

Watershed: Lake Buchanan

Segments: 1408, 1409, 1410, 1416

Water Bodies: Colorado River, San Saba River, Brady Creek, Cherokee Creek, Lake Brady, Lake Buchanan

Population Centers: San Saba, Menard, Brady, Eden

Counties: Schleicher, Sutton, Menard, Concho, McCullough, Coleman, Brown, Mills, Lampasas, San Saba, Mason, Llano, Burnet

Ecoregion: Central Great Plains, Central Oklahoma-Texas Plains, Central Texas Plateau (Edwards Plateau)

Ecoregion Description: The Central Great Plains are slightly lower, receive more precipitation and are somewhat more irregular than the Western High Plains to the west. Once a grassland, with scattered low trees and shrubs in the south, much of this ecological region is now cropland, with the eastern boundary of the region marking the eastern limits of the major winter wheat growing area of the United States.

- ◆ The Central Oklahoma-Texas Plains is a transition area between the once prairie, now winter wheat growing regions to the west and the forested low mountains of eastern Oklahoma. The region does not possess the arability and suitability for crops such as corn and soybeans that are common in the Central Irregular Plains to the northeast. Transitional “cross-timbers” (little bluestem grassland with scattered blackjack oak and post oak trees) is the native vegetation, and presently rangeland and pastureland comprise the predominant land cover. Oil extraction has been a major activity in this region for more than 80 years.
- ◆ Central Texas Plateau 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:

- ◆ Central Great Plains are low humidity, wide ranges of temperature and precipitation with frequent windstorms. Annual average precipitation is about 20 inches with May the wettest month. Although a substantial portion of this precipitation falls during the growing season, the amount and distribution is usually inadequate to ensure good crop yields.

- ◆ Central Texas Plateau is subtropical and 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: Generally cropland with grazing land and some vegetated agriculture.

- ◆ The Central Oklahoma-Texas Plains have cropland with pasture, woodland and forest.
- ◆ The Central Texas Plateau is open woodland grazed, forest and woodland grazed, some subhumid grassland and semi-arid grazing land.

Soils:

- ◆ Central Great Plains are dry mollisols, sandy, generally developed from unconsolidated beds of sands and clays under grasses with large quantities of organic matter deposited in the soil structure. However, due to the loose structure and coarse texture of many of the soils, the organic matter has largely leached out.
- ◆ Central Oklahoma-Texas Plains – affisols.
- ◆ Central Texas Plateau are dry mollisols, thin reddish-brown, gravelly and stony, sandy loam prairie soils.

Permitted Discharges: 10

Permitted CAFOs: 2

The Lake Buchanan Watershed encompasses 13 counties.



Fig 23. - Lake Buchanan Watershed

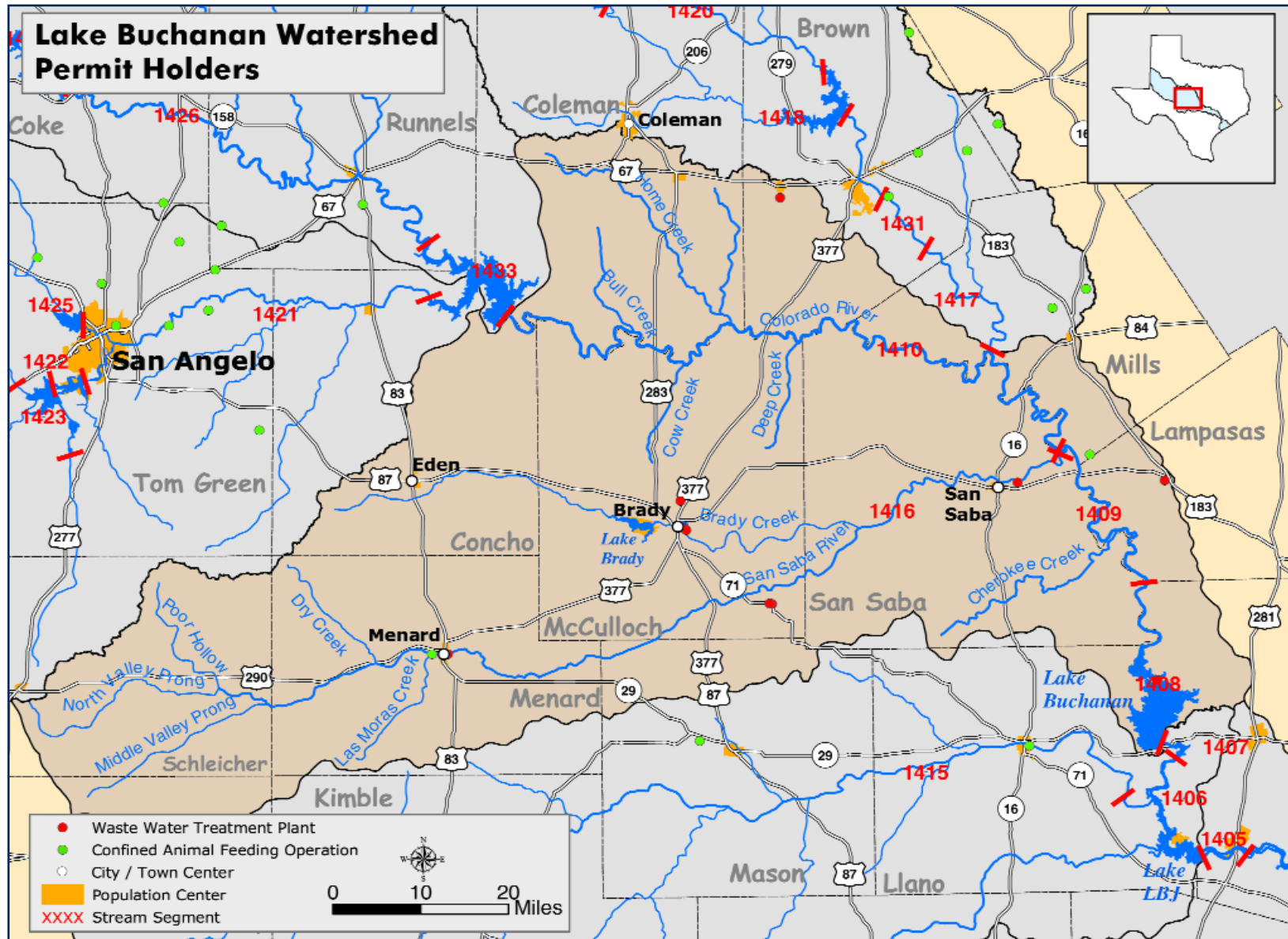


Table 20 - Trend Analysis Results for the Lake Buchanan Watershed and Its Tributaries.

Time vs. Constituent									
Station	Description	DO	CI	Fecal	Nutrients		Ch a	Secchi	TSS
					TP	NO ₃ -N			
12358	CR Winchell		↑				NA		
12394	Pecan Bayou					↑	NA		
12392	San Saba						NA		
12355	CR US 190					↑	NA		
12353	Lk Buchanan Fall Creek		↓			↓			
12352	Lk Buchanan Beaver Creek				↑				
12350 Fp site	Lk Buchanan 30°,50		NA	NA	NA	NA	NA	↓	NA
12347	Lk Buchanan Rocky Pt.		↓		↑			↓	
12344	Lk Buchanan Dam		↓		↑			↓	

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

Lake Buchanan Trend Analysis

Nine sampling locations were evaluated for trends in 1988 to 1998 water quality data. Four of these locations are flowing stream sites and five are located in Lake Buchanan. One location (12350, Buchanan at 30° 50') is a field parameter location.

Nutrient trends, increasing chlorophyll *a* concentrations and decreasing secchi visibility over the past 10 years are potential areas of concern for this watershed. Specific results of this watershed's trend analysis are in Table 20.

Two major events affected water quality in the Buchanan watershed during the past 10 years. A spill from Natural Dam Lake (1986), and construction and filling of Ivie Reservoir (1990).

Table 21 - Lake Buchanan Data Summary (continued on p.56)

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 Buchanan Segment 1408 5 sites	1996	22.75	8.35	8.29	0.068	0.059	0.068	0.007	136.6	90.6	2	8.2
	1997	18.27	9.39	8.22	0.079	0.130	0.198	0.014	82.4	50.4	1	27.5
	1998	22.51	8.60	8.29	0.180	0.070	0.096	0.010	90.4	60.7	2	17.5
	1999	21.15	8.51	8.25	0.034	0.036	0.055	0.015	87.9	52.6	2	16.6
	2000	19.22	8.55	8.25	0.028	0.231	0.091	0.011	76.0	46.3	2	13.3
	Mean	21.08	8.63	8.26	0.081	0.112	0.095	0.011	94.1	59.8	2	16.9
	Benchmark	34.44	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	0.60	0.00	19.200	11.100	12.400	0.900	9.3	9.3	0	16.8	
Colorado River above Lake Buchanan Segment 1409 1 site	1996	18.45	8.00	8.03	0.100	0.334	0.125	0.012	144.7	99.8	90	5.3
	1997	21.09	8.19	8.07	0.092	0.565	0.102	0.013	64.7	42.5	61	14.4
	1998	21.11	8.03	7.83	0.105	0.351	0.082	0.013	130.0	90.0	92	14.8
	1999	20.36	8.69	7.79	0.020	0.165	0.399	0.010	50.9	20.7	25	9.0
	2000	21.32	7.78	8.13	0.022	0.424	0.094	0.010	61.5	33.1	27	4.1
	Mean	20.41	8.16	7.95	0.072	0.382	0.147	0.012	93.0	59.7	54	9.7
	Benchmark	32.78	5.00	6.5 - 9.0	0.170	2.760	0.800	0.500	200.0	200.0	126	11.6
Violation Rate	0.00	3.60	0.00	7.700	0.000	3.800	0.000	7.7	7.7	8	20.0	
Colorado River below Ivie Reservoir Segment 1410 1 site	1996	19.15	8.60	8.06	0.108	0.097	0.058	0.003	352.6	255.3	11	3.1
	1997	21.40	7.93	8.02	0.082	0.090	0.066	0.028	296.6	213.4	22	9.2
	1998	19.73	8.04	7.75	0.094	0.057	0.095	0.011	405.6	283.6	32	12.4
	1999	20.17	7.75	7.77	0.020	0.023	0.049	0.010	449.3	314.8	3	5.3
	2000	19.54	8.73	8.11	0.020	0.110	0.041	0.010	154.7	121.0	22	6.1
	Mean	20.04	8.18	7.91	0.070	0.078	0.063	0.013	333.5	238.9	15	7.6
	Benchmark	32.78	5.00	6.5 - 9.0	0.170	2.760	0.800	0.500	500.0	455.0	126	11.6
Violation Rate	0.00	3.70	0.00	8.300	0.000	0.000	0.000	12.0	4.0	0	17.4	
San Saba River Segment 1416 2 sites	1996	19.05	7.74	8.03	0.121	0.351	0.115	0.013	24.8	18.9	158	3.7
	1997	21.46	7.35	8.00	0.080	0.852	0.064	0.013	31.7	28.4	55	7.7
	1998	21.43	7.87	7.87	0.128	0.628	0.078	0.012	28.4	24.3	174	6.5
	1999	19.96	8.87	7.95	0.022	0.304	0.233	0.010	30.6	22.7	34	2.7
	2000	23.04	7.65	8.06	0.030	0.436	0.087	0.010	22.4	19.7	55	2.8
	Mean	21.09	7.89	7.98	0.073	0.515	0.113	0.012	27.3	22.6	77	4.7
	Benchmark	32.22	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	2.90	0.00	7.400	0.000	3.600	0.000	0.0	0.0	10	3.7	

Mean - annual average value

Benchmark - state standard or threshold

Violation Rate - percent of sample exceeded benchmark

Table 21 - Lake Buchanan Data Summary (continued from p. 55)

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)
Lower Pecan Bayou	1996	18.27	7.75	7.93	0.142	0.936	0.288	0.111	93.4	64.5	43	10.7
Segment 1417	1997	20.45	7.88	7.90	0.080	1.193	0.258	0.107	130.5	91.0	37	22.2
1 site	1998	20.42	8.60	7.97	0.132	1.167	0.282	0.086	119.7	92.9	132	82.1
	1999	19.24	9.10	7.82	0.024	1.960	0.224	0.120	121.0	80.8	13	253.0
	2000	20.56	8.04	8.03	0.067	1.542	0.336	0.204	90.3	66.3	28	13.7
	Mean	19.78	8.27	7.92	0.094	1.314	0.280	0.124	110.7	78.9	39	69.4
	Benchmark	32.22	5.00	6.5 - 9.0	0.170	2.760	0.800	0.500	310.0	120.0	126	11.6
	Violation Rate	0.00	13.30	3.30	16.000	26.900	0.000	0.000	0.0	11.5	4	66.7

Mean - annual average value

Benchmark - state standard or threshold

Violation Rate - percent of sample exceeded benchmark

Fig. 24 - Lake Buchanan Watershed Monitoring Locations

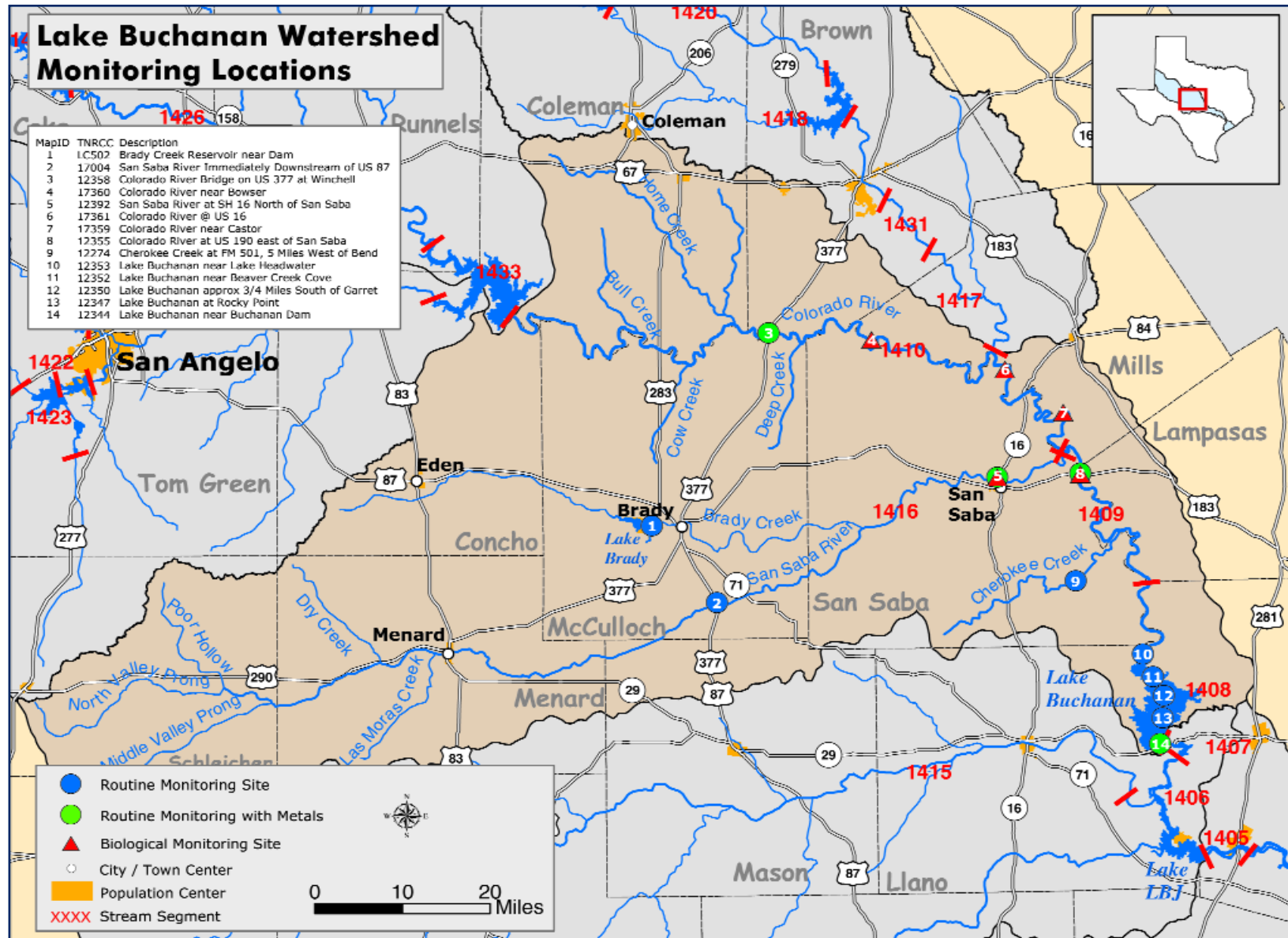


Table 22 - Results from Biological Monitoring in the Lake Buchanan Watershed

Site	Date	Aquatic Life Use Fish	Aquatic Life Use Macroinvertebrates	Aquatic Life Use Dissolved Oxygen
Colorado River at Bowser	May-02	High	Intermediate	Exceptional
Colorado River at Bowser	Aug-02	High	-	Exceptional
Colorado River at Castor	May-02	High	Intermediate	Exceptional
Colorado River at Castor	Aug-02	High	-	-
Colorado River at US 16	May-02	Intermediate	Limited	Exceptional
Colorado River at US 16	Aug-02	Intermediate	Limited	Exceptional
Colorado River at Red Bluff	Apr-00	High	Exceptional	-
Colorado River at Red Bluff	Aug-00	Intermediate	High	-
Colorado River at Red Bluff	Jun-01	High	High	Exceptional
Colorado River at Red Bluff	Aug-01	High	High	Exceptional
Colorado River at Red Bluff	May-02	High	High	Exceptional
Colorado River at Red Bluff	Aug-02	High	High	Exceptional
San Saba River at US 16	Apr-00	Intermediate/High	High	-
San Saba River at US 16	Aug-00	High	High	-
San Saba River at US 16	Jun-01	High	High	Exceptional
San Saba River at US 16	Sep-01	High	High	Exceptional
San Saba River at 16	May-02	High	High	Exceptional
San Saba River at 16	Aug-02	High	High	Exceptional

Lake Buchanan Basin Biological Monitoring

Five sites were sampled for fish, benthic macroinvertebrates and dissolved oxygen in the Lake Buchanan basin. Four of the sites are located on the main stem of the Colorado River and on the San Saba River.

Overall, the biota indicates good water quality throughout the region. Fish collections were diverse and typically rated high. Benthic macroinvertebrate communities typically concurred with the fish ratings of high, except at those sites where suitable habitat was lacking. Dissolved oxygen always rated exceptional and is not limiting the biota.

Metals

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

