



8/1/2022

Lake Conroe Clean Rivers Program Second Quarter 2022



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Clean Rivers Sampling Program

The San Jacinto River Authority participates in and contributes to the Clean Rivers Program (CRP) by sampling Lake Conroe and its tributaries at various sites on a monthly basis (Fig 1). The collected water quality samples are transported and delivered to the City of Houston Water Quality Laboratory for analysis. The Clean Rivers Program is managed regionally by the Houston Galveston Area Council (H-GAC). The H-GAC disseminates the laboratory results through its website www.h-gac.com. Annually the “Basin Highlights/ Summary Report” is created to give an update on the health of the local waterways. The health of the waterway is rated by a frog chart and the more frogs that are given the healthier the water (Fig 2). You can find the “Basin Highlights/ Summary Report here: <https://www.h-gac.com/clean-rivers-program/basin-highlights-summary-reports.aspx>

There are 10 water quality monitoring stations in the Lake Conroe watershed (Fig. 1). The CRP sites are all located in the main body of the lake or at the mouth of major tributaries and were chosen to capture water quality from all tributaries to represent the mixing of all inflow. At each site there are “grab samples” and instantaneous monitoring done. The grab samples are collected in bottles to be sent to the lab for analysis. The instantaneous monitoring is done with a water quality sonde that gives very useful real time data from different depths in the water column. The data gathered from each sampling event is compared to the TCEQ water quality standards and screening levels (Table 1). The standards and screening levels are set for each water body by TCEQ based on the “use”. Lake Conroe’s uses are drinking water, fish consumption and recreation.

2022 Second Quarter Review

Second quarter sampling went smoothly and all sites were sampled for successfully. We were still using HGACs hydrolab for the month of April, but we did receive SJRAs MS5 hydrolab back from the shop and it works great.

All data was below TCEQ standards and screening levels for the second quarter of 2022. The water is warming up now and in June the stratification of the water column is starting to become apparent. Chlorophyll and TKN were collected in April.

Clean Rivers Sampling

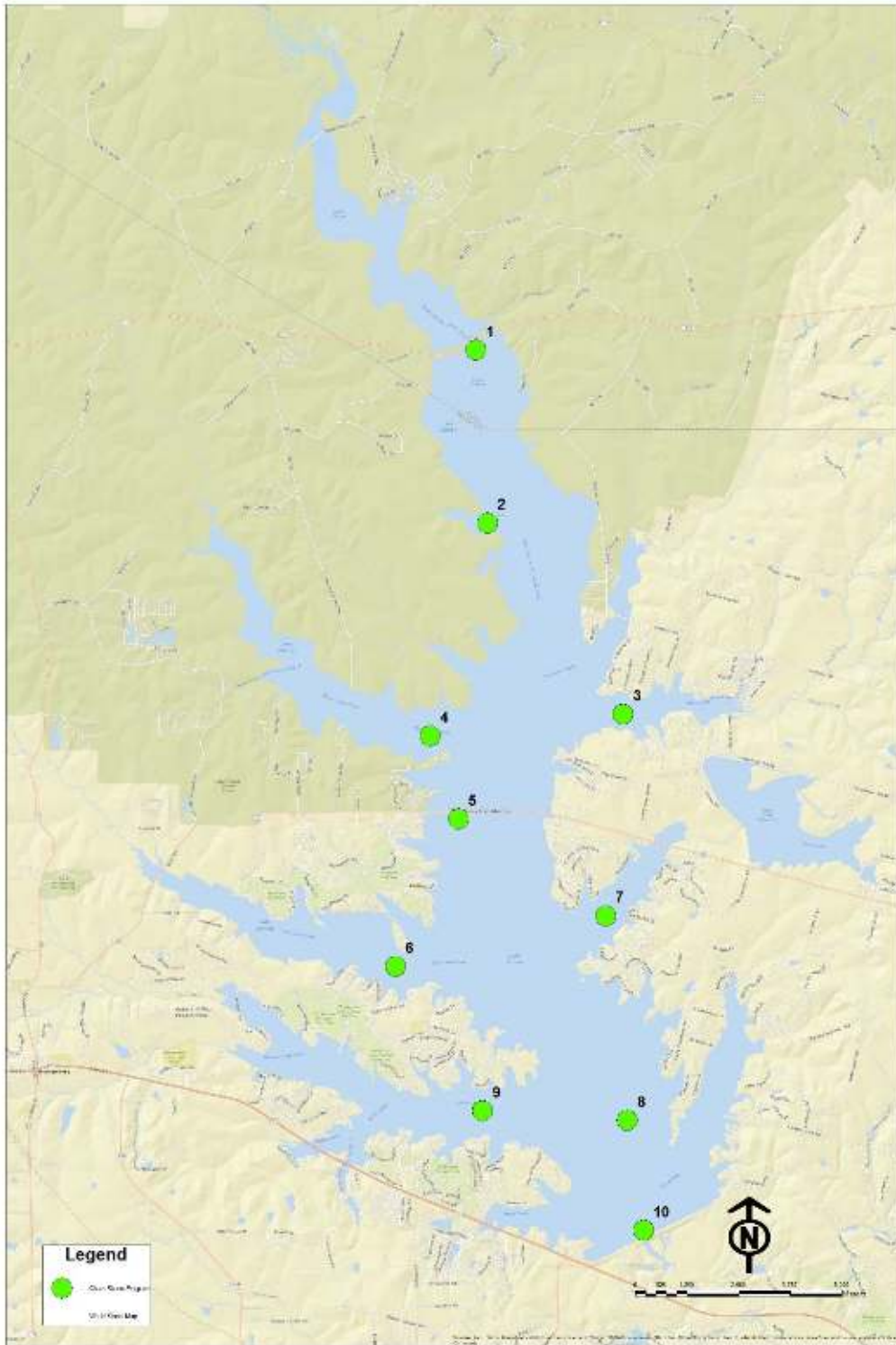


Fig 1: CRP Lake Conroe sampling locations

Table 1. Water Quality Standards and Screening Levels

Parameter	Criterion Type	Standard or Screening Level
Total Phosphorus	2014 TCEQ Screening Level	0.20 mg/L
Total Dissolved Solids	2014 Water Quality Standard	300 mg/L
Temperature	2014 Water Quality Standard	32.22C
Sulfate	2014 Water Quality Standard	50 mg/L
Orthophosphate-P	2014 TCEQ Screening Level	0.05 mg/L
Nitrate-N	2014 TCEQ Screening Level	0.37 mg/L
Enterococci	Special Project	35 MPN/100 mL
E. Coli	2014 Water Quality Standard	126 MPN/100 mL
Dissolved Oxygen (single sample minimum)	2014 Water Quality Standard	3.0 mg/L
Dissolved Oxygen (minimum 24-hour mean)	2014 Water Quality Standard	5.0 mg/L
Chlorophyll a	2014 TCEQ Screening Level	26.7 Micrograms / L
Chloride	2014 Water Quality Standard	50 mg/L
Ammonia-N	2014 TCEQ Screening Level	0.11 mg/L

Table 1: TCEQ Screening Levels and Standards for the water quality parameters

2021 REGIONAL WATER QUALITY SUMMARY

The numbers represent the percent of total segment length that is impaired or of concern for each parameter. Cells without numbers (blanks) represent stream segments that are currently meeting state standards but may be improving or degrading for each parameter.

DO = Dissolved Oxygen Bact = Bacteria Chl-a = Chlorophyll a Nutr = Nutrients PCB = PBC/Dioxins OTHER = See Below

Basin	Watershed	Segment	DO	Bact	Chl-a	Nutr	PCB	Other*	Frogs
Trinity-San Jacinto Coastal	Cedar Bayou Tidal	0901	14.2	100			85.8		
	Cedar Bayou Above Tidal	0902	82.7	82.7				**	
San Jacinto River	Buffalo Bayou Above Tidal	1014	12.0	77.9		64.7			
	Buffalo Bayou Tidal	1013	34.2	77.8		43.6		**	
	Caney Creek	1010	16.8	69.2					
	Cypress Creek	1009	18.8	80.3		80.3		10.3	
	East Fork San Jacinto River	1003		85.7					
	Greens Bayou Above Tidal	1016	6.4	95.8		85.3			
	Houston Ship Channel	1006		44.7	7.1	68.4	39.8	22.2	
	Houston Ship Channel Buffalo Bayou Tidal	1007	13.0	70.2		68.9	28.7	0.9	
	Houston Ship Channel/ San Jacinto River Tidal	1005					100		
	Lake Conroe	1012			55.7**	55.7**			
	Lake Creek	1015	40.1	12.1				30.7	
	Lake Houston	1002	20.9	7.0		20.9		0.1	
	Peach Creek	1011		100				15.4	
	San Jacinto River Tidal	1001					36.5		
	Spring Creek	1008	0.3	80.5	0.6	23.8		11.4	
West Fork San Jacinto River	1004		53.6			**	16.6		
White Oak Bayou Above Tidal	1017	11.7	87.0		79.6				

Fig. 2: HGAC Basin Highlights/ Summary Report “Frog Chart”

The following tables 2-4 show the water quality data for July - August , 2020. Any data that exceeds the TCEQ screening levels or set standards, is indicated by a red font. Any data with a “<” indicates that the measurement for this parameter was below detection levels. New to this report is a row with the TCEQ standards and screenings levels to aid in reviewing the data.

Lake Conroe - April 2022

Lab													Field			
TCEQ standards/ screening levels		N/A	>50	>126	0.11	>.37	N/A	>50	>.20	N/A	>26.7	N/A	<3.0	N/A	>32.22	N/A
Date	Site	Alk mg/L	Chlor- ide mg/L	E Coli MPN/ 100mL	NH3_N mg/L	NO2_N mg/L	NO3_N Mg/L	Sulfate mg/L	T- PO4_P mg/L	TSS Mg/L	Chlor- ophyll	TKN	DO	Spec/ Cond	Temp *C	pH
4/6/2022	1	51	21	13.5	< 0.1	< 0.04	< 0.04	8	0.09	21	21.9	0.5	7.64	186.7	22.86	7.98
4/6/2022	2	57	22	<1	< 0.1	< 0.04	< 0.04	8	0.06	11	NA	NA	8.51	202	22.21	8.21
4/6/2022	3	61	23	2.0	< 0.1	< 0.04	< 0.04	8	0.03	7	NA	NA	10.04	215	22.53	8.83
4/6/2022	4	63	23	<1	< 0.1	< 0.04	< 0.04	8	0.04	6	NA	NA	9.14	214	20.84	8.37
4/6/2022	5	62	23	7.2	< 0.1	< 0.04	< 0.04	8	0.04	5	14.9	0.5	8.61	214	20.4	8.12
4/6/2022	6	63	23	<1	< 0.1	< 0.04	< 0.04	8	0.03	6	NA	NA	9.19	216	21.2	8.34
4/6/2022	7	63	23	8.6	< 0.1	< 0.04	< 0.04	8	0.04	6	NA	NA	9.8	217	28.77	8.22
4/6/2022	8	62	23	<1	< 0.1	< 0.04	< 0.04	8	0.02	5	14.4	0.6	9.71	216	20.85	8.81
4/6/2022	9	64	23	7.4	< 0.1	< 0.04	< 0.04	8	0.05	6	NA	NA	9.01	219	20.6	8.18
4/6/2022	10	62	23	1.0	< 0.1	< 0.04	< 0.04	8	0.05	5	11.5	0.6	8.71	215	18.83	7.9

Table 2: CRP Lake Conroe April 2022 data for all 10 sites

Lake Conroe – May 2022																
Lab													Field			
TCEQ standards/ screening levels		N/A	>50	>126	0.11	>.37	N/A	>50	>.20	N/A	>26.7	N/A	<3.0	N/A	>32.22	N/A
Date	Site	Alk mg/L	Chlor- ide mg/L	E Coli MPN/ 100mL	NH3_N mg/L	NO2_N mg/L	NO3_N mg/L	Sulfate mg/L	T- PO4_P mg/L	TSS Mg/L	Chlor- ophyll	TKN	DO	Spec/ Cond	Temp *C	pH
5/4/2022	1	55	25	6.3	< 0.1	< 0.04	< 0.04	9	0.16	15	NA	NA	7.67	216.4	26.8	8.22
5/4/2022	2	63	24	<1	< 0.1	< 0.04	< 0.04	9	0.08	6	NA	NA	9.09	228.3	26.37	8.88
5/4/2022	3	64	23	<1	< 0.1	< 0.04	< 0.04	8	0.06	10	NA	NA	8.33	225.6	25.95	8.55
5/4/2022	4	64	24	2.0	< 0.1	< 0.04	< 0.04	8	0.05	6	NA	NA	8.23	222.8	25.77	8.51
5/4/2022	5	65	23	2.0	< 0.1	< 0.04	< 0.04	8	0.04	5	NA	NA	7.81	219.8	24.79	8.26
5/4/2022	6	65	24	2.0	< 0.1	< 0.04	< 0.04	8	0.06	6	NA	NA	8.77	223.6	25.58	8.6
5/4/2022	7	66	24	9.6	< 0.1	< 0.04	< 0.04	8	0.05	5	NA	NA	8.67	219.9	24.96	8.67
5/4/2022	8	66	23	6.3	< 0.1	< 0.04	< 0.04	8	0.05	4	NA	NA	8.08	217.4	23.5	8.44
5/4/2022	9	67	24	5.2	< 0.1	< 0.04	< 0.04	8	0.03	6	NA	NA	8.99	224.1	24.97	8.56
5/4/2022	10	69	23	10.9	< 0.1	< 0.04	< 0.04	8	0.05	5	NA	NA	7.99	214.7	23.29	7.94

Table 3: CRP Lake Conroe May 2022 data for all 10 sites

Lake Conroe – June 2022

Lab													Field			
TCEQ standards/ screening levels		N/A	>50	>126	0.11	>.37	N/A	>50	>.20	N/A	>26.7	N/A	<3.0	N/A	>32.22	N/A
Date	Site	Alk mg/L	Chlor- ide mg/L	E Coli MPN/ 100mL	NH3_N mg/L	NO2_N mg/L	NO3_N mg/L	Sulfate mg/L	T- PO4_P mg/L	TSS Mg/L	Chlor- ophyll	TKN	DO	Spec/ Cond	Temp *C	pH
6/1/2022	1	57	21	<10	< 0.1	< 0.04	< 0.04	7	0.08	14	NA	NA	8.41	151.7	29.34	8.5
6/1/2022	2	63	22	1.0	< 0.1	< 0.04	< 0.04	8	0.04	7	NA	NA	8.83	165.3	29.08	8.62
6/1/2022	3	66	23	1.0	< 0.1	< 0.04	< 0.04	8	0.05	9	NA	NA	8.41	172	28.49	8.45
6/1/2022	4	65	23	1.0	< 0.1	< 0.04	< 0.04	8	0.03	6	NA	NA	9.1	172.6	28.39	8.67
6/1/2022	5	66	23	<1.0	< 0.1	< 0.04	< 0.04	8	0.04	7	NA	NA	8.6	171.2	28.3	8.57
6/1/2022	6	66	24	<1.0	< 0.1	< 0.04	< 0.04	8	0.04	7	NA	NA	8.61	177.4	28.09	8.62
6/1/2022	7	68	24	1.0	< 0.1	< 0.04	< 0.04	8	0.04	7	NA	NA	9.85	175.9	28.77	8.82
6/1/2022	8	68	23	1.0	< 0.1	< 0.04	< 0.04	8	0.03	5	NA	NA	9.52	176.5	28.37	8.65
6/1/2022	9	68	24	2.0	< 0.1	< 0.04	< 0.04	8	0.05	6	NA	NA	8.75	180.7	27.8	8.51
6/1/2022	10	69	24	1.0	< 0.1	< 0.04	< 0.04	8	0.03	5	NA	NA	8.09	181.2	27.64	8.34

Table 2: CRP Lake Conroe June 2022 data for all 10 sites

Appendix:

Total Phosphorus:

Phosphorus is a nutrient important for plant growth. In most lakes, phosphorus is the limiting nutrient, which means that everything that plants and algae need to grow is available in excess, (sunlight, warmth, water nitrogen, etc.) except phosphorus. Phosphorus has a direct effect on algae growth, so the more phosphorus the more algae. Phosphorus can come from nature and man-made sources, such as soil erosion, waste water plants, septic systems, runoff and fertilizer.

Total Phosphorus (TP) is a measurement of Ortho-phosphate and phosphorus. Orthophosphates is the chemically active dissolved form of phosphorus that is taken up directly by plants. Orthophosphates come from the breakdown of rocks and minerals, as well as man-made sources like waste water plants, agriculture runoff and fertilizers. Phosphorus is found in the animal tissue and plant fragments suspended in the water.

Another way phosphorus enters the water column is from the bottom and up and this is called internal loading. When the bottom of the lake is anoxic during the hottest parts of the summer, the sediment water interface has a chemical reaction causing the water to become phosphorus rich. Once the lake starts mixing again, through the stratified levels, it brings phosphorus to the top of the water column where more plants and algae can take it up.

Total Dissolved Solids:

Total Dissolved Solids (TDS) is the measurement of the dissolved combined content of inorganic and organic substances present in a liquid in molecular, ionized, or micro-granular suspended form. TDS is measured in freshwater for the amount of ions in the water, which is usually referred to as salinity. The Texas Commission on Environmental Quality has set a standard for all freshwater systems of 300mg/L of TDS. High TDS levels can give an indication of chemical contaminants in the water, such as agricultural runoff, sewage, fertilizers and sediment runoff from construction sites. High TDS levels can also affect the different aquatic species in the freshwater environment. Each species has a certain threshold that they can survive in and reproduce. If the TDS levels are too high it greatly affects the small offspring and reproduction levels.

Temperature:

Water temperature is an important factor in an aquatic ecosystem because it controls biological activities and chemical processes. Many species depend on the environment to regulate metabolic rates and have certain temperature ranges they can handle. Temperature also affects the amount of dissolved oxygen that is available to aquatic organisms. As a general rule, cool water is capable of retaining more dissolved oxygen than warm water. Generally as the water temperature increases, metabolic activities increase such as respiration, but the amount of oxygen in the water decreases. Wastewater plants, stormwater and loss of natural stream cover are all things that can affect the temperature of a stream or reservoir.

Sulfate:

Sulfates can be naturally occurring or the result of municipal or industrial discharges. When naturally occurring, they are often the result of the breakdown of leaves that fall into a stream, water passing

through rock or soil containing gypsum and other common minerals, or atmospheric deposition like acid rain. Point sources include sewage treatment plants and industrial discharges such as tanneries, pulp mill, fertilizers and agricultural runoff. Sulfates can be an indicator of possible pollution runoff into the reservoir and can also have great effect on pH at high concentrations.

Orthophosphate-P:

Orthophosphate is the chemically active dissolved form of phosphorus that can be directly taken up by plants. Orthophosphates can also come from the breakdown of rocks and minerals, as well as man-made sources like waste water plants, agriculture runoff and fertilizers. Orthophosphates can cause rapid algae growth in surface waters, which can deplete sunlight and oxygen levels and harm fish populations.

Nitrate- N:

Nitrates in the water are from fertilizer runoff, leaky OSSF's, sewage treatment plants, agriculture runoff, pet waste and wild animal feces. Nitrates are an essential part of plant growth and have the same effect on plants as phosphorus. The plants and algae are stimulated, which is good in small amounts but with too much growth there is a decline in the water quality due to lower oxygen levels and light penetration to lower growing vegetation.

E Coli:

This bacteria is a preferred indicator for fecal contamination from warm blooded animals. Although usually harmless, E. coli can cause illnesses such as meningitis, septicemia, and urinary tract infections. This indicator species is mainly samples for to see if the waterbody is suitable for recreational use.

Dissolved Oxygen:

Dissolved oxygen (DO) is the amount of oxygen that is present in water. Water bodies receive oxygen from the atmosphere and from aquatic plants. Running water, such as that of a swift moving stream, dissolves more oxygen than the still water of a pond or lake. All aquatic animals need DO to breathe. Low levels of oxygen (hypoxia) or no oxygen levels (anoxia) can occur when excess organic materials, such as large algal blooms, are decomposed by microorganisms. During this decomposition process, DO in the water is consumed. Lower DO levels are usually toward the bottom of the water column and this can change with the seasons and water temperature. Low DO levels can kill some fish and other aquatic organisms.

Chlorophyll-a:

Chlorophyll allows plants (including algae) to photosynthesize, i.e., use sunlight to convert simple molecules into organic compounds. Chlorophyll a is the predominant type of chlorophyll found in green plants and algae. Chlorophyll a is a measure of the amount of algae growing in a waterbody. Some algae is an ok for a freshwater ecosystem, but too much algae can cause aesthetic problems and decreased dissolved oxygen levels. Some algae can produce toxins that can cause a public health concern when found in high concentrations.

Chloride:

Chloride in water is a dissolved solid and makes up the ions found in freshwater lakes and streams. Chloride can end up in freshwater from salting of roads, over fertilization and wastewater. Chloride is directly correlated to the salinity in the water. Too much salinity in freshwater can harm the aquatic ecosystem because most species have a range of salinity levels they can live in.

Ammonia-N:

Ammonia is one of several forms of nitrogen that exist in aquatic environments. Unlike other forms of Nitrogen Ammonia can cause direct toxic effects on aquatic life. Ammonia can enter into waterways via agriculture runoff, industrial applications, and natural breakdown of organic matter, animal waste, wastewater plants and forest fires. Environmental factors, such as pH and temperature, can affect ammonia toxicity to aquatic animals.

Total Suspended Solids:

Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. These solids include anything drifting or floating in the water, from sediment, silt, and sand to plankton and algae. Organic particles from decomposing materials can also contribute to the TSS concentration. Increase in TSS can be caused from construction sites, turbulent water and runoff.