Lake Elsinore and Canyon Lake Watersheds Nutrient TMDL Monitoring 2022-2023 Annual Report - FINAL

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Lake Elsinore & San Jacinto Watersheds Authority

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
µS/cm	microSiemens per centimeter
Basin Plan	Water Quality Control Plan for the Santa Ana River Basin
CCC	criterion continuous concentration
cf	cubic feet
cfs	cubic feet per second
CMC	criterion maximum concentration
DI	Depth-integrated
DO	dissolved oxygen
EMC	event mean concentration
Epi	epilimnion
EVMWD	Elsinore Valley Municipal Water District
Forest Service	San Bernardino Nation Forest Service
FY	fiscal year
Hypo	hypolimnion
J	concentration between MDL and RL
kg	kilogram
LA	load allocation
LESJWA	Lake Elsinore and San Jacinto Watersheds Authority
MDL	Method detection limit
Mgal	million gallons of water
mg/L	milligrams per liter
NA	not applicable
ND	non-detect
NM:LE	not measured lab error
NPDES	National Pollutant Discharge Elimination System
NS	not sampled
NWS	National Weather Service
QAPP	Quality Assurance Project Plan
RCFC&WCD	Riverside County Flood Control and Water Conservation District
RL	Reporting limit
RWQCB	Regional Water Quality Control Board, Santa Ana Region
SAWPA	Santa Ana Watershed Project Authority
SM	Standard Method
Surf	Surface sample (0-2 meter composite)
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TMDL Task Force	Lake Elsinore and Canyon Lake TMDL Task Force
US EPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey
WLA	waste load allocation

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1.0 Introduction

The following document summarizes results of compliance monitoring required in support of the Lake Elsinore and Canyon Lake Nutrient Total Maximum Daily Load (TMDL) for the 2022-2023 fiscal year (FY). The monitoring was performed according to the Lake Elsinore & Canyon Lake Nutrient TMDL Monitoring Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, September 2016), and the associated Compliance Monitoring Work Plan (Haley & Aldrich, Inc., July 2016).

1.1 Background

Lake Elsinore is a natural freshwater lake in southern California that provides a variety of habitats for terrestrial and aquatic species. While being a natural lake, the lake does have a history of drying during extended drought periods, and then being refilled through large storm events over one or more years. Currently, Elsinore Valey Municipal Water District (EVMWD) discharges approximately 6.0 million gallons per day (MDG) of treated, recycled water into Lake Elsinore to help maintain its water level during periods when the lake would potentially dry. The beneficial uses of the lake include water contact recreation (REC1), non-water contact recreation (REC2), commercial and sportfishing (COMM), warm freshwater habitat (WARM), wildlife habitat (WILD), and rare, threatened or endangered species (RARE)[1]. While being a natural lake, the lake has been modified in various ways to enhance its recreational use and aquatic habitat, including creation of a levee at the lake's south end to increase the water depth / reduce evaporation, and water in the lake is supplemented with approximately 6 million gallons per day of recycled water from Elsinore Valley Municipal Water District (EVMWD). Canyon Lake was constructed in 1928 as the Railroad Canyon Reservoir. It is located approximately two miles upstream of Lake Elsinore and water spilled from Canyon Lake is a main source of water for Lake Elsinore during wet years. The beneficial uses of Canyon Lake include municipal and domestic water supply (MUN), agricultural supply (AGR), groundwater recharge (GWR), body contact recreation (REC1), non-body contact recreation (REC2), commercial and sportfishing (COMM), warm freshwater aquatic habitat (WARM), and wildlife habitat (WILD). The beneficial uses of COMM and RARE in Lake Elsinore and COMM in Canyon Lake were approved by the California Regional Water Quality Control Board, Santa Ana Region (RWQCB) as an amendment to the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) under resolution R8-2017-0019 on June 16, 2017, and became effective on October 15, 2018 after being approved by US EPA.

In 1994, Lake Elsinore and Canyon Lake were first listed by the RWQCB on its Clean Water Act Section 303(d) list of impaired waterbodies. Both lakes remain on the latest approved 303(d) list, Res. No. 2022-0006. Current impairments identified for these waters included excessive levels of nutrients in both lakes, as well as organic enrichment/low dissolved oxygen (DO), sedimentation/siltation, unknown causes of toxicity, and PCBs/DDTs in Lake Elsinore. The Clean Water Act Section 303(d) requires the development and implementation of a TMDL for waters that do not or are not expected to meet water quality standards (beneficial uses, water quality

[1] Based on federally listed Riverside fairy shrimp (*Streptocephalus woottoni*) in adjacent wetlands.

objectives). In 2000, the RWQCB initiated the development of TMDLs for nutrients for Lake Elsinore and Canyon Lake.

In December 2004, the RWQCB adopted amendments to the Basin Plan to incorporate TMDLs for nutrients in Canyon Lake and Lake Elsinore. The amendments were subsequently approved by US EPA on September 30, 2005. The Basin Plan Amendment specifies, among other things, monitoring recommendations to measure progress towards attainment of TMDL thresholds and associated waste load allocations (WLAs) and monitoring to measure compliance towards in-lake numeric water quality targets. Numeric in-lake targets and watershed load allocations have been established and incorporated in the TMDL for nutrients (total nitrogen, phosphorus, and ammonia), DO, and chlorophyll-a (Tables 1-1 and 1-2); however, the ultimate compliance goal for beneficial uses in both lakes is to reduce eutrophication, which can negatively affect biological communities, result in fish kills, and impact recreational use. The recommendations outlined in RWQCB Resolution No. R8-2004-0037 required stakeholders to develop management plans and conduct long-term monitoring and implementation programs aimed at reducing nutrient loads to Lake Elsinore and Canyon Lake. Task 4 of the adopted Lake Elsinore and Canyon Lake TMDL Amendment required stakeholders to prepare and implement a Nutrient Monitoring Program. The program was to include the following:

1. A watershed-wide monitoring program to determine compliance with interim and/or final nitrogen and phosphorus loading; compliance with the nitrogen and phosphorus TMDL, and load allocations (LAs), including WLAs.

2. A Lake Elsinore in-lake nutrient monitoring program to determine compliance with interim and final nitrogen, phosphorus, chlorophyll-a, and DO numeric targets.

3. A Canyon Lake in-lake nutrient monitoring program to determine compliance with interim and final nitrogen, phosphorus, chlorophyll-a, and DO numeric targets.

4. A draft annual report summarizing the data collected for the year and evaluating compliance with the TMDL, due August 15 of each year.

Table 1-1. Final In-Lake Numeric Compliance Targets for the 2004 TMDLs (adapted from Table 5-9n in the Basin Plan, Santa Ana Water Board 2016)

Indicator	Lake Elsinore	Canyon Lake
Total Phosphorus Concentration (Final)	Annual average no greater than 0.1 milligrams/liter (mg/L) to be attained no later than 2020	Annual average no greater than 0.1 mg/L to be attained no later than 2020
Total Nitrogen Concentration (Final)	Annual average no greater than 0.75 mg/L to be attained no later than 2020	Annual average no greater than 0.75 mg/L to be attained no later than 2020
Ammonia Nitrogen Concentration (Final)	Calculated concentrations to be attained no later than 2020 *Acute*: 1-hour average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the Criterion Maximum Concentration (CMC) (acute criteria), where $CMC = 0.411/(1+10^{7.204-pH}) + 58.4/(1+10^{pH-7.204})$ *Chronic*: 30-day average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the Criterion Continuous Concentration (CCC) (chronic criteria), where $CCC = (0.0577/(1+10^{7.688-pH}) + 2.487/(1+10^{pH-7.688})) * \min(2.85, 1.45*10^{0.028(25-T)})$	Calculated concentrations to be attained no later than 2020 *Acute*: 1-hour average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the CMC (acute criteria), where $CMC = 0.411/(1+10^{7.204-pH}) + 58.4/(1+10^{pH-7.204})$ *Chronic*: 30-day average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the CCC (chronic criteria), where $CCC = (0.0577/(1+10^{7.688-pH}) + 2.487/(1+10^{pH-7.688})) * \min(2.85, 1.45*10^{0.028(25-T)})$
Chlorophyll-*a* Concentration (Final)	Summer average no greater than 25 micrograms/liter (µg/L); to be attained no later than 2020	Annual average no greater than 25 µg/L; to be attained no later than 2020
Dissolved Oxygen Concentration (Final)	No less than 5 mg/L 1 meter (m) above lake bottom; to be attained no later than 2020	Daily average in hypolimnion no less than 5 mg/L; to be attained no later than 2020

Table 1-2. Final Watershed Loading Numeric Load Allocations from the 2004 TMDL (adapted from Table 5-9p in the Basin Plan, Santa Ana Water Board 2016)

TMDL	Final Total Phosphorus TMDL (kg/yr)[a, b]	Final Total Nitrogen TMDL (kg/yr)[a, b]
Canyon Lake	8,691	37,735
Lake Elsinore	28,584	230,025

a - Final compliance to be achieved as soon as possible, but no later than December 31, 2020.
b - TMDL specified as 10-year running average. Sum all wasteload and allocation sources.

Since August 2001, the Lake Elsinore and San Jacinto Watersheds Authority (LESJWA) has been working with local stakeholders and the RWQCB to identify the source of nutrients impairing each lake and evaluate the impacts to water quality and beneficial uses incurred from nutrient sources.

At that time, LESJWA contracted with the State to serve as a neutral facilitator for the RWQCB to assist in formation of a TMDL workgroup and assist the workgroup in participating with the RWQCB in the development and definition of the TMDLs.

After adoption of the Lake Elsinore and Canyon Lake nutrient TMDLs on December 20, 2004, stakeholders named in the TMDLs began the process to create a formal cost sharing body, or Task Force, to implement a number of tasks included in the TMDLs.

In November 2006, stakeholders finalized an agreement to form the Lake Elsinore and Canyon Lake TMDL Task Force (hereafter "TMDL Task Force"). The TMDL Task Force consists of representatives from local cities, Riverside County, agriculture and dairy, and the regulatory community. At the request of the stakeholders and RWQCB, LESJWA (staffed by the Santa Ana Watershed Project Authority or "SAWPA") serves as administrator of the TMDL Task Force and oversees the TMDL implementation for Lake Elsinore and Canyon Lake.

LESJWA, in support of the TMDL Task Force, provided funding to meet the requirement of the TMDL by developing a single comprehensive watershed-wide nutrient Monitoring Plan. The Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Plan was approved by the RWQCB in March 2006, and subsequently implemented by the TMDL Task Force starting in April 2006 through October 2012. During this time frame, in-lake monitoring for both lakes was conducted through the EVMWD National Pollutant Discharge Elimination System (NPDES) compliance program (Order No. R8-2005-0003, NPDES No. CA8000027, Regional Water Reclamation Plant, Lake Elsinore, Riverside County). On October 26, 2012, the RWQCB adopted a resolution (Resolution No. R8-2012-0052) granting the TMDL Task Force a temporary suspension of in-lake TMDL monitoring programs to achieve cost savings that were then applied to implementing lake improvement projects aimed at reducing nutrient impacts in Canyon Lake and Lake Elsinore. As a result, the Lake Elsinore and Canyon Lake Nutrient TMDL field compliance monitoring was not conducted during the 2013-2014 and 2014-2015 fiscal year (FY) cycles.

The in-lake and watershed-wide water quality monitoring for both lakes was resumed in July 2015 as Phase II of the Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Program moving forward. A revised Monitoring Work Plan (Haley & Aldrich 2016) and companion Quality Assurance Project Plan (Amec Foster Wheeler 2016) were prepared and approved by the RWQCB in October 2016.

1.2 Nutrient TMDL Compliance Monitoring Objectives

The primary objectives of the Nutrient TMDL Compliance Monitoring Program are to:

1. Determine in-lake concentrations of causal (total nitrogen and total phosphorus) and response (total ammonia, dissolved oxygen, and chlorophyll-a) targets outlined in the adopted 2004 Lake Elsinore and Canyon Lake Nutrient TMDL through regular monitoring of both lakes.

2. Evaluate trends in causal and response parameter concentrations toward achieving 2004 TMDL numeric targets.

3. Quantify the external pollutant loading originating from the watershed above the lakes through stormwater monitoring of the major upstream inputs to Canyon Lake.

4. Determine the total nutrient loads into Lake Elsinore and Canyon Lake from their tributaries (i.e., San Jacinto River and Salt Creek).

5. Provide water quality data from both in-lake and watershed monitoring to update loading model.

Additionally, the data generated by this monitoring program will help support the needs of other programs by tracking the trends in watershed loading and in-lake concentrations relative to BMPs or any other actions taken in the upstream watershed to reduce nutrient loads.

2.0 San Jacinto River Watershed-Wide Monitoring

Watershed monitoring and reporting was performed by NV5 of San Diego, California.

2.1 Summary of 2022-2023 Wet Weather Watershed Monitoring and Nutrient Loads

A summary of the measured concentrations and estimated annual nutrient loads derived from each of the three monitored locations for the period of July 1, 2022 through June 30, 2023, is presented in **Table 2-1**. A more detailed account, including storm hydrographs and event loads are presented in the following sections for each monitoring location.

Table 2-1. Summary of 2022-2023 Monitoring

Number and Location Description	Total Annual Flow [a] (Mgal)	Annual Event Mean Storm Concentration (mg/L)		Estimated Annual Load (kg)	
		Total Nitrogen	Total Phosphorus	Total Nitrogen	Total Phosphorus
Site 3 - Salt Creek at Murrieta Road (USGS 11070465)	1,240	1.83	0.33	8,576	1,533
Site 4 - San Jacinto River at Goetz Road (USGS 11070365)	2,821	1.67	0.43	17,643	4,516
Site 6 - San Jacinto River at Ramona Expressway [b] (USGS 11070210)	13	Not Measured	Not Measured	Not Measured	Not Measured
Site 30 - Canyon Lake Spillway [c] (USGS 11070500)	4,037	1.57	0.10	23,428	1,662

Note:

When a concentration was non-detect, the annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

a - Flow data after 03/06/2023 are provisional and may be subject to change.
b - Mystic Lake did not overflow during the wet weather monitoring period from October 1, 2022, to May 31, 2023. Therefore, no samples were collected from the sampling station at San Jacinto River at Ramona Expressway (Station ID 741) during the 2022-2023 monitoring year.
c -The USGS stream gauge at Site 30 (USGS 11070500) is located downstream of Canyon Lake on the San Jacinto River close to the river entrance to Lake Elsinore. This downstream location is influenced by local urban runoff and groundwater seepage in addition to the flows from Canyon Lake. In addition, runoff from other local tributaries into Lake Elsinore are not included in this table.
Mgal = million gallons; 1 million gallons = 133,680 cubic feet = 3,785,412 L; mg/L = milligrams per liter; kg = kilograms; USGS = United States Geological Survey.

2.2 Historical Wet Weather Watershed Monitoring and Incoming Nutrient Loads

A summary of the historical total nitrogen and total phosphorus water quality monitoring data for the period of July 1, 2013 through June 30, 2023, is presented in **Tables 2-2 to 2-3**. **Table 2-4** presents the 10-year running average of incoming total nitrogen and total phosphorus loads for both lakes in comparison to their TMDL load allocations. In general, the monitoring locations only flow during storm events and the storm flows account for the estimated annual load of nutrients. Lake Elsinore and Canyon Lake meet the current 10-year running average TMDL load allocations for both total nitrogen and total phosphorus (**Table 2-4**). The Canyon Lake TMDL load allocation for total phosphorous is met when accounting for an annual allowable 1,993 kg offset resulting

from alum addition to the lake. Without accounting for this offset, the watershed loading of total phosphorus to the lake would exceed the TMDL allocation as shown in **Table 2-4**. The 10-year running average loading for Lake Elsinore was calculated from samples collected at the Canyon Lake Spillway station. These samples represent the catchment area upstream of the Canyon Lake Spillway and correspond to 93.6% of the total area contributing runoff to Lake Elsinore. The remaining 6.4% of the Lake Elsinore catchment is in the immediate area surrounding Lake Elsinore.

Table 2-2. Summary of Historical Annual Mean Storm Concentrations Based on Monitoring Year

Monitoring Year	Site 3 - Salt Creek at Murrieta Road		Site 4 - San Jacinto River at Goetz Road		Site 30 - Canyon Lake Spillway	
	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)
2013-2014	2.7	0.9	1.8	0.6	NS	NS
2014-2015	2.2	0.5	1.8	0.4	NS	NS
2015-2016	2.5	0.5	2.4	1.4	NS	NS
2016-2017	2.1	0.6	2	1.2	1.9	0.4
2017-2018	2.7	0.4	2	0.4	NS	NS
2018-2019	2.4	0.4	1.7	0.6	1.4	0.2
2019-2020	2.4	0.6	1.8	0.7	1.1	0.16
2020-2021	1.9	0.4	1.9	0.5	1.7	0.05
2021-2022	2.7	0.5	2.4	0.6	1.5	ND (<0.003)[a]
2022-2023	1.8	0.3	1.7	0.4	1.6	0.10

ND = not detected (analyte not detected at the indicated method detection limit (MDL)).

NS – Not sampled when Canyon Lake does not overtop the Canyon Lake Spillway. The USGS stream gauge at Site 30 (USGS 11070500) is located downstream of Canyon Lake on the San Jacinto River close to the river entrance to Lake Elsinore. This downstream location is influenced by local urban runoff and groundwater seepage in addition to the flows from Canyon Lake. In addition, runoff from other local tributaries into Lake Elsinore are not included in this table.

a - When a concentration was non-detect, the annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

Table 2-3. Summary of Historical Estimated Annual Loads Based on Monitoring Year

Monitoring Year	Site 3 - Salt Creek at Murrieta Road			Site 4 - San Jacinto River at Goetz Road			Site 30 - Canyon Lake Spillway		
	Total Annual Flow (Mgal)	Total Nitrogen (kg)	Total Phosphorus (kg)	Total Annual Flow (Mgal)	Total Nitrogen (kg)	Total Phosphorus (kg)	Total Annual Flow (Mgal)	Total Nitrogen (kg)	Total Phosphorus (kg)
2013-2014[a]	464	4,641	1,473	638	4,457	1,475	217	NS	NS
2014-2015	511	4,661	1,257	570	3,932	1,041	196	NS	NS
2015-2016	515	5,647	1,447	872	7,926	4,624	476	NS	NS
2016-2017	1,596	12,366	4,026	2,802	21,651	14,403	4,850	33,759	6,637
2017-2018	271	2,586	482	393	3,055	810	117	NS	NS
2018-2019	1,394	12,213	2,266	3,208	20,457	7,409	5,893	32,832	5,416
2019-2020	1,645	14,792	3,705	3,290	23,337	8,660	4,497	18,762	2,635
2020-2021	255	1,902	396	519	3,794	992	878	5,626	175
2021-2022	351	3,698	625	537	4,976	1,282	640	3,632	0[b]
2022-2023	1,240	8,576	1,533	2,821	17,643	4,516	4,037	23,428	1,662

NS – Not sampled when Canyon Lake does not overtop the Canyon Lake Spillway. The USGS stream gauge at Site 30 (USGS 11070500) is located downstream of Canyon Lake on the San Jacinto River close to the river entrance to Lake Elsinore. This downstream location is influenced by local urban runoff and groundwater seepage in addition to the flows from Canyon Lake. In addition, runoff from other local tributaries into Lake Elsinore are not included in this table.
a - Sum of January 1, 2013 to June 30, 2014. All other monitoring year dates are July 1 to June 30.
b - When a concentration was non-detect, the annual load value for compliance purposes was calculated by converting non-detect (ND) values to zero.

Table 2-4. Historical Estimated Annual Loads as a 10-Year Running Average Relative to the 2004 TMDL Wasteload and Load Allocations

Lake	Analyte	10-yr Running Average (kg/yr) [a]	TMDL Load Allocation (kg/yr)	% of TMDL Load Allocation
Lake Elsinore [b]	Total Nitrogen	9,493	20,774	45.47%
	Total Phosphorus	1,486	2,770	53.6%
Canyon Lake[c]	Total Nitrogen	15,835	21,902	72.3%
	Total Phosphorus	5,688	3,797	149.8%
		-1,993 credit for alum application = 3,695		97.3%

a - Sum of average 10-year annual loads for the monitoring period January 2013 - December 2022.

b – Load allocations taken from Resolution R8-2004-0037 (2004 TMDL) Table 5-9r categorized as Canyon Lake Overflows. Watershed loading estimates for Lake Elsinore were taken from data collected at the Canyon Lake Spillway when it overflows.

c – Load allocations taken from Resolution R8-2004-0037 (2004 TMDL) Table 5-9q. Internal sediment, atmospheric deposition, and supplemental water allocations (Table 5-9q) were subtracted from the total of all allocation sources for both TN and TP to provide a more valid comparison to incoming watershed loads.

2.3 Monitoring Strategy

Phase II of the San Jacinto River Watershed Monitoring Program follows the guidelines detailed in the Lake Elsinore and Canyon Lake Nutrient TMDL Compliance Monitoring Plan. The Phase II San Jacinto River Watershed Monitoring Program sampling activities during the 2022-2023 monitoring period included collection of samples during up to three storm events at the designated monitoring stations throughout the San Jacinto River Watershed. Average nutrient concentrations during the monitored events were used to calculate mass loading during remaining wet weather events that were not monitored to derive total estimated annual mass loads throughout the monitoring year.

2.4 Monitoring Stations and Stream Gauge Locations

To monitor TMDL compliance, five sampling stations were carefully selected to reflect various types of land uses within the San Jacinto River Watershed. Sampling of these locations began in 2006. Sampling station locations were deliberately set up to be within the vicinity of United States Geological Survey (USGS) stream gauge stations. The sampling stations are listed in **Table 2-5** below and shown on **Figure 2-1**.

Three of the five sites (Station IDs 745, 759, and 741) were selected because they are indicative of inputs to Canyon Lake originating from the main stem of the San Jacinto River, Salt Creek, and the watershed above Mystic Lake. The sampling location along the San Jacinto River at Ramona Expressway (Station 741) is located downgradient of Mystic Lake and is only sampled if Mystic Lake is overflowing. Flow has not been observed at this location since a strong El Niño event in the mid-1990s. Because Mystic Lake is an area of active land subsidence, this monitoring station is not expected to flow except under extremely high rainfall conditions.

Table 2-5. San Jacinto River Watershed Monitoring Stations

Station ID	USGS Station ID	Agency	Site Number and Location Description
745	11070465	USGS	Site 3 - Salt Creek at Murrieta Road
759	11070365	USGS	Site 4 - San Jacinto River at Goetz Road
741	11070210	USGS	Site 6 - San Jacinto River at Ramona Expressway
841	11070500	USGS	Site 30 - Canyon Lake Spillway
792a	11069500	USGS	Site 1 - San Jacinto River at Cranston Guard Station

a - The Cranston Guard Station (Station 792) was monitored between 2007 and 2011 by the San Bernardino National Forest Service in accordance with their agreement for in-lieu obligations to the Task Force. In 2012, the Forest Service pulled out of the Task Force and no longer provides monitoring support.

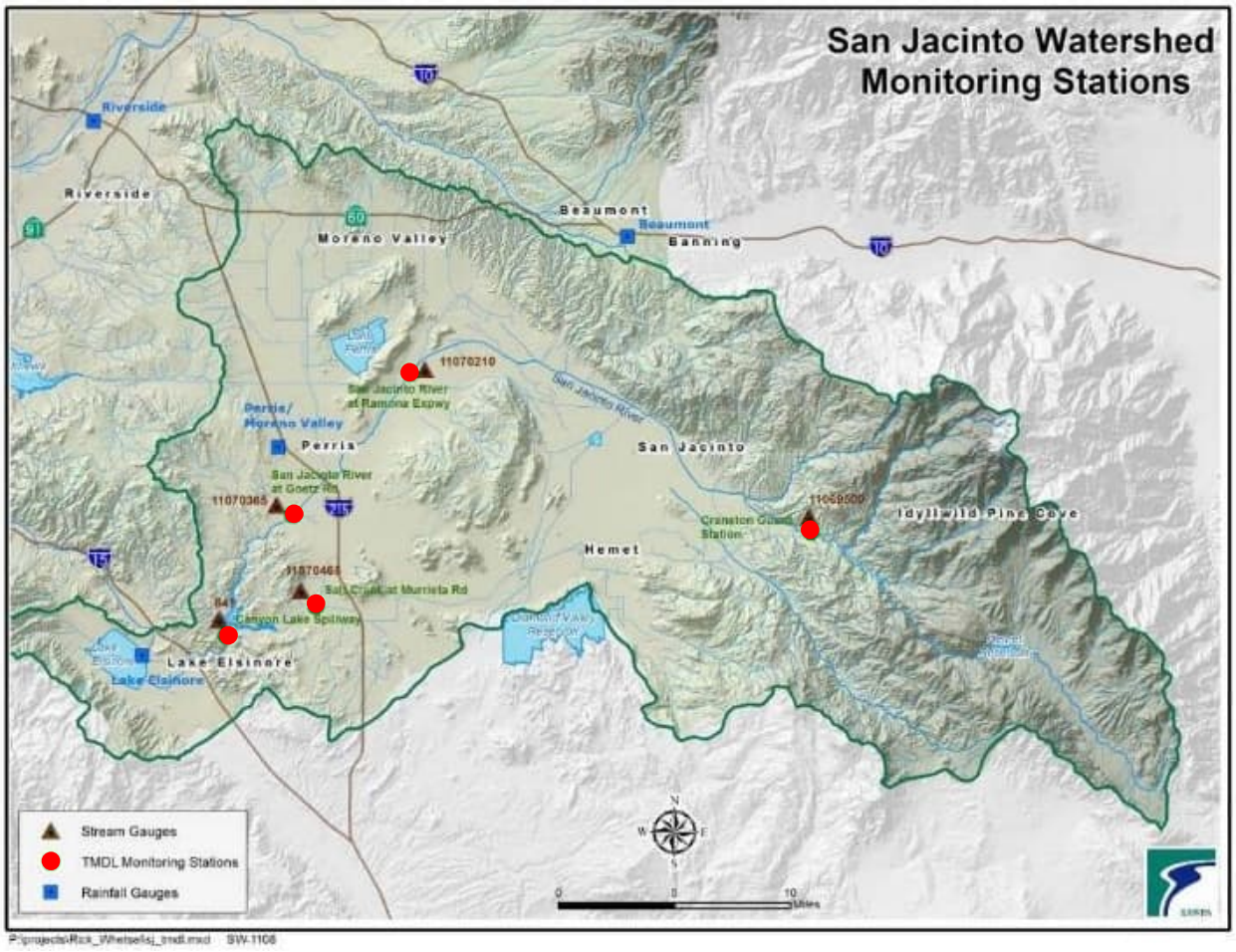

Figure 2-1. San Jacinto River Watershed Monitoring Stations

The fourth site, located below the Canyon Lake Dam (Station ID 841), is indicative of loads entering Lake Elsinore from Canyon Lake and the upstream watershed when the water level overtops the Railroad Canyon Dam Spillway. This site only represents a portion of the total load into Lake Elsinore from upstream of Canyon Lake Dam and does not include runoff from the local watershed. The Railroad Canyon Dam Spillway elevation at Canyon Lake is 1,381.76 feet. Samples are collected from this location during storm events that create lake levels that overtop the dam spillway elevation. The Canyon Lake level is publicly available at the following website:

https://www.evmwd.com/who-we-are/lake-levels

The fifth site at the Cranston Guard Station site on the San Jacinto River (Station 792) was only monitored between 2007 and 2011 by the San Bernardino National Forest Service who no longer provides monitoring support.

2.5 Stream Gauge Records

The USGS monitor stream flow from several gauging stations in the San Jacinto River Watershed. Stream gauging stations maintained and operated for Phase II of the San Jacinto River Watershed Monitoring Program are shown in **Figure 2-1** and identified in **Table 2-5**.

The data record captured per USGS stream gauge is publicly available at the USGS website, where data for the specific gauge numbers provided in **Table 2-6** can be found:

http://waterdata.usgs.gov/ca/nwis/current/?type=flow

A summary of the stream gauge data recorded at each of the stations with measured flow for the monitoring period of July 1, 2022 through June 30, 2023 is presented in **Table 2-6** and visually presented in **Figure 2-2** through **Figure 2-6**. The total monthly flows at each of the USGS stations are reported in **Table 2-6**. In general, the flows are only observed during wet weather storm events and dry weather flows are not observed from each of the USGS stations. The flow data are downloaded from the USGS website and are considered provisional for approximately six months; therefore, flow data presented after March 6, 2023, in this report are provisional. The provisional data provided by the USGS are subject to change and are not citable until reviewed and approved by the USGS.

Table 2-6. Summary of Stream Gauge Data (July 2022 through June 2023)

July 2022-June 2023 Total Monthly Flow (cf)	Site 3 - Salt Creek at Murrieta Road (11070465[c])	Site 4 - San Jacinto River at Goetz Road (11070365 [c])	Site 6 - San Jacinto River at Ramona Expressway [a] (11070210 [c])	Site 30 - Canyon Lake Spillway (11070500 [b])	Site 1 - San Jacinto River at Cranston Guard Station (11069500 [c])
July	0	0	0	0	75,582
August	0	0	0	0	52,587
September	19,458	3,956,229	0	19,215	48,231
October	1,542,240	1,161,189	0	1,368,117	100,620
November	9,665,658	23,194,575	0	3,010,779	4,074,516
December	3,039,138	6,878,871	0	3,168,072	1,055,457
January	59,987,385	116,121,366	1,566,477	258,690,987	158,149,881
February	20,929,536	69,126,543	86,157	89,983,422	21,117,411
March	69,730,218	149,435,379	137,673	161,431,461	492,429,690
April	392,607	6,858,207	0	16,014,753	273,512,430
May	460,242	322,380	0	4,023,522	146,849,220
June	0	0	0	1,959,543	55,261,827
Total Annual Flow (cf)	**165,766,482**	**377,054,739**	**1,790,307**	**539,669,871**	**1,152,727,452**

Notes:
a - No flows originating from the upper watershed were observed at the TMDL monitoring location just downstream of Mystic Lake.
b - USGS gauge number
cf = cubic feet

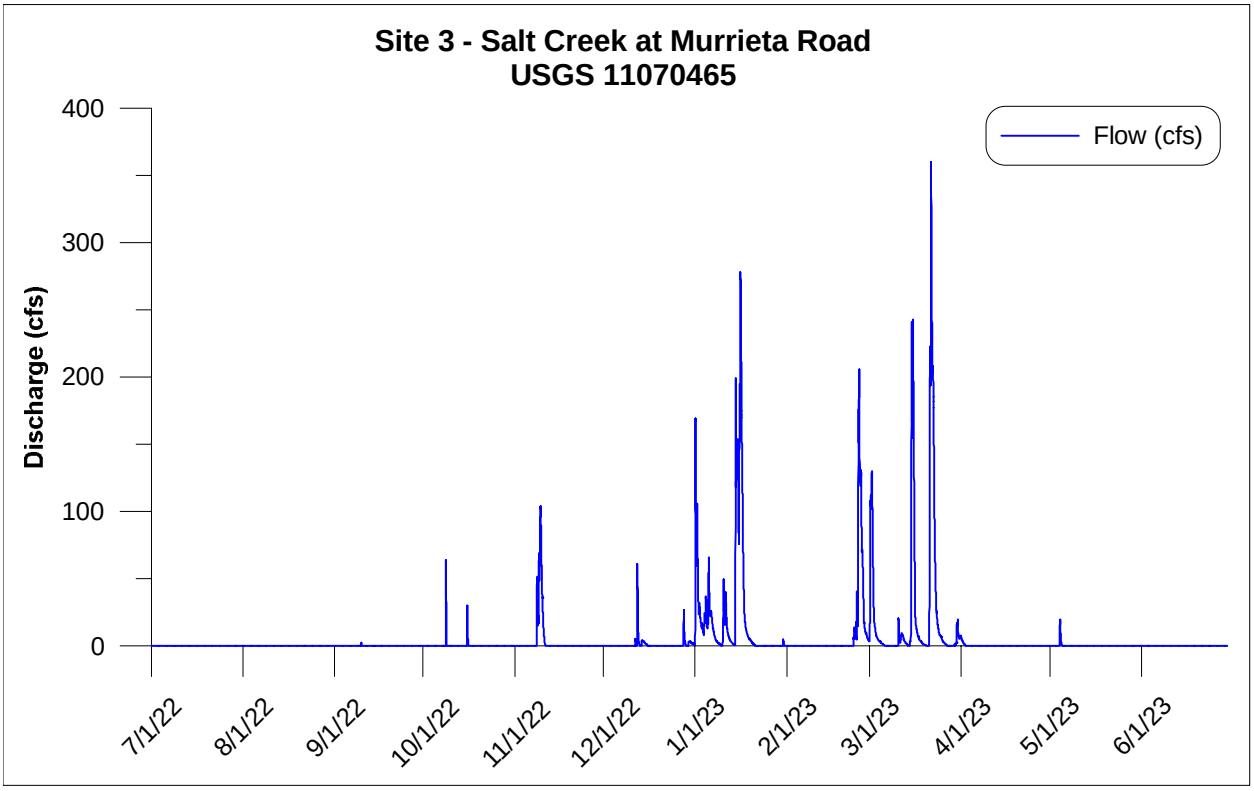

Figure 2-2. Site 3 – Salt Creek at Murrieta Road – Daily Stream Gauge Records

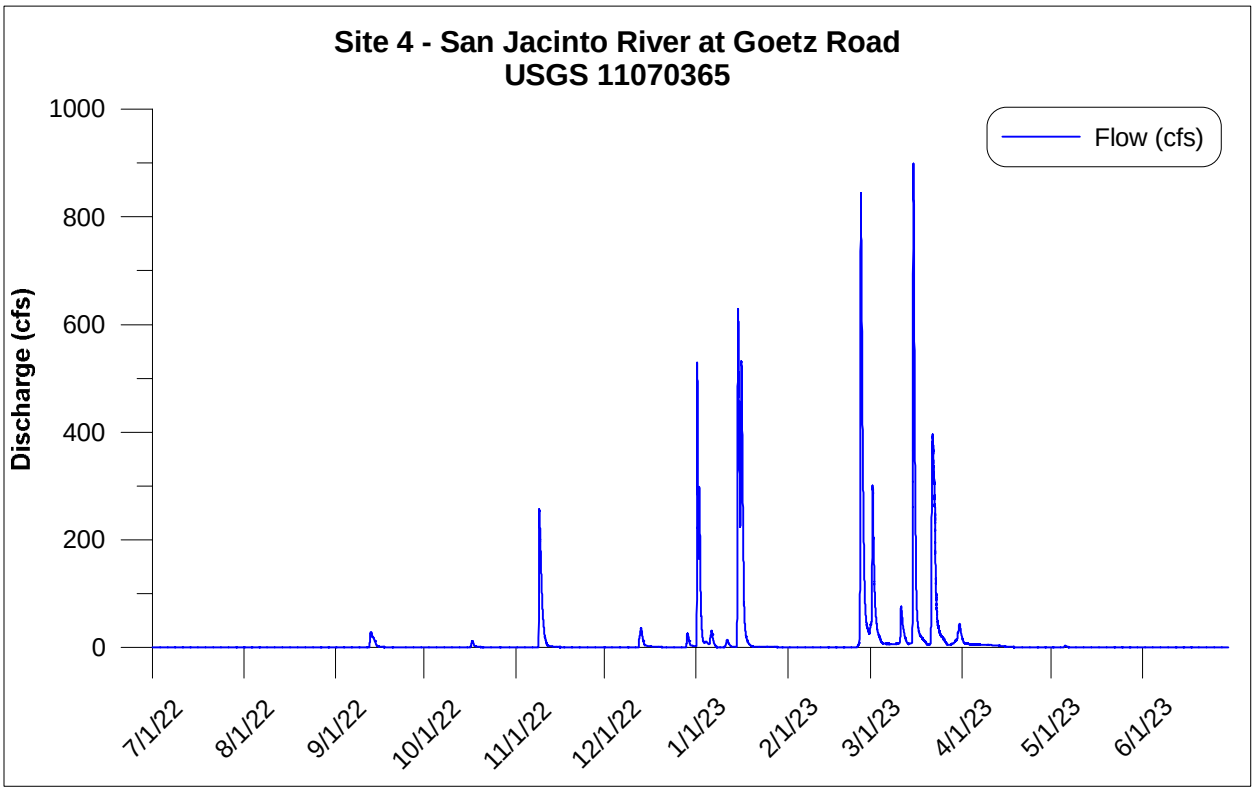

Figure 2-3. Site 4 – San Jacinto River at Goetz Road – Daily Stream Gauge Records

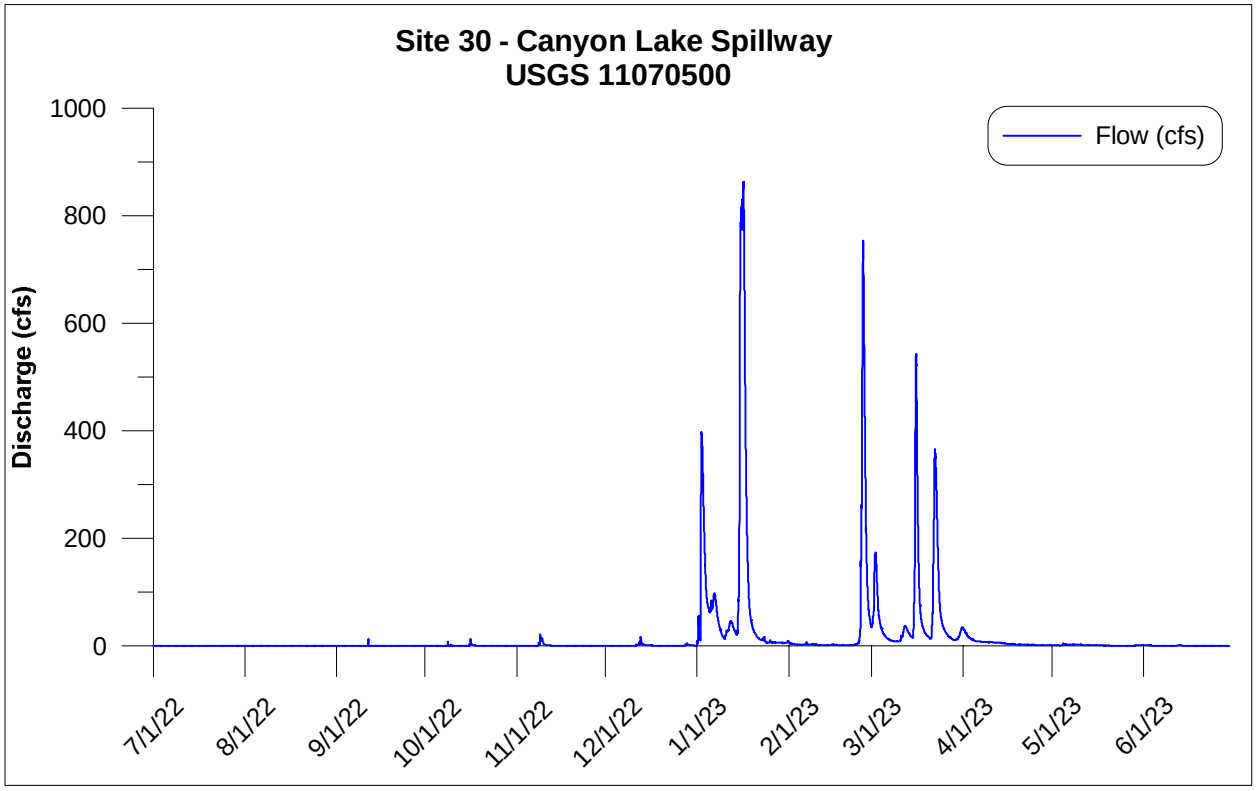

Figure 2-4. Site 30 – Canyon Lake Spillway – Daily Stream Gauge Records

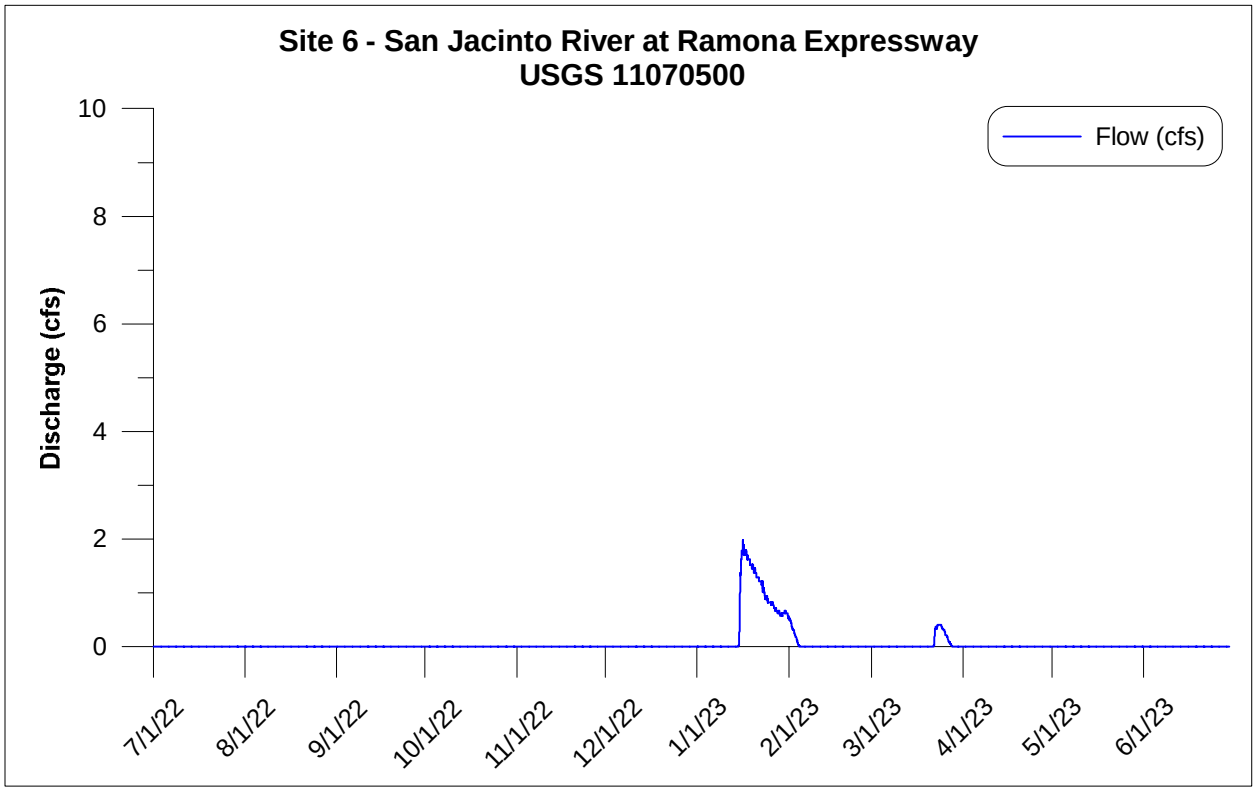

Figure 2-5. Site 6 – San Jacinto River at Ramona Expressway – Daily Stream Gauge Records

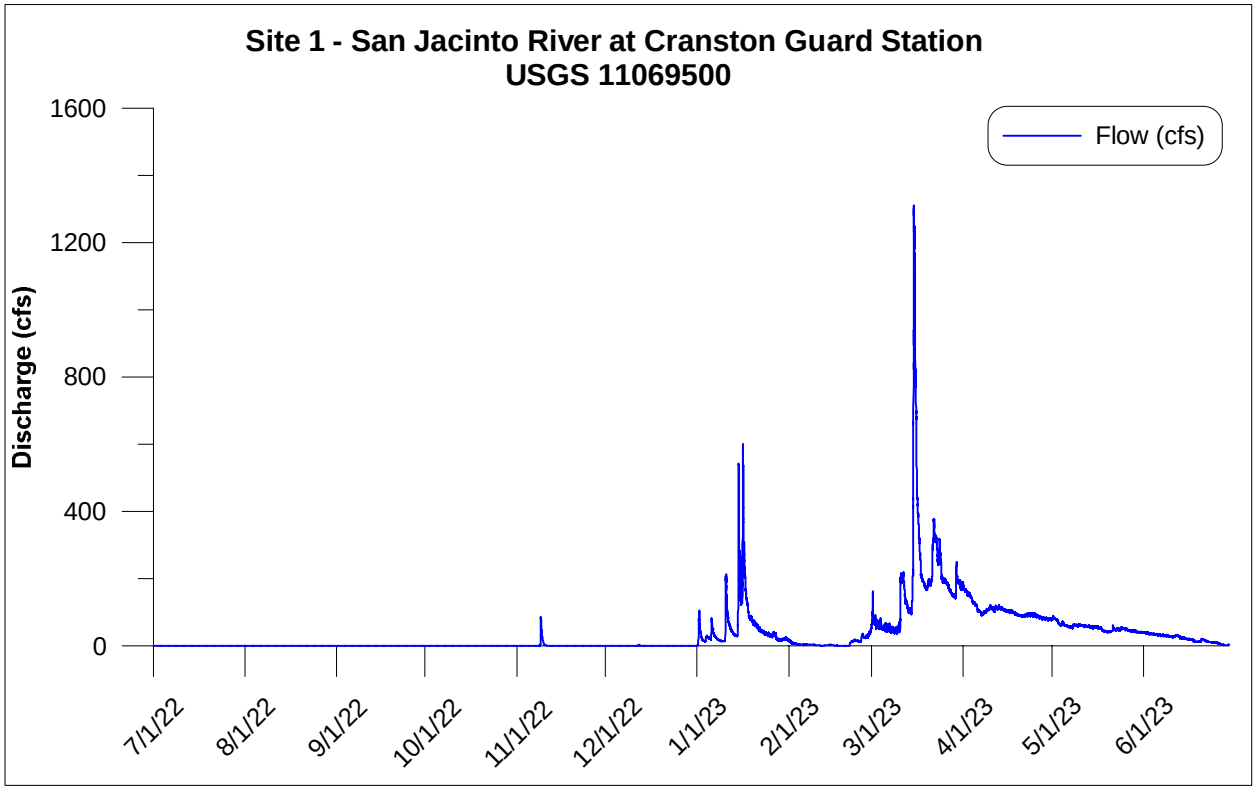

Figure 2-6. Site 1 – San Jacinto River at Cranston Guard Station – Daily Stream Gauge Records

2.6 Sampling Strategy

Phase II of the San Jacinto River Watershed Monitoring Program includes collecting water quality samples during up to three storm events at the designated monitoring stations throughout the San Jacinto River Watershed. Throughout the wet weather monitoring period from October 1, 2022, to May 31, 2023, the National Weather Service (NWS) forecasts were monitored to determine when storm events met the mobilization criteria. The mobilization criteria for sampling requires an NWS quantitative precipitation forecast greater than a 1.0-inch forecast within 24 hours from October 1 through December 31, and greater than an 0.5-inch forecast within 24 hours from January 1 through May 31.

Flow-weighted composite samples were collected during the storm events at the designated monitoring stations. Discrete time-weighted sample aliquots were collected over the rising limb (increasing flow) and the falling limb (decreasing flow) of the hydrograph using automatic sampling equipment (e.g., ISCO autosamplers). The first sample aliquot was taken at or shortly after the time that storm water runoff began, and each subsequent aliquot of equal volume was collected at intervals of approximately 2 hours across the hydrograph, depending on the forecasted size of the storm event. Flow rates and volumes were based on data from USGS stream gauges located near the sampling stations. Upon completion of sampling, field teams downloaded the USGS flow data and subsampled each time-weighted discrete sample to create a single flow-weighted composite sample for laboratory analysis.

The following protocols were applied:

- Sampling commenced once flow was established in the channel.
- Field measurements (temperature, pH, conductivity, dissolved oxygen, and turbidity) were recorded in the field during the rising limb of the hydrograph using portable calibrated YSI multi-parameter meters, or equivalent.
- Biochemical Oxygen Demand and Chemical Oxygen Demand were analyzed for the first discrete grab sample only.

Sampling and analysis followed the guidelines detailed in the Lake Elsinore and Canyon Lake Nutrient TMDL Compliance Monitoring Plan (Haley & Aldrich, Inc., July 2016). More detail regarding the sampling approach (e.g., compositing, sample naming conventions) are described in the Lake Elsinore and Canyon Lake Nutrient TMDL Compliance QAPP (Amec Foster Wheeler, September 2016). These documents are available at the following website:

https://sawpa.org/task-forces/lake-elsinore-and-canyon-lake-tmdl-task-force/#monitoring-program

Samples for all analytical chemistry measurements were submitted Weck Laboratories Inc. located in Industry, California.

2.7 San Jacinto River Watershed Monitoring Events

Water quality samples were collected during the four storm events that met the mobilization criteria during the wet weather monitoring period from October 1, 2022, to May 31, 2023.

The first monitoring event occurred on November 8-10, 2022. Water quality samples were collected at Salt Creek at Murrieta Road (Station ID 745) and San Jacinto River at Goetz Road (Station ID 759). A peak flow of 104 cubic feet per second (cfs) was recorded at Salt Creek at Murrieta Road (Station ID 745) and a peak flow of 257 cfs was recorded at San Jacinto River at Goetz Road (Station ID 759). No flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake did not crest the spillway) and no flows were recorded at the San Jacinto River at Ramona Expressway (Station ID 741). A total of 0.8 to 1.57 inches of rainfall was recorded in the region during this storm (RCFCWCD 2023).

The second monitoring event occurred on December 11-14, 2022. Water quality samples were collected at Salt Creek at Murrieta Road (Station ID 745) and San Jacinto River at Goetz Road (Station ID 759). A peak flow of 61 cfs was recorded at Salt Creek at Murrieta Road (Station ID 745) and a peak flow of 36 cfs was recorded at San Jacinto River at Goetz Road (Station ID 759). No flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake did not crest the spillway) and no flows were recorded at the San Jacinto River at Ramona Expressway (Station ID 741). A total of 0.61 to 1.07 inches of rainfall was recorded in the region during this storm (RCFCWCD 2023).

The third monitoring event occurred on January 4-8, 2023. Water quality samples were collected at Canyon Lake Spillway (Station ID 841) for the period that flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake was actively cresting the spillway) and a peak flow of 98 cfs was recorded. No sampling occurred at Salt Creek at Murrieta Road (Station ID 745) and San Jacinto River at Goetz Road (Station ID 759) due to the flows occurring over the New Years Holiday and the associated laboratory closures. No flows were recorded at the San Jacinto River at Ramona Expressway (Station ID 741). A total of 1.49 to 1.52 inches of rainfall was recorded in the region during this storm (RCFCWCD 2023).

The fourth monitoring event occurred on January 10-12, 2023. Water quality samples were collected at Salt Creek at Murrieta Road (Station ID 745), San Jacinto River at Goetz Road (Station ID 759), and Canyon Lake Spillway (Station ID 841). A peak flow of 50 cfs was recorded at Salt Creek at Murrieta Road (Station ID 745), a peak flow of 14 cfs was recorded at San Jacinto River at Goetz Road (Station ID 759), and a peak flow of 47 cfs was recorded at Canyon Lake Spillway (Station ID 841). No flows were recorded at the San Jacinto River at Ramona Expressway (Station ID 741). A total of 0.32 to 0.52 inches of rainfall was recorded in the region during this storm (RCFCWCD 2023).

The fifth monitoring event occurred on February 24-28, 2023. Water quality samples were collected at Canyon Lake Spillway (Station ID 841) for the period that flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake was actively cresting the spillway) and a peak flow of 753 cfs was recorded. No sampling occurred at Salt Creek at Murrieta Road (Station ID 745) and San Jacinto River at Goetz Road (Station ID 759). No flows were recorded at the San Jacinto River at Ramona Expressway (Station ID 741). A total of 1.23 to 2.64 inches of rainfall was recorded in the region during this storm (RCFCWCD 2023).

Mass loads for each chemical constituent at each location were calculated as the product of the event mean concentrations and the storm volumes for each storm event. The annual loads were calculated as the sum of the monitored event loads and the storm events where no sampling occurred, which are the product of the storm volumes for the storm events not monitored and the annual mean concentrations.

2.8 San Jacinto River Watershed Annual Water Quality Summary

A summary of watershed water quality monitoring data for each of the four monitoring locations for the monitoring period of July 1, 2022, through June 30, 2023, is presented below. The complete set of analytical laboratory report results is included in **Appendix A**. Included with each summary of the monitoring data are the concentrations for each analyte. Also included are the estimated storm event loads and annual loads for each analyte.

2.8.1 Summary of Monitoring Data – Salt Creek at Murrieta Road

Water quality samples were collected during three storm events at Salt Creek at Murrieta Road (Station ID 745) during the wet weather monitoring period from October 1, 2022, to May 31, 2023.

During the storm event on November 8-10, 2022, a total of 24 discrete time-weighted samples were collected across the hydrograph at two-hour intervals and a single flow-weighted composite

sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070465), flow for the storm event was estimated at 258 acre-feet or 72 million gallons (Mgal), which represents approximately 5.8% of the total annual flow.

During the storm event on December 11-13, 2022, a total of 21 discrete time-weighted samples were collected across the hydrograph at two-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070465), flow for the storm event was estimated at 39 acre-feet or 11 Mgal, which represents approximately 0.9% of the total annual flow.

During the storm event on January 10-12, 2023, a total of 113 discrete time-weighted samples were collected across the hydrograph at 30-minute intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070465), flow for the storm event was estimated at 102 acre-feet or 29 Mgal, which represents approximately 2.3% of the total annual flow.

Photos taken during the storm events are provided in **Figure 2-7** through **Figure 2-9.**

Figure 2-7. Storm Event at Salt Creek at Murrieta Road (November 8-10, 2022)

Figure 2-8. Storm Event at Salt Creek at Murrieta Road (December 11-13, 2022)

Figure 2-9. Storm Event at Salt Creek at Murrieta Road (January 10-12, 2023)

Event and annual mean concentrations for each analyte are presented in **Table 2-7Error! Reference source not found.**. Event and annual loads for each analyte are presented in **Table 2-8**. Concentrations for nutrients for the three storm events ranged from 1.6 to 2.2 milligrams per liter (mg/L) for total nitrogen, and 0.24 to 0.41 mg/L for total phosphorus (**Table 2-7**). Based on flow data provided by the nearby USGS stream gauge (Station ID 11070465), the total annual flow was estimated at 165,766,482 cubic feet (cf) or 1,240 Mgal for the period of July 1, 2022, through June 30, 2023. The estimated annual nutrient load was calculated to be 8,576 kg for total nitrogen and 1,533 kg for total phosphorus (**Table 2-8**) for the period of July 1, 2022 through June 30, 2023.

Table 2-7. Water Quality Concentrations at Salt Creek at Murrieta Road

Analyte	Units	Event 1	Event 2	Event 3	Annual Mean	Annual Geomean
Ammonia-Nitrogen	mg/L	0.15	0.19	0.34	0.23	0.21
Chemical Oxygen Demand	mg/L	31	33	29	31.0	31.0
Kjeldahl Nitrogen	mg/L	0.83	1.1	1.8	1.24	1.18
Nitrate as N	mg/L	0.77	0.58	0.42	0.59	0.57
Nitrite as N	mg/L	ND (<0.042)[a]	(0.047)J	(0.069)J	0.06[b]	0.06[b]
Organic Nitrogen	mg/L	0.68	0.89	1.4	0.99	0.95
Total Nitrogen	mg/L	1.6	1.7	2.2	1.83	1.82
Total Phosphorus	mg/L	0.24	0.34	0.41	0.33	0.32
Ortho Phosphate Phosphorus	mg/L	0.11	0.29	0.32	0.24	0.22
Total Dissolved Solids	mg/L	570	83	410	354	269
Total Hardness	mg/L	277	34.6	178	163	119
Total Suspended Solids	mg/L	22	40	38	33.3	32.2

ND = not detected (analyte not detected at the indicated method detection limit (MDL)).
J- Reported value was detected above the MDL, but below the RL.
a – When the result was ND the detection limit is shown in parenthesis
b –The annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

Table 2-8. Water Quality Event and Annual Loads at Salt Creek at Murrieta Road

Analyte	Units	Load Event 1	Load Event 2	Load Event 3	Annual Load
Ammonia-Nitrogen	kg	41	8	37	1,054
Chemical Oxygen Demand	kg	8,485	1,367	3,146	145,379
Kjeldahl Nitrogen	kg	227	46	195	5,778
Nitrate as N	kg	211	24	46	2,800
Nitrite as N	kg	0[a]	2	7	257[a]
Organic Nitrogen	kg	186	37	152	4,603
Total Nitrogen	kg	438	70	239	8,576
Total Phosphorus	kg	66	14	44	1,533
Ortho Phosphate Phosphorus	kg	30	12	35	1,102
Total Dissolved Solids	kg	156,010	3,438	44,479	1,717,063
Total Hardness	kg	75,815	1,433	19,310	793,484
Total Suspended Solids	kg	6,021	1,657	4,122	154,147

a - When a concentration was non-detect, the annual load value for compliance purposes was calculated by converting non-detect (ND) values to zero.

Hydrographs with the discrete time-weighted sample aliquot times are provided in **Figure 2-10** through **Figure 2-12.** The figures were developed based on flow data provided by the nearby USGS stream gauge (Station ID 11070465).

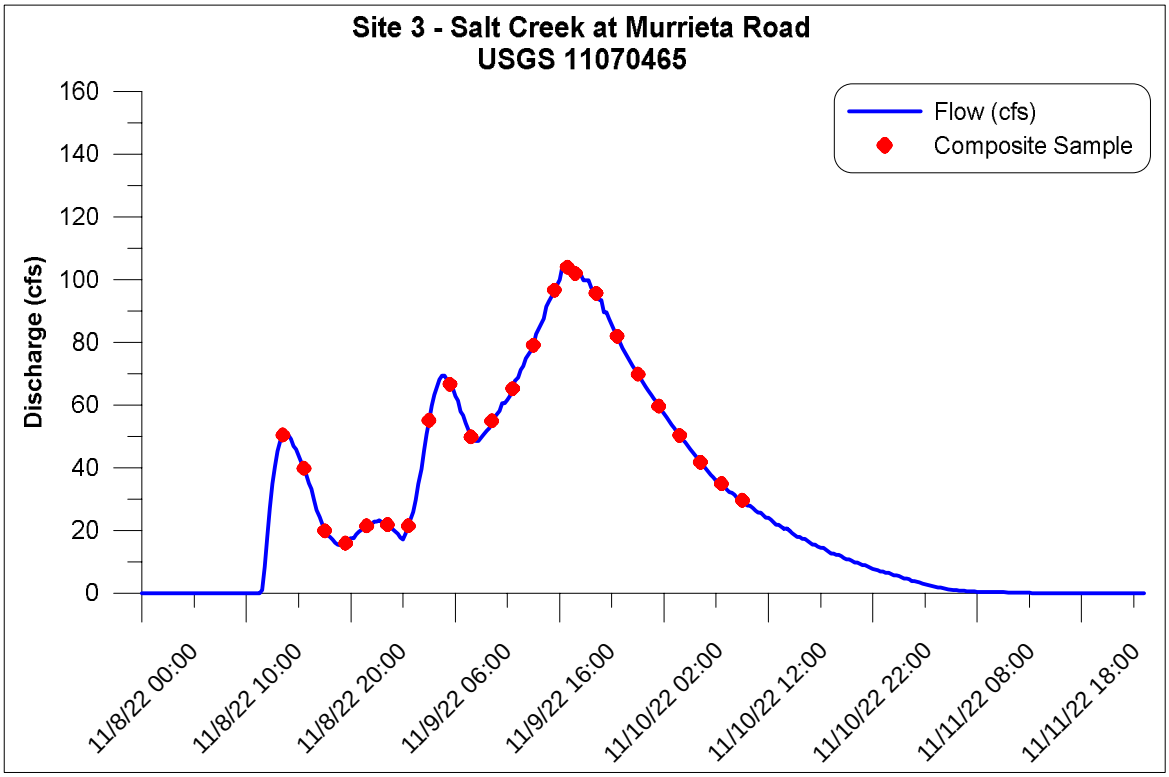

Figure 2-10. Hydrograph of First Storm Event at Salt Creek at Murrieta Road (November 8-10, 2022)

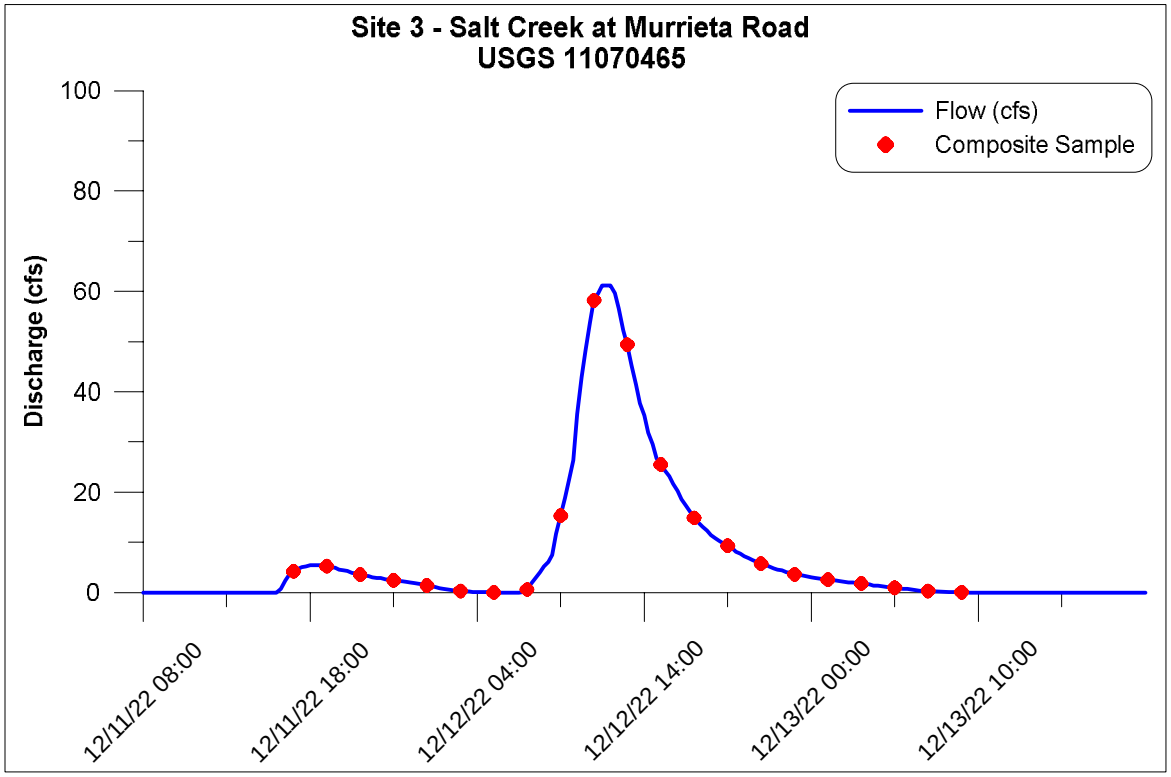

Figure 2-11. Hydrograph of Second Storm Event at Salt Creek at Murrieta Road (December 11-13, 2022)

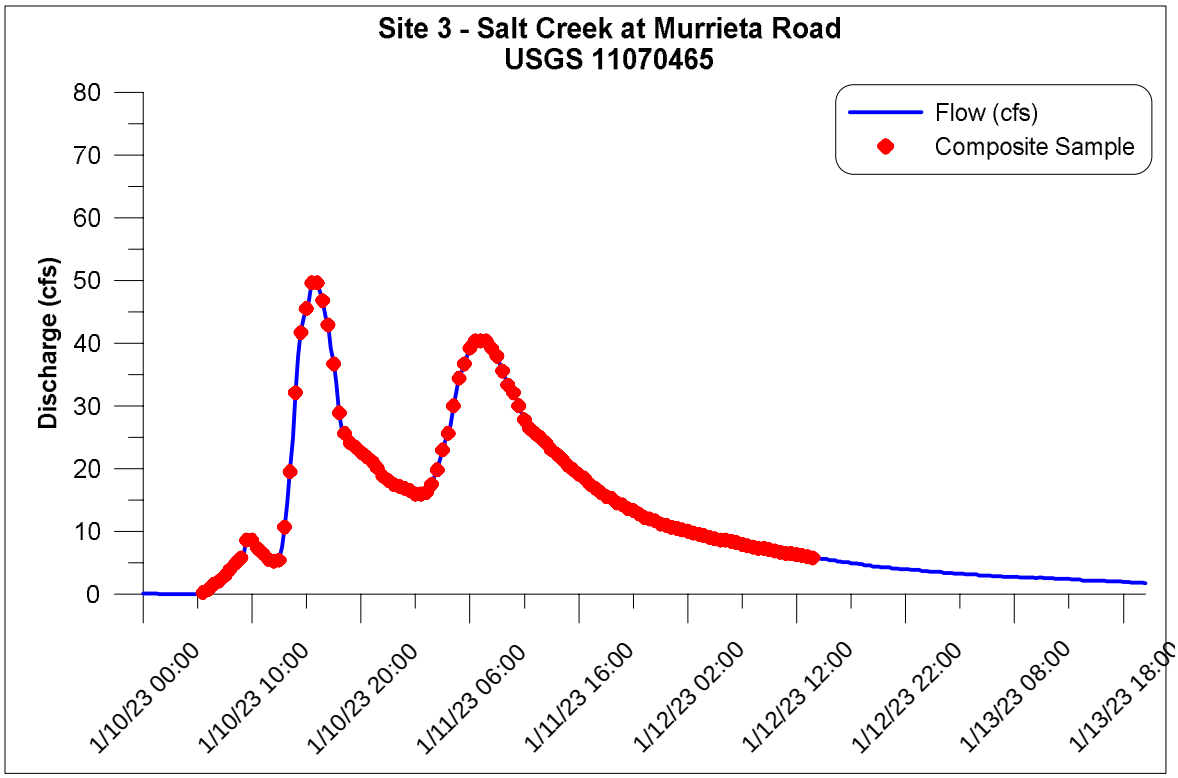

Figure 2-12. Hydrograph of Third Storm Event at Salt Creek at Murrieta Road (January 10-12, 2023)

2.8.2 Summary of Monitoring Data – San Jacinto River at Goetz Road

Water quality samples were collected during two storm events at San Jacinto River at Goetz Road (Station ID 759) during the wet weather monitoring period from October 1, 2022, to May 31, 2023.

During the storm event on November 8-10, 2022, a total of 21 discrete time-weighted samples were collected across the hydrograph at two-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070365), flow for the storm event was estimated at 606 acre-feet or 170 Mgal, which represents approximately 6.0% of the total annual flow.

During the storm event on December 12-14, 2022, a total of 22 discrete time-weighted samples were collected across the hydrograph at two-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070365), flow for the storm event was estimated at 101 acre-feet or 28 Mgal, which represents approximately 1.0% of the total annual flow.

During the storm event on January 10-13, 2023, a total of 31 discrete time-weighted samples were collected across the hydrograph at two-hour intervals and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070365), flow for the storm event was estimated at 38 acre-feet or 11 Mgal, which represents approximately 0.4% of the total annual flow.

Photos taken during the storm events are provided in **Figure 2-13** and **Figure 2-15**.

Figure 2-13. Storm Event at San Jacinto River at Goetz Road (November 8-10, 2022)

Figure 2-14. Storm Event at San Jacinto River at Goetz Road (December 12-14, 2022)

Figure 2-15. Storm Event at San Jacinto River at Goetz Road (January 10-13, 2023)

Event and annual mean concentrations for each analyte are presented in **Error! Reference source not found.**. Event and annual loads for each analyte are presented in **Error! Reference source not found.**. Concentrations for nutrients for the two storm events ranged from 1.4 to 1.8 mg/L for total nitrogen, and 0.36 to 0.49 mg/L for total phosphorus (**Error! Reference source not found.**). Based on flow data provided by the nearby USGS stream gauge (Station ID 11070365), the total annual flow was estimated at 377,054,739 cf or 2,821 Mgal for the period of July 1, 2022, through June 30, 2023. The estimated annual nutrient load was calculated to be 17,643 kg for total nitrogen and 4,516 kg for total phosphorus (**Error! Reference source not found.**) for the period of July 1, 2022 through June 30, 2023.

Table 2-9. Water Quality Concentrations at San Jacinto River at Goetz Road

Analyte	Units	Event 1	Event 2	Event 3	Annual Mean	Annual Geomean
Ammonia-Nitrogen	mg/L	(0.037)J	0.29	(0.085)J	0.14	0.10
Chemical Oxygen Demand	mg/L	44	52	28	41.3	40.0
Kjeldahl Nitrogen	mg/L	0.54	1.1	1.1	0.91	0.87
Nitrate as N	mg/L	0.79	0.66	0.61	0.69	0.68
Nitrite as N	mg/L	(0.044)J	ND(<0.042)[a]	(0.068)J	0.06[a]	0.056[a]
Organic Nitrogen	mg/L	0.5	0.78	1	0.76	0.73
Total Nitrogen	mg/L	1.4	1.8	1.8	1.67	1.66
Total Phosphorus	mg/L	0.36	0.43	0.49	0.43	0.42
Ortho Phosphate Phosphorus	mg/L	0.28	0.31	0.34	0.31	0.31
Total Dissolved Solids	mg/L	180	200	320	233	226
Total Hardness	mg/L	73.2	85.4	95.1	84.6	84.1
Total Suspended Solids	mg/L	52	47	93	64.0	61.0

ND = not detected (analyte not detected at the indicated method detection limit (MDL)).
J- Reported value was detected above the MDL, but below the RL.
a - When a concentration was non-detect, the annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

Table 2-10. Water Quality Event and Annual Loads at San Jacinto River at Goetz Road

Analyte	Units	Load Event 1	Load Event 2	Load Event 3	Annual Load
Ammonia-Nitrogen	kg	24	31	3	1,416
Chemical Oxygen Demand	kg	28,274	5,559	1,118	443,637
Kjeldahl Nitrogen	kg	347	118	44	9,539
Nitrate as N	kg	508	71	24	7,392
Nitrite as N	kg	28	0[a]	3	585[a]
Organic Nitrogen	kg	321	83	40	7,959
Total Nitrogen	kg	900	192	72	17,643
Total Phosphorus	kg	231	46	20	4,516
Ortho Phosphate Phosphorus	kg	180	33	14	3,292
Total Dissolved Solids	kg	115,668	21,381	12,779	2,456,926
Total Hardness	kg	47,038	9,130	3,798	896,124
Total Suspended Solids	kg	33,415	5,024	3,714	674,958

a - When a concentration was non-detect, the annual load value for compliance purposes was calculated by converting non-detect (ND) values to zero.

Hydrographs with the discrete time-weighted sample aliquot times are provided in **Figure 2-16** through **Figure 2-18**. The figure was developed based on flow data provided by the nearby USGS stream gauge (Station ID 11070365).

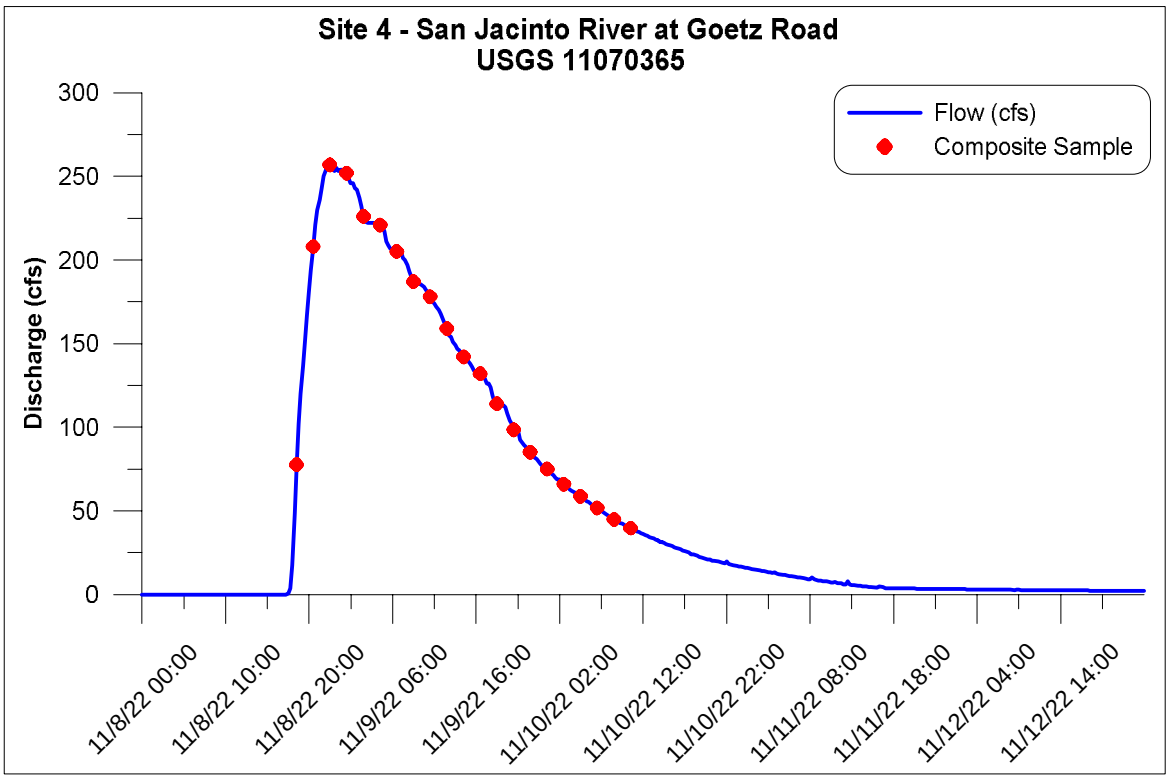

Figure 2-16. Hydrograph of First Storm Event at San Jacinto River at Goetz Road (November 8-10, 2022)

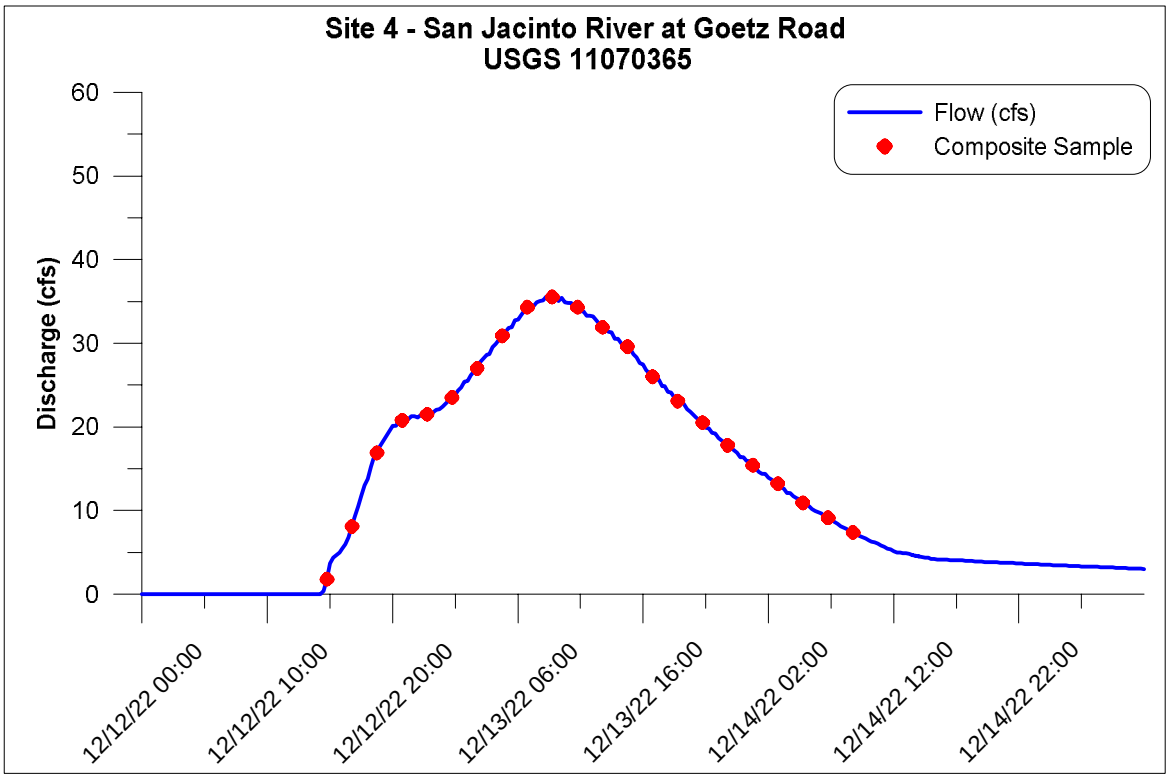

Figure 2-17. Hydrograph of Second Storm Event at San Jacinto River at Goetz Road (December 12-14, 2022)

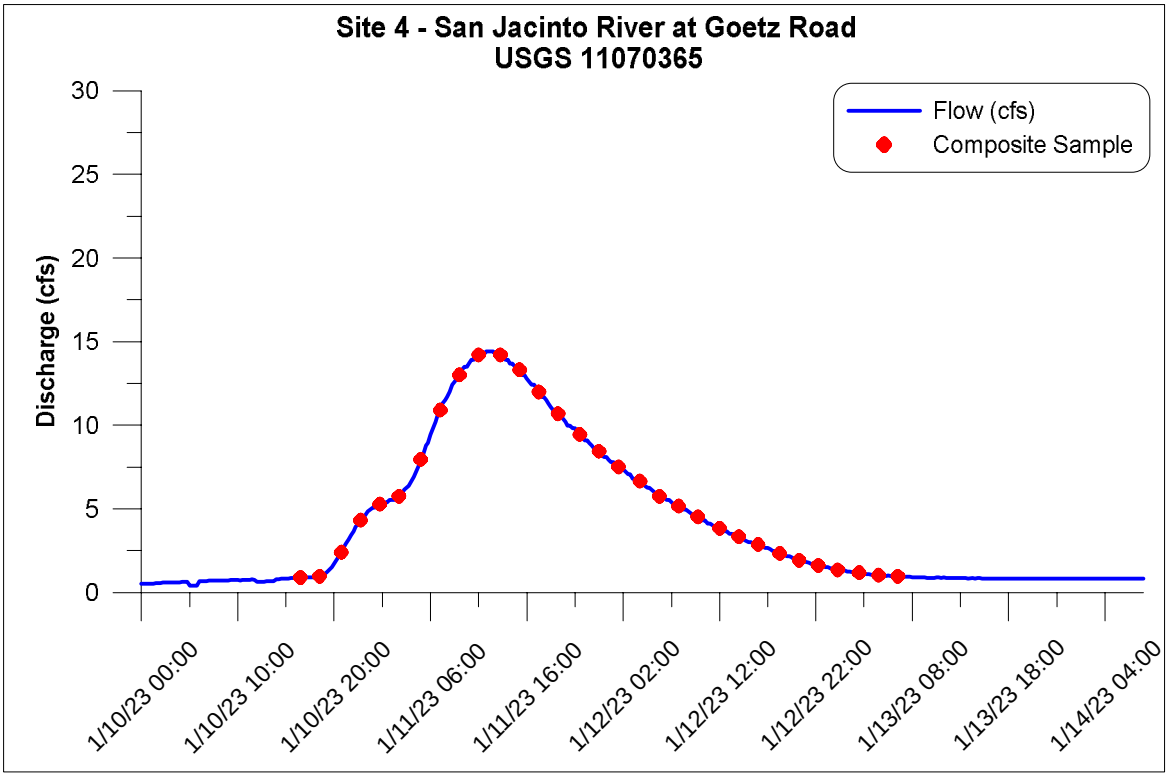

Figure 2-18. Hydrograph of Third Storm Event at San Jacinto River at Goetz Road (January 10-13, 2023)

2.8.3 Summary of Monitoring Data – San Jacinto River at Ramona Expressway

Mystic Lake did not overflow during the wet weather monitoring period from October 1, 2022, to May 31, 2023. Therefore, no samples were collected from the sampling station at San Jacinto River at Ramona Expressway (Station ID 741) during the 2022-2023 monitoring year. Flows from the local area and from overflow of the upstream levee structure were observed at the San Jacinto River at Ramona Expressway (Station ID 741) from January 15, 2023, through February 5, 2023, and from March 21,2023, through March 28, 2023. However, these flows did not originate from Mystic Lake.

2.8.4 Summary of Monitoring Data – Canyon Lake Spillway

Water quality samples were collected during three storm events at Canyon Lake Spillway (Station ID 841) during the wet weather monitoring period from October 1, 2022, to May 31, 2023.

During the storm event on January 4-8, 2023, a total of 46 discrete time-weighted samples were collected across the hydrograph at two-hour intervals for the period that flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake was actively cresting the spillway) and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070500), flow for the storm event was estimated at 675 acre-feet or 189 Mgal, which represents approximately 4.7% of the total annual inflow to Lake Elsinore from Canyon Lake.

During the storm event on January 11-13, 2023, a total of 31 discrete time-weighted samples were collected across the hydrograph at two-hour intervals for the period that flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake was actively cresting the spillway) and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070500), flow for the storm event was estimated at 212 acre-feet or 59 Mgal, which represents approximately 1.5% of the total annual inflow to Lake Elsinore from Canyon Lake.

During the storm event on February 24-28, 2023, a total of 28 discrete time-weighted samples were collected across the hydrograph at three-hour intervals for the period that flows exited Canyon Lake during the monitoring event (i.e., the water level in Canyon Lake was actively cresting the spillway) and a single flow-weighted composite sample was submitted for analysis. Based on data provided by the nearby USGS stream gauge (Station ID 11070500), flow for the storm event was estimated at 2,260 acre-feet or 633 Mgal, which represents approximately 15.7% of the total annual inflow to Lake Elsinore from Canyon Lake.

Note that this USGS stream gauge is located below the Canyon Lake Dam at a location that does occasionally capture other flows from the surrounding local watershed as shown in **Figure 2-4**. The flows from Canyon Lake do not include runoff from the local surrounding watershed into Lake Elsinore. Photos taken during the storm events are provided in **Figure 2-19** through **Figure 2-21**.

Figure 2-19. Storm Event Sampling Below the Canyon Lake Spillway (January 4-8, 2023)

Figure 2-20. Storm Event Sampling Below the Canyon Lake Spillway (January 11-13, 2023)

Figure 2-21. Storm Event Sampling Below the Canyon Lake Spillway (February 24-28, 2023)

Event and annual mean concentrations of each analyte are presented in Table 2-11. Event and annual loads for each analyte are presented in Table 2-12. Concentrations of nutrients for the storm event ranged from 1.3 to 1.7 mg/L for total nitrogen and 0.058 to 0.17 mg/L for total phosphorus (Table 2-11). Based on flow data provided by the nearby USGS stream gauge (Station ID 11070500), the total annual flow was estimated at 539,669,871 cf or 4,037 Mgal for the period of July 1, 2022, through June 30, 2023. The USGS stream gauge (Station ID 11070500) located downstream of the Canyon Lake Spillway (Station ID 841) sampling location has minimal dry weather flow and storm flows account for the vast majority of the estimated annual load of nutrients exiting Canyon Lake. The estimated annual nutrient load was calculated to be 23,428 kg for total nitrogen and 1,662 kg for total phosphorus (Table 2-12) for the period of July 1, 2022, through June 30, 2023.

Table 2-11. Water Quality Concentrations at Canyon Lake Spillway

Analyte	Units	Event 1	Event 2	Event 3	Annual Mean	Annual Geomean
Ammonia-Nitrogen	mg/L	0.37	0.19	(0.058)J	0.21	0.16
Chemical Oxygen Demand	mg/L	100	25	17	47.3	34.9
Kjeldahl Nitrogen	mg/L	1.5	1.4	0.99	1.3	1.28
Nitrate as N	mg/L	(0.15)J	(0.18)J	0.25	0.19	0.19
Nitrite as N	mg/L	ND (<0.042)[a]	(0.072)J	0.1	0.09[a]	0.09[a]
Organic Nitrogen	mg/L	1.2	1.2	0.94	1.11	1.11
Total Nitrogen	mg/L	1.7	1.7	1.3	1.57	1.56
Total Phosphorus	mg/L	0.071	0.058	0.17	0.10	0.09
Ortho Phosphate Phosphorus	mg/L	(0.0050)J	(0.0050)J	0.036	0.02	0.01
Total Dissolved Solids	mg/L	610	620	490	573	570
Total Hardness	mg/L	281	274	234	263	262
Total Suspended Solids	mg/L	11	8	34	17.7	14.4

ND = not detected (analyte not detected at the indicated method detection limit (MDL)).
J- Reported value was detected above the MDL, but below the RL.
a - When a concentration was non-detect, the annual average value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculated mean was non-zero but below the corresponding MDL, the average value was reported as ND.

Table 2-12. Water Quality Event and Annual Loads at Canyon Lake Spillway

Analyte	Units	Load Event 1	Load Event 2	Load Event 3	Annual Load
Ammonia-Nitrogen	kg	265	43	139	2,907
Chemical Oxygen Demand	kg	71,601	5,628	40,725	683,352
Kjeldahl Nitrogen	kg	1,074	315	2,372	19,250
Nitrate as N	kg	107	41	599	3,056
Nitrite as N	kg	0[a]	16	240	1,283[a]
Organic Nitrogen	kg	859	270	2,252	16,680
Total Nitrogen	kg	1,217	383	3,114	23,428
Total Phosphorus	kg	51	13	407	1,662
Ortho Phosphate Phosphorus	kg	4	1	86	274
Total Dissolved Solids	kg	436,768	139,573	1,173,847	8,598,662
Total Hardness	kg	201,200	61,682	560,572	3,964,992
Total Suspended Solids	kg	7,876	1,801	81,451	302,156

a - When a concentration was non-detect, the annual load value for compliance purposes was calculated by converting non-detect (ND) values to zero.

Hydrographs with the discrete time-weighted sample aliquot times are provided in **Figure 2-22** through **Figure 2-24**. The figure was developed based on flow data provided by the nearby USGS stream gauge (Station ID 11070365). A hydrograph of the Canyon Lake Level at Railroad Canyon Dam Spillway compared to the spillway elevation is provided in **Figure 2-25**.

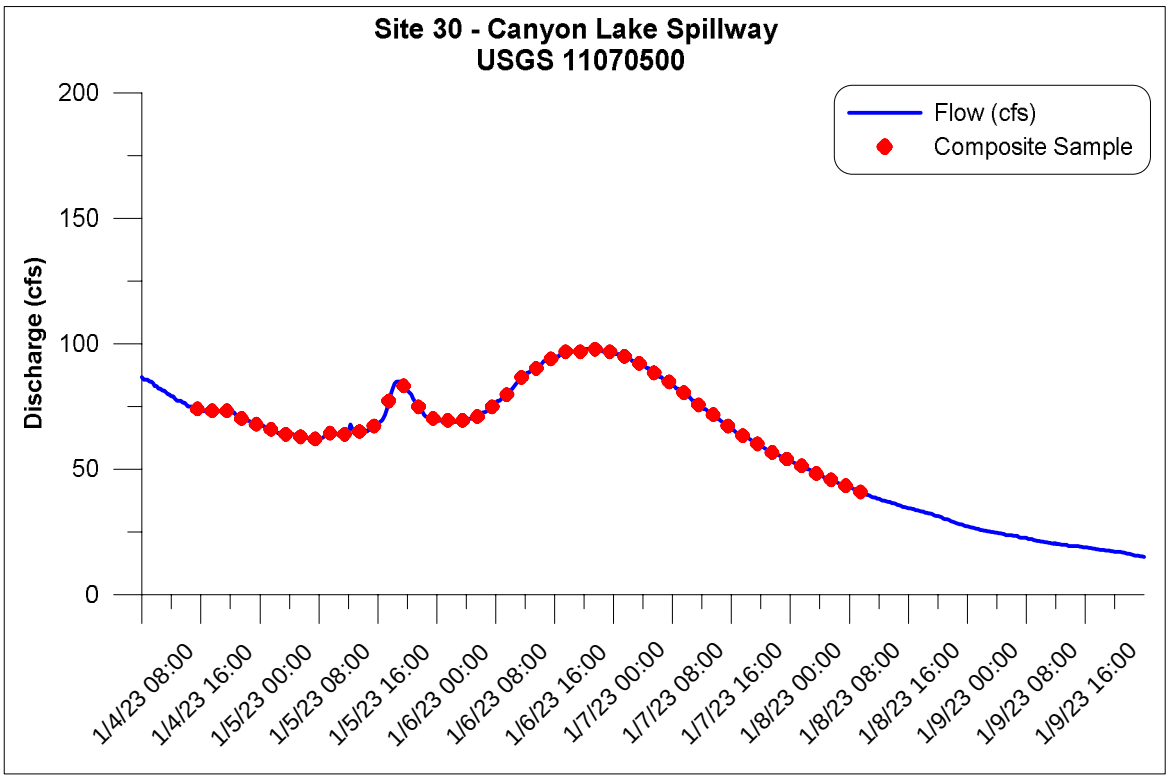

Figure 2-22. Hydrograph of First Storm Event at Canyon Lake Spillway (January 4-8, 2023)

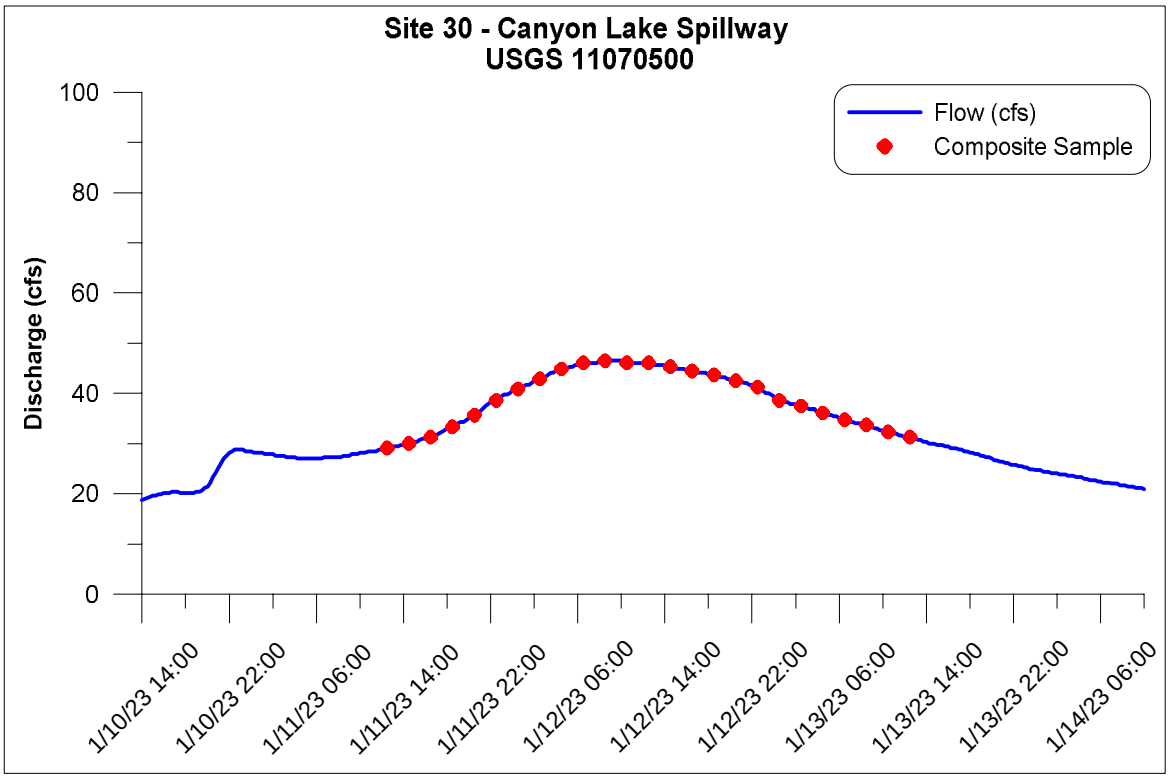

Figure 2-23. Hydrograph of Second Storm Event at Canyon Lake Spillway (January 11-13, 2023)

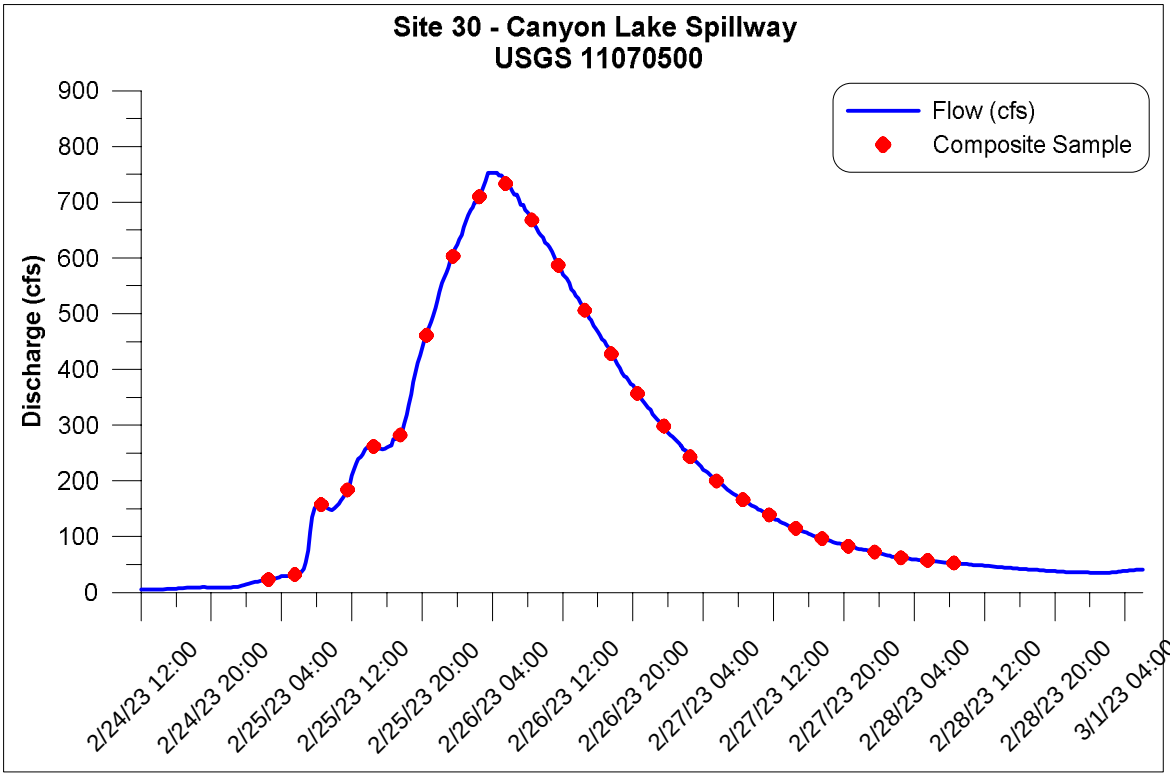

Figure 2-24. Hydrograph of Third Storm Event at Canyon Lake Spillway (February 24-28, 2023)

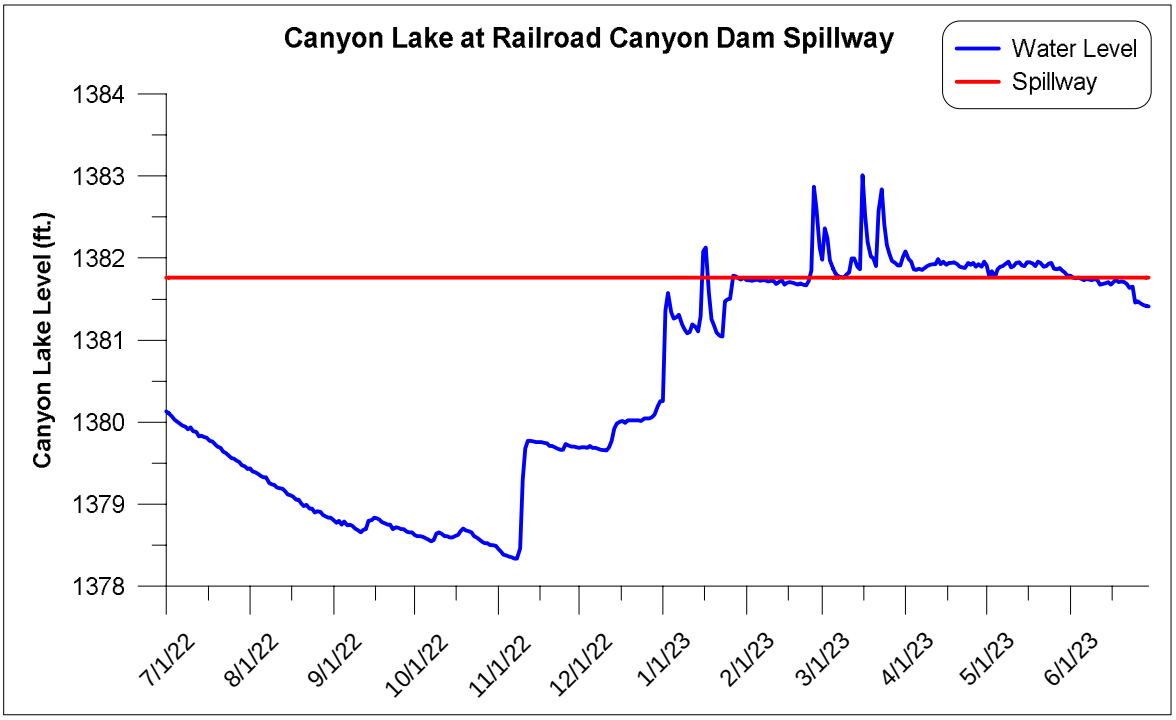

Figure 2-25. Canyon Lake Level at Railroad Canyon Dam Spillway

2.9 San Jacinto River Watershed Rainfall Records

The RCFC&WCD maintains rainfall records for rain gauges located within or near the San Jacinto River Watershed as shown in **Table 2-13**.

Table 2-13. San Jacinto River Watershed Rainfall Gauges

Station ID	Station Description	Latitude	Longitude	Elevation (ft.)
67	Lake Elsinore	33.668712	-117.332380	1281
152	Perris	33.786980	-117.231831	1494
155	Perris / Moreno Valley – Pigeon Pass	33.987703	-117.270221	1902
186	Hemet / San Jacinto	33.787067	-116.959024	1554
248	Winchester	33.702903	-117.090382	1466

Rainfall data recorded at these five stations for the period July 1, 2022, through June 30, 2023, are summarized in **Table 2-14**.

Table 2-14. Summary Rainfall Data (July 2022 to June 2023)

Monthly Rainfall (inches)	Lake Elsinore	Perris CDF	Pigeon Pass	Hemet / San Jacinto	Winchester
Jul	0.02	0.00	0.00	0.00	0.00
Aug	0.01	0.00	0.00	0.02	0.03
Sep	1.08	0.23	0.44	0.37	1.76
Oct	0.57	0.53	0.31	0.58	0.25
Nov	0.98	0.82	1.59	1.23	1.56
Dec	1.18	0.97	1.53	1.16	1.03
Jan	4.19	3.71	5.42	4.09	3.95
Feb	2.31	2.26	2.84	1.94	1.72
Mar	4.79	4.17	5.88	5.74	4.28
Apr	0.03	0.01	0.12	0.05	0.00
May	0.25	0.57	0.59	0.6	0.63
Jun	0.32	0.03	0.23	0.06	0.00
Annual Rainfall (inches)	**15.73**	**13.30**	**18.95**	**15.84**	**15.21**

3.0 In-Lake Monitoring

3.1 Background

Routine in-lake monitoring was initiated in 2006 by local stakeholders in cooperation with the RWQCB at three open water locations in Lake Elsinore and four locations in Canyon Lake. Initially, monitoring consisted of monthly sampling October to May, and biweekly sampling June to September, with grab samples collected at the surface, within the water column, and/or as depth-integrated samples (depending on the lake and the analyte). Based on modifications adopted to the sampling program (RWQCB Resolution No. R8-2011-0023), in 2011-2012 sampling locations in Lake Elsinore and Canyon Lake were reduced to one and four stations, respectively, for analytical chemistry. This decision was based on a review of available data that indicated consistent similar nutrient concentrations and physical water quality parameters among the three sampling sites in Lake Elsinore and two sites in the East Basin of Canyon Lake. This cost savings allowed for shifting resources toward several implementation strategies aimed at reducing nutrient impacts in both lakes as described in RWQCB Resolution No. R8-2011-0023. All in-lake monitoring was then suspended temporarily during the 2013-2014 and 2014-2015 FYs to further redirect resources toward implementing in-lake best management practices. Starting in FY 2015-2016, ongoing in-lake sampling was resumed and is required to estimate progress toward attaining nutrient TMDL targets and calculating annual and 10-year running averages. The following sections describe monitoring methods and results in both lakes for the 2021-2022 FY.

3.2 Historical In-Lake Monitoring Concentrations

A summary of TMDL water quality monitoring data parameters of interest during the period of July 1, 2011 through June 30, 2023 is presented in **Tables 3-1 and 3-2**. These tables present historical calendar-year annual means since 2011 for each of the numeric targets outlined in the 2004 TMDL. The tables also present the 10-year running averages for each parameter and the number of annual means (total nitrogen, total phosphorus, dissolved oxygen, and chlorophyll-a) and individual samples (total ammonia) within each 10-year period that did not achieve the TMDL target.

Table 3-1. Summary of Historical TMDL Data for Lake Elsinore Based on Calendar Year [1]

Parameter	2020 TMDL Target	Calendar Year	Number of Samples Collected	Annual Average	Units	2011-2020 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2012-2021 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2013-2022 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2014-2023 Ten Year Average[a] (Percent of Annual Means/Samples Not Meeting TMDL Target)
Total Phosphorus[b]	<0.1 mg/L (Annual Average)	2011	14	**0.294**	mg/L	0.246 (100%)	0.238 (100%)	0.236 (100%)	0.230 (100%)
		2012	9	**0.162**					
		2013	NA	NA					
		2014	NA	NA					
		2015	3	**0.383**					
		2016	8	**0.416**					
		2017	8	**0.181**					
		2018	8	**0.162**					
		2019	8	**0.154**					
		2020	8	**0.219**					
		2021	8	**0.227**					
		2022	8	**0.146**					
		2023	3	**0.180**					
Total Nitrogen[b]	<0.75 mg/L (Annual Average)	2011	14	**3.88**	mg/L	4.91 (100%)	4.97 (100%)	5.18 (100%)	5.04 (100%)
		2012	9	**3.32**					
		2013	NA	NA					
		2014	NA	NA					
		2015	3	**6.10**					
		2016	8	**7.28**					
		2017	8	4.68					
		2018	8	5.56					
		2019	8	4.50					
		2020	8	3.99					
		2021	8	4.30					
		2022	8	5.00					
		2023	3	3.98					
Total Ammonia[c]	Exceedance Thresholds Calculated from Site Specific Water Quality Conditions During each Event	2011	15	0.049	mg/L	0.150 (2004- CMC: 0%; CCC: 11%)	0.184 (2004- CMC: 0%; CCC: 13%)	0.200 (2004- CMC: 0%; CCC: 15%)	0.200 (2004- CMC: 0%; CCC: 15%)
		2012	9	0.096					
		2013	NA	NA					
		2014	NA	NA					
		2015	3	0.357					
		2016	8	0.176					
		2017	8	0.124					
		2018	8	0.097					
		2019	8	0.300					
		2020	8	0.312					
		2021	8	0.199					
		2022	8	0.253					
		2023	3	0.071					

Table 3-1 (cont.). Summary of Historical TMDL Data for Lake Elsinore Based on Calendar Year [1]

Parameter	2020 TMDL Target	Calendar Year	Number of Samples Collected	Annual Average	Units	2011-2020 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2012-2021 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2013-2022 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2014-2023 Ten Year Average[a] (Percent of Annual Means Not Meeting TMDL Target)
Depth-Integrated Chlorophyll-a (Summer)[b]	≤ 25 mg/L (Summer Average)	2011	8	169	µg/L	186 (100%)	183 (100%)	174 (100%)	171 (100%)
		2012	2	200					
		2013	NA	NA					
		2014	NA	NA					
		2015	1	326					
		2016	4	258					
		2017	4	148					
		2018	4	87					
		2019	4	89					
		2020	2	212					
		2021	3	147					
		2022	4	122					
		2023	1	151					
Dissolved Oxygen (1-m from lake bottom)[b]	>5 mg/L 1-m from lake bottom	2011	15	3.4	mg/L	3.7 (100%)	3.6 (100%)	3.4 (100%)	3.9 (90%)
		2012	8	4.8					
		2013	NA	NA					
		2014	NA	NA					
		2015	3	2.9					
		2016	8	4.2					
		2017	8	4.9					
		2018	8	3.2					
		2019	8	3.3					
		2020	8	2.8					
		2021	8	2.7					
		2022	8	3.6					
		2023	3	7.4					

Notes:
mg-milligram; ug- microgram; L-liter; m-meter,
CCC- Criterion Continuous Concentration; CMC- Criterion Maximum Concentration
Values in Bold indicate an exceedance of one or more TMDL criteria
The CCC and CMC were calculated using the 2004 TMDL formulas.
1- Reported values and compliance summary based on sampling at the central sampling location in Lake Elsinore (LE02).
a- includes data January 2014 - June 2023.
b- exceedance frequency based annual means
c- exceedance frequency based on individual samples exceeding corresponding sample-specific CMC or CCC
NA - not applicable, data not collected in 2013-2014

Table 3-2. Summary of Historical TMDL Data for Canyon Lake Based on Calendar Year [1]

Parameter	2020 TMDL Target	Calendar Year	Number of Sampling Events	Annual Average	Units	2011-2020 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2012-2021 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2013-2022 Ten Year Average (Percent of Annual Means/Samples Not Meeting TMDL Target)	2014-2023 Ten Year Average[a] (Percent of Annual Means/Samples Not Meeting TMDL Target)
Total Phosphorus[b]	<0.1 mg/L (Annual Average)	2011	15	**0.846**	mg/L	0.243 (70%)	0.167 (60%)	0.136 (40%)	0.128 (50%)
		2012	8	**0.346**					
		2013	2	**0.266**					
		2014	15	**0.246**					
		2015	7	0.084					
		2016	7	0.089					
		2017	6	**0.237**					
		2018	6	0.038					
		2019	6	**0.144**					
		2020	6	**0.133**					
		2021	6	0.084					
		2022	6	0.036					
		2023	3	**0.191**					
Total Nitrogen[b]	<0.75 mg/L (Annual Average)	2011	15	1.64	mg/L	1.60 (100%)	1.66 (100%)	1.53 (100%)	1.51 (100%)
		2012	8	2.43					
		2013	NA	NA					
		2014	NA	NA					
		2015	3	1.50					
		2016	7	1.47					
		2017	6	1.30					
		2018	6	1.37					
		2019	6	1.50					
		2020	6	1.62					
		2021	6	2.06					
		2022	6	1.43					
		2023	3	1.31					
Total Ammonia[c]	Exceedance Thresholds Calculated from Site Specific Water Quality Conditions During each Event	2011	14	0.672	mg/L	0.412 (CMC: 0%; CCC: 6.2%)	0.425 (CMC: 0%; CCC: 4.0%)	0.476 (CMC: 0%; CCC: 5.1%)	0.467 (CMC: 0%; CCC: 4.8%)
		2012	8	0.168					
		2013	NA	NA					
		2014	NA	NA					
		2015	3	0.455					
		2016	7	0.236					
		2017	6	0.297					
		2018	6	0.346					
		2019	6	0.471					
		2020	6	0.733					
		2021	6	0.680					
		2022	6	0.516					
		2023	3	0.330					

Table 3-2 (cont.). Summary of Historical TMDL Data for Canyon Lake Based on Calendar Year [1]

Parameter	2020 TMDL Target	Calendar Year	Number of Sampling Events	Annual Average	Units	2011-2020 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2012-2021 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2013-2022 Ten Year Average (Percent of Annual Means Not Meeting TMDL Target)	2014-2023 Ten Year Average[a] (Percent of Annual Means Not Meeting TMDL Target)
Depth-Integrated Chlorophyll-a[b]	< 25 µg/L (Annual Average)	2011	15	59.1	µg/L	44.3 (80%)	40.6 (70%)	35.5 (70%)	35.5 (60%)
		2012	8	76.3					
		2013	2	59.6					
		2014	15	56.4					
		2015	3	60.2					
		2016	7	29.7					
		2017	6	29.4					
		2018	6	27.9					
		2019	6	21.6					
		2020	6	22.7					
		2021	6	21.8					
		2022	6	25.4					
		2023	3	23.0					
Dissolved Oxygen (Hypolimnion)[b,d]	>5 mg/L Hypolimnion (Daily Average)	2011	11	0.3	mg/L	0.9 (100%)	0.9 (100%)	0.8 (100%)	0.7 (100%)
		2012	6	0.8					
		2013	NA	NA					
		2014	NA	NA					
		2015	3	4.0					
		2016	7	1.3					
		2017	5	0.3					
		2018	5	0.4					
		2019	4	0.2					
		2020	3	0.03					
		2021	4	0.2					
		2022	4	0.3					
		2023	1	0.0					

Notes:
mg-milligram; ug- microgram; L-liter; m-meter,
CCC- Criterion Continuous Concentration; CMC- Criterion Maximum Concentration
Values in Bold indicate an exceedance of one or more TMDL criteria
The CCC and CMC were calculated using 2004 TMDL formulas.
1- Reported values and compliance summary based on a lake-wide average for each sampling date (Sites CL07, CL08, CL09, and CL10)
a- includes data January 2014 - June 2023.
b- exceedance frequency based annual means
c- exceedance frequency based on individual samples exceeding corresponding sample-specific CMC or CCC
NA - not applicable, data not collected in 2013-2014

3.3 Lake Elsinore Monitoring

3.3.1 Sampling Station Locations and Frequency

To maintain consistency and facilitate the assessment of trends toward meeting compliance goals, the in-lake monitoring design was resumed in July 2015 using the three former stations outlined in the approved Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Plan (LESJWA, 2006; **Figure 3-1**, **Table 3-3**). Analytical chemistry samples and in-situ water column profile readings were collected at Site LE02, while only in-situ water column profile readings were performed at the remaining two stations (LE01 and LE03). Profile readings for all three stations were taken in both the morning and afternoon. Water chemistry samples collected at Site LE02 were analyzed for those constituents outlined in **Table 3-4**. Sampling in Lake Elsinore was conducted monthly during summer months (June-September) and bi-monthly (i.e., every other month) for the remainder of the monitoring year, for a total of eight sampling events per year. In-lake TMDL sampling events were coordinated to correspond with satellite overpass dates to facilitate the comparison of in-lake and satellite derived chlorophyll-a data (see Section 3.4).

Table 3-3. Lake Elsinore TMDL Monitoring Locations

Site	Latitude	Longitude
LE01	33.668978°	-117.364185°
LE02	33.663344°	-117.354213°
LE03	33.654939°	-117.341653°

Table 3-4. In-lake Analytical Constituents and Methods for Lake Elsinore

Parameter	Analysis Method	Sampling Method
Analytical Chemistry		
Nitrite Nitrogen (NO_2-N)	EPA 353.2	Depth Integrated
Nitrate Nitrogen (NO_3-N)	EPA 353.2	Depth Integrated
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	Depth Integrated
Total Nitrogen (TN)[1]	Calculated	Depth Integrated
Ammonia Nitrogen (NH4-N)	EPA 350.1	Depth Integrated
Sulfide	SM 4500S2 D	Depth Integrated
Total Phosphorus (TP)	EPA 365.3	Depth Integrated
Soluble Reactive Phosphorus (SRP / Ortho-P)	EPA 365.3, EPA 353.2	Depth Integrated
Chlorophyll-a	SM 10200H	Surface (0-2m) & Depth Integrated
Total Dissolved Solids (TDS)	SM 2540 C	Depth Integrated

US EPA - United States Environmental Protection Agency; m- meter; SM- standard method
[1] Total Nitrogen calculated as TKN+NO_2+NO_3

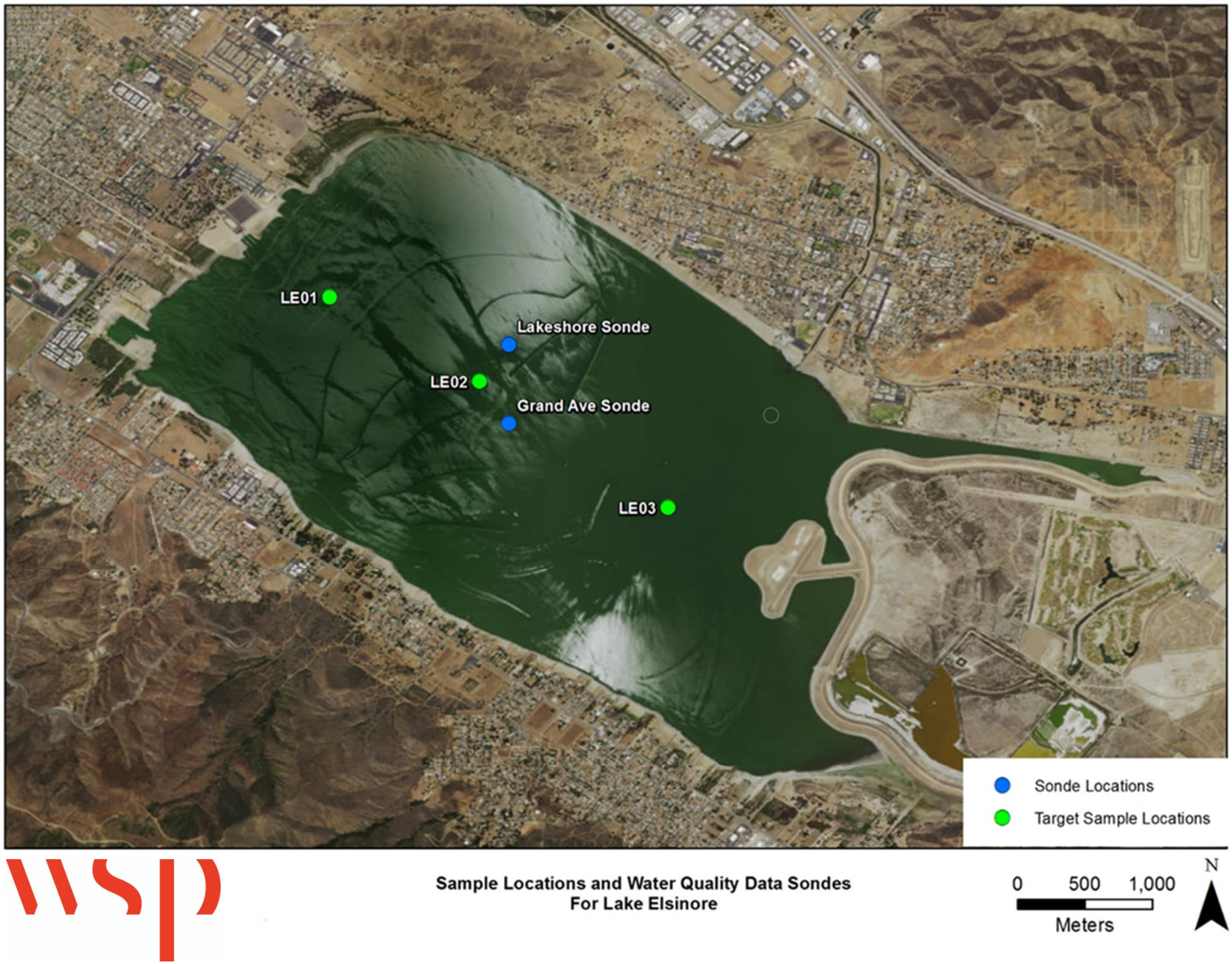

Figure 3-1. Lake Elsinore Sampling Locations

3.3.2 Sampling Methods

Depth-integrated composite samples for analytical chemistry were collected at Site LE02 by utilizing a peristaltic pump and lowering/raising an inlet tube through the water column at a uniform speed, creating a composite sample of the entire water column. Two samples were collected for chlorophyll-a: 1) a full depth-integrated composite sample as described above; and 2) a 0-2-meter (m) depth-integrated composite surface sample. All samples for chemical analysis were placed and held on wet ice immediately following collection and transferred to a local courier or shipping company on the same day of collection. Samples for analysis of nutrients, ammonia, sulfide, total dissolved solids (TDS), and chlorophyll-a were submitted to Weck Laboratories Inc., located in City of Industry, California.

Secchi disk readings for water clarity, as well as in-situ water column profile data, were typically recorded between 7:00 and 9:00 in the morning at all three Lake Elsinore stations using pre-calibrated hand-held YSI field meters or equivalent for pH, temperature, DO, and specific conductivity at 1-m intervals throughout the water column. This data was used to assess lateral and vertical spatial variability within the lake. End-of-the-day water column profiles (i.e., after ~2:00pm) were also recorded for the same in-situ parameters at all three stations to assess any potential temporal variability in these parameters over the course of a day. For water quality reporting purposes the morning and afternoon in situ measurements were averaged at each site on each date.

Satellite imagery was used as a tool to remotely measure chlorophyll-a concentrations at the water surface. These images provide a more complete picture of spatial variability that can exist for these two parameters at any given point in time. In-lake sampling dates were selected to correspond with satellite overpasses to enable comparison of analytical laboratory and satellite derived chlorophyll-a concentrations. Processed satellite imagery and associated reports were provided by EOMAP GmbH & co. KG (EOMAP) based in Germany (Castle Seefeld Schlosshof).

3.3.3 Water Quality Summary

A summary of the in-lake monitoring events for Lake Elsinore for the period of July 1, 2022 to June 30, 2023 is presented below. A total of eight Lake Elsinore events were sampled during this period under the TMDL monitoring program, with five occurring in 2022 (July 18, August 11, September 20, October 5 and December 19) and three in 2023 (February 7, April 6 and June 22). Complete monthly water column profile measurements are provided in Appendix B. Detailed analytical chemistry lab reports for each event are contained in Appendix C. Satellite imagery reports for each event are provided in Appendix D. Current data in the context of historical water quality monitoring results from 2002-present are presented in Appendix E.

A summary of mean water column profile values for each site and monitoring event are presented in **Tables 3-5 and 3-6**. Water column mean profile statistics for each site across the entire monitoring period are presented in **Table 3-7**. Mean values for water column measurements for each site, as well as the lake-wide mean are also summarized graphically in **Figures 3-2 through 3-7**. The measurements during the morning and afternoon of any given monitoring event were averaged prior to summarizing in the tables and figures below.

Table 3-5. In-Situ Water Quality Parameter Measurements in Lake Elsinore – 2022 Monthly Means for Each Site (July – Dec 2022)

Site	Measure	Jul-22		Aug-22		Sep-22		Oct-22		Dec-22	
		Water Column Mean	1m from Bottom	Water Column Mean	1m from Bottom	Water Column Mean	1m from Bottom	Water Column Mean	1m from Bottom	Water Column Mean	1m from Bottom
LE01	Temp (°C)	27.6	27.1	27.8	27.4	24.6	24.3	24.0	23.7	10.6	10.4
	Cond (µS/cm)	*4293*	*4289*	*3096*	*3096*	*4508*	*4507*	*4490*	*4485*	*4210*	*4212*
	pH	*8.77*	*8.71*	*8.93*	*8.86*	*9.15*	*9.11*	*9.30*	*9.25*	*8.98*	*8.95*
	DO (mg/L)	2.8	**0.8**	4.1	**2.0**	6.6	5.4	6.5	**4.6**	3.0	**1.8**
LE02	Temp (°C)	27.6	27.0	27.6	27.2	24.2	24.0	24.2	23.9	10.6	10.6
	Cond (µS/cm)	*4292*	*4287*	*3099*	*3097*	*4507*	*4507*	*4483*	*4477*	*4213*	*4212*
	pH	*8.74*	*8.64*	*8.93*	*8.88*	*9.09*	*9.05*	*9.28*	*9.20*	*8.94*	*8.94*
	DO (mg/L)	2.2	**0.2**	4.5	**2.6**	6.0	**4.3**	6.4	**3.1**	2.6	**2.6**
LE03	Temp (°C)	28.1	27.4	28.0	27.2	24.6	24.5	24.6	24.5	10.9	10.9
	Cond (µS/cm)	*4290*	*4282*	*3097*	*3096*	*4513*	*4515*	*4481*	*4484*	*4197*	*4197*
	pH	*8.78*	*8.70*	*8.95*	*8.83*	*9.21*	*9.20*	*9.34*	*9.35*	*9.00*	*8.99*
	DO (mg/L)	3.0	**0.5**	5.4	**2.1**	8.0	7.7	7.6	7.7	4.9	5.0
Lake-wide Average	Temp (°C)	27.8	27.2	27.8	27.2	24.4	24.3	24.3	24.0	10.7	10.6
	Cond (µS/cm)	*4292*	*4286*	*3097*	*3096*	*4509*	*4509*	*4485*	*4482*	*4207*	*4207*
	pH	*8.76*	*8.68*	*8.93*	*8.86*	*9.15*	*9.12*	*9.31*	*9.27*	*8.97*	*8.96*
	DO (mg/L)	2.7	**0.5**	4.7	**2.2**	6.8	5.8	6.8	5.1	3.5	**3.1**

Notes:
°C = degrees Celsius; µS/cm = microSiemens per centimeter; m= meter; mg/L = milligrams per liter
2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in bottom 1m of sampling site
Bold Underline - Indicates not meeting the 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan water quality objective

Table 3-6. In-Situ Water Quality Parameter Measurements in Lake Elsinore – 2023 Monthly Means for Each Site (February – June 2023)

Site	Measure	Feb-23		Apr-23		Jun-23	
		Water Column Mean	1m from Bottom	Water Column Mean	1m from Bottom	Water Column Mean	1m from Bottom
LE01	Temp (°C)	11.0	10.8	15.5	14.6	23.0	22.7
	Cond (µS/cm)	*3676*	*3679*	*2940*	*2939*	*3163*	*3169*
	pH	*8.93*	*8.90*	*9.04*	*8.95*	*8.75*	*8.68*
	DO (mg/L)	9.8	9.4	10.7	8.6	5.1	**3.7**
LE02	Temp (°C)	11.1	10.9	15.1	14.2	23.0	22.7
	Cond (µS/cm)	*3674*	*3677*	*2935*	*2950*	*3148*	*3148*
	pH	*8.93*	*8.91*	*9.01*	*8.93*	*8.72*	*8.69*
	DO (mg/L)	10.2	9.9	10.6	8.8	4.8	**3.4**
LE03	Temp (°C)	11.4	11.2	15.2	14.6	23.3	23.0
	Cond (µS/cm)	*3667*	*3667*	*2931*	*2938*	*3138*	*3141*
	pH	*8.87*	*8.82*	*9.04*	*8.95*	*8.83*	*8.74*
	DO (mg/L)	10.2	9.2	10.1	8.5	5.7	**4.5**
Lake-wide Average	Temp (°C)	11.1	10.9	15.2	14.4	23.1	22.8
	Cond (µS/cm)	*3672*	*3674*	*2935*	*2942*	*3150*	*3153*
	pH	*8.91*	*8.88*	*9.03*	*8.94*	*8.77*	*8.70*
	DO (mg/L)	10.1	9.5	10.5	8.6	5.2	**3.9**

Notes:
°C = degrees Celsius; µS/cm = microSiemens per centimeter; m= meter; mg/L = milligrams per liter
2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in bottom 1m of sampling site
Bold Underline - Indicates not meeting the 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan water quality objective

Generally, the greatest DO concentrations throughout the water column (both water column mean and 1-meter from bottom) were observed in February at all three sites. This is the typical pattern observed at Lake Elsinore. However, this monitoring year, possibly as a result of the larger volume of incoming water from the storm season, the water column mean in April was the highpoint of dissolved oxygen at two of the three sites (LE01 and LE02), as well as the lake-wide average. Concentrations of DO near the bottom, while lower, generally tracked with the overall water column mean for all three sites. Two exceptions to this in which the water column mean dissolved oxygen matched that within 1-m of the bottom, was during the time of year when the lake typically destratifies (December through February) and at the shallower of the three locations (LE03, multiple dates). All three sites exhibited a divergence in the water column mean and 1-meter from bottom DO concentration beginning in April 2023. These diverging measurements indicate that the lake was beginning to stratify as it warmed, supported by the concurrent increased temperatures recorded during the April and June 2023 events and historical trends that demonstrate stratification of the lake typically begins during this period. The 12-month rolling mean DO concentration 1-m above the lake bottom at Site LE02 ranged from 3.4 to 4.4 mg/L, never rising above the 2020 TMDL target of 5.0 mg/L (**Figure 3-3**).

Conductivity exhibited a gradual increase from July through September 2022, from 4286 to 4509 microSiemens per centimeter (µS/cm) before decreasing each subsequent month to a low value of 2550 µS/cm in June 2023.

The water column mean pH for the first 4 monitoring events exhibited a steady increase from 8.76 to 9.31 pH units across the July to October field events, followed by a general decline through June 2023 back to pH levels consistent with the beginning of the monitoring period. There is no obvious cause for the increase in pH across these monitoring events but is likely due to the historically intense algal bloom in Fall 2022. There is a close relationship between the processes involved in algal photosynthesis and water pH levels particularly in lakes with high algal biomass. The process of algal photosynthesis involves the uptake of carbon dioxide from the water, which aids in cell growth. As algae remove carbon dioxide, the pH levels of the water increase due to a decrease in carbonate and bicarbonate levels. Then as the large and numerous rain events across the 2022/2023 winter season began, pH levels began to decrease.

Water clarity measured using a Secchi disk exhibited a decrease across July to October 2022 from 0.98 feet (ft) to 0.66 ft before increasing back to 0.98 ft in December (**Figure 3-7**). Clarity then remained stable for the remaining sampling events. This decrease in clarity in the fall of 2022 coincided with the intense algal bloom during this period, as indicated by the water clarity closely following the pattern observed for surface chlorophyll-a concentration (see **Figure 3-10**).

For further comparisons regarding in-situ water quality parameters, **Table 3-7** includes lake-wide averages observed for the current 2022-23 monitoring year, as well as the prior 2019-20, 2020-21, and 2021-22 monitoring years.

Table 3-7. In-Situ Water Quality Parameter Measurements in Lake Elsinore – 2022-2023 Annual Mean Statistics for Each Site

		Measure	LE01	LE02	LE03	Lake-wide Average (July 2022-June 2023)	Lake-wide Average (July 2021-June 2022)	Lake-wide Average (July 2020-June 2021)	Lake-wide Average (July 2019-June 2020)
Water Column Mean	Min	Temp (°C)	10.6	10.6	10.9	10.7	11.7	13.0	12.0
		Cond (µS/cm)	2940	2935	2931	2935	3610	3144	2880
		pH	*8.75*	*8.72*	*8.78*	*8.75*	*8.67*	*8.56*	*8.97*
		DO (mg/L)	2.8	2.2	3.0	2.7	1.8	1.9	2.8
	Max	Temp (°C)	27.8	27.6	28.1	27.9	27.6	27.3	27.4
		Cond (µS/cm)	4508	4507	4513	4509	4127	3474	3895
		pH	*9.30*	*9.28*	*9.34*	*9.31*	*9.03*	*9.16*	*9.28*
		DO (mg/L)	10.7	10.6	10.2	10.5	10.7	8.5	11.6
	Average	Temp (°C)	20.5	20.4	20.8	20.6	21.4	21.5	20.5
		Cond (µS/cm)	*3797*	*3794*	*3789*	*3793*	*3819*	*3322*	*3562*
		pH	*8.98*	*8.95*	*9.00*	*8.98*	*8.79*	*8.81*	*9.15*
		DO (mg/L)	6.1	5.9	6.9	6.3	5.4	5.1	5.9
1m from Bottom	Min	Temp (°C)	10.4	10.6	10.9	10.6	11.4	12.9	11.6
		Cond (µS/cm)	2939	2950	2938	2942	3608	3144	3007
		pH	*8.68*	*8.64*	*8.70*	*8.67*	*8.60*	8.50	*8.85*
		DO (mg/L)	0.8	0.2	0.5	0.5	0.3	0.2	0.1
	Max	Temp (°C)	27.4	27.2	27.4	27.3	27.2	26.8	27.2
		Cond (µS/cm)	4507	4507	4515	4509	4124	3478	3896
		pH	*9.25*	*9.20*	*9.35*	*9.27*	*8.98*	*9.07*	*9.23*
		DO (mg/L)	9.4	9.9	9.2	9.5	10.5	8.1	8.3
	Average	Temp (°C)	20.1	20.0	20.4	20.2	21	21.0	20.1
		Cond (µS/cm)	*3797*	*3794*	*3790*	*3794*	*3817*	*3322*	*3578*
		pH	*8.92*	*8.90*	*8.95*	*8.92*	*8.74*	*8.73*	*9.07*
		DO (mg/L)	**4.5**	**4.4**	5.6	**4.8**	**3.8**	**3.0**	**3.7**

Notes:
°C = degrees Celsius; µS/cm = microSiemens per centimeter; m= meter; mg/L = milligrams per liter
2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in bottom 1m of sampling site
Bold Underline - Indicates not meeting the 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan water quality objective

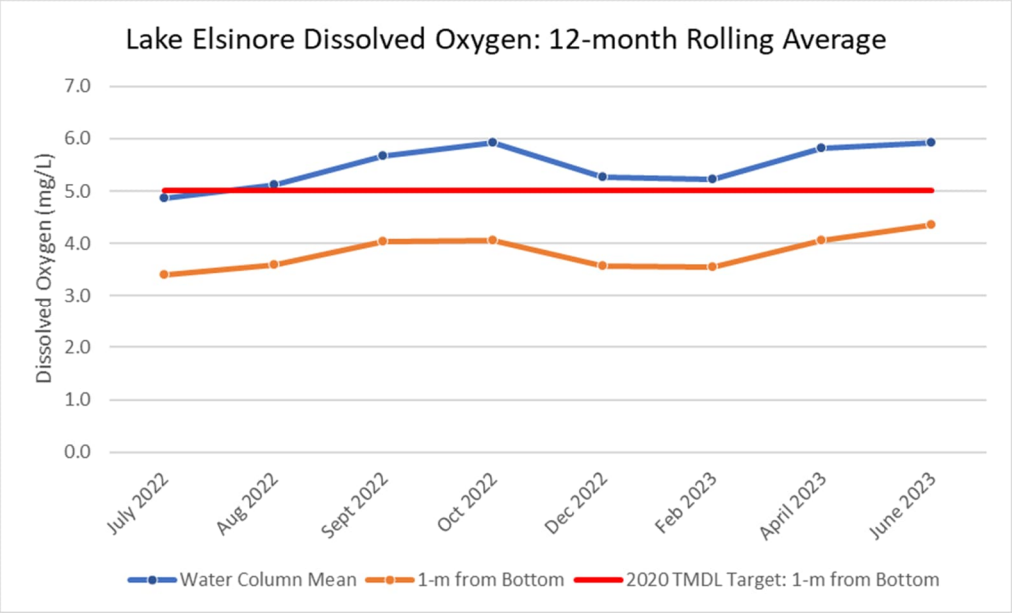

Figure 3-2. Water Column Mean Dissolved Oxygen 12-month Rolling Average – Lake Elsinore for Site LE02

Each data point is calculated by averaging the measurement from each event with the previous seven events (i.e., one year of data) to obtain a rolling average. Therefore, the graph represents data collected from August 2022 to June 2023.

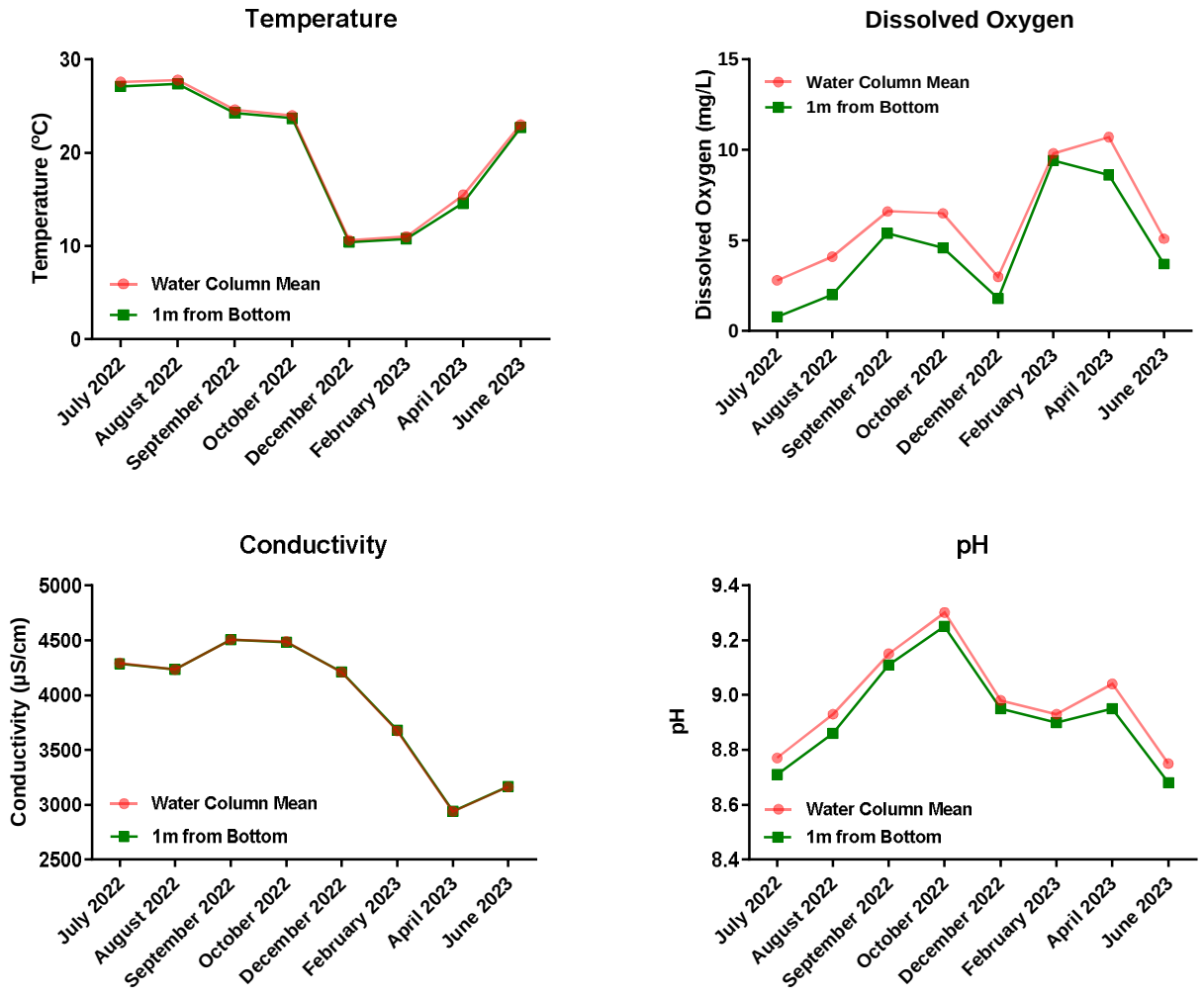

Figure 3-3. In-Situ Physical Water Quality Parameters - Lake Elsinore - Site LE01

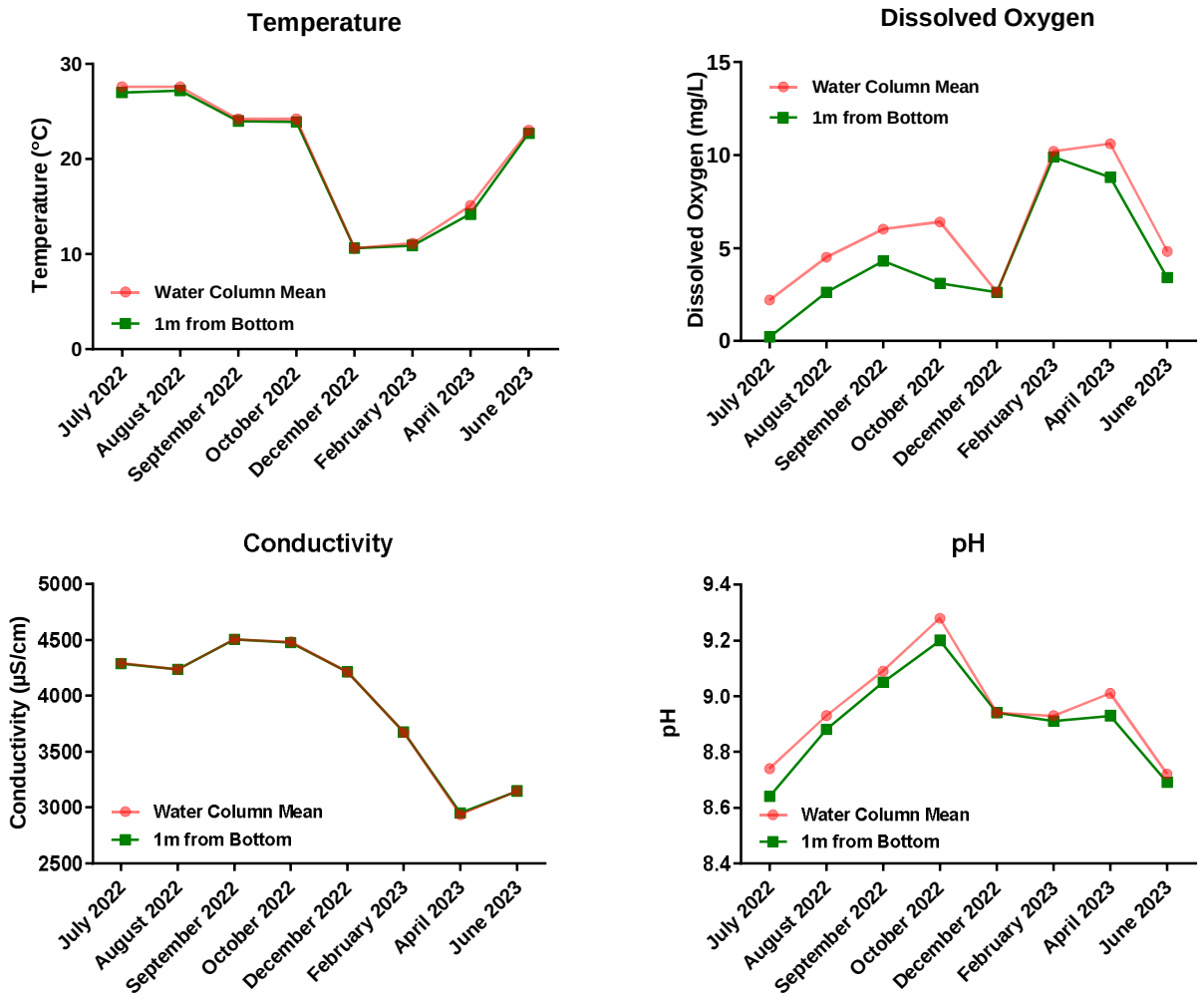

Figure 3-4. In- Situ Physical Water Quality Parameters - Lake Elsinore Site LE02

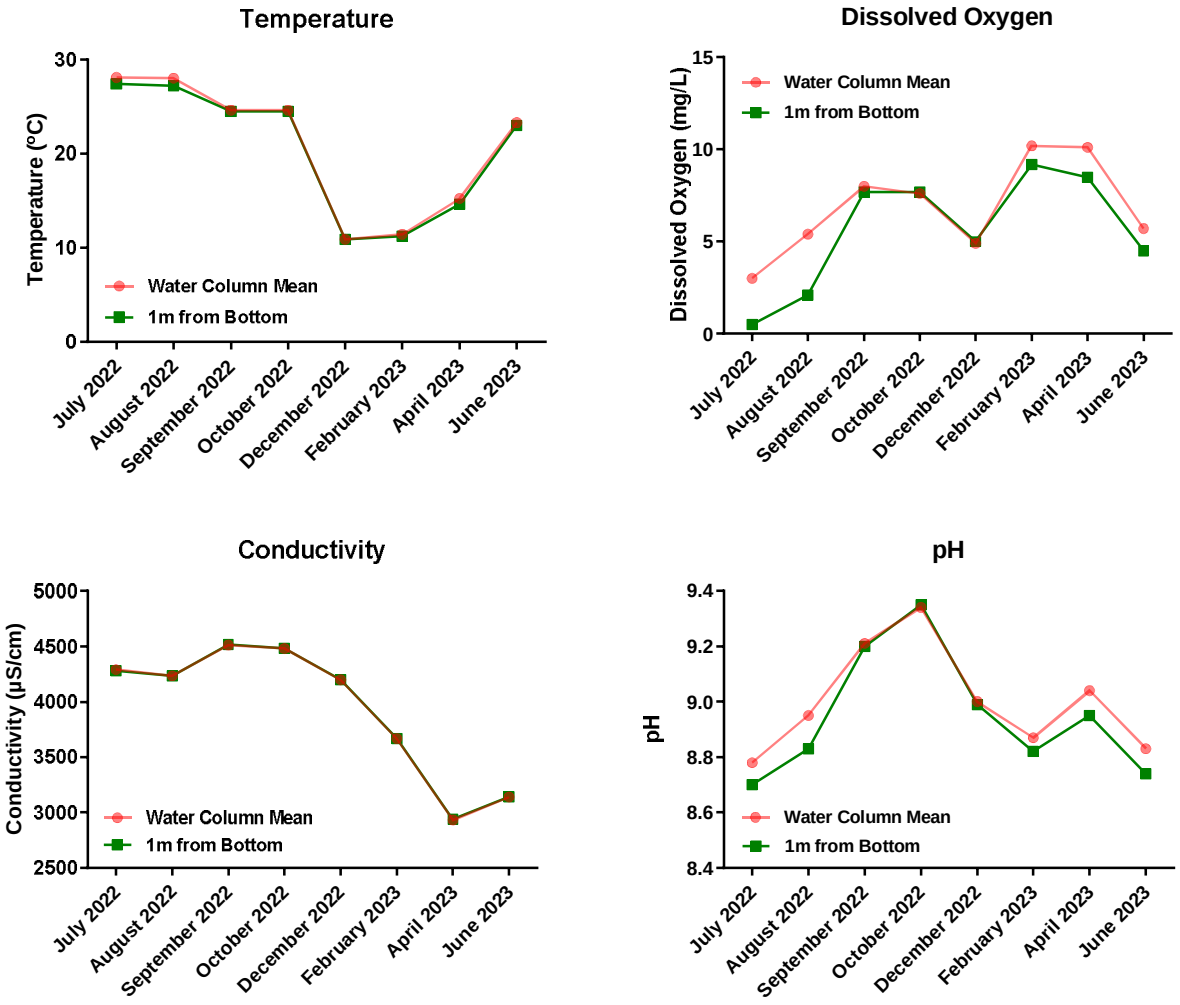

Figure 3-5. In- Situ Physical Water Quality Parameters - Lake Elsinore Site LE03

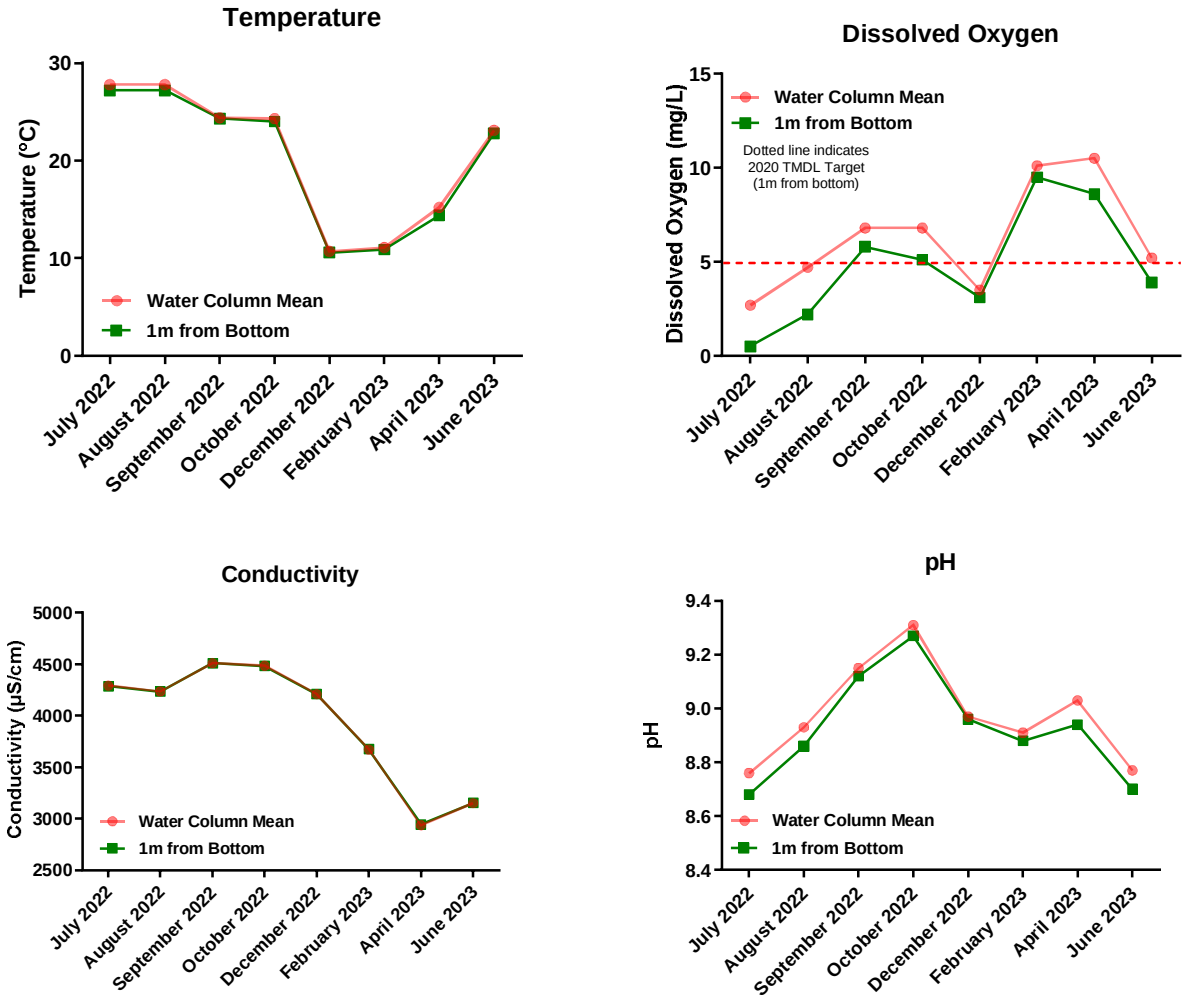

Figure 3-6. Monthly Lake-wide Mean of In-Situ Physical Water Quality Parameters – Mean of All Three Stations

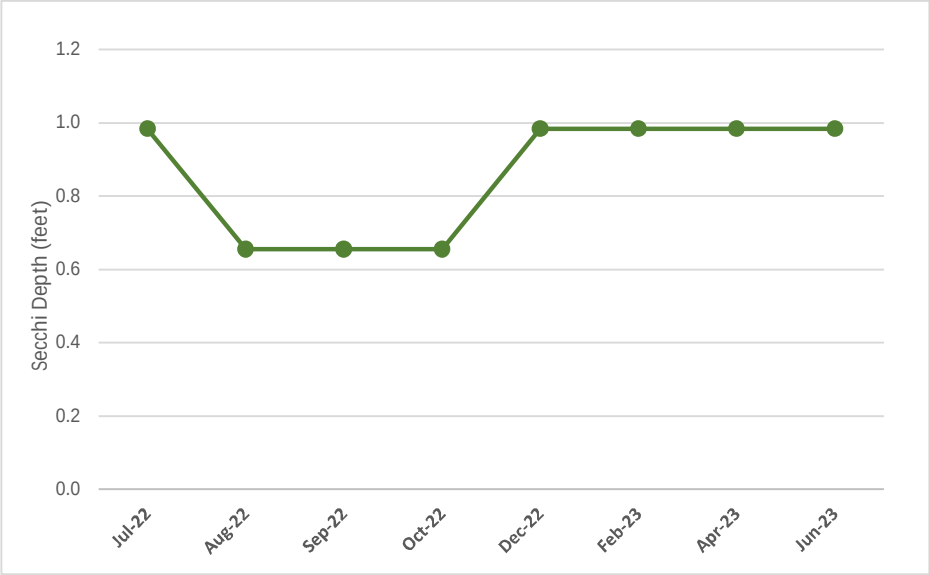

Figure 3-7. In- Situ Water Clarity Using a Secchi Disk - Lake Elsinore Site LE02

Analytical Chemistry

Monthly and annual summary analytical concentrations at Site LE02 are presented in **Tables 3-8 and 3-9**, respectively. Concentrations of analytes at Site LE02 are graphically presented in **Figures 3-8 through 3-10**.

Total nitrogen concentrations were steady across the summer, gradually increased in October and December, then decreased over the remaining three monitoring events likely as a result of winter precipitation events (**Figure 3-8**). Total nitrogen values across the monitoring year ranged from 3.4 to 6.3 mg/L. The annual mean concentration of total nitrogen was 4.8 mg/L (4.6 mg/L in the previous monitoring year). The total nitrogen 1-year rolling average concentration, calculated by averaging the measurement from each event with the previous seven events (i.e., one year of data), is shown in **Figure 3-9**. Each point of the graph representing a year's worth of data, exceeded the current 2020 TMDL annual target of 0.75 mg/L (**Figure 3-9**).

Total phosphorus concentrations ranged from 0.10 to 0.21 mg/L across all monitoring events. A decrease in total phosphorus concentration was observed between July and August 2022, followed by a steady increase through December 2022. Total phosphorus then decreased slightly in February 2023, the increased again in April 2023 (**Figure 3-8**). The annual mean concentration of total phosphorus was 0.15 mg/L, down from the 0.19 mg/L annual mean in the previous monitoring year. The decreasing trend in total phosphorus rolling average from the previous monitoring year continued through the first five monitoring events then remained stable for the remainder of the monitoring year. Despite this decrease, each 1-year total phosphorus rolling average point concentration exceeded the current 2020 TMDL annual target of 0.1 mg/L (**Figure 3-9**).

Total ammonia-N concentrations were variable across the monitoring year, with the highest concentrations observed in July and December. Concentrations ranged from 0.032 to 1.0 mg/L,

with an annual mean of 0.24 mg/L (**Table 3-10**). A large increase in ammonia was observed in December 2022. This increase is not uncommon in Lake Elsinore and has been observed in every prior monitoring year in either December or February, with the exception of the 2021-2022 monitoring year, and is likely tied to the stratification cycle of the lake. Two exceedances of the 2004 TMDL total ammonia Criterion Continuous Concentration (CCC) objective were observed in July (0.42 mg/L) and December 2022 (1.0 mg/L). No samples exceeded the acute total ammonia Criterion Maximum Concentration (CMC) objective.[2]

Total dissolved solids concentrations were stable between July and December before steadily decreasing in February and April as a result of stormwater input, and then remained stable in June 2023. All values prior to April 2023 were above the Basin Plan Water Quality Objective.

Depth-integrated concentration range of chlorophyll-a ranged from 73 to 190 µg/L across all eight sampling events was similar to the previous monitoring year. Surface (0-2m) chlorophyll-a concentrations ranged from 79 to 210 µg/L. Surface and depth-integrated samples generally tracked with each other, with the one exception of the two samples in August 2022. Chlorophyll-a concentrations exhibited a general increase across the summer and early fall months (**Figure 3-10**). This was followed by a decrease in December and then a variable increase through June 2023. The mean chlorophyll-a concentration observed in samples collected during the summer months (June 2022 through September 2022) was 122 µg/L for depth-integrated samples and 160 µg/L for surface samples**.** The mean annual chlorophyll-a concentration across the entire monitoring year was 124 µg/L for depth-integrated samples and 142 µg/L for surface samples**.**

[2]Note that the water quality objectives for total ammonia vary for each sampling date based on site-specific pH, temperature, and salinity values.

Table 3-8. Monthly Analytical Chemistry Results for Lake Elsinore in 2022-2023

Compound	Units	MDL	RL	Depth Integrated or Surface Sample	July 2022	August 2022	September 2022	October 2022	December 2022	February 2023	April 2023	June 2023	Annual Average
General Chemistry													
Total Dissolved Solids	mg/L	4.0	10	DI	*2500*	*2600*	*2600*	*2600*	*2600*	*2200*	1800	1800	*2338*
Sulfide	mg/L	0.05	0.1	DI	0.2	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	0.03
Nitrate as N	mg/L	0.04	0.2	DI	0.041 J	ND (<0.04)	0.043 J	0.045 J	0.051 J	0.18	ND (<0.04)	ND (<0.04)	0.05
Nitrite as N	mg/L	0.042	0.1	DI	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	0.26	ND (<0.04)	ND (<0.04)	0.03
Total Kjeldahl Nitrogen	mg/L	0.065-0.26	0.1-0.4	DI	4.9	4.9	5.2	5.5	6.2	4.6	3.4	3.5	4.78
Total Nitrogen[a]	mg/L	NA	NA	DI	4.9	4.9	5.2	5.5	6.3	5.0	3.4	3.5	**4.85**
Ammonia-Nitrogen	mg/L	0.017	0.1	DI	**0.42***	0.21	0.032 J	0.045 J	**1.0***	0.11	0.043 J	0.059 J	0.24
Unionized Ammonia[b]	mg/L	NA	NA	DI	0.1124	0.07	0.0116	0.0215	0.142	0.0141	0.0083	0.0106	0.05
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	DI	0.013	0.008 J	0.008 J	0.01	0.016	0.013	ND (<0.007)	ND (<0.007)	0.01
Total Phosphorus	mg/L	0.0067	0.01	DI	0.16	0.10	0.11	0.12	0.16	0.15	0.21	0.18	**0.15**
Chlorophyll-a													
Chlorophyll-a	µg/L	NA	1.0	Surf	140	160	180	210	79	108	105	156	142
Chlorophyll-a	µg/L	NA	1.0	DI	120	78	170	190	73	125	88.5	151	124

Notes:
When a concentration was non-detect (ND), the annual mean value for compliance purposes was calculated by converting ND values to zero. If the result of the calculated mean was non-zero, but below the corresponding MDL, the mean value was reported as ND.

a - Total Nitrogen = TKN+NO_2+NO_3
b - The concentration of unionized ammonia was calculated using equation by Thursby (1986), based on site specific pH and temperature recorded at each location.
c – Sample measured out of holding time
ND – Not detected; NA – Not Applicable/ available
DI = Depth integrated; Surf = Surface 0-2m
µg/L – micrograms per liter; mg/L – milligrams per liter; MDL – method detection limit; RL – reporting limit; J - Reported value is an estimate as detection was above the MDL, but below the RL
Bold Underline - Indicates exceedance of 2020 TMDL Objective for annual average
Italicize – Indicates exceedance of Basin Plan Water Quality Objective
* Exceeds 2004 TMDL Permit NH3 CCC; ** Exceeds 2004 TMDL Permit NH3 CMC

Table 3-9. Analytical Chemistry Summary for Lake Elsinore – Annual Mean Statistics for 2022-2023

Compound	Units	MDL	RL	Basin Plan WQO or TMDL Target	Depth Integrated or Surface Sample	Min	Max	Summer Average[d]	Annual Average
General Chemistry									
Total Dissolved Solids	mg/L	4.0	10	2000 [2]	DI	1800	2600	2525	2338
Sulfide	mg/L	0.05	0.1	NA	DI	ND (<0.05)	0.20	0.05	0.03
Nitrate as N	mg/L	0.04	0.2	NA	DI	ND (<0.04)	0.18	0.02	0.05
Nitrite as N	mg/L	0.042	0.1	NA	DI	ND (<0.04)	0.26	ND (<0.04)	0.03
Total Kjeldahl Nitrogen	mg/L	0.065-0.26	0.1-0.4	NA	DI	3.4	6.2	4.9	4.78
Total Nitrogen[a]	mg/L	NA	NA	0.75 [1]	DI	3.4	6.3	4.9	**4.85**
Ammonia-Nitrogen	mg/L	0.017	0.1	2004 - CMC: 0.928-2.329[d1]; CCC: 0.19-0.574[d1]	DI	0.03	1.0	0.24	0.24
Unionized Ammonia[d]	mg/L	NA	NA	NA	DI	0.008	0.142	0.06	0.05
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	NA	DI	ND (<0.003)	0.016	0.01	0.01
Total Phosphorus	mg/L	0.0067	0.01	0.1[b1]	DI	0.10	0.21	0.13	**0.15**
Chlorophyll-a									
Chlorophyll-a	µg/L	NA	1.0	25 [1]	Surf	79	210	**160**	142
Chlorophyll-a	µg/L	NA	1.0	25 [1]	DI	73	190	**122**	124

Notes:
When a concentration was non-detect, the annual value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculation was below the corresponding MDL, the annual average value was reported as ND.

a - Total Nitrogen = TKN+NO_2+NO_3
b - Annual average
c - Values calculated using water column mean ammonia, temperature, salinity and pH. Calculated using equation by Thursby (1986). The range of TMDL target thresholds apply to individual samples, not applicable to annual means
d - Summer average (June 2021 – September 2021)
1 – 2020 TMDL Target, based on Table 5-9n of 2004 TMDL
2 – Santa Ana Region Basin Plan Water Quality Objective
NA – Not applicable/ available; ND – not detected
DI = Depth integrated; Surf = Surface 0-2m
mg/L – micrograms per liter; ug/L – milligrams per liter; MDL – method detection limit; RL – reporting limit; J –Reported value was detected above the MDL, but below the RL
Bold Underline - Indicates exceedance of 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan Water Quality Objective
* Exceeds 2004 TMDL Permit NH3 CCC; ** Exceeds 2004 TMDL Permit NH3 CMC

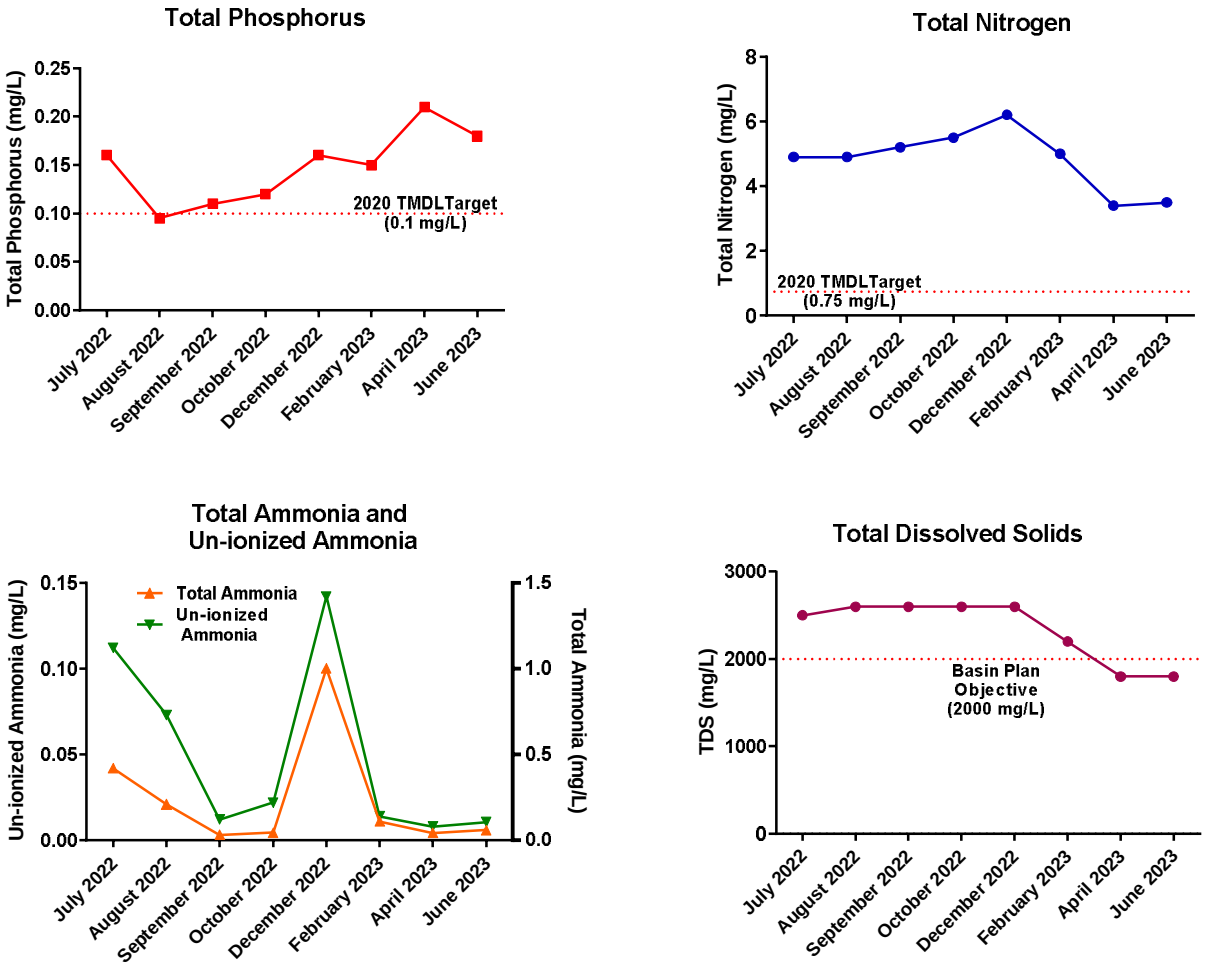

Figure 3-8. Lake Elsinore Analytical Chemistry – Depth-Integrated Means at Site LE02 (July 2022-June 2023)

Long term trends can be found in Appendix E

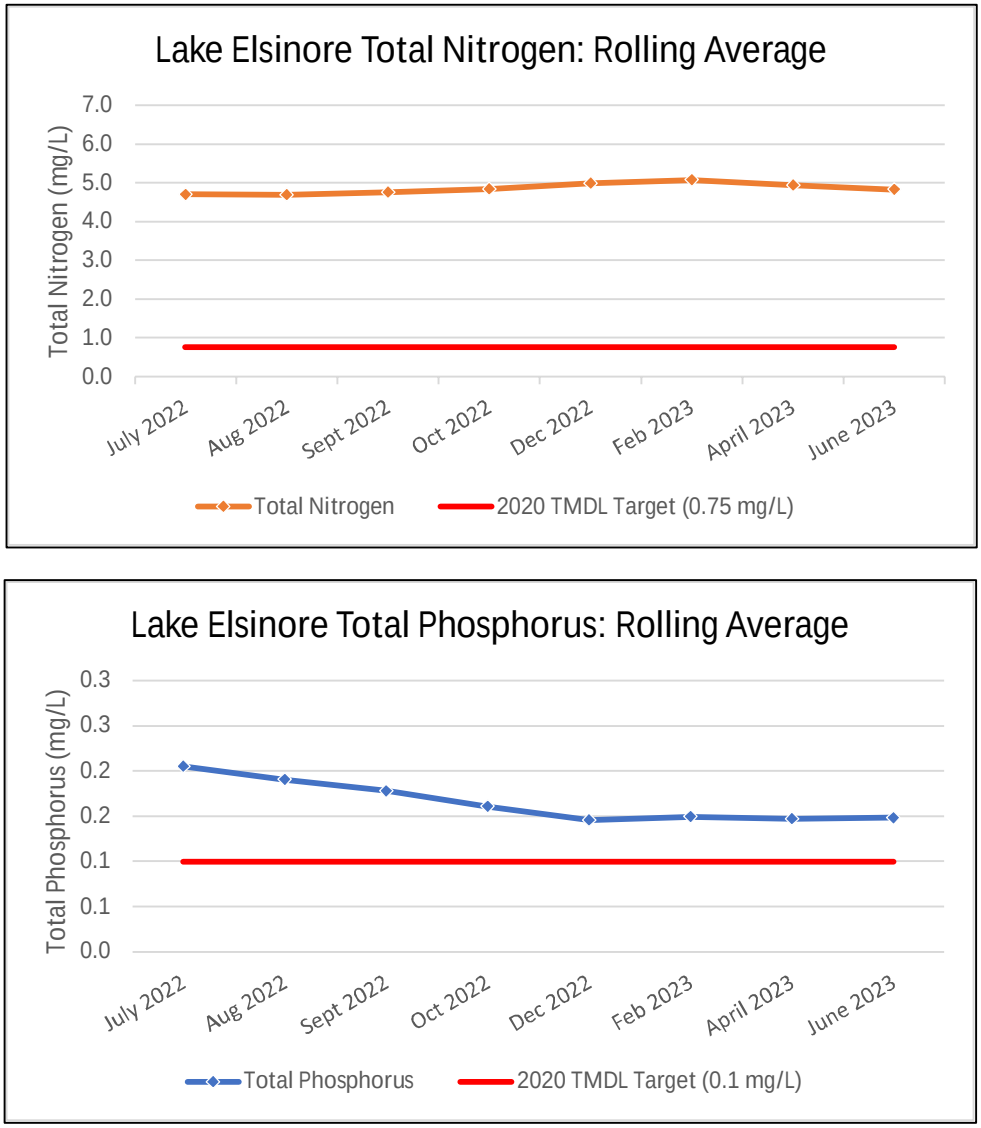

Figure 3-9. Lake Elsinore Analytical Chemistry – Total Nitrogen and Phosphorus Rolling Averages (July 2022 – June 2023)

Each data point is calculated by averaging the value of each event with the previous seven events (i.e., one year of data) to obtain a rolling average. Therefore, the graph represents data collected from August 2021 to June 2023.

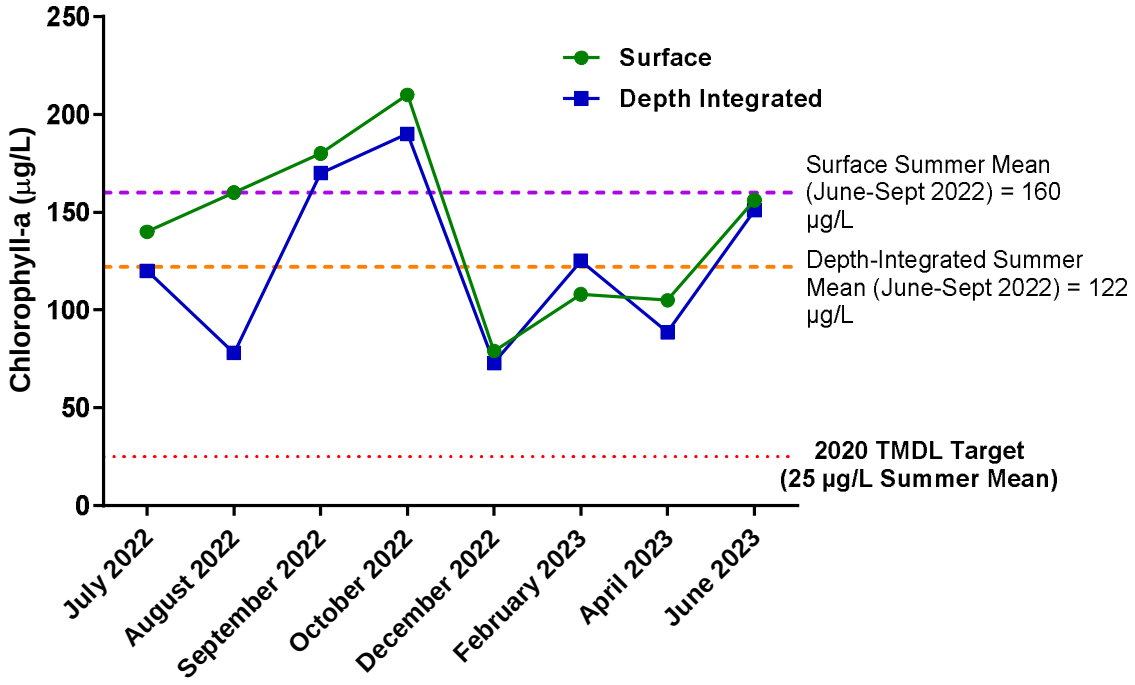

Figure 3-10. Lake Elsinore Analytical Chemistry – Depth-Integrated and Surface Chlorophyll-a at Site LE02

Long term trends can be found in Appendix E

3.4 Canyon Lake Monitoring

3.4.1 Sampling Station Locations and Frequency

Similar to Lake Elsinore, sampling parameters and locations in Canyon Lake were based on the TMDL monitoring conducted between 2006 and 2012 to provide consistency in assessing trends toward meeting compliance goals. The in-lake monitoring design halted in 2012 was resumed in July 2015 using the four stations outlined in the approved Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Plan (LESJWA, 2006; **Figure 3-11**, **Table 3-10)**. Two sites are located in the main body of the lake (CL07 near the dam and CL08 in the northern arm), and two in the East Bay (CL09 and CL10). Samples for analytical chemistry and chlorophyll-a were collected at all four sites, in addition to morning and afternoon in-situ water column profile readings.

Sampling in Canyon Lake was conducted bi-monthly (i.e., every other month) concurrent with the TMDL sampling in Lake Elsinore and was also coordinated with satellite overpass dates (see Section 3.4).

Table 3-10. Canyon Lake TMDL Monitoring Locations

Site	Latitude	Longitude
CL07	33.678027°	-117.275135°
CL08	33.688211°	-117.268944°
CL09	33.681100°	-117.258892°
CL10	33.679495°	-117.250669°

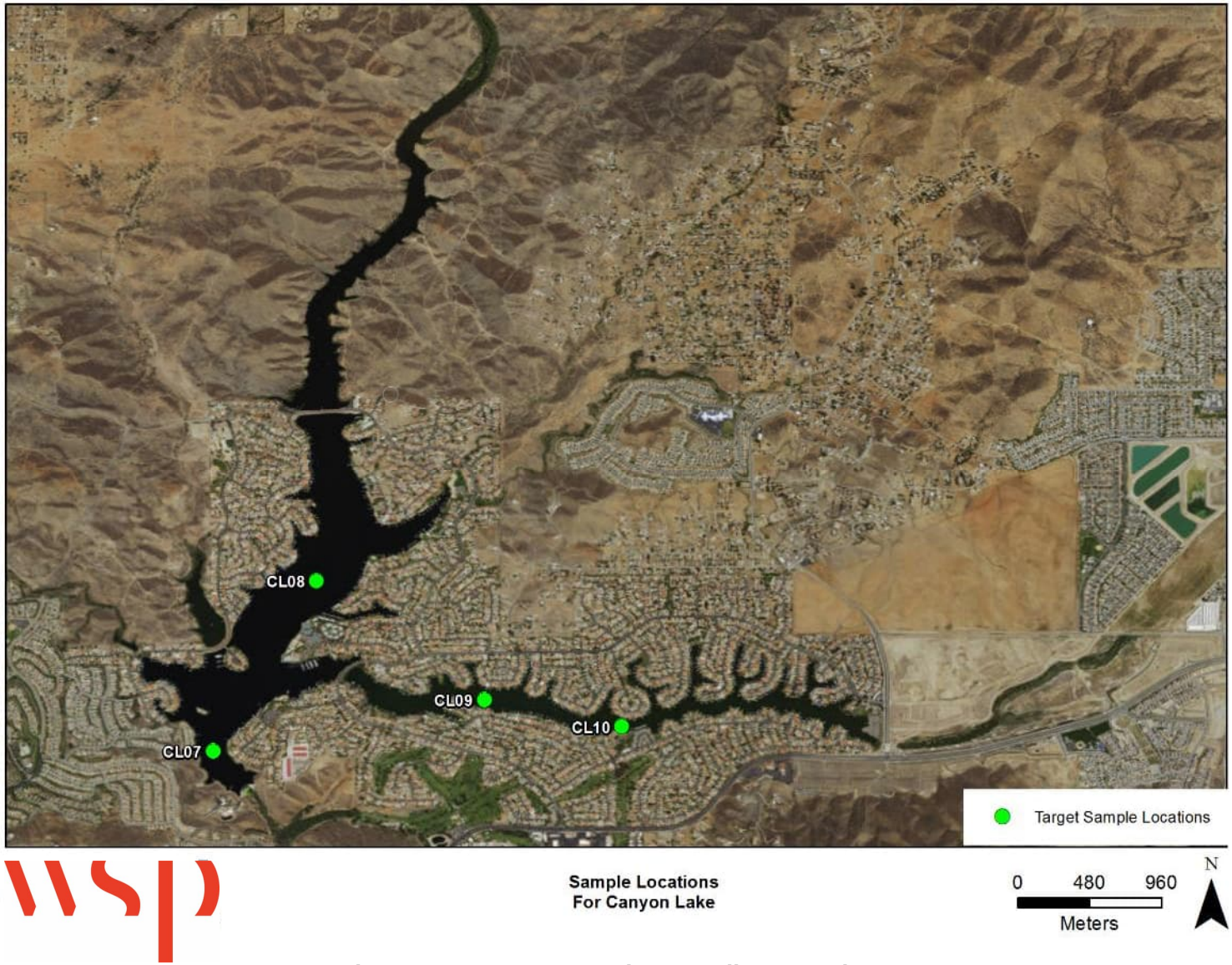

Figure 3-11. Canyon Lake Sampling Locations

3.4.2 Sampling Methods

Samples for analytical chemistry were collected in the same manner as in Lake Elsinore using a peristaltic pump to collect depth-integrated composite samples. Two samples were collected for chlorophyll-a: 1) a full depth-integrated composite sample; and 2) a 0-2-m depth-integrated composite surface sample. All analytical samples were held on wet ice immediately following collection and transferred to a local courier or shipping company on the same day of collection. Samples for analysis of nutrients, ammonia, sulfide, TDS, total suspended solids and chlorophyll-a were submitted to Weck Laboratories Inc., located in City of Industry, California with methods summarized in **Table 3-11**.

Beginning with the February 2017 sampling event, the TMDL Task Force directed that the pre- and post-alum application monitoring be integrated into the routine TMDL monitoring, given that the monitored analytes were largely identical to the TMDL monitoring, with the exception of aluminum and total suspended solids. Given this directive, total/dissolved aluminum and total suspended solids were added to the nutrient TMDL monitoring analyte list for all subsequent routine TMDL monitoring events on Canyon Lake. During the 2022-2023 monitoring period, Canyon Lake alum applications were performed during the week of October 10, 2022 and May 15, 2023. Pre-alum application monitoring events were performed on October 5, 2022 and April 6, 2023 with the subsequent respective bi-monthly TMDL events on December 19, 2022 and June 22, 2023 serving as the post-alum application monitoring.

In-situ water column profile data was recorded in the morning at all four Canyon Lake stations using pre-calibrated hand-held YSI field meters or equivalent for pH, temperature, DO, and specific conductivity at 1-m intervals throughout the water column. These data were used to assess lateral and vertical spatial variability within the lake. End-of-the-day water column profiles (i.e., after ~2:00pm) were also recorded for the same suite of in-situ parameters at all stations to assess any potential temporal variability in these parameters over the course of a day. Water clarity was also assessed with a Secchi disk at all stations. For water quality reporting purposes, the morning and afternoon in situ measurements were averaged at each site on each date.

Satellite imagery was used to remotely measure chlorophyll-a concentrations at the water surface in Canyon Lake. Satellite imagery was also used to estimate the likelihood of a harmful algae bloom.

Table 3-11. In-lake Analytical Constituents and Methods for Canyon Lake (2022-2023)

Parameter	Analysis SOP #	Sampling Method
Analytical Chemistry		
Nitrite Nitrogen (NO_2-N)	EPA 353.2	Depth Integrated
Nitrate Nitrogen (NO_3-N)	EPA 353.2	Depth Integrated
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	Depth Integrated
Total Nitrogen (TN)	Calculated	Depth Integrated
Ammonia Nitrogen (NH4-N)	EPA 350.1	Depth Integrated
Sulfide	SM 4500S2 D	Depth Integrated
Total Phosphorus (TP)	EPA 365.3	Depth Integrated
Soluble Reactive Phosphorus (SRP / Ortho-P)	EPA 365.3	Depth Integrated
Chlorophyll-a	SM 10200H	Surface (0-2m) & Depth Integrated
Total Dissolved Solids (TDS)	SM 2540 C	Depth Integrated
Total Suspended Solids (TSS)	SM 2540D	Depth Integrated
Total Aluminum	EPA 200.7	Depth Integrated
Dissolved Aluminum	EPA 200.7	Depth Integrated

Notes:
US EPA - United States Environmental Protection Agency; m- meter; SM- standard method

3.4.3 Water Quality Summary

A summary of the in-lake monitoring events for Canyon Lake for the period of July 1, 2022 to June 30, 2023 is presented below. A total of six events were sampled under the TMDL monitoring program, with three occurring in 2022 (August 11, October 5, and December 19) and three in 2023 (February 7, April 6, and June 22). Complete monthly water column profiles can be found in Appendix B. Detailed analytical chemistry lab reports for each event are contained in Appendix C. Satellite imagery reports for each event are provided in Appendix D. Current data in the context of historical water quality monitoring results from 2002-present are presented in Appendix E.

Water Column Profiles

A summary of water column profile mean values for each site and monitoring event are presented in **Tables 3-12 and 3-13**. A summary of water column profile mean values for each basin (i.e., Main Lake and Eastern) are presented in **Tables 3-14 and 3-15**. Water column profile mean statistics for each site across the entire monitoring period are presented in **Table 3-16**. Mean water column values across the annual cycle are also summarized graphically in **Figures 3-12 to 3-16**. Mean profile values are gathered by averaging morning and afternoon readings across sites.

For the purposes of this report, the epilimnion is defined as the region of the water column above the thermocline, while the hypolimnion is the region of the water column below the thermocline, with both regions exhibiting relatively stable temperatures. The thermocline portion of the water column is defined as the region between the epilimnion and hypolimnion where a marked drop in temperature per unit of depth is evident (i.e., >1.0°C change over 1-m depth differential).

Measurements within the thermocline were excluded from epilimnion and hypolimnion averaging. Full water column means included data recorded from all three zones when stratification was present.

For both the Main Basin and East Basin, temperatures exhibited a somewhat different pattern than seen in previous years. While the lowest temperatures occurred during the winter months (December and February) as has been observed in the past, the highest temperatures were observed in August and October (rather than the typical June and August). Dissolved oxygen concentrations for both basins reflected an inverse pattern with temperature, exhibiting higher concentrations during the winter months when averaged throughout the water column, reaching a maximum concentration in December 2022 and February 2023. When the thermocline develops, typically beginning in late spring and lasting through early fall period, DO concentrations within the epilimnion and hypolimnion diverge, with hypolimnion concentrations falling substantially during that timeframe. The same pattern was observed this monitoring year with the lake exhibiting stratification in August and October 2022, being de-stratified in December and February, and becoming stratified again in late Spring 2023 (**Figures 3-12 and 3-13**). Lake-wide water column DO average for the current monitoring year was 6.7 mg/L, down slightly from the mean of 7.2 mg/L in the 2021-2022 monitoring year, but substantially higher than the three monitoring years prior to that (**Table 3-16**). The rolling 12-month DO concentration was never above the 2020 TMDL target of 5.0 mg/L in the hypolimnion (**Figure 3-14**). The rolling average of the full water column mean was above 5.0 mg/L for all monitoring dates (**Figure 3-15**).

Specific conductivity within the epilimnion and hypolimnion (when stratified) and the water column was stable through December. A large decline in specific conductivity was observed in February and April, followed by a slight increase in June 2023. Full water column mean specific conductivity ranged from 669 to 1073 µS/cm and 734 to 1237 µS/cm, in the Main Basin and East Basin, respectively (**Tables 3-14 and 3-15, Figure 3-12**). Mean values for pH were similar between the two Basins, with values ranging from 7.49 to 8.30 and 7.53 to 8.26 for the East Basin and Main Basin, respectively.

Secchi depths were stable between August and October 2022 before decreasing (decreased water clarity) in December and February. Similar to the previous year, a large increase in secchi depth (increased clarity) was then observed between February and April 2023. Both basins exhibited the increase with secchi depths rising from approximately 8.6 feet and 9.5 feet for the Main and East Basins, respectively (**Figure 3-16**). The increase in water clarity during the April 2022 event could be related to the decreased concentrations of planktonic algae in Canyon Lake as chlorophyll-a exhibited a corresponding decline in April 2023.

For further comparisons regarding in-situ water quality parameters, **Table 3-16** includes lake-wide averages observed for the current 2022-23 monitoring year, as well as the prior years dating back to the 2018-19 monitoring years.

Table 3-12. In-Situ Water Quality Parameter Measurements for Canyon Lake - Monthly Means for Each Site (August – December 2022)

Basin	Site	Measure	Aug-22			Oct-22			Dec-22		
			Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo
Main Basin	CL07	Temp (°C)	22.2	28.9	14.4	21.3	26.1	14.7	12.5	--	--
		Cond (µS/cm)	1044	1097	992	1036	1086	973	1077	--	--
		pH	7.77	*8.44*	7.11	7.74	8.46	7.06	7.77	--	--
		DO (mg/L)	3.7	7.8	**0.2**	3.9	8.3	**0.0**	6.7	--	--
	CL08	Temp (°C)	27.1	28.9	18.2	25.5	--	--	12.6	--	--
		Cond (µS/cm)	1077	1094	1006	1077	--	--	1069	--	--
		pH	8.11	*8.35*	7.15	8.13	--	--	7.89	--	--
		DO (mg/L)	5.6	7.2	**0.2**	5.9	--	--	7.8	--	--
East Basin	CL09	Temp (°C)	26.5	28.6	18.8	24.8	--	--	11.7	--	--
		Cond (µS/cm)	1215	1224	1187	1199	--	--	1158	--	--
		pH	7.90	*8.23*	6.89	7.94	--	--	8.20	--	--
		DO (mg/L)	5.0	6.7	**0.1**	5.4	--	--	9.3	--	--
	CL10	Temp (°C)	29.1	--	--	25.9	--	--	11.7	--	--
		Cond (µS/cm)	1258	--	--	1240	--	--	1167	--	--
		pH	*8.45*	--	--	8.33	--	--	8.41	--	--
		DO (mg/L)	8.2	--	--	7.7	--	--	11.0	--	--
Lake-wide Average		Temp (°C)	26.2	28.8	17.1	24.4	26.1	14.7	12.1	--	--
		Cond (µS/cm)	1148	1138	1062	1138	1086	973	1118	--	--
		pH	8.05	*8.34*	7.05	8.03	8.46	7.06	8.07	--	--
		DO (mg/L)	5.6	7.2	**0.1**	5.7	8.3	**0.0**	8.7	--	--

Notes:
Epi = epilimnion; Hypo = hypolimnion**; --** not applicable due to lack of thermocline
2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in the hypolimnion
Bold Underline - Indicates exceedance of 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan Water Quality Objective

Table 3-13. In-Situ Water Quality Parameter Measurements for Canyon Lake - Monthly Means for Each Site (February – June 2023)

Basin	Site	Measure	Feb-23			Apr-23			Jun-23		
			Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo
Main Basin	CL07	Temp (°C)	11.5	--	--	13.2	--	--	17.0	24.3	12.4
		Cond (µS/cm)	845	--	--	687	--	--	753	717	785
		pH	8.29	--	--	7.50	--	--	7.72	8.67	7.25
		DO (mg/L)	10.5	--	--	3.5	--	--	2.9	8.6	**0.0**
	CL08	Temp (°C)	11.1	--	--	13.8	--	--	20.3	24.6	13.4
		Cond (µS/cm)	839	--	--	651	--	--	731	714	775
		pH	8.23	--	--	7.57	--	--	7.99	8.58	7.28
		DO (mg/L)	10.1	--	--	4.6	--	--	4.6	8.1	**0.0**
East Basin	CL09	Temp (°C)	11.1	--	--	14.9	--	--	21.0	24.5	13.5
		Cond (µS/cm)	914	--	--	747	--	--	907	883	937
		pH	7.81	--	--	7.48	--	--	7.96	8.50	7.10
		DO (mg/L)	6.9	--	--	5.0	--	--	4.8	8.0	**0.0**
	CL10	Temp (°C)	11.9	--	--	15.7	--	--	24.6	--	--
		Cond (µS/cm)	918	--	--	722	--	--	933	--	--
		pH	*8.34*	--	--	7.51	--	--	8.57	--	--
		DO (mg/L)	11.6	--	--	6.2	--	--	9.1	--	--
Lake-wide Average		Temp (°C)	11.4	--	--	14.4	--	--	20.7	24.4	13.1
		Cond (µS/cm)	879	--	--	702	--	--	831	771	832
		pH	8.17	--	--	7.51	--	--	8.06	8.58	7.21
		DO (mg/L)	9.8	--	--	4.8	--	--	5.3	8.2	**0.0**

Notes:
Epi = epilimnion; Hypo = hypolimnion**; --** not applicable due to lack of thermocline
2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in the hypolimnion
Bold Underline - Indicates exceedance of 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan Water Quality Objective

Table 3-14. In-Situ Water Quality Parameter Measurements for Canyon Lake - Monthly Means for Each Basin (August – December 2022)

Basin	Measure	Aug-22			Oct-22			Dec-22		
		Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo
Main	**Temp (°C)**	24.7	28.9	16.3	23.4	26.1	14.7	12.5	--	--
	Cond (µS/cm)	1060	1096	999	1056	1086	973	1073	--	--
	pH	7.94	*8.40*	7.13	7.93	8.46	7.06	7.83	--	--
	DO (mg/L)	4.7	7.5	**0.2**	4.9	8.3	**0.0**	7.2	--	--
East	**Temp (°C)**	27.8	28.6	18.8	25.3	--	--	11.7	--	--
	Cond (µS/cm)	1237	1224	1187	1220	--	--	1163	--	--
	pH	8.17	*8.23*	6.89	8.14	--	--	8.30	--	--
	DO (mg/L)	6.6	6.7	**0.1**	6.5	--	--	10.1	--	--
Lake-wide Average	**Temp (°C)**	26.2	28.8	17.6	24.4	26.1	14.7	12.1	--	--
	Cond (µS/cm)	1148	1160	1093	1138	1086	973	1118	--	--
	pH	8.05	*8.31*	7.01	8.03	8.46	7.06	8.07	--	--
	DO (mg/L)	5.6	7.1	**0.1**	5.7	8.3	**0.0**	8.7	--	--

Notes:
Epi = epilimnion; Hypo = hypolimnion**; --** not applicable due to lack of thermocline
2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in the hypolimnion
Bold Underline - Indicates exceedance of 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan Water Quality Objective

Table 3-15. In-Situ Water Quality Parameter Measurements for Canyon Lake - Monthly Means for Each Basin (February – June 2023)

Basin	Measure	Feb-23			Apr-23			Jun-23		
		Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo	Water Column Mean - All	Water Column Mean - Epi	Water Column Mean - Hypo
Main	**Temp (°C)**	11.3	--	--	13.5	--	--	18.6	24.4	12.9
	Cond (µS/cm)	842	--	--	669	--	--	742	716	780
	pH	8.26	--	--	7.53	--	--	7.85	8.62	7.26
	DO (mg/L)	10.3	--	--	4.1	--	**--**	3.7	8.3	**0.0**
East	**Temp (°C)**	11.5	--	--	15.3	--	--	22.8	24.5	13.5
	Cond (µS/cm)	916	--	--	734	--	--	920	883	937
	pH	8.08	--	--	7.49	--	--	8.27	8.50	7.10
	DO (mg/L)	9.3	--	--	5.6	--	**--**	6.9	8.0	**0.0**
Lake-wide Average	**Temp (°C)**	11.4	--	--	14.4	--	--	20.7	24.5	13.2
	Cond (µS/cm)	879	--	--	702	--	--	831	799	858
	pH	8.17	--	--	7.51	--	--	8.06	8.56	7.18
	DO (mg/L)	9.8	--	--	4.8	--	**--**	5.3	8.2	**0.0**

Notes:
Epi = epilimnion; Hypo = hypolimnion**; --** not applicable due to lack of thermocline
2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in the hypolimnion
Bold Underline - Indicates exceedance of 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan Water Quality Objective

Table 3-16. In-Situ Water Quality Parameter Measurements for Canyon Lake - Annual Mean Statistics for Each Site (August 2022 – June 2023) and Comparison to Previous Monitoring Events

		Measure	CL07	CL08	Main Basin	CL09	CL10	East Basin	Lake-wide Average (July 2022-June 2023)	Lake-wide Average (July 2021-June 2022)	Lake-wide Average (July 2020-June 2021)	Lake-wide Average (July 2019-June 2020)	Lake-wide Average (July 2018-June 2019)
Water Column Mean	Min	Temp (°C)	11.5	11.1	11.3	11.1	11.7	11.4	11.3	12.4	12.8	12.1	11.6
		Cond (µS/cm)	687	651	669	747	722	734	702	939	740	583	519
		pH	7.50	7.57	7.53	7.48	7.51	7.49	7.51	7.72	7.45	7.59	7.40
		DO (mg/L)	2.9	4.6	3.7	4.8	6.2	5.5	4.6	5.4	3.8	4.3	3.1
	Max	Temp (°C)	22.2	27.1	24.7	26.5	29.1	27.8	26.2	25.6	24.3	24.6	26.7
		Cond (µS/cm)	1077	1077	1077	1215	1258	1237	1157	1102	960	894	1069
		pH	8.29	8.23	8.26	8.20	*8.57*	8.38	8.32	8.29	8.26	*8.57*	8.20
		DO (mg/L)	10.5	10.1	10.3	9.3	11.6	10.5	10.4	9.1	7.6	8.7	8.3
	Average	Temp (°C)	16.3	18.4	17.3	18.3	19.8	19.1	18.2	19.4	18.9	17.8	18.6
		Cond (µS/cm)	907	907	907	1023	1040	1031	969	1016	839	767	839
		pH	7.80	7.99	7.89	7.88	8.27	8.07	7.98	8.04	7.92	8.05	7.85
		DO (mg/L)	5.2	6.4	5.8	6.1	8.9	7.5	6.7	7.2	5.4	5.8	5.5
Epilimnion	Min	Temp (°C)	24.3	24.6	24.4	24.5	--	24.5	24.4	20.1	20.4	24.9	20.2
		Cond (µS/cm)	717	714	716	883	--	883	771	930	685	594	594
		pH	8.44	8.35	8.40	8.23	--	8.23	8.34	8.20	8.21	*8.58*	8.40
		DO (mg/L)	7.8	7.2	7.5	6.7	--	6.7	7.2	7.9	7.7	7.3	6.7
	Max	Temp (°C)	28.9	28.9	28.9	28.6	--	28.6	28.8	28.5	28.3	27.7	28.1
		Cond (µS/cm)	1097	1094	1096	1224	--	1224	1138	1077	923	716	920
		pH	*8.67*	*8.58*	*8.62*	*8.50*	--	*8.50*	*8.58*	*8.60*	*9.13*	*9.55*	*8.91*
		DO (mg/L)	8.6	8.1	8.3	8.0	--	8.0	8.2	10.6	11.2	11.0	9.1
	Average	Temp (°C)	26.4	26.7	26.6	26.6	--	26.6	26.6	24.9	24.9	26.5	24.6
		Cond (µS/cm)	967	904	936	1053	--	1053	975	1012	803	660	734
		pH	8.52	*8.46*	8.49	8.37	--	8.37	8.45	8.42	*8.61*	*9.05*	*8.60*
		DO (mg/L)	8.2	7.6	7.9	7.4	--	7.4	7.7	9.5	9.2	9.0	7.8
Hypolimnion	Min	Temp (°C)	12.4	13.4	12.9	13.5	--	13.5	13.1	13.2	13.7	14.3	12.5
		Cond (µS/cm)	785	775	780	937	--	937	832	923	800	760	657
		pH	7.06	7.15	7.10	6.89	--	6.89	7.03	7.13	6.93	7.06	7.06
		DO (mg/L)	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	0.0	0.2
	Max	Temp (°C)	14.7	18.2	16.5	18.8	--	18.8	17.2	19.5	16.9	14.9	17.2
		Cond (µS/cm)	992	1006	999	1187	--	1187	1062	1056	942	788	888
		pH	7.25	7.28	7.26	7.10	--	7.10	7.21	7.49	7.29	7.35	7.21
		DO (mg/L)	0.2	0.2	0.2	0.1	--	0.1	0.1	1.0	0.8	0.2	0.3
	Average	Temp (°C)	13.8	15.8	14.8	16.2	--	16.2	15.3	16.5	15.2	14.6	14.4
		Cond (µS/cm)	917	890	904	1062	--	1062	956	995	870	776	744
		pH	7.14	7.21	7.18	6.99	--	6.99	7.11	7.29	7.10	7.22	7.14
		DO (mg/L)	0.1	0.1	0.1	0.1	--	0.1	0.1	0.4	0.2	0.1	0.2

Notes:
-- not applicable due to lack of thermocline
Values reported for epilimnion and hypolimnion are the arithmetic mean of measurements collected across all months sampled in which stratification was present.
Main Basin = mean of Sites CL07 and CL08
East Basin = mean of Sites CL09 and CL10
2020 TMDL target for Dissolved Oxygen (DO) is no less than 5 mg/L in the hypolimnion
Bold Underline - Indicates exceedance of 2020 TMDL target

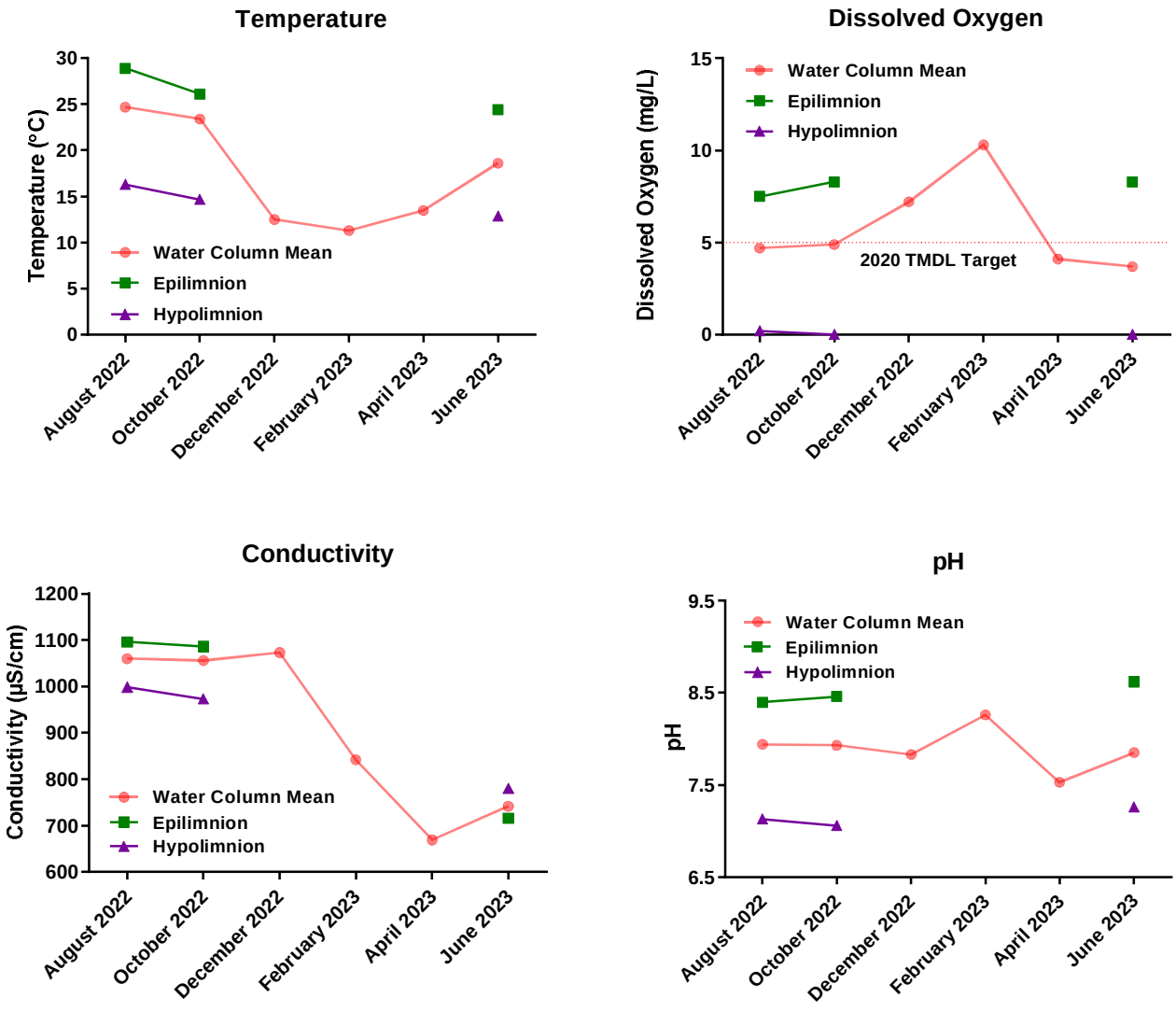

Figure 3-12. Mean In-Situ Physical Water Quality Parameters – Canyon Lake Main Basin

(Values represent the mean of Sites CL07 & CL08. Missing epilimnion and hypolimnion values represent time periods when no stratification was present)

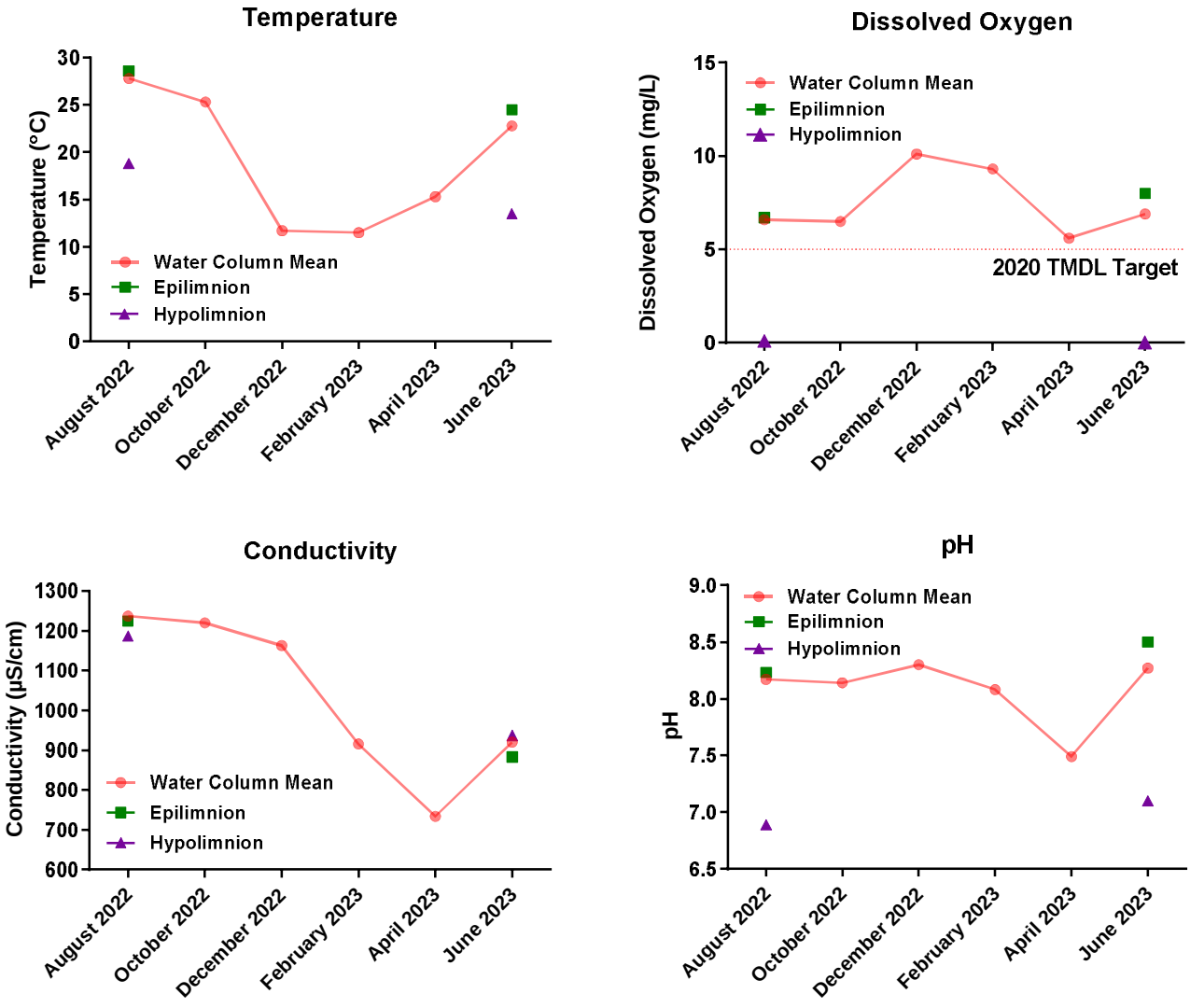

Figure 3-13. Mean In-Situ Physical Water Quality Parameters - Canyon Lake East Basin

(Values represent the mean of Sites CL09 & CL10. Missing epilimnion and hypolimnion values represent time periods when no stratification was present.)

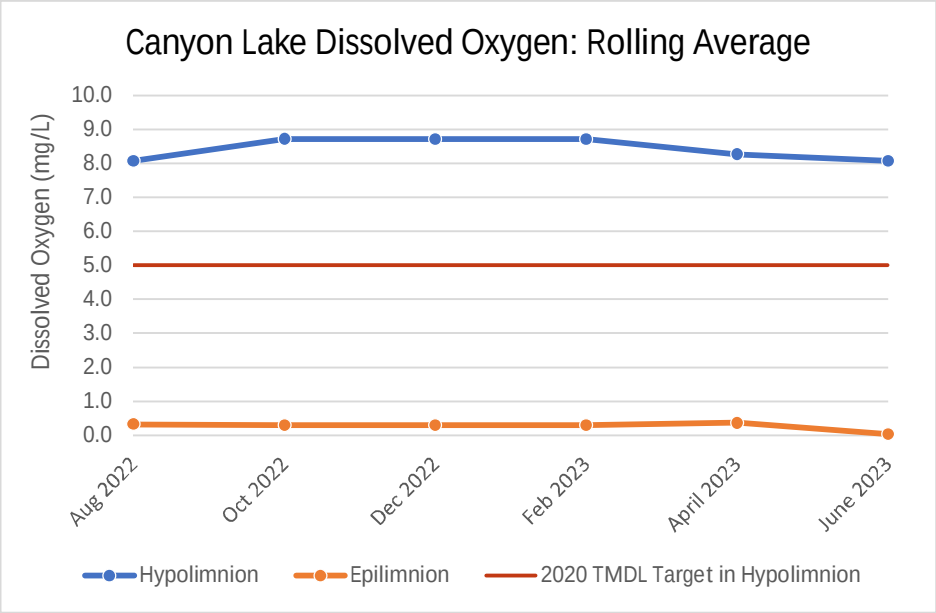

Figure 3-14. Rolling Average Concentrations of Dissolved Oxygen in the Epilimnion and Hypolimnion of Canyon Lake

Means are calculated by averaging the values from all 4 sites of each event with the previous five event values (i.e., one year of data) to obtain a rolling average. Therefore, the graph represents data collected from August 2021 to June 2023. Events in which a thermocline was not present were not included in rolling average.

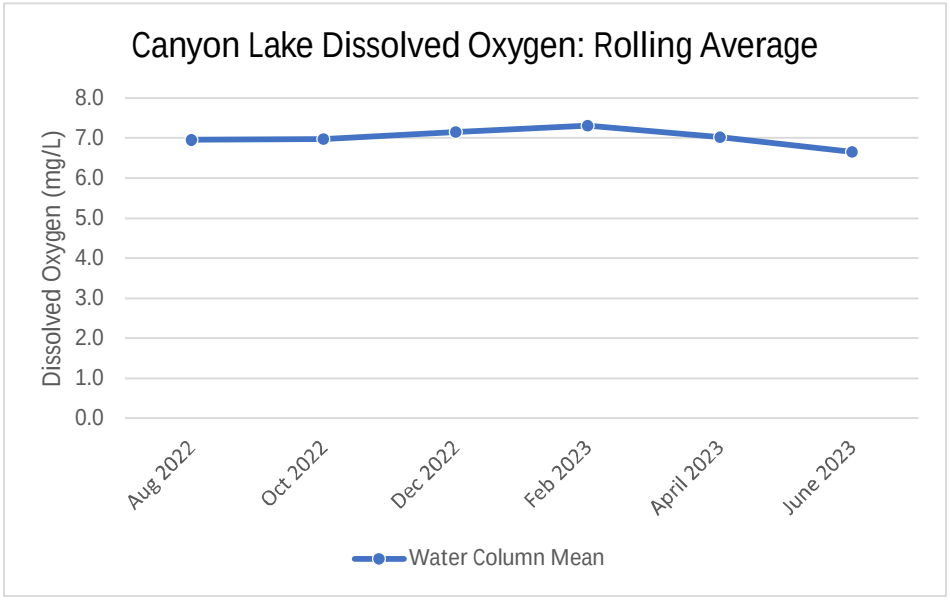

Figure 3-15. Rolling Average Concentration of Dissolved Oxygen Across the Full Vertical Water Column in Canyon Lake

Each data point is calculated by averaging the values from all 4 sites of each event with the previous five event values (i.e., one year of data) to obtain a rolling average. Therefore, the graph represents data collected from August 2021 to June 2023.

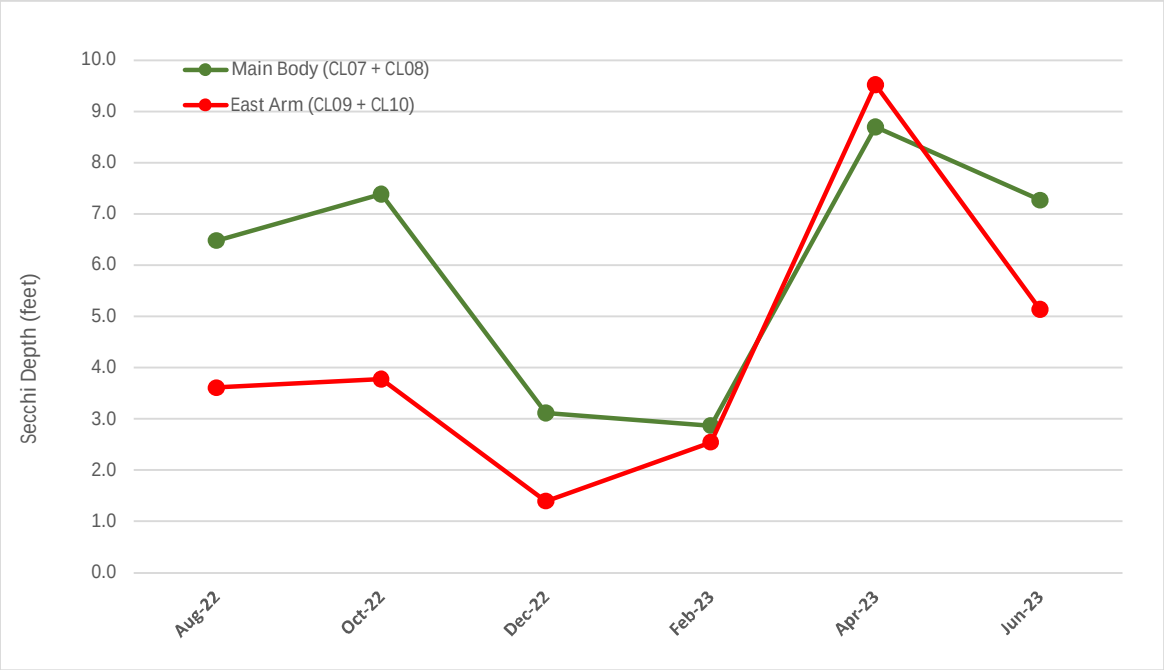

Figure 3-16. In-Situ Water Clarity Using a Secchi Disk– Main and East Basins

Analytical Chemistry

Summaries of analytical chemistry concentrations for each monitoring event in Canyon Lake are presented in **Tables 3-17 and 3-18**. A summary of analytical chemistry mean statistics for each site across the entire monitoring period are presented in **Tables 3-19 through 3-21**. Concentrations of analytes are presented graphically in **Figures 3-17 and 3-18.**

Depth-integrated concentrations of total nitrogen in the Main Basin (Sites CL07 and CL08) ranged from 0.99 to 2.8 mg/L across the six sampling events, with a Main Basin annual mean of 1.4 mg/L (down from the 2021-22 annual mean of 2.1 mg/L). Total nitrogen concentrations at the two East Basin sites ranged from 0.02 to 2.7 mg/L across the six sampling events, with an annual mean of 1.5 mg/L (a decrease from the 2021-22 annual mean of 1.8 mg/L). Both basins exhibited a decrease from October to December, however only the East Basin increased in February 2023, while the Main Basin remained stable. After a decreasing trend in the lake-wide rolling average for total nitrogen the previous monitoring year, the trend was relatively flat across the 2022-2023 monitoring year, ranging from 1.42 to 1.48 mg/L. All points of the total nitrogen rolling average exceeded the current 2020 TMDL target of 0.75 mg/L (**Figure 3-19**).

Depth-integrated total phosphorus concentrations in both basins remained low and stable across the first three months of the monitoring period, but then rose sharply in February and April 2023 before dropping in June. The period between the December 2022 and April 2023 sampling events is when the majority of the rain fell in the region and likely contributed to the spike in total phosphorus. The total suspended solids also increased in February 2023 undoubtedly as a result of the suspended fine sediment load brought into the lake by storm flows and could have been responsible for the jump in total phosphorus (i.e., elemental phosphorus). However, total

suspended solids had decreased by April, while total phosphorus continued to increase. Total phosphorus concentrations in the Main Basin ranged from 0.02 to 0.21 mg/L, with an annual Main Basin mean of 0.092 mg/L (an increase from the 2021-22 annual mean of 0.049 mg/L). Total phosphorus concentrations in the East Basin ranged from 0.013 to 0.36 mg/L**,** with an annual mean of 0.129 mg/L (an increase from the 2021-22 annual mean of 0.059 mg/L). The lake-wide rolling average for total phosphorus in Canyon Lake ranged from 0.04 to 0.11 mg/L (**Figure 3-19**). All points of the rolling average with the exception of the last event in June were below the current 2020 TMDL target of 0.1 mg/L (**Figure 3-19**).

During the 2022-2023 monitoring year, two alum applications occurred in Canyon Lake. The first during the week of October 10, 2022, with pre-alum application TMDL monitoring occurring on October 5, 2022. The second alum application was during the week of May 15, 2023, with the pre-alum monitoring occurring on April 6, 2023. Total phosphorus remained stable after the first alum treatment, but a notable decrease was observed after the second alum treatment in May. The reason for this difference in reduction in total phosphorus between the two events may have been a result of the ratio of dissolved (ortho) phosphorus to total phosphorus. The mean lake-wide ratio of dissolved phosphorus to total phosphorus was at its lowest point of the monitoring year in October (2.3% of the total phosphorus was dissolved phosphorus), while April just before the May alum application was the monitoring month with the highest ratio of dissolved phosphorus to total phosphorus (89.5% of the total phosphorus was dissolved). The observed ratio between total and ortho-phosphorous in October is also likely influenced by the low concentrations measured at or below reporting limits in several samples. The regular application of alum since September 2013 has served to reduce the annual mean water column total phosphorus concentration in Canyon Lake in comparison to those measured prior to the alum applications (see historical figures in Appendix E).

The mean depth-integrated concentration of total ammonia for the two sites in the Main Basin were at their highest in October 2022 at a value of 1.14 mg/L, a decrease from the peak concentration last monitoring year (1.35 mg/L in October 2021). Concentrations then decreased through February 2023, before increasing in April and June 2023. This same pattern was observed for the East Basin, with highest total ammonia concentration of 0.85 mg/L observed in October 2022. This pattern is likely tied to the annual stratification cycle of the lake, where the Main Basin exhibits a stratification beginning in early spring (April) through early Fall (October). During this time low dissolved oxygen in the hypolimnion facilitates the release of phosphorus and ammonia from the sediments. Due to the increase depths in the Main Basin, stronger stratification develops accounting for higher ammonia concentrations (particularly at the deeper Site CL07) and longer periods of stratification. Total ammonia concentrations in the Main Basin ranged from 0.14 to 2.1 mg/L**,** with an annual mean of 0.56 mg/L. Total ammonia values in the East Basin ranged from values below detection limits (<0.017 mg/L) to 1.7 mg/L, with an annual mean of 0.47 mg/L, an increase from the previous monitoring year (0.36 mg/L). The total ammonia concentrations of 1.6 mg/L (August 2022) and 1.7 (October 2022) at Site CL09 exceeded the corresponding CCC objectives of 1.39 and 1.54 mg/L, respectively (**Table 3-17**). This same site exceeded the CCC in August 2021. No other total ammonia concentrations exceeded the CCC or CMC.

Total dissolved solids concentration in the Main Basin increased slightly between August and December 2022, while the East Basin remained stable. Both basins displayed a decrease in TDS beginning in February and April as a result of winter storms. The average TDS concentration in the Main Basin ranged from 370 to 700 mg/L. The average concentrations of TDS in the East Basin were slightly higher and ranged from 420 to 740 mg/L. The first three monitoring events August through December at Site CL10 exceeded the Basin Plan water quality objective of 700 mg/L for TDS for Canyon Lake.

Chlorophyll-a concentrations were rather variable this monitoring year. Depth-integrated concentrations in the Main and East Basins decreased between August and December 2022, increased in February 2023, and then decreased again in April 2022, followed by an increase in June. The mean depth-integrated concentration in the Main Basin (mean of Sites CL07 and CL08) across all six sampling events ranged from below the detection limit (<1.0 µg/L) to 55 µg/L, with a mean of 17 µg/L (**Figure 3-18**). The mean East Basin depth-integrated chlorophyll-a (Sites CL09 and CL10) ranged from below the detection limit (<1.0 µg/L) to 93 µg/L, with an annual mean of 28 µg/L. The lake-wide chlorophyll-a depth-integrated rolling average was slightly above the 2020 TMDL target of 25 µg/L between August and February, but then dropped below the target in April and June 2023. The very low chlorophyll-a values observed in December and February did correspond to lower satellite imagery values (see Section 3.5), and chlorophyll-a detections in Lake Elsinore samples run in the same laboratory batch appear to indicate that these values are accurate concentrations rather than spurious laboratory errors. Concentrations of chlorophyll-a varied in some cases between the surface and depth-integrated samples with no consistent trends noted. However, when averaged over time and location, the lake-wide mean concentration of chlorophyll-a was very similar at the surface compared to the depth-integrated concentration. Variation in the vertical distribution of algae will drive differences observed between surface and depth-integrated values of chlorophyll-a.

Concentrations of total and dissolved aluminum are measured in Canyon Lake to assess any potential long-term influence that the alum additions may have on water column aluminum concentrations relative to existing water quality objectives. Concentrations of total aluminum ranged from 50 to 590 µg/L in the Main Basin and 57 to 310 µg/L in the East Basin.

All total aluminum concentrations measured were below calculated CCC and CMC values based on the US EPA's Final Aquatic Life Ambient Water Quality Criteria for Aluminum[3] (US EPA, 2018) when using the water column mean pH for each station/date combination, and a default total organic carbon and hardness value. Dissolved aluminum concentrations ranged from ND (<0.041 µg/L) to 120 µg/L in the Main Basin and ND (<0.041 µg/L) to 140 µg/L in the East Basin. It does not appear that the regular additions of alum to Canyon Lake are causing an increase in aluminum concentration that would result in acute or chronic effects on resident aquatic life.

[3] Aquatic Life Criteria - Aluminum | US EPA

Table 3-17. Analytical Chemistry Results for Canyon Lake - Monthly Depth-Integrated Results (Aug – Dec 2022)

Compound	Units	MDL	RL	Depth Integrated or Surface Sample	August 2022				October 2022				December 2022			
					Main Basin		East Basin		Main Basin		East Basin		Main Basin		East Basin	
					CL07	CL08	CL09	CL10	CL07	CL08	CL09	CL10	CL07	CL08	CL09	CL10
General Chemistry																
Total Dissolved Solids	mg/L	4.0	10	DI	580	610	680	710	620	620	700	740	670	700	700	730
Total Suspended Solids	mg/L	NA	5	DI	3.0	4.0	7.0	6.0	ND (<5)	ND (<5)	6.0	6.0	5.0	6.0	7.0	8.0
Sulfide	mg/L	0.05-0.5	0.1	DI	7.0	1.5	8.0	ND (<0.05)	6.0	0.40	6.0	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)
Nitrate as N	mg/L	0.04	0.2	DI	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	0.066	0.062	0.065	0.071	0.054	0.054	0.095	0.066
Nitrite as N	mg/L	0.042	0.1	DI	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)
Total Kjeldahl Nitrogen	mg/L	0.065-0.13	0.1-0.2	DI	2.0	1.1	2.7	0.93	2.7	0.93	2.5	0.86	1.3	1.2	1.1	1.2
Total Nitrogen[a]	mg/L	NA	NA	DI	2.0	1.1	2.7	0.93	2.8	1.0	2.6	0.93	1.4	1.3	1.2	1.3
Ammonia-Nitrogen	mg/L	0.017	0.1	DI	1.3	0.29	**1.6***	0.021	2.1	0.17	**1.7***	ND (<0.017)	0.44	0.42	0.22	0.15
Unionized Ammonia[b]	mg/L	NA	NA	DI	0.03	0.02	0.07	0.003	0.05	0.01	0.06	NA	0.006	0.007	0.007	0.006
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	DI	0.007	0.003	0.022	ND (<0.003)	0.069	ND (<0.003)	ND (<0.003)	0.003	0.003	0.004	0.003	0.004
Total Phosphorus	mg/L	0.0067	0.01	DI	0.02	0.02	0.031	0.013	0.034	0.024	0.04	0.033	0.026	0.027	0.041	0.046
Total Aluminum	µg/L	22-41	50	DI	57	74	62	85	50	59	57	110	87	93	140	200
Dissolved Aluminum	µg/L	41	50	DI	53	65	ND (<41)	41	41	50	ND (<41)	48	ND (<41)	ND (<41)	ND (<41)	ND (<41)
Chlorophyll-a																
Chlorophyll-a	µg/L	NA	1.0	Surf (0-2m)	6.4	5.3	10	91	9.1	11	16	18	ND (<1.0)	ND (<1.0)	ND (<1.0)	15
Chlorophyll-a	µg/L	NA	1.0	DI	14	30	71	93	18	24	32	19	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)

Notes:
When a concentration was non-detect (ND), the annual mean value for compliance purposes was calculated by converting ND values to zero. If the result of the calculated mean was non-zero, but below the corresponding MDL, the mean value was reported as ND.

a - Total Nitrogen = TKN+NO_2+NO_3
b - The concentration of unionized ammonia was calculated using equation by Thursby (1986), based on site specific pH and temperature recorded at each location.
ND – Not detected; NA – Not Applicable/ available
DI = Depth integrated; Surf = Surface 0-2m
µg/L – micrograms per liter; mg/L – milligrams per liter; MDL – method detection limit; RL – reporting limit; J - Reported value is an estimate detection was above the MDL, but below the RL
Bold Underline - Indicates exceedance of 2020 TMDL Objective
Italicize – Indicates exceedance of Basin Plan Water Quality Objective
* Exceeds 2004 TMDL Permit NH3 CCC; ** Exceeds 2004 TMDL Permit NH3 CMC

Table 3-18. Analytical Chemistry Results for Canyon Lake- Monthly Depth-Integrated Results (Feb – June 2023)

Compound	Units	MDL	RL	Depth Integrated or Surface Sample	February 2023				April 2023				June 2023			
					Main Basin		East Basin		Main Basin		East Basin		Main Basin		East Basin	
					CL07	CL08	CL09	CL10	CL07	CL08	CL09	CL10	CL07	CL08	CL09	CL10
General Chemistry																
Total Dissolved Solids	mg/L	4.0	10	DI	470	480	520	540	390	370	440	420	440	420	530	550
Total Suspended Solids	mg/L	NA	5	DI	9.0	46	5.0	11	1.0	2.0	1.0	0.3	3.0	2.0	4.0	4.0
Sulfide	mg/L	0.05-0.5	0.1	DI	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	2.0	1.5	3.0	ND (<0.05)
Nitrate as N	mg/L	0.04	0.2	DI	0.20	0.19	0.36	0.39	0.36	0.37	0.34	0.41	ND (<0.04)	ND (<0.04)	ND (<0.04)	0.046
Nitrite as N	mg/L	0.042	0.1	DI	0.042	ND (<0.04)	ND (<0.04)	0.043	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)
Total Kjeldahl Nitrogen	mg/L	0.065-0.13	0.1-0.2	DI	1.0	0.84	1.2	1.3	0.82	0.80	1.0	1.3	1.3	1.0	1.7	0.776
Total Nitrogen[a]	mg/L	NA	NA	DI	1.2	1.0	1.6	1.7	1.2	1.2	1.3	1.7	1.3	1.0	1.7	0.78
Ammonia-Nitrogen	mg/L	0.017	0.1	DI	0.18	0.14	0.31	0.20	0.27	0.27	0.32	0.22	0.75	0.42	0.86	0.023
Unionized Ammonia[b]	mg/L	NA	NA	DI	0.0044	0.0046	0.0037	0.0046	0.002	0.0024	0.0024	0.0018	0.0134	0.0147	0.0281	0.0044
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	DI	0.026	0.019	0.19	0.20	0.17	0.20	0.33	0.31	0.14	0.099	0.14	ND (<0.007)
Total Phosphorus	mg/L	0.0067	0.01	DI	0.081	0.15	0.22	0.27	0.20	0.21	0.36	0.36	0.20	0.11	0.11	0.026
Total Aluminum	µg/L	22-41	50	DI	170	280	120	310	240	300	150	170	590	150	130	200
Dissolved Aluminum	µg/L	41	50	DI	ND (<41)	ND (<41)	ND (<41)	ND (<41)	65	72	ND (<41)	59	84	120	100	140
Chlorophyll-a																
Chlorophyll-a	µg/L	NA	1.0	Surf (0-2m)	68.9	64.8	47	68	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	3	3	10	12
Chlorophyll-a	µg/L	NA	1.0	DI	30.4	54.6	23	40	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	15	16	51	13

Notes:
When a concentration was non-detect (ND), the annual mean value for compliance purposes was calculated by converting ND values to zero. If the result of the calculated mean was non-zero, but below the corresponding MDL, the mean value was reported as ND.

a - Total Nitrogen = TKN+NO_2+NO_3
b - The concentration of unionized ammonia was calculated using equation by Thursby (1986), based on site specific pH and temperature recorded at each location.
c – Sample measured out of holding time
ND – Not detected; NA – Not Applicable/ available
DI = Depth integrated; Surf = Surface 0-2m
µg/L – micrograms per liter; mg/L – milligrams per liter; MDL – *method* detection limit; RL – reporting limit; J - Reported value is an estimate detection was above the MDL, but below the RL
* Exceeds 2004 TMDL Permit NH3 CCC; ** Exceeds 2004 TMDL Permit NH3 CMC

Table 3-19. Analytical Chemistry Results for Canyon Lake - Annual Mean Statistics for Each Site in the Main Basin

Compound	Units	MDL	RL	Basin Plan WQO or TMDL Target	Depth Integrated or Surface Sample	CL07			CL08			Main Basin		
						Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
General Chemistry														
Total Dissolved Solids	mg/L	4.0	10	700[2]	DI	390	670	528	370	700	533	370	700	531
Total Suspended Solids	mg/L	NA	5	NA	DI	ND (<5)	9.0	3.5	ND (<5)	46	10	ND (<5)	46	7
Sulfide	mg/L	0.05-0.5	0.1	NA	DI	ND (<0.05)	7.0	2.5	ND (<0.05)	1.5	0.57	ND (<0.05)	7.0	1.5
Nitrate as N	mg/L	0.04	0.2	NA	DI	ND (<0.04)	0.36	0.11	ND (<0.04)	0.37	0.11	ND (<0.04)	0.37	0.11
Nitrite as N	mg/L	0.042	0.1	NA	DI	ND (<0.04)	0.04	0.01	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	0.04	0.004
Total Kjeldahl Nitrogen	mg/L	0.065-0.13	0.1-0.2	NA	DI	0.82	2.7	1.5	0.80	1.2	1.0	0.80	2.7	1.2
Total Nitrogen[a]	mg/L	NA	NA	0.75[b1]	DI	1.2	2.8	**1.6**	0.99	1.3	**1.1**	0.99	2.8	**1.4**
Ammonia-Nitrogen	mg/L	0.017	0.1	2004- CMC: 2.46-20.79[c1]; CCC: 0.45-4.43[c1]	DI	0.18	2.1	0.8	0.14	0.42	0.29	0.14	2.1	0.56
Unionized Ammonia[c]	mg/L	NA	NA	NA	DI	0.0	0.05	0.02	0.0	0.02	0.01	0.0	0.05	0.01
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	NA	DI	0.003	0.17	0.07	ND (<0.003)	0.20	0.05	ND (<0.003)	0.20	0.06
Total Phosphorus	mg/L	0.0067	0.01	0.1[b1]	DI	0.02	0.20	0.09	0.02	0.21	0.09	0.02	0.21	0.09
Total Aluminum	µg/L	22-41	50	NA	DI	50	590	199	59	300	159	50	590	179
Dissolved Aluminum	µg/L	41	50	NA	DI	ND (<41)	84	41	ND (<41)	120	51	ND (<41)	120	46
Chlorophyll-a														
Chlorophyll-a	µg/L	NA	1.0	25[b1]	Surf (0-2m)	ND (<1.0)	69	15	ND (<1.0)	65	14	ND (<1.0)	69	14
Chlorophyll-a	µg/L	NA	1.0	25[b1]	DI	ND (<1.0)	30	13	ND (<1.0)	55	21	ND (<1.0)	55	17

Notes:

When a concentration was non-detect, the annual value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculation was below the corresponding MDL, the average value was reported as ND.

a - Total Nitrogen = TKN+NO_2+NO_3

b - Annual average

c - Values calculated using water column mean ammonia, temperature, salinity and pH. Calculated using equation by Thursby (1986). The range of TMDL target thresholds apply to individual samples, not applicable *to* annual means.

1 – 2020 TMDL Target, based on Table 5-9n of 2004 TMDL

2 – Santa Ana Region Basin Plan Objective

NA – Not applicable/ available; ND – not detected

DI = Depth integrated; Surf = Surface 0-2m

mg/L – micrograms per liter; ug/L – milligrams per liter; MDL – method detection limit; RL – reporting limit; J –Reported value was detected above the MDL, but below the RL

Bold Underline - Indicates exceedance of 2020 TMDL target

Italicize – Indicates exceedance of Basin Plan Water Quality Objective

Table 3-20. Analytical Chemistry Results for Canyon Lake - Annual Mean Statistics for Each Site in the East Basin

Compound	Units	MDL	RL	Basin Plan WQO or TMDL Target	Depth Integrated or Surface Sample	CL09			CL10			East Basin		
						Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
General Chemistry														
Total Dissolved Solids	mg/L	4.0	10	700[2]	DI	440	700	595	420	740	615	420	740	605
Total Suspended Solids	mg/L	NA	5	NA	DI	1.0	7.0	5.0	0.30	11	5.9	0.30	11	5.4
Sulfide	mg/L	0.05-0.5	0.1	NA	DI	ND (<0.05)	8.0	2.8	ND (<0.05)	0.00	0.00	ND (<0.05)	8.0	1.4
Nitrate as N	mg/L	0.04	0.2	NA	DI	ND (<0.04)	0.36	0.14	ND (<0.04)	0.41	0.16	ND (<0.04)	0.41	0.15
Nitrite as N	mg/L	0.042	0.1	NA	DI	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)	ND (<0.04)
Total Kjeldahl Nitrogen	mg/L	0.065-0.13	0.1-0.2	NA	DI	1.0	2.7	1.7	0.78	1.3	1.1	0.78	2.7	1.4
Total Nitrogen[a]	mg/L	NA	NA	0.75 [1]	DI	1.2	2.7	**1.8**	0.02	1.7	**1.1**	0.02	2.7	**1.5**
Ammonia-Nitrogen	mg/L	0.017	0.1	2004- CMC: 2.46-20.79[c1]; CCC: 0.45-4.43[c1]	DI	0.22	**1.7***	0.84	ND (<0.017)	0.22	0.10	ND (<0.017)	1.7	0.47
Unionized Ammonia[c]	mg/L	NA	NA	NA	DI	0.0	0.068	0.03	0.0	0.01	0.00	0.0	0.07	0.02
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	NA	DI	ND (<0.003)	0.33	0.11	ND (<0.003)	0.31	0.09	ND (<0.003)	0.33	0.10
Total Phosphorus	mg/L	0.0067	0.01	0.1 [1]	DI	0.03	0.36	**0.13**	0.01	0.36	**0.12**	0.01	0.36	**0.13**
Total Aluminum	µg/L	22-41	50	NA	DI	57	150	110	85	310	179	57.00	310	145
Dissolved Aluminum	µg/L	41	50	NA	DI	ND (<41)	ND (<41)	ND (<41)	ND (<41)	140	48	ND (<41)	140	32
Chlorophyll-a														
Chlorophyll-a	µg/L	NA	1.0	25 [1]	Surf (0-2m)	ND (<1.0)	47	14	ND (<1.0)	91	34	ND (<1.0)	91	24
Chlorophyll-a	µg/L	NA	1.0	25 [1]	DI	ND (<1.0)	71	29	ND (<1.0)	93	27	ND (<1.0)	93	28

Notes:
When a concentration was non-detect, the annual value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculation was below the corresponding MDL, the average value was reported as ND.

a - Total Nitrogen = TKN+NO_2+NO_3
b - Annual average
c - Values calculated using water column mean ammonia, temperature, salinity and pH. Calculated using equation by Thursby (1986). The range of TMDL target thresholds apply to individual samples, not applicable to annual means.
1 – 2020 TMDL Target, based on Table 5-9n of 2004 TMDL
2 – 2015 TMDL Target, based on Table 5-9n of 2004 TMDL
3 – Santa Ana Region Basin Plan Water Quality Objective
NA – Not applicable/ available; ND – not detected
DI = Depth integrated; Surf = Surface 0-2m
mg/L – micrograms per liter; ug/L – milligrams per liter; MDL – method detection limit; RL – reporting limit; J –Reported value was detected above the MDL, but below the RL
Bold Underline - Indicates exceedance of 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan Water Quality Objective
* Exceeds 2004 TMDL Permit NH3 CCC; ** Exceeds 2004 TMDL Permit NH3 CMC

Table 3-21. Analytical Chemistry Results for Canyon Lake - Annual Mean Statistics for Main and East Basins

Compound	Units	MDL	RL	Basin Plan WQO or TMDL Target	Depth Integrated or Surface Sample	Main Basin			East Basin			Lake-wide Average		
						Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
General Chemistry														
Total Dissolved Solids	mg/L	4.0	10	700[2]	DI	370	700	531	420	*740*	605	370	*740*	568
Total Suspended Solids	mg/L	NA	5	NA	DI	ND (<5)	46	6.8	0.30	11	5.4	ND (<5)	46	6.1
Sulfide	mg/L	0.05-0.5	0.1	NA	DI	ND (<0.05)	7.0	1.5	ND (<0.05)	8.0	1.4	ND (<0.05)	8.0	1.5
Nitrate as N	mg/L	0.04	0.2	NA	DI	ND (<0.04)	0.37	0.11	ND (<0.04)	0.41	0.15	ND (<0.04)	0.41	0.13
Nitrite as N	mg/L	0.042	0.1	NA	DI	ND (<0.04)	0.04	0.004	ND (<0.04)	0.04	0.004	ND (<0.04)	0.04	0.004
Total Kjeldahl Nitrogen	mg/L	0.065-0.13	0.1-0.2	NA	DI	0.8	2.7	1.2	0.8	2.7	1.4	0.8	2.7	1.3
Total Nitrogen[a]	mg/L	NA	NA	0.75 [1]	DI	1.0	2.8	**1.4**	0.02	2.7	**1.5**	0.02	2.8	**1.4**
Ammonia-Nitrogen	mg/L	0.017	0.1	2004- CMC: 2.46-20.79[c1]; CCC: 0459-4.43[c1]	DI	0.14	2.1	0.6	ND (<0.017)	**1.7***	0.47	ND (<0.017)	2.1	0.5
Unionized Ammonia[c]	mg/L	NA	NA	NA	DI	0.0	0.05	0.01	0.0	0.07	0.02	0.0	0.07	0.01
Ortho Phosphate Phosphorus	mg/L	0.003-0.007	0.01	NA	DI	ND (<0.003)	0.20	0.06	ND (<0.003)	0.33	0.10	ND (<0.003)	0.33	0.08
Total Phosphorus	mg/L	0.0067	0.01	0.1 [1]	DI	0.02	0.21	0.09	0.01	0.36	**0.13**	0.01	0.36	**0.11**
Total Aluminum	µg/L	22-41	50	NA	DI	50	590	179	57	310	145	50	590	162
Dissolved Aluminum	µg/L	41	50	NA	DI	ND (<41)	120	46	ND (<41)	140	32	ND (<41)	140	39
Chlorophyll-a														
Chlorophyll-a	µg/L	NA	1.0	25 [1]	Surf (0-2m)	ND (<1.0)	69	14	ND (<1.0)	91	24	ND (<1.0)	91	19
Chlorophyll-a	µg/L	NA	1.0	25 [1]	DI	ND (<1.0)	55	17	ND (<1.0)	93	28	ND (<1.0)	93	23

Notes:
When a concentration was non-detect, the annual value for compliance purposes was calculated by converting non-detect (ND) values to zero. If the result of the calculation was below the corresponding MDL, the average value was reported as ND.

a - Total Nitrogen = TKN+NO_2+NO_3
b - Annual average
c - Values calculated using water column mean ammonia, temperature, salinity and pH. Calculated using equation by Thursby (1986). The range of TMDL target thresholds apply to individual samples, not applicable to annual means.
1 – 2020 TMDL Target, based on Table 5-9n of 2004 TMDL
2 – Santa Ana Region Basin Plan Water Quality Objective
NA – Not applicable/ available; ND – not detected
DI = Depth integrated; Surf = Surface 0-2m
mg/L – micrograms per liter; ug/L – milligrams per liter; MDL – method detection limit; RL – reporting limit; J –Reported value was detected above the MDL, but below the RL
Bold Underline - Indicates exceedance of 2020 TMDL target
Italicize – Indicates exceedance of Basin Plan Water Quality Objective
* Exceeds 2004 TMDL Permit NH3 CCC; ** Exceeds 2004 TMDL Permit NH3 CMC

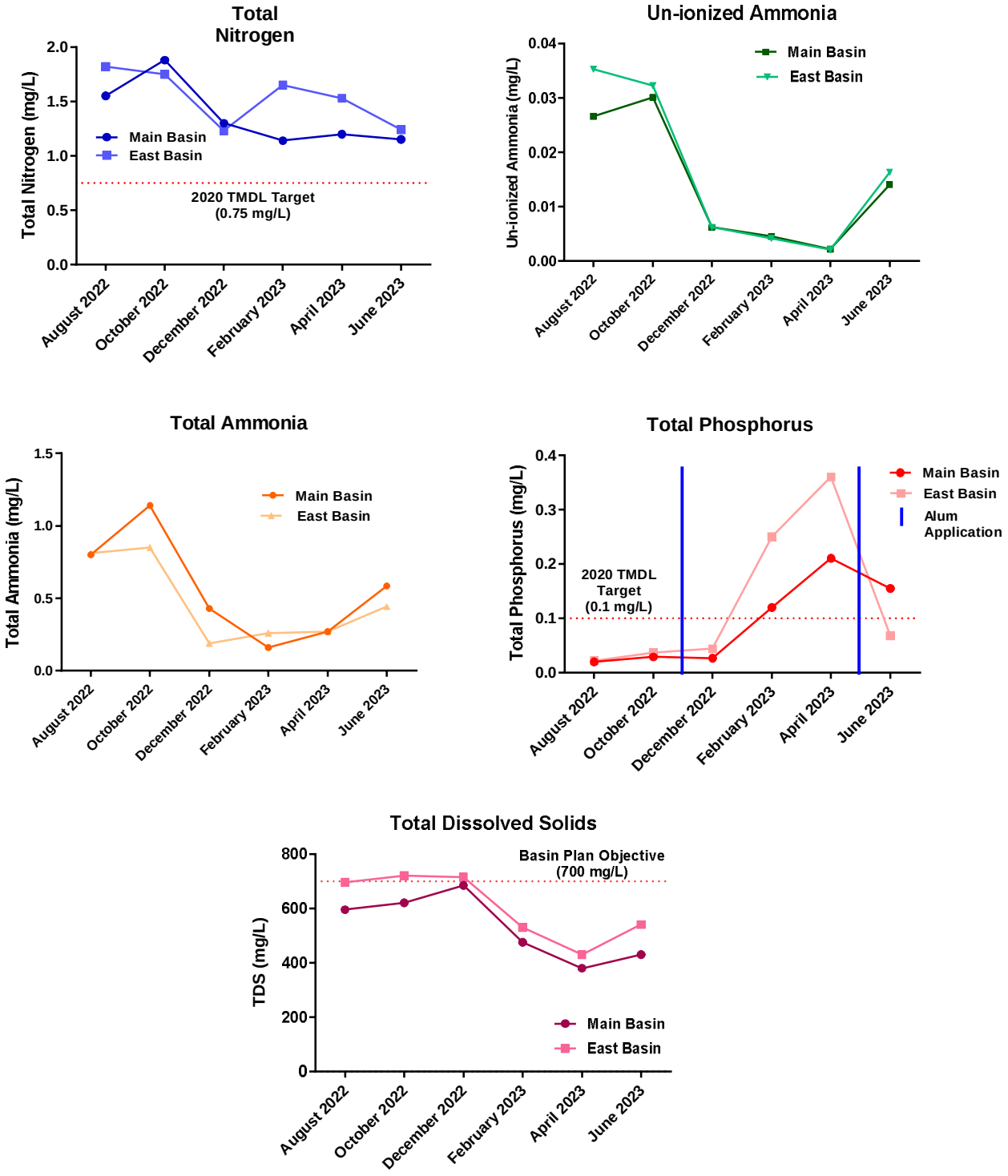

Figure 3-17. Canyon Lake Analytical Chemistry – Depth-Integrated Means

Main Basin values represent the mean of Sites CL07 & CL08, East Basin values represent the mean of Sites CL09 & CL10
Long term trends can be found in Appendix E

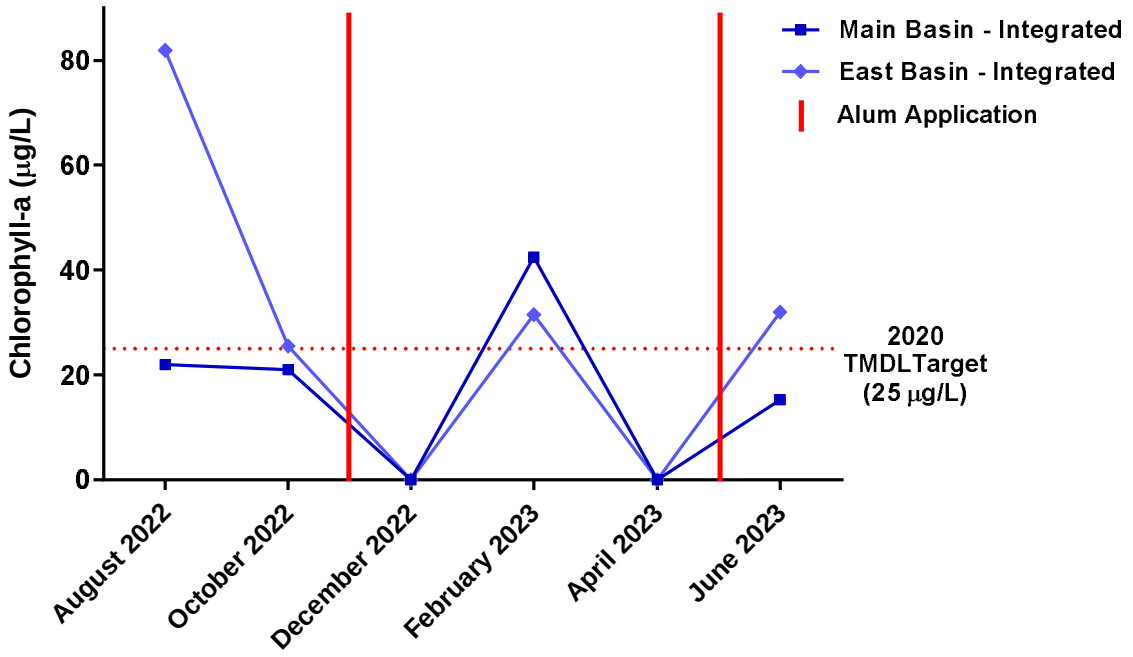

Figure 3-18. Canyon Lake Analytical Chemistry – Depth-Integrated Chlorophyll-a

Main Basin values represent the mean of Sites CL07 & CL08, East Basin values represent the mean of Sites CL09 & CL10
Long term trends can be found in Appendix E

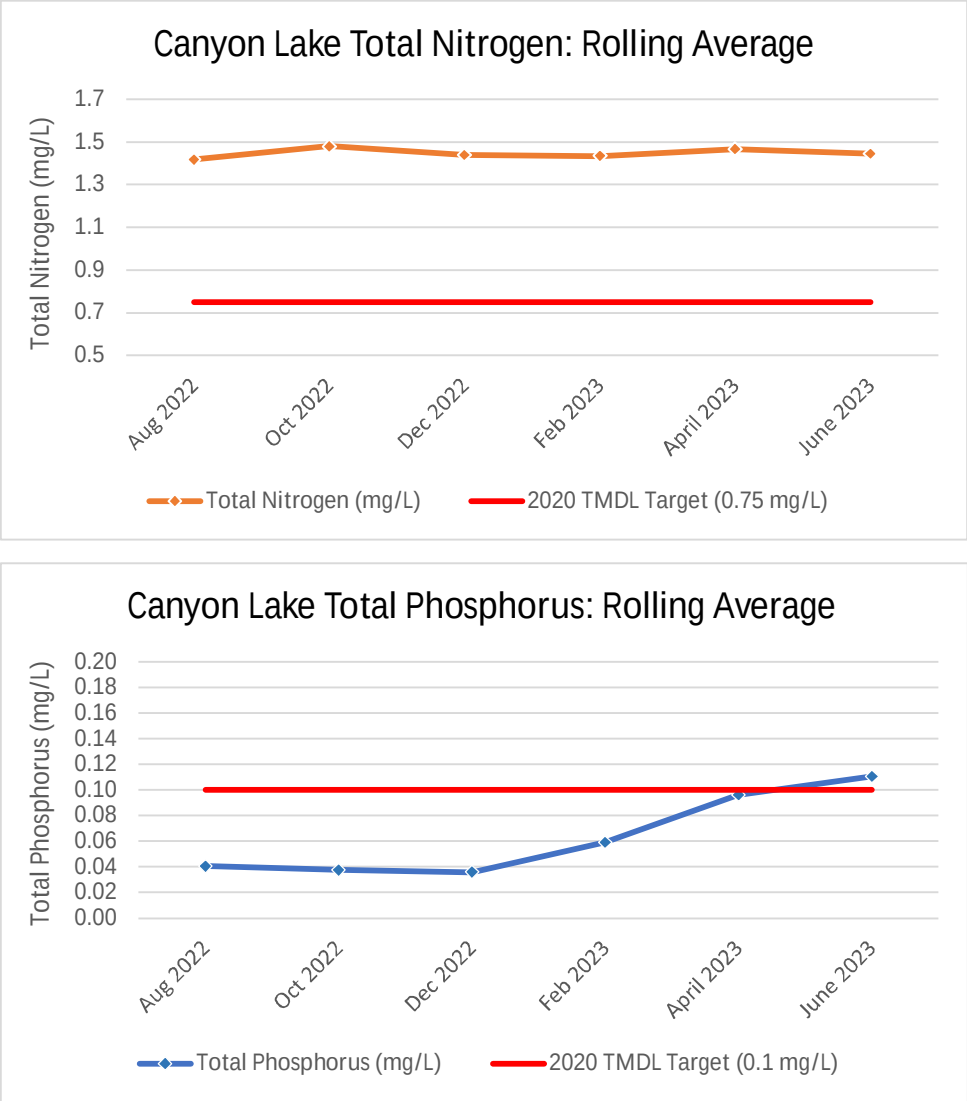

Figure 3-19. Canyon Lake Lake-wide Analytical Chemistry- Rolling Averages

Each data point is calculated by averaging the value from each event across all 4 sites with the previous five events across all 4 sites (i.e., one year of data) to obtain a rolling average. Therefore, each graph represents data collected from October 2021 to June 2023.

3.5 Satellite Imagery

In 2015-2016 and following, the TMDL Task Force contracted with satellite vendor EOMAP to conduct remote sensing using LandSat and Sentinel-2 satellite imagery to estimate chlorophyll-a and turbidity concentrations in Lake Elsinore and Canyon Lake. Using 30-m (LandSat) or 10-m (Sentinel-2) pixel resolution, this effort produced maps of the lakes showing graphical, color-coded images of chlorophyll-a and turbidity concentrations at up to approximately 1,000 unique data points across Canyon Lake and approximately 11,000 unique data points across Lake Elsinore. This tool provides a snapshot of conditions throughout the lakes at a given point in time,

as opposed to the single data points provided at water quality collection locations and dates. The satellite images are also able to provide a sense of the relative variability in algae concentrations across the lake that can be rather dramatic and missed by measuring individual values from only a few discrete locations. However, the satellite imagery only represents approximately the upper 3-feet of the water column depending on water clarity, and therefore cannot completely replace manual sampling where depth-integrated values are required.

As part of the TMDL compliance monitoring, satellite imagery depicting surficial lake-wide chlorophyll-a and turbidity concentrations in Lake Elsinore and Canyon Lake were generated for each in-lake monitoring event. Satellite images for each lake during the eight monitoring events evaluated in the report are presented in **Figures 3-20 and 3-21**. Spatial variability in chlorophyll-a is evident, providing a more complete assessment of algal density conditions across each lake.

To quantify the data presented in the satellite images, cumulative frequency distribution plots showing lake-wide chlorophyll-a concentrations based on individual pixels from the satellite measurements are provided in **Figures 3-22 and 3-23**. Satellite derived mean and median concentrations along with measured in-lake chlorophyll-a concentrations in the surface composite (0-2m) sample are provided for each date showing how these single samples compare to concentrations throughout the entire lake. Mean and median lake-wide values were derived from satellite imagery data treating each pixel as a unique individual data point.

The satellite images for Lake Elsinore show relatively low concentrations of chlorophyll-a in July 2022, then increasing over the summer through September. A slight decrease in overall concentration was observed October as temperatures cooled, and then a larger decreasing trend December through June 2023 as a result of the winter storm season. These generalizations somewhat matched with in-lake analytical values. While the larger decrease in December was noted in the analytical data, the decreasing trend based on satellite imagery across Spring 2023 was not reflected in the lab analyses.

Chlorophyll-a concentrations in Canyon Lake derived from satellite imagery remained relatively low throughout the monitoring period, with some patchy blooms noted in July and August 2022 in the East Basin, as well as a more general increase in lake-wide chlorophyll-a in June 2023. Higher satellite derived chlorophyll-a concentrations were observed upstream of the causeway separating the Main Body of the lake from the North Ski Basin, particularly beginning in February 2023 after several rain events. Measured in-lake concentrations of chlorophyll-a in the Main Basin were relatively low and generally matched those observed in the satellite images. A corruption of the February 2023 source data for the eastern arm of Canyon Lake led to lack of data for that portion of the lake. Chlorophyll-a was not analytically detected in numerous samples from Canyon Lake in December 2022 and April 2023. These analytical results were verified by satellite imagery with many pixel values equal to the lowest possible detection value (<0.1 mg/L).

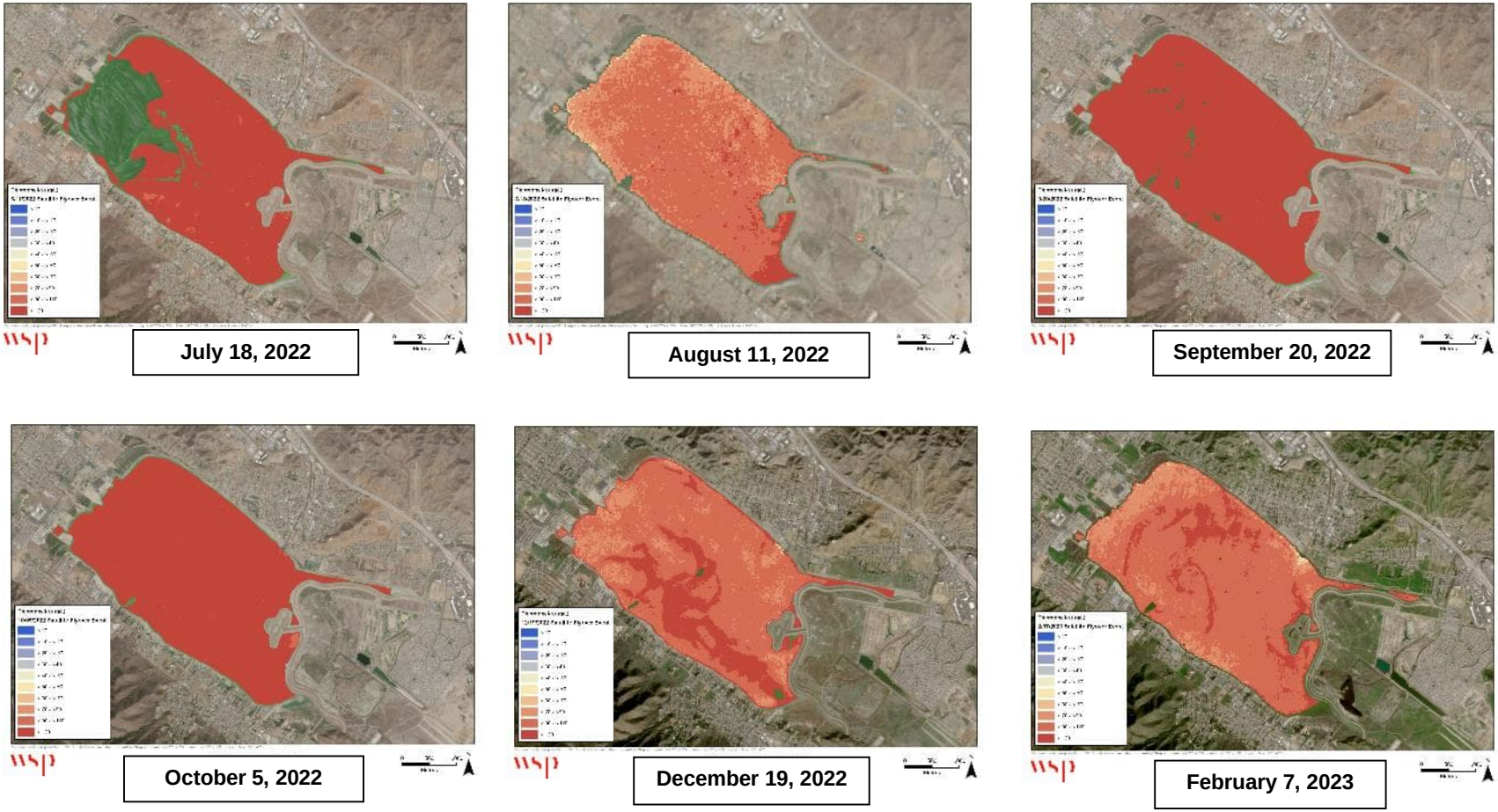

Figure 3-20. Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore

(Data gaps are due to sun glare)

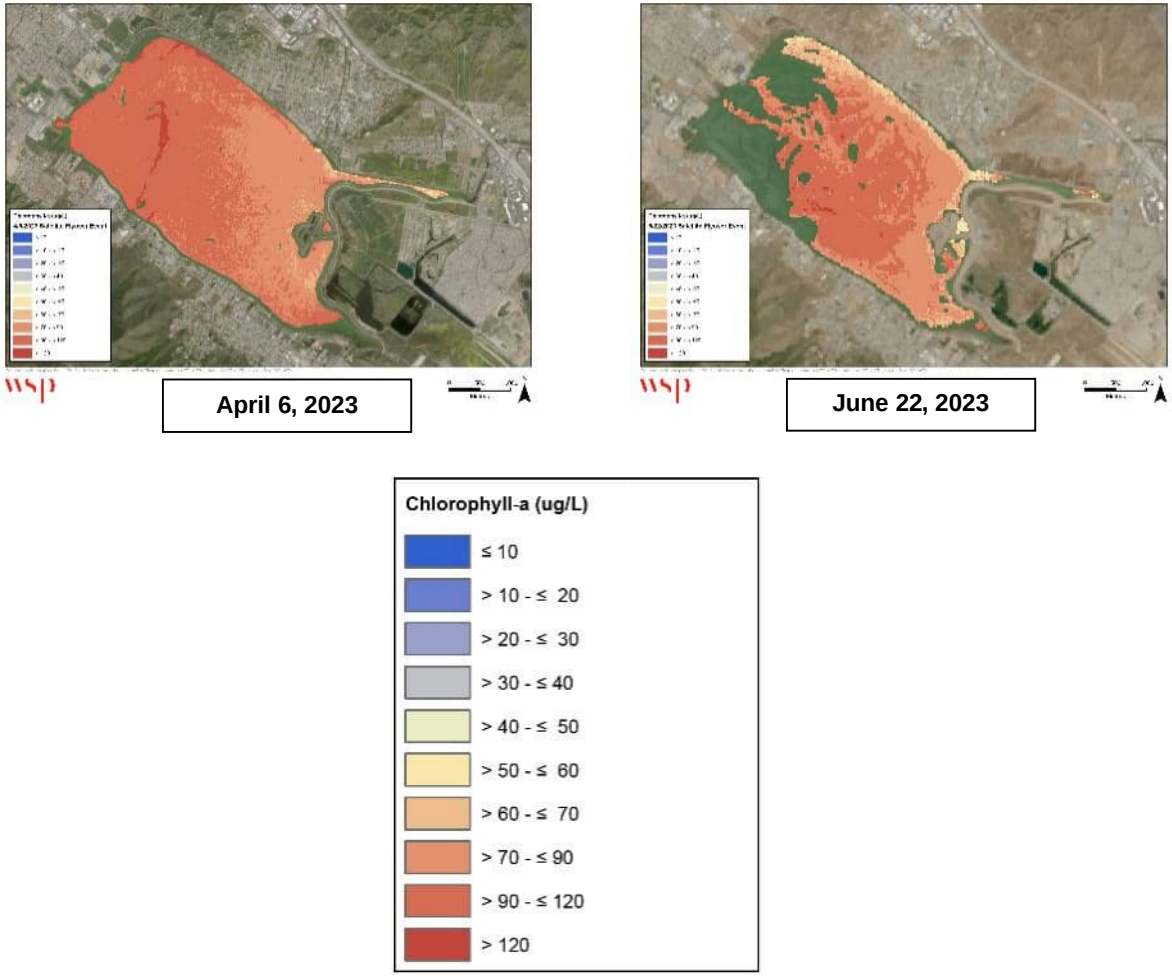

Figure 3-20 (cont.). Satellite Imagery of Chlorophyll-a Concentrations in Lake Elsinore

(Data gaps are due to sun glare)

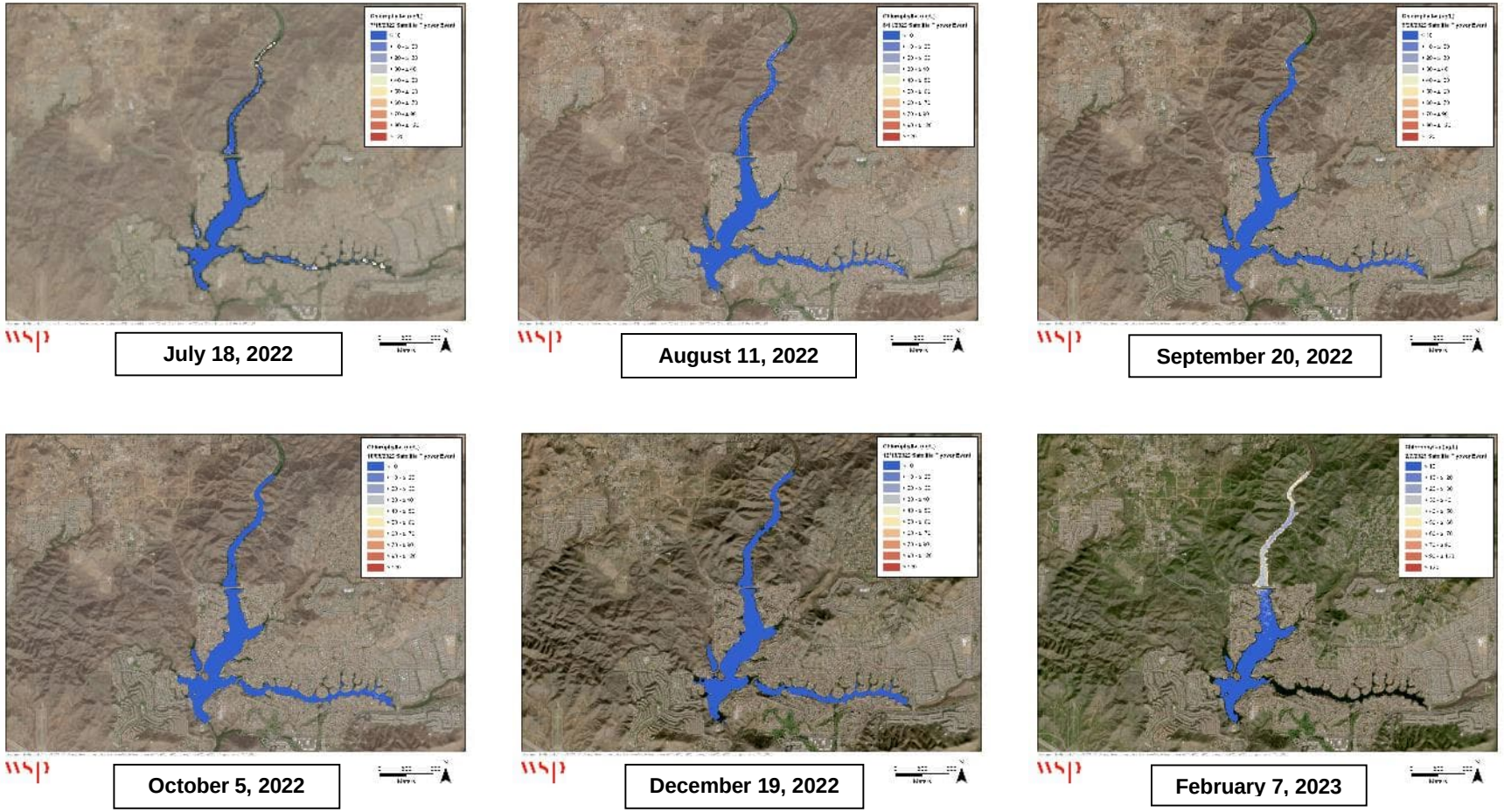

Figure 3-21. Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake

(February 2023 data gap in the eastern arm due to source file corruption)

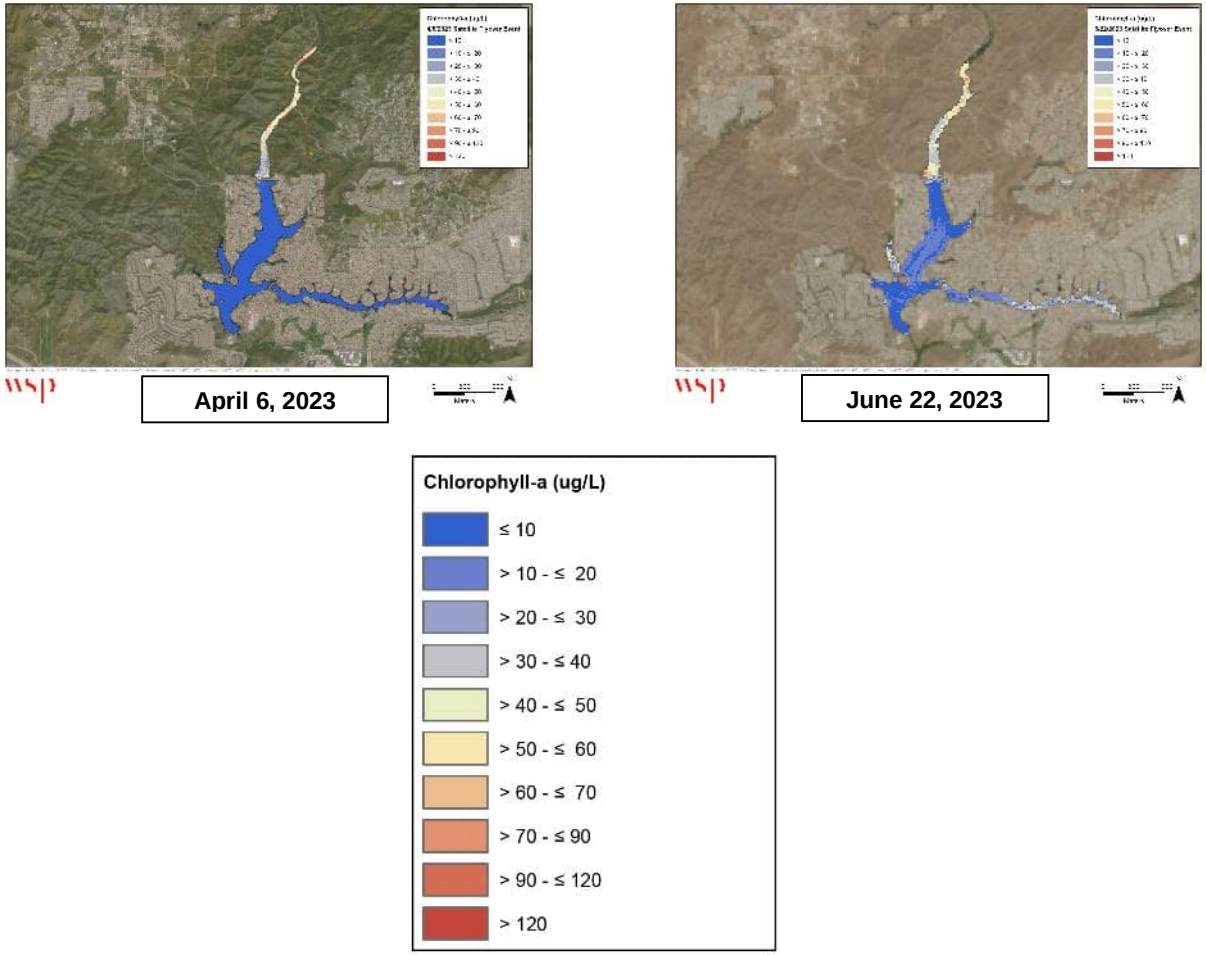

Figure 3-21 (cont.). Satellite Imagery of Chlorophyll-a Concentrations in Canyon Lake

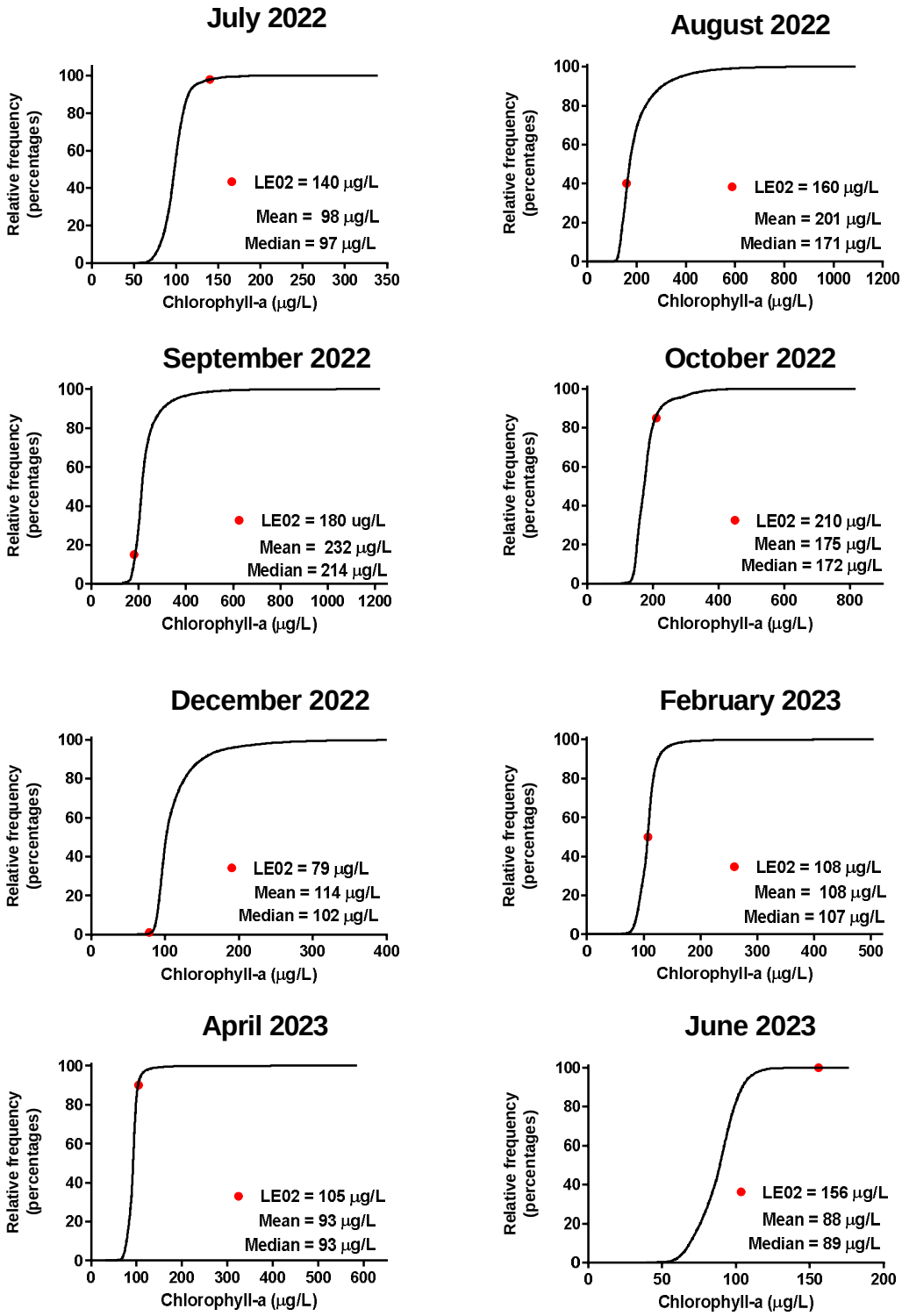

Figure 3-22. Cumulative Distribution of Satellite Derived Chlorophyll-a Concentrations in Lake Elsinore Relative to Measured Chlorophyll-a in Field Collected Samples

Colored dots represent the in-lake surface (0-2m) analytical measured concentration for each event

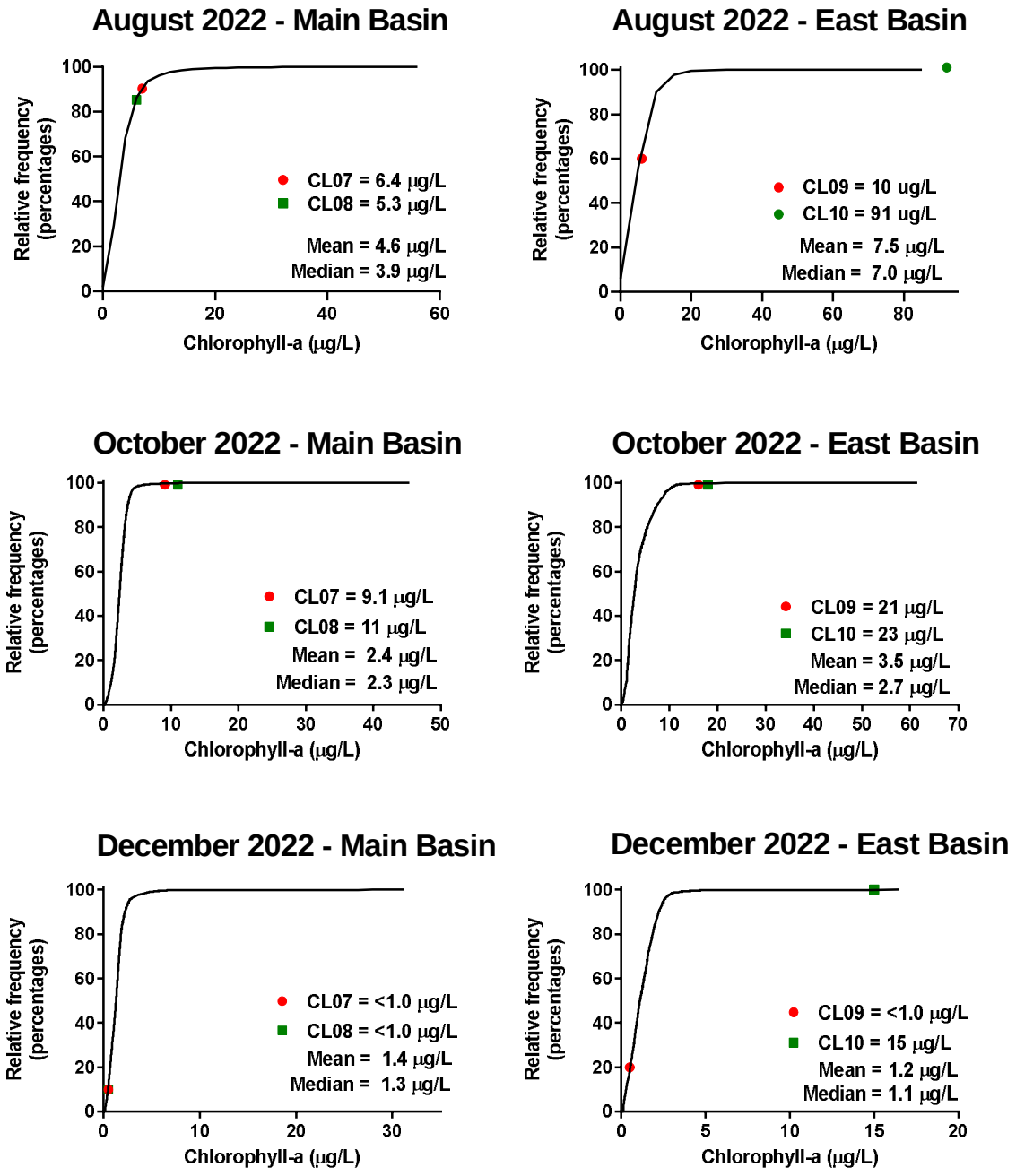

Figure 3-23. Cumulative Distribution of Satellite Derived Chlorophyll-a Concentrations in Canyon Lake Relative to Measured Chlorophyll-a in Field Collected Samples

Colored dots represent the in-lake surface (0-2m) analytical measured concentration for each event

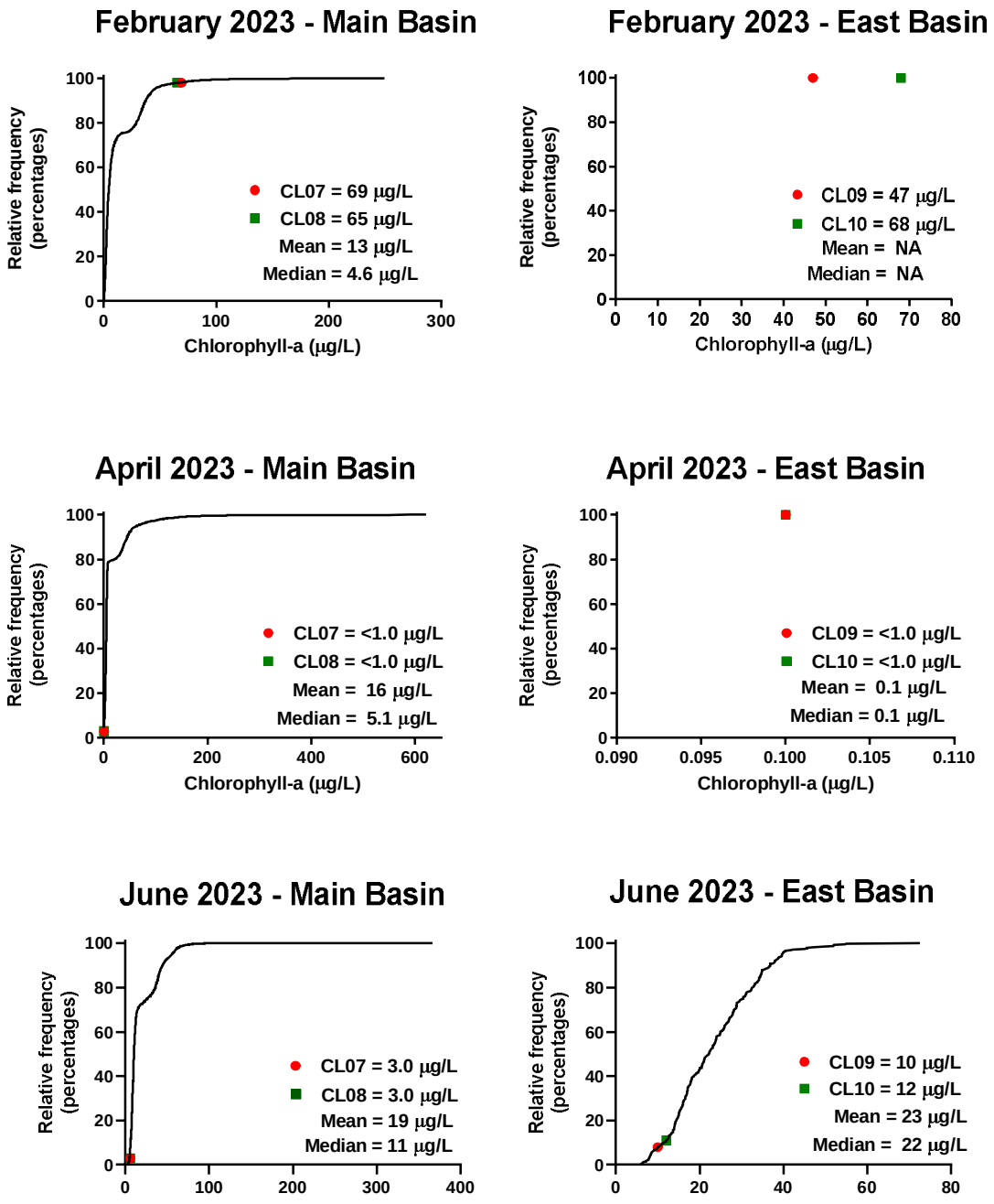

Figure 3-23 (continued). Cumulative Distribution of Satellite Derived Chlorophyll-a Concentrations in Canyon Lake Relative to Measured Chlorophyll-a in Field Collected Samples

Colored dots represent the in-lake surface (0-2m) analytical measured concentration for each event
No satellite data available for February 2023 East Basin. April 2023 East Basin satellite data below detection limit.

4.0 Conclusions

Sampling was conducted during the July 2022 to June 2023 monitoring year according to the Lake Elsinore and Canyon Lake Nutrient Monitoring Work Plan (Haley & Aldrich 2016) and companion Quality Assurance Project Plan (Amec Foster Wheeler 2016) in order to fulfill the requirements outlined in RWQCB Resolution No. R8-2004-0037. A total of 8 monitoring events were conducted in Lake Elsinore (monthly June to September, bi-monthly otherwise) and 6 monitoring events in Canyon Lake (bi-monthly). A total of five storm events met mobilization criteria for watershed stormwater sampling, occurring on November 8, 2022; December 11, 2022; January 4, 2022; January 10, 2023; and February 24, 2023.

The following summarizes the data collected during the 2022-2023 monitoring year, noting any exceedances of TMDL targets, and any relevant observations pertaining to results obtained.

4.1 Watershed Monitoring

A summary of watershed water quality monitoring data for each of the four monitoring locations for the monitoring period of July 1, 2022 through June 30, 2023 is provided below.

1. Concentrations of nutrients for the three storm events monitored at Salt Creek at Murrieta Road (Station ID 745) ranged from 1.6 to 2.2 mg/L for total nitrogen, and 0.24 to 0.41 mg/L for total phosphorus. Based on flow data provided by the nearby USGS stream gauge (Station ID 11070465), the total annual flow was estimated at 165,766,482 cubic feet. The estimated annual nutrient load was calculated to be 8,576 kg for total nitrogen and 1,533 kg for total phosphorus.

2. Concentrations of nutrients for the three storm events monitored at San Jacinto River at Goetz Road (Station ID 759) ranged from 1.4 to 1.8 mg/L for total nitrogen, and 0.36 to 0.49 mg/L for total phosphorus. Based on flow data provided by the nearby USGS stream gauge (Station ID 11070365), the total annual flow was estimated at 377,054,739 cf. The estimated annual nutrient load was calculated to be 17,643 kg for total nitrogen and 4,516 kg for total phosphorus.

3. Concentrations of nutrients for the three storm events monitored at Canyon Lake Spillway (Station ID 841) ranged from 1.3 to 1.7 mg/L for total nitrogen, and from 0.058 to 0.17 mg/L for total phosphorus. Based on flow data provided by the nearby USGS stream gauge (Station ID 11070500), the total annual flow was estimated at 539,669,871 cf. The estimated annual nutrient load was calculated to be 23,428 kg for total nitrogen and 1,662 kg for total phosphorus.

4. No samples were collected from the sampling station at San Jacinto River at Ramona Expressway (Station ID 741) during the 2022-2023 monitoring year. Flows from the local area and from overflow of the upstream levee structure were observed at the San Jacinto River at Ramona Expressway (Station ID 741) from January 15, 2023 through February 5, 2023, and from March 21, 2023 through March 28, 2023, however these flows did not originate from Mystic Lake.

4.2 In-Lake Monitoring

4.2.1 Lake Elsinore

5. The Lake Elsinore annual monitoring year means for total nitrogen and total phosphorus were 4.8 mg/L and 0.15 mg/L, with both exceeding their associated 2020 TMDL limits. Annual mean total phosphorous concentration dropped from the previous monitoring year (0.19 mg/L in 2021-2022), while total nitrogen exhibited an increase (4.6 mg/L in 2021-2022).

6. The annual mean for total ammonia was 0.24 mg/L, an increase from the previous monitoring year mean (0.17 mg/L). All total ammonia concentrations were below CMC threshold, however two exceeded the CCC threshold in July 2022 (0.42 mg/L) and December 2022 (1.0 mg/L). The 2021-2022 monitoring year had one total ammonia exceedances of the CCC threshold in July 2021.

7. The DO concentration 1-m above the lake bottom as a 12-month rolling average at Site LE02 remained below the 2020 TMDL target (>5.0 mg/L) for the entire monitoring year. Identical results were observed during the 2021-2022 monitoring year. The average full-water column DO concentration at LE02 during the 2022-2023 monitoring year was 5.9 mg/L, and the 12-month rolling average was above the 2020 TMDL target (>5.0 mg/L) for the entire monitoring year, with the exception of July 2022 (4.9 mg/L).

8. The mean chlorophyll-a concentration observed in samples collected during the summer TMDL compliance period (June 2022 through September 2022) was 160 µg/L for depth-integrated samples and 122 µg/L for surface samples. These concentrations both exceed the 2020 TMDL target of 25 µg/L chlorophyll-a. The mean summer depth-integrated 2022 chlorophyll-a value was higher than that observed during the previous summer of 2021 (147 µg/L), however the mean 2022 summer surface chlorophyll-a value was lower than that of the previous summer (150 µg/L).

4.2.2 Canyon Lake

1. The Canyon Lake annual lake-wide monitoring year mean for total nitrogen and total phosphorus was 1.4 mg/L and 0.11 mg/L, respectively. Both the total nitrogen and total phosphorus mean exceeded their 2020 TMDL limits of 0.75 mg/L and 0.1 mg/L, respectively. The annual mean total nitrogen concentration decreased from the previous monitoring year (1.9 mg/L in 2021-2022). While the lake-wide annual mean for total phosphorus at 0.11 mg/L was slightly above its 2020 TMDL target of 0.1 mg/L, this was likely due to the extremely wet season occurring this monitoring year. Total phosphorus concentrations exhibited large increases in February and April 2023 during the height of the storm season.

2. The annual lake-wide mean for total ammonia was 0.50 mg/L. This value is lower than the previous monitoring year which had a mean total ammonia of 0.55 mg/L but was similar to the 0.48 mg/L mean total ammonia observed in the 2019-2020 monitoring

year. Two samples, both at Site CL09 exceeded its corresponding total ammonia CCC threshold value (1.6 mg/L in August 2022; 1.7 mg/L in October 2022). The only sample to exceed its CCC in the previous two monitoring years was also CL09. No samples exceeded the total ammonia CMC value.

3. The lake-wide DO concentration in the hypolimnion (when the lake was stratified) ranged from 0.0 to 0.1 mg/L. The rolling 12-month mean DO concentration in the hypolimnion was never above the 2020 TMDL target of >5.0 mg/L. The magnitude of stratification in Canyon Lake, particularly in the Main Basin, as well as its duration limits the ability of the lake to meet the 2020 TMDL target for DO. The lake is stratified during large portions of the year, during which there is almost no mixing between the upper epilimnion and lower hypolimnion. During this time, the DO in the hypolimnion declines substantially as sediment processes deplete the oxygen. However, the lake-wide average DO concentration was 6.7 mg/L when averaging values across all monitored sites and depths during the 2022-2023 period.

4. The mean annual lake-wide depth-integrated chlorophyll-a concentration was 23 µg/L and 19 µg/L for surface samples. Both concentrations are below the 2020 TMDL target of 25 µg/L. These values are similar to the previous monitoring year of 24 µg/L and 14 µg/L, for the depth-integrated and surface samples.

5. The highest total aluminum concentration was measured at 590 µg/L at Site CL07 in the Main Basin. This was measured during the June 2023 event after the alum application in May 2023. Even this highest concentration observed was well below the calculated 2018 EPA water chronic water quality objective (the CCC). It appears that alum continues to have the desired effect of lowering total phosphorus and chlorophyll-a. The lake-wide annual mean for chlorophyll-a was below its 2020 TMDL target concentration. However, the lake-wide annual mean for total phosphorus was slightly above its 2020 TMDL target of 0.1 mg/L, but as noted above was likely due to the extremely wet season occurring this monitoring year.

5.0 References

Amec Foster Wheeler. 2016. Quality Assurance Project Plan for Lake Elsinore, Canyon Lake, and San Jacinto River Watershed TMDL Monitoring Program. May 2016.

Amec Foster Wheeler. 2017. Lake Elsinore and Canyon Lake Watersheds Nutrient TMDL Monitoring, 2016-2017 Annual Report. Prepared for the Lake Elsinore & San Jacinto Watersheds Project Authority, August 2017.

Haley & Aldrich, Inc. 2016. Lake Elsinore and Canyon Lake Nutrient TMDL Compliance Monitoring Work Plan for Lake Elsinore and San Jacinto Watershed Authority. Riverside, CA. April 2016.

Lake Elsinore and San Jacinto Watersheds Authority (LESJWA). 2006. Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Plan. CA Regional Water Quality Control Board, Santa Ana Region. February.

Montgomery Watson and Elsinore Valley Municipal Water District (MWH/ EVMWD). 2009. Canyon Lake Bacteria Characterization Study. Technical Memorandum prepared for the Lake Elsinore and Canyon Lake TMDL Task Force. December 1, 2009

Riverside County Flood Control and Water Conservation District (RCFCWCD). 2021. Hydrologic Data Collection, Rain Fall Reports.

Santa Ana Regional Water Quality Control Board. 2007. Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Nutrient Total Maximum Daily Loads (TMDLs) for Lake Elsinore and Canyon Lake, No. R8-2004-0037.

Santa Ana Regional Water Quality Control Board. 2007. Resolution Approving Plans and Schedules Submitted by the Canyon Lake/Lake Elsinore TMDL Task Force and Individual Discharger Groups Pursuant to the Lake Elsinore and Canyon Lake Nutrient Total Maximum Daily Loads Specified in the Water Quality Control Plan for the Santa Ana River Basin. Resolution R8-2007-0083.

Thursby, C.B. 1986. Memorandum to David J. Hansen, U.S. EPA, Narragansett, Rhode Island.

United States Environmental Protection Agency (US EPA). 2018. 2018 Final Aquatic Life Ambient Water Quality Criteria for Aluminum. EPA-822-R-18-001. U.S. EPA Office of Water. December 2018. EPA-822-R-18-001

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APPENDIX A
WATERSHED ANALYTICAL REPORTS

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders:	1L15071	**Report Date:**	1/10/2022
		Received Date:	12/15/2021
Project:	Lake Elsinore/Canyon Lake TMDL Stormwater	**Turnaround Time:**	Normal
		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	**P.O. #:**	C015101084
		Billing Code:	
Client:	Wood - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123		

ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • HW-DOH #4047 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 12/15/21 with the Chain-of-Custody document. The samples were received in good condition, at 3.4 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634

www.wecklabs.com

Wood - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: Lake Elsinore/Canyon Lake TMDL Stormwater

Project Manager: John Rudolph

Reported: 01/10/2022 12:13

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-121421	Austin Kay	1L15071-01	Water	12/14/21 17:45	
S-04-121421	Austin Kay	1L15071-02	Water	12/14/21 19:25	

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Wood - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: Lake Elsinore/Canyon Lake TMDL Stormwater

Project Manager: John Rudolph

Reported: 01/10/2022 12:13

Sample Results

Sample: S-03-121421 — Sampled: 12/14/21 17:45 by Austin Kay

1L15071-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 410.4			**Instr:** UVVIS04				
Batch ID: W1L1678 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/23/21 10:29				**Analyst:** heq
Chemical Oxygen Demand	**40**	2.9	5.0	mg/l	1	01/02/22	
Method: SM 5210B			**Instr:** PH13				
Batch ID: W1L1132 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/16/21 09:39				**Analyst:** HEQ
Biochemical Oxygen Demand	**6.9**	2.0	2.0	mg/l	1	12/21/21	

Sample Results

Sample: S-04-121421 — Sampled: 12/14/21 19:25 by Austin Kay

1L15071-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 410.4			**Instr:** UVVIS04				
Batch ID: W1L1678 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/23/21 10:29				**Analyst:** heq
Chemical Oxygen Demand	**50**	2.9	5.0	mg/l	1	01/02/22	
Method: SM 5210B			**Instr:** PH13				
Batch ID: W1L1132 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/16/21 09:39				**Analyst:** HEQ
Biochemical Oxygen Demand	**8.4**	2.0	2.0	mg/l	1	12/21/21	

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Project Number: Lake Elsinore/Canyon Lake TMDL Stormwater

Project Manager: John Rudolph

Reported: 01/10/2022 12:13

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W1L1132 - SM 5210B											
Blank (W1L1132-BLK1)					**Prepared: 12/16/21**	**Analyzed: 12/21/21**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
Blank (W1L1132-BLK2)					**Prepared: 12/16/21**	**Analyzed: 12/21/21**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
Blank (W1L1132-BLK3)					**Prepared: 12/16/21**	**Analyzed: 12/21/21**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
LCS (W1L1132-BS1)					**Prepared: 12/16/21**	**Analyzed: 12/21/21**					
Biochemical Oxygen Demand	186	2.0	2.0	mg/l	198		94	85-115			
Batch: W1L1678 - EPA 410.4											
Blank (W1L1678-BLK1)					**Prepared: 12/23/21**	**Analyzed: 01/02/22**					
Chemical Oxygen Demand	ND	2.9	5.0	mg/l							
LCS (W1L1678-BS1)					**Prepared: 12/23/21**	**Analyzed: 01/02/22**					
Chemical Oxygen Demand	996	2.9	5.0	mg/l	1000		100	90-110			
Matrix Spike (W1L1678-MS1)	**Source: 1L15004-06**				**Prepared: 12/23/21**	**Analyzed: 01/02/22**					
Chemical Oxygen Demand	259	12	20	mg/l	200	56.3	101	90-110			
Matrix Spike (W1L1678-MS2)	**Source: 1L15084-01**				**Prepared: 12/23/21**	**Analyzed: 01/02/22**					
Chemical Oxygen Demand	5970	46	80	mg/l	4000	2130	96	90-110			
Matrix Spike Dup (W1L1678-MSD1)	**Source: 1L15004-06**				**Prepared: 12/23/21**	**Analyzed: 01/02/22**					
Chemical Oxygen Demand	259	12	20	mg/l	200	56.3	101	90-110	0.3	15	
Matrix Spike Dup (W1L1678-MSD2)	**Source: 1L15084-01**				**Prepared: 12/23/21**	**Analyzed: 01/02/22**					
Chemical Oxygen Demand	5970	46	80	mg/l	4000	2130	96	90-110	0	15	

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Wood - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: Lake Elsinore/Canyon Lake TMDL Stormwater

Project Manager: John Rudolph

Reported: 01/10/2022 12:13

Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders: 1L16133

Project: Lake Elsinore and Canyon Lake Nutrient TMDL

Attn: John Rudolph

Client: Wood - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Report Date: 1/20/2022
Received Date: 12/16/2021
Turnaround Time: Normal
Phones: (858) 514-6465
Fax: (858) 278-5300
P.O. #: C015101084
Billing Code:

ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • HW-DOH #4047 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 12/16/21 with the Chain-of-Custody document. The samples were received in good condition, at 2.6 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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San Diego, CA 92123

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Project Manager: John Rudolph

Reported: 01/20/2022 12:10

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-121621	Austin Kay	1L16133-01	Water	12/16/21 10:38	
S-04-121621	Austin Kay	1L16133-02	Water	12/16/21 11:03	

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Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Project Manager: John Rudolph

Reported: 01/20/2022 12:10

Sample Results

Sample: S-03-121621 — Sampled: 12/16/21 10:38 by Austin Kay

1L16133-01 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods						
Method: _Various		**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]		**Prepared:** 12/27/21 13:03				**Analyst:** YMT
Organic Nitrogen, Total	**1.9**	0.10	mg/l	1	12/29/21	
Method: Calculation		**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]		**Prepared:** 12/21/21 13:40				**Analyst:** YMT
Nitrogen, Total	**3.2**	0.20	mg/l	1	12/23/21	
Method: EPA 350.1		**Instr:** AA06				
Batch ID: W1L1796 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/27/21 13:03				**Analyst:** YMT
Ammonia as N	**0.22**	0.10	mg/l	1	12/29/21	
Method: EPA 351.2		**Instr:** AA06				
Batch ID: W1L1483 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/21/21 13:40				**Analyst:** YMT
TKN	**2.1**	0.20	mg/l	1	12/23/21	
Method: EPA 353.2		**Instr:** AA01				
Batch ID: W1L1282 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/17/21 15:05				**Analyst:** ism
Nitrate as N	**1.1**	0.20	mg/l	1	12/17/21 16:07	
Nitrite as N	ND	0.10	mg/l	1	12/17/21 16:07	
NO2+NO3 as N	**1200**	200	ug/l	1	12/17/21	
Method: EPA 365.3		**Instr:** UVVIS04				
Batch ID: W1L1224 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/16/21 19:05				**Analyst:** UVVIS04
o-Phosphate as P	**0.23**	0.010	mg/l	1	12/17/21 11:20	**
Method: EPA 365.3		**Instr:** UVVIS04				
Batch ID: W1L1896 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/28/21 13:27				**Analyst:** heq
Phosphorus as P, Total	**0.56**	0.020	mg/l	2	01/04/22	
Method: SM 2540C		**Instr:** OVEN01				
Batch ID: W1L1514 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/21/21 17:18				**Analyst:** jao
Total Dissolved Solids	**430**	10	mg/l	1	12/22/21	
Method: SM 2540D		**Instr:** OVEN15				
Batch ID: W1L1621 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/22/21 13:03				**Analyst:** ttf
Total Suspended Solids	**73**	5	mg/l	1	12/22/21	
Metals by EPA 200 Series Methods						
Method: Calculation		**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]		**Prepared:** 01/04/22 10:18				**Analyst:** kvm
Hardness as CaCO3, Total	**203**	3.31	mg/l	1	01/10/22	
Method: EPA 200.7		**Instr:** ICP03				
Batch ID: W2A0134 **Preparation:** EPA 200.2		**Prepared:** 01/04/22 10:18				**Analyst:** kvm
Calcium, Total	**49.1**	0.500	mg/l	1	01/10/22	
Magnesium, Total	**19.6**	0.500	mg/l	1	01/10/22	

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Reported: 01/20/2022 12:10

Sample Results

(Continued)

Sample: S-04-121621
1L16133-02 (Water)

Sampled: 12/16/21 11:03 by Austin Kay

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods						
Method: _Various		**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]		**Prepared:** 12/27/21 13:03				**Analyst:** YMT
Organic Nitrogen, Total	**1.5**	0.10	mg/l	1	12/29/21	
Method: Calculation		**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]		**Prepared:** 12/21/21 13:40				**Analyst:** YMT
Nitrogen, Total	**2.7**	0.20	mg/l	1	12/23/21	
Method: EPA 350.1		**Instr:** AA06				
Batch ID: W1L1796 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/27/21 13:03				**Analyst:** YMT
Ammonia as N	ND	0.10	mg/l	1	12/29/21	
Method: EPA 351.2		**Instr:** AA06				
Batch ID: W1L1483 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/21/21 13:40				**Analyst:** YMT
TKN	**1.5**	0.20	mg/l	1	12/23/21	
Method: EPA 353.2		**Instr:** AA01				
Batch ID: W1L1282 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/17/21 15:05				**Analyst:** ism
Nitrate as N	**1.2**	0.20	mg/l	1	12/17/21 16:09	
Nitrite as N	ND	0.10	mg/l	1	12/17/21 16:09	
NO2+NO3 as N	**1200**	200	ug/l	1	12/17/21	
Method: EPA 365.3		**Instr:** UVVIS04				
Batch ID: W1L1224 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/16/21 19:05				**Analyst:** UVVIS04
o-Phosphate as P	**0.40**	0.010	mg/l	1	12/17/21 11:21	**
Method: EPA 365.3		**Instr:** UVVIS04				
Batch ID: W1L1896 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/28/21 13:27				**Analyst:** heq
Phosphorus as P, Total	**0.79**	0.020	mg/l	2	01/04/22	
Method: SM 2540C		**Instr:** OVEN01				
Batch ID: W1L1514 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/21/21 17:18				**Analyst:** jao
Total Dissolved Solids	**170**	10	mg/l	1	12/22/21	
Method: SM 2540D		**Instr:** OVEN15				
Batch ID: W1L1621 **Preparation:** _NONE (WETCHEM)		**Prepared:** 12/22/21 13:03				**Analyst:** ttf
Total Suspended Solids	**130**	5	mg/l	1	12/22/21	
Metals by EPA 200 Series Methods						
Method: Calculation		**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]		**Prepared:** 01/04/22 10:18				**Analyst:** kvm
Hardness as CaCO3, Total	**95.6**	3.31	mg/l	1	01/10/22	
Method: EPA 200.7		**Instr:** ICP03				
Batch ID: W2A0134 **Preparation:** EPA 200.2		**Prepared:** 01/04/22 10:18				**Analyst:** kvm
Calcium, Total	**25.1**	0.500	mg/l	1	01/10/22	
Magnesium, Total	**7.98**	0.500	mg/l	1	01/10/22	

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Project Manager: John Rudolph

Reported: 01/20/2022 12:10

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W1L1224 - EPA 365.3										
Blank (W1L1224-BLK1)				**Prepared: 12/16/21 Analyzed: 12/17/21**						
o-Phosphate as P	ND	0.010	mg/l							
LCS (W1L1224-BS1)				**Prepared: 12/16/21 Analyzed: 12/17/21**						
o-Phosphate as P	0.199	0.010	mg/l	0.200		100	88-111			
Matrix Spike (W1L1224-MS1)	**Source: 1L16110-01**			**Prepared: 12/16/21 Analyzed: 12/17/21**						
o-Phosphate as P	0.232	0.010	mg/l	0.200	0.0150	108	85-112			
Matrix Spike Dup (W1L1224-MSD1)	**Source: 1L16110-01**			**Prepared: 12/16/21 Analyzed: 12/17/21**						
o-Phosphate as P	0.231	0.010	mg/l	0.200	0.0150	108	85-112	0.4	20	
Batch: W1L1282 - EPA 353.2										
Blank (W1L1282-BLK1)				**Prepared & Analyzed: 12/17/21**						
Nitrate as N	ND	0.20	mg/l							
Nitrite as N	ND	0.10	mg/l							
NO2+NO3 as N	ND	200	ug/l							
LCS (W1L1282-BS1)				**Prepared & Analyzed: 12/17/21**						
Nitrate as N	0.997	0.20	mg/l	1.00		100	90-110			
Nitrite as N	0.974	0.10	mg/l	1.00		97	90-110			
NO2+NO3 as N	997	200	ug/l	1000		100	90-110			
Matrix Spike (W1L1282-MS1)	**Source: 1L17056-01**			**Prepared & Analyzed: 12/17/21**						
Nitrate as N	10.2	0.20	mg/l	2.00	8.19	100	90-110			
Nitrite as N	0.994	0.10	mg/l	1.00	ND	99	90-110			
NO2+NO3 as N	10200	200	ug/l	2000	8190	100	90-110			
Matrix Spike Dup (W1L1282-MSD1)	**Source: 1L17056-01**			**Prepared & Analyzed: 12/17/21**						
Nitrate as N	10.2	0.20	mg/l	2.00	8.19	100	90-110	0	20	
Nitrite as N	0.994	0.10	mg/l	1.00	ND	99	90-110	0	20	
NO2+NO3 as N	10200	200	ug/l	2000	8190	100	90-110	0	20	
Batch: W1L1483 - EPA 351.2										
Blank (W1L1483-BLK1)				**Prepared: 12/21/21 Analyzed: 12/23/21**						
TKN	ND	0.10	mg/l							
Blank (W1L1483-BLK2)				**Prepared: 12/21/21 Analyzed: 12/23/21**						
TKN	ND	0.10	mg/l							
LCS (W1L1483-BS1)				**Prepared: 12/21/21 Analyzed: 12/23/21**						
TKN	1.00	0.10	mg/l	1.00		100	90-110			
LCS (W1L1483-BS2)				**Prepared: 12/21/21 Analyzed: 12/23/21**						
TKN	1.00	0.10	mg/l	1.00		100	90-110			
Matrix Spike (W1L1483-MS1)	**Source: 1L21028-01**			**Prepared: 12/21/21 Analyzed: 12/23/21**						
TKN	1.19	0.10	mg/l	1.00	0.188	100	90-110			
Matrix Spike (W1L1483-MS2)	**Source: 1L21052-01**			**Prepared: 12/21/21 Analyzed: 12/23/21**						
TKN	3.46	0.20	mg/l	2.00	1.38	104	90-110			

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Project Manager: John Rudolph

Reported: 01/20/2022 12:10

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W1L1483 - EPA 351.2 (Continued)										
Matrix Spike Dup (W1L1483-MSD1)	**Source: 1L21028-01**			**Prepared: 12/21/21**	**Analyzed: 12/23/21**					
TKN	1.20	0.10	mg/l	1.00	0.188	101	90-110	0.5	10	
Matrix Spike Dup (W1L1483-MSD2)	**Source: 1L21052-01**			**Prepared: 12/21/21**	**Analyzed: 12/23/21**					
TKN	3.39	0.20	mg/l	2.00	1.38	101	90-110	2	10	
Batch: W1L1514 - SM 2540C										
Blank (W1L1514-BLK1)				**Prepared: 12/21/21**	**Analyzed: 12/22/21**					
Total Dissolved Solids	ND	10	mg/l							
LCS (W1L1514-BS1)				**Prepared: 12/21/21**	**Analyzed: 12/22/21**					
Total Dissolved Solids	811	10	mg/l	824		98	96-102			
Duplicate (W1L1514-DUP1)	**Source: 1L16117-01**			**Prepared: 12/21/21**	**Analyzed: 12/22/21**					
Total Dissolved Solids	27800	10	mg/l		25400			9	10	
Duplicate (W1L1514-DUP2)	**Source: 1L17060-02**			**Prepared: 12/21/21**	**Analyzed: 12/22/21**					
Total Dissolved Solids	3920	10	mg/l		3910			0.3	10	
Batch: W1L1621 - SM 2540D										
Blank (W1L1621-BLK1)				**Prepared & Analyzed: 12/22/21**						
Total Suspended Solids	ND	5	mg/l							
LCS (W1L1621-BS1)				**Prepared & Analyzed: 12/22/21**						
Total Suspended Solids	52.1	5	mg/l	52.5		99	90-110			
Duplicate (W1L1621-DUP1)	**Source: 1L20076-03**			**Prepared & Analyzed: 12/22/21**						
Total Suspended Solids	6.70	5	mg/l		6.40			5	10	
Duplicate (W1L1621-DUP2)	**Source: 1L15006-02**			**Prepared & Analyzed: 12/22/21**						
Total Suspended Solids	13.9	5	mg/l		14.0			0.7	10	
Batch: W1L1796 - EPA 350.1										
Blank (W1L1796-BLK1)				**Prepared: 12/27/21**	**Analyzed: 12/29/21**					
Ammonia as N	ND	0.10	mg/l							
Blank (W1L1796-BLK2)				**Prepared: 12/27/21**	**Analyzed: 12/29/21**					
Ammonia as N	ND	0.10	mg/l							
LCS (W1L1796-BS1)				**Prepared: 12/27/21**	**Analyzed: 12/29/21**					
Ammonia as N	0.241	0.10	mg/l	0.250		96	90-110			
LCS (W1L1796-BS2)				**Prepared: 12/27/21**	**Analyzed: 12/29/21**					
Ammonia as N	0.242	0.10	mg/l	0.250		97	90-110			
Duplicate (W1L1796-DUP1)	**Source: 1L15108-01**			**Prepared: 12/27/21**	**Analyzed: 12/29/21**					
Ammonia as N	0.127	0.10	mg/l		0.126			0.3	15	
Matrix Spike (W1L1796-MS1)	**Source: 1L15111-01**			**Prepared: 12/27/21**	**Analyzed: 12/29/21**					
Ammonia as N	0.616	0.10	mg/l	0.250	0.379	95	90-110			
Matrix Spike (W1L1796-MS2)	**Source: 1L15120-03**			**Prepared: 12/27/21**	**Analyzed: 12/29/21**					
Ammonia as N	0.247	0.10	mg/l	0.250	ND	99	90-110			
Matrix Spike Dup (W1L1796-MSD1)	**Source: 1L15111-01**			**Prepared: 12/27/21**	**Analyzed: 12/29/21**					

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Project Manager: John Rudolph

Reported: 01/20/2022 12:10

Quality Control Results (Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W1L1796 - EPA 350.1 (Continued)										
Matrix Spike Dup (W1L1796-MSD1)	**Source: 1L15111-01**			**Prepared: 12/27/21**	**Analyzed: 12/29/21**					
Ammonia as N	0.617	0.10	mg/l	0.250	0.379	95	90-110	0.06	15	
Matrix Spike Dup (W1L1796-MSD2)	**Source: 1L15120-03**			**Prepared: 12/27/21**	**Analyzed: 12/29/21**					
Ammonia as N	0.249	0.10	mg/l	0.250	ND	99	90-110	0.8	15	
Batch: W1L1896 - EPA 365.3										
Blank (W1L1896-BLK1)				**Prepared: 12/28/21**	**Analyzed: 01/04/22**					
Phosphorus as P, Total	ND	0.010	mg/l							
LCS (W1L1896-BS1)				**Prepared: 12/28/21**	**Analyzed: 01/04/22**					
Phosphorus as P, Total	0.197	0.010	mg/l	0.200		98	90-110			
Matrix Spike (W1L1896-MS1)	**Source: 1L20107-01**			**Prepared: 12/28/21**	**Analyzed: 01/04/22**					
Phosphorus as P, Total	0.380	0.010	mg/l	0.200	0.178	101	90-110			
Matrix Spike Dup (W1L1896-MSD1)	**Source: 1L20107-01**			**Prepared: 12/28/21**	**Analyzed: 01/04/22**					
Phosphorus as P, Total	0.379	0.010	mg/l	0.200	0.178	100	90-110	0.3	20	

Quality Control Results (Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2A0134 - EPA 200.7										
Blank (W2A0134-BLK1)				**Prepared: 01/04/22**	**Analyzed: 01/10/22**					
Calcium, Total	ND	0.500	mg/l							
Magnesium, Total	ND	0.500	mg/l							
LCS (W2A0134-BS1)				**Prepared: 01/04/22**	**Analyzed: 01/10/22**					
Calcium, Total	50.5	0.500	mg/l	50.2		101	85-115			
Magnesium, Total	50.9	0.500	mg/l	50.2		101	85-115			
Matrix Spike (W2A0134-MS1)	**Source: 1L16102-01**			**Prepared: 01/04/22**	**Analyzed: 01/10/22**					
Calcium, Total	111	0.500	mg/l	50.2	60.1	101	70-130			
Magnesium, Total	76.3	0.500	mg/l	50.2	23.5	105	70-130			
Matrix Spike (W2A0134-MS2)	**Source: 1L17013-01**			**Prepared: 01/04/22**	**Analyzed: 01/10/22**					
Calcium, Total	109	0.500	mg/l	50.2	61.4	94	70-130			
Magnesium, Total	74.2	0.500	mg/l	50.2	23.9	100	70-130			
Matrix Spike Dup (W2A0134-MSD1)	**Source: 1L16102-01**			**Prepared: 01/04/22**	**Analyzed: 01/10/22**					
Calcium, Total	110	0.500	mg/l	50.2	60.1	99	70-130	0.9	30	
Magnesium, Total	75.7	0.500	mg/l	50.2	23.5	104	70-130	0.8	30	
Matrix Spike Dup (W2A0134-MSD2)	**Source: 1L17013-01**			**Prepared: 01/04/22**	**Analyzed: 01/10/22**					
Calcium, Total	109	0.500	mg/l	50.2	61.4	95	70-130	0.2	30	
Magnesium, Total	74.3	0.500	mg/l	50.2	23.9	100	70-130	0.06	30	

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Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Project Manager: John Rudolph

Reported: 01/20/2022 12:10

Notes and Definitions

Item	Definition
**	The recommended holding time for field filtering is only 15 minutes. The sample was filtered as soon as possible but it was filtered past holding time. However, the sample was analyzed within holding time.
%REC	Percent Recovery
Dil	Dilution
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Certificate of Analysis

FINAL REPORT

Work Orders:	1L30028	**Report Date:**	2/01/2022
		Received Date:	12/30/2021
Project:	Lake Elsinore/Canyon Lake Nutrient TMDL	**Turnaround Time:**	Normal
		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	**P.O. #:**	C015101084
		Billing Code:	
Client:	Wood - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123		

ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • LACSD #10143 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 12/30/21 with the Chain-of-Custody document. The samples were received in good condition, at 4.8 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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San Diego, CA 92123

Project Number: Lake Elsinore/Canyon Lake Nutrient TMDL

Project Manager: John Rudolph

Reported:
02/01/2022 16:20

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CLS-123021	Nick Poser	1L30028-01	Water	12/30/21 09:00	

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Project Number: Lake Elsinore/Canyon Lake Nutrient TMDL

Project Manager: John Rudolph

Reported:
02/01/2022 16:20

Sample Results

Sample: CLS-123021
1L30028-01 (Water)

Sampled: 12/30/21 9:00 by Nick Poser

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 410.4			**Instr:** UVVIS04				
Batch ID: W2A0346 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/05/22 17:39				**Analyst:** heq
Chemical Oxygen Demand	**15**	2.9	5.0	mg/l	1	01/10/22	
Method: SM 5210B			**Instr:** PH13				
Batch ID: W1L2037 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/30/21 13:45				**Analyst:** HEQ
Biochemical Oxygen Demand	**2.1**	2.0	2.0	mg/l	1	01/04/22	

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Reported:
02/01/2022 16:20

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W1L2037 - SM 5210B											
Blank (W1L2037-BLK1)					**Prepared: 12/30/21**	**Analyzed: 01/04/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
Blank (W1L2037-BLK2)					**Prepared: 12/30/21**	**Analyzed: 01/04/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
Blank (W1L2037-BLK3)					**Prepared: 12/30/21**	**Analyzed: 01/04/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
LCS (W1L2037-BS1)					**Prepared: 12/30/21**	**Analyzed: 01/04/22**					
Biochemical Oxygen Demand	194	2.0	2.0	mg/l	198		98	85-115			
Duplicate (W1L2037-DUP1)	**Source: 1L30028-01**				**Prepared: 12/30/21**	**Analyzed: 01/04/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l		2.06			200	20	R-03
Batch: W2A0346 - EPA 410.4											
Blank (W2A0346-BLK1)					**Prepared: 01/05/22**	**Analyzed: 01/10/22**					
Chemical Oxygen Demand	ND	2.9	5.0	mg/l							
LCS (W2A0346-BS1)					**Prepared: 01/05/22**	**Analyzed: 01/10/22**					
Chemical Oxygen Demand	996	2.9	5.0	mg/l	1000		100	90-110			
Duplicate (W2A0346-DUP1)	**Source: 1L30022-01**				**Prepared: 01/05/22**	**Analyzed: 01/12/22**					
Chemical Oxygen Demand	1340	12	20	mg/l		1440			7	15	
Matrix Spike (W2A0346-MS1)	**Source: 1L30019-01**				**Prepared: 01/05/22**	**Analyzed: 01/10/22**					
Chemical Oxygen Demand	262	12	20	mg/l	200	61.1	100	90-110			
Matrix Spike (W2A0346-MS2)	**Source: 1L30030-01**				**Prepared: 01/05/22**	**Analyzed: 01/10/22**					
Chemical Oxygen Demand	2270	12	20	mg/l	2000	216	103	90-110			
Matrix Spike Dup (W2A0346-MSD1)	**Source: 1L30019-01**				**Prepared: 01/05/22**	**Analyzed: 01/10/22**					
Chemical Oxygen Demand	262	12	20	mg/l	200	61.1	100	90-110	0	15	
Matrix Spike Dup (W2A0346-MSD2)	**Source: 1L30030-01**				**Prepared: 01/05/22**	**Analyzed: 01/10/22**					
Chemical Oxygen Demand	2270	12	20	mg/l	2000	216	103	90-110	0	15	

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Notes and Definitions

Item	Definition
R-03	The RPD is not applicable for result below the reporting limit (either ND or J value).
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Certificate of Analysis

FINAL REPORT

Work Orders:	1L30029
Project:	Lake Elsinore and Canyon Lake Nutrient TMDL
Attn:	John Rudolph
Client:	Wood - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Report Date:	2/01/2022
Received Date:	12/30/2021
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
P.O. #:	C015101084
Billing Code:	

ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • LACSD #10143 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 12/30/21 with the Chain-of-Custody document. The samples were received in good condition, at 4.8 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Project Manager: John Rudolph

Reported: 02/01/2022 16:25

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CLS-123021	Nick Poser	1L30029-01	Water	12/30/21 08:10	

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Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Project Manager: John Rudolph

Reported: 02/01/2022 16:25

Sample Results

Sample: CLS-123021

1L30029-01 (Water)

Sampled: 12/30/21 8:10 by Nick Poser

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: _Various			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 01/19/22 18:02				**Analyst:** YMT
Organic Nitrogen, Total	**0.67**		0.10	mg/l	1	01/21/22	
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 01/19/22 18:02				**Analyst:** YMT
Nitrogen, Total	**1.5**		0.10	mg/l	1	01/21/22	
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2A0326 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/05/22 15:58				**Analyst:** YMT
Ammonia as N	**0.64**	0.017	0.10	mg/l	1	01/13/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2A1289 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/19/22 18:02				**Analyst:** YMT
TKN	**1.3**	0.065	0.10	mg/l	1	01/21/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W1L2048 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/30/21 13:09				**Analyst:** JOG
Nitrate as N	**0.096**	0.040	0.20	mg/l	1	12/30/21 15:04	J
Nitrite as N	**0.066**	0.042	0.10	mg/l	1	12/30/21 15:04	J
NO2+NO3 as N	**160**	36	200	ug/l	1	12/30/21	J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W1L2017 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/30/21 17:39				**Analyst:** heq
Phosphorus as P, Total	ND	0.0030	0.010	mg/l	1	01/04/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W1L2059 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/30/21 17:12				**Analyst:** heq
o-Phosphate as P	**0.0080**	0.0030	0.010	mg/l	1	12/30/21 18:54	**, J
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2A0126 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/04/22 09:25				**Analyst:** jao
Total Dissolved Solids	**580**	4.0	10	mg/l	1	01/04/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2A0349 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/05/22 18:10				**Analyst:** ttf
Total Suspended Solids	ND		5	mg/l	1	01/05/22	
Metals by EPA 200 Series Methods							
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 01/11/22 19:13				**Analyst:** kvm
Hardness as CaCO3, Total	**287**		3.31	mg/l	1	01/17/22	
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2A0741 **Preparation:** EPA 200.2			**Prepared:** 01/11/22 19:13				**Analyst:** kvm
Calcium, Total	**74.2**	0.160	0.500	mg/l	1	01/17/22	
Magnesium, Total	**24.7**	0.0390	0.500	mg/l	1	01/17/22	

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Project Manager: John Rudolph

Reported: 02/01/2022 16:25

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W1L2017 - EPA 365.3											
Blank (W1L2017-BLK1)					**Prepared: 12/29/21 Analyzed: 01/04/22**						
Phosphorus as P, Total	ND	0.0030	0.010	mg/l							
LCS (W1L2017-BS1)					**Prepared: 12/29/21 Analyzed: 01/04/22**						
Phosphorus as P, Total	0.202	0.0030	0.010	mg/l	0.200		101	90-110			
Matrix Spike (W1L2017-MS1)	**Source: 1L28036-01**				**Prepared: 12/29/21 Analyzed: 01/04/22**						
Phosphorus as P, Total	0.373	0.0030	0.010	mg/l	0.200	0.181	96	90-110			
Matrix Spike Dup (W1L2017-MSD1)	**Source: 1L28036-01**				**Prepared: 12/29/21 Analyzed: 01/04/22**						
Phosphorus as P, Total	0.376	0.0030	0.010	mg/l	0.200	0.181	97	90-110	0.8	20	
Batch: W1L2048 - EPA 353.2											
Blank (W1L2048-BLK1)					**Prepared & Analyzed: 12/30/21**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
NO2+NO3 as N	ND	36	200	ug/l							
LCS (W1L2048-BS1)					**Prepared & Analyzed: 12/30/21**						
Nitrate as N	0.962	0.040	0.20	mg/l	1.00		96	90-110			
Nitrite as N	0.991	0.042	0.10	mg/l	1.00		99	90-110			
NO2+NO3 as N	962	36	200	ug/l	1000		96	90-110			
Matrix Spike (W1L2048-MS1)	**Source: 1L30038-01**				**Prepared & Analyzed: 12/30/21**						
Nitrate as N	4.80	0.040	0.20	mg/l	2.00	2.78	101	90-110			
Nitrite as N	0.997	0.042	0.10	mg/l	1.00	ND	100	90-110			
NO2+NO3 as N	4800	36	200	ug/l	2000	2800	100	90-110			
Matrix Spike Dup (W1L2048-MSD1)	**Source: 1L30038-01**				**Prepared & Analyzed: 12/30/21**						
Nitrate as N	4.80	0.040	0.20	mg/l	2.00	2.78	101	90-110	0	20	
Nitrite as N	0.997	0.042	0.10	mg/l	1.00	ND	100	90-110	0	20	
NO2+NO3 as N	4800	36	200	ug/l	2000	2800	100	90-110	0	20	
Batch: W1L2059 - EPA 365.3											
Blank (W1L2059-BLK1)					**Prepared & Analyzed: 12/30/21**						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
LCS (W1L2059-BS1)					**Prepared & Analyzed: 12/30/21**						
o-Phosphate as P	0.204	0.0030	0.010	mg/l	0.200		102	88-111			
Matrix Spike (W1L2059-MS1)	**Source: 1L30010-01**				**Prepared & Analyzed: 12/30/21**						
o-Phosphate as P	0.436	0.0030	0.010	mg/l	0.200	0.227	104	85-112			
Matrix Spike Dup (W1L2059-MSD1)	**Source: 1L30010-01**				**Prepared & Analyzed: 12/30/21**						
o-Phosphate as P	0.434	0.0030	0.010	mg/l	0.200	0.227	104	85-112	0.5	20	
Batch: W2A0126 - SM 2540C											
Blank (W2A0126-BLK1)					**Prepared & Analyzed: 01/04/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2A0126-BS1)					**Prepared & Analyzed: 01/04/22**						
Total Dissolved Solids	795	4.0	10	mg/l	824		96	96-102			

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Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2A0126 - SM 2540C (Continued)											
LCS (W2A0126-BS1)					**Prepared & Analyzed: 01/04/22**						
Duplicate (W2A0126-DUP1)	**Source: 1L30085-08**				**Prepared & Analyzed: 01/04/22**						
Total Dissolved Solids	11800	4.0	10	mg/l		11600			1	10	
Duplicate (W2A0126-DUP2)	**Source: 1L30085-07**				**Prepared & Analyzed: 01/04/22**						
Total Dissolved Solids	7040	4.0	10	mg/l		6840			3	10	
Batch: W2A0326 - EPA 350.1											
Blank (W2A0326-BLK1)					**Prepared: 01/05/22 Analyzed: 01/13/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W2A0326-BLK2)					**Prepared: 01/05/22 Analyzed: 01/13/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W2A0326-BS1)					**Prepared: 01/05/22 Analyzed: 01/13/22**						
Ammonia as N	0.259	0.017	0.10	mg/l	0.250		104	90-110			
LCS (W2A0326-BS2)					**Prepared: 01/05/22 Analyzed: 01/13/22**						
Ammonia as N	0.260	0.017	0.10	mg/l	0.250		104	90-110			
Matrix Spike (W2A0326-MS1)	**Source: 1L30061-01**				**Prepared: 01/05/22 Analyzed: 01/13/22**						
Ammonia as N	0.389	0.017	0.10	mg/l	0.250	0.133	102	90-110			
Matrix Spike (W2A0326-MS2)	**Source: 2A03024-03**				**Prepared: 01/05/22 Analyzed: 01/13/22**						
Ammonia as N	0.346	0.017	0.10	mg/l	0.250	0.0916	102	90-110			
Matrix Spike Dup (W2A0326-MSD1)	**Source: 1L30061-01**				**Prepared: 01/05/22 Analyzed: 01/13/22**						
Ammonia as N	0.390	0.017	0.10	mg/l	0.250	0.133	103	90-110	0.2	15	
Matrix Spike Dup (W2A0326-MSD2)	**Source: 2A03024-03**				**Prepared: 01/05/22 Analyzed: 01/13/22**						
Ammonia as N	0.348	0.017	0.10	mg/l	0.250	0.0916	103	90-110	0.6	15	
Batch: W2A0349 - SM 2540D											
Blank (W2A0349-BLK1)					**Prepared & Analyzed: 01/05/22**						
Total Suspended Solids	ND		5	mg/l							
LCS (W2A0349-BS1)					**Prepared & Analyzed: 01/05/22**						
Total Suspended Solids	58.0		5	mg/l	58.3		99	90-110			
Duplicate (W2A0349-DUP1)	**Source: 1L30030-01**				**Prepared & Analyzed: 01/05/22**						
Total Suspended Solids	177		5	mg/l		178			0.6	10	
Duplicate (W2A0349-DUP2)	**Source: 2A03031-01**				**Prepared & Analyzed: 01/05/22**						
Total Suspended Solids	30.4		5	mg/l		30.3			0.3	10	
Batch: W2A1289 - EPA 351.2											
Blank (W2A1289-BLK1)					**Prepared: 01/19/22 Analyzed: 01/21/22**						
TKN	ND	0.065	0.10	mg/l							
Blank (W2A1289-BLK2)					**Prepared: 01/19/22 Analyzed: 01/21/22**						
TKN	ND	0.065	0.10	mg/l							
Blank (W2A1289-BLK3)					**Prepared: 01/19/22 Analyzed: 01/24/22**						
TKN	ND	0.065	0.10	mg/l							

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Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2A1289 - EPA 351.2 (Continued)											
LCS (W2A1289-BS1)					**Prepared: 01/19/22 Analyzed: 01/21/22**						
TKN	1.03	0.065	0.10	mg/l	1.00		103	90-110			
LCS (W2A1289-BS2)					**Prepared: 01/19/22 Analyzed: 01/21/22**						
TKN	1.02	0.065	0.10	mg/l	1.00		102	90-110			
LCS (W2A1289-BS3)					**Prepared: 01/19/22 Analyzed: 01/24/22**						
TKN	1.01	0.065	0.10	mg/l	1.00		101	90-110			
Matrix Spike (W2A1289-MS1)	**Source: 2A06015-01**				**Prepared: 01/19/22 Analyzed: 01/21/22**						
TKN	1.27	0.065	0.10	mg/l	1.00	0.219	105	90-110			
Matrix Spike (W2A1289-MS2)	**Source: 2A06015-02**				**Prepared: 01/19/22 Analyzed: 01/21/22**						
TKN	1.26	0.065	0.10	mg/l	1.00	0.244	102	90-110			
Matrix Spike (W2A1289-MS3)	**Source: 2A06015-02**				**Prepared: 01/19/22 Analyzed: 01/24/22**						
TKN	1.25	0.065	0.10	mg/l	1.00	0.244	101	90-110			
Matrix Spike Dup (W2A1289-MSD1)	**Source: 2A06015-01**				**Prepared: 01/19/22 Analyzed: 01/21/22**						
TKN	1.25	0.065	0.10	mg/l	1.00	0.219	103	90-110	1	10	
Matrix Spike Dup (W2A1289-MSD2)	**Source: 2A06015-02**				**Prepared: 01/19/22 Analyzed: 01/21/22**						
TKN	1.22	0.065	0.10	mg/l	1.00	0.244	97	90-110	3	10	
Matrix Spike Dup (W2A1289-MSD3)	**Source: 2A06015-02**				**Prepared: 01/19/22 Analyzed: 01/24/22**						
TKN	1.25	0.065	0.10	mg/l	1.00	0.244	101	90-110	0.1	10	

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Reported: 02/01/2022 16:25

Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2A0741 - EPA 200.7											
Blank (W2A0741-BLK1)					**Prepared: 01/11/22**	**Analyzed: 01/17/22**					
Calcium, Total	ND	0.160	0.500	mg/l							
Magnesium, Total	ND	0.0390	0.500	mg/l							
Blank (W2A0741-BLK2)					**Prepared: 01/11/22**	**Analyzed: 01/19/22**					
Calcium, Total	ND	0.160	0.500	mg/l							
Magnesium, Total	ND	0.0390	0.500	mg/l							
LCS (W2A0741-BS1)					**Prepared: 01/11/22**	**Analyzed: 01/17/22**					
Calcium, Total	51.0	0.160	0.500	mg/l	50.2		102	85-115			
Magnesium, Total	51.5	0.0390	0.500	mg/l	50.2		103	85-115			
LCS (W2A0741-BS2)					**Prepared: 01/11/22**	**Analyzed: 01/19/22**					
Calcium, Total	50.6	0.160	0.500	mg/l	50.2		101	85-115			
Magnesium, Total	51.2	0.0390	0.500	mg/l	50.2		102	85-115			
Matrix Spike (W2A0741-MS1)	**Source: 1L30020-01**				**Prepared: 01/11/22**	**Analyzed: 01/17/22**					
Calcium, Total	53.7	0.160	0.500	mg/l	50.2	3.33	100	70-130			
Magnesium, Total	55.8	0.0390	0.500	mg/l	50.2	4.80	102	70-130			
Matrix Spike (W2A0741-MS2)	**Source: 1L30020-02**				**Prepared: 01/11/22**	**Analyzed: 01/17/22**					
Calcium, Total	55.8	0.160	0.500	mg/l	50.2	5.06	101	70-130			
Magnesium, Total	53.3	0.0390	0.500	mg/l	50.2	1.69	103	70-130			
Matrix Spike (W2A0741-MS3)	**Source: 1L30020-01**				**Prepared: 01/11/22**	**Analyzed: 01/19/22**					
Calcium, Total	53.2	0.160	0.500	mg/l	50.2	3.33	99	70-130			
Magnesium, Total	55.3	0.0390	0.500	mg/l	50.2	4.80	101	70-130			
Matrix Spike Dup (W2A0741-MSD1)	**Source: 1L30020-01**				**Prepared: 01/11/22**	**Analyzed: 01/17/22**					
Calcium, Total	54.4	0.160	0.500	mg/l	50.2	3.33	102	70-130	1	30	
Magnesium, Total	56.6	0.0390	0.500	mg/l	50.2	4.80	103	70-130	1	30	
Matrix Spike Dup (W2A0741-MSD2)	**Source: 1L30020-02**				**Prepared: 01/11/22**	**Analyzed: 01/17/22**					
Calcium, Total	55.6	0.160	0.500	mg/l	50.2	5.06	101	70-130	0.4	30	
Magnesium, Total	53.0	0.0390	0.500	mg/l	50.2	1.69	102	70-130	0.4	30	
Matrix Spike Dup (W2A0741-MSD3)	**Source: 1L30020-01**				**Prepared: 01/11/22**	**Analyzed: 01/19/22**					
Calcium, Total	53.9	0.160	0.500	mg/l	50.2	3.33	101	70-130	1	30	
Magnesium, Total	56.1	0.0390	0.500	mg/l	50.2	4.80	102	70-130	1	30	

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: Lake Elsinore and Canyon Lake Nutrient TMDL

Project Manager: John Rudolph

Reported: 02/01/2022 16:25

Notes and Definitions

Item	Definition
**	The recommended holding time for field filtering is only 15 minutes. The sample was filtered as soon as possible but it was filtered past holding time. However, the sample was analyzed within holding time.
J	Estimated conc. detected <MRL and >MDL.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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FINAL REPORT

Work Orders:	2C04079	**Report Date:**	4/22/2022
		Received Date:	3/4/2022
Project:	LECL Nutrient TMDL	**Turnaround Time:**	Normal
		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	**P.O. #:**	C015101084
		Billing Code:	
Client:	Wood - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123		

EPA-UCMR #CA00211 • Guam-EPA #17-008R • LACSD #10143 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 3/04/22 with the Chain-of-Custody document. The samples were received in good condition, at 3.6 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
04/22/2022 13:15

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-030422	Austin Kay	2C04079-01	Water	03/04/22 10:40	
FB	Austin Kay	2C04079-02	Water	03/04/22 10:50	
S-03-030422-DUP	Austin Kay	2C04079-03	Water	03/04/22 10:40	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
04/22/2022 13:15

Sample Results

Sample: S-03-030422
2C04079-01 (Water)

Sampled: 03/04/22 10:40 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 410.4			**Instr:** UVVIS04				
Batch ID: W2C0442 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/06/22 10:59				**Analyst:** heq
Chemical Oxygen Demand	**72**	2.9	5.0	mg/l	1	03/08/22	
Method: SM 5210B			**Instr:** PH13				
Batch ID: W2C0435 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/06/22 08:21				**Analyst:** heq/MPW
Biochemical Oxygen Demand	**12**	2.0	2.0	mg/l	1	03/11/22	

Sample Results

Sample: FB
2C04079-02 (Water)

Sampled: 03/04/22 10:50 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 410.4			**Instr:** UVVIS04				
Batch ID: W2C0442 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/06/22 10:59				**Analyst:** heq
Chemical Oxygen Demand	ND	2.9	5.0	mg/l	1	03/08/22	
Method: SM 5210B			**Instr:** PH13				
Batch ID: W2C0435 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/06/22 08:21				**Analyst:** heq/MPW
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l	1	03/11/22	

Sample Results

Sample: S-03-030422-DUP
2C04079-03 (Water)

Sampled: 03/04/22 10:40 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 410.4			**Instr:** UVVIS04				
Batch ID: W2C0442 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/06/22 10:59				**Analyst:** heq
Chemical Oxygen Demand	**77**	2.9	5.0	mg/l	1	03/08/22	
Method: SM 5210B			**Instr:** PH13				
Batch ID: W2C0435 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/06/22 08:21				**Analyst:** heq/MPW
Biochemical Oxygen Demand	**14**	2.0	2.0	mg/l	1	03/11/22	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
04/22/2022 13:15

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2C0435 - SM 5210B											
Blank (W2C0435-BLK1)					**Prepared: 03/06/22**	**Analyzed: 03/11/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
Blank (W2C0435-BLK2)					**Prepared: 03/06/22**	**Analyzed: 03/11/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
Blank (W2C0435-BLK3)					**Prepared: 03/06/22**	**Analyzed: 03/11/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
LCS (W2C0435-BS1)					**Prepared: 03/06/22**	**Analyzed: 03/11/22**					
Biochemical Oxygen Demand	197	2.0	2.0	mg/l	198		99	85-115			
Duplicate (W2C0435-DUP1)	**Source: 2C04079-02**				**Prepared: 03/06/22**	**Analyzed: 03/11/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l		ND				20	
Batch: W2C0442 - EPA 410.4											
Blank (W2C0442-BLK1)					**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Chemical Oxygen Demand	ND	2.9	5.0	mg/l							
LCS (W2C0442-BS1)					**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Chemical Oxygen Demand	1020	2.9	5.0	mg/l	1000		102	90-110			
Duplicate (W2C0442-DUP1)	**Source: 2C03035-01**				**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Chemical Oxygen Demand	5940	29	50	mg/l		5870			1	15	
Matrix Spike (W2C0442-MS1)	**Source: 2C04080-01**				**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Chemical Oxygen Demand	236	12	20	mg/l	200	30.0	103	90-110			
Matrix Spike (W2C0442-MS2)	**Source: 2C04082-01**				**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Chemical Oxygen Demand	2180	12	20	mg/l	2000	192	99	90-110			
Matrix Spike Dup (W2C0442-MSD1)	**Source: 2C04080-01**				**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Chemical Oxygen Demand	236	12	20	mg/l	200	30.0	103	90-110	0	15	
Matrix Spike Dup (W2C0442-MSD2)	**Source: 2C04082-01**				**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Chemical Oxygen Demand	2180	12	20	mg/l	2000	192	99	90-110	0	15	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
04/22/2022 13:15

Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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FINAL REPORT

Work Orders:	2C04081	**Report Date:**	4/22/2022
		Received Date:	3/4/2022
Project:	LECL Nutrient TMDL	**Turnaround Time:**	Normal
		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	**P.O. #:**	C015101084
Client:	Wood - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	**Billing Code:**	

EPA-UCMR #CA00211 • Guam-EPA #17-008R • LACSD #10143 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 3/04/22 with the Chain-of-Custody document. The samples were received in good condition, at 3.6 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
04/22/2022 13:21

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-030422	Austin Kay	2C04081-01	Water	03/04/22 13:54	
S-03-030422	Austin Kay	2C04081-02	Water	03/04/22 13:54	
S-03-030422	Austin Kay	2C04081-03	Water	03/04/22 14:15	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported: 04/22/2022 13:21

Sample Results

Sample: S-03-030422
2C04081-01 (Water)

Sampled: 03/04/22 13:54 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: _Various			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 03/17/22 12:58				**Analyst:** ymt
Organic Nitrogen, Total	**1.6**	0.017	0.10	mg/l	1	03/23/22	
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 03/17/22 12:58				**Analyst:** ymt
Nitrogen, Total	**3.1**	0.036	0.20	mg/l	1	03/23/22	
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2C1004 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/14/22 17:48				**Analyst:** YMT
Ammonia as N	**0.53**	0.017	0.10	mg/l	1	03/16/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2C1272 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/17/22 12:58				**Analyst:** ymt
TKN	**2.1**	0.13	0.20	mg/l	1	03/23/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2C0424 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/05/22 11:34				**Analyst:** JOG
Nitrate as N	**0.92**	0.040	0.20	mg/l	1	03/05/22 13:16	
Nitrite as N	**0.047**	0.042	0.10	mg/l	1	03/05/22 13:16	J
NO2+NO3 as N	**960**	36	200	ug/l	1	03/05/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C0316 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/04/22 16:03				**Analyst:** heq
Phosphorus as P, Total	**0.43**	0.013	0.020	mg/l	1	03/08/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C0403 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/04/22 16:00				**Analyst:** heq
o-Phosphate as P	**0.43**	0.0030	0.010	mg/l	1	03/04/22 16:21	**
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2C0737 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/09/22 18:31				**Analyst:** jao
Total Dissolved Solids	**110**	4.0	10	mg/l	1	03/10/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2C0653 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/09/22 09:54				**Analyst:** ttf
Total Suspended Solids	**43**		5	mg/l	1	03/09/22	
Metals by EPA 200 Series Methods							
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 03/06/22 15:18				**Analyst:** kvm
Hardness as CaCO3, Total	**42.2**	0.219	3.31	mg/l	1	03/08/22	
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2C0453 **Preparation:** EPA 200.2			**Prepared:** 03/06/22 15:18				**Analyst:** kvm
Calcium, Total	**12.4**	0.0234	0.500	mg/l	1	03/08/22	
Magnesium, Total	**2.72**	0.0390	0.500	mg/l	1	03/08/22	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported: 04/22/2022 13:21

Sample Results

(Continued)

Sample: S-03-030422
2C04081-02 (Water)

Sampled: 03/04/22 13:54 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: _Various			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 03/17/22 12:58				**Analyst:** ymt
Organic Nitrogen, Total	**1.3**	0.017	0.10	mg/l	1	03/23/22	
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 03/17/22 12:58				**Analyst:** ymt
Nitrogen, Total	**2.8**	0.036	0.20	mg/l	1	03/23/22	
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2C1004 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/14/22 17:48				**Analyst:** YMT
Ammonia as N	**0.53**	0.017	0.10	mg/l	1	03/16/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2C1272 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/17/22 12:58				**Analyst:** ymt
TKN	**1.8**	0.13	0.20	mg/l	1	03/23/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2C0424 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/05/22 11:34				**Analyst:** JOG
Nitrate as N	**0.92**	0.040	0.20	mg/l	1	03/05/22 13:17	
Nitrite as N	**0.048**	0.042	0.10	mg/l	1	03/05/22 13:17	J
NO2+NO3 as N	**970**	36	200	ug/l	1	03/05/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C0316 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/04/22 16:03				**Analyst:** heq
Phosphorus as P, Total	**0.41**	0.013	0.020	mg/l	1	03/08/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C0403 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/04/22 16:00				**Analyst:** heq
o-Phosphate as P	**0.45**	0.0030	0.010	mg/l	1	03/04/22 16:21	**
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2C0737 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/09/22 18:31				**Analyst:** jao
Total Dissolved Solids	**110**	4.0	10	mg/l	1	03/10/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2C0653 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/09/22 09:54				**Analyst:** ttf
Total Suspended Solids	**93**		5	mg/l	1	03/09/22	
Metals by EPA 200 Series Methods							
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 03/06/22 15:18				**Analyst:** kvm
Hardness as CaCO3, Total	**42.0**	0.219	3.31	mg/l	1	03/08/22	
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2C0453 **Preparation:** EPA 200.2			**Prepared:** 03/06/22 15:18				**Analyst:** kvm
Calcium, Total	**12.3**	0.0234	0.500	mg/l	1	03/08/22	
Magnesium, Total	**2.72**	0.0390	0.500	mg/l	1	03/08/22	

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San Diego, CA 92123

Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported: 04/22/2022 13:21

Sample Results

(Continued)

Sample: S-03-030422
2C04081-03 (Water)

Sampled: 03/04/22 14:15 by Austin Kay

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: _Various			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 03/17/22 12:58				**Analyst:** ymt
Organic Nitrogen, Total	ND	0.017	0.10	mg/l	1	03/23/22	
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 03/17/22 12:58				**Analyst:** ymt
Nitrogen, Total	ND	0.036	0.10	mg/l	1	03/23/22	
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2C1004 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/14/22 17:48				**Analyst:** YMT
Ammonia as N	ND	0.017	0.10	mg/l	1	03/16/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2C1272 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/17/22 12:58				**Analyst:** ymt
TKN	ND	0.065	0.10	mg/l	1	03/23/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2C0424 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/05/22 11:34				**Analyst:** JOG
Nitrate as N	ND	0.040	0.20	mg/l	1	03/05/22 13:10	
Nitrite as N	ND	0.042	0.10	mg/l	1	03/05/22 13:10	
NO2+NO3 as N	ND	36	200	ug/l	1	03/05/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C0316 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/04/22 16:03				**Analyst:** heq
Phosphorus as P, Total	ND	0.0067	0.010	mg/l	1	03/08/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C0403 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/04/22 16:00				**Analyst:** heq
o-Phosphate as P	ND	0.0030	0.010	mg/l	1	03/04/22 16:21	**
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2C0737 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/09/22 18:31				**Analyst:** jao
Total Dissolved Solids	**13**	4.0	10	mg/l	1	03/10/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2C0653 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/09/22 09:54				**Analyst:** ttf
Total Suspended Solids	ND		5	mg/l	1	03/09/22	
Metals by EPA 200 Series Methods							
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 03/06/22 15:18				**Analyst:** kvm
Hardness as CaCO3, Total	ND	0.219	3.31	mg/l	1	03/08/22	
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2C0453 **Preparation:** EPA 200.2			**Prepared:** 03/06/22 15:18				**Analyst:** kvm
Calcium, Total	**0.0658**	0.0234	0.500	mg/l	1	03/08/22	J
Magnesium, Total	ND	0.0390	0.500	mg/l	1	03/08/22	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
04/22/2022 13:21

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2C0316 - EPA 365.3											
Blank (W2C0316-BLK1)					**Prepared: 03/04/22 Analyzed: 03/08/22**						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W2C0316-BS1)					**Prepared: 03/04/22 Analyzed: 03/08/22**						
Phosphorus as P, Total	0.192	0.0067	0.010	mg/l	0.200		96	90-110			
Matrix Spike (W2C0316-MS1)	**Source: 2C01076-01**				**Prepared: 03/04/22 Analyzed: 03/08/22**						
Phosphorus as P, Total	0.376	0.0067	0.010	mg/l	0.200	0.179	98	90-110			
Matrix Spike Dup (W2C0316-MSD1)	**Source: 2C01076-01**				**Prepared: 03/04/22 Analyzed: 03/08/22**						
Phosphorus as P, Total	0.376	0.0067	0.010	mg/l	0.200	0.179	98	90-110	0	20	
Batch: W2C0403 - EPA 365.3											
Blank (W2C0403-BLK1)					**Prepared & Analyzed: 03/04/22**						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
LCS (W2C0403-BS1)					**Prepared & Analyzed: 03/04/22**						
o-Phosphate as P	0.201	0.0030	0.010	mg/l	0.200		100	88-111			
Matrix Spike (W2C0403-MS1)	**Source: 2C04049-01**				**Prepared & Analyzed: 03/04/22**						
o-Phosphate as P	0.244	0.0030	0.010	mg/l	0.200	0.0360	104	85-112			
Matrix Spike Dup (W2C0403-MSD1)	**Source: 2C04049-01**				**Prepared & Analyzed: 03/04/22**						
o-Phosphate as P	0.240	0.0030	0.010	mg/l	0.200	0.0360	102	85-112	2	20	
Batch: W2C0424 - EPA 353.2											
Blank (W2C0424-BLK1)					**Prepared & Analyzed: 03/05/22**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
NO2+NO3 as N	ND	36	200	ug/l							
Blank (W2C0424-BLK2)					**Prepared & Analyzed: 03/05/22**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
NO2+NO3 as N	ND	36	200	ug/l							
LCS (W2C0424-BS1)					**Prepared & Analyzed: 03/05/22**						
Nitrate as N	1.01	0.040	0.20	mg/l	1.00		101	90-110			
Nitrite as N	0.991	0.042	0.10	mg/l	1.00		99	90-110			
NO2+NO3 as N	1010	36	200	ug/l	1000		101	90-110			
LCS (W2C0424-BS2)					**Prepared & Analyzed: 03/05/22**						
Nitrate as N	0.123	0.040	0.20	mg/l	0.100		123	90-110			J
Nitrite as N	0.0975	0.042	0.10	mg/l	0.100		97	90-110			J
NO2+NO3 as N	123	36	200	ug/l	100		123	90-110			J
Matrix Spike (W2C0424-MS1)	**Source: 2C04081-03**				**Prepared & Analyzed: 03/05/22**						
Nitrate as N	2.04	0.040	0.20	mg/l	2.00	ND	102	90-110			
Nitrite as N	1.01	0.042	0.10	mg/l	1.00	ND	101	90-110			
NO2+NO3 as N	2040	36	200	ug/l	2000	ND	102	90-110			
Matrix Spike Dup (W2C0424-MSD1)	**Source: 2C04081-03**				**Prepared & Analyzed: 03/05/22**						

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Project Manager: John Rudolph

Reported:
04/22/2022 13:21

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2C0424 - EPA 353.2 (Continued)											
Matrix Spike Dup (W2C0424-MSD1)	**Source: 2C04081-03**				**Prepared & Analyzed: 03/05/22**						
Nitrate as N	2.03	0.040	0.20	mg/l	2.00	ND	102	90-110	0.5	20	
Nitrite as N	0.947	0.042	0.10	mg/l	1.00	ND	95	90-110	6	20	
NO2+NO3 as N	2030	36	200	ug/l	2000	ND	102	90-110	0.5	20	
Batch: W2C0653 - SM 2540D											
Blank (W2C0653-BLK1)					**Prepared & Analyzed: 03/09/22**						
Total Suspended Solids	ND		5	mg/l							
LCS (W2C0653-BS1)					**Prepared & Analyzed: 03/09/22**						
Total Suspended Solids	53.2		5	mg/l	54.0		99	90-110			
Duplicate (W2C0653-DUP1)	**Source: 2C08046-03**				**Prepared & Analyzed: 03/09/22**						
Total Suspended Solids	21.5		5	mg/l		22.0			2	10	
Duplicate (W2C0653-DUP2)	**Source: 2C04081-02**				**Prepared & Analyzed: 03/09/22**						
Total Suspended Solids	93.3		5	mg/l		93.2			0.1	10	
Batch: W2C0737 - SM 2540C											
Blank (W2C0737-BLK1)					**Prepared: 03/09/22 Analyzed: 03/10/22**						
Total Dissolved Solids	5.00	4.0	10	mg/l							J
LCS (W2C0737-BS1)					**Prepared: 03/09/22 Analyzed: 03/10/22**						
Total Dissolved Solids	839	4.0	10	mg/l	824		102	96-102			
Duplicate (W2C0737-DUP1)	**Source: 2C03090-03**				**Prepared: 03/09/22 Analyzed: 03/10/22**						
Total Dissolved Solids	3240	4.0	10	mg/l		3220			0.6	10	
Duplicate (W2C0737-DUP2)	**Source: 2C07021-01**				**Prepared: 03/09/22 Analyzed: 03/10/22**						
Total Dissolved Solids	1010	4.0	10	mg/l		1000			0.5	10	
Batch: W2C1004 - EPA 350.1											
Blank (W2C1004-BLK1)					**Prepared: 03/14/22 Analyzed: 03/16/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W2C1004-BLK2)					**Prepared: 03/14/22 Analyzed: 03/16/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W2C1004-BS1)					**Prepared: 03/14/22 Analyzed: 03/16/22**						
Ammonia as N	0.258	0.017	0.10	mg/l	0.250		103	90-110			
LCS (W2C1004-BS2)					**Prepared: 03/14/22 Analyzed: 03/16/22**						
Ammonia as N	0.256	0.017	0.10	mg/l	0.250		102	90-110			
Matrix Spike (W2C1004-MS1)	**Source: 2C04049-14**				**Prepared: 03/14/22 Analyzed: 03/16/22**						
Ammonia as N	0.288	0.017	0.10	mg/l	0.250	0.0264	104	90-110			
Matrix Spike (W2C1004-MS2)	**Source: 2C04081-03**				**Prepared: 03/14/22 Analyzed: 03/16/22**						
Ammonia as N	0.257	0.017	0.10	mg/l	0.250	ND	103	90-110			
Matrix Spike Dup (W2C1004-MSD1)	**Source: 2C04049-14**				**Prepared: 03/14/22 Analyzed: 03/16/22**						
Ammonia as N	0.287	0.017	0.10	mg/l	0.250	0.0264	104	90-110	0.1	15	
Matrix Spike Dup (W2C1004-MSD2)	**Source: 2C04081-03**				**Prepared: 03/14/22 Analyzed: 03/16/22**						

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
04/22/2022 13:21

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2C1004 - EPA 350.1 (Continued)											
Matrix Spike Dup (W2C1004-MSD2)	**Source: 2C04081-03**				**Prepared: 03/14/22**	**Analyzed: 03/16/22**					
Ammonia as N	0.258	0.017	0.10	mg/l	0.250	ND	103	90-110	0.1	15	
Batch: W2C1272 - EPA 351.2											
Blank (W2C1272-BLK1)					**Prepared: 03/17/22**	**Analyzed: 03/23/22**					
TKN	ND	0.065	0.10	mg/l							
Blank (W2C1272-BLK2)					**Prepared: 03/17/22**	**Analyzed: 03/23/22**					
TKN	ND	0.065	0.10	mg/l							
LCS (W2C1272-BS1)					**Prepared: 03/17/22**	**Analyzed: 03/23/22**					
TKN	1.01	0.065	0.10	mg/l	1.00		101	90-110			
LCS (W2C1272-BS2)					**Prepared: 03/17/22**	**Analyzed: 03/23/22**					
TKN	0.961	0.065	0.10	mg/l	1.00		96	90-110			
Matrix Spike (W2C1272-MS1)	**Source: 2C10026-01**				**Prepared: 03/17/22**	**Analyzed: 03/23/22**					
TKN	1.18	0.065	0.10	mg/l	1.00	0.182	100	90-110			
Matrix Spike (W2C1272-MS2)	**Source: 2C10026-02**				**Prepared: 03/17/22**	**Analyzed: 03/23/22**					
TKN	1.17	0.065	0.10	mg/l	1.00	0.198	97	90-110			
Matrix Spike Dup (W2C1272-MSD1)	**Source: 2C10026-01**				**Prepared: 03/17/22**	**Analyzed: 03/23/22**					
TKN	1.19	0.065	0.10	mg/l	1.00	0.182	100	90-110	0.6	10	
Matrix Spike Dup (W2C1272-MSD2)	**Source: 2C10026-02**				**Prepared: 03/17/22**	**Analyzed: 03/23/22**					
TKN	1.24	0.065	0.10	mg/l	1.00	0.198	104	90-110	6	10	

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Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2C0453 - EPA 200.7											
Blank (W2C0453-BLK1)					**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Calcium, Total	ND	0.0234	0.500	mg/l							
Magnesium, Total	ND	0.0390	0.500	mg/l							
Blank (W2C0453-BLK2)					**Prepared: 03/06/22**	**Analyzed: 03/09/22**					
Calcium, Total	ND	0.0234	0.500	mg/l							
LCS (W2C0453-BS1)					**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Calcium, Total	49.8	0.0234	0.500	mg/l	50.2		99	85-115			
Magnesium, Total	49.4	0.0390	0.500	mg/l	50.2		98	85-115			
LCS (W2C0453-BS2)					**Prepared: 03/06/22**	**Analyzed: 03/09/22**					
Calcium, Total	49.1	0.0234	0.500	mg/l	50.2		98	85-115			
Matrix Spike (W2C0453-MS1)	**Source: 2C01100-03**				**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Calcium, Total	95.7	0.0234	0.500	mg/l	50.2	47.5	96	70-130			
Magnesium, Total	62.5	0.0390	0.500	mg/l	50.2	13.2	98	70-130			
Matrix Spike (W2C0453-MS2)	**Source: 2C01100-03**				**Prepared: 03/06/22**	**Analyzed: 03/09/22**					
Calcium, Total	94.4	0.0234	0.500	mg/l	50.2	47.5	93	70-130			
Matrix Spike Dup (W2C0453-MSD1)	**Source: 2C01100-03**				**Prepared: 03/06/22**	**Analyzed: 03/08/22**					
Calcium, Total	94.2	0.0234	0.500	mg/l	50.2	47.5	93	70-130	2	30	
Magnesium, Total	61.6	0.0390	0.500	mg/l	50.2	13.2	96	70-130	1	30	
Matrix Spike Dup (W2C0453-MSD2)	**Source: 2C01100-03**				**Prepared: 03/06/22**	**Analyzed: 03/09/22**					
Calcium, Total	92.9	0.0234	0.500	mg/l	50.2	47.5	90	70-130	2	30	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
04/22/2022 13:21

Notes and Definitions

Item	Definition
**	The recommended holding time for field filtering is only 15 minutes. The sample was filtered as soon as possible but it was filtered past holding time. However, the sample was analyzed within holding time.
J	Estimated conc. detected <MRL and >MDL.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Certificate of Analysis

FINAL REPORT

Work Orders:	2C29033	**Report Date:**	4/20/2022
		Received Date:	3/29/2022
Project:	Lake Elsinore/Canyon Lake TMDL	**Turnaround Time:**	Normal
		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	**P.O. #:**	C015101084
Client:	Wood - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	**Billing Code:**	

EPA-UCMR #CA00211 • Guam-EPA #17-008R • LACSD #10143 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 3/29/22 with the Chain-of-Custody document. The samples were received in good condition, at 9.1 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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Project Number: Lake Elsinore/Canyon Lake TMDL

Project Manager: John Rudolph

Reported:
04/20/2022 16:54

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-032922	Austin Kay	2C29033-01	Water	03/29/22 06:00	
S-04-032922	Austin Kay	2C29033-02	Water	03/29/22 08:00	

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Project Manager: John Rudolph

Reported:
04/20/2022 16:54

Sample Results

Sample: S-03-032922 — Sampled: 03/29/22 6:00 by Austin Kay

2C29033-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 410.4			**Instr:** UVVIS04				
Batch ID: W2C2211 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/31/22 12:39				**Analyst:** heq
Chemical Oxygen Demand	**37**	2.9	5.0	mg/l	1	04/07/22	
Method: SM 5210B			**Instr:** PH13				
Batch ID: W2C2017 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/29/22 18:39				**Analyst:** HEQ
Biochemical Oxygen Demand	**8.5**	2.0	2.0	mg/l	1	04/04/22	

Sample Results

Sample: S-04-032922 — Sampled: 03/29/22 8:00 by Austin Kay

2C29033-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 410.4			**Instr:** UVVIS04				
Batch ID: W2C2211 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/31/22 12:39				**Analyst:** heq
Chemical Oxygen Demand	**29**	2.9	5.0	mg/l	1	04/07/22	
Method: SM 5210B			**Instr:** PH13				
Batch ID: W2C2017 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/29/22 18:39				**Analyst:** HEQ
Biochemical Oxygen Demand	**7.7**	2.0	2.0	mg/l	1	04/04/22	

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Project Number: Lake Elsinore/Canyon Lake TMDL

Project Manager: John Rudolph

Reported:
04/20/2022 16:54

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2C2017 - SM 5210B											
Blank (W2C2017-BLK1)					**Prepared: 03/29/22**	**Analyzed: 04/04/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
Blank (W2C2017-BLK2)					**Prepared: 03/29/22**	**Analyzed: 04/04/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
Blank (W2C2017-BLK3)					**Prepared: 03/29/22**	**Analyzed: 04/04/22**					
Biochemical Oxygen Demand	ND	2.0	2.0	mg/l							
LCS (W2C2017-BS1)					**Prepared: 03/29/22**	**Analyzed: 04/04/22**					
Biochemical Oxygen Demand	178	2.0	2.0	mg/l	198		90	85-115			
Duplicate (W2C2017-DUP1)	**Source: 2C29095-03**				**Prepared: 03/29/22**	**Analyzed: 04/05/22**					
Biochemical Oxygen Demand	5.72	2.0	2.0	mg/l		5.61			2	20	
Batch: W2C2211 - EPA 410.4											
Blank (W2C2211-BLK1)					**Prepared: 03/31/22**	**Analyzed: 04/07/22**					
Chemical Oxygen Demand	ND	2.9	5.0	mg/l							
LCS (W2C2211-BS1)					**Prepared: 03/31/22**	**Analyzed: 04/07/22**					
Chemical Oxygen Demand	996	2.9	5.0	mg/l	1000		100	90-110			
Duplicate (W2C2211-DUP1)	**Source: 2C31021-01**				**Prepared: 03/31/22**	**Analyzed: 04/07/22**					
Chemical Oxygen Demand	715	5.8	10	mg/l		783			9	15	
Matrix Spike (W2C2211-MS1)	**Source: 2C29033-02**				**Prepared: 03/31/22**	**Analyzed: 04/07/22**					
Chemical Oxygen Demand	231	12	20	mg/l	200	29.0	101	90-110			
Matrix Spike (W2C2211-MS2)	**Source: 2C31021-01**				**Prepared: 03/31/22**	**Analyzed: 04/07/22**					
Chemical Oxygen Demand	2750	12	20	mg/l	2000	783	98	90-110			
Matrix Spike Dup (W2C2211-MSD1)	**Source: 2C29033-02**				**Prepared: 03/31/22**	**Analyzed: 04/07/22**					
Chemical Oxygen Demand	230	12	20	mg/l	200	29.0	101	90-110	0.3	15	
Matrix Spike Dup (W2C2211-MSD2)	**Source: 2C31021-01**				**Prepared: 03/31/22**	**Analyzed: 04/07/22**					
Chemical Oxygen Demand	2700	12	20	mg/l	2000	783	96	90-110	2	15	

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Project Number: Lake Elsinore/Canyon Lake TMDL

Project Manager: John Rudolph

Reported:
04/20/2022 16:54

Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Certificate of Analysis

FINAL REPORT

Work Orders:	2C30147	**Report Date:**	5/20/2022
		Received Date:	3/30/2022
Project:	LECL Nutrient TMDL	**Turnaround Time:**	Normal
		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	**P.O. #:**	C015101084
		Billing Code:	
Client:	Wood - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123		

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH #4047 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 3/30/22 with the Chain-of-Custody document. The samples were received in good condition, at 5.9 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
05/20/2022 10:51

Case Narrative

No H2SO4 preserved bottle was recieved for these two samples. Per client request, aliquots were preserved with H2SO4 on 3/31/22 and instructions to proceed with analyses were given. BG 3/31/2022

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
S-03-032922	Client	2C30147-01	Water	03/29/22 16:00	
S-04-032922	Client	2C30147-02	Water	03/30/22 10:30	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported: 05/20/2022 10:51

Sample Results

Sample: S-03-032922 — Sampled: 03/29/22 16:00 by Client

2C30147-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: _Various			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 04/28/22 16:24				**Analyst:** YMT
Organic Nitrogen, Total	**1.0**	0.017	0.10	mg/l	1	04/29/22	
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 04/23/22 07:36				**Analyst:** YMT
Nitrogen, Total	**1.9**	0.036	0.10	mg/l	1	04/27/22	
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2D2187 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/28/22 16:24				**Analyst:** YMT
Ammonia as N	**0.17**	0.017	0.10	mg/l	1	04/29/22	O-04
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2D1706 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/23/22 07:36				**Analyst:** YMT
TKN	**1.2**	0.065	0.10	mg/l	1	04/27/22	O-04
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2C2225 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/31/22 14:30				**Analyst:** JOG
Nitrate as N	**0.68**	0.040	0.20	mg/l	1	03/31/22 15:18	FILT
Nitrite as N	**0.044**	0.042	0.10	mg/l	1	03/31/22 15:18	FILT, J
NO2+NO3 as N	**720**	36	200	ug/l	1	03/31/22	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C2182 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/31/22 09:42				**Analyst:** heq
o-Phosphate as P	**0.34**	0.0030	0.010	mg/l	1	03/31/22 11:40	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C2214 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/31/22 13:03				**Analyst:** heq
Phosphorus as P, Total	**0.38**	0.013	0.020	mg/l	1	04/04/22	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2D0190 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/04/22 18:41				**Analyst:** jao
Total Dissolved Solids	**67**	4.0	10	mg/l	1	04/05/22	
Method: SM 2540D			**Instr:** _ANALYST				
Batch ID: W2D0183 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/04/22 17:16				**Analyst:** ttf
Total Suspended Solids	**29**		5	mg/l	1	04/04/22	
Metals by EPA 200 Series Methods							
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 04/06/22 15:17				**Analyst:** kvm
Hardness as CaCO3, Total	**30.3**	0.219	3.31	mg/l	1	04/08/22	
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2D0419 **Preparation:** EPA 200.2			**Prepared:** 04/06/22 15:17				**Analyst:** kvm
Calcium, Total	**9.12**	0.0234	0.500	mg/l	1	04/08/22	
Magnesium, Total	**1.82**	0.0390	0.500	mg/l	1	04/08/22	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported: 05/20/2022 10:51

Sample Results

(Continued)

Sample: S-04-032922 — Sampled: 03/30/22 10:30 by Client

2C30147-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: _Various			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 04/28/22 16:24				**Analyst:** YMT
Organic Nitrogen, Total	**1.1**	0.017	0.10	mg/l	1	04/29/22	
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 04/23/22 07:36				**Analyst:** YMT
Nitrogen, Total	**2.1**	0.036	0.10	mg/l	1	04/27/22	
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2D2187 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/28/22 16:24				**Analyst:** YMT
Ammonia as N	**0.032**	0.017	0.10	mg/l	1	04/29/22	O-04, J
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2D1706 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/23/22 07:36				**Analyst:** YMT
TKN	**1.2**	0.065	0.10	mg/l	1	04/27/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2C2225 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/31/22 14:30				**Analyst:** JOG
Nitrate as N	**0.89**	0.040	0.20	mg/l	1	03/31/22 15:23	FILT
Nitrite as N	**0.072**	0.042	0.10	mg/l	1	03/31/22 15:23	FILT, J
NO2+NO3 as N	**960**	36	200	ug/l	1	03/31/22	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C2182 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/31/22 09:42				**Analyst:** heq
o-Phosphate as P	**0.36**	0.0030	0.010	mg/l	1	03/31/22 11:41	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2C2214 **Preparation:** _NONE (WETCHEM)			**Prepared:** 03/31/22 13:03				**Analyst:** heq
Phosphorus as P, Total	**0.41**	0.013	0.020	mg/l	1	04/04/22	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2D0345 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/06/22 09:47				**Analyst:** jao
Total Dissolved Solids	**200**	4.0	10	mg/l	1	04/06/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2D0349 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/06/22 09:59				**Analyst:** ttf
Total Suspended Solids	**61**		5	mg/l	1	04/06/22	
Metals by EPA 200 Series Methods							
Method: Calculation			**Instr:** [CALC]				
Batch ID: [CALC] **Preparation:** [CALC]			**Prepared:** 04/06/22 15:17				**Analyst:** kvm
Hardness as CaCO3, Total	**86.2**	0.219	3.31	mg/l	1	04/08/22	
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2D0419 **Preparation:** EPA 200.2			**Prepared:** 04/06/22 15:17				**Analyst:** kvm
Calcium, Total	**24.1**	0.0234	0.500	mg/l	1	04/08/22	
Magnesium, Total	**6.32**	0.0390	0.500	mg/l	1	04/08/22	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
05/20/2022 10:51

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2C2182 - EPA 365.3											
Blank (W2C2182-BLK1)					**Prepared & Analyzed: 03/31/22**						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
LCS (W2C2182-BS1)					**Prepared & Analyzed: 03/31/22**						
o-Phosphate as P	0.200	0.0030	0.010	mg/l	0.200		100	88-111			
Matrix Spike (W2C2182-MS1)	**Source: 2C30147-01**				**Prepared & Analyzed: 03/31/22**						
o-Phosphate as P	0.536	0.0030	0.010	mg/l	0.200	0.336	100	85-112			
Matrix Spike Dup (W2C2182-MSD1)	**Source: 2C30147-01**				**Prepared & Analyzed: 03/31/22**						
o-Phosphate as P	0.538	0.0030	0.010	mg/l	0.200	0.336	101	85-112	0.4	20	
Batch: W2C2214 - EPA 365.3											
Blank (W2C2214-BLK1)					**Prepared: 03/31/22 Analyzed: 04/04/22**						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W2C2214-BS1)					**Prepared: 03/31/22 Analyzed: 04/04/22**						
Phosphorus as P, Total	0.201	0.0067	0.010	mg/l	0.200		100	90-110			
Matrix Spike (W2C2214-MS1)	**Source: 2C29065-01**				**Prepared: 03/31/22 Analyzed: 04/04/22**						
Phosphorus as P, Total	0.394	0.0067	0.010	mg/l	0.200	0.194	100	90-110			
Matrix Spike Dup (W2C2214-MSD1)	**Source: 2C29065-01**				**Prepared: 03/31/22 Analyzed: 04/04/22**						
Phosphorus as P, Total	0.397	0.0067	0.010	mg/l	0.200	0.194	102	90-110	0.8	20	
Batch: W2C2225 - EPA 353.2											
Blank (W2C2225-BLK1)					**Prepared & Analyzed: 03/31/22**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
NO2+NO3 as N	ND	36	200	ug/l							
LCS (W2C2225-BS1)					**Prepared & Analyzed: 03/31/22**						
Nitrate as N	1.02	0.040	0.20	mg/l	1.00		102	90-110			
Nitrite as N	1.02	0.042	0.10	mg/l	1.00		102	90-110			
NO2+NO3 as N	1020	36	200	ug/l	1000		102	90-110			
Matrix Spike (W2C2225-MS1)	**Source: 2C30147-01**				**Prepared & Analyzed: 03/31/22**						
Nitrate as N	2.77	0.040	0.20	mg/l	2.00	0.677	105	90-110			
Nitrite as N	1.11	0.042	0.10	mg/l	1.00	0.0444	107	90-110			
NO2+NO3 as N	2770	36	200	ug/l	2000	721	102	90-110			
Matrix Spike Dup (W2C2225-MSD1)	**Source: 2C30147-01**				**Prepared & Analyzed: 03/31/22**						
Nitrate as N	2.76	0.040	0.20	mg/l	2.00	0.677	104	90-110	0.4	20	
Nitrite as N	1.01	0.042	0.10	mg/l	1.00	0.0444	97	90-110	9	20	
NO2+NO3 as N	2760	36	200	ug/l	2000	721	102	90-110	0.4	20	
Batch: W2D0183 - SM 2540D											
Blank (W2D0183-BLK1)					**Prepared & Analyzed: 04/04/22**						
Total Suspended Solids	ND		5	mg/l							
LCS (W2D0183-BS1)					**Prepared & Analyzed: 04/04/22**						
Total Suspended Solids	53.9		5	mg/l	52.8		102	90-110			

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05/20/2022 10:51

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result		MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2D0183 - SM 2540D (Continued)											
LCS (W2D0183-BS1)					**Prepared & Analyzed: 04/04/22**						
Duplicate (W2D0183-DUP1)	**Source: 2C29080-01**				**Prepared & Analyzed: 04/04/22**						
Total Suspended Solids	147		5	mg/l		150			2	10	
Duplicate (W2D0183-DUP2)	**Source: 2C29107-04**				**Prepared & Analyzed: 04/04/22**						
Total Suspended Solids	290		5	mg/l		294			2	10	
Batch: W2D0190 - SM 2540C											
Blank (W2D0190-BLK1)					**Prepared: 04/04/22 Analyzed: 04/05/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2D0190-BS1)					**Prepared: 04/04/22 Analyzed: 04/05/22**						
Total Dissolved Solids	823	4.0	10	mg/l	824		100	96-102			
Duplicate (W2D0190-DUP1)	**Source: 2C29100-03**				**Prepared: 04/04/22 Analyzed: 04/05/22**						
Total Dissolved Solids	20400	4.0	10	mg/l		20300			0.3	10	
Duplicate (W2D0190-DUP2)	**Source: 2C29113-01**				**Prepared: 04/04/22 Analyzed: 04/05/22**						
Total Dissolved Solids	34500	4.0	10	mg/l		35300			2	10	
Batch: W2D0345 - SM 2540C											
Blank (W2D0345-BLK1)					**Prepared & Analyzed: 04/06/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2D0345-BS1)					**Prepared & Analyzed: 04/06/22**						
Total Dissolved Solids	827	4.0	10	mg/l	824		100	96-102			
Duplicate (W2D0345-DUP1)	**Source: 2D01051-02**				**Prepared & Analyzed: 04/06/22**						
Total Dissolved Solids	1530	4.0	10	mg/l		1510			0.9	10	
Duplicate (W2D0345-DUP2)	**Source: 2D01051-01**				**Prepared & Analyzed: 04/06/22**						
Total Dissolved Solids	1780	4.0	10	mg/l		1650			7	10	
Batch: W2D0349 - SM 2540D											
Blank (W2D0349-BLK1)					**Prepared & Analyzed: 04/06/22**						
Total Suspended Solids	ND		5	mg/l							
LCS (W2D0349-BS1)					**Prepared & Analyzed: 04/06/22**						
Total Suspended Solids	53.9		5	mg/l	54.9		98	90-110			
Duplicate (W2D0349-DUP1)	**Source: 2C28012-01**				**Prepared & Analyzed: 04/06/22**						
Total Suspended Solids	17.8		5	mg/l		17.1			4	10	
Duplicate (W2D0349-DUP2)	**Source: 2D05113-02**				**Prepared & Analyzed: 04/06/22**						
Total Suspended Solids	4.40		5	mg/l		4.40			0	10	
Batch: W2D1706 - EPA 351.2											
Blank (W2D1706-BLK1)					**Prepared: 04/23/22 Analyzed: 04/27/22**						
TKN	ND	0.065	0.10	mg/l							
Blank (W2D1706-BLK2)					**Prepared: 04/23/22 Analyzed: 04/27/22**						
TKN	ND	0.065	0.10	mg/l							
LCS (W2D1706-BS1)					**Prepared: 04/23/22 Analyzed: 04/27/22**						

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Project Manager: John Rudolph

Reported:
05/20/2022 10:51

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2D1706 - EPA 351.2 (Continued)											
LCS (W2D1706-BS1)					**Prepared: 04/23/22 Analyzed: 04/27/22**						
TKN	0.955	0.065	0.10	mg/l	1.00		95	90-110			
LCS (W2D1706-BS2)					**Prepared: 04/23/22 Analyzed: 04/27/22**						
TKN	0.984	0.065	0.10	mg/l	1.00		98	90-110			
Matrix Spike (W2D1706-MS1)	**Source: 2D14041-01**				**Prepared: 04/23/22 Analyzed: 04/27/22**						
TKN	1.14	0.065	0.10	mg/l	1.00	0.231	91	90-110			
Matrix Spike (W2D1706-MS2)	**Source: 2D14041-02**				**Prepared: 04/23/22 Analyzed: 04/27/22**						
TKN	1.33	0.065	0.10	mg/l	1.00	0.396	94	90-110			
Matrix Spike Dup (W2D1706-MSD1)	**Source: 2D14041-01**				**Prepared: 04/23/22 Analyzed: 04/27/22**						
TKN	1.19	0.065	0.10	mg/l	1.00	0.231	96	90-110	5	10	
Matrix Spike Dup (W2D1706-MSD2)	**Source: 2D14041-02**				**Prepared: 04/23/22 Analyzed: 04/27/22**						
TKN	1.32	0.065	0.10	mg/l	1.00	0.396	93	90-110	0.8	10	
Batch: W2D2187 - EPA 350.1											
Blank (W2D2187-BLK1)					**Prepared: 04/28/22 Analyzed: 04/29/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W2D2187-BLK2)					**Prepared: 04/28/22 Analyzed: 04/29/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W2D2187-BS1)					**Prepared: 04/28/22 Analyzed: 04/29/22**						
Ammonia as N	0.248	0.017	0.10	mg/l	0.250		99	90-110			
LCS (W2D2187-BS2)					**Prepared: 04/28/22 Analyzed: 04/29/22**						
Ammonia as N	0.249	0.017	0.10	mg/l	0.250		100	90-110			
Matrix Spike (W2D2187-MS1)	**Source: 2C17003-01**				**Prepared: 04/28/22 Analyzed: 04/29/22**						
Ammonia as N	0.594	0.017	0.10	mg/l	0.250	0.351	97	90-110			
Matrix Spike (W2D2187-MS2)	**Source: 2D26028-02**				**Prepared: 04/28/22 Analyzed: 04/29/22**						
Ammonia as N	1.80	0.017	0.10	mg/l	0.250	1.58	89	90-110			MS-02
Matrix Spike Dup (W2D2187-MSD1)	**Source: 2C17003-01**				**Prepared: 04/28/22 Analyzed: 04/29/22**						
Ammonia as N	0.593	0.017	0.10	mg/l	0.250	0.351	97	90-110	0.06	15	
Matrix Spike Dup (W2D2187-MSD2)	**Source: 2D26028-02**				**Prepared: 04/28/22 Analyzed: 04/29/22**						
Ammonia as N	1.80	0.017	0.10	mg/l	0.250	1.58	90	90-110	0.2	15	

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Project Number: LECL Nutrient TMDL

Project Manager: John Rudolph

Reported:
05/20/2022 10:51

Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2D0419 - EPA 200.7											
Blank (W2D0419-BLK1)					**Prepared: 04/06/22**	**Analyzed: 04/08/22**					
Calcium, Total	ND	0.0234	0.500	mg/l							
Magnesium, Total	ND	0.0390	0.500	mg/l							
LCS (W2D0419-BS1)					**Prepared: 04/06/22**	**Analyzed: 04/08/22**					
Calcium, Total	50.7	0.0234	0.500	mg/l	50.0		101	85-115			
Magnesium, Total	49.7	0.0390	0.500	mg/l	50.0		99	85-115			
Matrix Spike (W2D0419-MS1)	**Source: 2C30147-01**				**Prepared: 04/06/22**	**Analyzed: 04/08/22**					
Calcium, Total	59.7	0.0234	0.500	mg/l	50.0	9.12	101	70-130			
Magnesium, Total	52.2	0.0390	0.500	mg/l	50.0	1.82	101	70-130			
Matrix Spike Dup (W2D0419-MSD1)	**Source: 2C30147-01**				**Prepared: 04/06/22**	**Analyzed: 04/08/22**					
Calcium, Total	59.3	0.0234	0.500	mg/l	50.0	9.12	100	70-130	0.6	30	
Magnesium, Total	51.9	0.0390	0.500	mg/l	50.0	1.82	100	70-130	0.5	30	

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05/20/2022 10:51

Notes and Definitions

Item	Definition
FILT	The sample was filtered prior to analysis.
J	Estimated conc. detected <MRL and >MDL.
MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
O-04	This analysis was performed outside the EPA recommended holding time.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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APPENDIX B
WATER COLUMN PROFILE TABLES

Lake Elsinore and Canyon Lake TMDL Monitoring
2021-22

FIELD DATASHEET

Date: 7/18/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 1030 Time off Station: 1035 Staff Initials: NS/JR

Weather Conditions: clear, sunny Wind (mph & direction): 2mph SE

Lat: ON Long: ON

Water Depth (m): 5.0 ~ Secchi Depth (m): .25

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: Surface volume filtered (ml): Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.6	4301	8.95	7.79	12				
1	27.6	4293	8.84	4.07	13				
2	27.5	4292	8.76	2.35	14				
3	27.4	4291	8.73	1.37	15				
4.0	27.3	4290	8.73	1.31	16				
4.5	26.8	4285	8.65	0.32	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 7/18/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE-01

Time on Station: 1500 Time off Station: 1503 Staff Initials: NS/JR

Weather Conditions: clear, windy Wind (mph & direction): 9mph W

Lat: 01 Long: 01

Water Depth (m): 5.0 Secchi Depth (m): ✓

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI or 14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.8	4302	8.96	7.14	12				
1	28.6	4300	8.92	6.61	13				
2	27.5	4295	8.76	1.78	14				
3	27.3	4293	8.71	0.67	15				
4	26.9	4287	8.68	0.25	16				
4.5	26.6	4285	8.58	0.19	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 7/18 Location (Circle): Lake Elsinore Station: LE02

Time on Station: 0830 Time off Station: 1025 Staff Initials: NS/~~AR~~

Weather Conditions: clear, partly cloudy Wind (mph & direction): 2mph SE

Lat: on Long: on

Water Depth (m): 6.2 Secchi Depth (m): 0.3

Water Chemistry Sample Times:

Surface: 0840
Surface DUP: 0930
Depth Int: ~~0900~~ 0945 NS
Depth Int. DUP: ~~0945~~ 0900
Bottom: 0910
Bottom DUP: 0955

0-2m chl-A 1010

Chl-a Samples?: (Y) / N

Surface volume filtered (ml): 250
Surface DUP volume filtered *(ml)*: 250
Depth Int. volume filtered (ml): 250
Depth Int. DUP volume filtered (ml): 250

Algae Taxonomy Sample?: (Y) / N
-0840

Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

0-2m : 250mL

Comments:
pre recordings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	27.8	4292	8.85	3.86	80.9	25.8
0.5	27.8	4292	8.84	3.92	81.7	25.8
1	27.8	4293	8.82	3.60	82.5	25.4
2	27.8	4291	8.81	3.20	82.9	24.8
3	27.6	4290	8.78	2.50	82.9	24.2
4	27.5	4290	8.71	0.87	83.0	24.2
5	26.7	4285	8.62	0.27	-141.9	26.4
~~6~~ 5.7	26.6	4285	8.56	0.15	-178.0	23.2
7						
8						
9						
10						
11						

FIELD DATASHEET

Date: 7/18/22 Location (Circle): Lake Elsinore Station: LE02

Time on Station: 0830 Time off Station: 1025 Staff Initials: NJ/JR

Weather Conditions: clear, sunny Wind (mph & direction): 2 mph SE

Lat: 0 Long: 0

Water Depth (m): 6.2 Secchi Depth (m): 0.3

Water Chemistry Sample Times: **Chl-a Samples**?: Y / N **Algae Taxonomy Sample**?: Y / N

Surface:
Surface DUP:
Depth Int:
Depth Int. DUP:
Bottom:
Bottom DUP:

Surface volume filtered (ml):
Surface DUP volume filtered *(ml):*
Depth Int. volume filtered (ml):
Depth Int. DUP volume filtered (ml):
Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments: post recordings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	~~29.~~ 30.1	4307	8.96	8.22	77.5	23.7
0.5	28.1	4291	8.91	6.27	82.9	25.8
1	28.0	4294	8.81	5.27	85.0	24.5
2	27.7	4291	8.78	2.46	84.5	23.2
3	27.5	4290	8.72	1.12	84.2	22.5
4	27.2	4288	8.69	0.28	18.8	24.6
5	26.9	4284	8.67	0.20	-73.6	26.5
~~6~~ 5.7	26.5	4283	8.61	0.17	-147.6	22.1
7						
8						
9						
10						
11						

FIELD DATASHEET

Date: 7/18/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE02

Time on Station: 1430 Time off Station: 1435 Staff Initials: NS/JR

Weather Conditions: clear, windy Wind (mph & direction): 9 mph W

Lat: on Long: on

Water Depth (m): 6.2 m Secchi Depth (m):

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME:

Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed 7 **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	29.8	4310	8.98	9.45	12				
1	28.0	4299	8.79	3.87	13				
2	27.6	4296	8.74	1.36	14				
3	27.4	4295	8.69	0.53	15				
4	27.3	4291	8.69	0.31	16				
5	27.2	4289	8.66	0.21	17				
5.7	~~6~~	26.9	4286	8.62	0.19	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 7/18/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 0805 Time off Station: 0810 Staff Initials: NJ/JR

Weather Conditions: clear, partly cloudy Wind (mph & direction): 2mph SE

Lat: on target Long: on target

Water Depth (m): 4.3 Secchi Depth (m): 0.3

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.7	4283	8.84	3.9	12				
1	27.7	4283	8.83	3.7	13				
2	27.7	4283	8.81	3.2	14				
3	27.3	4282	8.70	0.45	15				
4	27.1	4283	8.68	0.22	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 7/18/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 1335 Time off Station: 1338 Staff Initials: NJ/JR

Weather Conditions: clear / sunny Wind (mph & direction): 7mph W

Lat: on Long: on

Water Depth (m): 4.2 Secchi Depth (m):

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y (N)

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	32.2	4328	9.05	12.4	12				
1	28.1	4301	8.80	3.8	13				
2	27.7	4287	8.74	1.90	14				
3	27.5	4281	8.70	0.51	15				
4	27.3	4286	8.66	0.32	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 7/18/22 Location (Circle): Lake Elsinore/Canyon Lake Station: Lakeshore

Time on Station: 1438 Time off Station: 1450 Staff Initials: NJ/JR

Weather Conditions: Sunny, windy Wind (mph & direction): 9mph W

Lat: on Long: on

Water Depth (m): 6.4m Secchi Depth (m): ✓

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: ✓ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	30.1	4306	9.03	11.72	12				
1	29.3	4304	8.94	8.15	13				
2	27.8	4295	8.73	1.65	14				
3	27.5	4293	8.70	0.72	15				
4	27.3	4291	8.68	0.31	16				
5	27.2	4289	8.67	0.22	17				
6	26.8	4284	8.64	0.17	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 7/18/22 Location (Circle): Lake Elsinore/Canyon Lake Station: Cmnd

Time on Station: 1345 Time off Station: 1425 Staff Initials: NJ/JR

Weather Conditions: clear Wind (mph & direction): 7mph W

Lat: on Long: on

Water Depth (m): 5.5 Secchi Depth (m): ~~~

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	29.9	4302	8.98	9.91	12				
1	27.7	4293	8.73	1.56	13				
2	27.5	4293	8.69	0.62	14				
3	27.4	4291	8.68	0.32	15				
4	27.3	4288	8.67	0.30	16				
5	27.0	4285	8.63	0.19	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 08/11/2022 Location (Circle): (Lake Elsinore)/Canyon Lake Station: LE01

Time on Station: 1020 Time off Station: 1030 Staff Initials: MS/TA

Weather Conditions: sunny + hot Wind (mph & direction): Ø

Lat: on station Long: on station

Water Depth (m): 5.2 Secchi Depth (m): 0.2

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.0	3095	8.97	5.42	12				
1	27.7	3094	8.95	4.36	13				
2	27.5	3093	8.91	2.97	14				
3	27.4	3096	8.88	2.48	15				
4	27.3	3096	8.88	2.28	16				
5	27.2	3099	8.87	1.56	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 08/11/2022 Location (Circle): (Lake Elsinore)/Canyon Lake Station: LE01

Time on Station: 1445 Time off Station: 1450 Staff Initials: MS/TA

Weather Conditions: sunny + hot Wind (mph & direction): 4-5mph NW

Lat: on station Long: on station

Water Depth (m): 5.2 Secchi Depth (m): 0.2

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	30.1	3102	9.18	12.14	12				
1	29.0	3102	9.09	9.79	13				
2	27.5	3095	8.86	2.84	14				
3	27.4	3093	8.84	1.81	15				
4	27.4	3095	8.84	1.74	16				
5	27.3	3095	8.84	1.71	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 08/11/2022 Location (Circle): (Lake Elsinore) Station: LE02

Time on Station: 0810 Time off Station: 1015 Staff Initials: MS / TA

Weather Conditions: Sunny & hot Wind (mph & direction): Ø

Lat: on station Long: on station

Water Depth (m): 6.1 Secchi Depth (m): 0.2

Water Chemistry Sample Times: **Chl-a Samples**?: (Y) / N **Algae Taxonomy Sample**?: (Y) / N

Surface: 0835
Surface DUP: 0930
Depth Int: 0830
Depth Int. DUP: 0915
Bottom: 0900
Bottom DUP: 0950
chl 0-2: 0940

Surface volume filtered (ml): 220
Surface DUP volume filtered *(ml)*: 200
Depth Int. volume filtered (ml): 200
Depth Int. DUP volume filtered (ml): 200
0-2 m TMDL Chl-A: volume filter (ml): 200
Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments:
before sampling

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	27.6	3101	8.99	5.83	146.0	32.40
0.5	27.6	3101	8.96	5.67	139.2	32.37
1	27.5	3102	8.95	4.75	137.8	32.48
2	27.5	3102	8.94	4.45	136.8	31.95
3	27.3	3104	8.91	3.51	135.9	28.40
4	27.0	3099	8.87	2.69	135.4	24.31
5	26.9	3097	8.86	2.39	133.5	26.52
~~5.5~~	26.8	3097	8.85	1.96	132.1	25.21
7						
8						
9						
10						
11						

FIELD DATASHEET

Date: 08/11/2022 Location (Circle): (Lake Elsinore) Station: LE02

Time on Station: 0810 Time off Station: 1015 Staff Initials: MS/TA

Weather Conditions: sunny & hot Wind (mph & direction): 0

Lat: on station Long: on station

Water Depth (m): 6.1 Secchi Depth (m): 0.2

Water Chemistry Sample Times: **Chl-a Samples**?: (Y) N **Algae Taxonomy Sample**?: (Y) N

Surface: see morning
Surface DUP: _____
Depth Int: _____
Depth Int. DUP: _____
Bottom: _____
Bottom DUP: _____

Surface volume filtered (ml): _____
Surface DUP volume filtered *(ml)*: _____
Depth Int. volume filtered (ml): _____
Depth Int. DUP volume filtered (ml): _____
0-2 m TMDL Chl-A: volume filter (ml): _____
Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments:

after sampling

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	28.7	3101	9.12	9.88	85.2	35.30
0.5	28.6	3103	9.13	10.28	86.2	35.88
1	27.8	3099	9.04	7.12	88.9	34.31
2	27.6	3100	8.95	4.38	90.2	31.83
3	27.4	3101	8.94	4.05	90.2	29.95
4	27.0	3099	8.92	3.57	90.5	27.49
5	26.8	3096	8.85	1.89	91.1	24.52
~~5.5~~	26.8	3096	8.85	1.81	90.9	24.68
7						
8						
9						
10						
11						

FIELD DATASHEET

Date: 08/11/2022 Location (Circle): (Lake Elsinore)/Canyon Lake Station: LE02

Time on Station: 1430 Time off Station: 1440 Staff Initials: MS/TA

Weather Conditions: Sunny, hot, light breeze Wind (mph & direction): 7-8 mph NW

Lat: on station Long: on station

Water Depth (m): 6.1 Secchi Depth (m): 0.2

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	29.6	3101	9.15	11.97	12				
1	29.1	3101	9.08	10.15	13				
2	27.6	3096	8.88	3.47	14				
3	27.6	3096	8.87	3.03	15				
4	27.5	3096	8.87	2.85	16				
5	27.4	3097	8.89	2.77	17				
5.56	27.4	3098	8.88	2.77	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 8/11/2022 Location (Circle): Lake Elsinore / Canyon Lake Station: LE03

Time on Station: 0745 Time off Station: 0805 Staff Initials: MS / TA

Weather Conditions: SUNNY + HOT Wind (mph & direction): Ø

Lat: on station Long: on station

Water Depth (m): 4.3 Secchi Depth (m): 0.2

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	27.3	3090	8.93	4.68	12				
1	27.3	3096	8.91	4.12	13				
2	27.3	3098	8.91	3.90	14				
3	27.2	3097	8.84	2.25	15				
4	26.9	3095	8.82	1.82	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 08/11/2022 Location (Circle): (Lake Elsinore) Canyon Lake Station: LE03

Time on Station: 1420 Time off Station: 1430 Staff Initials: MS/TA

Weather Conditions: Sunny + hot Wind (mph & direction): 7-8 mph NW

Lat: on station Long: on station

Water Depth (m): 4.3 Secchi Depth (m): 0.2

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	31.0	3098	9.27	15.21	12				
1	30.8	3106	9.22	14.06	13				
2	27.8	3096	8.92	4.61	14				
3	27.2	3094	8.82	1.90	15				
4	27.2	3095	8.82	1.56	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 08/11/2022 Location (Circle) (Lake Elsinore)/Canyon Lake Station: Lakeshore

Time on Station: 1040 Time off Station: 1050 Staff Initials: TA MS

Weather Conditions: SUNNY | HOT Wind (mph & direction): <1 NW

Lat: on station Long: on station

Water Depth (m): 6.1 Secchi Depth (m): 0.2

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.0	3110	9.02	6.66	12				
1	27.8	3091	8.94	4.39	13				
2	27.6	3092	8.91	3.36	14				
3	27.5	3095	8.88	2.68	15				
4	27.4	3098	8.87	2.47	16				
5	27.2	3100	8.88	2.45	17				
6	27.0	3098	8.87	2.33	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 08/11/2022 Location (Circle): (Lake Elsinore)/Canyon Lake Station: Grand Ave

Time on Station: 1055 Time off Station: 1105 Staff Initials: MS/TA

Weather Conditions: sunny + hot Wind (mph & direction): 21 NW

Lat: on station Long: on station

Water Depth (m): 5.1 Secchi Depth (m): 0.2

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	29.0	3110	9.23	12.85	12				
1	27.8	3102	9.09	7.43	13				
2	27.5	3100	8.99	5.85	14				
3	27.1	3097	8.93	4.32	15				
4	26.8	3096	8.89	3.07	16				
5	26.8	3095	8.87	2.11	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 09/11/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL07

Time on Station: 1035 Time off Station: 1110 Staff Initials: NJ/TD

Weather Conditions: Clear/sunny Wind (mph & direction): 1mph NE

Lat: on target Long: on target

Water Depth (m): 14.6 Secchi Depth (m): 2.1

Water Chemistry Sample?: (Y) N Chl-a Sample?: (Y) N Plankton Sample?: (Y) N

SAMPLE TIME: 1050 Surface volume filtered (ml): 500

0-2m Chl-a: 1055 Depth-Integrated volume filtered (ml): 500mL

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Sulfide odor

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	29.2	1100	8.48	8.13	12	14.4	985	7.07	0.16
1	28.9	1098	8.49	8.19	13	14.1	993	7.05	0.15
2	28.8	1098	8.50	8.22	14	14.0	992	7.04	0.14
3	28.7	1098	8.49	8.17	15				
4	28.7	1098	8.46	7.97	16				
5	28.7	1098	8.46	7.94	17				
6	27.9	1085	8.07	5.55	18				
7	23.5	1019	7.48	0.57	19				
8	19.4	1006	7.23	0.24	20				
9	16.8	994	7.21	0.20	21				
10	15.2	995	7.14	0.18	22				
11	14.8	986	7.15	0.16	23				

FIELD DATASHEET

Date: 8/11/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL07

Time on Station: 1455 Time off Station: 1505 Staff Initials: NJ/TD

Weather Conditions: clear/sunny Wind (mph & direction): 6 mph NW

Lat: on target Long: on target

Water Depth (m): 14.6 Secchi Depth (m):

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed 7 PSI or 14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	30.6	1104	8.57	8.19	12	14.2	996	7.14	0.14
1	30.1	1101	8.53	8.34	13	14.0	996	7.10	0.14
2	29.2	1100	8.55	8.53	14	14.0	999	7.03	0.13
3	29.0	1098	8.55	8.60	15				
4	28.8	1098	8.52	8.38	16				
5	28.7	1098	8.47	8.01	17				
6	27.4	1084	8.00	4.45	18				
7	22.8	1020	7.42	0.47	19				
8	18.9	1002	7.24	0.19	20				
9	16.0	992	7.23	0.18	21				
10	15.1	991	7.22	0.16	22				
11	14.4	991	7.19	0.15	23				

FIELD DATASHEET

Date: 08/11/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL08

Time on Station: 0955 Time off Station: 1030 Staff Initials: NJ/TD

Weather Conditions: clear sunny Wind (mph & direction): 1 mph NE

Lat: on Long: on

Water Depth (m): 8.4m Secchi Depth (m): 1.85

Water Chemistry Sample? (Y)/N Chl-a Sample? (Y)/N Plankton Sample? (Y)/N

SAMPLE TIME: 1010 Surface volume filtered (ml): 500 1030

0+2 m Chl-a: 1020 Depth-Integrated volume filtered (ml): 425

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	29.3	1097	8.50	7.92	12				
1	29.2	1097	8.48	7.96	13				
2	29.1	1097	8.47	7.90	14				
3	29.0	1097	8.45	7.84	15				
4	28.9	1098	8.42	7.66	16				
5	28.2	1094	8.21	6.34	17				
6	27.2	1072	7.71	2.89	18				
7	23.5	1024	7.35	0.20	19				
8	18.2	1009	7.13	0.16	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 8/11/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL08

Time on Station: 1440 Time off Station: 1450 Staff Initials: NJ/TD

Weather Conditions: clear/sunny Wind (mph & direction): 6mph NW

Lat: on target Long: on target

Water Depth (m): 8.4m Secchi Depth (m):

Water Chemistry Sample?: Y/N Chl-a Sample?: Y/N Plankton Sample?: Y/N

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	30.7	1101	8.56	8.07	12				
1	29.9	1098	8.52	8.30	13				
2	29.4	1097	8.52	8.36	14				
3	29.1	1097	8.51	8.28	15				
4	28.9	1097	8.48	8.11	16				
5	28.6	1097	8.39	7.49	17				
6	27.4	1079	7.73	3.05	18				
7	23.3	1024	7.34	0.22	19				
8	18.2	1003	7.17	0.15	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 08/11/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL09

Time on Station: 0850 Time off Station: 0935 Staff Initials: NS/TD

Weather Conditions: Sunny/clear Wind (mph & direction): 1 mph NE

Lat: on target Long: on target

Water Depth (m): 7.1 m Secchi Depth (m): 1.2

Water Chemistry Sample?: (Y) / N Chl-a Sample?: (Y) / N Plankton Sample?: (Y) / N

SAMPLE TIME: 0910 Surface volume filtered (ml): 420

0-2m : 0915 Depth-Integrated volume filtered (ml): 205

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Very strong sulfate smell

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.6	1223	8.45	8.08	12				
1	28.6	1223	8.44	8.07	13				
2	28.5	1222	8.41	7.92	14				
3	28.5	1220	8.41	~~6.68~~	15	7.92 - NS			
4	28.4	1220	8.27	6.68	16				
5	27.8	1231	7.29	0.18	17				
6	20.8	1186	6.81	0.13	18				
7	18.3	1181	6.82	0.11	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 8/11/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL09

Time on Station: 1410 Time off Station: 1421 Staff Initials: NS/TD

Weather Conditions: clear / sunny Wind (mph & direction): 6 mph NW

Lat: On target Long: on target

Water Depth (m): 7.1 Secchi Depth (m): /

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: / Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	30.5	1236	8.52	8.84	12				
1	29.5	1225	8.55	9.18	13				
2	28.8	1222	8.52	8.83	14				
3	28.6	1218	8.44	8.19	15				
4	28.4	1226	8.08	5.88	16				
5	27.5	1223	7.39	0.29	17				
6	21.5	1194	6.97	0.18	18				
6.5	19.3	1193	6.96	0.16	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 8/11/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL10

Time on Station: 0755 Time off Station: 0840 Staff Initials: NS/TD

Weather Conditions: clear / sunny Wind (mph & direction): 0 mph

Lat: ON Long: ON

Water Depth (m): 3.1 Secchi Depth (m): 1.0 m

Water Chemistry Sample? (Y) N Chl-a Sample? (Y) N Plankton Sample? (Y) N

SAMPLE TIME: 0815 Surface volume filtered (ml): 360

Depth-Integrated volume filtered (ml): 355

O2 Meters-0830

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.6	1261	8.38	7.61	12				
1	28.6	1261	8.37	7.61	13				
2	28.6	1261	8.36	7.58	14				
2.5	28.6	1261	8.35	7.49	15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 8/11/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL10

Time on Station: 1355 Time off Station: 1400 Staff Initials: NS/TD

Weather Conditions: clear/sunny Wind (mph & direction): 6mph NW

Lat: on target Long: on target

Water Depth (m): 3.1 Secchi Depth (m): ~~

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: ~~ Surface volume filtered (ml): ~~

Depth-Integrated volume filtered (ml): ~~

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

afternoon readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	31.2	1269	8.56	8.87	12				
1	29.3	1254	8.61	9.47	13				
2	28.8	1249	8.52	8.75	14				
~~2.5~~	28.7	1251	8.42	7.91	15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 9/20/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 0955 Time off Station: 1000 Staff Initials: NJ/TD

Weather Conditions: sunny, clear Wind (mph & direction): 1-2 NE

Lat: on target Long: on target

Water Depth (m): 4.7m Secchi Depth (m): 0.25

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.6	4525	9.21	7.75	12				
1	24.5	4507	9.17	5.47	13				
2	24.4	4506	9.13	5.47	14				
3	24.4	4509	9.11	5.09	15				
4	24.4	4513	9.10	5.04	16				
~~4.5~~	24.4	4514	9.10	4.86	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

LE01

Date: 9/20/22 Location (Circle): Lake Elsinore/Canyon Lake Station: ~~LE08~~ LE01

Time on Station: 1320 Time off Station: 1325 Staff Initials: NJ / TM

Weather Conditions: Clear sunny Wind (mph & direction): 5mph SW

Lat: UN Long: _____

Water Depth (m): 4.7m Secchi Depth (m): ~~_____~~

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	26.7	4514	9.37	15.95	12				
1	24.5	4509	9.15	6.51	13				
2	24.3	4498	9.12	5.72	14				
3	24.3	4499	9.12	5.71	15				
4	24.2	4501	9.12	5.71	16				
~~5~~ 4.5	24.1	4501	9.12	5.61	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore TNTP Offset Monitoring
~~2021-22~~
2022-23

FIELD DATASHEET

Date: 9/20/22 Location (Circle): ~~Lake Elsinore~~ Station: L1502

Time on Station: 0750 Time off Station: 0925 Staff Initials: NJ, TO

Weather Conditions: clear, sunny Wind (mph & direction): 1-2 mph NE

Lat: on target Long:

Water Depth (m): 5.8m Secchi Depth (m): 0.20m

Water Chemistry Sample Times:

Surface: 0805
Surface DUP: 0850
Depth Int: 0820
Depth Int. DUP: 0840
Bottom: 0835
Bottom DUP: 0910
surface 0-2m: 0900

Chl-a Samples? (Y) N **Algae Taxonomy Sample**? (Y) N 0805
0-2 m (mL) 130 mL
Surface volume filtered (ml): 130 mL
Surface DUP volume filtered *(ml):* 135mL
Depth Int. volume filtered (ml): 130 mL
Depth Int. DUP volume filtered (ml): 110 mL
Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments:
pre recordings eyes on lake @ 0750

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	24.0	4500	9.05	4.65	56.6	50.5
0.5	24.0	4503	9.04	4.32	59.7	49.7
1	24.0	4504	9.04	4.27	60.9	50.4
2	24.0	4504	9.04	4.27	61.9	50.1
3	24.0	4504	9.04	4.25	62.9	50.0
4	24.0	4504	9.04	4.23	64.3	49.9
5	24.0	4504	9.04	4.20	65.6	50.3
~~5.5~~	24.0	4505	9.03	4.14	-132.0	~~58.0~~ NJ
7						
8						
9						
10						
11						

FIELD DATASHEET

Date: 9/20/22 Location (Circle): Lake Elsinore Station: LE02

Time on Station: 0750 Time off Station: 0925 Staff Initials: NJ TD

Weather Conditions: clear; sunny Wind (mph & direction): 1-2mph NE

Lat: on target Long:

Water Depth (m): 5.8m Secchi Depth (m): 0.20 m

Water Chemistry Sample Times:

Surface:
Surface DUP:
Depth Int:
Depth Int. DUP:
Bottom:
Bottom DUP:

Chl-a Samples?: Y / N **Algae Taxonomy Sample**?: Y / N

Surface volume filtered (ml):
Surface DUP volume filtered *(ml)*:
Depth Int. volume filtered (ml):
Depth Int. DUP volume filtered (ml):
Do not exceed 7 **PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments:

post readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	24.8 TD	4494	9.13	5.93	71.5	49.8
0.5	24.1	4508	9.08	5% TD 4.74	73.8	48.9
1	24.1	4508	9.07	4.77	75.2	50.1
2	24.0	4509	9.06	4.55	76.0	50.3
3	24.0	4508	9.06	4.46	76.7	50.1 TD
4	24.0	4508	9.06	4.43	77.4	49.2
5	24.0	4508	9.06	4.29	78.0	50.3
5.56	23.9	4511	9.06	4.07	-68.0	52.2
7						
8						
9						
10						
11						

FIELD DATASHEET

Date: 9/20/22 Location (Circle): (Lake Elsinore)/Canyon Lake Station: LE62

Time on Station: 1305 Time off Station: 1310 Staff Initials: NJ/TD

Weather Conditions: clear, sunny Wind (mph & direction): 5mph SW

Lat: on target Long:

Water Depth (m): 5.8m Secchi Depth (m): —

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME:

Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.7	4522	9.41	17.67	12				
1	24.6	4510	9.24	12.00	13				
2	24.2	4508	9.11	6.64	14				
3	24.2	4509	9.07	5.09	15				
4	24.1	4508	9.05	4.51	16				
5	24.0	4509	9.05	4.38	17				
~~5.5~~	24.0	4507	9.04	4.00	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 9/20/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 0735 Time off Station: 0745 Staff Initials: NJ; TD

Weather Conditions: clear, sunny Wind (mph & direction): 1-2 mph NE

Lat: on target Long:

Water Depth (m): 4.0m Secchi Depth (m): 0.25m

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.5	4507	9.20	8.03	12				
1	24.5	4510	9.19	8.01	13				
2	24.5	4510	9.19	7.99	14				
3	24.5	4510	9.18	7.98	15				
3.5	24.5	4512	9.19	8.01	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 9/20/22 Location (Circle): (Lake Elsinore)/Canyon Lake Station: LE03

Time on Station: 1255 Time off Station: 1300 Staff Initials: NJ/TD

Weather Conditions: clear, sunny Wind (mph & direction): 5 mph SW

Lat: on target Long: _____

Water Depth (m): 4.0 m Secchi Depth (m): —

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y (N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.8	4510	9.27	9.65	12				
1	24.7	4516	9.22	7.41	13				
2	24.6	4519	9.20	7.57	14				
3	24.5	4519	9.21	7.51	15				
~~3.5~~	24.5	4519	9.20	7.36	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 9/20/22 Location (Circle): Lake Elsinore/Canyon Lake Station: Lake Shore

Time on Station: 0945 Time off Station: 1000 Staff Initials: NJ/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 1-2 NE

Lat: on target Long: on target

Water Depth (m): 6.1 Secchi Depth (m): 0.25

Water Chemistry Sample?: Y / ~~N~~ Chl-a Sample?: Y / N Plankton Sample?: ~~Y~~ / N

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in-Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.3	4511	9.09	5.85	12				
1	24.2	4516	9.08	5.23	13				
2	24.2	4515	9.06	4.82	14				
3	24.1	4514	9.05	4.01	15				
4	24.1	4513	9.04	3.95	16				
5	24.0	4512	9.04	3.93	17				
5.5	24.0	4512	9.04	3.92	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 9/20/22 Location (Circle): Lake Elsinore/Canyon Lake Station: Grand Avenue

Time on Station: 0930 Time off Station: 0940 Staff Initials: NJ/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 1-2 NE

Lat: on target Long: on target

Water Depth (m): 5.3 Secchi Depth (m): 0.25

Water Chemistry Sample?: Y / N
SAMPLE TIME: _____

Chl-a Sample?: Y / N Plankton Sample?: Y / N
Surface volume filtered (ml): _____
Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.3	4520	9.21	9.37	12				
1	24.3	4518	9.15	6.69	13				
2	24.2	4514	9.11	5.00	14				
3	24.1	4513	9.07	4.59	15				
4	24.0	4512	9.07	4.56	16				
5	23.9	4510	9.06	4.46	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 10/05/2022 Location (Circle): Lake Elsinore (Canyon Lake) Station: CL07

Time on Station: 1045 Time off Station: 1125 Staff Initials: MS/KB

Weather Conditions: Sunny, clear Wind (mph & direction): 3-5 mph NE

Lat: on station Long: on station

Water Depth (m): 14.4 Secchi Depth (m): 1.8

Water Chemistry Sample?: Y / N Chl-a Sample?: (Y) / N Plankton Sample?: (Y) / N

SAMPLE TIME: 1105 Surface volume filtered (ml): 500 mL

Surf chla: 1115 Depth-Integrated volume filtered (ml): 500 mL

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Conlee

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	26.3	1089	8.49	8.38	12	14.4	970	7.11	0.00
1	26.1	1087	8.48	8.54	13	14.3	983	7.05	0.00
2	25.9	1085	8.48	8.47	14	14.1	982	7.03	0.00
3	25.8	1086	8.46	8.25	15				
4	25.8	1086	8.42	7.95	16				
5	25.8	1086	8.39	7.74	17				
6	25.8	1086	8.37	7.53	18				
7	25.2	1086	7.49	0.51	19				
8	21.6	1010	7.12	0.02	20				
9	17.5	974	7.10	0.00	21				
10	15.9	975	7.11	0.00	22				
11	15.0	964	7.13	0.00	23				

FIELD DATASHEET

Date: 10/05/2022 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL07

Time on Station: 1445 Time off Station: 1505 Staff Initials: KB/MS

Weather Conditions: sunny, breezy Wind (mph & direction): 5-8 NW

Lat: See note below Long: See note below

Water Depth (m): 14.5 Secchi Depth (m): 1.90

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: N/A Surface volume filtered (ml): N/A

Depth-Integrated volume filtered (ml): N/A

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments: Wind direction alternating b/w SW/NW during pm sampling. ~150ft off station to avoid buoy line

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	27.2	1087	8.53	8.76	12	14.5	977	7.01	0.00
1	26.7	1084	8.56	8.98	13	14.3	979	6.98	0.00
2	26.2	1085	8.58	9.16	14	14.2	978	6.94	0.00
3	26.0	1086	8.54	8.81	15				
4	25.8	1086	8.47	8.24	16				
5	25.8	1085	8.43	7.95	17				
6	25.7	1092	8.21	6.79	18				
7	24.6	1077	7.43	0.17	19				
8	21.9	1011	7.11	0.04	20				
9	17.2	947	7.08	0.00	21				
10	15.6	963	7.10	0.00	22				
11	14.9	961	7.09	0.00	23				

FIELD DATASHEET

Date: 10/05/2022 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL08

Time on Station: 0950 Time off Station: _____ Staff Initials: MS/KB

Weather Conditions: Sunny, clear Wind (mph & direction): 0

Lat: on station Long: on station

Water Depth (m): 8.3 Secchi Depth (m): 2.7

Water Chemistry Sample?: Y / N Chl-a Sample?: (Y) / N Plankton Sample?: (Y) / N

SAMPLE TIME: 1010 Surface volume filtered (ml): 500

Surf Chl a: 1020 Depth-Integrated volume filtered (ml): 425

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	26.3	1083	8.50	8.42	12				
1	26.0	1082	8.49	8.40	13				
2	25.9	1082	8.46	8.20	14				
3	25.9	1082	8.45	8.08	15				
4	25.9	1082	8.40	7.65	16				
5	25.8	1089	8.22	6.56	17				
6	25.5	1093	7.77	3.53	18				
7	24.9	1086	7.52	0.12	19				
8	21.3	1006	7.09	0.00	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 10/05/2022 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL08

Time on Station: 1430 Time off Station: 1440 Staff Initials: MS/KB

Weather Conditions: sunny, light breeze Wind (mph & direction): 5-8 mph W

Lat: on station Long: on station

Water Depth (m): 8.3 Secchi Depth (m): 1.6

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	27.1	1083	8.57	8.98	12				
1	27.0	1083	8.56	8.95	13				
2	26.3	1081	8.55	8.91	14				
3	26.0	1082	8.53	8.70	15				
4	25.8	1083	8.42	7.90	16				
5	25.8	1084	8.45	8.06	17				
6	25.6	1085	7.66	2.75	18				
7	25.0	1079	7.45	0.24	19				
8	22.9	1043	7.17	0.11	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 10/05/2022 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL09

Time on Station: 0855 Time off Station: 0930 Staff Initials: MS/KB

Weather Conditions: sunny, clear Wind (mph & direction): 0

Lat: on station Long: on station

Water Depth (m): 6.9 Secchi Depth (m): 1.2

Water Chemistry Sample? (Y) / N Chl-a Sample?: (Y) / N Plankton Sample?: (Y) / N

SAMPLE TIME: 0910 Surface volume filtered (ml): 500 mL

Surf Chl a : 0920 Depth-Integrated volume filtered (ml): 350mL

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.4	1201	8.34	7.51	12				
1	25.4	1203	8.34	7.49	13				
2	25.4	1202	8.33	7.45	14				
3	25.4	1201	8.32	7.37	15				
4	25.4	1200	8.23	6.90	16				
5	25.2	1197	7.58	2.38	17				
6	23.1	1196	6.94	0.06	18				
6.5 T	20.0	1181	6.84	0.00	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 10/05/2022 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL09

Time on Station: 1410 Time off Station: 1415 Staff Initials: MS/KB

Weather Conditions: Sunny, calm Wind (mph & direction): 5mph var

Lat: on station Long: on station

Water Depth (m): 6.9 Secchi Depth (m): 1.1

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	26.7	1209	8.51	9.04	12				
1	26.1	1204	8.51	9.11	13				
2	25.6	1200	8.46	8.58	14				
3	25.5	1200	8.38	7.92	15				
4	25.4	1202	8.30	7.30	16				
5	25.3	1200	7.93	5.00	17				
6	24.2	1206	7.09	0.13	18				
6.5	21.9	1183	6.88	0.05	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 10/05/2022 Location (Circle): Lake Elsinore (Canyon Lake) Station: CL10

Time on Station: 0800 Time off Station: 0845 Staff Initials: MS/KB

Weather Conditions: sunny, clear Wind (mph & direction): 0

Lat: on station Long: on station

Water Depth (m): 3.2 Secchi Depth (m): 1.1

Water Chemistry Sample?: (Y) / N Chl-a Sample?: (Y) / N Plankton Sample?: (Y) / N

SAMPLE TIME: 0815 Surface volume filtered (ml): 350 mL

Depth-Integrated volume filtered (ml): 350 mL

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.5	1239	8.30	7.40	12				
1	25.5	1239	8.30	7.35	13				
2	25.5	1239	8.25	7.29	14				
3	25.5	1244	8.19	7.16	15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 10/05/2022 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL10

Time on Station: 1400 Time off Station: 1405 Staff Initials: MS/KB

Weather Conditions: sunny, calm Wind (mph & direction): 0-2 mph W

Lat: on station Long: on station

Water Depth (m): 2.9 Secchi Depth (m): 1.2

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	28.1	1236	8.43	8.25	12				
1	26.1	1242	8.53	8.91	13				
2	25.7	1239	8.37	7.78	14				
2.5	25.6	1242	8.30	7.25	15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore and Canyon Lake TMDL Monitoring

~~2021-22~~ 2022-23

FIELD DATASHEET

Date: 10/5/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 0950 Time off Station: 1000 Staff Initials: NJ/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 1 mph NE

Lat: on target Long: on target

Water Depth (m): 4.7 Secchi Depth (m): 0.2

Water Chemistry Sample?: ~~Y~~ / N Chl-a Sample?: Y / N Plankton Sample?: ~~Y~~ / N

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.8	4500	9.44	12.03	12				
1	24.0	4490	9.32	6.28 ~~6.82~~	13				
2	23.8	4491	9.29	5.41	14				
3	23.6	4483	9.27	5.07	15				
4	23.6	4482	9.26	4.55	16				
~~5~~ 4.5	23.5	4483	9.23	4.35	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore and Canyon Lake TMDL Monitoring

~~2021-22~~
2022-23

FIELD DATASHEET

Date: 10/5/22 Location (Circle) Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 1455 Time off Station: 1500 Staff Initials: NS/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 6-7mph W

Lat: on target Long: on target

Water Depth (m): 4.7m Secchi Depth (m): /

~~Water Chemistry Sample?: Y / N~~ Chl-a Sample?: Y / N Plankton Sample?: Y / N

~~SAMPLE TIME:~~ _____ Surface ~~volume~~ filtered (ml): _____

Depth-Integrated volume ~~filtered (ml)~~: _____

*Do not exceed **7 PSI or 14 in. Hg** when ~~filtering~~ chlorophyll (~500 mL ~~fill~~ volume preferred). Discard lower ~~chamber~~ when ~~full~~ (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.2	4495	9.43	11.90	12				
1	25.0	4497	9.39	9.79	13				
2	24.0	4499	9.26	5.22	14				
3	23.8	4492	9.25	5.13	15				
4	23.7	4488	9.24	4.63	16				
~~4.5~~	23.5	4485	9.22	3.41	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore TNTP Offset Monitoring
~~2021-22~~
22-23

FIELD DATASHEET

Date: 10/05/22 Location (Circle): Lake Elsinore Station: LE02

Time on Station: 0805 Time off Station: 0945 Staff Initials: NJ/TD

Weather Conditions: clear; sunny Wind (mph & direction): 1 mph NE

Lat: on target Long: on target

Water Depth (m): 5.9m Secchi Depth (m): 0.20m

Water Chemistry Sample Times:

Surface: 0825
Surface DUP: 0905
Depth Int: 0835
Depth Int. DUP: 0905
Bottom: 0845
Bottom DUP: ~~0905~~ 0925
0-2m chl-a: 0925

Chl-a Samples? (Y) / N
0-2m chl-a: 107mL

Algae Taxonomy Sample? (Y) / N
0825

Surface volume filtered (ml): 115 mL
Surface DUP volume filtered *(ml)*: 113.5 mL
Depth Int. volume filtered (ml): 124 mL
Depth Int. DUP volume filtered (ml): 133mL
Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments:
pre-recordings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	24.0	4477	9.33	5.83	28.2	59.6
0.5	24.0	4475	9.27	5.83	28.8	59.8
1	24.0	4478	9.27	5.74	29.2	60.5
2	24.0	4476	9.27	5.73	29.7	59.1
3	24.0	4476	9.26	5.51	30.3	58.9
4	24.0	4475	9.26	5.49	30.8	59.5
5	24.0	4476	9.26	5.44	31.5	59.0
~~5.5~~	23.5	4480	9.10	0.27	~~-240.1~~ -240.1 NS	52.5
7						
8						
9						
10						
11						

Lake Elsinore TNTP Offset Monitoring
~~2021-22~~
22-23

FIELD DATASHEET

Date: 10/5/22 Location (Circle): ~~Lake Elsinore~~ Station: LE02

Time on Station: 0805 Time off Station: 0945 Staff Initials: NJ/TD

Weather Conditions: Clear/sunny Wind (mph & direction): 1mph NE

Lat: on target Long: on target

Water Depth (m): 5.9 Secchi Depth (m): 0.20

~~**Water Chemistry Sample Times:**~~

Surface: _____
Surface DUP: _____
Depth Int: _____
Depth Int. DUP: _____
Bottom: _____
Bottom DUP: _____

~~**Chl-a Samples**~~?: Y / N **Algae Taxonomy Sample**?: ~~Y / N~~

Surface volume filtered (ml): _____
Surface DUP volume filtered ~~(ml)~~: _____
Depth Int. volume filtered (ml): _____
Depth Int. DUP volume filtered (ml): _____
~~**Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll~~
(~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments: Post Readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	24.23	4489	9.41	9.9241	44.9	62.2
0.5	24.1	4490	9.33	6.84	47.7	60.3
1	24.1	4489	9.32	6.22	48.9	59.4
2	24.1	4489	9.30	5.75	49.8	59.1
3	24.80	4489	9.29	5.59	50.6	59.2
4	24.0	4489	9.28	5.42	51.2	58.4
5	24.0	4490	9.25	2.28	52.1	50.2
~~6~~ 5.5	23.6	4475	9.14	0.26	-101.3	59.1
7						
8						
9						
10						
11						

FIELD DATASHEET

Date: 10/5/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE02

Time on Station: 1445 Time off Station: 1450 Staff Initials: NJ/TO

Weather Conditions: Sunny, clear Wind (mph & direction): 6-7 mph NW

Lat: on target Long: on target

Water Depth (m): 5.9m Secchi Depth (m):

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.6	4496	9.52	16.12	12				
1	25.5	4497	9.50	15.74	13				
2	24.7	4494	9.40	11.48	14				
3	24.1	4492	9.28	6.21	15				
4	24.0	4492	9.23	4.50	16				
5	23.7	4478	9.13	0.74	17				
5.5	23.6	4476	9.12	0.34	18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore and Canyon Lake TMDL Monitoring

~~2021-22~~
2022-23

FIELD DATASHEET

Date: 10/5/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 0750 Time off Station: 0755 Staff Initials: NJ/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 1 mph NE

Lat: on target Long: on target

Water Depth (m): 4.0 m Secchi Depth (m): 0.20 m

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y/(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.5	4466	9.37	9.51	12				
1	24.6	4466	9.36	9.30	13				
2	24.6	4466	9.36	9.29	14				
3	24.6	4467	9.35	8.83	15				
~~3.5~~	24.1	4477	9.14	0.23	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 10/5/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 1430 Time off Station: 1435 Staff Initials: NJ/TD

Weather Conditions: sunny, clear Wind (mph & direction): 6-7 mph W

Lat: on target Long: on target

Water Depth (m): 4.0 Secchi Depth (m): ~~/~~

~~Water Chemistry Sample?: Y / N~~ Chl-a Sample?: Y / N ~~Plankton Sample?: Y / N~~

~~SAMPLE TIME:~~ ~~Surface volume filtered (ml):~~

~~Depth-Integrated volume filtered (ml):~~

~~*Do not exceed **7 PSI or 14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).~~

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.5	4491	9.51	13.36	12				
1	25.0	4488	9.44	11.11	13				
2	24.5	4487	9.36	7.62	14				
3	24.4	4501	9.35	6.51	15				
~~3.5~~	24.1	4499	9.13	0.49	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore and Canyon Lake TMDL Monitoring
~~2021-22~~
2022-23

FIELD DATASHEET

Date: 10/5/22 Location (Circle): ~~Lake Elsinore~~/Canyon Lake Station: Lake Shore

Time on Station: 1035 Time off Station: 1045 Staff Initials: NJ/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 1 mph NE

Lat: on target Long: on target

Water Depth (m): ~~5.4~~ 6.2 Secchi Depth (m): 0.2

~~Water Chemistry Sample?: Y / N~~ ~~Chl-a Sample?: Y / N~~ ~~Plankton Sample?: Y / N~~

~~SAMPLE TIME:~~ Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~~~500 mL~~ fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.4	4493	9.433	7.43	12				
1	24.2	4493	9.32	6.59	13				
2	24.1	4492	9.29	5.85	14				
3	24.1	4491	9.28	5.46	15				
4	24.1	4492	9.27	5.31	16				
5	24.0	4484	9.22	1.66	17				
6	23.6	4476	9.15	0.44	18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore and Canyon Lake TMDL Monitoring

~~2021-22~~
2022-23

FIELD DATASHEET

Date: 10/5/22 Location (Circle): Lake Elsinore/Canyon Lake Station: Grand Avenue

Time on Station: 1020 Time off Station: 1030 Staff Initials: NJ/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 1 mph NE

Lat: on target Long: on target

Water Depth (m): ~~6.2~~ 5.4 Secchi Depth (m): 0.2

~~Water Chemistry Sample?: Y / N~~ Chl-a Sample?: Y / N Plankton Sample?: ~~Y~~ / N

~~SAMPLE TIME:~~ Surface ~~volume~~ filtered (ml): _____

Depth-Integrated volume ~~filtered (ml)~~: _____

*Do not exceed **7 PSI ~~or 14 in. Hg~~** when filtering ~~chlorophyll~~ (~500 mL ~~fill~~ volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.6	4492	9.43	10.25	12				
1	24.5	4495	9.39	9.06	13				
2	24.4	4493	9.36	8.00	14				
3	24.3	4495	9.32	4.63	15				
4	24.1	4489	9.185	0.82	16				
5	23.8	4479	9.13	0.43	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

LE01

Date: 12/19/22 Location (Circle): Lake Elsinore/Canyon Lake Station: ~~LE03~~

Time on Station: 1013 Time off Station: 1019 Staff Initials: JR/TD

Weather Conditions: clear Wind (mph & direction): Ø

Lat: on target Long: on target

Water Depth (m): 4.9 Secchi Depth (m): 0.3

Water Chemistry Sample?: Y / ~~N~~ Chl-a Sample?: Y / N Plankton Sample?: ~~Y~~ / N

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed ~~7~~ **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.0	4212	9.04	5.6	12				
1	10.6	4207	9.01	4.2	13				
2	10.6	4209	8.98	2.9	14				
3	10.4	4211	8.95	1.9	15				
4	10.4	4212	8.95	1.8	16				
~~4.5~~	10.4	4211	8.94	1.7	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 12/19/22 Location (Circle): Lake Elsinore Station: LE02

Time on Station: 0818 Time off Station: 1005 Staff Initials: JR/TD

Weather Conditions: Clear Wind (mph & direction): 0

Lat: On target Long: on target

Water Depth (m): 5.9 Secchi Depth (m): 0.3

Water Chemistry Sample Times: **Chl-a Samples**?: (Y)/ N **Algae Taxonomy Sample**?: (Y)/ N

Surface: 0840
Surface DUP: 0930
Depth Int: 0849
Depth Int. DUP: 0928
Bottom: 0911
Bottom DUP: 0945
0-2 TMDL: 1000

Surface volume filtered (ml): 150
Surface DUP volume filtered *(ml)*: 190
Depth Int. volume filtered (ml): 150
Depth Int. DUP volume filtered (ml): 200 TMDL
Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments:

Pre-reading

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	10.6	4214	8.95	2.8	117.0	23.2
0.5	10.6	4213	8.94	2.7	116.6	22.9
1	10.6	4213	8.94	2.6	116.2	23.7
2	10.6	4213	8.94	2.6	115.8	22.1
3	10.6	4213	8.94	2.6	115.4	22.6
4	10.6	4213	8.94	2.6	115.1	23.2
~~5~~	10.6	4212	8.94	2.6	114.8	23.6
~~6~~ 5.4	10.6	4212	8.94	2.5	112.1	38.4
7						
8						
9						
10						
11						

FIELD DATASHEET

Date: 12/19/22 Location (Circle): Lake Elsinore Station: LE02

Time on Station: 0818 Time off Station: 1005 Staff Initials: JR/TD

Weather Conditions: clear Wind (mph & direction): 0

Lat: on target Long: on target

Water Depth (m): 5.9 Secchi Depth (m): 0.3

~~**Water Chemistry Sample Times:**~~

Surface: _____
Surface DUP: _____
Depth Int: _____
Depth Int. DUP: _____
Bottom: _____
Bottom DUP: _____

~~**Chl-a Samples**~~?: Y / N ~~**Algae Taxonomy Sample**?: Y / N~~

Surface volume filtered (ml): _____
Surface DUP volume filtered ~~*(ml)*~~: _____
Depth Int. volume filtered (ml): _____
Depth Int. DUP volume filtered (ml): _____
Do not exceed ~~7 PSI~~ or **14 in. Hg when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments:

Post-Readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	11.1	4220	9.04	3.9	100.6	24.2
0.5	10.9	4214	9.01	3.4	101.0	23.1
1	10.7	4212	9.00	3.1	101.0	23.8
2	10.7	4212	8.99	3.0	100.8	23.1
3	10.6	4211	8.98	2.7	100.7	22.2
4	10.6	4211	8.98	2.6	100.5	22.9
5	10.6	4211	8.98	2.6	100.4	22.8
~~6~~ 5.5	10.6	4210	8.98	2.6	87.3	25.3
7						
8						
9						
10						
11						

FIELD DATASHEET

Date: 12/19/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 0802 Time off Station: 0812 Staff Initials: JR

Weather Conditions: Clear Wind (mph & direction): 0

Lat: _____ Long: _____

Water Depth (m): 4.2 Secchi Depth (m): 0.3

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	10.9	4197	9.00	4.2	12				
1	10.9	4197	9.00	5.1	13				
2	10.9	4197	9.00	5.1	14				
3	10.9	4197	8.99	5.0	15				
4	10.9	4196	8.99	4.9	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 12/19/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL07

Time on Station: 1150 Time off Station: 1220 Staff Initials: NS/RI

Weather Conditions: Clear ; sunny Wind (mph & direction): 1-2 mph S

Lat: on target Long: on target

Water Depth (m): 14.8 m Secchi Depth (m): 0.90 m

Water Chemistry Sample? (Y) N Chl-a Sample? (Y) N Plankton Sample? (Y) / N

SAMPLE TIME: 1205 Surface volume filtered (ml): 250 time : 1215

chlA time : 1210 Depth-Integrated volume filtered (ml): 250

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	13.4	1079	7.94	8.10	12	12.3	1077	7.75	6.36
1	12.7	1078	7.87	7.45	13	12.3	1078	7.76	6.35
2	12.4	1076	7.80	6.81	14	12.3	1078	7.76	6.33
3	12.4	1076	7.78	6.60	14.5	12.3	1079	7.74	6.31
4	12.4	1076	7.78	6.54	16				
5	12.4	1075	7.78	6.52	17				
6	12.4	1075	7.78	6.51	18				
7	12.3	1076	7.77	6.46	19				
8	12.3	1076	7.77	6.43	20				
9	12.3	1077	7.76	6.40	21				
10	12.3	1077	7.76	6.38	22				
11	12.3	1077	7.75	6.37	23				

12/19/22

FIELD DATASHEET

Date: ~~CL08~~ Location (Circle): ~~Lake Elsinore~~/Canyon Lake Station: CL08

Time on Station: 1100 Time off Station: 1135 Staff Initials: NJ/ISI

Weather Conditions: on target Wind (mph & direction): on target

Lat: clear; sunny Long: 1-2 mph S

Water Depth (m): 8.8m Secchi Depth (m): 1.0m

Water Chemistry Sample? (Y / N) Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: 1120 Surface volume filtered (ml): 500mL time: 1130

sample time chl-a: 1125 Depth-Integrated volume filtered (ml): 500mL

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	12.9	1071	8.12	9.10	12				
1	12.7	1070	7.93	8.21	13				
2	12.4	1069	7.90	7.87	14				
3	12.4	1069	7.87	7.57	15				
4	12.3	1069	7.86	7.46	16				
5	12.3	1069	7.84	7.28	17				
6	12.2	1069	7.82	7.08	18				
7	12.2	1069	7.80	6.99	19				
8	12.2	1069	7.79	6.93	20				
~~9~~ 8.5	12.2	1069	7.76	6.87	21				
10					22				
11					23				

FIELD DATASHEET

Date: 12/14/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL09

Time on Station: 1015 Time off Station: 1045 Staff Initials: NS / IST

Weather Conditions: clear; sunny Wind (mph & direction): 1-2mph S

Lat: ON Long: ON

Water Depth (m): 7.0 m Secchi Depth (m): 0.85

Water Chemistry Sample?: (Y) / N Chl-a Sample?: (Y) / N Plankton Sample?: Y / N

SAMPLE TIME: 1035 Surface volume filtered (ml): 250 time: 1045

Chl-A time: 10.40 Depth-Integrated volume filtered (ml): 250

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.7	1157	8.24	9.71	12				
1	11.6	1157	8.20	9.55	13				
2	11.4	1158	8.19	9.38	14				
3	11.4	1158	8.18	9.24	15				
4	11.4	1158	8.16	9.11	16				
5	11.4	1158	8.16	9.06	17				
6	11.4	1158	8.16	9.03	18				
~~6.5~~	11.4	1158	8.13	8.91	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 12/19/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL10

Time on Station: 0924 Time off Station: 0955 Staff Initials: NS/ISI

Weather Conditions: clear, sunny Wind (mph & direction): 1-2 mph S

Lat: on target Long: on target

Water Depth (m): 10.5 ft ~~3.2~~ m 2.5m Secchi Depth (m):

Water Chemistry Sample?: (Y) N Chl-a Sample?: (Y) N Plankton Sample?: (Y) N

SAMPLE TIME: 0940 Surface volume filtered (ml): ← time: 0945

Chl-A time: 0945 Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.2	1169	8.30	10.56	12				
1	11.1	1170	8.31	10.54	13				
2	11.1	1171	8.31	10.53	14				
3					15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 12/19/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL07

Time on Station: 1510 Time off Station: 1515 Staff Initials: NS/BL

Weather Conditions: Clear; sunny Wind (mph & direction): 1-2 mph SE

Lat: on Long: on

Water Depth (m): 14.8 Secchi Depth (m): ~~_____~~

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed 7 **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.1	1077	7.96	8.45	12	12.3	1077	7.69	6.17
1	12.8	1076	7.90	8.09	13	12.3	1077	7.68	6.13
2	12.7	1076	7.88	7.41	14	12.3	1077	7.67	6.06
3	12.4	1076	7.81	7.15	14.5	12.3	1078	7.66	6.03
4	12.4	1076	7.76	6.75	16				
5	12.4	1076	7.75	6.65	17				
6	12.4	1076	7.74	6.56	18				
7	12.4	1076	7.73	6.47	19				
8	12.4	1077	7.72	6.36	20				
9	12.4	1077	7.71	6.30	21				
10	12.4	1077	7.71	6.27	22				
11	12.3	1077	7.69	6.20	23				

FIELD DATASHEET

Date: 12/19/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL08

Time on Station: 1455 Time off Station: 1457 Staff Initials: NS/BL

Weather Conditions: clear; sunny Wind (mph & direction): 1-2 mph SE

Lat: On Long: On

Water Depth (m): 8.8 Secchi Depth (m): _____

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.3	1068	8.08	9.50	12				
1	14.0	1068	8.04	9.21	13				
2	13.1	1069	8.02	8.75	14				
3	12.4	1070	7.94	8.05	15				
4	12.3	1071	7.87	7.76	16				
5	12.3	1070	7.85	7.58	17				
6	12.3	1070	7.84	7.47	18				
7	12.2	1070	7.82	7.28	19				
8	12.2	1069	7.80	7.12	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 12/19/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CLO9

Time on Station: 1430 Time off Station: 1433 Staff Initials: NS

Weather Conditions: clear; sunny Wind (mph & direction): 1-2 mph SE

Lat: ON Long: ON

Water Depth (m): 7.0 Secchi Depth (m): ____

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: ____ Surface volume filtered (ml): ____

Depth-Integrated volume filtered (ml): ____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	13.6	1158	8.30	9.91	12				
1	12.1	1161	8.29	9.95	13				
2	11.9	1155	8.26	9.68	14				
3	11.5	1157	8.22	9.41	15				
4	11.5	1158	8.18	9.15	16				
5	11.41	1158	8.15	9.00	17				
6	11.4	1159	8.16	9.00	18				
~~6.5~~	11.4	1159	8.15	8.92	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 12/19/22 Location (Circle): Lake Elsinore/Canyon Lake Station: CL10

Time on Station: 1420 Time off Station: 1422 Staff Initials: NS/BI

Weather Conditions: Clear; sunny Wind (mph & direction): 1-2 mps SE

Lat: on Long: on

Water Depth (m): 2.5 Secchi Depth (m):

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed 7 **PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

afternoon readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	12.8	1165	8.52	11.20	12				
1	12.0	1164	8.51	11.44	13				
2	11.8	1165	8.51	11.47	14				
3					15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: ~~CL10~~ CL07

Time on Station: 1030 Time off Station: 1115 Staff Initials: KB/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 4mph NNE

Lat: on target * Long: on target *

Water Depth (m): 15.8 Secchi Depth (m): 0.90

Water Chemistry Sample?: (Y) / N
SAMPLE TIME: 1045
↳ sediment @ 15m, sample composite starts @ 14m

Chl-a Sample?: Y / N
Surface volume filtered (ml): 500
Depth-Integrated volume filtered (ml): 500

Plankton Sample?: (Y) / N @ 1108

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

surface (0-2m). Chl-A comp @ 1105

* Approximately 45 m off target to avoid buoy line at dam

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.6	841	8.68	12.24	12	10.8	85~~8~~3	7.73	6.88
1	11.5	841	8.67	12.32	13	10.8	852	7.72	6.73
2	11.4	842	8.61	11.95	14	10.8	853	7.70	6.61
3	11.3	842	8.55	11.51	15	10.8	854	7.68	6.47
4	11.3	842	8.53	11.44	~~16~~ 15.5	10.8	854	7.~~64~~ ~~57~~ 48	~~43~~ 1.95
5	11.3	842	8.53	11.43	17			↑7.48	
6	11.2	843	8.49	11.21	18				
7	11.2	84~~4~~7	8.~~30~~ 17	9.39	19				
8	11.0	851	7.93	7.85	20				
9	10.9	851	7.68	7.83	21				
10	10.9	851	7.82	7.59	22				
11	10.9	852	7.80	7.17	23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: ~~CL09~~ CL08

Time on Station: 0950 Time off Station: 1025 Staff Initials: KB/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 4mph NE

Lat: on target Long: on target

Water Depth (m): 9.5 Secchi Depth (m): 0.85

Water Chemistry Sample? (Y) / N Chl-a Sample?: Y / N Plankton Sample? (Y) / N

SAMPLE TIME: 1005 Surface volume filtered (ml): 350 @ 1005

Depth-Integrated volume filtered (ml): 230

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Surface (0-2m) Chl-A comp @ 1020

some algae / organic debris present in sample.

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.4	837	8.58	11.83	12				
1	11.3	838	8.49	11.08	13				
2	11.1	839	8.31	10.50	14				
3	11.0	839	8.28	10.22	15				
4	11.0	840	8.23	10.04	16				
5	11.0	840	8.20	9.89	17				
6	10.9	840	8.13	9.57	18				
7	10.9	840	8.10	9.33	19				
8	10.9	840	8.06	9.14	20				
9	10.9	841	~~8.7.99~~	8.70	21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL09 ~~CL08~~

Time on Station: 0855 Time off Station: 0925 Staff Initials: KB/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 4mph NNE

Lat: on target Long: on target

Water Depth (m): 8.1 Secchi Depth (m): 0.90

Water Chemistry Sample? (Y)/ N Chl-a Sample?: (Y)/ N Plankton Sample?: (Y)/ N @ 0909

SAMPLE TIME: 0910 Surface volume filtered (ml): 500

Depth-Integrated volume filtered (ml): 500mL

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Surface (0-2m) Chl-A comp: 0920

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.1	900	8.11	10.05	12				
1	11.1	901	8.08	9.93	13				
2	11.1	901	8.04	9.65	14				
3	11.0	901	7.99	9.17	15				
4	11.0	902	7.92	7.05	16				
5	10.8	909	7.62	5.36	17				
6	10.8	918	7.52	~~5~~ 3.63	18				
7	10.8	931	7.42	3.29	19				
~~8~~ 7.5	10.8	951	7.37	2.0 1.88	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL10 ~~CL7~~

Time on Station: 0805 Time off Station: 0845 Staff Initials: KB/TD

Weather Conditions: Sunny, clear Wind (mph & direction): 4mph NNE

Lat: on target Long: on target

Water Depth (m): 3.7 Secchi Depth (m): 0.75

Water Chemistry Sample?: (Y) / N Chl-a Sample?: Y / N Plankton Sample?: (Y) / N @ 0821

SAMPLE TIME: 0815 Surface volume filtered (ml): 400

Depth-Integrated volume filtered (ml): 495

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Surface (0-2m): 0835
Chl-a comp

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.2	904	8.18	11.18	12				
1	11.2	904	8.24	11.03	13				
2	11.2	904	8.25	10.93	14				
3	11.2	935	87.92	8.33	15				
~~3.5~~	11.2	975	7.77	8.34	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CLO 7

Time on Station: 1515 Time off Station: 1530 Staff Initials: KB/TD

Weather Conditions: Sunny, breezy Wind (mph & direction): 7mph NNW

Lat: on target * Long: on target *

Water Depth (m): 15.9m Secchi Depth (m): 0.80m

~~Water Chemistry Sample?~~: Y / N Chl-a Sample?: Y / N ~~Plankton Sample?~~: Y / N

~~SAMPLE TIME:~~ _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not ~~exceed~~ **7 PSI** or ~~**14 in. Hg**~~ when filtering chlorophyll (~~~500~~ mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments: * Approximately 45m off target to avoid buoy line at dam.

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	12.6	835	8.99	15.28	12	10.8	854	7.69	6.75
1	12.6	835	8.98	15.20	13	10.8	854	7.68	6.60
2	12.6	835	8.95	15.00	14	10.8	853	7.67	6.52
3	12.1	838	8.83	13.88	15	10.8	853	7.64	6.43
4	11.9	838	8.78	13.47	~~16~~ 15.5				HIT BOTTOM
5	11.6	840	8.72	12.88	17				
6	11.3	842	8.52	11.42	18				
7	11.2	845	8.39	10.80	19				
8	11.1	847	8.11	9.36	20				
9	11.1	848	7.96	8.52	21				
10	11.0	848	7.87	8.02	22				
11	10.9	852	7.78	7.11	23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL08

Time on Station: 1500 Time off Station: 1510 Staff Initials: KBITD

Weather Conditions: Sunny, breezy Wind (mph & direction): 6mph NNW

Lat: on target Long: on target

Water Depth (m): ~~8~~ 9.6 Secchi Depth (m): 0.85

~~Water Chemistry Sample?: Y / N~~ Chl-a Sample?: Y / N ~~Plankton Sample?: Y / N~~

~~SAMPLE TIME:~~ Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed 7 **PSI** or ~~14 in. Hg~~ when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.7	837	8.41	11.26	12				
1	11.6	838	8.41	11.41	13				
2	11.5	837	8.39	11.02	14				
3	11.6	838	8.40	11.03	15				
4	11.2	840	8.32	10.58	16				
5	11.0	~~837~~ 849	8.17	9.87	17				
6	11.0	841	8.12	9.58	18				
7	10.9	840	8.11	9.48	19				
8	10.9	840	8.04	9.24	20				
9	10.9	840	7.94	8.45	21				
10					22				
11					23				

FIELD DATASHEET

Date: 02/07/2023 Location (Circle): Lake Elsinore/Canyon Lake Station: CL09

Time on Station: 1425 Time off Station: 1440 Staff Initials: KB/TD

Weather Conditions: Sunny, breezy Wind (mph & direction): 6 mph WNW

Lat: on target Long: on target

Water Depth (m): 8.0 Secchi Depth (m): 0.9 m

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: N/A Surface volume filtered (ml): N/A

Depth-Integrated volume filtered (ml): N/A

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	13.0	896	8.74	13.93	12				
1 (12.0 KB)	~~11.7~~ 11.8	907	8.26	11.75	13				
2	11.1	903	8.18	10.05	14				
3	11.0	902	7.96	9.25	15				
4	10.9	903	7.75	7.68	16				
5	10.8	910	7.55	5.27	17				
6	10.8	921	7.45	3.93	18				
7	10.7	944	7.35	1.80	19				
7.5 ~~8~~	10.7	955	7.32	1.24	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 02/07/2023 Location (Circle): Lake Elsinore/Canyon Lake Station: CLO

Time on Station: 1405 Time off Station: 1415 Staff Initials: KB/TD

Weather Conditions: Sunny, breezy Wind (mph & direction): 6 mph WNW

Lat: on target * Long: on target *

Water Depth (m): 2.7 Secchi Depth (m): 0.7

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: N/A Surface volume filtered (ml): N/A

Depth-Integrated volume filtered (ml): N/A

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

*Drifted slightly off target due to wind

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	14.0	900	9.02	16.10	12				
1	13.7	903	8.96	15.50	13				
2	11.5	908	8.63	13.00	14				
2.5 ~~3~~	11.2	934	7.86	8.40	15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 1101 Time off Station: 1104 Staff Initials: NS

Weather Conditions: clear; sunny Wind (mph & direction): 4mph N

Lat: ON Long: ON

Water Depth (m): 5.8 Secchi Depth (m): 0.3-

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.8	3675	8.97	10.9	12				
1	11.6	3676	8.96	10.7	13				
2	10.9	3681	8.94	9.9	14				
3	10.7	3681	8.91	9.6	15				
4	10.6	3682	8.89	8.3	16				
5	10.6	3683	8.89	9.2	17				
5.5	10.5	3682	8.89	9.3	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore Station: LE02

Time on Station: 0815 Time off Station: 1005 Staff Initials: NS/HK

Weather Conditions: clear/sunny Wind (mph & direction): 6 mph N

Lat: on Long: on

Water Depth (m): 6.9 m Secchi Depth (m): 0.30m

Water Chemistry Sample Times:

Surface: 0930
Surface DUP: 0915
Depth Int: 0840
Depth Int. DUP: 0925
Bottom: 0855
Bottom DUP: 0930

0.2m TMDL 1005

Chl-a Samples?: (Y) / N

Surface volume filtered (ml): 220
Surface DUP volume filtered *(ml)*: 170
Depth Int. volume filtered (ml): 205
Depth Int. DUP volume filtered (ml): 190

Algae Taxonomy Sample?: (Y) / N

0830

Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Surface TMDL – 225mL

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	10.8	3674	8.91	9.9	72.0	19.9
0.5	10.8	3676	8.88	9.9	66.0	20.0
1	10.8	3676	8.92	9.8	77.2	20.4
2	10.7	3678	8.91	9.6	82.6	20.4
3	10.6	3678	8.90	9.6	84.4	19.2
4	10.6	3679	8.89	9.5	86.4	18.7
5	10.5	3679	8.88	9.4	88.8	19.0
6	10.5	3680	8.87	9.3	90.2	18.7
6.5	10.5	3680	8.87	9.3	91.2	20.0
8						
9						
10						
11						

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 0802 Time off Station: 0809 Staff Initials: NJ/HK

Weather Conditions: clear; sunny Wind (mph & direction): 6mph N

Lat: on Long: on

Water Depth (m): 5.3 Secchi Depth (m): 0.30

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: X Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.4	3663	8.80	10.8	12				
1	11.3	3662	8.80	10.8	13				
2	11.2	3682	8.72	9.9	14				
3	10.5	3680	8.67	9.0	15				
4	10.5	3669	8.65	7.8	16				
5	10.5	3681	8.68	8.6	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: Grand Ave

Time on Station: 1012 Time off Station: _____ Staff Initials: HK

Weather Conditions: Clear + Sunny Wind (mph & direction): 4 mph & North

Lat: On target Long: _____

Water Depth (m): 6-5 Secchi Depth (m): 0-3

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.5	3673	9.00	10.5	12				
1	11.0	3677	8.96	9.7	13				
2	10.5	3678	8.91	9.1	14				
3	10.5	3678	8.90	9.0	15				
4	10.5	3678	8.89	9.1	16				
5	10.4	3678	8.89	9.0	17				
☆ 6	10.4	3678	8.88	8.9	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: Lake View

Time on Station: 1048 Time off Station: 1056 Staff Initials: NJ/KH

Weather Conditions: Clear + Sunny Wind (mph & direction): 4mph North

Lat: on target Long: _____

Water Depth (m): 7.3 Secchi Depth (m): 0.3m

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.7	3674	9.12	11.4	12				
1	11.2	3680	9.01	11.5	13				
2	10.9	3679	8.96	9.9	14				
3	10.9	3679	8.94	9.7	15				
4	10.8	3679	8.93	9.6	16				
5	10.6	3684	8.89	9.2	17				
6	10.5	3683	8.88	9.0	18				
6.5 ~~7~~	10.6	3683	8.87	9.0	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 1515 Time off Station: 1518 Staff Initials: NJ

Weather Conditions: clear windy Wind (mph & direction): 7 mph N

Lat: on Long: on

Water Depth (m): 5.8 Secchi Depth (m): —

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.1	3671	8.98	10.1	12				
1	11.1	3671	8.96	10.1	13				
2	11.1	3672	8.95	10.1	14				
3	11.1	3672	8.93	9.9	15				
4	11.1	3672	8.93	9.9	16				
5	10.9	3674	8.90	9.6	17				
~~5.5~~	10.8	3674	8.90	9.5	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE02

Time on Station: 1507 Time off Station: 1510 Staff Initials: NJ/HK

Weather Conditions: ~~Clear~~ Cloudy windy Wind (mph & direction): ~~0~~ 7 mph N

Lat: on Long: on

Water Depth (m): 6.9 Secchi Depth (m): ~~_____~~

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / N Plankton Sample?: Y / ~~N~~

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	11.6	3667	8.98	11.1	12				
1	11.6	3667	8.98	11.1	13				
2	11.6	3668	8.98	11.1	14				
3	11.6	3668	8.97	10.9	15				
4	11.5	3669	8.97	10.8	16				
5	11.5	3671	8.96	10.7	17				
6	11.3	3673	8.95	10.5	18				
6.5	11.1	3673	8.93	10.1	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 2/7/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 1500 Time off Station: 1505 Staff Initials: NJ

Weather Conditions: clear; windy Wind (mph & direction): 7mph N

Lat: on Long: on

Water Depth (m): 5.3 Secchi Depth (m): ~~_____~~

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	12.1	3650	9.12	11.4	12				
1	12.0	3657	9.04	11.5	13				
2	12.0	3658	9.03	11.4	14				
3	12.0	3657	9.01	11.3	15				
4	11.8	3665	8.99	10.5	16				
5	11.5	3669	8.93	9.6	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 1042 Time off Station: 1046 Staff Initials: NJ/HK

Weather Conditions: ~~OC~~ clear; breezy Wind (mph & direction): 4-5 N

Lat: ON Long: ON

Water Depth (m): 7.3 Secchi Depth (m): 0.3 m

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	16.9	2936	9.22	14.5	12				
1	16.7	2935	9.21	14.5	13				
2	16.0	2937	9.15	12.6	14				
3	15.4	2937	9.04	10.1	15				
4	14.8	2933	8.98	9.2	16				
5	14.7	2934	8.99	8.9	17				
6	14.5	2934	8.95	8.5	18				
7	14.5	2943	8.98	8.0	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore Station: LE02

Time on Station: 0805 Time off Station: 0945 Staff Initials: NJ/HK

Weather Conditions: clear; sunny Wind (mph & direction): 1-2mph N

Lat: on Long: on

Water Depth (m): 8.3m Secchi Depth (m): 0.3m

Water Chemistry Sample Times:

Surface: 0820
Surface DUP: 0900
Depth Int: 0825
Depth Int. DUP: 0910
Bottom: 0845
Bottom DUP: 0920
0-2m chl-a: 0935

Chl-a Samples? (Y) N **Algae Taxonomy Sample?** (Y) N
0-2m: 175mL time: 0820

Surface volume filtered (ml): 200mL
Surface DUP volume filtered *(ml)*: 180mL
Depth Int. volume filtered (ml): 175mL
Depth Int. DUP volume filtered (ml): 175mL

Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments:
pre recordings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	15.1	2928	9.05	11.8	64.9	25.9
0.5	15.2	2929	9.05	11.8	68.7	25.9
1	15.2	2930	9.05	11.8	70.1	25.9
2	15.1	2930	9.01	10.6	72.1	25.7
3	14.9	2935	8.98	10.2	73.2	27.4
4	14.7	2934	8.96	9.7	74.1	25.4
5	14.3	2942	8.95	9.4	75.2	26.2
6	14.2	2948	8.92	8.9	76.3	23.6
7	14.2	2950	8.90	8.7	76.9	23.8
8	14.1	2950	8.87	8.1	77.8	23.6
9						
10						
11						

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore Station: LE02

Time on Station: 0805 Time off Station: 0945 Staff Initials: NS

Weather Conditions: clear, breezy Wind (mph & direction): 4-5N

Lat: on Long: on

Water Depth (m): 8.3m Secchi Depth (m): 0.3m

Water Chemistry Sample Times: **Chl-a Samples**?: Y / N **Algae Taxonomy Sample**?: Y / N

Surface:
Surface DUP:
Depth Int:
Depth Int. DUP:
Bottom:
Bottom DUP:

Surface volume filtered (ml):
Surface DUP volume filtered (ml):
Depth Int. volume filtered (ml):
Depth Int. DUP volume filtered (ml):
Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

Comments: post readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	15.6	2920	9.21	13.1	157.6	27.8
0.5	15.7	2919	9.18	13.4	155.7	27.3
1	15.5	2921	9.16	13.4	154.5	26.4
2	15.3	2922	9.12	12.1	153.7	25.6
3	15.2	2925	9.07	11.1	153.5	24.4
4	15.0	2933	9.04	10.5	153.1	25.1
5	14.8	2936	9.03	10.3	152.8	25.2
6	14.6	2935	9.00	9.9	152.8	25.6
7	14.4	2944	8.97	9.0	152.9	24.7
8	14.1	2949	8.91	8.0	152.6	23.1
9						
10						
11						

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 0755 Time off Station: 0800 Staff Initials: NS, HK

Weather Conditions: clear; sunny Wind (mph & direction): 1-2 N

Lat: on Long: on

Water Depth (m): 6.5m Secchi Depth (m): 0.3m

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.0	2893	9.09	11.6	12				
1	15.1	2901	9.06	11.3	13				
2	15.1	2918	9.03	10.4	14				
3	14.9	2927	8.99	9.6	15				
4	14.7	2933	8.96	8.9	16				
5	14.5	2936	8.91	8.5	17				
6	14.5	2937	8.88	7.8	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LAKE SHORE

Time on Station: 1005 Time off Station: 1015 Staff Initials: HK

Weather Conditions: CLEAR, SUNNY, WINDY Wind (mph & direction): 5 MPH

Lat: _____ Long: _____

Water Depth (m): 8.6 Secchi Depth (m): 0.3

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.6	2931	9.16	12.6	12				
1	15.3	2930	9.11	12.1	13				
2	15.1	2933	9.09	11.6	14				
3	15.1	2933	9.08	11.4	15				
4	15.1	2378	9.06	11.0	16				
5	15.0	2931	9.01	9.9	17				
6	14.8	2356	8.99	9.6	18				
7	14.3	2950	8.95	8.7	19				
8	14.1	2951	8.92	8.1	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: Grand Ave

Time on Station: 0950 Time off Station: 1000 Staff Initials: HK

Weather Conditions: Clear & Sunny, Breezy Wind (mph & direction): 5 Knots

Lat: on target Long: _____

Water Depth (m): 7.8 Secchi Depth (m): 0.3

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.0	2902	9.16	13.2	12				
1	15.6	2909	9.12	12.4	13				
2	15.2	2919	9.06	10.8	14				
3	14.8	2932	9.03	10.2	15				
4	14.7	2936	9.00	9.8	16				
5	14.5	2933	8.99	9.7	17				
6	14.4	2943	8.98	9.2	18				
7	14.2	2949	8.94	8.6	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 1435 Time off Station: 1438 Staff Initials: NS

Weather Conditions: clear; sunny Wind (mph & direction): 2-3 N

Lat: ON Long: ON

Water Depth (m): 7.3 Secchi Depth (m): /

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	19.01	2939	9.19	14.2	12				
1	15.8	2975	9.12	14.4	13				
2	15.6	2936	9.10	11.9	14				
3	15.1	2935	9.01	10.0	15				
4	14.8	2936	8.96	9.2	16				
5	14.7	2937	8.94	8.8	17				
6	14.6	2938	8.94	8.6	18				
7	14.5	2942	8.91	8.0	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE02

Time on Station: 1430 Time off Station: @ 1433 Staff Initials: NJ/HK

Weather Conditions: clear; sunny Wind (mph & direction): 2-3 N

Lat: on Long: on

Water Depth (m): 8.3 m Secchi Depth (m): /

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	19.8	2923	9.19	14.8	12				
1	16.2	2931	9.22	15.0	13				
2	15.7	2905	9.15	13.2	14				
3	15.2	2914	9.08	11.3	15				
4	14.9	2926	9.04	10.5	16				
5	14.7	2935	9.00	9.8	17				
6	14.3	2948	8.97	9.2	18				
7	14.2	2950	8.96	8.9	19				
8	14.2	2951	8.92	8.2	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/6/21 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 1420 Time off Station: 1425 Staff Initials: NS/HK

Weather Conditions: Clear; Sunny Wind (mph & direction): 2-3 N

Lat: On Long: On

Water Depth (m): 6.5 Secchi Depth (m): /

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	19.3	2902	9.28	14.9	12				
1	16.1	2931	9.22	12.8	13				
2	15.2	2922	9.11	10.4	14				
3	14.8	2932	9.04	9.4	15				
4	14.7	2937	9.02	9.2	16				
5	14.6	2940	8.98	8.5	17				
6	14.5	2941	8.94	8.1	18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore and Canyon Lake TMDL Monitoring
~~2021-22~~
2022-23

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL07

Time on Station: 1048 Time off Station: _____ Staff Initials: JR

Weather Conditions: Clear Wind (mph & direction): 0

Lat: _____ Long: _____

Water Depth (m): 15.4 Secchi Depth (m): 2.7

Water Chemistry Sample?: (Y) N Chl-a Sample?: (Y) N Plankton Sample?: Y (N)

SAMPLE TIME: 1100 Surface volume filtered (ml): 250

0 - 2 1105 Depth-Integrated volume filtered (ml): 250

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	16.9	562	7.91	8.7	12	11.2	779	7.30	0.1
1	16.3	562	7.92	8.7	13	11.2	780	7.30	0.1
2	15.7	562	7.86	8.4	14	11.1	780	7.29	0.1
3	15.1	567	7.81	7.9	15	11.0	780	7.29	0.1
4	14.4	572	7.72	7.2	16				
5	14.0	594	7.62	6.1	17				
6	13.5	660	7.48	4.0	18				
7	13.1	702	7.39	2.5	19				
8	12.2	743	7.35	1.1	20				
9	11.9	761	7.33	0.4	21				
10	11.5	772	7.32	0.2	22				
11	11.3	778	7.31	0.1	23				

Lake Elsinore and Canyon Lake TMDL Monitoring

~~2021-22~~
2022-23

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: EL08

Time on Station: 1005 Time off Station: _____ Staff Initials: JR

Weather Conditions: Clear Wind (mph & direction): 0

Lat: _____ Long: _____

Water Depth (m): 10.2 Secchi Depth (m): 2.6

Water Chemistry Sample?: (Y) / N Chl-a Sample?: (Y) / N Plankton Sample?: (Y) / N

SAMPLE TIME: 1015 Surface volume filtered (ml): 250

0-2m 1020 Depth-Integrated volume filtered (ml): 250

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.7	551	7.88	8.5	12				
1	15.4	550	7.87	8.5	13				
2	15.0	550	7.85	8.3	14				
3	14.7	570	7.75	7.2	15				
4	14.2	604	7.61	6.1	16				
5	13.9	619	7.54	5.3	17				
6	13.5	661	7.47	3.9	18				
7	12.6	732	7.38	1.6	19				
8	11.6	775	7.33	0.1	20				
9	11.4	780	7.31	0.1	21				
9.5	11.3	781	7.31	0.1	22				
11					23				

Lake Elsinore and Canyon Lake TMDL Monitoring
~~2021-22~~
2022-23

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL09

Time on Station: 0905 Time off Station: 0945 Staff Initials: RN/JR

Weather Conditions: Sunny/Clear Wind (mph & direction): <5mph

Lat: _____ Long: _____

Water Depth (m): 5.8 Secchi Depth (m): 2.7

Water Chemistry Sample?: (Y) / N Chl-a Sample?: (Y) / N Plankton Sample?: Y / (N)

SAMPLE TIME: ~~0920~~ 0915

Surface volume filtered (ml): 255

0-2m - 0920

Depth-Integrated volume filtered (ml): 255

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:
Sulfide smell @ first aliquot

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.4	699	7.64	7.17	12				
1	15.5	699	7.61	7.10	13				
2	15.3	694	7.59	6.79	14				
3	14.6	689	7.53	0.67	15				
4	14.2	836	7.24	1.44	16				
5	13.0	877	7.21	0.08	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

Lake Elsinore and Canyon Lake TMDL Monitoring
~~2021-22~~
2022-23

FIELD DATASHEET

Date: 4/10/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL10

Time on Station: 0815 Time off Station: 0855 Staff Initials: RV/JR

Weather Conditions: Sunny/clear Wind (mph & direction): <5mph

Lat: _____ Long: _____

Water Depth (m): 4 Secchi Depth (m): 3.1

Water Chemistry Sample?: (Y) / N Chl-a Sample?: (Y) / N Plankton Sample?: Y / (N)

SAMPLE TIME: 0830

Surface volume filtered (ml): 255

0.2 0835

Depth-Integrated volume filtered (ml): 250

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	15.6	712	7.46	7.12	12				
1	15.6	714	7.54	7.00	13				
2	15.3	718	7.53	6.50	14				
3	14.8	692	7.53	6.38	15				
3.5 RV	14.6	705	7.41	3.78	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL07

Time on Station: 1535 Time off Station: _____ Staff Initials: JR

Weather Conditions: Clear Wind (mph & direction): 5 E

Lat: _____ Long: _____

Water Depth (m): 15.4 Secchi Depth (m): _____

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	18.1	561	7.88	8.8	12	11.2	779	7.27	0.1
1	17.6	552	7.90	8.9	13	11.2	781	7.27	0.1
2	15.9	564	7.89	8.5	14	11.1	782	7.26	0.1
3	15.0	564	7.88	8.8	15	11.1	783	7.26	0.1
4	14.6	566	7.77	7.7	16				
5	14.0	552	7.61	6.4	17				
6	13.3	672	7.45	3.6	18				
7	12.8	715	7.35	2.3	19				
8	11.9	757	7.31	0.8	20				
9	11.5	773	7.28	0.1	21				
10	11.3	779	7.27	0.1	22				
11	11.2	779	7.27	0.1	23				

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL08

Time on Station: 1510 Time off Station: _____ Staff Initials: _____

Weather Conditions: Clear Wind (mph & direction): 5 E

Lat: _____ Long: _____

Water Depth (m): 10.2 Secchi Depth (m): —

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	17.5	553	7.87	8.8	12				
1	16.1	553	7.89	8.8	13				
2	15.6	555	7.88	8.7	14				
3	15.0	583	7.81	8.1	15				
4	14.4	578	7.61	6.9	16				
5	13.9	622	7.51	4.9	17				
6	13.3	684	7.40	3.4	18				
7	12.4	737	7.32	1.3	19				
8	11.8	767	7.29	0.1	20				
9	11.7	772	7.27	0.1	21				
10	11.7	772	7.29	0.1	22				
11					23				

FIELD DATASHEET

Date: 4/6/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL09

Time on Station: 1445 Time off Station: _____ Staff Initials: JR

Weather Conditions: Clear Wind (mph & direction): 5 E

Lat: _____ Long: _____

Water Depth (m): 5.8 Secchi Depth (m): _____

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	17.2	705	7.65	7.5	12				
1	16.4	700	7.62	7.4	13				
2	15.5	690	7.58	7.0	14				
3	14.9	678	7.54	6.7	15				
4	14.1	817	7.32	1.8	16				
5	13.2	877	7.20	0.1	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 4/10/23 Location (Circle): Lake Elsinore/Canyon Lake Station: CL10

Time on Station: 1430 Time off Station: _____ Staff Initials: RV/JR

Weather Conditions: Sunny, calm Wind (mph & direction): 5 mph

Lat: _____ Long: _____

Water Depth (m): _____ Secchi Depth (m): _____

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	18.6	716	7.59	7.3	12				
1	16.7	719	7.58	7.0	13				
2	15.6	729	7.54	6.6	14				
3	14.9	691	7.50	5.8	15				
3.5 A	14.8	759	7.41	4.7	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/22/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 1057 Time off Station: 1101 Staff Initials: NJ/KP

Weather Conditions: clear; sunny Wind (mph & direction): 3-4 SE

Lat: on Long: on

Water Depth (m): 7.0m Secchi Depth (m): 0.3

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.2	6011	8.84	7.37	12				
1	23.1	6012	8.82	6.07	13				
2	23.0	5781	8.78	5.24	14				
3	23.0	6010	8.78	5.11	15				
4	22.9	6010	8.76	4.77	16				
5	22.9	6009	8.76	4.64	17				
6	22.8	6010	8.72	4.46	18				
~~6.5~~	22.7	6010	8.73	3.94	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/22/23 Location: Lake Elsinore Station: LE02

Time on Station: 0810 Time off Station: 1030 Staff Initials: NS/KP

Weather Conditions: Clear; sunny; breezy Wind (mph & direction): 3-4 SE

Lat: ON Long: ON

Water Depth (m): 8.0 Secchi Depth (m): 0.3m

Water Chemistry Sample Times:

Surface: 0840
Surface DUP: 0925
Depth Int.: 0847
Depth Int. DUP: 0938
Bottom: 0905
Bottom DUP: 0940
0-2m chl- 1010

Comments:

Chl-a Samples? Y / N **Algae Taxonomy Sample?** Y / N
time 0840

Surface volume filtered (ml): 365
Surface DUP volume filtered *(ml)*: 425
Depth Int. volume filtered (ml): 250
Depth Int. DUP volume filtered (ml): 200
Do not exceed **7 PSI or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250mL filter volume).

TMDL (0-2m) surface (mL): 380

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)
0	22.9	5925	8.72	5.89	141.6	25.31
0.5	22.9	5927	8.71	5.57	140.2	24.7
1	22.9	5928	8.73	5.45	138.0	25.0
2	22.8	5930	8.74	5.10	136.0	25.8
3	22.8	5931	8.73	3.99	135.3	23.4
4	22.6	5932	8.66	3.38	135.3	25.0
5	22.6	5933	8.65	3.12	135.1	23.6
6	22.5	5935	8.62	2.61	135.0	24.0
7	22.5	5937	8.59	2.10	134.5	24.2
8 (7.5)	22.5	5938	8.59	2.00	133.9	24.5
9						
10						
11						

FIELD DATASHEET

Date: 6/22/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 0755 Time off Station: 0805 Staff Initials: NJ/KD

Weather Conditions: clear; sunny; breezy Wind (mph & direction): 3-4 SE

Lat: On Long: On

Water Depth (m): 6.2m Secchi Depth (m): 0.3m

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y/(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.1	5880	8.87	6.27	12				
1	23.1	5896	8.81	6.19	13				
2	23.1	5902	8.80	6.21	14				
3	23.1	5906	8.80	6.10	15				
4	23.1	5910	8.80	5.90	16				
5	23.0	5914	8.69	4.05	17				
6	22.8	5915	8.60	2.50	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/22/23 Location (Circle): Lake Elsinore/Canyon Lake Station: Lakeshore

Time on Station: 1047 Time off Station: 1053 Staff Initials: NJ/KP

Weather Conditions: Clear; Sunny Wind (mph & direction): 3-4 SE

Lat: ON Long: ON

Water Depth (m): 8.3 Secchi Depth (m): 0.3m

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y (N) Plankton Sample?: Y / (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.5	5970	8.91	7.85	12				
1	23.4	5968	8.90	7.69	13				
2	23.1	5969	8.64	5.77	14				
3	22.9	5967	8.77	4.67	15				
4	22.8	5967	8.71	3.65	16				
5	22.6	5966	8.67	2.96	17				
6	22.5	5966	8.62	2.14	18				
7	22.4	5967	8.63	2.23	19				
8	22.4	5970	8.59	1.23	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/22/23 Location (Circle): Lake Elsinore/Canyon Lake Station: ~~Latitude~~ Grandview

Time on Station: 1040 Time off Station: 1045 Staff Initials: NS/KP

Weather Conditions: clear sunny Wind (mph & direction): 3-4 SE

Lat: on Long: on

Water Depth (m): 7.4 m Secchi Depth (m): 0.3 m

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) Plankton Sample?: Y / (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or ~~**14 in. Hg**~~ when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when ~~full~~ (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.4	5974	8.86	8.06	12				
1	23.5	5970	8.85	~~7~~ 6.84	13				
2	23.9	5966	8.77	4.88	14				
3	22.7	5960	8.64	3.01	15				
4	22.6	5961	8.64	2.83	16				
5	22.6	5961	8.62	2.51	17				
6	22.5	5962	8.60	1.95	18				
7	22.5	5963	8.59	1.87	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/22/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE01

Time on Station: 1513 Time off Station: 1518 Staff Initials: NJ

Weather Conditions: windy Wind (mph & direction): 15-20 mph

Lat: on Long: on

Water Depth (m): 7.0 Secchi Depth (m): 0.3

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: ~~730~~ Surface volume filtered (ml):

Depth-Integrated volume filtered (ml):

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.4	6049	8.81	7.00	12				
1	23.4	6044	8.81	6.88	13				
2	23.4	6041	8.81	6.72	14				
3	23.4	6039	8.80	6.50	15				
4	22.8	6035	8.69	4.26	16				
5	22.7	6033	8.67	3.57	17				
6	22.6	6032	8.63	2.90	18				
~~6.5~~	22.6	6031	8.60	2.29	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/22/23 Location (Circle): Lake Elsinore/Canyon Lake Station: LE02

Time on Station: 1503 Time off Station: 1508 Staff Initials: NJ

Weather Conditions: windy Wind (mph & direction): 10-15 mph

Lat: On Long: On

Water Depth (m): 8.0 Secchi Depth (m): 0.3

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.7	6032	8.81	7.48	12				
1	23.6	6032	8.81	7.25	13				
2	23.5	6031	8.79	6.99	14				
3	23.5	6029	8.78	6.62	15				
4	23.5	6030	8.78	6.35	16				
5	23.2	6027	8.74	5.53	17				
6	23.0	6025	8.70	5.12	18				
7	22.9	6027	8.78	4.79	19				
~~8~~ 7.5	23.2	6027	8.73	2.34	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/22 Location (Circle): Lake Elsinore/Canyon Lake Station: LE03

Time on Station: 1450 Time off Station: 1457 Staff Initials: NJ

Weather Conditions: Sunny/windy Wind (mph & direction): 10-15 SW

Lat: on Long: on

Water Depth (m): 6.2 Secchi Depth (m): 0.3

Water Chemistry Sample?: Y / N Chl-a Sample?: Y / N Plankton Sample?: Y / N

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	23.9	6019	9.09	7.81	12				
1	23.8	6023	9.01	7.60	13				
2	23.8	6025	8.96	7.47	14				
3	23.6	6023	8.92	7.00	15				
4	23.4	6022	8.87	6.05	16				
5	23.0	6022	8.78	4.93	17				
6	22.9	6022	8.60	1.94	18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 06/22/2023 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL07

Time on Station: 1030 Time off Station: 1105 Staff Initials: KB/TD

Weather Conditions: sunny, light breeze Wind (mph & direction): 3-5mph ESE

Lat: See below* Long: See below*

Water Depth (m): 15.3 Secchi Depth (ft/m): 7'6" → 2.29

Water Chemistry Sample?: (Y) / N Chl-a Sample?: (Y) / N Plankton ~~Sample?~~: Y / N NA

SAMPLE TIME: 10:50 Surface volume filtered (ml): 500

Depth-Integrated volume filtered (ml): 500

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments: * ~60m off target to avoid buoy line
Surface (0-2m) Ch-A: 1056
some blue-green algae clumps on surface + in sample

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.4	1485	8.73	8.72	12	12.2	1636	7.29	0.00
1	24.4	1486	8.72	8.74	13	12.2	1644	7.28	0.00
2	24.2	1485	8.71	8.68	14	12.1	1643	7.26	0.00
3	24.1	1484	8.73	8.78	15	12.1	1646	7.25	0.00
4	23.1	KB 1511	8.26	6.37	16				
5	21.1 KB	1530	7.76	3.00	17				
6	17.7	1499	7.55	2.41	18				
7	15.2	1531	7.40	0.10	19				
8	13.6	1574	7.34	0.00	20				
9	12.9	1603	7.34	0.00	21				
10	12.4	1629	7.33	0.00	22				
11	12.4	1633	7.30	0.00	23				

FIELD DATASHEET

Date: 06/22/2023 Location (Circle): Lake Elsinore/Canyon Lake Station CL08

Time on Station: 0945 Time off Station: 1020 Staff Initials: TD/KB

Weather Conditions: Sunny, ~~calm~~ breezy Wind (mph & direction): 3-5mph SSW

Lat: on target Long: on target

Water Depth (m): 9.2 Secchi Depth (~~m~~ ft): 7'0" → 2.14 m.

Water Chemistry Sample? Y / N Chl-a Sample?: Y / N Plankton ~~Sample?: Y / N~~

SAMPLE TIME: 10:06 Surface volume filtered (ml): 500 N/A

Depth-Integrated volume filtered (ml): 500

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments: Boater activity (wakeboarding) during sampling. Some blue-green algae clumps on surface (see photos)
Surface (0-2m) CL-A: 1013

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.9	1476	8.64	8.36	12				
1	24.7	1476	8.64	8.40	13				
2	24.6	1475	8.64	8.43	14				
3	24.5	1475	8.64	8.41	15				
4	23.0	1524	8.20	5.98	16				
5	20.5	1522	7.61	2.46	17				
6	18.3	1491	7.49	1.93	18				
7	14.9	1536	7.31	0.02	19				
8	13.5	1596	7.30	0.00	20				
8.5 ~~9~~	13.4	1628	7.27	0.00	21				
10					22				
11					23				

FIELD DATASHEET

Date: 06/22/2023 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL09

Time on Station: 0900 Time off Station: 0940 Staff Initials: KB/TD

Weather Conditions: sunny, calm Wind (mph & direction): 0 mph

Lat: on target Long: on target

Water Depth (m): 7.6 Secchi Depth (~~m~~ ft): 6'0" → 1.83

Water Chemistry Sample?: (Y) N Chl-a Sample?: (Y)/ N ~~Plankton Sample?: Y / N~~ N/A

SAMPLE TIME: 0915 Surface volume filtered (ml): 500

Depth-Integrated volume filtered (ml): 500

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments: Strong odor (sulfur-like) from sample Surface (0-2m) CL-A: 0925

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.4	1786	8.79	10.07	12				
1	24.5	1790	8.79	10.08	13				
2	24.4	1781	8.78	9.94	14				
3	24.3	1776	8.73	9.54	15				
4	KB 24.3 ~~23.3~~	1998	7.56	0.72	16				
5	20.6	1963	7.39	0.06	17				
6	16.1	1993	7.10	0.00	18				
7	14.0	1957	7.10	0.00	19				
7.5 ~~8~~	13.1	1945	7.09	0.00	20				
9					21				
10					22				
11					23				

FIELD DATASHEET

CL10

Date: 10/22/23 Location (Circle): Lake Elsinore/Canyon Lake Station: ~~CL10~~

Time on Station: 0810 Time off Station: 0850 Staff Initials: KB/TD

Weather Conditions: sunny, calm Wind (mph & direction): 0-3mph

Lat: on target Long: on target

4'4"NA Water Depth (m): 3.4 Secchi Depth (~~m~~ ft): 4'4"

Water Chemistry Sample? (Y) / N Chl-a Sample?: (Y) / N ~~Plankton Sample?: Y / N~~ NA

SAMPLE TIME: 0830 Surface volume filtered (ml): 500

Depth-Integrated volume filtered (ml): 500

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Surface (0-2m) CL-A: 0840

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.5	1909	8.62	9.49	12				
1	24.5	1911	8.63	9.47	13				
2	24.5	1926	8.65	9.60	14				
3	24.4	1932	8.65	9.55	15				
4					16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/22/2023 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL07

Time on Station: 1520 Time off Station: 1530 Staff Initials: KB/TD

Weather Conditions: Sunny, clear, breezy Wind (mph & direction): SE 7 mph

Lat: on target Long: on target

Water Depth (m): 15.4 Secchi Depth (~~m~~ ft): 6' 4"

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____ N/A

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Afternoon Readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	24.7	1486	8.75	9.0	12	12.1	1647	7.17	0.0
1	24.7	1488	8.73	9.0	13	12.1	1647	7.16	0.0
2	24.6	1489	8.72	9.0	14	12.1	1648	7.16	0.0
3	24.3	1509	8.67	8.7	15	12.1	1649	7.16	0.0
4	~~23.5~~ 23.4	~~1495~~ 1493	8.77	4.0	16				
5	18.4	1504	7.57	2.3	17				
6	16.6	1519	7.52	3.1	18				
7	14.8	1540	7.34	0.1	19				
8	14.4	1564	7.25	0.0	20				
9	12.7	1615	7.26	0.0	21				
10	12.6	1617	7.25	0.0	22				
11	12.2	1645	7.20	0.0	23				

FIELD DATASHEET

Date: 6/22/2023 Location (Circle): Lake Elsinore/Canyon Lake Station: CL08

Time on Station: 1503 Time off Station: 1510 Staff Initials: KB/TD

Weather Conditions: Sunny, clear, breezy Wind (mph & direction): SE @ 7mph

Lat: on target Long: on target

Water Depth (m): 8.7 Secchi Depth (ft): 7'4"

Water Chemistry Sample?: Y /(N) Chl-a Sample?: Y /(N) Plankton Sample?: Y /(N)

SAMPLE TIME: _____ Surface volume filtered (ml): _____ N/A

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Afternoon readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.4	1478	8.67	8.6	12				
1	25.4	1478	8.65	8.6	13				
2	25.3	1477	8.64	8.6	14				
3	24.4	1479	8.64	8.5	15				
4	23.5	1521	8.39	7.2	16				
5	20.5	1510	7.68	2.2	17				
6	17.4	1498	7.52	3.5	18				
7	14.6	1549	7.31	0.3	19				
8	13.4	1609	7.27	0.0	20				
8.5	13.3	1611	7.26	0.0	21				
10					22				
11					23				

FIELD DATASHEET

Date: 6/22/2023 Location (Circle): Lake Elsinore/(Canyon Lake) Station: CL089

Time on Station: 1440 Time off Station: 1445 Staff Initials: KB/TD

Weather Conditions: Sunny, clear, breezy Wind (mph & direction): SE 7 mph

Lat: on target Long: on target

Water Depth (m): 7.5 Secchi Depth (~~m~~ ft): 5' 8"

Water Chemistry Sample?: Y (N) Chl-a Sample?: Y (N) Plankton Sample?: Y (N) N/A

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Afternoon readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.9	1806	8.85	11.0	12				
1	25.5	1799	8.86	10.9	13				
2	25.0	1756	8.87	11.0	14				
3	24.3	1883	8.17	6.5	15				
4	23.1	1984	7.60	0.6	16				
5	19.1	1951	7.32	0.1	17				
6	16.1	1963	7.13	0.0	18				
7	13.5	1948	7.10	0.0	19				
8					20				
9					21				
10					22				
11					23				

FIELD DATASHEET

Date: 06/22/2023 Location (Circle): Lake Elsinore/Canyon Lake Station: CL1D

Time on Station: 1420 Time off Station: 1425 Staff Initials: KB/TD

Weather Conditions: Sunny, breezy Wind (mph & direction): SE 7 mph

Lat: on target Long: on target

Water Depth (m): 3.8 Secchi Depth (~~m~~ ft): 4'9"

Water Chemistry Sample?: Y / (N) Chl-a Sample?: Y / (N) ~~Plankton Sample?: Y / N~~ N/A

SAMPLE TIME: _____ Surface volume filtered (ml): _____

Depth-Integrated volume filtered (ml): _____

*Do not exceed **7 PSI** or **14 in. Hg** when filtering chlorophyll (~500 mL fill volume preferred). Discard lower chamber when full (after first 250 mL are filtered).

Comments:

Afternoon readings

Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)	Depth (m)	Temp (°C)	Sp. Cond (µS/cm)	pH (units)	DO (mg/L)
0	25.5	1908	8.83	11.0	12				
1	25.4	1908	8.83	11.1	13				
2	24.7	1973	8.83	10.8	14				
3	24.5	1913	8.57	9.5	15				
3.5A	23.4	2097	7.49	0.5	16				
5					17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				

APPENDIX C
LAKE MONITORING ANALYTICAL REPORTS

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders:	2G18105	**Report Date:**	8/12/2022
		Received Date:	7/18/2022
Project:	1915100404 LECL TMDL Monitoring	**Turnaround Time:**	Normal
		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	**P.O. #:**	C015101084
		Billing Code:	
Client:	Wood - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123		

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH #4047 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 7/18/22 with the Chain-of-Custody document. The samples were received in good condition, at 10.4 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
08/12/2022 14:08

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
LE02	Client	2G18105-01	Water	07/18/22 09:00	
LE02 - Int	Client	2G18105-02	Water	07/18/22 09:00	
LE02 - Surf	Client	2G18105-03	Water	07/18/22 10:10	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
08/12/2022 14:08

Sample Results

Sample: LE02
2G18105-01 (Water)

Sampled: 07/18/22 9:00 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2G1175 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/19/22 09:23				**Analyst:** YMT/HEQ
Ammonia as N	**0.42**	0.017	0.10	mg/l	1	07/19/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2G1561 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/28/22 10:00				**Analyst:** ymt
TKN	**4.9**	0.13	0.20	mg/l	2	07/29/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2G1214 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/19/22 13:30				**Analyst:** ISM
Nitrate as N	**0.041**	0.040	0.20	mg/l	1	07/19/22 18:16	J
Nitrite as N	ND	0.042	0.10	mg/l	1	07/19/22 18:16	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2G1225 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/19/22 14:21				**Analyst:** heq
o-Phosphate as P	**0.013**	0.0030	0.010	mg/l	1	07/19/22 16:23	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2G1568 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/24/22 08:24				**Analyst:** heq
Phosphorus as P, Total	**0.16**	0.0067	0.010	mg/l	1	07/27/22	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2G1358 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/20/22 14:46				**Analyst:** jao
Total Dissolved Solids	**2500**	4.0	10	mg/l	1	07/21/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2G1316 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/20/22 10:21				**Analyst:** ymt
Sulfide, Total	**0.20**	0.050	0.10	mg/l	1	07/20/22	

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Project Manager: John Rudolph

Reported:
08/12/2022 14:08

Sample Results Enthalpy Orange

Sample: LE02 - Int
2G18105-02 (Water)

Sampled: 07/18/22 9:00 by Client

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H						
Method: Chlorophyll	**Batch ID:** 293947	**Prepared:** 07/18/22 00:00				**Analyst:** KXP
Chlorophyll a	**120**	1.0	mg/M3	1	07/29/22	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
08/12/2022 14:08

Sample Results Enthalpy Orange (Continued)

Sample: LE02 - Surf
2G18105-03 (Water)

Sampled: 07/18/22 10:10 by Client

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H						
Method: Chlorophyll	**Batch ID:** 293947	**Prepared:** 07/18/22 00:00				**Analyst:** KXP
Chlorophyll a	**140**	1.0	mg/M3	1	07/29/22	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
08/12/2022 14:08

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2G1175 - EPA 350.1											
Blank (W2G1175-BLK1)					**Prepared & Analyzed: 07/19/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W2G1175-BLK2)					**Prepared & Analyzed: 07/19/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W2G1175-BS1)					**Prepared & Analyzed: 07/19/22**						
Ammonia as N	0.259	0.017	0.10	mg/l	0.250		104	90-110			
LCS (W2G1175-BS2)					**Prepared & Analyzed: 07/19/22**						
Ammonia as N	0.256	0.017	0.10	mg/l	0.250		102	90-110			
Matrix Spike (W2G1175-MS1)	**Source: 2G12003-01**				**Prepared & Analyzed: 07/19/22**						
Ammonia as N	0.269	0.017	0.10	mg/l	0.250	ND	108	90-110			
Matrix Spike (W2G1175-MS2)	**Source: 2G14098-01**				**Prepared & Analyzed: 07/19/22**						
Ammonia as N	0.293	0.017	0.10	mg/l	0.250	0.0319	104	90-110			
Matrix Spike Dup (W2G1175-MSD1)	**Source: 2G12003-01**				**Prepared & Analyzed: 07/19/22**						
Ammonia as N	0.269	0.017	0.10	mg/l	0.250	ND	107	90-110	0.3	15	
Matrix Spike Dup (W2G1175-MSD2)	**Source: 2G14098-01**				**Prepared & Analyzed: 07/19/22**						
Ammonia as N	0.297	0.017	0.10	mg/l	0.250	0.0319	106	90-110	2	15	
Batch: W2G1214 - EPA 353.2											
Blank (W2G1214-BLK1)					**Prepared & Analyzed: 07/19/22**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
LCS (W2G1214-BS1)					**Prepared & Analyzed: 07/19/22**						
Nitrate as N	0.989	0.040	0.20	mg/l	1.00		99	90-110			
Nitrite as N	0.969	0.042	0.10	mg/l	1.00		97	90-110			
Matrix Spike (W2G1214-MS1)	**Source: 2G08007-01**				**Prepared & Analyzed: 07/19/22**						
Nitrate as N	2.67	0.040	0.20	mg/l	2.00	0.683	99	90-110			
Nitrite as N	1.00	0.042	0.10	mg/l	1.00	ND	100	90-110			
Matrix Spike (W2G1214-MS2)	**Source: 2G08007-02**				**Prepared & Analyzed: 07/19/22**						
Nitrate as N	2.83	0.040	0.20	mg/l	2.00	0.765	103	90-110			
Nitrite as N	1.08	0.042	0.10	mg/l	1.00	0.0961	98	90-110			
Matrix Spike Dup (W2G1214-MSD1)	**Source: 2G08007-01**				**Prepared & Analyzed: 07/19/22**						
Nitrate as N	2.69	0.040	0.20	mg/l	2.00	0.683	100	90-110	0.7	20	
Nitrite as N	0.996	0.042	0.10	mg/l	1.00	ND	100	90-110	0.4	20	
Matrix Spike Dup (W2G1214-MSD2)	**Source: 2G08007-02**				**Prepared & Analyzed: 07/19/22**						
Nitrate as N	2.82	0.040	0.20	mg/l	2.00	0.765	103	90-110	0.4	20	
Nitrite as N	1.08	0.042	0.10	mg/l	1.00	0.0961	98	90-110	0	20	
Batch: W2G1225 - EPA 365.3											
Blank (W2G1225-BLK1)					**Prepared & Analyzed: 07/19/22**						
o-Phosphate as P	ND	0.0030	0.010	mg/l							

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
08/12/2022 14:08

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2G1225 - EPA 365.3 (Continued)											
LCS (W2G1225-BS1)					**Prepared & Analyzed: 07/19/22**						
o-Phosphate as P	0.198	0.0030	0.010	mg/l	0.200		99	88-111			
Matrix Spike (W2G1225-MS1)	**Source: 2G19058-01**				**Prepared & Analyzed: 07/19/22**						
o-Phosphate as P	0.301	0.0030	0.010	mg/l	0.200	0.110	96	85-112			
Matrix Spike Dup (W2G1225-MSD1)	**Source: 2G19058-01**				**Prepared & Analyzed: 07/19/22**						
o-Phosphate as P	0.303	0.0030	0.010	mg/l	0.200	0.110	96	85-112	0.7	20	
Batch: W2G1316 - SM 4500S2-D											
Blank (W2G1316-BLK1)					**Prepared & Analyzed: 07/20/22**						
Sulfide, Total	ND	0.050	0.10	mg/l							
LCS (W2G1316-BS1)					**Prepared & Analyzed: 07/20/22**						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	90-110			
Duplicate (W2G1316-DUP1)	**Source: 2G18105-01**				**Prepared & Analyzed: 07/20/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l		0.200			0	20	
Duplicate (W2G1316-DUP2)	**Source: 2G20045-01**				**Prepared & Analyzed: 07/20/22**						
Sulfide, Total	4.00	0.50	1.0	mg/l		4.00			0	20	
Matrix Spike (W2G1316-MS1)	**Source: 2G19047-02**				**Prepared & Analyzed: 07/20/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120			
Matrix Spike Dup (W2G1316-MSD1)	**Source: 2G19047-02**				**Prepared & Analyzed: 07/20/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120	0	20	
Batch: W2G1358 - SM 2540C											
Blank (W2G1358-BLK1)					**Prepared: 07/20/22 Analyzed: 07/21/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2G1358-BS1)					**Prepared: 07/20/22 Analyzed: 07/21/22**						
Total Dissolved Solids	808	4.0	10	mg/l	824		98	96-102			
Duplicate (W2G1358-DUP1)	**Source: 2B11007-01**				**Prepared: 07/20/22 Analyzed: 07/21/22**						
Total Dissolved Solids	769	4.0	10	mg/l		732			5	10	
Duplicate (W2G1358-DUP2)	**Source: 2G19098-12**				**Prepared: 07/20/22 Analyzed: 07/21/22**						
Total Dissolved Solids	293	4.0	10	mg/l		294			0.3	10	
Batch: W2G1561 - EPA 351.2											
Blank (W2G1561-BLK1)					**Prepared: 07/28/22 Analyzed: 07/29/22**						
TKN	ND	0.065	0.10	mg/l							
LCS (W2G1561-BS1)					**Prepared: 07/28/22 Analyzed: 07/29/22**						
TKN	0.997	0.065	0.10	mg/l	1.00		100	90-110			
Matrix Spike (W2G1561-MS1)	**Source: 2G19052-05**				**Prepared: 07/28/22 Analyzed: 07/29/22**						
TKN	1.20	0.065	0.10	mg/l	1.00	0.195	101	90-110			
Matrix Spike Dup (W2G1561-MSD1)	**Source: 2G19052-05**				**Prepared: 07/28/22 Analyzed: 07/29/22**						
TKN	1.19	0.065	0.10	mg/l	1.00	0.195	100	90-110	0.8	10	
Batch: W2G1568 - EPA 365.3											

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
08/12/2022 14:08

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2G1568 - EPA 365.3 (Continued)											
Blank (W2G1568-BLK1)					**Prepared: 07/24/22**	**Analyzed: 07/27/22**					
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W2G1568-BS1)					**Prepared: 07/24/22**	**Analyzed: 07/27/22**					
Phosphorus as P, Total	0.198	0.0067	0.010	mg/l	0.200		99	90-110			
LCS (W2G1568-BS2)					**Prepared: 07/24/22**	**Analyzed: 07/27/22**					
Phosphorus as P, Total	0.00900	0.0067	0.010	mg/l	0.0100		90	90-110			J
Matrix Spike (W2G1568-MS1)	**Source: 2G19058-01**				**Prepared: 07/24/22**	**Analyzed: 07/27/22**					
Phosphorus as P, Total	0.345	0.0067	0.010	mg/l	0.200	0.149	98	90-110			
Matrix Spike Dup (W2G1568-MSD1)	**Source: 2G19058-01**				**Prepared: 07/24/22**	**Analyzed: 07/27/22**					
Phosphorus as P, Total	0.339	0.0067	0.010	mg/l	0.200	0.149	95	90-110	2	20	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
08/12/2022 14:08

Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Certificate of Analysis

FINAL REPORT

Work Orders:	2H11116	**Report Date:**	9/02/2022
		Received Date:	8/11/2022
Project:	1915100404 LECL TMDL Monitoring	**Turnaround Time:**	Normal
		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	**P.O. #:**	C015101084
Client:	Wood - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	**Billing Code:**	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH #4047 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 8/11/22 with the Chain-of-Custody document. The samples were received in good condition, at 5.6 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
09/02/2022 18:42

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nicholas Jernack	2H11116-01	Water	08/11/22 10:50	
CL08	Nicholas Jernack	2H11116-02	Water	08/11/22 10:10	
CL09	Nicholas Jernack	2H11116-03	Water	08/11/22 09:10	
CL10	Nicholas Jernack	2H11116-04	Water	08/11/22 08:15	
LE02	Nicholas Jernack	2H11116-05	Water	08/11/22 09:15	
CL07 - Int	Nicholas Jernack	2H11116-06	Water	08/11/22 10:50	
CL07 - Surf	Nicholas Jernack	2H11116-07	Water	08/11/22 10:55	
CL08 - Int	Nicholas Jernack	2H11116-08	Water	08/11/22 10:10	
CL08 - Surf	Nicholas Jernack	2H11116-09	Water	08/11/22 10:20	
CL09 - Int	Nicholas Jernack	2H11116-10	Water	08/11/22 09:10	
CL09 - Surf	Nicholas Jernack	2H11116-11	Water	08/11/22 09:15	
CL10 - Int	Nicholas Jernack	2H11116-12	Water	08/11/22 08:15	
CL10 - Surf	Nicholas Jernack	2H11116-13	Water	08/11/22 08:30	
LE02 - Int	Nicholas Jernack	2H11116-14	Water	08/11/22 09:15	
LE02 - Surf	Nicholas Jernack	2H11116-15	Water	08/11/22 09:40	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported: 09/02/2022 18:42

Sample Results

Sample: CL07

2H11116-01 (Water)

Sampled: 08/11/22 10:50 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2H1180 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 10:02				**Analyst:** YMT/HEQ
Ammonia as N	**1.3**	0.017	0.10	mg/l	1	08/16/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2H1151 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/13/22 11:11				**Analyst:** YMT
TKN	**2.0**	0.065	0.10	mg/l	1	08/17/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2H1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 16:41				**Analyst:** ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	08/12/22 18:36	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	08/12/22 18:36	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1013 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/11/22 11:21				**Analyst:** heq
Phosphorus as P, Total	**0.020**	0.0067	0.010	mg/l	1	08/18/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1124 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 13:03				**Analyst:** vat
o-Phosphate as P	**0.0070**	0.0030	0.010	mg/l	1	08/12/22 15:34	J
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2H1245 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 16:11				**Analyst:** jao
Total Dissolved Solids	**580**	4.0	10	mg/l	1	08/16/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2H1407 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/17/22 09:53				**Analyst:** ism
Total Suspended Solids	**3**		5	mg/l	1	08/17/22	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2H1525 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/18/22 14:00				**Analyst:** ymt
Sulfide, Total	**7.0**	0.50	1.0	mg/l	10	08/18/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2H1219 **Preparation:** EPA 200.2			**Prepared:** 08/15/22 12:52				**Analyst:** kvm
Aluminum, Dissolved	**0.053**	0.041	0.050	mg/l	1	08/22/22	
Aluminum, Total	**0.057**	0.041	0.050	mg/l	1	08/22/22	

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San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported: 09/02/2022 18:42

Sample Results

(Continued)

Sample: CL08

2H11116-02 (Water)

Sampled: 08/11/22 10:10 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2H1180 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 10:02				**Analyst:** YMT/HEQ
Ammonia as N	**0.29**	0.017	0.10	mg/l	1	08/16/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2H1151 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/13/22 11:11				**Analyst:** YMT
TKN	**1.1**	0.065	0.10	mg/l	1	08/17/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2H1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 16:41				**Analyst:** ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	08/12/22 18:42	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	08/12/22 18:42	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1013 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/11/22 11:21				**Analyst:** heq
Phosphorus as P, Total	**0.020**	0.0067	0.010	mg/l	1	08/18/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1124 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 13:03				**Analyst:** vat
o-Phosphate as P	**0.0030**	0.0030	0.010	mg/l	1	08/12/22 15:36	J
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2H1245 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 16:11				**Analyst:** jao
Total Dissolved Solids	**610**	4.0	10	mg/l	1	08/16/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2H1407 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/17/22 09:53				**Analyst:** ism
Total Suspended Solids	**4**		5	mg/l	1	08/17/22	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2H1525 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/18/22 14:00				**Analyst:** ymt
Sulfide, Total	**1.5**	0.25	0.50	mg/l	5	08/18/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2H1219 **Preparation:** EPA 200.2			**Prepared:** 08/15/22 12:52				**Analyst:** kvm
Aluminum, Dissolved	**0.065**	0.041	0.050	mg/l	1	08/22/22	
Aluminum, Total	**0.074**	0.041	0.050	mg/l	1	08/22/22	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported: 09/02/2022 18:42

Sample Results

(Continued)

Sample: CL09

Sampled: 08/11/22 9:10 by Nicholas Jernack

2H11116-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2H1180 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 10:02				**Analyst:** YMT/HEQ
Ammonia as N	**1.6**	0.017	0.10	mg/l	1	08/16/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2H1151 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/13/22 11:11				**Analyst:** YMT
TKN	**2.7**	0.065	0.10	mg/l	1	08/17/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2H1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 16:41				**Analyst:** ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	08/12/22 18:47	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	08/12/22 18:47	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1013 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/11/22 11:21				**Analyst:** heq
Phosphorus as P, Total	**0.031**	0.0067	0.010	mg/l	1	08/18/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1124 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 13:03				**Analyst:** vat
o-Phosphate as P	**0.022**	0.0030	0.010	mg/l	1	08/12/22 15:37	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2H1245 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 16:11				**Analyst:** jao
Total Dissolved Solids	**680**	4.0	10	mg/l	1	08/16/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2H1407 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/17/22 09:53				**Analyst:** ism
Total Suspended Solids	**7**		5	mg/l	1	08/17/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2H1525 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/18/22 14:00				**Analyst:** ymt
Sulfide, Total	**8.0**	0.50	1.0	mg/l	10	08/18/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2H1219 **Preparation:** EPA 200.2			**Prepared:** 08/15/22 12:52				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	08/22/22	
Aluminum, Total	**0.062**	0.041	0.050	mg/l	1	08/22/22	

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Sample Results

(Continued)

Sample: CL10
2H11116-04 (Water)

Sampled: 08/11/22 8:15 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2H1180 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 10:02				**Analyst:** YMT/HEQ
Ammonia as N	**0.021**	0.017	0.10	mg/l	1	08/16/22	J
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2H1151 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/13/22 11:11				**Analyst:** YMT
TKN	**0.93**	0.065	0.10	mg/l	1	08/17/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2H1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 16:41				**Analyst:** ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	08/12/22 18:48	FILT
Nitrite as N	**0.042**	0.042	0.10	mg/l	1	08/12/22 18:48	FILT, J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1013 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/11/22 11:21				**Analyst:** heq
Phosphorus as P, Total	**0.013**	0.0067	0.010	mg/l	1	08/18/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1124 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 13:03				**Analyst:** vat
o-Phosphate as P	ND	0.0030	0.010	mg/l	1	08/12/22 15:38	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2H1245 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 16:11				**Analyst:** jao
Total Dissolved Solids	**710**	4.0	10	mg/l	1	08/16/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2H1407 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/17/22 09:53				**Analyst:** ism
Total Suspended Solids	**6**		5	mg/l	1	08/17/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2H1525 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/18/22 14:00				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	08/18/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2H1219 **Preparation:** EPA 200.2			**Prepared:** 08/15/22 12:52				**Analyst:** kvm
Aluminum, Dissolved	**0.044**	0.041	0.050	mg/l	1	08/22/22	J
Aluminum, Total	**0.085**	0.041	0.050	mg/l	1	08/22/22	

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Sample Results

(Continued)

Sample: LE02
2H11116-05 (Water)

Sampled: 08/11/22 9:15 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2H1180 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 10:02				**Analyst:** YMT/HEQ
Ammonia as N	**0.21**	0.017	0.10	mg/l	1	08/16/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2H1151 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/13/22 11:11				**Analyst:** YMT
TKN	**4.9**	0.26	0.40	mg/l	4	08/17/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2H1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 16:41				**Analyst:** ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	08/12/22 18:49	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	08/12/22 18:49	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1013 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/11/22 11:21				**Analyst:** heq
Phosphorus as P, Total	**0.095**	0.0067	0.010	mg/l	1	08/18/22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2H1124 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/12/22 13:03				**Analyst:** vat
o-Phosphate as P	**0.0080**	0.0030	0.010	mg/l	1	08/12/22 15:39	J
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2H1245 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/15/22 16:11				**Analyst:** jao
Total Dissolved Solids	**2600**	4.0	10	mg/l	1	08/16/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2H1525 **Preparation:** _NONE (WETCHEM)			**Prepared:** 08/18/22 14:00				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	08/18/22	

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Sample Results Enthalpy Orange

Sample: CL07 - Int
2H11116-06 (Water)

Sampled: 08/11/22 10:50 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**14**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Sample Results Enthalpy Orange (Continued)

Sample: CL07 - Surf
2H11116-07 (Water)

Sampled: 08/11/22 10:55 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**6.4**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Sample Results Enthalpy Orange (Continued)

Sample: CL08 - Int
2H11116-08 (Water)

Sampled: 08/11/22 10:10 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**30**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Sample Results Enthalpy Orange (Continued)

Sample: CL08 - Surf
2H11116-09 (Water)

Sampled: 08/11/22 10:20 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**5.3**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Sample Results Enthalpy Orange (Continued)

Sample: CL09 - Int
2H11116-10 (Water)

Sampled: 08/11/22 9:10 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**71**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Sample Results Enthalpy Orange (Continued)

Sample: CL09 - Surf
2H11116-11 (Water)

Sampled: 08/11/22 9:15 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**10**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Sample Results Enthalpy Orange (Continued)

Sample: CL10 - Int
2H11116-12 (Water)

Sampled: 08/11/22 8:15 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**93**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Sample Results Enthalpy Orange (Continued)

Sample: CL10 - Surf
2H11116-13 (Water)

Sampled: 08/11/22 8:30 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**91**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Sample Results Enthalpy Orange (Continued)

Sample: LE02 - Int
2H11116-14 (Water)

Sampled: 08/11/22 9:15 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**78**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Sample Results Enthalpy Orange (Continued)

Sample: LE02 - Surf
2H11116-15 (Water)

Sampled: 08/11/22 9:40 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 295120		**Prepared:** 08/11/22 00:00				**Analyst:** KXP
Chlorophyll a	**160**	1.0	1.0	mg/M3	1	08/16/22	

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Reported:
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Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2H1013 - EPA 365.3											
Blank (W2H1013-BLK1)					**Prepared: 08/11/22 Analyzed: 08/18/22**						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W2H1013-BS1)					**Prepared: 08/11/22 Analyzed: 08/18/22**						
Phosphorus as P, Total	0.202	0.0067	0.010	mg/l	0.200		101	90-110			
Matrix Spike (W2H1013-MS1)	**Source: 2H09077-01**				**Prepared: 08/11/22 Analyzed: 08/18/22**						
Phosphorus as P, Total	0.265	0.0067	0.010	mg/l	0.200	0.0580	104	90-110			
Matrix Spike Dup (W2H1013-MSD1)	**Source: 2H09077-01**				**Prepared: 08/11/22 Analyzed: 08/18/22**						
Phosphorus as P, Total	0.261	0.0067	0.010	mg/l	0.200	0.0580	102	90-110	2	20	
Batch: W2H1124 - EPA 365.3											
Blank (W2H1124-BLK1)					**Prepared & Analyzed: 08/12/22**						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
LCS (W2H1124-BS1)					**Prepared & Analyzed: 08/12/22**						
o-Phosphate as P	0.193	0.0030	0.010	mg/l	0.200		96	88-111			
Matrix Spike (W2H1124-MS1)	**Source: 2H11116-01**				**Prepared & Analyzed: 08/12/22**						
o-Phosphate as P	0.211	0.0030	0.010	mg/l	0.200	0.00700	102	85-112			
Matrix Spike Dup (W2H1124-MSD1)	**Source: 2H11116-01**				**Prepared & Analyzed: 08/12/22**						
o-Phosphate as P	0.217	0.0030	0.010	mg/l	0.200	0.00700	105	85-112	3	20	
Batch: W2H1139 - EPA 353.2											
Blank (W2H1139-BLK1)					**Prepared & Analyzed: 08/12/22**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
LCS (W2H1139-BS1)					**Prepared & Analyzed: 08/12/22**						
Nitrate as N	1.02	0.040	0.20	mg/l	1.00		102	90-110			
Nitrite as N	0.971	0.042	0.10	mg/l	1.00		97	90-110			
Matrix Spike (W2H1139-MS1)	**Source: 2H11116-01**				**Prepared & Analyzed: 08/12/22**						
Nitrate as N	2.01	0.040	0.20	mg/l	2.00	ND	100	90-110			
Nitrite as N	0.956	0.042	0.10	mg/l	1.00	ND	96	90-110			
Matrix Spike (W2H1139-MS2)	**Source: 2H11116-02**				**Prepared & Analyzed: 08/12/22**						
Nitrate as N	2.04	0.040	0.20	mg/l	2.00	ND	102	90-110			
Nitrite as N	0.926	0.042	0.10	mg/l	1.00	ND	93	90-110			
Matrix Spike Dup (W2H1139-MSD1)	**Source: 2H11116-01**				**Prepared & Analyzed: 08/12/22**						
Nitrate as N	2.02	0.040	0.20	mg/l	2.00	ND	101	90-110	0.5	20	
Nitrite as N	0.979	0.042	0.10	mg/l	1.00	ND	98	90-110	2	20	
Matrix Spike Dup (W2H1139-MSD2)	**Source: 2H11116-02**				**Prepared & Analyzed: 08/12/22**						
Nitrate as N	2.03	0.040	0.20	mg/l	2.00	ND	102	90-110	0.5	20	
Nitrite as N	0.970	0.042	0.10	mg/l	1.00	ND	97	90-110	5	20	
Batch: W2H1151 - EPA 351.2											
Blank (W2H1151-BLK1)					**Prepared: 08/13/22 Analyzed: 08/17/22**						

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
09/02/2022 18:42

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2H1151 - EPA 351.2 (Continued)											
Blank (W2H1151-BLK1)					**Prepared: 08/13/22**	**Analyzed: 08/17/22**					
TKN	ND	0.065	0.10	mg/l							
Blank (W2H1151-BLK2)					**Prepared: 08/13/22**	**Analyzed: 08/17/22**					
TKN	ND	0.065	0.10	mg/l							
LCS (W2H1151-BS1)					**Prepared: 08/13/22**	**Analyzed: 08/17/22**					
TKN	0.992	0.065	0.10	mg/l	1.00		99	90-110			
LCS (W2H1151-BS2)					**Prepared: 08/13/22**	**Analyzed: 08/17/22**					
TKN	0.983	0.065	0.10	mg/l	1.00		98	90-110			
Matrix Spike (W2H1151-MS1)	**Source: 2H09042-01**				**Prepared: 08/13/22**	**Analyzed: 08/17/22**					
TKN	1.25	0.065	0.10	mg/l	1.00	0.260	99	90-110			
Matrix Spike (W2H1151-MS2)	**Source: 2H12044-01**				**Prepared: 08/13/22**	**Analyzed: 08/17/22**					
TKN	2.39	0.065	0.10	mg/l	1.00	1.39	100	90-110			
Matrix Spike Dup (W2H1151-MSD1)	**Source: 2H09042-01**				**Prepared: 08/13/22**	**Analyzed: 08/17/22**					
TKN	1.25	0.065	0.10	mg/l	1.00	0.260	99	90-110	0.07	10	
Matrix Spike Dup (W2H1151-MSD2)	**Source: 2H12044-01**				**Prepared: 08/13/22**	**Analyzed: 08/17/22**					
TKN	2.37	0.065	0.10	mg/l	1.00	1.39	98	90-110	1	10	
Batch: W2H1180 - EPA 350.1											
Blank (W2H1180-BLK1)					**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W2H1180-BLK2)					**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W2H1180-BS1)					**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Ammonia as N	0.257	0.017	0.10	mg/l	0.250		103	90-110			
LCS (W2H1180-BS2)					**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Ammonia as N	0.261	0.017	0.10	mg/l	0.250		104	90-110			
Matrix Spike (W2H1180-MS1)	**Source: 2H12027-02**				**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Ammonia as N	0.647	0.017	0.10	mg/l	0.250	0.379	107	90-110			
Matrix Spike (W2H1180-MS2)	**Source: 2H12044-01**				**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Ammonia as N	0.275	0.017	0.10	mg/l	0.250	0.0183	103	90-110			
Matrix Spike Dup (W2H1180-MSD1)	**Source: 2H12027-02**				**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Ammonia as N	0.650	0.017	0.10	mg/l	0.250	0.379	108	90-110	0.5	15	
Matrix Spike Dup (W2H1180-MSD2)	**Source: 2H12044-01**				**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Ammonia as N	0.274	0.017	0.10	mg/l	0.250	0.0183	102	90-110	0.3	15	
Batch: W2H1245 - SM 2540C											
Blank (W2H1245-BLK1)					**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2H1245-BS1)					**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Total Dissolved Solids	829	4.0	10	mg/l	824		101	96-102			

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Project Manager: John Rudolph

Reported:
09/02/2022 18:42

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2H1245 - SM 2540C (Continued)											
Duplicate (W2H1245-DUP1)	**Source: 2G15128-03**				**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Total Dissolved Solids	4560	4.0	10	mg/l		4570			0.2	10	
Duplicate (W2H1245-DUP2)	**Source: 2H11116-05**				**Prepared: 08/15/22**	**Analyzed: 08/16/22**					
Total Dissolved Solids	2560	4.0	10	mg/l		2600			2	10	
Batch: W2H1407 - SM 2540D											
Blank (W2H1407-BLK1)					**Prepared & Analyzed: 08/17/22**						
Total Suspended Solids	ND		5	mg/l							
LCS (W2H1407-BS1)					**Prepared & Analyzed: 08/17/22**						
Total Suspended Solids	48.9		5	mg/l	51.0		96	90-110			
Duplicate (W2H1407-DUP1)	**Source: 2H11011-01**				**Prepared & Analyzed: 08/17/22**						
Total Suspended Solids	2100		5	mg/l		2000			5	10	
Duplicate (W2H1407-DUP2)	**Source: 2H11048-01**				**Prepared & Analyzed: 08/17/22**						
Total Suspended Solids	1540		5	mg/l		1500			3	10	
Batch: W2H1525 - SM 4500S2-D											
Blank (W2H1525-BLK1)					**Prepared & Analyzed: 08/18/22**						
Sulfide, Total	ND	0.050	0.10	mg/l							
LCS (W2H1525-BS1)					**Prepared & Analyzed: 08/18/22**						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	90-110			
Duplicate (W2H1525-DUP1)	**Source: 2H11116-02**				**Prepared & Analyzed: 08/18/22**						
Sulfide, Total	1.50	0.15	0.30	mg/l		1.50			0	20	
Duplicate (W2H1525-DUP2)	**Source: 2H11116-01**				**Prepared & Analyzed: 08/18/22**						
Sulfide, Total	7.00	0.50	1.0	mg/l		7.00			0	20	
Duplicate (W2H1525-DUP3)	**Source: 2H11116-03**				**Prepared & Analyzed: 08/18/22**						
Sulfide, Total	8.00	1.0	2.0	mg/l		8.00			0	20	
Matrix Spike (W2H1525-MS1)	**Source: 2H11116-04**				**Prepared & Analyzed: 08/18/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120			
Matrix Spike Dup (W2H1525-MSD1)	**Source: 2H11116-04**				**Prepared & Analyzed: 08/18/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120	0	20	

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Project Manager: John Rudolph

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09/02/2022 18:42

Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2H1219 - EPA 200.7											
Blank (W2H1219-BLK1)					**Prepared: 08/15/22**	**Analyzed: 08/22/22**					
Aluminum, Dissolved	ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.041	0.050	mg/l							
LCS (W2H1219-BS1)					**Prepared: 08/15/22**	**Analyzed: 08/22/22**					
Aluminum, Dissolved	0.226	0.041	0.050	mg/l	0.200		113	85-115			
Aluminum, Total	0.226	0.041	0.050	mg/l	0.200		113	85-115			
Matrix Spike (W2H1219-MS1)	**Source: 2H11117-01**				**Prepared: 08/15/22**	**Analyzed: 08/22/22**					
Aluminum, Total	0.299	0.041	0.050	mg/l	0.200	0.0423	128	70-130			
Matrix Spike (W2H1219-MS2)	**Source: 2H11117-03**				**Prepared: 08/15/22**	**Analyzed: 08/22/22**					
Aluminum, Total	0.292	0.041	0.050	mg/l	0.200	ND	146	70-130			MS-01
Matrix Spike Dup (W2H1219-MSD1)	**Source: 2H11117-01**				**Prepared: 08/15/22**	**Analyzed: 08/22/22**					
Aluminum, Total	0.301	0.041	0.050	mg/l	0.200	0.0423	129	70-130	0.7	30	
Matrix Spike Dup (W2H1219-MSD2)	**Source: 2H11117-03**				**Prepared: 08/15/22**	**Analyzed: 08/22/22**					
Aluminum, Total	0.273	0.041	0.050	mg/l	0.200	ND	136	70-130	7	30	MS-01

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Project Manager: John Rudolph

Reported:
09/02/2022 18:42

Notes and Definitions

Item	Definition
FILT	The sample was filtered prior to analysis.
J	Estimated conc. detected <MRL and >MDL.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Certificate of Analysis

FINAL REPORT

Work Orders:	2I21005
Project:	1915100405 LE TMDL Monitoring
Attn:	John Rudolph
Client:	WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Report Date:	10/06/2022
Received Date:	9/20/2022
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
P.O. #:	C015101084
Billing Code:	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH #4047 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 9/20/22 with the Chain-of-Custody document. The samples were received in good condition, at 1.4 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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Project Number: 1915100405 LE TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/06/2022 16:23

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
LE02	Nicholas Jernack	2I21005-01	Water	09/20/22 08:40	

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Project Manager: John Rudolph

Reported:
10/06/2022 16:23

Sample Results

Sample: LE02

Sampled: 09/20/22 8:40 by Nicholas Jernack

2I21005-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2I1986 **Preparation:** _NONE (WETCHEM)			**Prepared:** 09/27/22 12:22				**Analyst:** HEQ
Ammonia as N	**0.032**	0.017	0.10	mg/l	1	09/28/22	J
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2I2020 **Preparation:** _NONE (WETCHEM)			**Prepared:** 09/27/22 15:41				**Analyst:** YMT
TKN	**5.2**	0.26	0.40	mg/l	4	09/29/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2I1588 **Preparation:** _NONE (WETCHEM)			**Prepared:** 09/21/22 13:54				**Analyst:** ism
Nitrate as N	**0.043**	0.040	0.20	mg/l	1	09/21/22 18:01	J
Nitrite as N	ND	0.042	0.10	mg/l	1	09/21/22 18:01	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2I1614 **Preparation:** _NONE (WETCHEM)			**Prepared:** 09/21/22 16:51				**Analyst:** heq
o-Phosphate as P	**0.0080**	0.0030	0.010	mg/l	1	09/21/22 18:20	J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2I1816 **Preparation:** _NONE (WETCHEM)			**Prepared:** 09/25/22 08:07				**Analyst:** heq
Phosphorus as P, Total	**0.11**	0.0067	0.010	mg/l	1	09/26/22	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2I1643 **Preparation:** _NONE (WETCHEM)			**Prepared:** 09/22/22 09:35				**Analyst:** jao
Total Dissolved Solids	**2600**	4.0	10	mg/l	1	09/22/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2I1653 **Preparation:** _NONE (WETCHEM)			**Prepared:** 09/22/22 10:02				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	09/22/22	

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Project Manager: John Rudolph

Reported:
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Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2I1588 - EPA 353.2											
Blank (W2I1588-BLK1)					**Prepared & Analyzed: 09/21/22**						
Nitrate as N	ND	0.040	0.15	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
LCS (W2I1588-BS1)					**Prepared & Analyzed: 09/21/22**						
Nitrate as N	1.02	0.040	0.15	mg/l	1.00		102	90-110			
Nitrite as N	1.01	0.042	0.10	mg/l	1.00		101	90-110			
Matrix Spike (W2I1588-MS1)	**Source: 2I20077-01**				**Prepared & Analyzed: 09/21/22**						
Nitrate as N	4.91	0.040	0.15	mg/l	2.00	2.91	100	90-110			
Nitrite as N	0.994	0.042	0.10	mg/l	1.00	ND	99	90-110			
Matrix Spike (W2I1588-MS2)	**Source: 2I20077-02**				**Prepared & Analyzed: 09/21/22**						
Nitrate as N	4.94	0.040	0.15	mg/l	2.00	2.93	100	90-110			
Nitrite as N	1.00	0.042	0.10	mg/l	1.00	ND	100	90-110			
Matrix Spike Dup (W2I1588-MSD1)	**Source: 2I20077-01**				**Prepared & Analyzed: 09/21/22**						
Nitrate as N	4.93	0.040	0.15	mg/l	2.00	2.91	101	90-110	0.4	20	
Nitrite as N	1.00	0.042	0.10	mg/l	1.00	ND	100	90-110	0.6	20	
Matrix Spike Dup (W2I1588-MSD2)	**Source: 2I20077-02**				**Prepared & Analyzed: 09/21/22**						
Nitrate as N	4.95	0.040	0.15	mg/l	2.00	2.93	101	90-110	0.2	20	
Nitrite as N	0.996	0.042	0.10	mg/l	1.00	ND	100	90-110	0.4	20	
Batch: W2I1614 - EPA 365.3											
Blank (W2I1614-BLK1)					**Prepared & Analyzed: 09/21/22**						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
LCS (W2I1614-BS1)					**Prepared & Analyzed: 09/21/22**						
o-Phosphate as P	0.199	0.0030	0.010	mg/l	0.200		100	88-111			
Matrix Spike (W2I1614-MS1)	**Source: 2I21004-01**				**Prepared & Analyzed: 09/21/22**						
o-Phosphate as P	0.203	0.0030	0.010	mg/l	0.200	0.0100	96	85-112			
Matrix Spike Dup (W2I1614-MSD1)	**Source: 2I21004-01**				**Prepared & Analyzed: 09/21/22**						
o-Phosphate as P	0.210	0.0030	0.010	mg/l	0.200	0.0100	100	85-112	3	20	
Batch: W2I1643 - SM 2540C											
Blank (W2I1643-BLK1)					**Prepared & Analyzed: 09/22/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2I1643-BS1)					**Prepared & Analyzed: 09/22/22**						
Total Dissolved Solids	836	4.0	10	mg/l	824		101	96-102			
Duplicate (W2I1643-DUP1)	**Source: 2I20039-01**				**Prepared & Analyzed: 09/22/22**						
Total Dissolved Solids	540	4.0	10	mg/l		538			0.4	10	
Duplicate (W2I1643-DUP2)	**Source: 2I20039-02**				**Prepared & Analyzed: 09/22/22**						
Total Dissolved Solids	559	4.0	10	mg/l		540			3	10	
Batch: W2I1653 - SM 4500S2-D											
Blank (W2I1653-BLK1)					**Prepared & Analyzed: 09/22/22**						

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Project Manager: John Rudolph

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Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2I1653 - SM 4500S2-D (Continued)											
Blank (W2I1653-BLK1)					**Prepared & Analyzed: 09/22/22**						
Sulfide, Total	ND	0.050	0.10	mg/l							
LCS (W2I1653-BS1)					**Prepared & Analyzed: 09/22/22**						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	90-110			
Duplicate (W2I1653-DUP1)	**Source: 2I12007-01**				**Prepared & Analyzed: 09/22/22**						
Sulfide, Total	0.600	0.050	0.10	mg/l		0.600			0	20	
Duplicate (W2I1653-DUP2)	**Source: 2I19063-01**				**Prepared & Analyzed: 09/22/22**						
Sulfide, Total	0.500	0.050	0.10	mg/l		0.500			0	20	
Duplicate (W2I1653-DUP3)	**Source: 2I21086-01**				**Prepared & Analyzed: 09/22/22**						
Sulfide, Total	6.00	1.0	2.0	mg/l		6.00			0	20	
Duplicate (W2I1653-DUP4)	**Source: 2I21091-03**				**Prepared & Analyzed: 09/22/22**						
Sulfide, Total	6.00	1.0	2.0	mg/l		6.00			0	20	
Duplicate (W2I1653-DUP5)	**Source: 2I22031-01**				**Prepared & Analyzed: 09/22/22**						
Sulfide, Total	4.00	0.50	1.0	mg/l		4.00			0	20	
Matrix Spike (W2I1653-MS1)	**Source: 2H02097-01**				**Prepared & Analyzed: 09/22/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120			
Matrix Spike Dup (W2I1653-MSD1)	**Source: 2H02097-01**				**Prepared & Analyzed: 09/22/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120	0	20	
Batch: W2I1816 - EPA 365.3											
Blank (W2I1816-BLK1)					**Prepared: 09/25/22 Analyzed: 09/26/22**						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W2I1816-BS1)					**Prepared: 09/25/22 Analyzed: 09/26/22**						
Phosphorus as P, Total	0.199	0.0067	0.010	mg/l	0.200		100	90-110			
Matrix Spike (W2I1816-MS1)	**Source: 2I20017-01**				**Prepared: 09/25/22 Analyzed: 09/26/22**						
Phosphorus as P, Total	0.314	0.0067	0.010	mg/l	0.200	0.125	94	90-110			
Matrix Spike Dup (W2I1816-MSD1)	**Source: 2I20017-01**				**Prepared: 09/25/22 Analyzed: 09/26/22**						
Phosphorus as P, Total	0.311	0.0067	0.010	mg/l	0.200	0.125	93	90-110	1	20	
Batch: W2I1986 - EPA 350.1											
Blank (W2I1986-BLK1)					**Prepared: 09/27/22 Analyzed: 09/28/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W2I1986-BS1)					**Prepared: 09/27/22 Analyzed: 09/28/22**						
Ammonia as N	0.266	0.017	0.10	mg/l	0.250		106	90-110			
Matrix Spike (W2I1986-MS1)	**Source: 2I15116-01**				**Prepared: 09/27/22 Analyzed: 09/28/22**						
Ammonia as N	0.578	0.017	0.10	mg/l	0.250	0.315	105	90-110			
Matrix Spike Dup (W2I1986-MSD1)	**Source: 2I15116-01**				**Prepared: 09/27/22 Analyzed: 09/28/22**						
Ammonia as N	0.577	0.017	0.10	mg/l	0.250	0.315	105	90-110	0.04	15	
Batch: W2I2020 - EPA 351.2											
Blank (W2I2020-BLK1)					**Prepared: 09/27/22 Analyzed: 09/29/22**						

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San Diego, CA 92123

Project Number: 1915100405 LE TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/06/2022 16:23

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2I2020 - EPA 351.2 (Continued)											
Blank (W2I2020-BLK1)					**Prepared: 09/27/22**	**Analyzed: 09/29/22**					
TKN	ND	0.065	0.10	mg/l							
Blank (W2I2020-BLK2)					**Prepared: 09/27/22**	**Analyzed: 09/29/22**					
TKN	ND	0.065	0.10	mg/l							
LCS (W2I2020-BS1)					**Prepared: 09/27/22**	**Analyzed: 09/29/22**					
TKN	0.941	0.065	0.10	mg/l	1.00		94	90-110			
LCS (W2I2020-BS2)					**Prepared: 09/27/22**	**Analyzed: 09/29/22**					
TKN	0.917	0.065	0.10	mg/l	1.00		92	90-110			
Matrix Spike (W2I2020-MS1)	**Source: 2I22038-01**				**Prepared: 09/27/22**	**Analyzed: 09/29/22**					
TKN	1.21	0.065	0.10	mg/l	1.00	0.258	95	90-110			
Matrix Spike (W2I2020-MS2)	**Source: 2I26056-01**				**Prepared: 09/27/22**	**Analyzed: 09/29/22**					
TKN	1.83	0.065	0.10	mg/l	1.00	0.853	98	90-110			
Matrix Spike Dup (W2I2020-MSD1)	**Source: 2I22038-01**				**Prepared: 09/27/22**	**Analyzed: 09/29/22**					
TKN	1.21	0.065	0.10	mg/l	1.00	0.258	95	90-110	0.02	10	
Matrix Spike Dup (W2I2020-MSD2)	**Source: 2I26056-01**				**Prepared: 09/27/22**	**Analyzed: 09/29/22**					
TKN	1.80	0.065	0.10	mg/l	1.00	0.853	95	90-110	2	10	

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San Diego, CA 92123

Project Number: 1915100405 LE TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/06/2022 16:23

Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders: 2I21006

Project: 1915100404 LECL TMDL Monitoring

Attn: John Rudolph

Client: WSP USA E&I Inc. - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Report Date: 10/06/2022
Received Date: 9/21/2022
Turnaround Time: Normal
Phones: (858) 514-6465
Fax: (858) 278-5300
P.O. #: C015101084
Billing Code:

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH #4047 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 9/21/22 with the Chain-of-Custody document. The samples were received in good condition, at 1.4 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/06/2022 16:16

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
LE02 - Int	Nicholas Jernack	2I21006-01	Water	09/20/22 08:40	
LE02 - Surf	Nicholas Jernack	2I21006-02	Water	09/20/22 09:00	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/06/2022 16:16

Sample Results Enthalpy Orange

Sample: LE02 - Int
2I21006-01 (Water)

Sampled: 09/20/22 8:40 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298173		**Prepared:** 09/20/22 00:00				**Analyst:** KXP
Chlorophyll a	**170**	1.0	1.0	mg/M3	1	10/03/22	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/06/2022 16:16

Sample Results Enthalpy Orange (Continued)

Sample: LE02 - Surf
2I21006-02 (Water)

Sampled: 09/20/22 9:00 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298173		**Prepared:** 09/20/22 00:00				**Analyst:** KXP
Chlorophyll a	**180**	1.0	1.0	mg/M3	1	10/03/22	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/06/2022 16:16

Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Certificate of Analysis

FINAL REPORT

Work Orders: 2J05098

Project: 1915100405 LECL TMDL Monitoring

Attn: John Rudolph

Client: WSP USA E&I Inc. - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Report Date: 10/26/2022
Received Date: 10/5/2022
Turnaround Time: Normal
Phones: (858) 514-6465
Fax: (858) 278-5300
P.O. #: C015101084
Billing Code:

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH #4047 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 10/05/22 with the Chain-of-Custody document. The samples were received in good condition, at 2.8 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:52

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nick Jernack	2J05098-01	Water	10/05/22 11:05	
CL08	Nick Jernack	2J05098-02	Water	10/05/22 10:10	
CL09	Nick Jernack	2J05098-03	Water	10/05/22 09:10	
CL10	Nick Jernack	2J05098-04	Water	10/05/22 08:15	
LE02	Nick Jernack	2J05098-05	Water	10/05/22 09:05	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:52

Sample Results

Sample: CL07
2J05098-01 (Water)

Sampled: 10/05/22 11:05 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2J0511 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/07/22 10:38				**Analyst:** YMT
Ammonia as N	**2.1**	0.017	0.10	mg/l	1	10/10/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2J1114 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/15/22 09:07				**Analyst:** YMT
TKN	**2.7**	0.13	0.20	mg/l	1	10/20/22	M-02
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2J0391 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:15				**Analyst:** ism
Nitrate as N	**0.066**	0.040	0.20	mg/l	1	10/06/22 16:53	FILT, J
Nitrite as N	ND	0.042	0.10	mg/l	1	10/06/22 16:53	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0379 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:32				**Analyst:** heq
o-Phosphate as P	**0.069**	0.0030	0.010	mg/l	1	10/06/22 12:01	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0384 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:36				**Analyst:** heq
Phosphorus as P, Total	**0.034**	0.0067	0.010	mg/l	1	10/10/22	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2J0641 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/10/22 15:43				**Analyst:** jao
Total Dissolved Solids	**620**	4.0	10	mg/l	1	10/11/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2J0701 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/11/22 10:07				**Analyst:** ism
Total Suspended Solids	ND		5	mg/l	1	10/11/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2J0405 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:41				**Analyst:** ymt
Sulfide, Total	**6.0**	0.50	1.0	mg/l	10	10/06/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2J0494 **Preparation:** EPA 200.2			**Prepared:** 10/07/22 09:26				**Analyst:** kvm
Aluminum, Dissolved	**0.041**	0.041	0.050	mg/l	1	10/11/22	J
Aluminum, Total	**0.050**	0.041	0.050	mg/l	1	10/11/22	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:52

Sample Results

(Continued)

Sample: CL08
2J05098-02 (Water)

Sampled: 10/05/22 10:10 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2J0511 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/07/22 10:38				**Analyst:** YMT
Ammonia as N	**0.17**	0.017	0.10	mg/l	1	10/10/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2J1114 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/15/22 09:07				**Analyst:** YMT
TKN	**0.93**	0.065	0.10	mg/l	1	10/20/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2J0391 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:15				**Analyst:** ism
Nitrate as N	**0.062**	0.040	0.20	mg/l	1	10/06/22 16:54	FILT, J
Nitrite as N	ND	0.042	0.10	mg/l	1	10/06/22 16:54	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0379 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:32				**Analyst:** heq
o-Phosphate as P	ND	0.0030	0.010	mg/l	1	10/06/22 12:02	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0384 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:36				**Analyst:** heq
Phosphorus as P, Total	**0.024**	0.0067	0.010	mg/l	1	10/10/22	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2J0588 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/10/22 09:38				**Analyst:** jao
Total Dissolved Solids	**620**	4.0	10	mg/l	1	10/10/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2J0701 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/11/22 10:07				**Analyst:** ism
Total Suspended Solids	ND		5	mg/l	1	10/11/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2J0405 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:41				**Analyst:** ymt
Sulfide, Total	**0.40**	0.050	0.10	mg/l	1	10/06/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2J0494 **Preparation:** EPA 200.2			**Prepared:** 10/07/22 09:26				**Analyst:** kvm
Aluminum, Dissolved	**0.050**	0.041	0.050	mg/l	1	10/11/22	
Aluminum, Total	**0.059**	0.041	0.050	mg/l	1	10/11/22	

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San Diego, CA 92123

Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:52

Sample Results

(Continued)

Sample: CL09
2J05098-03 (Water)

Sampled: 10/05/22 9:10 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2J0511 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/07/22 10:38				**Analyst:** YMT
Ammonia as N	**1.7**	0.017	0.10	mg/l	1	10/10/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2J1114 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/15/22 09:07				**Analyst:** YMT
TKN	**2.5**	0.13	0.20	mg/l	1	10/20/22	M-02
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2J0391 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:15				**Analyst:** ism
Nitrate as N	**0.065**	0.040	0.20	mg/l	1	10/06/22 16:55	FILT, J
Nitrite as N	ND	0.042	0.10	mg/l	1	10/06/22 16:55	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0379 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:32				**Analyst:** heq
o-Phosphate as P	ND	0.0030	0.010	mg/l	1	10/06/22 12:02	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0384 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:36				**Analyst:** heq
Phosphorus as P, Total	**0.040**	0.0067	0.010	mg/l	1	10/10/22	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2J0587 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/10/22 09:36				**Analyst:** jao
Total Dissolved Solids	**700**	4.0	10	mg/l	1	10/10/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2J0701 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/11/22 10:07				**Analyst:** ism
Total Suspended Solids	**6**		5	mg/l	1	10/11/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2J0405 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:41				**Analyst:** ymt
Sulfide, Total	**6.0**	0.50	1.0	mg/l	10	10/06/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2J0494 **Preparation:** EPA 200.2			**Prepared:** 10/07/22 09:26				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	10/11/22	
Aluminum, Total	**0.057**	0.041	0.050	mg/l	1	10/11/22	

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San Diego, CA 92123

Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:52

Sample Results

(Continued)

Sample: CL10
2J05098-04 (Water)

Sampled: 10/05/22 8:15 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2J0511 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/07/22 10:38				**Analyst:** YMT
Ammonia as N	ND	0.017	0.10	mg/l	1	10/10/22	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2J1114 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/15/22 09:07				**Analyst:** YMT
TKN	**0.86**	0.065	0.10	mg/l	1	10/20/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2J0391 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:15				**Analyst:** ism
Nitrate as N	**0.071**	0.040	0.20	mg/l	1	10/06/22 16:56	FILT, J
Nitrite as N	ND	0.042	0.10	mg/l	1	10/06/22 16:56	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0379 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:32				**Analyst:** heq
o-Phosphate as P	**0.0030**	0.0030	0.010	mg/l	1	10/06/22 12:04	J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0384 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:36				**Analyst:** heq
Phosphorus as P, Total	**0.033**	0.0067	0.010	mg/l	1	10/10/22	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2J0587 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/10/22 09:36				**Analyst:** jao
Total Dissolved Solids	**740**	4.0	10	mg/l	1	10/10/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2J0701 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/11/22 10:07				**Analyst:** ism
Total Suspended Solids	**6**		5	mg/l	1	10/11/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2J0405 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:41				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	10/06/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W2J0494 **Preparation:** EPA 200.2			**Prepared:** 10/07/22 09:26				**Analyst:** kvm
Aluminum, Dissolved	**0.048**	0.041	0.050	mg/l	1	10/11/22	J
Aluminum, Total	**0.11**	0.041	0.050	mg/l	1	10/11/22	

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Project Manager: John Rudolph

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10/26/2022 17:52

Sample Results

(Continued)

Sample: LE02
2J05098-05 (Water)

Sampled: 10/05/22 9:05 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2J0511 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/07/22 10:38				**Analyst:** YMT
Ammonia as N	**0.045**	0.017	0.10	mg/l	1	10/10/22	J
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W2J1114 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/15/22 09:07				**Analyst:** YMT
TKN	**5.5**	0.13	0.20	mg/l	2	10/20/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2J0391 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:15				**Analyst:** ism
Nitrate as N	**0.045**	0.040	0.20	mg/l	1	10/06/22 16:58	J
Nitrite as N	ND	0.042	0.10	mg/l	1	10/06/22 16:58	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0379 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:32				**Analyst:** heq
o-Phosphate as P	**0.010**	0.0030	0.010	mg/l	1	10/06/22 12:05	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2J0384 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 09:36				**Analyst:** heq
Phosphorus as P, Total	**0.12**	0.0067	0.010	mg/l	1	10/10/22	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2J0587 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/10/22 09:36				**Analyst:** jao
Total Dissolved Solids	**2600**	4.0	10	mg/l	1	10/10/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2J0405 **Preparation:** _NONE (WETCHEM)			**Prepared:** 10/06/22 10:41				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	10/06/22	

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Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2J0379 - EPA 365.3											
Blank (W2J0379-BLK1)					**Prepared & Analyzed: 10/06/22**						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
LCS (W2J0379-BS1)					**Prepared & Analyzed: 10/06/22**						
o-Phosphate as P	0.204	0.0030	0.010	mg/l	0.200		102	88-111			
Matrix Spike (W2J0379-MS1)	**Source: 2J05100-01**				**Prepared & Analyzed: 10/06/22**						
o-Phosphate as P	0.209	0.0030	0.010	mg/l	0.200	0.0130	98	85-112			
Matrix Spike Dup (W2J0379-MSD1)	**Source: 2J05100-01**				**Prepared & Analyzed: 10/06/22**						
o-Phosphate as P	0.214	0.0030	0.010	mg/l	0.200	0.0130	100	85-112	2	20	
Batch: W2J0384 - EPA 365.3											
Blank (W2J0384-BLK1)					**Prepared: 10/06/22 Analyzed: 10/10/22**						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W2J0384-BS1)					**Prepared: 10/06/22 Analyzed: 10/10/22**						
Phosphorus as P, Total	0.198	0.0067	0.010	mg/l	0.200		99	90-110			
Matrix Spike (W2J0384-MS1)	**Source: 2J05100-01**				**Prepared: 10/06/22 Analyzed: 10/10/22**						
Phosphorus as P, Total	0.312	0.0067	0.010	mg/l	0.200	0.107	102	90-110			
Matrix Spike Dup (W2J0384-MSD1)	**Source: 2J05100-01**				**Prepared: 10/06/22 Analyzed: 10/10/22**						
Phosphorus as P, Total	0.317	0.0067	0.010	mg/l	0.200	0.107	105	90-110	2	20	
Batch: W2J0391 - EPA 353.2											
Blank (W2J0391-BLK1)					**Prepared & Analyzed: 10/06/22**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
LCS (W2J0391-BS1)					**Prepared & Analyzed: 10/06/22**						
Nitrate as N	0.990	0.040	0.20	mg/l	1.00		99	90-110			
Nitrite as N	0.980	0.042	0.10	mg/l	1.00		98	90-110			
Matrix Spike (W2J0391-MS1)	**Source: 2I13087-04**				**Prepared & Analyzed: 10/06/22**						
Nitrate as N	2.27	0.040	0.20	mg/l	2.00	0.267	100	90-110			
Nitrite as N	0.998	0.042	0.10	mg/l	1.00	ND	100	90-110			
Matrix Spike (W2J0391-MS2)	**Source: 2J05091-01**				**Prepared & Analyzed: 10/06/22**						
Nitrate as N	4.83	0.040	0.20	mg/l	2.00	2.81	101	90-110			
Nitrite as N	0.990	0.042	0.10	mg/l	1.00	ND	99	90-110			
Matrix Spike Dup (W2J0391-MSD1)	**Source: 2I13087-04**				**Prepared & Analyzed: 10/06/22**						
Nitrate as N	2.25	0.040	0.20	mg/l	2.00	0.267	99	90-110	0.9	20	
Nitrite as N	1.00	0.042	0.10	mg/l	1.00	ND	100	90-110	0.2	20	
Matrix Spike Dup (W2J0391-MSD2)	**Source: 2J05091-01**				**Prepared & Analyzed: 10/06/22**						
Nitrate as N	4.85	0.040	0.20	mg/l	2.00	2.81	102	90-110	0.4	20	
Nitrite as N	0.993	0.042	0.10	mg/l	1.00	ND	99	90-110	0.3	20	
Batch: W2J0405 - SM 4500S2-D											
Blank (W2J0405-BLK1)					**Prepared & Analyzed: 10/06/22**						

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10/26/2022 17:52

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2J0405 - SM 4500S2-D (Continued)											
Blank (W2J0405-BLK1)					**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	ND	0.050	0.10	mg/l							
LCS (W2J0405-BS1)					**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	90-110			
Duplicate (W2J0405-DUP1)	**Source: 2J04129-01**				**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	1.20	0.30	0.60	mg/l		1.20			0	20	
Duplicate (W2J0405-DUP2)	**Source: 2J04129-02**				**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	2.50	0.25	0.50	mg/l		2.50			0	20	
Duplicate (W2J0405-DUP3)	**Source: 2J05098-01**				**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	6.00	1.0	2.0	mg/l		6.00			0	20	
Duplicate (W2J0405-DUP4)	**Source: 2J05098-02**				**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	0.400	0.050	0.10	mg/l		0.400			0	20	
Duplicate (W2J0405-DUP5)	**Source: 2J05098-03**				**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	6.00	1.0	2.0	mg/l		6.00			0	20	
Duplicate (W2J0405-DUP6)	**Source: 2J05105-01**				**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	1.00	0.50	1.0	mg/l		1.00			0	20	
Matrix Spike (W2J0405-MS1)	**Source: 2J04101-01**				**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120			
Matrix Spike Dup (W2J0405-MSD1)	**Source: 2J04101-01**				**Prepared & Analyzed: 10/06/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120	0	20	
Batch: W2J0511 - EPA 350.1											
Blank (W2J0511-BLK1)					**Prepared: 10/07/22 Analyzed: 10/10/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W2J0511-BLK2)					**Prepared: 10/07/22 Analyzed: 10/10/22**						
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W2J0511-BS1)					**Prepared: 10/07/22 Analyzed: 10/10/22**						
Ammonia as N	0.264	0.017	0.10	mg/l	0.250		106	90-110			
LCS (W2J0511-BS2)					**Prepared: 10/07/22 Analyzed: 10/10/22**						
Ammonia as N	0.265	0.017	0.10	mg/l	0.250		106	90-110			
Matrix Spike (W2J0511-MS1)	**Source: 2I22008-01**				**Prepared: 10/07/22 Analyzed: 10/10/22**						
Ammonia as N	0.580	0.017	0.10	mg/l	0.250	0.320	104	90-110			
Matrix Spike (W2J0511-MS2)	**Source: 2J05089-02**				**Prepared: 10/07/22 Analyzed: 10/10/22**						
Ammonia as N	0.270	0.017	0.10	mg/l	0.250	ND	108	90-110			
Matrix Spike Dup (W2J0511-MSD1)	**Source: 2I22008-01**				**Prepared: 10/07/22 Analyzed: 10/10/22**						
Ammonia as N	0.580	0.017	0.10	mg/l	0.250	0.320	104	90-110	0.05	15	
Matrix Spike Dup (W2J0511-MSD2)	**Source: 2J05089-02**				**Prepared: 10/07/22 Analyzed: 10/10/22**						
Ammonia as N	0.272	0.017	0.10	mg/l	0.250	ND	109	90-110	0.5	15	
Batch: W2J0587 - SM 2540C											

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10/26/2022 17:52

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2J0587 - SM 2540C (Continued)											
Blank (W2J0587-BLK1)					**Prepared & Analyzed: 10/10/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2J0587-BS1)					**Prepared & Analyzed: 10/10/22**						
Total Dissolved Solids	818	4.0	10	mg/l	824		99	96-102			
Duplicate (W2J0587-DUP1)	**Source: 2J06022-02**				**Prepared & Analyzed: 10/10/22**						
Total Dissolved Solids	1270	4.0	10	mg/l		1280			1	10	
Duplicate (W2J0587-DUP2)	**Source: 2J06045-01**				**Prepared & Analyzed: 10/10/22**						
Total Dissolved Solids	1150	4.0	10	mg/l		1160			1	10	
Batch: W2J0588 - SM 2540C											
Blank (W2J0588-BLK1)					**Prepared & Analyzed: 10/10/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2J0588-BS1)					**Prepared & Analyzed: 10/10/22**						
Total Dissolved Solids	803	4.0	10	mg/l	824		97	96-102			
Duplicate (W2J0588-DUP1)	**Source: 2I21121-02**				**Prepared & Analyzed: 10/10/22**						
Total Dissolved Solids	538	4.0	10	mg/l		525			2	10	
Duplicate (W2J0588-DUP2)	**Source: 2J05098-02**				**Prepared & Analyzed: 10/10/22**						
Total Dissolved Solids	631	4.0	10	mg/l		623			1	10	
Batch: W2J0641 - SM 2540C											
Blank (W2J0641-BLK1)					**Prepared: 10/10/22 Analyzed: 10/11/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2J0641-BS1)					**Prepared: 10/10/22 Analyzed: 10/11/22**						
Total Dissolved Solids	802	4.0	10	mg/l	824		97	96-102			
Duplicate (W2J0641-DUP1)	**Source: 2J06045-04**				**Prepared: 10/10/22 Analyzed: 10/11/22**						
Total Dissolved Solids	1050	4.0	10	mg/l		991			5	10	
Duplicate (W2J0641-DUP2)	**Source: 2J07035-04**				**Prepared: 10/10/22 Analyzed: 10/11/22**						
Total Dissolved Solids	1060	4.0	10	mg/l		1050			1	10	
Batch: W2J0701 - SM 2540D											
Blank (W2J0701-BLK1)					**Prepared & Analyzed: 10/11/22**						
Total Suspended Solids	ND		5	mg/l							
LCS (W2J0701-BS1)					**Prepared & Analyzed: 10/11/22**						
Total Suspended Solids	60.4		5	mg/l	57.1		106	90-110			
Duplicate (W2J0701-DUP1)	**Source: 2J05110-05**				**Prepared & Analyzed: 10/11/22**						
Total Suspended Solids	688		5	mg/l		718			4	10	
Duplicate (W2J0701-DUP2)	**Source: 2J05123-01**				**Prepared & Analyzed: 10/11/22**						
Total Suspended Solids	1500		5	mg/l		1560			4	10	
Batch: W2J1114 - EPA 351.2											
Blank (W2J1114-BLK1)					**Prepared: 10/15/22 Analyzed: 10/20/22**						
TKN	ND	0.065	0.10	mg/l							

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Quality Control Results (Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2J1114 - EPA 351.2 (Continued)											
Blank (W2J1114-BLK2)					**Prepared: 10/15/22 Analyzed: 10/20/22**						
TKN	ND	0.065	0.10	mg/l							
LCS (W2J1114-BS1)					**Prepared: 10/15/22 Analyzed: 10/20/22**						
TKN	0.975	0.065	0.10	mg/l	1.00		98	90-110			
LCS (W2J1114-BS2)					**Prepared: 10/15/22 Analyzed: 10/20/22**						
TKN	0.973	0.065	0.10	mg/l	1.00		97	90-110			
Matrix Spike (W2J1114-MS1)	**Source: 2J11055-04**				**Prepared: 10/15/22 Analyzed: 10/20/22**						
TKN	1.35	0.065	0.10	mg/l	1.00	0.326	102	90-110			
Matrix Spike (W2J1114-MS2)	**Source: 2J11055-05**				**Prepared: 10/15/22 Analyzed: 10/20/22**						
TKN	1.31	0.065	0.10	mg/l	1.00	0.315	99	90-110			
Matrix Spike Dup (W2J1114-MSD1)	**Source: 2J11055-04**				**Prepared: 10/15/22 Analyzed: 10/20/22**						
TKN	1.32	0.065	0.10	mg/l	1.00	0.326	99	90-110	2	10	
Matrix Spike Dup (W2J1114-MSD2)	**Source: 2J11055-05**				**Prepared: 10/15/22 Analyzed: 10/20/22**						
TKN	1.37	0.065	0.10	mg/l	1.00	0.315	106	90-110	4	10	

Quality Control Results (Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2J0494 - EPA 200.7											
Blank (W2J0494-BLK1)					**Prepared: 10/07/22 Analyzed: 10/11/22**						
Aluminum, Dissolved	ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.041	0.050	mg/l							
LCS (W2J0494-BS1)					**Prepared: 10/07/22 Analyzed: 10/11/22**						
Aluminum, Dissolved	0.228	0.041	0.050	mg/l	0.200		114	85-115			
Aluminum, Total	0.228	0.041	0.050	mg/l	0.200		114	85-115			
Matrix Spike (W2J0494-MS1)	**Source: 2J05098-01**				**Prepared: 10/07/22 Analyzed: 10/11/22**						
Aluminum, Dissolved	0.268	0.041	0.050	mg/l	0.200	0.0413	113	70-130			
Aluminum, Total	0.268	0.041	0.050	mg/l	0.200	0.0499	109	70-130			
Matrix Spike (W2J0494-MS2)	**Source: 2J05100-02**				**Prepared: 10/07/22 Analyzed: 10/11/22**						
Aluminum, Total	0.290	0.041	0.050	mg/l	0.200	0.0610	114	70-130			
Matrix Spike Dup (W2J0494-MSD1)	**Source: 2J05098-01**				**Prepared: 10/07/22 Analyzed: 10/11/22**						
Aluminum, Dissolved	0.282	0.041	0.050	mg/l	0.200	0.0413	120	70-130	5	30	
Aluminum, Total	0.282	0.041	0.050	mg/l	0.200	0.0499	116	70-130	5	30	
Matrix Spike Dup (W2J0494-MSD2)	**Source: 2J05100-02**				**Prepared: 10/07/22 Analyzed: 10/11/22**						
Aluminum, Total	0.301	0.041	0.050	mg/l	0.200	0.0610	120	70-130	4	30	

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Notes and Definitions

Item	Definition
FILT	The sample was filtered prior to analysis.
J	Estimated conc. detected <MRL and >MDL.
M-02	Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Certificate of Analysis

FINAL REPORT

Work Orders:	2J05103
Project:	1915100405 LECL TMDL Monitoring
Attn:	John Rudolph
Client:	WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Report Date:	10/26/2022
Received Date:	10/5/2022
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
P.O. #:	C015101084
Billing Code:	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH #4047 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047 • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 10/05/22 with the Chain-of-Custody document. The samples were received in good condition, at 2.8 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

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10/26/2022 17:58

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07 - Int	Nick Jernack	2J05103-01	Water	10/05/22 11:05	
CL07 - Surf	Nick Jernack	2J05103-02	Water	10/05/22 11:15	
CL08 - Int	Nick Jernack	2J05103-03	Water	10/05/22 10:10	
CL08 - Surf	Nick Jernack	2J05103-04	Water	10/05/22 10:20	
CL09 - Int	Nick Jernack	2J05103-05	Water	10/05/22 09:10	
CL09 - Surf	Nick Jernack	2J05103-06	Water	10/05/22 09:20	
CL10 - Int	Nick Jernack	2J05103-07	Water	10/05/22 08:15	
CL10 - Surf	Nick Jernack	2J05103-08	Water	10/05/22 08:35	
LE02 - Int	Nick Jernack	2J05103-09	Water	10/05/22 09:05	
LE02 - Surf	Nick Jernack	2J05103-10	Water	10/05/22 09:25	

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San Diego, CA 92123

Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange

Sample: CL07 - Int
2J05103-01 (Water)

Sampled: 10/05/22 11:05 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**18**	1.0	1.0	mg/M3	1	10/12/22	

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Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange (Continued)

Sample: CL07 - Surf
2J05103-02 (Water)

Sampled: 10/05/22 11:15 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**9.4**	1.0	1.0	mg/M3	1	10/12/22	

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Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange (Continued)

Sample: CL08 - Int
2J05103-03 (Water)

Sampled: 10/05/22 10:10 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**24**	1.0	1.0	mg/M3	1	10/12/22	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange (Continued)

Sample: CL08 - Surf
2J05103-04 (Water)

Sampled: 10/05/22 10:20 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**11**	1.0	1.0	mg/M3	1	10/12/22	

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Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange (Continued)

Sample: CL09 - Int
2J05103-05 (Water)

Sampled: 10/05/22 9:10 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**32**	1.0	1.0	mg/M3	1	10/12/22	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange (Continued)

Sample: CL09 - Surf
2J05103-06 (Water)

Sampled: 10/05/22 9:20 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**16**	1.0	1.0	mg/M3	1	10/12/22	

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Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange (Continued)

Sample: CL10 - Int
2J05103-07 (Water)

Sampled: 10/05/22 8:15 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**19**	1.0	1.0	mg/M3	1	10/12/22	

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Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange (Continued)

Sample: CL10 - Surf
2J05103-08 (Water)

Sampled: 10/05/22 8:35 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**18**	1.0	1.0	mg/M3	1	10/12/22	

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Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange (Continued)

Sample: LE02 - Int
2J05103-09 (Water)

Sampled: 10/05/22 9:05 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**190**	1.0	1.0	mg/M3	1	10/12/22	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Sample Results Enthalpy Orange (Continued)

Sample: LE02 - Surf
2J05103-10 (Water)

Sampled: 10/05/22 9:25 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 298793		**Prepared:** 10/05/22 00:00				**Analyst:** KXP
Chlorophyll a	**210**	1.0	1.0	mg/M3	1	10/12/22	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
10/26/2022 17:58

Notes and Definitions

Item	Definition
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Certificate of Analysis

FINAL REPORT

Work Orders:	2L20024
Project:	1915100404 LECL TMDL Monitoring
Attn:	John Rudolph
Client:	WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Report Date:	1/10/2023
Received Date:	12/19/2022
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
P.O. #:	C015101084
Billing Code:	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH #4047 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 12/19/22 with the Chain-of-Custody document. The samples were received in good condition, at 2.4 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
01/10/2023 11:02

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Client	2L20024-01	Water	12/19/22 12:05	
CL08	Client	2L20024-02	Water	12/19/22 11:20	
CL09	Client	2L20024-03	Water	12/19/22 10:35	
CL10	Client	2L20024-04	Water	12/19/22 09:40	
LE02	Client	2L20024-05	Water	12/19/22 09:28	
CL07 - Int	Client	2L20024-06	Water	12/19/22 12:05	
CL07 - Surf	Client	2L20024-07	Water	12/19/22 12:10	
CL08 - Int	Client	2L20024-08	Water	12/19/22 11:20	
CL08 - Surf	Client	2L20024-09	Water	12/19/22 11:25	
CL09 - Int	Client	2L20024-10	Water	12/19/22 10:35	
CL09 - Surf	Client	2L20024-11	Water	12/19/22 10:40	
CL10 - Int	Client	2L20024-12	Water	12/19/22 09:40	
CL10 - Surf	Client	2L20024-13	Water	12/19/22 09:45	
LE02 - Int	Client	2L20024-14	Water	12/19/22 09:28	
LE02 - Surf	Client	2L20024-15	Water	12/19/22 10:00	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
01/10/2023 11:02

Sample Results

Sample: CL07
2L20024-01 (Water)

Sampled: 12/19/22 12:05 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3A0061 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/03/23 11:56				**Analyst:** YMT
Ammonia as N	**0.44**	0.017	0.10	mg/l	1	01/04/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3A0244 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/04/23 14:17				**Analyst:** YMT
TKN	**1.3**	0.065	0.10	mg/l	1	01/06/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2L1536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 11:20				**Analyst:** ISM
Nitrate as N	**0.054**	0.040	0.20	mg/l	1	12/20/22 17:13	J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/20/22 17:13	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2L1355 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 10:03				**Analyst:** heq
o-Phosphate as P	**0.0030**	0.0030	0.010	mg/l	1	12/20/22 12:49	J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3A0369 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/05/23 12:26				**Analyst:** heq
Phosphorus as P, Total	**0.026**	0.0067	0.010	mg/l	1	01/09/23	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2L1888 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/23/22 10:35				**Analyst:** tmp
Total Dissolved Solids	**670**	4.0	10	mg/l	1	12/23/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2L1850 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/22/22 17:11				**Analyst:** mes
Total Suspended Solids	**5**		5	mg/l	1	12/23/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2L1910 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/23/22 16:51				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/23/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3A0052 **Preparation:** EPA 200.2			**Prepared:** 01/03/23 11:07				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	01/04/23	
Aluminum, Total	**0.087**	0.041	0.050	mg/l	1	01/04/23	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
01/10/2023 11:02

Sample Results

(Continued)

Sample: CL08
2L20024-02 (Water)

Sampled: 12/19/22 11:20 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3A0061 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/03/23 11:56				**Analyst:** YMT
Ammonia as N	**0.42**	0.017	0.10	mg/l	1	01/04/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3A0244 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/04/23 14:17				**Analyst:** YMT
TKN	**1.2**	0.065	0.10	mg/l	1	01/06/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2L1536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 11:20				**Analyst:** ISM
Nitrate as N	**0.054**	0.040	0.20	mg/l	1	12/20/22 17:14	J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/20/22 17:14	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2L1355 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 10:03				**Analyst:** heq
o-Phosphate as P	**0.0040**	0.0030	0.010	mg/l	1	12/20/22 12:50	J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3A0369 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/05/23 12:26				**Analyst:** heq
Phosphorus as P, Total	**0.027**	0.0067	0.010	mg/l	1	01/09/23	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2L1888 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/23/22 10:35				**Analyst:** tmp
Total Dissolved Solids	**700**	4.0	10	mg/l	1	12/23/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2L1850 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/22/22 17:11				**Analyst:** mes
Total Suspended Solids	**6**		5	mg/l	1	12/23/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2L1910 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/23/22 16:51				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/23/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3A0052 **Preparation:** EPA 200.2			**Prepared:** 01/03/23 11:07				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	01/04/23	
Aluminum, Total	**0.093**	0.041	0.050	mg/l	1	01/04/23	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported: 01/10/2023 11:02

Sample Results

(Continued)

Sample: CL09 — Sampled: 12/19/22 10:35 by Client

2L20024-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3A0061 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/03/23 11:56				**Analyst:** YMT
Ammonia as N	**0.22**	0.017	0.10	mg/l	1	01/04/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3A0244 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/04/23 14:17				**Analyst:** YMT
TKN	**1.1**	0.065	0.10	mg/l	1	01/06/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2L1536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 11:20				**Analyst:** ISM
Nitrate as N	**0.095**	0.040	0.20	mg/l	1	12/20/22 17:15	J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/20/22 17:15	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2L1355 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 10:03				**Analyst:** heq
o-Phosphate as P	**0.0030**	0.0030	0.010	mg/l	1	12/20/22 12:51	J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3A0369 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/05/23 12:26				**Analyst:** heq
Phosphorus as P, Total	**0.041**	0.0067	0.010	mg/l	1	01/09/23	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2L1827 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/22/22 12:00				**Analyst:** heq
Total Dissolved Solids	**700**	4.0	10	mg/l	1	12/22/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2L1850 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/22/22 17:11				**Analyst:** mes
Total Suspended Solids	**7**		5	mg/l	1	12/23/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2L1910 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/23/22 16:51				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/23/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3A0052 **Preparation:** EPA 200.2			**Prepared:** 01/03/23 11:07				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	01/04/23	
Aluminum, Total	**0.14**	0.041	0.050	mg/l	1	01/04/23	

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Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
01/10/2023 11:02

Sample Results

(Continued)

Sample: CL10
2L20024-04 (Water)

Sampled: 12/19/22 9:40 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3A0061 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/03/23 11:56				**Analyst:** YMT
Ammonia as N	**0.15**	0.017	0.10	mg/l	1	01/04/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3A0244 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/04/23 14:17				**Analyst:** YMT
TKN	**1.2**	0.065	0.10	mg/l	1	01/06/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2L1536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 11:20				**Analyst:** ISM
Nitrate as N	**0.066**	0.040	0.20	mg/l	1	12/20/22 17:16	J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/20/22 17:16	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2L1355 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 10:03				**Analyst:** heq
o-Phosphate as P	**0.0040**	0.0030	0.010	mg/l	1	12/20/22 12:51	J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3A0369 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/05/23 12:26				**Analyst:** heq
Phosphorus as P, Total	**0.046**	0.0067	0.010	mg/l	1	01/09/23	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2L1677 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/21/22 10:41				**Analyst:** tmp
Total Dissolved Solids	**730**	4.0	10	mg/l	1	12/21/22	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W2L1850 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/22/22 17:11				**Analyst:** mes
Total Suspended Solids	**8**		5	mg/l	1	12/23/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2L1910 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/23/22 16:51				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/23/22	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3A0052 **Preparation:** EPA 200.2			**Prepared:** 01/03/23 11:07				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	01/04/23	
Aluminum, Total	**0.20**	0.041	0.050	mg/l	1	01/04/23	

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Reported:
01/10/2023 11:02

Sample Results

(Continued)

Sample: LE02
2L20024-05 (Water)

Sampled: 12/19/22 9:28 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3A0061 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/03/23 11:56				**Analyst:** YMT
Ammonia as N	**1.0**	0.017	0.10	mg/l	1	01/04/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3A0244 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/04/23 14:17				**Analyst:** YMT
TKN	**6.2**	0.13	0.20	mg/l	1	01/06/23	M-06
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2L1536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 11:20				**Analyst:** ISM
Nitrate as N	**0.051**	0.040	0.20	mg/l	1	12/20/22 17:18	FILT, J
Nitrite as N	ND	0.042	0.10	mg/l	1	12/20/22 17:18	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W2L1355 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/20/22 10:03				**Analyst:** heq
o-Phosphate as P	**0.016**	0.0030	0.010	mg/l	1	12/20/22 12:51	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3A0369 **Preparation:** _NONE (WETCHEM)			**Prepared:** 01/05/23 12:26				**Analyst:** heq
Phosphorus as P, Total	**0.16**	0.0067	0.010	mg/l	1	01/09/23	
Method: SM 2540C			**Instr:** OVEN01				
Batch ID: W2L1677 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/21/22 10:41				**Analyst:** tmp
Total Dissolved Solids	**2600**	4.0	10	mg/l	1	12/21/22	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W2L1910 **Preparation:** _NONE (WETCHEM)			**Prepared:** 12/23/22 16:51				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	12/23/22	

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Sample Results Enthalpy Orange

Sample: CL07 - Int
2L20024-06 (Water)

Sampled: 12/19/22 12:05 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**1.0**	1.0	1.0	mg/M3	1	12/29/22	ND

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Sample Results Enthalpy Orange (Continued)

Sample: CL07 - Surf
2L20024-07 (Water)

Sampled: 12/19/22 12:10 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**1.0**	1.0	1.0	mg/M3	1	12/29/22	ND

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Sample Results Enthalpy Orange (Continued)

Sample: CL08 - Int
2L20024-08 (Water)

Sampled: 12/19/22 11:20 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**1.0**	1.0	1.0	mg/M3	1	12/29/22	ND

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Sample Results Enthalpy Orange (Continued)

Sample: CL08 - Surf
2L20024-09 (Water)

Sampled: 12/19/22 11:25 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**1.0**	1.0	1.0	mg/M3	1	12/29/22	ND

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Sample Results Enthalpy Orange (Continued)

Sample: CL09 - Int
2L20024-10 (Water)

Sampled: 12/19/22 10:35 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**1.0**	1.0	1.0	mg/M3	1	12/29/22	ND

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Sample Results Enthalpy Orange (Continued)

Sample: CL09 - Surf
2L20024-11 (Water)

Sampled: 12/19/22 10:40 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**1.0**	1.0	1.0	mg/M3	1	12/29/22	ND

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Sample Results Enthalpy Orange (Continued)

Sample: CL10 - Int
2L20024-12 (Water)

Sampled: 12/19/22 9:40 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**1.0**	1.0	1.0	mg/M3	1	12/29/22	ND

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Sample Results Enthalpy Orange (Continued)

Sample: CL10 - Surf
2L20024-13 (Water)

Sampled: 12/19/22 9:45 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**15**	1.0	1.0	mg/M3	1	12/29/22	

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Sample Results Enthalpy Orange (Continued)

Sample: LE02 - Int
2L20024-14 (Water)

Sampled: 12/19/22 9:28 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**73**	1.0	1.0	mg/M3	1	12/29/22	

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Sample Results Enthalpy Orange (Continued)

Sample: LE02 - Surf
2L20024-15 (Water)

Sampled: 12/19/22 10:00 by Client

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
SM 10200-H							
Method: Chlorophyll	**Batch ID:** 304286		**Prepared:** 12/19/22 00:00				**Analyst:** GKD
Chlorophyll a	**79**	1.0	1.0	mg/M3	1	12/29/22	

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Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2L1355 - EPA 365.3											
Blank (W2L1355-BLK1)					**Prepared & Analyzed: 12/20/22**						
o-Phosphate as P	0.00300	0.0030	0.010	mg/l							J
LCS (W2L1355-BS1)					**Prepared & Analyzed: 12/20/22**						
o-Phosphate as P	0.201	0.0030	0.010	mg/l	0.200		100	88-111			
Matrix Spike (W2L1355-MS1)	**Source: 2L20024-01**				**Prepared & Analyzed: 12/20/22**						
o-Phosphate as P	0.199	0.0030	0.010	mg/l	0.200	0.00300	98	85-112			
Matrix Spike Dup (W2L1355-MSD1)	**Source: 2L20024-01**				**Prepared & Analyzed: 12/20/22**						
o-Phosphate as P	0.210	0.0030	0.010	mg/l	0.200	0.00300	104	85-112	5	20	
Batch: W2L1536 - EPA 353.2											
Blank (W2L1536-BLK1)					**Prepared & Analyzed: 12/20/22**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
LCS (W2L1536-BS1)					**Prepared & Analyzed: 12/20/22**						
Nitrate as N	1.02	0.040	0.20	mg/l	1.00		102	90-110			
Nitrite as N	0.958	0.042	0.10	mg/l	1.00		96	90-110			
Matrix Spike (W2L1536-MS1)	**Source: 2L19154-01**				**Prepared & Analyzed: 12/20/22**						
Nitrate as N	8.26	0.040	0.20	mg/l	2.00	6.19	104	90-110			
Nitrite as N	1.00	0.042	0.10	mg/l	1.00	ND	100	90-110			
Matrix Spike (W2L1536-MS2)	**Source: 2L20042-01**				**Prepared & Analyzed: 12/20/22**						
Nitrate as N	3.51	0.040	0.20	mg/l	2.00	1.34	108	90-110			
Nitrite as N	1.01	0.042	0.10	mg/l	1.00	ND	101	90-110			
Matrix Spike Dup (W2L1536-MSD1)	**Source: 2L19154-01**				**Prepared & Analyzed: 12/20/22**						
Nitrate as N	8.27	0.040	0.20	mg/l	2.00	6.19	104	90-110	0.1	20	
Nitrite as N	1.00	0.042	0.10	mg/l	1.00	ND	100	90-110	0	20	
Matrix Spike Dup (W2L1536-MSD2)	**Source: 2L20042-01**				**Prepared & Analyzed: 12/20/22**						
Nitrate as N	3.50	0.040	0.20	mg/l	2.00	1.34	108	90-110	0.3	20	
Nitrite as N	1.00	0.042	0.10	mg/l	1.00	ND	100	90-110	1	20	
Batch: W2L1677 - SM 2540C											
Blank (W2L1677-BLK1)					**Prepared & Analyzed: 12/21/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2L1677-BS1)					**Prepared & Analyzed: 12/21/22**						
Total Dissolved Solids	811	4.0	10	mg/l	824		98	97-103			
Duplicate (W2L1677-DUP1)	**Source: 2L20099-02**				**Prepared & Analyzed: 12/21/22**						
Total Dissolved Solids	9780	4.0	10	mg/l		9720			0.7	10	
Duplicate (W2L1677-DUP2)	**Source: 2L20099-05**				**Prepared & Analyzed: 12/21/22**						
Total Dissolved Solids	6820	4.0	10	mg/l		6880			1	10	
Batch: W2L1827 - SM 2540C											
Blank (W2L1827-BLK1)					**Prepared & Analyzed: 12/22/22**						

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Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2L1827 - SM 2540C (Continued)											
Blank (W2L1827-BLK1)					**Prepared & Analyzed: 12/22/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2L1827-BS1)					**Prepared & Analyzed: 12/22/22**						
Total Dissolved Solids	806	4.0	10	mg/l	824		98	97-103			
Duplicate (W2L1827-DUP1)	**Source: 2L20037-01**				**Prepared & Analyzed: 12/22/22**						
Total Dissolved Solids	1490	4.0	10	mg/l		1510			2	10	
Duplicate (W2L1827-DUP2)	**Source: 2L21045-01**				**Prepared & Analyzed: 12/22/22**						
Total Dissolved Solids	846	4.0	10	mg/l		841			0.6	10	
Batch: W2L1850 - SM 2540D											
Blank (W2L1850-BLK1)					**Prepared: 12/22/22 Analyzed: 12/23/22**						
Total Suspended Solids	ND		5	mg/l							
LCS (W2L1850-BS1)					**Prepared: 12/22/22 Analyzed: 12/23/22**						
Total Suspended Solids	69.5		5	mg/l	64.0		109	90-110			
Duplicate (W2L1850-DUP1)	**Source: 2L20026-01**				**Prepared: 12/22/22 Analyzed: 12/23/22**						
Total Suspended Solids	27.0		5	mg/l		27.0			0	10	
Duplicate (W2L1850-DUP2)	**Source: 2L21069-01**				**Prepared: 12/22/22 Analyzed: 12/23/22**						
Total Suspended Solids	47.0		5	mg/l		45.5			3	10	
Batch: W2L1888 - SM 2540C											
Blank (W2L1888-BLK1)					**Prepared & Analyzed: 12/23/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
Blank (W2L1888-BLK2)					**Prepared & Analyzed: 12/23/22**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W2L1888-BS1)					**Prepared & Analyzed: 12/23/22**						
Total Dissolved Solids	827	4.0	10	mg/l	824		100	97-103			
LCS (W2L1888-BS2)					**Prepared & Analyzed: 12/23/22**						
Total Dissolved Solids	821	4.0	10	mg/l	824		100	97-103			
Duplicate (W2L1888-DUP1)	**Source: 2L20035-01**				**Prepared & Analyzed: 12/23/22**						
Total Dissolved Solids	3260	4.0	10	mg/l		3360			3	10	
Duplicate (W2L1888-DUP2)	**Source: 2L21027-01**				**Prepared & Analyzed: 12/23/22**						
Total Dissolved Solids	31.0	4.0	10	mg/l		32.0			3	10	
Duplicate (W2L1888-DUP3)	**Source: 2L21027-01RE1**				**Prepared & Analyzed: 12/23/22**						
Total Dissolved Solids	7.00	4.0	10	mg/l		5.00			33	10	R-03, J
Batch: W2L1910 - SM 4500S2-D											
Blank (W2L1910-BLK1)					**Prepared & Analyzed: 12/23/22**						
Sulfide, Total	ND	0.050	0.10	mg/l							
LCS (W2L1910-BS1)					**Prepared & Analyzed: 12/23/22**						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.100		100	90-110			
Duplicate (W2L1910-DUP1)	**Source: 2K14007-01**				**Prepared & Analyzed: 12/23/22**						

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Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2L1910 - SM 4500S2-D (Continued)											
Duplicate (W2L1910-DUP1)	**Source: 2K14007-01**				**Prepared & Analyzed: 12/23/22**						
Sulfide, Total	0.700	0.050	0.10	mg/l		0.700			0	20	
Duplicate (W2L1910-DUP2)	**Source: 2L19071-01**				**Prepared & Analyzed: 12/23/22**						
Sulfide, Total	0.800	0.10	0.20	mg/l		0.800			0	20	
Duplicate (W2L1910-DUP3)	**Source: 2L21071-01**				**Prepared & Analyzed: 12/23/22**						
Sulfide, Total	20.0	2.0	4.0	mg/l		20.0			0	20	
Matrix Spike (W2L1910-MS1)	**Source: 2L15011-01**				**Prepared & Analyzed: 12/23/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120			
Matrix Spike Dup (W2L1910-MSD1)	**Source: 2L15011-01**				**Prepared & Analyzed: 12/23/22**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.200	ND	100	80-120	0	20	
Batch: W3A0061 - EPA 350.1											
Blank (W3A0061-BLK1)					**Prepared: 01/03/23 Analyzed: 01/04/23**						
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W3A0061-BLK2)					**Prepared: 01/03/23 Analyzed: 01/04/23**						
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W3A0061-BS1)					**Prepared: 01/03/23 Analyzed: 01/04/23**						
Ammonia as N	0.248	0.017	0.10	mg/l	0.250		99	90-110			
LCS (W3A0061-BS2)					**Prepared: 01/03/23 Analyzed: 01/04/23**						
Ammonia as N	0.246	0.017	0.10	mg/l	0.250		98	90-110			
Matrix Spike (W3A0061-MS1)	**Source: 2L28095-17**				**Prepared: 01/03/23 Analyzed: 01/04/23**						
Ammonia as N	0.251	0.017	0.10	mg/l	0.250	ND	100	90-110			
Matrix Spike (W3A0061-MS2)	**Source: 2L29026-02**				**Prepared: 01/03/23 Analyzed: 01/04/23**						
Ammonia as N	0.925	0.017	0.10	mg/l	0.250	0.686	96	90-110			
Matrix Spike Dup (W3A0061-MSD1)	**Source: 2L28095-17**				**Prepared: 01/03/23 Analyzed: 01/04/23**						
Ammonia as N	0.252	0.017	0.10	mg/l	0.250	ND	101	90-110	0.6	15	
Matrix Spike Dup (W3A0061-MSD2)	**Source: 2L29026-02**				**Prepared: 01/03/23 Analyzed: 01/04/23**						
Ammonia as N	0.923	0.017	0.10	mg/l	0.250	0.686	95	90-110	0.2	15	
Batch: W3A0244 - EPA 351.2											
Blank (W3A0244-BLK1)					**Prepared: 01/04/23 Analyzed: 01/06/23**						
TKN	ND	0.065	0.10	mg/l							
Blank (W3A0244-BLK2)					**Prepared: 01/04/23 Analyzed: 01/06/23**						
TKN	ND	0.065	0.10	mg/l							
LCS (W3A0244-BS1)					**Prepared: 01/04/23 Analyzed: 01/06/23**						
TKN	0.988	0.065	0.10	mg/l	1.00		99	90-110			
LCS (W3A0244-BS2)					**Prepared: 01/04/23 Analyzed: 01/06/23**						
TKN	0.979	0.065	0.10	mg/l	1.00		98	90-110			
Matrix Spike (W3A0244-MS1)	**Source: 2L29008-01**				**Prepared: 01/04/23 Analyzed: 01/06/23**						
TKN	1.22	0.065	0.10	mg/l	1.00	0.189	103	90-110			

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
01/10/2023 11:02

Quality Control Results (Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3A0244 - EPA 351.2 (Continued)											
Matrix Spike (W3A0244-MS2)	**Source: 2L29073-02**				**Prepared: 01/04/23**	**Analyzed: 01/06/23**					
TKN	2.30	0.13	0.20	mg/l	2.00	0.296	100	90-110			
Matrix Spike Dup (W3A0244-MSD1)	**Source: 2L29008-01**				**Prepared: 01/04/23**	**Analyzed: 01/06/23**					
TKN	1.22	0.065	0.10	mg/l	1.00	0.189	104	90-110	0.6	10	
Matrix Spike Dup (W3A0244-MSD2)	**Source: 2L29073-02**				**Prepared: 01/04/23**	**Analyzed: 01/06/23**					
TKN	2.39	0.13	0.20	mg/l	2.00	0.296	105	90-110	4	10	
Batch: W3A0369 - EPA 365.3											
Blank (W3A0369-BLK1)					**Prepared: 01/05/23**	**Analyzed: 01/09/23**					
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W3A0369-BS1)					**Prepared: 01/05/23**	**Analyzed: 01/09/23**					
Phosphorus as P, Total	0.205	0.0067	0.010	mg/l	0.200		102	90-110			
Matrix Spike (W3A0369-MS1)	**Source: 2L28058-01**				**Prepared: 01/05/23**	**Analyzed: 01/09/23**					
Phosphorus as P, Total	0.294	0.0067	0.010	mg/l	0.200	0.0870	104	90-110			
Matrix Spike Dup (W3A0369-MSD1)	**Source: 2L28058-01**				**Prepared: 01/05/23**	**Analyzed: 01/09/23**					
Phosphorus as P, Total	0.294	0.0067	0.010	mg/l	0.200	0.0870	104	90-110	0	20	

Quality Control Results (Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3A0052 - EPA 200.7											
Blank (W3A0052-BLK1)					**Prepared: 01/03/23**	**Analyzed: 01/04/23**					
Aluminum, Dissolved	ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.041	0.050	mg/l							
LCS (W3A0052-BS1)					**Prepared: 01/03/23**	**Analyzed: 01/04/23**					
Aluminum, Dissolved	0.228	0.041	0.050	mg/l	0.200		114	85-115			
Aluminum, Total	0.228	0.041	0.050	mg/l	0.200		114	85-115			
Matrix Spike (W3A0052-MS1)	**Source: 2L20024-01**				**Prepared: 01/03/23**	**Analyzed: 01/04/23**					
Aluminum, Total	0.317	0.041	0.050	mg/l	0.200	0.0870	115	70-130			
Matrix Spike (W3A0052-MS2)	**Source: 2L20024-02**				**Prepared: 01/03/23**	**Analyzed: 01/04/23**					
Aluminum, Total	0.328	0.041	0.050	mg/l	0.200	0.0929	117	70-130			
Matrix Spike Dup (W3A0052-MSD1)	**Source: 2L20024-01**				**Prepared: 01/03/23**	**Analyzed: 01/04/23**					
Aluminum, Total	0.322	0.041	0.050	mg/l	0.200	0.0870	117	70-130	2	30	
Matrix Spike Dup (W3A0052-MSD2)	**Source: 2L20024-02**				**Prepared: 01/03/23**	**Analyzed: 01/04/23**					
Aluminum, Total	0.330	0.041	0.050	mg/l	0.200	0.0929	118	70-130	0.6	30	

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
01/10/2023 11:02

Notes and Definitions

Item	Definition
FILT	The sample was filtered prior to analysis.
J	Estimated conc. detected <MRL and >MDL.
M-06	Due to the high concentration of analyte inherent in the sample, sample was diluted prior to preparation and/or analysis. The MDL and MRL were raised due to this dilution.
ND	Not Detected
R-03	The RPD is not applicable for result below the reporting limit (either ND or J value).
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Chain of Custody & Sample Information Record

2L20024

Client: Wood E&I Solutions, Inc. **Contact:** John Rudolph **Phone No.** 858-243-8158

FAX No. **Email:** john.rudolph@woodplc.com

Project Name: LECL TMDL Monitoring

Project Number: 1915100404

Turn Around Time: Routine *3-5 Day Rush *48 Hour Rush *24 Hour Rush *Additional Charges May Apply

Lab TAT Approval: By:

Additional Reporting Requests
Include QC Data Package: ☐ Yes ☐ No
FAX Results: ☐ Yes ☐ No
Email Results: ☐ Yes ☐ No
State EDT: ☐ Yes ☐ No
(Include Source Number in Notes)

Sampler Information
Name:
Employer: Wood E&I Solutions, Inc.
Signature:

Sample ID	Date	Time	# of Containers & Preservatives: Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Total # of Containers	Sample Type: Routine	Resample	Special	Analysis Requested: TSS	Nitrate - Nitrite (EPA 353.2)	TDS (SM2540 C)	TKN (EPA 351.2	Ammonia (EPA 350.1)	Total Phosphorus (EPA 365.3)	SRP/Ortho-P (EPA 365.3)	Total Sulfide (SM4500S)	Total AL (EPA 200.7)	Dissolved AL (EPA 200.7)	Matrix	Notes
CL07	12/19/22	1205															X	X	X	X	X	X	X	X	X	X		
CL08	12/19/22	1120															X	X	X	X	X	X	X	X	X	X		
CL09	12/19/22	1035															X	X	X	X	X	X	X	X	X	X		
CL10	12/19/22	0940															X	X	X	X	X	X	X	X	X	X		
LE02	12/19/22	0938																X	X	X	X	X	X	X				

DW = Drinking Water
WW = Wastewater
GW = Groundwater
S = Soil
SG = Sludge
L = Liquid
M = Miscellaneous

Ortho-P is field filtered (0.45 um)

Dissolved Al is field filtered (0.45 um)

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (Sign)	Print Name / Company
	John Rudolph WSP	12/19/22 1340		
	Laura Gastrum	12/19/22 1730		12/19/22 1830

(For Lab Use Only) **Sample Integrity Upon Receipt**

Sample(s) Submitted on Ice? (Yes) No
Custody Seal(s) Intact? Yes No (N/A)
Sample(s) Intact? (Yes) No

Temperature: 2.4 °C T0268
☐ Cooler Blank

Lab Notes

Lab No.

Page 1 of 4

Chain of Custody & Sample Information Record

2170024

Client: Wood E&I Solutions, Inc. **Contact:** John Rudolph **Phone No.** 858-243-8158

FAX No. **Email:** john.rudolph@woodplc.com

Project Name: LECL TMDL Monitoring

Project Number: 1915100404

Turn Around Time: Routine *3-5 Day Rush *48 Hour Rush *24 Hour Rush

*Lab TAT Approval: By: *Additional Charges May Apply

Additional Reporting Requests
Include QC Data Package: ☐ Yes ☐ No
FAX Results: ☐ Yes ☐ No
Email Results: ☐ Yes ☐ No
State EDT: ☐ Yes ☐ No
(Include Source Number in Notes)

Sampler Information
Name:
Employer: Wood E&I Solutions, Inc.
Signature:

Sample ID	Date	Time	# of Containers & Preservatives: Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Total # of Containers	Sample Type: Routine	Resample	Special	Analysis Requested: Total Sulfide	Nitrate - Nitrite	TDS	TKN	Ammonia	Total Phosphorus	SRP/Ortho-P	Chlorophyll-a	Matrix	Notes
CL07 - Int	12/19/22	1205																						x		Filter Volume: 250 mL
CL07 - Surf	"	1210																						x		Filter Volume: 250 mL
CL08 - Int	"	1120																						x		Filter Volume: 500mL
CL08 - Surf	"	1125																						x		Filter Volume: 500 mL
CL09 - Int	"	1035																						x		Filter Volume: 250 mL
CL09 - Surf	"	1040																						x		Filter Volume: 250 mL
CL10 - Int	"	0940																						x		Filter Volume: 250 mL
CL10 - Surf	"	0945																						x		Filter Volume: 270 mL
LE02 - Int	"	0928																						x		Filter Volume: 200
LE02 - Surf	"	1000																						x		Filter Volume: 150

Matrix: DW = Drinking Water; WW = Wastewater; GW = Groundwater; S = Soil; SG = Sludge; L = Liquid; M = Miscellaneous

Notes: Chl-a samples on 0.7 um GFF

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (Sign)	Print Name / Company
	John Rudolph WST	12/19/22 1345		
	Laura Carter WSP	12/19/22		12/19/22 1630

(For Lab Use Only) **Sample Integrity Upon Receipt**

Sample(s) Submitted on Ice? Yes No
Custody Seal(s) Intact? Yes No N/A
Sample(s) Intact? Yes No

Temperature: 2.4 °C
☐ Cooler Blank TDLAB

Lab Notes

Lab No.

WECK LABORATORIES, INC.

Sample Receipt Checklist

Weck WKO: 2L20024
WKO Logged by: Algabriel Holanda
Samples Checked by: ATH

Date/Time Received: 12/19/22 @ 1:30
Of Samples: 15
Delivered by: RMS

	Task	Yes	No	N/A	Comments
COC	COC present at receipt?	☒	☐		
	COC properly completed?	☒	☐		
	COC matches sample labels?	☒	☐		
	Project Manager notified?	☐	☐	☒	
Receipt Information	Sample Temperature	2.4C			
	Samples received on ice?	☒	☐		
	Ice Type (Blue/Wet)	Wet			
	All samples intact?	☒	☐		
	Samples in proper containers?	☒	☐		
	Sufficient sample volume?	☒	☐		
	Samples intact?	☒	☐		
	Received within holding time?	☒	☐		
	Project Manager notified?	☐	☐	☒	
Sample Preservation Verification?	Sample labels checked for correct preservation?	☒	☐	☐	
	VOC Headspace: (No) none, If Yes (See comment) 524.2, 524.3, 624.1, 8260, 1666 P/T, LUFT	☐	☐	☒	☐ <6mm/Pea size?
	pH verified upon receipt? Metals <2; H2SO4 pres tests <2; 522<4; TOC <2; 525.2<2; 6710B<2; 608.3 5-9	☒	☐	☐	pH paper Lot# 2071882
	Free Chlorine Tested <0.1	☐	☐	☒	Cl Test Strip Lot# 061221E
	O&G pH <2 verified?	☐	☐	☐	pH paper Lot# pH Reading:
	pH adjusted for O&G	☐	☐	☐	Acid Lot# Amt added:
	Project Manager notified?	☐	☐	☒	

PM Comments

Sample Receipt Checklist Prepared by:

Signature: _____ Date: 12/20/22

WECK LABORATORIES, INC.

Subcontract Order

Subcontracted Laboratory:

Enthalpy Analytical
931 W. Barkley Ave
Orange, CA 92868
Phone: (714) 771-6900
Fax: (714) 538-1209

Turn Around Time: Normal unless noted in comments
Project Manager: Chris Samatmanakit
Project Name: Lake Elsinore/Canyon Lake TMDL Mo
Project Number: 1915100404 LECL TMDL Monitoring
Sampler Employed by:
Drinking Water: Yes / (No)
Need Transfer File (xls): (Yes) / No
Tracking Number:

Work Order: 2L20024

Analysis	Expires	Comments
Sample ID: 2L20024-06/CL07 - Int		**Sampled:** 12/19/2022 12:05
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 12:05	J, field filtered 250mL
Containers Supplied:		
Sample ID: 2L20024-07/CL07 - Surf		**Sampled:** 12/19/2022 12:10
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 12:10	J, field filtered 250mL
Containers Supplied:		
Sample ID: 2L20024-08/CL08 - Int		**Sampled:** 12/19/2022 11:20
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 11:20	J, field filtered 500mL
Containers Supplied:		
Sample ID: 2L20024-09/CL08 - Surf		**Sampled:** 12/19/2022 11:25
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 11:25	J, field filtered 500mL
Containers Supplied:		
Sample ID: 2L20024-10/CL09 - Int		**Sampled:** 12/19/2022 10:35
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 10:35	J, field filtered 250mL
Containers Supplied:		
Sample ID: 2L20024-11/CL09 - Surf		**Sampled:** 12/19/2022 10:40
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 10:40	J, field filtered 250mL
Containers Supplied:		
Sample ID: 2L20024-12/CL10 - Int		**Sampled:** 12/19/2022 09:40
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 09:40	J, field filtered 250mL
Containers Supplied:		

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Subcontract Order

(Continued)

Work Order: 2L20024

(Continued)

Analysis	Expires	Comments
Sample ID: 2L20024-13/CL10 - Surf		**Sampled:** 12/19/2022 09:45
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 09:45	J, field filtered 250mL
Containers Supplied:		
Sample ID: 2L20024-14/LE02 - Int		**Sampled:** 12/19/2022 09:28
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 09:28	J, field filtered 200mL
Containers Supplied:		
Sample ID: 2L20024-15/LE02 - Surf		**Sampled:** 12/19/2022 10:00
Sample comment:		**Matrix:**Water **Sampled By:** Client
Chlorophyll-a - SM 10200H	12/21/2022 10:00	J, field filtered 150mL
Containers Supplied:		

Remarks / Special Comments:

Sample Condition

Temperature:	
Preserved:	Yes / No
Evidence Seal Intact:	Yes / No
Container Attacked:	Yes / No
Preserved at Lab:	Yes / No

Relinquished By	Date / Time	Received By	Date / Time
	12/22/22 1255	Ricardo Corrales	12-22-22 12:55

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Certificate of Analysis

FINAL REPORT

Work Orders:	3B08010
Project:	1915100404 LECL TMDL Monitoring
Attn:	John Rudolph
Client:	WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Report Date:	4/03/2023
Received Date:	2/7/2023
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
P.O. #:	C015101084
Billing Code:	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 2/07/23 with the Chain-of-Custody document. The samples were received in good condition, at 3.0 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Tiffany T. Felix For Chris Samatmanakit
Project Manager

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
04/03/2023 15:16

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nick Jernack	3B08010-01	Water	02/07/23 10:45	
CL08	Nick Jernack	3B08010-02	Water	02/07/23 10:05	
CL09	Nick Jernack	3B08010-03	Water	02/07/23 09:10	
CL10	Nick Jernack	3B08010-04	Water	02/07/23 08:15	
LE02	Nick Jernack	3B08010-05	Water	02/07/23 09:25	

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San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
04/03/2023 15:16

Sample Results

Sample: CL07
3B08010-01 (Water)

Sampled: 02/07/23 10:45 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3B1691 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/21/23 11:37				**Analyst:** heq
Ammonia as N	**0.18**	0.017	0.10	mg/l	1	02/22/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3B1560 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/17/23 10:01				**Analyst:** YMT/HEQ
TKN	**1.0**	0.065	0.10	mg/l	1	02/21/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3B0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 16:38				**Analyst:** ISM
Nitrate as N	**0.20**	0.040	0.20	mg/l	1	02/08/23 18:14	
Nitrite as N	**0.042**	0.042	0.10	mg/l	1	02/08/23 18:14	J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0662 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 10:13				**Analyst:** heq
o-Phosphate as P	**0.026**	0.0030	0.010	mg/l	1	02/08/23 19:51	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0839 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/09/23 11:51				**Analyst:** heq
Phosphorus as P, Total	**0.081**	0.0067	0.010	mg/l	1	02/15/23	
Method: SM 2540C			**Instr:** OVEN16				
Batch ID: W3B1017 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/12/23 10:26				**Analyst:** bel
Total Dissolved Solids	**470**	4.0	10	mg/l	1	02/13/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3B0977 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/10/23 13:35				**Analyst:** mes
Total Suspended Solids	**9**		5	mg/l	1	02/10/23	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3B1193 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/14/23 14:33				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	02/14/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3B1276 **Preparation:** EPA 200.2			**Prepared:** 02/15/23 10:05				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	02/17/23	
Aluminum, Total	**0.17**	0.022	0.050	mg/l	1	02/17/23	

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported: 04/03/2023 15:16

Sample Results

(Continued)

Sample: CL08

Sampled: 02/07/23 10:05 by Nick Jernack

3B08010-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3B1691 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/21/23 11:37				**Analyst:** heq
Ammonia as N	**0.14**	0.017	0.10	mg/l	1	02/22/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3B1560 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/17/23 10:01				**Analyst:** YMT/HEQ
TKN	**0.84**	0.065	0.10	mg/l	1	02/21/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3B0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 16:38				**Analyst:** ISM
Nitrate as N	**0.19**	0.040	0.20	mg/l	1	02/08/23 18:15	J
Nitrite as N	ND	0.042	0.10	mg/l	1	02/08/23 18:15	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0662 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 10:13				**Analyst:** heq
o-Phosphate as P	**0.019**	0.0030	0.010	mg/l	1	02/08/23 19:51	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0839 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/09/23 11:51				**Analyst:** heq
Phosphorus as P, Total	**0.15**	0.0067	0.010	mg/l	1	02/15/23	
Method: SM 2540C			**Instr:** OVEN16				
Batch ID: W3B1017 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/12/23 10:26				**Analyst:** bel
Total Dissolved Solids	**480**	4.0	10	mg/l	1	02/13/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3B0850 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/09/23 12:11				**Analyst:** mes
Total Suspended Solids	**46**		5	mg/l	1	02/09/23	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3B1193 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/14/23 14:33				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	02/14/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3B1276 **Preparation:** EPA 200.2			**Prepared:** 02/15/23 10:05				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	02/17/23	
Aluminum, Total	**2.8**	0.022	0.050	mg/l	1	02/17/23	

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Project Manager: John Rudolph

Reported:
04/03/2023 15:16

Sample Results

(Continued)

Sample: CL09
3B08010-03 (Water)

Sampled: 02/07/23 9:10 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3B1691 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/21/23 11:37				**Analyst:** heq
Ammonia as N	**0.31**	0.017	0.10	mg/l	1	02/22/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3B1560 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/17/23 10:01				**Analyst:** YMT/HEQ
TKN	**1.2**	0.065	0.10	mg/l	1	02/21/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3B0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 16:38				**Analyst:** ISM
Nitrate as N	**0.36**	0.040	0.20	mg/l	1	02/08/23 18:19	
Nitrite as N	ND	0.042	0.10	mg/l	1	02/08/23 18:19	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0662 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 10:13				**Analyst:** heq
o-Phosphate as P	**0.19**	0.0030	0.010	mg/l	1	02/08/23 19:52	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0839 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/09/23 11:51				**Analyst:** heq
Phosphorus as P, Total	**0.22**	0.0067	0.010	mg/l	1	02/15/23	
Method: SM 2540C			**Instr:** OVEN16				
Batch ID: W3B1017 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/12/23 10:26				**Analyst:** bel
Total Dissolved Solids	**520**	4.0	10	mg/l	1	02/13/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3B0850 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/09/23 12:11				**Analyst:** mes
Total Suspended Solids	**5**		5	mg/l	1	02/09/23	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3B1193 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/14/23 14:33				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	02/14/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3B1276 **Preparation:** EPA 200.2			**Prepared:** 02/15/23 10:05				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	02/17/23	
Aluminum, Total	**0.12**	0.022	0.050	mg/l	1	02/17/23	

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Sample Results

(Continued)

Sample: CL10
3B08010-04 (Water)

Sampled: 02/07/23 8:15 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3B1691 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/21/23 11:37				**Analyst:** heq
Ammonia as N	**0.20**	0.017	0.10	mg/l	1	02/22/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3B1560 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/17/23 10:01				**Analyst:** YMT/HEQ
TKN	**1.3**	0.065	0.10	mg/l	1	02/21/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3B0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 16:38				**Analyst:** ISM
Nitrate as N	**0.39**	0.040	0.20	mg/l	1	02/08/23 18:20	
Nitrite as N	**0.043**	0.042	0.10	mg/l	1	02/08/23 18:20	J
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0662 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 10:13				**Analyst:** heq
o-Phosphate as P	**0.20**	0.0030	0.010	mg/l	1	02/08/23 19:52	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0839 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/09/23 11:51				**Analyst:** heq
Phosphorus as P, Total	**0.27**	0.0067	0.010	mg/l	1	02/15/23	
Method: SM 2540C			**Instr:** OVEN16				
Batch ID: W3B1017 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/12/23 10:26				**Analyst:** bel
Total Dissolved Solids	**540**	4.0	10	mg/l	1	02/13/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3B0850 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/09/23 12:11				**Analyst:** mes
Total Suspended Solids	**11**		5	mg/l	1	02/09/23	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3B1193 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/14/23 14:33				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	02/14/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3B1276 **Preparation:** EPA 200.2			**Prepared:** 02/15/23 10:05				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	02/17/23	
Aluminum, Total	**0.31**	0.022	0.050	mg/l	1	02/17/23	

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Sample Results

(Continued)

Sample: LE02
3B08010-05 (Water)

Sampled: 02/07/23 9:25 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3B1691 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/21/23 11:37				**Analyst:** heq
Ammonia as N	**0.11**	0.017	0.10	mg/l	1	02/22/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3B1560 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/17/23 10:01				**Analyst:** YMT/HEQ
TKN	**4.6**	0.13	0.20	mg/l	2	02/21/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3B0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 16:38				**Analyst:** ISM
Nitrate as N	**0.18**	0.040	0.20	mg/l	1	02/08/23 18:21	J
Nitrite as N	**0.26**	0.042	0.10	mg/l	1	02/08/23 18:21	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0662 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/08/23 10:13				**Analyst:** heq
o-Phosphate as P	**0.013**	0.0030	0.010	mg/l	1	02/08/23 19:53	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3B0839 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/09/23 11:51				**Analyst:** heq
Phosphorus as P, Total	**0.15**	0.0067	0.010	mg/l	1	02/15/23	
Method: SM 2540C			**Instr:** OVEN16				
Batch ID: W3B1017 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/12/23 10:26				**Analyst:** bel
Total Dissolved Solids	**2200**	4.0	10	mg/l	1	02/13/23	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3B1193 **Preparation:** _NONE (WETCHEM)			**Prepared:** 02/14/23 14:33				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	02/14/23	

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Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3B0662 - EPA 365.3											
Blank (W3B0662-BLK1)					**Prepared & Analyzed: 02/08/23**						
o-Phosphate as P	ND	0.0030	0.010	mg/l							
LCS (W3B0662-BS1)					**Prepared & Analyzed: 02/08/23**						
o-Phosphate as P	0.206	0.0030	0.010	mg/l	0.200		103	88-111			
Matrix Spike (W3B0662-MS1)	**Source: 3B07130-01**				**Prepared & Analyzed: 02/08/23**						
o-Phosphate as P	0.275	0.0030	0.010	mg/l	0.200	0.0730	101	85-112			
Matrix Spike Dup (W3B0662-MSD1)	**Source: 3B07130-01**				**Prepared & Analyzed: 02/08/23**						
o-Phosphate as P	0.278	0.0030	0.010	mg/l	0.200	0.0730	102	85-112	1	20	
Batch: W3B0734 - EPA 353.2											
Blank (W3B0734-BLK1)					**Prepared & Analyzed: 02/08/23**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
LCS (W3B0734-BS1)					**Prepared & Analyzed: 02/08/23**						
Nitrate as N	1.07	0.040	0.20	mg/l	1.00		107	90-110			
Nitrite as N	0.975	0.042	0.10	mg/l	1.00		98	90-110			
Matrix Spike (W3B0734-MS1)	**Source: 3B08033-01**				**Prepared & Analyzed: 02/08/23**						
Nitrate as N	6.52	0.040	0.20	mg/l	2.00	4.37	107	90-110			
Nitrite as N	0.934	0.042	0.10	mg/l	1.00	ND	93	90-110			
Matrix Spike (W3B0734-MS2)	**Source: 3B08082-11**				**Prepared & Analyzed: 02/08/23**						
Nitrate as N	5.43	0.040	0.20	mg/l	2.00	3.20	111	90-110			MS-01
Nitrite as N	1.01	0.042	0.10	mg/l	1.00	0.0669	94	90-110			
Matrix Spike Dup (W3B0734-MSD1)	**Source: 3B08033-01**				**Prepared & Analyzed: 02/08/23**						
Nitrate as N	6.54	0.040	0.20	mg/l	2.00	4.37	108	90-110	0.3	20	
Nitrite as N	0.953	0.042	0.10	mg/l	1.00	ND	95	90-110	2	20	
Matrix Spike Dup (W3B0734-MSD2)	**Source: 3B08082-11**				**Prepared & Analyzed: 02/08/23**						
Nitrate as N	5.39	0.040	0.20	mg/l	2.00	3.20	109	90-110	0.7	20	
Nitrite as N	1.02	0.042	0.10	mg/l	1.00	0.0669	95	90-110	1	20	
Batch: W3B0839 - EPA 365.3											
Blank (W3B0839-BLK1)					**Prepared: 02/09/23 Analyzed: 02/15/23**						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W3B0839-BS1)					**Prepared: 02/09/23 Analyzed: 02/15/23**						
Phosphorus as P, Total	0.207	0.0067	0.010	mg/l	0.200		104	90-110			
Matrix Spike (W3B0839-MS1)	**Source: 3B07130-01**				**Prepared: 02/09/23 Analyzed: 02/15/23**						
Phosphorus as P, Total	0.309	0.0067	0.010	mg/l	0.200	0.0980	106	90-110			
Matrix Spike Dup (W3B0839-MSD1)	**Source: 3B07130-01**				**Prepared: 02/09/23 Analyzed: 02/15/23**						
Phosphorus as P, Total	0.310	0.0067	0.010	mg/l	0.200	0.0980	106	90-110	0.3	20	
Batch: W3B0850 - SM 2540D											
Blank (W3B0850-BLK1)					**Prepared & Analyzed: 02/09/23**						

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Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3B0850 - SM 2540D (Continued)											
Blank (W3B0850-BLK1)					**Prepared & Analyzed: 02/09/23**						
Total Suspended Solids	0.300		5	mg/l							J
LCS (W3B0850-BS1)					**Prepared & Analyzed: 02/09/23**						
Total Suspended Solids	68.8		5	mg/l	65.5		105	90-110			
Duplicate (W3B0850-DUP1)	**Source: 3B06112-01**				**Prepared & Analyzed: 02/09/23**						
Total Suspended Solids	128		5	mg/l		123			4	10	
Duplicate (W3B0850-DUP2)	**Source: 3B08010-04**				**Prepared & Analyzed: 02/09/23**						
Total Suspended Solids	12.0		5	mg/l		11.2			7	10	
Batch: W3B0977 - SM 2540D											
Blank (W3B0977-BLK1)					**Prepared & Analyzed: 02/10/23**						
Total Suspended Solids	0.400		5	mg/l							J
LCS (W3B0977-BS1)					**Prepared & Analyzed: 02/10/23**						
Total Suspended Solids	61.1		5	mg/l	56.4		108	90-110			
Duplicate (W3B0977-DUP1)	**Source: 3B07155-01**				**Prepared & Analyzed: 02/10/23**						
Total Suspended Solids	33.2		5	mg/l		30.4			9	10	
Duplicate (W3B0977-DUP2)	**Source: 3B08010-01**				**Prepared & Analyzed: 02/10/23**						
Total Suspended Solids	9.20		5	mg/l		8.60			7	10	
Batch: W3B1017 - SM 2540C											
Blank (W3B1017-BLK1)					**Prepared: 02/12/23 Analyzed: 02/13/23**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W3B1017-BS1)					**Prepared: 02/12/23 Analyzed: 02/13/23**						
Total Dissolved Solids	819	4.0	10	mg/l	824		99	97-103			
Duplicate (W3B1017-DUP1)	**Source: 3B06112-04**				**Prepared: 02/12/23 Analyzed: 02/13/23**						
Total Dissolved Solids	2030	4.0	10	mg/l		2030			0	10	
Duplicate (W3B1017-DUP2)	**Source: 3B08010-05**				**Prepared: 02/12/23 Analyzed: 02/13/23**						
Total Dissolved Solids	2130	4.0	10	mg/l		2150			0.8	10	
Batch: W3B1193 - SM 4500S2-D											
Blank (W3B1193-BLK1)					**Prepared & Analyzed: 02/14/23**						
Sulfide, Total	ND	0.050	0.10	mg/l							
LCS (W3B1193-BS1)					**Prepared & Analyzed: 02/14/23**						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.102		98	90-110			
Duplicate (W3B1193-DUP1)	**Source: 2K28009-01**				**Prepared & Analyzed: 02/14/23**						
Sulfide, Total	0.800	0.050	0.10	mg/l		0.800			0	20	
Duplicate (W3B1193-DUP2)	**Source: 3B07113-01**				**Prepared & Analyzed: 02/14/23**						
Sulfide, Total	1.00	0.50	1.0	mg/l		1.00			0	20	
Duplicate (W3B1193-DUP3)	**Source: 3B07113-02**				**Prepared & Analyzed: 02/14/23**						
Sulfide, Total	2.00	0.50	1.0	mg/l		2.00			0	20	
Duplicate (W3B1193-DUP4)	**Source: 3B07113-03**				**Prepared & Analyzed: 02/14/23**						

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Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3B1193 - SM 4500S2-D (Continued)											
Duplicate (W3B1193-DUP4)	**Source: 3B07113-03**				**Prepared & Analyzed: 02/14/23**						
Sulfide, Total	4.00	0.50	1.0	mg/l		4.00			0	20	
Matrix Spike (W3B1193-MS1)	**Source: 2J20014-01**				**Prepared & Analyzed: 02/14/23**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.204	ND	98	80-120			
Matrix Spike Dup (W3B1193-MSD1)	**Source: 2J20014-01**				**Prepared & Analyzed: 02/14/23**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.204	ND	98	80-120	0	20	
Batch: W3B1560 - EPA 351.2											
Blank (W3B1560-BLK1)					**Prepared: 02/17/23 Analyzed: 02/21/23**						
TKN	ND	0.065	0.10	mg/l							
Blank (W3B1560-BLK2)					**Prepared: 02/17/23 Analyzed: 02/21/23**						
TKN	ND	0.065	0.10	mg/l							
LCS (W3B1560-BS1)					**Prepared: 02/17/23 Analyzed: 02/21/23**						
TKN	1.00	0.065	0.10	mg/l	1.00		100	90-110			
LCS (W3B1560-BS2)					**Prepared: 02/17/23 Analyzed: 02/21/23**						
TKN	1.00	0.065	0.10	mg/l	1.00		100	90-110			
Duplicate (W3B1560-DUP1)	**Source: 3B09039-04**				**Prepared: 02/17/23 Analyzed: 02/21/23**						
TKN	0.924	0.065	0.10	mg/l		0.852			8	10	
Matrix Spike (W3B1560-MS1)	**Source: 3B09039-06**				**Prepared: 02/17/23 Analyzed: 02/21/23**						
TKN	1.01	0.065	0.10	mg/l	1.00	ND	101	90-110			
Matrix Spike (W3B1560-MS2)	**Source: 3B16112-10**				**Prepared: 02/17/23 Analyzed: 02/21/23**						
TKN	1.22	0.065	0.10	mg/l	1.00	0.243	98	90-110			
Matrix Spike Dup (W3B1560-MSD1)	**Source: 3B09039-06**				**Prepared: 02/17/23 Analyzed: 02/21/23**						
TKN	1.01	0.065	0.10	mg/l	1.00	ND	101	90-110	0.4	10	
Matrix Spike Dup (W3B1560-MSD2)	**Source: 3B16112-10**				**Prepared: 02/17/23 Analyzed: 02/21/23**						
TKN	1.21	0.065	0.10	mg/l	1.00	0.243	97	90-110	1	10	
Batch: W3B1691 - EPA 350.1											
Blank (W3B1691-BLK1)					**Prepared: 02/21/23 Analyzed: 02/22/23**						
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W3B1691-BLK2)					**Prepared: 02/21/23 Analyzed: 02/22/23**						
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W3B1691-BS1)					**Prepared: 02/21/23 Analyzed: 02/22/23**						
Ammonia as N	0.253	0.017	0.10	mg/l	0.250		101	90-110			
LCS (W3B1691-BS2)					**Prepared: 02/21/23 Analyzed: 02/22/23**						
Ammonia as N	0.253	0.017	0.10	mg/l	0.250		101	90-110			
Matrix Spike (W3B1691-MS1)	**Source: 3B08168-01**				**Prepared: 02/21/23 Analyzed: 02/22/23**						
Ammonia as N	0.376	0.017	0.10	mg/l	0.250	0.140	94	90-110			
Matrix Spike (W3B1691-MS2)	**Source: 3B09137-03**				**Prepared: 02/21/23 Analyzed: 02/22/23**						
Ammonia as N	0.294	0.017	0.10	mg/l	0.250	0.0360	103	90-110			

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WSP USA E&I Inc. - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
04/03/2023 15:16

Quality Control Results (Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3B1691 - EPA 350.1 (Continued)											
Matrix Spike Dup (W3B1691-MSD1)	**Source: 3B08168-01**				**Prepared: 02/21/23**	**Analyzed: 02/22/23**					
Ammonia as N	0.375	0.017	0.10	mg/l	0.250	0.140	94	90-110	0.3	15	
Matrix Spike Dup (W3B1691-MSD2)	**Source: 3B09137-03**				**Prepared: 02/21/23**	**Analyzed: 02/22/23**					
Ammonia as N	0.295	0.017	0.10	mg/l	0.250	0.0360	103	90-110	0.4	15	

Quality Control Results (Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3B1276 - EPA 200.7											
Blank (W3B1276-BLK1)					**Prepared: 02/15/23**	**Analyzed: 02/17/23**					
Aluminum, Dissolved	ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.022	0.050	mg/l							
LCS (W3B1276-BS1)					**Prepared: 02/15/23**	**Analyzed: 02/17/23**					
Aluminum, Dissolved	0.213	0.041	0.050	mg/l	0.200		106	85-115			
Aluminum, Total	0.213	0.022	0.050	mg/l	0.200		106	85-115			
Matrix Spike (W3B1276-MS1)	**Source: 3B08010-01**				**Prepared: 02/15/23**	**Analyzed: 02/17/23**					
Aluminum, Total	0.486	0.022	0.050	mg/l	0.200	0.173	157	70-130			MS-02
Matrix Spike (W3B1276-MS2)	**Source: 3B08170-02**				**Prepared: 02/15/23**	**Analyzed: 02/17/23**					
Aluminum, Dissolved	0.251	0.041	0.050	mg/l	0.200	ND	125	70-130			
Aluminum, Total	0.251	0.022	0.050	mg/l	0.200	ND	125	70-130			
Matrix Spike Dup (W3B1276-MSD1)	**Source: 3B08010-01**				**Prepared: 02/15/23**	**Analyzed: 02/17/23**					
Aluminum, Total	0.475	0.022	0.050	mg/l	0.200	0.173	151	70-130	2	30	MS-02
Matrix Spike Dup (W3B1276-MSD2)	**Source: 3B08170-02**				**Prepared: 02/15/23**	**Analyzed: 02/17/23**					
Aluminum, Dissolved	0.252	0.041	0.050	mg/l	0.200	ND	126	70-130	0.6	30	
Aluminum, Total	0.252	0.022	0.050	mg/l	0.200	ND	126	70-130	0.6	30	

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100404 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
04/03/2023 15:16

Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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Chain of Custody & Sample Information Record

3B080010

Client: Wood E&I Solutions, Inc. **Contact:** John Rudolph **Phone No.** 858-243-8158

FAX No. **Email:** john.rudolph@woodplc.com

Project Name: LECL TMDL Monitoring

Project Number: 1915100404

Turn Around Time: **Routine** *3-5 Day Rush *48 Hour Rush *24 Hour Rush *Additional Charges May Apply

Lab TAT Approval: By:

Additional Reporting Requests
Include QC Data Package: ☐ Yes ☐ No
FAX Results: ☐ Yes ☐ No
Email Results: ☐ Yes ☐ No
State EDT: ☐ Yes ☐ No
(Include Source Number in Notes)

Sampler Information
Name: Nick Jernack
Employer: Wood E&I Solutions, Inc.
Signature:

Sample ID	Date	Time	# of Containers & Preservatives: Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Total # of Containers	Sample Type: Routine	Resample	Special	Analysis Requested: TSS	Nitrate - Nitrite (EPA 353.2)	TDS (SM2540 C)	TKN (EPA 351.2	Ammonia (EPA 350.1)	Total Phosphorus (EPA 365.3)	SRP/Ortho-P (EPA 365.3)	Total Sulfide (SM4500S)	Total AL (EPA 200.7)	Dissolved AL (EPA 200.7)	Matrix	Notes
CL07	2/7/23	1045															x	x	x	x	x	x	x	x	x	x		
CL08		1005															x	x	x	x	x	x	x	x	x	x		
CL09		0910															x	x	x	x	x	x	x	x	x	x		
CL10		0815															x	x	x	x	x	x	x	x	x	x		
LE02	↓	0925																x	x	x	x	x	x	x				

Matrix
DW = Drinking Water
WW = Wastewater
GW = Groundwater
S = Soil
SG = Sludge
L = Liquid
M = Miscellaneous

Notes
Ortho-P is field filtered (0.45 um)
Dissolved Al is field filtered (0.45 um)

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (Sign)	Print Name / Company
	Nick Jernack / WSP	2/7/23 -1350	JAM	SAM RMS
SAM		2/7/23 : 3:25	Jamghan	2/7/23 1425 3.0°C T0270

(For Lab Use Only) **Sample Integrity Upon Receipt**

Sample(s) Submitted on Ice? Yes No
Custody Seal(s) Intact? Yes No N/A
Sample(s) Intact? Yes No

Temperature 3.0 °C
☐ Cooler Blank

Lab Notes

Lab No. _____

Page 1 of 2

WECK LABORATORIES, INC.

Sample Receipt Checklist

Weck WKO: 3B08010
WKO Logged by: Jaime Gomez
Samples Checked by: Jaime Gomez

Date/Time Received: 02/07/23 @ 14:25
# of Samples: 05
Delivered by: RMS

	Task	Yes	No	N/A	Comments
COC	COC present at receipt?	☒	☐		
	COC properly completed?	☒	☐		
	COC matches sample labels?	☒	☐		
		☒	☐		
	Project Manager notified?	☐	☐	☒	
Receipt Information	Sample Temperature	3.0 °C			
	Samples received on ice?	☒	☐		
	Ice Type (Blue/Wet)				
	All samples intact?	☒	☐		
	Samples in proper containers?	☒	☐		
	Sufficient sample volume?	☒	☐		
	Samples intact?	☒	☐		
	Received within holding time?	☒	☐		
		☐	☐		
	Project Manager notified?	☐	☐	☒	
Sample Preservation Verification?	Sample labels checked for correct preservation?	☒	☐	☐	
	VOC Headspace: (No) none, If Yes (See comment) 524.2, 524.3, 624.1, 8260, 1666 P/T, LUFT	☐	☐	☒	☐ <6mm/Pea size?
	pH verified upon receipt? Metals <2; H2SO4 pres tests <2; 522<4; TOC <2; 508.1, 525.2<2; 6710B<2; 608.3 5-9	☒	☐	☐	pH paper Lot# 2071882
	Free Chlorine Tested <0.1	☐	☒	☐	Cl Test Strip Lot# 061221E
	O&G pH <2 verified?	☐	☐	☐	pH paper Lot#
					pH Reading:
	pH adjusted for O&G	☐	☐	☐	Acid Lot#
					Amt added:
	Project Manager notified?	☐	☐	☐	

PM Comments

Sample Receipt Checklist Prepared by:

Signature: Jaime Gomez Date: 02/08/23

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

March 13, 2023

John D. Rudolph
WSP USA
9177 Sky Park Court
San Diego, CA 92123-

Project Name: LECL TMDL Monitoring Project # 1915100405
Physis Project ID: 2302004-002

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 2/9/2023. A total of 10 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals
Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards,

Rich Gossett
714 602-5320
Extension 201
richgossett@physislabs.com

PROJECT SAMPLE LIST

WSP USA

PHYSIS Project ID: 2302004-002

LECL TMDL Monitoring Project # 1915100405

Total Samples: 10

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
104051	CL07 - Int		2/7/2023	10:45	Biologic	Not Specified
104052	CL07 - Surf		2/7/2023	11:05	Biologic	Not Specified
104053	CL08 - Int		2/7/2023	10:05	Biologic	Not Specified
104054	CL08 - Surf		2/7/2023	10:20	Biologic	Not Specified
104055	CL09 - Int		2/7/2023	9:10	Biologic	Not Specified
104056	CL09 - Surf		2/7/2023	9:20	Biologic	Not Specified
104057	CL10 - Int		2/7/2023	8:15	Biologic	Not Specified
104058	CL10 - Surf		2/7/2023	8:35	Biologic	Not Specified
104059	LE02 - Int		2/7/2023	9:25	Biologic	Not Specified
104060	LE02 - Surf		2/7/2023	10:05	Biologic	Not Specified

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ABBREVIATIONS and ACRONYMS

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.

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PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
B	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
H	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
N	insufficient sample, analysis could not be performed
M	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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ANALYTICAL REPORT

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2302004-002
Client: WSP USA
Project: LECL TMDL Monitoring Project # 1915100405

Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 104051-R1	**CL07 - Int**		**Matrix: Biologic**					**Sampled: 07-Feb-23 10:45**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	30.4	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23
Sample ID: 104052-R1	**CL07 - Surf**		**Matrix: Biologic**					**Sampled: 07-Feb-23 11:05**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	68.9	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23
Sample ID: 104053-R1	**CL08 - Int**		**Matrix: Biologic**					**Sampled: 07-Feb-23 10:05**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	54.6	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23
Sample ID: 104054-R1	**CL08 - Surf**		**Matrix: Biologic**					**Sampled: 07-Feb-23 10:20**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	64.8	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23
Sample ID: 104055-R1	**CL09 - Int**		**Matrix: Biologic**					**Sampled: 07-Feb-23 9:10**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	23	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23
Sample ID: 104056-R1	**CL09 - Surf**		**Matrix: Biologic**					**Sampled: 07-Feb-23 9:20**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	47	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23
Sample ID: 104057-R1	**CL10 - Int**		**Matrix: Biologic**					**Sampled: 07-Feb-23 8:15**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	39.9	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23
Sample ID: 104058-R1	**CL10 - Surf**		**Matrix: Biologic**					**Sampled: 07-Feb-23 8:35**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	68.1	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23
Sample ID: 104059-R1	**LE02 - Int**		**Matrix: Biologic**					**Sampled: 07-Feb-23 9:25**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	108	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23
Sample ID: 104060-R1	**LE02 - Surf**		**Matrix: Biologic**					**Sampled: 07-Feb-23 10:05**		**Received:**	**09-Feb-23**
Chlorophyll-a	SM 10200 H	mg/m3	125	1	1	2	NA		C-70100	20-Feb-23	20-Feb-23

QUALITY CONTROL REPORT

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2302004-002
Client: WSP USA
Project: LECL TMDL Monitoring Project # 1915100405

Conventionals

QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
Chlorophyll-a		**Method: SM 10200 H**					**Fraction: NA**				**Prepared: 20-Feb-23**			**Analyzed: 20-Feb-23**	
104050-B1	QAQC Procedural Blank	C-70100	ND	1	1	2	mg/m3								
104050-BS1	QAQC Procedural Blank	C-70100	40600	1	1	2	mg/m3	40600	0	100	70 - 130%	PASS			
104050-BS2	QAQC Procedural Blank	C-70100	47000	1	1	2	mg/m3	40600	0	116	70 - 130%	PASS	15	30	PASS

CHAIN OF CUSTODY

Chain of Custody & Sample Information Record

Client: WSP USA E&I Inc. **Contact:** John Rudolph **Phone No.** 858-243-8158

FAX No. **Email:** john.rudolph@wsp.com

Project Name: LECL TMDL Monitoring

Project Number: 1915100405

Turn Around Time: Routine *3-5 Day Rush *48 Hour Rush *24 Hour Rush

*Lab TAT Approval: By: *Additional Charges May Apply

Additional Reporting Requests

Include QC Data Package: ☐ Yes ☐ No
FAX Results: ☐ Yes ☐ No
Email Results: ☐ Yes ☐ No
State EDT: ☐ Yes ☐ No
(Include Source Number in Notes)

Sampler Information

Name: Nicholas Jernack

Employer: WSP USA

Signature:

Sample ID	Date	Time	# of Containers & Preservatives: Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Total # of Containers	Sample Type: Routine	Resample	Special	Analysis Requested: Total Sulfide	Nitrate - Nitrite	TDS	TKN	Ammonia	Total Phosphorus	SRP/Ortho-P	Chlorophyll-a	Matrix	Notes
CL07 - Int	2/7/23	10:45																						x		Filter Volume: 500 mL
CL07 - Surf	2/7/23	11:05																						x		Filter Volume: 500 mL
CL08 - Int	2/7/23	10:05																						x		Filter Volume: 230 mL
CL08 - Surf	2/7/23	10:20																						x		Filter Volume: 350 mL
CL09 - Int	2/7/23	9:10																						x		Filter Volume: 500 mL
CL09 - Surf	2/7/23	9:20																						x		Filter Volume: 500 mL
CL10 - Int	2/7/23	8:15																						x		Filter Volume: 495 mL
CL10 - Surf	2/7/23	8:35																						x		Filter Volume: 400 mL
LE02 - Int	2/7/23	9:25																						x		Filter Volume: 190 mL
LE02 - Surf	2/7/23	10:05																						x		Filter Volume: 225 mL

Matrix: DW = Drinking Water; WW = Wastewater; GW = Groundwater; S = Soil; SG = Sludge; L = Liquid; M = Miscellaneous

Notes: Chl-a samples on 0.7 um GFF

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (Sign)	Print Name / Company
	Nicholas Jernack - WSP	02/08/2023 - 1400		Manya NONU physics 2/9/23 1028

(For Lab Use Only) **Sample Integrity Upon Receipt**

Sample(s) Submitted on Ice? Yes No Temperature

Custody Seal(s) Intact? Yes No N/A °C

Sample(s) Intact? Yes No ☐ Cooler Blank

Lab Notes

Lab No. _____

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
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ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Project Iteration ID: 2302004-002
Client Name: WSP USA
Project Name: LECL TMDL Monitoring Project # 1915100405
COC Page Number: 2 of 2
Bottle Label Color: NA

Sample Receipt Summary

Receiving Info

1. Initials Received By: MN
2. Date Received: 2/9/23
3. Time Received: 1028
4. Client Name: WSP USA
5. Courier Information: (Please circle)
   - Client
   - UPS
   - Area Fast
   - DRS
   - FedEx
   - GSO/GLS
   - Ontrac
   - PAMS
   - PHYSIS Driver:
     - i. Start Time: _____
     - ii. End Time: _____
     - iii. Total Mileage: _____
     - iv. Number of Pickups: _____
6. Container Information: (Please put the # of containers or circle none)
   - 1 Cooler
   - __ Styrofoam Cooler
   - ____ Boxes
   - None
   - ___ Carboy(s)
   - __Carboy Trash Can(s)
   - ____ Carboy Cap(s)
   - Other _____
7. What type of ice was used: (Please circle any that apply)
   - Wet Ice
   - Blue Ice
   - Dry Ice
   - Water
   - None
8. Randomly Selected Samples Temperature (°C): 6.4 Used I/R Thermometer # 1-2

Inspection Info

1. Initials Inspected By: RGH

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out..... (Yes) / No
2. All sample containers arrived intact..... (Yes) / No
3. All samples listed on COC(s) are present..... (Yes) / No
4. Information on containers consistent with information on COC(s)..... (Yes) / No
5. Correct containers and volume for all analyses indicated..... (Yes) / No
6. All samples received within method holding time..... (Yes) / No
7. Correct preservation used for all analyses indicated..... Yes / (No)
8. Name of sampler included on COC(s)..... (Yes) / No

Notes:

See temp

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders:	3D07044
Project:	1915100405 LECL TMDL Monitoring
Attn:	John Rudolph
Client:	WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123

Report Date:	5/15/2023
Received Date:	04/07/2023
Turnaround Time:	Normal
Phones:	(858) 514-6465
Fax:	(858) 278-5300
P.O. #:	C015102495
Billing Code:	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 4/07/23 with the Chain-of-Custody document. The samples were received in good condition, at 2.3 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Tiffany T. Felix For Chris Samatmanakit
Project Manager

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WSP USA E&I Inc. - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
05/15/2023 14:55

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nick Jernack	3D07044-01	Water	04/06/23 11:00	
CL08	Nick Jernack	3D07044-02	Water	04/06/23 10:15	
CL09	Nick Jernack	3D07044-03	Water	04/06/23 09:15	
CL10	Nick Jernack	3D07044-04	Water	04/06/23 08:30	
LE02	Nick Jernack	3D07044-05	Water	04/06/23 09:10	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
05/15/2023 14:55

Sample Results

Sample: CL07
3D07044-01 (Water)

Sampled: 04/06/23 11:00 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3D1037 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 10:37				**Analyst:** heq
Ammonia as N	**0.27**	0.017	0.10	mg/l	1	04/16/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3D1837 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/20/23 09:20				**Analyst:** YMT
TKN	**0.82**	0.065	0.10	mg/l	1	04/28/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3D0694 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 15:42				**Analyst:** ism
Nitrate as N	**0.36**	0.040	0.20	mg/l	1	04/07/23 17:43	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	04/07/23 17:43	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0673 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 13:23				**Analyst:** vat
o-Phosphate as P	**0.17**	0.0071	0.010	mg/l	1	04/07/23 15:03	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/09/23 10:27				**Analyst:** heq
Phosphorus as P, Total	**0.20**	0.0067	0.010	mg/l	1	04/12/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3D1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 18:50				**Analyst:** tmp
Total Dissolved Solids	**390**	4.0	10	mg/l	1	04/13/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3D0970 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/11/23 14:16				**Analyst:** mes
Total Suspended Solids	**1**		5	mg/l	1	04/11/23	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3D1027 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 09:41				**Analyst:** heq
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/12/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3D1560 **Preparation:** EPA 200.2			**Prepared:** 04/18/23 10:01				**Analyst:** kvm
Aluminum, Dissolved	**0.065**	0.041	0.050	mg/l	1	04/19/23	
Aluminum, Total	**0.24**	0.022	0.050	mg/l	1	04/19/23	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported: 05/15/2023 14:55

Sample Results

(Continued)

Sample: CL08 — Sampled: 04/06/23 10:15 by Nick Jernack

3D07044-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3D1037 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 10:37				**Analyst:** heq
Ammonia as N	**0.27**	0.017	0.10	mg/l	1	04/16/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3D1837 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/20/23 09:20				**Analyst:** YMT
TKN	**0.80**	0.065	0.10	mg/l	1	04/28/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3D0694 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 15:42				**Analyst:** ism
Nitrate as N	**0.37**	0.040	0.20	mg/l	1	04/07/23 17:44	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	04/07/23 17:44	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0673 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 13:23				**Analyst:** vat
o-Phosphate as P	**0.20**	0.0071	0.010	mg/l	1	04/07/23 15:03	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/09/23 10:27				**Analyst:** heq
Phosphorus as P, Total	**0.21**	0.0067	0.010	mg/l	1	04/12/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3D1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 18:50				**Analyst:** tmp
Total Dissolved Solids	**370**	4.0	10	mg/l	1	04/13/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3D0970 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/11/23 14:16				**Analyst:** mes
Total Suspended Solids	**2**		5	mg/l	1	04/11/23	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3D1027 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 09:41				**Analyst:** heq
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/12/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3D1560 **Preparation:** EPA 200.2			**Prepared:** 04/18/23 10:01				**Analyst:** kvm
Aluminum, Dissolved	**0.072**	0.041	0.050	mg/l	1	04/19/23	
Aluminum, Total	**0.30**	0.022	0.050	mg/l	1	04/19/23	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported: 05/15/2023 14:55

Sample Results

(Continued)

Sample: CL09 — Sampled: 04/06/23 9:15 by Nick Jernack

3D07044-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3D1037 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 10:37				**Analyst:** heq
Ammonia as N	**0.32**	0.017	0.10	mg/l	1	04/16/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3D1837 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/20/23 09:20				**Analyst:** YMT
TKN	**1.0**	0.065	0.10	mg/l	1	04/28/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3D0694 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 15:42				**Analyst:** ism
Nitrate as N	**0.34**	0.040	0.20	mg/l	1	04/07/23 17:46	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	04/07/23 17:46	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0673 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 13:23				**Analyst:** vat
o-Phosphate as P	**0.33**	0.0071	0.010	mg/l	1	04/07/23 15:06	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/09/23 10:27				**Analyst:** heq
Phosphorus as P, Total	**0.36**	0.0067	0.010	mg/l	1	04/12/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3D1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 18:50				**Analyst:** tmp
Total Dissolved Solids	**440**	4.0	10	mg/l	1	04/13/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3D0970 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/11/23 14:16				**Analyst:** mes
Total Suspended Solids	**1**		5	mg/l	1	04/11/23	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3D1027 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 09:41				**Analyst:** heq
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/12/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3D1560 **Preparation:** EPA 200.2			**Prepared:** 04/18/23 10:01				**Analyst:** kvm
Aluminum, Dissolved	ND	0.041	0.050	mg/l	1	04/19/23	
Aluminum, Total	**0.15**	0.022	0.050	mg/l	1	04/19/23	

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Project Manager: John Rudolph

Reported: 05/15/2023 14:55

Sample Results

(Continued)

Sample: CL10

Sampled: 04/06/23 8:30 by Nick Jernack

3D07044-04 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3D1037 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 10:37				**Analyst:** heq
Ammonia as N	**0.22**	0.017	0.10	mg/l	1	04/16/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3D1837 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/20/23 09:20				**Analyst:** YMT
TKN	**1.3**	0.065	0.10	mg/l	1	04/28/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3D0694 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 15:42				**Analyst:** ism
Nitrate as N	**0.41**	0.040	0.20	mg/l	1	04/07/23 17:50	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	04/07/23 17:50	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0673 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 13:23				**Analyst:** vat
o-Phosphate as P	**0.31**	0.0071	0.010	mg/l	1	04/07/23 15:07	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/09/23 10:27				**Analyst:** heq
Phosphorus as P, Total	**0.36**	0.0067	0.010	mg/l	1	04/12/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3D1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 18:50				**Analyst:** tmp
Total Dissolved Solids	**420**	4.0	10	mg/l	1	04/13/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3D0970 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/11/23 14:16				**Analyst:** mes
Total Suspended Solids	**0.3**		5	mg/l	1	04/11/23	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3D1027 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 09:41				**Analyst:** heq
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/12/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3D1560 **Preparation:** EPA 200.2			**Prepared:** 04/18/23 10:01				**Analyst:** kvm
Aluminum, Dissolved	**0.059**	0.041	0.050	mg/l	1	04/19/23	
Aluminum, Total	**0.17**	0.022	0.050	mg/l	1	04/19/23	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
05/15/2023 14:55

Sample Results

(Continued)

Sample: LE02
3D07044-05 (Water)

Sampled: 04/06/23 9:10 by Nick Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3D1037 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 10:37				**Analyst:** heq
Ammonia as N	**0.043**	0.017	0.10	mg/l	1	04/16/23	J
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3D1837 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/20/23 09:20				**Analyst:** YMT
TKN	**3.4**	0.065	0.10	mg/l	1	04/28/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3D0694 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 15:42				**Analyst:** ism
Nitrate as N	ND	0.040	0.20	mg/l	1	04/07/23 17:51	FILT
Nitrite as N	ND	0.042	0.10	mg/l	1	04/07/23 17:51	FILT
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0673 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/07/23 13:23				**Analyst:** vat
o-Phosphate as P	ND	0.0071	0.010	mg/l	1	04/07/23 15:07	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3D0734 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/09/23 10:27				**Analyst:** heq
Phosphorus as P, Total	**0.21**	0.0067	0.010	mg/l	1	04/12/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3D1139 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 18:50				**Analyst:** tmp
Total Dissolved Solids	**1800**	4.0	10	mg/l	1	04/13/23	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3D1027 **Preparation:** _NONE (WETCHEM)			**Prepared:** 04/12/23 09:41				**Analyst:** heq
Sulfide, Total	ND	0.050	0.10	mg/l	1	04/12/23	

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported: 05/15/2023 14:55

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3D0673 - EPA 365.3											
Blank (W3D0673-BLK1)					**Prepared & Analyzed: 04/07/23**						
o-Phosphate as P	ND	0.0071	0.010	mg/l							
LCS (W3D0673-BS1)					**Prepared & Analyzed: 04/07/23**						
o-Phosphate as P	0.190	0.0071	0.010	mg/l	0.200		95	88-111			
Matrix Spike (W3D0673-MS1)	**Source: 3D07043-01**				**Prepared & Analyzed: 04/07/23**						
o-Phosphate as P	0.205	0.0071	0.010	mg/l	0.200	ND	102	85-112			
Matrix Spike Dup (W3D0673-MSD1)	**Source: 3D07043-01**				**Prepared & Analyzed: 04/07/23**						
o-Phosphate as P	0.204	0.0071	0.010	mg/l	0.200	ND	102	85-112	0.5	20	
Batch: W3D0694 - EPA 353.2											
Blank (W3D0694-BLK1)					**Prepared & Analyzed: 04/07/23**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
LCS (W3D0694-BS1)					**Prepared & Analyzed: 04/07/23**						
Nitrate as N	0.913	0.040	0.20	mg/l	1.00		91	90-110			
Nitrite as N	0.957	0.042	0.10	mg/l	1.00		96	90-110			
Matrix Spike (W3D0694-MS1)	**Source: 3D07081-01**				**Prepared & Analyzed: 04/07/23**						
Nitrate as N	8.97	0.040	0.20	mg/l	2.00	7.12	93	90-110			
Nitrite as N	0.971	0.042	0.10	mg/l	1.00	ND	97	90-110			
Matrix Spike (W3D0694-MS2)	**Source: 3D07081-02**				**Prepared & Analyzed: 04/07/23**						
Nitrate as N	8.94	0.040	0.20	mg/l	2.00	7.10	92	90-110			
Nitrite as N	0.764	0.042	0.10	mg/l	1.00	ND	76	90-110			MS-01
Matrix Spike (W3D0694-MS3)	**Source: 3D07081-02**				**Prepared: 04/07/23 Analyzed: 04/08/23**						
Nitrite as N	4.87	0.21	0.50	mg/l	5.00	ND	97	90-110			
Matrix Spike Dup (W3D0694-MSD1)	**Source: 3D07081-01**				**Prepared & Analyzed: 04/07/23**						
Nitrate as N	8.97	0.040	0.20	mg/l	2.00	7.12	93	90-110	0	20	
Nitrite as N	0.973	0.042	0.10	mg/l	1.00	ND	97	90-110	0.2	20	
Matrix Spike Dup (W3D0694-MSD2)	**Source: 3D07081-02**				**Prepared & Analyzed: 04/07/23**						
Nitrate as N	8.91	0.040	0.20	mg/l	2.00	7.10	90	90-110	0.3	20	
Nitrite as N	0.764	0.042	0.10	mg/l	1.00	ND	76	90-110	0	20	MS-01
Matrix Spike Dup (W3D0694-MSD3)	**Source: 3D07081-02**				**Prepared: 04/07/23 Analyzed: 04/08/23**						
Nitrite as N	4.86	0.21	0.50	mg/l	5.00	ND	97	90-110	0.3	20	
Batch: W3D0734 - EPA 365.3											
Blank (W3D0734-BLK1)					**Prepared: 04/09/23 Analyzed: 04/12/23**						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W3D0734-BS1)					**Prepared: 04/09/23 Analyzed: 04/12/23**						
Phosphorus as P, Total	0.202	0.0067	0.010	mg/l	0.200		101	90-110			
Matrix Spike (W3D0734-MS1)	**Source: 3D04095-01**				**Prepared: 04/09/23 Analyzed: 04/12/23**						
Phosphorus as P, Total	0.310	0.0067	0.010	mg/l	0.200	0.101	104	90-110			

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WSP USA E&I Inc. - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
05/15/2023 14:55

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3D0734 - EPA 365.3 (Continued)											
Matrix Spike Dup (W3D0734-MSD1)	**Source: 3D04095-01**				**Prepared: 04/09/23**	**Analyzed: 04/12/23**					
Phosphorus as P, Total	0.308	0.0067	0.010	mg/l	0.200	0.101	104	90-110	0.6	20	
Batch: W3D0970 - SM 2540D											
Blank (W3D0970-BLK1)					**Prepared & Analyzed: 04/11/23**						
Total Suspended Solids	ND		5	mg/l							
LCS (W3D0970-BS1)					**Prepared & Analyzed: 04/11/23**						
Total Suspended Solids	64.2		5	mg/l	61.1		105	90-110			
Duplicate (W3D0970-DUP1)	**Source: 3D06034-03**				**Prepared & Analyzed: 04/11/23**						
Total Suspended Solids	6.30		5	mg/l		5.80			8	10	
Duplicate (W3D0970-DUP2)	**Source: 3D07058-01**				**Prepared & Analyzed: 04/11/23**						
Total Suspended Solids	30.0		5	mg/l		27.7			8	10	
Batch: W3D1027 - SM 4500S2-D											
Blank (W3D1027-BLK1)					**Prepared & Analyzed: 04/12/23**						
Sulfide, Total	ND	0.050	0.10	mg/l							
LCS (W3D1027-BS1)					**Prepared & Analyzed: 04/12/23**						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.0940		106	90-110			
Duplicate (W3D1027-DUP1)	**Source: 3D07044-03**				**Prepared & Analyzed: 04/12/23**						
Sulfide, Total	ND	0.050	0.10	mg/l		ND				20	
Matrix Spike (W3D1027-MS1)	**Source: 3D07127-01**				**Prepared & Analyzed: 04/12/23**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.188	ND	106	80-120			
Matrix Spike Dup (W3D1027-MSD1)	**Source: 3D07127-01**				**Prepared & Analyzed: 04/12/23**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.188	ND	106	80-120	0	20	
Batch: W3D1037 - EPA 350.1											
Blank (W3D1037-BLK1)					**Prepared: 04/12/23**	**Analyzed: 04/16/23**					
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W3D1037-BLK2)					**Prepared: 04/12/23**	**Analyzed: 04/16/23**					
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W3D1037-BS1)					**Prepared: 04/12/23**	**Analyzed: 04/16/23**					
Ammonia as N	0.258	0.017	0.10	mg/l	0.250		103	90-110			
LCS (W3D1037-BS2)					**Prepared: 04/12/23**	**Analyzed: 04/16/23**					
Ammonia as N	0.257	0.017	0.10	mg/l	0.250		103	90-110			
Matrix Spike (W3D1037-MS1)	**Source: 3D07043-01**				**Prepared: 04/12/23**	**Analyzed: 04/16/23**					
Ammonia as N	0.289	0.017	0.10	mg/l	0.250	0.0449	98	90-110			
Matrix Spike (W3D1037-MS2)	**Source: 3D07044-01**				**Prepared: 04/12/23**	**Analyzed: 04/16/23**					
Ammonia as N	0.521	0.017	0.10	mg/l	0.250	0.274	99	90-110			
Matrix Spike Dup (W3D1037-MSD1)	**Source: 3D07043-01**				**Prepared: 04/12/23**	**Analyzed: 04/16/23**					
Ammonia as N	0.290	0.017	0.10	mg/l	0.250	0.0449	98	90-110	0.5	15	
Matrix Spike Dup (W3D1037-MSD2)	**Source: 3D07044-01**				**Prepared: 04/12/23**	**Analyzed: 04/16/23**					

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
05/15/2023 14:55

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3D1037 - EPA 350.1 (Continued)											
Matrix Spike Dup (W3D1037-MSD2)	**Source: 3D07044-01**				**Prepared: 04/12/23**	**Analyzed: 04/16/23**					
Ammonia as N	0.519	0.017	0.10	mg/l	0.250	0.274	98	90-110	0.4	15	
Batch: W3D1139 - SM 2540C											
Blank (W3D1139-BLK1)					**Prepared: 04/12/23**	**Analyzed: 04/13/23**					
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W3D1139-BS1)					**Prepared: 04/12/23**	**Analyzed: 04/13/23**					
Total Dissolved Solids	811	4.0	10	mg/l	824		98	97-103			
Duplicate (W3D1139-DUP1)	**Source: 3D07035-01**				**Prepared: 04/12/23**	**Analyzed: 04/13/23**					
Total Dissolved Solids	3470	4.0	10	mg/l		3580			3	10	
Duplicate (W3D1139-DUP2)	**Source: 3D07035-02**				**Prepared: 04/12/23**	**Analyzed: 04/13/23**					
Total Dissolved Solids	3530	4.0	10	mg/l		3520			0.5	10	
Batch: W3D1837 - EPA 351.2											
Blank (W3D1837-BLK1)					**Prepared: 04/20/23**	**Analyzed: 04/28/23**					
TKN	ND	0.065	0.10	mg/l							
Blank (W3D1837-BLK2)					**Prepared: 04/20/23**	**Analyzed: 05/01/23**					
TKN	ND	0.065	0.10	mg/l							
LCS (W3D1837-BS1)					**Prepared: 04/20/23**	**Analyzed: 04/28/23**					
TKN	1.01	0.065	0.10	mg/l	1.00		101	90-110			
LCS (W3D1837-BS2)					**Prepared: 04/20/23**	**Analyzed: 04/28/23**					
TKN	0.956	0.065	0.10	mg/l	1.00		96	90-110			
Matrix Spike (W3D1837-MS1)	**Source: 3D12159-08**				**Prepared: 04/20/23**	**Analyzed: 04/28/23**					
TKN	1.19	0.065	0.10	mg/l	1.00	0.182	100	90-110			
Matrix Spike (W3D1837-MS2)	**Source: 3D12159-09**				**Prepared: 04/20/23**	**Analyzed: 04/28/23**					
TKN	1.38	0.065	0.10	mg/l	1.00	0.370	101	90-110			
Matrix Spike Dup (W3D1837-MSD1)	**Source: 3D12159-08**				**Prepared: 04/20/23**	**Analyzed: 04/28/23**					
TKN	1.20	0.065	0.10	mg/l	1.00	0.182	102	90-110	1	10	
Matrix Spike Dup (W3D1837-MSD2)	**Source: 3D12159-09**				**Prepared: 04/20/23**	**Analyzed: 04/28/23**					
TKN	1.40	0.065	0.10	mg/l	1.00	0.370	103	90-110	1	10	

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Quality Control Results

(Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3D1560 - EPA 200.7											
Blank (W3D1560-BLK1)					**Prepared: 04/18/23**	**Analyzed: 04/19/23**					
Aluminum, Dissolved	ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.022	0.050	mg/l							
LCS (W3D1560-BS1)					**Prepared: 04/18/23**	**Analyzed: 04/19/23**					
Aluminum, Dissolved	0.228	0.041	0.050	mg/l	0.200		114	85-115			
Aluminum, Total	0.228	0.022	0.050	mg/l	0.200		114	85-115			
Matrix Spike (W3D1560-MS1)	**Source: 3D05145-01**				**Prepared: 04/18/23**	**Analyzed: 04/19/23**					
Aluminum, Dissolved	0.422	0.041	0.050	mg/l	0.200	0.182	120	70-130			
Aluminum, Total	0.422	0.022	0.050	mg/l	0.200	0.182	120	70-130			
Matrix Spike (W3D1560-MS2)	**Source: 3D07044-04**				**Prepared: 04/18/23**	**Analyzed: 04/19/23**					
Aluminum, Total	0.451	0.022	0.050	mg/l	0.200	0.167	142	70-130			MS-02
Matrix Spike Dup (W3D1560-MSD1)	**Source: 3D05145-01**				**Prepared: 04/18/23**	**Analyzed: 04/19/23**					
Aluminum, Dissolved	0.420	0.041	0.050	mg/l	0.200	0.182	119	70-130	0.5	30	
Aluminum, Total	0.420	0.022	0.050	mg/l	0.200	0.182	119	70-130	0.5	30	
Matrix Spike Dup (W3D1560-MSD2)	**Source: 3D07044-04**				**Prepared: 04/18/23**	**Analyzed: 04/19/23**					
Aluminum, Total	0.445	0.022	0.050	mg/l	0.200	0.167	139	70-130	1	30	MS-02

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Project Number: 1915100405 LECL TMDL Monitoring

Project Manager: John Rudolph

Reported:
05/15/2023 14:55

Notes and Definitions

Item	Definition
FILT	The sample was filtered prior to analysis.
J	Estimated conc. detected <MRL and >MDL.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

May 04, 2023

John D. Rudolph
WSP USA
9177 Sky Park Court
San Diego, CA 92123-

Project Name: LECL TMDL Monitoring Project # 1915100405
Physis Project ID: 2302004-005

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 4/11/2023. A total of 13 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals
Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards,

Rachel Hansen
714 602-5320
Extension 203
rachelhansen@physislabs.com

PROJECT SAMPLE LIST

WSP USA

PHYSIS Project ID: 2302004-005

LECL TMDL Monitoring Project # 1915100405

Total Samples: 13

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
104908	CL07 - Int		4/6/2023	11:00	Biologic	Not Specified
104909	CL07 - Surf		4/6/2023	11:05	Biologic	Not Specified
104910	CL08 - Int		4/6/2023	10:15	Biologic	Not Specified
104911	CL08 - Surf		4/6/2023	10:20	Biologic	Not Specified
104912	CL09 - Int		4/6/2023	9:15	Biologic	Not Specified
104913	CL09 - Surf		4/6/2023	9:20	Biologic	Not Specified
104914	CL10 - Int		4/6/2023	8:30	Biologic	Not Specified
104915	CL10 - Surf		4/6/2023	8:35	Biologic	Not Specified
104916	LE02 - Int		4/6/2023	9:10	Biologic	Not Specified
104917	LE02 - Surf		4/6/2023	9:35	Biologic	Not Specified
104918	LE02 - Surf (0.5m) TNTP		4/6/2023	8:20	Biologic	Not Specified
104919	LE02 - Depth Integrated TNTP		4/6/2023	8:25	Biologic	Not Specified
104920	LE02 - Surf (05m) TNTP DUP		4/6/2023	9:00	Biologic	Not Specified

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ABBREVIATIONS and ACRONYMS

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

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SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.

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PHYSIS
TERRA FAUNA FLORA AQUA AURA
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PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
B	analyte was detected in the procedural blank greater than 10 times the MD
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
H	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
N	insufficient sample, analysis could not be performed
M	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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ANALYTICAL REPORT

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2302004-005
Client: WSP USA
Project: LECL TMDL Monitoring Project # 1915100405

Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 104908-R1	**CL07 - Int**		**Matrix: Biologic**					**Sampled: 06-Apr-23 11:00**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	ND	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104909-R1	**CL07 - Surf**		**Matrix: Biologic**					**Sampled: 06-Apr-23 11:05**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	ND	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104910-R1	**CL08 - Int**		**Matrix: Biologic**					**Sampled: 06-Apr-23 10:15**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	ND	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104911-R1	**CL08 - Surf**		**Matrix: Biologic**					**Sampled: 06-Apr-23 10:20**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	ND	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104912-R1	**CL09 - Int**		**Matrix: Biologic**					**Sampled: 06-Apr-23 9:15**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	ND	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104913-R1	**CL09 - Surf**		**Matrix: Biologic**					**Sampled: 06-Apr-23 9:20**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	ND	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104914-R1	**CL10 - Int**		**Matrix: Biologic**					**Sampled: 06-Apr-23 8:30**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	ND	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104915-R1	**CL10 - Surf**		**Matrix: Biologic**					**Sampled: 06-Apr-23 8:35**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	ND	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104916-R1	**LE02 - Int**		**Matrix: Biologic**					**Sampled: 06-Apr-23 9:10**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	88.5	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104917-R1	**LE02 - Surf**		**Matrix: Biologic**					**Sampled: 06-Apr-23 9:35**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	105	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104918-R1	**LE02 - Surf (0.5m) TNTP**		**Matrix: Biologic**					**Sampled: 06-Apr-23 8:20**		**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	121	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23

PHYSIS Project ID: 2302004-005
Client: WSP USA
Project: LECL TMDL Monitoring Project # 1915100405

Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 104919-R1	**LE02 - Depth Integrated TNTP**		**Matrix: Biologic**					**Sampled:**	**06-Apr-23 8:25**	**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	119	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23
Sample ID: 104920-R1	**LE02 - Surf (05m) TNTP DUP**		**Matrix: Biologic**					**Sampled:**	**06-Apr-23 9:00**	**Received:**	**11-Apr-23**
Chlorophyll-a	SM 10200 H	mg/m3	69.7	1	1	2	NA		C-72002	26-Apr-23	26-Apr-23

QUALITY CONTROL REPORT

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2302004-005
Client: WSP USA
Project: LECL TMDL Monitoring Project # 1915100405

Conventionals

QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
Chlorophyll-a		**Method: SM 10200 H**					**Fraction: NA**				**Prepared: 26-Apr-23**			**Analyzed: 26-Apr-23**	
104907-B1	QAQC Procedural Blank	C-72002	ND	1	1	2	mg/m3								
104907-BS1	QAQC Procedural Blank	C-72002	39500	1	1	2	mg/m3	44200	0	89	70 - 130%	PASS			
104907-BS2	QAQC Procedural Blank	C-72002	41700	1	1	2	mg/m3	44200	0	94	70 - 130%	PASS	5	30	PASS

CHAIN OF CUSTODY

Chain of Custody & Sample Information Record

Client: WSP USA E&I Inc. **Contact:** John Rudolph **Phone No.** 858-243-8158

FAX No. **Email:** john.rudolph@wsp.com

Project Name: LECL TMDL Monitoring

Project Number: 1915100405

Turn Around Time: Routine *3-5 Day Rush *48 Hour Rush *24 Hour Rush

*Lab TAT Approval: By: *Additional Charges May Apply

Additional Reporting Requests
Include QC Data Package: Yes No
FAX Results: Yes No
Email Results: Yes No
State EDT: Yes No
(Include Source Number in Notes)

Sampler Information
Name: Nicholas Jernack
Employer: WSP USA
Signature:

Sample ID	Date	Time	# of Containers & Preservatives: Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Total # of Containers	Sample Type: Routine	Resample	Special	Analysis Requested: Total Sulfide	Nitrate - Nitrite	TDS	TKN	Ammonia	Total Phosphorus	SRP/Ortho-P	Chlorophyll-a	Matrix	Notes
CL07 - Int	4/6/23	11:00																						x		Filter Volume: 250 mL
CL07 - Surf	4/6/23	11:05																						x		Filter Volume: 250 mL
CL08 - Int	4/6/23	10:15																						x		Filter Volume: 250 mL
CL08 - Surf	4/6/23	10:20																						x		Filter Volume: 250 mL
CL09 - Int	4/6/23	9:15																						x		Filter Volume: 255 mL
CL09 - Surf	4/6/23	9:20																						x		Filter Volume: 255 mL
CL10 - Int	4/6/23	8:30																						x		Filter Volume: 255 mL
CL10 - Surf	4/6/23	8:35																						x		Filter Volume: 250 mL
LE02 - Int	4/6/23	9:10																						x		Filter Volume: 175 mL
LE02 - Surf	4/6/23	9:35																						x		Filter Volume: 175 mL

Matrix: DW = Drinking Water; WW = Wastewater; GW = Groundwater; S = Soil; SG = Sludge; L = Liquid; M = Miscellaneous

Notes: Chl-a samples on 0.7 um GFF

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (Sign)	Print Name / Company
	Nicholas Jernack - WSP	4/10/23 - 1600		Physis 4/11/23 0945

(For Lab Use Only) **Sample Integrity Upon Receipt**

Sample(s) Submitted on Ice? Yes No Temperature

Custody Seal(s) Intact? Yes No N/A °C

Sample(s) Intact? Yes No ☐ Cooler Blank

Lab Notes

Lab No. _____

Chain of Custody & Sample Information Record

Client: WSP USA E&I Inc **Contact:** John Rudolph **Phone No.** 858-243-8158

FAX No. **Email:** john.rudolph@wsp.com

Project Name: LE TNTP Offset

Project Number: 1915100405

Turn Around Time: Routine *3-5 Day Rush *48 Hour Rush *24 Hour Rush

*Lab TAT Approval: By: *Additional Charges May Apply

Additional Reporting Requests

Include QC Data Package: ☐ Yes ☐ No
FAX Results: ☐ Yes ☐ No
Email Results: ☐ Yes ☐ No
State EDT: ☐ Yes ☐ No
(Include Source Number in Notes)

Sampler Information

Name: Nicholas Jernack

Employer: WSP USA E&I Inc

Signature:

Sample ID	Date	Time	# of Containers & Preservatives: Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Total # of Containers	Sample Type: Routine	Resample	Special	Analysis Requested: Total Sulfide	Nitrate - Nitrite	TDS	TKN	Ammonia	Total Phosphorus	SRP/Ortho-P	Chlorophyll-a (SM10200 H)	Matrix	Notes
LE02 - Surf (0.5m) TNTP	4/6/23	8:20																						x		Filter Volume: 200 mL
LE02 - Depth Integrated TNTP	4/6/23	8:25																						x		Filter Volume: 175 mL
LE02 - Surf (0.5m) TNTP DUP	4/6/23	9:00																						x		Filter Volume: 180 mL
																										Filter Volume:
																										Filter Volume:
																										Filter Volume:
																										Filter Volume:
																										Filter Volume:
																										Filter Volume:
																										Filter Volume:

Matrix: DW = Drinking Water; WW = Wastewater; GW = Groundwater; S = Soil; SG = Sludge; L = Liquid; M = Miscellaneous

Notes: Chl-a samples on 0.7 um GFF

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (Sign)	Print Name / Company
	Nicholas Jernack - WSP	4/10/23 - 1600		Physis 4/11/23 0945

(For Lab Use Only) **Sample Integrity Upon Receipt**

Sample(s) Submitted on Ice? Yes No Temperature

Custody Seal(s) Intact? Yes No N/A °C

Sample(s) Intact? Yes No ☐ Cooler Blank

Lab Notes

Lab No. _____

PHYSIS
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Project Iteration ID: 2302004-005
Client Name: WSP USA
Project Name: LECL TMDL Monitoring Project # 1915100405
COC Page Number: 3 of 3
Bottle Label Color: NA

Sample Receipt Summary

Receiving Info

1. Initials Received By: AT
2. Date Received: 4/11/23
3. Time Received: 0945
4. Client Name: WSP
5. Courier Information: (Please circle)
   - Client
   - UPS
   - Area Fast
   - DRS
   - FedEx
   - GSO/GLS
   - Ontrac
   - PAMS
   - PHYSIS Driver:
     - i. Start Time:_____
     - ii. End Time:_____
     - iii. Total Mileage: _____
     - iv. Number of Pickups:_____
6. Container Information: (Please put the # of containers or circle none)
   - 1 Cooler
   - __ Styrofoam Cooler
   - ____ Boxes
   - None
   - ___ Carboy(s)
   - __Carboy Trash Can(s)
   - ____ Carboy Cap(s)
   - Other _____
7. What type of ice was used: (Please circle any that apply)
   - Wet Ice
   - Blue Ice
   - Dry Ice
   - Water
   - None
8. Randomly Selected Samples Temperature (°C): 15.0 Used I/R Thermometer # 1-2

Inspection Info

1. Initials Inspected By: RGH

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out..... Yes / No
2. All sample containers arrived intact..... Yes / No
3. All samples listed on COC(s) are present..... Yes / No
4. Information on containers consistent with information on COC(s)..... Yes / No
5. Correct containers and volume for all analyses indicated..... Yes / No
6. All samples received within method holding time..... Yes / No
7. Correct preservation used for all analyses indicated..... Yes / No
8. Name of sampler included on COC(s)..... Yes / No

Notes:

See temp

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders:	3F05004	**Report Date:**	7/27/2023
		Received Date:	06/22/2023
Project:	1915100405.04	**Turnaround Time:**	Normal
		Phones:	(858) 514-6465
		Fax:	(858) 278-5300
Attn:	John Rudolph	**P.O. #:**	C015102495
Client:	WSP USA E&I Inc. - San Diego 9177 Sky Park Court, Ste A San Diego, CA 92123	**Billing Code:**	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • ISO17025 ANAB #L2457.01 • LACSD #10143

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear John Rudolph,

Enclosed are the results of analyses for samples received 6/22/23 with the Chain-of-Custody document. The samples were received in good condition, at 5.6 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Kim G. Tu
Project Manager

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634

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WSP USA E&I Inc. - San Diego
9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100405.04

Project Manager: John Rudolph

Reported:
07/27/2023 11:14

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
CL07	Nicholas Jernack	3F05004-01	Water	06/22/23 10:50	
CL08	Nicholas Jernack	3F05004-02	Water	06/22/23 10:06	
CL09	Nicholas Jernack	3F05004-03	Water	06/22/23 09:15	
CL10	Nicholas Jernack	3F05004-04	Water	06/22/23 08:30	
LE02	Nicholas Jernack	3F05004-05	Water	06/22/23 09:38	

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San Diego, CA 92123

Project Number: 1915100405.04

Project Manager: John Rudolph

Reported:
07/27/2023 11:14

Sample Results

Sample: CL07
3F05004-01 (Water)

Sampled: 06/22/23 10:50 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3G0478 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/07/23 16:37				**Analyst:** YMT
Ammonia as N	**0.75**	0.017	0.10	mg/l	1	07/14/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3G1009 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/13/23 14:42				**Analyst:** YMT
TKN	**1.3**	0.065	0.10	mg/l	1	07/17/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3F2035 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 14:49				**Analyst:** ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	06/23/23 17:20	
Nitrite as N	ND	0.042	0.10	mg/l	1	06/23/23 17:20	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3F1985 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 09:51				**Analyst:** cpt
o-Phosphate as P	**0.14**	0.0071	0.010	mg/l	1	06/23/23 12:17	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3G0536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/10/23 11:12				**Analyst:** cpt
Phosphorus as P, Total	**0.20**	0.0067	0.010	mg/l	1	07/11/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3F2006 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/26/23 13:33				**Analyst:** bel
Total Dissolved Solids	**440**	4.0	10	mg/l	1	06/26/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3F2364 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/28/23 09:55				**Analyst:** mes
Total Suspended Solids	**3**		5	mg/l	1	06/28/23	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3F2545 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/29/23 17:36				**Analyst:** ymt
Sulfide, Total	**2.0**	0.25	0.50	mg/l	5	06/29/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3G0389 **Preparation:** EPA 200.2			**Prepared:** 07/06/23 20:15				**Analyst:** kvm
Aluminum, Dissolved	**0.084**	0.041	0.050	mg/l	1	07/10/23	
Aluminum, Total	**0.59**	0.022	0.050	mg/l	1	07/10/23	

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100405.04

Project Manager: John Rudolph

Reported:
07/27/2023 11:14

Sample Results

(Continued)

Sample: CL08
3F05004-02 (Water)

Sampled: 06/22/23 10:06 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3G0478 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/07/23 16:37				**Analyst:** YMT
Ammonia as N	**0.42**	0.017	0.10	mg/l	1	07/14/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3G1009 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/13/23 14:42				**Analyst:** YMT
TKN	**1.0**	0.065	0.10	mg/l	1	07/17/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3F2035 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 14:49				**Analyst:** ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	06/23/23 17:21	
Nitrite as N	ND	0.042	0.10	mg/l	1	06/23/23 17:21	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3F1985 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 09:51				**Analyst:** cpt
o-Phosphate as P	**0.099**	0.0071	0.010	mg/l	1	06/23/23 12:20	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3G0536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/10/23 11:12				**Analyst:** cpt
Phosphorus as P, Total	**0.11**	0.0067	0.010	mg/l	1	07/11/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3F2006 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/26/23 13:33				**Analyst:** bel
Total Dissolved Solids	**420**	4.0	10	mg/l	1	06/26/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3F2140 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/26/23 13:50				**Analyst:** mes
Total Suspended Solids	**2**		5	mg/l	1	06/27/23	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3F2545 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/29/23 17:36				**Analyst:** ymt
Sulfide, Total	**1.5**	0.25	0.50	mg/l	5	06/29/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3G0389 **Preparation:** EPA 200.2			**Prepared:** 07/06/23 20:15				**Analyst:** kvm
Aluminum, Dissolved	**0.12**	0.041	0.050	mg/l	1	07/10/23	
Aluminum, Total	**0.15**	0.022	0.050	mg/l	1	07/10/23	

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100405.04

Project Manager: John Rudolph

Reported:
07/27/2023 11:14

Sample Results

(Continued)

Sample: CL09
3F05004-03 (Water)

Sampled: 06/22/23 9:15 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3G0478 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/07/23 16:37				**Analyst:** YMT
Ammonia as N	**0.86**	0.017	0.10	mg/l	1	07/14/23	
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3G1009 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/13/23 14:42				**Analyst:** YMT
TKN	**1.7**	0.13	0.20	mg/l	1	07/17/23	M-02
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3F2035 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 14:49				**Analyst:** ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	06/23/23 17:22	
Nitrite as N	ND	0.042	0.10	mg/l	1	06/23/23 17:22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3F1985 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 09:51				**Analyst:** cpt
o-Phosphate as P	**0.14**	0.0071	0.010	mg/l	1	06/23/23 12:20	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3G0536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/10/23 11:12				**Analyst:** cpt
Phosphorus as P, Total	**0.11**	0.0067	0.010	mg/l	1	07/11/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3F2005 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 17:40				**Analyst:** bel
Total Dissolved Solids	**530**	4.0	10	mg/l	1	06/26/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3F2140 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/26/23 13:50				**Analyst:** mes
Total Suspended Solids	**4**		5	mg/l	1	06/27/23	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3F2545 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/29/23 17:36				**Analyst:** ymt
Sulfide, Total	**3.0**	0.25	0.50	mg/l	5	06/29/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3G0389 **Preparation:** EPA 200.2			**Prepared:** 07/06/23 20:15				**Analyst:** kvm
Aluminum, Dissolved	**0.097**	0.041	0.050	mg/l	1	07/10/23	
Aluminum, Total	**0.13**	0.022	0.050	mg/l	1	07/10/23	

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100405.04

Project Manager: John Rudolph

Reported:
07/27/2023 11:14

Sample Results

(Continued)

Sample: CL10
3F05004-04 (Water)

Sampled: 06/22/23 8:30 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3G0478 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/07/23 16:37				**Analyst:** YMT
Ammonia as N	**0.023**	0.017	0.10	mg/l	1	07/14/23	J
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3G1009 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/13/23 14:42				**Analyst:** YMT
TKN	**0.73**	0.065	0.10	mg/l	1	07/17/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3F2035 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 14:49				**Analyst:** ISM
Nitrate as N	**0.046**	0.040	0.20	mg/l	1	06/23/23 17:23	J
Nitrite as N	ND	0.042	0.10	mg/l	1	06/23/23 17:23	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3F1985 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 09:51				**Analyst:** cpt
o-Phosphate as P	ND	0.0071	0.010	mg/l	1	06/23/23 12:22	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3G0536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/10/23 11:12				**Analyst:** cpt
Phosphorus as P, Total	**0.026**	0.0067	0.010	mg/l	1	07/11/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3F2005 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 17:40				**Analyst:** bel
Total Dissolved Solids	**550**	4.0	10	mg/l	1	06/26/23	
Method: SM 2540D			**Instr:** OVEN15				
Batch ID: W3F2140 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/26/23 13:50				**Analyst:** mes
Total Suspended Solids	**4**		5	mg/l	1	06/27/23	J
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3F2545 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/29/23 17:36				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	06/29/23	
Metals by EPA 200 Series Methods							
Method: EPA 200.7			**Instr:** ICP03				
Batch ID: W3G0389 **Preparation:** EPA 200.2			**Prepared:** 07/06/23 20:15				**Analyst:** kvm
Aluminum, Dissolved	**0.14**	0.041	0.050	mg/l	1	07/10/23	
Aluminum, Total	**0.20**	0.022	0.050	mg/l	1	07/10/23	

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9177 Sky Park Court, Ste A
San Diego, CA 92123

Project Number: 1915100405.04

Project Manager: John Rudolph

Reported:
07/27/2023 11:14

Sample Results

(Continued)

Sample: LE02
3F05004-05 (Water)

Sampled: 06/22/23 9:38 by Nicholas Jernack

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W3G0478 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/07/23 16:37				**Analyst:** YMT
Ammonia as N	**0.059**	0.017	0.10	mg/l	1	07/14/23	J
Method: EPA 351.2			**Instr:** AA06				
Batch ID: W3G1099 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/14/23 15:08				**Analyst:** YMT
TKN	**3.5**	0.13	0.20	mg/l	1	07/18/23	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W3F2035 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 14:49				**Analyst:** ISM
Nitrate as N	ND	0.040	0.20	mg/l	1	06/23/23 17:24	
Nitrite as N	ND	0.042	0.10	mg/l	1	06/23/23 17:24	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3F1985 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 09:51				**Analyst:** cpt
o-Phosphate as P	ND	0.0071	0.010	mg/l	1	06/23/23 12:23	
Method: EPA 365.3			**Instr:** UVVIS04				
Batch ID: W3G0536 **Preparation:** _NONE (WETCHEM)			**Prepared:** 07/10/23 11:12				**Analyst:** cpt
Phosphorus as P, Total	**0.18**	0.0067	0.010	mg/l	1	07/11/23	
Method: SM 2540C			**Instr:** OVEN17				
Batch ID: W3F2005 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/23/23 17:40				**Analyst:** bel
Total Dissolved Solids	**1800**	4.0	10	mg/l	1	06/26/23	
Method: SM 4500S2-D			**Instr:** _ANALYST				
Batch ID: W3F2545 **Preparation:** _NONE (WETCHEM)			**Prepared:** 06/29/23 17:36				**Analyst:** ymt
Sulfide, Total	ND	0.050	0.10	mg/l	1	06/29/23	

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San Diego, CA 92123

Project Number: 1915100405.04

Project Manager: John Rudolph

Reported:
07/27/2023 11:14

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3F1985 - EPA 365.3											
Blank (W3F1985-BLK1)					**Prepared & Analyzed: 06/23/23**						
o-Phosphate as P	ND	0.0071	0.010	mg/l							
LCS (W3F1985-BS1)					**Prepared & Analyzed: 06/23/23**						
o-Phosphate as P	0.205	0.0071	0.010	mg/l	0.200		102	88-111			
Matrix Spike (W3F1985-MS1)	**Source: 3F05004-01**				**Prepared & Analyzed: 06/23/23**						
o-Phosphate as P	0.369	0.0071	0.010	mg/l	0.200	0.139	115	85-112			MS-01
Matrix Spike Dup (W3F1985-MSD1)	**Source: 3F05004-01**				**Prepared & Analyzed: 06/23/23**						
o-Phosphate as P	0.349	0.0071	0.010	mg/l	0.200	0.139	105	85-112	6	20	
Batch: W3F2005 - SM 2540C											
Blank (W3F2005-BLK1)					**Prepared: 06/23/23 Analyzed: 06/26/23**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W3F2005-BS1)					**Prepared: 06/23/23 Analyzed: 06/26/23**						
Total Dissolved Solids	810	4.0	10	mg/l	824		98	97-103			
Duplicate (W3F2005-DUP1)	**Source: 3F23092-01**				**Prepared: 06/23/23 Analyzed: 06/26/23**						
Total Dissolved Solids	7210	4.0	10	mg/l		7170			0.6	10	
Duplicate (W3F2005-DUP2)	**Source: 3F23092-02**				**Prepared: 06/23/23 Analyzed: 06/26/23**						
Total Dissolved Solids	7080	4.0	10	mg/l		7100			0.3	10	
Batch: W3F2006 - SM 2540C											
Blank (W3F2006-BLK1)					**Prepared & Analyzed: 06/26/23**						
Total Dissolved Solids	ND	4.0	10	mg/l							
LCS (W3F2006-BS1)					**Prepared & Analyzed: 06/26/23**						
Total Dissolved Solids	816	4.0	10	mg/l	824		99	97-103			
Duplicate (W3F2006-DUP1)	**Source: 3F23038-02**				**Prepared & Analyzed: 06/26/23**						
Total Dissolved Solids	1520	4.0	10	mg/l		1500			0.9	10	
Duplicate (W3F2006-DUP2)	**Source: 3F15008-01**				**Prepared & Analyzed: 06/26/23**						
Total Dissolved Solids	1380	4.0	10	mg/l		1370			0.2	10	
Batch: W3F2035 - EPA 353.2											
Blank (W3F2035-BLK1)					**Prepared & Analyzed: 06/23/23**						
Nitrate as N	ND	0.040	0.20	mg/l							
Nitrite as N	ND	0.042	0.10	mg/l							
LCS (W3F2035-BS1)					**Prepared & Analyzed: 06/23/23**						
Nitrate as N	1.01	0.040	0.20	mg/l	1.00		101	90-110			
Nitrite as N	1.02	0.042	0.10	mg/l	1.00		102	90-110			
Matrix Spike (W3F2035-MS1)	**Source: 3F15008-01**				**Prepared & Analyzed: 06/23/23**						
Nitrate as N	2.08	0.040	0.20	mg/l	2.00	0.157	96	90-110			
Nitrite as N	0.995	0.042	0.10	mg/l	1.00	ND	100	90-110			
Matrix Spike (W3F2035-MS2)	**Source: 3F22115-01**				**Prepared & Analyzed: 06/23/23**						
Nitrate as N	1.95	0.040	0.20	mg/l	2.00	ND	98	90-110			

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Project Manager: John Rudolph

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Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3F2035 - EPA 353.2 (Continued)											
Matrix Spike (W3F2035-MS2)	**Source: 3F22115-01**				**Prepared & Analyzed: 06/23/23**						
Nitrite as N	1.03	0.042	0.10	mg/l	1.00	ND	103	90-110			
Matrix Spike Dup (W3F2035-MSD1)	**Source: 3F15008-01**				**Prepared & Analyzed: 06/23/23**						
Nitrate as N	2.08	0.040	0.20	mg/l	2.00	0.157	96	90-110	0	20	
Nitrite as N	0.995	0.042	0.10	mg/l	1.00	ND	100	90-110	0	20	
Matrix Spike Dup (W3F2035-MSD2)	**Source: 3F22115-01**				**Prepared & Analyzed: 06/23/23**						
Nitrate as N	1.94	0.040	0.20	mg/l	2.00	ND	97	90-110	0.5	20	
Nitrite as N	1.03	0.042	0.10	mg/l	1.00	ND	103	90-110	0	20	
Batch: W3F2140 - SM 2540D											
Blank (W3F2140-BLK1)					**Prepared: 06/26/23 Analyzed: 06/27/23**						
Total Suspended Solids	ND		5	mg/l							
LCS (W3F2140-BS1)					**Prepared: 06/26/23 Analyzed: 06/27/23**						
Total Suspended Solids	62.8		5	mg/l	57.9		108	90-110			
Duplicate (W3F2140-DUP1)	**Source: 3F16025-05**				**Prepared: 06/26/23 Analyzed: 06/27/23**						
Total Suspended Solids	12.8		5	mg/l		13.2			3	10	
Duplicate (W3F2140-DUP2)	**Source: 3F23076-01**				**Prepared: 06/26/23 Analyzed: 06/27/23**						
Total Suspended Solids	ND	1	5	mg/l		ND				10	
Batch: W3F2364 - SM 2540D											
Blank (W3F2364-BLK1)					**Prepared & Analyzed: 06/28/23**						
Total Suspended Solids	ND		5	mg/l							
LCS (W3F2364-BS1)					**Prepared & Analyzed: 06/28/23**						
Total Suspended Solids	50.9		5	mg/l	52.3		97	90-110			
Duplicate (W3F2364-DUP1)	**Source: 3F23098-01**				**Prepared & Analyzed: 06/28/23**						
Total Suspended Solids	284		5	mg/l		302			6	10	
Duplicate (W3F2364-DUP2)	**Source: 3F27006-04**				**Prepared & Analyzed: 06/28/23**						
Total Suspended Solids	19.4		5	mg/l		18.8			3	10	
Batch: W3F2545 - SM 4500S2-D											
Blank (W3F2545-BLK1)					**Prepared & Analyzed: 06/29/23**						
Sulfide, Total	ND	0.050	0.10	mg/l							
LCS (W3F2545-BS1)					**Prepared & Analyzed: 06/29/23**						
Sulfide, Total	0.100	0.050	0.10	mg/l	0.0997		100	90-110			
Duplicate (W3F2545-DUP1)	**Source: 3F05004-01**				**Prepared & Analyzed: 06/29/23**						
Sulfide, Total	2.00	0.50	1.0	mg/l		2.00			0	20	
Duplicate (W3F2545-DUP2)	**Source: 3F05004-02**				**Prepared & Analyzed: 06/29/23**						
Sulfide, Total	1.50	0.15	0.30	mg/l		1.50			0	20	
Duplicate (W3F2545-DUP3)	**Source: 3F05004-03**				**Prepared & Analyzed: 06/29/23**						
Sulfide, Total	3.00	0.50	1.0	mg/l		3.00			0	20	
Duplicate (W3F2545-DUP4)	**Source: 3F26064-03**				**Prepared & Analyzed: 06/29/23**						

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Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3F2545 - SM 4500S2-D (Continued)											
Duplicate (W3F2545-DUP4)	**Source: 3F26064-03**				**Prepared & Analyzed: 06/29/23**						
Sulfide, Total	35.0	2.5	5.0	mg/l		35.0			0	20	
Matrix Spike (W3F2545-MS1)	**Source: 3F28029-01**				**Prepared & Analyzed: 06/29/23**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.199	ND	100	80-120			
Matrix Spike Dup (W3F2545-MSD1)	**Source: 3F28029-01**				**Prepared & Analyzed: 06/29/23**						
Sulfide, Total	0.200	0.050	0.10	mg/l	0.199	ND	100	80-120	0	20	
Batch: W3G0478 - EPA 350.1											
Blank (W3G0478-BLK1)					**Prepared: 07/07/23 Analyzed: 07/14/23**						
Ammonia as N	ND	0.017	0.10	mg/l							
Blank (W3G0478-BLK2)					**Prepared: 07/07/23 Analyzed: 07/14/23**						
Ammonia as N	ND	0.017	0.10	mg/l							
LCS (W3G0478-BS1)					**Prepared: 07/07/23 Analyzed: 07/14/23**						
Ammonia as N	0.244	0.017	0.10	mg/l	0.250		98	90-110			
LCS (W3G0478-BS2)					**Prepared: 07/07/23 Analyzed: 07/14/23**						
Ammonia as N	0.245	0.017	0.10	mg/l	0.250		98	90-110			
Matrix Spike (W3G0478-MS1)	**Source: 3F26059-01**				**Prepared: 07/07/23 Analyzed: 07/14/23**						
Ammonia as N	0.267	0.017	0.10	mg/l	0.250	ND	107	90-110			
Matrix Spike (W3G0478-MS2)	**Source: 3F27102-01**				**Prepared: 07/07/23 Analyzed: 07/14/23**						
Ammonia as N	0.304	0.017	0.10	mg/l	0.250	0.0435	104	90-110			
Matrix Spike Dup (W3G0478-MSD1)	**Source: 3F26059-01**				**Prepared: 07/07/23 Analyzed: 07/14/23**						
Ammonia as N	0.267	0.017	0.10	mg/l	0.250	ND	107	90-110	0.05	15	
Matrix Spike Dup (W3G0478-MSD2)	**Source: 3F27102-01**				**Prepared: 07/07/23 Analyzed: 07/14/23**						
Ammonia as N	0.304	0.017	0.10	mg/l	0.250	0.0435	104	90-110	0.1	15	
Batch: W3G0536 - EPA 365.3											
Blank (W3G0536-BLK1)					**Prepared: 07/10/23 Analyzed: 07/11/23**						
Phosphorus as P, Total	ND	0.0067	0.010	mg/l							
LCS (W3G0536-BS1)					**Prepared: 07/10/23 Analyzed: 07/11/23**						
Phosphorus as P, Total	0.200	0.0067	0.010	mg/l	0.200		100	90-110			
Matrix Spike (W3G0536-MS1)	**Source: 3F27069-01**				**Prepared: 07/10/23 Analyzed: 07/11/23**						
Phosphorus as P, Total	0.314	0.0067	0.010	mg/l	0.200	0.118	98	90-110			
Matrix Spike Dup (W3G0536-MSD1)	**Source: 3F27069-01**				**Prepared: 07/10/23 Analyzed: 07/11/23**						
Phosphorus as P, Total	0.314	0.0067	0.010	mg/l	0.200	0.118	98	90-110	0	20	
Batch: W3G1009 - EPA 351.2											
Blank (W3G1009-BLK1)					**Prepared: 07/13/23 Analyzed: 07/17/23**						
TKN	ND	0.065	0.10	mg/l							
LCS (W3G1009-BS1)					**Prepared: 07/13/23 Analyzed: 07/17/23**						
TKN	1.02	0.065	0.10	mg/l	1.00		102	90-110			
Matrix Spike (W3G1009-MS1)	**Source: 3F05004-03**				**Prepared: 07/13/23 Analyzed: 07/17/23**						

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Quality Control Results (Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3G1009 - EPA 351.2 (Continued)											
Matrix Spike (W3G1009-MS1)	**Source: 3F05004-03**				**Prepared: 07/13/23**	**Analyzed: 07/17/23**					
TKN	3.66	0.13	0.20	mg/l	2.00	1.68	99	90-110			
Matrix Spike Dup (W3G1009-MSD1)	**Source: 3F05004-03**				**Prepared: 07/13/23**	**Analyzed: 07/17/23**					
TKN	3.76	0.13	0.20	mg/l	2.00	1.68	104	90-110	3	10	
Batch: W3G1099 - EPA 351.2											
Blank (W3G1099-BLK1)					**Prepared: 07/14/23**	**Analyzed: 07/18/23**					
TKN	ND	0.065	0.10	mg/l							
Blank (W3G1099-BLK2)					**Prepared: 07/14/23**	**Analyzed: 07/18/23**					
TKN	ND	0.065	0.10	mg/l							
LCS (W3G1099-BS1)					**Prepared: 07/14/23**	**Analyzed: 07/18/23**					
TKN	0.948	0.065	0.10	mg/l	1.00		95	90-110			
LCS (W3G1099-BS2)					**Prepared: 07/14/23**	**Analyzed: 07/18/23**					
TKN	0.944	0.065	0.10	mg/l	1.00		94	90-110			
Duplicate (W3G1099-DUP1)	**Source: 3F28072-01**				**Prepared: 07/14/23**	**Analyzed: 07/18/23**					
TKN	0.445	0.065	0.10	mg/l		0.444			0.1	10	
Matrix Spike (W3G1099-MS1)	**Source: 3F28004-07**				**Prepared: 07/14/23**	**Analyzed: 07/18/23**					
TKN	0.991	0.065	0.10	mg/l	1.00	0.0768	91	90-110			
Matrix Spike (W3G1099-MS2)	**Source: 3F28072-02**				**Prepared: 07/14/23**	**Analyzed: 07/18/23**					
TKN	0.957	0.065	0.10	mg/l	1.00	ND	96	90-110			
Matrix Spike Dup (W3G1099-MSD1)	**Source: 3F28004-07**				**Prepared: 07/14/23**	**Analyzed: 07/18/23**					
TKN	0.990	0.065	0.10	mg/l	1.00	0.0768	91	90-110	0.1	10	
Matrix Spike Dup (W3G1099-MSD2)	**Source: 3F28072-02**				**Prepared: 07/14/23**	**Analyzed: 07/18/23**					
TKN	0.930	0.065	0.10	mg/l	1.00	ND	93	90-110	3	10	

Quality Control Results (Continued)

Metals by EPA 200 Series Methods

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W3G0389 - EPA 200.7											
Blank (W3G0389-BLK1)					**Prepared: 07/06/23**	**Analyzed: 07/10/23**					
Aluminum, Dissolved	ND	0.041	0.050	mg/l							
Aluminum, Total	ND	0.022	0.050	mg/l							
LCS (W3G0389-BS1)					**Prepared: 07/06/23**	**Analyzed: 07/10/23**					
Aluminum, Dissolved	0.226	0.041	0.050	mg/l	0.200		113	85-115			
Aluminum, Total	0.226	0.022	0.050	mg/l	0.200		113	85-115			
Matrix Spike (W3G0389-MS1)	**Source: 3F05004-01**				**Prepared: 07/06/23**	**Analyzed: 07/10/23**					
Aluminum, Total	0.558	0.022	0.050	mg/l	0.200	0.590	NR	70-130			MS-02
Matrix Spike Dup (W3G0389-MSD1)	**Source: 3F05004-01**				**Prepared: 07/06/23**	**Analyzed: 07/10/23**					
Aluminum, Total	0.583	0.022	0.050	mg/l	0.200	0.590	NR	70-130	4	30	MS-02

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Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
M-02	Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

August 07, 2023

John D. Rudolph
WSP USA
9177 Sky Park Court
San Diego, CA 92123-

Project Name: LECL TMDL Monitoring Project # 1915100405.04 PO # C015102827 GL Code #3973000 Org # 3151
Physis Project ID: 23020408

Dear John,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 7/7/2023. A total of 10 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals
Chlorophyll-a (mg/m3) by SM 10200 H

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards,

Misty Mercier
714 602-5320
Extension 202
mistymercier@physislabs.com

PHYSIS
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PROJECT SAMPLE LIST

WSP USA PHYSIS Project ID: 2302004-00

LECL TMDL Monitoring Project # 1915100405.04 PO # C015102827 GL Code # Total Samples: 10

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
108012	CL07 - Int		6/22/2023	10:50	Biologic	Not Specified
108013	CL07 - Surf		6/22/2023	10:57	Biologic	Not Specified
108014	CL08 - Int		6/22/2023	10:06	Biologic	Not Specified
108015	CL08 - Surf		6/22/2023	10:13	Biologic	Not Specified
108016	CL09 - Int		6/22/2023	9:15	Biologic	Not Specified
108017	CL09 - Surf		6/22/2023	9:25	Biologic	Not Specified
108018	CL10 - Int		6/22/2023	8:30	Biologic	Not Specified
108019	CL10 - Surf		6/22/2023	8:40	Biologic	Not Specified
108020	LE02 - Int		6/22/2023	9:38	Biologic	Not Specified
108021	LE02 - Surf		6/22/2023	10:10	Biologic	Not Specified

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ABBREVIATIONS and ACRONYMS

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.

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PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
B	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
H	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
N	insufficient sample, analysis could not be performed
M	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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ANALYTICAL REPORT

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2302004-008
Client: WSP USA
Project: LECL TMDL Monitoring Project # 1915100405.04 PO # C

Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 108012-R1	**CL07 - Int**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 10:50**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	15	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23
Sample ID: 108013-R1	**CL07 - Surf**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 10:57**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	2.67	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23
Sample ID: 108014-R1	**CL08 - Int**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 10:06**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	15.5	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23
Sample ID: 108015-R1	**CL08 - Surf**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 10:13**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	3.2	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23
Sample ID: 108016-R1	**CL09 - Int**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 9:15**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	50.7	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23
Sample ID: 108017-R1	**CL09 - Surf**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 9:25**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	10.2	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23
Sample ID: 108018-R1	**CL10 - Int**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 8:30**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	12.8	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23
Sample ID: 108019-R1	**CL10 - Surf**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 8:40**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	12.3	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23
Sample ID: 108020-R1	**LE02 - Int**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 9:38**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	151	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23
Sample ID: 108021-R1	**LE02 - Surf**		**Matrix: Biologic**					**Sampled:**	**22-Jun-23 10:10**	**Received:**	**07-Jul-23**
Chlorophyll-a	SM 10200 H	mg/m3	156	1	1	2	NA		C-72099	18-Jul-23	18-Jul-23

QUALITY CONTROL REPORT

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2302004-008
Client: WSP USA
Project: LECL TMDL Monitoring Project # 1915100405.04 PO # C

Conventionals

QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
Chlorophyll-a		**Method: SM 10200 H**		**Fraction: NA**						**Prepared: 18-Jul-23**			**Analyzed: 18-Jul-23**		
108011-B1	QAQC Procedural Blank	C-72099	ND	1	1	2	mg/m3								
108011-BS1	QAQC Procedural Blank	C-72099	38400	1	1	2	mg/m3	44200	0	87	70 - 130%	PASS			
108011-BS2	QAQC Procedural Blank	C-72099	39500	1	1	2	mg/m3	44200	0	89	70 - 130%	PASS	2	30	PASS

CHAIN OF CUSTODY

Chain of Custody & Sample Information Record

Client: WSP USA E&I Inc. **Contact:** John Rudolph **Phone No.** 858-243-8158

Project Name: LECL TMDL Monitoring **Email:** john.rudolph@wsp.com

Project Number: 1915100405.04

PO#: C015102827

GL Code: 573000

Org# 3151

Turn Around Time: Routine *3-5 Day Rush *48 Hour Rush *24 Hour Rush

***Lab TAT Approval:** By: *Additional Charges May Apply

Additional Reporting Requests

Include QC Data Package: Yes No

FAX Results: Yes No

Email Results: Yes No

State EDT: Yes No

(Include Source Number in Notes)

Sampler Information

Name: Nicholas Jernack

Employer: WSP USA

Signature:

Sample ID	Date	Time	# of Containers & Preservatives: Unpreserved	H2SO4	HCl	HNO3	Na2S2O3	NaOH	NaOH/ZnAcetate	NH4Cl	MCAA	Frozen	Total # of Containers	Sample Type: Routine	Resample	Special	Analysis Requested: Total Sulfide	Nitrate - Nitrite	TDS	TKN	Ammonia	Total Phosphorus	SRP/Ortho-P	Chlorophyll-a	Matrix	Notes
CL07 - Int	6/22/23	10:50																						x		Filter Volume: 500 mL
CL07 - Surf	6/22/23	10:57																						x		Filter Volume: 500 mL
CL08 - Int	6/22/23	10:06																						x		Filter Volume: 500 mL
CL08 - Surf	6/22/23	10:13																						x		Filter Volume: 500 mL
CL09 - Int	6/22/23	9:15																						x		Filter Volume: 500 mL
CL09 - Surf	6/22/23	9:25																						x		Filter Volume: 500 mL
CL10 - Int	6/22/23	8:30																						x		Filter Volume: 500 mL
CL10 - Surf	6/22/23	8:40																						x		Filter Volume: 500 mL
LE02 - Int	6/22/23	9:38																						x		Filter Volume: 200 mL
LE02 - Surf	6/22/23	10:10																						x		Filter Volume: 380 mL

DW = Drinking Water
WW = Wastewater
GW = Groundwater
S = Soil
SG = Sludge
L = Liquid
M = Miscellaneous

Chl-a samples on 0.7 um GFF

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (Sign)	Print Name / Company
	Nicholas Jernack / WSP	7/6/23 - 1600		Richard Hanken Physis 7/7/23 925

(For Lab Use Only) **Sample Integrity Upon Receipt**

Sample(s) Submitted on Ice? Yes No Temperature

Custody Seal(s) Intact? Yes No N/A °C

Sample(s) Intact? Yes No ☐ Cooler Blank

Lab Notes

Lab No. _____

PHYSIS
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PHYSIS
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Project Iteration ID: 2302004-008
Client Name: WSP USA
Project Name: LECL TMDL Monitoring Project # 1915100405.04 PO # C015102827 GL Code # 573000 Org # 3151
COC Page Number: 2 of 2
Bottle Label Color: NA

Sample Receipt Summary

Receiving Info

1. Initials Received By: RGH
2. Date Received: 7/7/23
3. Time Received: 925
4. Client Name: WSP
5. Courier Information: (Please circle)
   - Client
   - UPS
   - Area Fast
   - DRS
   - FedEx
   - GSO/GLS
   - Ontrac
   - PAMS
   - PHYSIS Driver:
     i. Start Time:_____ iii. Total Mileage:_____
     ii. End Time:_____ iv. Number of Pickups:_____
6. Container Information: (Please put the # of containers or circle none)
   - 1 Cooler
   - __ Styrofoam Cooler
   - ____ Boxes
   - None
   - ___ Carboy(s)
   - __Carboy Trash Can(s)
   - ____ Carboy Cap(s)
   - Other _____
7. What type of ice was used: (Please circle any that apply)
   - Wet Ice
   - Blue Ice
   - Dry Ice
   - Water
   - None
8. Randomly Selected Samples Temperature (°C): 12.6 Used I/R Thermometer # ____

Inspection Info

1. Initials Inspected By: RGH

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out..... (Yes) / No
2. All sample containers arrived intact..... (Yes) / No
3. All samples listed on COC(s) are present..... (Yes) / No
4. Information on containers consistent with information on COC(s)..... (Yes) / No
5. Correct containers and volume for all analyses indicated..... (Yes) / No
6. All samples received within method holding time..... (Yes) / No
7. Correct preservation used for all analyses indicated..... Yes / (No)
8. Name of sampler included on COC(s)..... (Yes) / No

Notes:

See temp

APPENDIX D
SATELLITE DATA REPORTS

Delivery report

Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2022-07-22
Version: 15

Clients: Wood Plc.
Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,
Schlosshof 4, 82229 Seefeld
Germany

Authors:	Email	Phone
Hendrik Bernert	bernert@eomap.de	+49 8152 99861 14
Minha Sultan	sultan@eomap.de	+49 8152 99861 14

EOMAP detect more.

CONTENT

1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	**Point of Contact**
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2022-07-22
Version	15

1.1. List of all delivered scenes

Sensor	Time of record
Landsat-8	2022-07-18 18:22:48 UTC

1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	☐
Aerosol Optical Thickness	AOT	☐
Yellow Substances	CDM	☐
Chlorophyll-a	CHL	☒
Ratio of Absorption and Scattering	DIV	☐
Harmful Algae Bloom Indicator	HAB	☒
Diffuse Attenuation Coefficient	KDC	☐
Quality Coding	QUC	☒
Total Quality	QUT	☒
True Color/False Color Composite	RGB	☒
Remote Sensing Reflectance	RRS	☐
Secchi Disc Depth	SDD	☐
Sum of Inorganic Absorption	SIA	☐
Sum if Organic Absorption	SOA	☐
Surface Temperature	SST	☐
Turbidity	TUR	☒
Trophic State Index (Chlorophyll)	TSC	☐
Total Suspended Matter	TSM	☐
Light Penetration Depth	Z90	☐
Water Body Extent	WEX	☐

1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs15_20220722.pdf	PDF	Delivery Report
CHL_us-california_040037_EOMAP_20220718_182248_LSAT8_m0030.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_040037_EOMAP_20220718_182248_LSAT8_m0030_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_040037_EOMAP_20220718_182248_LSAT8_m0030_32bit_wgs84.txt	ASCII	Product text file, real values
CHL_us-california_040037_EOMAP_20220718_182248_LSAT8_m0030.kmz	KMZ	GoogleEarth overlay
CHL_us-california_040037_EOMAP_20220718_182248_LSAT8_m0030.xml	XML	Metadata
CHL_us-california_040037_EOMAP_20220718_182248_LSAT8_m0030_overview.pdf	PDF	Overview PDF, metadata and quicklook

1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

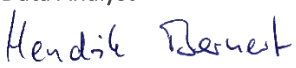
With

[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

- None

Data Analyst



Hendrik Bernert

QA/QC

Minha Sultan

2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

a. water, land, cloud identification
b. estimation and correction of atmosphere and aerosol impacts[1] [2]
c. correction altitude level impacts[3]
d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)[4]
e. correction[5] or flagging[6] of sunglitter impact
f. retrieval of in-water absorption and scattering as physical measures[7]
g. accounting for varying spectral slopes of specific inherent optical properties[8]
h. provision of uncertainty measures and flagging procedures
i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

[1] Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

[2] Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

[3] Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

[4] Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, http://dx.doi.org/10.1016/j.rse.2014.07.025

[5] Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

[6] EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf

[7] Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

[8] Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings "Water Quality in Europe: Challenges and Best Practice" UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4

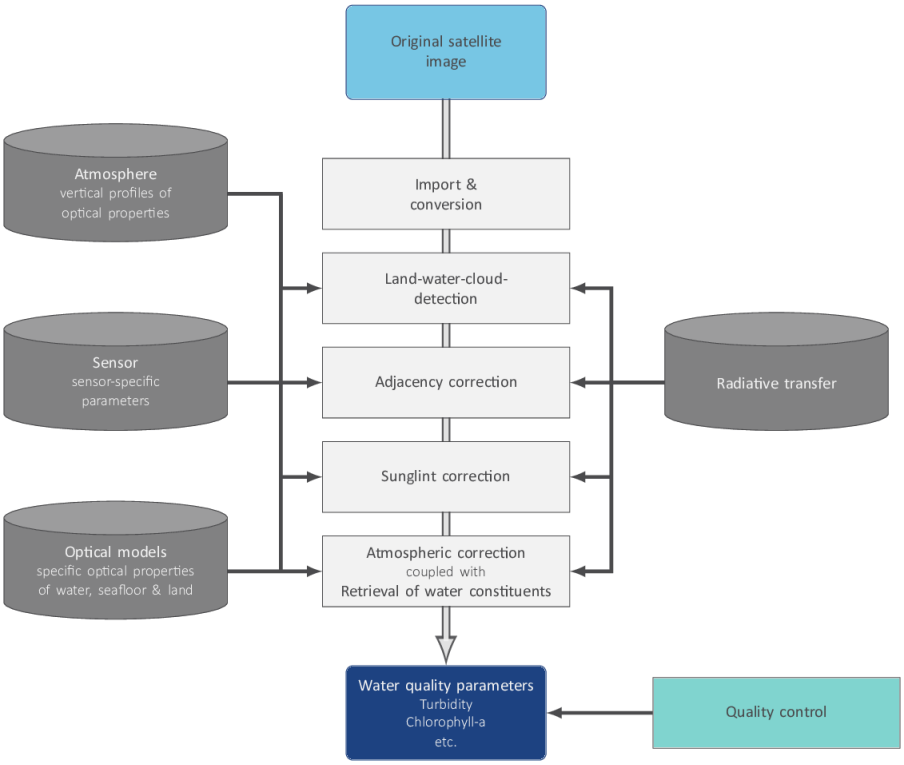


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.

3. Products

3.1. Turbidity (TUR)

Turbidity (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2022-07-18 is shown in Figure 2.

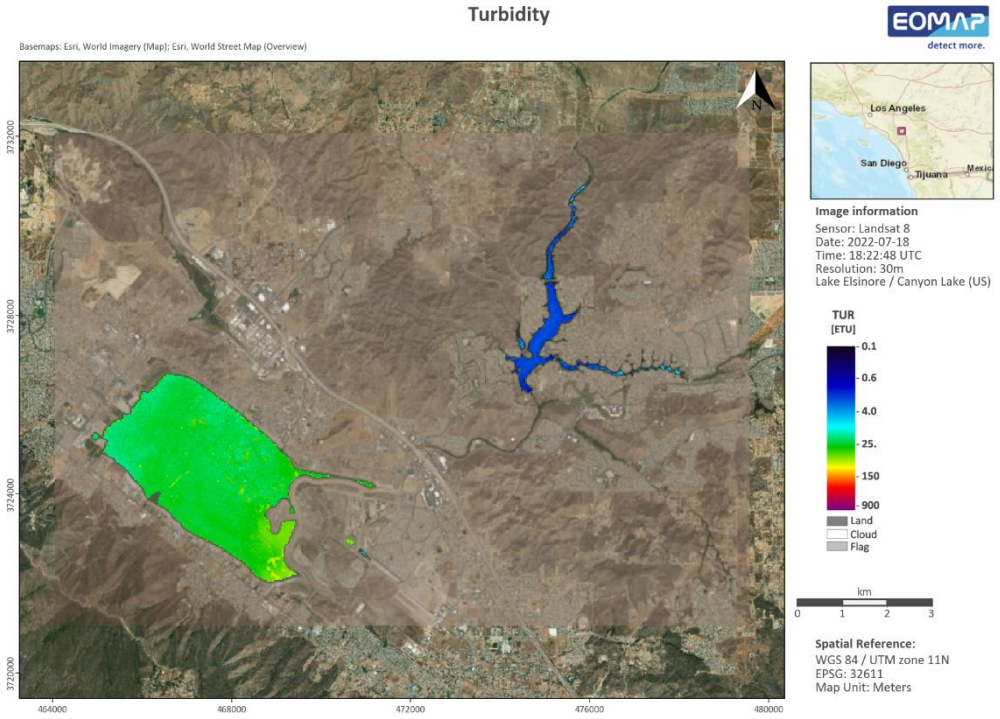


Figure 2: Turbidity product from 2022-07-18

3.2. Chlorophyll-a (CHL)

Chlorophyll-a (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [µg/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1 µg/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995[9]). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015[10]), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2022-07-18 is shown in Figure 3.

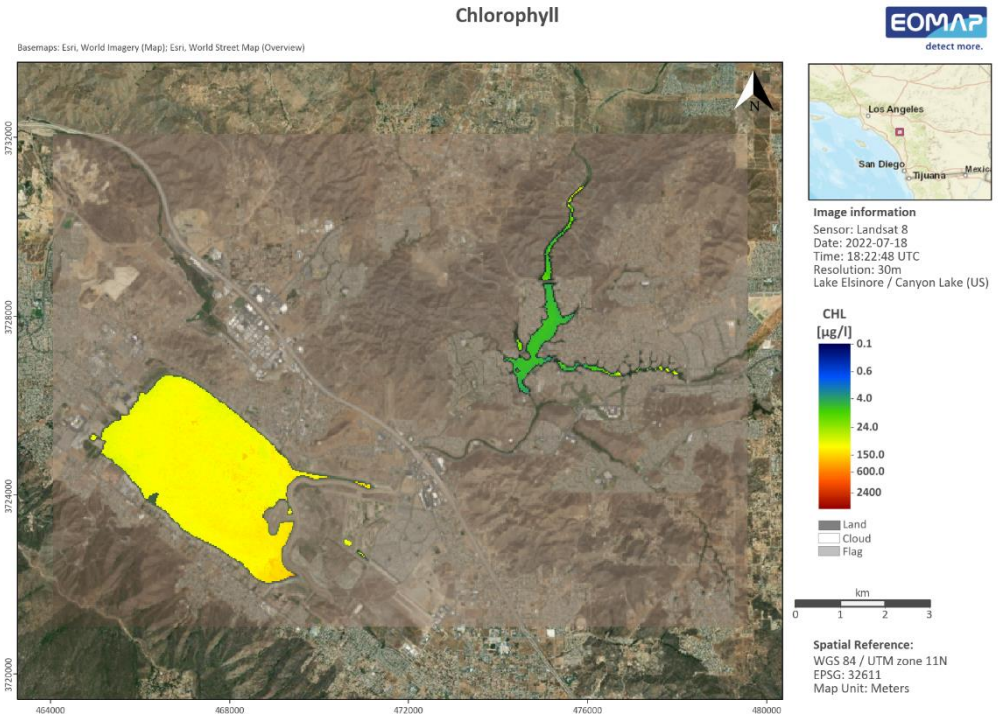


Figure 3: Chlorophyll-a product from 2022-07-18

[9] Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

[10] Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p

3.3. Harmful Algae Bloom Indicator (HAB)

The **Harmful Algae Bloom Indicator** (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption in the retrieval process. The modelled phytoplankton absorption therefore lacks the absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance ($R_{modelled}$) and satellite derived reflectance ($R_{satellite}$) occurs. The algorithm then compares the slope of $R_{modelled}$ and $R_{satellite}$ between the green and red band ($\delta R = R_{green} - R_{red}$) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2022-07-18 is shown in Figure 4.

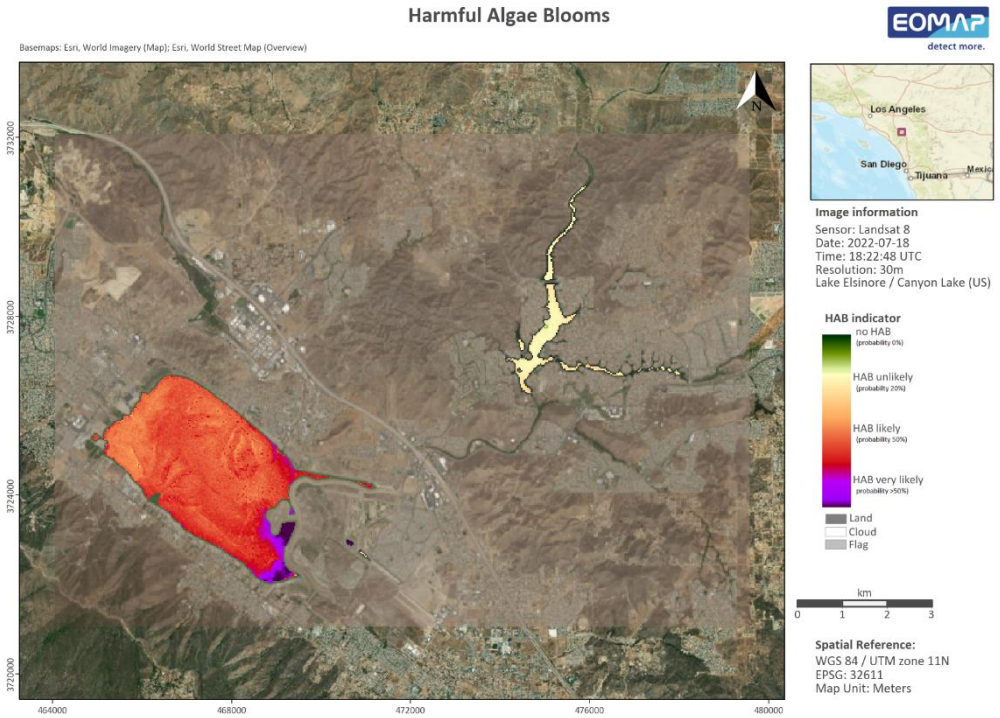


Figure 4: Harmful Algae Bloom Indicator product from 2022-07-18

3.4. True color composite (RGB)

RGB composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.

4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
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Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT - Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels - excluding land, cloud or flagged pixels - are represented in QUT indicator (Figure 5).
- QUC – EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.

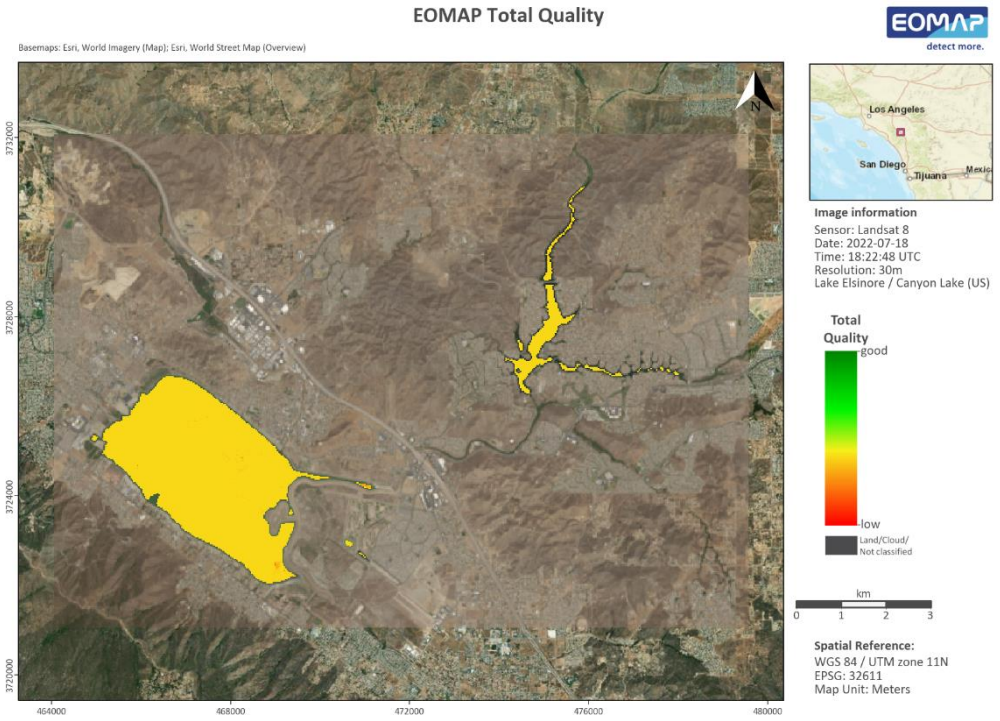

Figure 5: QUT product from 2022-07-18

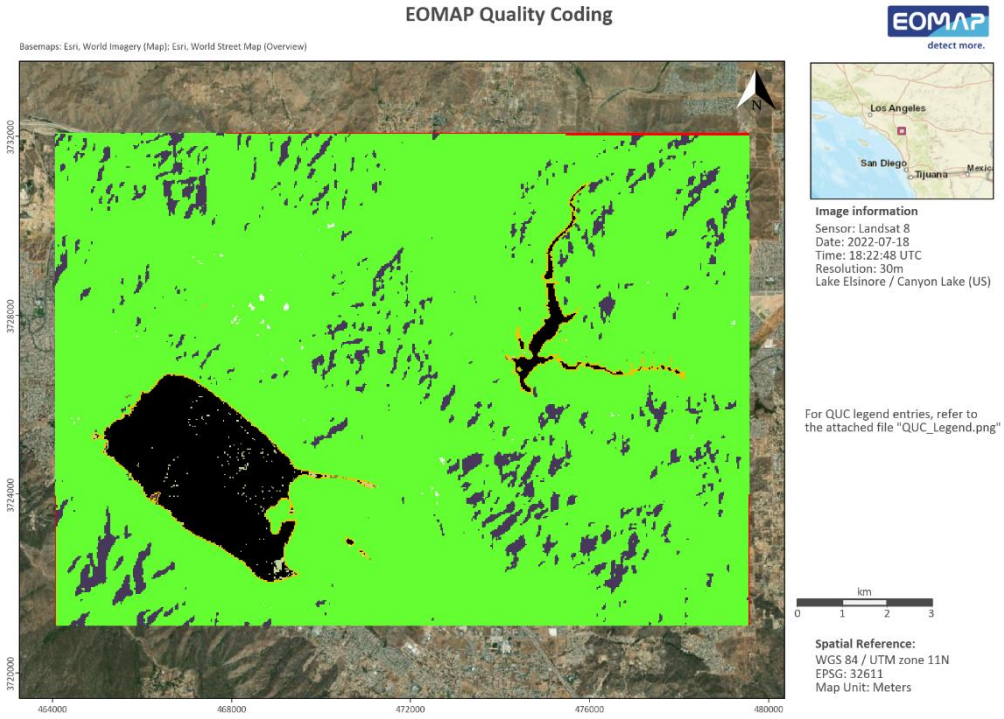

Figure 6: QUC product from 2022-07-18

The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional version allow combination of the two most relevant flags:

First number = most relevant flag
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle

Examples: 25 Warning flag for large zenit solar angle and Whitecaps
114 Critical flag for sunglint, plus warning for aerosol above limits

GV	GV range	Flag status	Flag description	Color code	Color
0	0	Water	No risk identified	0 0 0	
10	10 - 19	Warning	sunglint risk	148 138 84	
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30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
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150	150 - 159	Critical	Cloud Shadow	96 73 122	
160	160 - 169	Critical	Shallow water risk	49 134 155	
170	170 - 179	Critical	Mixed pixel risk	226 107 10	
180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
220	220	No value	Transition Zone	102 255 51	
221	221	Unreliable	Shallow water automatically	146 205 220	
222	222	Unreliable	Shallow water manually	60 159 186	
223	223	Unreliable	Floating material	32 95 107	
230	230	No water	Land	102 255 51	
232	232	Unreliable	Invalid pixel manually	255 192 0	
240	240	No water	Cloud	255 255 255	
242	242	Unreliable	Cloud Shadow manually	96 73 122	
244	244	Unreliable	Hill shadow	73 57 93	
250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product.
As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.
Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.

5. Data Format

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, 2.5

6. Data Sources

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Landsat-8 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Landsat-9 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Sentinel-2: ESA Sentinel HUB https://scihub.copernicus.eu/dhus/#/home

EOMAP
Schlosshof 4
82229 Seefeld
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+49 (0)8152 99861 10
info@eomap.com
www.eomap.com

Delivery report

Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2023-01-13
Version: 16

Clients: Wood Plc.
Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,
Schlosshof 4, 82229 Seefeld
Germany

Authors:	Email	Phone
Hendrik Bernert	bernert@eomap.de	+49 8152 99861 14
Minha Sultan	sultan@eomap.de	+49 8152 99861 14

EOMAP detect more.

CONTENT

1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	**Point of Contact**
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2023-01-13
Version	16

1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2022-08-11 18:45:03 UTC

1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	☐
Aerosol Optical Thickness	AOT	☐
Yellow Substances	CDM	☐
Chlorophyll-a	CHL	☒
Ratio of Absorption and Scattering	DIV	☐
Harmful Algae Bloom Indicator	HAB	☒
Diffuse Attenuation Coefficient	KDC	☐
Quality Coding	QUC	☒
Total Quality	QUT	☒
True Color/False Color Composite	RGB	☒
Remote Sensing Reflectance	RRS	☐
Secchi Disc Depth	SDD	☐
Sum of Inorganic Absorption	SIA	☐
Sum if Organic Absorption	SOA	☐
Surface Temperature	SST	☐
Turbidity	TUR	☒
Trophic State Index (Chlorophyll)	TSC	☐
Total Suspended Matter	TSM	☐
Light Penetration Depth	Z90	☐
Water Body Extent	WEX	☐

1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs16_20230113.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20220811_184503_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20220811_184503_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EOMAP_20220811_184503_SENT2_m0010_32bit_wgs84.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20220811_184503_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20220811_184503_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20220811_184503_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook

1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

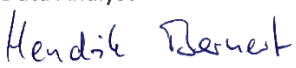
With

[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

- None

Data Analyst



Hendrik Bernert

QA/QC

Minha Sultan

2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

a. water, land, cloud identification
b. estimation and correction of atmosphere and aerosol impacts[1] [2]
c. correction altitude level impacts[3]
d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)[4]
e. correction[5] or flagging[6] of sunglitter impact
f. retrieval of in-water absorption and scattering as physical measures[7]
g. accounting for varying spectral slopes of specific inherent optical properties[8]
h. provision of uncertainty measures and flagging procedures
i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

[1] Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

[2] Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

[3] Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

[4] Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, http://dx.doi.org/10.1016/j.rse.2014.07.025

[5] Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

[6] EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf

[7] Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

[8] Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings “Water Quality in Europe: Challenges and Best Practice” UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4

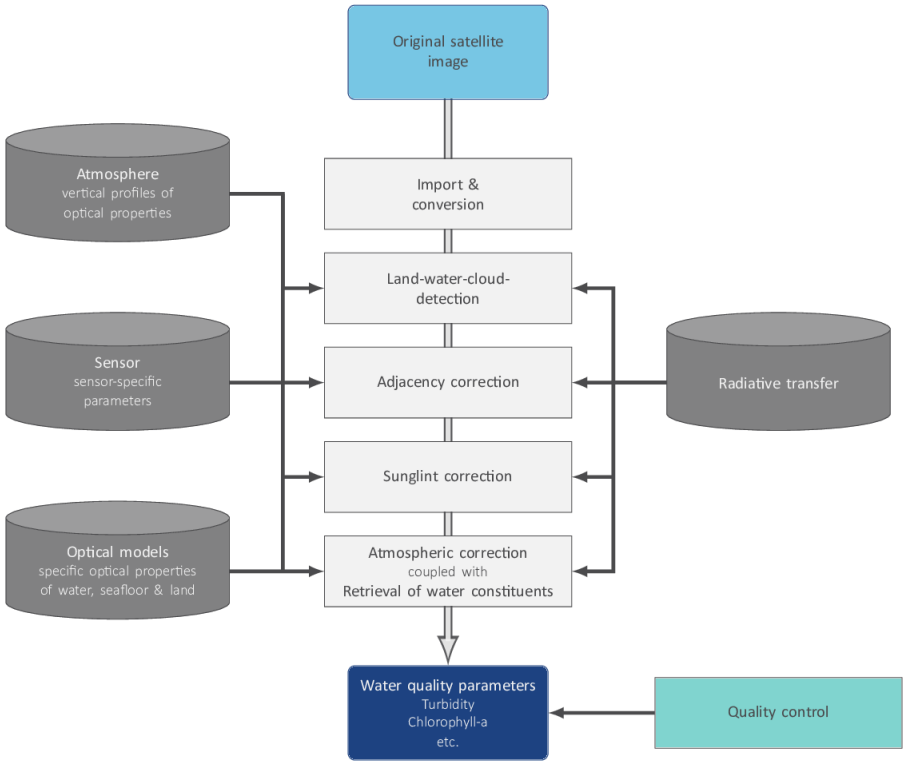


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.

3. Products

3.1. Turbidity (TUR)

Turbidity (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2022-08-11 is shown in Figure 2.

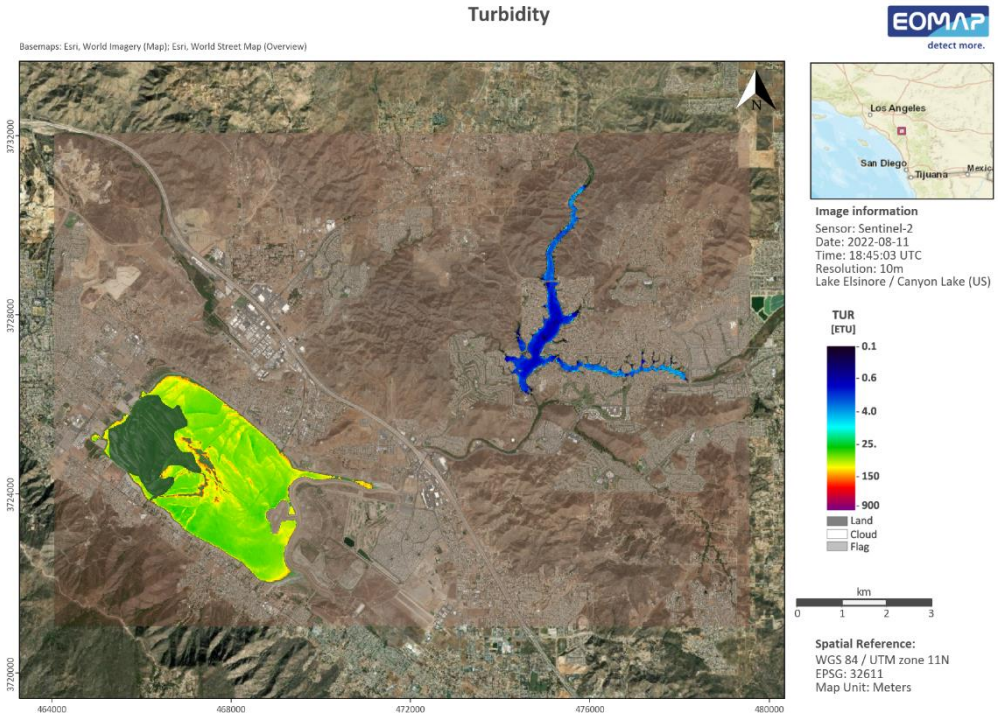
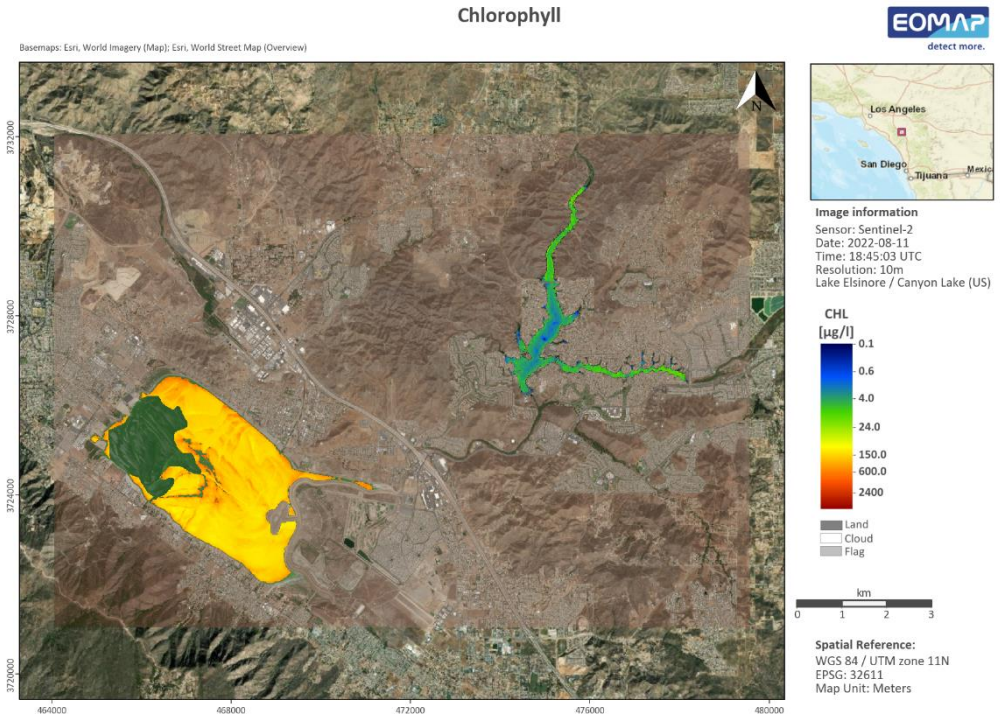


Figure 2: Turbidity product from 2022-08-11

3.2. Chlorophyll-a (CHL)

Chlorophyll-a (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [µg/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1 µg/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995[9]). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015[10]), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2022-08-11 is shown in Figure 3.



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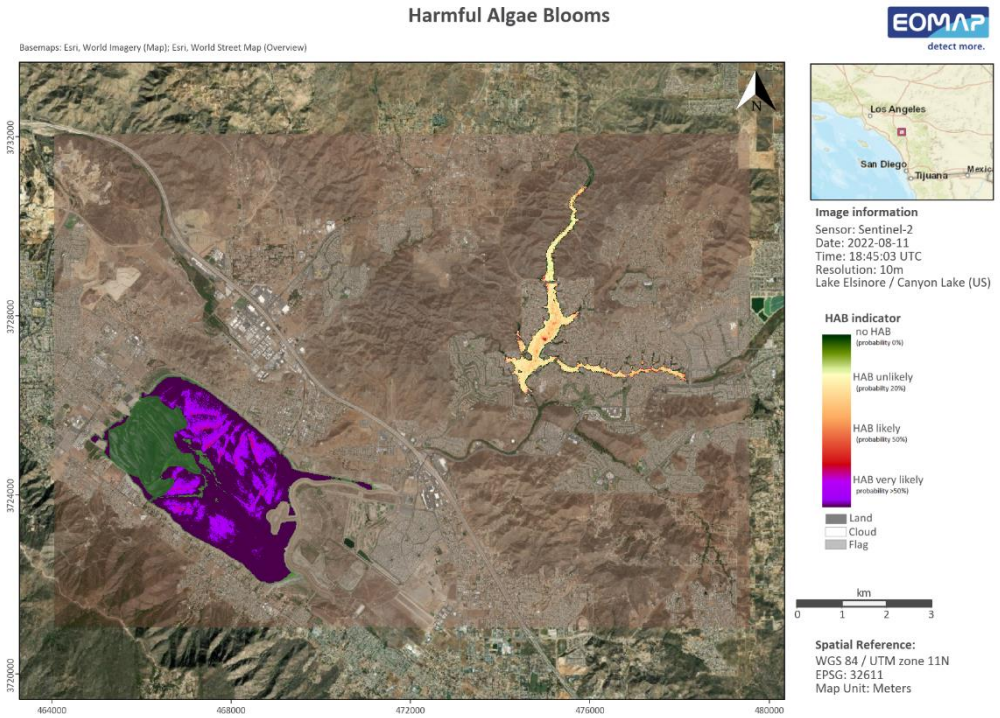

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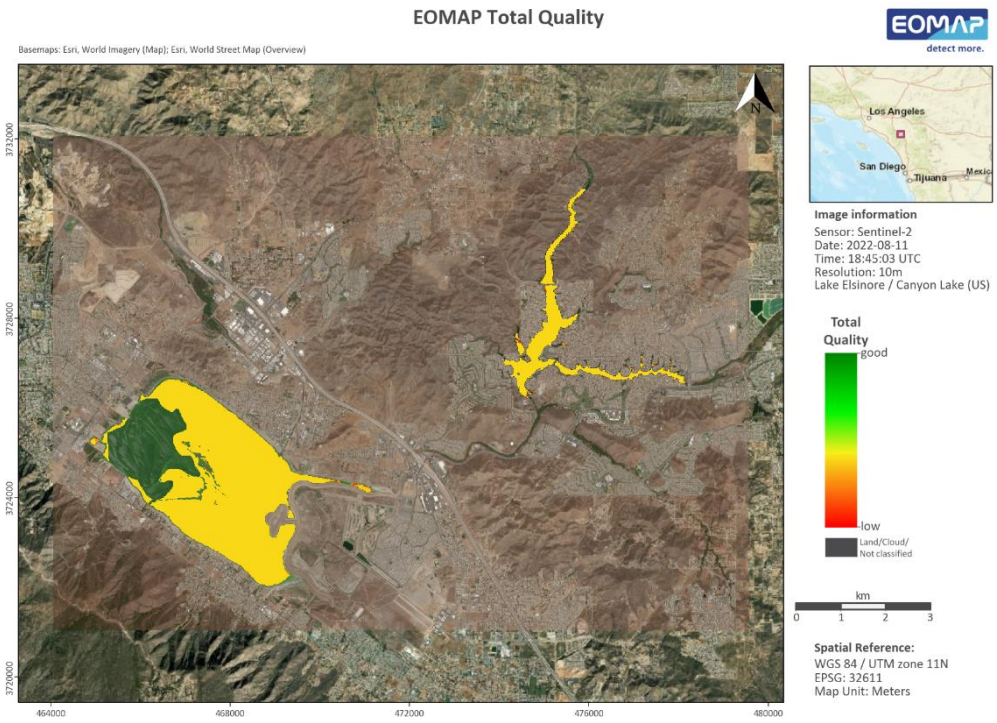

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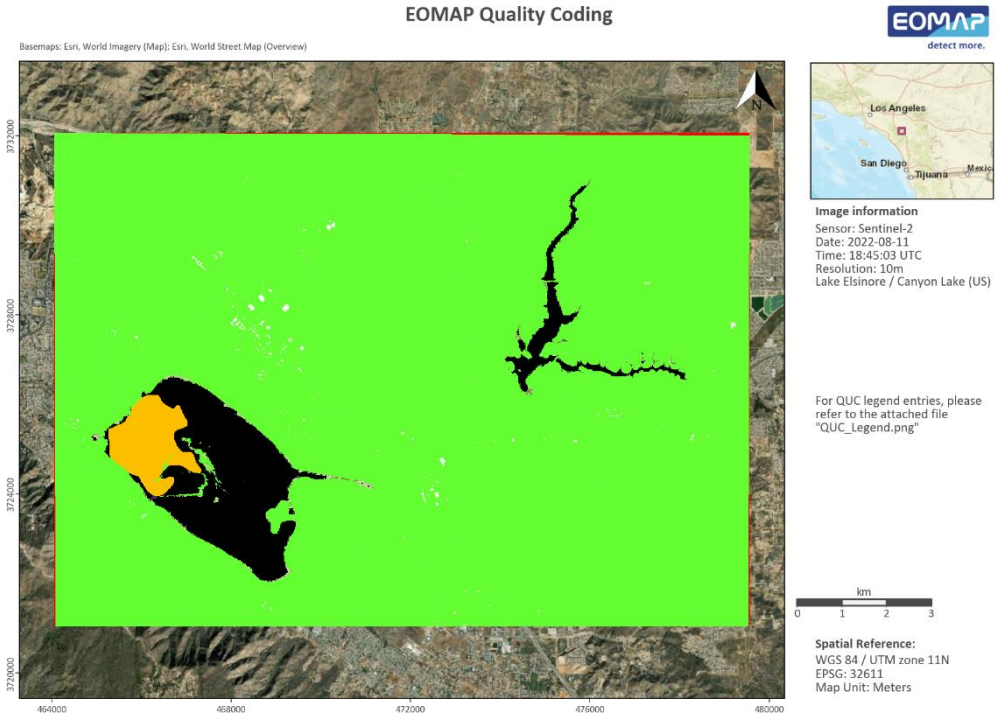

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130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
150	150 - 159	Critical	Cloud Shadow	96 73 122	
160	160 - 169	Critical	Shallow water risk	49 134 155	
170	170 - 179	Critical	Mixed pixel risk	226 107 10	
180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
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222	222	Unreliable	Shallow water manually	60 159 186	
223	223	Unreliable	Floating material	32 95 107	
230	230	No water	Land	102 255 51	
232	232	Unreliable	Invalid pixel manually	255 192 0	
240	240	No water	Cloud	255 255 255	
242	242	Unreliable	Cloud Shadow manually	96 73 122	
244	244	Unreliable	Hill shadow	73 57 93	
250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product.
As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.
Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.

5. Data Format

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, 2.5

6. Data Sources

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Landsat-8 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Landsat-9 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Sentinel-2: ESA Sentinel HUB https://scihub.copernicus.eu/dhus/#/home

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Delivery report

Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2023-01-13
Version: 17

Clients: Wood Plc.
Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,
Schlosshof 4, 82229 Seefeld
Germany

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EOMAP detect more.

CONTENT

1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	**Point of Contact**
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2023-01-13
Version	17

1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2022-09-20 18:45:00 UTC

1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	☐
Aerosol Optical Thickness	AOT	☐
Yellow Substances	CDM	☐
Chlorophyll-a	CHL	☒
Ratio of Absorption and Scattering	DIV	☐
Harmful Algae Bloom Indicator	HAB	☒
Diffuse Attenuation Coefficient	KDC	☐
Quality Coding	QUC	☒
Total Quality	QUT	☒
True Color/False Color Composite	RGB	☒
Remote Sensing Reflectance	RRS	☐
Secchi Disc Depth	SDD	☐
Sum of Inorganic Absorption	SIA	☐
Sum if Organic Absorption	SOA	☐
Surface Temperature	SST	☐
Turbidity	TUR	☒
Trophic State Index (Chlorophyll)	TSC	☐
Total Suspended Matter	TSM	☐
Light Penetration Depth	Z90	☐
Water Body Extent	WEX	☐

1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs17_20230113.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20220920_184500_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20220920_184500_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EOMAP_20220920_184500_SENT2_m0010_32bit_wgs84.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20220920_184500_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20220920_184500_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20220920_184500_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook

1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

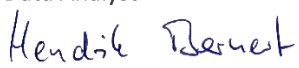
With

[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

- None

Data Analyst



Hendrik Bernert

QA/QC

Minha Sultan

2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

a. water, land, cloud identification
b. estimation and correction of atmosphere and aerosol impacts[1] [2]
c. correction altitude level impacts[3]
d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)[4]
e. correction[5] or flagging[6] of sunglitter impact
f. retrieval of in-water absorption and scattering as physical measures[7]
g. accounting for varying spectral slopes of specific inherent optical properties[8]
h. provision of uncertainty measures and flagging procedures
i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

[1] Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

[2] Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

[3] Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

[4] Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, http://dx.doi.org/10.1016/j.rse.2014.07.025

[5] Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

[6] EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf

[7] Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

[8] Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings "Water Quality in Europe: Challenges and Best Practice" UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4

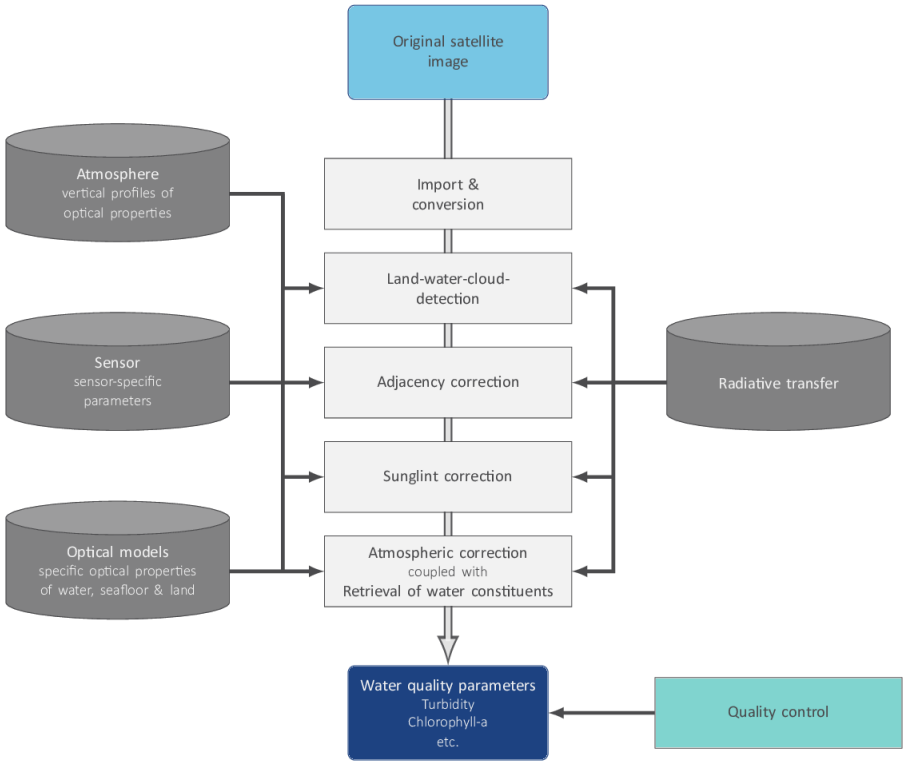


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.

3. Products

3.1. Turbidity (TUR)

Turbidity (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2022-09-20 is shown in Figure 2.

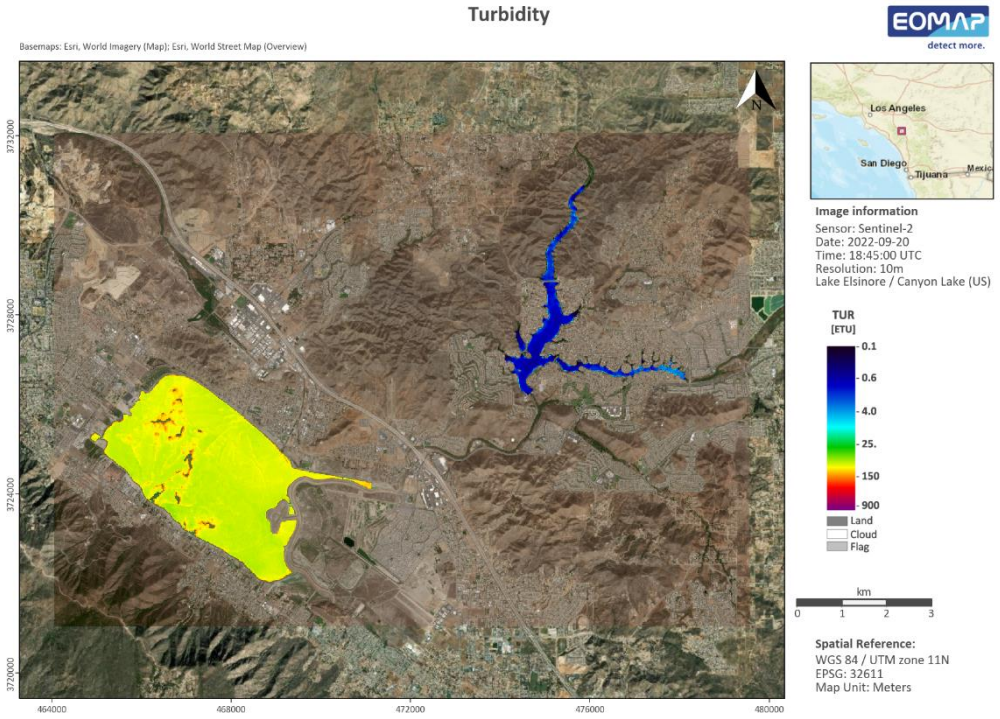


Figure 2: Turbidity product from 2022-09-20

3.2. Chlorophyll-a (CHL)

Chlorophyll-a (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [µg/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1 µg/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995[9]). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015[10]), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2022-09-20 is shown in Figure 3.

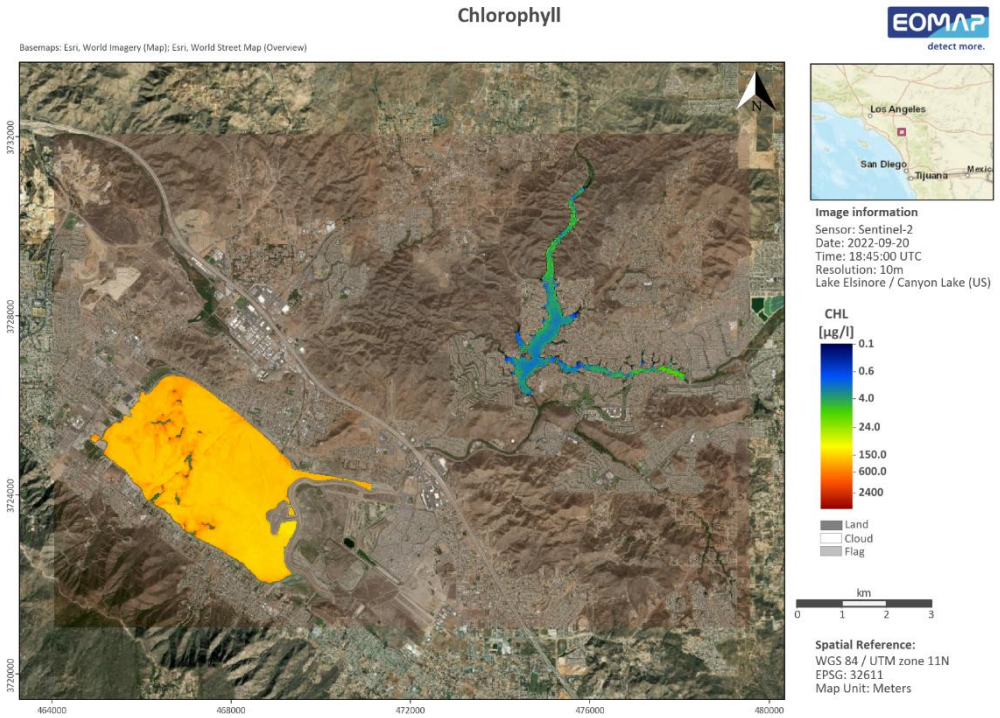


Figure 3: Chlorophyll-a product from 2022-09-20

[9] Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

[10] Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p

3.3. Harmful Algae Bloom Indicator (HAB)

The **Harmful Algae Bloom Indicator** (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption in the retrieval process. The modelled phytoplankton absorption therefore lacks the absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance ($R_{modelled}$) and satellite derived reflectance ($R_{satellite}$) occurs. The algorithm then compares the slope of $R_{modelled}$ and $R_{satellite}$ between the green and red band ($\delta R = R_{green} - R_{red}$) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2022-09-20 is shown in Figure 4.

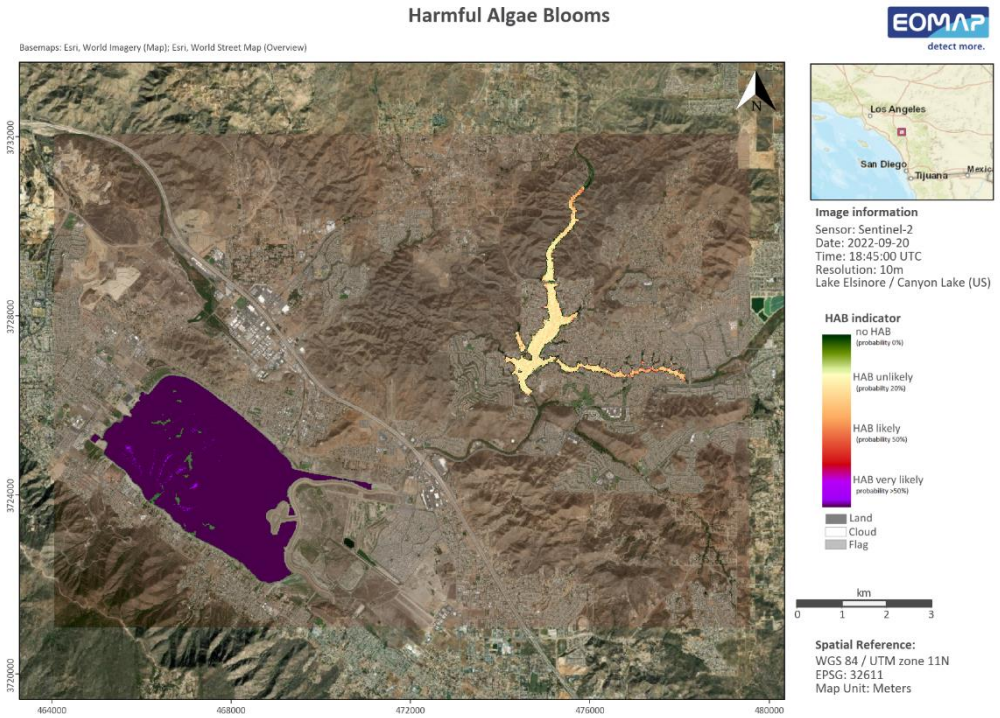


Figure 4: Harmful Algae Bloom Indicator product from 2022-09-20

3.4. True color composite (RGB)

RGB composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.

4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT - Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels - excluding land, cloud or flagged pixels - are represented in QUT indicator (Figure 5).
- QUC – EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.

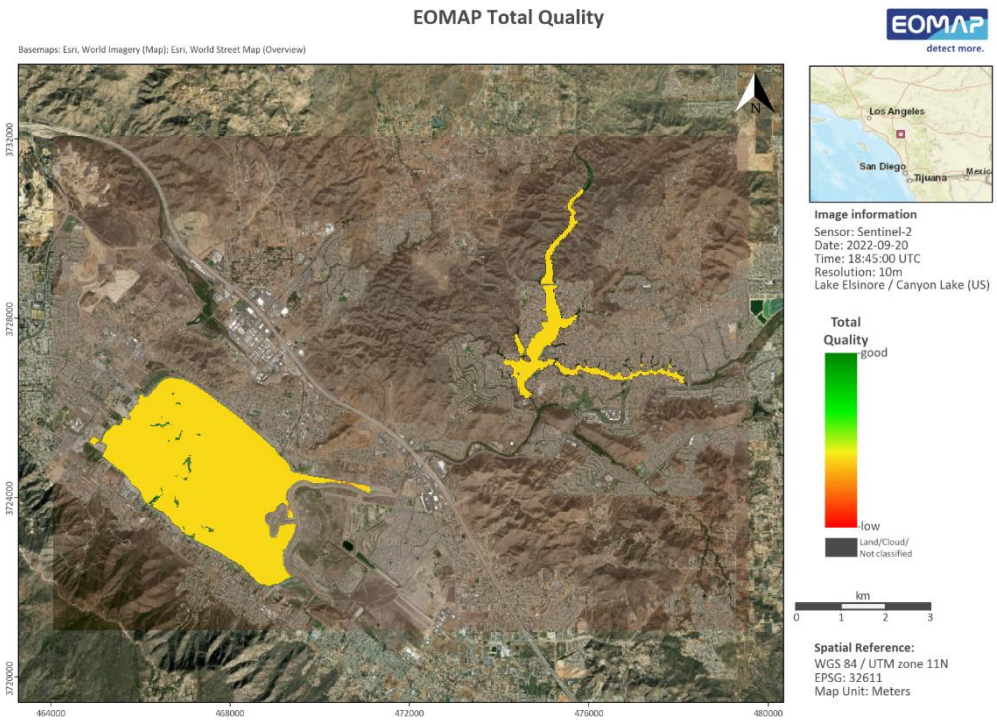


Figure 5: QUT product from 2022-09-20

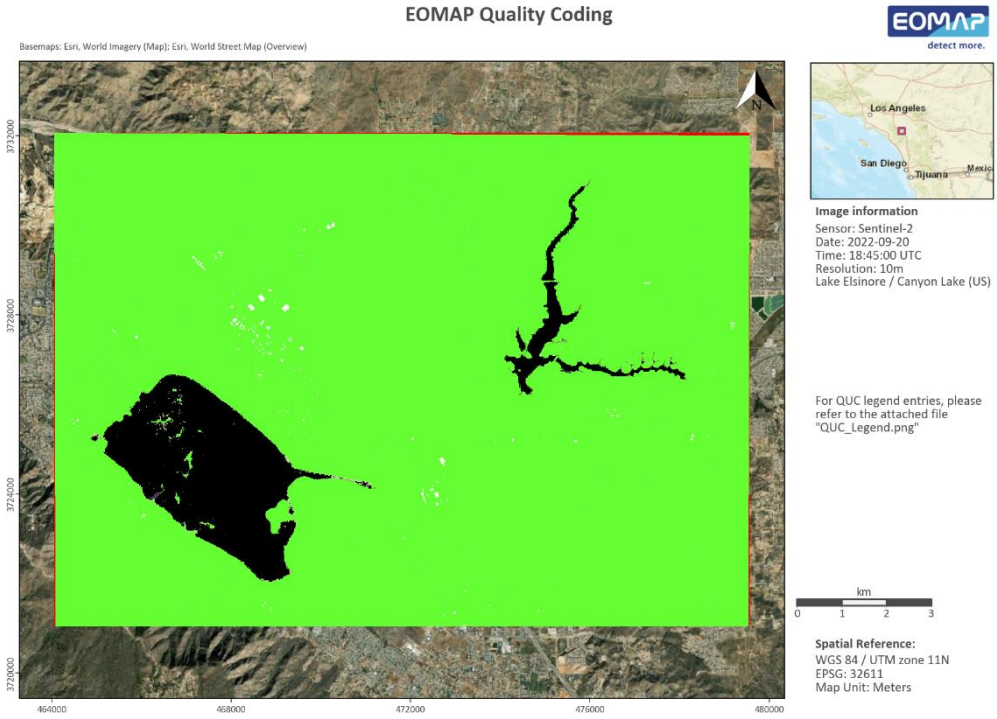


Figure 6: QUC product from 2022-09-20

The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional version allow combination of the two most relevant flags:

First number = most relevant flag
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle

Examples: 25 Warning flag for large zenit solar angle and Whitecaps
114 Critical flag for sunglint, plus warning for aerosol above limits

GV	GV range	Flag status	Flag description	Color code	Color
0	0	Water	No risk identified	0 0 0	
10	10 - 19	Warning	sunglint risk	148 138 84	
20	20 - 29	Warning	large solar zenith angle	83 141 213	
30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
50	50 - 59	Warning	Cloud Shadow	177 160 199	
60	60 - 69	Warning	Shallow water risk	146 205 220	
70	70 - 79	Warning	Mixed pixel risk	250 191 143	
80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
110	110 - 119	Critical	sunglint risk	73 69 41	
120	120 - 129	Critical	large solar zenith angle	22 54 92	
130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
150	150 - 159	Critical	Cloud Shadow	96 73 122	
160	160 - 169	Critical	Shallow water risk	49 134 155	
170	170 - 179	Critical	Mixed pixel risk	226 107 10	
180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
220	220	No value	Transition Zone	102 255 51	
221	221	Unreliable	Shallow water automatically	146 205 220	
222	222	Unreliable	Shallow water manually	60 159 186	
223	223	Unreliable	Floating material	32 95 107	
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Figure 7: EOMAP QUC quality coding

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- Landsat-9 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Sentinel-2: ESA Sentinel HUB https://scihub.copernicus.eu/dhus/#/home

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82229 Seefeld
Germany
+49 (0)8152 99861 10
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Delivery report

Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2023-01-13
Version: 18

Clients: Wood Plc.
Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,
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Hendrik Bernert	bernert@eomap.de	+49 8152 99861 14
Minha Sultan	sultan@eomap.de	+49 8152 99861 14

EOMAP detect more.

CONTENT

1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	**Point of Contact**
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2023-01-13
Version	18

1.1. List of all delivered scenes

Sensor	Time of record
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1.2. Content

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Aerosol Optical Thickness	AOT	☐
Yellow Substances	CDM	☐
Chlorophyll-a	CHL	☒
Ratio of Absorption and Scattering	DIV	☐
Harmful Algae Bloom Indicator	HAB	☒
Diffuse Attenuation Coefficient	KDC	☐
Quality Coding	QUC	☒
Total Quality	QUT	☒
True Color/False Color Composite	RGB	☒
Remote Sensing Reflectance	RRS	☐
Secchi Disc Depth	SDD	☐
Sum of Inorganic Absorption	SIA	☐
Sum if Organic Absorption	SOA	☐
Surface Temperature	SST	☐
Turbidity	TUR	☒
Trophic State Index (Chlorophyll)	TSC	☐
Total Suspended Matter	TSM	☐
Light Penetration Depth	Z90	☐
Water Body Extent	WEX	☐

1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs18_20230113.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20221005_184506_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20221005_184506_SENT2_m0010_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EOMAP_20221005_184506_SENT2_m0010_32bit_wgs84.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20221005_184506_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20221005_184506_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20221005_184506_SENT2_m0010_overview.pdf	PDF	Overview PDF, metadata and quicklook

1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

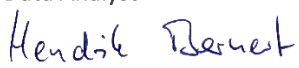
With

[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

- None

Data Analyst



Hendrik Bernert

QA/QC

Minha Sultan

2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

a. water, land, cloud identification
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d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)[4]
e. correction[5] or flagging[6] of sunglitter impact
f. retrieval of in-water absorption and scattering as physical measures[7]
g. accounting for varying spectral slopes of specific inherent optical properties[8]
h. provision of uncertainty measures and flagging procedures
i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

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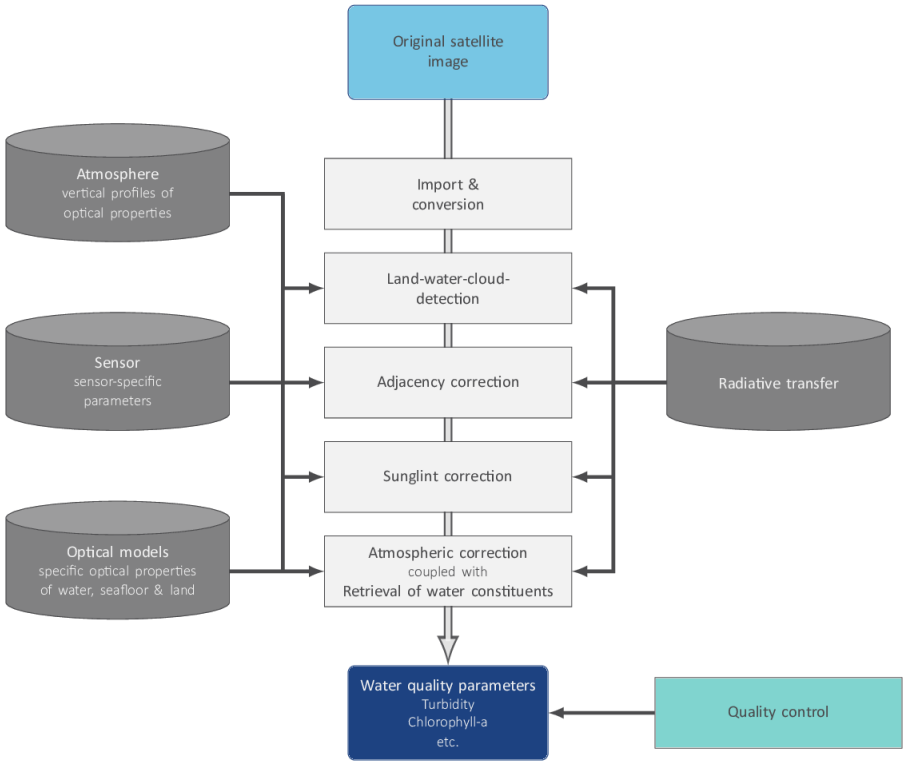


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.

3. Products

3.1. Turbidity (TUR)

Turbidity (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2022-10-05 is shown in Figure 2.

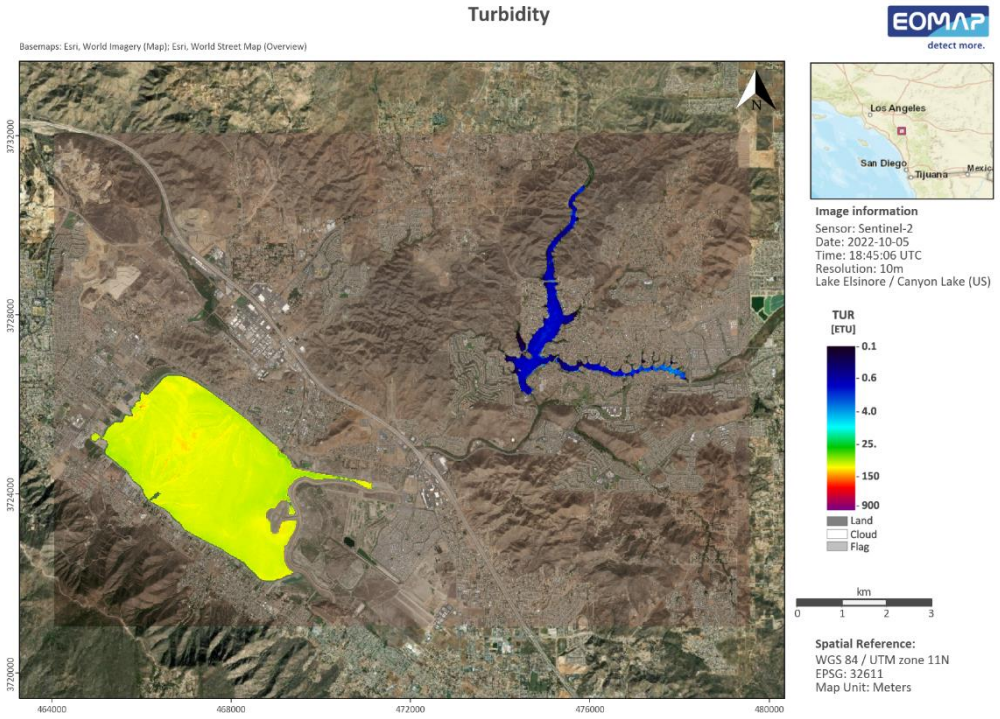


Figure 2: Turbidity product from 2022-10-05

3.2. Chlorophyll-a (CHL)

Chlorophyll-a (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [µg/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1 µg/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995[9]). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015[10]), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2022-10-05 is shown in Figure 3.

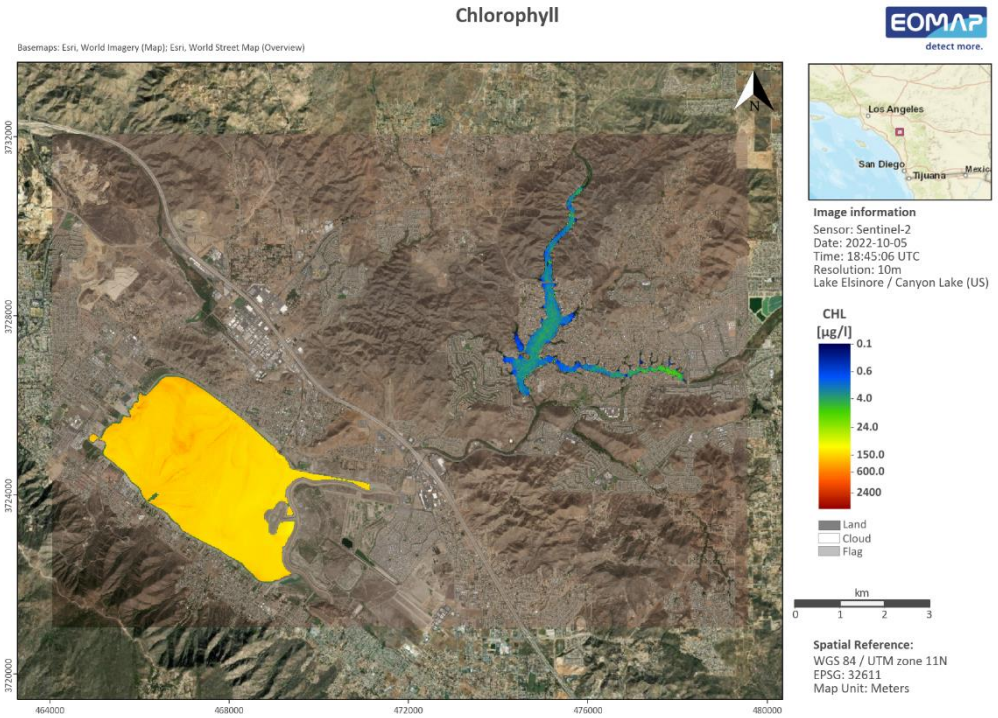


Figure 3: Chlorophyll-a product from 2022-10-05

[9] Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

[10] Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p

3.3. Harmful Algae Bloom Indicator (HAB)

The **Harmful Algae Bloom Indicator** (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption in the retrieval process. The modelled phytoplankton absorption therefore lacks the absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance ($R_{modelled}$) and satellite derived reflectance ($R_{satellite}$) occurs. The algorithm then compares the slope of $R_{modelled}$ and $R_{satellite}$ between the green and red band ($\delta R = R_{green} - R_{red}$) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2022-10-05 is shown in Figure 4.

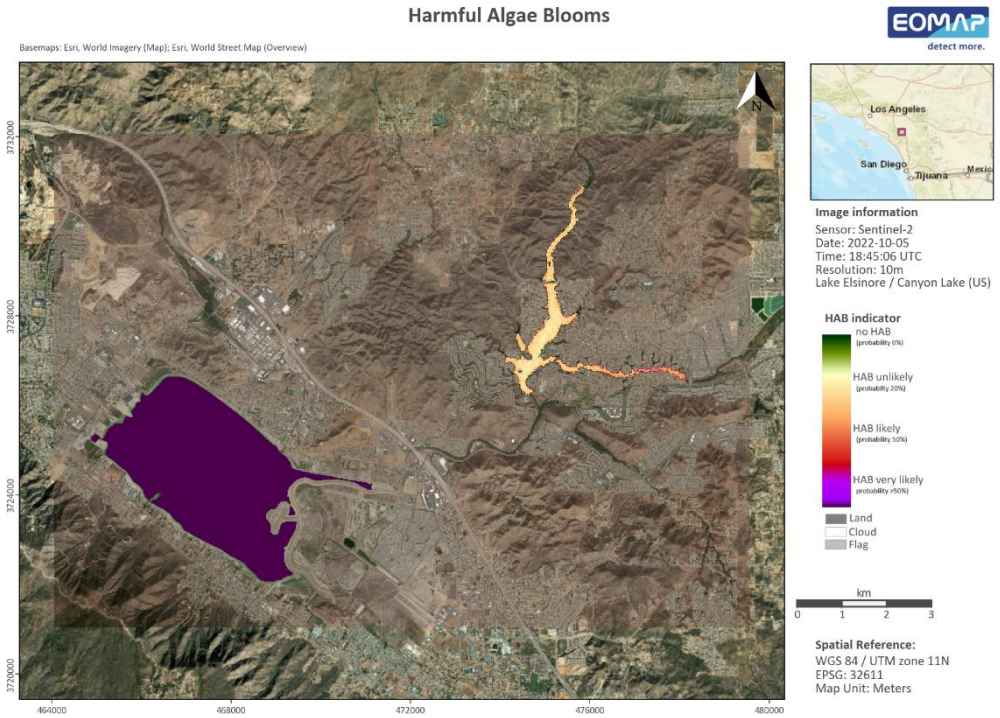


Figure 4: Harmful Algae Bloom Indicator product from 2022-10-05

3.4. True color composite (RGB)

RGB composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.

4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT - Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels - excluding land, cloud or flagged pixels - are represented in QUT indicator (Figure 5).
- QUC – EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.

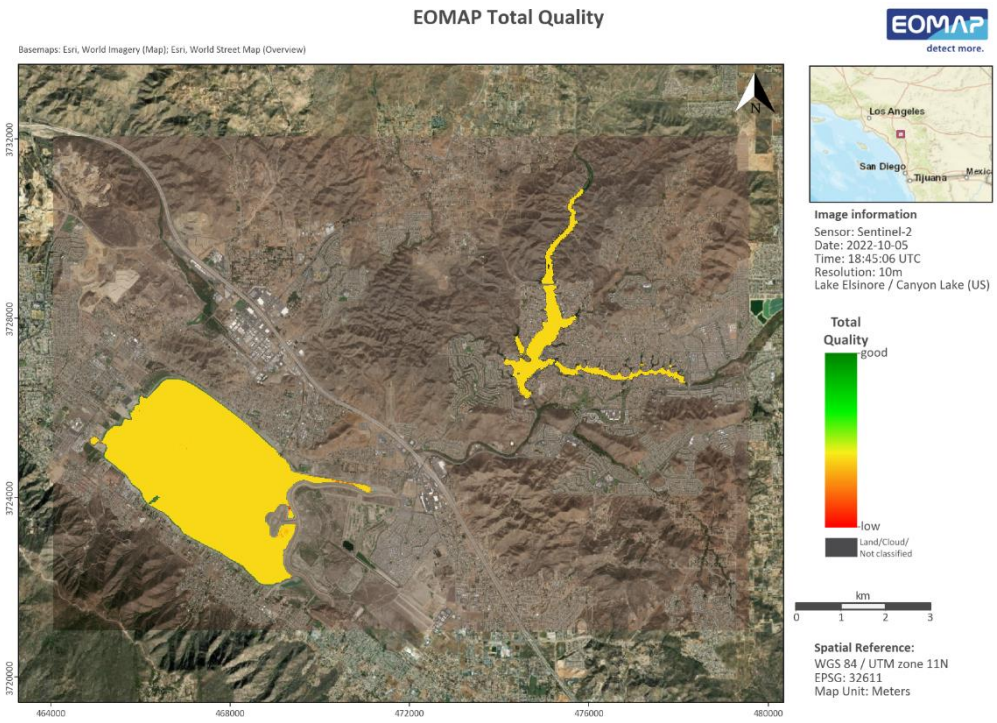


Figure 5: QUT product from 2022-10-05

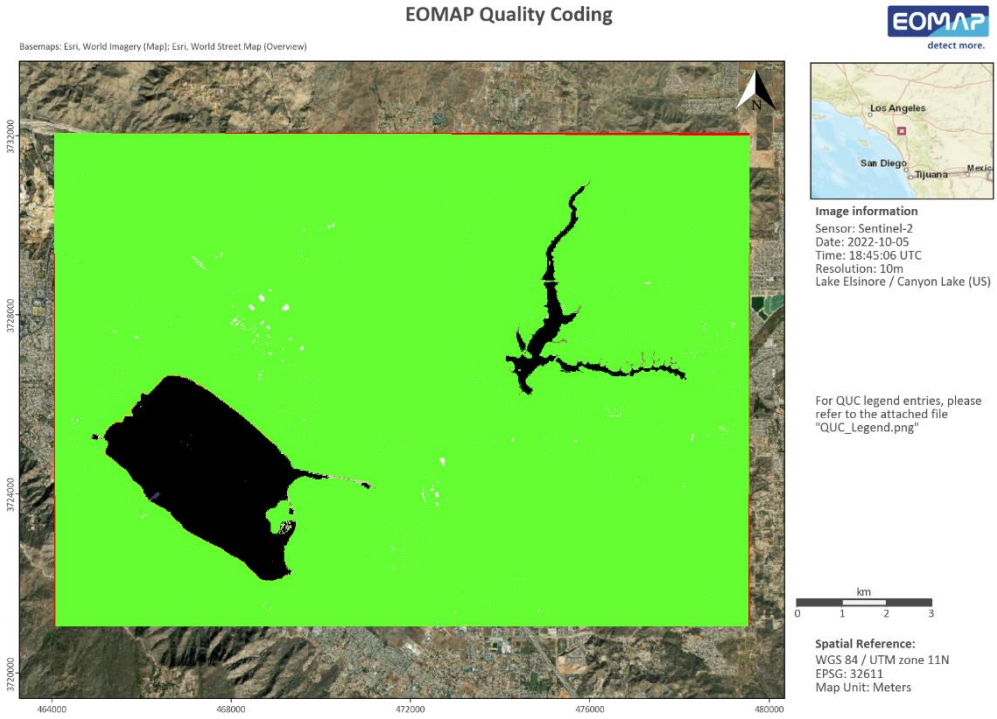


Figure 6: QUC product from 2022-10-05

The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional version allow combination of the two most relevant flags:

First number = most relevant flag
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle

Examples: 25 Warning flag for large zenit solar angle and Whitecaps
114 Critical flag for sunglint, plus warning for aerosol above limits

GV	GV range	Flag status	Flag description	Color code	Color
0	0	Water	No risk identified	0 0 0	
10	10 - 19	Warning	sunglint risk	148 138 84	
20	20 - 29	Warning	large solar zenith angle	83 141 213	
30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
50	50 - 59	Warning	Cloud Shadow	177 160 199	
60	60 - 69	Warning	Shallow water risk	146 205 220	
70	70 - 79	Warning	Mixed pixel risk	250 191 143	
80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
110	110 - 119	Critical	sunglint risk	73 69 41	
120	120 - 129	Critical	large solar zenith angle	22 54 92	
130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
150	150 - 159	Critical	Cloud Shadow	96 73 122	
160	160 - 169	Critical	Shallow water risk	49 134 155	
170	170 - 179	Critical	Mixed pixel risk	226 107 10	
180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
220	220	No value	Transition Zone	102 255 51	
221	221	Unreliable	Shallow water automatically	146 205 220	
222	222	Unreliable	Shallow water manually	60 159 186	
223	223	Unreliable	Floating material	32 95 107	
230	230	No water	Land	102 255 51	
232	232	Unreliable	Invalid pixel manually	255 192 0	
240	240	No water	Cloud	255 255 255	
242	242	Unreliable	Cloud Shadow manually	96 73 122	
244	244	Unreliable	Hill shadow	73 57 93	
250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product.
As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.
Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.

5. Data Format

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, 2.5

6. Data Sources

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Landsat-8 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Landsat-9 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Sentinel-2: ESA Sentinel HUB https://scihub.copernicus.eu/dhus/#/home

EOMAP
Schlosshof 4
82229 Seefeld
Germany
+49 (0)8152 99861 10
info@eomap.com
www.eomap.com

Delivery report

Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2023-01-13
Version: 19

Clients: Wood Plc.
Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,
Schlosshof 4, 82229 Seefeld
Germany

Authors:	Email	Phone
Hendrik Bernert	bernert@eomap.de	+49 8152 99861 14
Minha Sultan	sultan@eomap.de	+49 8152 99861 14

EOMAP detect more.

CONTENT

1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	**Point of Contact**
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2023-01-13
Version	19

1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2022-12-19 18:45:58 UTC

1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	☐
Aerosol Optical Thickness	AOT	☐
Yellow Substances	CDM	☐
Chlorophyll-a	CHL	☒
Ratio of Absorption and Scattering	DIV	☐
Harmful Algae Bloom Indicator	HAB	☒
Diffuse Attenuation Coefficient	KDC	☐
Quality Coding	QUC	☒
Total Quality	QUT	☒
True Color/False Color Composite	RGB	☒
Remote Sensing Reflectance	RRS	☐
Secchi Disc Depth	SDD	☐
Sum of Inorganic Absorption	SIA	☐
Sum if Organic Absorption	SOA	☐
Surface Temperature	SST	☐
Turbidity	TUR	☒
Trophic State Index (Chlorophyll)	TSC	☐
Total Suspended Matter	TSM	☐
Light Penetration Depth	Z90	☐
Water Body Extent	WEX	☐

1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs19_20230113.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010 _32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010 _32bit_wgs84.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010 _overview.pdf	PDF	Overview PDF, metadata and quicklook

1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

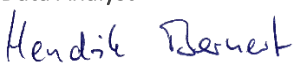
With

[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

- None

Data Analyst



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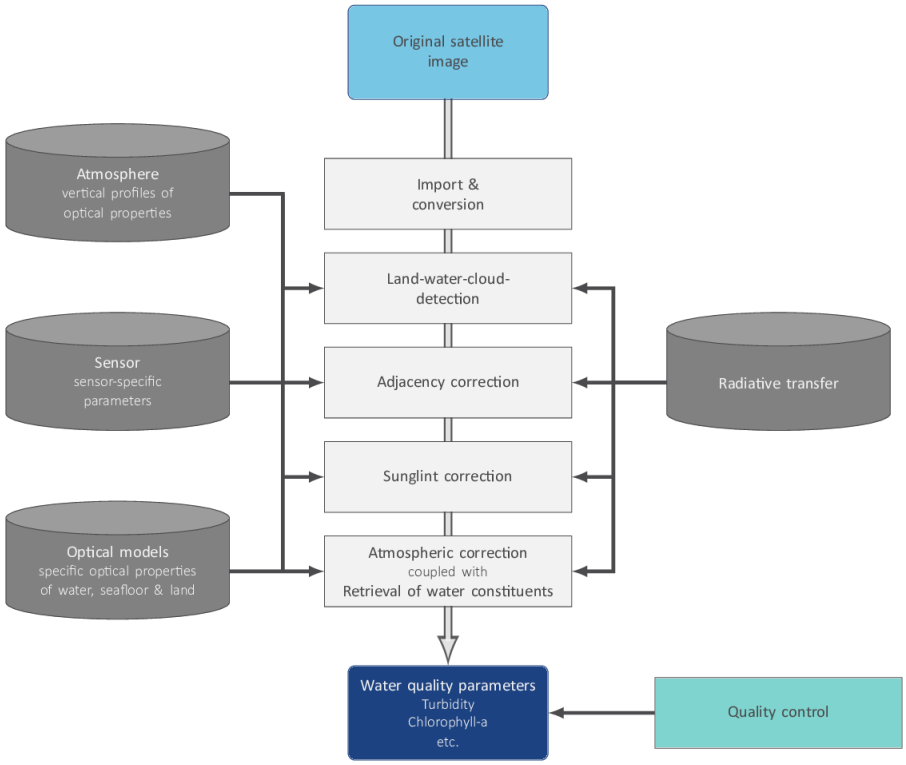

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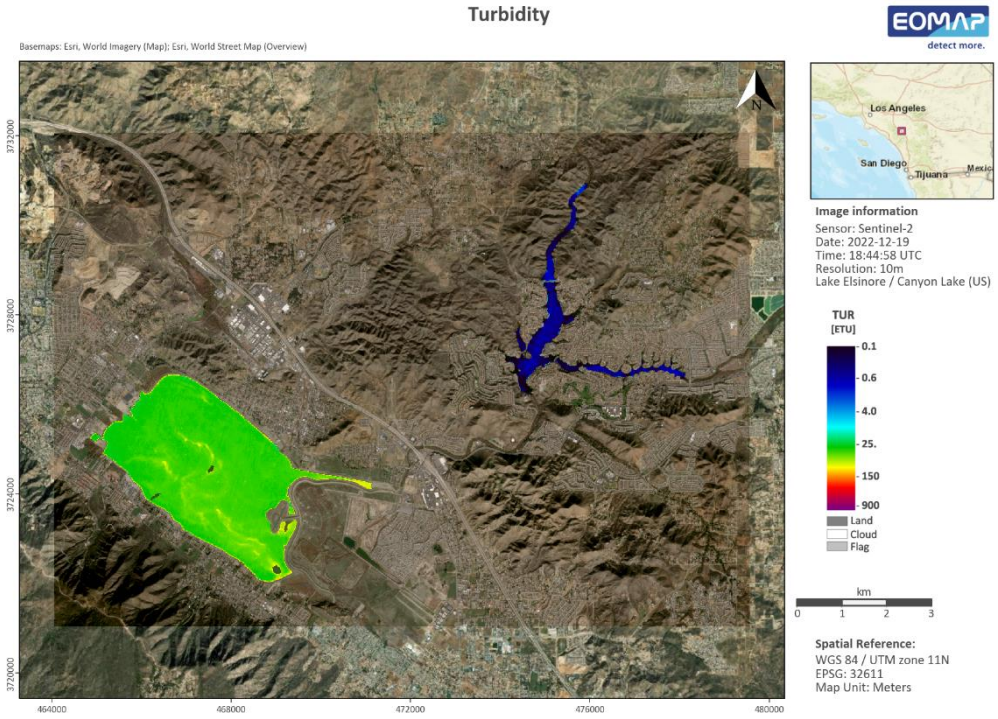
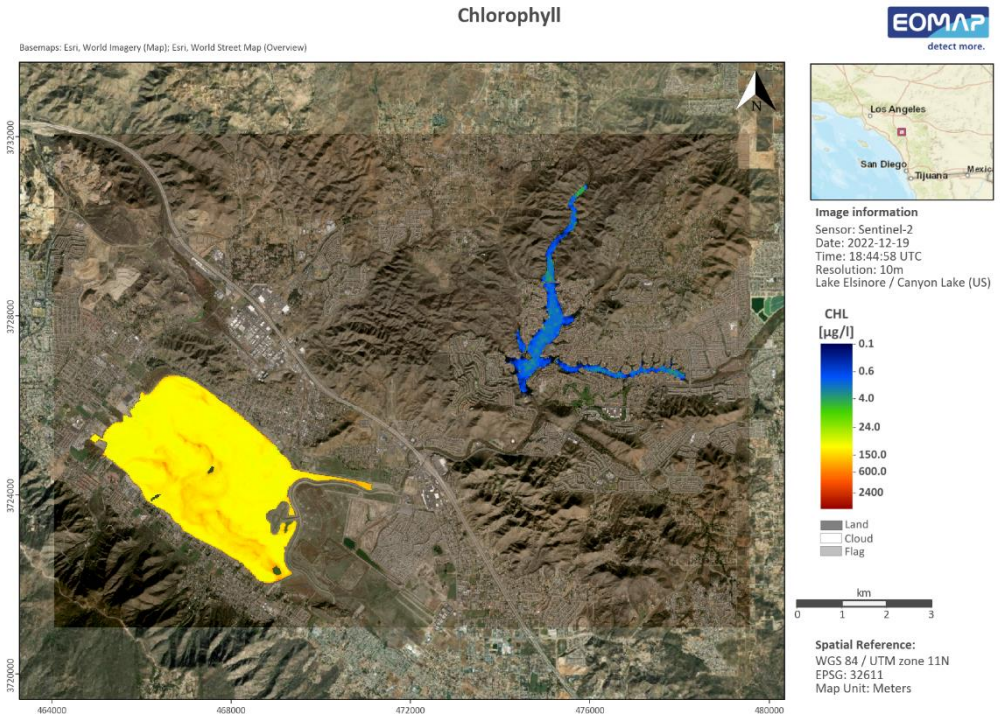


Figure 2: Turbidity product from 2022-12-19

3.2. Chlorophyll-a (CHL)

Chlorophyll-a (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [µg/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1 µg/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995[9]). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015[10]), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2022-12-19 is shown in Figure 3.



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[9] Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

[10] Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p

3.3. Harmful Algae Bloom Indicator (HAB)

The **Harmful Algae Bloom Indicator** (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption in the retrieval process. The modelled phytoplankton absorption therefore lacks the absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance ($R_{modelled}$) and satellite derived reflectance ($R_{satellite}$) occurs. The algorithm then compares the slope of $R_{modelled}$ and $R_{satellite}$ between the green and red band ($\delta R = R_{green} - R_{red}$) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2022-12-19 is shown in Figure 4.

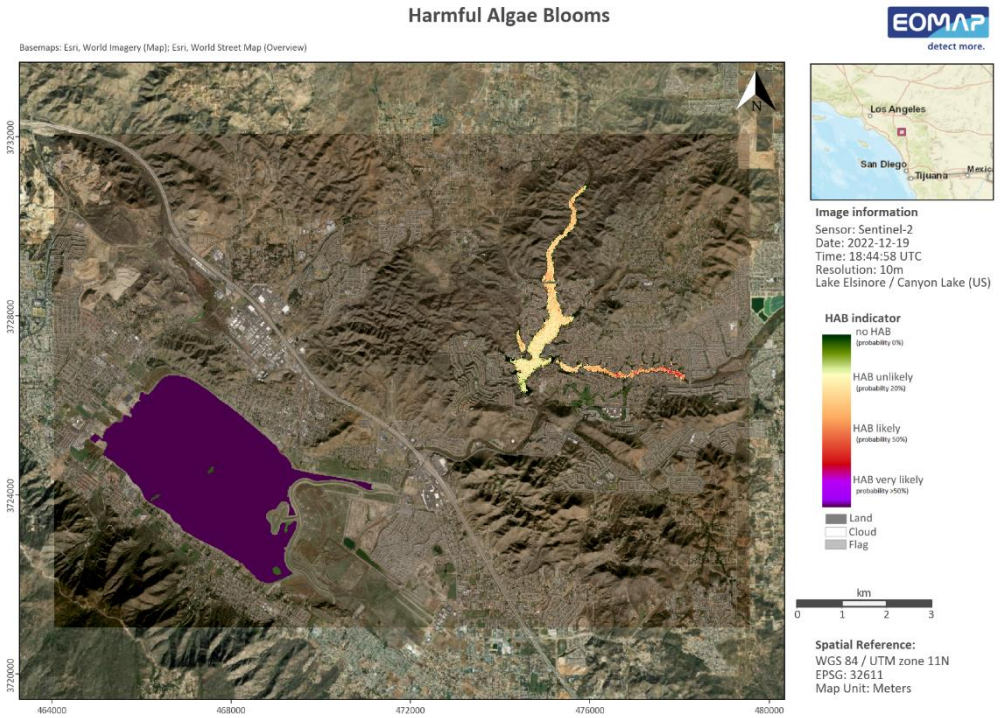

Figure 4: Harmful Algae Bloom Indicator product from 2022-12-19

3.4. True color composite (RGB)

RGB composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.

4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
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Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT - Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels - excluding land, cloud or flagged pixels - are represented in QUT indicator (Figure 5).
- QUC – EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.

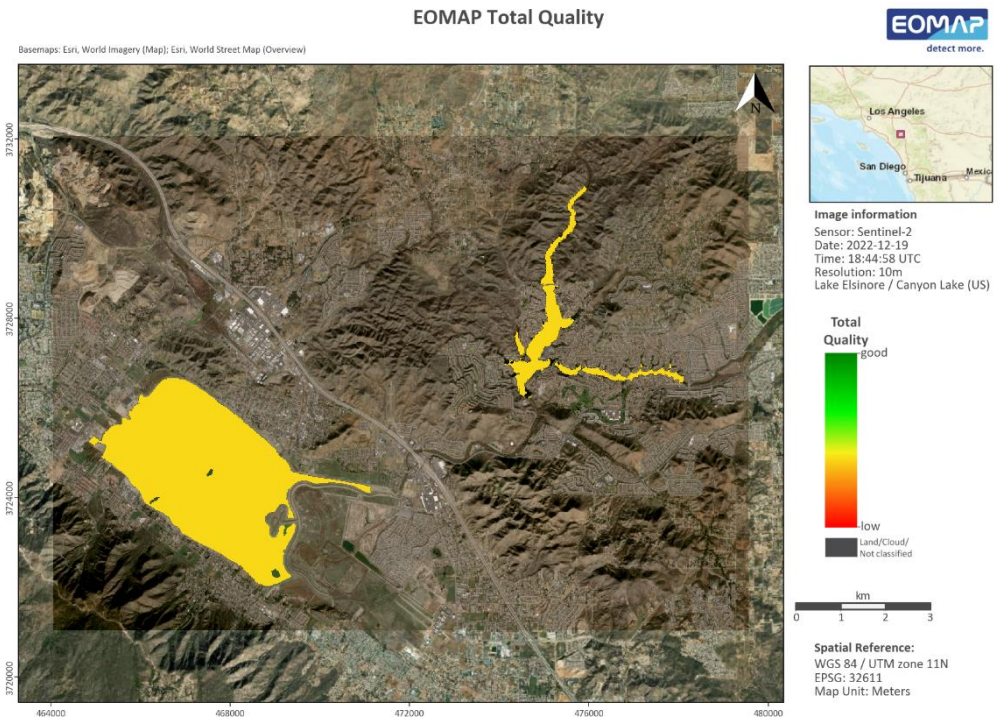


Figure 5: QUT product from 2022-12-19

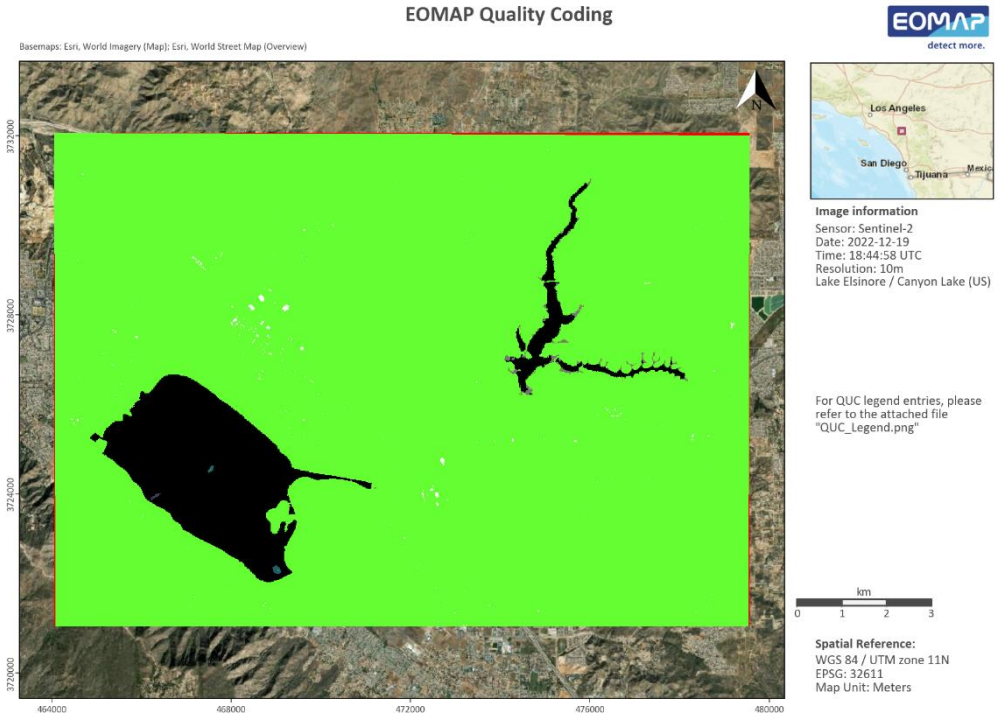


Figure 6: QUC product from 2022-12-19

The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional version allow combination of the two most relevant flags:

First number = most relevant flag
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle

Examples: 25 Warning flag for large zenit solar angle and Whitecaps
114 Critical flag for sunglint, plus warning for aerosol above limits

GV	GV range	Flag status	Flag description	Color code	Color
0	0	Water	No risk identified	0 0 0	
10	10 - 19	Warning	sunglint risk	148 138 84	
20	20 - 29	Warning	large solar zenith angle	83 141 213	
30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
50	50 - 59	Warning	Cloud Shadow	177 160 199	
60	60 - 69	Warning	Shallow water risk	146 205 220	
70	70 - 79	Warning	Mixed pixel risk	250 191 143	
80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
110	110 - 119	Critical	sunglint risk	73 69 41	
120	120 - 129	Critical	large solar zenith angle	22 54 92	
130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
150	150 - 159	Critical	Cloud Shadow	96 73 122	
160	160 - 169	Critical	Shallow water risk	49 134 155	
170	170 - 179	Critical	Mixed pixel risk	226 107 10	
180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
220	220	No value	Transition Zone	102 255 51	
221	221	Unreliable	Shallow water automatically	146 205 220	
222	222	Unreliable	Shallow water manually	60 159 186	
223	223	Unreliable	Floating material	32 95 107	
230	230	No water	Land	102 255 51	
232	232	Unreliable	Invalid pixel manually	255 192 0	
240	240	No water	Cloud	255 255 255	
242	242	Unreliable	Cloud Shadow manually	96 73 122	
244	244	Unreliable	Hill shadow	73 57 93	
250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product.
As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.
Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.

5. Data Format

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, 2.5

6. Data Sources

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Landsat-8 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Landsat-9 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Sentinel-2: ESA Sentinel HUB https://scihub.copernicus.eu/dhus/#/home

EOMAP
Schlosshof 4
82229 Seefeld
Germany
+49 (0)8152 99861 10
info@eomap.com
www.eomap.com

Delivery report

Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2023-05-30
Version: 23

Clients: Wood Plc.
Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,
Schlosshof 4, 82229 Seefeld
Germany

Authors:	Email	Phone
Hendrik Bernert	bernert@eomap.de	+49 8152 99861 14
Minha Sultan	sultan@eomap.de	+49 8152 99861 14

EOMAP detect more.

CONTENT

1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	**Point of Contact**
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2023-05-30
Version	23

1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2023-02-07 18:44:57 UTC

1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	☐
Aerosol Optical Thickness	AOT	☐
Yellow Substances	CDM	☐
Chlorophyll-a	CHL	☒
Ratio of Absorption and Scattering	DIV	☐
Harmful Algae Bloom Indicator	HAB	☒
Diffuse Attenuation Coefficient	KDC	☐
Quality Coding	QUC	☒
Total Quality	QUT	☒
True Color/False Color Composite	RGB	☒
Remote Sensing Reflectance	RRS	☐
Secchi Disc Depth	SDD	☐
Sum of Inorganic Absorption	SIA	☐
Sum if Organic Absorption	SOA	☐
Surface Temperature	SST	☐
Turbidity	TUR	☒
Trophic State Index (Chlorophyll)	TSC	☐
Total Suspended Matter	TSM	☐
Light Penetration Depth	Z90	☐
Water Body Extent	WEX	☐

1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs19_20230113.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010 _32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010 _32bit_wgs84.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20221219_184458_SENT2_m0010 _overview.pdf	PDF	Overview PDF, metadata and quicklook

1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

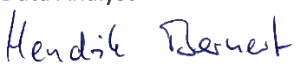
With

[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

- None

Data Analyst



Hendrik Bernert

QA/QC

Minha Sultan

2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

a. water, land, cloud identification
b. estimation and correction of atmosphere and aerosol impacts[1] [2]
c. correction altitude level impacts[3]
d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)[4]
e. correction[5] or flagging[6] of sunglitter impact
f. retrieval of in-water absorption and scattering as physical measures[7]
g. accounting for varying spectral slopes of specific inherent optical properties[8]
h. provision of uncertainty measures and flagging procedures
i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

[1] Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

[2] Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

[3] Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

[4] Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, http://dx.doi.org/10.1016/j.rse.2014.07.025

[5] Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

[6] EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf

[7] Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

[8] Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings "Water Quality in Europe: Challenges and Best Practice" UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4

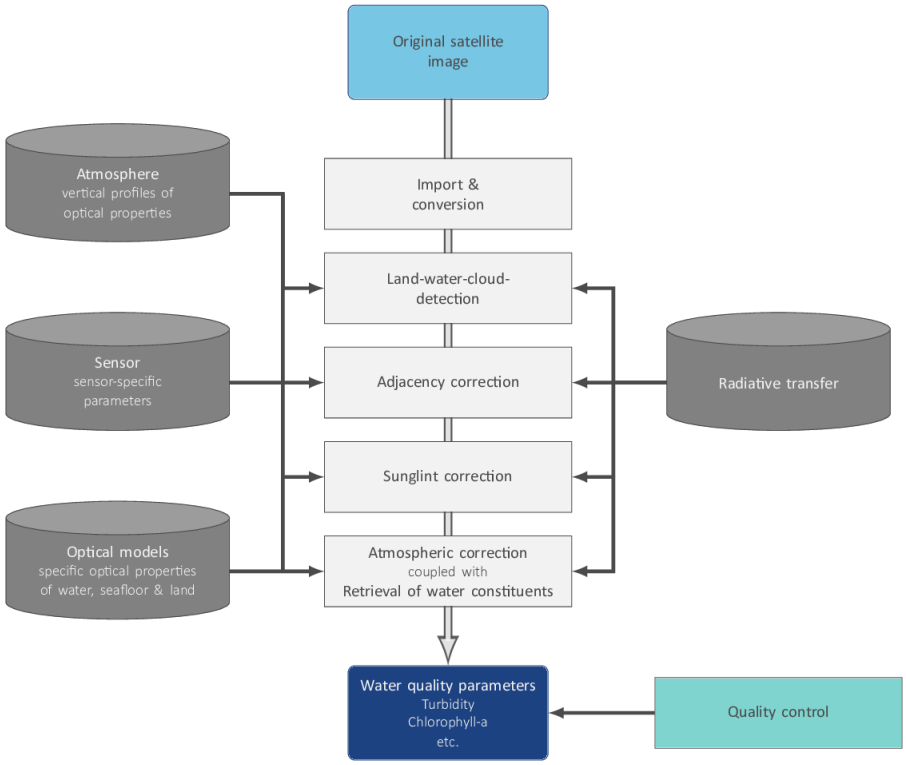


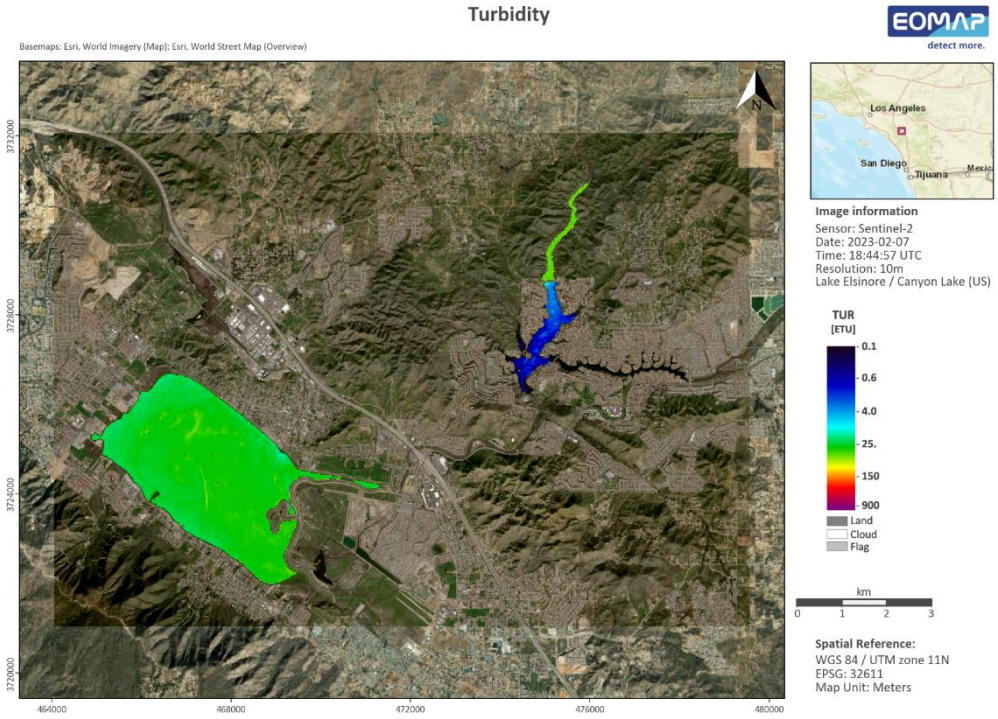
Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.

3. Products

3.1. Turbidity (TUR)

Turbidity (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2023-02-07 is shown in Figure 2.



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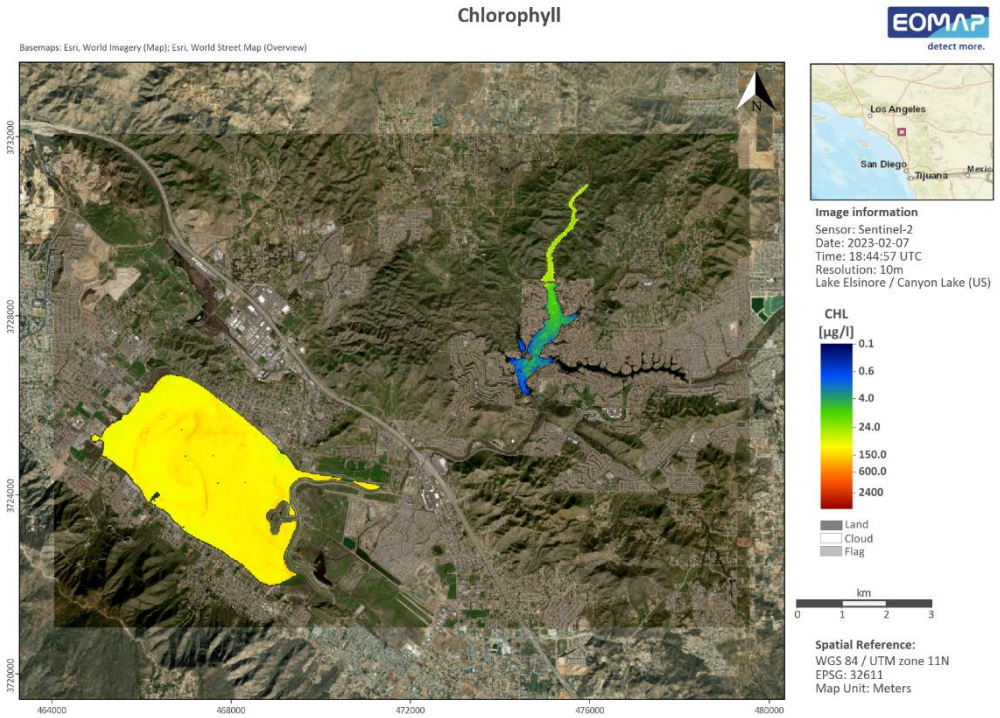

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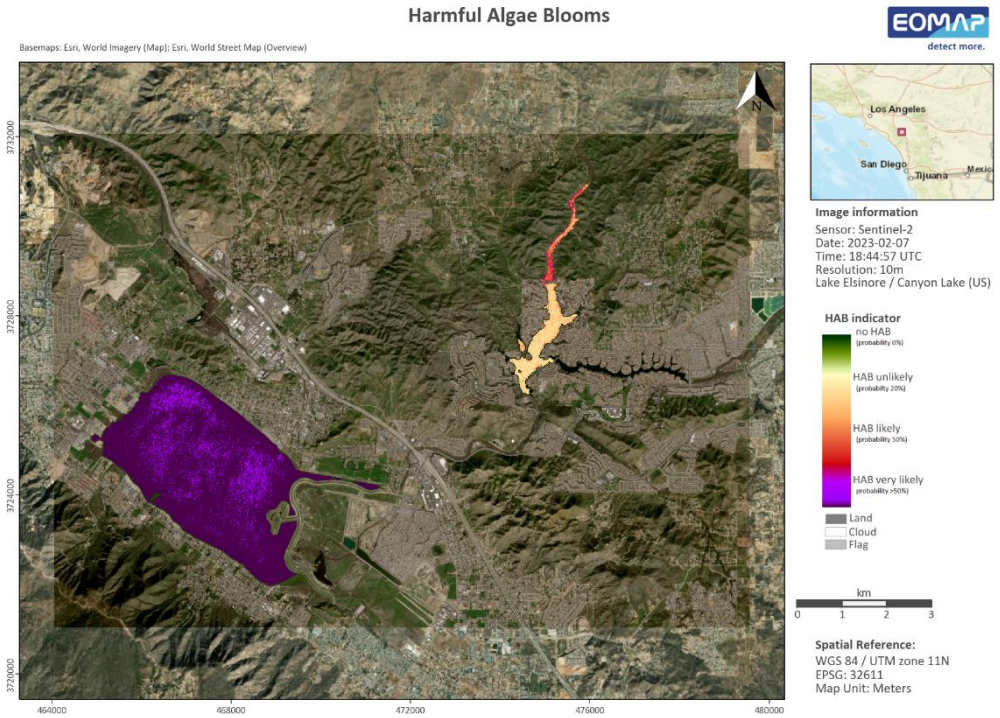

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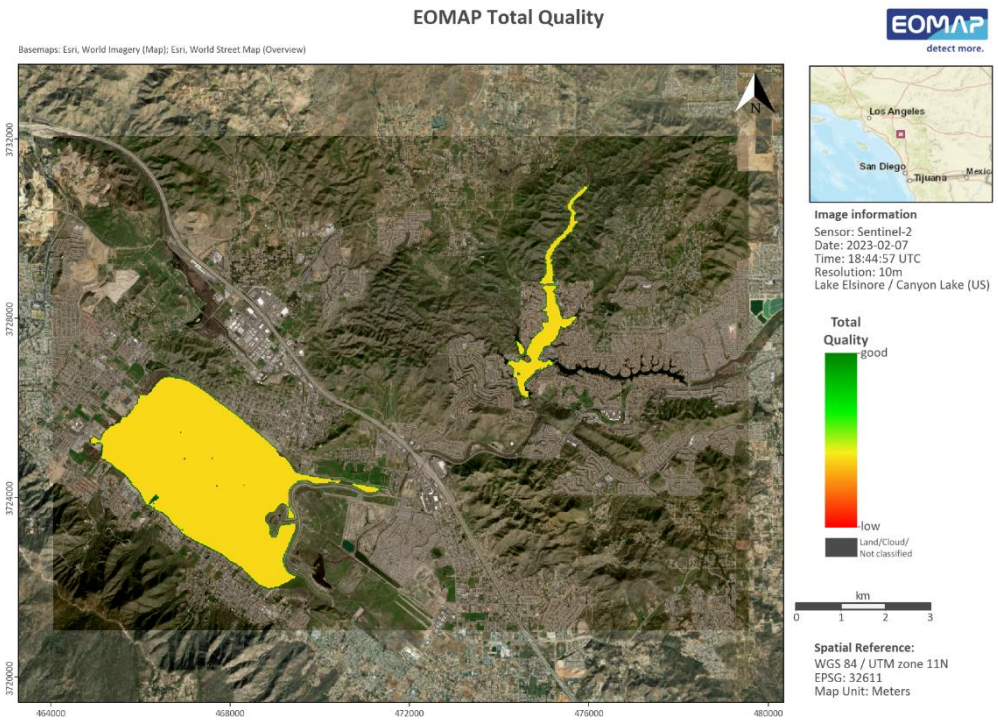
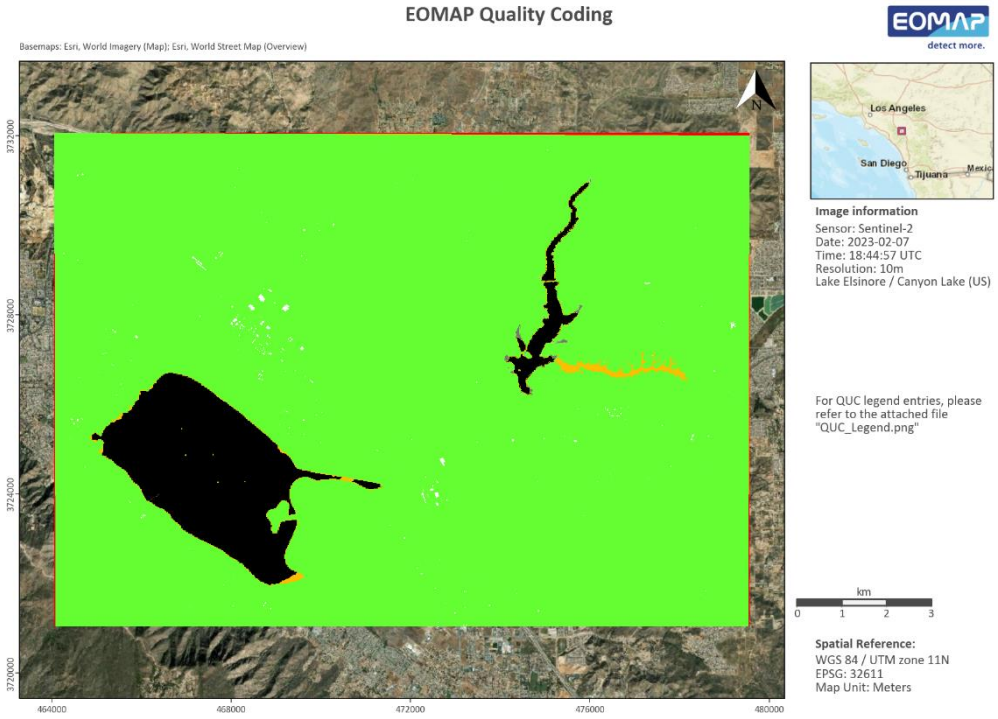


Figure 5: QUT product from 2023-02-07



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1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle

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GV	GV range	Flag status	Flag description	Color code	Color
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30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
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50	50 - 59	Warning	Cloud Shadow	177 160 199	
60	60 - 69	Warning	Shallow water risk	146 205 220	
70	70 - 79	Warning	Mixed pixel risk	250 191 143	
80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
110	110 - 119	Critical	sunglint risk	73 69 41	
120	120 - 129	Critical	large solar zenith angle	22 54 92	
130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
150	150 - 159	Critical	Cloud Shadow	96 73 122	
160	160 - 169	Critical	Shallow water risk	49 134 155	
170	170 - 179	Critical	Mixed pixel risk	226 107 10	
180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
220	220	No value	Transition Zone	102 255 51	
221	221	Unreliable	Shallow water automatically	146 205 220	
222	222	Unreliable	Shallow water manually	60 159 186	
223	223	Unreliable	Floating material	32 95 107	
230	230	No water	Land	102 255 51	
232	232	Unreliable	Invalid pixel manually	255 192 0	
240	240	No water	Cloud	255 255 255	
242	242	Unreliable	Cloud Shadow manually	96 73 122	
244	244	Unreliable	Hill shadow	73 57 93	
250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product.
As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.
Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.

5. Data Format

The water quality data is delivered as 32bit real value GeoTIFF as well as 8bit scaled and colored GeoTIFF for easier visualization. The colours currently used are a suggestion/standard, but can be changed according to client specific request. In addition, 2.5

6. Data Sources

EOMAP uses the following data hubs to access and download satellite raw data from different sensors:

- Landsat-8 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Landsat-9 Amazon Web Services, https://landsat-pds.s3.amazonaws.com
- Sentinel-2: ESA Sentinel HUB https://scihub.copernicus.eu/dhus/#/home

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Delivery report

Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2023-07-11
Version: 24.2

Clients: Wood Plc.
Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,
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CONTENT

1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	**Point of Contact**
John D. Rudolph	Hendrik Bernert
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Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2023-07-11
Version	24.2

1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2023-04-08 18:45:01 UTC

1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	☐
Aerosol Optical Thickness	AOT	☐
Yellow Substances	CDM	☐
Chlorophyll-a	CHL	☒
Ratio of Absorption and Scattering	DIV	☐
Harmful Algae Bloom Indicator	HAB	☒
Diffuse Attenuation Coefficient	KDC	☐
Quality Coding	QUC	☒
Total Quality	QUT	☒
True Color/False Color Composite	RGB	☒
Remote Sensing Reflectance	RRS	☐
Secchi Disc Depth	SDD	☐
Sum of Inorganic Absorption	SIA	☐
Sum if Organic Absorption	SOA	☐
Surface Temperature	SST	☐
Turbidity	TUR	☒
Trophic State Index (Chlorophyll)	TSC	☐
Total Suspended Matter	TSM	☐
Light Penetration Depth	Z90	☐
Water Body Extent	WEX	☐

1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs24.2_20230711.pdf	PDF	Delivery Report
CHL_us-california_11smt_EOMAP_20230408_184501_SENT2_m0010.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_11smt_EOMAP_20230408_184501_SENT2_m0010 _32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_11smt_EOMAP_20230408_184501_SENT2_m0010 _32bit_wgs84.txt	ASCII	Product text file, real values
CHL_us-california_11smt_EOMAP_20230408_184501_SENT2_m0010.kmz	KMZ	GoogleEarth overlay
CHL_us-california_11smt_EOMAP_20230408_184501_SENT2_m0010.xml	XML	Metadata
CHL_us-california_11smt_EOMAP_20230408_184501_SENT2_m0010 _overview.pdf	PDF	Overview PDF, metadata and quicklook

1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

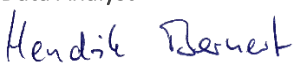
With

[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

- None

Data Analyst



Hendrik Bernert

QA/QC

Minha Sultan

2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

a. water, land, cloud identification
b. estimation and correction of atmosphere and aerosol impacts[1] [2]
c. correction altitude level impacts[3]
d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)[4]
e. correction[5] or flagging[6] of sunglitter impact
f. retrieval of in-water absorption and scattering as physical measures[7]
g. accounting for varying spectral slopes of specific inherent optical properties[8]
h. provision of uncertainty measures and flagging procedures
i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

[1] Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

[2] Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

[3] Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

[4] Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, http://dx.doi.org/10.1016/j.rse.2014.07.025

[5] Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

[6] EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf

[7] Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

[8] Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings “Water Quality in Europe: Challenges and Best Practice” UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4

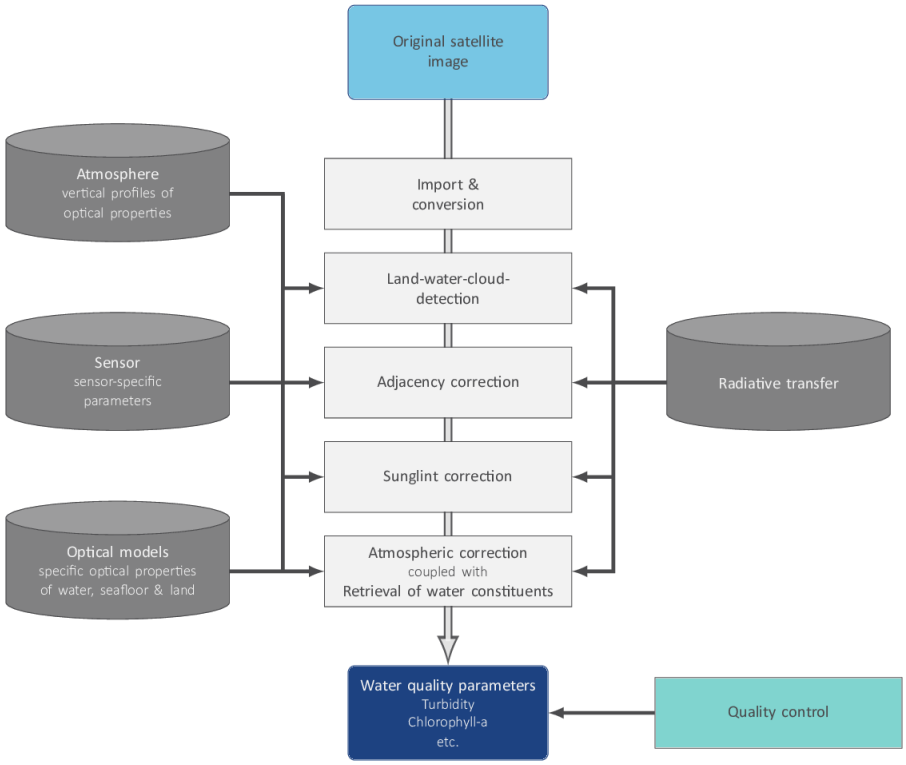


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.

3. Products

3.1. Turbidity (TUR)

Turbidity (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2023-04-08 is shown in Figure 2.

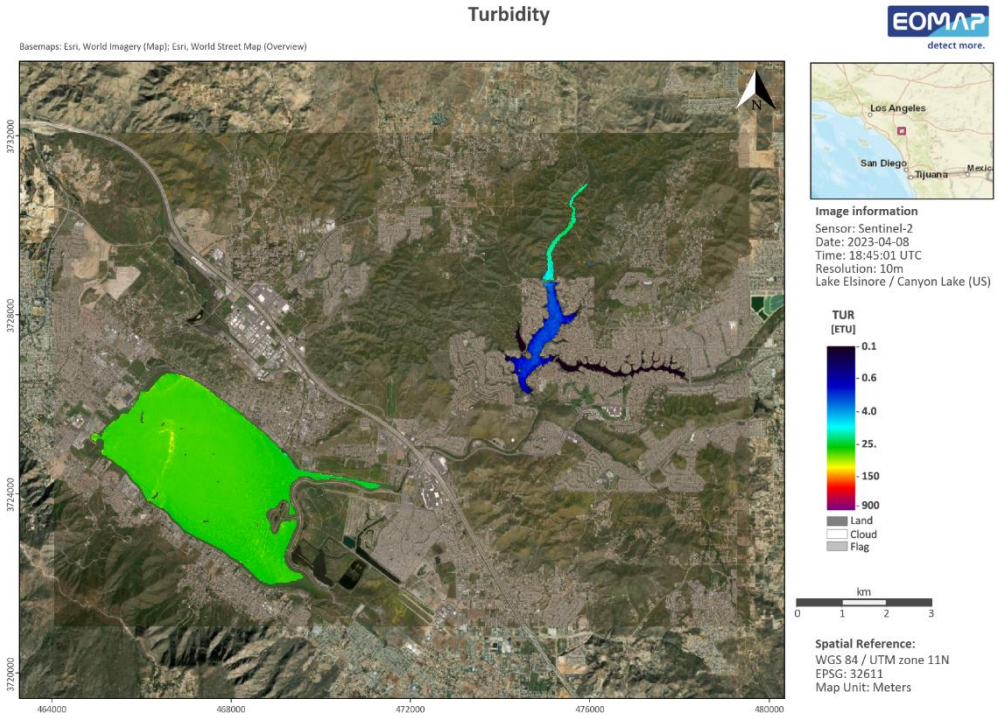


Figure 2: Turbidity product from 2023-04-08

3.2. Chlorophyll-a (CHL)

Chlorophyll-a (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [µg/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1 µg/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995[9]). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015[10]), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2023-04-08 is shown in Figure 3.

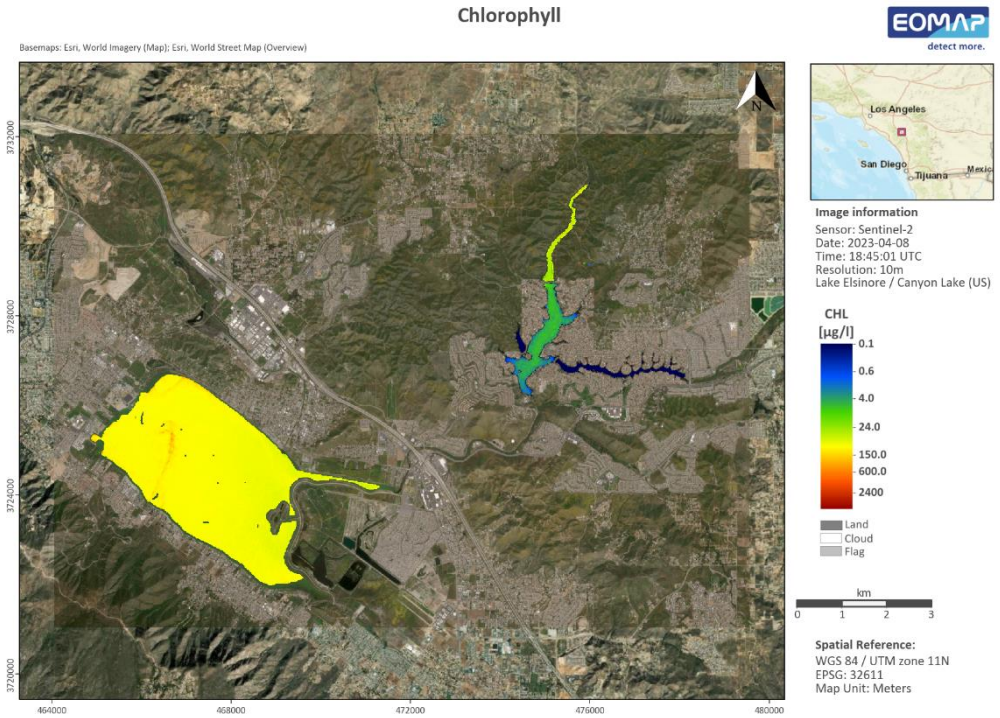


Figure 3: Chlorophyll-a product from 2023-04-08

[9] Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

[10] Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p

3.3. Harmful Algae Bloom Indicator (HAB)

The **Harmful Algae Bloom Indicator** (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption in the retrieval process. The modelled phytoplankton absorption therefore lacks the absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance ($R_{modelled}$) and satellite derived reflectance ($R_{satellite}$) occurs. The algorithm then compares the slope of $R_{modelled}$ and $R_{satellite}$ between the green and red band ($\delta R = R_{green} - R_{red}$) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2023-04-08 is shown in Figure 4.

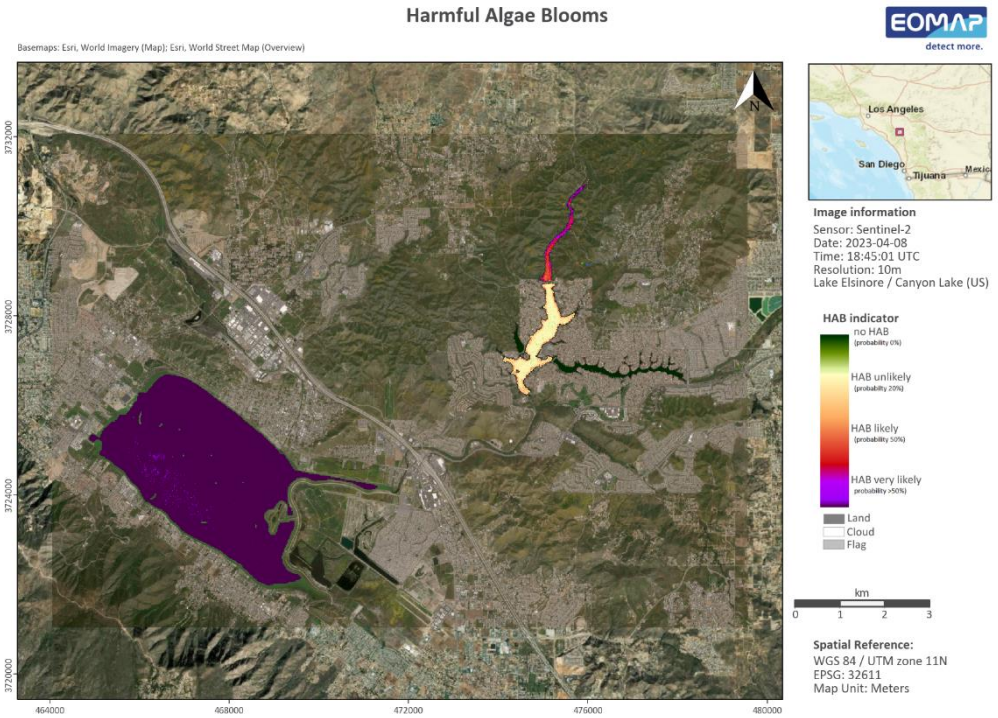


Figure 4: Harmful Algae Bloom Indicator product from 2023-04-08

3.4. True color composite (RGB)

RGB composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.

4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT - Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels - excluding land, cloud or flagged pixels - are represented in QUT indicator (Figure 5).
- QUC – EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.

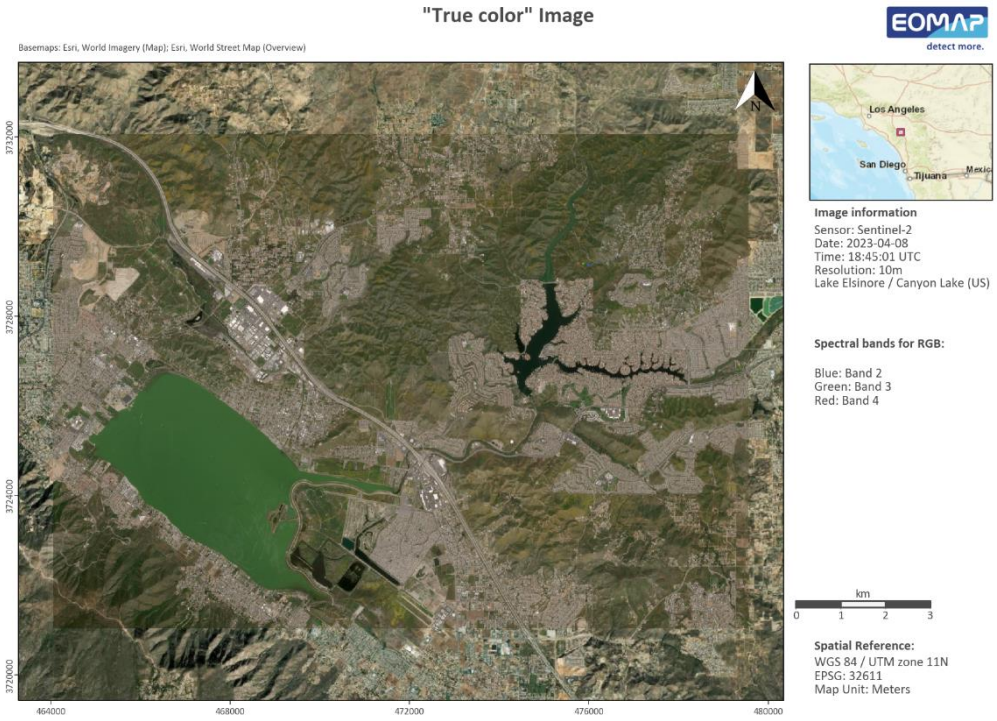


Figure 5: QUT product from 2023-04-08

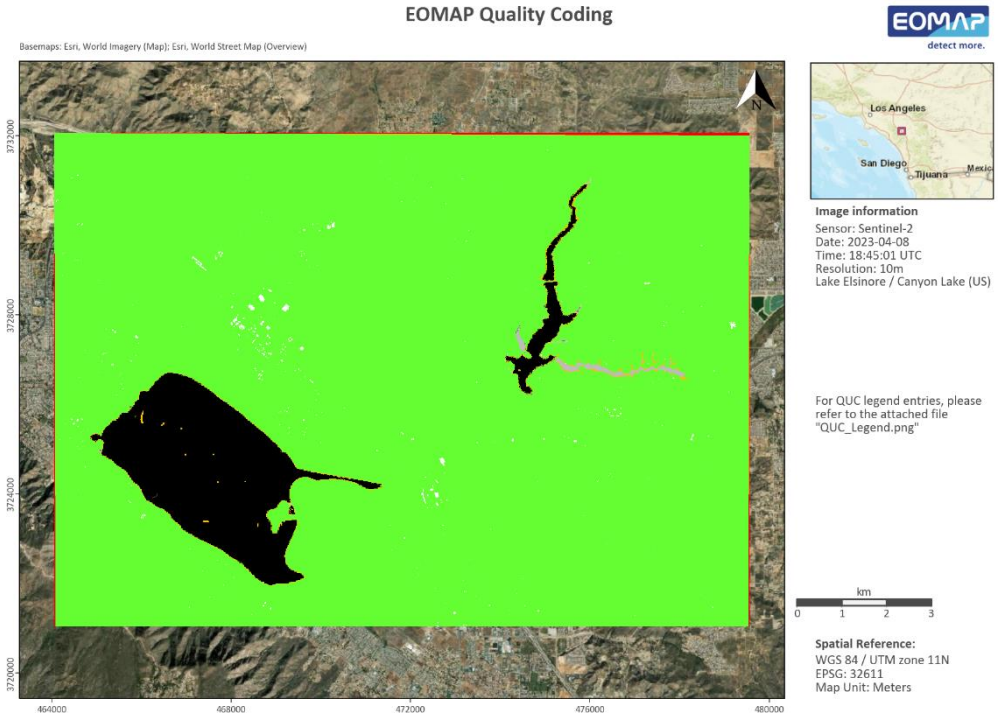


Figure 6: QUC product from 2023-04-08

The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional version allow combination of the two most relevant flags:

First number = most relevant flag

1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle

Examples: 25 Warning flag for large zenit solar angle and Whitecaps

114 Critical flag for sunglint, plus warning for aerosol above limits

GV	GV range	Flag status	Flag description	Color code	Color
0	0	Water	No risk identified	0 0 0	
10	10 - 19	Warning	sunglint risk	148 138 84	
20	20 - 29	Warning	large solar zenith angle	83 141 213	
30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
50	50 - 59	Warning	Cloud Shadow	177 160 199	
60	60 - 69	Warning	Shallow water risk	146 205 220	
70	70 - 79	Warning	Mixed pixel risk	250 191 143	
80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
110	110 - 119	Critical	sunglint risk	73 69 41	
120	120 - 129	Critical	large solar zenith angle	22 54 92	
130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
150	150 - 159	Critical	Cloud Shadow	96 73 122	
160	160 - 169	Critical	Shallow water risk	49 134 155	
170	170 - 179	Critical	Mixed pixel risk	226 107 10	
180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
220	220	No value	Transition Zone	102 255 51	
221	221	Unreliable	Shallow water automatically	146 205 220	
222	222	Unreliable	Shallow water manually	60 159 186	
223	223	Unreliable	Floating material	32 95 107	
230	230	No water	Land	102 255 51	
232	232	Unreliable	Invalid pixel manually	255 192 0	
240	240	No water	Cloud	255 255 255	
242	242	Unreliable	Cloud Shadow manually	96 73 122	
244	244	Unreliable	Hill shadow	73 57 93	
250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product.
As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.
Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.

5. Data Format

The water quality data are delivered as 32bit real value GeoTIFFs as well as 8bit scaled and colored GeoTIFFs for easier visualization. These colors are only a suggestion a corresponding to EOMAPs standard except for the HAB visualization, which has been changed according to a client-specific request. In addition, KMZ- as well as XYZ-files are delivered as per client request.

6. Data Sources

EOMAP uses the following the AWS data hub (https://registry.opendata.aws/index.html) to access and download satellite raw data from different sensors.

- Landsat 8/9: https://registry.opendata.aws/usgs-landsat/index.html
- Sentinel-2: https://registry.opendata.aws/sentinel-2/

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Delivery report

Water Quality Monitoring: Lake Elsinore & Canyon Lake

Date: 2023-07-11
Version: 26

Clients: Wood Plc.
Reference: 2370_Delivery_EOMAP2WoodPlc

EOMAP GmbH & Co.KG,
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CONTENT

1. Service Provision Report

Contractor Details	Service Provider Details
Wood Environment & Infrastructure Solutions, Inc.	EOMAP GmbH & Co. KG
9210 Sky Park Court, Suite 200	Schlosshof 4, 82229 Seefeld, Germany
San Diego, CA 92123, USA	
Point of Contact	**Point of Contact**
John D. Rudolph	Hendrik Bernert
john.rudolph@woodplc.com	bernert@eomap.de, +49 (0)8152 9986114

Contractor PO / Reference number	
Contractor project title	
Service Provider reference number	2370
Date of delivery	2023-07-11
Version	26

1.1. List of all delivered scenes

Sensor	Time of record
Sentinel-2	2023-06-27 18:21:55 UTC

1.2. Content

Product	Abbreviation	Yes/No
Total Absorption	ABS	☐
Aerosol Optical Thickness	AOT	☐
Yellow Substances	CDM	☐
Chlorophyll-a	CHL	☒
Ratio of Absorption and Scattering	DIV	☐
Harmful Algae Bloom Indicator	HAB	☒
Diffuse Attenuation Coefficient	KDC	☐
Quality Coding	QUC	☒
Total Quality	QUT	☒
True Color/False Color Composite	RGB	☒
Remote Sensing Reflectance	RRS	☐
Secchi Disc Depth	SDD	☐
Sum of Inorganic Absorption	SIA	☐
Sum if Organic Absorption	SOA	☐
Surface Temperature	SST	☐
Turbidity	TUR	☒
Trophic State Index (Chlorophyll)	TSC	☐
Total Suspended Matter	TSM	☐
Light Penetration Depth	Z90	☐
Water Body Extent	WEX	☐

1.3. List of delivered files (one product example)

File name	File format	Content
2370_Delivery_EOMAP2WoodPlc_Vs26_20230711.pdf	PDF	Delivery Report
CHL_us-california_040037_EOMAP_20230627_182155_LSAT9_m0030.tif	GeoTIFF	Product raster file, 8bit scaled and coloured
CHL_us-california_040037_EOMAP_20230627_182155_LSAT9_m0030_32bit.tif	GeoTIFF	Product raster file, 32bit real values
CHL_us-california_040037_EOMAP_20230627_182155_LSAT9_m0030_32bit_wgs84.txt	ASCII	Product text file, real values
CHL_us-california_040037_EOMAP_20230627_182155_LSAT9_m0030.kmz	KMZ	GoogleEarth overlay
CHL_us-california_040037_EOMAP_20230627_182155_LSAT9_m0030.xml	XML	Metadata
CHL_us-california_040037_EOMAP_20230627_182155_LSAT9_m0030_overview.pdf	PDF	Overview PDF, metadata and quicklook

1.4. File naming

[Product abbreviation]_[Country code]-[Area]_EOMAP_[Date of satellite image recording]_[Time of satellite image recording]_[sensor code]_[spatial resolution]_[optional]

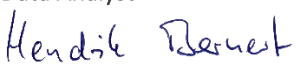
With

[Product abbreviation]	see list of product abbreviations
[Country code]	Country ID following ISO 3166 ALPHA-2 standards
[Area]	name of city/region or other relevant area characterization
[Date of satellite image rec.]	Satellite image date used for the analysis in YYMMDD (YY= Year, MM = Month, DD = Date) in UTC
[Time of satellite image rec.]	Satellite image date used for the analysis in HHMMSS (HH= Hours, MM = Minute, SS = Seconds) in UTC time
[sensor code]	Sensor in use
[spatial resolution]	Spatial resolution/grid spacing in meters
[optional]	is an optional parameter which can is used to support the intuitive use of the data, such as 'metadata' or 'XYZQ' for metadata files and ASCII XYZQ files.

1.5. Notes (e.g. technical issues, exceptional conditions, etc.)

- None

Data Analyst



Hendrik Bernert

QA/QC

Minha Sultan

2. Methodology: Modular Inversion and Processing System (MIP)

For the retrieval of satellite-derived water quality data, the physics-based Modular Inversion and Processing System (MIP), developed by EOMAP, has been applied to the satellite imagery. This sensor-independent approach includes all the relevant processing steps to guarantee a robust, standardised and operational retrieval of water quality parameters from various satellite data sources. The advantage of physics-based methods is that they do not require a priori information about the study area and can therefore be applied independently of satellite type and study area.

MIP imbeds sensor-independent algorithms and processing modules to derive consistent water quality parameters for multiple scales through a number of different satellite sensors. The algorithms take all relevant environmental impacts into account and do so for each individual measurement and pixel according to the current state-of-the-art, including:

a. water, land, cloud identification
b. estimation and correction of atmosphere and aerosol impacts[1] [2]
c. correction altitude level impacts[3]
d. correction of adjacency impact (light scattering into the water signal from adjacent land surfaces)[4]
e. correction[5] or flagging[6] of sunglitter impact
f. retrieval of in-water absorption and scattering as physical measures[7]
g. accounting for varying spectral slopes of specific inherent optical properties[8]
h. provision of uncertainty measures and flagging procedures
i. accounting for the full bidirectional effects in the atmosphere, at the water-atmosphere boundary layers and in-water, using a fully coupled radiative transfer model
j. application of procedures to minimize errors, resulting from the coupled interaction of light between atmosphere, water surface and in-water on the signal, through coupled inversion procedures

The different workflow steps from satellite raw imagery import to value-added water quality retrieval are displayed in Figure 1.

[1] Heege, T., Kiselev, V., Wettle, M., Hung N.N. (2014): Operational multi-sensor monitoring of turbidity for the entire Mekong Delta . Int. J. Remote Sensing, Special Issues Remote Sensing of the Mekong, Vol. 35 (8), pp. 2910-2926

[2] Richter, R., Heege, T., Kiselev, V., Schläpfer, D. (2014): Correction of ozone influence on TOA radiance. Int. J. of Remote Sensing. Vol. 35(23), pp. 8044-8056, doi: 10.1080/01431161.2014.978041

[3] Heege, T., Fischer, J. (2004): Mapping of water constituents in Lake Constance using multispectral airborne scanner data and a physically based processing scheme. Can. J. Remote Sensing, Vol. 30, No. 1, pp. 77-86

[4] Kiselev, V., Bulgarelli, B. and Heege, T., (2015). Sensor independent adjacency correction algorithm for coastal and inland water systems. Remote Sensing of Environment, 157: 85-95. , ISSN 0034-4257, http://dx.doi.org/10.1016/j.rse.2014.07.025

[5] Heege, T. & Fischer, J. (2000): Sun glitter correction in remote sensing imaging spectrometry. SPIE Ocean Optics XV Conference, Monaco, Oct. 16-20.

[6] EU FP7-Projekt GLASS: WP4 Validation report (29.2.2016): www.glass-project.eu/assets/Deliverables/GLaSS-D4.2.pdf

[7] Bumberger J., Heege T., Klinger P., et al. (2017): Towards a Harmonized Validation Procedure for Inland Water Optical Remote Sensing Data using Inherent Optical Properties, Rem. Sens. 2017(9), 21p, submitted 28 Feb. 2017

[8] Heege T., Schenk K., Klinger P., Broszeit A., Wenzel J., Kiselev V. (2015): Monitoring status and trends of water quality in inland waters using earth observation technologies. Proceedings "Water Quality in Europe: Challenges and Best Practice" UNESCO-IHP European Regional Consultation Workshop, Koblenz, Germany, Dec 2015, p. 1-4

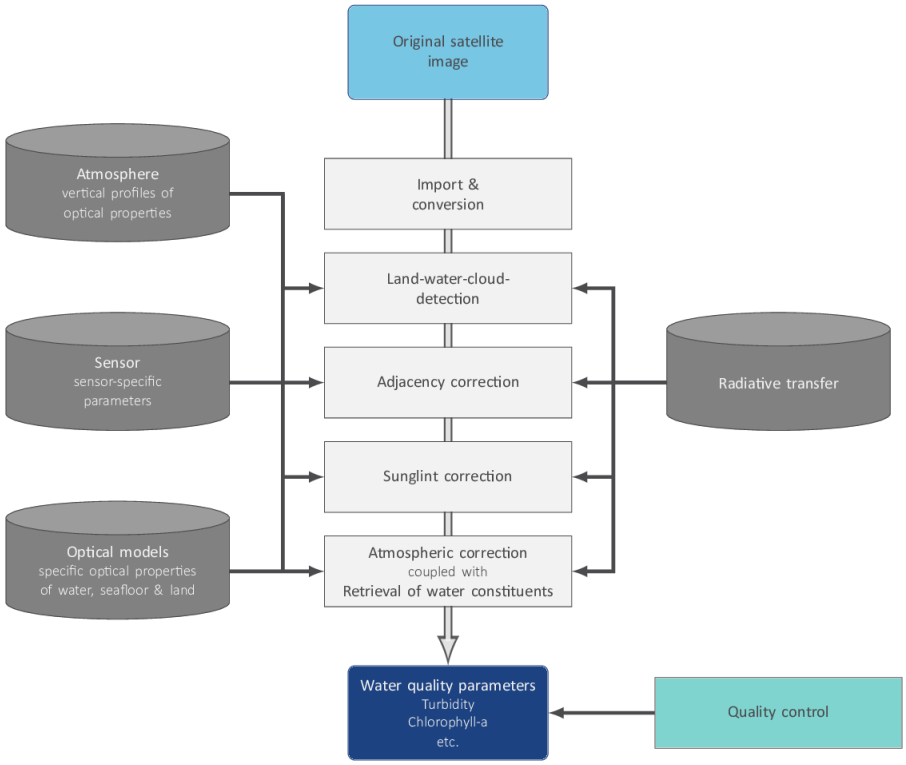


Figure 1: EOMAP's physics-based workflow to derive satellite-based water quality

MIP is the most established, sensor-independent and operational aquatic remote sensing processing system for the full range of high, medium and low-resolution satellite sensors. Fully-automated water monitoring processors are installed in satellite ground segments worldwide (Europe, Australia, Asia and America), to ensure fast and efficient access to a wide range of satellite data. The data processing and orchestration software, the EOMAP Workflow System (EWS) allows for continuous, daily production.

3. Products

3.1. Turbidity (TUR)

Turbidity (TUR) is a key parameter of water quality and is linearly related to the backward scattering of light of organic and inorganic particles in water. Turbidity is also linearly related to Total Suspended Matter (TSM) at low to moderate turbidity values. The measurement unit is Nephelometric Turbidity Unit (NTU). Satellite-derived turbidity is determined by the backward scattering of light between 450 to 800nm, which is physically retrieved using satellite data. The standard relation of EOMAP concentrations to inherent optical properties is defined as 1 NTU = 0.0118 1/m backward scattering at 550nm, or 1 NTU = 0.619 1/m total scattering at 550nm for an assumed ratio bb/b = 0.019. The linear relation between turbidity and suspended matter/solids in low to moderate concentrations is in most cases a regional constant, but can vary with particle size distribution. Note that the geometrical properties of an in-situ measurement device, and the wavelength in use, may differ in comparison to the satellite product. For example, the standard FTU determination, a measure of turbidity similar to NTU, is based on the measurement of light scattered within a 90° angle from a beam directed at the water sample. Alongside temporal differences in satellite and in situ measurements, different sampling depths and the measurement location, this needs to be considered when comparing and interpreting satellite derived vs. in situ measured turbidity values. The Turbidity product from 2023-06-27 is shown in Figure 2.

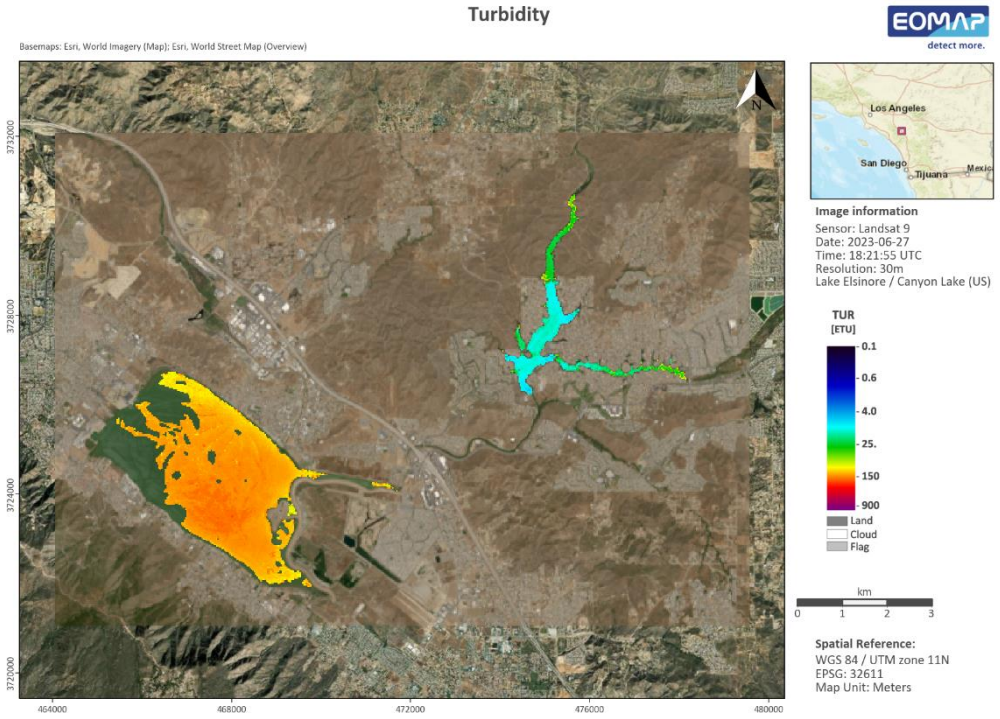


Figure 2: Turbidity product from 2023-06-27

3.2. Chlorophyll-a (CHL)

Chlorophyll-a (CHL) retrieval is based on the derived information of in-water organic absorption, in-water turbidity and spectral characteristics of each water body. Chlorophyll-a in [µg/l], is provided as a measure linearly related to the pigment-specific absorption at 440nm, with 1 µg/l Chl equal to 0.035 1/m pigment absorption. Phaeophytin and further pigments cannot be discriminated methodologically with the spectral resolution provided by Landsat 8/Sentinel-2 and similar sensors and is therefore included in this product. The pigment-related absorption is always smaller than the absorption of organic components (SOA). For clear water conditions (low chlorophyll/total suspended solids), the specific absorption chlorophyll increases significantly (Bricaud et al. 1995[9]). Chlorophyll values can vary over 4 magnitudes, for marine waters or clear lakes typical concentrations between 0.01 and 10 µg/l, while for eutrophic lakes concentrations can reach 100 µg/l and more. The chlorophyll products are typically reliable within a range of 10 – 50 % in comparison to in situ measures (Broszeit 2015[10]), which are typically based on one of three different methods, which include photometric, fluorescence and HPLC approaches and their subcategories. The Chlorophyll-a product from 2023-06-27 is shown in Figure 3.

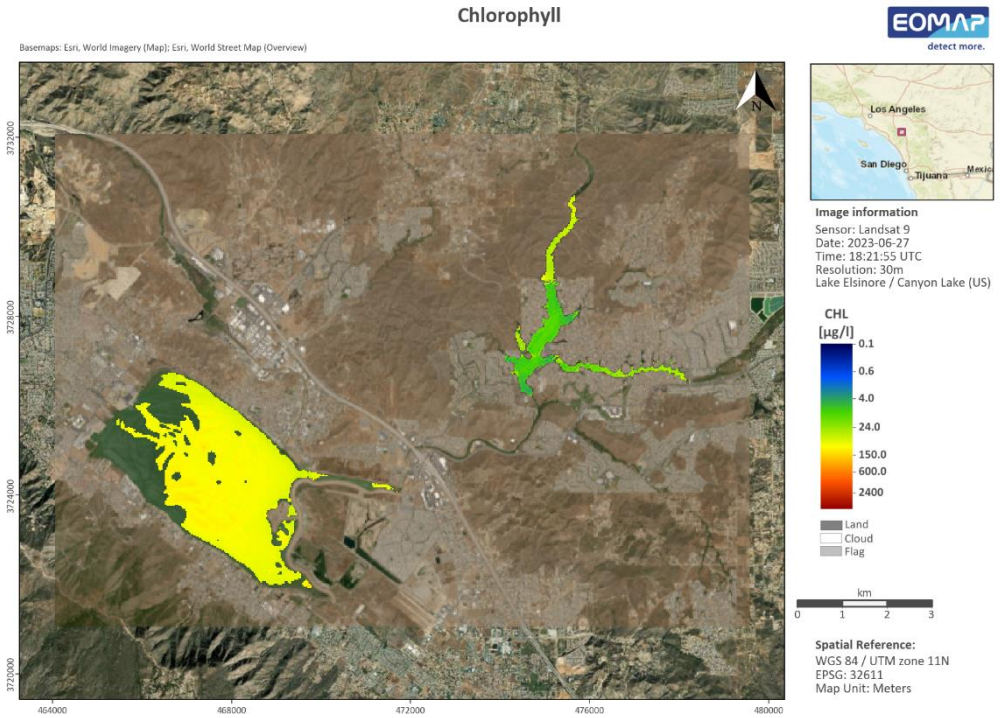


Figure 3: Chlorophyll-a product from 2023-06-27

[9] Bricaud, A., Babin, M., Morel, A., Claustre, H. (1995): Variability in the chlorophyll-specific absorption coefficients of natural phytoplankton: Analysis and parametrization. Journal of Geophysical Research Atmospheres, 100(C7):13,321-13,332

[10] Broszeit, A., 2015. Assessing long-term inland water quality using satellite imagery: A Feasibility and validation study of different lake types. MSc Thesis, Julius-Maximilian-University Würzburg, 96p

3.3. Harmful Algae Bloom Indicator (HAB)

The **Harmful Algae Bloom Indicator** (HAB) refers to the presence of cyanobacteria. It is sensitive to the appearance of cyanobacteria-related pigments, i.e. phycocyanin and phycoerythrin. Both pigments show absorption features in green wavelengths from 500 nm to approx. 640 nm; phycoerythrin shows its absorption maximum at 540-570 nm, phycocyanin at 610-620 (Colyer et al. 2005). Most satellite sensors support the identification of this feature with only two bands, i.e. one in the green wavelength region (e.g. L7 and L8 at 530 – 590 nm) and in the red wavelength region at approx. 640 – 670 nm. The used standard parameterisation of phytoplankton absorption in MIP as described above, however, does not account phycocyanin and phycoerythrin absorption in the retrieval process. The modelled phytoplankton absorption therefore lacks the absorption features of these pigments. Nonetheless, if these pigments are present in the water a slight spectral mismatch between modelled water leaving reflectance ($R_{modelled}$) and satellite derived reflectance ($R_{satellite}$) occurs. The algorithm then compares the slope of $R_{modelled}$ and $R_{satellite}$ between the green and red band ($\delta R = R_{green} - R_{red}$) in order to classify pixels with regard to phycocyanin and phycoerythrin occurrence, i.e. harmful algae bloom probability. The HAB indicator from 2023-06-27 is shown in Figure 4.

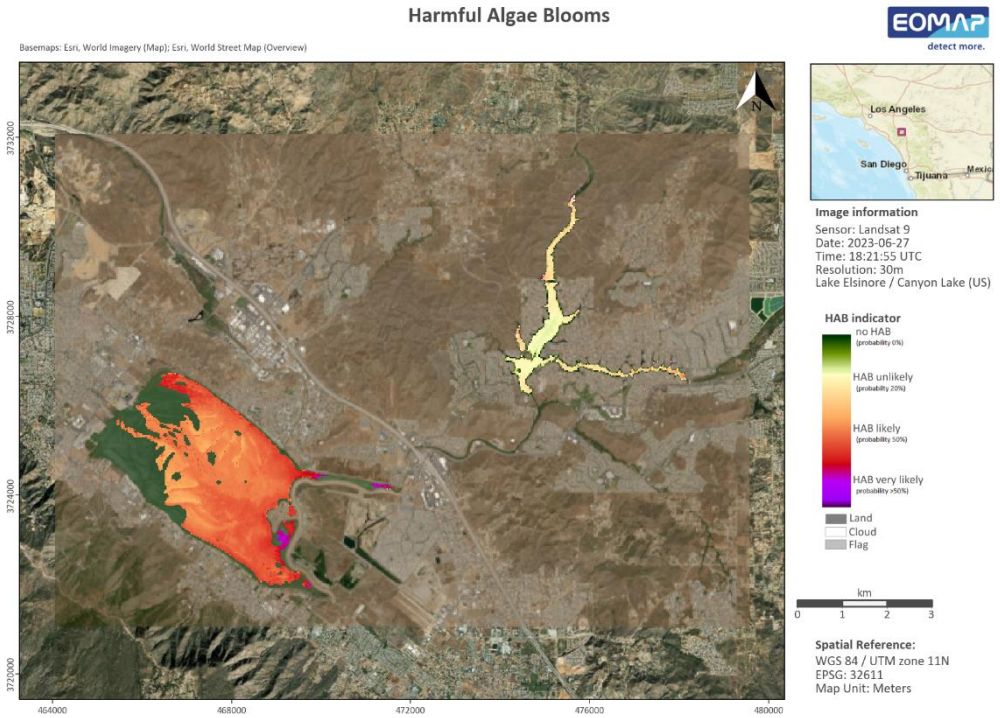


Figure 4: Harmful Algae Bloom Indicator product from 2023-06-27

3.4. True color composite (RGB)

RGB composite images represent the area of interest in true colour or false colour modes by combining predefined bands, depending on the sensor in use.

4. Quality Control and Flagging

As a standard output of the processing, an accuracy or quality indicator is calculated for each retrieved parameter and for each detected water pixel. This measure comprises a comprehensive range of factors that can impact the derived product quality, including:

- the geometry between sun, target, and sensor,
- the estimated sun glint probability,
- the retrieved aerosol optical depth,
- residuals of the measured and modelled sensor radiance and subsurface reflectance,
- the comparison of retrieved water species concentrations to extreme values as defined in the configuration files,
- pixels affected by cloud shadow and
- shallow water areas.

Threshold values define distinct values when a parameter is assumed to influence the quality. All parameters are integrated into one remaining quality parameter, allowing both an improved flagging and a quality weighting of pixels, that can later be merged into integrated 3rd level products.

The quality information is part of each standard geodata delivery and is visualized by two different 8bit GeoTIFFs:

- QUT - Total Quality, quantifying the overall quality of each pixel from low to high. Only valid water pixels - excluding land, cloud or flagged pixels - are represented in QUT indicator (Figure 5).
- QUC – EOMAP Quality coding (Figure 6), revealing the processor's internal quality check, split into the defined indicators (e.g. sunglint, shallow water risk, etc.). These are classified into 'no quality concerns', 'quality risk and 'bad quality' (flag). Note that 'quality risk' pixels are marked as such but not flagged.

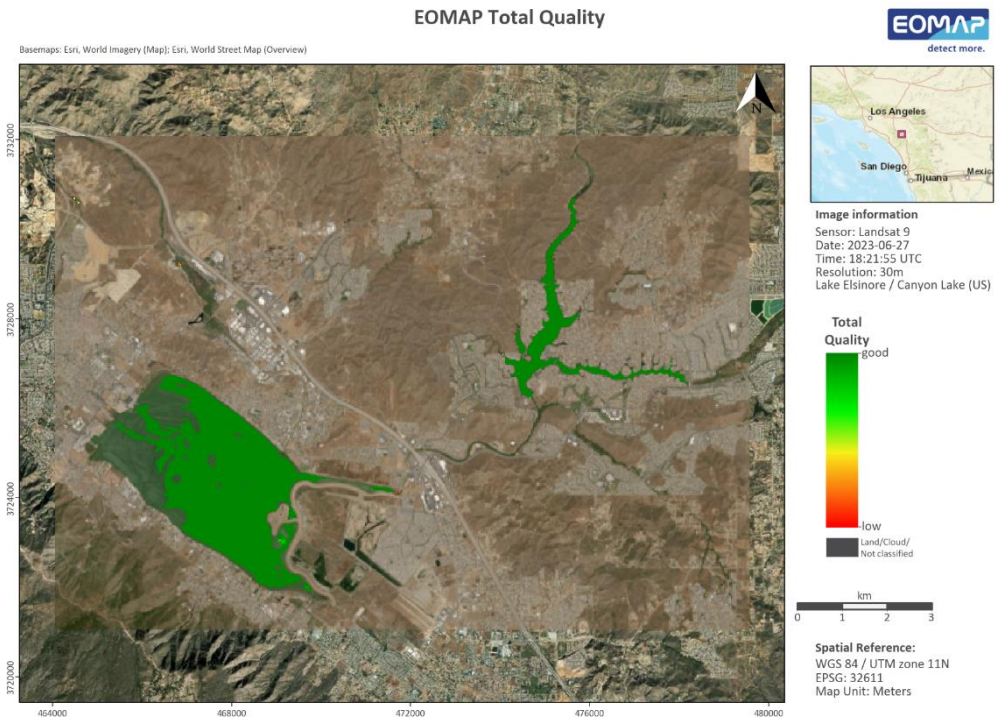


Figure 5: QUT product from 2023-06-27

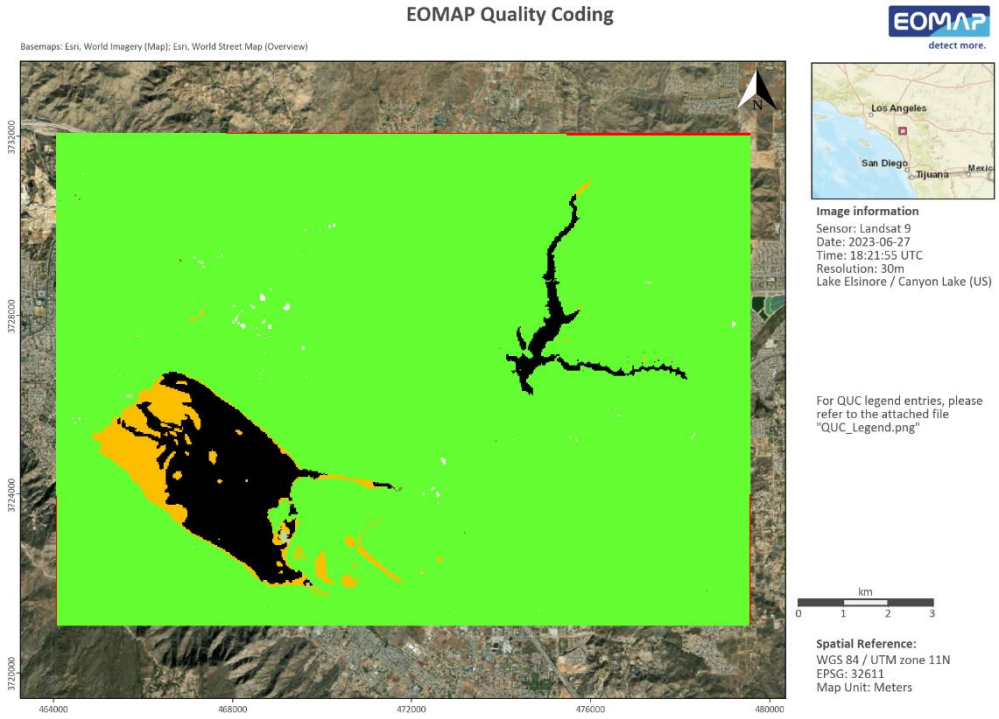


Figure 6: QUC product from 2023-06-27

The QUC file indicates the main quality influencing parameter using a specific EOMAP quality coding classification scheme with corresponding grey values (GV), shown in Figure 7.

Professional version allow combination of the two most relevant flags:

First number = most relevant flag
1-digit-number refer to second relevant flag, e.g. 1 for sunglint risk, 2 for large solar zenith angle

Examples: 25 Warning flag for large zenit solar angle and Whitecaps
114 Critical flag for sunglint, plus warning for aerosol above limits

GV	GV range	Flag status	Flag description	Color code	Color
0	0	Water	No risk identified	0 0 0	
10	10 - 19	Warning	sunglint risk	148 138 84	
20	20 - 29	Warning	large solar zenith angle	83 141 213	
30	30 - 39	Warning	large spacecraft zenith angle	218 150 148	
40	40 - 49	Warning	Aerosol above limit or Cirrus risk	196 215 155	
50	50 - 59	Warning	Cloud Shadow	177 160 199	
60	60 - 69	Warning	Shallow water risk	146 205 220	
70	70 - 79	Warning	Mixed pixel risk	250 191 143	
80	80 - 89	Warning	Retrieved concentration at configuration limit	190 190 190	
90	90 - 99	Warning	Retrieval / processor warning	210 210 210	
110	110 - 119	Critical	sunglint risk	73 69 41	
120	120 - 129	Critical	large solar zenith angle	22 54 92	
130	130 - 139	Critical	large spacecraft zenith angle	150 54 52	
140	140 - 149	Critical	Aerosol above limit or Cirrus risk	118 147 60	
150	150 - 159	Critical	Cloud Shadow	96 73 122	
160	160 - 169	Critical	Shallow water risk	49 134 155	
170	170 - 179	Critical	Mixed pixel risk	226 107 10	
180	180 - 189	Critical	Retrieved concentration at configuration limit	120 120 120	
190	190 - 199	Critical	Retrieval / processor warning	130 130 130	
220	220	No value	Transition Zone	102 255 51	
221	221	Unreliable	Shallow water automatically	146 205 220	
222	222	Unreliable	Shallow water manually	60 159 186	
223	223	Unreliable	Floating material	32 95 107	
230	230	No water	Land	102 255 51	
232	232	Unreliable	Invalid pixel manually	255 192 0	
240	240	No water	Cloud	255 255 255	
242	242	Unreliable	Cloud Shadow manually	96 73 122	
244	244	Unreliable	Hill shadow	73 57 93	
250	250	No retrieval	No retrieval / out of AOI or image extend	255 0 0	

Figure 7: EOMAP QUC quality coding

EOMAP's water quality products are accompanied by the processor's internal quality control mechanisms QUT and QUC, resulting in pixel flagging in case of unreliable values. Moreover, a manual quality check and - if required - additional masking is applied to each product.
As an example, cloud shadow effects typically occur in the vicinity of clouds, resulting in unrealistically low water parameter values. In order to detect and flag these areas, EOMAP has developed a specific algorithm based on geometric models, considering the sun angle and sensor viewing geometry, the retrieved aerosol properties, the height of the clouds, an analysis of the blue channel radiances and a statistical anomaly detection of the water species concentrations. When applying this cloud shadow detection algorithm, approx. 85% of the cloud shadows are detected and masked. Remaining cloud shadows are manually flagged and can be identified in the QUC file by GV 242.
Due to the spatial extent of single pixels (Sentinel-2: 10*10m, Landsat 8/9: 30*30m), it is likely that spectral mixing of signals from land and water can affect the pixels along the edge of the water body, leading to unreliable retrieval of water parameter values. Such pixels are labelled with the quality flag 'transition zone'. EOMAP uses a high-resolution land-water-mask database to determine the land-water-boundary, which is then filtered to create a transition zone that is automatically flagged during processing. In the 8bit water constituent products the transition zone is marked by GV 251, whereas in the QUC product it is 220.

5. Data Format

The water quality data are delivered as 32bit real value GeoTIFFs as well as 8bit scaled and colored GeoTIFFs for easier visualization. These colors are only a suggestion a corresponding to EOMAPs standard except for the HAB visualization, which has been changed according to a client-specific request. In addition, KMZ- as well as XYZ-files are delivered as per client request.

6. Data Sources

EOMAP uses the following the AWS data hub (https://registry.opendata.aws/index.html) to access and download satellite raw data from different sensors.

- Landsat 8/9: https://registry.opendata.aws/usgs-landsat/index.html
- Sentinel-2: https://registry.opendata.aws/sentinel-2/

EOMAP
Schlosshof 4
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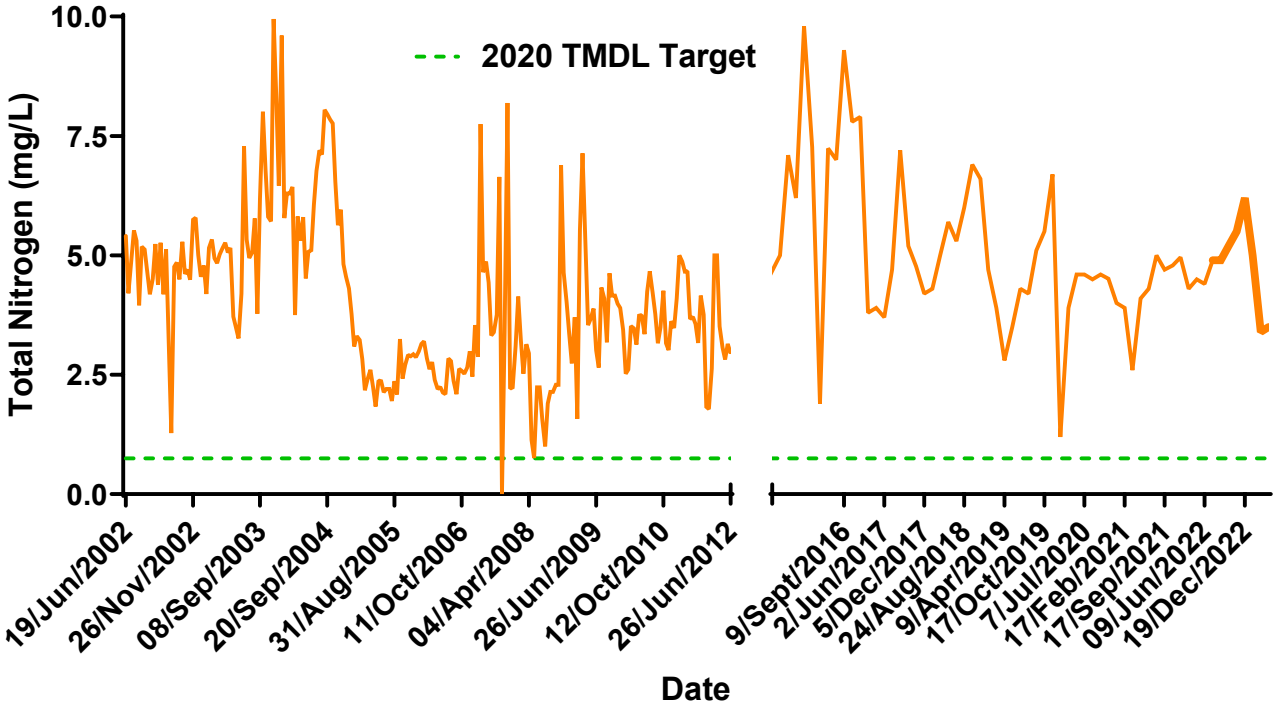
Germany
+49 (0)8152 99861 10
info@eomap.com
www.eomap.com

APPENDIX E
CURRENT DATA IN HISTORICAL CONTEXT

Lake Elsinore- Historical Monitoring Results

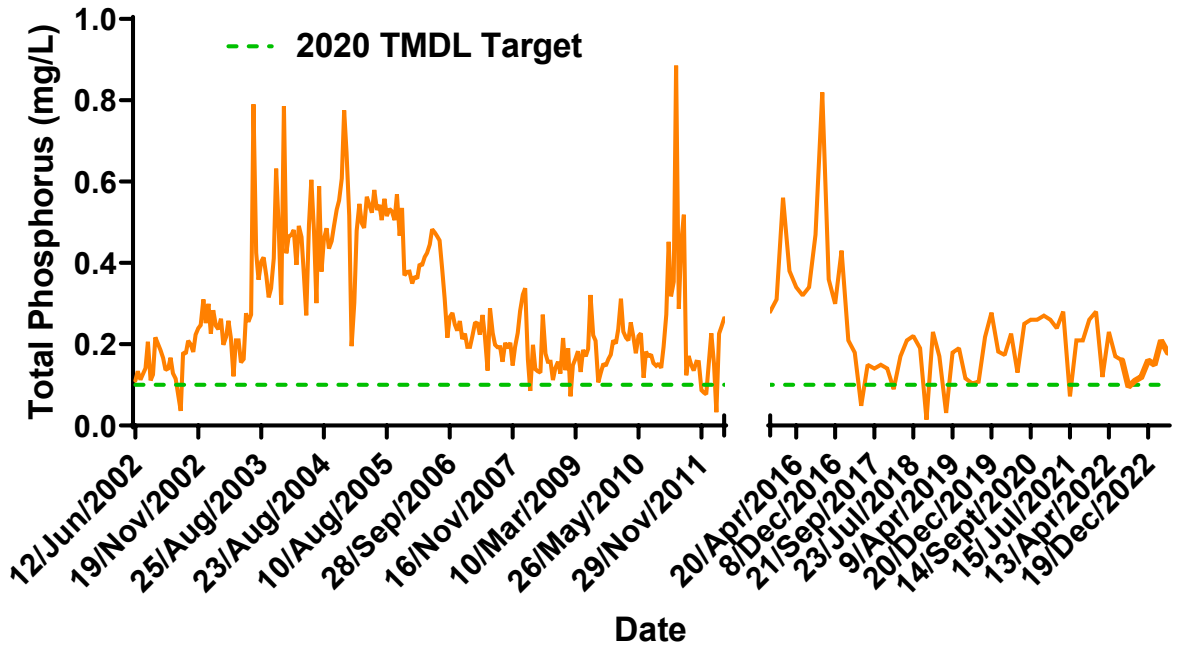


No data available from June 2012-July2015

TMDL target of 0.75 mg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2022-June 2023

Lake Elsinore- Historical Monitoring Results (continued)

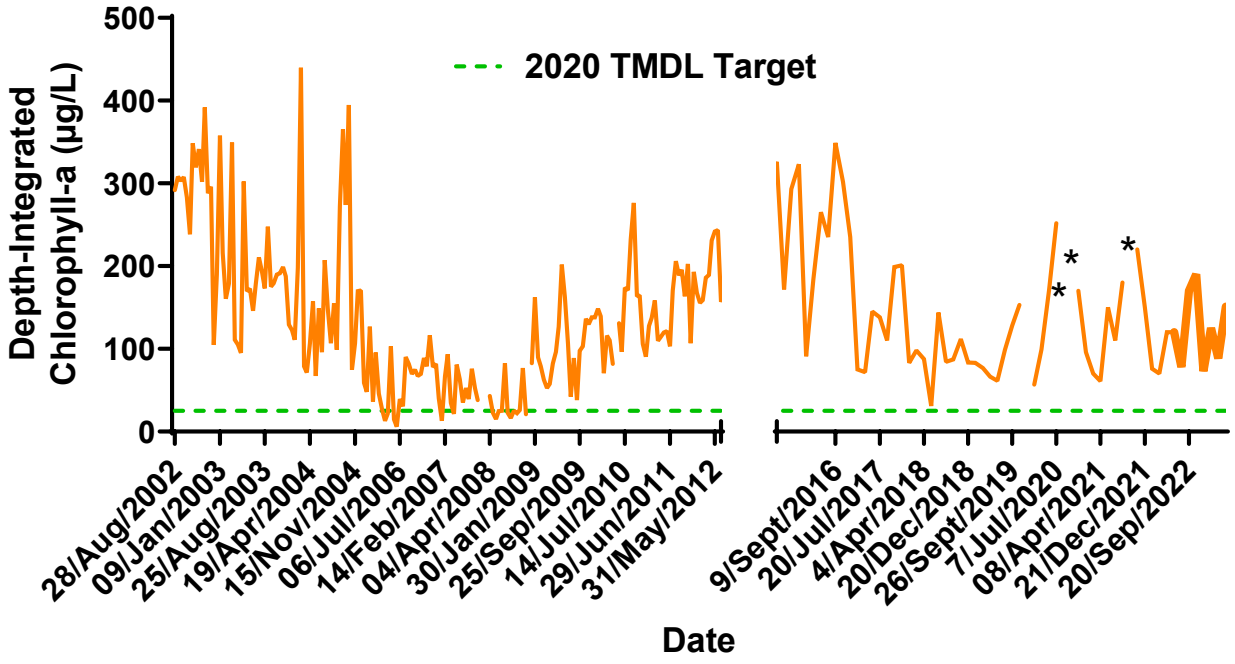


No data available from June 2012-July2015

TMDL target of 0.1 mg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2022-June 2023

Lake Elsinore- Historical Monitoring Results (continued)

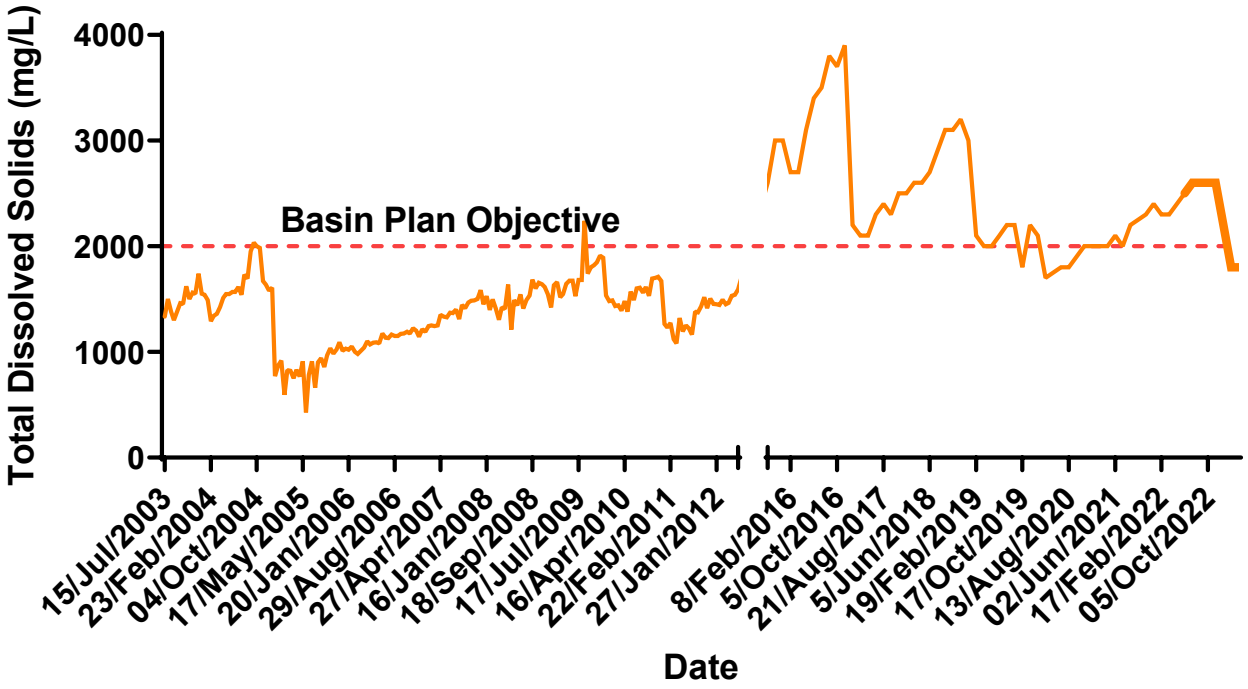


No data available from June 2012-July2015

TMDL target of 25 µg/L is summer average to be attained by 2020

Bold represents current monitoring year July 2022- June 2023
***Not measured due to laboratory error. See report for details.**

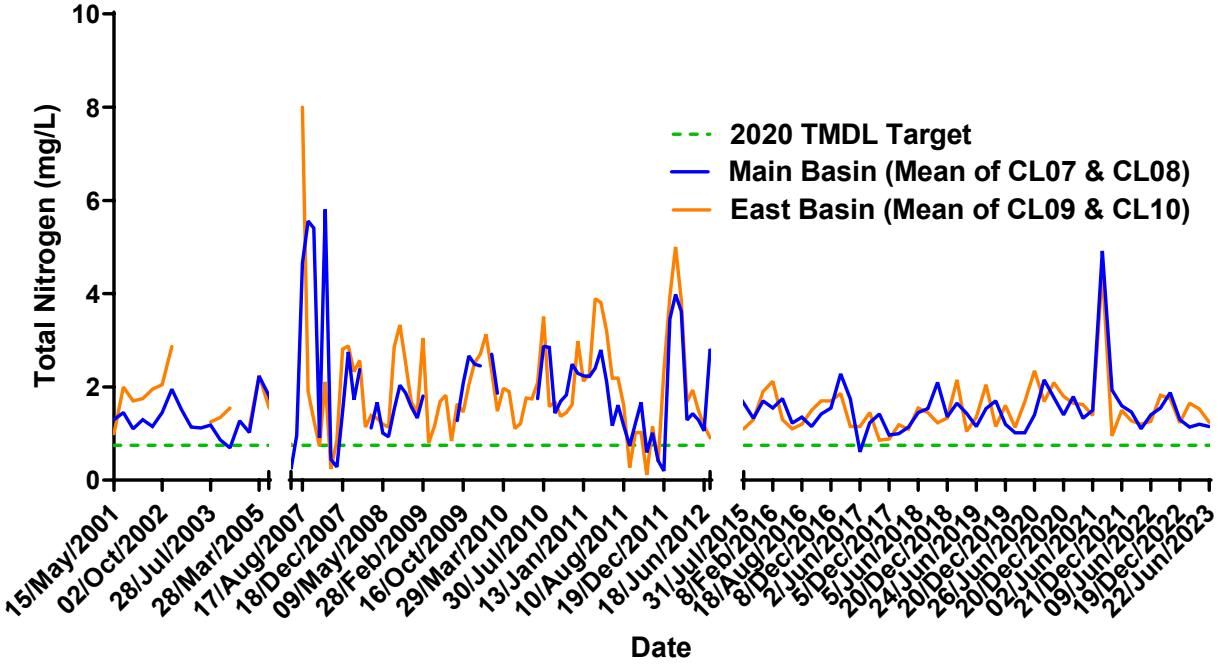
Lake Elsinore- Historical Monitoring Results (continued)



No data available from June 2012-July 2015

Bold represents current monitoring year July 2022-June 2023

Canyon Lake- Historical Monitoring Results

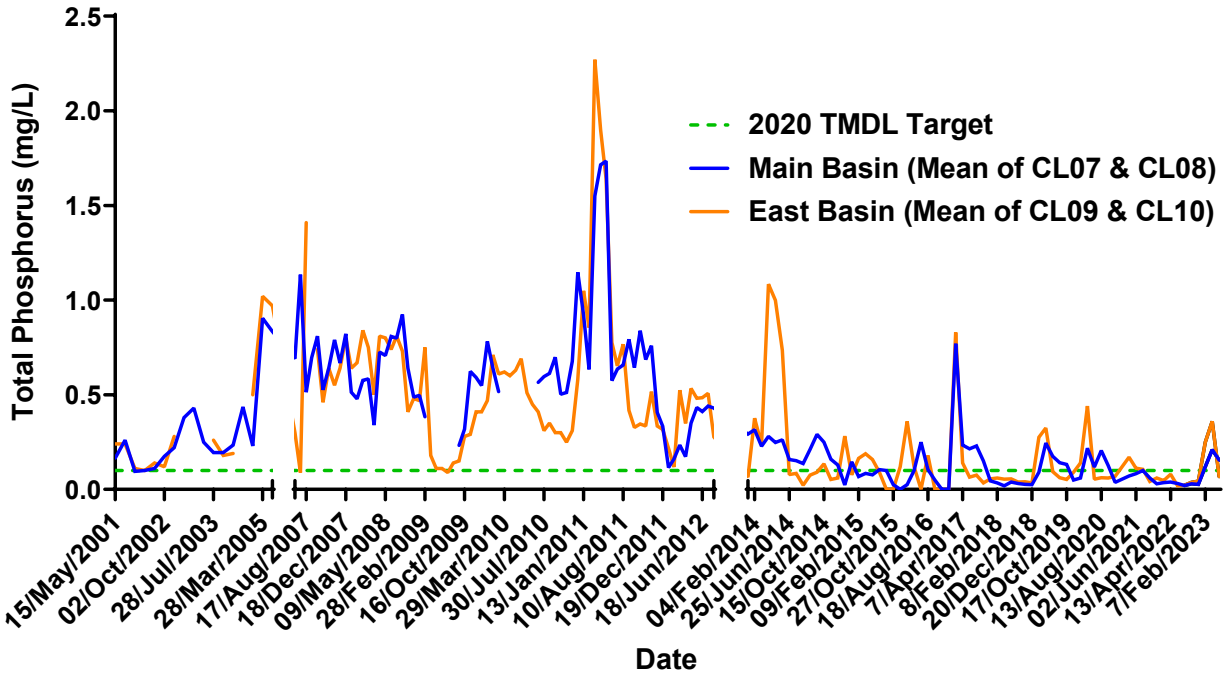


No data available from May 2005-July 2007; June 2012-July2015

TMDL target of 0.75 mg/L is annual average to be attained by 2020

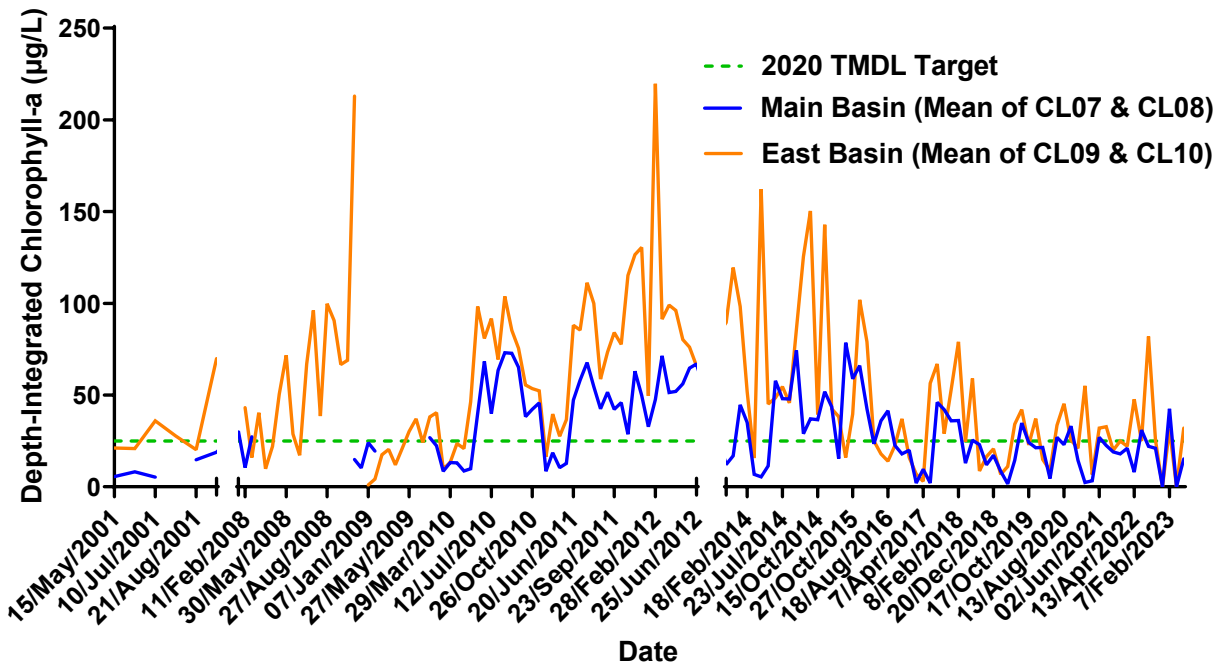
Bold represents current monitoring year July 2022-June 2023

Canyon Lake- Historical Monitoring Results (continued)



No data available from May 2005-July 2007; June 2012-Sept 2013
TMDL target of 0.1 mg/L is annual average to be attained by 2020
Bold represents current monitoring year July 2022-June 2023

Canyon Lake- Historical Monitoring Results (continued)

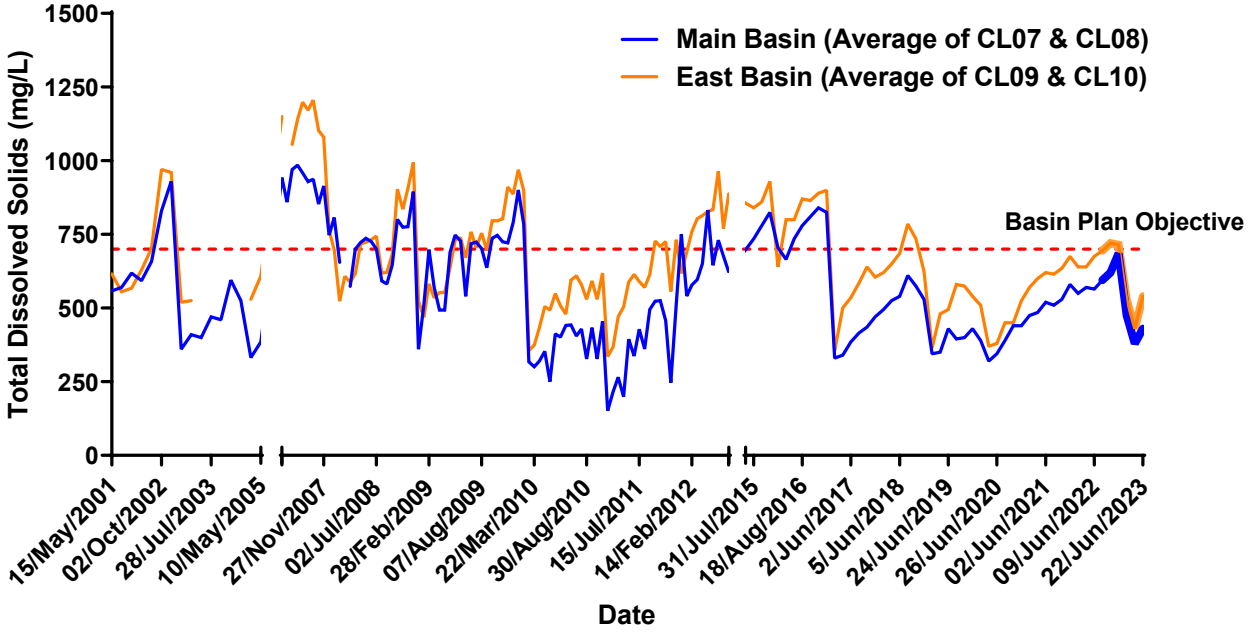


No data available from June 2012-July2015

2020 TMDL target of 25 µg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2022-June 2023

Canyon Lake- Historical Monitoring Results (continued)



No data available from May 2005-July 2007; June 2012-July 2015

Bold represents current monitoring year July 2022-June 2023