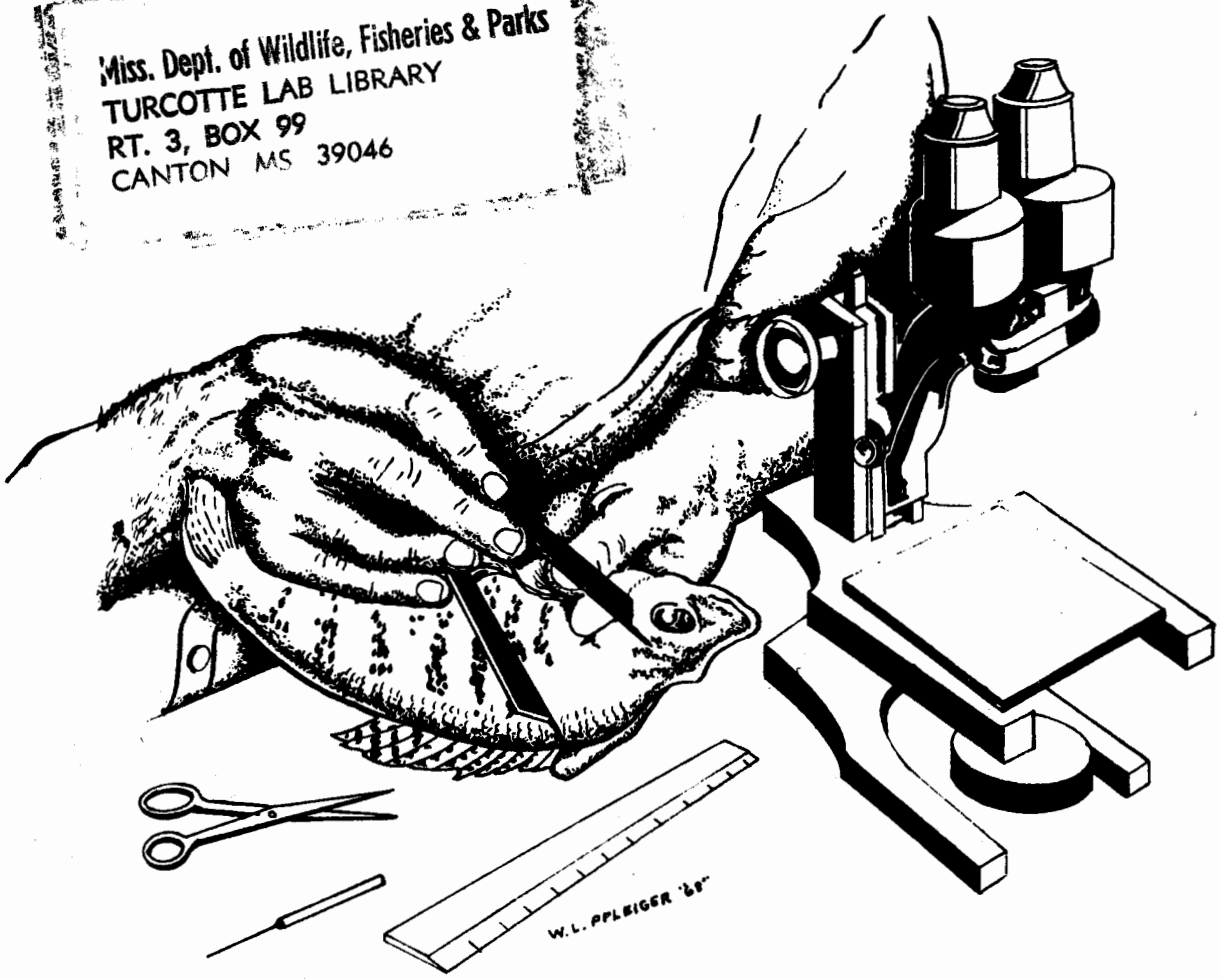
AMERICAN FISHERIES SOCIETY

PROCEEDINGS ANNUAL MEETING

MISSISSIPPI CHAPTER



Volume V

February 19, 1981

Delta Branch Experiment Station

Stoneville, Mississippi

PROCEEDINGS
ANNUAL MEETING
MISSISSIPPI CHAPTER OF THE
AMERICAN FISHERIES SOCIETY
FEBRUARY 19, 1981
STONEVILLE, MISSISSIPPI

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AMERICAN FISHERIES SOCIETY
MISSISSIPPI CHAPTER
1981 ANNUAL MEETING

DELTA BRANCH EXPERIMENT STATION
STONEVILLE, MISSISSIPPI

FEBRUARY 19, 1981

AGENDA

8:30 - 9:30	Registration
9:30 - 11:30	Business meeting
11:45 - 1:00	Luncheon & Group Photograph
1:10 - 4:50	Contributed Papers
1:10	Development and evaluation of audio-visual tape/slide instruction for an undergraduate/graduate ichthyology course. Charles Edward Meadows, Ball State University (now at Northwest Mississippi Junior College).
1:30	Comparison of species composition and catch variation between a high opening and a standard 13 m shrimp trawl. Bennie A. Rohr, National Marine Fisheries Service, Southeast Fisheries Center, Pascagoula.
1:50	Incidental catch of finfish by the Gulf of Mexico shrimp fleet. Gilmore Pellegrin, Jr., National Marine Fisheries Service, Southeast Fisheries Center, Pascagoula.
2:10	Fecundity of Atlantic croaker (Micropogon undulatus) in the north central Gulf of Mexico. Nathaniel Sanders, Jr., National Marine Fisheries Service, Southeast Fisheries Center, Pascagoula.
2:30	The use of cottonseed meal in channel catfish feeds. Warren Dorsa and H. Randall Robinette, Department of Wildlife and Fisheries, Mississippi State University, and Ed Robinson and Bill Poe, Department of Biochemistry, Mississippi State University.
2:50	Use of duckweed in diets of channel catfish. Martin W. Brunson and H. Randall Robinette, Department of Wildlife and Fisheries, Mississippi State University.
3:10	Break

3:30 Comparison of fish populations between two Mississippi River habitats.
Michael E. Potter and C. H. Pennington, Waterways Experiment Station, Vicksburg.

3:50 Fish species occurrence and distribution in a spring fed, southern stream.
Danny Ebert, U.S. Forest Service and Paul Hartfield, Museum of Natural History.

4:10 The effects of flooding on southeastern stream fishes.
John A. Baker and Stephen T. Ross, Dept. Biology, University of Southern Mississippi.

DEVELOPMENT AND EVALUATION OF AUDIO-VISUAL TAPE/SLIDE INSTRUCTION FOR AN UNDERGRADUATE/ GRADUATE ICHTHYOLOGY COURSE

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Abstract: Audio-visual tutorial instruction was integrated into the Ball State University's ichthyology course in an attempt to bring students to a common knowledge level and enrich the curriculum. Eight modules were integrated into the course from 1977 to 1979. The first two modules were entitled: Fish Topography and Measurement, and Perch Dissection. The remaining six modules dealt with the ecology of selected Indiana fish species. The modules were presented to students enrolled in the Ball State University ichthyology course from 1977-79 and to students enrolled in a Huntington College ecology course during the 1979 spring semester. The goals of the presentations were to 1) improve the software through revision of content, slides, and test questions and 2) collect pre- and post-test data. All statistical data collected dealt with the evaluation of short-term learning. Correlated, paired, one-tailed, t-tests and percent gains computed on pre- and post-test data showed significant increases for all modules for both study groups. After module revision all modules showed acceptable reliability coefficients. The majority of students, participating in an evaluation questionnaire dealing with program effectiveness, quality, and testing, rated items either excellent or good.

COMPARISON OF SPECIES COMPOSITION AND CATCH VARIATION BETWEEN A HIGH OPENING AND A STANDARD 13m SHRIMP TRAWL

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Abstract: The National Marine Fisheries Service survey trawl is a standard 13m shrimp trawl which has a vertical opening of 1.4m and a horizontal opening of 9.1m. A high opening mongoose shrimp trawl (vertical opening 2.8m, horizontal opening 9.1m) has been towed simultaneously with the standard shrimp trawl at over 200 stations. Survey objectives using the standard trawl are to define species composition, relative abundance, and population densities on the northern Gulf of Mexico shelf from 9 to 90m. Comparison of catch rates, species composition, and relative abundance between these two trawls provides a more realistic estimate of the population structure and density on these fishing grounds. Preliminary analysis indicates that the high open trawl catches a higher portion of pelagic species and fewer invertebrates than the standard shrimp trawl. Inherent variation in catch rates and composition appears to be fairly large which somewhat hinders analysis and may indicate that our sample size is presently too small.

INCIDENTAL CATCH OF FINFISH BY THE GULF OF MEXICO SHRIMP FLEET.

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Abstract: From 1972 to 1978 the Pascagoula Laboratory of the National Marine Fisheries Service collected incidental catch data from the northern Gulf of Mexico shrimp fleet. The Gulf was partitioned into three zoogeographical areas; northwestern, northcentral, and northeastern Gulf. Mean finfish to shrimp ratios were calculated for each area and finfish species compositions were determined. Estimates of total finfish by-catch were calculated by multiplying the mean ratios times the shrimp landings for the respective areas.

FECUNDITY OF ATLANTIC CROAKER (MICROPOGON UNDULATUS) IN THE NORTH CENTRAL GULF OF MEXICO.

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Abstract: Croaker represent the dominant species in the industrial fishery and are primarily utilized for petfood production. Catch rates of croaker in this fishery have declined during the past several years. Because of its importance in the fishery aspects of its life history are presently being studied. This project will define spawning season, duration, and fecundity rates throughout the size range of the spawning populations. Monthly samples of specimens were removed from the industrial catch during 1979. These samples were sexed for a male-female ratio and the ovaries were then removed. Total length, weight, and ovarian weight were recorded for a somatic-gonadal index. Ovarian sections were taken from the anterior, mid, and posterior portions of 5 fish to determine variation in egg size. An ANOVA test indicated no significant difference in egg sizes anterior to posterior or medially to outside. Midsection samples will be taken to determine fecundity of croaker throughout the spawning population size range.

THE USE OF COTTONSEED MEAL IN CHANNEL CATFISH FEEDS.

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Mississippi State University

and

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Abstract: Channel catfish fingerlings weighing approximately 7-8 grams were stocked in 100 liter flow through aquaria. A flow rate of approximately 900 ml/min. and water temperature of 27 ± 1°C was maintained. Diurnal light/dark cycle of 17-10 hours was maintained by supplemental incandescent lighting. Prior to the experiments initiation, the channel catfish fingerlings were fed a casein-gelatin conditioning diet for a period of one month. Experimental diets were formulated from commercially available feed ingredients to contain 38% crude protein and 1200 kcal/lb of digestible energy. All diets were formulated to contain 1.6% available lysine. Cottonseed meal was placed in diets two through six by removing 5, 10, 15, 20 and 25% peanut meal and replacing with cottonseed meal on a lysine basis. Three other diets, eight through ten, were made from the basal diet (diet one) to contain 0.035, 0.105 and 0.164 grams of gossypol acetate.

Growth inhibition began to occur at the 20% level of cottonseed meal and at the 0.105 gram level of gossypol acetate. Free gossypol was not found to any significant amount in the muscle tissue of the fingerling catfish at dietary levels of 15% cottonseed meal and less. Liver tissue showed low levels of gossypol from the fish fed the 5% cottonseed meal diet with progressively increasing levels of liver tissue gossypol as the percent cottonseed meal in the diet increased.

USE OF DUCKWEED IN CHANNEL CATFISH DIETS

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The potential of duckweed (Family Lemnaceae) for inclusion into channel catfish (Ictalurus punctatus) diets was investigated. The duckweed was found to be high in crude protein (33.45% of dry matter), and the amino acid profile of the duckweed compared favorably with those of other commonly used feed ingredients.

A ten-week aquarium study was conducted to determine the suitability of duckweed for utilization in channel catfish diets. Six isocaloric diets were formulated to meet or exceed the nutritional requirements of the channel catfish. Two control diets containing no duckweed were used. Diet 1 supplied adequate amounts of all essential amino acids and other nutrients. Diet 4 was identical to Diet 1 with the exception that the levels of essential amino acids were dropped to 85% of the levels found in Diet 1. Two experimental diets were used per control. These were formulated to meet the same nutritional limits as their controls, but in these diets duckweed was used to supply a portion of the necessary nutrients. Each pair of experimental diets consisted of a 15% duckweed and a 20% duckweed diet.

Analysis of variance of the mean weight gain of fish fed Diets 1-3 and of fish fed Diets 4-6 showed no significant differences (α=0.05) between means within each group. The mean percent weight gain per fingerling was reduced when the fish were fed the diets containing the lower levels of amino acids, but the addition of duckweed (in Diets 2, 3, 5, and 6) had no effect on the quality of the diets as compared with the control diets (1 and 4).

Mean feed conversion ranged from 2.43 (Diet 2) to 2.72 (Diet 4). Kilocalories of energy per g of weight gain averaged 5.74 (Diet 2) to 6.43 (Diet 4). ANOVA revealed no significant differences (α=0.05) in these parameters among the six diets. Thus, the inclusion of duckweed had no effect on the rate of feed conversion nor on the energy per g of weight gain.

Since the controls were formulated to provide approximately the same nutrient levels as commercially used catfish feeds, it appears that inclusion of duckweed into commercial diets would not significantly reduce feed quality, and that duckweed may be a suitable source of protein for catfish feeds.

A COMPARISON OF FISH COMMUNITIES FROM TWO HABITATS IN THE LOWER MISSISSIPPI RIVER

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Abstract

Fish were sampled from two different habitats on a stretch of the Mississippi River between river mile 524 and 528, approximately 4 miles downstream of the Greenville, MS, bridge. The two habitats were natural and revetted banks. They were similar with respect to location and water depth, but different with respect to substrate. Substrate of the revetted bank was articulated concrete mattress, whereas the natural bank was of clay. Fish were sampled seasonally with hoop nets and by electrofishing. Population differences were evident between the two habitats within given sampling trips, and seasonal changes in population composition were also seen within each habitat.

FISH SPECIES OCCURRENCE AND DISTRIBUTION IN A SPRING-FED SOUTHERN STREAM

Danny J. Ebert [1/] & Paul D. Hartfield [2/]

ABSTRACT

Brushy Creek, Amite County, Mississippi, is a clear, cool water stream with moderate flow, a sand-gravel bottom and pool-riffle areas. Physicochemical parameters are typical for the area, with the exception of temperature (maximum 22° C).

Fish species occurrence and distribution have been evaluated since January 1979. To date, 30 samples containing 48 species in 14 families have been collected. The fish fauna of this stream is relatively typical compared with other areas of the state. Cyprinids (Notropis camurus, N. chrysocephalus, N. longirostris, and Pimephales notatus) were the dominant fish species at all sample stations. Darters (Etheostoma caeruleum and Percina nigrofasciata), Madtoms (Noturus hildebrandi, N. miurus and N. nocturnus), and Lamprey (Ichthyomyzon gagei) were in great abundance. Several waif species, Etheostoma caeruleum, Noturus hildebrandi, N. phaeus, Hypentelium nigricans, Fundulus catenatus and Notropis camurus were collected uniformly throughout the stream. Fish species were generally concentrated around woody debris or aquatic vegetation, with darters occurring primarily at the head portions of riffles.

INTRODUCTION

Beginning in 1978, the U. S. Forest Service initiated several programs to assess the well-being and population strengths of lentic and, to a lesser extent, lotic fishes in the National Forests in Mississippi. The initial two years were concerned with re-stocking and improving lakes and ponds on the Forests (Ebert and Knight, 1980). During this period, over 30 lakes received treatment. In 1980, a shift from pure lake management to stream investigations began. The Holly Springs National Forest was initially sampled for lotic fish composition and received habitat improvement (Ebert and Knight, 1981). During this period, stream fish sampling of Brushy Creek, Homochitto National Forest, began.

Small streams throughout Mississippi have received little attention. Cook (1959) discussed watersheds in southwest Mississippi but was primarily concerned with the larger streams and rivers. Fisheries

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investigations of the Homochitto National Forest (Douglas, 1975) and adjacent drainages (Cashner et al., 1976, Dosher, 1976, and Matthews, 1978) have primarily been concerned with the Amite, Homochitto, Pearl, Bogue Chitto and Bayou Pierre Rivers. This investigation surveyed the fish fauna of Brushy Creek, a representative small (1st to 3rd order) stream in the Homochitto National Forest.

STUDY SITE

Brushy Creek originates in the rolling hills (Fig. 1) of the Homochitto Ranger District, Amite County, Mississippi, north of Hwy. 24. It flows through bottomland hardwood and empties into the Homochitto River east of Hwy. 33. The stream is characteristically shallow, slow flowing, clear and cool in temperature. The stream substrate in the headwater portions is primarily gravel with alternating pools and riffles. As the stream progresses toward the Homochitto River, the substrate changes to shifting, sinking sand with pool areas around woody debris. Low turbidity (10-25 JTU), acid pH (6.2-7.0), low conductivity (18-36 umhos/cm), cool temperature (10-25° C) and oxygen always near saturation characterize the stream.

METHODS

Beginning in 1979, Brushy Creek was sampled for fish species composition, abundance and distribution. The study was in part undertaken to obtain species information in the event the stream was impounded by a proposed PL 566 project and to evaluate various types of natural and man-made stream structures as fish concentrating devices.

Fishes were collected by electrofishing and seining 30 m blocked sections of the stream. Each station was shocked for 30 minutes, or until fishes were no longer taken. All specimens were preserved in 10 percent formalin and placed in the freshwater fishes collections at the Department of Biology, University of Mississippi; the Museum of Natural Science; and the Department of Biology, University of Southern Mississippi.

Stream bottom substrate at all stations was classified according to Gorman and Karr (1978) for habitat evaluation. Four depths and substrate particle sizes, five current velocities and three miscellaneous categories were identified (Table 1). Water quality parameters were measured at quarterly intervals at all sample stations (Table 2), following Rand et al. (1975). Two continuous recording thermographs (Peabody/Leird) have been in place (Stations 5 and 7) since August 1980. Daily air and water temperature data, along with daily rainfall, have been recorded for the Forest (U. S. Forest Service Weather Station, Bude Ranger District).

RESULTS AND DISCUSSION

As fishing demand increases, marginally productive waters will be considered for fish stocking and recreational development. Many of the shallow unaltered streams in the National Forests in Mississippi are being

considered for fisheries modifications. It is our opinion that, before any management action is attempted, the natural fish populations of target streams should be recorded. This information may be used in planning and assessing the potential modifications to the habitat or fish populations.

Brushy Creek has been sampled for fish species composition since January 1979. To date, 48 species in 14 families have been collected (Table 3). Douglas (1975) and Seehorn (1975), in surveys of fish fauna of the Southern National Forests, listed 84 species of fish as possibly occurring in the Homochitto National Forest. Seventy-seven species were reported as collected or previously collected, and 28 species (Moore, 1968) ranged throughout the general area. Our survey list of 48 species compared favorably with previous investigations; our lower species number may be attributed to our restricted sampling of one stream instead of the entire system.

Cyprinids accounted for 79% of all collections; dominant among these were Notropis camurus and N. chrysocephalus. Grady and Cashner (1980), in their study of Bayou Sara, southwestern Mississippi, reported N. chrysocephalus and N. venustus accounting for 87% of total specimens captured. Darters (Etheostoma caeruleum and Percina nigrofasciata), Madtoms (Noturus hildebrandi, N. miurus, and N. nocturnus) and Lamprey (Ichthyomyzon gagei) were abundant at all sample stations. Relative percentages are given in Table 4.

Among our collections are several species of special interest. Douglas (1975) considered Notropis camurus unique for this area, due to its geographic isolation from northern populations. This species was the most abundant fish collected at all sample stations.

Brushy Creek is the type locality of Noturus hildebrandi (Bailey & Taylor, 1950). We collected this species, along with greater numbers of N. miurus, at several stations in shallow riffles adjacent to sandy areas.

Douglas (1975) considered Fundulus catenatus in Mississippi as apparently confined to the Homochitto River, but Bart and Cashner (1980) extended the range of F. catenatus to two tributaries of the lower Mississippi River (Buffalo Bayou and Coles Creek), one tributary of Lake Pontchartrain (Amite River) and a small section of the middle Pearl River. We have collected substantial numbers of F. catenatus throughout Brushy Creek and in many other streams in the Forest.

Bart and Cashner (1980) commented on the parallel distribution of Fundulus catenatus, Etheostoma caeruleum and Phoxinus erythrogaster: We have not collected P. erythrogaster, but E. caeruleum populations have occurred in conjunction with populations of F. catenatus. Douglas (1975) regarded the distribution of E. caeruleum as similar to the previously discussed species. We found populations of E. caeruleum to occur abundantly at most of the stations.

The presence of the previously discussed species and Hypentelium nigricans, Etheostoma nigrum and Noturus phaeus in the Homochitto River drainage, specifically Brushy Creek, indicates either a wider species distribution in the geologic past or introduction and subsequent dispersal. Bart and Cashner (1980) believe that Fundulus catenatus entered the Buffalo River system about the same time it entered the Homochitto River. They stated that no ecological barrier exists to prevent further dispersal (Fig. 2). Suttkus and Clemmer (1977) discussed the role Bayou Pierre may have played in the eastward migration of fishes from the Mississippi River to the Pearl River. Fundulus catenatus and Notropis camurus movements are cited as examples. There have, however, been no records of these species from Bayou Pierre.

Guillory and Conner (1973) also commented on the distribution patterns of various lower Mississippi species. Several of our reported species (Fundulus catenatus, Noturus miurus, N. nocturnus, F. notatus, Ammocrypta beani, Etheostoma stigmaeum and E. zonale) were mentioned by them as occurring in larger westward-flowing tributaties of the Mississippi River, skipping the southern-flowing Tunica Bayou, Bayou Sara and Thompson Creek, and reappearing in the Pearl River and Lake Pontchartrain tributaries.

CONSIDERATIONS

The identification of the resident fish fauna of Brushy Creek has been an important part of our investigation. We expect to find additional species to add to our list. One recent addition has been Etheostoma nigrum, which was previously reported in the Amite River drainage by Cook (1959). Lee et al.(1980) did not list the species as occurring in the Southwestern portion of Mississippi. We suspect it occurs sporadically throughout the Homochitto drainage in addition to its Brushy Creek location.

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Table 1. Habitat parameters for Brushy Creek following Gorman and Karr (1978).

Parameter						
Depth	Range (cm)	0 - 5	5 - 20	20 - 50	>50	
	Description	very shallow	shallow	moderate	deep	
Current	Velocity (m/s)	<.05	.05 - .20	.2 - .4	.4 - 1.0	>1.0
	Description	very slow	slow	moderate	fast	torrent
Bottom	Diameters (mm)	<2	2 - 10	10 - 30	>30	
	Description	sand	gravel	pebble	rock	
Vegetative	Aquatic weed beds					
Litter	Hardwood leaves					
Woody Debris	Tree trunks	Tree stumps		Decayed bridge pylons		

Table 2. Average water quality parameters for Brushy Creek stations A - E. (S-spring; S-summer; F-fall; W-winter)

Parameters		Stations				
		A	B	C	D	E
Dissolved Oxygen (ppm)	S	9.6	9.6	9.3	9.4	9.3
	S	9.1	9.0	9.5	9.1	9.2
	F	10.6	9.9	9.7	9.6	9.6
	W	9.8	9.7	9.6	9.8	9.7
Water Temp. (°C)	S	23.0	24.0	22.0	20.0	19.0
	S	26.0	25.0	24.0	22.0	22.0
	F	17.0	18.0	18.0	12.0	13.0
	W	10.5	11.0	12.0	12.0	13.0
Turbidity (JTU)	S	15	14	14	12	10
	S	13	12	12	12	11
	F	10	10	11	10	10
	W	12	10	16	12	10
Conductivity (umhos/cm)	S	34	31	30	28	26
	S	24	24	28	30	28
	F	32	32	30	27	28
	W	31	28	27	26	26
pH	S	6.7	6.6	6.4	6.4	6.5
	S	6.2	6.4	6.6	6.4	6.4
	F	6.4	6.4	6.5	6.6	6.7
	W	6.9	6.8	6.6	6.7	6.7

Table 3. Species composition list for Brushy Creek, Amite County, Mississippi.

PETROMYZONTIDAE
- *Ichthyomyzon gagei*
- *Lampetra aepyptera*

LEPISOSTEIDAE
- *Lepisosteus platostomus*

ANGUILLIDAE
- *Anguilla rostrata*

ESOCIDAE
- *Esox americanus*

CYPRINIDAE
- *Nocomis leptocephalus*
- *Notropis atherinoides*
- **Notropis camurus*
- *Notropis chrysocephalus*
- *Notropis longirostris*
- *Notropis venustus*
- *Notropis volucellus*
- *Pimephales notatus*
- *Semotilus atromaculatus*

CATOSTOMIDAE
- *Erimyzon oblongus*
- **Hypentelium nigricans*
- *Moxostoma poecilurum*

ICTALURIDAE
- *Ictalurus natalis*
- *Ictalurus punctatus*
- **Noturus hildebrandi*
- *Noturus miurus*
- *Noturus nocturnus*
- **Noturus phaeus*
- *Pylodictis olivaris*

APHREDODERIDAE
- *Aphredoderus sayanus*

CYPRINODONTIDAE
- **Fundulus catenatus*
- *Fundulus notatus*
- *Fundulus olivaceus*

POECILIDAE
- *Gambusia affinis*

ATHERINIDAE
- *Labidesthes sicculus*

CENTRARCHIDAE
- *Ambloplites rupestris*
- *Lepomis cyanellus*
- *Lepomis macrochirus*
- *Lepomis megalotis*
- *Lepomis punctatus*
- *Micropterus punctulatus*
- *Micropterus salmoides*

PERCIDAE
- *Ammocrypta beani*
- **Etheostoma caeruleum*
- *Etheostoma chlorosomum*
- **Etheostoma nigrum*
- *Etheostoma stigmaeum*
- *Etheostoma swaini*
- *Etheostoma whipplei*
- *Etheostoma zonale*
- *Percina maculata*
- *Percina nigrofasciata*
- *Percina sciera*

SCIAENIDAE
- *Aplodinotus grunniens*

* Waif species occurrences

Table 4. Relative percentages of most abundant fishes per sample station for Brushy Creek, 1980.

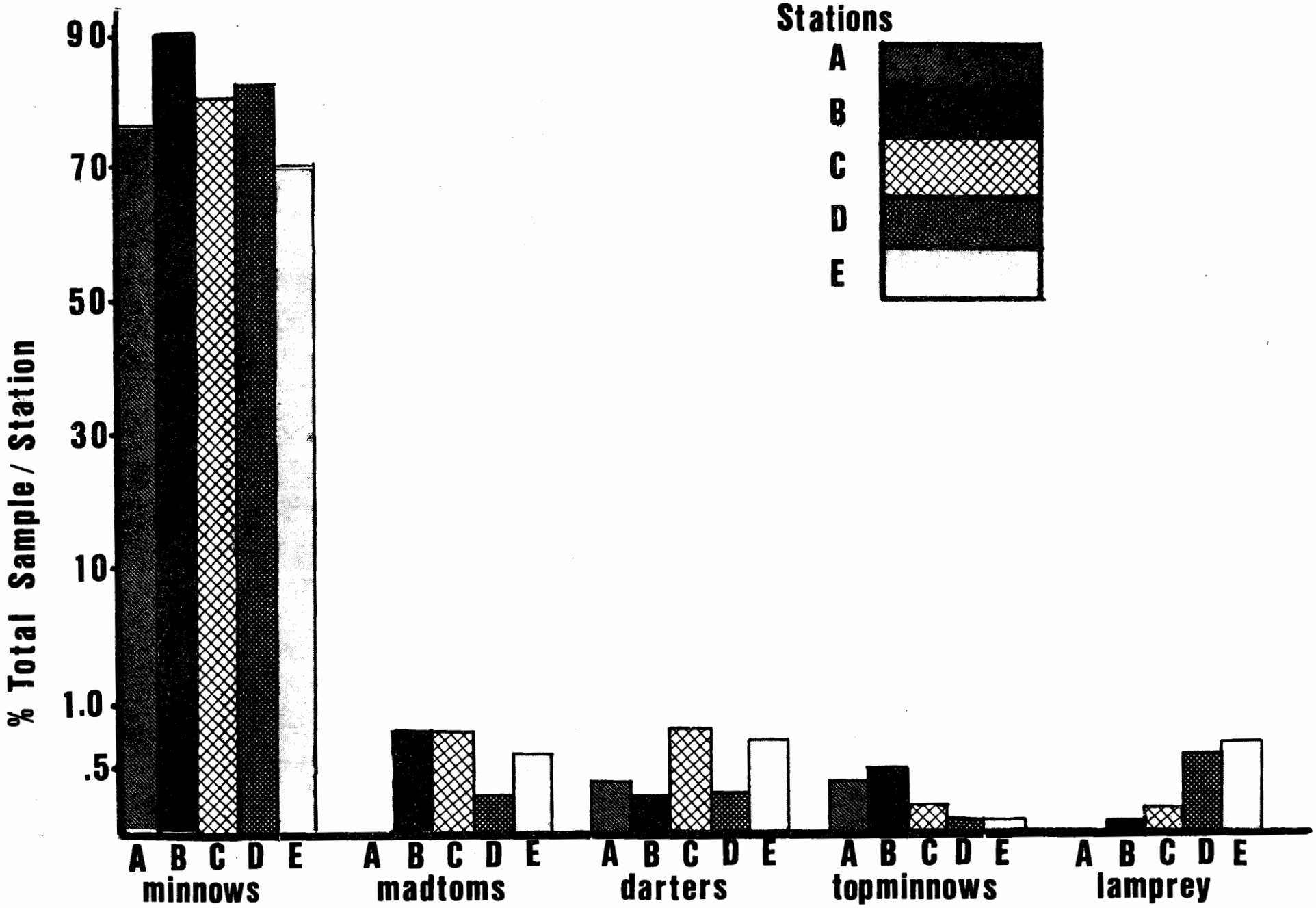


Figure 1. Drainage map for Brushy Creek, Amite County, Mississippi.

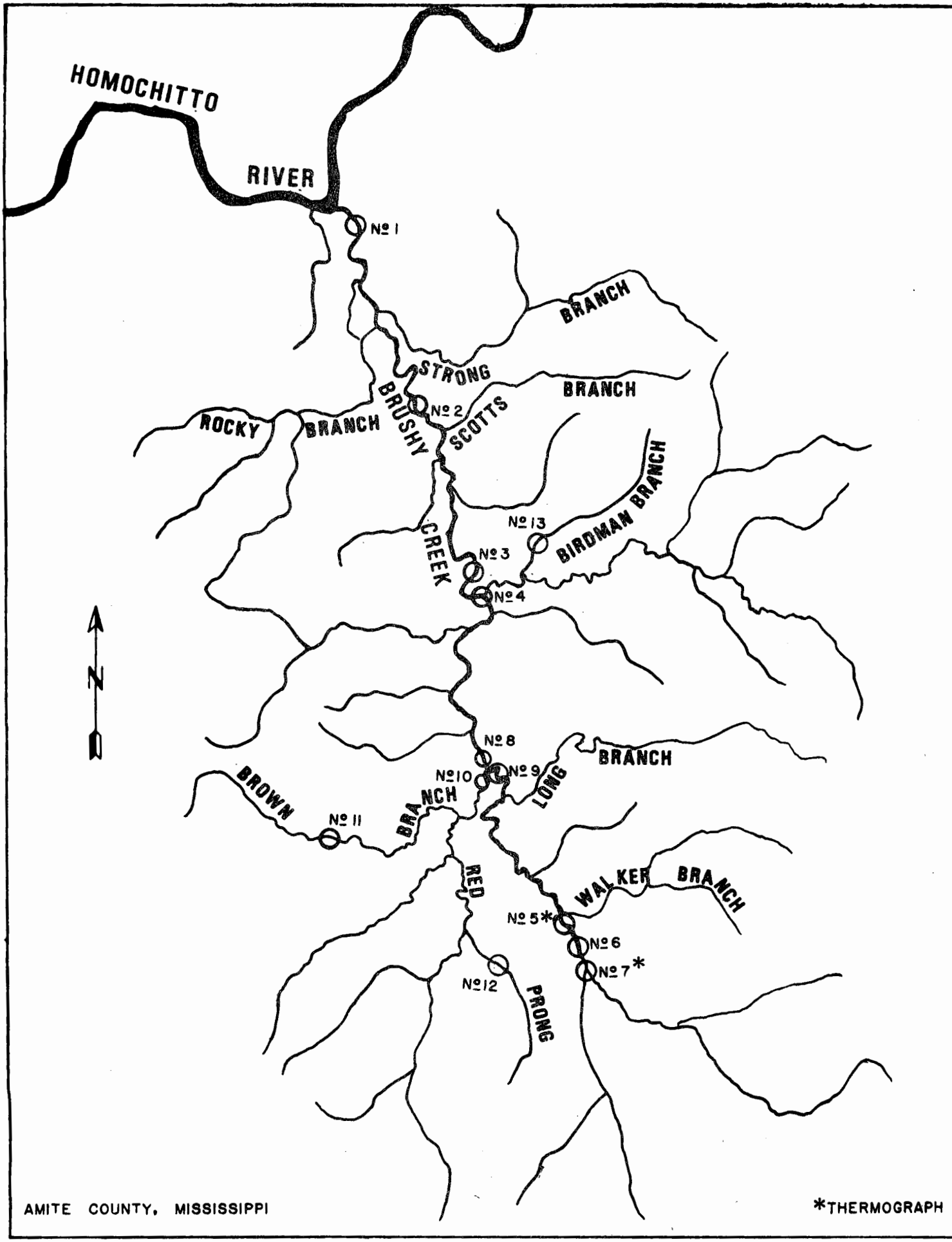
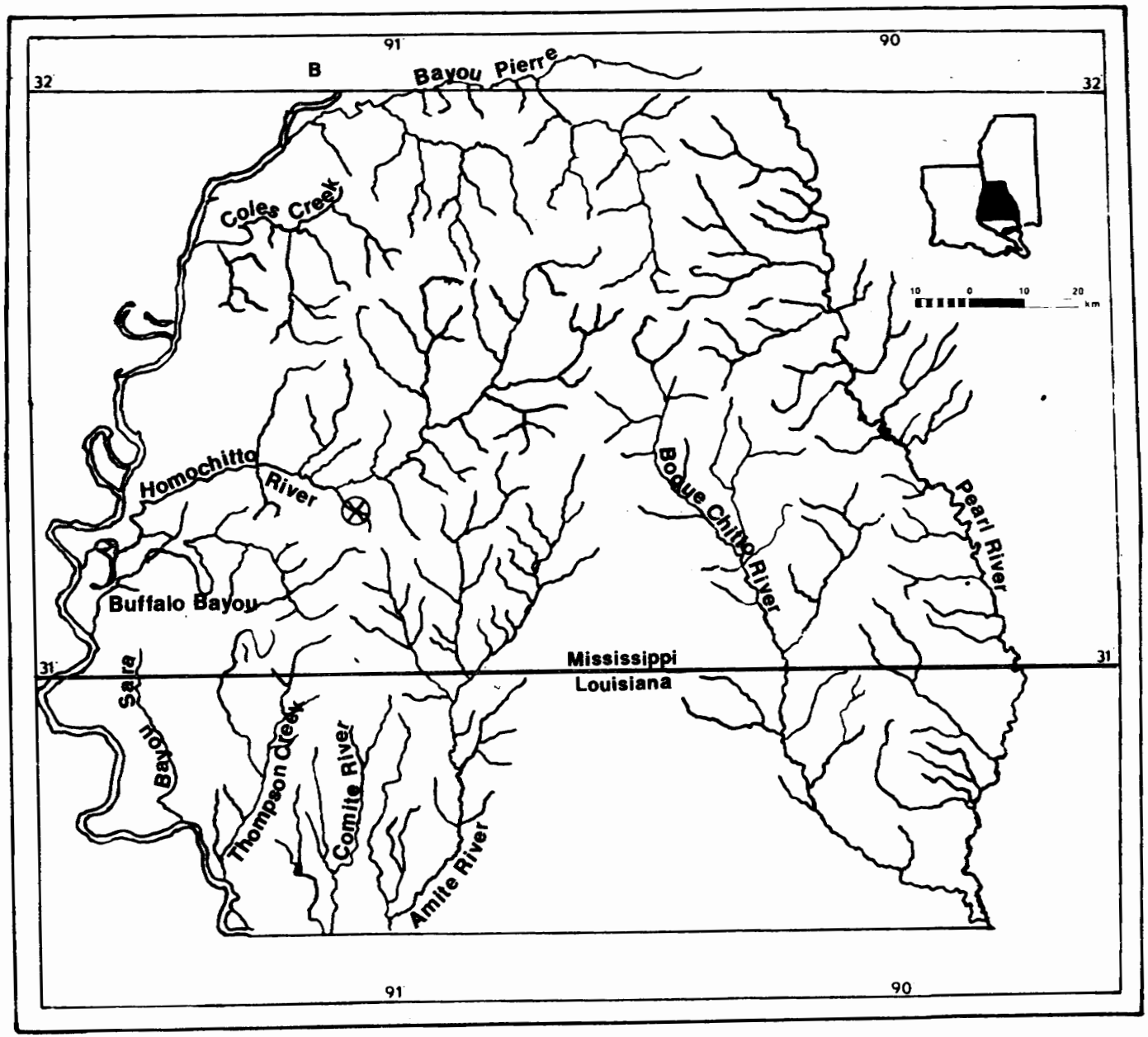


Figure 2. Drainage map of southwestern Mississippi (from Bart and Cashner, 1980) (X Brushy Creek).



THE RESPONSE OF FISHES TO PERIODIC SPRING FLOODS IN A SOUTHEASTERN STREAM[1]

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ABSTRACT: Movement of fishes onto a fringing floodplain was studied by seining and trapping during five spring floods. We collected 26 species from the inundated floodplain; the known channel fauna is 42 species. Species numerically dominant on the floodplain were Fundulus olivaceus, F. notti, Gambusia affinis, Notropis welaka, N. texanus, N. roseipinnis, Lepomis macrochirus, L. cyanellus and L. marginatus. Catch-per-effort in traps was generally greatest on the upper floodplain during the day and greatest nearer the channel at night. Night activity of fishes on the floodplain was apparently low.

Several species, which we term flood quiescent forms, were common in the channel (e.g. L. megalotis and Percina nigrofasciata)but did not exploit the floodplain. Activity (as catch per trap-hour) of P. nigrofasciata was negatively correlated with flood-induced turbidity. A flood exploitative species, N. texanus, showed higher population abundance during three high-flow years than in three low-flow years, suggesting that spring flooding may exert significant control over fish community structure.

[1] Based on a manuscript accepted for publication in American Midland Naturalist