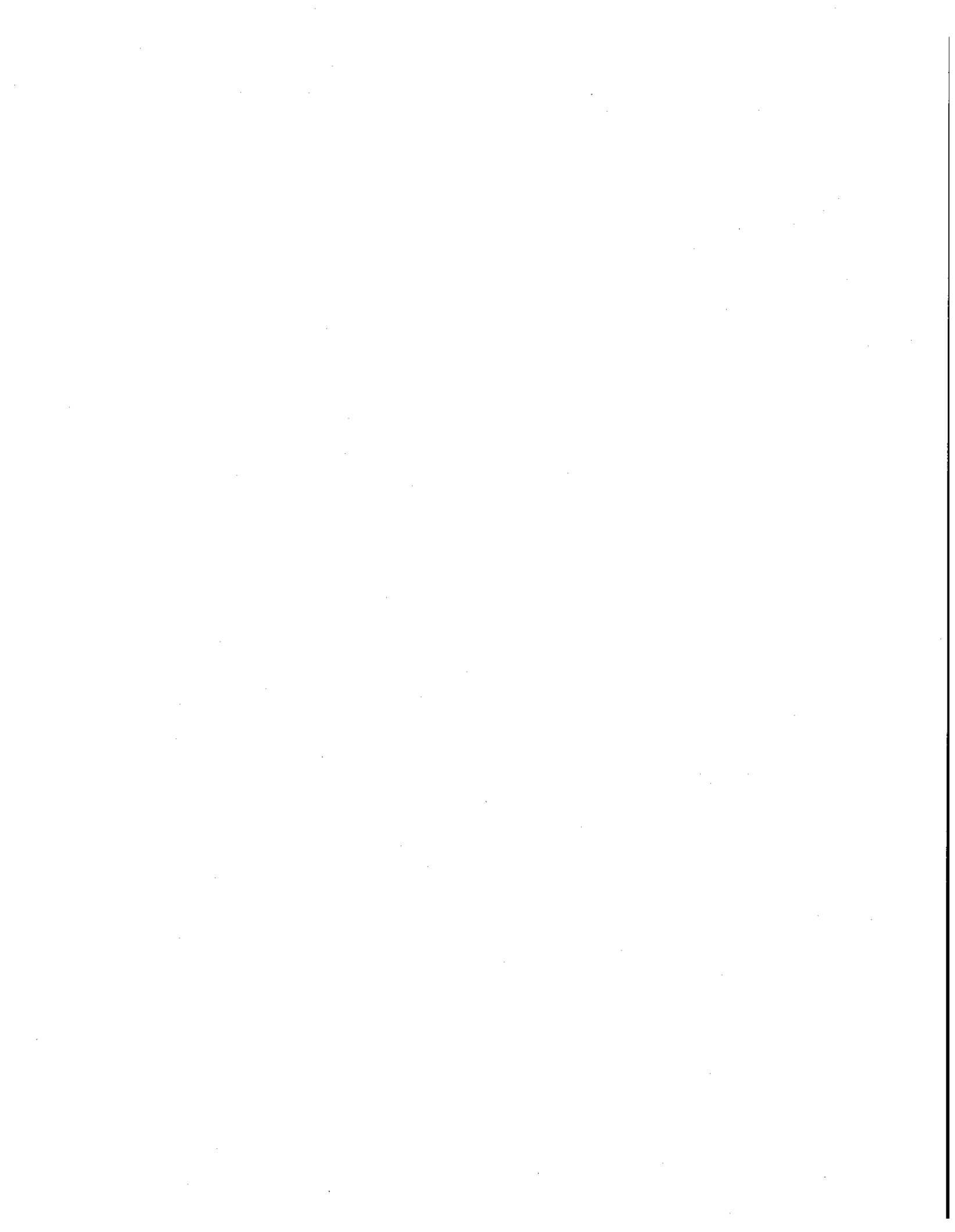


DATA SUMMARY
OF
SPECIAL WATER QUALITY SAMPLING
ON
LAKE CONWAY, ARKANSAS



September 2001
WQ-01-09-1



LAKE CONWAY, FAULKNER COUNTY, ARKANSAS

INTRODUCTION

Lake Conway is located in Faulkner County, Arkansas near the City of Conway. The lake was constructed and is owned by the Arkansas Game and Fish Commission (AGFC). In July 1998, concerned citizens residing in the area around Lake Conway requested that the Arkansas Department of Pollution Control and Ecology (Department) conduct a study to determine the extent of possible contamination in Lake Conway. The citizens were concerned that the effluent discharge from waste water treatment facilities (WWTF) and poorly maintained and operated septic systems may be causing unacceptable levels of nutrients, metals and fecal coliform bacteria in the lake. Additional water quality concerns expressed to the Arkansas Commission on Pollution Control and Ecology prompted additional data collection in March, April and August 2001.

DATA COLLECTION

The data included in this report has been compiled from four sampling events:

October 12, 1998 - Water quality, dissolved metals and fecal coliform bacteria collected was collected from five stations on Lake Conway (Figure 1). Data from this sampling event is shown in Table 1. It should be noted that the water level in Lake Conway was very low during this sampling event due to a designed drawdown of the lake by AGFC, and the water temperature was below 70° F.

Location of Sample Stations

Hwy 89 - Hwy 89 at the first bridge after exiting I-40.

Narrows - Hwy 89 at the narrows bridge.

Gold Creek - At the first bridge on I-40 (Gold Creek) between the cities of Mayflower and Conway.

Stone Dam Cr - At the second bridge on I-40 (Stone Dam Creek) between the cities of Mayflower and Conway.

Caney Creek - At the Arkansas Game and Fish Caney Creek access to Lake Conway on Amity Road in Conway.

July 1999 - Water quality, dissolved metals and fecal coliform bacteria collected from transects across the upper and lower ends of Lake Conway during the project titled "Water Quality Assessment of Arkansas' Significant Publicly-Owned Lakes".

March 27, 2001(Table 2) - Water quality and dissolved metals collected from the same five stations identified during the October 12, 1998 event.

April 10, 2001 - Fecal Coliform bacteria samples were collected by boat at 50 locations in Lake Conway. Samples were evenly distributed around the lake and were collected near the shoreline.

August 6, 2001- Fecal Coliform bacteria samples were collected by boat at the same 50 locations identified in April 2001. Water quality, dissolved metals and fecal coliform bacteria was collected from the same five stations identified on October 12, 1998 and at two additional locations. Data from this sampling event is shown in Table 3.

Location of Additional Stations

Adams Lake- Lake Conway at the AGFC Adams Lake Public Access.

Palarm Creek- Palarm Creek at Hwy 286.

DATA RESULTS

The most elevated concentration of **total phosphorus** in Lake Conway was 1.86 mg/L at the Stone Dam Creek station in August 2001 (Figure 2). This has increased from 1.14 mg/L in March 2001 and 0.86 mg/L in October 1998. The Stone Dam Creek site has consistently produced the most elevated total phosphorus concentrations since 1998. All other stations indicated concentrations of total phosphorus at or below 0.17 mg/L, with the exception of 0.45 mg/L collected in August 2001 at the Palarm Creek station.

Nitrate-nitrogen concentrations were most elevated at the Stone Dam Creek site. In 1998, water samples indicated a concentration of 4.17 mg/L nitrates. In March 2001, a concentration of 7.43 mg/L was collected at the same location. In August 2001, a concentration of 1.25 mg/L was recorded at Stone Dam Creek. All other stations indicated nitrate concentrations at or below 0.50 mg/L (Figure 3).

Chloride concentrations were relatively low at all stations with the exception of Stone Dam Creek. This station indicated chloride concentrations of 45.5 mg/L and 44.0 mg/L for 1999 and March 2001, respectively. The August 2001 sampling event indicated a chloride concentration of 46.6 mg/L. All other stations produced chloride concentrations at or below 10.9 mg/L (Figure 4).

Fecal Coliform bacteria samples collected during the October 1998 event at the five tributary stations produced concentrations of 590 col/100ml and 560 col/100ml at Gold Creek and Stone Dam Creek, respectively. At the same stations in March 2001, the concentrations were much reduced, with concentrations of ~10 and ~20 col/100ml. In August 2001, the most elevated concentration of fecal coliform bacteria collected at these same five stations were 320 col/100ml and 252 col/100ml at Hwy 89 and Caney Creek, respectively (Figure 5).

Concentrations of Fecal Coliform bacteria were very low at all 50 shoreline stations collected during the April 2001 event (Figure 6). Eighty-five percent of water samples collected around the shore of Lake Conway produced concentrations of 10 col/100 ml or less. The western shore of the Lake produced the majority of bacterial counts above 10 col/100ml, however, no concentrations were found to exceed 30 col/100ml in the April 2001 collections.

Concentrations of Fecal Coliform bacteria around the Lake Conway shoreline were also low in August 2001 (Figure 7). Excluding the five tributary stations previously discussed, only five stations indicated fecal coliform counts over 100 col/100ml and these exhibited near random distribution around the lake. The most elevated concentration of fecal coliform bacteria collected from the 50 lake stations was 300 col/100ml from a location near the Palarm Creek Landing.

Dissolved copper was detected at higher concentrations on March 27, 2001 than on previous sampling events (Figure 8). The most elevated concentration of 3.65 $\mu\text{g/L}$ was indicated at the Stone Dam Creek station. In 1998 and in August 2001, only the sample collected at the Stone Dam Creek station produced a concentration of copper above the ADEQ laboratory detection limit, this value was below toxic levels.

Dissolved lead was also found in the highest concentration of 0.58 $\mu\text{g/L}$ at the Stone Dam Creek station in March 2001, and the Caney Creek sample revealed a lead concentration of 0.46 $\mu\text{g/L}$ (Figure 9). In October 1998 and August 2001, no samples indicated lead levels above the ADEQ laboratory detection limit.

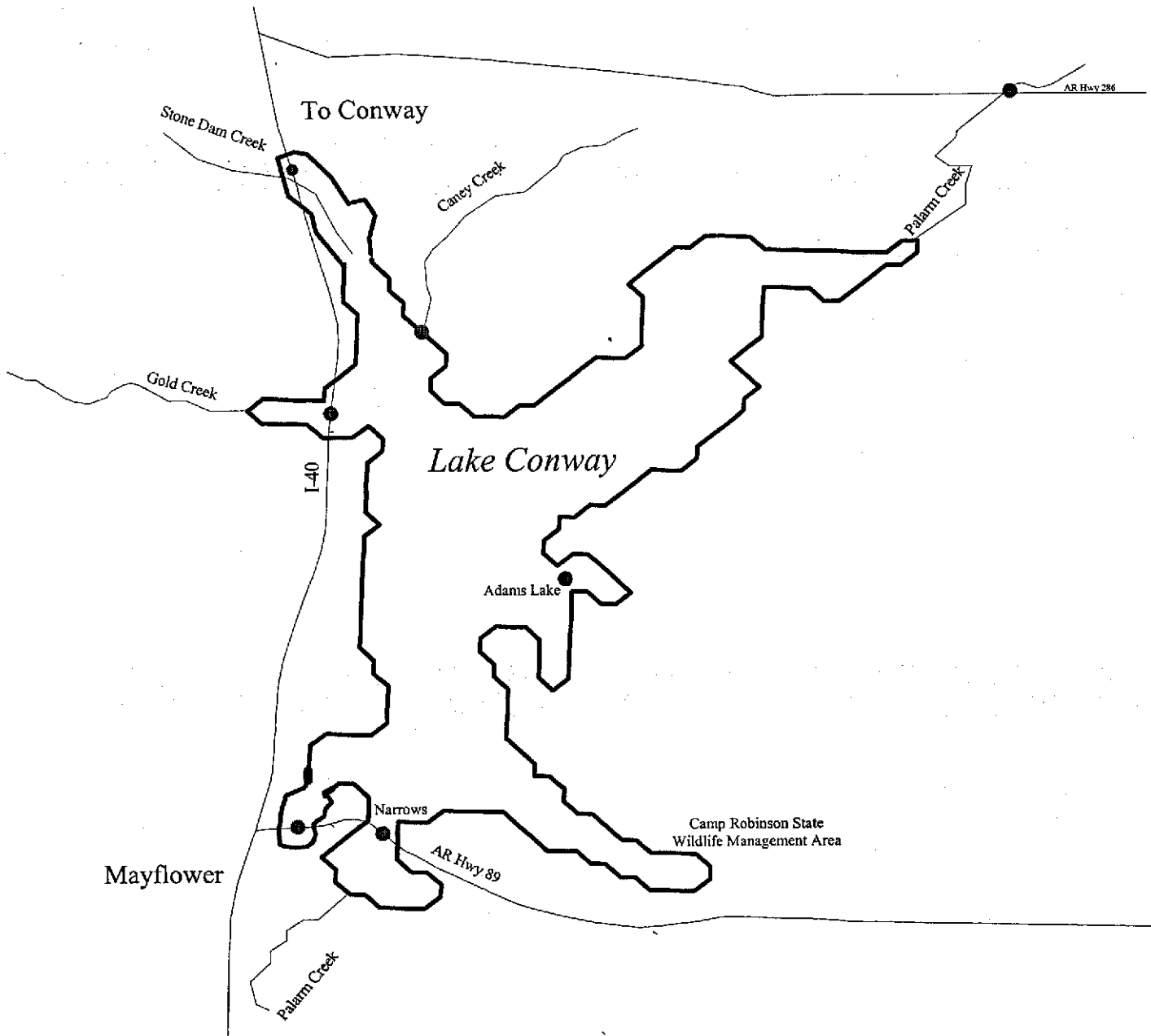
Using the ecoregion hardness value for calculating toxic levels as prescribed in the implementation procedure, none of the dissolved metals were found to be acutely toxic. However, the concentrations of copper (3.65 $\mu\text{g/L}$) and lead (0.58 $\mu\text{g/L}$) collected on March 27, 2001 slightly exceed the chronic toxicity values for copper and lead of 3.5 $\mu\text{g/L}$ and 0.5 $\mu\text{g/L}$, respectively.

CONCLUSIONS

The results of these data collection activities demonstrate the influence of a municipal WWTF on a tributary entering Lake Conway. Several parameters, including nutrients, chlorides and some heavy metals were noticeably elevated below the city of Conway WWTF although the values are typical of most municipal WWTF discharges.

Little can be concluded from the fecal coliform bacteria data , except, under the conditions which existed at the time of the collection, none of the values were considered to be excessive.

Figure 1



● Sample Sites



LAKE CONWAY

Sampling Stations

October 12, 1998

March 27, 2001

August 6, 2001

Arkansas Department of
Environmental Quality

Water Division

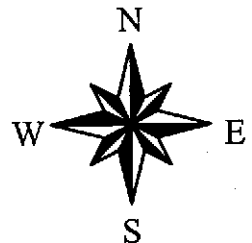


Table 1

STATION ID	units	Hwy 89	Narrows	Gold Cr.	Stone Dam	Caney Cr	Upper Lake	Lower Lake
Water Quality								
October 12, 1998							July 1999	July 1999
Collect Time	hrs	0900	0920	1000	1020	1140		
DO	mg/L	4.11	6.43	4.50	4.11	3.78	7.50	8.71
pH	s.u.	7.50	7.75	7.40	7.43	7.21	7.55	8.08
Water Temp	C	17.20	19.70	19.70	19.50	21.30	30.20	31.30
Bromide(Br)	mg/L	0.06	0.05	<0.03	<0.03	<0.03	0.07	0.06
Chloride(Cl)	mg/L	10.90	10.20	5.09	45.50	4.78	6.31	6.35
Fluoride(F)	mg/L	0.16	0.23	0.12	1.54	0.15	0.13	0.12
Sulfate(SO4)	mg/L	9.62	6.53	16.90	195.00	13.92	3.91	3.50
NH3-N	mg/L	0.08	<0.005	0.26	0.52	0.29	<0.01	<0.01
NO3-N	mg/L	0.04	0.03	0.52	4.17	0.33	0.02	0.02
O-PHOS	mg/L	1.28	0.01	0.02	0.52	0.02	0.01	0.01
T-PHOS	mg/L	0.17	0.12	0.17	0.86	0.17	0.06	0.06
TKN	mg/L	1.73	1.35	1.87	1.52	1.51	0.92	0.79
TOC	mg/L	6.60	7.90	7.50	7.60	7.10	5.90	5.50
BOD5	mg/L	4.50	3.70	3.50	2.05	3.29	2.98	2.93
Turbidity	NTU	*	*	*	*	*	6.10	6.20
TSS	mg/L	32.00	15.00	55.00	42.00	50.00	4.50	6.50
TDS	mg/L	77.00	83.00	85.00	450.00	82.00	64.00	63.50
Fecal Coliform	col/100ml	66	188	590	560	216	3.8**	4.6**
Dissolved Metals								
Aluminum (Al)	ug/L	<127	<127	342.50	<127	467.30	<127.00	<127.00
Arsenic (As)	ug/L	<1.0	<1.0	<1.0	1.64	<1.0	1.51	1.80
Barium (Ba)	ug/L	24.00	13.20	24.10	23.90	25.60	<8.80	<8.80
Beryllium (Be)	ug/L	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Boron (B)	ug/L	35.70	57.60	33.50	418.60	23.50	31.10	24.30
Cadmium (Cd)	ug/L	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Calcium (Ca)	mg/L	5.50	5.60	4.10	23.40	4.60	5.30	5.40
Chromium (Cr)	ug/L	0.41	<0.4	0.44	0.76	0.56	<0.40	<0.40
Cobalt (Co)	ug/L	<0.50	<0.50	1.21	1.50	1.34	<0.50	<0.50
Copper (Cu)	ug/L	<0.5	<0.5	<0.5	2.15	<0.5	<0.50	<0.50
Iron (Fe)	ug/L	198.90	41.70	443.50	164.90	560.70	43.60	33.00
Lead (Pb)	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.30	<0.30
Magnesium (Mg)	mg/L	2.40	2.40	2.60	3.80	1.90	2.30	2.40
Manganese (Mn)	ug/L	430.40	113.60	462.80	653.50	485.00	1.60	31.30
Nickel (Ni)	ug/L	<2.0	<2.0	2.62	17.65	<2.0	<2.00	<2.00
Potassium (K)	mg/L	4.90	5.90	4.70	11.10	3.30	4.50	4.40
Selenium (Se)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.00	<3.00
Sodium (Na)	mg/L	10.50	14.00	6.30	107.40	4.70	7.80	6.60
Vanadium (V)	ug/L	<1.0	<1.0	<1.0	2.43	<1.0	<1.00	<1.00
Zinc (Z)	ug/L	5.60	3.50	5.00	17.40	4.80	5.90	1.30
Hardness	mg/L	24.00	24.00	21.00	74.00	20.00	23.00	23.00
* Turbidity was not run due to laboratory technician error.								
** Calculated as the average of five 100 ml grab samples across the lake.								

Table 2

STATION ID	units	Hwy 89	Narrows	Gold Cr.	Stone Dam	Caney Cr
Water Quality						
March 27 2001						
Collect Time	hrs	1230	1250	1300	1305	1320
D.O.	mg/L	9.6	9.8	11	12.5	10.6
PH	s.u.	7.25	7.50	8.23	8.00	7.78
Water Temp	C	14.90	13.50	14.40	15.30	15.20
Bromide(Br)	mg/L	<0.010	<0.010	0.03	0.23	0.03
Chloride(Cl)	mg/L	4.04	3.90	5.64	44.01	9.91
Fluoride(F)	mg/L	0.07	0.10	0.12	1.10	0.12
Sulfate(SO4)	mg/L	4.86	6.40	9.66	129.00	9.16
NH3-N	mg/L	<0.005	<0.005	<0.005	0.86	<0.005
NO3-N	mg/L	0.06	0.04	0.05	7.43	0.02
O-PHOS	mg/L	<0.005	<0.005	<0.005	0.96	<0.005
T-PHOS	mg/L	0.07	0.08	0.14	1.14	0.09
TKN	mg/L	0.96	0.83	1.02	4.31	0.84
TOC	mg/L	6.70	4.81	4.72	9.48	6.72
BOD	mg/L	2.15	2.17	4.20	3.22	2.72
Turbidity	NTU	5.0	5.2	9.3	16.5	7.7
TSS	mg/L	7.0	8.5	13.5	10.3	5.8
TDS	mg/L	47	41	52	362	76
Fecal Coliform	col/100ml	<5	<5	~10	~20	<5
Dissolved Metals						
Aluminum (Al)	ug/L	<127	<127	<127	<127	<127
Arsenic (As)	ug/L	<1	<1	<1	1.76	<1
Barium (Ba)	ug/L	12.6	11.3	<8.8	11.1	11.9
Beryllium (Be)	ug/L	<0.11	<0.11	<0.11	<0.11	<0.11
Boron (B)	ug/L	11.1	13.6	18.6	384	10.9
Cadmium (Cd)	ug/L	<0.14	<0.14	<0.14	<0.14	<0.14
Calcium (Ca)	mg/L	3	2.8	3.2	22	5.9
Chromium (Cr)	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4
Cobalt (Co)	ug/L	<0.50	<0.50	<0.50	1.72	<0.50
Copper (Cu)	ug/L	1.28	1.20	1.02	3.65	1.39
Iron (Fe)	ug/L	587	106	168	153	525
Lead (Pb)	ug/L	0.33	<0.3	<0.3	0.58	0.46
Magnesium (Mg)	mg/L	1.4	1.5	1.7	3.8	2.8
Manganese (Mn)	ug/L	50.9	13.3	15.1	382	66.8
Nickel (Ni)	ug/L	<2	<2	<2	11.98	<2
Potassium (K)	mg/L	2.2	3.1	2.3	9.1	3.1
Selenium (Se)	ug/L	<3	<3	<3	<3	<3
Sodium (Na)	mg/L	5.1	5.6	7.8	69.1	10.7
Vanadium (V)	ug/L	<1.0	<1.0	<1.0	1.04	<1.0
Zinc (Z)	ug/L	4.3	2.2	1.1	20.1	2.1
Hardness	mg/L	14	13	15	70	26

Table 3

STATION ID	units	Hwy 89	Narrows	Gold Cr	Stone Dam	Caney Cr	Adams Lake	Palarm Cr
August 6, 2001								
Time	hours	1215	1200	1150	1140	1130	1056	1110
DO	mg/L	7.1	7.1	3.4	3.4	3.8	7.8	1.9
pH	s.u.	6.70	6.73	6.43	6.31	6.91	7.32	7.23
Water Temp	C	32	33	30	30	31	32	28
Bromide (Br)	mg/L	0.04	0.04	0.07	0.41	0.06	0.03	0.03
Chloride (Cl)	mg/L	7.37	7.35	10.41	46.62	8.12	7.38	6.24
Fluoride (F)	mg/L	0.20	0.20	0.29	1.23	0.25	0.21	0.10
Sulfate (SO4)	mg/L	1.99	1.92	4.54	110.80	7.51	1.80	1.67
NH3-N	mg/L	0.01	<0.005	0.07	1.28	<0.005	0.01	0.02
NO3-N	mg/L	0.04	0.04	0.03	1.25	0.03	0.03	0.03
O-PHOS	mg/L	0.01	0.01	0.04	1.46	0.01	0.02	0.01
T-PHOS	mg/L	0.04	0.07	0.17	1.86	0.05	0.17	0.45
TKN	mg/L	0.14	0.21	0.45	1.99	0.12	0.28	0.34
TOC	mg/L	7.15	6.76	9.37	9.64	7.50	6.84	8.83
BOD	mg/L	3.93	3.66	7.42	3.79	2.74	5.38	2.06
Turbidity	NTU	11	14	14	9.2	5.6	31	7.0
TSS	mg/L	10.75	15.75	18.75	11.00	7.25	32.00	3.75
TDS	mg/L	81.5	79.5	107.0	376.0	90.0	81.5	79.0
Fecal Coliform	col/100ml	320	~35	-13	~22	252	175	~22
Dissolved Metals								
Aluminum (Al)	ug/L	<127	<127	<127	175	<127	<127	<127
Arsenic (As)	ug/L	2.23	2.37	3.22	3.72	2.4	1.87	2.12
Barium (Ba)	ug/L	<8.8	<8.8	16.4	14.2	<8.8	18.4	21.8
Beryllium (Be)	ug/L	<.11	<.11	<.11	<.11	<.11	<.11	<.11
Boron (B)	ug/L	29.3	29.1	69.7	754	55.3	36.3	15.8
Cadmium (Cd)	ug/L	<.14	<.14	<.14	<.14	<.14	<.14	<.14
Calcium (Ca)	mg/L	5.78	6.44	7.32	25.2	7.42	5.32	5.84
Chromium (Cr)	ug/L	<.4	0.44	0.45	0.71	0.69	<.4	0.43
Cobalt (Co)	ug/L	<.5	<.5	<.5	1.19	<.5	<.5	0.61
Copper (Cu)	ug/L	<.5	<.5	<.5	1.6	<.5	<.5	<.5
Iron (Fe)	ug/L	<15	<15	163	146	188	109	601
Lead (Pb)	ug/L	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Magnesium (Mg)	mg/L	3.09	3.1	2.82	3.29	2.84	2.68	3.43
Manganese (Mn)	ug/L	6.58	110	143	571	182	477	1480
Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	9.28	<2.0	<2.0	<2.0
Potassium (K)	mg/L	4.02	3.7	4.53	13.8	3.78	4.02	5.46
Selenium (Se)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Sodium (Na)	mg/L	7.99	7.92	14.4	81.6	10.6	8.44	4.81
Vanadium (V)	ug/L	<1.0	<1.0	<1.0	1.66	<1.0	<1.0	<1.0
Zinc (Zn)	ug/L	<1.0	1.17	1.29	5.51	1.39	2.81	1.25
Hardness	mg/L	27	29	30	76	30	24	29

Figure 2

Total Phosphorus

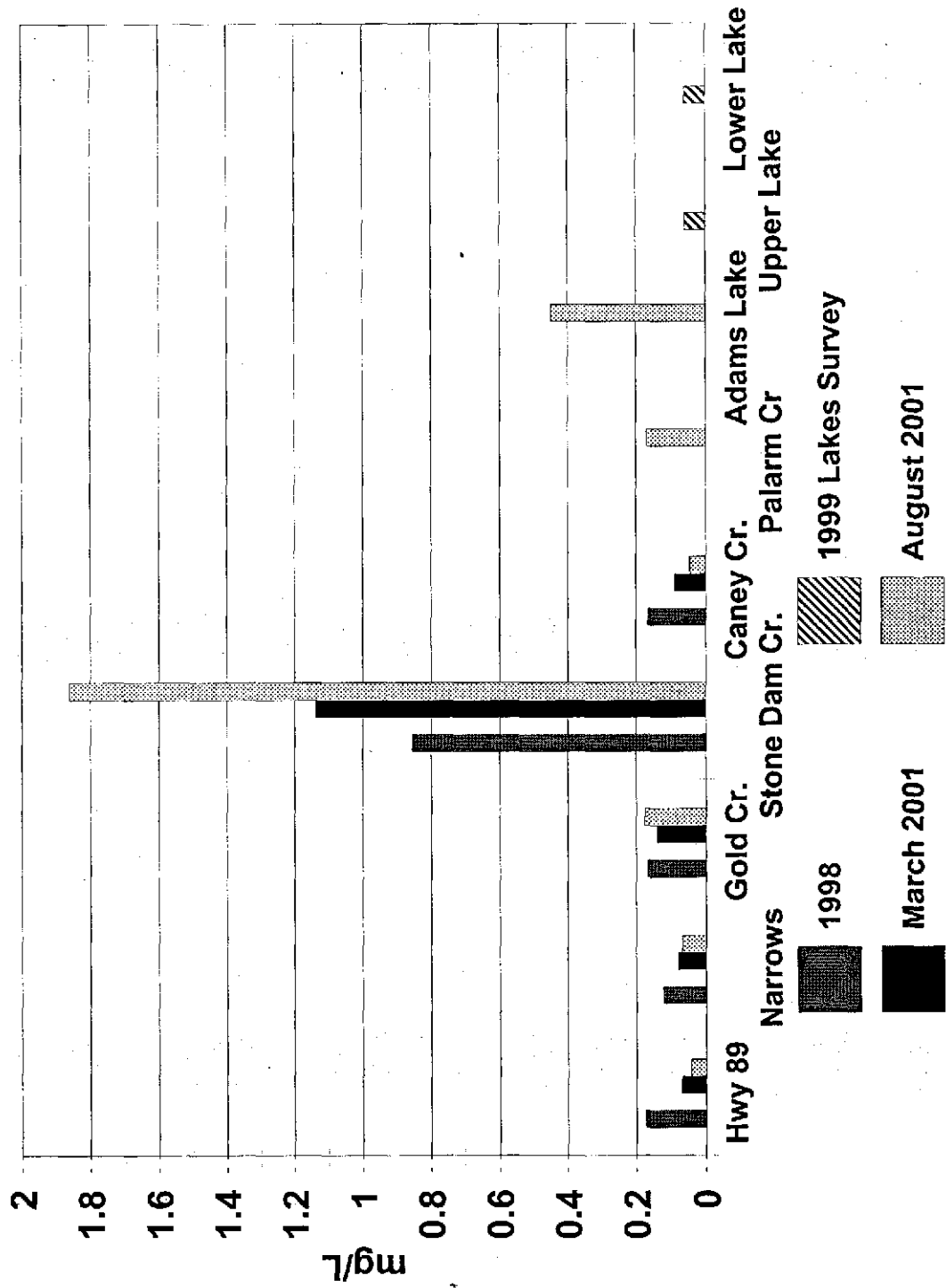


Figure 3

Nitrates

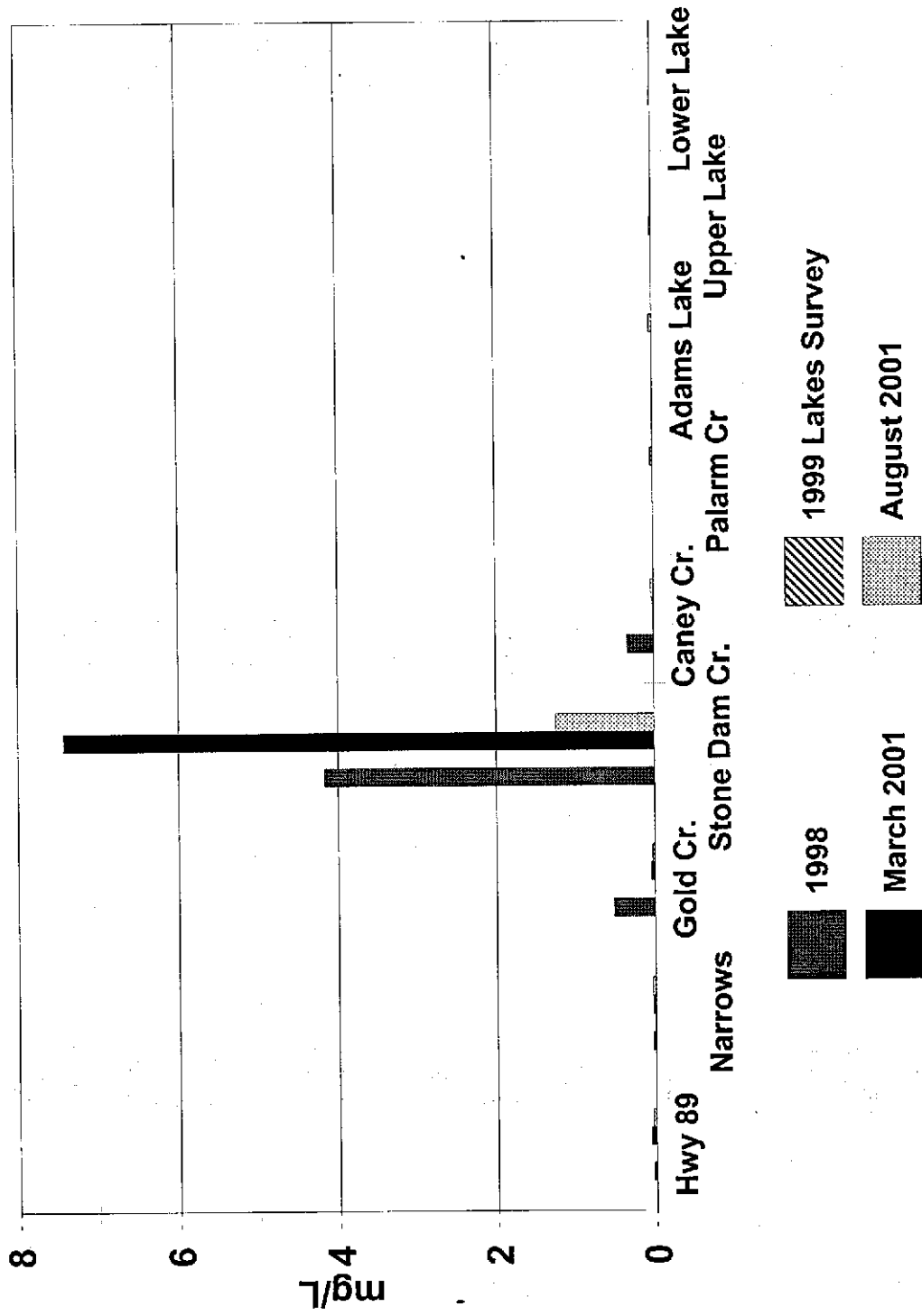


Figure 4

Chloride

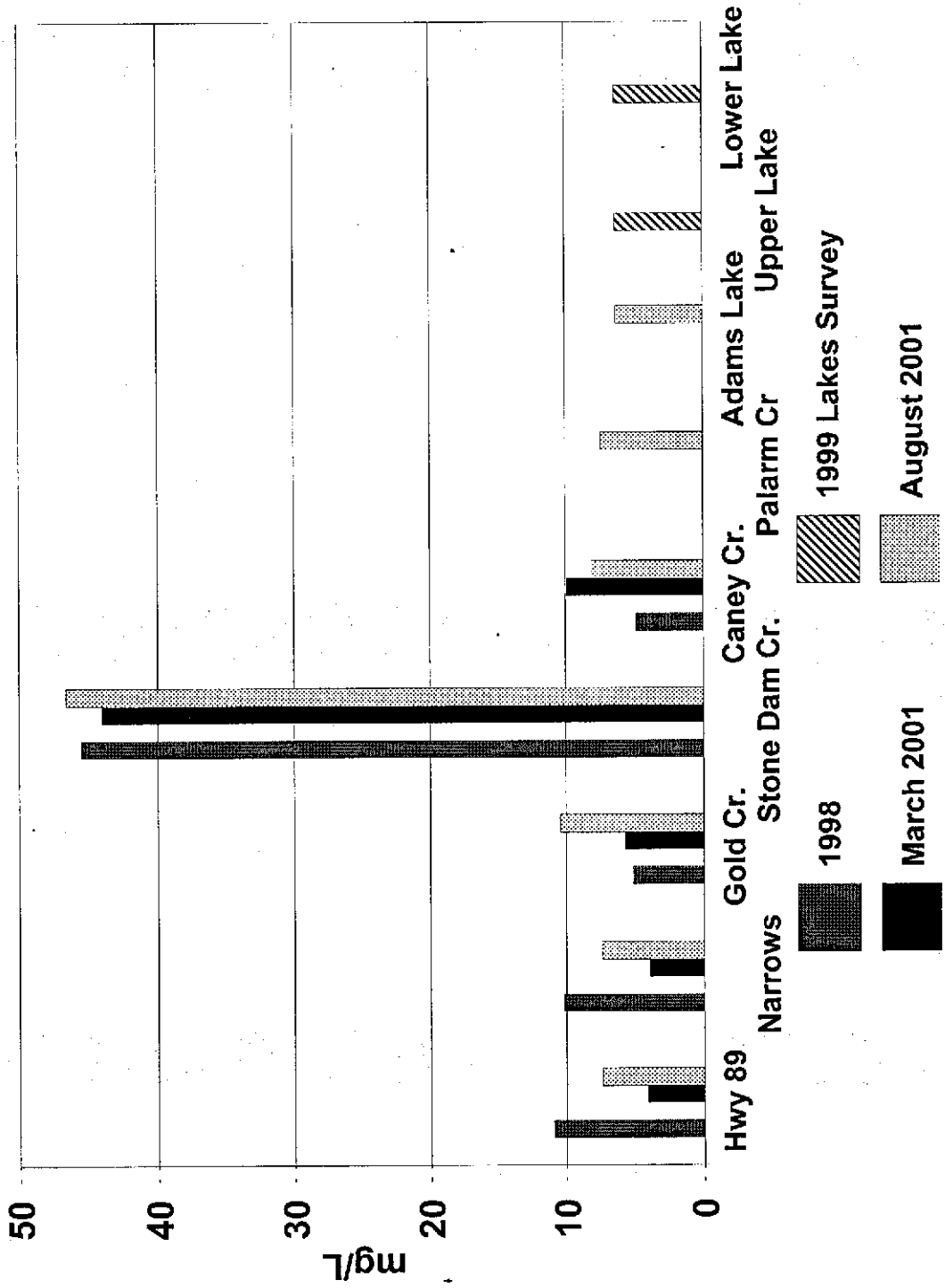
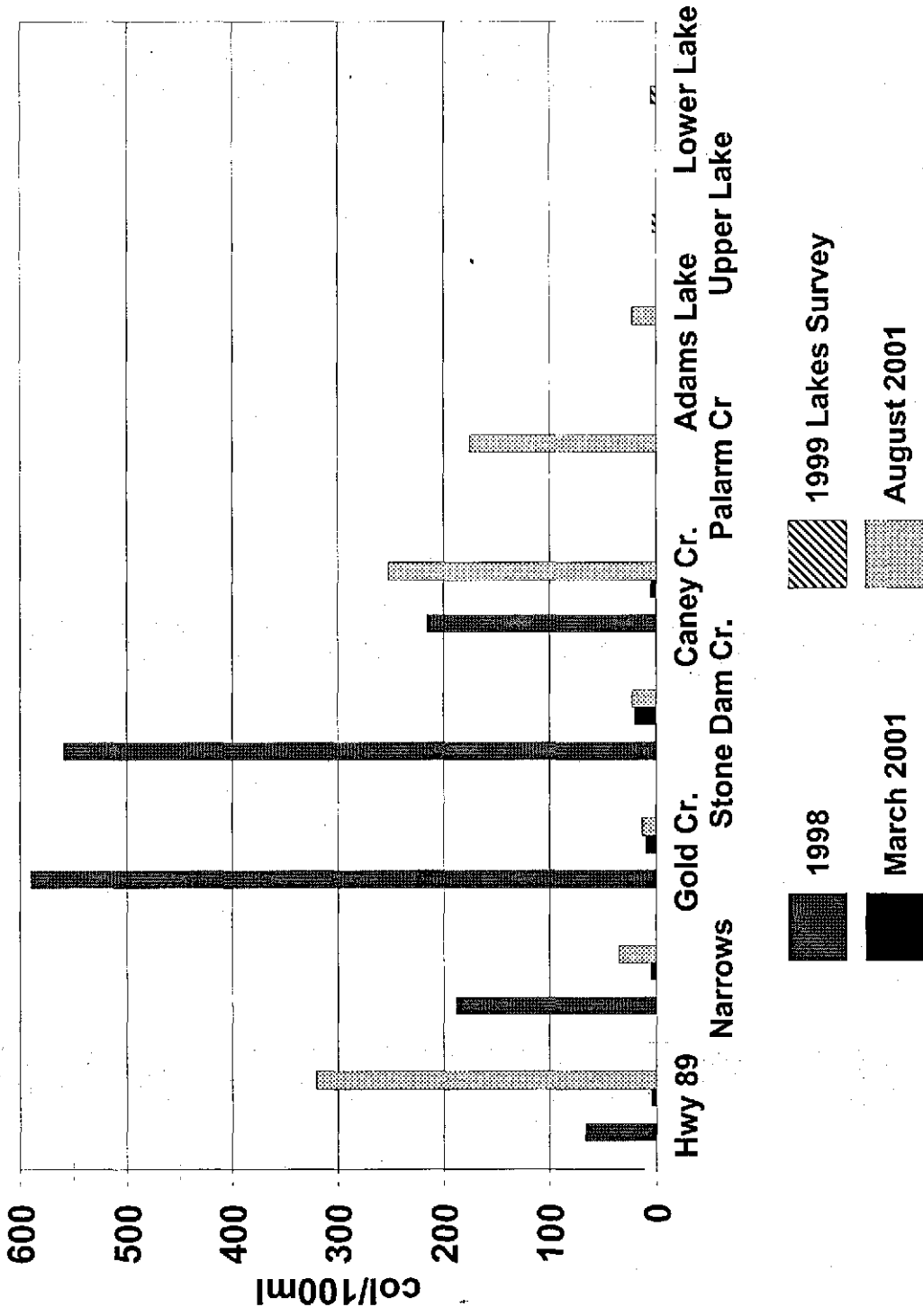


Figure 5

Fecal Coliform Bacteria



LAKE CONWAY

Fecal Coliform Bacteria (#/100 mL)

August 6, 2001

Figure 7

To Conway

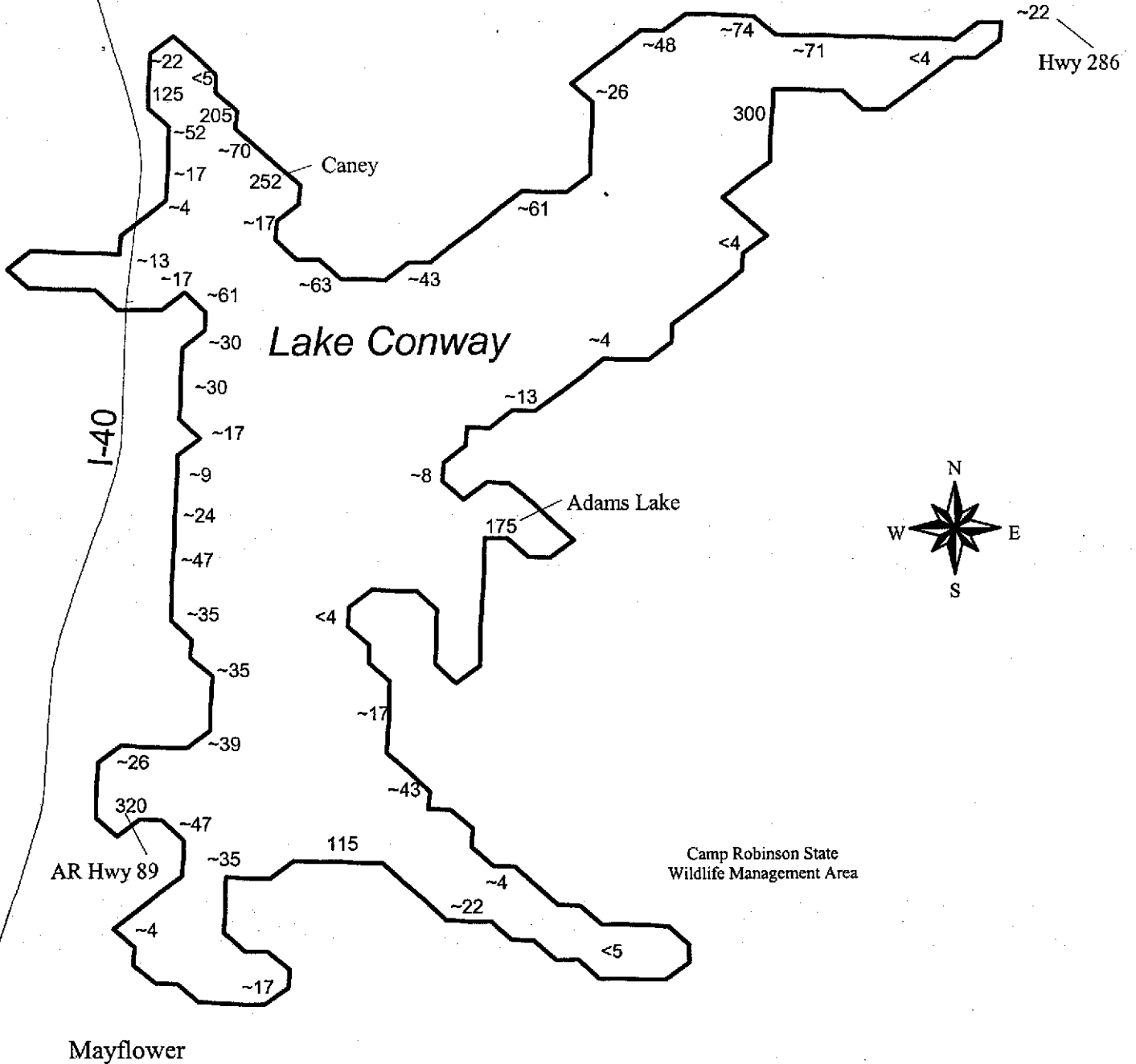


Figure 8

Dissolved Copper

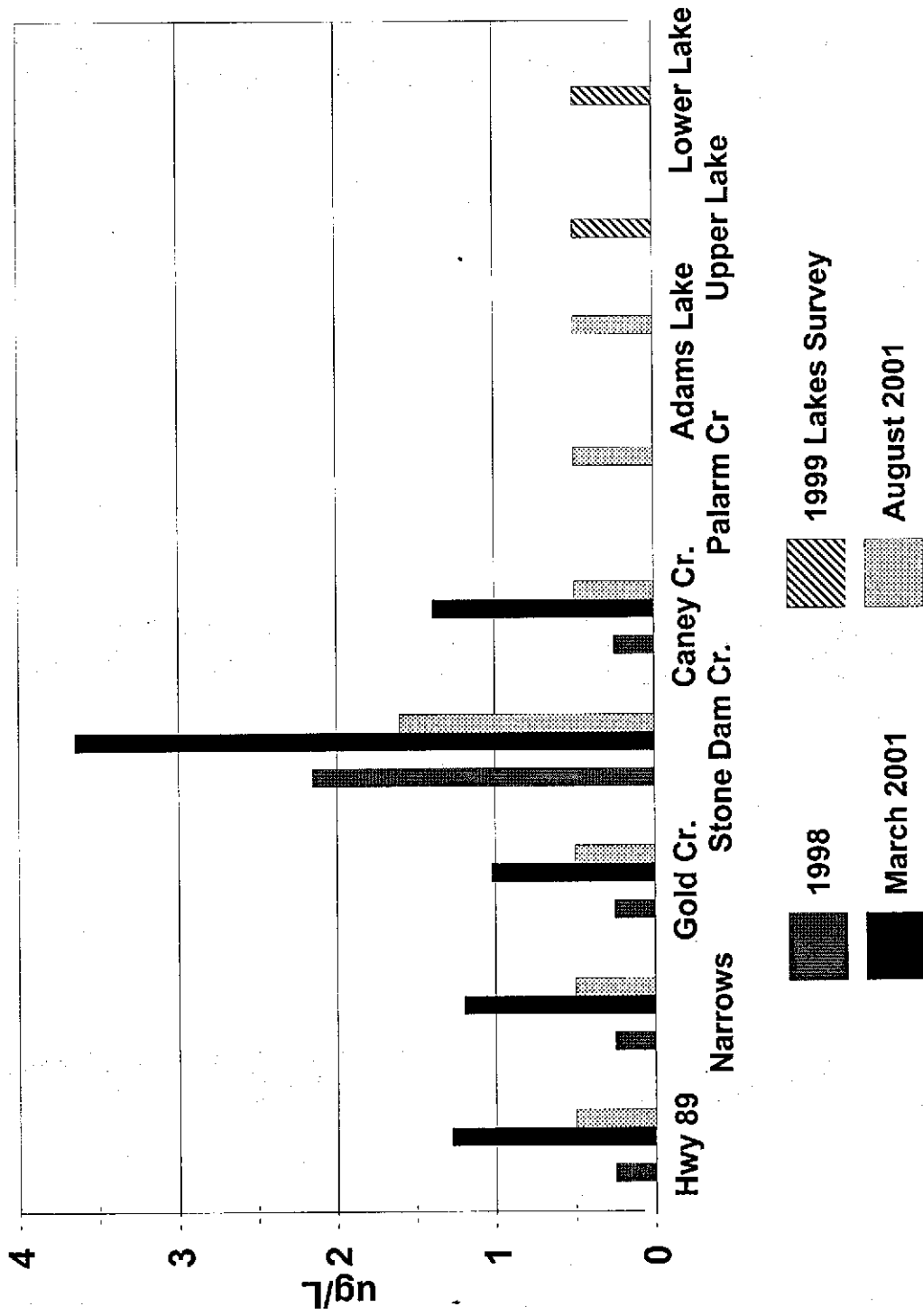


Figure 9

Dissolved Lead

