

LCRA

Basin-wide Water Quality Summary

August 2011



Purpose

Water Resource Protection routinely collects water quality information at 69 sites throughout the lower Colorado River basin. The data we collect is used for trend detection and monitoring water quality standards compliance. Data collection frequency is bimonthly (usually during even-numbered months) for most sites. This document is produced bimonthly and is intended to provide a general summary of water quality conditions and give the user the ability to look at spatial trends in an individual water body. If you have specific questions about any of the results presented here, please call Dave Bass at (800) 776-5272 extension 2112.

Water Quality Variables

This report examines eight of the 26 separate measurements collected during a routine sampling event. These eight constituents provide a general overview of water quality conditions at the time samples were collected. Additional data can be found at: waterquality.lcra.org.

<u>Water Quality Variable</u>	<u>Provides information about...</u>
Temperature	Physical environment
Dissolved Oxygen	Physical and biological environments
Secchi Depth	Water clarity
<i>E. coli</i>	Human health
Nitrite+Nitrate Nitrogen	Nutrients
Total Phosphorus	Nutrients
Chlorophyll	Physical and biological environments
Chloride	Ionic content

Sites

Sites are representative of the water body in which they are located, and where possible, multiple sites are shown for each water body. The following table lists the sites covered in this summary. This report reviews data for 37 of the 71 locations sampled by the LCRA. These sites are distributed throughout the LCRA's monitoring area.

Part of the Watershed	Site Description
Colorado River Below Austin	Bay City Wharton Columbus LaGrange Smithville Bastrop Webberville
Streams Downstream of Austin	Bull Creek at FM 2222 Onion Creek at US 183 Gilleland Creek at FM 969 Cedar Creek at SH 304 Cummins Creek at FM 109
Lakes Austin and Travis	Lake Austin at the Dam Lake Austin at the Headwaters Lake Travis at the Dam Lake Travis at Pace Bend Lake Travis at the Headwaters
Lakes Marble Falls and LBJ	Lake Marble Falls at the Dam Lake Marble Falls at the Headwaters Lake LBJ at the Dam Lake LBJ at Kingsland Lake LBJ at the Headwaters
Middle Basin Rivers and Streams	Sandy Creek at SH 71 Llano River at the Slab Llano River at Llano Pedernales River at FM 962 Pedernales River at Johnson City Pedernales River at Sandy
Lakes Inks and Buchanan	Inks Lake at the Dam Inks Lake at the Headwaters Lake Buchanan at the Dam Lake Buchanan at Beaver Creek Lake Buchanan at the Headwaters
Upstream Rivers	Colorado River at Red Bluff San Saba River at San Saba Colorado River at Winchell Pecan Bayou at FM 573

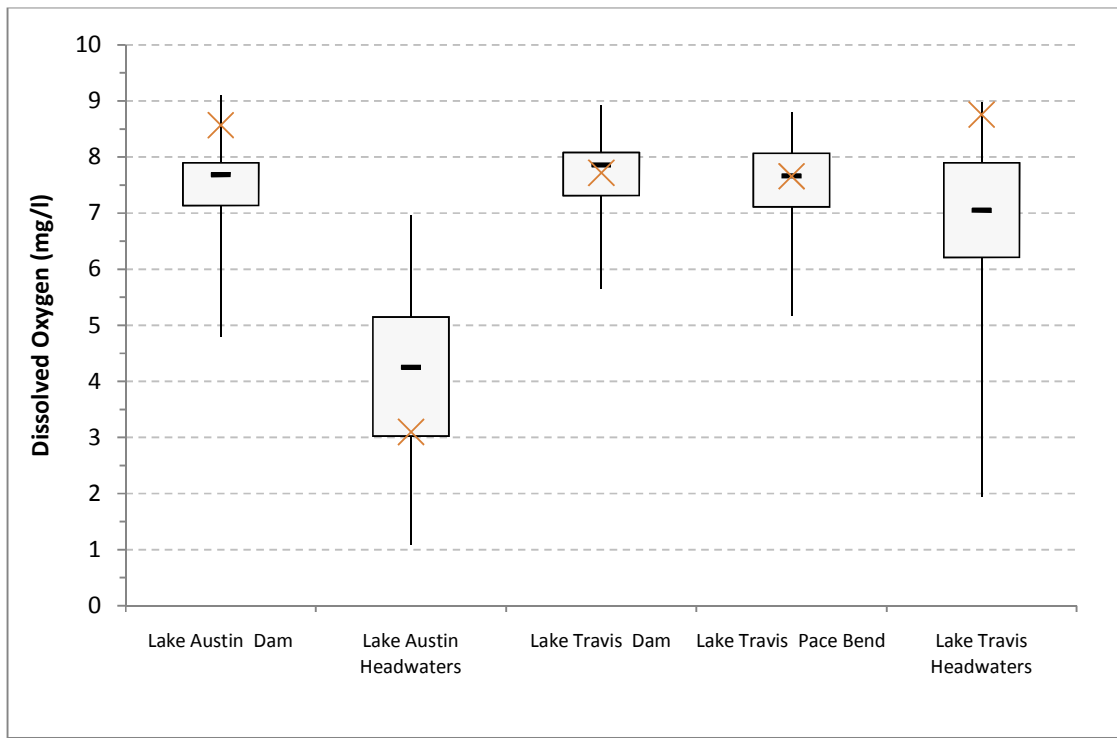
Format and Interpretation

The data collected during the most recent bimonthly sampling effort is presented in both tabular and graphic form. A sample graph is located on the next page. Measurements above the standard or screening criteria are highlighted, and possible explanations will be provided in a short discussion. Data reported below

laboratory detection limits are reported as the detection limit. This document compares the most recent set of water quality measurements to the historical median, maximum, minimum, and the first and third quartiles of data collected during that same month. For instance, the water quality information collected during February will only be compared to the median, maximum and minimum of all February data in our database.

Sample Graph

In these graphs, the red X marks this month's value for the site. The vertical lines show the range of the data, and the box in the middle represents the middle half of the data for the site. For example, at Lake Austin at the Dam, the current reading is approximately 8.6 mg/l, the maximum historical value recorded in this month is about 9.1 mg/l, while the minimum is about 4.8 mg/l. Half of the historical data recorded for this month at this site was between 7.1 and 7.9 mg/l, and the median value for dissolved oxygen was about 7.8 mg/l.



In addition to the graphs mentioned above, there are also a series of graphs showing the profile measurements of temperature, pH, dissolved oxygen and specific conductance for each of the Highland Lakes. These graphs lend insight into the changing environment through the water column.

Discussion

General

The effects of the hot, dry weather show in this month's data. Three sites were dry this month. Neither Onion Creek at US 183, Sandy Creek at SH 71 nor Bull Creek at RR 2222 had water in them.

Water Temperature

Of the 34 sites with water, 23 reported temperatures higher than normal (greater than the 75th percentile) and six of those were August record highs. One stream (Cedar Creek near Bastrop) exceeded the temperature criterion for state water quality standards.

Dissolved Oxygen

Dissolved oxygen was, again, quite variable this month. Two locations (Inks Lake at its headwaters and Pecan Bayou) were well below the state water quality standard. The reported values were in the 2 mg/l range. Four locations reported record high August values, six returned record low values, and 12 were outside of normal ranges. As waters slow and begin to pool, chlorophyll increases. The increased chlorophyll causes large swings in dissolved oxygen.

Secchi Depth

Overall, water transparencies were shallower at most locations this month, especially the Highland Lakes. Eight locations, including 4 reservoir sites, reported record shallow readings

E. coli

Twenty one of the 34 locations reported normal bacteria numbers this month. Twelve locations were outside their normal ranges (7 high and 5 low), and four sites set new monthly low records. All sites were well within the state water quality standard.

Nitrogen

With the exception of Colorado River below Austin and Gilleand Creek, all but two sites were below their expected ranges. In the Colorado downstream of Austin, sampling locations in Bastrop, Smithville, La Grange and Columbus were above their normal range. At Smithville, Bastrop and Webberville the state screening criterion was exceeded. Smithville set a new August record (2.12 mg/l)

Phosphorus

In general, phosphorus was low to normal at most locations. The one exception was the Pedernales at Johnson City, which returned a value of 0.76 mg/l. Thirty-two of the remaining 33 sites were normal or below normal for phosphorus content. Lake LBJ at its headwaters was above its normal range.

Chlorophyll

Eighteen locations showed elevated chlorophyll this month. Eight were above their expected ranges, eight set new August records and 2 violated stream water quality standards. Lake LBJ, Inks Lake and Lake Marble Falls were responsible for five of the 8 records set.

Chloride

Diminished flows increased chloride concentrations in the tributaries this month. Five record highs were set in the Llano and Pedernales Rivers. There were also 3 water quality standards exceedances – in the Pedernales River, Gilleland Creek and Cummins Creek.

Profiles

As expected, the deep reservoirs are still firmly stratified this month.

August 2011 Values									
Watershed	Location	Water Temperature °C	Dissolved Oxygen mg/L	Secchi Depth m	E. coli MPN/dL	NO ₂ +NO ₃ Nitrogen mg/L	Total Phosphorus mg/L	Chlorophyll a µg/L	Chloride mg/L
Colorado below Austin	Bay City	31.25	7.53	0.35	12	0.008	0.185	17.0	51
	Wharton	31.43	6.85	1.00	32	0.309	0.209	2.9	42
	Columbus	31.94	7.70	1.00	16	1.310	0.274	3.1	37
	LaGrange	31.85	7.69	0.33	27	1.930	0.312	3.8	37
	Smithville	32.00	7.41	0.50	63	2.120	0.303	2.2	36
	Bastrop	31.92	7.16	0.35	34	2.090	0.326	1.7	37
	Webberville	31.02	7.12	0.45	6	2.120	0.282	1.3	37
Lake Austin	Dam	28.85	7.88	2.25	1	0.008	0.008	2.7	29
	Headwaters	25.80	6.43	2.40	1	0.008	0.008	1.6	29
Lake Travis	Dam	29.59	7.55	2.58	1	0.008	0.010	4.7	30
	Pace Bend Headwaters	31.50	7.11	1.09	1	0.008	0.025	20.9	41
Lake Marble Falls	Dam	32.62	6.89	0.30	5	0.020	0.032	22.0	50
	Headwaters	30.97	8.94	0.95	10	0.008	0.017	36.8	49
Lake LBJ	Dam	28.63	5.81	0.50	7	0.008	0.023	24.8	49
	Kingsland Headwaters	29.95	7.85	0.63	2	0.008	0.018	32.9	50
Inks Lake	Dam	31.36	8.74	0.68	1	0.008	0.031	27.0	52
	Headwaters	27.41	4.42	0.97	10	0.008	0.046	16.8	53
Lake Buchanan	Dam	28.55	8.92	1.01	1	0.008	0.036	39.6	53
	Headwaters	24.90	2.35	1.73	11	0.027	0.031	10.2	53
Upstream Rivers	Dam	28.50	8.27	1.11	1	0.008	0.008	21.5	54
	Beaver Creek	31.37	7.88	0.60	1	0.008	0.029	23.9	57
	Headwaters	31.59	6.67	0.06	1	0.008	0.136	51.6	63
Llano River	Col at US 190	30.09	6.27	0.20	3	0.008	0.105	16.2	77
	Col at US 377	29.28	2.83	0.18	72	0.032	0.233	107.0	1600
	San Saba	30.39	5.81	0.10	125	0.093	0.059	7.0	26
	Pecan Bayou	28.46	2.17	0.30	47	0.008	0.170	22.0	65
Pedernales River	SH 71								
	The Slab Llano	33.09	9.57	0.60	1	0.008	0.048	12.7	78
Austin Area	Llano	31.35	7.99	0.40	20	0.011	0.008	2.8	46
	Hammetts	28.11	8.26	0.30	1	0.027	0.026	2.7	85
	Sandy Johnson City	31.19	2.90	0.30	5	0.008	0.052	6.7	136
Austin Area	Bull Creek	30.14	17.62	0.37	3	0.008	0.756	249.0	190
	Col at US 183								
	Gilleland Ck	28.10	8.29	0.30	326	13.700	0.315	0.4	269
	Cedar Creek	34.91	12.51	0.10	1	0.008	0.073	12.2	78
	Cummins Ck	30.10	6.30	0.12	59	0.012	0.008	1.4	206

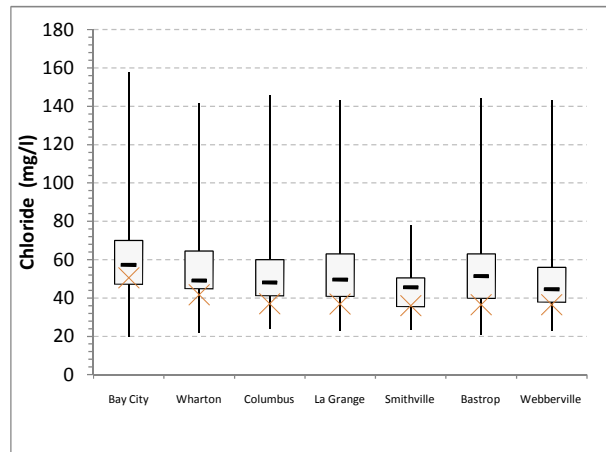
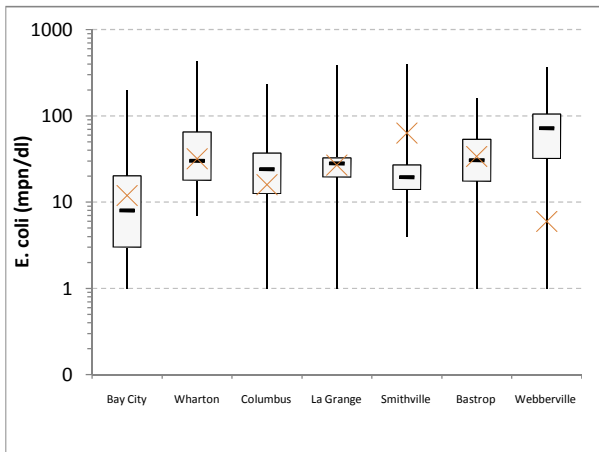
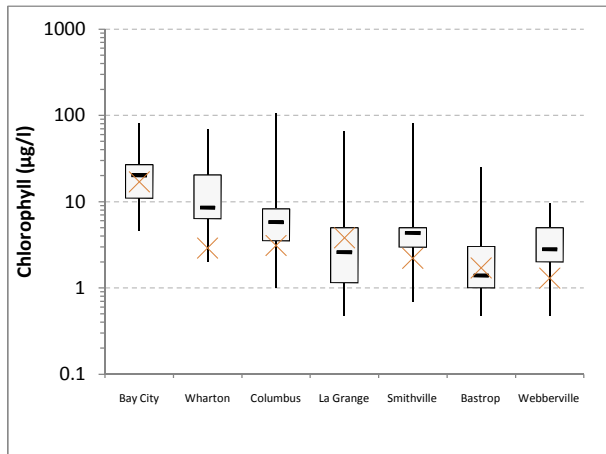
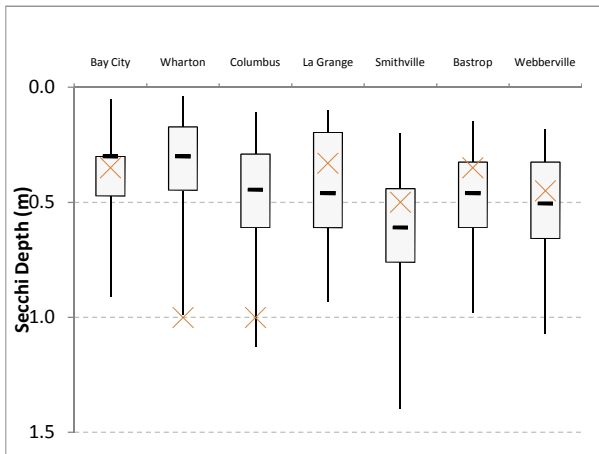
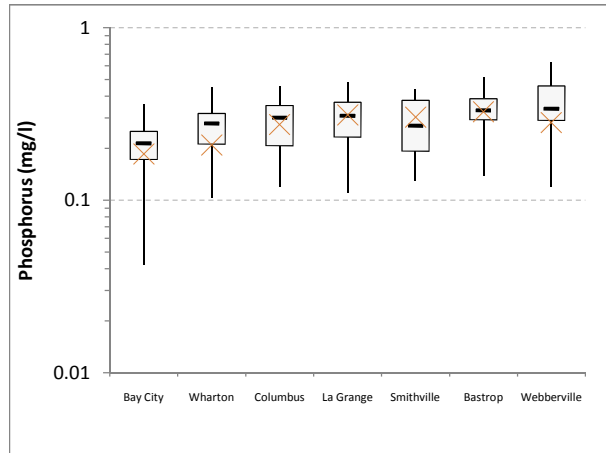
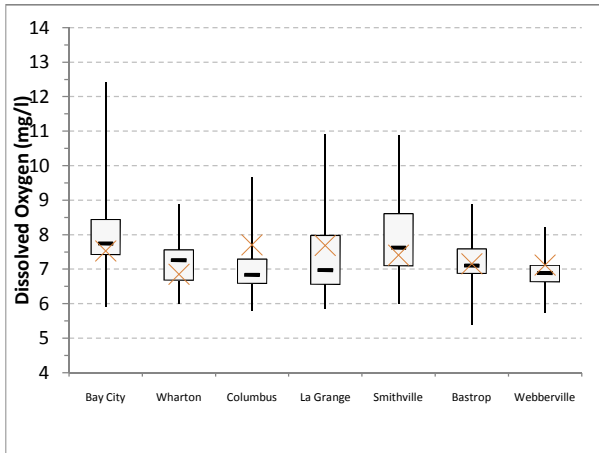
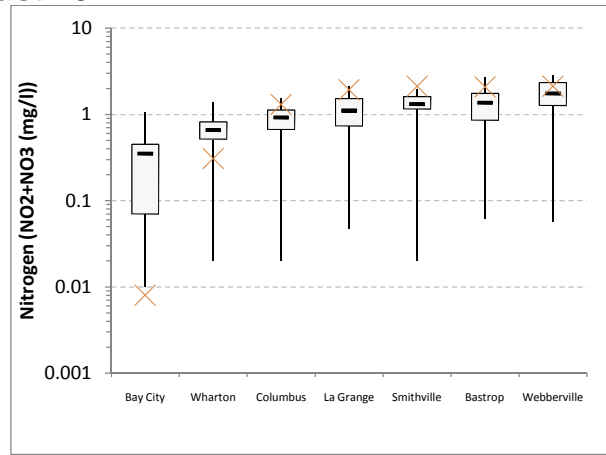
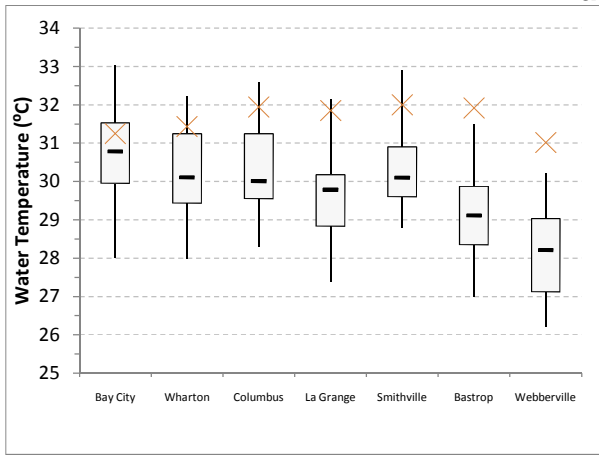
August 2011 Quick Summary									
Watershed	Location	Water Temperature °C	Dissolved Oxygen mg/L	Secchi Depth m	E. coli MPN/dL	NO ₂ +NO ₃ Nitrogen mg/L	Total Phosphorus mg/L	Chlorophyll a µg/L	Chloride mg/L
Colorado below Austin	Bay City	Normal	Normal	Normal	Normal	Record Low	Normal	Normal	Normal
	Wharton	High	Normal	Record High	Normal	Low	Low	Low	Low
	Columbus	High	High	High	Normal	High	Normal	Low	Low
	LaGrange	High	Normal	Normal	Normal	High	Normal	Normal	Low
	Smithville	High	Normal	Normal	High	Record High	Normal	Low	Normal
	Bastrop	Record High	Normal	Normal	Normal	Criterion	Normal	Normal	Low
Lake Austin	Webberville	Record High	High	Normal	Low	Normal	Low	Low	Low
	Dam	Record High	Normal	High	Normal	Record Low	Low	Normal	Low
Lake Travis	Headwaters	High	High	High	Normal	Record Low	Low	Normal	Low
	Dam	Normal	Normal	Low	Normal	Low	Normal	Normal	Low
Lake Marble Falls	Pace Bend	High	Low	Low	Normal	Low	Normal	High	Normal
	Headwaters	Record High	Normal	Normal	Normal	Normal	Normal	High	Normal
Lake LBJ	Dam	High	Record High	Low	High	Low	Normal	Record High	Normal
	Headwaters	Normal	Normal	Low	Low	Low	Normal	Record High	Normal
Inks Lake	Dam	High	High	Record Low	High	Low	Normal	Record High	Normal
	Headwaters	Normal	High	Low	Normal	Low	Normal	Record High	Normal
Lake Buchanan	Dam	Normal	High	Record Low	High	High	Low	Normal	Normal
	Beaver Creek	Record High	High	Record Low	Normal	High	Record Low	High	Normal
	Headwaters	High	Normal	Record Low	Normal	Low	High	Criterion	Normal
Upstream Rivers	Col at US 190	Normal	Normal	Normal	Low	Low	High	Criterion	High
	Col at US 377	Normal	Record Low	Low	High	High	High	Record High	Record High
	San Saba	High	Low	Low	Normal	Low	Normal	Normal	High
	Pecan Bayou	Normal	Record Low	Normal	Normal	Low	Normal	Normal	Normal
Llano River	Sandy Creek								
	The Slab	Criterion	Record High	Normal	Low	Low	Normal	Record High	Record High
Pedernales River	Llano	Normal	Normal	Low	Normal	Low	Record Low	High	Record High
	Hammetts	Low	High	Low	Low	Normal	Normal	Normal	Record High
	Sandy	High	Record Low	Normal	Normal	Record Low	Normal	High	Criterion
Austin Area	Johnson City	High	Record High	Normal	Normal	Record Low	Record High	Record High	Record High
	Bull Creek								
	Onion Creek								
	Gilleland Ck	High	High	Normal	High	Record High	Normal	Low	Criterion
	Cedar Creek	Record High	Record High	Low	Record Low	Record Low	Normal	High	High
Cummins Ck	Normal	Low	Record Low	High	Low	Record Low	Normal	Criterion	

Explanation:

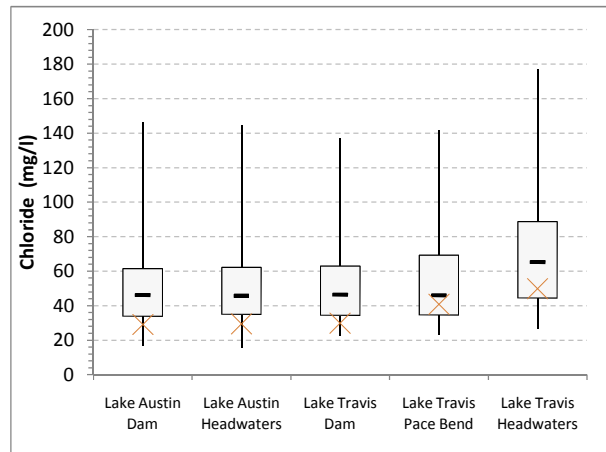
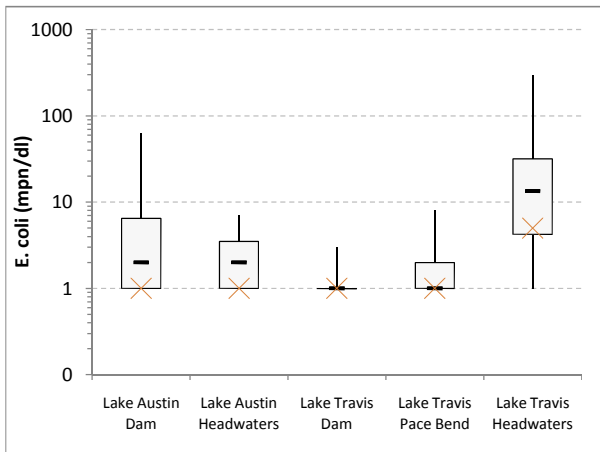
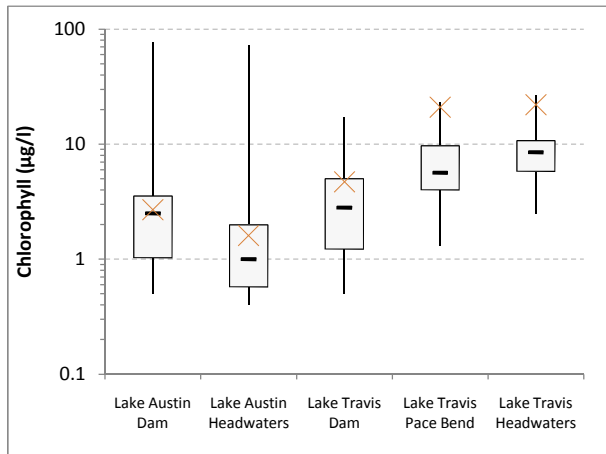
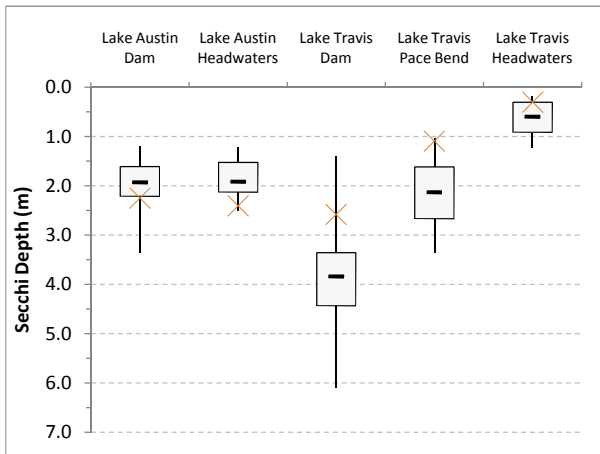
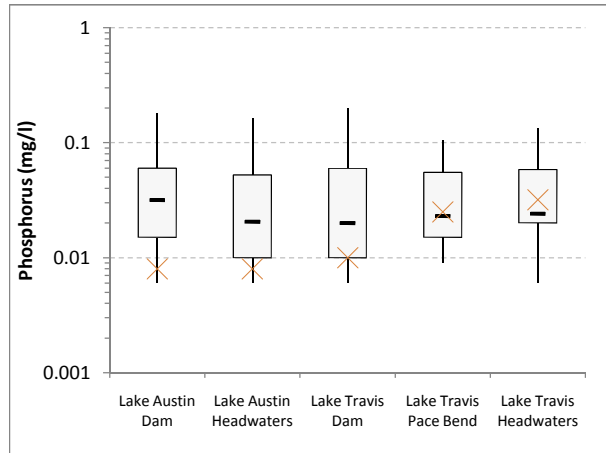
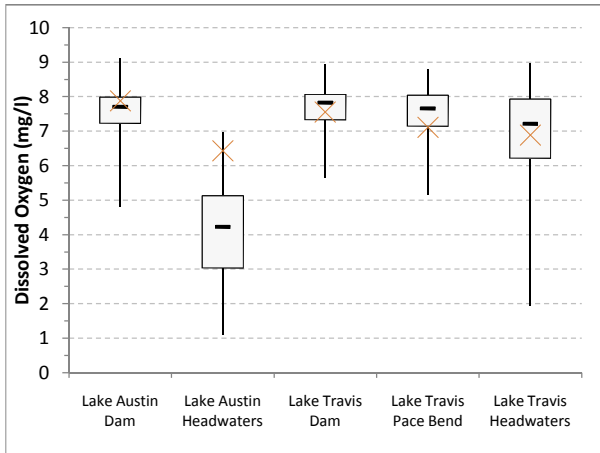
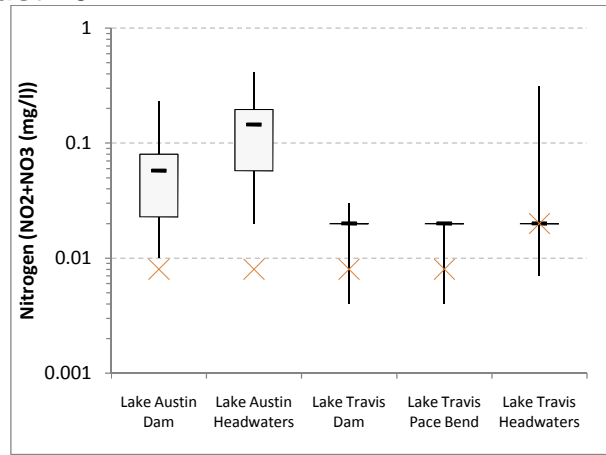
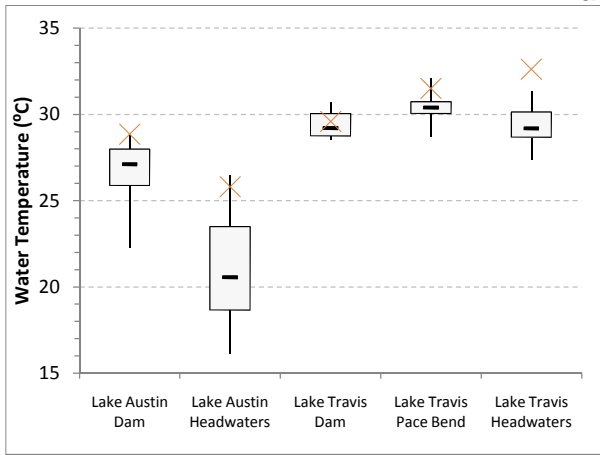
Low = this month's value was below the expected range for the month
Record Low = New low measurement for the month of February
Normal = this month's value was within the expected range for February
High = this month's value was above the expected range for the month
Record High = New high measurement for the month of February
Criterion = state water quality criterion or screening level was violated

	Criterion	Record		Outside of Normal		Within
	Exceeded	High	Low	High	Low	Range
Water Temperature:	1	6	0	15	1	11
Dissolved Oxygen:	1	4	3	9	3	14
Secchi Depth:	N/A	1	5	4	11	13
E. coli:	0	0	1	7	5	21
NO ₂ +NO ₃ Nitrogen:	1	2	6	4	18	3
Total Phosphorus:	0	1	3	4	5	21
Chlorophyll a:	2	8	0	8	5	11
Chloride:	3	5	0	3	8	15

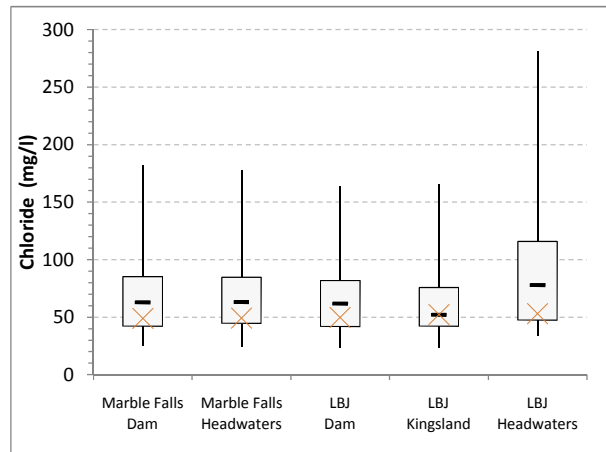
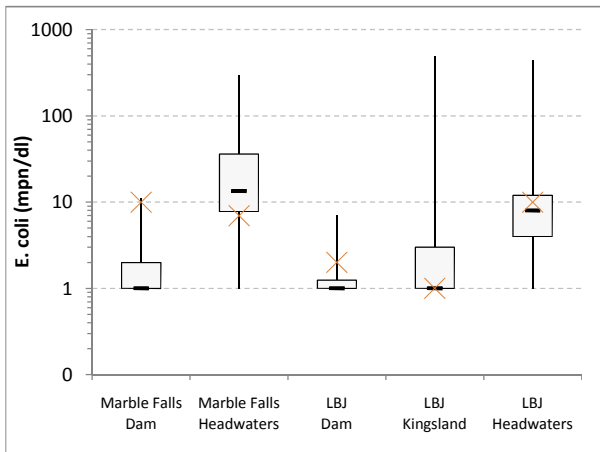
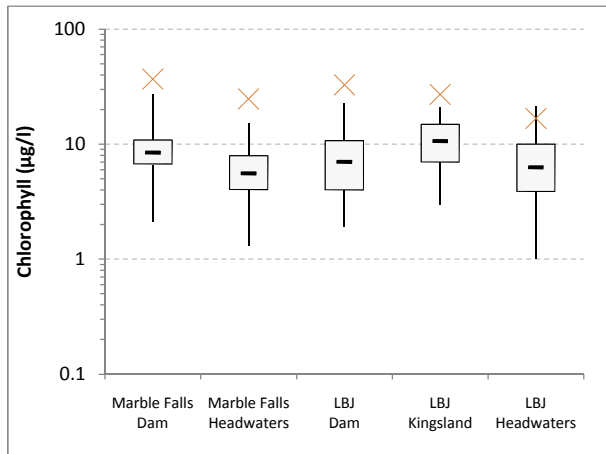
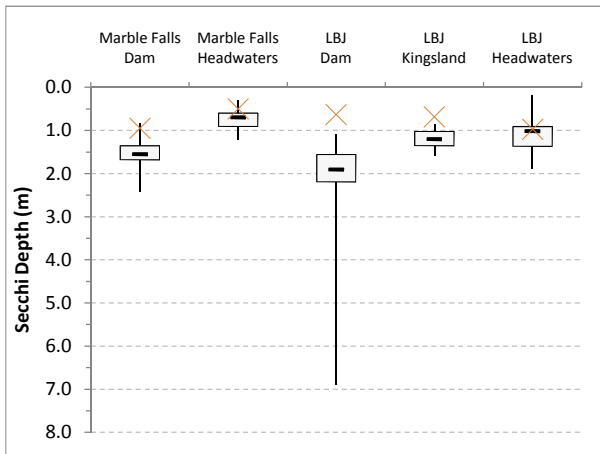
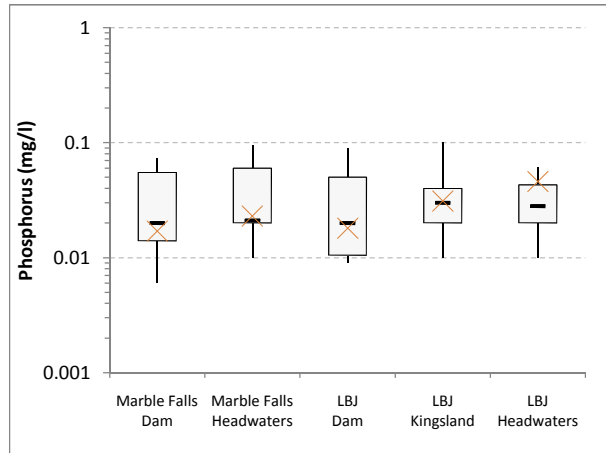
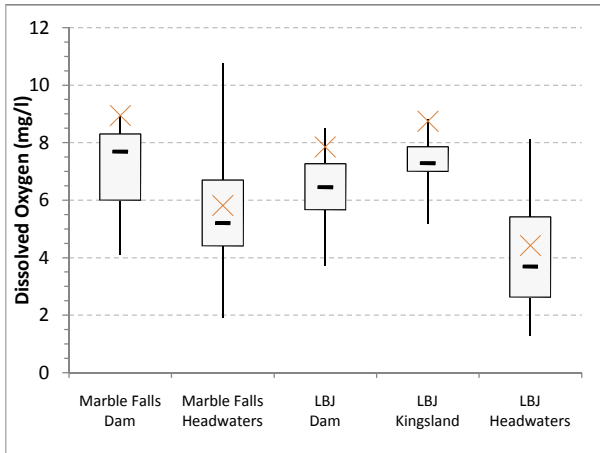
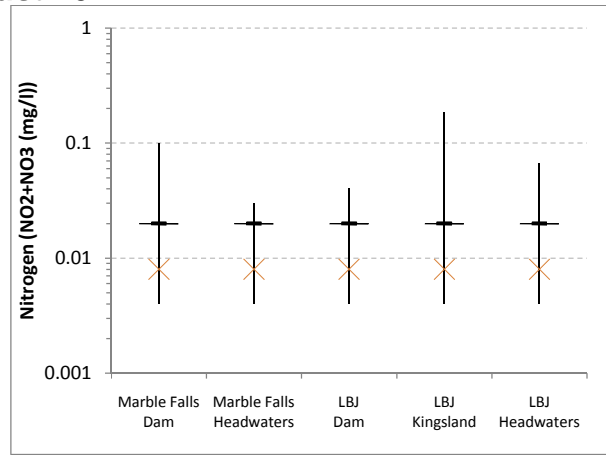
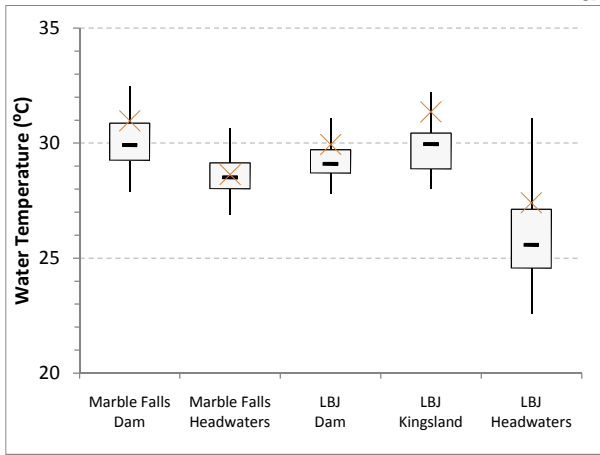
August 2011



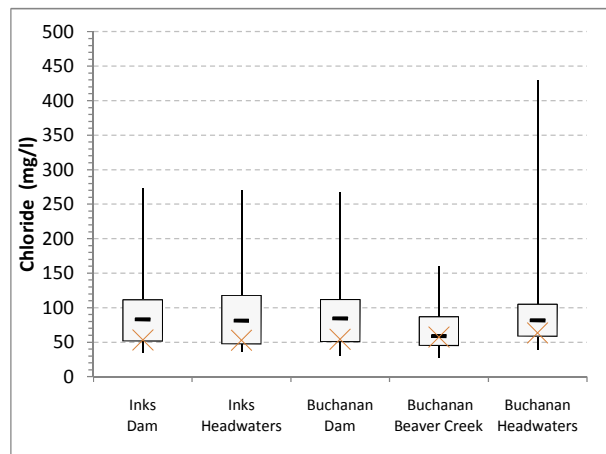
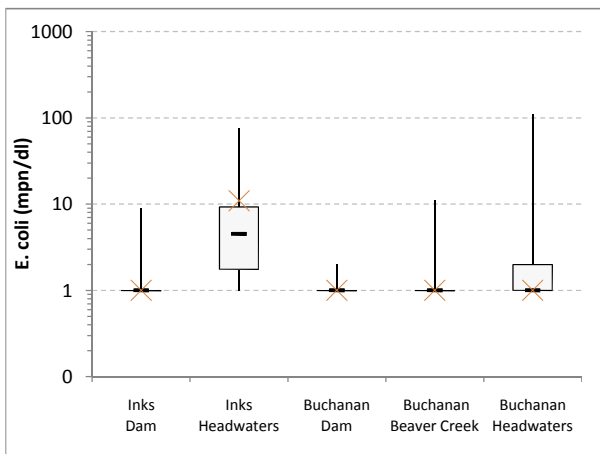
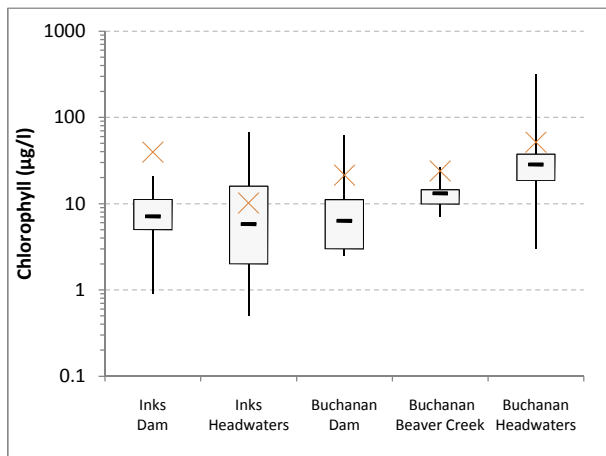
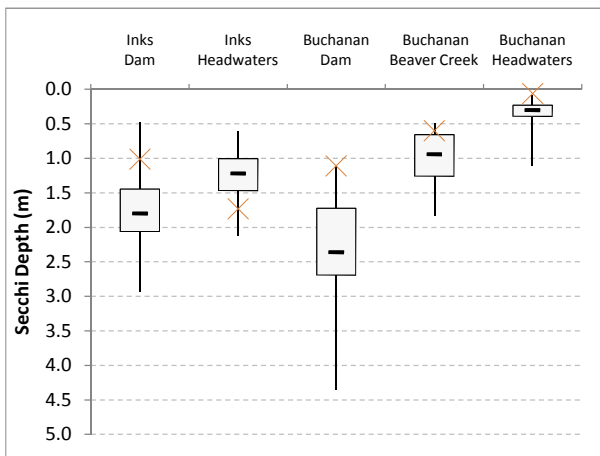
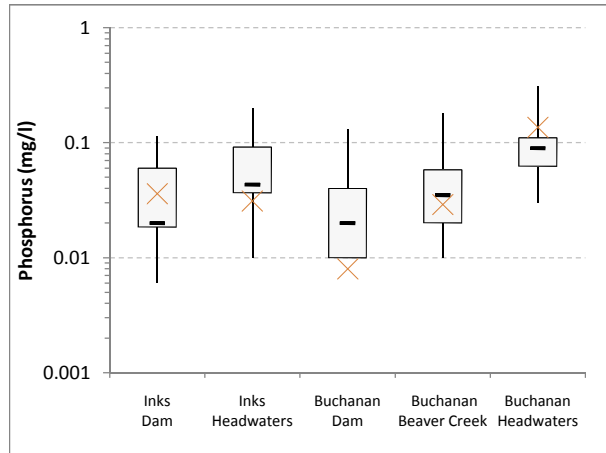
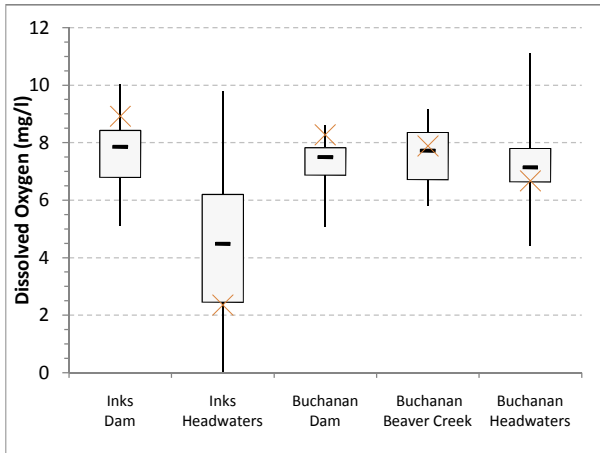
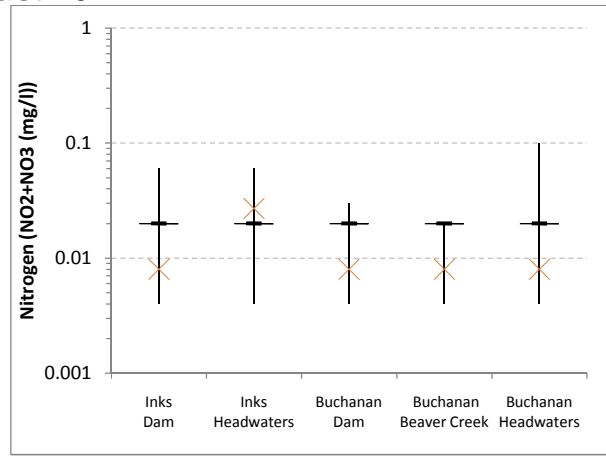
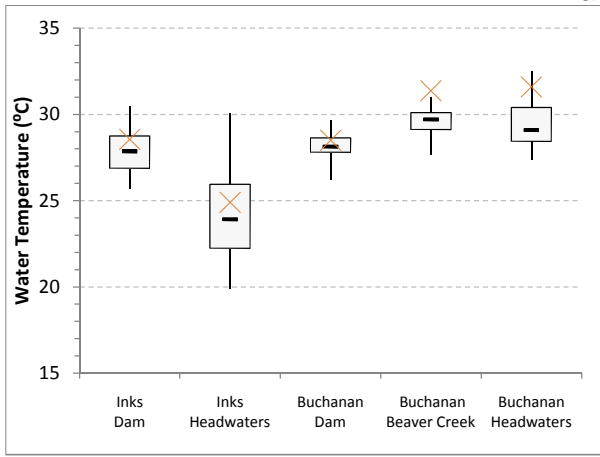
August 2011



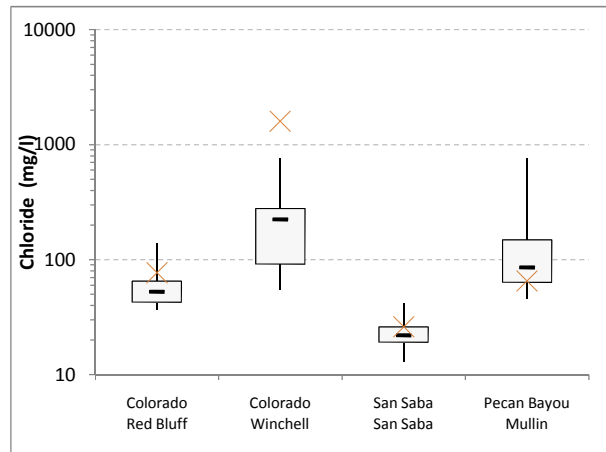
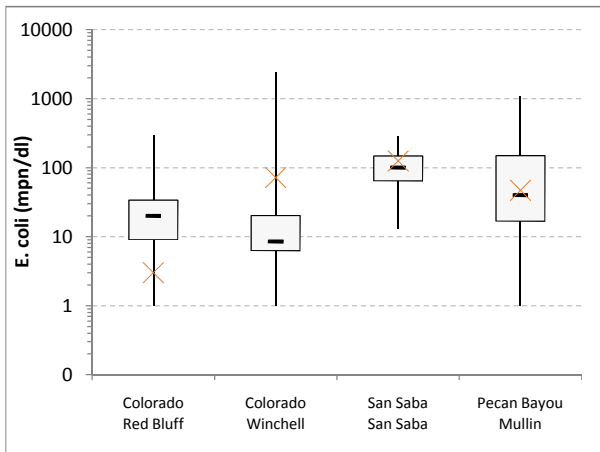
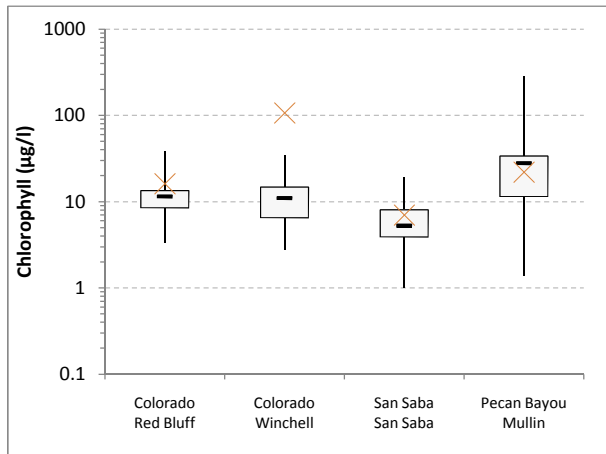
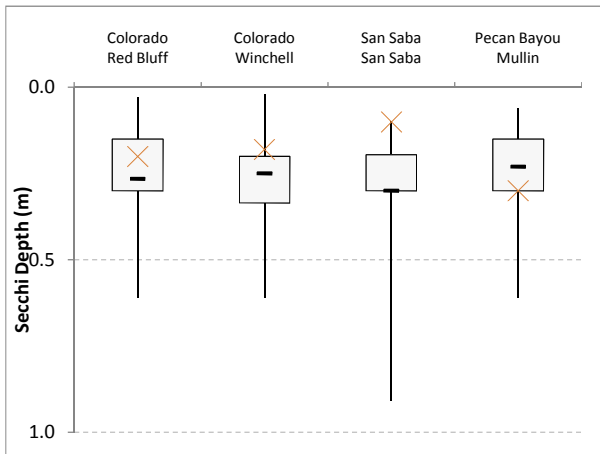
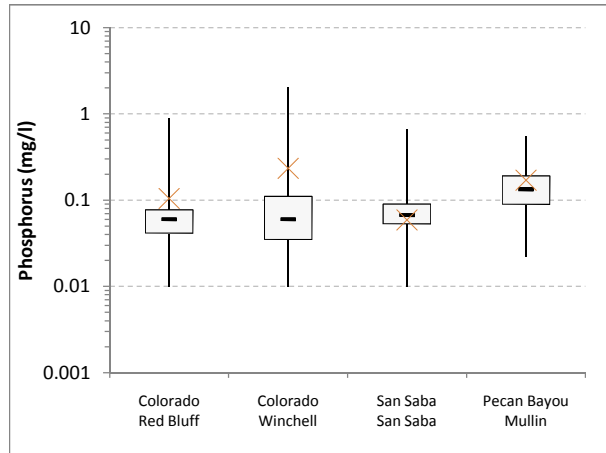
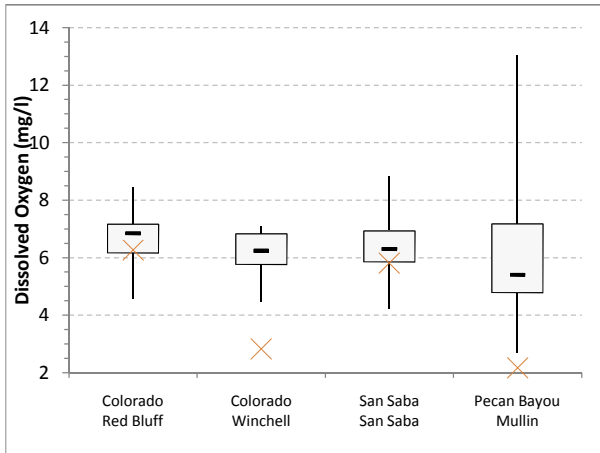
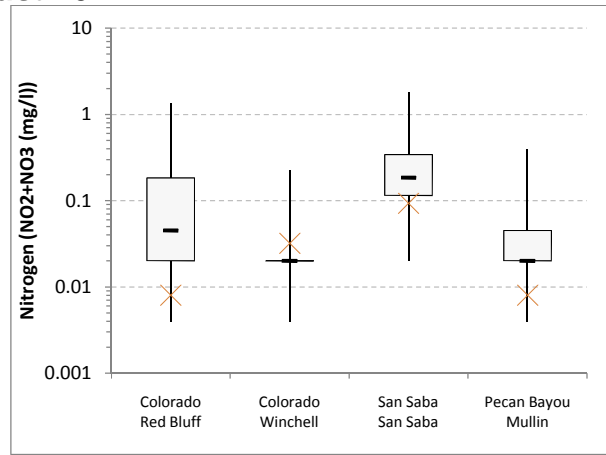
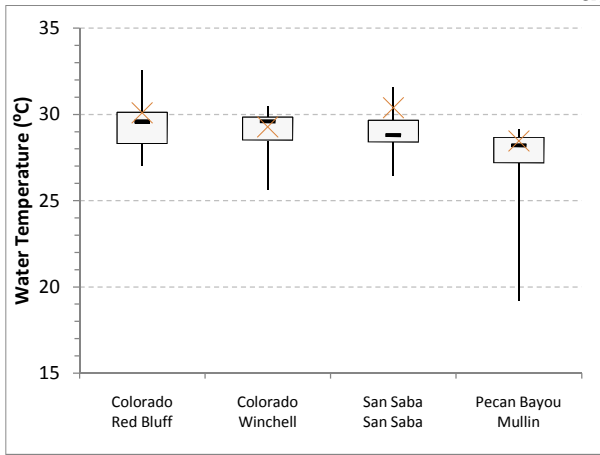
August 2011



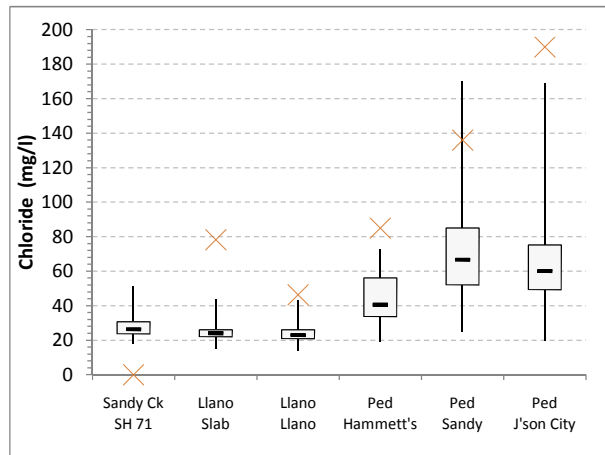
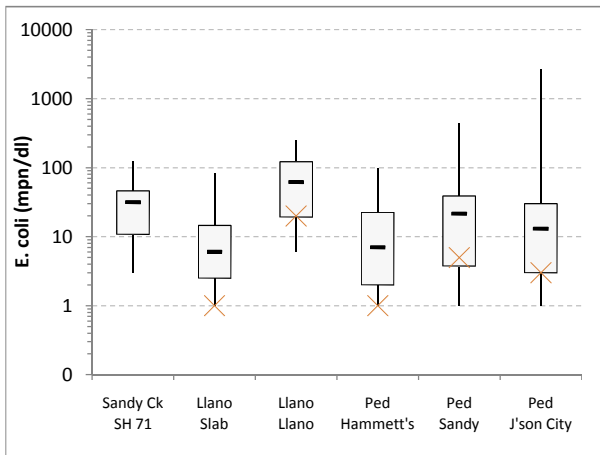
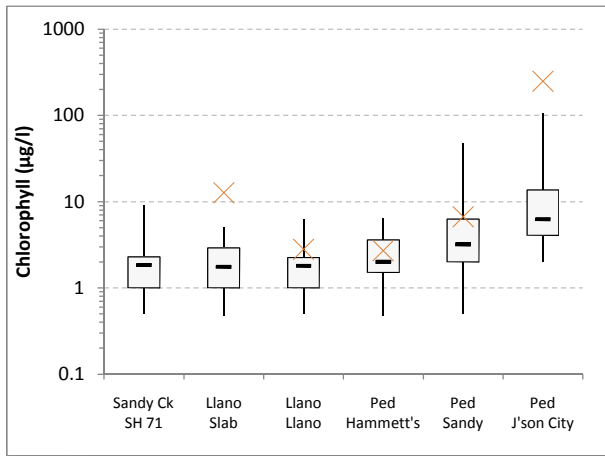
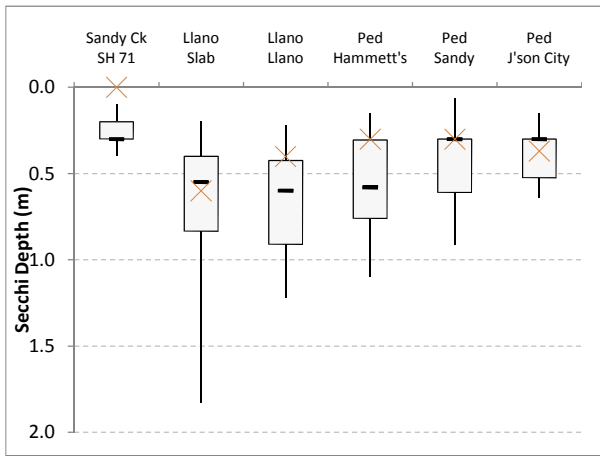
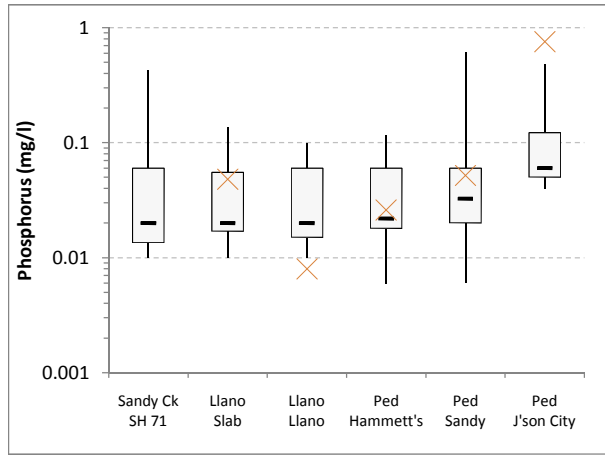
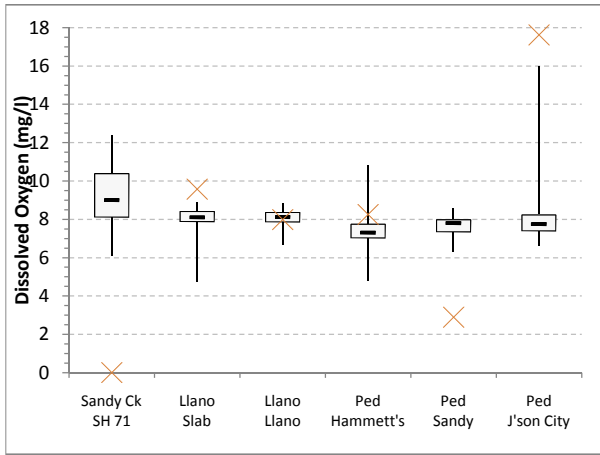
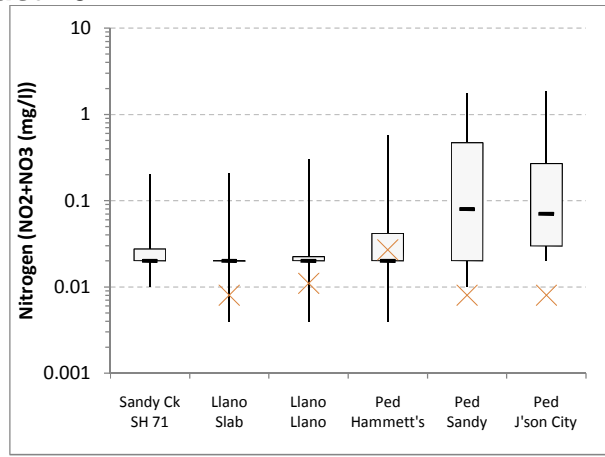
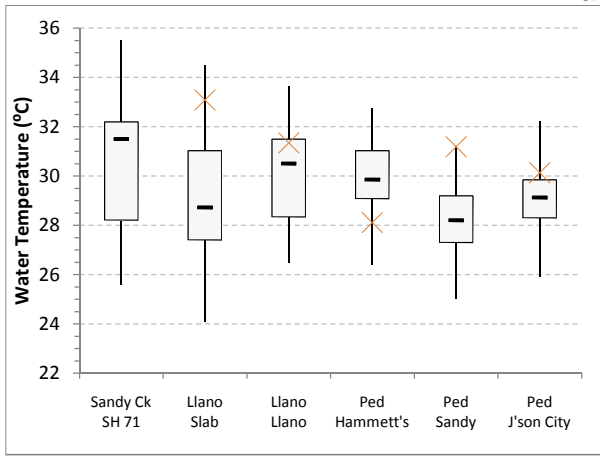
August 2011



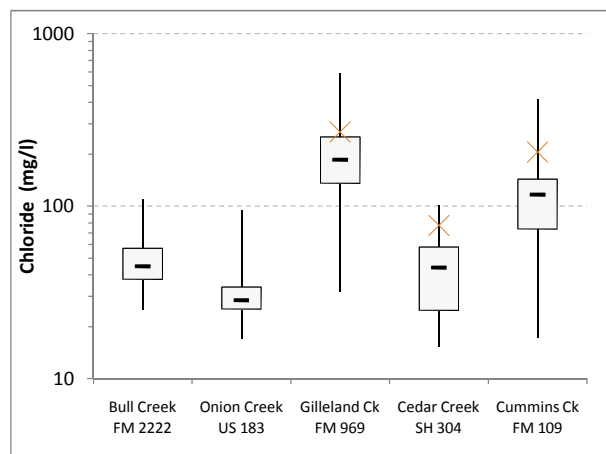
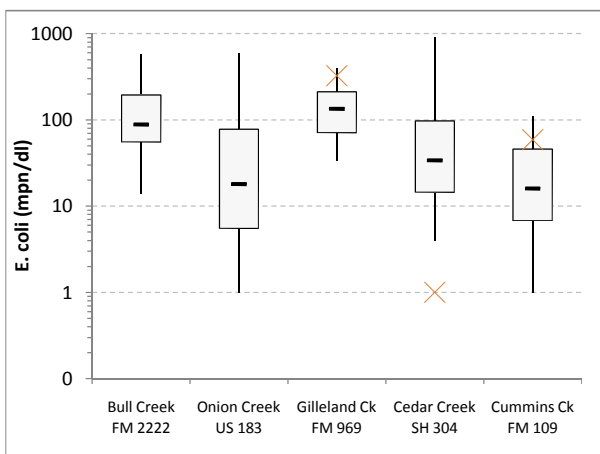
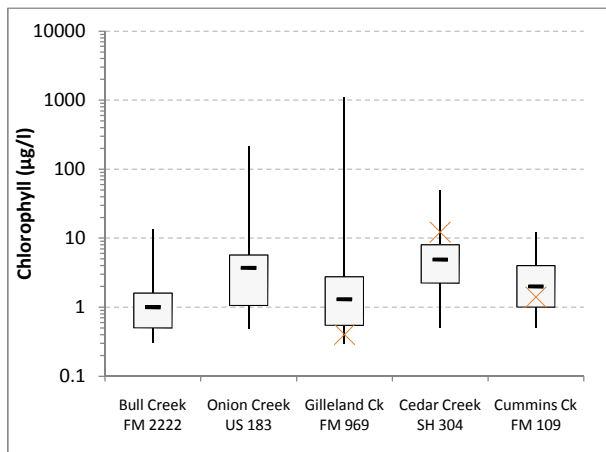
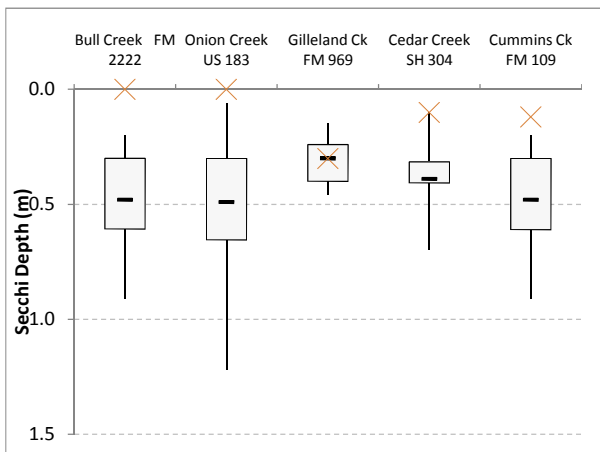
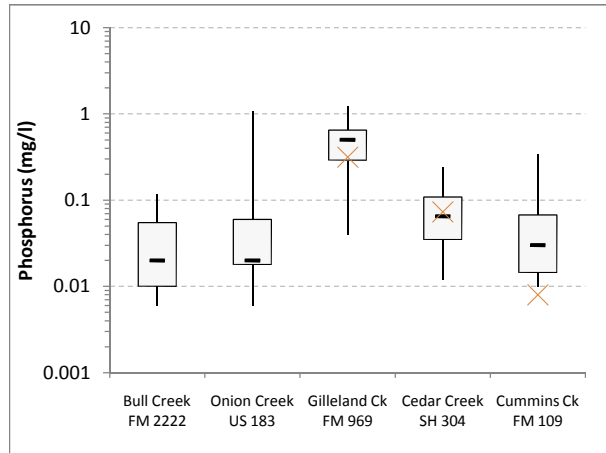
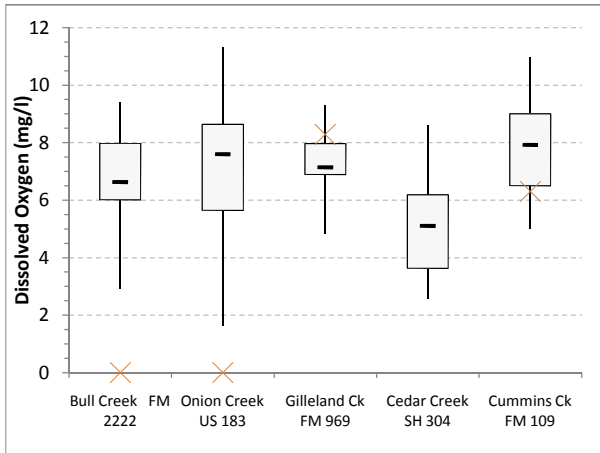
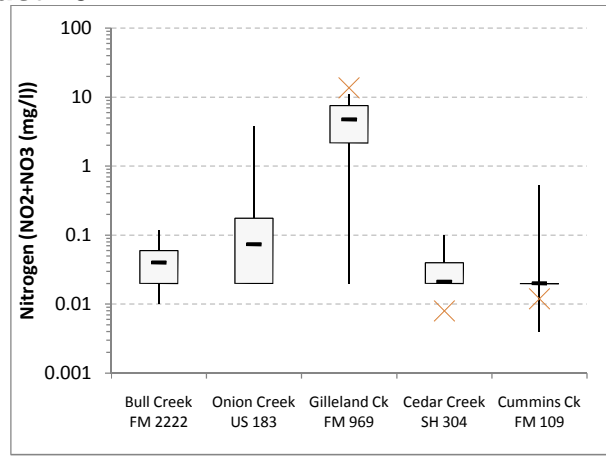
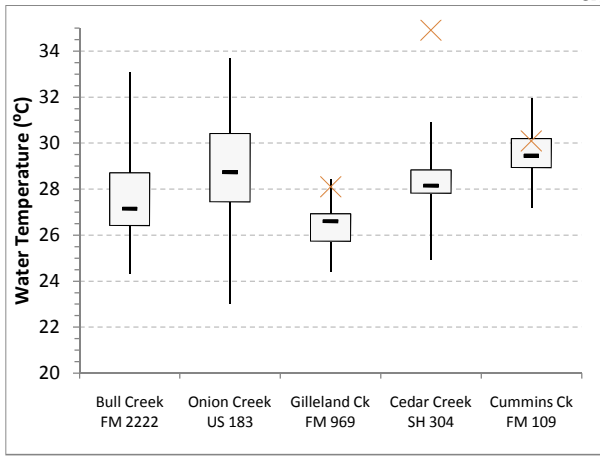
August 2011



August 2011



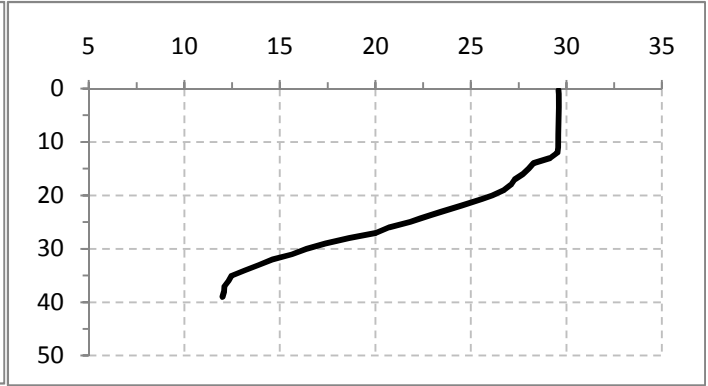
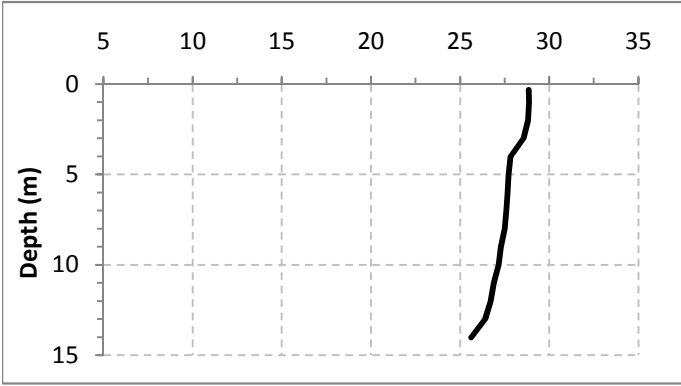
August 2011



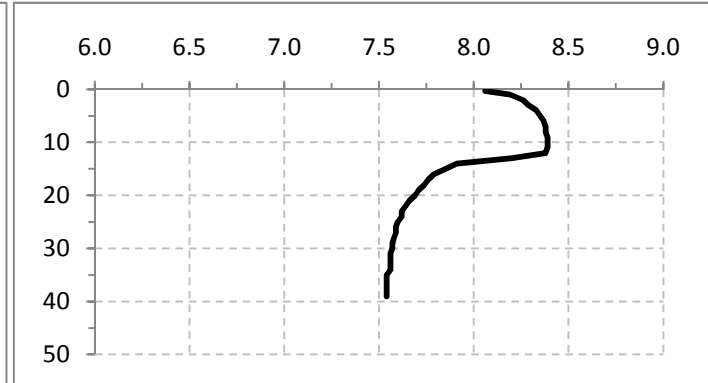
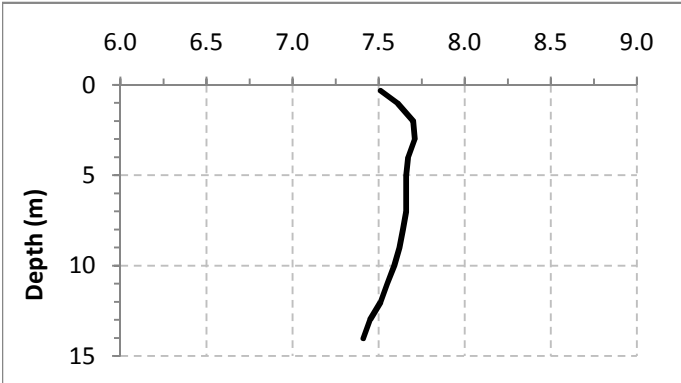
Lake Austin

Lake Travis

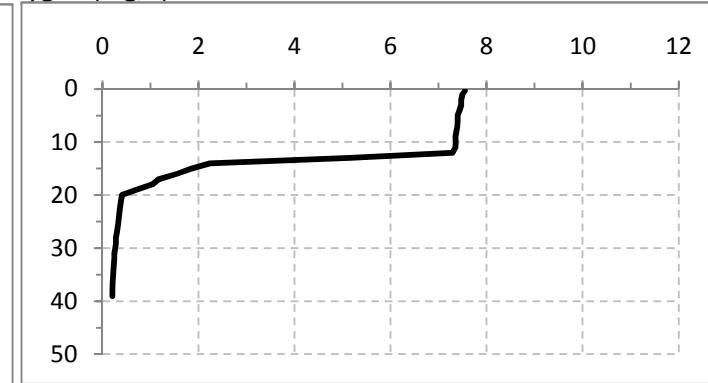
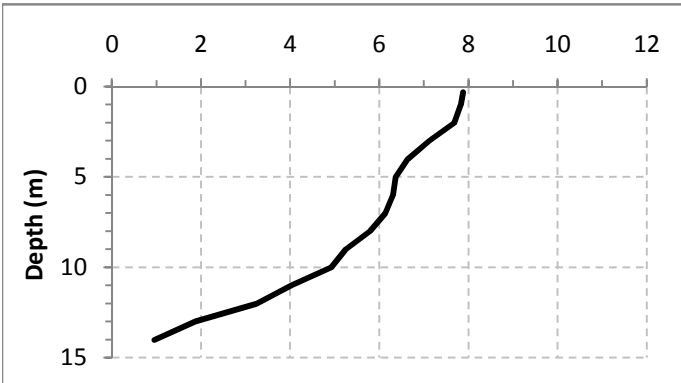
Water Temperature (°C)



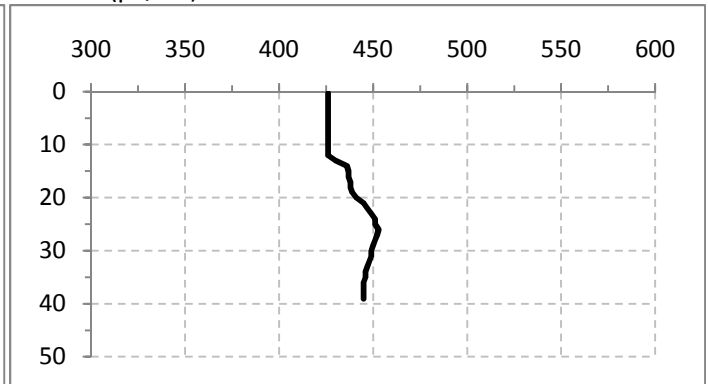
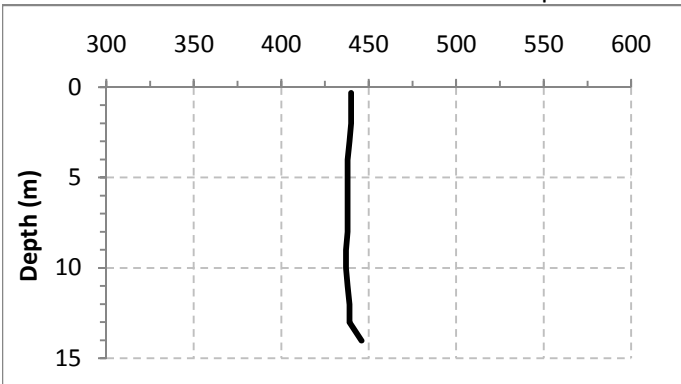
pH (Std Units)



Dissolved Oxygen (mg/L)



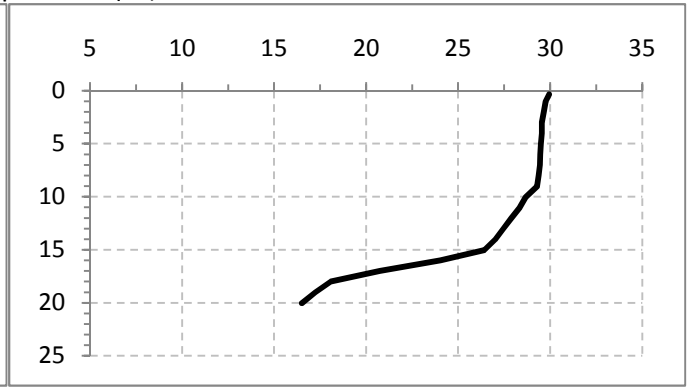
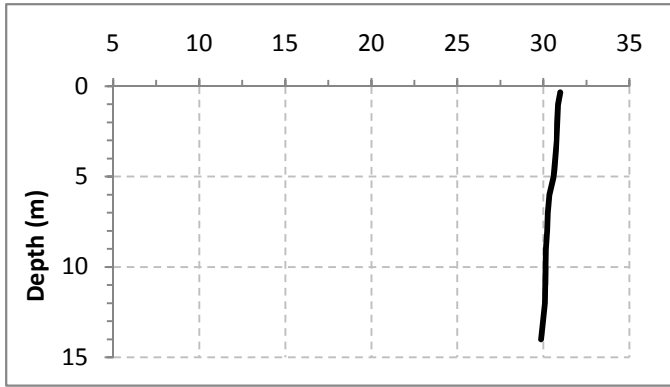
Specific Conductance (µS/cm)



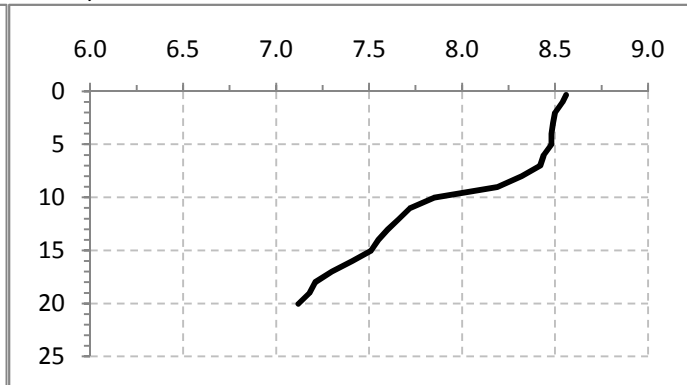
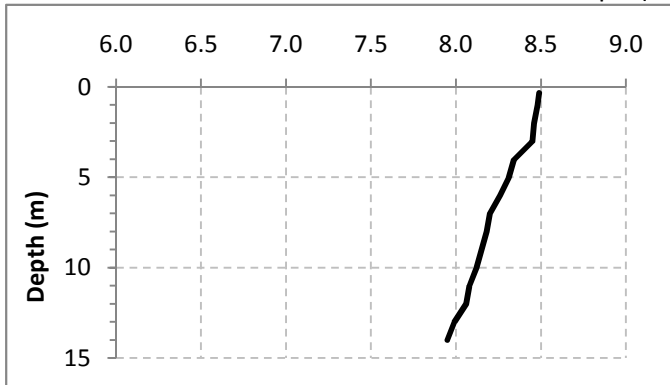
Lake Marble Falls

Lake LBJ

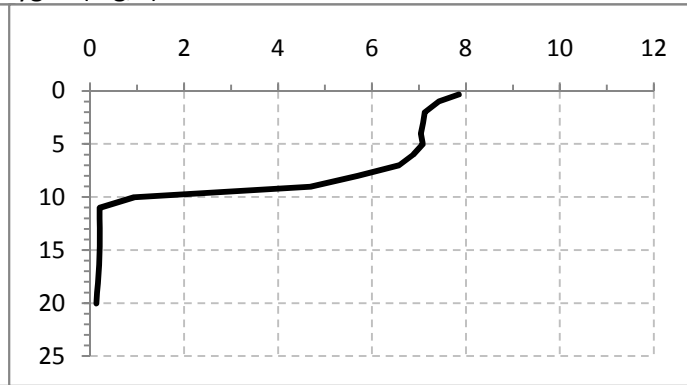
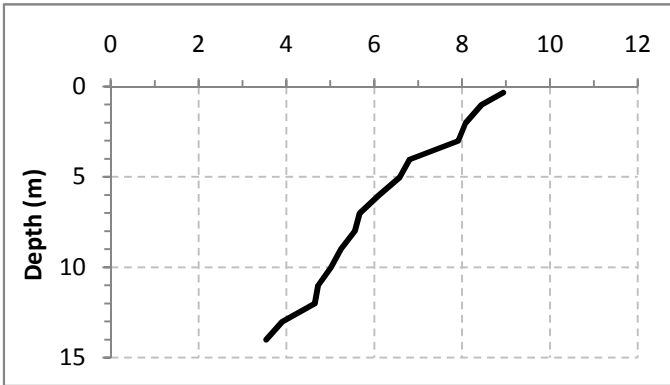
Water Temperature (°C)



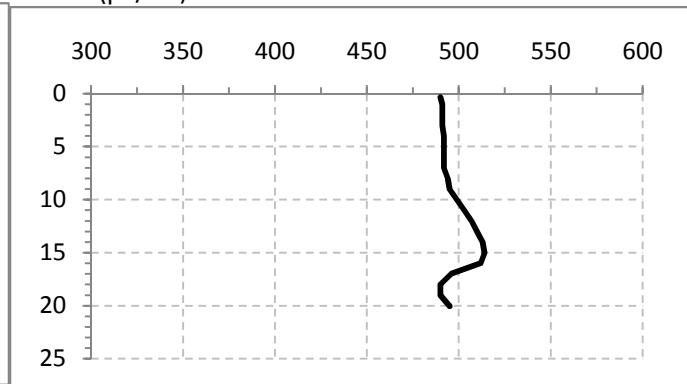
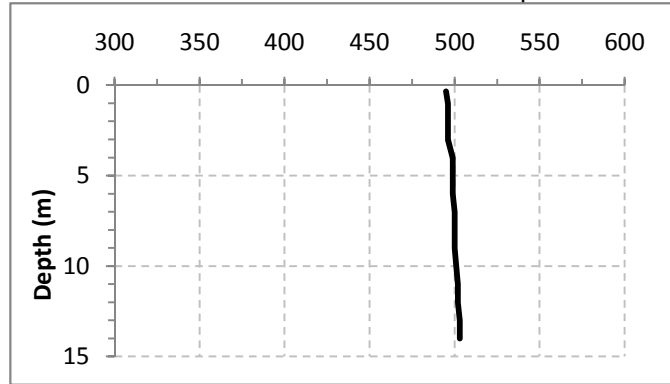
pH (Std Units)



Dissolved Oxygen (mg/L)



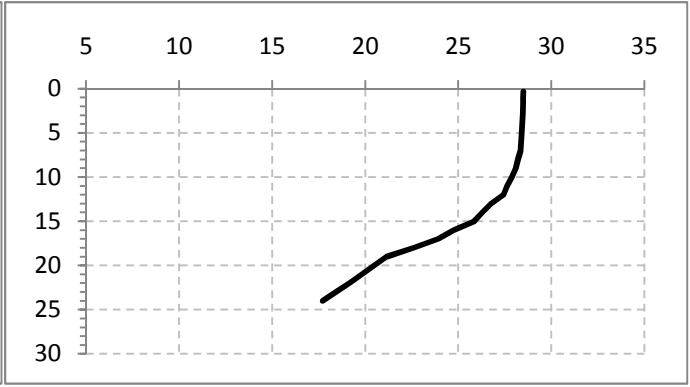
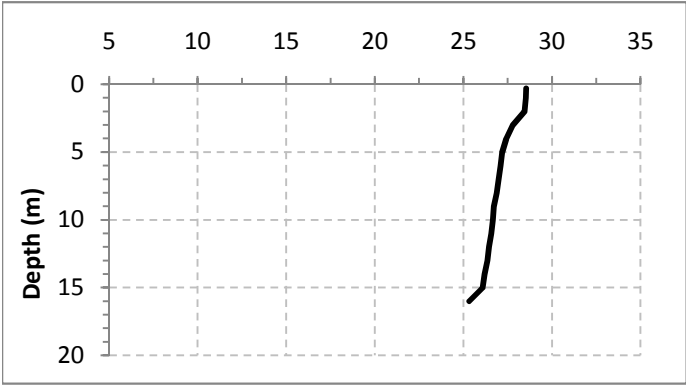
Specific Conductance (µS/cm)



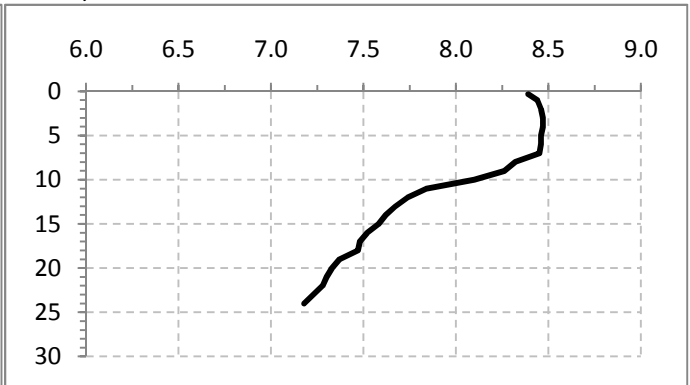
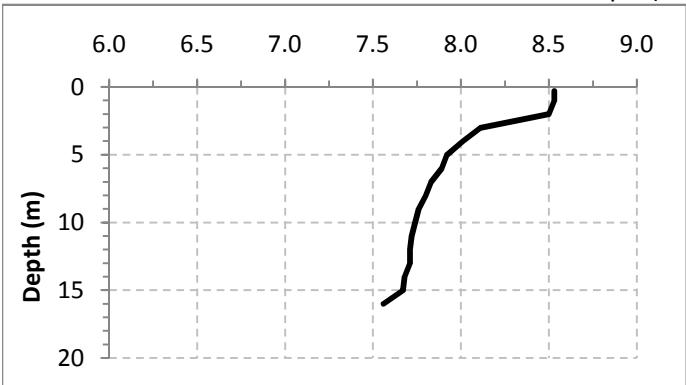
Inks Lake

Lake Buchanan

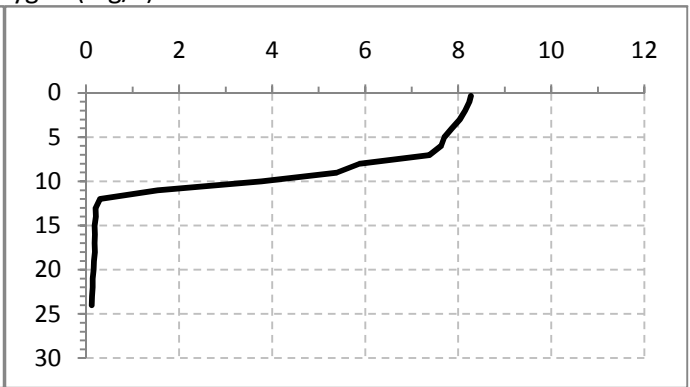
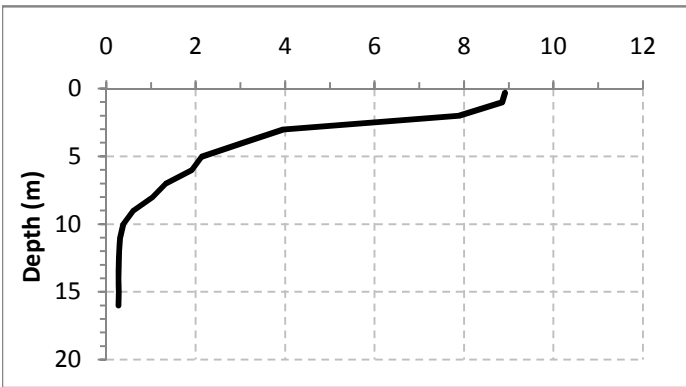
Water Temperature (°C)



pH (Std Units)



Dissolved Oxygen (mg/L)



Specific Conductance (µS/cm)

