

Lake Elsinore and Canyon Lake TMDL Water Quality Monitoring Update – 2020-2021 Summary



wood.
N|V|5
ALTA
ENVIRONMENTAL

August 30, 2021

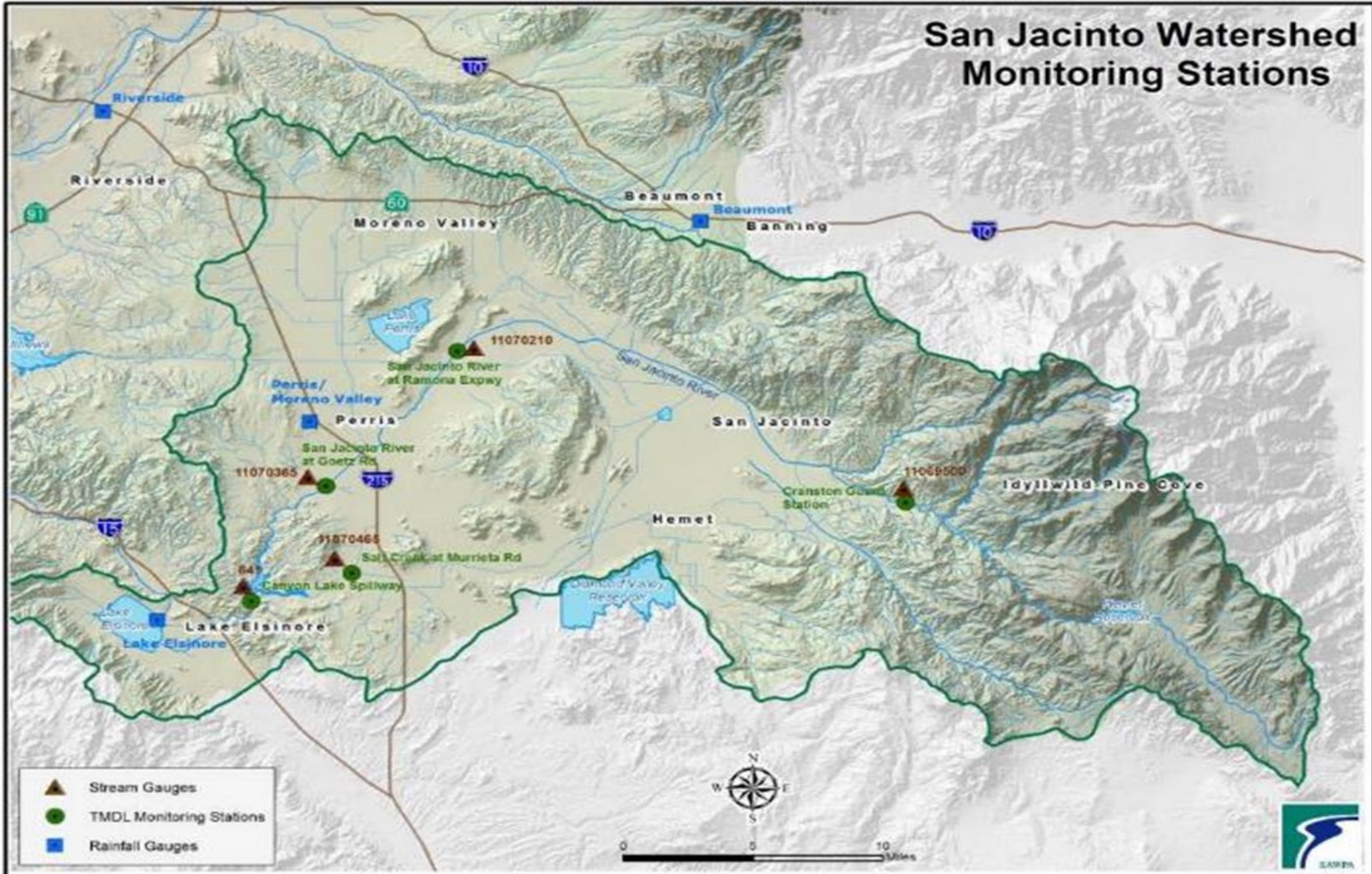
Lake Elsinore and Canyon Lake TMDL Water Quality Monitoring Update – 2020-2021 Summary



Watershed
Monitoring



San Jacinto Watershed Monitoring Stations



- ▲ Stream Gauges
- TMDL Monitoring Stations
- Rainfall Gauges

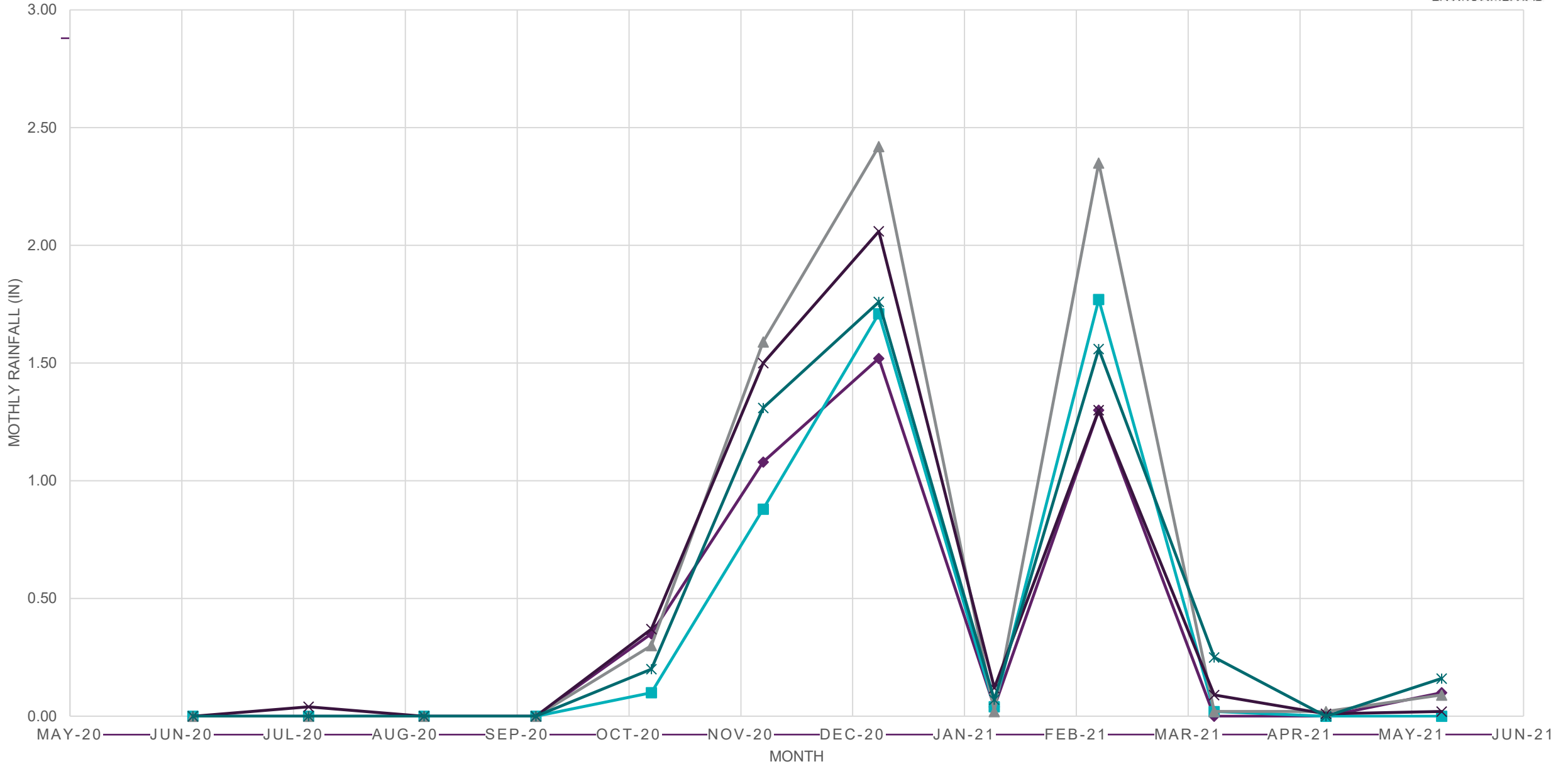


0 5 10 Miles



SUMMARY OF 2020-2021 RAINFALL

◆ Lake Elsinore ■ Perris CDF ▲ Pigeon Pass ✕ Hemet / San Jacinto * Winchester



Summary of 2020-2021 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)	255	1.9	0.39	1,902	396
Site 4 - San Jacinto River at Goetz Road (USGS 11070365)	519	1.9	0.48	3,794	992
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)	878	1.7	0.05	5,626	175

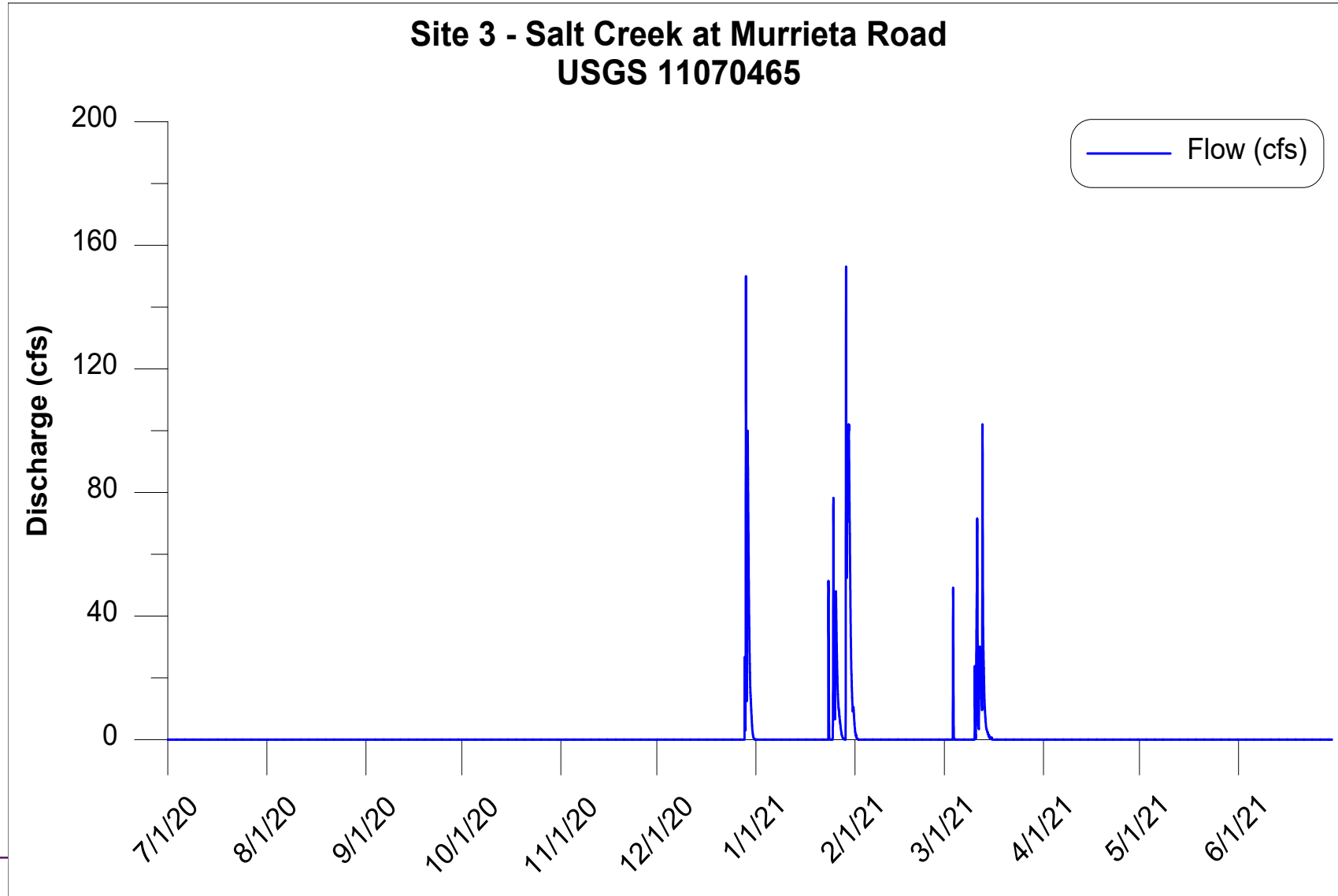
a - Flow data after 04/27/2021 are provisional and may be subject to change.

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.

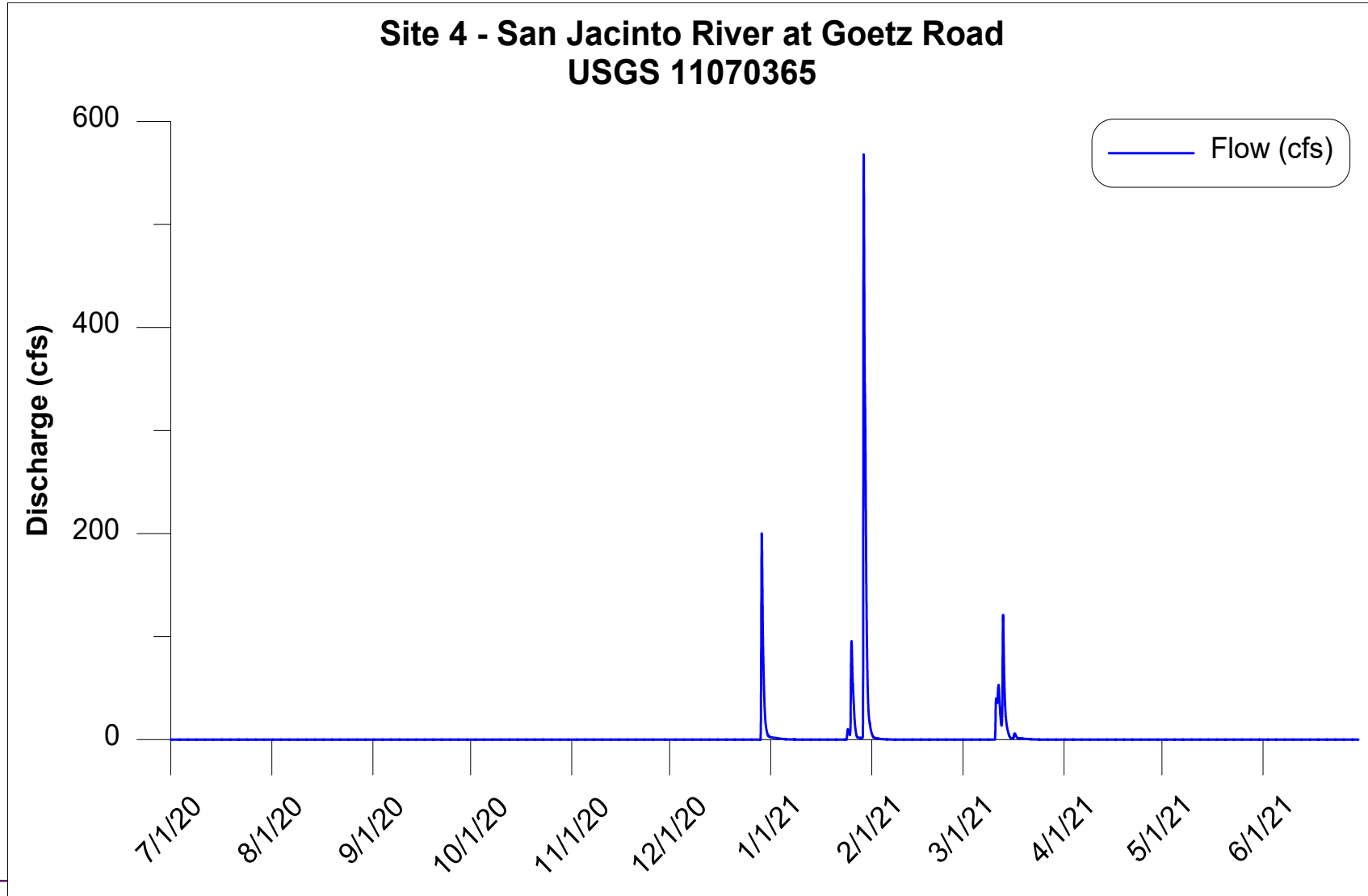
c - The USGS stream gauge at Site 30 (USGS 11070500) is located downstream of Canyon Lake on the San Jacinto River close to the river entrance to Lake Elsinore. This downstream location is influenced by local urban runoff and groundwater seepage in addition to the flows from Canyon Lake. In addition, 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.

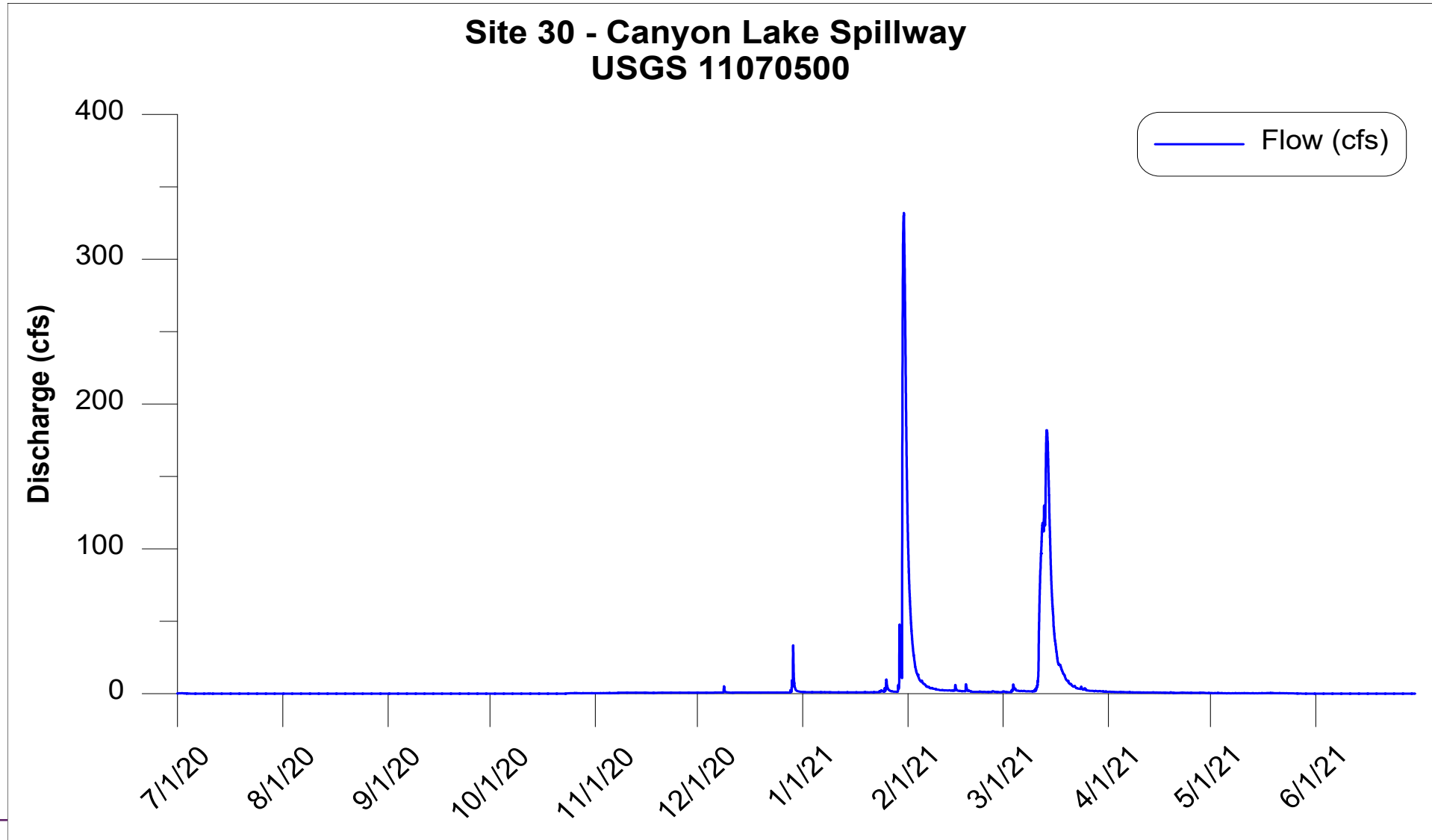
2020-2021 Annual Hydrograph



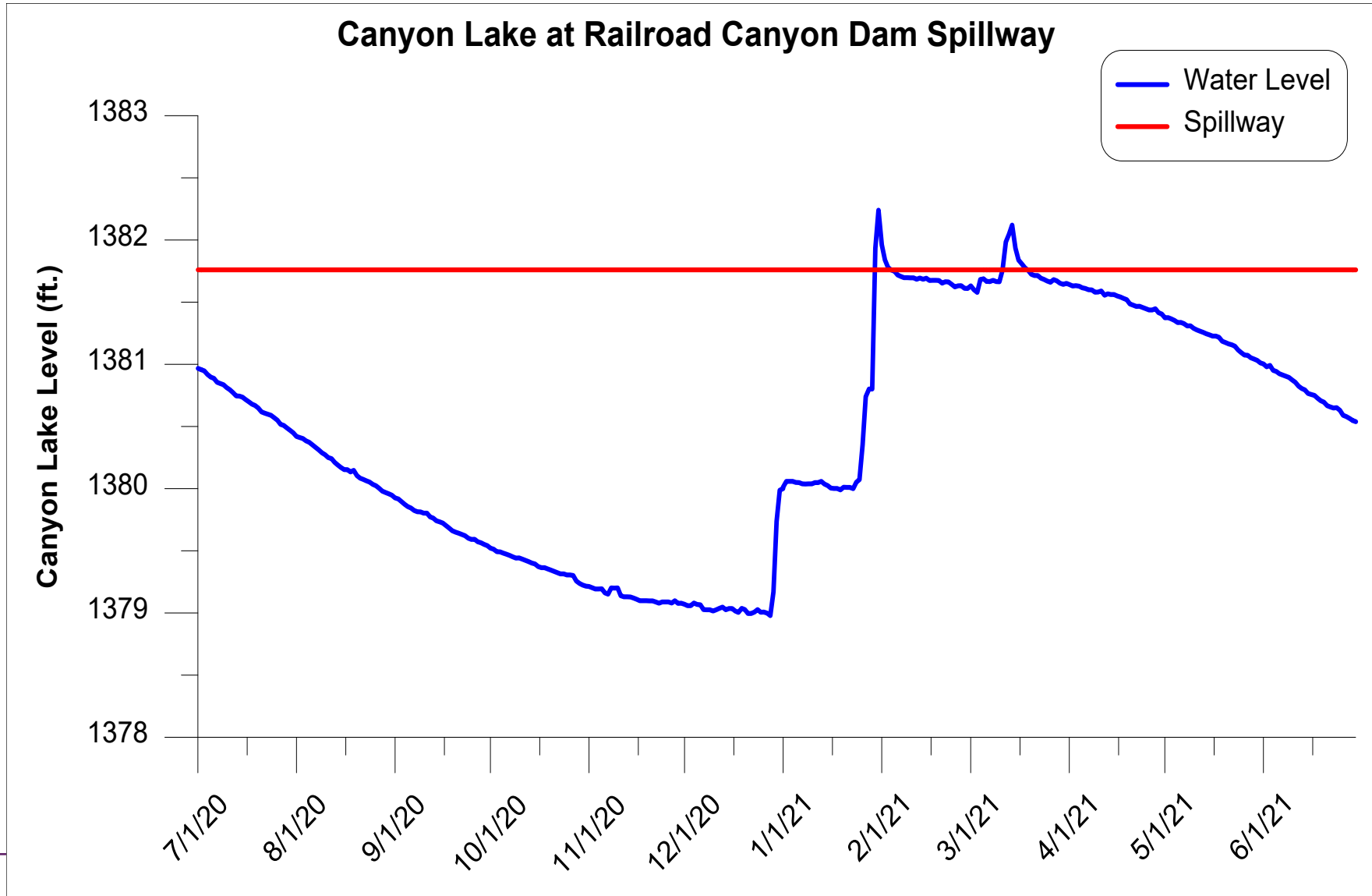
2020-2021 Annual Hydrograph



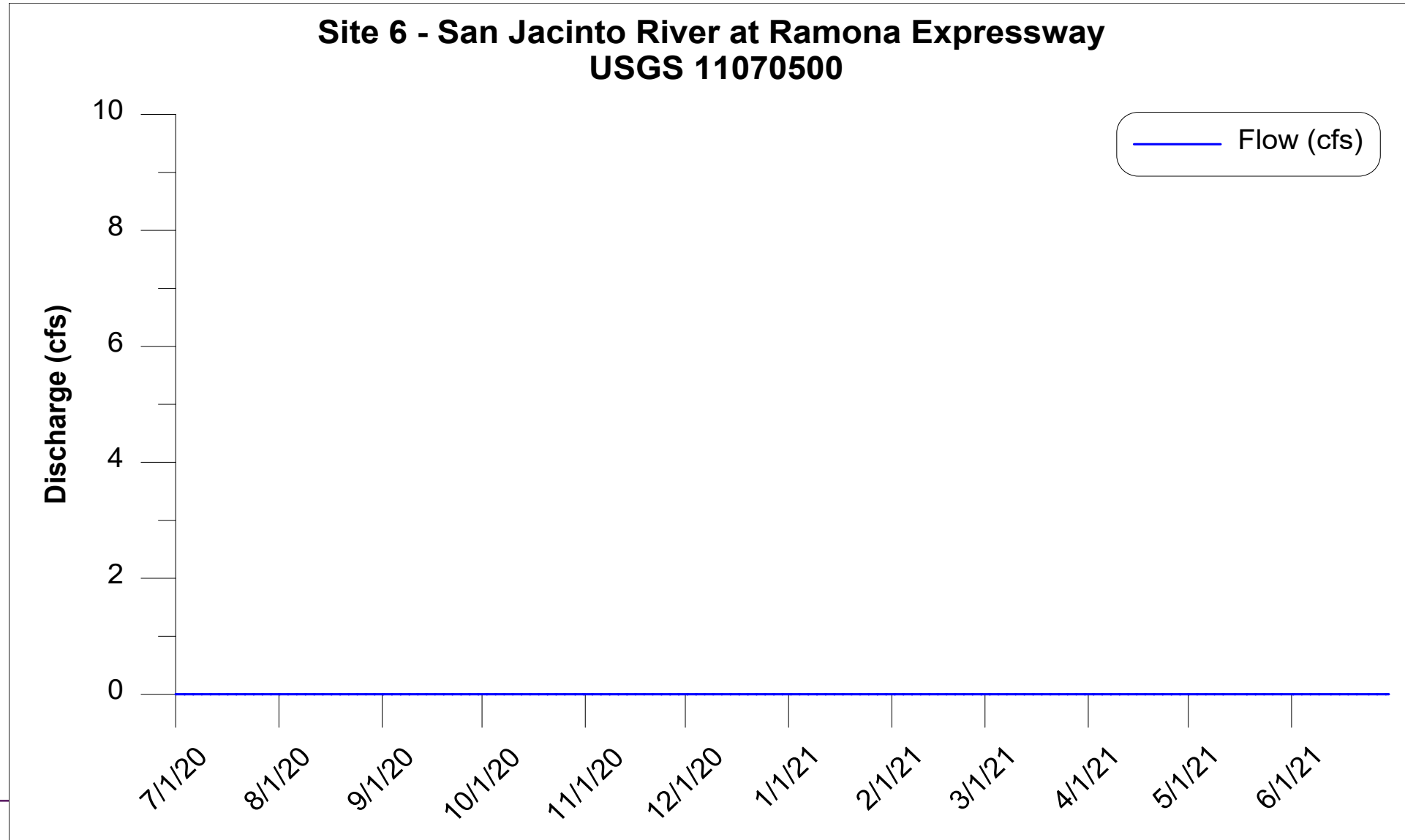
2020-2021 Annual Hydrograph



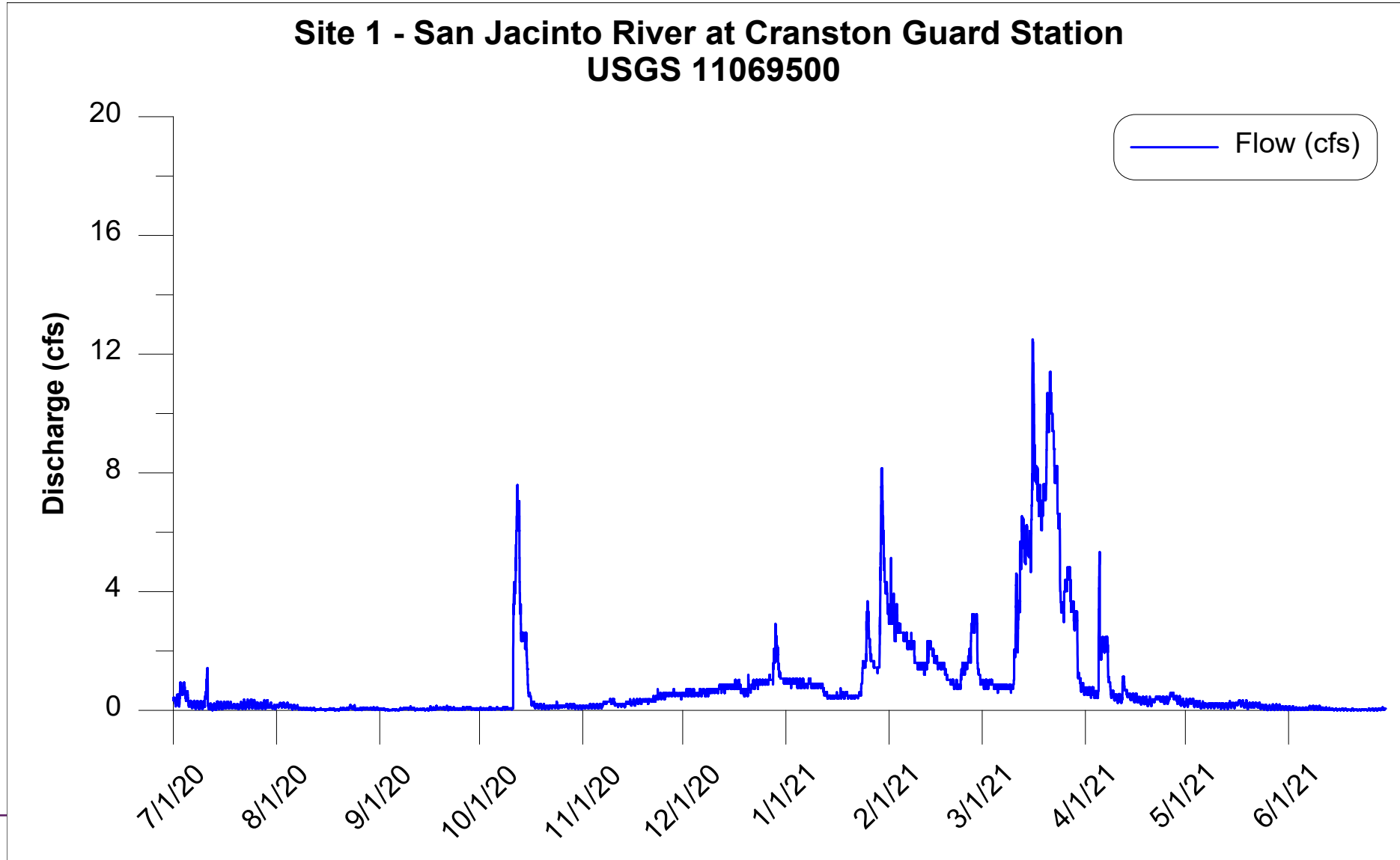
2020-2021 Annual Hydrograph



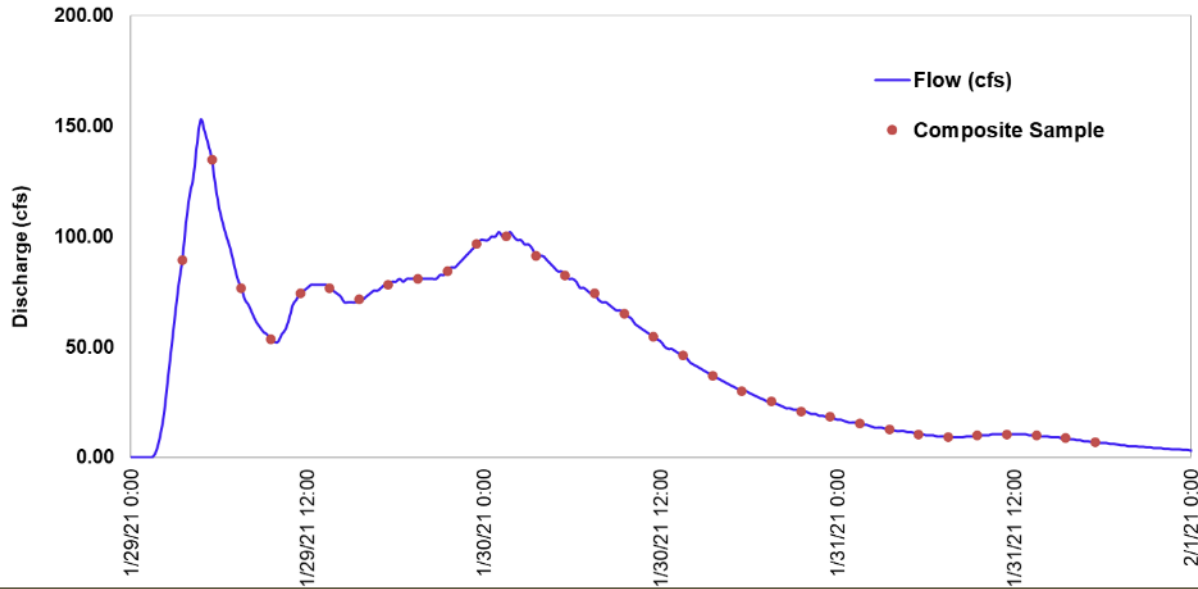
2020-2021 Annual Hydrograph



2020-2021 Annual Hydrograph



**Site 3 - Salt Creek at Murrieta Road
USGS 11070465**



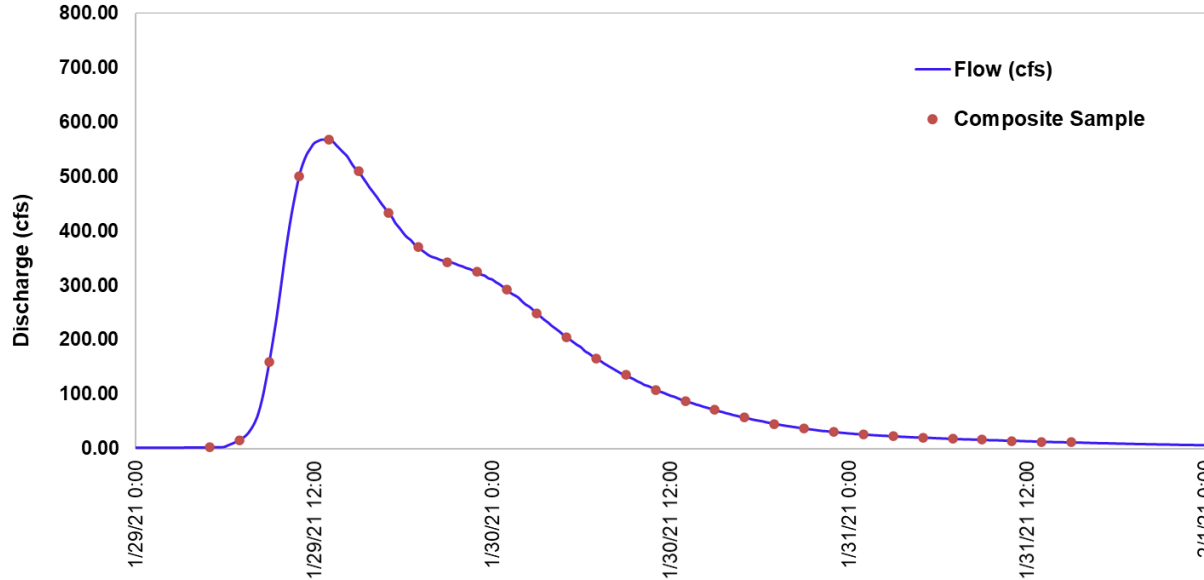
Wet Event #1

January 29-31, 2021

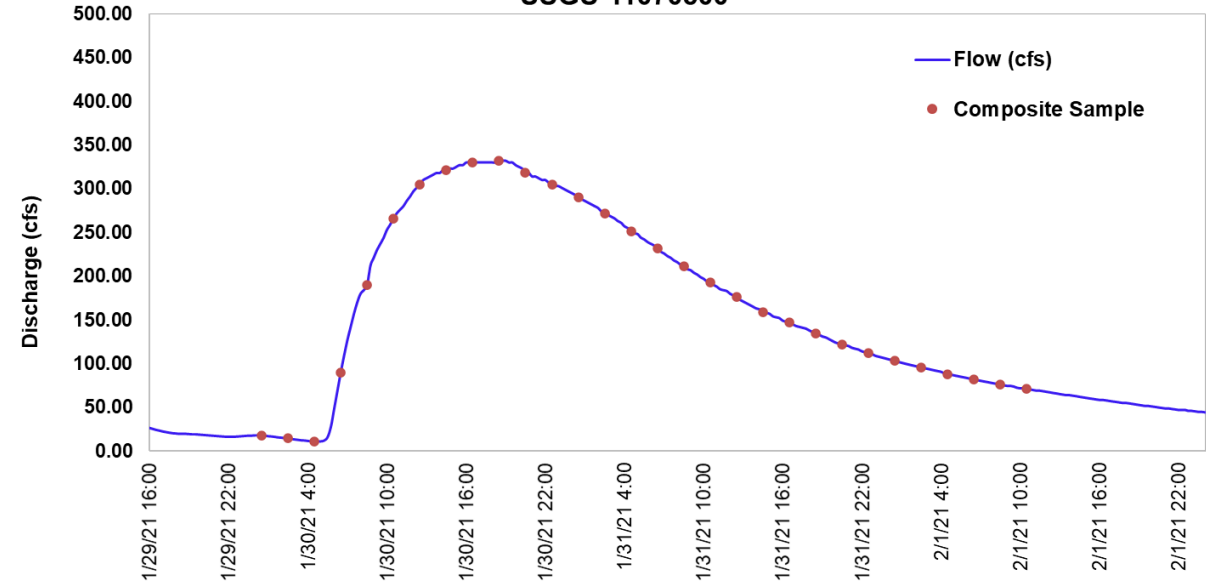
Watershed Rainfall: 0.76-1.08 inches

Sites: Salt Creek and San Jacinto

**Site 4 - San Jacinto River at Goetz Road
USGS 11070365**



**Site 30 - Canyon Lake Spillway
USGS 11070500**

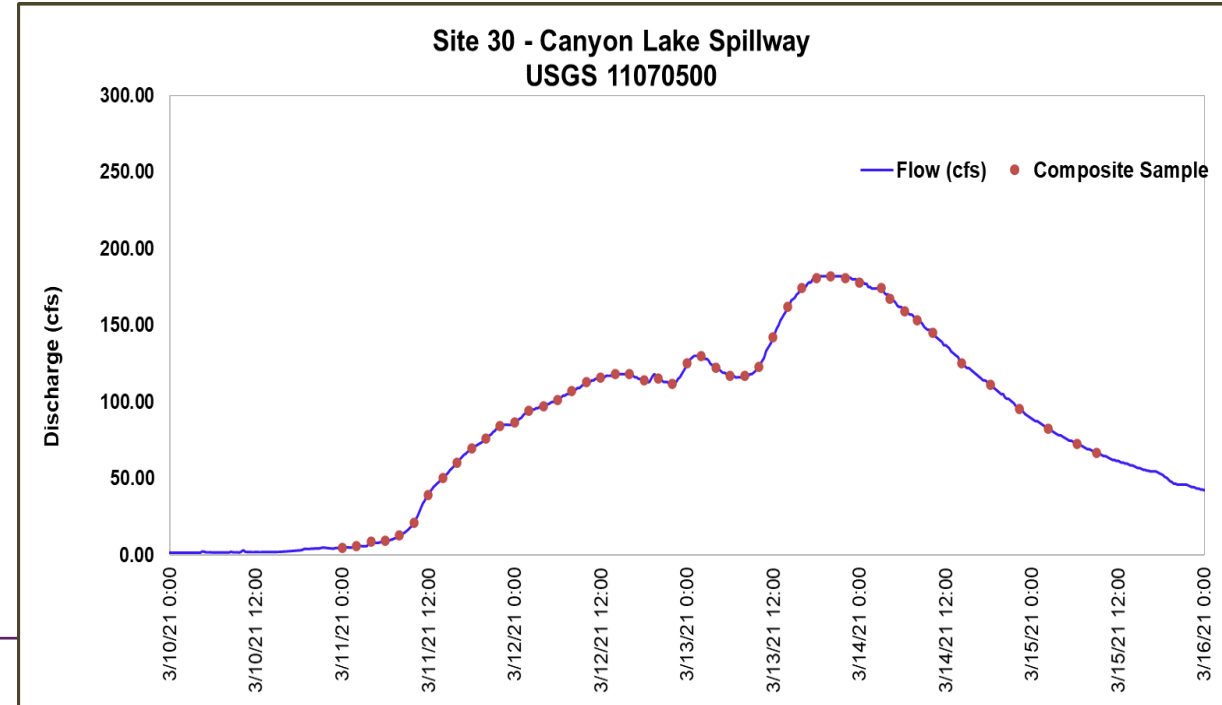
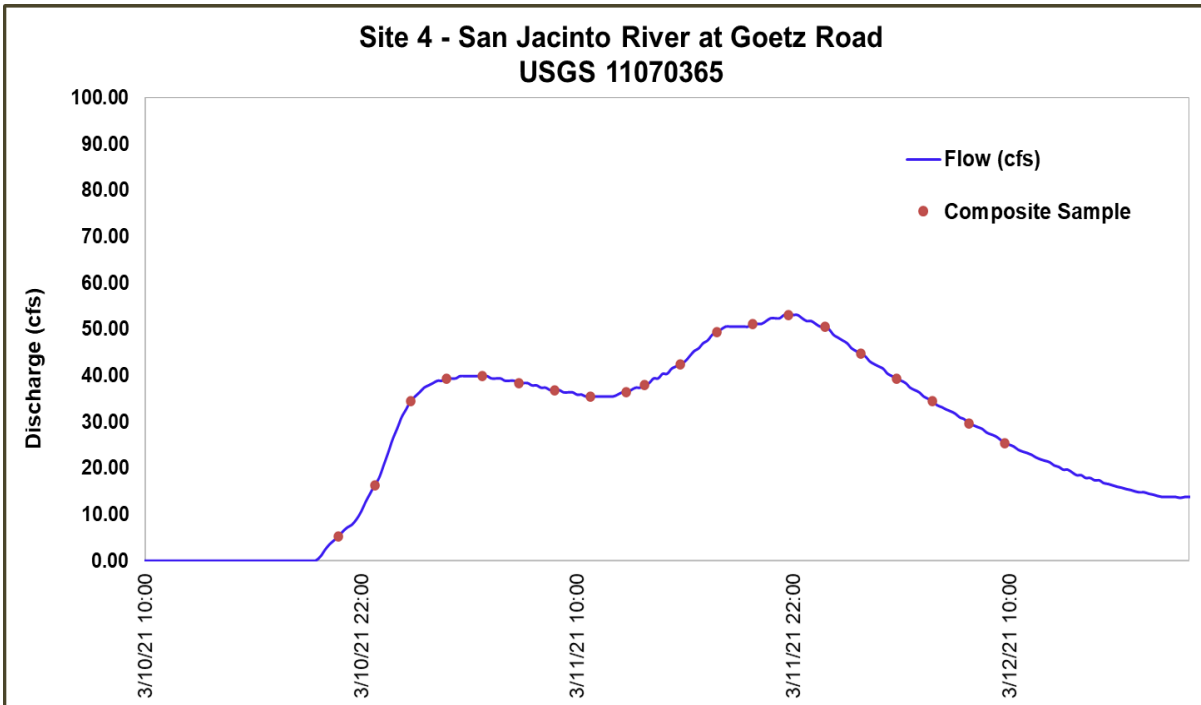
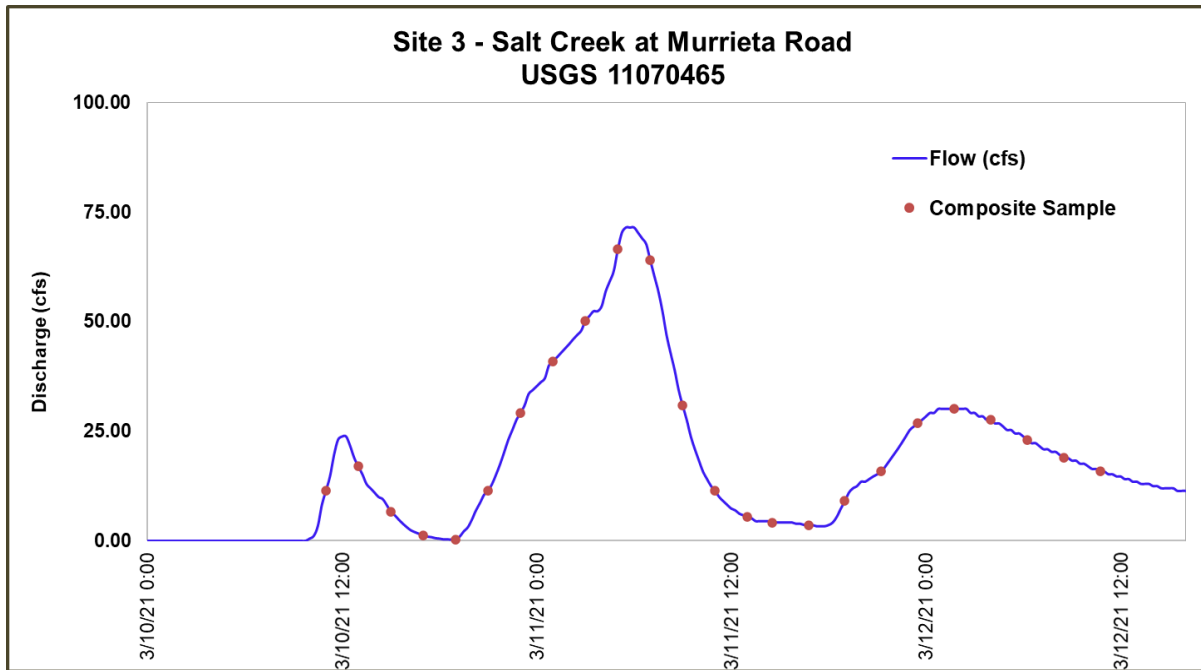


Wet Event #2

March 10-12, 2021

Watershed Rainfall: 1.06-2.07 inches

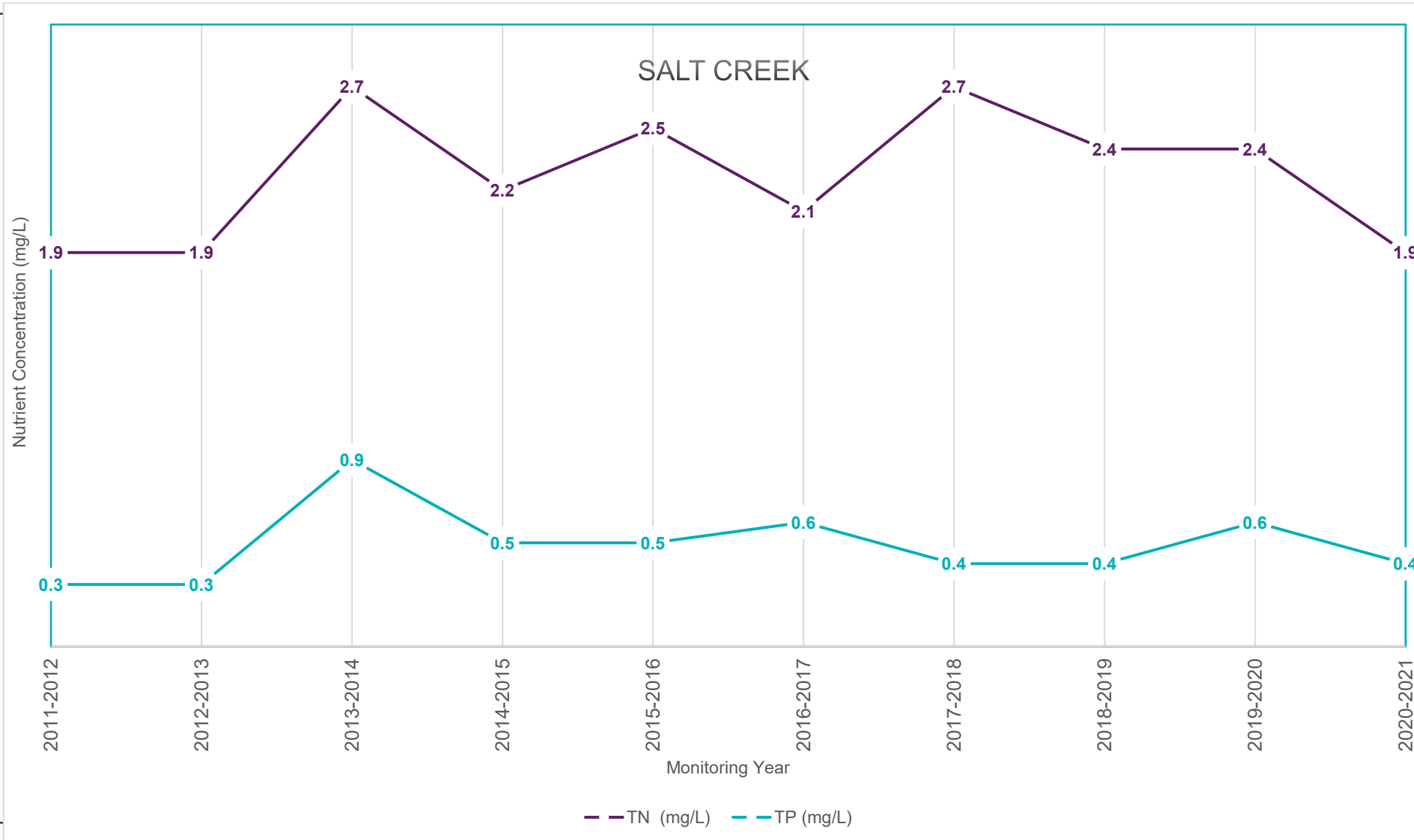
Sites: Salt Creek, San Jacinto, and Canyon Lake



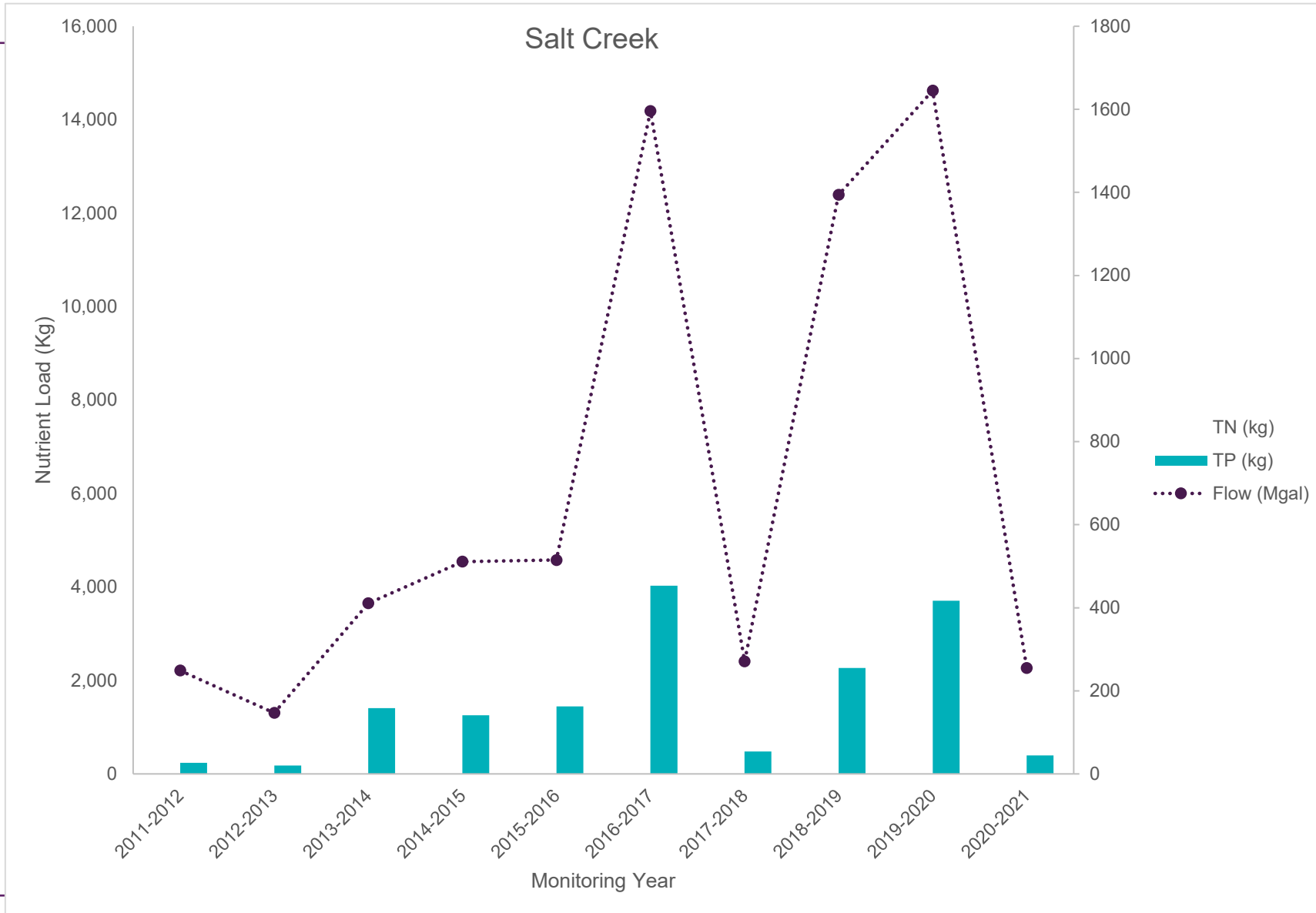
Wet Event #2



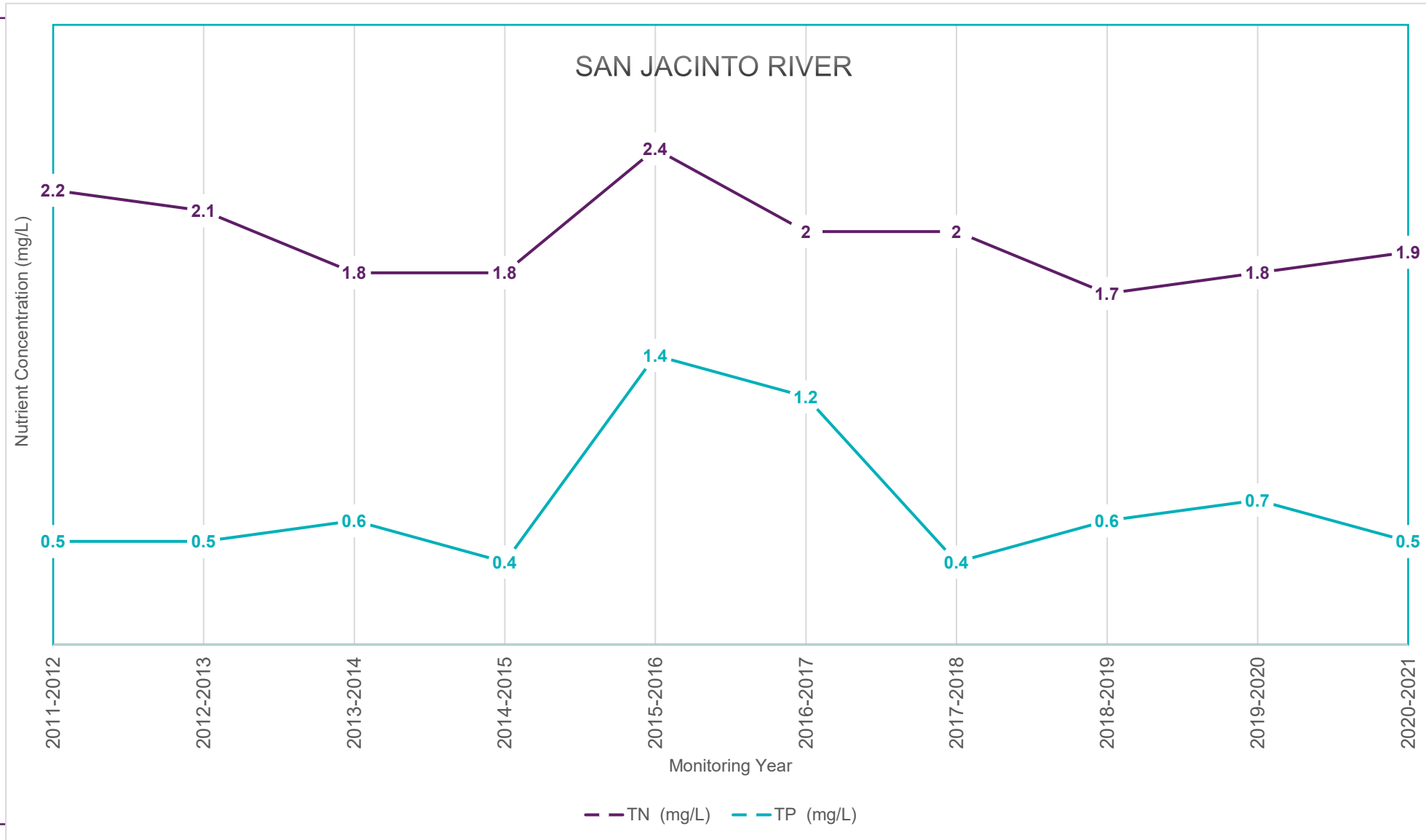
Salt Creek Historic Nutrient Concentrations



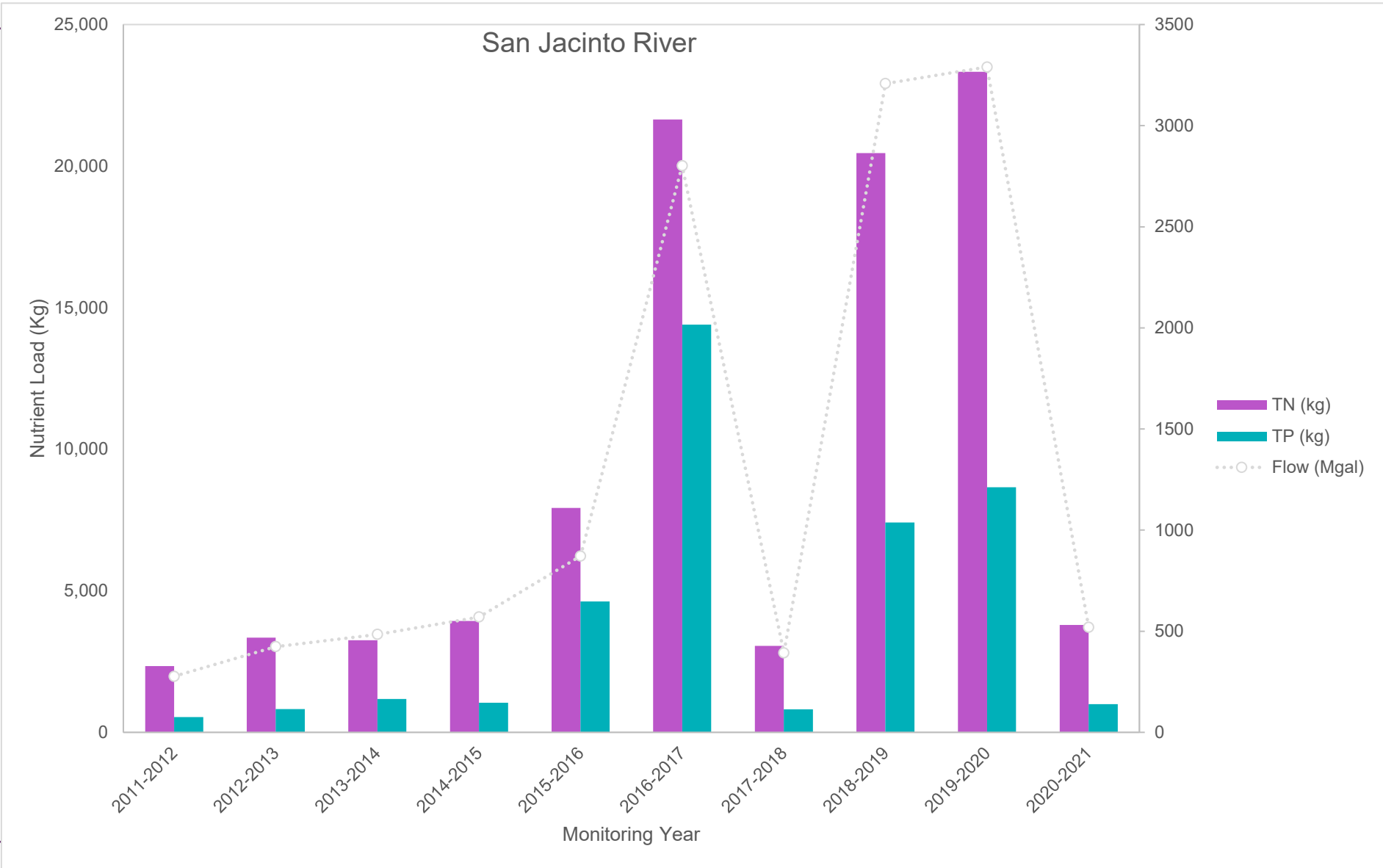
Salt Creek Historic Nutrient Loads



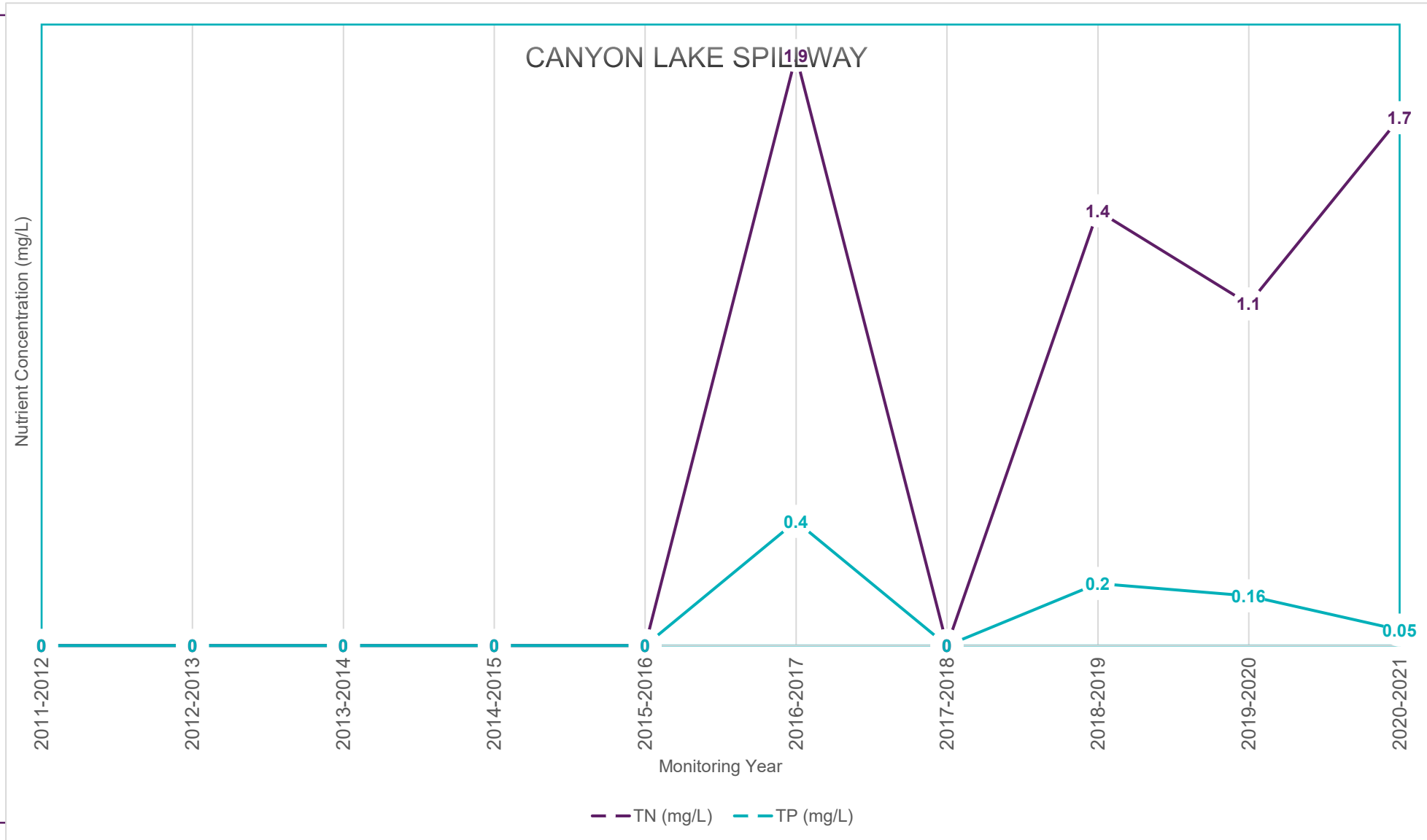
San Jacinto Historic Nutrient Concentrations



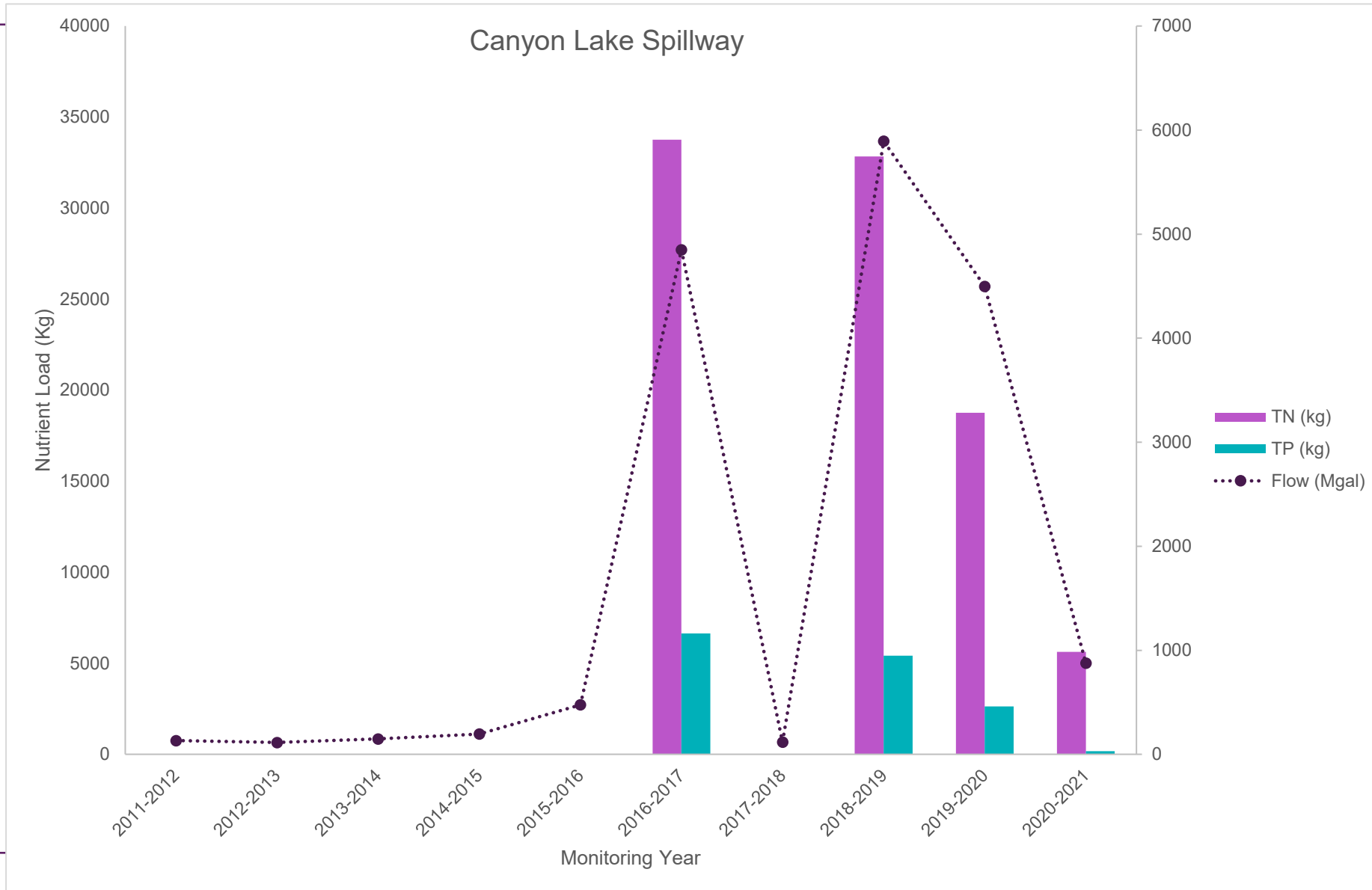
San Jacinto Historic Nutrient Loads



Canyon Lake Spillway Historic Nutrient Concentrations



Canyon Lake Spillway Historic Nutrient Loads



Summary of 2011-2021 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)
2011-2012	1.9	0.3	2.2	0.5	NS	NS
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

NS-Not sampled

Summary of 2011-2021 Nutrient Loads

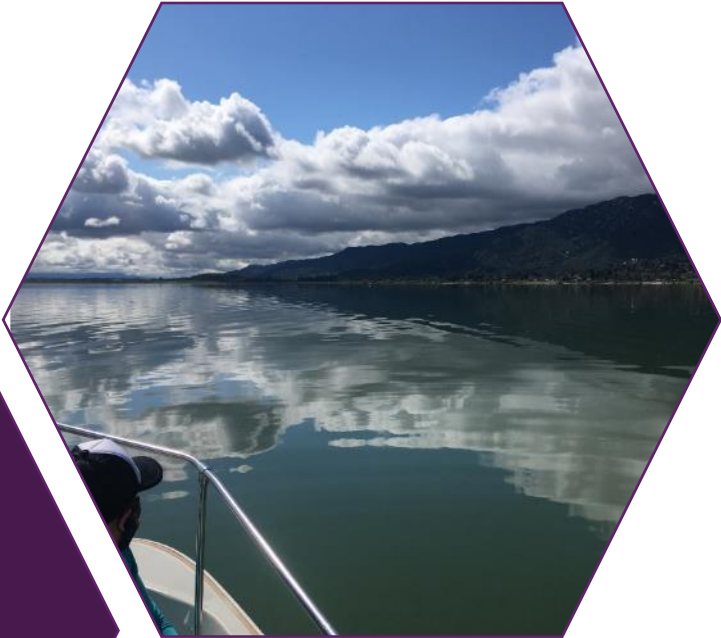
Monitoring Year	Site 3 - Salt Creek			Site 4 - San Jacinto River			Site 30 - Canyon Lake Spillway		
	Flow (Mgal)	TN (kg)	TP (kg)	Flow (Mgal)	TN (kg)	TP (kg)	Flow (Mgal)	TN (kg)	TP (kg)
2011-2012	249	1,843	238	277	2,338	542	133	NS	NS
2012-2013	147	1,025	180	424	3,341	822	114	NS	NS
2013-2014	411	4,268	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

NS-Not Sampled
NA-Not Available

Lake Elsinore and Canyon Lake TMDL Water Quality Monitoring Update – 2020-2021 Summary



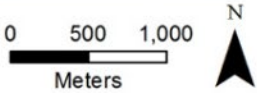
In-Lake
Monitoring



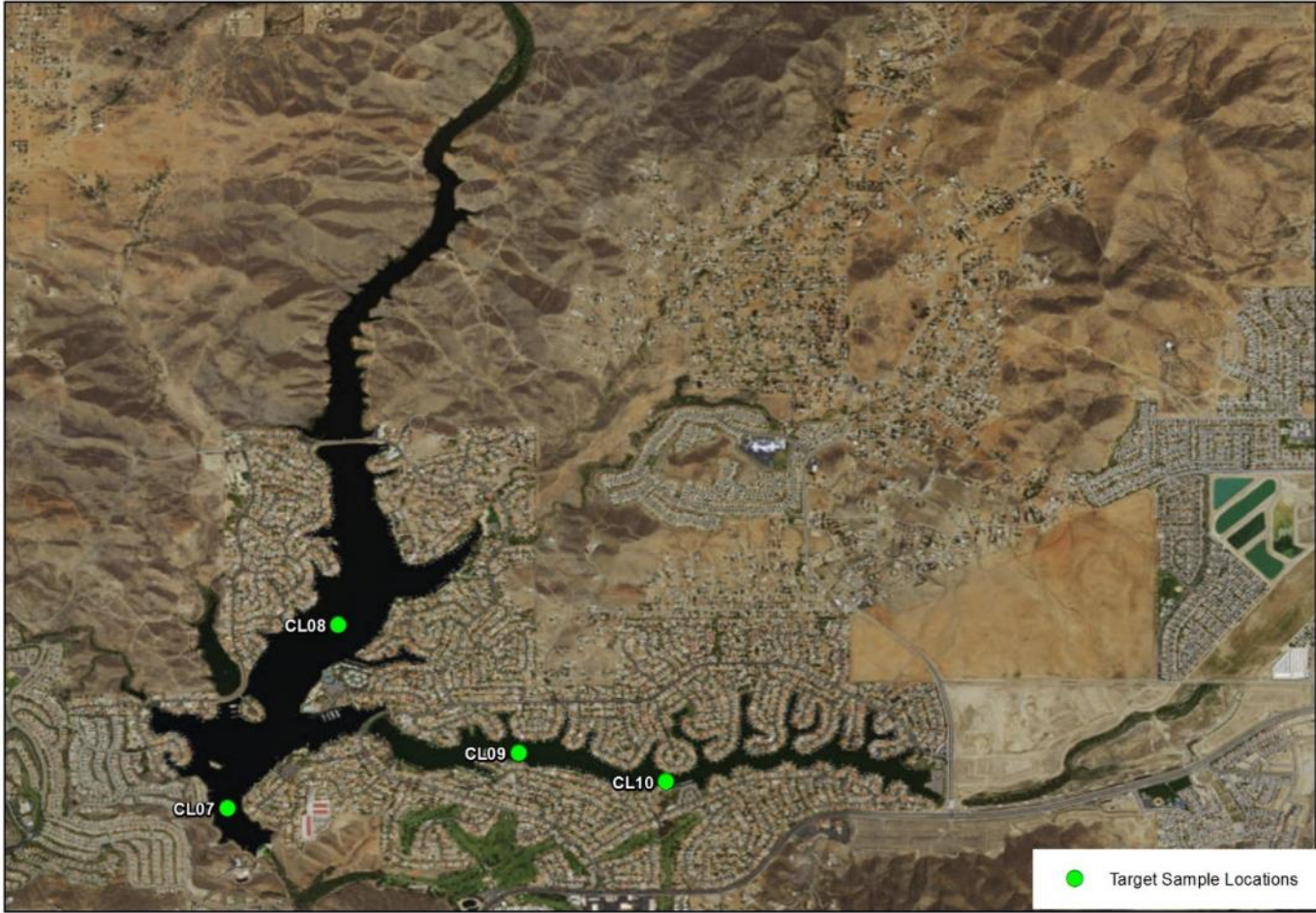
Station Locations – Lake Elsinore



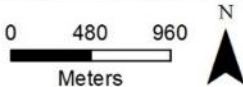
Sample Locations and Water Quality Data Sondes For Lake Elsinore



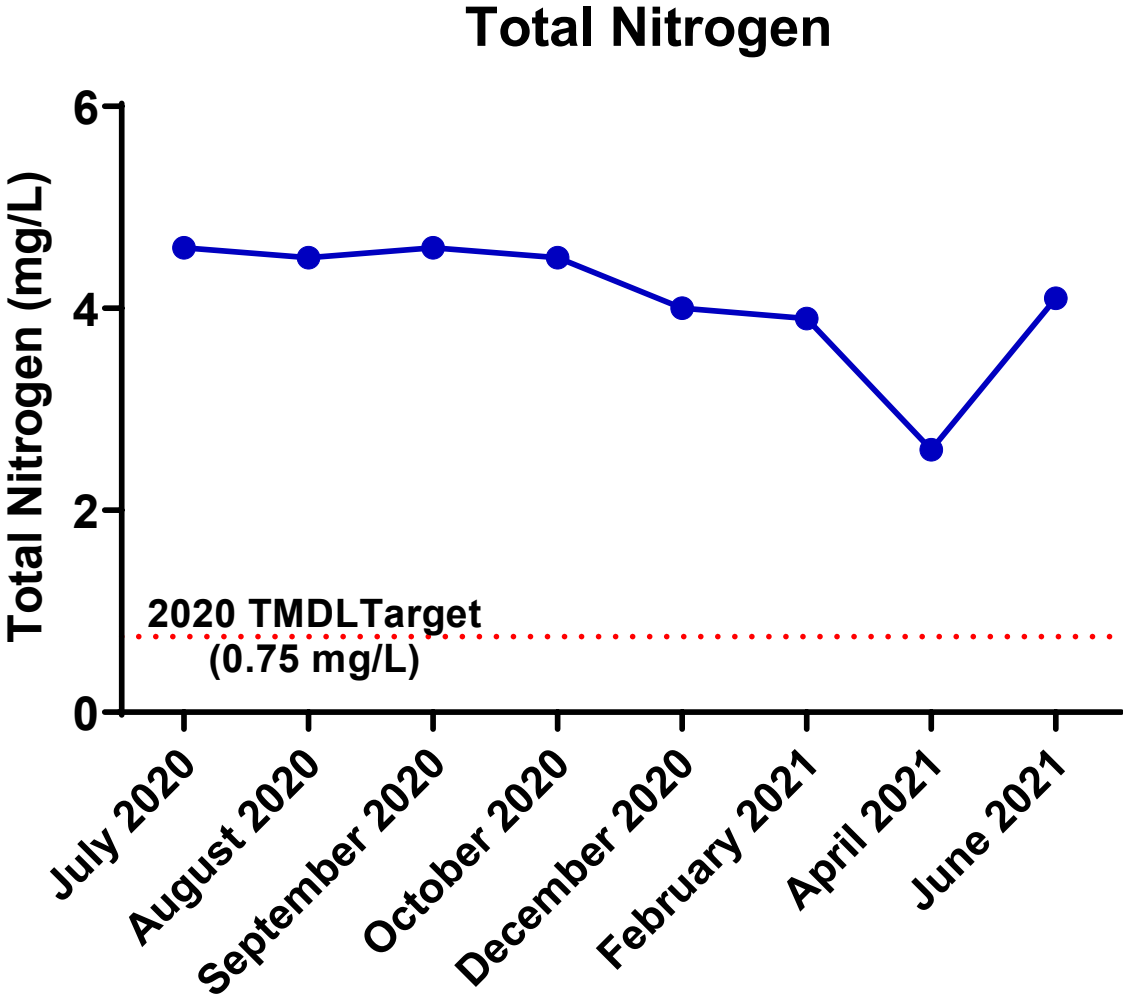
Station Locations – Canyon Lake



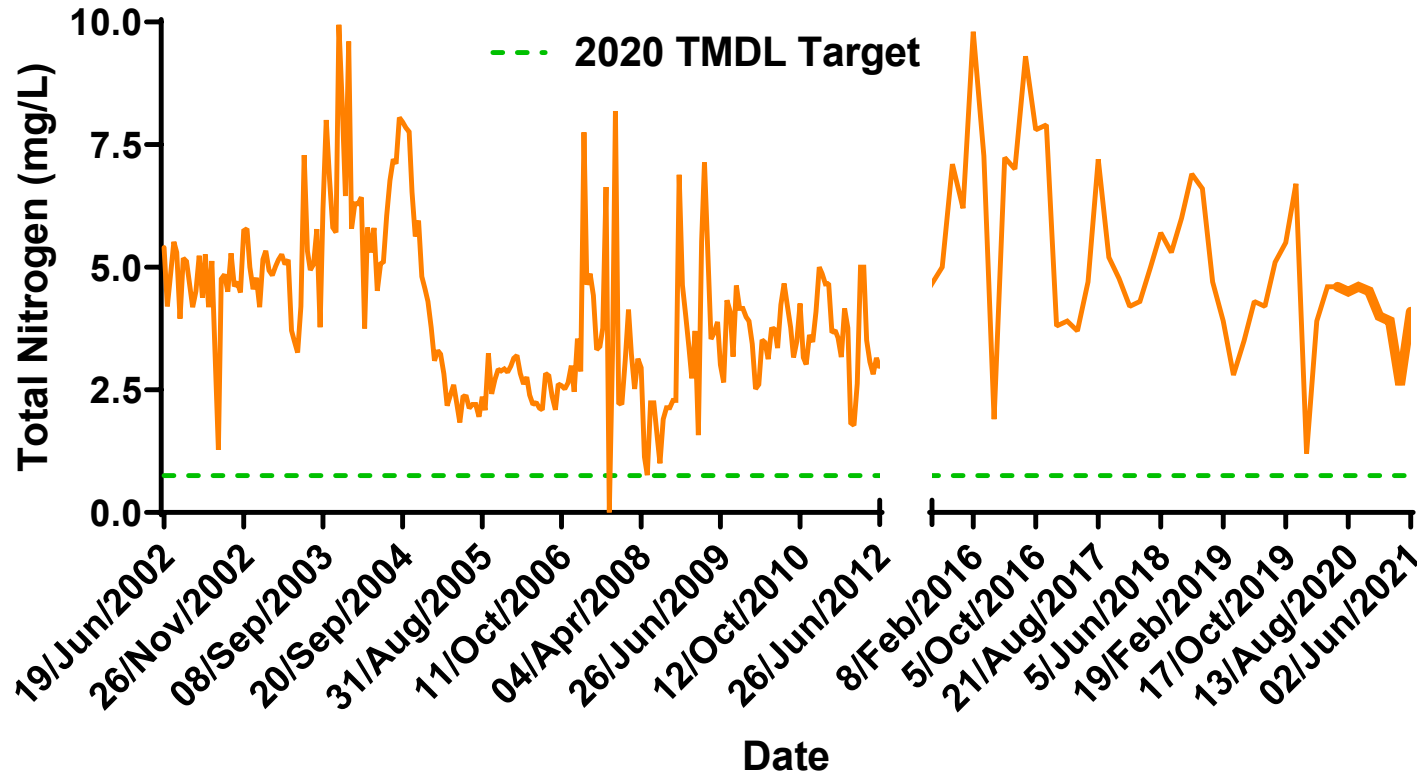
Sample Locations
For Canyon Lake



Total Nitrogen – Lake Elsinore 2020-2021



Total Nitrogen – Lake Elsinore Historic Data

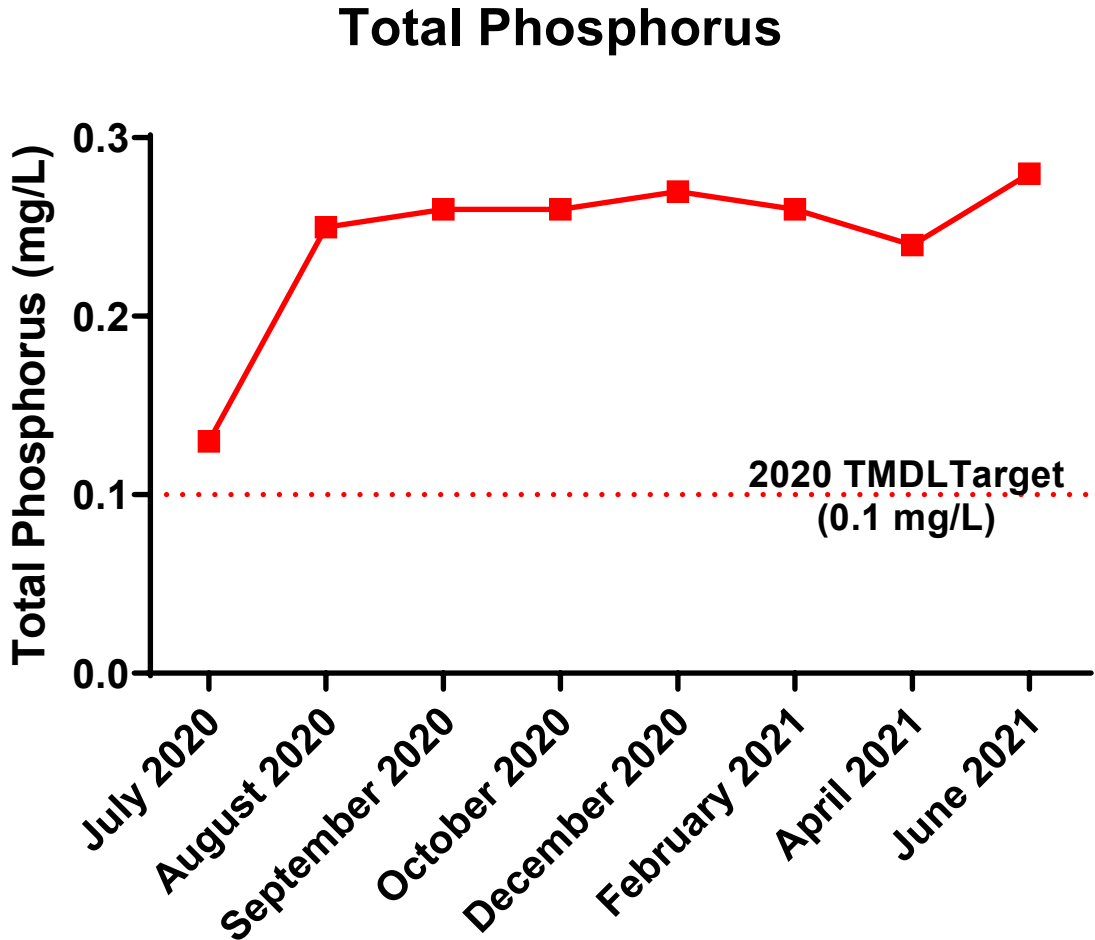


No data available from June 2012-July 2015

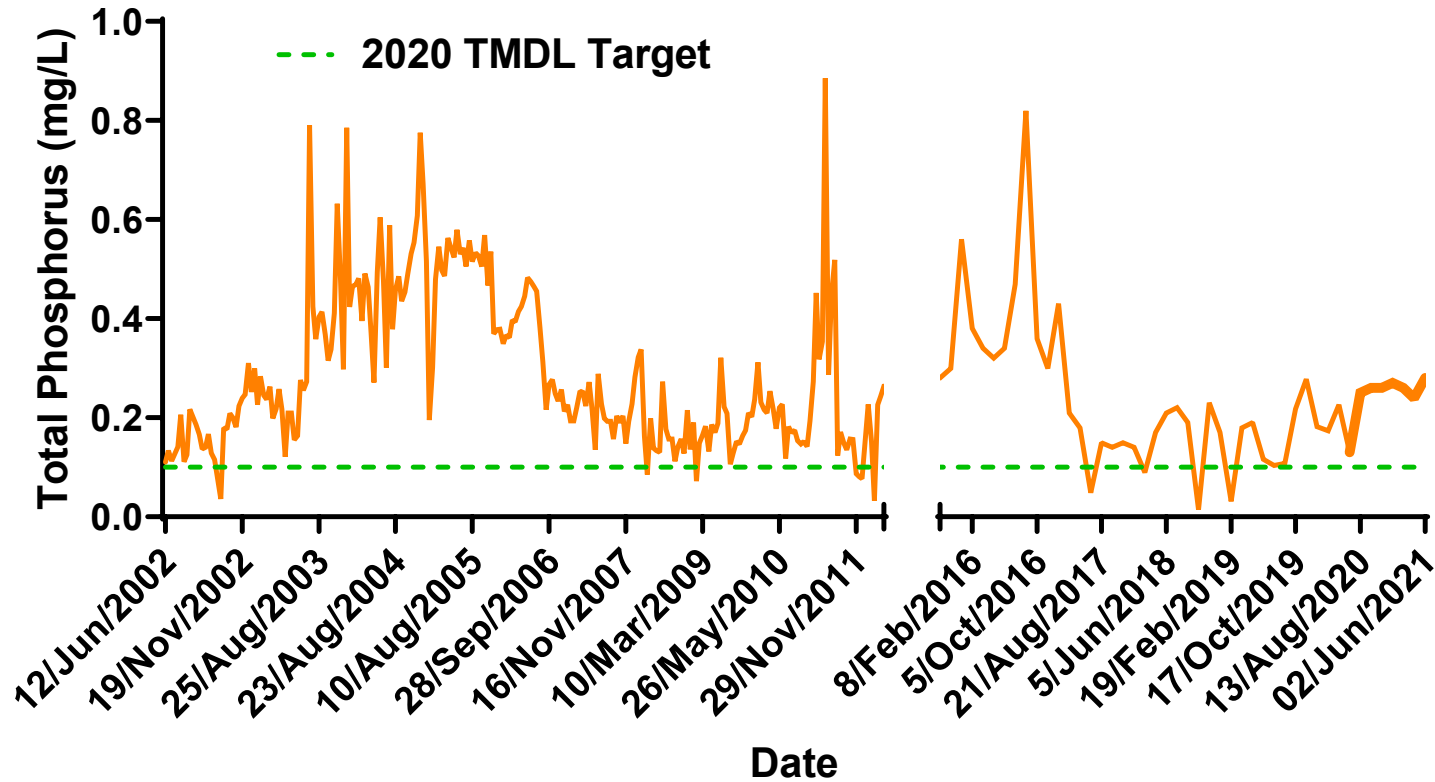
TMDL target of 0.75 mg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2020-June 2021

Total Phosphorus – Lake Elsinore 2020-2021



Total Phosphorus – Lake Elsinore Historic Data



No data available from June 2012-July 2015

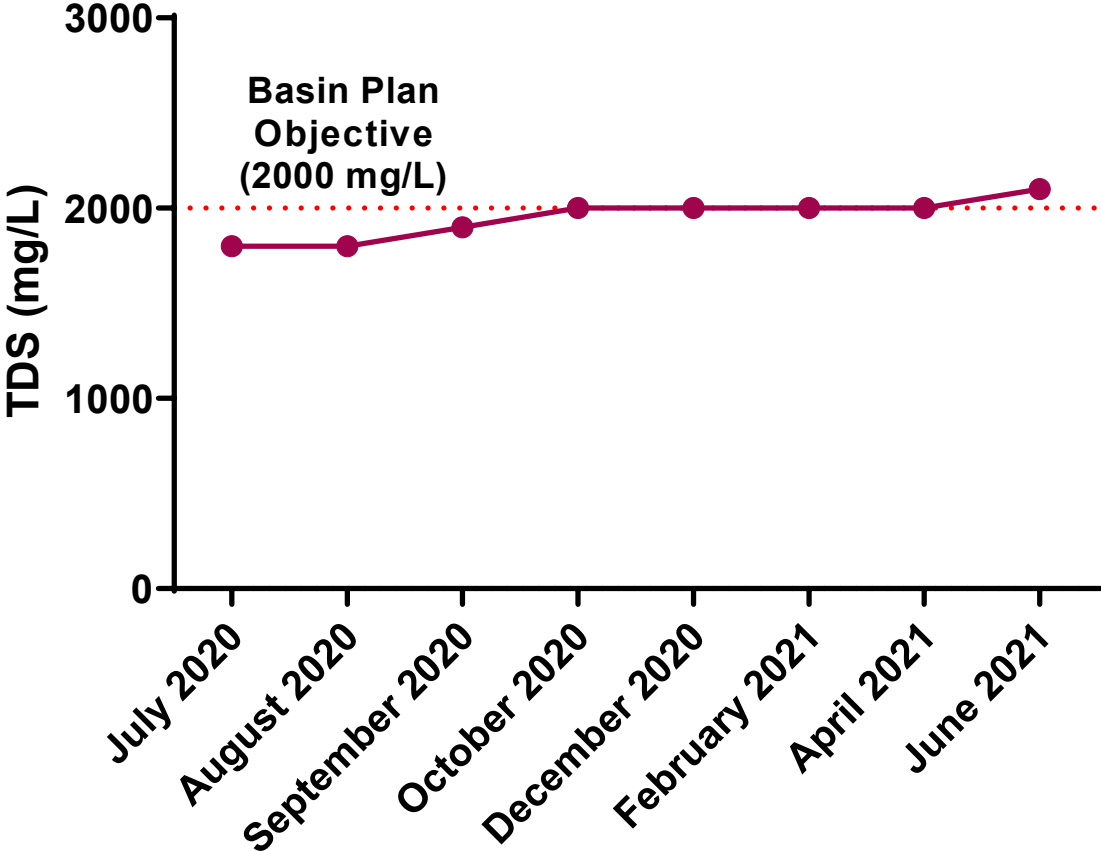
TMDL target of 0.1 mg/L is annual average to be attained by 2020

July 2020-June 2021 represents current monitoring year

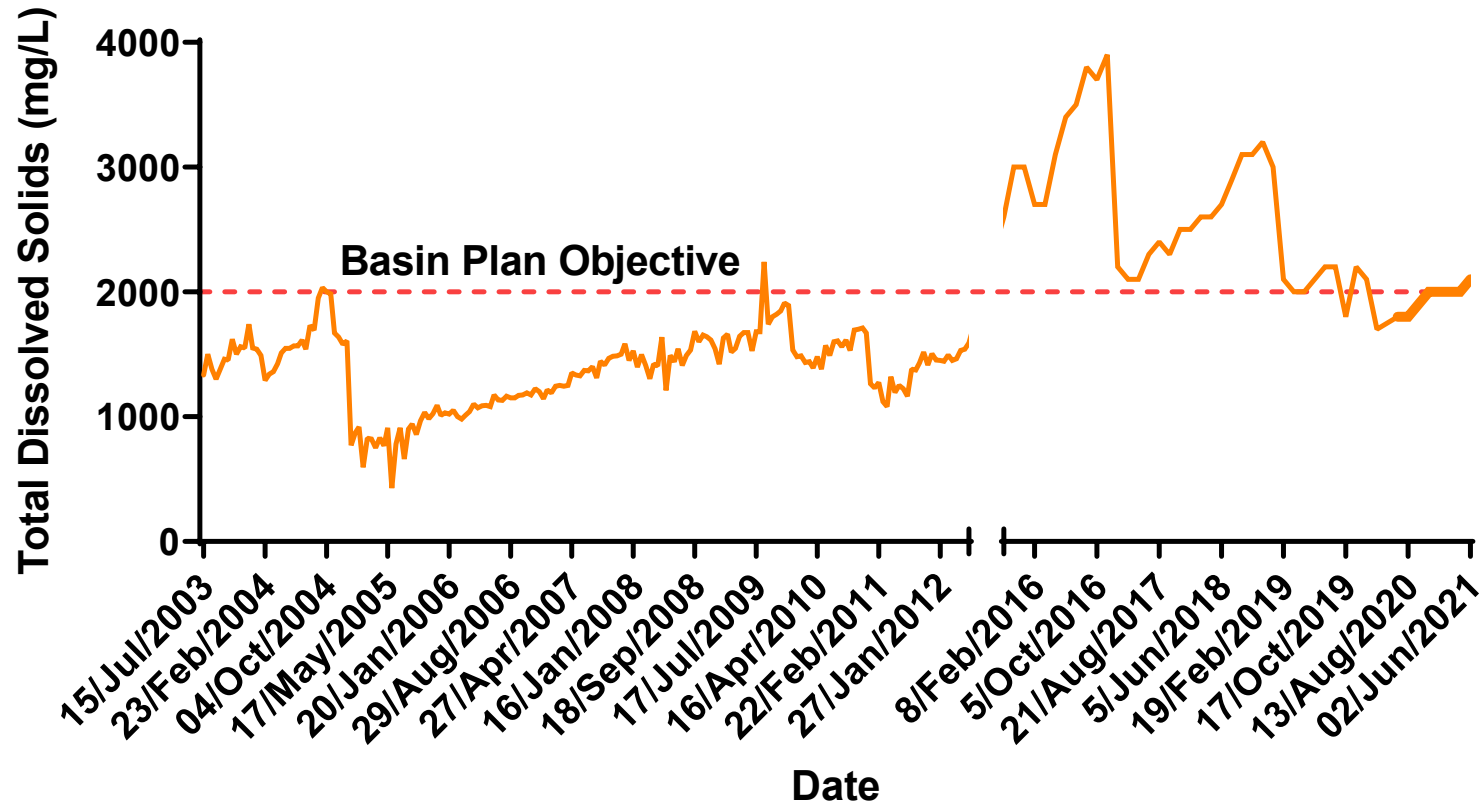
Total Dissolved Solids– Lake Elsinore 2020-2021



Total Dissolved Solids



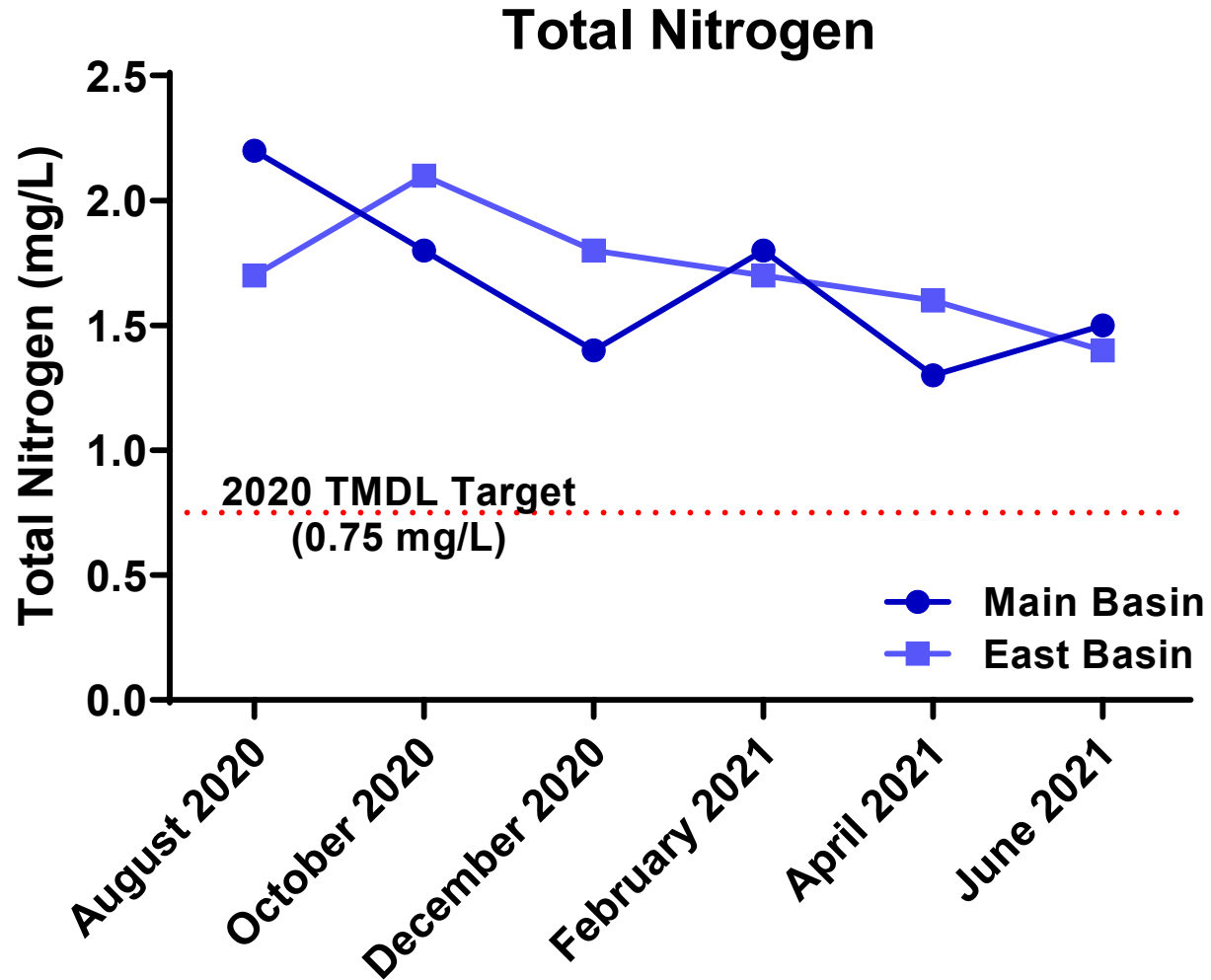
Total Dissolved Solids– Lake Elsinore Historic Data



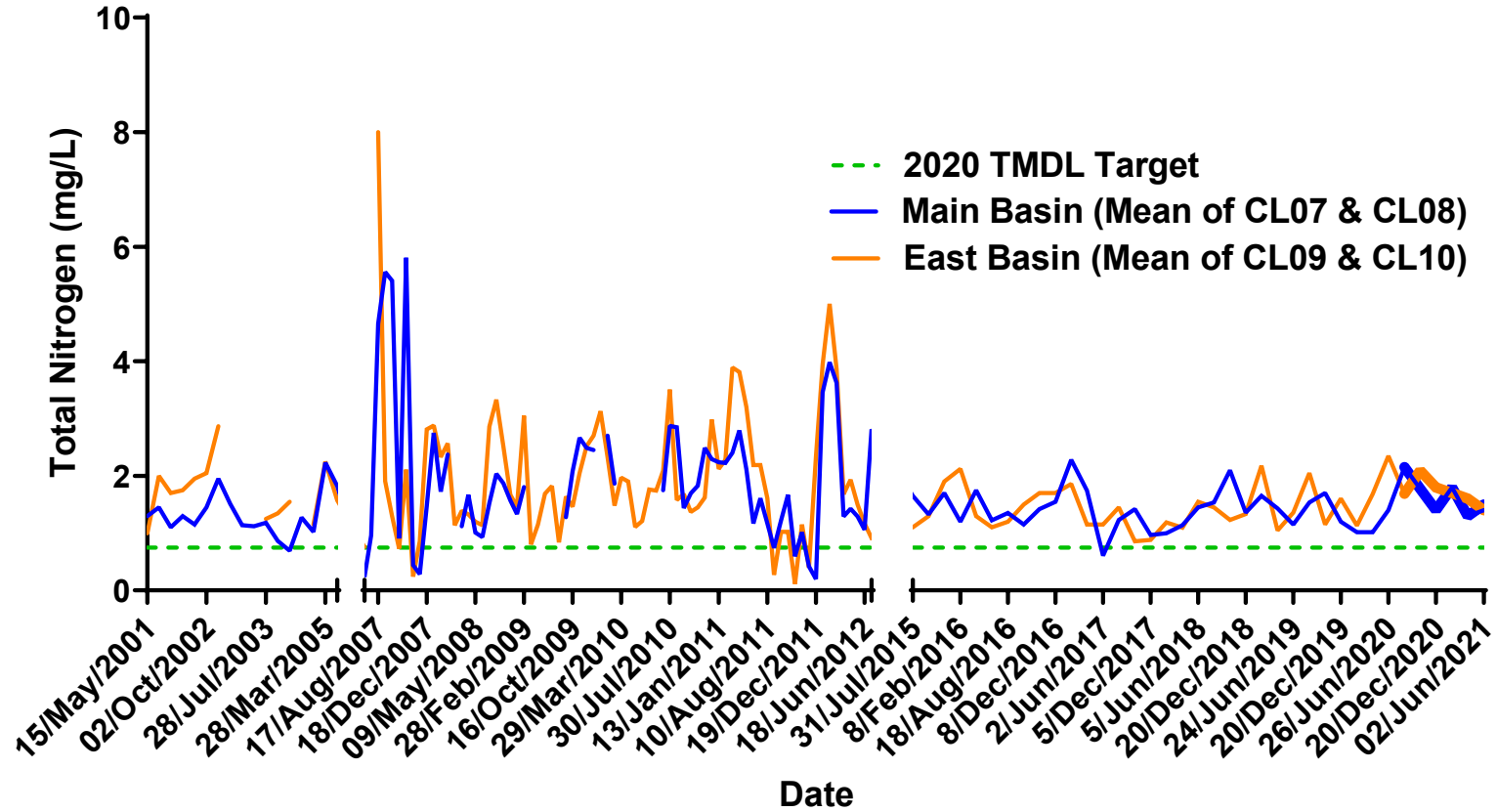
No data available from June 2012-July 2015

Bold represents current monitoring year July 2020-June 2021

Total Nitrogen – Canyon Lake 2020-2021



Total Nitrogen – Canyon Lake Historic Data

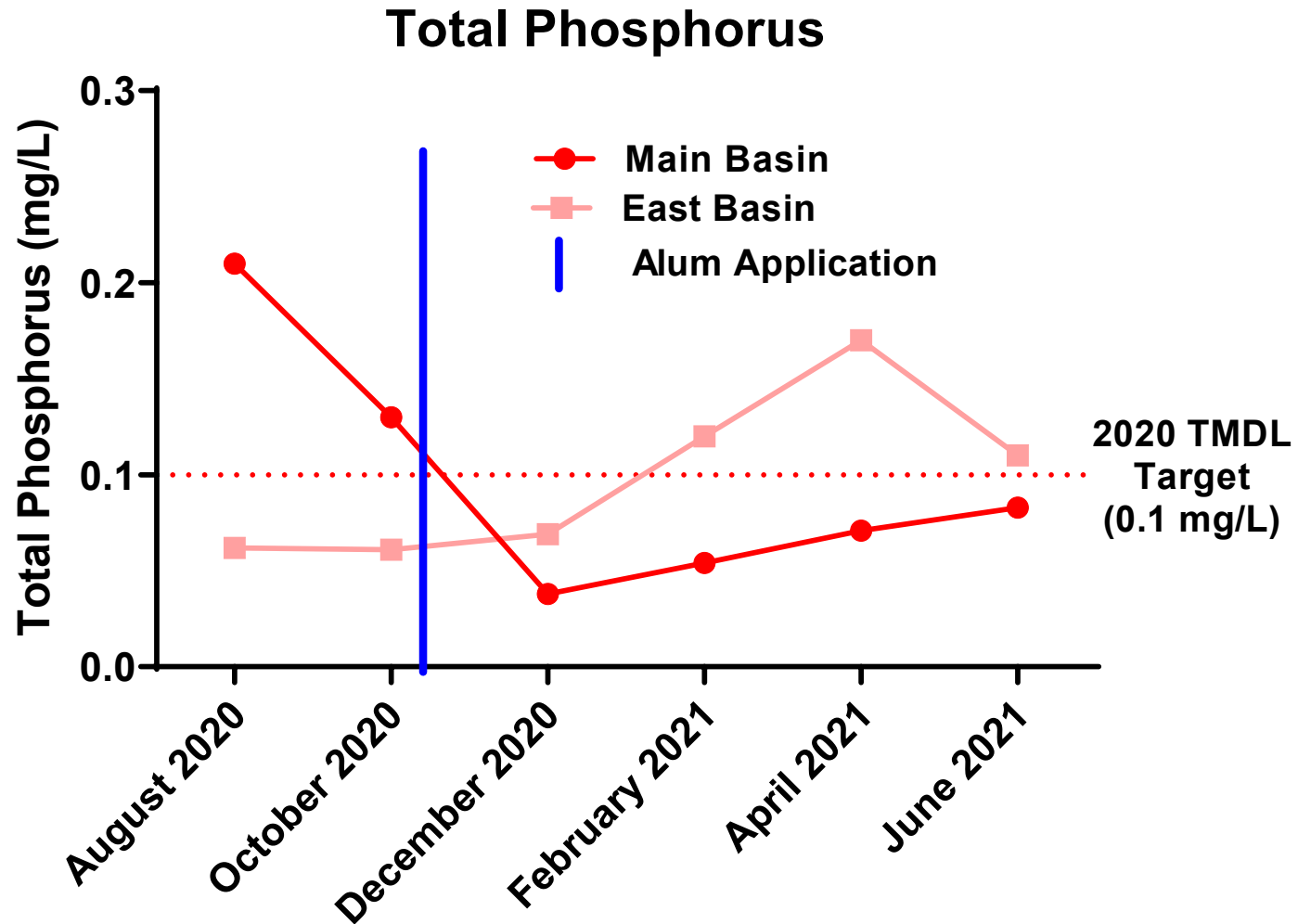


No data available from May 2005-July 2007; June 2012-July 2015

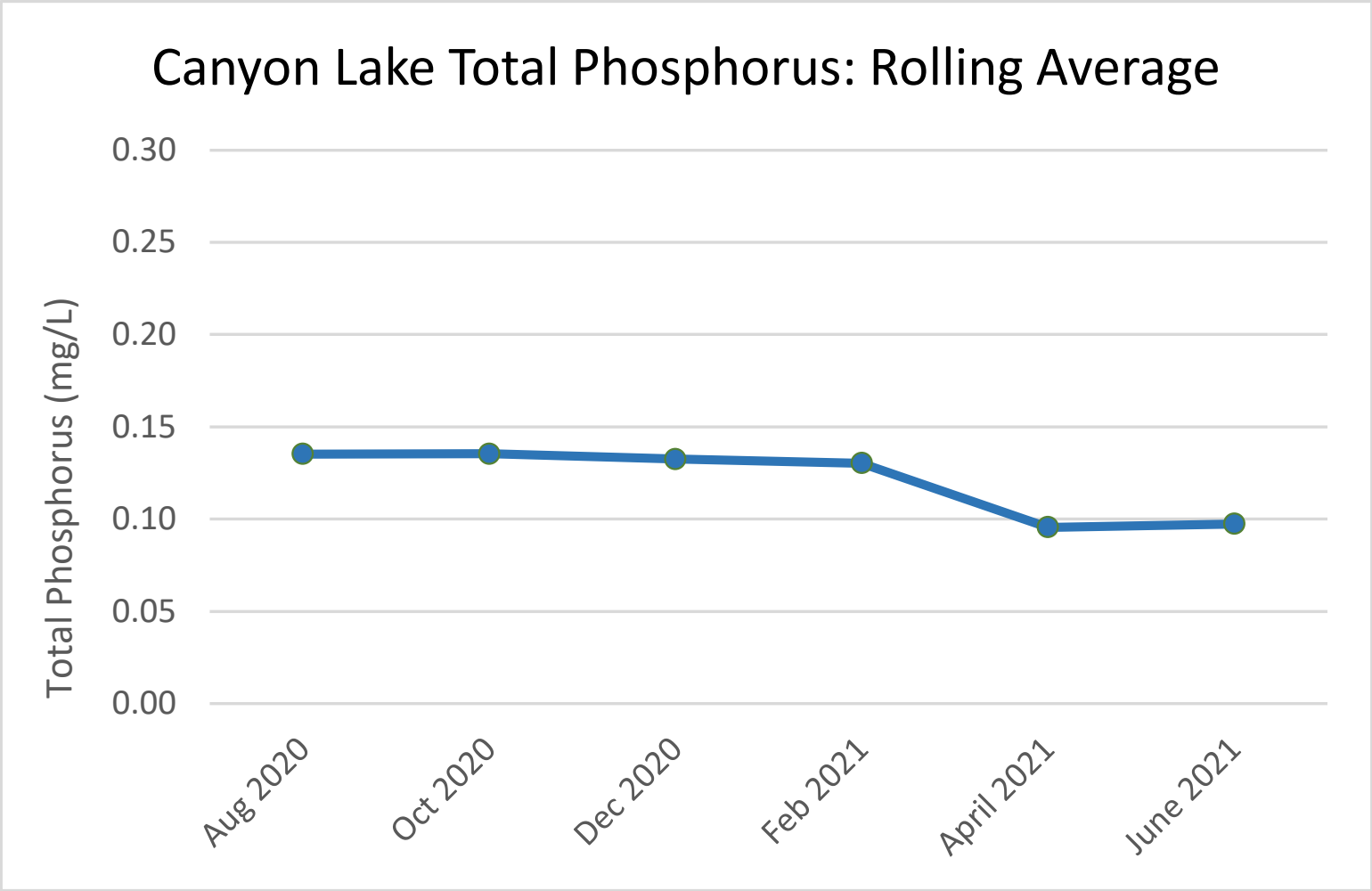
TMDL target of 0.75 mg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2020-June 2021

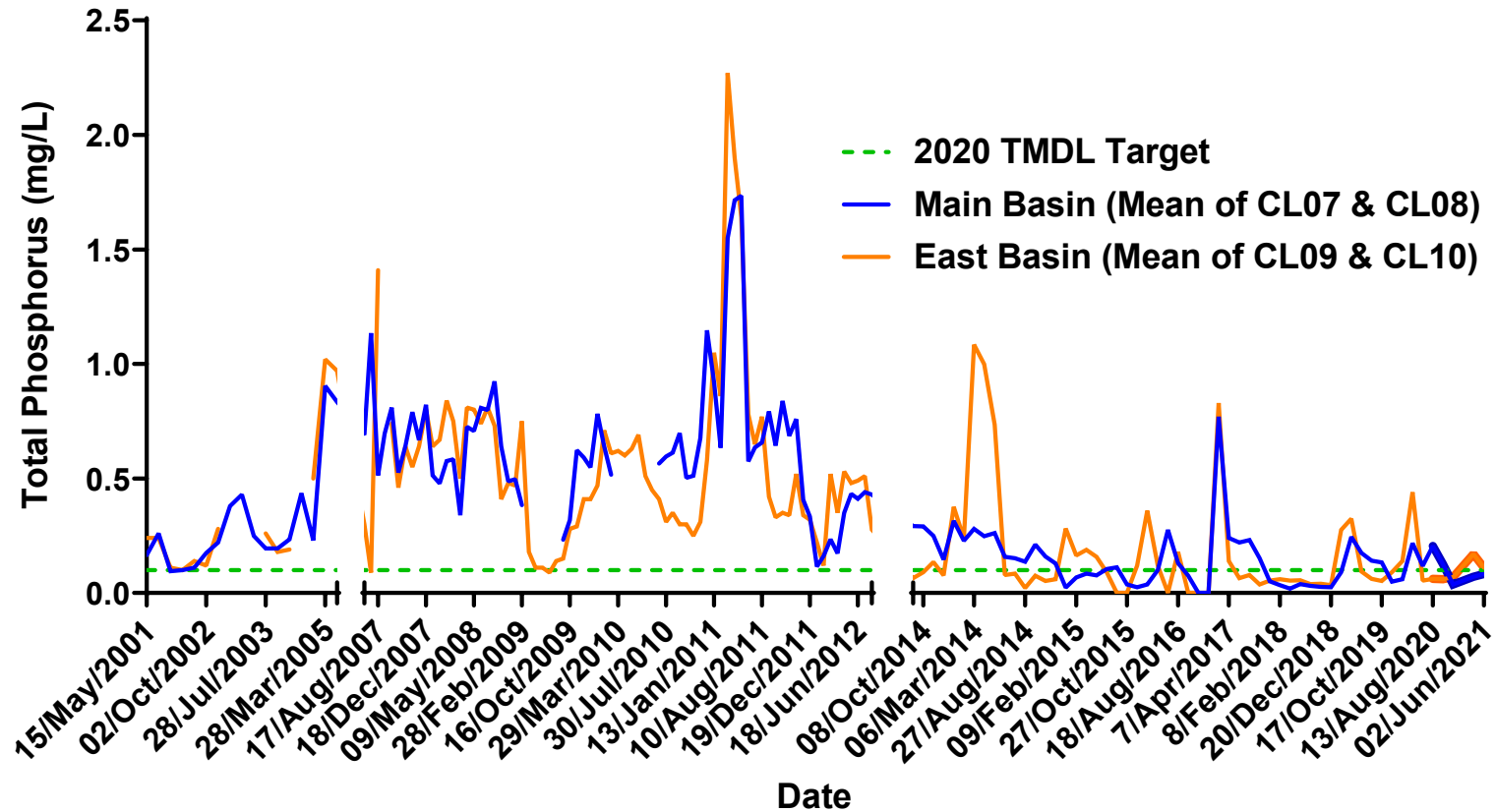
Total Phosphorus – Canyon Lake 2020-2021



Total Phosphorus – Canyon Lake 2020-2021



Total Phosphorus – Canyon Lake Historic Data

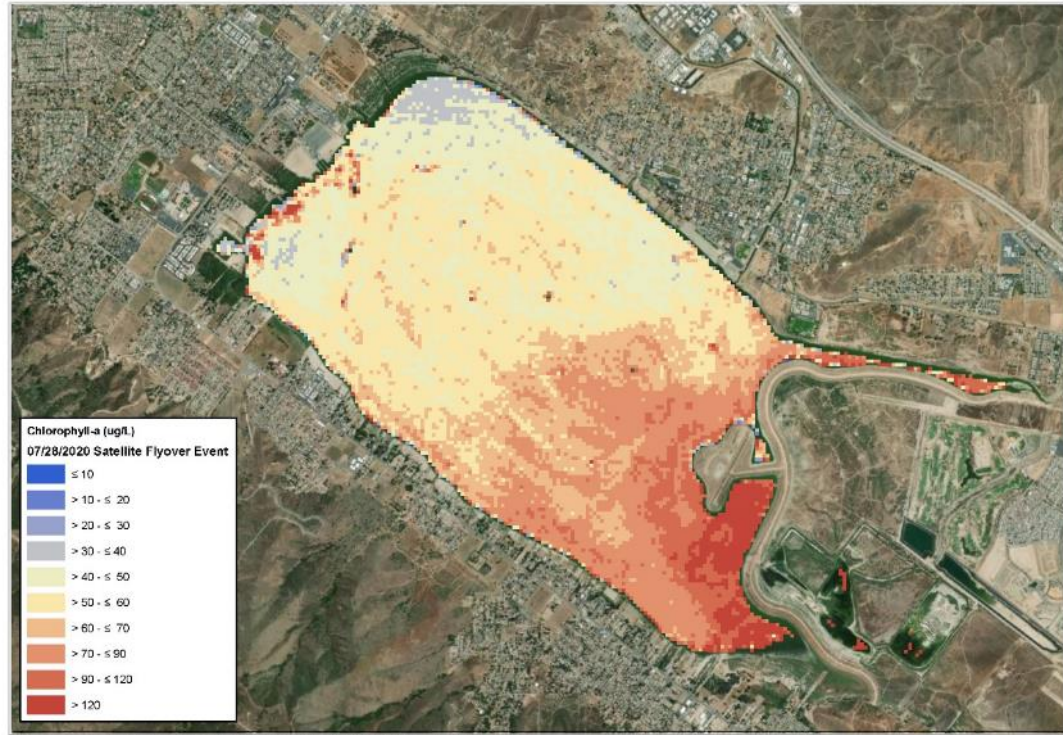


No data available from May 2005-July 2007; June 2012-Sept 2013
TMDL target of 0.1 mg/L is annual average to be attained by 2020
Bold represents current monitoring year July 2020-June 2021

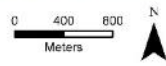
Satellite Imagery – Chlorophyll July 28, 2020



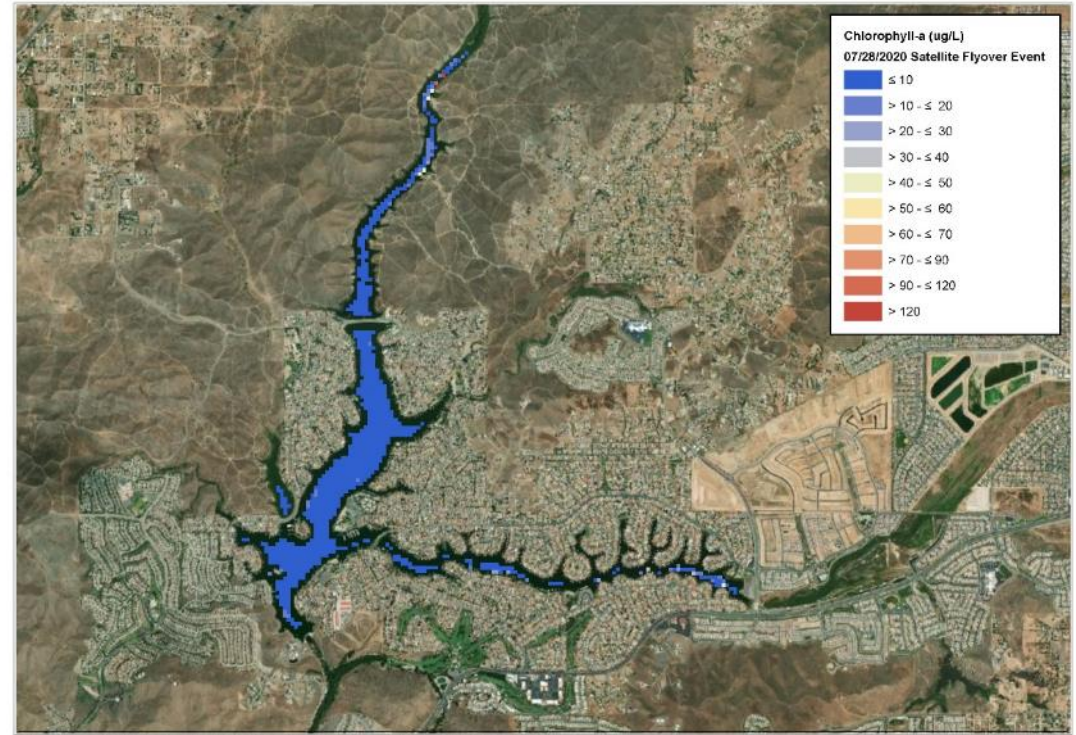
Lake Elsinore



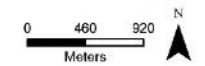
Chlorophyll-a Concentrations
Lake Elsinore
July 28, 2020 Satellite Flyover Event



Canyon Lake



Chlorophyll-a Concentrations
Canyon Lake
July 28, 2020 Satellite Flyover Event



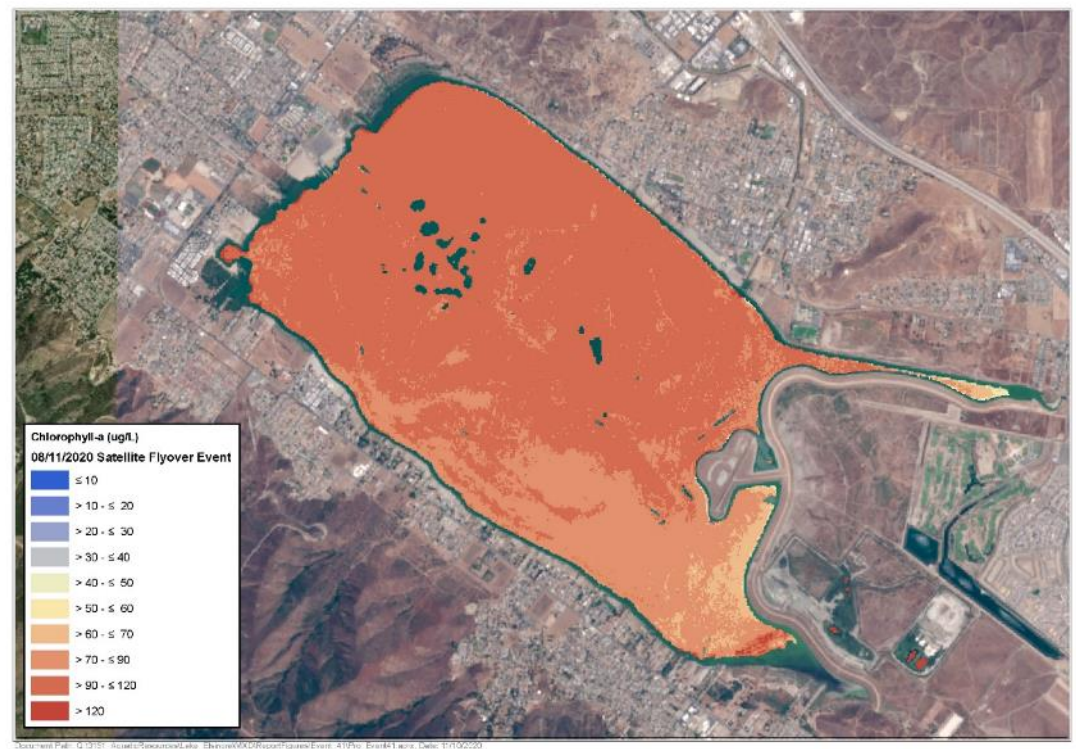
**Data gaps due to land mass interference

Satellite Imagery – Chlorophyll August 11, 2020



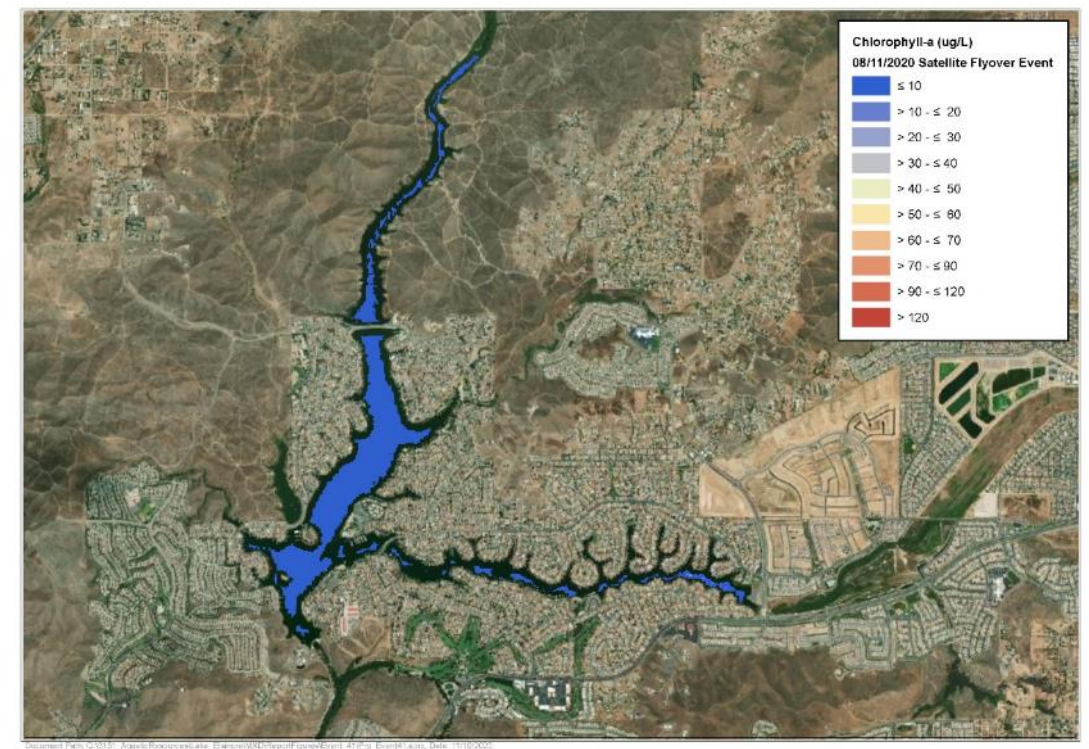
Lake Elsinore

Canyon Lake



wood. Chlorophyll-a Concentrations
Lake Elsinore
August 11, 2020 Satellite Flyover Event

0 400 800
Meters



wood. Chlorophyll-a Concentrations
Canyon Lake
August 11, 2020 Satellite Flyover Event

0 480 920
Meters

**Data gaps due to sunglint

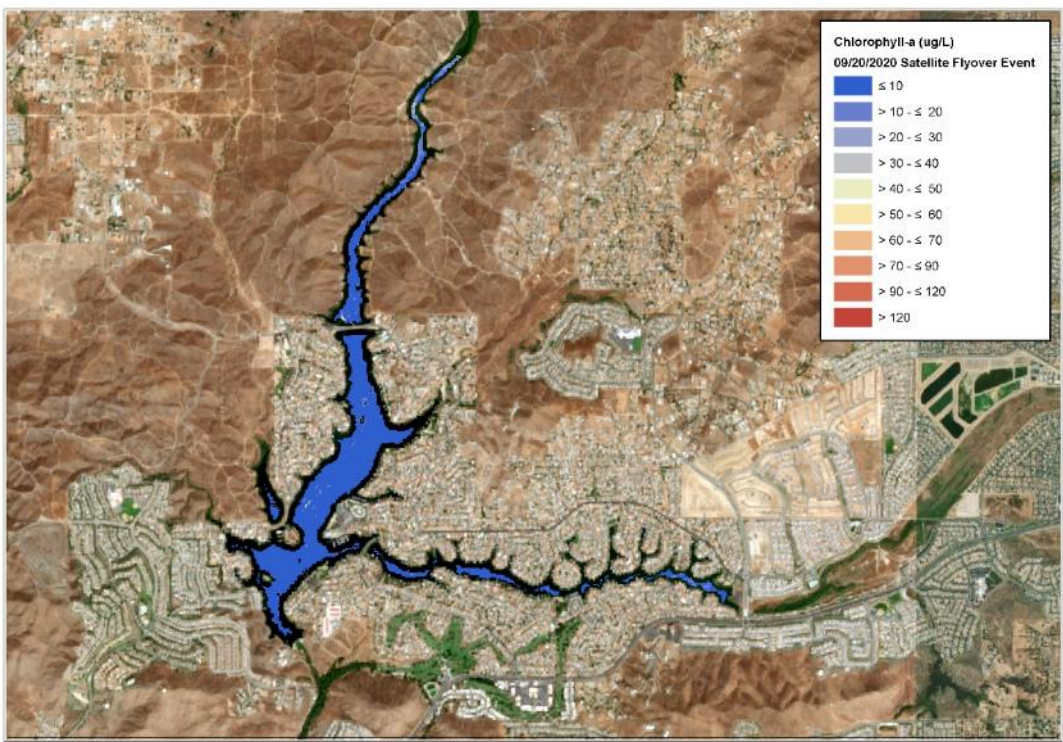
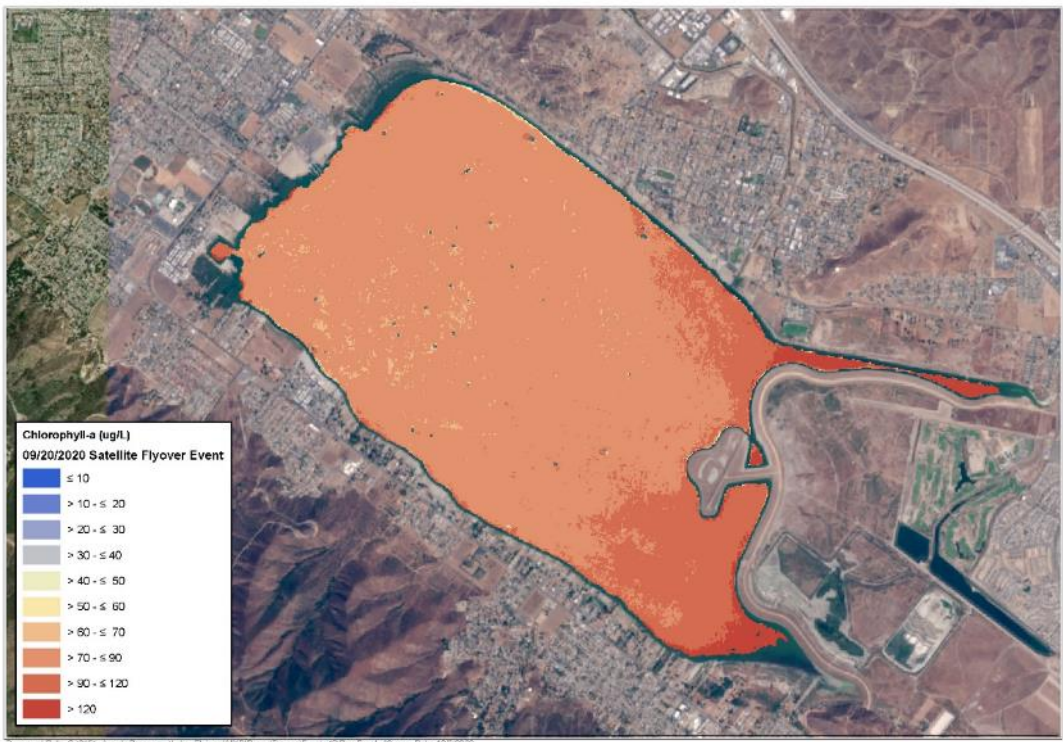
**Data gaps due to land mass interference

Satellite Imagery – Chlorophyll September 20, 2020



Lake Elsinore

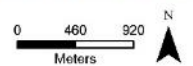
Canyon Lake



**Chlorophyll-a Concentrations
Lake Elsinore
September 20, 2020 Satellite Flyover Event**



**Chlorophyll-a Concentrations
Canyon Lake
September 20, 2020 Satellite Flyover Event**



**Data gaps due to land mass interference

Satellite Imagery – Chlorophyll October 10, 2020

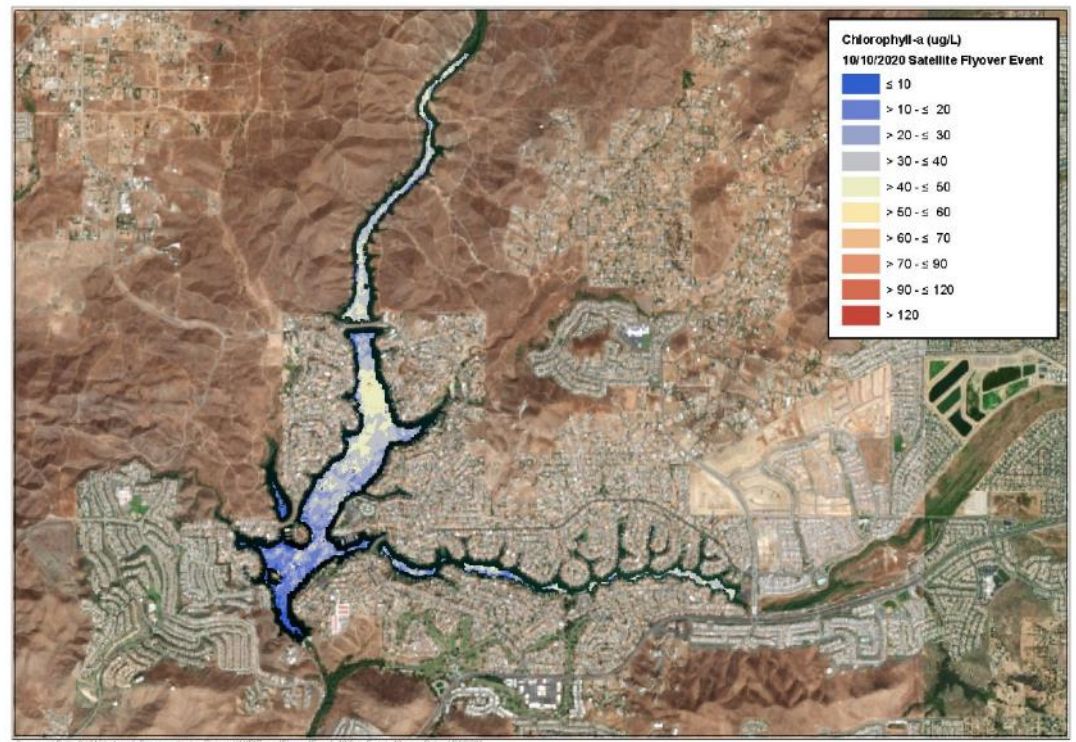
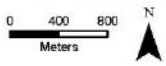


Lake Elsinore

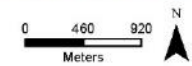
Canyon Lake



Chlorophyll-a Concentrations
Lake Elsinore
October 10, 2020 Satellite Flyover Event



Chlorophyll-a Concentrations
Canyon Lake
October 10, 2020 Satellite Flyover Event

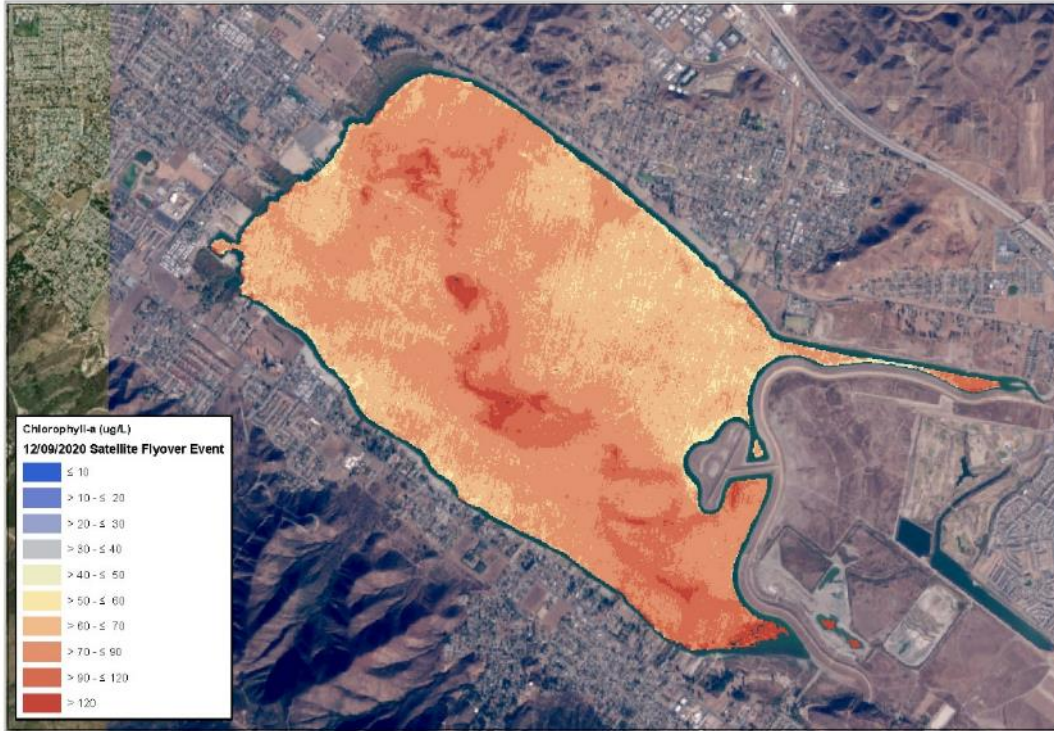


**Data gaps due to land mass interference

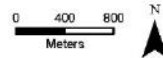
Satellite Imagery – Chlorophyll December 9, 2020



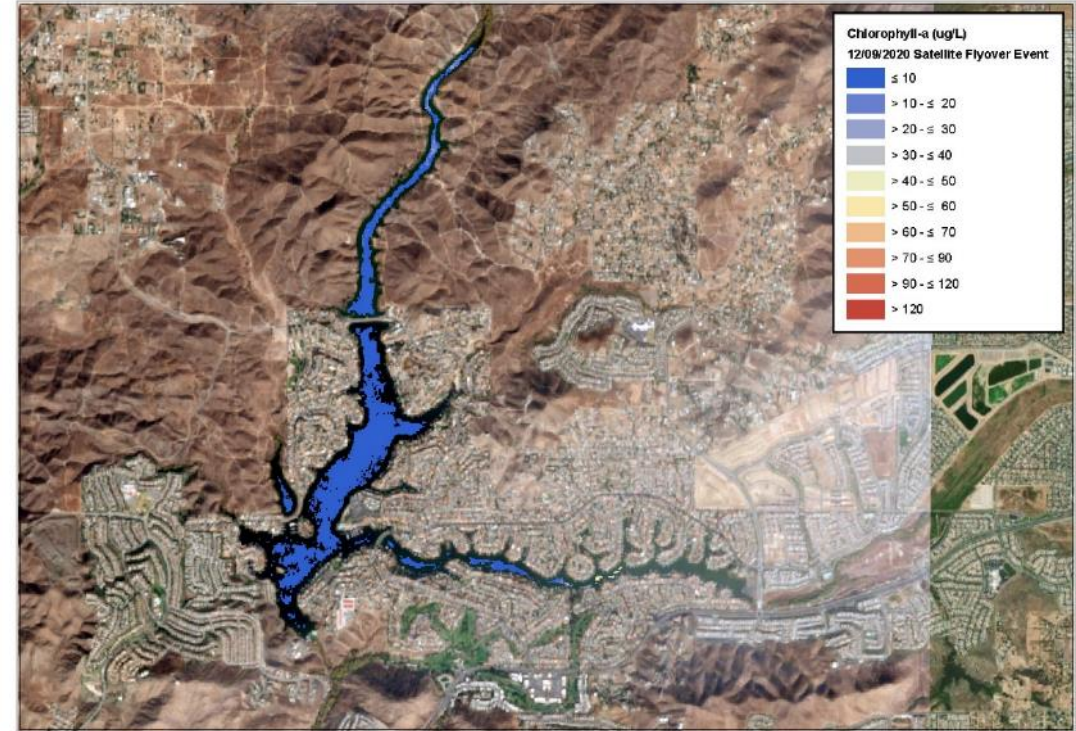
Lake Elsinore



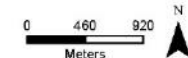
Chlorophyll-a Concentrations
Lake Elsinore
December 09, 2020 Satellite Flyover Event



Canyon Lake



Chlorophyll-a Concentrations
Canyon Lake
December 9, 2020 Satellite Flyover Event



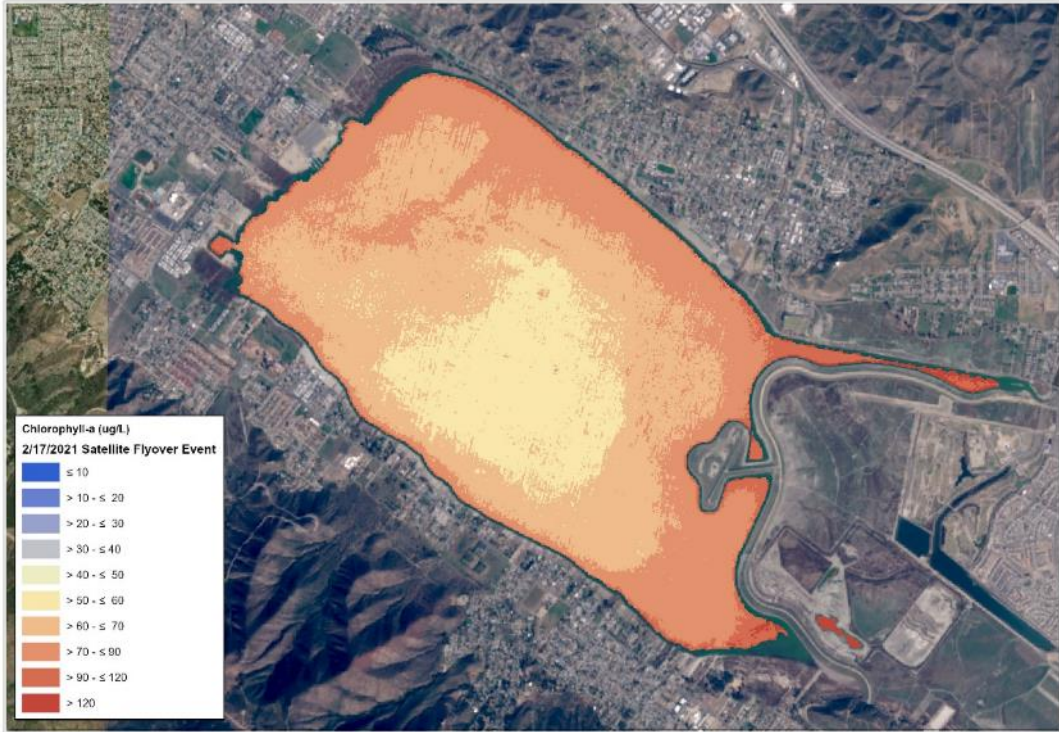
**Data gaps due to sunglint and haze over eastern arm

Satellite Imagery – Chlorophyll February 17, 2021

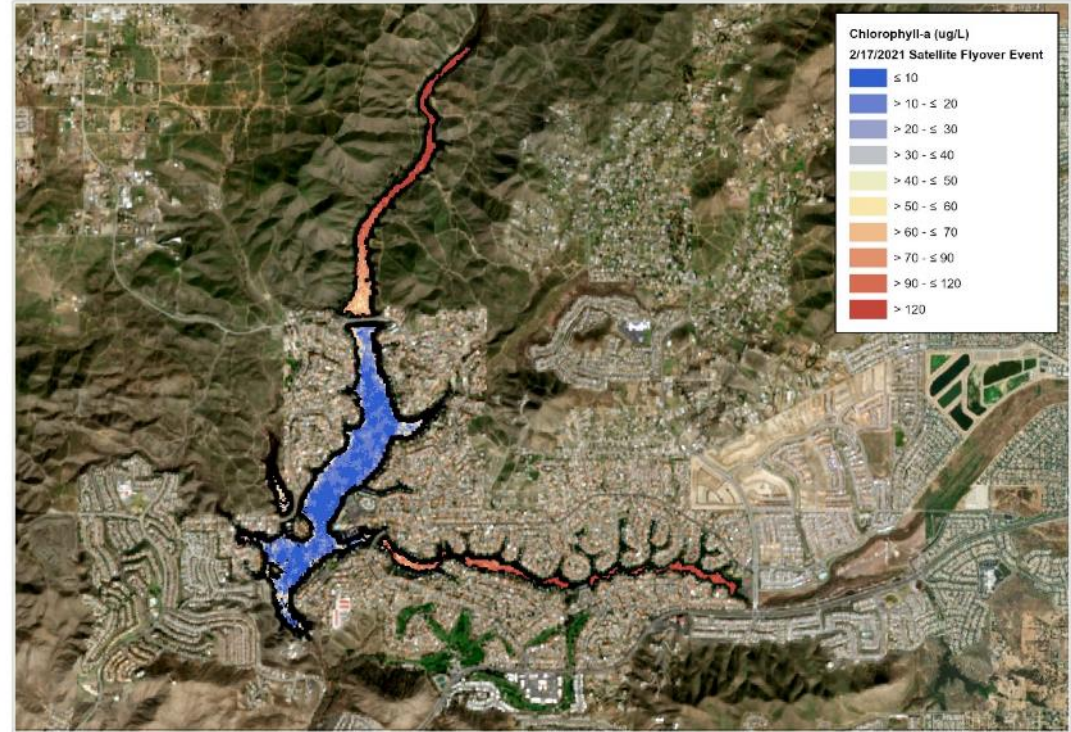
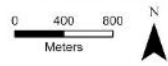


Lake Elsinore

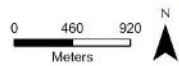
Canyon Lake



Chlorophyll-a Concentrations
Lake Elsinore
February 17, 2021 Satellite Flyover Event



Chlorophyll-a Concentrations
Canyon Lake
February 17, 2021 Satellite Flyover Event

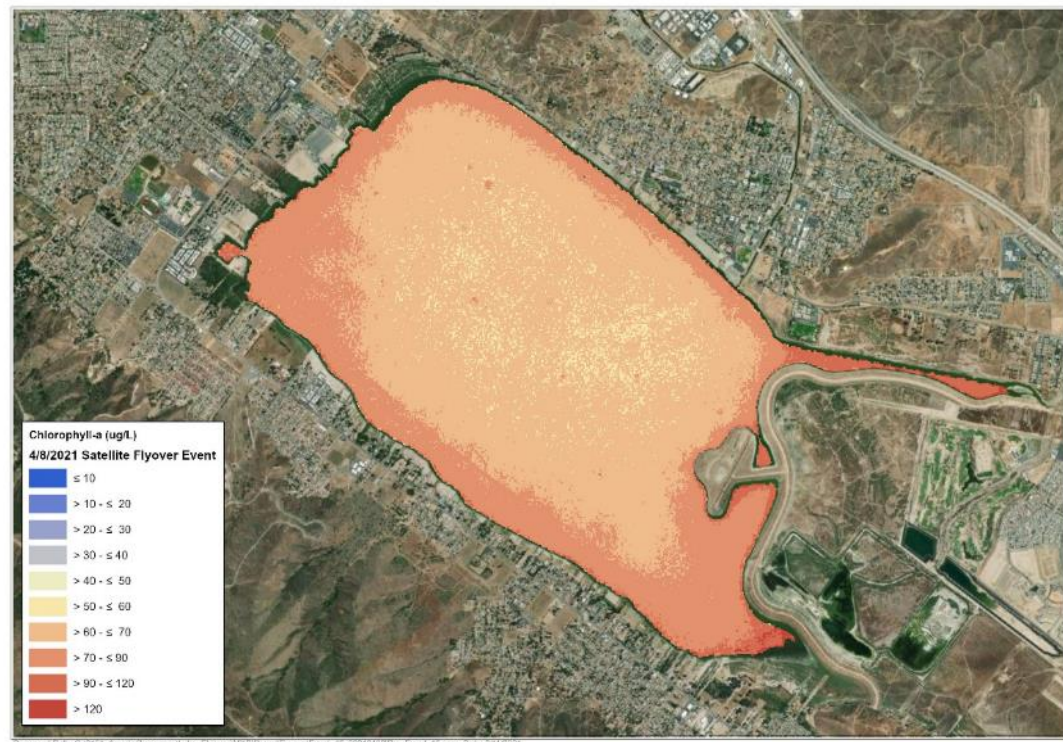


**Data gaps due to land mass interference

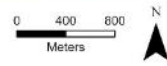
Satellite Imagery – Chlorophyll April 8, 2021



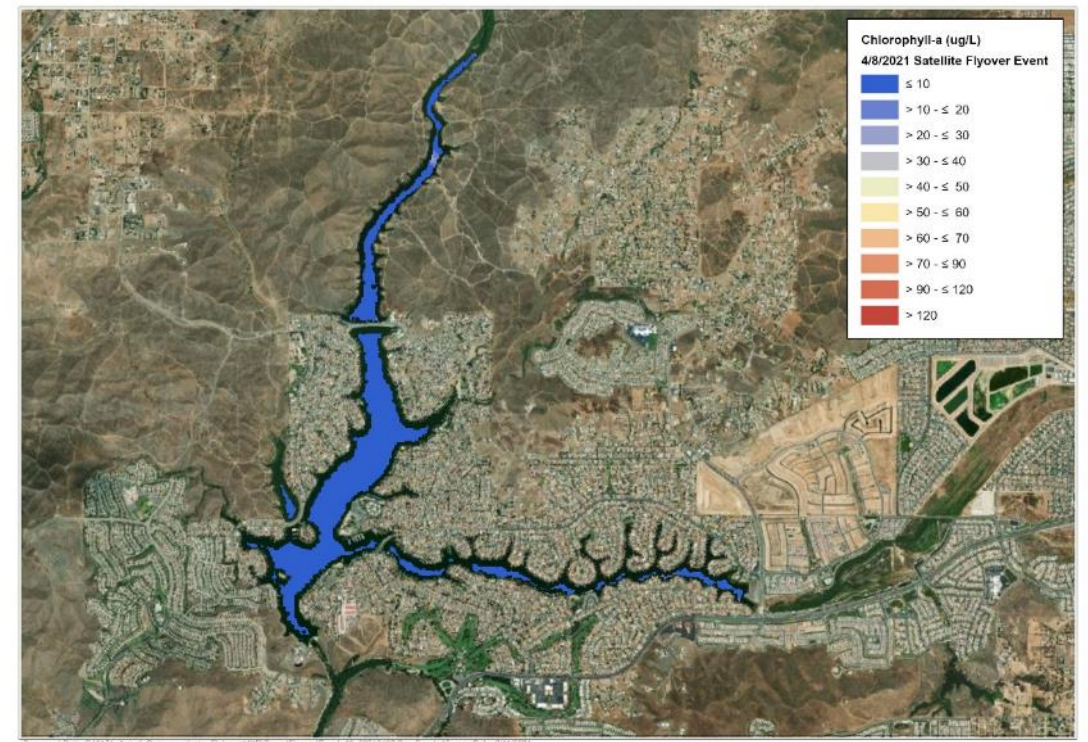
Lake Elsinore



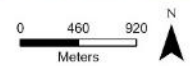
Chlorophyll-a Concentrations
Lake Elsinore
April 8, 2021 Satellite Flyover Event



Canyon Lake



Chlorophyll-a Concentrations
Canyon Lake
April 8, 2021 Satellite Flyover Event

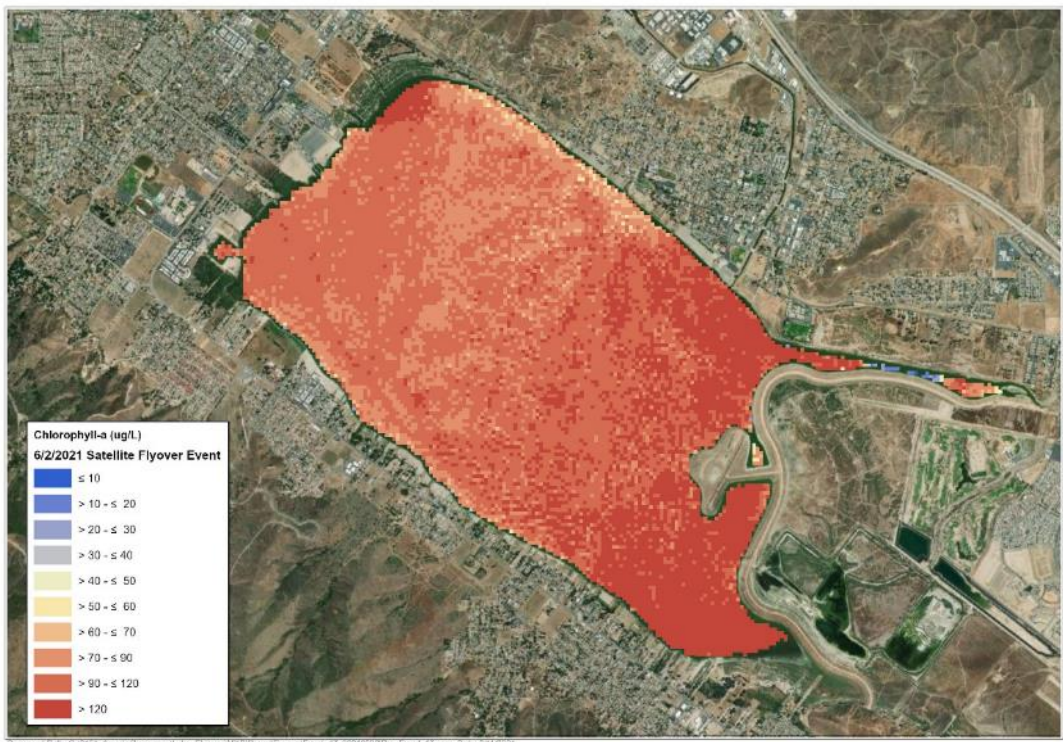


**Data gaps due to land mass interference

Satellite Imagery – Chlorophyll June 2, 2021



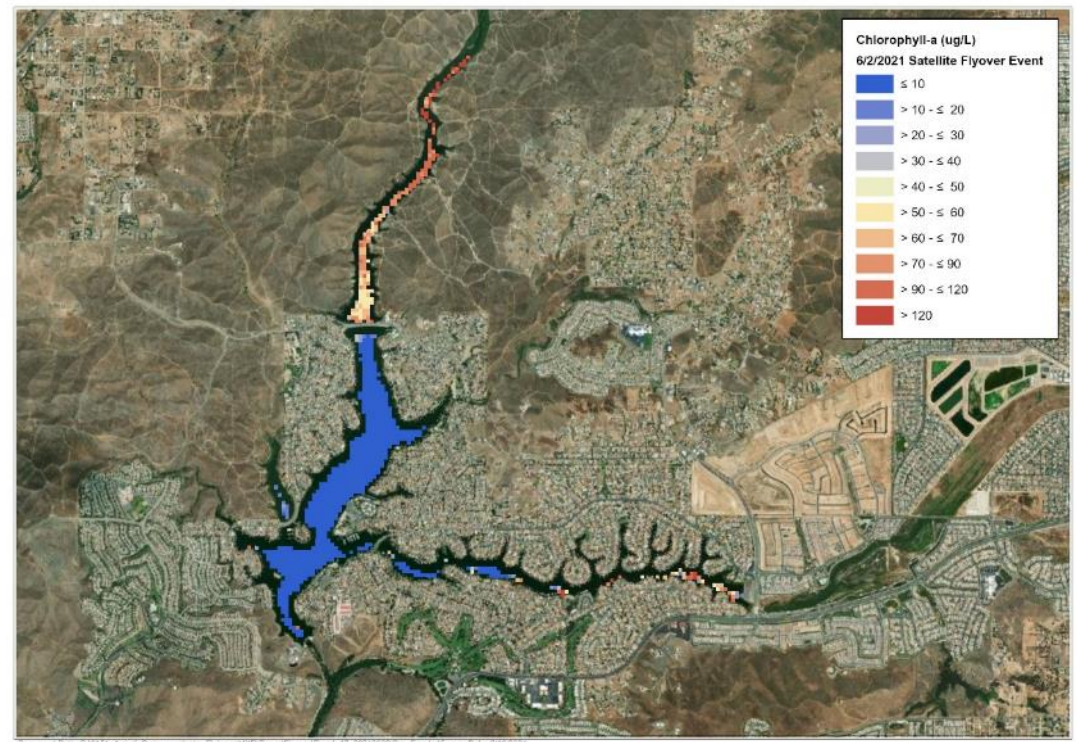
Lake Elsinore



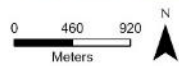
Chlorophyll-a Concentrations
Lake Elsinore
June 2, 2021 Satellite Flyover Event



Canyon Lake

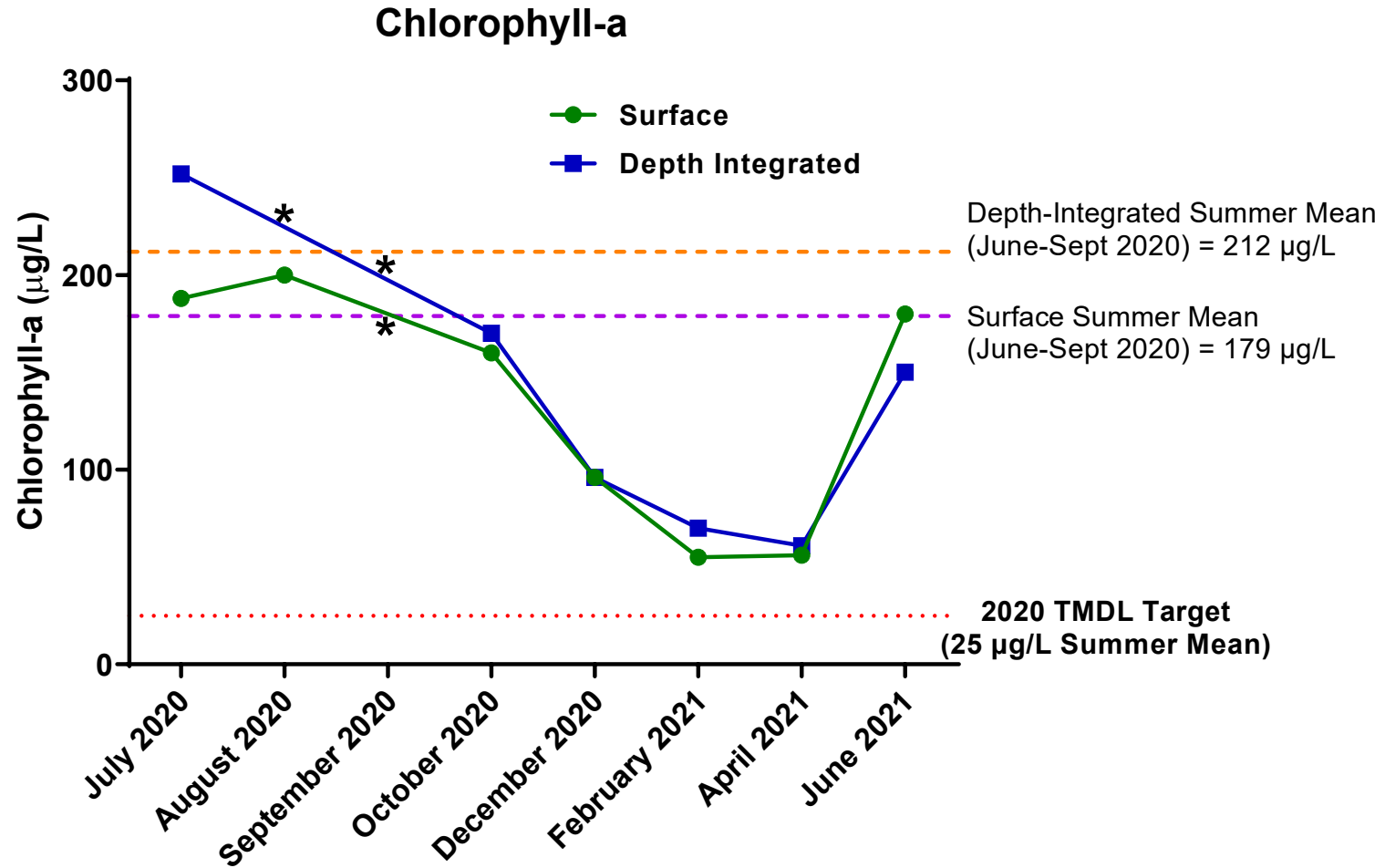


Chlorophyll-a Concentrations
Canyon Lake
June 2, 2021 Satellite Flyover Event



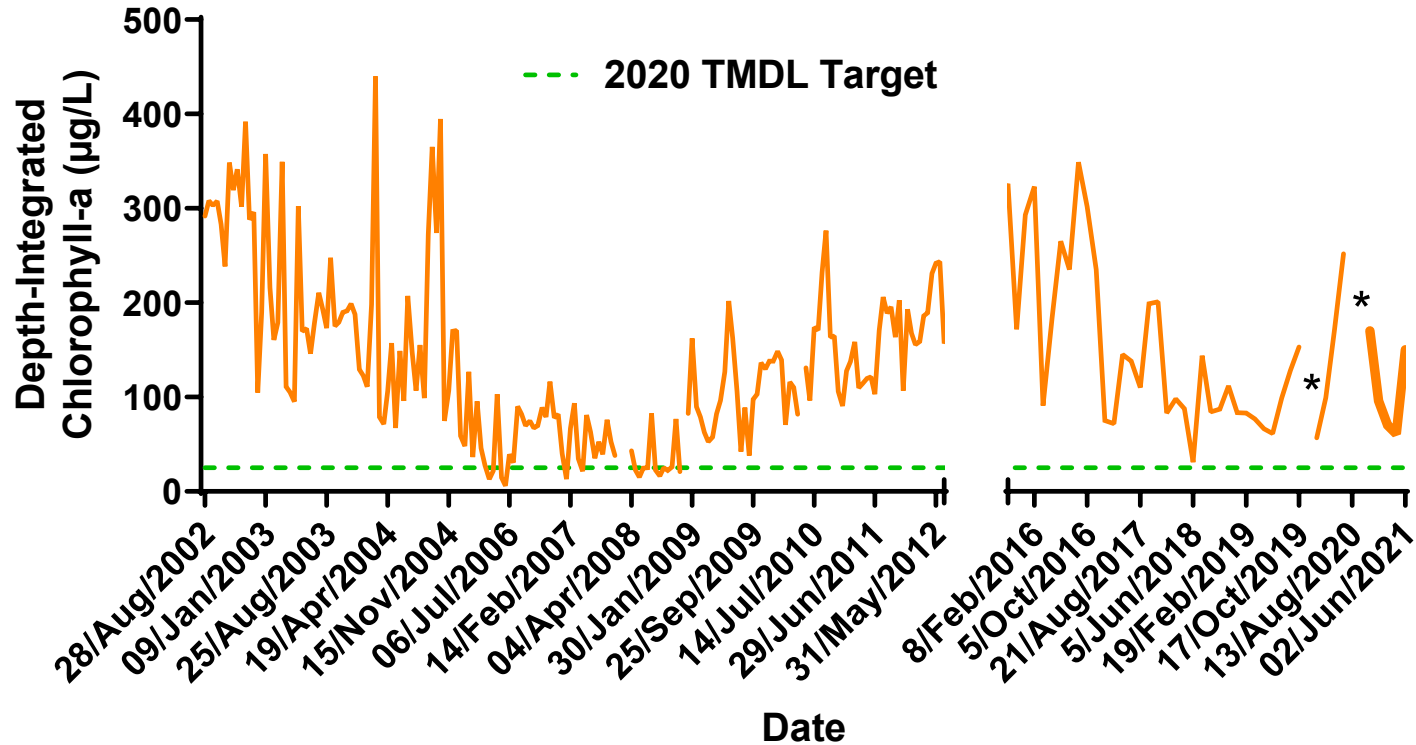
**Data gaps due to land mass interference

Lake Elsinore Chlorophyll – 2020-2021



*- Not measured due to laboratory error.

Lake Elsinore Chlorophyll – Depth Integrated Historic Data



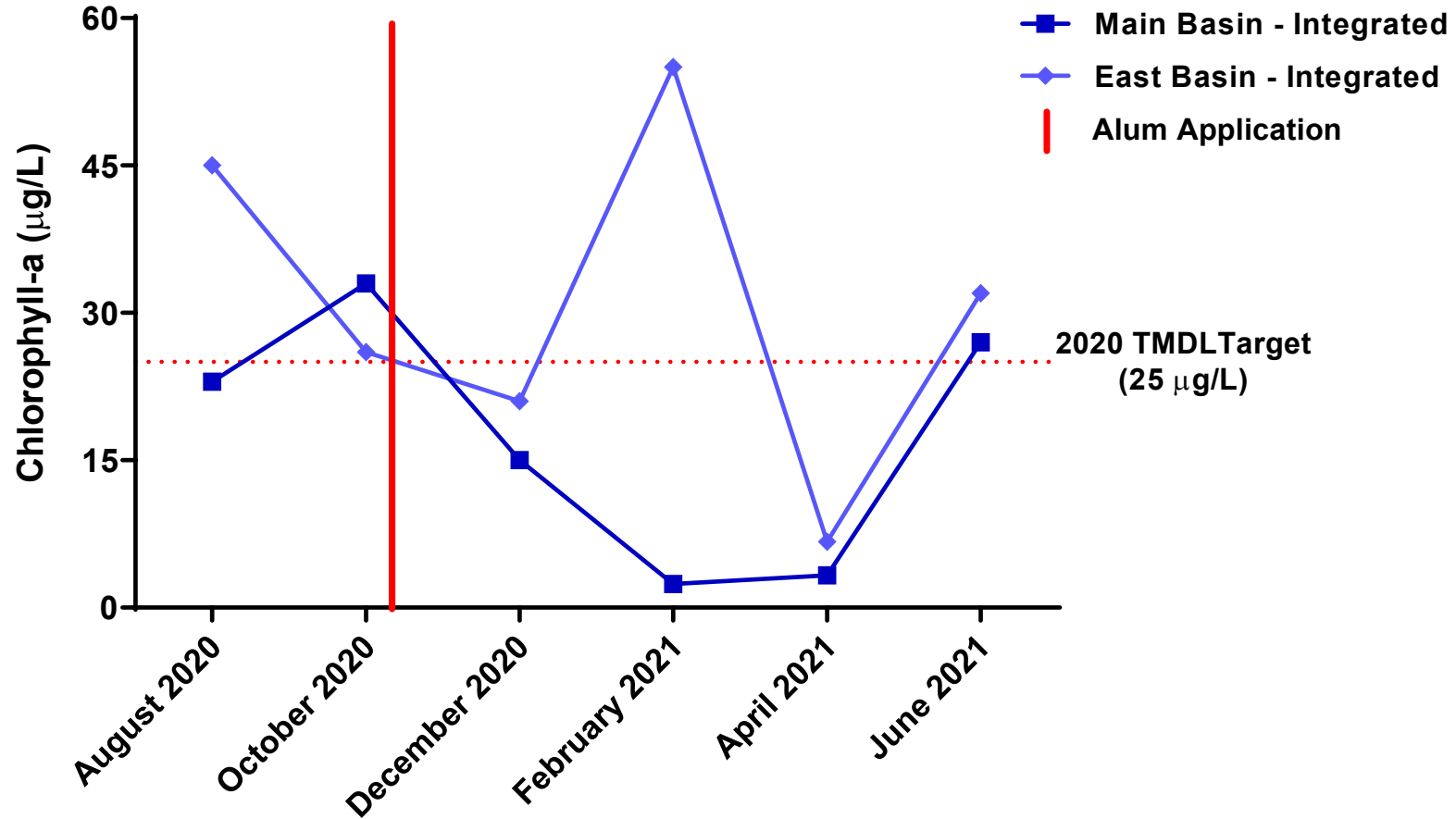
No data available from June 2012-July2015

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

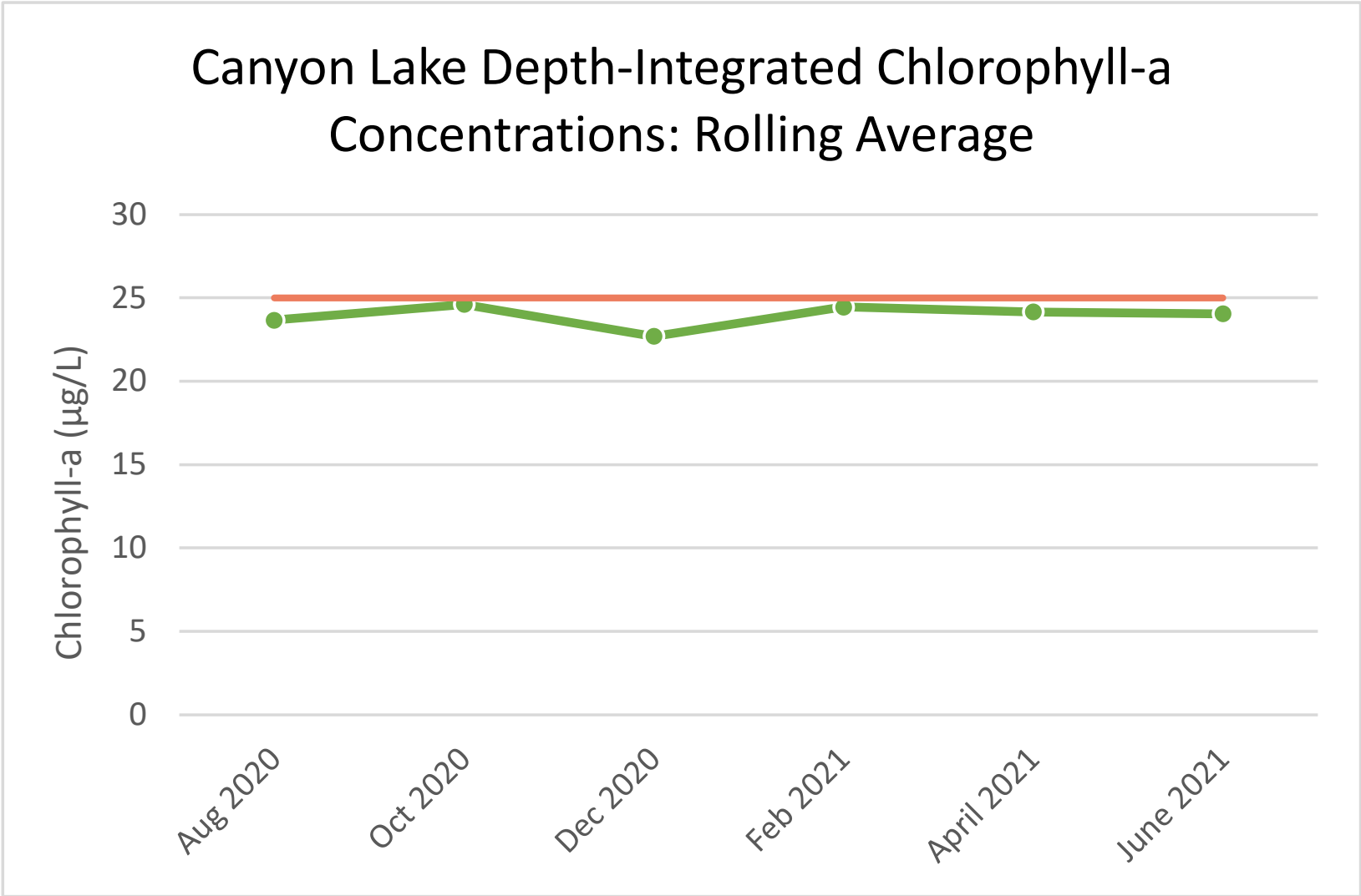
Bold represents current monitoring year July 2020-June 2021

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

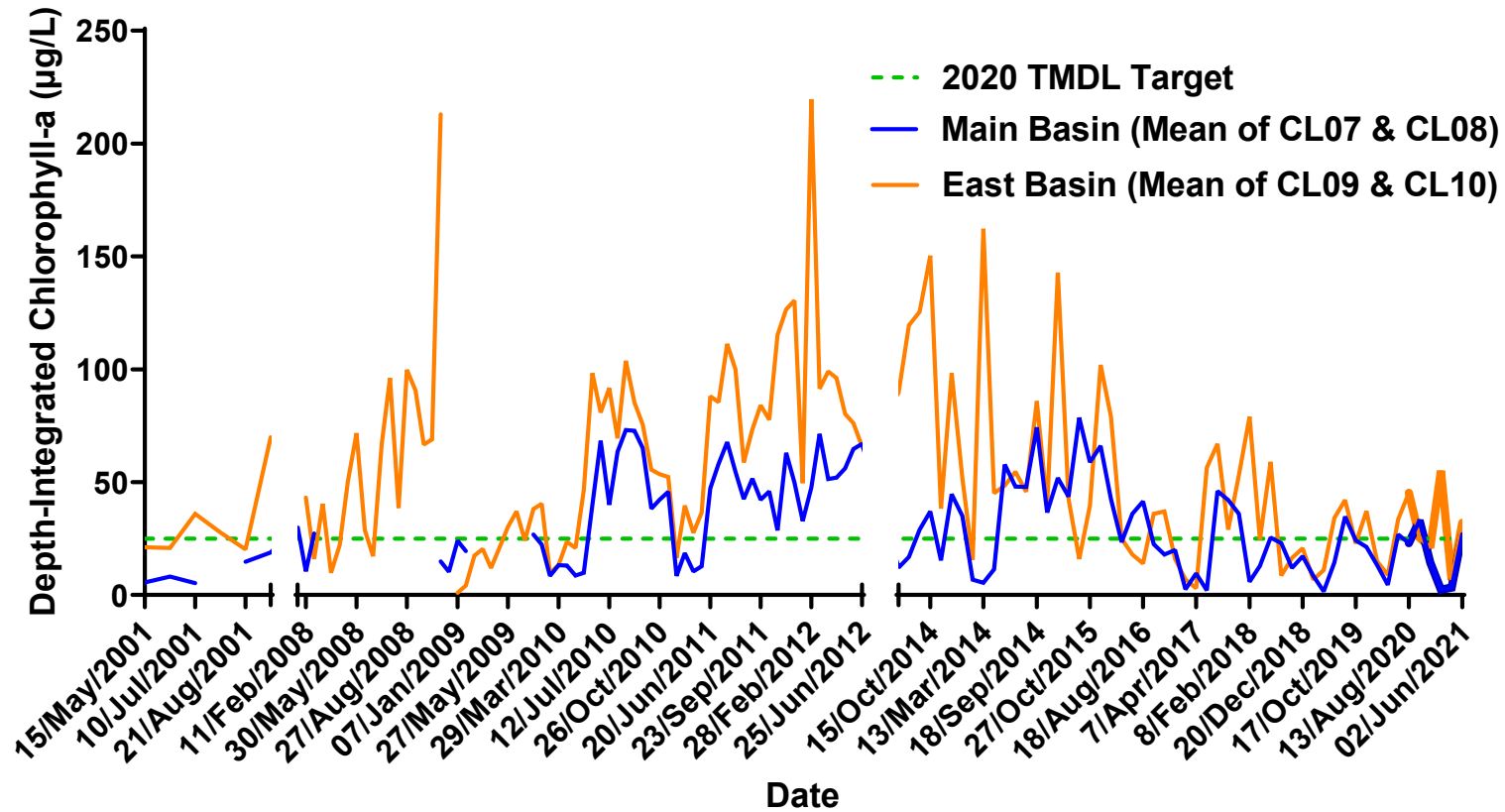
Canyon Lake Chlorophyll – 2020-2021



Canyon Lake Chlorophyll – 2020-2021



Canyon Lake Chlorophyll – Depth Integrated Historic Data

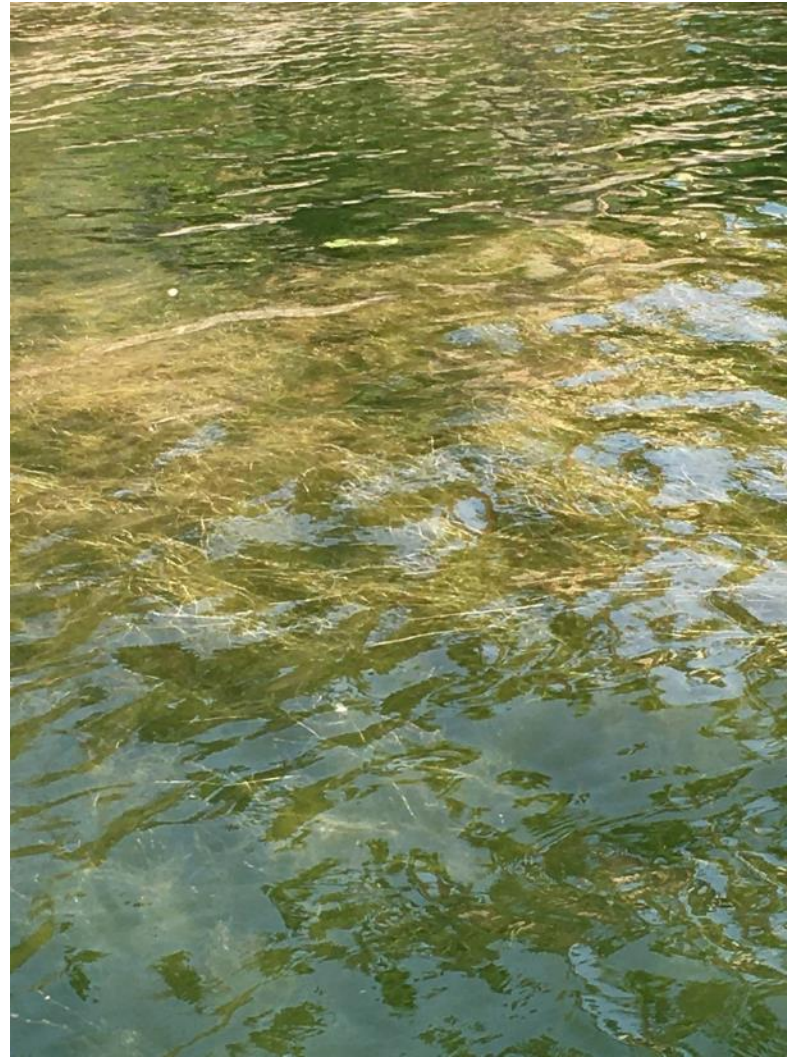
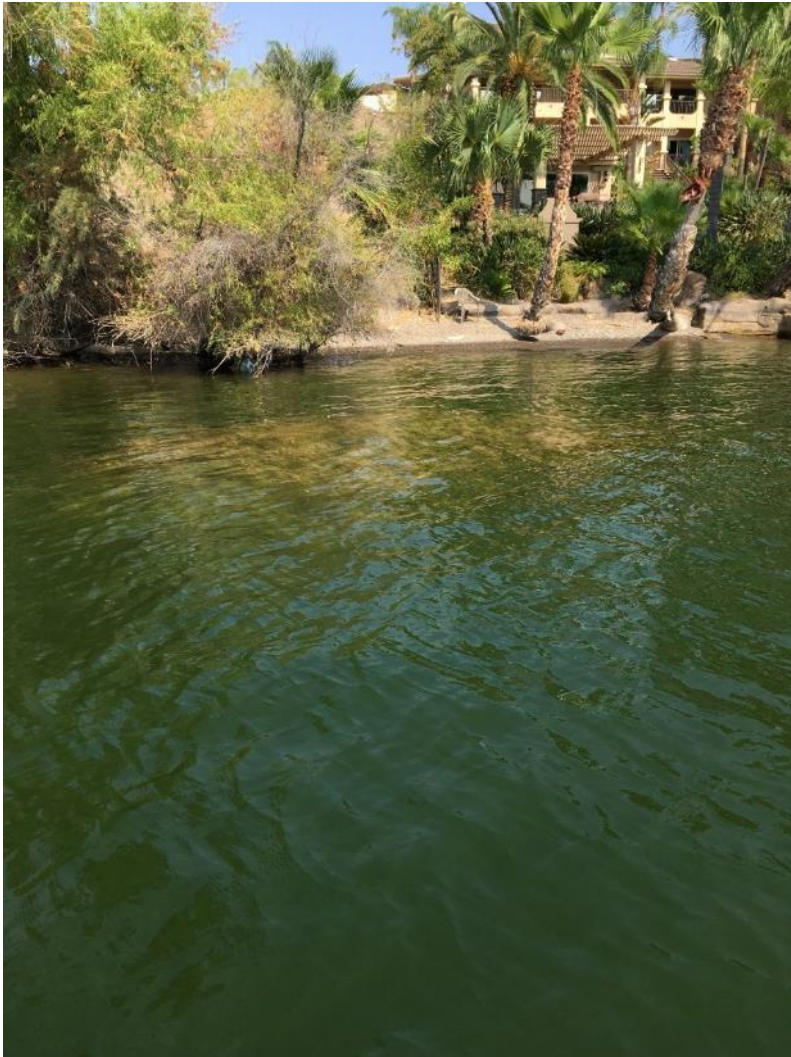


No data available from June 2012-July 2015

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

Bold represents current monitoring year July 2020-June 2021

Canyon Lake Macroalgae Sidenote August 2021 Monitoring Event

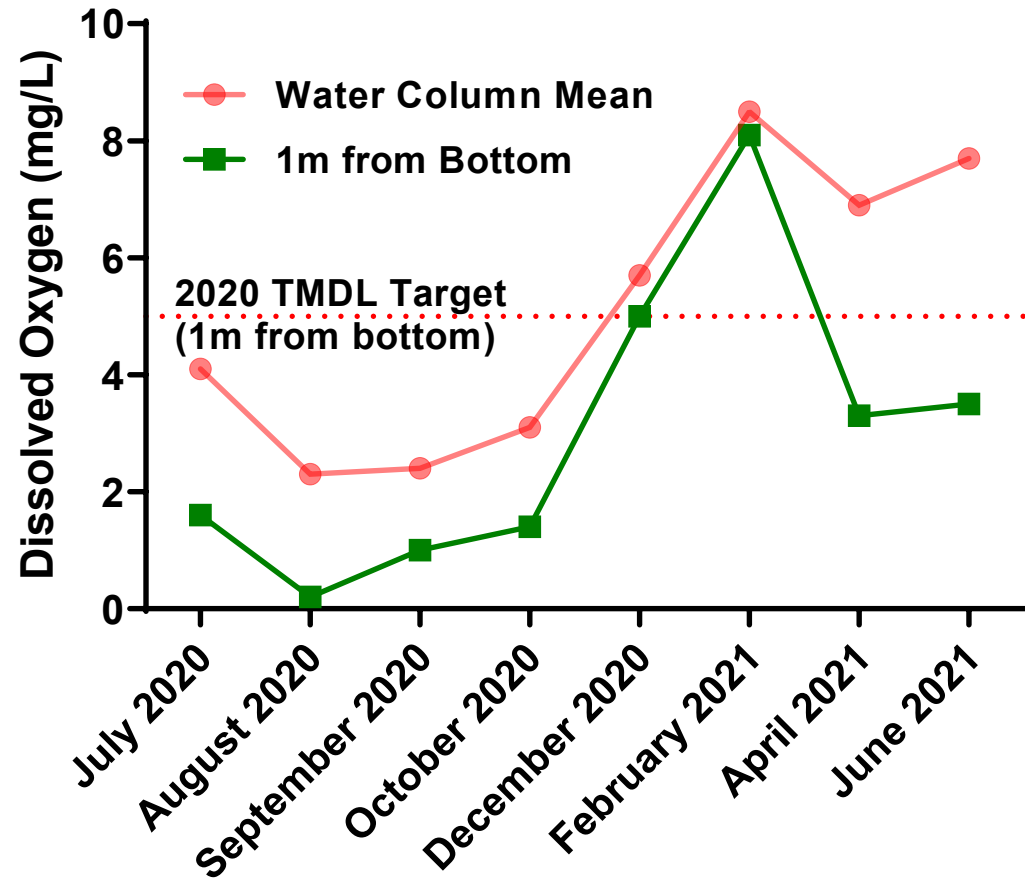


Lake Elsinore and Canyon Lake TMDL Water Quality Monitoring Update – 2020-2021 Summary



Dissolved
Oxygen
Monitoring

Lake Elsinore Dissolved Oxygen – Lake-wide Water Column Mean vs. 1m from Bottom 2020-2021

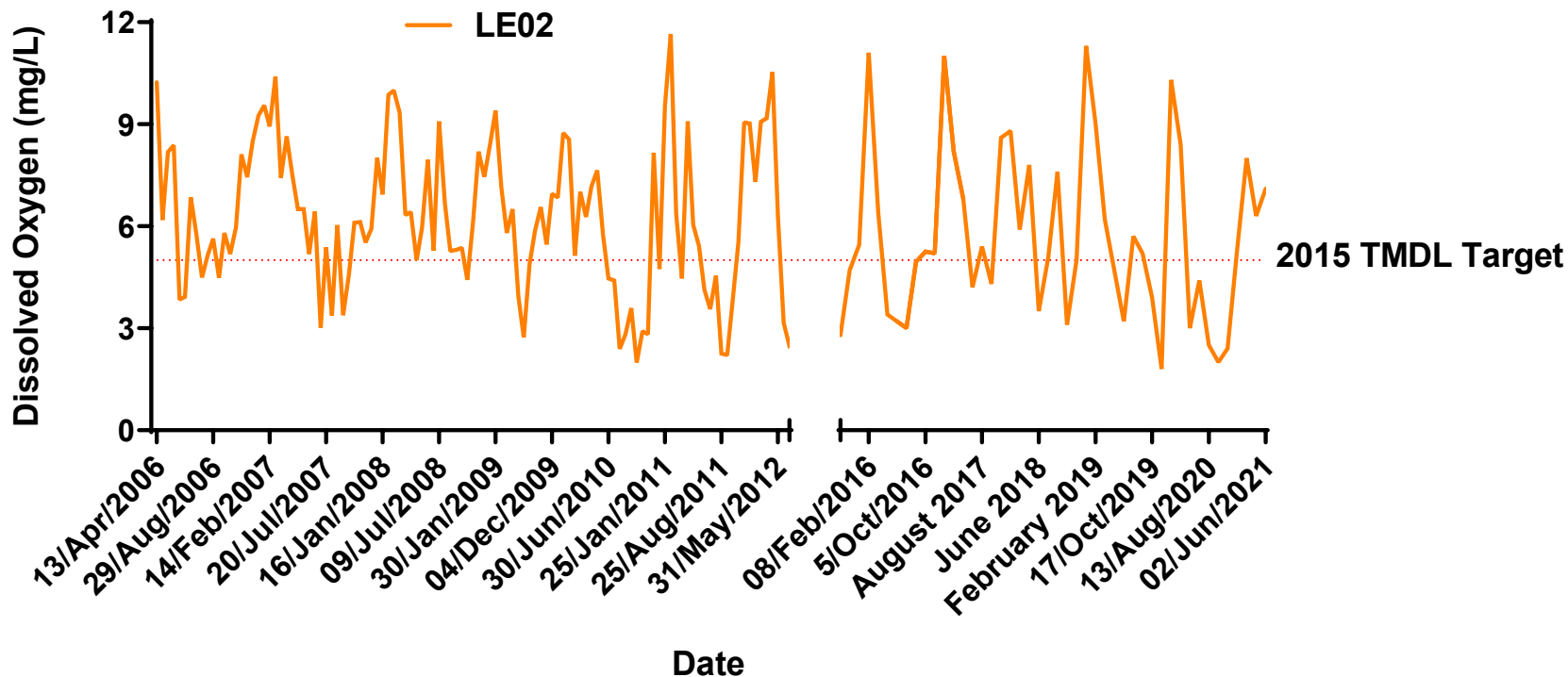


**Lake-wide is mean of three sites monitored: LE01, LE02, LE03

Lake Elsinore Dissolved Oxygen – LE02 Water Column Mean Historic Data



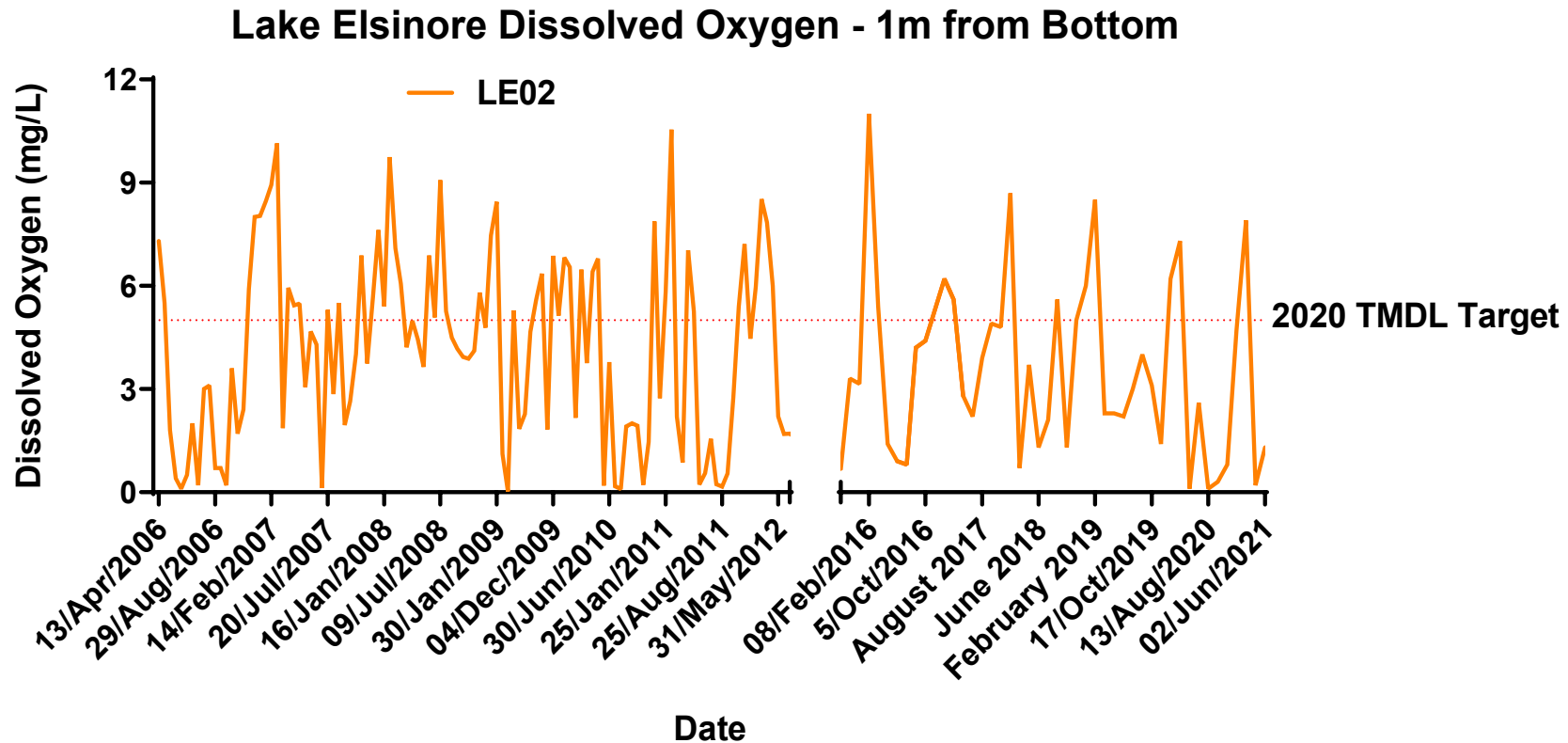
Lake Elsinore Dissolved Oxygen - Water Column mean



No data available from June 2012-July 2015

TMDL target of 5 mg/L is depth average to be attained by 2015

Lake Elsinore Dissolved Oxygen – LE02 1m from Bottom Historic Data



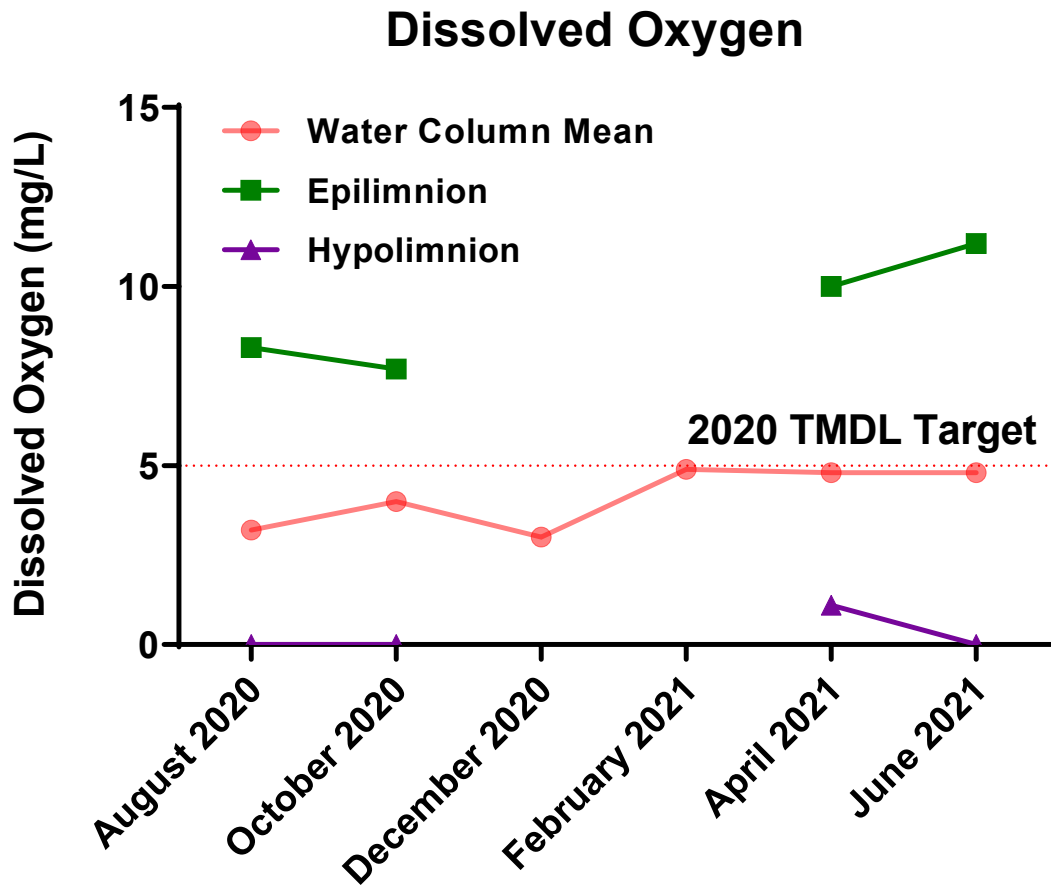
No data available from June 2012-July 2015

TMDL target of 5 mg/L is 1m off lake bottom to be attained by 2020

Canyon Lake Dissolved Oxygen – Main Basin Epilimnion vs. Hypolimnion 2020-2021



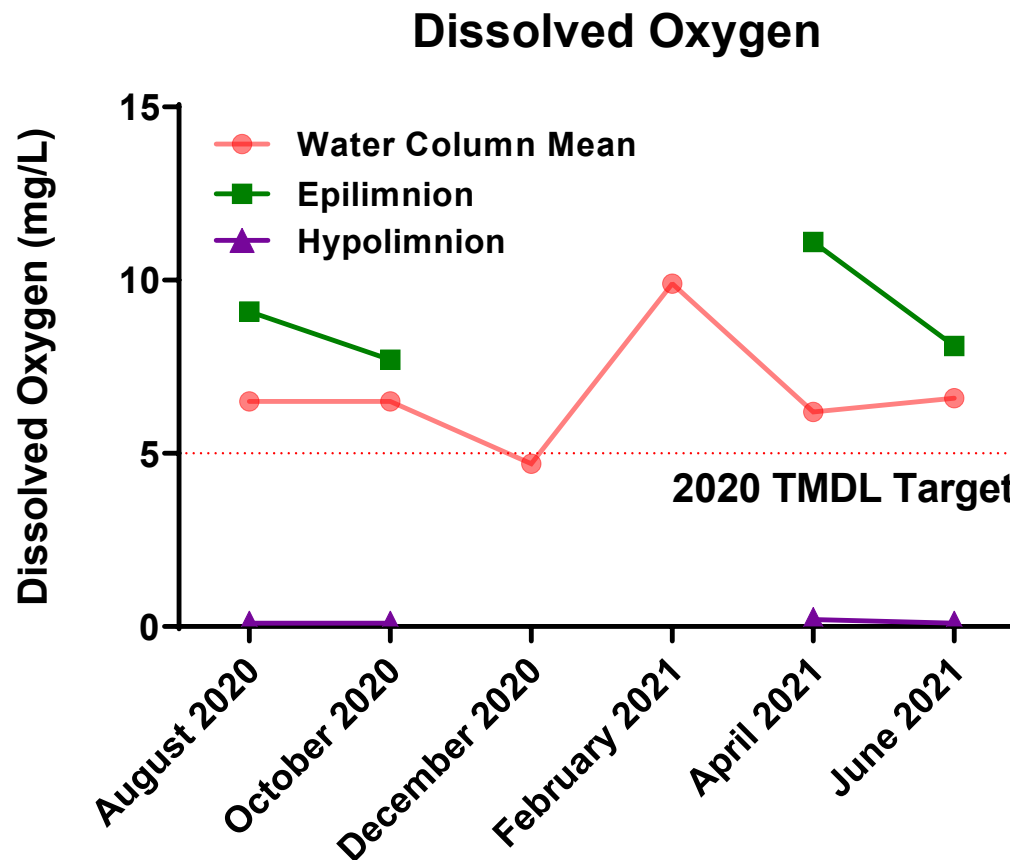
Mean of Sites
CL07 & CL08



No stratification in December and February

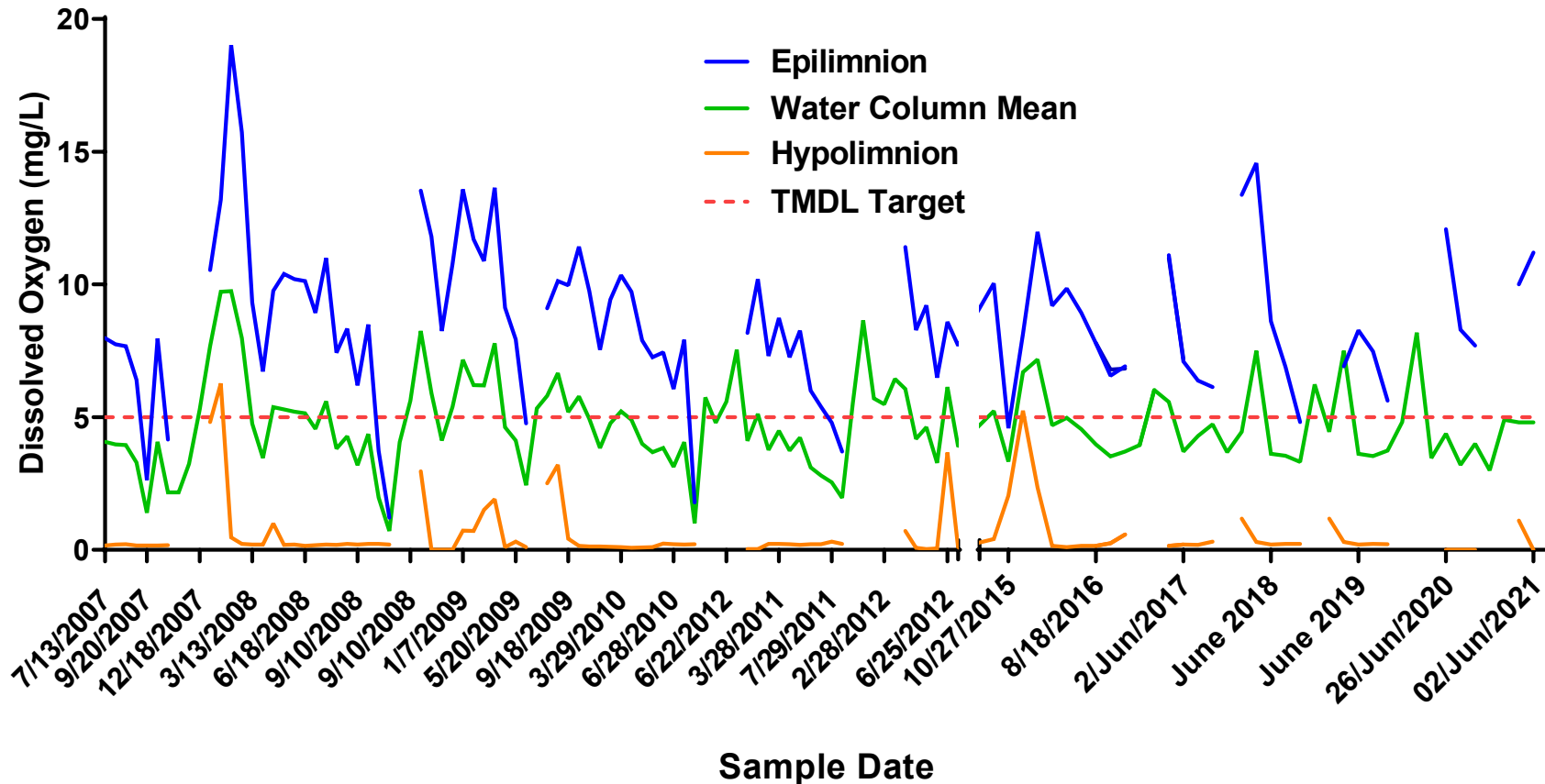
Canyon Lake Dissolved Oxygen – East Basin Epilimnion vs. Hypolimnion 2020-2021

Mean of Sites CL09 & CL10



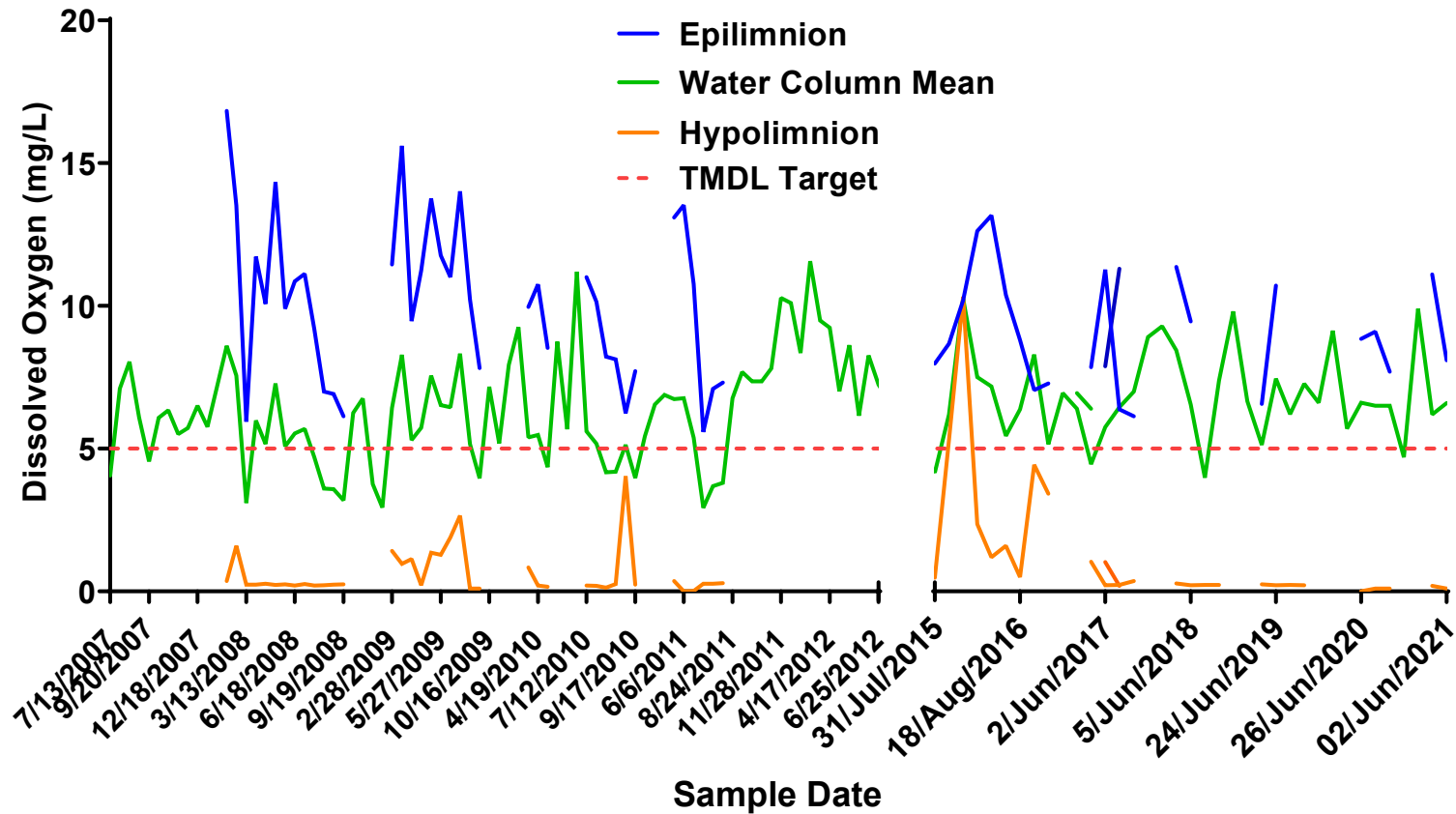
No stratification in December and February

Canyon Lake Dissolved Oxygen – Main Basin Mean Historic Data



Sample Date
 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

Canyon Lake Dissolved Oxygen – East Basin Mean Historic Data



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?

