WATER QUALITY DEMONSTRATION STUDY

KLONDIKE CREEK
OZARK, ALABAMA
OCTOBER 1992

SPECIAL STUDIES SECTION
FIELD OPERATIONS DIVISION
ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

WATER QUALITY DEMONSTRATION STUDY
KLONDIKE CREEK AT OZARK, ALABAMA

INTRODUCTION

The City of Ozark, Alabama utilizes Klondike Creek as a receiving stream for the treated effluent from its Southside municipal wastewater treatment facility (WWTP). Staff members of the Special Studies Section, Field Operations Division of the Alabama Department of Environmental Management (ADEM), at the request of the Municipal Branch of the Water Division of ADEM, conducted a water quality demonstration study to assess the effects of the treatment facility on Klondike Creek. During October 1992, data was collected to establish conditions and provide a comparative base of information on Klondike Creek. Although stream sampling was originally scheduled to coincide with the low flow (7Q10 = 1.5 cubic feet per second) period of the year, an unusually wet season prevented collection of samples under the preferred low flow conditions.

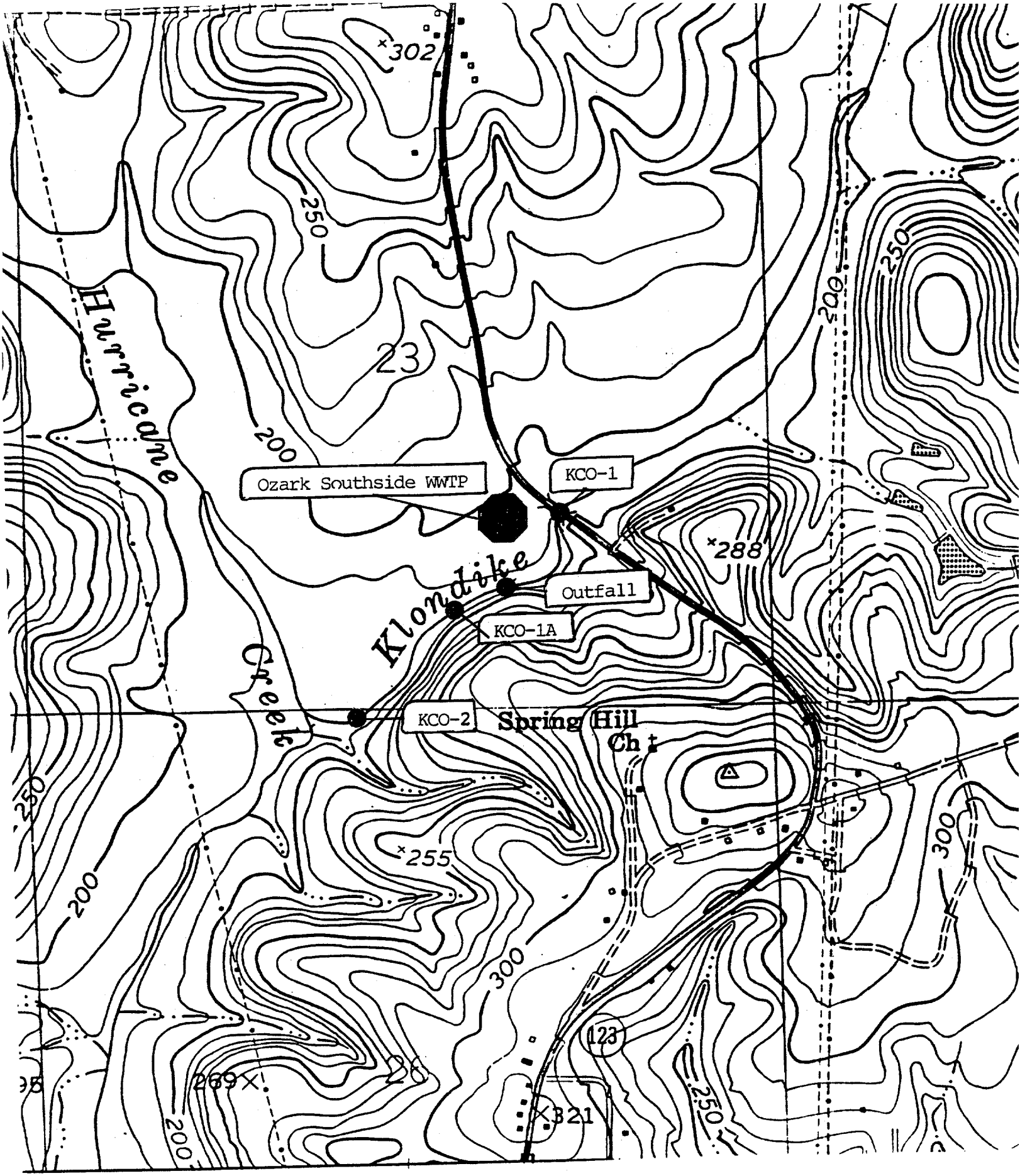
Permit information provided to the Special Studies Section for the Ozark - Southside WWTP lists the receiving waters as Hurricane Creek. A reconnaissance visit revealed that the WWTP effluent actually discharges to Klondike Creek. This discrepancy, which may or may not affect permitting requirements, was discussed with the Municipal Branch.

SAMPLING LOCATIONS AND METHODOLOGY

The station names and locations were as follows:

STATION	LOCATION:
KCO-1 (control)	Klondike Creek at AL. Hwy. 123 crossing. T5N,R24E,S23,SE1/4,NW1/4. Latitude: 31 23 18.2 Longitude: 085 36 29.5
KCO-1A	Klondike Creek approx. 200 yards downstream of WWTP. T5N,R24E,S23,SE1/4,SW1/4. Latitude: 31 23 12.0 Longitude: 085 36 38.2
KCO-2	Klondike Creek approx. 0.3 mile downstream of WWTP. T5N,R24E,S23,SW1/4,SE1/4. Latitude: 31 23 04.2 Longitude: 085 36 39.4

All physical data, chemical and biological sampling, sample handling techniques, and field parameter analyses utilized in the acquisition of data for this water quality demonstration study were as described in the Field Operations Standard Operating Procedures and Quality Control Assurance Manual (Field Operations Division, ADEM, Volumes 1, 2, and 3), as amended. Chain-of-custody was maintained by locking the samples in a Departmental vehicle when not in sight of a Field Operations employee. The samples requiring laboratory analysis were transported to the ADEM Environmental Laboratory in Montgomery, Alabama. Analysis methodology were as



MAP 1

KLONDIKE CREEK
OZARK, ALABAMA

specified in the Federal Register, 40 CFR Part 136, October 1984, as amended. Analysis of the samples yielded the data which is reported in Table 1.

DISCUSSION AND RESULTS

As suggested in the EPA document entitled Introduction to Water Quality-Based Toxics Control for the NPDES Program (EPA # 831-S-9202, March 1992), an integrated approach to water quality monitoring is utilized by the Field Operations Division when feasible and appropriate. This approach advocates analyzing the chemical component of waters, evaluating the condition of the stream by studying its resident biota, and testing effluents for toxic effects on living organisms. *"Each method contributes specific types of information to an evaluation of water quality... As a result, data collected using one method should not be used to contradict or overrule data obtained with the other two. If results of any one method show an impairment of water quality, then... an impairment may exist."*

A. PHYSICAL

Klondike Creek (Tables 5 through 7) is a third order stream over the length of the study reach. It drains primarily forested lands and falls within the Southeastern Plains and Hills sub-Ecoregion. Klondike Creek has canopy cover which varies from mostly shaded to shaded, has trees as the dominant type of streamside vegetation and has moderately stable banks. Bottom structure is largely dominated by bedrock, and sand substrates. Flows are usually greater than one and one-half cubic feet per second, even during low flow conditions. Klondike Creek exhibits signs of erosion to varying degrees, but shows no channel alteration. Multiple habitats suitable for colonization by aquatic macroinvertebrates are present and Habitat Assessments rated this stream as FAIR to GOOD at all evaluated locations. Klondike Creek lies within the Choctawhatchee River drainage basin.

B. CHEMICAL

The Water Use Classification for Klondike Creek is Fish and Wildlife (F&W). The F&W designation specifies the waters to be suitable for fishing, propagation of fish, aquatic life, and wildlife, and any other usage except for swimming and water contact sports or as a source of water supply for drinking or food processing purposes.

As shown in Table 1 and Figure 1, data collected from Klondike Creek indicated that the waters below the Ozark Southside WWTP outfall were meeting the dissolved oxygen standard for the F&W classification (5.0 mg/L). Stream pH data (Table 1, Figure 2) remained essentially the same. Total Suspended Solids, Hardness, and Turbidity data (Table 1, Figures 3, and 4) also reflected very minor changes.

In contrast (Table 1, Figures 2 through 5), Conductivity data experienced a notable increase. Alkalinity, Total Suspended Solids,

Ammonia, Nitrate and Phosphate concentrations also exhibited a substantial increase, as compared to background. Stream flow data collected was approximately two times that of normal low flow conditions. The WWTP flow comprised about 29% of the total flow.

C. BIOLOGICAL

1. In-stream Bioassessment

The aquatic macroinvertebrate community was sampled using the RBP-Multihabitat method to substantiate the physical, and chemical data and to provide an aspect that reflects pollution response over time.

A complete listing of the taxa collected during this water quality demonstration study has been included in Table 2. Biological metrics (Tables 3 and 4 , Figures 6 to 10) were used to analyze only the raw macroinvertebrate data collected at similar habitats. Table 8 provides a simplified interpretation of these metrics and should be referred to during the following discussion.

As demonstrated in Table 3, and 4, and Figures 6 through 11, aquatic macroinvertebrates collected from Klondike Creek, during the study period , showed a definite impact from the addition of the effluent bearing waters from the WWTP. Total Taxa Richness, Ephemeroptera, Plecoptera and Trichoptera (EPT) Taxa Richness, and Chironomidae Taxa Richness experienced a reduction in the overall number of taxa present (Table 3, Figures 6 through 8). Diversity (Table 3, Figure 11), Equitability, and the EPT to EPT+Chironomidae ratio also experienced a reduction, indicating a decrease in water quality. When compared to background, the Biotic Index (Table 3, Figure 9) exhibited little change downstream of the effluent. The Similarity Indices (Table 4) also indicated little difference in the community downstream of the WWTP.

Community structure (Table 3, Figure 10) was observed to be poorly balanced with one or two functional feeding groups dominating the community. The Shredders to Total ratio (Table 3) indicated that there were some community structure differences present, as compared to upstream of the WWTP. The dominant functional feeding groups experienced a shift from Collector-Gatherers, upstream of the WWTP, to Shredders and Collector-Gatherers downstream. This shift suggests a slight improvement in conditions since Shredders are good indicators of toxic effects.

2. Whole Effluent Toxicity Testing

In addition to the sampling of the macroinvertebrate community, short term, static renewal, chronic toxicity tests were performed on samples collected from the Ozark- Southside WWTP effluent, and on stream stations KCO-1 and KCO-1A during October 14-22, 1992. The effluent samples were diluted to the *permitted* in-stream waste concentration (IWC) of 42% and were analyzed. The downstream samples were analyzed as collected; at the *actual* in-stream waste concentration on the date collected (approximately 29%). The upstream samples were also analyzed as collected; 100% stream water. All tests utilized the fathead minnow (Pimephales promelas), and the

daphnid, Ceriodaphnia dubia. The measured endpoints for the fathead minnow test were survival and growth (weight), while the measured endpoints for the daphnids were survival and reproduction. Toxicity was indicated if there were significant differences ($P<0.05$) between survival and growth (weight) of the fathead minnows, or, if there were significant differences between survival and reproduction of the daphnids. No formal statistical analysis was necessary if the toxicity test sample endpoints exceeded control endpoints.

Initial water chemistry data for each sampling site/event were determined either on site or upon receipt at the lab (Table 9). Test water chemistries are presented in Table 10. A summary of toxicity test conditions is included in Table 11. Water chemistries and adverse toxicant effects were recorded at test initiation, solution renewals, and at test termination. No test condition variations or interferences were noted. At test termination, larval survival for each replicate was recorded and weights (growth) determined, and final daphnid survival and/or reproduction recorded. To insure sensitivity to toxicants, organism condition, and test validity, reference toxicant tests were conducted on October 15, 1992 (fathead minnow), and September 10, 1992 (daphnid), using reagent grade sodium chloride (NaCl). Results of these tests indicated acceptable 24 hour LC50's of 8222.87 mg/L (C.I. 8025.19/8425.41), and 2558.51 mg/L (C.I. 2352.62/2782.43) for fathead minnows and daphnids, respectively.

Analysis of the fathead minnow toxicity test data revealed no measured adverse biological test response during the seven day sampling period among the three sampling stations. The results of the daphnid chronic tests were invalid.

Measured Toxicity Test Responses

Fathead Minnow	KCO-1	WWTP	KCO-1A
Control Survival (%)	93*	100	97
Sample Survival (%)	98	98.3	97
Control Growth (avg. wt. mg)	0.616	0.587	0.586
Sample Growth (avg. wt. mg)	0.647	0.628	0.600

SURVIVAL - KCO-1 survival exceeded control survival, therefore no formal statistics are necessary. KCO-1A survival was the same as control survival, therefore no formal statistics are necessary. There was no significant difference between the WWTP sample and the control ($P<0.05$).

GROWTH - KCO-1, WWTP, and KCO-1A sample growths all exceeded control growths, therefore no formal statistics are necessary.

* One fish was injured during transfer on day 3 of the test. Even if this fish was used to determine total survival (95%), total sample survival would still have exceeded control survival.

Daphnids	KCO-1	WWTP	KCO-1A
Control Survival (%)	100	100	100
Sample Survival (%)	100	90	0**
Control Reproduction**	14.1	10	9.1
Sample Reproduction	18.7	9.2	0

** The daphnid tests are INVALID due to less than the minimum recommended number of control neonates produced (=/>15). These tests should be repeated.

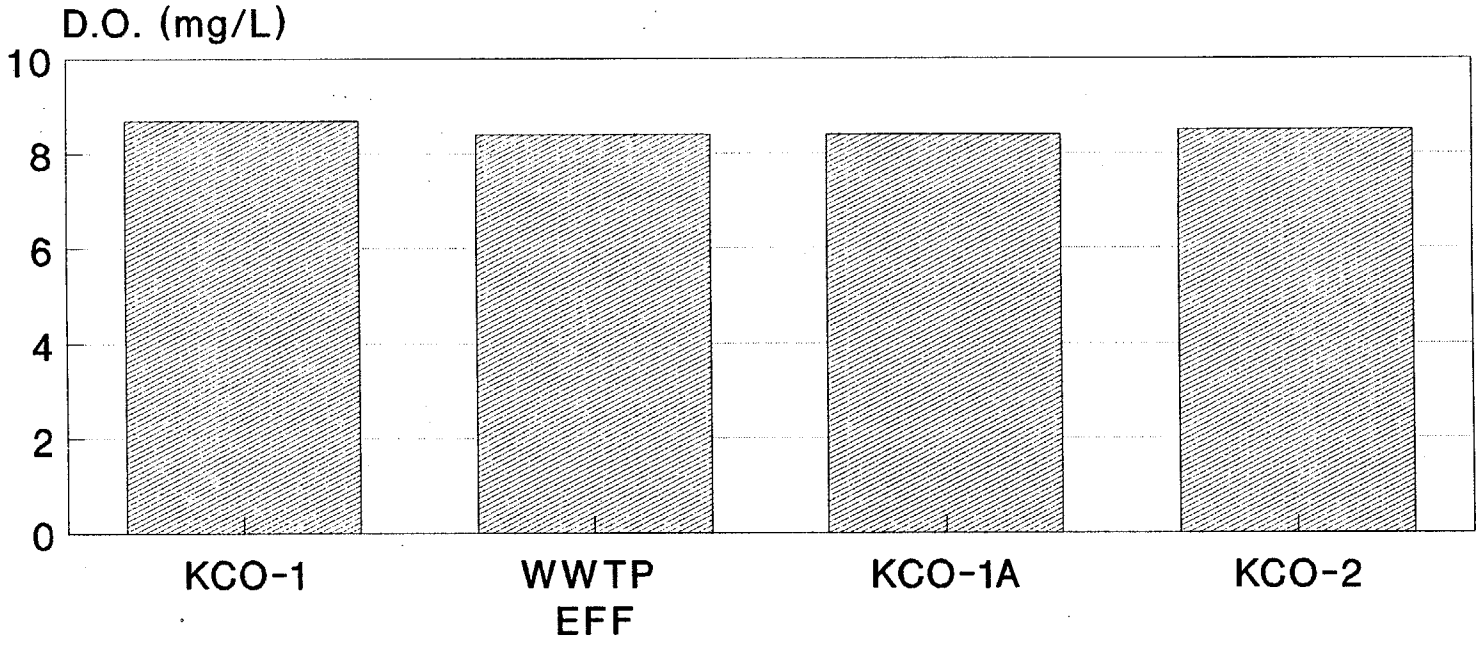
NOTE: A 48 hour acute toxicity test was conducted on KCO-1A from September 19-22, 1992. Results revealed 100% survival in the controls and 100% survival in the KCO-1A sample. There was 100% survival even after 72 hours.

CONCLUSIONS

An integrated approach to water quality monitoring was utilized in the characterization of the effluent at the Ozark Southside wastewater treatment plant and its effect on Klondike Creek. Chemical data, which provides an instantaneous picture of water quality conditions, indicated an increase in suspended solids and nutrient levels in the stream. Instream bioassessment data, which reflects long-term pollution response, suggests that the WWTP effluent is having an adverse impact on the water quality of Klondike Creek. However, toxicity data, which evaluated the effluent and stream toxicity to fathead minnows over the seven day study period, indicated no measurable adverse biological response.

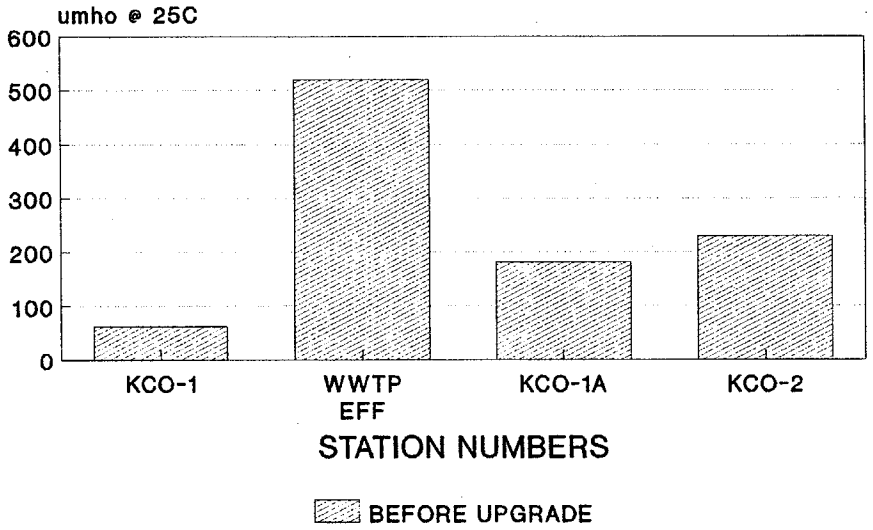
Despite higher than average stream flows, Klondike Creek appears to be adversely impacted by the addition of the WWTP effluent. Additional monitoring during stream flow conditions nearer to 7Q10 would assist in further documenting the severity of any adverse impacts to the receiving stream resulting from the effluent.

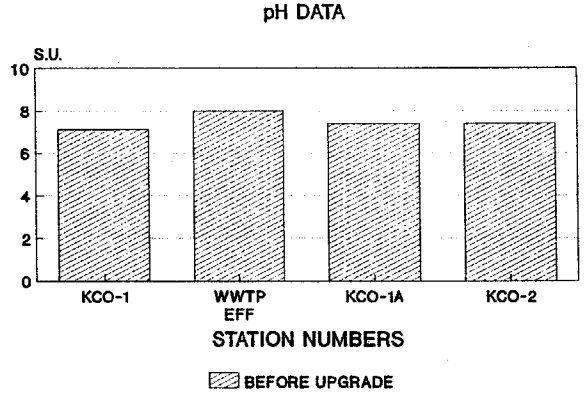
FIGURE 1
KLONDIKE CREEK
DISSOLVED OXYGEN DATA

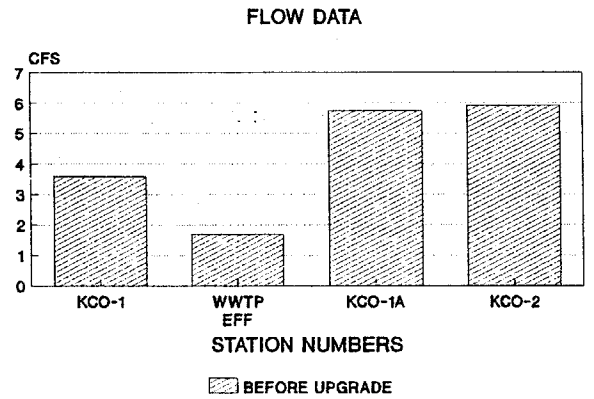


THE ABOVE NUMBERS ARE AVERAGES REPRESENTING MULTIPLE SAMPLING EVENTS.

FIGURE 2
KLONDIKE CREEK

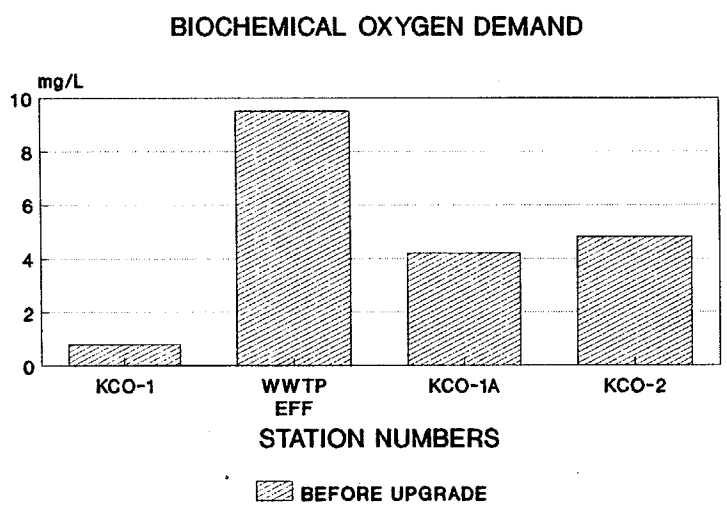


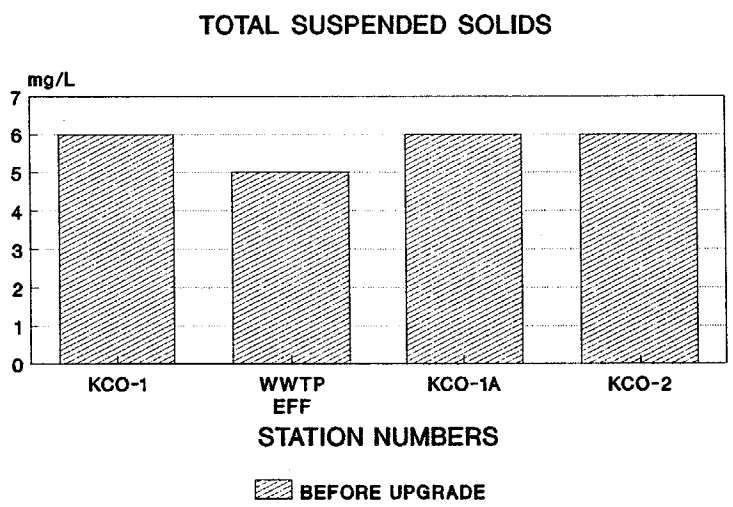




THE ABOVE NUMBERS ARE AVERAGES REPRESENTING MULTIPLE SAMPLING EVENTS.

FIGURE 3
KLONDIKE CREEK
CHEMICAL ANALYSIS DATA

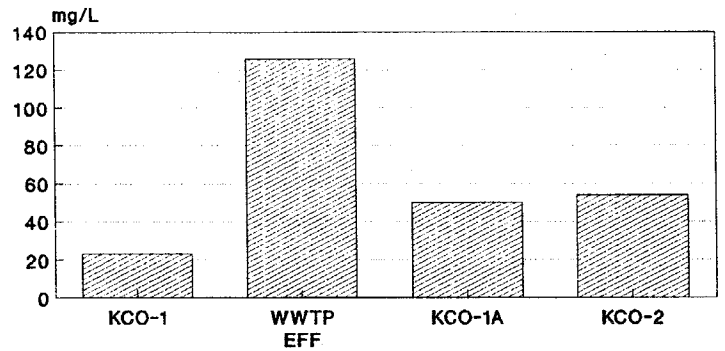




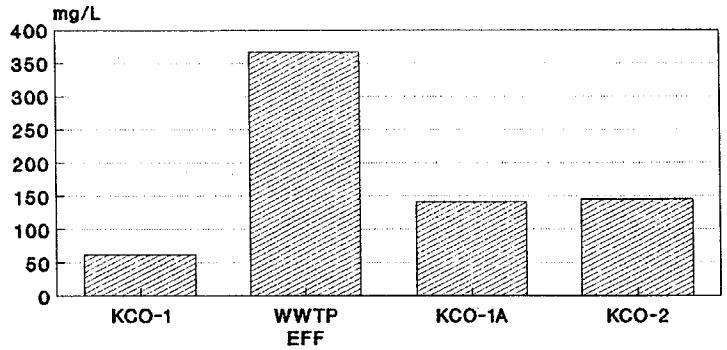
THE ABOVE NUMBERS ARE AVERAGES REPRESENTING MULTIPLE SAMPLING EVENTS.

FIGURE 4

ALKALINITY



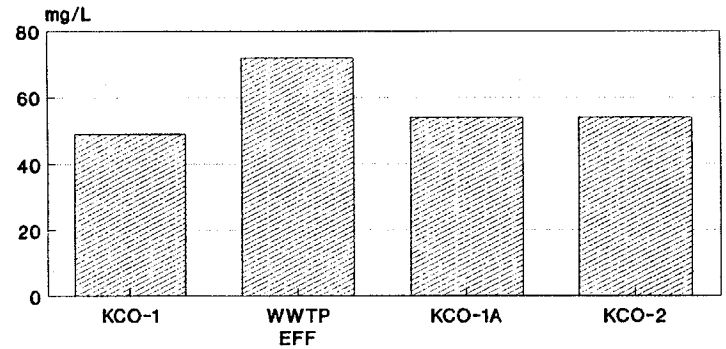
TOTAL DISSOLVED SOLIDS



KLONDIKE CREEK

THESE NUMBERS ARE AVERAGES REPRESENTING MULTIPLE SAMPLING EVENTS.

HARDNESS



TURBIDITY

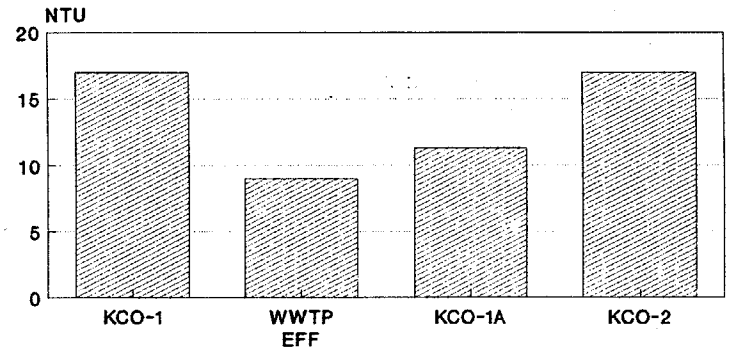
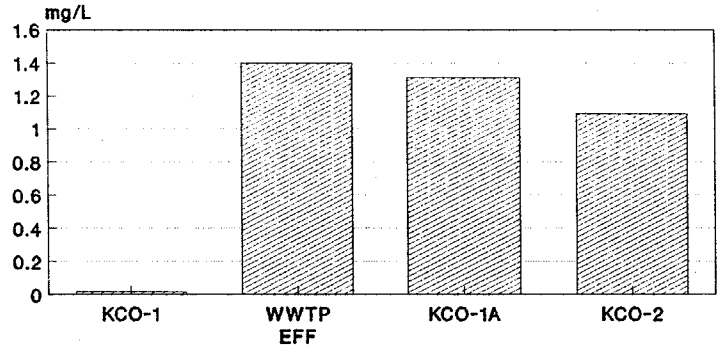
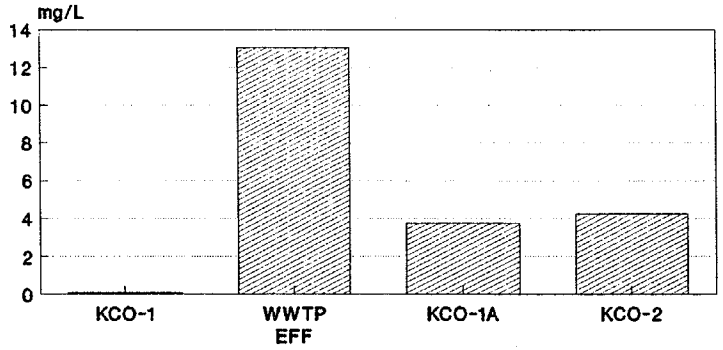


FIGURE 5

AMMONIA



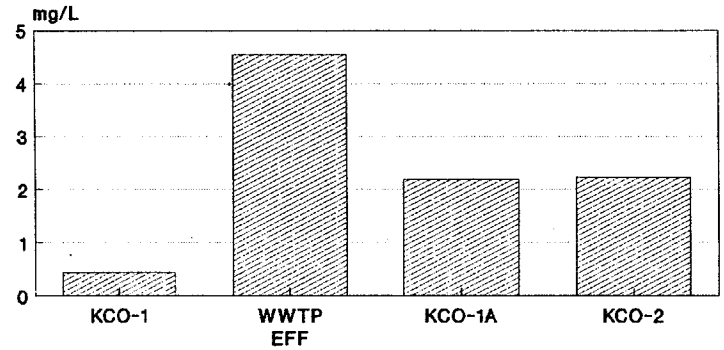
NITRATE



KLONDIKE CREEK

THESE NUMBERS ARE AVERAGES REPRESENTING MULTIPLE SAMPLING EVENTS.

TOTAL KJELDAHL NITROGEN



PHOSPHATES

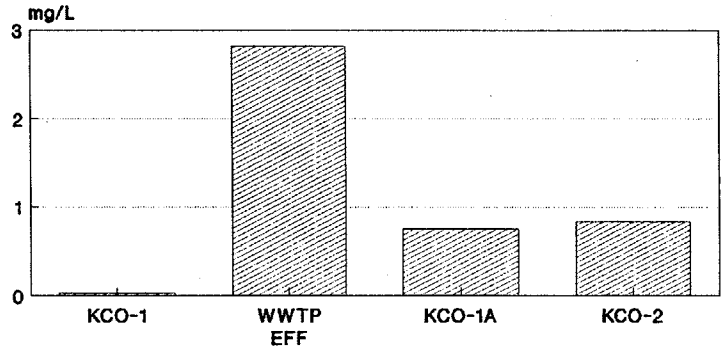


FIGURE 6

Klondike Creek KCO1-921014

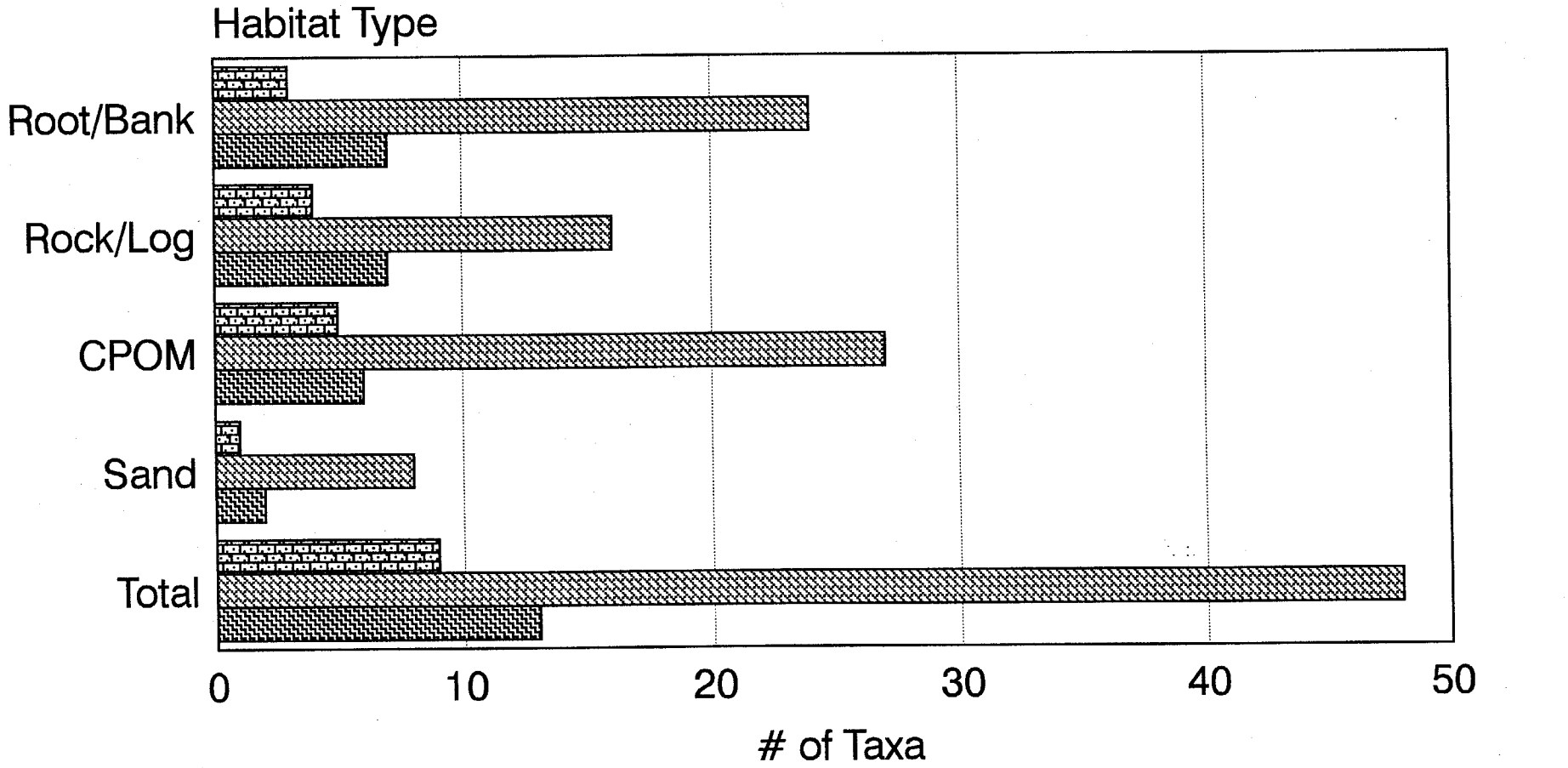


FIGURE 7

Klondike Creek KCO1A-921014

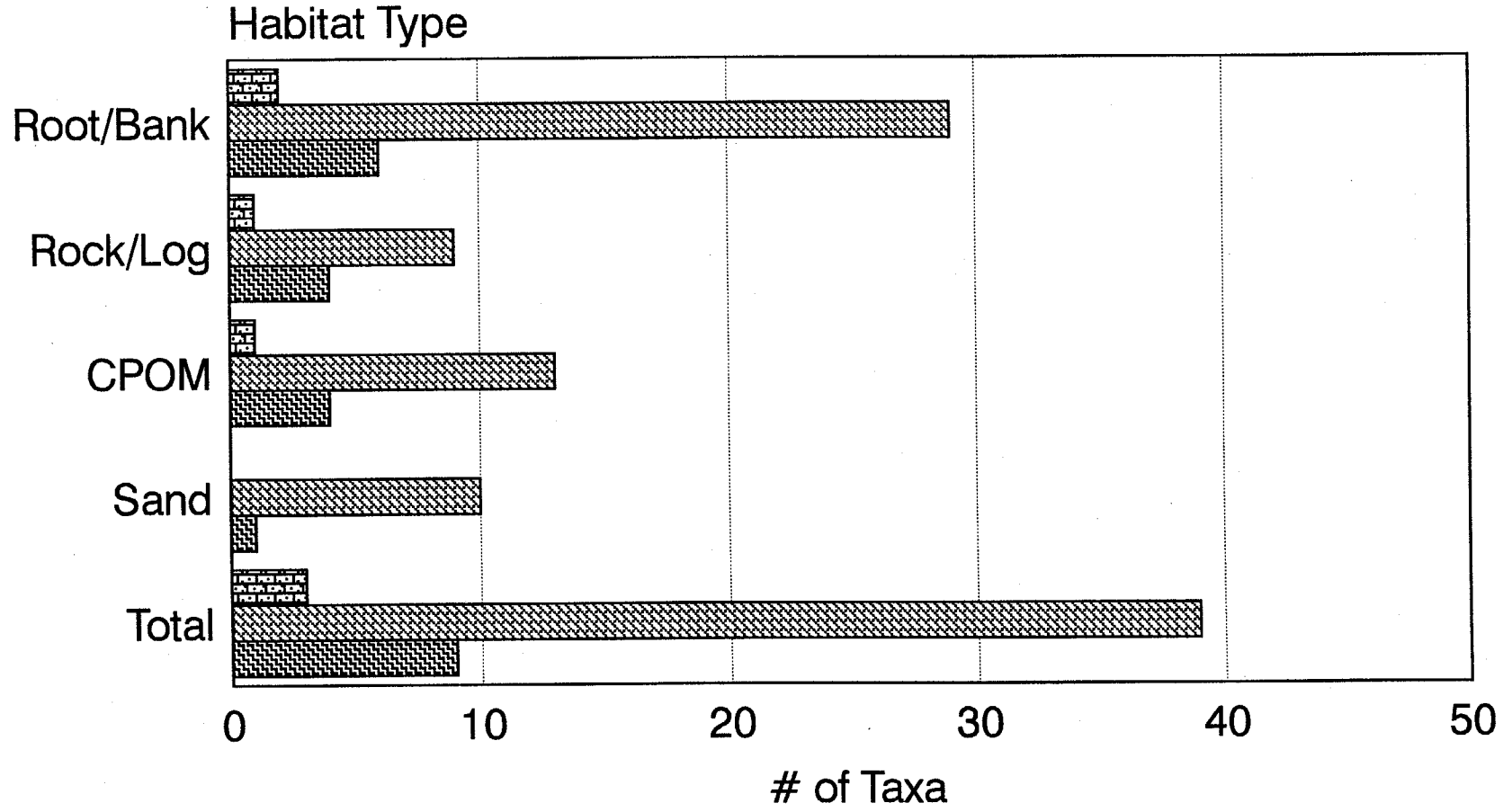


FIGURE 8

Klondike Creek KCO2-921014

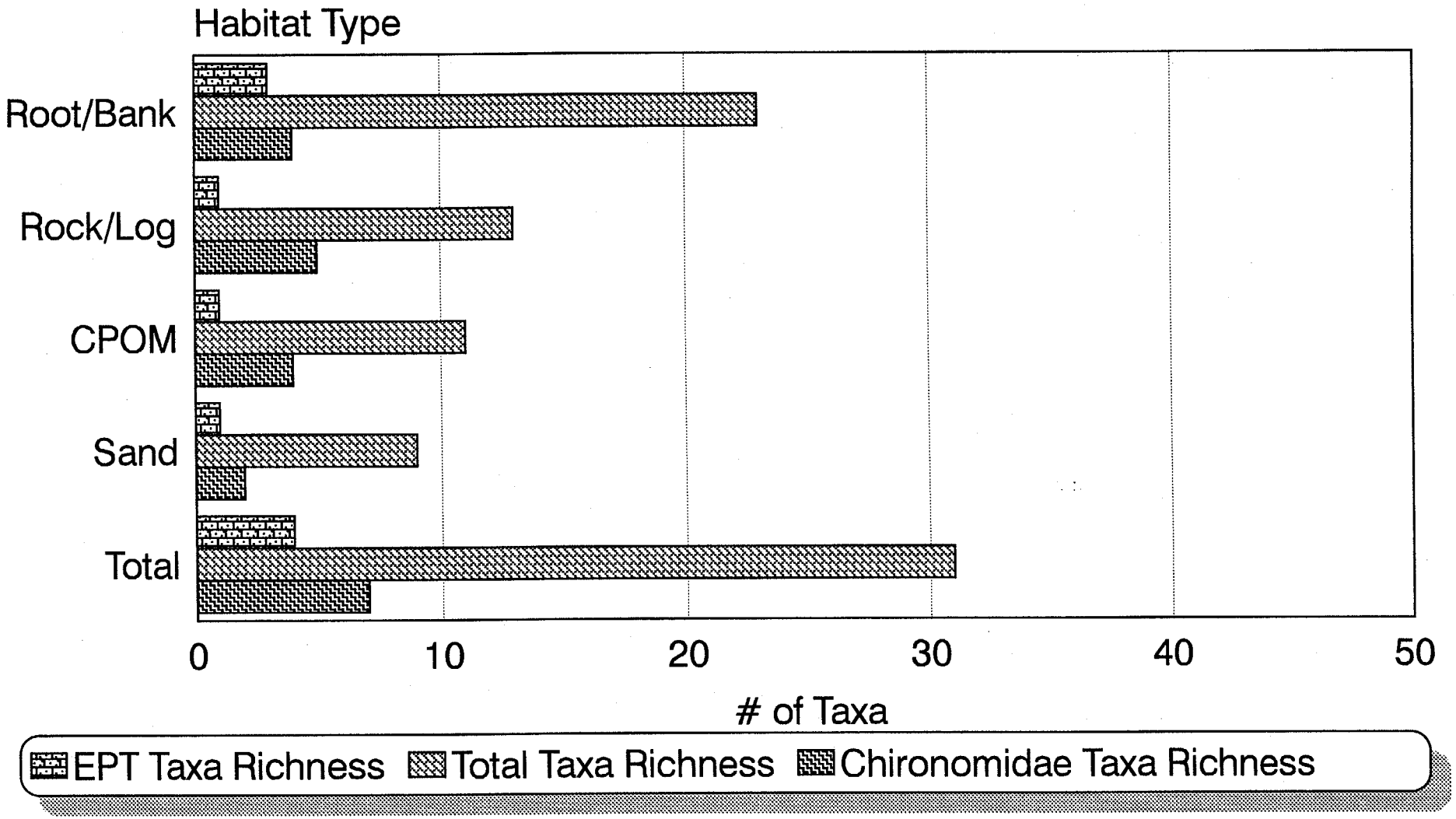


FIGURE 9

Klondike Creek Biotic Index

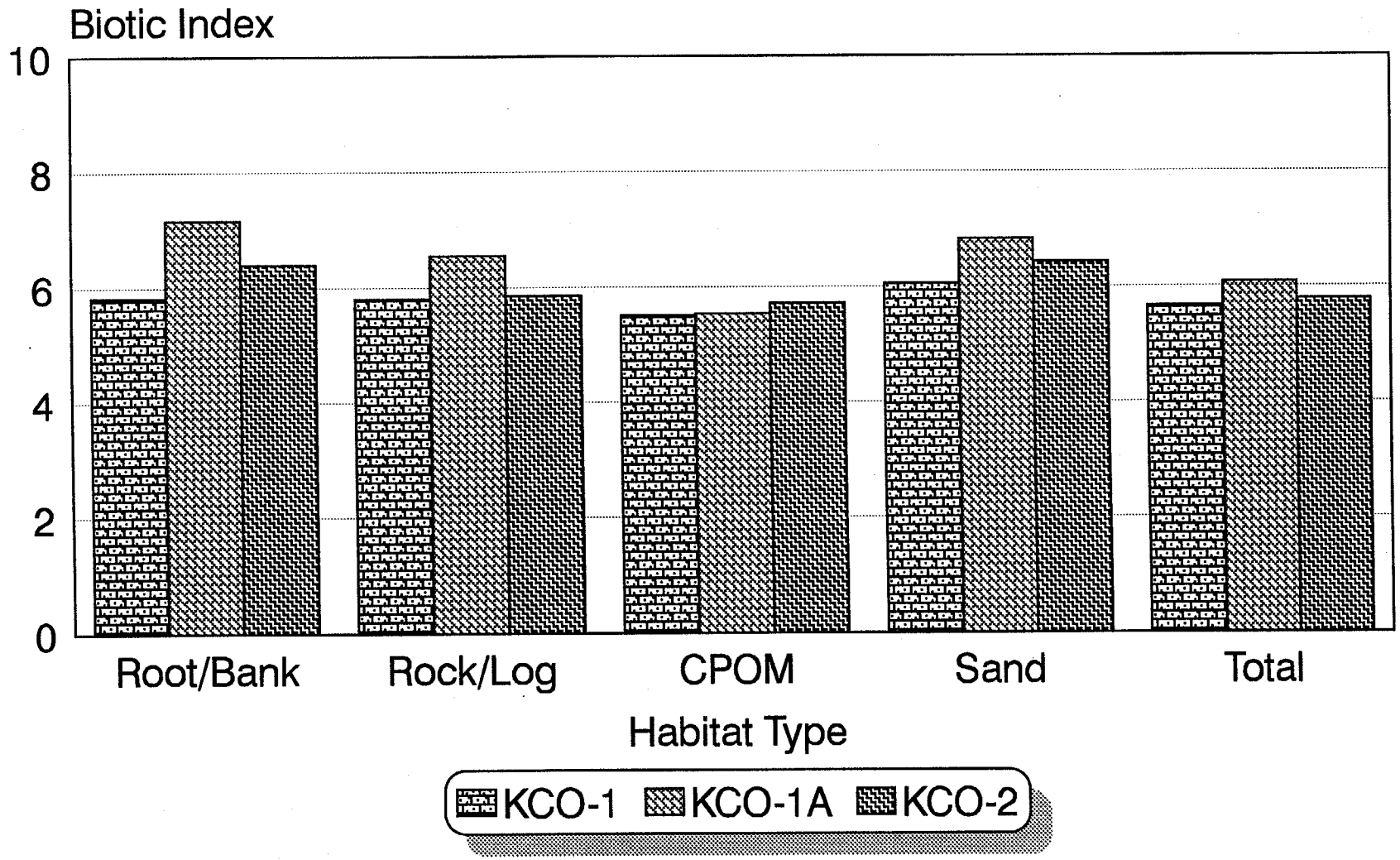


FIGURE 10

Klondike Creek

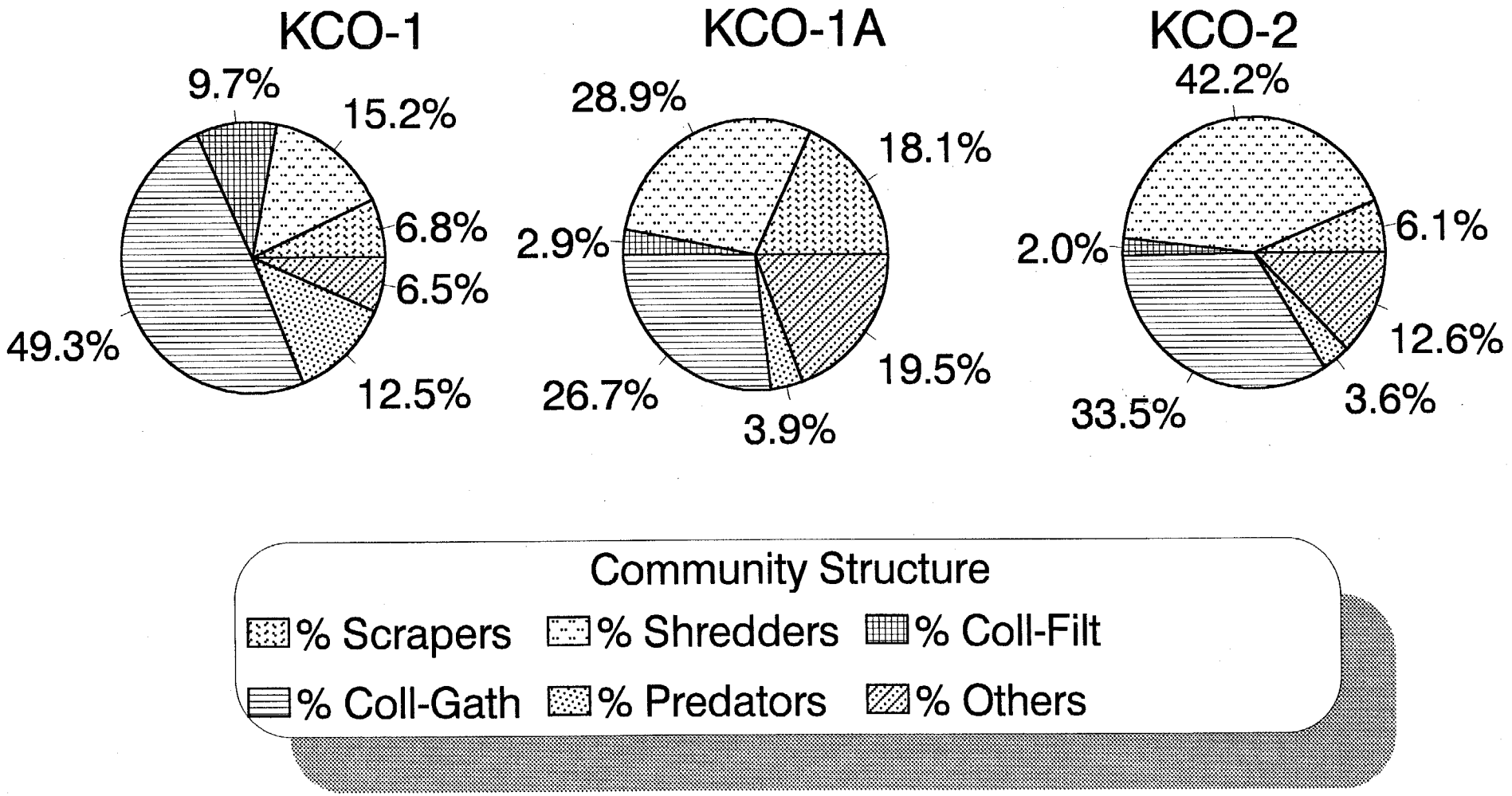


FIGURE 11

Klondike Creek Species Diversity

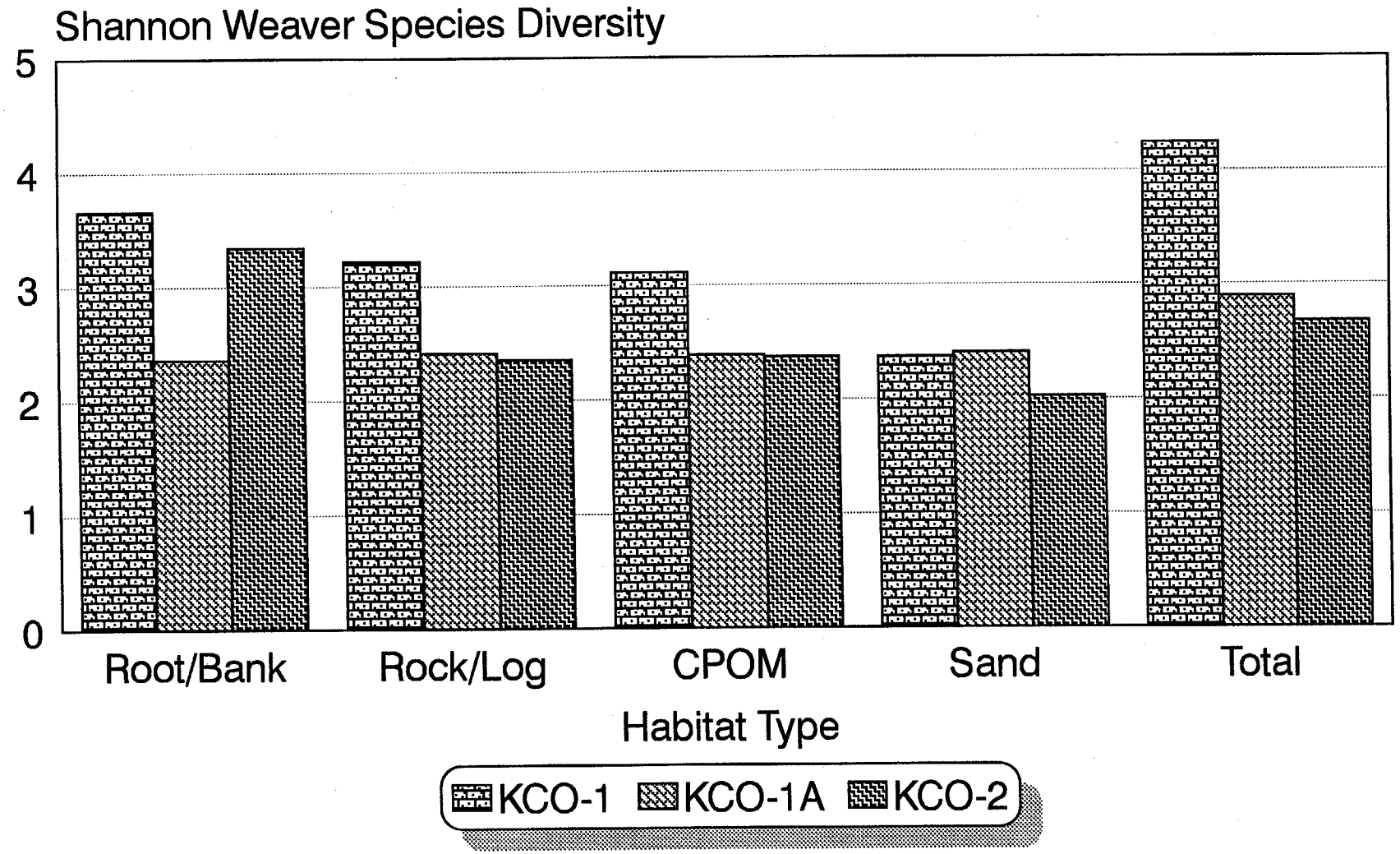


TABLE 1
WATER QUALITY DEMONSTRATION STUDY
KLONDIKE CREEK AT OZARK, ALABAMA
DATA COLLECTED BEFORE UPGRADE OF WWTP

DATE	LOCATION	TIME	AIR TEMP	H20 TEMP	D.O.	pH	TURB	COND	ALK	BOD5	Cl	TSS	TDS	HARD	COD	NH3-N	NO3-N	TKN	TON	PO4-P	FLOW	BACT
5/13/92	KCO-1	0950	24	18	8.7	7	27	92													2.59	
8/11/92		0945																			1.69	
10/13/92		1505	21	18	8.7	6.9	15	55	21	0.8	5.5	6	69	47	8	<0.015	0.073	0.295	0.3	0.028	5.33	
10/14/92		0705	10	16	8.8	6.9	14	54	22	0.7	5.5	8	66	44	4	<0.015	0.075	0.805	0.81	0.023	4.21	
10/14/92		1432	22	19	8.6	7.5	15	56	24	0.6	6	2	51	55	4	<0.015	0.079	<0.150	0.02	0.042		83
10/16/92		1300	23	20	8.5	7.1	13	55	24	0.9	6	7	60	51	4	<0.015	0.060	0.501	0.5		4.08	
AVERAGE			20	18	8.7	7.1	17	62	23	0.8	5.8	6	62	49	5	---	0.072	---	0.41	0.031	3.58	83
5/13/92	STP	0940	24	19	8.8	8.4	17.0	531													2.16	
8/11/92	EFF	0930																			1.10	
10/13/92		1420	29	24	7.7	7.8	8	561													1.89	
10/14/92		0635	10	18	9	8.1	5.5	508													1.03	
10/14/92		1459	30	28	7.8	7.7	7.2	473	130	11	37	8	376	70	48	1.77	11.5	5.65	3.88	3.2		
10/16/92		1420	26	19	8.5	8.1	7.1	525	121	8.0	36	1	357	73	41	1.03	14.60	3.44	2.41	2.44	2.34	
AVERAGE			24	22	8.4	8.0	9.0	520	126	9.5	37	5	367	72	45	1.40	13.05	4.55	3.15	2.82	1.70	
8/11/92	KCO-1A	0945																			2.79	
10/13/92		1450	22	19	8.5	7.5	8.9	186	49	4.2	13.5	5	148	50	18	1.08	3.28	2.35	1.27	0.71	7.22	
10/14/92		0655	10	16	8.7	7.1	8.4	109	38	1.7	10.5	5	120	50	38	0.037	1.92	0.805	0.77	0.42	6.56	
10/14/92		1420	20	20	8.1	7.4	14	205	55	5.3	14.5	5	135	53	24	2.71	4.22	2.87	0.16	0.92		570
10/16/92		1235	23	20	8.2	7.7	14.0	227	56	5.6	15	9	161	62	20	1.41	5.61	2.72	1.31	0.95	6.42	
AVERAGE			19	19	8.4	7.4	11.3	182	50	4.2	13	6	141	54	25	1.31	3.76	2.19	0.88	0.75	5.75	570
5/13/92	KCO-2	1241	26	20	8.4	7.3	18	299													4.75	
10/14/92		1050	20	17	8.9	7.4	20	201	52	3.5	14.5	<1	153	56	24	<0.015	3.59	1.53	1.53	0.79	6.56	
10/14/92		1350	20	19	8.4	7.3	14	209	56	5.9	14	9	132	55	18	2.49	4.28	3.35	0.92	0.92		560
10/16/92		1215	21	20	8.1	7.6	15	210	54	4.9	15	8	150	52	18	0.76	4.78	1.77	1.01	0.78	6.42	
AVERAGE			22	19	8.5	7.4	17	230	54	4.8	15	---	145	54	20	---	4.22	2.22	1.15	0.83	5.91	560
			C	C	ppm	S.U.	NTU	umho @25C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	cfs	org/ 100mL

TABLE 2
TAXA LIST
KLONDIKE CREEK KC01-921014
MACROINVERTEBRATE DATA

MACROINVERTEBRATE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
ANNELIDA					
OLIGOCHAETA	5		11	7	23
ARTHROPODA					
MALACOSTRACA					
AMPHIPODA					
Gammaridae					
Gammarus	3		4		7
DECAPODA	5		2		7
ISOPODA					
Asellidae					
Asellus			2		2
INSECTA					
COLEOPTERA					
Dytiscidae					
Hydrovatus	3				3
Elmidae					
Ancyronyx	6	1			7
Dubiraphia	30		1	3	34
Macronychus		1	2		3
Optioservus			1		1
Stenelmis			3		3
Eubriidae					
Ectopria	2	1			3
Gyrinidae					
Dineutus			1		1
Gyretes	1				1
DIPTERA					
CHIRONOMIDAE					
Chironominae					
Chironomini					
Cryptochironomus				1	1
Dicrotendipes	2	4			6
Polypedilum	3	17	46	1	67
Stenochironomus	1	2			3

TABLE 2
TAXA LIST
KLONDIKE CREEK KC01-921014
MACROINVERTEBRATE DATA

MACROINVERTEBRATE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
Tanytarsini					
Rheotanytarsus	2				2
Tanytarsus	1		7		8
Orthocladinae					
Corynoneura			7		7
Nanocladius	1				1
Orthocladius		13			13
Rheocricotopus		13	124		137
Thienemanniella		2			2
Tanypodinae					
Ablabesmyia	5	4	6		15
Thienemannimyia Grp			6		6
Culicidae					
Anopheles			1		1
Simulidae					
Simulium			19		19
Tipulidae					
Tipula	1	1	3		5
EPHEMEROPTERA					
Baetidae					
Baetis			9		9
Caenidae					
Caenis	5	1	1		7
Ephemerellidae					
Attenella				1	1
Ephemeridae					
Hexagenia	30				30
Heptageniidae					
Stenonema		5	24		29
Oligoneuridae					
Isonychia			3		3

TABLE 2
TAXA LIST
KLONDIKE CREEK KC01-921014
MACROINVERTEBRATE DATA

MACROINVERTEBRATE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
HEMIPTERA					
Veliidae					
Rhagovelia			1		1
MEGALOPTERA					
Corydalidae					
Corydalus			1		1
ODONATA					
Calopterygidae					
Calopteryx			1		1
Hetaerina	1				1
Coenagrionidae					
Argia	18				18
Corduliidae					
Somatochlora	2				2
Gomphidae					
Gomphus	4				4
Progomphus				11	11
PLECOPTERA					
Leuctridae					
Leuctra		1			1
TRICHOPTERA					
Hydropsychidae					
Cheumatopsyche		2	5		7
Leptoceridae					
Nectopsyche	7				7
MOLLUSCA					
PELECYPODA					
HETERODONTA					
Corbiculidae					
Corbicula				2	2
Sphaeriidae *					
Sphaeriidae UNID dif *	1	1	1	1	4

TABLE 2
TAXA LIST
KLONDIKE CREEK KC01A-921014
MACROINVERTEBRATE DATA

MACROINVERTEBRATE	RIFFLE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
ANNELIDA	6	2				8
OLIGOCHAETA	444	135	5	260	34	878
ARTHROPODA						
MALACOSTRACA						
AMPHIPODA						
Talitridae						
Hyalella		1				1
DECAPODA		3				3
INSECTA						
COLEOPTERA						
Elmidae						
Ancyronyx		2		5		7
Dubiraphia		7		10	1	18
Microcylloepus		4				4
Psephenidae						
Psephenus		1				1
COLEOPTERA UNID dif		2				2
DIPTERA						
Ceratopogonidae						
Bezzia		4				4
CHIRONOMIDAE						
Chironominae						
Chironomini						
Chironomus		10				10
Polypedilum	396	194	67	635	4	1296
Tanytarsini						
Rheotanytarsus	12		7			19
Tanytarsus		10				10
Orthocladinae						
Cricotopus			7			7
Nanocladius	84	48		295		427
Rheocricotopus	90	10	21	635		756
Tanypodinae						
Ablabesmyia		10				10

TABLE 2
TAXA LIST
KLONDIKE CREEK KC01A-921014
MACROINVERTEBRATE DATA

MACROINVERTEBRATE	RIFFLE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
Larsia				50		50
Psychodidae						
Pericoma	6					6
Simulidae						
Prosimulium	12	2	5	10		29
Tabanidae						
Tabanus					1	1
Tipulidae						
Tipula	6	13		5		24
EPHEMEROPTERA						
Heptageniidae						
Heptageniidae UNID dif		1				1
MEGALOPTERA						
Corydalidae						
Corydalus	6					6
ODONATA						
Calopterygidae						
Calopteryx		7		10		17
Coenagrionidae						
Argia		58				58
Chromagrion		3				3
Gomphidae						
Dromogomphus					1	1
Gomphus		2				2
Progomphus					23	23
Libellulidae						
Libellula		3				3
TRICHOPTERA						
Hydropsychidae						
Cheumatopsyche	12	4	3	20		39
Philopotamidae						
Chimarra	6					6

TABLE 2
TAXA LIST
KLONDIKE CREEK KC01A-921014
MACROINVERTEBRATE DATA

MACROINVERTEBRATE	RIFFLE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
MOLLUSCA						
GASTROPODA						
LIMNOPHILA						
Ancylidae						
Ferrissia		3	9	10		22
Rhodacmea	6				1	7
Physidae						
Physella	30	643	49	60	19	801
Planorbidae						
Planorbula		3			1	4
PELECYPODA						
HETERODONTA						
Corbiculidae						
Corbicula		1			27	28

TABLE 2
TAXA LIST
KLONDIKE CREEK KCO2-921014
MACROINVERTEBRATE DATA

MACROINVERTEBRATE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
ANNELIDA					
OLIGOCHAETA	16	52	120	34	222
ARTHROPODA					
MALACOSTRACA					
DECAPODA	2				2
INSECTA					
COLEOPTERA					
Elmidae					
Ancyronyx	1				1
Dubiraphia	3			3	6
Macronychus	2				2
Microcylloepus	2	2			4
Gyrinidae					
Dineutus	1				1
COLEOPTERA UNID dif	1				1
DIPTERA					
CHIRONOMIDAE					
Chironominae					
Chironomini					
Chironomus		13		3	16
Goeldichironomus		7			7
Polypedilum	50	116	1272	4	1442
Orthocladinae					
Limnophyes			48		48
Nanocladius	20	45	288		353
Rheocricotopus	3	155	648		806
Tanypodinae					
Ablabesmyia	34				34
Stratiomyidae					
Nemotelus	1				1
Tipulidae					
Tipula	7	3	120		130
EPHEMEROPTERA					
Caenidae					

TABLE 2
TAXA LIST
KLONDIKE CREEK KC02-921014
MACROINVERTEBRATE DATA

MACROINVERTEBRATE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
Caenis	1				1
Ephemeridae					
Hexagenia	2			1	3
Heptageniidae					
Stenonema	1				1
MEGALOPTERA					
Corydalidae					
Corydalus		1	24		25
ODONATA					
Aeshnidae					
Boyeria	1				1
Calopterygidae					
Calopteryx	2				2
Coenagrionidae					
Argia	31		24		55
Gomphidae					
Dromogomphus				1	1
Gomphus	2				2
Progomphus				14	14
TRICHOPTERA					
Hydropsychidae					
Cheumatopsyche		3	72		75
MOLLUSCA					
GASTROPODA					
LIMNOPHILA					
Ancylidae					
Ferrissia	6	1	24	1	32
Physidae					
Physella	42	8	144	1	195
Planorbidae					
Planorbula		1			1
PELECYPODA					
HETERODONTA					
Sphaeriidae *					

TABLE 2
TAXA LIST
KLONDIKE CREEK KC02-921014
MACROINVERTEBRATE DATA

MACROINVERTEBRATE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
Sphaeriidae UNID *		6	48	190	244

KLONDIKE CREEK KC01-921014 METRICS
MACROINVERTEBRATE DATA

METRIC	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
TAXA RICHNESS	24	16	27	8	48
# ORGANISMS	139	69	292	27	527
EPT TAXA RICHNESS	3	4	5	1	9
# EPT ORGANISMS	42	9	42	1	94
# CHIRONOMIDAE TAXA	7	7	6	2	13
# CHIRONOMIDAE	15	55	196	2	268
AVERAGE TOLERANCE VALUE	5.27	5.27	5.28	6.00	5.15
BIOTIC INDEX	5.82	5.81	5.50	6.05	5.65
# CHIRONOMIDAE TAXA / TOTAL TAXA	.29	.44	.22	.25	.27
# EPT / # EPT + # CHIRONOMIDAE	.74	.14	.18	.33	.26
# SCRAPERS / # FILTERING COLLECTORS + # SCRAPERS	.25	.75	.41	.00	.41
# SHREDDERS / TOTAL # ORGANISMS	.08	.28	.17	.04	.15
PERCENT SCRAPERS	1.44	8.70	9.59	.00	6.83
PERCENT SHREDDERS	7.91	27.54	16.78	3.70	15.18
PERCENT FILTERING COLLECTORS	4.32	2.90	14.04	7.41	9.68
PERCENT COLLECTOR GATHERERS	53.96	53.62	49.32	14.81	49.34
PERCENT PREDATORS	24.46	5.80	5.48	44.44	12.52
PERCENT MACROPHYTE PIERCERS	.00	.00	.00	.00	.00
PERCENT OTHERS	7.91	1.45	4.79	29.63	6.45
# HYDROPTILIDAE / # TRICHOPTERA	.0000	.0000	.0000	.0000	.0000
SHANNON WEAVER DIVERSITY INDEX	3.66	3.22	3.11	2.37	4.24
EQUITABILITY	.76	.83	.45	.87	.58

KLONDIKE CREEK KC01-921014 METRICS
MACROINVERTEBRATE DATA

DOMINANT TAXON AND PERCENT CONTRIBUTION

ROOT BANK	ROCK LOG	CPOM	SAND	TOTAL
Dubiraphia	Polypedilum	Rheocricotopus	Progomphus	Rheocricotopus
21.58	24.64	42.47	40.74	26.00

KLONDIKE CREEK KC01-921014 METRICS
MACROINVERTEBRATE DATA

FIVE DOMINANT TAXA IN TOTAL COLUMN AND PERCENT CONTRIBUTION

Rheocricotopus
26.00

Polypedilum
12.71

Dubiraphia
6.45

Hexagenia
5.69

Stenonema
5.50

KLONDIKE CREEK KC01A-921014 METRICS
MACROINVERTEBRATE DATA

METRIC	RIFFLE	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
TAXA RICHNESS	14	29	9	13	10	39
# ORGANISMS	1116	1186	173	2005	112	4592
EPT TAXA RICHNESS	2	2	1	1	0	3
# EPT ORGANISMS	18	5	3	20	0	46
# CHIRONOMIDAE TAXA	4	6	4	4	1	9
# CHIRONOMIDAE	582	282	102	1615	4	2585
AVERAGE TOLERANCE VALUE	4.91	5.85	6.00	5.46	6.00	5.66
BIOTIC INDEX	5.58	7.16	6.55	5.53	6.82	6.07
# CHIRONOMIDAE TAXA / TOTAL TAXA	.29	.21	.44	.31	.10	.23
# EPT / # EPT + # CHIRONOMIDAE	.03	.02	.03	.01	.00	.02
# SCRAPERS / # FILTERING COLLECTORS + # SCRAPERS	.46	.97	.79	.70	.43	.86
# SHREDDERS / TOTAL # ORGANISMS	.36	.17	.43	.32	.04	.29
PERCENT SCRAPERS	3.23	54.64	33.53	3.49	17.86	18.12
PERCENT SHREDDERS	36.02	17.45	42.77	31.92	3.57	28.90
PERCENT FILTERING COLLECTORS	3.76	1.52	8.67	1.50	24.11	2.87
PERCENT COLLECTOR GATHERERS	16.13	6.83	12.14	47.13	.89	26.74
PERCENT PREDATORS	.54	7.34	.00	2.99	22.32	3.88
PERCENT MACROPHYTE PIERCERS	.00	.00	.00	.00	.00	.00
PERCENT OTHERS	40.32	12.23	2.89	12.97	31.25	19.49
# HYDROPTILIDAE / # TRICHOPTERA	.0000	.0000	.0000	.0000	.0000	.0000
SHANNON WEAVER DIVERSITY INDEX	2.23	2.36	2.41	2.39	2.40	2.89
EQUITABILITY	.45	.24	.80	.54	.71	.27

KLONDIKE CREEK KC01A-921014 METRICS
MACROINVERTEBRATE DATA

DOMINANT TAXON AND PERCENT CONTRIBUTION

RIFFLE	ROOT BANK	ROCK LOG	CPOM	SAND	TOTAL
OLIGOCHAETA	Physella	Polypedilum	Polypedilum	OLIGOCHAETA	Polypedilum
39.78	54.22	38.73	31.67	30.36	28.22

KLONDIKE CREEK KC01A-921014 METRICS
MACROINVERTEBRATE DATA

FIVE DOMINANT TAXA IN TOTAL COLUMN AND PERCENT CONTRIBUTION

Polypedilum	28.22
OLIGOCHAETA	19.12
Physella	17.44
Rheocricotopus	16.46
Nanocladius	9.30

KLONDIKE CREEK KC02-921014 METRICS
MACROINVERTEBRATE DATA

METRIC	ROOT/ BANK	ROCK LOG	CPOM	SAND	TOTAL
TAXA RICHNESS	23	13	11	9	31
# ORGANISMS	231	413	2832	252	3728
EPT TAXA RICHNESS	3	1	1	1	4
# EPT ORGANISMS	4	3	72	1	80
# CHIRONOMIDAE TAXA	4	5	4	2	7
# CHIRONOMIDAE	107	336	2256	7	2706
AVERAGE TOLERANCE VALUE	5.19	6.09	5.90	6.50	5.64
BIOTIC INDEX	6.40	5.85	5.71	6.43	5.78
# CHIRONOMIDAE TAXA / TOTAL TAXA	.17	.38	.36	.22	.23
# EPT / # EPT + # CHIRONOMIDAE	.04	.01	.03	.13	.03
# SCRAPERS / # FILTERING COLLECTORS + # SCRAPERS	1.00	.75	.70	1.00	.75
# SHREDDERS / TOTAL # ORGANISMS	.25	.29	.49	.02	.42
PERCENT SCRAPERS	21.21	2.18	5.93	.79	6.12
PERCENT SHREDDERS	24.68	28.81	49.15	1.59	42.17
PERCENT FILTERING COLLECTORS	.00	.73	2.54	.00	2.01
PERCENT COLLECTOR GATHERERS	15.15	53.75	34.75	2.78	33.48
PERCENT PREDATORS	30.74	.24	1.69	5.95	3.62
PERCENT MACROPHYTE PIERCERS	.00	.00	.00	.00	.00
PERCENT OTHERS	8.23	14.29	5.93	88.89	12.61
# HYDROPTILIDAE / # TRICHOPTERA	.0000	.0000	.0000	.0000	.0000
SHANNON WEAVER DIVERSITY INDEX	3.34	2.35	2.37	2.02	2.67
EQUITABILITY	.63	.53	.64	.60	.28

KLONDIKE CREEK KCO2-921014 METRICS
MACROINVERTEBRATE DATA

DOMINANT TAXON AND PERCENT CONTRIBUTION

ROOT BANK	ROCK LOG	CPOM	SAND	TOTAL
Polypedilum	Rheocricotopus	Polypedilum	Sphaeriidae	Polypedilum
			UNID *	
21.65	37.53	44.92	75.40	38.68

KLONDIKE CREEK KC02-921014 METRICS
MACROINVERTEBRATE DATA

FIVE DOMINANT TAXA IN TOTAL COLUMN AND PERCENT CONTRIBUTION

Polypedilum
38.68

Rheocricotopus
21.62

Nanocladius
9.47

Sphaeriidae UNID *
6.55

OLIGOCHAETA
5.95

KLONDIKE CREEK STATION COMPARISON
MACROINVERTEBRATE DATA

	KCO 001 92-10-14 VERSUS KCO 001 A 92-10-14	KCO 001 92-10-14 VERSUS KCO 002 92-10-14
DOMINANTS IN COMMON	Rheocricotopus	Rheocricotopus
	Polypedilum	Polypedilum
NUMBER OF DOMINANTS IN COMMON	2	2
INDICATOR ASSEMBLAGE INDEX	.42	.41
SORENSON'S COMMUNITY SIMILARITY INDEX	.40	.51
COMMUNITY LOSS INDEX	.86	.90
JACCARD COEFFICIENT OF COMMUNITY	.25	.33
QUANTITATIVE SIMILARITY INDEX TAXA	42.27	46.44
QUANTITATIVE SIMILARITY INDEX FUNCTIONAL FEEDING GROUP	66.15	66.86
QUANTITATIVE SIMILARITY INDEX COMPOSITION OF TAXA GROUPS TAXA	73.61	83.40
QUANTITATIVE SIMILARITY INDEX COMPOSITION OF TAXA GROUPS ORGANISMS	62.43	64.65

TABLE 5

93/01/26 08:15:44 STATION DATA REPORT PAGE 1

PROGRAM ID: PRTSTATN
STATION NUMBER: KCO 001 -921014
WATER BODY: KLONDIKE CREEK
LAT/LONG: 31 DEGS 23 MINS 18.2 SECS N / 085 DEGS 36 MINS 29.5 SECS W (1)
ECOREGION: SOUTHEASTERN PLAINS AND HILLS (065E)
MINOR DRAINAGE BASIN: CHOCTAWHATCHEE RIVER
BASIN CODES: (03) (32) (00)
HUC/REACH CODE: 03140201-038 CHECK DIGIT: 0 LOCATION: OFF MILE: 3.400
COUNTY: DALE (045)
NEAR CITY: OZARK STATE: Alabama (01)
SAMPLING METHOD: RBP-MULTIHABITAT (001)
COLLECTORS: (NO 1 Hulcher) (NO 2 Blakey) (NO 3)
SITE CLASSIFICATION: SITE SPECIFIC CONTROL (002)
STATION TYPE: WATER QUALITY DEMONSTRATION STUDY STATION (0005)
HABITAT EVALUATION: 60
HABITAT QUALITY: FAIR (35-70)

BOTTOM SUBSTRATE AVAILABLE COVER:	5
EMBEDDEDNESS.....:	6
STREAM FLOW CATEGORY.....:	8
CHANNEL ALTERATION.....:	5
BOTTOM SCOURING AND DEPOSITION..:	4
RUN/BEND POOL/RIFFLE RATIO.....:	12
BANK STABILITY.....:	5
BANK VEGETATIVE STABILITY.....:	7
STREAMSIDE COVER.....:	8

WATER QUALITY

PH.....:	6.90	st. u.
CONDUCTIVITY.....:	54	umhos
DISSOLVED OXYGEN.:	8.80	mg/l
TURBIDITY.....:	.000	NTU
WATER TEMPERATURE:	16.0	Celsius
STREAM FLOW.....:	4.21	CFS
DRAINAGE AREA.....:	0	Sq Mi
STREAM ORDER.....:	0	

RIPARIAN ZONE / INSTREAM FEATURES

PREDOMINANT SURROUNDING LAND USE:

_X_ FOREST ___ FIELD/PASTURE ___ AGRICULTURE ___ RESIDENTIAL
___ COMMERCIAL _X_ INDUSTRIAL ___ OTHER _____

LOCAL WATERSHED EROSION:

___ NONE _X_ MODERATE ___ HEAVY

LOCAL WATERSHED NPS POLLUTION:

___ NO EVIDENCE _X_ SOME POTENTIAL SOURCES ___ OBVIOUS SOURCES

ESTIMATED STREAM WIDTH: 20.0 FT
ESTIMATED STREAM DEPTH: ___ RIFFLE FT
_X_ RUN 0.5 FT
_X_ POOL 2 FT

ESTIMATED HIGH WATER MARK: 8.0 FT DAM PRESENT? N

CHANNELIZED? N

CANOPY COVER: ___ OPEN ___ MOSTLY OPEN _X_ MOSTLY SHADED ___ SHADED

SEDIMENT / SUBSTRATE CHARACTERISTICS

ODORS: _X_ NORMAL ___ SEWAGE ___ PETROLEUM ___CHEMICAL
___ ANAEROBIC ___ NONE ___ OTHER _____

OILS: _X_ ABSENT ___ SLIGHT ___ MODERATE ___ PROFUSE

DEPOSITS: ___ SLUDGE ___ SAWDUST ___ PAPER FIBER _X_ SAND
___ RELICIT SHELLS ___ OTHER _____

ARE THE UNDERSIDES OF STONES, WHICH ARE NOT DEEPLY EMBEDDED, BLACK? N

ESTIMATED PERCENT CONTRIBUTION OF INORGANIC AND ORGANIC MATERIAL: 100

BEDROCK	%	DETRITUS	
BOULDER	%	STICK/WOOD	3 %
COBBLE	%	CPOM	1 %
GRAVEL	%	MUD/MUCK	
SAND	95 %	FPOM	%
SILT	1 %	MARL	%
CLAY	%		

WATER QUALITY CHARACTERISTICS

WATER ODORS:
_X_ NORMAL ___ SEWAGE ___ PETROLEUM ___ CHEMICAL
___ OTHER _____

WATER SURFACE OILS: ___ SLICK ___ SHEEN ___ GLOBS ___ FLECKS ___ NONE

WATER COLOR: _X_ SLIGHTLY TANNIC ___ MODERATELY TANNIC ___ VERY TANNIC
___ OTHER _____

WEATHER: _X_ CLEAR ___ PARTLY CLOUDY ___ MOSTLY CLOUDY ___ CLOUDY
___ RAINING AIR TEMPERATURE: .0 Celsius

BIOLOGICAL COMMUNITIES NOTED

___ PERIPHYTON ___ MACROPHYTES ___ FILAMENTOUS ALGAE
___ SLIMES _X_ FISH ___ OTHER _____

TABLE 6

93/01/26 08:18:25 STATION DATA REPORT PAGE 1

PROGRAM ID: PRTSTATN
STATION NUMBER: KCO 001A-921014
WATER BODY: KLONDIKE CREEK
LAT/LONG: 31 DEGS 23 MINS 12.0 SECS N / 085 DEGS 36 MINS 38.2 SECS W (1)
ECOREGION: SOUTHEASTERN PLAINS AND HILLS (065E)
MINOR DRAINAGE BASIN: CHOCTAWHATCHEE RIVER
BASIN CODES: (03) (32) (00)
HUC/REACH CODE: 03140201-038 CHECK DIGIT: 0 LOCATION: OFF MILE: 3.400
COUNTY: DALE (045)
NEAR CITY: OZARK STATE: Alabama (01)
SAMPLING METHOD: RBP-MULTIHABITAT (001)
COLLECTORS: (NO 1 Hulcher) (NO 2 Blakey) (NO 3)
SITE CLASSIFICATION: STUDY STATION (003)
STATION TYPE: WATER QUALITY DEMONSTRATION STUDY STATION (0005)
HABITAT EVALUATION: 78
HABITAT QUALITY: GOOD (71-103)

BOTTOM SUBSTRATE AVAILABLE COVER:	11	WATER QUALITY		
EMBEDDEDNESS.....:	9	PH.....:	7.10	st. u.
STREAM FLOW CATEGORY.....:	11	CONDUCTIVITY.....:	109	umhos
CHANNEL ALTERATION.....:	9	DISSOLVED OXYGEN.:	8.70	mg/l
BOTTOM SCOURING AND DEPOSITION..:	7	TURBIDITY.....:	8.400	NTU
RUN/BEND POOL/RIFFLE RATIO.....:	15	WATER TEMPERATURE:	16.0	Celsius
BANK STABILITY.....:	4	STREAM FLOW.....:	6.56	CFS
BANK VEGETATIVE STABILITY.....:	4	DRAINAGE AREA.....:	0	Sq Mi

RIPARIAN ZONE / INSTREAM FEATURES

PREDOMINANT SURROUNDING LAND USE:

_X_ FOREST ___ FIELD/PASTURE ___ AGRICULTURE ___ RESIDENTIAL
___ COMMERCIAL ___ INDUSTRIAL ___ OTHER _____

LOCAL WATERSHED EROSION:

___ NONE _X_ MODERATE ___ HEAVY

LOCAL WATERSHED NPS POLLUTION:

_X_ NO EVIDENCE ___ SOME POTENTIAL SOURCES ___ OBVIOUS SOURCES

ESTIMATED STREAM WIDTH: 20.0 FT

ESTIMATED STREAM DEPTH: _X_ RIFFLE 0.25 FT
_X_ RUN 0.75 FT
_X_ POOL 1 FT

ESTIMATED HIGH WATER MARK: 10.0 FT DAM PRESENT? N

CHANNELIZED? N

CANOPY COVER: ___ OPEN ___ MOSTLY OPEN ___ MOSTLY SHADED _X_ SHADED

SEDIMENT / SUBSTRATE CHARACTERISTICS

ODORS: _X_ NORMAL ___ SEWAGE ___ PETROLEUM ___CHEMICAL
___ ANAEROBIC ___ NONE ___ OTHER _____

OILS: _X_ ABSENT ___ SLIGHT ___ MODERATE ___ PROFUSE

DEPOSITS: ___ SLUDGE ___ SAWDUST ___ PAPER FIBER _X_ SAND
___ RELICIT SHELLS ___ OTHER _____

ARE THE UNDERSIDES OF STONES, WHICH ARE NOT DEEPLY EMBEDDED, BLACK? N

ESTIMATED PERCENT CONTRIBUTION OF INORGANIC AND ORGANIC MATERIAL: 100

BEDROCK	39 %	DETRITUS	
BOULDER	%	STICK/WOOD	%
COBBLE	1 %	CPOM	1 %
GRAVEL	%	MUD/MUCK	
SAND	58 %	FPOM	%
SILT	1 %	MARL	%
CLAY	%		

WATER QUALITY CHARACTERISTICS

WATER ODORS:
_X_ NORMAL ___ SEWAGE ___ PETROLEUM ___ CHEMICAL
___ OTHER _____

WATER SURFACE OILS: ___ SLICK ___ SHEEN ___ GLOBS ___ FLECKS ___ NONE

WATER COLOR: _X_ SLIGHTLY TANNIC ___ MODERATELY TANNIC ___ VERY TANNIC
___ OTHER _____

WEATHER: _X_ CLEAR ___ PARTLY CLOUDY ___ MOSTLY CLOUDY ___ CLOUDY
___ RAINING AIR TEMPERATURE: .0 Celsius

BIOLOGICAL COMMUNITIES NOTED

_X_ PERIPHYTON ___ MACROPHYTES ___ FILAMENTOUS ALGAE
___ SLIMES _X_ FISH ___ OTHER _____

TABLE 7

93/01/26 08:21:52 STATION DATA REPORT PAGE 1

PROGRAM ID: PRTSTATN
STATION NUMBER: KCO 002 -921014
WATER BODY: KLONDIKE CREEK
LAT/LONG: 31 DEGS 23 MINS 04.2 SECS N / 085 DEGS 36 MINS 39.4 SECS W (1)
ECOREGION: SOUTHEASTERN PLAINS AND HILLS (065E)
MINOR DRAINAGE BASIN: CHOCTAWHATCHEE RIVER
BASIN CODES: (03) (32) (00)
HUC/REACH CODE: 03140201-038 CHECK DIGIT: 0 LOCATION: OFF MILE: 3.400
COUNTY: DALE (045)
NEAR CITY: OZARK STATE: Alabama (01)
SAMPLING METHOD: RBP-MULTIHABITAT (001)
COLLECTORS: (NO 1 Hulcher) (NO 2 Blakey) (NO 3)
SITE CLASSIFICATION: STUDY STATION (003)
STATION TYPE: WATER QUALITY DEMONSTRATION STUDY STATION (0005)
HABITAT EVALUATION: 68
HABITAT QUALITY: FAIR (35-70)

BOTTOM SUBSTRATE AVAILABLE COVER:	8
EMBEDDEDNESS:	6
STREAM FLOW CATEGORY:	11
CHANNEL ALTERATION:	9
BOTTOM SCOURING AND DEPOSITION:	3
RUN/BEND POOL/RIFFLE RATIO:	12
BANK STABILITY:	4
BANK VEGETATIVE STABILITY:	7
STREAMSIDE COVER:	8

WATER QUALITY

PH:	7.40	st. u.
CONDUCTIVITY:	201	umhos
DISSOLVED OXYGEN.:	8.90	mg/l
TURBIDITY:	.000	NTU
WATER TEMPERATURE:	17.0	Celsius
STREAM FLOW:	6.56	CFS
DRAINAGE AREA:	0	Sq Mi
STREAM ORDER:	0	

RIPARIAN ZONE / INSTREAM FEATURES

PREDOMINANT SURROUNDING LAND USE:

_X_ FOREST ___ FIELD/PASTURE ___ AGRICULTURE ___ RESIDENTIAL
___ COMMERCIAL ___ INDUSTRIAL ___ OTHER _____

LOCAL WATERSHED EROSION:

___ NONE _X_ MODERATE ___ HEAVY

LOCAL WATERSHED NPS POLLUTION:

_X_ NO EVIDENCE ___ SOME POTENTIAL SOURCES ___ OBVIOUS SOURCES

ESTIMATED STREAM WIDTH: 20.0 FT
ESTIMATED STREAM DEPTH: ___ RIFFLE FT
_X_ RUN 0.5 FT
_X_ POOL 1 FT

ESTIMATED HIGH WATER MARK: .0 FT DAM PRESENT? N

CHANNELIZED? N

CANOPY COVER: ___ OPEN ___ MOSTLY OPEN ___ MOSTLY SHADED _X_ SHADED

SEDIMENT / SUBSTRATE CHARACTERISTICS

ODORS: _X_ NORMAL ___ SEWAGE ___ PETROLEUM ___ CHEMICAL
___ ANAEROBIC ___ NONE ___ OTHER _____

OILS: _X_ ABSENT ___ SLIGHT ___ MODERATE ___ PROFUSE

DEPOSITS: ___ SLUDGE ___ SAWDUST ___ PAPER FIBER _X_ SAND
___ RELICIT SHELLS ___ OTHER _____

ARE THE UNDERSIDES OF STONES, WHICH ARE NOT DEEPLY EMBEDDED, BLACK? N

ESTIMATED PERCENT CONTRIBUTION OF INORGANIC AND ORGANIC MATERIAL: 100

BEDROCK	10 %	DETRITUS	
BOULDER	%	STICK/WOOD	5 %
COBBLE	%	CPOM	3 %
GRAVEL	2 %	MUD/MUCK	
SAND	78 %	FPOM	%
SILT	2 %	MARL	%
CLAY	%		

WATER QUALITY CHARACTERISTICS

WATER ODORS:
_X_ NORMAL ___ SEWAGE ___ PETROLEUM ___ CHEMICAL
___ OTHER _____

WATER SURFACE OILS: ___ SLICK ___ SHEEN ___ GLOBS ___ FLECKS ___ NONE

WATER COLOR: _X_ SLIGHTLY TANNIC ___ MODERATELY TANNIC ___ VERY TANNIC
___ OTHER _____

WEATHER: _X_ CLEAR ___ PARTLY CLOUDY ___ MOSTLY CLOUDY ___ CLOUDY
___ RAINING AIR TEMPERATURE: .0 Celsius

BIOLOGICAL COMMUNITIES NOTED

___ PERIPHYTON ___ MACROPHYTES ___ FILAMENTOUS ALGAE
___ SLIMES ___ FISH ___ OTHER _____

TABLE 8
BIOMETRIC INTERPRETATION

METRIC	RANGE	INTERPRETATION
HABITAT ASSESSMENT	104-135	EXCELLENT
	71-103	GOOD
	35-70	FAIR
	0-34	POOR
a). TAXA RICHNESS b). EPT INDEX c). SHANNON-WEAVER SPECIES DIVERSITY d). EQUITABILITY		GENERALLY INCREASES WITH INCREASING WATER QUALITY.
a). BIOTIC INDEX b). % DOMINANT TAXA c). TOLERANCE VALUE OF DOM TAXA		GENERALLY INCREASES WITH DECREASING WATER QUALITY.
a). % SHREDDERS b). % SCRAPERS c). % PREDATORS d). % COLLECTOR-GATHERERS e). % COLLECTOR-FILTERERS f). % MACROPHYTE PIERCERS g). % OTHERS		PERCENTAGES AND COMPOSITION SHOULD BE SIMILAR TO BACKGROUND STATION FOR SIMILAR STREAM SIZES AND HABITAT COMPOSITION.
a). SCRAPERS/SCRAPERS+C-F b). SHREDDERS/TOTAL c). HYDROPTILIDAE/TRICHOPTERA		NO SIGNIFICANT CHANGE AS COMPARED TO BACKGROUND.
a). EPT/EPT+CHIRONOMIDAE		GENERALLY INCREASING WATER QUALITY AS APPROACHES 1.0.
SIMILARITY INDICES		
a). INDICATOR ASSEMBLAGE INDEX (IAI) b). JACCARD COMMUNITY SIMILARITY c). SORENSON'S CSI		INCREASING SIMILARITY AS APPROACHES 1.0.
a). DOMINANTS IN COMMON b). QUANTITATIVE SIMILARITY INDEX (QSI)-TAXA c). QSI-FUNCTIONAL FEEDING GROUP (FFG)		GENERALLY INCREASING WITH INCREASING SIMILARITY.
a). COMMUNITY LOSS INDEX		GENERALLY INCREASING WITH INCREASING DISSIMILARITY.

Table 9. Initial Water Chemistries For Each Sampling Station - Sampling Event

Sample #1; Collected October 14, 1992.

	KCO-1	WWTP	KCO-1A
Water Temperature (C)*	18.5	20.0/4.0	19.5
Dissolved Oxygen (mg/L)	8.6	7.8	8.1
pH (S.U.)	7.5	7.7	7.4
Conductivity (umhos/cm)	50.0	500.0	185.0
Total Residual Chlorine (mg/L)**	N/A	N/A	N/A

Sample #2; Collected October 16, 1992.

	KCO-1	WWTP	KCO-1A
Water Temperature (C)	20.0	19.0/4.0	20.0
Dissolved Oxygen (mg/L)	8.55	8.50	8.25
pH (S.U.)	7.1	8.1	7.7
Conductivity (umhos/cm)	50.0	465.0	205.0
Total Residual Chlorine (mg/L)	N/A	N/A	N/A

Sample #3; Collected October 18, 1992.

	KCO-1	WWTP	KCO-1A
Water Temperature (C)	18.5	18.0/4.0	18.0
Dissolved Oxygen (mg/L)	8.55	8.25	8.3
pH (S.U.)	7.4	8.2	7.5
Conductivity (umhos/cm)	50.0	450.0	200.0
Total Residual Chlorine (mg/L)	N/A	N/A	N/A

*WWTP Temperatures = Raw Discharge/Iced Composite Sample Temps.

**Facility Uses UV Light Disinfection

Table 10. Water Chemistry Ranges During Testing

FATHEAD MINNOWS

KCO-1 (100%)	CONTROL	EFFLUENT
Water Temperature (C)	24.2-25.3	24.0-26.0
Dissolved Oxygen (mg/L)	5.3-8.1	6.0-8.5
pH (S.U.)	6.8-7.5	6.4-6.8
Conductivity (umhos/cm)	169-177	58.4-69.8
Alkalinity (mg/L as CaCO3)	70-74	20-22
Hardness (mg/L as CaCO3)	86-87	23-24

WWTP (42%)	CONTROL	EFFLUENT
Water Temperature (C)	24.0-25.5	24.0-26.0
Dissolved Oxygen (mg/L)	6.1-8.1	6.2-8.4
pH (S.U.)	6.9-7.5	7.3-7.6
Conductivity (umhos/cm)	169-177	283-318
Alkalinity (mg/L as CaCO3)	70-74	95-97
Hardness (mg/L as CaCO3)	86-87	25-29

KCO-1A (100%)	CONTROL	EFFLUENT
Water Temperature (C)	24.2-25.1	24.2-26.0
Dissolved Oxygen (mg/L)	6.1-8.1	5.4-8.4
pH (S.U.)	7.1-7.5	6.8-7.5
Conductivity (umhos/cm)	169-177	205-235
Alkalinity (mg/L as CaCO3)	70-74	56-64
Hardness (mg/L as CaCO3)	86-87	24-28

NOTE: Since Daphnid tests were invalid, no water chemistries are presented. Raw data is on file in Field Operations.

Table 11. Toxicity Test Conditions

FATHEAD MINNOW

Test Type: Static Renewal
Age of Test Organisms: <24 hr old larvae
Test Chamber Size/Replicate: 600 mL
Test Solution Volume/Replicate: 250 mL
Photoperiod: 16 hr light; 8 hr darkness
Light Intensity: 84.4 ft-c. (7-day Average)
Initial Number of Replicates per Concentration: 4
Initial Number of Test Organisms per Replicate: 15
Total Larvae per Concentration: 60
Feeding Regime: Newly hatched brine shrimp (*Artemia* sp.) prior to and after solution renewals
Aeration: None
Dilutions: KCO-1 and KCO-1A were tested at 100%. Ozark WWTP was diluted to the RWC of 42%.

DAPHNID (Chronic Test Results Invalid)*

Test Type: Static Renewal
Age of Test Organisms: <24 hr old neonates**
Test Chamber Size/Replicate: 30 mL
Test Solution Volume/Replicate: 15 mL
Photoperiod: 16 hr light; 8 hr darkness
Light Intensity: 84.4 ft-c.(7-day Average)
Initial Number of Replicates per Concentration: 10
Initial Number of Test Organisms per Replicate: 1
Total Larvae per Concentration: 10
Feeding Regime: Yeast-Ceropyhyll-Trout Chow (YCT) extract and the green alga *Selenastrum capricornutum* daily at solution renewal
Aeration: None
Dilutions: KCO-1 and KCO-1A were tested at 100%. Ozark WWTP was diluted to the RWC of 42%.

*See RESULTS for concurrent acute toxicity test NOTE.

**Neonates did not meet requirements of recommended EPA protocol.