TMDL Compliance Monitoring Program Update

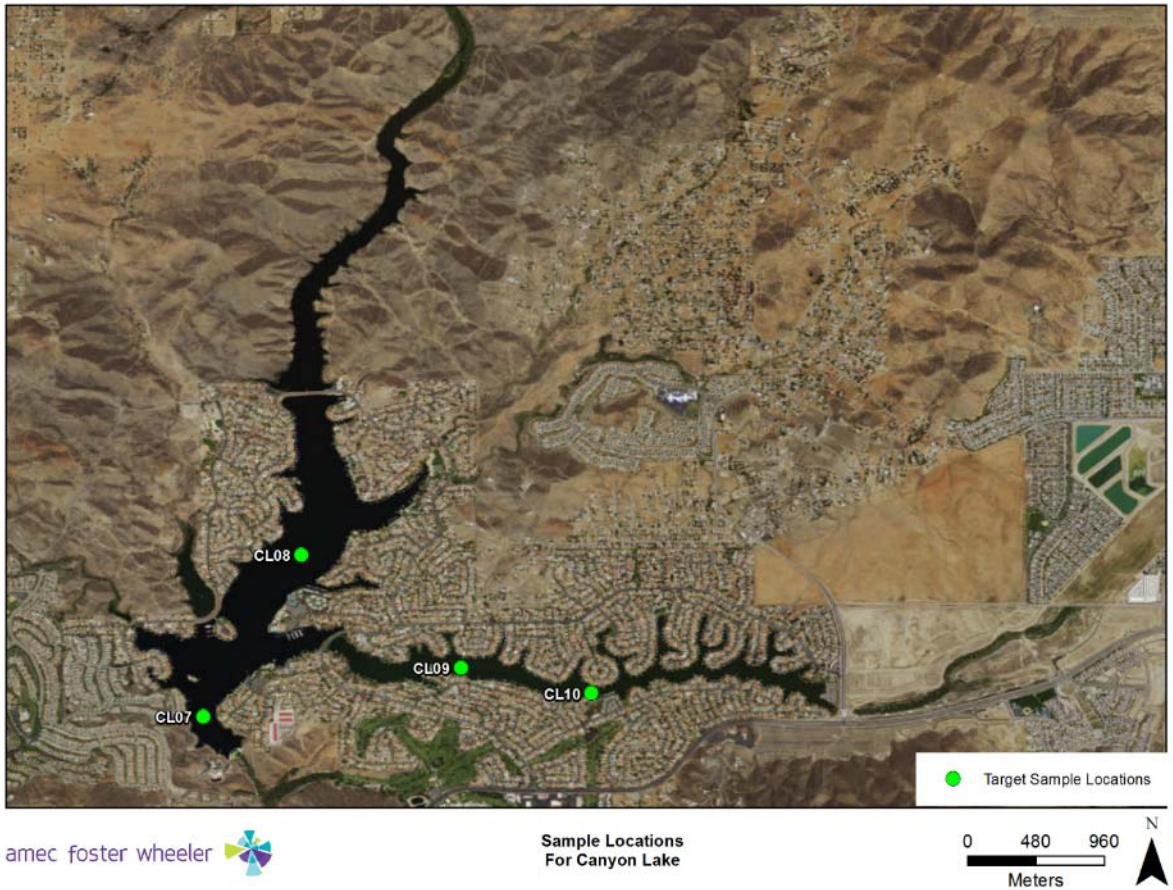
December 2, 2015

In-Lake Monitoring Approach

1. Bi-monthly sampling (every other month)
2. Water column vertical profiles (DO, pH, Temp, Cond) - 1 meter intervals
   - 3 sites in Lake Elsinore
   - 4 sites in Canyon Lake
3. Water column chemistry/nutrient sampling (full depth integration)
   - 1 site in Lake Elsinore (LE02)
   - 3 sites in Canyon Lake (CL07, CL08, CL10)
4. Chlorophyll-a
   - Full and 0-2m depth integrated sample (all chem stations)
   - 0-2m depth integrated surface sample only (CL09)
5. Lake-wide satellite imagery
   - Chlorophyll-a
   - Turbidity
6. Plankton sampling – preserved and archived

Station Locations – Lake Elsinore

Station Locations – Canyon Lake

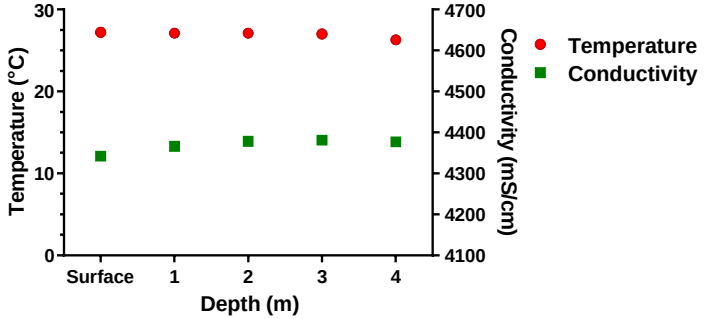


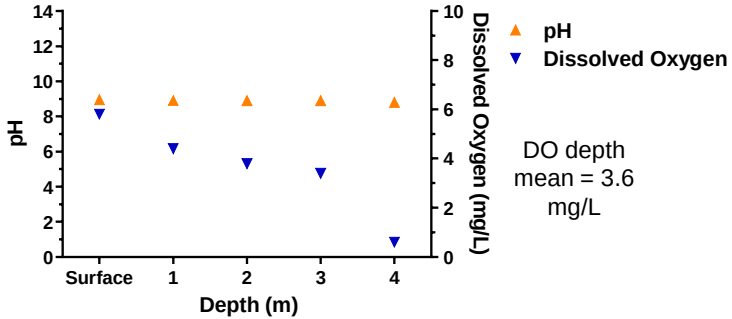
Two Sampling Events Completed
July 31 and October 27, 2015

Lake Elsinore Water Profiles – July 2015

Site LE03

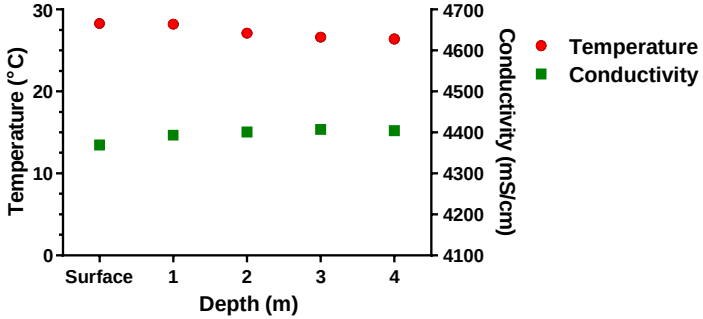
Morning - 0815

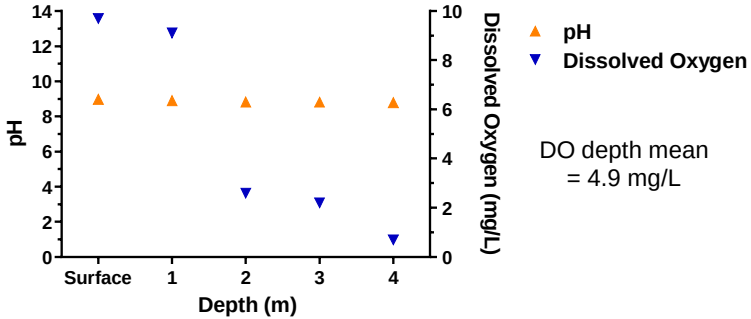




DO depth mean = 3.6 mg/L

Afternoon - 1830



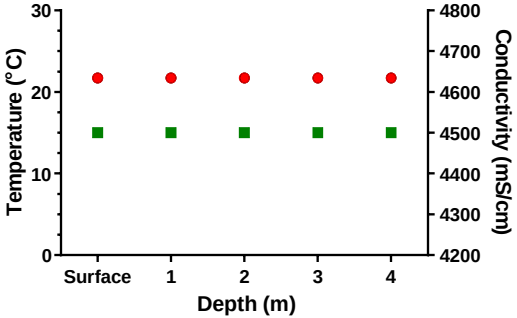


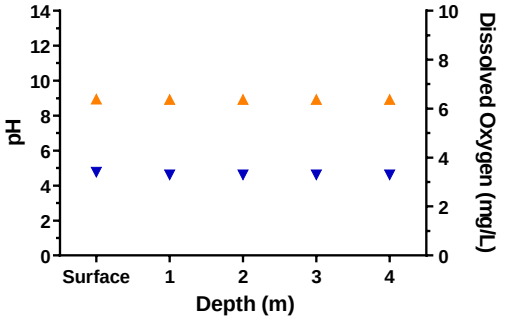
DO depth mean = 4.9 mg/L

Lake Elsinore Water Profiles – October 2015

Site LE03

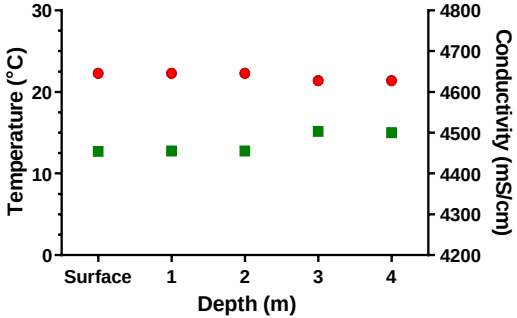
Morning - 0740

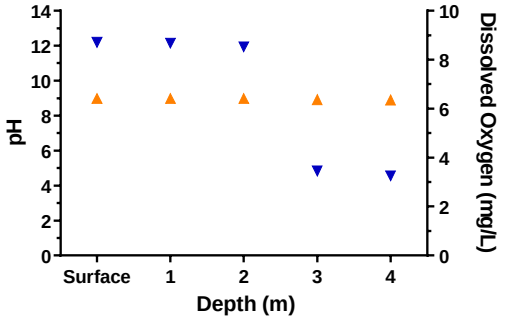




DO depth mean = 3.3 mg/L

Afternoon - 1730



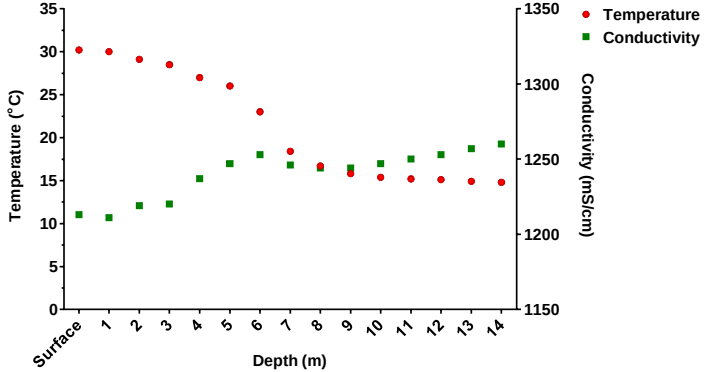


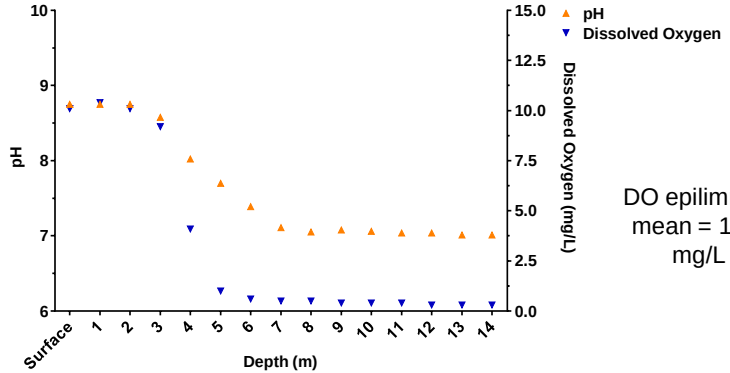
DO depth mean = 6.5 mg/L

Canyon Lake Water Profiles – July/October 2015

Site CL07

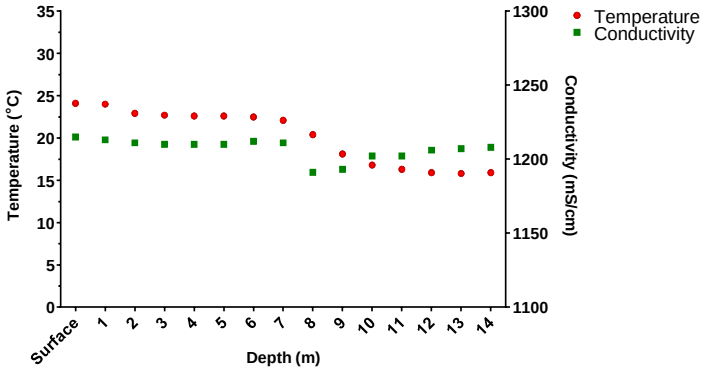
July 31 @ 1405

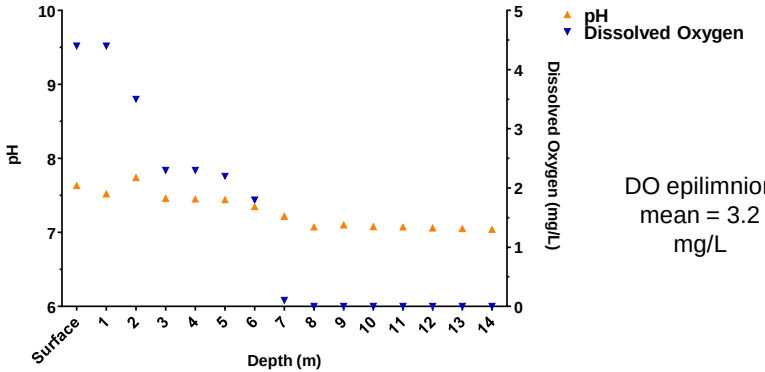




DO epilimnion mean = 10.0 mg/L

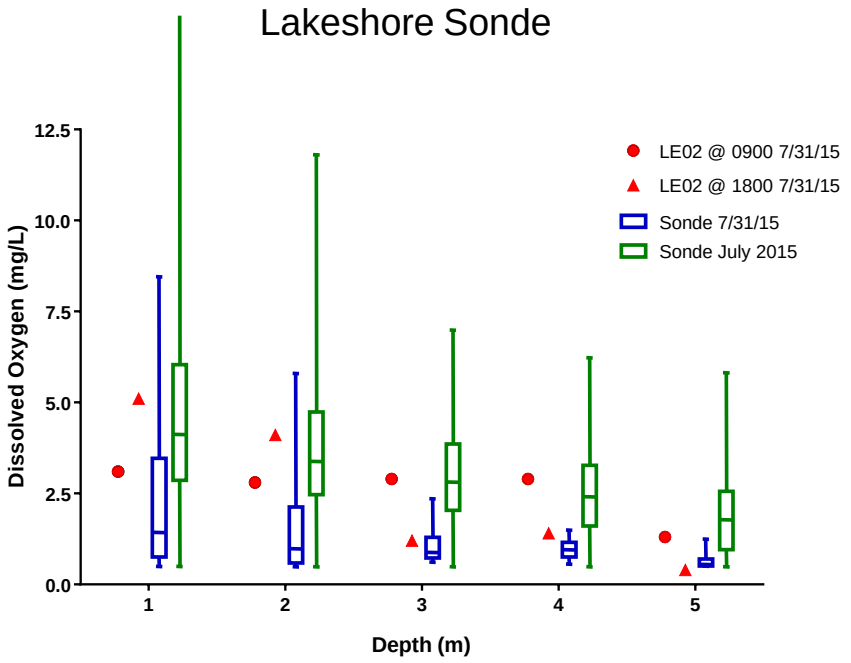
October 27 @ 1405

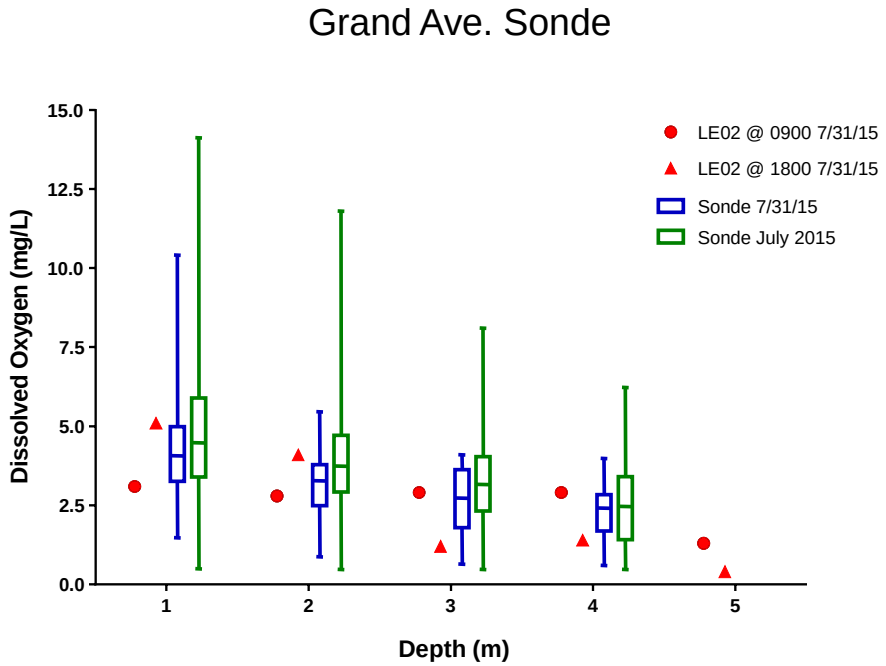




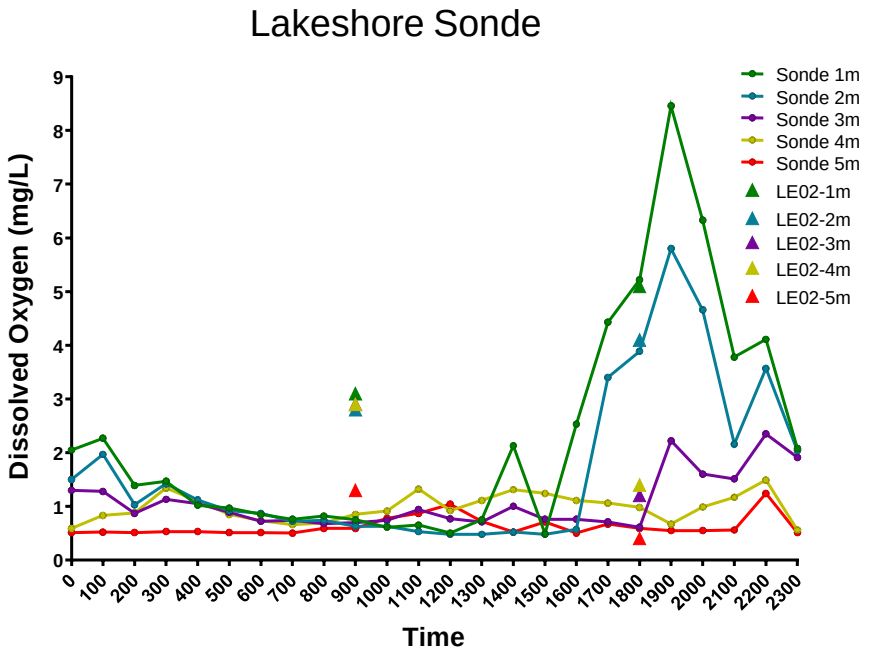
DO epilimnion mean = 3.2 mg/L

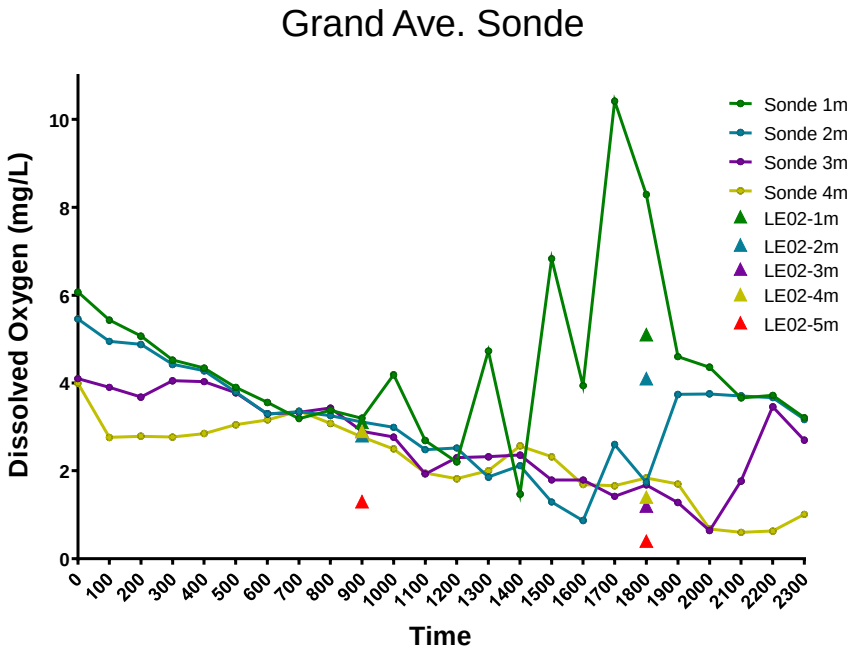
Lake Elsinore Data Sonde Water Profiles – July 2015





Lake Elsinore Data Sonde Water Profiles – July 2015





Analytical Water Chemistry – July 2015

Compound	Units	Basin Plan or TMDL Target	Depth Integrated or Surface	CL07	CL08	CL09	CL10	LE02
General Chemistry								
TDS	mg/L	700 (CL), 2000 (LE)[3]	DI	720	750	--	840	2600
Sulfide	mg/L	NA	DI	ND	ND	--	ND	ND
Nitrate as N	mg/L	10	DI	ND	ND	--	ND	ND
Nitrite as N	mg/L	NA	DI	ND	ND	--	ND	ND
Kjeldahl Nitrogen	mg/L	NA	DI	2.3	1.0	--	1.1	5
Total Nitrogen[a]	mg/L	0.75[b]	DI	2.3	1.0	--	1.1	5.0
Ammonia-Nitrogen	mg/L	CMC: 1.56-17.03[c] CCC: 0.25-2.57[c]	DI	1.5	0.17	--	0.13	ND
Ortho Phosphate	mg/L	NA	DI	0.16	ND	--	ND	ND
Total Phosphorus	mg/L	0.1[b]	DI	0.2	ND	--	ND	0.28
Chlorophyll-a								
Chlorophyll-a	µg/L	25[1], 40[2]	Surf (0-2m)	4	13	13	17	290
Chlorophyll-a	µg/L	25[1], 40[2]	DI	67	90	--	16	326

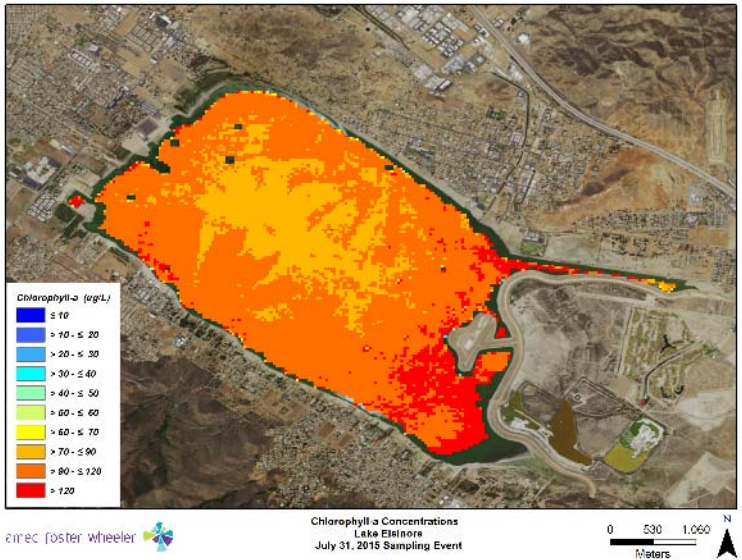
[a] - Total Nitrogen = TKN+NO2+NO3
[b] - Annual average
[c] - Values are site specific dependent upon pH and temperature recorded at each location
[1] – 2020 TMDL Target; [2] – 2015 TMDL Target
[3] – Santa Ana Region Basin Plan Objective

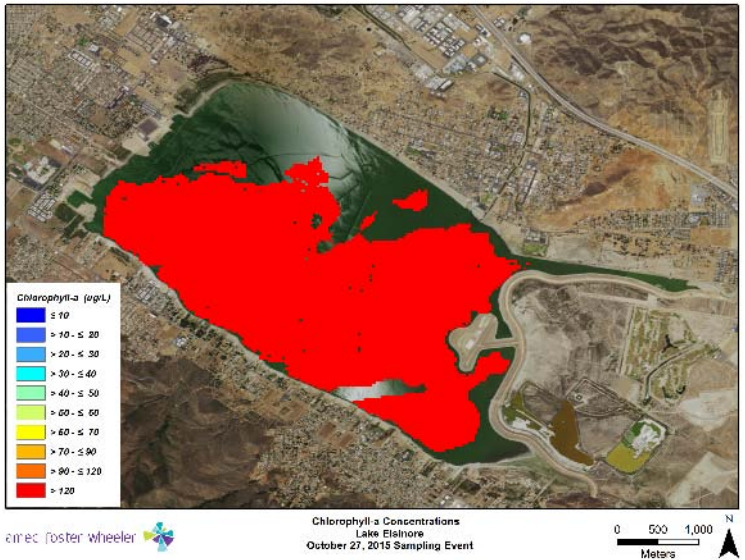
Analytical Water Chemistry – October 2015

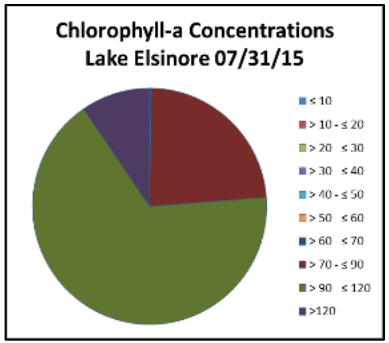
Compound	Units	Basin Plan or TMDL Target	Depth Integrated or Surface	CL07	CL08	CL09	CL10	LE02
General Chemistry								
TDS	mg/L	700 (CL), 2000 (LE)[3]	DI	760	800	--	860	3000
Sulfide	mg/L	NA	DI	ND	ND	--	ND	ND
Nitrate as N	mg/L	10	DI	ND	ND	--	ND	0.41
Nitrite as N	mg/L	NA	DI	ND	ND	--	ND	ND
Kjeldahl Nitrogen	mg/L	NA	DI	1.8	0.86	--	1.3	7.1
Total Nitrogen[a]	mg/L	0.75[b]	DI	1.8	0.86	--	1.3	7.1
Ammonia-Nitrogen	mg/L	CMC: 1.56-26.21[c] CCC: 0.25-3.52[c]	DI	1.2	1.0	--	ND	0.94*
Ortho Phosphate	mg/L	NA	DI	ND	ND	--	ND	ND
Total Phosphorus	mg/L	0.1[b]	DI	0.05	ND	--	ND	0.31
Chlorophyll - a								
Chlorophyll-a	µg/L	25[1], 40[2]	Surf (0-2m)	105	14.6	55.5	50.2	292
Chlorophyll-a	µg/L	25[1], 40[2]	DI	102	15.7	--	39.6	266

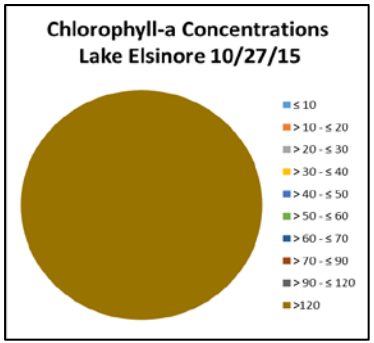
[a] - Total Nitrogen = TKN+NO2+NO3
[b] - Annual average
[c] - Values are site specific dependent upon pH and temperature recorded at each location
[1] – 2020 TMDL Target, [2] – 2015 TMDL Target
[3] – Santa Ana Region Basin Plan Objective
* - Exceeds CCC for ammonia

Satellite Imagery – Lake Elsinore
Chlorophyll-a

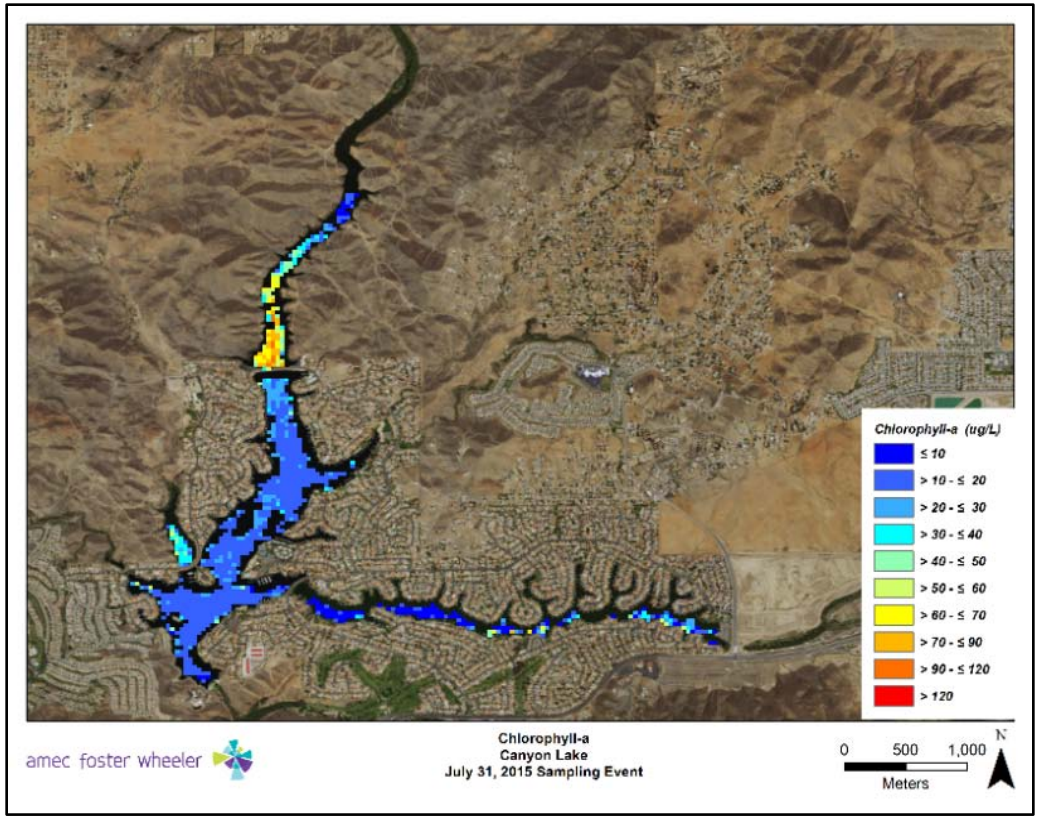


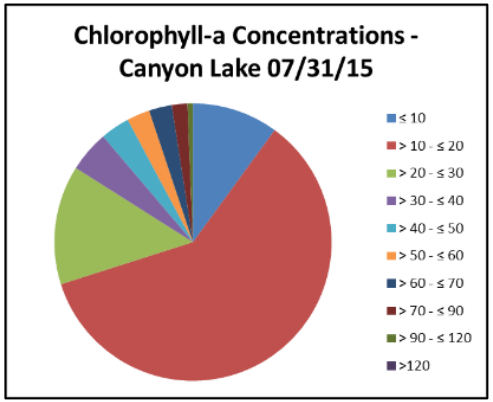






Satellite Imagery – Canyon Lake Chlorophyll-a





Relative frequency (percentages)

Next Steps

- Finalize draft of Q1 monitoring report
- Continue multidimensional analysis of data
  - Data variability/ representativeness
  - Support potential revised TMDL targets down the road
- Next sampling date Sunday, December 6 (LandSat8 overpass)