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Abstract

Bayou Meto is a low-gradient, highly turbid, warm-water stream that originates in the foothills of the Interior Highlands of central Arkansas and flows southeastward 290 km to the Arkansas River. In the 1970's, Bayou Meto was contaminated with dioxins from a point source (Vertac Corp.) now recognized as a USEPA Superfund site. The present study was initiated to investigate the impact of dioxin on the fish community of Bayou Meto. Fishes were collected by backpack-electrofishing, boat-electrofishing, seines, hoopnets, minnow traps, and trot lines, at 14 sampling stations. Diversity indices (Shannon and Margalef) were used to compare diversity among sample sites. A total of 73 fish species was collected from Bayou Meto and Wattensaw Bayou (a reference stream) between May, 1991 and September, 1992. A total of 79 species had been reported from these drainages. I collected 64 species from Bayou Meto and 48 species from Wattensaw Bayou. Of the 79 species historically reported from these drainages, 17 were not collected during this study. However, of the 73 species collected, 11 (15% of the entire collection) had not been previously recorded from these drainages. There was 57% overlap in species between Bayou Meto and Wattensaw Bayou. Differences in collected species from the two drainages mostly involved rare species i.e., those species in low abundance according to the literature and/or difficult to collect. Centrarchids and castostomids dominated the fish communities of both streams. Percids were also well represented, but 50% were not previously reported from these drainages. Cyprinidae numbers were low and distributions spotty. Diversity varied among sites and was related to impacts and stream order. Diversity was highest at less impacted locations and downstream sites.

Introduction

Surveys of species are the cornerstone of ecological studies, providing basic data about what is present or absent in an ecosystem. Listing and recording the occurrence of species is indispensable to science, from the discovery of new species to affirmation of the anticipated. Species lists from geographical regions or from specific systems provide baseline data for future studies. Species and population baselines have become increasingly important to understanding the impacts of massive habitat alterations, pollution, introduction of non-native species, and recovery of endangered species.

The overall objective of this study was to describe the fish communities of Bayou Meto and Wattensaw Bayou for present and future reference. This study was part of a larger study funded by the U. S. Enviromental Protection Agency and the U. S. Fish and Wildlife Service for the Arkansas Cooperative Fish and Wildlife Research Unit to investigate the impact of dioxins upon the aquatic community of Bayou Meto.

Bayou Meto is a low-gradient, highly turbid, warm-water stream that originates in the foothills of the Interior Highlands of central Arkansas (Fig. 1). Bayou Meto begins 38.8 km northeast of Jacksonville, Arkansas, and flow southeastward 290 km through the flat, fertile farmlands of the Mississippi Embayment to the Arkansas River near Reydell, Arkansas. The entire drainage area for Bayou Meto is 1,606 km^2 (Neely, 1985). Based upon 30 years of monitoring at the United States Geological Survey (USGS) gauging station at Lonoke, Arkansas, the average flow for Bayou Meto at Lonke is 8.2 m^3/s; minimum and maximum flows were 0 and 133 m^3/s, respectively (Neely, 1985).

Bayou Meto begins as an intermittent stream at an elevation of 500 m and becomes a second order stream 12.9 km above Jacksonville. The headwaters are characteristic of an upland stream with typical riffle and pool complexes. Bayou Meto becomes a third order stream 9.2 km above Jacksonville at its confluence with Bridge Creek, a fourth order stream at Bayou Meto Wildlife Refuge, and enters the Arkansas River as a fifth order stream.

A paucity of acquatic faunal studies in east-central Arkansas and the impacts of dioxins, sewage, and pesticides from industry, municipalities, and agriculture necessitated comparison of the fish fauna of Bayou Meto to a less impacted stream to ascertain patterns of species alterations. Since 1970, dioxin-laden waste chemicals have been discharged from Vertac Chemical Corp. into Bayou Meto (ADPC&E, 1984, 1989). The Vertac site has been declared a Superfund Site by USEPA (USEPA, 1990, 1991).

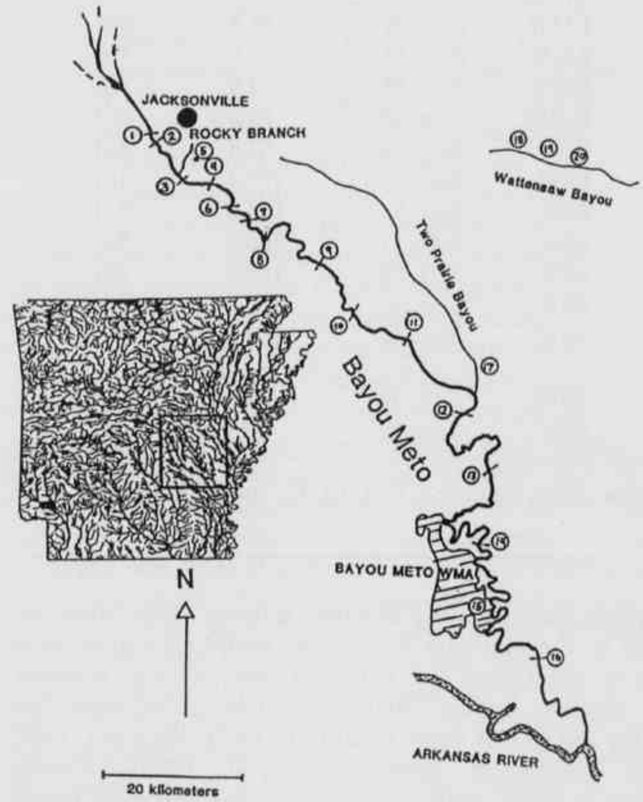


Fig. 1. Sample stations on bayous Meto and Wattensaw. Number in circle indicates location and station. Station 5 was Lake Dupreee. Bayou Meto Wildlife Management area (WMA) is denoted by paraellel lines.

Wattensaw Bayou was used as a reference stream to Bayou Meto. Wattensaw Bayou begins 3 km southeast of Cabot, Arkansas, within 16 km of Bayou Meto, and flows eastward for 103.5 km before its confluence with the White River. These two streams are morphologically similar, flowing through the Mississippi Alluvial Plain of Arkansas. Both are meandering streams with large variances in seasonal flows. Deposition in both systems includes clay, sand, gravel, and detritus. The riparian zones of both streams are dominated by bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa acquatica*). The fish communities of these lowland streams should be dominated by Centrarchidae (Lee et al., 1980; Robinson and Buchanan, 1988), a family of fishes particularly adapted to the slow moving and turbid waters found in bayous of east central Arkansas. The native fish species compositions of both Meto and Wattensaw bayous were hypothesized to be similar. However, there is no known point source of effluent flowing into Wattensaw Bayou. Except for agricultural practices that dominate the lower reaches of both rivers, Wattensaw Bayou is not known to be highly polluted and, therefore, useful as a control to Bayou Meto.

Physicochemical parameters were analyzed in an seperate study and these parameters followed patterns in downstream gradients as predicted by Vannote et al. (1980) and others (Heckathorn, 1993). Assumptions made of these two drainages were that all sampling stations should produce relatively similar species, richness, and diversity with trends toward increasing numbers downstream and differences among sampling stations within Bayou Meto and between bayous Meto and Wattensaw should correlate to point source inputs. The above assumptions are based upon Heckathorn (1993) and personal observations.

Materials and Methods

In May, 1991, 12 sampling stations were designated on Bayou Meto and two sampling stations on Wattensaw Bayou (Fig. 1; Table 1). Fish collection methods included backpack-electrofishing, boat-electrofishing using a 240 V, 3500 W DC electrofishing boat adjusted to five amperes, seining, hoop nets, minnow traps, and trot lines (Nielson and Johnson, 1985). Collection sites were sampled during daylight hours intermittently from May through October, 1991. Seining proved impractical at most stations because of extensive vegetation, including both dead and living trees. At the end of the 1991 field season, sampling sties were confirmed (Table 1) and a sampling regime was designed and developed for 1992. Intensive sampling occurred in May and September of 1992 at all stations. Each sampling station was measured at 75-100 m of stream length (Owens and Karr, 1978; Schlosser, 1982). The sampling regime consisted of three 20-min. boat-electrofishing runs, accompanied by one set of two 24-h 576 mm diameter hoopnet (1 baited and 1 unbaited) and one set of eight 24-h unbaited minnow trap. Both banks of each station were boat-electrofished using a 240 V, 3500 W DC electrofishing boat adjusted to five amperes, with the same pattern of 100 m downstream and then 100 m upstream of the opposite bank being followed on all three runs. All electrofishing was done during daylight hours. Immediately after electrofishing hoopnets and minnow traps were set. Hoopnets were placed with the unbaited

Table 1. Sampling stations with locations, counties, legal descriptions, distance from the river source, and stream order. BM is bayou Meto, WB is Wattensaw Bayou, and WMA is Wattensaw Wildlife Management Area. The first of two Sewage Treatment Plants discharges into Bayou Meto above Station 3, and the second plant discharges above Station 4. Rocky Branch confluence with Bayou Meto is between stations 3 and 4.

Stations	River Locations	Counties	Legal Descriptions			Km	Stream Order
BM-1	Macon Br.	Pulaski	3N,	R11W,	Sect. 5	26.9	2nd
BM-2	Cato Br.	Pulaski	T3N,	R11W,	Sect. 22	35.3	3rd
BM-4	Reeds Br.	Pulaski	T3N,	R11W,	Sect. 31	41.9	3rd
BM-6	Broken Br.	Pulaski	T3N,	R10W,	Sect. 33	44.9	3rd
BM-7	I-40 Br.	Pulaski	T2N,	R10W,	Sect. 14	55.8	3rd
BM-8	HWY 15 Br.	Lonoke	T2N,	R9W,	Sect. 29	61.4	3rd
BM-11	HWY 13 Br.	Lonoke	T1N,	R8W,	Sect. 10	107.4	3rd
BM-12	HWY 165 Br.	Lonoke	T2S,	R6W,	Sect. 7	133.6	3rd
BM-13	HWY 79 Br.	Arkansas	T3S,	R6W,	Sect. 11	166.3	3rd
BM-14	HWY 152 Br.	Arkansas	T3S,	R6W,	Sect. 33	182.0	4th
BM-15	Cox Cypress	Arkansas	T5S,	R6W,	Sect. 1	218.7	4th
BM-16	HWY 11 Br.	Arkansas	T6S,	R5W,	Sect. 3	253.9	4th
WB-18	HWY 13 Br.	Prairie	T3N,	R9W,	Sect. 12	60.5	2nd
WB-20	WMA	Prairie	T3N,	R6W,	Sect. 22	90.7	4th

NOTE: Only Cox Cypress (BM-15) was deleted from the 1992 sampling regime. Also, stations 3, 5, 9, 10, 17, and 19 were used in the sediment and invertebrate part of the overall dioxin contamination study.

net immediatly downstream of each 100 m sampling station and with the baited net immediately upstream. Minnow traps were placed randomly throughout the sampling station. Block nets were not used due to possible high levels of dioxin contamination. The sampling was repeated again in September, 1992, but hoopnets and minnow traps were not set due to poor catches during spring sampling. Fish species lists for both Bayou Meto and Wattensaw Bayou were compiled from data collected from the 1991 random sampling and the 1992 sampling regime.

Most collected fishes were fixed in 10% formalin, washed in water, preserved in 50% isopropyl alcohol, and returned to the lab for identification. Large fish were identified in the field and returned unharmed. Specimens were eventually changed to 70% ethanol and placed into the University of Arkansas Natural History Museum in Fayetteville, Arkansas. The Common and Scientific Names of Fishes published by the American Fishery Society was used to name fish species collected (Robins et al., 1991). Species identifications were confirmed in the lab by Dr. James E. Johnson, U.S. Fish and Wildlife Service.

Electrofishing, hoopnets, and minnow traps catch per unit effort (CPUE) in the 1992 sampling regime was consistent among sites and allowed for comparisons among sampling stations using diversity indices. Only fishes collected in the May and September sampling regime were used to determine and compare diversity and richness. Two diversity indices (Shannon and Margalef) were chosen for use in this study (Shannon, 1958; Margalef, 1958, 1963; Washington, 1984; Boyle et al., 1990). Diversity indices elucidate differences among sites and show trends in declines or increases in diversity. Boyle et al. (1990), showed that best results are obtained by using indices in concert, thus allowing for complementation and dampening of deficiencies.

Shannon and Margalef indices were chosen based upon wide use, acceptance in aquatic studies, and distinction in responses to variances in populations (Washington, 1984; Boyle et al., 1990).

Results

Sampling efficiency was subjectively assesed as excellent to good for the 1992 electrofishing effort. The first and second of the set of three electrofishing runs collected 81% and 91% of the species, respectively, and numbers of fish collected declined with each successive run. These data are judged adequate to make inferences about species presence or absence, richness (total number of species), and diversity.

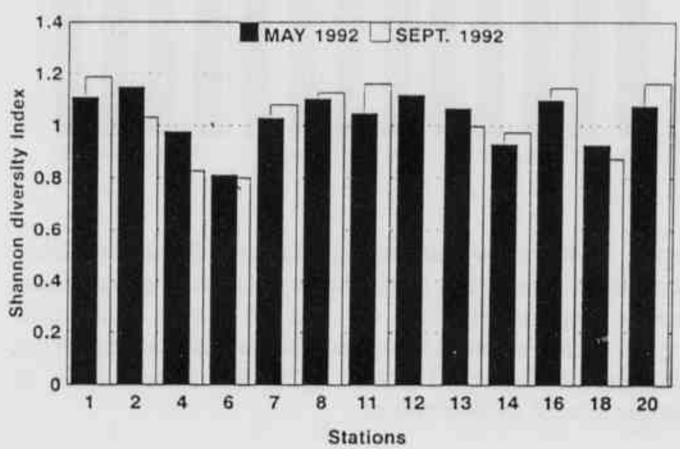
A total of 73 fish species was collected from bayous Meto and Wattensaw between May, 1991, and September, 1992 (Table 2). Seventy-nine species had been reported from the regional area of these drainages (Lee et al., 1980; Robison and Buchanan, 1988). Sixty-four fish species were collected from Bayou Meto and 48 species from Wattensaw Bayou. Fishes collected in only one of these two drainages are shown in Table 3. Of the 79 species historically reported from these drainages, 17 (22%) were not found during this survey. Conversely, of the 73 species collected, 11 (15%) had not been previously recorded from these drainages. There was a 53% overlap in species between Bayou Meto and Wattensaw Bayou.

Centrarchids and catostomids dominated the fish communities of both streams. *Polyodon spathula* and *Anguilla rostrata* were both collected only from Wattensaw Bayou, and only in low numbers. Gars were represented in both streams at all stations by *Lepisosteus oculatus*, but *L. platostomas* was collected only in Bayou Meto and *L. osseus* only in Wattensaw Bayou. *Amia calva* was well represented in both systems. Cyprinids were represented by shiners and minnows, but their species numbers were notably low and their distributions spotty and variable. Shiners in Wattensaw had a higher diversity than in Bayou Meto. Ictalurids were represented in both streams; *Ictalurus punchtatus* was most abundant. Esocids were represented in both systems by *Esox americanus*. *Aphredoderus sayanus* was abundant in Bayou Meto but absent from Wattensaw Bayou. The family Cyprinodontidae was well depicted by *Fundulus olivaceus* in both drainages, but *F. notatus* was taken only from Bayou Meto, and then only in low numbers. *Gambusia affinis*, and at least one of two species of Atherinidae, were collected at most stations in both streams. The family Percicthyidae was represented by *Morone mississippiensis* in low numbers in both bayous, and *M. saxatilis* was collected once at mid-stream in Bayou Meto. Percids were well represented, considering their lack of susceptibility to electrofishing (Vibert, 1967, Novotny and Priegel, 1974). Percidae also had the highest percentage of unreported species, with 50% as newly described from these drainages in this work. *Aplodinotus grunniens* was collected at all sampling stations except Station 4 on Bayou Meto. Some of the highest dioxin contamination concentrations in Bayou Meto were reported from Station 4 (ITC, 1987, USEPA, 1990, 1991).

Species diversity varied by station (Fig. 2). However, relative diversity trends did not vary greatly between indices nor between May and September sampling dates, and congruence between these parameters ameliorates validation of sample methodologies and these data. The highest diversities from Bayou Meto were consistently found at stations 1, 2, and 12, with the lowest diversities at stations 4 and 6, where dioxin levels and sewage effluent were highest (ITC, 1987, USEPA, 1990, 1991) (Fig. 2). Sewage effluent negatively impacts fish communities immediately downstream, but further downstream beyond the septic and/or toxic zone, benefits may be derived by certain fish species due to increases in flow and nutrients (Owens and Karr, 1978). Diversity in Bayou Meto remained unpredictable low from stations 4 through 12. At stations 14 and 16, increases in width, depth, and turbidity of the stream may have reduced sampling efficiency, resulting in an underestimate of diversity and richness (Schlosser 1982; Heckathorn, 1993). Diversity in Wattensaw Bayou was relatively low at the upper station and highest at the most downstream station. Station 20 at Wattensaw had the highest diversity and richness of any station (Figs. 2 and 3).

Richness proved variable among sampling dates. Total numbers of species in May fluctuated less and averaged higher than in September. Numbers of species for both sampling dates followed the same trend as seen in the diversity indices, except that May results were not as conspicuously low. Contrasts between samples taken in May and September, were most likely due to differences in flow. For example, in September, water flows dropped to levels which prevented the sampling of Station 12. Fishes might have emmigrated out of my sampling stations to deeper waters. Lower water levels should also concentrate fishes, making them more susceptable to collecting gear. In general diversity and richness decreased at stations with decreases in water levels, but realative diversity and richness remained consistent among stations in between May and September sampling dates.

Diversity indices for Bayou Meto and Wattensaw Bayou



Diversity indices for Bayou Meto and Wattensaw Bayou

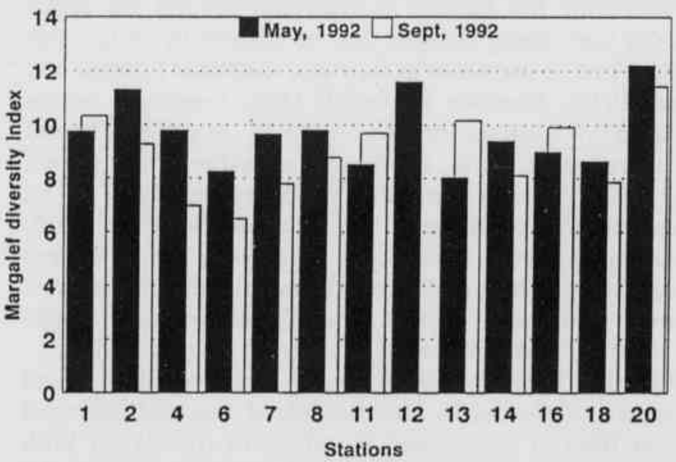


Fig. 2. Diversity by stations for May and September sampling dates. Stations 1 and 2 are upstream of dioxin and sewage impacts. Stations 18 and 20 are at unimpacted Wattensaw Bayou. We were unable to sample station 12 in September due to low flow.

Richness of Bayou Meto and Wattensaw Bayou

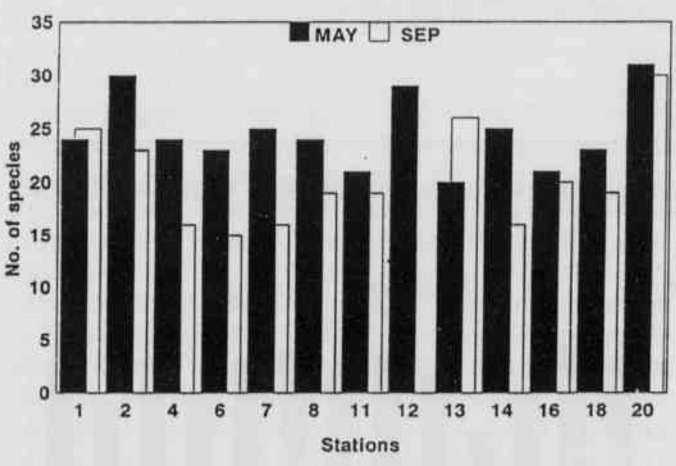


Fig. 3. Richness by stations for May and September sampling dates. Stations 1 and 2 are upstream of dioxins and sewage impacts. Stations 18 and 20 are at Wattensaw Bayou. Richness should increase downstream as seen from unimpacted stations 1-2 and 18-20. We were unable to sample site 12 in September.

Discussion

Differences in species collected from the two drainages mostly involved rare species (those collected in low numbers or at only one station). It is likely that these species were present in low numbers in both streams. However, 15 species were collected in substantial numbers in one drainage but not the other: *Lepisosteus platostomas, Cyprinus carpio, Lythrurus umbratilis, Carpoides carpio, Ictiobus niger, Ictalurus furcatus, Aphredoderus sayanus, Fundulus notatus, Centrarchus macropterus, Micropterus punctulatus, Etheostoma chlorosomum, E. spectabile,* and *Percina maculata* came only from Bayou Meto, and *Lepisosteus osseus* and *Notropis texanus* came only from Wattensaw Bayou (Table 3).

Many of the 17 species reported from bayou Meto and Wattensaw, but not collected during this study, are not susceptible to electrofishing, and other species, if present, would be expected in low numbers, reducing their chances of capture (Table 3). For example, *Polyodon spathula* was collected from Wattensaw Bayou, but only by chance. During a water quality sampling effort, not during fish collection efforts I chanced upon a fisherman, whom was catching young *P. spathula* on minnows. Fish like *P. spathula, Scaphirhynchus platorynchus, Cycleptus elongatus*, and *Percina shumardi* may still reside in the two streams, but are not susceptible to capture (Miller and Robison, 1973; Robison and Buchanan, 1988). Fish like *Alosa chrysochloris, Hiodon alosoides, H. terqisus, Hypophthalmichthys molitrix, H. nobilis,* and *Erimyzon sucetta* should have been present, but low numbers likely reduced chance of capture (Beckett and Pennington, 1986; Robison and Buchanan, 1988). *Notropis blennius, N. venustus, N. volucellus, Pimephales notatus, Fundulus chrysotus, F. dispar, Morone chrysops, and Lepomis marginatus* were expected in abundant numbers and are also susceptable to electrofishing as evidenced by the consistent capture of similar species from the same families of the above species, and their absence may indicate recent losses from these drainages (Robison and Buchanan, 1988) (Table 3). Results of Shannon and Margalef diversity indices were similar, and indicate a real change in diversity among stations. Species diversity should be maximized at mid-reach of rivers (fourth to sixth stream order) where microhabitats are most abundant. However, as expected the fish community of Bayou Meto did not recapitulate the River Continuum Concept (RCC), possibly due to contaminants from dioxins, pesticides, and sewage discharge (Platts, 1979; Vannote et al., 1980; Minshall et al., 1983; Schlosser, 1982).

In May, diversity and richness increased as expected between the first two stations at Bayou Meto, and in both May and September at Wattensaw, in accordance with the RCC. Diversity decreased at Station 4 (below dioxin and sewage effluent) and continued at a reduced level to the

Table 2. Fish species composition of Bayou Meto and Wattensaw Bayou, for May, 1991, through September, 1992 (without CPUE for stations). Numbers under stations are the number of individual fish collected for all sample dates. N is the total number of individuals of a species collected from both drainages, and totals are total number of fishes collected at a sample station. Total collection included 7,465 fishes.

TAXA	STATIONS														
Family / Species	Above Vertac												Wattensaw Bayou		
	1	2	4	6	7	8	11	12	13	14	15	16	18	20	N
Polyodontidae															
Polyodon spathula														3	3
Lepisosteidae															
Lepisosteus oculatus	5	13	14	46	20	22	7	16	33	35	8	19	8	33	279
Lepisosteus osseus													*4*	*1*	*5*
Lepisosteus platostomas					1		4	4	9	6	4				28
Amiidae															
Amia calva	9	10	1	9	4	4	1	4	6	5		4		9	66
Anguillidae															
Anguilla rostrata														1	1
Clupeidae															0
Dorosoma cepedianum	22	92	13	8	19	16	18	3	38	11	20a	15	13	26	314
Dorosoma petenense												23		55	78
Cyprinidae															*0*
Campostoma anomalum	3													1	4
Ctenopharyngoden idella							1					1			2
Cyprinus carpio	21	24	5	6	35	13	18	6	5	3	10	6	9		161
Hybognathus hayi									1					40	41
Hybognathus nuchalis	1			1					1		1			39	43
Lythrurus fumeus	67			14	4	2	6	11	16		8	7		2	137
Lythrurus umbratilis	53	1	2		1										57
Macrhybopsis storeriana														1	1
Notemigonus crysoleucas	2	5			2				1		1			3	14
Notropis amis						1						1		16	18
Notropis atherinoides					1			1	1	2		1	2	13	21
Notropis buchanani														4	4
Notropis lutrensis											3				3
Notropis maculatus	4	1						1		1		2	3	14	26
Notropis shumardi														4	4
Notropis texanus														31	31
Opsopoeodus emiliae	26	18	2	8	4	7	1		5	6	4	1	8	13	103
Pimephales vigilax											1				1
Catostomidae															0
Carpiodes carpio					2	9		1	1	10	1	13			37
Erimyzon oblongus														1	1
Ictiobus bubalus	1	34	7		5	58		3	1	13	21c	9	7	5	164
Ictiobus cyprinellus	14	35	12	30	18	37	2	1	6	7	59b	3		6	230
Ictiobus niger		3	4		2	5	1				10				25
Minytrema melanops	18	11			2									5	36
Moxostoma macrolepidotum				1											1
Ictaluridae															0
Ameiurus melas													1		1
Ameiurus natalis	1	1												2	*4*
Ictalurus furcatus										2	3	5			10
Ictalurus punctatus		4	4	3	3	2	1	2	11	6	1	24		8	69
Noturus gyrinus	1	1													2
Pylodictis olivaris					2				1						3
Esocidae															0
Esox americanus	11	1	1								1			2	16
Aphredoderidae															0
Aphredoderus sayanus	5	6						1							12
Cyprinodontidae															0
Fundulus notatus	1	2							8						11
Fundulus olivaceus	84	15	3	1	1	3	1	2		1	1	3	11	26	152

Table 2. Continued:

TAXA Family Species	STATIONS Above Vertac 1	2	4	6	7	8	11	12	13	14	15	16	18	Wattensaw Bayou 20	N
Poeciliidae															
Gambusia affinis	16	8	1	6	4	43	3	2	2		93	19	1	15	213
Atherinidae															0
Labidesthes sicculus	21	24	3	5	2	1			4	4	2		1	21	88
Menidia beryllina	2		4											5	11
Percicthyidae															0
Morone mississippiensis												4		3	7
Morone saxatilis								1							1
Centrarachidae															0
Centrarchus macropterus	6	2													8
Elassoma zonatum		2													2
Lepomis cyanellus	11	3	5	2	1		3	3	8	2	3	1	10	1	53
Lepomis gulosus	31	30	21	62	92	33	24	25	25	16	23	6	33	23	444
Lepomis humilis	2	14	7	29	45	46	25	50	83	119	38	51	32	2	543
Lepomis macrochirus	145	113	113	187	121	109	72	58	104	160	88	48	155	167	1,640
Lepomis megalotis	97	102	120	183	44	12	25	22	172	73	19	50	172	89	1,180
Lepomis microlophus	15	4	8	2	7	9	8	1		3			12	9	78
Lepomis punctatus	8	6	10		3	4	16	10	16	18	6	3	34	6	140
Lepomis symmetricus		2													2
Micropterus punctulatus			2	20					1	9	2	3			37
Micropterus salmoides	24d	10	13	10	5	7	7	6	7	8	74e	3	17	45	236
Pomoxis annularis	12	24	9	12	29	19	24	16	26	14	44	16	6	2	253
Pomoxis nigromaculatus	3	4	1	3	1	3	4	3	12	2	2	4	6	10	58
Percidae															0
Ammocrypta vivax										1					1
Etheostoma asprigene											3			1	4
Etheostoma chlorosomum	1	3						1	1		33				39
Etheostoma gracile		1													1
Etheostoma proeliare	1	1									4		1	2	9
Etheostoma spectabile	5														5
Etheostoma stigmaeum	1														1
Etheostoma shipplei	1														1
Percina caprodes								1	3		3			10	17
Percina maculata	2		1					1		1					5
Sciaenidae															0
Aplodinotus grunniens	1	2		3	24	14	21	6	51	11	1	25	2	8	169
TOTALS	754	632	386	651	504	479	293	262	659	549	595	370	548	783	7,465

a = + 263 fry.
b = 50 juveniles between 28/mm - 68/mm.
c = 18 juveniles between 28/mm - 68/mm.
d = 13 were fry.
e = 71 juveniles between 33/mm - 55/mm.

Table 3. Comparison of fish species collected in 1991 and 1992 from bayous Meto and Wattensaw (without CPUE for the two drainages). Species collected in Bayou Meto and/or in Watensaw Bayou are denoted by X. Species historically reported from these drainages but not collected in this study are listed and followed by an asterisk but not marked. Rare species are those collected only once from a station or so designated in the literature, and are denoted by an X. Species difficult to capture by my sample methods are so designated; and species not recorded from these drainages but collected are designated by two asterisks.

Species	Bayou Meto	Wattensaw Bayou	Rare species	Difficult to collect
Scaphirhynchus [;atprumcjis			X	X
Polyodon spathula		X		X
Lepisosteus osseus		X		
Lepisosteus platostomus	X			
Anguilla rostrata		X	X	
Alosa chrysochloris *			X	X
Campostoma anomalum **	X	X		
Ctenoparyngoden idella	X			
Cyprinus carpio	X			
Hiodon alosoides *			X	
Hiodon tergisus *			X	
Hybognathus hayi **	X	X		
Hypophthalmichthys molitrix			X	
Hypophthalmichthys nobilis			X	
Lythrurus umbratilis **	X			
Macrhybopsis storeriana		X	X	
Notropis blennius *				
Notropis buchanani		X		
Notropis lutrensis	X		X	
Notropis shumardi **		X	X	
Notropis texanus **		X		
Notropis venusthus *				
Notropis volucellus *				
Pimephales notatus *				
Pimephales vigilax	X		X	
Carpoides carpio	X			
Cycleptus elongatus *				
Erimyzon oblongus **		X	X	
Erimyzon sucetta		X	X	
Ictiobus niger	X			
Moxostoma macrolepidotum	X		X	
Ameiurus melas		X	X	
Ictalurus furcatus	X		X	
Noturus gyrinus	X			
Pylodictis olivaris	X			
Aphredoderus sayanus	X			
Fundulus chrysotus *				
Fundulus dispar *				
Fundulus notatus	X			
Morone chrysops *				
Morone saxatilis	X		X	
Centrarchus macropterus	X			
Elassoma zonatum	X		X	
Lepomis marginatus				
Lepomis symmetricus	X		X	
Micropterus punctulatus	X			
Ammocrypta vivax **	X		X	X
Etheostoma chlorosomum	X			X
Etheostoma gracile	X		X	X
Etheostoma spectabile **	X		X	X
Etheostoma stigmaeum **	X		X	X
Etheostoma whipplei **	X		X	X
Percina maculata **	X			X
Percina shumardi *				X

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last station. Declines along a gradient in which diversity and richness should increase are indicative of disturbance (Diamond and Gilipin, 1980; Angermeir and Schlosser, 1989). The fish community of Bayou Meto appears to be impacted at Station 4, and community structure remained variable and unpredictable through the last sample station.

The 1992 sampling regime showed Wattensaw Bayou to have higher diversity and richness when compared to Bayou Meto. The highest diversity and most species collected for all sample dates was at Station 20 on Wattensaw Bayou. However, when examining total fish species collected for 1991 (without CPUE) and 1992 Bayou Meto has more species than Wattensaw Bayou. Bayous Meto and Wattensaw are both well represented by the total number of species. Difference in the two streams may be due to differential sampling efforts. Most likely, the total number of species in Wattensaw would have exceeded Bayou Meto if a similar sampling effort had been used (same number of sampling stations and sampling days). For example, absence of *C. carpio* from Wattensaw likely was an artifact of this differential sampling.

Bayou Meto is an impacted stream below the confluence of Rocky Branch. Dioxins and/or pesticide contamination appear to be the most likely reasons for declines in fish diversity in Bayou Meto, although sewage effluent and pesticides could also contribute significantly to these declines as a singular agent or in synergism. Fish taxa were missing from this survey, and loss of species due to the above anthropomorphic alterations is possible, and is deserving of future investigation. Wattensaw Bayou and stations 1 and 2 on Bayou Meto proved high in fish diversity and followed the RCC model.

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