1989 WATER QUALITY REPORT

National Park Service

Buffalo National River

1989
WATER QUALITY REPORT

NATIONAL PARK SERVICE

BUFFALO NATIONAL RIVER

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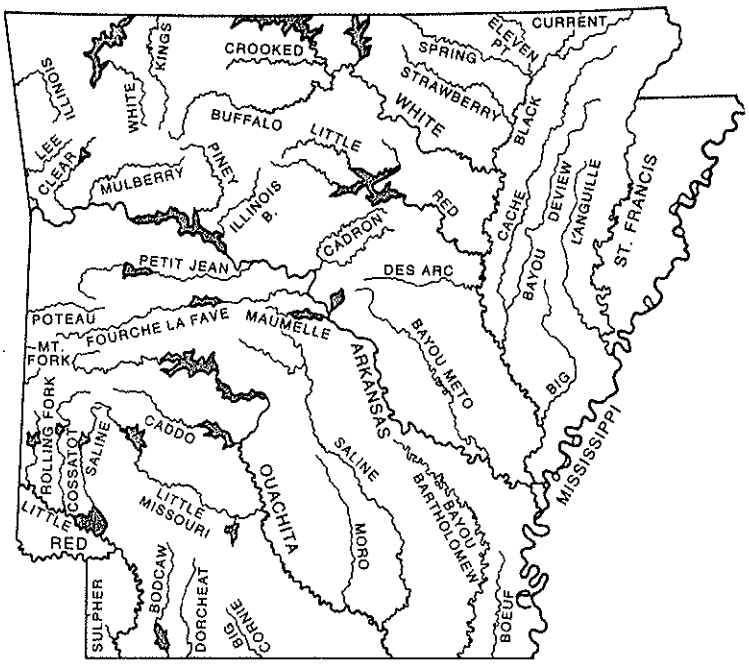


Major streams and rivers of Arkansas

INTRODUCTION

Buffalo National River (BNR) was established by Congress (P.L. 92-237) in 1972 "for the purposes of conserving and interpreting an area containing unique scenic and scientific features, and preserving as a free-flowing stream an important segment of the Buffalo River...". The Buffalo River is also designated by the Arkansas Department of Pollution Control and Ecology (ADPCE) as Outstanding Natural Resource Waters (ONRW) with extraordinary recreation and aesthetic values, the highest ranking of stream quality in this system (ADPCE, 1988). ADPC&E applies specific standards to BNR, under the ONRW designation, which exceed those standards applied to undesignated waters. In addition, the Buffalo River and most of the tributaries sampled by BNR are designated as primary contact recreation waters and specific standards are applicable between April 1 and September 30.

The water quality monitoring program (WQM) at BNR is designed to evaluate the waters of the Buffalo River and its major tributaries to determine compliance with state standards. The WQM program also defines the present water quality of the surface and ground waters at BNR, thereby establishing a baseline against which future changes can be compared. This information will be critical for park managers making decisions about future demands placed on the Buffalo River and the waters within its drainage basin. As the Buffalo River's watershed becomes increasingly populated and developed, background water quality data will be crucial in understanding the effects of changing land use on the National River's water resources. The goal of the WQM program is the protection of visitors to BNR and the preservation of the entire array of Buffalo River's aquatic resources.

Sampling sites monitored in 1989 include nine river corridor sites, 18 tributaries and three springs (Figure 1). The sampling schedule included all river corridor sites monthly and the tributary and spring sites approximately eight times between June and September. The river corridor samples were analyzed for selected metals twice and nutrient parameters once each season during 1989. The availability of additional funding in FY89 also allowed BNR to measure the concentration of nutrients in tributary samples five times during the summer season. In total, 286 site samples/measurements were recorded in 1989.

An additional study of the upper river was undertaken by Hydrologic Technician David Mott as part of his Master's Thesis at the University of Arkansas. The study compared water quality parameters at sites above and below Boxley Valley during rain events and high water flows. The site above Boxley Valley represented natural background conditions and the site below the valley reflected the influence of the agricultural land use occurring between the two. Both sites were monitored during four separate rain events between January and May 1989 (Mott, 1990).

RESULTS

The water quality data collected during 1989 represents 286 visits to sampling locations in the field. These locations are displayed in Figure 1 on page 7 and listed in Appendix 1. The data has been tabulated and is expressed graphically in Figures 4 through F2 and in tabular form in Tables 1 through 30. The following discussion summarizes the results for each parameter and references the appropriate graphs and tables.

Fecal Coliform

River Corridor: The geometric mean of fecal coliform counts on the river corridor as a whole dropped from 6 col/100ml in 1988 to four col/100 ml in 1989 (Figure C1). The site with the highest geometric mean (4) and maximum (325) counts was Ponca (R2). These numbers were much lower than those observed in 1988 (44 & 540 respectively). Fecal coliform sampling during rain events in Boxley Valley at R1 and R2 (Mott, 1990) indicated higher concentrations at R2 than R1 throughout all four rain events sampled. The maximum concentration, measured during a January storm, at Ponca (R2) was 1500 col/100 ml. During the same storm the maximum concentration at site R1 was 500 col/100 ml. The average concentration at Ponca (R2) from all four rain events sampled was twice as high as at the Wilderness Boundary above Boxley (R1).

Fecal coliform concentrations at the other sites down river remained low (Figure A1, Table 2). At all sites, except R2, 75% of the samples were below 10 col/100 ml. The highest counts generally occurred on June 15th and 16th in association with a storm event and more turbid water. The flow at Highway 65 increased from 438 cfs on June 11th to 1980 cfs on June 14. On June 15 and 16 the flow at Hwy. 65 was 1790 and 1310 cfs respectively.

Tributaries: Tomahawk Creek (T14) had the highest mean fecal coliform concentration (35.4 col/100 ml) of the tributaries sampled in 1989 (Figure D5 and Table 10). This compares with a g-mean in 1988 of 98 col/100 ml. The lowest fecal coliform concentration at T-14 was 22 col/100 ml. Richland Creek's fecal coliform concentration decreased significantly from a g-mean of 154 in 1988 to 8 in 1989. A combination of differences in flow conditions and the number of cattle grazing adjacent to the stream may account for the decrease. The consistently high counts at Tomahawk Creek do not appear to be related to rain events. When elevated bacteria numbers are associated with storm runoff a strong correlation with turbidity is evident. The maximum turbidity measured at T14 was 1.9 FTU and the mean turbidity was 1.0 FTU (Table 13). This suggests a source other than agricultural runoff. The maximum concentration for all sites in 1989 was 3,400 col/100 ml on Big Creek (T-6) on July 24th. The associated turbidity reading was 68 FTU. These high numbers

appeared to have been related to two events 1) a heavy rain storm over the Big Creek drainage and 2) highway construction activity in the stream bed near Vendor. The only other tributary with a maximum fecal coliform concentration above 200 col/100 ml was Cave Creek (T8). This concentration was measured on July 25th and is probably related to the same rain event that occurred in the neighboring Big Creek drainage.

All three springs sampled in 1989 showed fecal coliform g-means less than 10 col/100 ml with the maximum being 44 at Gilbert Spring (S41) on July 25th (Table 15). Tributaries were only sampled from June 5th to September 27.

TURBIDITY

River Corridor: Mean turbidity values ranged from 3.7 FTU at R1 to 2.0 FTU at R5 (Figure A2 and Table 6). As in 1988, the highest turbidity readings occurred in the spring and summer due to floods in the spring and algae growth in the summer.

Tributaries: Turbidity readings ranged from a minimum of 0.3 FTU at T7, T15, and T23 to a maximum of 68 FTU at T6. The mean values ranged from .5 FTU at Water Creek (T15) to 9.46 FTU at Big Creek (T6). The high turbidity reading at T6 was associated with a rain event and a construction project as discussed in the previous section. Tributaries were only sampled from June 5th to September 27.

DISSOLVED OXYGEN

River Corridor: As in previous years g-mean values are fairly consistent throughout the river corridor (Figure A3). Mean concentrations of dissolved oxygen varied from 7.9 mg/l at R9 to 9.0 mg/l at R1. As expected the highest concentrations occur during January (mean of 16.0 mg/l) and the lowest during August (mean of 8.13 mg/l) (Table 7).

Tributaries: Mean dissolved oxygen values ranged from 9.63 mg/l at Mill Creek (T11) to 7.68 mg/l at Leatherwood Creek (T24)(Figure D1 and D2). The lowest D.O. measurement was 6.2 mg/l at Middle Creek on August 30th. Tributaries were only sampled from June 5th to September 27th.

TEMPERATURE

River Corridor: Water temperatures ranged from a high of 27.5 degrees C. at Rush (R8) in August to a low of 4.4 at Pruitt (R3) in January. Mean water temperatures ranged from 5.78 degrees C. in February to 25.43 in August (Figure B2 and Tables 5 & 8).

Tributaries: Tributary water temperatures ranged from a high of 28.9 degrees C. at Big Creek (T18) in June to a low of 11.0 at Davis Creek on September 27th. Mean water temperatures ranged from 24.7 degrees C. at Clabber Creek to 17.9 at Davis Creek (Table 9). Tributaries were only sampled from June 5th to September 27.

SPECIFIC CONDUCTANCE

River Corridor: The same general increase of specific conductance values in the down stream direction which has been reported in previous years occurred in 1989 (Table 3).

Tributaries: As reported in 1988, the specific conductance values of tributaries in the lower or eastern portion of the watershed tend to be higher due to the higher proportion of limestone and dolomite bedrock (Table 11).

NUTRIENTS

River Corridor: River corridor sites were sampled in March, July, October and November for nutrient concentrations (Table 17-20). Mean nitrogen (NO2/NO3-N) values generally increased only slightly in a downstream direction with all values being less than .03 mg/l (Figure E1 and Table 17). Total Kjeldahl Nitrogen (TKN) values were highest, mean .69 mg/l, in the fall during October but had dropped to .2 mg/l by November. Ammonia (NH4-N) values were significantly higher in March with a mean of .22 mg/l compared to all other samples which were $\leq$ .03 mg/l (Table 20). The discharge at Highway 65 was approximately 3,000 cfs when the March sample was taken, in comparison to $\leq$ 250 cfs when the other samples in July, October and November were taken. The highest mean value for total phosphate was .026 mg/l at Hasty (R4).

Tributaries: 1989 was the first time nutrient analysis was performed on samples from tributaries. Tributaries were sampled five times from June 4th to September 27. Nitrogen (NO3/NO2-N) mean values ranged from a high of .822 mg/l at Richland Creek (T9) to a low of .02 mg/l at Middle Creek (T23). TKN mean values ranged from .32 mg/l at the Little Buffalo, Big Creek, and Cave Creek to .08 mg/l at Tomahawk Creek (T14). Total Phosphate values ranged from .032 mg/l at Calf Creek (T10) to .0002 mg/l at Davis Creek (T7). Ammonia mean values ranged from .07 at Cave Creek (T8) and Tomahawk Creek (T14) to .012 at Big Creek (T6).

DISCHARGE

Discharge, as measured by the U.S. Geological Survey at Highway 65 in cubic feet/second, was fairly normal until October (Figures 4,5,6). While the mean monthly discharges over the period of record typically show the lowest flows in September (200 cfs), in 1989 the flow had dropped below 100 cfs by mid August and never exceeded that mark again until January 19, 1990. Mean flows in October, November and December were 32 cfs or less, compared to the means for the period of record above 1,000 cfs. Maximum mean daily discharge occurred on February 14, 1989 at 25,800 cfs. Minimum mean daily discharge occurred on several days in the last half of October at 27 cfs.

CONCLUSIONS

The water quality monitoring program at Buffalo National River in 1989 did not reveal any significant abnormalities as compared with previous years. An important addition to the program was the analysis of nutrients from tributary samples over the summer period. Nutrient concentrations were generally very low with a few notable exceptions such a NO3/NO2-N concentration of 4.0 mg/l on Richland Creek in July. This appears to have been an anomaly since the other four samples had concentrations of $\leq$ .05 mg/l.

As expected, fecal coliform concentrations were highest in areas with livestock grazing adjacent to streams. As in previous years the R2 site at the Ponca Low-water bridge had the highest levels on the river. Tomahawk Creek continued to show consistently higher fecal coliform levels than similar tributaries. The elevated levels on Tomahawk Creek do not appear to be related to storm events and subsequent agricultural runoff.

Dissolved oxygen levels on the river corridor sites were lower in the months of October, November and December than in previous years due to reduced flows. Due to the low flow conitions, the normal late summer build up of periphyton algae remained until December.

A separate study of the effects of cattle pasture runoff was conducted by David Mott. Two sample sites were located above and below Boxley Valley. Samples were collected during four rain storms in the winter and spring. Differences in chemical and bacterial concentrations were attributed to the cattle grazing and geology between the two stations. Differences observed between winter and spring samples were the result of vegetative growth in the spring.

The parameters of greatest interest in this study were fecal coliform bacteria and nutrients. The study results indicated average fecal coliform concentrations in the runoff draining from pastures in Boxley Valley were over fifty times greater than background concentrations. State water quality standards for fecal coliform were exceeded at both stations during high water following rain storms, but for a longer period of time and by a greater margin at the downstream station. Fecal coliform concentrations greater than 400 col/100 ml were detected in only one sample from the site above the Valley while eight samples from below the Valley exceeded that level.

Nutrient concentrations were generally higher at the downstream station but not to the same extent as fecal coliform increased. Unlike fecal coliform , nutrient correlation with discharge was affected by season and was more pronounced in the winter.

RECOMMENDATIONS

With the planned addition of a hydrologist to the National River staff in 1990, a complete analysis of the data collected since 1985 will be possible. Once this analysis is completed, the current monitoring program should be examined and any changes in light of the first five years of monitoring should be made. It may be possible to reduce the number of sampling sites or the frequency of sampling at some locations. An increased emphasis should be placed on establishing gauging stations on the river and major tributaries to obtain discharge information. In addition to its importance in analyzing other water quality parameters, discharge data will be critical in assessing the impacts of diversion projects on tributaries and establishing minimum instream flow requirements.

The consistently high levels of fecal coliform bacteria on Tomahawk Creek suggest a source other than agricultural runoff, possibly sewage from a human source. Increase monitoring to establish whether the state water quality standard is being exceeded should be under taken. Since only 1% of the Tomahawk Creek watershed is within the BNR boundary, assistance should be sought from the Arkansas Department of Pollution Control and Ecology to determine the source.

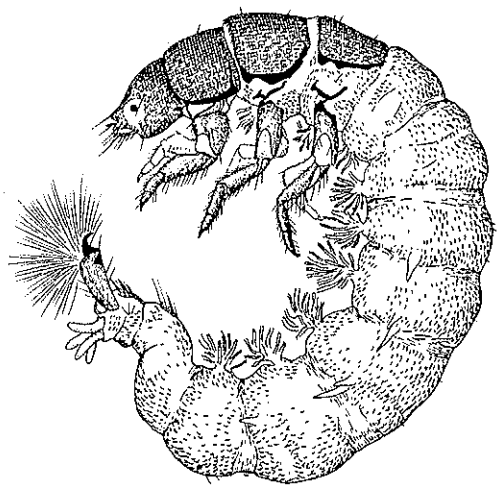
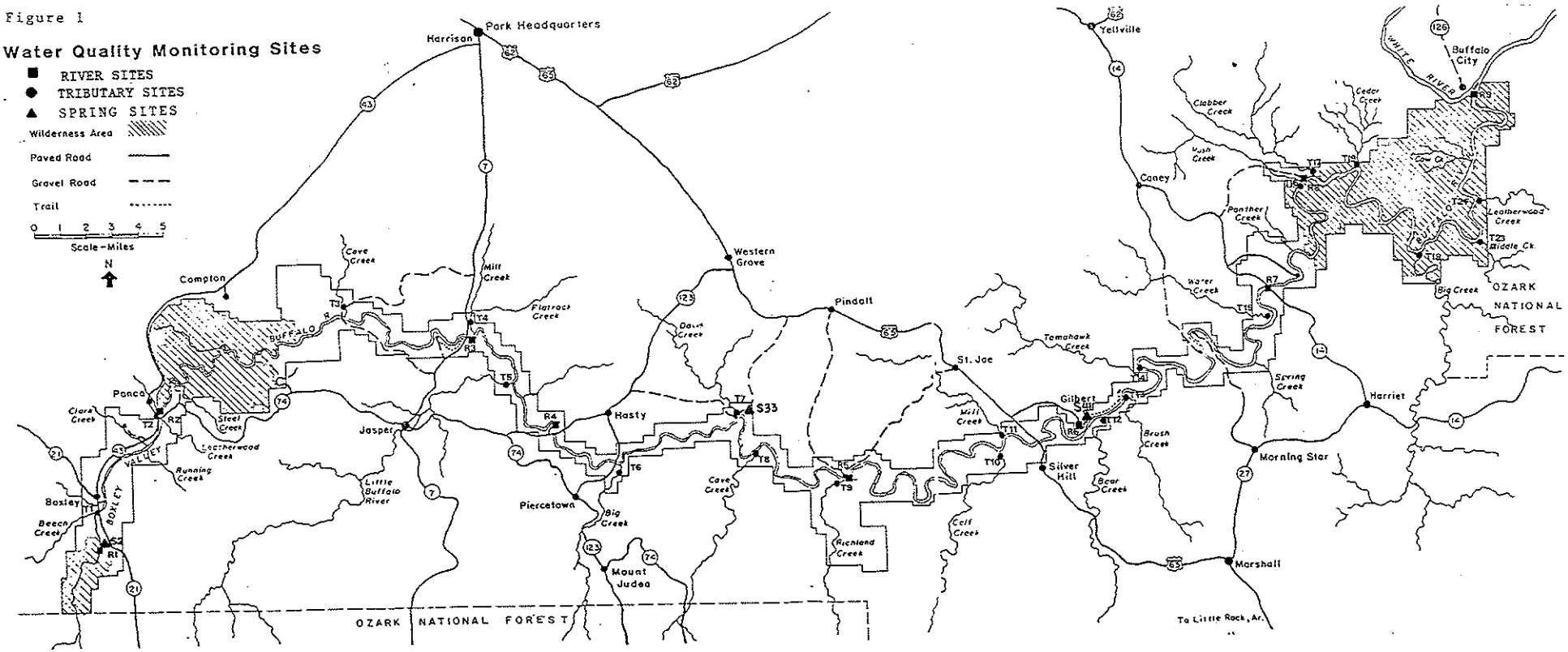


Figure 1



RIVER SITES

R-1 (Wild. boundary)
R-2 (Ponca)
R-3 (Pruitt)
R-4 (Hasty)
R-5 (Woolum)
R-6 (Gilbert)
R-7 (HWY 14)
R-8 (Rush)
R-9 (Mouth)

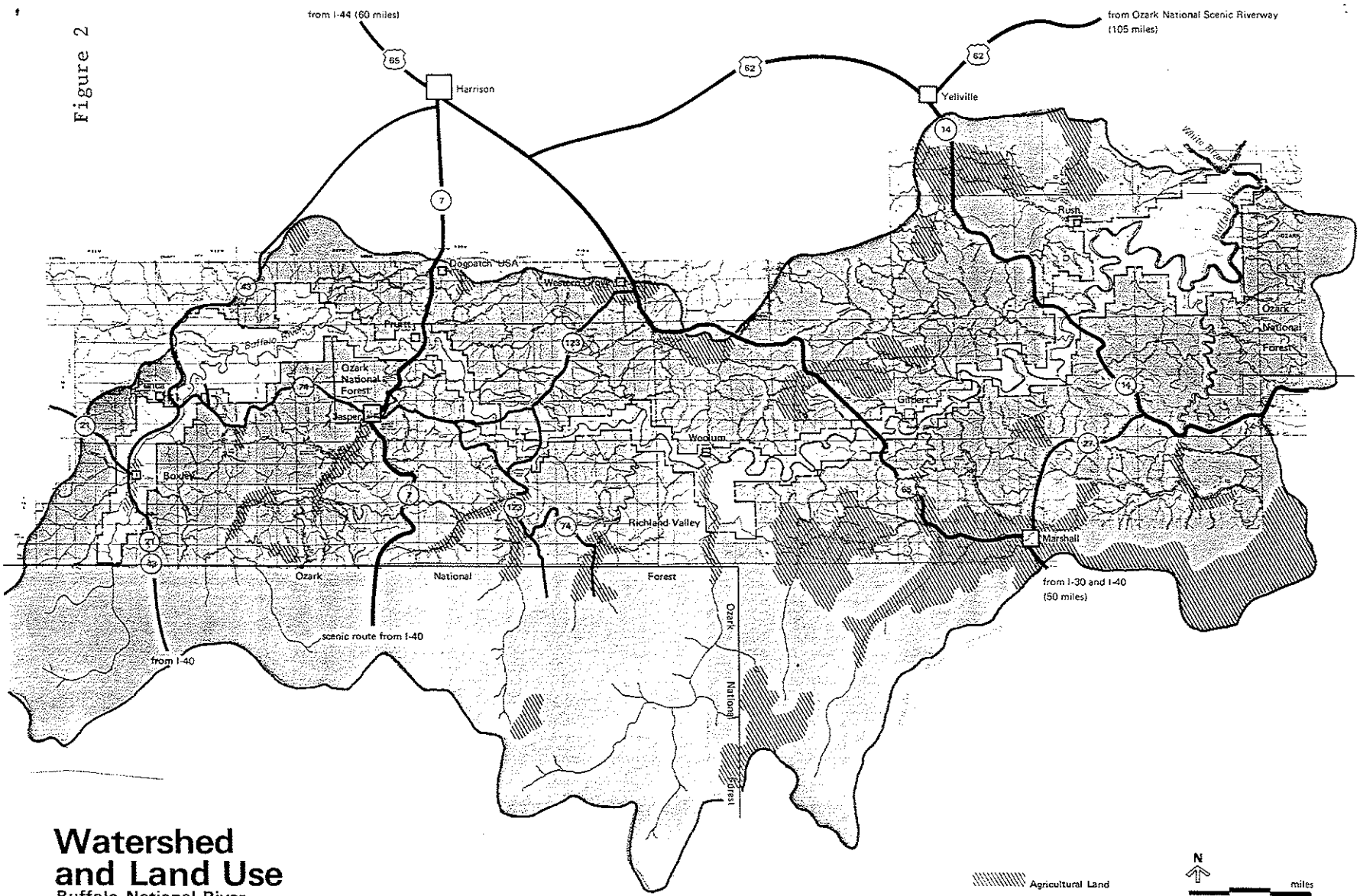
TRIBUTARY SITES

T-1 (Beech Creek)
T-2 (Ponca Creek)
T-3 (Cecil Creek)
T-4 (Mill Creek U)
T-5 (Little Buffalo River)
T-6 (Big Creek H)
T-7 (Davis Creek)
T-8 (Cave Creek)
T-9 (Richland Creek)
T-10 (Calf Creek)
T-11 (Mill Creek M)
T-12 (Bear Creek)
T-13 (Brush Creek)
T-14 (Tomahawk Creek)
T-15 (Water Creek)
T-16 (Rush Creek)
T-17 (Clabber Creek)
T-18 (Big Creek L)
T-19 (Cedar Creek)
T-23 (Middle Creek)
T-24 (Leatherwood Creek)

SPRING SITES

S-2 (Luallen Spring)
S-33 (Mitch Hill Spring)
S-41 (Gilbert Spring)

Figure 2



Watershed and Land Use

Buffalo National River

United States Department of the Interior / National Park Service

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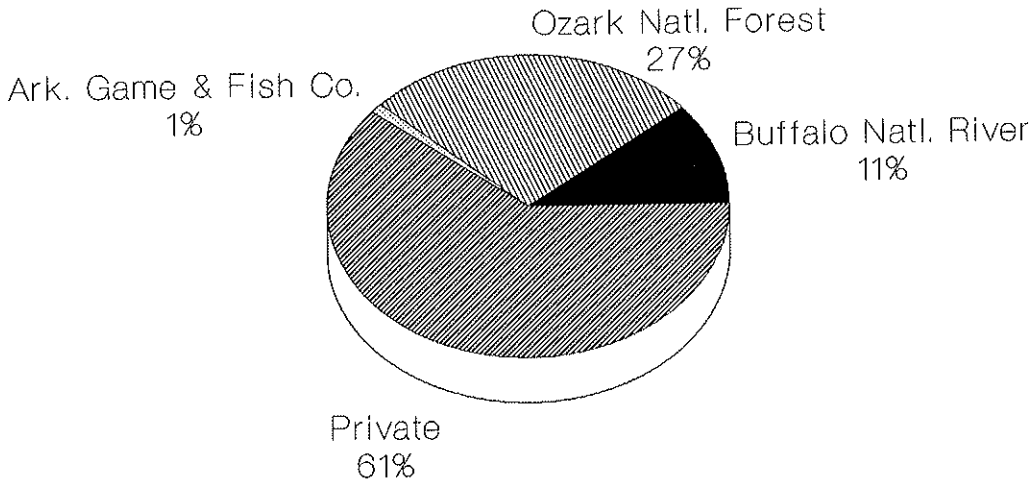
Figure 3

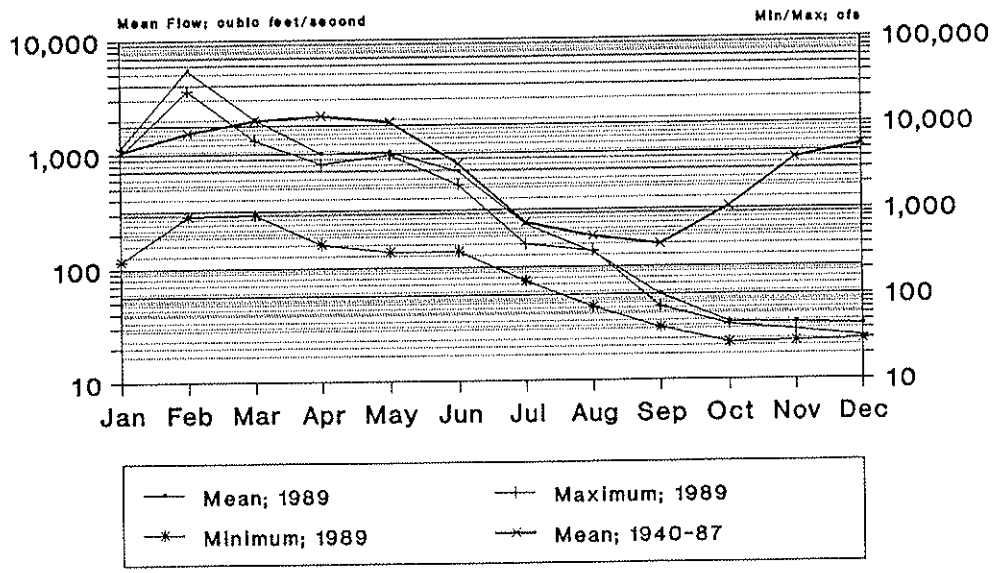
Buffalo River Watershed
Land Ownership



840,000 acre watershed

Figure 4

1989 Flow vs. 1940-87 Flows
Buffalo River, Hwy 65

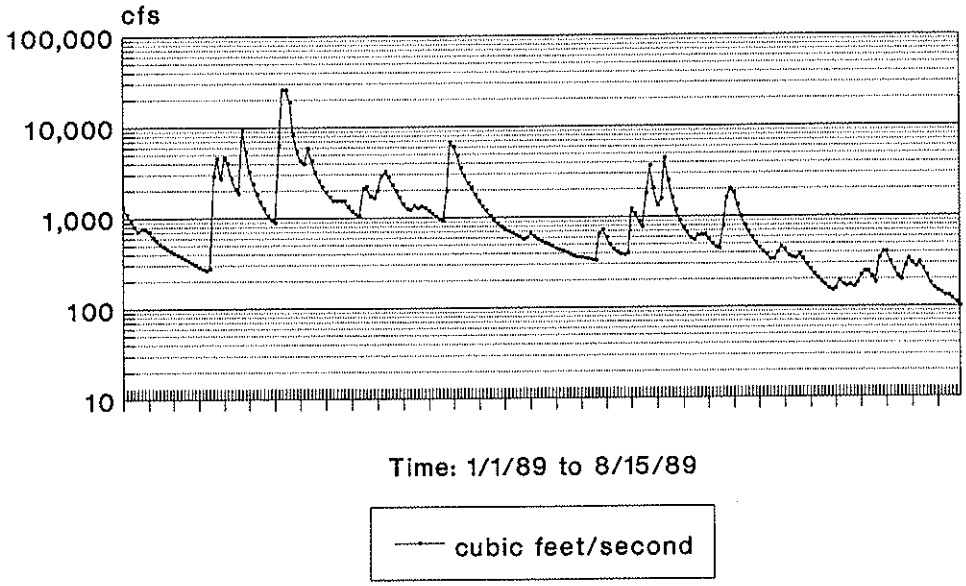


Source: U.S. Geological Survey

Drainage Basin; 829 sq. miles

Figure 5

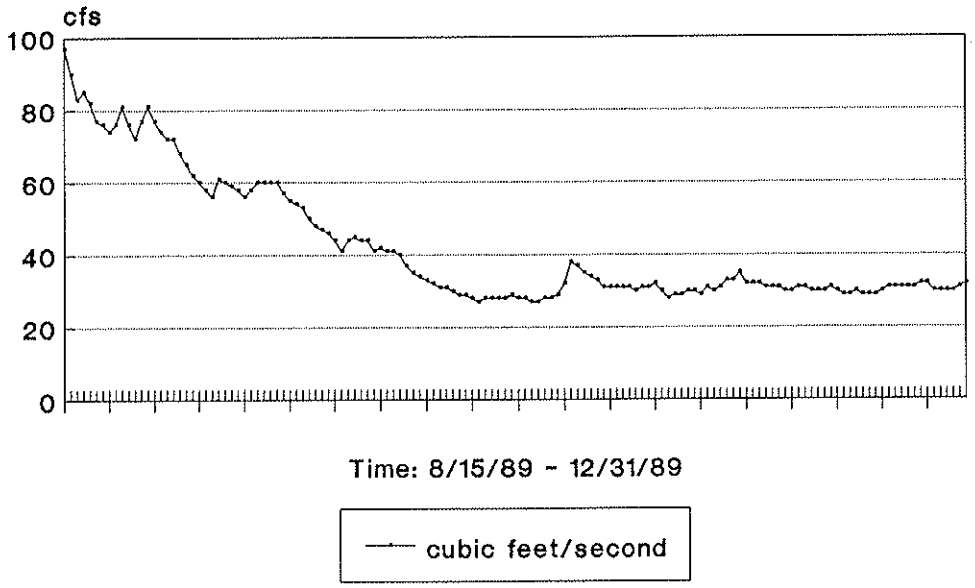
Mean Daily Flows; 1/1/89 - 8/15/89
Buffalo River; Highway 65



Source: U.S. Geological Survey
Drainage Area: 829 sq. miles

Figure 6

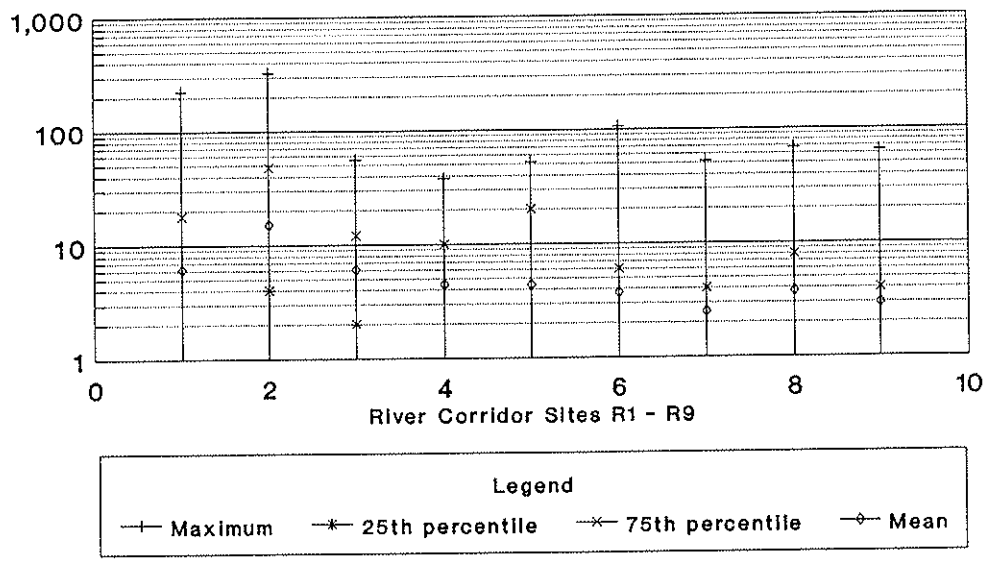
Mean Daily Flows; 8/15/89 - 12/31/89
Buffalo River; Highway 65



Source: U.S. Geological Survey
Drainage Area: 829 sq. miles

Figure A1

River Corridor Sites; R1 - R9
Fecal Coliform; Col/100ml

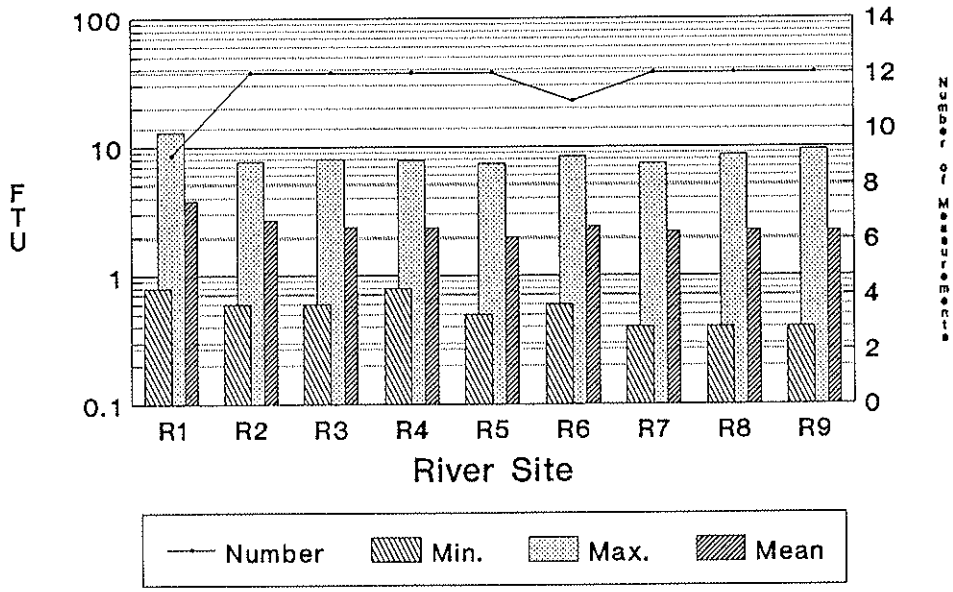


Source; 12 samples/site

All minimum values = 0

Figure A2

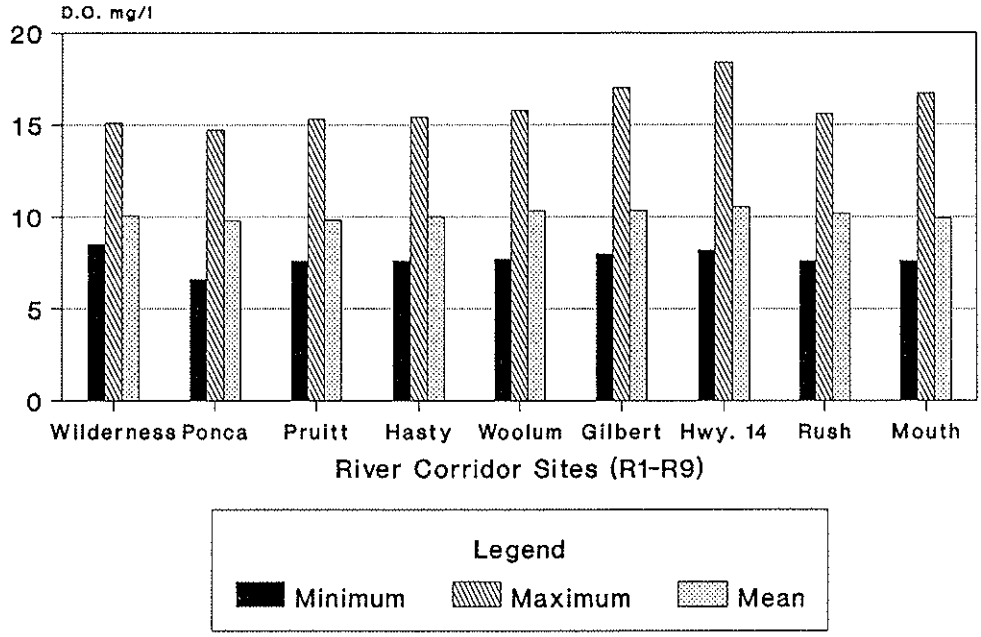
Turbidity (FTU)
River Corridor Sites; R1-R9



FTU = Formazin Turbidity Unit

Figure A3

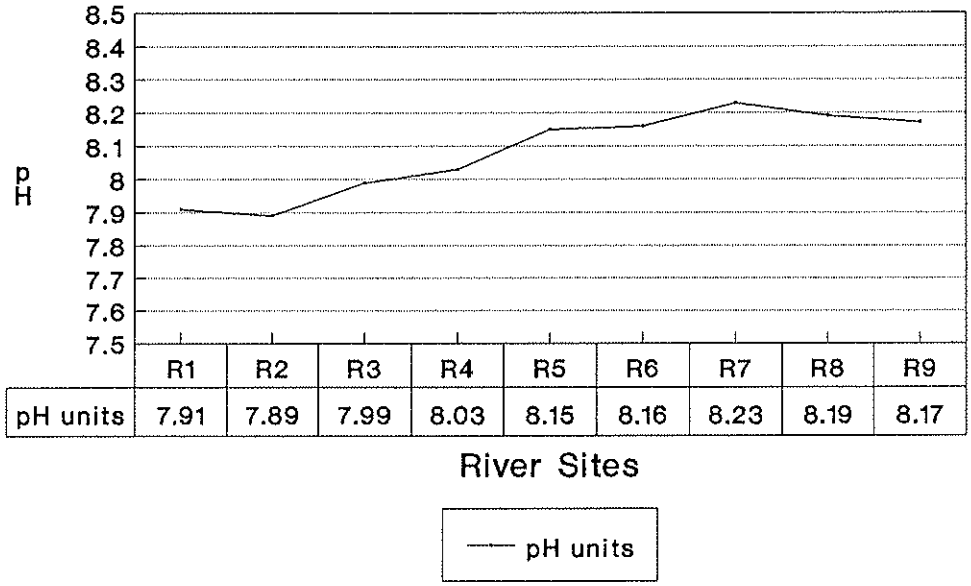
River Corridor Sites; R1 - R9
Dissolved Oxygen; mg/l



Source: 1 sample/month/site

Figure A4

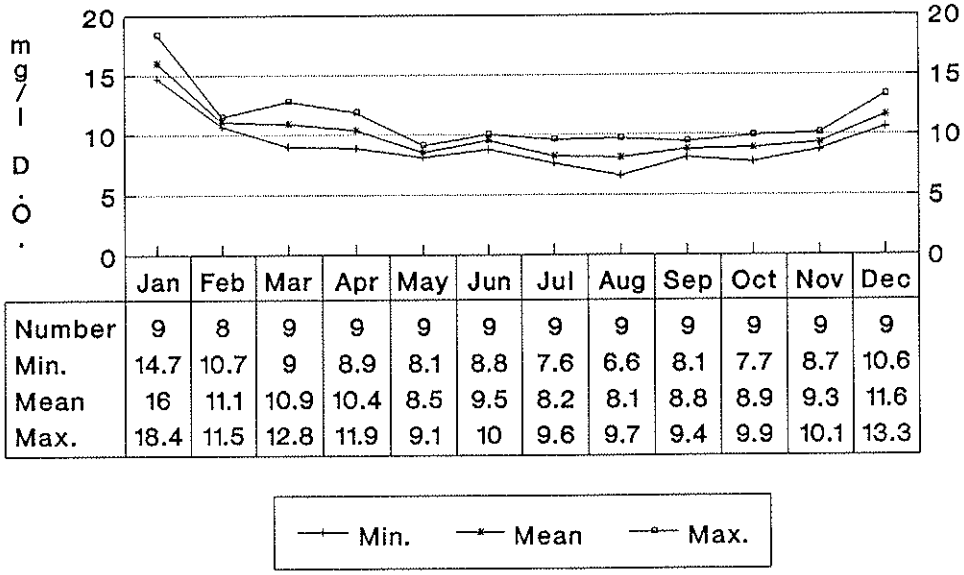
Mean pH; River Sites
Buffalo River



Source: 1 sample/month in 1989

Figure B1

Dissolved Oxygen (mg/l); River Sites
Buffalo River

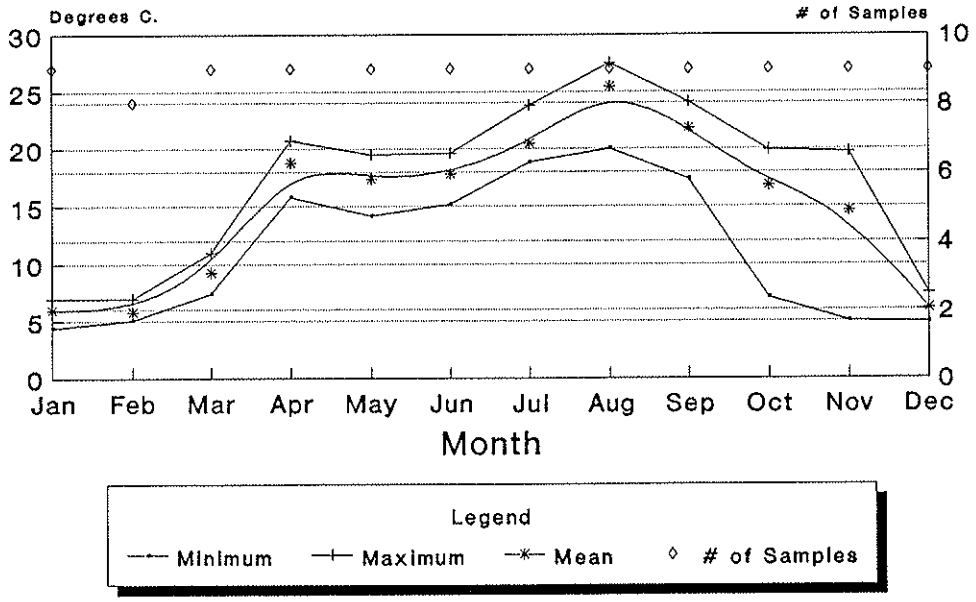


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Number	9	8	9	9	9	9	9	9	9	9	9	9
Min.	14.7	10.7	9	8.9	8.1	8.8	7.6	6.6	8.1	7.7	8.7	10.6
Mean	16	11.1	10.9	10.4	8.5	9.5	8.2	8.1	8.8	8.9	9.3	11.6
Max.	18.4	11.5	12.8	11.9	9.1	10	9.6	9.7	9.4	9.9	10.1	13.3

mg/l = milligrams per liter
Number = sites measured

Figure B2

1989 Water Temperatures; Degrees C.
River Corridor Sites (R1-R9); Monthly



Includes all samples (107)

Figure C1

Mean Fecal Coliform Counts; 1985-89
River Corridor Sites (Combined)

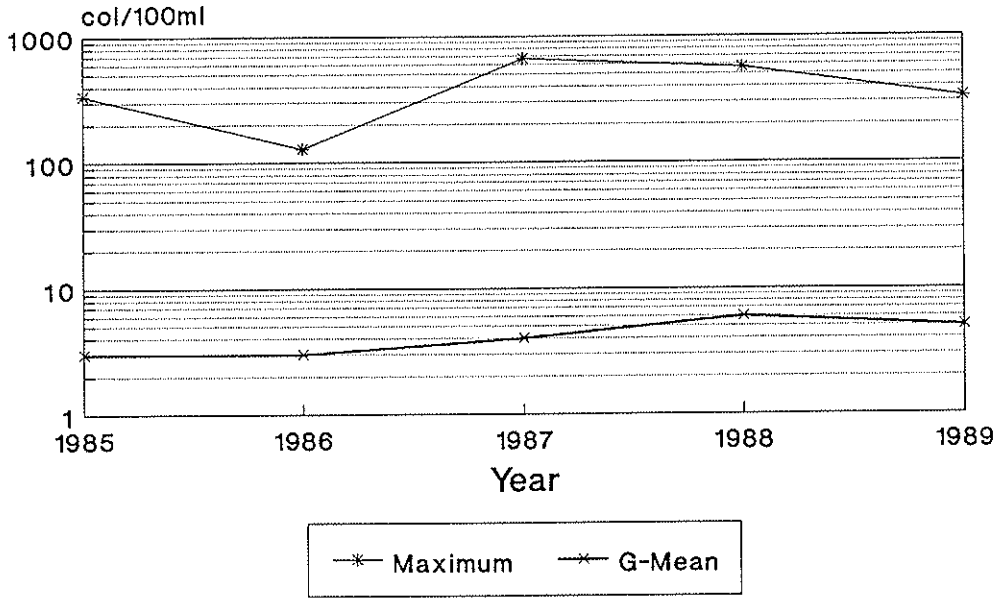


Figure C2

Fecal Coliform, Ponca (R2)
Mean & Maximum Counts; 1985-89

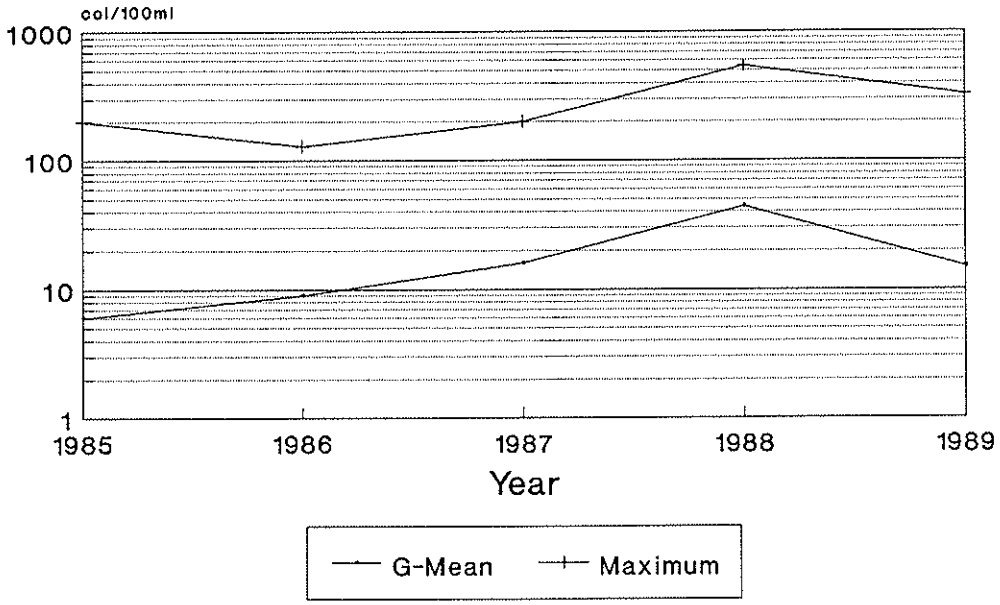
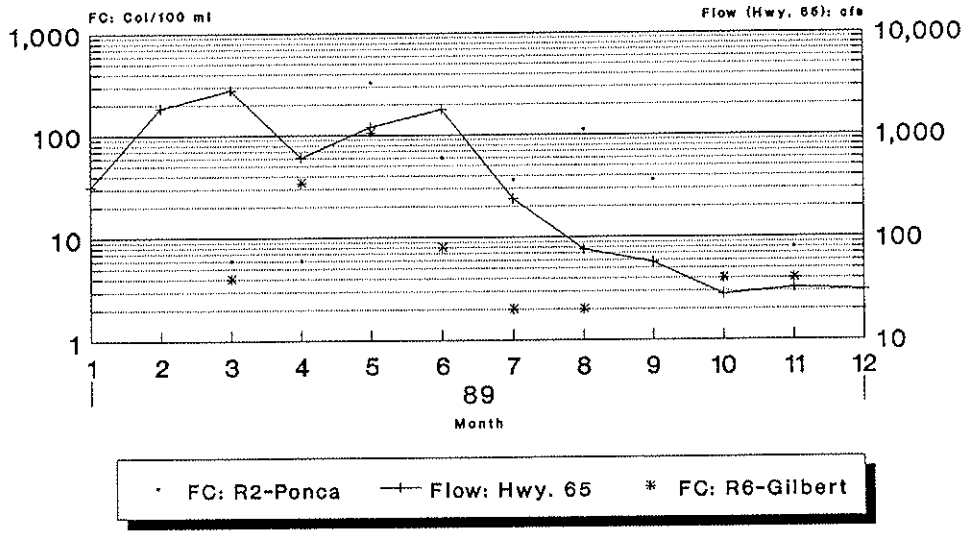


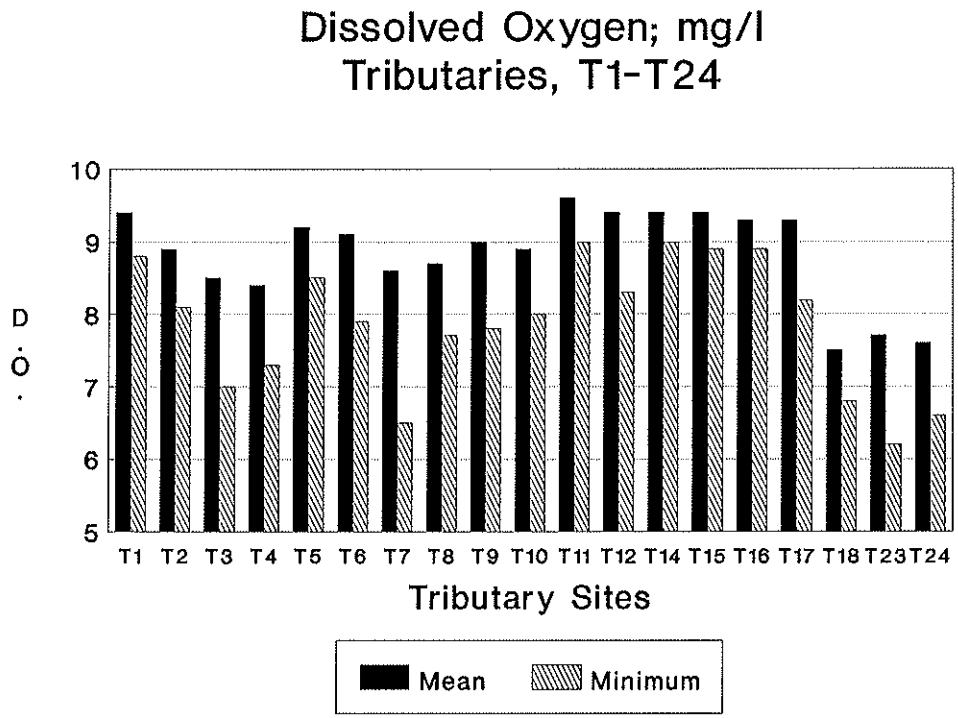
Figure C3

Buffalo National River
FC vs. Flow



cfs = cubic feet/second
FC = Fecal Coliform
Col/100ml = colonies per 100 milliliters

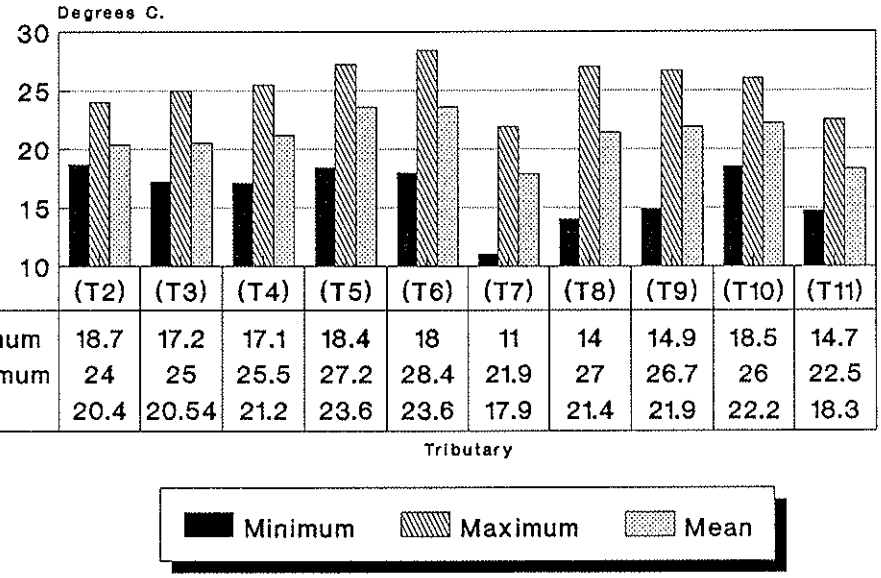
Figure D1



D.O. = dissolved oxygen in milligrams per liter

Figure D3

Water Temperature; degrees C.
Tributaries; T2 - T11

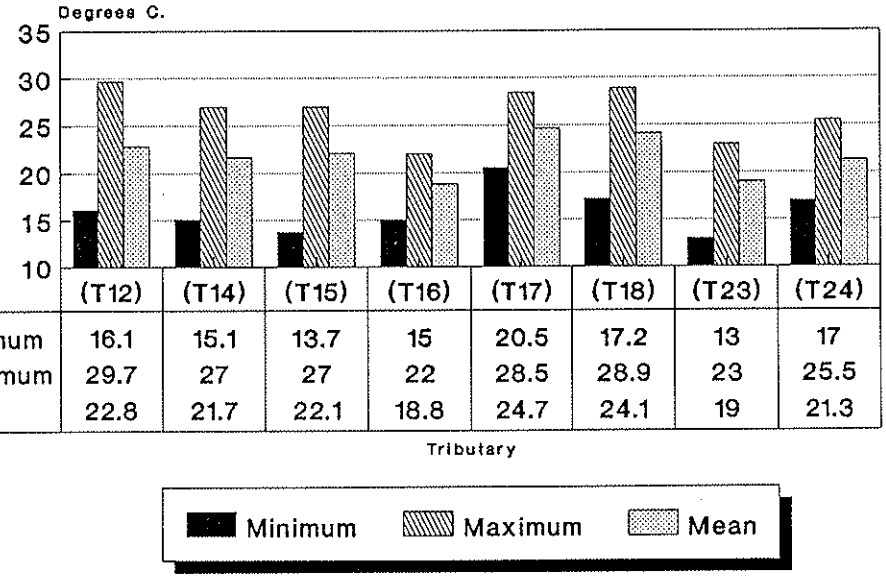


	(T2)	(T3)	(T4)	(T5)	(T6)	(T7)	(T8)	(T9)	(T10)	(T11)
Minimum	18.7	17.2	17.1	18.4	18	11	14	14.9	18.5	14.7
Maximum	24	25	25.5	27.2	28.4	21.9	27	26.7	26	22.5
Mean	20.4	20.54	21.2	23.6	23.6	17.9	21.4	21.9	22.2	18.3

Sampled 6/5/89 to 9/27/89
8-9 measurements/site

Figure D4

Water Temperature; degrees C.
Tributaries; T12 - T24

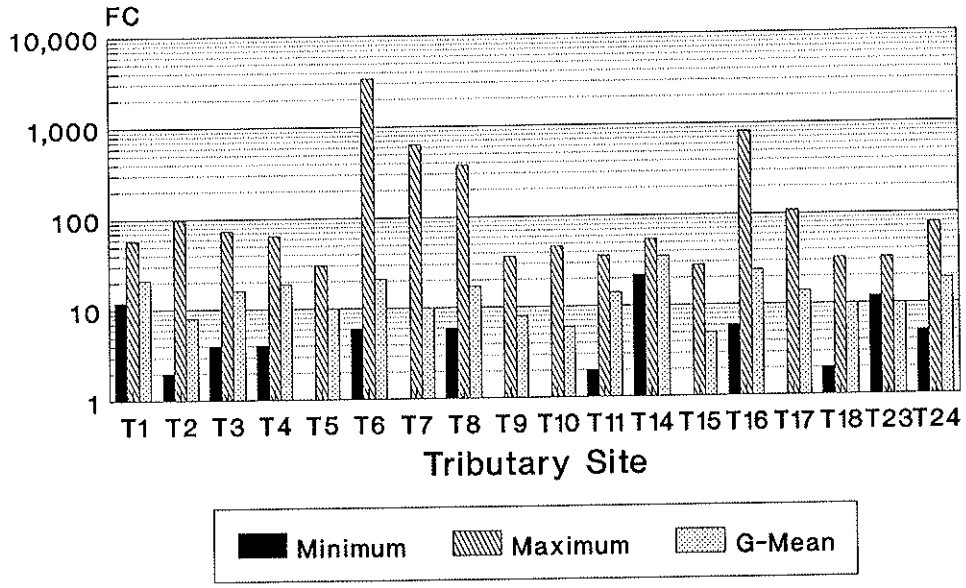


	(T12)	(T14)	(T15)	(T16)	(T17)	(T18)	(T23)	(T24)
Minimum	16.1	15.1	13.7	15	20.5	17.2	13	17
Maximum	29.7	27	27	22	28.5	28.9	23	25.5
Mean	22.8	21.7	22.1	18.8	24.7	24.1	19	21.3

Sampled 6/5/89 to 9/27/89
8-9 measurements/site

Figure D5

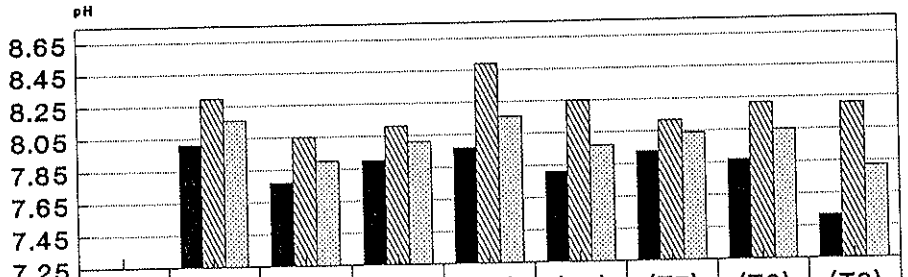
Fecal Coliform, col/100 ml
Tributaries (T1-T24)



FC = fecal coliform colonies per 100 ml
Sampled from 6/5/89 to 9/27/89

Figure D6

pH
Tributaries; T2 - T9



	(T2)	(T3)	(T4)	(T5)	(T6)	(T7)	(T8)	(T9)
Minimum	8.01	7.77	7.9	7.97	7.81	7.93	7.87	7.52
Maximum	8.3	8.05	8.11	8.49	8.25	8.12	8.22	8.21
G-Mean	8.16	7.9	8.01	8.16	7.97	8.04	8.05	7.82

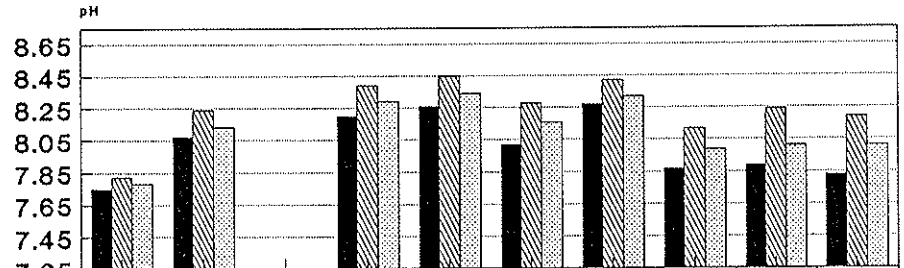
Tributary

Minimum Maximum G-Mean

Sampled 6/5/89 - 9/27/89
7-8 measurements/site

Figure D7

pH
Tributaries; T10 - T24



	(T10)	(T11)	(T12)	(T14)	(T15)	(T16)	(T17)	(T18)	(T23)	(T24)
Minimum	7.75	8.07		8.2	8.26	8.02	8.27	7.87	7.89	7.83
Maximum	7.82	8.24		8.39	8.45	8.28	8.42	8.12	8.24	8.19
G-Mean	7.78	8.13		8.29	8.34	8.16	8.32	7.99	8.01	8.01

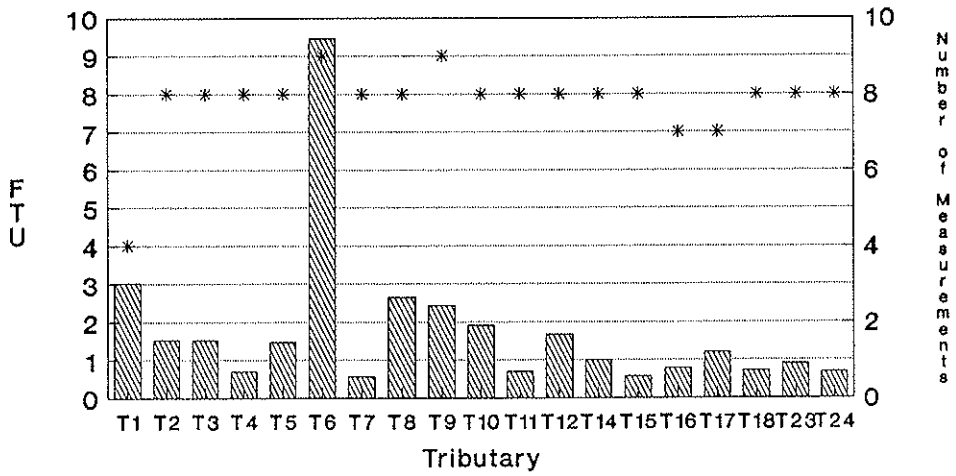
Tributary

Minimum Maximum G-Mean

Sampled 6/5/89 - 9/27/89
7-8 measurements/site

Figure D8

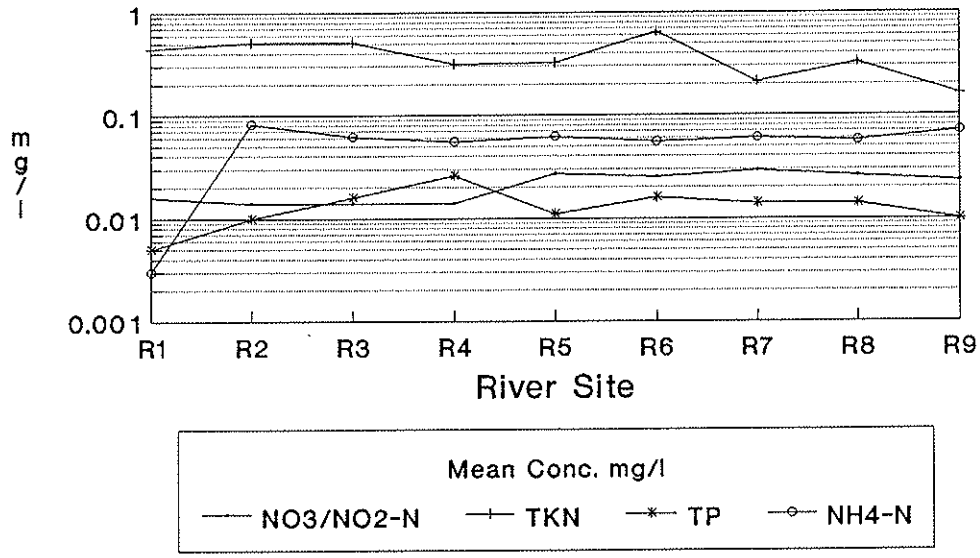
Turbidity (FTU)
Tributary Sites



FTU - Formizan Turbidity Units
Measured between 6/4/89 and 9/27/89

Figure E1

Mean Nutrient Concentrations (mg/l)
River Sites; R1 - R9

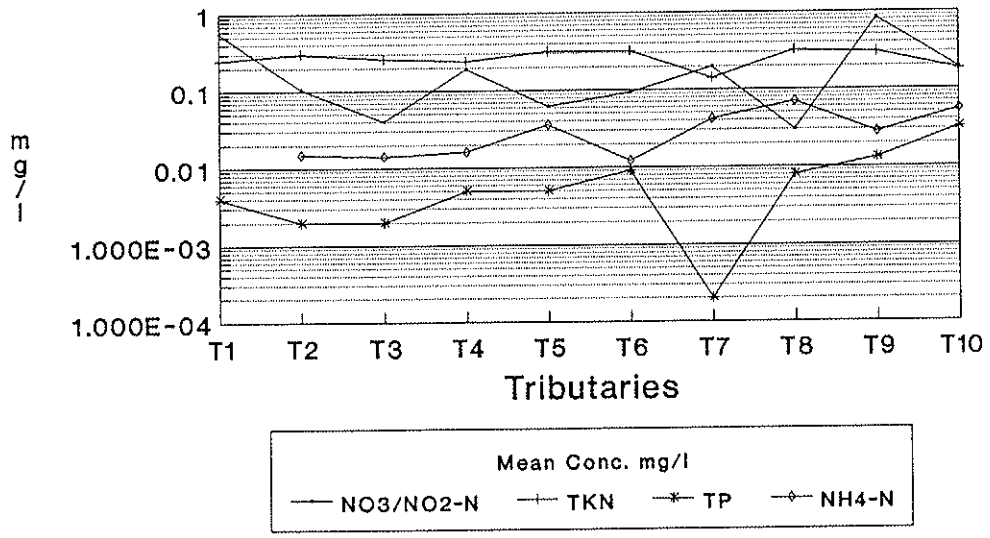


mg/l = milligrams per liter

Sampled between 3/11/89 and 11/4/89
Four Samples

Figure F1

Mean Nutrient Concentration; mg/l
Tributary Sites; T1 - T10

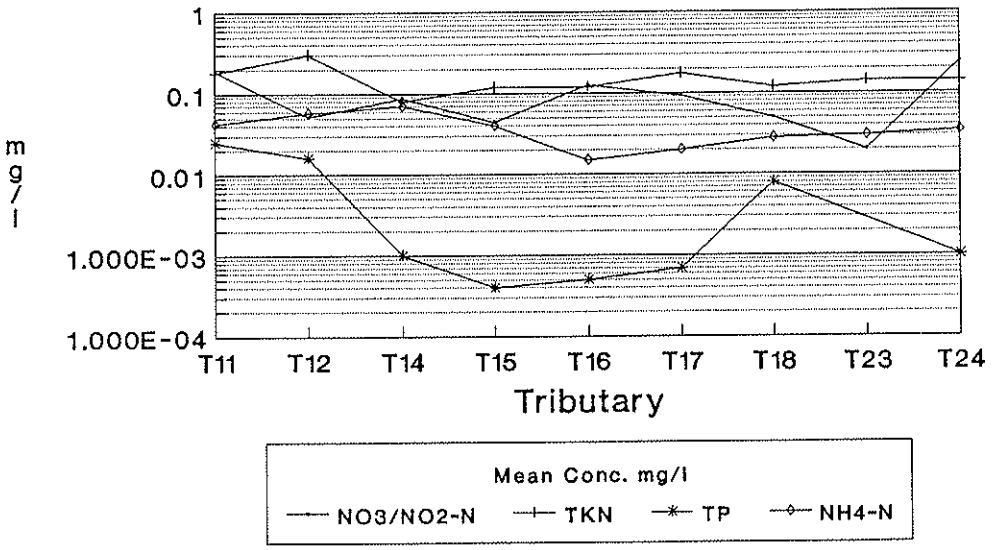


mg/l = milligrams per liter

Five samples taken between 6/4/89 and 9/27/89

Figure F2

Mean Nutrient Concentration; mg/l
Tributary Sites; T11 - T24



mg/l = milligrams per liter

Sampled 5X, 6/4-9/27/90

TABLE 1

RIVER CORRIDOR - **DISSOLVED OXYGEN** - (mg/l) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
R1	12	8.5	15.1	9.0	9.65	9.9	10.06
R2	12	6.6	14.7	8.7	9.10	10.7	9.80
R3	12	7.6	15.3	8.1	9.20	10.9	9.83
R4	12	7.6	15.4	8.4	9.45	10.5	9.99
R5	12	7.7	15.8	8.4	9.90	10.9	10.30
R6	11	8.0	17.0	8.3	9.20	10.8	10.35
R7	12	8.2	18.4	8.5	9.75	11.5	10.56
R8	12	7.6	15.6	8.6	9.35	11.3	10.17
R9	12	7.6	16.7	7.9	8.75	10.6	9.92

TABLE 2

RIVER CORRIDOR - **FECAL COLIFORM** - (col/100ml) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
R1	12	0	225	0	5.5	18	6.18
R2	11	0	325	4	8	48	15.17
R3	12	0	56	2	6	12	6.04
R4	12	0	38	0	6	10	4.43
R5	12	0	52	0	2	20	4.42
R6	11	0	106	0	2	6.0	3.71
R7	12	0	52	0	0	4	2.48
R8	12	0	68	0	4	8	3.74
R9	12	0	64	0	3	4	2.93

TABLE 3

RIVER CORRIDOR - **SPECIFIC CONDUCTANCE** - (umhos) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
R1	12	63.6	166.6	86.4	129	150.2	110.7
R2	12	82.8	221.6	110.6	181.7	198.0	148.5
R3	12	114.2	252	132.8	200.8	243.8	178.5
R4	12	129.2	263	158.6	207.6	233.2	194.1
R5	12	141.2	261	177.0	218.3	230.6	206.2
R6	11	124.8	247	181.1	211.0	221.2	199.9
R7	12	135.8	268.0	192.6	214.5	235.6	211.4
R8	12	136.4	250.0	190.4	210.1	238.2	207.5
R9	12	161	287	204	217	236.0	219.5

TABLE 4

RIVER CORRIDOR - **pH** - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
R1	12	7.5	8.34	7.7	7.9	8.09	7.91
R2	12	7.64	8.44	7.7	7.83	7.9	7.89
R3	12	7.83	8.15	7.94	8.00	8.02	7.99
R4	12	7.88	8.17	7.94	8.02	8.13	8.03
R5	12	7.95	8.30	8.04	8.17	8.20	8.15
R6	11	8.03	8.30	8.07	8.12	8.22	8.16
R7	12	8.08	8.50	8.13	8.15	8.33	8.23
R8	12	7.90	8.37	8.15	8.20	8.23	8.19
R9	12	8.03	8.42	8.06	8.13	8.27	8.17

TABLE 5

RIVER CORRIDOR - **WATER TEMPERATURE** -(deg.C) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
R1	12	4.8	20	7.0	14.95	17.5	13.6
R2	12	5.2	21.5	7.0	15.40	18.5	14.07
R3	12	4.4	26.0	5.0	12.65	17.4	12.78
R4	12	5.5	26.0	5.7	17.45	8.4	14.86
R5	12	5.8	27	7.5	18.25	19.7	15.86
R6	11	6.7	27.1	7.95	18.6	19.40	16.55
R7	12	6.1	27.3	6.7	18.5	20.7	16.0
R8	12	5.6	27.5	7.0	19.05	19.9	16.04
R9	12	5.2	26.5	6.9	19.25	20.5	16.28

TABLE 6

RIVER CORRIDOR - **TURBIDITY** - (FTU) - 1989

Site	N-value	Min.	Max.	Mean	Var.	SD
R1	9	0.8	13.0	3.775	21.8	4.67
R2	12	0.6	7.7	2.69	5.879	2.42
R3	12	0.6	8.0	2.35	7.34	2.71
R4	12	0.8	7.8	2.34	5.55	2.35
R5	12	0.5	7.4	2.00	5.38	2.31
R6	11	0.6	8.4	2.39	6.44	2.53
R7	12	0.4	7.4	2.19	5.34	2.31
R8	12	0.4	8.6	2.23	6.44	2.53
R9	12	0.4	9.4	2.21	6.87	2.62

TABLE 7

RIVER CORRIDOR (by month) - **DISSOLVED OXYGEN** - (mg/l) - 1989

Month	N-value	Min.	Max.	Mean	25%	Median	75%
Jan.	9	14.7	18.4	16.00	15.2	15.6	16.25
Feb.	8	10.7	11.5	11.14	10.7	11.25	11.3
Mar.	9	9.0	12.8	10.26	9.7	10.7	11.65
Apr.	9	8.9	11.9	10.4	9.65	10.3	10.95
May	9	8.1	9.1	8.54	8.35	8.5	8.55
June	9	8.8	10.0	9.51	9.15	9.7	9.75
July	9	7.6	9.6	8.17	7.65	8.0	8.15
Aug.	9	6.6	9.7	8.13	7.6	7.9	8.4
Sept.	9	8.1	9.4	8.84	8.35	9.0	9.2
Oct.	9	7.7	9.9	8.86	8.35	8.8	9.10
Nov.	9	8.7	10.1	9.31	8.95	9.2	9.55
Dec.	9	10.6	13.3	11.63	10.85	11.1	12.2

TABLE 8

RIVER CORRIDOR (by month) - **WATER TEMPERATURE** - (deg.C) - 1989

Month	N-value	Min.	Max.	Mean	25%	Median	75%
Jan.	9	4.4	7.0	5.96	5.0	6.0	6.8
Feb.	8	5.1	7.0	5.78	5.3	5.65	5.8
Mar.	9	7.4	11.0	9.26	8.55	8.55	9.5
Apr.	9	15.8	20.7	18.79	17.40	19.0	19.80
May	9	14.2	19.5	17.37	16.0	17.6	18.20
June	9	15.1	19.6	17.81	16.3	18.4	18.80
July	9	18.8	23.8	20.43	19.5	20.2	20.75
Aug.	9	20.0	27.5	25.43	23.75	26.5	27.05

RIVER CORRIDOR (by month) - **WATER TEMPERATURE** - (deg.C) - 1989

Month	N-value	Min.	Max.	Mean	25%	Median	75%
Sept.	9	17.4	24.1	21.80	14.95	18.7	19.05
Oct.	9	7.1	19.9	16.82	14.95	18.7	19.05
Nov.	9	5.0	19.7	14.61	14.30	15.1	15.65
Dec.	9	4.9	7.5	6.14	5.35	6.1	6.5

TABLE 9

TRIBUTARY SITES - **WATER TEMPERATURE** - (deg.C) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
T1	4	15.2	23.5	19.0	15.2	18.7	20.5
T2	8	17.2	24.0	20.4	18.7	19.8	20.7
T3	8	17.2	25.0	20.5	18.2	20.0	22.4
T4	9	17.1	25.5	21.8	19.75	20.6	21.5
T5	8	18.1	28.4	23.6	21.2	23.7	26.3
T6	9	18.0	28.4	23.6	20.3	24.5	26.2
T7	8	11.0	21.9	17.9	16.7	17.8	19.0
T8	8	14.0	27.0	21.4	17.5	21.9	23.5
T9	9	14.9	26.7	21.9	18.8	23.6	24.2
T10	8	18.5	26.0	22.2	19.0	22.2	23.8
T11	8	14.7	22.5	18.3	15.7	17.6	19.5
T12	8	14.7	22.5	18.3	15.7	17.6	19.5
T14	8	15.1	27.0	21.7	18.6	22.5	23.3
T15	8	13.7	27.0	22.0	18.3	22.8	23.0
T16	7	15.0	22.0	18.9	15.4	19.2	20.9
T17	7	20.5	28.5	24.7	20.9	26.3	26.7
T18	8	17.2	28.9	24.2	21.8	24.9	26.3
T23	8	13.0	23.0	19.0	16.9	19.2	20.6

TRIBUTARY SITES - **WATER TEMPERATURE** - (deg.C) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
T24	8	17.0	25.5	21.3	17.5	21.7	22.7

TABLE 10

TRIBUTARY SITES - **FECAL COLIFORM** - (col/100ml) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
T1	4	12	58	20.7	12	17	22
T2	8	2	98	7.6	2	5	14
T3	8	4	74	15.9	6	15	28
T4	9	4	65	18.6	11.0	20	28.0
T5	8	0	30	10	6.0	12	12
T6	9	6	3,400	20.8	8.0	12	15
T7	8	0	64	10.3	4	11	30
T8	8	6	370	17.2	6.0	9	26
T9	8	0	36	7.8	0	12	20
T10	8	0	46	6.2	0	11	12
T11	8	2	36	14.5	10	16.5	18
T14	8	22	54	35.4	22	41	45
T15	8	0	28	4.9	0	4.0	14
T16	7	6	80	24.1	11	20	42.0
T17	7	0	108	13.8	1	16	64.0
T18	7	2	32	9.6	3.0	12.0	25
T23	8	12	32	9.6	3.0	12.0	25
T24	8	5	78	19.1	8	20.0	34

TABLE 11

TRIBUTARY SITES - SPECIFIC CONDUCTANCE - (umhos) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
T2	8	206.6	329.0	274.1	231.8	278.4	306.6
T3	8	193.6	287.6	242.0	206.0	249.0	263.0
T4	9	240.2	306.8	275.9	265.0	279.0	281.0
T5	8	173.2	252.0	212.2	173.2	219.3	222.4
T6	9	165.8	289.0	229.0	206.8	238.0	248.5
T7	8	318.4	407.0	353.7	331.0	339.9	377.0
T8	8	163.0	258.6	213.8	192.6	220.7	235.0
T9	9	80.8	227.0	157.6	111.4	198.2	196.5
T10	8	231.4	326.4	279.4	241.0	279.9	289.6
T11	8	294.8	353.6	310.5	294.8	302.5	305.0
T12	8	184.0	280.6	243.1	218.2	243.4	278.8
T14	8	291.2	361.0	318.4	291.2	310.5	343.0
T15	8	244.8	330.6	277.8	244.8	270.1	287.0
T16	7	271.6	346.6	308.1	281.8	311.0	326.6
T17	7	337.4	466.4	401.3	359.7	400.4	418.2
T18	8	224.4	316.0	257.9	235.6	251.2	272.2
T23	8	331.4	424.0	367.6	331.4	357.4	389.2
T24	8	295.8	399.0	343.3	331.0	338.5	356.6

TABLE 12

TRIBUTARY SITES - pH - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
T2	8	8.01	8.30	8.16	8.04	8.16	8.25
T3	7	7.77	8.05	7.90	7.79	7.88	7.98
T4	8	7.90	8.11	8.01	7.95	8.01	8.05
T5	7	7.97	8.49	8.16	8.04	8.12	8.17
T6	8	7.81	8.25	7.97	7.82	7.96	8.00
T7	7	7.93	8.12	8.04	7.94	8.10	8.11
T8	7	7.87	8.22	8.05	7.91	8.05	8.14
T9	8	7.52	8.21	7.82	7.61	7.83	7.96
T10	7	7.75	7.82	7.78	7.75	7.78	7.81
T11	7	8.07	8.24	8.13	8.08	8.10	8.16
T14	7	8.20	8.39	8.29	8.21	8.27	8.35
T15	7	8.26	8.45	8.34	8.27	8.31	8.39
T16	7	8.02	8.28	8.16	8.07	8.17	8.21
T17	7	8.27	8.42	8.32	8.28	8.33	8.35
T18	8	7.87	8.12	7.99	7.95	7.98	8.01
T23	8	7.89	8.24	8.01	7.90	8.00	8.04
T24	7	7.83	8.19	8.01	7.89	8.01	8.06

TABLE 13

TRIBUTARY SITES - TURBIDITY - (FTU) - 1989

Site	N-value	Min.	Max.	Mean	Var.	SD
T1	4	1.10	5.50	3.02	4.72	2.17
T2	8	0.70	4.50	1.52	1.55	1.24
T3	8	1.20	1.80	1.52	0.05	0.24
T4	8	0.60	0.90	0.71	0.01	0.12
T5	8	1.00	2.10	1.48	0.10	0.32
T6	9	1.30	68.0	9.46	482	21.9
T7	8	0.30	0.90	0.56	0.03	0.18
T8	8	0.70	12.0	2.65	14.39	3.79
T9	9	1.20	4.70	2.44	1.25	1.12
T10	8	1.40	2.70	1.91	0.30	0.54
T11	8	0.60	0.90	0.71	0.01	0.12
T12	8	0.90	3.70	1.68	0.77	0.88
T14	8	0.50	1.90	1.00	0.20	0.45
T15	8	0.30	0.80	0.575	0.03	0.19
T16	7	0.40	1.40	0.785	0.09	0.30
T17	7	----	----	1.20	0.59	0.77
T18	8	0.50	1.10	0.725	0.039	0.198
T23	8	0.30	1.00	0.91	0.21	0.46
T24	8	0.40	1.50	0.68	0.13	0.36

TABLE 14

SPRING SITES - **TEMPERATURE** - (deg.C) - 1989

Site	N-Value	Min.	Max.	Mean	25%	Median	75%
S2	6	10.80	13.80	12.42	11.40	12.45	12.80
S33	8	11.90	15.80	13.70	12.50	13.90	14.10
S41	6	13.10	16.70	14.62	13.45	14.50	14.95

TABLE 15

SPRING SITES - **FECAL COLIFORM** - (Col/100ml) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
S2	6	0.00	34.0	6.79	1.00	7.00	19.00
S33	8	0.00	12.0	3.78	2.00	5.00	6.00
S41	6	0.00	44.0	4.02	0.00	4.00	5.00

TABLE 16

SPRING SITES - **SPECIFIC CONDUCTANCE** - (umhos) - 1989

Site	N-value	Min.	Max.	Mean	25%	Median	75%
S2	6	163.40	263.40	214.00	177.90	223.40	228.90
S33	8	321.60	365.20	341.20	327.40	339.40	346.80
S41	6	324.40	390.40	357.80	335.60	353.10	372.70

TABLE 17

RIVER CORRIDOR - **NO3/NO2-N** - (mg/l) - 1989

Site	3/11-12	7/20-21	10/17	11/14	Mean
R1	--	0.015	0.005	0.003	0.016
R2	0.020	0.000	0.018	0.020	0.014
R3	0.020	0.024	0.005	0.010	0.014
R4	0.030	0.011	0.007	0.010	0.014
R5	0.060	0.036	0.005	0.010	0.027
R6	0.050	0.045	0.005	0.010	0.025
R7	0.060	0.040	0.007	0.010	0.029
R8	0.060	0.028	0.007	0.010	0.026
R9	0.030	0.040	0.005	0.020	0.023

TABLE 18

RIVER CORRIDOR - **TOTAL KJELDAHL NITROGEN** - (mg/l) - 1989

Site	3/11-12	7/20-21	10/17	11/14	Mean
R1	--	0.050	1.080	0.200	0.443
R2	0.780	0.260	0.810	0.200	0.512
R3	0.480	0.390	0.980	0.200	0.512
R4	0.390	0.440	0.230	0.200	0.315
R5	0.430	0.300	0.360	0.200	0.322
R6	0.210	0.460	1.710	0.200	0.645
R7	0.250	0.120	0.280	0.200	0.212
R8	0.280	0.220	0.590	0.200	0.322
R9	0.140	0.110	0.190	0.200	0.160

TABLE 19

RIVER SITES - **TOTAL PHOSPHATE** - (mg/l) - 1989

Site	3/11-12	7/20-21	10/17	11/14	Mean
R1	---	0.000	0.005	0.010	0.005
R2	0.016	0.000	0.019	0.006	0.010
R3	0.033	0.000	0.022	0.009	0.016
R4	0.033	0.000	0.070	0.003	0.026
R5	0.034	0.000	0.007	0.006	0.011
R6	0.019	0.000	0.042	0.005	0.016
R7	0.033	0.000	0.015	0.009	0.014
R8	0.033	0.009	0.011	0.004	0.014
R9	0.029	0.000	0.011	0.004	0.010

TABLE 20

RIVER SITES - **NH4-N** - (mg/l) - 1989

Site	3/11-12	7/20-21	10/17	11/14	Mean
R1	---	0.000	0.005	0.010	0.005
R2	0.300	0.000	0.010	0.020	0.082
R3	0.230	0.000	0.010	0.010	0.062
R4	0.200	0.000	0.010	0.010	0.055
R5	0.210	0.000	0.010	0.030	0.062
R6	0.190	0.000	0.010	0.020	0.055
R7	0.210	0.000	0.010	0.020	0.060
R8	0.190	0.000	0.010	0.030	0.057
R9	0.260	0.000	0.010	0.010	0.070

TABLE 21

TRIBUTARY SITES - NO3/NO2-N - (mg/l) - 1989

Site	6/4-7	7/5-11	8/7-16	9/5-13	9/18-27	Mean
T1	0.010	1.120	----	----	----	0.565
T2	----	0.290	0.050	0.040	0.040	0.105
T3	0.010	0.120	0.030	0.020	0.020	0.040
T4	0.180	0.190	0.160	0.140	0.290	0.192
T5	0.070	0.210	0.000	0.010	0.020	0.062
T6	0.160	0.210	0.060	0.010	0.020	0.092
T7	0.140	0.340	0.170	0.170	0.170	0.198
T8	0.060	0.050	0.020	0.010	0.010	0.030
T9	0.030	4.000	0.020	0.010	0.050	0.822
T10	0.130	0.300	0.130	0.180	0.190	0.186
T11	0.140	0.300	0.210	0.100	0.210	0.192
T12	0.080	0.040	0.070	0.040	0.030	0.052
T13	-----	-----	0.310	-----	-----	-----
T14	0.130	0.110	0.060	0.070	0.070	0.088
T15	0.090	0.040	0.020	0.040	0.030	0.044
T16	0.080	0.320	0.040	0.070	-----	0.127
T17	0.030	0.300	0.020	0.020	-----	0.092
T18	0.030	0.060	0.030	0.090	0.040	0.050
T19	0.010	-----	-----	-----	------	-----
T23	0.010	0.020	0.020	0.020	0.030	0.020
T24	0.010	1.080	0.030	0.020	0.040	0.236

TABLE 22

TRIBUTARY SITES - **TOTAL KJELDAHL NITROGEN** - (mg/l) - 1989

Site	6/4-7	7/5-11	8/7-16	9/5-13	9/18-27	Mean
T1	0.100	0.400	-----	-----	-----	0.250
T2	-----	0.300	0.200	0.600	0.100	0.300
T3	0.100	0.400	0.200	0.300	0.300	0.260
T4	0.200	0.400	0.200	0.200	0.200	0.240
T5	0.700	0.300	0.200	0.300	0.100	0.320
T6	0.600	0.400	0.300	0.200	0.100	0.320
T7	0.400	0.200	0.000	0.000	0.100	0.140
T8	0.700	0.400	0.200	0.200	0.100	0.320
T9	0.400	0.400	0.100	0.300	0.300	0.300
T10	0.100	0.400	0.200	0.100	0.100	0.180
T11	0.200	0.400	0.100	0.100	0.100	0.180
T12	0.100	0.300	0.100	0.100	0.000	0.300
T13	-----	-----	0.000	-----	-----	-----
T14	0.100	0.200	0.000	0.100	0.000	0.080
T15	0.100	0.200	0.000	0.200	0.100	0.120
T16	0.100	0.100	0.100	0.100	-----	0.100
T17	0.200	0.200	0.200	0.100	-----	0.175
T18	0.100	0.200	0.100	0.100	0.100	0.120
T19	0.600	-----	-----	-----	-----	-----
T23	0.200	0.100	0.200	0.100	0.100	0.140
T24	0.200	0.200	0.100	0.100	0.100	0.140

TABLE 23

TRIBUTARY SITES - TOTAL PHOSPHATE - (mg/l) - 1989

Site	6/4-7	7/5-11	8/7-16	9/5-13	9/18-27	Mean
T1	0.007	0.002	-----	-----	-----	0.004
T2	-----	0.000	0.004	0.006	0.001	0.002
T3	0.005	0.000	0.003	0.004	0.002	0.002
T4	0.011	0.000	0.005	0.007	0.003	0.005
T5	0.006	0.000	0.008	0.008	0.005	0.005
T6	0.007	-----	0.012	0.010	0.009	0.009
T7	0.000	0.000	0.000	0.000	0.001	0.0002
T8	0.007	0.008	0.008	0.009	0.008	0.008
T9	0.007	0.008	0.011	0.020	0.021	0.013
T10	0.024	0.029	0.034	0.030	0.043	0.032
T11	0.003	0.000	0.004	0.020	0.010	0.025
T12	0.020	0.000	0.022	0.024	0.014	0.016
T13	-----	-----	0.014	-----	-----	-----
T14	-----	0.000	0.000	0.003	0.003	0.001
T15	0.001	0.000	0.000	0.000	0.001	0.0004
T16	0.000	0.000	0.000	0.002	-----	0.0005
T17	0.003	0.000	0.000	0.000	-----	0.0007
T18	0.011	0.005	0.008	0.009	0.007	0.008
T19	0.023	-----	-----	-----	-----	-----
T23	0.000	0.000	0.000	0.000	0.000	0.000
T24	0.000	0.000	0.000	0.004	0.001	0.001

TABLE 24

TRIBUTARY SITES - NH4-N - (mg/l) - 1989

Site	6/4-7	7/5-11	8/7-16	9/5-13	9/18-27	Mean
T1	0.000	0.000	-----	-----	-----	-----
T2	-----	0.000	0.010	0.010	0.040	0.015
T3	0.000	0.000	0.020	0.030	0.020	0.014
T4	0.000	0.030	0.020	0.010	0.020	0.016
T5	0.020	0.090	0.010	0.020	0.040	0.036
T6	0.020	0.000	-----	0.010	0.020	0.012
T7	0.020	0.110	0.030	0.020	0.030	0.042
T8	0.020	0.120	0.060	0.010	0.050	0.070
T9	0.010	0.060	0.020	0.030	0.021	0.028
T10	0.020	0.100	0.050	0.030	0.070	0.054
T11	0.010	0.100	0.020	0.020	0.060	0.042
T12	0.020	0.060	0.070	0.040	0.010	0.058
T13	-----	-----	0.090	-----	-----	-----
T14	0.020	0.070	0.110	0.140	0.010	0.070
T15	0.010	0.070	0.060	0.060	0.000	0.040
T16	0.000	0.030	0.020	0.010	-----	0.015
T17	0.000	0.010	0.050	0.020	-----	0.020
T18	0.000	0.060	0.040	0.020	0.020	0.028
T19	0.020	-----	-----	-----	-----	-----
T23	0.000	0.090	0.030	0.010	0.020	0.030
T24	0.000	0.080	0.050	0.020	0.020	0.034

TABLE 25

SPRING SITES - **NO3/NO2-N** - (mg/l) - 1989

Site	8/7	9/5	Mean
S2	0.430	0.470	0.450
S33	-----	-----	-----
S41	-----	-----	-----

TABLE 26

SPRING SITES - **TOTAL KJELDAHL NITROGEN** - (mg/l) - 1989

Site	8/7	9/5	Mean
S2	0.100	0.100	0.100
S33	-----	-----	-----
S41	-----	-----	-----

TABLE 27

SPRING SITES - **TOTAL PHOSPHATE** - (mg/l) - 1989

Site	8/7	9/5	Mean
S2	0.015	0.014	0.0145
S33	-----	-----	-----
S41	-----	-----	-----

TABLE 28

SPRING SITES - **NH/4-N** - (mg/l) - 1989

Site	8/7	9/5	Mean
S2	0.020	0.010	0.015
S33	-----	-----	-----
S41	-----	-----	-----

TABLE 29

HEAVY METAL ANALYSES - (ug/l)

3/13/89

	R1	R2	R3	R4	R5	R6	R7	R8	R9
Fe	70	89	79	60	42	70	60	23	23
Mn	<3	<3	<3	5	<3	<3	<3	<3	<3
Cu	<4	<4	<4	<4	<4	<4	<4	<4	<4
Pb	<8	<8	<8	<8	<8	<8	<8	<8	<8
Zn	<3	<3	<3	<3	<3	<3	<3	<3	<3
Cd	<1	<1	<1	1	<1	1	1	2	1
Co	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ni	<5	<5	<5	<5	<5	<5	<5	<5	<5

10/17/89

	R1	R2	R3	R4	R5	R6	R7	R8	R9
Fe	6	13	13	6	6	6	6	6	6
Mn	9	11	9	14	6	9	9	11	6
Cu	<6	<6	<6	<6	<6	<6	<6	<6	<6
Pb	<10	<10	<10	<10	<10	<10	<10	<10	<10
Zn	<3	<3	<3	<3	<3	<3	<3	<3	<3
Cd	2	2	2	1	2	1	2	2	2
Co	<8	<8	<8	<8	<8	<8	<8	<8	<8
Ni	<5	<5	<5	<5	<5	<5	<5	<5	<5

TABLE 30

CATION ANALYSES - (mg/l)

03/13/89

Site	Ca	Mg	Na	K
R1	7.40	0.84	1.20	0.57
R2	11.40	0.93	1.30	0.63
R3	14.20	1.17	1.00	0.61
R4	23.20	1.32	1.40	1.35
R5	26.80	1.68	1.50	0.63
R6	27.60	1.62	1.50	0.63
R7	29.60	1.95	1.40	0.63
R8	30.40	2.04	1.50	0.63
R9	31.00	3.00	1.50	0.70

10/17/89

Site	Ca	Mg	Na	K
R1	30.80	2.50	1.70	1.25
R2	42.80	4.25	3.00	1.33
R3	42.80	4.40	2.20	1.15
R4	44.00	4.05	2.30	1.02
R5	40.00	5.65	2.20	1.02
R6	42.00	3.70	2.00	0.93
R7	41.60	4.10	2.30	0.96
R8	39.60	4.30	2.30	0.96
R9	37.60	5.80	2.10	0.96

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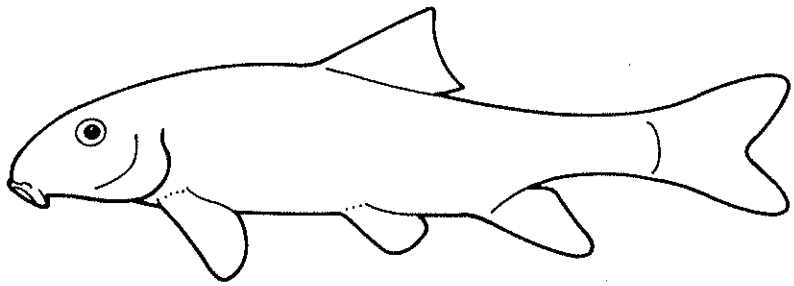

APPENDIX 1

List of Water Quality Monitoring Sites

National Park Service
Buffalo National River

Water Quality Monitoring Stations

River Corridor Sites

Location	Site #	Description	Latitude dd/mm/ss	Longitude dd/mm/ss
Wilderness Boundary RM 131.8	R1	South End of Boxley Valley west of the Luallen Farm, 1.1 miles upriver from the Hwy. 21 BR bridge.	93/24/20	35/56/35
Ponca RM 124.6	R2	Just below the old low water bridge at the Hwy. 74 BR bridge.	93/21/15	36/01/15
Pruitt RM 101.7	R3	Lower Pruitt canoe access area, 2000 feet down river from the Hwy. 7 BR bridge.	93/08/12	36/03/32
Hasty RM 94.7	R4	Hasty Low-water Bridge, on paved county road between Hwy. 74 & 123.	93/04/53	36/00/18
Woolum RM 75.2	R5	Woolum Ford, 6.8 miles soutwest of St. Joe, AR on an unpaved county road.	92/53/10	35/58/12
Gilbert RM 54.2	R6	Upper end of the gravel bar south of the town of Gilbert, AR. End of Hwy. 333 3 miles east of Hwy. 65.	92/43/00	35/59/05
Hwy 14 RM 33.1	R7	First riffle below the Hwy. 7 BR bridge (25 meters).	92/34/38	36/04/03

Rush RM 24.45	R8	50 meters upriver from the mouth of Rush Creek, 5.3 miles northeast of Hwy. 14 on county roads.	92/32/59	36/07/25
Mouth RM .38	R9	Mid channel 200 meters up the Buffalo River from confluence with the White River. Access from Buffalo City on Hwy. 126 from Hwy. 62.	92/25/45	36/10/00

Tributary Sites

Beech Creek RM 129.7	T1	Just upstream from the Hwy. 21 Bridge	93/24/20	35/58/00
Ponca Creek RM 124.6	T2	At the mouth of Ponca Creek just below the Ponca low water bridge.	93/21/16	36/01/16
Cecil Creek RM 109.6	T3	Just upstream of a concrete slab on an unpaved road .2 mile north of the Erbie Ford on the Buffalo River.	93/14/29	36/04/38
Mill Creek RM 101.4	T4	At the mouth of the creek just below the Lower Pruitt canoe access, .4 mile southeast of the Hwy.7 bridge.	93/07/55	36/03/28
Little Buffalo River RM 97.9	T5	Approximately 1000 feet upstream from the mouth of the stream. Access via unpaved (4X4) road 2.8 miles northeast of Hwy. 74 at the community of Flatwoods.	93/06/35	36/02/02

Big Creek RM 90.3	T6	Just below the low water bridge .3 mile southeast of Hwy. 123 and the Carver Cemetery.	93/02/35	36/58/40
Davis Creek 83.8	T7	At the mouth of the creek at the Mt. Hersey canoe access, 6 miles south of Hwy. 65 on unpaved county roads.	92/57/12	36/00/32
Cave Creek 81.3	T8	At the mouth of the creek. Access via 4X4 road on north side of river 7.7 miles south of Hwy. 65. Access limited due to river crossing required.	92/57/05	35/58/55
Richland Creek RM 75.2	T9	Upstream from the mouth approximately .1 mile. Access via unpaved road from north at Woolum River Access. During highwater vehicle access limited.	92/53/20	35/58/05
Calf Creek RM 60.5	T10	At the stream's mouth, access via unpaved road (4X4) 3.4 miles west from the Tyler Bend access road.	92/46/20	35/58/45
Mill Creek RM 59.7	T11	At the stream's mouth, access at the old Tyler Bend River Access. Access limited during high water, river crossing required.	92/46/00	35/59/25

Bear Creek T12 RM 52.9	At the mouth of the creek. Access via old railroad bed 1.1 miles east of Gilbert or during high water via unpaved road 7.2 miles north of Marshall.	92/42/00	35/59/48
Brush Creek T13 RM 52.7	At the mouth of the creek. Access via abandoned road leading upriver to old railroad bed from the Plum Field River access or during high water via unpaved (4X4) road 9.5 miles north of Marshall.	92/41/52	35/59/58
Tomahawk T14 Creek RM 48.8	Access via unpaved road 7.9 miles east of St. Joe. Monitoring site at mouth of creek, last .6 mile from road requires creek crossing & 4X4 or ATV.	92/40/18	36/01/18
Water Creek T15 RM 35.1	Monitoring site .1 mile upstream from the mouth. Access via foot/ATV trail 2.5 miles from Hwy. 14 (.2 miles east of Hwy 268 junction).	92/34/40	36/03/00
Rush Creek T16 RM 24.4	At the mouth of the creek. Access at Rush River Access 5.3 miles northeast of Hwy 14.	92/32/57	36/07/28
Clabber T17 Creek RM 24.0	150 feet upstream from the mouth. Access from Rush River Access 1200' downstream.	92/32/45	36/07/45

Big Creek RM 13.0	T18	300 feet upstream from the mouth. Access via boat 11.8 miles below Rush or foot/horseback 1.7 miles from the Big Creek Wilderness Access.	92/28/22	36/04/45
Cedar Creek RM 21.0	T19	100 feet upstream from the mouth. Access unpaved road 3.4 miles from the Hathaway Wilderness Access (via Hwy. 62 & 101).	92/30/48	36/07/55
Middle Creek RM 9.2	T23	200 feet upstream from the mouth. Access via boat only, 15.4 miles below Rush.	92/25/42	36/05/08
Leatherwood Creek RM 7.2	T24	200 feet upstream, from the mouth. Access via boat only, 17.4 miles below Rush.	92/25/45	36/06/32
		Spring Sites		
Luallen Spring	S2	At the Luallen Farm site south end of Boxley Valley, 300 feet west of Hwy. 21.	93/23/58	35/56/40
Mitch Hill Spring	S33	.4 mile north of Mt. Hersy River Access on the east side of the road.	92/57/02	36/00/52
Gilbert Spring	S41	Southeast side of Gilbert. 300 feet east of Gilbert Store south of the old railroad bed.	92/42/50	35/59/20

APPENDIX 2

Water Quality Data, River Corridor

Buffalo National River
Water Quality Data
1989
RIVER LOCATIONS

SITE #	DATE	WATER TEMP. (deg.C)	SPECIFIC CONDUCTIVITY (umhos)	pH	DISSOLVED OXYGEN (mg/l)	TURBIDITY (FTU)	FECAL COLIFORM (col./100ml)	NO3/NO2-N (mg/l)	TKN (mg/l)	TP (mg/l)	NH4-N (mg/l)	STAFF GAUGE (FT)
** BOXLEY BRIDGE												
R1	01/20/89	4.8	46.0	7.50	15.1	1.5	0	-1.000	-1.000	-1.000	-1.000	3.02
R1	02/11/89	5.3	48.0	7.74	10.7	4.0	0	-1.000	-1.000	-1.000	-1.000	3.40
R1	03/12/89	8.6	47.0	7.81	9.0	6.4	6	0.040	1.390	0.027	0.220	-99.99
** WILDERNESS BOUNDARY												
R1	04/21/89	17.5	87.0	7.88	8.9	2.5	5	-1.000	-1.000	-1.000	-1.000	2.15
R1	05/18/89	14.2	42.0	7.70	9.1	13.0	225	-1.000	-1.000	-1.000	-1.000	2.70
R1	06/15/89	15.7	45.0	7.67	9.8	9.3	18	-1.000	-1.000	-1.000	-1.000	2.70
R1	07/21/89	18.8	135.0	8.09	9.6	1.1	8	0.015	0.050	0.000	0.000	0.00
R1	08/24/89	20.0	138.0	7.92	8.5	1.4	20	-1.000	-1.000	-1.000	-1.000	-99.99
R1	09/19/89	17.4	135.0	7.99	9.3	1.1	20	-1.000	-1.000	-1.000	-1.000	-99.00
R1	10/17/89	14.2	145.0	8.22	9.9	0.9	2	0.005	1.080	0.005	0.010	-99.00
R1	11/14/89	19.7	150.0	8.34	9.7	1.2	4	0.030	0.200	0.010	0.000	-99.00
R1	12/06/89	7.0	120.0	8.10	11.1	0.8	0	-1.000	-1.000	-1.000	-1.000	0.00
** PONCA												
R2	01/20/89	5.2	71.0	7.64	14.7	1.8	6	-1.000	-1.000	-1.000	-1.000	1.82
R2	02/11/89	7.0	73.0	7.77	10.7	3.5	0	-1.000	-1.000	-1.000	-1.000	1.80
R2	03/12/89	10.0	61.0	7.93	9.2	6.0	6	0.020	0.780	0.016	0.300	2.70
R2	04/21/89	18.7	158.0	8.44	11.9	2.3	6	-1.000	-1.000	-1.000	-1.000	2.05
R2	05/18/89	14.6	75.0	7.83	9.0	5.5	325	-1.000	-1.000	-1.000	-1.000	2.65
R2	06/15/89	15.1	63.0	7.86	10.0	7.7	60	-1.000	-1.000	-1.000	-1.000	2.80
R2	07/21/89	19.5	185.0	8.13	8.7	1.1	36	0.000	0.260	0.000	0.000	1.55
R2	08/24/89	21.5	205.0	7.77	6.6	1.2	112	-1.000	-1.000	-1.000	-1.000	1.35
R2	09/19/89	18.5	185.0	7.81	8.1	0.8	36	-1.000	-1.000	-1.000	-1.000	0.40
R2	10/17/89	15.7	203.0	7.78	8.9	0.6	-1	0.018	0.810	0.019	0.010	1.32
R2	11/14/89	16.9	205.0	7.90	9.0	0.8	8	0.020	0.200	0.006	0.020	1.35
R2	12/06/89	6.1	155.0	7.82	10.8	1.0	2	-1.000	-1.000	-1.000	-1.000	1.32
** PRUITT												
R3	01/20/89	4.4	88.0	7.83	15.3	1.1	2	-1.000	-1.000	-1.000	-1.000	0.50
R3	02/11/89	5.1	93.0	7.96	11.0	3.3	0	-1.000	-1.000	-1.000	-1.000	1.40
R3	03/11/89	9.5	86.0	8.07	12.0	8.0	6	0.020	0.480	0.033	0.230	1.40
R3	04/22/89	15.8	181.0	7.99	9.2	2.3	4	-1.000	-1.000	-1.000	-1.000	1.00
R3	05/17/89	17.4	152.0	7.90	8.1	1.0	32	-1.000	-1.000	-1.000	-1.000	0.80
R3	06/15/89	16.9	98.0	7.94	9.5	7.8	56	-1.000	-1.000	-1.000	-1.000	1.80
R3	07/21/89	20.2	225.0	8.02	8.0	1.4	16	0.024	0.390	0.000	0.000	0.50
R3	08/24/89	26.0	240.0	8.00	7.6	0.6	2	-1.000	-1.000	-1.000	-1.000	0.40
R3	09/19/89	21.1	190.0	8.02	8.4	0.8	6	-1.000	-1.000	-1.000	-1.000	-99.00
R3	10/17/89	7.1	208.0	7.99	8.8	0.6	12	0.005	0.980	0.022	0.010	0.30
R3	11/14/89	5.0	212.0	8.04	9.2	0.7	6	0.010	0.200	0.009	0.010	-99.00
R3	12/06/89	4.9	162.0	8.15	10.9	0.7	2	-1.000	-1.000	-1.000	-1.000	0.20

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SITE #	DATE	WATER TEMP. (deg.C)	SPECIFIC CONDUCTIVITY (umhos)	pH	DISSOLVED OXYGEN (mg/l)	TURBIDITY (FTU)	FECAL COLIFORM (col./100ml)	NO3/NO2-N (mg/l)	TKN (mg/l)	TP (mg/l)	NH4-N (mg/l)	STAFF GAUGE (FT)
** HASTY												
R4	01/20/89	5.7	120.0	7.89	15.4	1.0	0	-1.000	-1.000	-1.000	-1.000	0.50
R4	02/11/89	5.7	125.0	8.02	11.3	2.8	0	-1.000	-1.000	0.000	-1.000	1.40
R4	03/11/89	7.4	94.0	7.94	10.5	7.8	24	0.030	0.390	0.033	0.200	1.40
R4	04/22/89	17.3	210.0	8.01	10.1	2.1	6	-1.000	-1.000	-1.000	-1.000	1.00
R4	05/17/89	17.6	175.0	7.88	8.4	0.8	22	-1.000	-1.000	-1.000	-1.000	0.80
R4	06/15/89	17.7	118.0	8.01	9.5	6.6	38	-1.000	-1.000	-1.000	-1.000	1.80
R4	07/20/89	19.6	233.0	8.02	8.1	1.4	10	0.011	0.440	0.000	0.000	0.50
R4	08/24/89	26.0	265.0	7.98	7.6	1.3	0	-1.000	-1.000	-1.000	-1.000	0.40
R4	09/19/89	22.2	215.0	8.13	9.4	0.9	8	-1.000	-1.000	-1.000	-1.000	0.40
R4	10/17/89	18.4	220.0	8.17	9.3	1.2	6	0.007	0.230	0.070	0.010	0.30
R4	11/14/89	15.2	222.0	8.13	9.4	1.5	0	0.010	0.200	0.003	0.010	-99.00
R4	12/06/89	5.5	150.0	8.17	10.9	0.7	0	-1.000	-1.000	-1.000	-1.000	-1.00
** WOOLUM												
R5	01/20/89	6.0	157.0	8.16	15.8	0.7	0	-1.000	-1.000	-1.000	-1.000	1.30
R5	02/11/89	5.8	150.0	8.18	11.4	2.4	0	-1.000	-1.000	-1.000	-1.000	3.40
R5	03/11/89	8.5	118.0	8.04	10.2	7.4	16	0.060	0.430	0.034	0.210	3.90
R5	04/22/89	19.7	242.0	8.28	10.9	1.2	0	-1.000	-1.000	-1.000	-1.000	4.00
R5	05/17/89	18.1	190.0	7.95	8.4	0.8	52	-1.000	-1.000	-1.000	-1.000	1.40
R5	06/15/89	18.4	128.0	8.15	9.7	6.2	38	-1.000	-1.000	-1.000	-1.000	4.50
R5	07/20/89	20.5	240.0	8.02	7.7	1.1	0	0.036	0.300	0.000	0.000	1.10
R5	08/24/89	27.0	265.0	8.08	7.8	1.8	22	-1.000	-1.000	-1.000	-1.000	0.80
R5	09/20/89	23.7	228.0	8.19	9.3	0.8	4	-1.000	-1.000	-1.000	-1.000	-99.00
R5	10/17/89	19.0	225.0	8.30	9.6	0.6	20	0.005	0.360	0.007	0.010	-99.00
R5	11/14/89	16.1	215.0	8.28	10.1	0.6	0	0.010	0.200	0.006	0.030	-99.00
R5	12/05/89	7.5	142.0	8.20	12.7	0.5	0	-1.000	-1.000	-1.000	-1.000	-1.00
** GILBERT												
R6	01/20/89	6.9	149.0	8.22	17.0	1.0	0	-1.000	-1.000	-1.000	-1.000	1.30
R6	03/11/89	9.0	145.0	8.12	10.7	6.2	4	0.050	0.210	0.019	0.190	3.90
R6	04/22/89	19.0	235.0	8.30	11.0	0.9	0	-1.000	-1.000	-1.000	-1.000	4.00
R6	05/17/89	17.6	165.0	8.03	8.3	0.8	34	-1.000	-1.000	-1.000	-1.000	1.40
R6	06/14/89	18.6	112.0	8.06	9.7	8.4	106	-1.000	-1.000	-1.000	-1.000	4.50
R6	07/20/89	19.5	200.0	8.11	8.0	2.3	8	0.045	0.460	0.000	0.000	1.10
R6	08/24/89	27.1	250.0	8.30	9.2	1.7	2	-1.000	-1.000	-1.000	-1.000	0.80
R6	09/20/89	23.5	220.0	8.20	9.1	2.2	2	-1.000	-1.000	-1.000	-1.000	-99.00
R6	10/17/89	19.3	208.0	8.08	8.4	1.3	0	0.005	1.710	0.042	0.010	-99.00
R6	11/14/89	14.9	200.0	8.12	9.1	0.9	4	0.010	0.200	0.005	0.020	-99.00
R6	12/05/89	6.7	165.0	8.22	13.3	0.6	0	-1.000	-1.000	-1.000	-1.000	-1.00
** HWY 14												
R7	01/20/89	6.7	160.0	8.50	18.4	1.1	0	-1.000	-1.000	-1.000	-1.000	4.20
R7	02/11/89	6.2	155.0	8.21	11.5	2.1	0	-1.000	-1.000	-1.000	-1.000	5.10
R7	03/11/89	9.5	152.0	8.15	11.5	6.6	4	0.060	0.250	0.033	0.210	7.50

Buffalo National River
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SITE #	DATE	WATER TEMP. (deg.C)	SPECIFIC CONDUCTIVITY (umhos)	pH	DISSOLVED OXYGEN (mg/l)	TURBIDITY (FTU)	FECAL COLIFORM (col./100ml)	NO3/NO2-N (mg/l)	TKN (mg/l)	TP (mg/l)	NH4-N (mg/l)	STAFF GAUGE (FT)
R7	04/22/89	20.7	255.0	8.38	11.1	0.8	0	-1.000	-1.000	-1.000	-1.000	4.75
R7	05/17/89	18.3	195.0	8.15	8.5	1.3	4	-1.000	-1.000	-1.000	-1.000	3.90
R7	06/16/89	19.6	125.0	8.33	9.8	7.4	52	-1.000	-1.000	-1.000	-1.000	5.80
R7	07/20/89	21.0	260.0	8.14	8.2	1.4	8	0.040	0.120	0.000	0.000	3.75
R7	08/24/89	27.3	245.0	8.44	9.7	2.2	0	-1.000	-1.000	-1.000	-1.000	3.00
R7	09/20/89	23.2	232.0	8.13	8.7	1.2	0	-1.000	-1.000	-1.000	-1.000	2.90
R7	10/17/89	18.7	211.0	8.08	8.3	1.2	0	0.007	0.280	0.015	0.010	2.70
R7	11/14/89	14.7	200.0	8.09	8.9	0.6	8	0.010	0.200	0.009	0.020	2.70
R7	12/05/89	6.1	168.0	8.15	12.1	0.4	0	-1.000	-1.000	-1.000	-1.000	2.72
** RUSH												
R8	01/20/89	7.0	162.0	8.36	15.6	0.8	0	-1.000	-1.000	-1.000	-1.000	4.20
R8	02/11/89	5.6	157.0	8.15	11.3	2.3	0	-1.000	-1.000	-1.000	-1.000	5.10
R8	03/11/89	9.8	160.0	8.19	11.8	6.2	8	0.060	0.280	0.033	0.190	7.50
R8	04/22/89	19.9	228.0	8.26	10.3	0.9	12	-1.000	-1.000	-1.000	-1.000	4.75
R8	05/17/89	19.0	194.0	8.14	8.6	0.8	6	-1.000	-1.000	-1.000	-1.000	3.90
R8	06/16/89	19.3	125.0	8.17	8.8	8.6	68	-1.000	-1.000	-1.000	-1.000	5.80
R8	07/20/89	21.0	242.0	7.90	7.6	2.0	8	0.028	0.220	0.009	0.000	3.75
R8	08/24/89	27.5	245.0	8.37	8.3	2.0	0	-1.000	-1.000	-1.000	-1.000	3.00
R8	09/20/89	24.1	235.0	8.23	9.0	1.2	2	-1.000	-1.000	-1.000	-1.000	-99.00
R8	10/17/89	19.1	197.0	8.15	8.8	1.0	6	0.007	0.590	0.011	0.010	2.70
R8	11/14/89	13.9	192.0	8.22	9.7	0.6	2	0.010	0.200	0.004	0.030	2.70
R8	12/05/89	6.3	165.0	8.20	12.3	0.4	0	-1.000	-1.000	-1.000	-1.000	2.72
** MOUTH												
R9	01/20/89	6.9	170.0	8.42	16.7	0.9	0	-1.000	-1.000	-1.000	-1.000	4.20
R9	02/11/89	5.5	165.0	8.15	11.2	2.1	0	-1.000	-1.000	-1.000	-1.000	5.10
R9	03/11/89	11.0	177.0	8.27	12.8	5.3	2	0.030	0.140	0.027	0.260	7.50
R9	04/22/89	20.5	278.0	8.27	10.2	0.7	0	-1.000	-1.000	-1.000	-1.000	4.75
R9	05/17/89	19.5	225.0	8.28	8.5	0.7	4	-1.000	-1.000	-1.000	-1.000	3.90
R9	06/16/89	19.0	149.0	8.12	8.8	9.4	64	-1.000	-1.000	-1.000	-1.000	5.80
R9	07/20/89	23.8	258.0	8.07	7.6	2.4	4	0.040	0.110	0.000	0.000	3.75
R9	08/24/89	26.5	240.0	8.26	7.9	1.6	4	-1.000	-1.000	-1.000	-1.000	3.00
R9	09/20/89	22.5	224.0	8.10	8.3	1.4	4	-1.000	-1.000	-1.000	-1.000	-99.00
R9	10/17/89	19.9	205.0	8.05	7.7	1.0	0	0.005	0.190	0.011	0.010	2.70
R9	11/14/89	15.1	200.0	8.03	8.7	0.7	12	0.020	0.200	0.004	0.010	2.70
R9	12/05/89	5.2	160.0	8.06	10.6	0.4	0	-1.000	-1.000	-1.000	-1.000	2.72

APPENDIX 3

Water Quality Data, Tributaries and Springs

Buffalo National River
Water Quality Data

TRIBUTARIES & SPRINGS

SITE #	DATE	WATER TEMP. (deg.C)	SPECIFIC CONDUCTIVITY (umhos)	pH	DISSOLVED OXYGEN (mg/l)	TURBIDITY (FTU)	FECAL COLIFORM (col./100ml)	NO3/NO2-N (mg/l)	TKN (mg/l)	TP (mg/l)	NH4-N (mg/l)	STAFF GAUGE (FT)
** BEAR CREEK												
T12	06/07/89	20.9	210.0	-1.00	10.0	1.1	20	0.080	0.100	0.020	0.020	0.00
T12	06/21/89	24.0	182.0	8.32	9.0	2.0	36	-1.000	-1.000	-1.000	-1.000	-99.99
T12	07/11/89	29.7	290.0	8.54	9.4	1.5	10	0.040	0.300	0.000	0.060	-99.99
T12	07/26/89	23.1	275.0	8.44	9.5	3.7	15	-1.000	-1.000	-1.000	-1.000	-99.99
T12	08/09/89	21.6	230.0	8.27	10.0	1.6	14	0.070	0.100	0.022	0.070	-99.99
T12	08/22/89	24.8	278.0	8.25	9.3	1.5	18	-1.000	-1.000	-1.000	-1.000	-99.99
T12	09/11/89	22.5	245.0	8.05	8.3	1.2	18	0.040	0.100	0.024	0.040	-99.00
T12	09/26/89	16.1	218.0	-9.99	10.1	0.9	4	0.030	0.000	0.014	0.010	-99.00
** BEECH CREEK												
T1	06/05/89	15.2	78.0	-1.00	8.8	4.2	58	0.010	0.100	0.007	0.000	-99.99
T1	06/19/89	16.9	70.0	8.28	9.6	5.5	12	-1.000	-1.000	-1.000	-1.000	-99.99
T1	07/05/89	23.5	127.0	8.47	9.1	1.3	12	1.120	0.400	0.002	0.000	-0.40
T1	07/24/89	20.5	178.0	8.58	10.3	1.1	22	-1.000	-1.000	-1.000	-1.000	-99.99
** BIG CREEK/L												
T18	06/04/89	28.9	280.0	8.01	6.8	0.6	-1	0.030	0.100	0.011	0.000	-99.99
T18	06/23/89	25.0	250.0	8.12	7.7	0.5	12	-1.000	-1.000	-1.000	-1.000	-99.99
T18	07/11/89	27.0	320.0	7.98	6.8	0.9	4	0.060	0.200	0.005	0.060	-99.99
T18	07/27/89	22.2	285.0	8.04	7.5	0.6	20	-1.000	-1.000	-1.000	-1.000	-99.99
T18	08/11/89	24.8	235.0	7.95	7.9	0.7	2	0.030	0.100	0.008	0.040	-99.99
T18	08/30/89	26.3	255.0	7.87	7.0	1.1	30	-1.000	-1.000	-1.000	-1.000	-99.99
T18	09/13/89	21.8	218.0	7.97	8.0	0.8	32	0.090	0.100	0.009	0.020	-99.00
T18	09/27/89	17.2	220.0	7.97	8.7	0.6	4	0.040	0.100	0.007	0.020	-99.00
** BIG CREEK/U												
T6	06/06/89	18.0	183.0	-1.00	9.4	1.7	12	0.160	0.600	0.007	0.020	-99.99
T6	06/19/89	21.1	158.0	8.02	9.4	2.7	6	-1.000	-1.000	-1.000	-1.000	-99.99
T6	07/05/89	27.0	242.0	7.82	7.9	3.8	18	0.210	0.400	-1.000	0.000	-99.99
T6	07/24/89	19.4	222.0	7.81	8.4	68.0	3400	-1.000	-1.000	-1.000	-1.000	2.50
T6	08/07/89	25.3	247.0	7.94	8.6	2.7	8	0.060	0.300	0.012	-1.000	2.10
T6	08/21/89	24.5	268.0	8.25	11.2	1.9	8	-1.000	-1.000	-1.000	-1.000	2.00
T6	09/05/89	27.2	255.0	7.93	8.5	1.3	18	0.010	0.200	0.010	0.010	1.95
T6	09/01/89	28.4	273.0	8.00	8.6	1.7	12	-1.000	-1.000	-1.000	-1.000	1.92
T6	09/18/89	21.7	210.0	7.98	9.5	1.4	12	0.020	0.100	0.009	0.020	1.94
** BRUSH CREEK												
T13	08/09/89	18.2	302.0	8.16	9.4	0.5	0	0.310	0.000	0.014	0.090	-99.99
** CALF CREEK												
T10	06/07/89	18.5	228.0	-1.00	9.3	1.4	10	0.130	0.100	0.024	0.020	0.00
T10	06/21/89	21.8	225.0	7.82	8.0	1.4	20	-1.000	-1.000	-1.000	-1.000	-0.05
T10	07/10/89	26.0	275.0	7.75	9.2	1.5	12	0.300	0.400	0.029	0.100	-99.99
T10	07/25/89	20.8	318.0	7.81	9.2	1.4	0	-1.000	-1.000	-1.000	-1.000	-0.20

Buffalo National River
Water Quality Data

TRIBUTARIES & SPRINGS

SITE #	DATE	WATER TEMP. (deg.C)	SPECIFIC CONDUCTIVITY (umhos)	pH	DISSOLVED OXYGEN (mg/l)	TURBIDITY (FTU)	FECAL COLIFORM (col./100ml)	NO3/NO2-N (mg/l)	TKN (mg/l)	TP (mg/l)	NH4-N (mg/l)	STAFF GAUGE (FT)
T10	08/08/89	22.6	282.0	7.78	8.4	2.1	0	0.130	0.200	0.034	0.050	-99.99
T10	08/23/89	23.8	315.0	7.75	8.7	2.7	2	-1.000	-1.000	-1.000	-1.000	-99.99
T10	09/06/89	25.2	290.0	7.77	8.6	2.5	46	0.180	0.100	0.030	0.030	-99.00
T10	09/25/89	19.0	272.0	7.81	9.6	2.3	12	0.190	0.100	0.043	0.070	-99.00
** CAVE CREEK												
T8	06/06/89	20.2	183.0	-1.00	10.1	1.3	6	0.060	0.700	0.007	0.020	0.00
T8	06/20/89	23.5	160.0	8.22	9.2	1.9	6	-1.000	-1.000	-1.000	-1.000	-0.05
T8	07/10/89	27.0	228.0	7.87	7.9	1.6	50	0.050	0.400	0.008	0.120	-99.99
T8	07/25/89	17.5	220.0	7.97	9.0	12.0	370	-1.000	-1.000	-1.000	-1.000	-99.99
T8	08/08/89	20.6	218.0	8.14	8.6	1.4	6	0.020	0.200	0.008	0.060	-99.99
T8	08/23/89	23.2	255.0	7.95	7.7	1.1	6	-1.000	-1.000	-1.000	-1.000	-99.99
T8	09/06/89	25.2	215.0	8.05	7.8	1.2	26	0.010	0.200	0.009	0.010	-99.00
T8	09/25/89	14.0	188.0	8.13	9.4	0.7	12	0.010	0.100	0.008	0.050	-99.00
** CECIL CREEK												
T3	06/04/89	17.2	190.0	-1.00	8.5	1.5	74	0.010	0.100	0.005	0.000	0.20
T3	06/19/89	18.2	180.0	7.99	9.4	1.8	30	-1.000	-1.000	-1.000	-1.000	2.06
T3	07/05/89	25.0	250.0	7.88	8.3	1.8	16	0.120	0.400	0.000	0.000	1.40
T3	07/24/89	19.8	238.0	8.05	9.8	1.7	4	-1.000	-1.000	-1.000	-1.000	1.80
T3	08/07/89	22.4	258.0	7.96	8.6	1.6	12	0.030	0.200	0.003	0.020	1.30
T3	08/21/89	20.2	278.0	7.77	7.0	1.4	6	-1.000	-1.000	-1.000	-1.000	1.15
T3	09/05/89	23.0	260.0	7.85	7.8	1.2	28	0.020	0.300	0.004	0.030	1.10
T3	09/18/89	18.5	230.0	7.81	8.8	1.2	14	0.020	0.300	0.002	0.020	1.15
** CEDAR CREEK												
T19	06/04/89	17.0	290.0	8.22	8.5	55.0	-1	0.010	0.600	0.023	0.020	-99.99
T19	07/27/89	18.9	398.0	8.24	8.3	1.2	40	-1.000	-1.000	-1.000	-1.000	-0.30
T19	08/16/89	19.3	335.0	8.03	8.1	0.9	20	-1.000	-1.000	-1.000	-1.000	-0.45
T19	08/30/89	23.0	375.0	8.02	7.2	1.7	30	-1.000	-1.000	-1.000	-1.000	-99.99
T19	09/27/89	10.7	315.0	8.05	9.5	0.6	8	-1.000	-1.000	-1.000	-1.000	-99.00
** CLABBER CREEK												
T17	06/04/89	20.5	390.0	8.28	8.2	0.6	106	0.030	0.200	0.003	0.000	0.12
T17	06/27/89	28.5	412.0	8.42	9.0	0.8	12	-1.000	-1.000	-1.000	-1.000	-0.20
T17	07/11/89	26.8	470.0	8.27	8.6	1.1	16	0.300	0.200	0.000	0.010	-0.30
T17	07/26/89	22.8	427.0	8.28	10.3	2.6	0	-1.000	-1.000	-1.000	-1.000	-0.30
T17	08/16/89	26.5	385.0	8.34	10.4	0.9	2	0.020	0.200	0.000	0.050	-0.45
T17	08/30/89	26.3	403.0	8.33	9.4	1.9	108	-1.000	-1.000	-1.000	-1.000	-0.40
T17	09/13/89	21.3	330.0	8.35	9.3	0.5	22	0.020	0.100	0.000	0.020	-0.35
** DAVIS CREEK												
T7	06/06/89	17.3	303.0	-1.00	10.3	0.5	30	0.140	0.400	0.000	0.020	-99.99
T7	06/20/89	18.2	322.0	8.12	9.3	0.6	14	-1.000	-1.000	-1.000	-1.000	2.26
T7	07/10/89	21.5	370.0	7.95	8.7	0.5	64	0.340	0.200	0.000	0.110	2.15

Buffalo National River
Water Quality Data

TRIBUTARIES & SPRINGS

SITE #	DATE	WATER TEMP. (deg.C)	SPECIFIC CONDUCTIVITY (umhos)	pH	DISSOLVED OXYGEN (mg/l)	TURBIDITY (FTU)	FECAL COLIFORM (col./100ml)	NO3/NO2-N (mg/l)	TKN (mg/l)	TP (mg/l)	NH4-N (mg/l)	STAFF GAUGE (FT)
T7	07/25/89	16.7	375.0	8.10	8.6	0.7	4	-1.000	-1.000	-1.000	-1.000	2.20
T7	08/08/89	17.3	320.0	8.11	8.7	0.4	38	0.170	0.000	0.000	0.030	1.15
T7	08/23/89	19.0	395.0	7.94	6.5	0.6	0	-1.000	-1.000	-1.000	-1.000	2.10
T7	09/06/89	21.9	338.0	7.93	6.7	0.9	4	0.170	0.000	0.000	0.020	2.10
T7	09/25/89	11.0	303.0	8.10	9.7	0.3	8	0.170	0.100	0.001	0.030	2.10
** GILBERT SPRING												
S41	06/07/89	13.8	302.0	-1.00	8.5	0.7	6	-1.000	-1.000	-1.000	-1.000	-99.99
S33	06/15/89	14.2	300.0	7.58	9.1	0.9	6	-1.000	-1.000	-1.000	-1.000	-99.99
S41	07/25/89	13.1	360.0	7.52	8.8	1.4	44	-1.000	-1.000	-1.000	-1.000	-99.99
S41	08/09/89	14.8	370.0	7.74	9.0	1.0	4	-1.000	-1.000	-1.000	-1.000	-99.99
S41	08/22/89	14.2	340.0	7.58	8.9	0.7	0	-1.000	-1.000	-1.000	-1.000	-99.99
S41	09/11/89	16.7	328.0	7.48	8.1	1.1	4	-1.000	-1.000	-1.000	-1.000	-99.00
S41	09/26/89	15.1	327.0	7.57	8.8	0.7	0	-1.000	-1.000	-1.000	-1.000	-99.00
** LEATHERWOOD CREEK												
T24	06/04/89	17.5	330.0	-1.00	7.6	0.6	78	0.010	0.200	0.000	0.000	-99.99
T24	06/23/89	24.0	330.0	8.19	7.8	0.4	34	-1.000	-1.000	-1.000	-1.000	-99.99
T24	07/11/89	25.5	400.0	8.06	7.4	0.7	10	1.080	0.200	0.000	0.080	-99.99
T24	07/27/89	21.6	360.0	8.05	7.8	0.9	8	-1.000	-1.000	-1.000	-1.000	-99.99
T24	08/16/89	22.7	325.0	7.97	8.4	0.5	22	0.030	0.100	0.000	0.050	-99.99
T24	08/30/89	21.7	350.0	7.83	6.6	1.5	5	-1.000	-1.000	-1.000	-1.000	-99.99
T24	09/13/89	20.6	287.0	7.95	7.3	0.5	42	0.020	0.100	0.004	0.020	-99.00
T24	09/27/89	17.0	315.0	8.01	8.1	0.4	18	0.040	0.100	0.001	0.020	-99.00
** LITTLE BUFFALO RIVER												
T5	06/06/89	18.4	162.0	-1.00	8.8	1.5	30	0.070	0.700	0.006	0.020	-99.99
T5	06/19/89	23.4	170.0	8.12	9.0	1.5	22	-1.000	-1.000	-1.000	-1.000	-0.50
T5	07/05/89	27.2	218.0	8.15	8.6	2.1	14	0.210	0.300	0.000	0.090	-0.30
T5	07/24/89	21.5	218.0	8.10	9.3	1.7	22	-1.000	-1.000	-1.000	-1.000	-0.20
T5	08/07/89	26.3	225.0	8.49	10.1	1.5	8	0.000	0.200	0.008	0.010	-0.60
T5	08/21/89	24.0	250.0	7.97	8.5	1.2	0	-1.000	-1.000	-1.000	-1.000	-0.50
T5	09/05/89	27.1	230.0	8.19	9.4	1.0	10	0.010	0.300	0.008	0.020	-0.80
T5	09/18/89	21.2	215.0	8.10	9.9	1.4	6	0.020	0.100	0.005	0.040	-0.70
** LUALLEN SPRING												
S2	06/15/89	12.3	138.0	7.34	9.7	4.0	30	-1.000	-1.000	-1.000	-1.000	-99.99
S2	07/24/89	10.8	235.0	7.12	9.7	1.0	34	-1.000	-1.000	-1.000	-1.000	-99.99
S2	08/07/89	12.0	207.0	7.04	9.6	1.3	2	0.430	0.100	0.015	0.020	-99.99
S2	08/21/89	12.6	200.0	7.05	9.4	0.8	6	-1.000	-1.000	-1.000	-1.000	-99.99
S2	09/05/89	13.8	170.0	7.23	8.9	0.7	0	0.470	0.100	0.014	0.010	-99.00
S2	09/19/89	13.0	198.0	7.37	9.3	0.7	8	-1.000	-1.000	-1.000	-1.000	-99.00
** MIDDLE CREEK												
T23	06/04/89	16.9	330.0	7.90	8.3	0.5	74	0.010	0.200	0.000	0.000	-99.99

Buffalo National River
Water Quality Data

TRIBUTARIES & SPRINGS

SITE #	DATE	WATER TEMP. (deg.C)	SPECIFIC CONDUCTIVITY (umhos)	pH	DISSOLVED OXYGEN (mg/l)	TURBIDITY (FTU)	FECAL COLIFORM (col./100ml)	NO3/NO2-N (mg/l)	TKN (mg/l)	TP (mg/l)	NH4-N (mg/l)	STAFF GAUGE (FT)
T23	06/23/89	17.0	340.0	8.24	8.5	0.3	20	-1.000	-1.000	-1.000	-1.000	-99.99
T23	07/11/89	23.0	420.0	8.07	7.7	0.8	14	0.020	0.100	0.000	0.090	-99.99
T23	07/27/89	19.0	395.0	8.04	18.0	1.0	16	-1.000	-1.000	-1.000	-1.000	-99.99
T23	08/16/89	20.6	350.0	8.04	7.7	1.0	16	0.020	0.200	0.000	0.030	-99.99
T23	08/30/89	22.9	385.0	7.89	6.2	1.8	124	-1.000	-1.000	-1.000	-1.000	-99.99
T23	09/13/89	19.3	320.0	7.93	7.1	0.7	52	0.020	0.100	0.000	0.010	-99.00
T23	09/27/89	13.0	315.0	7.97	8.3	1.2	12	0.030	0.100	0.000	0.020	-99.00
** MILL CREEK/M												
T11	06/07/89	16.6	278.0	-1.00	9.7	0.6	6	0.140	0.200	0.003	0.010	-99.99
T11	06/20/89	22.0	298.0	8.24	10.2	0.7	24	-1.000	-1.000	-1.000	-1.000	-99.99
T11	07/10/89	22.5	300.0	8.17	10.3	0.9	24	0.300	0.400	0.000	0.100	-99.99
T11	07/25/89	15.7	335.0	8.14	9.7	0.7	144	-1.000	-1.000	-1.000	-1.000	-99.99
T11	08/08/89	17.3	285.0	8.10	9.0	0.9	2	0.210	0.100	0.004	0.020	-99.99
T11	08/23/89	17.8	320.0	8.07	9.2	0.7	24	-1.000	-1.000	-1.000	-1.000	-99.99
T11	09/06/89	19.5	290.0	8.09	9.0	0.6	2	0.100	0.100	0.020	0.020	-99.00
T11	09/25/89	14.7	275.0	8.09	10.0	0.6	10	0.210	0.100	0.010	0.060	0.15
** MILL CREEK/U												
T4	06/04/89	19.6	270.0	-1.00	7.3	1.4	30	0.180	0.200	0.011	0.000	-99.99
T4	06/14/89	17.1	275.0	8.06	9.0	5.0	65	-1.000	-1.000	-1.000	-1.000	0.84
T4	06/19/89	20.5	270.0	8.11	9.4	1.3	14	-1.000	-1.000	-1.000	-1.000	0.50
T4	07/05/89	25.5	260.0	7.98	7.8	1.1	42	0.190	0.400	0.000	0.030	0.34
T4	07/24/89	20.6	298.0	8.04	9.2	1.0	4	-1.000	-1.000	-1.000	-1.000	0.32
T4	08/07/89	22.0	265.0	8.05	8.6	0.8	14	0.160	0.200	0.005	0.020	0.40
T4	08/21/89	21.0	282.0	7.97	8.2	0.7	8	-1.000	-1.000	-1.000	-1.000	-99.99
T4	09/05/89	24.4	270.0	7.95	7.6	0.9	20	0.140	0.200	0.007	0.010	0.30
T4	09/18/89	19.9	230.0	7.90	8.6	0.6	26	0.290	0.200	0.003	0.020	0.25
** MITCH HILL SPRING												
S33	06/20/89	13.8	305.0	7.37	7.2	0.7	12	-1.000	-1.000	-1.000	-1.000	-99.99
S33	07/10/89	15.8	322.0	7.16	8.4	1.2	6	-1.000	-1.000	0.000	-1.000	-99.99
S33	07/25/89	11.9	339.0	7.34	8.0	0.6	2	-1.000	-1.000	-1.000	-1.000	-99.99
S33	08/08/89	13.3	315.0	7.30	8.2	1.3	4	-1.000	-1.000	-1.000	-1.000	-99.99
S33	08/23/89	12.5	335.0	7.22	8.0	0.6	0	-1.000	-1.000	-1.000	-1.000	-99.99
S33	09/06/89	14.0	310.0	7.33	8.2	0.6	6	-1.000	-1.000	-1.000	-1.000	-99.00
S33	09/25/89	14.1	325.0	7.21	7.8	0.4	2	-1.000	-1.000	-1.000	-1.000	-99.00
** PONCA CREEK												
T2	06/14/89	18.7	194.0	8.30	9.1	4.5	40	-1.000	-1.000	-1.000	-1.000	1.00
T2	06/19/89	19.1	220.0	8.25	9.2	1.1	14	-1.000	-1.000	-1.000	-1.000	0.84
T2	07/05/89	24.0	275.0	8.16	8.5	0.7	4	0.290	0.300	0.000	0.000	0.74
T2	07/24/89	18.7	312.0	8.27	9.7	1.3	98	-1.000	-1.000	-1.000	-1.000	0.75
T2	08/07/89	20.7	298.0	8.15	9.2	1.7	6	0.050	0.200	0.004	0.010	0.72
T2	08/21/89	20.5	320.0	8.04	8.1	0.9	2	-1.000	-1.000	-1.000	-1.000	0.70

Buffalo National River
Water Quality Data

TRIBUTARIES & SPRINGS

SITE #	DATE	WATER TEMP. (deg.C)	SPECIFIC CONDUCTIVITY (umhos)	pH	DISSOLVED OXYGEN (mg/l)	TURBIDITY (FTU)	FECAL COLIFORM (col./100ml)	NO3/NO2-N (mg/l)	TKN (mg/l)	TP (mg/l)	NH4-N (mg/l)	STAFF GAUGE (FT)
T2	09/05/89	22.6	275.0	8.01	8.1	1.3	2	0.040	0.600	0.006	0.010	0.68
T2	09/18/89	18.9	250.0	8.07	9.2	0.7	2	0.040	0.100	0.001	0.040	0.70
** RICHLAND CREEK												
T9	06/06/89	20.3	82.0	-1.00	9.8	4.7	30	0.030	0.400	0.007	0.010	0.00
T9	06/20/89	23.6	78.0	8.21	10.2	3.1	6	-1.000	-1.000	-1.000	-1.000	-0.05
T9	07/10/89	24.3	130.0	7.52	8.6	1.6	6	4.000	0.400	0.008	0.060	-99.99
T9	07/25/89	19.2	180.0	7.96	9.6	1.4	0	-1.000	-1.000	-1.000	-1.000	-0.20
T9	08/08/89	18.3	155.0	7.61	8.8	2.4	18	0.020	0.100	0.011	0.020	-99.99
T9	08/23/89	24.0	225.0	7.82	8.9	1.2	0	-1.000	-1.000	-1.000	-1.000	-99.99
T9	09/01/89	26.7	215.0	7.64	7.8	1.8	20	-1.000	-1.000	-1.000	-1.000	-0.90
T9	09/06/89	25.8	203.0	7.83	8.5	3.3	36	0.010	0.300	0.020	0.030	-1.68
T9	09/25/89	14.9	178.0	7.96	9.3	2.5	-1	0.050	0.300	0.021	0.021	-1.52
** RUSH CREEK												
T16	06/04/89	15.0	272.0	8.02	8.4	0.4	48	0.080	0.100	0.000	0.000	0.12
T16	06/22/89	22.0	305.0	8.28	9.9	0.9	18	-1.000	-1.000	-1.000	-1.000	-0.20
T16	07/11/89	19.2	335.0	8.15	9.4	0.7	36	0.320	0.100	0.000	0.030	-0.30
T16	07/26/89	15.8	318.0	8.12	9.5	0.7	80	-1.000	-1.000	-1.000	-1.000	-0.30
T16	08/16/89	21.2	282.0	8.22	10.0	0.7	20	0.040	0.100	0.000	0.020	0.45
T16	08/30/89	20.6	308.0	8.17	9.0	1.4	6	-1.000	-1.000	-1.000	-1.000	-0.40
T16	09/13/89	18.2	258.0	8.19	8.9	0.7	16	0.070	0.100	0.002	0.010	-0.35
** TOMAHAWK CREEK												
T14	06/07/89	18.6	292.0	-1.00	9.6	0.6	38	0.130	0.100	-0.003	0.020	-99.99
T14	06/21/89	24.0	313.0	8.33	9.8	0.7	44	-1.000	-1.000	-1.000	-1.000	-99.99
T14	07/11/89	27.0	365.0	8.39	9.1	1.3	54	0.110	0.200	0.000	0.070	-99.99
T14	07/26/89	21.0	335.0	8.27	9.6	1.9	45	-1.000	-1.000	-1.000	-1.000	-99.99
T14	08/09/89	23.0	302.0	8.36	9.4	0.9	22	0.060	0.000	0.000	0.110	-99.99
T14	08/22/89	23.3	338.0	8.23	9.2	1.2	26	-1.000	-1.000	-1.000	-1.000	-99.99
T14	09/11/89	21.9	285.0	8.20	9.0	0.9	48	0.070	0.100	0.003	0.140	-99.00
T14	09/26/89	15.1	272.0	8.22	9.8	0.5	22	0.070	0.000	0.003	0.010	-99.00
** WATER CREEK												
T15	06/07/89	18.3	255.0	-1.00	9.0	0.6	26	0.090	0.100	0.001	0.010	-99.99
T15	06/21/89	27.0	275.0	8.45	9.7	0.3	2	-1.000	-1.000	-1.000	-1.000	-99.99
T15	07/11/89	27.0	322.0	8.43	9.0	0.8	0	0.040	0.200	0.000	0.070	-99.99
T15	07/26/89	22.2	325.0	8.29	9.6	0.6	28	-1.000	-1.000	-1.000	-1.000	-99.99
T15	08/09/89	22.9	265.0	8.36	10.0	0.7	4	0.020	0.000	0.000	0.060	-99.99
T15	08/22/89	23.0	283.0	8.26	8.9	0.8	14	-1.000	-1.000	-1.000	-1.000	-99.99
T15	09/11/89	22.6	240.0	8.31	9.5	0.5	0	0.040	0.200	0.000	0.060	-99.00
T15	09/26/89	13.7	223.0	8.27	9.7	0.3	4	0.030	0.100	0.001	0.000	-99.00

APPENDIX 4

Watershed Tributary Inventory

BUFFALO NATIONAL RIVER
WATERSHED INVENTORY

Name of Stream	Drainage Area (acres)	Location: River Mile	Side of River?	Topo. Quad. Tributaries' Mouth	Monitored by NPS?	Site #	% NPS	NPDES Permit yes/no
COCK HOLLOW	1282	0.4	N	BUFFALO CITY	N		97	N
STEWART CREEK	1473	2.3	S	BUFFALO CITY	N		28	N
GOSHA CREEK	323	4.0	S	BUFFALO CITY	N		49	N
COW CREEK	2080	4.5	N	BUFFALO CITY	N		99	N
BRUSH CREEK 2	1616	5.3	S	BUFFALO CITY	N		35	N
LEATHERWOOD CREEK	7834	7.2	S	BIG FLAT	Y	T24	3	N
SHORT CREEK	1300	8.9	S	BIG FLAT	N		5	N
MIDDLE CREEK	6285	9.2	S	BIG FLAT	Y	T23	4	N
CANEY HOLLOW	499	10.1	S	BIG FLAT	N		46	N
BEAR HOLLOW	578	11.0	N	BIG FLAT	N		99	N
COLD SPRING HOLLOW	0	12.8	S	BIG FLAT	N		0	N
BIG CREEK	79745	13.0	S	BIG FLAT	Y	T18	2	N
BRUSH CREEK 1	1611	15.7	N	BIG FLAT	N		99	N
FISHTRAP HOLLOW	805	16.5	S	COZAHOME	N		20	N
LONELY HOLLOW	279	17.8	S	COZAHOME	N		80	N
BOAT CREEK	2390	20.7	N	REA VALLEY	Y	T21	98	N
CEDAR CREEK	2860	21.0	N	REA VALLEY	Y	T19	12	N
CABIN CREEK	939	21.6	N	REA VALLEY	Y	T20	42	N
SILVER HOLLOW	313	22.4	S	COZAHOME	N		99	N
CLABBER CREEK	15643	22.9	N	REA VALLEY	Y	T17	2	N
RUSH CREEK	9508	24.4	N	COZAHOME	Y	T16	9	N
INGRAM CREEK	1502	29.4	S	COZAHOME	N		28	N
PANTHER CREEK	3971	30.3	N	COZAHOME	N		28	N
HICKORY CREEK	2527	31.6	S	COZAHOME	N		5	N
ROCK CREEK	2766	31.9	S	COZAHOME	N		4	N
BOGSKIN HOLLOW	250	32.7	N	COZAHOME	N		99	N
JIM HOLLOW	495	33.0	N	COZAHOME	N		91	N
PETER HOLLOW	282	33.4	N	COZAHOME	N		62	N
WATER CREEK	22699	35.1	N	COZAHOME	Y	T15	2	N
KIMBALL CREEK	768	35.2	S	COZAHOME	N		13	N
SPRING CREEK	7601	38.7	S	COZAHOME	N		1	N
GREEN BAW HOLLOW	1457	42.7	N	MAUMEE	N		14	N
LITTLE ROCKY CREEK	2004	45.5	S	MAUMEE	N		10	N
ROCKY CREEK	3369	46.0	S	MAUMEE	N		2	N
TOMAHAWK CREEK	21324	48.8	N	MAUMEE	Y	T14	1	N
BRUSH CREEK	11520	52.7	S	MARSHALL	Y	T13	1	N
BEAR CREEK	53415	52.9	S	MARSHALL	Y	T12	1	N
DRY CREEK	6323	54.2	N	MARSHALL	N		8	N
MILL CREEK	9177	59.7	N	SNOWBALL	Y	T11	1	N
CALF CREEK	28616	60.5	S	SNOWBALL	Y	T10	3	N
ROCKY HOLLOW	2416	64.3	N	SNOWBALL	N		14	N
HAGE HOLLOW	3251	68.2	S	SNOWBALL	N		16	N
BEN BRANCH	712	71.2	S	SNOWBALL	N		45	N
JAMISON CREEK	4716	72.7	N	SNOWBALL	N		3	N
RICHLAND CREEK	75952	75.2	S	RULA	Y	T9	5	N
ROUGHEDGE HOLLOW	1856	76.5	N	RULA	N		10	N
CANE BRANCH	4556	79.9	N	RULA	N		3	N

BUFFALO NATIONAL RIVER
WATERSHED INVENTORY

Name of Stream	Drainage Area (acres)	Location: River Mile	Side of River?	Topo. Quad. Tributaries' Mouth	Monitored by NPS?	Site #	% NPS	NPDES Permit yes/no
SWEETGUM HOLLOW	295	79.9	N	EULA	N		17	N
CAVE CREEK	30402	81.3	S	EULA	Y	T8	1	N
MILL BRANCH	2304	83.7	N	WESTERN GROVE	N		2	N
DAVIS CREEK	16760	83.8	N	WESTERN GROVE	Y	T7	1	N
LICK CREEK	2818	87.1	S	EULA	N		6	N
HANCOCK HOLLOW	913	88.7	N	MT JUDEA	N		20	N
BIG CREEK	53460	90.3	S	MT JUDEA	Y	T6	1	N
STILLHOUSE HOLLOW	540	92.5	N	MT JUDEA	N		13	N
SHELDON BRANCH	1842	93.9	S	MT JUDEA	N		3	N
ROCK CREEK	3667	94.5	S	MT JUDEA	N		0	N
BEAR CAVE HOLLOW 2	1029	96.8	S	HASTY	N		24	N
WELLS CREEK	6942	97.1	N	HASTY	N		1	N
LITTLE BUFFALO R	81973	97.9	S	HASTY	Y	T5	1	Y
BOOMER HOLLOW	992	98.4	N	HASTY	N		4	N
MILL CREEK	12423	101.4	N	JASPER	Y	T4	3	Y
BOSKIN HOLLOW	1223	103.4	N	JASPER	N		10	N
SAWMILL HOLLOW	1272	105.6	S	JASPER	N		10	N
WEBB BRANCH	1998	109.4	S	JASPER	N		19	N
CECIL CREEK	12704	109.6	N	JASPER	Y	T3	25	N
DRY CREEK	1018	112.1	S	PONCA	N		39	N
SHOP CREEK	805	112.2	S	PONCA	N		38	N
CLEMMON HOLLOW	380	113.2	N	PONCA	N		98	N
CECIL HOLLOW	343	114.4	N	PONCA	N		95	N
BEAR CREEK	764	114.5	S	PONCA	N		60	N
INDIAN CREEK	1525	115.2	S	PONCA	N		81	N
BEAR CAVE HOLLOW 1	205	116.4	N	PONCA	N		99	N
FISHTRAP HOLLOW	332	117.1	N	PONCA	N		95	N
HEMMED IN HOLLOW	667	117.4	N	PONCA	N		95	N
SNEEDS CREEK	2740	117.7	N	PONCA	N		98	N
JACKIES BIG HOLLOW	235	118.9	S	PONCA	N		99	N
BEECH CREEK	1007	119.2	S	PONCA	N		11	N
CLIFF HOLLOW	817	121.1	N	PONCA	N		98	N
STEEL CREEK	2002	122.0	S	PONCA	N		23	N
PONCA CREEK	2711	124.6	N	PONCA	Y	T2	6	N
LEATHERWOOD CREEK	1048	124.7	S	PONCA	N		29	N
BIG HOLLOW	406	125.4	S	PONCA	N		76	N
CLARK CREEK	1252	125.8	N	PONCA	N		89	N
RUNNING CREEK	2632	126.1	S	PONCA	N		10	N
DRY CREEK	834	126.3	S	PONCA	N		16	N
WHITELY CREEK	3420	127.5	N	BOXLEY	N		15	N
MOORE CREEK	3551	128.7	N	BOXLEY	N		12	N
ARRINGTON CREEK	1506	129.1	S	BOXLEY	N		48	N
BEECH CREEK	12041	129.7	N	BOXLEY	Y	T1	4	N
SMITH CREEK	4499	131.0	S	BOXLEY	N		10	N
UPPER BUFFALO	33556	135.1	S	BOXLEY	N		1	N