Watershed: Lake LBJ

Segments: 1406, 1406A, 1407, 1415

Water Bodies: Colorado River, Llano River (North and South), Sandy Creek, Lake LBJ, Inks Lake

Population Centers: Granite Shoals, Sunrise Beach, Llano, Mason, Junction

Counties: Llano, Kimble, Mason, Sutton and Edwards

Ecoregion: Central Texas Plateau (Edwards Plateau)

Ecoregion Description: This ecoregion is largely a dissected plateau that is hillier in the south and east where it is easily distinguished from bordering ecological regions by a sharp fault line. The region contains a sparse network of perennial streams, but they are relatively clear and cool compared to those of surrounding areas. Originally covered by juniper-oak savanna and mesquite-oak savanna, most of the region is used for grazing beef cattle, sheep, goats and wildlife. Hunting leases are a major source of income.

Climate: Subtropical, subhumid and annual precipitation averages about 24 inches, with May and September the wetter months. Although dry periods commonly occur in July and August, the driest months are November, December and January.

Land Use: Open woodland grazed, forest and woodland grazed, some subhumid grassland and semi acid grazing land

Soils: Dry mollisols; thin reddish-brown, gravelly and stony, sandy loam prairie soils

Discharges: 14

CAFOs: 2

700 Springs is located in the Lake LBJ Watershed.

Fig. 21 - Lake LBJ Watershed

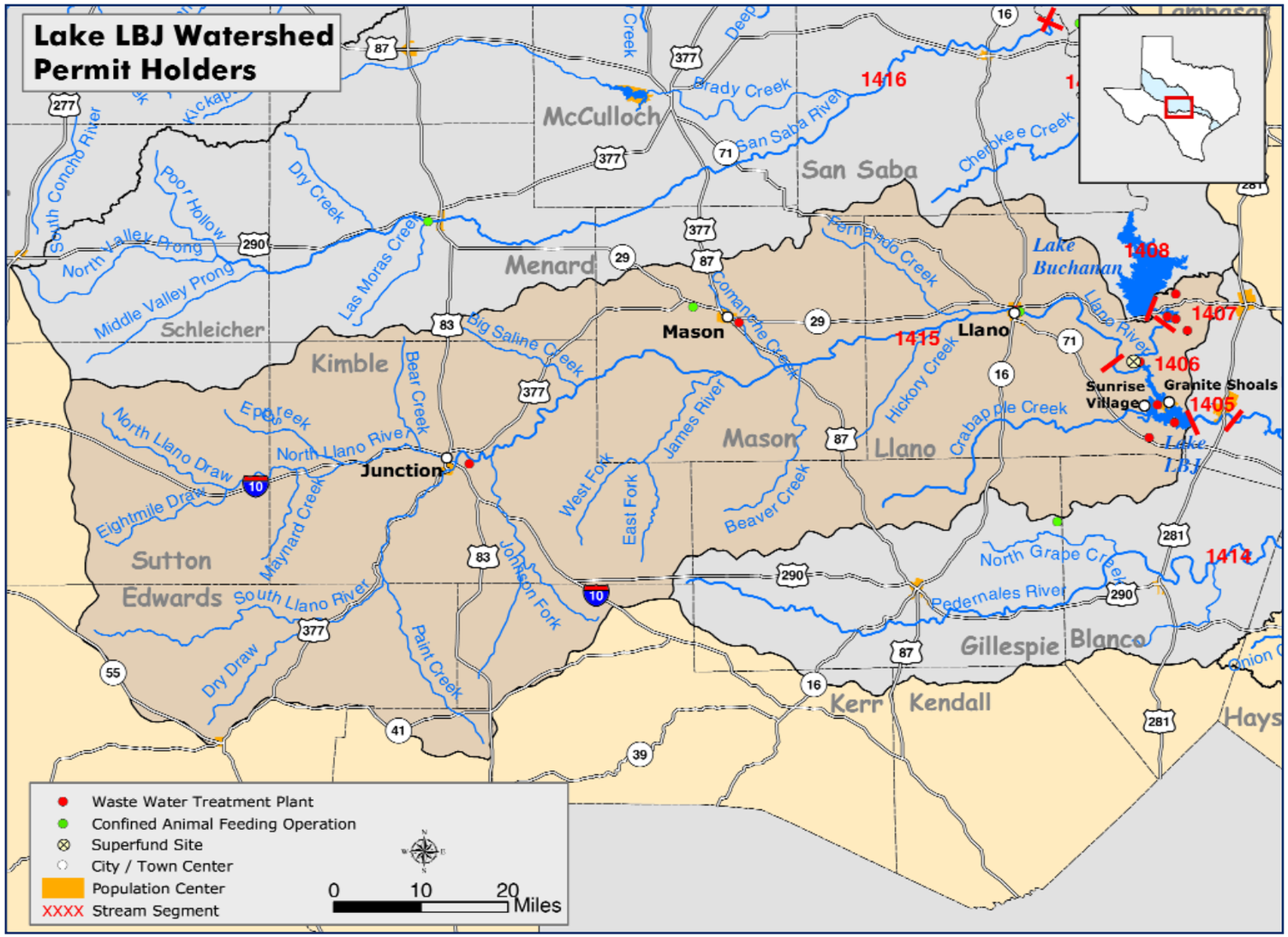

Table 17 - Trend Analysis Results for Lake LBJ Watershed and Its tributaries.

		Time vs. Constituent							
					Nutrients				
Station	Description	DO	CI	Fecal	TP	NO_3-N	Ch a	Secchi	TSS
12343	Inks Headwaters		↓		↑				
12336	Inks Dam						↑		
12335	LBJ Headwaters		↓		↑		↑		↓
12333 FP site	LBJ 30°,50'		NA	NA	NA	NA	NA		NA
12331 FP site	LBJ FM 2900		NA	NA	NA	NA	NA		NA
12330	LBJ Kingsland		↓		↑				
12327	LBJ Granite Shoal		↓	↑	↑		↑	↓	
12324	LBJ Dam		↓		↑		↑	↓	↑
12384	Llano River Llano	↑					NA		
12383	Llano River FM 3404	↓	↑		↑		NA		
12214	Sandy Creek	↑	↓				NA		

See Appendix A: Glossary on page 76 for definition of terms.

Lake LBJ Trend Analysis

Eleven sampling locations were evaluated for trends in water qua-lity during the assessment period. Three locations are flowing stream sites, six are located in Lake LBJ and two are located on Inks Lake. Two locations (12333 and 12331 on Lake LBJ) are field parameter (FP) only locations.

Similar to the Lake Buchanan watershed, nutrient trends, increasing chlorophyll *a* concentrations and decreasing secchi visibility over the past 10 years are potential areas of concern for this watershed. See Table 17 for results by site.

Four major events affected water quality in the Lake LBJ watershed during the past 10 years. These events listed in chronological order are: "salt" spill from Natural Dam Lake (1986), the Christmas flood (1991-1992), the Memorial Day flood along Sandy Creek (1995) and the Llano River Flood (1997).

Table 17 - Lake LBJ Watershed Data Summary

Segment	Year	Temperature (°C)	Dissolved Oxygen (mg/L)	pH (S.U.)	Ammonia (mg/L)	Nitrate + Nitrite (mg/L)	Total Phosphorus (mg/L)	Ortho Phosphorus (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	E. coli (cfu/dL)	Chlorophyll (µg/L)
Lake LBJ	1996	20.78	8.13	8.11	0.070	0.109	0.050	0.011	91.9	58.5	3	8.8
Segment 1406	1997	20.25	8.66	8.11	0.103	0.152	0.184	0.015	64.9	40.4	6	6.9
6 sites	1998	22.48	7.70	7.93	0.138	0.072	0.097	0.010	57.6	37.3	5	14.9
	1999	21.61	8.22	8.04	0.027	0.061	0.044	0.010	67.4	40.1	3	9.8
	2000	21.39	8.24	8.15	0.021	0.206	0.046	0.010	65.9	40.1	7	5.3
	Mean	**21.27**	**8.19**	**8.06**	**0.074**	**0.122**	**0.076**	**0.011**	**69.3**	**43.2**	**5**	**9.2**
	Benchmark	**34.44**	**5.00**	**6.5 - 9.0**	**0.106**	**0.320**	**0.180**	**0.050**	**125.0**	**75.0**	**126**	**21.4**
	Violation Rate	**0.00**	**3.70**	**0.00**	**16.100**	**6.900**	**6.700**	**0.000**	**4.0**	**5.0**	**0**	**6.2**
Sandy Creek	1996	19.76	9.39	8.30	0.082	0.138	0.048	0.006	28.1	23.0	21	3.8
Unclassified Stream	1997	21.78	9.27	8.36	0.080	0.104	0.090	0.035	22.3	16.4	503	16.0
1 site	1998	22.11	9.33	7.57	0.064	0.020	0.075	0.011	31.3	25.0	26	1.5
	1999	24.41	8.66	8.23	0.020	0.020	0.040	0.010	28.8	20.0	56	1.4
	2000	24.22	9.20	8.41	0.020	0.180	0.042	0.010	26.4	21.6	28	0.7
	Mean	**22.18**	**9.22**	**7.99**	**0.057**	**0.097**	**0.061**	**0.017**	**26.9**	**20.9**	**63**	**5.9**
	Benchmark	**34.44**	**5.00**	**6.5 - 9.0**	**0.170**	**2.760**	**0.800**	**0.500**	**125.0**	**75.0**	**126**	**11.6**
	Violation Rate	**0.00**	**0.00**	**0.00**	**4.800**	**0.000**	**0.000**	**0.000**	**0.0**	**0.0**	**9**	**4.8**
Llano River	1996	21.51	9.28	8.41	0.046	0.169	0.039	0.003	21.2	12.7	17	2.8
Segment 1415	1997	21.46	9.49	8.39	0.078	0.229	0.032	0.030	35.6	22.5	10	3.1
4 sites	1998	22.65	8.43	7.65	0.088	0.088	0.070	0.014	28.0	16.4	16	2.5
	1999	24.67	8.51	8.32	0.038	0.113	0.040	0.010	21.5	12.0	13	0.9
	2000	21.46	9.17	8.21	0.020	0.722	0.066	0.010	19.5	12.2	22	0.9
	Mean	**22.04**	**9.04**	**8.07**	**0.047**	**0.323**	**0.052**	**0.014**	**24.4**	**14.8**	**16**	**1.9**
	Benchmark	**32.78**	**5.00**	**6.5 - 9.0**	**0.170**	**2.760**	**0.800**	**0.500**	**50.0**	**50.0**	**126**	**11.6**
	Violation Rate	**0.00**	**1.70**	**0.00**	**3.400**	**0.000**	**0.000**	**0.000**	**0.0**	**0.0**	**8**	**1.7**
Inks Lake	1996	19.05	7.70	7.99	0.110	0.065	0.044	0.175	130.6	85.8	2	6.7
Segment 1407	1997	18.35	7.96	8.04	0.110	0.146	0.050	0.016	82.5	53.6	3	12.3
2 sites	1998	21.09	8.56	8.01	0.105	0.051	0.086	0.011	80.0	52.2	4	35.4
	1999	20.73	7.54	7.88	0.069	0.029	0.040	0.010	84.4	53.8	5	10.2
	2000	20.62	6.68	7.89	0.044	0.078	0.074	0.011	82.6	51.9	5	7.2
	Mean	**19.93**	**7.71**	**7.96**	**0.088**	**0.077**	**0.061**	**0.049**	**93.2**	**60.3**	**4**	**14.8**
	Benchmark	**32.22**	**5.00**	**6.5 - 9.0**	**0.106**	**0.320**	**0.180**	**0.050**	**150.0**	**100.0**	**126**	**21.4**
	Violation Rate	**0.00**	**15.80**	**0.00**	**27.700**	**5.700**	**0.000**	**3.800**	**7.5**	**7.5**	**0**	**5.9**

Mean - annual average value *Benchmark - state standard or threshold* *Violation Rate - percent of sample exceeded benchmark*

Fig. 22 - Lake LBJ Watershed Monitoring Locations

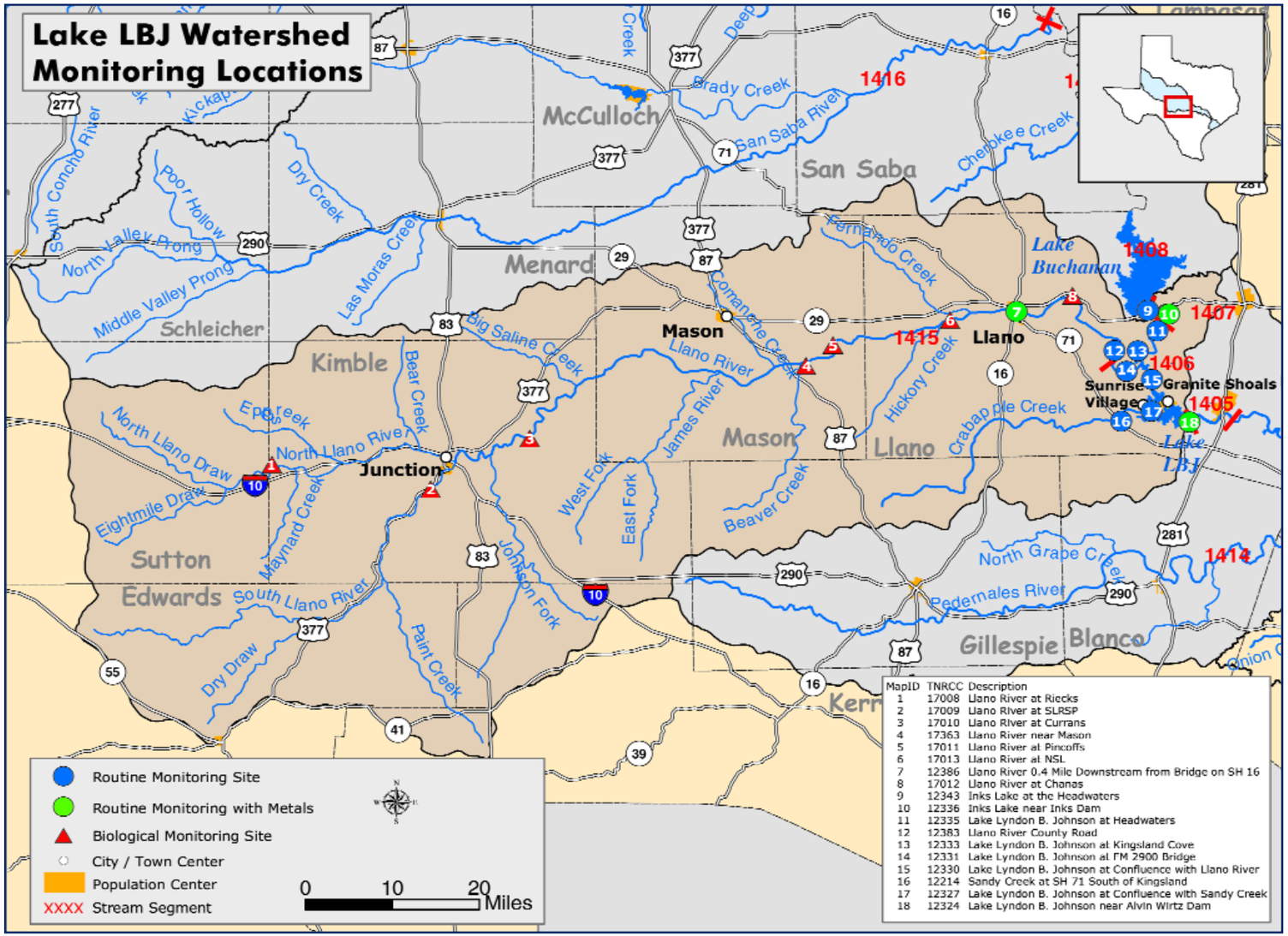

Table 19 - Results of Biological Surveys in the Lake LBJ Watershed

Site	Date	Aquatic Life Use Fish	Aquatic Life Use Macroinvertebrates	Aquatic Life Use Dissolved Oxygen
Llano River near Llano	Feb-00	Exceptional	High	Exceptional
Llano River near Llano	Jun-00	High	High	Exceptional
Llano River near Llano	Sep-00	High	Exceptional	Exceptional
Llano River near Scotts Crossing	Feb-00	Exceptional	High	Exceptional
Llano River near Scotts Crossing	Jun-00	High	High	High
Llano River near Scotts Crossing	Sep-00	Exceptional	Exceptional	Exceptional
Llano River near Castell	Feb-00	High	High	Exceptional
Llano River near Castell	Jun-00	Exceptional	Intermediate	Exceptional
Llano River near Castell	Sep-00	High	Exceptional	Exceptional
Llano River near Junction	Feb-00	Exceptional	Exceptional	Exceptional
Llano River near Junction	Jun-00	Exceptional	High	Exceptional
Llano River near Junction	Sep-00	Exceptional	High	Exceptional
South Llano River at SLRSP	Feb-00	High	High	Exceptional
South Llano River at SLRSP	Jun-00	Exceptional	High	Exceptional
South Llano River at SLRSP	Sep-00	Exceptional	Exceptional	Exceptional
South Llano River at SLRSP	May-01	High/Exceptional	Exceptional	Exceptional
South Llano River at SLRSP	Aug-01	High/Exceptional	High	Exceptional
North Llano River near Roosevelt	Feb-00	Exceptional	High	-
North Llano River near Roosevelt	Jun-00	High	High	Exceptional
North Llano River near Roosevelt	Sep-00	High	High	Exceptional
Llano River at Mason	Mar-00	High/Exceptional	Exceptional	-
Llano River at Mason	Aug-00	High/Exceptional	High	-
Llano River at Mason	May-01	High/Exceptional	Exceptional	Exceptional
Llano River at Mason	Aug-01	High	Exceptional	Exceptional

Lake LBJ Basin Biological Monitoring

Seven sites were sampled for fish, benthic macroinvertebrates and dissolved oxygen in the Lake LBJ basin. Five of the sites were located on the main stem of the Llano River and one site was located on each the North and South Llano Rivers.

The fish and benthic macroinvertebrates consistently scored higher than anywhere in the Colorado River basin. The biota indicates the water is in excellent condition. Fish scores were either high or exceptional and this basin supports the highest populations of pollution-sensitive darters found in the Colorado river basin. Benthic macroinvertebrate scores are similar to those in the fish community and indicate good water quality. There is an abundance of pollution- sensitive benthic species that reside in the Llano River and its tributaries. Dissolved oxygen is exceptional and does not limit the biology of the stream. Table 19 shows the aquatic life uses for streams in the Lake LBJ basin that were sampled during the reporting period.

Metals

Results for the lake LBJ Watershed dissolved metals in water sampling in August of 1998 is located in Appendix E on page 82.