

Lake Elsinore and Canyon Lake TMDL Water Quality Monitoring 2021-2022 Summary

Lake Elsinore / Canyon Lake TMDL Task Force Meeting
September 27, 2022

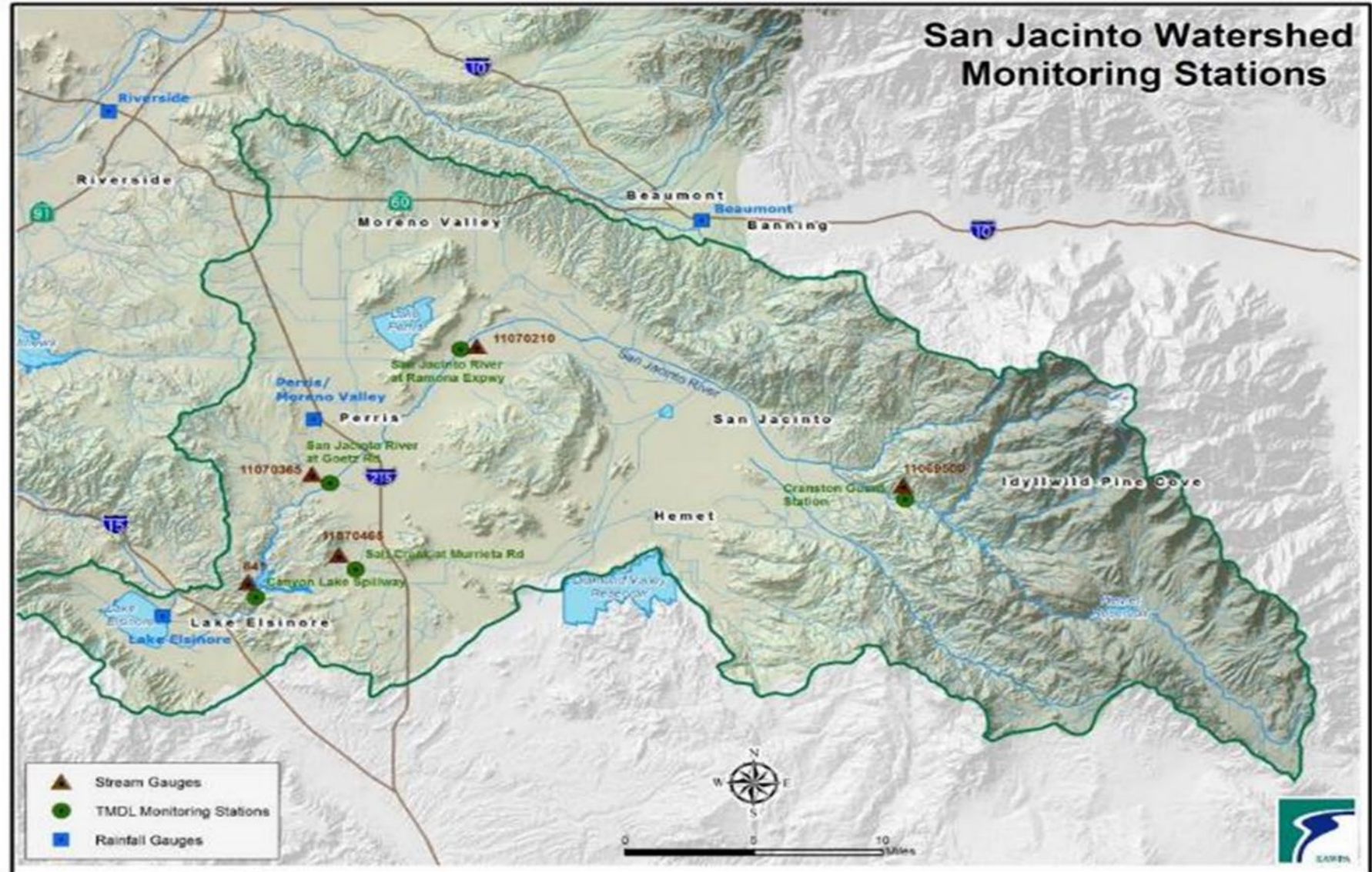
John Rudolph and Chris Stransky
WSP USA

Garth Engelhorn
NV5 Alta



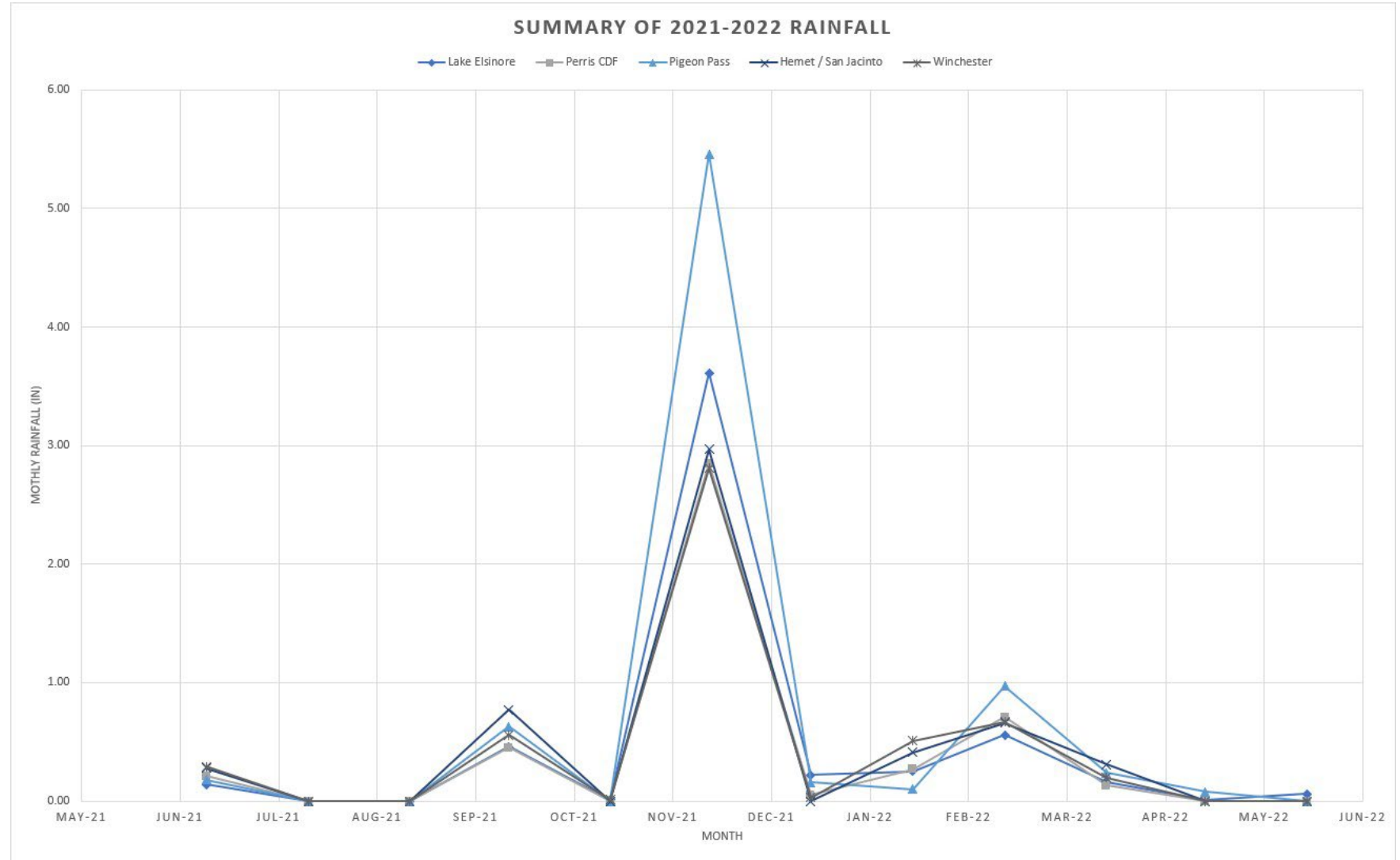


Watershed Monitoring





Watershed Monitoring



Watershed Monitoring

Summary of 2021-2022 Nutrient Loads

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)	351	2.73	0.46	3,698	625
Site 4 - San Jacinto River at Goetz Road (USGS 11070365)	537	2.40	0.60	4,976	1,282
Site 6 - San Jacinto River at Ramona Expressway ^b (USGS 11070210)	0	Not Measured ^b	Not Measured ^b	Not Measured ^b	Not Measured ^b
Site 30 - Canyon Lake Spillway ^c (USGS 11070500)	640	1.5	ND (<0.003) ^d	3,632	0

a - Flow data after 10/14/2021 are provisional and may be subject to change.

b - No flows originating from the upper watershed were observed at the TMDL monitoring location just downstream of Mystic Lake and no sampling was conducted.

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.

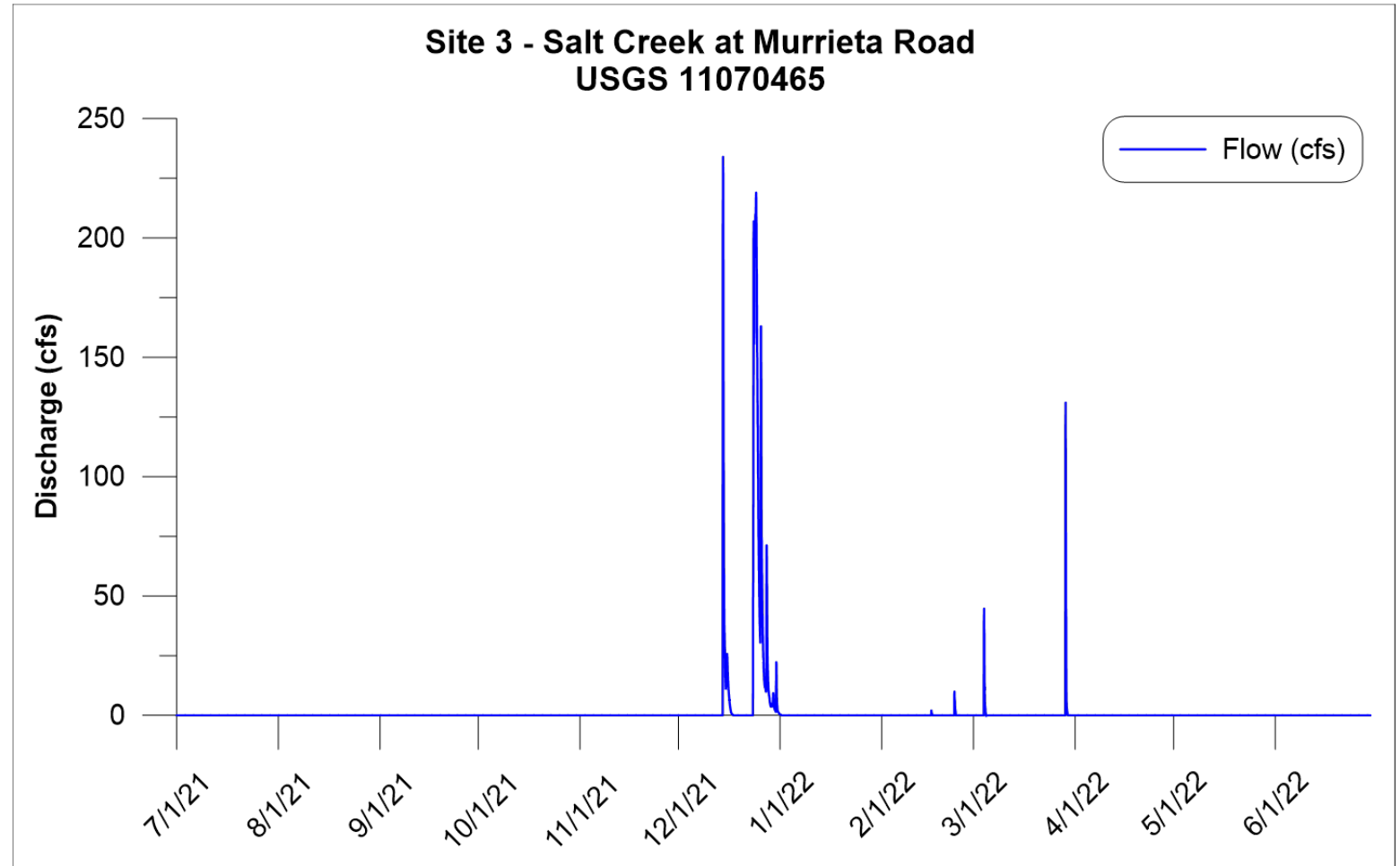
Mgal = million gallons; 1 million gallons = 133,680 cubic feet; mg/L = milligrams per liter; kg = kilograms; USGS = United States Geological Survey.

d - 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



Watershed Monitoring

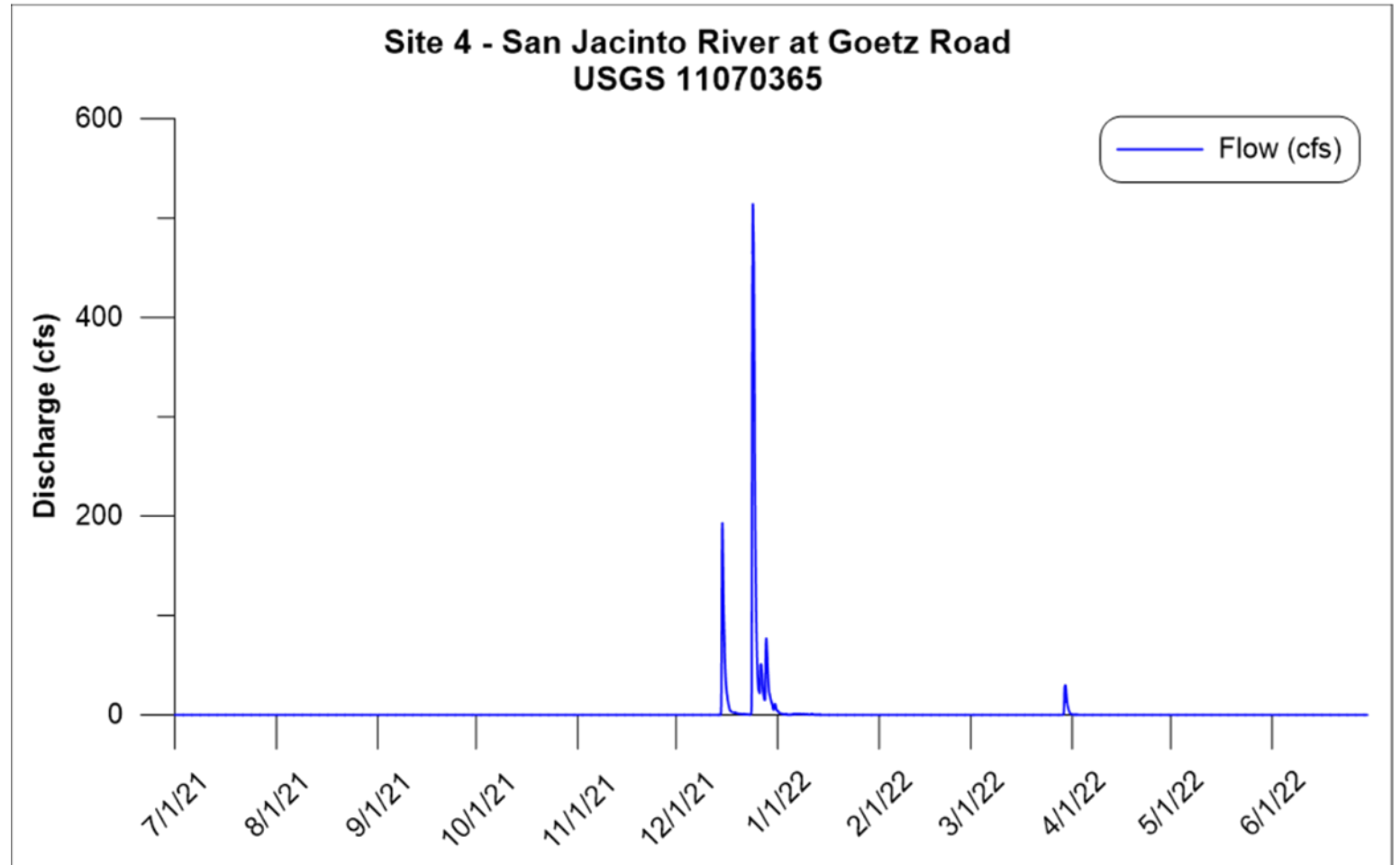
2021-2022 Annual Hydrograph





Watershed Monitoring

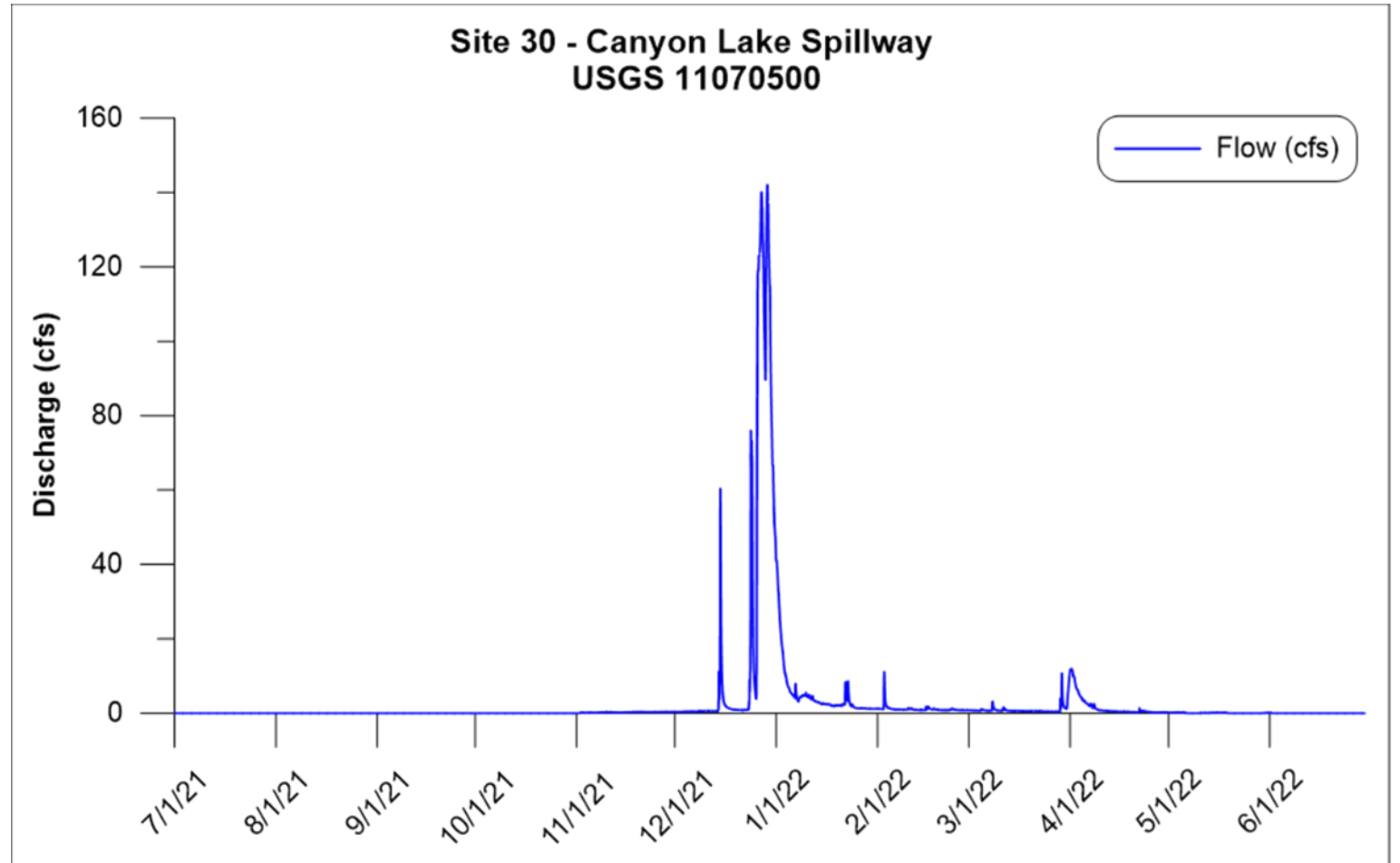
2021-2022 Annual Hydrograph





Watershed Monitoring

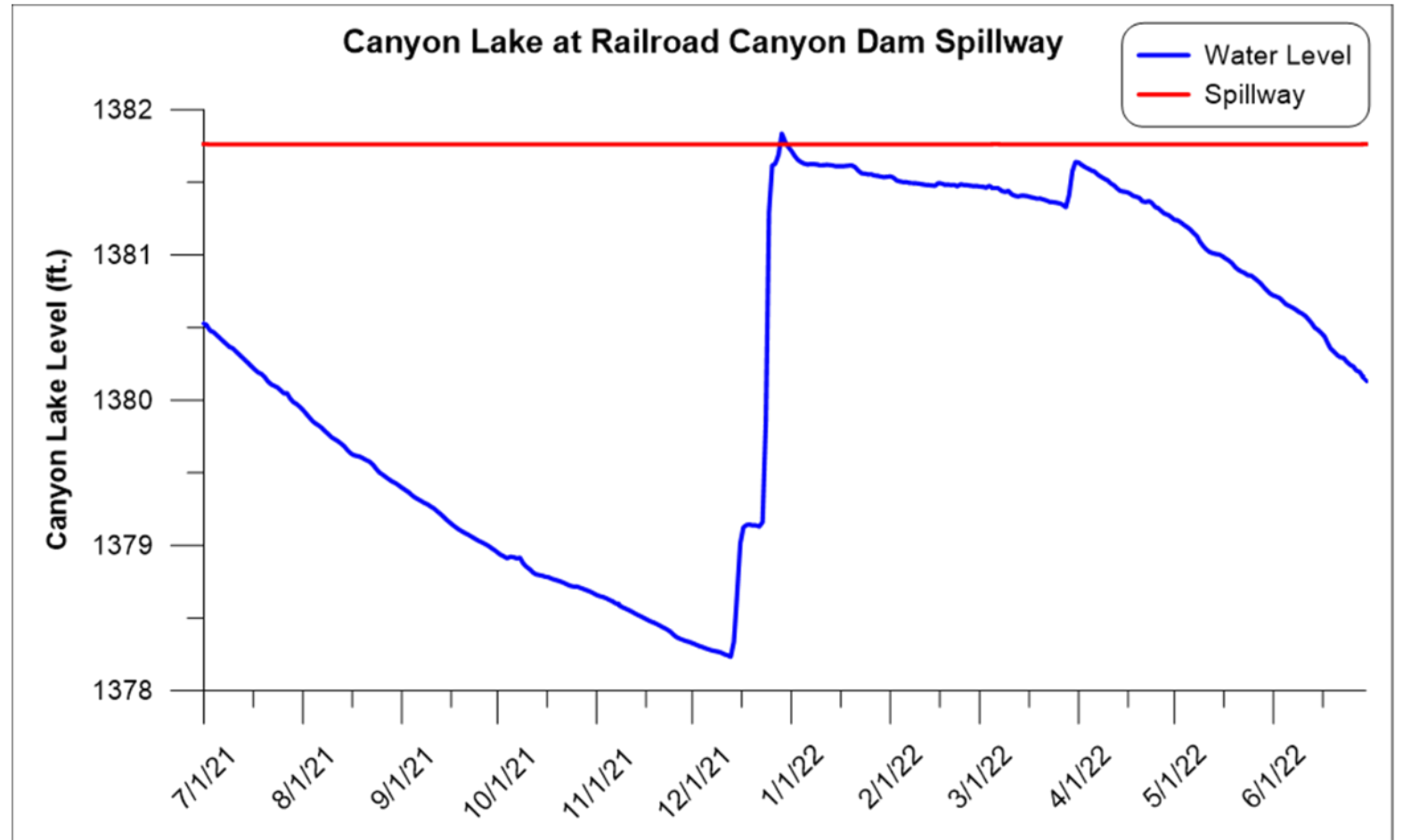
2021-2022 Annual Hydrograph





Watershed Monitoring

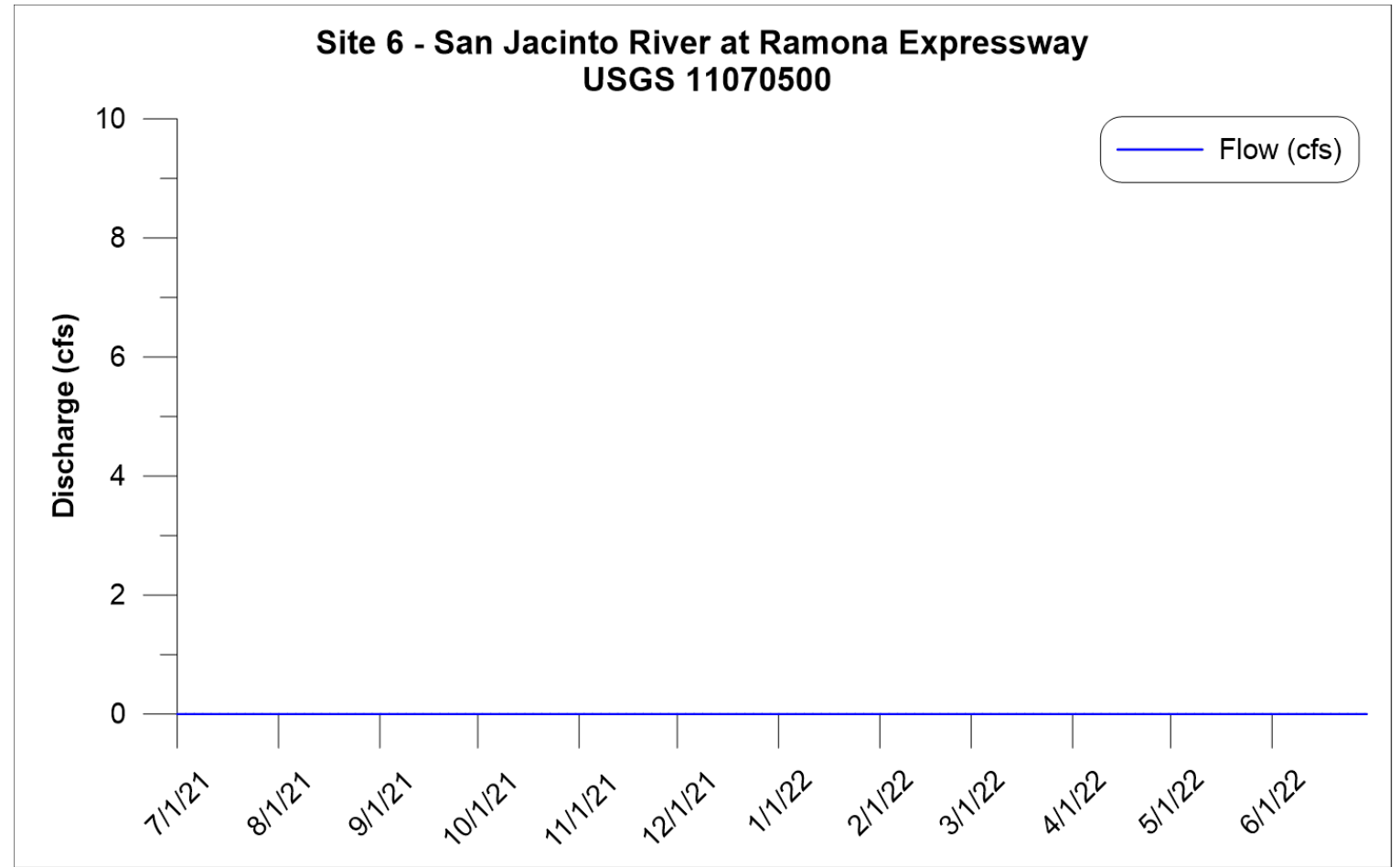
2021-2022 Annual Hydrograph





Watershed Monitoring

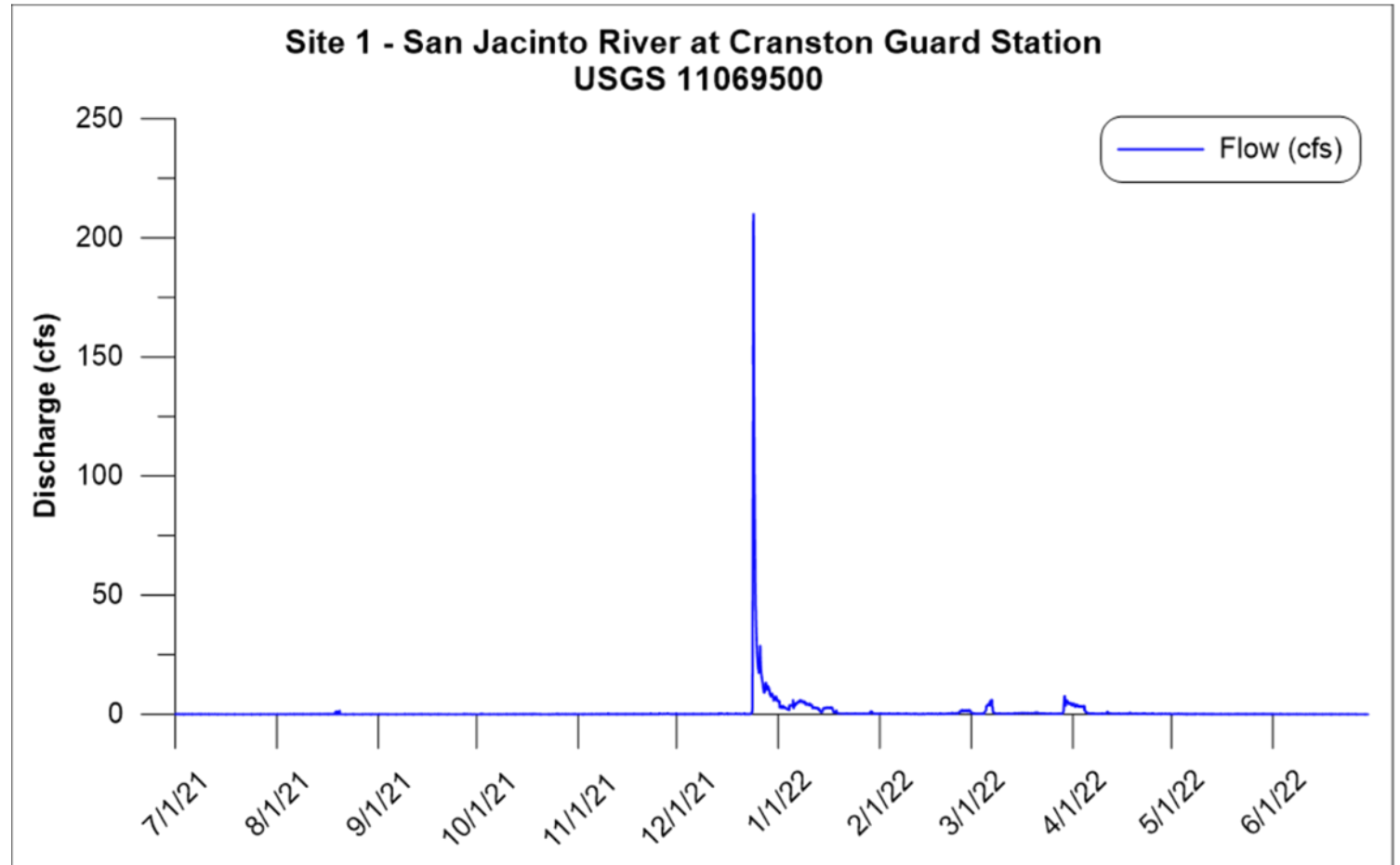
2021-2022 Annual Hydrograph





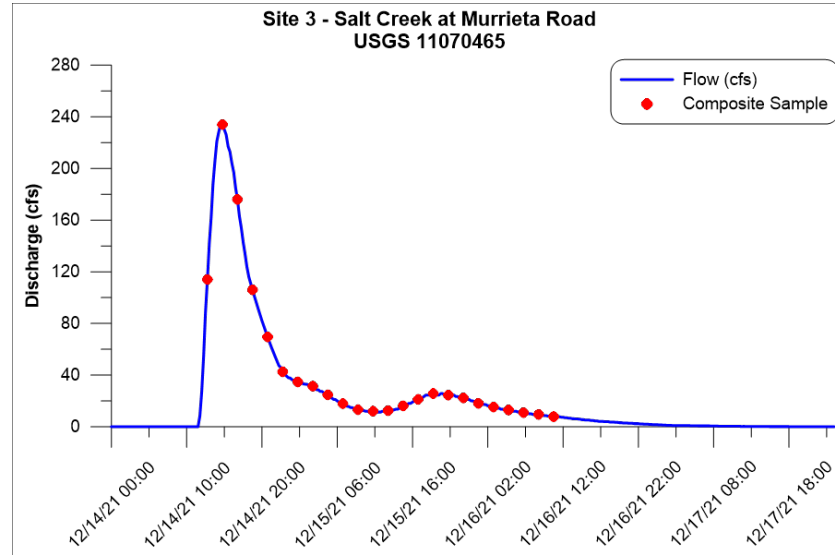
Watershed Monitoring

2021-2022 Annual Hydrograph





Watershed Monitoring

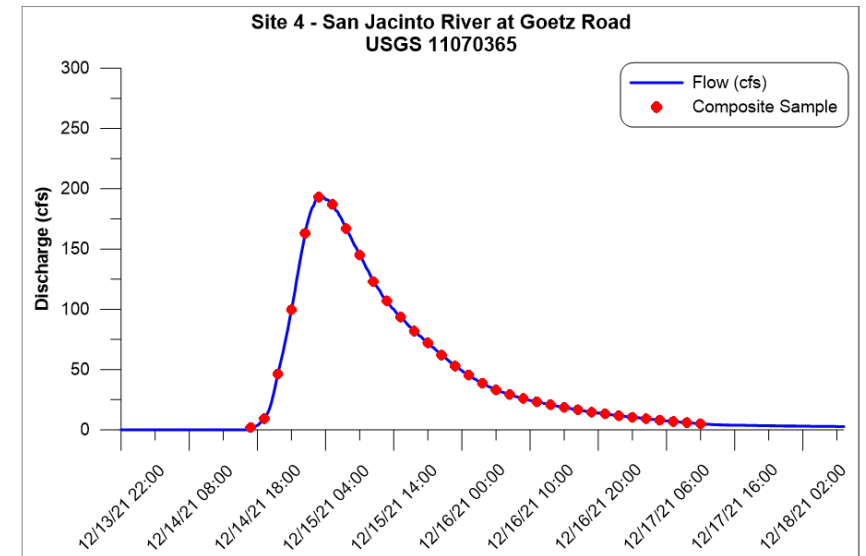


Wet Event #1

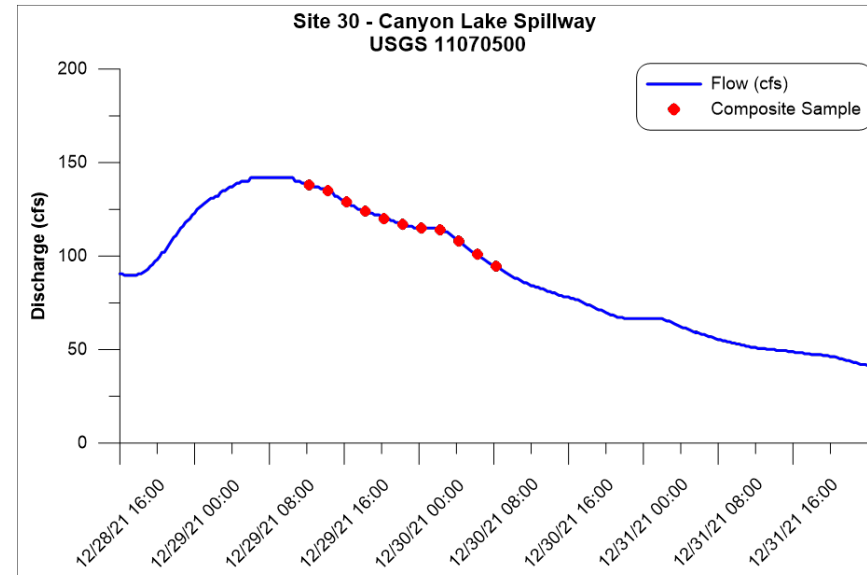
December 14-16, 2021

Watershed Rainfall: 0.76-1.74 inches

Sites: Salt Creek and San Jacinto



Watershed Monitoring



Wet Event #2

December 29-30, 2021

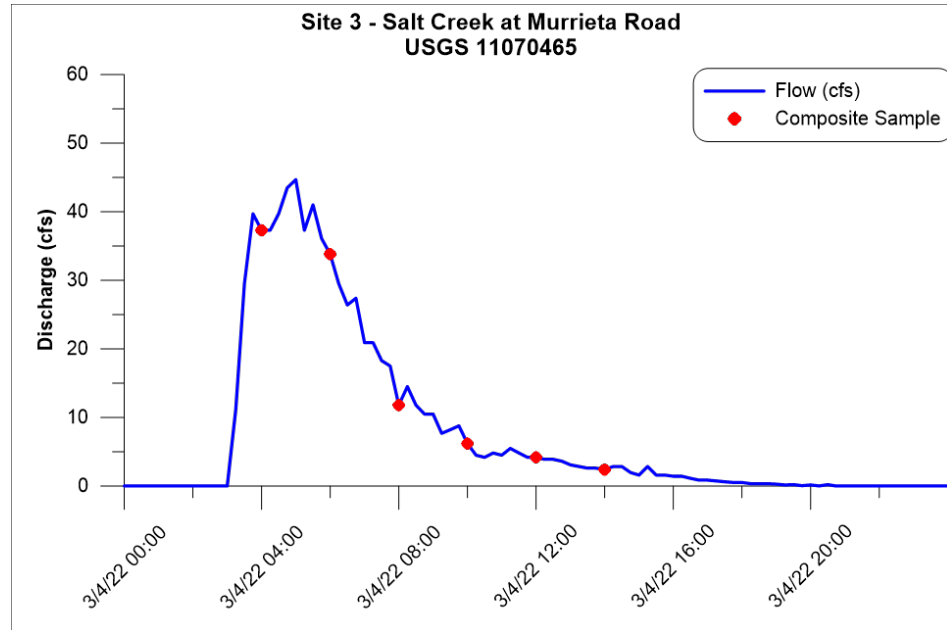
Watershed Rainfall: 1.57 to 3.35 inches in the region from December 24-30, 2021

Sites: Canyon Lake

Samples were collected at two-hour intervals for the period of time that flows exited Canyon Lake (i.e., the water level in Canyon Lake was actively cresting the spillway). It was the only event from October 1, 2021 to May 31, 2022 when flows exited Canyon Lake.



Watershed Monitoring



Wet Event #3

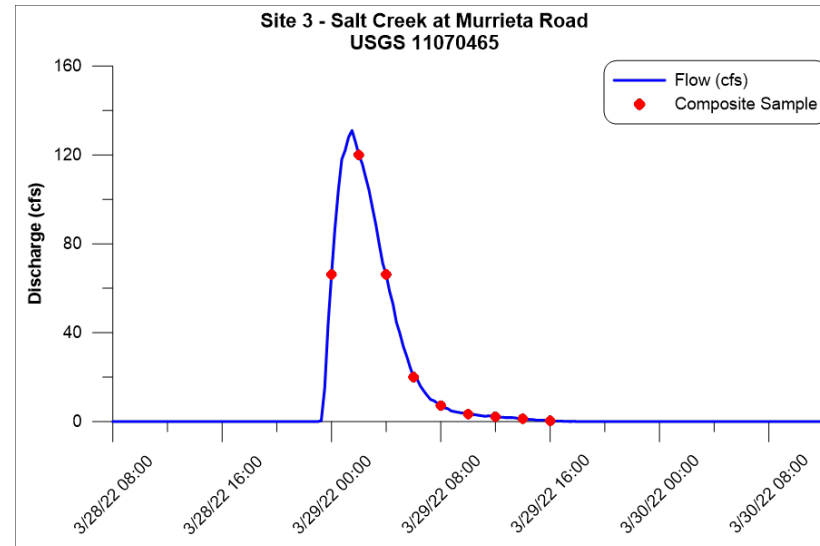
March 4, 2022

Watershed Rainfall: 0.02-0.16 inches

Sites: Salt Creek



Watershed Monitoring

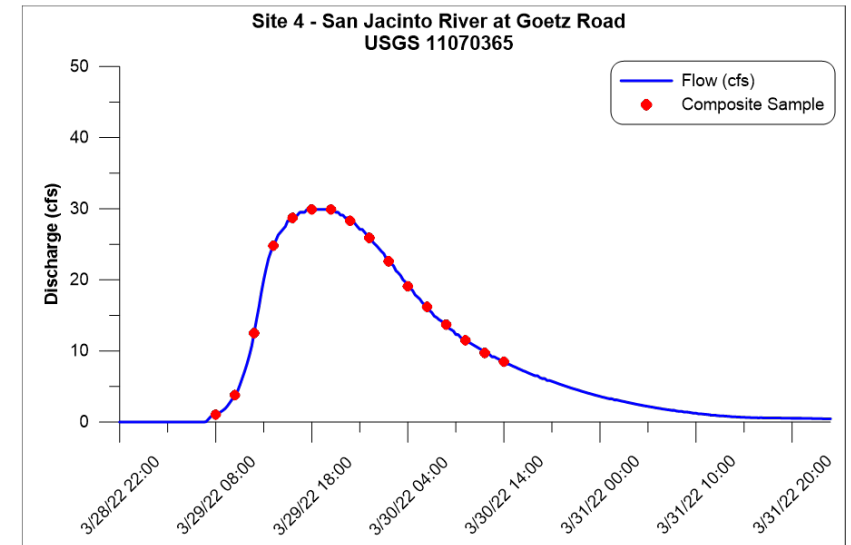


Wet Event #4

March 29-30, 2022

Watershed Rainfall: 0.40-0.79 inches

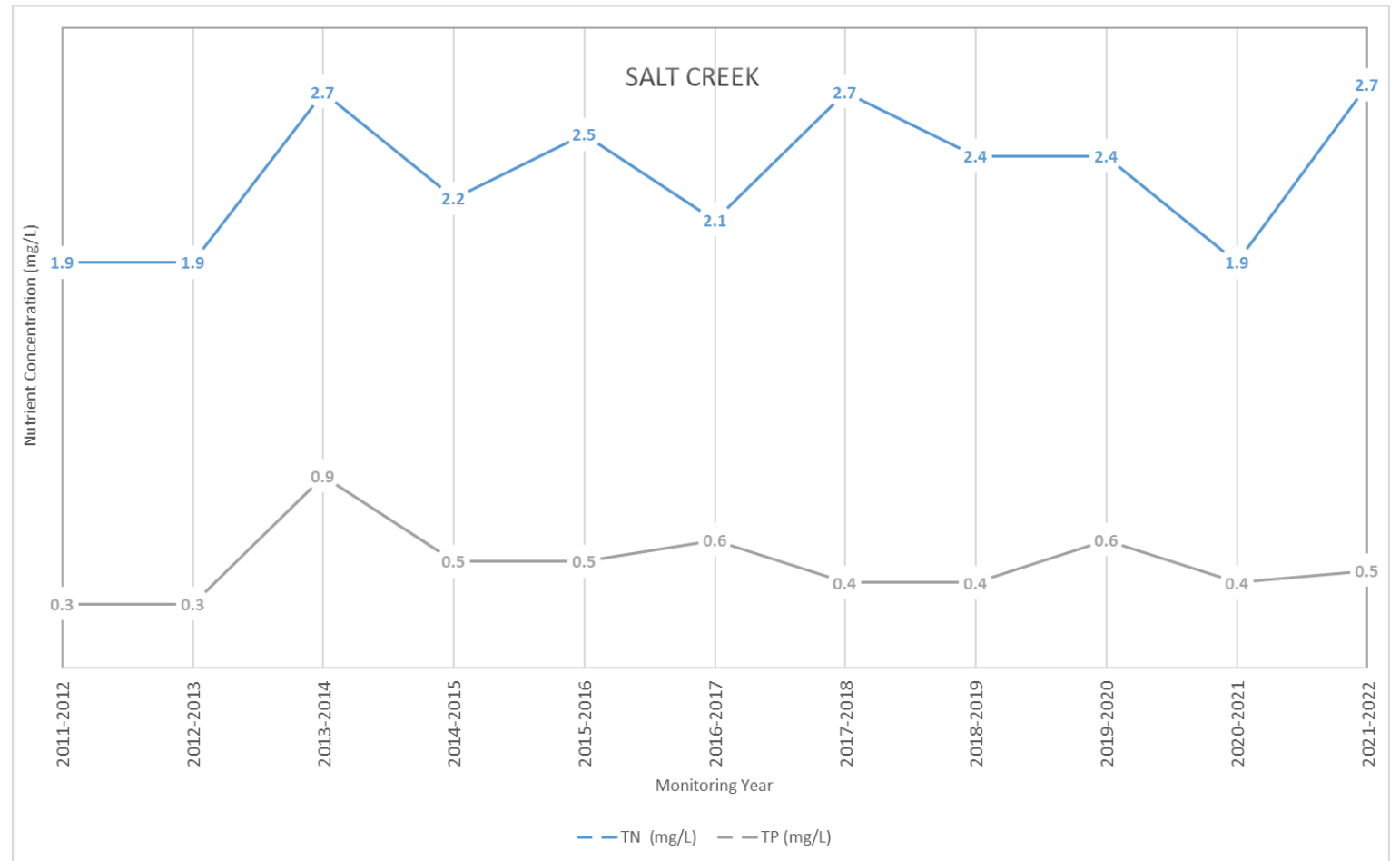
Sites: Salt Creek and San Jacinto





Watershed Monitoring

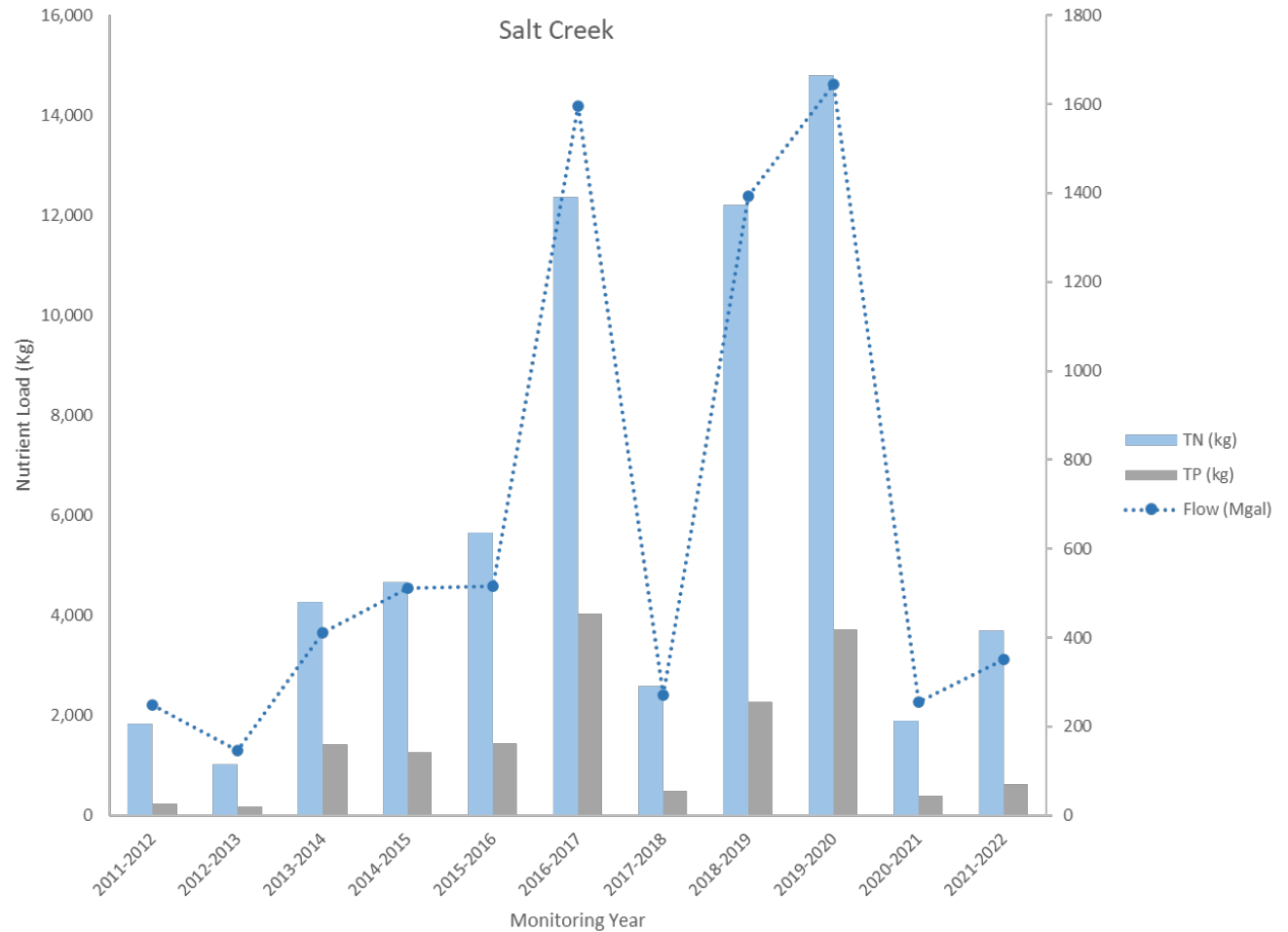
Salt Creek Historic Nutrient Concentrations





Watershed Monitoring

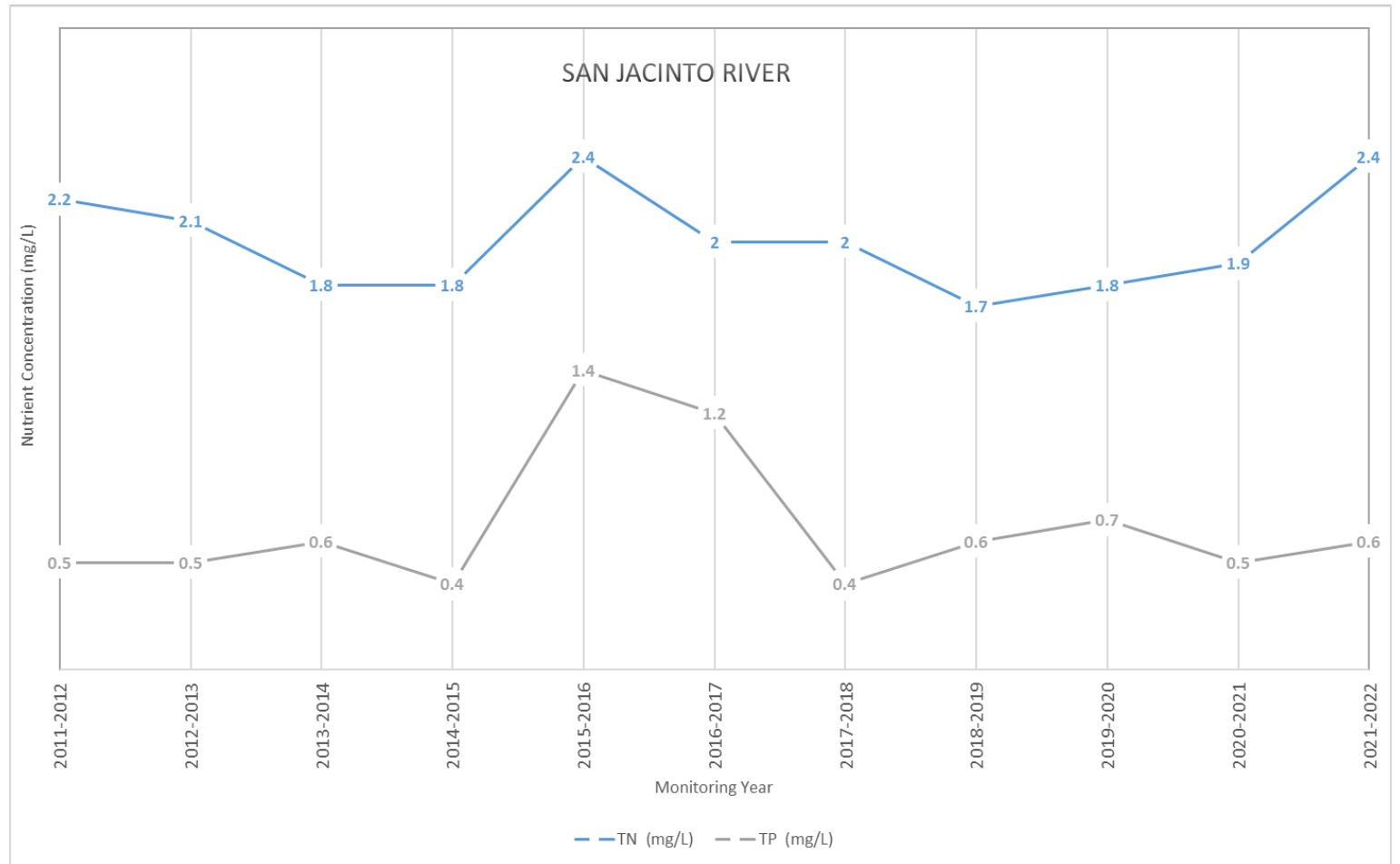
Salt Creek Historic Nutrient Loads





Watershed Monitoring

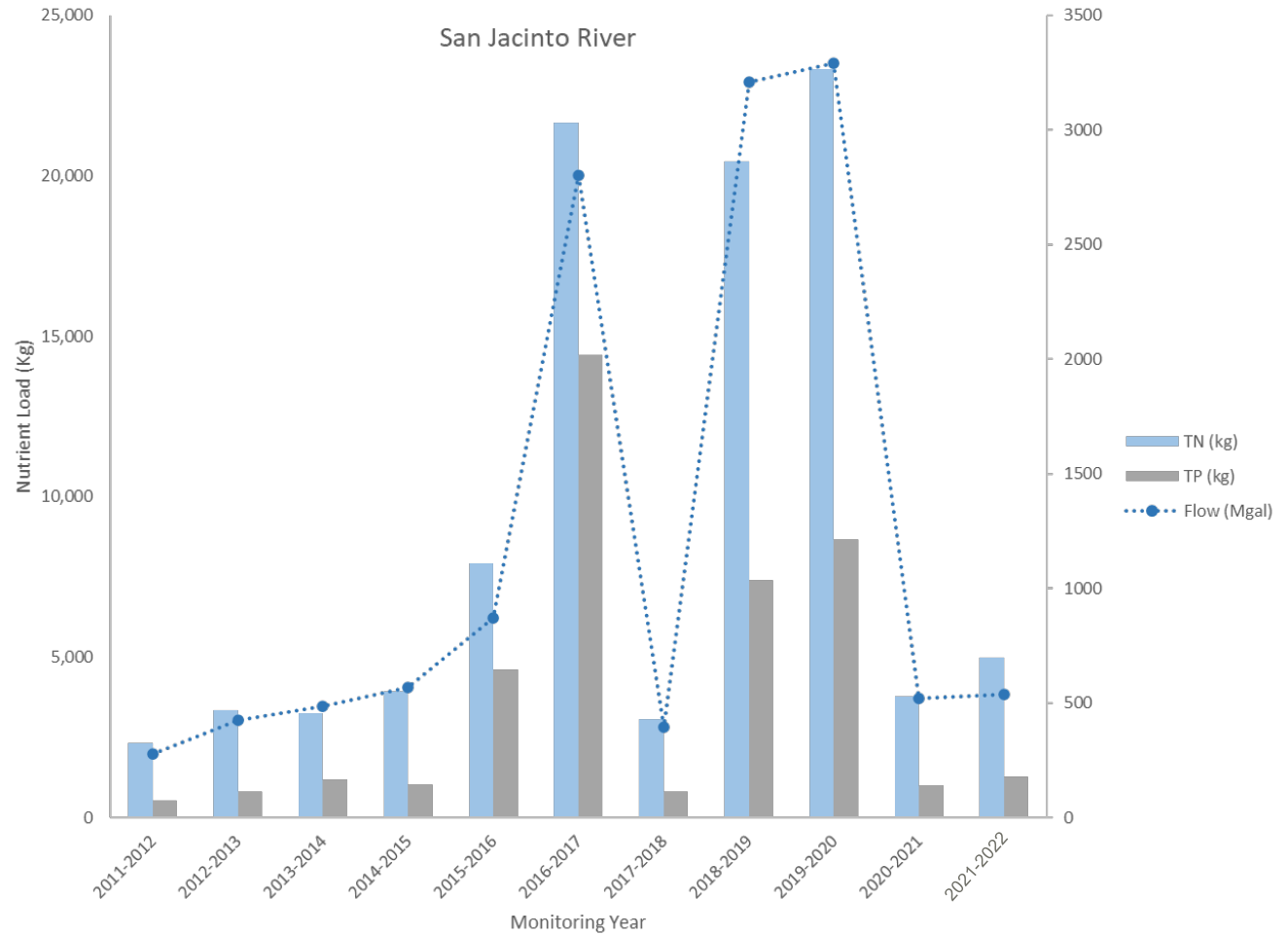
San Jacinto Historic Nutrient Concentrations





Watershed Monitoring

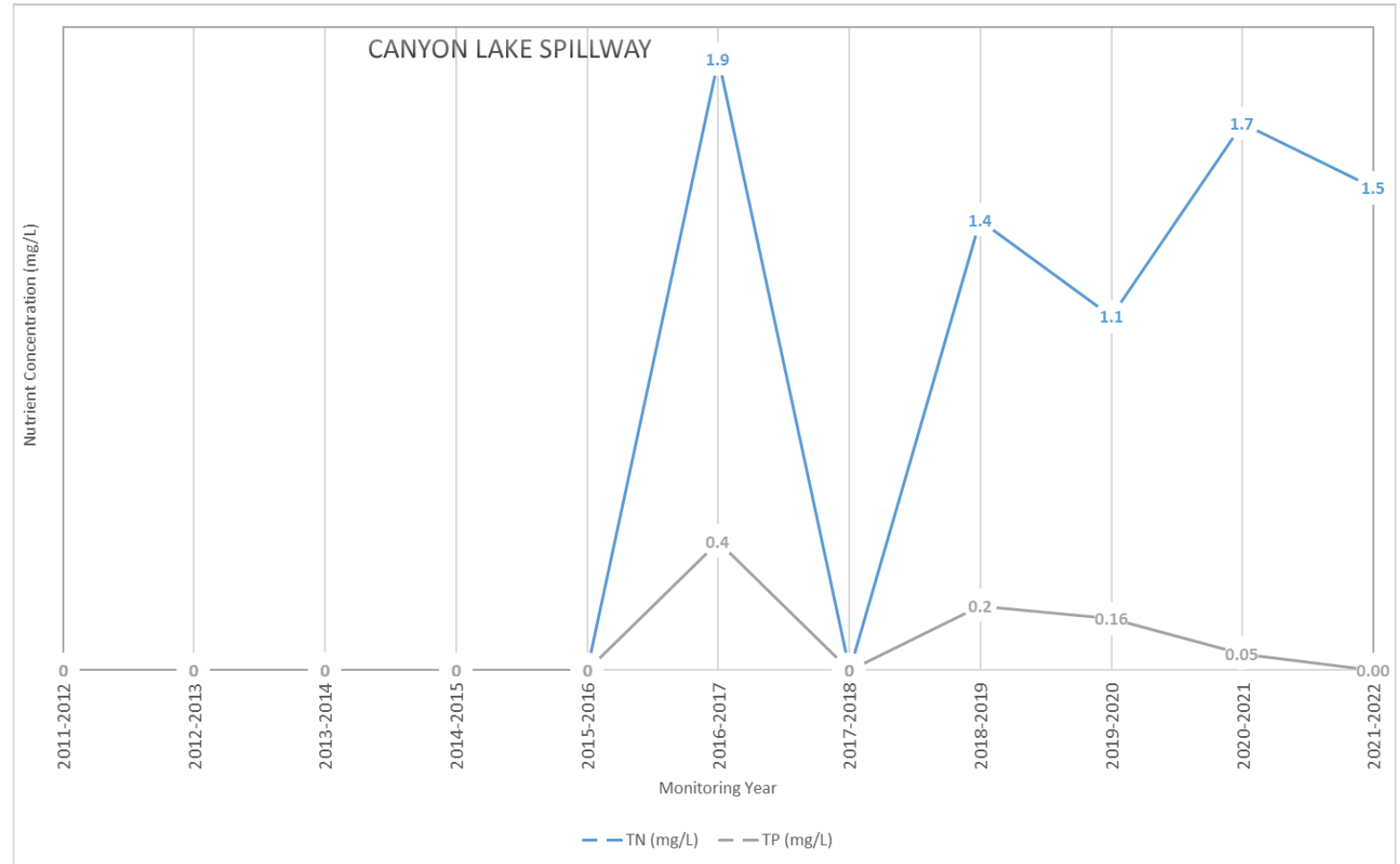
San Jacinto Historic Nutrient Loads





Watershed Monitoring

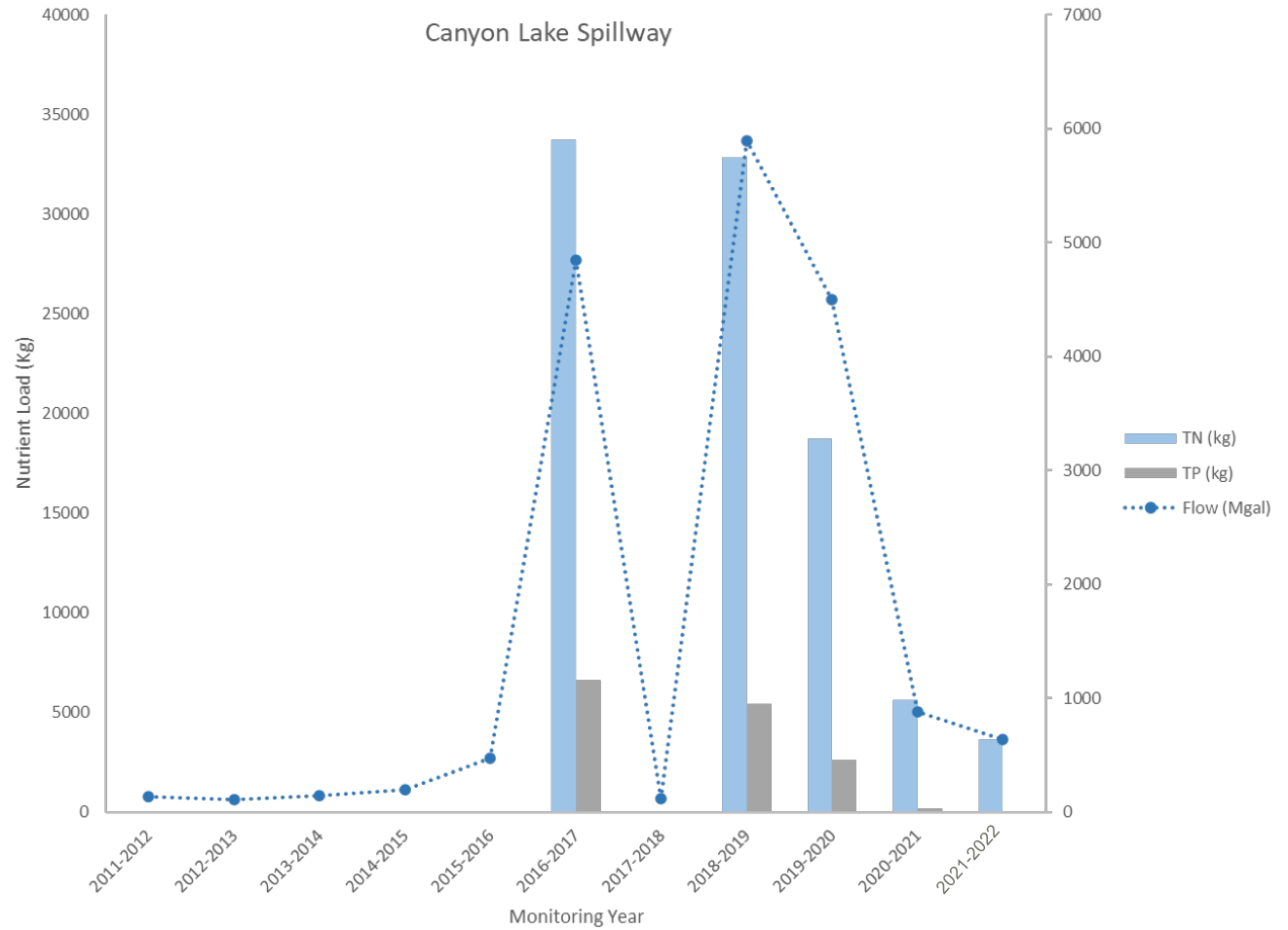
Canyon Lake Spillway Historic Nutrient Concentrations





Watershed Monitoring

Canyon Lake Spillway Historic Nutrient Loads





Watershed Monitoring

Summary of Nutrient Concentrations

Monitoring Year	Site 3 - Salt Creek		Site 4 - San Jacinto River		Site 30 - Canyon Lake Spillway	
	TN (mg/L)	TP (mg/L)	TN (mg/L)	TP (mg/L)	TN (mg/L)	TP (mg/L)
2012-2013	1.9	0.3	2.1	0.5	NS	NS
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)

NS-Not sampled
 ND – not detected (analyte not detected at the indicated method detection limit (MDL))



Watershed Monitoring

Summary of Nutrient Loads

Monitoring Year	Site 3 - Salt Creek			Site 4 - San Jacinto River			Site 30 - Canyon Lake Spillway		
	Flow (Mgal)	TN (kg)	TP (kg)	Flow (Mgal)	TN (kg)	TP (kg)	Flow (Mgal)	TN (kg)	TP (kg)
2012-2013 ^a	309	2,211	363	606	4,869	1,145	192	NS	NS
2013-2014	411	4,268	1,409	484	3,252	1,178	148	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

^a - Sum of January 1, 2012 through June 30, 2013. Other monitoring year dates are July 1 to June 30.

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.

Watershed Monitoring

10-yr Running Average Loads

Lake	Analyte	10-yr Running Average (kg/yr) ^a	TMDL Load Allocation (kg/yr) ^b	% of TMDL Load Allocation
Lake Elsinore ^c	Total Nitrogen	9,361	29,953	31.3%
	Total Phosphorus	1,486	6,922	21.5%
Canyon Lake	Total Nitrogen	16,202	22,268	72.8%
	Total Phosphorus	5,782	3,845	150.4%
		-1,981 credit for alum application = 3,801		98.9%

a - Sum of average 10-year annual loads from Salt Creek at Murrieta Road and San Jacinto River at Goetz Road for the monitoring period January 2012 - December 2021.

b - Load allocations taken from Resolution R8-2004-0037 (2004 TMDL) Tables 5-9p and 5-9q. Internal sediment and atmospheric deposition 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.

c - watershed loading estimates for Lake Elsinore were taken from data collected at the Canyon Lake Spillway when it overflows



In-Lake Monitoring



LE01

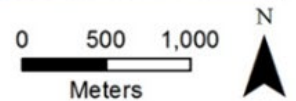
Lakeshore Sonde

LE02

Grand Ave Sonde

LE03

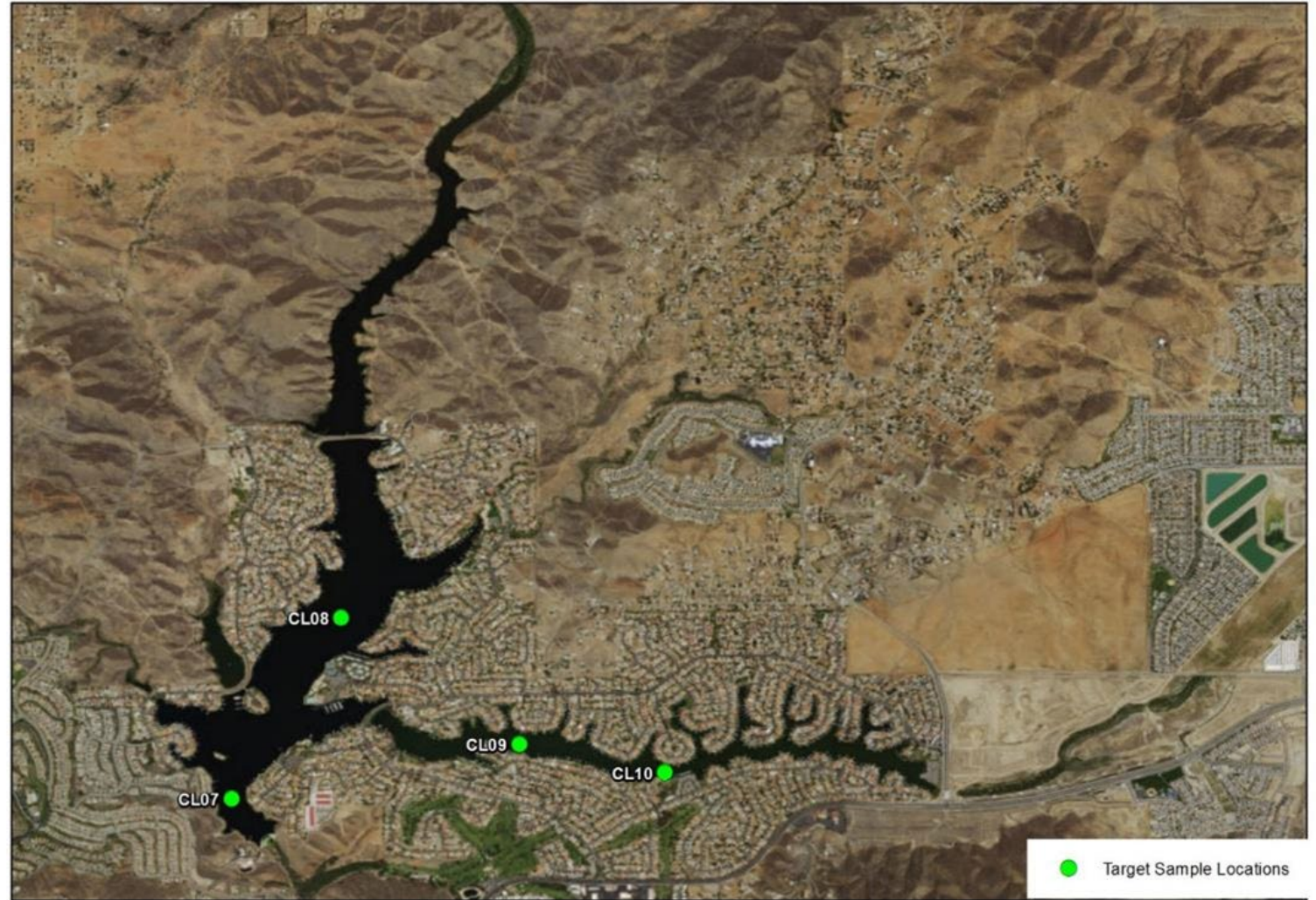
- Sonde Locations
- Target Sample Locations



Sample Locations and Water Quality Data Sondes For Lake Elsinore

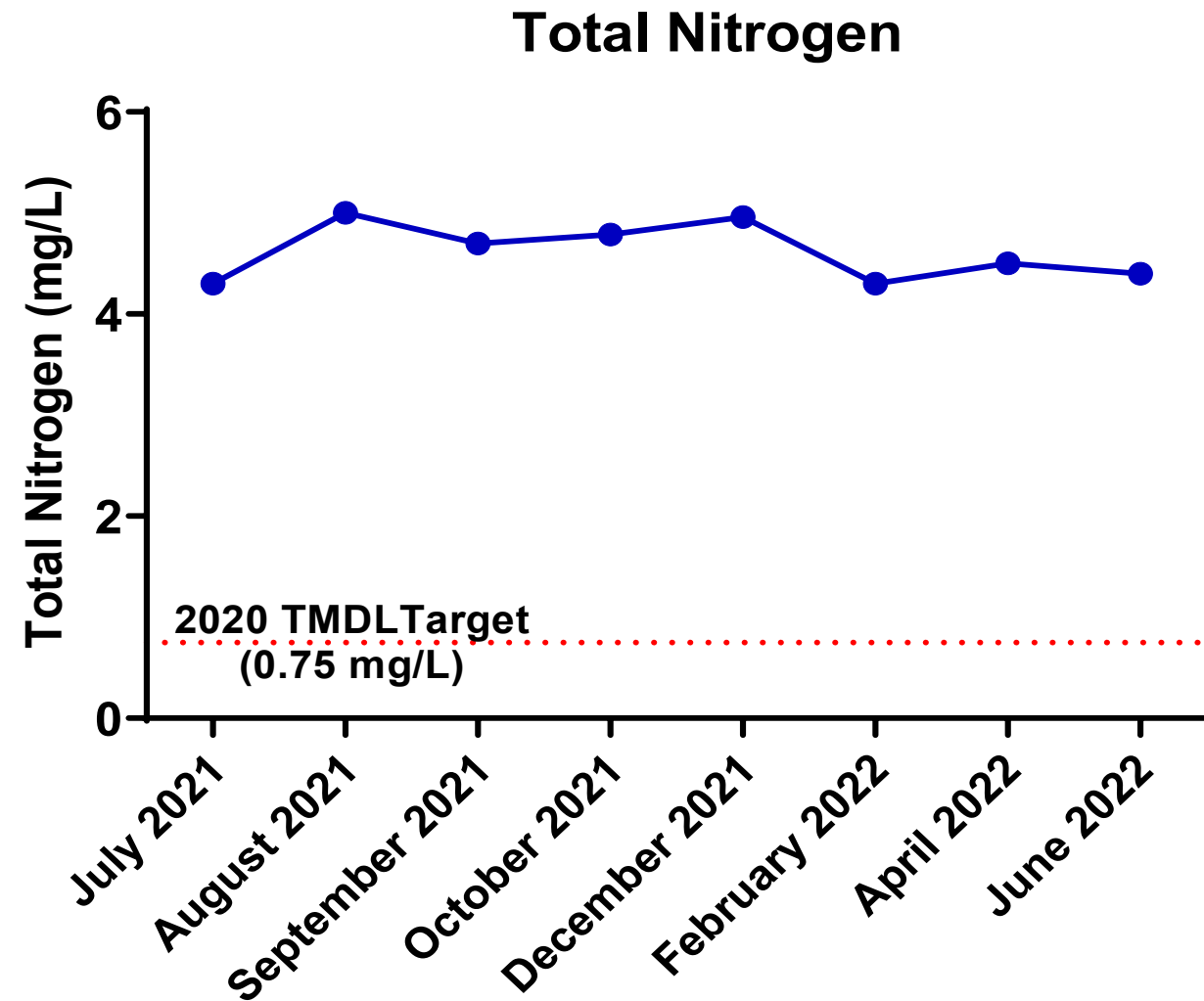


In-Lake Monitoring



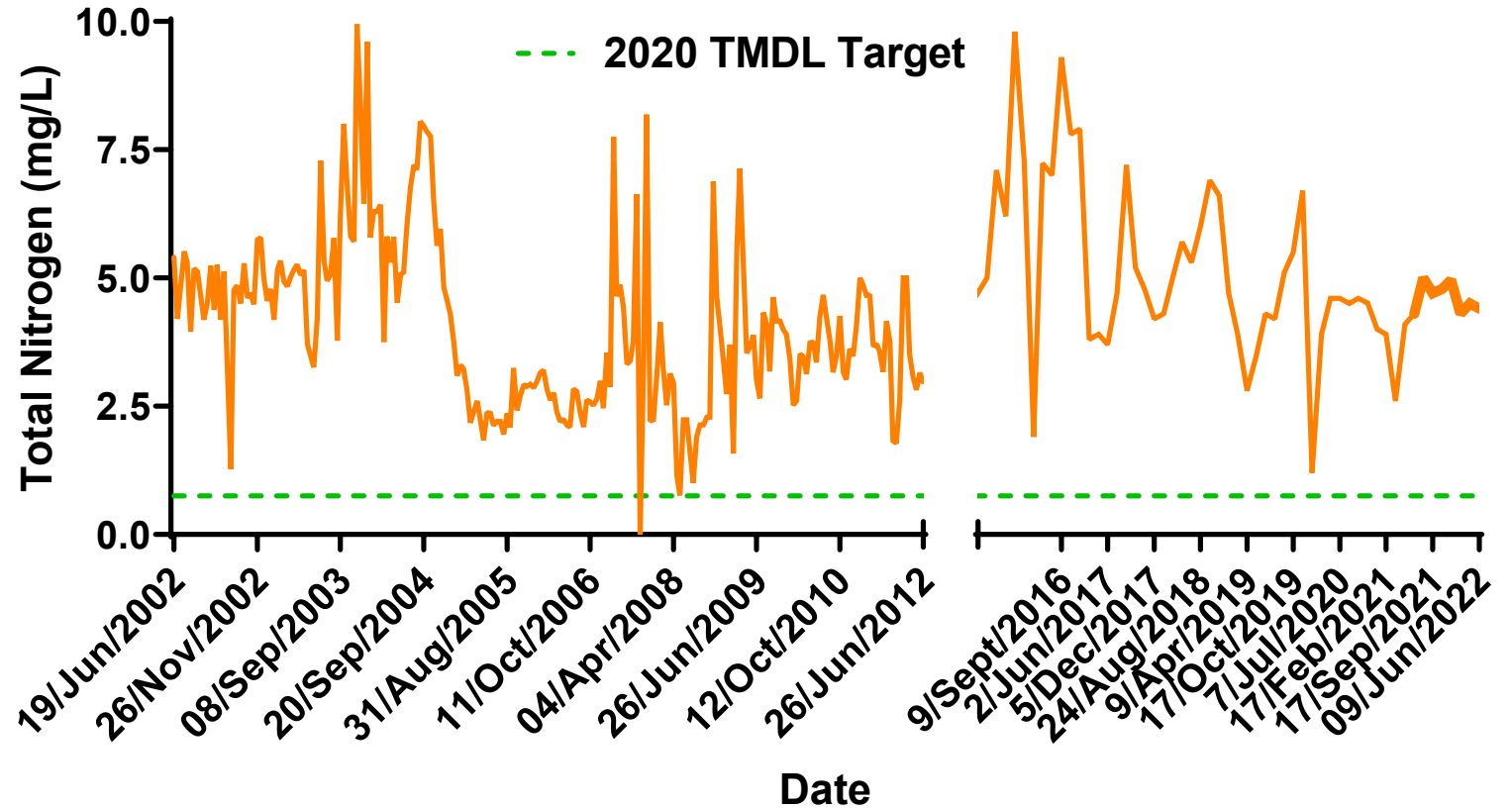


In-Lake Monitoring – Lake Elsinore





In-Lake Monitoring - Lake Elsinore



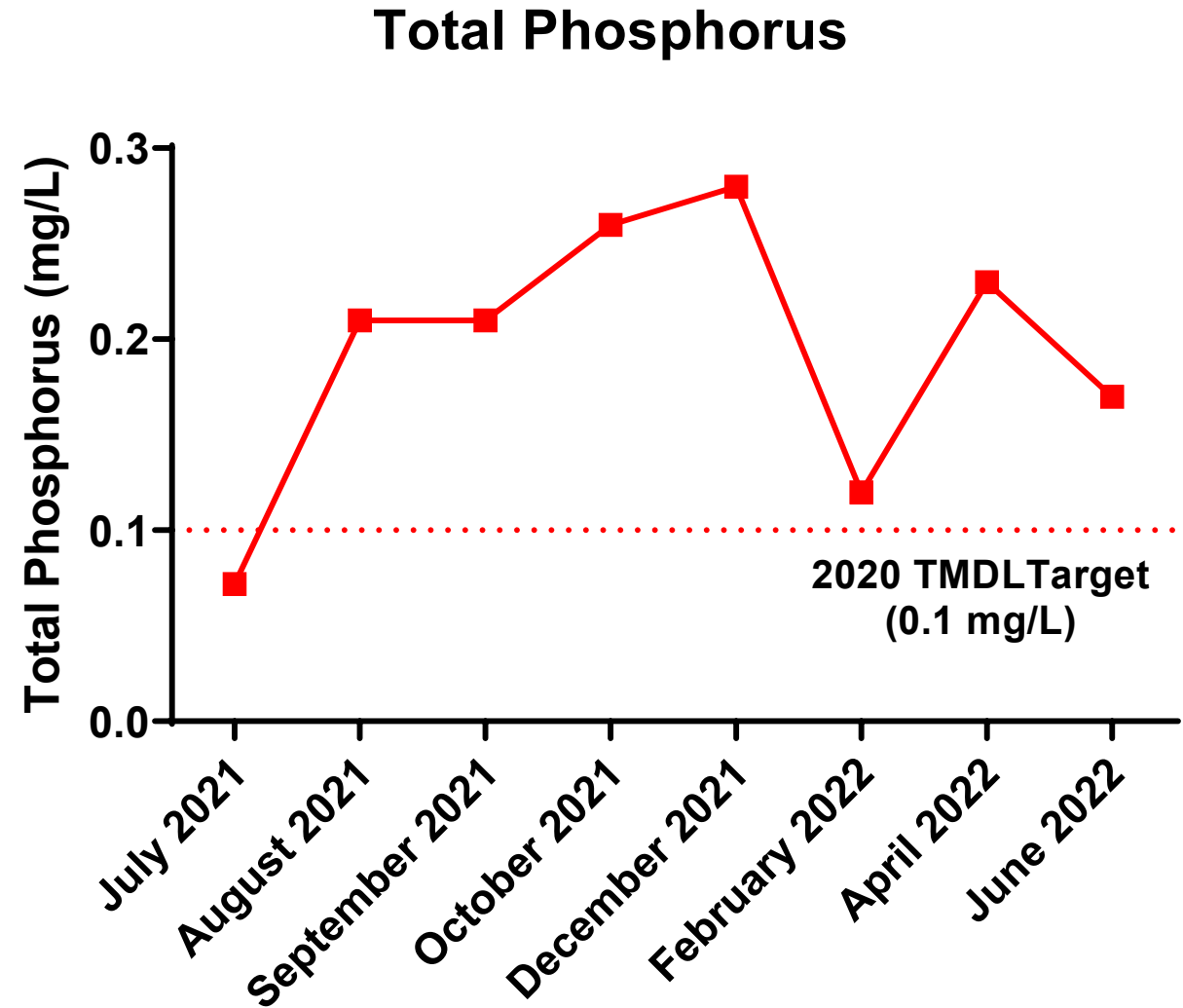
No data available from June 2012-July2015

TMDL target of 0.75 mg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2021-June 2022

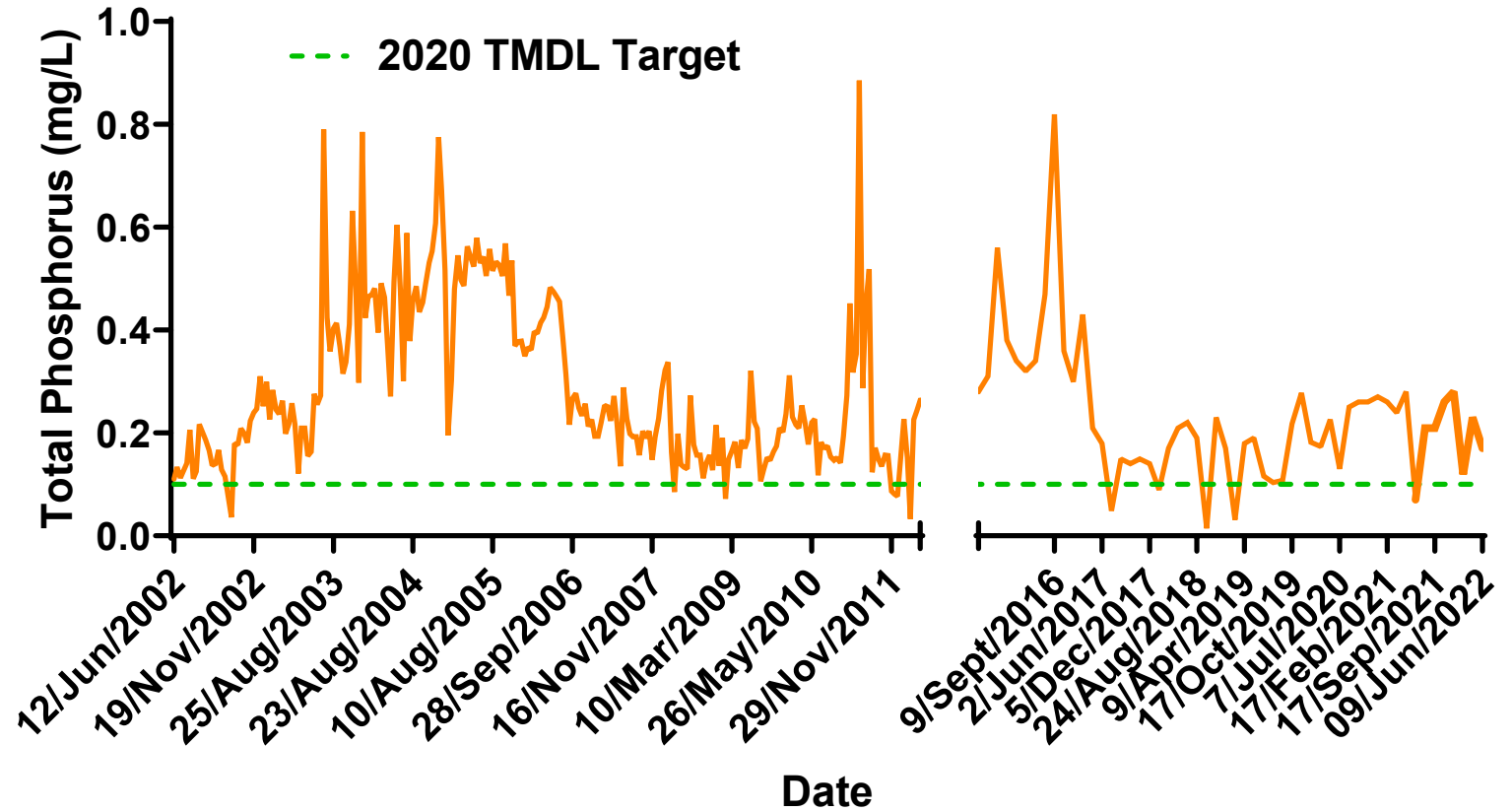


In-Lake Monitoring - Lake Elsinore





In-Lake Monitoring - Lake Elsinore



No data available from June 2012-July 2015

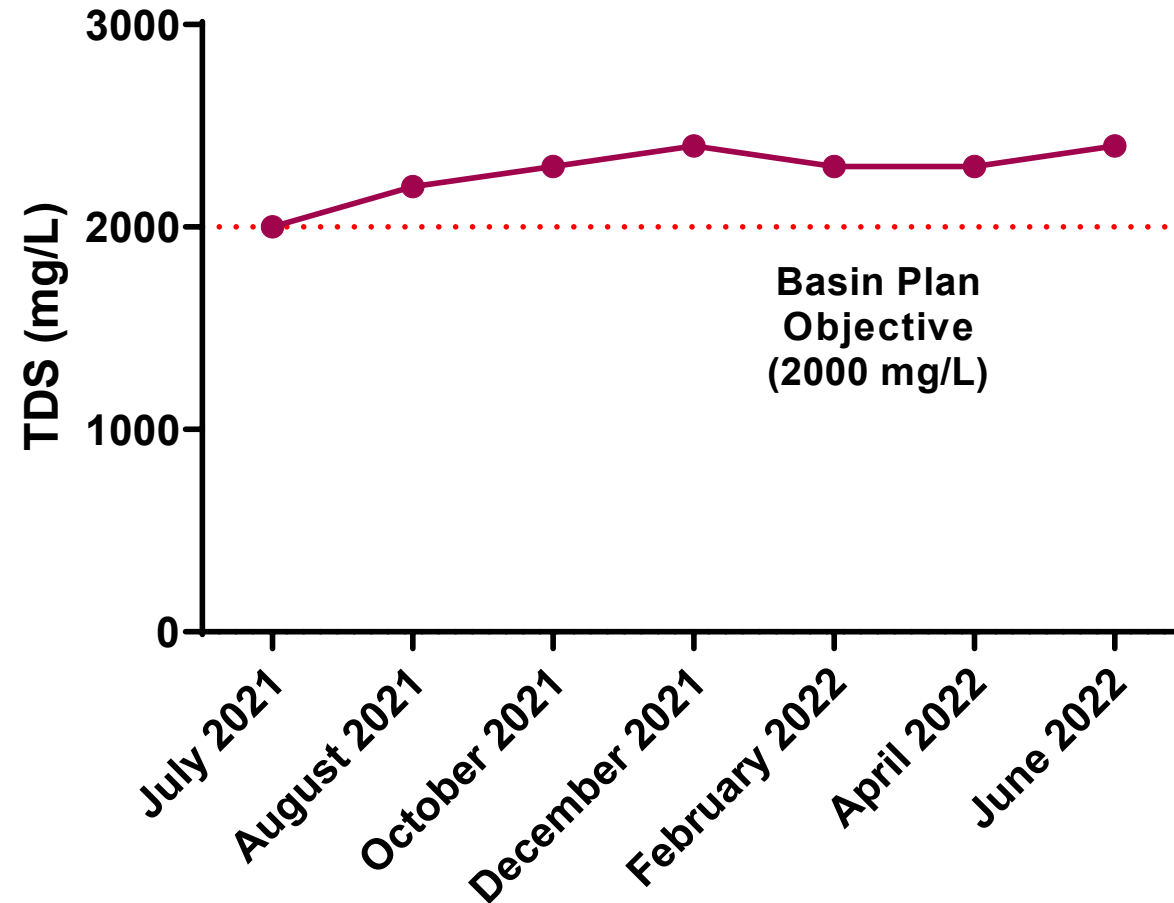
TMDL target of 0.1 mg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2021-June 2022



In-Lake Monitoring - Lake Elsinore

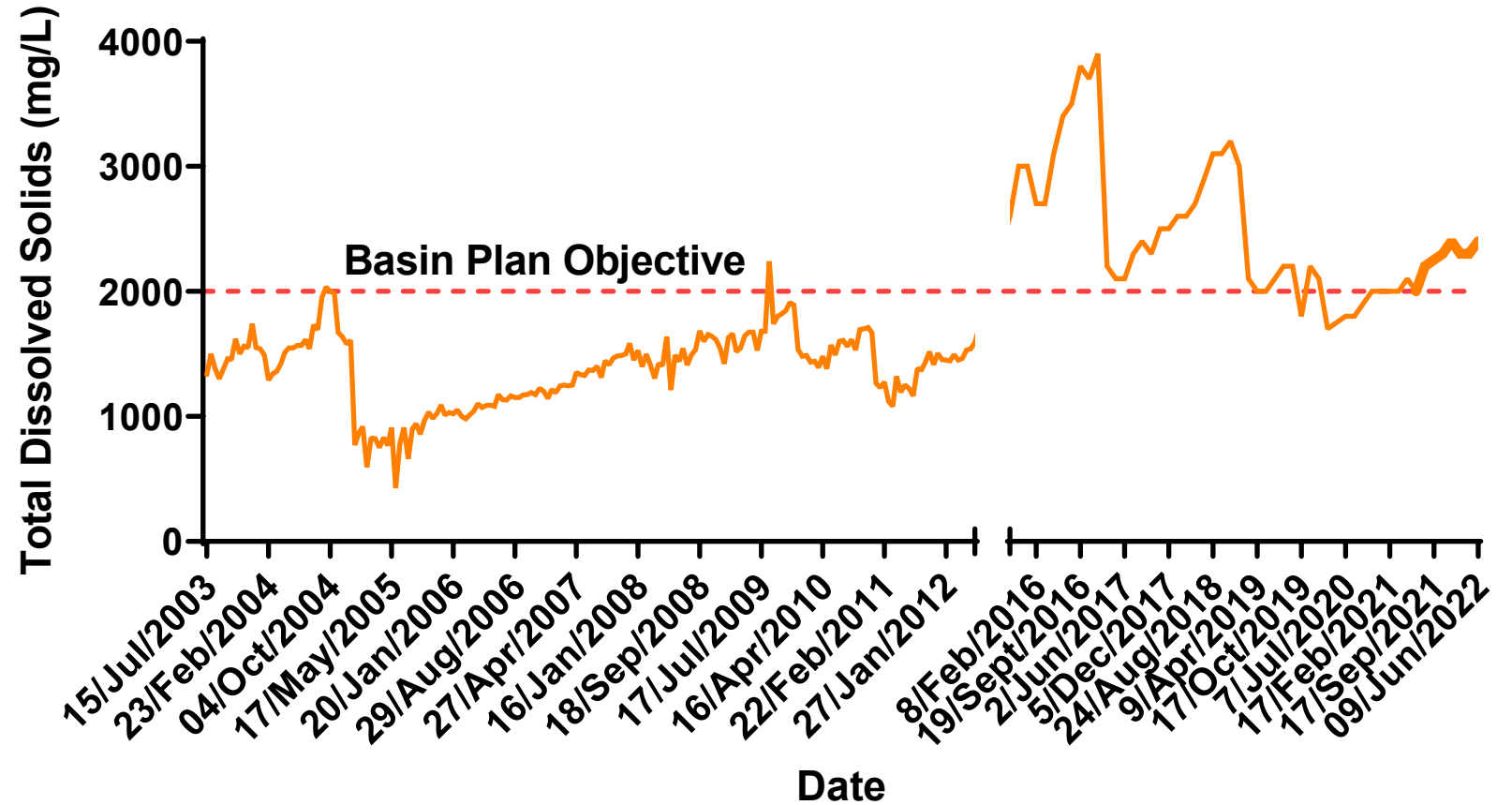
Total Dissolved Solids



* September omitted due to lab error



In-Lake Monitoring - Lake Elsinore



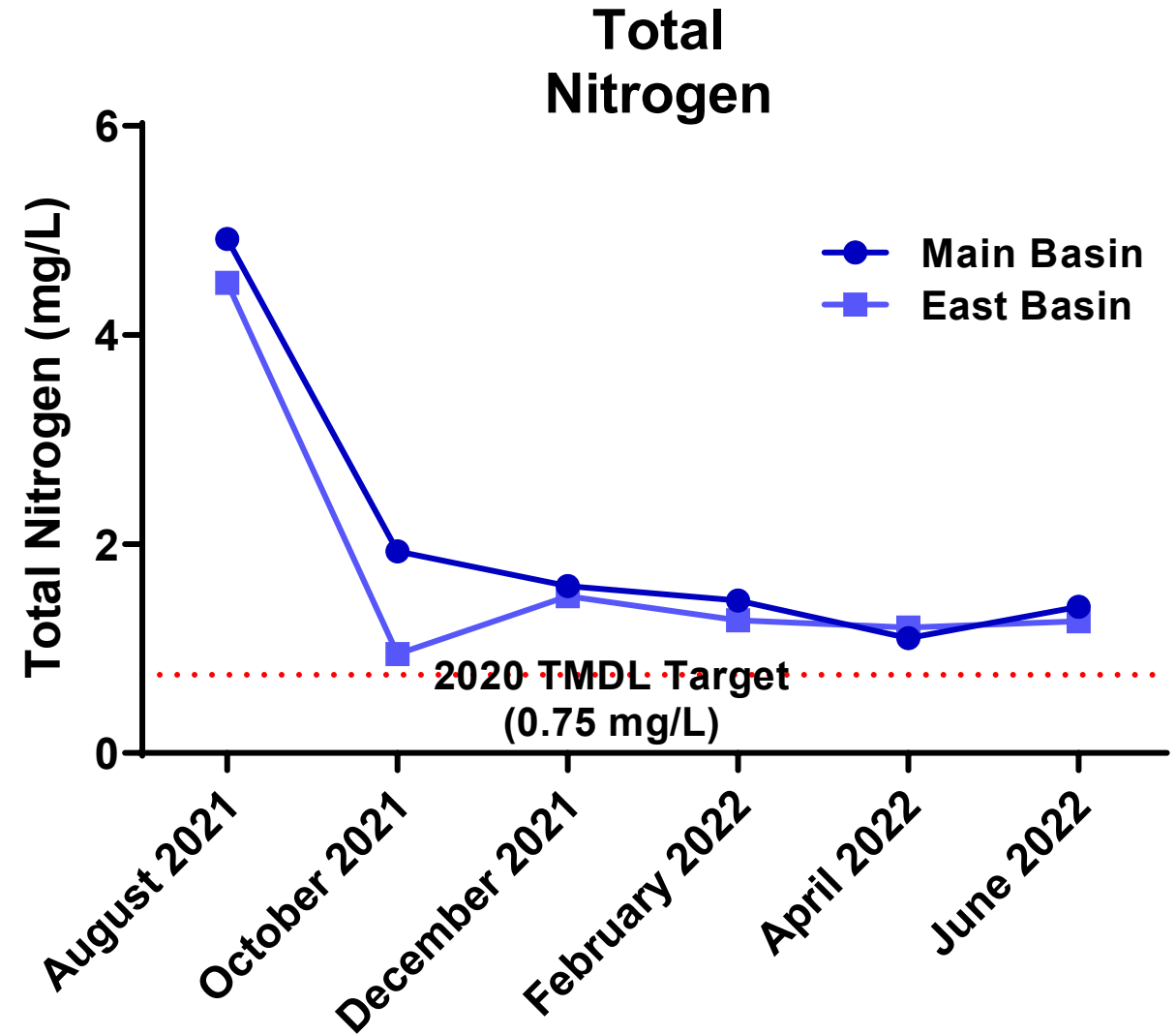
No data available from June 2012-July 2015

Bold represents current monitoring year July 2021-June 2022

* not measured due to laboratory error. See report for details.

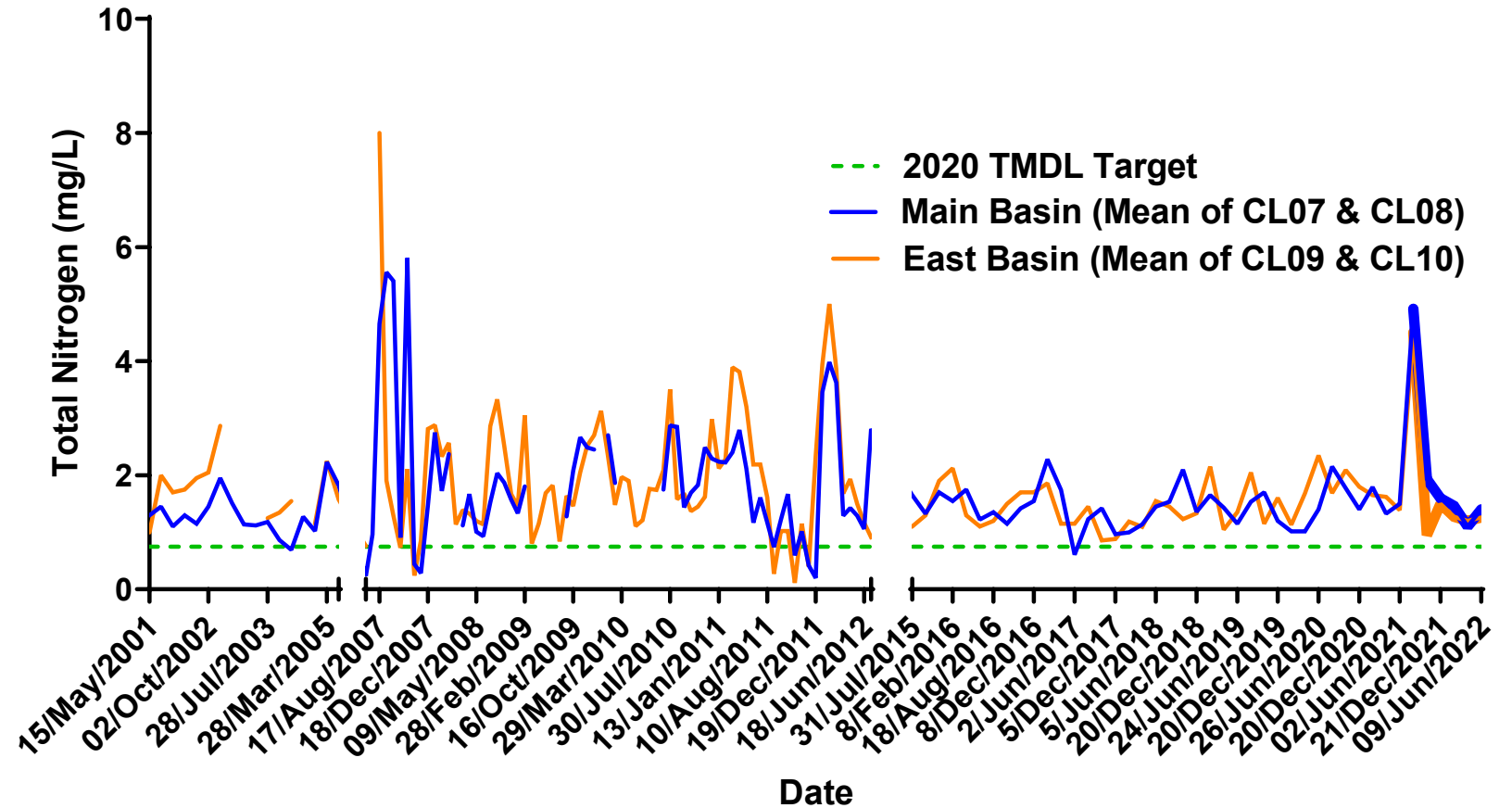


In-Lake Monitoring – Canyon Lake





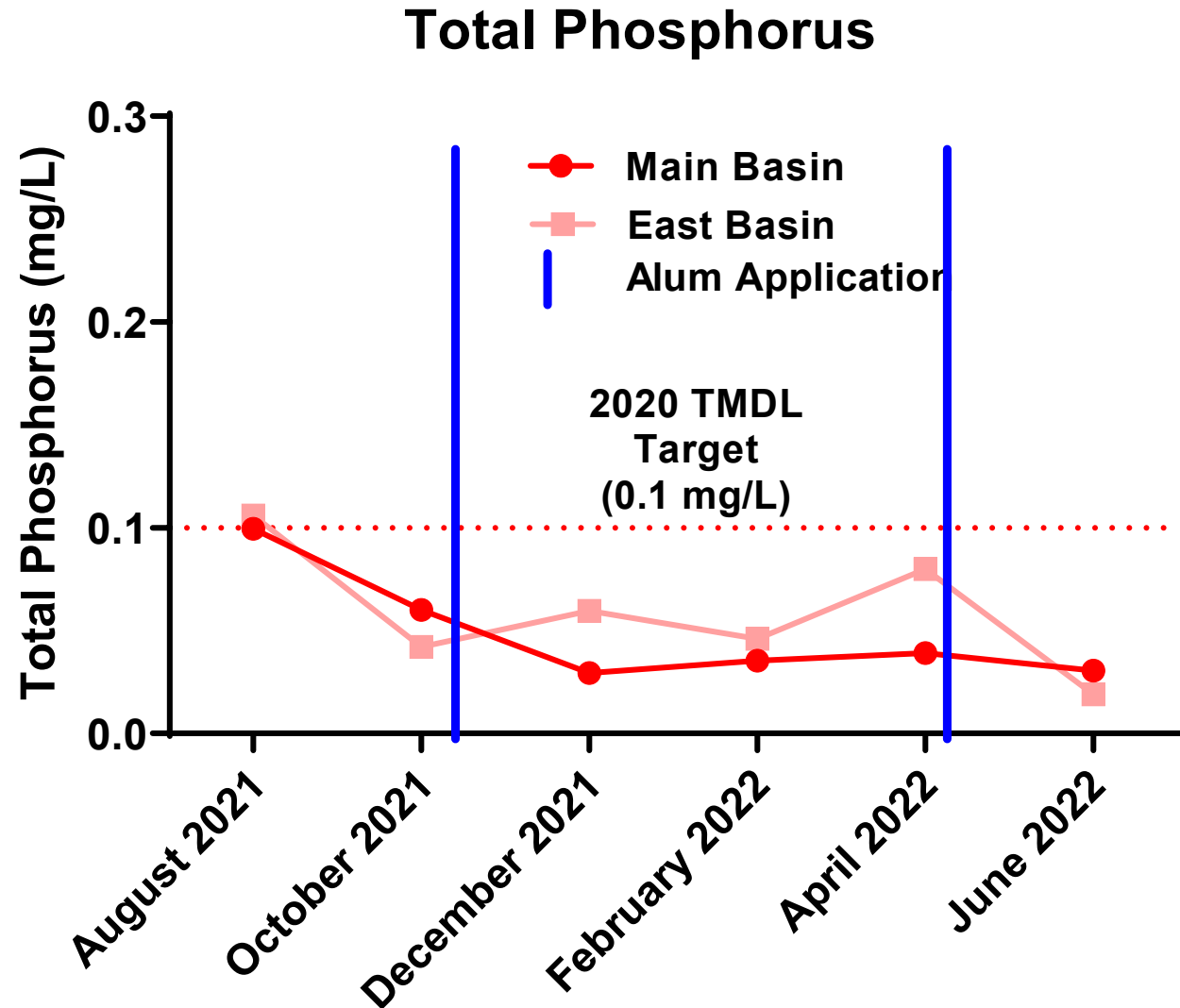
In-Lake Monitoring - Canyon Lake



No data available from May 2005-July 2007; June 2012-July 2015
 TMDL target of 0.75 mg/L is annual average to be attained by 2020
Bold represents current monitoring year July 2021-June 2022

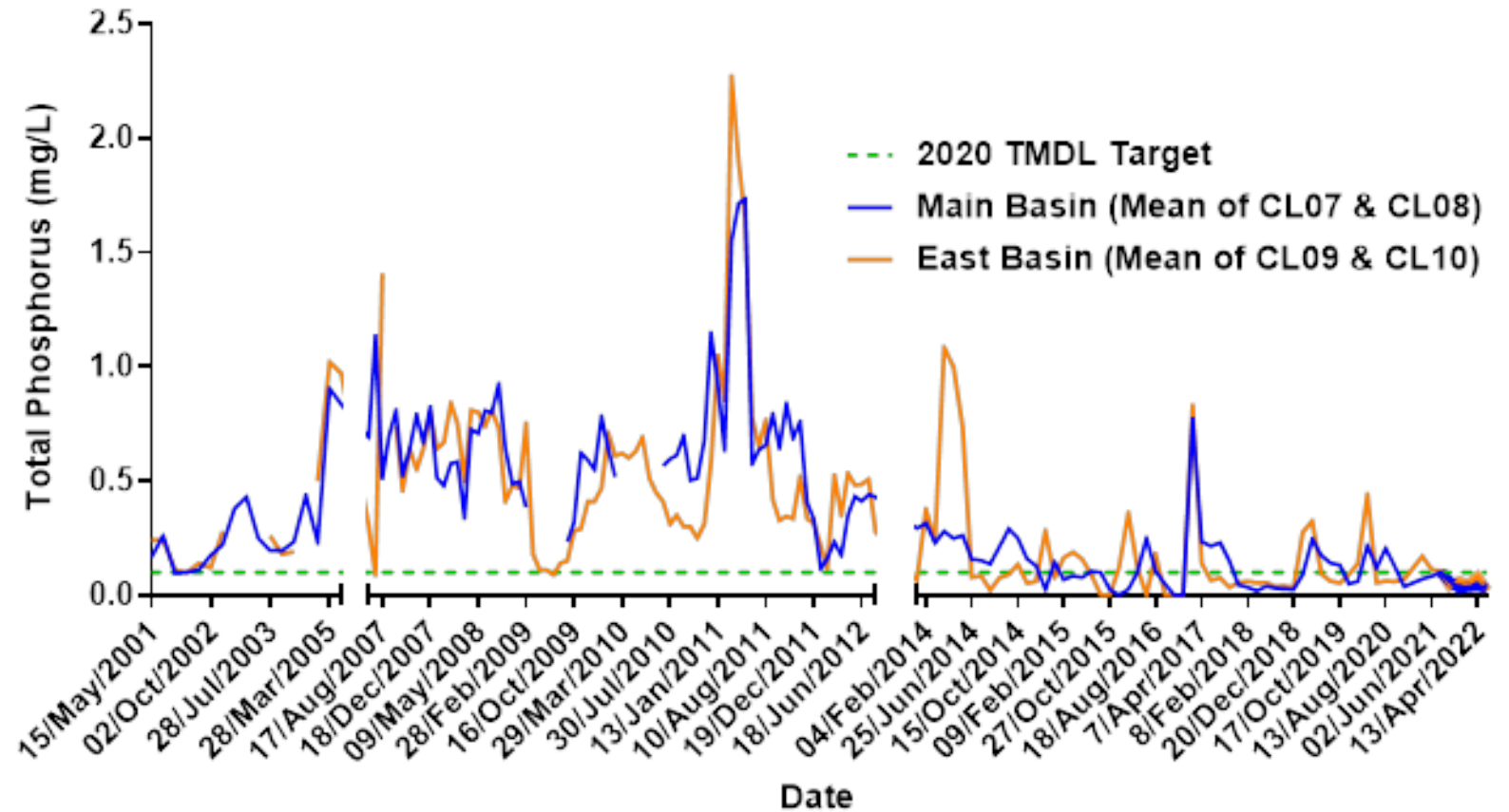


In-Lake Monitoring - Canyon Lake



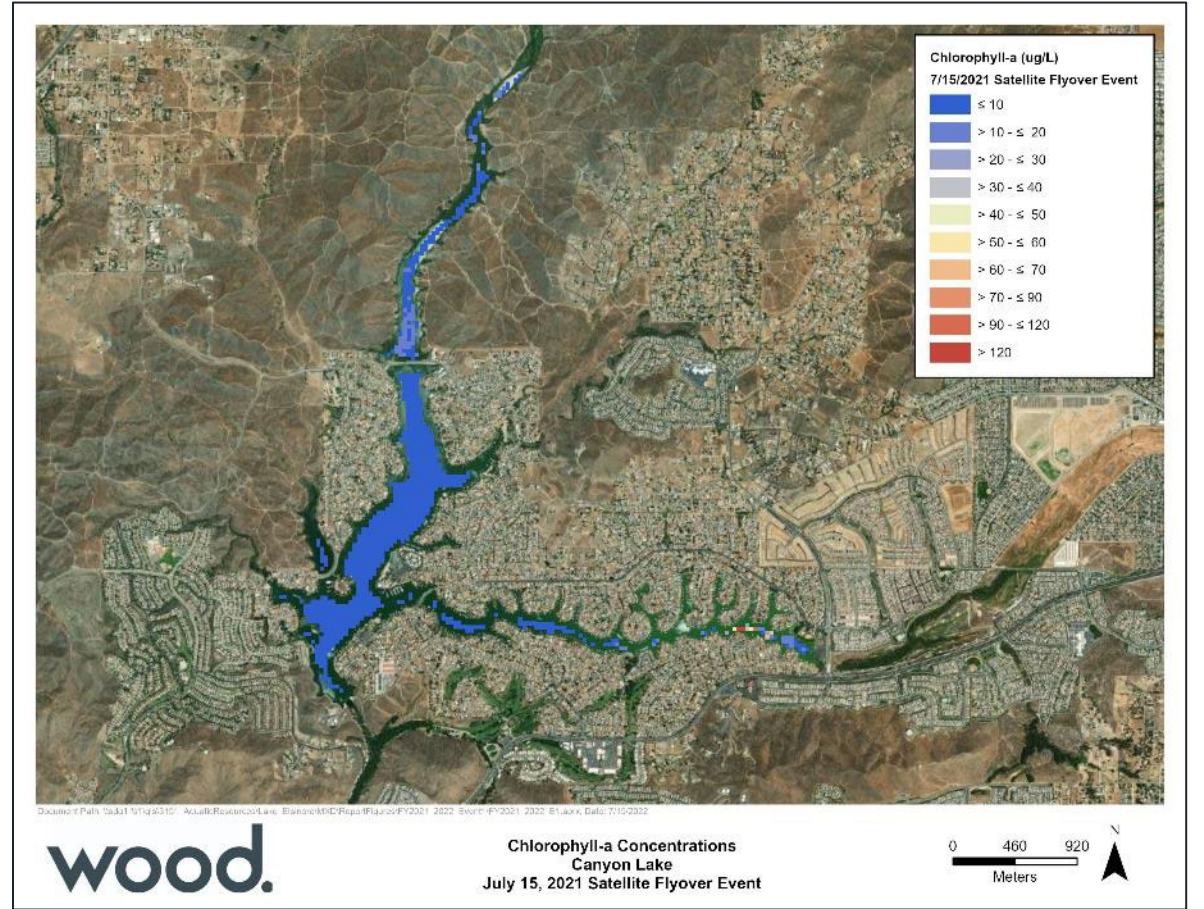
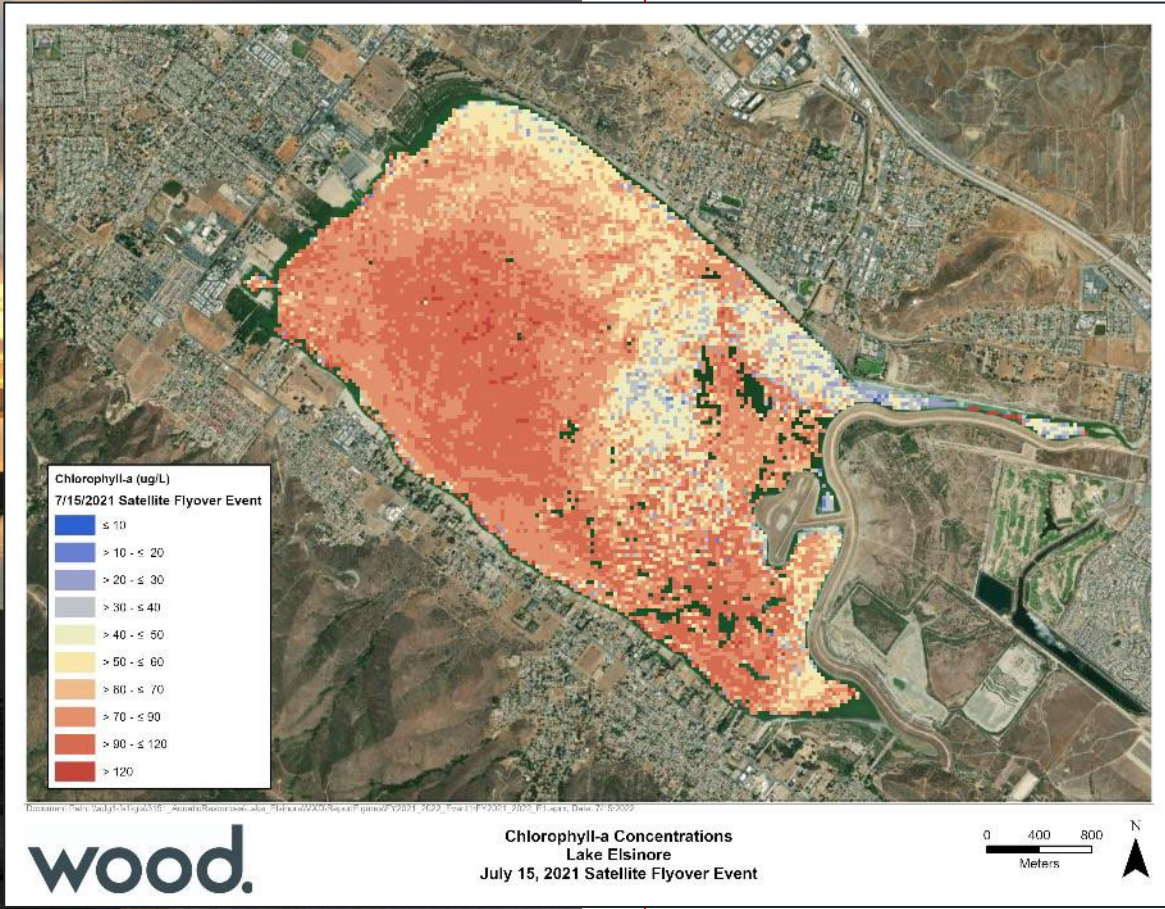


In-Lake Monitoring - Canyon Lake

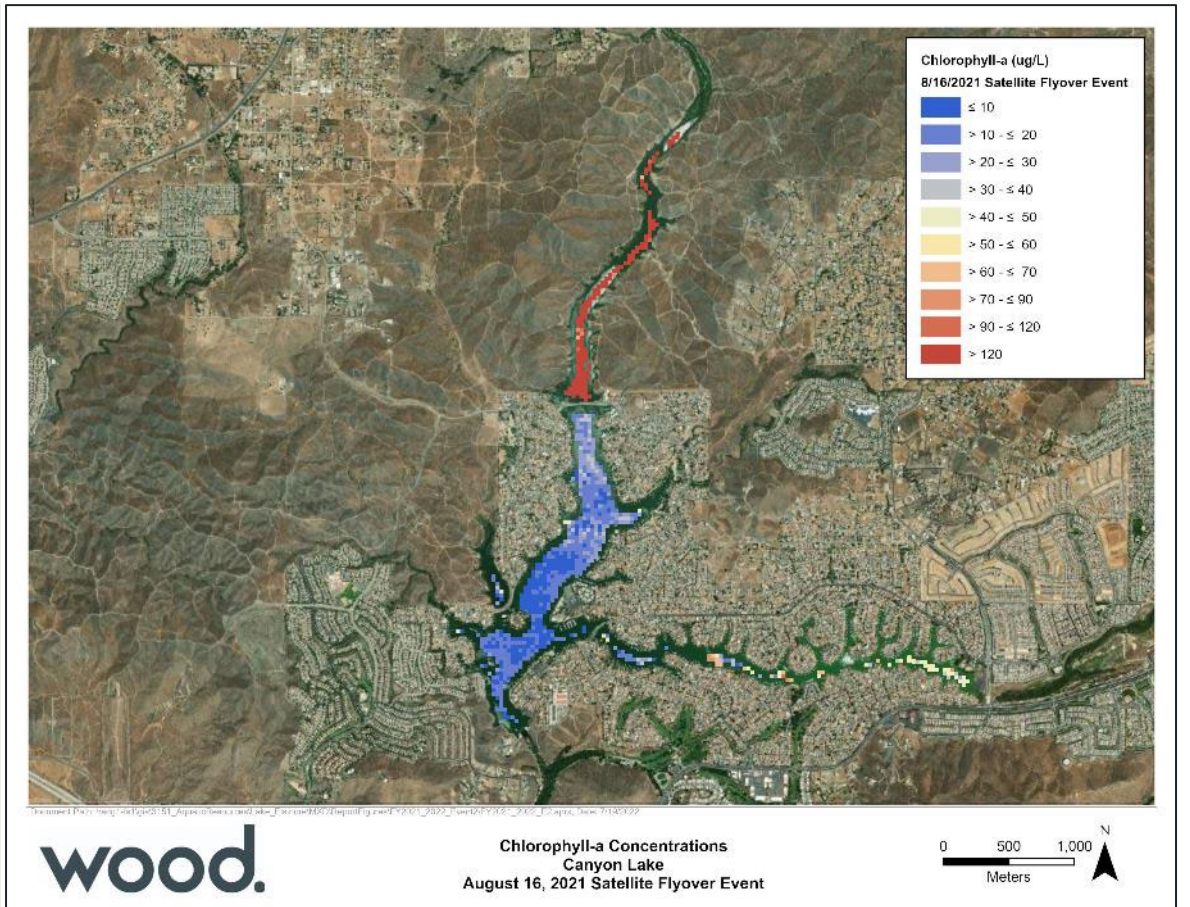
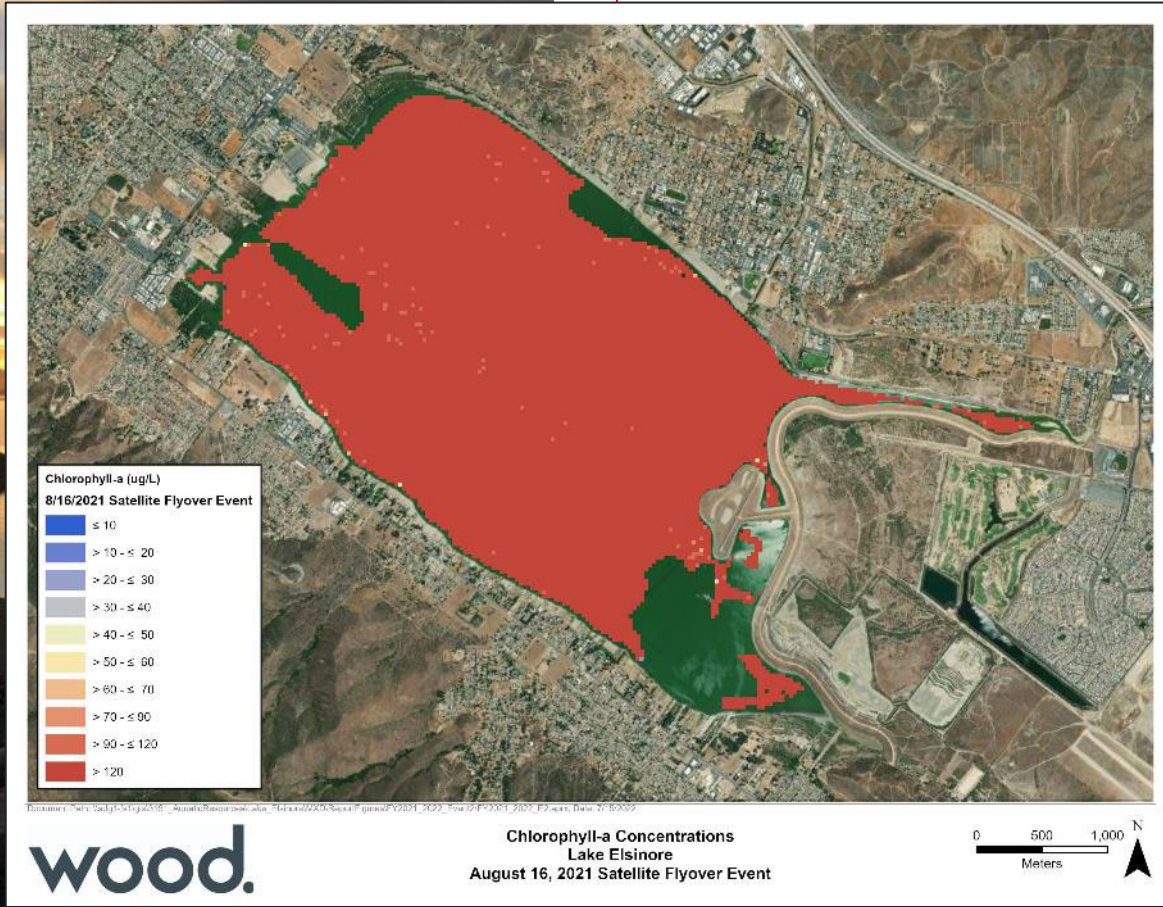


No data available from May 2005-July 2007; June 2012-Sept 2013
 TMDL target of 0.1 mg/L is annual average to be attained by 2020
 Bold represents current monitoring year July 2021-June 2022

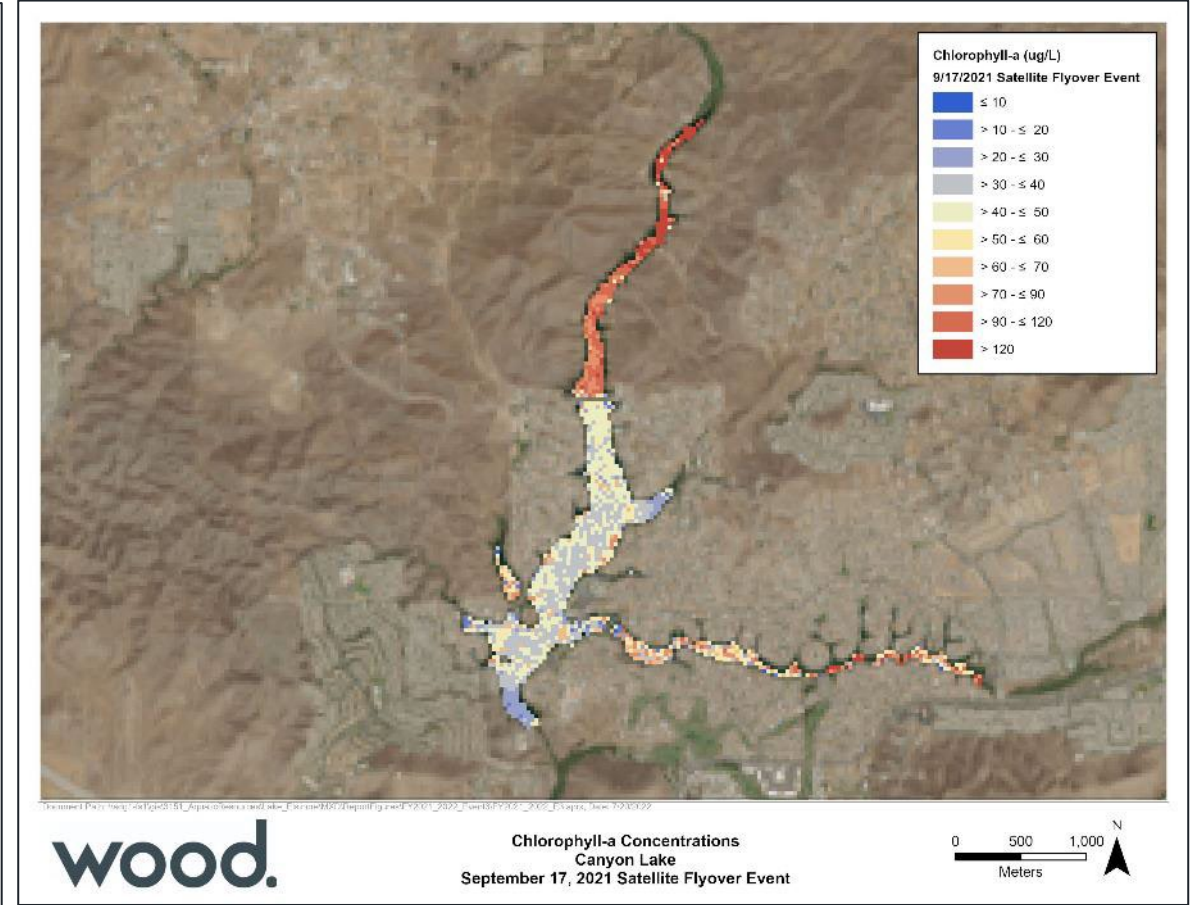
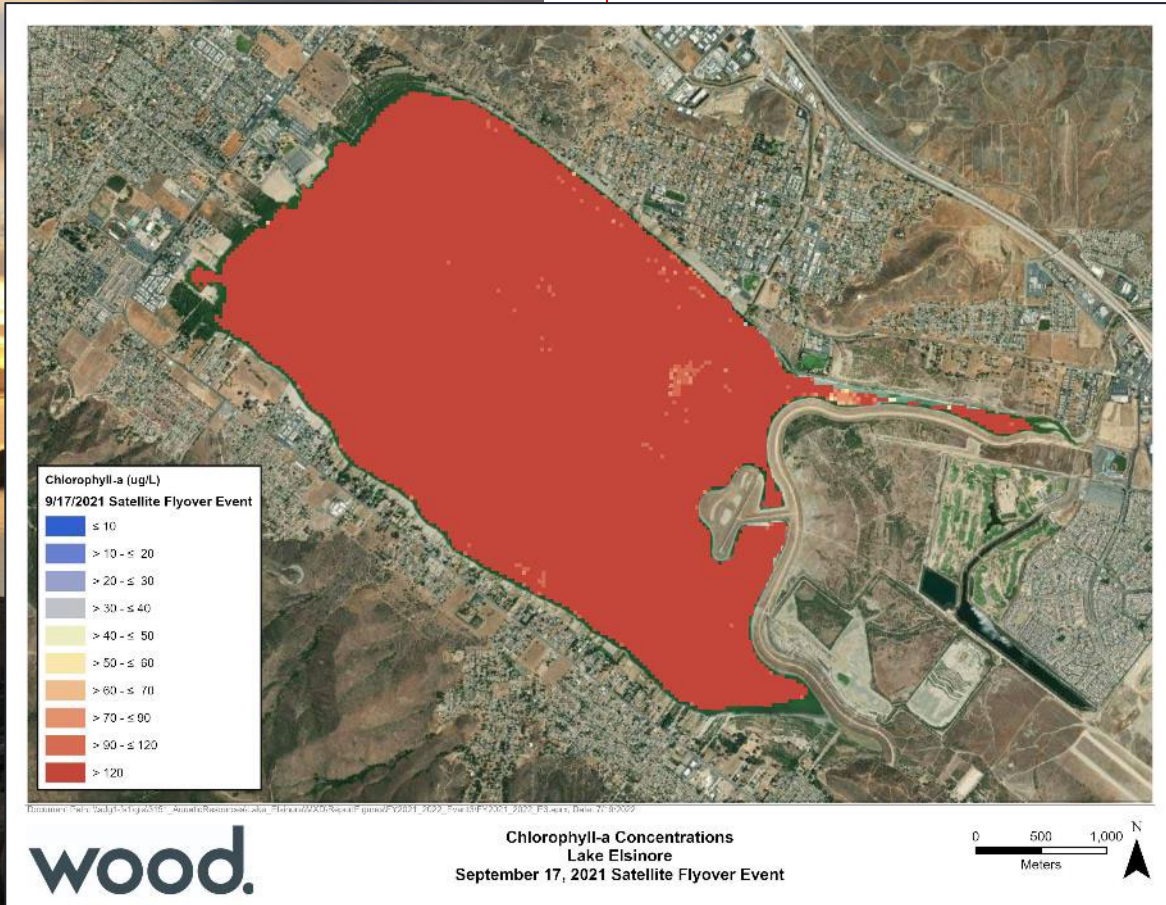
In-Lake Monitoring – Satellite July



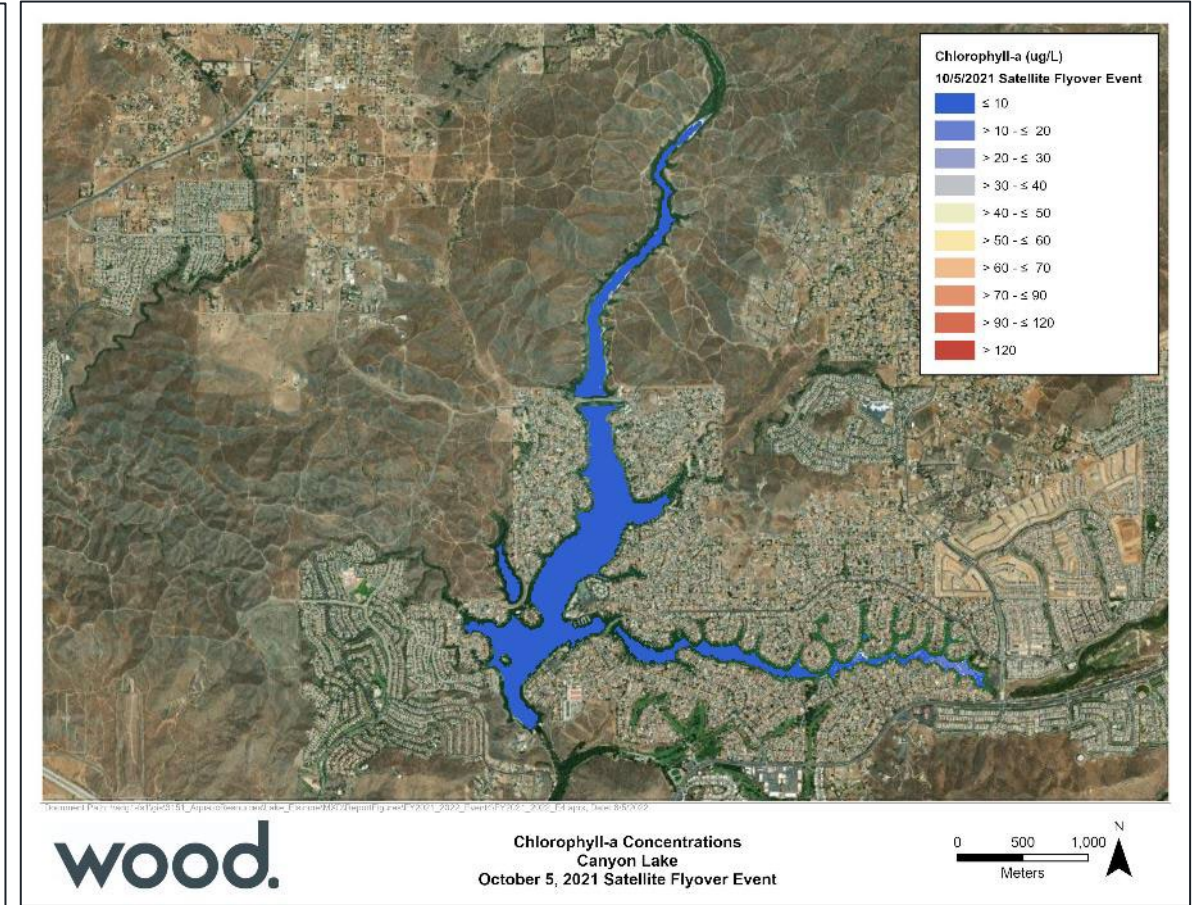
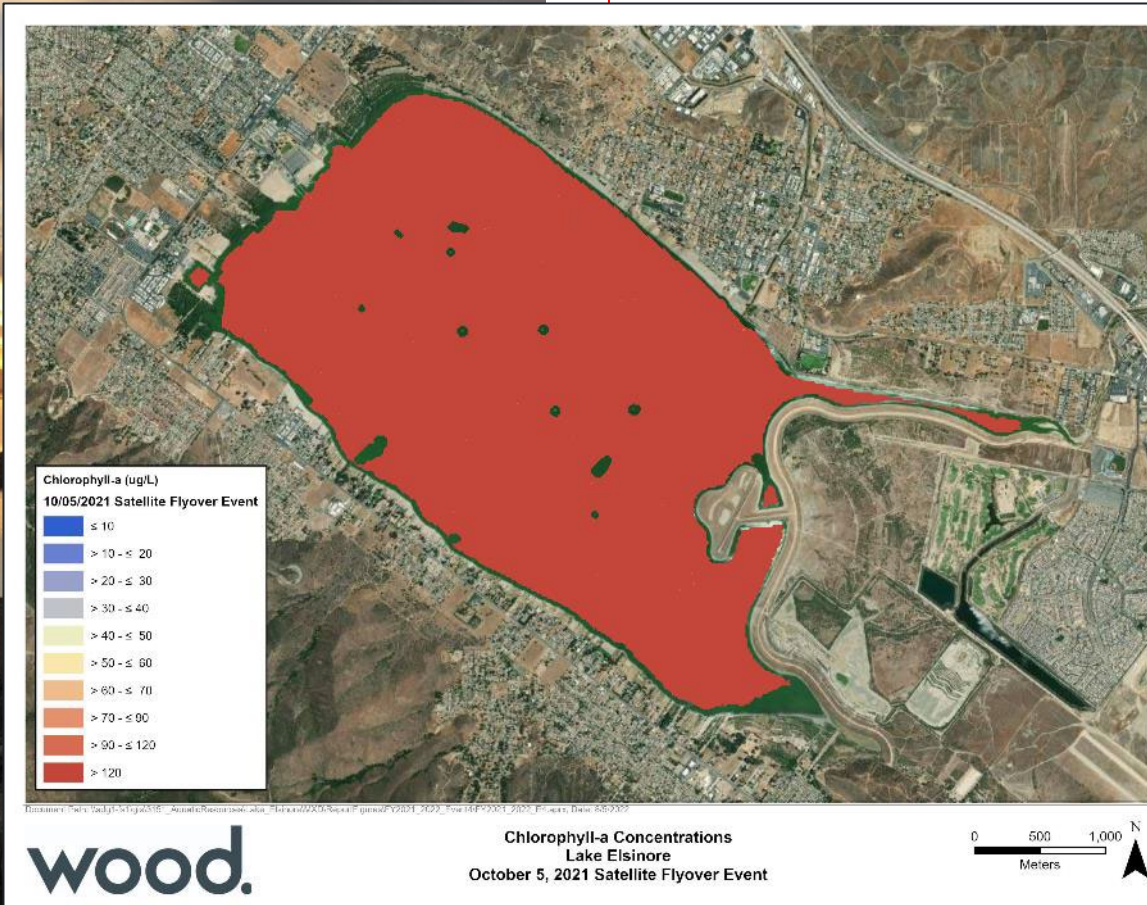
In-Lake Monitoring - Satellite August



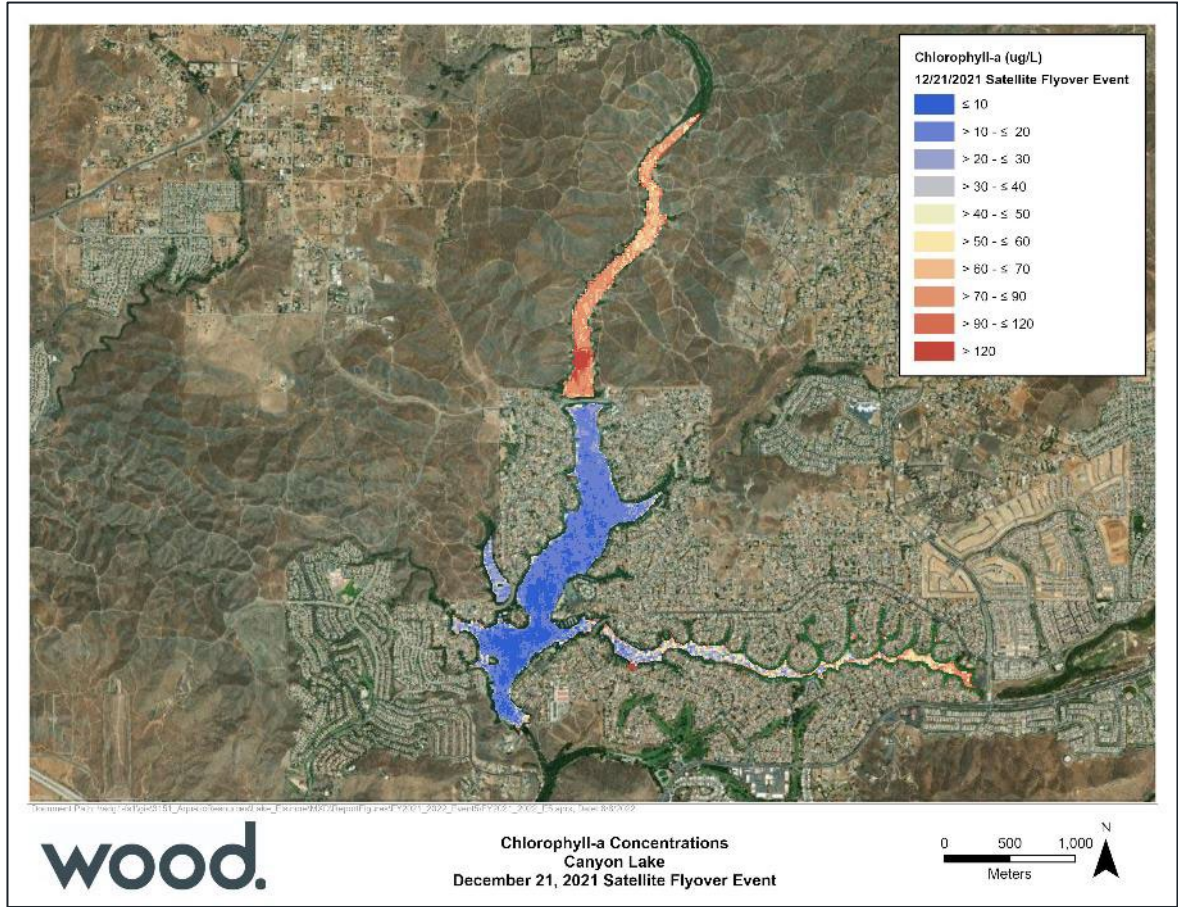
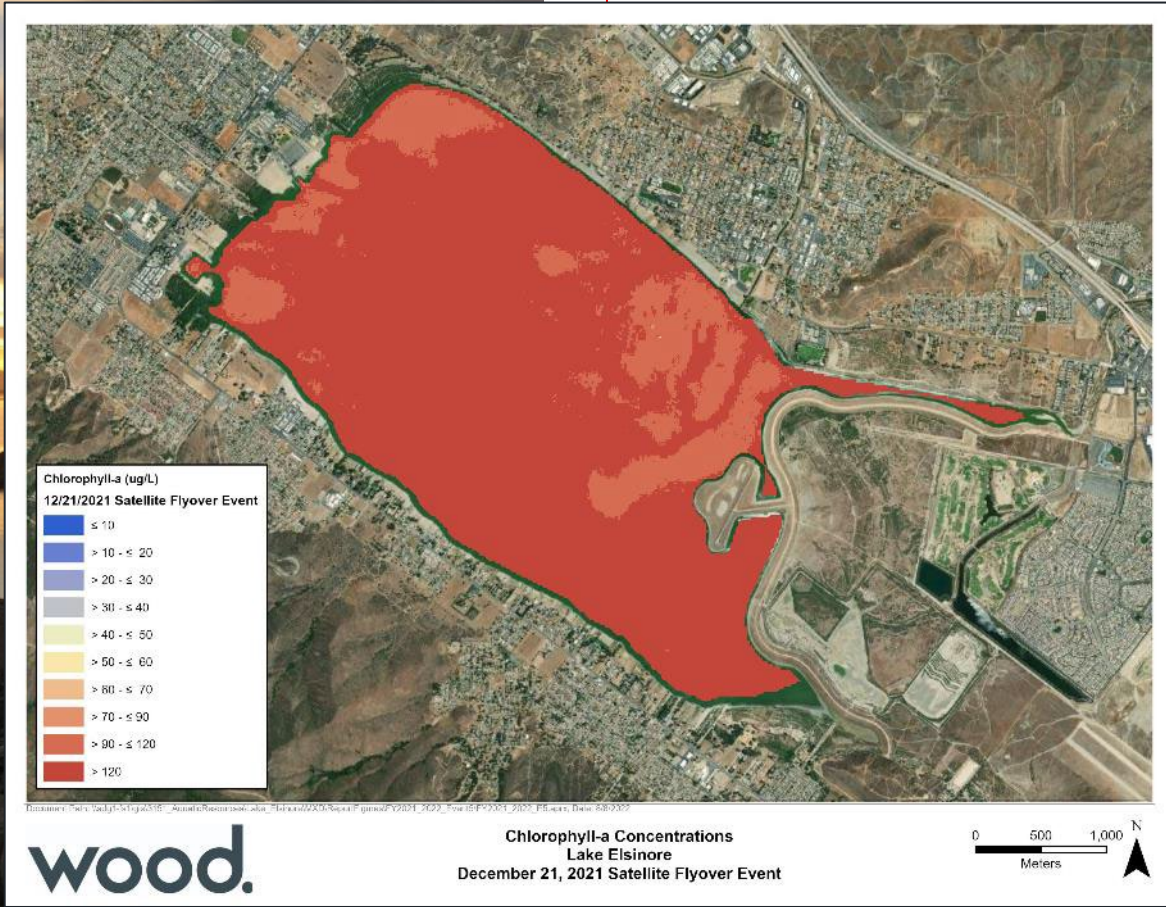
In-Lake Monitoring – Satellite September



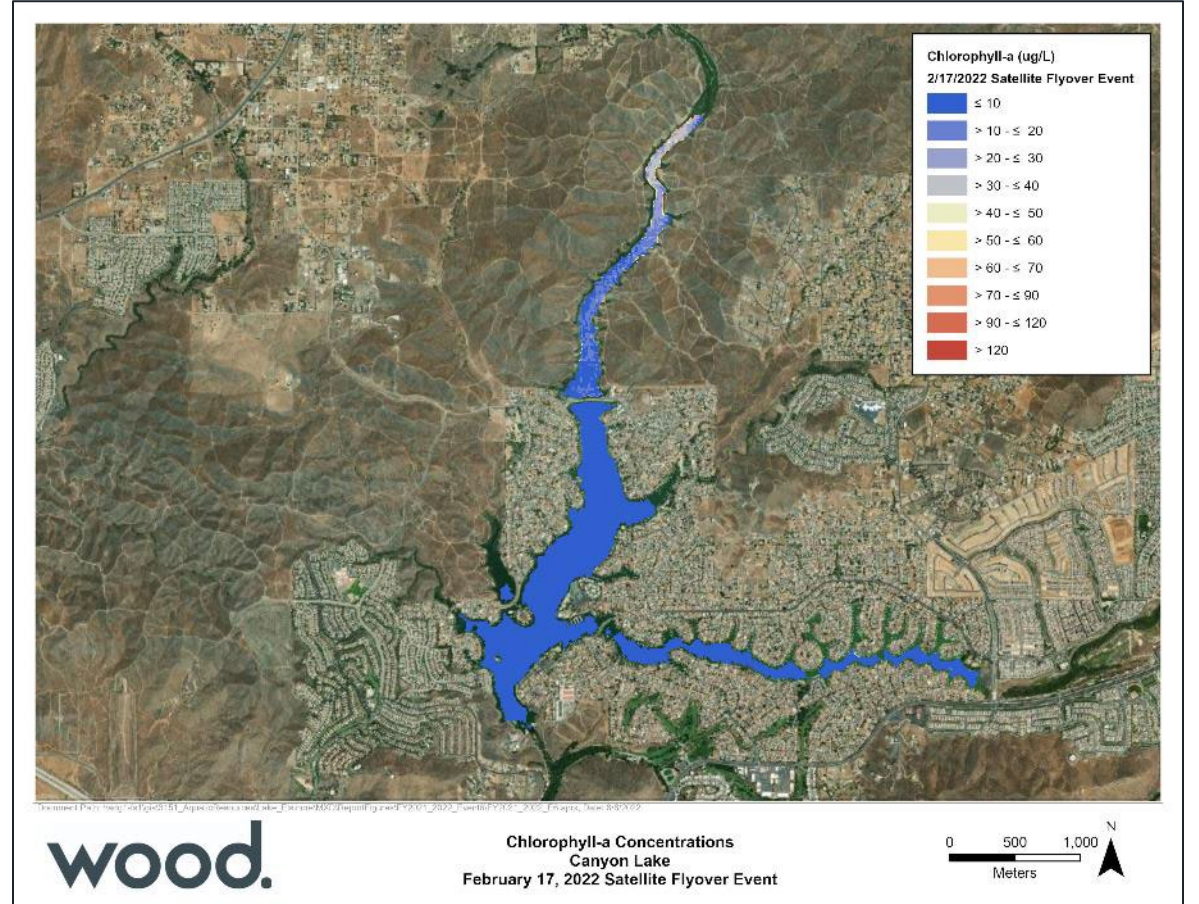
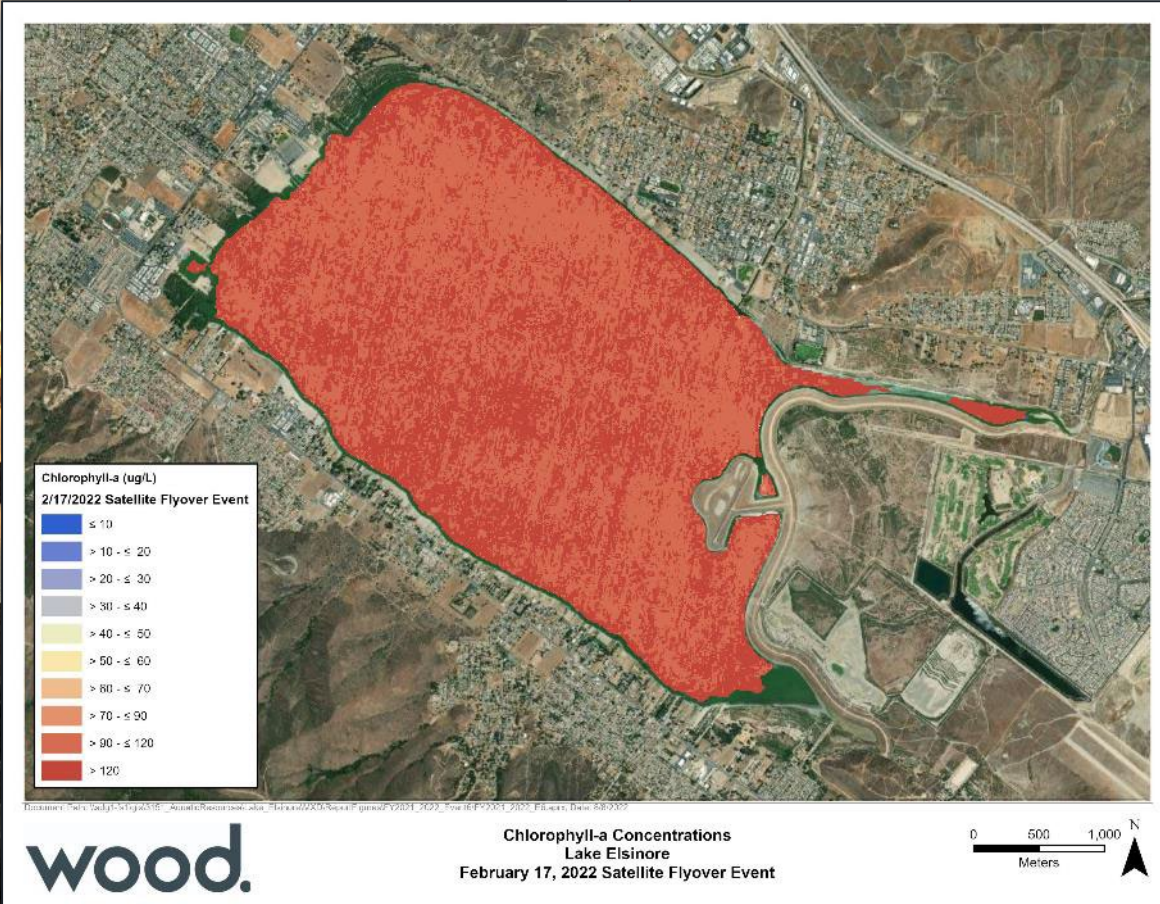
In-Lake Monitoring – Satellite October



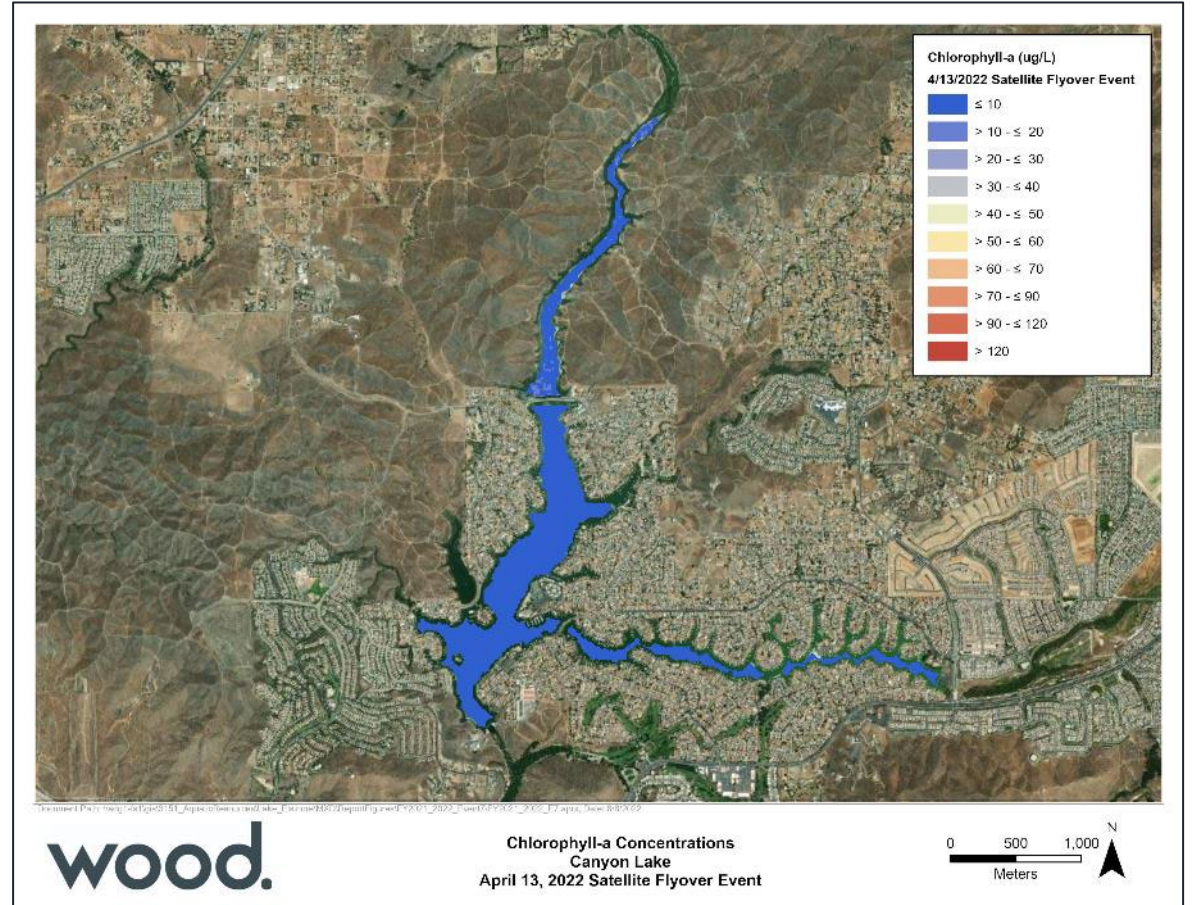
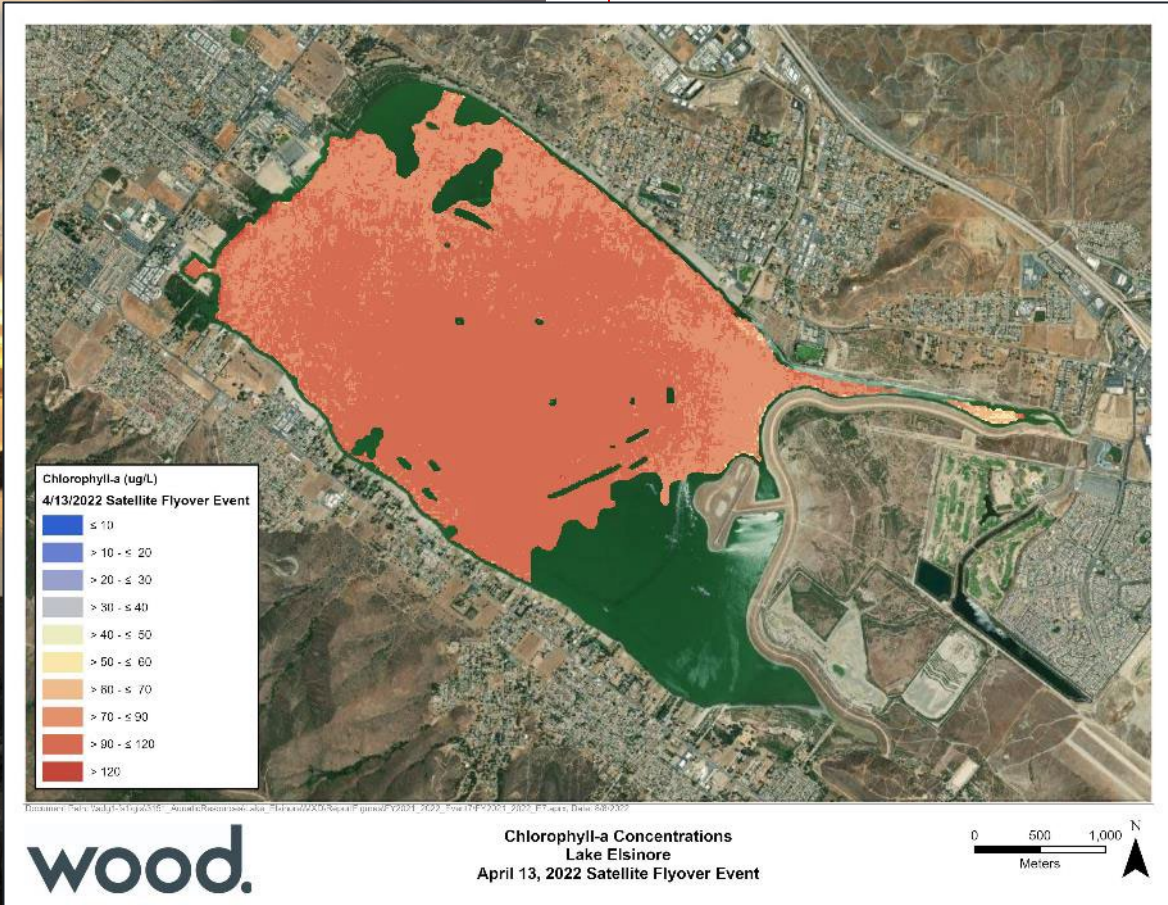
In-Lake Monitoring – Satellite December



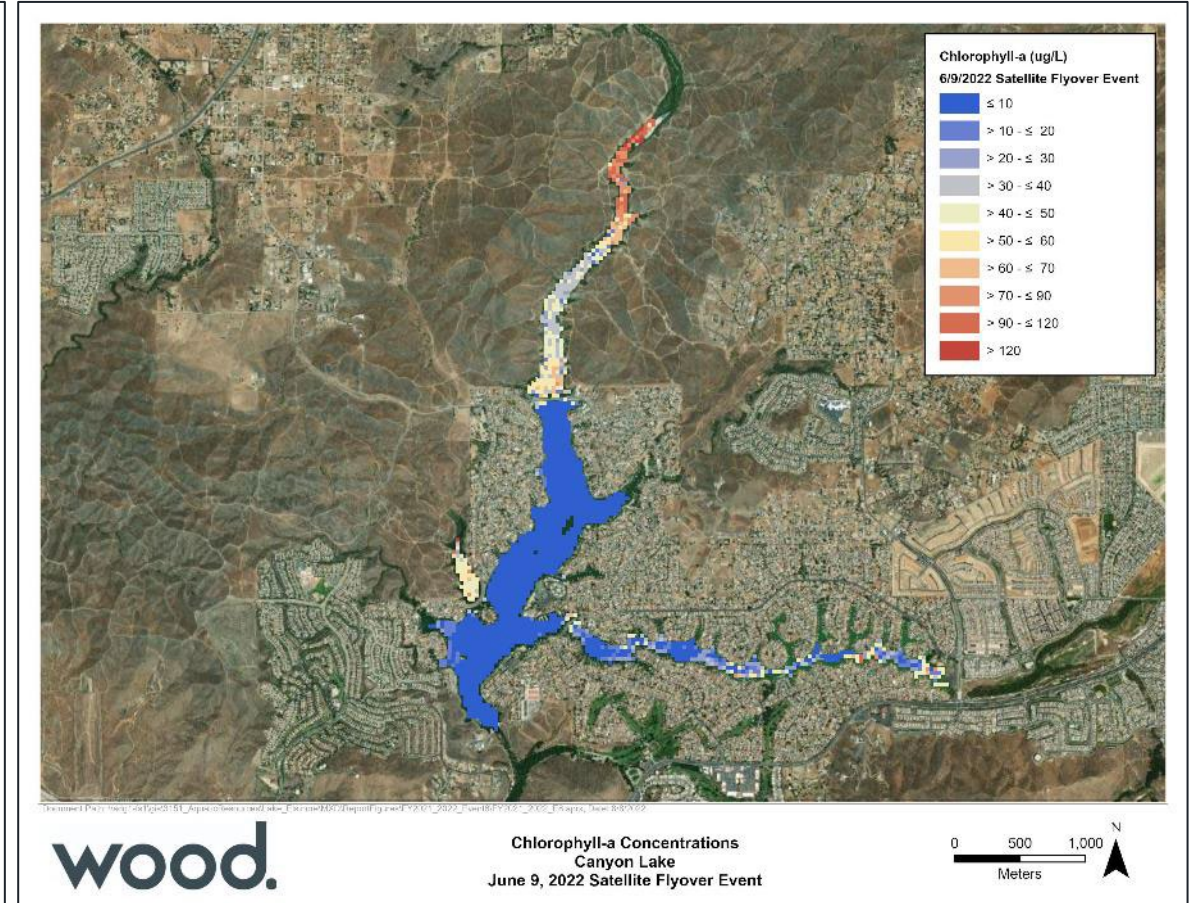
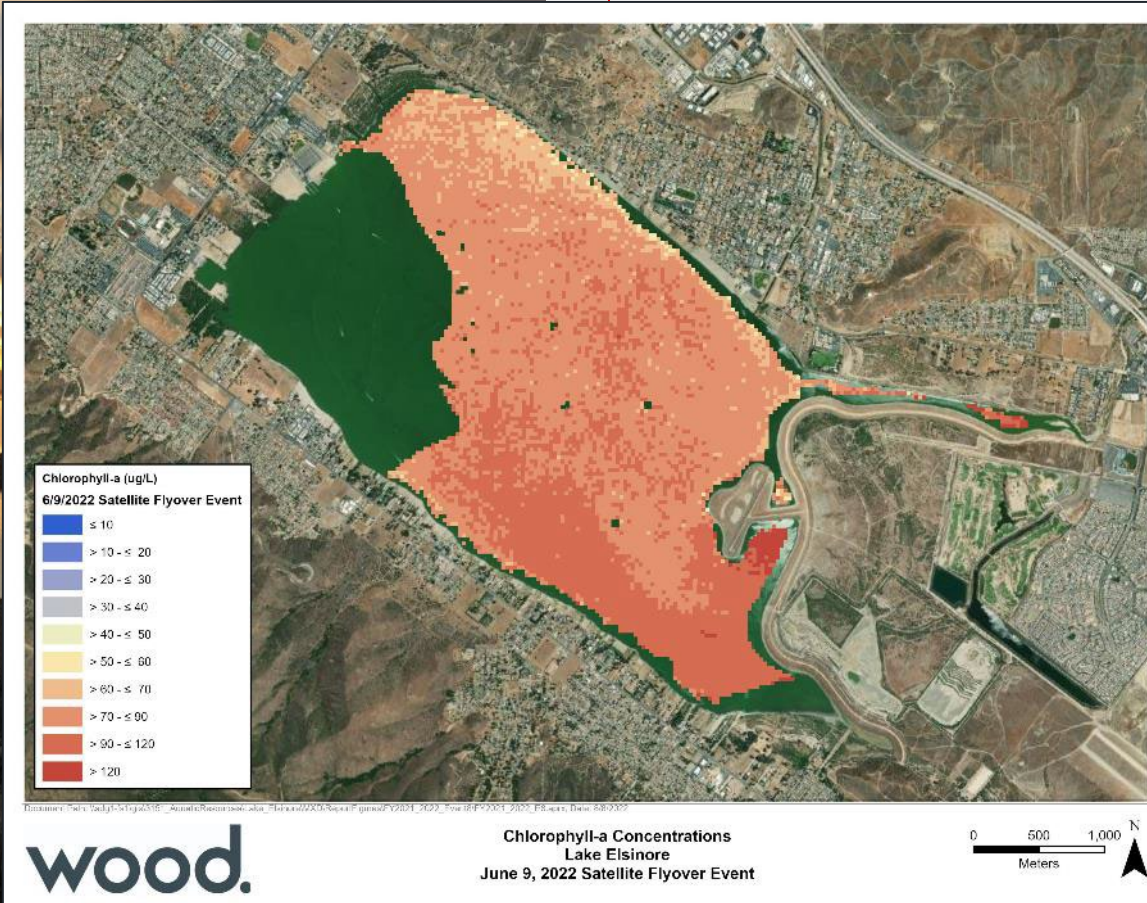
In-Lake Monitoring - Satellite February



In-Lake Monitoring – Satellite April

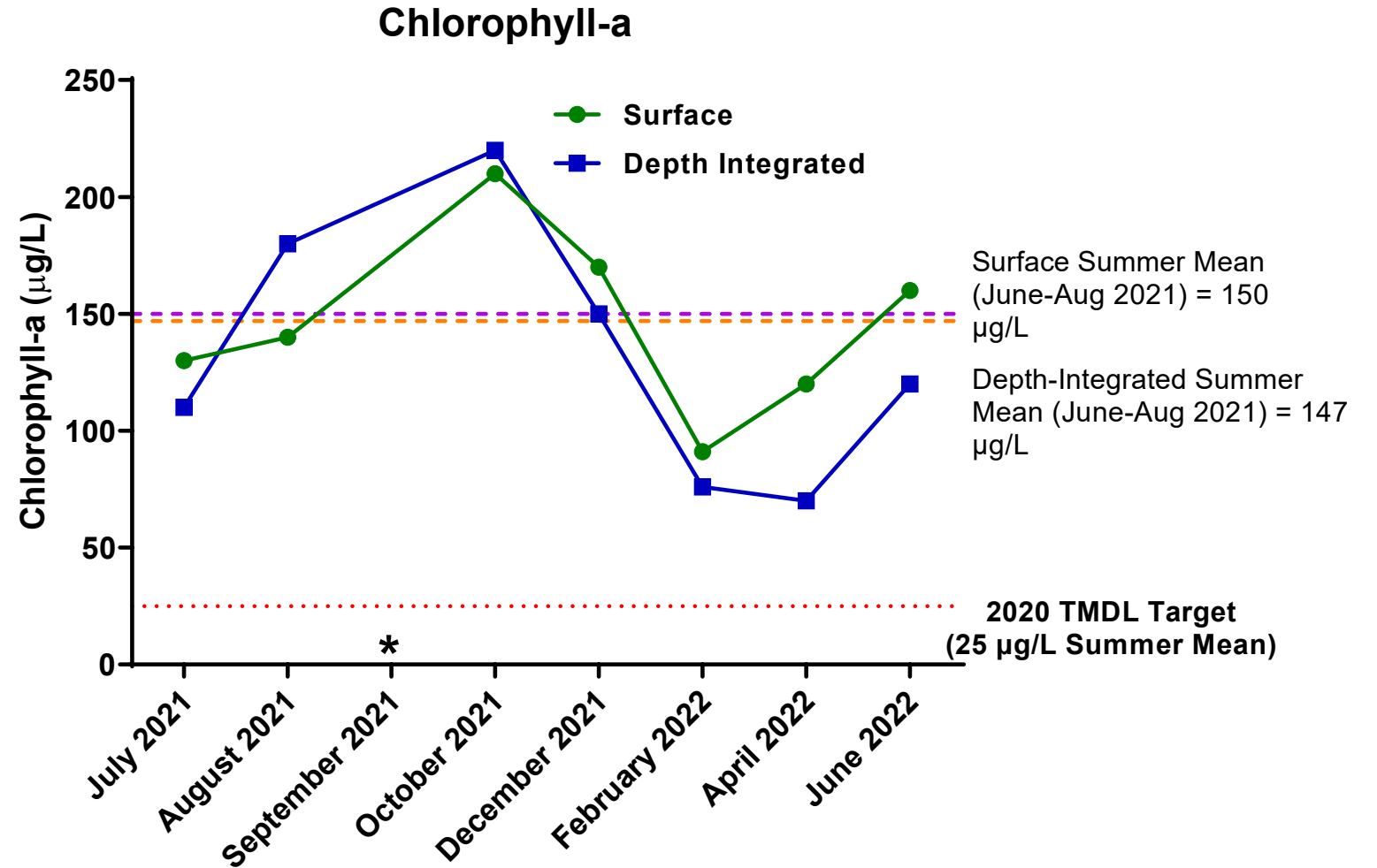


In-Lake Monitoring – Satellite June





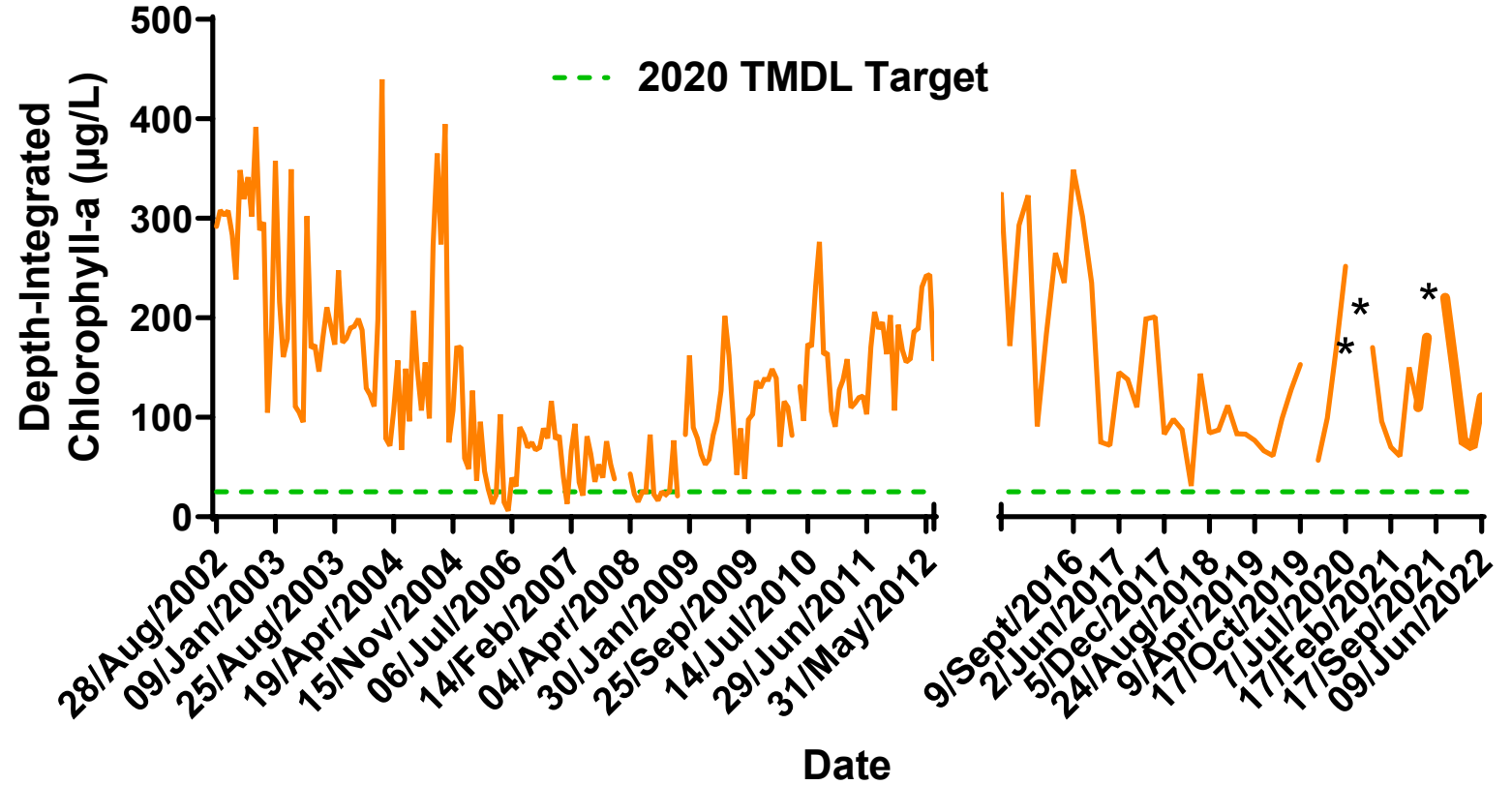
In-Lake Monitoring – Lake Elsinore



* - Not measured due to laboratory error.



In-Lake Monitoring – Lake Elsinore



No data available from June 2012-July 2015

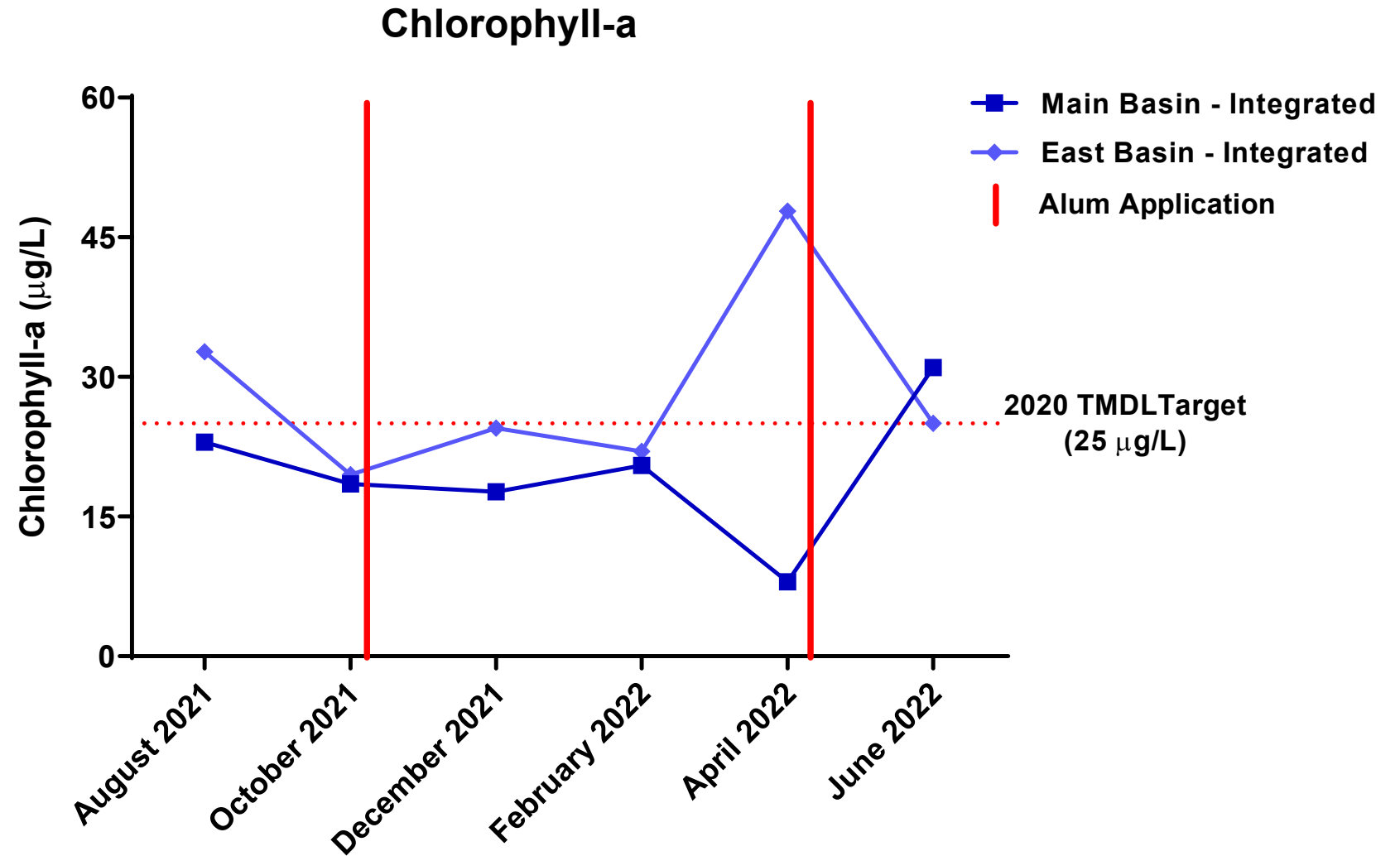
TMDL target of 25 µg/L is summer average to be attained by 2020

Bold represents current monitoring year July 2021- June 2022

*Not measured due to laboratory error. See report for details.

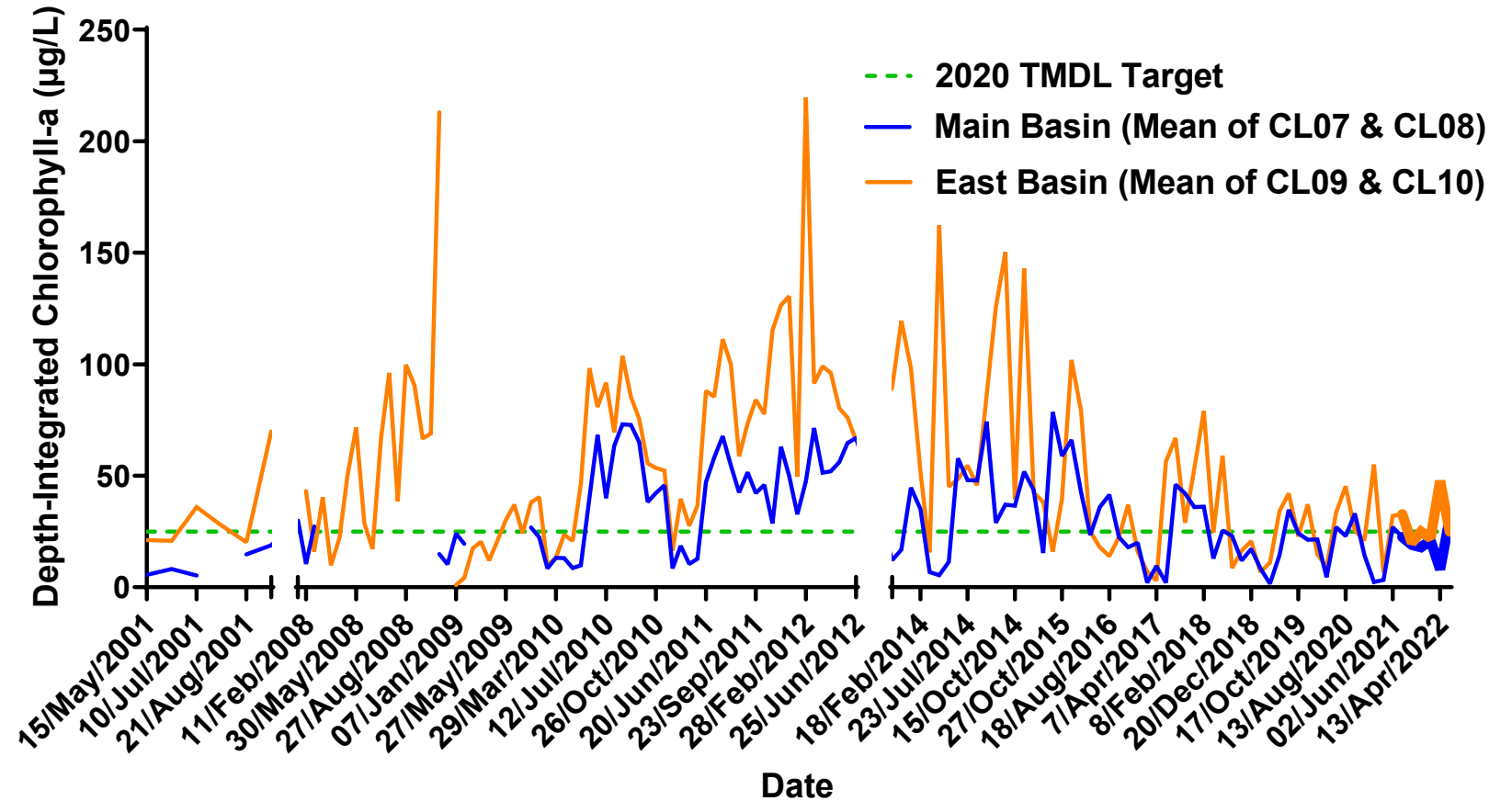


In-Lake Monitoring – Canyon Lake





In-Lake Monitoring – Canyon Lake



No data available from June 2012-July 2015

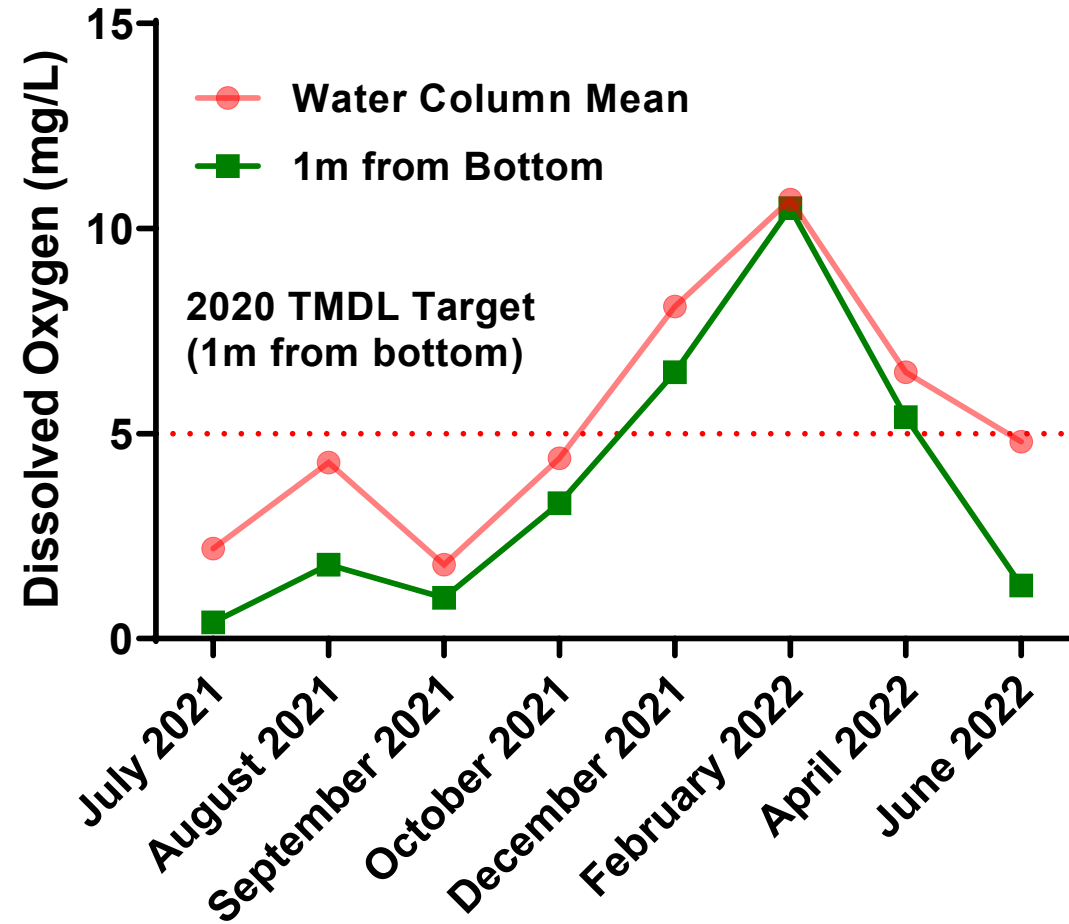
2020 TMDL target of 25 µg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2021-June 2022



In-Lake Monitoring – Lake Elsinore

Dissolved Oxygen

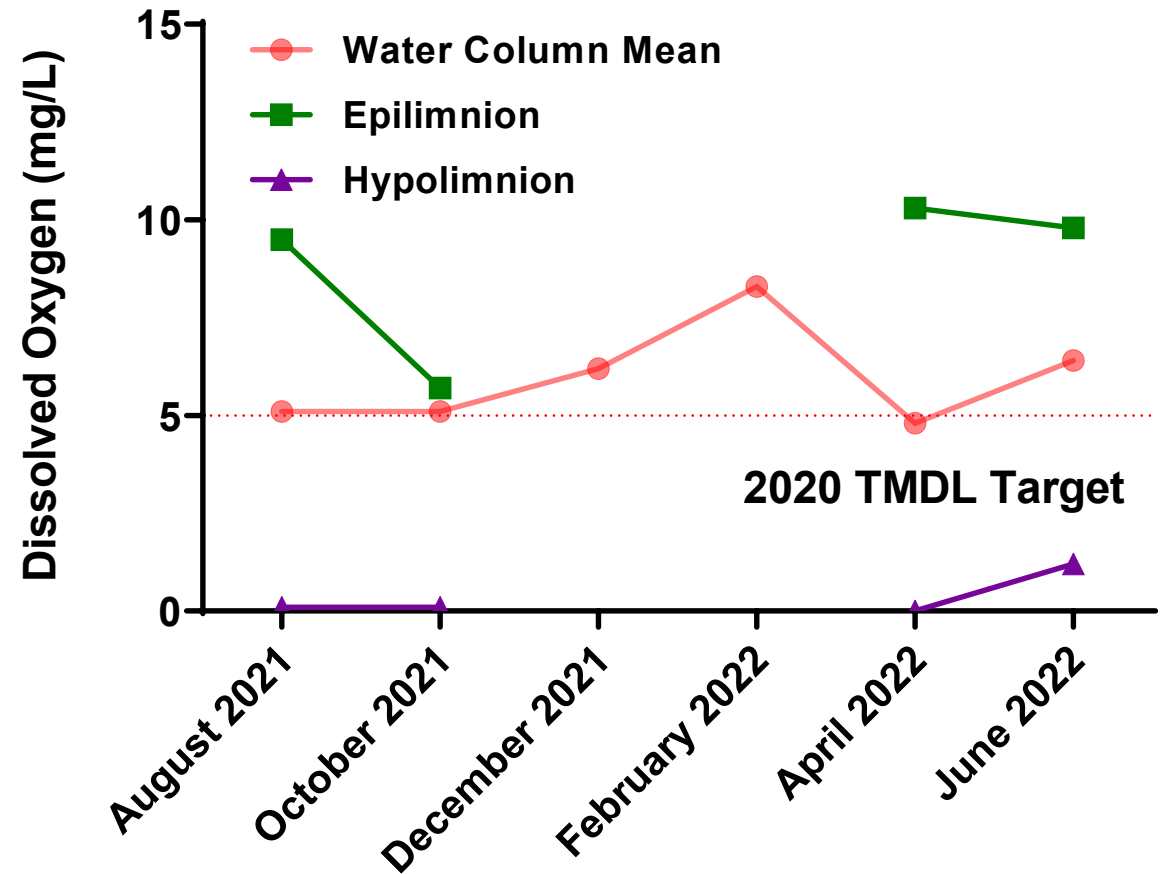




In-Lake Monitoring – Canyon Lake

**Main Basin
Mean of Sites
CL07 & CL08**

Dissolved Oxygen



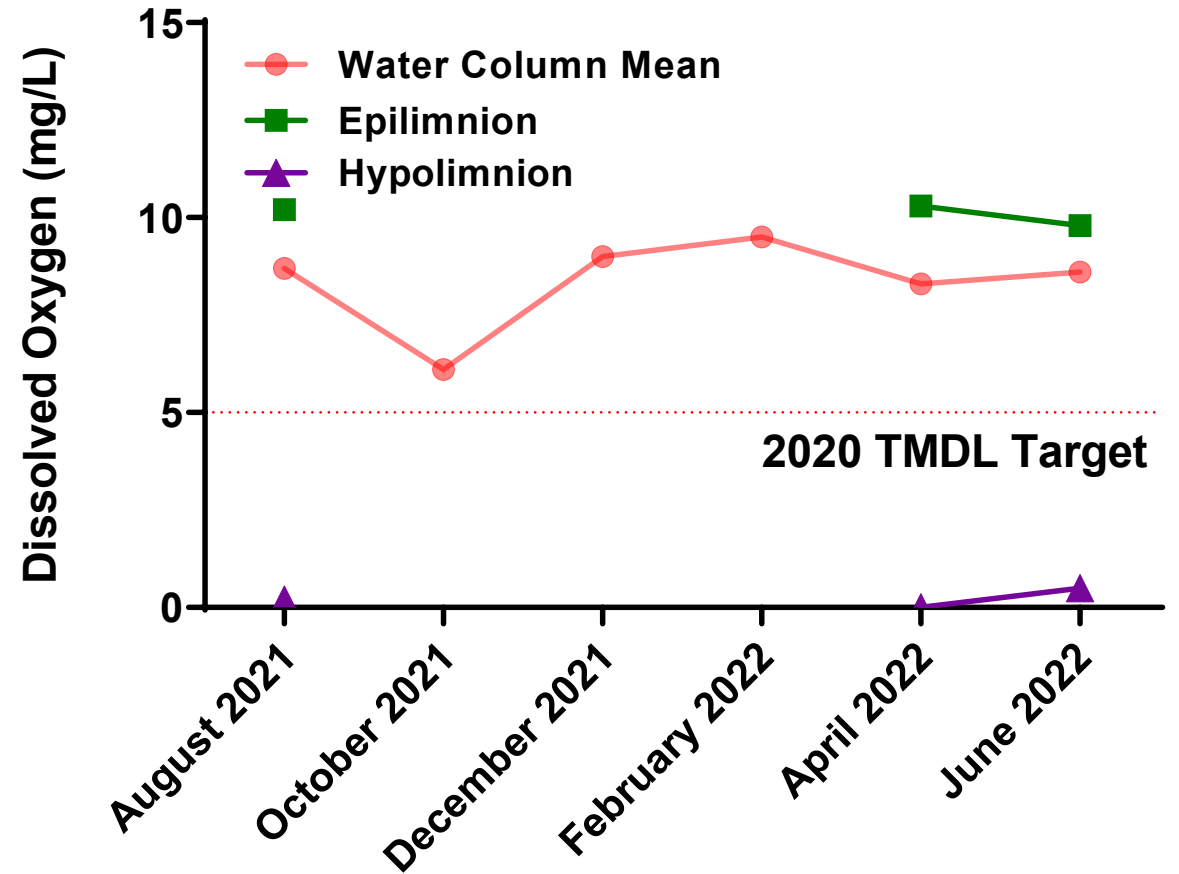
No stratification in December and February



In-Lake Monitoring – Canyon Lake

East Basin
Mean of Sites
CL09 & CL10

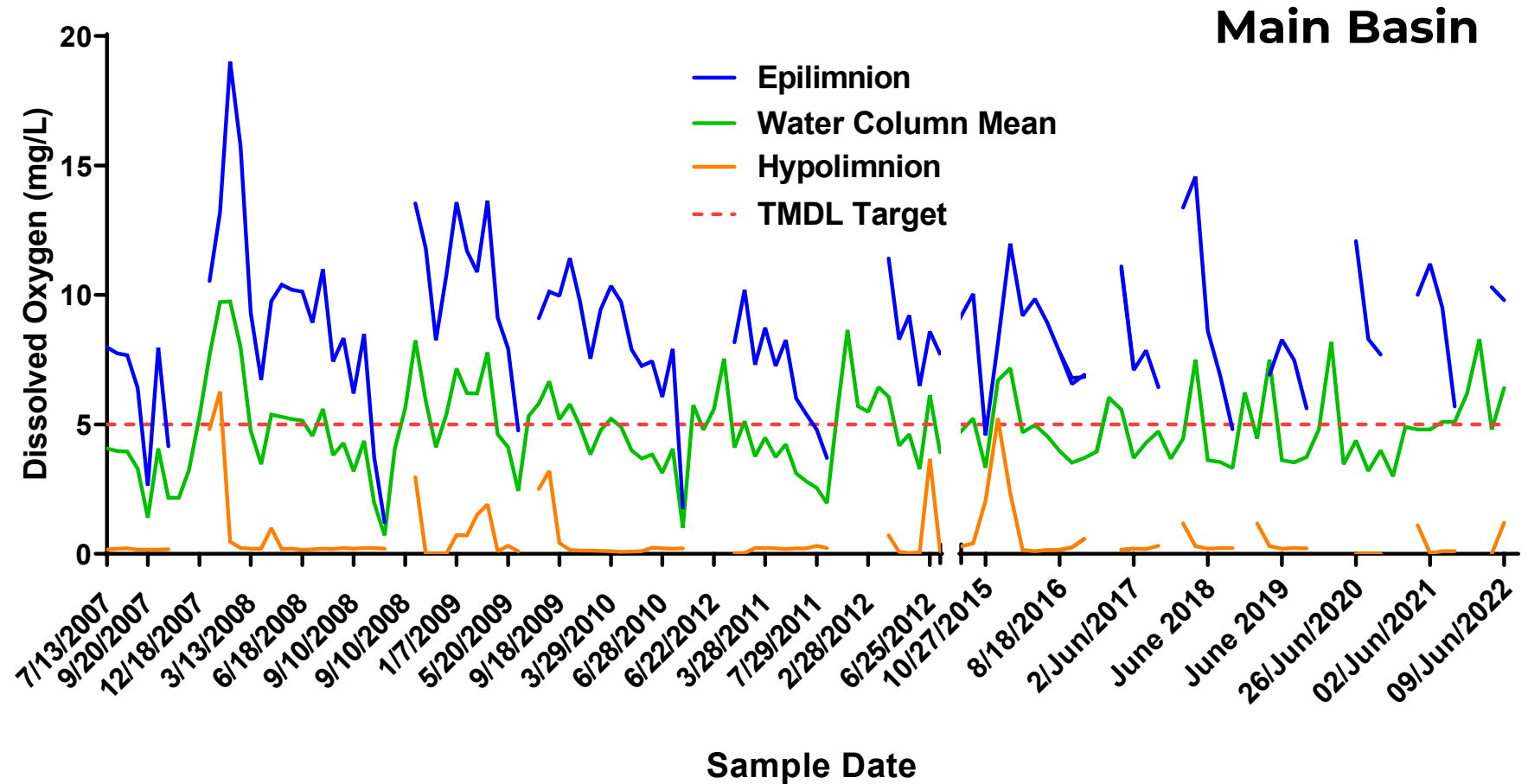
Dissolved Oxygen



No stratification in October, December, and February



In-Lake Monitoring – Canyon Lake



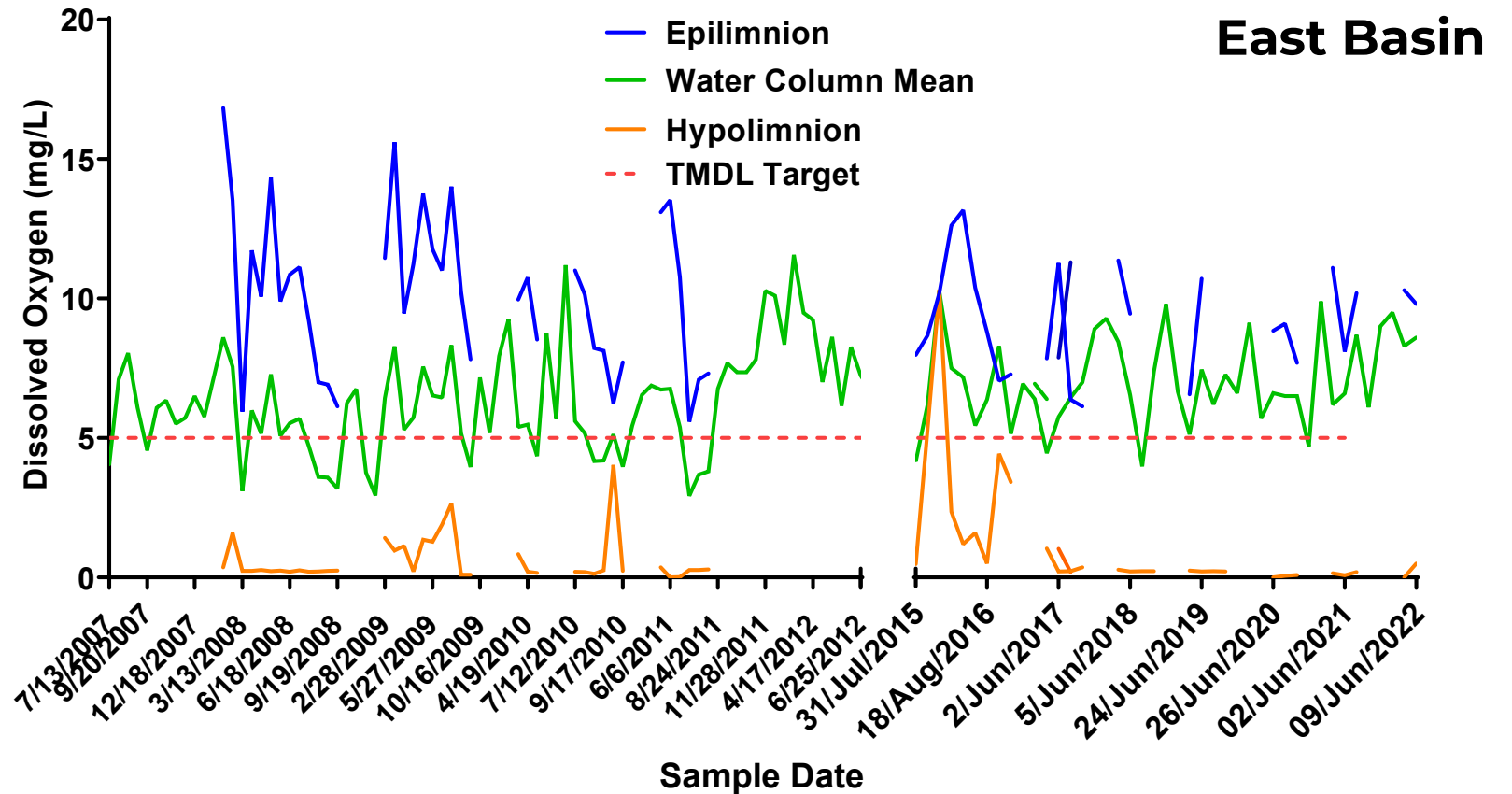
No data available from June 2012 - July 2015

Data represents average values of sites CL07 and CL08

TMDL 2015 target >5 mg/L in Epilimnion, 2020 target >5 mg/L in Hypolimnion



In-Lake Monitoring – Canyon Lake



No data available from June 2012 - July 2015

Data represents average values of sites CL09 and CL10

TMDL 2015 target >5 mg/L in Epilimnion, 2020 target >5 mg/L in Hypolimnion



Questions?



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