

Lake Elsinore and Canyon Lake TMDL Water Quality Monitoring Update – 2019-2020 Summary



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N|V|5
ALTA
ENVIRONMENTAL

August 17, 2020

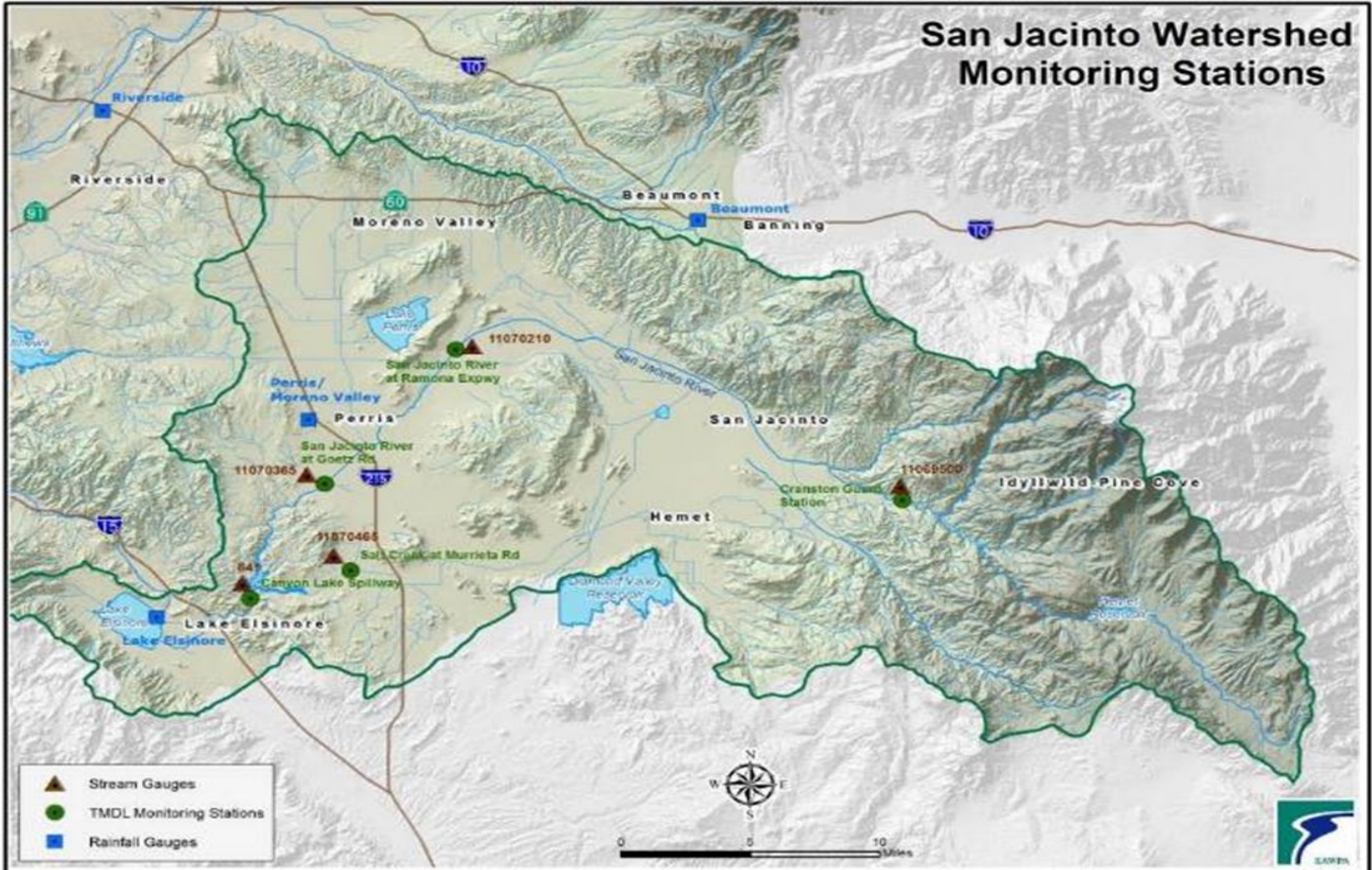
Lake Elsinore and Canyon Lake TMDL Water Quality Monitoring Update – 2019-2020 Summary



**Watershed
Monitoring**

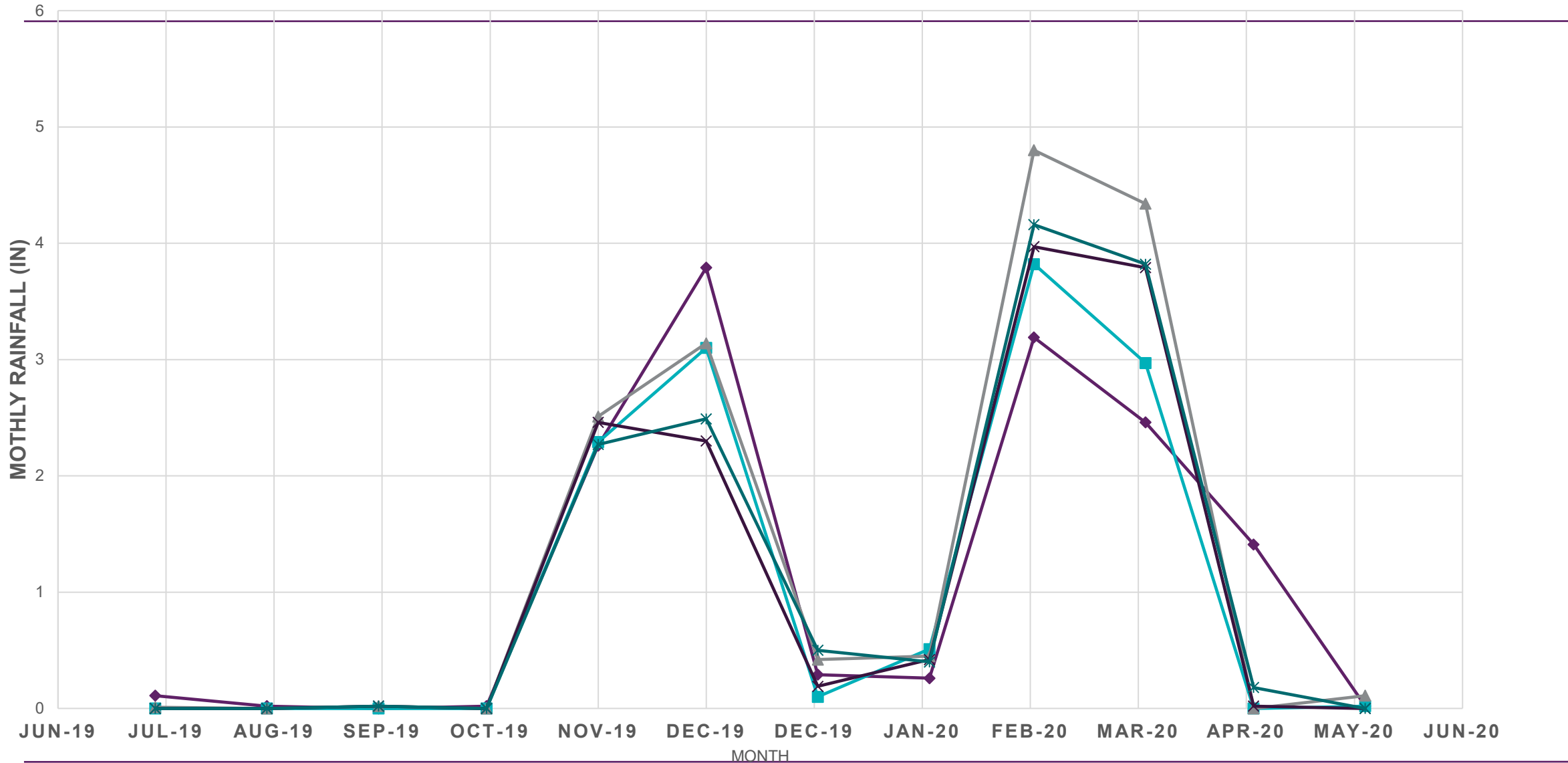


San Jacinto Watershed Monitoring Stations



SUMMARY OF 2019-2020 RAINFALL

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



Summary of 2019-2020 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)	1,645	2.37	0.59	14,792	3,705
Site 4 - San Jacinto River at Goetz Road (USGS 11070365)	3,290	1.83	0.67	23,337	8,660
Site 6 - San Jacinto River at Ramona Expressway ^b (USGS 11070210)	7	Not Measured ^b	Not Measured ^b	Not Measured ^b	Not Measured ^b
Site 30 - Canyon Lake Spillway ^c (USGS 11070500)	4,497	1.1	0.16	17,768	2,429

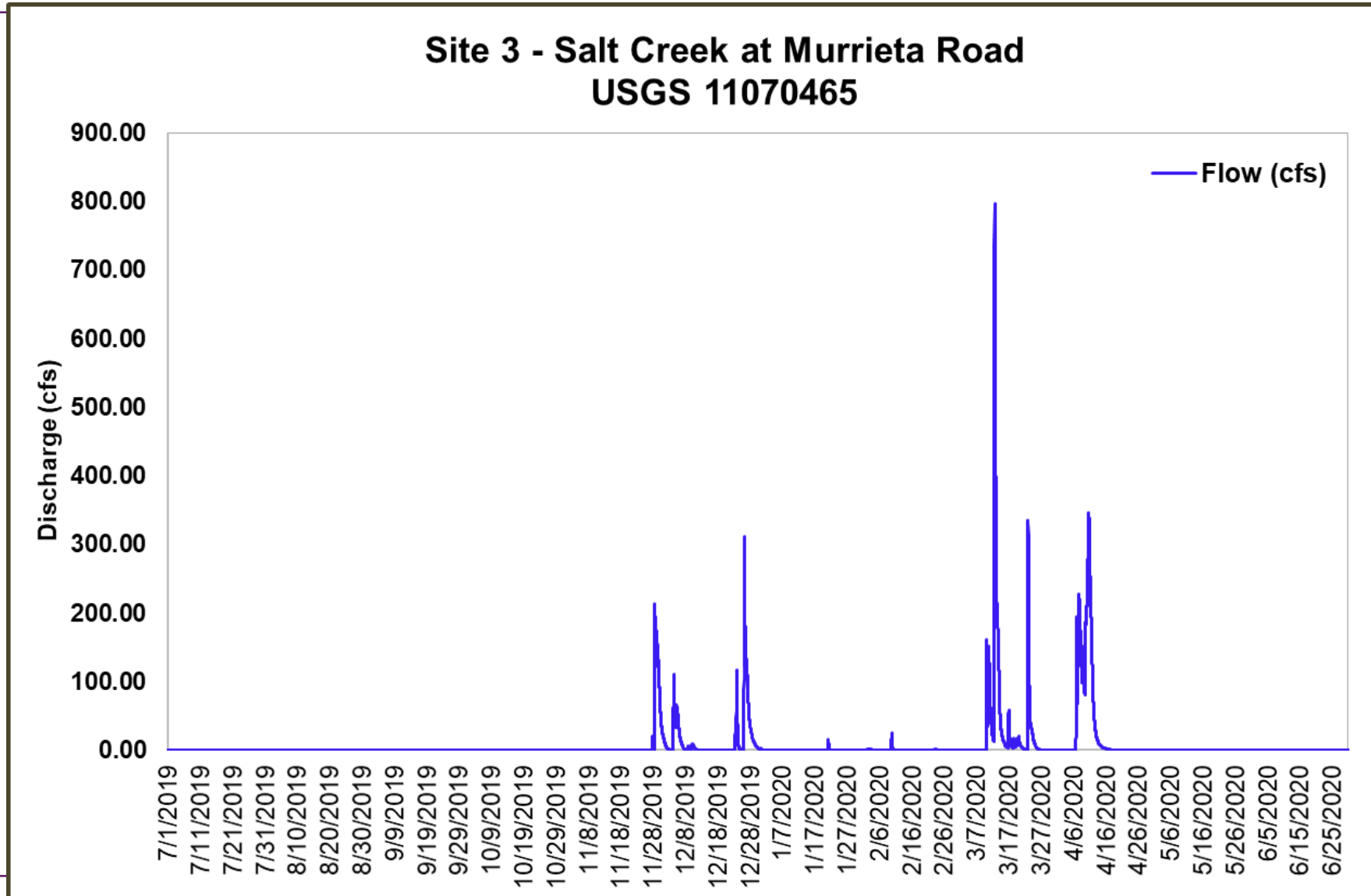
a - Flow data after 03/03/2020 are provisional and may be subject to change.

b - No flows originating from the upper watershed were observed at the TMDL monitoring location just downstream of Mystic Lake, only local flows were observed, 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.

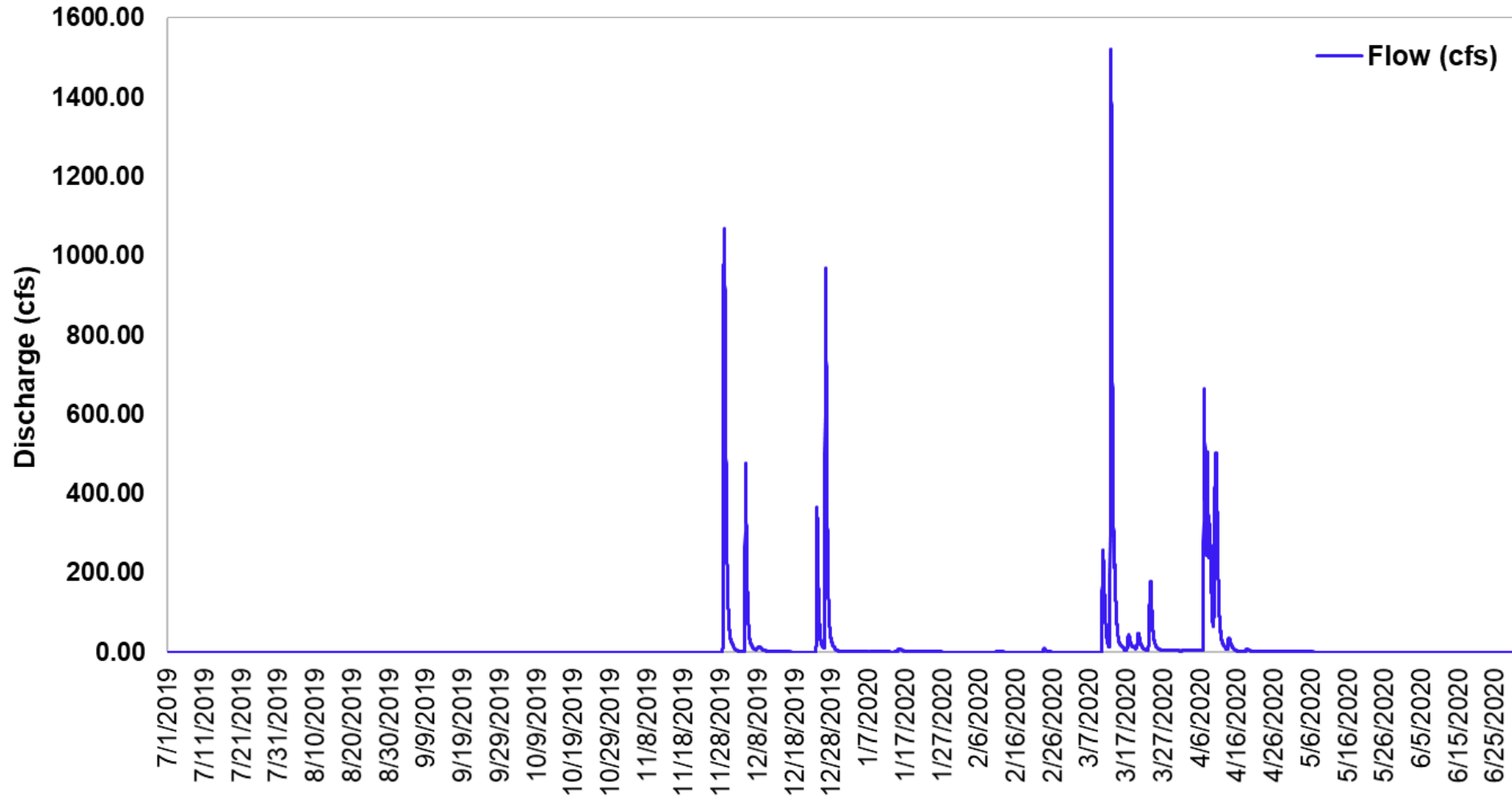
Mgal = million gallons; 1 million gallons = 133,680 cubic feet; mg/L = milligrams per liter; kg = kilograms; USGS = United States Geological Survey.

2019-2020 Annual Hydrograph

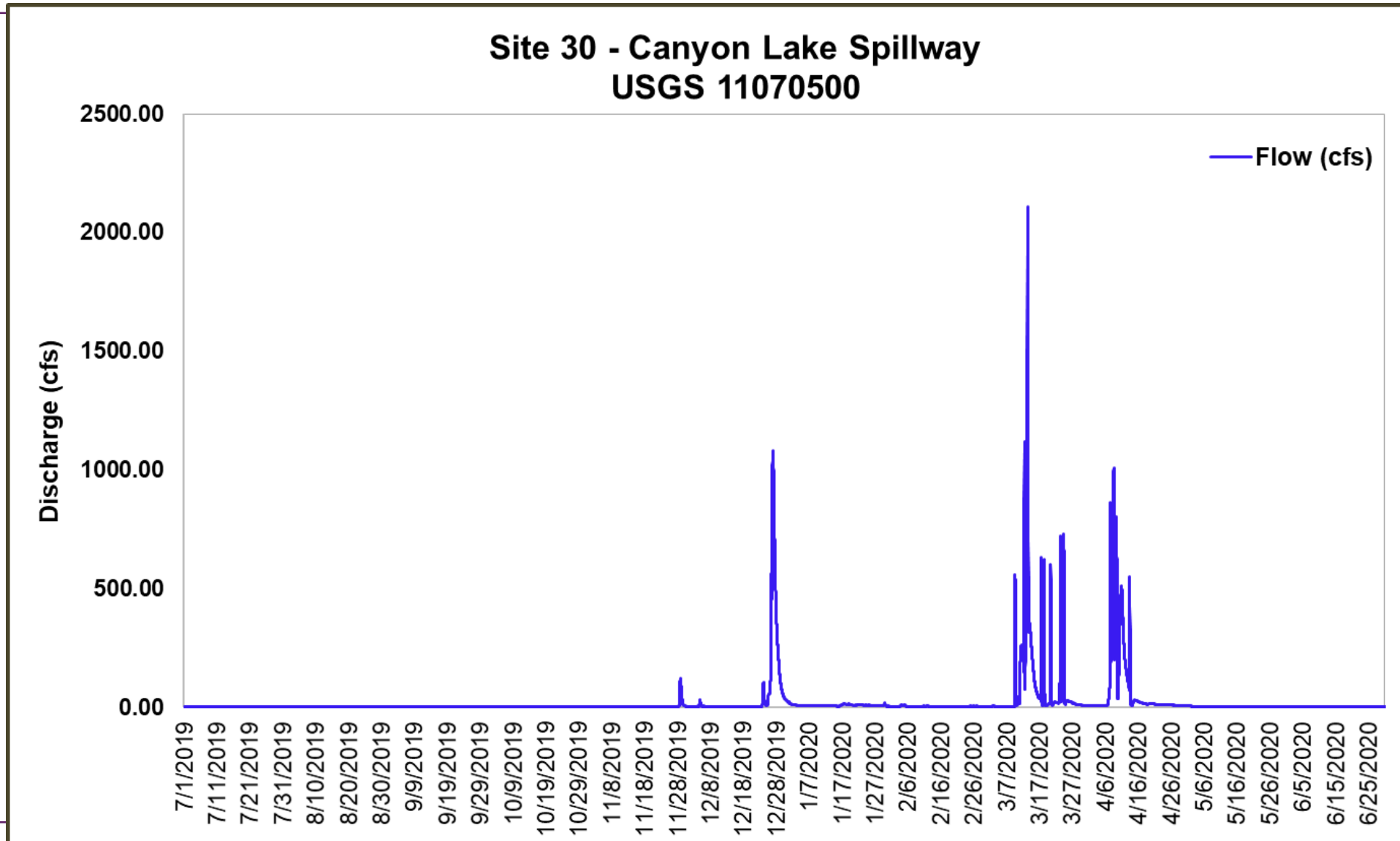


2019-2020 Annual Hydrograph

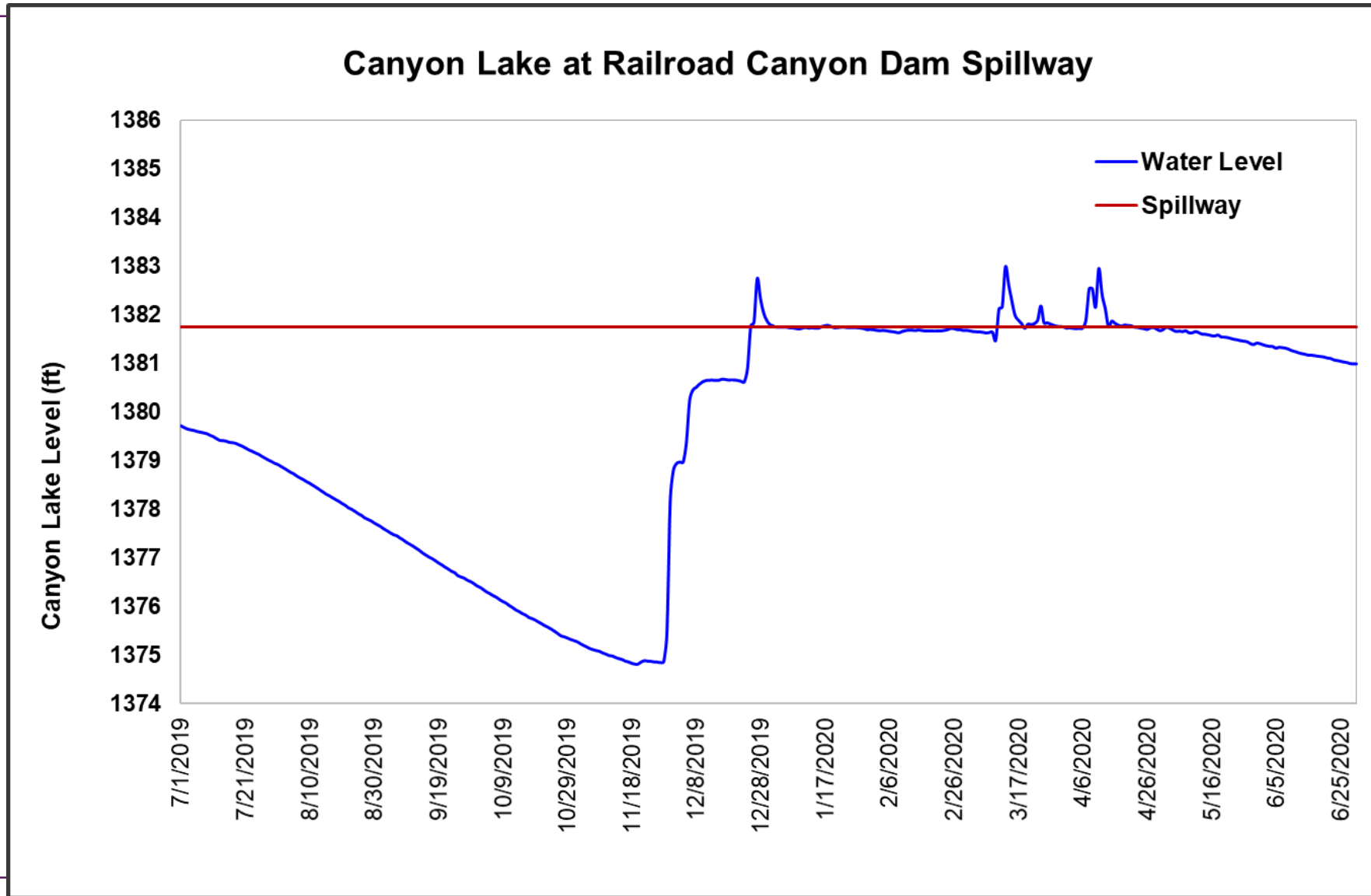
**Site 4 - San Jacinto River at Goetz Road
USGS 11070365**



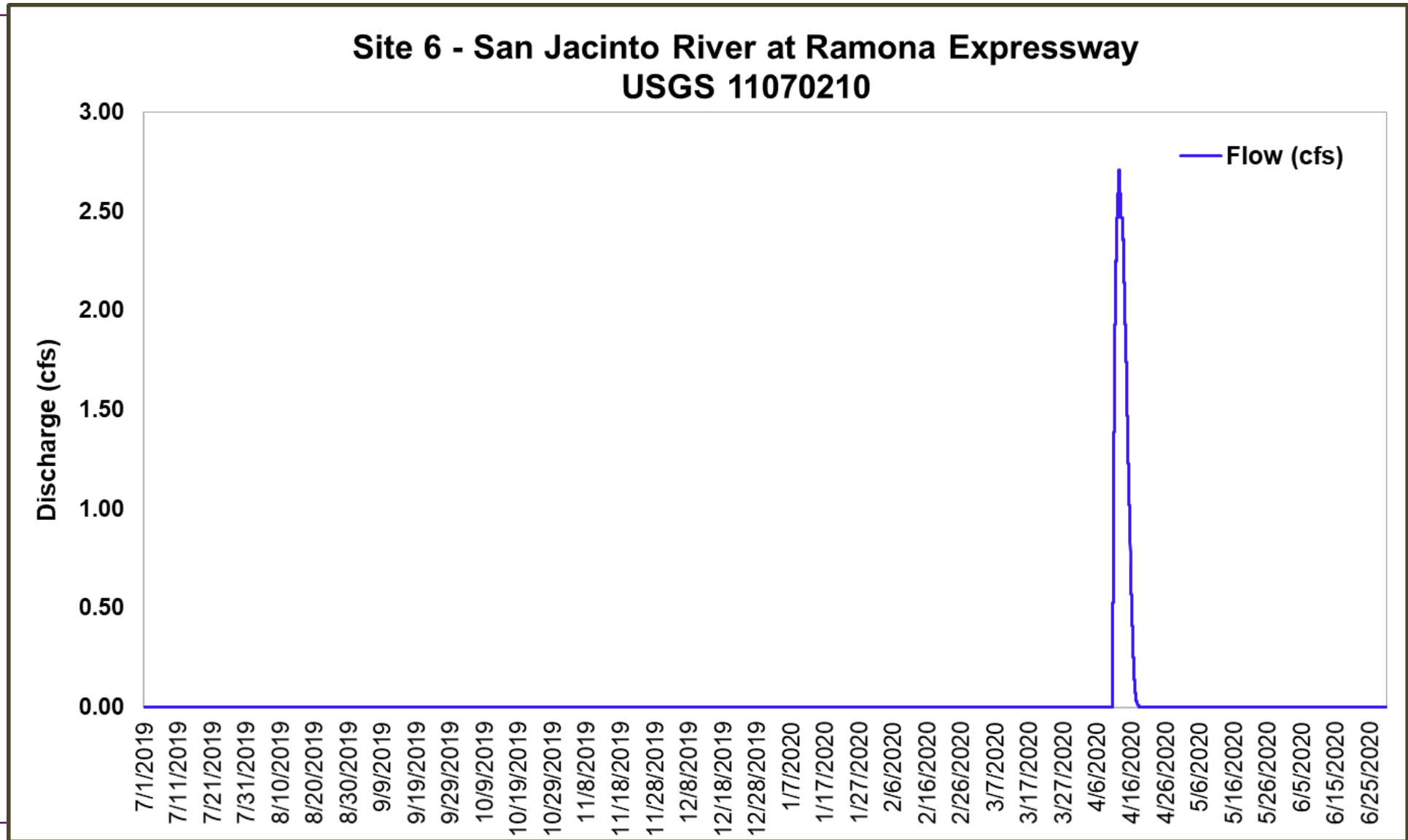
2019-2020 Annual Hydrograph



2019-2020 Annual Hydrograph

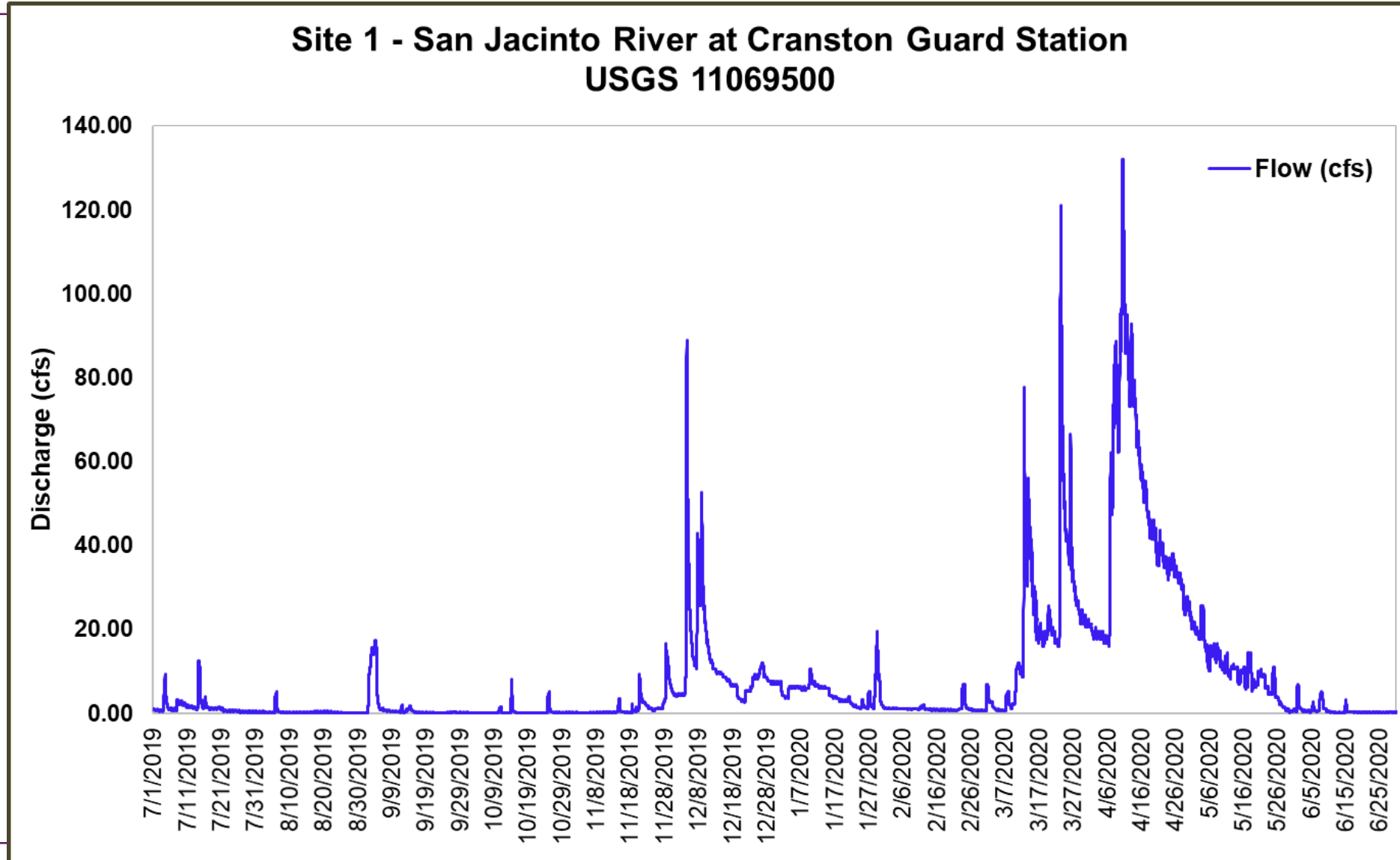


2019-2020 Annual Hydrograph



2019-2020 Annual Hydrograph

**Site 1 - San Jacinto River at Cranston Guard Station
USGS 11069500**

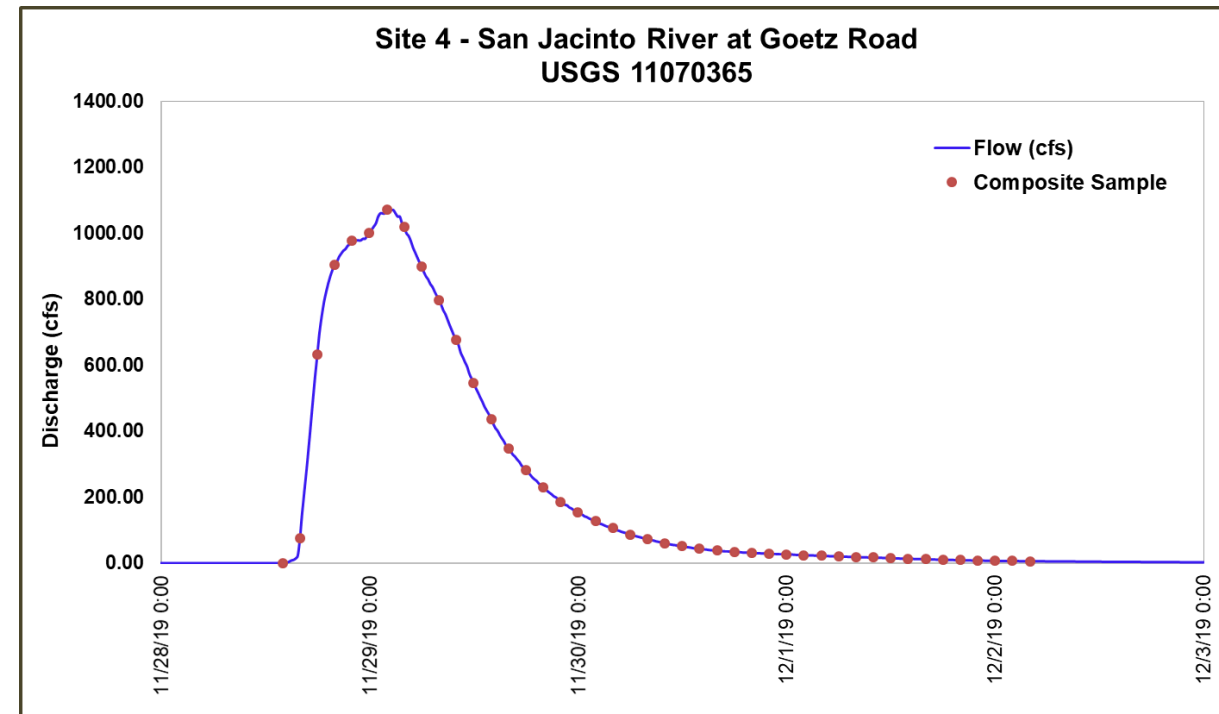
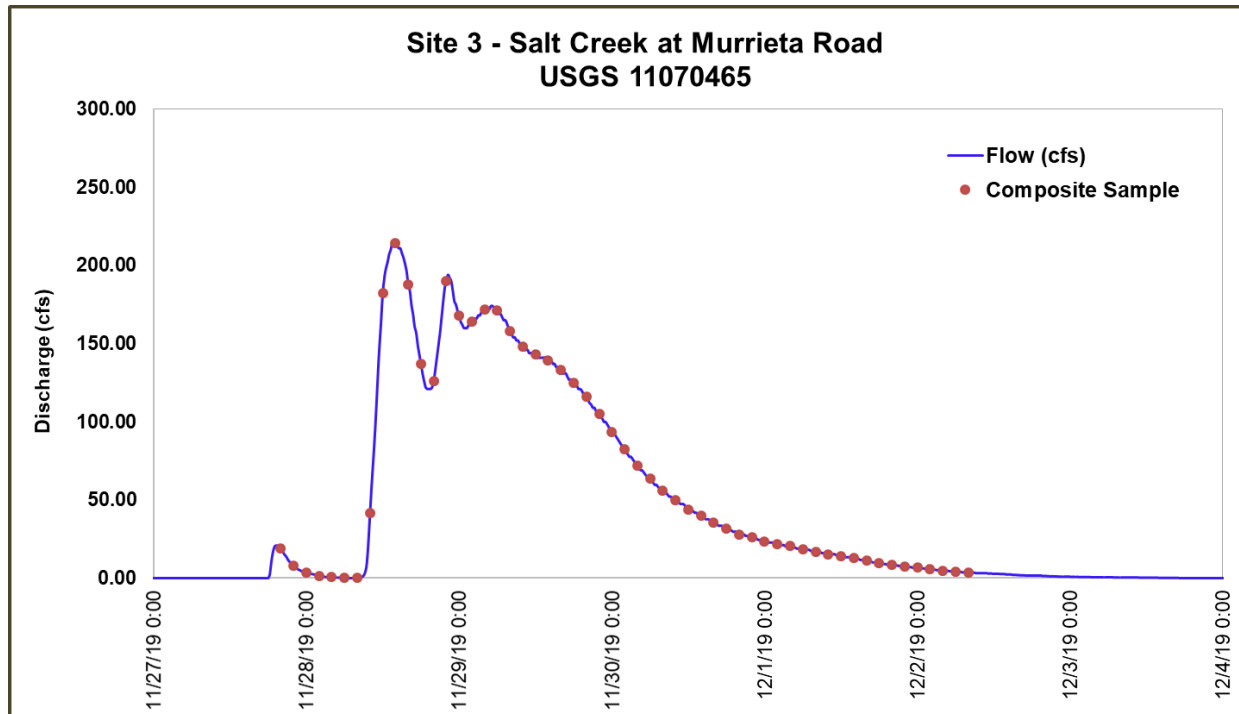


Wet Event #1

November 27-December 2, 2019

Watershed Rainfall: 1.88-2.16 inches

Sites: Salt Creek and San Jacinto

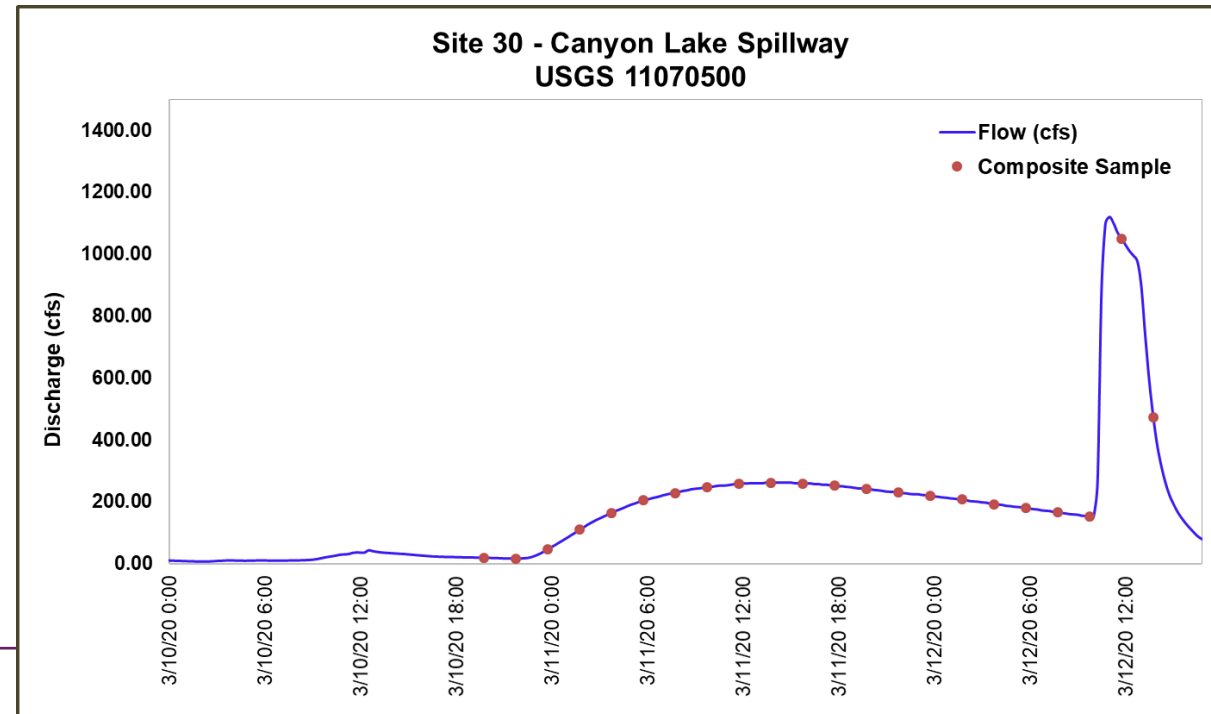
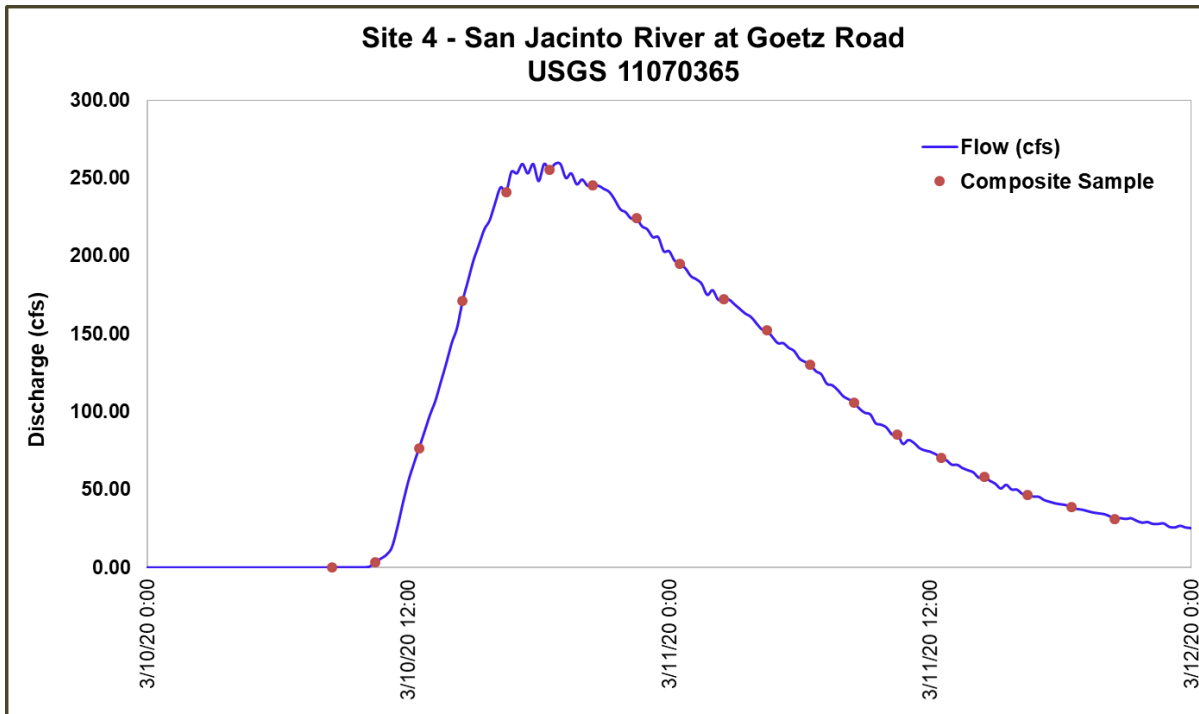
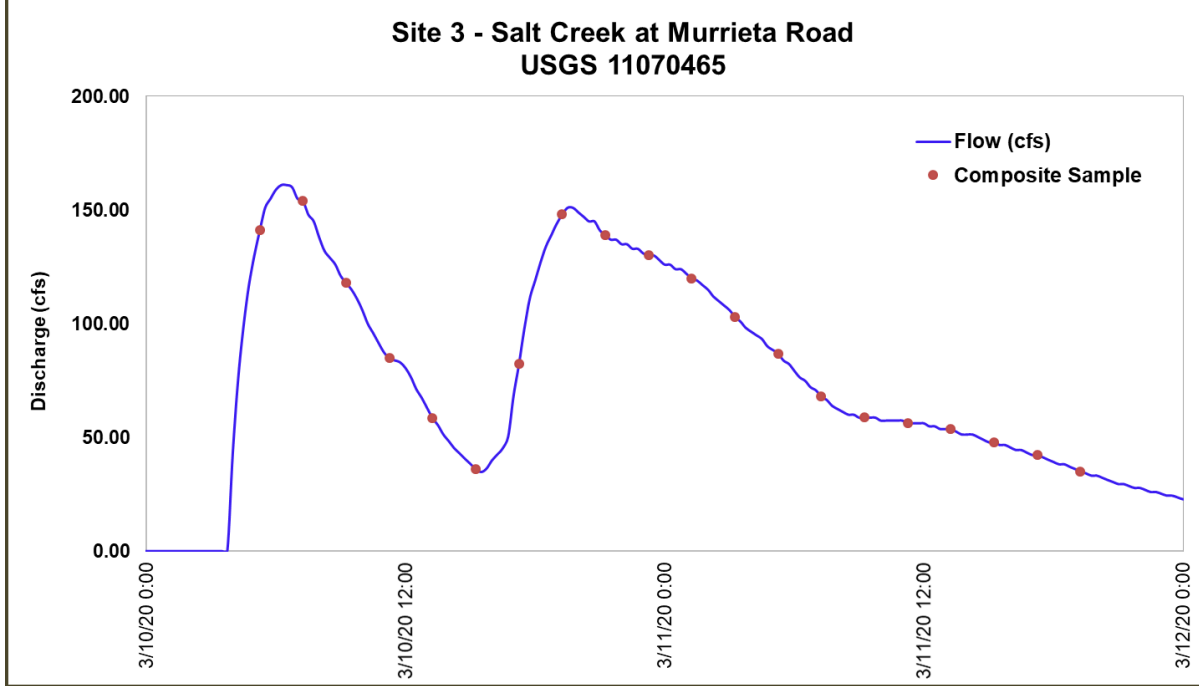


Wet Event #2

March 10-12, 2020

Watershed Rainfall: 0.69-1.36 inches

Sites: Salt Creek, San Jacinto, and Canyon Lake

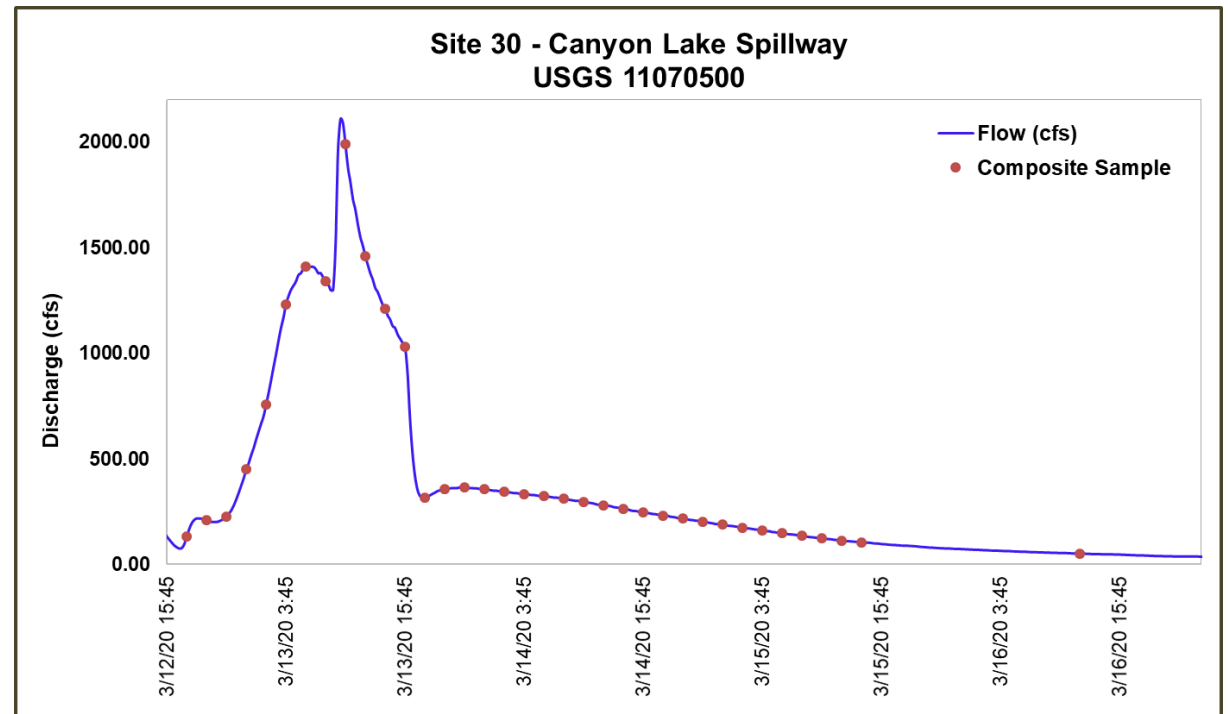


Wet Event #3

March 12-16, 2020

Watershed Rainfall: 1.06-2.38 inches

Sites: Canyon Lake Spillway



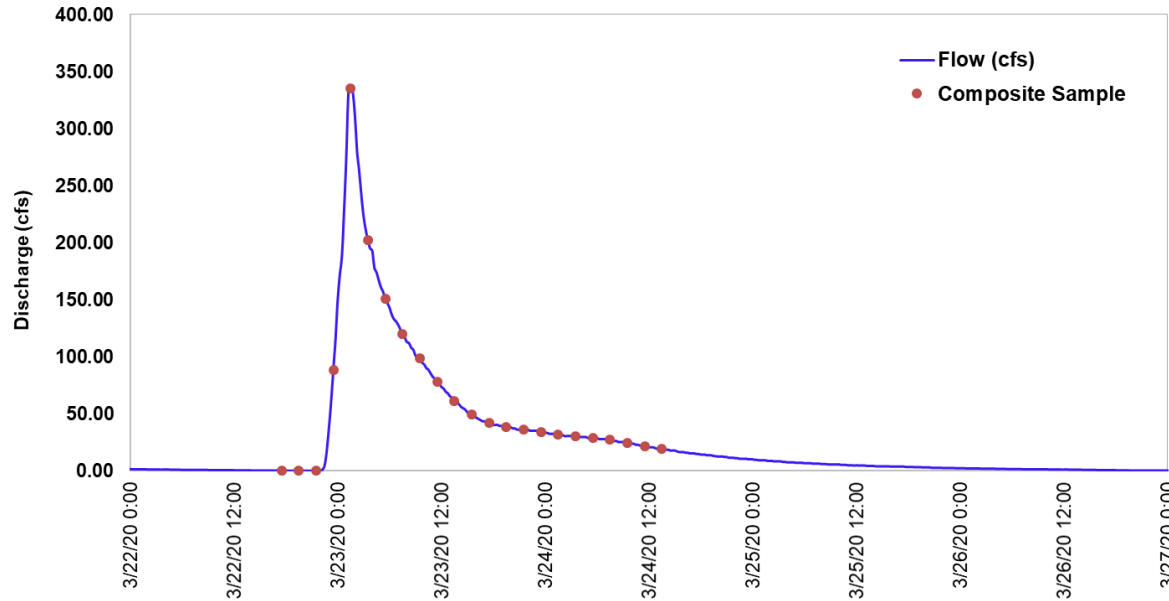
Wet Event #4

March 22-24, 2020

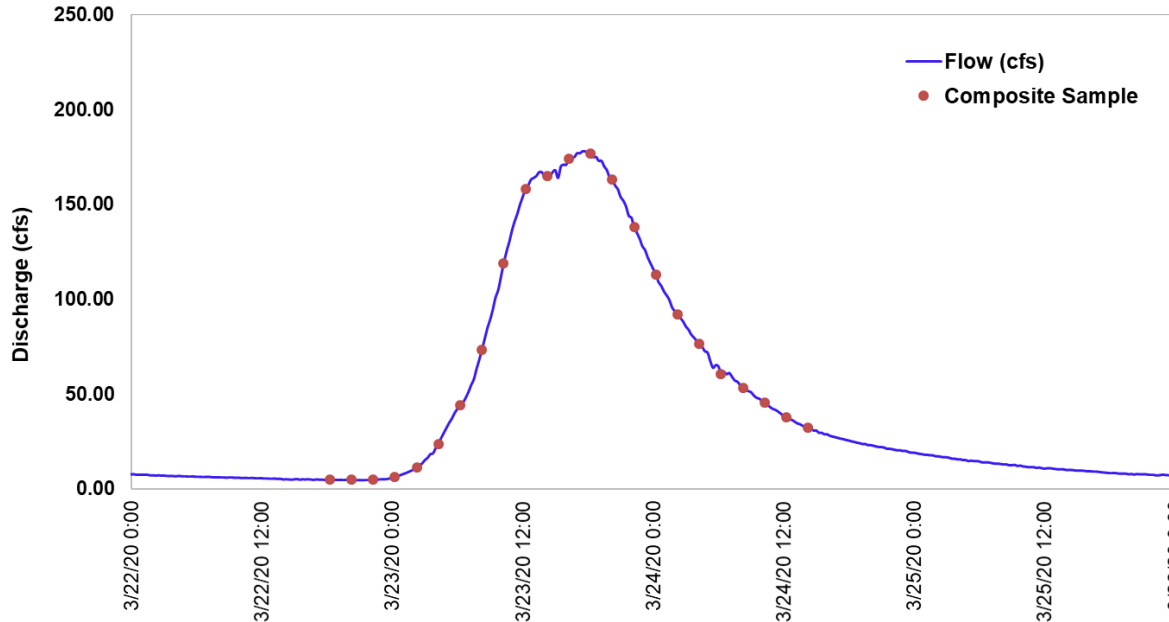
Watershed Rainfall: 0.32-0.76 inches

Sites: Salt Creek, San Jacinto, and Canyon
Lake

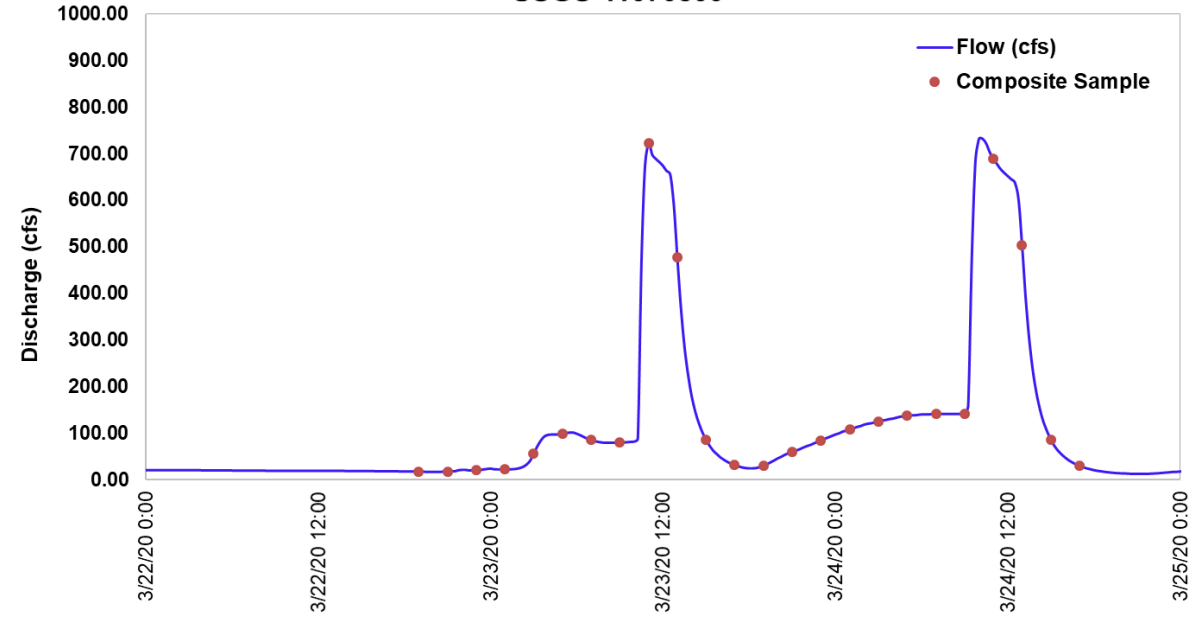
**Site 3 - Salt Creek at Murrieta Road
USGS 11070465**



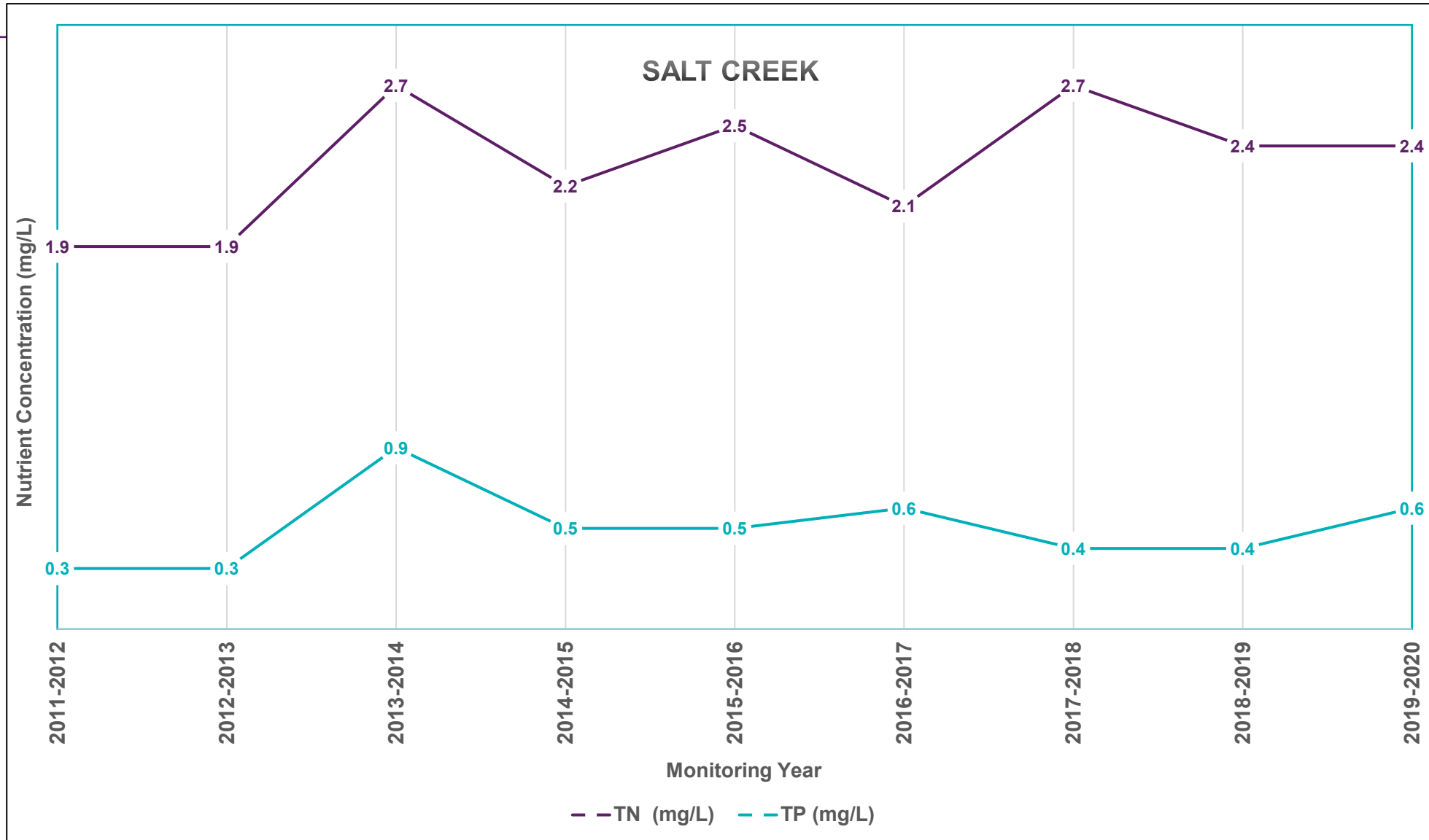
**Site 4 - San Jacinto River at Goetz Road
USGS 11070365**



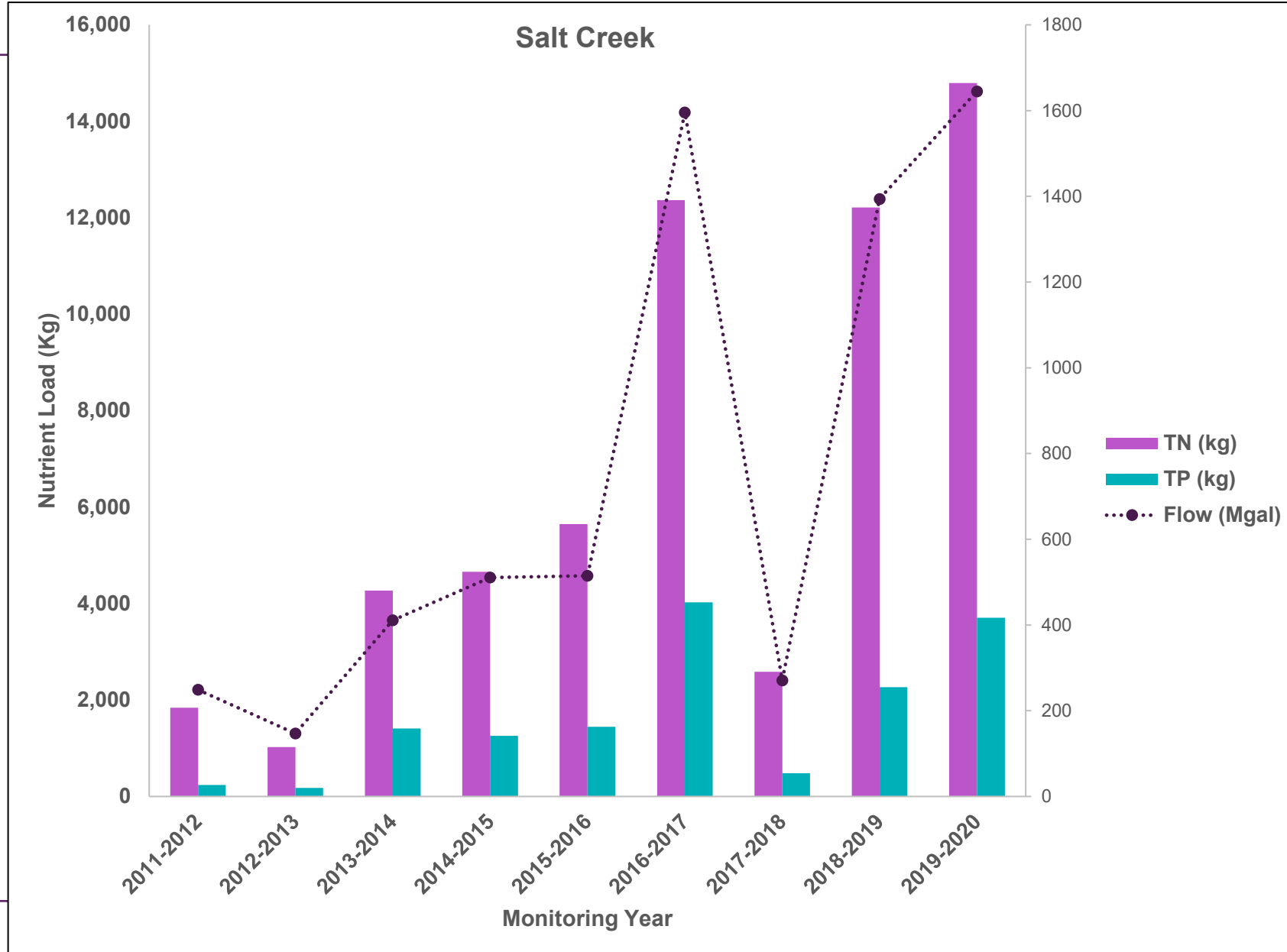
**Site 30 - Canyon Lake Spillway
USGS 11070500**



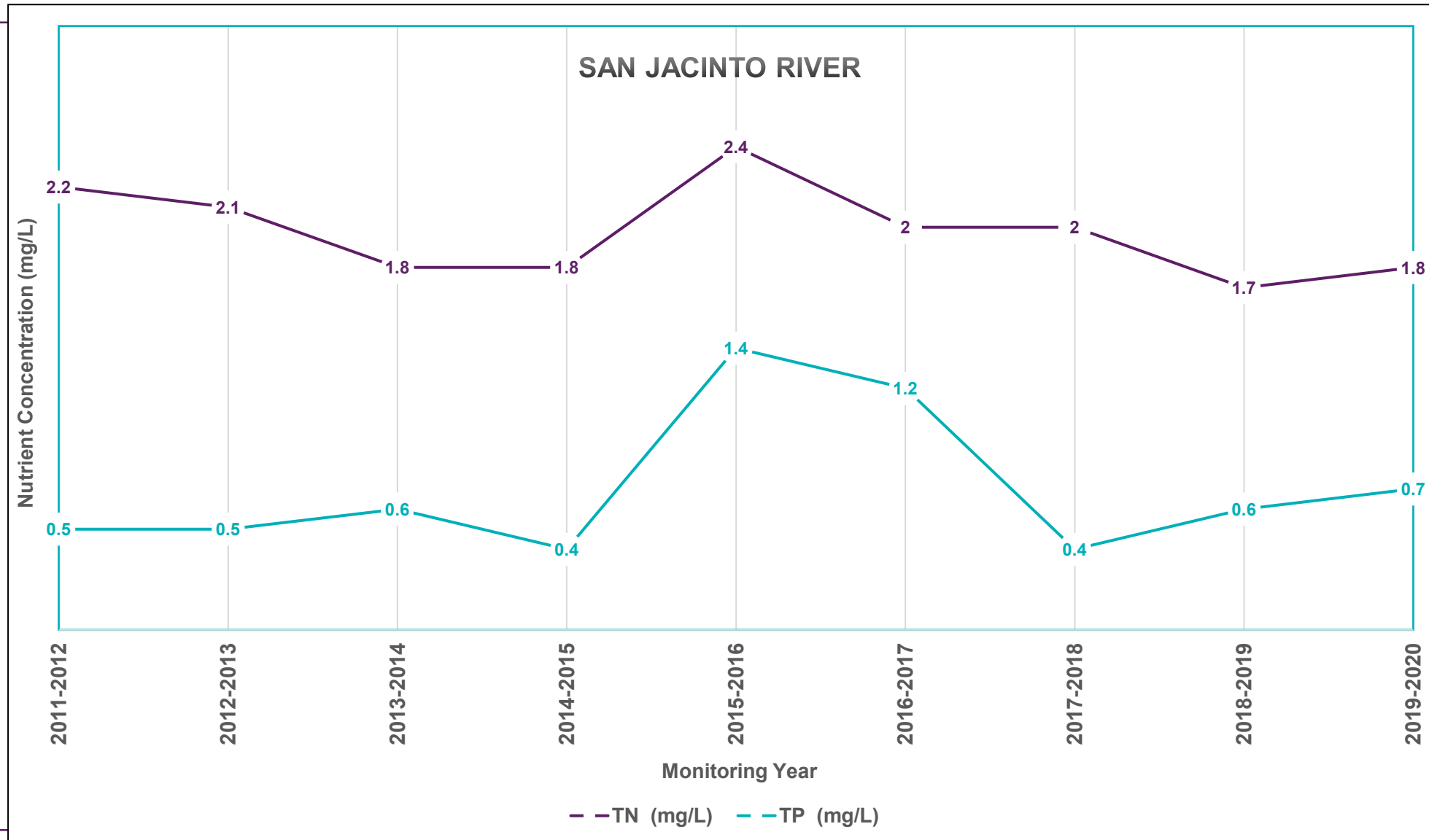
Salt Creek Historic Nutrient Concentrations



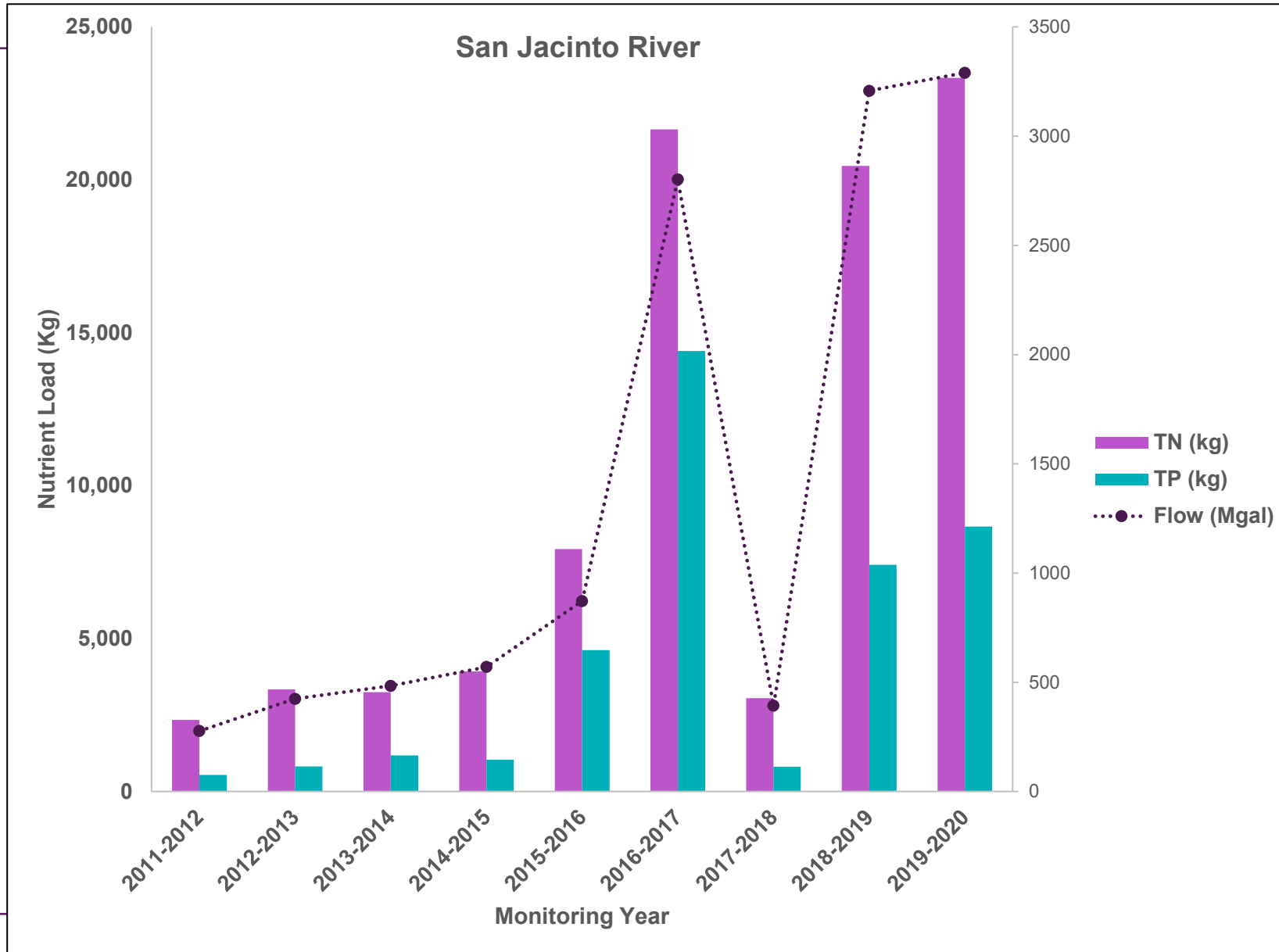
Salt Creek Historic Nutrient Loads



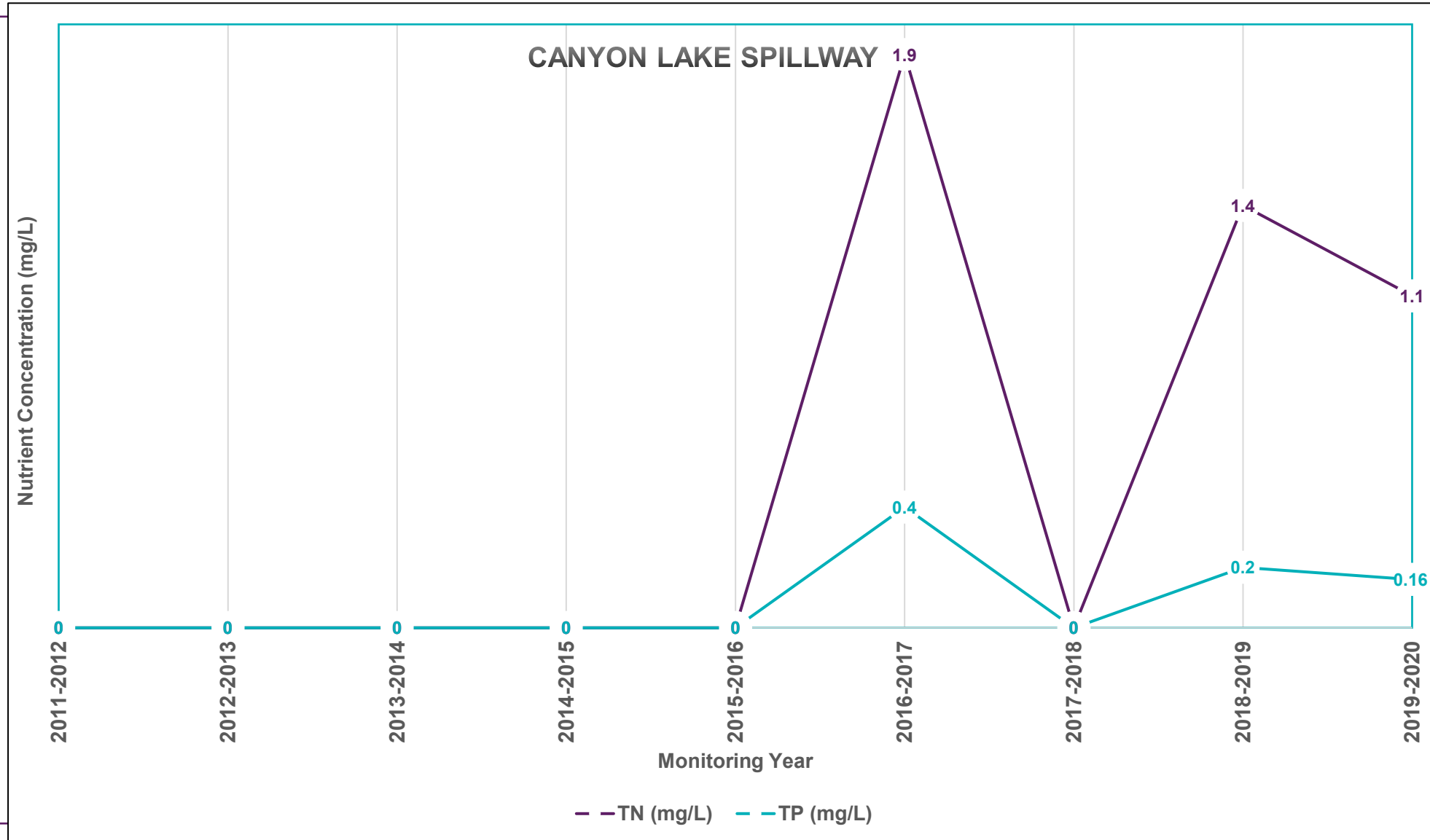
San Jacinto Historic Nutrient Concentrations



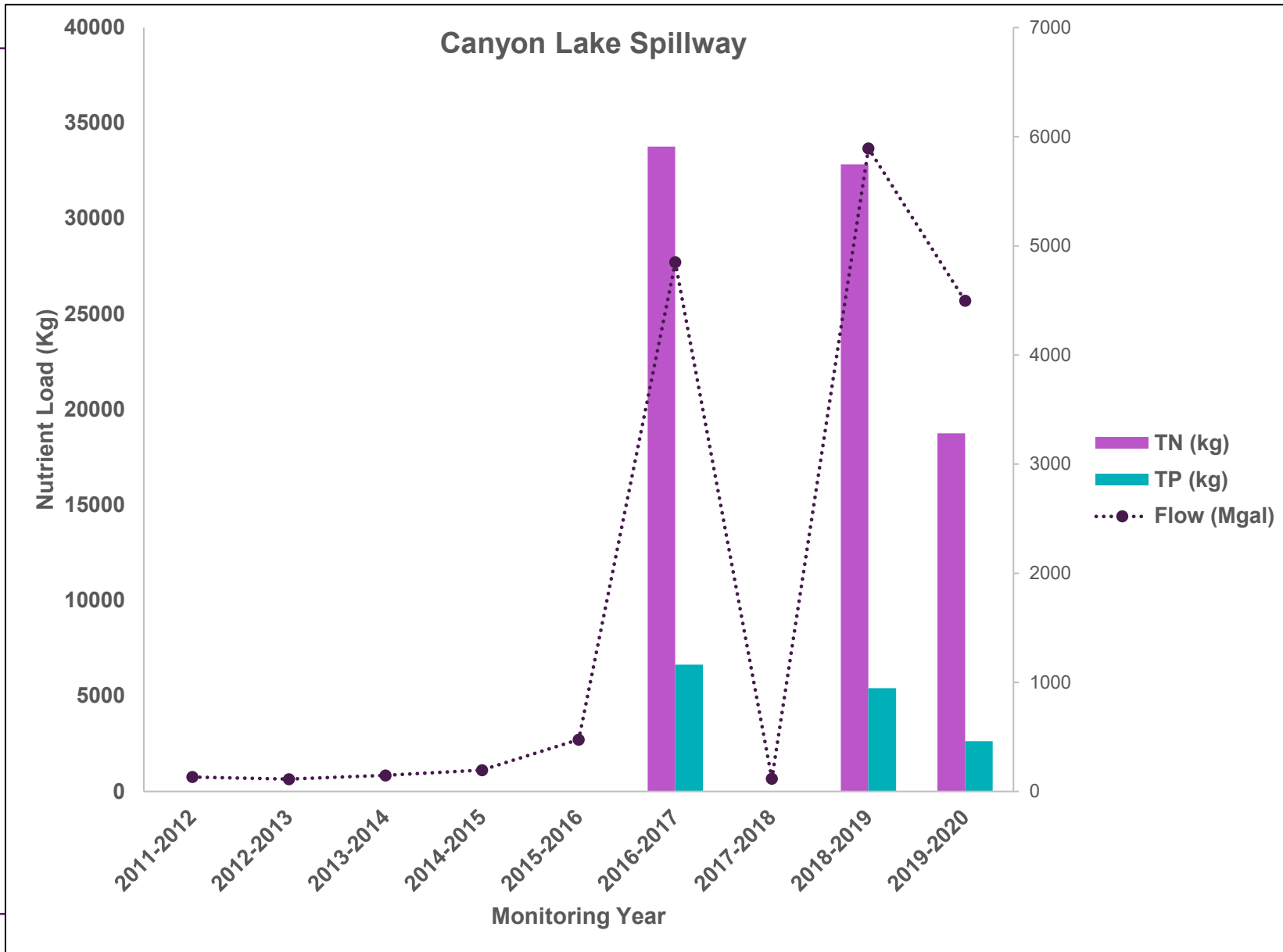
San Jacinto Historic Nutrient Loads



Canyon Lake Spillway Historic Nutrient Concentrations



Canyon Lake Spillway Historic Nutrient Loads



Summary of 2008-2020 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)
2008-2009*	3.0/3.1	0.8/1.3	1.4/3.1	0.7/1.5	NS	NS
2009-2010*	1.5/1.9	0.6/1.0	1.6/3.2	0.5/1.2	0.7/1.3	0.6/0.8
2010-2011*	1.5/2.2	0.4/0.5	1.4/2.2	0.7/1.9	0.9/1.5	0.5/0.9
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	2.0	1.2	1.9	0.4
2017-2018	2.7	0.4	2.0	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

*Values shown for nutrient concentrations are minimum/maximum

NS-Not sampled

Summary of 2008-2020 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)
2008-2009*	529	6,085/6,125	1,541/2,642	1,042	5,323/12,145	2,682/5,954	NA	NS	NS
2009-2010*	1,282	7,474/9,180	2,960/4,804	2,681	14,716/32,680	4,668/12,382	62	167/294	137/188
2010-2011*	1,946	5,112/7,484	1,370/1,704	3,269	7,690/12,124	4,041/10,664	1,302	2,035/3,556	1,029/2,102
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

*Values shown for nutrient loads are minimum/maximum

NS-Not Sampled

NA-Not Available

Lake Elsinore and Canyon Lake TMDL Water Quality Monitoring Update – 2019-2020 Summary

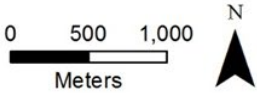


In-Lake
Monitoring

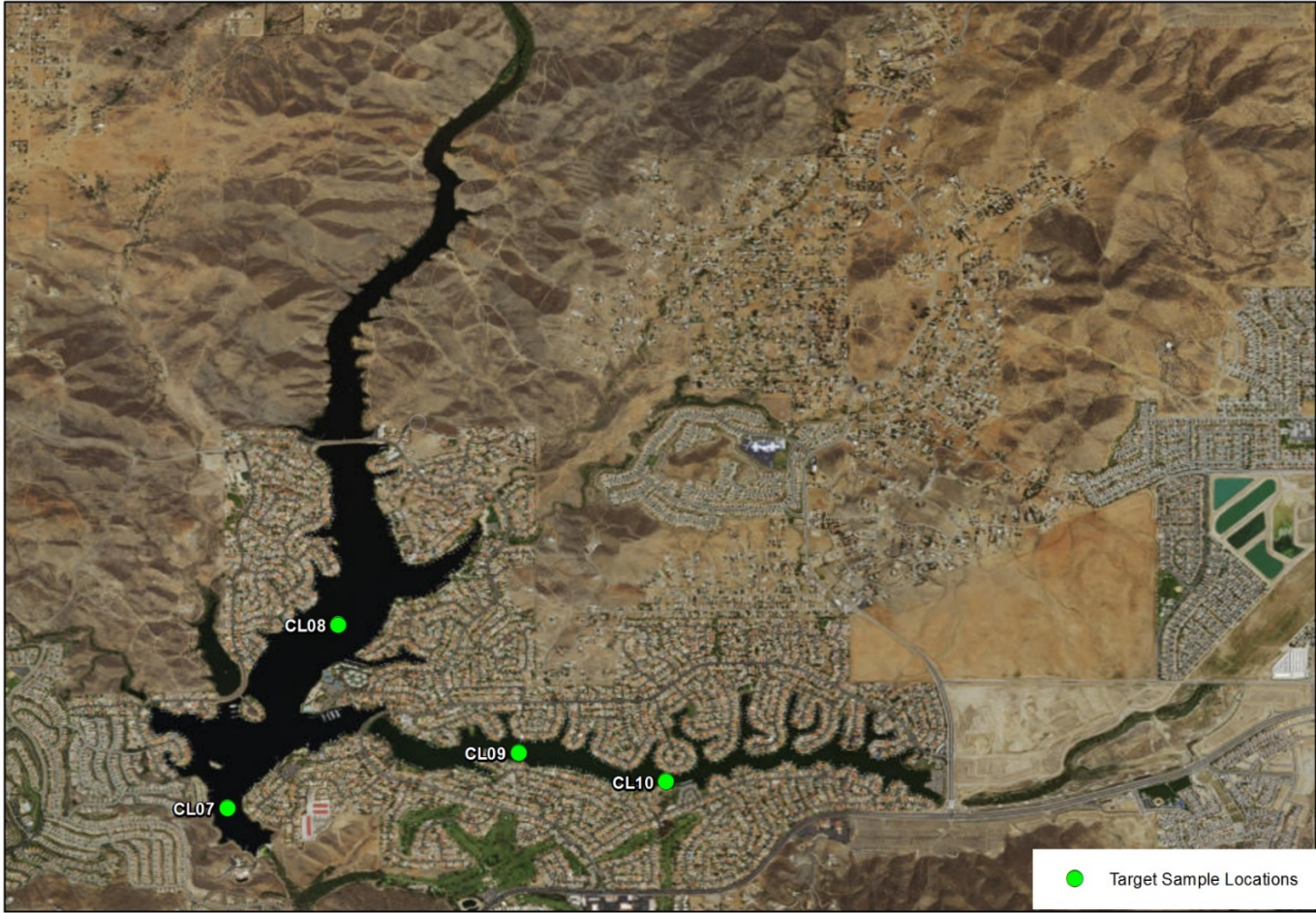
Station Locations – Lake Elsinore



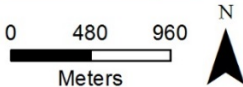
Sample Locations and Water Quality Data Sondes For Lake Elsinore



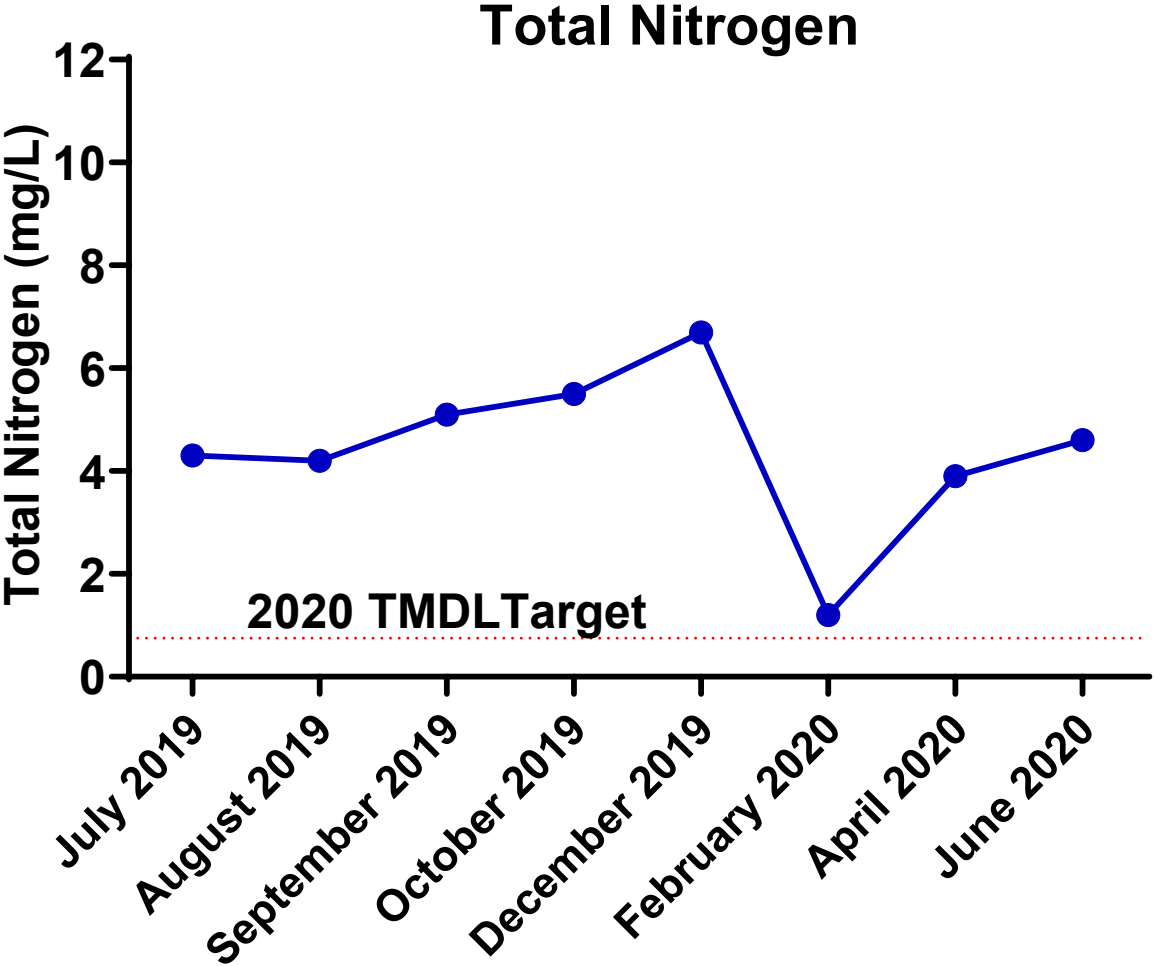
Station Locations – Canyon Lake



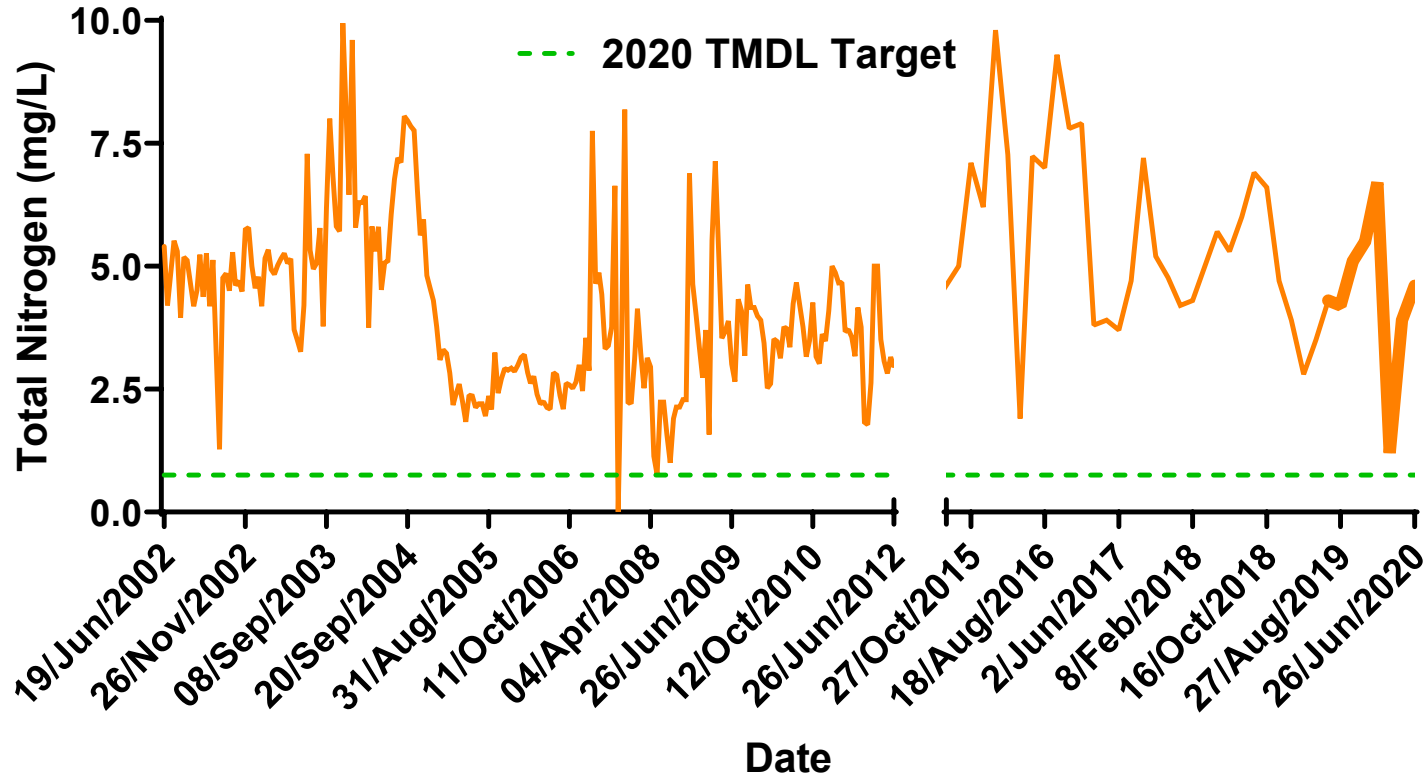
Sample Locations For Canyon Lake



Total Nitrogen – Lake Elsinore 2019-2020



Total Nitrogen – Lake Elsinore Historic Data

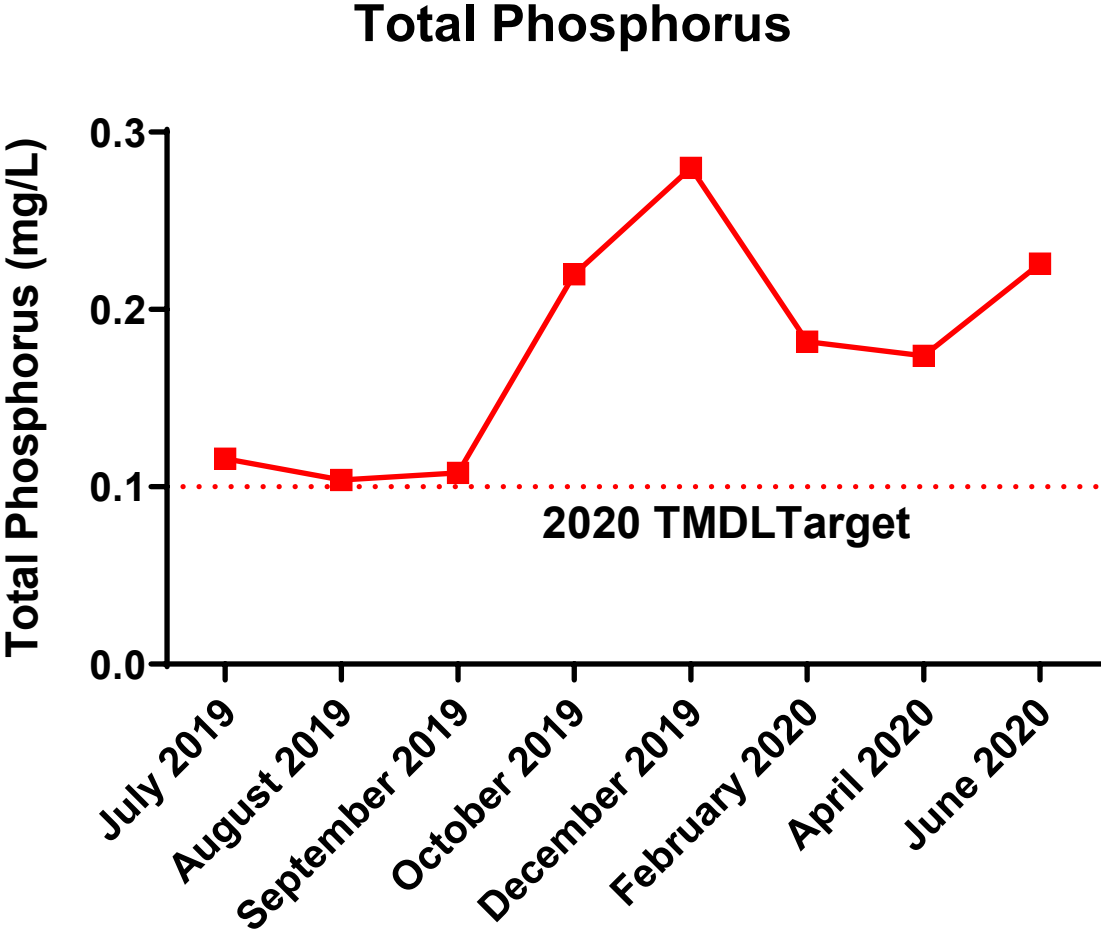


No data available from June 2012-July 2015

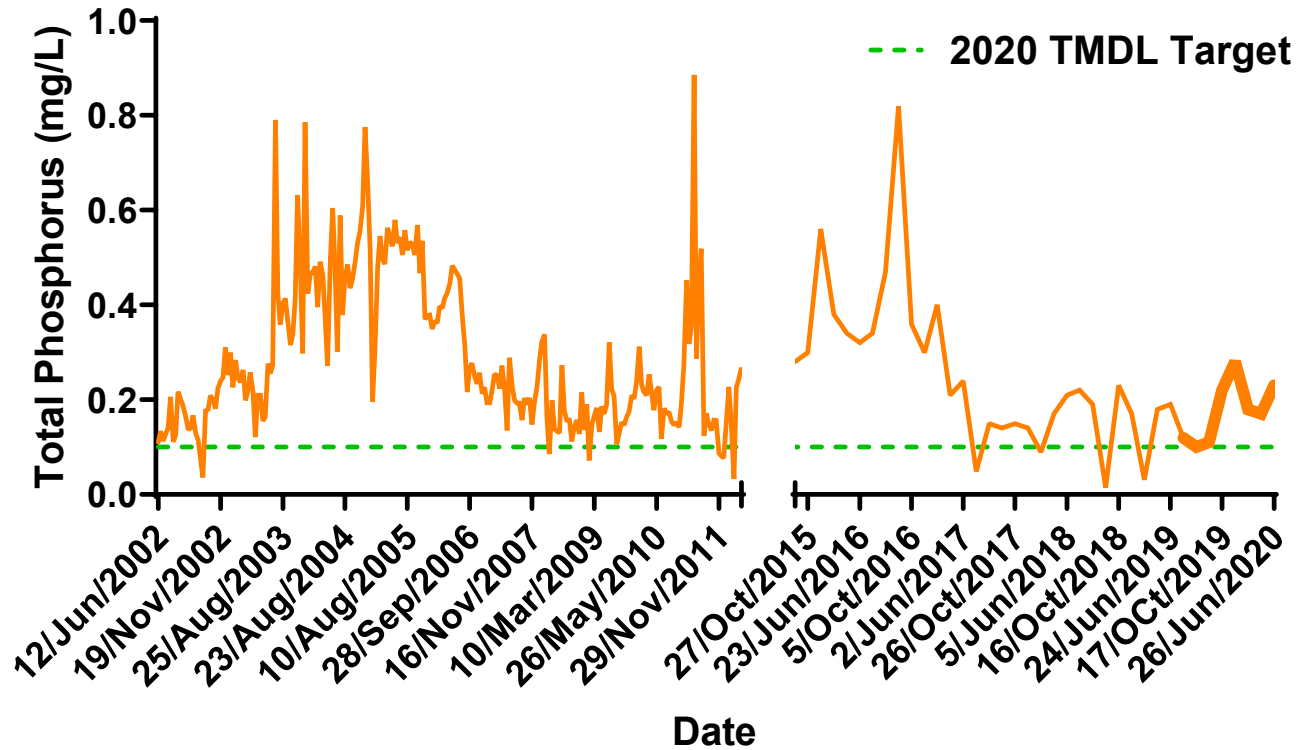
TMDL target of 0.75 mg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2019-June 2020

Total Phosphorus – Lake Elsinore 2019-2020



Total Phosphorus – Lake Elsinore Historic Data

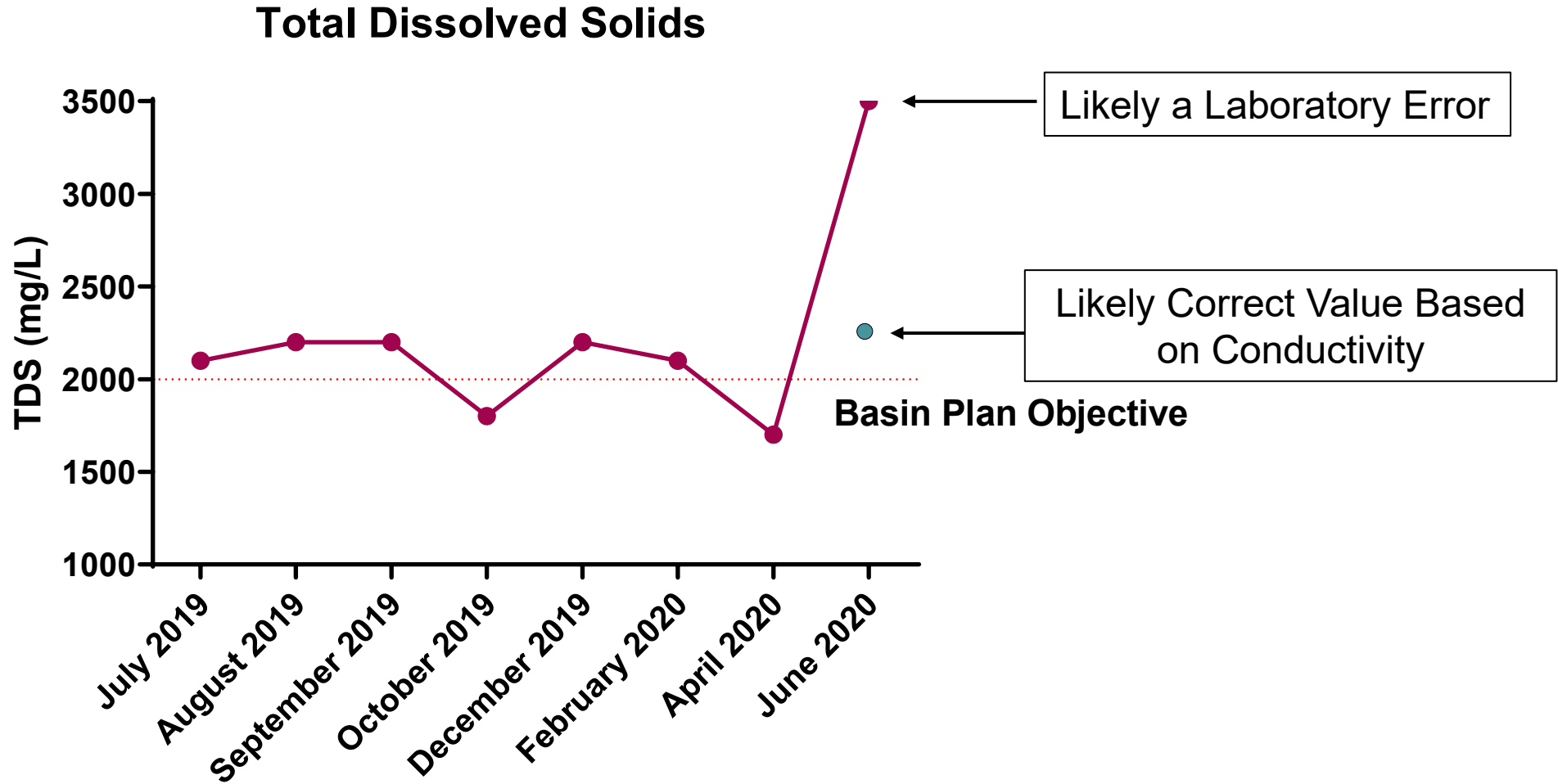


No data available from June 2012-July 2015

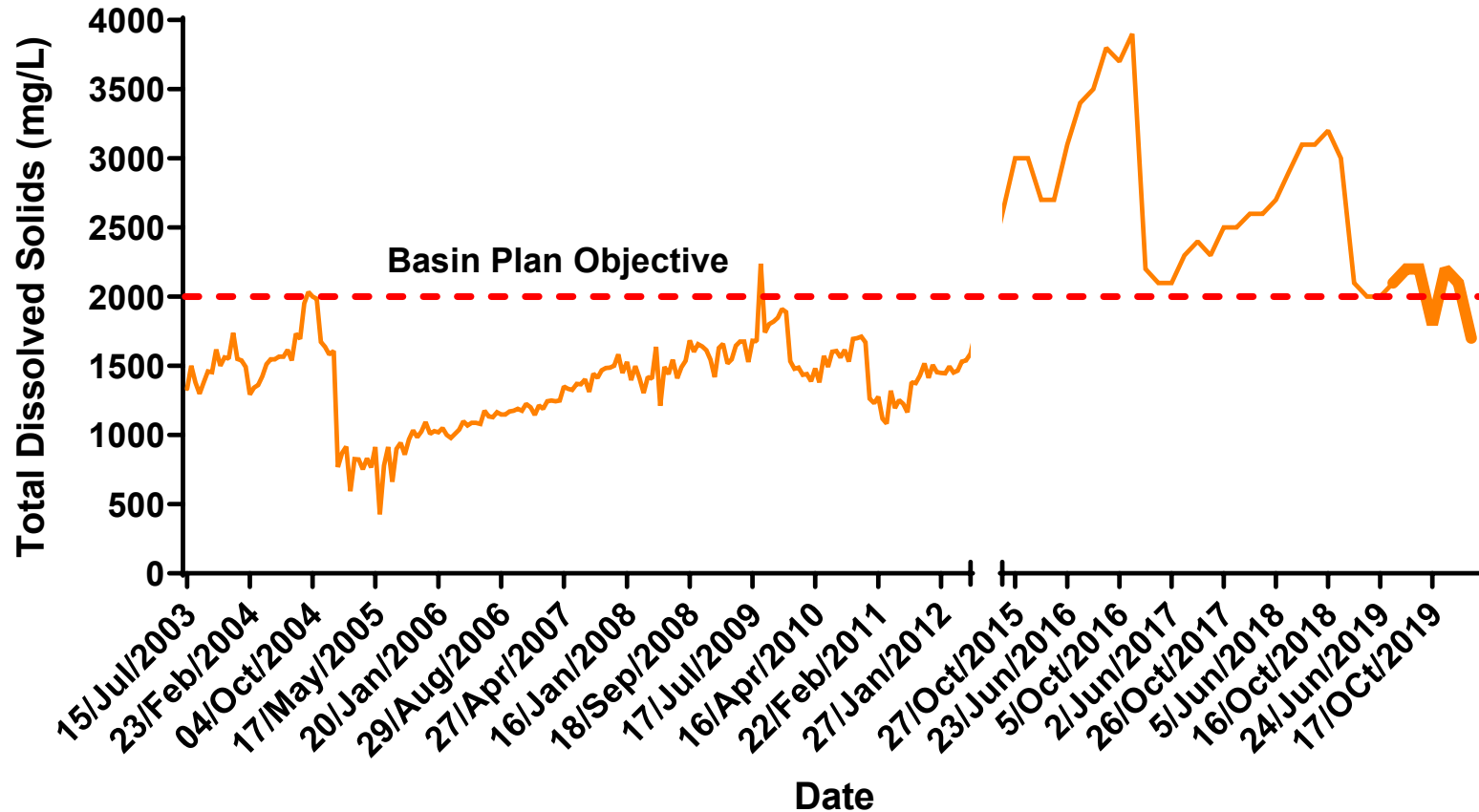
TMDL target of 0.1 mg/L is annual average to be attained by 2020

Bold represents current monitoring year July 2019-June 2020

Total Dissolved Solids– Lake Elsinore 2019-2020



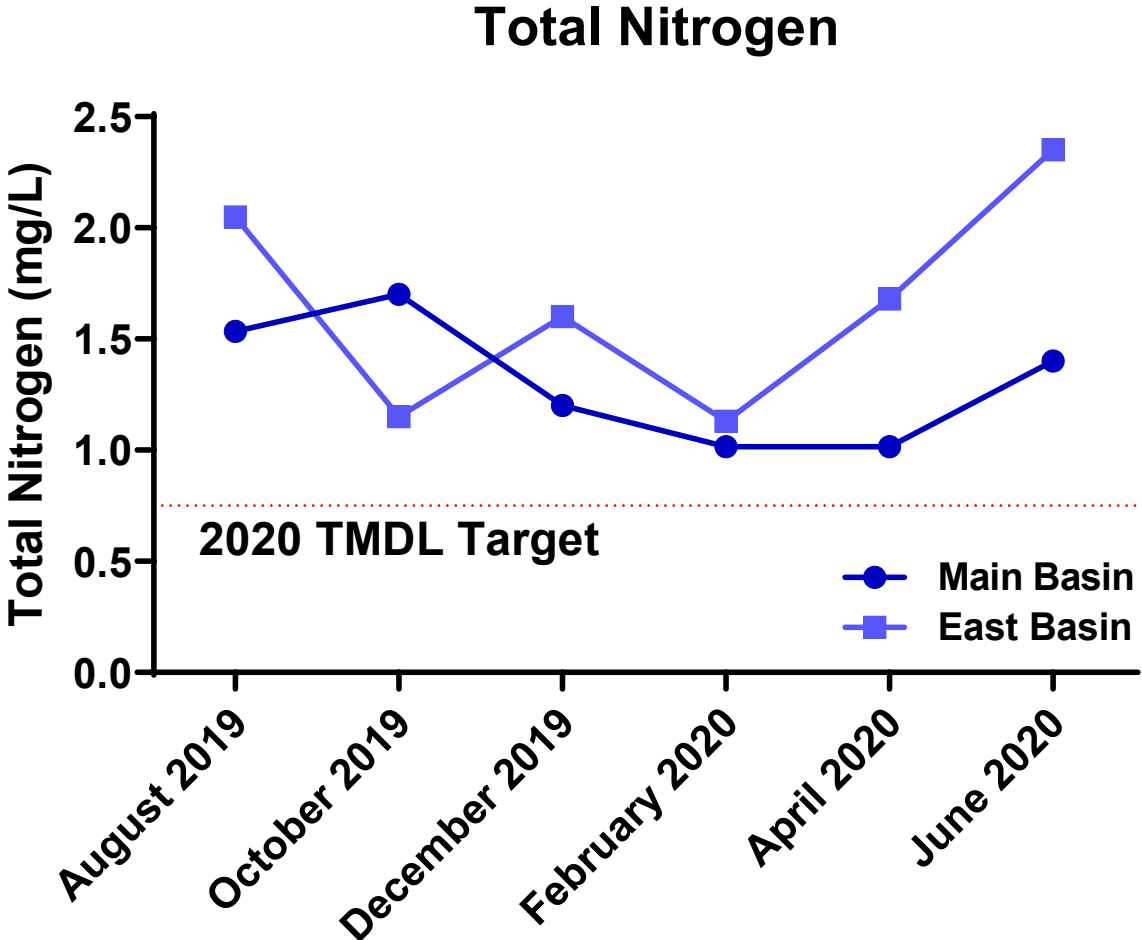
Total Dissolved Solids– Lake Elsinore Historic Data



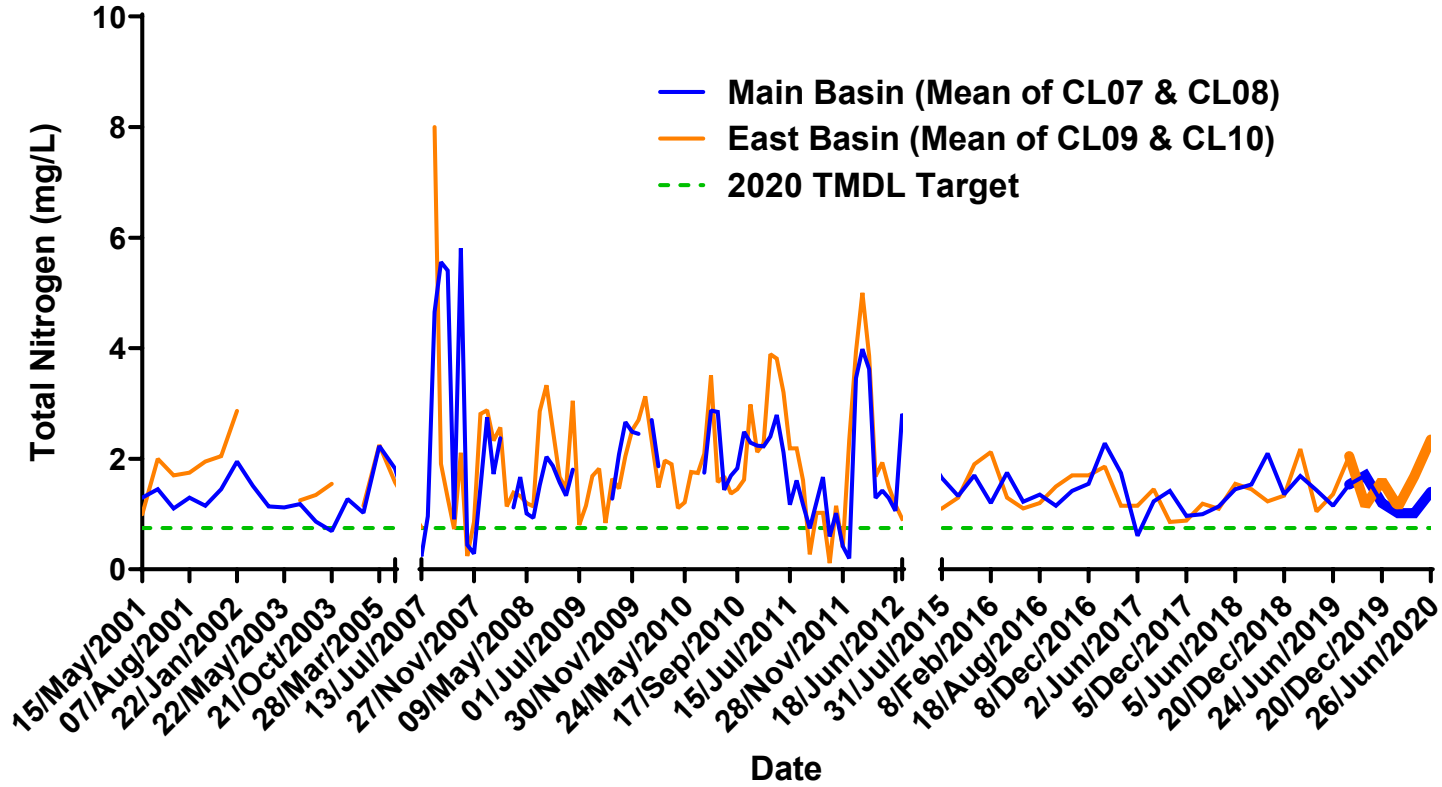
No data available from June 2012-July 2015

Bold represents current monitoring year July 2019-June 2020

Total Nitrogen – Canyon Lake 2019-2020

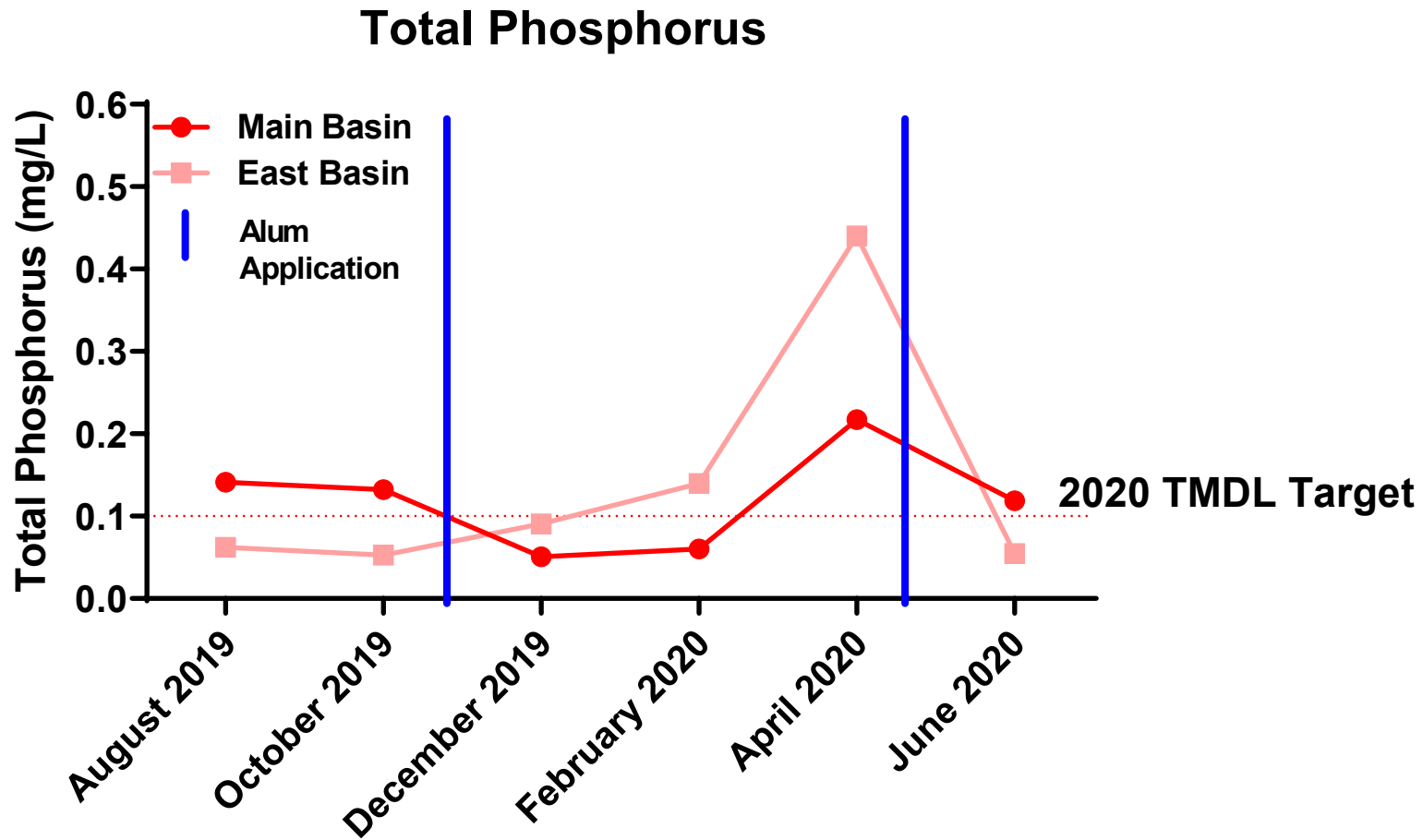


Total Nitrogen – Canyon Lake Historic Data

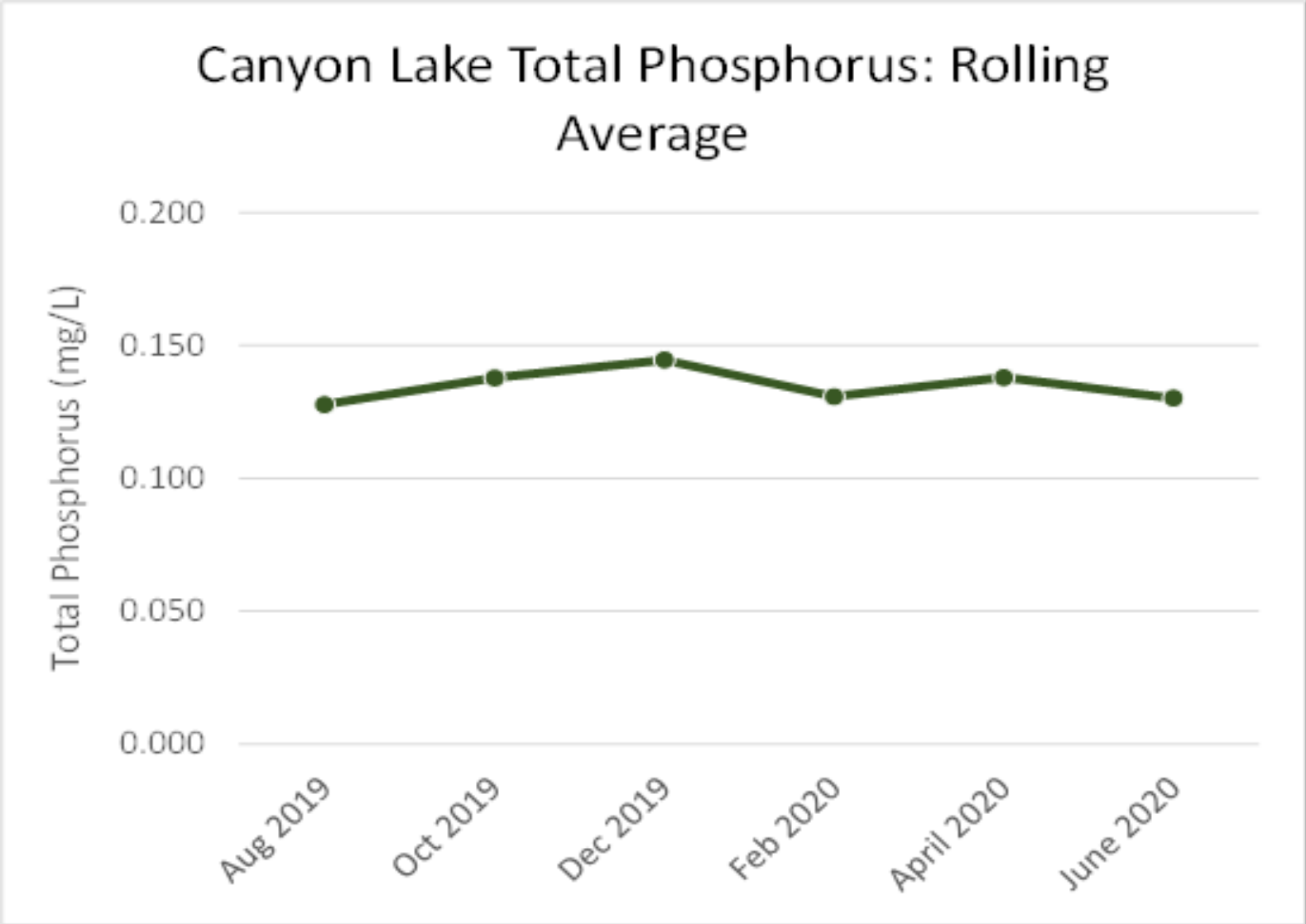


No data available from May 2005-July 2007; June 2012-July 2015
TMDL target of 0.75 mg/L is annual average to be attained by 2020
Bold represents current monitoring year July 2019-June 2020

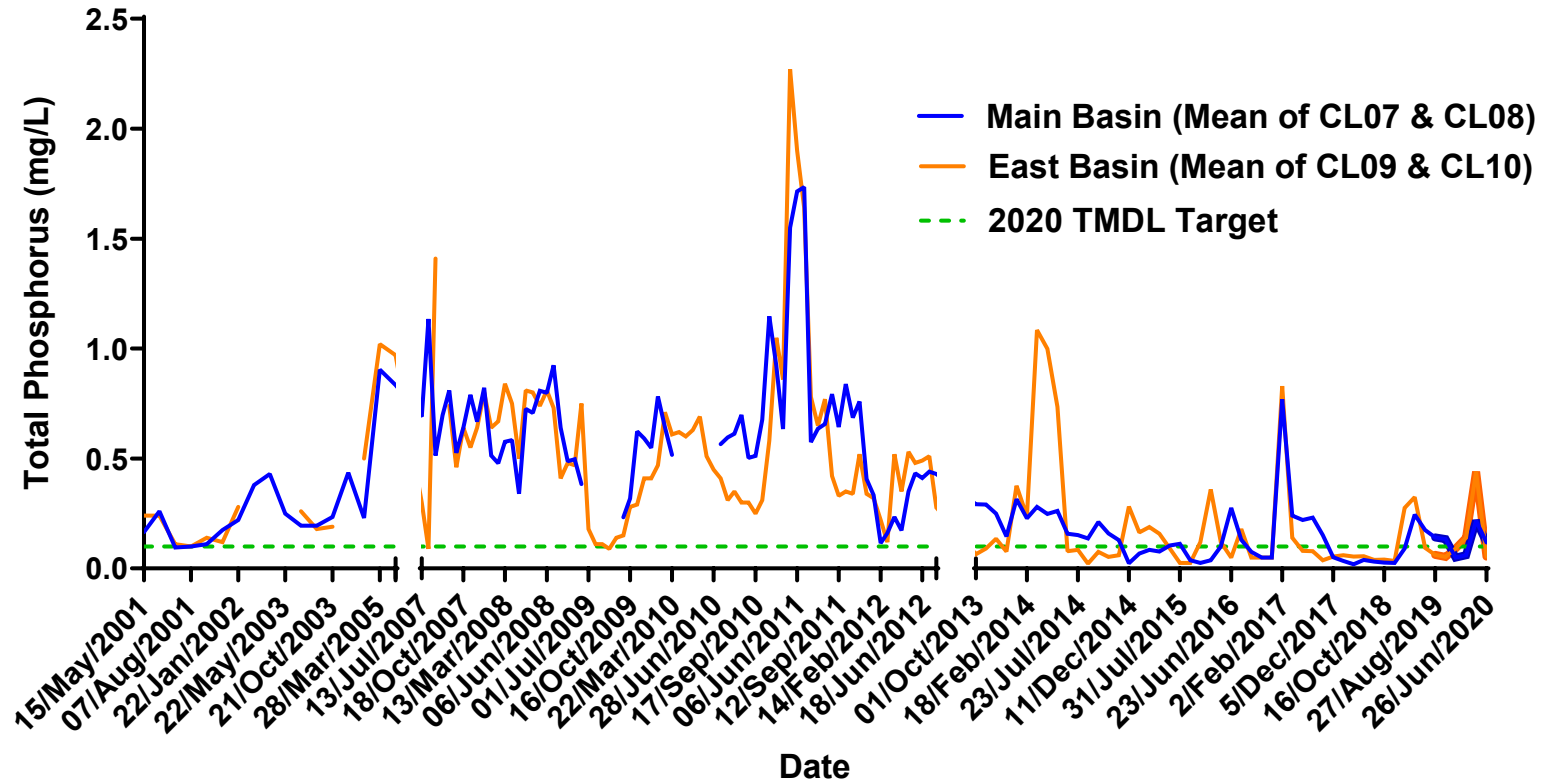
Total Phosphorus – Canyon Lake 2019-2020



Total Phosphorus – Canyon Lake 2019-2020



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

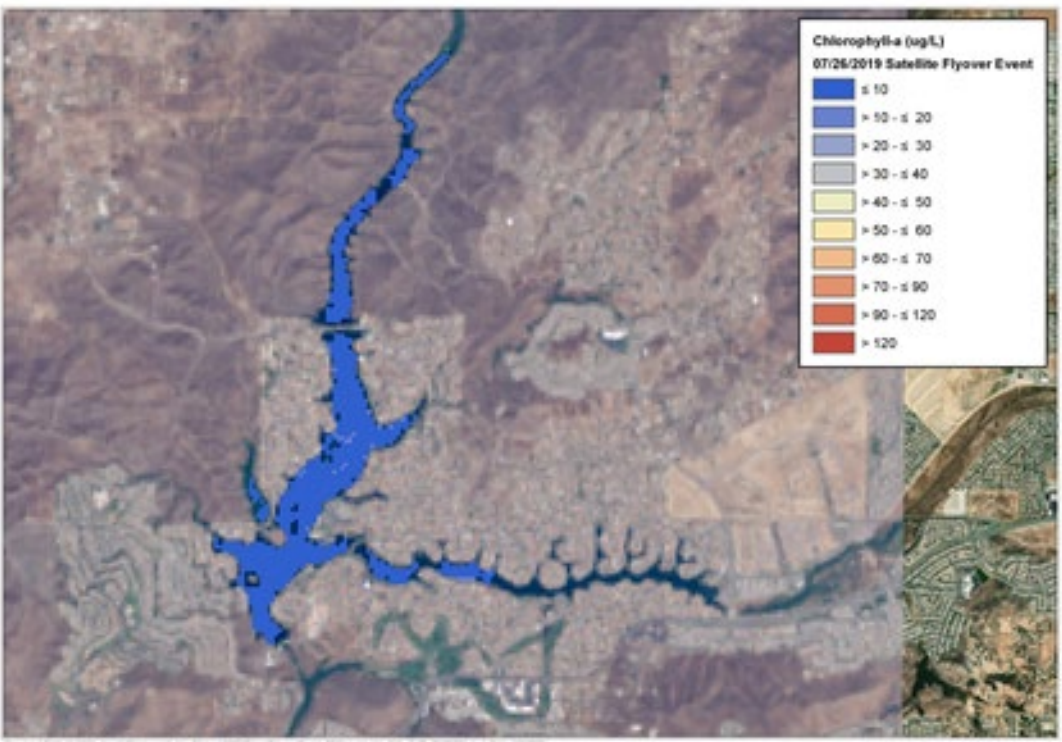
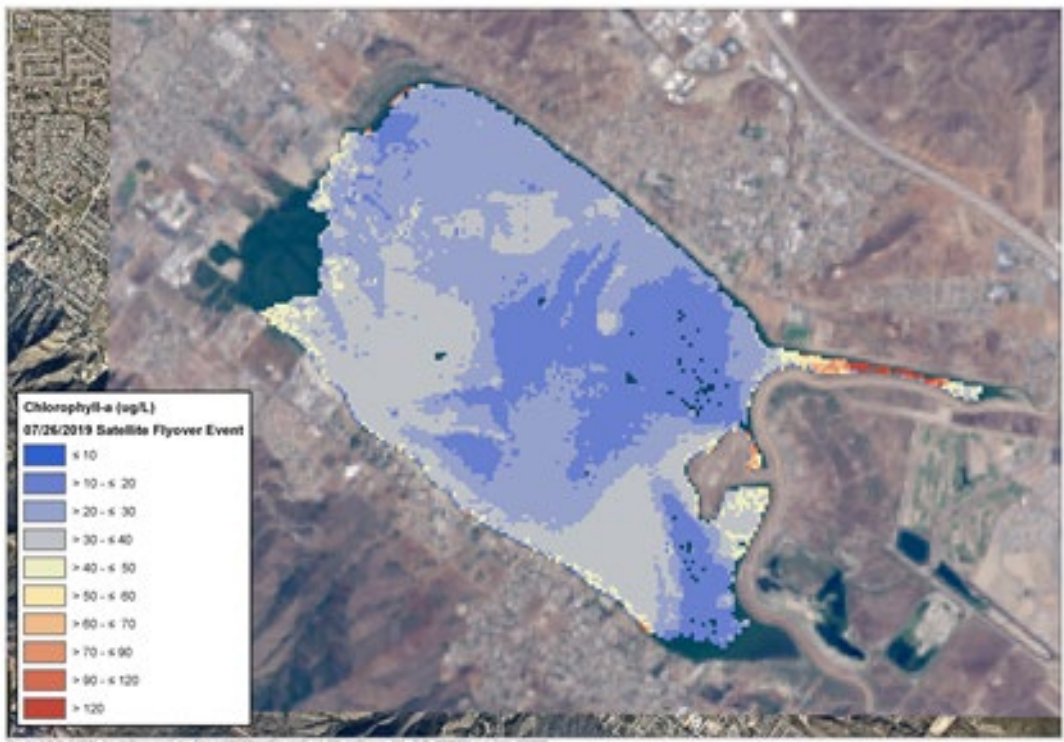
Bold represents current monitoring year July 2019-June 2020

Satellite Imagery – Chlorophyll July 26, 2019



Lake Elsinore

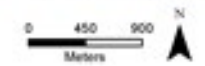
Canyon Lake



Chlorophyll-a Concentrations
Lake Elsinore
July 26, 2019 Satellite Flyover Event



Chlorophyll-a Concentrations
Canyon Lake
July 26, 2019 Satellite Flyover Event



**Data gaps due to surface reflections

**Data gaps due to land mass interference

Satellite Imagery – Chlorophyll August 27, 2019



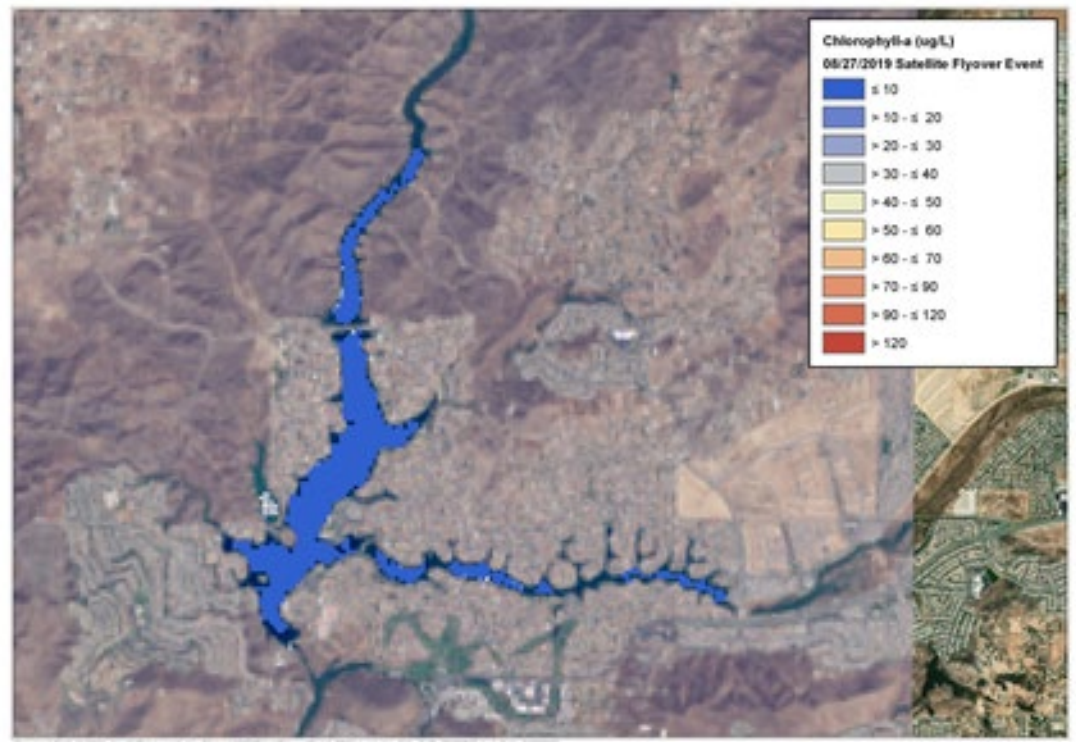
Lake Elsinore



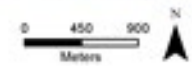
Chlorophyll-a ($\mu\text{g/L}$)
Lake Elsinore
August 27, 2019 Satellite Flyover Event



Canyon Lake



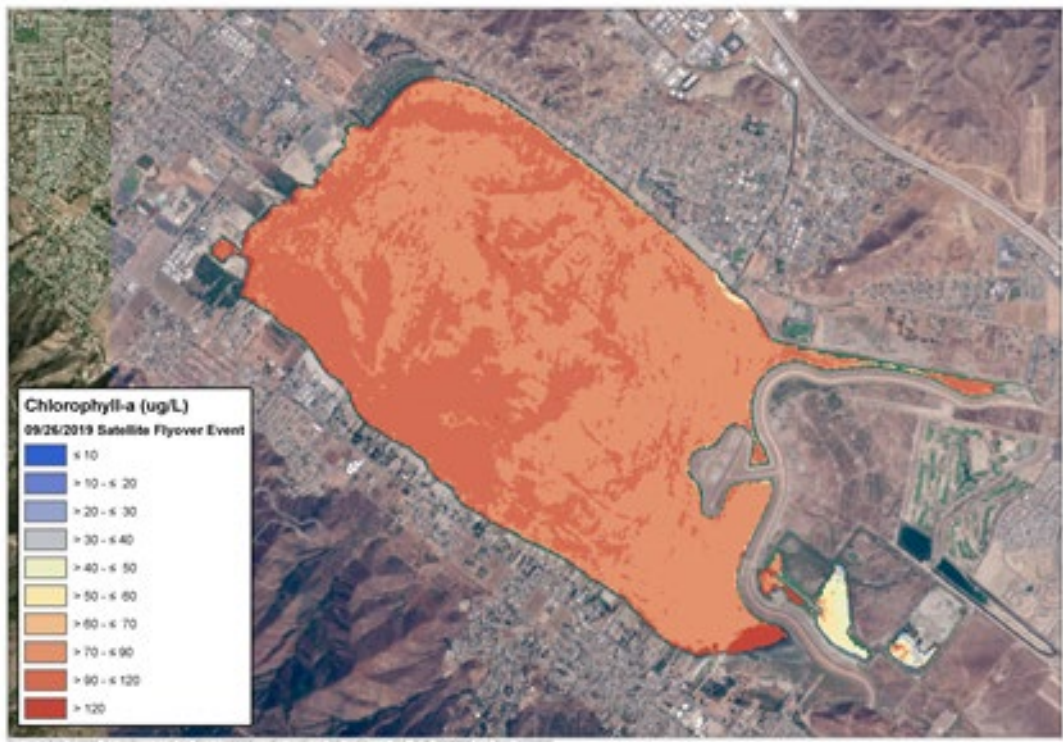
Chlorophyll-a ($\mu\text{g/L}$)
Canyon Lake
August 27, 2019 Satellite Flyover Event



Satellite Imagery – Chlorophyll September 26, 2019



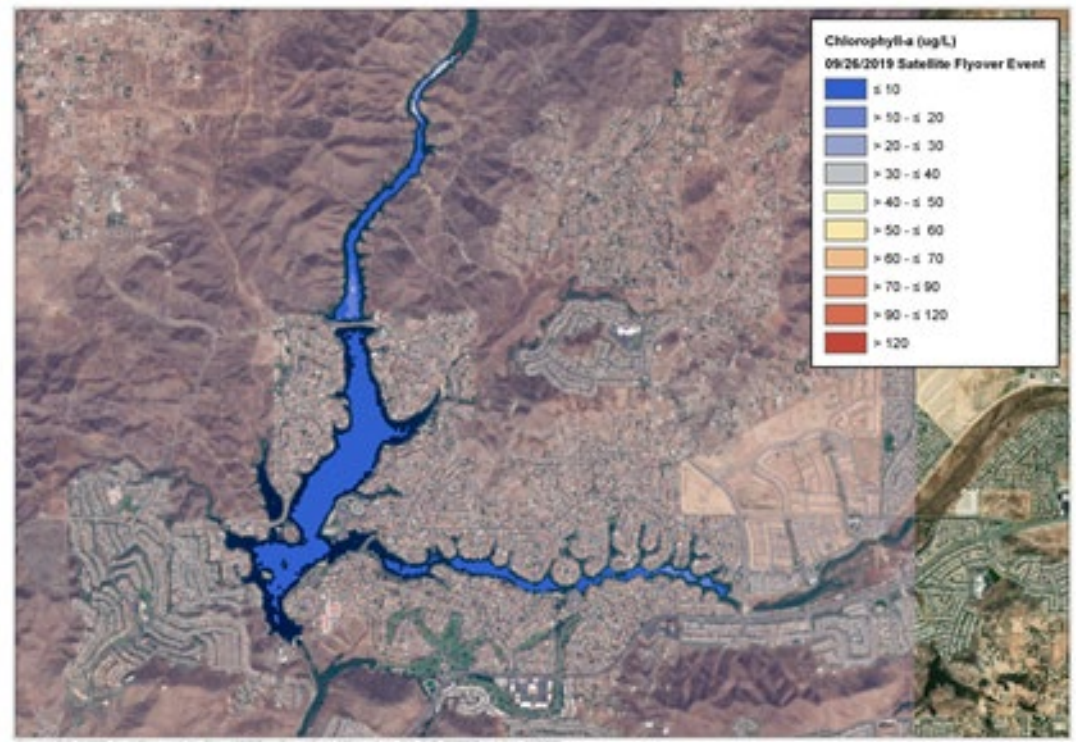
Lake Elsinore



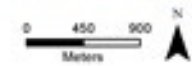
Chlorophyll-a (ug/L)
Lake Elsinore
September 26, 2019 Satellite Flyover Event



Canyon Lake



Chlorophyll-a (ug/L)
Canyon Lake
September 26, 2019 Satellite Flyover Event



Satellite Imagery – Chlorophyll October 17, 2019



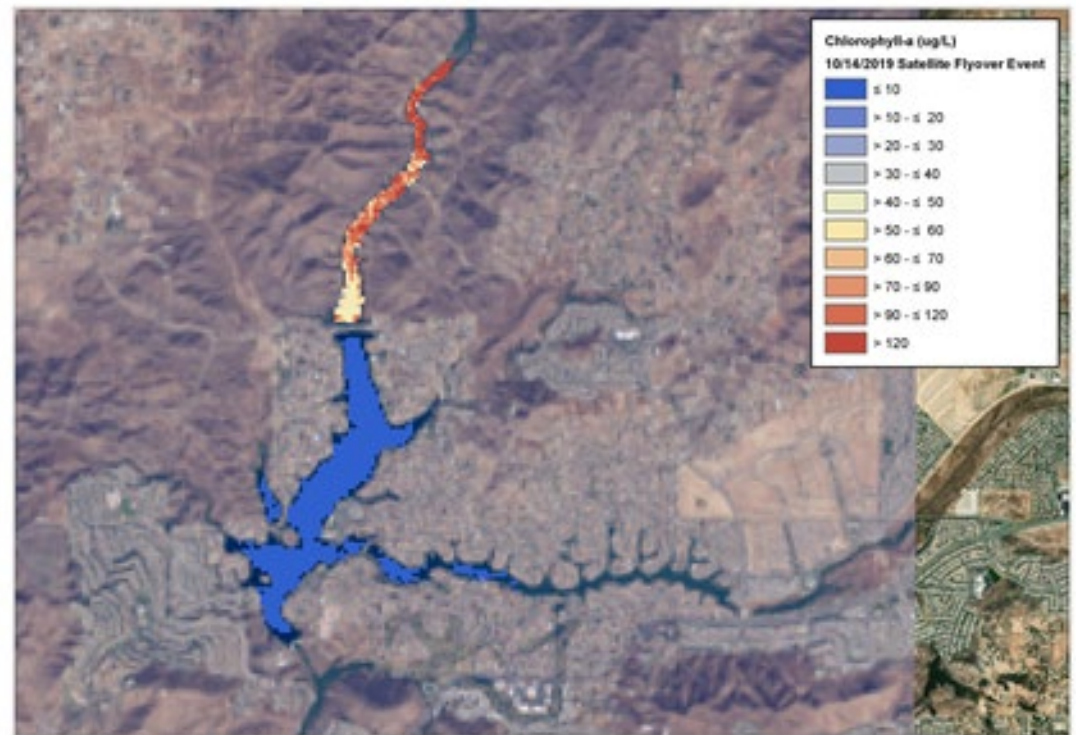
Lake Elsinore



Chlorophyll-a (ug/L)
Lake Elsinore
October 14, 2019 Satellite Flyover Event



Canyon Lake



Chlorophyll-a (ug/L)
Canyon Lake
October 14, 2019 Satellite Flyover Event



Satellite Imagery – Chlorophyll December 20, 2019

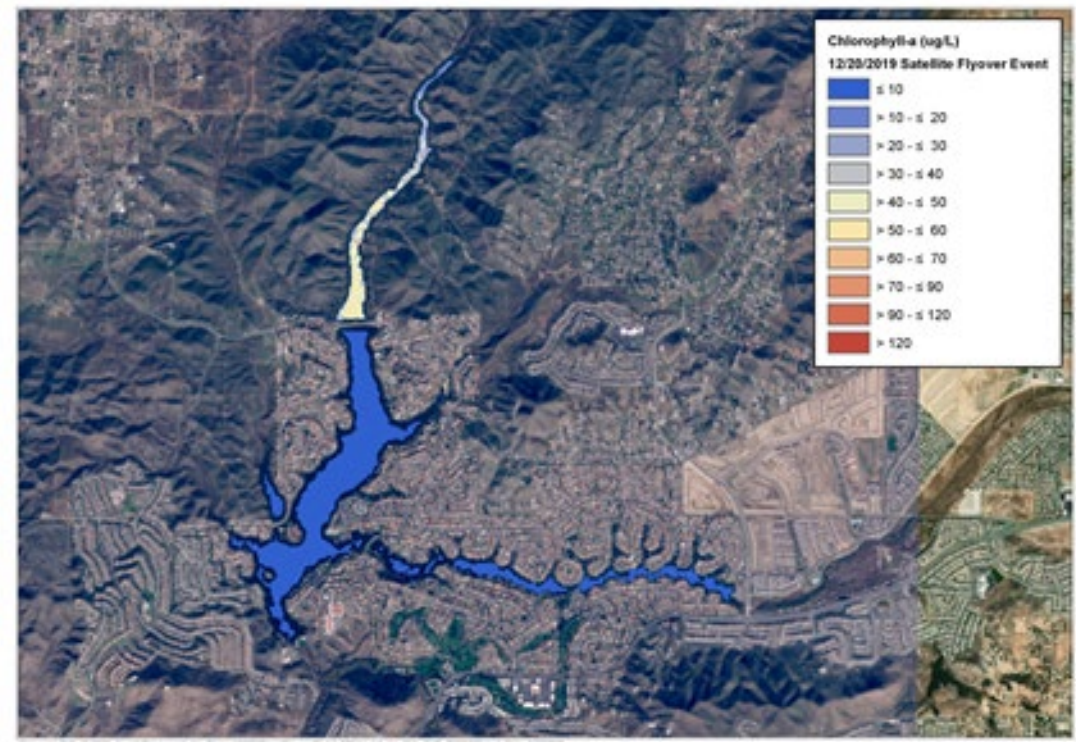


Lake Elsinore

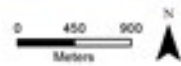
Canyon Lake



Chlorophyll-a (ug/L)
Lake Elsinore
December 20, 2019 Satellite Flyover Event



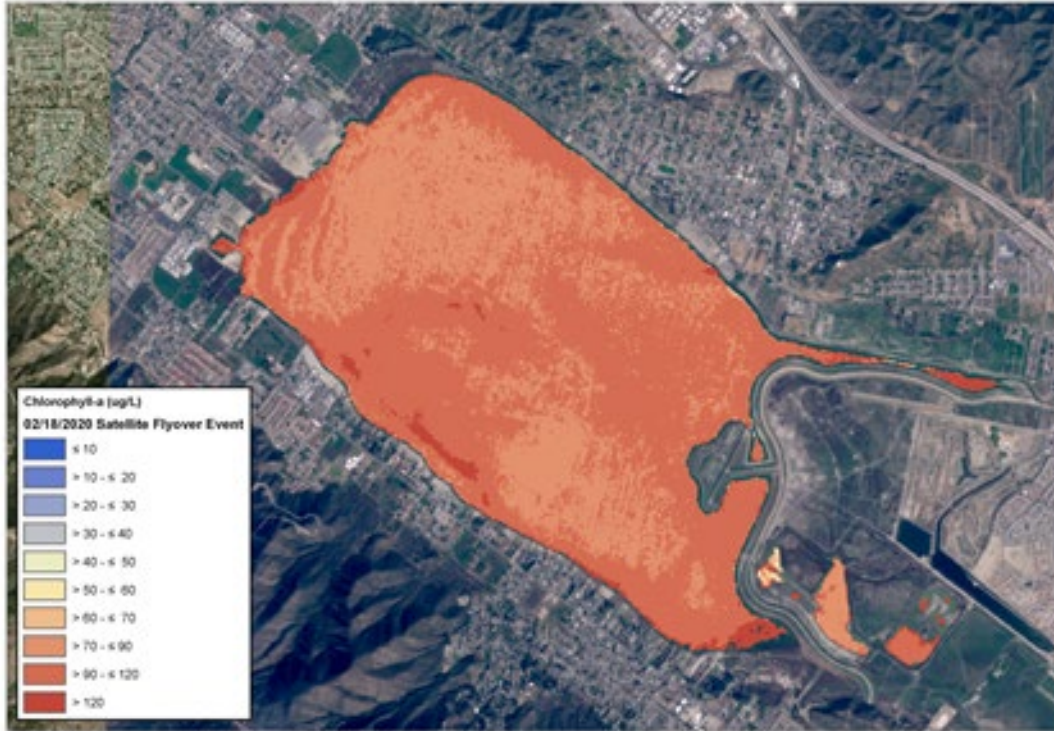
Chlorophyll-a (ug/L)
Canyon Lake
December 20, 2019 Satellite Flyover Event



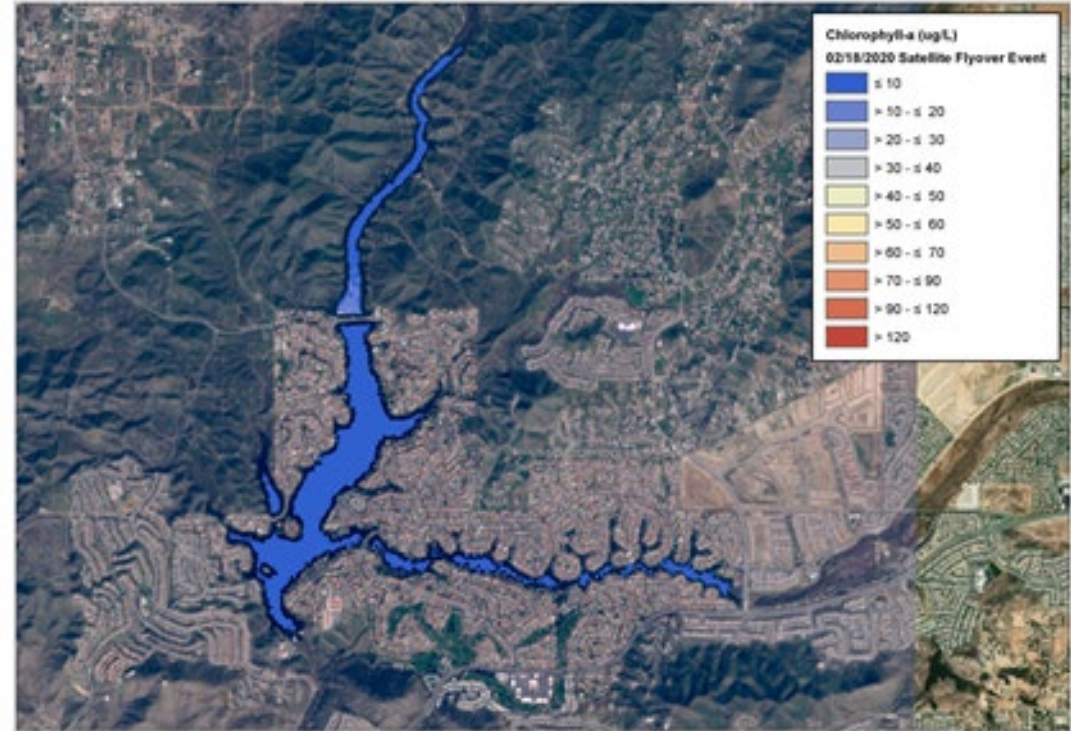
Satellite Imagery – Chlorophyll February 18, 2020

Lake Elsinore

Canyon Lake



Chlorophyll-a Concentrations
Lake Elsinore
February 18, 2020 Satellite Flyover Event



Chlorophyll-a Concentrations
Canyon Lake
February 18, 2020 Satellite Flyover Event



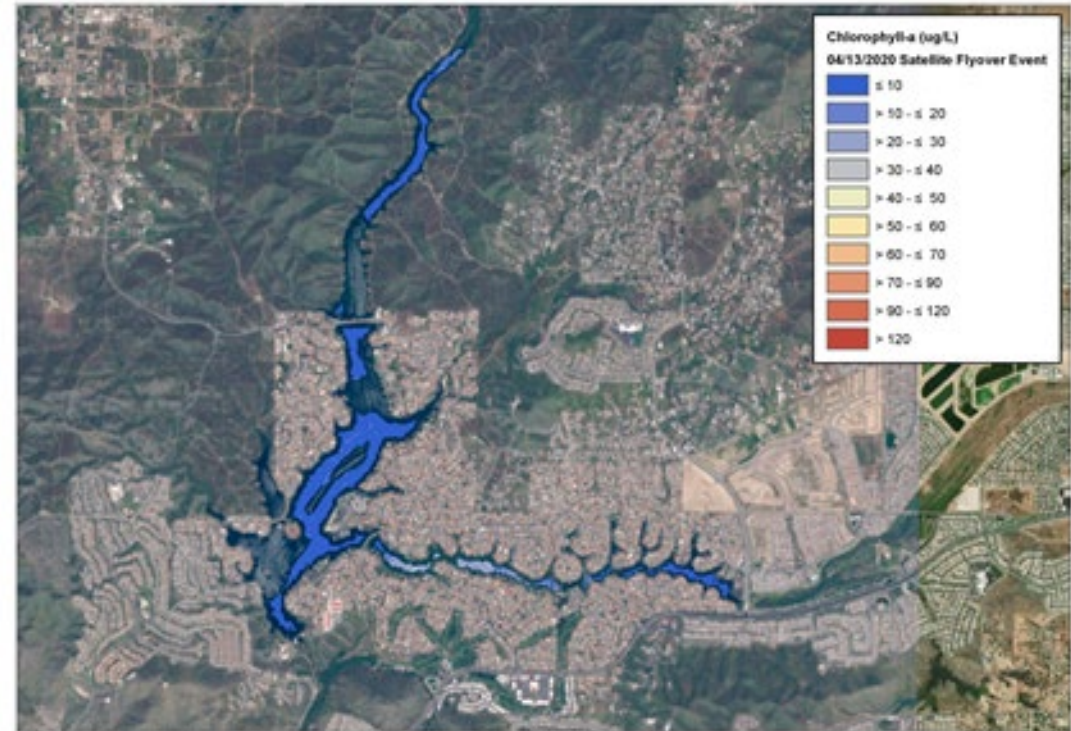
Satellite Imagery – Chlorophyll April 13, 2020

Lake Elsinore

Canyon Lake



Chlorophyll-a Concentrations
Lake Elsinore
April 13, 2020 Satellite Flyover Event



Chlorophyll-a Concentrations
Canyon Lake
April 13, 2020 Satellite Flyover Event



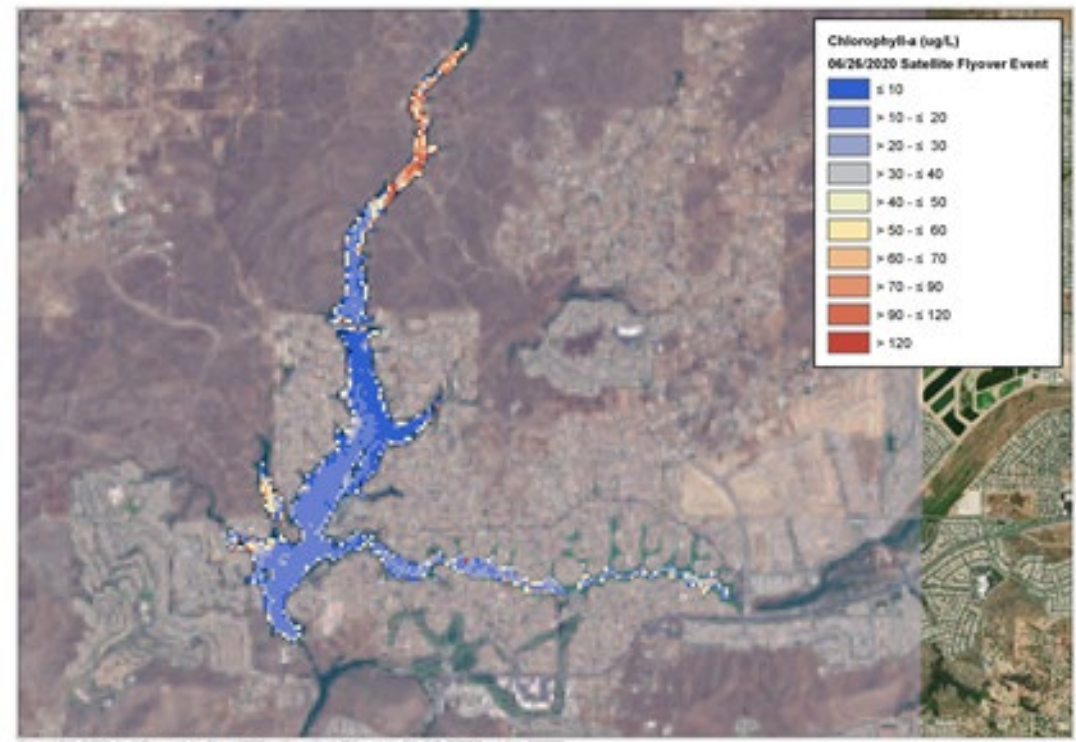
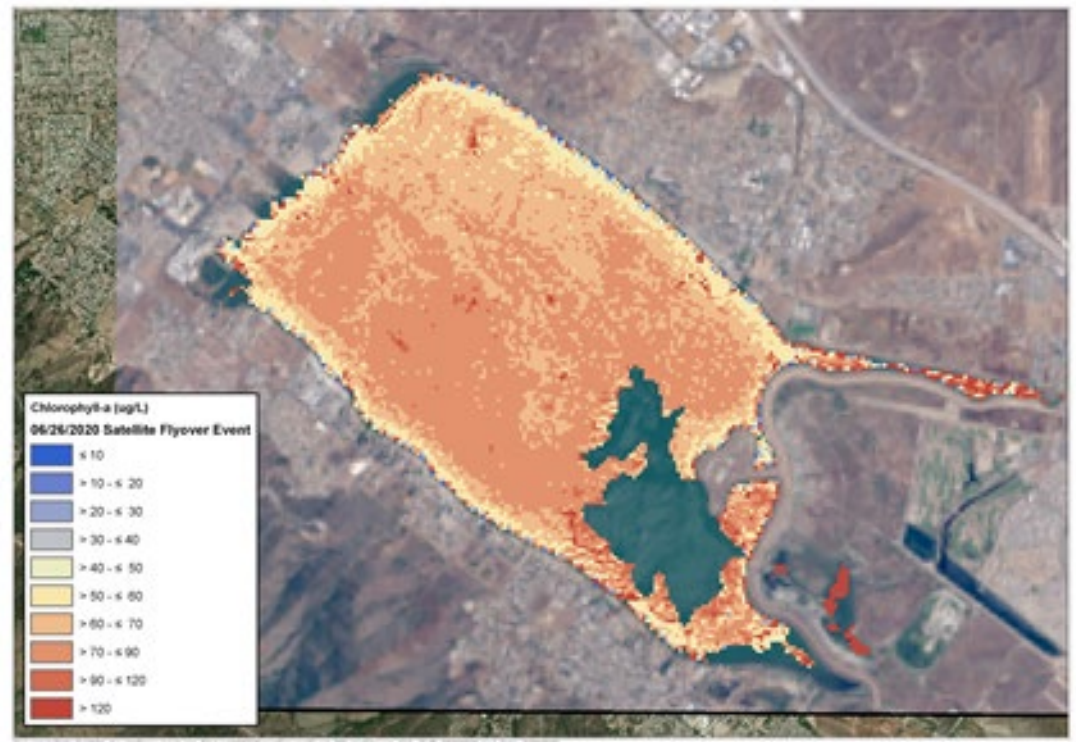
**Data gaps due surface reflections

Satellite Imagery – Chlorophyll June 26, 2020



Lake Elsinore

Canyon Lake



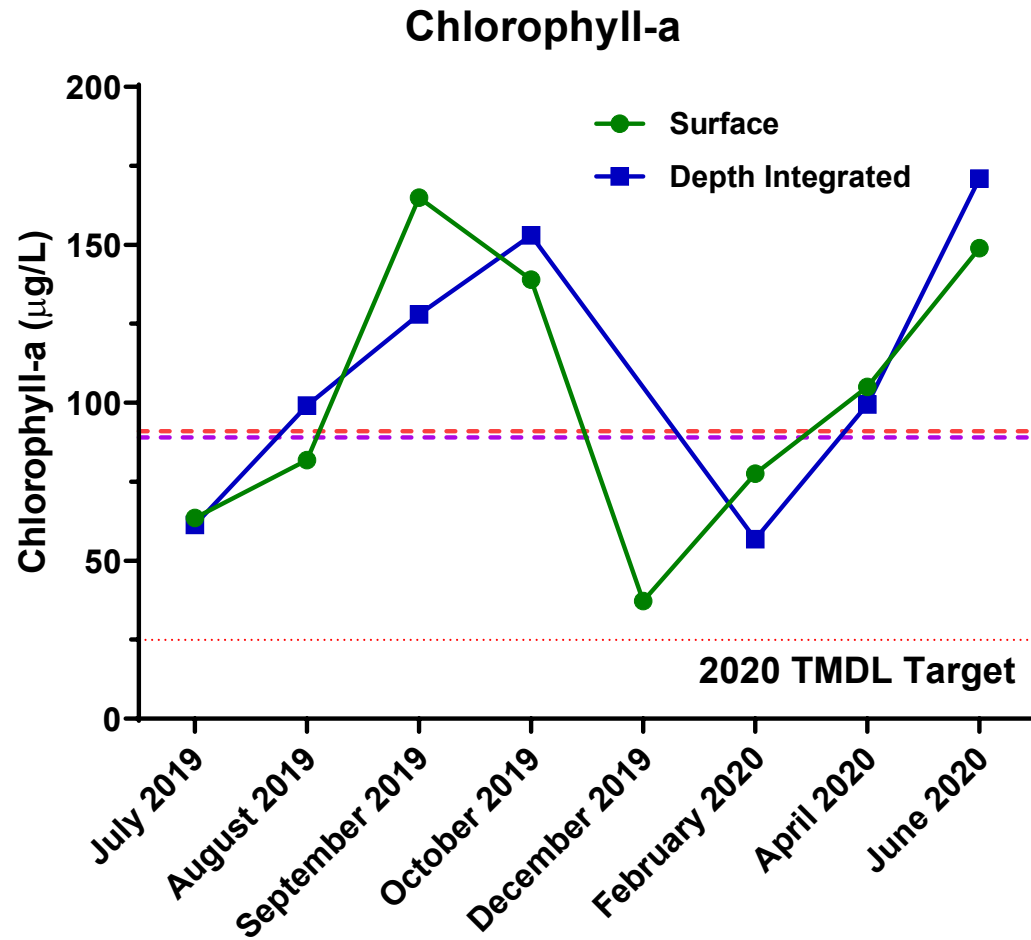
Chlorophyll-a Concentrations
Lake Elsinore
June 26, 2020 Satellite Flyover Event



Chlorophyll-a Concentrations
Canyon Lake
June 26, 2020 Satellite Flyover Event

**Data gaps due surface reflections

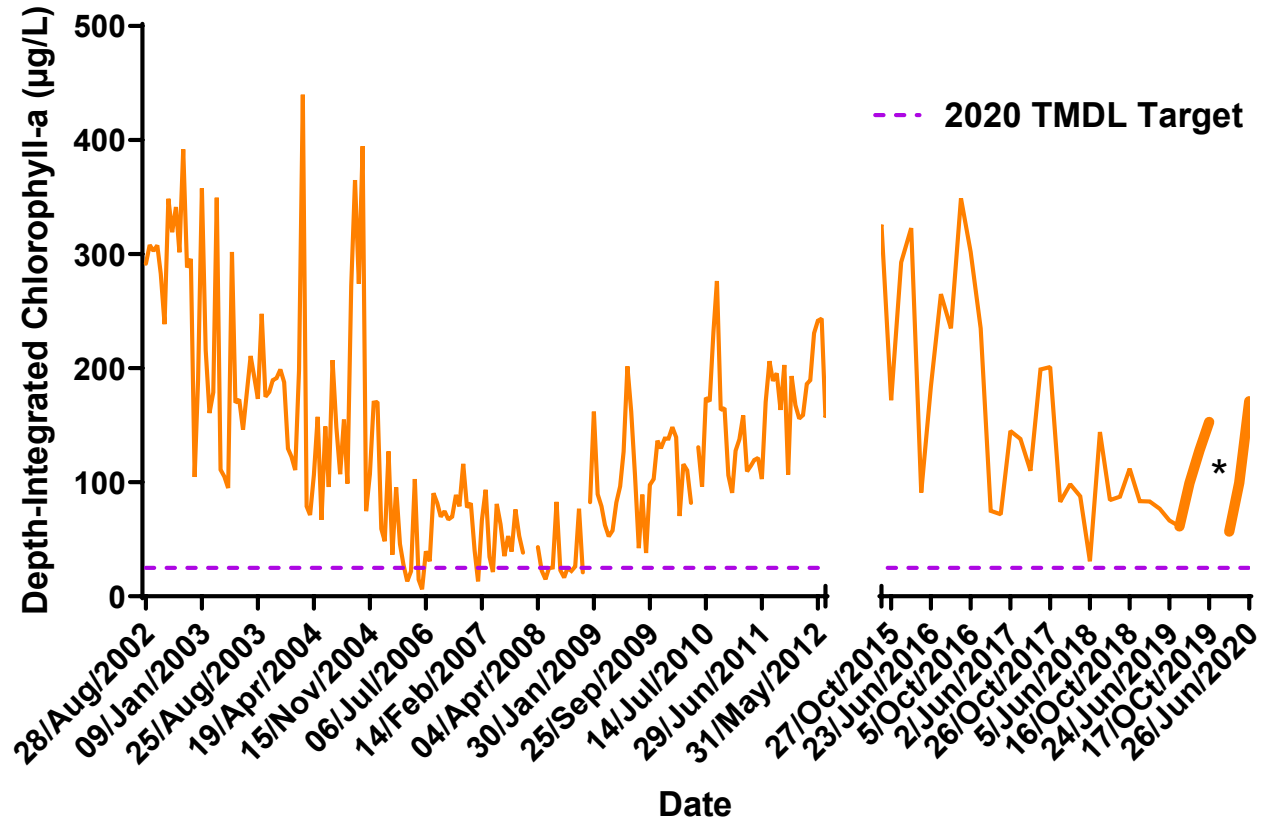
Lake Elsinore Chlorophyll – 2019-2020



Surface Summer Mean
(June-Sept) = 91 ug/L
Depth-Integrated Summer Mean
(June-Sept) = 89 ug/L

December depth integrated
value missing due to lab error

Lake Elsinore Chlorophyll – Depth Integrated Historic Data



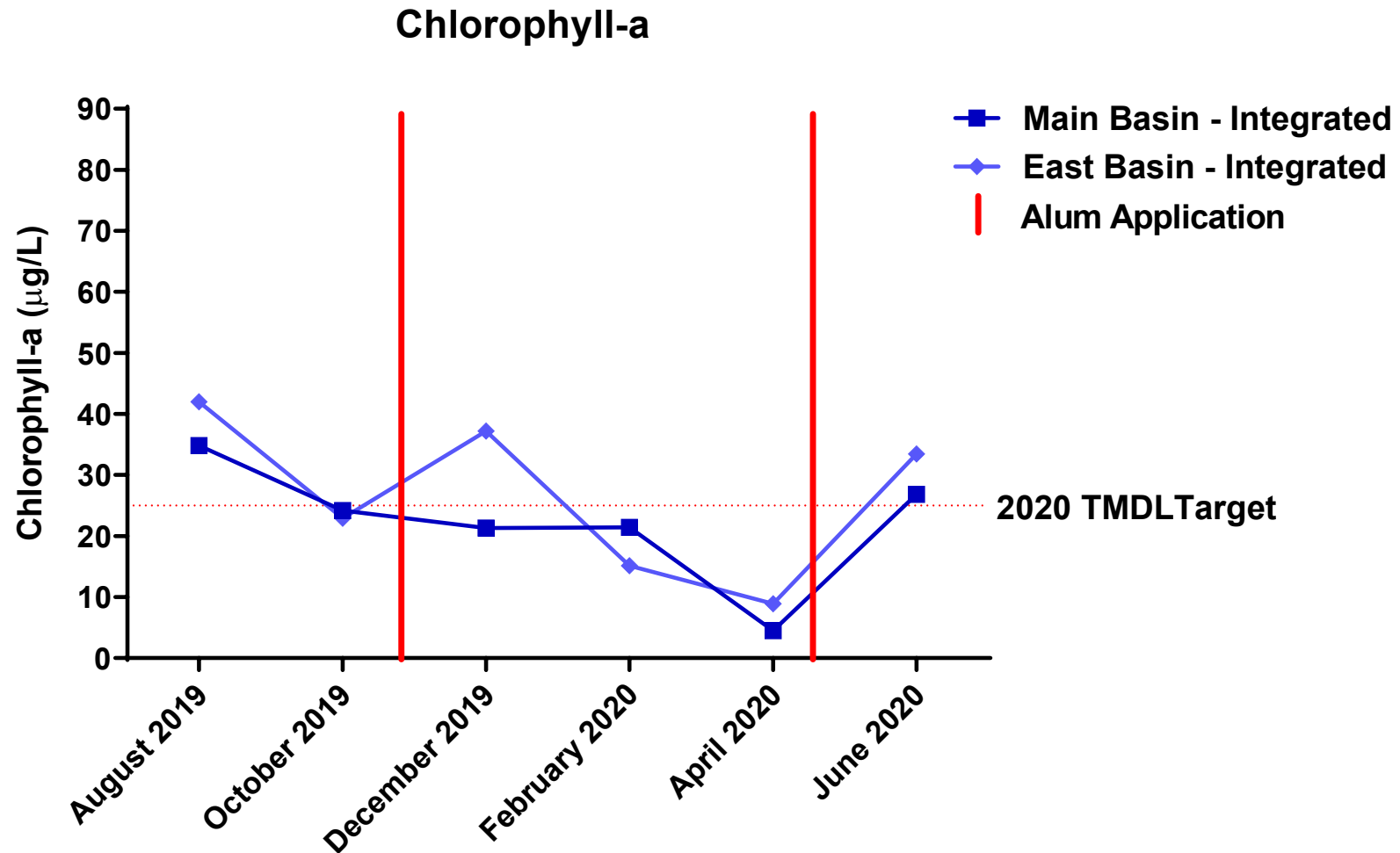
No data available from June 2012-July 2015

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

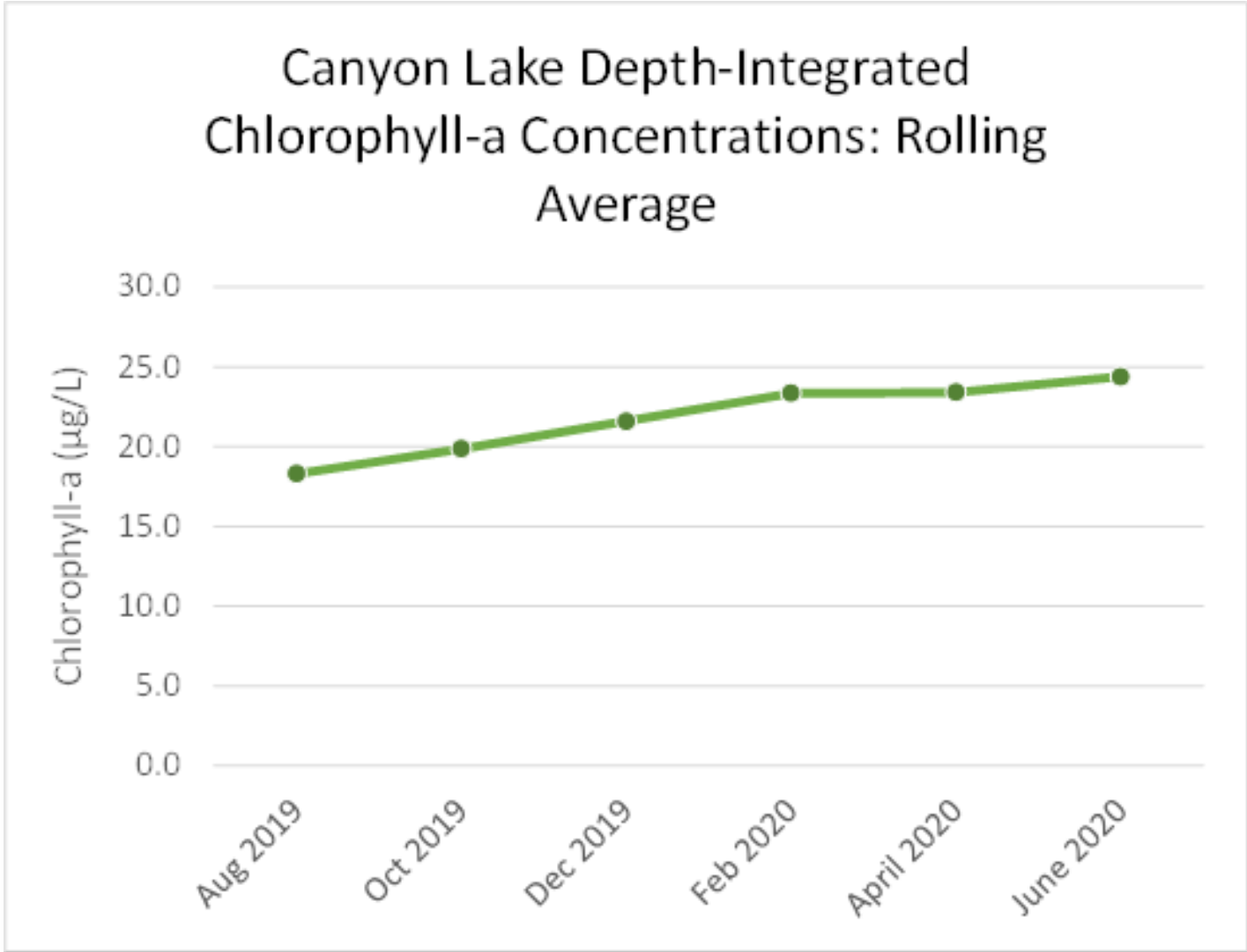
Bold represents current monitoring year July 2019-June 2020

*No results for December 2019 sample. See report for details.

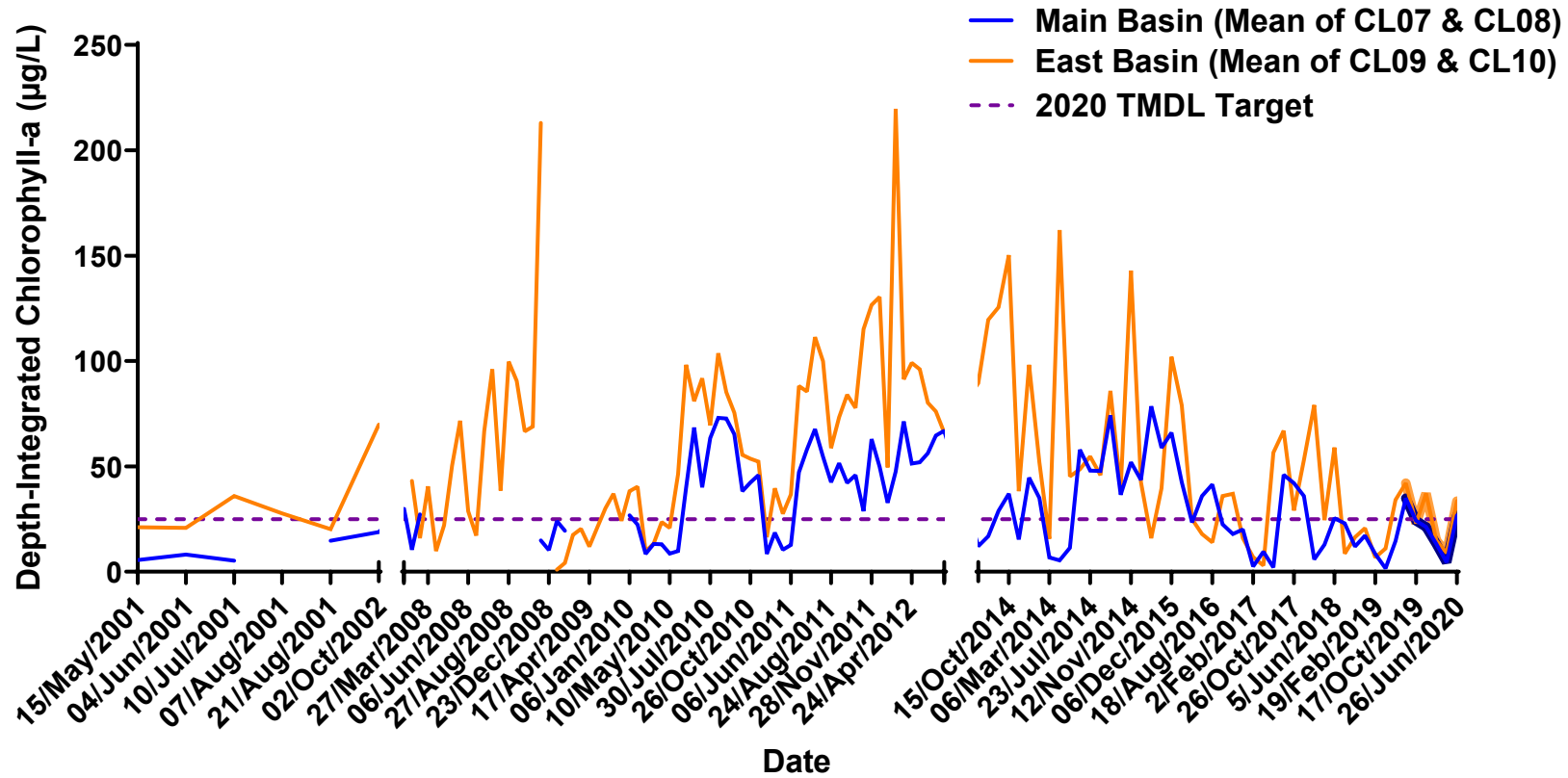
Canyon Lake Chlorophyll – 2019-2020



Canyon Lake Chlorophyll – 2019-2020



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

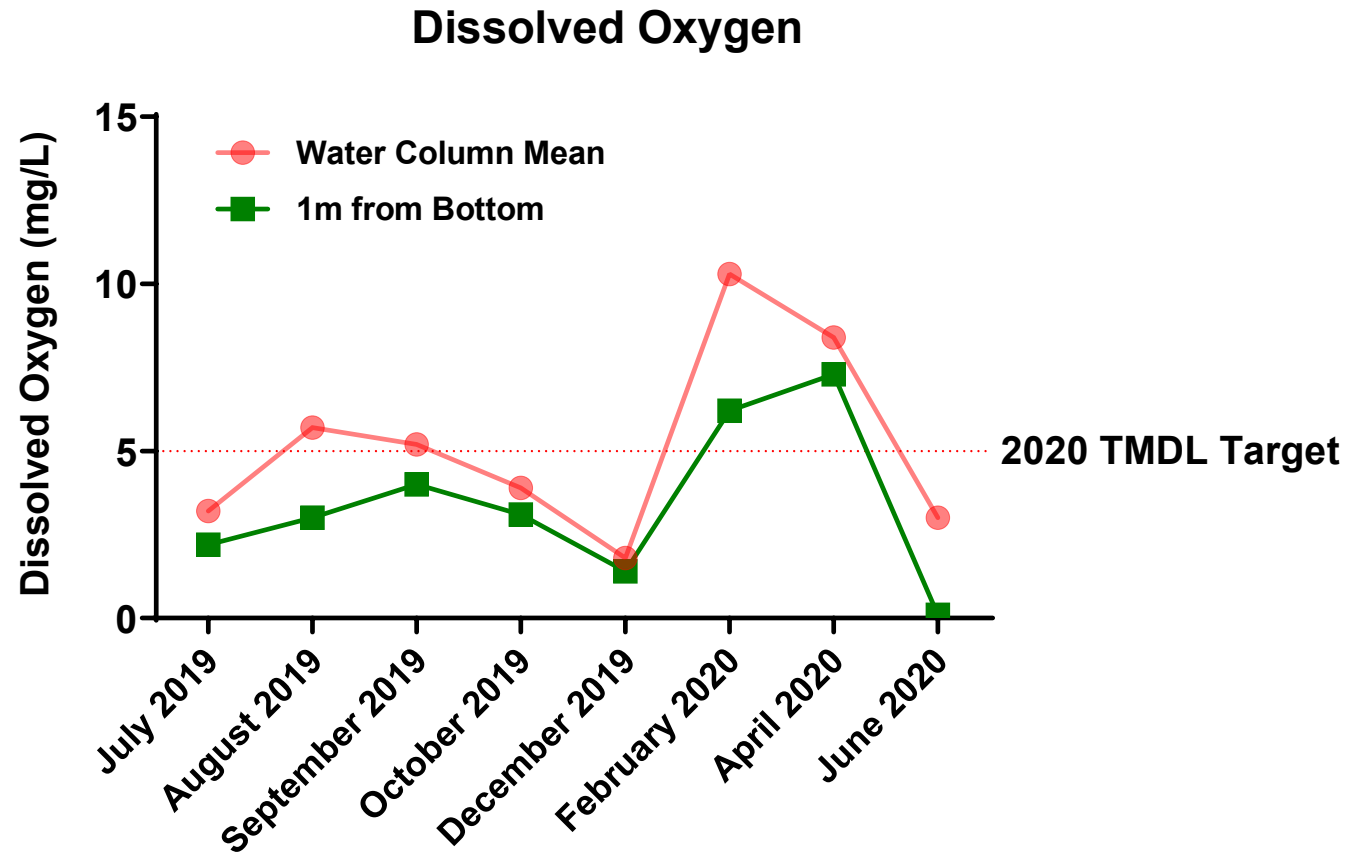
Bold represents current monitoring year July 2019-June 2020

Lake Elsinore and Canyon Lake TMDL Water Quality Monitoring Update – 2019-2020 Summary



Dissolved
Oxygen
Monitoring

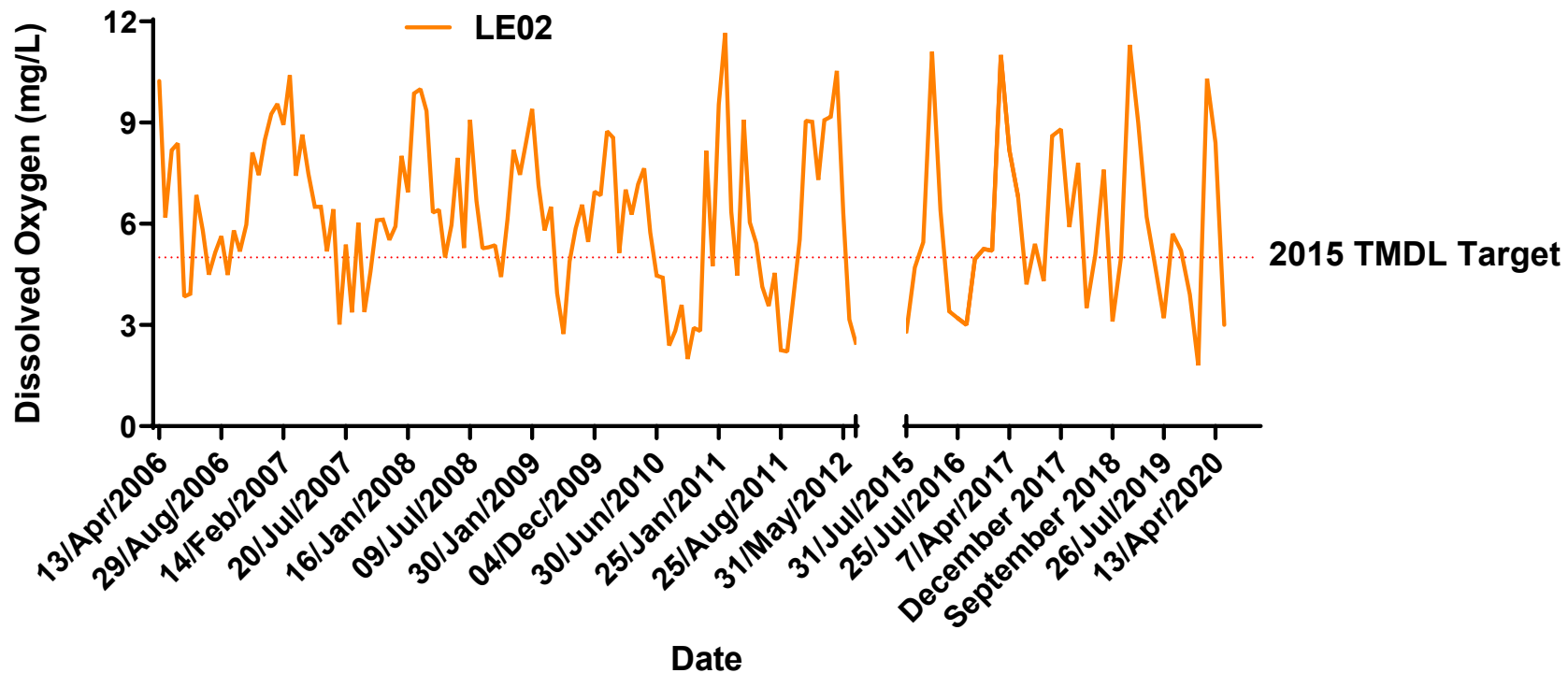
Lake Elsinore Dissolved Oxygen – LE02 Water Column Mean vs. 1m from Bottom 2019-2020



Lake Elsinore Dissolved Oxygen – LE02 Water Column Mean Historic Data



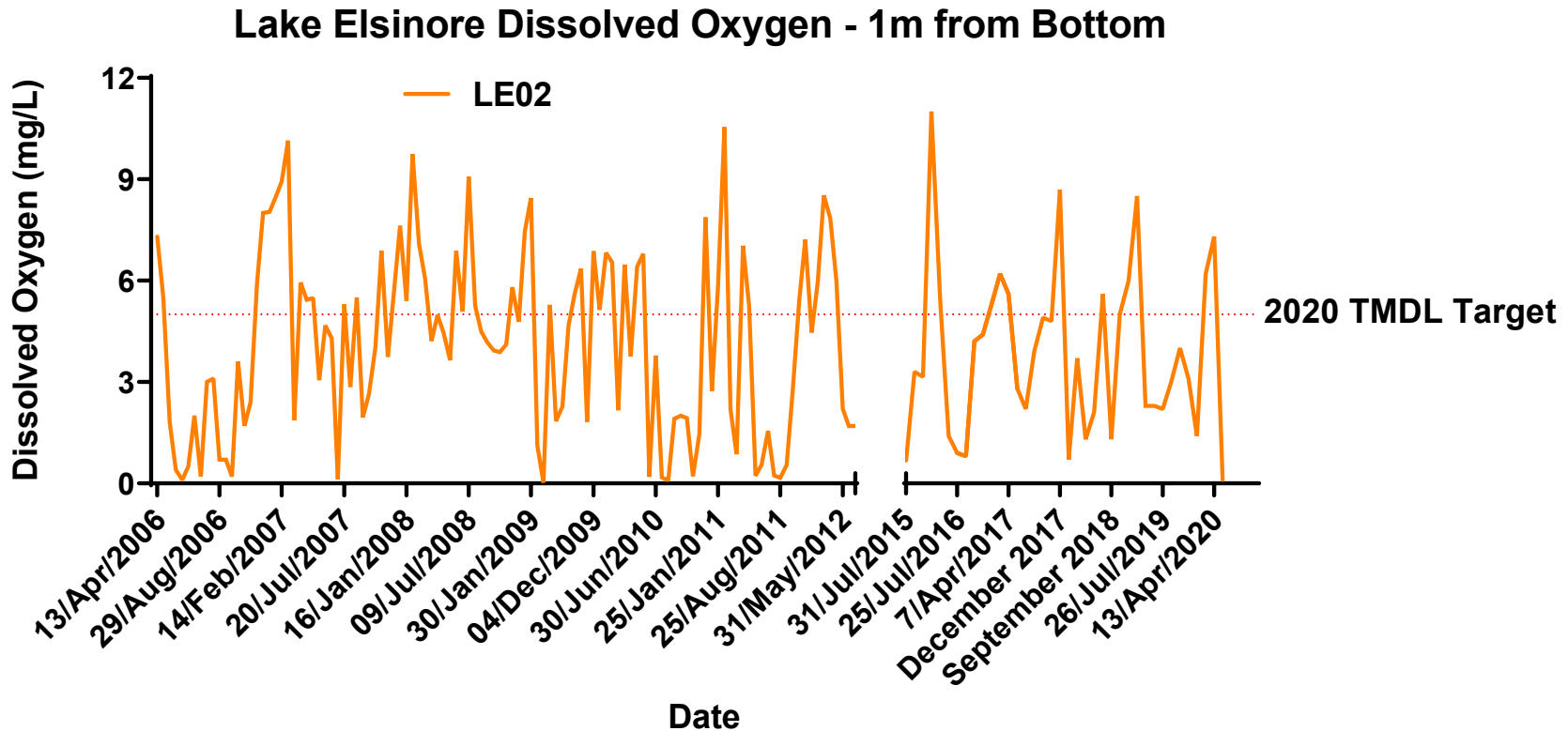
Lake Elsinore Dissolved Oxygen - Water Column mean



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



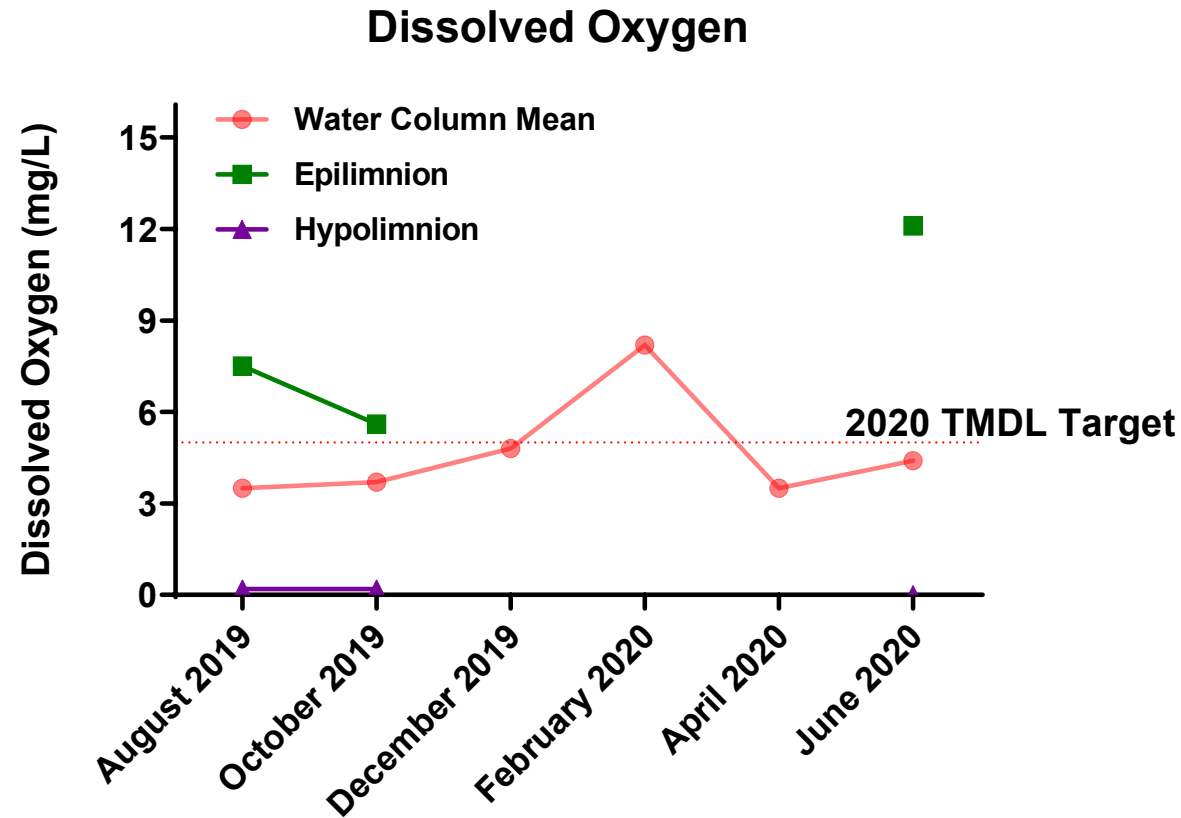
No data available from June 2012-July 2015

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 2019-2020



Mean of Sites
CL07 & CL08

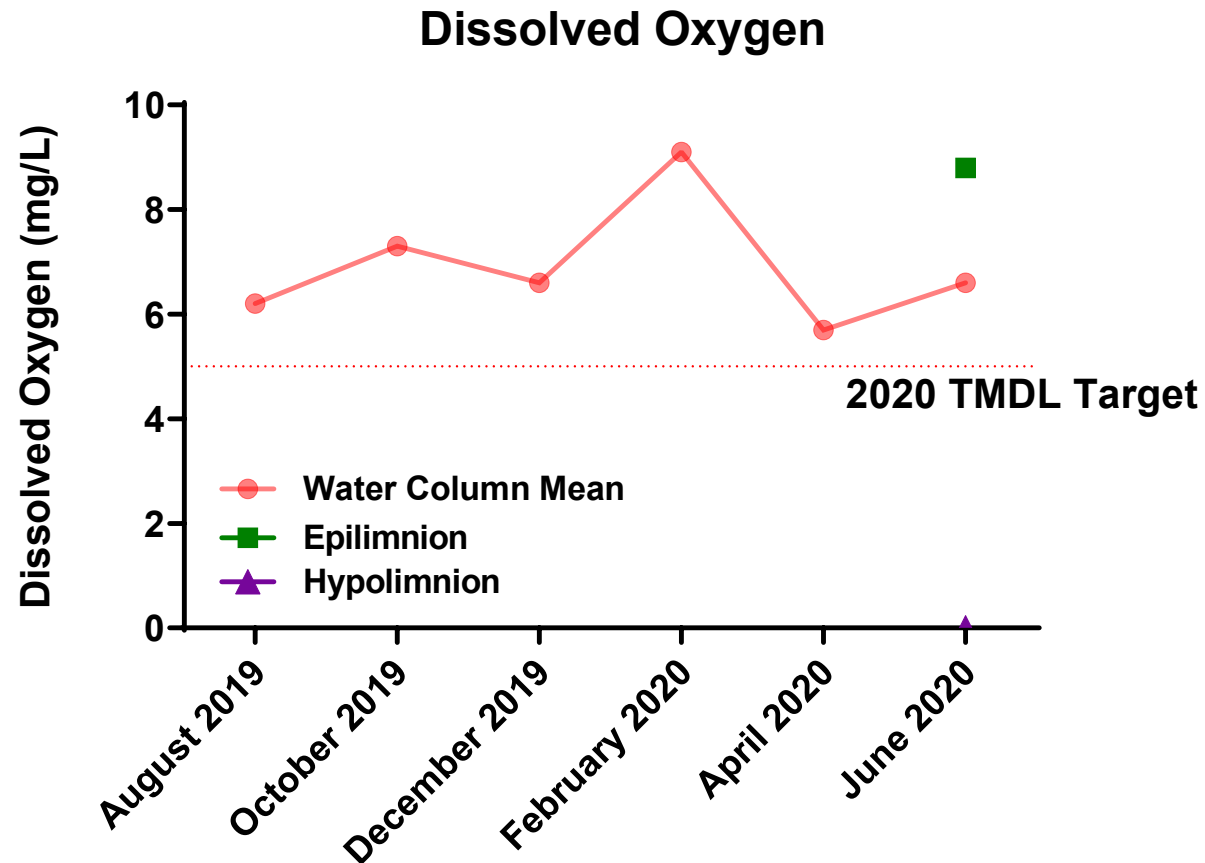


No stratification in December, February or April

Canyon Lake Dissolved Oxygen – East Basin Epilimnion vs. Hypolimnion 2019-2020

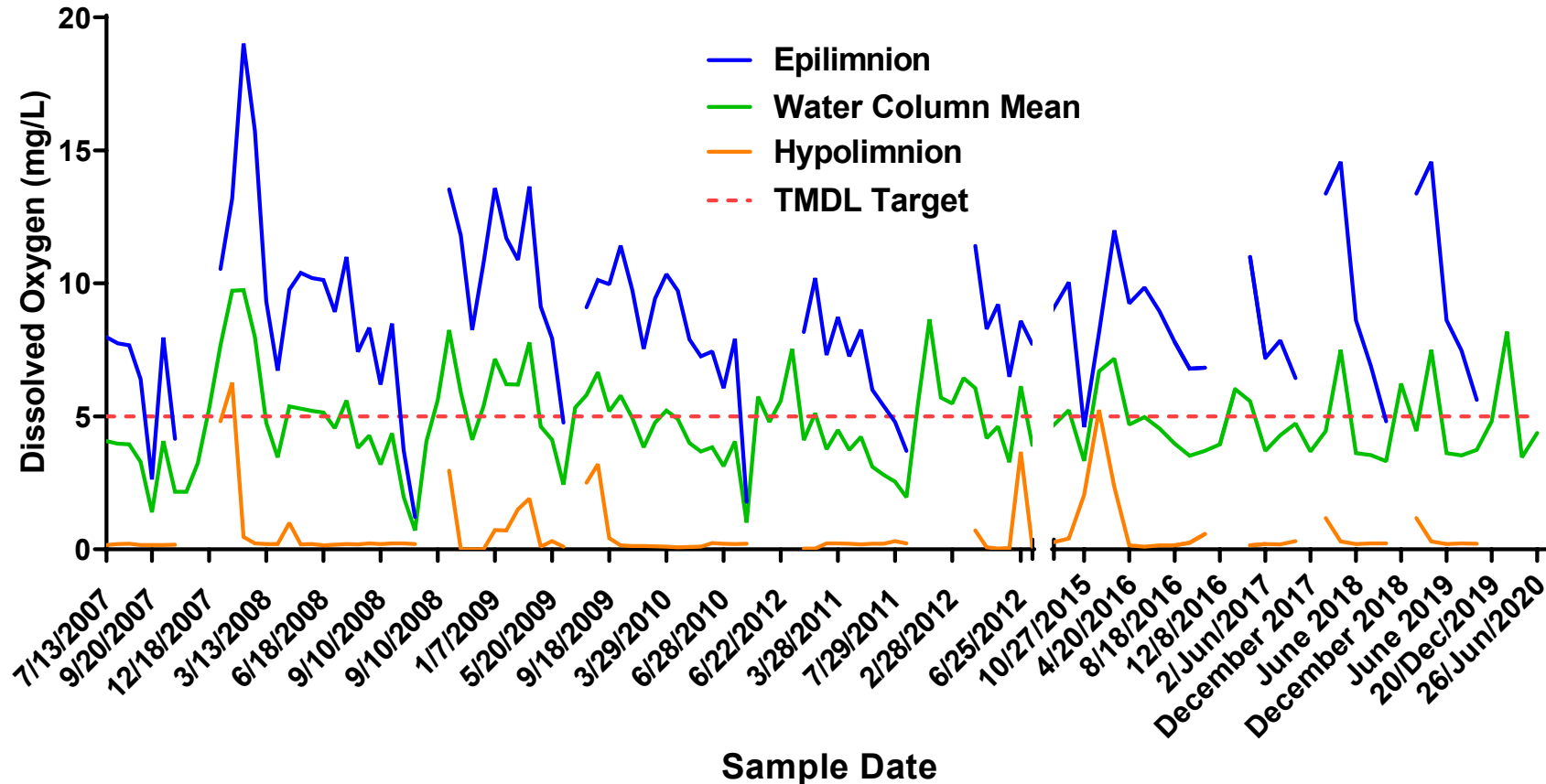


Mean of Sites
CL09 & CL10



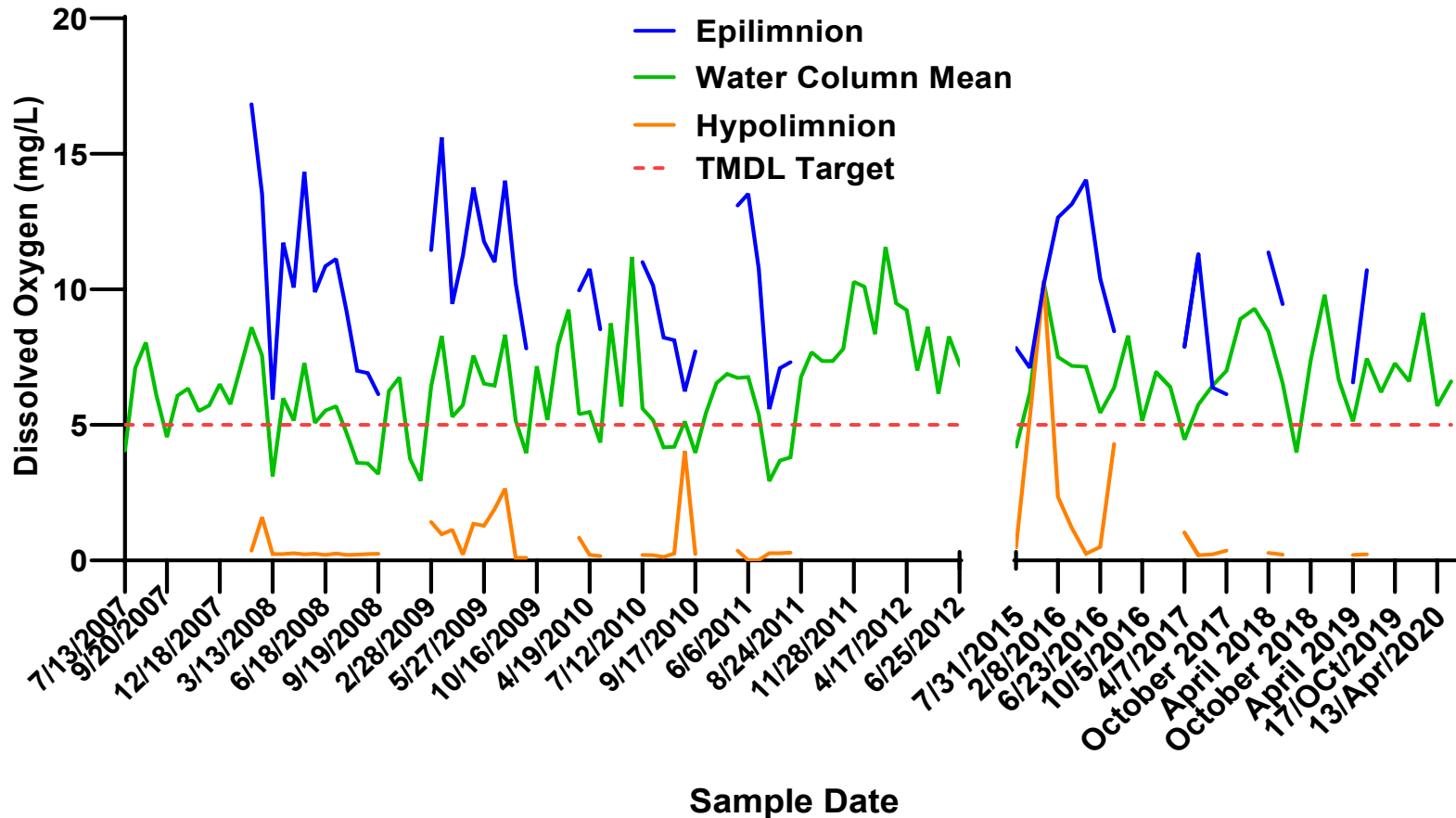
Stratified only in June 2020

Canyon Lake Dissolved Oxygen – Main Basin Mean Historic Data



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

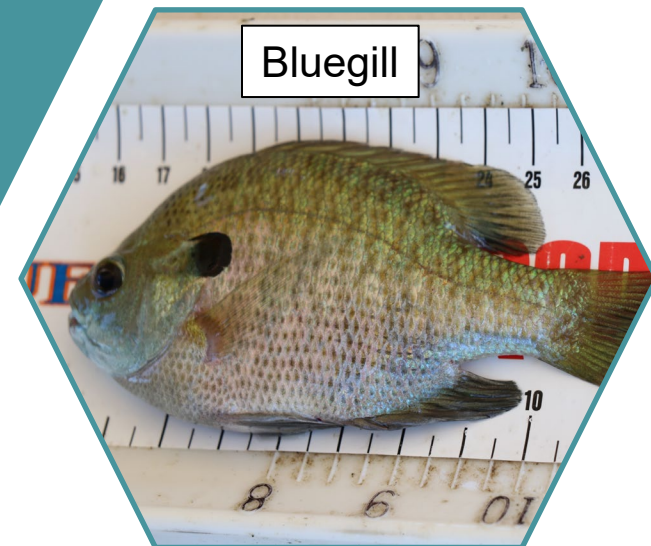
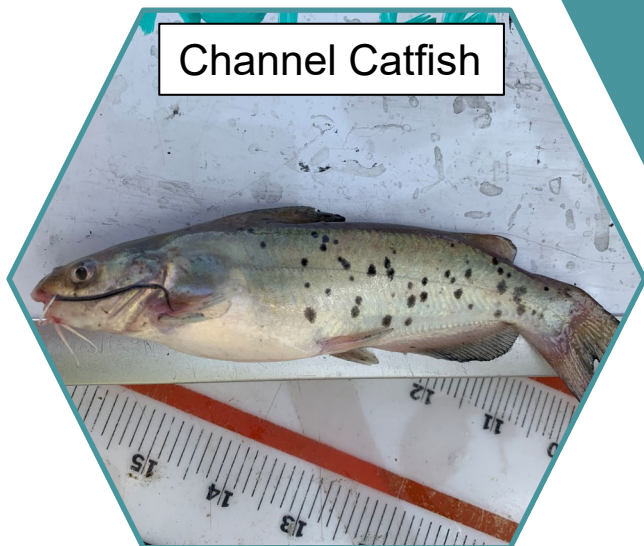
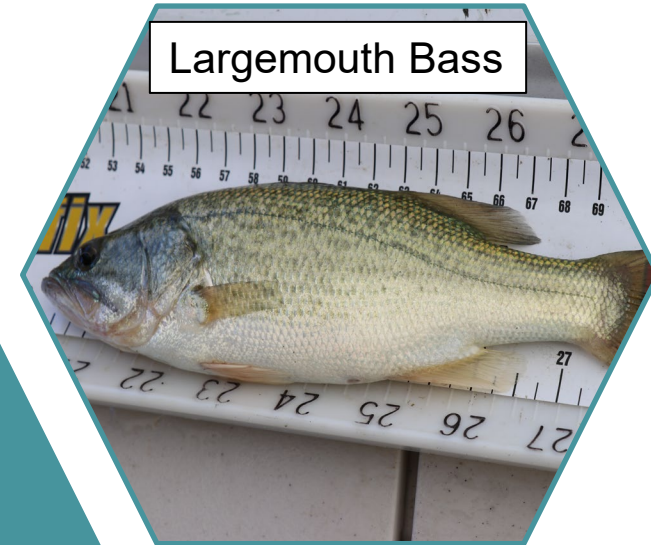
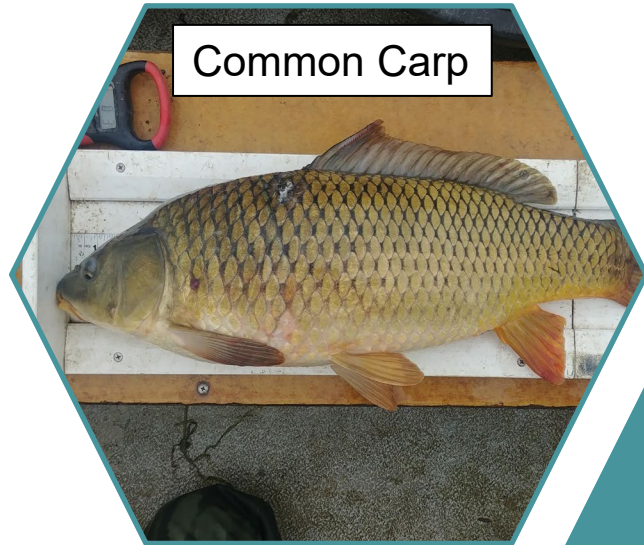
TMDL 2015 target >5 mg/L in Epilimnion, 2020 target >5 mg/L in Hypolimnion

Questions?



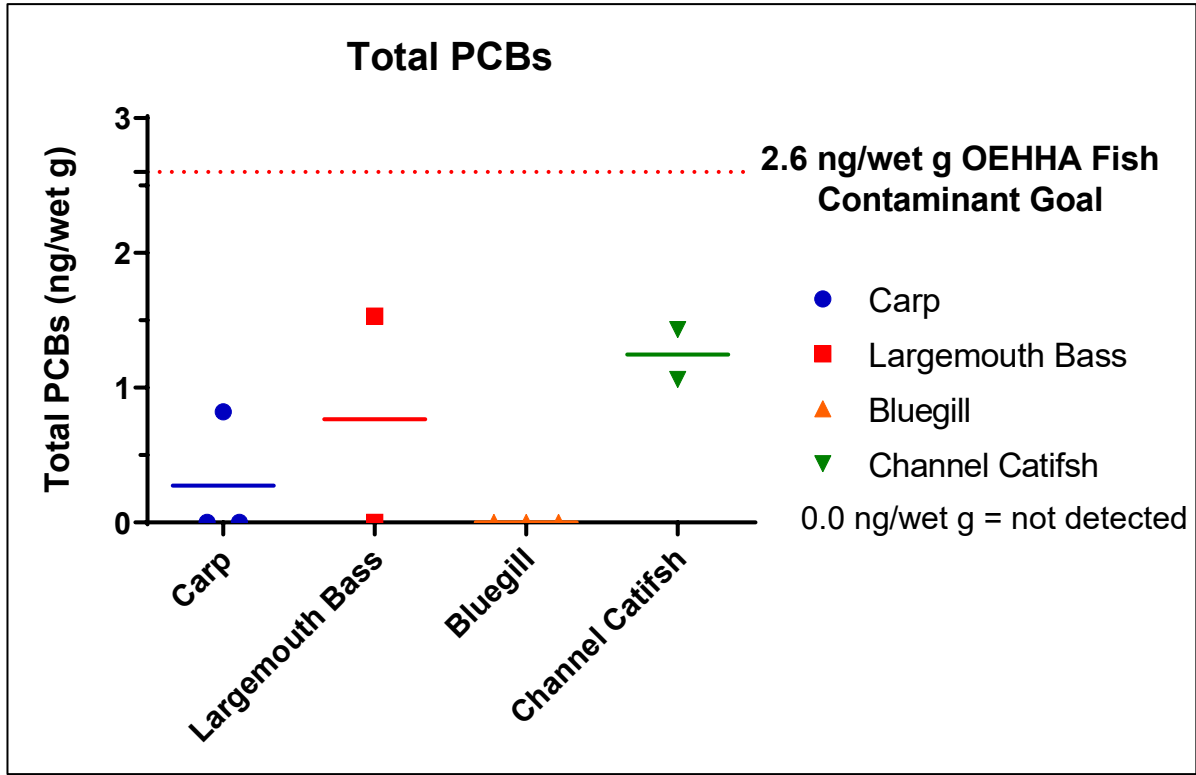
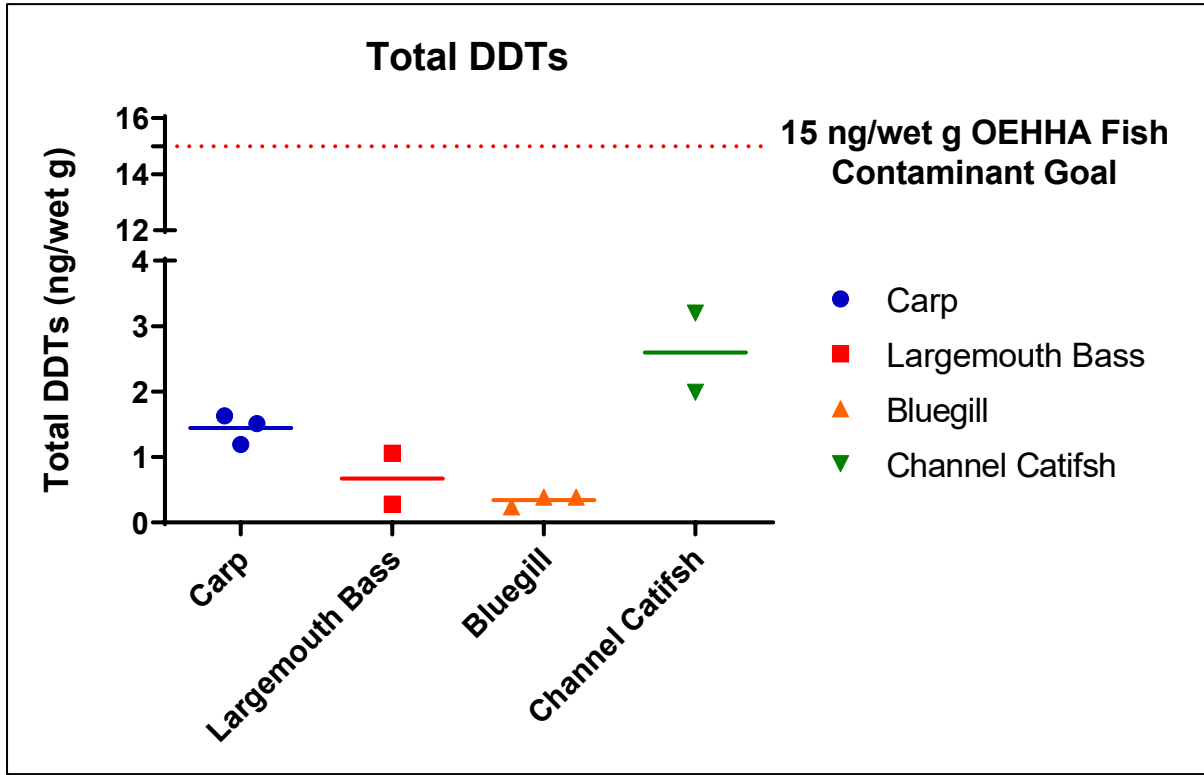
Lake Elsinore Fisheries Management Program

wood.



Fish
Tissue
Monitoring

Summary of DDT and PCB Concentrations for 2019 Fish Tissue Collections



Summary of DDT and PCB Concentrations for 2019 Fish Tissue Collections



Analyte	Carp Rep 1	Carp Rep 2	Carp Rep 3	LMB Small Fish	LMB Large Fish	Bluegill Rep 1	Bluegill Rep 2	Bluegill Rep 3	Catfish Small Fish	Catfish Large Fish
# Fish in Composite	5	5	5	2	1	5	4	2	2	1
Total DDTs (ng/wet g)	1.51	1.19	1.63	0.28	1.06	0.39	0.39	0.24	1.99	3.20
Total PCBs (ng/wet g)	ND	ND	0.82	ND	1.53	ND	ND	ND	1.06	1.43
Aroclor 1248 (ng/wet g)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1254 (ng/wet g)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1260 (ng/wet g)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Nitrogen (% wet wt)	5.3	5.3	5.3	5.8	6.0	5.8	5.9	5.7	5.2	5.2
Total Phosphorus (µg/wet g)	10710	10610	13730	15360	16310	11700	15770	16760	11080	10730
Lipids (%)	1.12	0.75	1.29	0.38	1.3	0.78	0.42	0.49	3.21	1.68
Solids (%)	19.5	20.7	20.1	19.5	22.2	20.3	19.3	20.6	21.5	21.0

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OEHHA Fish Contaminant Goal (June 2008)
 Total DDT 15 ng/wet g
 Total PCB 2.6 ng/wet g