

BLANCO RIVER, CYPRESS CREEK WATER QUALITY STUDY

Study Partners- Village of Wimberley, Guadalupe Blanco River Authority , Wimberley Valley Watershed Association

Managing water resources is of paramount importance for the continued health and welfare of local citizens and our local economy. Wimberley's natural beauty and attractiveness for both tourism and residential development is centered on the Cypress Creek and the Blanco River. Both of these waterways are supported by spring flow from the Trinity Aquifer. All drinking water in the Wimberley Valley, except those on rainwater collection systems, comes from local groundwater aquifers. Portions of the incorporated City are in the Edwards Aquifer Recharge Zone. All of Wimberley is within the Contributing Zone for the Edwards Aquifer.

The purpose of the Blanco River-Cypress Creek Water Quality Monitoring Plan is to be proactive in protecting the Village of Wimberley's water resources. Through collecting water quality data and analyzing pollution threats the VOW will develop an informed position to establish a specific long-term strategy for protection of ground and surface water in the Wimberley Valley.

Sampling completed for the Village of Wimberley will be common for all sites and include field measurements, routine water chemistry, field observations and bacterial analysis. The goals of the following sampling regime are to protect, preserve and restore surface and groundwater resources within the applicable areas of the Blanco River basin. The objectives of monitoring these parameters are to detect and describe spatial and temporal changes, determine impacts of point and nonpoint sources, and assess compliance with established water quality standards for Cypress Creek and Blanco River.

Goals

- Establishing a baseline of the water quality data for the Cypress Creek and the Blanco River.
- Identify any specific pollution problems that may be a threat to native aquatic species of concern, contact recreation and human health.
- Detect and describe the spatial and temporal changes, determine impacts of point and non-point source pollution, and assess compliance with established water quality standards for Cypress Creek and Blanco River and the impacts on fish and wildlife populations and habitat.
- Educate the Water and Wastewater Advisory Board the Village of Wimberley Council and the local community about the findings of the study and provide recommendations for local planning efforts to protect water quality.

2003-2006 DATA SUMMARY

SITE NAME: CYPRESS CREEK AT JACOBS WELL

Site ID Number: 12677

Sample Order: 1 of 6

2003 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TDS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	5.92	20.17	6.94	570	1	4.45	0.02	0.04	0.051	0.319	333.3
min	4.31	17.72	6.74	479	1	1	0.02	0.02	0.04	0.03	316
max	7.56	20.9	7.2	594	1	20	0.02	0.08	0.4	0.51	356

Jan 2003 – Nov 2006 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TSS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	5.94	20.3	6.96	564	122.1	119.5	0.01	0.04	0.05	0.33	1.2
min	4.31	17.7	6.57	475	0.5	1.0	0.01	0.02	0.01	0.03	0.5
max	7.90	21.8	7.41	608	323.0	1137.0	0.05	0.11	0.40	0.60	6.8

(TDS is the same, only 3 data points)

Area land use is predominantly residential, and this site is heavily used for contact recreation. Channel width is approximately four meters. The average depth (not including well depth values) is 0.8 meters. Conditions are significantly influenced by groundwater flows from the Trinity Aquifer through Jacobs Well. Substrate and surface algae coverage has increased from approximately 15% to 35% at the spring during study period. Substrate and surface algae coverage has increased from approximately 30% to 50% upstream of the spring during study period. There has been an increase in indicator bacteria over the study period. The maximum level of E. coli was measured in October 2004, while the minimum was measured in May 2004.

Water chemistry values demonstrate “typical” conditions associated with significant groundwater flows:

- pH values are lowest
- Specific conductivity values are highest
- Dissolved oxygen values are generally lower
- P04 and N03 are highest
- Total suspended solids are lowest

SITE NAME: CYPRESS CREEK AT RR12 (NORTH)
 Site ID Number: 12676
 Sample Order: 2 of 6

2003 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TDS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	6.71	20.9	7.45	526	70.3	89.8	0.02	0.045	0.011	0.1	308
min	4.39	14.0	7.08	451	36	31	0.02	0.02	0.005	0.02	284
max	9.02	26.2	7.8	560	97	276	0.02	0.07	0.03	0.29	324

Jan 2003 – Nov 2006 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TSS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	6.77	20.5	7.53	526	56	207	0.01	0.04	0.01	0.13	3.6
min	3.01	12.2	6.85	436	32	21	0.01	0.01	0.01	0.03	0.5
max	9.13	26.4	7.94	582	97	2400	0.03	0.12	0.03	0.29	35.0

Located one mile north of downtown Wimberley, this site is at the midpoint of the watershed, near rental cabins that are located adjacent to Cypress Creek. The cabins utilize OSF for wastewater treatment.

There is moderate to heavy contact recreation activity. Channel width is approximately four meters. The average depth is one meter. Located five meters downstream of a riffle, the site resembles “run” characteristics. Secchi depth is always greater than the total depth.

Conditions are significantly influenced by groundwater flows primarily from Eagle Fault and secondarily from Jacobs Well. Substrate and surface algae coverage has been minimal. Low dissolved oxygen values are observed. These values may be depressed due to groundwater flows, the effects of which are most pronounced during periods of low surface water flow. Indicator bacteria values (E. coli) have increased over the study period. The highest value for E. coli was recorded in March 2006 during a period of relatively low flows.

Water chemistry values demonstrate “typical” conditions associated with significant groundwater flows, with increasing surface inputs compared to Jacob’s Well:

- pH values are second lowest
- Specific conductivity values are second highest
- Dissolved oxygen values are low at times
- Indicator bacteria values are slightly increasing
- P04 and N03 are decreasing as dilution and assimilation occur
- Total suspended solids are increasing

SITE NAME: CYPRESS CREEK AT BLUE HOLE

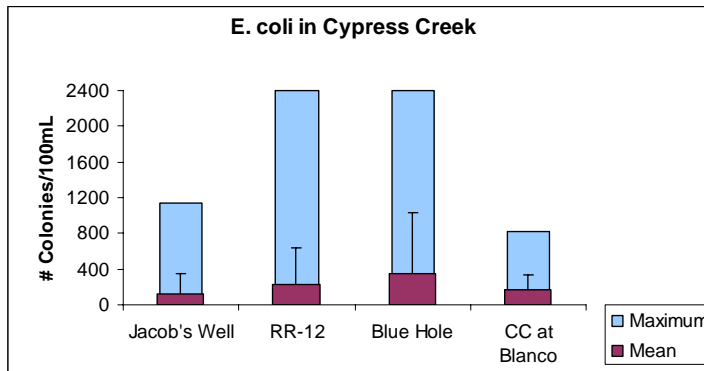
Site ID Number: 12675

Sample Order:

Dec 2005 – Nov 2006 Data Summary:

Stat	D.O. (mg/L)	Water Temp (°C)	pH (s.u)	SC (mhos/cm)	E.coli colonies	Ammonia (mg/L)	Total P (mg/L)	N03 (mg/L)	TSS (mg/L)
mean	5.13	19.4	7.71	525	397	0.01	0.03	0.15	4.6
min	3.53	11.7	7.31	441	19	0.01	0.03	0.01	1.7
max	8.09	26.2	7.93	627	2400	0.03	0.03	1.14	10.0

E. coli measurements are highest and most variable at this site. Both very high and very low dissolved oxygen values have been observed at this site and positively correlate with water temperature.



This graph shows E. coli values at four Cypress Creek sites. The red bars indicate the mean values over the study period, the blue bars indicate the maximum values recorded, and the bars indicate the amount of variability in the data (standard error).

SITE NAME: CYPRESS CREEK UPSTREAM BLANCO RIVER
 Site ID Number: 12673
 Sample Order: 3 of 6

2003 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TDS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	7.89	20.13	7.7	520	84.6	125.7	0.02	0.053	0.012	0.11	289
min	5.93	13.2	7.13	408	66	74	0.02	0.02	0.005	0.02	264
max	9.84	26.8	7.93	590	101	249	0.02	0.07	0.03	0.48	320

Jan 2003 – Nov 2006 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TSS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	7.8	20.0	7.77	514	65	163	0.02	0.04	0.01	0.11	1.5
min	2.8	11.1	6.95	403	41	13	0.01	0.01	0.01	0.01	0.5
max	10.2	27.6	8.26	590	101	824	0.07	0.12	0.03	0.48	10.2

Located in the lower portion of Cypress Creek, this site is fifty meters upstream of the confluence with the Blanco River. This area is moderately used for contact recreation and the predominant land use is residential. Channel width is approximately twenty-five meters.

Sampling usually occurs on six meters from right bank in the centroid.

The average depth is .3 meters. Secchi depth is always greater than the total depth.

Substrate and surface algae coverage has been minimal. Very low and high dissolved oxygen values are observed.

- Highest Cypress Creek pH values are observed
- Lowest Cypress Creek specific conductivity values are observed
- Dissolved oxygen values are low and high at times and positively correlate with water temperature
- Relatively high indicator bacteria values are observed
- Lowest Cypress Creek P04 and N03 are observed
- Relatively low values of total suspended solids observed

SITE NAME: BLANCO RIVER AT 7A RANCH
 Site ID Number: 126663
 Sample Order: 4 of 6

2003 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TDS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	7.73	19.89	7.75	483	27.6	42.6	0.02	0.03	0.013	0.24	285
min	5.04	9.75	7.25	366	12	4	0.02	0.02	0.005	0.02	268
max	11.00	28.00	7.98	532	44	185	0.02	0.08	0.031	0.69	300

Jan 2003 – Nov 2006 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TSS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	8.0	20.5	7.81	469	31	354	0.02	0.04	0.01	0.26	4.8
min	5.0	9.8	7.05	353	12	4	0.01	0.01	0.003	0.02	0.5
max	11.0	29.9	8.82	532	44	4812	0.07	0.13	0.03	0.78	44.8

Located in the “gaining” portion of the Blanco River, this is the most upstream Blanco River monitoring location. Located upstream of the low water crossing, the site exhibits “pool” characteristics with slow moving water that backs up behind the impoundment. This area is heavily used for contact recreation and water fowl frequently reside.

Monitoring and grab samples occur 0.3 meters upstream of the outfall channel at the centroid. Channel width is approximately twenty meters. The average depth is one meter. Secchi depth is always greater than the total depth. Minimal water movement and lack of riparian shading and the resulting temperature variances significantly influence conditions. Substrate and surface algae coverage has been minimal. Low and high dissolved oxygen values are observed.

- Lowest Blanco River pH values are observed
- Dissolved oxygen values are low and high at times and positively correlate with water temperature
- Indicator bacteria values have increased over study period

SITE NAME: BLANCO RIVER AT RR12
 Site ID Number: 12661
 Sample Order: 5 of 6

2003 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TDS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	9.26	20.52	7.85	477.5	38.33	56.2	0.02	0.045	0.017	0.232	262.6
min	7.9	10.69	7.22	359	7	6	0.02	0.02	0.005	0.03	248
max	11.08	28.6	8.04	522	74	147	0.02	0.07	0.07	0.6	260

Jan 2003 – Nov 2006 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TSS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	8.8	21.1	7.92	466	30	203	0.02	0.04	0.02	0.23	4.4
min	5.1	10.7	7.00	345	7	6	0.01	0.01	0.003	0.02	0.5
max	11.7	29.6	8.57	526	74	2452	0.05	0.12	0.07	0.62	40.2

Located in the “gaining” portion of the Blanco River, this is the midpoint Blanco River monitoring location. This area is moderately used for contact recreation. Monitoring and grab samples occur at the centroid. Channel width is approximately twenty-five meters. The average depth is two meters. Secchi depth is always greater than the total depth. The site exhibits “run” conditions with swift moving waters. Substrate and surface algae coverage has been minimal. High dissolved oxygen values are observed and are likely due to strong flows. Numerous fish, snakes, turtles, birds, and people are often seen at this site.

- pH values are slightly increasing
- Specific conductivity values are slightly decreasing
- Dissolved oxygen values are low and high at times and positively correlate with water temperature
- Indicator bacteria values are slightly decreasing from upstream site, but have increased over the study period

SITE NAME: BLANCO RIVER AT CR 174
 Site ID Number: 12660
 Sample Order: 6 of 6

2003 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TDS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	9.13	20.7	7.89	464.3	22	48	0.02	0.04	0.014	0.22	257
min	7.05	10.45	7.33	345	3	4	0.02	0.02	0.005	0.03	248
max	10.9	29.7	8.08	531	52	152	0.02	0.08	0.06	0.55	264

Jan 2003 – Nov 2006 Data Summary:

Stat	D.O.	Water Temp	pH	SC	Fecal	E.coli	Ammonia	Total P	P04	N03	TSS
	(mg/L)	(°C)	(s.u)	(mhos/cm)	colonies	colonies	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
mean	9.1	21.2	7.96	466	17	235	0.02	0.04	0.01	0.22	5.1
min	5.1	10.5	7.33	323	3	2	0.01	0.01	0.01	0.01	0.5
max	11.6	30.1	8.67	901	52	4800	0.04	0.13	0.06	0.70	49.7

Located in the “losing” portion of the Blanco River, this is the most downstream Blanco River monitoring location. This area is moderately used for contact recreation. Monitoring and grab samples occur at the centroid. Channel width is approximately twenty meters. The average depth is .5 meters. Secchi depth is always greater than the total depth. Substrate and surface algae coverage has been minimal. High dissolved oxygen values are observed and are likely due strong flow.

- pH values are slightly increasing
- Specific conductivity values are slightly decreasing
- Dissolved oxygen values are low and high at times and positively correlate with water temperature
- Fecal coliform bacteria values have slightly decreased over the study period, however E. coli bacteria values have increased
- Slight decreases in P04 and N03 are observed
- Highest Blanco River total suspended solids values observed