Water Quality Monitoring Report - 2021

Sacramento Municipal Utility District

Hydro License Implementation • June 2022

Upper American River Project

FERC Project No. 2101

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Acronyms and Abbreviations

Acronym	Definition
ATL	Advisory Tissue Level
ºC	degrees Celsius
CDFW	California Department of Fish and Wildlife
COLD	cold freshwater habitat
cfu	colony forming units
dw	dry weight
EPA	United States Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
FL	fork length
hr	hour
m	meter
mm	millimeter
MDL	Method Detection Limit
mg/L	milligram per liter
mL	milliliter
MLML	Moss Landing Marine Laboratory
MPN	Most Probable Number
MPSL	Marine Pollution Studies Laboratories
MRL	Method Reporting Limit
MQO	Measurement Quality Objective
NTU	Nephelometric Turbidity Unit
OEHHA	Office of Environmental Hazard Assessment
% Sat	percent saturation
QA/QC	quality assurance and quality control
RWQCB	Regional Water Quality Control Board
SFAR	South Fork American River
SFWQO	Sport Fish Water Quality Objective
SM	standard methods
SMUD	Sacramento Municipal Utility District
SPWN	spawning, reproduction and/or early development
s.u.	standard unit of pH
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TL	total length
UARP	Upper American River Project
ug/g	microgram per gram
uS/cm	microsiemens per centimeter
USFS	United States Forest Service
ww	wet weight
YSI	Yellow Springs Instruments

1.0 INTRODUCTION AND BACKGROUND

This Water Quality Monitoring Report (Report) addresses monitoring requirements set forth in Sacramento Municipal Utility District's (SMUD) Water Quality Monitoring Plan (Plan) (SMUD 2021a). The requirements for this Plan are found in State Water Resources Control Board (SWRCB) Condition 8.J, and U.S. Forest Service (USFS) 4(e) Condition 31.10, located in Appendices A and B, respectively, of the Federal Energy Regulatory Commission's (FERC) Order Issuing New License for the Upper American River Project (UARP), dated July 23, 2014. The Plan was developed by SMUD (SMUD 2015) in coordination with the Consultation Group and Resource Agencies stipulated in the license (FERC 2014). The Plan was revised in 2015 (Revision 1), 2016 (Revision 2), and 2021 (Revision 3). Revision 3 of the Plan reduced the bacterial monitoring frequency at several sites to occur only during even years (i.e., 2022, 2024, 2026…) since no exceedances of 2018 Basin Plan objectives for the recreational water contact (REC-1) designated beneficial use were identified at these sites during the 2015–2020 monitoring period (SMUD 2020, 2021b, SWRCB 2018).

This Report describes the results of the seventh year (2021) of water quality monitoring of basic *in situ* parameters and bacteria for the UARP. This report also describes the results of the second year (2021) of metals bioaccumulation monitoring for the UARP; sampling for metals bioaccumulation was last conducted in 2016.

SMUD owns and operates the UARP, which is licensed by FERC. The UARP (FERC Project No. 2101) 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 also includes recreation facilities containing over 700 campsites, five boat ramps, hiking paths, and bicycle trails at the reservoirs.

2.0 MONITORING OBJECTIVE

The objective of the 2021 monitoring program was to perform *in situ* water quality and bacteria monitoring in reservoirs and stream reaches, as well as to assess potential bioaccumulation of metals of resident fish within specific UARP reservoirs, in order to meet the objectives and rationale of 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 UARP 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; the relatively small Robbs Peak Forebay (30 acre-feet) was not included. [Note: Rockbound Lake, although hydraulically associated with the UARP, is not a UARP reservoir and is not included within the FERC-defined UARP boundary.] The diverted stream reaches included in the monitoring program represented all streams and rivers downstream of UARP reservoirs (Figure 3-1).

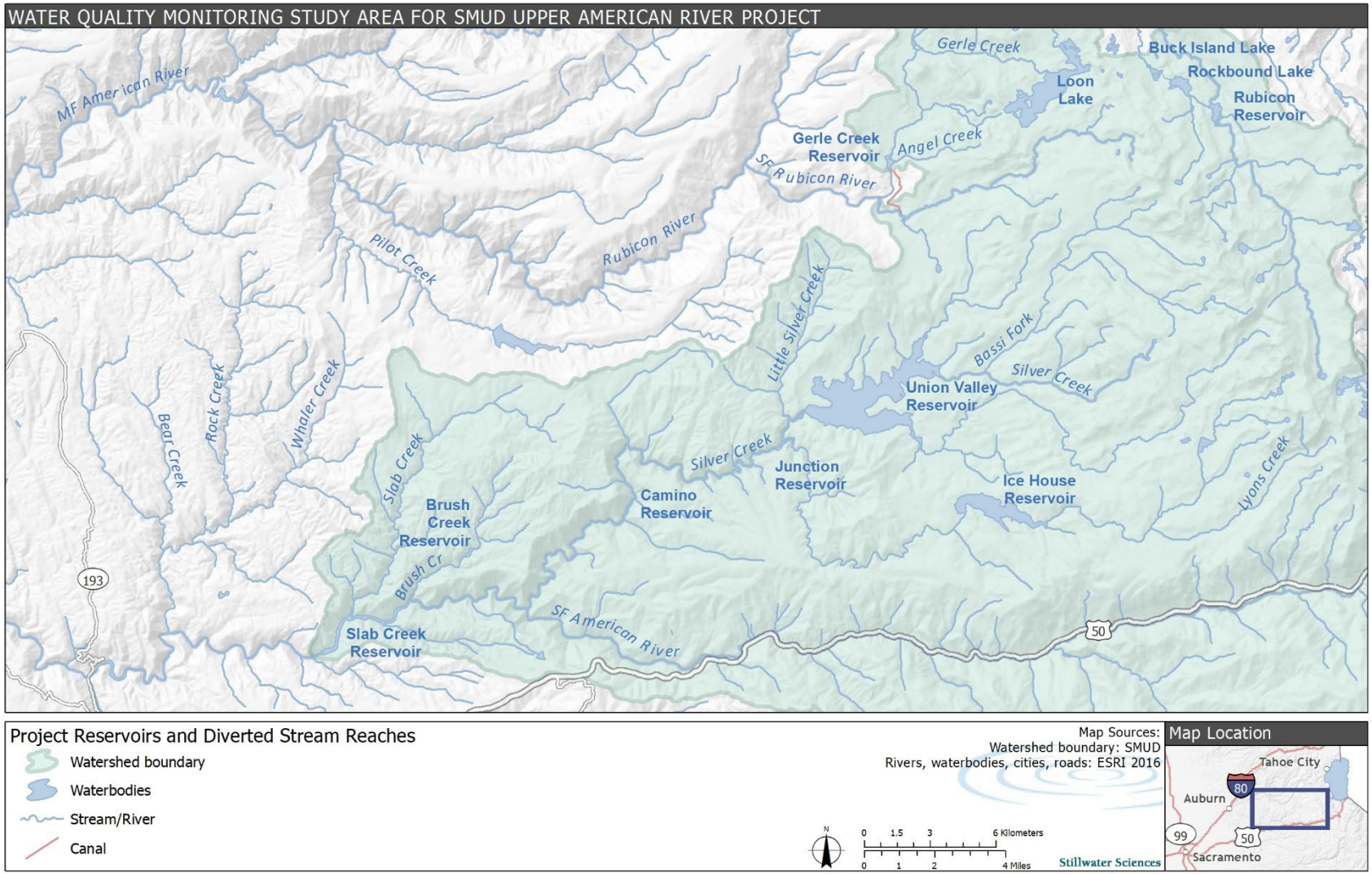

Figure 3-1. Study area for SMUD Upper American River Project *in situ* and bacteria monitoring.

4.0 SAMPLING FREQUENCY AND LOCATIONS

Year 7 (2021) sampling frequency for *in situ* water quality was consistent with winter, spring, summer, and fall monitoring periods designated in the Plan (SMUD 2021a) (Table 4-1). Required bacteria monitoring in 2021 was conducted by sampling the middle elevation UARP reservoir sites (Union Valley, Junction, Ice House, and Slab Creek) during the 30-day period surrounding 4th of July. Fish tissue sampling for metals bioaccumulation was conducted through one period during August at UARP reservoirs identified in the Plan (Table 4-1).

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

Type	2021 (Year 7) Frequency
In situ reservoir	Once in spring – May Once in fall – October
In situ riverine	Once in winter – February Once in spring – April Once in summer – August Once in fall – November
Bacteria	Five samples within 30 days – around 4th of July
Metals bioaccumulation	Once in August

Specific sampling locations within reservoirs and diverted stream reaches varied depending on the water quality parameter or constituent of interest. As specified in the Plan, *in situ* monitoring occurred at 15 representative reservoir locations (Figure 4-1 and Figure 4-2, Table 4-2) and 19 representative stream reaches (Figure 4-1 and Figure 4-2, Table 4-3). Several riverine sites could not be safely sampled during the winter, spring, and fall survey periods due to snow accumulation, and one reservoir site could not be sampled during the fall survey period due to low water surface elevation (Table 4-4). Bacteria sampling occurred at five locations in 2021, the first year in which the updated bacterial monitoring schedule in Revision 3 of the Plan was implemented (Figure 4-2, Table 4-5; SMUD 2021a). All bacterial monitoring locations (i.e., 15 sites in eight reservoirs) will be surveyed 2022. Fish tissue sampling for metals bioaccumulation occurred in six reservoirs (Figures 4-1 and 4-2, Table 4-6), consistent with the Plan (SMUD 2021a). Individual metals bioaccumulation sampling locations within each reservoir are identified in Appendix H.

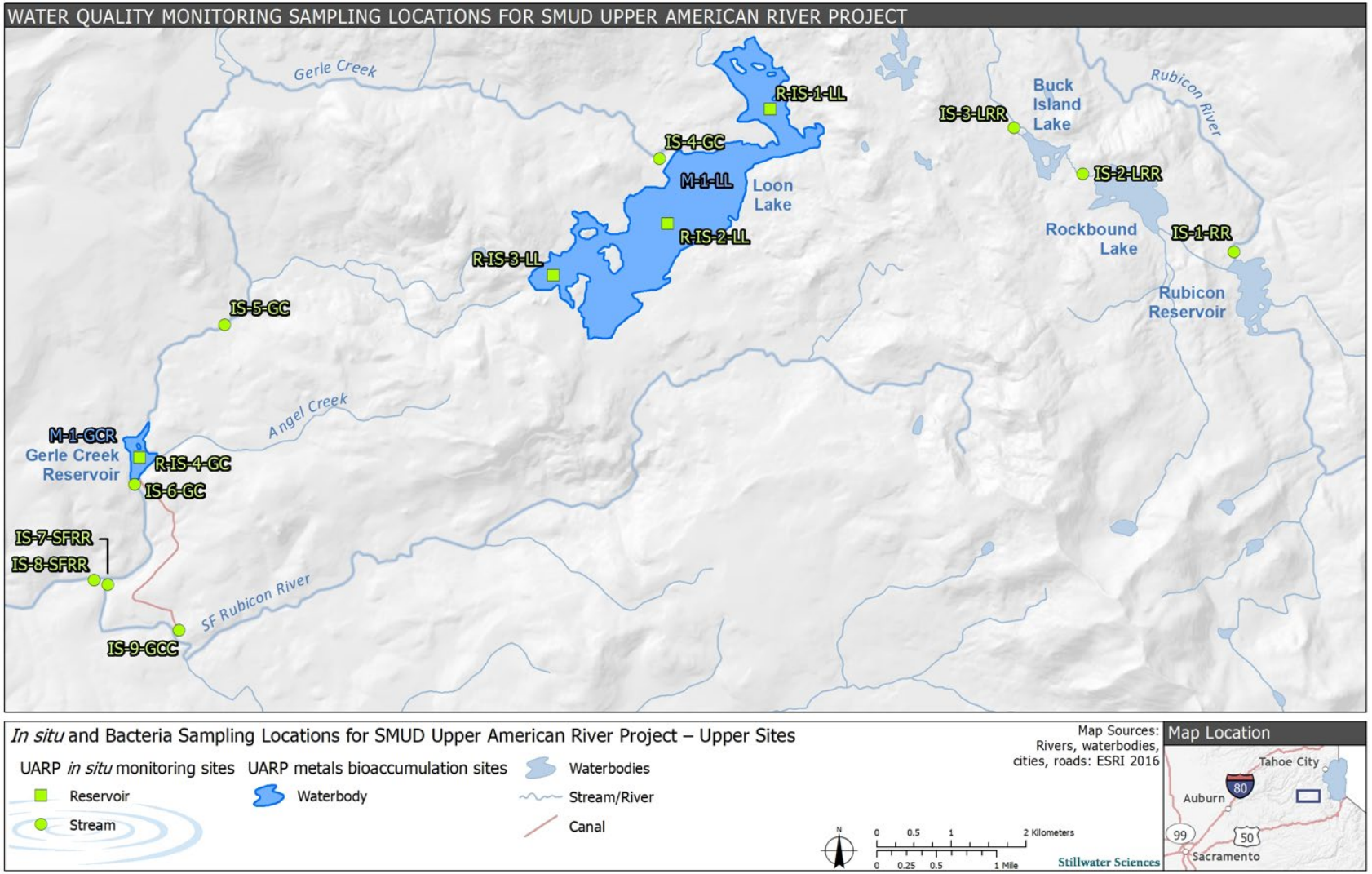

Figure 4-1. *In situ* water quality, bacteria, and metals bioaccumulation sampling locations for SMUD Upper American River Project – upper sites.

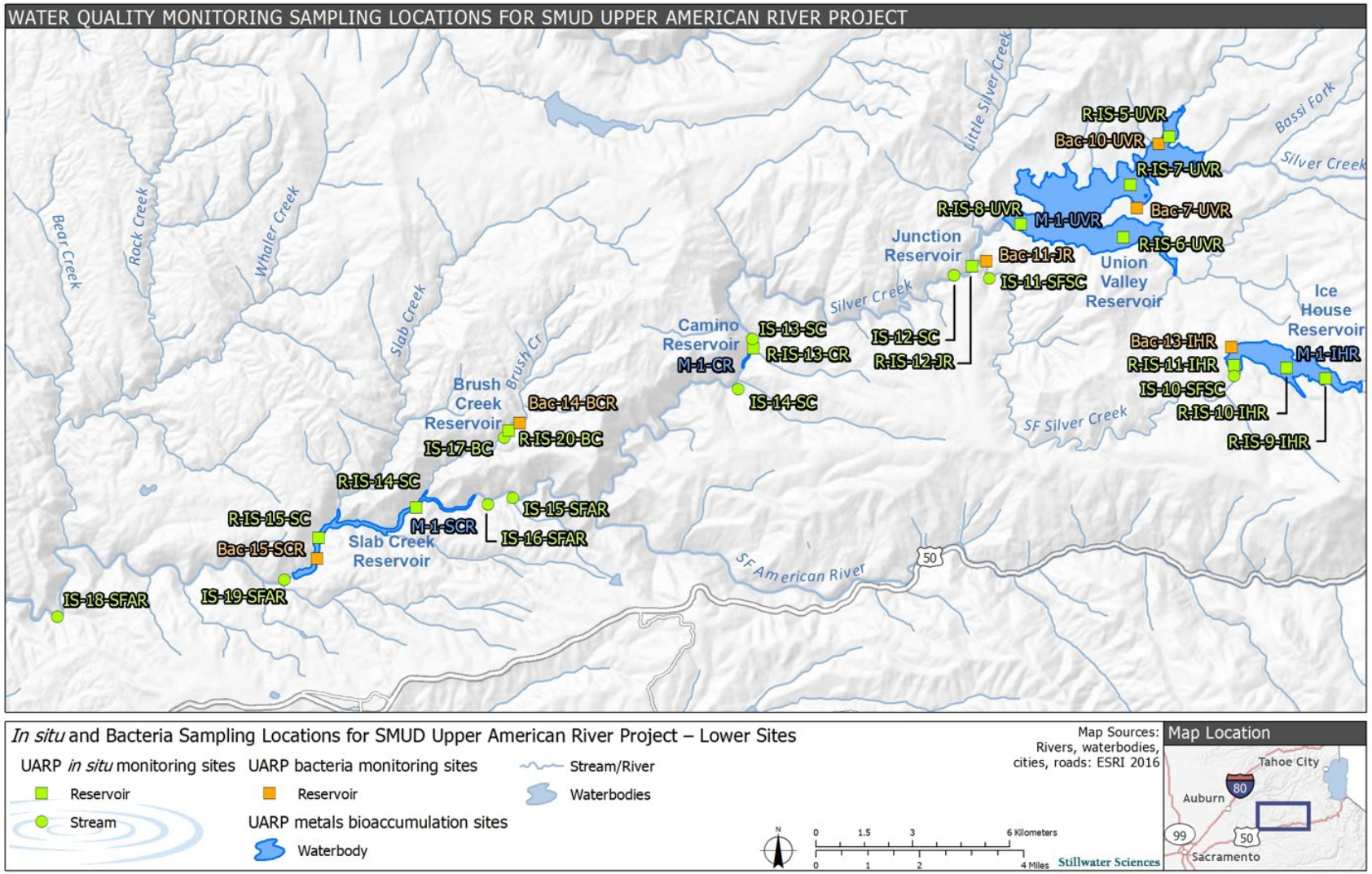

Figure 4-2. *In situ* water quality, bacteria, and metals bioaccumulation sampling locations for SMUD Upper American River Project – lower sites.

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

SMUD Site Name	Site ID	Location	2021 *In situ* Survey Sample Date
R-4C	R-IS-1-LL	Loon Lake, upper reservoir (northeast body)	5/25, 10/19
R-4B	R-IS-2-LL	Loon Lake, mid-reservoir (west body)	5/25, 10/19
R-4A	R-IS-3-LL	Loon Lake, near dam	5/25, 10/19
R-5	R-IS-4-GC	Gerle Creek Reservoir, mid-reservoir	5/26, 10/22
R-6C	R-IS-5-UVR	Union Valley Reservoir, Robbs Powerhouse tailrace zone	5/19
R-6D	R-IS-6-UVR	Union Valley Reservoir, Jones Fork Silver Creek arm	5/19, 10/18
R-6B	R-IS-7-UVR	Union Valley Reservoir, mid-reservoir	5/19, 10/18
R-6A	R-IS-8-UVR	Union Valley Reservoir, near dam	5/19, 10/18
R-7C	R-IS-9-IHR	Ice House Reservoir, upper lake body	5/18, 10/20
R-7B	R-IS-10-IHR	Ice House Reservoir, mid-reservoir	5/18, 10/20
R-7A	R-IS-11-IHR	Ice House Reservoir, near dam	5/18, 10/20
R-8	R-IS-12-JR	Junction Reservoir, mid-reservoir between arms	5/26, 10/22
R-9	R-IS-13-CR	Camino Reservoir, mid-reservoir	5/26, 10/22
R-11B	R-IS-14-SC	Slab Creek Reservoir, upper-reservoir	5/20, 10/21
R-11A	R-IS-15-SC	Slab Creek Reservoir, mid-reservoir	5/20, 10/21

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

SMUD Site Name	Site ID	Location	2021 *In situ* Survey Sample Date
2	IS-1-RR	Rubicon River outflow from Rubicon Reservoir	8/11
5	IS-2-LRR	Little Rubicon River outflow from Rockbound Lake	8/11
6	IS-3-LRR	Little Rubicon River outflow from Buck Island Lake	8/11
7	IS-4-GC	Gerle Creek outflow from Loon Lake	8/9, 11/16
14	IS-5-GC	Gerle Creek inflow to Gerle Creek Reservoir	8/9, 11/16
15	IS-6-GC	Gerle Creek outflow from Gerle Creek Reservoir	4/27, 8/9, 11/16
18	IS-7-SFRR	S.F. Rubicon upstream of Gerle Creek confluence	8/9, 11/16
19	IS-8-SFRR	S.F. Rubicon downstream of Gerle Creek confluence	8/9, 11/16
16	IS-9-GCC	Gerle Creek Canal inflow to Robbs Forebay	4/27, 8/9, 11/16
25	IS-10-SFSC	S.F. Silver Creek outflow from Ice House Reservoir	2/11, 4/27, 8/9, 11/16
27	IS-11-SFSC	S.F. Silver Creek inflow to Junction Reservoir	2/11, 4/27, 8/9, 11/18
29	IS-12-SC	Silver Creek outflow from Junction Reservoir	2/11, 4/27, 8/9, 11/18
32	IS-13-SC	Silver Creek inflow to Camino Reservoir	2/11, 4/27, 8/9, 11/18
34	IS-14-SC	Silver Creek outflow from Camino Reservoir	2/11, 4/27, 8/9, 11/18
38	IS-15-SFAR	South Fork American River (SFAR) upstream of Camino Powerhouse	2/10, 4/28, 8/10, 11/18
41	IS-16-SFAR	SFAR downstream of Camino Powerhouse	2/10, 4/28, 8/10, 11/18
40	IS-17-BC	Brush Creek outflow from Brush Creek Reservoir	4/28, 8/10, 11/18
60	IS-18-SFAR	SFAR upstream of White Rock Powerhouse	2/10, 4/28, 8/10, 11/19
43	IS-19-SFAR	SFAR downstream of Slab Creek Reservoir	2/10, 4/29, 8/9, 11/19

Table 4-4. *In situ* Water Quality Sampling Locations Not Sampled for SMUD Upper American River Project Riverine and Reservoir Sites.

SMUD Site Name	Site ID	Location	Reason Not Sampled for 2021 *In situ* Survey
Winter			
2	IS-1-RR	Rubicon River outflow from Rubicon Reservoir	Snow accumulation
5	IS-2-LRR	Little Rubicon River outflow from Rockbound Lake	Snow accumulation
6	IS-3-LRR	Little Rubicon outflow from Buck Island Lake	Snow accumulation
7	IS-4-GC	Gerle Creek outflow from Loon Lake	Snow accumulation
14	IS-5-GC	Gerle Creek inflow to Gerle Creek Reservoir	Snow accumulation
18	IS-7-SFRR	S.F. Rubicon upstream of Gerle Creek confluence	Snow accumulation
19	IS-8-SFRR	S.F. Rubicon downstream of Gerle Creek confluence	Snow accumulation
16	IS-9-GCC	Gerle Creek Canal inflow to Robbs Forebay	Snow accumulation
40	IS-17-BC	Brush Creek outflow from Brush Creek Reservoir	Restricted access due to construction activity
Spring			
2	IS-1-RR	Rubicon River outflow from Rubicon Reservoir	Snow accumulation
5	IS-2-LRR	Little Rubicon River outflow from Rockbound Lake	Snow accumulation
6	IS-3-LRR	Little Rubicon outflow from Buck Island Lake	Snow accumulation
7	IS-4-GC	Gerle Creek outflow from Loon Lake	Snow accumulation
14	IS-5-GC	Gerle Creek inflow to Gerle Creek Reservoir	Snow accumulation
18	IS-7-SFRR	S.F. Rubicon upstream of Gerle Creek confluence	Snow accumulation
19	IS-8-SFRR	S.F. Rubicon downstream of Gerle Creek confluence	Snow accumulation
Fall			
231	R-IS-5-UVR	Union Valley Reservoir near Robbs Powerhouse	Low water surface elevation
2	IS-1-RR	Rubicon River outflow from Rubicon Reservoir	Snow accumulation
5	IS-2-LRR	Little Rubicon River outflow from Rockbound Lake	Snow accumulation
6	IS-3-LRR	Little Rubicon outflow from Buck Island Lake	Snow accumulation

Table 4-5. Bacteria Sampling Locations and Dates for SMUD Upper American River Project Sites, 2021.

Reservoir	SMUD Site Name	Site ID	Location	2021 Sample Dates
Union Valley Reservoir (swim areas)	R-6H	Bac-7-UVR	At Fashoda Beach	6/22, 6/29, 7/6, 7/13, 7/20
	R-6F	Bac-10-UVR	Near Yellowjacket Campground	6/22, 6/29, 7/6, 7/13, 7/20
Other UARP Locations	R-8B	Bac-11-JR	Junction Reservoir, near boat launch	6/22, 6/29, 7/6, 7/13, 7/20
Ice House Reservoir (beach locations)	69	Bac-13-IHR	East of boat launch and picnic area	6/22, 6/29, 7/6, 7/13, 7/20
Other UARP locations	R-11C	Bac-15-SCR	Slab Creek Reservoir, near boat launch	6/22, 6/29, 7/6, 7/13, 7/20

Table 4-6. Metals Bioaccumulation Sampling Locations and Dates for SMUD Upper American River Project Reservoir Sites.

Reservoir	SMUD Site Name	Site ID	Locations[1]	2021 Sample Dates
Loon Lake Reservoir	80	M-1-LL	Various	8/2
Gerle Creek Reservoir	81	M-1-GCR	Various	8/5
Union Valley Reservoir	82	M-1-UVR	Various	8/5, 8/17
Ice House Reservoir	83	M-1-IHR	Various	8/29
Camino Reservoir	84	M-1-CR	Various	8/3
Slab Creek Reservoir	85	M-1-SCR	Various	8/4

[1] Electrofishing and gill-net placement locations are described in Appendix H.

5.0 METHODS

5.1 *IN SITU* PARAMETERS

A multi-probe Sonde (Yellow Springs Instruments [YSI] EXO2 [winter, spring, and fall sampling events] or YSI ProDSS [summer sampling event]) was used for measurement of *in situ* water quality parameters, including water temperature, conductivity, dissolved oxygen, pH, and turbidity (Table 5-1).

Table 5-1. *In situ* Water Quality Parameters and Measurement Methods.

Parameter	Method	Units	Reporting Resolution
Water temperature	EPA 170.1	degrees Celsius (ºC)	0.1
Conductivity	SM 2510-B	microsiemens per centimeter (uS/cm)	1.0
Dissolved oxygen	SM 4500-O(G)	milligrams per liter (mg/L)	0.1
pH	SM 4500-H	standard unit of pH (s.u.)	0.1
Turbidity	SM 2130B	Nephelometric Turbidity Unit (NTU)	0.1
Secchi depth (Secchi disk)	USGS	meter (m)	0.1

EPA = U.S. Environmental Protection Agency
SM = Standard Method
USGS = United States Geological Survey

Reservoir *in situ* water quality monitoring was conducted by watercraft to access mid-reservoir areas (Figure 5-1). At each reservoir site, a vertical water column profile was collected for all *in situ* water quality 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 to two minutes, as needed). Water transparency was measured at reservoir stations with a standard 7.9-inch-diameter Secchi disk.

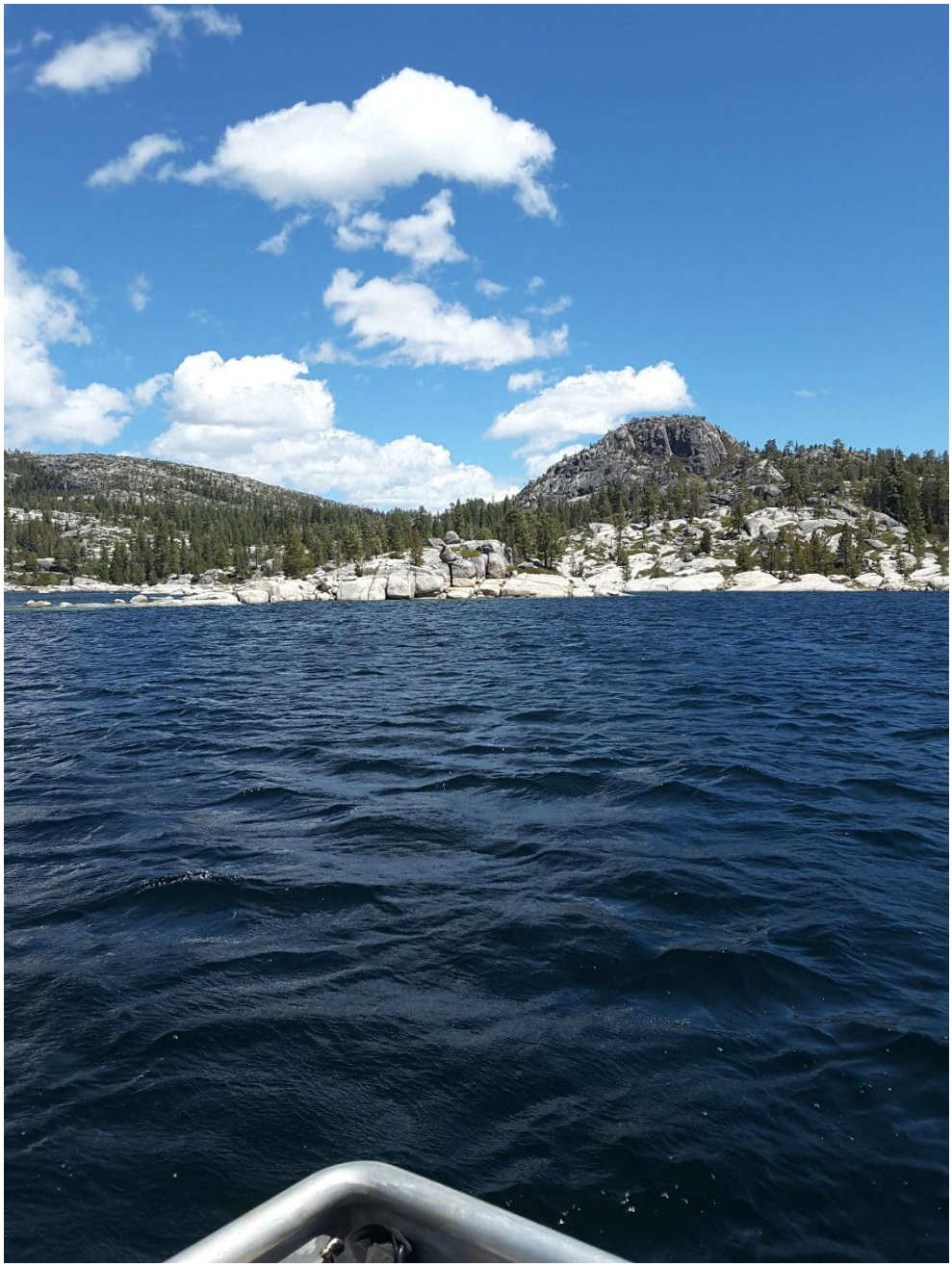

Figure 5-1. Example of mid-reservoir *in situ* water quality sampling site (R-IS-1-LL) at Loon Lake Reservoir.

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 to two minutes, as needed) such that there was little variability in parameter readings at each location.

Figure 5-2. Example of an *in situ* water quality sampling site (IS-16-SFAR) on the South Fork American River downstream of Camino Powerhouse.

For both reservoir and riverine *in situ* monitoring, Sonde calibration was conducted prior to the start of each sampling day, and a post-sampling calibration check was conducted following each sampling day, using standard solutions and recorded on calibration logs (Appendix F). Comparisons between post-sampling and post-calibration values were made and Measurement Quality Objective (MQO) codes (Accept, Qualify, Reject) were assigned to each parameter. MQO criteria for each *in situ* parameter are provided in Table 5-2.

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 event, data were added to a

database template provided by SMUD, for eventual transfer into SMUD's master database. All *in situ* water quality sampling was conducted in compliance with the approved Plan (SMUD 2021a).

Table 5-2. Measurement Quality Objectives Criteria for *In situ* Parameters.

Measurement Quality Objectives (MQO)				
Parameter	**Units**	**Accept**	**Qualify**	**Reject**
Dissolved Oxygen	% Saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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%

NTU = Nephelometric Turbidity Unit
s.u. = standard unit of pH
uS/cm = microsiemens per centimeter

5.2 BACTERIA

Bacteria grab samples were collected near reservoir shorelines in shallow water, and in particular at swim areas/beach locations (Table 4-5, Figure 5-3). Samples were collected in sterilized bottles supplied by the analytical laboratory. Field sampling personnel wearing sterile gloves filled each sample bottle by direct immersion in the reservoir. Immediately after collection, samples were placed on ice for transport to the analytical laboratory within the required field hold time (Table 5-3).

Figure 5-3. Example of a bacteria sampling site in Junction Reservoir (Site Bac-13-JR).

Table 5-3. Bacteria Analytical Methods and Field Hold Times.

Analyte	Method	Units	MDL	Hold Time
Escherichia coli	SM9223B (Quantitray)	MPN/100 mL	1.0	8 hr
Fecal coliform	SM9221E (MPN 15 or 25)	MPN/100 mL	1.8	8 hr

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

Field-based Quality Assurance/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 (Appendix G). Sample labels included sample identification code, date, time, preservative, client name, collector's name, reservoir 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.

5.3 METALS BIOACCUMULATION

Fish tissue samples were collected by Moss Landing Marine Laboratory (MLML) Marine Pollution Studies Lab (MPSL) on August 3–5 and 17, 2021 and analyzed at MPSL in Moss Landing, in accordance with protocols of the SWRCB Surface Water Ambient Monitoring Program (SWAMP). Fish collection was conducted by boat using hook and line, gill netting, and electrofishing. Target species included brown trout (*Salmo trutta*), black bass (*Micropterus* spp.), rainbow trout (*Oncorhynchus mykiss*), and Sacramento pikeminnow (*Ptychocheilus grandis*) (Table 5-4). An attempt was made to collect a minimum of three individuals per species. Field collection methods are provided in Appendix H.

Physical characteristics were recorded for each individual fish, including: weight, total length (TL), fork length (FL), and presence of any abnormalities. Each fish was individually tagged, wrapped in aluminum foil, placed in a labeled zipper-closure bag, and stored on dry ice for the duration of the trip. At the analytical laboratory, samples were stored in an ultra-cold freezer at -20 ^{o}C until they were processed for analysis.

Fish tissue samples were analyzed in accordance with the *General Protocol for Sport Fish Sampling and Analysis* (CEPA 2005) and with methods comparable to those used at the MPSL. Fish were dissected following MPSL-105 (MPSL 2021a). Metals samples (copper, lead, and silver) were digested using EPA 3052 (EPA 1996, MPSL 2021b), and analyzed using EPA 200.8 (EPA 1994, MPSL 2021c). Mercury samples were analyzed using EPA 7473 (EPA 2007, 2022).

Method detection limits (MDLs) and method reporting limits (MRLs) are shown in Table 5-5 and Appendix I. In August 2017, the U.S. Environmental Protection Agency (EPA) altered the approach for determining MDLs and MRLs (40 CFR Part 136, Revision 2), resulting in different MDLs and MRLs for 2021 fish tissue analyses of mercury, copper, lead, and silver compared with those used for 2016 fish tissue analyses and indicated in the Plan (SMUD 2017, SMUD 2021a) (Table 5-5). The MDL and MRL for mercury in 2021 fish tissue analyses were each less than the corresponding limit used in 2016 and indicated in the Plan, while the MDLs and MRLs for copper, lead, and silver were higher in 2021 than in 2016.

Table 5-4. Target Fish Species, Size Ranges, and Numbers by Location for Metals Bioaccumulation Sampling.

Reservoir (Site Name)	Species Common Name	FL (range, in mm)	Number of Fish Collected
Loon Lake Reservoir (M-1-LL)	Rainbow Trout	179	1
Gerle Creek Reservoir (M-1-GCR)	Rainbow Trout	174	1
	Brown Trout	208–332	11
Union Valley Reservoir (M-1-UVR)	Brown Trout	501	1
	Lake Trout	407	1
	Rainbow Trout	313–414	16
	Spotted bass	172–360	10
Ice House Reservoir (M-1-IHR)	Rainbow Trout	214–355	4
Camino Reservoir (M-1-CR)	Brown Trout	182–320	6
	Rainbow Trout	139–252	6
Slab Creek Reservoir (M-1-SCR)	Brown Trout	360	1
	Rainbow Trout	342	1
	Sacramento Pikeminnow	376–440	9

FL = Fork Length
mm = millimeter

Table 5-5. Metals, Method Detection and Reporting Limits for Fish Tissue Analyses, 2016 and 2021.

Metal	Method	MDL (ug/g ww)		MRL (ug/g ww)		MDL (ug/g dw)		MRL (ug/g dw)	
		2016[1]	2021	2016[1]	2021	2016[1]	2021	2016[1]	2021
Mercury	EPA 7473[2]	0.004	0.003	0.012	0.010	0.016	0.012	0.047	0.039
Copper	EPA 220.8[3]	0.06	0.36	0.20	1.07	0.34	1.34	1.00	4.02
Lead	EPA 220.8[3]	0.002	0.02	0.005	0.05	0.01	0.07	0.03	0.20
Silver	EPA 220.8[3]	0.003	0.02	0.01	0.07	0.02	0.09	0.06	0.27

dw = dry weight
EPA = U.S. Environmental Protection Agency
MDL = method detection limit
MRL = method reporting limit
ug/g = microgram per gram
ww = wet weight

[1] From the Water Quality Monitoring Plan (Revision 3) (SMUD 2021a)
[2] Total mercury is a proxy for methylmercury in fish (Weiner *et al.* 2007).
[3] Digestion and analysis of total copper, total lead, and total silver.

6.0 RESULTS

6.1. *IN SITU* PARAMETERS

6.1.1. Riverine Sites

Detailed *in situ* water quality dates and measurements for UARP riverine sites can be found in Table 6-1. Field data sheets for the February (Winter) sampling event are provided in Appendix E. Field data for the April (Spring), August (Summer), and November (Fall) surveys were recorded on a field tablet using ArcGIS Survey123 software; these data records are also provided in Appendix E. Several riverine sites were not sampled during the 2021 February (Winter), April (Spring), and November (Fall) sampling events due to safety issues associated with snow accumulation or restricted access (Table 4-4).

February (Winter) In situ Water Quality Sampling Event

During the February sampling event, water temperatures ranged from 3.1 to 7.5 degrees Celsius (°C) and were variable by site. Riverine dissolved oxygen ranged from 10.9 to 12.2 milligrams per liter (mg/L) (83 to 100% saturation), with no measurements falling below the Basin Plan minimum concentration of 7.0 mg/L for cold freshwater habitat (COLD) and spawning, reproduction, and/or early development (SPWN) designated beneficial uses (CRWQCB 2018). pH at riverine sites ranged from 6.8 to 7.6 standard units (s.u.), with no measurements falling below the Basin Plan instantaneous minimum pH objective (6.5 s.u.) and no exceedances of the instantaneous maximum objective (8.5 s.u) (Table 6-1).

Typical of granitic watersheds, conductivity at the riverine sites was low, ranging from 7 to 42 microsiemens per centimeter (uS/cm) (Table 6-1).

Turbidity measurements during the January sampling event were low, ranging from 0.4 to 0.8 Nephelometric Turbidity Units (NTUs) (Table 6-1).

April (Spring) In situ Water Quality Sampling Event

During the April sampling event, water temperatures (5.0 to 14.6°C) exhibited a greater range and were generally higher than temperatures measured during the winter sampling event. Dissolved oxygen ranged from 10.2 to 11.4 mg/L (89 to 100% saturation) across all accessible riverine sites, which is well above the Basin Plan minimum concentration of 7.0 mg/L for COLD and SPWN. pH ranged from 7.0 to 7.6 s.u., with no measurments falling below the Basin Plan instantaneous minimum objective (6.5 s.u.) and no exceedences of the Basin Plan instantaneous maximum objective (8.5 s.u.) (Table 6-1).

Conductivity at the riverine sites was low, ranging from 7 to 30 uS/cm during the May sampling event (Table 6-1).

Turbidity measurements were low, ranging from 0.1 to 0.9 NTU (Table 6-1).

August (Summer) In situ Water Quality Sampling Event

During the August sampling event, water temperatures ranged from 8.5 to 23.3°C and were variable by site. Riverine dissolved oxygen during the August sampling event ranged from 7.0 to 11.2 mg/L (80 to 104% saturation), with zero measurements falling below the Basin Plan minimum concentration of 7.0 mg/L for COLD and SPWN. pH ranged from 6.4 to 8.1 s.u., with one measurement falling below the Basin Plan instantaneous minimum (6.5 s.u.) and no exceedences of the instantaneous maximum objective (8.5 s.u.). Measured pH below the Basin Plan instantaneous minimum objective occurred at Site IS-4-GC (6.4 s.u.) (Table 6-1).

Conductivity at the riverine sites was low, ranging from 7 to 56 uS/cm in August (Table 6-1).

During the August sampling event, turbidity measurements were low, ranging from 0.0 to 0.9 NTU (Table 6-1).

November (Fall) In situ Water Quality Sampling Event

Water temperatures during the November sampling event ranged from 3.6 to 11.1°C. Riverine dissolved oxygen ranged from 9.7 to 11.5 mg/L (80 to 96% saturation), with no measurements falling below the Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPWN. Riverine pH ranged from 5.4 to 7.5 s.u. with six measurements falling below the Basin Plan instantaneous minimum pH objective (6.5 s.u.) and no exceedances of the instantaneous maximum objective (8.5 s.u). Measured pH below the Basin Plan intantaneous minimum occurred at sites IS-4-GC (5.4 s.u.), IS-5-GC (6.4 s.u.), IS-6-GC (6.4 s.u.), IS-9-GCC (6.4 s.u.), IS-12-SC (6.4 s.u.) and IS-17-BC (6.4 s.u.) (Table 6-1).

Conductivity at the riverine sites was low, ranging from 7 to 48 uS/cm during the November sampling event (Table 6-1).

Turbidity at riverine sites was low, ranging from 0.1 to 3.3 NTU. Only two sites (IS-17-BC and IS-19-SFAR) exhibited turbidity greater than 1.0 NTU (Table 6-1).

Table 6-1. *In situ* Water Quality for UARP Riverine Sites.

Site ID	2021 Sample Date	Water Temperature (°C)	pH (s.u.)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	Turbidity (NTU)
Winter							
IS-1-RR	--	--	--	--	--	--	--
IS-2-LRR	--	--	--	--	--	--	--
IS-3-LRR	--	--	--	--	--	--	--
IS-4-GC	--	--	--	--	--	--	--
IS-5-GC	--	--	--	--	--	--	--
IS-6-GC	--	--	--	--	--	--	--
IS-7-SFRR	--	--	--	--	--	--	--
IS-8-SFRR	--	--	--	--	--	--	--
IS-9-GCC	--	--	--	--	--	--	--
IS-10-SFSC	2/11	3.6	7.1	10.9	83	7	0.7
IS-11-SFSC	2/11	3.1	7.2	11.8	88	10	0.4
IS-12-SC	2/11	3.1	6.8	11.5	86	9	0.8
IS-13-SC	2/11	5.1	7.0	11.9	93	11	0.5
IS-14-SC	2/11	6.0	7.3	11.7	94	16	0.4
IS-15-SFAR	2/10	5.9	7.6	12.1	97	42	0.7
IS-16-SFAR	2/10	5.7	7.1	11.5	91	28	0.7
IS-17-BC	--	--	--	--	--	--	--
IS-18-SFAR	2/10	7.5	7.6	12.0	100	36	0.6
IS-19-SFAR	2/10	5.3	7.3	12.2	97	24	0.8
Spring							
IS-1-RR	--	--	--	--	--	--	--
IS-2-LRR	--	--	--	--	--	--	--
IS-3-LRR	--	--	--	--	--	--	--
IS-4-GC	--	--	--	--	--	--	--
IS-5-GC	--	--	--	--	--	--	--
IS-6-GC	4/27	5.0	7.1	11.4	90	7	0.3
IS-7-SFRR	--	--	--	--	--	--	--
IS-8-SFRR	--	--	--	--	--	--	--
IS-9-GCC	4/27	6.1	7.0	11.3	91	8	0.1
IS-10-SFSC	4/27	6.4	7.0	11.0	89	7	0.4
IS-11-SFSC	4/27	9.7	7.3	10.5	93	12	0.3
IS-12-SC	4/27	7.4	7.3	11.0	91	10	0.3

Site ID	2021 Sample Date	Water Temperature (°C)	pH (s.u.)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	Turbidity (NTU)
IS-13-SC	4/27	9.9	7.4	11.1	98	12	0.4
IS-14-SC	4/27	9.2	7.4	11.3	98	13	0.2
IS-15-SFAR	4/28	10.6	7.4	10.8	97	30	0.5
IS-16-SFAR	4/28	11.5	7.4	10.9	100	25	0.5
IS-17-BC	4/28	8.3	7.3	10.9	93	16	0.4
IS-18-SFAR	4/28	14.6	7.6	10.2	100	30	0.9
IS-19-SFAR	4/28	10.9	7.3	10.8	98	24	0.5
Summer							
IS-1-RR	8/11	20.8	6.9	7.7	86	16	0.1
IS-2-LRR	8/11	23.3	7.0	7.0	82	17	0.0
IS-3-LRR	8/11	21.9	6.8	7.0	80	11	0.0
IS-4-GC	8/9	11.1	6.4	8.9	81	7	0.1
IS-5-GC	8/9	14.8	6.8	8.5	84	11	0.0
IS-6-GC	8/9	15.5	6.8	8.3	83	12	0.1
IS-7-SFRR	8/9	16.0	7.2	8.3	85	14	0.0
IS-8-SFRR	8/9	15.8	7.1	8.5	86	14	0.1
IS-9-GCC	8/9	20.2	7.2	8.0	88	15	0.1
IS-10-SFSC	8/9	8.5	6.8	9.9	84	8	0.1
IS-11-SFSC	8/9	22.2	7.3	7.6	87	13	0.0
IS-12-SC	8/9	11.3	6.9	9.4	86	10	0.1
IS-13-SC	8/9	18.1	7.2	8.6	91	14	0.1
IS-14-SC	8/9	12.9	7.2	9.9	94	11	0.0
IS-15-SFAR	8/10	22.5	8.1	9.0	104	56	0.0
IS-16-SFAR	8/10	9.7	6.7	11.2	99	11	0.0
IS-17-BC	8/10	13.1	7.1	9.6	92	19	0.9
IS-18-SFAR	8/10	18.0	7.3	9.5	100	20	0.2
IS-19-SFAR	8/9	13.5	7.3	10.0	95	15	0.1
Fall							
IS-1-RR	--	--	--	--	--	--	--
IS-2-LRR	--	--	--	--	--	--	--
IS-3-LRR	--	--	--	--	--	--	--
IS-4-GC	11/16	7.8	5.4	9.7	82	7	0.4
IS-5-GC	11/16	6.3	6.4	10.4	84	13	0.2
IS-6-GC	11/16	8.2	6.4	10.0	84	7	0.3

Site ID	2021 Sample Date	Water Temperature (°C)	pH (s.u.)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	Turbidity (NTU)
IS-7-SFRR	11/16	6.4	6.7	10.4	85	13	0.1
IS-8-SFRR	11/16	7.0	6.6	10.3	85	11	0.2
IS-9-GCC	11/16	8.3	6.4	10.2	86	8	0.3
IS-10-SFSC	11/16	8.7	6.6	10.0	86	12	0.8
IS-11-SFSC	11/18	3.6	6.8	11.5	87	12	0.3
IS-12-SC	11/18	4.8	6.4	10.3	80	11	0.5
IS-13-SC	11/18	7.6	6.7	10.9	91	14	0.3
IS-14-SC	11/18	8.1	7.2	11.0	93	20	0.2
IS-15-SFAR	11/18	7.1	6.8	11.5	95	46	0.7
IS-16-SFAR	11/18	8.0	6.6	11.0	93	36	0.6
IS-17-BC	11/18	11.1	6.4	9.9	90	20	3.3
IS-18-SFAR	11/19	10.0	7.5	10.0	96	48	0.7
IS-19-SFAR	11/19	9.4	7.3	10.4	90	43	1.3

°C = degrees Celsius
s.u. = standard unit of pH
mg/L = milligrams per liter
% sat = percent saturation
uS/cm = microsiemens per centimeter
NTU = Nephelometric Turbidity Unit
"–" Indicates that data were not collected due to site inaccessibility. See Table 4-4.

6.1.2. Reservoir Sites

In situ water quality data for selected UARP reservoir sites are presented in Figures 6-1 and 6-2 as representative of vertical profiles at other similar sites. Data for all sites are presented in Appendices A and B. As noted in Section 5, *in situ* water quality parameters were collected as part of Spring and Fall *in situ* sampling events in 2021, consistent with the Plan (SMUD 2021a). One sampling location at Union Valley Reservoir, Site R-IS-5-UVR, could not be sampled during the fall sampling event due to low water surface elevation (Table 4-4).

May (Spring) In situ Water Quality Sampling Event

During the May (Spring) sampling event, reservoir water temperatures ranged from approximately 11 to 18°C in surface waters to 6 to 14°C in bottom waters (Figure 6-1 and Appendix B, Figures B-1 through B-8). The onset of thermal stratification was apparent in all UARP reservoirs. In Loon Lake, surface water temperatures at the more shallow Site R-IS-1-LL were consistent from the surface to approximately 7 m, at which point temperatures decreased by approximately 2°C in the bottom waters. A small thermocline (i.e., a temperature change of more than 1°C per 1.0 m of depth) was located at 11 m at the deeper Site R-IS-2-LL, and at Site R-IS-3-LL water temperatures decreased by 1°C between the surface and bottom waters (Appendix B, Figures B-1 and B-2). Gerle Creek Reservoir exhibited a thermocline near the surface between 1 and 2 m, beneath which water temperature decreased gradually with depth (Appendix B, Figure B-2). The deep Union Valley Reservoir exhibited a thermocline ranging from 5 to 20 m depending on the site (Figure 6-1 and Appendix B, Figures B-3 and B-4). The thermocline was most clearly defined between 7 and 15 m at the deep Site R-IS-8-UVR nearest the dam (Appendix B, Figure B-4), with vertical temperature differences extending closer to the reservoir bottom at the other three more shallow sites. In Ice House Reservoir, the thermocline was located between 6 and 14 m at the deep Site R-IS-11-IHR nearest the dam. The more shallow Site R-IS-9-IHR exhibited a gradual and fairly consistent decline in temperature with depth, whereas the shallow Site R-IS-10-IHR exhibited a thermocline at approximately 6 m (Figure 6-1 and Appendix B, Figures B-5 and B-6). In Junction Reservoir, surface warming was apparent, along with a more gradual decrease in water temperatures and a developing thermocline between 4 and 5 m (Appendix B, Figure B-6). In Camino Reservoir, water temperature decreased gradually between the surface and 4 m, with a slightly greater decrease in temperature near the bottom between 4 and 5 m (Appendix B, Figure B-7). In Slab Creek Reservoir, the thermocline was located between 3 and 5 m, although temperatures continued to decrease gradually at depths below this point (Appendix B, Figures B-7 and B-8).

In Union Valley, Ice House, and Gerle Creek reservoirs, dissolved oxygen concentrations increased slightly (0.3 to 1.4 mg/L) within the thermoclines before decreasing gradually with depth (Appendix B, Figures B-2 through B-4 and B-6). Dissolved oxygen concentrations in Loon Lake, Junction, Camino, and Slab Creek reservoirs were generally consistent with depth. Dissolved oxygen concentrations were

above 7.7 mg/L at all reservoir sites during the May (Spring) sampling event, which is greater than the Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPAWN designated beneficial uses. pH values generally showed little variation among reservoirs and with depth, ranging from 5.6 to 7.6 s.u (Appendix A, Table A-1). pH values at R-IS-8-UVR decreased slightly (0.7 s.u.) within the thermocline before stabilizing with depth (Appendix B, Figure B-4). Ten sites (R-IS-1-LL, R-IS-2-LL, R-IS-3-LL, R-IS-4-GC, R-IS-6-UVR, R-IS-7-UVR, R-IS-8-UVR, R-IS-9-IHR, R-IS-11-IHR, and R-IS-12-JR) exhibited pH values that fell below the Basin Plan instantaneous minimum pH objective (6.5 s.u.). There were no exceedances of the instantaneous maximum pH objective (8.5 s.u). Turbidity levels were very low and were generally consistent with depth (less than or equal to 0.8 NTU) across all reservoir monitoring sites (Appendix A, Table A-1).

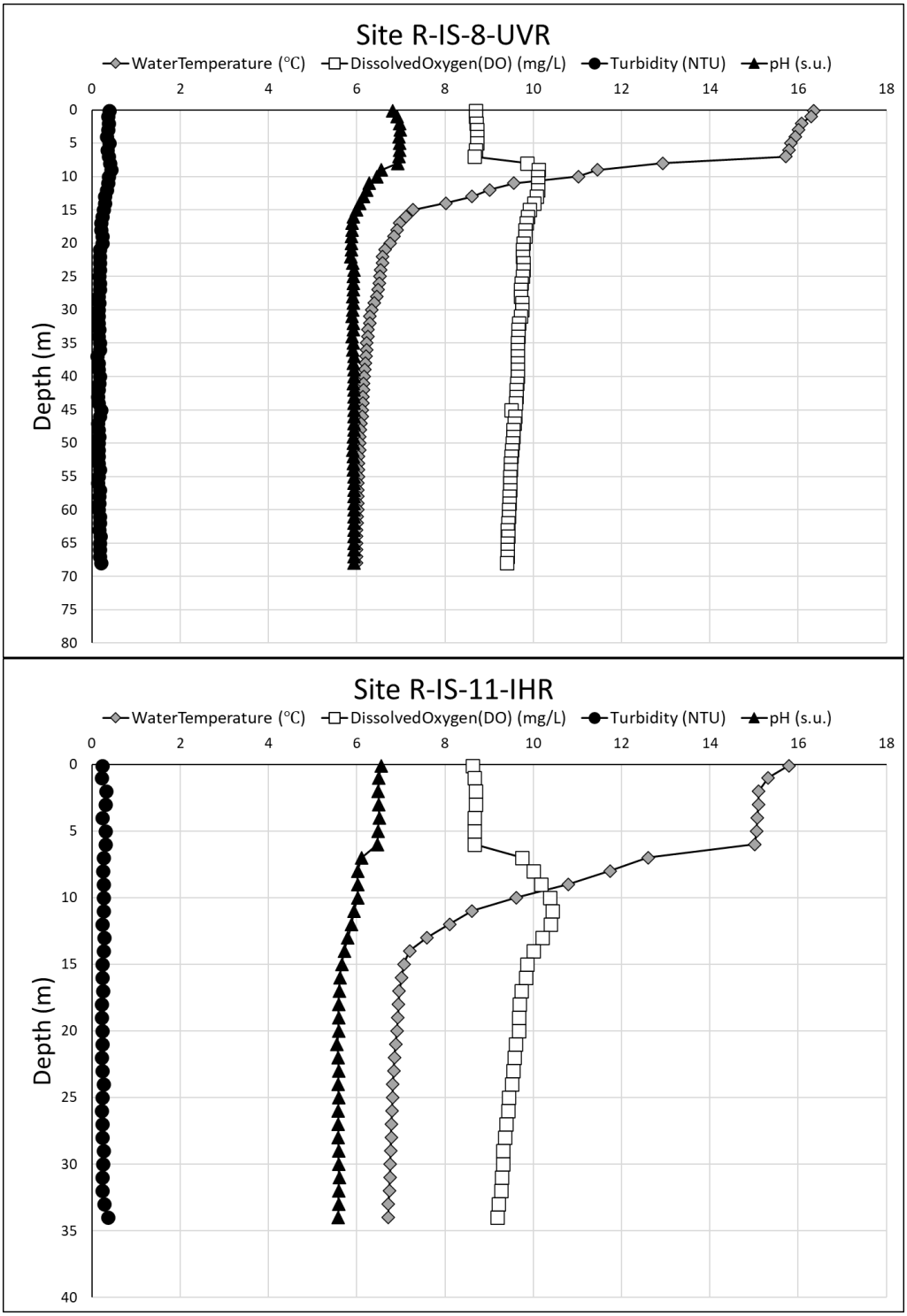

Figure 6-1. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir and Ice House Reservoir sites R-IS-8-UVR (top) and R-IS-11-IHR (bottom) during May (Spring) 2021.

October (Fall) In situ Sampling Event

During the October (Fall) sampling event, surface water temperatures across all reservoir sites ranged from approximately 10 to 15°C and bottom water temperatures ranged from 8 to 15°C. Most sites exhibited little to no variation in water temperature with depth, indicating that the reservoirs were generally well mixed (Figure 6-2 and Appendix B, Figures B-9 through B-11 and B-13 through B-15). Thermal stratification was observed at Union Valley Reservoir, Ice House Reservoir, and Slab Creek Reservoir at sites R-IS-8-UVR, R-IS-9-IHR, R-IS-11-IHR, and R-IS-14-SC, where thermoclines were located at depths of 26 m, 17 m, 17 m, and 2 m from the surface, respectively (Figure 6-2 and Appendix B, Figures B-12, B-13, and B-15).

Dissolved oxygen, pH, and turbidity at all reservoir sites were generally consistent with depth; exceptions occured at sites R-IS-8-UVR, R-IS-9-IHR, R-IS-11-IHR, and, R-IS-14-SC. At sites R-IS-8-UVR and R-IS-11-IHR, dissolved oxygen concentrations and pH decreased along with decreases in water temperature within the thermoclines (Appendix B, Figures B-12 and B-13). Dissolved oxygen concentrations increased slightly (1.5 mg/L) within the thermocline at Site R-IS-14-SC (Appendix B, Figure B-15). At Site R-IS-9-IHR, dissolved oxygen concentrations showed a dramatic decrease below the thermocline, decreasing from 5.9 to 0.6 mg/L, the lowest concentration across all sites (Appendix A, Table A-2), while pH decreased from 5.9 to 5.4 s.u. and turbidity increased from 0.4 to 1.5 NTU within this zone (Appendix B, Figure B-12). Dissolved oxygen concentrations fell below the Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPAWN designated uses below the thermoclines of sites R-IS-8-UVR, R-IS-9-IHR, and R-IS-11-IHR (Appendix B, Figures B-12 and B-13). Loon Lake (Site R-IS-1-LL), Union Valley Reservoir (Site R-IS-8-UVR), Ice House Reservoir (sites R-IS-9-IHR, R-IS-10-IHR, and R-IS-11-IHR), Junction Reservoir (Site R-IS-12-JR), Camino Reservoir (Site R-IS-13-CR), and Slab Creek Reservoir (Site R-IS-15-SC) all exhibited values below the Basin Plan instantaneous minimum pH objective (6.5 s.u.), either throughout the water column or in the deeper portions of the water column (Appendix B, Figures B-9 and B-11 through B-15). There were no exceedences of the instantaneous maximim pH objective (8.5 s.u.). Turbidity levels were low (less than or equal to 2.0 NTU) (Appendix A, Table A-2).

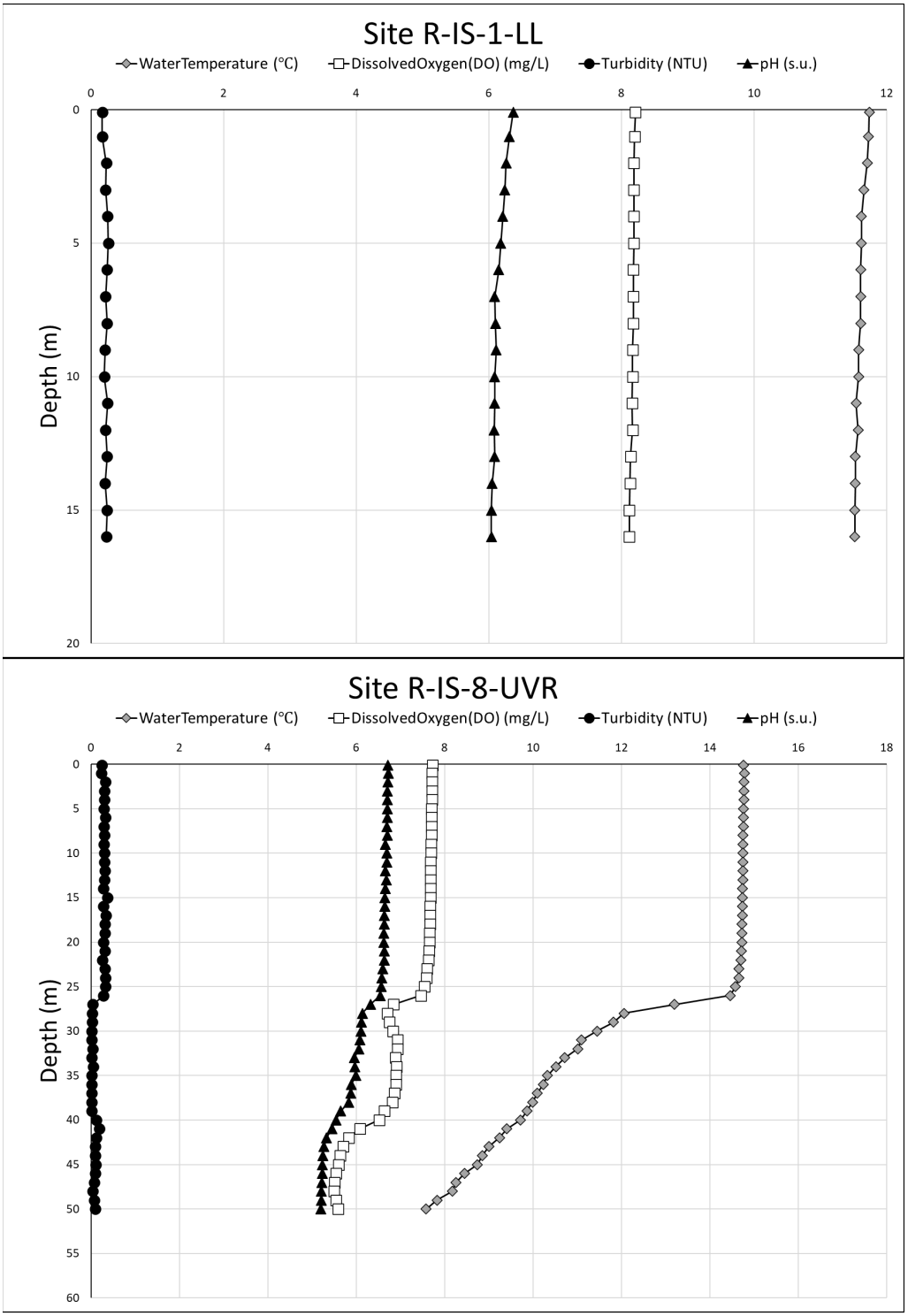

Figure 6-2. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Loon Lake Reservoir and Union Valley Reservoir sites R-IS-1-LL (top) and R-IS-8-UVR (bottom) during October (Fall) 2021.

6.2. BACTERIA

Instantaneous fecal coliform counts ranged from less than the MDL (i.e., 1.8 most probable number per 100 milliliters [MPN/100 mL]) to greater than 1,600 MPN/100 mL during the 2021 Independence Day sampling event (Appendix C, Table C-1). Only one of the samples exceeded the 2018 Basin Plan instantaneous maximum objective of 400 MPN/100 mL (CRWQCB 2018), which was cited in the Plan and used for comparisons in prior monitoring years. The fifth sample at Site Bac-15-SCR during the Independence Day sampling event exhibited an instantaneous fecal coliform count greater than the maximum allowable count for a 15-tube laboratory analytical test (1,600 MPN/100 mL). During collection of the fifth sample at Site Bac-15-SCR, a large amount of avian fecal matter was observed near the shoreline. The instantaneous fecal coliform count for the fifth sample event at Site Bac-15-SCR was treated as double the maximum allowable count (3,200 MPN/100 mL) for the calculation of the geometric mean at this site. Although not precisely known, the relatively higher count for this sampling event is unlikely to have resulted in a geometric mean value that exceeded the 2018 Basin Plan objective (200 MPN/100 mL) for Site Bac-15-SCR because the required sample result associated with a geometric mean exceedance of 200 MPN/100 mL would be at least 4.4×10^{10} MPN/100 mL, a value which is eight orders of magnitude greater than any fecal coliform sample reported at a UARP site.

Fecal coliform geometric mean counts in 2021 were well below the 2018 Basin Plan objective of 200 MPN/100 mL for REC-1 designated beneficial use (CRWQCB 2018). The lowest fecal coliform geometric mean count (0.9 MPN/100 mL) was calculated for samples from Union Valley Reservoir (Site Bac-10-UVR), and the highest fecal coliform geometric mean count (50.0 MPN/100 mL) was calculated for samples from Junction Reservoir (Site Bac-11-JR) (Table 6-2).

Instantaneous *Escherichia coli* (*E. coli*) counts ranged from less than the MDL (i.e., <1.0 MPN/100 mL) to 195.6 MPN/100 mL during the 2021 Independence Day sampling event (Appendix C, Table C-1). The fifth sample at Site Bac-15-SCR during the Independence Day sampling event, which exhibited an elevated instantaneous fecal coliform count (>1,600 MPN/100 mL) and was associated with proximal avian fecal matter, did not exhibit elevated E. coli counts (Appendix C, Table C-1). There is no 2018 Basin Plan instantaneous objective for E. coli.

The lowest *E. coli* geometric mean count (0.9 MPN/100 mL) was calculated for samples from Union Valley Reservoir (Site Bac-10-UVR), and the highest *E. coli* geometric mean count (25.3 MPN/100 mL) was calculated for samples from Junction Reservoir (Site Bac-11-JR) (Table 6-2). There is no 2018 Basin Plan geometric mean objective for *E. coli*.

Table 6-2. Bacteria Counts for UARP Reservoir Sites.

Site ID	Fecal Coliform Geometric Mean [1,2] (MPN/100 mL)	*E. coli* Geometric Mean [1] (MPN/100 mL)
Independence Day		
Bac-7-UVR	1.0	1.6
Bac-10-UVR	0.9	0.9
Bac-11-JR	50.0	25.3
Bac-13-IHR	3.3	1.7
Bac-15-SCR	7.5	2.6

MPN/100 mL = most probable number per 100 milliliters
-- = not sampled in 2021

[1] Method detection limit (MDL for fecal coliform = 1.8 MPN/100 mL. MDL for *E. coli* = 1.0 MPN/100 mL). Individual results less than the MDL were treated as 0.5 x MDL for the geometric mean calculations. Individual results greater than 1,600 MPN/100 mL (maximum allowable count for a 15-tube laboratory analytical test) were treated as 2.0 x 1,600 for the geometric mean calculations.

[2] The 2018 Basin Plan REC-1 water quality objectives for fecal coliform are 200 MPN/100 mL expressed as the geometric mean of five samples collected over 30 days, and no more than ten percent of the total number of samples collected during any 30-day period shall exceed 400 MPN/100 mL (CRWQCB 2018).

6.3. METALS BIOACCUMULATION

Metals bioaccumulation data for UARP reservoirs are presented in Table 6-3, Figure 6-3, and Appendix D. Results for mercury were compared with the Office of Environmental Health Hazard Assessment's (OEHHA's) methylmercury Advisory Tissue Level (ATL) of 0.07 ug/g wet weight and ATL of 0.44 ug/g wet weight[1] (Klasing and Brodberg 2008), where total mercury is a surrogate for methylmercury in fish tissue (Weiner et al. 2007). OEHHA's ATLs are California's current screening values for determining the potential impairment of a body of water due to the presence of pollutants in sport fish tissue (Davis et al. 2009). Results for mercury were also compared with the SWRCB Sport Fish Water Quality Objective (SFWQO) of 0.20 ug/g methylmercury wet weight. The SWRCB Water Quality Objectives were established for the reasonable protection of people and wildlife that consume fish and these objectives apply to all the inland surface waters, enclosed bays, and estuaries of the State that have applicable beneficial uses (SWRCB 2017). There are no existing advisory levels for copper, lead, or silver.

6.3.1. Loon Lake Reservoir

One individual of one fish species (rainbow trout) was collected from Loon Lake Reservoir. The rainbow trout fish tissue sample from Loon Lake Reservoir exhibited a total mercury concentration of 0.03 micrograms per gram wet weight (ug/g wet weight), which was below OEHHA's methylmercury ATL of 0.07 ug/g wet weight and ATL of 0.44

[1] OEHHA's methylmercury ATLs include (Klasing and Brodberg 2008): 0.070 ug/g wet weight − OEHHA would begin to consider advising children and women of child-bearing age to limit consumption to two meals or fewer per week; and 0.44 ug/g wet weight − OEHHA may recommend no consumption by children and women of child-bearing age.

ug/g wet weight, as well as the SFWQO of 0.20 ug/g methylmercury wet weight (Table 6-3, Figure 6-3).

Copper, lead, and silver concentrations were below the MDLs for all fish sampled (Table 6-3).

6.3.2. Gerle Creek Reservoir

Two fish species (rainbow trout [n=1] and brown trout [n=11]) were collected from Gerle Creek Reservoir. Fish tissue samples exhibited total mercury concentrations ranging 0.04−0.16 ug/g wet weight. Brown trout exhibited a higher average total mercury concentration (0.09 ug/g wet weight) than rainbow trout (0.04 ug/g wet weight) (Table 6-3). Half of the samples collected from brown trout exhibited total mercury concentrations greater than OEHHA's ATL of 0.07 ug/g methylmercury wet weight. No samples were above the SFWQO of 0.20 ug/g methylmercury wet weight and no samples were greater than OEHHA's ATL of 0.44 ug/g methylmercury wet weight (Figure 6-3, Appendix D, Table D-1).

Copper, lead, and silver concentrations were below the MDLs for all fish sampled (Table 6-3).

6.3.3. Union Valley Reservoir

Four fish species (brown trout [n=1], lake trout [*Salvelinus namaycush*; n=1], rainbow trout [n=16], and spotted bass [*Micropterus punctulatus*; n=10]) were collected from Union Valley Reservoir. Fish tissue samples exhibited total mercury concentrations ranging 0.01–0.85 ug/g wet weight. The highest average total mercury concentration across species belonged to spotted bass (0.18 ug/g wet weight) (Table 6-3). Just over one third of samples, including all eight spotted bass samples, one lake trout sample, and one brown trout sample, exhibited total mercury concentrations greater than OEHHA's ATL of 0.07 ug/g methylmercury wet weight. One spotted bass sample was greater than the SFWQO of 0.20 ug/g methylmercury wet weight and OEHHA's ATL of 0.44 ug/g methylmercury wet weight, exhibiting a tissue concentration of 0.85 ug/g methylmercury wet weight (Figure 6-3, Appendix D, Table D-1).

Copper, lead, and silver concentrations were below the MDLs for all fish sampled (Table 6-3).

6.3.4. Ice House Reservoir

One fish species (rainbow trout [n=4]) was collected from Ice House Reservoir. Fish tissue samples exhibited total mercury concentrations ranging 0.01–0.03 ug/g wet weight, and the average total mercury concentration was 0.02 ug/g wet weight (Table 6-3). No tissue samples were above the SFWQO of 0.20 ug/g methylmercury wet

weight, OEHHA's ATL of 0.07 ug/g methylmercury wet weight, or OEHHA's ATL of 0.44 ug/g methylmercury wet weight (Figure 6-3, Appendix D, Table D-1).

Copper, lead, and silver concentrations were below the MDLs for all fish sampled (Table 6-3).

6.3.5. Camino Reservoir

Two fish species (brown trout [n=6] and rainbow trout [n=6]) were collected from Camino Reservoir. Fish tissue samples exhibited total mercury concentrations ranging 0.02–0.07 ug/g wet weight. Brown trout had a slightly higher average total mercury concentration (0.04 ug/g wet weight) than rainbow trout (0.03 ug/g wet weight) (Table 6-3). No tissue samples were above the SFWQO of 0.20 ug/g methylmercury wet weight, OEHHA's ATL of 0.07 ug/g methylmercury wet weight, or OEHHA's ATL of 0.44 ug/g methylmercury wet weight (Figure 6-3, Appendix D, Table D-1).

Copper, lead, and silver concentrations were below the MDLs for nearly all fish sampled. One rainbow trout exhibited a lead concentration of 0.02 ug/g (Table 6-3).

6.3.6. Slab Creek Reservoir

Three fish species (brown trout [n=1], rainbow trout [n=1], and Sacramento pikeminnow [n=9]) were collected from Slab Creek Reservoir. Fish tissue samples exhibited total mercury concentrations ranging 0.07–1.15 ug/g wet weight. Sacramento pikeminnow had the highest average total mercury concentration across species (0.52 ug/g wet weight) (Table 6-3). Just over 90% of samples, including all nine Sacramento pikeminnow samples and the only brown trout sample, exhibited total mercury concentrations greater than OEHHA's ATL of 0.07 ug/g methylmercury wet weight. Four Sacramento pikeminnow samples exhibited total mercury concentrations exceeding OEHHA's ATL of 0.44 ug/g methylmercury wet weight, and eight Sacramento pikeminnow samples exhibited total mercury concentrations exceeding the SFWQO of 0.20 ug/g methylmercury wet weight (Figure 6-3, Appendix D, Table D-1).

Copper, lead, and silver concentrations were below the MDLs for all fish sampled (Table 6-3).

6.3.7. Summary

Fish tissue mercury concentrations varied by reservoir and species. Concentrations were higher than the OEHHA ATL of 0.07 ug/g methylmercury wet weight in Gerle Creek, Union Valley, and Slab Creek reservoirs (Figure 6-3). No fish exhibiting methylmercury concentrations greater than 0.07 ug/g wet weight were sampled at Loon Lake, Ice House, or Camino reservoirs (Table 6-3). Every Sacramento pikeminnow and 80% (8 of 10 samples) of spotted bass sampled in 2021 exhibited total mercury

concentrations greater than 0.07 methylmercury ug/g wet weight (Figure 6-3, Appendix D, Table D-1). No rainbow trout exceeded 0.07 ug/g methylmercury wet weight and nearly one third had total mercury concentrations less than the MRL (Figure 6-3). Generally, only the larger brown trout (>250 mm FL, 42% of total) exceeded the ATL of 0.07 ug/g methylmercury wet weight (Appendix D, Table D-1). Four Sacramento pikeminnow from Slab Creek Reservoir and a single spotted bass from Union Valley Reservoir exhibited total mercury concentrations greater than the ATL of 0.44 ug/g methylmercury wet weight (Figure 6-3). Nine fish exceeded the SFWQO of 0.20 ug/g methylmercury wet weight (Figure 6-3).

Copper, lead, and silver concentrations in 2021 were below MDLs for nearly all fish sampled (Table 6-3, Appendix D, Table D-1).

Table 6-3. Fish Tissue Metals Concentrations in UARP Reservoirs.

Location	Species Common Name	2021 Sampling Date	Number of Fish Sampled	Mercury (Hg) (ug/g ww)			Copper (Cu) (ug/g ww)		Lead (Pb) (ug/g ww)		Silver (Ag) (ug/g ww)	
				Range		Avg[1]	Range		Range		Range	
Loon Lake Reservoir (M-1-LL)	Rainbow Trout	8/2	1	0.025	0.025	0.025	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
Gerle Creek Reservoir (M-1-GCR)	Brown Trout	8/5	11	0.042	0.160	0.088	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
	Rainbow Trout		1	0.039	0.039	0.039	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
Union Valley Reservoir (M-1-UVR)	Brown Trout	8/5, 8/17	1	0.160	0.160	0.160	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
	Lake Trout		1	0.120	0.120	0.120	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
	Rainbow Trout		16	0.007	0.023	0.011	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
	Spotted Bass		10	0.040	0.851	0.177	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
Ice House Reservoir (M-1-IHR)	Rainbow Trout	8/3	4	0.006	0.032	0.020	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
Camino Reservoir (M-1-CR)	Brown Trout	8/3	6	0.019	0.068	0.038	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
	Rainbow Trout		6	0.015	0.049	0.029	<0.36	<0.36	<0.02	0.02	<0.02	<0.02
Slab Creek Reservoir (M-1-SCR)	Brown Trout	8/4	1	0.071	0.071	0.071	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
	Rainbow Trout		1	0.069	0.069	0.069	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02
	Sacramento Pikeminnow		9	0.127	1.150	0.521	<0.36	<0.36	<0.02	<0.02	<0.02	<0.02

ug/g = microgram per gram
ww = wet weight

[1] Results less than the method detection limit (MDL) were treated as 0.5 x MDL for the calculation of averages.

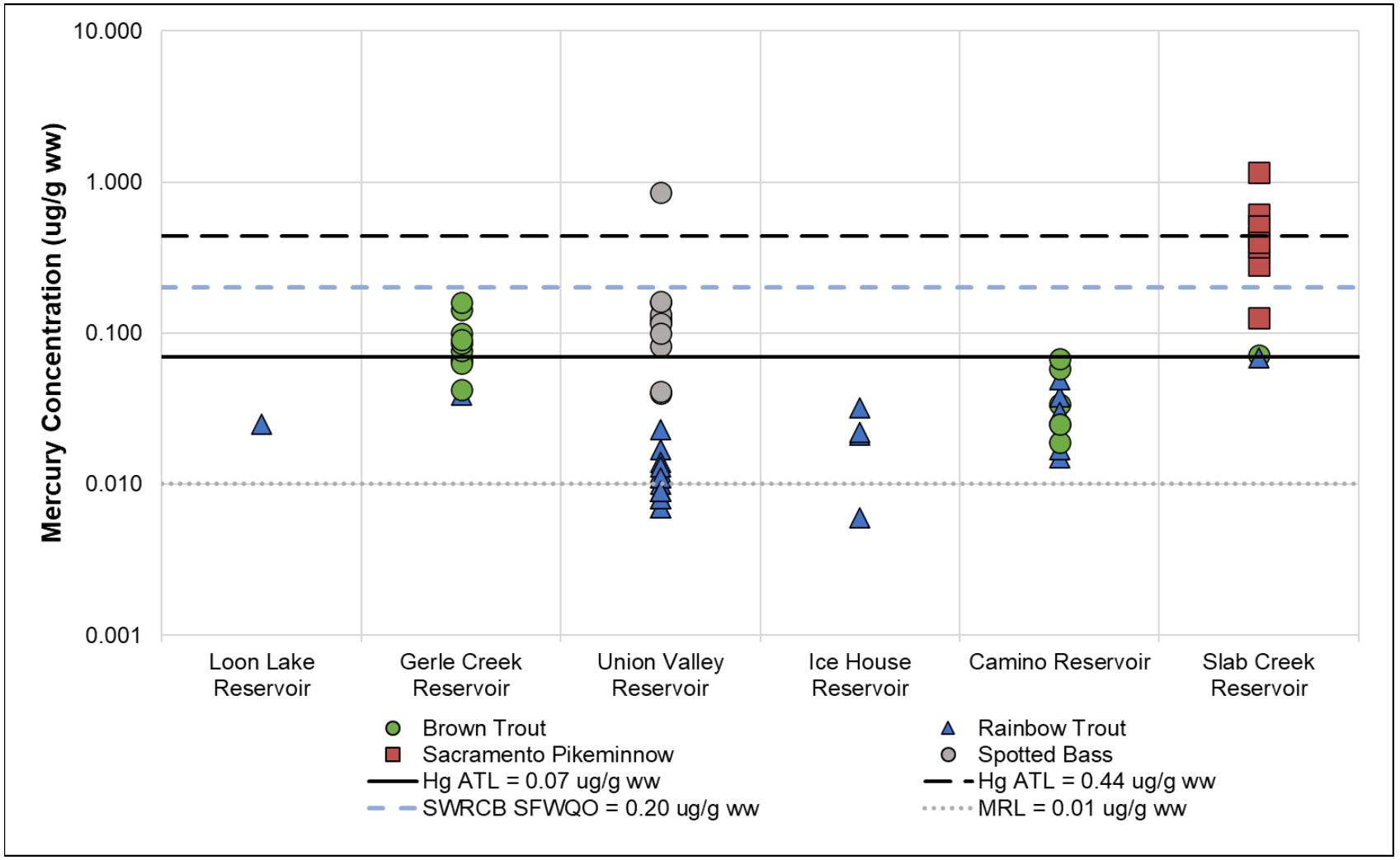

Figure 6-3. Fish tissue mercury concentrations in UARP reservoirs, August 2021.

7.0 CONCLUSIONS

Based on 2021 *in situ* monitoring results, riverine water quality in the UARP study area generally met Basin Plan water quality objectives. There were no instances of dissolved oxygen measured below the Basin Plan instantaneous minimum objective (7.0 mg/L) for COLD and SPWN. There were seven instances of pH measured below the Basin Plan instantaneous minimum objective (6.5 s.u.) (13% of total pH measurements), which was generally similar to what was measured in prior monitoring years (Table 7-1). The occasionally low pH values are likely due to the low buffering capacity characteristic of headwater reaches in granitic watersheds, whereby the relatively low weathering rates of the predominant geology (i.e., granite) result in low alkalinity (<17 mg/L across all sites in 2017; SMUD [2018]) and low hardness (<20 mg/L across all sites in 2017; SMUD [2018]). Low alkalinity and hardness make the waters susceptible to pH decreases when naturally acidic inputs occur, such as snow melt, rainfall, and tannins from surrounding vegetation. Six of the seven instances of pH measured below the Basin Plan instantaneous minimum objective in 2021 occurred during the November (fall) sampling event, which occurred roughly two weeks after an atmospheric river brought historic rainfall to Northern California and a total of 11.5 inches of rain (541% of average) to the city of Placerville during the month of October (CNRFC 2021). The occasionally low pH level measured during the 2015−2021 monitoring period may also represent background conditions for the UARP watershed, particularly in the upper reaches of the study area. There were no instances of pH measured above the Basin Plan instantaneous maximum objective (8.5 s.u.) in 2021. There were no instances of elevated turbidity in 2021, supporting prior statements that elevated turbidity levels measured at low elevation sites during 2015–2017 were a direct result of sediment influx due to vegetation loss from the 2014 King Fire event.

Table 7-1. *In situ* pH Measurements below Basin Plan Instantaneous Minimum Objective (6.5 s.u.) for UARP Riverine Sites, 2015–2021.

Year	Number of pH Measurements below Basin Plan Objective	Percentage of pH Measurements below Basin Plan Objective
2015	3	8%
2016	30	46%
2017	5	7%
2018	6	9%
2019	2	3%
2020	12	21%
2021	7	13%

Reservoir *in situ* water quality in 2021 was also generally good, with occasional dissolved oxygen values during the October (Fall) sampling effort measuring below the Basin Plan instantaneous minimum objective (7 mg/L) for COLD and SPAWN designated beneficial uses in the bottom waters of the larger reservoirs (i.e., Union Valley Reservoir and Ice House Reservoir), a result that is not uncommon for deep waterbodies that have been thermally stratified for several months. There were several

instances of pH measured below the Basin Plan instantaneous minimum objective (6.5 s.u.), which, similar to the riverine pH results, may be due to low buffering capacity characteristic of headwater reaches in granitic watersheds. There were no instances of pH measured above the Basin Plan instantaneous maximum objective (8.5 s.u.). There were no instances of elevated turbidity in 2021.

Sampling results for 2021 indicated no exceedances of the 2018 Basin Plan fecal coliform objective of 200 MPN/100 mL (geometric mean of five samples collected over 30 days), and only one of the 25 samples exceeded the instantaneous maximum Basin Plan objective of 400 MPN/100 mL. The 2021 sampling results from the five sites monitored in 2021 are generally consistent with results reported in the Five-Year Monitoring Summary and the 2020 Water Quality Monitoring Report (SMUD 2020, 2021b).

Metals bioaccumulation sampling indicated that fish tissue mercury concentrations varied by reservoir and species. Fish tissue mercury concentrations were higher than the OEHHA ATL of 0.07 ug/g methylmercury wet weight in Gerle Creek, Union Valley, and Slab Creek reservoirs for 36–92% of samples, or 38% of all samples collected across all reservoirs in 2021 (Table 7-2, Figure 6-3). Four Sacramento pikeminnow from Slab Creek Reservoir and a single spotted bass from Union Valley Reservoir exhibited total mercury concentrations greater than the ATL of 0.44 ug/g methylmercury wet weight. Eight Sacramento pikeminnow from Slab Creek Reservoir and one spotted bass from Union Valley Reservoir exhibited total mercury concentrations greater than the SFWQO of 0.20 ug/g methylmercury wet weight (Figure 6-3).

The total proportion of samples and the number of reservoirs with fish tissue samples exceeding the OEHHA ATL of 0.07 methylmercury wet weight slightly decreased and the total proportion of samples exceeding the ATL of 0.44 methylmercury wet weight slightly increased in 2021 compared to 2016 (Table 7-2). However, where sample sizes were greater than one, average mercury concentrations in 2021 were generally within one standard deviation of average mercury concentrations in 2016 (Figure 7-1). Sacramento pikeminnow exhibited the greatest increase in average total mercury concentration in 2021 compared to 2016 (0.52 and 0.25 ug/g methylmercury wet weight, respectively) (Figure 7-1). The increase in average total mercury concentration of Sacramento pikeminnow in 2021 is likely attributable to the larger average size of pikeminnow collected in 2021 (406 mm FL, compared to 289 mm FL in 2016 [SMUD 2017]), which is consistent with mercury bioaccumulation. Further analysis of metals bioaccumulation in fish tissue will be presented in the forthcoming 5-year summary report (2025).

Table 7-2. Percentage of Fish Tissue Samples Greater Than OEHHA Methylmercury Advisory Tissue Levels.

Location	Samples greater than 0.07 ug/g ATL[1]		Samples greater than 0.44 ug/g ATL[1]	
	2016[2]	2021	2016[2]	2021
Loon Lake Reservoir (M-1-LL)	43%	0%	0%	0%
Gerle Creek Reservoir (M-1-GCR)	29%	50%	0%	0%
Union Valley Reservoir (M-1-UVR)	45%	36%	3%	4%
Ice House Reservoir (M-1-IHR)	38%	0%	13%	0%
Camino Reservoir (M-1-CR)	8%	0%	0%	0%
Slab Creek Reservoir (M-1-SCR)	67%	92%	7%	36%
Total	**40%**	**38%**	**3%**	**7%**

[1] ATL = Advisory Tissue Level, Office of Environmental Health Hazard Assessment (OEHHA) (Klasing and Brodberg 2008)

[2] SMUD 2017. Note: The original 2016 calculations incorrectly treated laboratory QC and duplicates as individual samples. The corrected 2016 percentages are presented above and reflect a one to five percentage point increase over the originally reported result.

Copper, lead, and silver concentrations in 2021 were below MDLs for nearly all fish sampled (Table 6-3, Appendix D, Table D-1). Because of this, the concentrations of copper, silver, and lead in 2021 cannot be quantitatively compared to data collected in 2016.

Despite occasional low dissolved oxygen and pH measurements, one instance of elevated instantaneous fecal coliform measurements, and a relatively small number of fish exhibiting total mercury concentrations greater than OEHHA's ATL of 0.44 ug/g methylmercury wet weight and the SFWQO of 0.20 ug/g methylmercury wet weight, 2021 monitoring results indicate that overall, surface waters of the UARP study area consistently support designated beneficial uses, including COLD, SPWN, and REC-1.

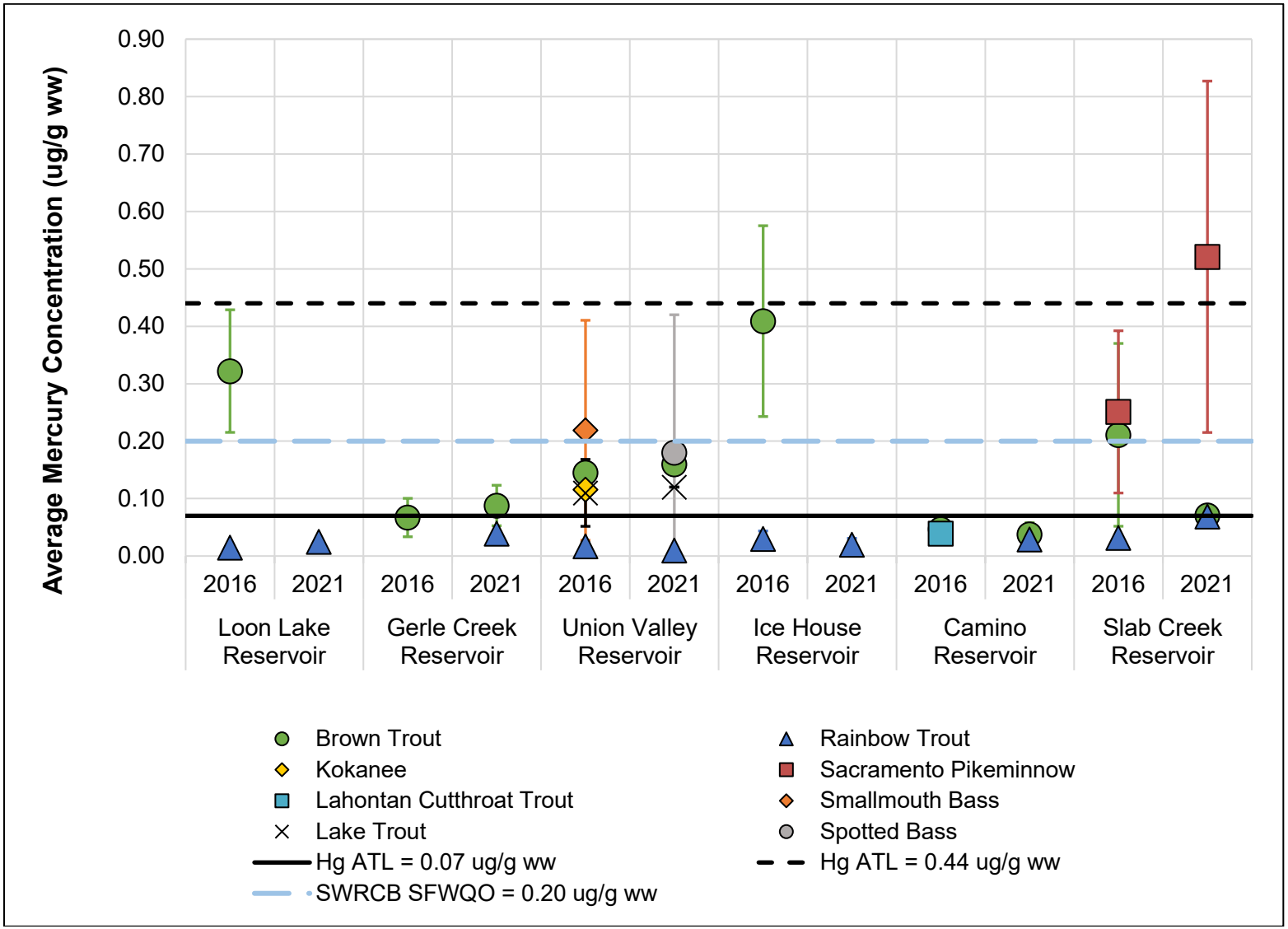

Figure 7-1. Average fish tissue mercury concentration in UARP reservoirs, 2016 and 2021.
Note: Average values are shown ± one standard deviation.

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APPENDIX A
In situ Vertical Profile Data for UARP Reservoir Sites

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Table A-1. Vertical Profile Data for UARP Reservoir Sites – May (Spring) *In situ* Surveys.

Site ID	2021 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 Reservoir									
R-IS-1-LL	5/25	0.1	11.9	8.9	82	7	6.1	0.1	9.8
		1	11.9	8.9	82	7	5.9	0.1	
		2	11.9	8.9	82	7	6.0	0.1	
		3	11.9	8.9	82	7	6.0	0.1	
		4	11.9	8.9	82	7	6.0	0.1	
		5	11.8	8.9	82	7	6.0	0.1	
		6	11.8	8.9	82	7	5.9	0.1	
		7	11.7	8.9	82	7	6.0	0.1	
		8	11.3	8.9	82	7	5.9	0.1	
		9	11.1	8.9	81	7	5.8	0.1	
		10	10.9	9.0	81	6	5.7	0.1	
		11	10.7	9.1	82	6	5.7	0.1	
		12	10.5	9.1	82	6	5.7	0.1	
		13	10.4	9.1	82	6	5.7	0.1	
		14	9.9	9.2	82	6	5.6	0.1[1]	
R-IS-2-LL	5/25	0.1	11.3	9.1	83	7	6.8	0.1	12.2
		1	11.3	9.1	83	7	6.5	0.1	
		2	11.2	9.0	82	7	6.5	0.1	
		3	11.2	9.0	82	7	6.5	0.1	
		4	11.2	9.0	82	7	6.5	0.1	
		5	11.2	9.0	82	7	6.5	0.1	
		6	11.2	9.0	82	7	6.5	0.1	
		7	11.2	9.0	82	7	6.3	0.1	
		8	11.1	9.0	82	7	6.4	0.1	
		9	11.1	9.0	82	7	6.4	0.1	
		10	11.1	9.0	82	7	6.3	0.1	
		11	11.0	9.0	82	7	6.3	0.1	
		12	9.9	9.2	82	6	6.2	0.1	

Site ID	2021 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)
		13	9.7	9.3	82	6	6.2	0.1	
		14	9.6	9.3	81	6	6.1	0.1	
		15	9.5	9.3	81	6	5.9	0.1	
		16	9.4	9.3	81	6	5.7	0.1	
		17	9.2	9.3	81	6	5.6	0.1	
		18	9.2	9.3	81	6	5.6	0.1	
		19	9.1	9.3	81	6	5.6	0.1	
		20	9.1	9.3	80	6	5.6	0.1[1]	
R-IS-3-LL	5/25	0.1	10.8	9.1	82	6	6.8	0.1	8.9
		1	10.8	9.1	82	6	6.7	0.1	
		2	10.8	9.1	82	6	6.7	0.1	
		3	10.8	9.1	82	6	6.6	0.1	
		4	10.8	9.1	82	6	6.6	0.1	
		5	10.7	9.1	82	6	6.6	0.1	
		6	10.7	9.1	82	6	6.6	0.1	
		7	10.7	9.1	82	6	6.6	0.1	
		8	10.6	9.1	82	6	6.6	0.1	
		9	10.6	9.1	81	6	6.6	0.1	
		10	10.2	9.1	81	6	6.5	0.1	
		11	10.1	9.2	81	6	6.4	0.1	
		12	10.1	9.2	81	6	6.4	0.1	
		13	10.0	9.1	81	6	6.3	0.1	
		14	9.8	9.2	81	6	6.3	0.1	
		15	9.8	9.1	80	6	6.1	0.1[1]	

Site ID	2021 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)
Gerle Reservoir									
R-IS-4-GC	5/26	0.1	15.3	8.8	88	11	6.9	0.2	5.0
		1	14.5	8.9	88	11	6.8	0.2	
		2	12.1	9.2	86	10	6.7	0.2	
		3	11.3	9.5	87	9	6.7	0.2	
		4	10.8	9.5	86	9	6.7	0.3	
		5	10.4	9.6	85	9	6.7	0.3	
		6	10.0	9.6	85	9	6.5	0.3	
		7	9.6	9.4	82	10	6.4	0.3[1]	
Union Valley Reservoir									
R-IS-5-UVR	5/19	0.1	17.3	8.7	90	12	7.1	0.7	4.3
		1	17.3	8.7	90	12	7.1	0.7	
		2	17.3	8.7	90	12	7.1	0.7	
		3	17.3	8.7	90	12	7.1	0.7	
		4	17.2	8.7	90	12	7.0	0.7	
		5	17.1	8.7	90	12	7.0	0.8	
		6	17.1	8.7	90	12	7.0	0.5	
		7	17.1	8.6	89	12	7.0	0.5	
		8	15.8	8.7	88	12	7.0	0.5	
		9	14.2	8.8	86	11	6.8	0.4	
		10	12.7	9.0	85	10	6.8	0.3	
		11	11.8	9.1	84	9	6.6	0.4	
R-IS-6-UVR	5/19	0.1	16.9	8.7	89	12	7.0	0.6	5.4
		1	16.9	8.7	89	12	7.0	0.5	
		2	16.9	8.7	89	12	7.0	0.5	
		3	16.9	8.7	89	12	7.0	0.5	
		4	16.9	8.6	89	12	7.0	0.5	
		5	16.8	8.7	89	12	7.0	0.5	
		6	13.9	9.6	93	11	7.0	0.4	
		7	13.7	9.6	93	10	7.0	0.4	

Site ID	2021 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)
		8	13.0	9.7	92	10	6.9	0.4	
		9	11.9	9.8	91	10	6.8	0.4	
		10	11.0	9.9	89	10	6.8	0.4	
		11	10.9	9.8	89	10	6.7	0.4	
		12	10.3	9.8	88	10	6.7	0.4	
		13	9.7	9.8	87	10	6.7	0.4	
		14	9.2	9.8	85	9	6.6	0.4	
		15	8.7	9.7	84	9	6.6	0.3	
		16	8.4	9.7	82	9	6.5	0.3	
		17	7.8	9.7	81	9	6.5	0.3	
		18	7.7	9.7	81	9	6.5	0.2	
		19	7.5	9.7	80	9	6.4	0.2	
		20	7.2	9.6	80	9	6.4	0.2	
		21	7.1	9.6	79	9	6.4	0.2	
		22	7.1	9.6	79	9	6.4	0.2	
		23	6.9	9.6	78	9	6.3	0.2	
		24	6.6	9.5	77	9	6.3	0.2	
		25	6.6	9.5	77	9	6.2	0.2	
		26	6.5	9.4	77	9	6.1	0.2	
		27	6.5	9.4	77	9	6.1	0.2	
		28	6.5	9.4	77	9	6.1	0.2	
R-IS-7-UVR	5/19	0.1	16.8	8.7	90	12	6.8	0.5	5.9
		1	16.8	8.7	90	12	6.9	0.4	
		2	16.8	8.7	90	12	6.8	0.5	
		3	16.8	8.7	90	12	6.8	0.5	
		4	16.8	8.7	90	12	6.9	0.4	
		5	16.8	8.7	90	12	6.8	0.4	
		6	16.7	8.7	89	12	6.8	0.5	
		7	16.6	8.7	90	12	6.8	0.5	
		8	13.7	9.5	92	10	6.7	0.4	

Site ID	2021 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)
		9	12.4	9.7	91	10	6.6	0.3	
		10	11.6	9.7	90	10	6.6	0.4	
		11	11.3	9.7	88	9	6.5	0.3	
		12	10.5	9.7	88	9	6.4	0.3	
		13	10.4	9.7	87	9	6.4	0.3	
		14	10.4	9.7	87	9	6.4	0.3	
		15	9.7	9.6	85	9	6.4	0.3	
		16	9.6	9.6	84	9	6.3	0.3	
		17	9.0	9.5	82	9	6.3	0.3	
		18	8.5	9.5	81	9	6.3	0.3	
		19	7.9	9.4	80	9	6.2	0.2	
		20	7.7	9.4	79	9	6.2	0.2	
		21	7.7	9.4	79	9	6.2	0.2	
		22	7.4	9.4	78	9	6.2	0.2	
		23	7.1	9.4	77	9	6.2	0.2	
		24	7.1	9.4	77	9	6.2	0.2	
		25	7.0	9.4	77	9	6.1	0.2	
		26	7.0	9.3	77	9	6.2	0.2	
		27	7.0	9.3	77	9	6.1	0.2	
		28	7.0	9.3	77	9	6.1	0.2	
		29	7.0	9.3	77	9	6.1	0.2	
		30	6.9	9.3	77	9	6.0	0.2	
		31	6.9	9.3	77	9	5.9	0.3	
		32	6.9	9.3	76	9	6.0	0.2	
		33	6.7	9.3	76	9	6.0	0.2	
		34	6.7	9.3	76	9	6.0	0.2	
		35	6.6	9.3	76	9	6.0	0.2	
		36	6.7	9.3	76	9	6.0	0.2	
R-IS-8-UVR	5/19	0.1	16.4	8.7	89	12	6.8	0.4	8.4
		1	16.3	8.7	89	12	6.9	0.4	

Site ID	2021 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)
		2	16.1	8.7	89	12	7.0	0.4	
		3	16.0	8.7	88	12	7.0	0.4	
		4	15.9	8.7	88	11	7.0	0.3	
		5	15.8	8.7	88	11	7.0	0.4	
		6	15.8	8.7	88	11	7.0	0.4	
		7	15.7	8.7	88	11	7.0	0.4	
		8	12.9	9.9	93	10	6.9	0.4	
		9	11.5	10.1	93	10	6.6	0.4	
		10	11.0	10.1	91	10	6.5	0.4	
		11	9.6	10.1	89	10	6.3	0.4	
		12	9.0	10.1	87	10	6.2	0.3	
		13	8.6	10.1	87	9	6.2	0.3	
		14	8.0	10.0	85	9	6.1	0.3	
		15	7.3	9.9	82	9	6.0	0.3	
		16	7.1	9.9	82	9	5.9	0.2	
		17	7.0	9.9	81	9	5.9	0.2	
		18	6.9	9.8	81	9	5.9	0.2	
		19	6.8	9.8	80	9	5.9	0.2	
		20	6.8	9.8	80	9	5.9	0.2	
		21	6.6	9.8	80	9	5.9	0.2	
		22	6.6	9.8	80	9	5.9	0.2	
		23	6.6	9.8	80	9	5.9	0.2	
		24	6.5	9.8	80	9	5.9	0.2	
		25	6.5	9.8	79	9	5.9	0.2	
		26	6.5	9.7	79	9	5.9	0.2	
		27	6.5	9.7	79	9	5.9	0.2	
		28	6.5	9.7	79	9	5.9	0.1	
		29	6.4	9.7	79	9	5.9	0.2	
		30	6.3	9.7	79	9	5.9	0.1	
		31	6.3	9.7	79	9	5.9	0.2	

Site ID	2021 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)
		32	6.3	9.7	78	9	5.9	0.1	
		33	6.3	9.7	78	9	5.9	0.2	
		34	6.3	9.7	78	9	5.9	0.2	
		35	6.2	9.7	78	9	5.9	0.2	
		36	6.2	9.7	78	9	5.9	0.2	
		37	6.2	9.6	78	9	5.9	0.1	
		38	6.2	9.6	78	9	5.9	0.2	
		39	6.2	9.7	78	9	5.9	0.1	
		40	6.2	9.7	78	9	5.9	0.2	
		41	6.2	9.6	78	9	5.9	0.2	
		42	6.2	9.6	78	9	5.9	0.1	
		43	6.1	9.6	77	9	5.9	0.1	
		44	6.1	9.6	77	9	5.9	0.2	
		45	6.1	9.5	77	9	5.9	0.2	
		46	6.1	9.6	77	9	5.9	0.2	
		47	6.1	9.6	77	9	5.9	0.1	
		48	6.1	9.6	77	9	5.9	0.1	
		49	6.1	9.5	77	9	5.9	0.2	
		50	6.1	9.5	77	9	5.9	0.2	
		51	6.1	9.5	77	9	5.9	0.1	
		52	6.0	9.5	76	9	5.9	0.2	
		53	6.0	9.5	76	9	5.9	0.2	
		54	6.0	9.5	76	9	5.9	0.2	
		55	6.0	9.5	76	9	5.9	0.1	
		56	6.0	9.5	76	9	5.9	0.1	
		57	6.0	9.5	76	9	5.9	0.2	
		58	6.0	9.5	76	9	5.9	0.2	
		59	6.0	9.5	76	9	5.9	0.2	
		60	6.0	9.5	76	9	5.9	0.2	
		61	6.0	9.4	76	9	5.9	0.2	

Site ID	2021 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)
		62	6.0	9.4	76	9	5.9	0.2	
		63	6.0	9.4	76	9	5.9	0.2	
		64	6.0	9.4	76	9	5.9	0.2	
		65	6.0	9.4	76	9	5.9	0.2	
		66	6.0	9.4	76	9	5.9	0.2	
		67	6.0	9.4	76	9	5.9	0.2	
		68	6.0	9.4	75	9	5.9	0.2[1]	
Ice House Reservoir									
R-IS-9-IHR	5/18	0.1	16.7	8.6	88	9	7.0	0.2	7.2
		1	16.7	8.6	88	9	7.0	0.3	
		2	16.6	8.6	88	9	7.0	0.3	
		3	15.8	8.7	88	9	7.0	0.2	
		4	15.5	8.8	88	9	7.0	0.3	
		5	14.5	9.1	89	9	7.0	0.2	
		6	14.2	9.2	89	8	7.0	0.3	
		7	13.4	9.3	89	8	7.0	0.3	
		8	13.2	9.2	88	8	6.9	0.3	
		9	12.4	9.2	86	7	6.8	0.3	
		10	11.8	9.5	88	7	6.8	0.3	
		11	11.2	9.7	88	7	6.8	0.3	
		12	10.7	9.5	86	7	6.7	0.2	
		13	10.2	9.4	84	7	6.6	0.3	
		14	9.7	9.5	84	7	6.6	0.2	
		15	9.0	9.6	83	7	6.6	0.3	
		16	8.4	9.5	81	7	6.5	0.3	
		17	7.7	9.3	78	7	6.4	0.3[1]	
R-IS-10-IHR	5/18	0.1	16.1	8.6	88	9	7.1	0.3	8.4
		1	16.1	8.6	88	9	7.0	0.2	
		2	16.0	8.6	88	9	7.0	0.3	
		3	16.0	8.6	87	9	7.0	0.2	

Site ID	2021 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)
		4	15.7	8.6	87	9	7.0	0.2	
		5	15.5	8.7	87	9	7.0	0.2	
		6	15.2	8.8	87	9	7.0	0.3	
		7	13.2	9.3	89	8	7.0	0.2	
		8	12.2	9.6	90	8	6.9	0.2	
		9	11.5	9.8	90	8	6.9	0.3	
		10	10.2	10.0	90	7	6.9	0.3[1]	
R-IS-11-IHR	5/18	0.1	15.8	8.6	87	9	6.6	0.2	9.8
		1	15.3	8.7	87	9	6.5	0.2	
		2	15.1	8.7	86	9	6.5	0.3	
		3	15.1	8.7	86	9	6.5	0.3	
		4	15.1	8.7	86	9	6.5	0.2	
		5	15.1	8.7	86	9	6.5	0.3	
		6	15.0	8.7	86	9	6.5	0.3	
		7	12.6	9.7	92	8	6.1	0.3	
		8	11.7	10.0	92	8	6.0	0.3	
		9	10.8	10.2	92	8	6.0	0.3	
		10	9.6	10.4	91	8	6.0	0.3	
		11	8.6	10.4	90	8	5.9	0.3	
		12	8.1	10.4	88	7	5.9	0.2	
		13	7.6	10.2	85	7	5.8	0.3	
		14	7.2	10.0	83	7	5.7	0.3	
		15	7.1	9.9	81	7	5.7	0.2	
		16	7.0	9.8	81	7	5.6	0.2	
		17	7.0	9.7	80	7	5.6	0.3	
		18	7.0	9.7	80	7	5.6	0.2	
		19	6.9	9.7	80	7	5.6	0.2	
		20	6.9	9.7	79	7	5.6	0.2	
		21	6.9	9.6	79	7	5.6	0.2	
		22	6.9	9.6	79	7	5.6	0.2	

Site ID	2021 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)
		23	6.8	9.6	78	7	5.6	0.2	
		24	6.8	9.5	78	7	5.6	0.3	
		25	6.8	9.5	78	7	5.6	0.2	
		26	6.8	9.4	77	7	5.6	0.2	
		27	6.8	9.4	77	7	5.6	0.2	
		28	6.8	9.4	77	7	5.6	0.2	
		29	6.8	9.3	76	7	5.6	0.3	
		30	6.8	9.3	76	7	5.6	0.3	
		31	6.8	9.3	76	7	5.6	0.2	
		32	6.7	9.3	76	7	5.6	0.2	
		33	6.7	9.2	75	7	5.6	0.3	
		34	6.7	9.2	75	7	5.6	0.4	
Junction Reservoir									
R-IS-12-JR	5/26	0.1	14.7	9.2	91	12	7.0	0.5	4.7
		1	13.7	9.3	90	11	7.0	0.4	
		2	13.6	9.3	89	11	6.9	0.3	
		3	13.5	9.3	89	11	7.0	0.4	
		4	13.2	9.4	89	11	6.9	0.3	
		5	12.3	9.3	87	11	6.8	0.3	
		6	11.8	9.3	86	11	6.7	0.3	
		7	11.4	9.4	86	11	6.6	0.3	
		8	11.1	9.3	84	11	6.5	0.4	
		9	11.0	9.2	84	11	6.3	0.4	
		10	10.8	9.3	84	11	6.2	0.4	
		11	10.6	9.4	84	11	6.0	0.3	
		12	10.3	9.4	84	11	6.0	0.4	
		13	10.2	8.1	69	14	5.8	0.4[1]	
Camino Reservoir									
R-IS-13-CR	5/26	0.1	13.3	9.9	95	13	6.8	0.3	6.0
		1	13.0	9.9	94	12	6.9	0.3	

Site ID	2021 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)
		2	12.6	10.0	94	12	6.8	0.3	
		3	12.4	10.0	94	12	6.7	0.3	
		4	12.1	10.0	93	12	6.6	0.3	
		5	11.0	10.2	93	11	6.6	0.3	
		6	10.9	10.2	93	11	6.5	0.4	
Slab Creek Reservoir									
R-IS-14-SC	5/20	0.1	18.4	9.6	103	28	7.5	0.5	3.4
		1	18.4	9.6	103	28	7.5	0.6	
		2	18.4	9.6	103	28	7.6	0.5	
		3	18.3	9.6	102	28	7.6	0.5	
		4	16.1	9.4	95	26	7.3	0.5	
		5	15.1	9.3	93	24	7.1	0.6	
		6	14.7	9.4	93	24	7.1	0.5	
		7	14.5	9.4	92	23	7.0	0.6	
		8	14.4	9.4	92	23	7.0	0.8	
R-IS-15-SC	5/20	0.1	18.0	9.6	101	27	7.4	0.4	3.9
		1	18.0	9.6	101	27	7.5	0.3	
		2	18.0	9.6	101	27	7.5	0.4	
		3	17.8	9.6	101	27	7.5	0.4	
		4	17.6	9.6	101	27	7.5	0.3	
		5	16.4	9.5	97	26	7.3	0.4	
		6	16.0	9.4	95	25	7.1	0.4	
		7	15.9	9.3	94	26	7.0	0.4	
		8	15.7	9.2	93	26	7.0	0.5	
		9	15.6	9.2	92	26	7.0	0.4	
		10	15.5	9.1	92	25	7.0	0.5	
		11	15.4	9.1	91	25	7.0	0.4	
		12	15.3	9.1	91	25	6.9	0.4	
		13	15.3	9.0	90	24	6.9	0.4	
		14	15.1	9.0	89	24	6.9	0.4	

Site ID	2021 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)
		15	15.0	8.9	89	24	6.9	0.3	
		16	15.0	8.9	88	23	6.9	0.3	
		17	14.9	8.9	88	23	6.9	0.4	
		18	14.8	8.9	88	23	6.8	0.3	
		19	14.8	8.9	88	23	6.8	0.5	
		20	14.7	8.9	88	23	6.8	0.4	
		21	14.7	8.9	88	23	6.8	0.5	
		22	14.6	8.9	88	23	6.8	0.4	
		23	14.6	8.9	88	23	6.8	0.4	
		24	14.6	8.9	87	23	6.8	0.5	
		25	14.5	8.9	87	23	6.8	0.5	
		26	14.5	8.9	87	23	6.8	0.5	
		27	14.5	8.9	87	23	6.7	0.5	
		28	14.4	8.4	81	25	6.7	0.5[1]	

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

[1] Turbidity values are recorded as the values from the previous depth. Higher turbidity values collected in the field reflect turbidity caused by the probe coming into contact with reservoir bottom sediments.

Table A-2. Vertical Profile Data for UARP Reservoir Sites – October (Fall) *In situ* Surveys.

Site ID	2021 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	0.1	11.7	8.2	76	8	6.4	0.2	8.1
		1	11.7	8.2	76	8	6.3	0.2	
		2	11.7	8.2	76	8	6.3	0.2	
		3	11.7	8.2	75	8	6.2	0.2	
		4	11.6	8.2	75	8	6.2	0.3	
		5	11.6	8.2	75	8	6.2	0.3	
		6	11.6	8.2	75	8	6.2	0.2	
		7	11.6	8.2	75	8	6.1	0.2	
		8	11.6	8.2	75	8	6.1	0.2	
		9	11.6	8.2	75	8	6.1	0.2	
		10	11.6	8.2	75	8	6.1	0.2	
		11	11.5	8.2	75	8	6.1	0.3	
		12	11.6	8.2	75	8	6.1	0.2	
		13	11.5	8.1	75	8	6.1	0.2	
		14	11.5	8.1	75	8	6.1	0.2	
		15	11.5	8.1	75	8	6.0	0.2	
		16	11.5	8.1	75	8	6.0	0.2	
R-IS-2-LL	10/19	0.1	11.9	8.1	75	8	6.4	0.2	8.1
		1	11.9	8.1	75	8	6.6	0.2	
		2	11.8	8.1	75	8	6.6	0.2	
		3	11.9	8.1	75	8	6.6	0.2	
		4	11.8	8.1	75	8	6.6	0.2	
		5	11.8	8.1	75	8	6.7	0.2	
		6	11.8	8.1	75	8	6.7	0.2	
		7	11.8	8.1	75	8	6.7	0.2	
		8	11.8	8.1	75	8	6.7	0.2	
		9	11.7	8.1	75	8	6.7	0.2	
		10	11.7	8.1	75	8	6.7	0.2	

Site ID	2021 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)
		12	11.7	8.1	75	8	6.7	0.2	
		13	11.7	8.1	75	8	6.7	0.2	
R-IS-3-LL	10/19	0.1	11.8	8.2	76	8	6.8	0.2	7.8
		1	11.8	8.2	76	8	6.8	0.2	
		2	11.8	8.2	76	8	6.7	0.2	
		3	11.7	8.2	75	8	6.7	0.2	
		4	11.6	8.2	75	8	6.7	0.2	
		5	11.6	8.2	75	8	6.7	0.2	
		6	11.6	8.2	75	8	6.7	0.2	
		7	11.5	8.2	75	8	6.7	0.2	
		8	11.5	8.2	75	8	6.7	0.2	
		9	11.5	8.2	75	8	6.7	0.2	
		10	11.5	8.2	75	8	6.7	0.2	
		11	11.5	8.2	75	8	6.7	0.2	
		12	11.5	8.2	75	8	6.7	0.3	
		13	11.4	8.2	75	8	6.6	0.2	
Gerle Creek Reservoir									
R-IS-4-GC	10/22	0.1	11.3	9.1	83	10	7.0	0.1	7.1
		1	11.3	9.0	82	10	6.9	0.1	
		2	11.3	9.0	82	10	6.8	0.0	
		3	11.3	9.0	82	10	6.7	0.0	
		4	11.1	8.9	81	10	6.6	0.0	
		5	10.7	8.9	80	10	6.5	0.1	
		6	10.2	9.0	80	10	6.5	0.0	
Union Valley Reservoir									
R-IS-6-UVR	10/18	0.1	14.9	8.0	79	18	6.7	0.5	3.6
		1	14.9	8.0	79	18	6.7	0.4	
		2	14.8	8.0	79	18	6.8	0.5	
		3	14.8	8.0	79	18	6.8	0.4	
		4	14.8	8.0	79	18	6.8	0.5	

Site ID	2021 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)
		5	14.8	8.0	79	18	6.8	0.5	
		6	14.8	8.0	79	18	6.8	0.5	
		7	14.8	8.0	79	18	6.8	0.5	
		8	14.8	8.0	79	18	6.8	0.4	
		9	14.8	8.0	79	18	6.8	0.5	
		10	14.8	8.0	78	18	6.8	0.4	
		11	14.8	7.9	78	18	6.7	0.4	
		12	14.8	7.9	78	18	6.7	0.4	
		13	14.7	7.9	78	18	6.7	0.5	

Site ID	2021 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-7-UVR	10/18	0.1	15.0	8.0	79	19	6.7	0.5	3.7
		1	14.9	8.0	79	19	6.7	0.5	
		2	14.9	8.0	79	19	6.7	0.6	
		3	14.9	8.0	79	19	6.7	0.6	
		4	14.8	8.0	79	19	6.7	0.6	
		5	14.8	8.0	79	19	6.7	0.6	
		6	14.8	8.0	79	19	6.7	0.6	
		7	14.7	8.0	79	19	6.7	0.7	
		8	14.7	8.0	79	19	6.7	0.7	
		9	14.7	8.0	79	19	6.7	0.7	
		10	14.7	8.0	79	19	6.7	0.7	
		11	14.7	8.0	79	19	6.7	0.7	
		12	14.7	8.0	78	19	6.7	0.6	
		13	14.7	8.0	78	19	6.7	0.7	
		14	14.6	8.0	78	18	6.7	0.7	
		15	14.6	8.0	78	18	6.7	0.7	
		16	14.6	8.0	78	18	6.7	0.7	
		17	14.6	8.0	78	18	6.7	0.7	
		18	14.6	8.0	78	18	6.7	0.7	
		19	14.6	8.0	78	18	6.7	0.7	
		20	14.6	8.0	78	18	6.7	0.7	
		21	14.6	8.0	78	18	6.7	0.8	
R-IS-8-UVR	10/18	0.1	14.8	7.7	76	18	6.7	0.3	3.5
		1	14.8	7.7	76	18	6.7	0.2	
		2	14.8	7.7	76	18	6.7	0.3	
		3	14.8	7.7	76	18	6.7	0.3	
		4	14.8	7.7	76	18	6.7	0.3	
		5	14.8	7.7	76	18	6.7	0.3	
		6	14.8	7.7	76	18	6.7	0.3	
		7	14.8	7.7	76	18	6.7	0.3	

Site ID	2021 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)
		8	14.8	7.7	76	18	6.7	0.3	
		9	14.8	7.7	76	18	6.7	0.3	
		10	14.8	7.7	76	18	6.7	0.3	
		11	14.8	7.7	76	18	6.7	0.3	
		12	14.8	7.7	76	18	6.7	0.3	
		13	14.8	7.7	76	18	6.7	0.3	
		14	14.7	7.7	76	18	6.7	0.3	
		15	14.7	7.7	76	18	6.7	0.4	
		16	14.7	7.7	76	18	6.7	0.3	
		17	14.7	7.7	76	18	6.6	0.3	
		18	14.7	7.7	76	18	6.6	0.3	
		19	14.7	7.7	76	18	6.6	0.3	
		20	14.7	7.7	76	18	6.6	0.3	
		21	14.7	7.7	75	18	6.6	0.3	
		22	14.7	7.6	75	18	6.6	0.3	
		23	14.7	7.6	75	18	6.6	0.3	
		24	14.7	7.6	75	18	6.6	0.3	
		25	14.6	7.5	74	18	6.6	0.3	
		26	14.5	7.5	73	18	6.5	0.3	
		27	13.2	6.8	65	16	6.3	0.0	
		28	12.1	6.7	62	15	6.1	0.0	
		29	11.8	6.8	62	15	6.1	0.0	
		30	11.5	6.8	63	14	6.1	0.0	
		31	11.1	6.9	63	14	6.1	0.0	
		32	11.0	6.9	63	14	6.1	0.0	
		33	10.7	6.9	62	14	6.0	0.0	
		34	10.5	6.9	62	14	6.0	0.1	
		35	10.3	6.9	62	14	6.0	0.0	
		36	10.2	6.9	62	14	5.9	0.0	
		37	10.1	6.9	61	14	5.9	0.0	

Site ID	2021 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)
		38	10.0	6.8	60	14	5.8	0.0	
		39	9.9	6.6	59	14	5.7	0.0	
		40	9.7	6.5	57	14	5.5	0.1	
		41	9.4	6.1	53	14	5.5	0.2	
		42	9.2	5.8	51	14	5.3	0.1	
		43	9.0	5.7	49	14	5.3	0.1	
		44	8.9	5.6	49	14	5.2	0.1	
		45	8.7	5.6	48	14	5.2	0.1	
		46	8.5	5.5	47	14	5.2	0.1	
		47	8.3	5.5	47	14	5.2	0.1	
		48	8.2	5.5	47	14	5.2	0.0	
		49	7.8	5.5	47	14	5.2	0.1	
		50	7.6	5.6	47	14	5.2	0.1[1]	
Ice House Reservoir									
R-IS-9-IHR	10/20	0.1	13.4	8.0	76	10	6.7	0.2	6.3
		1	13.4	8.0	76	10	6.6	0.3	
		2	13.4	8.0	76	10	6.6	0.2	
		3	13.4	8.0	76	10	6.5	0.2	
		4	13.4	8.0	76	10	6.5	0.2	
		5	13.4	8.0	76	10	6.6	0.2	
		6	13.4	7.9	76	10	6.4	0.2	
		7	13.4	7.9	76	10	6.4	0.3	
		8	13.3	7.9	76	10	6.4	0.2	
		9	13.3	7.9	76	10	6.4	0.3	
		10	13.3	7.9	76	10	6.4	0.3	
		11	13.3	7.9	76	10	6.4	0.3	
		12	13.3	7.9	76	10	6.3	0.3	
		13	13.3	7.9	76	10	6.3	0.2	
		14	13.3	7.9	76	10	6.3	0.3	
		15	13.2	7.8	75	10	6.3	0.3	

Site ID	2021 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)
		16	13.0	7.6	72	10	6.3	0.3	
		17	12.3	6.0	56	10	5.9	0.4	
		18	9.7	1.6	14	11	5.5	0.8	
		19	9.0	1.0	9	11	5.4	1.3	
		20	8.7	0.6	5	12	5.4	1.5	
R-IS-10-IHR	10/20	0.1	13.3	8.0	77	10	6.6	0.2	7.5
		1	13.3	8.0	77	10	6.4	0.2	
		2	13.4	8.0	77	10	6.4	0.2	
		3	13.4	8.0	77	10	6.4	0.2	
		4	13.4	8.0	77	10	6.3	0.2	
		5	13.3	8.0	77	10	6.3	0.3	
		6	13.3	8.0	77	10	6.3	0.2	
		7	13.3	8.0	77	10	6.3	0.2	
		8	13.3	8.0	77	10	6.3	0.2	
		9	13.3	8.0	77	10	6.3	0.2	
R-IS-11-IHR	10/20	0.1	13.2	8.1	77	10	6.7	0.3	10.3
		1	13.2	8.1	77	10	6.5	0.2	
		2	13.2	8.0	77	10	6.5	0.2	
		3	13.2	8.0	77	10	6.4	0.2	
		4	13.2	8.0	77	10	6.4	0.2	
		5	13.2	8.0	77	10	6.3	0.2	
		6	13.2	8.0	77	10	6.3	0.2	
		7	13.2	8.0	77	10	6.2	0.2	
		8	13.2	8.0	77	10	6.2	0.2	
		9	13.2	8.0	77	10	6.1	0.3	
		10	13.2	8.0	77	10	6.1	0.2	
		11	13.2	8.0	76	10	6.1	0.2	
		12	13.2	8.0	76	10	6.1	0.2	
		13	13.2	8.0	76	10	6.1	0.2	
		14	13.2	8.0	76	10	6.1	0.2	

Site ID	2021 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)
		15	13.2	8.0	76	10	6.1	0.3	
		16	13.2	8.0	76	10	6.1	0.2	
		17	12.5	7.4	70	10	5.9	0.2	
		18	9.2	5.2	45	9	5.2	0.3	
		19	8.8	4.7	41	9	5.0	0.5	
		20	8.5	4.7	40	9	4.9	0.5	
		21	8.3	4.5	38	9	4.9	0.4	
Junction Reservoir									
R-IS-12-JR	10/22	0.1	10.0	9.9	88	11	6.1	0.1	6.2
		1	10.0	9.9	88	11	6.1	0.1	
		2	9.9	9.9	88	11	6.2	0.1	
		3	9.8	9.9	87	11	6.1	0.1	
		4	9.6	9.9	87	11	6.1	0.1	
		5	9.6	9.9	87	11	6.1	0.1	
		6	9.5	9.9	87	11	6.1	0.0	
		7	9.4	9.9	56	11	6.1	0.1	
		8	9.3	9.8	86	11	6.1	0.1	
		9	9.2	9.8	85	11	6.1	0.0	
		10	9.2	9.8	85	11	6.1	0.1	
		11	9.1	9.7	84	11	6.1	0.1	
		12	9.0	9.7	84	11	6.0	0.0	
		13	9.0	9.7	84	11	5.9	0.0	
		14	8.9	9.6	83	11	5.9	0.1	
		15	8.9	9.6	83	11	5.8	0.0	
Camino Reservoir									
R-IS-13-CR	10/22	0.1	10.1	10.3	92	13	6.8	--[2]	6.3
		1	10.1	10.3	92	12	6.5	--[2]	
		2	10.1	10.4	92	12	6.2	--[2]	
		3	10.0	10.4	92	12	6.2	--[2]	
		4	9.8	10.4	92	12	6.2	--[2]	

Site ID	2021 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)
		5	9.6	10.5	92	12	6.1	--[2]	
		6	9.5	10.4	91	12	6.1	--[2]	
		7	9.5	10.4	91	12	6.0	--[2]	
Slab Creek Reservoir									
R-IS-14-SC	10/21	0.1	14.0	9.4	91	26	7.0	0.1	5.0
		1	13.5	9.3	89	25	6.9	0.2	
		2	13.4	9.3	89	25	6.9	0.2	
		3	11.0	10.5	95	21	6.9	0.3	
		4	10.0	10.8	96	19	6.8	0.3	
		5	9.9	10.9	96	19	6.8	0.4	
R-IS-15-SC	10/21	0.1	13.6	9.3	90	25	6.9	0.1	6.1
		1	13.3	9.3	89	25	6.9	0.2	
		2	13.2	9.2	88	25	6.9	0.2	
		3	13.2	9.2	88	25	6.8	0.2	
		4	13.2	9.2	88	25	6.8	0.3	
		5	13.1	9.2	88	25	6.8	0.2	
		6	13.1	9.2	87	25	6.8	0.2	
		7	13.1	9.2	87	25	6.8	0.3	
		8	12.9	9.0	85	25	6.7	0.2	
		9	12.8	9.0	85	25	6.7	0.2	
		10	12.7	9.0	84	25	6.7	0.3	
		11	12.6	8.9	84	25	6.6	0.3	
		12	12.6	8.9	84	25	6.6	0.3	
		13	12.6	8.9	83	25	6.5	0.3	
		14	12.5	8.8	83	25	6.5	0.4	
		15	12.5	8.8	83	25	6.5	0.4	
		16	12.4	8.9	83	26	6.4	0.4	
		17	12.4	9.0	84	26	6.5	0.4	
		18	12.4	9.1	85	26	6.5	0.4	
		19	12.3	9.2	86	27	6.5	0.3	

Site ID	2021 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)
		20	12.3	9.2	86	27	6.5	0.4	
		21	12.2	9.3	86	27	6.5	0.3	
		22	12.2	9.3	87	26	6.5	0.3	
		23	12.2	9.3	87	25	6.5	0.4	
		24	12.2	9.4	88	24	6.5	0.3	
		25	12.1	9.5	88	24	6.5	0.3	
		26	12.1	9.5	88	24	6.5	0.3	
		27	12.0	9.6	89	24	6.5	0.4	
		28	11.9	9.6	89	24	6.5	0.4	
		29	11.8	9.7	90	24	6.4	0.5	
		30	11.7	9.8	90	23	6.4	0.5	
		31	11.6	9.8	91	23	6.4	0.6	
		32	11.6	9.9	91	23	6.4	0.6	
		33	11.5	9.9	91	23	6.2	0.7	
		34	11.4	9.9	91	23	6.2	0.7[1]	

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

[1] Turbidity values are recorded as the values from the previous depth. Higher turbidity values collected in the field reflect turbidity caused by the probe coming into contact with reservoir bottom sediments.

[2] Turbidity not collected due to sensor malfunction.

APPENDIX B
In situ Vertical Profiles for UARP Reservoir Sites

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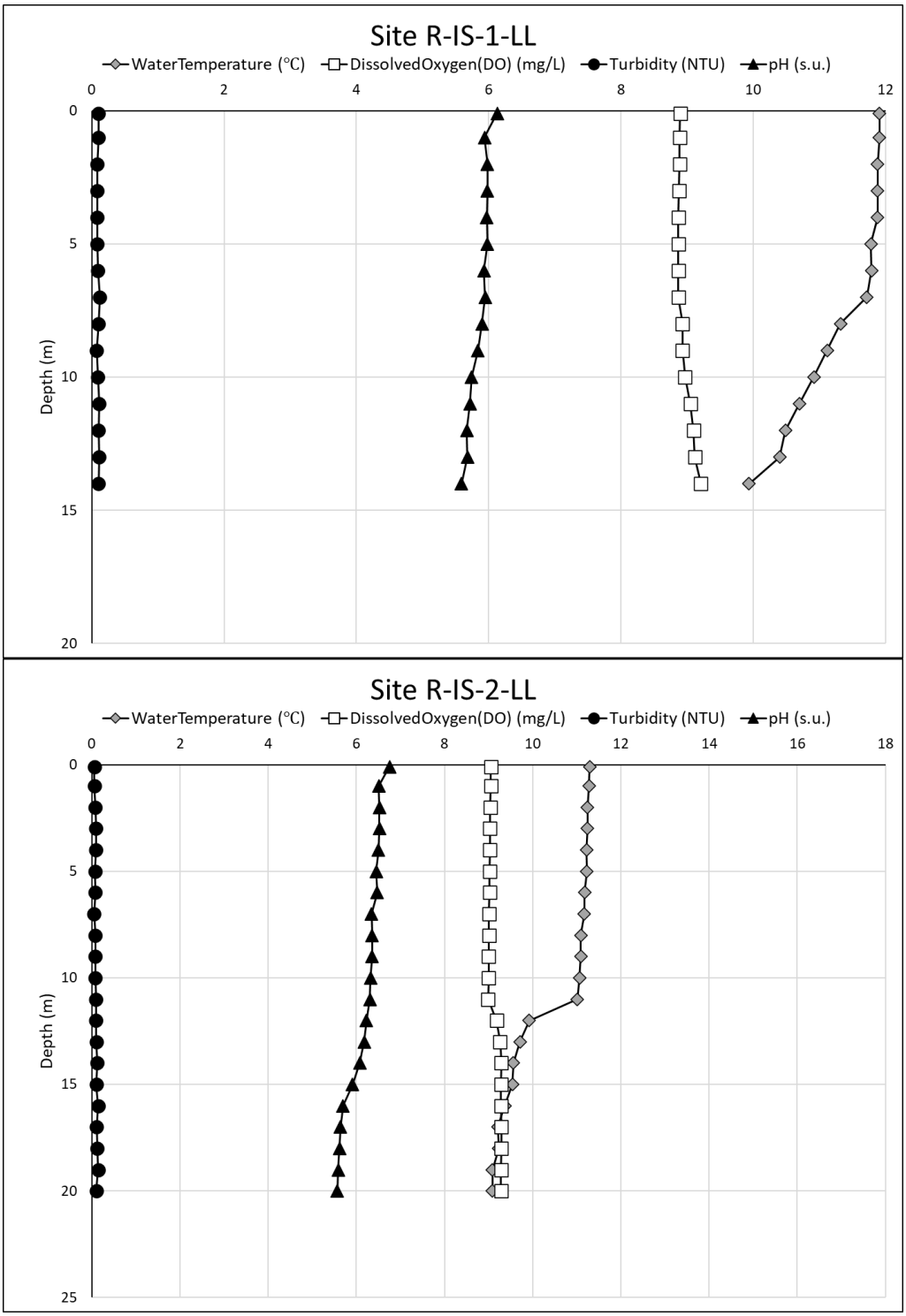

Figure B-1. ***In situ*** **water temperature, dissolved oxygen, and turbidity at Loon Lake sites R-IS-1-LL and R-IS-2-LL during May (Spring) 2021.**

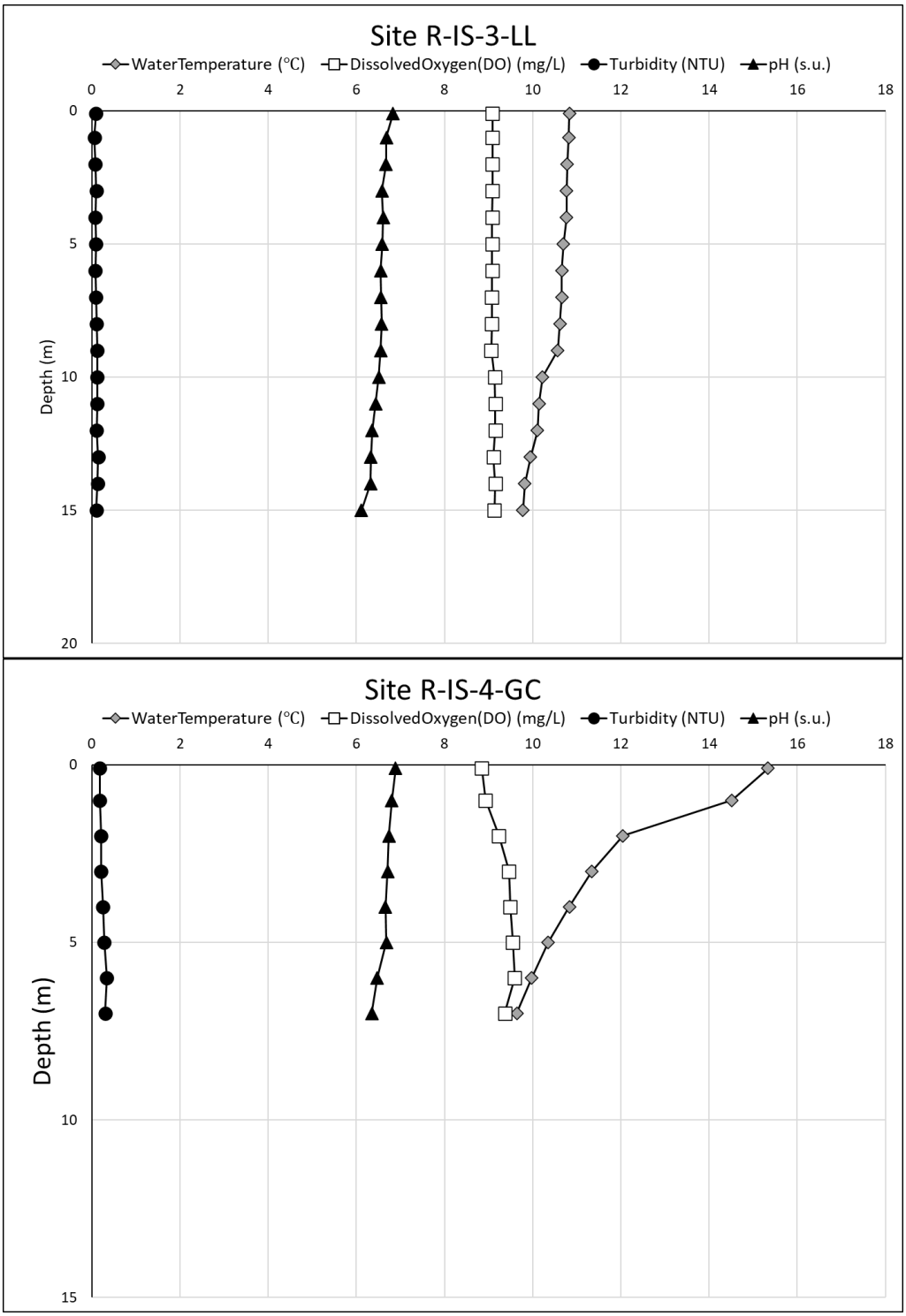

Figure B-2. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Loon Lake and Gerle Creek Reservoir sites R-IS-3-LL and R-IS-4-GC during May (Spring) 2021.

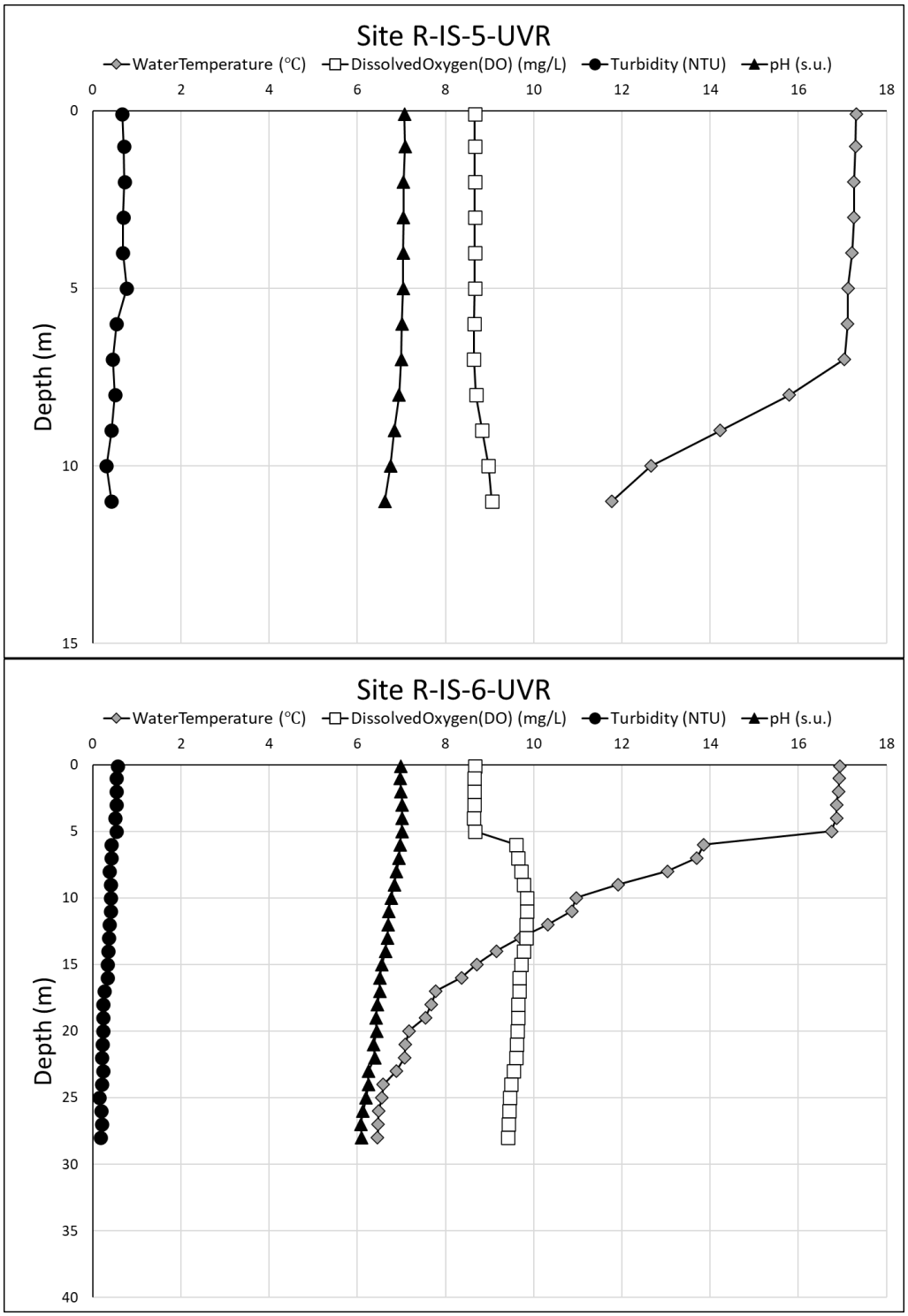

Figure B-3. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir sites R-IS-5-UVR and R-IS-6-UVR during May (Spring) 2021.

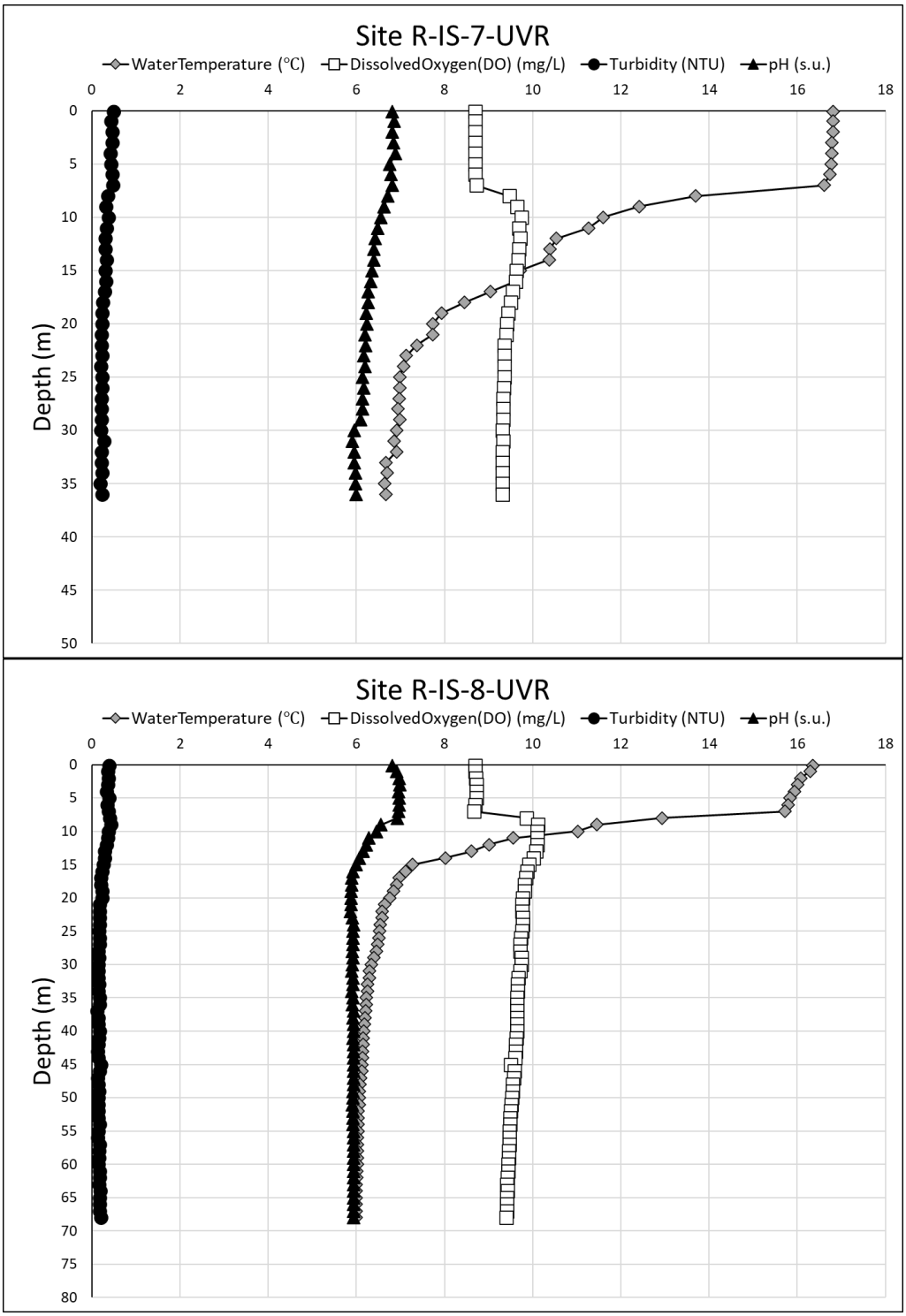

Figure B-4. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir sites R-IS-7-UVR and R-IS-8-UVR during May (Spring) 2021.

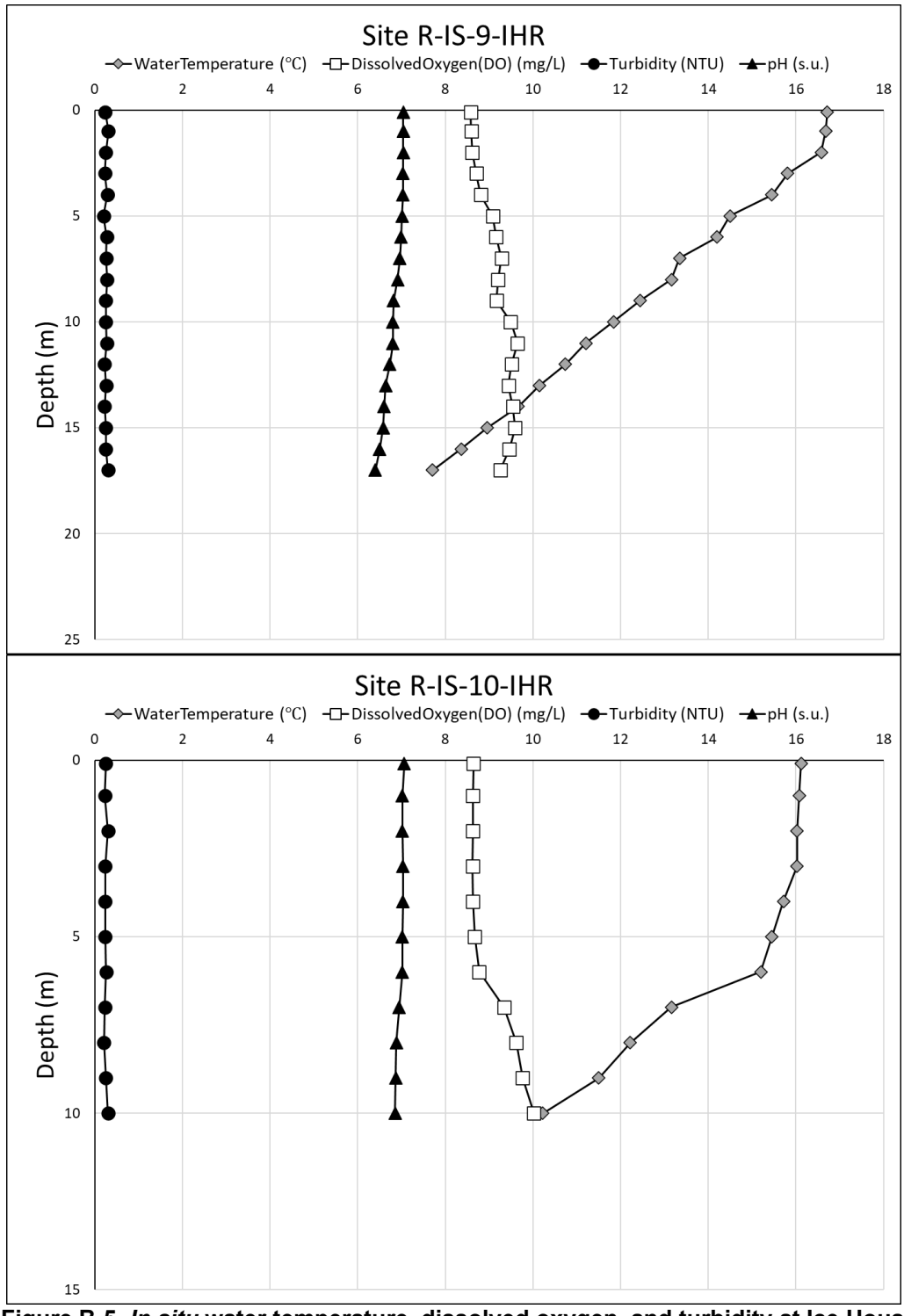

Figure B-5. *In situ* water temperature, dissolved oxygen, and turbidity at Ice House Reservoir sites R-IS-9-IHR and R-IS-10-IHR during May (Spring) 2021.

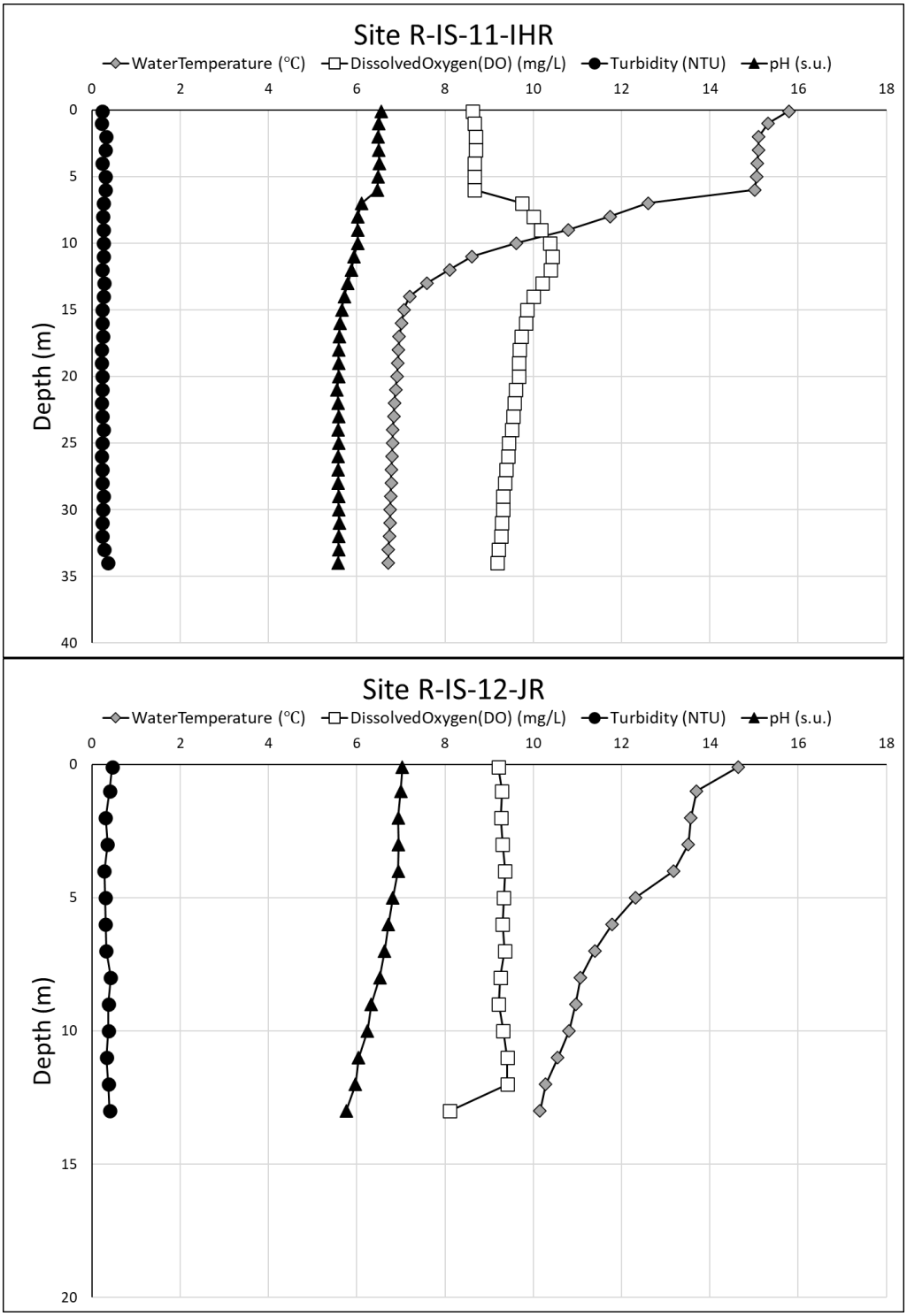

Figure B-6. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Ice House Reservoir and Junction Reservoir sites R-IS-11-IHR and R-IS-12-JR during May (Spring) 2021.

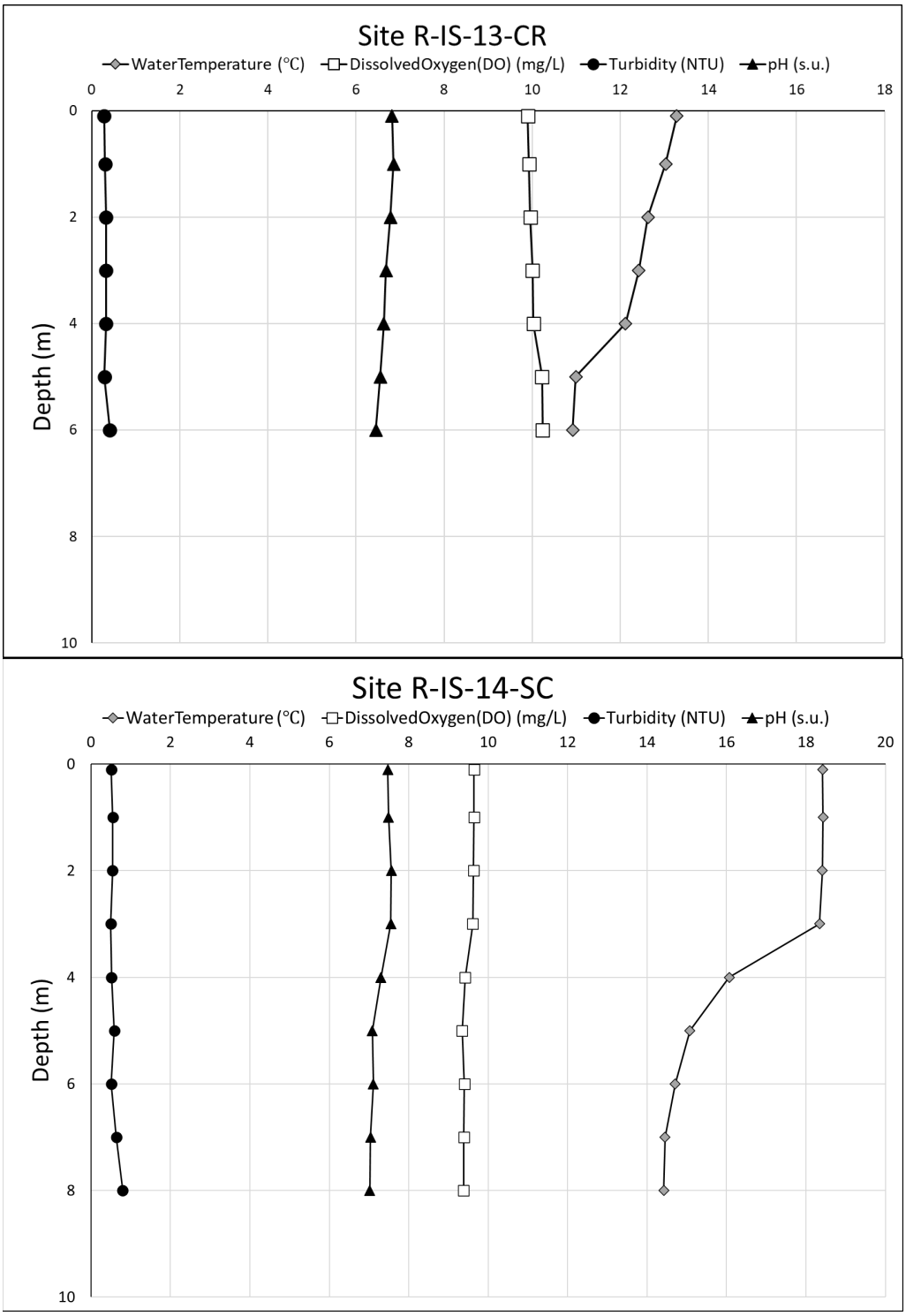

Figure B-7. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Camino Reservoir and Slab Creek Reservoir sites R-IS-13-CR and R-IS-14-SC during May (Spring) 2021.

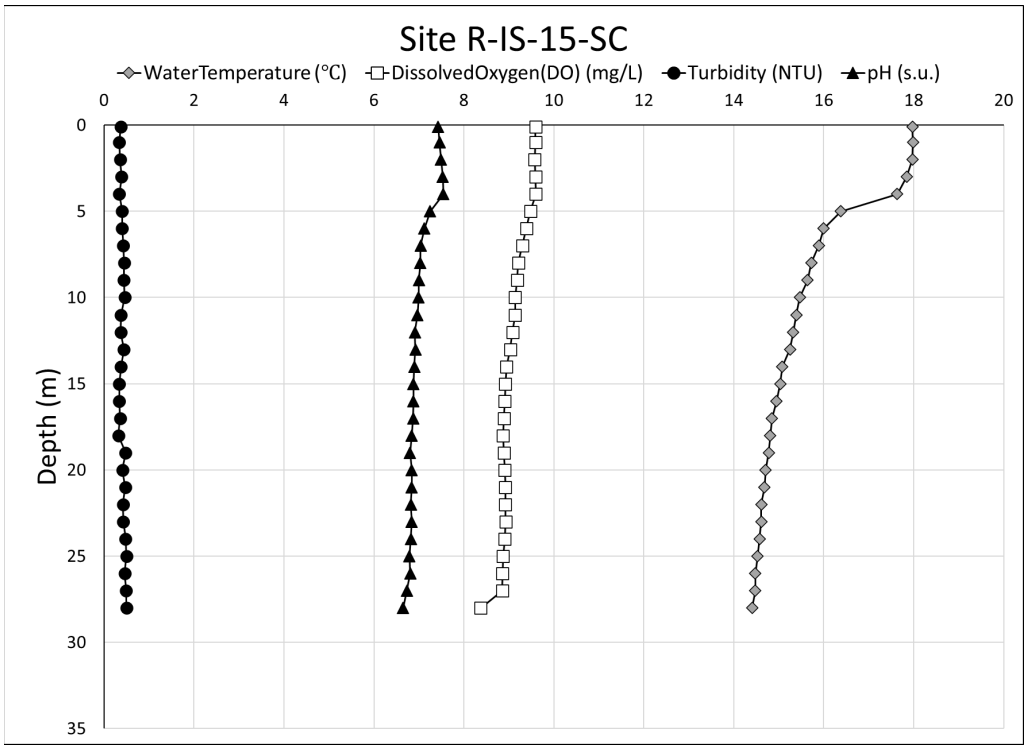

Figure B-8. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Slab Creek Reservoir Site R-IS-15-SC during May (Spring) 2021.

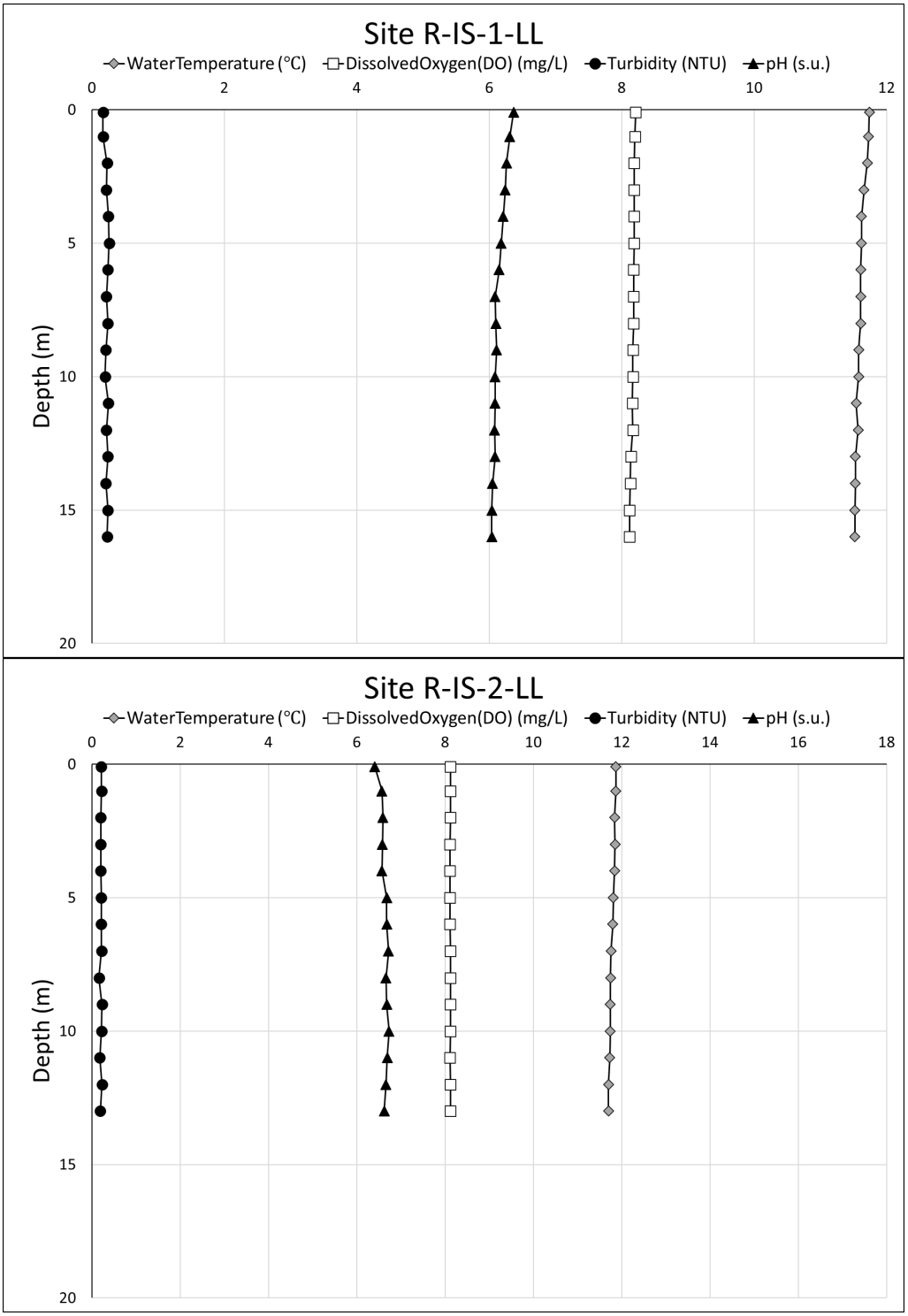

Figure B-9. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Loon Lake Reservoir sites R-IS-1-LL and R-IS-2-LL during October (Fall) 2021.

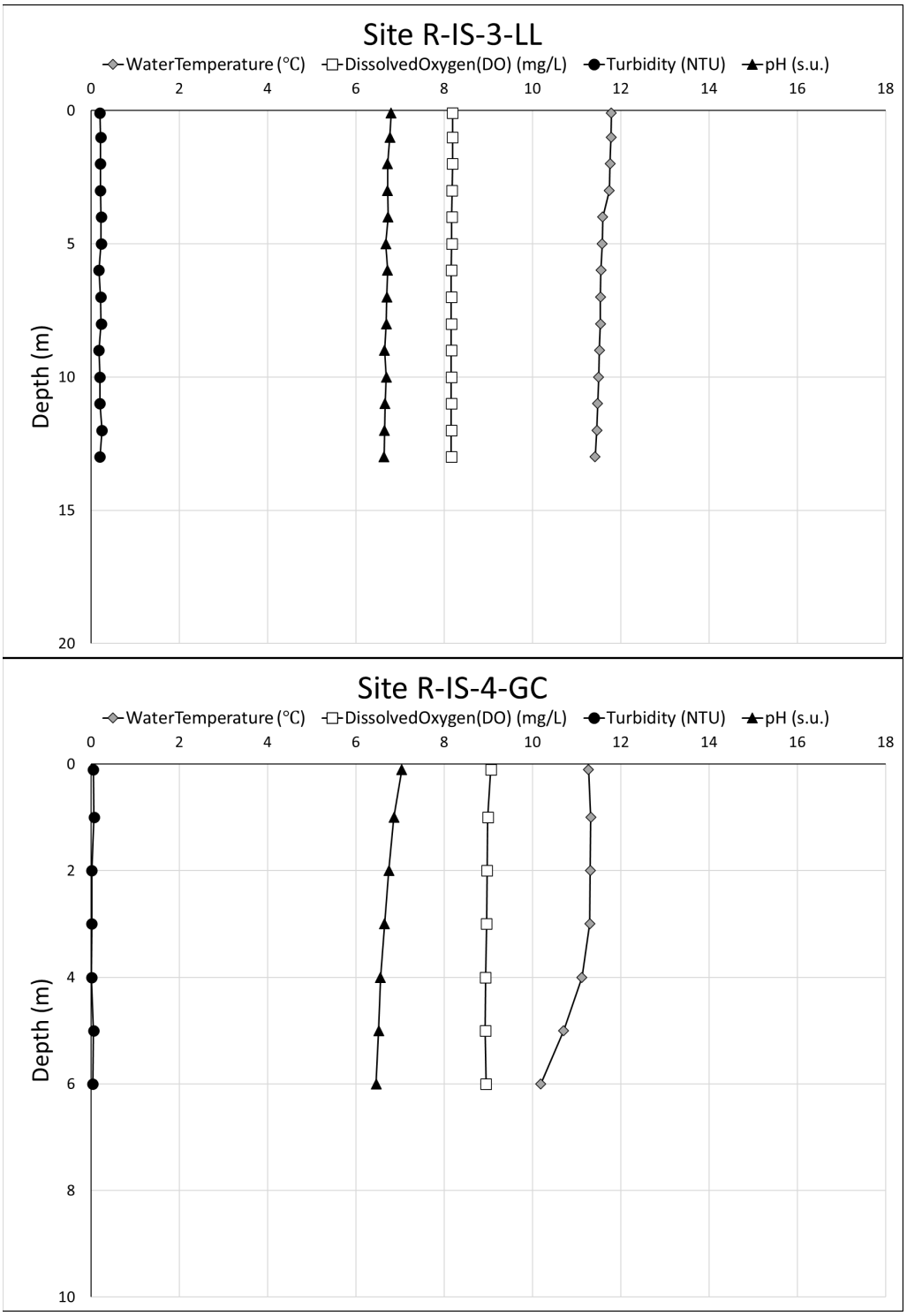

Figure B-10. *In situ* water temperature, dissolved oxygen, turbidity, and pH Loon Lake Reservoir and Gerle Creek Reservoir sites R-IS-3-LL and R-IS-4-GC during October (Fall) 2021.

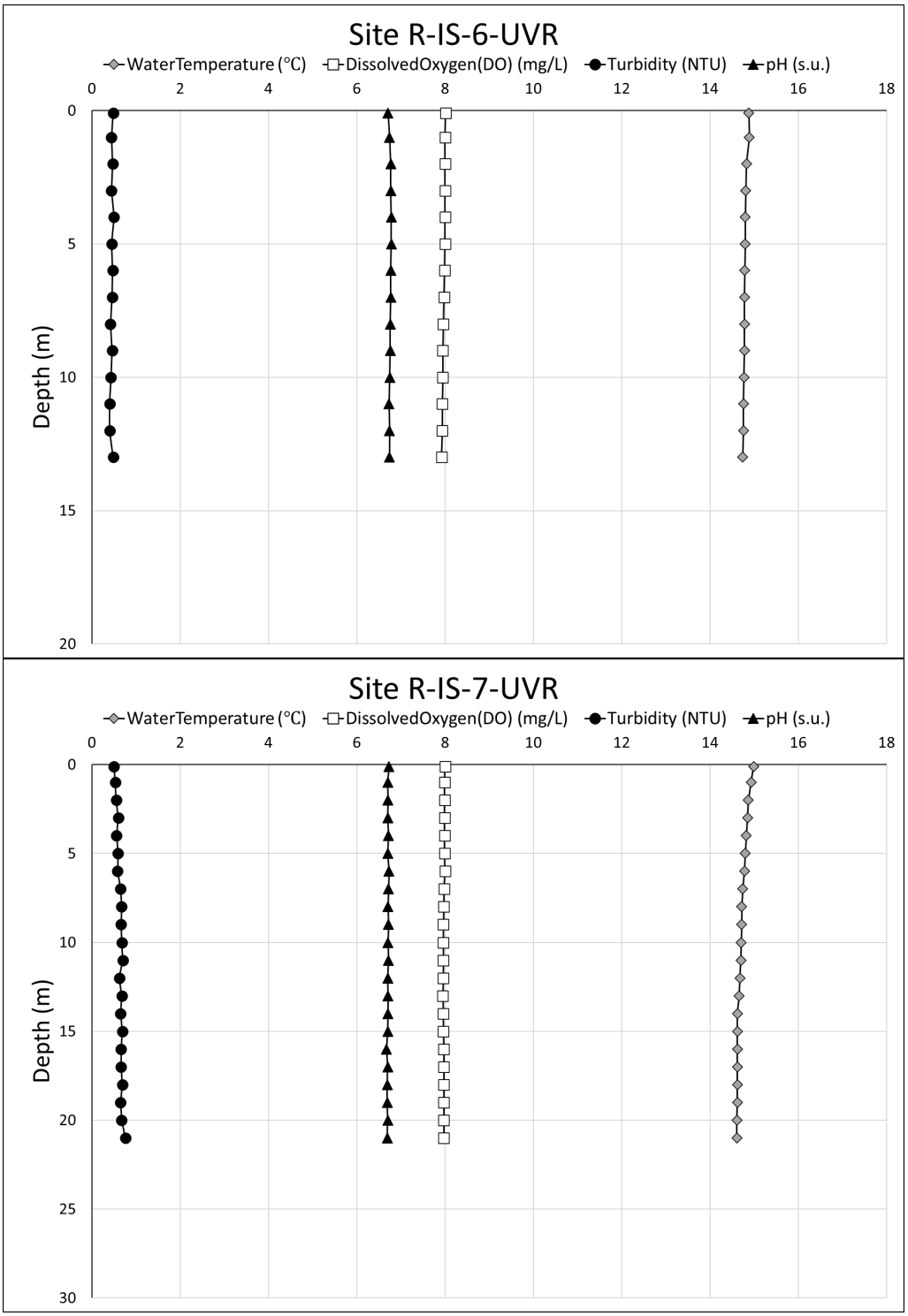

Figure B-11. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir sites R-IS-6-UVR and R-IS-7-UV during October (Fall) 2021.

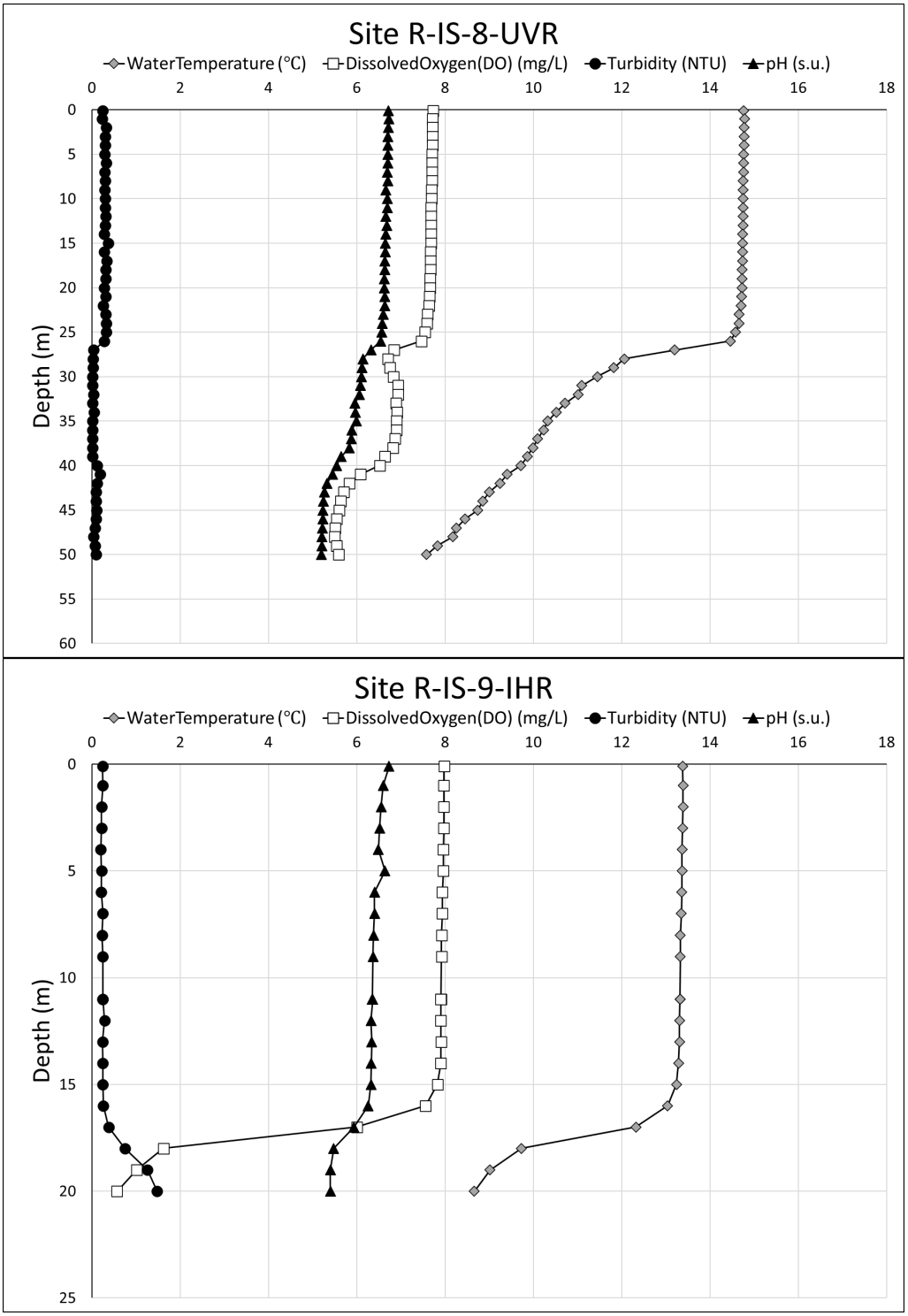

Figure B-12. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir and Ice House Reservoir sites R-IS-8-UVR and R-IS-9-IHR during October (Fall) 2021.

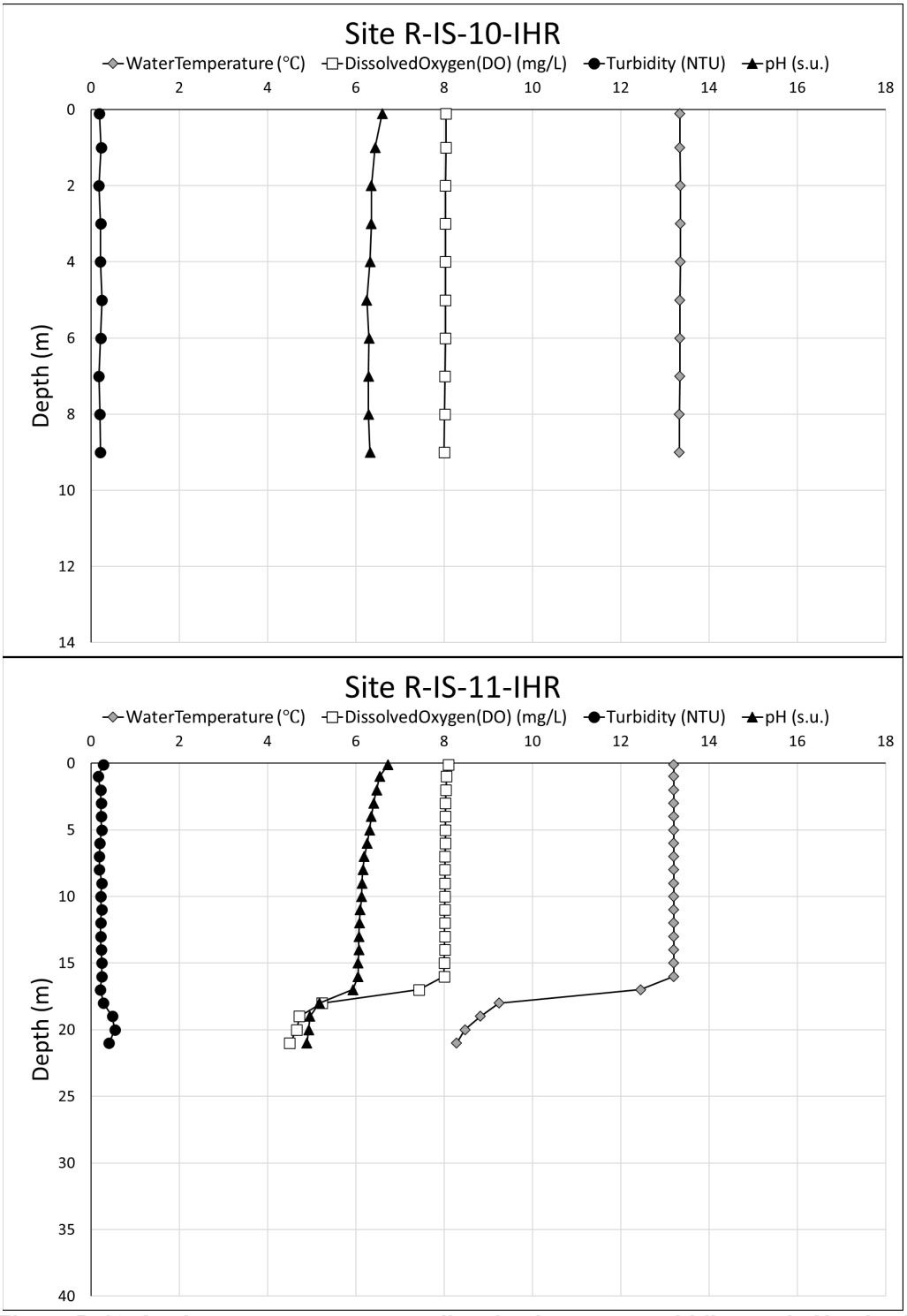

Figure B-13. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Ice House Reservoir sites R-IS-10-IHR and R-IS-11-IHR during October (Fall) 2021.

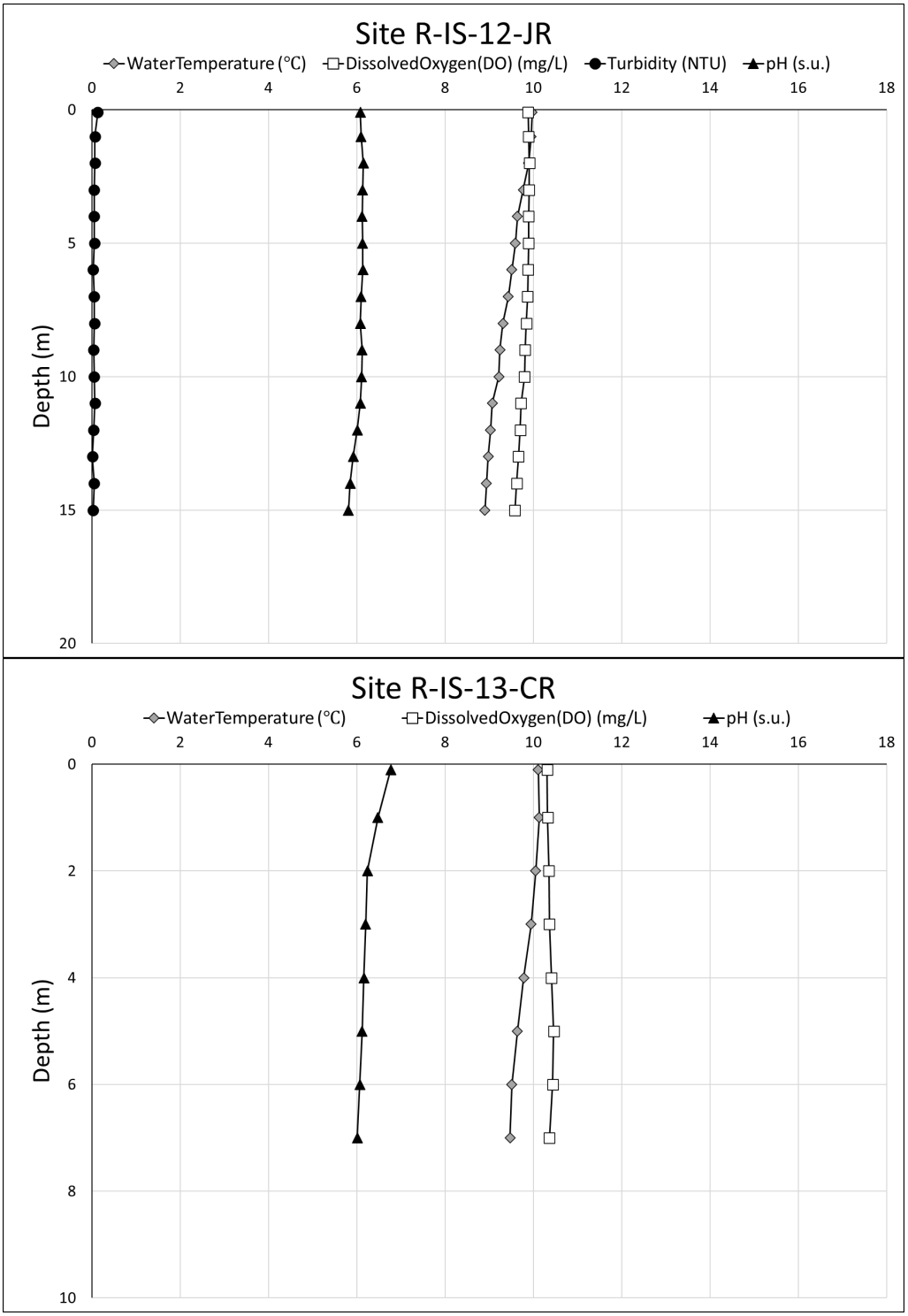

Figure B-14. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Junction Reservoir and Camino Reservoir sites R-IS-12-JR and R-IS-13-CR during October (Fall) 2021. [Turbidity measurements were not collected at Site R-IS-13-CR due to sensor malfunction.]

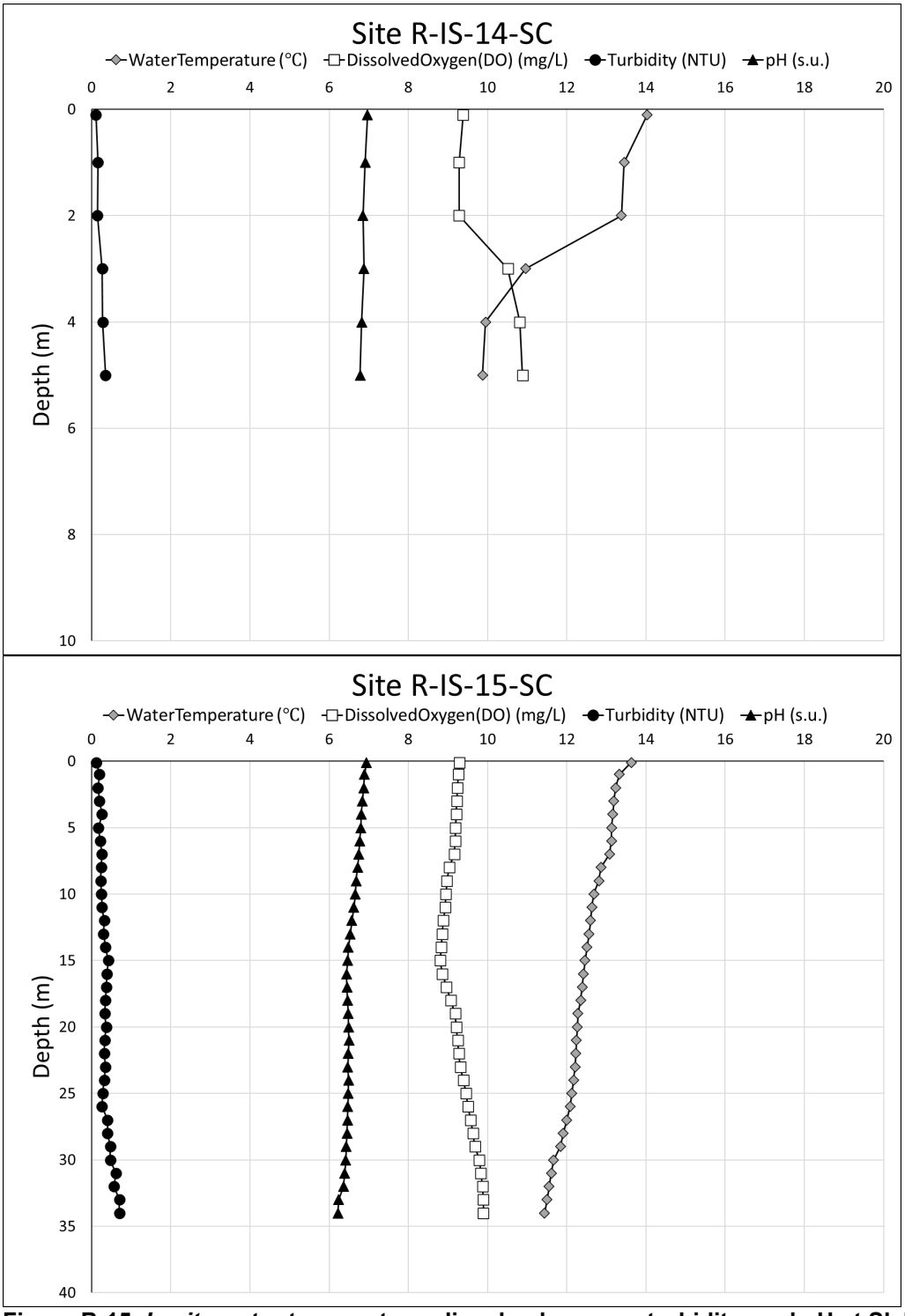

Figure B-15. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Slab Creek Reservoir sites R-IS-14-SC and R-IS-15-SC during October (Fall) 2021.

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APPENDIX C
Bacteria Results for UARP Reservoir Sites

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Table C-1. Bacteria (MPN/100mL) for UARP Sites during the 30-day Period Surrounding Independence Day[1,2].

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-7-UVR	1.8	21.1	<1.8	1.0	<1.8	1.0	<1.8	1.0	<1.8	<1.0	1.0	1.6
Bac-10-UVR	<1.8	<1.0	<1.8	<1.0	<1.8	<1.0	<1.8	2.0	<1.8	2.0	0.9	0.9
Bac-11-JR	23.0	34.5	170.0	195.6	7.8	4.1	130.0	50.4	79.0	7.5	50.0	25.3
Bac-13-IHR	<1.8	3.0	33.0	<1.0	17.0	18.7	<1.8	1.0	<1.8	<1.0	3.3	1.7
Bac-15-SCR	<1.8	3.1	2.0	<1.0	2.0	1.0	2.0	<1.0	>1,600	139.6	7.5	2.6
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	-	-

MDL = method detection limit
MRL = method reporting limit

[1] Individual results < MDL were treated as 0.5 x MDL for the geometric mean calculations.
[2] Individual results >1,600 were treated as 2.0 x 1,600 for the geometric mean calculations.

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APPENDIX D
Metals Bioaccumulation Results for UARP Reservoir Sites

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Table D-1. Fish tissue metals concentrations for UARP reservoirs.

Species Common Name	2021 Sampling Date	Fork Length (mm)	Weight (g)	Mercury (Hg)			% Moisture for Cu, Pb, Ag	Copper (Cu)		Lead (Pb)		Silver (Ag)	
				% Moisture	ug/g ww	ug/g dw		ug/g ww	ug/g dw	ug/g ww	ug/g dw	ug/g ww	ug/g dw
LOON LAKE (M-1-LL)													
Rainbow Trout	8/2	179	59	81.84	0.025	0.138	80.8	< 0.36, < 0.36	< 1.34, < 1.34	< 0.02, < 0.02	< 0.07, < 0.07	< 0.02, < 0.02	< 0.09, < 0.09
GERLE CREEK RESERVOIR (M-1-GCR)													
Brown Trout	8/5	295	210	79.48	**0.143**	0.697	78.5	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		226	125	78.03	0.042	0.191	77.8	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		233	145	78.21	0.069	0.317	77.3	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		241	130	78.35	0.066	0.305	77.7	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		248	140	80.10	0.063	0.317	79.5	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		255	135	78.65	**0.077**	0.361	78.1	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		224	135	78.06	0.069	0.315	78.0	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		208	305	77.70	**0.099**	0.444	77.6	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		296	255	79.10	**0.085**	0.407	78.8	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		301	290	78.54	**0.09**	0.419	78.3	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		332	275	80.50	**0.16**	0.820	80.7	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
Rainbow Trout	8/5	174	63	75.91	0.039	0.162	76.0	< 0.36	1.44	< 0.02	< 0.07	< 0.02	< 0.09

Species Common Name	2021 Sampling Date	Fork Length (mm)	Weight (g)	Mercury (Hg)			% Moisture for Cu, Pb, Ag	Copper (Cu)		Lead (Pb)		Silver (Ag)	
				% Moisture	ug/g ww	ug/g dw		ug/g ww	ug/g dw	ug/g ww	ug/g dw	ug/g ww	ug/g dw
UNION VALLEY RESERVOIR (M-1-UVR)													
Brown Trout	8/17	501	1480	77.62	**0.160**	0.715	77.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
Lake Trout	8/17	407	675	77.59	**0.120**	0.535	77.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
Rainbow Trout	8/5	373[1]	500	78.14	0.010	0.082	78.1	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		368[1]	530	76.62	0.011	0.041	76.6	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		414[1]	910	73.28	0.009 [2]	0.030 [2]	73.2	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
	8/17	339	400	79.33	0.017	0.046	79.5	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		334	440	77.86	0.009 [2]	0.047	77.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		330	460	76.93	0.007 [2]	0.034 [2]	76.7	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		371	615	76.56	0.012	0.051	72.2	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		336	490	76.51	0.007 [2]	0.030 [2]	76.7	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		313	365	78.19	0.023, 0.025	0.110, 0.115	76.5	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		356	490	77.61	0.014	0.063	78.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		331	445	77.23	0.008 [2]	0.035 [2]	77.7	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		401	725	76.14	0.013	0.054	78.3	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		334	465	76.46	0.008 [2]	0.034 [2]	76.9	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		345	460	76.87	0.011, 0.010	0.048, 0.043	76.9	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		334	405	77.66	0.009 [2]	0.040	76.3	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		320	345	78.18	0.009 [2]	0.041	76.5	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
Spotted Bass	8/5	172	80	79.80	**0.125**	0.619	79.9	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		185	90	78.50	**0.117**	0.544	78.3	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		212	130	79.36	**0.133**	0.644	78.7	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		220	160	77.75	**0.116**	0.521	77.9	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		360	780	78.91	***0.851***	4.03	77.6	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
	8/17	296	425	78.04	0.040	0.178	77.8	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		172	80	77.58	0.041	0.181	77.8	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		183	100	77.39	**0.082**	0.392	76.9	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		208	135	79.08	***0.162***	0.714	78.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09

Species Common Name	2021 Sampling Date	Fork Length (mm)	Weight (g)	Mercury (Hg)			% Moisture for Cu, Pb, Ag	Copper (Cu)		Lead (Pb)		Silver (Ag)	
				% Moisture	ug/g ww	ug/g dw		ug/g ww	ug/g dw	ug/g ww	ug/g dw	ug/g ww	ug/g dw
Spotted Bass	8/17	282	365	77.32	**0.100**	0.455	78.2	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
ICE HOUSE RESERVOIR (M-1-IHR)													
Rainbow Trout	8/3	255	160	78.45	0.021	0.097	78.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		233	140	85.43	0.022	0.151	85.0	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		214	120	79.79	0.032	0.158	79.2	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		355	580	76.88	0.006 [2]	0.026 [2]	76.6	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
CAMINO RESERVOIR (M-1-CR)													
Brown Trout	8/3	238	122	78.91	0.034	0.161	78.9	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		190	75	79.12	0.025	0.120	79.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		320	345	78.32	0.058	0.268	78.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		183	70	78.63	0.019	0.089	78.6	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		182	68	78.53	0.025, 0.024	0.116, 0.112	78.2	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		219	100	79.43	0.068	0.331	78.9	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
Rainbow Trout	8/3	252	189	78.2	0.038	0.174	78.1	< 0.36	< 1.34	0.02[2]	0.08[2]	< 0.02	< 0.09
		180	69	78.61	0.030	0.140	78.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		157	41	77.64	0.049	0.219	77.9	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		139	28	79.06	0.015	0.072	79.1	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		139	27	79.85	0.017	0.084	79.6	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		176	57	79.1	0.022	0.105	79.1	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
SLAB CREEK RESERVOIR (M-1-SCR)													
Brown Trout	8/4	360	505	76.59	**0.071**	0.303	77.5	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
Sacramento Pikeminnow	8/4	432	735	80.64	**0.431**, ***0.501***	2.23, 2.59	80.2	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		395	625	82.27	***0.616***	3.48	81.5	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		440	960	80.34	***1.15***	5.85	79.5	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		415	765	81.98	**0.280**	1.55	80.9	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		433	815	81.50	***0.811***	4.38	80.8	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		376	575	80.45	***0.512***	2.62	79.4	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09

Species Common Name	2021 Sampling Date	Fork Length (mm)	Weight (g)	Mercury (Hg)			% Moisture for Cu, Pb, Ag	Copper (Cu)		Lead (Pb)		Silver (Ag)	
				% Moisture	ug/g ww	ug/g dw		ug/g ww	ug/g dw	ug/g ww	ug/g dw	ug/g ww	ug/g dw
Sacramento Pikeminnow	8/4	379	485	80.38	**0.127, 0.129**	0.647, 0.657	80.3	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		407	635	80.20	**0.370**	1.87	79.8	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
		376	545	80.53	**0.396**	2.03	80.3	< 0.36	< 1.34	< 0.02	< 0.07	< 0.02	< 0.09
Rainbow Trout	8/4	342	425	77.09	0.069	0.301	76.4	< 0.36, < 0.36	< 1.34, < 1.34	< 0.02, < 0.02	< 0.07, < 0.07	< 0.02, < 0.02	< 0.09, < 0.09

dw = dry weight
ug/g = micrograms per gram
ww = wet weight

Bold indicates values that are greater than the Office of Environmental Health Hazard Assessment's (OEHHA's) Advisory Tissue Level (ATL) of 0.07 ug/g methylmercury wet weight (Klasing and Brodberg 2008).
Bold and italic indicate values that are greater than OEHHA's ATL of 0.44 ug/g wet weight (Klasing and Brodberg 2008).

[1] Length measured in Total Length.
[2] Result is above the method detection limit but under the method reporting limit.

APPENDIX E
In situ Field Data Sheets

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Stillwater Sciences

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

Page 1 of 3

Instrument(s) used: YSI EXO² **Crew:** ES, AL

Site Location: IS-18-SFAR GPS:
Date: 02/10/2021 Time: 1225
Photos: 692, 693 Weather: Clear, cool
Notes:

In situ

Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
7.50	12.02	100.2	35.5	0.053	7.55	0.55	735.4 mmHg

Site Location: IS-19-SFAR GPS:
Date: 02/10/2021 Time: 1317
Photos: 694, 695 Weather: Clear, warm
Notes:

In situ

Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
5.32	12.22	96.10	24.4	0.039	7.29	0.75	718.0 mmHg

Site Location: IS-15-SFAR GPS:
Date: 02/10/2021 Time: 1430
Photos: 696, 697 Weather: Clear, cool
Notes:

In situ

Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
5.88	12.05	96.6	41.8	0.066	7.58	0.70	712.4 mmHg

Stillwater Sciences

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

Page 2 of 3

Instrument(s) used: YSI EXO2 **Crew:** ES, AL

Site Location: IS-16-SFAR GPS:
Date: 02/10/2021 Time: 1443
Photos: 698, 699 Weather: clear, cool
Notes:

In situ

Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
5.65	11.48	91.4	27.8	0.044	7.12	0.72	712.7 mmHg

Site Location: IS-10-SFSC GPS:
Date: 02/11/2021 Time: 0924
Photos: Weather: cloudy, cool
Notes:

In situ

Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
3.61	10.93	82.5	6.7	0.011	7.05	0.69	628.4 mmHg

Site Location: IS-11-SFSC GPS:
Date: 02/11/2021 Time: 1010
Photos: 700, 701 Weather: overcast, cool
Notes:

In situ

Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
3.12	11.78	87.8	9.9	0.017	7.24	0.43	648.7 mmHg

Stillwater Sciences

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

Page 3 of 3

Instrument(s) used: YSI Exo2 **Crew:** AL, ES

Site Location: IS-12-SC GPS:
Date: 02/11/2021 Time: 1046
Photos: 702, 703 Weather: overcast, cool
Notes:

In situ

Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
3.13	11.51	85.7	8.7	0.015	6.83	0.81	652.7 mmHg

Site Location: IS-13-SC GPS:
Date: 02/11/2021 Time: 1145
Photos: 704, 705 Weather: overcast, cool
Notes:

In situ

Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
5.05	11.87	93.0	11.3	0.018	7.04	0.47	686.4 mmHg

Site Location: IS-14-SC GPS:
Date: 02/11/2021 Time: 1220
Photos: 706, 707 Weather: overcast, cool
Notes:

In situ

Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
6.03	11.65	93.6	16.2	0.026	7.31	0.44	690.5 mmHg

RIVERINE - Spring

Site Type: Riverine
Instrument: YSI EXO2
Recorded by: Eric Sommerauer

SWS ID	Date & Time	Weather	Temp. (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
IS_6_GC	4/27/2021 10:33 AM	Warm	5.04	11.42	89.6	7.2	0.012	7.11	0.25	630.3
IS_9_GCC	4/27/2021 11:00 AM	Warm	6.14	11.26	90.8	7.7	0.012	6.98	0.12	629.1
IS_10_SFSC	4/27/2021 12:13 PM	Warm	6.40	11.00	89.3	7.3	0.011	6.96	0.39	627.7
IS_11_SFSC	4/27/2021 1:20 PM	Warm	9.73	10.51	92.6	11.5	0.016	7.26	0.32	647.6
IS_12_SC	4/27/2021 2:07 PM	Warm	7.37	10.96	91.1	10.2	0.015	7.31	0.29	651.9
IS_13_SC	4/27/2021 3:05 PM	Warm	9.90	11.08	97.9	11.9	0.017	7.37	0.37	685.4
IS_14_SC	4/27/2021 3:35 PM	Warm	9.18	11.32	98.2	12.8	0.018	7.42	0.23	689.0
IS_17_BC	4/28/2021 12:46 PM	Warm	8.26	10.92	92.8	16.4	0.024	7.32	0.42	695.1
IS_15_SFAR	4/28/2021 1:34 PM	Warm	10.61	10.81	97.2	29.9	0.041	7.41	0.50	716.6
IS_16_SFAR	4/28/2021 1:53 PM	Warm	11.51	10.85	99.6	24.6	0.033	7.41	0.46	716.5
IS_18_SFAR	4/28/2021 4:03 PM	Warm	14.58	10.20	100.2	29.9	0.037	7.63	0.87	738.0
IS_19_SFAR	4/29/2021 9:35 AM	Warm	10.86	10.82	97.9	23.9	0.033	7.27	0.49	723.2

RIVERINE - Summer

Site Type: Riverine
Instrument: YSI EXO2
Recorded by: Kevin Ha Eric Sommerauer

SWS ID	Date & Time	Weather	Temp. (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
IS_4_GC	8/3/2021 12:06 PM	Clear, warm	11.17	8.36	76	32	0.043	6.79	0.1	621.2
IS_5_GC	8/3/2021 12:52 PM	Clear, warm	18.87	7.93	85.4	39	0.044	7.7	0.1	639.3
IS_6_GC	8/3/2021 1:15 PM	Clear, warm	15.9	8.12	82.1	37	0.045	7.46	0.4	643.6
IS_9_GCC	8/3/2021 1:38 PM	Clear, warm	24.58	7.63	91.7	44	0.044	7.78	0.1	642.8
IS_7_SFRR	8/3/2021 2:01 PM	Clear, warm	19.52	7.87	85.7	42	0.046	7.99	0.1	647.3
IS_8_SFRR	8/3/2021 2:14 PM	Clear, warm	18.25	8.34	88.6	37	0.042	7.71	0.1	648.3
IS_10_SFSC	8/3/2021 3:01 PM	Clear, warm	8.03	9.66	81.4	30	0.045	7.3	0.3	638.6
IS_4_GC	8/9/2021 10:54 AM	Clear, warm	11.1	8.91	80.9	7.3	0.01	6.42	0.09	610.3
IS_5_GC	8/9/2021 11:23 AM	Clear, warm	14.8	8.54	84.3	10.6	0.013	6.84	0.04	631
IS_6_GC	8/9/2021 11:42 AM	Clear, warm	15.5	8.25	82.6	11.7	0.014	6.78	0.06	634.9
IS_9_GCC	8/9/2021 11:58 AM	Clear, warm	20.2	7.95	87.7	14.7	0.016	7.18	0.1	633.7
IS_7_SFRR	8/9/2021 12:15 PM	Clear, warm	16	8.34	84.5	14.4	0.017	7.17	0.04	688.8
IS_8_SFRR	8/9/2021 12:24 PM	Clear, warm	15.8	8.49	85.7	13.7	0.017	7.1	0.07	639.6
IS_10_SFSC	8/9/2021 1:11 PM	Clear, warm	8.5	9.86	84.1	7.8	0.011	6.81	0.1	631.8
IS_13_SC	8/9/2021 2:03 PM	Clear, warm	18.1	8.57	90.7	14.4	0.017	7.15	0.06	686.5
IS_14_SC	8/9/2021 2:32 PM	Clear, warm	12.9	9.92	93.9	11.4	0.015	7.2	0.03	690
IS_11_SFSC	8/9/2021 3:27 PM	Clear, warm	22.2	7.62	87.4	13	0.014	7.31	0.04	650.7
IS_12_SC	8/9/2021 3:51 PM	Clear, warm	11.3	9.42	85.6	10.2	0.014	6.93	0.07	654.2
IS_19_SFAR	8/9/2021 5:13 PM	Clear, warm	13.5	10	95.3	15.3	0.02	7.25	0.1	716.3
IS_18_SFAR	8/10/2021 11:16 AM	Clear, warm	18	9.46	99.8	20.3	0.023	7.25	0.17	734.6
IS_17_BC	8/10/2021 12:47 PM	Clear, warm	13.1	9.62	91.5	19	0.025	7.09	0.86	692.2
IS_15_SFAR	8/10/2021 1:21 PM	Clear, warm	22.5	8.99	103.8	56.1	0.059	8.14	0.03	712.9
IS_16_SFAR	8/10/2021 1:34 PM	Clear, warm	9.7	11.23	98.7	10.7	0.015	6.72	0.01	713.1
IS_1_RR	8/11/2021 12:03 PM	Clear, warm	20.8	7.65	85.6	16.1	0.017	6.87	0.12	607.9
IS_2_LRR	8/11/2021 1:27 PM	Clear, warm	23.3	7.03	82.3	17	0.017	7.04	0.04	608.2
IS_3_LRR	8/11/2021 2:13 PM	Clear, warm	21.9	6.98	79.7	10.7	0.011	6.82	0.03	609.6

RIVERINE - Fall

Site Type: Riverine
Instrument: YSI EXO2
Recorded by: Emily Applequist Eric Sommerauer

SWS ID	Date & Time	Weather	Temp. (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
IS_4_GC	11/16/2021 10:28 AM	Sunny, cool	7.82	9.73	81.8	7.2	0.01	5.4	0.36	608.2
IS_5_GC	11/16/2021 11:01 AM	Sunny, cool, slightly windy	6.26	10.42	84.3	13.3	0.021	6.39	0.23	629.3
IS_6_GC	11/16/2021 11:20 AM	Sunny, cool	8.15	9.96	84.4	7	0.011	6.35	0.33	633.4
IS_9_GCC	11/16/2021 11:37 AM	Sunny, cool	8.3	10.15	86.4	7.7	0.011	6.41	0.27	631.9
IS_7_SFRR	11/16/2021 11:53 AM	Sunny, cool	6.36	10.43	84.6	12.5	0.019	6.68	0.13	637.1
IS_8_SFRR	11/16/2021 12:05 PM	Sunny, cool	7	10.29	84.9	10.7	0.016	6.61	0.21	638
IS_10_SFSC	11/16/2021 12:48 PM	Sunny, 60 degrees	8.73	9.99	85.9	11.7	0.017	6.55	0.79	629.6
IS_17_BC	11/18/2021 9:31 AM	Cloudy, cool	11.06	9.9	89.9	20.4	0.028	6.38	3.31	693.2
IS_15_SFAR	11/18/2021 10:09 AM	Cloudy, cool	7.11	11.46	94.7	46.3	0.07	6.78	0.66	715.4
IS_16_SFAR	11/18/2021 10:23 AM	Overcast, cool	8.04	10.96	92.6	35.5	0.053	6.57	0.6	715.7
IS_11_SFSC	11/18/2021 11:30 AM	Overcast, cool	3.6	11.52	87	12.2	0.021	6.83	0.3	650.6
IS_12_SC	11/18/2021 11:56 AM	Overcast, cool	4.82	10.27	80.1	11.1	0.018	6.43	0.46	654.5
IS_13_SC	11/18/2021 12:46 PM	Overcast, cool	7.59	10.87	90.8	14.1	0.021	6.65	0.3	687.6
IS_14_SC	11/18/2021 1:21 PM	Overcast, cool	8.11	11.03	93.4	19.6	0.029	7.23	0.23	691.4
IS_19_SFAR	11/19/2021 8:46 AM	Cloudy, cool	9.38	10.35	90.4	43	0.061	7.32	1.32	721.3
IS_18_SFAR	11/19/2021 9:41 AM	Cloudy, cool	10.01	10.8	95.7	47.9	0.067	7.54	0.67	738.8

RESERVOIR R_IS_1_LL

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/25/2021 11:25 AM	Eric Sommerauer	Clear, calm	41.1	32.3

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	11.91	8.9	82.4	6.6	0.009	6.13	0.1	605
1	11.91	8.89	82.3	6.6	0.009	5.94	0.1	605
2	11.88	8.89	82.2	6.6	0.009	5.98	0.08	605
3	11.88	8.88	82.2	6.6	0.009	5.98	0.08	605
4	11.88	8.87	82.1	6.6	0.009	5.97	0.08	605
5	11.78	8.87	82	6.6	0.009	5.98	0.08	605
6	11.79	8.87	81.9	6.6	0.009	5.93	0.09	605
7	11.72	8.87	81.8	6.6	0.009	5.95	0.12	605
8	11.32	8.93	81.8	6.5	0.009	5.9	0.1	605
9	11.12	8.93	81.2	6.5	0.009	5.84	0.07	605
10	10.92	8.97	81.2	6.4	0.009	5.74	0.09	605
11	10.7	9.05	81.5	6.4	0.009	5.72	0.11	605
12	10.49	9.1	81.6	6.4	0.009	5.67	0.1	605
13	10.4	9.12	81.6	6.4	0.009	5.68	0.11	605
14	9.94	9.21	81.5	6.3	0.009	5.59	3.42	605

RESERVOIR R_IS_2_LL

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/25/2021 12:19 PM	Eric Sommerauer	Clear, windy	61.5	39.9

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
1	11.28	9.05	82.6	6.5	0.009	6.51	0.06	605
2	11.24	9.04	82.4	6.5	0.009	6.52	0.08	605
3	11.24	9.03	82.4	6.5	0.009	6.52	0.09	605
4	11.22	9.03	82.3	6.5	0.009	6.5	0.09	605
5	11.23	9.02	82.2	6.5	0.009	6.45	0.07	605
6	11.18	9.02	82.1	6.5	0.009	6.47	0.08	605
7	11.17	9.01	82	6.5	0.009	6.34	0.05	605
8	11.09	9.01	81.9	6.5	0.009	6.36	0.08	605
9	11.09	9	81.7	6.5	0.009	6.36	0.08	605
10	11.06	9	81.7	6.5	0.009	6.32	0.08	605
11	11.01	8.99	81.6	6.5	0.009	6.31	0.09	605
12	9.92	9.18	81.5	6.3	0.009	6.23	0.09	605
13	9.71	9.26	81.5	6.3	0.009	6.18	0.1	605
14	9.56	9.29	81.4	6.2	0.009	6.08	0.12	605
15	9.54	9.28	81.3	6.2	0.009	5.91	0.1	605
16	9.37	9.28	80.9	6.2	0.009	5.7	0.14	605
17	9.21	9.29	80.8	6.2	0.009	5.64	0.11	605
18	9.23	9.29	80.9	6.2	0.009	5.62	0.12	605
19	9.09	9.28	80.5	6.2	0.009	5.59	0.14	605
20	9.09	9.28	80.4	6.2	0.009	5.57	1.39	605

RESERVOIR R_IS_3_LL

Site Type: Reservoir
Instrument: YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/25/2021 12:58 PM	Eric Sommerauer	Cloudy, windy	48.1	29.1

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
1	10.82	9.09	82.1	6.4	0.009	6.68	0.06	605
2	10.78	9.09	82	6.4	0.009	6.67	0.08	605
3	10.77	9.09	82	6.4	0.009	6.58	0.1	605
4	10.77	9.08	81.9	6.4	0.009	6.61	0.08	605
5	10.7	9.08	81.7	6.4	0.009	6.59	0.09	605
6	10.66	9.08	81.7	6.4	0.009	6.55	0.08	605
7	10.66	9.07	81.6	6.4	0.009	6.56	0.09	605
8	10.62	9.07	81.5	6.4	0.009	6.57	0.11	605
9	10.57	9.06	81.2	6.4	0.009	6.55	0.12	605
10	10.22	9.14	81.4	6.3	0.009	6.51	0.12	605
11	10.14	9.15	81.4	6.3	0.009	6.44	0.12	605
12	10.11	9.15	81.3	6.3	0.009	6.36	0.11	605
13	9.95	9.11	80.7	6.3	0.009	6.33	0.14	605
14	9.82	9.15	80.7	6.3	0.009	6.32	0.13	605
15	9.78	9.13	80.2	6.3	0.009	6.11	259.62	605

RESERVOIR R_IS_4_GC

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/26/2021 3:10 PM	Eric Sommerauer	Cloudy, calm	25.1	16.5

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	11.91	8.9	82.4	6.6	0.009	6.13	0.1	605
1	11.91	8.89	82.3	6.6	0.009	5.94	0.1	605
2	11.88	8.89	82.2	6.6	0.009	5.98	0.08	605
3	11.88	8.88	82.2	6.6	0.009	5.98	0.08	605
4	11.88	8.87	82.1	6.6	0.009	5.97	0.08	605
5	11.78	8.87	82	6.6	0.009	5.98	0.08	605
6	11.79	8.87	81.9	6.6	0.009	5.93	0.09	605
7	11.72	8.87	81.8	6.6	0.009	5.95	0.12	605
8	11.32	8.93	81.8	6.5	0.009	5.9	0.1	605
9	11.12	8.93	81.2	6.5	0.009	5.84	0.07	605
10	10.92	8.97	81.2	6.4	0.009	5.74	0.09	605
11	10.7	9.05	81.5	6.4	0.009	5.72	0.11	605
12	10.49	9.1	81.6	6.4	0.009	5.67	0.1	605
13	10.4	9.12	81.6	6.4	0.009	5.68	0.11	605
14	9.94	9.21	81.5	6.3	0.009	5.59	3.42	605

RESERVOIR R_IS_5_UVR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/19/2021 1:17 PM	Eric Sommerauer	Clear, windy	37.2	14.2

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	17.31	8.66	90.2	12	0.014	7.07	0.67	636.5
1	17.3	8.66	90.2	12	0.014	7.08	0.7	636.6
2	17.26	8.66	90.2	12	0.014	7.05	0.72	636.7
3	17.26	8.66	90.1	12	0.014	7.05	0.69	636.7
4	17.22	8.66	89.9	12	0.014	7.04	0.68	636.5
5	17.13	8.66	89.8	11.9	0.014	7.04	0.77	636.7
6	17.12	8.65	89.7	11.9	0.014	7.01	0.54	636.6
7	17.05	8.64	89.3	11.9	0.014	7	0.45	636.7
8	15.8	8.69	87.9	12	0.015	6.95	0.5	636.6
9	14.23	8.83	86.1	11.1	0.014	6.84	0.42	636.5
10	12.66	8.97	84.6	9.7	0.013	6.75	0.31	636.6
11	11.77	9.05	84	9.2	0.012	6.62	0.42	636.5

RESERVOIR R_IS_6_UVR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/19/2021 1:56 PM	Eric Sommerauer	Clear, windy	115.0	17.6

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	16.94	8.66	89.4	11.7	0.014	6.99	0.57	636.5
1	16.93	8.65	89.4	11.7	0.014	6.97	0.53	636.5
2	16.91	8.65	89.3	11.7	0.014	6.99	0.54	636.6
3	16.87	8.65	89.2	11.6	0.014	7.02	0.53	636.6
4	16.87	8.64	89.2	11.6	0.014	7.01	0.51	636.8
5	16.75	8.66	89.2	11.6	0.014	7.01	0.54	636.5
6	13.86	9.60	92.8	10.5	0.013	6.97	0.42	636.6
7	13.70	9.64	93.0	10.4	0.013	6.95	0.42	636.7
8	13.03	9.72	92.3	10.1	0.013	6.89	0.38	636.7
9	11.92	9.78	90.6	9.9	0.013	6.84	0.40	636.7
10	10.96	9.85	89.3	9.7	0.013	6.77	0.41	636.6
11	10.86	9.84	89.0	9.7	0.013	6.71	0.40	636.7
12	10.32	9.83	87.8	9.6	0.013	6.70	0.37	636.7
13	9.70	9.83	86.7	9.5	0.013	6.68	0.36	636.8
14	9.15	9.77	84.6	9.4	0.014	6.64	0.35	636.7
15	8.71	9.72	83.5	9.3	0.014	6.56	0.34	636.6
16	8.36	9.67	82.4	9.3	0.014	6.51	0.34	636.6
17	7.78	9.68	81.3	9.2	0.014	6.51	0.26	636.6
18	7.68	9.65	80.9	9.2	0.014	6.46	0.24	636.7
19	7.54	9.65	80.4	9.2	0.014	6.42	0.23	636.6
20	7.17	9.63	79.6	9.1	0.014	6.44	0.23	636.6

RESERVOIR R_IS_6_UVR

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
21	7.09	9.61	79.4	9.1	0.014	6.37	0.22	636.6
22	7.07	9.60	79.2	9.1	0.014	6.39	0.21	636.7
23	6.88	9.55	78.4	9.1	0.014	6.25	0.23	636.7
24	6.59	9.48	77.4	9.1	0.014	6.25	0.21	636.5
25	6.56	9.46	77.0	9.1	0.014	6.20	0.15	636.8
26	6.48	9.44	76.7	9.1	0.014	6.13	0.19	636.6
27	6.47	9.43	76.7	9.1	0.014	6.08	0.20	636.6
28	6.46	9.42	76.5	9.1	0.014	6.10	0.17	636.5

RESERVOIR R_IS_7_UVR

Site Type: Reservoir
Instrument: YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/19/2021 12:11 PM	Eric Sommerauer	Clear, windy	124.0	19.4

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	16.82	8.69	89.6	11.6	0.014	6.81	0.49	636.4
1	16.81	8.69	89.6	11.6	0.014	6.86	0.44	636.2
2	16.81	8.7	89.6	11.6	0.014	6.82	0.46	636.4
3	16.79	8.7	89.6	11.6	0.014	6.84	0.46	636.4
4	16.79	8.69	89.5	11.6	0.014	6.89	0.42	636.4
5	16.77	8.69	89.5	11.6	0.014	6.76	0.44	636.5
6	16.74	8.69	89.4	11.6	0.014	6.79	0.46	636.5
7	16.61	8.72	89.6	11.5	0.014	6.81	0.47	636.5
8	13.7	9.47	91.9	10.4	0.013	6.71	0.36	636.6
9	12.42	9.65	91	9.7	0.013	6.63	0.32	636.5
10	11.6	9.74	89.6	9.5	0.013	6.56	0.37	636.5
11	11.27	9.69	88.3	9.3	0.013	6.49	0.33	636.5
12	10.54	9.72	87.7	9.2	0.013	6.43	0.31	636.5
13	10.39	9.69	86.6	9.1	0.013	6.39	0.31	636.5
14	10.37	9.68	86.5	9.2	0.013	6.4	0.34	636.5
15	9.72	9.63	84.7	9	0.013	6.36	0.3	636.6
16	9.62	9.61	84.3	9	0.013	6.33	0.32	636.5
17	9.04	9.54	82.3	8.9	0.013	6.27	0.29	636.5
18	8.45	9.5	81	8.9	0.013	6.27	0.25	636.5
19	7.93	9.44	79.5	8.9	0.013	6.23	0.24	636.5
20	7.74	9.42	79.2	8.9	0.013	6.24	0.24	636.5

RESERVOIR R_IS_7_UVR

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
21	7.74	9.4	78.6	8.9	0.013	6.2	0.22	636.5
22	7.37	9.36	77.7	8.9	0.013	6.21	0.22	636.5
23	7.13	9.36	77.3	8.9	0.014	6.17	0.24	636.5
24	7.07	9.35	77.1	8.9	0.014	6.2	0.21	636.6
25	6.98	9.35	77	8.9	0.014	6.14	0.24	636.5
26	6.99	9.34	76.9	8.9	0.014	6.16	0.24	636.5
27	6.97	9.33	76.8	8.9	0.014	6.14	0.22	636.4
28	6.95	9.33	76.7	8.9	0.014	6.14	0.22	636.5
29	6.99	9.33	76.8	8.9	0.014	6.09	0.22	636.5
30	6.92	9.32	76.6	8.9	0.014	5.95	0.21	636.5
31	6.85	9.33	76.6	8.9	0.014	5.91	0.27	636.5
32	6.91	9.31	76.3	9	0.014	5.95	0.22	636.5
33	6.67	9.32	76.4	9	0.014	5.95	0.22	636.6
34	6.7	9.31	76.1	9	0.014	5.98	0.24	636.5
35	6.64	9.32	76.1	9	0.014	5.98	0.19	636.5
36	6.67	9.31	76	9	0.014	5.99	0.23	636.5

RESERVOIR R_IS_8_UVR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/19/2021 10:13 AM	Eric Sommerauer	Clear, breezy	243.0	27.7

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	16.36	8.7	88.9	11.6	0.014	6.82	0.39	637
1	16.29	8.7	88.8	11.5	0.014	6.91	0.36	636.9
2	16.08	8.71	88.5	11.5	0.014	6.97	0.38	636.8
3	16.01	8.72	88.4	11.5	0.014	6.98	0.36	636.8
4	15.94	8.72	88.3	11.4	0.014	6.96	0.34	636.8
5	15.84	8.72	88.2	11.4	0.014	6.97	0.39	636.7
6	15.79	8.7	87.8	11.4	0.014	6.97	0.35	636.8
7	15.72	8.67	87.9	11.3	0.014	6.96	0.38	636.9
8	12.94	9.86	93	10.2	0.013	6.93	0.41	637
9	11.45	10.12	92.7	10.1	0.014	6.56	0.43	636.9
10	11.02	10.11	91.3	10	0.014	6.46	0.37	637.1
11	9.56	10.11	88.6	9.7	0.014	6.28	0.36	637.1
12	9.01	10.11	87.4	9.5	0.014	6.22	0.33	637
13	8.61	10.08	86.8	9.4	0.014	6.15	0.29	637
14	8.02	10.02	84.6	9.3	0.014	6.06	0.29	637
15	7.27	9.92	82.3	9.2	0.014	6	0.26	637
16	7.11	9.88	81.6	9.2	0.014	5.92	0.24	637
17	6.97	9.85	81.1	9.2	0.014	5.89	0.21	637
18	6.91	9.82	80.7	9.2	0.014	5.89	0.2	637
19	6.84	9.81	80.4	9.1	0.014	5.88	0.23	637
20	6.76	9.78	80.1	9.1	0.014	5.88	0.23	637

RESERVOIR R_IS_8_UVR

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
21	6.64	9.76	79.6	9.1	0.014	5.88	0.17	636.9
22	6.59	9.76	79.6	9.1	0.014	5.87	0.17	636.8
23	6.58	9.78	79.7	9.1	0.014	5.91	0.17	637
24	6.54	9.77	79.6	9.1	0.014	5.93	0.17	637
25	6.53	9.76	79.4	9.1	0.014	5.92	0.16	637
26	6.51	9.73	79.2	9.1	0.014	5.92	0.17	637
27	6.49	9.72	79.1	9.1	0.014	5.92	0.17	636.7
28	6.45	9.71	78.8	9.1	0.014	5.91	0.14	636.8
29	6.39	9.74	79	9	0.014	5.92	0.16	637
30	6.34	9.74	78.9	9	0.014	5.91	0.14	637
31	6.3	9.71	78.6	9	0.014	5.9	0.15	636.9
32	6.29	9.67	78.2	9	0.014	5.92	0.14	637
33	6.26	9.66	78.1	9	0.014	5.92	0.16	636.9
34	6.25	9.66	78	9	0.014	5.9	0.15	637
35	6.23	9.65	78	9	0.014	5.92	0.18	637
36	6.22	9.65	77.9	9	0.014	5.91	0.17	637
37	6.21	9.64	77.9	9	0.014	5.93	0.12	636.8
38	6.19	9.64	77.8	9	0.014	5.92	0.15	636.9
39	6.18	9.65	77.8	9	0.014	5.93	0.14	637
40	6.17	9.65	77.8	9	0.014	5.93	0.18	637
41	6.15	9.63	77.6	9	0.014	5.92	0.16	637
42	6.15	9.61	77.5	9	0.014	5.94	0.14	637
43	6.14	9.61	77.4	9	0.014	5.94	0.13	637
44	6.14	9.6	77.4	9	0.014	5.94	0.15	636.8
45	6.13	9.5	77.3	9	0.014	5.93	0.2	637
46	6.12	9.58	77.2	9	0.014	5.94	0.18	637
47	6.1	9.57	77.1	9	0.014	5.93	0.13	637
48	6.08	9.55	76.8	9	0.014	5.93	0.14	637
49	6.07	9.54	76.8	9	0.014	5.92	0.16	637

RESERVOIR R_IS_8_UVR

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
50	6.07	9.53	76.7	9	0.014	5.92	0.15	637
51	6.06	9.52	76.6	9	0.014	5.91	0.14	637
52	6.04	9.5	76.4	9	0.014	5.92	0.15	636.9
53	6.04	9.49	76.3	9	0.014	5.92	0.15	636.8
54	6.04	9.48	76.3	9	0.014	5.92	0.17	636.8
55	6.04	9.47	76.2	9	0.014	5.94	0.14	636.8
56	6.03	9.47	76.2	9	0.014	5.93	0.13	636.8
57	6.03	9.47	76.1	9	0.014	5.93	0.18	636.8
58	6.02	9.46	76.1	9	0.014	5.94	0.16	636.8
59	6.02	9.46	76	9	0.014	5.93	0.16	636.8
60	6.02	9.45	75.9	9	0.014	5.94	0.15	636.8
61	6.01	9.44	75.8	9	0.014	5.94	0.17	636.8
62	6.01	9.43	75.8	9	0.014	5.93	0.17	636.8
63	5.99	9.42	75.7	9	0.014	5.94	0.16	636.8
64	5.99	9.43	75.7	9	0.014	5.93	0.19	636.8
65	5.99	9.42	75.7	9	0.014	5.94	0.17	363.8
66	5.99	9.42	75.7	9	0.014	5.93	0.17	636.8
67	5.99	9.42	75.6	9	0.014	5.93	0.17	636.7
68	5.99	9.4	75.4	9	0.014	5.93	1.19	636.7

RESERVOIR R_IS_9_IHR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/18/2021 1:06 PM	Eric Sommerauer	Clear, breezy	54.5	23.7

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	16.72	8.58	88.3	9.3	0.011	7.04	0.24	627.2
1	16.68	8.59	88.2	9.3	0.011	7.04	0.31	627.2
2	16.58	8.61	88.2	9.3	0.011	7.04	0.25	627.2
3	15.81	8.71	87.9	9.1	0.011	7.03	0.23	627.2
4	15.45	8.81	88.2	8.9	0.011	7.03	0.29	627.2
5	14.5	9.08	89.1	8.5	0.011	7.01	0.2	627.2
6	14.2	9.16	89.3	8.3	0.01	6.99	0.27	627.2
7	13.35	9.28	88.6	7.9	0.01	6.96	0.26	627.2
8	13.16	9.2	87.6	7.7	0.01	6.91	0.28	627.2
9	12.44	9.17	86	7.4	0.01	6.82	0.25	627.3
10	11.84	9.49	87.7	74	0.01	6.8	0.25	627.4
11	11.21	9.65	87.9	7.4	0.01	6.8	0.27	627.3
12	10.74	9.51	85.6	7.2	0.01	6.73	0.22	627.3
13	10.15	9.44	83.9	7.1	0.01	6.64	0.26	627.3
14	9.66	9.54	83.8	7.1	0.01	6.6	0.22	627.3
15	8.95	9.59	82.9	7	0.01	6.58	0.25	627.4
16	8.36	9.46	80.5	7.1	0.01	6.5	0.25	627.3
17	7.71	9.25	77.7	7.2	0.011	6.4	20.42	627.2

RESERVOIR R_IS_10_IHR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/18/2021 1:52 PM	Eric Sommerauer	Clear, hot	30.2	27.6

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	16.12	8.64	87.7	9.3	0.011	7.06	0.25	627.1
1	16.08	8.63	87.6	9.3	0.011	7.02	0.23	627.1
2	16.03	8.63	87.5	9.3	0.011	7.02	0.3	627.1
3	16.03	8.62	87.4	9.3	0.011	7.03	0.24	627.1
4	15.72	8.63	86.9	9.2	0.011	7.03	0.24	627.2
5	15.45	8.67	86.9	9.2	0.011	7.02	0.24	627.1
6	15.2	8.77	87.3	9	0.011	7.02	0.26	627.1
7	13.16	9.34	89	8.1	0.01	6.95	0.23	627.1
8	12.22	9.62	89.7	7.8	0.01	6.88	0.21	627.1
9	11.5	9.76	89.6	7.6	0.01	6.87	0.25	627.2
10	10.22	10.02	89.5	7.4	0.01	6.85	3.64	627.1

RESERVOIR R_IS_11_IHR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/18/2021 11:33 AM	Eric Sommerauer	Clear warm	90.0	32.1

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	15.79	8.63	87.1	9.3	0.011	6.55	0.24	627.4
1	15.32	8.66	86.7	9.2	0.011	6.5	0.22	627.4
2	15.11	8.69	86.4	9.1	0.011	6.49	0.32	627.5
3	15.1	8.69	86.3	9.1	0.011	6.5	0.3	627.6
4	15.08	8.67	86.2	9.1	0.011	6.51	0.23	627.5
5	15.06	8.66	86	9.1	0.011	6.48	0.3	627.5
6	15.02	8.66	86	9.1	0.011	6.47	0.3	627.6
7	12.6	9.74	91.7	8	0.011	6.11	0.26	627.6
8	11.74	10.01	92.4	8	0.011	6.02	0.25	627.6
9	10.8	10.17	92	7.8	0.011	6.02	0.26	627.5
10	9.62	10.37	91.1	7.6	0.011	6.03	0.26	627.5
11	8.61	10.43	89.7	7.5	0.011	5.93	0.26	627.4
12	8.1	10.39	88	7.4	0.011	5.88	0.23	627.4
13	7.59	10.2	85.1	7.4	0.011	5.8	0.27	627.5
14	7.2	10.01	82.8	7.4	0.011	5.72	0.26	627.5
15	7.07	9.86	81.4	7.4	0.011	5.66	0.23	627.5
16	7.02	9.83	80.9	7.4	0.011	5.62	0.23	627.5
17	6.96	9.73	80	7.4	0.011	5.6	0.25	627.4
18	6.95	9.69	79.7	7.4	0.011	5.59	0.22	627.4
19	6.93	9.68	79.6	7.4	0.011	5.59	0.22	627.4
20	6.91	9.67	79.4	7.4	0.011	5.59	0.24	627.5

RESERVOIR R_IS_11_IHR

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
21	6.88	9.6	78.9	7.4	0.011	5.55	0.23	627.4
22	6.85	9.57	78.5	7.4	0.011	5.58	0.22	627.4
23	6.84	9.55	78.3	7.4	0.011	5.59	0.24	627.4
24	6.82	9.51	77.9	7.4	0.011	5.58	0.26	627.4
25	6.81	9.45	77.6	7.4	0.011	5.59	0.23	627.4
26	6.8	9.43	77.3	7.4	0.011	5.58	0.22	627.4
27	6.78	9.39	76.9	7.4	0.011	5.58	0.23	627.4
28	6.78	9.35	76.6	7.4	0.011	5.58	0.24	627.4
29	6.77	9.31	76.2	7.4	0.011	5.59	0.26	627.3
30	6.76	9.31	76.2	7.4	0.011	5.59	0.25	627.3
31	6.75	9.29	76	7.4	0.011	5.6	0.24	627.4
32	6.74	9.27	75.8	7.4	0.011	5.59	0.24	627.4
33	6.72	9.21	75.4	7.4	0.011	5.59	0.27	627.3
34	6.72	9.18	627.3	7.4	0.011	5.58	0.36	627.4

RESERVOIR R_IS_12_JR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/26/2021 12:44 PM	Eric Sommerauer	Clear, calm	41.4	15.4

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	14.65	9.21	90.6	11.6	0.015	7.03	0.46	650.3
1	13.7	9.29	89.5	11.4	0.015	7	0.4	650.6
2	13.57	9.27	89.1	11.3	0.015	6.94	0.31	650.4
3	13.51	9.3	89.3	11.3	0.015	6.95	0.35	650.5
4	13.18	9.36	89.2	11.3	0.015	6.94	0.28	650.4
5	12.32	9.33	87.1	11.2	0.015	6.82	0.3	650.5
6	11.79	9.3	85.7	11.1	0.015	6.72	0.31	650.5
7	11.39	9.35	85.7	10.9	0.015	6.63	0.32	650.5
8	11.07	9.25	84	11	0.015	6.52	0.42	650.5
9	10.96	9.22	83.6	11	0.015	6.33	0.37	650.5
10	10.81	9.32	84.1	10.8	0.015	6.24	0.37	650.5
11	10.55	9.41	84.3	10.7	0.015	6.04	0.33	650.6
12	10.28	9.41	83.9	10.7	0.015	5.97	0.37	650.5
13	10.15	8.1	69.2	13.8	0.019	5.76	313.32	650.5

RESERVOIR R_IS_13_CR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/26/2021 10:51 AM	Eric Sommerauer	Clear, calm	19.7	19.7

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	13.28	9.9	94.6	12.5	0.016	6.82	0.28	686.9
1	13.03	9.93	94.4	12.4	0.016	6.85	0.3	686.9
2	12.63	9.96	93.7	12.2	0.016	6.78	0.32	686.9
3	12.42	10.01	93.8	12	0.016	6.68	0.32	686.9
4	12.12	10.03	93.2	12	0.016	6.63	0.32	686.9
5	10.99	10.22	92.8	11.4	0.016	6.55	0.29	686.9
6	10.92	10.24	92.5	11.4	0.016	6.45	0.41	686.9

RESERVOIR R_IS_14_SC

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	***Recorded By***	***Weather***	***Water Depth (ft.)***	***Secchi Depth (ft.)***
5/20/2021 1:20 PM	Eric Sommerauer	Clear, windy	29.1	11.2

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	18.42	9.64	102.7	27.8	0.032	7.47	0.51	711.2
1	18.43	9.64	102.8	27.8	0.032	7.49	0.55	711.2
2	18.41	9.63	102.6	27.8	0.032	7.56	0.54	711.2
3	18.34	9.61	102.2	27.7	0.032	7.55	0.5	711.2
4	16.07	9.42	95	25.5	0.031	7.3	0.52	711.2
5	15.08	9.34	92.7	24	0.03	7.08	0.59	711.2
6	14.71	9.4	92.7	23.6	0.029	7.11	0.51	711.2
7	14.45	9.39	92	23.3	0.029	7.04	0.64	711.2
8	14.42	9.38	91.8	23.2	0.029	7.02	0.8	711.2

RESERVOIR R_IS_15_SC

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
5/20/2021 12:10 PM	Eric Sommerauer	Clear, windy	98.0	12.8

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0.1	17.97	9.59	101.3	27.3	0.031	7.43	0.37	711.6
1	17.98	9.59	101.2	27.3	0.031	7.46	0.34	711.7
2	17.97	9.57	101	27.3	0.032	7.49	0.36	711.7
3	17.84	9.59	101	27.2	0.031	7.53	0.39	711.7
4	17.63	9.6	100.6	27	0.031	7.54	0.34	711.6
5	16.38	9.48	97	26.1	0.031	7.25	0.4	711.6
6	16	9.39	95.1	25.3	0.031	7.12	0.4	711.7
7	15.89	9.3	93.9	25.8	0.031	7.04	0.43	711.5
8	15.72	9.21	92.6	25.6	0.031	7.03	0.45	711.7
9	15.64	9.18	92.2	25.5	0.031	7	0.44	711.7
10	15.47	9.14	91.6	25.3	0.031	6.99	0.46	711.7
11	15.39	9.14	91.4	25.3	0.031	6.97	0.38	711.7
12	15.32	9.08	90.6	24.5	0.03	6.91	0.37	711.7
13	15.25	9.03	90	24.2	0.03	6.92	0.43	711.7
14	15.08	8.95	88.9	23.7	0.029	6.9	0.38	711.6
15	15.03	8.92	88.5	23.5	0.029	6.88	0.34	711.7
16	14.95	8.91	88.3	23.4	0.029	6.88	0.34	711.7
17	14.85	8.89	87.9	23.3	0.029	6.87	0.36	711.7
18	14.81	8.87	87.6	23.2	0.029	6.84	0.32	711.7
19	14.78	8.89	87.8	23.2	0.029	6.8	0.48	711.7
20	14.71	8.91	87.8	23	0.029	6.84	0.41	711.7

RESERVOIR R_IS_15_SC

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
21	14.68	8.92	87.8	23.2	0.029	6.84	0.47	711.7
22	14.61	8.92	87.7	23.2	0.029	6.82	0.42	711.7
23	14.61	8.93	87.8	23.2	0.029	6.84	0.43	711.7
24	14.57	8.91	87.4	23.3	0.029	6.82	0.48	711.7
25	14.53	8.87	87.1	23.3	0.029	6.79	0.5	711.7
26	14.48	8.86	86.9	23.3	0.029	6.81	0.46	711.7
27	14.48	8.85	86.7	23.3	0.029	6.73	0.49	711.7
28	14.41	8.37	81.3	25.1	0.031	6.65	127.5	711.7

RESERVOIR R_IS_1_LL

Site Type: Reservoir
Instrument: YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/19/2021 10:55 AM	CTB	Clear, cool	55.3	26.5

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	11.74	8.21	75.7	7.6	0.01	6.37	0.17	602.9
1	11.73	8.2	75.6	7.6	0.01	6.31	0.17	602.9
2	11.71	8.19	75.5	7.6	0.01	6.26	0.23	602.9
3	11.66	8.19	75.4	7.6	0.01	6.24	0.22	602.9
4	11.62	8.19	75.3	7.5	0.01	6.21	0.25	602.9
5	11.62	8.19	75.3	7.6	0.01	6.18	0.26	602.9
6	11.61	8.18	75.3	7.6	0.01	6.15	0.24	602.9
7	11.61	8.18	75.2	7.6	0.01	6.09	0.22	602.9
8	11.61	8.18	75.2	7.5	0.01	6.1	0.24	602.9
9	11.58	8.17	75.1	7.5	0.01	6.11	0.21	602.9
10	11.58	8.17	75.1	7.5	0.01	6.09	0.2	602.9
11	11.54	8.16	74.9	7.5	0.01	6.09	0.25	602.9
12	11.57	8.17	75	7.5	0.01	6.08	0.22	602.9
13	11.53	8.14	74.7	7.5	0.01	6.09	0.24	602.9
14	11.53	8.13	74.6	7.5	0.01	6.05	0.21	602.9
15	11.52	8.12	74.6	7.5	0.01	6.04	0.24	602.9
16	11.52	8.12	74.5	7.5	0.01	6.04	0.23	602.9

RESERVOIR R_IS_2_LL

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/19/2021 11:57 AM	Eric Sommerauer	Clear, cool	45.9	26.5

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	11.87	8.12	75.1	7.6	0.01	6.41	0.21	602.7
1	11.87	8.12	75.1	7.6	0.01	6.57	0.22	602.7
2	11.84	8.12	75	7.6	0.01	6.59	0.2	602.7
3	11.85	8.11	75	7.6	0.01	6.58	0.2	602.7
4	11.84	8.11	75	7.76	0.01	6.57	0.2	602.7
5	11.81	8.11	75	7.6	0.01	6.68	0.21	602.7
6	11.8	8.11	74.9	7.6	0.01	6.68	0.21	602.7
7	11.76	8.12	74.9	7.6	0.01	6.72	0.22	602.7
8	11.75	8.12	74.9	7.6	0.01	6.66	0.16	602.7
9	11.74	8.12	74.9	7.5	0.01	6.68	0.23	602.7
10	11.74	8.12	74.8	7.6	0.01	6.73	0.22	602.7
11	11.73	8.11	74.8	7.5	0.01	6.69	0.18	602.7
12	11.7	8.12	74.8	7.5	0.01	6.66	0.23	602.7
13	11.7	8.12	74.8	7.5	0.01	6.62	0.19	602.7

RESERVOIR R_IS_3_LL

Site Type: Reservoir
Instrument: YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/19/2021 12:45 PM	Eric Sommerauer	Clear, cool	46.5	25.6

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	11.79	8.19	75.6	7.6	0.01	6.8	0.2	602.4
1	11.78	8.19	75.6	7.6	0.01	6.77	0.22	602.4
2	11.76	8.19	75.5	7.5	0.01	6.72	0.21	602.4
3	11.74	8.18	75.4	7.5	0.01	6.72	0.21	602.4
4	11.59	8.17	75.1	7.5	0.01	6.73	0.23	602.4
5	11.58	8.17	75	7.5	0.01	6.68	0.23	602.4
6	11.55	8.16	75	7.5	0.01	6.72	0.18	602.4
7	11.54	8.16	74.9	7.5	0.01	6.7	0.22	602.4
8	11.54	8.16	74.9	7.5	0.01	6.69	0.23	602.4
9	11.52	8.16	74.9	7.5	0.01	6.65	0.18	602.4
10	11.5	8.16	74.8	7.5	0.01	6.69	0.2	602.4
11	11.48	8.16	74.8	7.5	0.01	6.66	0.2	602.4
12	11.46	8.16	74.8	7.5	0.01	6.65	0.25	602.4
13	11.42	8.16	74.7	7.5	0.01	6.64	0.2	602.4

RESERVOIR R_IS_4_GC

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/22/2021 12:52 PM	Eric Sommerauer	Rain	23.3	23.3

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	11.27	9.06	82.7	9.5	0.013	7.04	0.05	629.2
1	11.32	8.99	82.2	9.5	0.013	6.86	0.07	629.2
2	11.31	8.97	82	9.5	0.013	6.75	0.02	629.2
3	11.3	8.96	81.8	9.5	0.013	6.65	0.02	629.2
4	11.12	8.94	81.2	9.6	0.013	6.56	0.01	629.2
5	10.71	8.93	80.4	9.8	0.013	6.52	0.06	629.2
6	10.19	8.95	79.6	9.9	0.014	6.46	0.04	629.2

RESERVOIR R_IS_6_UVR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/18/2021 12:10 PM	Eric Sommerauer	Clear, cold	44.9	11.7

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	14.88	8.01	79.2	18.3	0.023	6.71	0.48	639
1	14.89	8	79.1	18.3	0.023	6.74	0.44	639
2	14.83	8	79.1	18.2	0.023	6.77	0.47	639
3	14.81	8	79	18.2	0.023	6.77	0.44	639
4	14.8	8	79	18.2	0.023	6.78	0.5	639
5	14.8	8	79	18.2	0.023	6.78	0.45	639
6	14.79	7.99	78.9	18.2	0.023	6.77	0.47	639
7	14.78	7.98	78.8	18.2	0.023	6.77	0.46	639
8	14.78	7.96	78.6	18.2	0.023	6.76	0.42	639
9	14.78	7.95	78.5	18.2	0.023	6.76	0.46	639
10	14.77	7.95	78.4	18.2	0.023	6.75	0.43	639
11	14.76	7.94	78.4	18.2	0.023	6.73	0.4	639
12	14.76	7.94	78.3	18.2	0.023	6.74	0.4	639.1
13	14.74	7.92	78.1	18.2	0.023	6.74	0.48	639

RESERVOIR R_IS_7_UVR

Site Type: Reservoir
Instrument: YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/18/2021 1:24 PM	Eric Sommerauer	Clear, calm	75	12.2

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	14.99	8	79.3	18.6	0.023	6.73	0.5	639
1	14.93	7.99	79.1	18.6	0.023	6.7	0.53	639
2	14.87	7.99	79	18.5	0.023	6.71	0.55	639
3	14.85	7.99	78.9	18.5	0.023	6.7	0.6	636
4	14.82	7.99	78.9	18.5	0.023	6.72	0.56	639
5	14.8	7.99	78.9	18.5	0.023	6.7	0.59	639
6	14.78	8	78.9	18.5	0.023	6.73	0.58	639
7	14.74	7.98	78.7	18.5	0.023	6.72	0.65	639
8	14.72	7.97	78.5	18.5	0.023	6.71	0.67	639
9	14.72	7.96	78.5	18.5	0.023	6.72	0.66	639
10	14.71	7.96	78.5	18.5	0.023	6.71	0.68	639
11	14.7	7.96	78.5	18.5	0.023	6.72	0.7	639
12	14.68	7.96	78.4	18.5	0.023	6.7	0.62	639
13	14.66	7.95	78.3	18.5	0.023	6.71	0.68	639
14	14.62	7.96	78.3	18.4	0.023	6.71	0.65	639
15	14.62	7.96	78.3	18.4	0.023	6.7	0.69	639
16	14.62	7.97	78.3	18.4	0.023	6.67	0.66	639
17	14.62	7.97	78.4	18.4	0.023	6.7	0.66	639
18	14.62	7.97	78.4	18.4	0.023	6.69	0.69	639
19	14.62	7.97	78.4	18.4	0.023	6.69	0.65	639
20	14.61	7.97	78.4	18.4	0.023	6.7	0.67	639
21	14.61	7.97	78.4	18.4	0.023	6.69	0.76	639

RESERVOIR R_IS_8_UVR

Site Type: Reservoir
Instrument: YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/18/2021 10:26 AM	Emily Applequist	Cloudy, cold - 40s	185	11.5

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	14.76	7.73	76.2	18.2	0.023	6.72	0.25	638.9
1	14.78	7.72	76.2	18.2	0.023	6.73	0.23	638.9
2	14.77	7.72	76.2	18.2	0.023	6.72	0.32	638.9
3	14.77	7.72	76.2	18.2	0.023	6.7	0.3	638.9
4	14.77	7.72	76.2	18.2	0.023	6.7	0.3	638.9
5	14.76	7.71	76.1	18.2	0.023	6.71	0.29	638.9
6	14.76	7.71	76	18.2	0.023	6.7	0.32	639
7	14.76	7.7	76	18.2	0.023	6.69	0.29	638.9
8	14.75	7.7	75.9	18.2	0.023	6.7	0.3	639
9	14.75	7.69	75.9	18.2	0.023	6.66	0.29	638.9
10	14.75	7.69	75.8	18.2	0.023	6.69	0.3	638.9
11	14.75	7.68	75.8	18.2	0.023	6.69	0.3	638.9
12	14.75	7.68	75.8	18.2	0.023	6.66	0.31	638.9
13	14.75	7.68	75.8	18.2	0.023	6.68	0.3	639
14	14.74	7.68	75.7	18.2	0.023	6.66	0.28	639
15	14.74	7.68	75.7	18.2	0.023	6.65	0.37	638.9
16	14.74	7.67	75.6	18.2	0.023	6.65	0.28	638.9
17	14.74	7.67	75.6	18.2	0.023	6.64	0.34	638.9
18	14.73	7.67	75.6	18.2	0.023	6.64	0.31	638.9
19	14.73	7.66	75.6	18.2	0.023	6.62	0.31	639.1
20	14.73	7.66	75.5	18.2	0.023	6.62	0.28	639.1
21	14.72	7.65	75.4	18.2	0.023	6.63	0.31	639

RESERVOIR R_IS_8_UVR

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
22	14.7	7.64	75.2	18.2	0.023	6.63	0.26	639.1
23	14.66	7.6	74.8	18.1	0.023	6.6	0.31	639
24	14.66	7.59	74.7	18.1	0.023	6.58	0.32	639
25	14.58	7.54	74.1	17.9	0.022	6.57	0.33	639.1
26	14.46	7.46	73	17.7	0.022	6.54	0.28	639
27	13.2	6.84	65.1	15.6	0.02	6.32	0.04	639
28	12.06	6.7	62.3	14.7	0.02	6.14	0.03	639
29	11.82	6.75	62.4	14.6	0.019	6.12	0.03	639
30	11.45	6.83	62.7	14.4	0.019	6.11	0.01	639
31	11.1	6.93	63	14.2	0.019	6.08	0.02	639
32	11.01	6.94	62.9	14.1	0.019	6.06	0.04	639
33	10.72	6.89	62	14	0.019	5.96	0.01	639
34	10.52	6.91	62.1	13.9	0.019	5.97	0.05	639.1
35	10.33	6.9	61.6	13.9	0.019	5.99	0.02	639
36	10.23	6.9	61.5	13.9	0.019	5.89	0.01	639.1
37	10.1	6.86	60.8	13.9	0.019	5.88	0.01	639
38	9.99	6.82	60.4	13.9	0.019	5.83	0.01	639.1
39	9.86	6.63	58.5	13.9	0.02	5.65	0.02	639
40	9.72	6.52	56.8	14.1	0.02	5.54	0.12	638.9
41	9.41	6.08	53	14.1	0.02	5.45	0.19	639
42	9.24	5.83	50.7	14.2	0.02	5.33	0.12	639
43	9	5.7	49.3	14.1	0.02	5.27	0.1	639
44	8.85	5.64	48.5	14.1	0.02	5.24	0.1	638.9
45	8.74	5.6	48.1	14.1	0.02	5.23	0.11	639
46	8.45	5.54	47.3	14	0.02	5.23	0.09	639
47	8.26	5.51	46.8	13.9	0.02	5.22	0.07	639.1
48	8.17	5.5	46.6	13.9	0.02	5.21	0.04	639.1
49	7.83	5.54	46.7	13.8	0.02	5.21	0.07	639
50	7.58	5.59	46.8	13.6	0.02	5.2	59.1	639

RESERVOIR R_IS_9_IHR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/20/2021 10:24 AM	Eric Sommerauer	Breezy, overcast	70	20.7

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	13.38	7.98	76.4	10.1	0.013	6.73	0.24	627.8
1	13.39	7.97	76.3	10	0.013	6.6	0.25	627.8
2	13.39	7.97	76.3	10.1	0.013	6.55	0.22	627.8
3	13.38	7.97	76.2	10	0.013	6.52	0.22	627.8
4	13.37	7.96	76.2	10	0.013	6.49	0.2	627.8
5	13.37	7.96	76.2	10	0.013	6.641	0.22	627.8
6	13.36	7.94	76	10	0.013	6.4	0.21	627.8
7	13.35	7.94	75.9	10	0.013	6.4	0.25	627.8
8	13.33	7.92	75.7	10	0.013	6.38	0.23	627.8
9	13.33	7.92	75.7	10	0.013	6.37	0.25	627.8
11	13.32	7.91	75.6	10	0.013	6.35	0.25	627.8
11	13.32	7.9	75.5	10	0.013	6.36	0.25	627.8
12	13.31	7.9	75.5	10	0.013	6.32	0.29	627.8
13	13.31	7.91	75.6	10	0.013	6.34	0.24	627.8
14	13.29	7.9	75.5	10	0.013	6.33	0.25	627.8
15	13.24	7.83	74.7	10	0.013	6.32	0.25	627.8
16	13.04	7.56	71.6	10.1	0.013	6.26	0.26	627.8
17	12.32	6	55.7	10.1	0.013	5.94	0.38	627.8
18	9.73	1.62	14	10.7	0.015	5.48	0.75	627.8
19	9.02	1.01	8.6	11	0.016	5.4	1.26	627.8
20	8.66	0.57	4.9	11.5	0.017	5.4	1.48	627.8

RESERVOIR R_IS_10_IHR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	***Recorded By***	***Weather***	***Water Depth (ft.)***	***Secchi Depth (ft.)***
10/20/2021 9:57 AM	Eric Sommerauer	Overcast, breezy	27.7	24.5

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	13.34	8.04	76.9	10	0.013	6.6	0.19	627.6
1	13.34	8.04	76.8	10	0.013	6.44	0.23	627.6
2	13.35	8.03	76.8	10	0.013	6.35	0.18	627.6
3	13.35	8.03	76.8	10	0.013	6.35	0.22	627.6
4	13.35	8.03	76.8	10	0.013	6.32	0.21	627.6
5	13.34	8.03	76.8	10	0.013	6.25	0.25	627.6
6	13.34	8.03	76.8	10	0.023	6.3	0.22	627.6
7	13.34	8.02	76.7	10	0.013	6.29	0.18	627.6
8	13.33	8.01	76.5	10	0.013	6.29	0.2	627.6
9	13.33	8	76.5	10	0.013	6.32	0.21	627.6

RESERVOIR R_IS_11_IHR

Site Type: Reservoir
Instrument: YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/20/2021 8:52 AM	Eric Sommerauer	Overcast, calm	66	33.9

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	13.2	8.09	77.1	9.9	0.013	6.73	0.28	627.5
1	13.2	8.05	76.7	9.9	0.013	6.54	0.16	627.5
2	13.2	8.04	76.7	9.9	0.013	6.47	0.22	627.5
3	13.2	8.03	76.6	9.9	0.013	6.4	0.23	627.5
4	13.2	8.03	76.6	9.9	0.013	6.35	0.23	627.5
5	13.2	8.03	76.6	9.9	0.013	6.31	0.24	627.5
6	13.2	8.03	76.6	9.9	0.013	6.26	0.2	627.5
7	13.2	8.02	76.5	9.9	0.013	6.19	0.19	627.5
8	13.2	8.02	76.5	9.9	0.013	6.16	0.19	627.5
9	13.2	8.02	76.5	9.9	0.013	6.14	0.25	627.5
10	13.2	8.02	76.5	9.9	0.013	6.13	0.22	627.5
11	13.2	8.01	76.4	9.9	0.013	6.1	0.24	627.5
12	13.2	8.01	76.4	9.9	0.013	6.08	0.22	627.5
13	13.2	8.01	76.4	9.9	0.013	6.07	0.22	627.5
14	13.2	8.01	76.4	9.9	0.013	6.07	0.23	627.5
15	13.2	8	76.3	9.9	0.013	6.05	0.25	627.5
16	13.2	8	76.3	9.9	0.013	6.05	0.24	627.5
17	12.45	7.43	70.2	9.8	0.013	5.93	0.21	627.5
18	9.24	5.23	45.3	8.8	0.013	5.17	0.28	627.5
19	8.82	4.72	40.6	8.7	0.013	4.96	0.48	627.5
20	8.47	4.66	39.8	8.5	0.012	4.93	0.54	627.5
21	8.28	4.5	38.3	8.5	0.013	4.89	0.41	627.5

RESERVOIR R_IS_12_JR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/22/2021 2:50 PM	Eric Sommerauer	Rain	53.9	20.4

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	9.97	9.88	87.5	10.7	0.015	6.08	0.13	629.2
1	9.95	9.89	87.5	10.7	0.015	6.1	0.07	647.6
2	9.89	9.91	87.6	10.8	0.015	6.15	0.07	647.6
3	9.77	9.9	87.2	10.8	0.015	6.13	0.05	647.6
4	9.64	9.89	86.9	10.8	0.015	6.12	0.05	647.6
5	9.59	9.89	86.8	10.8	0.015	6.13	0.06	647.6
6	9.51	9.88	86.5	10.8	0.015	6.14	0.03	647.6
7	9.43	9.87	56.2	10.8	0.015	6.1	0.05	647.6
8	9.31	9.84	85.7	10.8	0.015	6.08	0.06	647.6
9	9.24	9.81	85.3	10.8	0.015	6.12	0.04	647.6
10	9.22	9.8	85.2	10.8	0.015	6.11	0.05	647.6
11	9.07	9.72	84.2	10.7	0.015	6.08	0.07	647.6
12	9.03	9.7	83.9	10.7	0.015	6.01	0.04	647.6
13	8.98	9.66	83.5	10.8	0.816	5.92	0.01	647.6
14	8.94	9.62	83	10.8	0.016	5.85	0.05	647.6
15	8.9	9.58	82.7	10.9	0.016	5.81	0.03	647.6

RESERVOIR R_IS_13_CR

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/22/2021 10:30 AM	Eric Sommerauer	Rainy	25.1	20.6

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	10.11	10.31	91.6	12.5	0.017	6.77	0	715
1	10.13	10.32	91.7	12.4	0.017	6.48	0	715
2	10.05	10.35	91.8	12.3	0.017	6.24	0	715
3	9.95	10.36	91.7	12.3	0.017	6.2	0	715
4	9.78	10.41	91.8	12.1	0.017	6.16	0	715
5	9.64	10.46	91.9	11.9	0.017	6.12	0	715
6	9.51	10.44	91.4	11.7	0.017	6.07	0	715
7	9.47	10.36	90.6	11.6	0.016	6.01	0	715

RESERVOIR R_IS_14_SC

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	***Recorded By***	***Weather***	***Water Depth (ft.)***	***Secchi Depth (ft.)***
10/21/2021 2:47 PM	Eric Sommerauer	Overcast	20.3	20.3

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	14.03	9.38	91	25.5	0.032	6.97	0.11	715.7
1	13.45	9.28	89	25.1	0.032	6.91	0.16	715.7
2	13.38	9.28	88.8	25	0.032	6.85	0.15	715
3	10.96	10.51	95.3	20.5	0.028	6.88	0.27	715
4	9.95	10.81	95.7	18.9	0.027	6.82	0.28	715
5	9.87	10.88	96.1	18.8	0.026	6.78	0.35	715

RESERVOIR R_IS_15_SC

Site Type:	Reservoir
Instrument:	YSI EXO2

Date & Time	*Recorded By*	*Weather*	*Water Depth (ft.)*	*Secchi Depth (ft.)*
10/21/2021 1:37 PM	Eric Sommerauer	Overcast, drizzle	117	20

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
0	13.63	9.29	89.5	25	0.032	6.94	0.12	715.7
1	13.33	9.26	88.5	24.9	0.032	6.89	0.2	715.7
2	13.23	9.24	88.1	24.8	0.032	6.87	0.16	715.7
3	13.19	9.22	87.9	24.8	0.032	6.84	0.2	715.7
4	13.16	9.21	87.7	24.7	0.032	6.81	0.26	715.7
5	13.13	9.19	87.5	24.7	0.032	6.8	0.17	715.7
6	13.13	9.18	87.3	24.7	0.032	6.77	0.22	715.7
7	13.08	9.16	87	24.6	0.032	6.75	0.26	715.7
8	12.86	9.03	85.4	25	0.033	6.72	0.24	715.7
9	12.81	8.97	84.8	25.3	0.033	6.68	0.23	715.7
10	12.68	8.95	84.4	25	0.033	6.66	0.25	715.7
11	12.63	8.93	84	24.7	0.032	6.62	0.26	715.7
12	12.6	8.88	83.5	24.8	0.032	6.57	0.32	715.7
13	12.56	8.85	83.1	25	0.033	6.53	0.3	715.7
14	12.51	8.83	82.8	25	0.033	6.48	0.35	715.7
15	12.46	8.8	82.5	25.1	0.033	6.47	0.42	715.7
16	12.42	8.86	83.1	25.6	0.034	6.44	0.39	715.7
17	12.39	8.96	83.9	26	0.034	6.45	0.37	715.7
18	12.35	9.07	84.9	26.4	0.035	6.46	0.35	715.7
19	12.28	9.18	85.7	26.8	0.035	6.48	0.33	715.7
20	12.27	9.21	86	26.7	0.035	6.49	0.37	715.7

RESERVOIR R_IS_15_SC

Depth (m)	Temperature (°C):	Dissolved Oxygen (mg/L):	Dissolved Oxygen (%):	Conductivity (µS/cm):	Specific Conductance (mS/cm):	pH (s.u.):	Turbidity (NTU):	Mercury (mmHg):
21	12.24	9.25	86.3	26.6	0.035	6.5	0.33	715.7
22	12.23	9.27	86.5	26	0.034	6.48	0.32	715.7
23	12.21	9.31	86.9	25	0.032	6.47	0.35	715.7
24	12.17	9.39	87.5	24.4	0.032	6.49	0.32	715.7
25	12.13	9.46	88	24.1	0.032	6.48	0.28	715.7
26	12.08	9.5	88.4	24	0.032	6.47	0.26	715.7
27	12	9.57	88.9	23.8	0.032	6.46	0.4	715.7
28	11.91	9.63	89.2	23.7	0.032	6.45	0.4	715.7
29	11.84	9.68	89.5	23.5	0.031	6.43	0.47	715.7
30	11.67	9.79	90.2	23.1	0.031	6.42	0.47	715.7
31	11.61	9.83	90.5	23.1	0.031	6.39	0.61	715.7
32	11.55	9.87	90.7	23	0.031	6.36	0.57	715.7
33	11.5	9.89	90.7	23	0.031	6.24	0.7	715.7
34	11.44	9.89	90.6	22.8	0.031	6.22	2.18	715.7

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APPENDIX F
In situ Field Calibration Sheets

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Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: UARP/LB WQ - WINTER 2021

Unit ID: YSI EXO²

Sampling Event Date(s): 2/10/2021 → 2/11/2021

PRE-SAMPLING CALIBRATION

Date and time 2/10/21 0615 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	16.5	1003	1000	
Cond (uS/cm @ 25°C)	1,413	16.8	~	1412	
DO (%) ~94	~94	16.6	100.2	93.8	
DO (mg/L)* ~9.1	~9.1	16.6	~	9.14	Check solubility table*
pH4	pH4	17.0	4.04	4.00	712.6 mm Hg
pH 7	pH 7	17.5	7.12	7.03	
pH 10	pH 10	16.9	10.15	10.10	
Turbidity	0.0	17.2	0.09	0.0	
Turbidity	12.4	17.2	11.41	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 2/10/21 1630 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	18.31	980	N		A	
Cond (uS/cm @ 25°C)	1,413	17.88	1389	N		A	
DO (%)	~94	13.70	94.5	N		A	mm Hg 712.9
*DO (mg/L)	~9.7	13.70	9.79	N		A	Check solubility table*
pH4	pH 4	17.18	3.98	N		A	
pH 7	pH 7	17.92	7.05	N		A	
pH 10	pH 10	18.22	10.00	N		A	
Turbidity	0.0	22.33	-0.02	N		A	
Turbidity	12.4	19.08	12.26	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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/LB WQ WINTER 2021

Unit ID: YSI EXO2

Sampling Event Date(s): 2/10/2021 → 2/11/2021

PRE-SAMPLING CALIBRATION

Date and time 2/10/2021 1705 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	18.37	998	1000	
Cond (uS/cm @ 25°C)	1,413		–		713.3 mm Hg
DO (%)	~94	17.2	93.8	93.8	
DO (mg/L)*	~9.1	17.2	–	9.04	*Check solubility table**
pH4	pH4	18.3	3.97	4.00	
pH 7	pH 7	18.3	7.06	7.03	
pH 10	pH 10	18.2	10.11	10.08	
Turbidity	0.0	21.4	-0.08	0.00	
Turbidity	12.4	20.0	12.38	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 2/11/2021 1530 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	15.87	996	N		A	
Cond (uS/cm @ 25°C)	1,413	16.12	1404	N		A	
DO (%)	~100	13.76	100.2	N		A	760.6 mm Hg
*DO (mg/L)	~10.3	13.76	10.38	N		A	*Check solubility table**
pH4	pH 4	15.21	4.05	N		A	
pH 7	pH 7	15.55	7.13	N		A	
pH 10	pH 10	15.93	10.10	N		A	
Turbidity	0.0	15.71	0.03	N		A	
Turbidity	12.4	15.52	12.36	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD WATER QUALITY 2021 SPRING SURVEY - RIVERINE

Unit ID: YSI EXO2

Sampling Event Date(s): 4/27-29/2021

PRE-SAMPLING CALIBRATION

Date and time 4/27/21 0730 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	16.9	1002	1000	
Cond (uS/cm @ 25°C)	1,413	16.9	–	1414	
DO (%)	~93.5	16.5	87.5	93.6	711.1 mm Hg
DO (mg/L)*	~9.1	16.5	8.54	9.13	*Check solubility table**
pH4	pH4	17.2	4.00	4.00	
pH 7	pH 7	16.7	6.98	7.04	
pH 10	pH 10	17.1	9.86	10.10	
Turbidity	0.0	15.0	-0.35	0.00	
Turbidity	12.4	16.8	10.91	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 4/27/21 1802 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	16.45	993	N		A	
Cond (uS/cm @ 25°C)	1,413	16.49	1385	N		A	
DO (%)	~93.5	18.23	99.3	N		A	
*DO (mg/L)	~8.8	18.29	9.36	N		A	*Check solubility table**
pH4	pH 4	16.71	4.09	N		A	712.5 mm Hg
pH 7	pH 7	16.39	7.17	N		A	
pH 10	pH 10	16.29	10.03	N		A	
Turbidity	0.0	15.15	-0.03	N		A	
Turbidity	12.4	16.17	12.19	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD WATER QUALITY 2021 SPRING SURVEY - RIVERINE

Unit ID: YSI EXO2

Sampling Event Date(s): 4/27 - 29/21

PRE-SAMPLING CALIBRATION

Date and time 4/28/21 0730 Name Eric Sommerauer

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	16.0	1001	1000	
Cond (uS/cm @ 25°C)	1,413	16.2	–	1418	
DO (%)	~94.5	15.3	100.1	94.3	
DO (mg/L)*	~9.5	15.3	–	9.43	*Check solubility table**
pH4	pH4	16.2	4.08	4.00	716.9 mm Hg
pH 7	pH 7	16.4	7.16	7.04	
pH 10	pH 10	16.4	10.04	10.11	
Turbidity	0.0	15.0	-0.01	0.00	
Turbidity	12.4	16.0	12.56	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 4/28/21 1730 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	17.44	995	N		A	
Cond (uS/cm @ 25°C)	1,413						
DO (%)	~94.5	20.05	94.0	N		A	
*DO (mg/L)	~8.5	20.05	8.54	N		A	*Check solubility table**
pH4	pH 4	17.42	3.92	N		A	716.3 mm Hg
pH 7	pH 7	17.08	7.04	N		A	
pH 10	pH 10	16.96	10.15	N		A	
Turbidity	0.0	15.10	0.04	N		A	
Turbidity	12.4	17.19	12.45	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD WQ 2021 SPRING SURVEY - RIVERINE

Unit ID: YSI EXO2

Sampling Event Date(s): 4/27-29/21

PRE-SAMPLING CALIBRATION

Date and time 4/29/21 0630 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	18.45	1001	1000	
Cond (uS/cm @ 25°C)	1,413	19.26	~	14.17	
DO (%)	~94.5	17.9	94.1	94.4	717.5 mm Hg
DO (mg/L)*	~8.9	17.9	~	8.96	Check solubility table*
pH4	pH4	18.5	3.98	4.00	
pH 7	pH 7	19.6	7.17	7.03	
pH 10	pH 10	18.7	10.15	10.08	
Turbidity	0.0	21.2	-0.02	0.00	
Turbidity	12.4	20.7	12.60	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 4/29/21 1500 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	21.86	998	N		A	
Cond (uS/cm @ 25°C)	1,413	22.34	1413	N		A	
DO (%)	~100.5	25.97	100.9	N		A	764.7
*DO (mg/L)	~8.1	25.97	8.19	N		A	Check solubility table*
pH4	pH 4	21.38	4.02	N		A	
pH 7	pH 7	22.62	7.04	N		A	
pH 10	pH 10	24.22	9.97	N		A	
Turbidity	0.0	25.26	-0.08	N		A	
Turbidity	12.4	22.72	12.24	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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 SPRING WQ RESERVOIR SURVEY

Unit ID: YSI EXO 2

Sampling Event Date(s): 5/18/21 → 5/26/21

PRE-SAMPLING CALIBRATION

Date and time 5/18/21 0652 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	19.54	997	1000	
Cond (uS/cm @ 25°C)	1,413	19.83	—	1420	
DO (%)	~100	20.05	101.7	100.2	
DO (mg/L)*	~9.1	20.05	—	9.11	*Check solubility table**
pH4	pH4	20.2	4.15	4.00	
pH 7	pH 7	20.4	7.05	7.02	
pH 10	pH 10	19.5	9.82	10.07	
Turbidity	0.0	20.0	0.04	0.00	
Turbidity	12.4	20.2	12.31	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 5/18/21 1712 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	24.61	995	N		A	
Cond (uS/cm @ 25°C)	1,413	23.89	1403	N		A	
DO (%)	~93	25.58	93.3	N		A	
*DO (mg/L)	~7.7	25.58	7.62	N		A	*Check solubility table**
pH4	pH 4	24.17	3.89	N		A	
pH 7	pH 7	24.60	6.96	N		A	
pH 10	pH 10	25.26	9.97	N		A	
Turbidity	0.0	26.83	0.01	N		A	
Turbidity	12.4	24.81	12.66	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD RESERVOIR WQ- SPRING SURVEY

Unit ID: YSI EXO2

Sampling Event Date(s): 5/18/21 – 5/26/21

PRE-SAMPLING CALIBRATION

Date and time 5/19/21 0630 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	24.05	1003	1000	
Cond (uS/cm @ 25°C)	1,413	24.07	—	1416	
DO (%)	~93	23.8	92.7	93.1	707.3 mm Hg
DO (mg/L)*	~7.8	23.8	—	7.87	Check solubility table*
pH4	pH4	24.4	3.82	4.00	
pH 7	pH 7	24.3	6.99	7.01	
pH 10	pH 10	24.5	10.17	10.01	
Turbidity	0.0	23.3	0.10	0.00	
Turbidity	12.4	24.5	12.56	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 5/19/21 1735 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	23.19	1004	N		A	
Cond (uS/cm @ 25°C)	1,413	22.85	1413	N		A	
DO (%)	~93	20.41	93.3	N		A	705.4 mm Hg
*DO (mg/L)	~8.4	20.41	8.42	N		A	Check solubility table*
pH4	pH 4	22.68	4.03	N		A	
pH 7	pH 7	23.35	6.99	N		A	
pH 10	pH 10	23.94	9.98	N		A	
Turbidity	0.0	23.00	-0.02	N		A	
Turbidity	12.4	23.21	12.33	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD WATER QUALITY RESERVOIR SPRING SURVEY

Unit ID: YSI EXO2

Sampling Event Date(s): 5/18/21 – 5/26/21

PRE-SAMPLING CALIBRATION

Date and time 5/20/21 0600 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	22.67	1006	1000	
Cond (uS/cm @ 25°C)	1,413	22.41	—	1414	
DO (%)	~93	22.16	93.1	93.1	707.5 mm Hg
DO (mg/L)*	~8.1	22.16	—	8.1	*Check solubility table*
pH4	pH4	22.9	4.05	4.00	
pH 7	pH 7	22.9	7.01	7.01	
pH 10	pH 10	23.0	9.95	10.03	
Turbidity	0.0	22.7	-0.01	0.00	
Turbidity	12.4	23.3	12.24	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 5/20/21 1802 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	21.41	1002	N		A	
Cond (uS/cm @ 25°C)	1,413	22.62	1412	N		A	
DO (%)	~100	20.99	99.6	N		A	761.2 mm Hg
*DO (mg/L)	8.9	20.99	8.88	N		A	*Check solubility table*
pH4	pH 4	21.79	4.00	N		A	
pH 7	pH 7	21.65	6.91	N		A	
pH 10	pH 10	22.06	9.88	N		A	
Turbidity	0.0	20.66	0.01	N		A	
Turbidity	12.4	21.82	12.38	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD UARP WQ SPRING Reservoir Survey

Unit ID: YSI EXO2

Sampling Event Date(s): 5/18/21 – 5/26/21

PRE-SAMPLING CALIBRATION

Date and time 5/25/21 0600 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	21.9	996	1000	
Cond (uS/cm @ 25°C)	1,413	21.9	—	1413	
DO (%)	~100	22.1	100.7	100.1	
DO (mg/L)*	~8.7	22.1	—	8.73	Check solubility table*
pH4	pH4	22.0	4.12	4.00	760.9 mm Hg
pH 7	pH 7	22.1	7.10	7.01	
pH 10	pH 10	22.0	10.14	10.04	
Turbidity	0.0	22.0	-0.02	0.00	
Turbidity	12.4	22.3	12.60	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 5/25/21 1800 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	24.89	1000	N		A	
Cond (uS/cm @ 25°C)	1,413	24.42	1405	N		A	
DO (%)	~93	24.59	93.3	N		A	708.7 mm Hg
*DO (mg/L)	~7.7	24.59	7.77	N		A	Check solubility table*
pH4	pH 4	24.25	3.89	N		A	
pH 7	pH 7	24.13	6.90	N		A	
pH 10	pH 10	24.22	9.93	N		A	
Turbidity	0.0	20.02	0.04	N		A	
Turbidity	12.4	24.37	12.47	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD IN SITU RESERVOIR WQ - SPRING SURVEY

Unit ID: YSI EXO2

Sampling Event Date(s): 5/18/21 - 5/26/21

PRE-SAMPLING CALIBRATION

Date and time 5/26/21 0730 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	23.8	999	1000	
Cond (uS/cm @ 25°C)	1,413	24.1	~	1413	
DO (%)	~93	22.2	92.6	93.3	708.8 mm Hg
DO (mg/L)*	~8.1	22.2	~	8.12	Check solubility table*
pH4	pH4	23.7	388	4.00	
pH 7	pH 7	23.7	6.91	7.01	
pH 10	pH 10	23.9	10.00	10.01	
Turbidity	0.0	23.9	0.01	0.00	
Turbidity	12.4	24.1	12.40	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 5/26/21 1845 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	25.89	998	N		A	
Cond (uS/cm @ 25°C)	1,413	25.71	1408	N		A	
DO (%)	100	23.97	100.9	N		A	758.0 mm Hg
*DO (mg/L)	8.4	23.97	8.48	N		A	Check solubility table*
pH4	pH 4	24.89	4.07	N		A	
pH 7	pH 7	24.39	7.05	N		A	
pH 10	pH 10	24.85	10.06	N		A	
Turbidity	0.0	22.11	0.01	N		A	
Turbidity	12.4	24.13	12.46	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD WQ SUMMER RIVERINE

Unit ID: YSI Pro DSS

Sampling Event Date(s): 8/9/21 – 8/11/21

PRE-SAMPLING CALIBRATION

Date and time 8/9/21 0920 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	23.4	927	1000	
Cond (uS/cm @ 25°C)	1,413	22.6	—	1414	
DO (%)	~88	20.8	95.0	88.2	670.5 mm Hg
DO (mg/L)*	~7.8	20.8	—	7.80	*Check solubility table**
pH4	pH4	22.7	3.94	4.00	
pH 7	pH 7	23.2	7.14	7.01	
pH 10	pH 10	23.0	10.34	10.03	
Turbidity	0.0	23.2	-2.97	0.00	
Turbidity	12.4	23.7	53.69	12.4	

POST-SAMPLING CALIBRATION CHECK

Date and time 8/9/21 1900 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	27.2	1004	N		A	
Cond (uS/cm @ 25°C)	1,413	27.1	1409	N		A	
DO (%)	~93.6	29.2	93.4	N		A	
*DO (mg/L)	~7.1	29.2	7.15	N		A	*Check solubility table**
pH4	pH 4	29.5	4.07	N		A	708.0 mm Hg
pH 7	pH 7	27.9	6.86	N		A	
pH 10	pH 10	27.5	9.94	N		A	
Turbidity	0.0	28.2	0.04	N		A	
Turbidity	12.4	27.5	12.32	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD SUMMER RIVERINE WQ

Unit ID: YSI ProDSS

Sampling Event Date(s): 8/9/21 – 8/11/21

PRE-SAMPLING CALIBRATION

Date and time 8/10/21 0600 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	17.0	1049	1000	
Cond (uS/cm @ 25°C)	1,413	17.3	1469	1413	
DO (%)	~93.5	17.8	93.2	93.4	
DO (mg/L)*	~8.8	17.8	—	8.82	*Check solubility table**
pH4	pH4	17.3	4.10	4.00	709.8 mm Hg
pH 7	pH 7	17.7	7.15	7.03	
pH 10	pH 10	18.5	10.20	10.08	
Turbidity	0.0	20.2	0.06	0.00	
Turbidity	12.4	20.4	10.20	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 8/10/21 1430 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	22.1	1002	N		A	
Cond (uS/cm @ 25°C)	1,413	22.4	1421	N		A	
DO (%)	~93.5	28.9	94.0	N		A	
*DO (mg/L)	~7.1	28.9	7.24	N		A	*Check solubility table**
pH4	pH 4	22.1	4.15	N		A	709.8 mm Hg
pH 7	pH 7	21.2	7.08	N		A	
pH 10	pH 10	21.4	9.93	N		A	
Turbidity	0.0	19.7	0.02	N		A	
Turbidity	12.4	22.1	12.49	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD SUMMER RIVERINE WQ

Unit ID: YSI ProDSS

Sampling Event Date(s): 8/9/21 - 8/11/21

PRE-SAMPLING CALIBRATION

Date and time 8/11/21 0830 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	21.4	960	1000	
Cond (uS/cm @ 25°C)	1,413	21.7	—	1414	
DO (%)	~80.5	23.5	80.9	80.3	
DO (mg/L)*	~6.7	23.5	—	6.82	*Check solubility table**
pH4	pH4	21.7	3.99	4.00	610.2 mm Hg
pH 7	pH 7	22.7	6.94	7.01	
pH 10	pH 10	22.2	10.03	10.03	
Turbidity	0.0	23.2	0.23	0.00	
Turbidity	12.4	23.0	20.20	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 8/11/21 1944 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	31.1	991	N		A	
Cond (uS/cm @ 25°C)	1,413	31.7	1404	N		A	
DO (%)	~99.5	32.0	98.5	N		A	
*DO (mg/L)	~7.3	32.0	7.20	N		A	*Check solubility table**
pH4	pH 4	31.6	4.09	N		A	757.9
pH 7	pH 7	31.4	6.96	N		A	
pH 10	pH 10	30.4	9.99	N		A	
Turbidity	0.0	25.3	0.01	N		A	
Turbidity	12.4	22.1	12.32	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD WQ FALL RESERVOIR SURVEY

Unit ID: YSI EXO2

Sampling Event Date(s): 10/18/2021 → 10/22/2021

PRE-SAMPLING CALIBRATION

Date and time 10/17/2021 2144 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	20.3	750	1000	
Cond (uS/cm @ 25°C)	1,413	20.6	—	1410	
DO (%)	~93.5	17.5	93.7	93.5	710.5 mmHg
DO (mg/L)*	~8.9	17.5	—	8.96	Check solubility table*
pH4	pH4	20.5	3.98	4.00	
pH 7	pH 7	20.2	6.94	7.02	
pH 10	pH 10	20.1	10.04	10.06	
Turbidity	0.0	16.3	0.01	0.00	
Turbidity	12.4	18.9	12.01	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 10/18/2021 1745 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	19.3	992	N		A	
Cond (uS/cm @ 25°C)	1,413	19.4	1408	N		A	
DO (%)	~93.5	18.4	93.7	N		A	712.1 mm Hg
*DO (mg/L)	~8.8	18.4	8.81	N		A	Check solubility table*
pH4	pH 4	19.3	4.05	N		A	
pH 7	pH 7	17.4	6.94	N		A	
pH 10	pH 10	18.3	9.99	N		A	
Turbidity	0.0	19.2	0.04	N		A	
Turbidity	12.4	19.3	12.50	N		A	
[1] See Table 1							

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: SMUD WQ FALL RESERVOIR SURVEY

Unit ID: YSI EXO2

Sampling Event Date(s): 10/18/21 – 10/22/2021

PRE-SAMPLING CALIBRATION

Date and time 10/18/21 1908 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	15.4	1344	1000	
Cond (uS/cm @ 25°C)	1,413	15.8	—	1414	
DO (%)	~93.5	17.3	94.7	93.7	
DO (mg/L)*	~9.0	17.4	—	8.98	Check solubility table*
pH4	pH4	15.7	3.98	4.00	712.2
pH 7	pH 7	16.3	6.94	7.04	
pH 10	pH 10	15.9	9.78	10.11	
Turbidity	0.0	16.6	-0.16	0.00	
Turbidity	12.4	17.7	12.36	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 10/19/21 1700 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	17.44	990	N		A	
Cond (uS/cm @ 25°C)	1,413	17.56	1401	N		A	
DO (%)	~93.5	15.80	91.4	N		A	
*DO (mg/L)	~9.2	15.81	9.09	N		A	Check solubility table*
pH4	pH 4	17.37	3.95	N		A	710.6 mailed
pH 7	pH 7	17.47	7.04	N		A	
pH 10	pH 10	17.58	10.13	N		A	
Turbidity	0.0	17.23	0.03	N		A	
Turbidity	12.4	17.45	12.44	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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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Stillwater Sciences

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Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: SMUD WQ FALL RESERVOIR SURVEY

Unit ID: YSI EXO2

Sampling Event Date(s): 10/18 – 10/22, 2021

PRE-SAMPLING CALIBRATION

Date and time 10/20/21 0500 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	17.6	1004	1000	
Cond (uS/cm @ 25°C)	1,413	17.7	—	1413	
DO (%)	~94	18.2	94.1	93.8	712.8 mmHg
DO (mg/L)*	~8.9	18.2	—	8.85	Check solubility table*
pH4	pH4	18.0	3.97	4.00	
pH 7	pH 7	18.0	7.04	7.03	
pH 10	pH 10	17.9	10.31	10.09	
Turbidity	0.0	17.4	-0.02	0.0	
Turbidity	12.4	17.7	12.45	12.4	

POST-SAMPLING CALIBRATION CHECK

Date and time 10/20/21 1530 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	17.94	993	N		A	
Cond (uS/cm @ 25°C)	1,413	18.23	1407	N		A	
DO (%)	~100	19.5	99.6	N		A	762.7 mm Hg
*DO (mg/L)	~9.1	19.5	9.21	N		A	Check solubility table*
pH4	pH 4	17.49	3.86	N		A	
pH 7	pH 7	17.90	6.90	N		A	
pH 10	pH 10	15.06	10.02	N		A	
Turbidity	0.0	19.76	0.05	N		A	
Turbidity	12.4	18.84	12.53	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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%

Ver. 01/2016

Stillwater Sciences

pg 4 of 5

Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: SMUD WQ FALL RESERVOIR SURVEY

Unit ID: YSI EXO2

Sampling Event Date(s): 10/18 – 10/22, 2021

PRE-SAMPLING CALIBRATION

Date and time 10/20/21 1545 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	17.64	995	1000	
Cond (uS/cm @ 25°C)	1,413	17.81	–	1413	
DO (%)	~100	18.4	99.3	100.4	
DO (mg/L)*	~9.4		–	9.43	*Check solubility table**
pH4	pH4	17.8	3.82	4.00	762.6
pH 7	pH 7	17.4	6.92	7.0	
pH 10	pH 10	17.1	10.01	10.10	
Turbidity	0.0	18.8	-0.03	0.00	
Turbidity	12.4	17.4	12.49	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 10/21/21 2030 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	23.27	990	N		A	
Cond (uS/cm @ 25°C)	1,413	23.36	1389	N		A	
DO (%)	~105	22.84	100.8	N		A	761 mm Hg
*DO (mg/L)	~8.6	22.84	8.67	N		A	*Check solubility table*
pH4	pH 4	23.07	4.09	N		A	
pH 7	pH 7	22.96	7.08	N		A	
pH 10	pH 10	23.23	10.02	N		A	
Turbidity	0.0	21.20	0.01	N		A	
Turbidity	12.4	23.11	12.46	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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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pg 5 of 5

Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: 2021 SMUD FALL RESERVOIR IN SITU

Unit ID: YSI EXO2 10/18-22/2021

Sampling Event Date(s):

PRE-SAMPLING CALIBRATION

Date and time 10/22/21 0808 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	—	—	—	1ST TURB CAL WAS FAULTY, BAD READ
Cond (uS/cm @ 25°C)	1,413	18.28	1381	1413	AT SITE R.5.5-13-CR
DO (%)	~94	20.9	94.2	93.7	
DO (mg/L)*	~8.3	20.8	—	8.38	*Check solubility table*
pH4	pH4	18.6	4.01	4.00	711.8 mm Hg
pH 7	pH 7	18.7	7.11	7.03	Recal in field
pH 10	pH 10	17.8	10.09	10.09	pre post
Turbidity	0.0	17.6	4.27	0.60	7.5°C, -5.79, 0.00, 8:37 AM
Turbidity	12.4	18.5	12.29	12.40	13.1°C, 12.32, 12.46 12:37 AM

POST-SAMPLING CALIBRATION CHECK

Date and time 10/22/21 1830 Name ERIC SOMMERAUER

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	23.2	994	N		A	
Cond (uS/cm @ 25°C)	1,413	22.9	1397	N		A	
DO (%)	~100.5	23.1	100.7	N		A	
*DO (mg/L)	~8.6	23.1	8.58	N		A	*Check solubility table*
pH4	pH 4	22.7	4.06	N		A	760.8 mm Hg
pH 7	pH 7	22.7	7.09	N		A	
pH 10	pH 10	22.9	10.04	N		A	
Turbidity	0.0	23.4	0.03	N		A	
Turbidity	12.4	22.8	12.36	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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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pg 1 of 3

Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: 2021 SMUD UARP Water Quality

Unit ID: YSI Exo 2

Sampling Event Date(s): 11/16/2021 – 11/19/2021

PRE-SAMPLING CALIBRATION

Date and time 11/16/21 0808 Name Emily Applequist, Eric Sommeraver

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000				bad batch of 1,000 µS/cm standard
Cond (uS/cm @ 25°C)	1,413	14.03	1,352	1,413	
DO (%)	~87	19.6	87.0	87.1	662.1 mm Hg
DO (mg/L)*	~7.9	19.54	—	7.99	Check solubility table*
pH4	pH4	15.6	4.00	4.00	
pH 7	pH 7	15.4	7.08	7.04	
pH 10	pH 10	15.1	10.43	10.12	
Turbidity	0.0	15.0	0.82	0.00	
Turbidity	12.4	13.7	12.45	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 11/16/21 1330 Name Emily Applequist, Eric Sommeraver

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000						See above
Cond (uS/cm @ 25°C)	1,413	17.09	1,408	N		A	
DO (%)	~88	13.90	88.3	N		A	668.6 mm Hg
*DO (mg/L)	~9.0	13.90	9.13	N		A	Check solubility table*
pH4	pH 4	16.13	4.03	N		A	
pH 7	pH 7	16.88	6.98	N		A	
pH 10	pH 10	16.68	10.07	N		A	
Turbidity	0.0	17.57	0.03	N		A	
Turbidity	12.4	17.17	12.41	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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: 2021 SMUD UARP Water Quality

Unit ID: YSI Exo2

Sampling Event Date(s): 11/16/2021-11/19/2021

PRE-SAMPLING CALIBRATION

Date and time 11/18/2021 0800 Name Emily Applequist, Eric Sommerauer

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	17.01	1,027	1,000	
Cond (uS/cm @ 25°C)	1,413	11.40	–	1,419	
DO (%)	~87	16.8	88.9	87.1	662.1 mm Hg
DO (mg/L)*	~8.4	16.8	–	8.44	*Check solubility table*
pH4	pH4	11.4	4.14	4.00	
pH 7	pH 7	11.0	7.10	7.06	
pH 10	pH 10	10.8	10.32	10.18	
Turbidity	0.0	9.7	0.09	0.00	
Turbidity	12.4	9.7	12.37	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 11/18/2021 14:40 Name Emily Applequist

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	16.57	1,005	N		A	
Cond (uS/cm @ 25°C)	1,413	15.71	1,405	N		A	
DO (%)	~88	13.66	86.8	N		A	670.0 mm Hg
*DO (mg/L)	~9.1	13.66	9.01	N		A	*Check solubility table*
pH4	pH 4	15.90	3.97	N		A	
pH 7	pH 7	15.83	6.92	N		A	
pH 10	pH 10	16.52	9.96	N		A	
Turbidity	0.0	16.11	0.07	N		A	
Turbidity	12.4	15.75	12.36	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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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Stillwater Sciences

pg 3 of 3

Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: 2021 SMUD UARP & CB Water Quality

Unit ID: YSI Exo 2

Sampling Event Date(s): 11/16/2021 - 11/19/2021

PRE-SAMPLING CALIBRATION

Date and time 11/19/21 0755 Name Emily Applequist & Eric Sommerauer

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	14.71	1,005	1,000	
Cond (uS/cm @ 25°C)	1,413	14.46	—	1,402	
DO (%)	~87	17.9	87.7	87.2	662.9 mm Hg
DO (mg/L)*	~8.2	17.94	—	8.26	*Check solubility table*
pH4	pH4	15.2	3.96	4.00	
pH 7	pH 7	14.9	6.94	7.04	
pH 10	pH 10	14.7	10.05	10.13	
Turbidity	0.0	13.7	-0.10	0.00	
Turbidity	12.4	13.5	12.38	12.40	

POST-SAMPLING CALIBRATION CHECK

Date and time 11/19/21 1400 Name Emily Applequist, Eric Sommerauer

Parameter	Std. Value	Std. Temp (°C)	Post-Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code[1]	Notes
Cond (uS/cm @ 25°C)	1,000	19.13	994	N		A	
Cond (uS/cm @ 25°C)	1,413	19.40	1,393	N		A	
DO (%)	~97	16.30	94.3	N		A	740.7 mm Hg
*DO (mg/L)	~9.5	16.30	9.25	N		A	*Check solubility table*
pH4	pH 4	18.35	4.06	N		A	
pH 7	pH 7	20.00	7.07	N		A	
pH 10	pH 10	19.59	10.08	N		A	
Turbidity	0.0	18.46	0.01	N		A	
Turbidity	12.4	19.11	12.33	N		A	

[1] See Table 1

Table 1: Measurement Quality Objectives – comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	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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APPENDIX G
Analytical Laboratory Bacteria Reports

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CALIFORNIA LABORATORY SERVICES
Committed. Responsive. Flexible.

June 29, 2021

CLS Work Order #: 21F1220
COC #:

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

Project Name: SMUD In situ, Bac-T, & Chemistry Monitoring

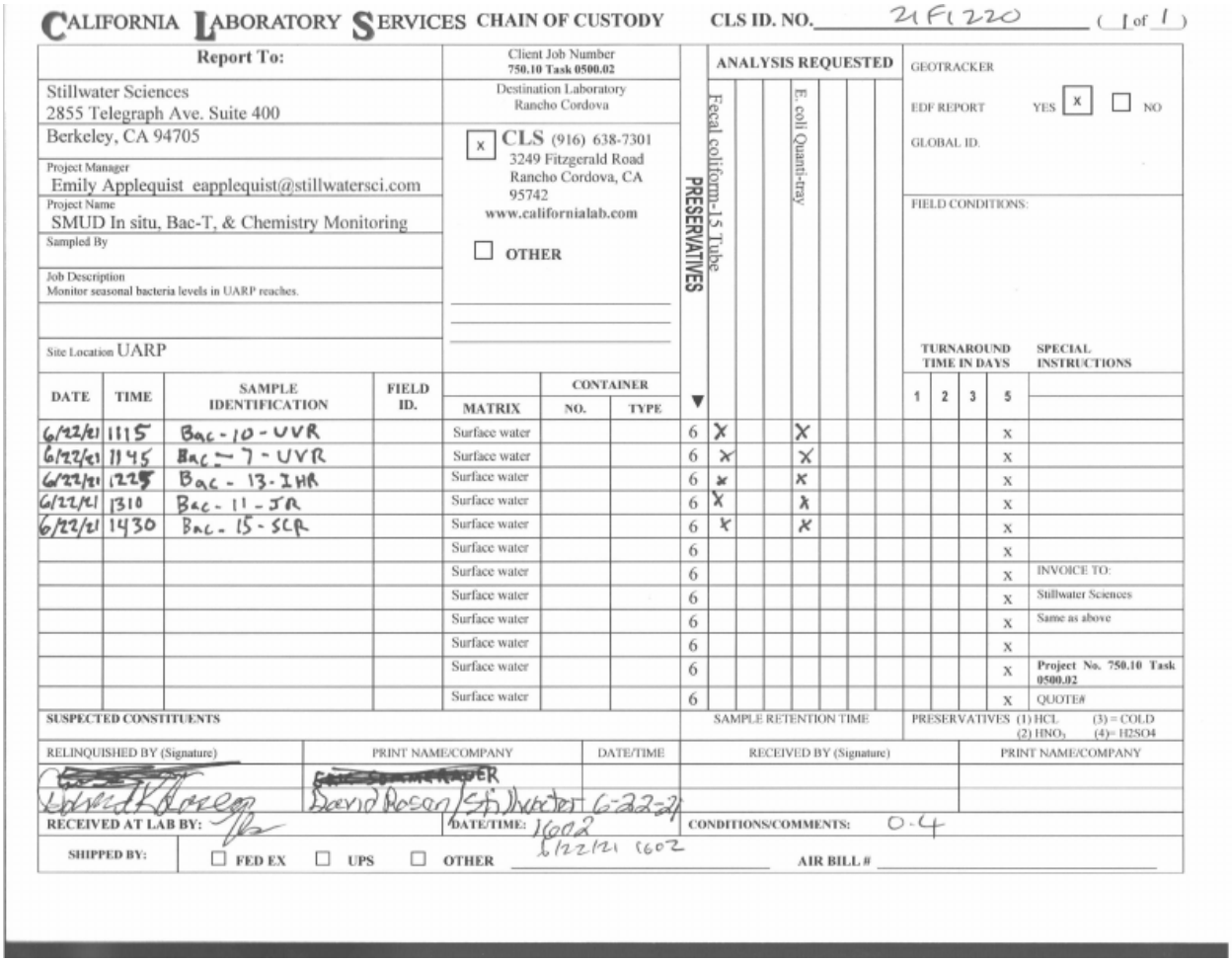
Enclosed are the results of analyses for samples received by the laboratory on 06/22/21 16:02. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness. Any comments and exceptions are addressed under the Notes and Definitions section.

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

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA SWRCB ELAP Accreditation/Registration number 1233



CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. 21F1220 (1 of 1)

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

Client Job Number: 750.10 Task 0500.02
Destination Laboratory: Rancho Cordova
[X] CLS (916) 638-7301, 3249 Fitzgerald Road, Rancho Cordova, CA 95742, www.californialab.com
[ ] OTHER

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

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	E. coli Quanti-tray	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
6/22/21	1115	Bac-10-UVR		Surface water			6	X	X				X	
6/22/21	1145	Bac-7-UVR		Surface water			6	X	X				X	
6/22/21	1225	Bac-13-IHR		Surface water			6	X	X				X	
6/22/21	1310	Bac-11-JR		Surface water			6	X	X				X	
6/22/21	1430	Bac-15-SCR		Surface water			6	X	X				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. 750.10 Task 0500.02
				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
[redacted]	[redacted] DAVID ROSEN			
Edward Koren	David Rosen/Stillwater	6-22-21		

RECEIVED AT LAB BY: DATE/TIME: 1602 6/22/21 1602
CONDITIONS/COMMENTS: 0-4
SHIPPED BY: [ ] FED EX [ ] UPS [ ] OTHER AIR BILL #

CALIFORNIA LABORATORY SERVICES
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 06/29/21 13:53

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

Project: SMUD In situ, Bac-T, & Chemistry Monitoring
Project Number: 750.10 Task 0500.02
Project Manager: Emily Applequist

CLS Work Order #: 21F1220
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-10-UVR (21F1220-01) Surface Water	**Sampled: 06/22/21 11:15**		**Received: 06/22/21 16:02**						
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105141	06/22/21 16:30	06/25/21	SM 9221	
E. Coli	<1	1.0	"	"	2105133	06/22/21 17:00	06/23/21	SM9223	
Bac-7-UVR (21F1220-02) Surface Water	**Sampled: 06/22/21 11:45**		**Received: 06/22/21 16:02**						
Fecal Coliforms	**1.8**	1.8	MPN/100 mL	1	2105141	06/22/21 16:30	06/25/21	SM 9221	
E. Coli	**21.1**	1.0	"	"	2105133	06/22/21 17:00	06/23/21	SM9223	
Bac-13-IHR (21F1220-03) Surface Water	**Sampled: 06/22/21 12:25**		**Received: 06/22/21 16:02**						
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105141	06/22/21 16:30	06/25/21	SM 9221	
E. Coli	**3.0**	1.0	"	"	2105133	06/22/21 17:00	06/23/21	SM9223	
Bac-11-JR (21F1220-04) Surface Water	**Sampled: 06/22/21 13:10**		**Received: 06/22/21 16:02**						
Fecal Coliforms	**23**	1.8	MPN/100 mL	1	2105141	06/22/21 16:30	06/25/21	SM 9221	
E. Coli	**34.5**	1.0	"	"	2105133	06/22/21 17:00	06/23/21	SM9223	
Bac-15-SCR (21F1220-05) Surface Water	**Sampled: 06/22/21 14:30**		**Received: 06/22/21 16:02**						
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105141	06/22/21 16:30	06/25/21	SM 9221	
E. Coli	**3.1**	1.0	"	"	2105133	06/22/21 17:00	06/23/21	SM9223	

3249 Fitzgerald Road, Rancho Cordova, CA 95742 | 800.638.7301 | Tel: 916.638.7301 x102 | Fax: 916.638.4510 | www.californialab.com
Small Business #2916 | ELAP #1233 | NAICS #541380 | CA SWRCB ELAP Accreditation/Registration Number 1233

CALIFORNIA LABORATORY SERVICES
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 06/29/21 13:53

Stillwater Sciences	Project: SMUD In situ, Bac-T, & Chemistry Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 750.10 Task 0500.02	**CLS Work Order #: 21F1220**
Berkeley, CA 94705	Project Manager: Emily Applequist	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

3249 Fitzgerald Road, Rancho Cordova, CA 95742 | 800.638.7301 | Tel: 916.638.7301 x102 | Fax 916.638.4510 | www.californialab.com
Small Business #2916 | ELAP #1233 | NAICS #541380 | CA SWRCB ELAP Accreditation/Registration Number 1233

CALIFORNIA LABORATORY SERVICES
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July 07, 2021

CLS Work Order #: 21F1497
COC #:

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

Project Name: SMUD In situ, Bac-T, & Chemistry Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 06/29/21 13:45. 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. Any comments and exceptions are addressed under the Notes and Definitions section.

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

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA SWRCB ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. 21F1497 (1 of 1)

Report To:
Stillwater Sciences
2855 Telegraph Ave. Suite 400
Berkeley, CA 94705
Project Manager: Emily Applequist eapplequist@stillwatersci.com
Project Name: SMUD In situ, Bac-T, & Chemistry Monitoring
Sampled By: Eric Sommerauer/David Rosen
Job Description: Monitor seasonal bacteria levels in UARP reaches.
Site Location: UARP

Client Job Number: 750.10 Task 0500.02
Destination Laboratory: Rancho Cordova
[x] CLS (916) 638-7301, 3249 Fitzgerald Road, Rancho Cordova, CA 95742, www.californialab.com
[ ] OTHER

ANALYSIS REQUESTED: PRESERVATIVES; Fecal coiform-15 Tube; E. coli Quanti-tray

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

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES ▼	Fecal coiform-15 Tube	E. coli Quanti-tray	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
6/29/21	0810	Bac-10-UVR		Surface water			6	x	x				x	
6/29/21	0920	Bac-7-UVR		Surface water			6	x	x				x	
6/29/21	0950	Bac-13-IMR		Surface water			6	x	x				x	
6/29/21	1035	Bac-11-JR		Surface water			6	x	x				x	
6/29/21	1120	Bac-15-SCR		Surface water			6	x	x				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. 750.10 Task 0500.02
				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
David K Rosen	David Rosen/Stillwater	6/29/21 1345		

RECEIVED AT LAB BY: VZ DATE/TIME: 6/29/21 1345 CONDITIONS/COMMENTS: 2.9

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

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 07/07/21 12:08

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

Project: SMUD In situ, Bac-T, & Chemistry Monitoring
Project Number: 750.10 Task 0500.02
Project Manager: Emily Applequist

CLS Work Order #: 21F1497
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-10-UVR (21F1497-01) Surface Water	**Sampled: 06/29/21 08:10**		**Received: 06/29/21 13:45**						
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105351	06/29/21 14:00	07/02/21	SM 9221	
E. Coli	<1	1.0	"	"	2105335	06/29/21 16:00	06/30/21	SM9223	
Bac-7-UVR (21F1497-02) Surface Water	**Sampled: 06/29/21 09:20**		**Received: 06/29/21 13:45**						
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105351	06/29/21 14:00	07/02/21	SM 9221	
E. Coli	**1.0**	1.0	"	"	2105335	06/29/21 16:00	06/30/21	SM9223	
Bac-13-IHR (21F1497-03) Surface Water	**Sampled: 06/29/21 09:50**		**Received: 06/29/21 13:45**						
Fecal Coliforms	**33**	1.8	MPN/100 mL	1	2105351	06/29/21 14:00	07/02/21	SM 9221	
E. Coli	<1	1.0	"	"	2105335	06/29/21 16:00	06/30/21	SM9223	
Bac-11-JR (21F1497-04) Surface Water	**Sampled: 06/29/21 10:35**		**Received: 06/29/21 13:45**						
Fecal Coliforms	**170**	1.8	MPN/100 mL	1	2105351	06/29/21 14:00	07/02/21	SM 9221	
E. Coli	**195.6**	1.0	"	"	2105335	06/29/21 16:00	06/30/21	SM9223	
Bac-15-SCR (21F1497-05) Surface Water	**Sampled: 06/29/21 12:20**		**Received: 06/29/21 13:45**						
Fecal Coliforms	**2.0**	1.8	MPN/100 mL	1	2105351	06/29/21 14:00	07/02/21	SM 9221	
E. Coli	<1	1.0	"	"	2105335	06/29/21 16:00	06/30/21	SM9223	

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 07/07/21 12:08

Stillwater Sciences	Project: SMUD In situ, Bac-T, & Chemistry Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 750.10 Task 0500.02	**CLS Work Order #: 21F1497**
Berkeley, CA 94705	Project Manager: Emily Applequist	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

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CALIFORNIA LABORATORY SERVICES
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July 13, 2021

CLS Work Order #: 21G0167
COC #:

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

Project Name: SMUD In situ, Bac-T, & Chemistry Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/06/21 12:12. 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. Any comments and exceptions are addressed under the Notes and Definitions section.

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

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA SWRCB ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. 2160167 (of)

Report To:	Client Job Number 780.10 Task 0500.02	ANALYSIS REQUESTED
Stillwater Sciences 2855 Telegraph Ave. Suite 400 Berkeley, CA 94705	Destination Laboratory Rancho Cordova [x] CLS (916) 638-7301 3249 Fitzgerald Road Rancho Cordova, CA 95742 www.californialab.com [ ] OTHER	GEOTRACKER EDF REPORT YES [x] NO [ ] GLOBAL ID
Project Manager: Emily Applequist eapplequist@stillwatersci.com Project Name: SMUD In situ, Bac-T, & Chemistry Monitoring Sampled By: EAS DKR Job Description: Monitor seasonal bacteria levels in UARP reaches Site Location: UARP		FIELD CONDITIONS

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	CONTAINER MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	Fecal coliform-LS Tube	E. coli Quanti-tray	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
7/6/21	0750	Bac-10-UVR		Surface water			6	X	X				X	
7/6/21	0820	Bac-7-UVR		Surface water			6	X	X				X	
7/6/21	0910	Bac-13-IHR		Surface water			6	X	X				X	
7/6/21	0940	Bac-11-JR		Surface water			6	X	X				X	
7/6/21	1105	Bac-15-SCR		Surface water			6	X	X				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. 780.10 Task 0500.02
				Surface water			6						X	QUOTE#

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

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
[signature]	ERIC SUMMERHAYES/STILL WATER	7/6/21 1712		

RECEIVED AT LAB BY: [signature] DATE/TIME: 7/6/21 1712 CONDITIONS/COMMENTS: OS

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

CALIFORNIA LABORATORY SERVICES
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 07/13/21 13:31

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

Project: SMUD In situ, Bac-T, & Chemistry Monitoring
Project Number: 750.10 Task 0500.02
Project Manager: Emily Applequist

CLS Work Order #: 21G0167
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-10-UVR (21G0167-01) Surface Water Sampled: 07/06/21 07:50 Received: 07/06/21 12:12									
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105530	07/06/21 12:30	07/08/21	SM 9221	
E. Coli	<1	1.0	"	"	2105533	07/06/21 12:45	07/07/21	SM9223	
Bac-7-UVR (21G0167-02) Surface Water Sampled: 07/06/21 08:30 Received: 07/06/21 12:12									
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105530	07/06/21 12:30	07/09/21	SM 9221	
E. Coli	**1.0**	1.0	"	"	2105533	07/06/21 12:45	07/07/21	SM9223	
Bac-13-IHR (21G0167-03) Surface Water Sampled: 07/06/21 09:10 Received: 07/06/21 12:12									
Fecal Coliforms	**17**	1.8	MPN/100 mL	1	2105530	07/06/21 12:30	07/09/21	SM 9221	
E. Coli	**18.7**	1.0	"	"	2105533	07/06/21 12:45	07/07/21	SM9223	
Bac-11-JR (21G0167-04) Surface Water Sampled: 07/06/21 09:40 Received: 07/06/21 12:12									
Fecal Coliforms	**7.8**	1.8	MPN/100 mL	1	2105530	07/06/21 12:30	07/09/21	SM 9221	
E. Coli	**4.1**	1.0	"	"	2105533	07/06/21 12:45	07/07/21	SM9223	
Bac-15-SCR (21G0167-05) Surface Water Sampled: 07/06/21 11:05 Received: 07/06/21 12:12									
Fecal Coliforms	**2.0**	1.8	MPN/100 mL	1	2105530	07/06/21 12:30	07/09/21	SM 9221	
E. Coli	**1.0**	1.0	"	"	2105533	07/06/21 12:45	07/07/21	SM9223	

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 07/13/21 13:31

Stillwater Sciences	Project: SMUD In situ, Bac-T, & Chemistry Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 750.10 Task 0500.02	**CLS Work Order #: 21G0167**
Berkeley, CA 94705	Project Manager: Emily Applequist	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

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CALIFORNIA LABORATORY SERVICES
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July 20, 2021

CLS Work Order #: 21G0707
COC #:

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

Project Name: SMUD In situ, Bac-T, & Chemistry Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/13/21 12:37. 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. Any comments and exceptions are addressed under the Notes and Definitions section.

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

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA SWRCB ELAP Accreditation/Registration number 1233

CALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY CLS ID. NO. 210707 (1 of 1)

Report To:	Client Job Number 750.10 Task 0500.02	ANALYSIS REQUESTED	GEOTRACKER
Stillwater Sciences 2855 Telegraph Ave. Suite 400 Berkeley, CA 94705	Destination Laboratory Rancho Cordova [x] CLS (916) 638-7301 3249 Fitzgerald Road Rancho Cordova, CA 95742 www.californialab.com [ ] OTHER	PRESERVATIVES: Fecal coliform-15 Tube; E. coli Quanti-tray	EDF REPORT YES [x] NO [ ] GLOBAL ID:
Project Manager: Emily Applequist eapplequist@stillwatersci.com Project Name: SMUD In situ, Bac-T, & Chemistry Monitoring Sampled By: Eric Summerauer, Kevin Ha Job Description: Monitor seasonal bacteria levels in UARP reaches Site Location: UARP			FIELD CONDITIONS:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	Fecal coliform-15 Tube	E. coli Quanti-tray	TURNAROUND TIME IN DAYS 1	2	3	5	SPECIAL INSTRUCTIONS
7/13/21	0800	Bac-10-UVR		Surface water			6	X	X				X	
7/13/21	0840	Bac-7-UVR		Surface water			6	X	X				X	
7/13/21	0915	Bac-13-IHR		Surface water			6	X	X				X	
7/13/21	0955	Bac-11-JR		Surface water			6	X	X				X	
7/13/21	1115	Bac-15-SCR		Surface water			6	X	X				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. 750.10 Task 0500.02
				Surface water			6						X	QUOTE#

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

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
[signature]	Eric Summerauer/SW	7/13/21 12:37		

RECEIVED AT LAB BY: [signature] DATE/TIME: 7/13/21 1237 CONDITIONS/COMMENTS: 0.8

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 07/20/21 15:25

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

Project: SMUD In situ, Bac-T, & Chemistry Monitoring
Project Number: 750.10 Task 0500.02
Project Manager: Emily Applequist

CLS Work Order #: 21G0707
COC #:

Microbiological Parameters by APHA Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-10-UVR (21G0707-01) Surface Water Sampled: 07/13/21 08:00 Received: 07/13/21 12:37									
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105767	07/13/21 12:45	07/16/21	SM 9221	
E. Coli	**2.0**	1.0	"	"	2105756	07/13/21 13:15	07/14/21	SM9223	
Bac-7-UVR (21G0707-02) Surface Water Sampled: 07/13/21 08:40 Received: 07/13/21 12:37									
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105767	07/13/21 12:45	07/16/21	SM 9221	
E. Coli	**1.0**	1.0	"	"	2105756	07/13/21 13:15	07/14/21	SM9223	
Bac-13-IHR (21G0707-03) Surface Water Sampled: 07/13/21 09:15 Received: 07/13/21 12:37									
Fecal Coliforms	<1.8	1.8	MPN/100 mL	1	2105767	07/13/21 12:45	07/16/21	SM 9221	
E. Coli	**1.0**	1.0	"	"	2105756	07/13/21 13:15	07/14/21	SM9223	
Bac-11-JR (21G0707-04) Surface Water Sampled: 07/13/21 09:55 Received: 07/13/21 12:37									
Fecal Coliforms	**130**	1.8	MPN/100 mL	1	2105767	07/13/21 12:45	07/16/21	SM 9221	
E. Coli	**50.4**	1.0	"	"	2105756	07/13/21 13:15	07/14/21	SM9223	
Bac-15-SCR (21G0707-05) Surface Water Sampled: 07/13/21 11:15 Received: 07/13/21 12:37									
Fecal Coliforms	**2.0**	1.8	MPN/100 mL	1	2105767	07/13/21 12:45	07/16/21	SM 9221	
E. Coli	<1	1.0	"	"	2105756	07/13/21 13:15	07/14/21	SM9223	

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CALIFORNIA LABORATORY SERVICES
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 07/20/21 15:25

Stillwater Sciences	Project: SMUD In situ, Bac-T, & Chemistry Monitoring	
2855 Telegraph Ave., Suite 400	Project Number: 750.10 Task 0500.02	**CLS Work Order #: 21G0707**
Berkeley, CA 94705	Project Manager: Emily Applequist	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

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CALIFORNIA LABORATORY SERVICES
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July 27, 2021

CLS Work Order #: 21G1136
COC #:

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

Project Name: SMUD In situ, Bac-T, & Chemistry Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/20/21 12:36. 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. Any comments and exceptions are addressed under the Notes and Definitions section.

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

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA SWRCB ELAP Accreditation/Registration Number 1233

CALIFORNIA LABORATORY SERVICES
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07/27/21 12:12

Stillwater Sciences	Project:	SMUD In situ, Bac-T, & Chemistry Monitoring	**CLS Work Order #: 21G1136**
2855 Telegraph Ave., Suite 400	Project Number:	750.10 Task 0500.02	COC #:
Berkeley CA, 94705	Project Manager:	Emily Applequist	

Microbiological Parameters by APHA Standard Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bac-10-UVR (21G1136-01) Water Sampled: 07/20/21 08:10 Received: 07/20/21 12:36										
Fecal Coliforms	<1.8	1.8	1.8	MPN/100 mL	1	2105975	07/20/21 13:00	07/23/21	SM 9221	
E. Coli	**2.0**	1.0	1.0	"	1	2105978	07/20/21 13:15	07/21/21	SM9223	
Bac-7-UVR (21G1136-02) Water Sampled: 07/20/21 08:50 Received: 07/20/21 12:36										
Fecal Coliforms	<1.8	1.8	1.8	MPN/100 mL	1	2105975	07/20/21 13:00	07/23/21	SM 9221	
E. Coli	<1	1.0	1.0	"	1	2105978	07/20/21 13:15	07/21/21	SM9223	
Bac-13-IHR (21G1136-03) Water Sampled: 07/20/21 09:25 Received: 07/20/21 12:36										
Fecal Coliforms	<1.8	1.8	1.8	MPN/100 mL	1	2105975	07/20/21 13:00	07/23/21	SM 9221	
E. Coli	<1	1.0	1.0	"	1	2105978	07/20/21 13:15	07/21/21	SM9223	
Bac-11-JR (21G1136-04) Water Sampled: 07/20/21 10:05 Received: 07/20/21 12:36										
Fecal Coliforms	**79**	1.8	1.8	MPN/100 mL	1	2105975	07/20/21 13:00	07/23/21	SM 9221	
E. Coli	**7.5**	1.0	1.0	"	1	2105978	07/20/21 13:15	07/21/21	SM9223	
Bac-15-SCR (21G1136-05) Water Sampled: 07/20/21 11:30 Received: 07/20/21 12:36										
Fecal Coliforms	>1600	1.8	1.8	MPN/100 mL	1	2105975	07/20/21 13:00	07/23/21	SM 9221	
E. Coli	**139.6**	1.0	1.0	"	1	2105978	07/20/21 13:15	07/21/21	SM9223	

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CALIFORNIA LABORATORY SERVICES
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07/27/21 12:12

Stillwater Sciences	Project:	SMUD In situ, Bac-T, & Chemistry Monitoring	**CLS Work Order #: 21G1136**
2855 Telegraph Ave., Suite 400	Project Number:	750.10 Task 0500.02	COC #:
Berkeley CA, 94705	Project Manager:	Emily Applequist	

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes

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CALIFORNIA LABORATORY SERVICES
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07/27/21 12:12

Stillwater Sciences	Project:	SMUD In situ, Bac-T, & Chemistry Monitoring	**CLS Work Order #: 21G1136**
2855 Telegraph Ave., Suite 400	Project Number:	750.10 Task 0500.02	COC #:
Berkeley CA, 94705	Project Manager:	Emily Applequist	

Notes and Definitions

BT-5	>1600
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

This is a "MDL Report", thus if the report denotes an "ND" for a particular analyte, it should be noted that the analyte was not detected at or above the MDL.

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CALIFORNIA LABORATORY SERVICES
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07/27/21 12:12

Stillwater Sciences	Project:	SMUD In situ, Bac-T, & Chemistry Monitoring	**CLS Work Order #: 21G1136**
2855 Telegraph Ave., Suite 400	Project Number:	750.10 Task 0500.02	COC #:
Berkeley CA, 94705	Project Manager:	Emily Applequist	

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APPENDIX H
Field Collection Methods for Metals Bioaccumulation Sampling

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Union Valley Reservoir

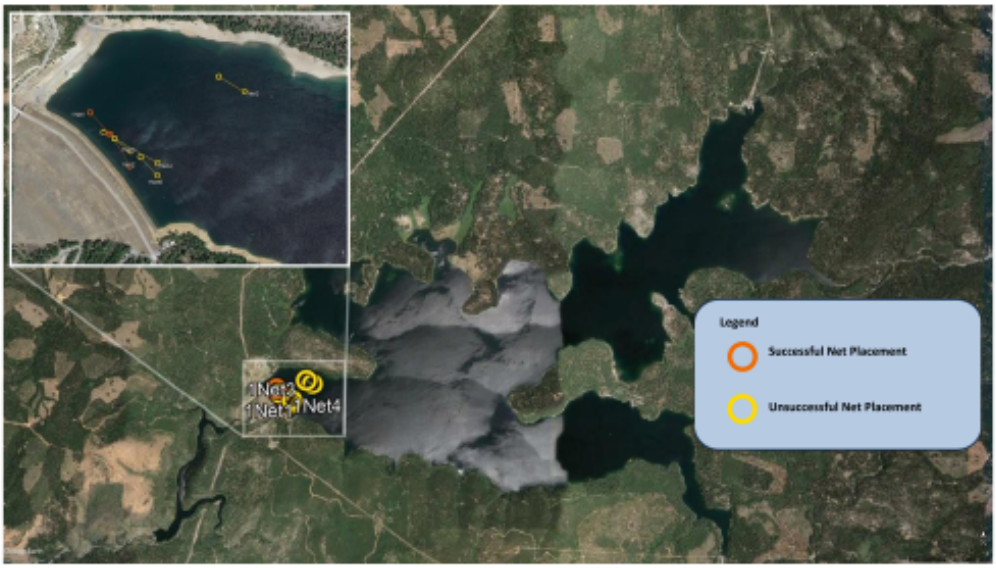

Figure 8. Union Valley Reservoir sampling locations.

Collection Method: Gill net
Date(s) of Collection: August 5, 2016
Sample Effort: 0720-1430 (7 hours)
Samplers: Gary Ichikawa and Scot Lucas

Sportfish Species FL (mm)					
**Rainbow Trout (*Oncorhynchus mykiss*) **					
373		368		414	
Spotted Bass (*Ptychocheilus grandi*)					
172	185	212	220	360	
Fork Length not recorded, Total Length shown					

Comments: The sampling vessel was launched from the launch ramp adjacent to the dam. Electrofishing vessel was ineffective due to low conductivity. Specimens were collected using only gill nets.

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Slab Creek Reservoir

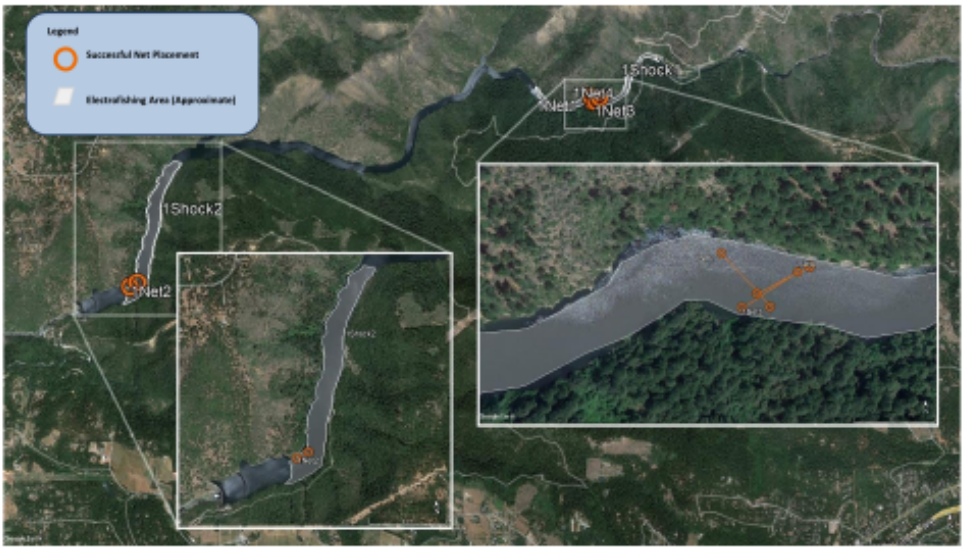

Figure 7a. Slab Creek Reservoir sampling locations.

Collection Method: Electro-fisher boat, gill net
Date(s) of Collection: August 4, 2021
Sample Effort: 0745 – 1645 (9 hours)
Samplers: Gary Ichikawa and Scot Lucas

Sportfish Species FL (mm)					
Rainbow Trout (*Oncorhynchus mykiss*)					
		425			
Brown Trout (Salmo trutta)					
		360			
Sacramento Pikeminnow (*Ptychocheilus grandi*)					
415	440	395	432	433	115
	376	379	407	376	

Comments: The sampling vessel was launched from the main launch ramp. Ten fish were collected via gill net with the remaining two fish samples collected via electro-fishing.

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Loon Lake

Figure 6a. Loon Lake sampling locations.

Collection Method: Electro-fisher boat, gill net
Date(s) of Collection: August 2, 2021
Sample Effort: 1240-1840 (6 hours)
Samplers: Chris Beebe and Evan Mattiasen

Sportfish Species FL (mm)		
Rainbow Trout (*Oncorhynchus mykiss*)		
	179	

Comments: The sampling vessel was launched from the main launch ramp. Strong winds down the fetch of the lake prohibited samplers from safely accessing the northern area. One Rainbow Trout was collected from gill net 1Net2. Low conductivity prohibited efficient use of the electrofishing vessel.

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Ice House Reservoir

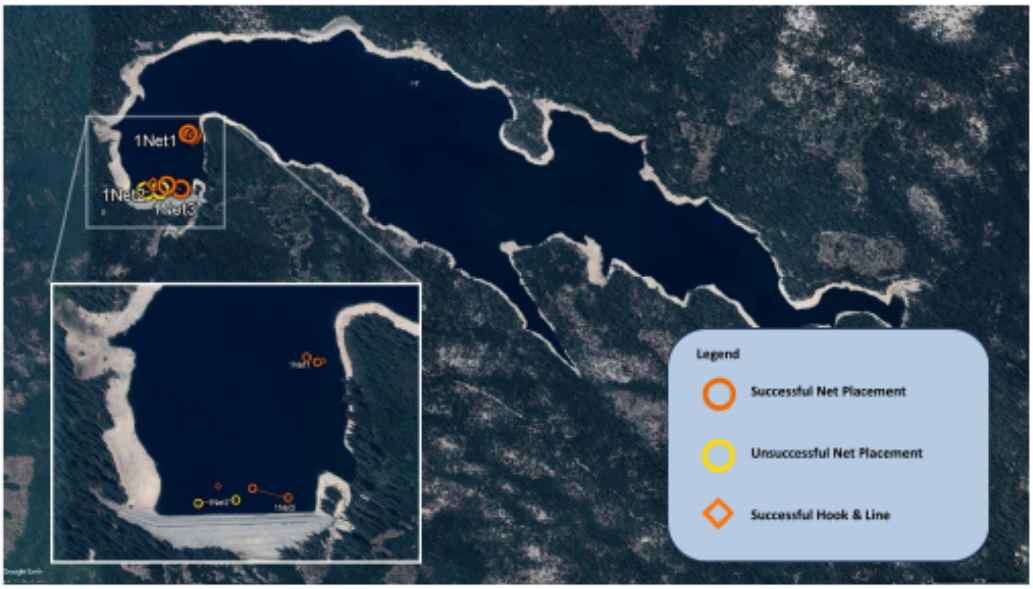

Figure 5a. Ice House Reservoir sampling locations.

Collection Method: Gill net, Hook and line
Date(s) of Collection: August 3, 2016
Sample Effort: 1050 - 1710 (5.33 hours)
Samplers: Gary Ichikawa and Scot Lucas

Sportfish Species FL (mm)			
Rainbow Trout (*Oncorhynchus mykiss*)			
255	233	214	355

Comments: The sampling vessel was launched from the main launch ramp. Two rainbow trout were caught via hook and line effort near the dam. Two Rainbow trout were collected via gill nets. The electro-fisher boat was unable to be used effectively due to low conductivity at the site.

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Gerle Creek Reservoir

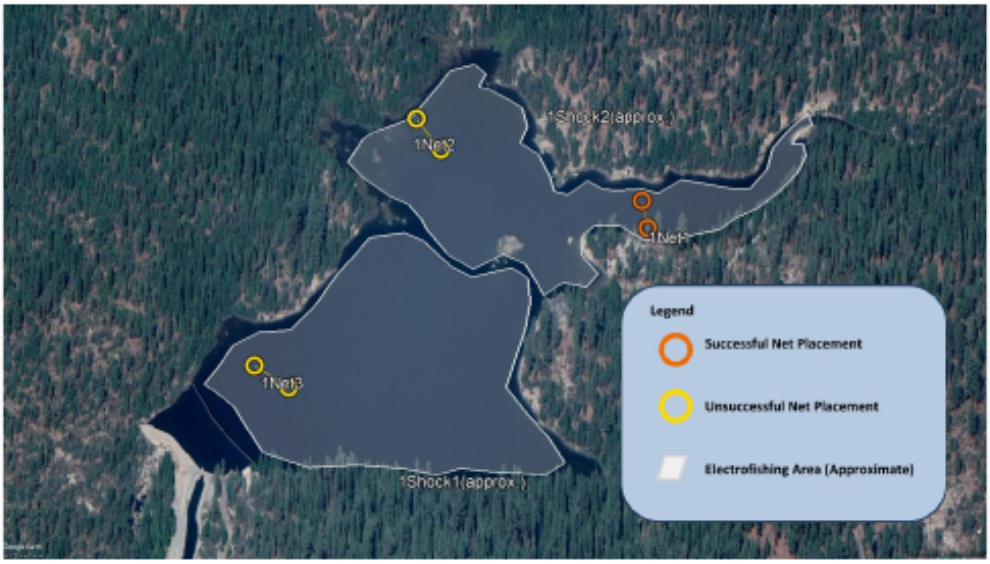

Figure 4. Gerle Creek Reservoir sampling locations.

Collection Method: Electro-fisher boat, gill net
Date(s) of Collection: August 5, 2021
Sample Effort: 0730 - 1200 (4.5 hours)
Samplers: Chris Beebe and Evan Mattiasen

Species Collected, FL (mm)					
Rainbow Trout (*Oncorhynchus mykiss*)					
		174			
Brown Trout (Salmo trutta)					
295	226	233	241	248	255
224	208	296	301	332	

Comments: The sampling vessel was launched from the ramp adjacent to the dam. Ten of the fourteen specimens collected via net placement 1Net1. Nearly the entire boatable area was sampled by electrofishing producing one Brown Trout and one Rainbow Trout.

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Chili Bar Reservoir

Figure 3. Chili Bar Reservoir sampling locations.

Collection Method: Electro-fisher boat, gill net
Date(s) of Collection: August 4, 2021
Sample Effort: 0730 - 1505 (7.5hours)
Samplers: Chris Beebe and Evan Mattiasen

Sportfish Species FL (mm)			
Rainbow Trout (*Oncorhynchus mykiss*)			
	176	307	
Sacramento Pikeminnow (*Ptychocheilus grandi*)			
	180	257	

Comments: The sampling vessel was launched from the main launch ramp adjacent to the dam. One brown trout was collected in the gill nets, the other specimens were collected using the electro-fisher boat.

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Camino Reservoir

Figure 2. Camino Reservoir sampling locations.

Collection Method: Electro-fisher boat, gill net
Date(s) of Collection: August 3, 2021
Sample Effort: 0815 – 1430 (5.25 hours)
Samplers: Chris Beebe and Evan Mattiasen

Sportfish Species FL (mm)					
Rainbow Trout (*Oncorhynchus mykiss*)					
252	180	157	139	139	176
Brown Trout (*Salmo trutta*)					
238	190	320	183	182	219

Comments: The sampling vessel was launched from the bank. The entire boatable area of the reservoir was sampled twice using the electro-fisher boat. Eight fish were collected using the electrofishing vessel. Three fish were collected at net placement 1Net1 and one Brown Trout was collected at 1Net2.

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Table 1. Fish Collection Summary

	Rainbow Trout	Brown Trout	Spotted Bass	Sacramento Pikeminnow
Camino Reservoir	6	6		
Chili Bar Reservoir	2			2
Gerle Creek Reservoir	1	11		
Ice House Reservoir	4			
Loon Lake	1			
Slab Creek Reservoir	1	1		10
Union Valley Reservoir	3		5	

2.6.1 Table of Contents for SMUD Collection Locations

At the MPSL-DFW lab, samples were stored in a freezer at -20°C until they were processed for authorized analysis, per appropriate SOP's. Analysis authorization dictates tissue analysis (QA/QC requirements-preservatives, dissecting, cooling, etc.).

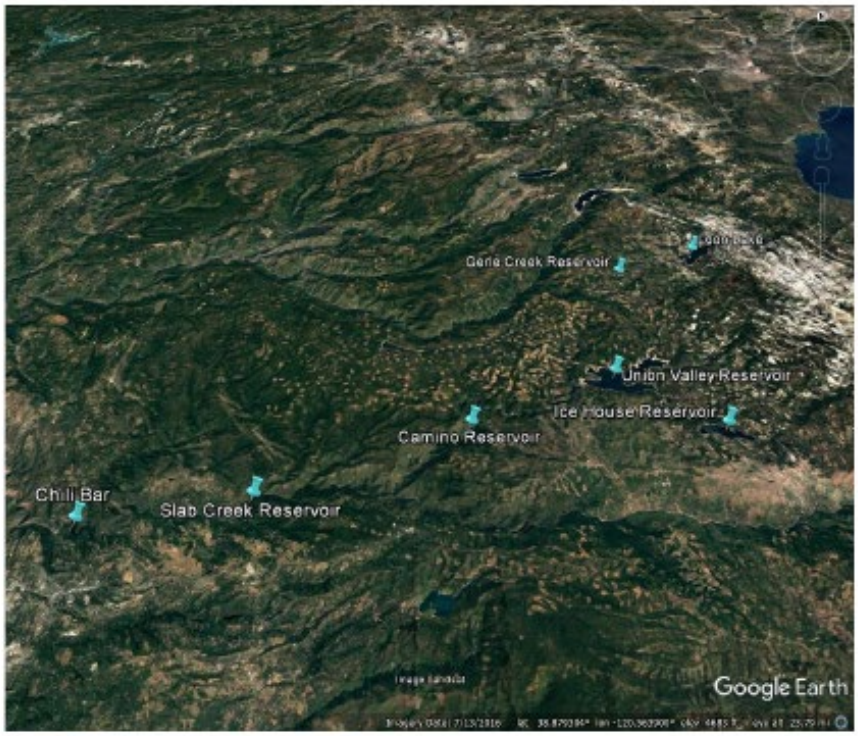

Figure 1. Overview of lakes sampled.

2.6 Results

A summary of the number of fish samples collected from the seven water bodies are in Table 1.

Two MPSL-DFW teams sampled the lakes and reservoirs. More detail regarding maps of the sampling effort for each water body, the sampling crew, station name, date, species collected and total length, are linked to Table 2.7.1 below.

2.2 MPSL-DFW Sampling personnel

Wesley Heim	Project Director
Gary Ichikawa	Crew Lead
Chris Beebe	Crew Lead
Scot Lucas	Research Tech
Evan Mattiasen	Research Tech

2.3 Authorization to collect samples

All sampling personnel are Marine Pollution Studies Lab staff contracted through San Jose State University Research Foundation (SJSURF) to conduct the sample collection activities listed herein. Fish were collected under Ca Department of Fish and Wildlife specific use permit S-183470004-21048-001; Title: Sacramento Municipal Utility District Monitoring.

2.4 Station selection

The study area includes seven project reservoirs and diverted stream reaches. Reservoirs included in the fish monitoring program include Chili Bar, Loon Lake, Gerle Creek, Ice House, Union Valley, Camino, and Slab Creek.

Fish tissues were sampled to assess potential bioaccumulation of metals in resident fish within these reservoirs in accordance with protocols of the State Water Quality Control Board (SWRCB) Surface Water Ambient Monitoring Program (SWAMP). Fish collection was conducted using hook and line, gill nets and electro-fishing boats; techniques approved by the CDFW.

2.5 Summary of types of samples authorized to be collected

Sport fish species were to be collected to better determine contamination risks at the chosen lakes. Target species included brown trout (*Salmo trutta*), black bass (*Micropterus spp.*), rainbow trout (*Oncorhynchus mykiss*) and Sacramento pikeminnow (*Ptychocheilus grandis*). An attempt was made to collect a minimum of three fish per species. Physical parameters were collected for each individual fish, which included: weight, total length, fork length and presence of any abnormalities. Each sport fish was individually tagged, wrapped in aluminum foil, placed in a labeled zipper-closure bag and stored on dry ice for the duration of the trip.

Cruise Report for the Water Quality Monitoring Plan for the Upper American River Project (UARP)/FERC Project No. 2101 UARP or 2155 CHILI BAR Sacramento Municipal Utility District (SMUD)

Sampling Dates: August 2 – August 5, 2021

**Prepared by Chris Beebe and Marine Pollution Studies Laboratory Staff (MPSL-DFW)
at Moss Landing Marine Laboratories; San Jose State University**

1.0 Introduction

This work was performed for the Sacramento Municipal Utility District (SMUD) as part of their relicensing requirements through the Water Quality Monitoring Plan for the Upper American River Project (UARP)/FERC Project No. 2101 UARP or 2155 CHILI BAR.

The Upper American River Project is situated within El Dorado and Sacramento counties on the western slope of the Sierra Nevada. Operated by SMUD, the UARP consists of eleven reservoirs and eight powerhouses. In normal water years the UARP provides roughly 1.8 billion kilowatt-hours of electricity or enough energy to power about 180,000 homes. It covers over 6400 acres in the El Dorado National Forest and land administered by the Bureau of Land Management and receives runoff from approximately 674 square miles. The UARP also has extensive recreational facilities at many of the reservoirs.

The UARP water quality plan includes monitoring of the following: 1) basic *in situ* parameters, 2) general water chemistry, 3) bacteria, and 4) metals bioaccumulation. The portion of this plan detailed below only describes the activities in Part 4: the bioaccumulation of metals in fish.

2.0 Cruise Report

2.1 Objectives

The objectives were to collect designated sportfish species as identified by the SMUD Water Quality Monitoring Plan (May 2015). We targeted the following primary fish species at all lakes: brown trout (*Salmo trutta*), smallmouth bass (*Micropterus dolomieu*), rainbow trout (*Oncorhynchus mykiss*) and Sacramento pikeminnow (*Ptychocheilus grandis*). A minimum of three individuals from each species were targeted from each lake, non-size specific. If hardhead were seen, they were returned unharmed to the reservoir.

Fish were collected under California Department of Fish and Wildlife (CDFW) specific use permit S-183470004-21048-001; Title: Sacramento Municipal Utility District Monitoring. Sample sites were reached by boating and fish were collected by hook and line, gill nets and electro-shocking boats in accordance with the permit.

2.7 Discussion

A total of seven lakes were sampled: Camino Reservoir, Chili Bar Reservoir, Gerle Creek Reservoir, Ice House Reservoir, Loon Lake, Slab Creek Reservoir and Union Valley Reservoir. The collections were done over a period of four consecutive days: August 2 through August 5, 2021.

APPENDIX I
QA/QC Summaries for Metals Bioaccumulation Sampling

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HOLDING TIME

Metals samples were digested January 14 through February 2, 2022 and analyzed January 22 through February 11, 2022. Samples were analyzed within the EPA holding time of 1 year from collection.

Mercury samples were analyzed January 26 through February 7, 2022. Samples were analyzed within the EPA holding time of 1 year from collection.

CALIBRATION VERIFICATION

Initial Calibration Verification (ICV) and all Continuing Calibration Verification (CCV) were within DQO of ±20%.

DETECTION LIMIT

Detection limits were determined using chicken breast, and calculated following EPA 40 CFR 136 Appendix B, revision 2 (2016). All detection limits listed in the table above were achieved.

METHOD BLANKS

Two (2) method blanks were analyzed with each batch of metals samples. Three (3) method blanks were analyzed with each batch of mercury samples. All blanks were below detection limits. Sample results are not blank corrected.

REPLICATES

One pair of analytical duplicates selected haphazardly was analyzed with each batch of samples. All RPDs met the DQO of ±25%, when calculable.

MATRIX SPIKES

Two matrix spike/matrix spike duplicate (MS/MSD) pairs were analyzed with each batch of metals samples. All recoveries and RPDs met the DQO of ±25%.

One matrix spike/matrix spike duplicate (MS/MSD) pair was analyzed with each batch of mercury samples. All recoveries and RPDs met the DQO of ±25%.

CERTIFIED REFERENCE MATERIAL

One CRM DORM-5 was analyzed with each batch of samples. The percent moisture of CRM DORM-5 at the time of analysis was 3.06 or 3.31. Percent moistures for CRMs were measured on January 11 and February 1, 2022.

The certified value for Lead is below the dry weight Method Detection Limit (MDL), therefore a Laboratory Control Spike (LCS) was reported instead. There is no percent moisture associated with LCS.

Percent recoveries met the DQO of ±25%.

Marine Pollution Studies Laboratories
Moss Landing Marine Laboratories
7544 Sandholdt Road
Moss Landing, CA 95039

Project Manager: Autumn Bonnema
Phone: 831-771-4175
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Project Name: SMUD_FERC_2021
Parameter: Metals and Mercury
Matrix: Tissue
Report Date: 18 Feb 2022

QA/QC SUMMARY

SAMPLE CUSTODY

Fifty-two (52) tissue samples were collected August 3-5, 2021 and were received in good condition on August 6, 2021. Cooler temperature at the time samples were received was -20°C. Samples were stored at -20°C before and after analysis.

An additional twenty (20) tissue samples were collected at Union Valley Reservoir on August 17, 2021 for the State Wide Bioaccumulation Monitoring Program. Cooler temperature when samples were received on August 18, 2021 was -20°C. Samples were stored at -20°C before and after analysis. Both programs agreed to share the data collected from these fish.

QA/QC DATA QUALITY OBJECTIVES (DQO)

Analyte	Reference Method	Range of Recovery	Relative Precision	Detection Limit (MDL)	Reporting Limit (RL)
Ag	EPA 200.8M	±25%	±25%	0.02 µg/g $_{wet}$ 0.09 µg/g $_{dry}$	0.07 µg/g $_{wet}$ 0.27 µg/g $_{dry}$
Cu	EPA 200.8M	±25%	±25%	0.36 µg/g $_{wet}$ 1.34 µg/g $_{dry}$	1.07 µg/g $_{wet}$ 4.02 µg/g $_{dry}$
Pb	EPA 200.8M	±25%	±25%	0.02 µg/g $_{wet}$ 0.07 µg/g $_{dry}$	0.05 µg/g $_{wet}$ 0.20 µg/g $_{dry}$
Hg	EPA 7473M	±20%	±25%	0.003 µg/g $_{wet}$ 0.012 µg/g $_{dry}$	0.010 µg/g $_{wet}$ 0.039 µg/g $_{dry}$

METHOD

Fish were dissected following MPSL-105, Laboratory Preparation of Tissue in Marine and Freshwater Bivalves and Fish for Trace Metal and Synthetic Organic Analysis.

Metals samples (Ag, Cu, and Pb) were digested using EPA 3052 (Modified): Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices, and analyzed using EPA 200.8 (Modified): Determination of Trace Elements in Ambient Waters and Wastes by ICP-MS. Digestion was performed by Amy Byington and analysis by Adam Newman.

Mercury samples were analyzed using EPA 7473 (Modified): Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry. Analysis was performed by Jessica Heath.