	55.9	0.014	10.0	5.60	0.3		
88.6	27	9.47	6.40	56.0	0.015	11.0	5.58	0.3		
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

Stillwater Sciences

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Reservoir - Water Quality
In situ Profiles

Date: 10/20/15
Time: 1600

Instrument used: 6920
Water depth: 74 ft
Secchi: 8 m

Site Location: R-IS-9-IHR
UTM (NAD27): 10S 0731991 4300133 (acu) 3m

Personnel: BRUCE HITCH, KELLEIGH CROWE

Site Notes: SUNNY, COOL, WINDY

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		15.91	8.70	88.0	0.011	9.0	7.80	0.5		
3.3	1	16.00	8.30	83.8	0.010	8.0	7.68	0.6		
6.6	2	15.91	8.10	81.7	0.010	8.0	7.55	0.6		
9.8	3	15.80	8.06	81.3	0.010	8.0	7.52	0.6		
13.1	4	15.79	8.04	81.0	0.010	8.0	7.35	0.6		
16.4	5	15.76	8.01	80.6	0.010	8.0	7.33	0.6		
19.7	6	15.72	7.99	80.3	0.010	8.0	7.40	0.6		
23.0	7	15.71	7.95	80.1	0.010	8.0	7.28	0.6		
26.2	8	15.70	7.93	79.8	0.012	9.0	7.27	0.6		
29.5	9	15.69	7.99	80.2	0.010	8.0	7.18	0.5		
32.8	10	15.69	7.92	79.7	0.010	8.0	7.13	0.6		
36.1	11	15.66	7.87	79.2	0.010	8.0	7.08	0.6		
39.4	12	15.61	7.85	78.7	0.010	8.0	7.03	0.6		
42.7	13	~~15.59~~	7.79	77.8	0.010	8.0	7.12	0.6		15.42°C
45.9	14	14.75	7.49	72.8	0.010	8.0	7.21	0.7		
49.2	15	12.75	6.44	59.5	0.010	8.0	7.01	0.7		
52.5	16	11.57	5.52	50.2	0.010	8.0	6.75	0.7		
55.8	17	10.11	5.75	50.9	0.012	8.0	6.63	1.5		
59.1	18	9.38	3.05	25.5	0.011	8.0	6.51	1.8		
62.3	19	8.88	1.92	15.5	0.016	11.0	6.40	2.5		
65.6	20	8.49	0.96	7.8	0.017	12.0	6.29	2.0		
68.9	21	8.13	0.64	5.3	0.022	15.0	6.24	1.1		
72.2	22	7.95	0.50	4.0	0.022	15.0	6.20	1.1		
75.5	23	7.89	0.42	3.5	0.023	16.0	6.15	4.4		
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

Stillwater Sciences

Reservoir - Water Quality
In situ Profiles

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Date: 10/20/15
Time: 1630

Site Location: R-IS-10-I&R
UTM (NAD27): 10S 0730717 4300382 (acu) 2m

Instrument used: 6920
Water depth: 43ft

Secchi: 8 m

Personnel: BTH, KKC

Site Notes: Sunny, cool, windy

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		15.74	8.62	86.9	0.011	9.0	6.72	0.4		
3.3	1	15.78	8.61	81.4	0.009	8.0	7.02	0.7		
6.6	2	15.79	7.97	80.4	0.010	8.0	7.04	0.6		
9.8	3	15.75	7.96	80.3	0.010	8.0	6.94	0.6		
13.1	4	15.73	7.94	80.0	0.010	8.0	6.95	0.6		
16.4	5	15.73	7.94	80.0	0.010	8.0	6.89	0.7		
19.7	6	15.69	7.93	79.8	0.010	8.0	6.87	0.6		
23.0	7	15.66	7.92	79.7	0.010	8.0	6.88	0.6		
26.2	8	15.64	7.91	79.5	0.010	8.0	6.87	0.6		
29.5	9	15.61	7.90	79.3	0.010	9.0	6.82	0.6		
32.8	10	15.55	7.90	79.3	0.011	9.0	6.86	0.6		
36.1	11	15.52	7.86	78.7	0.010	8.0	6.69	0.7		
39.4	12	15.52	7.78	78.1	0.010	8.0	6.88	2.2		
42.7	13									
45.9	14									
49.2	15									
52.5	16									
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

Stillwater Sciences

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Reservoir - Water Quality
In situ Profiles

Date: 10/22/15
Time: 1100

Instrument used: 6920
Water depth: 65 ft

Site Location: R-IS-11-IHR
UTM (NAD27): 10S 0729245 4300772 (acu) 3m

Secchi: 10.5 m

Personnel: BRUCE HITCH, KELLEIGH CROWE

Site Notes: SUNNY, WARM, CALM

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		15.54	8.46	84.8	0.011	9.0	7.78	0.6		
3.3	1	15.50	8.08	80.9	0.009	8.0	7.57	0.5		
6.6	2	15.43	8.00	80.0	0.010	8.0	7.36	0.5		
9.8	3	15.41	7.94	79.4	0.010	8.0	7.18	0.5		
13.1	4	15.40	7.91	79.1	0.010	8.0	7.06	0.5		
16.4	5	15.39	7.89	78.9	0.010	8.0	6.95	0.5		
19.7	6	15.38	7.87	78.7	0.010	8.0	6.87	0.6		
23.0	7	15.38	7.86	78.6	0.011	9.0	6.78	0.5		
26.2	8	15.38	7.86	78.6	0.011	9.0	6.72	0.5		
29.5	9	15.38	7.88	78.8	0.010	8.0	6.66	0.6		
32.8	10	15.37	7.86	78.6	0.010	8.0	6.63	0.6		
36.1	11	15.34	7.85	78.4	0.010	8.0	6.60	0.5		
39.4	12	15.34	7.83	78.2	0.010	8.0	6.57	0.4		
42.7	13	15.34	7.82	78.2	0.010	8.0	6.55	0.5		
45.9	14	15.31	7.82	78.0	0.010	8.0	6.53	0.5		
49.2	15	15.21	7.74	76.7	0.010	8.0	6.52	0.6		
52.5	16	11.01	6.66	58.5	0.010	7.0	6.58	0.5		
55.8	17	10.27	6.54	58.2	0.012	7.0	6.23	0.8		
59.1	18	9.76	5.04	43.3	0.011	8.0	6.09	0.8		
62.3	19	9.03	4.11	35.0	0.011	8.0	6.00	2.6		
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

Stillwater Sciences

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Reservoir - Water Quality
In situ Profiles

Date: 10/22/15
Time: 1545

Site Location: R-JS-12-JR
UTM (NAD27): 10S 0721007 4303527 (acu) 4m

Instrument used: 6920
Water depth: 53.4ft
Secchi: 3.5m

Personnel: BTH, KLC

Site Notes: Sunny, warm, calm

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		11.40	8.94	81.8	0.014	10.0	7.10	1.0		
3.3	1	10.28	8.92	79.3	0.014	10.0	6.91	0.9		
6.6	2	9.81	8.71	76.7	0.014	11.0	6.64	1.0		
9.8	3	9.67	8.75	76.9	0.014	10.0	6.51	0.9		
13.1	4	9.19	8.20	71.0	0.014	10.0	6.39	0.9		
16.4	5	8.77	7.82	66.6	0.014	9.0	6.31	1.0		
19.7	6	8.61	7.45	63.6	0.014	9.0	6.20	0.9		
23.0	7	8.53	7.22	61.6	0.014	9.0	6.16	0.9		
26.2	8	8.36	7.04	59.9	0.014	9.0	6.10	0.9		
29.5	9	8.35	6.97	59.3	0.014	9.0	6.06	1.0		
32.8	10	8.28	6.95	59.1	0.013	9.0	6.02	1.0		
36.1	11	8.17	7.00	59.3	0.015	10.0	5.99	0.9		
39.4	12	8.07	6.99	59.0	0.013	9.0	5.93	0.9		
42.7	13	8.00	6.87	57.9	0.013	9.0	5.91	0.9		
45.9	14	7.96	6.72	56.5	0.013	9.0	5.88	0.8		
49.2	15	7.95	6.42	54.1	0.013	9.0	5.85	0.8		
52.5	16									
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

Stillwater Sciences

Reservoir - Water Quality
In situ Profiles

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Date: 11/9/15
Time: 1430

Instrument used: YSI 6920
Water depth: 33.47 ft.

Site Location: R-IS-13-CR
UTM (NAD27): 10S 0713983 4300697 (acu) 15m

Secchi: 3m

Personnel: BTH + KKC

Site Notes: Heavy rain, cold
CAMINO

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		7.62	10.61	88.8	0.014	9.0	7.62	4.1		
3.3	1	7.53	10.66	89.0	0.014	9.0	7.14	3.8		
6.6	2	7.44	10.71	89.2	0.014	9.0	6.73	3.2		
9.8	3	7.40	10.71	89.1	0.014	9.0	6.45	3.0		
13.1	4	7.36	10.71	89.0	0.014	9.0	6.25	3.1		
16.4	5	7.30	10.72	89.0	0.014	9.0	6.09	4.0		
19.7	6	7.28	10.72	88.9	0.014	10.0	6.04	4.8		
23.0	7	7.22	10.71	88.7	0.015	10.0	6.04	5.3		
26.2	8	7.08	10.74	88.6	0.017	11.0	6.05	5.8		
29.5	9	7.07	10.75	88.7	0.015	10.0	6.07	6.0		
32.8	10									
36.1	11									
39.4	12									
42.7	13									
45.9	14									
49.2	15									
52.5	16									
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

Stillwater Sciences

Reservoir - Water Quality
In situ Profiles

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Date: 11/9/15
Time: 11:15

Site Location: R-JS-14-SC
UTM (NAD27): 10S 0703913 4296260 (4 acu)

Instrument used: YSI 6920
Water depth: 9.0 ft.

Secchi: 2.5m

Personnel: BTH + KKC

Site Notes: Light rain, windy, cold

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		7.61	11.54	96.8	0.031	21.0	7.10	4.7		
3.3	1	7.60	11.54	96.5	0.032	21.0	6.93	5.0		
6.6	2	7.59	11.52	96.3	0.032	21.0	6.85	5.0		
9.8	3									
13.1	4									
16.4	5									
19.7	6									
23.0	7									
26.2	8									
29.5	9									
32.8	10									
36.1	11									
39.4	12									
42.7	13									
45.9	14									
49.2	15									
52.5	16									
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25									
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									

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Reservoir - Water Quality
In situ Profiles

Date: 11/9/15
Time: 12:00

Site Location: R-IS-15-SC
UTM (NAD27): 10S 0700870 4295323 (3 acc)

Instrument used: YSI 6920
Water depth: 105 ft

Secchi: 3 m

Personnel: BTH + KKC

Site Notes: RAIN, COLD

Depth (ft)	Depth (m)	Temp (C)	DO (mg/l)	DO (%)	Conductivity mS/cm	Conductivity µS/cm	pH	Turbidity NTU	Water Sample	Notes
surface		11.38	9.84	90.1	0.033	24.0	6.81	2.5		
3.3	1	11.42	9.13	83.4	0.032	23.0	6.97	4.8		
6.6	2	11.38	8.93	81.6	0.032	23.0	6.98	5.2		
9.8	3	11.37	8.82	80.7	0.032	24.0	6.94	4.9		
13.1	4	11.36	8.78	80.2	0.032	24.0	6.94	4.8		
16.4	5	11.35	8.75	80.0	0.032	24.0	6.91	4.7		
19.7	6	11.35	8.72	79.8	0.032	24.0	6.91	4.7		
23.0	7	11.35	8.72	79.7	0.034	25.0	6.90	4.7		
26.2	8	11.33	8.72	79.7	0.034	25.0	6.87	5.1		
29.5	9	11.24	8.57	77.7	0.037	28.0	6.83	6.7		
32.8	10	11.18	8.37	76.2	0.037	28.0	6.81	6.9		
36.1	11	11.14	8.29	75.4	0.037	27.0	6.79	6.8		
39.4	12	11.10	8.25	75.0	0.036	26.0	6.77	6.7		
42.7	13	11.07	8.24	74.8	0.035	26.0	6.76	6.7		
45.9	14	11.02	8.27	75.1	0.034	25.0	6.75	6.2		
49.2	15	X	8.36	75.9	0.033	24.0	6.75	5.7		QC Check: water temp not correct, field crew error 7185 should be 10.98°C
52.5	16	10.93	8.43	76.3	0.035	26.0	6.73	8.6		
55.8	17	10.91	8.43	76.3	.033	24.0	6.72	5.6		
59.1	18	10.89	8.49	76.8	0.033	24.0	6.69	5.6		
62.3	19	10.81	8.53	77.0	0.033	24.0	6.68	5.3		
65.6	20	10.77	8.54	77.5	0.033	24.0	6.65	5.4		
68.9	21	10.76	8.62	77.8	0.033	24.0	6.64	5.3		
72.2	22	10.68	8.65	77.9	0.033	24.0	6.63	5.6		
75.5	23	10.61	8.71	78.3	0.033	24.0	6.63	5.6		
78.7	24	10.51	8.78	78.7	0.032	23.0	6.61	5.6		
82.0	25	10.40	8.85	79.1	0.032	23.0	6.61	5.7		
85.3	26	10.16	8.96	79.9	0.032	23.0	6.58	6.1		
88.6	27	10.07	9.05	80.3	0.033	24.0	6.57	6.4		
91.9	28	10.04	9.05	80.3	0.032	23.0	6.57	6.4		
95.1	29	10.01	9.09	81.2	0.032	23.0	6.56	6.6		
98.4	30	9.95	9.18	81.2	0.032	23.0	6.55	7.6		
101.7	31									
105.0	32									
108.3	33									
111.5	34									

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SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(s) used: YSI 6920 Personnel: BRUCE HITCH

Site Location: IS-11-SFSC UTM (NAD27): N/A
Date: 10/2/15 Time: 10:45 am
Photos: N/A Weather: 38° 36° RAIN, OVERCAST, NO WIND
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
7.78	9.73	81.8	0.018	12	7.13	2.5		0.5m => bottom	

Site Location: IS-12-SC UTM (NAD27): N/A
Date: 10/2/15 Time: 11:14 am
Photos: N/A Weather: 36° RAIN, OVERCAST, NO WIND
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
7.34	9.52	79.0	0.020	12	7.03	1.7		1.0m => bottom	

Site Location: IS-13-SC UTM (NAD27): N/A
Date: 10/2/15 Time: 12:30 pm &
Photos: N/A Weather: 38° DRIZZLE, OVERCAST, NO WIND
Notes: chocolate brown - right after heavy rain

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
9.34	9.97	87.0	0.026	18	6.89	71.5		<0.25 m	lots of sediment chocolate brown

Site Location: IS-14-SC UTM (NAD27): N/A
Date: 10/2/15 Time: 13:15
Photos: N/A Weather: 38° DRIZZLE, OVERCAST, NO WIND
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
8.70	10.02	86.2	0.015	10	6.87	3.3		1m => bottom	

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SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(S) used: YSI 6920 Personnel: BRUCE HITCH

Site Location: IS-15-SFAR UTM (NAD27): N/A
Date: 10/2/15 Time: 14:20
Photos: N/A Weather: 46° RAIN, OVERCAST, NO WIND
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
11.06	9.85	89.6	0.077	57	7.03	12.6		<0.25	

Site Location: IS-17-BC UTM (NAD27): N/A
Date: 10/3/15 Time: 10:40
Photos: N/A Weather: 44°, CLOUDY, NO WIND
Notes: chocolate brown (after rain event)

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
12.44	9.45	88.6	0.049	38	7.67	295.4		<0.25m	

Site Location: IS-16-SFAR UTM (NAD27): N/A
Date: 10/3/15 Time: 11:40
Photos: N/A Weather: 44°, PARTLY CLOUDY, NO WIND
Notes: chocolate brown (after rain event)

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
9.08	10.42	90.4	0.080	55	7.30	35.3		<0.3m	

Site Location: IS-19-SFAR UTM (NAD27): N/A
Date: 10/3/15 Time: 12:42
Photos: N/A Weather: 48°, PARTLY CLOUDY, NO WIND
Notes: water was moderately cloudy (after rain event)

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
11.42	9.77	89.7	0.029	21	7.60	10.0		0.75m	⇒ bottom

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SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(s) used: YSI 6920 Personnel: BTH + KKC

Site Location: IS-1B-SFAR UTM (NAD27): 10S 0692640 4292674
Date: 11/3/15 Time: 13:40
Photos: N/A Weather: Partly cloudy, no wind 54°F
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
11.94	9.98	92.5	0.047	35.0	7.30	9.5		0.5	=Bottom

Site Location: IS-9-GCC UTM (NAD27): N/A
Date: 11/4/15 Time: 9:45
Photos: N/A Weather: Sunny, clear, light wind 35°F
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
10.05	7.41	65.7	0.042	30.0	7.79	1.5		1.5	

Site Location: IS-6-GC UTM (NAD27): N/A
Date: 11/4/15 Time: 10:20
Photos: N/A Weather: Sunny, clear, light wind 37°F
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
7.83	9.30	78.2	0.018	12.0	7.31	1.9		0.5	=Bottom

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Instrument(S) used: YSI 6920 **Personnel:** BTH + KKC

Site Location: IS-5-GC UTM (NAD27): N/A
Date: 11/4/15 Time: 10:35
Photos: N/A Weather: Sunny, Clear, Slight breeze 38°F
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
3.77	9.77	74.1	0.017	10.0	7.16	1.6		1.0	= Bottom

Site Location: IS-4-GC UTM (NAD27): N/A
Date: 11/4/15 Time: 11:20
Photos: N/A Weather: Sunny, Clear, Slight breeze 36°F
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
10.47	8.90	79.7	0.009	6.0	7.44	1.5		1.0	= Bottom

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SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(S) used: YSI 6920 **Personnel:** BTH + KKC

Site Location: IS - 2 - ~~LRR~~ LRR UTM (NAD27): N/A
Date: 11/5/15 Time: 15:30
Photos: N/A Weather: Clear, cold, Sunny
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
6.09	10.01	80.6	0.006	5.0	7.78	1.2		2m	=Bottom

Site Location: IS - 3 - LRR UTM (NAD27): N/A
Date: 11/5/15 Time: 16:00
Photos: N/A Weather: Sunny, Clear, Cold
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
8.85	9.58	82.6	0.009	6.0	7.44	1.4		1.0	=Bottom

Site Location: UTM (NAD27):
Date: Time:
Photos: Weather:
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	

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SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(S) used: YSI 6920 **Personnel:** BTH + KKC

Site Location: IS-8-~~SS~~ SFRR UTM (NAD27): 10S 0725526 4314742 3m
Date: 11/4/15 Time: 12:20
Photos: N/A Weather: Sunny, clear, slight breeze 37°F
Notes: Upstream

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
5.77	10.15	81.0	0.018	12.0	6.96	1.7		2.5	= Bottom

Site Location: IS-10-SFSC UTM (NAD27): N/A
Date: 11/4/15 Time: 13:20
Photos: N/A Weather: Sunny, clear, slight breeze 37°F
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
7.39	8.88	73.9	0.015	10.0	6.57	3.4		0.25	= Bottom

Site Location: IS-1-RR UTM (NAD27): N/A
Date: 11/5/15 Time: 13:45
Photos: N/A Weather: Sunny, cold
Notes:

In situ

Temp	DO		Conductivity		pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	µS/cm		NTU	NTU	m	
3.48	10.09	75.9	0.009	5.0	7.79	2.3		1.0	= Bottom

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APPENDIX D
In situ Field Calibration Sheets

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Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: SMUD WQ

Unit ID: 6920

Sampling Event Date(s): 8/24/15 ONLY

Barometric Pressure

	PRE-SAMPLING	POST SAMPLING
Altitude (A_{ft}):	ft	ft
Barometric Pressure (BP_{in}):	in	in
Barometric Pressure (BP_{mmHg}) = BP_{in} x 25.4	mmHg	mmHg
Corrected BP (BP') = BP_{mmHg} - 2.5 x (A_{ft} /100)	mmHg	mmHg

INITIAL PRE-SAMPLING CALIBRATION

Date and time 8/23/15 @ 21:00 Name CMB

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	17.46	1049	1000	
Cond (uS/cm @ 25°C)	10,000	18.24	~~9871~~	9871	
DO (%)		ON DAY OF SURVEY			
DO (mg/L)*					*Check table**
pH4	pH4	~~17.71~~	—	3.98	OK
pH 7	pH 7	~~19.06~~	7.29	7.00	OK
pH 10	pH 10	18.33	~~9.80~~ 9.82	/10.00	OK
Turbidity NTU	0				
Turbidity NTU	12.7	18.37	12.4	12.7	OK
*DO Solubility Table: Temp (°C)._____ DO _____mg/L					

post – Turbidity meter: 1000NTU (reading=1002); 10.0 NTU (reading= 10.04); 0.02 (reading=0.02) readings

POST-SAMPLING CHECK & RECALIBRATION

Date and time 8/24/15 @ 1030 Name CMB

DO calibrated day of sampling2

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value[1]	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)							
Cond (uS/cm @ 25°C)							
DO (%)		21.62	80.4		21.64	82.2	625.2 mmHg
*DO (mg/L)		21.62	7.07		21.64	7.24	*Check table**
pH4	pH4						
pH 7	pH 7	~~18.06~~	~~6.83~~				
pH 10	pH 10	~~12.72~~	10.08				
Turbidity							
Turbidity							
*DO Solubility Table: Temp (°C). 21.62 DO 7.2 mg/L ✓							
✓ = Post Calibration or Sampling value accepted (Table 1)							

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4 FIELD CALIBRATION CHECK/RECALIBRATION

Date and time 9/28/15 @ 1820 Name CHRISTINA BUCK

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
							All OK
Cond (uS/cm @ 25°C)	1,000	24.47	0.990	✓	NO		
Cond (uS/cm @ 25°C)	10,000	25.04	9.859	✓	RECAL		
DO (%)		23.79	82.8%		ON		628.5 Baro
*DO (mg/L)	—	23.79	6.99	✓	9/25/15		Check table*
pH4	pH4	24.27	3.89	✓			
pH 7	pH 7	23.87	6.96	✓			
pH 10	pH 10	23.58	9.97	✓			
Turbidity	12.7	22.66	12.6	✓			
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO _____mg/L							

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

Turbidity meter (1000NTU = 969.2 reading); 10NTU = 10.24 reading; 0.02NTU = 0.33NTU)

FIELD CALIBRATION CHECK/RECALIBRATION

Date _____ and time_____

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value[1]	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)							
Cond (uS/cm @ 25°C)							
DO (%)							~~628.5 Baro~~
*DO (mg/L)							Check table*
pH4	pH4						
pH 7	pH 7						
pH 10	pH 10						
Turbidity							
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO _____mg/L							

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

Notes:

1. *= DO std. Temp & Std Value are based on table to check if within range.

Table 1: Measurement Quality Objectives – comparisons are between post-sampling value and post-calibration value

Parameter	Units	Accept	Qualify	Reject
Temperature	°C	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity[2]	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
pH	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%

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Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: UARP - WQ In Situ Riverine

Unit ID: YSI 6920

Sampling Event Date(s): 8-25-2015

Barometric Pressure

	PRE-SAMPLING	POST SAMPLING
Altitude (A_{ft}):	1976 m	ft
Barometric Pressure (BP_{in}):	— in	in
Barometric Pressure (BP_{mmHg}) = BP_{in} x 25.4	624.7 mmHg	mmHg
Corrected BP (BP') = BP_{mmHg} - 2.5 x (A_{ft} /100)	— mmHg	mmHg

INITIAL PRE-SAMPLING CALIBRATION

Date and time 8/25/15 9:05 am Name BRUCE HITCH, CHRISTINA BUCK

Parameter	Std. Value**	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Sp Cond	Cond (uS/cm @ 25°C)	1000	16.07	0.997	1.001	
	Cond (uS/cm @ 25°C)	10000	15.82	—	10.01	
	DO (%)	~~8888~~	14.78	82.2	82.3	
	DO (mg/L)*		15.23	8.30	8.26	Check table* 8.2
	pH4	pH4	17.67	3.87	4.00	
	pH 7	pH 7	17.41	6.93	7.00	
	~~pH 10~~	~~pH 10~~	16.52	~~9.86~~	9.92	
1 point	Turbidity	12.7	15.16	12.6	12.7	PRE POST
	Turbidity					10.0NTU (10.13NTU) POST (10.0)
	*DO Solubility Table: Temp (°C)._____ DO _____ mg/L					0.02NTU (0.01NTU) POST (0.03)

1000 NTU ** Sp Cond Std. units µS/cm; readings in µS/cm 1038 994.9

POST-SAMPLING CHECK & RECALIBRATION

Date and time 8/26/15 Name BRUCE HITCH, CHRISTINA BUCK

Parameter	Std. Value **	Std. Temp (°C)	Post-Sampling Value[1]	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	10000	24.17	9870	✓	~~No~~		
Cond (uS/cm @ 25°C)	1000	23.02	1002	✓	No		
since freshwater DO (%)	8	23.45	89.5				651.7
*DO (mg/L)			~~7.49~~ 7.15	✓			Check table*
pH4	pH4	25.25	4.04	✓			
pH 7	pH 7	25.65	7.00	✓			
pH 10	pH 10	25.01	10.00	✓			
Turbidity		22.93	13.4		YES	12.6	
Turbidity							
*DO Solubility Table: Temp (°C). 23.45 DO 7.1 mg/L							
✓ = Post Calibration or Sampling value accepted (Table 1)							

Sp Cond Std units µS/cm; readings in µS/cm

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FIELD CALIBRATION CHECK/RECALIBRATION

Date and time 8-27-2015 16:00 Name Bruce Hitch

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)							
Cond (uS/cm @ 25°C)							
DO (%)		22.20	89.9			88.6	
*DO (mg/L)		24.31	7.38				*Check table**
pH4	pH4						
pH 7	pH 7						
pH 10	pH 10						
Turbidity							9.9 Pre Post 10 (NTU) (10.0)
Turbidity							0.02 0.7 0.01
*DO Solubility Table: Temp (°C)._____ DO 673.5 mg/L							1000 996.5

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

see previous

FIELD CALIBRATION CHECK/RECALIBRATION

Date 8-28-2015 and time Bruce Witch 11:00

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value[1]	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	10000	26.99	9.90	✓			
Cond (uS/cm @ 25°C)	1000	26.38	1007	✓			
DO (%)		23.6	95.3	✓			710.3
*DO (mg/L)			8.08	✓			*Check table**
pH4	pH4	26.69	4.07	✓			
pH 7	pH 7	25.78	7.02	✓			Pre Post
pH 10	pH 10	25.57	9.97	✓		1000	1008 995.1
Turbidity		24.74	12.5	✓		10	0.98 10.0
Turbidity						0.02	0.01 0.02
*DO Solubility Table: Temp (°C)._____ DO _____ mg/L							

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

Notes:

1. *= DO std. Temp & Std Value are based on table to check if within range.

Table 1: Measurement Quality Objectives – comparisons are between post-sampling value and post-calibration value

Parameter	Units	Accept	Qualify	Reject
Temperature	°C	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity[2]	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
pH	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%

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Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: UARP Reservoir Insitu

Unit ID: YSI 6920

Sampling Event Date(s): 10/19 - 10/23

Barometric Pressure

	PRE-SAMPLING	POST SAMPLING
Altitude (A_{ft}):	ft	ft
Barometric Pressure (BP_{in}):	in	in
Barometric Pressure (BP_{mmHg}) = BP_{in} x 25.4	mmHg	mmHg
Corrected BP (BP') = BP_{mmHg} - 2.5 x (A_{ft} /100)	mmHg	mmHg

INITIAL PRE-SAMPLING CALIBRATION

Date and time 10/19 08:30 Name BRUCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value**	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	10 000	19.36	9.80	10.00	
Cond (uS/cm @ 25°C)	1 000	19.8	1.02 ~~0.96~~	1.00	
DO (%)		16.38	80.5		
DO (mg/L)*		16.51	7.93		Check table* 603.5
pH4	pH4	18.94	4.04	3.98	
pH 7	pH 7	18.85	6.86	7.00	
pH 10	pH 10	19.36	9.81	10.00	
Turbidity	12.7	17.78	12.5	12.6	
Turbidity					
*DO Solubility Table: Temp (°C)._____ DO_____mg/L					

** SpCond Std units = µS/cm; calibration reading units = mS/cm

POST-SAMPLING CHECK & RECALIBRATION

Date and time 10/20 12:00 Name BRUCE HITCH

Parameter	Std. Value **	Std. Temp (°C)	Post-Sampling Value[1] **	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1 000	19.21	875	✓			
Cond (uS/cm @ 25°C)	10000	17.63	8588 9	✓			Q
DO (%)		15.	8.26	✓			630.4
*DO (mg/L)			83.4 2	✓			Check table* 8.2
pH4	pH4	18.17	4.36	✓			
pH 7	pH 7	16.75	7.04	✓			
pH 10	pH 10	18.69	10.00	✓			
Turbidity	12.7	17.57	12.2	✓			
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO_____mg/L							
✓ = Post Calibration or Sampling value accepted (Table 1)							

** Spcond Std units = µS/cm; calibration reading units = mS/cm

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FIELD CALIBRATION CHECK/RECALIBRATION

Date and time 10/22 8:30 Name BRUCE HITCH

Parameter	Std. Value **	Std. Temp (°C)	Post-Sampling Value **	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1000	20.31	.889	✓			Q
Cond (uS/cm @ 25°C)	10 000	19.93	8901	✓			Q
DO (%)		17.50	81.80	✓			627.2
*DO (mg/L)			8.0	✓			Check table* 8.1
pH4	pH4	20.23	4.23	✓			
pH 7	pH 7	20.37	7.18	✓			
pH 10	pH 10	19.95	10.07	✓			
Turbidity	12.7	18.91	12.4	✓			
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO _____mg/L							

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

FIELD CALIBRATION CHECK/RECALIBRATION

Date 10/23 10:00 and time BRUCE HITCH

Parameter	Std. Value **	Std. Temp (°C)	Post-Sampling Value[1] **	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1000	18.40	859	✓	YES		Q
Cond (uS/cm @ 25°C)	10 000	18.42	8606	✓			Q
DO (%)		17.5	83.7	✓			641.9
*DO (mg/L)		17.5	8.01	✓			Check table* 8.0
pH4	pH4	18.32	4.23	✓			
pH 7	pH 7	17.92	7.24	✓			
pH 10	pH 10	17.87	10.00	✓			
Turbidity	12.7	17.47	12.1	✓			
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO _____mg/L							

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

Notes:

1. *= DO std. Temp & Std Value are based on table to check if within range.

Table 1: Measurement Quality Objectives – comparisons are between post-sampling value and post-calibration value

Parameter	Units	Accept	Qualify	Reject
Temperature	°C	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity[2]	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
pH	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%

**Sp Cond Std units = uS/cm; YSI calibration readings = mS/cm

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Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: UARP + CB WQ monitoring (Nov 2015)

Unit ID: YSI 6920

Sampling Event Date(s): 11/2 - 11/7

Barometric Pressure

	PRE-SAMPLING	POST SAMPLING
Altitude (A_{ft}):	ft	ft
Barometric Pressure (BP_{in}):	in	in
Barometric Pressure (BP_{mmHg}) = BP_{in} x 25.4	mmHg	mmHg
Corrected BP (BP') = BP_{mmHg} - 2.5 x (A_{ft} /100)	mmHg	mmHg

INITIAL PRE-SAMPLING CALIBRATION

Date and time 11/2 10:13 am Name BRUCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value **	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1000	18.13	~~0.988~~ 0.987 mS	1.004	
Cond (uS/cm @ 25°C)	10 000	17.42	10.77	9.991	
DO (%)		14.31	85.4		640.3 mm Hg
DO (mg/L)*		14.31	8.73	8.62	Check table* 8.6
pH4	pH4	17.98	4.34	4.00	
pH 7	pH 7	18.13	~~6.88~~ 6.93	7.00	
pH 10	pH 10	17.95	9.97	10.00	
Turbidity	12.7	17.51	12.0	12.7	
Turbidity					
*DO Solubility Table: Temp (°C)._____ DO_____mg/L					

** Conductivity units on YSI 6920 are mS/cm

POST-SAMPLING CHECK & RECALIBRATION

Date and time 11/2 18:01 Name BRUCE HITCH

Parameter	Std. Value **	Std. Temp (°C)	Post-Sampling Value¹ **	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1000	16.85	~~832~~ 850	✓Q			Q
Cond (uS/cm @ 25°C)	10000	16.59	10.07 mS	↘			
DO (%)		16.93	8.77	↘			718.3
*DO (mg/L)		16.93	8.77	↘			Check table* 9.0
pH4	pH4	17.04	4.07	↘			
pH 7	pH 7	17.06	7.08	↘			
pH 10	pH 10	17.12	9.98	↘			
Turbidity	12.7	16.38	12.8	↘			
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO_____mg/L							
✓ = Post Calibration or Sampling value accepted (Table 1)							

** Sp Cond Std units = µS/cm; YSI calibration readings = mS/cm

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FIELD CALIBRATION CHECK/RECALIBRATION

Date and time 11/5 17:39 Name BRUCE HITCH

Parameter	Std. Value **	Std. Temp (°C)	Post-Sampling Value **	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1000	14.85	~~1.008~~	✓			
Cond (uS/cm @ 25°C)	10 000	15.98	10.02	✓			
DO (%)			93.5	✓			725.5
*DO (mg/L)		17.32	9.0	✓			Check table* 9.2
pH4	pH4	14.50	4.04	✓			
pH 7	pH 7	14.74	7.07	✓			
pH 10	pH 10	15.07	9.90	✓			
Turbidity	12.7	16.80	13.5	✓			
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO _____mg/L							

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

FIELD CALIBRATION CHECK/RECALIBRATION

Date 11/5 6:50 and time BRUCE HITCH

Parameter	Std. Value **	Std. Temp (°C)	Post-Sampling Value[1] **	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (mS/cm @ 25°C)	10000	16.64	9.978	✓			
Cond (uS/cm @ 25°C)	1000	15.87	865	✓			⊘
DO (%)		17.42	93.8	✓			733.7
*DO (mg/L)			8.98	✓			Check table* 9.2
pH4	pH4	16.69	4.08	✓			
pH 7	pH 7	16.43	7.03	✓			
pH 10	pH 10	16.28	9.94	✓			
Turbidity	12.7	18.20	12.9	✓			
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO _____mg/L							

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

** Conductivity units on YSI 6920 are ms/cm; Sp Cond Std units = µs/cm

Notes:

1. *= DO std. Temp & Std Value are based on table to check if within range.

Table 1: Measurement Quality Objectives – comparisons are between post-sampling value and post-calibration value

Parameter	Units	Accept	Qualify	Reject
Temperature	°C	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity[2]	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
pH	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%

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FIELD CALIBRATION CHECK/RECALIBRATION

Date and time 11/7 8:30 am Name BRUCE HITCH

Parameter	Std. Value **	Std. Temp (°C)	Post-Sampling Value **	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1000	18.77	1.033	✓			
Cond (uS/cm @ 25°C)	10.000	18.99	10.01	✓			
DO (%)		~~18.84~~	93.1				733.2
*DO (mg/L)		19.5	8.65	✓			Check table* 8.8
pH4	pH4	18.53	4.02	✓			
pH 7	pH 7	18.48	7.00	✓			
pH 10	pH 10	18.68	10.01	✓			
Turbidity	12.7	18.72	12.8	✓			
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO _____mg/L							

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

** Spcond Std units = µS/cm; YSI calibration readings = mS/cm

FIELD CALIBRATION CHECK/RECALIBRATION

Date _____ and time_____

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value[1]	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)							
Cond (uS/cm @ 25°C)							
DO (%)							
*DO (mg/L)							Check table*
pH4	pH4						
pH 7	pH 7						
pH 10	pH 10						
Turbidity							
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO _____mg/L							

✓ = Post Calibration or Sampling value accepted (see Table 1 for MQOs)

Notes:

1. *= DO std. Temp & Std Value are based on table to check if within range.

Table 1: Measurement Quality Objectives – comparisons are between post-sampling value and post-calibration value

Parameter	Units	Accept	Qualify	Reject
Temperature	°C	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity[2]	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
pH	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%

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Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: UARP + CB RESERVOIR WQ MONITORING (2015)

Unit ID: YSI 6920

Sampling Event Date(s): 11/9 - 11/9

Barometric Pressure

	PRE-SAMPLING	POST SAMPLING
Altitude (A_{ft}):	ft	ft
Barometric Pressure (BP_{in}):	in	in
Barometric Pressure (BP_{mmHg}) = BP_{in} x 25.4	mmHg	mmHg
Corrected BP (BP') = BP_{mmHg} - 2.5 x (A_{ft} /100)	mmHg	mmHg

INITIAL PRE-SAMPLING CALIBRATION

Date and time 11/8 22:30 Name BRUCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1.000	18.10	1.002	1.000	
Cond (uS/cm @ 25°C)	10.000	17.89	9.928	10.000	
DO (%)		18.26	92.7	95.6	
DO (mg/L)*			8.7	8.98	Check table* 727.2 mm/Hg
pH4	pH4	18.09	4.13	4.00	
pH 7	pH 7	18.15	6.89	7.00	
pH 10	pH 10	18.11	9.98	10.00	
Turbidity	12.7	17.66	13.2	12.7	
Turbidity					
*DO Solubility Table: Temp (°C)._____ DO _____mg/L					

POST-SAMPLING CHECK & RECALIBRATION

Date and time 11/10 11:00 Name Kelleigh Crowe

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value[1]	✓	Re-Cal. Yes or No	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1000	11.82	1.021	✓			
Cond (uS/cm @ 25°C)	10,000	11.62	10.83	✓			
DO (%)		12.02	10.41	✓			
*DO (mg/L)			96.4%	✓			Check table* 10.4
pH4	pH4	11.72	4.00	✓			733.6 mm/Hg
pH 7	pH 7	11.49	6.96	✓			
pH 10	pH 10	11.32	9.85	✓			
Turbidity	12.7	10.80	12.2	✓			
Turbidity							
*DO Solubility Table: Temp (°C)._____ DO _____mg/L							
✓ = Post Calibration or Sampling value accepted (Table 1)							

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APPENDIX E
Analytical Laboratory Bacteria Reports

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 09, 2015

CLS Work Order #: CYI0080
COC #:

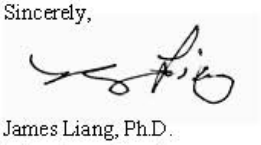
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/01/15 16:43. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 09/09/15 12:13

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: [none]
Project Manager: Maia Singer

CLS Work Order #: CYI0080
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI0080 (of)

Report To: Stillwater Sciences, 2855 Telegraph Ave. Suite 400, Berkeley, CA 94705
Project Manager: Maia Singer maia@stillwatersci.com
Project Name: SMUD In situ and Bac-T Monitoring
Sampled By: KKC + BTH
Job Description: Monitor seasonal bacteria levels in UARP and CB reaches.
Site Location: UARP

Client Job Number:
Destination Laboratory:
[X] CLS (916) 638-7301, 3249 Fitzgerald Road, Rancho Cordova, CA 95742, www.californialab.com
[ ] OTHER

ANALYSIS REQUESTED — PRESERVATIVES: Fecal coliform-15 Tube; Fecal coliform-20 Tube; E. coli

GEOTRACKER
EDF REPORT YES [X] NO [ ]
GLOBAL ID:
FIELD CONDITIONS: clear, sunny

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES ▼	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
SEPT 8th 2015	9:20	UARP-RSVR-BACT-1		Surface water			6	X		X				X	
9/1/2015	9:00	UARP-RSVR-BACT-2		Surface water			6	X		X				X	
9/1/2015	14:30	UARP-RSVR-BACT-3		Surface water			6	X		X				X	
9/1/2015	13:50	UARP-RSVR-BACT-4		Surface water			6	X		X				X	
9/1/2015	14:30	UARP-RSVR-BACT-5		Surface water			6	X		X				X	
9/1/2015	14:45	UARP-RSVR-BACT-6		Surface water			6	X		X				X	
				Surface water			6							X	INVOICE TO:
				Surface water			6							X	Stillwater Sciences
				Surface water			6							X	Same as above
				Surface water			6							X	
				Surface water			6							X	Project No. 500.20 Task 0110.00
				Surface water			6							X	QUOTE#

SUSPECTED CONSTITUENTS
SAMPLE RETENTION TIME
PRESERVATIVES (1) HCL (2) HNO_3 (3) = COLD (4) = H_2SO_4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
	Stillwater Sciences	9/1/15		
	Kelleigh Crowe	4:45		

RECEIVED AT LAB BY: DATE/TIME: 9-1-15 1643 CONDITIONS/COMMENTS:
SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER AIR BILL #
0.4

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 **www.californialab.com** **916-638-7301** **Fax: 916-638-4510**

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: [none]
Project Manager: Maia Singer

CLS Work Order #: CYI0080
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
UARP-RSVR-BacT-1 (CYI0080-01) Water	**Sampled: 09/01/15 09:20**		**Received: 09/01/15 16:43**						**HT-1**
E. Coli	**2.0**	1.8	MPN/100 mL	1	CY06032	09/01/15	09/03/15	SM 9221	
Fecal Coliforms	**4.0**	1.8	"	"	"	"	"	"	
UARP-RSVR-BacT-2 (CYI0080-02) Water	**Sampled: 09/01/15 09:00**		**Received: 09/01/15 16:43**						**HT-1**
E. Coli	<1.8	1.8	MPN/100 mL	1	CY06032	09/01/15	09/03/15	SM 9221	
Fecal Coliforms	<1.8	1.8	"	"	"	"	"	"	
UARP-RSVR-BacT-3 (CYI0080-03) Water	**Sampled: 09/01/15 14:30**		**Received: 09/01/15 16:43**						
E. Coli	**2.0**	1.8	MPN/100 mL	1	CY06032	09/01/15	09/03/15	SM 9221	
Fecal Coliforms	**2.0**	1.8	"	"	"	"	"	"	
UARP-RSVR-BacT-4 (CYI0080-04) Water	**Sampled: 09/01/15 13:50**		**Received: 09/01/15 16:43**						
E. Coli	**2.0**	1.8	MPN/100 mL	1	CY06032	09/01/15	09/03/15	SM 9221	
Fecal Coliforms	**2.0**	1.8	"	"	"	"	"	"	
UARP-RSVR-BacT-5 (CYI0080-05) Water	**Sampled: 09/01/15 14:30**		**Received: 09/01/15 16:43**						
E. Coli	**33**	1.8	MPN/100 mL	1	CY06032	09/01/15	09/03/15	SM 9221	
Fecal Coliforms	**23**	1.8	"	"	"	"	"	"	
UARP-RSVR-BacT-6 (CYI0080-06) Water	**Sampled: 09/01/15 14:45**		**Received: 09/01/15 16:43**						
E. Coli	**350**	1.8	MPN/100 mL	1	CY06032	09/01/15	09/03/15	SM 9221	
Fecal Coliforms	**350**	1.8	"	"	"	"	"	"	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: [none]	**CLS Work Order #: CYI0080**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

HT-1	The sample was received outside of the EPA recommended holding time.
BT-4	<1.8
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 10, 2015

CLS Work Order #: CYI0133
COC #:

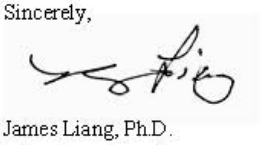
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/02/15 15:50. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 4 09/10/15 15:02

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0133
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI0133 (of)

Report To:
Stillwater Sciences
2855 Telegraph Ave. Suite 400
Berkeley, CA 94705
Project Manager: Maia Singer maia@stillwatersci.com
Project Name: SMUD In situ and Bac-T Monitoring
Sampled By: KRC + BTH
Job Description: Monitor seasonal bacteria levels in UARP and CB reaches.
Site Location: UARP

Client Job Number
Destination Laboratory
[x] CLS (916) 638-7301
3249 Fitzgerald Road
Rancho Cordova, CA
95742
www.californialab.com
[ ] OTHER

GEOTRACKER
EDF REPORT YES [x] NO [ ]
GLOBAL ID:
FIELD CONDITIONS: clear, sunny

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	CONTAINER MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli – QT 2000	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9/2/2015	11:30	Bac - 3 - LL		Surface water			6	X		X				X	
9/2/2015	10:50	Bac - 4 - LL		Surface water			6	X		X				X	
9/2/2015	10:30	Bac - 5 - GCR		Surface water			6	X		X				X	
9/2/2015	10:50	Bac - 6 - GCR		Surface water			6	X		X				X	
9/2/2015	12:15	Bac - 7 - UVR		Surface water			6		X	X				X	
9/2/2015	11:45	Bac - 8 - UVR		Surface water			6		X	X				X	
9/2/2015	13:20	Bac - 9 - UVR		Surface water			6		X	X				X	INVOICE TO:
9/2/2015	11:15	Bac - 10 - UVR		Surface water			6		X	X				X	Stillwater Sciences
9/2/2015	13:00	Bac - 11 - JR		Surface water			6		X	X				X	Same as above
9/2/2015	12:40	Bac - 12 - THR		Surface water			6	X		X				X	
9/2/2015	12:15	Bac - 13 - THR		Surface water			6	X		X				X	Project No. 500.20 Task 0110.00
9/2/2015	15:15	Bac - 15 - SCR		Surface water			6	X		X				X	QUOTE#

SUSPECTED CONSTITUENTS
SAMPLE RETENTION TIME
PRESERVATIVES (1) HCL (2) HNO_3 (3) = COLD (4) = H_2SO_4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
	Kelleigh Crowe Stillwater Sciences	9/2/15 3:50PM		

RECEIVED AT LAB BY: DATE/TIME: 9/2/15 1550 CONDITIONS/COMMENTS: (1.7)

SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER AIR BILL #

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0133
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-3-LL (CYI0133-01) Water Sampled: 09/02/15 11:30 Received: 09/02/15 15:50									
E. Coli	<1	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06079	09/02/15	09/05/15	SM 9221	
Bac-4-LL (CYI0133-02) Water Sampled: 09/02/15 10:50 Received: 09/02/15 15:50									
E. Coli	<1	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06079	09/02/15	09/05/15	SM 9221	
Bac-5-GCR (CYI0133-03) Water Sampled: 09/02/15 10:30 Received: 09/02/15 15:50									
E. Coli	**3.1**	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	**6.8**	1.8	"	"	CY06079	09/02/15	09/05/15	SM 9221	
Bac-6-GCR (CYI0133-04) Water Sampled: 09/02/15 10:50 Received: 09/02/15 15:50									
E. Coli	**71.7**	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	**220**	1.8	"	"	CY06079	09/02/15	09/05/15	SM 9221	
Bac-7-UVR (CYI0133-05) Water Sampled: 09/02/15 12:15 Received: 09/02/15 15:50									
E. Coli	<1	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06077	09/02/15	09/05/15	SM 9221	
Bac-8-UVR (CYI0133-06) Water Sampled: 09/02/15 11:45 Received: 09/02/15 15:50									
E. Coli	<1	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06077	09/02/15	09/05/15	SM 9221	
Bac-9-UVR (CYI0133-07) Water Sampled: 09/02/15 13:20 Received: 09/02/15 15:50									
E. Coli	<1	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06077	09/02/15	09/05/15	SM 9221	

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 www.californialab.com 916-638-7301 Fax: 916-638-4510

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0133
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-10-UVR (CYI0133-08) Water Sampled: 09/02/15 11:15 Received: 09/02/15 15:50									
E. Coli	**2.0**	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06077	09/02/15	09/05/15	SM 9221	
Bac-11-JR (CYI0133-09) Water Sampled: 09/02/15 13:00 Received: 09/02/15 15:50									
E. Coli	<1	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	**4.5**	1.8	"	"	CY06077	09/02/15	09/05/15	SM 9221	
Bac-12-IHR (CYI0133-10) Water Sampled: 09/02/15 12:40 Received: 09/02/15 15:50									
E. Coli	<1	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06079	09/02/15	09/05/15	SM 9221	
Bac-13-IHR (CYI0133-11) Water Sampled: 09/02/15 12:15 Received: 09/02/15 15:50									
E. Coli	**2.0**	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06079	09/02/15	09/05/15	SM 9221	
Bac-15-SCR (CYI0133-12) Water Sampled: 09/02/15 13:15 Received: 09/02/15 15:50									
E. Coli	**3.0**	1.0	MPN/100 mL	1	CY06074	09/02/15	09/03/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06079	09/02/15	09/05/15	SM 9221	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI0133**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 **www.californialab.com** **916-638-7301** **Fax: 916-638-4510**

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 11, 2015

CLS Work Order #: CYI0204
COC #: 164874

Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/03/15 17:15. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

SMUD®

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 09/11/15 11:36

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0204
COC #: 164874

CLS - Labs CHAIN OF CUSTODY CLS ID No.: CYI0204 LOG NO. 164874

REPORT TO:
NAME AND ADDRESS: STILLWATER SCIENCES, 2855 TELEGRAPH AVE SUITE 400, BERKELEY CA 94705
PROJECT MANAGER: MAIA SINGER PHONE#: maia@stillwatersci.com
PROJECT NAME: SMUD In situ + BacT Monitoring
SAMPLED BY: SMG + BRH
JOB DESCRIPTION: monitor seasonal bacteria levels in UARP + CB reaches
SITE LOCATION: UARP

CLIENT JOB NUMBER:
DESTINATION LABORATORY: ☒ CLS (916) 638-7301, 3249 FITZGERALD RD., RANCHO CORDOVA, CA. 95742 ☐ OTHER

ANALYSIS REQUESTED: Fecal coliform - 15 tube; E. coli

GEOTRACKER: EDF REPORT ☒ YES ☐ NO
GLOBAL ID:
COMPOSITE:
FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	Fecal coliform - 15 tube	E. coli	TURN AROUND TIME	SPECIAL INSTRUCTIONS
9/3/2015	10:30	Bac-14-BCR	Surface water				X	X	5 DAY X	

INVOICE TO: Stillwater Sciences, Same as above
P.O. # 500.20 Task
QUOTE # 0110.00

SUSPECTED CONSTITUENTS:
PRESERVATIVES: (1) HCL (2) HNO₃ (3) = COLD (4) = NaOH (5) = H₂SO₄ (6) = Na₂S₂O₃ (7) =

RELINQUISHED BY (SIGN)	PRINT NAME / COMPANY	DATE / TIME	RECEIVED BY (SIGN)	PRINT NAME / COMPANY
X [signature]	X Sara Gabrielson, Stillwater Sciences	9/3/15 17:15		

REC'D AT LAB BY: [signature] DATE / TIME: 9/3/15 1715 CONDITIONS / COMMENTS: 0.9

SHIPPED BY: ☐ FED X ☐ UPS ☐ OTHER AIR BILL #

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 www.californialab.com 916-638-7301 Fax: 916-638-4510

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0204
COC #: 164874

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-14-BCR (CYI0204-01) Water Sampled: 09/03/15 10:30 Received: 09/03/15 17:15									
E. Coli	<1	1.0	MPN/100 mL	1	CY06120	09/03/15	09/04/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06160	09/03/15	09/06/15	SM 9221	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI0204**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #: 164874

Notes and Definitions

BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 15, 2015

CLS Work Order #: CYI0345
COC #:

Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/08/15 17:20. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 4 09/15/15 12:51

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0345
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY

CLS ID. NO. CYI0345 (1 of 1)

Report To:
Stillwater Sciences
2855 Telegraph Ave. Suite 400
Berkeley, CA 94705
Project Manager: Maia Singer maia@stillwatersci.com
Project Name: SMUD In situ and Bac-T Monitoring
Sampled By:
Job Description: Monitor seasonal bacteria levels in UARP and CB reaches.
Site Location: UARP

Client Job Number:
Destination Laboratory:
[X] CLS (916) 638-7301
3249 Fitzgerald Road
Rancho Cordova, CA
95742
www.californialab.com
[ ] OTHER

GEOTRACKER
EDF REPORT YES [X] NO [ ]
GLOBAL ID:
FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9/8/2015	11:45	BAC-2-A1		Surface water			6	X		X				X	
9/8/2015	11:10	BAC-1-B1		Surface water			6	X		X				X	
9/8/2015	15:10	BAC-4-LL		Surface water			6	X		X				X	
9/8/2015	15:00	BAC-3-LL		Surface water			6	X		X				X	
9/8/2015	14:15	BAC-6-GCR		Surface water			6	X		X				X	
9/8/2015	14:00	BAC-5-GCR		Surface water			6	X		X				X	
9/8/2015	13:30	BAC-8-UVR		Surface water			6		X	X				X	INVOICE TO:
9/8/2015	12:15	BAC-7-UVR		Surface water			6		X	X				X	Stillwater Sciences
9/8/2015	11:25	BAC-9-UVR		Surface water			6		X	X				X	Same as above
9/8/2015	12:50	BAC-10-UVR		Surface water			6		X	X				X	
9/8/2015	11:00	BAC-11-JR		Surface water			6		X	X				X	Project No. 500.20 Task 0110.00
				Surface water			6							X	QUOTE#

SUSPECTED CONSTITUENTS | SAMPLE RETENTION TIME | PRESERVATIVES (1) HCL (3) = COLD (2) HNO_3 (4)= H_2SO_4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
	Kelleigh Cooke	9/8/15 5:20pm		

RECEIVED AT LAB BY: DS DATE/TIME: 9/8/15 1720 CONDITIONS/COMMENTS: (2.2)

SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER _____ AIR BILL # _____

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 www.californialab.com 916-638-7301 Fax: 916-638-4510

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0345
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-2-BI (CYI0345-01) Water Sampled: 09/08/15 11:45 Received: 09/08/15 17:20									
E. Coli	<1	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06195	09/08/15	09/11/15	SM 9221	
Bac-1-BI (CYI0345-02) Water Sampled: 09/08/15 11:10 Received: 09/08/15 17:20									
E. Coli	<1	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06195	09/08/15	09/11/15	SM 9221	
Bac-4-LL (CYI0345-03) Water Sampled: 09/08/15 15:10 Received: 09/08/15 17:20									
E. Coli	<1	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06195	09/08/15	09/11/15	SM 9221	
Bac-3-LL (CYI0345-04) Water Sampled: 09/08/15 15:00 Received: 09/08/15 17:20									
E. Coli	<1	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06195	09/08/15	09/11/15	SM 9221	
Bac-6-GCR (CYI0345-05) Water Sampled: 09/08/15 14:15 Received: 09/08/15 17:20									
E. Coli	**8.5**	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	**4.5**	1.8	"	"	CY06195	09/08/15	09/11/15	SM 9221	
Bac-5-GCR (CYI0345-06) Water Sampled: 09/08/15 14:00 Received: 09/08/15 17:20									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06195	09/08/15	09/11/15	SM 9221	
Bac-8-UVR (CYI0345-07) Water Sampled: 09/08/15 13:30 Received: 09/08/15 17:20									
E. Coli	<1	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06196	09/08/15	09/11/15	SM 9221	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0345
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-7-UVR (CYI0345-08) Water Sampled: 09/08/15 12:15 Received: 09/08/15 17:20									
E. Coli	<1	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06196	09/08/15	09/11/15	SM 9221	
Bac-9-UVR (CYI0345-09) Water Sampled: 09/08/15 11:25 Received: 09/08/15 17:20									
E. Coli	<1	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06196	09/08/15	09/11/15	SM 9221	
Bac-10-UVR (CYI0345-10) Water Sampled: 09/08/15 12:50 Received: 09/08/15 17:20									
E. Coli	<1	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06196	09/08/15	09/11/15	SM 9221	
Bac-11-JR (CYI0345-11) Water Sampled: 09/08/15 11:00 Received: 09/08/15 17:20									
E. Coli	<1	1.0	MPN/100 mL	1	CY06188	09/08/15	09/09/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06196	09/08/15	09/11/15	SM 9221	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI0345**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 17, 2015

CLS Work Order #: CYI0443
COC #:

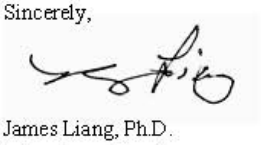
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/10/15 17:00. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 09/17/15 13:10

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0443
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI0443 (of)

Report To:
Stillwater Sciences
2855 Telegraph Ave. Suite 400
Berkeley, CA 94705
Project Manager
Maia Singer maia@stillwatersci.com
Project Name
SMUD In situ and Bac-T Monitoring
Sampled By
Job Description
Monitor seasonal bacteria levels in UARP and CB reaches.
Site Location UARP

Client Job Number
Destination Laboratory
[x] CLS (916) 638-7301
3249 Fitzgerald Road
Rancho Cordova, CA
95742
www.californialab.com
[ ] OTHER

ANALYSIS REQUESTED
PRESERVATIVES
Fecal coliform-15 Tube
Fecal coliform-20 Tube
E. coli

GEOTRACKER
EDF REPORT YES [X] NO [ ]
GLOBAL ID.
FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	▼	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9/10/15	15:50	BAC-15-SCR		Surface water			6	X		X				X	
9/10/15	13:00	BAC-13-IHR		Surface water			6	X		X				X	
9/10/15	14:30	BAC-14-BCR		Surface water			6	X		X				X	
9/10/15	11:05	BAC-2-BT		Surface water			6	X		X				X	
9/10/15	13:15	BAC-12-IHR		Surface water			6	X		X				X	
9/10/15	10:35	BAC-1-BT		Surface water			6	X		X				X	
				Surface water			6							X	INVOICE TO:
				Surface water			6							X	Stillwater Sciences
				Surface water			6							X	Same as above
				Surface water			6							X	
				Surface water			6							X	Project No. 500.20 Task 0110.00
				Surface water			6							X	QUOTE#

SUSPECTED CONSTITUENTS
SAMPLE RETENTION TIME
PRESERVATIVES (1) HCL (3) = COLD (2) HNO_3 (4) = H_2SO_4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
	Elyse DeFranco - Stillwater Sciences	9/10/15 1700		

RECEIVED AT LAB BY: DP DATE/TIME: 9/11/15 700 CONDITIONS/COMMENTS: (0.9)

SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER AIR BILL #

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 **www.californialab.com** **916-638-7301** **Fax: 916-638-4510**

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0443
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-15-SCR (CYI0443-01) Water Sampled: 09/10/15 10:50 Received: 09/10/15 17:00									
E. Coli	**66.3**	1.0	MPN/100 mL	1	CY06256	09/10/15	09/11/15	SM9223	
Fecal Coliforms	**4.5**	1.8	"	"	CY06260	09/10/15	09/13/15	SM 9221	HT-1
Bac-13-IHR (CYI0443-02) Water Sampled: 09/10/15 13:00 Received: 09/10/15 17:00									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06256	09/10/15	09/11/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06260	09/10/15	09/13/15	SM 9221	
Bac-14-BCR (CYI0443-03) Water Sampled: 09/10/15 14:30 Received: 09/10/15 17:00									
E. Coli	**2.0**	1.0	MPN/100 mL	1	CY06256	09/10/15	09/11/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06260	09/10/15	09/13/15	SM 9221	
Bac-2-BI (CYI0443-04) Water Sampled: 09/10/15 11:05 Received: 09/10/15 17:00									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06256	09/10/15	09/11/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06260	09/10/15	09/13/15	SM 9221	HT-B2
Bac-12-IHR (CYI0443-05) Water Sampled: 09/10/15 13:15 Received: 09/10/15 17:00									
E. Coli	<1	1.0	MPN/100 mL	1	CY06256	09/10/15	09/11/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06260	09/10/15	09/13/15	SM 9221	
Bac-1-BI (CYI0443-06) Water Sampled: 09/10/15 10:35 Received: 09/10/15 17:00									
E. Coli	**2.0**	1.0	MPN/100 mL	1	CY06256	09/10/15	09/11/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06260	09/10/15	09/13/15	SM 9221	HT-1

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI0443**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

HT-B2	The remaining holding time was less than an hour when the sample was received at the laboratory. Therefore, it was analyzed outside the holding time.
HT-1	The sample was received outside of the EPA recommended holding time.
BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 21, 2015

CLS Work Order #: CYI0560
COC #:

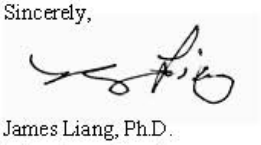
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/14/15 16:26. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 09/21/15 13:11

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 01 10.00
Project Manager: Maia Singer

CLS Work Order #: CYI0560
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI0560 (of)

Report To:	Client Job Number
Stillwater Sciences 2855 Telegraph Ave. Suite 400 Berkeley, CA 94705	Destination Laboratory
Project Manager Maia Singer maia@stillwatersci.com	[x] CLS (916) 638-7301 3249 Fitzgerald Road Rancho Cordova, CA 95742 www.californialab.com
Project Name SMUD In situ and Bac-T Monitoring	[ ] OTHER
Sampled By	
Job Description Monitor seasonal bacteria levels in UARP and CB reaches.	
Site Location UARP	

ANALYSIS REQUESTED — PRESERVATIVES: Fecal coliform-15 Tube; Fecal coliform-20 Tube; E. coli

GEOTRACKER
EDF REPORT YES [x] NO [ ]
GLOBAL ID.
FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	▼	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9/14/15	14:55	BAC-7-UVR		Surface water			6		X	X				X	
9/14/15	14:20	BAC-6-~~EST~~ GCR		Surface water			6	X		X				X	
9/14/15	14:05	BAC-5-GCR		Surface water			6	X		X				X	
9/14/15	13:20	BAC-4-LL		Surface water			6	X		X				X	
9/14/15	12:45	BAC-3-LL		Surface water			6	X		X				X	
9/14/15	11:30	BAC-8-UVR		Surface water			6		X	X				X	
9/14/15	11:00	BAC-10-UVR		Surface water			6		X	X				X	INVOICE TO:
				Surface water			6							X	Stillwater Sciences
				Surface water			6							X	Same as above
				Surface water			6							X	
				Surface water			6							X	Project No. 500.20 Task 0110.00
				Surface water			6							X	QUOTE#

SUSPECTED CONSTITUENTS — SAMPLE RETENTION TIME — PRESERVATIVES (1) HCL (3) = COLD (2) HNO_3 (4) = H_2SO_4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
	Kellegh Crowe Stillwater Sciences	9/14/15 1626		

RECEIVED AT LAB BY: DATE/TIME: 9/14/15 1626 CONDITIONS/COMMENTS: (3.0)

SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER _____ AIR BILL # _____

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0560
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-7-UVR (CYI0560-01) Water Sampled: 09/14/15 14:55 Received: 09/14/15 16:26									
E. Coli	**2.0**	1.0	MPN/100 mL	1	CY06338	09/14/15	09/15/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06346	"	09/17/15	SM 9221	
Bac-6-GCR (CYI0560-02) Water Sampled: 09/14/15 14:20 Received: 09/14/15 16:26									
E. Coli	<1	1.0	MPN/100 mL	1	CY06338	09/14/15	09/15/15	SM9223	
Fecal Coliforms	**7.8**	1.8	"	"	CY06348	"	09/17/15	SM 9221	
Bac-5-GCR (CYI0560-03) Water Sampled: 09/14/15 14:05 Received: 09/14/15 16:26									
E. Coli	<1	1.0	MPN/100 mL	1	CY06338	09/14/15	09/15/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06348	"	09/17/15	SM 9221	
Bac-4-LL (CYI0560-04) Water Sampled: 09/14/15 13:20 Received: 09/14/15 16:26									
E. Coli	<1	1.0	MPN/100 mL	1	CY06338	09/14/15	09/15/15	SM9223	
Fecal Coliforms	**4.0**	1.8	"	"	CY06348	"	09/17/15	SM 9221	
Bac-3-LL (CYI0560-05) Water Sampled: 09/14/15 12:45 Received: 09/14/15 16:26									
E. Coli	<1	1.0	MPN/100 mL	1	CY06338	09/14/15	09/15/15	SM9223	
Fecal Coliforms	**4.5**	1.8	"	"	CY06348	"	09/17/15	SM 9221	
Bac-8-UVR (CYI0560-06) Water Sampled: 09/14/15 11:30 Received: 09/14/15 16:26									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06338	09/14/15	09/15/15	SM9223	
Fecal Coliforms	**11**	1.8	"	"	CY06346	"	09/17/15	SM 9221	
Bac-10-UVR (CYI0560-07) Water Sampled: 09/14/15 11:00 Received: 09/14/15 16:26									
E. Coli	<1	1.0	MPN/100 mL	1	CY06338	09/14/15	09/15/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06346	"	09/17/15	SM 9221	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI0560**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 23, 2015

CLS Work Order #: CYI0684
COC #:

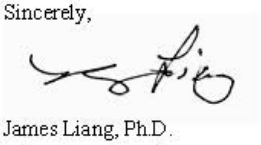
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/16/15 15:40. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 09/23/15 10:01

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 01 10.00
Project Manager: Maia Singer

CLS Work Order #: CYI0684
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI0684 (1 of 1)

Report To:
Stillwater Sciences
2855 Telegraph Ave. Suite 400
Berkeley, CA 94705
Project Manager: Maia Singer maia@stillwatersci.com
Project Name: SMUD In situ and Bac-T Monitoring
Sampled By:
Job Description: Monitor seasonal bacteria levels in UARP and CB reaches.
Site Location: UARP

Client Job Number:
Destination Laboratory:
[X] CLS (916) 638-7301
3249 Fitzgerald Road
Rancho Cordova, CA
95742
www.californialab.com
[ ] OTHER

GEOTRACKER
EDF REPORT YES [X] NO [ ]
GLOBAL ID:
FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9/16/15	11:15	Bac-9-UVR		Surface water			6		X	X				X	
9/16/15	11:51	Bac-11-JR		Surface water			6		X	X				X	
9/16/15	10:19	Bac-12-IHR		Surface water			6	X		X				X	
9/16/15	9:50	Bac-13-IHR		Surface water			6	X		X				X	
9/16/15	13:25	Bac-14-BCR		Surface water			6	X		X				X	
9/16/15	13:30	Bac-15-SCR		Surface water			6	X		X				X	
				Surface water			6							X	INVOICE TO:
				Surface water			6							X	Stillwater Sciences
				Surface water			6							X	Same as above
				Surface water			6							X	
				Surface water			6							X	Project No. 500.20 Task 0110.00
				Surface water			6							X	QUOTE#

SUSPECTED CONSTITUENTS | SAMPLE RETENTION TIME | PRESERVATIVES (1) HCL (2) HNO_3 (3) = COLD (4) = $H2SO4$

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
Heather Bowen	Heather Bowen Stillwater Sciences	9/16/15 9/16/15 15:40		

RECEIVED AT LAB BY: DS DATE/TIME: 9/16/15 1540 CONDITIONS/COMMENTS: 2.0

SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER AIR BILL #

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 **www.californialab.com** **916-638-7301** **Fax: 916-638-4510**

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0684
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-9-UVR (CYI0684-01) Water Sampled: 09/16/15 11:15 Received: 09/16/15 15:40									
E. Coli	<1	1.0	MPN/100 mL	1	CY06404	09/16/15	09/17/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06400	09/16/15	09/19/15	SM 9221	
Bac-11-JR (CYI0684-02) Water Sampled: 09/16/15 11:51 Received: 09/16/15 15:40									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06404	09/16/15	09/17/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06400	09/16/15	09/19/15	SM 9221	
Bac-12-IHR (CYI0684-03) Water Sampled: 09/16/15 10:19 Received: 09/16/15 15:40									
E. Coli	<1	1.0	MPN/100 mL	1	CY06404	09/16/15	09/17/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06401	09/16/15	09/19/15	SM 9221	
Bac-13-IHR (CYI0684-04) Water Sampled: 09/16/15 09:50 Received: 09/16/15 15:40									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06404	09/16/15	09/17/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06401	09/16/15	09/19/15	SM 9221	
Bac-14-BCR (CYI0684-05) Water Sampled: 09/16/15 13:25 Received: 09/16/15 15:40									
E. Coli	**235.9**	1.0	MPN/100 mL	1	CY06404	09/16/15	09/17/15	SM9223	
Fecal Coliforms	**130**	1.8	"	"	CY06401	09/16/15	09/19/15	SM 9221	
Bac-15-SCR (CYI0684-06) Water Sampled: 09/16/15 13:30 Received: 09/16/15 15:40									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06404	09/16/15	09/17/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06401	09/16/15	09/19/15	SM 9221	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI0684**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 24, 2015

CLS Work Order #: CYI0737
COC #:

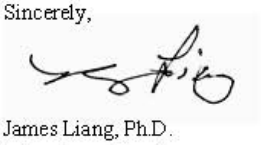
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/17/15 15:35. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 09/24/15 10:11

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0737
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI 0737 (of)

Report To:
Stillwater Sciences
2855 Telegraph Ave. Suite 400
Berkeley, CA 94705
Project Manager: Maia Singer maia@stillwatersci.com
Project Name: SMUD In situ and Bac-T Monitoring
Sampled By:
Job Description: Monitor seasonal bacteria levels in UARP and CB reaches
Site Location: UARP

Client Job Number:
Destination Laboratory:
[X] CLS (916) 638-7301
3249 Fitzgerald Road
Rancho Cordova, CA
95742
www.californialab.com
[ ] OTHER

ANALYSIS REQUESTED
PRESERVATIVES

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	▼	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9/17/15	9:20	Bac-1-B1		Surface water			6	X		X				X	
9/17/15	10:20	Bac-2-B1		Surface water			6	X		X				X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	

GEOTRACKER
EDF REPORT YES [X] NO [ ]
GLOBAL ID:
FIELD CONDITIONS:

INVOICE TO:
Stillwater Sciences
Same as above
Project No. 500.20 Task 0110.00
QUOTE#

SUSPECTED CONSTITUENTS
SAMPLE RETENTION TIME
PRESERVATIVES (1) HCL (2) HNO_3 (3) = COLD (4)= H_2SO_4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
	Heather Bowen Stillwater Sciences	9/17/15 15:35		

RECEIVED AT LAB BY: DATE/TIME: 9-17-15 1535
CONDITIONS/COMMENTS: 0.7
SHIPPED BY: [ ] FED EX [✓] UPS [ ] OTHER AIR BILL #

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0737
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-1-BI (CYI0737-01) Water Sampled: 09/17/15 09:20 Received: 09/17/15 15:35									
E. Coli	<1	1.0	MPN/100 mL	1	CY06446	09/17/15	09/18/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06442	09/17/15	09/20/15	SM 9221	
Bac-2-BI (CYI0737-02) Water Sampled: 09/17/15 10:20 Received: 09/17/15 15:35									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06446	09/17/15	09/18/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06442	09/17/15	09/20/15	SM 9221	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI0737**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 28, 2015

CLS Work Order #: CYI0875
COC #:

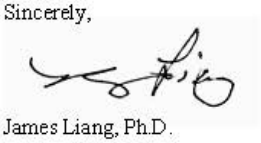
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/21/15 16:48. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 09/28/15 14:33

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 01 10.00
Project Manager: Maia Singer

CLS Work Order #: CYI0875
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI0875 (of)

Report To:
Stillwater Sciences
2855 Telegraph Ave. Suite 400
Berkeley, CA 94705
Project Manager: Maia Singer maia@stillwatersci.com
Project Name: SMUD In situ and Bac-T Monitoring
Sampled By:
Job Description: Monitor seasonal bacteria levels in UARP and CB reaches.
Site Location: UARP

Client Job Number:
Destination Laboratory:
[x] CLS (916) 638-7301
3249 Fitzgerald Road
Rancho Cordova, CA
95742
www.californialab.com
[ ] OTHER

ANALYSIS REQUESTED
PRESERVATIVES: Fecal coliform-15 Tube; Fecal coliform-20 Tube; E. coli

GEOTRACKER
EDF REPORT YES [x] NO [ ]
GLOBAL ID:
FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	▼	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9-21-15	10:40	Bac-3-LL		Surface water			6	X		X				X	
9-21-15	10:55	Bac-4-LL		Surface water			6	X		X				X	
9-21-15	11:30	Bac-5-QCR		Surface water			6	X		X				X	
9-21-15	11:49	Bac-6-QCR		Surface water			6	X		X				X	
9-21-15	12:25	Bac-10-LVR		Surface water			6		X	X				X	
9-21-15	14:00	Bac-8-LVR		Surface water			6		X	X				X	
9-21-15	14:50	Bac-7-LVR		Surface water			6		X	X				X	INVOICE TO:
				Surface water			6							X	Stillwater Sciences
				Surface water			6							X	Same as above
				Surface water			6							X	
				Surface water			6							X	Project No. 500.20 Task 0110.00
				Surface water			6							X	QUOTE#

SUSPECTED CONSTITUENTS
SAMPLE RETENTION TIME
PRESERVATIVES (1) HCL (3) = COLD (2) HNO3 (4) = H2SO4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
Heather Bowen	Heather Bowen Stillwater Sciences	9/21/15 16:48		

RECEIVED AT LAB BY: DATE/TIME: 9/21/15 1648 CONDITIONS/COMMENTS: (12)

SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER AIR BILL #

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 www.californialab.com 916-638-7301 Fax: 916-638-4510

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0875
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-3-LL (CYI0875-01) Water Sampled: 09/21/15 10:40 Received: 09/21/15 16:48									
E. Coli	<1	1.0	MPN/100 mL	1	CY06513	09/21/15	09/22/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06505	09/21/15	09/28/15	SM 9221	
Bac-4-LL (CYI0875-02) Water Sampled: 09/21/15 10:55 Received: 09/21/15 16:48									
E. Coli	<1	1.0	MPN/100 mL	1	CY06513	09/21/15	09/22/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06505	09/21/15	09/28/15	SM 9221	
Bac-5-GCR (CYI0875-03) Water Sampled: 09/21/15 11:30 Received: 09/21/15 16:48									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06513	09/21/15	09/22/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06505	09/21/15	09/28/15	SM 9221	
Bac-6-GCR (CYI0875-04) Water Sampled: 09/21/15 11:49 Received: 09/21/15 16:48									
E. Coli	<1	1.0	MPN/100 mL	1	CY06513	09/21/15	09/22/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06505	09/21/15	09/28/15	SM 9221	
Bac-10-UVR (CYI0875-05) Water Sampled: 09/21/15 12:25 Received: 09/21/15 16:48									
E. Coli	<1	1.0	MPN/100 mL	1	CY06513	09/21/15	09/22/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06504	09/21/15	09/24/15	SM 9221	
Bac-8-UVR (CYI0875-06) Water Sampled: 09/21/15 14:00 Received: 09/21/15 16:48									
E. Coli	<1	1.0	MPN/100 mL	1	CY06513	09/21/15	09/22/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06504	09/21/15	09/24/15	SM 9221	
Bac-7-UVR (CYI0875-07) Water Sampled: 09/21/15 14:50 Received: 09/21/15 16:48									
E. Coli	<1	1.0	MPN/100 mL	1	CY06513	09/21/15	09/22/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06504	09/21/15	09/24/15	SM 9221	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI0875**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 29, 2015

CLS Work Order #: CYI0936
COC #:

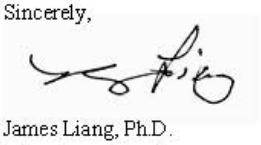
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/22/15 17:30. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 09/29/15 10:43

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0936
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI0936 (of)

Report To: Stillwater Sciences, 2855 Telegraph Ave. Suite 400, Berkeley, CA 94705
Project Manager: Maia Singer maia@stillwatersci.com
Project Name: SMUD In situ and Bac-T Monitoring
Sampled By:
Job Description: Monitor seasonal bacteria levels in UARP and CB reaches.
Site Location: UARP

Client Job Number:
Destination Laboratory: [X] CLS (916) 638-7301, 3249 Fitzgerald Road, Rancho Cordova, CA 95742, www.californialab.com [ ] OTHER

ANALYSIS REQUESTED: Fecal coliform-15 Tube (PRESERVATIVES); Fecal coliform-20 Tube; E. coli

GEOTRACKER
EDF REPORT YES [X] NO [ ]
GLOBAL ID.
FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9/22/2015	14:00	Bac - 9 - UAR		Surface water			6		X	X				X	
9/22/2015	15:30	Bac - 11 - JR		Surface water			6		X	X				X	
9/22/2015	14:45	Bac - 12 - DNR		Surface water			6	X		X				X	
9/22/2015	11:30	Bac - 13 - DNR		Surface water			6	X		X				X	
9/22/2015	10:00	Bac - 1 - BI		Surface water			6	X		X				X	
9/22/2015	09:20	Bac - 2 - BI		Surface water			6	X		X				X	
				Surface water			6							X	INVOICE TO:
				Surface water			6							X	Stillwater Sciences
				Surface water			6							X	Same as above
				Surface water			6							X	
				Surface water			6							X	Project No. 500.20 Task 0110.00
				Surface water			6							X	QUOTE#

SUSPECTED CONSTITUENTS | SAMPLE RETENTION TIME | PRESERVATIVES (1) HCL (2) HNO_3 (3) = COLD (4) = H_2SO_4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
	BRUCE HITCH/STILLWATER SCIENCES	9/22/2015 17:30		

RECEIVED AT LAB BY: DATE/TIME 9/22/15 1720 CONDITIONS/COMMENTS: 1.3

SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER AIR BILL #

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI0936
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-9-UVR (CYI0936-01) Water Sampled: 09/22/15 16:00 Received: 09/22/15 17:30									
E. Coli	**2.0**	1.0	MPN/100 mL	1	CY06545	09/22/15	09/23/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06551	09/22/15	09/25/15	SM 9221	
Bac-11-JR (CYI0936-02) Water Sampled: 09/22/15 15:30 Received: 09/22/15 17:30									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06545	09/22/15	09/23/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06551	09/22/15	09/25/15	SM 9221	
Bac-12-IHR (CYI0936-03) Water Sampled: 09/22/15 14:45 Received: 09/22/15 17:30									
E. Coli	<1	1.0	MPN/100 mL	1	CY06545	09/22/15	09/23/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06548	09/22/15	09/25/15	SM 9221	
Bac-13-IHR (CYI0936-04) Water Sampled: 09/22/15 14:30 Received: 09/22/15 17:30									
E. Coli	<1	1.0	MPN/100 mL	1	CY06545	09/22/15	09/23/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06548	09/22/15	09/25/15	SM 9221	
Bac-1-BI (CYI0936-05) Water Sampled: 09/22/15 10:00 Received: 09/22/15 17:30									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06545	09/22/15	09/23/15	SM9223	
Fecal Coliforms	**7.8**	1.8	"	"	CY06548	09/22/15	09/25/15	SM 9221	HT-1
Bac-2-BI (CYI0936-06) Water Sampled: 09/22/15 09:30 Received: 09/22/15 17:30									
E. Coli	**25.3**	1.0	MPN/100 mL	1	CY06545	09/22/15	09/23/15	SM9223	
Fecal Coliforms	**70**	1.8	"	"	CY06548	09/22/15	09/25/15	SM 9221	HT-1

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI0936**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

HT-1	The sample was received outside of the EPA recommended holding time.
BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

September 30, 2015

CLS Work Order #: CYI1003
COC #:

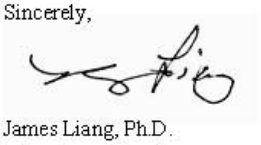
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/23/15 15:10. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 09/30/15 12:55

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI1003
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI1003 (1 of 1)

Report To: Stillwater Sciences, 2855 Telegraph Ave. Suite 400, Berkeley, CA 94705
Project Manager: Maia Singer maia@stillwatersci.com
Project Name: SMUD In situ and Bac-T Monitoring
Sampled By:
Job Description: Monitor seasonal bacteria levels in UARP and CB reaches.
Site Location: UARP

Client Job Number:
Destination Laboratory: [X] CLS (916) 638-7301, 3249 Fitzgerald Road, Rancho Cordova, CA 95742, www.californialab.com [ ] OTHER

ANALYSIS REQUESTED: PRESERVATIVES; Fecal coliform-15 Tube; Fecal coliform-20 Tube; E. coli

GEOTRACKER: EDF REPORT YES [X] NO [ ]; GLOBAL ID:

FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9/23/15	10:15	Bac-14-BCR		Surface water			6	X		X				X	
9/23	11:00	Bac-15 SCR		Surface water			6	X		X				X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	
				Surface water			6							X	INVOICE TO:
				Surface water			6							X	Stillwater Sciences
				Surface water			6							X	Same as above
				Surface water			6							X	
				Surface water			6							X	Project No. 500.20 Task 0110.00
				Surface water			6							X	QUOTE#

SUSPECTED CONSTITUENTS | SAMPLE RETENTION TIME | PRESERVATIVES (1) HCL (2) HNO_3 (3) = COLD (4) = H_2SO_4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
[signature]	BRUCE HOWELL/STILLWATER	9/23 15:30		

RECEIVED AT LAB BY: AS DATE/TIME: 9/23/15 1570 CONDITIONS/COMMENTS: (COLD)

SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER AIR BILL #

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI1003
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-14-BCR (CYI1003-01) Water	**Sampled: 09/23/15 10:15**	**Received: 09/23/15 15:10**							
E. Coli	<1.8	1.0	MPN/100 mL	1	CY06583	09/23/15	09/24/15	SM9223	
Fecal Coliforms	**1.8**	1.8	"	"	CY06591	09/23/15	09/26/15	SM 9221	
Bac-15-SCR (CYI1003-02) Water	**Sampled: 09/23/15 11:00**	**Received: 09/23/15 15:10**							
E. Coli	**6.3**	1.0	MPN/100 mL	1	CY06583	09/23/15	09/24/15	SM9223	
Fecal Coliforms	**17**	1.8	"	"	CY06591	09/23/15	09/26/15	SM 9221	

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI1003**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

BT-4	<1.8
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

October 06, 2015

CLS Work Order #: CYI1269
COC #:

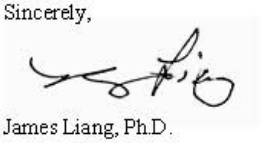
Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/29/15 17:00. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,



James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 10/06/15 12:41

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI1269
COC #

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. CYI1269 (of)

Report To:
Stillwater Sciences
2855 Telegraph Ave. Suite 400
Berkeley, CA 94705
Project Manager: Maia Singer maia@stillwatersci.com
Project Name: SMUD In situ and Bac-T Monitoring
Sampled By:
Job Description: Monitor seasonal bacteria levels in UARP and CB reaches.
Site Location: UARP

Client Job Number:
Destination Laboratory:
[X] CLS (916) 638-7301 3249 Fitzgerald Road Rancho Cordova, CA 95742 www.californialab.com
[ ] OTHER

ANALYSIS REQUESTED
PRESERVATIVES: Fecal coliform-15 Tube; Fecal coliform-20 Tube; E. coli

GEOTRACKER
EDF REPORT YES [X] NO [ ]
GLOBAL ID:
FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES ▼	Fecal coliform-15 Tube	Fecal coliform-20 Tube	E. coli	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
9/29/15	3:30PM	BAC-14-BCR		Surface water			6	X		X				X	
9/29/15	2:05PM	BAC-16-UUR		Surface water			6		X	X				X	
9/29/15	12:10PM	BAC-7-UUR		Surface water			6		X	X				X	
9/29/15	9:15AM	BAC-5-GCR		Surface water			6	X		X				X	
9/29/15	10:14AM	BAC-3-LL		Surface water			6	X		X				X	
9/29/15	10:45AM	BAC-4-LL		Surface water			6	X		X				X	
9/29/15	9:35AM	BAC-6-GCR		Surface water			6	X		X				X	INVOICE TO:
				Surface water			6							X	Stillwater Sciences
				Surface water			6							X	Same as above
				Surface water			6							X	
				Surface water			6							X	Project No. 500.20 Task 0110.00
				Surface water			6							X	QUOTE#

SUSPECTED CONSTITUENTS | SAMPLE RETENTION TIME | PRESERVATIVES (1) HCL (2) HNO_3 (3) = COLD (4) = H_2SO_4

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
	Kelleigh Cowen Stillwater Sciences	9/29/15 5:00PM		

RECEIVED AT LAB BY: DATE/TIME: 9/29/15 1700 CONDITIONS/COMMENTS: (1-3)

SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER AIR BILL #

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI1269
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-14-BCR (CYI1269-01) Water Sampled: 09/29/15 15:30 Received: 09/29/15 17:00									
E. Coli	<1	1.0	MPN/100 mL	1	CY06748	09/29/15	09/30/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06753	09/29/15	10/02/15	SM 9221	
Bac-10-UVR (CYI1269-02) Water Sampled: 09/29/15 14:05 Received: 09/29/15 17:00									
E. Coli	**11.0**	1.0	MPN/100 mL	1	CY06748	09/29/15	09/30/15	SM9223	
Fecal Coliforms	**17**	1.8	"	"	CY06754	09/29/15	10/02/15	SM 9221	
Bac-7-UVR (CYI1269-03) Water Sampled: 09/29/15 12:10 Received: 09/29/15 17:00									
E. Coli	**2.0**	1.0	MPN/100 mL	1	CY06748	09/29/15	09/30/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06754	09/29/15	10/02/15	SM 9221	
Bac-5-GCR (CYI1269-04) Water Sampled: 09/29/15 09:15 Received: 09/29/15 17:00									
E. Coli	<1	1.0	MPN/100 mL	1	CY06748	09/29/15	09/30/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06753	09/29/15	10/02/15	SM 9221	HT-1
Bac-3-LL (CYI1269-05) Water Sampled: 09/29/15 10:14 Received: 09/29/15 17:00									
E. Coli	<1	1.0	MPN/100 mL	1	CY06748	09/29/15	09/30/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06753	09/29/15	10/02/15	SM 9221	HT-1
Bac-4-LL (CYI1269-06) Water Sampled: 09/29/15 10:45 Received: 09/29/15 17:00									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06748	09/29/15	09/30/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06753	09/29/15	10/02/15	SM 9221	HT-1
Bac-6-GCR (CYI1269-07) Water Sampled: 09/29/15 09:35 Received: 09/29/15 17:00									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06748	09/29/15	09/30/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06753	09/29/15	10/02/15	SM 9221	HT-1

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI1269**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Notes and Definitions

HT-1	The sample was received outside of the EPA recommended holding time.
BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

October 07, 2015

CLS Work Order #: CYI1317
COC #: 164883

Maia Singer
Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/30/15 16:25. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES

Page 1 of 3 10/07/15 14:19

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI1317
COC # 164883

CLS - Labs CHAIN OF CUSTODY CLS ID No.: CYI1317 LOG NO. 164883

REPORT TO:
NAME AND ADDRESS: STILLWATER SCIENCES
2855 TELEGRAPH AVE SUITE 400
BERKELEY CA 94705
PROJECT MANAGER: MAIA SINGER maia@stillwatersci.com PHONE#
PROJECT NAME: SMUD In Situ + Bac-T Monitoring
SAMPLED BY:
JOB DESCRIPTION: monitor seasonal bacterial levels in UARP + CB reaches
SITE LOCATION: UARP sites

CLIENT JOB NUMBER:
DESTINATION LABORATORY:
☒ CLS (916) 638-7301 3249 FITZGERALD RD. RANCHO CORDOVA, CA. 95742
☐ OTHER

GEOTRACKER:
EDF REPORT ☒ YES ☐ NO
GLOBAL ID:
COMPOSITE:
FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	ANALYSIS REQUESTED: Fecal Coliform - 15 dilutions	ANALYSIS REQUESTED: Fecal Coliform - 200 dilutions	ANALYSIS REQUESTED: E. Coli	TURN AROUND TIME: 1 DAY	2 DAY	3 DAY	5 DAY	SPECIAL INSTRUCTIONS: OR ALT. ID:
9/30	9:23	Bac - 1 - B1	surface water				X		X				X	
9/30	9:10	Bac - 2 - B1	surface water				X		X					
9/30	13:40	Bac - 9 - UVR						X	X					
9/30	12:10	Bac - 11 - JR						X	X					
9/30	14:09	Bac - 13 - IHR					X		X					
9/30	14:27	Bac - 12 - IHR					X		X					
9/30	13:45	Bac - 8 - UVR						X	X					

INVOICE TO: STILLWATER SCIENCES
PROJECT NUMBER: 500.20
P.O. # TASK CODE:
QUOTE # 0110.00

SUSPECTED CONSTITUENTS
PRESERVATIVES: (1) HCl (2) HNO_3 (3) = COLD (4) = NaOH (5) = H_2SO_4 (6) = $Na_2S_2O_3$ (7) =

RELINQUISHED BY (SIGN)	PRINT NAME / COMPANY	DATE / TIME	RECEIVED BY (SIGN)	PRINT NAME / COMPANY
	Sara Gabrielsen Stillwater Sciences	9/30/15 4:25pm		

RECD AT LAB BY: CLS DATE / TIME: 9/30/15 1625 CONDITIONS / COMMENTS: (BD)
SHIPPED BY: ☐ FED X ☐ UPS ☐ OTHER AIR BILL #

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 www.californialab.com 916-638-7301 Fax: 916-638-4510

CALIFORNIA LABORATORY SERVICES

 10/07/15 14:19

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Project: SMUD In situ and Bac-T Monitoring
Project Number: 500.20 / Task 0110.00
Project Manager: Maia Singer

CLS Work Order #: CYI1317
COC #: 164883

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-1-BI (CYI1317-01) Water Sampled: 09/30/15 09:23 Received: 09/30/15 16:25									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06782	09/30/15	10/01/15	SM9223	
Fecal Coliforms	**2.0**	1.8	"	"	CY06786	09/30/15	10/03/15	SM 9221	HT-1
Bac-2-BI (CYI1317-02) Water Sampled: 09/30/15 09:10 Received: 09/30/15 16:25									
E. Coli	**2.0**	1.0	MPN/100 mL	1	CY06782	09/30/15	10/01/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06786	09/30/15	10/03/15	SM 9221	HT-1
Bac-9-UVR (CYI1317-03) Water Sampled: 09/30/15 13:40 Received: 09/30/15 16:25									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06782	09/30/15	10/01/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06785	09/30/15	10/03/15	SM 9221	
Bac-11-JR (CYI1317-04) Water Sampled: 09/30/15 12:30 Received: 09/30/15 16:25									
E. Coli	**5.2**	1.0	MPN/100 mL	1	CY06782	09/30/15	10/01/15	SM9223	
Fecal Coliforms	**6.8**	1.8	"	"	CY06785	09/30/15	10/03/15	SM 9221	
Bac-13-IHR (CYI1317-05) Water Sampled: 09/30/15 14:09 Received: 09/30/15 16:25									
E. Coli	**1.0**	1.0	MPN/100 mL	1	CY06782	09/30/15	10/01/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06786	09/30/15	10/03/15	SM 9221	
Bac-12-IHR (CYI1317-06) Water Sampled: 09/30/15 14:27 Received: 09/30/15 16:25									
E. Coli	<1	1.0	MPN/100 mL	1	CY06782	09/30/15	10/01/15	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CY06786	09/30/15	10/03/15	SM 9221	
Bac-8-UVR (CYI1317-07) Water Sampled: 09/30/15 13:45 Received: 09/30/15 16:25									
E. Coli	**2.0**	1.0	MPN/100 mL	1	CY06782	09/30/15	10/01/15	SM9223	
Fecal Coliforms	**4.5**	1.8	"	"	CY06785	09/30/15	10/03/15	SM 9221	

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742 **www.californialab.com** **916-638-7301** **Fax: 916-638-4510**

CALIFORNIA LABORATORY SERVICES

Stillwater Sciences	Project: SMUD In situ and Bac-T Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0110.00	**CLS Work Order #: CYI1317**
Berkeley, CA 94705	Project Manager: Maia Singer	COC #: 164883

Notes and Definitions

HT-1	The sample was received outside of the EPA recommended holding time.
BT-4a	<1.8
BT-4	<1
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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APPENDIX F
Correspondence Regarding Bacterial Sampling

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CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board

AUG 2 1 2015

Mr. Darold Perry
Supervisor, Hydro License Implementation
Sacramento Municipal Utility District
P.O. Box 1500
Pollock Pines, CA 95726-1500

Dear Mr. Perry:

APPROVAL OF MONITORING LOCATIONS UNDER ALTERNATIVE MONITORING SCHEDULE AND UPDATED SAMPLING METHODS FOR WATER QUALITY MONITORING PLAN; UPPER AMERICAN RIVER HYDROELECTRIC PROJECT, FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 2101; EL DORADO AND SACRAMENTO COUNTIES

On August 7, 2015, the Sacramento Municipal Utility District (SMUD) submitted an email to the State Water Resources Control Board (State Water Board), Deputy Director of Water Rights (Deputy Director) requesting approval of proposed bacterial monitoring locations for the Upper American River Hydroelectric Project (UARP). On August 14, 2015, SMUD submitted an email to the Deputy Director requesting approval to update the fecal coliform and *E. coli* sampling methods. Each of these requests is discussed in more detail below.

Bacterial Monitoring Locations

Per Condition 8.J. of the State Water Board water quality certification (certification) for the UARP, SMUD is required to consult with specified agencies[1] to determine proposed monitoring locations for each sampling year. The proposed monitoring locations must be submitted to the Deputy Director for review and approval no later than May 31. The required consultation and submission deadline was missed and SMUD was unable to obtain a contractor in time for the Independence Day holiday sampling outlined in the Water Quality Monitoring Plan (WQ Plan) approved by the Deputy Director on March 24, 2015. On July 15, 2015, the Deputy Director approved an alternative sampling schedule that combined the previously scheduled Independence Day monitoring with the proposed Labor Day monitoring. On August 7, 2015, SMUD provided the specified agencies with the proposed bacterial monitoring locations and requested comments regarding their adequacy. No comments were received by SMUD staff from the specified agencies. However, on August 12, 2015, State Water Board staff received an email from the United States Forest Service ~~staff~~ stating staff had no concerns with the proposed locations.

[1] Specified agencies include the State Water Board, United States Forest Service, California Department of Fish and Wildlife, United States Fish and Wildlife Service, and Central Valley Regional Water Quality Control Board.

State Water Board staff reviewed the proposed monitoring locations and finds that they meet the requirements of certification Condition 8.J. and the alternative sampling schedule approved by the Deputy Director on July 15, 2015. State Water Board staff finds that the locations proposed by SMUD are acceptable locations to conduct bacterial sampling.

Update Fecal Coliform and E. coli Sampling Methods and Other WQ Plan Revisions

The UARP WQ Plan outlines the methods that will be used to sample and detect bacteria. On August 4, 2015, SMUD informed State Water Board staff that the fecal coliform and *E. coli* sampling method outlined in the WQ Plan incorrectly listed the total coliform method. In order to correct this mistake, SMUD proposed to replace United States Environmental Protection Agency (USEPA) method SM 9222B (sampling method for ~~detection of~~ total coliform) with USEPA methods SM 9221E (~~detection~~ sampling method for ~~of~~ fecal coliform) and SM 9223B (sampling method for *E. coli*). State Water Board staff consulted with ~~staff from the~~ Office of Information Management and Analysis staff at the State Water Board and ~~staff from the~~ Surface Water Ambient Monitoring Program (SWAMP) staff at the Central Valley Regional Water Quality Control Board. The proposed alternate methods (SM 9221E and SM 9223B) are acceptable USEPA approved methods for the detection of fecal coliform and *E. coli*. During consultation with SWAMP staff, it was determined that the 24-hour maximum hold time for bacterial samples outlined in the WQ Plan is incorrect and should be changed to an eight-hour maximum hold time. State Water Board staff submitted an email to SMUD on August 10, 2015, ~~that stated that~~ stating the proposed alternate sampling methods were acceptable. SMUD staff was notified that as a condition of approval, the WQ Plan must be modified to reflect the changes described in this letter and a copy of the modified WQ Plan needed to be submitted to the State Water Board prior to the upcoming Labor Day holiday sampling period. State Water Board staff has reviewed the modified WQ Plan submitted by SMUD on August 14, 2015, and finds it is acceptable.

I hereby approve the proposed bacterial monitoring locations and the modified WQ Plan (dated August 14, 2015), including updates to the fecal coliform and *E. coli* sampling method and the maximum hold time for bacterial samples. If bacterial testing results indicate an exceedance of the water quality objective for bacteria outlined in the *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins*, Central Valley Regional Water Quality Control Board and State Water Board staffs shall be notified as soon as possible and no later than 48 hours following receipt of testing results that indicate an exceedance.

If you have questions regarding this letter, please contact Mr. Michael Maher, UARP Manager, by phone at: (916) 341-5408 or by email at: Michael.Maher@waterboards.ca.gov. Written correspondence should be directed to:

State Water Resources Control Board
Division of Water Rights
Water Quality Certification Program
Attention: Michael Maher
P.O. Box 2000
Sacramento, CA 95812-2000

Sincerely,

Barbara Evoy, Deputy Director
Division of Water Rights

cc: Please see next page.

cc: Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Ms. Anna Ewing
California Department of Fish and Wildlife
North Central Region
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670

Mr. Adam Laputz
Central Valley Regional Water Quality
Control Board
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670

Ms. Beth Livingston
United States Forest Service
100 Forni Road
Placerville, CA 95667

Ms. Alison Willy
U.S. Fish and Wildlife Service
Bay Delta Fish and Wildlife Office
650 Capitol Mall, Room 8-300
Sacramento, CA 95814

SMUD™

August 07, 2015
DPG 15-216

Barbara Evoy, Deputy Director
Division of Water Rights
State Water Resources Control Board
1001 I Street, 14th Floor
Sacramento, CA 95814

SUBJECT: Notification of 2015 Bacterial Monitoring Locations for the Upper American River Hydroelectric Project, FERC Project No. 2101

Dear Ms. Evoy:

Condition 8.J, Water Quality Monitoring Plan (Plan), of the State Water Resources Control Board (SWRCB) Section 401 Water Quality Certification for the Upper American River Project (UARP), located in Appendix A of the Federal Energy Regulatory Commission's (Commission) Order Issuing New License for the UARP, dated July 23, 2014, requires the Sacramento Municipal Utility District (SMUD) to provide the Deputy Director with the proposed annual bacterial sampling locations for review and approval by May 31 of each year. Given the Commission's May 23, 2015 filing deadline for the Plan and the resultant lack of Commission approval, SMUD was not able to begin monitoring, let alone propose any monitoring locations, by the May 31 date.

On July 9, 2015 the Commission approved SMUD's Plan. On July 15, 2015, the SWRCB issued SMUD a letter (enclosed) providing an alternative monitoring and consultation schedule for 2015, extending the consultation date to August 7, 2015 for Deputy Director approval of the 2015 monitoring locations. Below are the proposed 2015 locations for bacterial monitoring in the UARP under SMUD's approved Plan.

- Union Valley Reservoir (4 annually rotating stations)
  - At Fashoda Beach
  - Near Camino Cove Campground
  - Near Yellowjacket Campground
  - Near Wench Creek Campground
- Buck Island Reservoir
  - On northshore, near dam and OHV camping
  - On southshore, near Rubicon Hiking Trail
- Loon Lake Reservoir
  - West of main dam, near Red Fir Campground
  - West of Loon Lake Campground, near boat launch
- Gerle Creek Reservoir
  - Near Gerle Creek Campground
  - Near Angel Creek picnic area

- Ice House Reservoir
    - Northshore near private campground access
    - East of boat launch and picnic area
- Other UARP Locations
    - Junction Reservoir, near boat launch
    - Brush Creek Reservoir, near boat launch
    - Slab Creek Reservoir, near boat launch

If you have any questions, please contact me at (530) 647-5010 or Darold.Perry@smud.org.

Sincerely,

Darold Perry, Supervisor
Hydro License Implementation

DP/ap

Enclosures:

SWRCB Letter for Alternative Monitoring and Consultation Schedule for Water Quality Monitoring Plan; FERC Project No. 2101

Electronic Cc:

Michael Maher
Environmental Scientist
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board

JUL 15 2015

Mr. Darold Perry
Supervisor, Hydro License Implementation
Sacramento Municipal Utility District
P.O. Box 1500
Pollock Pines, CA 95726-1500

Dear Mr. Perry:

ALTERNATIVE MONITORING AND CONSULTATION SCHEDULE FOR WATER QUALITY MONITORING PLAN; UPPER AMERICAN RIVER HYDROELECTRIC PROJECT, FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 2101; EL DORADO AND SACRAMENTO COUNTIES

Thank you for contacting State Water Resources Control Board (State Water Board) staff regarding the need to modify the 2015 bacterial monitoring and consultation schedule for the Upper American River Hydroelectric Project (Project). I understand that on June 24, 2015, you notified State Water Board staff that the May 31 deadline for consultation (per Condition 8.J of the Project water quality certification) was missed and the scheduled Independence Day monitoring events were no longer possible because the Sacramento Municipal Utility District (SMUD) was unable to obtain a contractor in time to complete this monitoring. Condition 8.J. of the Project water quality certification (certification) requires development of a Water Quality Monitoring Plan (WQ Plan) and submission of a list of proposed bacterial sampling locations developed in consultation with the agencies[1] by May 31 of each designated sampling year. Condition 8.J of the Project certification also requires bacterial monitoring to be performed during the 30-day period that spans either the Independence Day holiday or the Labor Day holiday.

In the WQ Plan developed by SMUD and approved by the Deputy Director of Water Rights (Deputy Director) on March 24, 2015, SMUD proposed bacterial monitoring of the middle elevation portion of the Project during the Independence Day holiday and monitoring of the upper elevation portion of the Project during the Labor Day holiday. To enable the full annual complement of bacterial monitoring required in the certification and the WQ Plan, the bacterial monitoring proposed for the Independence Day period should be performed concurrently with the bacterial monitoring proposed for the Labor Day period. In addition, SMUD shall provide the Deputy Director with the proposed bacterial sampling locations for review and approval no later than August 7, 2015. The regular schedule for bacterial monitoring over both the Independence Day and Labor Day holidays, as outlined in the WQ Plan, shall resume in 2016 and continue throughout the term of the license and any extensions, unless otherwise approved by the Deputy Director.

[1] Agencies refer to the United States Forest Service, California Department of Fish and Wildlife, State Water Board, United States Fish and Wildlife Service, and the Central Valley Regional Water Quality Control Board.

If you have questions regarding this letter, please contact Mr. Michael Maher, UARP Manager, by phone at: (916) 341 5408 or by email at: michael.maher@waterboards.ca.gov. Written correspondence should be directed to:

State Water Resources Control Board
Division of Water Rights
Water Quality Certification Program
Attention: Michael Maher
P.O. Box 2000
Sacramento, CA 95812-2000

Sincerely,

Barbara Evoy, Deputy Director
Division of Water Rights

cc: Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Ms. Anna Ewing
California Department of Fish and Wildlife
North Central Region
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670

Mr. Adam Laputz
Central Valley
Water Regional Quality Control Board
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670

Ms. Deborah Giglio
U.S. Fish and Wildlife Service
2800 Cottage Way, W-2605
Sacramento, CA 95825

Ms. Beth Livingston
United States Forest Service
100 Forni Road
Placerville, CA 95667

Comments:
(2016 Annual Report -Monitoring Program)

#	Page	Par.	Review	Comment	Agency	Response
1	N/A			The report should be expanded to include the following: - A summary of meetings and site visits that occurred during the year (including discussion of major topics and objectives). - A summary of the findings for each monitoring element (introduction, methods, results, and conclusions). This should be more concise than the full reports provided in an appendix or reference section. - A summary of hydrology and water year type to provide context for the monitoring efforts. - A summary of any proposed changes in project operations.	USFS	*-Not included. SMUD does not have a requirement to hold or report on any meetings regarding the Monitoring Program outside of the Annual Review of Ecological Conditions, which has a separate reporting requirement in Aricle 401(a) of the License.* *-Not included. A summary of findings for each monitoring element in addition to those in the Appendix would be redundant and add unnecessarily to the volume of this Report.* *-Included the water year type for context.* *-There were no proposed changes to operation of the Project in 2015, though if there were, those would be reported as described in Articles 401(b)(c)(d) of the License.*
2	2-4			The status summary for each item should directly state whether or not any monitoring was conducted in 2015 and clearly indicate whether or not each report will be submitted for agency review at a future date. Ex: Riparian Vegetation Monitoring- Plan is still in development. Required to be filed with the Commission by November 23, 2016. No monitoring was conducted in 2015. A final report will be submitted for review at a future date. If any monitoring was conducted, details discussing field visits, monitoring efforts, discussions/changes in protocol, findings, and preliminary analysis/trends, etc. should be included (even if the monitoring is ongoing). There should be additional discussion provided for Gerle Creek SSIMP, Water Quality, Bacteria Monitoring, Robbs Peak Powerhouse Entrainment, Heritage Resources, and Large Woody Debris, and possibly any others that were approved in 2015 or prior and had implementation in 2015.	USFS	Additional language was added to identify general activiteis conducted in 2015 under the respective approved Plans. Any additional information noted in the comment will be included in the final Report for each respective Plan.
3	5			Table 1. Monitoring Program Frequency First Five Year – This table indicates that Geomorphology Monitoring (Sensitive Site Investigation and Mitigation Plan Development) was conducted in 2015. Details on the monitoring that occurred should be provided or an explanation provided as to why the monitoring did not occur.	USFS	See comment above.

Comments:
(2016 Annual Report -Monitoring Program)

#	Page	Par.	Review	Comment	Agency	Response
4	N/A (Appendix 1)			Will the draft Water Quality Monitoring Report be finalized in the Final Monitoring Program Annual Report?	USFS	Yes.
5	1 & 2 (Appendix 1)			The Introduction and Background section should also mention the USFS recommended condition, Settlement Agreement article, and developed UARP Water Quality Monitoring Plan.	USFS	The Settlement Agreement was added but there is no corresponding FPA 4(e) Condition. As mentioned, Condition 31 was submitted by the USFS as a recommendation pursuant to Section 10(a) of the FPA, acknowledging the jurisdiction of the SWRCB for this resource. As such, it was removed from Appendix B of the License, and is not cited in the document located in Appendix A of this Report.
6	4 (Appendix 1)	1		Recommend adding to the second sentence that winter (Jan-Feb) in-situ monitoring at riverine sites was also not conducted and clarifying which "middle elevation" sites are being referred to in this sentence. What is significant about "middle elevation" sites? Please provide a copy of the SWRCB July 2015 letter referred to in this paragraph.	USFS	The lack of in-situ monitoring during winter is now mentioned. "Middle elevation" sites are those that would normally be sampled around Independence Day; these were sampled around labor day this year. A copy of the letter is now contained in the Appendix F of the Water Quality Monitoring Report attached as Appendix A to this Report.
7	8 (Appendix 1)	Table 4-4		The UARP Water Quality Monitoring Plan calls for the addition of "three other selected stations" (pg. 12) for bacterial sampling, but only two "[o]ther UARP locations" are mentioned in Table 4-4. Please clarify why a third site was not monitored and discuss agency consultation relevant to the selection of these sites.	USFS	All three were mentioned in Table 4-4. Agency consultation occurred via e-mail on August 7, 2015 as part of the site proposal to the Deputy Director, SWRCB. As mentioned in the SWRCB approval of these sites, the only response received was from the USFS stating it had no concerns with the proposed locations (see Appendix F of 2015 Water Quality Monitoring Report).